

NRL

R410A

TECHNICAL INSTALLATION MAINTENANCE MANUAL

Chillers and air water heat pumps and motorcondensers with scroll compressors


- A HIGH EFFICIENCY**
- E HIGH EFFICIENCY SILENCED VERSION**
- HA HIGH EFFICIENCY HEAT PUMP**
- HE HIGH EFFICIENCY HEAT PUMP SILENCED VERSION**



 **57 KW ÷ 83 KW**

 **59 KW ÷ 86 KW**



 **90 KW ÷ 163 KW**

 **103 KW ÷ 171 KW**



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.

In addition, 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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For the installation of the appliance, please comply with the safety rules and regulations contained in these instructions



Moving parts hazard



High temperature hazard



Voltage hazard



Danger: Disconnect voltage



Generic danger



Useful information and notices



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NRL

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
TYPE	WATER/WATER HEAT PUMPCHILLER
MODEL	

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

Therefore complying with the essential requirements of the following directives:

- LVD Directive: 2006/95/CE
- Electromagnetic compatibility Directive 2004/108/CE
- Machinery Directive 98/37/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-QT3664 Rev.3 issued by the notified body n.1131 CEC via Pisacane 46 Legnano (MI) - Italy

Bevilacqua

15/01/2008

Marketing Manager
Signature

1. NOTES REGARDING THE DOCUMENTATION

1.1. USE IN COMPLIANCE WITH DESTINATION

AERMEC units are constructed according to the recognised technical standards and safety regulations. These appliances are designed and built for heating and hot water production and also for cooling and must be used in compatibility with their technical features. In spite of this, dangers to the user or third parties may arise, as well as damage to the appliance and other objects, in the event of improper use and use that is not in compliance with that envisioned.

Any use not expressly indicated in this

manual is not permitted. **Consequently AERMEC will not assume any responsibility for damage that may occur due to failure to comply with these instructions.**

1.2. PRESERVATION OF THE DOCUMENTATION

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

READ THIS DOCUMENT CAREFULLY, the appliance must be installed by

qualified and suitably prepared staff in compliance with the national legislation effective in the country of destination. (Ministerial Decree 329/2004).

The appliance must be installed so that maintenance and/or repairs can be carried out. The appliance warranty does not cover the costs for ladders, scaffolding, or other elevation systems that may become necessary for carrying out servicing under warranty.

The validity of the warranty shall be void in the event of failure to comply with the above-mentioned indications.

2. FUNDAMENTAL SAFETY REGULATIONS

We remind you that the use of products that employ electrical energy and water requires that a number of essential safety rules be followed, such as:

- ⦿ This appliance is not suitable for use by persons (including children) with limited physical, sensory, or mental capacities or those lacking experience or know-how, unless they are supervised or instructed regarding the use of the appliance by a person who is responsible for their safety. Children must always be supervised to ensure they do not play with the appliance.

- ⦿ It is prohibited to carry out any technical or maintenance operation before the unit has been disconnected from the electrical mains by switching off the master switch of the system and the main power switch on the control panel.
- ⦿ It is prohibited to modify the safety or adjustment devices without the manufacturer's authorisation and precise instructions
- ⦿ It is prohibited to pull, disconnect, or twist the electrical cables coming from the unit even if disconnected from the electrical mains.
- ⦿ It is prohibited to leave containers

and flammable substances near to the unit.

- ⦿ It is prohibited to touch the appliance when you are barefoot and with parts of the body that are wet or damp.
- ⦿ It is prohibited to open the access hatches to the internal parts of the appliance without first having switched off the system master switch.
- ⦿ It is prohibited to disperse or abandon the packing materials and they must be kept out of the reach of children, as they are a potential source of danger.

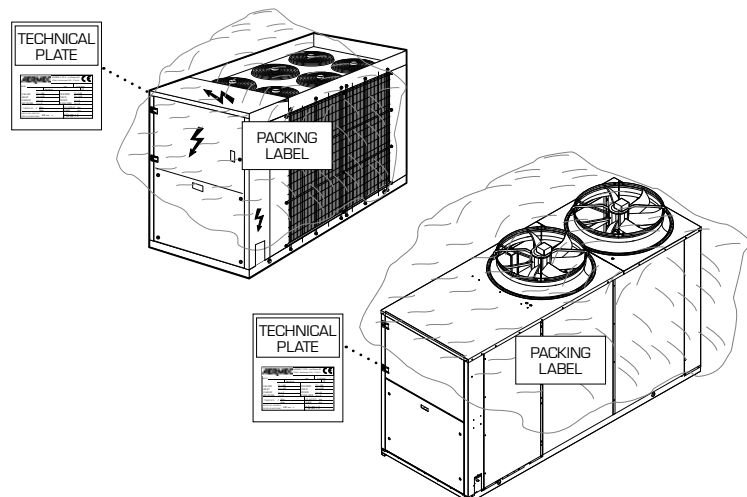
3. PRODUCT IDENTIFICATION

NRL can be identified by means of:

- **Packing label** that reports the identification data of the product.
- **Technical plate** positioned on the lateral cross-member of the electric box.

NOTE:

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



4. DESCRIZIONE DELL'UNITÀ

- The appliances in the **NRL** series are units used for the production of cold water for technological systems. The heat pump models also allow to produce hot water for heating. They are made up of two R410A cooling circuits and a unique hydraulic circuit, which may or may not be supplied with storage or pumping unit. The presence of several scroll compressors allows **NRL** chillers various partialisations of the cooling capacity. The electronic adjustment with microprocessor controls and manages all components and functioning parameters. An internal memory records the functioning conditions when an alarm occurs in order to show it on the display. The units have an **IP 24** protection rating.

4.1. MODELS AVAILABLE

- **"COOLING ONLY" (A - E)**
maximum external temperature accepted **46°C**;
- temperature water product **18°C**;
- **"HEAT PUMP" (HA - HE)**
in cooling mode the operational limits reach a maximum external air temperature of **46°C**;
- temperature water product **18°C**;
- in heating mode the operational limits reach a maximum external air temperature of **42°C**;
- temperature water product **55°C**;

-**NRLH does not envision the following configurations:**

- YH (with water produced lower than 4 °C)
- HC (motorcondensing heat pump)

4.2. VERSIONS AVAILABLE

- **HEAT RECUPERATORS:**

- with **desuperheater** inserted in series (**D**).
- **ATTENTION:**
In heat pump models the desuperheater must be shut-off in heat pump mode, or the warranty will be come void.

- **Total heat recovery (T)**
With plate heat exchanger inserted in parallel with the coils.

- **Both of these versions (D - T) have:**
- Hot gas by-pass device upstream from the evaporator.
- Water filter before the recovery heat exchanger.

Units with Desuperheater (D) or Total Recovery (T) do not envision the following versions:

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

4.3. SILENCED MOTORCONDENSERS (CL)

The NRL-C motorcondensers do not envision the following versions:

- HC (motorcondensing heat pump)
- TC (motorcondensing with total recovery)
- DC motorcondensing with storage tank.
- version Y: it is the version that allows to produce cooled water below the standard value of +4 °C to a minimum of -6 °C. Contact the head office for lower values.

4.4. CONFIGURATOR

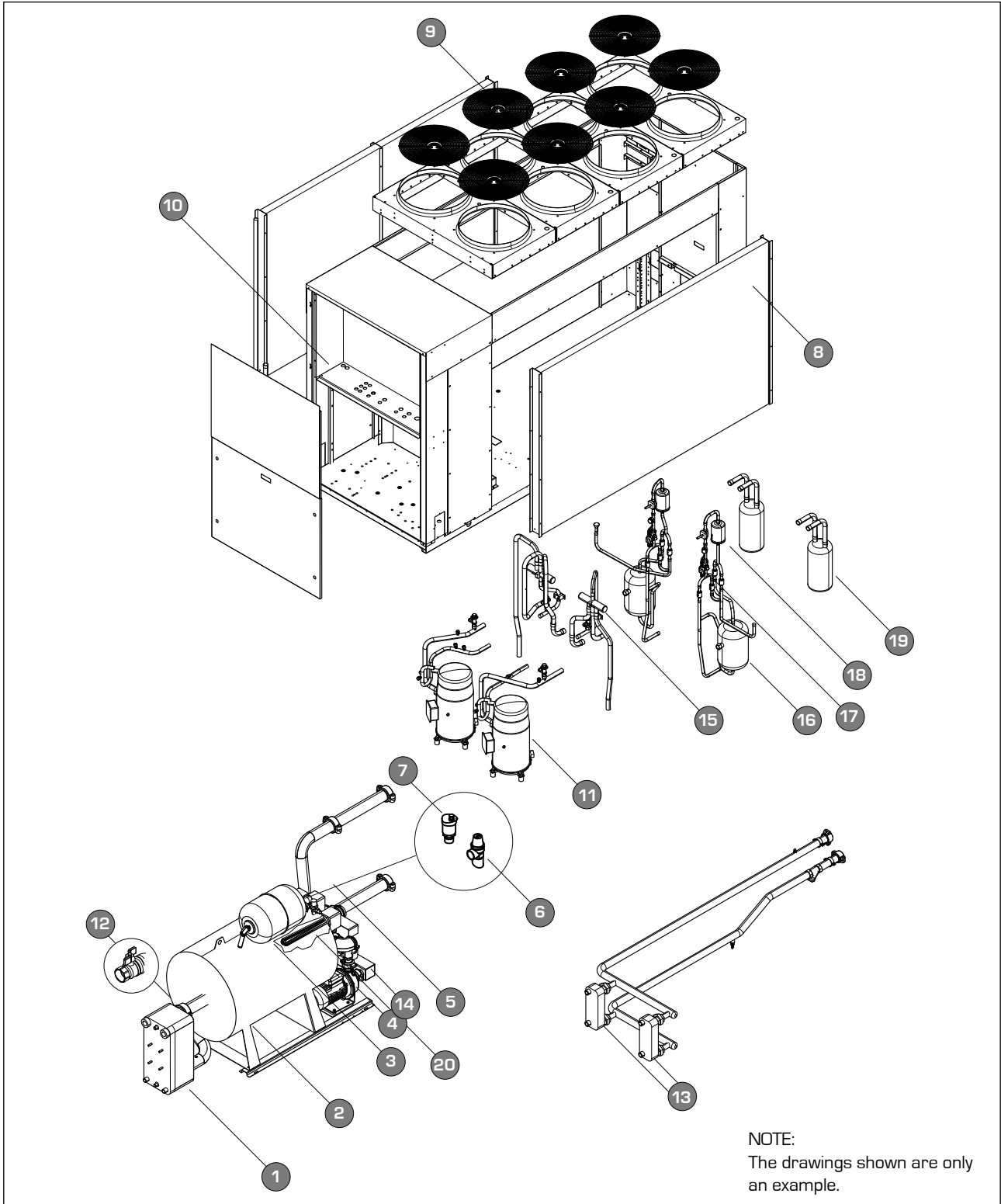
1,2,3	4,5,6	7	8	9	10	11	12	13	14	15, 16
NRL	028	°	°	°	°	°	°	°	°	00

Field

1, 2, 3	Code	NRL
4, 5, 6	Size	028, 030, 033, 035, 050, 055, 060, 065, 070
7	Compressor	° Standard compressor
8	Thermostatic valve	° Standard mechanical thermostatic valve Y Low water temperature mechanical hermostatic valve (to -6°C) X Electronic thermostatic valve also for low water temperature (to -6°C)
9	Model	° Cooling Only C Motorcondensing H Heat Pump
10	Heat recovery	° Without recuperators D Desuperheater T Total recovery
11	Version	A High efficiency E High efficiency silenced
12	Coils	° In aluminium R In copper S Tinned copper V Painted
13	Fans	° Standard M Larger
14	Power supply	° 400V-3N-50Hz with magnet circuit breakers 1 230V-3-50Hz with magnet circuit breakers 2 500V-3-50Hz with magnet circuit breakers
15, 16	Storage tank	00 Without hydronic storage tank 01 Low static pressure storage tank and single pump 02 Low static pressure storage tank and reserve pump 03 High static pressure storage tank and single pump 04 High static pressure storage tank and reserve pump 05 Storage tank with holes for int. res. low static pressure and single pump 06 Storage tank with holes for int. res. low static pressure and reserve pump 07 Storage tank with holes for int. res. high static pressure and single pump 08 Storage tank with holes for int. res. high static pressure and reserve pump 09 Double water ring 10 Double water ring with integrated resistance P1 Without storage tank with low static pressure P2 Without storage tank with low static pressure pump and reserve pump P3 Without storage tank with high static pressure P4 Without storage tank with high static pressure pump and reserve pump

5. DESCRIPTION OF THE COMPONENTS

5.1. NRL 0280-0300-0330-0350

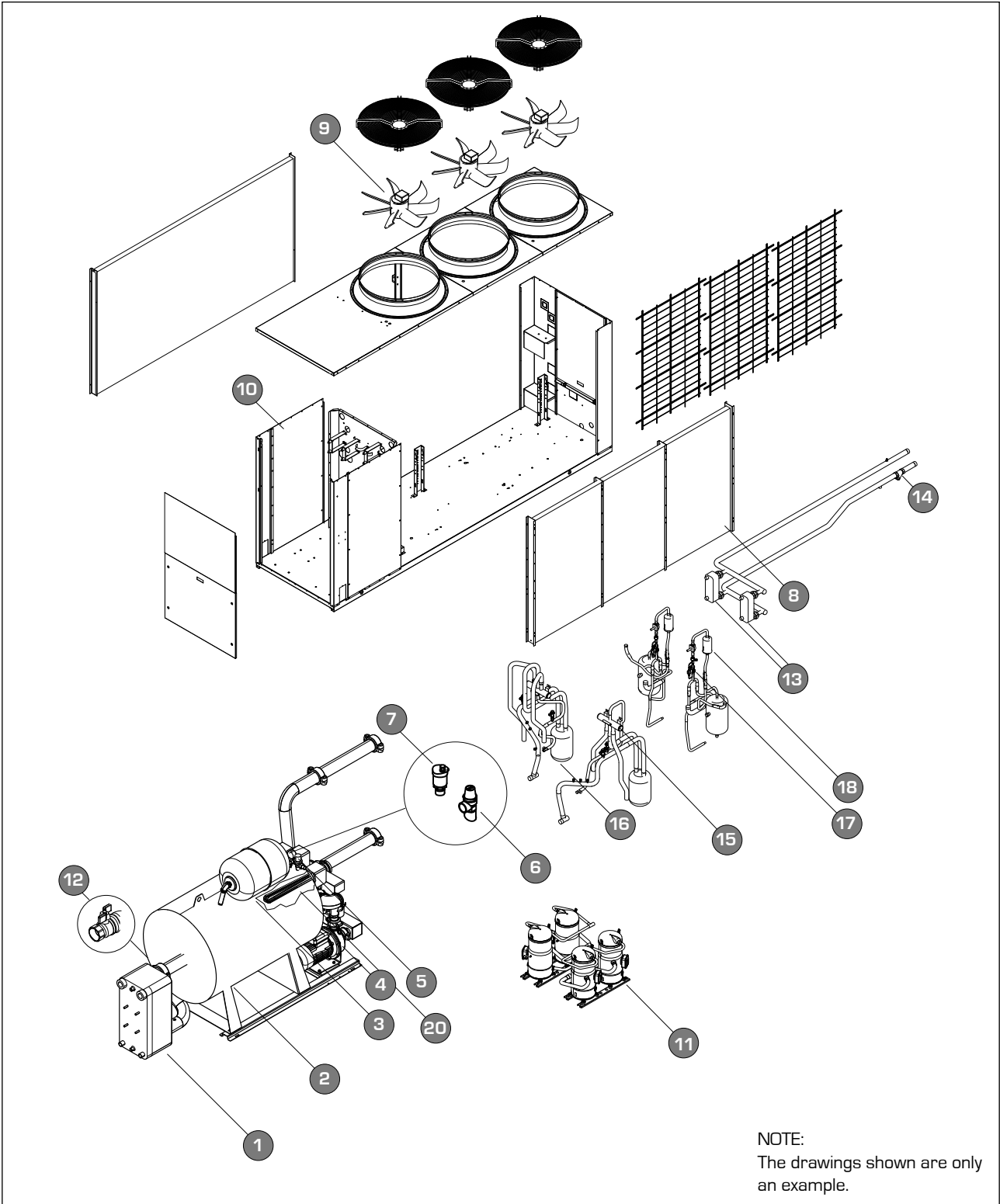


NOTE:
The drawings shown are only an example.

KEY:

1	Plate heat exchanger	11	Compressors
2	Storage tank	12	Storage tank draining
3	Expansion vessel	13	Desuperheater
4	Pumps	14	Mounted filter
5	Loading unit	15	Cycle reversing valves
6	Safety valve	16	Liquid storage tank
7	Vent valve	17	Thermostatic valves
8	Coil	18	Dehydrator filter
9	Fans	19	Liquid separator
10	Electric Control Board	20	Electric resistance

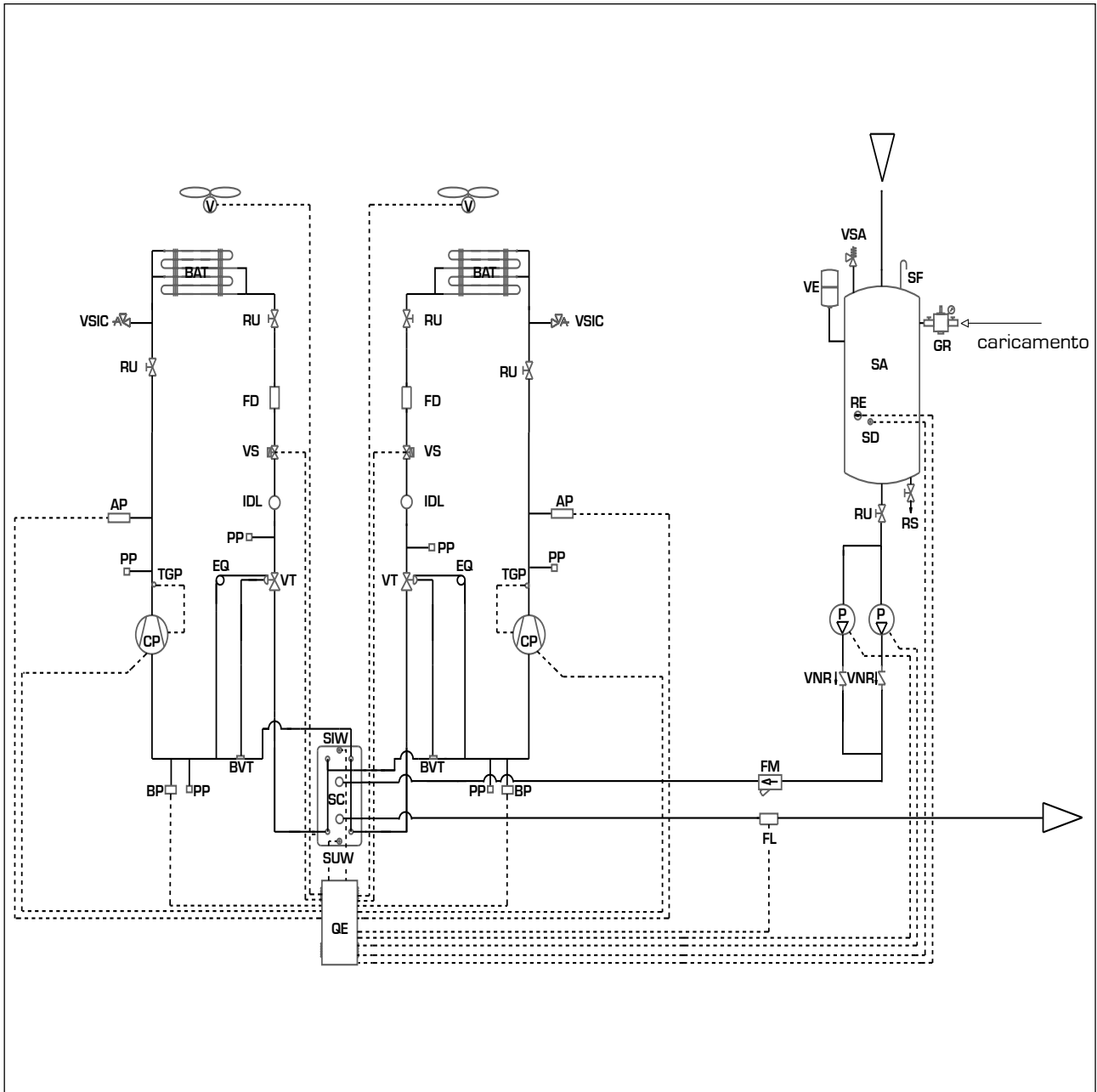
5.2. NRL 0500-0550-0600-0650-0700



KEY:

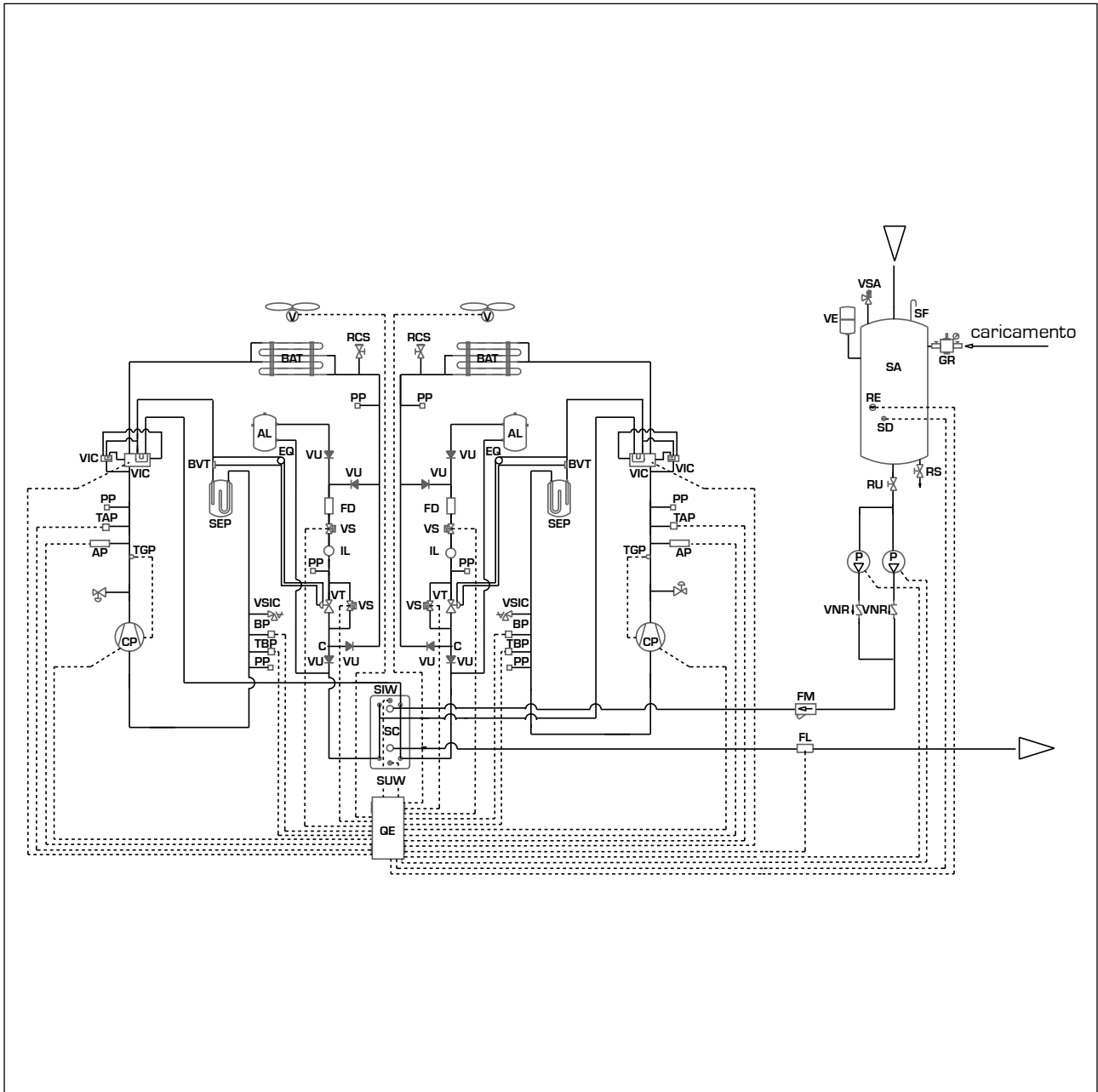
1	Plate heat exchanger	11	Compressors
2	Storage tank	12	Storage tank draining
3	Expansion vessel	13	Desuperheater
4	Pumps	14	Mounted filter
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8	Coil	18	Dehydrator filter
9	Fans	19	Liquid separator
10	Electric Control Board	20	Electric resistance

