AERMEC
air conditioning

60Hz | R410A | FREE COOLING | CPU

TECHNICAL MANUAL

CHILLER
- EXTERNAL UNITS
- HIGHT EFFICIENCY
- POWER SUPPLY 60Hz

NRL free-cooling 2000-3600

EN

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

AHRI CERTIFIED®
www.ahridirectory.org
Air-Cooled Chillers
AHRI Standard 550/590

4086985_00

Dear Customer,
Thank you for choosing AERMEC. It is the fruit of many years of experience and special design studies and has been made of the highest grade materials and with cutting edge technology.
In addition, all our products bear the EC mark indicating that they meet the requirements of the European Machine Directive regarding safety. The standard of quality is permanently being monitored and AERMEC products are therefore a synonym for Safety, Quality and Reliability.

The data may undergo modifications considered necessary for the improvement of the product, at any time and without the obligation for any notice thereof.

Thank you again.
AERMEC S.p.A

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

STANDARD

1. **UL 1995** Heating and cooling equipment
2. **ANSI/NFPA Sstandard 70** National Electrical code (N.E.C.)
3. **CSA C.22.1.- C.22.2** Safety Standard Electrical Installation

SAFETY LEVEL

1. IP24

ACOUSTIC PART

1. ISO DIS 9614/2 (sound intensity method)

REFRIGERANT GAS (R410A)

This unit contains fluorinated greenhouse gases covered by the Kyoto Protocol. Maintenance and disposal operations must be only carried out by qualified staff, in compliance with existing laws.

1. DESCRIPTION AND CHOICE OF THE UNIT

The NRL Free-cooling series appliances are water chillers equipped with an external air cooling capacity recovery system called "free-cooling".
The water free-cooling system consists in integrating and eventually completely replacing the cooling capacity delivered by the compressors through an additional water coil that exploits the low temperature of the external air to cool the system's return water.
Therefore, basically free chilled water can be obtained with this system for all installations where a continuos production is not required and therefore also with low external air temperatures; e.g. industrial processes, shopping centres, hospitals and other civil applications.
Considerable energy saving can be achieved with this type of solution: when the return flow of the system is 35.6°F / 2°C below the external air temperature, a three-way valve diverts the water into the free-cooling coil to be pre-cooled, after which it is sent to the evaporator where it is taken to the desired temperature.
The NRL free-cooling units are comprised of two R410A refrigerating circuits and one water circuit that by means of a three-wayvalve can activate the free-cooling water coil positioned in series with the plate evaporator. The water circuit may or may not be supplied with an accumulator assembly.
Thanks to several scroll type compressors and the fan speed control by means of the speed regulator, the NRL chillers can obtain various cooling capacity levels both in the compressors only mode as well as the free-cooling mode (partial or total).
The electronic adjustment with optimised microprocessor for free-cooling controls and manages all the unit components and operating parameters; an internal memory registers the operating condition as soon as an alarm arises and subsequently displays it.

OPERATING MODE:

– FREE-COOLING ONLY:

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

– MIXED FREE-COOLING + COMPRESSORS:

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

– COMPRESSORS ONLY:

when the external air temperature is greater than the return temperature of the system water.

Versions available

"COOLING ONLY" (A - E)
maximum permissible external temperature 114.8°F / 46°C;
processed water temperature 64.4°F / 18°C;

The units with desuperheater (D) are not available in the versions:

1. "YD"

2. "XD" (only for temperature lower than 39.2°F / 4°C)

2. CHECK LIST

Ciruit	Components	
Cooling circuit **Model**	**F**	**with D**
Resistance carter compressor	yes	yes
High pressure switch	yes	yes
Low pressure switch	no	no
High pressure trasducer	yes	yes
Low pressure trasducer	yes	yes
Solenoid valve of hot gas injecton	no	yes
By-pass valve of hot gas	yes	yes
Exchanger (EV- EV/CN)	yes	yes
Exchanger (desuperheater)	no	yes
Exchanger (glycol free)	no	no
Cock the liquid and discharge	yes	yes

hydraulic circuit **Version "F 00"**	**200**	**220**	**250**	**280**	**300**	**330**	**360**
Water filter	yes	yes	yes	yes	yes	yes	yes
Flow switch	yes	yes	yes	yes	yes	yes	yes
Air vent	yes	yes	yes	yes	yes	yes	yes

hydraulic circuit **Version "P1...P4"**	**200**	**220**	**250**	**280**	**300**	**330**	**360**
Water filter	yes	yes	yes	yes	yes	yes	yes
Flow switch	yes	yes	yes	yes	yes	yes	yes
Safety valve	yes	yes	yes	yes	yes	yes	yes
Air vent	yes	yes	yes	yes	yes	yes	yes
Pump	yes	yes	yes	yes	yes	yes	yes
Expansion tank	yes	yes	yes	yes	yes	yes	yes

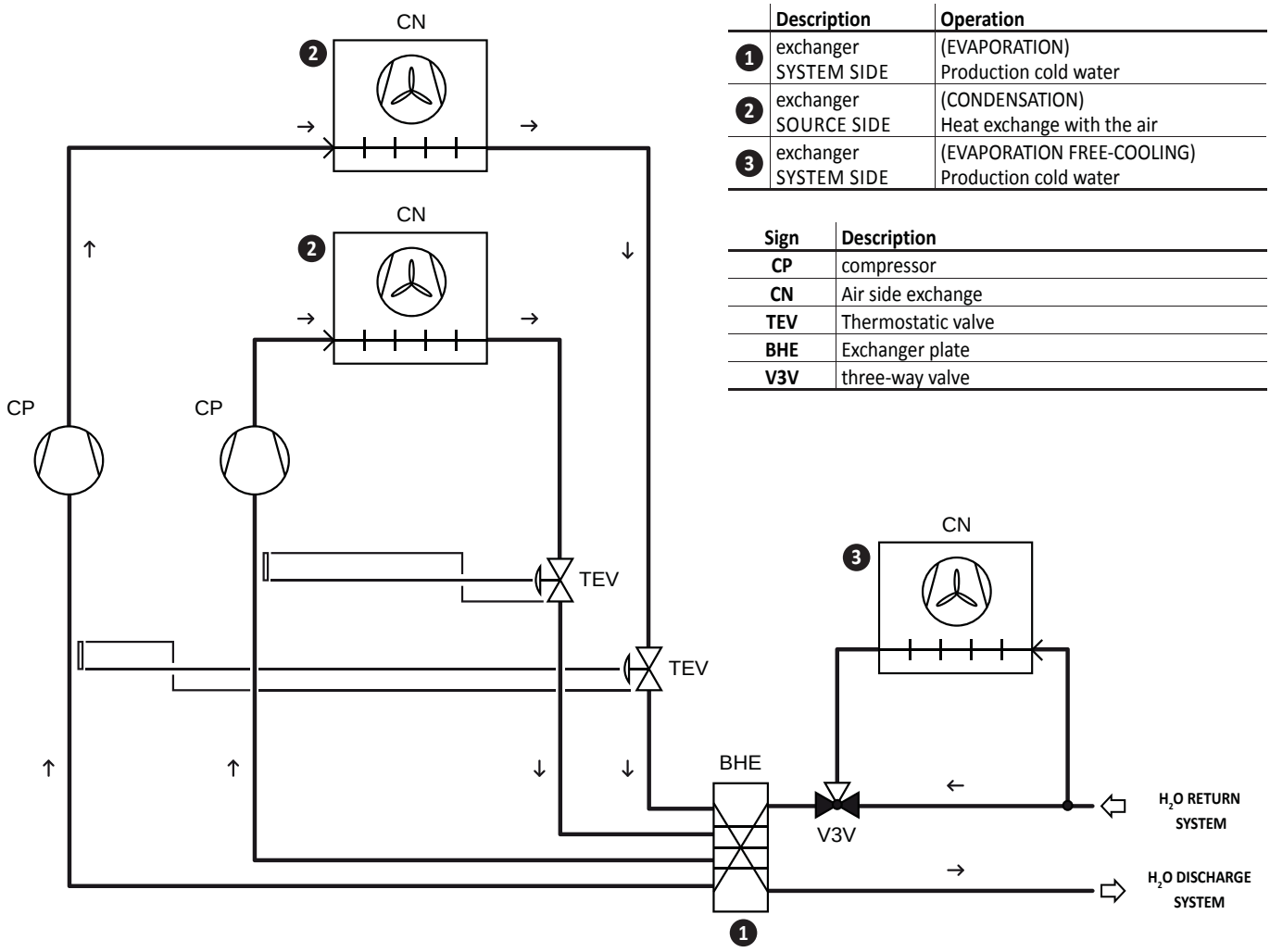
hydraulic circuit **Version "01...04"**	**200**	**220**	**250**	**280**	**300**	**330**	**360**
Water filter	yes	yes	yes	yes	yes	yes	yes
Flow switch	yes	yes	yes	yes	yes	yes	yes
Safety valve	yes	yes	yes	yes	yes	yes	yes
Air vent	yes	yes	yes	yes	yes	yes	yes
Pump	yes	yes	yes	yes	yes	yes	yes
Expansion tank	yes	yes	yes	yes	yes	yes	yes
Storage tank	yes	yes	yes	yes	yes	yes	yes

