AERMEC
air conditioning

English

NRL FREE-COOLING

R410A

TECHNICAL MANUAL FOR INSTALLATION AND MAINTENANCE

Air/water chillers with scroll compressor

HIGH EFFICIENCY AND HIGH EFFICIENCY LOW NOISE

❄ 59 kW - 85 kW

❄ 99 kW - 174 kW

CE

EUROVENT
CERTIFIED PERFORMANCE

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

INRLPY.0510.4538105_02

Dear customer,
thank you for choosing an AERMEC product. 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 quality level is being constantly monitored, so AERMEC products are synonymous with 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 once again.
AERMEC S.p.A

SUMMARY:

To install the unit, please observe the safety warnings included in these instructions


Danger: moving parts


Danger: cut off power supply


Danger: high temperature


General danger


Danger: power supply


Useful information and warnings

AERMEC S.p.A.
37040 Bevilacqua (VR) Italy – Via Roma, 996
Tel. (+39) 0442 633111
Telefax 0442 93730–(+39) 0442 93566
www .aermec. com - info @ aermec. com

NRL
FREE-COOLING

SERIAL NUMBER	

DECLARATION OF CONFORMITY	We, the undersigned, declare on our own exclusive responsibility that the object in question, so defined:
NAME	**NRL FREE-COOLING**
TYPE	**AIR/WATER chiller**
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 98/37/EC
- PED Directive relating to pressure equipment 97/23/EC

In compliance with Directive 97/23/EC, the product meets the Full quality assurance procedure (module H) with certificate no. 06/270-QT3664 Rev.5 issued by the notified body no. 1131 CEC via Pisacane 46 Legnano (MI) - Italy

Bevilacqua 15/01/2008

Marketing Director
Signature

1. WARNINGS ON THE DOCUMENTATION

1.1. INTENDED USE

AERMEC devices are built according to the recognised technical standards and safety regulations. These devices are designed and manufactured for cooling; they must be used for these purposes, in accordance with their performance characteristics. There may still arise risks for the safety of the user or third parties, or even damage to the units and other objects, in case of improper use.

Any use not specifically indicated in this manual is forbidden and **AERMEC cannot therefore be held responsible for any damage whatsoever resulting from the failure to observe these instructions.**

1.2. CONSERVING THE DOCUMENTATION

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

READ THIS DOCUMENT CAREFULLY. The unit must be installed by qualified skilled personnel, in compliance with the national legislation in force in the country of destination. (M.D. 329/2004).

The unit must be installed in such a way as to make all maintenance and/or repair operations possible. The warranty of the device does not in any case cover costs incurred as a result of motorised ladders, scaffolding or any other lifting systems made necessary to carry out the operations under warranty.

The warranty shall not be valid if the indications mentioned above are not observed.

2. ESSENTIAL SAFETY RULES

Remember that the use of products employing electricity and water requires the observance of some essential safety rules:

- The use of this unit is not intended for people (including children) with any physical or mental disability or any sensory impairment nor for people lacking experience and knowledge, unless they are supervised or instructed on the use of the unit by a person responsible for their safety. Children should be supervised in order to make sure that they do not play with the unit.
- It is forbidden to carry out any technical or maintenance operation before disconnecting the unit from the mains by positioning the system and control panel main switches at "off".
- It is forbidden to modify safety or regulation devices without the manufacturer's authorisation and indications.
- It is forbidden to pull, disconnect or twist the electrical cables of the unit, even if it has been disconnected from the mains.
- It is forbidden to leave containers and flammable substances near the unit.
- It is forbidden to touch the unit with wet parts of the body and bare feet.
- It is forbidden to open the access doors to the unit internal parts, without having first turned off the system main switch.
- It is forbidden to spread, leave or keep the packaging material within the reach of children as it may be a possible source of danger.

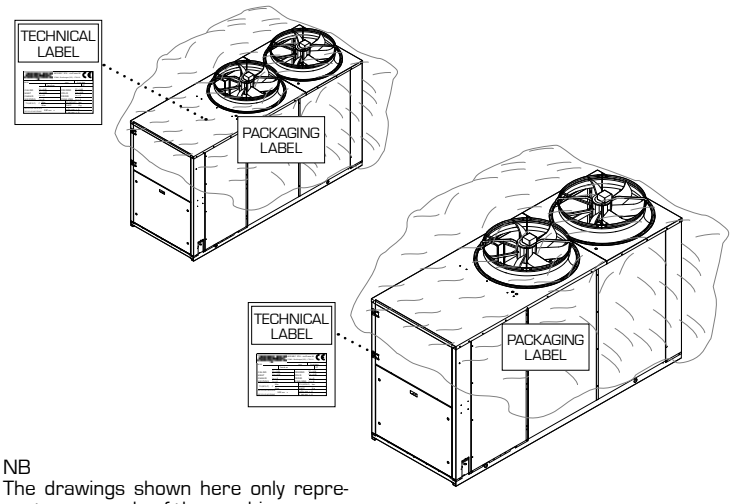
3. PRODUCT IDENTIFICATION

NRL is identifiable by:

– **the packaging label**
showing the product identification data

– **the technical label**
located on the electronic box side sill

NB
If the identification plate is tampered with, or removed, this prevents the certain identification of the product, making all installation and maintenance operations more difficult.



NB
The drawings shown here only represent an example of the machine.

4. DESCRIPTION OF THE UNIT

- The NRL F series appliances are water chillers equipped with an external air cooling capacity recovery system called "free-cooling". The water free-cooling system consists in integrating and eventually completely replacing the cooling capacity delivered by the compressors through an additional water coil that exploits the low temperature of the external air to cool the system's return water. Therefore, basically free chilled water can be obtained with this system for all installations where a continuos production is not required and therefore also with low external air temperatures; e.g. industrial processes, shopping centres, hospitals and other civil applications. Considerable energy saving can be achieved with this type of solution: when the return flow of the system is 2°C below the external air temperature, a three-way valve diverts the water into the free-cooling coil to be pre-cooled, after which it is sent to the evaporator where it is taken to the desired temperature. The NRL free-cooling units are comprised of two R410A refrigerating circuits and one water circuit that by means of a three-way valve can activate the free-cooling water coil positioned in series with the plate evaporator. The water circuit may or may not be supplied with an accumulator assembly. Thanks to several scroll type compressors and the fan speed control by means of the speed regulator, the NRL chillers can obtain various cooling capacity levels both in the compressors only mode as well as the free-cooling mode (partial or total).
  The electronic adjustment with optimised microprocessor for free-cooling controls and manages all the unit components and operating parameters; an internal memory registers the operating condition as soon as an alarm arises and subsequently displays it. The units have an IP 24 safety level. All appliances in the various versions are equipped as standard with:
  - fan speed control device,
  - evaporator antifreeze heating element,
  - compressor casing heater,
  - remote control panel,
  - water filter
  - flow switch

OPERATING MODE:

- **FREE-COOLING ONLY:**
  when the external temperature is sufficiently low to allow water cooling inside the free-cooling coils at the desired temperature. This is the most economical mode of the unit with only the fans operating in speed modulation.

- **MIXED FREE-COOLING + COMPRESSORS:**
  the compressors operate in integration with the free-cooling when the cooling capacity recovered from the external air is no longer sufficient for the power required by the system. The higher the cooling capacity recovery with free-cooling the lower the integration is.

- **COMPRESSORS ONLY:**
  when the external air temperature is greater than the return temperature of the system water.

4.1. CONFIGURATOR

1, 2, 3	4, 5, 6	7	8	9	10	11	12	13	14	15, 16
NRL	050	0	°	F	°	A	°	°	°	00

Field

1, 2 ,3 **Code** **NRL**

4, 5, 6 **Size** 028, 030, 033, 035, 050, 055, 060, 065, 070

7 **Compressors**
- **0** Standard compressor

8 **Thermostatic valve**
- **°** Standard mechanical thermostatic valve
- **Y** Mechanical thermostatic valve with processed water from +4°C to -6°C
- **X** Electronic thermostatic valve also with processed water up to -6°C

9 **Model**
- **F** Free-cooling
- **B** Free-cooling glycol free

10 **Heat recovery**
- **°** Without recovery units

11 **Version**
- **A** High efficiency
- **E** High efficiency, low noise operation

12 **Coils**
- **°** Made of aluminium
- **R** Made of copper
- **S** Tinned copper
- **V** In painted copper and aluminium (epoxy paint)

13 **Fans**
- **°** Standard
- **M** Enlarged

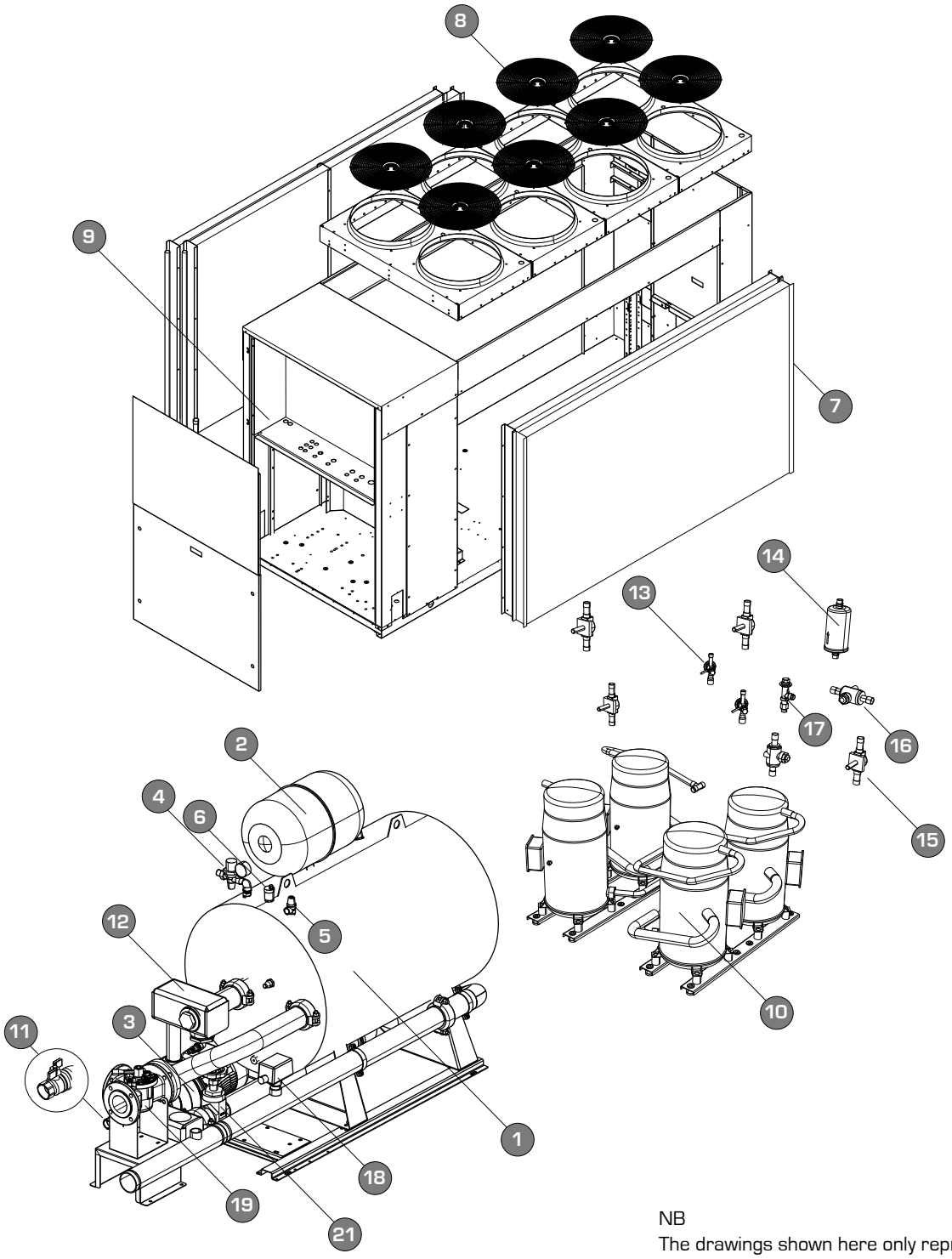
14 **Power supply**
- **°** 400V-3N-50Hz with thermomagnetic switches
- **1** 230V-3-50Hz with thermomagnetic switches
- **2** 500V-3-50Hz with thermomagnetic switches

15, 16 **Accumulator**
- **00** Without hydronic water accumulator
- **03** High-head water accumulator and single pump
- **04** High-head water accumulator and reserve pump
- **P3** Without water accumulator, with high-head pump
- **P4** Without water accumulator, with high-head pump and reserve pump

WARNING
With sizes 035 - 050 - 055 - 070 it is not possible to configure a 500V power supply

5. DESCRIPTION OF COMPONENTS

5.1. NRL 0280-0300-0330-0350

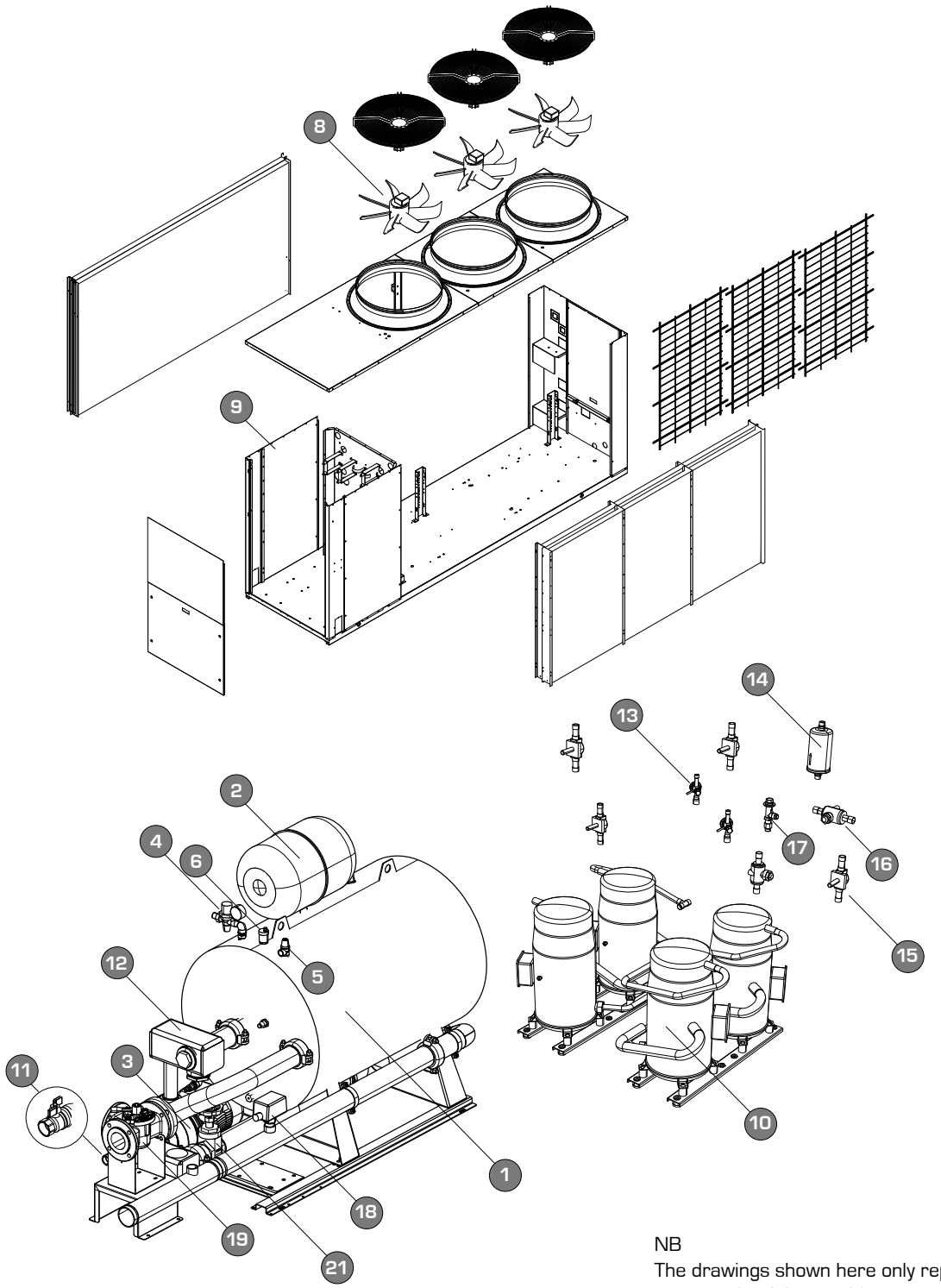


NB
The drawings shown here only represent an example of the machine.

