



CHILLERS - Technical - installation - maintenance manual

NRL free-cooling large scroll



EN



Dear Customer,

Thank you for choosing an AERMEC product. This product is the result of many years of experience and in-depth engineering research, and it is built using top quality materials and advanced technologies.

Moreover, the CE mark guarantees that our appliances fully comply with the requirements of the European Machinery Directive in terms of safety. We constantly monitor the quality level of our products, and as a result AERMEC products are synonymous with Safety, Quality, and Reliability.

Product data may be subject to modifications deemed necessary for improving the product without the obligation to give prior notice.

Thank you again.
AERMEC S.p.A

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NRL free-cooling

SERIAL NUMBER	
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EC DECLARATION OF CONFORMITY We, the undersigned, hereby declare under our own responsibility that the assembly in question, defined as follows:

NAME NRL FREECOOLING
TYPE AIR/WATER CHILLER
MODELLO

To which this declaration refers, complies with the following harmonised standards:

CEI EN 60335-2-40	Safety standard regarding electrical heat pumps, air conditioners and dehumidifiers
CEI EN 61000-6-1 CEI EN 61000-6-3	Immunity and electromagnetic emissions for residential environments
CEI EN 61000-6-2 CEI EN 61000-6-4	Immunity and electromagnetic emissions for industrial environments
EN378	Refrigerating systems and heat pumps - Safety and environmental requirements
UNI EN 12735 UNI EN 14276	Seamless, round copper tubes for air conditioning and refrigeration Pressure equipment for cooling systems and heat pumps

Therefore complying with the essential requirements of the following directives:

- LVD Directive: 2006/95/CE
- Directive for electromagnetic compatibility 2004/108/CE
- Machinery Directive 2006/42/CE
- PED Directive regarding pressurised devices 97/23/CE

The product, in agreement with Directive 97/23/CE, satisfies the Total quality Guarantee procedure (form H) with certificate n.06/270-OT3664 Rev.5 issued by the notified body n.1131 CEC via Pisacane 46 Legnano (MI) - Italy

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Bevilacqua

28/12/2009

Marketing Manager
Firma



1. GENERAL WARNINGS

Standards and Directives respected on designing and constructing the unit:

Safety:

Machinery Directive

2006/42/CE

Low Voltage Directive

LVD 2006/95/CE

Electromagnetic

compatibility Directive

EMC 2004/108/CE

Pressure Equipment Directive

PED 97/23/CE EN 378,

UNI EN 14276

Electric 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 fluoride gases with greenhouse effect covered by the Kyoto Protocol. Maintenance and disposal must only be performed by qualified staff. R410A GWP=1900

AERMEC NRLs are constructed according to the recognised technical standards and safety regulations. They have been designed for air conditioning and the production of hot water and must be destined to this use compatibly with their performance features. Any contractual or extracontractual liability of the Company is excluded for injury/damage to persons, animals or objects owing to installation, regulation and maintenance errors or improper use. All uses not expressly indicated in this manual are prohibited.

1.1. PRESERVATION OF THE DOCUMENTATION

The instructions along with all the related documentation must be given to the user of the system, who assumes the responsibility to conserve the instructions so that they are always at hand in case of need.

Read this sheet carefully; the execution of all works must be performed by qualified staff, according to Standards in force on this subject in different countries. (Ministerial Decree 329/2004). The appliance must be installed in such a way as to enable maintenance and/or repairs to be carried out.

The appliance warranty does not cover the costs for ladder trucks, scaffolding, or other elevation systems that may become necessary for carrying out servicing under warranty.

Do not modify or tamper with the chiller as dangerous situations can be created and the manufacturer will not be liable for any damage caused. The validity of the warranty shall be void in

the event of failure to comply with the above-mentioned indications.

1.2. WARNINGS REGARDING SAFETY AND INSTALLATION STANDARDS

- The chiller must be installed by a qualified and suitably trained technician, in compliance with the national legislation in force in the country of destination (Ministerial Decree 329/2004). **AERMEC will not assume any responsibility for damage due to failure to follow these instructions.**
- Before beginning any operation, READ THESE INSTRUCTIONS CAREFULLY AND CARRY OUT THE SAFETY CHECKS TO PREVENT ALL RISKS OF DANGER. All the staff involved must have thorough knowledge of the operations and any dangers that may arise at the moment in which the installation operations are carried out.



Danger!

The refrigerant circuit is under pressure. Moreover, very high temperatures can be reached. The appliance may only be opened by a SAT service technician or by a qualified technician. Work on the cooling circuit may only be carried out by a qualified refrigeration technician.



R410A REFRIGERANT GAS

The chiller is delivered complete with the correct refrigerant load. R134A does not contain chlorine, is not inflammable and does not damage the ozone layer. However, any interventions are always the competence of the technical after/sales service (SAT) or a qualified technician.

2. DESCRIPTION OF THE UNIT

- The appliances in the NRL F series are water chillers with cooling capacity recovery system of external air called "free-cooling". The free water cooling system (from here the name free-cooling) consists integrating the cooling capacity distributed by the compressors up to total replacement via the use of an additional water coil, which makes use of the low temperature of the external air to cool the system return water. With this system, it is possible to obtain cooled water almost free of charge for all those installations where the constant production is requested and therefore also with low external air temperatures, e.g. industrial processes, shopping centres, hospitals and other civil applications. This type of solution allows to obtain a large energy saving: when the system return water is 2°C lower than the external air, a three-way valve diverts the water into the free-cooling coil to be pre-cooled and therefore sent to the evaporator where it is taken to the project temperature. The NRL free-cooling units are made up from two cooling circuits with R410A and a unique hydraulic circuit that can activate the free-cooling water coil via the 3-way valve positioned in series with the plate evaporator. The hydraulic cir-

cuit can be supplied with storage tank unit or not. The presence of several scroll type compressors and the fan speed control via the revs, regulator device, allows the NRL chillers various partialisations of the cooling capacity both in compressors mode only and in free-cooling (partial or total).

The electronic regulation with optimised micro processor for functioning with free-cooling controls and manages all components and unit functioning parameters; an internal memory records the functioning conditions when an alarm condition arises, to then show it on the display. The units have protection rating of IP 24. All of the various versions of appliances are supplied as per standard with:

- fans revs. number control device,
- evaporator anti-freeze electrical resistance,
- Compressor sump resistance,
- remote control panel,
- water filter,
- flow switch.

FUNCTIONING MODE:

- **FREE-COOLING ONLY:**
when the external temperature is low enough to allow cooling of the water in the free-cooling coils to project temperature. It is the most economic way of using the unit. Only the fans work in speed modulation mode.
- **MIXED FREE-COOLING + COMPRESSORS:**
when the cooling capacity recovered from the external air is not longer sufficient to satisfy the power requested by the system, the compressors function in integration with free-cooling. The greater the power recovery with free-cooling the smaller this integration.
- **COMPRESSORS ONLY:**
when the external air temperature is greater than the return temperature of the system water.

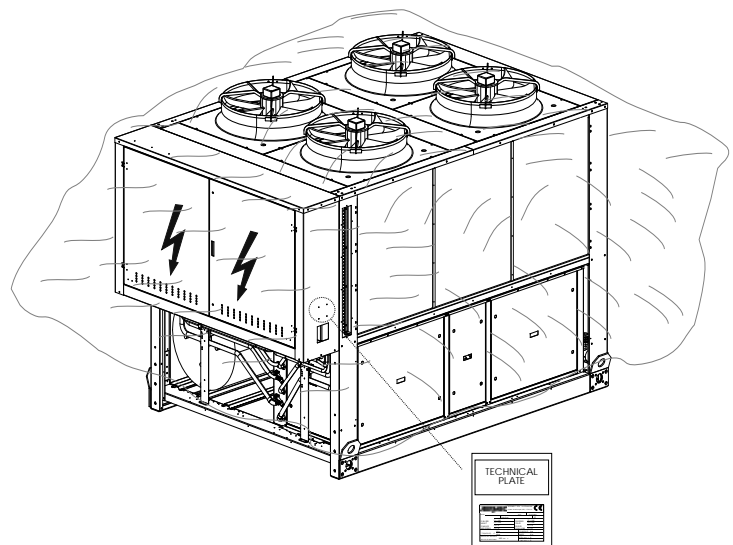
3. PRODUCT IDENTIFICATION

NRL can be identified by:

- **Packing label**
reporting the identification data of the product.
- **Technical plate**
positioned on the lateral side-member of the electric box.

NOTE:

Tampering, removal, lack of the identification plate or other does not allow the safe identification of the product and will make any installation or maintenance operation to be performed difficult.



NOTE:
The drawings shown are only an example.

3.1. CONFIGURATOR

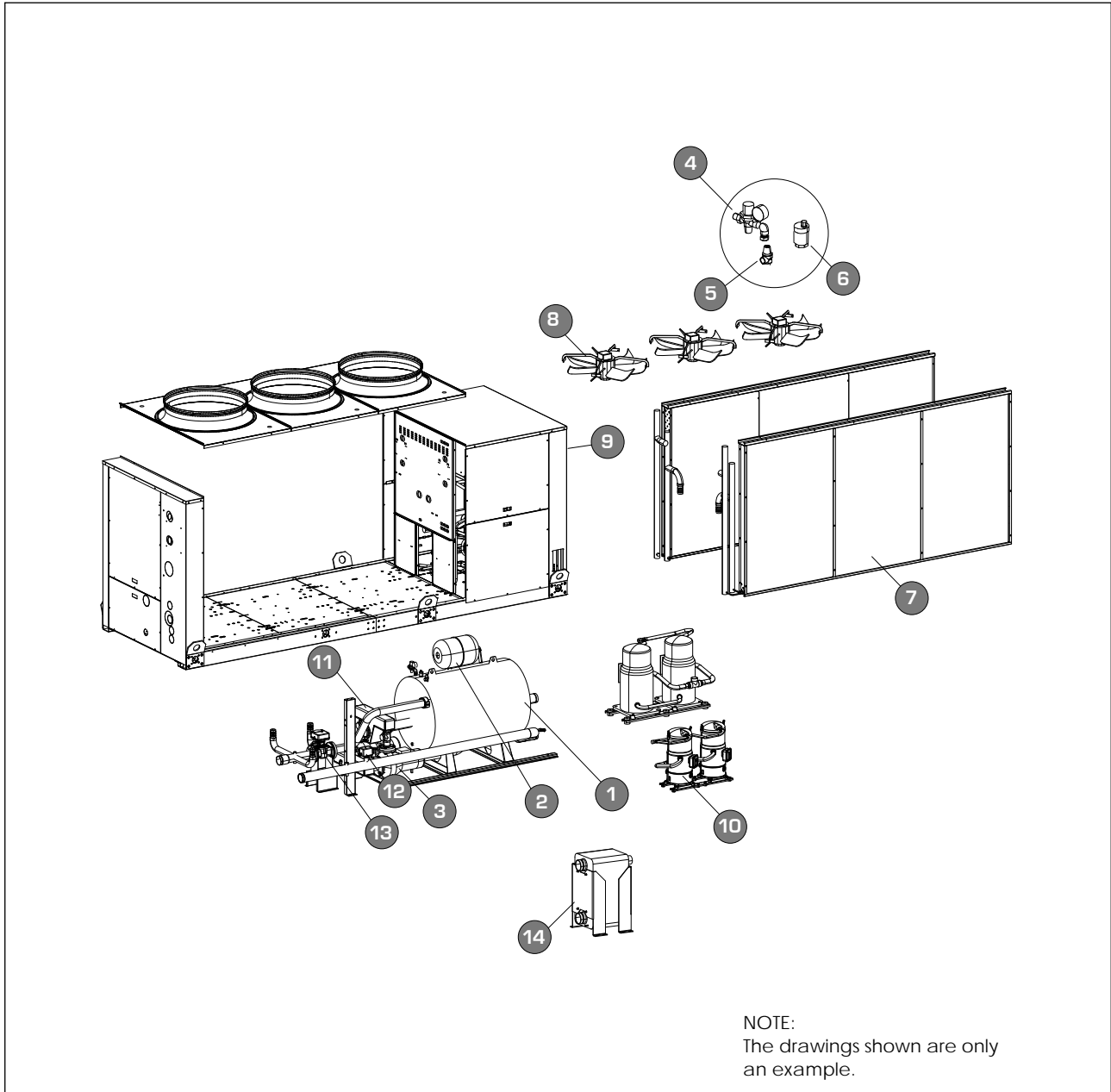
1, 2, 3	4, 5, 6	7	8	9	10	11	12	13	14	15, 16
NRL	075	0	°	F	°	A	°	°	°	00

Field

1, 2, 3	Code	NRL
4, 5, 6	Size	075, 080, 090, 100, 125, 140, 150, 165, 180
7	Compressors	
	0	Standard compressor
8	Thermostatic valve	
	°	Standard mechanical thermostatic valve
	Y	Mechanical thermostatic valve with water produced from +4°C to -6°C
	X	Electronic thermostatic valve with water produced to -6°C
9	Model	
	F	Free-cooling
10	Heat recovery	
	°	Without recuperators
	D	Desuperheater
11	Version	
	A	High efficiency
	E	High efficiency, silenced
12	Coils	
	°	In aluminium
	R	In copper
	S	Tinned copper
	V	Painted aluminium (epoxy paint)
13	Fans	
	°	Standard
	J	Inverter
14	Power supply	
	°	400V-3N-50Hz with magnet-circuit breakers (750 only), 400V-3-50Hz (from 800 to 1800)
	2	500V-3-50Hz with magnet circuit breakers
15, 16	Storage tank	
	00	Without hydronic storage tank
	03	Storage tank and high static pressure single pump
	04	Storage tank with high static pressure pump and reserve pump
	P3	Without storage tank with high static pressure pump
	P4	Without storage tank with high static head and reserve pump

4. DESCRIPTION OF THE COMPONENTS

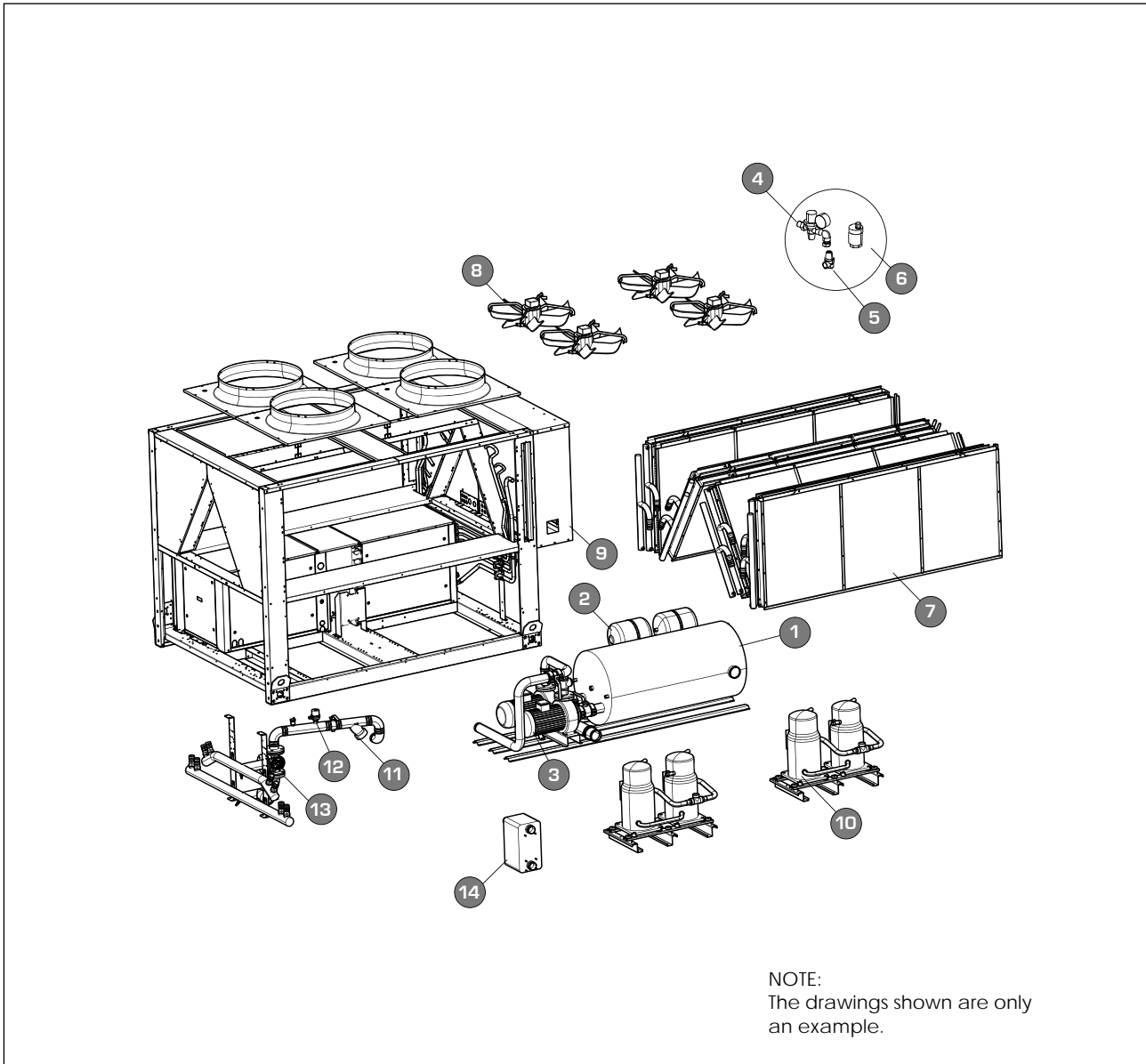
4.1. NRL 750 FC A/E



KEY:

1	Storage tank
2	Expansion vessel
3	Pump
4	Loading unit
5	Safety valve
6	Air vent valve
7	Free-cooling and condensing coils
8	Fans
9	Electric box
10	Compressors
11	Filter
12	Flow meter
13	3-way valves
14	Evaporator

4.2. NRL 800 - 900 - 1000 FC A/E



1	Storage tank
2	Expansion vessel
3	Pump
4	Loading unit
5	Safety valve
6	Air vent valve
7	Free-cooling and condensing coils
8	Fans
9	Electric box
10	Compressors
11	Filter
12	Flow meter
13	3-way valves
14	Evaporator

4.3. COOLING CIRCUIT

Compressors

High efficiency hermetic scroll compressors (on anti-vibration mounts), activated by a 2-pole electric motor with internal heat protection supplied as per standard of the sump resistance. The resistance is powered automatically when the unit stops as long as the unit is live.

Air-side heat exchanger (condenser)

High-efficiency, made with copper pipes and aluminium louvered fins blocked by mechanical expansion of the pipes.

Refrigerant- water heat exchanger (evaporator)

Unit with (AISI 316) heat plate, insulated externally with closed cell material to reduce heat loss. Supplied as per standard with the anti-freeze electric resistance.

Dehydrator filter

Mechanical dehydrator filter realised in ceramics and hygroscopic material, able to withhold impurities and any traces of humidity present in the cooling circuit.

Liquid indicator

Used to check the refrigerant gas load and the eventual presence of humidity in the cooling circuit.

Liquid and pressing line taps

Allows interruption of the refrigerant in the case of extraordinary maintenance.

Solenoid valve

The valve closes when the compressor switches off, blocking the flow of refrigerant gas towards the evaporator.

Thermostatic valve

Mechanical valve, with external equaliser positioned at evaporator outlet, modulates the flow of gas to the evaporator, depending on the heat load, in order to ensure a correct heating level of the intake gas.

One-way valve

Allows one-way flow of the refrigerant.

4.4. FRAME AND FANS

Support frame

Made in hot galvanised sheet steel with suitable thickness and painted with polyester powders able to resist atmospheric agents through time.

Ventilation Unit

Helical type, balanced statically and dynamically. The electric fans are protected electrically by magnet-circuit breakers and mechanically by anti-intrusion metal grids, according to the IEC EN 60335-2-40 Standard.

4.5. HYDRAULIC COMPONENTS

Air-water exchanger (free-cooling)

Passed through by water for functioning in free-cooling mode. It is realised with copper piping and aluminium louvers blocked via mechanical expansion of the pipes. (High-efficiency type.

Circulation pump (pump only or with storage tank versions)

Depending on the features of the pump chosen, it offers a useful static pressure to combat the system pressure drops. A reserve pump is also envisioned. The reserve pump is managed by the circuit board.

Water filter (installed as per standard)

This allows to block and eliminate any impurities present in the hydraulic circuits. It contains a filtering mesh with holes that do not exceed one millimetre. It is indispensable in order to prevent serious damage to the plate exchanger.

3-way valve

Present on the water side of the free-cooling circuit, it is an ON-OFF diverter valve controlled via electric servo-motor.

Storage tank

It is in steel with a capacity of 500 litres for the 750 size, from 800 to 1800 it is 700 litres. In order to reduce heat loss and eliminate the formation of condensate, it is insulated using thick polyurethane material. Mounted as per standard:
- 1x300 W for the 750
- 2x300 W from 800 to 1800 (up to -20 °C external temperature - tank water temperature 5 °C) controlled by the board via an anti-freeze probe inserted in the tank.

Air vent valve (all versions)

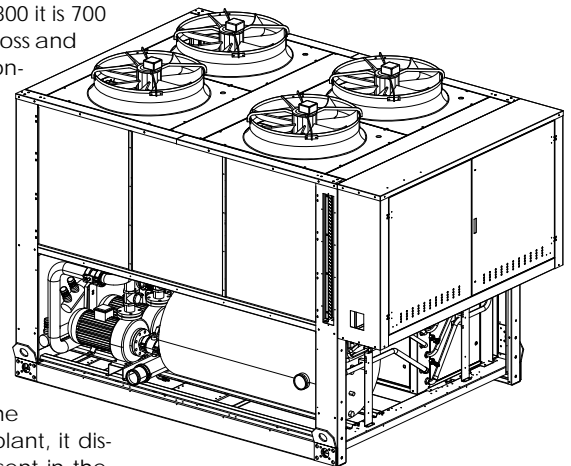
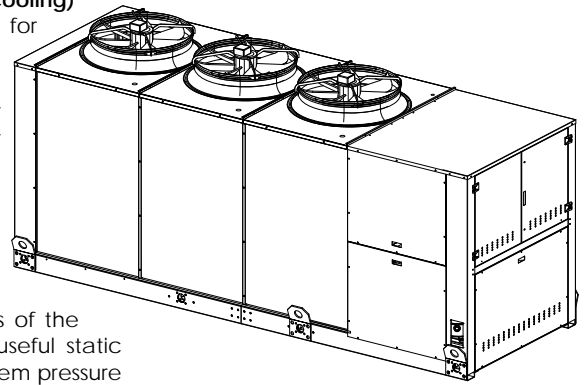
Automatic, mounted on the upper part of the hydraulic plant, it discharges any air pockets present in the same.