5.3. COOLING CIRCUITS,
HYDRAULIC (A - E)



QE	Electric Control Board	V	Fan	SD	Anti-freeze probe	VS	Solenoid valve
FM	Water filter	BAT	Coil	RE	300W electric resistance	IDL	Liquid indicator
VE	Expansion vessel	RU	Cock	VNR	Non-return valve	EQ	Equaliser
---	Electric cable	FD	Dehydrator filter	P	Pump	BVT	Temperature control valve bulb
VaS	Ball valve	VT	Thermostatic valve	GR	Filling unit	SIW	Inlet water temperature probe
VSA	Water safety valve	SC	Heat exchanger	RU	Cock	SUW	Outlet water temperature probe
TGP	Pressing line gas circuit breaker	PP	Pressure point	SD	Anti-freeze probe	AP	High pressure pressure switch
CP	Compressor	TAP	High pressure transducer	RE	Electric resistance		
FL	Flow switch	RU	Cock	VNR	Non-return valve		
SA	Water tank	BP	Low pressure switch	P	Pump		
SF	Venting	RS	Drain cock	GR	Filling unit		

5.4. COOLING CIRCUITS,
HYDRAULIC (HA - HE)



GE	ELECTRIC CONTROL BOARD	V	Fan	SD	Anti-freeze probe	VS	Solenoid valve
FM	Water filter	BAT	Coil	RE	300W electric resistance	IDL	Liquid indicator
VE	Expansion vessel	RU	Cock	VNR	Non-return valve	EQ	Equaliser
---	Electric cable	FD	Dehydrator filter	P	Pump	BVT	Temperature control valve bulb
VU	One-way valve	VT	Thermostatic valve	GR	Filling unit	SIW	Inlet water temperature probe
AL	Liquid storage tank	SC	Heat exchanger	RU	Cock	SUW	Outlet water temperature probe
CP	Compressor	PP	Pressure point	SD	Anti-freeze probe	AP	High pressure pressure switch
VSA	Water safety valve	TAP	High pressure transducer	RE	Electric resistance	TBP	Low pressure transducer
TGP	Pressing line gas circuit breaker	VSIC	Safety valve	VNR	Non-return valve	FL	Flow switch
SA	Water tank	BP	Low pressure switch	P	Pump		
SF	Venting	RS	Drain cock	GR	Filling unit		
RCS	Load/drain cock	SEP	Liquid separator	VIC	Cycle reversing valve		

5.5. COOLING CIRCUIT

Compressors

Highly efficient hermetic scroll compressors on anti-vibration mounts, activated by a 2-pole electric motor with internal circuit breaker protection, supplied as per standard with sump resistance. The resistance is powered automatically when the unit stops as long as the unit is live.

Air-side heat exchanger

High efficiency realised with copper pipes and aluminium louvers blocked by mechanical expansion of the pipes.

Water-side heat exchanger

Plate type (aisi 316), insulated externally with closed cell material to reduce heat loss. Equipped as per standard with the anti-freeze electric resistance.

Liquid separator (for heat pump only)

Positioned on compressor intake for protection against any return of refrigerant fluid, flooded start-up and functioning in the presence of liquids.

Liquid storage tank (for heat pumps and total recovery only)

Compensates the difference in volume between louvers coil and plate exchanger, withholding excess liquid.

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 any presence of humidity in the cooling circuit.

Thermostatic valve

The 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 level of heating of the intake gas.

Liquid and pressing line cocks (cooling versions only)

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 to the evaporator.

By-pass solenoid valve (heat pump only)

By-passes the thermostatic valve during the de-frosting cycle.

Cycle reversing valve (heat pump only)

It reverses the flow of refrigerant on vari-

ation of summer/winter mode and during de-frosting cycles.

One-way valve

Allows one-way flow of the refrigerant.

Desuperheater (on request only)

Plate type (AISI 316), insulated externally with closed cell material to reduce heat loss.

Total recovery (on request only)

Plate type (AISI 316), insulated externally with closed cell material to reduce heat loss.

5.6. FRAME AND FANS

Ventilation Unit

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

Larger fans (M)

Support frame

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

5.7. HYDRAULIC COMPONENTS

Circulation pump

Depending on the features of the pump selected, it offers a static pressure that is useful for beating system pressure drops. The possibility of a reserve pump is also envisioned. The reserve pump is managed by the circuit board.

Flow switch (installed as per standard)

It checks that there is circulation of water. If this is not the case, it blocks the unit.

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.

Storage tank

In sheet steel with capacity of 300 litres. In order to reduce heat loss and eliminate the condensate formation phenomenon, it is insulated using polyurethane material with a suitable thickness.

As per standard it has a 300W anti-freeze electric resistance (to -20°C external temperature- tank water temperature 5°C) controlled by the board using an anti-freeze probe inserted into the tank.

Vent valve (all versions)

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

Filling unit

(versions with storage tank)

It is equipped with a manometer for the display of system pressure.

Expansion vessel

(versions with storage tank)

with nitrogen pre-load membrane.

Hydraulic circuit safety valve

(only in versions with storage tank or with pump)

Calibrated at 6 Bar and with piped discharge, which intervenes by discharging overpressure if abnormal work pressures occur.

5.8. CONTROL AND SAFETY COMPONENTS

Low pressure pressure switch (LP)

- Cooling only (E)

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

High pressure pressure switch (AP)

- Cooling only (E)

- Heat pump (HE)

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

Low pressure transducers (TP2)

- Cooling only (E) "accessory"

- Heat pump (HE) "as per standard"

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

High pressure transducers (TP3)

- Cooling only (E) "accessory"

- Heat pump (HE) "as per standard"

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

Anti-freeze electric 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, housed in the adjustment board, manages the electric resistance.

Cooling circuit safety valve

Intervenes by discharging the overpressure in the case of abnormal pressures.

- Calibrated at 45 bar on the HP branch

- Calibrated at 30 bar on the LP branch (heat pump only)

5.9. ELECTRIC COMPONENTS

Electric Control Board

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

It is in compliance with the following Standards

IEC EN 61000-6-1

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

IEC EN 61000-6-2

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

With the Directives regarding electromagnetic compatibility EMC 89/336/CEE and 92/31/CEE and LVD 2006/95/CE.

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 breaker protection;

Auxiliary magnet circuit breaker protection;

Exhaust gas temperature control thermostat thermostat.

ELECTRONIC ADJUSTMENT

Microprocessor board

Made up from management and control board and display board.

• Functions performed:

- evaporator inlet water temperature adjustment with thermostating up to 4 steps and proportional control - integral on fan speed (with DCPX accessory).
- delayed start-up of compressors.
- compressors rotation sequence.
- compressors functioning hours count.
- start/ stop.
- reset.
- alarms permanent memory.
- autostart after voltage drop.
- multi-language messages.
- functioning with local or remote control.

• machine status 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:

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

• set settings:

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

For further information, please refer to user manual.

6. ACCESSORIES

	0280	0300	0330	0350	0500	0550	0600	0650	0700
AER485	This accessory allows connection of the unit to BMS supervising systems with RS485 electric standard and MODBUS protocol.								
A	-	-	-	-	•	•	•	•	•
E	•	•	•	•	•	•	•	•	•
HA	-	-	-	-	•	•	•	•	•
HE	•	•	•	•	•	•	•	•	•
VT (00-P1-P2-P3-P4)	Rubber or spring anti-vibration mounts. Select the model using the compatibility table.								
A	-	-	-	-	13	13	13	13	22
E	17	17	17	17					
HA	-	-	-	-					
HE	17	17	17	17					
VT (01-02-03-04-05-06-07-08)	Rubber or spring anti-vibration mounts. Select the model using the compatibility table.								
A	-	-	-	-	10	10	10	10	22
E	13	13	13	13					
HA	-	-	-	-					
HE	13	13	13	13					
GP	Protects the external coil from blows and prevents access to the area below where the compressors and cooling circuit are housed. Every kit includes two grids.								
A	-	-	-	-	2(x2)	2(x2)	2(x2)	2(x2)	2(x3)
E	3	4	4	4					
HA	-	-	-	-					
HE	3	4	4	4					
PGS	Board to couple onto 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	•	•	•	•	•	•	•	•	•
HA	-	-	-	-	•	•	•	•	•
HE	•	•	•	•	•	•	•	•	•

	0280	0300	0330	0350	0500	0550	0600	0650	0700
AERWEB30	The AERWEB device allows the remote control of a chiller from a common PC by means of a serial connection. By using additional modules the device allows control of the chiller by telephone network, using the AER-MODEM; accessory or GSM network, using the AER-MODEM-GSM. The AERWEB can pilot up to 9 chillers, each of which must be equipped with the AER485 or AER485P2 accessory.								
A	-	-	-	-	•	•	•	•	•
E	•	•	•	•	•	•	•	•	•
HA	-	-	-	-	•	•	•	•	•
HE	•	•	•	•	•	•	•	•	•
TP2	It allows to view the value of the compressor intake pressure on the microprocessor board display (one per circuit). Placed on the low pressure side of the cooling circuit, it inhibits functioning of the compressor if abnormal work pressures occur.								
A	-	-	-	-	(x2)	(x2)	(x2)	(x2)	(x2)
E	(x2)	(x2)	(x2)	(x2)					
HA	-	-	-	-	as per standard	as per standard	as per standard	as per standard	as per standard
HE	as per standard	as per standard	as per standard	as per standard					
TP3	It allows to view the value of the compressor flow pressure on the microprocessor board display (one per circuit). Placed on the high pressure side of the cooling circuit, it inhibits functioning of the compressor if abnormal work pressures occur.								
A	-	-	-	-					
E	(x2)	(x2)	(x2)	(x2)					
HA	-	-	-	-	as per standard	as per standard	as per standard	as per standard	as per standard
HE	as per standard	as per standard	as per standard	as per standard					
RIF	Current rephaser. Connected in parallel to the motor; it allows a reduction of the absorbed current. (It can only be installed in the machine construction phase and so must be requested on ordering).								
A	-	-	-	-					
E	50	50	50	51	52	52	53	53	53
HA	-	-	-	-					
HE	50	50	50	51					
DRE	It allows the reduction of peak power necessary for the machine during start-up phase (accessory applicable only in the factory).								
A	-	-	-	-					
E	281	301	331	351	501	551	601	651	701
HA	-	-	-	-					
HE	281	301	331	351					
DCPX	This accessory allows correct functioning with external temperatures lower than 10 °C and to - 10 °C. It is made up from an adjustment circuit board that varies the number of fan revs. on the basis of condensation pressure read by the high pressure transducer; in order to keep it high enough for correct unit functioning. It also allows correct functioning in heating mode with external temperatures exceeding 30°C and up to 42°C.								
A	-	-	-	-	64	64	64	64	64
E	56	56	57	57	as per standard	as per standard	as per standard	as per standard	as per standard
HA	-	-	-	-	64	64	64	64	65
HE	58	58	59	59	as per standard	as per standard	as per standard	as per standard	as per standard
DCPX	DCPX only for configurations with larger fans (M).								
A	-	-	-	-	64	64	64	64	65
E	61	61	61	61	as per standard	as per standard	as per standard	as per standard	as per standard
HA	-	-	-	-	DCPX - not necessary, fans already control their speed				
HE	63	63	63	63					
DUALCHILLER	Simplified control system for control, switch-on/off of two chillers, with Amec GR3 control, in the same plant as if they were the same unit.								
A	-	-	-	-	•	•	•	•	•
E	•	•	•	•	•	•	•	•	•
HA	-	-	-	-	•	•	•	•	•
HE	•	•	•	•	•	•	•	•	•
MULTICHILLER	Control system for control, switch-on/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	•	•	•	•	•	•	•	•	•
HA	-	-	-	-	•	•	•	•	•
HE	•	•	•	•	•	•	•	•	•
TRX1	The water accumulators with holes and supplementary electric heaters leave the factory with plastic protection caps. Before loading the system, if the installation of an electric heater is not envisaged it is compulsory to replace the plastic caps with the special TRX1.								
A	•	•	•	•	•	•	•	•	•
E	•	•	•	•	•	•	•	•	•
HA	•	•	•	•	•	•	•	•	•
HE	•	•	•	•	•	•	•	•	•
PRM 1	FACTORY FITTED ACCESSORY. It is a manual pressure switch electrically wired in series with the existing automatic high pressure switch on the compressor discharge pipe.								
A	•	•	•	•	•	•	•	•	•
E	•	•	•	•	•	•	•	•	•
HA	•	•	•	•	•	•	•	•	•
HE	•	•	•	•	•	•	•	•	•

7. TECHNICAL DATA

7.1. TECHNICAL DATA FOR VERSIONS (A - E)

COOLING			0280	0300	0330	0350	0500	0550	0600	0650	0700
Cooling capacity	kW	A	-	-	-	-	98	104	129	143	163
		E	57	65	74	83	90	95	117	129	150
Total input power	kW	A	-	-	-	-	30,2	34,2	40,1	44,6	52,3
		E	16,8	19,4	21,8	25,1	33,1	36,7	44,3	51,6	56,6
Water flow rate	l/h	A	-	-	-	-	16860	17890	22190	24600	28040
		E	9800	11180	12730	14280	15480	16340	20120	22190	25800
Total pressure drops	kPa	A	-	-	-	-	44	49	54	60	68
		E	43	39	35	44	37	41	44	49	58

ENERGETIC INDEX											
EER	W/W	A	-	-	-	-	3,25	3,04	3,22	3,21	3,12
		E	3,39	3,35	3,39	3,31	2,72	2,59	2,64	2,50	2,65
ESEER	W/W	A	-	-	-	-	3,83	3,59	4,28	4,26	4,15
		E	3,94	3,89	3,94	3,84	3,78	3,55	4,15	4,13	4,02

ELECTRICAL DATA											
Power supply	A	A	400V-3N-50Hz								
Absorbed current	A	A	-	-	-	-	55	60	71	77	90
		E	30	34	37	45	60	64	78	89	97
Maximum current	A	A	-	-	-	-	76	81	100	112	122
		E	46	53	58	63					
Peak current	A	A	-	-	-	-	214	220	232	243	261
		E	155	184	190	200					

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

FANS (AXIAL)											
Quantity	n°	A	-	-	-	-	2	2	2	2	3
Air flow rate	m³/h	A	-	-	-	-	34100	34100	32600	32600	50000
		E	22000	22000	27000	27000	21100	22200	21800	22800	32500
Input power	kW	A	-	-	-	-	2,5	2,5	2,5	2,5	3,75
		E	0,9	0,9	1,2	1,2					
Absorbed current	A	A	-	-	-	-	5,6	5,6	5,6	5,6	8,4
		E	3,9	3,9	5,2	5,2					
Useful static pressures [1] "M"	Pa	A	-	-	-	-	50	50	50	50	50
		E	50	50	50	50					

EVAPORATORS (PLATE)											
Quantity	n°	A	-	-	-	-	1	1	1	1	1
		E	1	1	1	1					

HYDRAULIC CONNECTIONS											
Hydraulic circuit connections* (IN/OUT)	∅	A	-	-	-	-	2"1/2	2"1/2	2"1/2	2"1/2	2"1/2
		E	2"1/2	2"1/2	2"1/2	2"1/2					

HYDRAULIC CIRCUIT											
Storage tank capacity	l	A	-	-	-	-	500	500	500	500	500
Storage tank anti-freeze resistance	W	A	-	-	-	-	300	300	300	300	300
		E	300	300	300	300					

LOW STATIC PRESSURE CIRCULATION PUMP											
Input power	KW	A	-	-	-	-	1,5	1,5	1,5	1,5	1,85
		E	1,1	1,1	1,1	1,1					
Absorbed current	A	A	-	-	-	-	3,6	3,6	3,6	3,6	5,0
		E	2,7	2,7	2,7	2,7					
Useful static pressures	KPa	A	-	-	-	-	127	117	94	76	78
		E	113	114	114	102	140	132	117	104	106

* The water connections are all 'Victaulic' type

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

		0280	0300	0330	0350	0500	0550	0600	0650	0700	
HIGH STATIC PRESSURE 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					
Absorbed current	A	A	-	-	-	-	5,0	5,0	5,7	5,7	5,7
		E	3,6	3,6	3,6	3,6					
Useful static pressures	KPa	A	-	-	-	-	166	156	188	172	140
		E	152	153	153	140	179	171	215	201	170

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	-	-	-	-	2950	2950	2950	2950	3950
		E	2450	2950	2950	2950					
Empty weight	Kg	A	-	-	-	-	1099	1103	1204	1212	1390
		E	686	751	761	767					

REFERENCE NOMINAL CONDITIONS

IN COOLING MODE

- Inlet water 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.

7.2. TECHNICAL DATA FOR VERSIONS (HA - HE)

COOLING			0280	0300	0330	0350	0500	0550	0600	0650	0700
Cooling capacity	kW	HA	-	-	-	-	94	100	122	138	150
		HE	57	65	74	83	90	95	114	128	143
Total input power	kW	HA	-	-	-	-	30,2	34,2	40,1	44,6	52,3
		HE	16,8	19,4	21,8	25,1	33,1	36,4	45,0	52,7	57,8
Water flow rate	l/h	HA	-	-	-	-	16170	17200	20980	23740	25800
		HE	9800	11180	12730	14280	15480	16340	19610	22020	24610
Total pressure drops	kPa	HA	-	-	-	-	33	36	36	43	49
		HE	43	39	35	42	30	32	31	37	45

HEATING											
Heating capacity	kW	HA	-	-	-	-	103	110	135	152	171
		HE	53	62	69	77					
Total input power	kW	HA	-	-	-	-	31,2	33,8	40,1	44,9	52,1
		HE	17,9	20,0	23,0	26,6					
Water flow rate	l/h	HA	-	-	-	-	17720	18920	23220	26140	29410
		HE	9120	10660	11870	13240					
Total pressure drops	kPa	HA	-	-	-	-	40	44	44	52	64
		HE	20	27	23	29					

ENERGETIC INDEX											
EER	W/W	HA	-	-	-	-	3,09	2,98	2,98	2,89	2,92
		HE	2,96	3,10	3,00	2,89	2,72	2,61	2,53	2,43	2,48
ESEER	W/W	HA	-	-	-	-	3,83	3,59	4,28	4,26	4,15
		HE	3,94	3,89	3,94	3,84	3,78	3,55	4,15	4,13	4,02
COP	W/W	HA	-	-	-	-	3,30	3,25	3,37	3,39	3,28
		HE	3,41	3,40	3,88	3,33					

ELECTRICAL DATA											
Power supply	A	HA	400V-3N-50Hz								
Absorbed current	A	HA	-	-	-	-	55	59	72	82	88
		HE	35	39	43	49	60	64	79	91	99
Maximum current	A	HA	-	-	-	-	76	81	100	112	122
		HE	46	53	58	63					
Peak current	A	HA	-	-	-	-	214	220	232	243	261
		HE	155	184	190	200					

COMPRESSORS (SCROLL)											
Number/circuit	n°/n°	HA	-	-	-	-	3/2	3/2	4/2	4/2	4/2
		HE	2/2	2/2	2/2	2/2					

FANS (AXIAL)											
Quantity	n°	HA	-	-	-	-	2	2	2	2	3
Air flow rate	m³/h	HA	-	-	-	-	37000	37000	36500	36500	58000
		HE	20000	26000	26000	26000	20200	21100	21400	22400	31900
Input power	kW	HA	-	-	-	-	2,5	2,5	2,5	2,5	3,75
		HE	0,9	1,2	1,2	1,2					
Absorbed current	A	HA	-	-	-	-	5,6	5,6	5,6	5,6	8,4
		HE	3,9	5,2	5,2	5,2					
Useful static pressures [1] "M"	Pa	HA	-	-	-	-	70*	70*	70*	70*	70*
		HE	50	50	50	50					

EVAPORATORS (PLATE)											
Quantity	n°	HA	-	-	-	-	1	1	1	1	1
		HE	1	1	1	1					

HYDRAULIC CONNECTIONS											
Hydraulic circuit connections* (IN/OUT)	Ø	HA	-	-	-	-	2"1/2	2"1/2	2"1/2	2"1/2	2"1/2
		HE	2"1/2	2"1/2	2"1/2	2"1/2					

HYDRAULIC CIRCUIT											
Storage tank capacity	l	HA	-	-	-	-	500	500	500	500	500
Storage tank anti-freeze resistance	W	HA	-	-	-	-	300	300	300	300	300
		HE	300	300	300	300					

LOW STATIC PRESSURE CIRCULATION PUMP											
Input power	KW	HA	-	-	-	-	1,5	1,5	1,5	1,5	1,85
		HE	1,5	1,5	1,5	1,5					
Absorbed current	A	HA	-	-	-	-	3,6	3,6	3,6	3,6	5
		HE	3,6	3,6	3,6	3,6					
Useful static pressures	KPa	HA	-	-	-	-	141	133	124	95	113
		HE	135	126	128	120	147	140	135	114	125

* The water connections are all 'Victaulic' type

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

[*] As for the NRL0500-0700 the fans for the "M" version are inverter-type. The DCPX accessory is not meant for this version as the fans are already equipped with the fan speed regulation.

