AERMEC

air conditioning

R410A | scroll | axial | cooling heat | | GR3

CHILLERS AND AIR WATER HEAT PUMPS - TECHNICAL MANUAL

COOLER AIR | WATER

- INDOOR UNIT STANDARD EFFICIENT
- FOR OUTDOOR INSTALLATIONS
- STANDARD VERSIONS RUNNING LOWNOISE

NRL 280-700
standard

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

EUROVENT CERTIFIED PERFORMANCE www.eurovent-certification.com

CE

EN

5 1 7 2 7 0 5 _ 0 1

INRLTY.05_13_5172705_01

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

INDEX

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	

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

NAME **NRL**

TYPE **AIR/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 **CEI EN 61000-6-3**	Immunity and electromagnetic emissions for residential environments
CEI EN 61000-6-2 **CEI EN 61000-6-4**	Immunity and electromagnetic emissions for industrial environments
EN378	Refrigerating systems and heat pumps - Safety and environmental requirements
UNI EN 12735	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 Directive2004/108/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.

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**

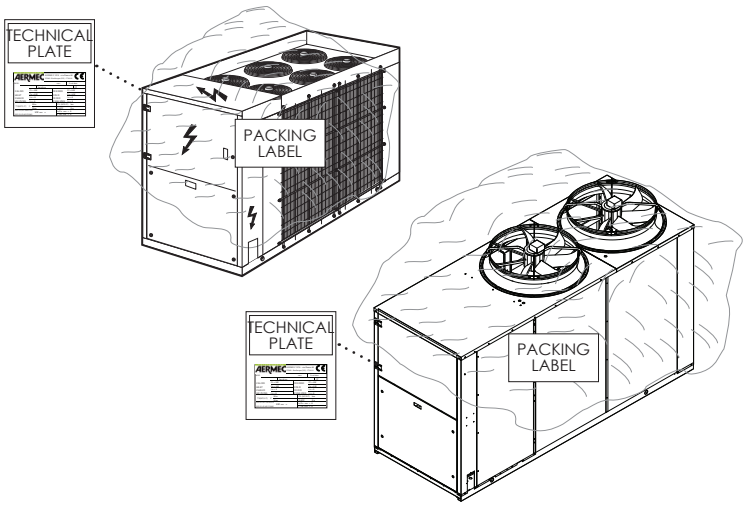
that reports the identification data of the product.

- **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. DESCRIPTION OF THE UNIT

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

Safety system:
Machine Directive
2006/42/EC

Low voltage directive
LVD 2006/95/EC

Electromagnetic compatibility directive
EMC 2004/108/EC

Pressure containers directive
PED 97/23/CE EN 378,
UNI EN 14276

Electrical part:
EN 60204-1

Protection rating
IP24

Acoustic part:
SOUND POWER
(EN ISO 9614-2)
SOUND PRESSURE
(EN ISO 3744)

Certifications:
Eurovent

Refrigerant GAS:
This unit contains fluorinated greenhouse gases covered by the Kyoto Protocol. Maintenance and disposal operations must be only carried out by qualified staff.
R410A GWP=1900

- The 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" (◦ - L)** maximum external temperature accepted **42°C**;
- temperature water product **18°C;**
- **"HEAT PUMP" (H - HL)** in cooling mode the operational limits reach a maximum external air temperature of **42°C;**
- temperature water product **18°C;**
- in heating mode the operational limits reach a maximum external air temperature of **42°C;**
- temperature water product **50°C;**
- **NRLH does not envision the following configurations:**
- YH (with water produced lower than 4 °C)
- HC (motorcondencing heat pump)

4.2. VERSIONS AVAILABLE

- **RECUPERATORI DI CALORE:**
  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 (motorcondencing heat pump)
- TC (motorcondensing with total recovery)
- DC motorcondensing with storage tank.

Mechanical thermostatic valve
- 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	16,17
NRL	028	°	°	°	°	°	°	°	°	00

Campo

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

4, 5, 6, 7 **Size** 0280 - 0300 - 0330 - 0350 - 0500 - 0550 - 0600 - 0650 - 0700

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

9 **Model**
- **°** Cooling Only
- **C** Motorcondensing
- **H** Heat Pump

10 **Heat recovery**
- **°** Without recuperators
- **D** Desuperheater
- **T** Total recovery

11 **Version**
- **°** Standard Cooling Only
- **L** Compact silenced

12 **Coils**
- **°** In aluminium
- **R** In copper
- **S** Tinned copper
- **V** Painted

13 **Fans**
- **°** Standard
- **M** Larger

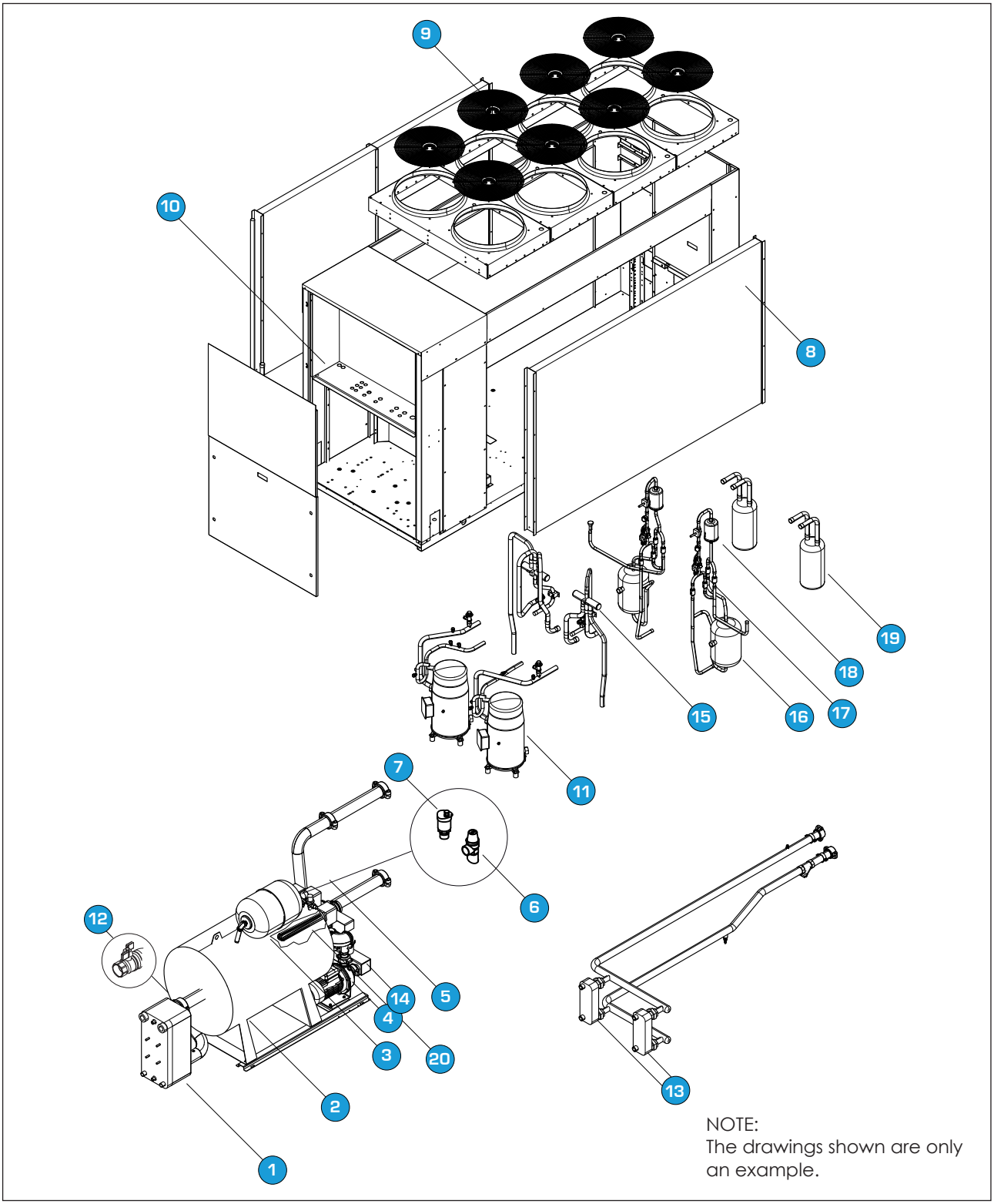
14 **Power supply**
- **°** 400V-3N-50Hz with magnet circuit breakers
- **1** 220V-3-50Hz with magnet circuit breakers

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

[1] Available only for 0280, 0300, 0330, 0600, 0650.