KEY

1	Accumulator	12	Filter
2	Expansion tank	13	Thermostatic valves
3	Pump	14	Filter-drier
4	Charging unit	15	Solenoid valves
5	Safety valve	16	Tap
6	Drain valve	17	Cooling circuit safety valve
7	Free-cooling and condensing coils	18	Flow switch
8	Fans	19	Three-way valve
9	Electric box	20	Electric heater
10	Compressors	21	Shutter valve
11	Accumulator discharge		

5.2. NRL 0500-0550-0600-0650-0700



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

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

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.

Liquid and discharge taps
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.

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.

Non-return valve
Allows the flow of refrigerant in one direction only.

5.4. FRAME AND FANS

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

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 aeraulic system.

5.5. HYDRAULIC COMPONENTS

Air-water heat exchanger (free-cooling)
Crossed by water for the free-cooling function. It IS made of copper pipes and aluminium blades blocked through the mechanical expansion of the pipes. (High efficiency type).

Circulation pump
(versions with pump only or with accumulator)
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.

Water filter(installed as standard)
Allows you to block and eliminate any impurities in the hydraulic circuits. Inside, it has a filtering mesh with holes not greater than one millimetre. It is essential in order to avoid serious damage to the plate heat exchanger.

3-way valve
This is an electric servo-controlled ON-OFF diverting valve on the water side of the free-cooling circuit controlled.

Accumulator tank
In stainless steel, with a 300-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.

Charging unit (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 precharge.

5.6. SAFETY AND CONTROL COMPONENTS

Flow switch (installed as standard)
This checks that the water is circulating. If this is not the case, it shuts down the unit.

High pressure switch "AP" (standard)
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)
Placed on the low 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)
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.

Evaporator antifreeze heating element
(installed as standard)
Its operation is commanded by the antifreeze probe located in the plate 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

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.

5.7. 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 61000-6-3 (immunity and electromagnetic emissions for the residential sector).
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 of the keypad refer to the user manual.

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

compressor protection thermomagnetic switch;
fan protection thermomagnetic switch;
auxiliary protection thermomagnetic switch;
Exhaust gas temperature control thermostat

ELECTRONIC REGULATION MICROPROCESSOR CARD
Consisting of a management/control card and a visualisation card.

Functions carried out:evaporator inlet water temperature adjustment, with thermostat control for up to 4 levels and integral-proportional fan speed control;

- 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;
- antifreeze;
- 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.

6. ACCESSORIES

	0280	0300	0330	0350	0500	0550	0600	0650	0700
AER485	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	•	•	•	•	•	•	•	•	•
VT (00 - P3 - P4)	Rubber anti-vibration support. Select the model using the compatibility table.								
A E	17	17	17	17	13	13	22	22	22
VT (03 - 04)	Rubber anti-vibration support. Select the model using the compatibility table.								
A E	13	13	13	13	10	10	22	22	22
GP	Protects the external coil from chance knocks and prevents access to the area underneath where the compressors and the chiller circuit are housed. Each kit includes two grilles.								
A E	4	4	4	4	2(x2)	2(x2)	2(x3)	2(x3)	2(x3)
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	•	•	•	•	•	•	•	•	•
DUALCHILLER	Simplified control system to switch on and off, and command, two chillers (using Aermec GR3 command) in a single system, as if they were a single unit.								
A E	•	•	•	•	•	•	•	•	•
MULTICHILLER	Control system to switch the individual chillers on and off, and command them, in a system in which several units are installed in parallel, always ensuring a constant delivery to the evaporators.								
A E	•	•	•	•	•	•	•	•	•
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	•	•	•	•	•	•	•	•	•
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 E	50	50	50	51	52	52	53	53	53
DRE	It permits the reduction of the starting current needed by the machine in the start up phase. This accessory can only be applied in the factory.								
A E	281	301	331	351	501	551	601	651	701

WATER CONTENT NRL FREE-COOLING

WATER CONTENT NRL A/E			0280	0300	0330	0350	0500	0550	0600	0650	0700
Vers "00"	l	**A/E**	93	164	164	165	192	192	147	278	278
Vers "P3"	l	**A/E**	99	170	170	171	198	198	151	281	281
Vers "P4"	l	**A/E**	99	170	170	171	193	193	156	282	282
Vers "03"	l	**A/E**	408	478	478	479	509	509	465	595	595
Vers "04"	l	**A/E**	414	485	485	486	516	516	471	602	602

7. TECHNICAL DATA

7.1. TECHNICAL DATA OF VERSIONS (A - E) CHILLER FUNCTION

COOLING			0280	0300	0330	0350	0500	0550	0600	0650	0700
Cooling capacity:	kW	A	-	-	-	-	99.0	104.0	132.0	144.0	159.0
		E	59.0	65.0	74.0	82.0	91.0	95.0	119.0	130.0	147.0
Total input power	kW	A	-	-	-	-	33.7	37.3	44.5	51.7	60.8
		E	18.1	21.8	24.0	28.3	37.0	40.0	49.2	59.8	65.8
Water flow rate	l/h	A	-	-	-	-	17030	17890	22700	24770	27350
		E	10150	11180	12730	14100	15650	16340	20470	22360	25280
Total pressure drops	kPa	A	-	-	-	-	60	69	78	73	87
		E	63	53	66	58	51	58	63	60	74
Energy indices											
EER	W/W	A	-	-	-	-	2.93	2.79	2.96	2.79	2.62
		E	3.26	2.98	3.08	2.90	2.46	2.37	2.42	2.17	2.23
ELECTRICAL DATA											
Fuel feed	A	A	400V-3N-50Hz								
		E									
Input current	A	A	-	-	-	-	61	65	79	84	101
		E	32	38	41	51	67	70	87	97	109
Maximum current	A	A	46	53	58	63	76	81	100	112	122
		E									
Peak current	A	A	155	184	190	200	214	220	232	243	261
		E									
COMPRESSORS (SCROLL)											
Number/Circuit	no./no.	A	2/2	2/2	2/2	2/2	3/2	3/2	4/2	4/2	4/2
		E									
FANS (AXIAL)											
Quantity	no.	A	6	6	8	8	2	2	3	3	3
		E									
Air flow rate	m^3/h	A	-	-	-	-	32500	32500	50000	49000	56000
		E	20000	19000	25000	25000	23400	24100	33500	35300	47600
Input power	kW	A	0.9	0.9	1.2	1.2	2.5	2.5	3.75	3.75	5.25
		E									
Input current	A	A	3.9	3.9	5.2	5.2	5.6	5.6	8.4	8.4	11.3
		E									
Useful heads**[1]**	Pa	A	50	50	50	50	50	50	50	50	70 **(**)**
		E									
EVAPORATORS (PLATES)											
Quantity	no.	A	1								
		E									
PLUMBING CONNECTIONS											
Plumbing connections (IN/OUT)	diam	A	2"1/2								
		E									
HYDRAULIC CIRCUIT											
Accumulator capacity	L	A	300								
		E									
Accumulator antifreeze heater	W	A	1X300								
		E									

(**) The fans for the "M" version on NRL0700_F are with inverter; therefore the DCPX accessory is not available because the fans are already equipped with a speed regulator.

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

NOMINAL REFERENCE CONDITIONS

COOLING MODE
- Inlet water temperature 12°C
- Outlet water temperature 7°C
- Outside air temperature 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.

			0280	0300	0330	0350	0500	0550	0600	0650	0700
HIGH-HEAD CIRCULATION PUMP											
Input power	KW	A	-	-	-	-	1.85	1.85	3.0	3.0	3.0
		E	1.5	1.5	1.5	1.5					
Input current	A	A	-	-	-	-	5.0	5.0	5.7	5.7	5.7
		E	3.6	3.6	3.6	3.6					
Useful head	kPa	A	-	-	-	-	144	132	147	137	99
		E	124	132	110	118	160	151	174	169	131
SOUND DATA											
Sound power (1)	dBA	A	-	-	-	-	82	82	82	83	85
		E	74	74	75	76	74	74	74	75	77
Sound pressure (2)	dBA	A	-	-	-	-	50	50	50	51	53
		E	42	42	43	44	42	42	42	43	45
DIMENSIONS											
Height	mm	A	-	-	-	-	1875	1875	1875	1875	1875
		E	1606	1606	1606	1606					
Width	mm	A	-	-	-	-	1100	1100	1100	1100	1100
		E	1100	1100	1100	1100					
Depth	mm	A	-	-	-	-	3200	3200	3950	3950	3950
		E	2450	2950	2950	2950					
Weight when empty	kg	A	-	-	-	-	1079	1083	1386	1460	1540
		E	838	908	913	922					

NOMINAL REFERENCE CONDITIONS

COOLING MODE

- Inlet water temperature	12°C
- Outlet water temperature	7°C
- Outside air temperature	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.

7.2. TECHNICAL DATA OF VERSIONS (A - E) FREE-COOLING FUNCTION

FREE-COOLING			0280	0300	0330	0350	0500	0550	0600	0650	0700
Cooling capacity:	kW	A	58.0	68.0	83.0	85.0	103.0	104.0	137.0	159.0	174.0
		E									
Total input power	kW	A	1.05	1.05	1.35	1.35	2.65	2.65	3.9	3.9	5.4
		E									
Water flow rate	l/h	A	-	-	-	-	17030	17890	22700	24770	27350
		E	10150	11180	12730	14100	15650	16340	20470	22360	25280
Total pressure drops	kPa	A	-	-	-	-	79.2	90.1	107.9	107.2	124.1
		E	95.6	69.1	85.8	82.2	67	75	88	87	106
Energy indices											
EER	W/W	A	55.24	64.76	61.48	62.96	38.87	39.25	35.13	40.77	32.22
		E									
ELECTRICAL DATA											
Fuel feed	A	A	400V-3N-50Hz								
		E									
Input current	A	A	4.6	4.6	5.9	5.9	5.9	5.9	8.7	8.7	11.6
		E									
Maximum current	A	A	46	53	58	63	76	81	100	112	122
		E									
Peak current	A	A	155	184	190	200	214	220	232	243	261
		E									
COMPRESSORS (SCROLL)											
Number/Circuit	no./no.	A	2/2	2/2	2/2	2/2	3/2	3/2	4/2	4/2	4/2
		E									
FANS (AXIAL)											
Quantity	no.	A	6	6	8	8	2	2	3	3	3
		E									
Air flow rate	m^3/h	A	-	-	-	-	32500	32500	50000	49000	56000
		E	20000	19000	25000	25000	23400	24100	33500	35300	47600
Input power	kW	A	0.9	0.9	1.2	1.2	2.5	2.5	3.75	3.75	5.25
		E									
Input current	A	A	3.9	3.9	5.2	5.2	5.6	5.6	8.4	8.4	11.3
		E									
Useful heads**[1]**	Pa	A	50	50	50	50	50	50	50	50	70 **(**)**
		E									
EVAPORATORS (PLATES)											
Quantity	no.	A	1								
		E									
PLUMBING CONNECTIONS											
Plumbing connections (IN/OUT)	diam	A	2"1/2								
		E									
HYDRAULIC CIRCUIT											
Accumulator capacity	L	A	300								
		E									
Accumulator antifreeze heater	W	A	1X300								
		E									

(**) The fans for the "M" version on NRL0700_F are with inverter; therefore the DCPX accessory is not available because the fans are already equipped with a speed regulator.

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

NOMINAL REFERENCE CONDITIONS

COOLING MODE
- Inlet water temperature 15°C
- Outside air temperature 2°C
- Rated flow rate
- Compressors off

(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.

			0280	0300	0330	0350	0500	0550	0600	0650	0700
HIGH-HEAD CIRCULATION PUMP											
Input power	KW	A	1.5	1.5	1.5	1.5	1.85	1.85	3.0	3.0	3.0
		E									
Input current	A	A	3.6	3.6	3.6	3.6	5.0	5.0	5.7	5.7	5.7
		E									
Useful head	kPa	A	-	-	-	-	123	109	114	122	77
		E	88	115	88	91	142	131	147	156	115
SOUND DATA											
Sound power (1)	dBA	A	-	-	-	-	82	82	82	83	85
		E	74	74	75	76	74	74	74	75	77
Sound pressure (2)	dBA	A	-	-	-	-	50	50	50	51	53
		E	42	42	43	44	42	42	42	43	45
DIMENSIONS											
Height	mm	A	-	-	-	-	1875	1875	1875	1875	1875
		E	1606	1606	1606	1606					
Width	mm	A	-	-	-	-	1100	1100	1100	1100	1100
		E	1100	1100	1100	1100					
Depth	mm	A	-	-	-	-	3200	3200	3950	3950	3950
		E	2450	2950	2950	2950					
Weight when empty	kg	A	-	-	-	-	1079	1083	1386	1460	1540
		E	838	908	913	922					

(*) Depth NRL 0500-0550 with pump and accumulator 3200mm.