Loading unit (versions with storage tank)

It is supplied with manometer for display of system pressure.

Expansion vessel (versions with storage tank and pump only)

With nitrogen pre-load membrane.



4.6. CONTROL AND SAFETY COMPONENTS

Flow switch (installed as per standard)

Has the task of controlling that there is water in circulation. If this is not the case, the unit blocks.

"AP" High pressure pressure switch(as per standard)

With fixed calibration, placed on high pressure side of cooling circuit, inhibits functioning of compressor if abnormal work pressure occurs.

"TP2" low pressure transducers (as per standard)

Placed on low pressure side of cooling circuit, signals the work pressure to control board, generating a pre-warning in case abnormal pressure occurs.

"TP3" High pressure transducer (as per standard)

Placed on high pressure side of cooling circuit, signals the work pressure to control board, generating a pre-warning in case abnormal pressure occurs.

Evaporator anti-freeze electrical resistance (installed as per standard)

Its functioning is controlled by the anti-freeze probe positioned in the plate evaporator. Activation takes place when the temperature of the water is +3°C while it is disconnected with water temperature of +5°C. The dedicated software, resident in the regulation board, manages the electric resistance.

Cooling circuit safety valves

They intervene by discharging the over-pressure in the case of anomalous pressures.

- Calibrated at 45 bar on the HP branch
- Calibrated at 30 bar on the LP branch

Hydraulic circuit safety valve

(Only for versions complete with hydronic unit or with a pump)

TCalibrated at 6 Bar and with piped discharger that discharges if abnormal work pressure occurs.

4.7. ELECTRIC COMPONENTS

Electric Control Board

Contains the power section and the management of controls and safety devices.

It is in compliance with the Standards IEC EN 61000-6-1

IEC EN 61000-6-3 (immunity and electromagnetic emissions for residential environments).

IEC EN 61000-6-2

IEC EN 61000-6-4 (immunity and electromagnetic emissions for industrial environments).

With the EMC 89/336/EEC and 92/31/EEC electro-magnetic compatibility Directives and the LVD 2006/95/CE Low Voltage Directive.

Door-lock isolating switch

The electric control board can be accessed by removing the voltage. Act on the opening lever of the control board itself. This lever can be locked using one or more padlocks during maintenance interventions to prevent the machine being powered up accidentally.

Control board

Allows the complete control of the appliance. For a more in-depth description please refer to the user manual.

Remote control panel

Allows to control the chiller at a distance.

Compressors magnet circuit breaker protection;

Fans magnet-circuit breakers protection;

Auxiliary magnet circuit-breaker protection;

Discharge gas temperature control thermostat.

ELECTRONIC ADJUSTMENT

Microprocessor board

Made up of management, control and display boards.

Functions carried out:

evaporator inlet water temperature regulation with thermostating up to 4 steps and proportional – integral control of fan speeds;

- compressors start-up delays;
- compressors rotation sequence;
- compressors functioning hours count;
- start/stop;
- reset;
- permanent alarms memory;
- autostart after voltage drop;
- multilanguage messages;
- functioning with local or remote control.

• Machine condition display:

- compressors ON/OFF;
- alarms summary.

• Alarms management:

- high pressure;
- flow switch;
- low pressure;
- anti-freeze;
- compressors overload;
- fans overload;
- pumps overload.

• Display of the following parameters:

- water inlet temperature;
- storage tank temp.;
- water outlet temperature;
- delta T;
- high pressure;
- low pressure;
- re-start stand-by time;
- alarms display.

• Settings:

- without password:
 - cold set;
 - total differential;
- with password:
 - anti-freeze set;
 - low pressure exclusion time;
 - display language;
 - access code.

For further information please refer to user manual.

5. ACCESSORIES

	0750	0800	0900	1000	1250	1400	1500	1650	1800
AER485		This accessory allows connection of the unit to BMS supervising systems with RS485 electric standard and MODBUS protocol.							
A	.	.	.	.	.	.	.	.	.
E	.	.	.	.	.	.	.	.	.
VT - AVX (00)		Rubber anti-vibration mounts. Select the model using the compatibility table.							
A	VT 23	AVX 739	AVX 739	AVX 745	AVX 748	AVX 752	AVX 757	AVX 761	AVX 766
E									
VT - AVX (03 - 04)		Rubber anti-vibration mounts. Select the model using the compatibility table.							
A	VT 23	AVX 740	AVX 743	AVX 746	AVX 749	AVX 753	AVX 753	AVX 762	AVX 762
E									
VT - AVX (P3 - P4)		Rubber anti-vibration mounts. Select the model using the compatibility table.							
A	VT 23	AVX 741	AVX 744	AVX 747	AVX 750	AVX 754	AVX 758	AVX 763	AVX 763
E									
GP		Protect the external coil from blows and prevent access to the area below where the compressors and the cooling circuit are housed. Every kit includes two grids.							
A	10 (x3)	260	260	260	350	350	350	500	500
E									
PGS		Small board to engage on the unit circuit board. Allows to program two time periods per day (two switch-on/off cycles) and to have differentiated programming for every day of the week.							
A	.	.	.	.	.	.	.	.	.
E	.	.	.	.	.	.	.	.	.
DUALCHILLER		Simplified control system for control, switch-on and switch-off of two chillers, with Aermec GR3 control, in the same plant as if they were the same unit.							
A	.	.	.	.	.	.	.	.	.
E	.	.	.	.	.	.	.	.	.
MULTICHILLER		Control system for control, switch-on and switch-off of the single chillers in a plant in where multiple units are installed in parallel, always ensuring constant flow to the evaporators.							
A	.	.	.	.	.	.	.	.	.
E	.	.	.	.	.	.	.	.	.
AERWEB30		AERWEB30: the AERWEB device allows remote control of a chiller from a common PC via serial connection. Using additional modules, the device allows to control the chiller via telephone network, using the AER-MODEM accessory; or GSM network, using the AERMODEMGSM accessory. The AERWEB can pilot up to 9 chillers, each of which must be equipped with the AER485 or AER485P2 accessory.							
A	.	.	.	.	.	.	.	.	.
E	.	.	.	.	.	.	.	.	.
RIF		Current rephaser. Connected in parallel to the motor, it allows a reduction of the input current. It can only be installed in the factory and so must be requested on ordering.							
A	53	88	90	92	92	93	94	94	94
E									
DRE		Allows the reduction of peak power supply necessary for the unit during start up phase. Accessory only applicable in the factory, only available power 400V							
A	751	801	901	1001	1251	1401	1501	1651	1801
E									

Reduction of the peak current with the accessory DRE

MODEL	Reduction of the peak current
MONOCIRCUIT	-30%
BICIRCUIT	-26%
TRICIRCUIT	-22%
QUADRICIRCUIT	-20%
PENTACIRCUIT	-18%
ESACIRCUIT	-16%

6. TECHNICAL DATA

6.1. CHILLER FUNCTIONING TECHNICAL DATA

COOLING			750	800	900	1000	1250	1400	1500	1650	1800
Cooling capacity	kW	A	191	210	229	247	310	337	364	430	452
		E	177	196	216	228	289	310	331	400	421
Total input power	kW	A	69,6	75	89	103	114	136	157	159	175
		E	76,4	80	93	109	120	145	169	169	186
Water flow rate	l/h	A	32850	36120	39390	42480	53320	57960	62610	73960	77740
		E	30440	33730	37110	39210	49670	53260	56850	68770	72330
Total pressure drops	kPa	A	103	77	82	81	92	98	83	104	107
		E	89	68	73	69	80	84	70	90	93

ENERGETIC INDEX											
EER	W/W	A	2,75	2,80	2,57	2,40	2,72	2,48	2,32	2,70	2,58
		E	2,32	2,45	2,32	2,09	2,41	2,14	1,96	2,37	2,26

ELECTRICAL DATA											
Power supply	A	A	400-3N-50 Hz			400-3-50 Hz					
Input current	A	A	123	144	169	195	208	252	296	298	317
		E	135	149	174	203	217	265	312	310	332
Maximum current	A	A	144	177	199	221	274	303	332	373	406
		E	320	352	408	430	542	512	541	641	674

COMPRESSORS (SCROLL)											
Number/circuit	n°/n°	A	4 / 2	2 / 2	2 / 2	2 / 2	2 / 3	3 / 3	3 / 3	3 / 3	3 / 3
		E									

FANS (AXIAL)											
Quantity	n°	A	3	4	4	4	6	6	6	8	8
Air flow rate	m³/h	A	56000	79600	78800	78000	115200	114000	112800	155200	153600
		E	46500	55700	55200	55800	80600	79800	80700	108600	109800
Input power	kW	A	5,25	7,0	7,0	7,0	10,5	10,5	10,5	13,9	13,9
		E									
Input current	A	A	11,3	14,8	14,8	14,8	22,2	22,2	22,2	29,6	29,6
		E									
Useful static pressure [1]	Pa	A	177	218	208	203	241	223	225	194	185
		E	200	231	220	221	262	250	255	216	208

FANS INVERTER (J)											
Quantity	n°	A	3	4	4	4	6	6	6	8	8
Air flow rate	m³/h	A	56000	79600	78800	78000	115200	114000	112800	155200	153600
		E	46500	55700	55200	55800	80600	79800	80700	108600	109800
Input power	kW	A	2,5	7,0	7,0	7,0	10,5	10,5	10,5	13,9	13,9
		E									
Input current	A	A	3,9	14,8	14,8	14,8	22,2	22,2	22,2	29,6	29,6
		E									
Useful static pressure [1]	Pa	A	70	49	48	47	46	45	44	46	46
		E									

EVAPORATORS (HEAT PLATE)											
Quantity	n°	A	1								
Hydraulic connections (in/out)	Ø	A	2" 1/2	3"	3"	3"	4"	4"	4"	4"	4"
		E									

HYDRAULIC CIRCUIT											
Storage tank capacity	l	A	500	700							
Storage tank anti-freeze resistance	W	A	1 x 300	2 x 300							
		E									
Expansion vessel	n°/l	A	2/25	2/25	2/25	2/25	2/25	2/25	2/25	2/25	2/25
		E									

* The hydraulic attachments are the Victalic type

[1] The useful static pressures refer to the nominal air flow rate.

		750	800	900	1000	1250	1400	1500	1650	1800	
HIGH STATIC PRESSURE CIRCULATION PUMP											
Input power	KW	A	5,5	6,5	6,5	6,5	8,6	8,6	8,6	12,3	12,3
		E									
Input current	A	A	11	11,0	11,0	11,0	14,6	14,6	14,6	21,2	21,2
		E									
Useful static pressures	KPa	A	177	220	210	204	242	223	224	192	182
		E	200	233	222	223	262	250	255	214	206

SOUND DATA											
Sound power (1)	dBA	A	87	88,5	88,5	88,5	91,5	91	90,5	92	94
		E	82	82,5	82,5	82,5	85,5	85	84,5	86	88
Sound pressure (2)	dBA	A	55	56,5	56,5	56,5	59,5	59,0	58,5	60,0	62,0
		E	50	50,5	50,5	50,5	53,5	53,0	52,5	54,00	56,0

DIMENSIONS											
Height	mm	A	1955	2450	2450	2450	2450	2450	2450	2450	2450
		E									
Width	mm	A	1500	2200	2200	2200	2200	2200	2200	2200	2200
		E									
Depth	mm	A	4350	3400	3400	3400	4250	4250	4250	5750	5750
		E									
Empty weight	Kg	A	1889	2460	2650	2840	3120	3380	3660	4220	4430
		E									

NOMINAL REFERENCE CONDITIONS

IN COOLING MODE

- Water input temperature	12 °C
- Outlet water temperature	7 °C
- External air temperature	35 °C
- Δt	5 °C

(1) SOUND POWER

Aermec determines sound power values in agreement with the 9614-2 standard, in compliance with that requested by Eurovent certification.

(2) SOUND PRESSURE

Sound pressure measured in free field conditions with reflective surface (directivity factor Q=2) at 10mt distance from external surface of unit, in compliance with ISO 3744 regulations.

6.2. FREECOOLING FUNCTIONING TECHNICAL DATA

COOLING			750	800	900	1000	1250	1400	1500	1650	1800
Cooling capacity	kW	A	187	182	206	229	257	291	326	399	440
		E		178	201	223	263	288	314	396	443
Total input power	kW	A	5,4	7,5	7,5	7,5	11,0	11,0	11,0	14,5	14,5
		E		7,5	7,5	7,5	11,0	11,0	11,0	14,5	14,5
Water flow rate	l/h	A	32850	36120	39390	42840	53320	57960	62610	73960	77740
		E	30440	33730	37110	39210	49670	53260	56850	68770	72330
Total pressure drops	kPa	A	156,3	105	110	110	123	131	117	140	145
		E	134	93	99	94	106	110	94	117	120

ENERGETIC INDEX											
EER	W/W	A	34,63	24,30	27,48	30,53	23,34	26,47	29,61	27,48	30,32
		E		23,76	26,76	29,76	23,89	26,19	28,50	27,33	30,58

ELECTRICAL DATA											
Power supply	A	A E	400-3N-50 Hz	400-3-50 Hz							
Input current	A	A E	11,6	15	15	15	22	22	22	30	30
Maximum current	A	A E	144	177	199	221	274	303	332	373	406
Peak current	A	A E	320	352	408	430	542	512	541	641	674

COMPRESSORS (SCROLL)											
Number/circuit	n°/n°	A E	4 / 2	4 / 2	4 / 2	4 / 2	5/2	6/2	6/2	6/2	6/2

FANS (AXIAL)											
Quantity	n°	A E	3	4	4	4	6	6	6	8	8
Air flow rate	m³/h	A	56000	79600	78800	78000	115200	114000	112800	155200	153600
		E	46500	55700	55200	55800	80600	79800	80700	108600	109800
Input power	kW	A E	5,25	7,0	7,0	7,0	10,5	10,5	10,5	13,9	13,9
Input current	A	A E	11,3	14,8	14,8	14,8	22,2	22,2	22,2	29,6	29,6
Useful static pressure [1]	Pa	A	119	196	187	181	222	204	208	173	164
		E	150	212	202	203	245	234	242	197	189

EVAPORATORS (HEAT PLATE)											
Quantity	n°	A E	1								
[*]Hydraulic connections (in/out)	Ø	A E	2" 1/2	3"	3"	3"	4"	4"	4"	4"	4"

HYDRAULIC CIRCUIT											
Storage tank capacity	l	A E	500	700							
Storage tank anti-freeze resistance	W	A E	1 x 300	2 x 300							
Expansion vessel	n°/l	A E	2/25	2/25	2/25	2/25	2/25	2/25	2/25	2/25	2/25

[*] The hydraulic attachments are the Victalic type

[1] The useful static pressures refer to the nominal air flow rate.

			750	800	900	1000	1250	1400	1500	1650	1800
HIGH STATIC PRESSURE CIRCULATION PUMP											
Input power	KW	A E	5,5	6,5	6,5	6,5	8,6	8,6	8,6	12,3	12,3
Input current	A	A E	11	11,0	11,0	11,0	14,6	14,6	14,6	21,2	21,2
Useful static pressures	KPa	A	119	194	184	177	214	195	195	165	155
		E	150	211	202	203	245	234	242	197	189

SOUND DATA											
Sound power (1)	dBA	A	87	88,5	88,5	88,5	91,5	91	90,5	92	94
		E	82	82,5	82,5	82,5	85,5	85	84,5	86	88
Sound pressure (2)	dBA	A	55	56,5	56,5	56,5	59,5	59,0	58,5	60,0	62,0
		E	50	50,5	50,5	50,5	53,5	53,0	52,5	54,00	56,0

DIMENSIONS											
Height	mm	A E	1955	2450	2450	2450	2450	2450	2450	2450	2450
Width	mm	A E	1500	2200	2200	2200	2200	2200	2200	2200	2200
Depth	mm	A E	4350	3400	3400	3400	4250	4250	4250	5750	5750
Empty weight	Kg	A E	1889	2470	2650	2840	3120	3380	3660	4220	4420

PC NOMINAL REFERENCE CONDITIONS

IN COOLING MODE

- Water input temperature
- External air temperature
- Nominal water flow rate
- Compressors off

15 °C
2 °C

(1) SOUND POWER

Aermec determines sound power values in agreement with the 9614-2 standard, in compliance with that requested by Eurovent certification.

(2) SOUND PRESSURE

Sound pressure measured in free field conditions with reflective surface (directivity factor Q=2) at 10mt distance from external surface of unit, in compliance with ISO 3744 regulations.

7. OPERATIONAL LIMITS

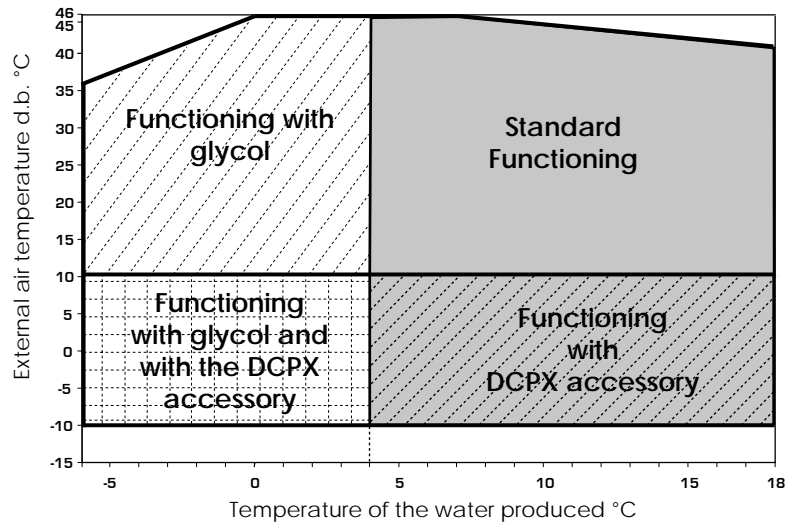
The units, in standard configuration, are not suitable for installation in salty environments.
For functioning limits, please refer to the diagram 7.1, valid for $\Delta t = 5^\circ\text{C}$.

NOTE

Whenever the unit must function outside the operational limits, we recommend contacting our technical-sales dept. first.

If the unit is installed in particularly windy areas, a windbreak should be provided to prevent malfunctioning of the DCPX

7.1. FUNCTIONING IN COOLING MODE



7.2. PROJECT DATA

COOLING		High Pressure side	Low Pressure side
Acceptable maximum pressure	bar	42	25
Acceptable maximum temperature	$^\circ\text{C}$	120	52
Acceptable minimum temperature	$^\circ\text{C}$	-16	-16

8. CHILLER FUNCTIONING CORRECTIVE FACTORS

8.1. COOLING CAPACITY AND INPUT POWER

– "HIGH EFFICIENCY VERSIONS"

The cooling capacity efficiency and electrical input power in conditions differing from normal conditions are obtained by multiplying the nominal values (P_f, P_a) by the respective coefficient correctives (C_f, C_a).
The following diagrams show how to obtain corrective coefficients to use for units in their various versions in cooling mode; external air temperature, to which reference is made, is shown in correspondence to each curve.

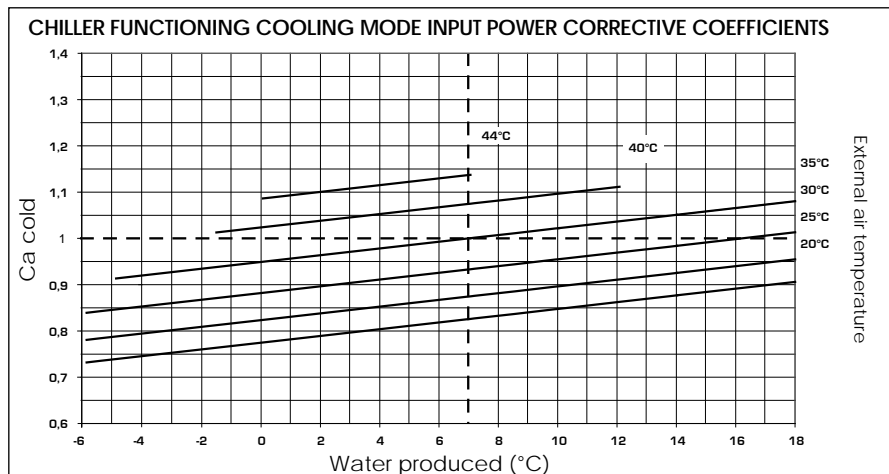
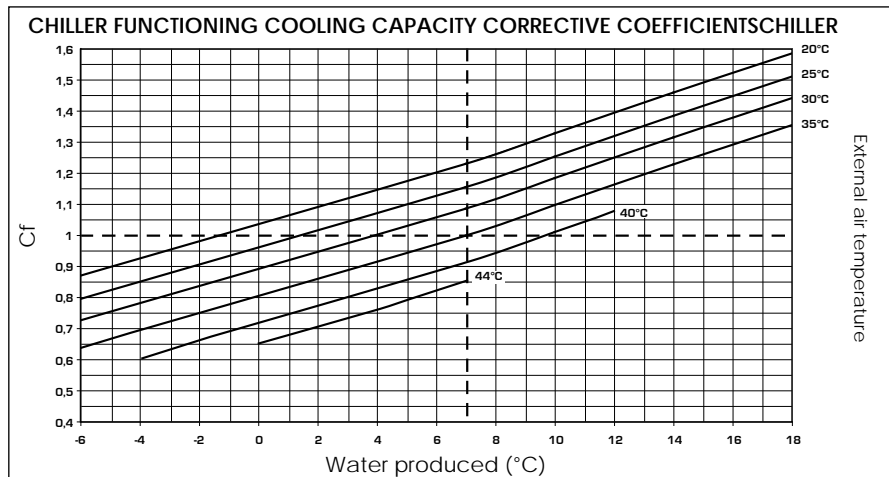
KEY:

Cf: Corrective co-efficient of the cooling capacity.

Ca: Corrective co-efficient of the Input power.