5. DESCRIPTION OF THE COMPONENTS

5.1. NRL 0280-0300-0330-0350

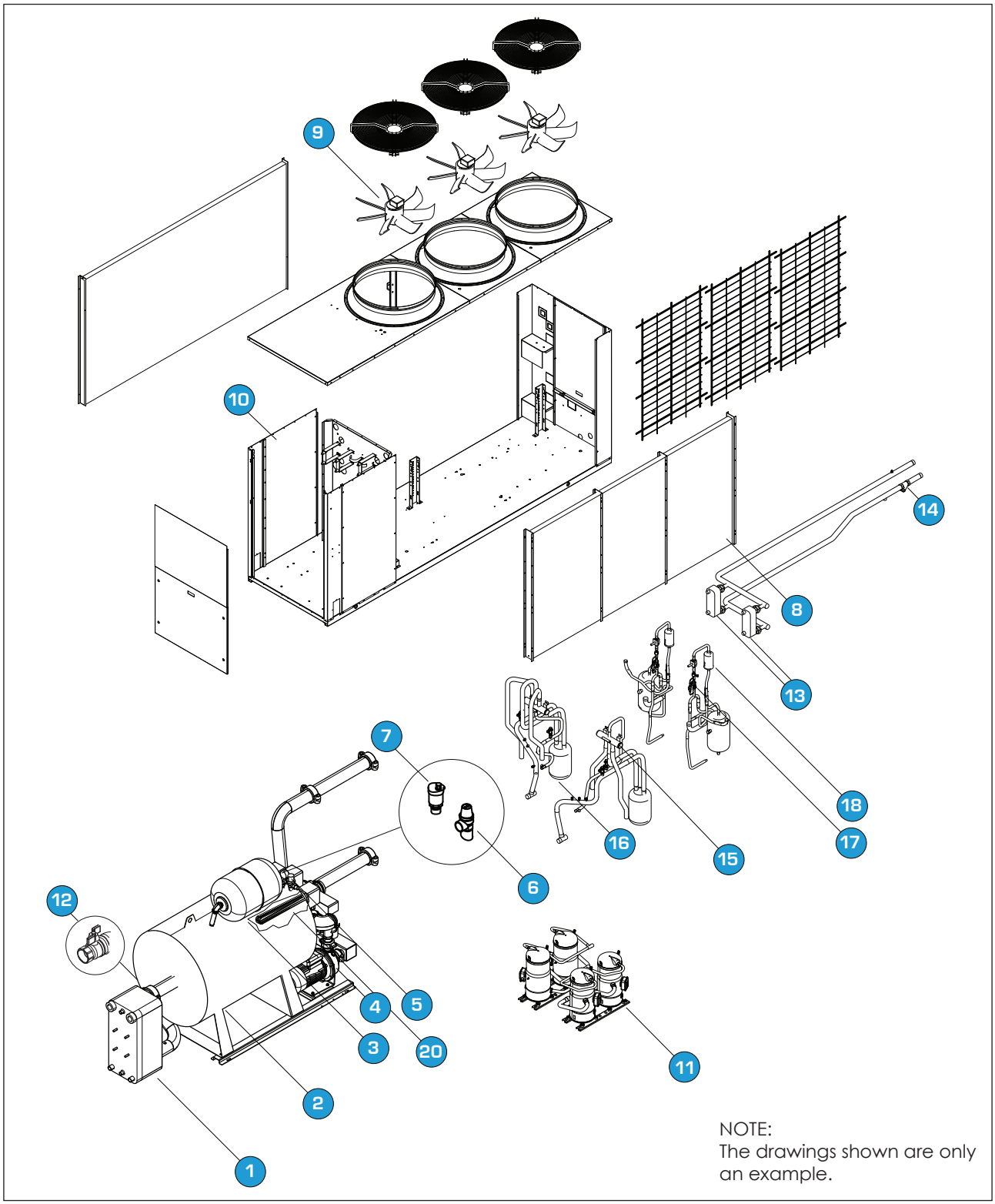


NOTE:
The drawings shown are only an example.

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:

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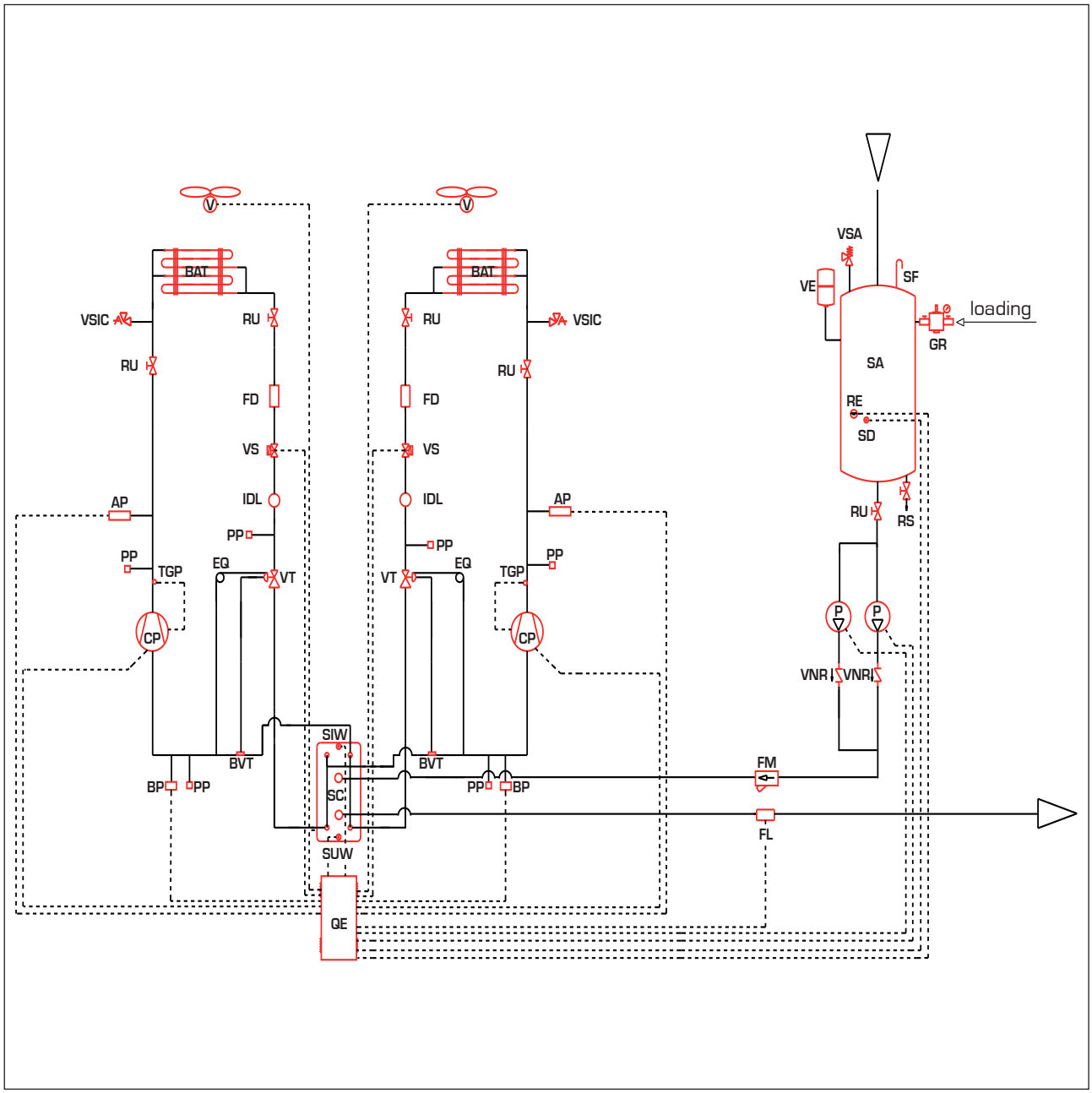
7	Vent valve	17	Thermostatic valves
8	Coil	18	Dehydrator filter
9	Fans	19	Liquid separator
10	Electric Control Board	20	Electric resistance

5.3. COOLING CIRCUITS, HYDRAULIC (° - L)



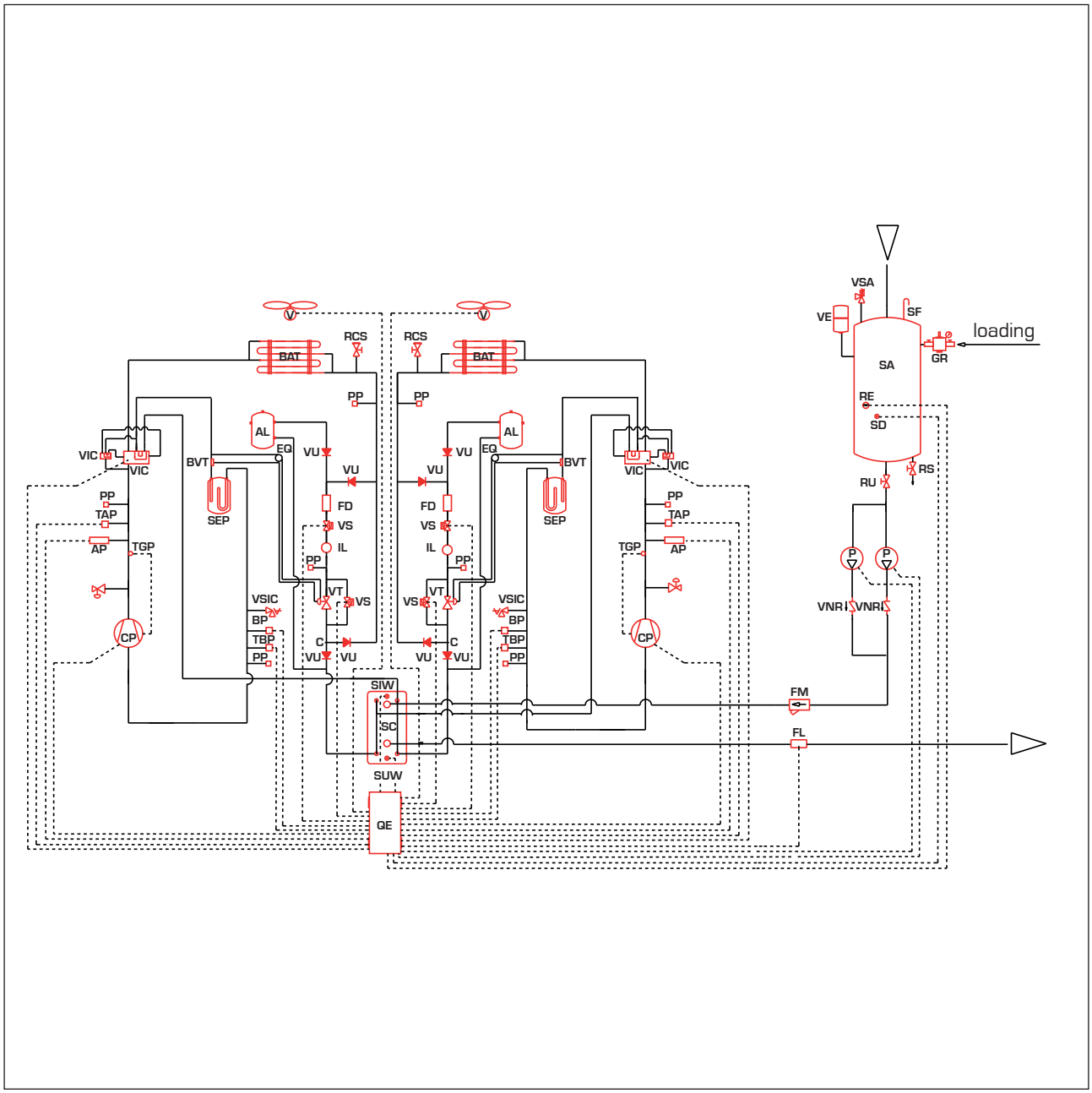
QE	Electric Control Board
FM	Water filter
VE	Expansion vessel
- - -	Electric cable
VaS	Ball valve
VSA	Water safety valve
TGP	Pressing line gas circuit breaker
CP	Compressor
FL	Flow switch
SA	Water tank
SF	Venting