		0280	0300	0330	0350	0500	0550	0600	0650	0700	
HIGH STATIC PRESSURE CIRCULATION PUMP											
Input power	KW	HA	-	-	-	-	1,85	1,85	3	3	3
		HE	1,5	1,5	1,5	1,5					
Absorbed current	A	HA	-	-	-	-	5	5	5,7	5,7	5,7
		HE	3,6	3,6	3,6	3,6					
Useful static pressures	KPa	HA	-	-	-	-	181	173	211	181	177
		HE	175	165	166	157	186	180	223	200	192

SOUND DATA											
Sound power (1)	dBA	HA	-	-	-	-	82	82	82	83	85
		HE	74	75	75	76	74	74	74	75	77
Sound Pressure (2)	dBA	HA	-	-	-	-	50	50	50	51	53
		HE	42	43	43	44	42	42	42	43	45

DIMENSIONS											
Height	mm	HA	-	-	-	-	1875	1875	1875	1875	1875
		HE	1606	1606	1606	1606					
Width	mm	HA	-	-	-	-	1100	1100	1100	1100	1100
		HE	1100	1100	1100	1100					
Depth	mm	HA	-	-	-	-	2950	2950	2950	2950	3950
		HE	2450	2950	2950	2950					
Empty weight	Kg	HA	-	-	-	-	1099	1103	1204	1212	1390
		HE	730	795	805	811					

REFERENCE NOMINAL CONDITIONS

IN COOLING MODE

- Inlet water temperature
- Outlet water temperature
- External air temperature
- Δt

12 °C
7 °C
35 °C
5°C

IN HEATING MODE

- Inlet water temperature
- Outlet water temperature
- External air temperature
- Δt

40 °C
45 °C
7/6 °C
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.

7.3. TECHNICAL DATA FOR VERSIONS (C)

		280	300	330	350	500	550	600	650	700	
COOLING											
Cooling capacity	KW	A	-	-	-	-	101	107	133	147	168
		E	59	67	76	85	93	98	121	133	155
Total input power	KW	A	-	-	-	-	30,5	34,5	40,5	45,0	52,8
		E	17,0	19,6	22,0	25,3	33,4	37,0	44,7	52,1	57,1
ENERGETIC INDEX											
EER	W	A	-	-	-	-	3,31	3,10	3,28	3,27	3,18
		E	3,46	3,42	3,47	3,38	2,78	2,64	2,70	2,55	2,71
DATI ELETTRICI RAFFREDDAMENTO											
Power supply	A	A	400V-3N-50Hz								
Cooling absorbed current	A	A	-	-	-	-	55,5	60,5	71,5	77,7	90,9
		E	35,3	39,4	43,4	49,4	70,5	64,9	78,9	89,9	97,9
Maximum current (FLA)	A	A	-	-	-	-	76	81	100	112	122
		E	46	53	58	63					
Peak current (LRA)	A	A	-	-	-	-	214	220	232	243	261
		E	155	184	190	200					
FANS (AXIAL)											
Quantity	n°	A	-	-	-	-	2	2	2	2	3
		E	6	6	8	8					
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	-	-	-	-	2950	2950	2950	2950	3950
		E	2450	2950	2950	2950					
Empty weight	Kg	A	-	-	-	-	918	922	1098	1105	1264
		E	662	724	730	736					

REFERENCE NOMINAL CONDITIONS

IN COOLING MODE

- External air temperature	35 °C
- Evaporation temperature	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.

8. OPERATIONAL LIMITS

8.1. COOLING MODE FUNCTIONING

The units, in standard configuration, are not suitable for installation in salty environments. Maximum and minimum limits for water flow rates at the exchanger are indicated by the curves in the pressure drop diagrams.

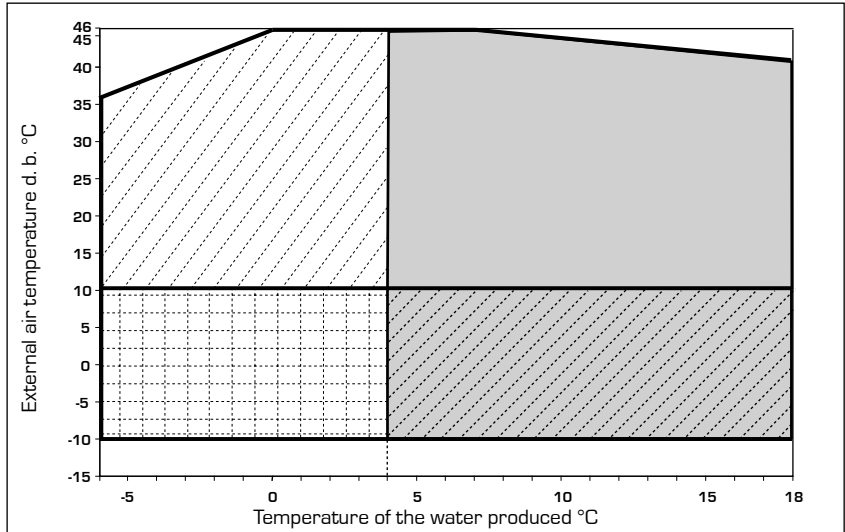
For functioning limits, please refer to the below diagrams, values for $\Delta t = 5^\circ\text{C}$.

NOTE:

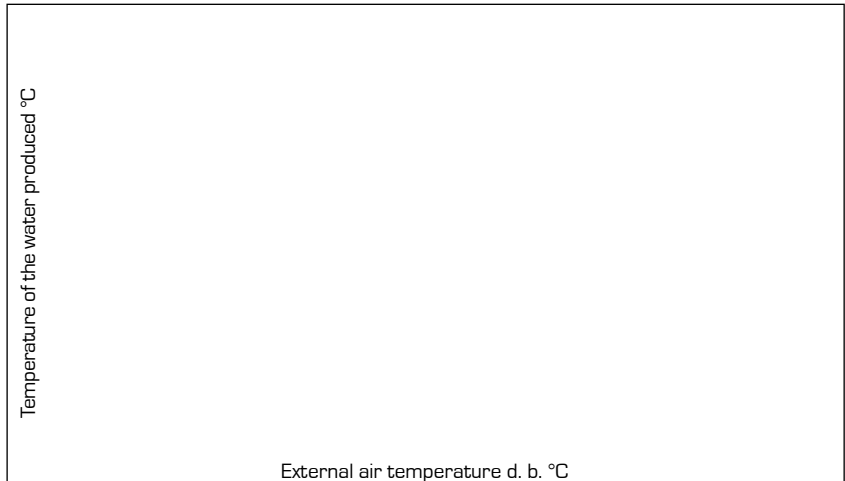
In the cooling mode the unit can be started up with ambient air at 46°C and inlet water at 35°C

In the heating mode the unit can be started up with ambient air at -15°C and inlet water at 20°C

The unit can operate at these conditions only for the time which is necessary to achieve the right temperature in the plant. To reduce this time it is recommended to install a 3-way valve that allows to bypass the water flow in the plant until the achievement of the conditions that allow the unit to work within the proper operating limits



8.2. HEATING MODE FUNCTIONING



NOTE: As for the versions with buffer tank (09-10) the operating limits in cooling and heating mode are 3°C lower

KEY:



Functioning with glycol



Functioning with glycol with DCPX accessory

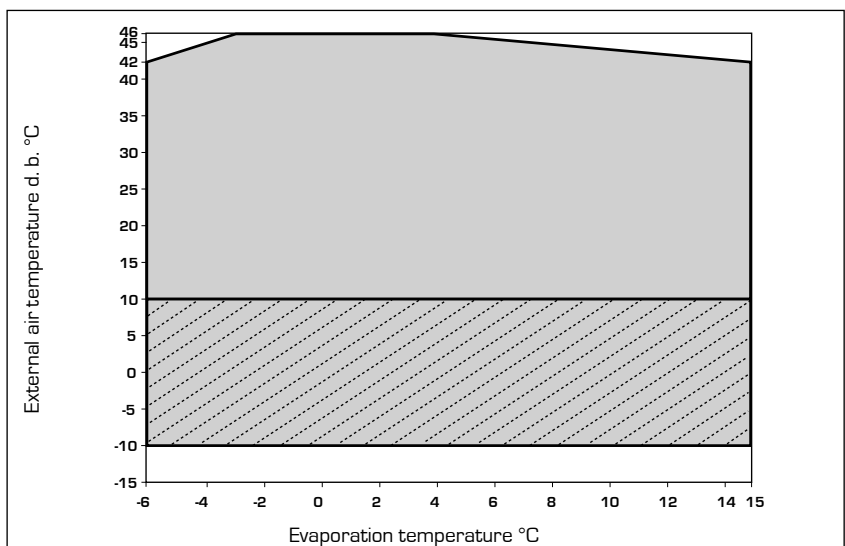


Standard functioning



Standard functioning with DCPX accessory

8.3. MOTORCONDENSING FUNCTIONING



9. CORRECTIVE COEFFICIENTS

9.1. COOLING CAPACITY AND INPUT POWER

- "STANDARD VERSIONS"
- "HEAT PUMP VERSIONS IN COOLING MODE"

The cooling capacity efficiency and electrical input power in conditions differing from normal conditions are obtained by multiplying the nominal values (Pf, Pa) by the respective corrective coefficients (Cf, Ca).

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:

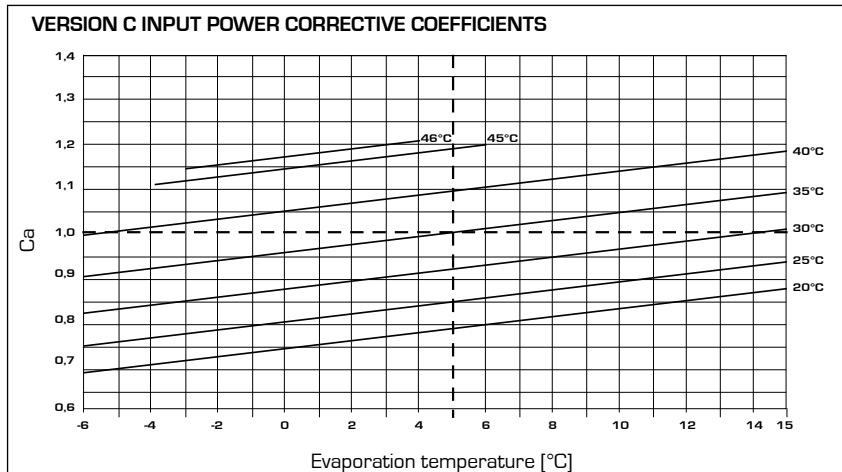
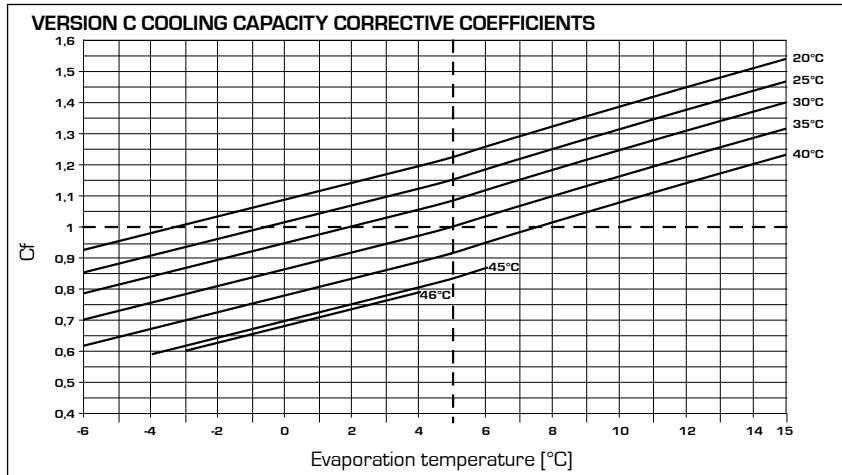
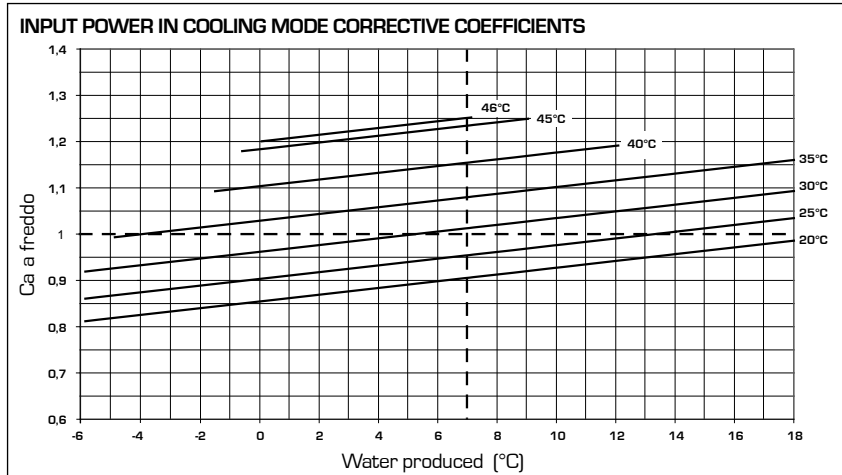
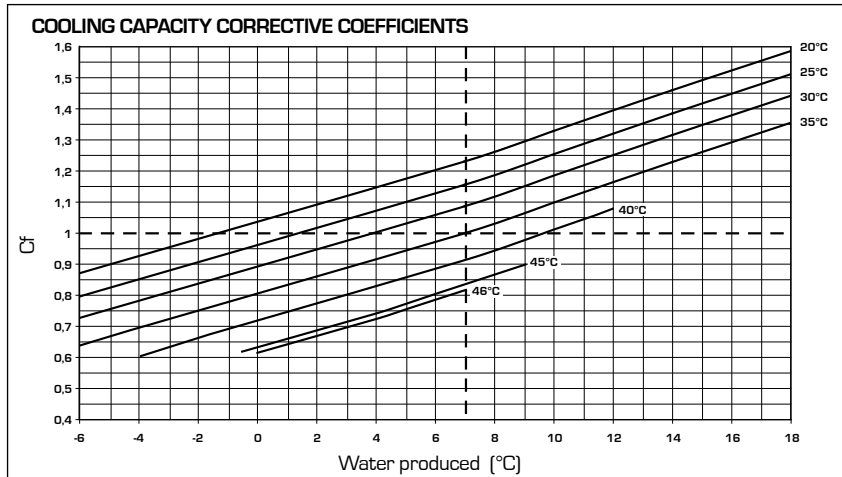
Cf: Corrective co-efficient of the cooling capacity.

Ca: Corrective co-efficient of the input power.

FOR Δt DIFFERENT TO 5°C

At the evaporator use **Tab. 9.3.1.**

to obtain the correction factors of the cooling capacity and input power. In order to consider exchanger dirtying, use the relative dirtying factors **Tab. 9.4.1.**



9.2. HEATING CAPACITY AND INPUT POWER

- "HEAT PUMP VERSIONS"

The heating capacity efficiency and electrical input power in conditions differing from normal conditions are obtained by multiplying the nominal values (Pt, Pa) by the respective coefficient correctives (Ct, Ca).

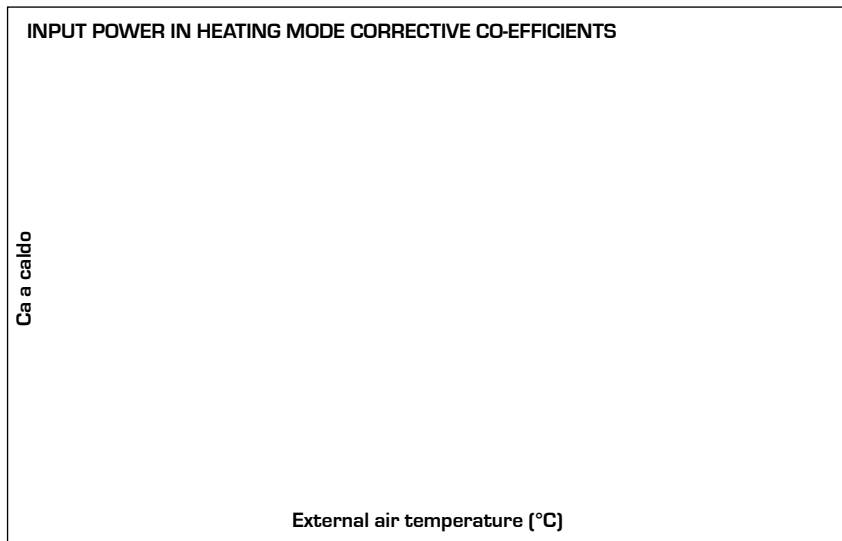
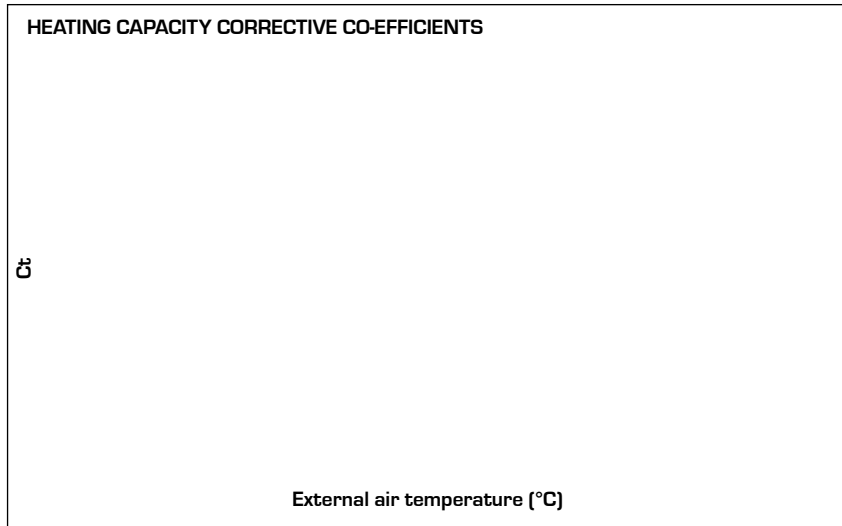
The following diagram shows how to obtain corrective coefficients; the produced hot water temperature, to which reference is made, is shown in correspondence to each curve, assuming a water temperature difference equal to 5°C between the condenser inlet and outlet.

The yields are intended net of de-frosting cycles.

KEY:

Ca: Corrective co-efficient of the input power.

Ct: Corrective co-efficient of the heating capacity.



9.3. FOR ΔT DIFFERENT TO THE NOMINAL

For Δt different from 5°C at the evaporator use Tab. 9.3.1. to obtain the correction factors of the cooling capacity and input power. In order to consider exchanger dirtying, use the relative dirtying factors Tab.9.4.1.

9.4. DEPOSIT FACTORS

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

For different deposit factor values, multiply the data in the performance tables by the co-efficients given.

9.3.1. Corrective factors at Δt different from the Chiller 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

9.4.1. Deposit factors

	[K*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. ETHYLENE GLYCOL SOLUTION

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

NOTE

An example is given on the next page to help graph reading.

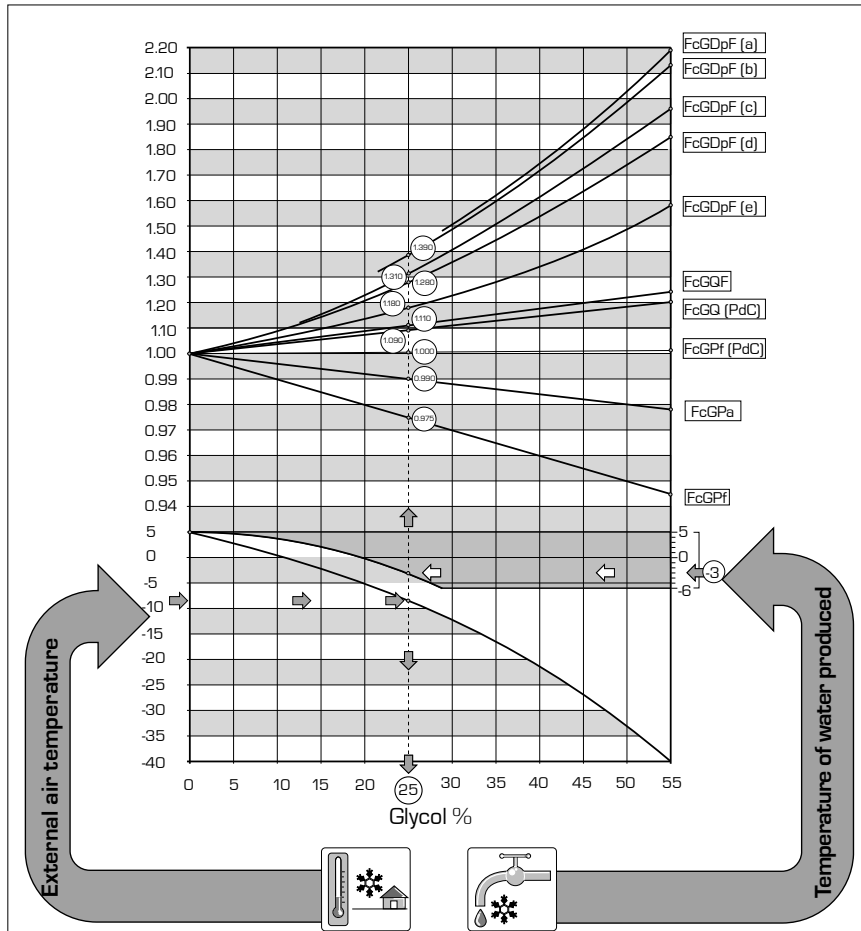
Using the diagram below it is possible to determine the percentage of glycol required; this percentage can be calculated by taking one of the following factors into consideration:

Depending on which fluid is considered (water or air), the graph is interpreted from the right or left side from the crossing point of the external temperature line or the water produced line and the relative curves. 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 require to calculate glycol percentage based on the temperature of the external air, enter from the left axis of the graph and once the curve is intercepted draw a vertical line, which in turn will intercept all the remaining curves; the points obtained from the upper curves represent the co-efficients for cooling capacity and input power for flow rates and pressure drops (remember that these co-efficients still need to be multiplied by the nominal value of the size in question); whilst the lower axis recommends the glycol percentage value necessary for producing water at the desired temperature.
- If you require to calculate glycol percentage based on the temperature of water produced, enter from the right axis of the graph and once the curve is intercepted draw a vertical line, which in turn will intercept all the remaining curves; the points



KEY:

FcGPF	Corrective factors of the cooling capacity
FcGPa	Corrective factors of the input power
FcGDpF (a)	Correction factors for pressure drops (evaporator) [av. temp. = -3.5 °C]
FcGDpF (b)	Correction factors of pressure drops [av. temp. = 0.5 °C]
FcGDpF (c)	Correction factors of pressure drops [av. temp. = 5.5 °C]
FcGDpF (d)	Correction factors of pressure drops [av. temp. = 9.5 °C]
FcGDpF (e)	Correction factors of 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 the graph reaches an external air temperature of -40°C, unit operational limits must be considered.

obtained from the upper curves represent the co-efficients for cooling capacity and input power for flow rates and pressure drops (remember that these co-efficients still need to be multiplied by the nominal value of the size in question); whilst the lower axis recommends the glycol percentage value necessary for producing water at the desired temperature. Remember that the initial measurements "EXTERNAL AIR TEMPERATURE" and "PRODUCED WATER TEMPERATURE", are not directly

linked to each other, therefore it will not be possible to enter the curve of one of these measurements and obtain the corresponding point on the other curve.