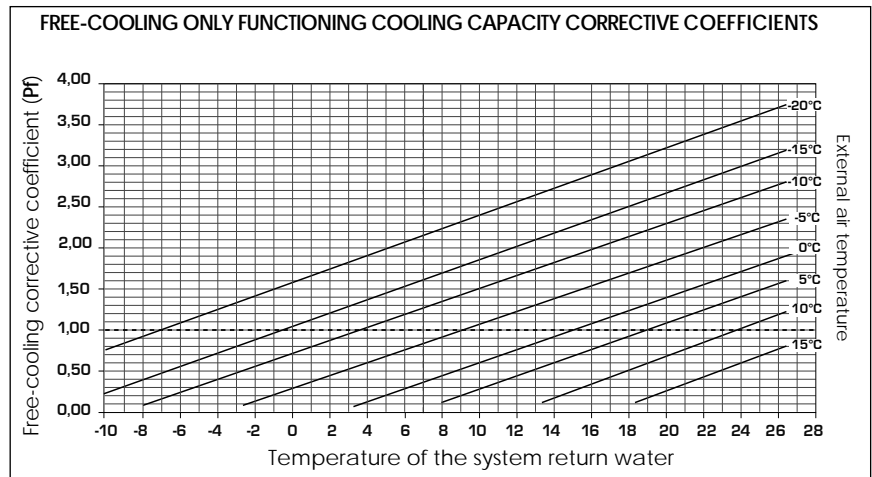
FOR Δt DIFFERENT FROM 5°C

At the evaporator use **Tab. 9.2.1.** to obtain correction factors of cooling power and input power. To consider dirtiness of the exchangers, use the relative deposit factors **Tab. 9.2.2.**



9. FREE-COOLING FUNCTIONING CORRECTIVE FACTORS

The maximum cooling capacity yielded when functioning is completely in free-cooling mode, i.e. all compressors are off, is obtained by multiplying the cooling capacity nominal value (Pf) given in the Technical Data by the respective corrective coefficient, which is obtained from the following diagram on the basis of the temperature of the water produced and the temperature of the external air. These values refer to the fans in full rev conditions (maximum input power). If the power yielded should result in excess, a modulation will intervene on the number of revs.



9.1. FOR Δt DIFFERENT TO NOMINAL

For Δt different from 5°C at evaporator use Tab. 9.2.1. to obtain correction factors of cooling power and input power. To be able to consider exchanger uncleanliness, relative dirtying factors are used Tab. 9.2.2.

9.2.1. Δt different to nominal	3	5	8	10
Cooling capacity correction factors	0,99	1	1,02	1,03
Input power correction factors	0,99	1	1,01	1,02

9.2. DEPOSIT FACTORS

The performances shown by the table refer to clean tubes with deposit factor=1.

For different deposit factors multiply the data in the performance tables by the coefficients given.

9.2.2. Deposit factors [$K \cdot m^2$]/[W]	0,00005	0,0001	0,0002
Cooling capacity correction factors	1	0,98	0,94
Input power correction factors	1	0,98	0,95

10. GLYCOL

- The correction factors of cooling power and input power take into account the presence of glycol and diverse evaporation temperatures.
- The pressure drop correction factor considers the different flow rate resulting from the application of the water flow rate correction factor.
- The water flow rate correction factor is calculated to keep the same Δt that would be present with the absence of glycol.

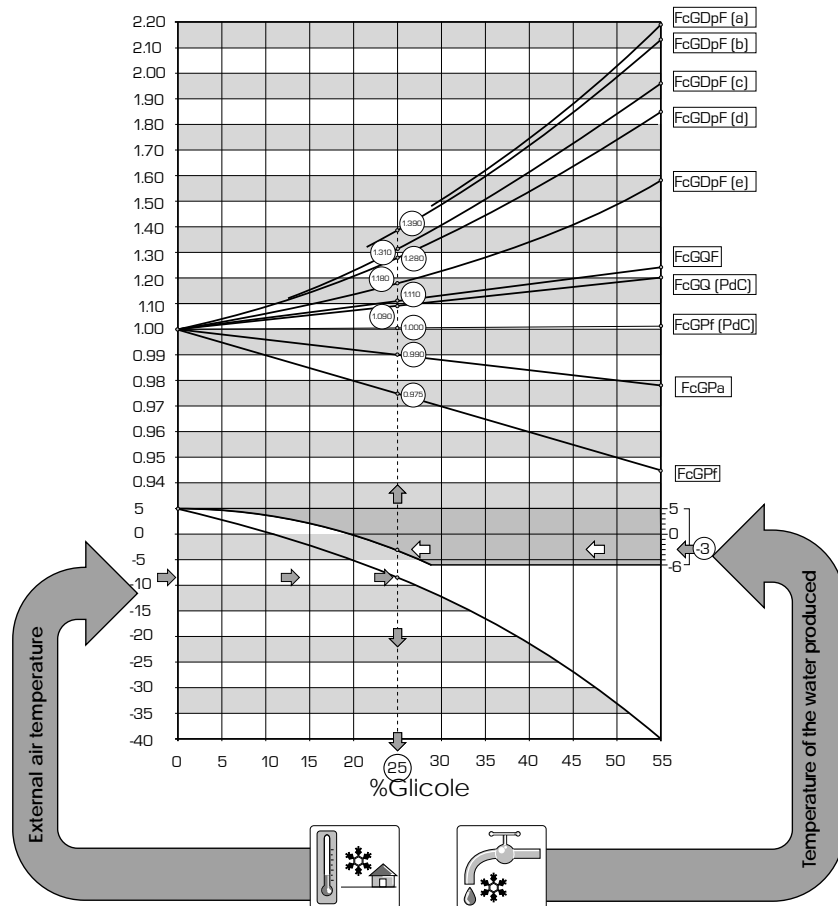
NOTE

On the following page an example is given to help graph reading. to determine the percentage of glycol required, see below diagram; this percentage calculation can take into consideration one of the following factors: Depending on which fluid is considered (water or air), the graph is interpreted by the right or left side at the crossing point on the curves with the external temperature line or the water produced line. A point from which the vertical line will pass is obtained and this will distinguish both glycol percentage and relative correction coefficients.

10.1. HOW TO INTERPRET GLYCOL CURVES

The curves shown in the diagram summarise a significant number of data, each of which is represented by a specific curve. In order to use these curves correctly it is first necessary to make some initial reflections.

- If you wish to calculate the percentage of glycol on the basis of the external air temperature, enter from the left axis and on reaching the curve draw 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, the flow rates and the pressure drops (remember that these coefficients must be multiplied by the nominal value of the size in question); while the glycol percentage value recommended to produce desired water temperature is on the lower axis.
- If you wish to calculate the percentage of glycol on the basis of the temperature of the water produced, enter from the right axis and on reaching the curve draw a vertical line, which in turn will intercept all the other curves; the points obtained from the upper curves



LEGENDA:

- FcGPf Corrective factors for cooling capacity
- FcGPa Corrective factors of the input power
- FcGDpF (a) Correction factors for pressure drop (evaporator) (av. temp. = -3.5 °C)
- FcGDpF (b) Correction factors for pressure drops (av. temp. = 0.5 °C)
- FcGDpF (c) Correction factors for pressure drops (av. temp. = 5.5 °C)
- FcGDpF (d) Correction factors for pressure drops (av. temp. = 9.5 °C)
- FcGDpF (e) Correction factors for pressure drops (av. temp. = 47.5 °C)
- FcGGF Correction factor of flow rates (evap.) (av. temp. = 9.5 °C)
- FcGQC Correction factors of flow rates (condenser) (av. temp. = 47.5 °C)

NOTE

Although graph shows up to external air temperature of -40°C, unit operational limits must be considered.

represent the coefficients for the correction of the cooling capacity and input power, the flow rates and the pressure drops (remember that these coefficients must be multiplied by the nominal value of the size in question); while the lower axis recommends the glycol percentage value necessary to produce water at the desired temperature.

- Initial rates for "EXTERNAL AIR TEMPERATURE" and "TEMPERATURE OF PRODUCED WATER", are not directly related, therefore it is not possible to refer to the curve of one of these

rates to obtain corresponding point on the curve of the other rate. on the curve of the other rate.

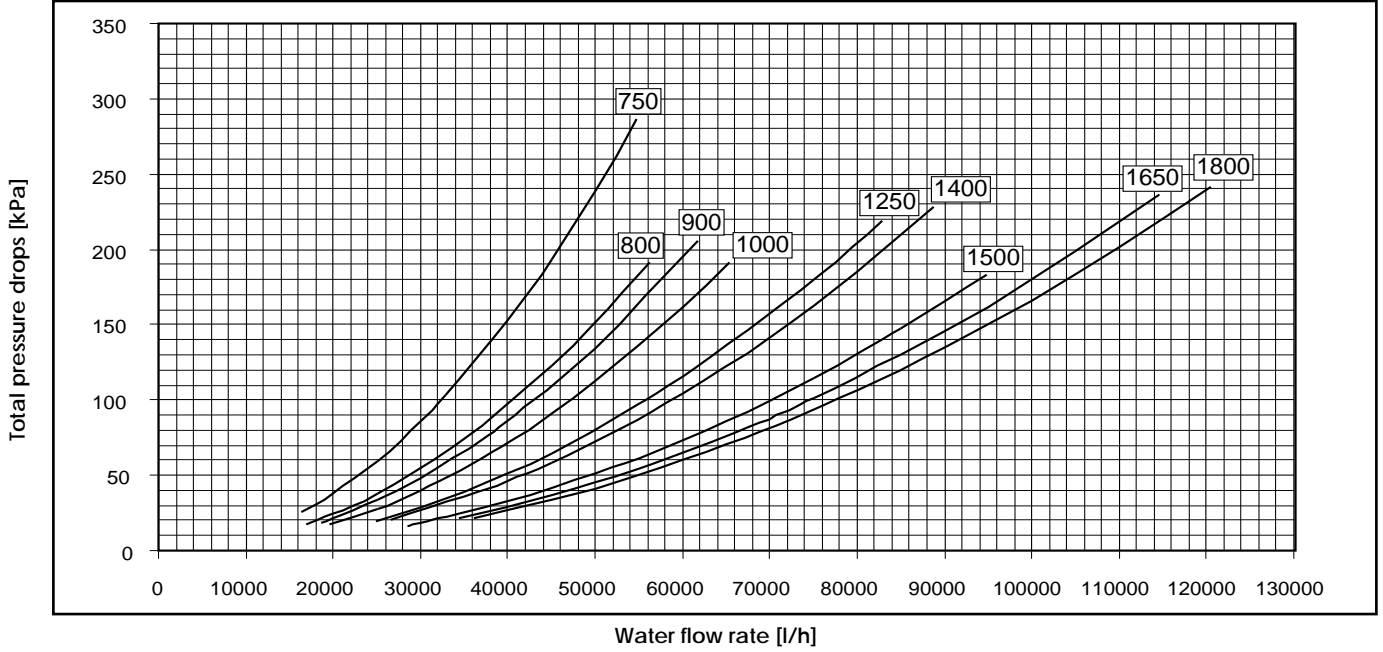
11. PRESSURE DROPS

11.1. TOTAL PRESSURE DROPS

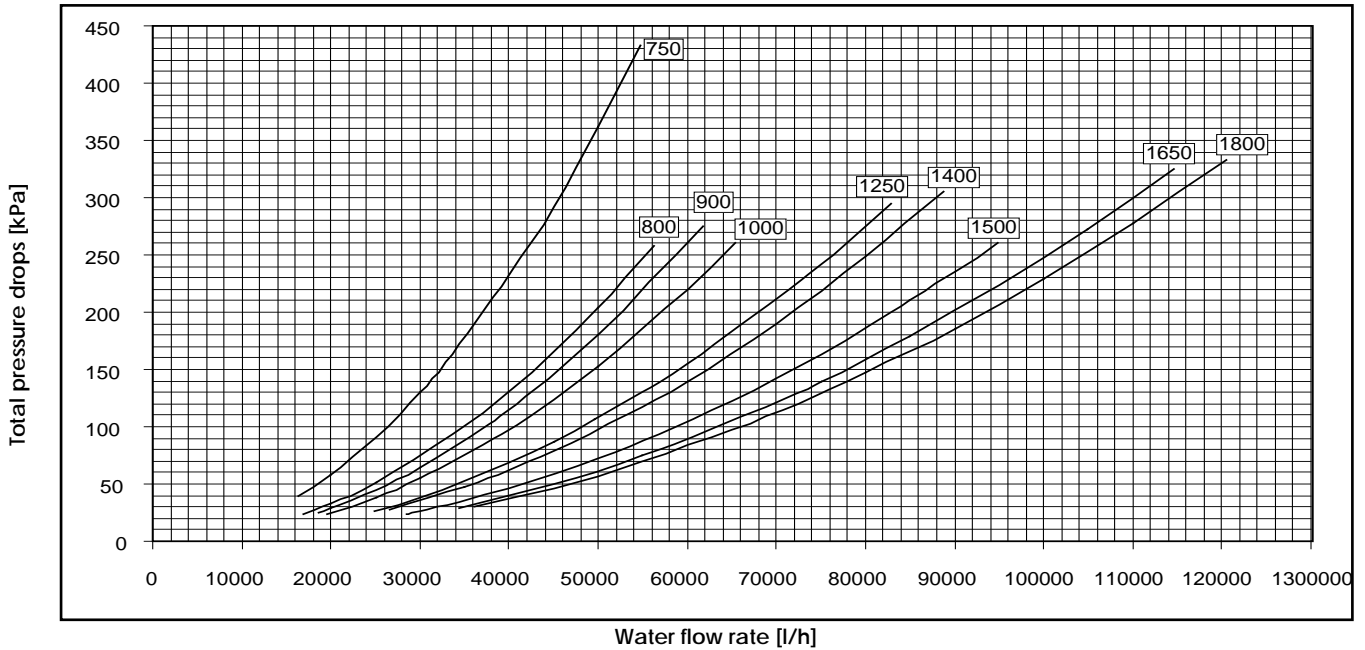
NOTE:

The pressure drops reported here are relative to functioning in "Chiller" and "Free-Cooling" modes, both calculated with an average temperature of the water at 10°C.

CHILLER FUNCTIONING PRESSURE DROPS

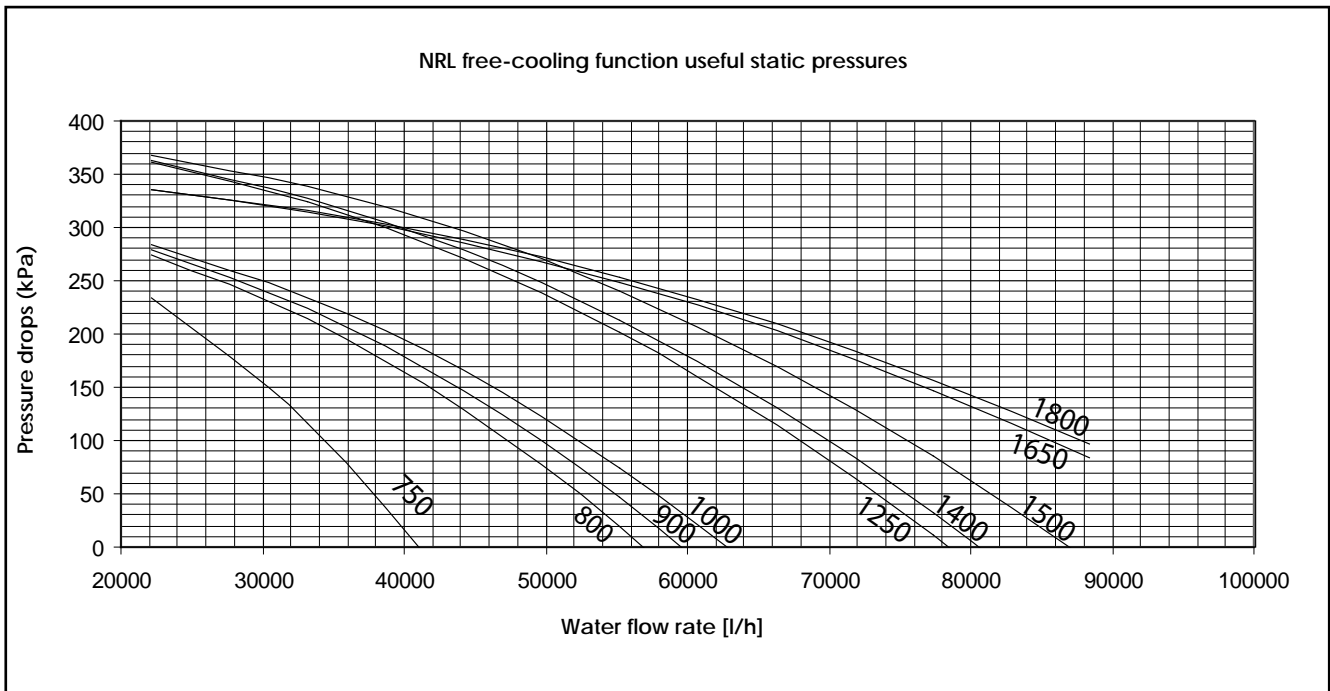
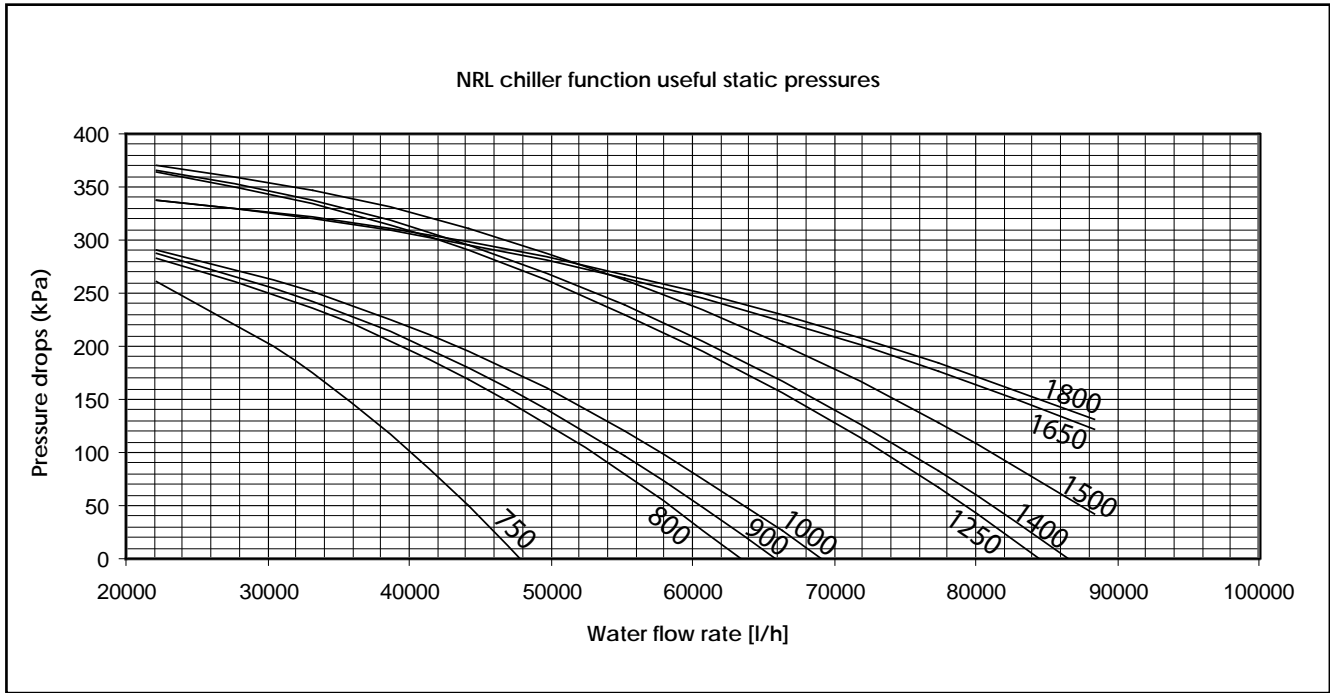


FREE-COOLING FUNCTIONING PRESSURE DROPS



Average water temperature [°C]	5	10	15	20	30	40	50
Multiplicative coefficients	1,02	1	0,985	0,97	0,95	0,93	0,91

12. USEFUL STATIC PRESSURES



13. STORAGE

13.1. MAXIMUM/MINIMUM WATER CONTENT IN THE SYSTEM

13.1.1. Recommended maximum water content

Table 13.3 indicates maximum water capacity in litres of hydraulic plant, compatible with expansion vessel. The values shown in the table refer to three maximum and minimum water temperatures. If the effective water content of the hydraulic plant (including the storage tank, if present) is greater than that given in the table at operational conditions, another dimensioned expansion vessel must be installed, using the normal criteria, with reference to the additional volume of water. In tables 13.4 it is possible to work out the maximum values of the system also for glycoled water function. Values are worked out by multiplying the referred value by the corrective coefficient.

13.1.2. Expansion vessel calibration

Standard pre-load pressure value of expansion vessel when empty is 1.5 bar, while their volume is 25 litres, maximum value is 6 bar.

Calibration of the vessel must be regulated using the maximum level difference (H) of the user (see diagram) by using the following formula:
 p (calibration) [bar] = H [m] / 10.2 + 0.3.

For example: if level difference (H) is equal to 20m, the calibration value of the vessel will be 2.3 bar.

If calibration value obtained from formula is less than 1.5 bar (that is for $H < 12.25$), keep calibration as standard.

