English

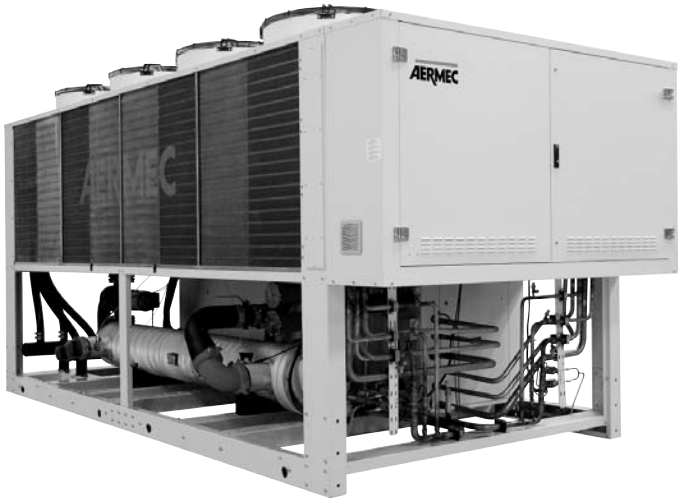
NSB

R134a

FREECOOLING

TECHNICAL MANUAL - INSTALLATION - MAINTENANCE

Air/water chiller with screw compressors



CE

AERMEC
COMPANY QUALITY SYSTEM
ICIM
CISQ IQNet

❄ 272 KW ÷ 1414 KW

FC 280 KW ÷ 1469 KW

INSBFCPY 0810 6310902_01 replacing 6310902_00 del 0710

SELECTION INSTRUCTIONS

Dear Customer,
Thank you for having purchased an AERMEC product. This product is the result of many years of experience and in-depth engineering research, and it is built using top quality materials and advanced technologies.
Moreover, the CE mark guarantees that the appliances respond to the requisites of the European Machinery Directive on the subject safety. The qualitative level is under constant surveillance and AERMEC products are therefore a synonym of 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 SpA

Index

To install the appliance, please comply with the warnings regarding safety, contained in these instructions


Moving parts hazard


High temperature hazard


Voltage hazard


Danger, disconnect voltage


Generic danger


Useful information and warnings

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NSB

SERIAL NUMBER	

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

NAME **NSB**

TYPE **FREECOOLING CHILLER**

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 system and heat pumps - Safety and environmental requirements
UNI EN 12735	Seamless, round copper pipes for air conditioning and cooling
UNI EN 14276	Pressurised equipment for cooling systems and heat pumps

Therefore complying with the essential requirements of the following directives:

- LVD Directive: 2006/95/CE
- Electromagnetic Compatibility Directive 2004/108/CE
- Machinery Directive 98/37/CE
- PED Directive regarding pressurised devices 97/23/CE

The product, in agreement with Directive 97/23/CE, satisfies the Total quality Guarantee procedure (form H) with certificate n.06/270-QT3664 Rev.3 issued by the notified body n.1131 CEC via Pisacane 46 Legnano (MI) - Italy

Bevilacqua 14/12/2007

Marketing Manager
Signature

1. WARNINGS REGARDING THE DOCUMENTATION

1.1. USE IN COMPLIANCE WITH DESTINATION

The AERMEC NSB chillers are built in compliance with Technical Standards and the acknowledged technical safety regulations. These appliances are designed and built for cooling and must be used accordingly in compatibility with their technical features. However, 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 not in compliance with that declared.
Any use not expressly indicated in this manual is not permitted and consequently **AERMEC will not assume any responsibility for damage occurring owing 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 to keep 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 prepared staff, in compliance with national legislation in force in the country of destination (Ministerial Decree 329/2004).
The appliance must be installed in a way to make maintenance and/or repairs possible. 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 if the above-mentioned indications are not respected.

2. FUNDAMENTAL SAFETY RULES

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

- This appliance is not suitable for use by persons (including children) with limited physical, sensory, or mental capacities or those lacking experience or knowledge, unless they are supervised or instructed regarding the use of the appliance by a person who is responsible for their safety. Children must be supervised to make sure that 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 positioning the system master switch and the control panel main switch at "off"
- It is prohibited to modify the safety or adjustment devices without the manufacturer's authorisation and precise instructions
- It is prohibited to pull, detach or twist the electrical cables coming from the unit, even if it is disconnected from the mains power supply
- It is prohibited to leave containers and flammable substances near to the chiller
- 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 doors to access the internal parts of the appliance, without first having first positioned the system master switch at off
- It is prohibited to disperse, abandon or leave the packing materials within the reach of children, as they are a potential source of danger.

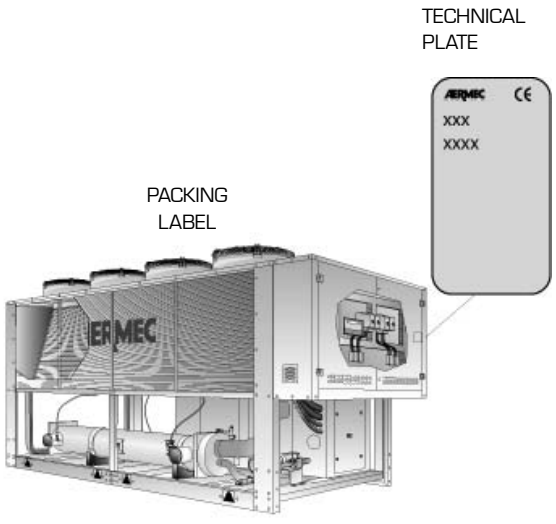
3. PRODUCT IDENTIFICATION

The NSB can be identified by:

- **Packing label**
  that shows the product identification data

- **Technical plate**
  Positioned on the longitudinal member of the electric box.

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



4. DESCRIPTION OF THE UNIT

Air-cooled liquid chillers with axial fans for outdoor installation (IP24 protection rating). They have one or more cooling circuits. The evaporators are the dry expansion shell and tube type. The entire range has up to three twin-screw compressors.
The new **NSB A** range is characterised by high efficiency values (**EER**) also thanks to the use of **R134a** refrigerant, which allows to obtain much higher efficiency than equivalent products functioning with R407C.
This result is also fruit of an accurate study and dimensioning of all internal components in order to make the most of the features of the **R134a** refrigerant gas.
PARTICULAR attention has been paid to the dimensioning of the heat exchangers, compressors and fans.
All units are inspected and delivered complete with refrigerant and oil load, (only hydraulic and electrical connections must be made on site).

4.1. AVAILABLE MODELS

- "COOLING ONLY" maximum external temperature allowed 46°C, (42°C for size 1601-3002-3202-3402-5003-5203) Acoustic protection cover for compressor for silent functioning.

4.2. AVAILABLE VERSIONS

- "HIGH EFFICIENCY" Maximum external temperature allowed 46°C, (42°C for size 1601-3002-3202-3402-5003-5203) acoustic protection cover for compressor for more silent functioning

- "SILENCED (E)" Extra to the high efficiency version (A) this configuration envisions a silencer on the pressing line and an electronic phase cutting device, which allows a reduction of fan revs. on the variation of the environmental temperature conditions.

ATTENTION
Before every unit start-up (or at the end of every prolonged pause period) it is extremely important that the compressor sump oil has been previously heated, by means of the power supply of the relevant electric resistance, for a period of at least 8 hours. The sump resistance is powered automatically when the unit stops as long as the unit is live

4.3. SET-UPS AVAILABLE

NSB range chillers are available in 32 sizes. By appropriately combining the variety of options available, it is possible to configure every model in the NSB range in a manner that satisfies all specific implant requirements.
The following configurer shows how to make up the sales code in the 16 fields that make it up, representative of the options available.

4.3.1. Configurer

1,2,3	4,5,6,7	8	9	10	11	12	13	14	15-16
NSB	1251	X	°	°	A	°	°	°	FB

Field **Identification**

1, 2 ,3 **NSB**

4, 5, 6, 7 **Sizes** 1251-1401-1601-1801-2101-2401-1402-1602-1802-2002-2202-2352-2502-2652-2802-3002-3202-3402-3602-3902-4202-4502-4802-5003-5203-5403-5703-6003-6303-6603-6903-7203

8 **Refrigerant**
- **°** Standard
- **Y** Low temperatures (to -6°C)
- **X** With electronic valve

9 **Model**
- **°** Cooling Only

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

11 **Version**
- **A** High efficiency
- **E** High efficiency in silenced execution

12 **Coils**
- **°** In aluminium
- **R** In copper
- **S** In tinned copper
- **V** In painted aluminium

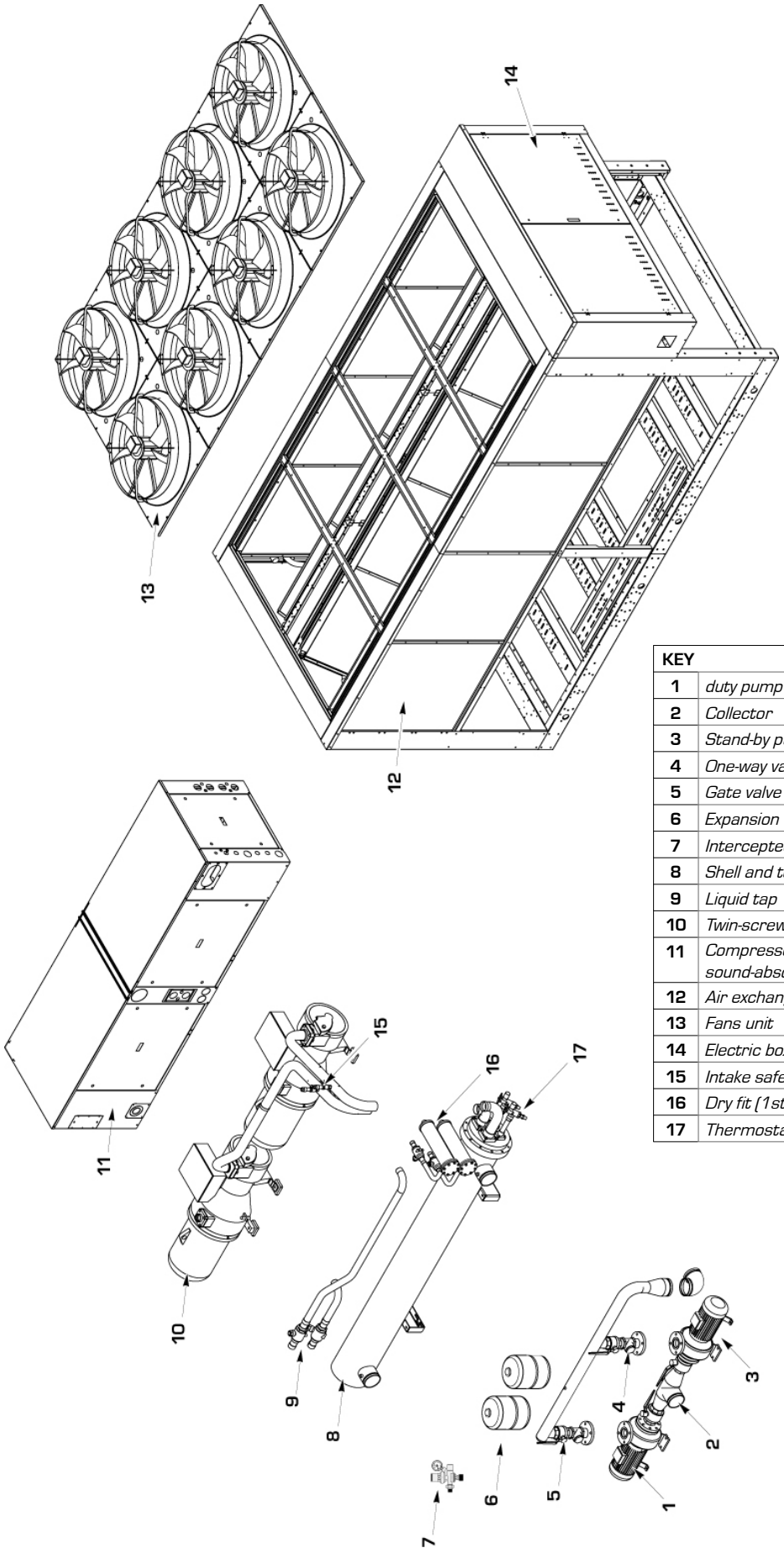
13 **Heat exchangers**
- **°** PED Regulation

14 **Power supply**
- **°** 3~ 400V - 50 Hz with fuses
- **2** 3~ 230V - 50 Hz with fuses
- **4** 3~ 230V - 50 Hz with magnet circuit breakers
- **5** 3~ 500V - 50Hz with fuses
- **8** 3~ 400V - 50 Hz with magnet circuit breakers
- **9** 3~ 500V - 50Hz with magnet circuit breakers

15-16 **Pumps**
- **F0** Without pumping unit
- **FA** Pumping unit (pump A)
- **FB** Pumping unit (pump A and reserve pump)
- **FC** Pumping unit (pump C)
- **FD** Pumping unit (pump C and reserve pump)
- **FE** Pumping unit (pump E)
- **FF** Pumping unit (pump E and reserve pump)
- **FG** Pumping unit (pump G)
- **FH** Pumping unit (pump G and reserve pump)
- **FJ** Pumping unit (pump J)
- **FK** Pumping unit (pump J and reserve pump)

5. DESCRIPTION OF THE COMPONENTS

Example NSB 2401 FB



KEY	
1	*duty pump*
2	*Collector*
3	*Stand-by pump*
4	*One-way valve*
5	*Gate valve*
6	*Expansion vessels (25 l x 2)*
7	*Intercepted charging assembly*
8	*Shell and tube heat exchanger*
9	*Liquid tap*
10	*Twin-screw compressor*
11	*Compressors compartment covered in sound-absorbing material*
12	*Air exchange coil*
13	*Fans unit*
14	*Electric box*
15	*Intake safety valve (1st for circuit)*
16	*Dry fit (1st for circuit)*
17	*Thermostatic valve (1st for circuit)*

5.1. COOLING CIRCUIT

Compressors
High efficiency semi-hermetic screw compressors with cooling capacity adjustment by means of continuous modulation from 40 to 100% (from 25 to 100% with electronic valve) and supplied with:
- Motor circuit breaker protection
- Oil discharge temperature control
- Electric resistance for heating oil sump with compressor at a standstill
- Reset button.

Water side heat exchanger
Shell and tube direct expansion heat exchanger, suitably dimensioned to obtain high performance.
Steel case with closed cell expanded elastomer anti-condensation covering. the shell and tube is made from copper pipes with a special section that allows high heat exchange associated to efficient draining. On request the heat exchanger can be equipped with an anti-freeze electric resistance (accessory to be mounted in the factory), which protects the heat exchanger from external temperatures to -20°C, with the aim of preventing the formation of ice in stand-by mode. With the unit running, protection is assured by the outlet water temperature probe

Dry fit
With removable cartridge, it can withhold the impurities and eventual traces of humidity in the cooling circuit

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

Thermostatic valve
Mechanical valve, with external equaliser positioned at evaporator output, modulates the flow of gas to the evaporator, depending on the heat load, in a way to ensure correct heating of the intake gas

Liquid and pressing line taps
They allow to shut-off the refrigerant in the case of extraordinary maintenance

Silencer
Positioned on the compressor flow in the E version. It contributes to attenuating noise emission

Solenoid valve
The valve closes when the compressor switches off, blocking the flow of refrigerant gas to the evaporator

5.2. FRAME AND FANS

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

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

Acoustic protection cover
All NSB versions are per standard made up from a thick sheet steel compartment and internally covered with sound-absorbing material. It allows to reduce the sound power level emitted by the unit and also protects the compressors from atmospheric agents.

5.3. HYDRAULIC COMPONENTS

Circulation pump/s
Whilst working with pump components it offers a static pressure that is useful for beating system pressure drops.
In the presence of a second pump (reserve), switch-over takes place manually by acting in the selector switch positioned inside the electric control board

Filling unit
(only in versions with pump)
It is supplied with a manometer for display of the system pressure

Expansion vessels
(only in versions with pump)
Two 25 litre membrane vessels with nitrogen pre-load.

Three-way valve
Present on the water side of the freecooling circuit, it is an electric servocontrolled ON-OFF diverter valve.

Freecooling air-water exchanger
Passed over by water in the freecooling functioning mode.
Made with copper pipes and aluminium louvered fins blocked by mechanical expansion of the pipes.
It is the high efficiency type.

5.4. SAFETY AND CONTROL COMPONENTS

IP54 differential pressure switch (installed in series)
It has the task of controlling that there is correct water circulation. If this is not the case, it blocks the unit

Low pressure transducer
It allows to view the compressor intake pressure value on the microprocessor board display (one per circuit). Positioned on the low pressure side of the cooling circuit, it stops compressor functioning in the case of anomalous work pressures

High pressure transducer
It allows to view the compressor flow pressure value on the microprocessor board display (one per circuit). Positioned on the high pressure side of the cooling circuit, it stops compressor functioning in the case of anomalous work pressures

Double high pressure switch (manual + tool)
Factory calibrated, placed on the high pressure side of the cooling circuit, it stops compressor functioning in the case of abnormal work pressures

Cooling circuit safety valve (HP, LP)
Calibrated at 22 bar HP - 16.5 LP. they intervene by discharging the over/pressure in the case of anomalous pressures.

5.5. ELECTRIC COMPONENTS

Electric control board
It contains the power section and the management of controls and safety devices. It is in compliance with IEC 60204-1 Standards and the Directives regarding Electromagnetic Compatibility EMC 89/336/EEC and 92/31/EEC. Moreover, all cables are numbered for immediate recognition of all electric components

NOTE
Moreover, all cables are numbered for immediate recognition of all electric components

Door-lock isolating switch
IT is possible to access the electric control board by removing the voltage on the opening lever of the control board itself. This lever can be blocked with one

or more padlocks during maintenance interventions in order to prevent undesired machine energising

Control keyboard
It allows the complete control of the appliance. For a more detailed description, refer to the user manual

- **Fuses and magnet circuit breakers for protection of the compressors, to be specified on ordering.**
- **Magnet circuit breakers for fan protection**
- **Auxiliary magnet circuit breaker protection**

5.6. ELECTRONIC ADJUSTMENT

The electronic adjustment of NSB chillers is made up from a control board for each compressor connected to each other in a network and a control panel with display. In the case of multi-compressor models the board that controls compressor n°1 is the "MASTER" board while the others are "SLAVE". Transducers, loads and alarms relative to the compressor that controls are connected on each board, while the general machine ones are only connected onto the master board

Microprocessor
- remote ON/OFF with external contact without voltage
- Multi-language menu
- Phases sequence control
- Independent control of the individual compressors
- Amperometric transformer
- Cumulative faults block signal
- Historical alarms function
- Daily/weekly programming
- Inlet/outlet water temperature display
- Alarms display
- Integral proportional adjustment on the outlet water temperature
- Programmable timer function
- Function with double calibration point linked to an external contact
- Fan adjustment
- Can be interfaced with Modbus protocol (accessory)
- Pump/s control
- Compressors rotation management
- Analogue input from 4 to 20 mA
- External air temperature probe
- "Always Working" function. In the case of critical conditions (e.g. an environmental temperature that is too high) the machine does not stop but can adjust itself and supply the maximum power in those conditions
- Self-adapting "Switching Hysteresis" work differential to always ensure the correct functioning times of the compressors even in plants with low water content or insufficient capacities. This system decreases wear of the compressors
- AFFP "Anti Freezing Fan Protection" system that periodically switches the fans on when external temperatures are very low
- PDC "Pull Down Control" system to prevent the activation of power steps when the temperature of the water quickly approaches the set-point. It optimises machine functioning when working normally and in the presence of load variations, thus ensuring the best efficiency in all conditions.

For further information please refer to user manual.

