AERMEC

air conditioning

R134a

RS485

CPU

Technical - Installation - Maintenance Manual

NSH

CHILLER/AIR - WATER HEAT PUMP

AERMEC

COMPANY QUALITY SYSTEM

ICIM

ISO 9001:2000 - Cert. n° 0128/5

CISQ IQNet

AERMEC S.P.A.

EUROVENT CERTIFIED PERFORMANCE

www.eurovent-certification.com

CE

EN

INSHPY. 1011. 4138505_00

Dear Customer,
Thank you for choosing an AERMEC product. This product is the result of many years of experience and in-depth engineering research, and it is built using top quality materials and advanced technologies.
In addition, the CE mark guarantees that our appliances fully comply with the requirements of the European Machinery Directive in terms of safety. We constantly monitor the quality level of our products, and as a result they are synonymous with Safety, Quality, and Reliability.

Product data may be subject to modifications deemed necessary for improving the product without the obligation to give prior notice.

Thank you again.
AERMEC S.p.A

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NSH

SERIAL NUMBER	

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

NAME **NSH**

TYPE **CHILLER/AIR - WATER HEAT PUMP**

MODEL

To which this declaration refers, complies with the following harmonised standards:

IEC EN 60335-2-40	Safety standard regarding electrical heat pumps, air conditioners and dehumidifiers
IEC EN 61000-6-1 **IEC EN 61000-6-3**	Immunity and electromagnetic emissions for residential environments
IEC EN 61000-6-2 **IEC EN 61000-6-4**	Immunity and electromagnetic emissions for industrial environments
EN378	Refrigerating systems and heat pumps - Safety and environmental requirements
UNI EN 12735	Seamless, round copper tubes for air conditioning and refrigeration
UNI EN 14276	Pressure equipment for cooling systems and heat pumps

Thereby, compliant with the essential requirements of the following directives:

- LVD Directive: 2006/95/CE
- Electromagnetic Compatibility Directive 2004/108/CE
- Machinery Directive 2006/42/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 no. 06/270-QT3664 Rev. 5 issued by the notified body n.1131 CEC via Pisacane 46 Legnano (MI) - Italy

The person authorised to constitute the technical file is: Massimiliano Sfragara - 37040 Bevilacqua (VR) Italy – Rome, 996

Bevilacqua 08/11/2010

Marketing Manager
Signature

Standards and Directives respected when designing and constructing the unit:

Safety:
Machinery Directive
2006/42/CE

Low Voltage Directive
LVD 2006/95/CE

Electromagnetic compatibility Directive
EMC 2004/108/CE

Pressure Equipment Directive
PED 97/23/CE EN 378,
UNI EN 14276

Electric part:
EN 60204-1

Protection rating
IP24

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

Certifications:
Eurovent
Aermec participates in the EUROVENT Certification Program up to 600 kW
The products of interest appear in the EUROVENT Guide of Certified products.

Refrigerant GAS: R134a
This unit contains fluoride gases with greenhouse effect covered by the Kyoto Protocol. Maintenance and disposal must only be performed by qualified staff.

GWP=1900

1. GENERAL WARNINGS

AERMEC NSHs are constructed according to the recognised technical standards and safety regulations.
They have been designed and must be used for air conditioning purposes, in accordance with their technical features. Any contractual or extracontractual liability of the Company is excluded for injury/ damage to persons, animals or objects owing to installation, regulation and maintenance errors or improper use.
All uses not expressly indicated in this manual are prohibited.

1.1. PRESERVATION OF THE DOCUMENTATION

The instructions along with all the related documentation must be given to the user of the system, who assumes the responsibility to conserve the instructions so that they are always at hand in case of need.
Read this sheet carefully; the execution of all works must be performed by qualified staff, according to Standards in force on this subject in different countries. (Ministerial Decree 329/2004).
The appliance must be installed in such a way as to enable maintenance and/ or repairs to be carried out.
The appliance warranty does not cover the costs for ladders, scaffolding, or other elevation systems that may become necessary for carrying out servicing under warranty.
Do not modify or tamper with the chiller as dangerous situations can be created and the manufacturer will not be liable for any damage caused. The validity of the warranty shall be void in the event of failure to comply with the above-mentioned indications.