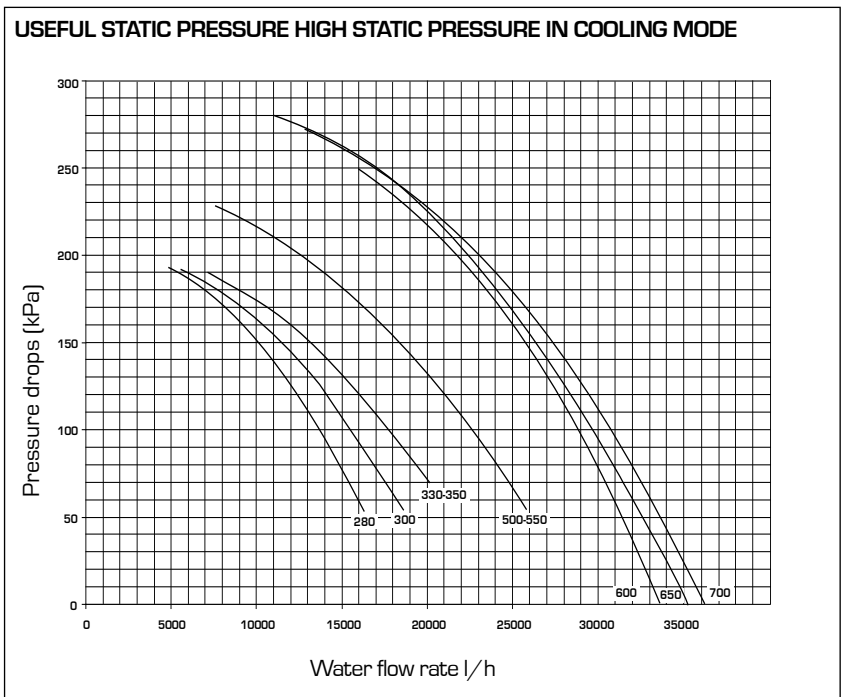
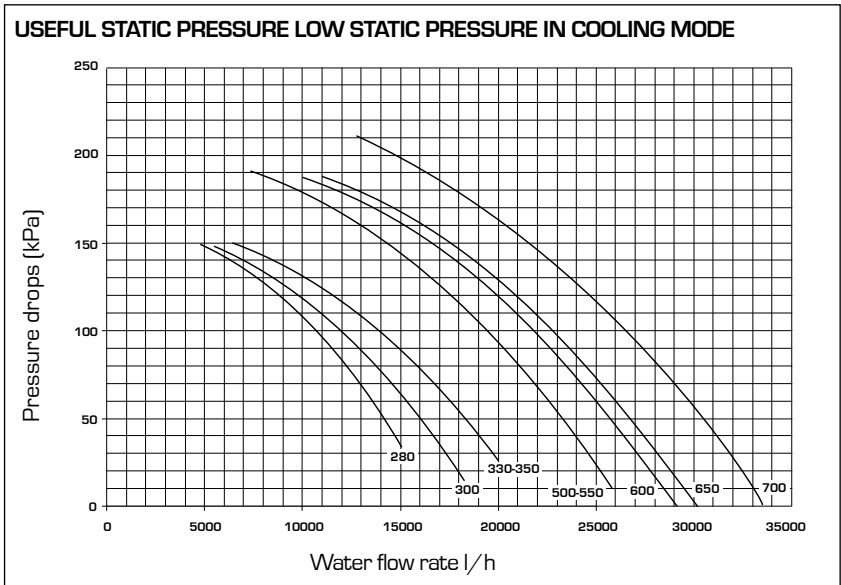
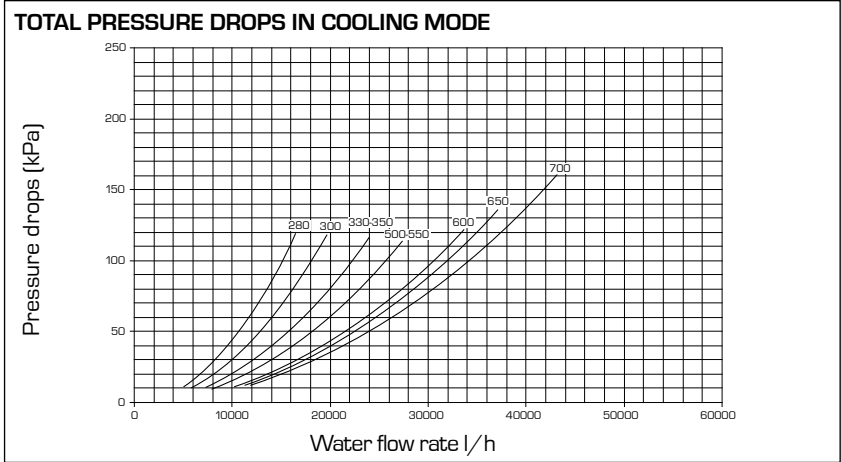
11. PRESSURE DROPS

11.1. TOTAL PRESSURE DROPS

Standard cooling only NRL (A - E).

NOTE:

The pressure drops and useful static pressures are calculated in cooling mode with water at 10°C.

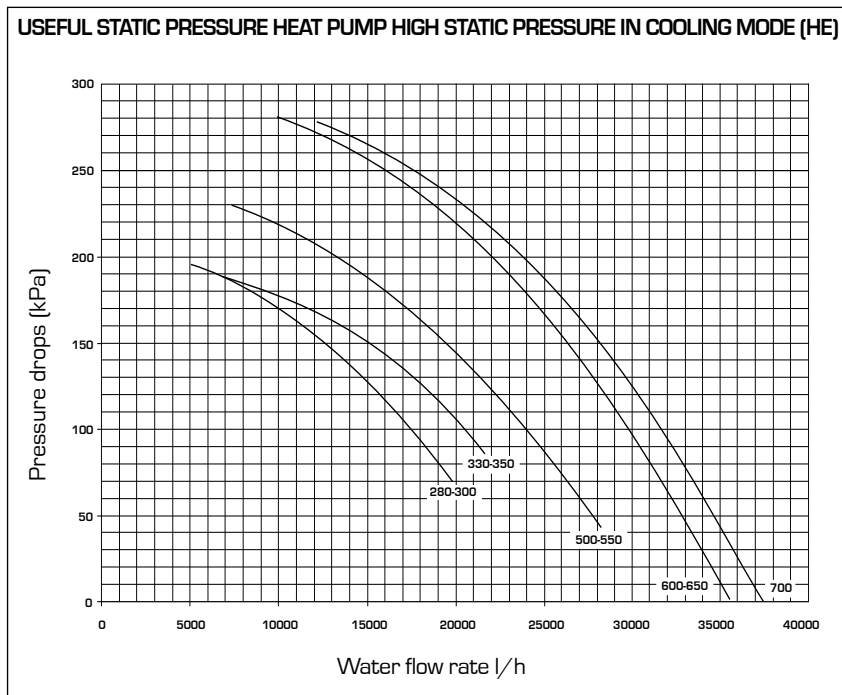
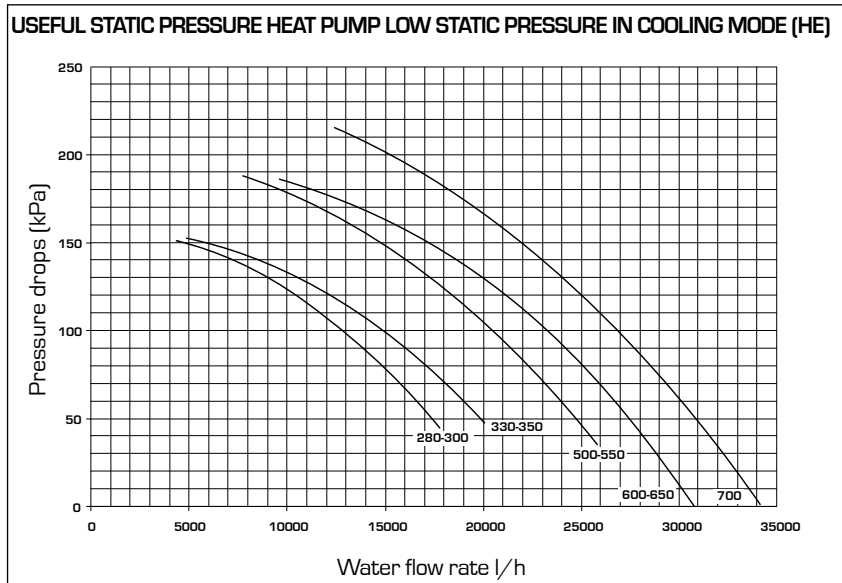
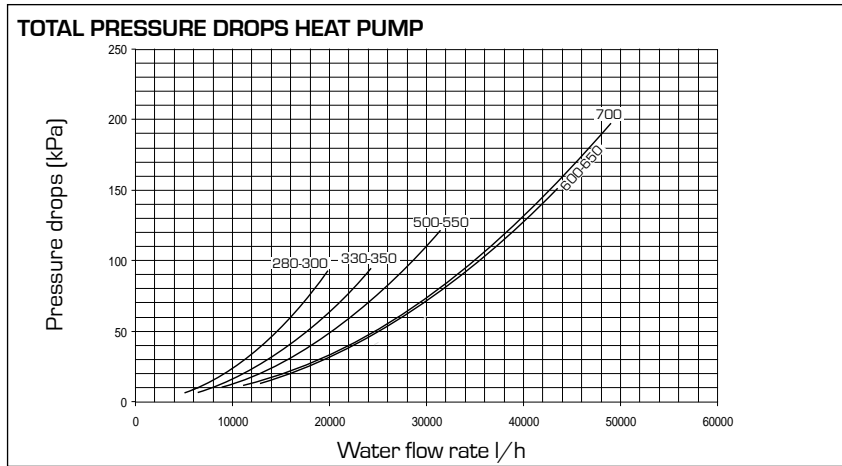


11.2. TOTAL PRESSURE DROPS

NRL standard heat pump (HA - HE).

NOTE:

The pressure drops and useful static pressures are calculated in cooling mode with water at 10°C.



Average water temperature °C	5	10	15	20	30	40	50
Multiplicative co-efficients	1,02	1	0,985	0,97	0,95	0,93	0,91

12. STORAGE TANK

The following tables highlight the principle features of hydraulic circuit components, whilst the graph on the following page shows relative static pressures.

12.1. MINIMUM/MAXIMUM WATER CONTENT IN THE SYSTEM

12.1.1. Recommended maximum water content

Table 12.2 indicates maximum water content in litres of hydraulic plant, compatible with expansion vessel capacity supplied as standard (FOR VERSIONS WITH STORAGE TANK OR JUST WITH PUMP). The values shown in the table refer to three maximum and minimum water temperature conditions. If the effective water content of the hydraulic system (including storage tank) is greater than that shown in the table, whilst active, an additional expansion vessel is required. Use usual criteria, referring to volume of added water, to determine size required.

From tables 12.3 it is possible to obtain the maximum content values for the system also for glycolated water functioning conditions.

Values are worked out by multiplying the referred value by the corrective co-efficient.

12.1.2. Expansion vessel calibration

The standard pre-load pressure value of the expansion vessel is 1.5 bar, while their volume is 24 litres. The maximum value is 6 bar.

Vessel calibration 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 the calibration value obtained from the calculation is less than 1.5 bar [i.e. for $H < 12.25$], keep standard calibration.

12.2.

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

12.3.

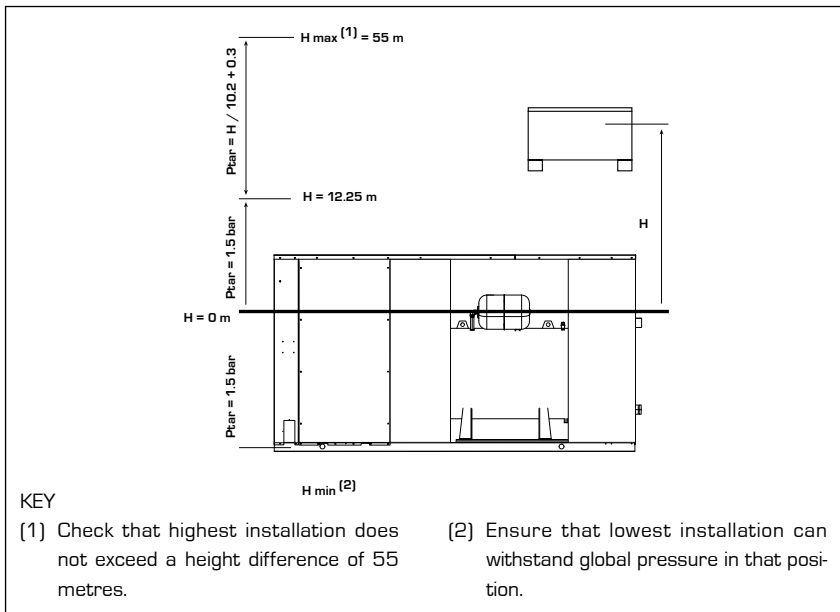
Glycolated water	Water temp. °C		Corrective co-efficients	Reference condition
	max.	min.		
10%	40	-2	0,507	(1)
10%	60	-2	0,686	(2)
10%	85	-2	0,809	(3)
20%	40	-6	0,434	(1)
20%	60	-6	0,604	(2)
20%	85	-6	0,729	(3)
35%	40	-6	0,393	(1)
35%	60	-6	0,555	(2)
35%	85	-6	0,677	(3)

Reference operational 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.



MINIMUM WATER CONTENT

NRL	n° 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			

Key:

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

13. CAPACITY CONTROL

(*) Cooling capacity %	Levels of power			
	1°	2°	3°	4°
NRLO280	55	100	-	-
NRLO300	55	100	-	-
NRLO330	55	100	-	-
NRLO350	55	100	-	-
NRLO500	40	75	100	-
NRLO550	36	68	100	-
NRLO600	25	50	75	100
NRLO650	25	50	75	100
NRLO700	25	50	75	100

(*) Input power %	Levels of power			
	1°	2°	3°	4°
NRLO280	45	100	-	-
NRLO300	45	100	-	-
NRLO330	45	100	-	-
NRLO350	45	100	-	-
NRLO500	30	65	100	-
NRLO550	26	58	100	-
NRLO600	20	45	70	100
NRLO650	20	45	70	100
NRLO700	20	45	70	100

(**) Heating capacity %	Levels of power			
	1°	2°	3°	4°
NRLO280	50	100	-	-
NRLO300	50	100	-	-
NRLO330	50	100	-	-
NRLO350	50	100	-	-
NRLO500	35	70	100	-
NRLO550	31	63	100	-
NRLO600	23	48	73	100
NRLO650	23	48	73	100
NRLO700	23	48	73	100

(**) Input power %	Levels of power			
	1°	2°	3°	4°
NRLO280	45	100	-	-
NRLO300	45	100	-	-
NRLO330	45	100	-	-
NRLO350	45	100	-	-
NRLO500	30	65	100	-
NRLO550	26	58	100	-
NRLO600	20	45	70	100
NRLO650	20	45	70	100
NRLO700	20	45	70	100

The performance levels refer to the following conditions:

- (*) processed water temperature = 7°C;
- (*) outside air temperature = 35°C.

The performance levels refer to the following conditions:

- (**) processed water temperature = 50°C;
- (**) outside air temperature = 7°C B.S./ 6°C B.U.

14. DESUPERHEATER

The heating capacity that can be obtained from the desuperheater is found by multiplying the nominal value (Pd) shown in figure 14.1.1, by a relative coefficient (Cd).

The following diagrams allow to obtain corrective co-efficients to use for chillers in their various versions; external air temperature, to which reference is made, is shown in correspondence to each curve.

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

14.1. PRESSURE DROPS

The NRL models with desuperheater have 2 desuperheaters for all sizes (positioned in parallel).

NOTE

Desuperheater features and pressure drop curves are shown below. For temperature values of produced water, different from 50°C, multiply the result by the corrective factor shown in figure 14.1.2.

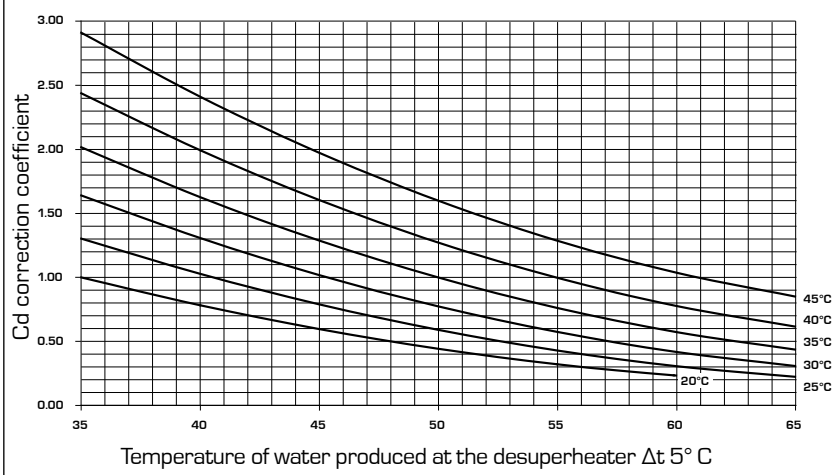
Nominal value referring to:

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

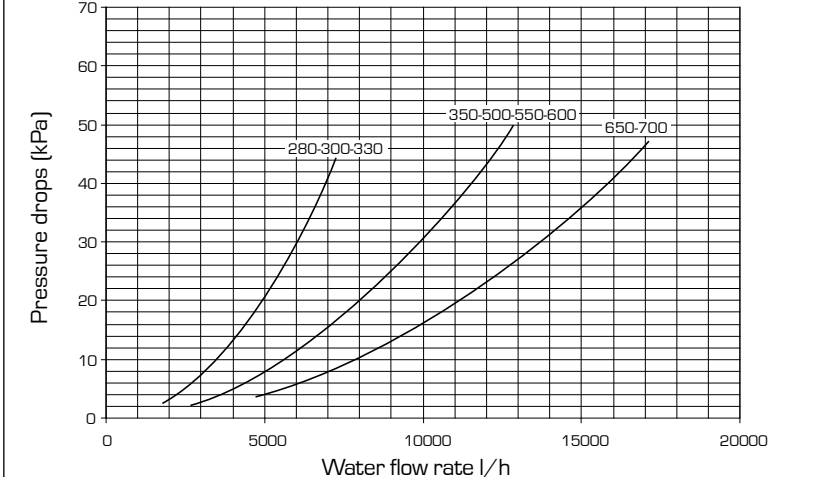
Units with Desuperheater (D) do not envision the following versions:

- YD
- XD (only for temperature under 4°C)

DESUPERHEATER CORRECTION COEFFICIENTS



DESUPERHEATER PRESSURE DROPS



14.1.1. NRL (D)		0280	0300	0330	0350	0500	0550	0600	0650	0700
Recovered heating capacity	kW	20,5	22,9	25,3	31,3	36,1	38,1	44,9	54,3	59,8
Desuperheater water flow rate	l/h	3520	3940	4350	5380	6210	6550	7710	9340	10290
Desuperheater pressure drop	kPa	10	13	16	9	12	14	18	14	17

14.1.2.

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

15. TOTAL RECOVERY

In the case of functioning with total heat recovery, machine performance does not depend on the external air temperature, but on that of the hot water produced: the electric input power and the recovery heating capacity are obtained by multiplying the values (Pa, Pr) given in table 15.1 by the respective corrective co-efficients (Ca, Cr), deductible from the following diagrams.

The temperature of the hot water produced is given in correspondence with each curve, to which reference is made, assuming a difference of 5°C between inlet and outlet from the total recuperator.

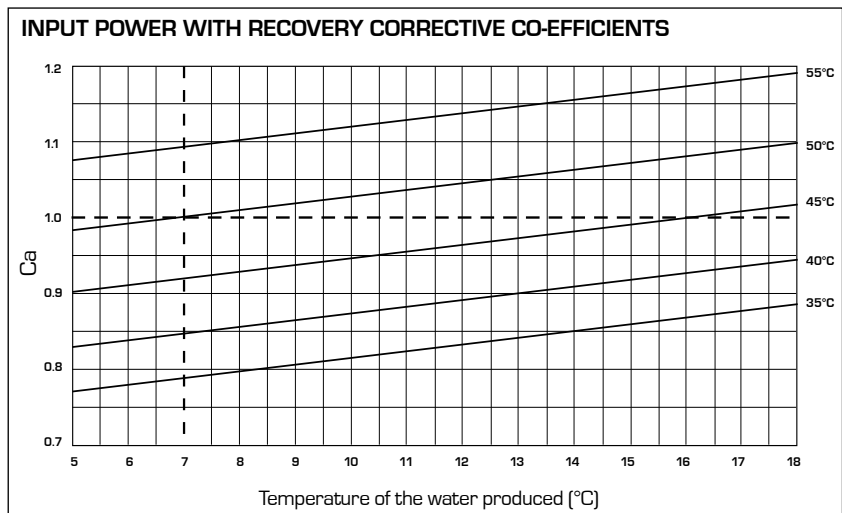
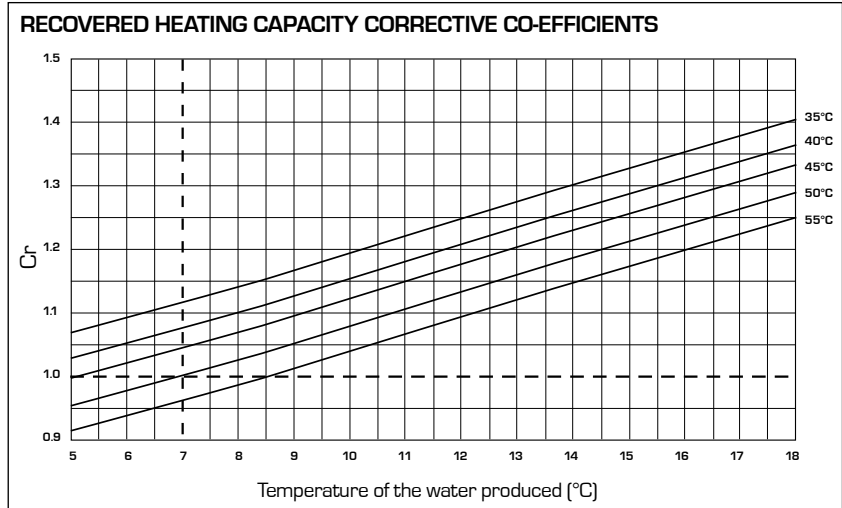
The cooling capacity (Pf) is obtained from the distance between the recovery heating capacity (Pr) and input power (Pa).