6. ACCESSORIES

		1251	1401	1601	1801	2101	2401	1402	1602	1802	2002	2202	2352	2502	2652	2802	3002
AER485P2		This accessory allows connection of the unit to BMS supervising systems with RS485 electric standard and MODBUS protocol															
		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
AK E versions only	(1)	AK: Acoustic kit This accessory allows further noise reduction by means of: - An optimised compressor cover using high density material without lead that allows to reduce vibrations even further - Anti-vibration mounts in AV rubber for compressors in order to reduce their vibrations so as to prevent damage caused to the pipes and use of flexible joints - Isolation of the larger pipes to reduce the typical noise of the gas - Isolation in the most critical points														
		E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
AVX		Spring anti-vibration mounts															
		501	501	501	506	512	512	501	501	505	511	511	511	511	511	511	509
PRV		Allows to control the chiller at a distance															
		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
ROMEO		The ROMEO device allows the remote control of the chiller from a mobile phone with WAP browser. It also allows to send alarm or pre-alarm SMS up to threes GSM mobile phones, even if they do not have WAP browser. The AER485 is included in the kit. The AER485P2 accessory must be added to this kit															
		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
RIF **400V - 3 - 50Hz**	(1)	Connected in parallel to the motor, it allows a reduction of the input current															
		301	301	301	301	371	411	161X2	161X2	201X2	201-241	241X2	241-301	301X2	301X2	301X2	301X2
MULTICHILLER		Control system for control, switch-on and switch-off of the individual chillers in a plant in where multiple units are installed in parallel. It is possible to choose from several command logics: sequential, homogeneous, combi. The accessory is supplied in an IP65 rated box															
		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
KRS	(1)	Heat exchangers electric resistance for outdoor temperatures to -20°C															
		4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5x2
GP	(1)	It protects the external coil from accidental blows and prevents access to the area below where the compressors and cooling circuit are housed															
		300M	300M	300M	400M	500M	500M	300B	300B	400B	500B	500B	500B	500B	500B	500B	300Mx2

6.6.1. ***(1) Accessories only applicable in the factory***

- *AK Acoustic kit*
- *RIF Re-phasers available only with 400V-3-50Hz power supply*
- *KRS heat exchangers electric resistance*
- *GP Protection Grid*

		3202	3402	3602	3902	4202	4502	4802	5003	5203	5403	5703	6003	6303	6603	6903	7203
AER485P2		This accessory allows connection of the unit to BMS supervising systems with RS485 electric standard and MODBUS protocol															
		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
AK E versions only	(1)	AK: Acoustic kit This accessory allows further noise reduction by means of: - An optimised compressor cover using high density material without lead that allows to reduce vibrations even further - Anti-vibration mounts in AV rubber for compressors in order to reduce their vibrations so as to prevent damage caused to the pipes and use of flexible joints - Isolation of the larger pipes to reduce the typical noise of the gas - Isolation in the most critical points															
		E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
AVX		Spring anti-vibration mounts															
		507	513	516	518	518	521	521	517	515	524	525	525	527	527	530	530
PRV		Allows to control the chiller at a distance															
		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
ROMEO		The ROMEO device allows the remote control of the chiller from a mobile phone with WAP browser. It also allows to send alarm or pre-alarm SMS up to threes GSM mobile phones, even if they do not have WAP browser. The AER485 is included in the kit. The AER485P2 accessory must be added to this kit															
		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
RIF **400V - 3 - 500Hz**	(1)	Connected in parallel to the motor, it allows a reduction of the input current															
		301X2	301X2	301X2	301 371	301 411	371 411	411X2	301X3	301X3	301X3	301X2 371	301X2 411	301 371 411	301 411X2	301 411X2	411X3
MULTICHILLER		Control system for control, switch-on and switch-off of the individual chillers in a plant in where multiple units are installed in parallel. It is possible to choose from several command logics: sequential, homogeneous, combi. The accessory is supplied in an IP65 rated box															
		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
KRS	(1)	Heat exchangers electric resistance for outdoor temperatures to -20°C															
		5X2	5X2	5X2	5X2	5X2	5X2	5X2	5X3	5X3	5X3	5X3	5X3	5X3	5X3	5X3	5X3
GP	(1)	It protects the external coil from accidental blows and prevents access to the area below where the compressors and cooling circuit are housed															
		300Mx2	300M 400M	400Mx2	400M 500M	400M 500M	500Mx2	500Mx2	300Mx2 400M	300M 400Mx2	400Mx3	400Mx2 500M	400Mx2 500M	400M 500Mx2	400M 500Mx2	500Mx3	500Mx3

6.6.2. ***(1) Accessories only applicable in the factory***

- *AK Acoustic kit*
- *RIF Re-phasers available only with 400V-3-50Hz power supply*
- *KRS heat exchangers electric resistance*
- *GP Protection Grid*

7. TECHNICAL DATA

7.1. NSB 1251A ÷ 2202A "HIGH EFFICIENCY AND IN FREECOOLING MODE

COOLING		1251A	1401A	1601A	1801A	2101A	2401A	1402A	1602A	1802A	2002A	2202A
Cooling capacity	kW	272	304	338	408	465	518	285	324	377	429	480
Total input power	kW	91	104	115	144	157	177	103	119	133	153	168
Evaporator water flow rate	l/h	46830	52360	58070	70250	79960	89100	49040	55670	64810	73720	82630
Evaporator pressure drop	kPa	48	30	36	43	32	37	27	32	43	48	34

FREECOOLING												
Cooling capacity	kW	280	291	301	403	486	503	285	297	393	452	491
Total input power	kW	12	12	12	16	20	20	12	12	16	20	20
Total pressure drop	kPa	121	125	108	153	135	176	118	102	142	143	152

EFFICIENCY INDEX												
EER	A	W/W	2.98	2.92	2.94	2.84	2.97	2.92	2.77	2.73	2.82	2.81	2.86
	FC	W/W	23.33	24.27	25.10	25.21	24.29	25.17	23.73	24.76	24.56	22.59	24.56
ESEER	A		4.22	4.24	4.30	4.24	4.20	4.28	4.20	4.22	4.20	4.23	4.24

ELECTRICAL DATA													
Power supply		V	400V-3-50Hz										
Nominal current	A	A	160	180	196	238	267	299	179	205	225	261	288
	FC	A	24	24	24	32	40	40	24	24	32	40	40
Maximum current	FLA	A	248	310	355	363	418	468	279	304	353	401	442
Peak current	LRA	A	338	460	489	497	626	690	226	266	308	352	366

COMPRESSORS												
Type		twin-screw										
Number	n°	1	1	1	1	1	1	2	2	2	2	2
Number per circuit	n°/n°	1/1	1/1	1/1	1/1	1/1	1/1	2/1	2/1	2/1	2/1	2/1

PARTIAL LOAD													
Partial load	VT Std	Pf.	%	56-100	56-100	56-100	56-100	56-100	56-100	28-100	28-100	28-100	28-100	28-100
		Pa.	%	49-100	49-100	49-100	49-100	49-100	49-100	24-100	24-100	24-100	24-100	24-100
	VT ele	Pf.	%	43-100	43-100	43-100	43-100	43-100	43-100	22-100	22-100	22-100	22-100	22-100
		Pa.	%	42-100	42-100	42-100	42-100	42-100	42-100	21-100	21-100	21-100	21-100	21-100

EVAPORATOR												
Type		Shell and tube										
Number	n°	1	1	1	1	1	1	1	1	1	1	1
Hydraulic connections	Tipo/ø	V / 4"	V / 5"	V / 5"	V / 5"	V / 6"	V / 6"	V / 5"	V / 5"	V / 5"	V / 6"	V / 6"

FANS													
Type			Axial										
Number		n°	6	6	6	8	10	10	6	6	8	10	10
Air flow rate	A/FC	m^3/h	102000	102000	102000	136000	170000	170000	102000	102000	136000	170000	170000
Input power	A/FC	kW	12	12	12	16	20	20	12	12	16	20	20
Current absorbed	A/FC	A	24	24	24	32	40	40	24	24	32	40	40

SOUND DATA												
Sound power	A/FC	dB(A)	94.0	95.0	97.0	97.0	98.0	98.0	96.0	97.0	97.0	98.0	98.0
Sound Pressure	A/FC	dB(A)	62.0	63.0	65.0	65.0	66.0	66.0	64.0	65.0	65.0	66.0	66.0

DIMENSIONS												
Height	mm	2450	2450	2450	2450	2450	2450	2450	2450	2450	2450	2450
Width	mm	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Length	mm	3780	3780	3780	4770	5750	5750	3780	3780	4770	5750	5750
empty WEIGHT	kg	3760	3770	3840	5000	5950	5980	4010	4030	4730	5740	5790

PUMPS		FA	FC	FE	FG	FJ
Input power	kW	4	55	75	92	11
Current absorbed	A	55	75	10	125	15
Weight	kg	109	117	121	140	148

NOTE
Pf. Cooling capacity
Pa. Input power

DATA DECLARED ACCORDING TO EN14511:2004

cooling

- *Input water temperature 12 °C*
- *Produced water temperature 7 °C*
- *External air temperature 35 °C*
- *Δt 5k*

Frecooling

- *Input water temperature 15 °C*
- *External air temperature 2 °C*
- *Glycol 0%*

- *SOUND PRESSURE measured in free field conditions at a distance of 10 mt. with directivity factor Q=2 in compliance with ISO 3744*
- *SOUND POWER Aermec determines the sound power value on the basis of measurements made in compliance with ISO 9614-2 Standards, with respect to the requisites implemented by EUROVENT certification*

7.2. NSB 2352A ÷ 4502A "HIGH EFFICIENCY AND IN FREECOOLING MODE

COOLING		2352A	2502A	2652A	2802A	3002A	3202A	3402A	3602A	3902A	4202A	4502A
Cooling capacity	kW	501	522	553	584	642	675	746	817	873	926	983
Total input power	kW	177	186	200	215	219	230	259	288	300	321	334
Evaporator water flow rate	l/h	86240	89860	95190	100520	110420	116130	128320	140500	150210	159350	169060
Evaporator pressure drop	kPa	37	40	32	35	33	36	42	43	38	42	35

FREECOOLING												
Cooling capacity	kW	498	505	514	522	592	602	705	807	889	907	989
Total input power	kW	20	20	20	20	24	24	28	32	36	36	40
Total pressure drop	kPa	168	184	197	226	116	108	130	153	144	165	156

EFFICIENCY INDEX												
EER	A	W/W	2.83	2.81	2.76	2.72	2.93	2.94	2.88	2.84	2.91	2.89	2.95
	FC	W/W	24.91	25.24	25.69	26.10	24.68	25.10	25.16	25.21	24.70	25.19	24.73
ESEER	A		3.71	4.25	4.25	4.21	4.28	4.3	4.26	4.19	4.18	4.24	4.17

ELECTRICAL DATA													
Power supply		V	400V-3-50Hz										
Nominal current	A	A	305	322	344	366	376	391	434	476	505	537	566
	FC	A	40	40	40	40	48	48	56	64	72	72	80
Maximum current	FLA	A	464	487	518	548	588	620	673	726	781	831	885
Peak current	LRA	A	413	429	456	458	464	464	594	618	745	847	847

COMPRESSORS													
Type			twin-screw										
Number		n°	2	2	2	2	2	2	2	2	2	2	2
Number per circuit		n°/n°	2/1	2/1	2/1	2/1	2/2	2/2	2/2	2/2	2/2	2/2	2/2

PARTIAL LOAD														
Partial load	VT Std	Pf.	%	28-100	28-100	28-100	28-100	28-100	28-100	28-100	28-100	28-100	28-100	28-100
		Pa.	%	24-100	24-100	24-100	24-100	24-100	24-100	24-100	24-100	24-100	24-100	24-100
	VT ele	Pf.	%	22-100	22-100	22-100	22-100	22-100	22-100	22-100	22-100	22-100	22-100	22-100
		Pa.	%	21-100	21-100	21-100	21-100	21-100	21-100	21-100	21-100	21-100	21-100	21-100

EVAPORATOR												
Type			Shell and tube										
Number		n°	1	1	1	1	2	2	2	2	2	2	2
Hydraulic connections		Tipo/ø	V / 6"	V / 6"	V / 6"	V / 6"	V / 5"	V / 5"	V / 5"	V / 5"	V 5"-6"	V 5"-6"	V / 6"

FANS													
Type			Axial										
Number		n°	10	10	10	10	12	12	14	16	18	18	20
Air flow rate	A/FC	m^3/h	170000	170000	170000	170000	204000	204000	238000	272000	306000	306000	340000
Input power	A/FC	kW	20	20	20	20	24	24	28	20	36	36	40
Current absorbed	A/FC	A	40	40	40	40	36	36	42	48	54	54	60

SOUND DATA													
Sound power	A/FC	dB(A)	98.0	98.0	99.0	99.0	99.0	100.0	100.0	100.0	101.0	101.0	101.0
Sound Pressure	A/FC	dB(A)	66.0	66.0	67.0	67.0	67.0	68.0	68.0	68.0	69.0	69.0	69.0

DIMENSIONS													
Height		mm	2450	2450	2450	2450	2450	2450	2450	2450	2450	2450	2450
Width		mm	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Length		mm	5750	5750	5750	5750	7160	7160	8150	9140	10120	10120	11100
empty WEIGHT		kg	6340	6330	6340	6350	7210	7310	8410	9180	10580	11580	11104

PUMPS		FA	FC	FE	FG	FJ
Input power	kW	4	55	75	92	11
Current absorbed	A	55	75	10	125	15
Weight	kg	109	117	121	140	148

NOTE
Pf. Cooling capacity
Pa. Input power

DATA DECLARED ACCORDING TO EN14511:2004

cooling

- *Input water temperature* *12 °C*
- *Produced water temperature* *7 °C*
- *External air temperature* *35 °C*
- *Δt* *5k*

Frecooling

- *Input water temperature* *15 °C*
- *External air temperature* *2 °C*
- *Glycol* *0%*
- *SOUND PRESSURE measured in free field conditions at a distance of 10 mt. with directivity factor Q=2 in compliance with ISO 3744*
- *SOUND POWER Aermec determines the sound power value on the basis of measurements made in compliance with ISO 9614-2 Standards, with respect to the requisites implemented by EUROVENT certification*

7.3. NSB 4802A ÷ 7203A "HIGH EFFICIENCY AND IN FREECOOLING MODE

COOLING			4802A	5003A	5203A	5403A	5703A	6003A	6303A	6603A	6903A	7203A
Cooling capacity		kW	1036	1084	1154	1225	1282	1335	1391	1444	1501	1554
Total input power		kW	354	374	403	432	444	465	478	498	511	532
Evaporator water flow rate		l/h	178200	186390	198570	210750	220460	229600	239310	248450	258160	267300
Evaporator pressure drop		kPa	37	42	42	43	38	42	38	42	35	37
FREECOOLING												
Cooling capacity		kW	1007	1006	1108	1210	1293	1310	1393	1410	1493	1510
Total input power		kW	40	40	44	48	52	52	56	56	60	60
Total pressure drop		kPa	176	123	138	153	147	161	155	149	163	176
EFFICIENCY INDEX												
EER	A	W/W	2.92	2.90	2.87	2.84	2.88	2.87	2.91	2.90	2.94	2.92
	FC	W/W	25.17	25.14	25.18	25.21	24.86	25.20	24.87	25.18	24.88	25.17
ESEER	A		4.17	4.25	4.26	4.2	4.15	4.28	4.25	4.28	4.29	4.28
ELECTRICAL DATA												
Power supply		V	400V-3-50Hz									
Nominal current	A	A	598	629	672	714	743	775	804	836	865	897
	FC	A	80	80	88	96	104	104	112	112	120	120
Maximum current	FLA	A	936	1074	1082	1090	1144	1194	1249	1299	1353	1403
Peak current	LRA	A	850	727	850	973	1102	1166	1195	1227	1256	1288
COMPRESSORS												
Type			twin-screw									
Number		n°	2	2	2	2	2	2	2	2	2	2
Number per circuit		n°/n°	2/2	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3
PARTIAL LOAD												
Partial load	VT Std	Pf.	%	28-100	28-100	28-100	28-100	28-100	28-100	28-100	28-100	28-100	28-100
		Pa.	%	24-100	24-100	24-100	24-100	24-100	24-100	24-100	24-100	24-100	24-100
	VT ele	Pf.	%	22-100	22-100	22-100	22-100	22-100	22-100	22-100	22-100	22-100	22-100
		Pa.	%	21-100	21-100	21-100	21-100	21-100	21-100	21-100	21-100	21-100	21-100
EVAPORATOR												
Type			Shell and tube									
Number		n°	2	3	3	3	3	3	3	3	3	3
Hydraulic connections		Tipo/ø	V / 6"	V / 5"	V / 5"	V / 5"	V 5"-6"	V 5"-6"	V 5"-6"	V 5"-6"	V / 6"	V / 6"
FANS												
Type			Axial									
Number		n°	20	20	22	24	26	26	28	28	30	30
Air flow rate	A/FC	m^3/h	340000	340000	374000	408000	442000	442000	476000	476000	510000	510000
Input power	A/FC	kW	40	40	44	48	52	52	2	56	60	60
Current absorbed	A/FC	A	60	80	88	96	104	104	79	112	120	120
SOUND DATA												
Sound power	A/FC	dB(A)	101.0	102.0	102.0	102.0	102.0	102.0	102.0	103.0	103.0	103.0
Sound Pressure	A/FC	dB(A)	69.0	70.0	70.0	70.0	70.0	70.0	70.0	71.0	71.0	71.0
DIMENSIONS												
Height		mm	2450	2450	2450	2450	2450	2450	2450	2450	2450	2450
Width		mm	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Length		mm	11100	11530	12520	13510	14490	14490	15470	15470	16450	16450
empty WEIGHT		kg	11320	12990	13790	15220	15130	15160	16560	17560	17084	17300

PUMPS		FA	FC	FE	FG	FJ
Input power	kW	4	55	75	92	11
Current absorbed	A	55	75	10	125	15
Weight	kg	109	117	121	140	148

NOTE
Pf. Cooling capacity
Pa. Input power

DATA DECLARED ACCORDING TO EN14511:2004

cooling

- *Input water temperature 12 °C*
- *Produced water temperature 7 °C*
- *External air temperature 35 °C*
- *Δt 5k*

Frecooling

- *Input water temperature 15 °C*
- *External air temperature 2 °C*
- *Glycol 0%*
- *SOUND PRESSURE measured in free field conditions at a distance of 10 mt. with directivity factor Q=2 in compliance with ISO 3744*
- *SOUND POWER Aermec determines the sound power value on the basis of measurements made in compliance with ISO 9614-2 Standards, with respect to the requisites implemented by EUROVENT certification*

7.4. NSB 1251E ÷ 2202E "LOW NOISE HIGH EFFICIENCY EXECUTION AND IN FREECOOLING MODE

COOLING			1251E	1401E	1601E	1801E	2101E	2401E	1402E	1602E	1802E	2002E	2202E
Cooling capacity		kW	243	282	322	372	415	471	257	295	340	389	439
Total input power		kW	93	105	117	148	161	183	105	121	136	156	167
Evaporator water flow rate		l/h	41780	48420	55450	63990	71400	81080	44280	50660	58490	66950	75420
Evaporator pressure drop		kPa	38	26	33	35	26	31	22	27	35	40	28
FREECOOLING													
Cooling capacity		kW	268	283	297	391	466	490	249	288	379	420	476
Total input power		kW	12	12	12	16	20	20	12	12	16	20	20
Total pressure drop		kPa	111	118	105	144	124	167	90	96	132	124	143
EFFICIENCY INDEX													
EER	E	W/W	2.60	2.68	2.76	2.51	2.59	2.58	2.45	2.43	2.51	2.50	2.62
	FC	W/W	22.33	23.62	24.74	24.45	23.32	24.48	20.74	23.99	23.68	21.00	23.79
ESEER	E		3.07	3.08	3.13	3.08	3.05	3.11	3.08	3.1	3.09	3.11	3.11
ELECTRICAL DATA													
Power supply		V	400V-3-50Hz										
Nominal current	E	A	158	176	194	238	264	300	177	203	222	255	286
	FC	A	24	24	24	32	40	40	24	24	32	40	40
Maximum current	FLA	A	230	293	338	340	389	439	264	292	333	376	418
Peak current	LRA	A	321	443	472	474	597	661	214	256	292	332	346
COMPRESSORS													
Type			twin-screw										
Number		n°	1	1	1	1	1	1	2	2	2	2	2
Number per circuit		n°/n°	1/1	1/1	1/1	1/1	1/1	1/1	2/1	2/1	2/1	2/1	2/1
PARTIAL LOAD													
Partial load	VT Std	Pf.	%	53-100	53-100	53-100	53-100	53-100	53-100	26-100	26-100	26-100	26-100	26-100
		Pa.	%	51-100	51-100	51-100	51-100	51-100	51-100	26-100	26-100	26-100	26-100	26-100
	VT ele	Pf.	%	40-100	40-100	40-100	40-100	40-100	40-100	20-100	20-100	20-100	20-100	20-100
		Pa.	%	44-100	44-100	44-100	44-100	44-100	44-100	22-100	22-100	22-100	22-100	22-100
EVAPORATOR													
Type			Shell and tube										
Number		n°	1	1	1	1	1	1	1	1	1	1	1
Hydraulic connections		Tipo/ø	V / 4"	V / 5"	V / 5"	V / 5"	V / 6"	V / 6"	V / 5"	V / 5"	V / 5"	V / 6"	V / 6"
FANS													
Type			Axial										
Number		n°	6	6	6	8	10	10	6	8	8	10	10
Air flow rate	E	m^3/h	70000	78000	87000	100000	112000	127000	74000	80000	96000	124500	120000
	FC		102000	102000	102000	136000	170000	170000	102000	102000	136000	170000	170000
Input power	E	kW	3.3	3.6	3.6	5.2	6.5	7	3.0	4.8	4.0	7.0	8.0
	FC		12	12	12	16	20	20	12	12	16	20	20
Current absorbed	E	A	6.6	6.6	6.6	8.8	11.0	11.0	6.3	8.4	8.4	10.5	10.5
	FC		24	24	24	32	40	40	24	24	32	40	40
SOUND DATA													
Sound power	FC	dB(A)	94.0	95.0	97.0	97.0	98.0	98.0	96.0	97.0	97.0	98.0	98.0
Sound Pressure	FC	dB(A)	62.0	63.0	65.0	65.0	66.0	66.0	64.0	65.0	65.0	66.0	66.0
Sound power	E	dB(A)	86.0	87.0	89.0	89.0	90.0	90.0	88.0	89.0	89.0	90.0	90.0
Sound Pressure	E	dB(A)	54.0	55.0	57.0	57.0	58.0	58.0	56.0	57.0	57.0	58.0	58.0
DIMENSIONS													
Height		mm	2450	2450	2450	2450	2450	2450	2450	2450	2450	2450	2450
Width		mm	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Length		mm	3780	3780	3780	4770	5750	5750	3780	3780	4770	5750	5750
empty WEIGHT		kg	3760	3770	3840	5000	5950	5980	4010	4030	4730	5740	5790

PUMPS		FA	FC	FE	FG	FJ
Input power	kW	4	55	75	92	11
Current absorbed	A	55	75	10	125	15
Weight	kg	109	117	121	140	148

NOTE
Pf. Cooling capacity
Pa. Input power

DATA DECLARED ACCORDING TO EN14511:2004

cooling

- *Input water temperature 12 °C*
- *Produced water temperature 7 °C*
- *External air temperature 35 °C*
- *Δt 5k*

Frecooling

- *Input water temperature 15 °C*
- *External air temperature 2 °C*
- *Glycol 0%*

- *SOUND PRESSURE measured in free field conditions at a distance of 10 mt. with directivity factor Q=2 in compliance with ISO 3744*
- *SOUND POWER Aermec determines the sound power value on the basis of measurements made in compliance with ISO 9614-2 Standards, with respect to the requisites implemented by EUROVENT certification*