1.2. WARNINGS REGARDING SAFETY AND INSTALLATION STANDARDS

- The cooler 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 due to failure to follow these instructions.**
- Before beginning any operation, READ THESE INSTRUCTIONS CAREFULLY AND CARRY OUT THE SAFETY CHECKS TO AVOID ALL RISKS. 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.

2. PRODUCT IDENTIFICATION

The NSHs can be identified by the following:

- PACKING LABEL
  which shows the product identification data
- TECHNICAL PLATE
  Positioned on the right lateral side-member (see fig.1)

⚠ ***ATTENTION***
Tampering, removal and/or a missing identification plate does not allow safe identification of the product and will complicate any installation or maintenance operation.

TECHNICAL PLATE POSITION

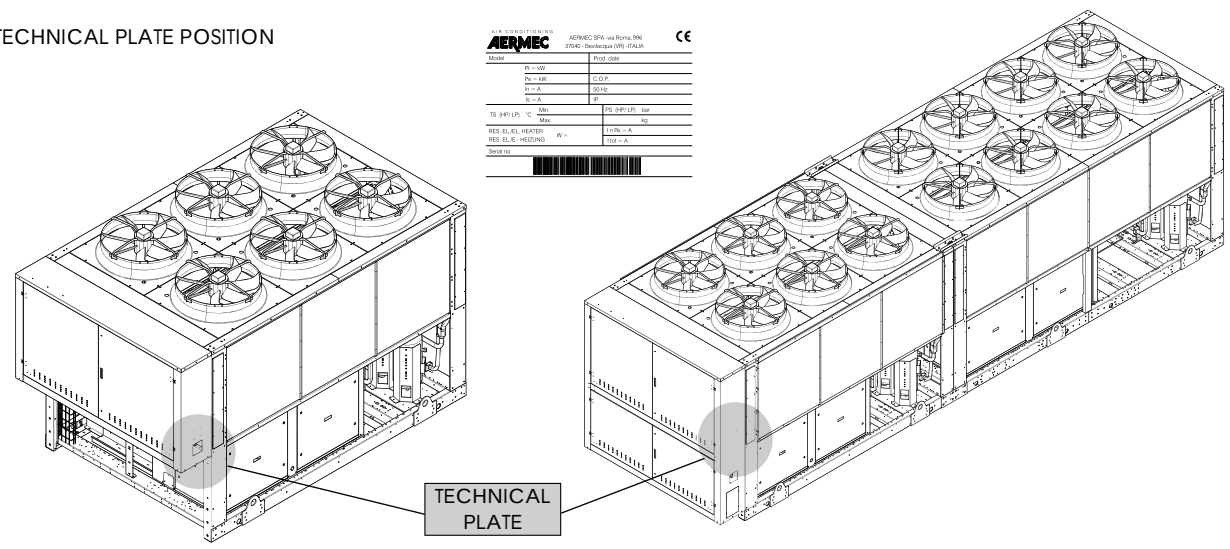


Fig.1

3. PRESENTATION

Water-cooled high efficiency air chillers for **outdoor installation**.

The NSH units have **semi-hermetic screw compressors**, optimised for the use of the R134a refrigerant.

The high unit efficiency axial fans are regulated to optimise the air flow rates to the condensing coils.

The air condensing coils made with copper pipes and aluminium louvered fins are optimised for better heat exchange performance.

Full use is made of the **shell and tube dry expansion** evaporator in all conditions thanks to the electronic expansion valve, mounted as per standard, allowing machine stability to be achieved within a short time.

The NSH units are **supplied with refrigerant load and oil**, factory-inspected and only require electric and hydraulic connections in the place of installation.
They are units designed to warranty:

3.1. HIGH EFFICIENCY

Thanks to the technology applied, the use of the dedicated compressors and heat exchangers with high heat exchange co-efficients, allow to reach high EER and COP values in the work conditions declared by Eurovent, thereby guaranteeing lower working costs and consequently quicker return of the investment.