13.2. RECOMMENDED MINIMUM WATER CONTENT

NRL FC	Compressor n°	(1) l/KW	(2) l/KW
0750	4	4	8
0800			
0900			
1000			
1250			
1400	5	4	8
1500	6	4	8
1650			
1800			

13.3. MAXIMUM CONTENT ON VARIATION OF THE CAPACITY OF THE EXPANSION VESSEL

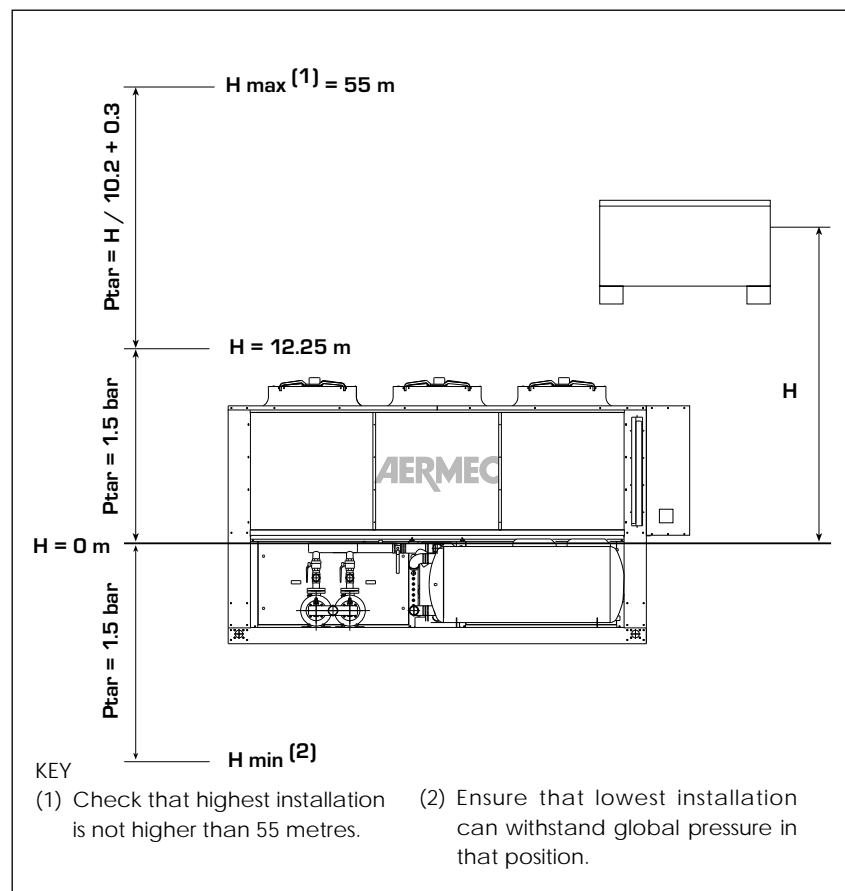
Hydraulic height	H m	30	25	20	15	≥ 12.25
Calibration of expansion vessel	bar	3.2	2.8	2.3	1.8	1.5
Recommended values of water content.	l ⁽¹⁾	2.174	2.646	3.118	3590	3852
Recommended values of water content.	l ⁽²⁾	978	1190	1404	1616	1732
Recommended values of water content.	l ⁽³⁾	510	622	732	844	904

13.4. WATER CONTENT IN OTHER FUNCTIONING CONDITIONS WITH GLYCOLED WATER

Glycoled water	Water temp. °C		Corrective coefficients	Recommended conditions
	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)

Recommended operational conditions:

- (1) Cooling: Max water temp. = 40 °C, min water temp. = 4 °C.
- (2) Heating (hot air pump): Max water temp. = 60 °C, min water temp. = 4 °C.
- (3) Heating (boiler): Max water temp. = 85 °C, min water temp. = 4 °C.



(1)	Minimum water content
(2)	Minimum water content in the case of application of process or functioning with low external temperatures and low load
	Regulation on the outlet water temperature project Δt less than 5°C.

14. PARTIALISATIONS

[*] % Cooling capacity	Power steps					
	1°	2°	3°	4°	5°	6°
Versions						
NRL 750	27	53	77	100	-	-
NRL 800	27	53	77	100	-	-
NRL 900	27	53	77	100	-	-
NRL 1000	27	53	77	100	-	-
NRL 1250	27	53	77	100	-	-
NRL 1400	23	44	63	82	100	-
NRL 1500	19	37	55	71	86	100
NRL 1650	19	37	55	71	86	100
NRL 1800	19	37	55	71	86	100

[*] % input power	Power steps					
	1°	2°	3°	4°	5°	6°
Versions						
NRL 750	23	47	73	100	-	-
NRL 800	23	47	73	100	-	-
NRL 900	23	47	73	100	-	-
NRL 1000	23	47	73	100	-	-
NRL 1250	23	47	73	100	-	-
NRL 1400	18	37	56	77	100	-
NRL 1500	14	29	46	63	81	100
NRL 1650	14	29	46	63	81	100
NRL 1800	14	29	46	63	81	100

KEY:

The performance refers to the following conditions:

- * Temperature of water produced: 7°C
- * External air temperature: 35°C

15. DESUPERHEATER

The heating capacity obtained by the desuperheater is attained by multiplying the nominal value (Pd), given in table 15.1.1, by a relevant coefficient (Cd).

The following diagrams show how to obtain corrective coefficients to use for units in their various versions in cooling mode; external air temperature, to which reference is made, is shown in correspondence to each curve.

In eat pump models the desuperheater must be shut-off in heat pump mode, or the warranty will be come null and void.

15.1. PRESSURE DROPS

The NRL models with desuperheater have 2 desuperheaters (placed in parallel).

NOTE:

The features of the desuperheaters and the pressure drop curves are given below.

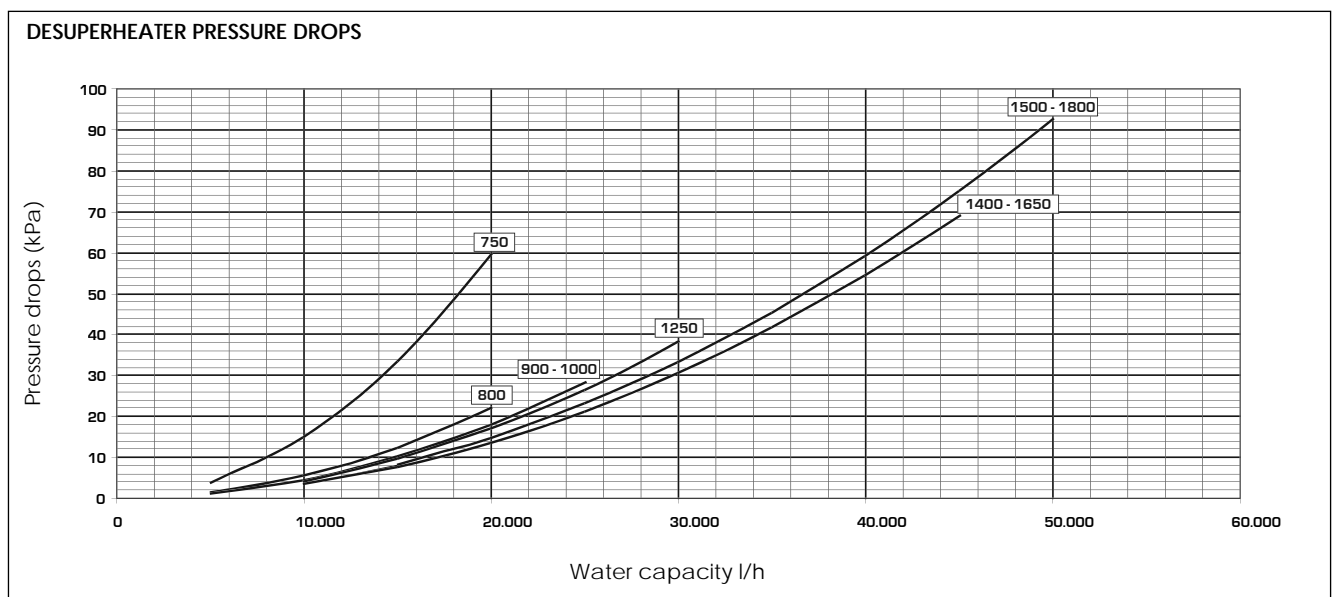
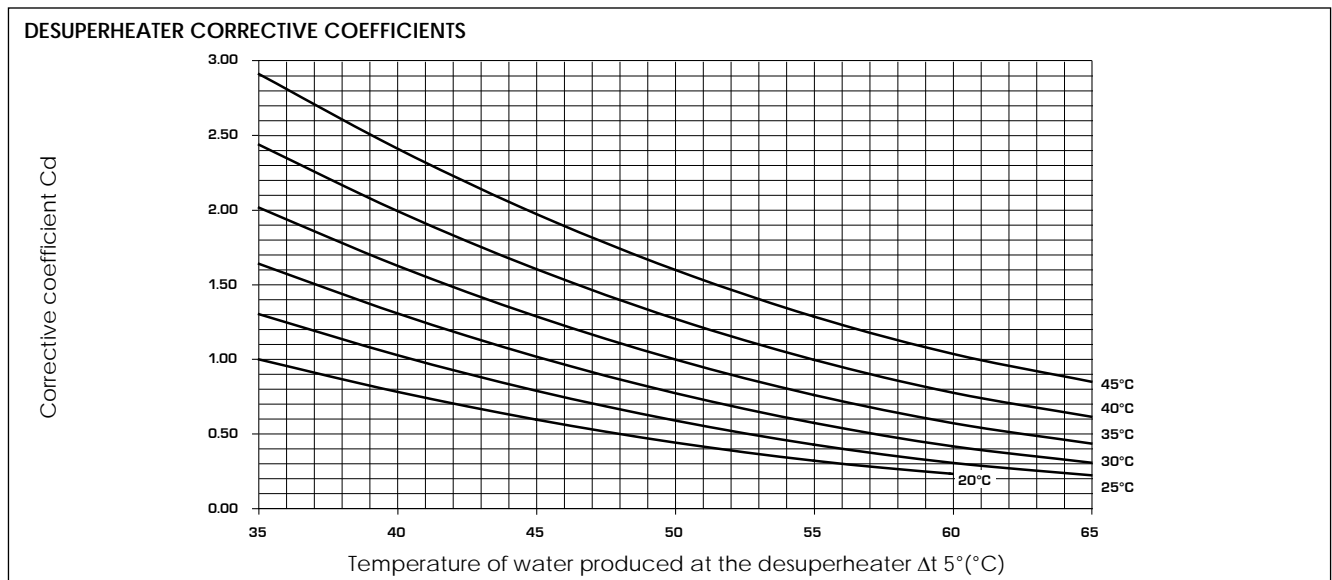
For temperature of produced water values, different from 50°C, multiply by corrective factor shown in figure 15.1.1.

Nominal value referring to:

- Air temperature 35°C
- Water to the desuperheater 45/50°C
- Δt 5°C

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

table 15.1.1



16.1.1. NRL (D)		750	800	900	1000	1250	1400	1500	1650	1800
Heating capacity recovered	kW	69,0	74,3	84,8	95,4	110,9	126,7	142,6	155,1	167,7
Desuperheater water flow rate	l/h	11870	12790	14590	16400	19070	21800	24520	26680	28840
Desuperheater pressure drop	kPa	21,0	9,0	9,6	12,5	15,5	16,5	22,5	24,3	30,9

16. SOUND DATA

Sound power

Aermec determines sound power values in agreement with the 9614-2 standard, in compliance with that requested by Eurovent certification.

Sound Pressure

Sound pressure measured in free field conditions with reflective surface (directivity factor Q=2) in compliance with ISO 3744 regulations.

NOTE:

The data is relative to the version with standard fans.

NRL A-FC	Total sound levels		Octave band [Hz]							
	Pow. dB(A)	Pressure		125	250	500	1000	2000	4000	8000
		dB(A) 10 m	dB(A) 1 m							
0750A	87,0	55,0	69,0	73,9	75,9	79,3	81,6	82,7	76,5	63,4
0800A	88,5	56,5	70,0	99,5	87,5	84,5	83,0	76,5	72,0	64,0
0900A	88,5	56,5	70,0	99,5	87,5	84,5	83,0	76,5	72,0	64,0
1000A	88,5	56,5	70,0	98,0	87,0	84,8	82,9	79,1	75,1	67,0
1250A	91,5	59,5	73,0	99,2	93,5	87,5	85,5	82,2	76,0	65,2
1400A	91,0	59,0	72,5	101,0	90,0	86,0	87,0	79,0	71,0	64,0
1500A	90,5	58,5	72,0	102,0	89,0	86,0	85,0	79,0	71,5	65,0
1650A	92,0	60,0	73,5	101,0	92,5	88,5	87,0	81,0	73,0	66,0
1800A	94,0	62,0	75,5	102,0	95,0	90,5	89,5	82,0	73,0	67,0

Values referring to:

- Water input temperature 12°C
- Temperature of produced water 7°C
- External air temperature 35°C

NRL E-FC	Total sound levels			Octave band [Hz]						
	Pow. dB(A)	Pressure		125	250	500	1000	2000	4000	8000
		dB(A) 10 m	dB(A) 1 m	Sound potential for centre of band [dB] frequency (A)						
0750E	82,0	50,0	64,0	72,3	74,5	74,9	72,1	77,3	71,1	67,8
0800E	82,5	50,5	64,0	96,0	79,5	76,5	75,0	68,5	64,5	58,5
0900E	82,5	50,5	64,0	96,0	79,5	76,5	75,0	68,5	64,5	58,5
1000E	82,5	50,5	64,0	96,0	79,5	76,5	75,0	68,5	64,5	58,5
1250E	85,5	53,5	67,0	95,0	87,5	80,0	79,0	76,5	69,5	61,5
1400E	85,0	53,0	66,5	97,5	82,5	80,0	79,0	72,5	63,5	57,5
1500E	84,5	52,5	66,0	98,5	81,5	78,5	75,5	71,5	62,5	56,5
1650E	86,0	54,0	67,5	98,5	83,5	79,0	79,5	76,5	66,5	61,5
1800E	88,0	56,0	69,5	99,5	87,0	81,3	82,5	78,0	68,5	62,9

17. CALIBRATION OF SAFETY AND CONTROL PARAMETERS

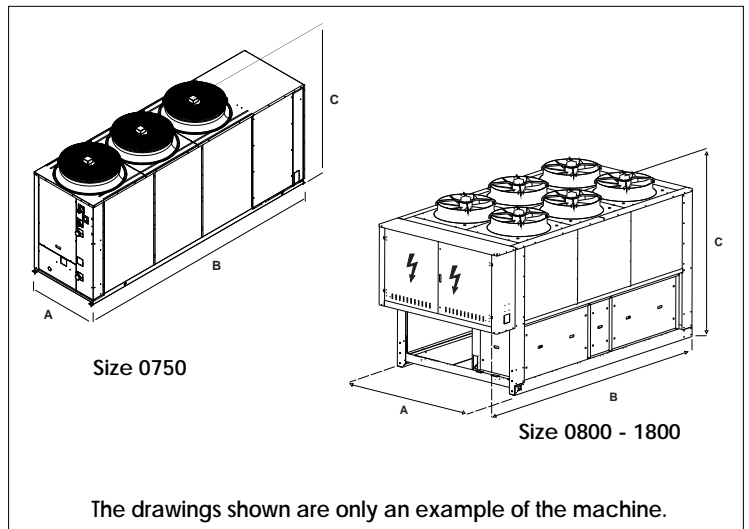
CONTROL PARAMETERS										
Cooling set	Inlet temperature of the water in cooling functioning mode.	MIN.	-10°C							
		MAX.	20°C							
		DEFAULT	7.0°C							
Anti-freeze intervention	Anti-freeze alarm intervention temperature on EV side (water outlet temperature).	MIN.	-15°C							
		MAX.	4°C							
		DEFAULT	3°C							
Total differential	Temperature proportional and within which the compressors are activated and deactivated.	MIN.	3°C							
		MAX.	10°C							
		DEFAULT	5°C							
Autostart	Auto									
NRL	750	800	900	1000	1250	1400	1500	1650	1800	
400V COMPRESSORS MAGNET-CIRCUIT BREAKERS										
MTC 1	29A	40A	40A	51A	62A	62A	51A	51A	62A	
MTC 1A	29A	40A	40A	51A	62A	62A	51A	51A	62A	
MTC 1B	-	-	-	-	-	-	51A	51A	62A	
MTC 2	29A	40A	51A	51A	62A	51A	51A	62A	62A	
MTC 2A	29A	40A	51A	51A	62A	51A	51A	62A	62A	
MTC 2B	-	-	-	-	-	51A	51A	62A	62A	
MANUAL REARM HIGH PRESSURE PRESSURE SWITCH										
PA (bar)	40	40	40	40	40	40	40	40	40	
HIGH PRESSURE TRANSDUCER										
TAP (bar)	50									
LOW PRESSURE TRANSDUCER										
TBP (bar)	30									
COOLING CIRCUIT SAFETY VALVES										
AP (bar)	45	45	45	45	45	45	45	45	45	
LP (bar) heat pump only	30	30	30	30	30	30	30	30	30	
MAGNETOTERMICI VENTILATORI										
N° fans A	3	4	4	4	6	6	6	8	8	
N° fans E										

Note:

The PS maximum pressure water side is 6 bar.

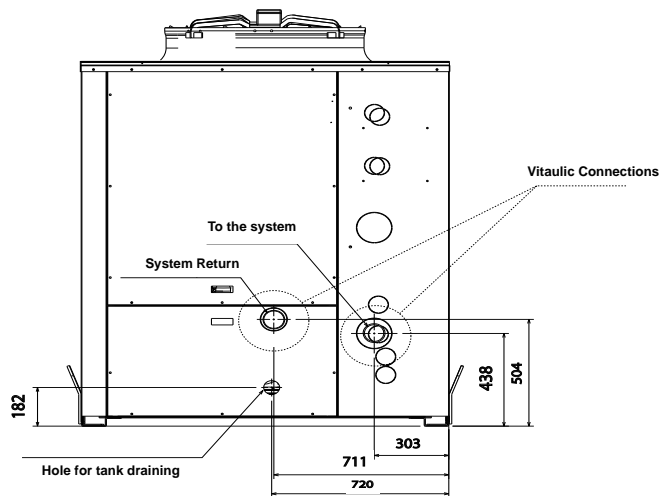
18. DIMENSIONS

MOD.	VERSIONS	A (mm)	B (mm)	C (mm)
0750	A-E	4350	1500	1955
0800	A-E	3400	2200	2450
0900	A-E	3400	2200	2450
1000	A-E	3400	2200	2450
1250	A-E	4250	2200	2450
1400	A-E	4250	2200	2450
1500	A-E	4250	2200	2450
1650	A-E	5750	2200	2450
1800	A-E	5750	2200	2450

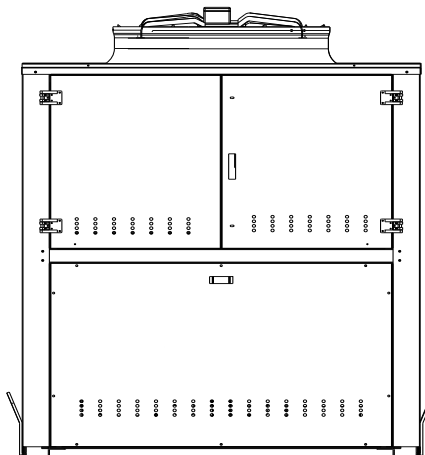


19. DIMENSION TABLES AND HYDRAULIC FITTING POSITIONS

19.1.1. NRL 750 FC A/E

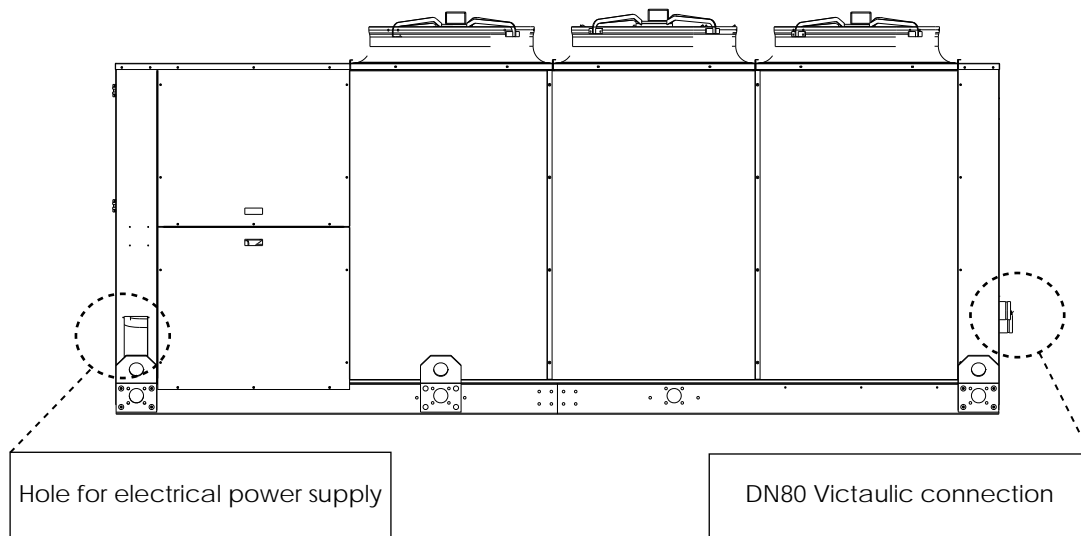
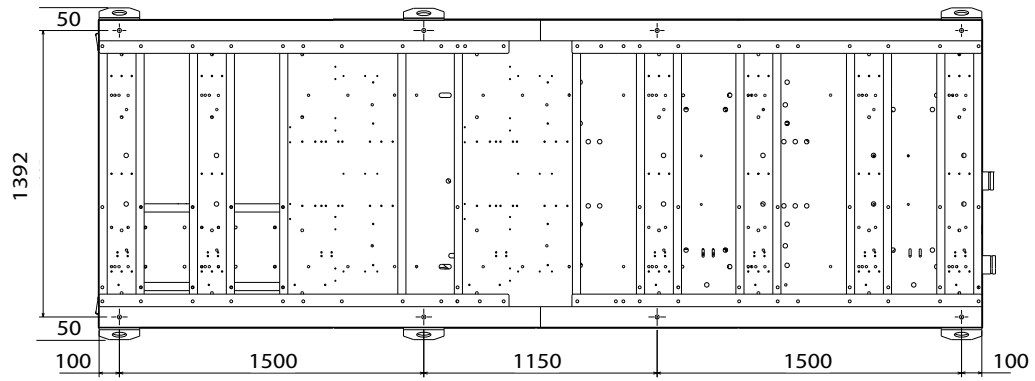