NOMINAL REFERENCE CONDITIONS

COOLING MODE
- Inlet water temperature 15°C
- Outside air temperature 2°C
- Rated flow rate
- Compressors off

(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.

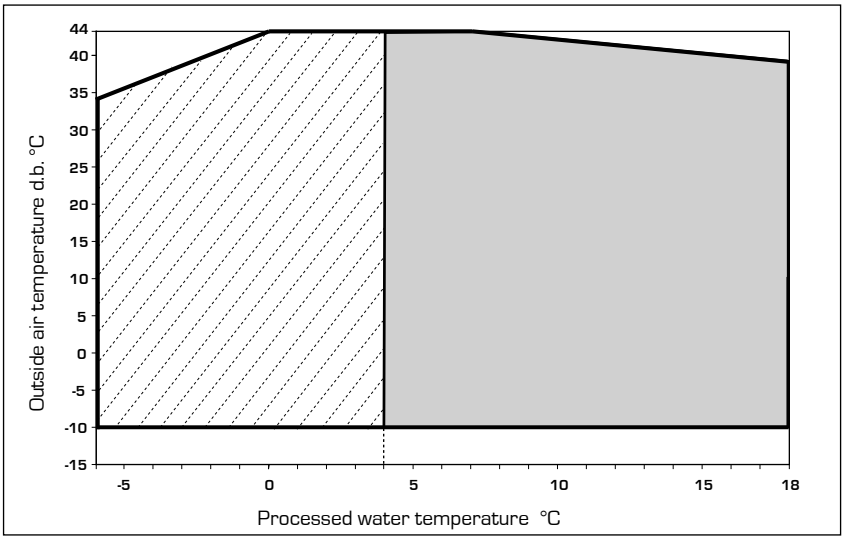
(2) SOUND PRESSURE
Sound pressure in an unrestricted range on a reflective plane (directional fact. Q=2), 10m away from the unit external surface, complying with ISO 3744.

8. OPERATING LIMITS

8.1. 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 Δt = 5°C.

NB
The unit can be activated with external air at 46°C and inlet water at 35°C in the summer 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

Standard operation

9. CORRECTIVE FACTORS CHILLER FUNCTION

9.1. 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 (Cft, Cpa).
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.

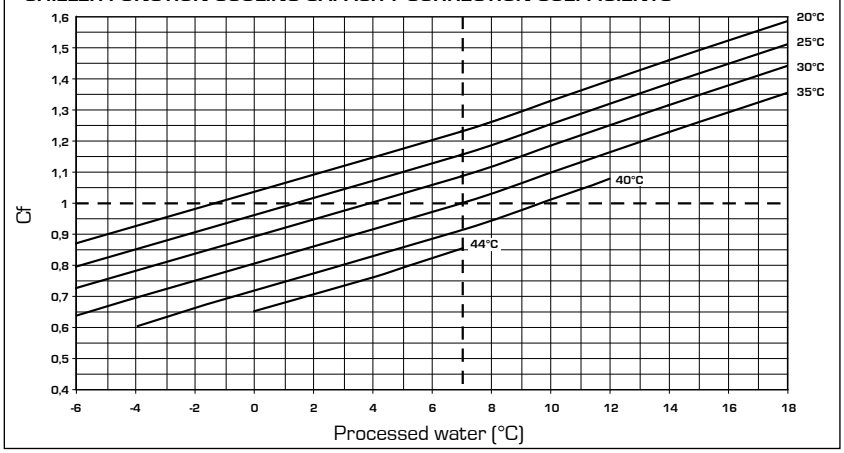
KEY

Cf: correction coefficient of the cooling capacity.

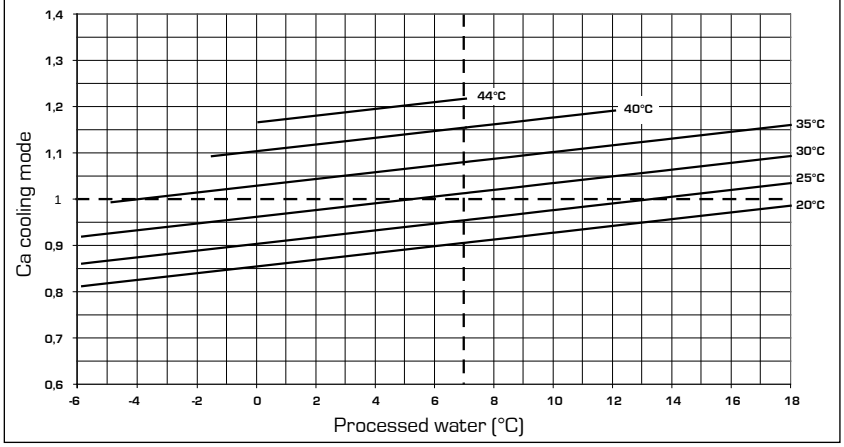
Ca: correction coefficient of the input power.

FOR Δt DIFFERENT FROM 5°C
For the evaporator, use **Tab. 9.3.1.** to obtain the corrective factors of the cooling and absorbed power. To take into account the exchanger soiling, apply the relative fouling factors, **Tab. 9.4.1.**

CHILLER FUNCTION COOLING CAPACITY CORRECTION COEFFICIENTS



CHILLER FUNCTION COLD ABSORBED POWER CORRECTION COEFFICIENTS



9.2. FOR Δt DIFFERENT FROM THE RATED VALUE

For Δt different than 5°C, use Tab. 9.3.1. for the corrective factors of the cooling capacity and the absorbed power to the evaporator. To account for exchanger soiling, apply the relative fouling factors, Tab.9.3.2.

9.3.1. Δt different from the rated value	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

9.3. FOULING FACTORS

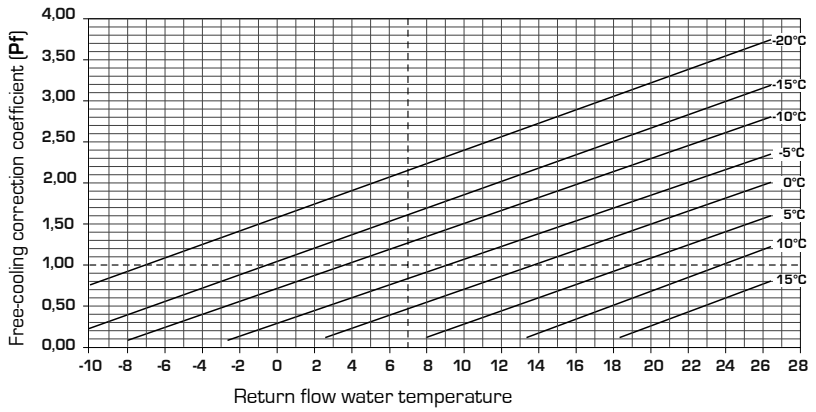
The performance levels indicated in the table refer to conditions with clean tubes, with a fouling factor = 1.
For other fouling factor values, multiply the data of performance table by the coefficients given.

9.3.2. Fouling factors [K*m^2]/[W]	0.00005	0.0001	0.0002
Cooling capacity correction factors	1	0.98	094
Cooling capacity correction factors	1	0.98	0.95

10. CORRECTION FACTORS FREE-COOLING FUNCTION

The maximum cooling capacity during operation in free-cooling mode, i.e. when all compressors are off, is obtained by multiplying the rated free-cooling capacity value (Pf), given in the Technical Data, by the corresponding correction coefficient, which is obtained from the following diagram according to the temperature of the processed water and the external air temperature.
These values refer to the fan at full speed (maximum input power), if the power were in excess the modulation of the fan speed would intervene.

FREE-COOLING ONLY CAPACITY CORRECTION COEFFICIENTS



10.1. FOR Δt DIFFERENT FROM THE RATED VALUE

For Δt different than 5°C Tab. 10.2.1. is used for the correction factors of the cooling capacity and the absorbed power to the evaporator. To account for exchanger soiling, apply the relative fouling factors Tab.10.2.2.

10.2.1. Δt different from the rated value	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

10.2. 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 performance table by the coefficients given.

10.2.2. Fouling factors [K*m^2]/[W]	0.00005	0.0001	0.0002
Cooling capacity correction factors	1	0.98	094
Cooling capacity correction factors	1	0.98	0.95

- 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 glycols.

NB

To make the reading of the graph easier, an example is given in the following page.

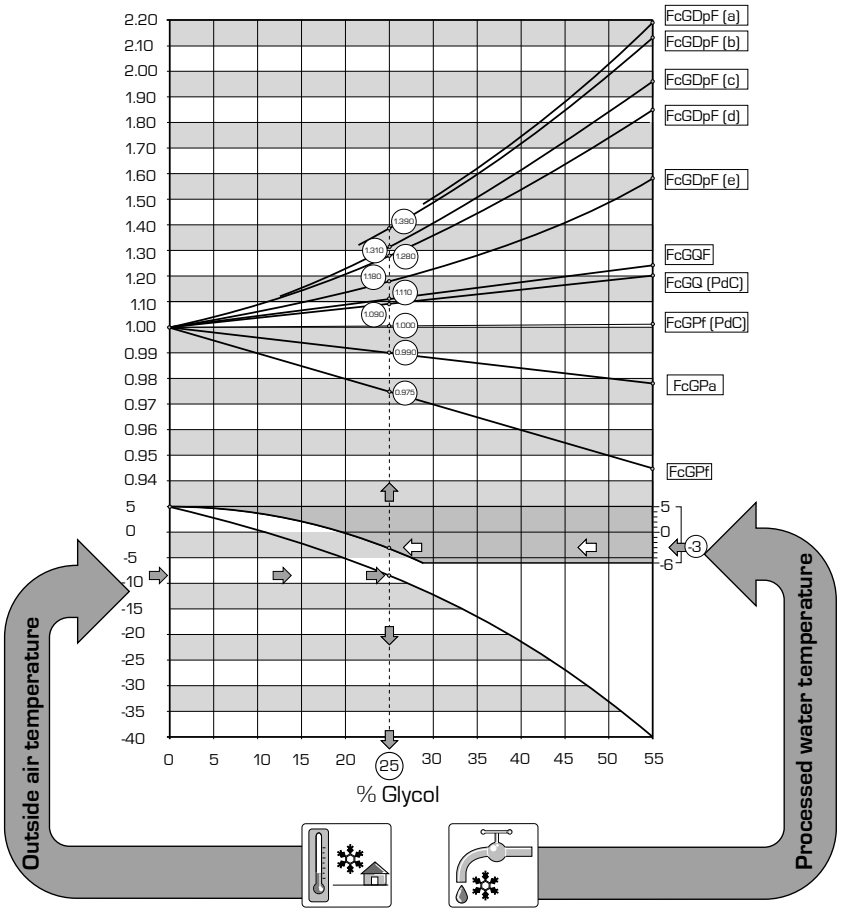
By using the diagram below it possible to establish the percentage of glycol necessary; this percentage can be calculated taking into account one of the following factors:

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.

11.1. 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 rated 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 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 rated 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.



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.

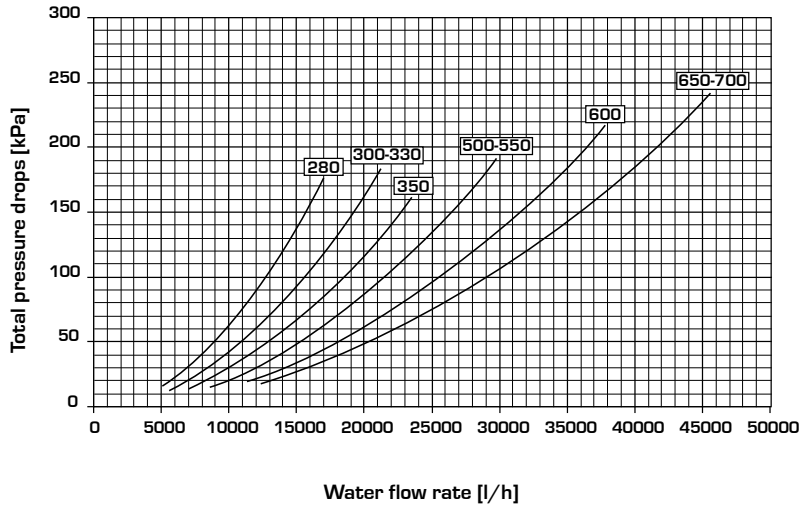
12. PRESSURE DROPS

12.1. TOTAL PRESSURE DROPS

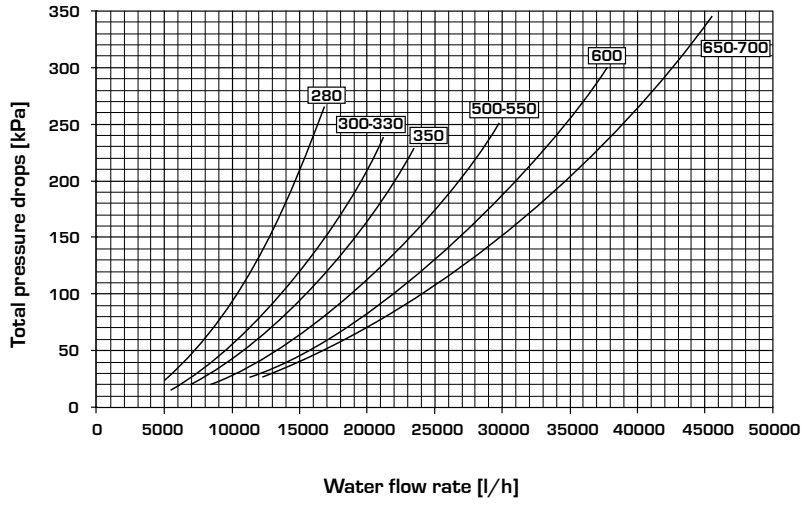
NB

The indicated pressure drops are related to the "Chiller" and "Free-Cooling" function, both calculated with an average water temperature of 10°C.