V	Fan
BAT	Coil
RU	Cock
FD	Dehydrator filter
VT	Thermostatic valve
SC	Heat exchanger
PP	Pressure point
TAP	High pressure transducer
RU	Cock
BP	Low pressure switch
RS	Drain cock

SD	Anti-freeze probe
RE	300W electric resistance
VNR	Non-return valve
P	Pump
GR	Filling unit
RU	Cock
SD	Anti-freeze probe
RE	Electric resistance
VNR	Non-return valve
P	Pump
GR	Filling unit

VS	Solenoid valve
IDL	Liquid indicator
EQ	Equaliser
BVT	Temperature control valve bulb
SIW	Inlet water temperature probe
SUW	Outlet water temperature probe
AP	High pressure pressure switch

5.4. COOLING CIRCUITS, HYDRAULIC (H - HL)



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
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.

Electronic valve (optional)

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 variation 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 (L)
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 (L)
- Heat pump (HL)
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 (L) "accessory"
- Heat pump (HL) "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 transducer (TP3)
- Cooling only (L) "accessory"
- Heat pump (HL) "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 (only for heat pump)

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.
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;
  outlet water temperature Storage tank 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 the connection of the unit with BMS supervision systems with RS 485 electrical standard and MODBUS protocol.								
°	-	-	-	-	•	•	•	•	•
L	•	•	•	•	•	•	•	•	•
H	-	-	-	-	•	•	•	•	•
HL	•	•	•	•	•	•	•	•	•
VT (00-P1-P2-P3-P4)	Rubber or spring anti-vibration mounts. Select the model using the compatibility table.								
°	-	-	-	-	13	13	13	13	13
L	17	17	17	17					
H	-	-	-	-					
HL	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.								
°	-	-	-	-	10	10	10	10	10
L	13	13	13	13					
H	-	-	-	-					
HL	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.								
°	-	-	-	-	2(x2)	2(x2)	2(x2)	2(x2)	2(x2)
L	3	3	3	3					
H	-	-	-	-					
HL	3	3	3	3					
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.								
°	-	-	-	-	•	•	•	•	•
L	•	•	•	•	•	•	•	•	•
H	-	-	-	-	•	•	•	•	•
HL	•	•	•	•	•	•	•	•	•

	0280	0300	0330	0350	0500	0550	0600	0650	0700
AERWEB30	The AERWEB device allows theremote control of a chiller from a common PCby means of a serial connection. By using addi-tional modules the device allows control of thechiller by telephone network, using the AER-MODEM; accessory or GSM network, usingthe AERMODEMGSM. The AERWEB can pilotup to 9 chillers, each of which must be equip-ped with the AER485 or AER485P2 accessory.								
°	-	-	-	-	•	•	•	•	•
L	•	•	•	•	•	•	•	•	•
H	-	-	-	-	•	•	•	•	•
HL	•	•	•	•	•	•	•	•	•
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.								
°	-	-	-	-	(x2)	(x2)	(x2)	(x2)	(x2)
L	(x2)	(x2)	(x2)	(x2)					
H	-	-	-	-	as per standard	as per standard	as per standard	as per standard	as per standard
HL	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.								
°	-	-	-	-	as per standard	as per standard	as per standard	as per standard	as per standard
L	(x2)	(x2)	(x2)	(x2)					
H	-	-	-	-					
HL	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).								
°	-	-	-	-	52	52	53	53	53
L	50	50	50	51					
H	-	-	-	-					
HL	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).								
°	-	-	-	-	501	551	601	651	701
L	281	301	331	351					
H	-	-	-	-					
HL	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.								
°	-	-	-	-	64	64	64	64	64
L	56	56	56	56	as per standard	as per standard	as per standard	as per standard	as per standard
H	-	-	-	-	64	64	64	64	64
HL	58	58	58	58	as per standard	as per standard	as per standard	as per standard	as per standard
DCPX	DCPX only for configurations with larger fans (M).								
°	-	-	-	-	64	64	64	64	64
L	60	60	60	61	as per standard	as per standard	as per standard	as per standard	as per standard
H	-	-	-	-	DCPX - not necessary, fans already control their speed				
HL	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.								
°	-	-	-	-	•	•	•	•	•
L	•	•	•	•	•	•	•	•	•
H	-	-	-	-	•	•	•	•	•
HL	•	•	•	•	•	•	•	•	•
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.								
°	-	-	-	-	•	•	•	•	•
L	•	•	•	•	•	•	•	•	•
H	-	-	-	-	•	•	•	•	•
HL	•	•	•	•	•	•	•	•	•
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.								
°	•	•	•	•	•	•	•	•	•
L	•	•	•	•	•	•	•	•	•
H	•	•	•	•	•	•	•	•	•
HL	•	•	•	•	•	•	•	•	•
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.								
°	•	•	•	•	•	•	•	•	•
L	•	•	•	•	•	•	•	•	•
H	•	•	•	•	•	•	•	•	•
HL	•	•	•	•	•	•	•	•	•

7. TECHNICAL DATA

7.1. TECHNICAL DATA FOR VERSIONS (° - L)

COOLING			0280	0300	0330	0350	0500	0550	0600	0650	0700
Cooling capacity	kW	°	-	-	-	-	97	103	126	137	156
		L	53	63	68	81	87	93	113	127	144
Total input power	kW	°	-	-	-	-	34,8	38,2	45,9	53,9	60,0
		L	20,3	22,6	26,1	28,4	38,5	42,5	50,9	57,6	64,8
Water flow rate	l/h	°	-	-	-	-	16680	17720	21670	23560	26830
		L	9120	10840	11700	13930	14960	16000	19440	21840	24770
Total pressure drops	kPa	°	-	-	-	-	53	59	64	61	74
		L	51	46	54	55	43	48	51	52	63
ENERGETIC INDEX											
EER	W/W	°	-	-	-	-	2,79	2,70	2,75	2,54	2,60
		L	2,61	2,79	2,61	2,85	2,26	2,19	2,22	2,20	2,22
ESEER	W/W	°	-	-	-	-	3,43	3,32	3,87	3,58	3,67
		L	3,16	3,37	3,15	3,45	3,40	3,30	3,83	3,56	3,65
ELECTRICAL DATA											
Power supply	A	°	400V-3N-50Hz								
		L									
Absorbed current	A	°	-	-	-	-	63	67	81	88	100
		L	36	40	44	51	70	75	90	99	111
Maximum current	A	°	-	-	-	-	76	81	100	112	122
		L	46	53	58	63					
Peak current	A	°	-	-	-	-	214	220	232	243	261
		L	155	184	190	200					
COMPRESSORS (SCROLL)											
Number/circuit	n°/n°	°	-	-	-	-	3/2	3/2	4/2	4/2	4/2
		L	2/2	2/2	2/2	2/2					
FANS (AXIAL)											
Quantity	n°	°	-	-	-	-	2	2	2	2	2
		L	4	4	4	6					
Air flow rate	m³/h	°	-	-	-	-	34600	34600	34600	34600	33600
		L	14200	14200	14200	20200	28400	28700	27700	29400	28600
Input power	kW	°	-	-	-	-	2,5	2,5	2,5	2,5	2,5
		L	0,6	0,6	0,6	0,9					
Absorbed current	A	°	-	-	-	-	5,6	5,6	5,6	5,6	5,6
		L	2,6	2,6	2,6	3,9					
Useful static pressures [1] "M"		°	-	-	-	-	50	50	50	50	50
		L	50	50	50	50					
EVAPORATORS (PLATE)											
Quantity	n°	°	-	-	-	-	1	1	1	1	1
		L	1	1	1	1	1	1	1	1	1
HYDRAULIC CONNECTIONS											
Hydraulic circuit connections* (IN/OUT)	Ø	°	-	-	-	-	2"1/2	2"1/2	2"1/2	2"1/2	2"1/2
		L	2"1/2	2"1/2	2"1/2	2"1/2					
HYDRAULIC CIRCUIT											
Storage tank capacity	l	°	-	-	-	-	500	500	500	500	500
		L	300	300	300	300					
Storage tank anti-freeze resistance	W	°	-	-	-	-	300	300	300	300	300
		L	300	300	300	300					
LOW STATIC PRESSURE CIRCULATION PUMP											
Input power	KW	°	-	-	-	-	1,5	1,5	1,5	1,5	1,85
		L	1,1	1,1	1,1	1,1					
Absorbed current	A	°	-	-	-	-	3,6	3,6	3,6	3,6	5,0
		L	2,7	2,7	2,7	2,7					
Useful static pressures	KPa	°	-	-	-	-	123	111	91	83	91
		L	104	106	96	89	141	130	117	103	117