3.2. FLEXIBILITY

Flexibility of system requirements, thanks to the use of latest generation electronic regulation and continuous modulation of the cooling capacity with the electronic thermostatic valve, benefiting the system energy efficiency.

3.3. SILENCE

Guaranteed by the standard integral bonnet of the compressors. Moreover, a **muffler** is to be installed on the compressor flow line in the L-E versions together with the **DCPXDEVICE (standard also on versions with desuperheater)**, to control the fan speed.
⚠ **THE DCPX ACCESSORY IS NOT REQUIRED in the versions with Inverter fans (J). The fans are already equipped with a device to regulate the number of revs.**

Sensitive and careful consideration of customer requirements, Aermec offers the possibility of lowering noise even further using the **AKW accessory**, only available in the silenced versions.

3.4. MODELS

Heat pump (H)
Reversible units in heat pump mode with the use of a **4-way cycle reversing valve** that allows the cooling cycle to be inverted, switching from the cooling mode in summer to the heating mode in winter.

3.5. VERSIONS

−Standard [°]
−Standard silenced (L)
−High efficiency [A]
−Silenced high efficiency (E)

Extended operational limits
Maximum water temperature produced in winter 55 °C.
Maximum external air temperature in summer 48°C for high efficiency versions, 44°C for the standard versions.
Minimum external air temperature in winter -7°C for high efficiency versions, -3°C for the standard versions

Possibility of exceeding the limits with reduced power, thanks to an intelligent algorithm that prevents blockage in extreme situations.

3.6. FANS

−STANDARD [°]
−INVERTER [J]

⚠ ***Note:***
The machines with an inverter fan require a Class B differential switch as protection (motor leakage current <3.5mA).

3.7. HEAT RECUPERATORS:

- **Without recuperators °**
- **Desuperheater D**: (1 per parallel circuit) Unit with (AISI 316) heat plate, insulated externally with closed cell material to reduce heat loss.

- **Outdoor unit**
- **Maximum temperature of water produced in winter 55 °C**
- **Standard electronic thermostatic valve**
- **High energy efficiencies**
- **Flexibility in the system**
- **Silent**

4. CONFIGURATOR

1,2	3,4,5,6	7	8	9	10	11	12	13	14,15
NS	1251	X	°	°	A	°	°	°	00

Field	Code	
1, 2	NS	
3, 4, 5, 6	Size	1251, 1401, 1601, 1801, 1402, 1602, 1802, 2002, 2202 2352, 2502, 2652, 2802,3002, 3202,3402, 3602
7	Thermostatic valve	
	X (1)	R134a Electronic thermostatic valve and minimum temperature of water produced -6 °C
8	Model	
	H	Heat Pump
9	Heat recovery	
	°	Without heat recovery
	D	Desuperheater (plate exchanger)
10	Version	
	°	Standard
	L	Standard version in silenced operation
	A	High efficiency
	E	High efficiency in silenced operation
11	coils	
	°	In aluminium
	R	In copper
	S	In tinned copper
	V	In painted aluminium-copper (epoxy paint)
12	Fans	
	°	Standard
	J	Inverter
13	Power supply	
	°	400-3-50 Hz with fuses
	2	230V-3-50 Hz with fuses *
	4	230V-3-50 Hz with magnet circuit beakers* * (available for sizes 1402, 1602, 1802, 2002, 2202)
	5	500V-3-50Hz with fuses**
	8	400V-3-50Hz with magnet circuit beakers
	9	500V-3-50Hz with magnet circuit beakers ** ** (not available for sizes 1801, 3402, 3602)
14 - 15	Pumps	
	00	Without pumps
	PA	Single pump (pump A)
	PC	Single pump (pump C)
	PE	Single pump (pump E)
	PG	Single pump (pump G)
	PJ	Single pump (pump J)

Example of the commercial code: NS1401XH°°°°00
This is an NS unit, size 1401, valve electronic, with heat pump model, without heat recovery units, standard version with aluminium coils, standard fans, 400V 3~50Hz power supply with fuse, without pumping assembly

5. DESCRIPTION OF COMPONENTS

5.1. STRUCTURE

Base and support structure
Made up from hot galvanised sheet steel profiles with suitable thickness. Polyester powder painting (RAL 9002), resistant to atmospheric agents.
Realised in a way to allow total accessibility to the internal components for service and maintenance operations.