Version with DESUPERHEATER "D"							
hydraulic circuit **Version "F with D"**	**200**	**220**	**250**	**280**	**300**	**330**	**360**
Water filter	no	no	no	no	no	no	no
Differential pressure switch	no	no	no	no	no	no	no
Flow switch	no	no	no	no	no	no	no
Exchanger (desuperheater)	yes	yes	yes	yes	yes	yes	yes

hydraulic circuit **Version "A with D "**	**200**	**220**	**250**	**280**	**300**	**330**	**360**
Water filter (desuperheater)	no	no	no	no	no	no	no
Differential pressure switch (desuperheater)	no	no	no	no	no	no	no
Flow switch (desuperheater)	no	no	no	no	no	no	no
Exchanger (desuperheater)	yes	yes	yes	yes	yes	yes	yes
Safety valve	yes	yes	yes	yes	yes	yes	yes
Air vent	yes	yes	yes	yes	yes	yes	yes
Pump	yes	yes	yes	yes	yes	yes	yes
Expansion tank	yes	yes	yes	yes	yes	yes	yes
Storage tank	yes	yes	yes	yes	yes	yes	yes

3. PRINCIPLE OF OPERATION SCHEMES

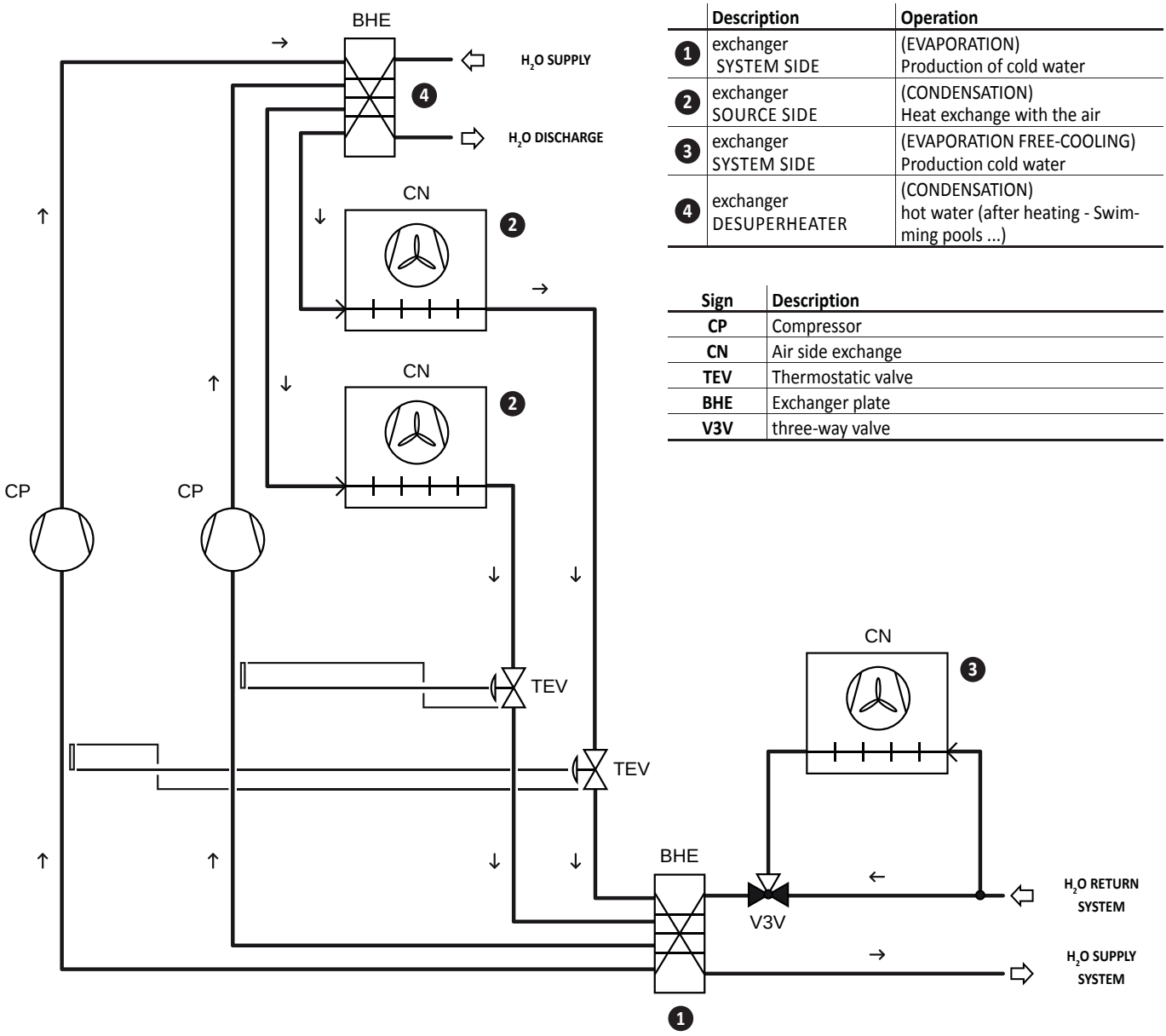
3.1. PRODUCTION OF COLD WATER ONLY THE SYSTEM



	Description	Operation
1	exchanger SYSTEM SIDE	(EVAPORATION) Production cold water
2	exchanger SOURCE SIDE	(CONDENSATION) Heat exchange with the air
3	exchanger SYSTEM SIDE	(EVAPORATION FREE-COOLING) Production cold water

Sign	Description
CP	compressor
CN	Air side exchange
TEV	Thermostatic valve
BHE	Exchanger plate
V3V	three-way valve

3.2. COLD WATER PRODUCTION AND THE SYSTEM RECOVERY (DESUPERHEATER)



	Description	Operation
1	exchanger SYSTEM SIDE	(EVAPORATION) Production of cold water
2	exchanger SOURCE SIDE	(CONDENSATION) Heat exchange with the air
3	exchanger SYSTEM SIDE	(EVAPORATION FREE-COOLING) Production cold water
4	exchanger DESUPERHEATER	(CONDENSATION) hot water (after heating - Swimming pools ...)

Sign	Description
CP	Compressor
CN	Air side exchange
TEV	Thermostatic valve
BHE	Exchanger plate
V3V	three-way valve

4. CONFIGURATOR

1, 2, 3	4, 5, 6	7	8	9	10	11	12	13	14	15, 16
NRL	200	0	°	F	°	A	°	°	6	00

field

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

4, 5, 6 **Size** 200, 225, 250, 280, 300, 330, 360

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

8 **Thermostatic valve**
- **°** Standard mechanical thermostatic valve with produced water up to 39.2°F / +4°C [(1)]
- **Y** Mechanical thermostatic valve with produced water from 39.2°F / +4°C to -42.8°F / -6°C [(1)]
- **X** Electronic thermostatic valve with produced water up to 39.2°F / +4°C [(1)]

9 **Model**
- **F** Free-cooling

10 **Heat recovery**
- **°** Without recovery units
- **D** [(2)] Desuperheater

11 **Version**
- **A** High efficiency
- **E** [(2)] High efficiency, silenced version

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

13 **Ventilation**
- I Fan speed modulating for condensation control

14 **Power supply**
- **6** 230V-3-60Hz with thermomagnetic switches [(2)]
- **7** 460V-3-60Hz with thermomagnetic switches
- **8** 575V-3-60Hz with thermomagnetic switches

15, 16 **Hydronic kit**
- **00** Without water storage
- **03** Water storage tank and high-head single pump
- **04** Water storage tank, with high-head pump and reserve pump
- **P3** Without water storage tank, with high-head pump
- **P4** Without water storage tank, with high-head pump and reserve pump

[(1)] For lower temperatures, contact the office.
[(2)] Versions avaible only on demand

5. DESCRIPTION OF THE COMPONENTS

5.1. CHILLER CIRCUIT

COMPRESSOR
High efficiency scroll-type hermetic compressors driven by a 2-pole electric motor with internal thermal protection of the electric heater casing included as standard.

HEAT EXCHANGER SYSTEM SIDE
Of the plate-type (AISI 316), externally insulated with closed cell material to reduce thermal dispersion. Fitted, as standard, with antifreeze heater.

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

HEAT EXCHANGER SOURCE SIDE
Scambiatore a pacco alettato realizzato con tubi in rame e alette in alluminio adeguatamente spaziate in modo da garantire il miglior rendimento nello scambio termico.

FILTER DRIER
Of the mechanical cartridge type, made of ceramics and hygroscopic material able to trap impurities and any traces of humidity in the chiller circuit.

ONE-WAY VALVE
Allows the passage of the refrigerant in just one direction.

THERMOSTATIC VALVE
The mechanical type valve, with outside equaliser on the evaporator outlet, modulates the gas flow to the evaporator on the basis of the thermal load, in such a way as to ensure the proper degree of overheating of the intake gas.

SOLENOID VALVE
The valve closes when the compressor turns off, preventing the flow of refrigerant gas towards the evaporator.

SIGHT GLASS
For checking the refrigerating gas load and any humidity in the refrigerating circuit.

TAPS
Present in the liquid and discharge lines, and allow to intercept the refrigerant in case of extraordinary maintenance.