Quotes referring to the base

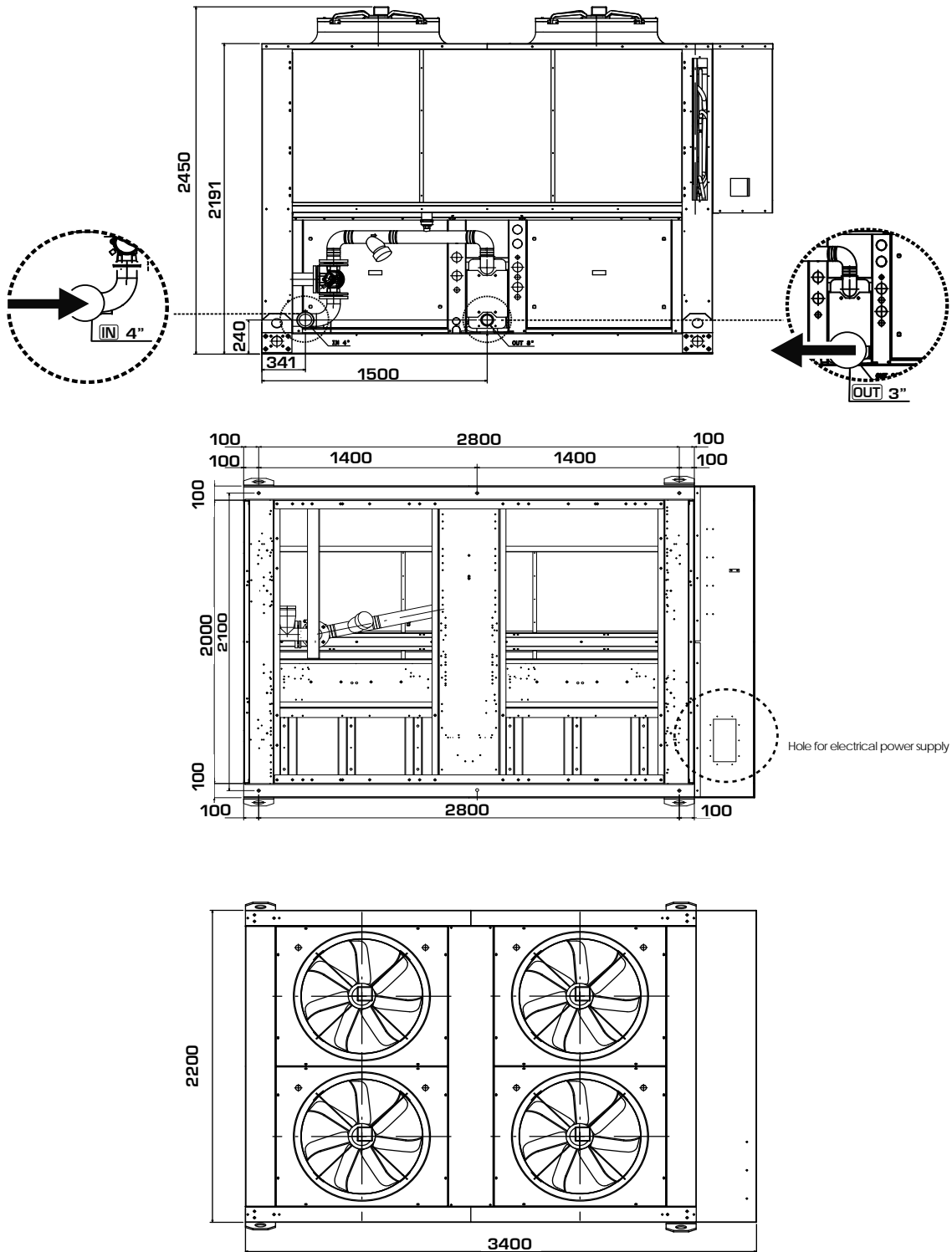


Aux. B view
Scale: 1:10

ATTENTION
The hydraulic attachments
are the Victallic type

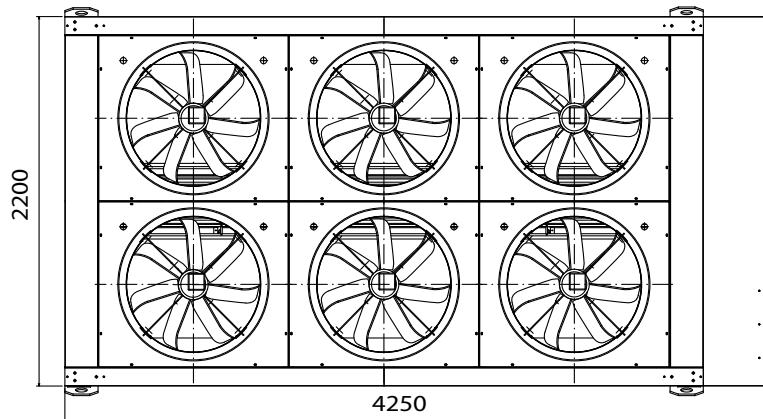
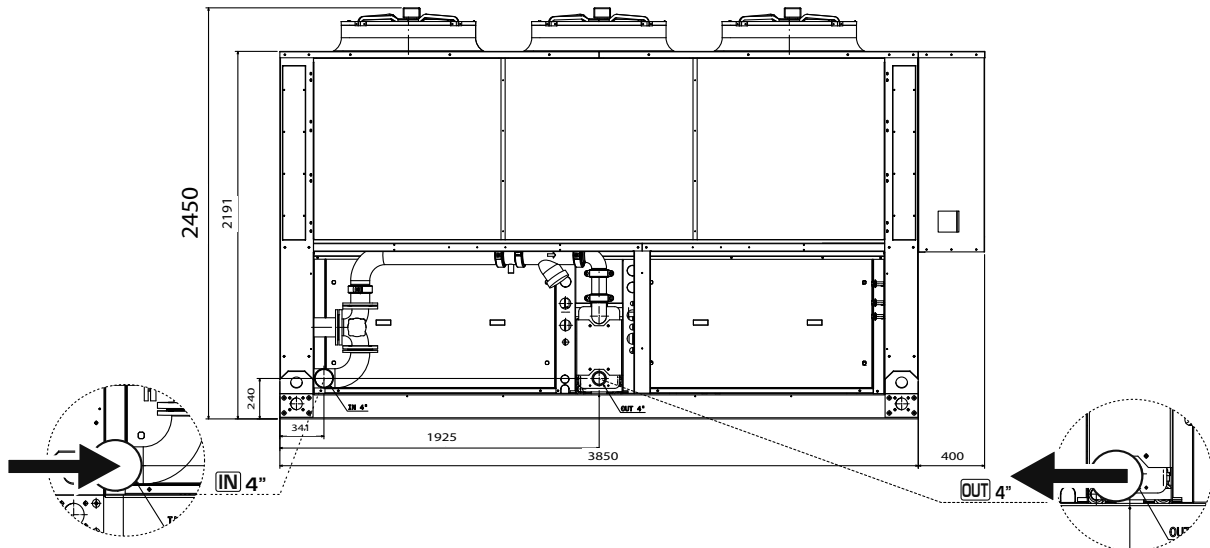
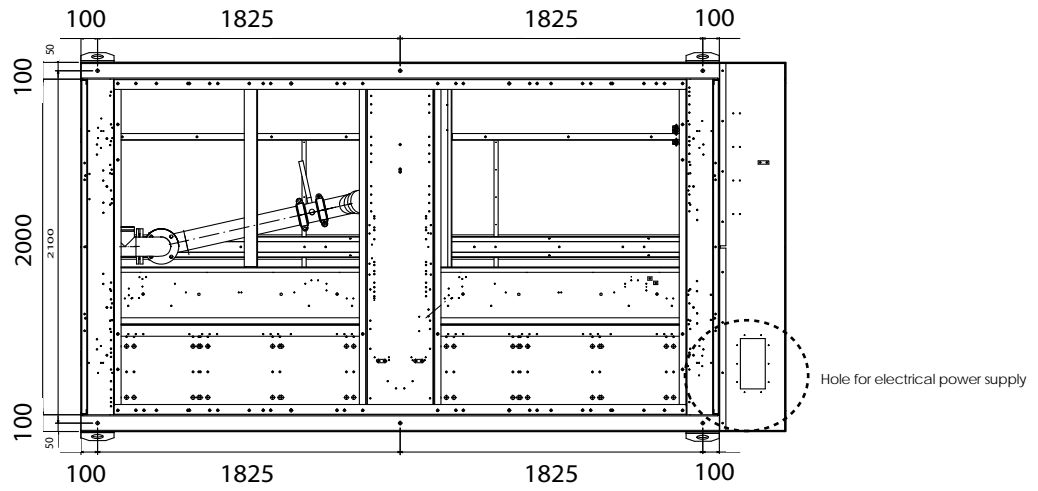


ATTENTION
*The hydraulic attachments
 are the Victalitic type*

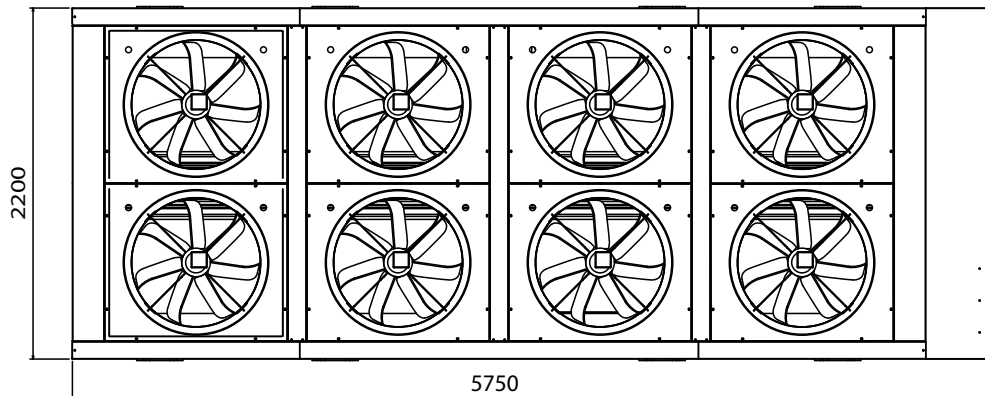
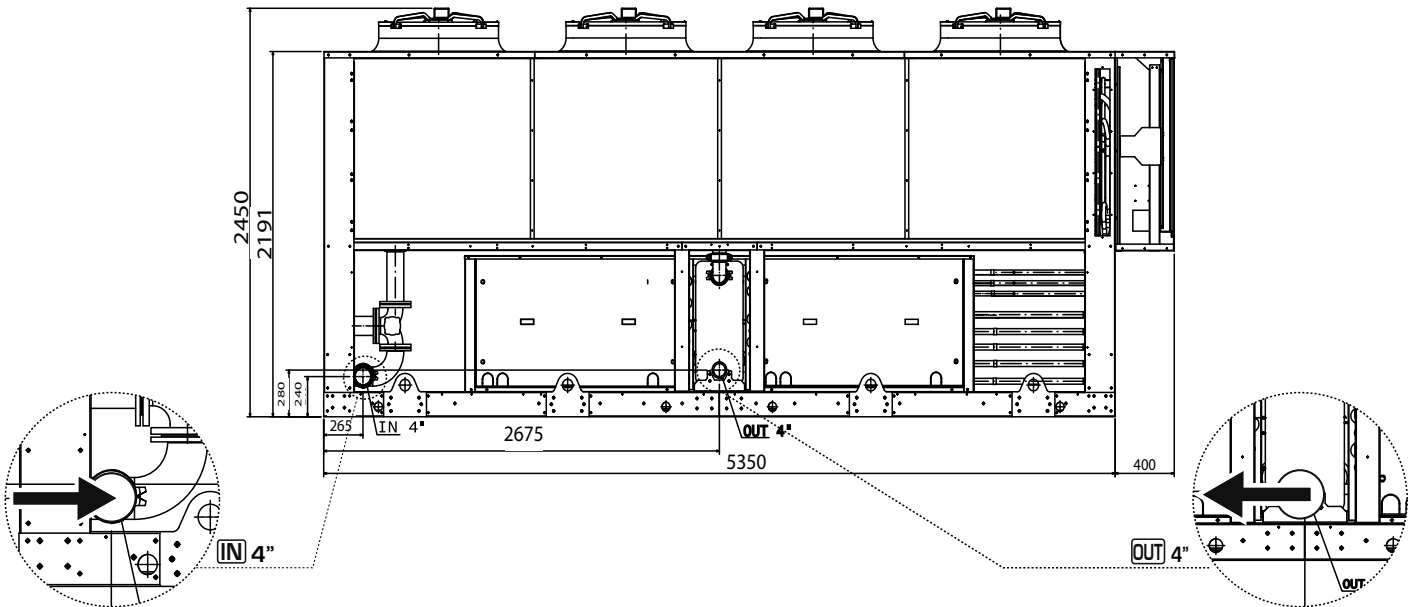
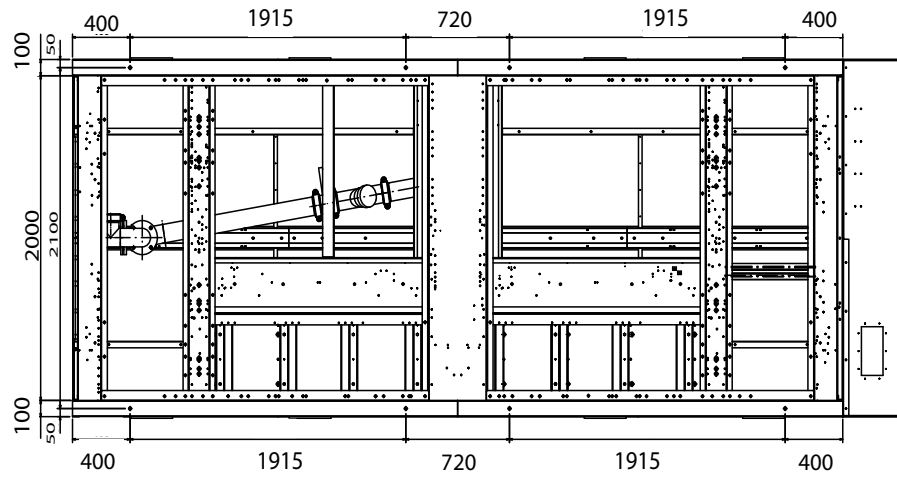


ATTENTION
 The hydraulic attachments
 are the Victalic type

19.1.3. NRL 1250 - 1400 - 1500 FC A / E

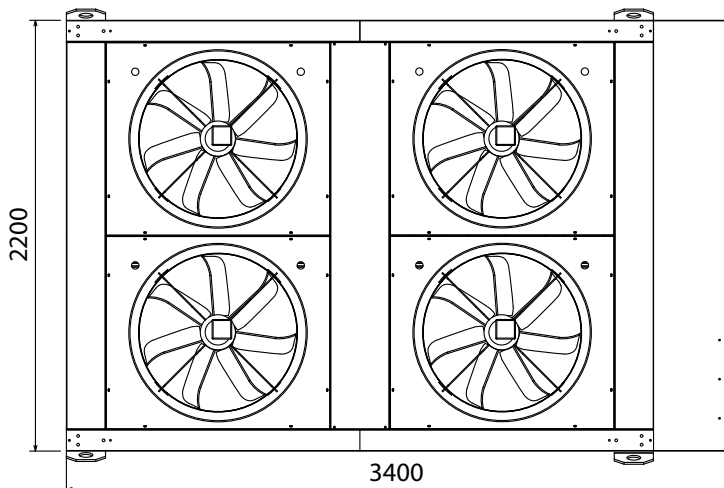
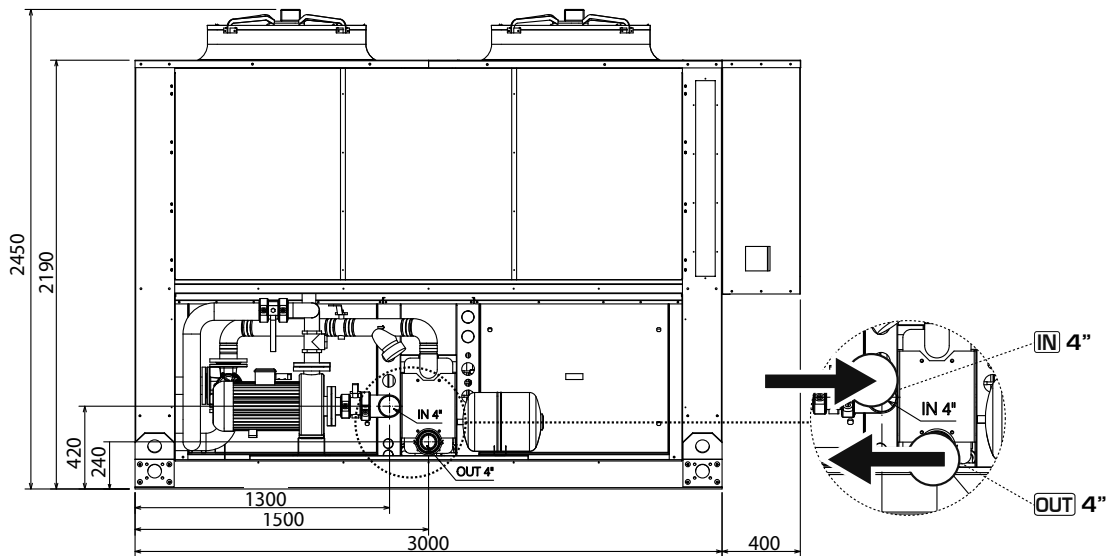
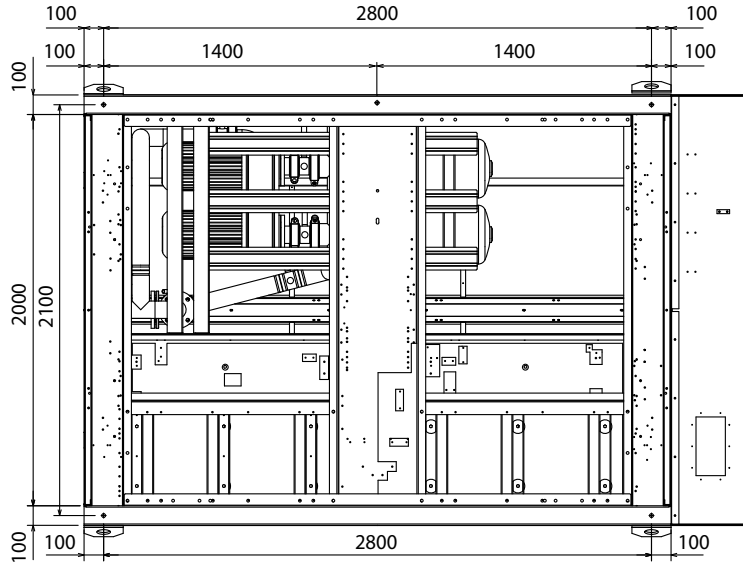


ATTENTION
*The hydraulic attachments
 are the Victallic type*

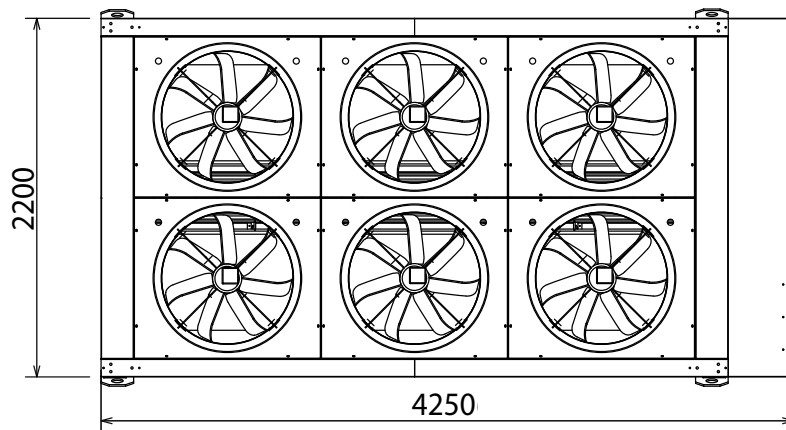
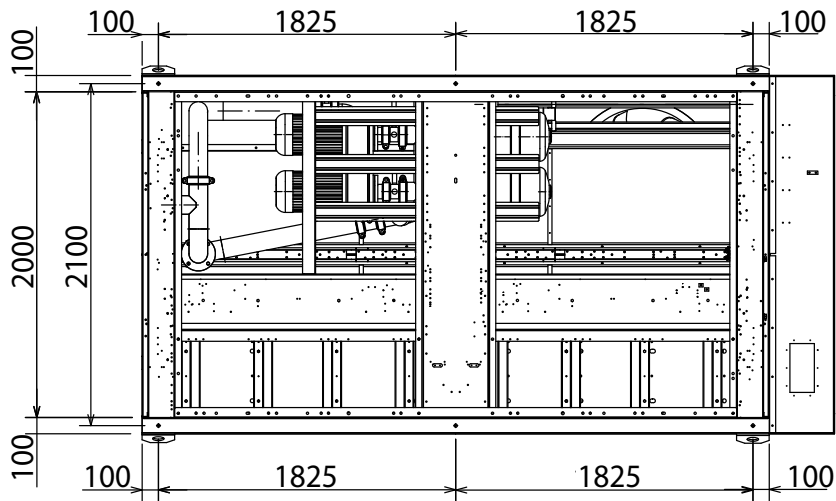
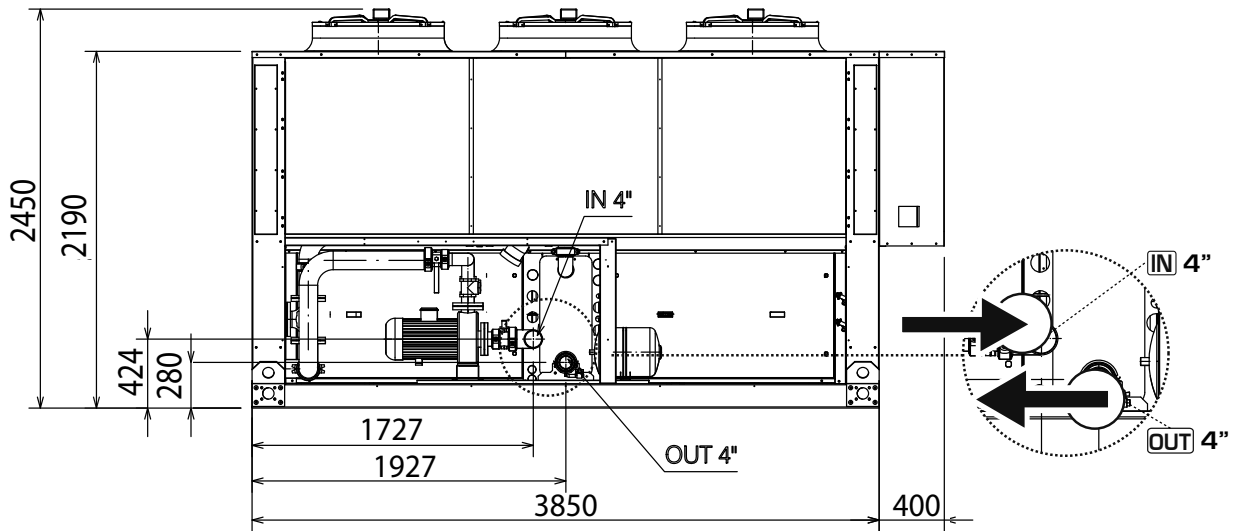