Acoustic protection cover
As per standard, all NSH versions consist of a thick galvanised steel compartment and a sound-absorbent lining. This reduces the sound power level emitted by the unit and also protects the compressors from atmospheric agents.

5.2. FANS

Ventilation Unit
Helical type with IP54 protection rating and 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.
Note:
The machines with an inverter fan require a Class B differential switch as protection (motor leakage current <3.5mA).

5.3. COOLING CIRCUIT

Compressor/s
High efficiency semi-hermetic screw compressors with adjustment of the cooling capacity via continuous modulation from 40 to 100% (from 25 to 100% with an electronic valve) and equipped with:
- Motor circuit breaker protection
- Oil discharge temperature control
- Electric resistance for heating the oil sump with compressor at a standstill
- Reset button
- Oil level

Shell and tube exchanger
Dry expansion type, suitably dimensioned to obtain high performance.
A steel case with closed cell expanded elastomer anti-condensation covering.
The shell and tube is made from copper pipes with a special profile that allows high exchange and low pressure drops.
On request, it can be supplied with an electric anti-freeze resistance, (ACCESSORY ONLY TO BE FACTORY ASSEMBLED), which protects the heat exchanger from external temperatures up to -10°C, with the purpose of preventing ice from forming in stand-by mode.
With the unit running, the protection is ensured by the output water temperature probe and the differential pressure switch.

Liquid separator
Positioned on compressor intake to protect against any return of refrigerant liquid, flooded-start-up and functioning in the presence of liquid.

Liquid storage
Compensates the difference in volume between the louvered fin coil and plate exchanger, retaining the excess liquid during winter functioning mode.

Dehydrator filter
Mechanical with cartridge made of ceramics and hygroscopic material, able to withhold impurities and any traces of humidity present in the cooling circuit.

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

Electronic thermostatic valve
As per standard, the NSHs have the electronic thermostatic valve with an indicator to monitor the stopper and the flow of refrigerant inside the circuit. In comparison with the classic thermostatic valve, the electronic thermostatic valve is distinguished for better overheating regulation, (lower overheating average) and full use is made of the evaporator in all conditions, thereby increasing machine efficiency and achieving machine stability quicker and maintaining this constant.

Desuperheater (optional plates)
(1 per parallel circuit)
Unit with (AISI 316) heat plate, insulated externally with closed cell material to reduce heat loss.

Economiser
Economiser circuit with a plate exchanger (AISI 316); optimises performance especially in high compression ratios, for example in low external temperatures in winter functioning.

4-way cycle inversion valve
Inverts the flow of refrigerant in summer/ winter switch-over.

Muffler: device mounted on the pressing line to reduce the noise produced when the high pressure gas passes through.

5.4. HYDRAULIC CIRCUIT

The NSH can have one or two circuits with the following (according to the size):
STANDARD VERSION
- **Evaporator 1 x circuit**
  supplied with stub pipe and victaulic connections
- **Differential pressure switch**
- **SIW water inlet probe**
- **SUW water outlet probe**

NOTE:
In the two-module units, the water outlet probe (SUW) together with its sump is free, nearby the electric box. Remember to insert it in the collector of the outlet hydraulic parallel, first providing a ½-inch sleeve.

VERSION WITH PUMPS
Depending on the characteristics of the pump chosen, it offers a useful head to overcome the pressure drops in the system.