7.5. NSB 2352E ÷ 4502E "LOW NOISE HIGH EFFICIENCY EXECUTION AND IN FREECOOLING MODE

COOLING			2352E	2502E	2652E	2802E	3002E	3202E	3402E	3602E	3902E	4202E	4502E
Cooling capacity		kW	457	475	514	554	604	645	694	744	787	843	887
Total input power		kW	179	191	203	214	222	233	265	298	311	333	346
Evaporator water flow rate		l/h	78540	81650	88490	95320	103870	110890	119440	127980	135390	145070	152480
Evaporator pressure drop		kPa	31	33	28	31	29	33	37	35	31	35	28
FREECOOLING													
Cooling capacity		kW	483	489	502	514	580	594	688	782	858	881	956
Total input power		kW	20	20	20	20	24	24	28	32	36	36	40
Total pressure drop		kPa	158	172	188	219	111	105	124	144	134	156	146
EFFICIENCY INDEX													
EER	E	W/W	2.55	2.48	2.54	2.59	2.72	2.76	2.62	2.49	2.53	2.53	2.56
	FC	W/W	24.14	24.46	25.12	25.70	24.18	24.74	24.57	24.45	23.82	24.47	23.90
ESEER	E		3.12	3.1	3.12	3.09	3.15	3.16	3.13	3.08	3.08	3.12	3.07
ELECTRICAL DATA													
Power supply		V	400V-3-50Hz										
Nominal current	E	A	302	318	337	357	370	387	431	476	502	538	564
	FC	A	40	40	40	40	48	48	56	64	72	72	80
Maximum current	FLA	A	440	464	495	525	559	592	686	686	736	788	838
Peak current	LRA	A	394	410	437	439	441	441	567	588	711	809	809
COMPRESSORS													
Type			twin-screw										
Number		n°	2	2	2	2	2	2	2	2	2	2	2
Number per circuit		n°/n°	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2
PARTIAL LOAD													
Partial load	VT Std	Pf.	%	26-100	26-100	26-100	26-100	26-100	26-100	26-100	26-100	26-100	26-100	26-100
		Pa.	%	26-100	26-100	26-100	26-100	26-100	26-100	26-100	26-100	26-100	26-100	26-100
	VT ele	Pf.	%	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100
		Pa.	%	22-100	22-100	22-100	22-100	22-100	22-100	22-100	22-100	22-100	22-100	22-100
EVAPORATOR													
Type			Shell and tube										
Number		n°	1	1	1	1	2	2	2	2	2	2	2
Hydraulic connections		Tipo/ø	V / 6"	V / 6"	V / 6"	V / 5"	V / 5"	V / 5"	V / 5"	V / 5"	V 5"- 6"	V 5"- 6"	V / 6"
FANS													
Type			Axial										
Number		n°	10	10	10	10	12	12	14	16	18	18	20
Air flow rate	E	m^3/h	123000	130000	130000	140000	165000	174000	187000	200000	212000	227000	239000
	FC		170000	170000	170000	170000	204000	204000	238000	272000	306000	306000	340000
Input power	E	kW	6.5	6.5	6.5	6.5	7.2	7.2	8.8	7	11.7	12.2	13.5
	FC		20	20	20	20	24	24	28	20	36	36	40
Current absorbed	E	A	10.5	11.0	11.0	11.0	13	13	15	18	20	20	22
	FC		40	40	40	40	36	36	42	48	54	54	60
SOUND DATA													
Sound power	FC	dB(A)	98.0	98.0	99.0	99.0	99.0	100.0	100.0	100.0	101.0	101.0	101.0
Sound Pressure	FC	dB(A)	66.0	66.0	67.0	67.0	67.0	68.0	68.0	68.0	69.0	69.0	69.0
Sound power	E	dB(A)	90.0	90.0	91.0	91.0	91.0	92.0	92.0	92.0	93.0	93.0	93.0
Sound Pressure	E	dB(A)	58.0	58.0	59.0	59.0	59.0	60.0	60.0	60.0	61.0	61.0	61.0
DIMENSIONS													
Height		mm	2450	2450	2450	2450	2450	2450	2450	2450	2450	2450	2450
Width		mm	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Length		mm	5750	5750	5750	5750	7160	7160	8150	9140	10120	10120	11100
empty WEIGHT		kg	6340	6330	6340	6350	7210	7310	8410	9180	10580	11580	11104

PUMPS		FA	FC	FE	FG	FJ
Input power	kW	4	55	75	92	11
Current absorbed	A	55	75	10	125	15
Weight	kg	109	117	121	140	148

NOTE
Pf. Cooling capacity
Pa. Input power

DATA DECLARED ACCORDING TO EN14511:2004

cooling

- *Input water temperature 12 °C*
- *Produced water temperature 7 °C*
- *External air temperature 35 °C*
- *Δt 5k*

recooling

- *Input water temperature 15 °C*
- *External air temperature 2 °C*
- *Glycol 0%*
- *SOUND PRESSURE measured in free field conditions at a distance of 10 mt. with directivity factor Q=2 in compliance with ISO 3744*
- *SOUND POWER Aermec determines the sound power value on the basis of measurements made in compliance with ISO 9614-2 Standards, with respect to the requisites implemented by EUROVENT certification*

7.6. NSB 4802E ÷ 7203E "LOW NOISE HIGH EFFICIENCY EXECUTION AND IN FREECOOLING MODE

COOLING			4802E	5003E	5203E	5403E	5703E	6003E	6303E	6603E	6903E	7203E
Cooling capacity		kW	943	1017	1066	1116	1159	1216	1259	1315	1358	1414
Total input power		kW	369	381	413	445	457	479	492	514	527	549
Evaporator water flow rate		l/h	162160	174890	183430	191980	199380	209070	216470	226160	233560	243250
Evaporator pressure drop		kPa	31	37	36	35	31	35	31	35	28	31
FREECOOLING												
Cooling capacity		kW	979	985	1079	1174	1249	1272	1347	1371	1446	1469
Total input power		kW	40	40	44	48	52	52	56	56	60	60
Total pressure drop		kPa	167	118	131	144	137	152	145	141	153	167
EFFICIENCY INDEX												
EER	E	W/W	2.56	2.67	2.58	2.51	2.54	2.54	2.56	2.56	2.58	2.58
	FC	W/W	24.48	24.62	24.53	24.45	24.02	24.46	24.06	24.47	24.09	24.48
ESEER	E		3.07	3.09	3.1	3.06	3.02	3.12	3.1	3.12	3.12	3.12
ELECTRICAL DATA												
Power supply		V	400V-3-50Hz									
Nominal current	E	A	600	625	669	713	740	776	802	838	864	900
	FC	A	80	80	88	96	104	104	112	112	120	120
Maximum current	FLA	A	890	1016	1018	1020	1069	1119	1167	1218	1266	1316
Peak current	LRA	A	812	707	828	949	1073	1137	1163	1199	1225	1261
COMPRESSORS												
Type			twin-screw									
Number		n°	2	3	3	3	3	3	3	3	3	3
Number per circuit		n°/n°	2/2	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3
PARTIAL LOAD												
Partial load	VT Std	Pf.	%	26-100	18-100	18-100	18-100	18-100	18-100	18-100	18-100	18-100	18-100
		Pa.	%	26-100	17-100	17-100	17-100	17-100	17-100	17-100	17-100	17-100	17-100
	VT ele	Pf.	%	20-100	13-100	13-100	13-100	13-100	13-100	13-100	13-100	13-100	13-100
		Pa.	%	22-100	15-100	15-100	15-100	15-100	15-100	15-100	15-100	15-100	15-100
EVAPORATOR												
Type			Shell and tube									
Number		n°	2	3	3	3	3	3	3	3	3	3
Hydraulic connections		Tipo/ø	V / 6"	V / 5"	V / 5"	V / 5"	V 5"-6"	V 5"-6"	V 5"-6"	V 5"-6"	V / 6"	V / 6"
FANS												
Type			Axial									
Number		n°	20	20	22	24	26	26	28	28	30	30
Air flow rate	E	m^3/h	254000	274000	287000	300000	312000	327000	339000	354000	366000	381000
	FC		340000	340000	374000	408000	442000	442000	476000	476000	510000	510000
Input power	E	kW	14	12	14	16	17	17	32	19	21	21
	FC		40	40	44	48	52	52	2	56	60	60
Current absorbed	E	A	22	22	24	26	29	29	60	31	33	33
	FC		60	80	88	96	104	104	79	112	120	120
SOUND DATA												
Sound power	FC	dB(A)	101.0	102.0	102.0	102.0	102.0	102.0	102.0	103.0	103.0	103.0
Sound Pressure	FC	dB(A)	69.0	70.0	70.0	70.0	70.0	70.0	70.0	71.0	71.0	71.0
Sound power	E	dB(A)	93.0	94.0	94.0	94.0	94.0	94.0	94.0	95.0	95.0	95.0
Sound Pressure	E	dB(A)	61.0	62.0	62.0	62.0	62.0	62.0	62.0	63.0	63.0	63.0
DIMENSIONS												
Height		mm	2450	2450	2450	2450	2450	2450	2450	2450	2450	2450
Width		mm	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Length		mm	11100	11530	12520	13510	14490	14490	15470	15470	16450	16450
empty WEIGHT		kg	11320	12990	13790	15220	15130	15160	16560	17560	17084	17300

PUMPS		FA	FC	FE	FG	FJ
Input power	kW	4	55	75	92	11
Current absorbed	A	55	75	10	125	15
Weight	kg	109	117	121	140	148

DATA DECLARED ACCORDING TO EN14511:2004

cooling

- *Input water temperature* *12 °C*
- *Produced water temperature* *7 °C*
- *External air temperature* *35 °C*
- *Δt* *5k*

- *SOUND PRESSURE measured in free field conditions at a distance of 10 mt. with directivity factor Q=2 in compliance with ISO 3744*

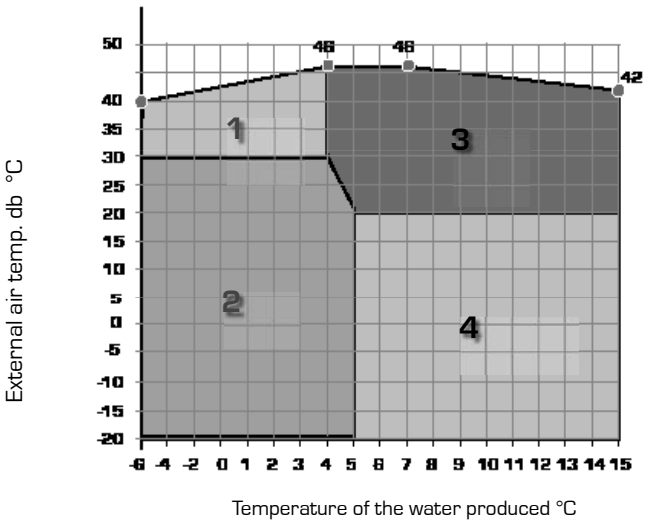
- *SOUND POWER Aermec determines the sound power value on the basis of measurements made in compliance with ISO 9614-2 Standards, with respect to the requisites implemented by EUROVENT certification*

8. SELECTION CRITERIA

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 diagrams below.

ATTENTION:
- Functioning with temperature of the produced water lower than 4°C is only allowed for specifically envisioned versions. (version Y)
- If the machine is to be used above the limits indicated in the diagram, please contact AERMEC technical sales office
- If it is positioned in a particularly windy zone, a windbreak should be provided to avoid unstable operation of the DCPX device.

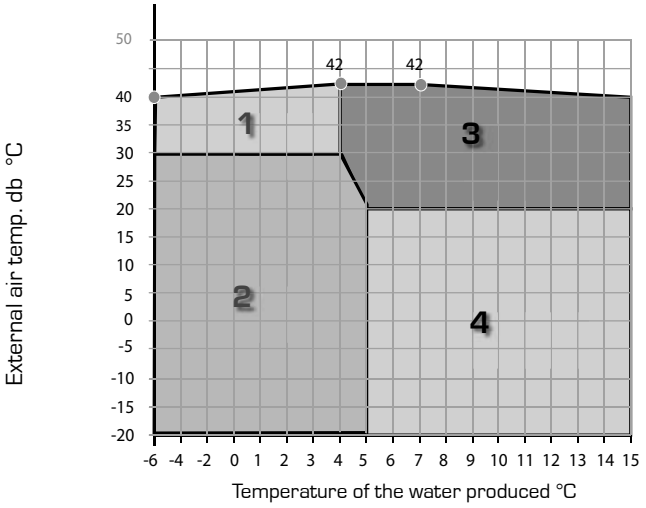
8.1. OPERATION LIMITS



VERSION
- HIGH EFFICIENCY - HIGH EFFICIENCY EXTRA-NOISE VERSION IN FREECOOLING MODE

KEY
1. *Glycoled water mode functioning, only for Y versions*
2. *Functioning with glycoled water and DCPX*
3. *Standard functioning*
4. *Functioning with DCPX*

1601-3002-3202-3402-5003-5203



8.2. DESIGN DATA DIR 97/23/CE

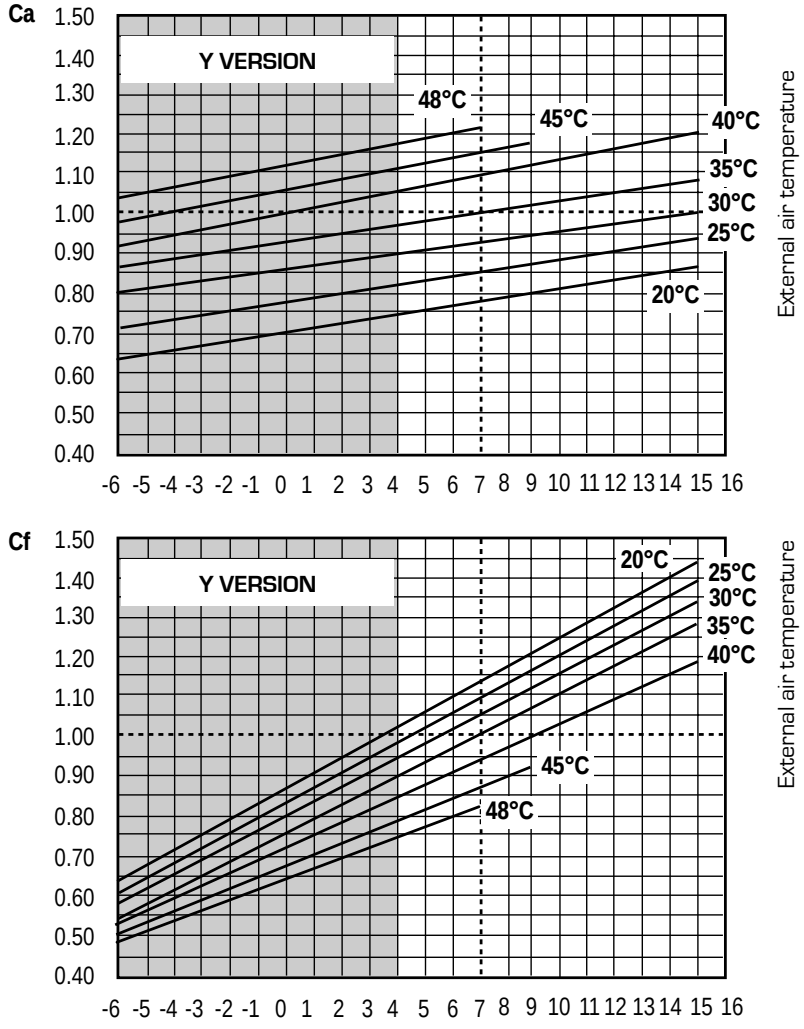
		HIGH PRESSURE SIDE	LOW PRESSURE SIDE
Acceptable maximum pressure	**bar**	22	16,5
Acceptable maximum calibration	**°C**	120	55
Acceptable minimum temperature	**°C**	-10	-10

9. COEFFICIENT FACTORS

9.1. COOLING CAPACITY AND INPUT POWER

9.2. "HIGH EFFIENCY VERSIONS"

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 coefficients factors (Cf, Ca).
The following diagrams show how to obtain coefficients factors to use for appliances in their various versions in cooling mode; external air temperature, to which reference is made, is shown in correspondence to each curve.



Temperature of evaporator produced water (Δt=5°C)

KEY:
Cf = Coefficients factors of the cooling capacity

Ca = Coefficients factors of the input power

NOTE:
FOR Y VERSIONS With temperatures below 4°C please contact the company.

FOR ΔT DIFFERENT TO 5°C
At the evaporator, use Tab. 9.2.1 to obtain the coefficients factors of the cooling capacity and input power. To consider dirty heat exchangers, use relative dirtying factors Tab. 9.2.2.

9.2.1. coefficient factors at Δt different from Chiller nominal

	3.5	5	8	10
Cooling capacity coefficient factors	0,99	1	1,02	1,03
Input power coefficient factors	0,99	1	1,01	1,02

9.2.2. Deposit factors

	[K*m^2]/[W]	0,00005	0,0001	0,0002
Cooling capacity coefficient factors		1	098	094
Input power coefficient factors		1	0,98	0,95

9.5. "HIGH EFFICIENCY VERSIONS IN LOW NOISE VERSION"

The cooling capacity efficiency and electrical input power in conditions differing from normal conditions are obtained by multiplying the nominal values (Pf, Pa) by the respective corrective coefficients (Cf, Ca).
The following diagrams show how to obtain corrective coefficients to use for appliances 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 coefficient of the cooling capacity*

Ca = *Corrective coefficient of the input power*

NOTE:
FOR Y VERSIONS With temperatures below 4°C please contact the company.

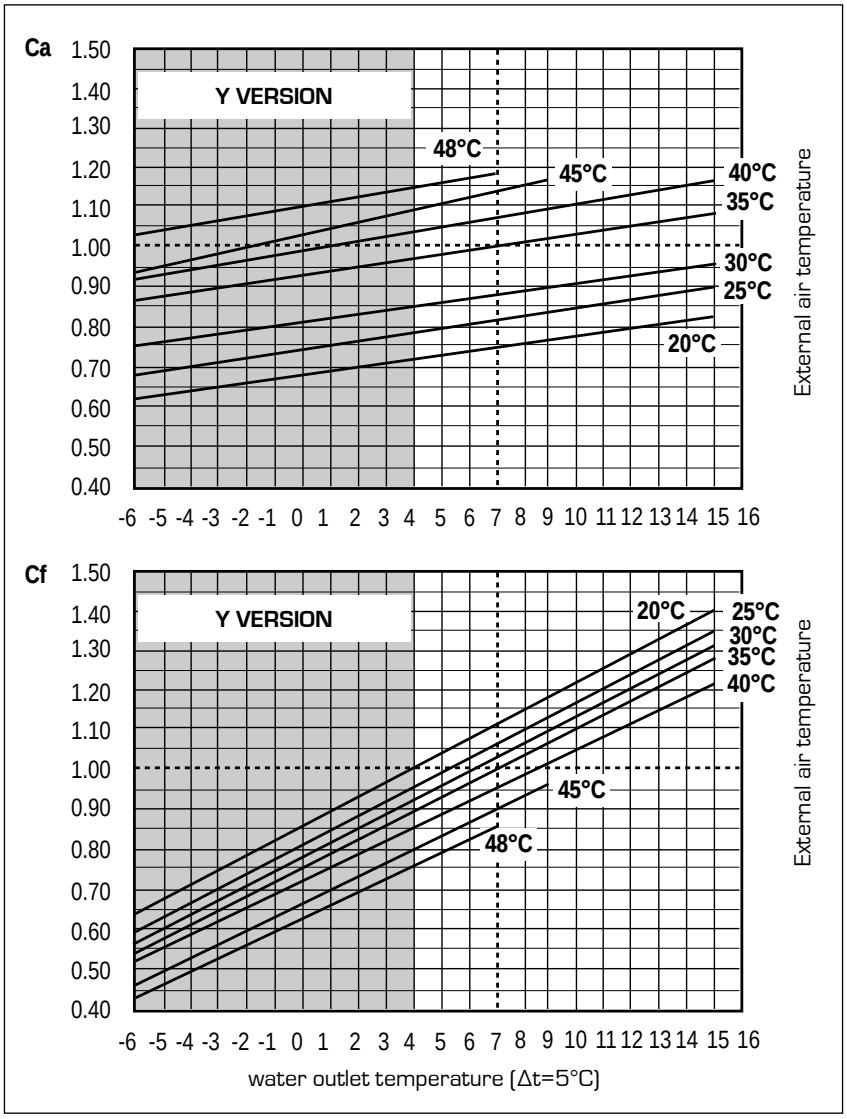
FOR ΔT DIFFERENT TO 5°C
At the evaporator, use Tab. 9.6.1 to obtain the corrective factors of the cooling capacity and input power. To consider dirty heat exchangers, use relative dirtying factors Tab. 9.6.2.

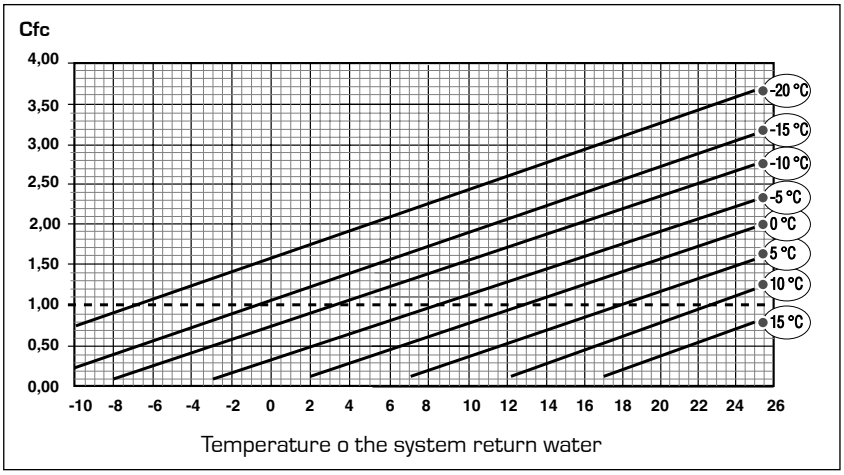
9.6. COEFFICIENT FACTOR VERSIONS WITH FREECOOLING ONLY

The maximum cooling capacity yielded when functioning is completely in freecooling i.e. all compressors are off, is obtained by multiplying the freecooling cooling capacity value (Pf) given in the technical data by the respective corrective coefficient (Cfc). The latter 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 are referred with fans at full revs. (maximum input power). If the power yielded should be in excess the number of revs. will be modulated.