Nominal value referring to:

- Air temperature 35°C
- Water at the desuperheater 50°C
- Δt 5°C

Units with Total Recovery (T) do not envision the following versions:

- YT
- XT (only for temperature under 4°C)



15.1. NRL (T)		0280	0300	0330	0350	0500	0550	0600	0650	0700
Recovered heating capacity	kW	72	84	92	107	127	136	167	185	210
Total input power	kW	19,7	22,0	25,5	27,5	31,8	35,2	42,9	50,9	57,0
Recovery water flow rate	l/h	12340	14430	15860	18430	21880	23470	28680	31880	36150
Heat exchanger recovery pressure drop	kPa	27	36	45	22	31	37	52	45	24

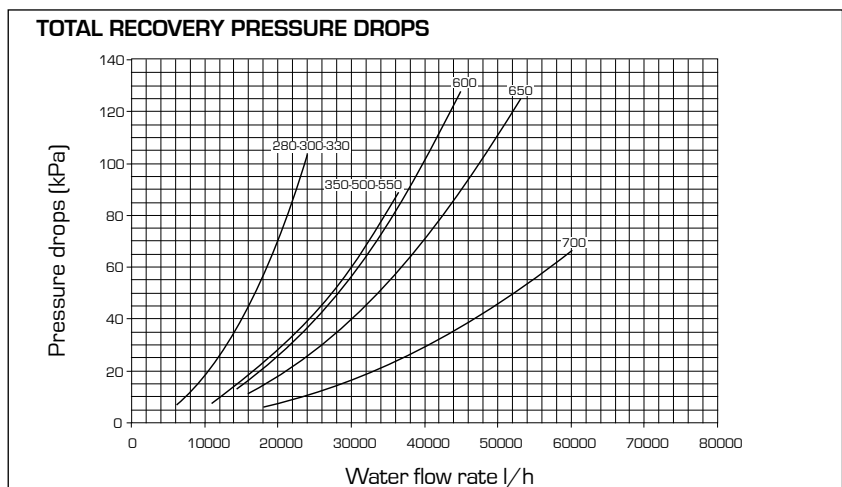
15.2. PRESSURE DROPS

The NRL models with total recovery always have 1 recuperator.

The features of the recuperators and the pressure drop curves are given below; filter losses are not considered.

The pressure drops in the diagram are relative to an average temperature of 50°C.

Table 15.2.1 shows the corrections to apply to pressure drops on variation of the average water temperature.



15.2.1. pressure drop corrections on variation of the average water temperature.

Average water temperature °C	30	40	50
Multiplicative co-efficients	1.04	1.02	1

16. DIMENSIONEMENT COOLING LINES VERSION (C)

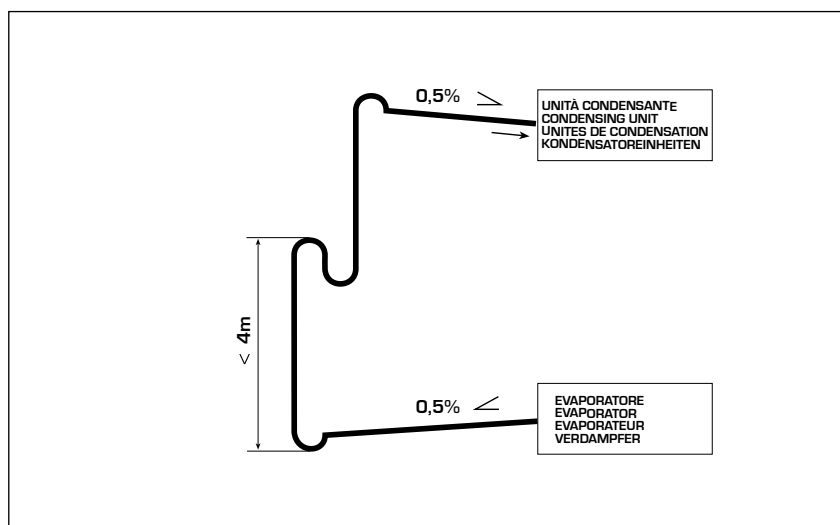
COOLING LINES							
Model	Line length [m]	Intake line f [mm]		Liquid line f [mm]		R410A refrigerant per metre of line [g/m]	R410A refrigerant per metre of line [g/m]
		C1	C2	C1	C2	C1	C2
NRLO280C	0-10	28	28	15,88	15,88	230	230
	10-20	28	28	15,88	15,88	230	230
	20-30	28	28	15,88	15,88	230	230
NRLO300C	0-10	28	28	15,88	15,88	230	230
	10-20	28	28	15,88	15,88	230	230
	20-30	28	28	15,88	15,88	230	230
NRLO330C	0-10	28	28	15,88	15,88	230	230
	10-20	28	28	15,88	15,88	230	230
	20-30	28	28	15,88	15,88	230	230
NRLO350C	0-10	28	28	18	18	280	280
	10-20	28	28	18	18	280	280
	20-30	35	35	18	18	310	310
NRLO500C	0-10	35	28	18	18	310	280
	10-20	35	28	18	18	310	280
	20-30	35	35	18	18	310	310
NRLO550C	0-10	35	28	18	18	310	280
	10-20	35	28	18	18	310	280
	20-30	42	35	18	18	350	310
NRLO600C	0-10	35	35	22	22	420	420
	10-20	35	35	22	22	420	420
	20-30	42	42	22	22	460	460
NRLO650C	0-10	35	35	22	22	420	420
	10-20	42	42	22	22	460	460
	20-30	42	42	22	22	460	460
NRLO700C	0-10	42	42	28	28	660	660
	10-20	42	42	28	28	660	660
	20-30	42	42	28	28	660	660

KEY:

C1 = Cooling circuit 1

C2 = Cooling circuit 2

Provide oil traps on suction pipe to allow the oil back to the compressor when the evaporating unit is at a lower level than the condensing one. The total length of the piping between the two units is measured in respect of the length of the liquid line. Contact Aer-mec in case of additional information needed.



17. SOUND DATA

Sound power

Aermec determines sound power values in agreement with the 9614-2 Standard, in compliance with that requested by Euro-vent 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 refer to the version with standard fans

NRL - E	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							
0280E	74	42	57	72,2	61,1	66,4	63,5	61,0	50,0	43,7
0300E	74	42	57	72,2	61,1	66,4	63,5	61,0	50,0	43,7
0330E	75	43	57	73,1	62,0	67,1	64,3	62,1	51,3	44,8
0350E	76	44	58	74,1	63,0	68,1	65,6	62,6	53,0	45,1

NRL - HE	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							
0280HE	74	42	57	72,2	61,1	66,4	63,5	61,0	50,0	43,7
0300HE	75	43	57	73,1	62,2	67,1	64,3	62,0	51,0	44,5
0330HE	75	43	57	73,1	62,0	67,1	64,3	62,1	51,3	44,8
0350HE	76	44	58	74,1	63,0	68,1	65,6	62,6	53,0	45,1

NRL E-HE	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							
0500 E-HE	74	42	56	60,9	63,9	66,9	68,8	67,1	63,3	56,9
0550 E-HE	74	42	56	61,4	64,6	68,1	68,8	67,2	63,3	56,9
0600 E-HE	74	42	56	61,6	65,1	68,2	68,9	67,2	63,5	57,4
0650 E-HE	75	43	57	62,1	65,1	68,5	69,1	68,4	65,5	61,5
0700 E-HE	77	45	58	65,7	67,6	68,6	69,8	71,4	65,7	62,0

NRL A-HA	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							
0500 A-HA	82	50	64	68,1	69,8	74,0	76,7	76,5	74,1	63,8
0550 A-HA	82	50	64	68,1	69,9	75,0	77,5	76,5	72,0	61,0
0600 A-HA	82	50	64	68,9	71,4	74,8	77,7	76,4	72,0	59,9
0650 A-HA	83	51	65	69,4	70,6	75,1	77,9	78,0	74,6	64,1
0700 A-HA	85	53	66	72,9	73,2	78,0	78,3	80,0	76,6	65,2

Values referring to:

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

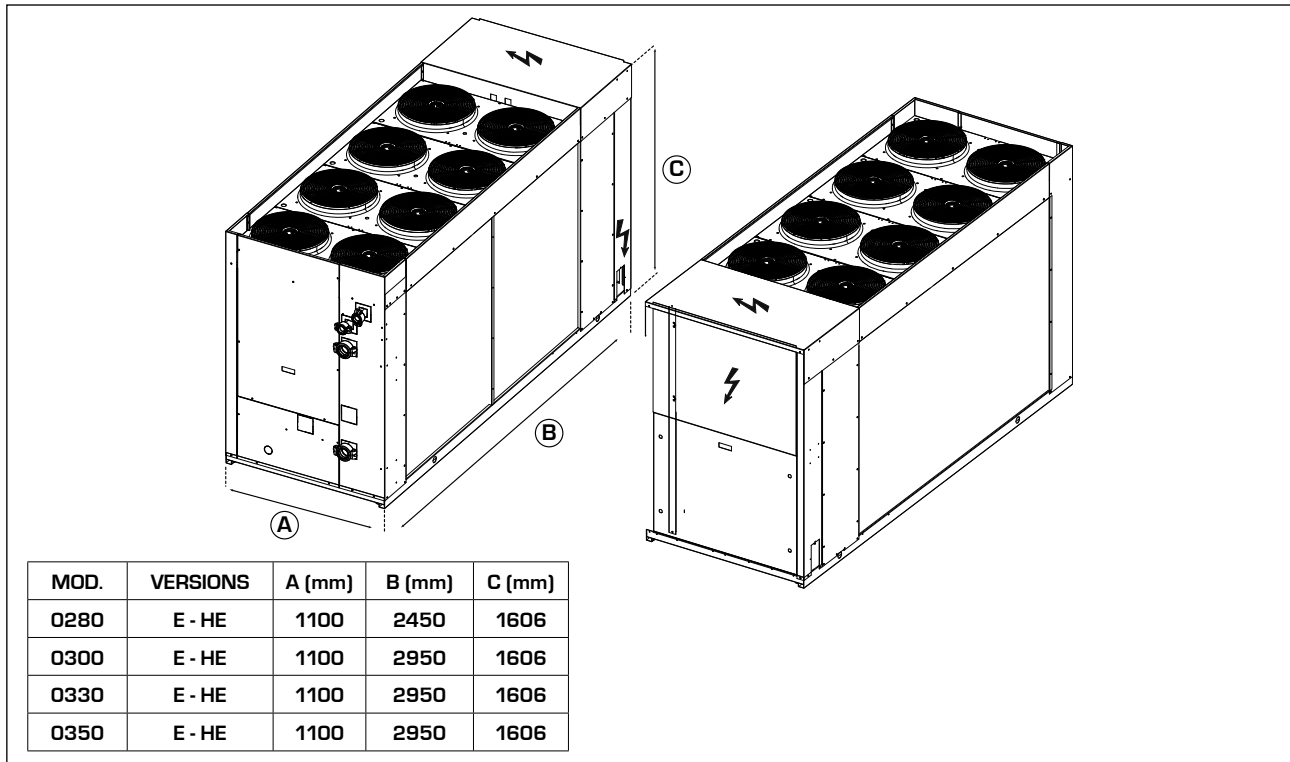
18. CALIBRATION OF CONTROL AND SAFETY PARAMETERS

CONTROL PARAMETERS			
Set Cooling	Inlet water temperature in cooling functioning mode.	MIN.	-10°C
		MAX.	20°C
		DEFAULT	7.0°C
Set Heating	Inlet water temperature in heating functioning mode.	MIN.	30°C
		MAX.	55°C
		DEFAULT	50°C
Anti-freeze intervention	Intervention temperature of the anti-freeze alarm on the EV side (water outlet 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		

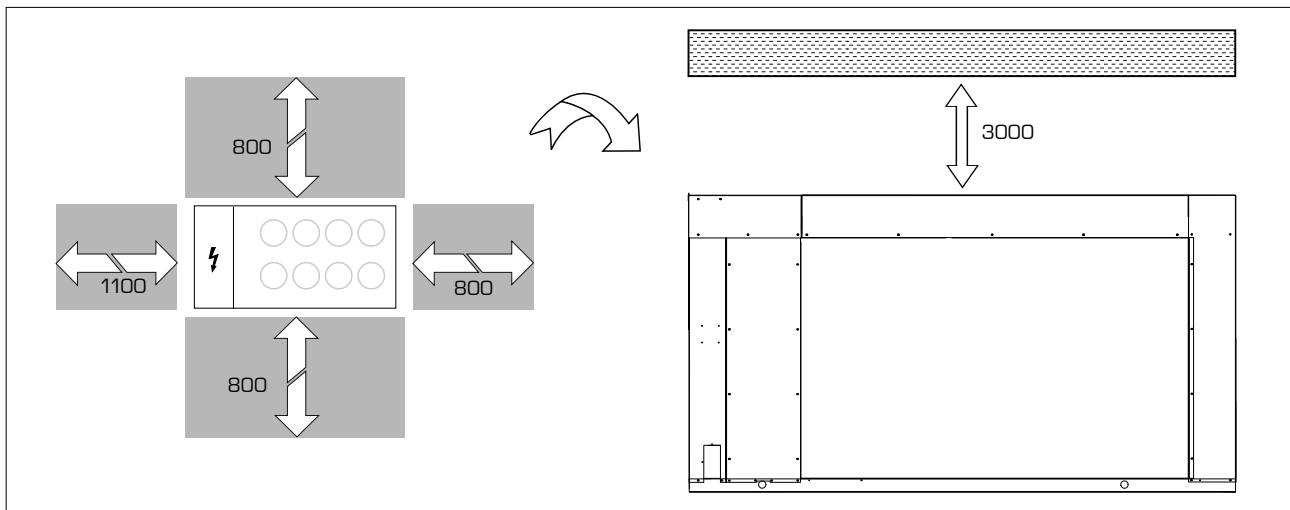
NRL	0280	0300	0330	0350	0500	0550	0600	0650	0700
400V COMPRESSORS MAGNET CIRCUIT BREAKERS									
MTC1	23A	28A	28A	29A	23A	28A	28A	28A	29A
MTC1A	-	-	-	-	23A	23A	28A	28A	29A
MTC2	23A	23A	28A	29A	28A	29A	28A	28A	29A
MTC2A	-	-	-	-	-	-	23A	28A	29A
HIGH PRESSURE PRESSURE SWITCH MANUAL REARM									
PA (bar)	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
COOLING CIRCUIT SAFETY VALVES									
AP (bar)	45	45	45	45	45	45	45	45	45
BP (bar) solo in pompa di calore	30	30	30	30	30	30	30	30	30
FANS MAGNET CIRCUIT BREAKERS									
N° ventilatori A	-	-	-	-	2	2	2	2	3
N° ventilatori E	6	6	8	8					
N° ventilatori HA	-	-	-	-	2	2	2	2	3
N° ventilatori HE	6	8	8	8					

19. DIMENSIONS

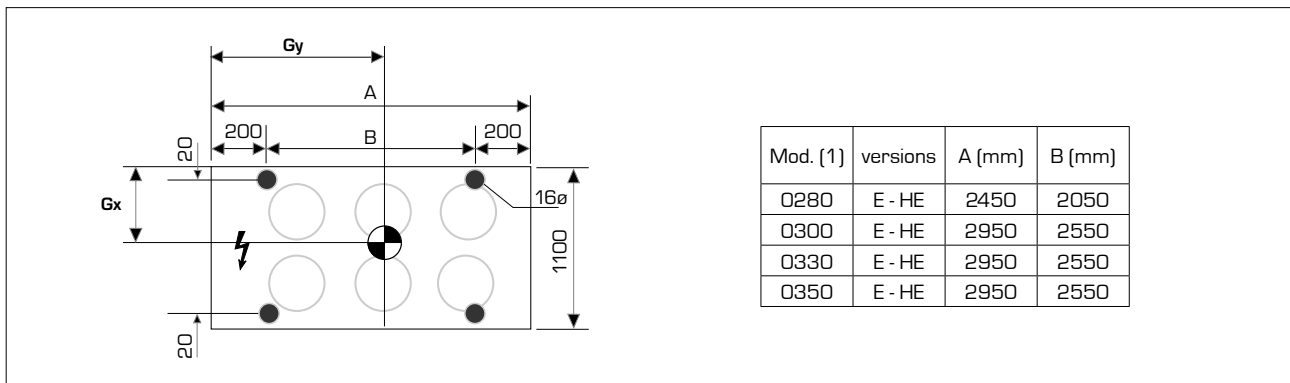
19.1. NRL 0280 - 0300 - 0330 - 0350



19.2. MINIMUM TECHNICAL SPACES NRL 0280 - 0300 - 0330 - 0350



19.3. ANTI-VIBRATION MOUNTS POSITION



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

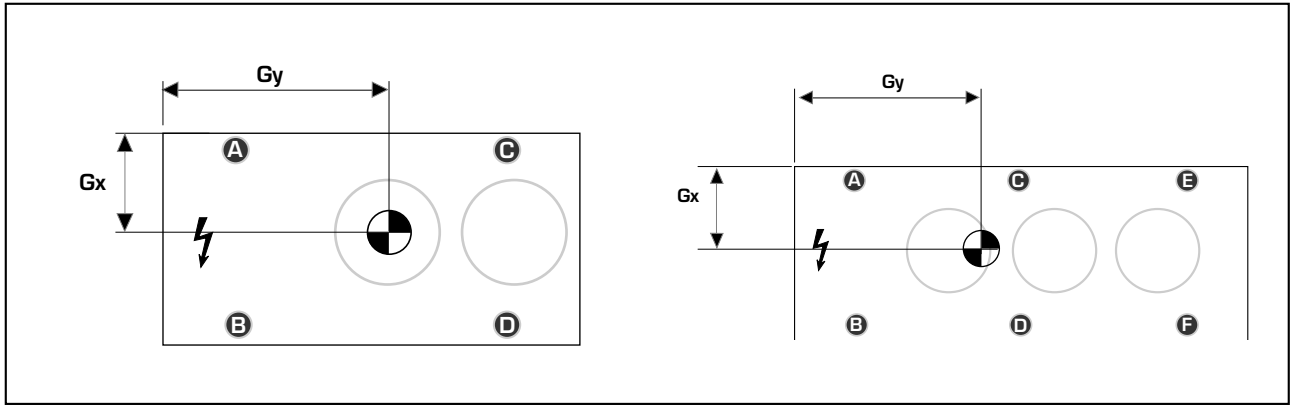
MOD.	VERSIONS	A (mm)	B (mm)	C (mm)
0500	E - A - HE - HA	1100	2950	1875
0550	E - A - HE - HA	1100	2950	1875
0600	E - A - HE - HA	1100	2950	1875
0650	E - A - HE - HA	1100	2950	1875
0700	E - A - HE - HA	1100	3950	1875

19.5. MINIMUM TECHNICAL SPACES 0500 - 0550 - 0600 - 0650 - 0700

19.6. ANTI-VIBRATION MOUNTS POSITION

0500	E - A - HE - HA	2950	2550
0550	E - A - HE - HA	2950	2550
0600	E - A - HE - HA	2950	2550
0650	E - A - HE - HA	2950	2550

Mod. (1)	versions	A (mm)	B (mm)	C (mm)	D (mm)
0700	E - A - HE - HA	3950	200	1440	2110



19.7. PERCENTAGE OF WIEGHT DISTRIBUTION ON SUPPORTS (EMPTY WEIGHT) VERSIONS (E - HE)

NRL	TYPE	WEIGHT	BARYCENTRE		PERCENTAGE OF WIEGHT DISTRIBUTION ON SUPPORTS				KIT VT
			Gx	Gy	A	B	C	D	
NRLO280E	00	686	558	1.030	23,6%	26,2%	23,8%	26,4%	17
NRLO280E	02 - 04	831	556	1.140	21,1%	23,3%	26,4%	29,2%	13
NRLO280E	01 - 03	816	557	1.122	21,5%	23,8%	26,0%	28,7%	13
NRLO280E	P2 - P4	716	558	1.076	22,5%	25,0%	24,9%	27,6%	17
NRLO280E	P1 - P3	701	558	1.053	23,0%	25,6%	24,4%	27,0%	17
NRLO300E	00	751	557	1.225	24,6%	27,3%	22,8%	25,3%	17
NRLO300E	02 - 04	896	556	1.296	23,4%	25,8%	24,2%	26,7%	13
NRLO300E	01 - 03	881	556	1.282	23,6%	26,1%	23,9%	26,4%	13
NRLO300E	P2 - P4	781	557	1.260	24,0%	26,6%	23,4%	26,0%	17
NRLO300E	P1 - P3	766	557	1.243	24,3%	26,9%	23,1%	25,6%	17
NRLO330E	00	761	558	1.223	24,7%	27,4%	22,7%	25,2%	17
NRLO330E	02 - 04	906	556	1.294	23,4%	25,9%	24,1%	26,6%	13
NRLO330E	01 - 03	891	556	1.279	23,7%	26,2%	23,8%	26,3%	13
NRLO330E	P2 - P4	791	557	1.258	24,0%	26,6%	23,4%	25,9%	17
NRLO330E	P1 - P3	776	557	1.241	24,3%	27,0%	23,1%	25,6%	17
NRLO350E	00	767	558	1.215	24,8%	27,6%	22,6%	25,1%	17
NRLO350E	02 - 04	912	557	1.287	23,5%	26,0%	24,0%	26,5%	13
NRLO350E	01 - 03	897	557	1.272	23,8%	26,3%	23,7%	26,2%	13
NRLO350E	P2 - P4	797	558	1.250	24,2%	26,8%	23,2%	25,8%	17
NRLO350E	P1 - P3	782	558	1.233	24,5%	27,2%	22,9%	25,4%	17
NRLO280HE	00	730	557	1.009	24,1%	26,7%	23,3%	25,9%	17
NRLO280HE	02 - 04	875	556	1.117	21,6%	23,9%	25,9%	28,6%	13
NRLO280HE	01 - 03	860	556	1.099	22,0%	24,3%	25,5%	28,1%	13
NRLO280HE	P2 - P4	760	557	1.053	23,1%	25,5%	24,4%	27,0%	17
NRLO280HE	P1 - P3	745	557	1.031	23,6%	26,1%	23,9%	26,5%	17
NRLO300HE	00	795	557	1.205	25,0%	27,7%	22,4%	24,8%	17
NRLO300HE	02 - 04	940	556	1.276	23,8%	26,2%	23,8%	26,2%	13
NRLO300HE	01 - 03	925	556	1.262	24,0%	26,5%	23,5%	26,0%	13
NRLO300HE	P2 - P4	825	557	1.239	24,4%	27,0%	23,1%	25,5%	17
NRLO300HE	P1 - P3	810	557	1.223	24,7%	27,3%	22,8%	25,2%	17
NRLO330HE	00	805	557	1.197	25,2%	27,9%	22,3%	24,7%	17
NRLO330HE	02 - 04	950	556	1.269	23,9%	26,4%	23,7%	26,1%	13
NRLO330HE	01 - 03	935	556	1.255	24,1%	26,7%	23,4%	25,8%	13
NRLO330HE	P2 - P4	835	557	1.231	24,5%	27,2%	22,9%	25,4%	17
NRLO330HE	P1 - P3	820	557	1.215	24,9%	27,5%	22,6%	25,0%	17
NRLO350HE	00	811	557	1.190	25,3%	28,0%	22,1%	24,5%	17
NRLO350HE	02 - 04	956	556	1.262	24,0%	26,5%	23,5%	26,0%	13
NRLO350HE	01 - 03	941	556	1.248	24,3%	26,8%	23,3%	25,7%	13
NRLO350HE	P2 - P4	841	557	1.224	24,7%	27,3%	22,8%	25,2%	17
NRLO350HE	P1 - P3	826	557	1.207	25,0%	27,7%	22,5%	24,9%	17