5.2. FRAME AND FANS

LOAD-BEARING STRUCTURE
Structure made of hot-dipped galvanised steel sheets, painted with polyester powders, built to guarantee easy accessibility for service and maintenance.

FAN UNIT
Axial fans with IP 54 degree of protection, external rotor, helical blades, housed in nozzles, complete with accident-prevention protective screen. 6-pole electric motor with built-in circuit breaker.

5.3. HYDRAULIC COMPONENTS (standard version)

AIR-WATER HEAT EXCHANGER (FREE-COOLING)
Crossed by water for the free-cooling function. Is made of copper pipes and aluminium blades blocked through the mechanical expansion of the pipes. (High efficiency type).

3-WAY VALVE
This is an electric servo-controlled ON-OFF diverting valve on the water side of the freecooling circuit controlled.

WATER FILTER
Allows you to block and eliminate any impurities in the hydraulic circuits. Inside, it has a filtering mesh with holes not greater than one millimetre. It is essential for avoiding serious damage to the plate-type exchanger.

FLOW SWITCH
Controls that the water is circulating, otherwise the unit blocks.

AIR VENT
Of the automatic type, assembled on the upper part of the hydraulic system; it releases any air bubbles that may be present in the system.

5.4. HYDRAULIC COMPONENTS (configurable version)

DRAIN VALVE
Of the automatic type, assembled on the upper part of the hydraulic system; it releases any air bubbles that may be present in the system.

CIRCULATION PUMPS (HIGH PUMP)
Depending on the characteristics of the pump chosen, it offers a useful head to overcome the pressure drops in the system.

EXPANSION TANK
Of the membrane type, with nitrogen pre-charge.

SAFETY VALVE
Calibrated to 87psi / 6bar and with ductable discharge, it releases overpressure in the event of abnormal working pressure levels.

STORAGE TANK
In stainless steel, with a 185gal / 700l capacity. In order to reduce the thermal dispersion and eliminate the phenomenon of the formation of condensation, it is insulated with polyurethane material of a suitable thickness. One antifreeze electric heater of 300W (down to -4°F / -20°C outside temperature and tank water temperature 41°F / 5°C) assembled as standard and commanded from the card via an antifreeze sensor inserted in the tank.

PH	6-8
Electric conductivity	less than 200 mV/ cm (77°F / 25°C)
Chloride ions	less than 50 ppm
Sulphuric acid ions	less than 50 ppm
Total iron	less than 0.3 ppm
Alkalinity M	less than 50 ppm
Total hardness	less than 50 ppm
Sulphur ions	none
ammonia ions	none
Silicone ions	less than 30 ppm

5.5. SAFETY AND CONTROL COMPONENTS

HIGHT PRESSURE SWITCH
With fixed calibration, placed on the high pressure side of the chiller circuit, it shuts down compressor operation in the case of abnormal operating pressure.

HIGH PRESSURE TRASDUCER
Placed on the high pressure side of the chiller circuit, it communicates to the control card the operating pressure, sending a pre-alarm in case of abnormal pressure.

LOW PRESSURE TRANSDUCER
Allows displaying, on the microprocessor board display, the value of the compressor's suction pressure (one per circuit) on the low-pressure side of the cooling circuit.

REFRIGERANT CIRCUIT SAFETY VALVE
This intervenes by releasing overpressure in the event of abnormal working pressure levels.
- Calibrated at 653psi / 45bar on the HP branch
- Calibrated at 435psi / 30bar on the BP branch

DCPX_UL CONDENSATION PRESSURE CONTROLLER
This accessory allows correct functioning when external temperatures drop below 50 °F / 10°C (up to 14 °F / -10°C). It consists of an adjustment circuit board that varies the number of fan revs according to the condensation pressure, read by the high pressure transducer, in order to keep it sufficiently high for correct unit functioning.

5.6. ELECTRICAL COMPONENTS

Electric board in compliance with the standards EN 60204-1/IEC 204-1, complete with:
- transformer for the control circuit,
- door lock main isolating switch,
- fuses and contactors for compressors and fans,
- clamps for REMOTE PANEL
- terminal boards of the spring type control circuits,
- outdoor electric control board, with double port and gaskets,
- electronic control,
- evaporator pump command consent relay and recovery pump (only for version without group pumps).
- All the cables numbered

DOOR LOCK KNIFE SWITCH
It is possible to access the electrical panel by disconnecting the voltage, then using the opening lever of the panel itself. This lever can be blocked with one or more padlocks during maintenance, in order to prevent the machine being powered up accidentally.

REMOTE CONTROL PANEL (PR3)
This allows the chiller command operations to be given from a distance.

CONTROL KEYPAD
Provides full control functions. For a detailed description refer to the user manual.

Electronic regulation GR3

–Consisting of a management/control card and a visualisation card.
– Functions carried out:
– adjustment of water temperature at evaporator inlet, with thermostat control for up to 4 levels and integral-proportional fan speed control (with DCPX_UL accessory);
– compressor start-up delay;
– compressor sequence rotation;
– count of compressor work hours;
– start/stop;
– reset;
– permanent alarms memory;
– autostart after voltage drop;
– multi-lingual messages;
– operation with local or remote control.

Machine status display:
1. alarms sumary;
2. ON/OFF compressors.

Display of the following parameters
1. water inlet temperature;
2. accumulator temperature;
3. water outlet temperature;
4. ΔT;
5. high pressure;
6. low pressure;
7. waiting time for restart;
8. alarms visualisation.

For further information, refer to the user manual.

6. ACCESSORIES

6.1. MECHANICAL ACCESSORIES

AVX
Group of anti-vibration, to be installed under the base.

GP
Protection grille, protects the external coil from accidental knocks.

6.2. ELECTRICAL ACCESORIES

AERWEB300
Accessory AERWEB allows remote control of a chiller through a common PC and an ethernet connection over a common browser; 4 versions available:

- AERWEB300-6: Web server to monitor and remote control max. 6 units in RS485 network;

- AERWEB300-18: Web server to monitor and remote control max. 18 units in RS485 network;

AERWEB300-6G: Web server to monitor and remote control max. 6 units in RS485 network with integrated GPRS modem;
AERWEB300-18G: Web server to monitor and remote control max. 18 units in RS485 network with integrated GPRS modem;

DRE
It allows the reduction of peak power necessary for the machine during start-up phase.
Accessories can only be fitted in the factory.

PGS: Daily/Weekly Programmer.
Allows you to programme two time bands per day (two switch on/off cycles) and to have differentiated programming for each day of the week.

PRM1-PRM2 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.

AER485
RS-485 interface for supervision systems with MODBUS protocol.

FOR MORE INFORMATION PLEASE CONTACT US

COMPATIBILITY TABLE MOUNTS AVX:

Model	2000	2250	2500	2800	3000	3300	3600
Model with Hydronic kit (00)	AVX 770	AVX 776	AVX 782	AVX 788	AVX 794	AVX 801	AVX 801
Model with Hydronic kit (P3/P4)	AVX 772	AVX 778	AVX 784	AVX 790	AVX 796	AVX 803	AVX 803
Model with Hydronic kit (03/04)	AVX 771	AVX 777	AVX 783	AVX 789	AVX 795	AVX 802	AVX 802

7. TECHNICAL DATA vers. F (CHILLER FUNCTION)

Model			2000	2250	2500	2800	3000	3300	3600
Cooling capacity	Alls	Tons	125.59	144.71	163.83	173.99	206.79	219.87	236.17
Total power input	Alls	kW	204.66	229.25	253.84	284.98	428.37	338.93	387.99
Total power input with HIGH - PUMP	Alls	kW	212.66	238.75	264.84	295.98	443.37	353.93	402.99
Water flow rate	Alls	gpm	301	347	392	417	495	527	566
Total pressure drop	Alls	psi	12.39	12.69	12.69	13.10	14.00	14.04	15.66
Useful head with HIGH - PUMP	Alls	psi	24.22	24.22	25.67	23.93	27.12	24.66	19.73
ENERGY INDICES									
EER	BTU/Wat		7,37	7,58	7,75	7,33	5,80	7,79	7,31
IPLV	BTU/Wat		10,24	10,19	10,23	10,42	9,90	10,19	10,04
PROTECTION RATING									
IP			24	24	24	24	24	24	24
ELECTRICAL DATA									
Total input current [1]	460V	A	303.80	344.90	385.90	425.90	499.80	512.50	584.80
	575V	A	244.80	278.50	312.20	343.90	405.00	413.50	472.40
Model **WITHOUT PUMP**									
L.R.A.	460V	A	501	594	655	735	791	844	857
	575V	A	403	501	553	603	668	693	721
M.C.A.	460V	A	318	380	441	500	556	610	643
	575V	A	257	311	364	433	498	523	531
M.O.P.	460V	A	352	427	488	561	617	670	690
	575V	A	284	350	403	488	553	578	570
Recom fuse	460V	A	350	400	450	500	600	600	600
	575V	A	250	300	400	450	500	500	500
Model **WITH HIGH HEAD PUMP**									
L.R.A.	460V	A	514	610	673	753	813	866	879
	575V	A	413	513	568	618	686	711	738
M.C.A.	460V	A	331	396	459	519	578	632	665
	575V	A	267	324	379	448	516	541	549
M.O.P.	460V	A	365	443	506	580	639	692	712
	575V	A	295	362	417	503	571	596	587
Recom fuse	460V	A	350	400	500	500	600	600	600
	575V	A	250	350	400	500	500	500	500
SCROLL COMPRESSORS									
Quantity / circuits	n°/n°		8/4	8/4	8/4	8/4	8/4	10/4	12/4
HEAT EXCHANGER SYSTEM SIDE									
Exchanger capacity	gal		8.77	9.64	10.54	11.86	14.02	15.92	17.35
Water connections	inch		3"	3" [2]	4"	4"	4"	4"	4"
				4" [2]					
HYDRONIC GROUP SYSTEM SIDE									
BUFFER TANK									
Buffer tank capacity	n°/gal		2 x 185	2 x 185	2 x 185	2 x 185	2 x 185	2 x 185	2 x 185
Electrical heater	n°/W		2 x 300	2 x 300	2 x 300	2 x 300	2 x 300	2 x 300	2 x 300
EXPANSION TANK									
Expansion tank	n°/gal		4 x 7	4 x 7	4 x 7	4 x 7	4 x 7	4 x 7	4 x 7
Expansion tank calibration	psi		21.75	21.75	21.75	21.75	21.75	21.75	21.75
HIGH HEAD PUMP									
Pump power input	kW		8.00	9.50	11.00	11.00	15.00	15.00	15.00
Pump input current	A		9.96	11.72	13.48	13.48	18.36	18.36	18.36