KEY

C_{fc} *coefficient factors of the freecooling cooling capacity (Pf)*
15 -10 ... Temperature of the external air





9.6.1. Coefficient factors at Δt different from Chiller nominal

	3.5	5	8	10
Cooling capacity coefficient factors	0,99	1	1,02	1,03
Input power coefficient factors	0,99	1	1,01	1,02

9.6.2. Deposit factors

	[K*m^2]/[W]	0,00005	0,0001	0,0002
Cooling capacity coefficient factors		1	098	094
Input power coefficient factors		1	0,98	0,95

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

NOTE

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

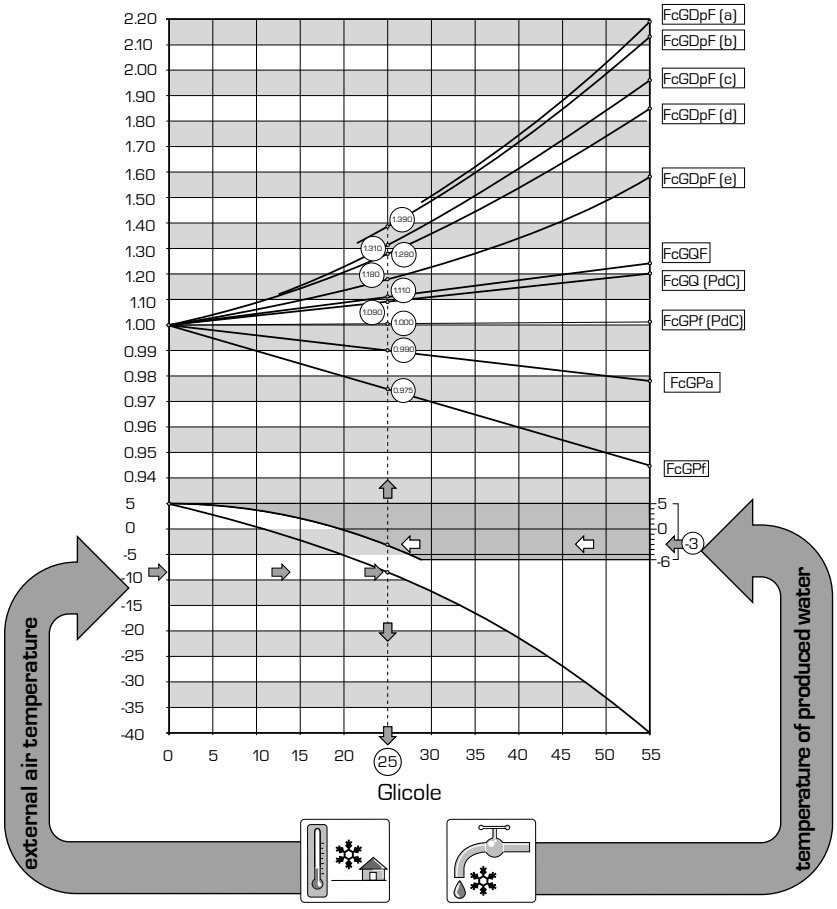
Using the diagram given below it is possible to determine the percentage of glycol required; this percentage can be calculated taking into consideration one of the following factors:

Depending on which fluid is considered (water or air), the graph should be 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 THE 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 draw a vertical line, which in turn will intercept all the remaining curves; the points obtained from the upper curves show the coefficients for cooling capacity and input power for flow rates and pressure drops (remember that these coefficients still need to be multiplied by the nominal value of the size examined); whilst the lower axis recommends the glycol percentage value necessary on the basis of the temperature of the external air considered
- If you require to calculate glycol percentage based on the temperature of water produced, enter from the right axis of the graph and draw a vertical line, which in turn will intercept all the remaining curves; the points obtained from the upper curves show the coefficients for cooling capacity and power absorption for flow rates and load losses (remember that these coefficients still need to be multiplied by the nominal value of the size examined); whilst the lower axis recommends the glycol percentage value necessary for producing water at the desired temperature
- **Initial sizes 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 sizes to obtain corresponding point on the curve of the other size.**



KEY:

FcGPf	*Coefficient factors of the cooling capacity*
FcGPa	*Coefficient factors of the input power*
FcGDpF (a)	*Coefficient factors for pressure drops (evaporator) (av. temp. = -3.5 °C)*
FcGDpF (b)	*Coefficient factors of pressure drops (av. temp. = 0.5 °C)*
FcGDpF (c)	*Coefficient factors of pressure drops (av. temp. = 5.5 °C)*
FcGDpF (d)	*Coefficient factors of pressure drops (av. temp. = 9.5 °C)*
FcGDpF (e)	*Coefficient factors of pressure drops (av. temp. = 47.5 °C)*
FcGQF	*Coefficient factors of the flow rates (evap) (average temperature = 9.5 °C)*
FcGQC	*Coefficient factors of flow rates (condenser) (av. temp. = 47.5 °C)*

NOTE

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

11. PRESSURE DROPS

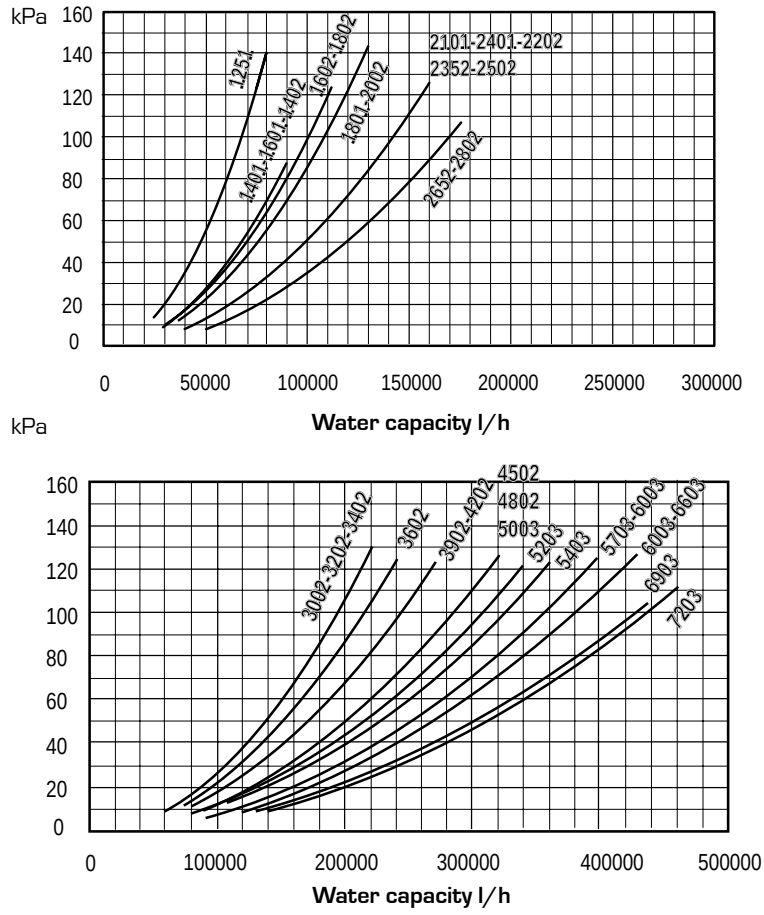
11.1. PRESSURE DROPS AND MINIMUM WATER CONTENT

11.1.1. Evaporators pressure drops. cooling mode

The following graphics illustrate the pressure drop values in kPa depending on the flow rate in l/h.

The functioning range is delimited by the minimum and maximum curve values, which indicate the limit of use of the water side heat exchangers (evaporators).

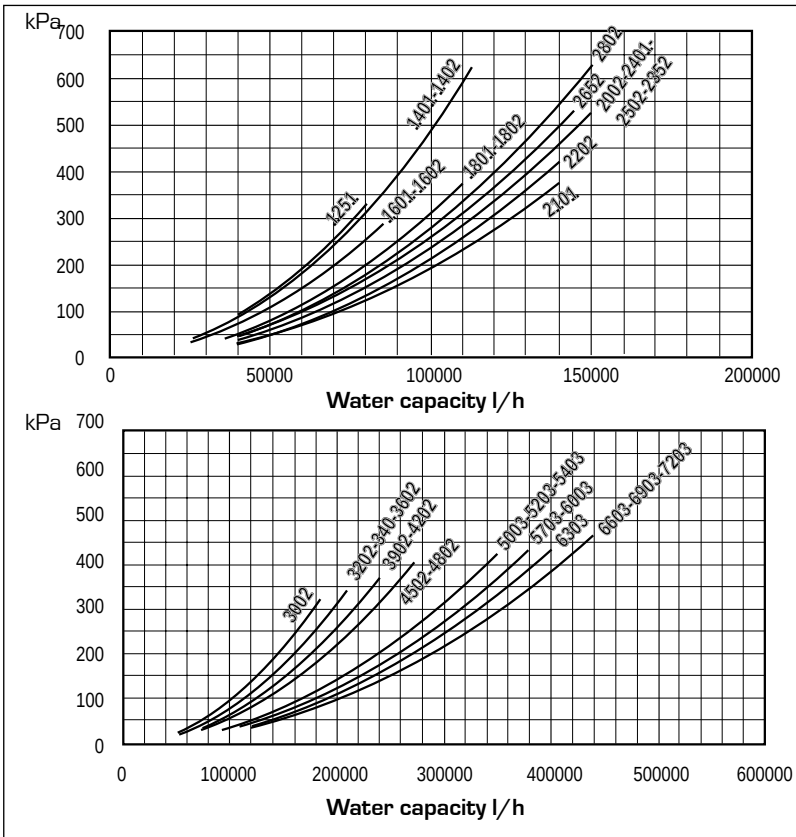
NOTE
For all models, the hydraulic parallels are the installer's responsibility.



11.1.2. Total pressure drops of the Chiller in FREECOOLING

The following graphics illustrate the TOTAL pressure drop values in kPa depending on the flow rate in l/h of the chiller in FREECOOLING mode.
The pressure drops of the following are considered:

- Evaporator
- Three-way valve
- Additional air water coil
- Pipe turns



The table shows corrections to apply to the pressure drops for on variation of the average water temperature.

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

11.2. MINIMUM WATER CONTENT

KEY
(1) Minimum water content for air conditioning applications.
(2) Minimum water content in the case of process or functioning applications with low external temperatures and low pressure.

KEY
(1) Minimum water content for air conditioning applications
(2) Minimum water content in the case of process or functioning applications with low external temperatures and low pressure

Minimum water content	m^3	(1)	(2)
1251	m^3	19	39
1401	m^3	22	44
1601	m^3	24	49
1801	m^3	29	59
2101	m^3	33	65
2401	m^3	37	75
1402	m^3	21	43
1602	m^3	24	48
1802	m^3	28	56
2002	m^3	32	63
2202	m^3	35	69

Minimum water content	m^3	(1)	(2)
2352	m^3	36	73
2502	m^3	38	76
2652	m^3	40	81
2802	m^3	43	86
3002	m^3	46	93
3202	m^3	49	97
3402	m^3	54	107
3602	m^3	59	117
3902	m^3	62	124
4202	m^3	67	133
4502	m^3	70	140

Minimum water content	m^3	(1)	(2)
4802	m^3	75	149
5003	m^3	78	156
5203	m^3	83	166
5403	m^3	88	176
5703	m^3	91	183
6003	m^3	96	192
6303	m^3	99	199
6603	m^3	104	208
6903	m^3	107	214
7203	m^3	112	224

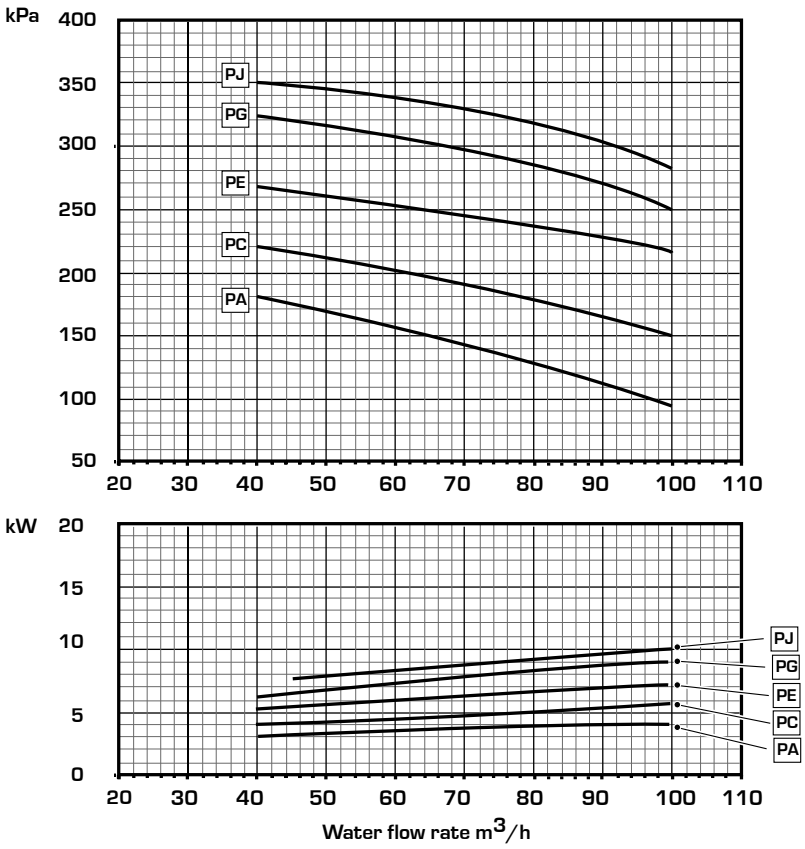
12.1. PUMPS SELECTION

NOTE
The type of pump is used for each NSB model, i.e. for all circuits that make up the model selected, the pump will always be the same.
In the presence of a second reserve pump, switch-over of the pumps takes place manually by acting in the selector switch positioned inside the electric control board.

Premise: the last number of the selected model indicates by how many hydraulic circuits the machine is composed. For models from 3002 to 4802, considering that stated above, the pump will be selected by dividing the total water flow rate indicated in the technical data table by 2 (last number of the sales code). The same procedure is applied with models from 5003 to 7203. As stated above, the total flow rate must be divided by three *(last number of the code). For all remaining models the flow rate remains the same, always indicated in the technical data table.

field	Pumping unit
F0	without pumping unit
FA	with pump A
FB	with pump A and reserve pump
FC	with pump C
FD	with pump C and reserve pump
FE	with pump E

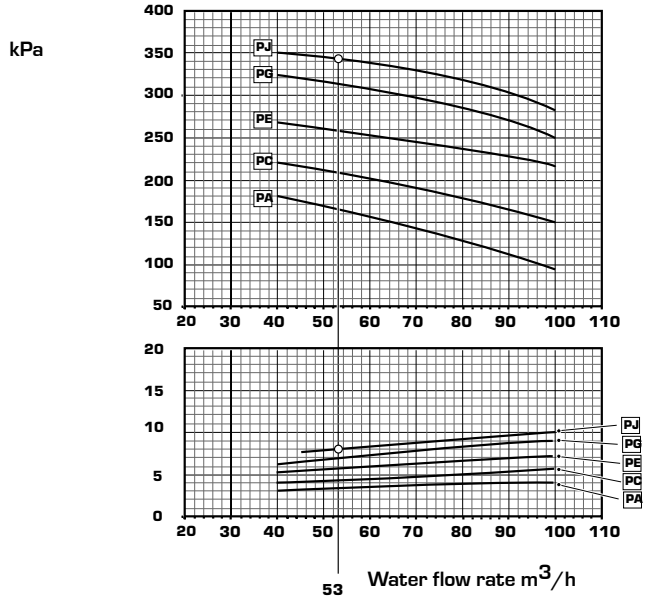
field	Pumping unit
FF	with pump E and reserve pump
FG	with pump G
FH	with pump G and reserve pump
FJ	with pump J
FK	with pump J and reserve pump



12.1.1. Pump selection example

NSB 3202L (2 hydraulic circuits)
Useful static pressure requested 300kPa.
Nominal water flow rate = 105.950 m3/h
Nominal pressure drop = 30 kPa per circuit.
Procedure:
1. Divide the nominal flow rate by 2 (2 circuits) 105.950/2 = 52.975 m3/h ≈ 53 m3/h
With the flow rate obtained (53 m3/h) enter the graphics as per example at the side, obtaining, in order to satisfy the need of a useful static pressure of 300 kPa the availability of pump J that offers:
Pump J = 345 kPa
kW absorbed by pump 8
2. At this point, in order to have useful static head at the plant, just subtract the evaporator pressure drop from the useful static pressure of the pump:
kPa pump (FJ) - Nominal pressure drops
345kPa - 30kPa = 315 kPa of useful static pressure at the plant. (15 kPa above the request).

Example of choice



13. SOUND DATA

Sound power

Aermec determines sound power values in agreement with the 9614 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) at 10mt from external surface of unit, in compliance with ISO 3744 regulations

KEY

Working conditions:

Input water temperature	12 °C
Produced water temperature	7 °C
External air temperature	35 °C

NOTE

The "NSB E" cannot be silenced in freecooling functioning mode, because the fans work at maximum speed

Therefore, for noise data refer to A versions.

A-FC	Total noise levels			Octave band [Hz]						
	Power dB(A)	Pressure.		125	250	500	1000	2000	4000	8000
		dB(A) 10 m	dB 1 m	Sound power for band central frequency [dB]						
1251	**94.0**	**62.0**	**78.0**	91.2	88.4	89.6	89.9	87.3	81.8	73.5
1401	**95.0**	**63.0**	**79.0**	94.1	90.9	91.9	91.3	87.4	80.4	72.0
1601	**97.0**	**65.0**	**81.0**	95.3	92.3	93.5	92.9	90.0	84.6	75.7
1801	**97.0**	**65.0**	**81.0**	95.9	93.2	94.3	92.4	89.4	85.1	76.5
2101	**98.0**	**66.0**	**82.0**	97.0	93.9	95.0	93.7	90.8	86.1	77.6
2401	**98.0**	**66.0**	**82.0**	99.0	94.9	95.2	93.4	90.4	86.3	78.7
1402	**96.0**	**64.0**	**80.0**	97.4	92.0	91.6	92.0	89.2	85.4	80.5
1602	**97.0**	**65.0**	**81.0**	98.0	94.7	92.7	92.5	89.9	86.0	82.1
1802	**97.0**	**65.0**	**81.0**	98.3	94.5	92.3	92.2	90.7	85.4	78.3
2002	**98.0**	**66.0**	**82.0**	98.4	94.2	93.1	93.4	92.0	86.0	80.9
2202	**98.0**	**66.0**	**82.0**	101.5	96.6	94.6	93.9	91.1	85.7	79.0
2352	**98.0**	**66.0**	**82.0**	100.7	94.7	93.7	93.3	90.4	86.9	81.6
2502	**98.0**	**66.0**	**82.0**	96.4	91.8	91.6	94.5	92.0	84.8	79.3
2652	**99.0**	**67.0**	**83.0**	98.0	92.7	94.0	95.0	92.4	86.2	81.6
2802	**99.0**	**67.0**	**83.0**	99.8	95.1	95.7	94.6	91.7	86.2	79.3
3002	**99.0**	**67.0**	**83.0**	97.8	94.7	95.8	95.2	91.9	86.0	77.2
3202	**100.0**	**68.0**	**84.0**	98.3	95.3	96.5	95.9	93.0	87.6	78.7
3402	**100.0**	**68.0**	**84.0**	98.6	95.8	97.0	95.7	92.7	87.8	79.1
3602	**100.0**	**68.0**	**84.0**	98.9	96.2	97.3	95.4	92.5	88.1	79.5
3902	**101.0**	**69.0**	**85.0**	99.5	96.6	97.7	96.1	93.2	88.6	80.1
4202	**101.0**	**69.0**	**85.0**	100.0	96.9	98.0	96.7	93.9	89.1	80.6
4502	**101.0**	**69.0**	**85.0**	101.1	97.5	98.1	96.6	93.6	89.2	81.2
4802	**101.0**	**69.0**	**85.0**	102.0	97.9	98.2	96.4	93.4	89.3	81.7
5003	**102.0**	**70.0**	**86.0**	100.3	97.4	98.6	97.5	94.6	89.5	80.8
5203	**102.0**	**70.0**	**86.0**	100.5	97.7	98.8	97.4	94.4	89.7	81.0
5403	**102.0**	**70.0**	**86.0**	100.7	98.0	99.1	97.2	94.2	89.8	81.3
5703	**102.0**	**70.0**	**86.0**	101.1	98.2	99.3	97.7	94.7	90.2	81.7
6003	**102.0**	**70.0**	**86.0**	102.0	98.6	99.4	97.5	94.6	90.3	82.1
6303	**102.0**	**70.0**	**86.0**	101.1	98.2	99.3	97.7	94.7	90.2	81.7
6603	**103.0**	**71.0**	**87.0**	103.0	99.2	99.7	97.9	94.9	90.7	82.8
6903	**103.0**	**71.0**	**87.0**	103.2	99.4	99.9	98.3	95.3	91.0	83.1
7203	**103.0**	**71.0**	**87.0**	103.8	99.7	100.0	98.2	95.2	91.1	83.5

E	Total noise levels			Octave band [Hz]						
	Power dB(A)	Pressure.		125	250	500	1000	2000	4000	8000
		dB(A) 10 m	dB 1 m	Sound power for band central frequency [dB]						
1251	**86.0**	**54.0**	**70.0**	80.6	83.4	84.7	82.6	75.2	66.8	58.5
1401	**87.0**	**55.0**	**71.0**	83.5	85.7	85.9	83.1	73.2	65.9	57.3
1601	**89.0**	**57.0**	**73.0**	85.3	86.4	87.0	85.4	79.8	71.3	59.1
1801	**89.0**	**57.0**	**73.0**	85.6	87.1	87.5	85.3	79.4	71.8	60.1
2101	**90.0**	**58.0**	**74.0**	86.6	87.6	88.0	86.0	80.8	73.1	61.2
2401	**90.0**	**58.0**	**74.0**	84.8	88.4	88.5	86.2	79.6	73.7	62.0
1402	**88.0**	**56.0**	**72.0**	86.5	88.5	87.0	83.6	73.6	69.7	61.4
1602	**89.0**	**57.0**	**73.0**	88.0	89.6	86.3	85.6	78.7	72.0	64.0
1802	**89.0**	**57.0**	**73.0**	87.6	90.5	88.0	82.5	79.0	70.3	62.6
2002	**90.0**	**58.0**	**74.0**	89.7	90.4	88.2	85.8	78.7	72.0	67.3
2202	**90.0**	**58.0**	**74.0**	92.0	91.2	89.7	85.2	78.6	71.6	62.7
2352	**90.0**	**58.0**	**74.0**	92.6	92.0	88.9	85.1	78.9	72.0	68.2
2502	**90.0**	**58.0**	**74.0**	84.9	88.2	85.6	87.6	80.2	70.5	60.9
2652	**91.0**	**59.0**	**75.0**	92.3	90.1	89.2	86.8	80.9	71.3	62.2
2802	**91.0**	**59.0**	**75.0**	92.3	91.7	89.9	86.3	79.6	71.8	64.5
3002	**91.0**	**59.0**	**75.0**	87.5	89.0	89.5	87.4	80.6	72.4	61.3
3202	**92.0**	**60.0**	**76.0**	88.3	89.4	90.0	88.4	82.8	74.3	62.1
3402	**92.0**	**60.0**	**76.0**	88.4	89.7	90.2	88.3	82.6	74.6	62.6
3602	**92.0**	**60.0**	**76.0**	88.6	90.1	90.5	88.3	82.4	74.8	63.1
3902	**93.0**	**61.0**	**77.0**	89.1	90.3	90.7	88.7	83.1	75.5	63.7
4202	**93.0**	**61.0**	**77.0**	89.6	90.6	91.0	89.0	83.8	76.1	64.2
4502	**93.0**	**61.0**	**77.0**	88.8	91.0	91.2	89.1	83.2	76.4	64.6
4802	**93.0**	**61.0**	**77.0**	87.8	91.4	91.5	89.2	82.6	76.7	65.0
5003	**94.0**	**62.0**	**78.0**	90.1	91.4	91.9	90.1	84.4	76.3	64.2
5203	**94.0**	**62.0**	**78.0**	90.2	91.6	92.1	90.1	84.3	76.4	64.5
5403	**94.0**	**62.0**	**78.0**	90.3	91.8	92.2	90.0	84.2	76.6	64.8
5703	**94.0**	**62.0**	**78.0**	90.7	92.0	92.4	90.3	84.7	77.1	65.2
6003	**94.0**	**62.0**	**78.0**	90.1	92.3	92.6	90.4	84.2	77.3	65.6
6303	**94.0**	**62.0**	**78.0**	90.7	92.0	92.4	90.3	84.7	77.1	65.2
6603	**95.0**	**63.0**	**79.0**	89.8	92.8	92.9	90.7	84.3	77.9	66.2
6903	**95.0**	**63.0**	**79.0**	90.2	92.9	93.1	90.9	84.8	78.3	66.5
7203	**95.0**	**63.0**	**79.0**	89.6	93.2	93.3	91.0	84.4	78.5	66.8

WITH THE ACCESSORY KIT AK,
(can only be installed when building the machine and therefore must be requested when placing the order). There is further noise reduction. The table with data is found at the side.