CHILLER FUNCTION PRESSURE DROPS



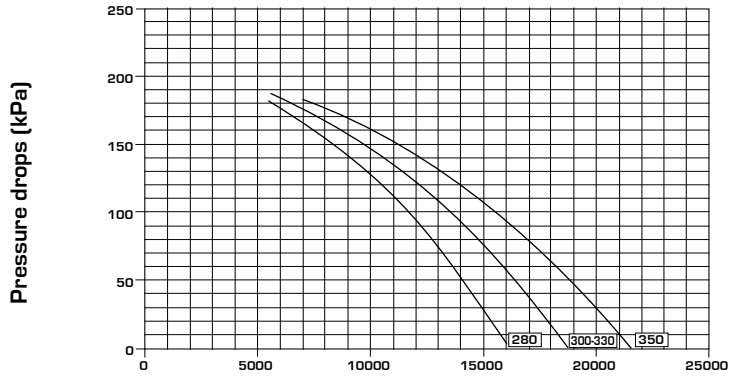
FREE-COOLING PRESSURE DROPS



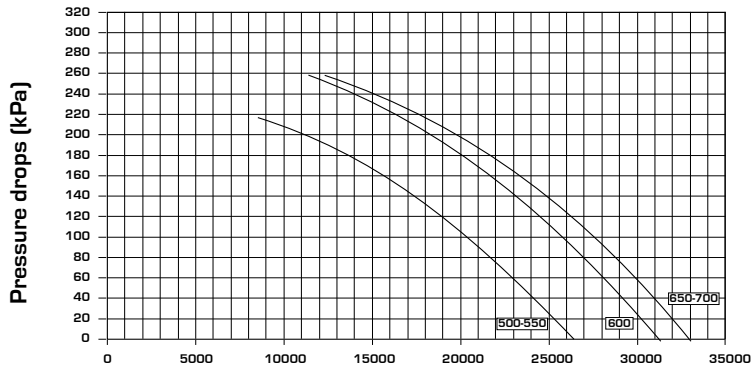
Average water temperature [°C]	5	10	15	20	30	40	50
Multiplicational coefficient	1.02	1	0.985	0.97	0.95	0.93	0.91

13. USEFUL HEADS

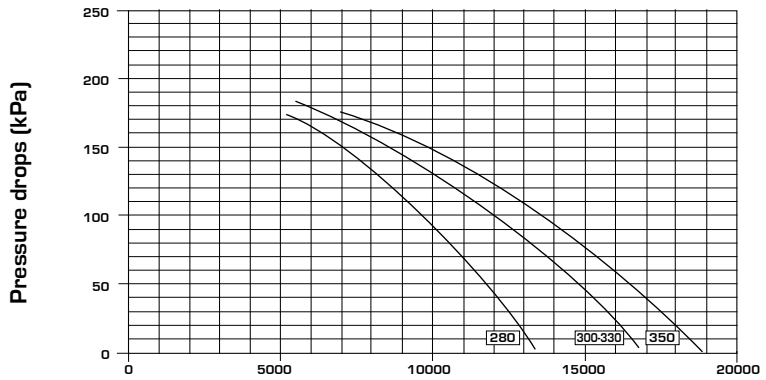
CHILLER FUNCTION USEFUL HEADS: NRL 0280 - 0350



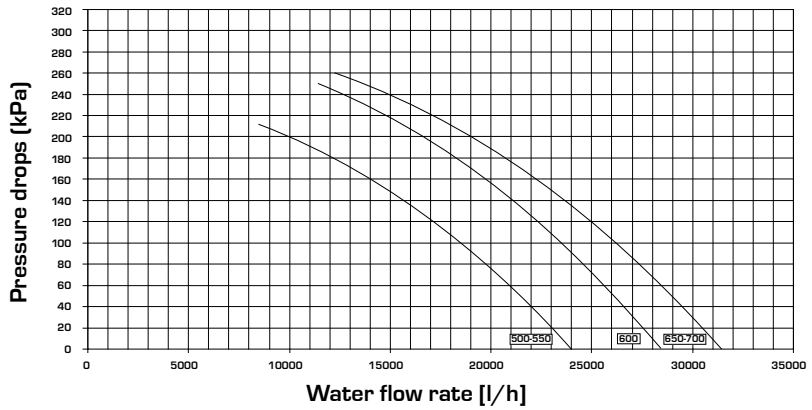
CHILLER FUNCTION USEFUL HEADS: NRL 0500 - 0700



FREE-COOLING FUNCTION USEFUL HEADS: NRL 0280 - 0350



FREE-COOLING FUNCTION USEFUL HEADS: NRL 0500 - 0700



14. ACCUMULATOR

14.3. MAXIMUM/MINIMUM WATER CONTENT IN THE SYSTEM

14.3.1. Maximum water content recommended

Table 13.2 indicates the maximum water content, in litres, of the hydraulic system, compatible with the capacity of the expansion tank. The values shown in the table refer to three conditions of maximum and minimum water temperature. If the effective water content of the hydraulic system (including the accumulator tank, if present) is greater than that shown in the operational conditions table, another, additional expansion tank must be installed, measured (using the common criteria) with reference to the additional volume of water.
From tables 13.3, 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.

14.3.2. Expansion tank calibration

The standard value of the expansion tank pre-charge pressure is 1.5 bar, 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.

14.3.3. Minimum water content recommended

NRL	no. Compressor	(1) l/KW	(2) l/KW
0280	2	7	14
0300			
0330			
0350			
0500	3	5	10
0550			
0600	4	4	8
0650			
0700			

NB
Note that the capacity is rated when cold and at full load.

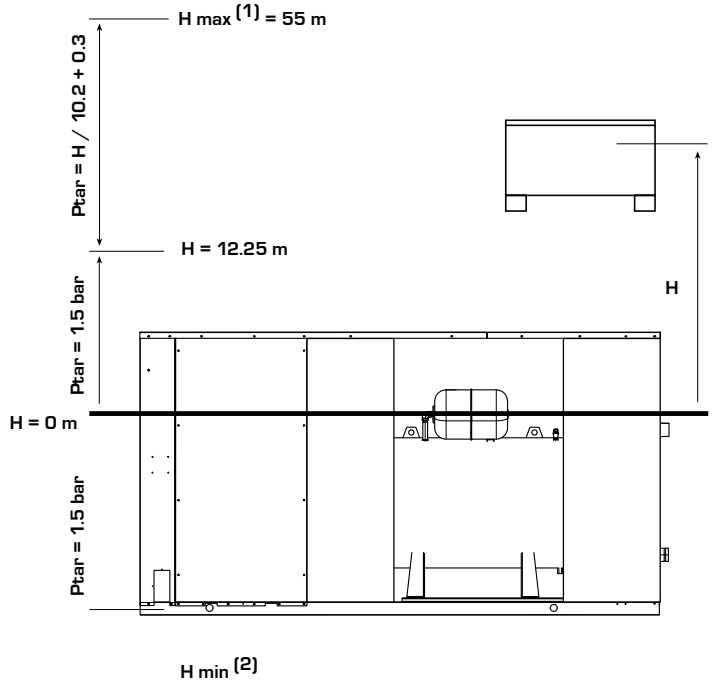
14.1.

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

14.2.

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.

15. CAPACITY CONTROLS

(*) Cooling capacity %	Levels of power			
Versions	**1°**	**2°**	**3°**	**4°**
NRL0280	55	100	-	-
NRL0300	55	100	-	-
NRL0330	55	100	-	-
NRL0350	55	100	-	-
NRL0500	40	75	100	-
NRL0550	36	68	100	-
NRL0600	30	55	100	-
NRL0650	25	50	75	100
NRL0700	25	50	75	100

(*) Input power %	Levels of power			
Versions	**1°**	**2°**	**3°**	**4°**
NRL0280	45	100	-	-
NRL0300	45	100	-	-
NRL0330	45	100	-	-
NRL0350	45	100	-	-
NRL0500	30	65	100	-
NRL0550	26	58	100	-
NRL0600	20	45	70	100
NRL0650	20	45	70	100
NRL0700	20	45	70	100

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

16. 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 relates to the version with standard fans".

NRL	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] (A)						
0280	74	42	57	72.2	61.1	66.4	63.5	61.0	50.0	43.7
0300	74	42	57	72.2	61.1	66.4	63.5	61.0	50.0	43.7
0330	75	43	57	73.1	62.0	67.1	64.3	62.1	51.3	44.8
0350	76	44	58	74.1	63.0	68.1	65.6	62.6	53.0	45.1
0500	82	50	64	68.1	69.8	74.0	76.7	76.5	74.1	63.8
0550	82	50	64	68.1	69.9	75.0	77.5	76.5	72.0	61.0
0600	82	50	64	68.9	71.4	74.8	77.7	76.4	72.0	59.9
0650	83	51	65	69.4	70.6	75.1	77.9	78.0	74.6	64.1
0700	85	53	66	72.9	73.2	78.0	78.3	80.0	76.6	65.2

The values refer to:

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

17. SAFETY AND CHECK PARAMETER SETTING

CHECK PARAMETERS

Cold Setting	Water inlet temperature in cooling mode	**MIN.**	-10°C
		MAX.	20°C
		DEFAULT	7.0°C
Antifreeze intervention	Antifreeze 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		

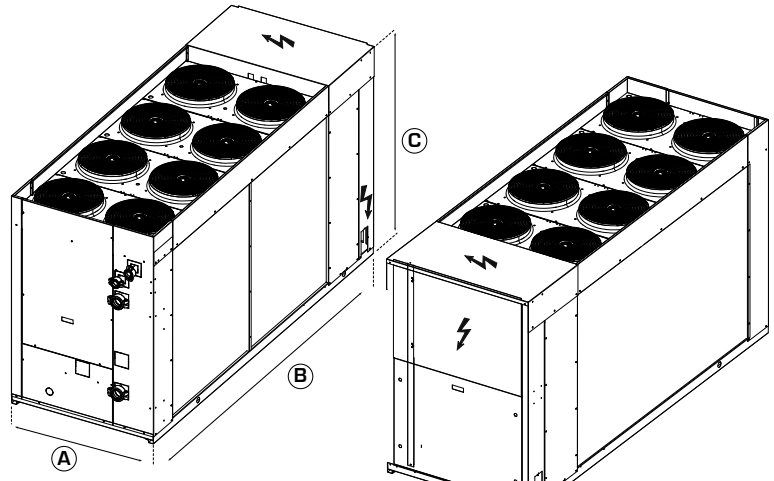
NRL	**0280**	**0300**	**0330**	**0350**	**0500**	**0550**	**0600**	**0650**	**0700**
COMPRESSOR THERMOMAGNETIC SWITCHES 400V									
MTC1	23A	28A	28A	29A	23A	28A	28A	28A	29A
MTC1A	-	-	-	-	23A	23A	23A	28A	29A
MTC2	23A	23A	28A	29A	28A	29A	28A	28A	29A
MTC2A	-	-	-	-	-	-	23A	28A	29A
HIGH PRESSURE SWITCH WITH MANUAL RESET									
PA (bar)	40	40	40	40	40	40	40	40	40
HIGH PRESSURE TRANSDUCER									
TAP (bar)	39	39	39	39	39	39	39	39	39
LOW PRESSURE TRANSDUCER									
TBP (bar)	2	2	2	2	2	2	2	2	2
CHILLER CIRCUIT SAFETY VALVE									
AP (bar)	45	45	45	45	45	45	45	45	45
BP (bar) only in heat pump	30	30	30	30	30	30	30	30	30
FAN THERMOMAGNETIC SWITCHES									
No. of fans A	-	-	-	-	2	2	3	3	3
No. of fans E	6	6	8	8					

NB

The maximum PS pressure on the water side is 6 bar.

18. DIMENSIONS

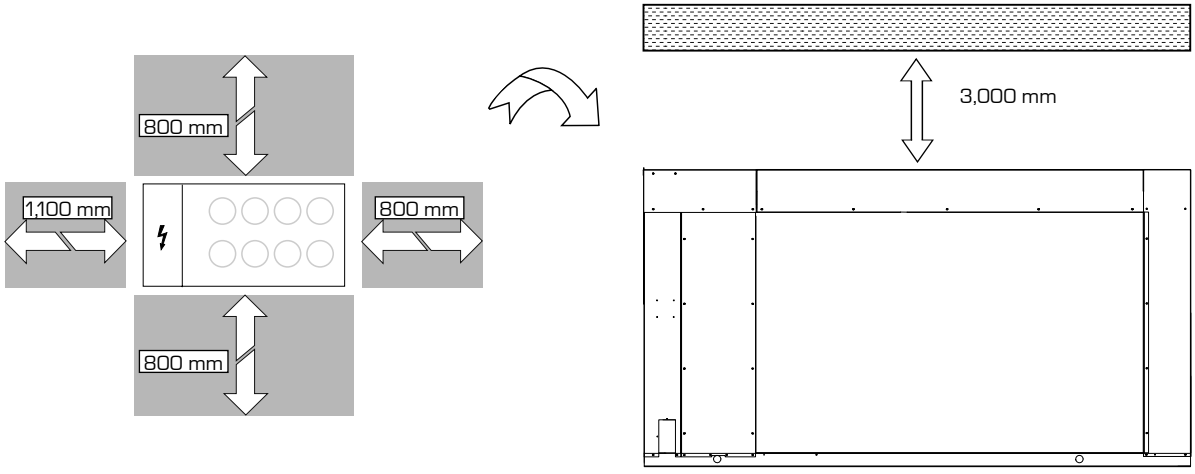
18.1. NRL 0280 - 0300 - 0330 - 0350



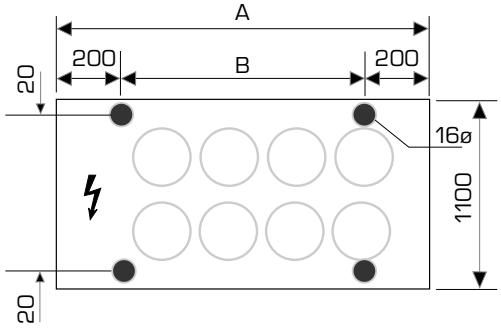
MOD.	VERSIONS	A (mm)	B (mm)	C (mm)
0280	E - A	1100	2950	1606
0300	E - A	1100	2950	1606
0330	E - A	1100	2950	1606
0350	E - A	1100	2950	1606

NB
Valid for all "accumulator range" configurations

18.2. MINIMUM TECHNICAL CLEARANCE NRL 0280 - 0300 - 0330 - 0350



18.3. POSITION OF VIBRATION DAMPERS

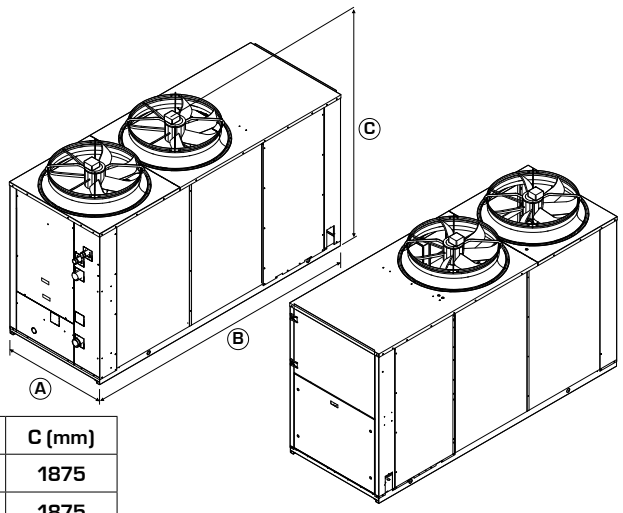


MOD.	VERSIONS	A (mm)	B (mm)
0280	E - A	2950	2550
0300	E - A	2950	2550
0330	E - A	2950	2550
0350	E - A	2950	2550

NB
Valid for all "accumulator range" configurations

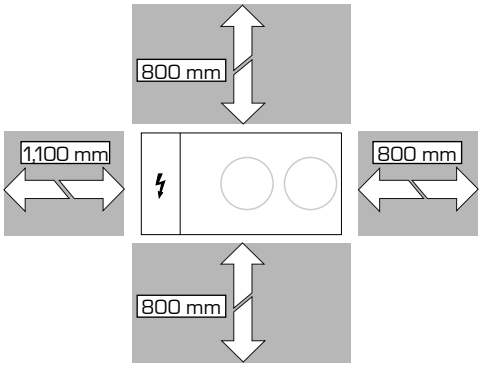
18.4. NRL 0500 - 0550 - 0600 - 0650 - 0700