COOLING (AHRI STANDARD CONDITIONS)

Outlet water temperature **6.7°C / 44,6 °F**
Flow rate **0.043l/s per kW**
External temperature **35°C / 95 °F**

AHRI conditions: leaving water 6.7°C/44.6°F
flow rate 0.043l/s per kW (full load)
Load 100% air 35°C/95°F
Load 75% air 26.7°C/80.06°F
Load 50% air 18.3°C/64.94°F
Load 25% air 12.8°C/55.04°F

[1] data refered to no pump version
[2] water connections:
3" for module 1000
4" for module 1250

Model			2000	2250	2500	2800	3000	3300	3600
SAFETY VALVE									
Safety valve calibration	psi		87	87	87	87	87	87	87
FAN MOTORS									
Quantity	n°		8	10	12	12	12	16	16
Air flow	CFM		117716	140788	137492	137492	186932	186932	317600
Fan input current	460V	A	30.4	38.0	45.6	45.6	45.6	60.8	60.8
	575V	A	26.6	33.2	39.8	39.8	39.8	53.1	53.1
Fan power input	460V	kW	16.0	20.0	24.0	24.0	24.0	32.0	32.0
	575V	kW	17.4	21.8	26.2	26.2	26.2	34.9	34.9
SOUND DATA									
Sound pressure	dB(A)		61	63	64	65	65	66	66
Sound power	dB(A)		93	94	96	97	97	98	98
CHARGE (The data reported can be changed at any time if deemed necessary from Aermec)									
R410A Gas refrigerant (C1/C2/C3/C4)	lbs		77,2 / 77,2 / 77,2 / 77,2	77,2 / 77,2 / 99,2 / 103,6	99,2 / 47 / 99,2 / 103,6	99,2 / 103,6 / 99,2 / 103,6	105,8 / 105,8 / 105,8 / 105,8	145,5 / 154,3 / 145,5 / 154,3	141,1 / 141,1 / 141,1 / 141,1
Oil (C1/C2/C3/C4)	lbs		15,4 / 15,4 / 15,4 / 15,4	15,4 / 15,4 / 15,4 / 15,4	15,4 / 15,4 / 15,4 / 15,4	15,4 / 16,5 / 15,4 / 16,5	16,5 / 16,5 / 16,5 / 16,5	16,5 / 16,5 / 16,5 / 16,5	16,5 / 16,5 / 16,5 / 16,5
DIMENSION									
Height	in		96.46	96.46	96.46	96.46	96.46	96.46	96.46
Width	in		86.61	86.61	86.61	86.61	86.61	86.61	86.61
Depth	in		251.97	285.43	318.90	318.90	318.90	437.01	437.01
Weight when empty	lbs		11709	13142	14553	14972	15479	18853	19889

COOLING (AHRI STANDARD CONDITIONS)

Outlet water temperature	**6.7°C / 44,6 °F**	**AHRI conditions: leaving water 6.7°C/44.6°F**
Flow rate	**0.043l/s per kW**	**flow rate 0.043l/s per kW (full load)**
External temperature	**35°C / 95 °F**	**Load 100% air 35°C/95°F**
		Load 75% air 26.7°C/80.06°F
		Load 50% air 18.3°C/64.94°F
		Load 25% air 12.8°C/55.04°F

8. TECHNICAL DATA vers. F (FREE-COOLING MODE)

Model			2000	2250	2500	2800	3000	3300	3600
Cooling capacity	Alls	Tons	86.78	92.67	98.57	111.75	130.33	148.17	168.23
Total power input	Alls	kW	17.73	21.97	26.22	26.58	26.58	34.71	34.71
Total power input with HIGH - PUMP	Alls	kW	25.73	31.47	37.22	37.58	41.58	49.71	49.71
Water flow rate	Alls	gpm	283	326	369	392	466	495	532
Total pressure drop	Alls	psi	13.37	13.95	13.95	14.66	15.84	16.07	19.75
Useful head with HIGH - PUMP	Alls	psi	27.86	20.04	24.28	22.38	26.09	23.71	17.01
ENERGY INDICES									
EER	BTU/Wat		58,80	50,66	45,15	50,50	58,90	51,27	58,21
PROTECTION RATING									
IP			24	24	24	24	24	24	24
ELECTRICAL DATA									
Total input current [1]	460V	A	30.40	38.00	45.60	45.60	45.60	60.80	60.80
	575V	A	26.60	33.20	39.80	39.80	39.80	53.10	53.10
SOUND DATA									
Sound pressure	dB(A)		61	63	64	65	65	66	66
Sound power	dB(A)		93	94	96	97	97	98	98

FREE-COOLING MODE

Inlet temperature	**59,00 °F**
Outlet temperature	**51.64 °F**
Δt	**7.36 °F**
External temperature	**35.60 °F**

Sound power

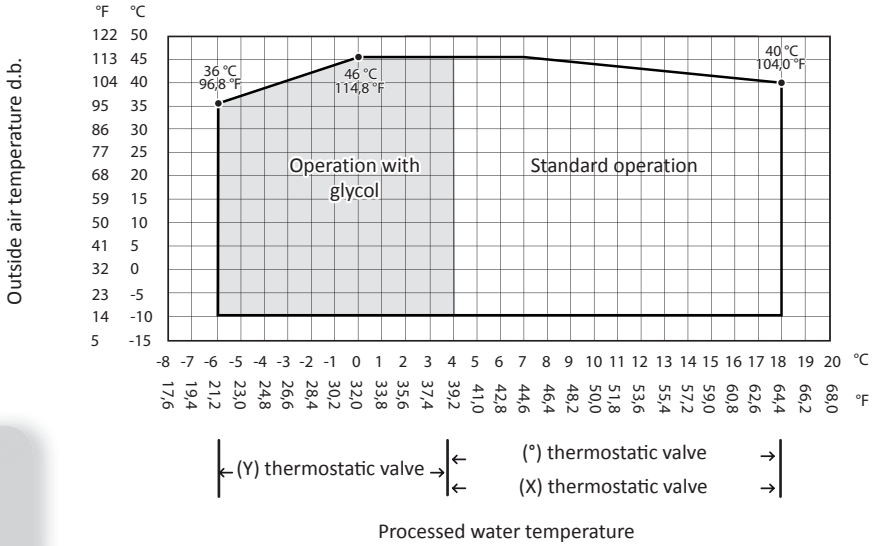
Aermec determines sound power values in agreement withthe 9614 Standard.

Sound Pressure

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

9. OPERATING LIMITS

The devices in their standard configurations are not suitable for installation in salty environments. For the operating limits, refer to diagram, valid for AHRI standard conditions.
Wind breaks should be implemented if the unit is installed in particularly windy areas, to prevent a malfunction of the unit.



ATTENTION
When the unit is installed in particularly windy areas, we recommend installing wind barriers if wind speed exceeds 2.5 m/s.

9.1. DESIGN SPECIFICATIONS

REFRIGERANT SIDE		High pressure side	Low pressure side
Acceptable maximum pressure	bar/PSI	45/653	30/435
Acceptable maximum temperature	°C / °F	120 / 257	51 / 131
Acceptable minimum temperature	°C / °F	-30 /- 22	-30 / -22

WATER SIDE		
Acceptable maximum pressure	bar/PSI	6/87

Hydarulic circuit safety valve
(only in version with storage tank or with pump)
Calibrated at 6/87 bar/PSI and with piped discharge, which intervents by discharging overpressure if abnormal work pressure occur.

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

Note:
1 - In summer mode the unit can be started with external air 46°C/114,8°F and water inlet 35°C/95°F. In winter mode the unit can be started with external air -15°C/5°F and water inlet 20°C/68°F. Operate in such conditions is permitted only for a short time and to bring the system up to temperature. To reduce the time of this operation, it is recommended to install a three-way valve that allows bypassing water from the system utilities, until the conditions that allow the unit to work within the permitted operation limits are achieved.