NOTE
For further information regarding the KIT, refer to the ACCESSORIES chapter

KEY
Working conditions:
Input water temperature 12 °C
Produced water temperature 7 °C
External air temperature 35 °C

AK	Total noise levels			Octave band [Hz]						
	Power dB(A)	Pressure.		125	250	500	1000	2000	4000	8000
		dB(A) 10 m	dB 1 m	Sound power for band central frequency [dB]						
1251	**84.0**	**52.0**	**68.0**	80.8	80.5	79.6	81.2	75.8	66.6	53.7
1401	**83.0**	**51.0**	**67.0**	80.8	80.5	79.1	80.2	74.8	65.6	53.7
1601	**84.0**	**52.0**	**68.0**	80.8	80.5	80.6	81.7	74.3	64.6	53.7
1801	**85.0**	**53.0**	**69.0**	88.4	83.7	82.7	79.6	74.2	72.1	59.6
2101	**86.0**	**54.0**	**70.0**	87.5	86.4	82.6	82.3	76.0	69.4	57.7
2401	**86.0**	**54.0**	**70.0**	87.5	87.4	82.1	82.3	76.0	70.4	58.7
1402	**83.0**	**51.0**	**67.0**	83.3	81.9	80.7	77.5	74.5	66.5	54.6
1602	**84.0**	**52.0**	**68.0**	83.2	80.9	83.3	80.0	73.5	66.5	54.6
1802	**84.0**	**52.0**	**68.0**	82.3	79.9	81.8	81.7	71.5	64.0	53.6
2002	**85.0**	**53.0**	**69.0**	82.9	81.3	82.0	82.6	73.9	65.3	52.5
2202	**85.0**	**53.0**	**69.0**	82.5	80.7	80.7	82.6	75.9	64.6	52.3
2352	**85.0**	**53.0**	**69.0**	82.5	80.7	80.7	82.6	75.9	64.6	52.3
2502	**85.0**	**53.0**	**69.0**	82.5	80.7	80.7	82.6	75.9	64.6	52.3
2652	**85.0**	**53.0**	**69.0**	82.5	80.7	80.7	82.6	75.9	64.6	52.3
2802	**86.0**	**54.0**	**70.0**	82.5	81.7	82.2	83.6	76.4	65.6	53.3
3002	**86.0**	**54.0**	**70.0**	82.5	81.7	82.2	83.6	76.4	65.6	53.3
3202	**86.0**	**54.0**	**70.0**	82.5	81.7	82.2	83.6	76.4	65.6	53.3
3402	**87.0**	**55.0**	**71.0**	88.3	86.3	84.6	83.5	78.1	69.6	56.8
3602	**87.0**	**55.0**	**71.0**	92.1	88.0	84.9	81.5	75.8	71.6	59.3
3902	**87.0**	**55.0**	**71.0**	91.1	88.3	84.6	82.6	75.7	70.0	57.3
4202	**88.0**	**56.0**	**72.0**	89.2	88.1	84.3	84.7	78.1	70.4	57.3
4502	**88.0**	**56.0**	**72.0**	89.2	88.1	84.3	84.7	78.1	70.4	57.3
4802	**88.0**	**56.0**	**72.0**	89.2	88.1	84.3	84.7	78.1	70.4	57.3
5003	**89.0**	**57.0**	**73.0**	90.6	87.7	85.5	85.5	79.8	71.3	58.7
5203	**89.0**	**57.0**	**73.0**	92.5	88.8	85.7	84.7	78.4	71.3	58.6
5403	**88.5**	**56.5**	**72.5**	94.2	88.5	86.5	83.4	78.0	74.4	62.4
5703	**89.0**	**57.0**	**73.0**	93.0	89.7	86.0	85.2	78.7	72.0	60.5
6003	**89.0**	**57.0**	**73.0**	93.0	89.7	86.0	85.2	78.7	72.5	59.5
6303	**89.0**	**57.0**	**73.0**	91.0	88.4	85.6	85.8	79.1	73.2	60.5
6603	**90.0**	**58.0**	**74.0**	93.0	91.2	86.6	86.4	79.5	72.0	60.5
6903	**91.0**	**59.0**	**75.0**	93.1	91.8	87.3	87.9	80.3	71.9	60.5
7203	**92.0**	**60.0**	**76.0**	93.6	93.8	87.8	88.4	82.3	73.9	60.5

14. CALIBRATION OF SAFETY AND CONTROL PARAMETERS

CONTROL PARAMETERS

		min.	standard	max.
Cooling set point	°C	4	7	16
Defrosting intervention	°C	-9	3	4
Total differential	°C	3	5	10
Autostart		auto		

FANS MAGNETIC CIRCUIT BREAKERS		1251	1401	1601	1801	2101	2401	1402	1602	1802	2002	2202
Fans	n°	6	6	6	8	10	10	6	6	8	10	10
MTV1	A	26	26	26	34.5	43	43	26	26	34.5	43	43
MTV2	A	\	\	\	\	\	\	\	\	\	\	\
MTV3	A	\	\	\	\	\	\	\	\	\	\	\

		2352	2502	2652	2802	3002	3202	3402	3602	3902	4202	4502
Fans	n°	10	10	10	10	12	12	14	16	18	18	20
MTV1	A	43	43	43	43	26	26	26	34.5	34.5	34.5	43
MTV2	A	\	\	\	\	26	26	34.5	34.5	43	43	43
MTV3	A	\	\	\	\	\	\	\	\	\	\	\

		4802	5003	5203	5403	5703	6003	6303	6603	6903	7203
Fans	n°	20	20	22	24	26	26	28	28	30	30
MTV1	A	43	26	26	34.5	34.5	34.5	34.5	34.5	43	43
MTV2	A	43	26	34.5	34.5	34.5	34.5	43	43	43	43
MTV3	A	\	34.5	34.5	34.5	43	43	43	43	43	43

400V COMPRESSORS MAGNET CIRCUIT BREAKERS		1251	1401	1601	1801	2101	2401	1402	1602	1802	2002	2202
Compressors	n°	1	1	1	1	1	1	2	2	2	2	2
MTC1	A	196	214	280	340	320	360	98	144	162	162	182
MTC2	A	\	\	\	\	\	\	144	144	162	182	182
MTC3	A	\	\	\	\	\	\	\	\	\	\	\

		2352	2502	2652	2802	3002	3202	3402	3602	3902	4202	4502
Compressors	n°	2	2	2	2	2	2	2	2	2	2	2
MTC1	A	182	196	196	214	214	280	280	340	340	340	320
MTC2	A	196	196	214	214	280	280	340	340	320	360	360
MTC3	A	\	\	\	\	\	\	\	\	\	\	\

		4802	5003	5203	5403	5703	6003	6303	6603	6903	7203
Compressors	n°	2	3	3	3	3	3	3	3	3	3
MTC1	A	360	214	280	340	340	340	340	320	320	360
MTC2	A	360	340	340	340	340	340	320	320	360	360
MTC3	A	\	340	340	340	320	360	360	360	360	360

COMPRESSORS CIRCUIT BREAKER RELAY		1251	1401	1601	1801	2101	2401	1402	1602	1802	2002	2202
RT1	A	125	136	178	197	203	228	78	91	103	103	115
RT2	A	\	\	\	\	\	\	78	91	103	125	115
RT3	A	\	\	\	\	\	\	\	\	\	\	\

		2352	2502	2652	2802	3002	3202	3402	3602	3902	4202	4502
RT1	A	115	125	125	136	136	178	178	197	197	203	203
RT2	A	125	125	136	136	178	178	197	197	203	203	228
RT3	A	\	\	\	\	\	\	\	\	\	\	\

		4802	5003	5203	5403	5703	6003	6303	6603	6903	7203
RT1	A	228	178	178	197	197	197	197	203	203	228
RT2	A	228	178	197	197	197	197	203	203	228	228
RT3	A	\	197	197	197	203	228	228	228	228	228

COMPRESSOR FUSES		1251	1401	1601	1801	2101	2401	1402	1602	1802	2002	2202
F1	A	250	250	315	315	400	500	160	160	200	200	200
F2	A	\	\	\	\	\	\	160	160	200	200	200
F3	A	\	\	\	\	\	\	\	\	\	\	\

		2352	2502	2652	2802	3002	3202	3402	3602	3902	4202	4502
F1	A	250	250	250	250	250	315	315	315	315	400	400
F2	A	250	250	250	250	315	315	315	315	400	400	500
F3	A	\	\	\	\	\	\	\	\	\	\	\

		4802	5003	5203	5403	5703	6003	6303	6603	6903	7203
F1	A	500	315	315	315	315	315	315	315	400	500
F2	A	500	315	315	315	315	315	400	400	500	500
F3	A	\	315	315	315	400	500	500	400	500	500

MASTER SWITCH		1251	1401	1601	1801	2101	2401	1402	1602	1802	2002	2202
IG	A	250	315	315	400	630	630	315	315	400	400	400

		2352	2502	2652	2802	3002	3202	3402	3602	3902	4202	4502
IG	A	630	630	630	630	630	630	800	800	800	800	1000

		4802	5003	5203	5403	5703	6003	6303	6603	6903	7203
IG	A	1000	1000	1000	1250	1250	800	800	800	1000	1000
	A	\	\	\	\	\	630	630	630	630	630

TRANSDUCERS AND PRESSURE SWITCHES		1251	1401	1601	1801	2101	2401	1402	1602	1802	2002	2202
High pressure double pressure switch (AP)	bar	18/19	18/19	18/19	18/19	18/19	18/19	18/19	18/19	18/19	18/19	18/19
High pressure transducer (TAP)	bar	17,7	17,7	17,7	17,7	17,7	17,7	17,7	17,7	17,7	17,7	17,7
Low pressure transducer (TBP)	bar	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6

		2352	2502	2652	2802	3002	3202	3402	3602	3902	4202	4502
High pressure double pressure switch (AP)	bar	18/19	18/19	18/19	18/19	18/19	18/19	18/19	18/19	18/19	18/19	18/19
High pressure transducer (TAP)	bar	17,7	17,7	17,7	17,7	17,7	17,7	17,7	17,7	17,7	17,7	17,7
Low pressure transducer (TBP)	bar	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6

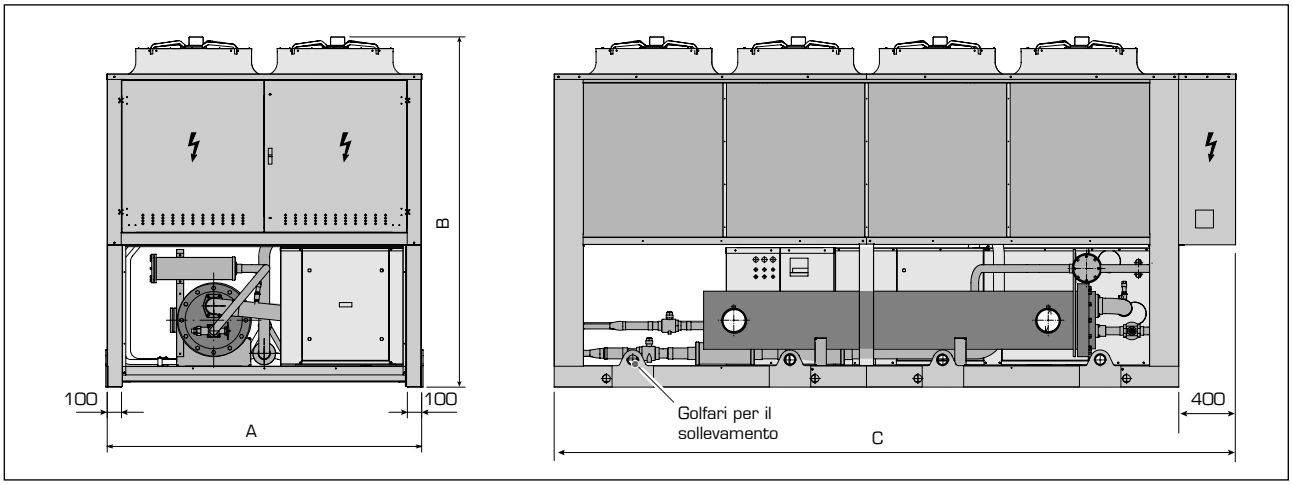
		4802	5003	5203	5403	5703	6003	6303	6603	6903	7203
High pressure double pressure switch (AP)	bar	18/19	18/19	18/19	18/19	18/19	18/19	18/19	18/19	18/19	18/19
High pressure transducer (TAP)	bar	17,7	17,7	17,7	17,7	17,7	17,7	17,7	17,7	17,7	17,7
Low pressure transducer (TBP)	bar	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6

COOLING CIRCUIT SAFETY DEVICES		1251	1401	1601	1801	2101	2401	1402	1602	1802	2002	2202
Low pressure valve	bar	16,5	16,5	16,5	16,5	16,5	16,5	16,5	16,5	16,5	16,5	16,5
High pressure valve	bar	22	22	22	22	22	22	22	22	22	22	22

		2352	2502	2652	2802	3002	3202	3402	3602	3902	4202	4502
Low pressure valve	bar	16,5	16,5	16,5	16,5	16,5	16,5	16,5	16,5	16,5	16,5	16,5
High pressure valve	bar	22	22	22	22	22	22	22	22	22	22	22

		4802	5003	5203	5403	5703	6003	6303	6603	6903	7203
Low pressure valve	bar	16,5	16,5	16,5	16,5	16,5	16,5	16,5	16,5	16,5	16,5
High pressure valve	bar	22	22	22	22	22	22	22	22	22	22

15. DIMENSIONS



15.1. DIMENSIONS OF HIGH EFFICIENCY VERSIONS (A) AND HIGH EFFICIENCY IN NOISE VERSION (E)

Version DIMENSIONS			1251	1401	1601	1801	2101	2401	1402	1602	1802	2002	2202
Height	B	mm	2450	2450	2450	2450	2450	2450	2450	2450	2450	2450	2450
Width	A	mm	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Length	C	mm	3780	3780	3780	4770	5750	5750	3780	3780	4770	5750	5750
empty WEIGHT		kg	3760	3770	3840	5000	5950	5980	4010	4030	4730	5740	5790

			2352	2502	2652	2802	3002	3202	3402	3602	3902	4202	4502
Height	B	mm	2450	2450	2450	2450	2450	2450	2450	2450	2450	2450	2450
Width	A	mm	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Length	C	mm	5750	5750	5750	5750	7160	7160	8150	9140	10120	10120	11100
empty WEIGHT		kg	6340	6330	6340	6350	7210	7310	8410	9180	10580	11580	11104

			4802	5003	5203	5403	5703	6003	6303	6603	6903	7203
Height	B	mm	2450	2450	2450	2450	2450	2450	2450	2450	2450	2450
Width	A	mm	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Length	C	mm	11100	11530	12520	13510	14490	14490	15470	15470	16450	16450
empty WEIGHT		kg	11320	12990	13790	15220	15130	15160	16560	17560	17084	17300

15.2. PUMPS WEIGHT

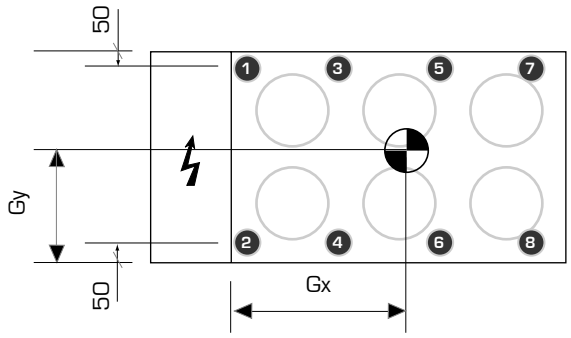
CODES		FA	FB	FC	FD	FE	FF	FG	FH	FJ	FK
Weight	kg	109	193	117	203	121	217	140	255	148	271

For the units with pumping kits, the following weights must be added, which however do not affect the barycentres and the distribution of weights on the rest surfaces.

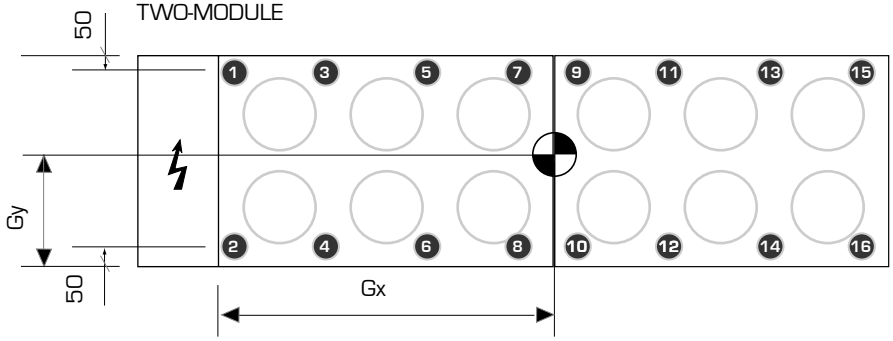
16. WEIGHTS AND BARYCENTRES

NOTE:
This chapter states the weight percentages on the rest surfaces (naturally the weight percentage also identifies the presence of the AVX). For the exact position of the holes for installation of the AVX, see chapter 22.

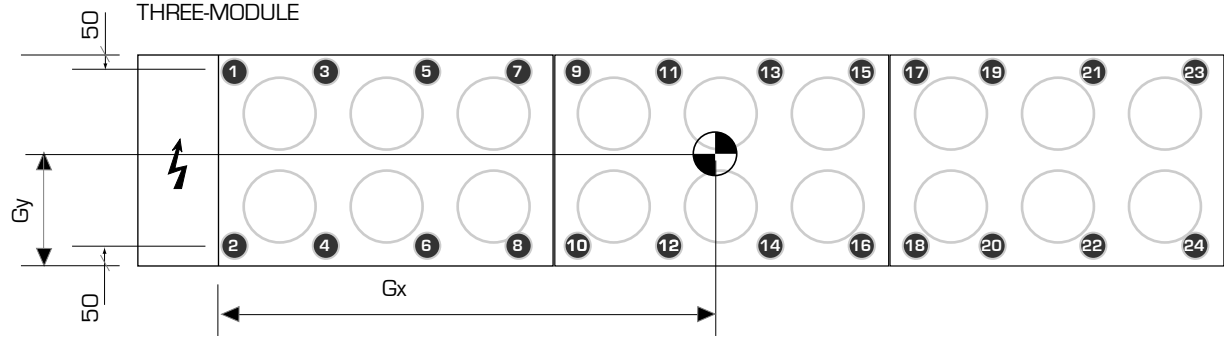
SINGLE-MODULE



TWO-MODULE



THREE-MODULE



16.1. BASE DIMENSIONS

		1251	1401	1601	1801	2101	2401	1402	1602	1802	2002	2202
		Single-module	Single-module	Single-module	Single-module	Single-module	Single-module	Single-module	Single-module	Single-module	Single-module	Single-module
Width	mm	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Length	mm	3780	3780	3780	4770	5750	5750	3780	3780	4770	5750	5750

		2352	2502	2652	2802	3002	3202	3402	3602	3902	4202	4502
		Single-module	Single-module	Single-module	Single-module	Two-module	Two-module	Two-module	Two-module	Two-module	Two-module	Two-module
Width	mm	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Length	mm	5750	5750	5750	5750	7160	7160	8150	9140	10120	10120	11100

		4802	5003	5203	5403	5703	6003	6303	6603	6903	7203
		Two-module	Three-module	Three-module	Three-module	Three-module	Three-module	Three-module	Three-module	Three-module	Three-module
Width	mm	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Length	mm	11100	11530	12520	13510	14490	14490	15470	15470	16450	16450

NOTE
The NSBs from 5703 to 7203 are delivered separated, composed of a two-module with the electric box placed at the head of the unit and a single-module that has its electric box under the compressors side exchange coil. After positioning in the place of installation they must be connected electrically. For further information, refer to the electric data chapter. For the distribution of weights, barycentres and lifting points, refer to the tables below.