*** 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	°	-	-	-	-	1,85	1,85	3,0	3,0	3,0
		L	1,5	1,5	1,5	1,5					
Absorbed current	A	°	-	-	-	-	5,0	5,0	5,7	5,7	5,7
		L	3,6	3,6	3,6	3,6					
Useful static pressures	KPa	°	-	-	-	-	161	150	184	178	134
		L	143	144	135	129	179	168	210	198	162
SOUND DATA											
Sound power (1)	dBA	°	-	-	-	-	82	82	82	83	83
		L	73	73	74	75	77	77	77	78	78
Sound Pressure (2)	dBA	°	-	-	-	-	50	50	50	51	51
		L	41	41	42	43	45	45	45	46	46
DIMENSIONS											
Height	mm	°	-	-	-	-	1875	1875	1875	1875	1875
		L	1606	1606	1606	1606					
Width	mm	°	-	-	-	-	1100	1100	1100	1100	1100
		L	1100	1100	1100	1100					
Depth	mm	°	-	-	-	-	3010	3010	3010	3010	3010
		L	2450	2450	2450	2450	3010	3010	3010	3010	3010
Empty weight	Kg	°	-	-	-	-	868	872	968	983	1091
		L	675	684	688	704					

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(H - HL)

COOLING			280	300	330	350	500	550	600	650	700
Cooling capacity	kW	H	-	-	-	-	90	95	115	134	145
		HL	51	61	66	73	83	90	110	124	140
Total input power	kW	H	-	-	-	-	36,4	40,5	49,1	53,3	62,9
		HL	20,1	22,5	26,2	31,0	39,7	42,9	51,8	58,3	65,6
Water flow rate	l/h	H	-	-	-	-	15480	16340	19780	23050	24940
		HL	8770	10490	11350	12560	14280	15480	18920	21330	24080
Total pressure drops	kPa	H	-	-	-	-	46	50	53	58	64
		HL	47	43	51	45	39	45	49	50	60

HEATING											
Heating capacity	kW	H	-	-	-	-	99	106	129	150	165
		HL	58	68	75	82					
Total input power	kW	H	-	-	-	-	33,2	36,0	43,1	48,0	55,1
		HL	18,6	21,3	24,3	27,8					
Water flow rate	l/h	H	-	-	-	-	17030	18230	22190	25800	28380
		HL	9980	11700	12900	14100					
Total pressure drops	kPa	H	-	-	-	-	55	62	67	73	83
		HL	61,1	53,6	65,6	56,4					

ENERGETIC INDEX											
EER	W/W	H	-	-	-	-	2,47	2,35	2,34	2,51	2,31
		HL	2,54	2,71	2,52	2,35	2,09	2,10	2,12	2,13	2,13
ESEER	W/W	H	-	-	-	-	3,43	3,32	3,87	3,58	3,67
		HL	3,16	3,37	3,15	3,45	3,40	3,30	3,83	3,56	3,65
COP	W/W	H	-	-	-	-	2,98	2,94	2,99	3,13	2,99
		HL	3,12	3,19	3,09	2,95					

ELECTRICAL DATA											
Power supply	A	H	400V-3N-50Hz								
		HL									
Absorbed current	A	H	-	-	-	-	66/60	71/63	87/76	92/82	108/95
		HL	36 /33	40 /38	44 / 41	56 /50	72/ 60	75/ 63	91/ 76	100/ 82	113/ 95
Maximum current	A	H	-	-	-	-	76	81	100	112	122
		HL	46	53	58	63					
Peak current	A	H	-	-	-	-	214	220	232	243	261
		HL	155	184	190	200					

COMPRESSORS (SCROLL)											
Number/circuit	n°/n°	H	-	-	-	-	3/2	3/2	4/2	4/2	4/2
		HL	2/2	2/2	2/2	2/2					

FANS (AXIAL)											
Quantity	n°	H	-	-	-	-	2	2	2	2	2
		HL	4	6	6	6					
Air flow rate	m³/h	H	-	-	-	-	39400	39400	39400	37500	37500
		HL	14000	20000	20000	20000	28400	28700	28700	27400	28100
Input power	kW	H	-	-	-	-	3,5	3,5	3,5	3,5	3,5
		HL	0,6	0,9	0,9	0,9					
Absorbed current	A	H	-	-	-	-	7,5	7,5	7,5	7,5	7,5
		HL	2,6	3,9	3,9	3,9					
Useful static pressures [1] "M"	Pa	H	-	-	-	-	70*	70*	70*	70*	70*
		HL	50	50	50	50					

EVAPORATORS (PLATE)											
Quantity	n°	H	-	-	-	-	1	1	1	1	1
		HL	1	1	1	1					

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

HYDRAULIC CIRCUIT											
Storage tank capacity	l	H	-	-	-	-	500	500	500	500	500
		HL	300	300	300	300					
Storage tank anti-freeze resistance	W	H	-	-	-	-	300	300	300	300	300
		HL	300	300	300	300					

LOW STATIC PRESSURE CIRCULATION PUMP											
Input power	KW	H	-	-	-	-	1,5	1,5	1,5	1,5	1,85
		HL	1,1	1,1	1,1	1,1					
Absorbed current	A	H	-	-	-	-	3,6	3,6	3,6	3,6	5,0
		HL	2,7	2,7	2,7	2,7					
Useful static pressures	KPa	H	-	-	-	-	136	127	113	89	115
		HL	108	110	100	95	148	136	123	109	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 fort his version as the fans are already equipped with the fan speed regulation.

			280	300	330	350	500	550	600	650	700
HIGH STATIC PRESSURE CIRCULATION PUMP											
Input power	KW	H	-	-	-	-	1,85	1,85	3,0	3,0	3,0
		HL	1,5	1,5	1,5	1,5					
Absorbed current	A	H	-	-	-	-	5,0	5,0	5,7	5,7	5,7
		HL	3,6	3,6	3,6	3,6					
Useful static pressures	KPa	H	-	-	-	-	174	165	206	184	160
		HL	152	153	153	144	185	174	216	204	171
SOUND DATA											
Sound power (1)	dBA	H	-	-	-	-	82	82	82	83	83
		HL	73	74	74	75	77	77	77	78	78
Sound Pressure (2)	dBA	H	-	-	-	-	50	50	50	51	51
		HL	41	42	42	43	45	45	45	46	46
DIMENSIONS											
Height	mm	H	-	-	-	-	1875				
		HL	1606	1606	1606	1606					
Width	mm	H	-	-	-	-	1100				
		HL	1100	1100	1100	1100					
Depth	mm	H	-	-	-	-	3010				
		HL	2450	2450	2450	2450					
Empty weight	Kg	H	-	-	-	-	913	917	1016	1130	1142
		HL	713	724	731	740					

REFERENCE NOMINAL CONDITIONS

IN COOLING MODE

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

IN HEAT MODE

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

7.3. TECHNICAL DATA FOR VERSIONS (C)

			280	300	330	350	500	550	600	650	700
COOLING											
Cooling capacity	KW	°	-	-	-	-	100	106	130	141	161
		L	55	65	70	83	90	96	116	131	148
Total input power	KW	°	-	-	-	-	35,1	38,5	46,3	54,4	60,5
		L	20,5	22,8	26,3	28,7	38,8	42,9	51,4	58,1	65,4
ENERGETIC INDEX											
EER	W	°	-	-	-	-	2,85	2,75	2,80	2,59	2,65
		L	2,67	2,85	2,66	2,91	2,31	2,23	2,27	2,25	2,27
DATI ELETTRICI RAFFREDDAMENTO											
Power supply	A	°	400V-3N-50Hz								
		L									
Cooling absorbed current	A	°	-	-	-	-	63,6	67,6	81,7	88,8	100,9
		L	36,3	40,4	44,4	51,5	60,8	75,2	90,7	99,9	112,0
Maximum current (FLA)	A	°	-	-	-	-	76	81	100	112	122
		L	46	53	58	63					
Peak current (LRA)	A	°	-	-	-	-	214	220	232	243	261
		L	155	184	190	200					
FANS (AXIAL)											
Quantity	n°	°	-	-	-	-	2	2	2	2	2
		L	4	4	4	6					
SOUND DATA											
Sound power (1)	dBA	°	-	-	-	-	82	82	82	83	83
		L	73	73	74	75	77	77	77	78	78
Sound Pressure (2)	dBA	°	-	-	-	-	50	50	50	51	51
		L	41	41	42	43	45	45	45	46	46
DIMENSIONS											
Height	mm	°	-	-	-	-	1875	1875	1875	1875	1875
		L	1606	1606	1606	1606					
Width	mm	°	-	-	-	-	1100	1100	1100	1100	1100
		L	1100	1100	1100	1100					
Depth	mm	°	-	-	-	-	3010	3010	3010	3010	3010
		L	2450	2450	2450	2450					
Empty weight	Kg	°	-	-	-	-	837	841	931	939	1047
		L	655	660	664	677					

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.