ATTENTION
 The hydraulic attachments
 are the Victallic type

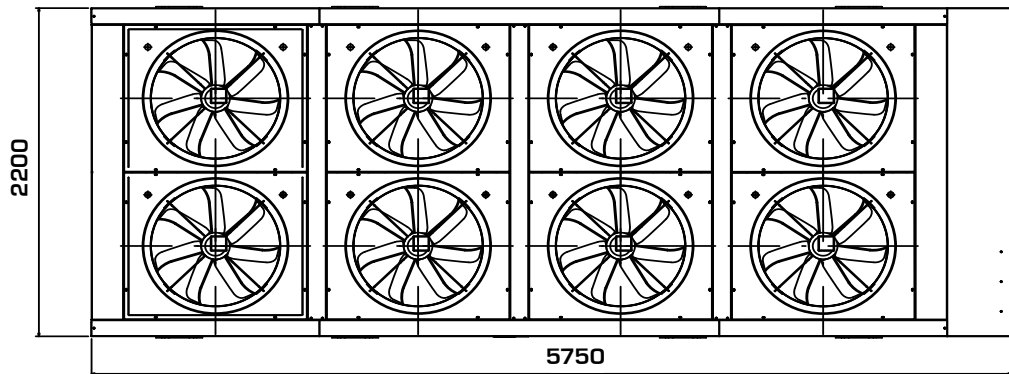
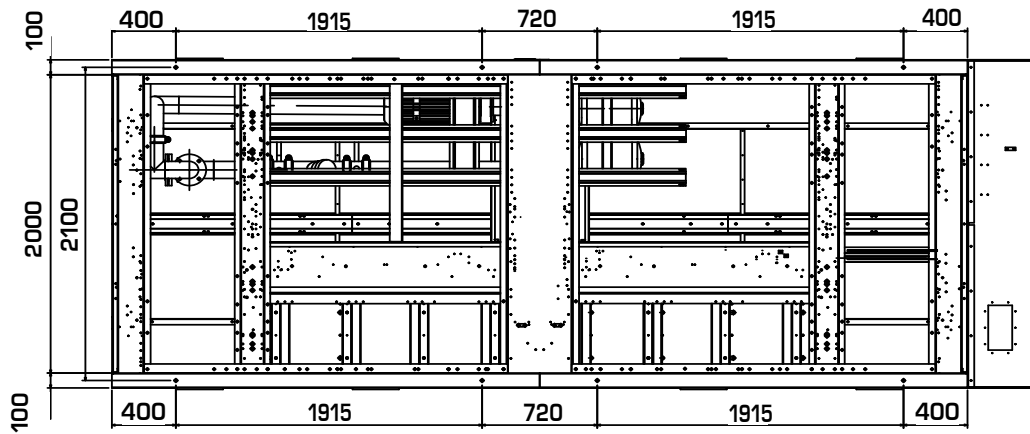
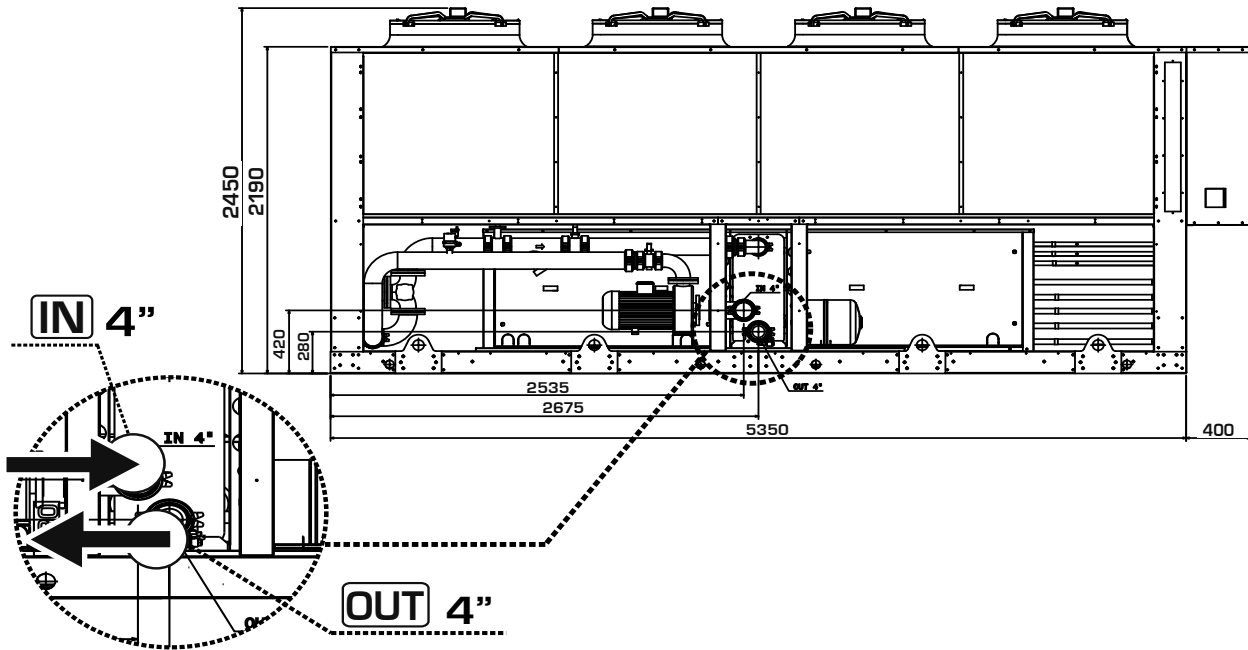
19.1.6. NRL 800 - 900 - 1000 [P3 - P4] FC A/E



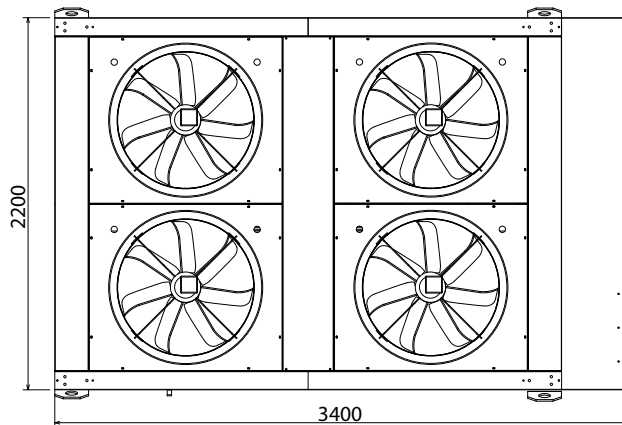
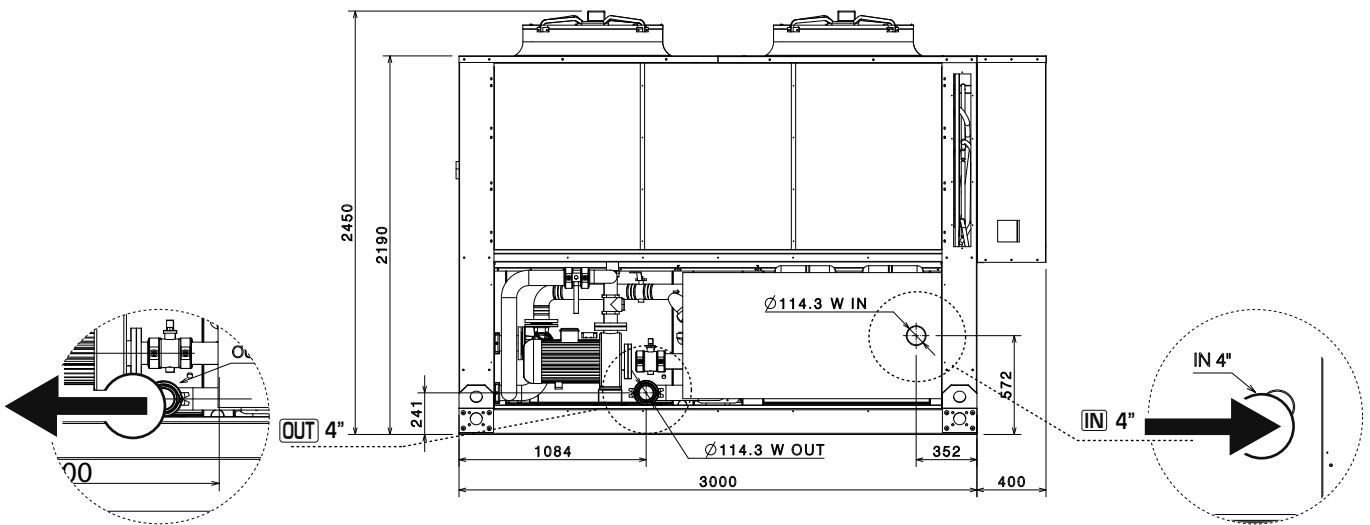
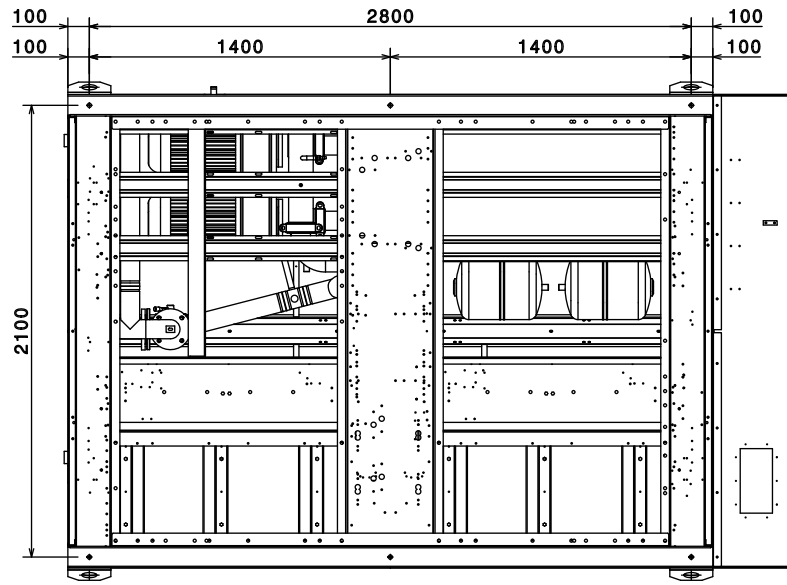
ATTENTION
The hydraulic attachments
are the Victallic type



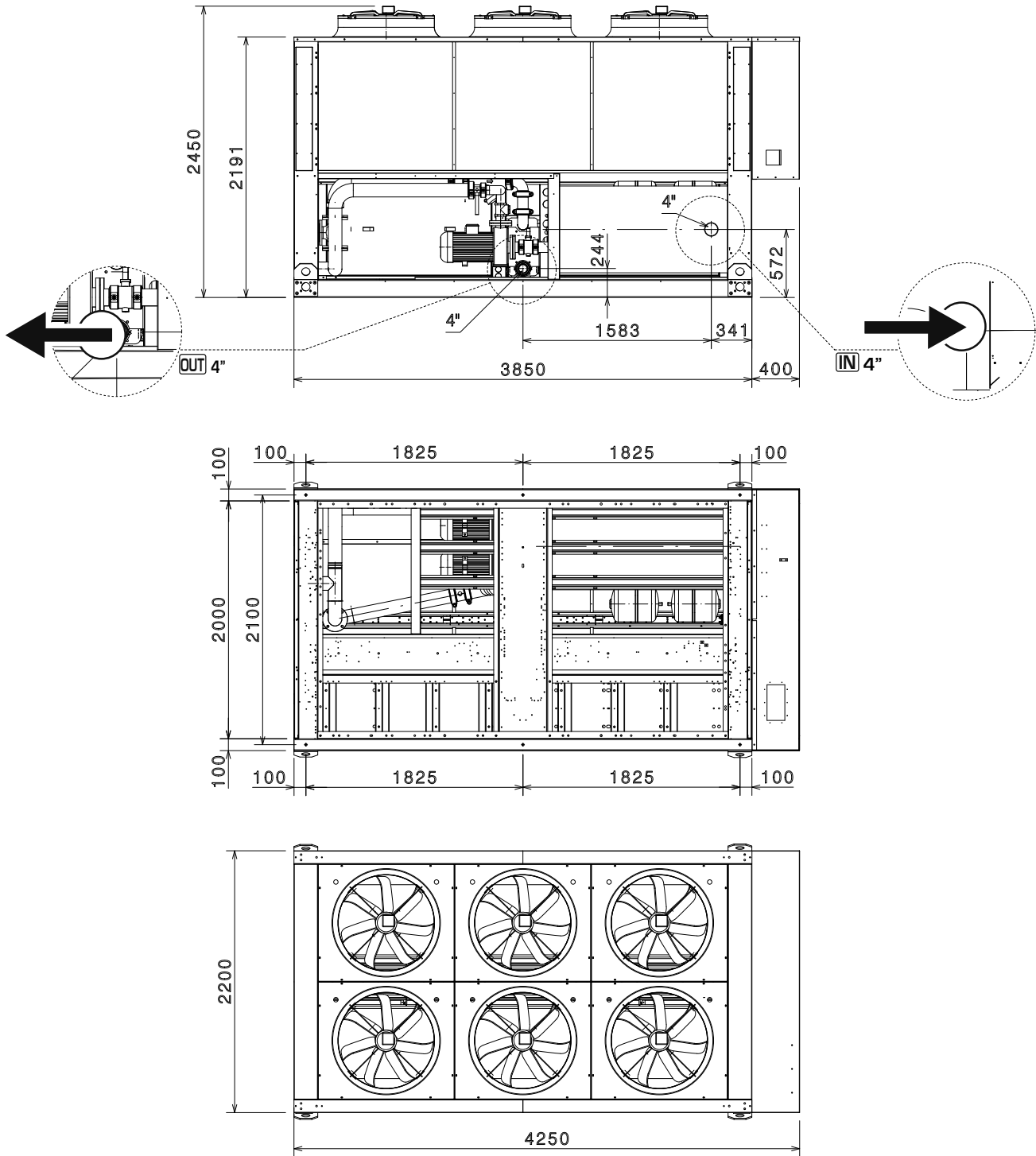
ATTENTION
 The hydraulic attachments
 are the Victalic type



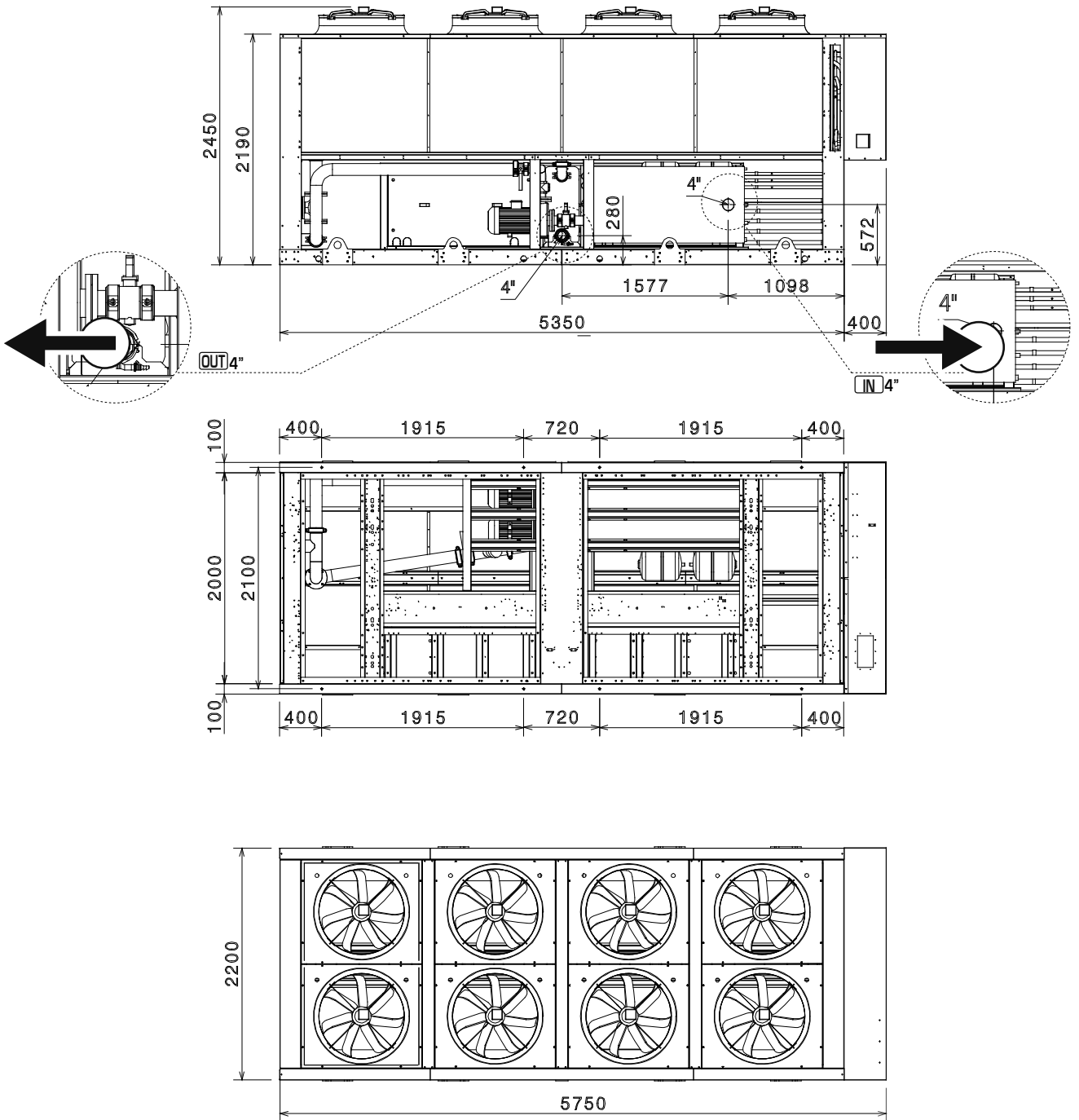
ATTENTION
The hydraulic attachments
are the Victallic type



ATTENTION
The hydraulic attachments
are the Victalic type

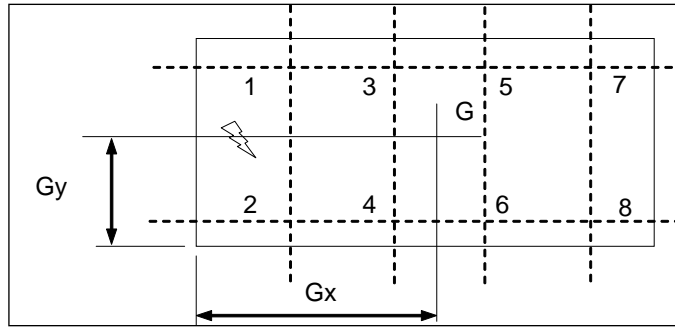


ATTENTION
 The hydraulic attachments
 are the Victallic type



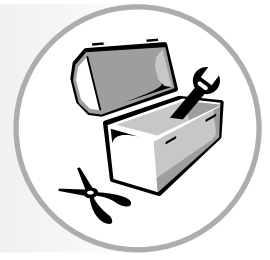
ATTENTION
 The hydraulic attachments
 are the Victalic type