NSB	WEIGHT		CENTRE OF GRAVITY		PERCENTAGE OF WEIGHT DISTRIBUTION ON SUPPORTS AS %																								KIT AVX
			Gx	Gy	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
SINGLE-MODULE																													
1251	3760	**FC**	1512	1195	25.9	30.8					19.8	23.5																	**501**
1401	3770	**FC**	1555	1196	25.1	30					20.5	24.4																	**501**
1601	3840	**FC**	1561	1186	25.3	29.6					20.8	24.3																	**501**
1801	5000	**FC**	1874	1217	10	12.4	26.8	33.2			7.8	9.8																	**506**
2101	5950	**FC**	2300	1192	11.6	13.8	22.7	26.8	3.6	4.3	7.9	9.3																	**512**
2401	5980	**FC**	2296	1195	11.6	13.8	22.8	27.1	3.5	4.2	7.8	9.2																	**512**
1402	4010	**FC**	1631	1213	23.4	28.9					21.4	26.3																	**501**
1602	4030	**FC**	1621	1231	23.4	28.8					21.4	26.4																	**501**
1802	4730	**FC**	2100	1197	8.5	10.1	25.7	30.7			11.4	13.6																	**505**
2002	5740	**FC**	2642	1230	10.3	12.5	12.6	15.4	12.3	15	9.9	12																	**511**
2202	5790	**FC**	2595	1228	10.5	13.3	12.8	16.2	11.8	14.9	9.2	11.4																	**511**
2352	6340	**FC**	2612	1214	10.4	12.9	12.9	15.9	12.1	14.9	9.4	11.5																	**511**
2502	6330	**FC**	2602	1215	10.5	12.9	13	16.1	12.1	14.9	9.2	11.3																	**511**
2652	6340	**FC**	2612	1214	10.4	12.9	12.9	15.9	12.1	14.9	9.4	11.5																	**511**
2802	6350	**FC**	2603	1217	10.4	12.9	13	16.1	12	14.9	9.2	11.5																	**511**
TWO-MODULE																													
3002	7210	**FC**	3232	1212	11.9	14.6					10.4	12.8	13.3	16.3					9.3	11.4									**509**
3202	7310	**FC**	3228	1209	13.5	12.9					11.9	11.3	15.2	14.5					10.5	10.2									**507**
3402	8410	**FC**	3656	1205	9.6	11.6					13.5	16.4	1.5	1.8	15.6	18.9			5	6.1									**513**
3602	9180	**FC**	4057	1228	6	7	13	16			4	4	5	6	13	17			4	5									**516**
3902	10580	**FC**	4604	1201	4.5	5.5	12.2	14.7			3.2	3.9	6	7.3	10.4	12.5	4.9	5.9	4.1	4.9									**518**
4202	11580	**FC**	4539	1201	5.2	6.3	12	14.4			3.2	3.8	6	7.2	10.5	12.7	4.3	5.2	4.1	5.1									**518**
4502	11104	**FC**	4687	1198	5.8	7.2	10.5	13	2.1	2.6	2.3	2.9	6.9	8.7	10.4	13	2.7	3.2	3.9	4.8									**521**
4802	11320	**FC**	4989	1200	5.8	6.9	10.6	12.7	3.2	3.8	2.6	3.1	6.6	7.9	10	12	2.9	3.4	3.8	4.7									**521**
THREE-MODULE																													
5003	12990	**FC**	5396	1213	6.6	7.9					8.2	9.7	5.7	6.8					9.8	11.6			11.9	14.1			3.5	4.2	**517**
5203	13790	**FC**	5297	1227	5.9	7.1					9.1	11.1			10.8	13			4.1	5			11.4	14			3.9	4.6	**515**
5403	15220	**FC**	6248	1237	5.1	6.3			9.1	11.2	1.7	2.2			9.5	11.7	3	3.7			4.7	5.8	8.8	10.9			2.8	3.5	**524**
5703				**NSB 5703 = NSB 3602 + NSB 2101**																									**525**
6003				**NSB 6003 = NSB 3602 + NSB 2401**																									**525**
6303				**NSB 6303 = NSB 3902 + NSB 2401**																									**527**
6603				**NSB 6603 = NSB 4202 + NSB 2401**																									**527**
6903				**NSB 6903 = NSB 4502 + NSB 2401**																									**530**
7203				**NSB 7203 = NSB 4802 + NSB 2401**																									**530**

KEY
N.U. Rest point and relative hole for AVX present but NOT TO BE USED

17. HANDLING

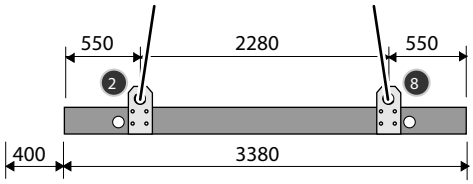
17.1. LIFTING INSTRUCTIONS

- Make sure that all panels are tightly fixed before handling the unit
- Use all and only the lifting points indicated
- Use ropes of the same length and that are suitable to lift the weight of the unit
- Handle the unit with care, without sudden movements and do not stop under the unit
- Handling must be performed by qualified staff, using safe means

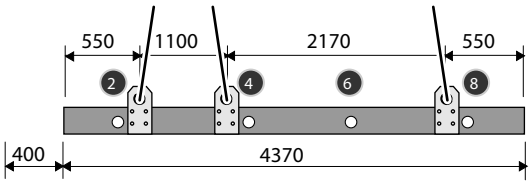
17.2. LIFTING POINTS

17.2.1. Single-module

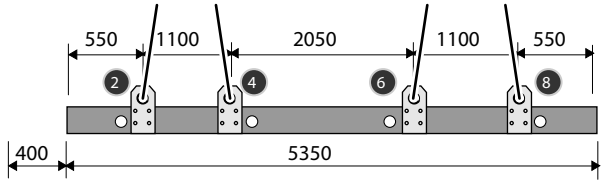
1251-1401-1601-1402-1602



1801-1802



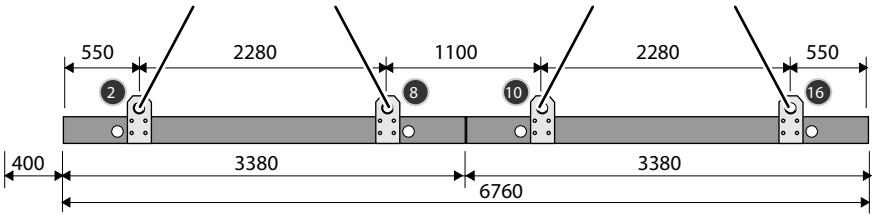
2101-2401-2002-2202 -2352-2502-2652-2802



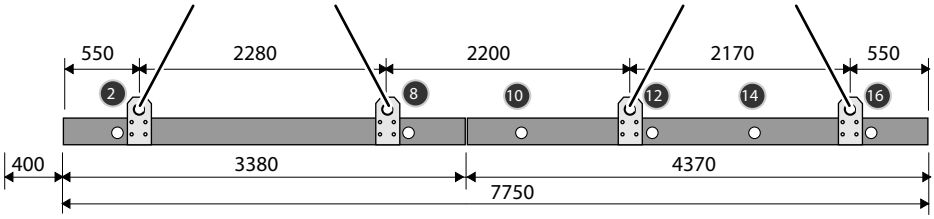
KEY
400 = Electric box

17.2.2. Two-module

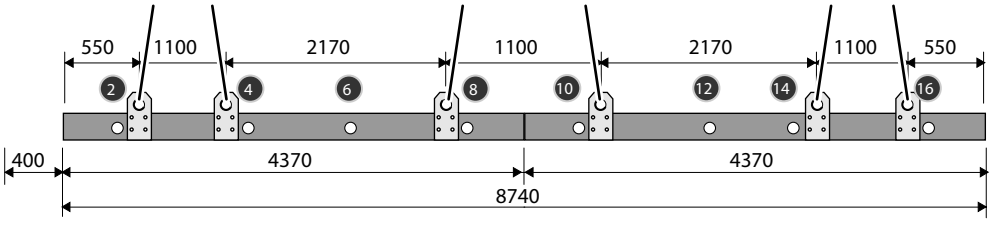
3002-3202



3402



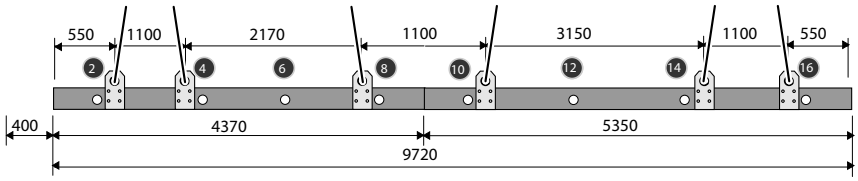
3602



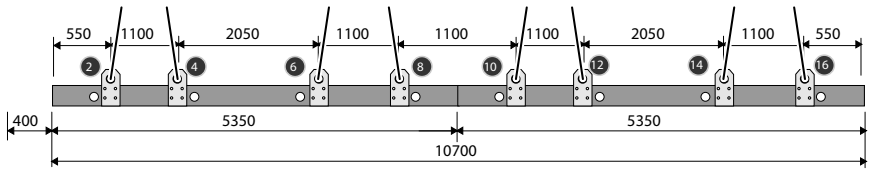
KEY
400 = Electric box

17.2.4. Two-module

3902-4202



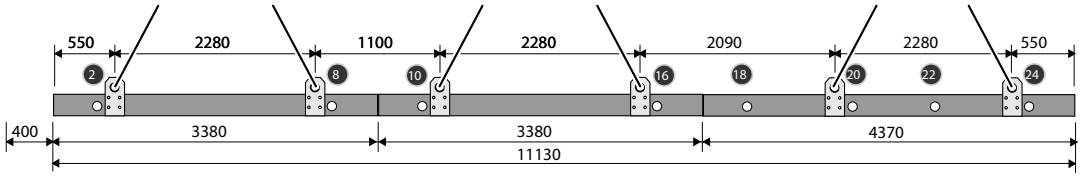
4502-4802



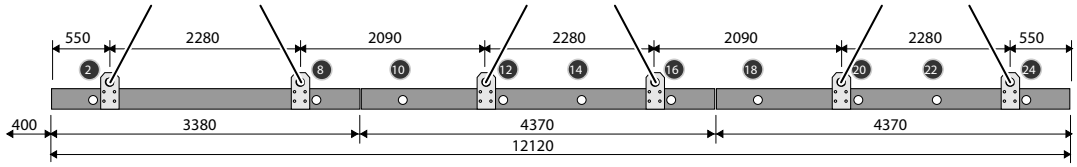
KEY
400 = Electric box

17.2.3. Three-module

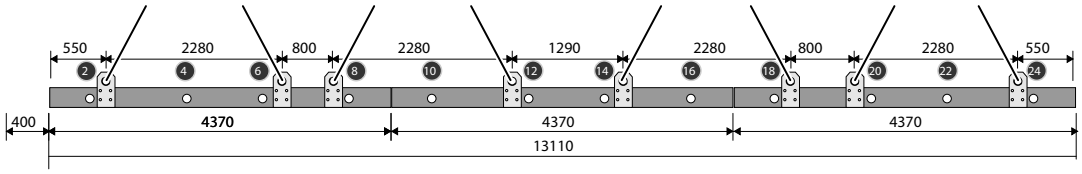
5003



5203

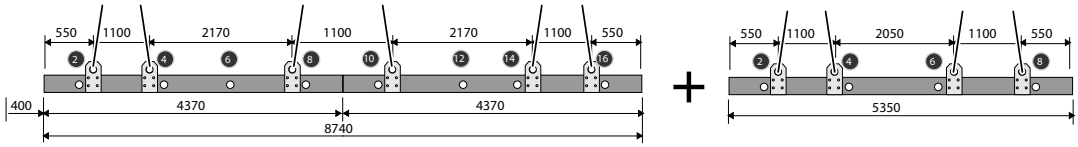


5403



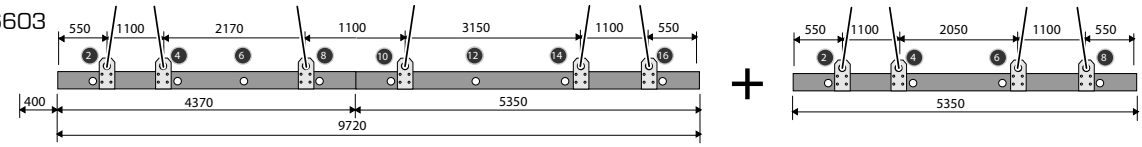
5703 (3602+2101) - **6003** (3602+2401)

5703-6003



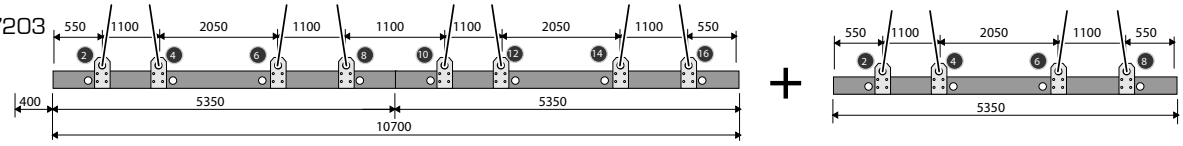
6303 (3902+2401) - **6603** (4202+2401)

6303-6603



6903 (4502+2401) - **7203** (4802+2401)

6903-7203



KEY
400 = Electric box

18. SAFETY PRECAUTIONS AND REGULATIONS STANDARDS

18.1. SAFETY WARNINGS

The NSB chiller must be installed by a qualified and suitably trained technician, in compliance with the national legislation in force in the country of destination (Ministerial Decree 329/2004).

AERMEC will not assume any responsibility for damage if these instructions are not followed.

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

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

GAS R134a
The chiller is delivered supplied with a sufficient quantity of R410A refrigerant gas. This is a refrigerant fluid without chloride that does not damage the ozone layer. R134a is not flammable. However all maintenance works must be performed exclusively by a specialised technician with suitable protection equipment.

Danger of electrical discharge!
Before opening the chiller, completely disconnect the appliance from the mains electricity.

19. INSTALLATION

19.1. CHOICE OF THE PLACE OF INSTALLATION

Before beginning installation agree the position with the customer and pay attention to the following recommendations:

- The point of installation must be capable of supporting the unit weight
- The selected place must have enough space to permit all the necessary tube positionings
- Remember that the chiller can transmit vibrations; it is therefore recommended to mount anti-vibration mounts (AVX accessories), fixing them to the holes on the base (Ø 20 mm). IT IS mandatory to envision the necessary technical spaces (Tab. 19.1.1), to allow ROUTINE AND EXTRAORDINARY MAINTENANCE AND FOR FUNCTIONING REQUIREMENTS

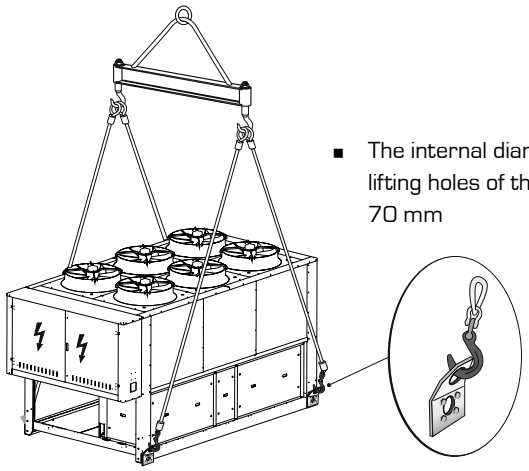
19.2. POSITIONING

- The chiller is delivered from the factory wrapped in estincoil positioned on a pallet
- Before any handling of the unit, verify the lifting capacity of the machines used
- Make sure that the ropes are type-approved to support the weight of the unit, make sure they are well-fastened.
- The lifting frame must have the connection point on the vertical of the barycentre. The axes of the barycentre are indicated by stickers positioned on the base.
- Handling must be performed by qualified, suitably equipped staff.
  To handle the machine: "IN THE CASE OF LIFTING"
  To ensure that the NSB structure is not damaged by the belts, place protection between the same and the unit
- IT IS strictly prohibited to stand underneath the unit

If it is positioned in a particularly windy zone, a windbreak should be provided to avoid unstable operation of the DCPX device.

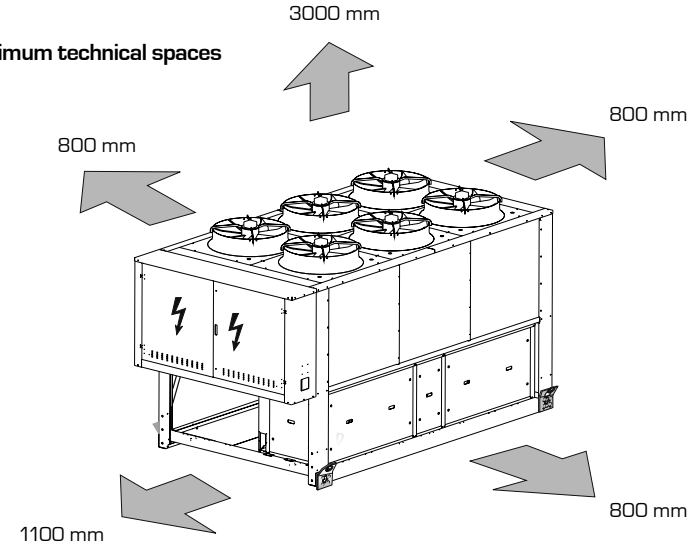
NOTE
The appliance warranty does not cover the costs for ladders, scaffolding or other elevation systems that may become necessary for carrying out servicing under warranty

19.1.1. Handling example - minimum technical spaces



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

Minimum technical spaces



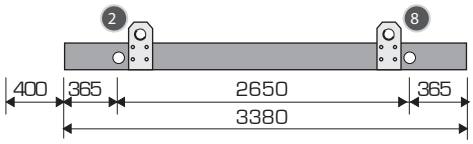
20. ANTI-VIBRATION MOUNTS POSITION

– The NSB chillers are built in modules, see figure, the total heights given in the drawings above are only the bases. For the total measurement of the unit, add the 400 mm of the electric box.

– The AVX resting points are also stated here. As it can be noted they do not coincide with the eye-bolts used for lifting (differently to some of our other machines). For the effective number and position of the eye-bolts, refer to the lifting points chapter.

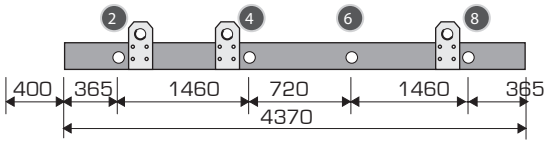
POSITIONS OF HOLES FOR ANTI-VIBRATION MOUNTS

Single-module	1251 FC	1401 FC	1601 FC	1402 FC	1602 FC



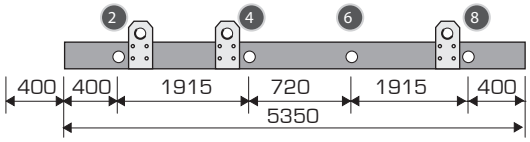
POSITIONS OF HOLES FOR ANTI-VIBRATION MOUNTS

Single-module	1801 FC	1802 FC



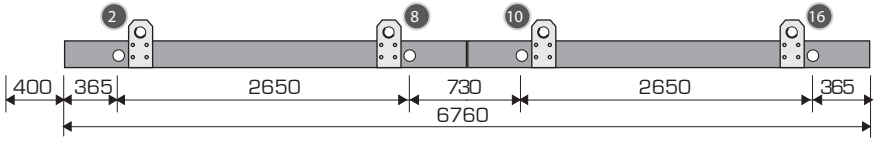
POSITIONS OF HOLES FOR ANTI-VIBRATION MOUNTS

Single-module	2101 FC	2401 FC	2002 FC	2202 FC	2352 FC	2502 FC	2802 FC



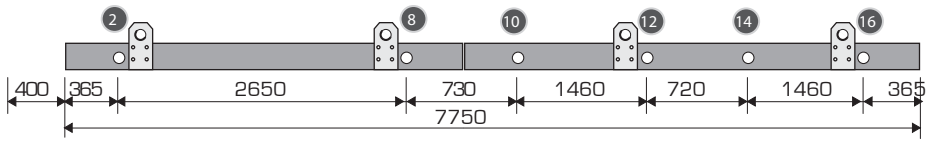
POSITIONS OF HOLES FOR ANTI-VIBRATION MOUNTS

Two-module	3002 FC	3202 FC



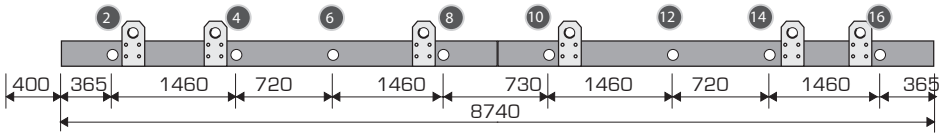
POSITIONS OF HOLES FOR ANTI-VIBRATION MOUNTS

Three-module	3402 FC



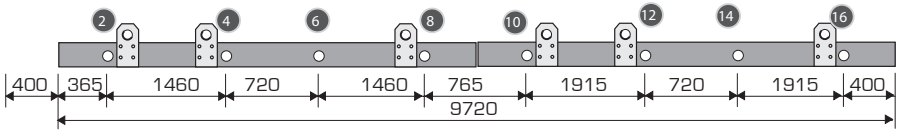
POSITIONS OF HOLES FOR ANTI-VIBRATION MOUNTS

Bi-module	3602 FC



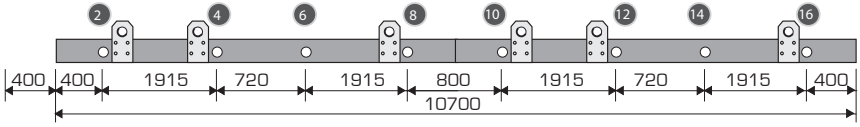
POSITIONS OF HOLES FOR ANTI-VIBRATION MOUNTS

Bi-module	3902 FC	4202 FC



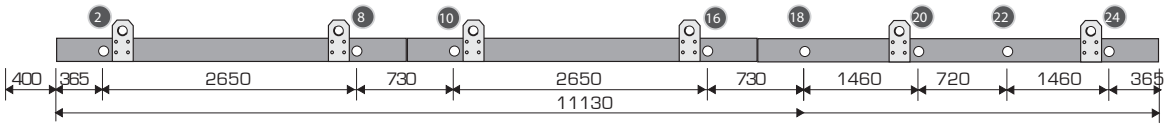
POSITIONS OF HOLES FOR ANTI-VIBRATION MOUNTS

Bi-module	4502 FC	4802 FC



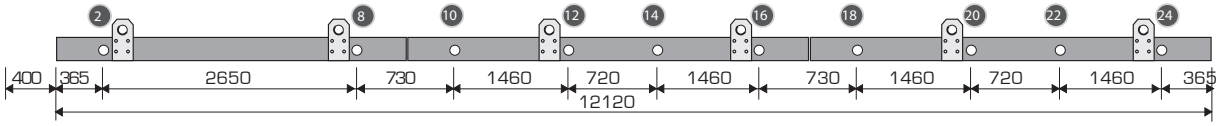
POSITIONS OF HOLES FOR ANTI-VIBRATION MOUNTS

Three-module	5003 FC



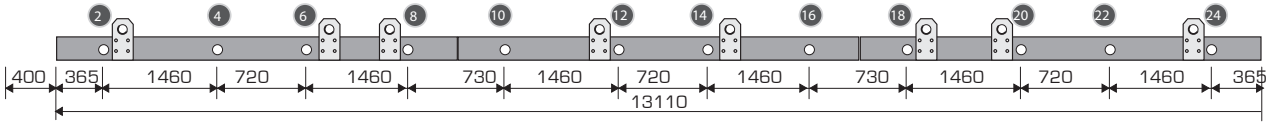
POSITIONS OF HOLES FOR ANTI-VIBRATION MOUNTS

Three-module	5203 FC



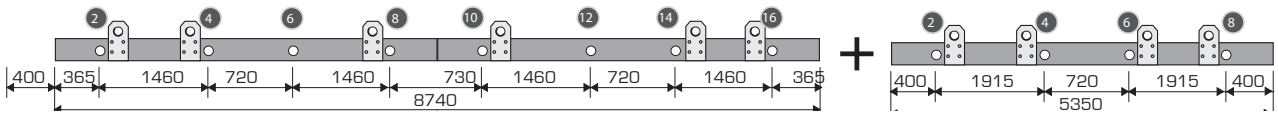
POSITIONS OF HOLES FOR ANTI-VIBRATION MOUNTS

Three-module	5403 FC



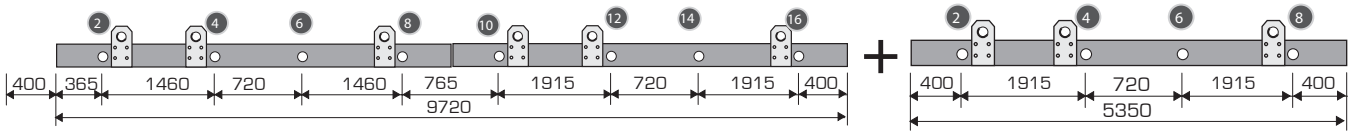
POSITIONS OF HOLES FOR ANTI-VIBRATION MOUNTS

Three-module	5703 FC	6003 FC



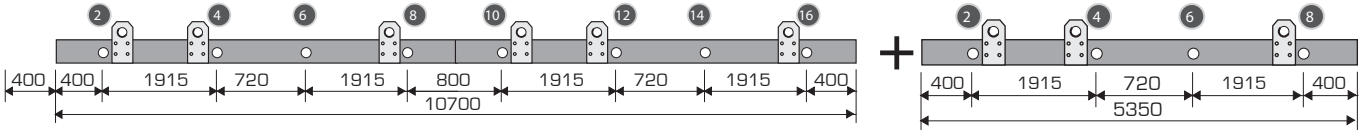
POSITIONS OF HOLES FOR ANTI-VIBRATION MOUNTS

Three-module	6303 FC	6603 FC



POSITIONS OF HOLES FOR ANTI-VIBRATION MOUNTS

Three-module	6903 FC	7203 FC



21. HYDRAULIC CIRCUIT

For correct design of the hydraulic plant, follow the local legislation in force regarding safety. The following information is suggested for correct installation of the unit.