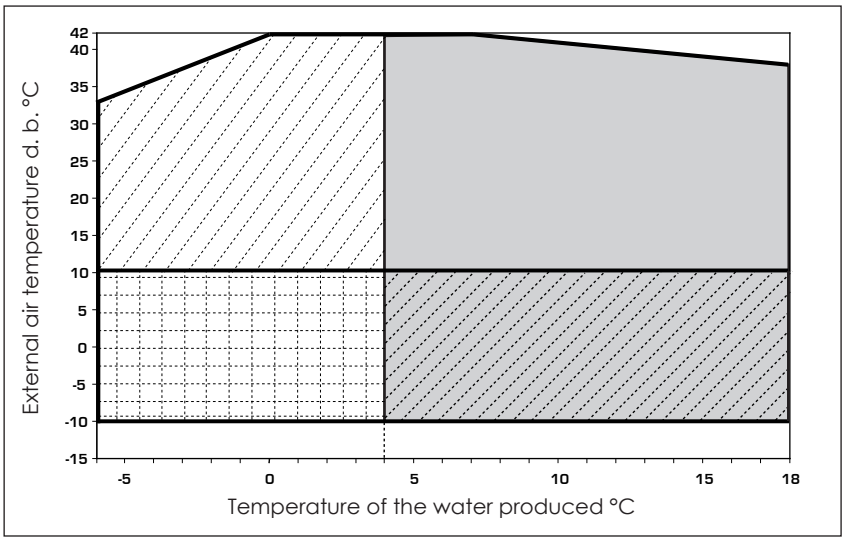
(2) SOUND PRESSURE
Sound pressure measured in free field conditions with reflective surface (directivity factor Q=2) at 10mt distance from external surface of unit, in compliance with ISO 3744 regulations.

8. OPERATIONAL LIMITS

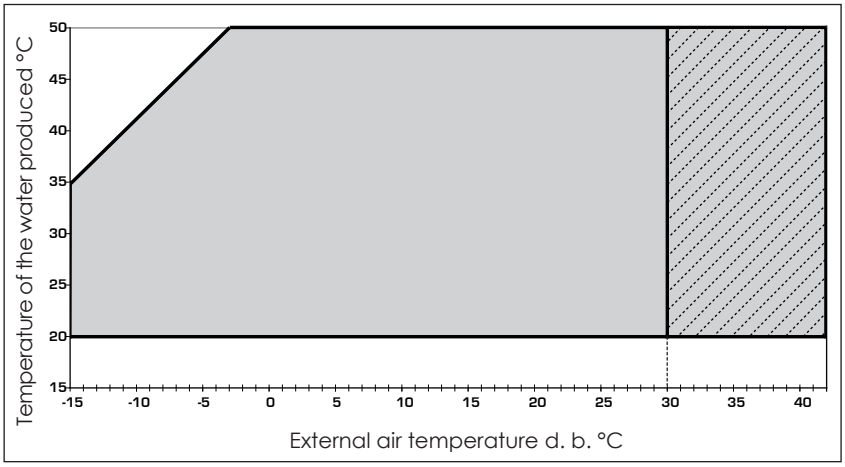
8.1. COOLING MODE FUNCTIONING

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 Δt = 5°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

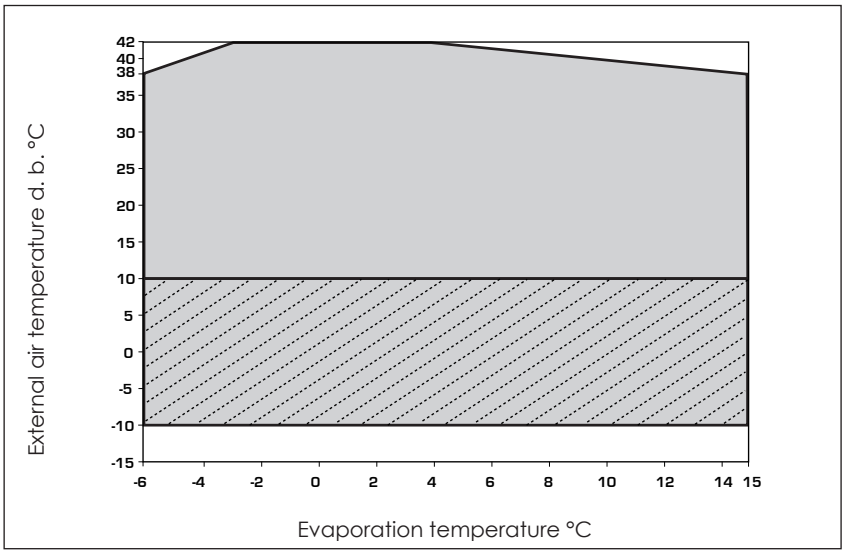


NOTE: As for the versions with buffer tank (09-10) the operating limits in cooling and heating mode are 3°C lower

KEY:

- Functioning with glycol
- Functioning with glycol with DCPX accessory
- Standard functioning
- Standard functioning with DCPX accessory

8.3. MOTORCONDENSING FUNCTIONING



ATTENTION
Contact our technical sales department if the unit needs to operated outside the operating limits.

ATTENTION
If the unit is installed in particularly windy areas, we recommend providing for windbreak to avoid malfunctioning of the unit device.

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 co-efficients (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.

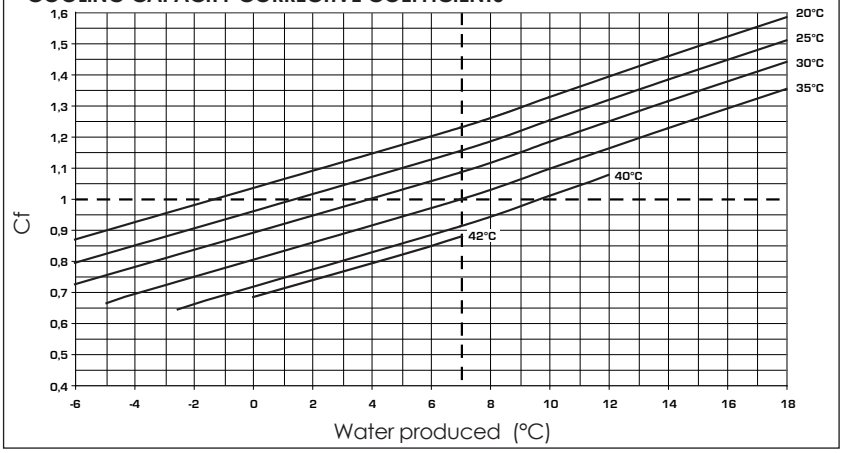
KEY:

Cf: Corrective co-efficient of the cooling capacity.

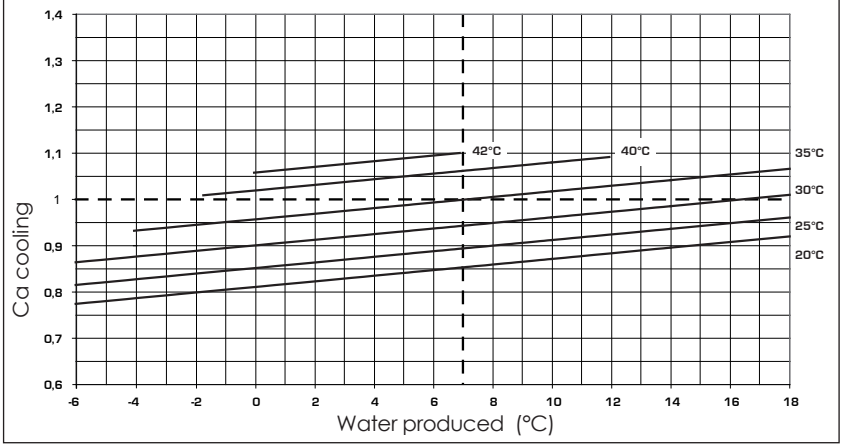
Ca: Corrective co-efficient of the input power.