19.8. PERCENTAGE OF WEIGHT DISTRIBUTION ON SUPPORTS
(MACHINE WORKING) VERSIONS (E - HE)

NRL	TYPE	WEIGHT	BARYCENTRE		PERCENTAGE OF WIEGHT DISTRIBUTION ON SUPPORTS				KIT VT
			Gx	Gy	A	B	C	D	
NRL0280E	00	701	550	1.037	23,8%	25,7%	24,3%	26,3%	17
NRL0280E	02 - 04	1146	550	1.248	18,8%	20,3%	29,3%	31,6%	13
NRL0280E	01 - 03	1131	550	1.236	19,1%	20,6%	29,0%	31,3%	13
NRL0280E	P2 - P4	731	550	1.082	22,7%	24,5%	25,4%	27,4%	17
NRL0280E	P1 - P3	716	550	1.060	23,2%	25,1%	24,9%	26,8%	17
NRL0300E	00	769	548	1.233	24,9%	26,7%	23,3%	25,0%	17
NRL0300E	02 - 04	1214	549	1.361	22,5%	24,2%	25,7%	27,6%	13
NRL0300E	01 - 03	1199	549	1.351	22,7%	24,4%	25,5%	27,4%	13
NRL0300E	P2 - P4	799	548	1.267	24,3%	26,0%	24,0%	25,7%	17
NRL0300E	P1 - P3	784	548	1.251	24,6%	26,4%	23,7%	25,4%	17
NRL0330E	00	780	549	1.230	25,0%	26,8%	23,3%	25,0%	17
NRL0330E	02 - 04	1225	549	1.357	22,5%	24,2%	25,7%	27,6%	13
NRL0330E	01 - 03	1210	549	1.348	22,7%	24,4%	25,5%	27,4%	13
NRL0330E	P2 - P4	810	549	1.264	24,3%	26,1%	23,9%	25,7%	17
NRL0330E	P1 - P3	795	549	1.247	24,6%	26,4%	23,6%	25,3%	17
NRL0350E	00	786	549	1.223	25,1%	27,0%	23,1%	24,8%	17
NRL0350E	02 - 04	1231	549	1.352	22,6%	24,3%	25,5%	27,5%	13
NRL0350E	01 - 03	1216	549	1.342	22,8%	24,5%	25,4%	27,3%	13
NRL0350E	P2 - P4	816	549	1.256	24,5%	26,3%	23,8%	25,5%	17
NRL0350E	P1 - P3	801	549	1.240	24,8%	26,6%	23,4%	25,2%	17
NRL0280HE	00	746	550	1.015	24,3%	26,2%	23,8%	25,7%	17
NRL0280HE	02 - 04	1191	550	1.226	19,3%	20,9%	28,8%	31,0%	13
NRL0280HE	01 - 03	1176	550	1.215	19,6%	21,2%	28,5%	30,7%	13
NRL0280HE	P2 - P4	776	550	1.059	23,3%	25,1%	24,8%	26,8%	17
NRL0280HE	P1 - P3	761	550	1.037	23,8%	25,6%	24,3%	26,3%	17
NRL0300HE	00	814	548	1.213	25,3%	27,1%	23,0%	24,6%	17
NRL0300HE	02 - 04	1259	549	1.343	22,8%	24,5%	25,4%	27,3%	13
NRL0300HE	01 - 03	1244	549	1.333	23,0%	24,7%	25,2%	27,1%	13
NRL0300HE	P2 - P4	844	549	1.246	24,7%	26,5%	23,6%	25,3%	17
NRL0300HE	P1 - P3	829	548	1.230	25,0%	26,8%	23,3%	25,0%	17
NRL0330HE	00	826	549	1.204	25,5%	27,3%	22,8%	24,4%	17
NRL0330HE	02 - 04	1271	549	1.336	22,9%	24,7%	25,2%	27,1%	13
NRL0330HE	01 - 03	1256	549	1.326	23,1%	24,9%	25,1%	26,9%	13
NRL0330HE	P2 - P4	856	549	1.237	24,8%	26,7%	23,4%	25,1%	17
NRL0330HE	P1 - P3	841	549	1.220	25,1%	27,0%	23,1%	24,8%	17
NRL0350HE	00	832	549	1.197	29,8%	29,7%	20,3%	20,2%	17
NRL0350HE	02 - 04	1277	549	1.331	23,0%	24,8%	25,1%	27,0%	13
NRL0350HE	01 - 03	1262	549	1.321	23,2%	25,0%	25,0%	26,8%	13
NRL0350HE	P2 - P4	862	549	1.230	25,0%	26,8%	23,2%	25,0%	17
NRL0350HE	P1 - P3	847	549	1.214	25,3%	27,1%	22,9%	24,6%	17

**19.9. PERCENTAGE OF WIEGHT DISTRIBUTION ON SUPPORTS
(EMPTY WEIGHT) VERSIONS (A - E)**

NRL	TYPE	WEIGHT	BARYCENTRE		PERCENTAGE OF WIEGHT DISTRIBUTION ON SUPPORTS				KIT VT
			Gx	Gy	A	B	C	D	
NRL0500A - E	00	955	511	1.302	29,9%	26,0%	23,6%	20,5%	13
NRL0500A - E	02 - 04	1119	517	1.423	27,4%	24,3%	25,6%	22,7%	10
NRL0500A - E	01 - 03	1102	516	1.401	27,9%	24,6%	25,2%	22,3%	10
NRL0500A - E	P2 - P4	989	513	1.354	28,9%	25,2%	24,5%	21,4%	13
NRL0500A - E	P1 - P3	972	512	1.329	29,4%	25,6%	24,1%	21,0%	13
NRL0550A - E	00	959	510	1.298	30,0%	26,0%	23,6%	20,4%	13
NRL0550A - E	02 - 04	1123	516	1.419	27,5%	24,3%	25,5%	22,6%	10
NRL0550A - E	01 - 03	1106	516	1.397	28,0%	24,7%	25,2%	22,2%	10
NRL0550A - E	P2 - P4	993	512	1.350	29,0%	25,2%	24,5%	21,3%	13
NRL0550A - E	P1 - P3	976	511	1.325	29,5%	25,6%	24,0%	20,9%	13
NRL0600A - E	00	1142	553	1.325	27,4%	27,7%	22,3%	22,6%	13
NRL0600A - E	02 - 04	1308	552	1.428	25,7%	25,9%	24,1%	24,3%	10
NRL0600A - E	01 - 03	1290	552	1.409	26,0%	26,2%	23,8%	24,0%	10
NRL0600A - E	P2 - P4	1178	553	1.371	26,6%	26,9%	23,1%	23,4%	13
NRL0600A - E	P1 - P3	1160	553	1.348	27,0%	27,3%	22,7%	23,0%	13
NRL0650A - E	00	1155	553	1.317	27,5%	27,8%	22,2%	22,4%	13
NRL0650A - E	02 - 04	1321	553	1.420	25,8%	26,1%	24,0%	24,2%	10
NRL0650A - E	01 - 03	1303	553	1.400	26,1%	26,4%	23,6%	23,8%	10
NRL0650A - E	P2 - P4	1191	553	1.362	26,8%	27,0%	23,0%	23,2%	13
NRL0650A - E	P1 - P3	1173	553	1.340	27,1%	27,4%	22,6%	22,8%	13

NRL	TYPE	WEIGHT	BARYCENTRE		PERCENTAGE OF WIEGHT DISTRIBUTION ON SUPPORTS								KIT VT
			Gx	Gy	A	B	C	D	E	F	G	H	
NRL0700A - E	00	1323	553	1.896	7,2%	7,2%	31,0%	31,3%	-	-	11,6%	11,7%	22
NRL0700A - E	02 - 04	1489	552	1.972	6,1%	6,1%	31,7%	32,0%	-	-	12,0%	12,1%	22
NRL0700A - E	01 - 03	1471	552	1.956	6,2%	6,2%	31,8%	32,1%	-	-	11,8%	11,9%	22
NRL0700A - E	P2 - P4	1359	553	1.932	7,0%	7,0%	30,8%	31,1%	-	-	12,0%	12,1%	22
NRL0700A - E	P1 - P3	1341	553	1.914	7,1%	7,1%	30,9%	31,2%	-	-	11,8%	11,9%	22

**19.10. PERCENTAGE OF WEIGHT DISTRIBUTION ON SUPPORTS
(MACHINE WORKING) VERSIONS (A - E)**

NRL	TYPE	WEIGHT	BARYCENTRE		PERCENTAGE OF WIEGHT DISTRIBUTION ON SUPPORTS				KIT VT
			Gx	Gy	A	B	C	D	
NRL0500A - E	00	976	505	1.310	30,1%	25,5%	24,0%	20,4%	13
NRL0500A - E	02 - 04	1640	523	1.585	24,3%	22,0%	28,2%	25,6%	10
NRL0500A - E	01 - 03	1623	523	1.572	24,5%	22,2%	28,0%	25,3%	10
NRL0500A - E	P2 - P4	1010	507	1.361	29,1%	24,8%	24,9%	21,2%	13
NRL0500A - E	P1 - P3	993	506	1.336	29,6%	25,2%	24,5%	20,8%	13
NRL0550A - E	00	980	504	1.306	30,2%	25,5%	24,0%	20,3%	13
NRL0550A - E	02 - 04	1644	523	1.582	24,3%	22,0%	28,1%	25,5%	10
NRL0550A - E	01 - 03	1627	522	1.569	24,6%	22,2%	27,9%	25,3%	10
NRL0550A - E	P2 - P4	1014	506	1.357	29,2%	24,8%	24,8%	21,1%	13
NRL0550A - E	P1 - P3	997	505	1.332	29,7%	25,2%	24,4%	20,7%	13
NRL0600A - E	00	1166	547	1.331	27,6%	27,3%	22,7%	22,4%	13
NRL0600A - E	02 - 04	1832	548	1.571	23,5%	23,3%	26,7%	26,5%	10
NRL0600A - E	01 - 03	1814	548	1.559	23,7%	23,5%	26,5%	26,3%	10
NRL0600A - E	P2 - P4	1202	547	1.376	26,8%	26,5%	23,4%	23,2%	13
NRL0600A - E	P1 - P3	1184	547	1.354	27,2%	26,9%	23,1%	22,8%	13
NRL0650A - E	00	1181	547	1.322	27,7%	27,4%	22,5%	22,3%	13
NRL0650A - E	02 - 04	1847	548	1.564	23,6%	23,4%	26,6%	26,4%	10
NRL0650A - E	01 - 03	1829	548	1.551	23,8%	23,6%	26,4%	26,2%	10
NRL0650A - E	P2 - P4	1217	547	1.366	27,0%	26,7%	23,3%	23,0%	13
NRL0650A - E	P1 - P3	1199	547	1.345	27,4%	27,1%	22,9%	22,7%	13

NRL	TYPE	WEIGHT	BARYCENTRE		PERCENTAGE OF WIEGHT DISTRIBUTION ON SUPPORTS								KIT VT
			Gx	Gy	A	B	C	D	E	F	G	H	
NRL0700A - E	00	1359	545	1.903	7,1%	7,0%	31,6%	31,0%	-	-	11,7%	11,5%	22
NRL0700A - E	02 - 04	2025	547	2.079	3,4%	3,4%	34,7%	34,3%	-	-	12,2%	12,0%	22
NRL0700A - E	01 - 03	2007	547	2.068	3,5%	3,4%	34,8%	34,4%	-	-	12,0%	11,9%	22
NRL0700A - E	P2 - P4	1395	545	1.938	6,9%	6,8%	31,4%	30,8%	-	-	12,2%	11,9%	22
NRL0700A - E	P1 - P3	1377	545	1.921	7,0%	6,9%	31,5%	30,9%	-	-	12,0%	11,7%	22

19.11. PERCENTAGE OF WIEGHT DISTRIBUTION ON SUPPORTS
(EMPTY WEIGHT) VERSIONS (HA - HE)

NRL	TYPE	WEIGHT	BARYCENTRE		PERCENTAGE OF WIEGHT DISTRIBUTION ON SUPPORTS				KIT VT
			Gx	Gy	A	B	C	D	
NRL0500HA - HE	00	1099	523	1.329	28,9%	26,1%	23,6%	21,4%	13
NRL0500HA - HE	02 - 04	1263	526	1.432	26,8%	24,6%	25,3%	23,2%	10
NRL0500HA - HE	01 - 03	1246	526	1.413	27,2%	24,9%	25,0%	22,9%	10
NRL0500HA - HE	P2 - P4	1133	523	1.373	28,0%	25,4%	24,4%	22,2%	13
NRL0500HA - HE	P1 - P3	1116	523	1.351	28,4%	25,8%	24,0%	21,8%	13
NRL0550HA - HE	00	1103	522	1.325	29,0%	26,1%	23,6%	21,3%	13
NRL0550HA - HE	02 - 04	1267	525	1.429	26,9%	24,6%	25,3%	23,1%	10
NRL0550HA - HE	01 - 03	1250	525	1.410	27,3%	24,9%	25,0%	22,8%	10
NRL0550HA - HE	P2 - P4	1137	522	1.370	28,1%	25,4%	24,4%	22,1%	13
NRL0550HA - HE	P1 - P3	1120	522	1.348	28,5%	25,8%	24,0%	21,7%	13
NRL0600HA - HE	00	1204	553	1.297	27,9%	28,1%	21,9%	22,1%	13
NRL0600HA - HE	02 - 04	1370	552	1.399	26,2%	26,4%	23,6%	23,8%	10
NRL0600HA - HE	01 - 03	1352	552	1.380	26,5%	26,7%	23,3%	23,5%	10
NRL0600HA - HE	P2 - P4	1240	553	1.342	27,1%	27,4%	22,6%	22,8%	13
NRL0600HA - HE	P1 - P3	1222	553	1.320	27,5%	27,8%	22,3%	22,5%	13
NRL0650HA - HE	00	1212	553	1.291	28,0%	28,3%	21,8%	22,0%	13
NRL0650HA - HE	02 - 04	1378	552	1.393	26,3%	26,5%	23,5%	23,7%	10
NRL0650HA - HE	01 - 03	1360	552	1.374	26,6%	26,8%	23,2%	23,4%	10
NRL0650HA - HE	P2 - P4	1248	553	1.335	27,2%	27,5%	22,5%	22,7%	13
NRL0650HA - HE	P1 - P3	1230	553	1.313	27,6%	27,9%	22,2%	22,4%	13

NRL	TYPE	WEIGHT	BARYCENTRE		PERCENTAGE OF WIEGHT DISTRIBUTION ON SUPPORTS								KIT VT
			Gx	Gy	A	B	C	D	E	F	G	H	
NRL0700HA - HE	00	1390	553	1.858	7,5%	7,6%	31,0%	31,3%	-	-	11,2%	11,3%	22
NRL0700HA - HE	02 - 04	1556	552	1.936	6,4%	6,5%	31,7%	32,0%	-	-	11,7%	11,7%	22
NRL0700HA - HE	01 - 03	1538	552	1.920	6,5%	6,6%	31,8%	32,1%	-	-	11,5%	11,6%	22
NRL0700HA - HE	P2 - P4	1426	552	1.894	7,3%	7,4%	30,8%	31,1%	-	-	11,6%	11,7%	22
NRL0700HA - HE	P1 - P3	1408	552	1.877	7,4%	7,5%	30,9%	31,0%	-	-	11,4%	11,5%	22

**19.12. PERCENTAGE OF WEIGHT DISTRIBUTION ON SUPPORTS
(MACHINE WORKING) VERSIONS (HA - HE)**

NRL	TYPE	WEIGHT	BARYCENTRE		PERCENTAGE OF WIEGHT DISTRIBUTION ON SUPPORTS				KIT VT
			Gx	Gy	A	B	C	D	
NRL0500HA - HE	00	1123	517	1.334	29,0%	25,7%	24,0%	21,3%	13
NRL0500HA - HE	02 - 04	1787	529	1.578	24,1%	22,4%	27,8%	25,7%	10
NRL0500HA - HE	01 - 03	1770	529	1.566	24,3%	22,6%	27,6%	25,5%	10
NRL0500HA - HE	P2 - P4	1157	518	1.378	28,2%	25,1%	24,7%	22,0%	13
NRL0500HA - HE	P1 - P3	1140	518	1.357	28,6%	25,4%	24,3%	21,6%	13
NRL0550HA - HE	00	1127	516	1.331	29,1%	25,8%	23,9%	21,2%	13
NRL0550HA - HE	02 - 04	1791	529	1.575	24,2%	22,4%	27,7%	25,7%	10
NRL0550HA - HE	01 - 03	1774	529	1.563	24,4%	22,6%	27,5%	25,5%	10
NRL0550HA - HE	P2 - P4	1161	517	1.374	28,3%	25,1%	24,7%	21,9%	13
NRL0550HA - HE	P1 - P3	1144	517	1.353	28,7%	25,4%	24,3%	21,5%	13
NRL0600HA - HE	00	1240	544	1.306	28,2%	27,6%	22,4%	21,9%	13
NRL0600HA - HE	02 - 04	1906	546	1.546	24,0%	23,6%	26,4%	26,0%	10
NRL0600HA - HE	01 - 03	1888	546	1.534	24,2%	23,8%	26,2%	25,8%	10
NRL0600HA - HE	P2 - P4	1276	544	1.349	27,4%	26,8%	23,1%	22,6%	13
NRL0600HA - HE	P1 - P3	1258	544	1.328	27,8%	27,2%	22,7%	22,3%	13
NRL0650HA - HE	00	1241	547	1.296	28,2%	27,9%	22,1%	21,9%	13
NRL0650HA - HE	02 - 04	1907	548	1.539	24,0%	23,8%	26,2%	26,0%	10
NRL0650HA - HE	01 - 03	1889	548	1.527	24,2%	24,0%	26,0%	25,8%	10
NRL0650HA - HE	P2 - P4	1277	547	1.339	27,4%	27,2%	22,8%	22,6%	13
NRL0650HA - HE	P1 - P3	1259	547	1.318	27,8%	27,5%	22,4%	22,2%	13

NRL	TYPE	WEIGHT	BARYCENTRE		PERCENTAGE OF WIEGHT DISTRIBUTION ON SUPPORTS								KIT VT
			Gx	Gy	A	B	C	D	E	F	G	H	
NRL0700HA - HE	00	1428	545	1.865	7,5%	7,4%	31,6%	31,0%	-	-	11,4%	11,2%	22
NRL0700HA - HE	02 - 04	2094	547	2.048	3,8%	3,7%	34,7%	34,3%	-	-	11,9%	11,7%	22
NRL0700HA - HE	01 - 03	2076	547	2.037	3,8%	3,8%	34,8%	34,4%	-	-	11,7%	11,6%	22
NRL0700HA - HE	P2 - P4	1464	545	1.900	7,3%	7,2%	31,4%	30,8%	-	-	11,8%	11,6%	22
NRL0700HA - HE	P1 - P3	1446	545	1.883	7,4%	7,3%	31,5%	30,9%	-	-	11,6%	11,4%	22

20. SAFETY WARNINGS AND INSTALLATION REGULATIONS

<p>i Safety warnings</p> <p>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.</p> <p>AERMEC will not assume any responsibility for damage due to fail-</p>	<p>ure to follow these instructions.</p> <p>i Before starting any operation READ THE INSTRUCTIONS CAREFULLY AND PERFORM SAFETY CONTROLS IN ORDER TO REDUCE ANY DANGER TO A MINIMUM. All staff involved must have thorough knowledge of the operations and</p>	<p>any dangers that may arise at the time in which the installation operations are carried out.</p>
<p>Danger!</p> <p>The refrigerant circuit is pressurised. Moreover, very high temperatures can be reached. The appliance may only be opened by an after-sales service technician or by a qualified technician. Interventions on the cooling circuit may only be carried out by a qualified refrigeration technician.</p>	<p>410A GAS</p> <p>The unit comes supplied with a sufficient quantity of 410A refrigerant fluid. This is a chlorine-free refrigerant and does not damage the ozone layer. 410A is not flammable. However, all maintenance operations must be carried out exclusively by a specialised technician using suitable protective equipment.</p>	<p>Danger of electric shock!</p> <p>Before opening the unit, disconnect the appliance completely from the mains power supply.</p>

21. RECEIVING THE PRODUCT

21.1. HANDLING

Before beginning installation agree on the place of positioning with client and pay attention to the following points:

- The support surface must be able to support the weight of the unit.
- The selected place must have enough space to permit laying of the necessary pipes.
- Remember that whilst operational the chiller can cause vibrations; therefore anti-vibration mounts (VT accessories) are recommended. Fix them to the holes on the base, following the assembly layout.
- It is mandatory to provide the necessary technical spaces in order

to allow **ROUTINE AND EXTRAORDINARY MAINTENANCE** interventions.

21.2. POSITIONING

The unit is sent from the factory wrapped in estincoil placed on a pallet. Before handling the unit, verify the lifting capacity of the machinery used.

On removal of the packaging, handling must be carried out by qualified staff, which is suitably equipped.

To handle the machine:

"IN THE CASE OF LIFTING"

Insert pipes (NOT SUPPLIED) in holes on the base with length such to allow positioning of the belts used for lifting.

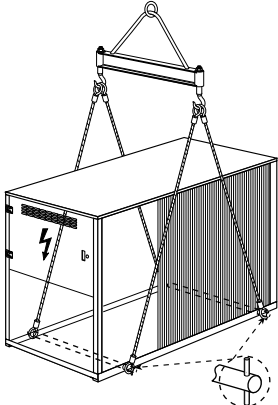
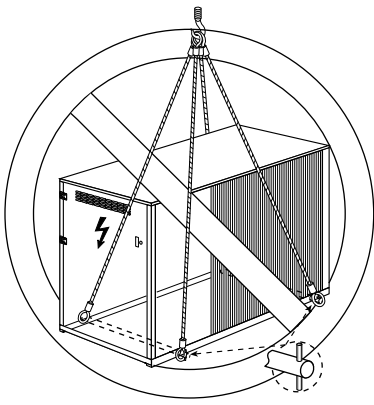
To prevent the unit structure being damaged by the belts place protections between the latter and the machine.

It is prohibited to stop under the unit.