NOTE
For good functioning of the unit it is recommended to install a filter on pump intake and a pump in the versions with desuperheater on heat exchanger entry

21.1. INTERNAL HYDRAULIC CIRCUIT (SUPPLIED AS PER STANDARD)

The hydraulic circuit of the NSB is made up according to the version from:

21.1.1. Standard NSB (fig. 1)
- Shell and tube HEAT EXCHANGER
- Differential pressure switch
- Water inlet and outlet probes (SIW- SUW).
- Three-way valve
- Additional air water coil
- Victaulic connection, joint with gasket to weld (all these components are standard but are supplied disassembled).

21.1.2. NSB FA/FB/FC/FD/FE/FF/FG/FH/FJ/FK" (fig. 2)
- SHELL AND TUBE heat exchanger
- Differential pressure switch
- Water inlet and outlet probes (SIW- SUW)
- Three-way valve
- Additional air water coil
- 2 expansion vessels (25 litre) shut-off by a gate valve
- Pumps (1 or 1+1 reserve, switch-over is manual)
- Charging unit with manometer shut-off by a gate valve
- Victaulic connection, joint with gasket to weld (all these components are standard but are supplied disassembled).

NOTE
All hydraulic parallels in the standard version and any other set-up (only evaporator with pumps) are the installer's responsibility.

21.2. EXTERNAL HYDRAULIC CIRCUIT (NOT SUPPLIED)

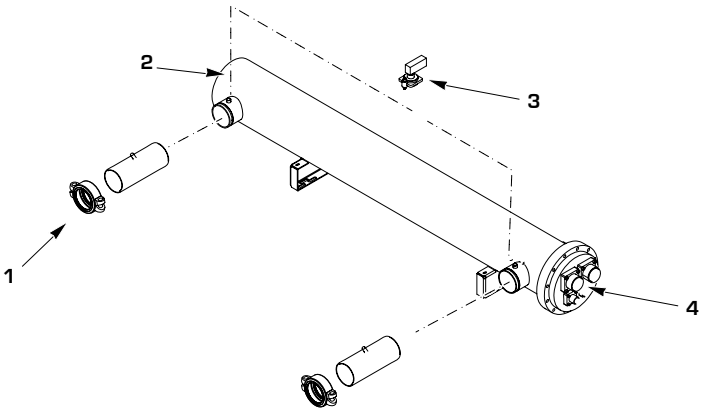
The choice and the installation of components outside of the NSB is installer's responsibility. He must operate according to the rules of good practice and in compliance with the regulations in force in the country of destination (Ministerial Decree 329/2004).
In any case, we recommend installation of the following:
- Water filter
- Storage tank
- Flow switch
- Safety valve/s
- High pressure flexible joints
- Air valve
- Manual shut-off valves
- Manometer

If they are not supplied with the machine
- Pump/s
- Charging unit
- Expansion tanks

NOTES
The hydraulic piping for connection to the machine must be suitably dimensioned for the effective flow rate of the water requested by the plant during functioning. The water flow rate to the heat exchanger must always be constant.

In the NSB 5703 - 6003 - 6303 - 6603 - 6903 - 7203, which are delivered separated, the hydraulic connection must be made after the two units have been positioned on site and they must be aligned by acting on the AVX jack in the order of 1/2 mm.

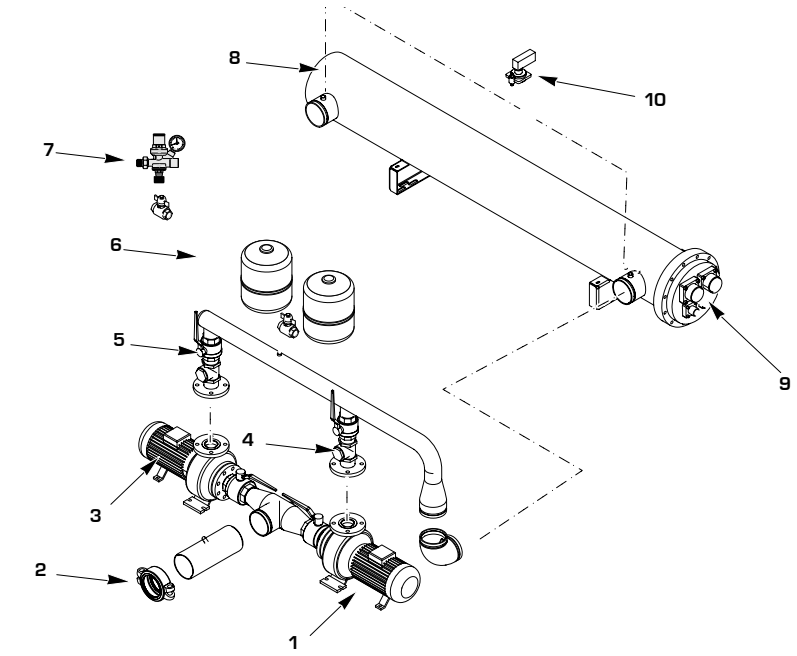
In the two and three-module models the water outlet probe (SUW) with its well is free, near to the electric box. Remember to insert it into the hydraulic parallel output collector, first envisioning a ½ inch coupling.



KEY	
1	*Supplied Victaulic connection and stub pipe connection.*
2	*Shell and tube heat exchanger*
3	*Differential pressure switch*
4	*Chiller connections*

Fig. 1

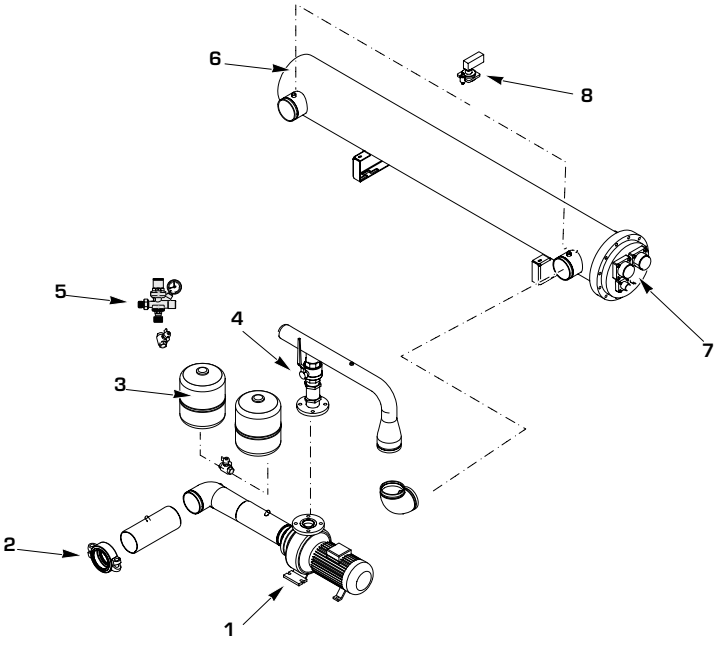
NSB "FB/FD/FF/FH/FK SINGLE-CIRCUIT



Two-circuit x 2 / Three-circuit x 3

KEY	
1	*Pump*
2	*Supplied Victaulic attachment and stub pipe connection.*
3	*Reserve pump*
4	*One-way valve*
5	*Gate valve*
6	*Shut-off expansion vessels (2x25l)*
7	*Charging unit*
8	*Heat exchanger*
9	*Chiller attachments*
10	*Differential pressure switch*

NSB "FA/FC/FE/FG/FJ SINGLE-CIRCUIT



Two-circuit x 2 / Three-circuit x 3

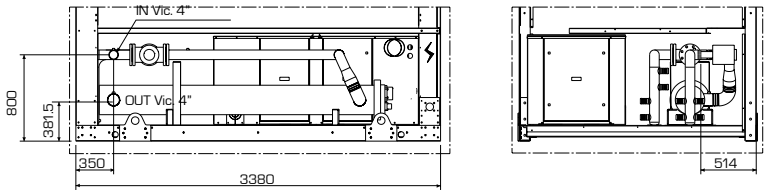
KEY	
1	*Pump*
2	*Supplied Victaulic attachment and stub pipe connection.*
3	*Shut-off expansion vessels (2x25l)*
4	*Gate valve*
5	*Charging unit*
6	*Heat exchanger*
7	*Chiller attachments*
8	*Differential pressure switch*

NOTE
In these versions the pump does not have a one-way valve

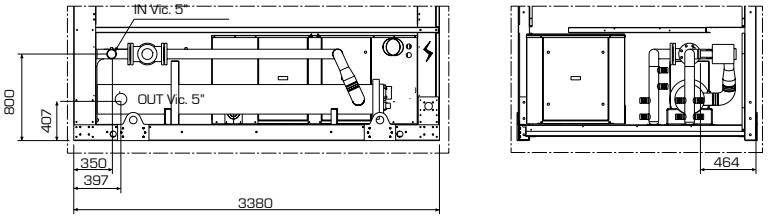
Fig. 2

22. POSITION OF HYDRAULIC CONNECTIONS

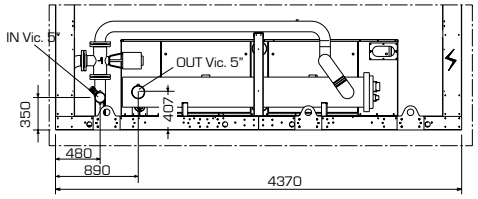
22.1. SINGLE-MODULE ATTACHMENTS POSITION



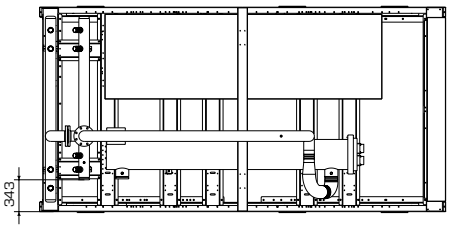
NSB Freecooling
1251



NSB Freecooling			
1401	**1402 (1)**	**1601**	**1602 (1)**



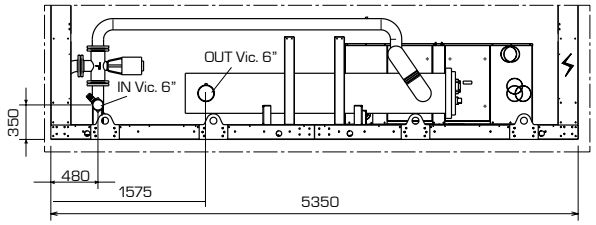
NSB Freecooling	
1801	**1802 (1)**

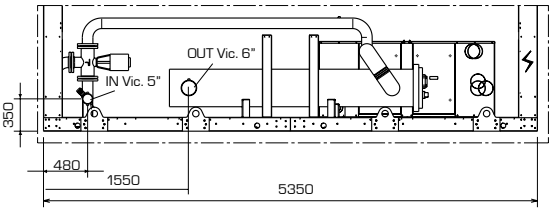


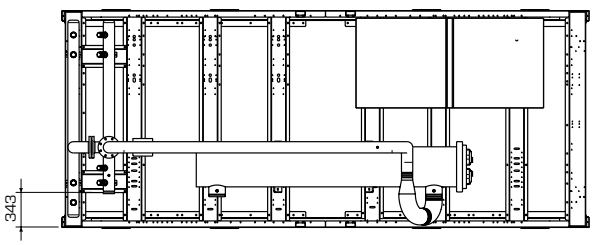
NSB Freecooling						
2101	**2401**	**2202 (1)**	**2352 (1)**	**2502 (1)**	**2652 (1)**	**2802 (1)**

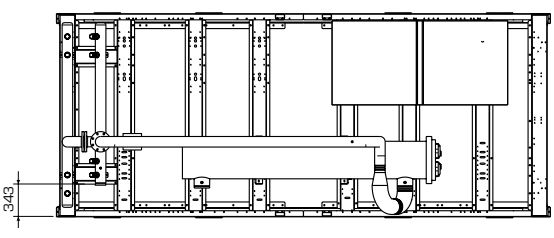
NSB Freecooling
2002 (1)

(1) = Two-circuit models with 1 evaporator built on a single-module.