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.**

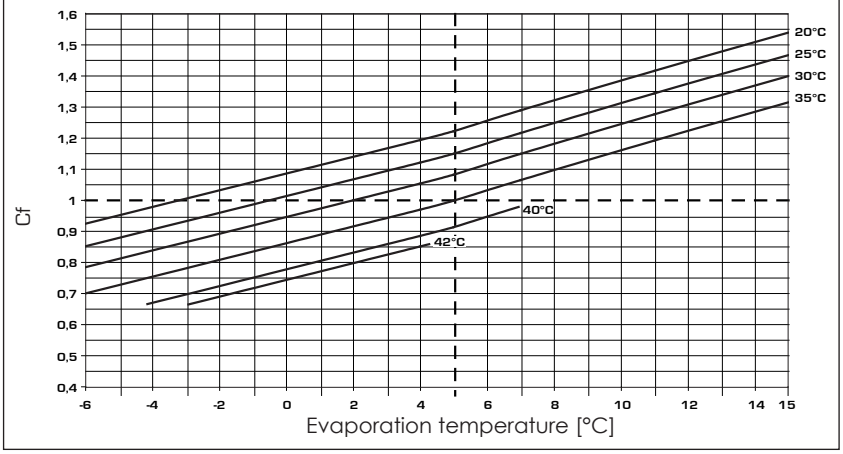
COOLING CAPACITY CORRECTIVE COEFFICIENTS



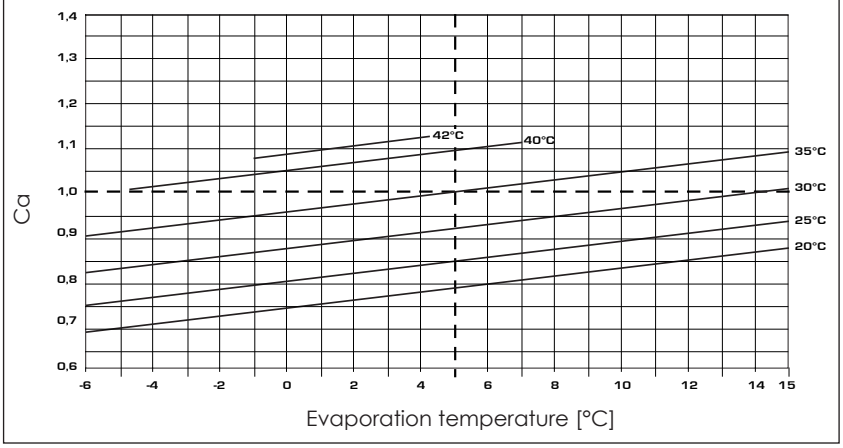
INPUT POWER IN COOLING MODE CORRECTIVE COEFFICIENTS



VERSION C COOLING CAPACITY CORRECTIVE COEFFICIENTS



VERSION C INPUT POWER CORRECTIVE COEFFICIENTS



9.2. HEATING CAPACITY AND INPUT POWER

– **"HEAT PUMP VERSIONS"**

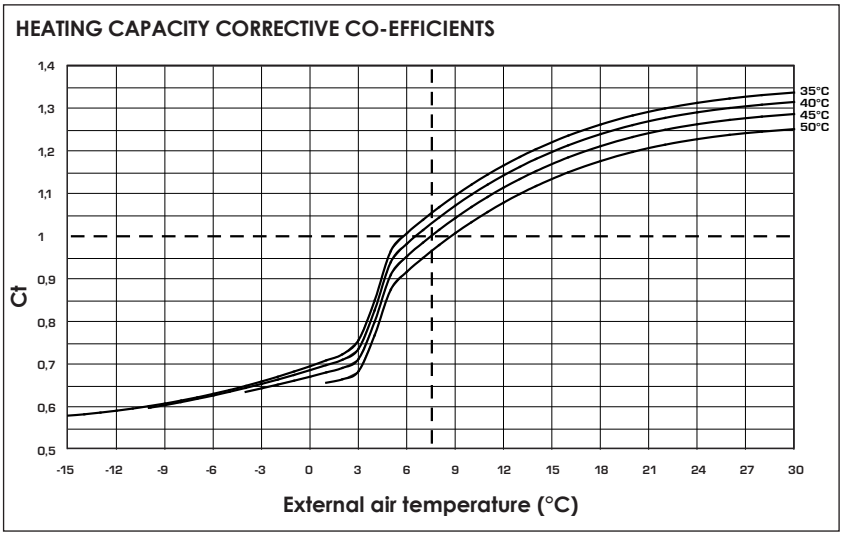
The heating capacity efficiency and electrical input power in conditions differing from normal conditions are obtained by multiplying the nominal values (Pt, Pa) by the respective co-efficient correctives (Ct, Ca).
The following diagram shows how to obtain corrective coefficients; the produced hot water 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.

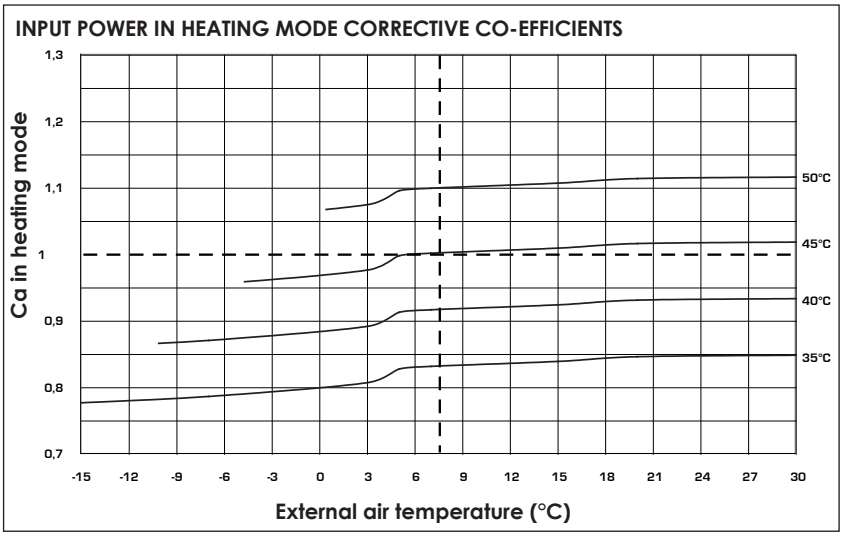
The yields are intended net of de-frosting cycles.

KEY:

Ct: Corrective co-efficient of the heating capacity.

Ca: Corrective co-efficient of the Input power.





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.

9.3.1. 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. 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.

9.4.1. Deposit factors

	$[K*m^2]/[W]$	0,00005	0,0001	0,0002
Cooling capacity correction factors		1	0,98	094
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.

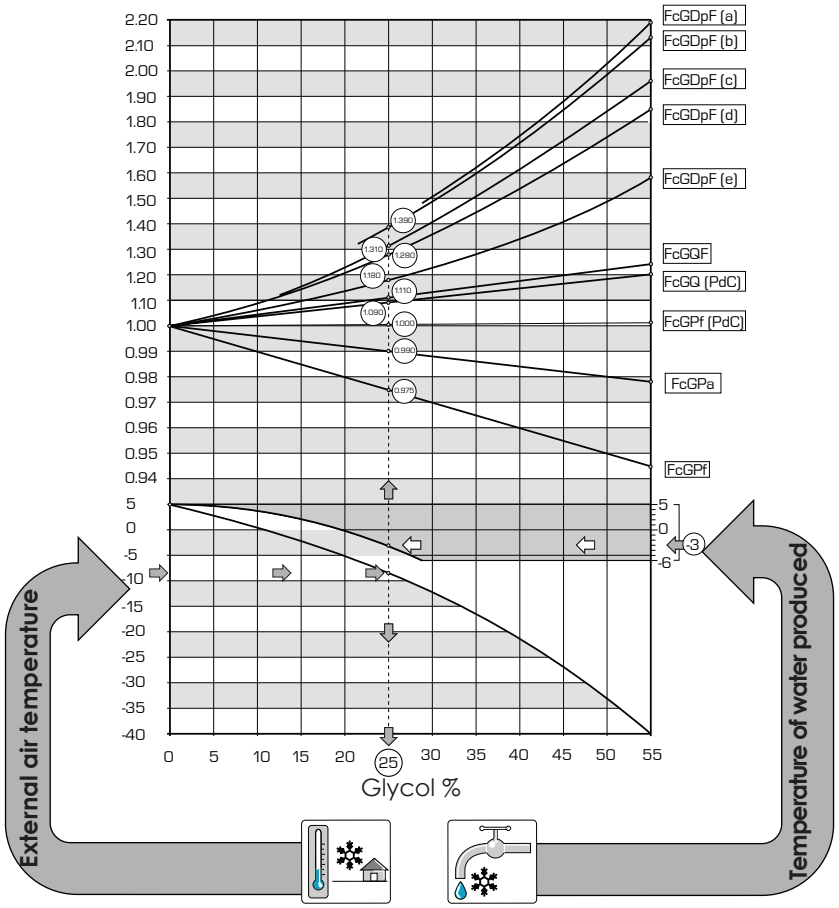
Using the diagram below it is possible to determine the percentage of glycol required; this percentage can be calculated by taking one of the following factors into consideration:

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 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.



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)

FcGQF 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.