19.1. PERCENTAGE WEIGHT DISTRIBUTION ON FC A-E SUPPORTS



MODEL	A VACUUM			RUNNING				PERCENTAGE OF WEIGHT DISTRIBUTION SUPPORTS (%)								VT AVX	KIT	
	WEIGHT (Kg)	CENTRE OF GRAVITY		TOTAL WEIGHT		CENTRE OF GRAVITY		1	2	3	4	5	6	7	8			
		Xg	Yg	Kg	Water	Xg	Yg											
NRL 750 F A/E	00	1889	2024	773	1920	31	2027	766	9%	9%	13%	13%	25%	26%	3%	3%	VT	23
NRL 750 F A/E	03	2079	2116	771	2670	531	2169	761	7%	7%	12%	13%	28%	29%	2%	2%	VT	23
NRL 750 F A/E	04	2139	2083	771	2610	531	2144	762	7%	7%	13%	13%	28%	29%	2%	2%	VT	23
NRL 750 F A/E	P3	1949	2098	772	2040	31	2100	765	8%	9%	12%	12%	26%	27%	3%	3%	VT	23
NRL 750 F A/E	P4	2009	2062	773	1980	31	2065	765	9%	9%	12%	13%	26%	27%	3%	3%	VT	23
NRL 800 F A/E	00	2470	1399	854	2610	140	1425	867	10,7%	16,5%	20,1%	30,9%	8,6%	13,2%	-	-	AVX	739
NRL 800 F A/E	03	2820	1377	971	3690	870	1365	1140	16,0%	14,9%	24,8%	23,0%	11,0%	10,2%	-	-	AVX	740
NRL 800 F A/E	04	2890	1373	991	3760	870	1362	1152	16,3%	14,8%	25,0%	22,7%	11,1%	10,1%	-	-	AVX	740
NRL 800 F A/E	P3	2650	1360	916	2870	220	1368	952	12,6%	16,6%	22,0%	28,9%	8,6%	11,2%	-	-	AVX	741
NRL 800 F A/E	P4	2700	1349	933	2920	220	1358	966	13,0%	16,6%	22,4%	28,6%	8,6%	10,9%	-	-	AVX	741
NRL 900 F A/E	00	2650	1434	868	2810	160	1456	887	10,4%	15,4%	20,8%	30,8%	9,1%	13,5%	-	-	AVX	739
NRL 900 F A/E	03	3000	1409	977	3890	890	1391	1140	15,4%	14,3%	25,1%	23,3%	11,4%	10,6%	-	-	AVX	743
NRL 900 F A/E	04	3070	1405	996	3960	890	1388	1152	15,6%	14,2%	25,3%	23,0%	11,4%	10,4%	-	-	AVX	743
NRL 900 F A/E	P3	2830	1395	926	3070	240	1401	964	12,2%	15,6%	22,6%	28,9%	9,1%	11,6%	-	-	AVX	744
NRL 900 F A/E	P4	2880	1384	941	3120	240	1391	977	12,5%	15,7%	22,9%	28,6%	9,1%	11,3%	-	-	AVX	744
NRL 1000 F A/E	00	2840	1415	836	3020	180	1437	852	10,1%	16,0%	20,3%	32,1%	8,4%	13,2%	-	-	AVX	745
NRL 1000 F A/E	03	3190	1393	942	4100	910	1380	1102	14,9%	14,8%	24,6%	24,5%	10,6%	10,6%	-	-	AVX	746
NRL 1000 F A/E	04	3260	1389	961	4170	910	1377	1114	15,2%	14,8%	24,8%	24,2%	10,7%	10,4%	-	-	AVX	746
NRL 1000 F A/E	P3	3010	1379	892	3280	270	1386	928	11,8%	16,2%	22,0%	30,2%	8,4%	11,5%	-	-	AVX	747
NRL 1000 F A/E	P4	3060	1369	907	3330	270	1378	941	12,1%	16,2%	22,3%	29,8%	8,4%	11,2%	-	-	AVX	747
NRL 1250 F A/E	00	3120	1820	831	3290	170	1847	845	10,3%	16,5%	19,5%	31,3%	8,6%	13,8%	-	-	AVX	748
NRL 1250 F A/E	03	3470	1748	929	4370	900	1662	1081	15,7%	16,3%	24,8%	25,6%	8,6%	8,9%	-	-	AVX	749
NRL 1250 F A/E	04	3540	1735	946	4440	900	1653	1092	16,0%	16,2%	25,0%	25,4%	8,6%	8,7%	-	-	AVX	749
NRL 1250 F A/E	P3	3300	1782	882	3550	250	1792	915	11,8%	16,5%	21,1%	29,6%	8,7%	12,3%	-	-	AVX	750
NRL 1250 F A/E	P4	3350	1772	896	3600	250	1782	927	12,0%	16,5%	21,3%	29,3%	8,8%	12,0%	-	-	AVX	750
NRL 1400 F A/E	00	3380	1830	846	3580	200	1854	865	9,9%	15,3%	21,0%	32,4%	8,4%	13,0%	-	-	AVX	752
NRL 1400 F A/E	03	3740	1760	936	4660	920	1679	1083	15,0%	15,5%	25,8%	26,6%	8,4%	8,7%	-	-	AVX	753
NRL 1400 F A/E	04	3810	1747	953	4740	930	1669	1094	15,3%	15,5%	26,0%	26,3%	8,4%	8,5%	-	-	AVX	753
NRL 1400 F A/E	P3	3560	1793	894	3840	280	1802	930	11,3%	15,5%	22,4%	30,6%	8,5%	11,6%	-	-	AVX	754
NRL 1400 F A/E	P4	3620	1782	908	3900	280	1792	942	11,6%	15,5%	22,7%	30,3%	8,5%	11,4%	-	-	AVX	754
NRL 1500 F A/E	00	3660	1833	814	3880	220	1856	831	9,0%	14,9%	21,1%	34,8%	7,6%	12,6%	-	-	AVX	757
NRL 1500 F A/E	03	4020	1768	901	4970	950	1691	1043	13,8%	15,4%	25,8%	28,6%	7,8%	8,6%	-	-	AVX	753
NRL 1500 F A/E	04	4090	1756	918	5040	950	1682	1054	14,1%	15,3%	26,0%	28,3%	7,7%	8,4%	-	-	AVX	753
NRL 1500 F A/E	P3	3840	1799	860	4150	310	1808	893	10,3%	15,1%	22,5%	32,9%	7,7%	11,3%	-	-	AVX	758
NRL 1500 F A/E	P4	3900	1789	874	4200	300	1799	905	10,6%	15,2%	22,8%	32,6%	7,8%	11,1%	-	-	AVX	758
NRL 1650 F A/E	00	4220	2476	894	4470	250	2464	922	11,1%	15,4%	12,7%	17,7%	10,4%	14,5%	7,6%	10,6%	AVX	761
NRL 1650 F A/E	03	4600	2453	970	5580	980	2410	1097	11,9%	12,0%	18,1%	18,2%	12,7%	12,8%	7,2%	7,2%	AVX	762
NRL 1650 F A/E	04	4710	2447	988	5690	980	2406	1110	12,0%	11,7%	18,5%	18,2%	12,9%	12,6%	7,1%	7,0%	AVX	762
NRL 1650 F A/E	P3	4430	2463	937	4760	330	2447	976	11,4%	14,3%	14,3%	17,9%	11,1%	13,9%	7,6%	9,5%	AVX	763
NRL 1650 F A/E	P4	4510	2458	953	4850	340	2442	990	11,5%	14,0%	14,7%	18,0%	11,3%	13,8%	7,5%	9,2%	AVX	763
NRL 1800 F A/E	00	4420	2479	870	4710	290	2468	893	10,7%	15,6%	12,5%	18,2%	10,0%	14,6%	7,5%	10,9%	AVX	766
NRL 1800 F A/E	03	4810	2456	944	5830	1020	2415	1067	11,6%	12,3%	17,6%	18,7%	12,2%	13,0%	7,1%	7,5%	AVX	762
NRL 1800 F A/E	04	4910	2450	962	5930	1020	2411	1080	11,6%	12,1%	18,0%	18,7%	12,4%	12,9%	7,1%	7,3%	AVX	762
NRL 1800 F A/E	P3	4630	2466	912	5010	380	2452	947	11,0%	14,6%	13,9%	18,5%	10,7%	14,1%	7,4%	9,8%	AVX	763
NRL 1800 F A/E	P4	4720	2461	928	5090	370	2447	961	11,1%	14,3%	14,4%	18,5%	10,8%	14,0%	7,4%	9,5%	AVX	763

FOR THE INSTALLER



20. SELECTION AND PLACE OF INSTALLATION

Before beginning installation consent with client and pay attention to the following recommendations:

- The support surface must be capable of supporting the unit weight.
- The safety differences between the unit and other appliances or structures must be scrupulously respected so that the inlet and outlet air from the fans is free to circulate.
- The unit must be installed by an enabled technician in compliance with the national legislation in force in the country of destination, respecting the minimum technical spaces in order to allow maintenance.

21. POSITIONING

The machine is delivered from the factory wrapped in estincoil. Before handling the unit, verify the lifting capacity of the machines used. After removal of packaging, move-



The unit must be installed by a qualified and suitably trained technician, in compliance with the national legislation in force in the country of destination (Ministerial Decree 329/2004). AERMEC will not assume any responsibility for damage due to failure to follow these instructions.



Before beginning any operation, READ THESE INSTRUCTIONS CAREFULLY AND CARRY OUT THE SAFETY CHECKS TO REDUCE ALL RISK OF DANGER TO A MINIMUM. All the staff involved must have thorough knowledge of the operations and any dangers that may arise at the moment in which the installation operations are carried out.

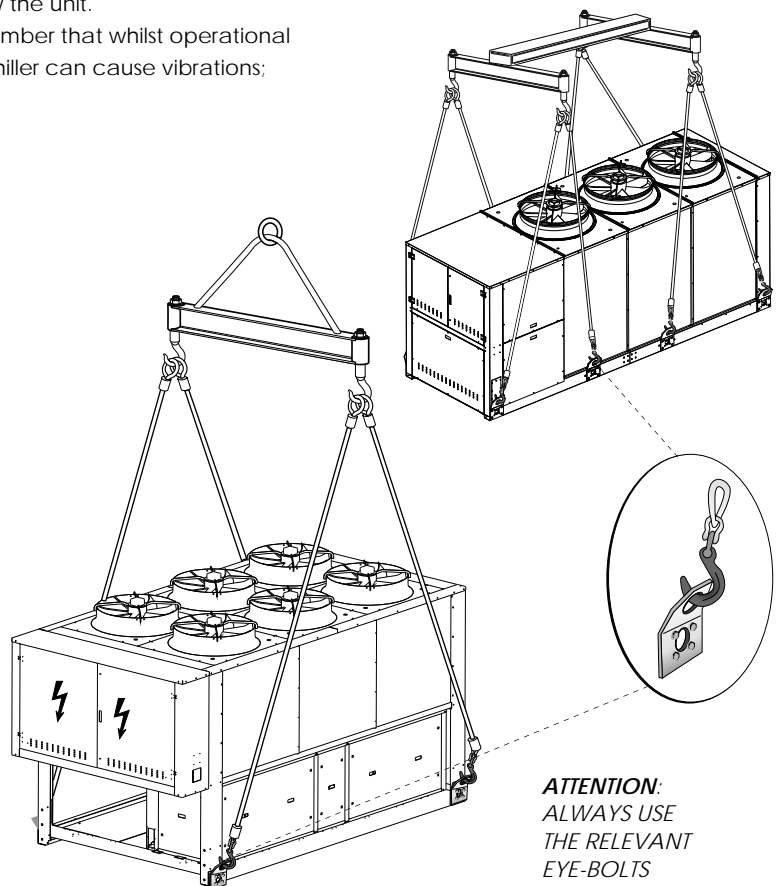
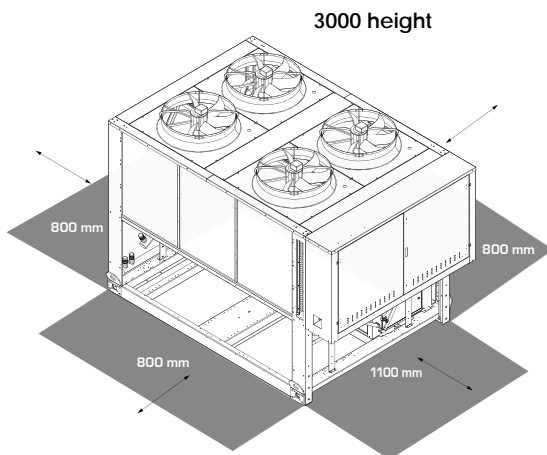
ment of apparatus must be carried out by qualified and adequately equipped personnel. To handle the machine: see figure

- attach the lifting belts to the relevant eye-bolts (as indicated in figure).
- ATTENTION: ALWAYS USE THE RELEVANT EYE-BOLTS**
- To ensure that the structure of the unit is not damaged, place protection between the lifting belt and the unit. It is strictly prohibited to stand below the unit.
- Remember that whilst operational the chiller can cause vibrations;

therefore anti-vibration mounts (AVX accessories) are recommended, fixed in the holes on the base according to the assembly layout.

- It is mandatory to foresee to the necessary technical space in order to allow ROUTINE AND EXTRAORDINARY MAINTENANCE interventions
- Fix the unit checking that it is level. Make sure that the hydraulic and electric part can be easily reached.

MINIMUM TECHNICAL (mm)



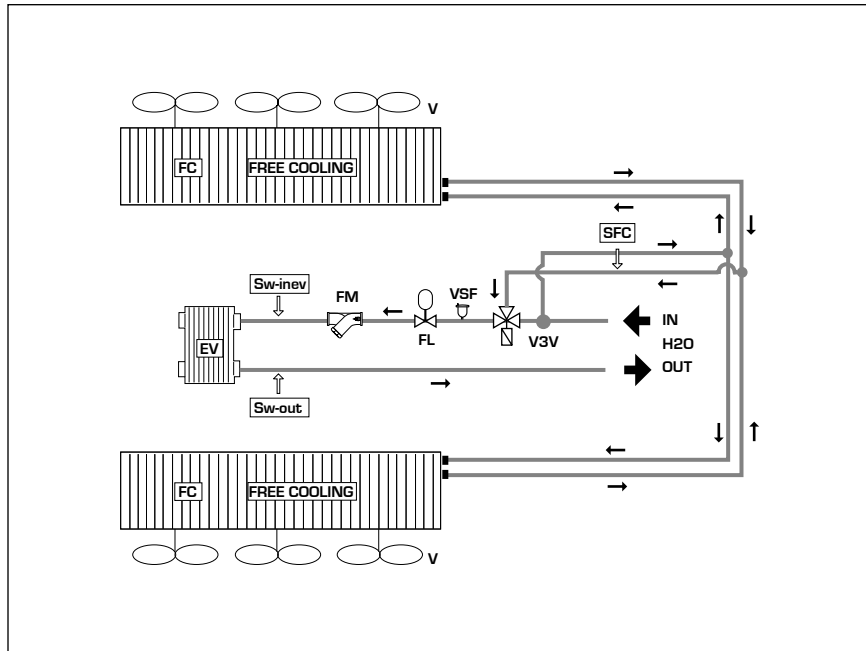
ATTENTION:
ALWAYS USE
THE RELEVANT
EYE-BOLTS

22. EXAMPLE OF HYDRAULIC CIRCUITS

HYDRAULIC CIRCUIT INDOOR NRL "00"

The hydraulic circuit is made up from:

- Water - air coil
- Flow meter
- Water filter
- Inlet water temperature probe
- Outlet water temperature probe
- Free-cooling probe
- Plate evaporator
- Motorised 3-way valve
- Air separator with automatic vent valve

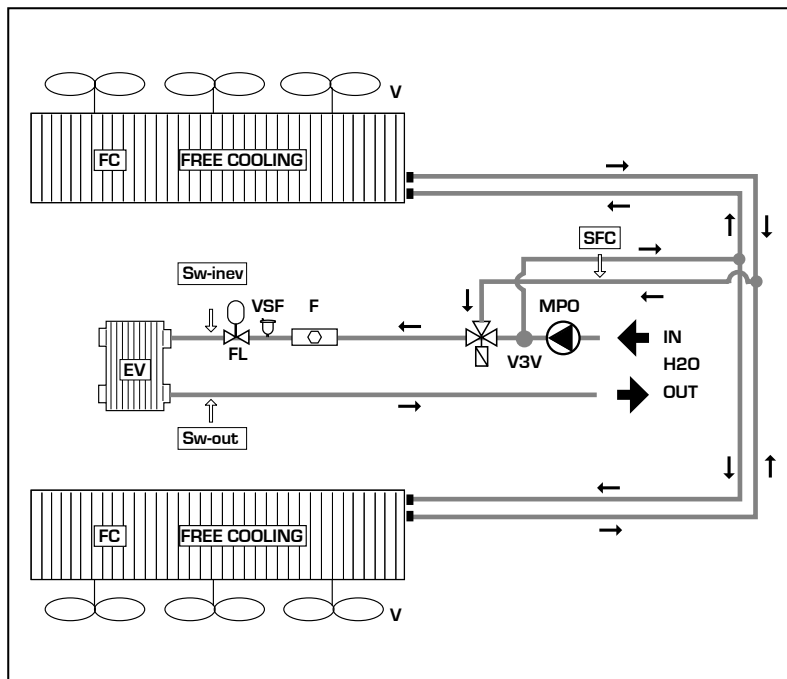


The diagrams shown here are only an example

HYDRAULIC CIRCUIT INDOOR NRL "P3-P4"

The hydraulic circuit is made up from:

- Water - air coil
- Flow meter
- Water filter
- Water pump
- Inlet water temperature probe
- Outlet water temperature probe
- Free-cooling probe
- Plate evaporator
- Motorised 3-way valve
- Air separator with automatic vent valve

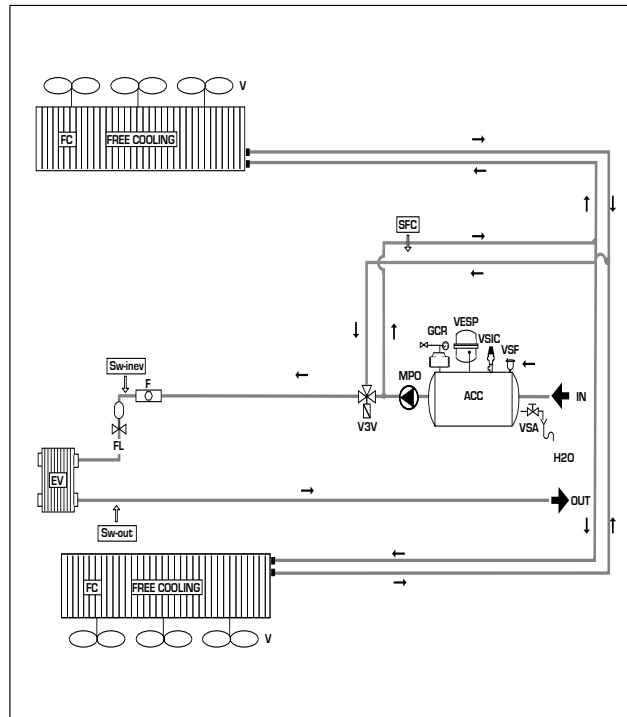


The diagrams shown here are only an example

HYDRAULIC CIRCUIT INDOOR NRL "03-04"

The hydraulic circuit is made up from:

- Storage tank
- Water - air coil
- Flow meter
- Water filter
- Water pump
- Inlet water temperature probe
- Outlet water temperature probe
- Plate evaporator
- Loading unit with manometer
- Motorised 3-way valve
- Air separator with automatic vent valve
- Water drain valve
- Safety valve



The diagrams shown here are only an example

KEY:

ACC	Storage tank
FC	Water - air coil
FL	Flow meter
FM	"Y" water filter
MPO	Water pump
SW-in	Inlet water temperature probe
SW-out	Outlet water temperature probe
F	Water filter
VSIC	Safety valve

EV	Plate evaporator
GCR	Loading unit with manometer
V	Fan
VESP	Expansion vessel
V3V	Motorised 3-way valve
VSF	Air separator with automatic vent valve
VSA	Water drain valve
SFC	Free-cooling probe

22.1. EXTERNAL HYDRAULIC CIRCUIT

The choice and the installation of components external to the NRL is up to the installer, who must operate according to the rules of good technical design and in compliance with the regulations in force in the country of destination (Ministerial Decree 329/2004). Before connecting the pipes make sure that they do not contain stones, sand, rust, sludge or foreign bodies that could damage the system. It is good practice to realise a unit by-pass to be able to wash the pipes without having to disconnect the appliance. The connection piping must be adequately supported so that its weight is not borne by the appliance.

It is recommended to install the following tools on the water circuit, whenever not envisioned in the version in your possession:

1. two manometers with suitable scale (in inlet and outlet).
2. Two anti-vibration joints (in inlet and in outlet).
3. Two cut-off valves (in normal input, in calibration valve output).
4. two thermometers (in inlet and in outlet).
5. Safety valve

It is necessary that the cooling unit water flow rate is in compliance with the values given in the performance tables.

The systems loaded with anti-freeze or particular legal dispositions, make the use of water disconnectors mandatory. Supply/reintegration water details, must be conditioned with appropriate treatment systems.

22.2. SYSTEM LOADING

- Before starting loading, check that the system drain cock is closed.
- Open all system vent valves and relative terminals.
- Open the system cut-off devices.
- Start filling by slowly opening the system water loading cock outside the appliance.
- When water starts to escape from the terminal vent valves, close them and continue loading until the value of 1.5 bar is read on the manometer.

The system must be loaded at a pressure between 1 and 2 bar.

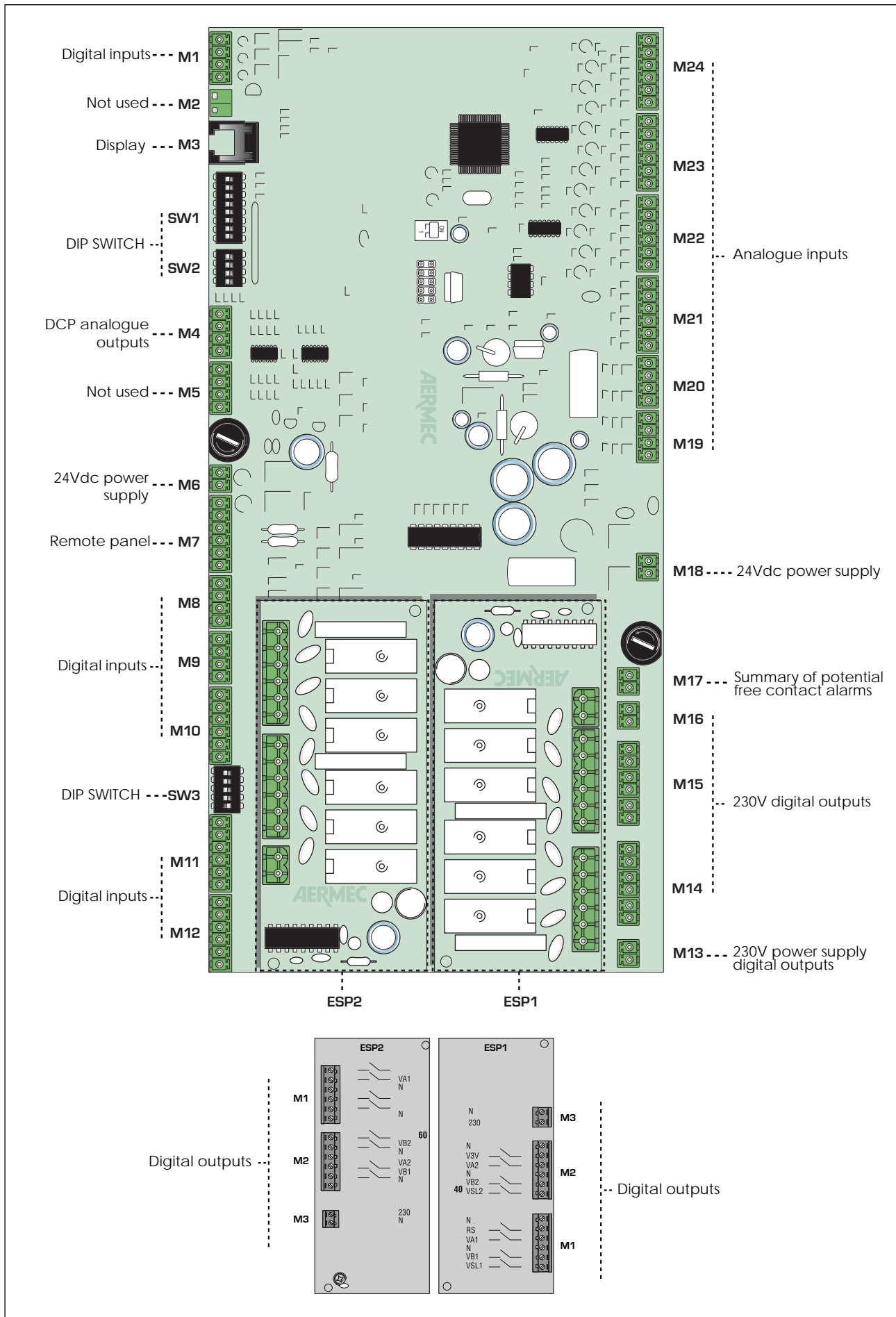
It is recommended to repeat this operation after the appliance has functioned for a few hours and to periodically check the system pressure, reintegrating it if it falls below 1 bar. Check the hydraulic sealing of the joints.

22.3. EMPTYING THE SYSTEM

- Before beginning emptying, place the master switch at "OFF"
- Check that loading/water system reintegration cock is closed
- Open the drain cock outside the appliance and all system vent valves and relative terminals.

If anti-freeze is used by the unit, it must not be dumped as it is harmful to the environment. It should be collected and if possible reused.

22.4. "GR3" CONTROL BOARD



23. ELECTRIC CONNECTIONS

The NRL chillers are completely wired at the factory and only require connection to the electrical mains, downstream from a unit switch, according to that envisioned by the Standards in force on this subject in the country of installation.