10. CORRECTION FACTORS

10.1. INPUT POWER AND COOLING CAPACITY "HIGH EFFICIENCY VERSION"

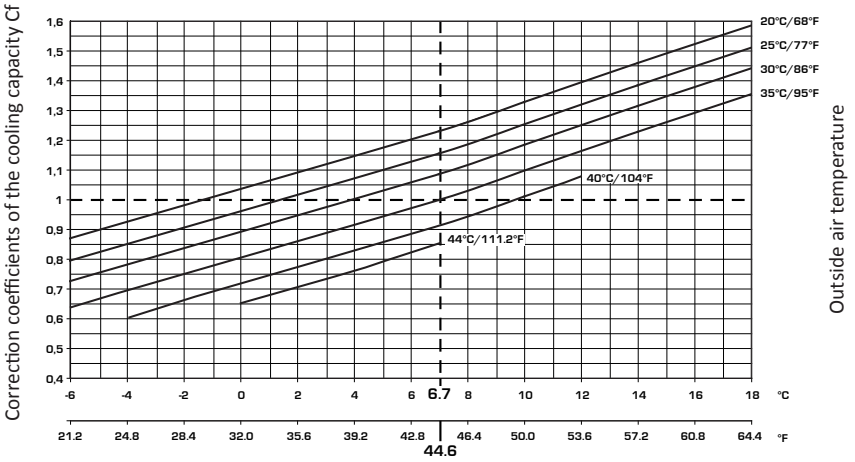
The refrigerating capacity yielded and the input electrical capacity in conditions other than rated conditions are obtained by multiplying the rated values (Pf, Pa) by the respective correction coefficients (Cf, Ca).
The following diagrams allow you to obtain the correction coefficients to be used for the various versions of the devices, in cold mode; next to each curve you can see the outside air temperature to which it refers.

KEY
Cf: correction coefficient of the cooling capacity.

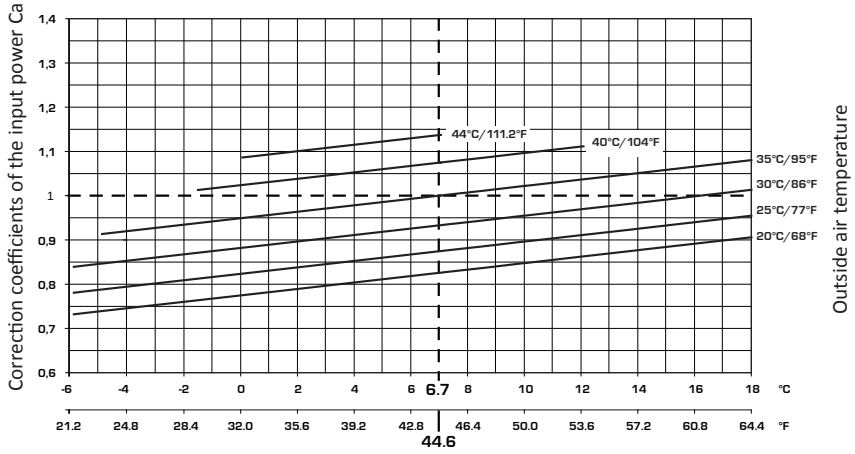
Ca: correction coefficient of the input power.

ATTENZIONE
FOR Δt DIFFERENT FROM 10.01°F / 5.56°C
Tab. 9.2 is used for the correction factors of the cooling capacity and input power of the water consumption. To take into account the soiling of the exchanger, apply the relative fouling factors, Tab. 9.3

CORRECTION COEFFICIENTS OF THE COOLING CAPACITY



CORRECTION COEFFICIENTS OF THE INPUT POWER IN COOLING MODE



10.2. FOR Δt DIFFERENT FROM THE RATED VALUE

The performances given by the technical data refer to AHRI standard conditions: flow rate 0.043l/s per kW (Δt 10.01°F / 5.56°C).
Use table to obtain the corrective factors of the cooling capacity and input power different than Δt 10.01°F / 5.56°C.

ΔT DIFFFERENT FROM THE RATED VALUE (ΔT 5°C - 10.01°F)	3°C / 5.40°F	5.56°C / 10.01°F	8°C / 14.40°F	10°C / 18°F
Cooling capacity correction factors	0,99	**1**	1,02	1,03
Input power correction factors	0,99	**1**	1,01	1,02

10.3. FOULING FACTORS

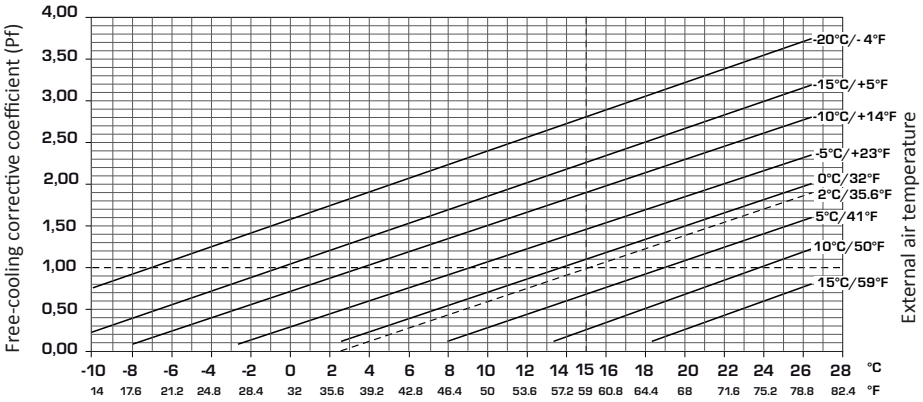
The performance levels given by the technical data refer to conditions with clean tubes, with a fouling factor = 1.
For other fouling factor values, multiply the data of performance table by the coefficients given.

FOULING FACTOR [K*M2]/[KW]	0.018	0.05	0.1
Cooling capacity correction factors	1	**0.987**	0.967
Input power correction factors			

11. FREE-COOLING FUNCTIONING CORRECTIVE FACTORS

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

FREE-COOLING ONLY FUNCTIONING COOLING CAPACITY CORRECTIVE COEFFICIENTS



Temperature of the system return water

11.1. FOR Δt DIFFERENT FROM THE RATED VALUE

The performances given by the technical data refer to AHRI standard conditions: flow rate 0.043l/s per kW (Δt 10.01°F / 5.56°C).
Use table to obtain the corrective factors of the cooling capacity and input power different than Δt 10.01°F / 5.56°C.

ΔT DIFFFERENT FROM THE RATED VALUE (ΔT 5°C - 10.01°F)	3°C / 5.40°F	5.56°C / 10.01°F	8°C / 14.40°F	10°C / 18°F
Cooling capacity correction factors	0,99	**1**	1,02	1,03
Input power correction factors	0,99	**1**	1,01	1,02

11.2. FOULING FACTORS

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

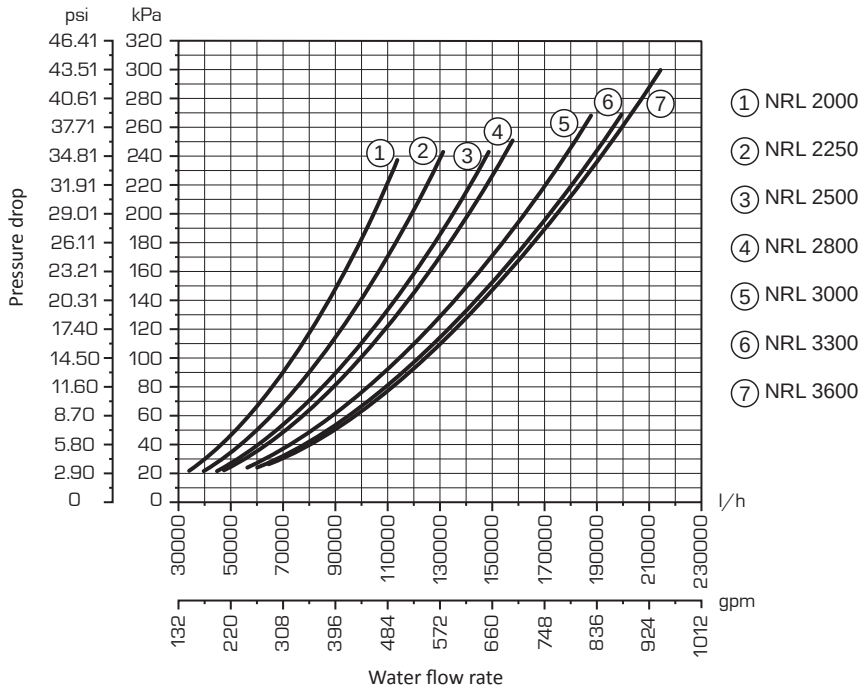
FOULING FACTOR [K*M2]/[KW]	0.018	0.05	0.1
Cooling capacity correction factors	1	**0.987**	0.967
Input power correction factors			

12. TOTAL PRESSURE DROPS

12.1. CHILLER FUNCTION PRESSURE DROP

Inlet temperature	53.6°F/12°C
Outlet temperature	44.6°F/7°C
Outside air temperature	95°F/35°C
Average water temperature	50°F/10°C