NOTE:

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

21.3. HANDLING EXAMPLE

<ul style="list-style-type: none"> • Correct handling 	<ul style="list-style-type: none"> • Incorrect handling 
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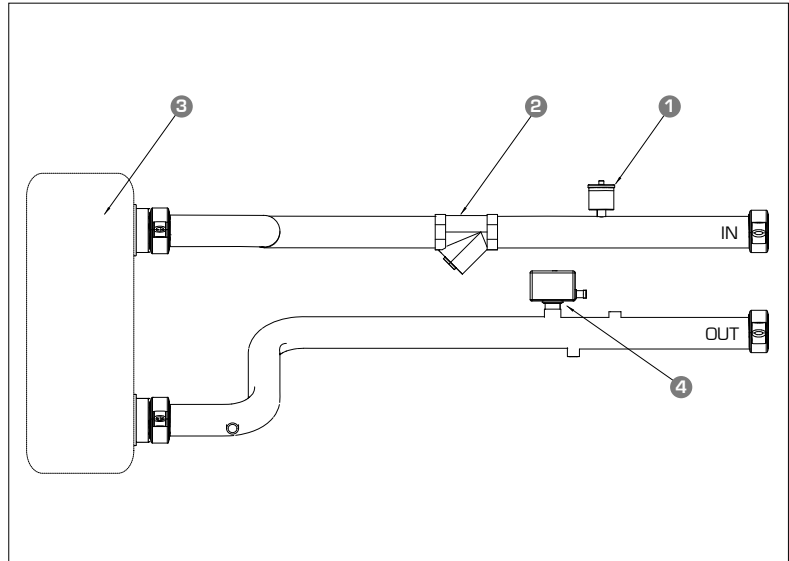
22. HYDRAULIC CIRCUITS

22.1. HYDRAULIC CIRCUIT INSIDE NRL "00"

(without storage tank and without pump)

The hydraulic circuit is made up from:

- Plate heat exchanger
- Mounted filter
- Flow switch
- Water inlet/outlet probes (SIW- SUW).
- Vent valve

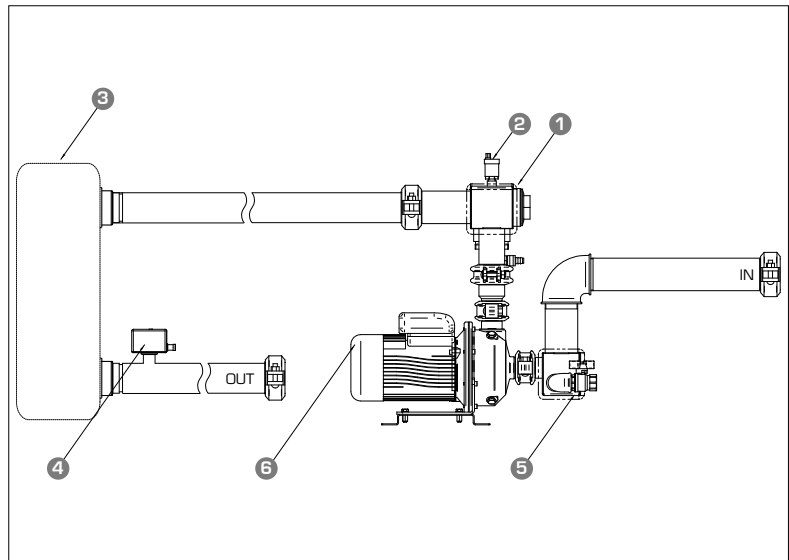


Key	
1	Vent valve
2	Filter
3	Plate heat exchanger
4	Flow switch

22.2. HYDRAULIC CIRCUIT INSIDE NRL "P1-P2-P3-P4"

The hydraulic circuit is made up from:

- Vent valve
- Safety valve
- Pump
- Plate heat exchanger
- Mounted filter
- Filter drain
- Drain
- Flow switch
- Water inlet/outlet probes (SIW- SUW).

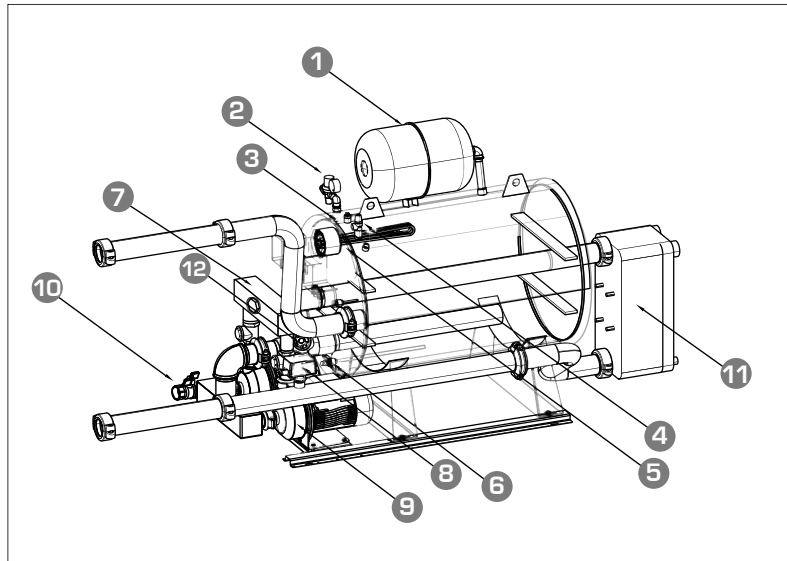


Key	
1	Filter
2	Vent valve
3	Plate heat exchanger
4	Flow switch
5	Drain cock
6	Pump

22.3. HYDRAULIC CIRCUIT INSIDE NRL "01-02-03-04-05-06-07-08"

The hydraulic circuit is made up from:

- Storage tank
- Loading unit
- Vent valve
- Safety valve
- Expansion vessel
- Pump
- Plate heat exchanger
- Mounted filter
- Filter drain
- Storage tank draining
- Flow switch
- Water inlet/outlet probes (SIW- SUW).
- Resistance only for versions "05-06-07-08"

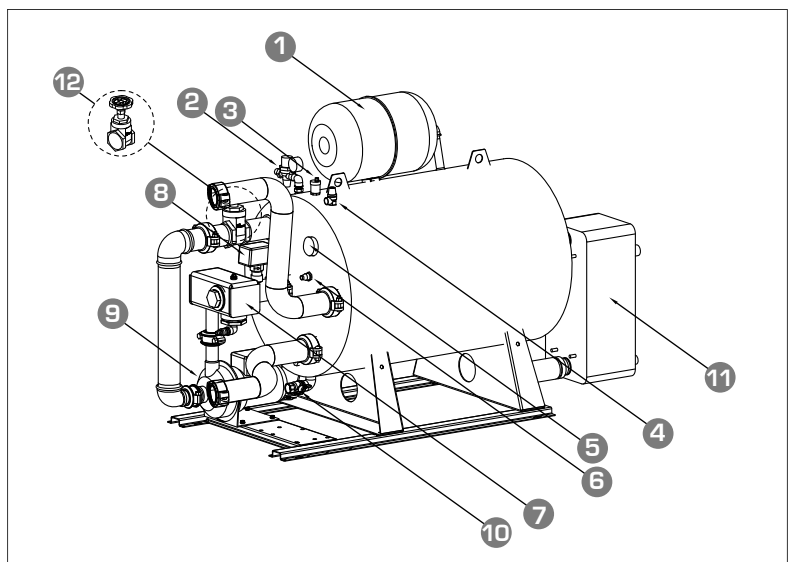


Key			
1	Expansion vessel	7	Filter
2	Loading unit	8	Flow switch
3	Vent valve	9	Pump
4	Safety valve (6 bar)	10	Storage tank draining
5	Resistance	11	Plate heat exchanger
6	Probe	12	Shut-off valve

22.4. HYDRAULIC CIRCUIT INSIDE NRL "09-10"

-The hydraulic circuit is made up from:

- Storage tank
- Loading unit
- Vent valve
- Safety valve
- Expansion vessel
- Pump
- Plate heat exchanger
- Mounted filter
- Filter drain
- Storage tank draining
- Flow switch
- Water inlet/outlet probes (SIW- SUW).
- Resistance only for versions "10"



Key			
1	Expansion vessel	7	Filter
2	Loading unit	8	Flow switch
3	Vent valve	9	Pump
4	Safety valve (6 bar)	10	Storage tank draining
5	Resistance	11	Plate heat exchanger
6	Probe	12	Shut-off valve

NOTES:

The presence of a filter is mandatory; removal voids the guarantee. IT SHOULD BE KEPT CLEAN AND THEREFORE must be checked after installation of the unit and its status must be checked frequently.

The installation of the manual shut-off valves between the unit and the rest of the system is mandatory in all NRL models (with and without storage tank) and for all hydraulic circuits that affect the chiller itself (desuperheaters, total recovery); FAILURE TO COMPLY VOIDS THE WARRANTY.

It is mandatory to calibrate the

flow switch on the flow rate values requested by the system; FAILURE TO COMPLY VOIDS THE WARRANTY.

RECOMMENDED EXTERNAL HYDRAULIC CIRCUIT

The choice and the installation of components outside the NRL is up to the installer, who must operate according to the rules of good practice and in compliance with the regulations in force in the country of destination (Ministerial Decree 329/2004).

Installation of the following is recommended:

- Filling/air vent unit.
- Anti-vibration joints.
- Pump (if not supplied with the machine).

- Expansion vessel (if not supplied with the machine).
- Shut-off cocks.
- Flow switch
- Safety valve (if not supplied with the machine).
- Manometers.

NOTE

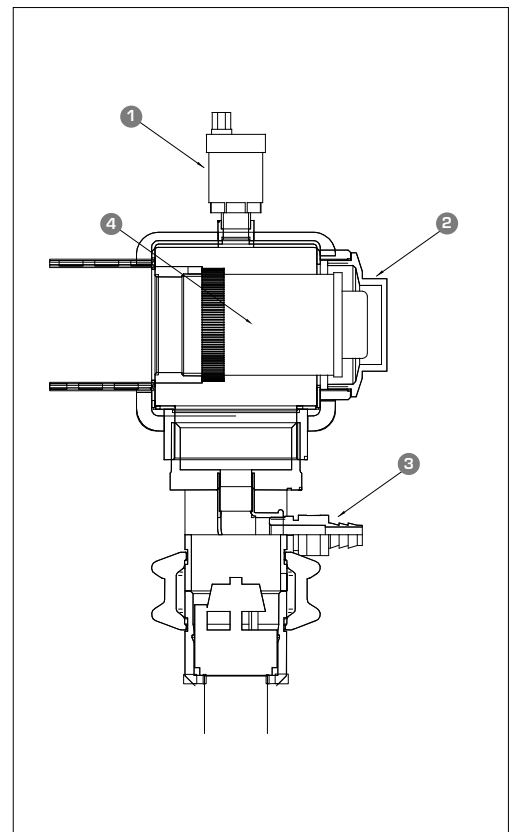
The hydraulic pipes for connection to the machine must be suitably dimensioned for the effective water flow rate requested by the system when functioning. The water flow rate to the heat exchanger must always be constant.

23. FILTER MAINTENANCE

23.1. PROCEDURE TO FOLLOW TO CLEAN THE FILTER:

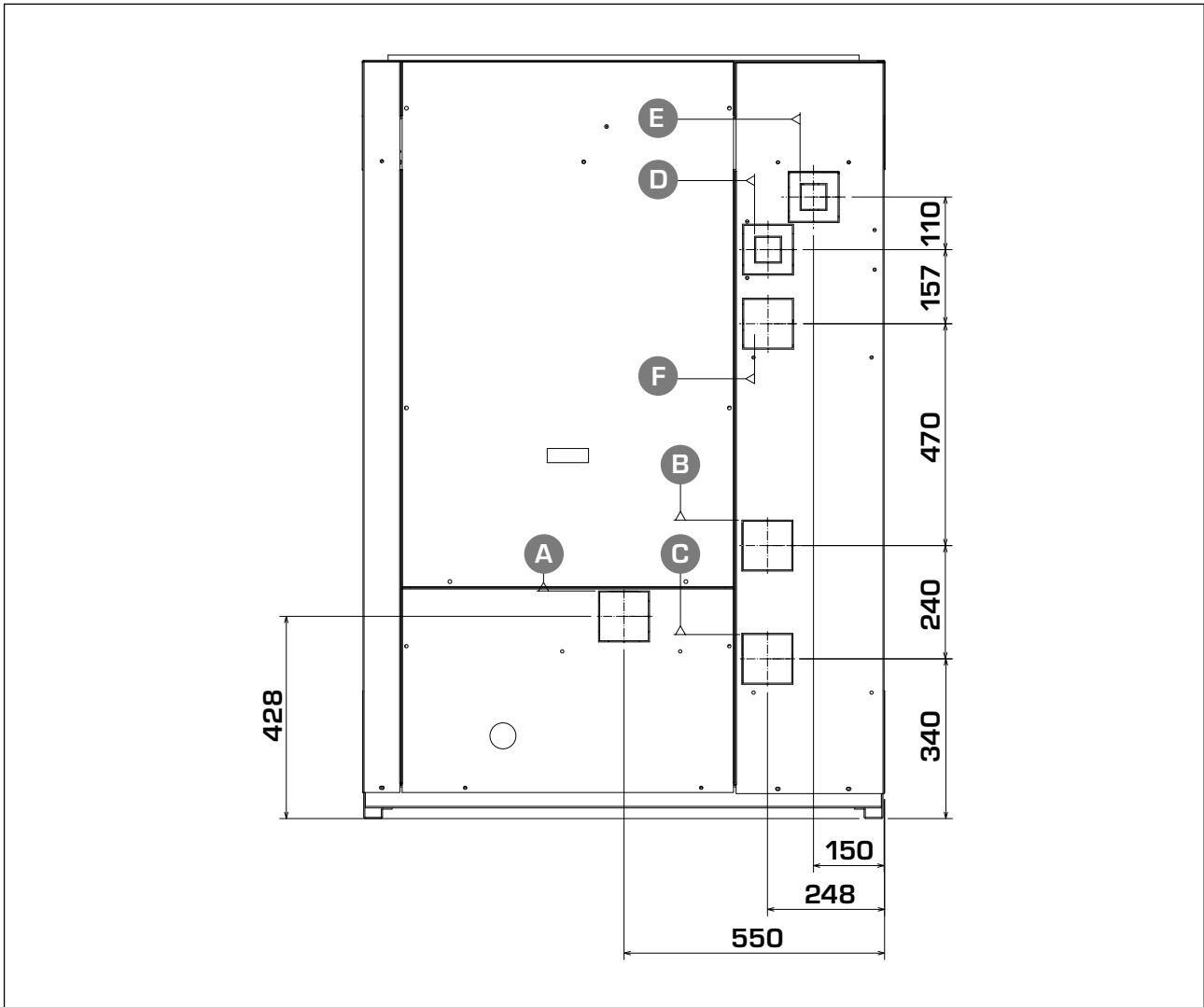
(Type of filter mounted only in the version with storage tank and pump).

- Stop the machine.
- Open the drain cock of the filter.
- Loosen the hexagonal nut positioned on the head of the filter; extract the metal ring nut and clean.
- Re-position the ring nut inside the filter housing, tighten the hexagonal nut.



Key	
1	Vent valve
2	Hexagonal nut
3	Filter drain cock
4	Metal ring nut housing

24. POSITION OF HYDRAULIC CONNECTIONS



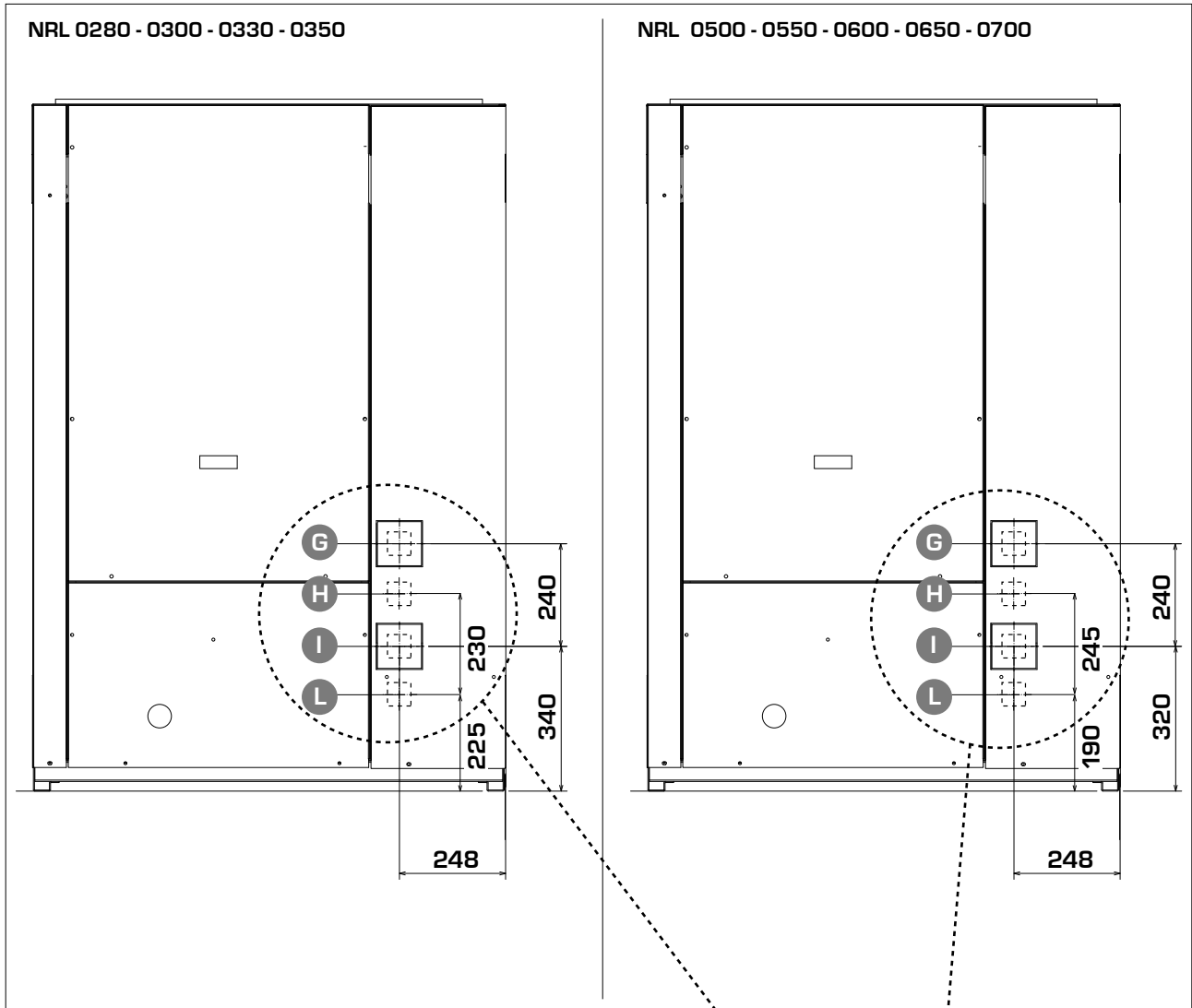
Key:	
A	Return system versions with pump
B	Basic return system versions
C	At the storage tank and basic system versions
D	Desuperheater inlet (Ø 1"1/2)
	Heat recovery inlet (Ø 2")
E	Desuperheater outlet (Ø 1"1/2)
	Heat recovery outlet (Ø 2")
F	Return system versions with storage tank

ATTENTION:

Wash the system well, before connecting the unit. This cleaning will eliminate any residues such as welding drips, scale, rust, or other impurities from the

pipings. These substances can also deposit inside and cause machine malfunctioning. The connection piping must be adequately supported so that its weight is not borne by the appliance.

24.1. POSITION OF HYDRAULIC CONNECTIONS MOTORCONDENSING VERSION



Key:

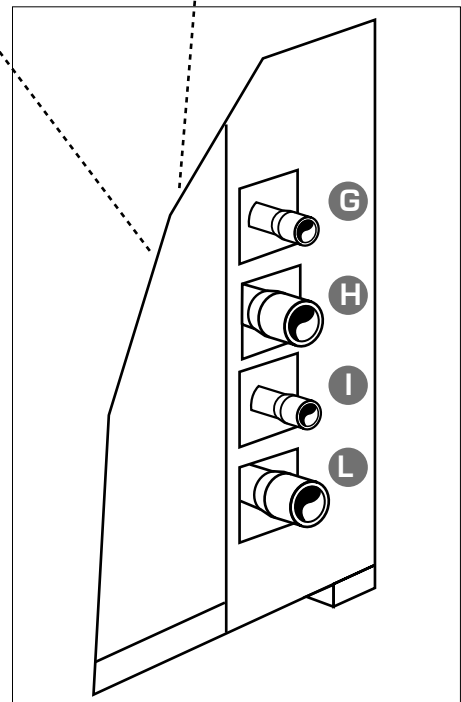
G	Liquid line (C1)
H	Gas line (C1)
I	Liquid line (C2)
L	Gas line (C2)

Key:
 C1: Cooling circuit (1)
 C2: Cooling circuit (2)

ATTENTION:

Wash the system well, before connecting the unit. This cleaning will eliminate any residues such as welding drips, scale, rust, or other impurities from the piping. These substances

can also deposit inside and cause machine malfunctioning. The connection piping must be adequately supported so that its weight is not borne by the appliance.



25. ELECTRICAL CONNECTIONS

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

i The features of the electrical lines and of the related components must be determined by STAFF QUALIFIED TO DESIGN ELECTRIC 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

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

i It is mandatory to verify that the machine's watertight integrity before making the electrical connections, and it must only be powered after the hydraulic and electrical works have been completed.

The units are completely wired in the factory and only require connection to the electric power supply mains. Please verify that the characteristics of your electrical mains are suitable for the absorption values indicated in the table of electrical data, taking into consideration any other machines operating at the same time.

25.1. UNIT ELECTRIC LINES AND DATA

NOTE

The connection cables are not supplied.

The cable sections shown in Table 25.2 are recommended for a maximum length of 50 m. For longer lengths, the PLANT ENGINEER is responsible for the power supply line sizing and the earth connection, according to:

tion, according to:

- the length
- the type of cable
- the absorption of the unit, the physical location and the environmental temperature.