5.5. CONTROL AND SAFETY COMPONENTS

IP54 differential pressure switch - 1 per circuit
Positioned between the evaporator inlet and outlet, it has the task of verifying that there is water circulation. Otherwise, it blocks the unit.

Low pressure transducer
Safety device that intervenes in case of anomalous pressures in the cooling circuit. Allows to view the value of the compressor intake pressure on the microprocessor board display (one per circuit). Placed on the low pressure side of the cooling circuit.

High pressure transducer
Safety device that intervenes in case of anomalous pressures in the cooling circuit. Allows to view the value of the compressor intake pressure on the microprocessor board display (one per circuit). Placed on the high pressure side of the cooling circuit.

Double high pressure switch (manual + tool)
Calibrated in the factory, placed on the high pressure side of the cooling circuit, it inhibits the functioning of the compressor if abnormal work pressure occurs

Cooling circuit safety valves (HP, LP)
Calibrated at 22 bar HP - 16,5 LP, they intervene by discharging the over pressure in case of anomalous pressures.

- **Compressor fuses or magnet circuit-breaker protections to be specified when placing the order**
- **Fans magnet-circuit breakers protection**
- **Auxiliary magnet circuit-breaker protection**

5.6. ELECTRIC CONTROL BOARD AND REGULATION

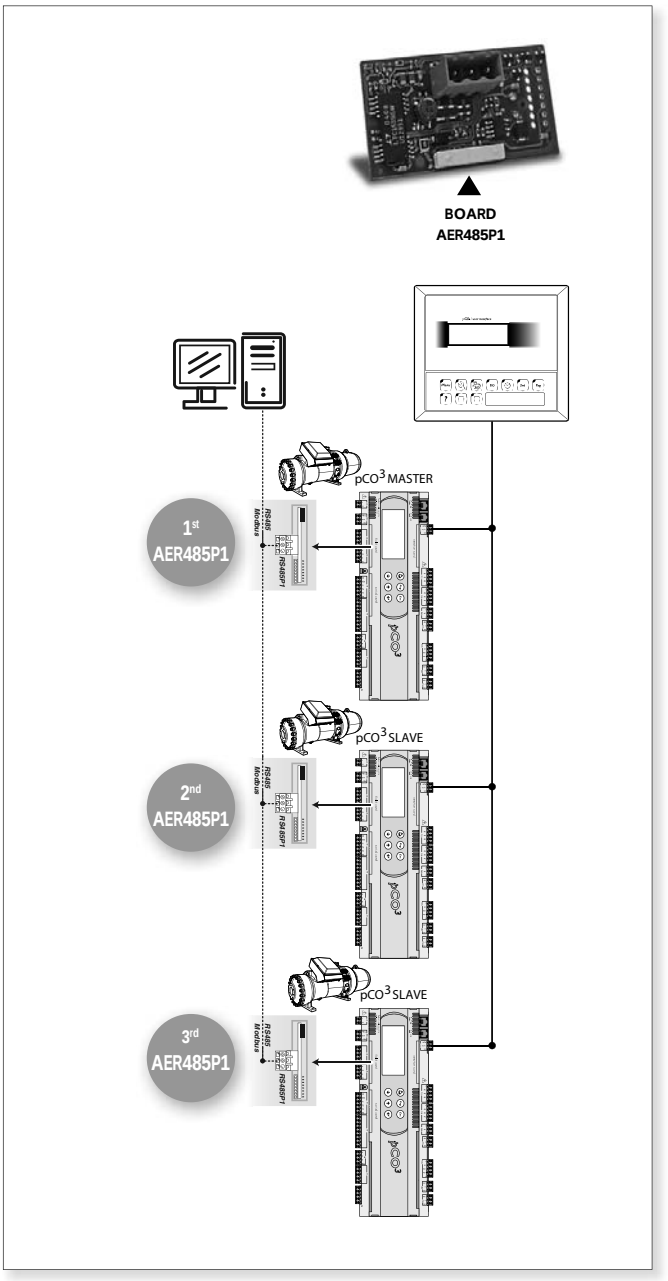
Electric power and control board, manufactured in compliance with the EN 60204-1/IEC 204-1 Standards, complete with:

- Circuit board,
- transformer for the control circuit,
- Door lock main isolating switch,
- Fuses for compressors. Magnet circuit breakers are also available on request,
- Power section,
- clamps for remote ON/OF,
- Compressors protection with internal circuit breakers,
- connection clamps to the remote keyboard,
- summer-winter manual change-over clamps,
- clamps for alarm signal,
- clamps for signalling compressor switch-on status,
- safety fuses,
- **IP54 Protection rating**,
- Control circuit numbered cables,
- Phase sequence and minimum-maximum voltage control.

Microprocessor

- Multi-language menu
- Phase sequence control
- Separate 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 regulation on the temperature of the output water
- Programmable timer function
- Can be interfaced with Modbus protocol (accessory)
- Pump/s rotation control and management
- Compressors rotation management
- Analogue input from 4 to 20 mA
- "Always Working" Function. In case of critical conditions, the machine does not stop but can adjust itself and supply the maximum power in those conditions
- "Switching Histeresys" self-adapting work differential to always ensure the correct work times of the compressors even in systems with low water content or insufficient flow rate. This system decreases wear of the compressors
- PDC "Pull Down Control" system to prevent the activation of power steps when the water temperature quickly approaches the set-point. Optimises machine functioning when working normally and in the presence of load variations, ensuring the best machine efficiency in all conditions.

For further information please refer to the user manual.



6. DESCRIPTION OF ACCESSORIES

6.1. ELECTRIC REGULATION ACCESSORY

- **AER485P1**: This accessory allows connection of the unit to BMS supervising systems with RS485 electric standard and MODBUS protocol
  NOTE: n°1 must be envisioned per compressor.
- **AERWEB30**: the AERWEB device allows remote control of a chiller from a common PC via a serial connection. By using additional modules, the device allows control of the chiller via a telephone network when the AERMODEM accessory is used or via a GSM network when the AERMODEMGSM accessory is used. The AERWEB can pilot up to 9 chillers, each of which must be equipped with the **AER485P1** accessory.
- **MULTICHILLER**: Control, switch-on and switch-off system of the single chillers where multiple units are installed in parallel.
- **PRV3**: Allows to control the chiller at a distance.

6.2. ELECTRIC ACCESSORIES

- **RIFNSH**: Current rephaser. Connected in parallel to the motor, it allows a reduction of the input current (approx. 10%). It can only be installed during the machine construction phase, therefore it must be requested when placing the order.
- **DCPX**: **AS PER STANDARD FOR THE FOLLOWING VERSIONS:**
- **SILENCED «L-E»**
- **WITH DESUPERHEATOR «D»**
  This accessory allows correct functioning when external temperatures drop below 10 °C (up to – 10 °C). It consists of an adjustment circuit board that varies the number of fan revs according to the condensation pressure, read by the high pressure transducer, in order to keep it sufficiently high for correct unit functioning.
- **KRS**: Electrical evaporator resistor for external temperatures up to -10 °C
- **KRSDES:** kit consisting of an electric resistance mounted in the evaporator and one mounted in the desuperheater
  (KRS and KRSDES accessories can only be applied in the factory)

6.3. GENERIC ACCESSORIES

- **GP**: **(TO BE MOUNTED IN THE FACTORY)**Protects the external coil from blows and prevents access to the underlying area where the compressors and chiller circuit are housed.
- **AK**: **(TO BE MOUNTED IN THE FACTORY)**
  This accessory reduces the noise further by means of a compressor cover, optimised with high density material without lead that reduces vibrations even further.
- **AVX (Spring anti-vibration mounts)**
  In order to reduce the vibrations transmitted to the support structure of the unit, mount anti-vibration supports on each resting point (see the compatibility table).