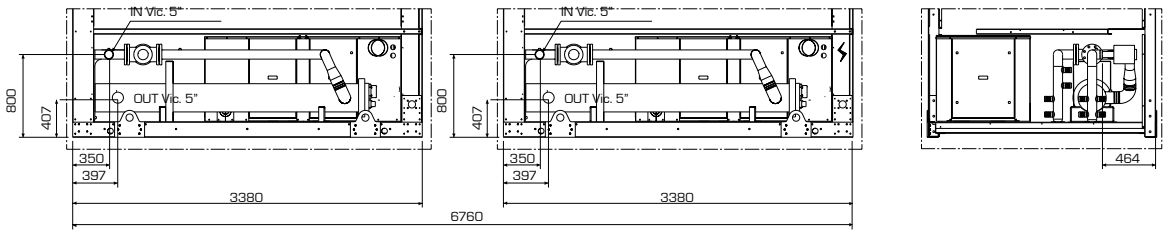




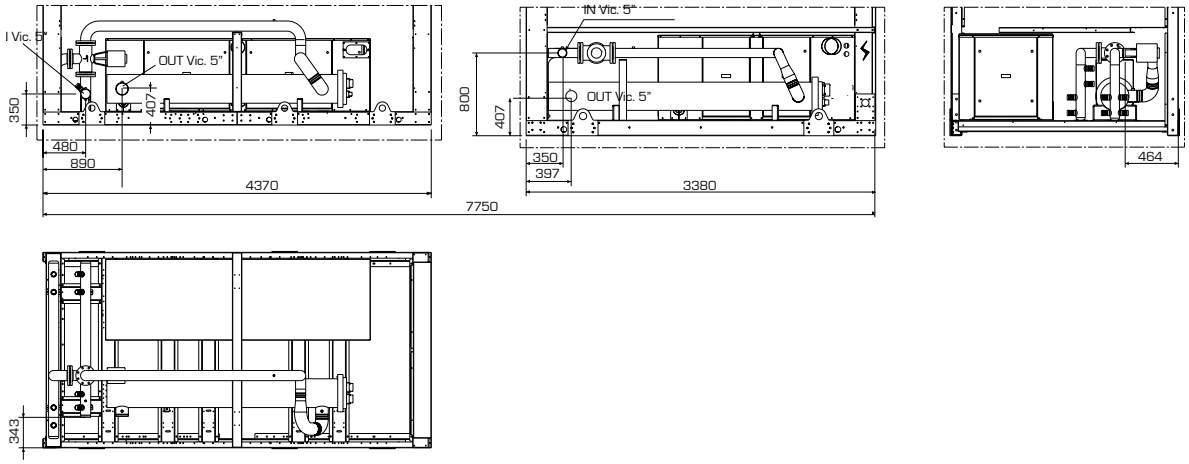


22.2. TWO-MODULE ATTACHMENTS POSITION

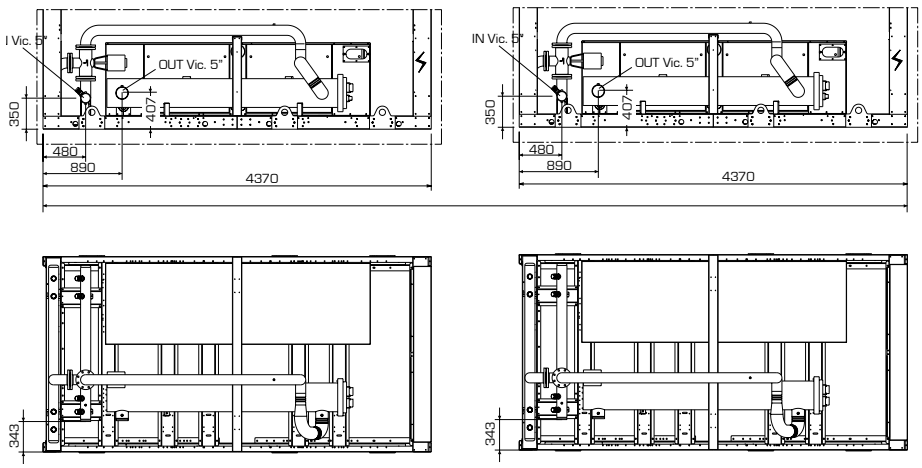
NSB FREECOOLING	
3002	**3202**



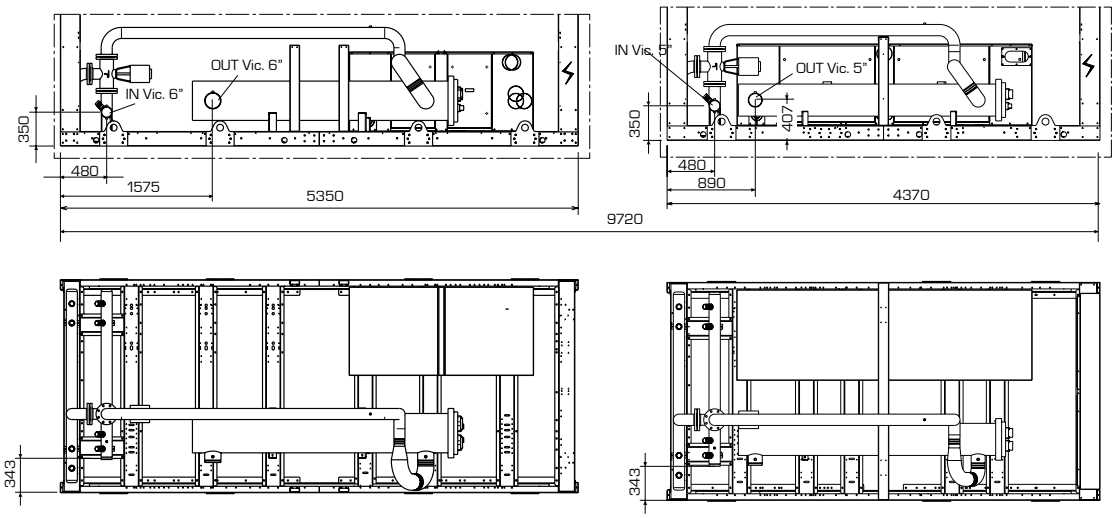
NSB FREECOOLING
3402



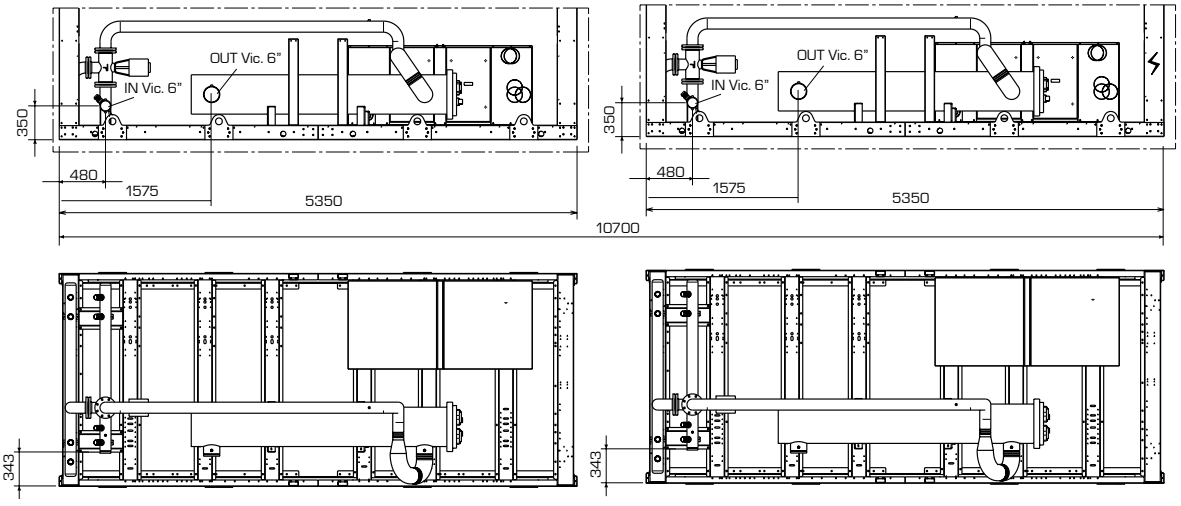
NSB FREECOOLING
3602



NSB FREECOOLING	
3902	**4202**

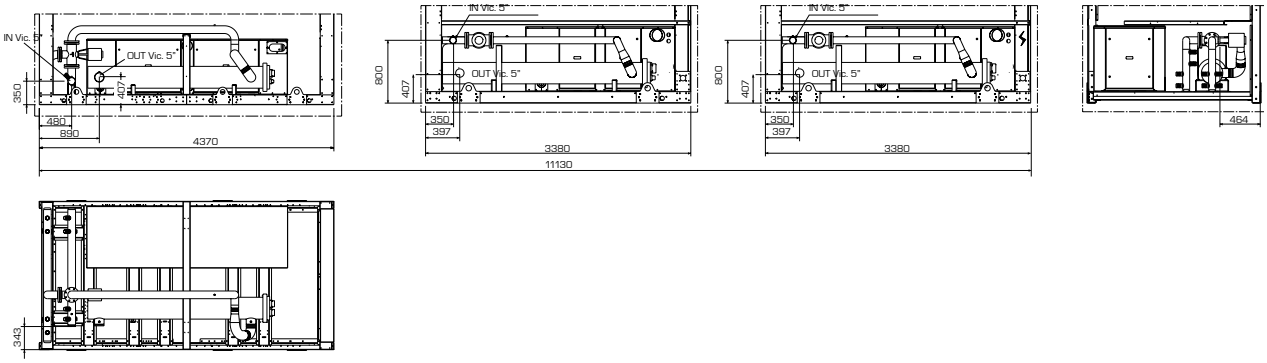


NSB FREECOOLING	
4502	**4802**

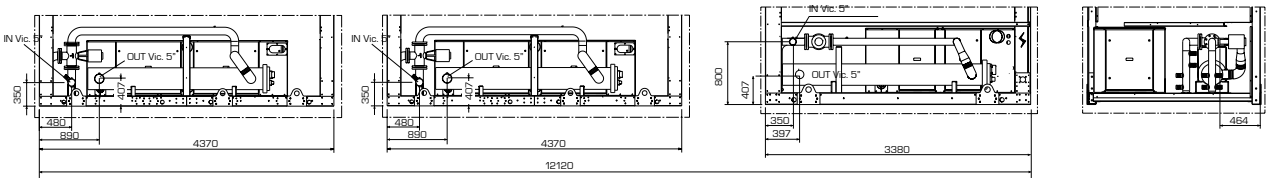


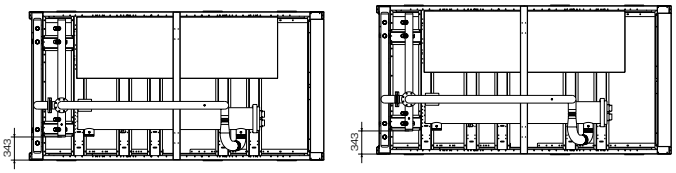
22.3. THREE-MODULE ATTACHMENTS POSITION

NSB FREECOOLING
5003

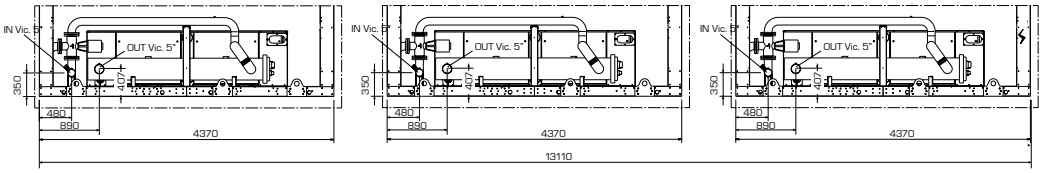


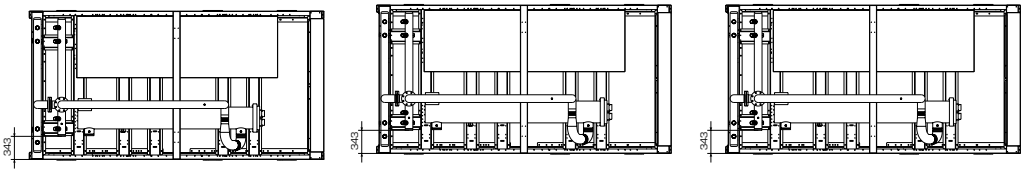
NSB FREECOOLING
5203





NSB FREECOOLING
5403

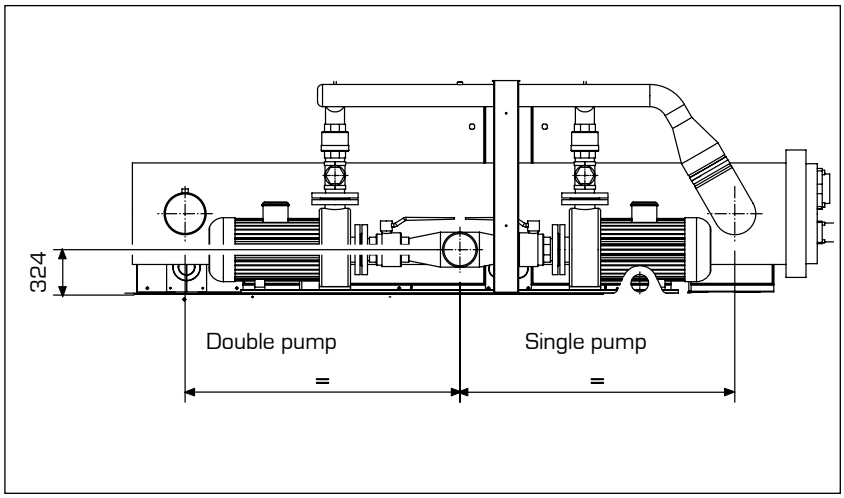




Note:
The models from 5703 to 7203 are delivered separately, 1 two-module, 1 single-module.
For the position of the ATTACHMENTS, refer to their compositions:
5703 = 8740 (NSB - 3602) + 5350 (NSB - 2101)
6003 = 8740 (NSB - 3602) + 5350 (NSB - 2401)
6303 = (NSB - 3902) + (NSB - 2401)
6603 = (NSB - 4202) + (NSB - 2401)
6903 = (NSB - 4502) + (NSB - 2401)
7203 = (NSB 4802) + (NSB - 2401)

22.4. VERSIONS WITH PUMP ATTACHMENTS

In all versions the pumps are positioned as per figure, at the centre of every evaporator. There can be up to three, one per circuit or six, two per circuit, one functioning and the other reserve. The single pump or pump coupled with the reserve have a Victaulic attachment.
The diameter of the pump connection is the same as the diameter of the evaporator output connection.



23. ELECTRICAL CONNECTIONS

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

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

For installation make reference to the wiring diagram supplied with the appliance. The wiring diagram and the manuals must be kept carefully and made AVAILABLE FOR FUTURE INTERVENTIONS ON THE UNIT

It is mandatory to verify the water-tightness of the machine before making the electrical connections. It must only be powered up after the hydraulic and electrical works have been completed

The NSB chillers are completely wired at the factory and only require connection to the electrical mains. Please verify that the features of the mains electricity are suitable for the absorption values indicated in the table of electrical data (CHAPTER 7) taking into consideration any other machines operating at the same time.

23.1. ELECTRICAL CABLES

NOTE
The cross-sections of the cables stated in Table 23.4 are recommended for a maximum length of 50 m. For longer lengths, the PLANT ENGINEER is responsible for the power supply line sizing and the earth connection, according to:

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

23.2. REMOTE CONTROLS CONNECTION

- Do not exceed the allowed maximum distance, which varies according to the type of accessory (PRV = 150mt.)
- Place cables away from power cables or cables with diverse voltage that emit electromagnetic interference.
- Avoid placing the cable in the vicinity of appliances that can create electromagnetic interference.
- The shield should be connected to earth without interference.
- The entire length of the cable must be shielded.

For further information please refer to instructions for the accessory.

23.3. CONNECTION TO THE MAINS ELECTRICITY POWER SUPPLY

- Make sure that the line isolating switch is open, padlocked and with sign.
- Protect cables with fairlead of suitable length.
- Before powering the unit, make sure that all protections removed during installation have been repositioned.

NOTE:
Check the tightness of all the terminals of the power conductors on commissioning and after 30 days from start-up. Successively, check the tightness of all the power terminals every six months. Loose terminals can cause overheating of the cables and components.

NOTE
Models 5003 - 5203 - 5403 - 5703 - 6003 - 6303 - 6603 - 6903 - 7203 have two electric boxes, one in front of the unit and one on the compressors side under the louvered exchange coil. Connect the power supplies and make the earth connection on site. (fig. 3). Moreover, the models from 5703 to 7203 are delivered separately. On installation the two units must be put into the network by connecting the two PCO2 MASTER SLAVE 1 positioned on the electric box of the two-module to the SLAVE 2 in the electric box of the single-module (see figure) only using a

23.4. ELECTRICAL DATA

shielded cable AWG20/22 made up from a twisted pair and one shield for standard RS485 communication. The boards must be connected in parallel, making reference to clamp J11. Respect the polarities: RX/TX+ of one board must be connected to RX/TX+ of the other board, the same thing for RX/TX-.

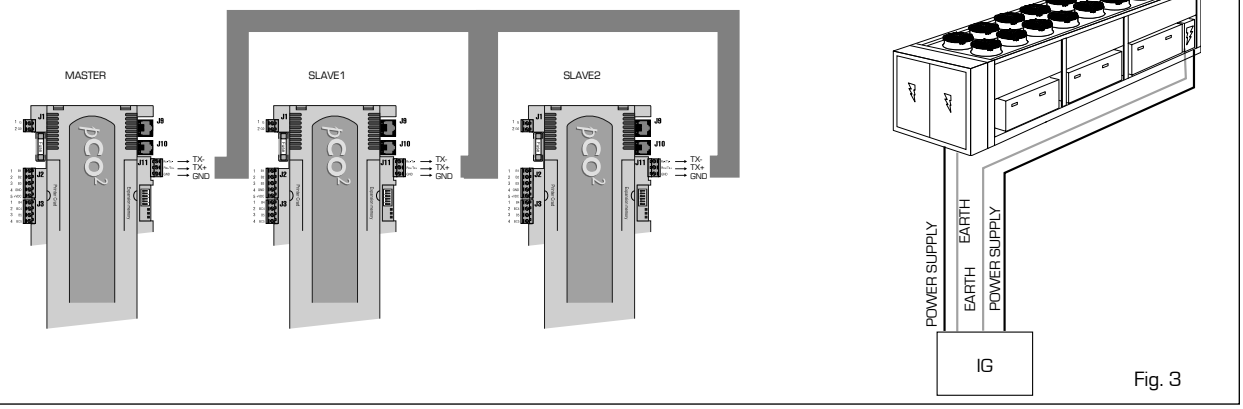


Fig. 3

NSB	VERSION	power supply n°	Formed from:	SECT A mm^2	SECT B mm^2	Earth mm^2	IL A
1251	**FC**	1		150	1.5	70	250
1401	**FC**	1		185	1.5	95	315
1601	**FC**	1		240	1.5	120	315
1801	**FC**	1		240	1.5	120	400
2101	**FC**	1		2x150	1.5	150	630
2401	**FC**	1		2x185	1.5	185	630
1402	**FC**	1		185	1.5	95	315
1602	**FC**	1		240	1.5	120	315
1802	**FC**	1		240	1.5	120	400
2002	**FC**	1		2x150	1.5	150	400
2202	**FC**	1		2x150	1.5	150	400
2352	**FC**	1		2x185	1.5	185	630
2502	**FC**	1		2x185	1.5	185	630
2652	**FC**	1		2x185	1.5	185	630
2802	**FC**	1		2x240	1.5	240	630
3002	**FC**	1		3x150	1.5	2x120	630
3202	**FC**	1		3x185	1.5	2x150	630
3402	**FC**	1		3x185	1.5	2x150	800
3602	**FC**	1		3x240	1.5	2x185	800
3902	**FC**	1		3x240	1.5	2x185	800
4202	**FC**	1		4x185	1.5	2x185	800
4502	**FC**	1		4x240	1.5	2x240	1000
4802	**FC**	1		4x240	1.5	2x300	1000
5003	**FC**	2	3202	3x185	1.5	2x150	630
			1801	240	1.5	120	400
5203	**FC**	2	3402	3x185	1.5	2x150	800
			1801	240	1.5	120	400
5403	**FC**	2	3602	3x240	1.5	2x185	800
			1801	240	1.5	120	400
5703	**FC**	2	3602	3x240	1.5	2x185	800
			2101	2x150	1.5	150	630
6003	**FC**	2	3602	3x240	1.5	2x185	800
			2401	2x185	1.5	185	630
6303	**FC**	2	3902	3x240	1.5	2x185	800
			2401	2x185	1.5	185	630
6603	**FC**	2	4202	4x185	1.5	3x185	800
			2401	2x185	1.5	185	630
6903	**FC**	2	4502	4x240	1.5	240	1000
			2401	2x185	1.5	185	630
7203	**FC**	2	4802	4x240	1.5	2x240	1000
			2401	2x185	1.5	185	630

24. COMMISSIONING

24.1. PREPARATION FOR COMMISSIONING

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

24.1.1. Electrical controls , on the unit without voltage

- Check that the main power cables are suitably sized, able to support the overall absorption of the unit, and that the unit has been appropriately earthed
- Check that all the electrical connections have been made correctly and all the terminals adequately tightened.

24.1.2. Electrical controls, of the live unit

The following operations are to be carried out when the unit is live.
- Use a tester to verify that the value of the power supply voltage is equal to 230V/400V ±10%. ACCORDING TO THE POWER SUPPLY OF THE UNIT
- Check that the connections made by the installer comply with the wiring diagrams on the machine.
- Supply power to the unit by turning the main switch to the ON position. The display will come on a few seconds after voltage has been supplied; check that the operating status is at OFF.

24.1.3. Hydraulic circuit controls

- Check that the system has been washed and the water used drained out before the unit was connected to the system
- Check that all the hydraulic connections have been made correctly and that the indications on the rating plates have been followed
- Check that the hydraulic system is filled and pressurised and also make sure that no air is present; if so, bleed it.
- Check to make sure that any shut-off valves present on the system are correctly opened

24.2. COMMISSIONING

NOTE
For the setting of the operating parameters and for detailed information regarding the machine functioning and of the control board, please refer to the user manual.

After having scrupulously carried out all the controls described above, the unit can be put into operation by pressing the ON button. Check the operating parameters set (set-point) and reset any alarms present. After a few minutes, the unit will begin operating.

24.2.1. Cooling circuit controls

- Check for any refrigerant gas leaks, particularly with reference to pressure points and pressure switches. (vibrations during transport may have loosened connections).

- HIGH-PRESSURE PRESSURE SWITCH
  It stops the compressor, generating the respective alarm, when the delivery pressure exceeds the set/point value. Correct operation can be checked by closing the water intake to the condenser and keeping the manometer under control, where installed by the user or the installer as it is not supplied by the factory, in the high pressure points. Verify that the intervention takes place in correspondence with the calibration value.

ATTENTION
In the event of failure to intervene at the calibration value, stop the compressor immediately and check the cause. ALARM reset is manual and can only be carried out when the pressure falls below the differential value.

- LOW PRESSURE TRANSDUCER
  It sends a signal that switches off the compressor, when the suction pressure falls below the set value.

ATTENTION
In the event of failure to intervene at the calibration value, stop the compressor immediately and check the cause. ALARM reset is manual and can only be carried out when the pressure falls below the differential value.

24.2.2.Overheating

Verify the overheating by comparing the temperature read with a contact thermometer situated on the compressor intake with the temperature shown on the manometer (saturation temperature corresponding to the evaporation pressure).
Heating mode optional values are between 3 - 5 °C.
Cooling mode optional values are between 6 - 10 °C
The manometer is not supplied in these units, therefore we recommend installing one in the respective pressure point.

24.2.3.Sub-cooling

Verify the sub-cooling by comparing the temperature read with a contact thermometer situated on the pipe at condenser outlet with the temperature shown on the high pressure manometer (saturation temperature corresponding to the condensation pressure).
The difference between these two temperatures gives the sub-cooling value. Optimal values are between 4 and 5 °C.
The manometer is not supplied in these units, therefore we recommend installing one in the respective pressure point.

24.2.4.Pressing line temperatures

If the sub-cooling and overheating values are normal, the temperature measured in the pressing line pipe at the compressor outlet must be 30/40°C greater than the condensation temperature.

24.3. SYSTEM DISCHARGE

It is recommended that the system is emptied before leaving switched off for long breaks or for unit maintenance that advise discharge.

- Before beginning discharge, place the master switch at "OFF":
- Check that water loading/re-fill tap is closed
- Open the discharge tap (not supplied USER'S RESPONSIBILITY) an all of the plant vent valves and relative terminals

ATTENTION
If Glycol is added to the unit, it must not be dumped as it is a pollutant. It should be collected and re-used, if possible.
- Use of heating resistors of the exchanger (ACCESSORY).
  In this case the resistances must always be supplied with electrical power for the entire period of possible freezing (machine in stand-by).

Circuit with glycol
- Functioning with glycoled water, with a percentage of glycol chosen ba-

sed on the minimum outdoor temperature expected. In this case you must take into account the different outputs and absorption of the chiller, the sizing of the pumps and the output of the terminals.

25. MAINTENANCE

NOTE
All routine and extraordinary maintenance operations must be carried out exclusively by qualified staff.
Before starting any servicing operation or cleaning, be sure to disconnect the power supply to the unit.

25.1. WARNINGS REGARDING MAINTENANCE

Inspection, maintenance and eventual repair work must be carried out only by a legally qualified technician.
Lack of control/maintenance can cause injury/damage to persons or objects.

Maintenance provides conditions necessary for a safe and prolonged use, elevated reliability and long life of unit.
All appliances are subject to inevitable wear and tear over time.
Maintenance makes it possible to:
- Maintain the efficiency of the unit
- Reduce the speed of deterioration
- Gather information and data and understand the state of efficiency of the unit in order to prevent breakdowns.

IT is fundamental that the following controls are made annually:

25.1.1. Hydraulic circuit
- Refilling of water circuit
- Cleaning the water filter
- Controlling flow switch/pressure switch
- Emptying the air from the circuit
- Verifying that the water flow rate to the evaporator is constant
- Verifying the thermal insulation of the hydraulic piping
- Checking the percentage of glycol where envisioned.

25.1.2. Electrical circuit
- Safety devices efficiency
- Electric power supply voltage
- Electrical Input
- Tightening of electrical connections
- Checking the condition of the electrical wires and their insulation
- Verifying the operation of the compressor sump

25.1.3. Cooling circuit
- State of compressor
- Resistance effectiveness of the exchanger (ACCESSORY)
- Verifying work pressure
- Verifying the water-tightness of the cooling circuit and that the pipes have not been damaged.
- Verifying the functioning of the pressure switches. Replace them if they malfunction.
- Checking the state of deposits on the dehydrator filter; if this is the case, replace the filter.

25.1.4. Mechanical checks
- Checking the tightness of the screws, the compressors and the electrical box, as well as the exterior panelling of the unit. Insufficient fastening can lead to anomalous noise and vibrations
- Check the condition of the structure. If there are any oxidised parts, treat with paint suitable to eliminate or reduce oxidation.

Keep a maintenance log on the machine (not supplied with the unit, it is the user's responsibility) that enables you to keep track of the servicing carried out on the unit. This makes it easy to organise the work appropriately and facilitates troubleshooting on the machine.
In the log, record the date, type of work carried out (routine maintenance, inspection, or repair), a description of the work, any measures taken and so on.

25.2. EXTRAORDINARY MAINTENANCE

The NSBs are filled with R410A gas and are inspected at the factory. Under normal conditions they do not require Technical Assistance related to control of refrigerant gas. During time gas leakage can be generated from the joints causing the appliance to malfunction. In these cases the leakage points must be detected, repaired and the gas circuit is to be replenished, respecting the law n°549 dated December 28 1993.

ATTENTION
Following extraordinary maintenance interventions
on the cooling circuit involving the replacement of components, before restarting the machine, carry out the following operations:
- Pay the maximum attention in restoring the load of refrigerant indicated on the machine plate
- Open all the cocks present in the cooling circuit
- Connect the electrical power supply and earth correctly
- Control that the coil is not dirty or obstructed

SYSTEM CHECKS
- Check all hydraulic connections of entire system
- Check that the water pump is working correctly
- Clean the water filter/s

ATTENTION
It is forbidden to LOAD the cooling circuit with a refrigerant gas different to the one indicated. Using a different refrigerant gas can cause serious damage to the compressor.

26. DISPOSAL

26.1. DISCONNECTING THE UNIT

The unit must be disconnected by a qualified technician. Before disconnecting the unit, the following must be recovered, if present:
- The refrigerant gas: the gas must be extracted using suction devices operating in a closed circuit to ensure there are no gas leaks into the environment
- The glycol must not be dispersed in the environment when removed, but stored in suitable containers

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

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

26.2. DISMANTLING AND DISPOSAL

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

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

27. INCORRECT USE

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

27.1. IMPORTANT SAFETY INFORMATION

The machine must not exceed the pressure and temperature limits indicated in the table shown in the "Functioning limits" paragraph of the technical manual
Correct operation of the unit is not guaranteed following a fire; before restarting the machine, have it checked by an authorised after-sales centre
The machine is equipped with safety valves that, in the event of excessive pressure, can discharge the high temperature gas into the atmosphere
Wind, earthquakes, and other natural phenomena of exceptional intensity have not been considered
If the unit is used in an aggressive atmosphere or with aggressive water, please consult the manufacturer.

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