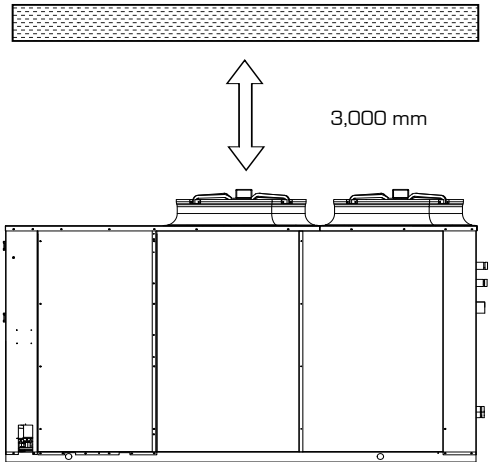
MOD.	VER-SIONS	ACCUMU-LATOR	A (mm)	B (mm)	C (mm)
0500	E - A	"00"	1100	3200	1875
0550	E - A	"00"	1100	3200	1875
0600	E - A	"00"	1100	3950	1875
0650	E - A	"00"	1100	3950	1875
0700	E - A	"00"	1100	3950	1875



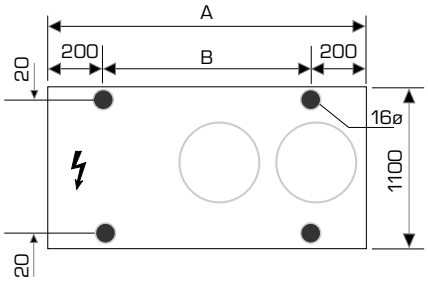
MOD.	VERSIONS	ACCUMULATOR	A (mm)	B (mm)	C (mm)
0500	E - A	"01 - 04" "P1 - P4"	1100	3200	1875
0550	E - A	"01 - 04" "P1 - P4"	1100	3200	1875
0600	E - A	"01 - 04" "P1 - P4"	1100	3950	1875
0650	E - A	"01 - 04" "P1 - P4"	1100	3950	1875
0700	E - A	"01 - 04" "P1 - P4"	1100	3950	1875

18.5. MINIMUM TECHNICAL CLEARANCE 0500 - 0550 - 0600 - 0650 - 0700

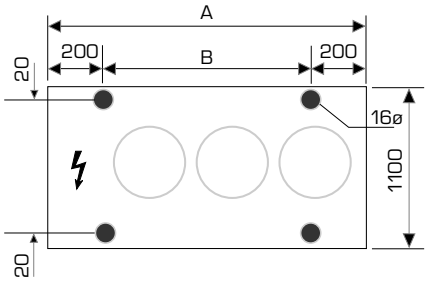




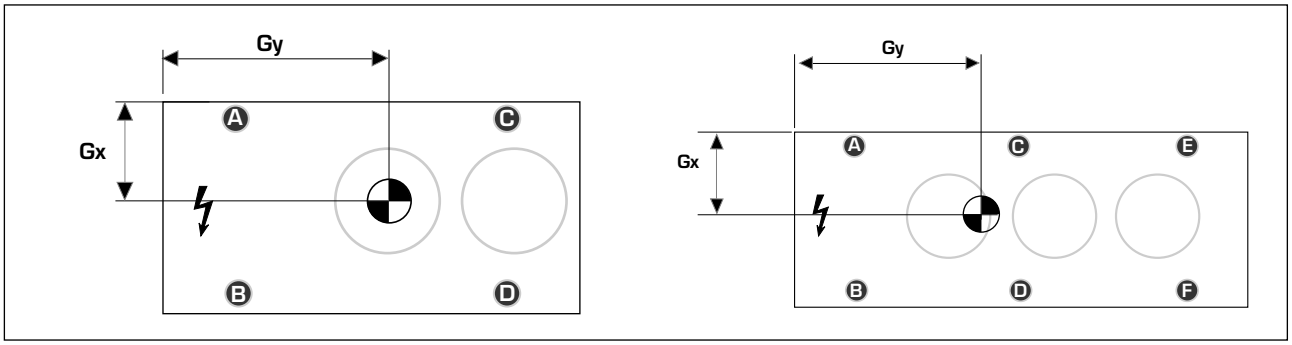
18.6. POSITION OF VIBRATION DAMPERS



MOD.	VERSIONS	ACCUMULATOR	A (mm)	B (mm)
0500	E - A	"00"	3200	2800
0550	E - A	"00"	3200	2800
0500	E - A	"01-04-P1-P4"	3200	2800
0550	E - A	"01-04-P1-P4"	3200	2800



MOD.	VERSIONS	ACCUMULATOR	A (mm)	B (mm)
0600	E - A	ALL	3950	3550
0650	E - A	ALL	3950	3550
0700	E - A	ALL	3950	3550



18.7. WEIGHT DISTRIBUTION PERCENTAGE ON THE SUPPORTS (WEIGHT WHEN EMPTY) NRL 0280 - 0350

NRL	TYPE	WEIGHT	CENTRE OF GRAVITY		PERCENTAGE WEIGHT DISTRIBUTION ON SUPPORTS (%)				VT KIT
			Gx	Gy	A	B	C	D	
NRL0280E	00	838	556	1312	23 %	25 %	24 %	27%	17
NRL0280E	04	983	555	1364	22 %	24 %	25 %	28%	13
NRL0280E	03	968	556	1352	22 %	25 %	25 %	28%	13
NRL0280E	P4	868	556	1341	23 %	25 %	25 %	28%	17
NRL0280E	P3	853	556	1327	23 %	25 %	25 %	27%	17
NRL0300E	00	908	556	1345	22 %	25 %	25 %	28%	17
NRL0300E	04	1053	555	1389	22 %	24 %	26 %	29 %	13
NRL0300E	03	1038	555	1378	22 %	24 %	26 %	28%	13
NRL0300E	P4	938	556	1371	22 %	24 %	26 %	28%	17
NRL0300E	P3	923	556	1358	22 %	25 %	25 %	28%	17
NRL0330E	00	913	556	1345	22 %	25 %	25 %	28%	17
NRL0330E	04	1058	555	1389	22 %	24 %	26 %	29 %	13
NRL0330E	03	1043	556	1378	22 %	24 %	26 %	28%	13
NRL0330E	P4	943	556	1371	22 %	24 %	26 %	28%	17
NRL0330E	P3	928	556	1358	22 %	25 %	25 %	28%	17
NRL0350E	00	922	557	1336	23 %	25 %	25 %	28%	17
NRL0350E	04	1067	556	1381	22 %	24 %	26 %	28%	13
NRL0350E	03	1052	556	1370	22 %	24 %	26 %	28%	13
NRL0350E	P4	952	556	1362	22 %	24 %	25 %	28%	17
NRL0350E	P3	937	556	1349	22 %	25 %	25 %	28%	17

18.8. WEIGHT DISTRIBUTION PERCENTAGE ON THE SUPPORTS (MACHINE RUNNING) NRL 0280 - 0350

NRL	TYPE	WEIGHT	CENTRE OF GRAVITY		PERCENTAGE WEIGHT DISTRIBUTION ON SUPPORTS SUPPORTS (%)				VT KIT
			Gx	Gy	A	B	C	D	
NRL0280E	00	886	548	1340	23 %	25 %	25 %	27%	17
NRL0280E	04	1331	549	1421	21 %	23 %	27%	29 %	13
NRL0280E	03	1316	546	1412	22 %	23 %	27%	29 %	13
NRL0280E	P4	916	544	1366	23 %	24 %	26 %	28%	17
NRL0280E	P3	901	544	1353	23 %	24 %	26 %	27%	17
NRL0300E	00	974	549	1378	22 %	24 %	26 %	28%	17
NRL0300E	04	1419	549	1441	21 %	23 %	27%	29 %	13
NRL0300E	03	1404	546	1434	21 %	23 %	27%	29 %	13
NRL0300E	P4	1004	544	1401	22 %	23 %	27%	28%	17
NRL0300E	P3	989	544	1389	22 %	23 %	27%	28%	17
NRL0330E	00	979	549	1377	22 %	24 %	26 %	28%	17
NRL0330E	04	1424	549	1441	21 %	23 %	27%	29 %	13
NRL0330E	03	1409	549	1433	21 %	23 %	27%	29 %	13
NRL0330E	P4	1009	549	1400	22 %	23 %	26 %	28%	17
NRL0330E	P3	994	549	1389	22 %	24 %	26 %	28%	17
NRL0350E	00	988	549	1368	22 %	24 %	26 %	28%	17
NRL0350E	04	1433	550	1434	21 %	23 %	27%	29 %	13
NRL0350E	03	1418	550	1426	21 %	23 %	27%	29 %	13
NRL0350E	P4	1018	550	1391	22 %	24 %	26 %	28%	17
NRL0350E	P3	1003	550	1380	22 %	24 %	26 %	28%	17

18.9. PERCENTAGE WEIGHT DISTRIBUTION ON THE SUPPORTS (WEIGHT WHEN EMPTY) NRL 0500 - 0700

NRL	TYPE	WEIGHT	CENTRE OF GRAVITY		PERCENTAGE WEIGHT DISTRIBUTION ON SUPPORTS SUPPORTS (%)				VT KIT
			Gx	Gy	A	B	C	D	
NRL0500 A-E	00	1079	517	1393	28%	25 %	25 %	22 %	13
NRL0500 A-E	04	1228	521	1607	31 %	28%	21 %	19 %	10
NRL0500 A-E	03	1211	520	1590	31 %	28%	21 %	19 %	10
NRL0500 A-E	P4	1113	518	1572	32 %	28%	21 %	19 %	13
NRL0500 A-E	P3	1096	517	1553	32 %	29 %	21 %	18 %	13
NRL0550 A-E	00	1083	516	1390	28%	25 %	25 %	22 %	13
NRL0550 A-E	04	1232	520	1603	31 %	28%	21 %	19 %	10
NRL0550 A-E	03	1215	520	1586	32 %	28%	21 %	19 %	10
NRL0550 A-E	P4	1117	517	1568	32 %	28%	21 %	19 %	13
NRL0550 A-E	P3	1100	516	1549	32 %	29 %	21 %	18 %	13

NRL	TYPE	WEIGHT	CENTRE OF GRAVITY		PERCENTAGE WEIGHT DISTRIBUTION ON SUPPORTS SUPPORTS (%)						VT KIT
			Gx	Gy	A	B	C	D	E	F	
NRL0600 A-E	00	1386	552	1715	8 %	8 %	33 %	33 %	9%	9%	22
NRL0600 A-E	04	1537	552	1758	7 %	7 %	34 %	34 %	9%	9%	22
NRL0600 A-E	03	1519	552	1745	7 %	7 %	34 %	34 %	9%	9%	22
NRL0600 A-E	P4	1422	552	1743	7 %	8 %	33 %	33 %	9%	9%	22
NRL0600 A-E	P3	1404	552	1729	8 %	8 %	33 %	33 %	9%	9%	22
NRL0650 A-E	00	1460	552	1738	7 %	8 %	33 %	34 %	9%	9%	22
NRL0650 A-E	04	1611	552	1777	7 %	7 %	34 %	34 %	9%	9%	22
NRL0650 A-E	03	1593	552	1765	7 %	7 %	34 %	34 %	9%	9%	22
NRL0650 A-E	P4	1496	552	1764	7 %	7 %	33 %	34 %	9%	10 %	22
NRL0650 A-E	P3	1478	552	1751	7 %	7 %	33 %	34 %	9%	9%	22
NRL0700 A-E	00	1540	552	1755	7 %	7 %	33 %	34 %	9%	9%	22
NRL0700 A-E	04	1691	552	1791	6%	6%	34 %	35%	9%	9%	22
NRL0700 A-E	03	1673	552	1780	7 %	7 %	34 %	35%	9%	9%	22
NRL0700 A-E	P4	1576	552	1780	7 %	7 %	33 %	34 %	10 %	10 %	22
NRL0700 A-E	P3	1558	552	1768	7 %	7 %	33 %	34 %	9%	9%	22

18.10. PERCENTAGE WEIGHT DISTRIBUTION ON THE SUPPORTS (MACHINE RUNNING) NRL 0500 - 0700

NRL	TYPE	WEIGHT	CENTRE OF GRAVITY		PERCENTAGE WEIGHT DISTRIBUTION ON SUPPORTS SUPPORTS (%)				VT KIT
			Gx	Gy	A	B	C	D	
NRL0500 A-E	00	1150	513	1429	28%	24 %	26 %	23 %	13
NRL0500 A-E	04	1599	523	1686	30 %	27%	22 %	20%	10
NRL0500 A-E	03	1582	523	1674	30 %	27%	22 %	20%	10
NRL0500 A-E	P4	1184	514	1596	32 %	28%	22 %	19 %	13
NRL0500 A-E	P3	1167	514	1578	32 %	28%	21 %	19 %	13
NRL0550 A-E	00	1154	512	1425	28%	24 %	26 %	22 %	13
NRL0550 A-E	04	1603	523	1683	30 %	27%	22 %	20%	10
NRL0550 A-E	03	1586	523	1671	30 %	27%	22 %	20%	10
NRL0550 A-E	P4	1188	513	1592	32 %	28%	21 %	19 %	13
NRL0550 A-E	P3	1171	513	1574	32 %	28%	21 %	19 %	13

NRL	TYPE	WEIGHT	CENTRE OF GRAVITY		PERCENTAGE WEIGHT DISTRIBUTION ON SUPPORTS SUPPORTS (%)						VT KIT
			Gx	Gy	A	B	C	D	E	F	
NRL0600 A-E	00	1461	548	1749	7 %	7 %	34 %	33 %	9%	9%	22
NRL0600 A-E	04	1912	548	1812	5 %	5 %	36 %	36 %	9%	9%	22
NRL0600 A-E	03	1894	548	1802	5 %	5 %	36 %	36 %	9%	9%	22
NRL0600 A-E	P4	1497	548	1775	7 %	7 %	34 %	33 %	10 %	10 %	22
NRL0600 A-E	P3	1479	548	1762	7 %	7 %	34 %	33 %	9%	9%	22
NRL0650 A-E	00	1564	548	1782	7 %	7 %	34 %	34 %	10 %	9%	22
NRL0650 A-E	04	2015	548	1834	5 %	5 %	37 %	36 %	9%	9%	22
NRL0650 A-E	03	1997	548	1825	5 %	5 %	37 %	36 %	9%	9%	22
NRL0650 A-E	P4	1600	548	1805	7 %	7 %	34 %	34 %	10 %	10 %	22
NRL0650 A-E	P3	1582	548	1794	7 %	7 %	34 %	34 %	10 %	10 %	22
NRL0700 A-E	00	1651	546	1799	7 %	7 %	34 %	34 %	10 %	9%	22
NRL0700 A-E	04	2102	547	1845	5 %	5 %	37 %	36 %	9%	9%	22
NRL0700 A-E	03	2084	547	1837	5 %	5 %	37 %	36 %	9%	9%	22
NRL0700 A-E	P4	1687	546	1821	6%	6%	34 %	34 %	10 %	10 %	22
NRL0700 A-E	P3	1669	546	1810	7 %	6%	34 %	34 %	10 %	10 %	22

19. SAFETY WARNINGS AND INSTALLATION REGULATIONS

Safety warnings
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.