For temperatures other than 50°F/10°C to use the table of correction factors

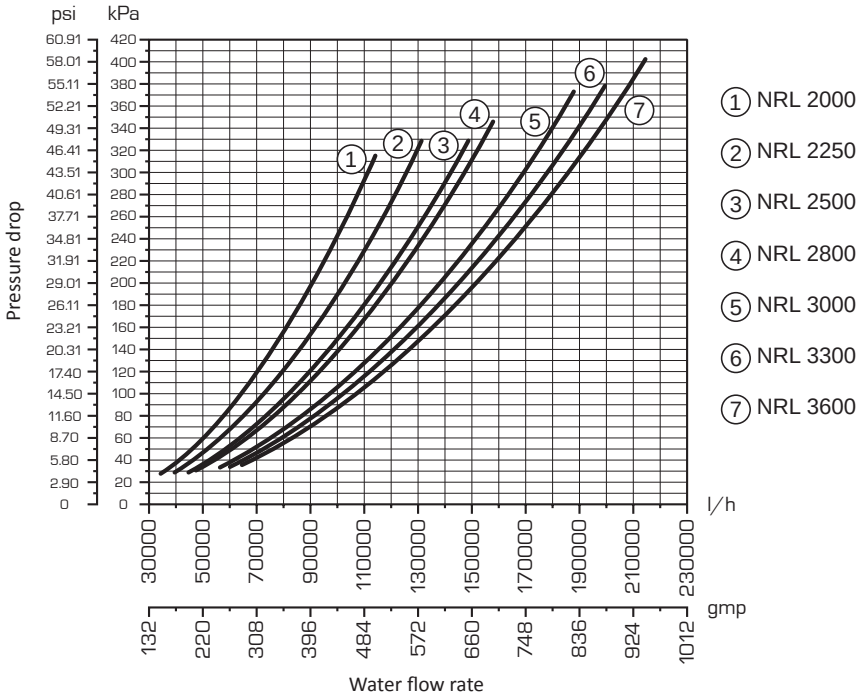


Average water temperature °F / °C	41 / 5	**50 / 10**	59 / 15	68 / 20	86 / 30	104 / 40	122 / 50
Coefficients	1,02	**1**	0,98	0,97	0,95	0,93	0,91

12.2. FREE-COOLING FUNCTION PRESSURE DROP

Inlet temperature	59.00°F/15°C
Outlet temperature	51.64°F/11°C
Outside air temperature	35.60°F/2°C
Average water temperature	50°F/10°C

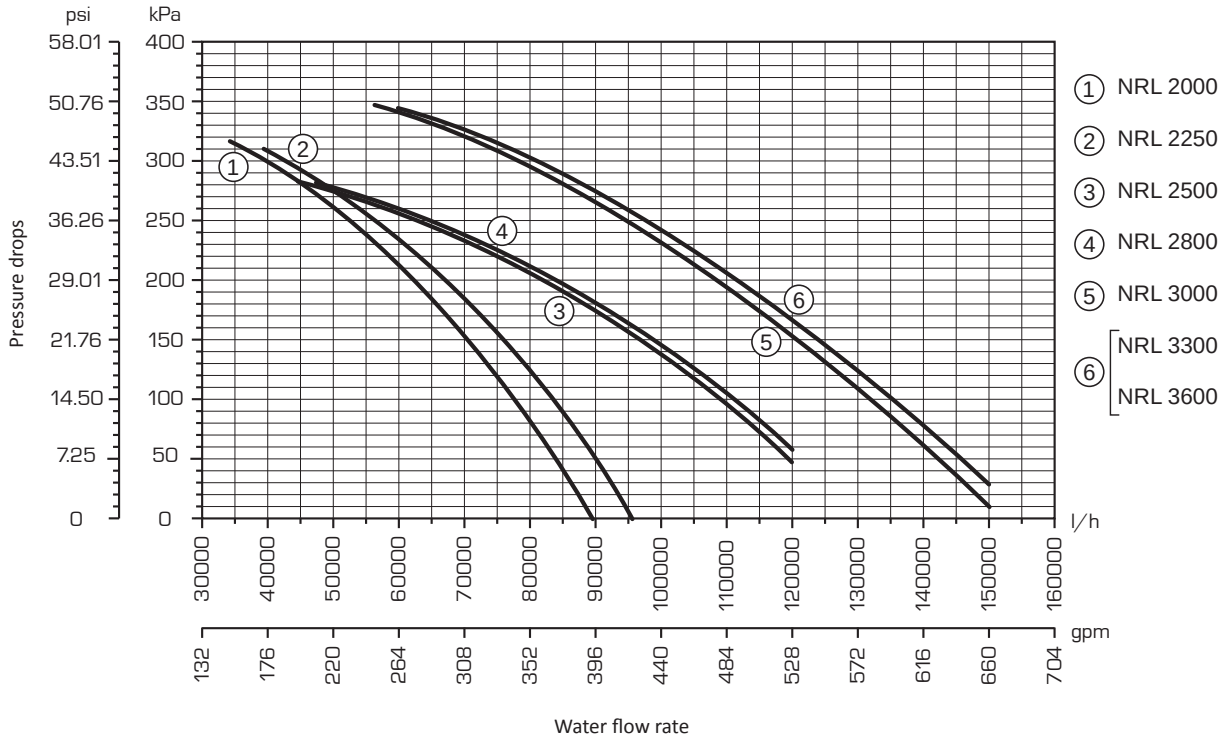
For temperatures other than 50°F/10°C to use the table of correction factors



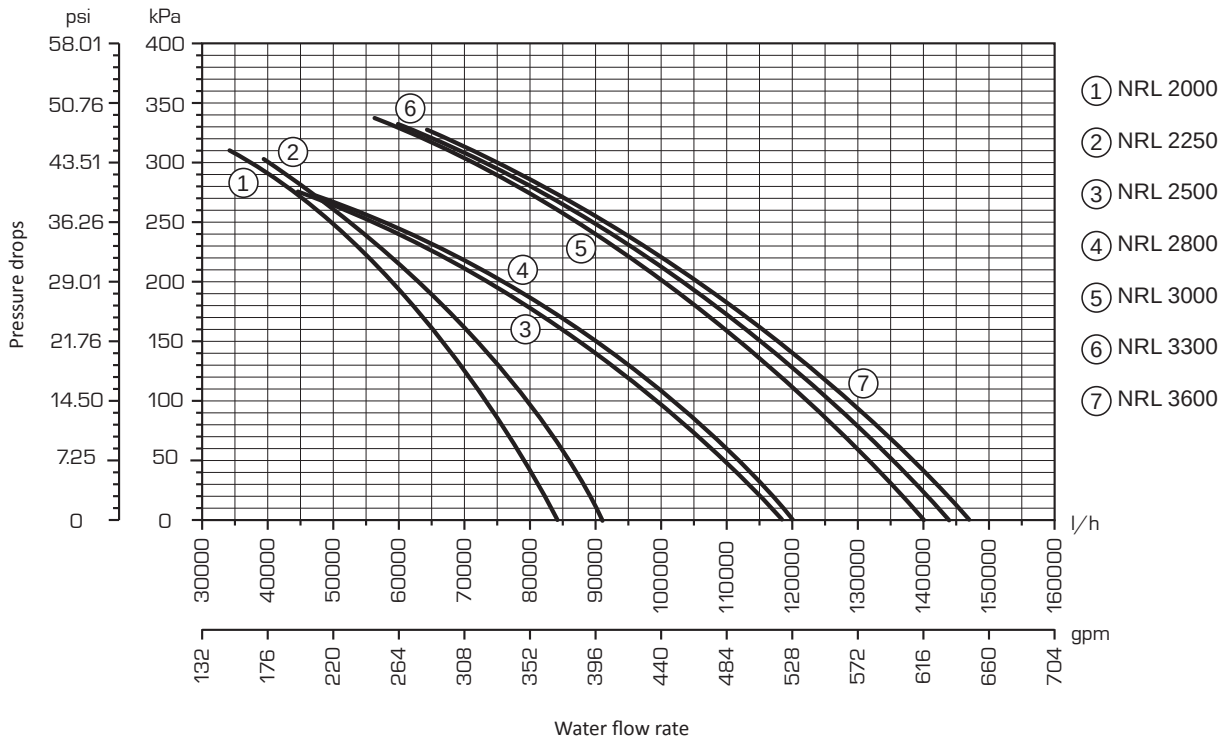
Average water temperature °F / °C	41 / 5	**50 / 10**	59 / 15	68 / 20	86 / 30	104 / 40	122 / 50
Coefficients	1,02	**1**	0,98	0,97	0,95	0,93	0,91

13. USEFUL HEADS

13.1. CHILLER FUNCTION USEFUL HEADS



13.2. FREE-COOLING FUNCTION USEFUL HEADS



14. ETHYLENE GLYCOL SOLUTIONS

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

NOTE

On the following page an example is given to help graph reading. Using the diagram below it is possible to determine the percentage of glycol required; this percentage can be calculated by taking of the following factors into consideration one:

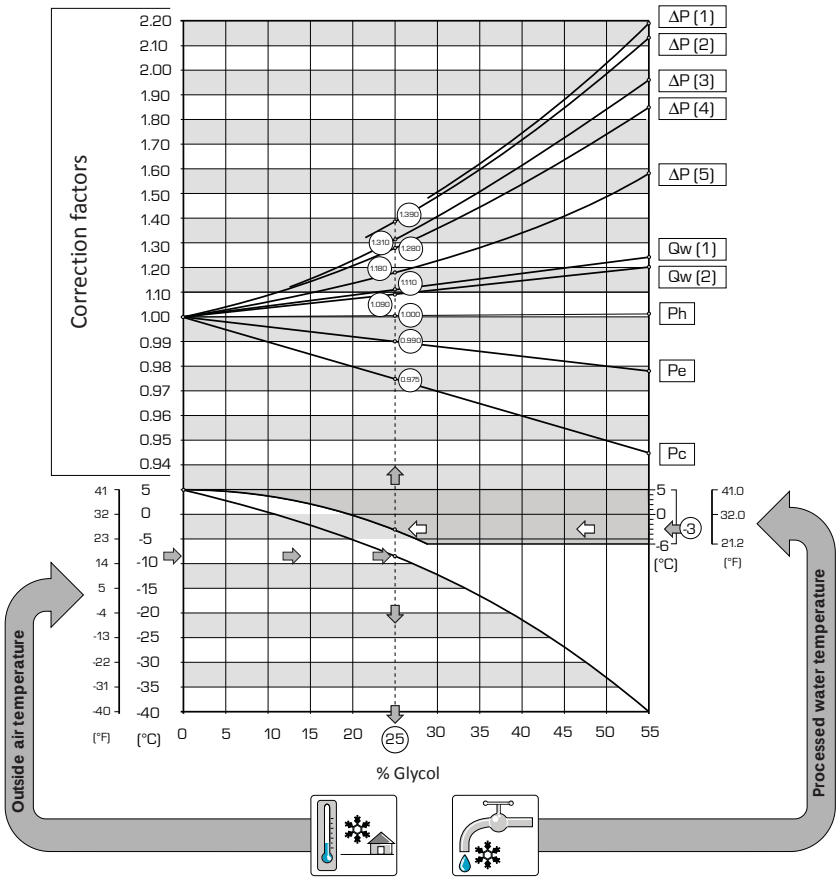
Depending on which fluid is considered (water or air), the graph is interpreted by the right or left side at the crossing point on the curves with the external temperature line or the water produced line. A point from which the vertical line will pass is obtained and this will distinguish both glycol percentage and relative correction coefficients.

14.1. 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.

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

Initial rates for "EXTERNAL AIR TEMPERATURE" and "TEMPERATURE OF PRODUCED WATER", are not directly related, therefore it is not possible to refer to the curve of one of these rates to obtain corresponding point on the curve of the other rate.



KEY:

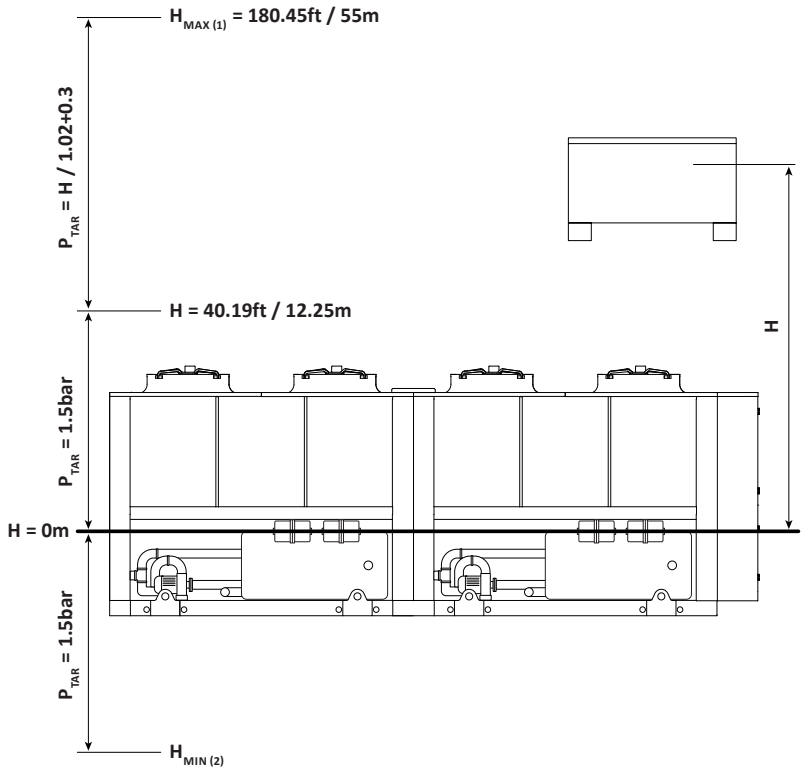
Pc	Corrective factors for cooling capacity
Pe	Corrective factors of the input power
Ph	Corrective factors of heating capacity
P (1)	Correction factors for pressure drop av. temp. = -3.5°C/25.7°F
P (2)	Correction factors for pressure drop av. temp. = 0.5°C/32.9°F
P (3)	Correction factors for pressure drop av. temp. = 5.5°C/41.9°F
P (4)	Correction factors for pressure drop av. temp. = 9.5°C/49.1°F
P (5)	Correction factors for pressure drop av. temp. = 47.5°C/117.5°F
Qw (1)	Correction factor of flow rates (evap.) av. temp = 9.5°C/49.1°F
Qw (2)	Correction factor of flow rates (cond.) av. temp = 47.5°C/117.5°F

NOTE
Although the graph arrives at external air temperatures of -40°C/-104°F, unit operational limits must be considered.

15. EXPANSION TANK CALIBRATION

The standard pressure value for pre-charging the expansion tank is 1.5 bar, and the volume is 25 litres. Maximum value 6 bar.
The tank must be calibrated according to the maximum difference in height (H) of the device (see figure) according to the formula:
p (calibration) [bar] = H [m] / 10.2 + 0.3.
For example, if the level difference H is 20m, the calibration value of the tank will be 2.3 bar.
If the calibration value obtained from the calculation is lower than 1.5 bar (i.e. for H < 12.25), maintain the standard calibration.

KEY:
(1) Check that the highest user does not exceed a level difference of 180.45ft
(2) Check that the lowest user can sustain the global pressure acting at that point



16. MINIMUM WATER CONTENT

NRL		2000	2250	2500	2800	3000	3300	3600
Number of compressor/circuits	n°/n°	8/4	8/4	8/4	10/4	12/4	12/4	12/4
Minimum water conten	l/kW (1)	4	4	4	4	4	4	4
	l/kW (2)	8	8	8	8	8	8	8

KEY:
(1) minimum water content in cooling mode
(2) minimum water content in the case of applications in process or operation at low outdoor temperatures

ATTENTION
It is recommended to design systems with high water content (minimum recommended values shown in table), to limit:
1. **The hourly number of inversions between functioning modes.**
2. **Decrease in water temperature during winter defrost cycles.**

17. PART LOAD

COOLING (AHRI CONDITIONS)

Inlet temperature	53,60°F/12°C
Outlet temperature	44,6°F/7°C
Δt	10,01°F/5.56°C
External temperature	95°F/35°C

	LEVELS OF POWER											
COOLING CAPACITY %	**1º**	**2º**	**3º**	**4º**	**5º**	**6º**	**7º**	**8º**	**9º**	**10º**	**11º**	**12º**
2000	12	25	37	50	62	75	87	100	-	-	-	-
2250	14	25	39	50	64	75	89	100	-	-	-	-
2500	12	25	37	50	62	75	87	100	-	-	-	-
2800	12	23	33	44	53	63	72	82	91	100	-	-
3000	9	17	25	34	42	50	58	67	75	84	92	100
3300	10	19	28	37	46	55	63	71	78	86	93	100
3600	9	17	25	34	42	50	58	67	75	84	92	100
POWER IMPUT %	**1º**	**2º**	**3º**	**4º**	**5º**	**6º**	**7º**	**8º**	**9º**	**10º**	**11º**	**12º**
2000	11	21	32	44	57	71	85	100	-	-	-	-
2250	12	21	34	44	59	71	87	100	-	-	-	-
2500	11	21	32	44	57	71	85	100	-	-	-	-
2800	9	18	27	37	46	56	66	77	88	100	-	-
3000	6	12	19	26	33	41	50	59	69	79	89	100
3300	7	14	16	29	37	46	54	63	72	81	90	100
3600	6	12	19	26	33	41	50	59	69	79	89	100

18. SOUND DATA

Sound power

Aermec determines the sound power value on the basis of measurements taken in accordance with standard 9614-2.

Sound pressure

Sound pressure in free field, on a reflecting plane (directional factor Q=2), in accordance with standard ISO 3744.