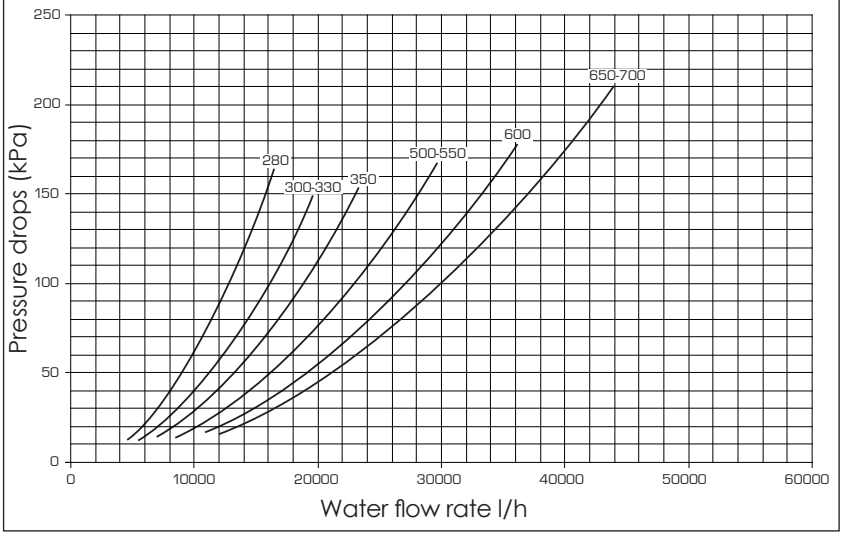
11. PRESSURE DROPS

11.1. TOTAL PRESSURE DROPS

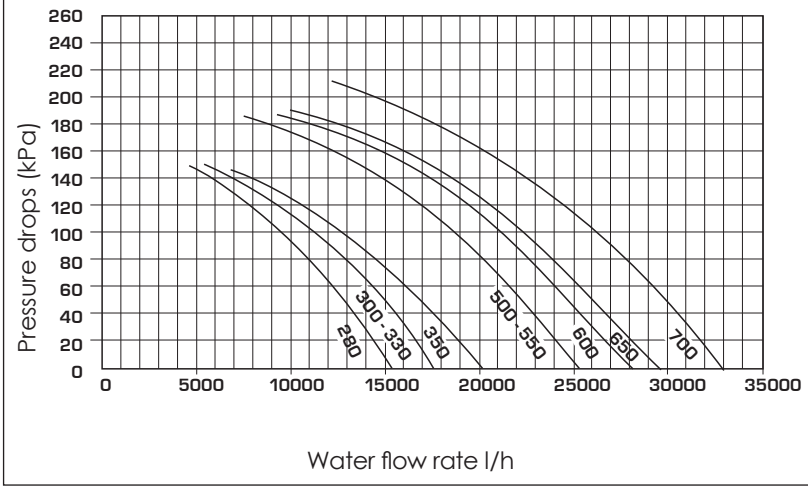
Standard cooling only NRL (∘ - L) and standard heat pump (H - HL).

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

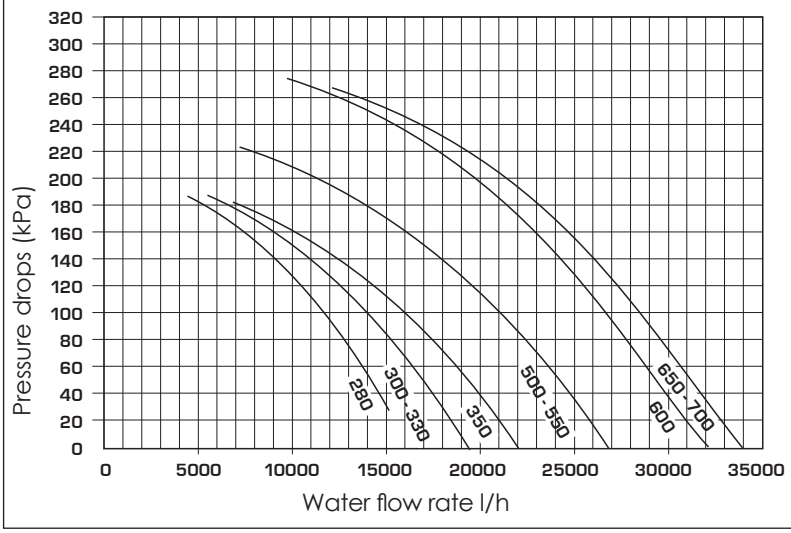
TOTAL PRESSURE DROPS (∘ - L)



USEFUL STATIC PRESSURE LOW STATIC PRESSURE (∘ - L - H - HL)



USEFUL STATIC PRESSURE HIGH STATIC PRESSURE (∘ - L - H - HL)



Average water temperature	5	10	15	20	30	40	50
Correction factor	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, whist 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 glycoled 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.

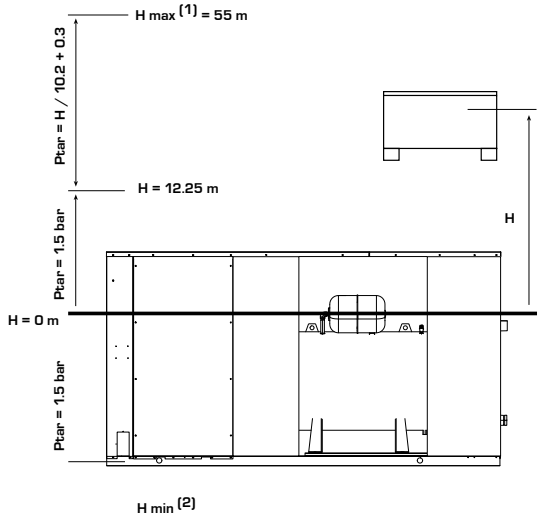
12.2.

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.

Glycoled 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.



KEY
(1) Check that highest installation does not exceed a height difference of 55 metres.
(2) Ensure that lowest installation can withstand global pressure in that position.

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.
	Regolation on the temperature outlet water.
	project Δt less than 5°C.

13. CAPACITY CONTROL

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

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

(**) Heating capacity %	Levels of power			
Versions	**1°**	**2°**	**3°**	**4°**
NRL0280	50	100	-	-
NRL0300	50	100	-	-
NRL0330	50	100	-	-
NRL0350	50	100	-	-
NRL0500	35	70	100	-
NRL0550	31	63	100	-
NRL0600	23	48	73	100
NRL0650	23	48	73	100
NRL0700	23	48	73	100

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

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

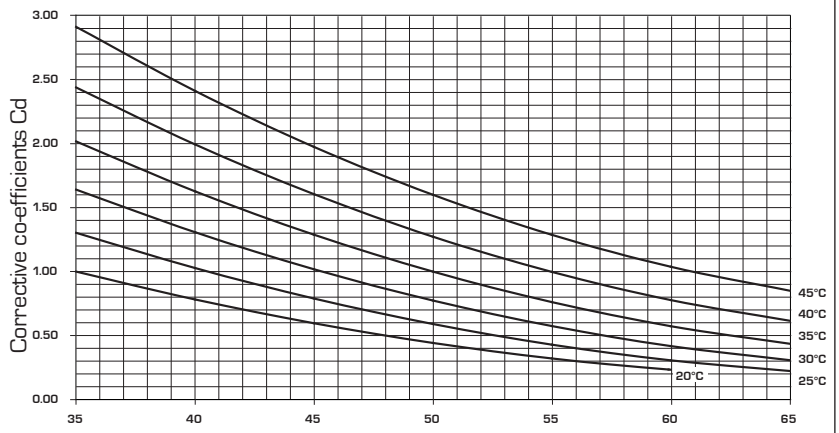
The performance levels refer to the following conditions:
(**) processed water temperature = 50°C;
(**) outside air temperature = 7°C B.S./ 6°C B.U.

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 co-efficient (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..

DESUPERHEATER CORRECTIVE CO-EFFICIENTS



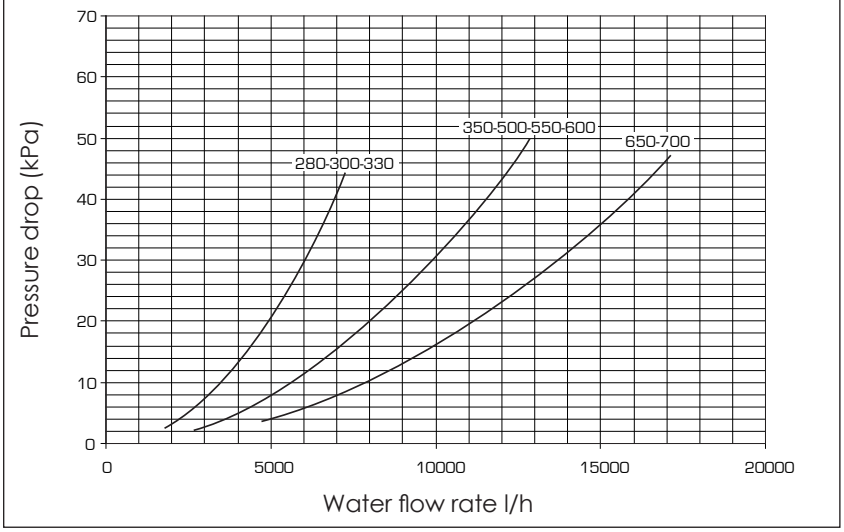
14.1. PRESSURE DROPS

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

DESUPERHEATER PRESSURE DROPS



Units with Desuperheater (D) do not envision the following versions:
- YD
- XD (only for temperature under 4°C)

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

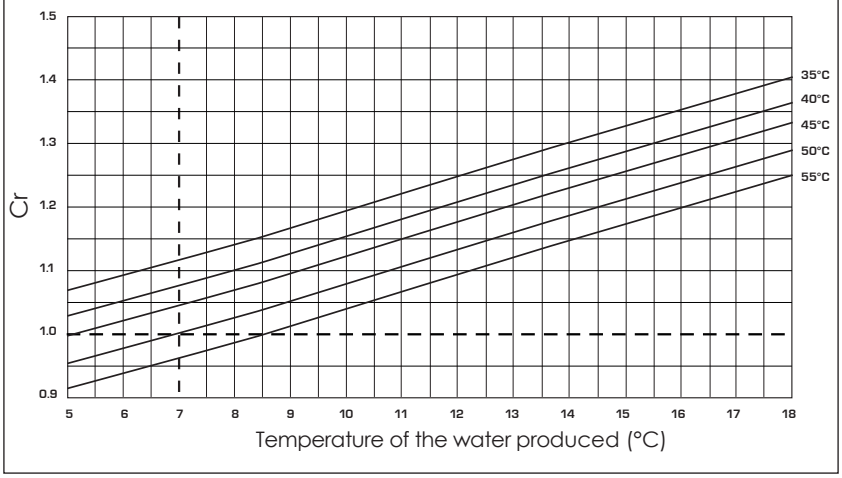
15. TOTAL RECOVERY

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).