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

GAS 410A
The unit is delivered with the necessary amount of refrigerant 410A for its operation. It is a refrigerant without chlorine that is not harmful for the ozone layer. 410A in not flammable. However, all maintenance operations must only be carried out by a specialised technician with the suitable protection equipment

Risk of electric discharge!
Before opening the unit, it is necessary to disconnect the device completely from the mains.

20. RECEIVING THE PRODUCT

20.1. HANDLING

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 selected place must be large enough for laying the necessary pipes.
- Take into account that when the chiller is working, vibrations may be generated; it is therefore advisable to install anti-vibration supports (VT accessories), fitting them to the holes in the base according to the assembly diagram.
- It is compulsory to provide the necessary technical clearances, to allow ROUTINE AND EXTRAORDINARY MAINTENANCE INTERVENTIONS.

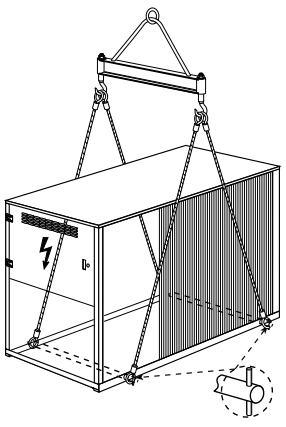
20.2. POSITIONING

The unit is delivered from the factory wrapped in estincoil and placed on a pallet.
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, using the appropriate equipment.
To handle the machine:
"LIFTING"
Insert pipes (NOT SUPPLIED) in the holes on the base; these pipes must be of a suitable length to allow the lifting cables to be positioned.
In order to avoid damaging the unit with the cables, insert protection elements between them and the machine.
It is absolutely forbidden to stand under the unit.

NB
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.

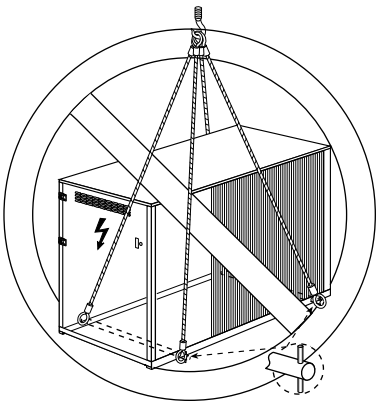
20.3. HANDLING EXAMPLE

- Correct handling



- The internal diameter of the flange's lifting holes is 70 mm.

- Incorrect handling

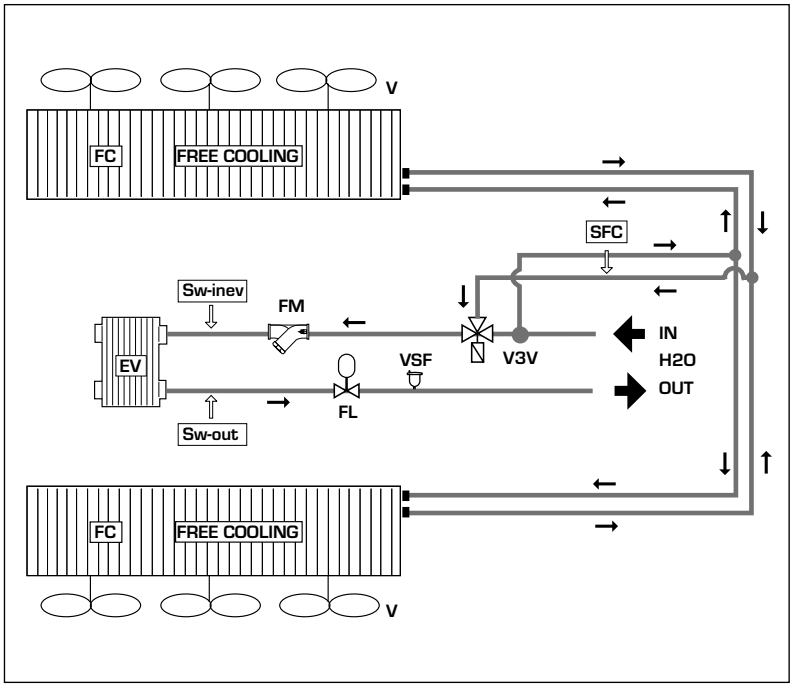


21. HYDRAULIC CIRCUITS

21.1. INTERNAL HYDRAULIC CIRCUIT NRL F "00"

The hydraulic circuit comprises:

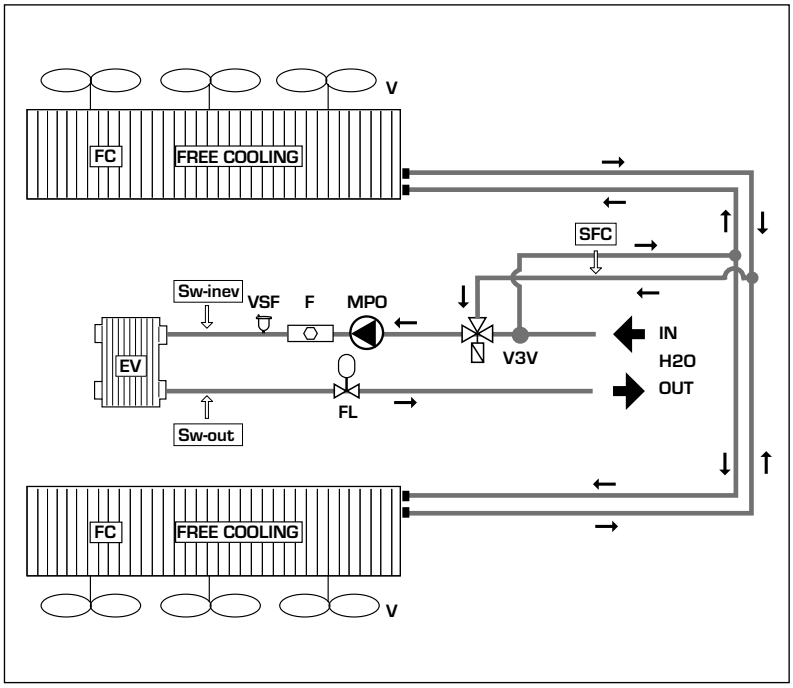
- water - air coil
- Flow switch
- Water filter
- Water inlet temperature sensor
- Water outlet temperature sensor
- Free cooling probe
- Plate evaporator
- Fan
- Motorised 3-way valve
- Air separator with automatic drain valve



21.2. INTERNAL HYDRAULIC CIRCUIT NRL F "P3-P4"

The hydraulic circuit comprises:

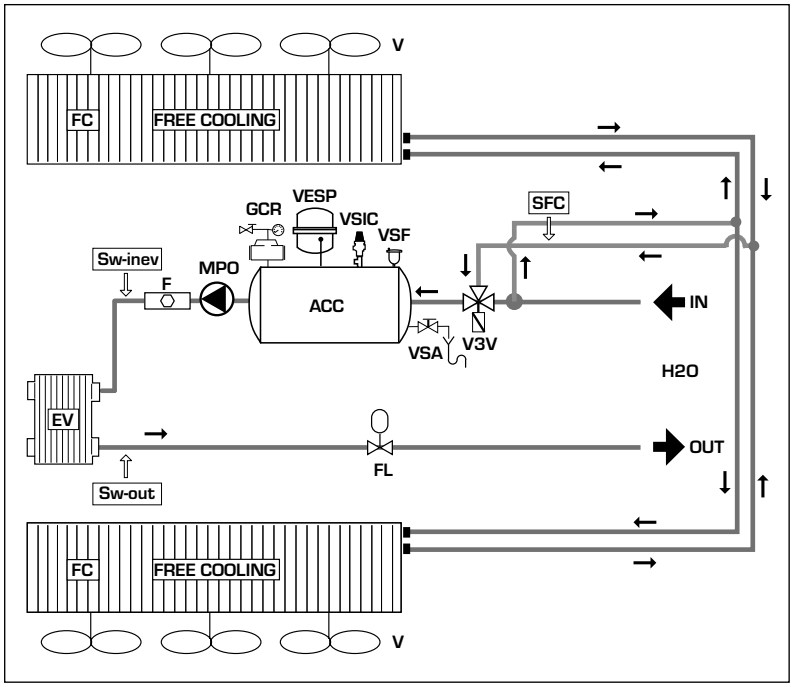
- water - air coil
- Flow switch
- Water filter
- Water pump
- Water inlet temperature sensor
- Water outlet temperature sensor
- Free cooling probe
- Plate evaporator
- Fan
- Motorised 3-way valve
- Air separator with automatic drain valve



21.3. INTERNAL HYDRAULIC CIRCUIT NRL F "03-04"

The hydraulic circuit comprises:

- Accumulator tank
- water - air coil
- Flow switch
- Water filter
- Water pump
- Water inlet temperature sensor
- Water outlet temperature sensor
- Plate evaporator
- Charging unit with pressure gauge
- Fan
- Motorised 3-way valve
- Air separator with automatic drain valve
- Water discharge valve
- Safety valve



KEY

ACC	Accumulator tank
FC	Water - air coil
FL	Flow switch
FM	Water filter "Y"
MPO	Water pump
SW-inev	Water inlet temperature sensor
SW-out	Water outlet temperature sensor
F	Water filter
VSIC	Safety valve

EV	Plate evaporator
GCR	Charging unit with pressure gauge
V	Fan
VESP	Expansion tank
V3V	Motorised 3-way valve
VSF	Air separator with automatic drain valve
VSA	Water discharge valve
SFC	Free cooling probe

NB :
The presence of the filter should be considered obligatory, and **ITS REMOVAL WILL MAKE THE GUARANTEE** void. It must be kept clean, so it is necessary to check its clean state after the installation of the unit, and check it regularly.

The installation of the shutoff valves is recommended, to be able to disconnect the machine from the system, or for maintenance operations.

EXTERNAL HYDRAULIC CIRCUIT RECOMMENDED
The choice and installation of components aside of the NRL is the responsibility of the installer, who must use good working practices and observe the standards in force in the destination country (M.D. 329/2004).

You are advised to install:
- the charging unit/air vent
- anti-vibration joints
- a pump (if it is not supplied with the machine)
- an expansion tank (if it is not supplied with the machine)
- shutoff taps
- a safety valve (if it is not supplied with the machine)
- pressure gauges

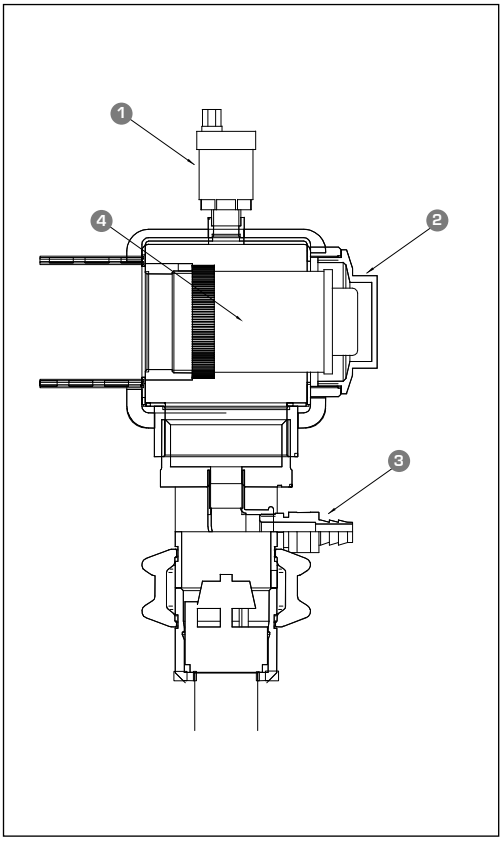
WARNING
The hydraulic piping for connection to the machine must be properly scaled for the actual water flow rate required by the plant when working. The water flow rate to the heat exchanger must always be constant.