It is also advised to check that:

- the electrical mains features are suitable for the absorption values indicated in the electrical data table, also taking into consideration any other machines operating at the same time.
- The unit is only powered when installation has been completed (hydraulic and electric).
- Respect the connection indications of the phase and earth wires.
- The power supply line must have a relevant protection mounted upstream against short circuits and dispersions to earth, which isolates the system with respect to other utilities.
- The voltage must be within a tolerance of $\pm 10\%$ of the nominal power supply voltage of the machine (for unbalanced three-phase unit max 3% between the phases). Whenever these parameters are not respected, contact the electric energy public body. For electric connections, use the cables with double isolation according to the Standards in force on this subject in the different countries.
- The use of an omnipolar magnet circuit breaker switch is mandatory, in compliance with the IEC-EN Standards (contact opening at least 3 mm), with suitable cut-off power and differential protection on the basis of the electric data table shown below, installed as near as possible to the appliance.
- It is mandatory to make an effective earth connection. The manufacturer cannot be considered responsible for any damage caused by the lack of or ineffective appliance earth connection.
- For units with three-phase power supply, check the correct connection of the phases.

WARNING:

It is prohibited to use the water pipes to earth the appliance.



All the electrical operations must be carried out by STAFF IN POSSESSION OF THE NECESSARY QUALIFICATIONS BY LAW suitably trained and informed on the risks related to these operations.



The characteristics of the electrical lines and of the related components must be determined by STAFF QUALIFIED TO DESIGN ELECTRICAL SYSTEMS, in compliance with the international and national regulations of the place of installation of the unit and in compliance with the regulations in force at the moment of installation.



For the installation requirements refer only to the electrical diagram supplied with the appliance. The electrical diagram along with the manuals must be kept in good condition and ALWAYS AVAILABLE FOR ANY FUTURE SERVICING ON THE UNIT.



IT IS mandatory to verify that the machine is watertight before making the electrical connections and it must only be powered up after the hydraulic and electrical works have been completed.

23.1. RECOMMENDED ELECTRIC CABLE SECTION

The cable section shown in the table are recommended for maximum lengths of 50m.

For longer lengths or different cable laying, it is up to the PLANNER to calculate the appropriate line switch, the power supply line as well as the connection to the earth wire and connection cables depending on:

- The length
- The type of cable
- Of the absorption of the unit and the physical location, and the ambient temperature.

ATTENTION:

Check the tightening of all power wire clamps on commissioning and after 30 days from start-up. Successively, check tightness of all power clamps every 6 months.

Loosened clamps can determine overheating of cables and components.

23.2. CONNECTION TO THE POWER SUPPLY NETWORK

- Make sure that there is no voltage present on the electric line you will connect to.

23.2.1. To access the electric box:

- Make $\frac{1}{4}$ anti-clockwise turn to the screws on the electric control board
- Turn the door lock isolating handle to OFF (see figure). In this way access is given to the electric control board

23.3. ELECTRIC POWER CONNECTION

- For the functional connection of the unit, take the power supply cable to the electric inside the unit fig. 1 and connect to the isolator clamps, respecting the phase and the earth fig.2

23.4. AUXILIARY CONNECTIONS UNDER THE RESPONSIBILITY OF THE USER/INSTALLER

The clamps to which reference is made in the following explanations are part of the GR3 terminal board. For the installation requirements refer only to the electrical diagram supplied with the appliance.

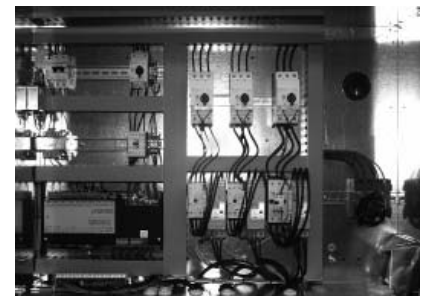
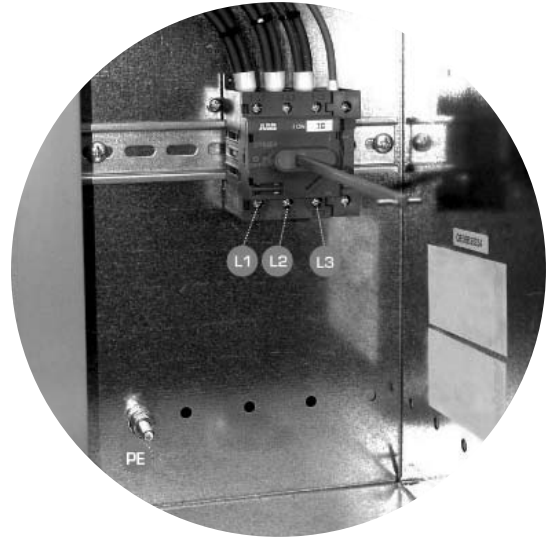


Fig. 1

The electrical diagram along with the manuals must be kept in good condition and ALWAYS AVAILABLE FOR ANY FUTURE SERVICING ON THE UNIT.

MODEL	VERSION	SEZ A mm ²	SEZ B mm ²	Earth (sec PE) mm ²	IL A
NRL 750	EF-AF	95	1,5	50	200
NRL 800	EF-AF	95	1,5	50	200
NRL 900	EF-AF	95	1,5	50	250
NRL 1000	EF-AF	95	1,5	50	250
NRL 1200	EF-AF	120	1,5	70	315
NRL 1400	EF-AF	120	1,5	70	315
NRL 1500	EF-AF	185	1,5	95	350
NRL 1650	EF-AF	2X185	1,5	150	400
NRL 1800	EF-AF	2X185	1,5	150	400

Key	
Sec A	400V-3N-50Hz power supply for NRL 750 FC version only
Sec A	400V-3-50Hz power supply from NRL 800 FC to NRL 1800 FC
Earth	Earth wire to connect to unit
IL	Master switch



▲
Fig. 2

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

23.4.1. Auxiliary switch (IAD)

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

23.4.2. Pump contactor (CP01 - CP02)

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

23.4.3. External alarm (AE)

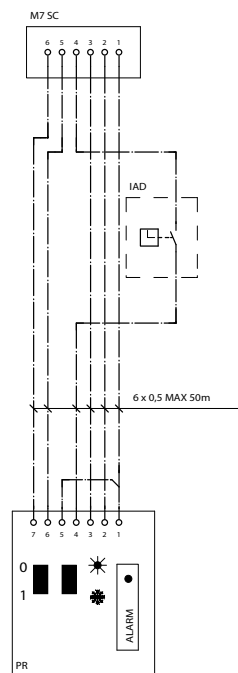
Per predisporre un dispositivo di allarme esterno, collegare il contatto del dispositivo al morsetto 1 e 2 della morsettiera M17.

23.4.4. Connection PR3 (as per standard)

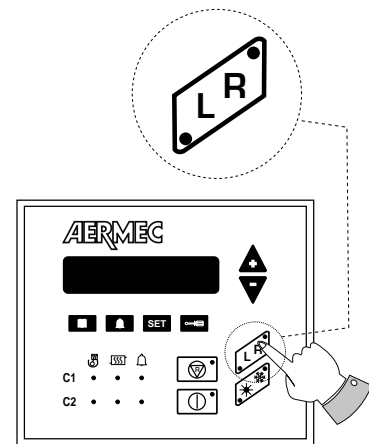
Connect the remote panel PR3 to the terminal board M7 SC (as stated below), remember that the maximum distance accepted is 50 mt.

THE PR3 MUST BE ENABLED AS WELL AS CONNECTED. See procedure at the side

REMOTE PANEL CONNECTION - PR3



REMOTE PANEL ENABLING - PR3



To enable the remote panel PR3:

- act on the L/R key on the GR3 panel on the machine (as shown in the figure above)
- when the LED near to the letter R switches on (Remote), machine functioning will be enabled from the remote panel.

24. CONTROL AND COMMISSIONING

24.1. PREPARATION FOR COMMISSIONING

Please note that, on request by the Aermec customer or the legitimate owner of the machine, the units in this series can be started up by the AERMEC After-Sales Service in your area (valid only on Italian territory).

The start of operation must be scheduled in advance based on the timeframe for the completion of works for the system. Prior to the work to be carried out by the AERMEC After-Sales Service, all other works (electrical and hydraulic connections, loading and bleeding of air from the system) must have been completed.

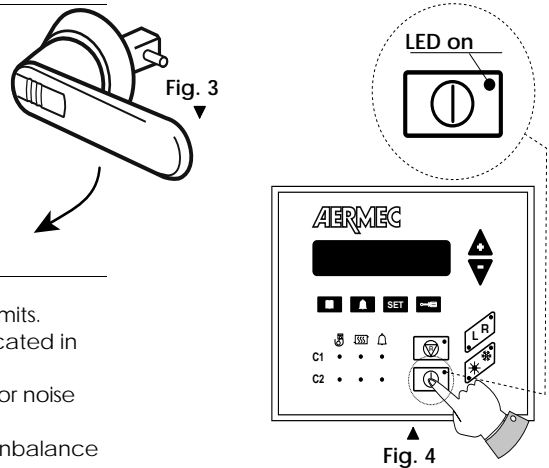
Before starting the unit make sure that:

- All safety conditions have been respected
- The unit is correctly fixed to the support surface
- The minimum technical spaces have been respected;
- The hydraulic connections have been made respecting the inlet and outlet
- The hydraulic plant has been loaded and bled.
- The hydraulic circuit cocks are open
- The electric connections have been made correctly
- The voltage is within the tolerance of 10% of the unit nominal value
- The earth connection has been made correctly
- All electric and hydraulic connections have been tightened well.

24.2. MACHINE COMMISSIONING

Before starting the unit:

- Close the electric control board hatch.
- Position the appliance door-lock isolating switch at ON, turning the handle downwards. (fig.3)
- Press the ON key to switch the machine on (fig.4) when the LED is switched on the machine is ready for functioning.

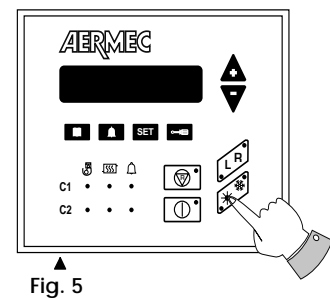


24.3. SEASON CHANGEOVER

- For every season change, check that the functioning limits lie within the limits.
- Check that the compressor input current is lower than the maximum indicated in the technical data table.
- Check, that in models with three-phase power supply, that the compressor noise level is not abnormal. If this is the case, invert a phase.
- Make sure that the voltage value lies within the pre-fixed limits and that unbalance between the three phases (three-phase power supply) is not above 3%.

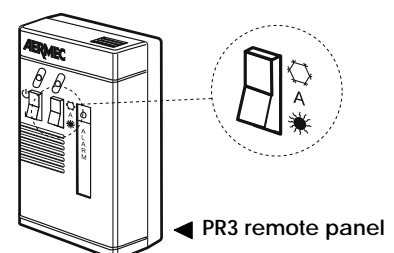
24.3.1. Season changeover from panel on machine

To activate season change, just press the key indicated in (fig. 5). To make sure the operation results positively, the machine must be activated in remote and local mode. For further information refer to the USER MANUAL.



24.3.2. Season changeover from PR3

- Just act directly on the switch. The machine switches off automatically and switches back-on with the selected functioning mode.



WARNING

Commissioning must be performed with standard settings. Only when the inspection has been completed can the functioning Set Point values be changed.

Before start-up, power the unit for at least 12-24 hours positioning the protection magnet circuit breaker switch and the door lock isolating switch at ON fig. 1 Make sure that the control panel is off in order to allow the compressor sup oil to heat.



25. FUNCTIONING FEATURES

25.1. SET POINT IN COOLING MODE

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

25.2. SET POINT IN HEATING MODE

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

If the unit power supply is restored after a temporary interruption, the set mode will be kept in the memory.

25.3. COMPRESSOR START-UP DELAY

Two functions have been prepared to prevent compressor start-ups that are too close.

- Minimum time from last switch-off 60 seconds.
- Minimum time from last switch-on 300 seconds.

25.4. CIRCULATION PUMP

The circuit board envisions an output for the management of the circulation pump. After the first 10 seconds that the pump functions, when the water flow rate is in normal working conditions, the water flow rate alarm functions are activated (flow meter).

25.5. ANTI-FREEZE ALARM

The anti-freeze alarm is active if the machine is off or in stand-by mode. In order to prevent the plate heat exchanger from breaking due to the water it contains freezing, envision compressor block (if the machine is on below 4 °C) and ignition of the resistance (if standby below 5 °C). If the temperature detected by the probe positioned in output of the heat exchanger and in inlet to the chiller is less than +4°C.

WARNING

THIS ANTI-FREEZE SET TEMPERATURE CAN ONLY BE VARIED BY AN AUTHORISED AFTER-SALES CENTRE AND ONLY AFTER HAVING CHECKED THAT THERE IS ANTI-FREEZE SOLUTION IN THE WATER SYSTEM.

The intervention of this alarm determines compressor block and not pump block, which remains active along with the switch-on of the resistance if installed.

To restore normal functions the temperature of the outlet water must rise above +4°C. Rearm is manual.

ATTENTION:

WHENEVER THIS ALARM INTERVENES, WE ADVISE YOU CALL THE NEAREST

AFTER-SALES SERVICE IMMEDIATELY

25.6. WATER FLOW RATE ALARM

The GR3 manages a water flow rate alarm controlled by the flow switch installed in series on the machine. This type of safety device intervenes after the first 10 seconds of pump functioning, if the water flow rate is not sufficient.

The intervention of this alarm determines compressor and pump block.

26. ROUTINE MAINTENANCE

All cleaning is prohibited until the unit has been disconnected from the electric power supply mains.

Make sure there is no voltage present before operating.

Periodic maintenance is fundamental to keep the unit perfectly efficient under a functional and energetic point of view. It is therefore essential to carry out periodic yearly controls for the:

26.6.1. Hydraulic circuit

CHECK:

- Refilling of water circuit
- Cleaning the water filter
- Flow switch control
- No air in the circuit (vent)
- That the water flow rate to the evaporator is constant
- The thermal insulation of the hydraulic piping.
- The percentage of glycol where necessary

26.6.2. Electrical circuit

CHECK:

- Safety efficiency
- Electric supply pressure
- Electrical Input
- Connection tightness
- Functioning of the compressor sump resistance

26.6.3. Cooling circuit

CHECK:

- State of compressor
- Efficiency of the plate heat exchanger resistance
- Work pressure
- Leak test for watertightness control of the cooling circuit
- Functioning of high and low pressure pressure switches
- Carry out the appropriate checks on the filter dryer to check efficiency.

26.6.4. Mechanical checks

CHECK:

- The tightening of the screws the compressors and the electrical box, as well as the exterior panelling of the unit. Insufficient fastening can lead to undesired noise and vibrations.
- The condition of the structure. If there are any oxidised parts, treat with paint suitable to eliminate or reduce oxidation.

27. EXTRAORDINARY MAINTENANCE

the NRLs are filled with R410A gas and are inspected at the factory. Under normal conditions they do not require Technical Assistance related to control of refrigerant gas. Through time gas leakage may be generated from the joints, causing refrigerant to escape and



WARNING

Inspection, maintenance and eventual repair work must be carried out only by a legally qualified technician.



Lack of control/maintenance can cause damage to persons or things.



For appliances installed near to the sea, the maintenance intervals must be halved.

discharge the circuit, causing appliance malfunctioning. In these cases the leakage points are to be discovered, repaired and the Gas circuit is to be replenished, respecting the December 28 1993 n°549 law.

27.6.1. Load procedure

The load procedure is the following:

- Empty and dry the entire cooling circuit using a vacuum pump connected to the low and high pressure socket until 10 Pa is read on the vacuum meter. Wait a few minutes and check that this value does not rise above 50 Pa.
- Connect the refrigerant gas cylinder or a load cylinder to the socket on the low pressure line.
- Load the amount of refrigerant gas indicated on the appliance features plate.
- After a few hours of functioning, check that the liquid indicator indicates the dry circuit (dry-green). In the case of partial loss, the circuit must be emptied completely before being re-loaded.

- The R410A refrigerant must only be loaded in the liquid state.
- Functioning conditions that are different to the nominal conditions can give rise to values that are greatly different.
- The sealing test or the search for leaks must only be performed using R410A refrigerant gas, checking using a suitable leak detector.
- In the cooling circuit it is prohibited to use oxygen or acetylene or other inflammable or poisonous gases because they are a cause of explosions or intoxication.

We recommend to envision a machine book (not supplied, but the user's responsibility), which allows to keep track of the interventions performed on the unit. In this way it will be easy to suitably organise the interventions making research and the prevention of any machine breakdowns easier. Use the date to record date, type of intervention made (routine maintenance, inspection or repairs), description of the intervention, measures actuated...

IT IS forbidden to RELOAD the circuit with a refrigerant gas different to the one indicated. Using a different refrigerant gas can cause serious damage to the compressor.

DISPOSAL

Envisions that disposal of the unit is carried out in conformity with the Standards in force in the different countries.

28. R410A REFRIGERANT GAS

CHEMICAL NAME	CONCENTRATION [%]
Difluoromethane (R32)	50 %
Pentafluoromethane (R125)	50 %

PHYSICAL AND CHEMICAL PROPERTIES	
Physical form	Liquefied gas
Colour	Colourless
Odour	Ether
pH	at (25°C) neutral
Boiling point/interval	-52.8°C (-63°F)
non flammable point	not inflammable
Vapour pressure	11 740 hPa at 25 °C
Vapour pressure	21 860 hPa at 50 °C
Relative density	1.08 g/cm ³
Solubility	Water: 0.15 g/100 ml.

IDENTIFICATION OF DANGER
Skin contact with evaporating liquids can cause freezing. Strong concentrations of vapours can cause headache, dizziness, sleepiness, nausea, as well as lipothymia. Irregular heart beating (arrhythmia).

FIRST AID MEASURES	
General information	In the event of unconsciousness, place the person on one side in a stable position and call a doctor. Do not administer anything to an unconscious person. In case of irregular breathing or respiratory arrest, apply artificial respiration. In case of persistence of symptoms, call a doctor
Inhalation	In case of inhalation breath fresh air. In case of respiratory difficulty, apply oxygen mask. In case of respiratory arrest, apply artificial respiration. Contact a doctor.
Contact with the skin	Skin contact with evaporating liquids can cause freezing. In case of direct contact with the liquid, warm frozen parts with water and call a doctor. Remove all contaminated clothing and shoes. Wash clothing before re-use.
Contact with the eyes	Wash eyes with running water for at least 15 minutes, keeping eye lids open. If irritation persists, call a doctor.
Note for the doctor	Do not administer adrenalin or similar substances.

Toxicological information	<p>Inhalation: Irregular heart beating (arrhythmia).</p> <p>Ingestion: No specific risk.</p> <p>Skin contact: Skin contact with evaporating liquids can cause freezing. Slight irritation for the skin.</p> <p>Contact with the eyes: Slight irritation for the eye.</p>
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FIRE-FIGHTING MEASURES	
Fire-fighting equipment	<p>Not inflammable</p> <p>ASTM D-56-82: ASTM E-681.</p> <p>In case of fire, use fire hose, foam, dry chemical products or CO₂.</p>
Exposure risks	<p>Possibility of dangerous reactions of the unit during fire.</p> <p>F and/or Cl. Fire or overheating causes increase of pressure that can cause explosion of unit. Use fire hose to keep units exposed to fire cool.</p> <p>This product is not inflammable at room temperature and atmospheric pressure. However it can catch on fire if mixes with pressurised air and exposed to a strong source of ignition.</p>

MEASURES TO TAKE IN CASE OF ACCIDENTAL RELEASE	
Environmental precautions	Block leakage if there is no risk involved. Leakages can evaporate quickly.
Method of cleaning	Evaporates

MANIPULATION AND STORAGE	
Manipulation	<p>Carefully open to allow release of eventual internal pressure. Preserve and use away from heat sources, sparks, open flames or other ignition sources. Pressurised container. Protect against the sun's rays and do not expose to a temperature exceeding 50°C. Do not perforate or burn even after use. Place in a well ventilated area</p> <p>Wash thoroughly after handling of product.</p>
Precautions for safe use	<ul style="list-style-type: none"> • Make sure there is a sufficient exchange of air and/or exhaust system in the work places. For salvage and maintenance works, dismantling and disposal, use an autonomous respiratory device. The vapours are heavier than air and can cause suffocation by reducing the oxygen available for respiration. • Protect your hands with gloves that insulate from heat. • Protect your eyes with safety goggles. • Manipulate following good practices of industrial hygiene and safety.

ECOLOGICAL INFORMATION	
Substance	FORANE 32
In water	Not easily biodegradable: 5% after 28d (OCDE 107 guideline)
IN the air	<p>Degradation due to OH radicals: t_{1/2} life= 1472d</p> <p>Ozone destruction potential: ODP (R-11) = 0</p> <p>Potential greenhouse effect of the halogenated hydrocarbons: HGWP (R-11=1) = 0.13</p>
Bioaccumulation	<p>Practically not biaccumulable: log Pow = 0.21</p> <p>OCDE 107 guideline</p>

INFORMATION REGARDING THE STANDARD	
EEC Directive	D.91/155/EEC modified by D. 93/112/EEC and D.2001/58/CE:
Information sheets	Dangerous substances and prepared products
Dangerous prepared products	D.199/45/CE modified by D.2001/60/CE Not classified as dangerous

CONSIDERATIONS ON DISPOSAL	
Disposal methods	Dispose of access and non-recyclable products via the use of authorised disposal company. Refer to manufacturer/seller for information about collection/recycling.

PERSONAL PROTECTION	
Limit of professional exposure:	Difluoromethane (R32) LTEL - UK [ppm]: 1000

SYMBOLS

GB

Contains fluorinated greenhouse gases covered by the Kyoto Protocol

R410A (Global warming potential 1980)

ES

Contiene gases fluorados de efecto invernadero regulados por el Protocolo de Kioto

R410A (Potencial de calentamiento atmosférico 1980)

DE

Enthält vom Kyoto-Protokoll erfasste fluorierte Treibhausgase

R410A (Treibhauspotenzial 1980)

FR

Contient des gaz à effet de serre fluorés relevant du protocole de Kyoto

R410A (Potential de réchauffement planétaire 1980)

IT

Contiene gas fluorurati ad effetto serra disciplinati dal protocollo di Kyoto

R410A (Potenziale di riscaldamento globale 1980)

PT

Contém gases fluorados com efeito de estufa abrangidos pelo Protocolo de Quioto

R410A (Potencial de aquecimento global 1980)

GR

Περιέχει φθοριούχα αέρια θερμοκηπίου καλυπτόμενα από το πρωτόκολλο του Κιότο

R410A (Δυναμικό θέρμανσης του πλανήτη 1980)

PL

Zawiera fluorowane gazy cieplarniane objęte Protokołem z Kioto

R410A (Współczynnik ocieplenia globalnego 1980)

SE

Innehåller sådana fluorerade växthusgaser som omfattas av Kyotoprotokollet

R410A (Faktor för global uppvärmningspotential 1980)



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