25.2. ELECTRICAL DATA

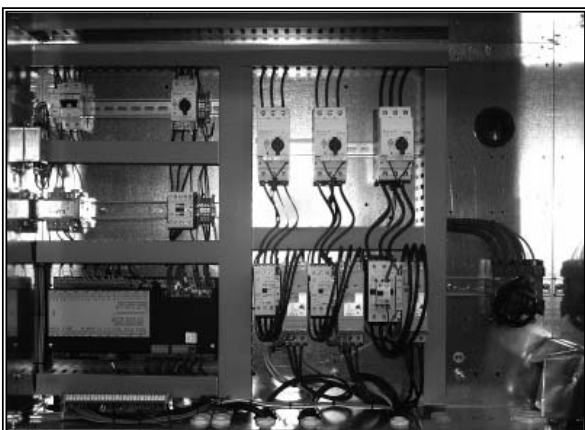
MODEL	VERSION	SEC A mm ²	Earth (sez PE) mm ²	IL A
0280	E - HE	16	16	63
0300	E - HE	16	16	63
0330	E - HE	25	16	80
0350	E - HE	25	16	80
0500	E - A - HE - HA	50	25	125
0550	E - A - HE - HA	50	25	125
0600	E - A - HE - HA	50	25	125
0650	E - A - HE - HA	70	35	160
0700	E - A - HE - HA	70	35	160

NOTE:

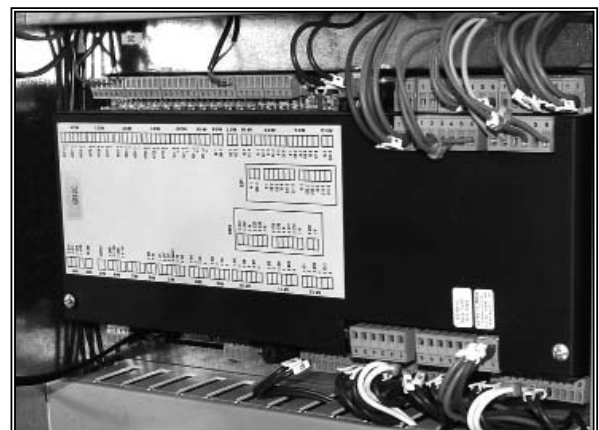
Check the tightness of all power conductor clamps on commissioning and after 30 days from the start of service. Subsequently, check tightness of all the power clamps every six months. Loose terminals can cause overheating of the cables and components.

Key	
Sec A	Power supply 400V-3N-50Hz
Earth	Earth wire to connect to unit
IL	Master switch

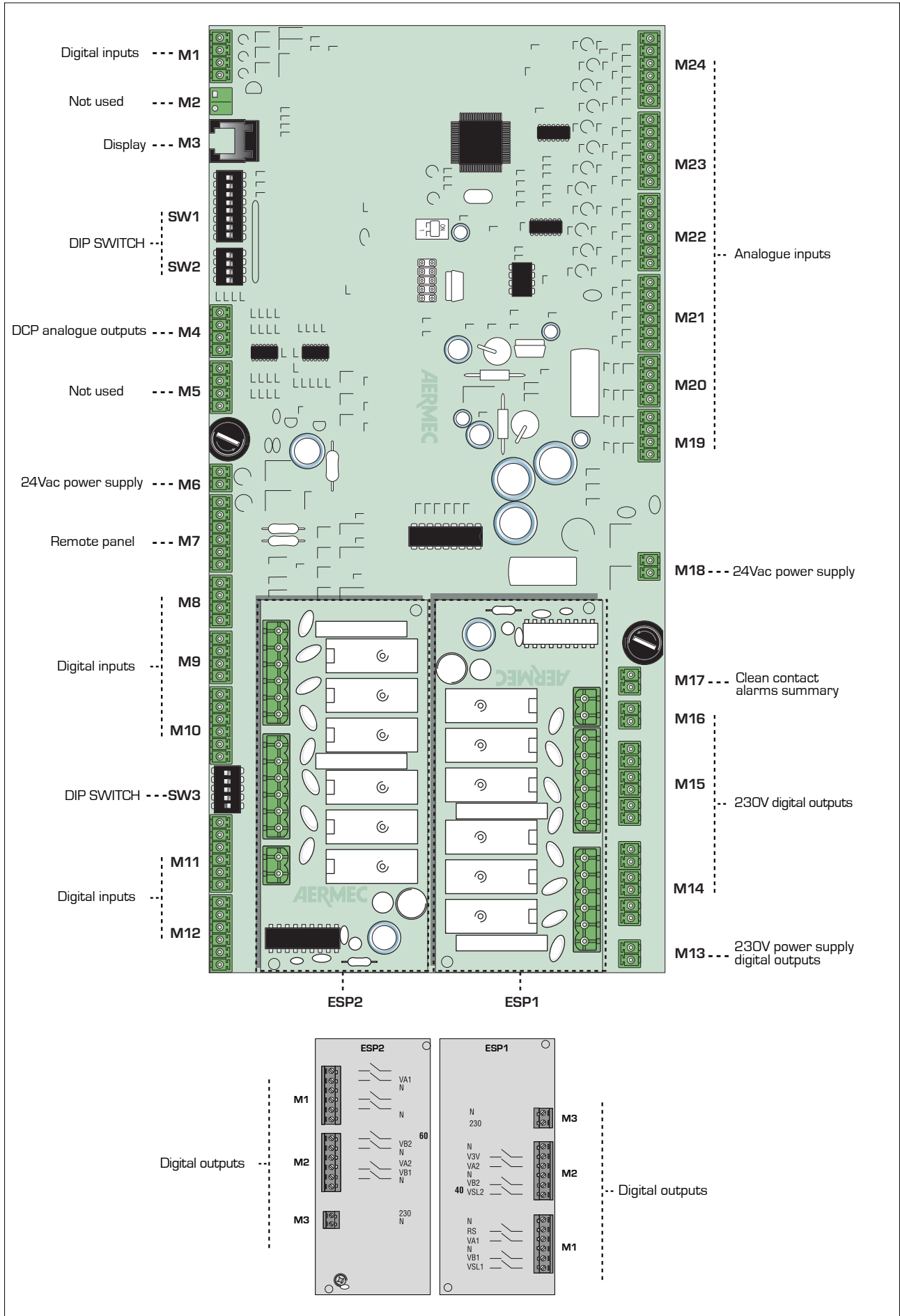
Electric Control Board



GR3

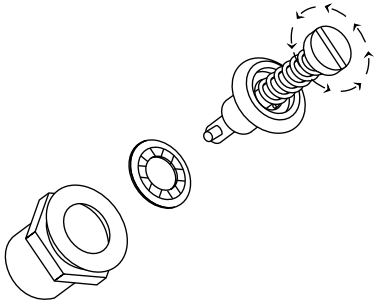


25.3. "GR3" CONTROL BOARD



25.4. CONNECTION TO THE ELECTRIC POWER SUPPLY MAINS

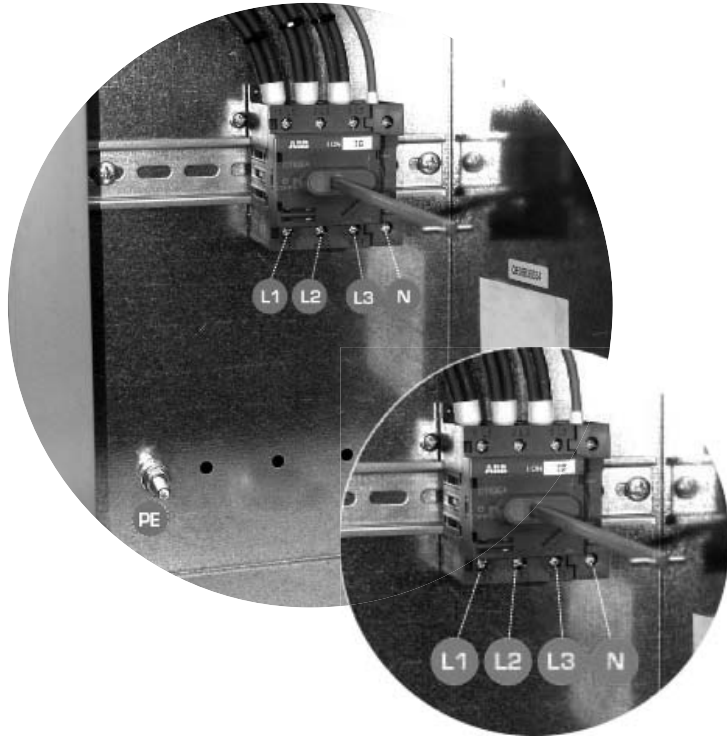
- Make sure that the electric line to which you are making the connection is not live.
- **To access the electric box:**
- **1** Move the screw by ¼ of a turn anti-clockwise



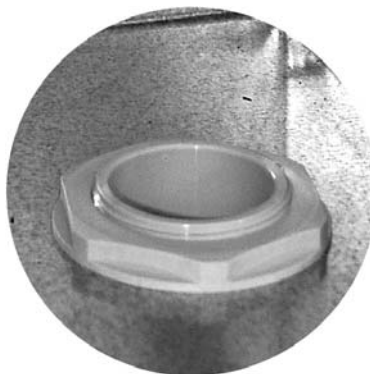
- **2** Turn the door-lock isolating switch to OFF, padlocked and with warning sign.



The figures below show the various parts used to make panel opening easy and the various line connections.



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

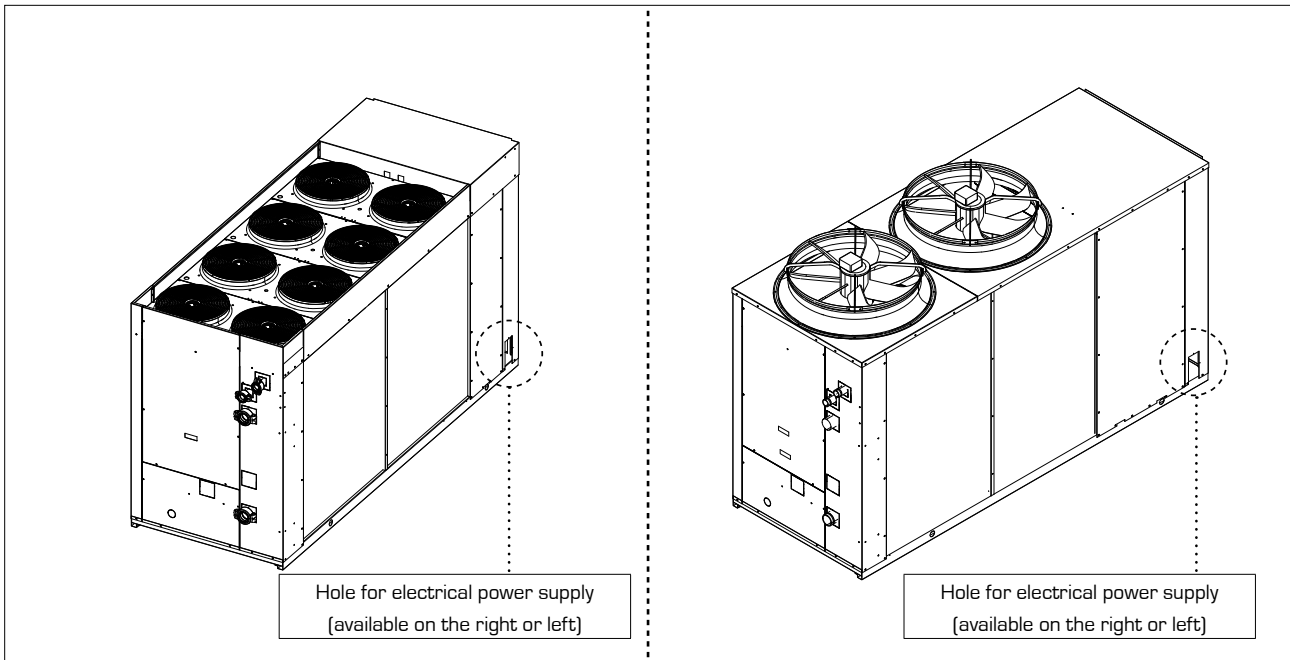


Electric cable passage hole



PE: Earth Connection

25.5. ELECTRIC CONNECTIONS



26. COMMISSIONING

26.1. PRELIMINARY OPERATIONS

ATTENTION

Before carrying out the controls indicated below, make sure that the unit is disconnected from the power mains.

Make sure that the master switch is in the OFF position and locked and a warning sign is applied. Before starting any operations check there is no voltage present using a voltmeter or a phase indicator.

26.1.1. Electric controls

- Check that the main power cables are suitably sized, able to support the overall absorption of the unit (see electric data) and that the unit has been appropriately earthed.
- Check that all the electrical connections have been made correctly and all the terminals adequately tightened. The following operations are to be carried out when the unit is not live.
- Supply power to the unit by turning the master switch to the ON position. The display will switch on a few seconds after voltage has been supplied; check that the operating status is at OFF (OFF BY KEYB on lower side of the display).

- Use a tester to verify that the value of the power supply voltage at the RST phases is equal to $400V \pm 10\%$; also verify that the unbalance between phases does not exceed 3%.
- Check that the connections made by the installer are in compliance with the data given.
- Verify that the compressor sump resistance/s is working properly by measuring the increase in temperature of the oil pan. The resistance/s must function for at least 24 hours before compressor start-up and the oil pan temperature must be 10 - 15°C above the environmental temperature.

ATTENTION

- Power must be supplied to the unit at least 24 hours before it is started-up (or at the end of any prolonged stand-still period) in a way to allow the compressor sump heating resistances to make any refrigerant present in the oil evaporate. Failure to comply with this precaution can cause serious damage to the compressor and will void the warranty.

26.1.2. Hydraulic circuit controls

- Check that all the hydraulic connections have been made correctly and that the indications on the rating plates have been followed.
- Check that the hydraulic system is filled and under pressure and also make sure that no air is present; bleed if necessary.
- Verify that any shut-off valves present in the system are correctly opened.
- Make sure that the circulation pump/s is operating and that the flow rate of the water is sufficient to close the contact of the flow switch.
- Check correct flow switch functioning. By closing the shut-off valve at the outlet of the heat exchanger the unit must display the block. Finally, re-open the valve and rearm the block.

26.2. COMMISSIONING

ATTENTION

Remember that free commissioning is envisioned by the local AERMEC after-sales service for the units in this series if requested by the Aermec customer or legitimate owner; (VALID ONLY IN ITALY).

The commissioning 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, filling and bleeding of air from the system) must have been completed.

Before carrying out the controls indicated below, make sure that the unit is disconnected from the electric mains, using the appropriate instruments:

26.2.1. Cooling circuit controls

- Check for any leaks of refrigerant gas, particularly in correspondence with the manometer pressure points, pressure transducers, and pressure switches (vibrations during transport may have loosened the fittings).
- After a brief functioning period, check the oil level in the compressor and the absence of bubbles in the liquid indicator window. The continuous passage of steam bubbles can mean that the refrigerant load is insufficient and that the thermostatic valve is not correctly adjusted. The presence of steam during functioning in cooling mode for brief periods is however possible.

26.2.2. Superheating

Verify the superheating by comparing the temperature measured with a contact thermometer situated on the compressor intake with the temperature shown on the manometer (saturation temperature corresponding to the evaporation pressure).

The difference between these two temperatures gives the value of superheating. Optimal values are between 4 and 8°C.

26.2.3. Subcooling

Verify the subcooling by comparing the temperature measured with a contact thermometer situated on the pipe at the outlet of the condenser with the temperature shown on the high pressure manometer (saturation temperature corresponding to the condensation pressure).

The difference between these two temperatures gives the subcooling value. The optimal values are included between 4 and 5°C in cooling functioning mode, between 1 and 3°C in heating functioning mode.

26.2.4. Pressing line temperature

If the subcooling and overheating values are regular, the temperature measured in the pressing line pipe at the compressor outlet must be 30/40°C above the condensation temperature.

26.3. SYSTEM LOADING UNLOADING

During the winter period, in the event of a system pause, the water present in the exchanger can freeze, causing irreparable damage to the exchanger, the complete discharge of the cooling circuits and, at times, damage to the compressors.

To prevent the danger of freezing, the following solutions are possible:

- Complete draining of the water from the heat exchanger at the end of the season and filling at the start of the next season using the vent valve on the storage tank in the versions with storage tank and/or pump.
- Functioning with glycoled water, with a percentage of glycol chosen based on the minimum outdoor temperature expected. In this case you must take into account the different outputs and absorption of the chiller, the sizing of the pumps and the output of the terminals.
- Use of heat exchanger heating resistances (as per standard on all appliances). In this case the resistances must always be live for the entire period of possible freezing (machine in stand-by).

27. MAINTENANCE

NOTE

All routine and special maintenance operations must be carried out exclusively by qualified staff.

Before starting any servicing operation or cleaning, be sure to disconnect the power supply to the unit.

All appliances are subject to inevitable wear and tear over time.

Maintenance makes it possible to:

- Maintain the efficiency of the unit
- Reduce the speed of deterioration
- Gather information and data and understand the status of efficiency of the unit in order to prevent possible breakdowns.

It is therefore fundamental to envision periodical controls:

- **YEARLY**
- **SPECIAL CASES**

Keep a maintenance log on the machine (not supplied with the unit, the user's responsibility) that enables you to keep track of the servicing carried

out on the unit. This makes it easy to organise the work appropriately and facilitates troubleshooting on the machine.

In the log, record the date, type of work carried out (routine maintenance, inspection, or repair), a description of the work, any measures taken, and so on....

- **Yearly checks**

Cooling circuit

- Verify the watertight integrity of the cooling circuit and that the pipes have not been damaged.
- Perform an acidity test on the oil of the cooling circuit.
- Verify the operation of the high and low pressure pressure switches; in the event of poor operation, replacement is recommended.
- Check the status of furring on the dehydrator filter; replace the filter if necessary.

- **Electric controls**

- Check the condition of the electrical wires and their insulation.
- Verify the functioning of the resistance of the evaporator and of the compressor sump.

- **Mechanical checks**

Check the tightness of the screws on the fan grids and on the fan bodies, the compressors and the electric box, as well as the exterior panelling of the unit. Incorrect fastening can lead to anomalous noise and vibrations.

Check the condition of the structure. If there are any oxidised parts, treat with paint suitable to eliminate or reduce oxidation.

- **Hydraulic controls**

- Clean the water filter
- Bleed the air from the circuit.
- Verify that the water flow rate to the evaporator is always constant.
- Verify the status of the thermal insulation of the hydraulic piping
- Where envisioned, check the percentage of glycol.

28. DISPOSAL

28.1. DISCONNECTING THE UNIT

The unit must be disconnected by a qualified technician.

Before disconnecting the unit, the following must be recovered, if present:

- The refrigerant gas: the gas must be extracted using suction devices operating in a closed circuit to ensure there are no gas leaks into the environment.
- The glycol must not be dispersed in the environment when removed, but stored in suitable containers.

NOTE

The disposal of the gas refrigerant, the glycolated water mixture where present and the recovery of any other material or substance must be carried out by qualified staff in compliance with the specific regulations in force on the subject to prevent injury to persons or damage to objects as well as the pollution of the surrounding area.

While waiting for disposal, the unit can be stored outdoors, as harsh weather conditions or extreme temperature changes do not cause damaging effects on the environment provided that the electrical, cooling, and hydraulic circuits are intact and closed.

28.2. DISMANTLING AND DISPOSAL

In the dismantling stage, the fan, the motor and the coil, if operational, can be recovered by specialised recycling centres.

NOTE

For dismantling/disposal, all the materials must be taken to the authorised facilities in compliance with the national regulations in force on this subject. For further information on disposal, contact the manufacturer.

29. IMPROPER USE

The appliance is designed and constructed to guarantee the maximum safety in its immediate vicinity (IP24), as well as to resist atmospheric agents.

The fans are protected from involuntary intrusion by means of protective grids.

Accidental opening of the electric control board with the machine running is prevented by the door-block isolating switch.

Avoid laying tools or heavy objects directly on the lateral heat exchanger coils, in order not to damage the louvers.

NOTE

Do not insert or drop objects through the grids of the fan motors. Do not lean against the heat exchange coils "Sharp surfaces".

29.1. IMPORTANT SAFETY INFORMATION

The machine must not exceed the pressure and temperature limits indicated in the table shown in the section "Functioning limits" paragraph of the technical manual.

Correct functioning of the unit is not guaranteed following a fire; before restarting the machine, have it checked by an authorised after-sales service centre.

The machine is equipped with safety valves which, in the event of excessive pressure, can discharge the high temperature gas into the atmosphere.

Wind, earthquakes, and other natural phenomena of exceptional intensity have not been considered.

If the unit is used in an aggressive atmosphere or with aggressive water, please contact the head offices.

ATTENTION

Following extraordinary maintenance work on the cooling circuit involving the replacement of components, before restarting the machine, carry out the following operations:

- Pay the maximum attention in restoring the load of refrigerant indicated on the machine plate (inside the electric control board).
- Open all the cocks present in the cooling circuit.
- Connect the electric power supply and earth correctly.
- Check the hydraulic connections
- Check that the water pump is working correctly.
- Clean the water filters.
- Check that the condenser coils are not soiled or blocked.
- Verify the correct rotation of the fan unit.

30. 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)
Flashpoint	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 of the tissues. Strong concentrations of vapours can cause headache, dizziness, sleepiness, nausea, as well as lipothymia. Irregular heart beat (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, practice artificial respiration. If the symptoms persist, call a doctor
Inhalation	In case of inhalation breathe fresh air. In case of respiratory difficulty, apply oxygen mask. In case of respiratory arrest, practice artificial respiration. Contact a doctor.
Contact with the skin	Skin contact with evaporating liquids can cause freezing of the tissues. 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	Inhalation: Irregular heart beat (arrhythmia).
	Ingestion: No specific risk. Skin contact: Skin contact with evaporating liquids can cause freezing of the tissues. Slight irritation for the skin. Contact with the eyes: Slight irritation for the eye.

FIRE-FIGHTING MEASURES	
Fire-fighting equipment	Not inflammable ASTM D-56-82; ASTM E-681. In case of fire, use fire hose, foam, dry chemical products or CO ₂ .
Particular risks of exposure	Possibility of dangerous reactions of during a fire due to the presence of units. 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. This product is not inflammable at room temperature and atmospheric pressure. However it can catch on fire if mixes with pressurized air and exposed to a strong source of ignition.

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

HANDLING AND STORAGE	
Manipulations	Open carefully in order to allow the release of any internal pressure. Keep and use away from heat sources, sparks, naked flames or other ignition sources. Pressurised container. Protect from sun rays and do not expose to temperatures higher than 50°C. Do not puncture or burn after use. Foresee adequate ventilation. Wash thoroughly after handling the product.
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 practice regarding industrial hygiene and safety.

ECOLOGICAL INFORMATION	
Substance	FORANE 32
In the water	Not easily biodegradable: 5% after 28d (OCDE 107 guideline)
In the air	Degradation for OH radicals: t _{1/2} life= 1472d Potential for destroying the ozone layer: ODP (R-11) = 0 Potential greenhouse effect of the halogenated hydrocarbons: HGWP (R-11=1) = 0.13
Bioaccumulation	Practically not biaccumable: log Pow = 0.21 OCDE 107 guideline

INFORMATION REGARDING THE STANDARD	
EEC Directive	D.91/155/EEC modified by D. 93/112/EEC and D.2001/58/CE:
Safety card	Substances and dangerous preparations
Dangerous preparations	D.199/45/CE modified by D.2001/60/CE Not classified as dangerous

CONSIDERATIONS REGARDING DISPOSAL	
Disposal methods	Dispose of access and non-recyclable products via the use of authorized disposal company. Refer to manufacturer/seller information regarding collection/recycling.

PERSONAL PROTECTION	
Limits 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 (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)



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