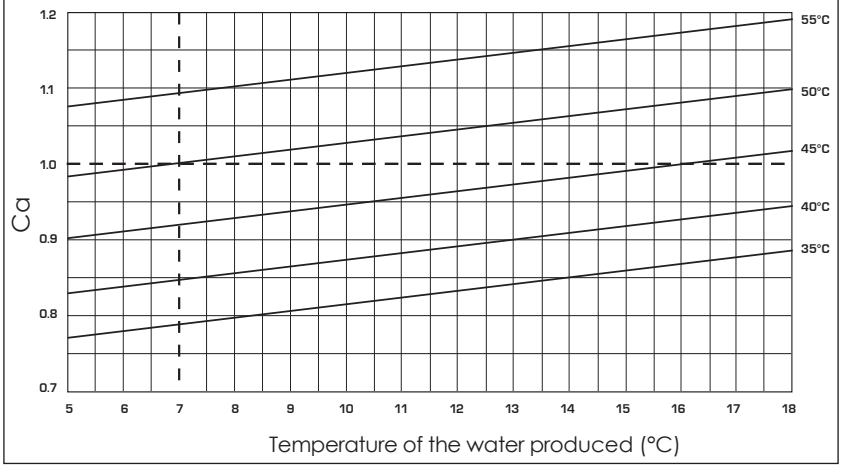
Nominal value referring to:
−Air temperature
35°C
−Water at the desuperheater
50°C
−Δt 5°C

Units with Total Recovery (T) do not envision the following versions:
- YT
- XT (only for temperature under 4°C)

RECOVERED HEATING CAPACITY CORRECTIVE CO-EFFICIENTS



INPUT POWER WITH RECOVERY CORRECTIVE CO-EFFICIENTS



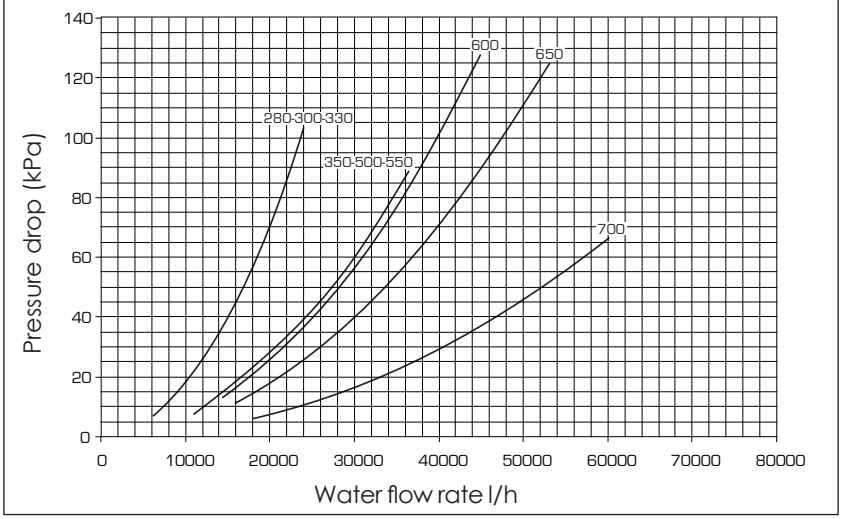
15.1. NRL (T)		0280	0300	0330	0350	0500	0550	0600	0650	0700
Recovered heating capacity	kW	72	84	92	107	127	136	167	185	210
Total input power	kW	19,7	22,0	25,5	27,5	31,8	35,2	42,9	50,9	57,0
Recovery water flow rate	l/h	12340	14430	15860	18430	21880	23470	28680	31880	36150
Heat exchanger recovery pressure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

TOTAL RECOVERY PRESSURE DROPS



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

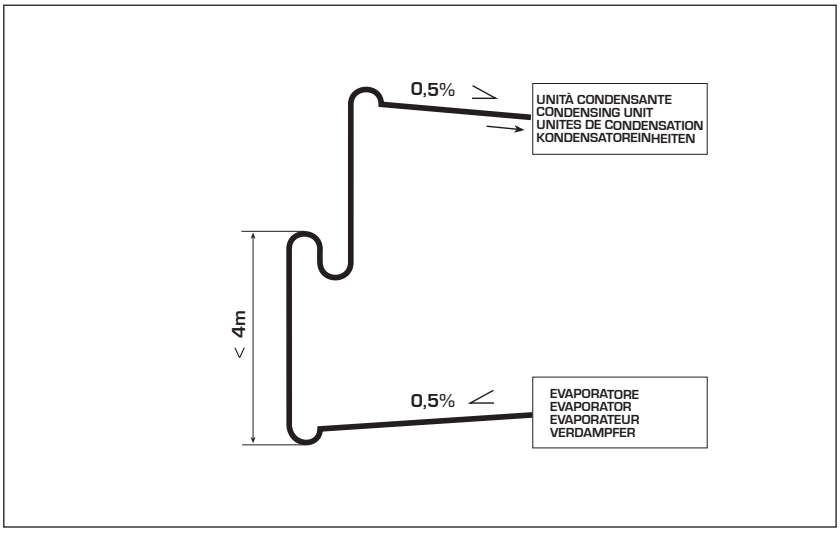
Average water temperature °C	30	40	50
Multiplicative co-efficients	1.04	1.02	1

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
NRL0280C	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
NRL0300C	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
NRL0330C	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
NRL0350C	0-10	28	28	18	18	280	280
	10-20	28	28	18	18	280	280
	20-30	35	35	18	18	310	310
NRL0500C	0-10	35	28	18	18	310	280
	10-20	35	28	18	18	310	280
	20-30	35	35	18	18	310	310
NRL0550C	0-10	35	28	18	18	310	280
	10-20	35	28	18	18	310	280
	20-30	42	35	18	18	350	310
NRL0600C	0-10	35	35	22	22	420	420
	10-20	35	35	22	22	420	420
	20-30	42	42	22	22	460	460
NRL0650C	0-10	35	35	22	22	420	420
	10-20	42	42	22	22	460	460
	20-30	42	42	22	22	460	460
NRL0700C	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 Aermec 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 Eurovent certification.

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

NOTE
The data refer to the version with standard fans

NRL	Total sound levels			Octave band [Hz]						
	Pow. dB(A)	Pressure.		125	250	500	1000	2000	4000	8000
		dB(A) 10 m	dB(A) 1 m	Sound potential for centre of band [dB] frequency (A)						
0280L	73	41	56	71,4	59,6	66,3	63,0	58,8	49,6	43,3
0300L	73	41	56	71,5	59,7	66,4	63,1	58,9	49,8	43,4
0330L	74	42	57	72,3	61,2	66,4	63,5	61,0	50,0	43,7
0350L	75	43	58	73,2	62,2	67,1	64,6	61,3	51,8	43,7
0280HL	73	41	56	71,4	59,6	66,3	63,0	58,8	49,6	43,3
0300HL	74	42	57	72,2	61,1	66,4	63,5	61,0	50,0	43,7
0330HL	74	42	57	72,4	61,2	66,6	63,5	61,2	50,3	43,7
0350HL	75	43	58	73,2	62,2	67,1	64,6	61,3	51,8	43,5

NRL	Total sound levels			Octave band [Hz]						
	Pow. dB(A)	Pressure.		125	250	500	1000	2000	4000	8000
		dB(A) 10 m	dB(A) 1 m	Sound potential for centre of band [dB] frequency (A)						
0500°- H	82	50	64	68,1	69,8	74,0	76,7	76,5	74,1	63,8
0550°- H	82	50	64	68,1	69,9	75,0	77,5	76,5	72,0	61,0
0600°- H	82	50	64	68,9	71,4	74,8	77,7	76,4	72,0	59,9
0650°- H	83	51	65	69,4	70,6	75,1	77,9	78,0	74,6	64,1
0700°- H	83	51	65	69,4	70,7	75,3	78,0	78,3	74,4	63,9
0500L - HL	77	45	59	64,4	67,0	69,8	71,8	70,7	66,6	58,9
0550L - HL	77	45	59	65,0	68,4	69,9	71,8	70,5	66,0	59,0
0600L - HL	77	45	59	65,1	68,9	70,0	72,0	70,6	66,1	59,1
0650L - HL	78	46	60	65,6	69,0	70,3	72,2	72,2	67,8	61,9
0700L - HL	78	46	60	65,6	69,1	70,5	72,3	72,5	68,0	62,0

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.	50°C
		DEFAULT	50°C
Anti-freez 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	23A	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 °	-	-	-	-	2	2	2	2	2
N° ventilatori L	4	4	4	6					
N° ventilatori H	-	-	-	-					
N° ventilatori HL	4	6	6	6					

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