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 power by central band frequency [dB(A)]						
2000FA	93	61	73	85,9	82,4	85,6	86,9	84,3	80,1	69,9
2250FA	94	62	74	86,6	86,8	87,2	88,4	86,1	80,6	69,1
2500FA	96	64	76	88,1	89,9	89,3	90,5	88,4	82,0	69,1
2800FA	97	65	77	90,9	87,4	88,8	93,0	86,2	78,0	68,9
3000FA	97	65	77	91,9	86,4	88,8	91,0	86,2	78,5	69,9
3300FA	98	66	78	90,9	89,9	91,3	93,0	88,2	80,0	70,9
3600FA	98	66	78	89,9	90,4	91,3	93,5	87,2	78,0	69,9
2000FE	88	56	68	83,9	78,1	79,4	78,2	78,5	74,3	68,3
2250FE	89	57	69	83,7	81,5	80,5	81,6	80,7	74,7	66,9
2500FE	91	59	71	84,4	84,4	82,3	84,5	83,2	76,0	65,9
2800FE	92	60	72	87,9	80,4	83,3	85,5	80,2	71,0	62,9
3000FE	91	59	71	88,9	79,4	81,8	82,0	79,2	70,0	61,9
3300FE	92	60	72	88,9	81,4	82,3	86,0	84,2	74,0	66,9
3600FE	92	60	72	87,9	82,9	82,6	87,0	83,7	74,0	66,3

19. CONTROL AND SAFETY PARAMETERS CALIBRATION

COOLING SET	min	Max.	default
Water inlet temperature in cooling mode	-10°C/14°F	20°C/68°F	7°C/44.6°C

ANTI-FREEZE INTERVENTION	min	Max.	default
Anti-freeze alarm intervention temperature on EV side	-15°C/5°F	4°C/39.2°F	3°C/37.4°F

TOTAL DIFFERENTIAL	min	Max.	default
Proportional temperature band within which the compressors are activated and deactivated	3°C / 5,4	10°C / 10	5°C / 18

		2000	2250	2500	2800	3000	3300	3600
HIGH PRESSURE SWITCH WITH MANUAL RESET								
PA	psi/bar	580.15/40	580.15/40	580.15/40	580.15/40	580.15/40	580.15/40	580.15/40
HIGH PRESSURE TRANSDUCER								
TAP	psi/bar	725.19/50	725.19/50	725.19/50	725.19/50	725.19/50	725.19/50	725.19/50
LOW PRESSURE TRANSDUCER								
TBP	psi/bar	435.11/30	435.11/30	435.11/30	435.11/30	435.11/30	435.11/30	435.11/30
CHILLER CIRCUIT SAFETY VALVE								
AP	psi/bar	652.67/45	652.67/45	652.67/45	652.67/45	652.67/45	652.67/45	652.67/45

19.1. COMPRESSOR THERMOMAGNETIC (460V-3-60HZ)

COMPRESSOR THERMOMAGNETIC		Circuit	2000	2250	2500	2800	3000	3300	3600
MTC1	A	1	40.5	40.5	51.5	51.5	40.5	40.5	51.5
MTC1A	A		40.5	40.5	51.5	51.5	40.5	40.5	51.5
MTC1B	A		---	---	---	---	40.5	40.5	51.5
MTC2	A	2	40.5	40.5	51.5	40.5	40.5	51.5	51.5
MTC2A	A		40.5	40.5	51.5	40.5	40.5	51.5	51.5
MTC2C	A		---	---	---	40.5	40.5	51.5	51.5
MTC3	A	3	40.5	51.5	51.5	51.5	40.5	40.5	51.5
MTC3A	A		40.5	51.5	51.5	51.5	40.5	40.5	51.5
MTC3B	A		---	---	---	---	40.5	40.5	51.5
MTC4	A	4	40.5	51.5	51.5	40.5	40.5	51.5	51.5
MTC4A	A		40.5	51.5	51.5	40.5	40.5	51.5	51.5
MTC4B	A		---	---	---	40.5	40.5	51.5	51.5

19.2. COMPRESSOR THERMOMAGNETIC (575V-3-60HZ)

COMPRESSOR THERMOMAGNETIC		Circuit	2000	2250	2500	2800	3000	3300	3600
MTC1	A	1	32.3	32.3	41.7	41.7	32.3	32.3	41.7
MTC1A	A		32.3	32.3	41.7	41.7	32.3	32.3	41.7
MTC1B	A		---	---	---	---	32.3	32.3	41.7
MTC2	A	2	32.3	32.3	41.7	32.3	32.3	41.7	41.7
MTC2A	A		32.3	32.3	41.7	32.3	32.3	41.7	41.7
MTC2C	A		---	---	---	32.3	32.3	41.7	41.7
MTC3	A	3	32.3	41.7	41.7	41.7	32.3	32.3	41.7
MTC3A	A		32.3	41.7	41.7	41.7	32.3	32.3	41.7
MTC3B	A		---	---	---	---	32.3	32.3	41.7
MTC4	A	4	32.3	41.7	41.7	32.3	32.3	41.7	41.7
MTC4A	A		32.3	41.7	41.7	32.3	32.3	41.7	41.7
MTC4B	A		---	---	---	32.3	32.3	41.7	41.7

19.3. PUMP THERMOMAGNETIC (03-P3)

PUMP THERMOMAGNETIC		Power supply	2000	2250	2500	2800	3000	3300	3600
MP1	A	460V-3-60Hz	7.2	7.2	9.7	9.7	13.2	13.2	13.2
	A	575V-3-60Hz	5.8	5.8	5.8	5.8	10.6	10.6	10.6
MP2	A	460V-3-60Hz	7.2	9.7	9.7	9.7	13.2	13.2	13.2
	A	575V-3-60Hz	5.8	7.7	5.8	5.8	10.6	10.6	10.6

19.4. PUMP THERMOMAGNETIC (04-P4)

PUMP THERMOMAGNETIC		Power supply	2000	2250	2500	2800	3000	3300	3600
MP1	A	460V-3-60Hz	7.2	7.2	9.7	9.7	13.2	13.2	13.2
	A	575V-3-60Hz	5.8	5.8	5.8	5.8	10.6	10.6	10.6
MP1A	A	460V-3-60Hz	7.2	7.2	9.7	9.7	13.2	13.2	13.2
	A	575V-3-60Hz	5.8	5.8	5.8	5.8	10.6	10.6	10.6
MP2	A	460V-3-60Hz	7.2	9.7	9.7	9.7	13.2	13.2	13.2
	A	575V-3-60Hz	5.8	7.7	5.8	5.8	10.6	10.6	10.6
MP2A	A	460V-3-60Hz	7.2	9.7	9.7	9.7	13.2	13.2	13.2
	A	575V-3-60Hz	5.8	7.7	5.8	5.8	10.6	10.6	10.6

19.5. FAN UNITS THERMOMAGNETIC (460V-3-60HZ)

COMPRESSOR THERMOMAGNETIC		Circuit	2000	2250	2500	2800	3000	3300	3600
MTV1	A	1	4.2	4.2	4.2	4.2	4.2	4.2	4.2
MTV1A	A		4.2	4.2	4.2	4.2	4.2	4.2	4.2
MTV1B	A		---	---	4.2	4.2	4.2	4.2	4.2
MTV1C	A		---	---	---	---	---	4.2	4.2
MTV2	A	2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
MTV2A	A		4.2	4.2	4.2	4.2	4.2	4.2	4.2
MTV2B	A		---	---	4.2	4.2	4.2	4.2	4.2
MTV2C	A		---	---	---	---	---	4.2	4.2
MTV3	A	3	4.2	4.2	4.2	4.2	4.2	4.2	4.2
MTV3A	A		4.2	4.2	4.2	4.2	4.2	4.2	4.2
MTV3B	A		---	4.2	4.2	4.2	4.2	4.2	4.2
MTV3C	A		---	---	---	---	---	4.2	4.2
MTV4	A	4	4.2	4.2	4.2	4.2	4.2	4.2	4.2
MTV4A	A		4.2	4.2	4.2	4.2	4.2	4.2	4.2
MTV4B	A		---	4.2	4.2	4.2	4.2	4.2	4.2
MTV4C	A		---	---	---	---	---	4.2	4.2

19.6. FAN UNITS THERMOMAGNETIC (575V-3-60HZ)

COMPRESSOR THERMOMAGNETIC		Circuit	2000	2250	2500	2800	3000	3300	3600
MTV1	A	1	3.7	3.7	3.7	3.7	3.7	3.7	3.7
MTV1A	A		3.7	3.7	3.7	3.7	3.7	3.7	3.7
MTV1B	A		---	---	3.7	3.7	3.7	3.7	3.7
MTV1C	A		---	---	---	---	---	3.7	3.7
MTV2	A	2	3.7	3.7	3.7	3.7	3.7	3.7	3.7
MTV2A	A		3.7	3.7	3.7	3.7	3.7	3.7	3.7
MTV2B	A		---	---	3.7	3.7	3.7	3.7	3.7
MTV2C	A		---	---	---	---	---	3.7	3.7
MTV3	A	3	3.7	3.7	3.7	3.7	3.7	3.7	3.7
MTV3A	A		3.7	3.7	3.7	3.7	3.7	3.7	3.7
MTV3B	A		---	3.7	3.7	3.7	3.7	3.7	3.7
MTV3C	A		---	---	---	---	---	3.7	3.7
MTV4	A	4	3.7	3.7	3.7	3.7	3.7	3.7	3.7
MTV4A	A		3.7	3.7	3.7	3.7	3.7	3.7	3.7
MTV4B	A		---	3.7	3.7	3.7	3.7	3.7	3.7
MTV4C	A		---	---	---	---	---	3.7	3.7

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