22. FILTER MAINTENANCE

22.1. FILTER CLEANING PROCEDURE:

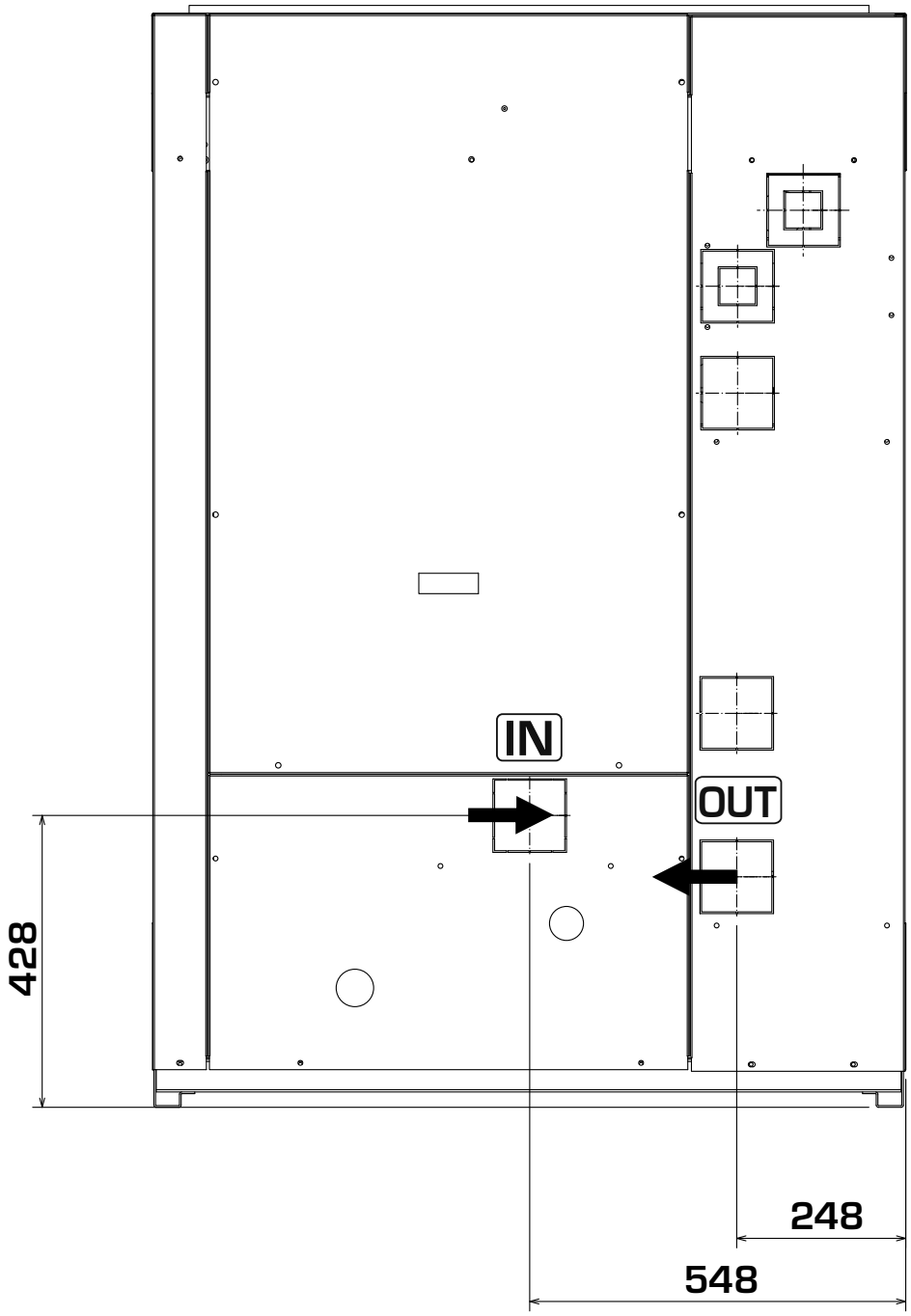
(type of filter only assembled in the version with water accumulator and pump).

- Stop the machine.
- Turn on the filter discharge tap.
- Loosen the hexagonal nut on the filter head, remove the metal ring nut, and clean it.
- Replace the ring nut in the filter housing and retighten the hexagonal nut.



Key	
1	Drain valve
2	Hexagonal nut
3	Filter discharge tap
4	Metal ring nut housing

23. PLUMBING CONNECTION POSITION



WARNING:
clean the system carefully before connecting the unit. Cleaning will eliminate any residues suck as drops of solder, waste, rust or other impurities from the piping. These substances could deposit inside and cause the machine to malfunction.
The connection pipes must be suitably supported so as not to burden the apparatus with their weight.

24. ELECTRICAL WIRINGS

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.

The units are fully wired in the factory, and therefore only need to be connected to the mains supply. You are advised to check the characteristics of the mains supply, to ensure it is suitable for the levels indicated in the electric data table, also taking into consideration any other equipment that may be operating at the same time.

24.1. LINES AND ELECTRIC DATA FOR THE UNIT

NB

Connection cables are not supplied.

The cable sections indicated in tab. 24.2 are advised for a maximum length of 50 m. The DESIGNER should suitably asses the power supply line and the earthing system for longer lengths, based on:

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

24.2. ELECTRICAL DATA

MODEL	Version	SECT. A mm^2	Earth (section PER) mm^2	IL A
0280	E	16	16	63
0300	E	16	16	63
0330	E	25	16	80
0350	E	25	16	80
0500	E - A	50	25	125
0550	E - A	50	25	125
0600	E - A	50	25	125
0650	E - A	70	35	160
0700	E - A	70	35	160

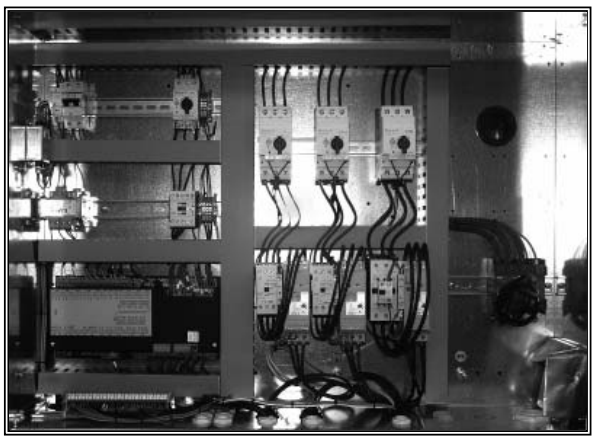
NB

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.

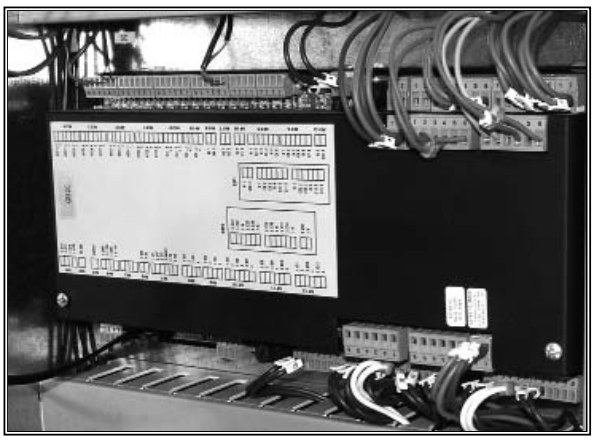
Slack terminals could cause the cables and components to overheat.

Key	
SECT. A	Power supply **400V-3N-50Hz**
Earth	Earth to bring to the machine
IL	Main switch

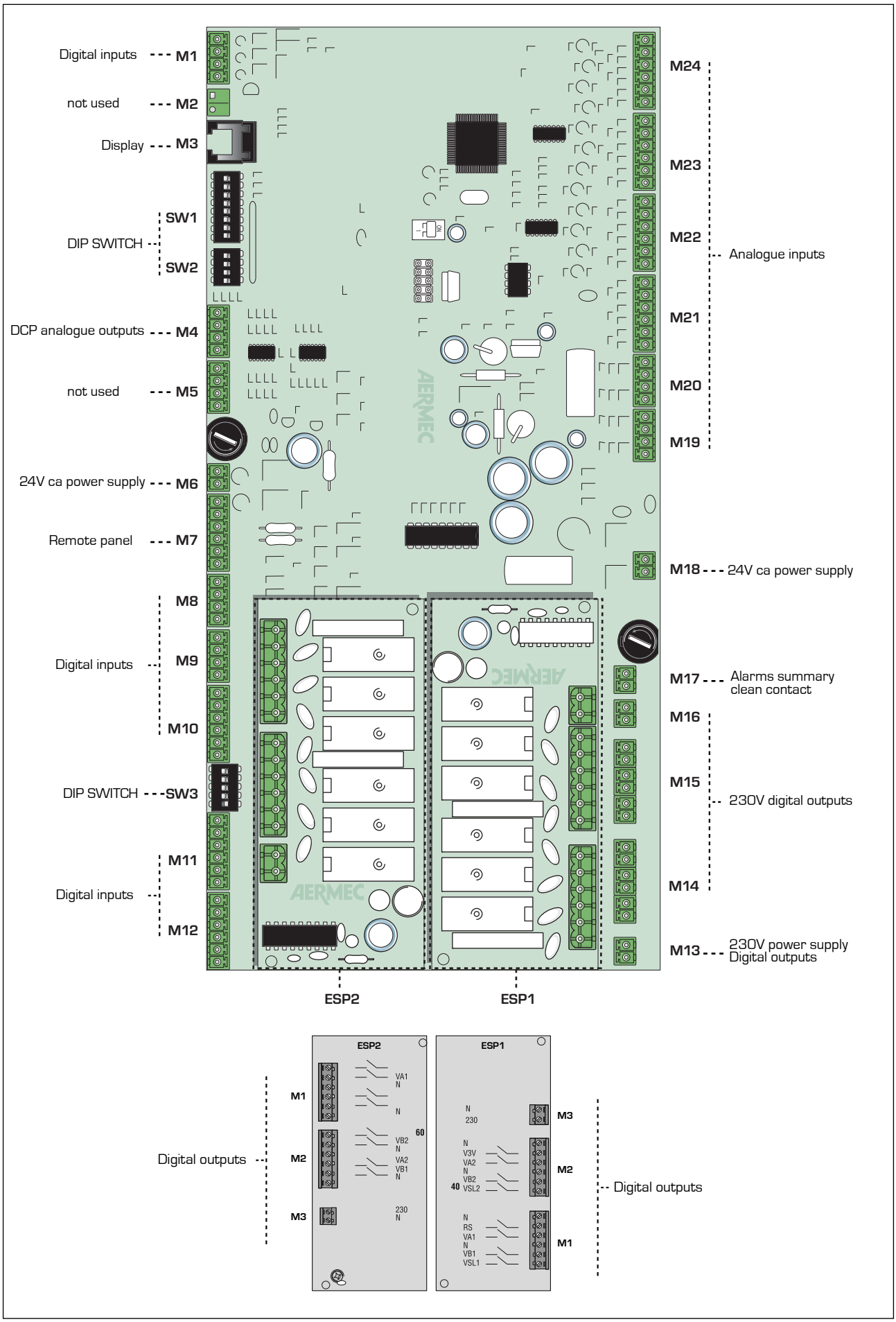
Electrical panel



GR3



24.3. "GR3" CONTROL BOARD

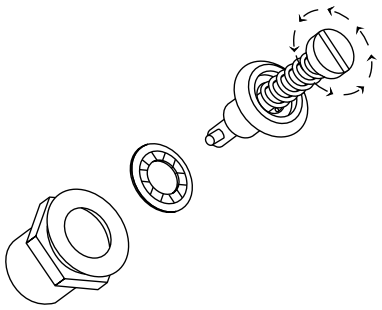


24.4. CONNECTION TO THE ELECTRICAL POWER SUPPLY

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

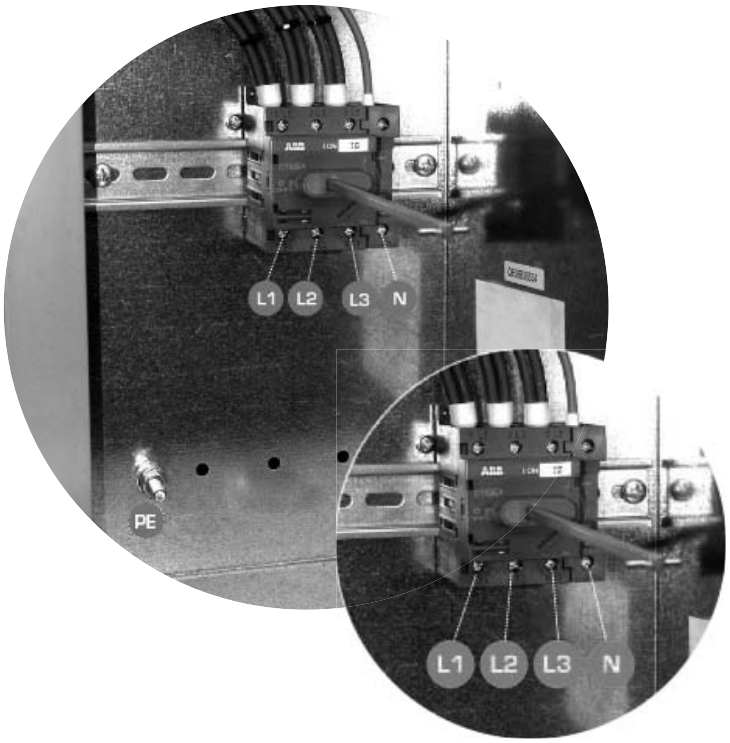
To access the electric box:

– 1 Make a ¼ turn of the screw, anticlockwise

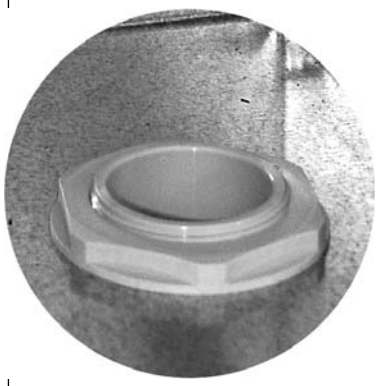


– 2 Turn the handle of the door-block disconnecting switch to OFF, then lock it and affix the warning notice.

The figures below show the various parts to facilitate the various line connections.



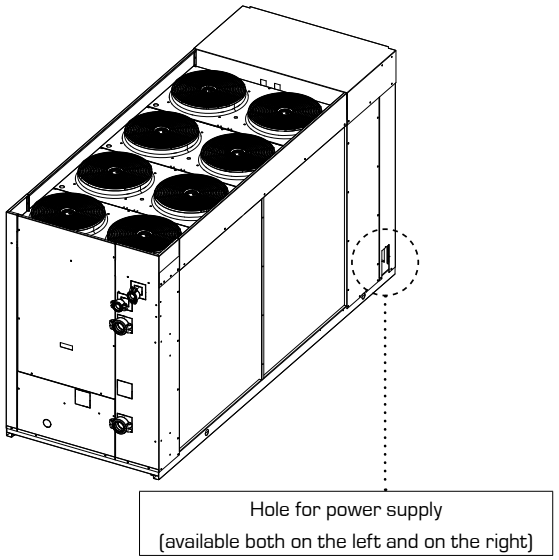
Key			
L1	Line 1	**N**	Neutral
L2	Line 2	**PE**	Earth
L3	Line 3		



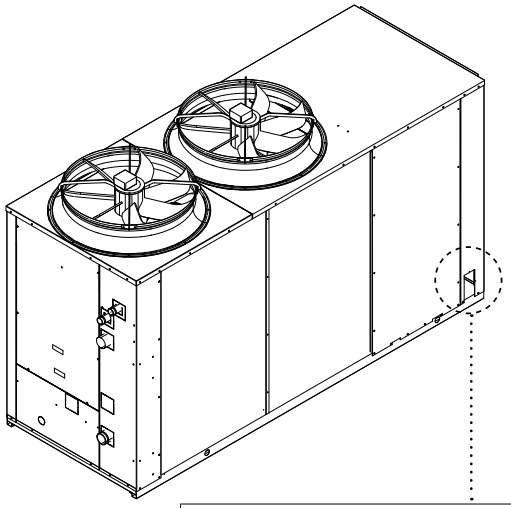
Hole for electric cables

PE: earth connection

25.4. ELECTRICAL CONNECTIONS



Hole for power supply
(available both on the left and on the right)



Hole for power supply
(available both on the left and on the right)

25. START-UP

25.1. PRELIMINARY OPERATIONS

WARNING
Before carrying out the controls indicated below, ensure that the unit is disconnected from the mains supply.
Ensure that the main switch is turned to OFF and locked in position, and attach a warning sign to the switch. Before beginning the operations, check the absence of voltage by means of a voltmeter or a phase detector.

25.1.1. Electrical checks

- Check the general power supply cables are of a suitable section, able to withstand the overall absorption of the unit (see electrical data), and that the unit has been duly earthed.
- Check all the electrical connections are correctly fixed and all the terminals adequately closed. The following operations must be carried out when the unit is not powered up.
- Power up the unit by turning the main switch to ON. The display will come on a few seconds after the machine is powered up, check that the operation status is at OFF (OFF BY KEYB at the bottom of the display).
- Using a tester, check that the value of the supply voltage to the RST phases is equal to 400V ±10%, furthermore, check that the imbalance between the phases is not more than 3%.
- Check that the connections made by the installer comply with the data given here.
- Check that the electric heater(s) of the compressor casing are working, by measuring the rise in the temperature in the oil sump. The heater(s) must work for at least 24 hours before the compressor start-up, and in any case the temperature of the oil sump must be 10-15°C higher than the room temperature.

WARNING
- At least 24 hours before starting up the unit (or at the end of each period of prolonged inactivity) the unit must be powered up, to allow the heaters of the compressor carter to evaporate any refrigerant that may be present in the oil. If this precaution is not performed the compressor could be seriously damaged and the guarantee would no longer be valid.

25.1.2. Hydraulic circuit controls

- Check that all the hydraulic connections are correctly made and that the indications on the plates are observed.
- Check that the hydraulic system is full and under pressure, and check also that there is no air (if there is air, bleed it).
- Check that any interception valves on the system are correctly opened.
- Check that the circulation pump(s) are working, and that the water flow rate is sufficient to close the flow switch contact.
- Check the correct working of the flow switch: closing the shutoff valve at the heat exchanger outlet, the lockout alarm must appear on the display. Finally, reopen the valve and rest the lockout.

25.2. START-UP

WARNING
Bear in mind that a free start-up service is offered by the AERMEC After Sales Service for the units of this series, at the request of Aermec customers or legitimate owners (VALID IN ITALY ONLY).
Placing machines in operation must be previously agreed on the basis of the system creation times. Before the intervention of the AERMEC After Sales Service department all the works (electrical and plumbing connections, charging and bleeding of the air of the system) must have been completed.
Before performing the checks indicated below, make sure that the unit is disconnected from the mains, using the suitable instruments.

25.2.1. Chiller circuit checks

- Check for refrigerant gas leaks, especially near the pressure test points, pressure gauges, pressure transducers and pressure switches; (vibration during transport may have loosened the connectors).
- After a brief working period, check the level of oil in the compressor and the absence of bubbles in the liquid indicator glass. A continuous passage of vapour bubbles in cooling mode may indicate an insufficient refrigerant charge or that the thermostatic valve is incorrectly set. The presence of vapour in the cooling mode is possible for short periods.

25.2.2. Overheating

Check the level of overheating by comparing the temperature indicated with a contact thermostat placed on the compressor suction and the temperature shown on the low pressure gauge (saturation temperature corresponding to the evaporation pressure).
The difference between these two temperatures gives the superheating value. Optimum values are between 4 and 8°C.

25.2.3. Under-cooling

Check the level of under-cooling by comparing the temperature indicated with a contact thermostat placed on the tube at the condenser outlet and the temperature shown on the high pressure gauge (saturation temperature corresponding to the condensation pressure).
The difference between these two temperatures gives the under-cooling value. Optimum values are between 4 and 5°C.

25.2.4. Discharge temperature

If the values of under-cooling and overheating are regular, the temperature measured in the discharge tube at the compressor outlet must be 30/40°C higher than the condensation temperature.

25.3. SYSTEM LOADING/ UNLOADING

During the winter, if the system remains idle, the water in the heat exchanger may freeze, causing irreparable damage to the heat exchanger itself, the complete draining of the refrigerating circuits and, sometimes, damage to the compressors.

To avoid the risk of freezing, there are three possible solutions:

- the complete draining of the water from the heat exchanger at the end of the season, and the refilling at the start of the next season, by means of the drain valve located on the accumulator tank in the versions with accumulator and/or pump
- the operation with glycol water, with a glycol percentage chosen on the basis of the minimum outside temperature envisaged. In this case, it is necessary to take into consideration the different yields and absorption of the chiller, the measurements of the pumps and the output of the terminals
- the use of heaters in the heat exchanger (standard on all devices). In this case the heaters must always be powered for the entire winter period (machine in standby).

26. MAINTENANCE

NB
All the routine and extraordinary maintenance operations must be carried out only by qualified personnel.
Before starting any cleaning or maintenance operation, it is advisable to disconnect the unit from the power supply.

All the units are subject to wear along time.

Maintenance operations allow you to:

- uphold unit efficiency
- reduce the speed of wear
- collect information and data and understand the unit efficiency status, to prevent possible failures

IT is therefore essential to carry out regular checks:

- **ANNUALLY**
- **SPECIAL CASES**

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

- **Annual checks**

Chiller circuit

- Check the chiller circuit seal, and make sure that the pipes in it have not suffered damage.
- Perform the acidity test on the oil of the chiller circuit.
- Check the functioning of the high and low pressure switches; in the event of poor functioning, replace them.
- Check for any scaling on the filter-drier and replace it if necessary.

- **Electrical checks**

- Check the conditions of the electrical wires and their insulators.
- Check the functioning of the evaporator heater, and the compressor casing.

- **Mechanical checks**

Check the screws on the fan grilles (and the fans themselves) are firmly tightened, as well as the compressors and the electric box, and the outer panelling of the unit. If they are poorly tightened, they produce abnormal noise and vibrations.
Check the structure conditions.
If necessary, treat oxidised parts with paints suitable for eliminating or reducing oxidation.

- **Hydraulic checks**

- Clean the water filter
- Eliminate the air from the circuit
- Check the water flow rate to the evaporator is always constant
- Check the state of the hydraulic piping thermal insulation
- Check the glycol percentage, when present.

27. DISPOSAL

27.1. DISCONNECTING THE UNIT

The unit disconnection operations must be carried out by a registered technician.
Before disconnecting the unit, the following elements must be removed, if present:
• The refrigerant gas: the gas must be removed with suction devices that operate in closed circuit so that there is no gas leak in the environment.
• The glycol must not be thrown away in such a manner that affects the environment when it is removed. It must be placed in suitable containers.

NB
The disposal of refrigerant gas, any glycol water, and any other material or substance must be carried out by qualified personnel and in compliance with the legislation in force, in order to avoid damage to things or people or pollution of the surrounding area.

When the unit is pending disposal, it can also be stored in the open, as exposure to the elements and temperature changes do not cause harmful effects for the environment, as long as the unit electrical, cooling and hydraulic circuits are closed and in good conditions.

27.2. DISMANTLING AND DISPOSAL

In the dismantling phase, the fan, the motor and the coil, if operating, could be taken from the specialised centres for possible reuse.

NB
For lo dismantling/disposal, all the materials must be sent to the authorised centres in compliance with the national regulations in force. For further information on discharge contact the head office.

28. IMPROPER USE

The device is designed and built to ensure the maximum safety in its immediate vicinity (IP24) as well as to resist atmospheric agents.
The fans have protection grilles to prevent the unwanted intrusion of foreign bodies.
The accidental opening of the electric panel with the machine in operation is prevented by the door lock sectioning device.
Do not rest tools or heavy objects directly on the side heat exchanger coils, so as not to ruin the fins.

NB
Do not introduce objects or allow them to fall through the grilles of the fan motors. Do not rest cutting surfaces against the thermal exchange coils.

28.1. IMPORTANT SAFETY INFORMATION

The machine must not exceed the pressure and temperature limits indicated in the table given in the "Operating limits" paragraph of the technical manual.
Correct functioning is not guaranteed after a fire; before starting up the machine again, contact an authorised Assistance Centre.
The machine is equipped with safety valves which, in the event of excessive pressure, can discharge the high temperature gases into the atmosphere.
Wind, earthquakes and other natural phenomena of exceptional intensity have not been taken into account.
If the unit is used in an aggressive atmosphere or with aggressive water, consult the company head office.

WARNING
Following extraordinary maintenance interventions on the refrigerating circuit, with the replacement of components, before restarting the machine it is necessary to carry out the following operations:

- Pay the closest attention when restoring the refrigerant load indicated on the machine's rating plate (inside the electrical panel).
- Open all the taps in the chiller circuit
- Correctly connect the power supply and the earthing
- Check the hydraulic connections
- Check the water pump works properly
- Clean the water filters
- Check that the condenser coils are not dirty or clogged.
- Check the correct rotation of the fan unit

29. REFRIGERANT GAS R410A

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

PHYSICAL AND CHEMICAL PROPERTIES	
Physical form	Liquefied gas
Colour	Colourless
Odour	Ethereal
pH	neutral at (25°C)
Boiling point/interval	-52.8°C (-63°F)
Flash point	not inflammable
Vapour pressure	11 740 hPa at 25°C
Vapour pressure	21 860 hPa at 50°C
Relative density	1.08g/cm3
Solubility	Water: 0.15g/100ml.

DANGER IDENTIFICATION
if the skin comes into contact with the quickly evaporating liquid, this may cause the tissues to freeze. High vapour concentrations can provoke headaches, dizziness, sleepiness, nausea, and also lead to lipothymia. irregular heartbeat (arrhythmia).

FIRST-AID MEASURES	
General information	If the person is unconscious, place him on his side in a stable position and call a doctor. Do not give anything to eat or drink to persons who have fainted. If the breathing is irregular or has stopped, practise artificial respiration. If the disturbances persist, contact a doctor.
Inhalation	In the event of inhalation, breathe in fresh air. If the person has trouble breathing, give him oxygen. If breathing has stopped, practise artificial respiration. Contact a doctor.
Contact with the skin	if the skin comes into contact with the quickly evaporating liquid, this may cause the tissues to freeze. In the event of contact with the liquid, heat the frozen tissues with water and call a doctor. Remove contaminated clothes and footwear. Wash the clothes before using them again.
Contact with the eyes	Rinse the eyes immediately with running water for at least 15 minutes, keeping the eyelids open. If the irritation persists, contact a doctor.
Note for the doctor	Do not give adrenaline or similar substances.

Toxicological information	**Inhalation:** irregular heartbeat (arrhythmia). **Ingestion:** no specific risk. **Contact with the skin:** if the skin comes into contact with the quickly evaporating liquid, this may cause the tissues to freeze. Slightly irritating for the skin. **Contact with the eyes:** slightly irritating for the eyes.

FIRE-FIGHTING MEASURES	
Extinction means	Not inflammable. ASTM D-56-82; ASTM E-681. In the event of a fire, use vaporised water, foam, dry chemical products or CO2.
Particular risks from exposure	Possibility of dangerous reactions being generated during a fire, due to the presence of F and/or Cl groups. In the event of a fire or overheating, there is an increase in pressure and the container could explode. Use vaporised water to keep the fire-exposed containers cool. This product is not inflammable at room temperature and atmospheric pressure. It could become inflammable however if mixed with pressurised air and exposed to strong ignition sources.

MEASURES TO BE ADOPTED IN THE EVENT OF ACCIDENTAL LEAKAGE	
Environmental precautions	Stop the leak if there is no risk involved. Any leaks will quickly evaporate.
Cleaning methods	The mixture evaporates

STORAGE AND HANDLING	
Handling	Open carefully to allow any internal pressure to be released gradually. Store and use away from heat, sparks, naked flames or other combustion sources. Pressurised container. Protect from direct sunlight and do not expose to temperatures above 50°C. Do not pierce or burn, even after use. Ensure adequate ventilation. Wash your hands well after touching the product.
Warnings for safe use	• Ensure there is a good air flow and/or aspiration in the working environment. For saving, maintenance, dismantling and disposal, use an autonomous breathing apparatus. The vapours are heavier than the air and can provoke suffocation, reducing the oxygen available for breathing. • Protect your hands with heatproof gloves • Protect your eyes with safety goggles • When handling, observe the good practices of industrial hygiene and safety.

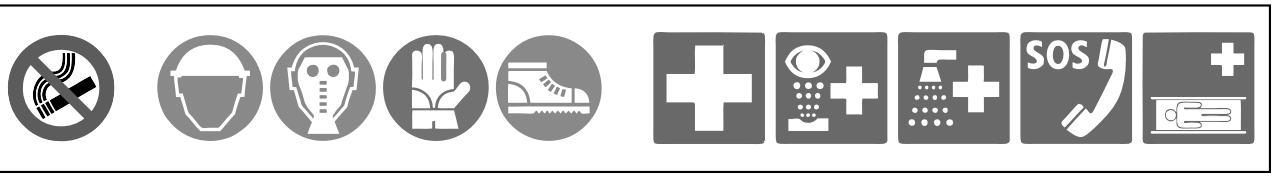
ECOLOGICAL INFORMATION	
Substance	FORANE 32
In water	Not easily biodegradable: 5% after 28d (Policy OCDE 107)
In the air	Degradation by OH radicals: t½ life= 1472d Ozone destruction potential: ODP (R-11) = 0 Greenhouse effect potential of the halogenated hydrocarbons: HGWP (R-11=1) = 0.13
Bio-accumulation	Practically non-biaccumulable: log Pow = 0.21 Policy OCDE 107

REGULATIONS INFORMATION	
EEC Directive **Safety cards**	D.91/155/EEC modified by D. 93/112/EEC and D.2001/58/EC: Dangerous substances and preparations
Dangerous preparations	D.199/45/EC modified by D.2001/60/EC **Not classified as dangerous**

DISPOSAL	
Disposal methods	Dispose of excess products and those that cannot be recycled via an authorised waste disposal firm. Refer to the information provided by the manufacturer/supplier with regard to recovery/recycling.

PERSONAL PROTECTION	
Professional exposure limit:	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 (Potentiel 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)

Aermec S.p.A.
37040 Bevilacqua (VR) Italy – Via Roma, 996
Tel. (+39) 0442 633111
Telefax 0442 93730–(+39) 0442 93566
www .aermec. com - info @ aermec. com