7. ACCESSORIES COMPATIBILITY

NSH MODELS FROM SIZE **1251** TO SIZE **2002**

MODEL	VERS.	1251	1401	1601	1801	1402	1602	1802	2002
AER485P1	All	• (x1)	• (x1)	• (x1)	• (x1)	• (x2)	• (x2)	• (x2)	• (x2)
MULTICHILLER		•	•	•	•	•	•	•	•
AK-ACOUSTIC KIT (1)(4)		•	•	•	•	•	•	•	•
PRV3		•	•	•	•	•	•	•	•
AERWEB30		•	•	•	•	•	•	•	•
KRS									
KRS (1)	All	KRS11	KRS11	KRS11	KRS11	KRS19	KRS19	KRS19	KRS19
KRSDES (1) (5)		KRS11DES	KRS11DES	KRS11DES	KRS11DES	KRS19DES	KRS19DES	KRS19DES	KRS19DES
RIFNSH									
RIFNSH(2)(1)	All	1251	1401	1601	1801	1402	1602	1802	2002
GP									
GP300M (1)	All	•	•	•					
GP400M (1)					•				
GP300B (1)						•	•		
GP400B (1)								•	
GP500B (1)									•
DCPX(STANDARD FANS)									
DCPX (3)(6)	all	DCPX69	DCPX69	DCPX69	DCPX69	DCPX68	DCPX68	DCPX68	DCPX73

(1) Accessories can only be applied in the factory

(2) Accessory only available with power supply 400V-3-50Hz

(3) Standard accessory in the silenced versions and desuperheater versions

(4) Accessory only available in the silenced versions

(5) The KRSDES accessory includes the electrical evaporator resistor and the electrical desuperheater resistor

(6) Inverter fans (J): DCPX not necessary. The fans are already equipped with a device to regulate the number of revs

NSH MODELS FROM SIZE **2202** TO SIZE **3602**

MODEL	VERS.	2202	2352	2502	2652	2802	3002	3202	3402	3602
AER485P1	All	• (x2)	• (x2)	• (x2)	• (x2)	• (x2)	• (x2)	• (x1)	• (x1)	• (x1)
MULTICHILLER		•	•	•	•	•	•	•	•	•
AK-ACOUSTIC KIT (1)(4)		•	•	•	•	•	•	•	•	•
PRV3		•	•	•	•	•	•	•	•	•
AERWEB30		•	•	•	•	•	•	•	•	•
KRS										
KRS (1)	All	KRS19	KRS19	KRS19	KRS19	KRS19	KRS14	KRS14	KRS14	KRS14
KRSDES (1) (5)		KRS19DES	KRS19DES	KRS19DES	KRS19DES	KRS19DES	KRS14DES	KRS14DES	KRS14DES	KRS14DES
RIFNSH										
RIFNSH (2)(1)	All	2202	2352	2502	2652	2802	3002	3202	3402	3602
GP										
GP500B(1)	All	•	•	•	•	•				
GP300M+GP300M (1)							•	•		
GP300M+GP400M (1)									•	
GP400M+GP400M										•
DCPX (STANDARD FANS °)										
DCPX (3)(6)		DCPX73	DCPX73	DCPX73	DCPX73	DCPX73	DCPX73	DCPX73	DCPX73	DCPX73

(1) Accessories can only be applied in the factory

(2) Accessory only available with power supply 400V-3-50Hz

(3) Standard accessory in the silenced versions and desuperheater versions

(4) Accessory only available in the silenced versions

(5) The KRSDES accessory includes the electrical evaporator resistor and the electrical desuperheater resistor

(6) Inverter fans (J): DCPX not necessary. The fans are already equipped with a device to regulate the number of revs

8. KIT AVX SELECTION

Mod.NSH	PUMP	(Version)	1251	1401	1601	1801	1402	1602	1802	2002
AVX	(00)	° - L	536	536	536	539	537	538	541	542
	(PA)		536	536	536	539	537	538	541	543
	(PC)		536	536	536	540	537	538	541	543
	(PE)		536	536	536	540	537	538	541	543
	(PG)		536	536	536	540	538	538	541	543
	(PJ)		536	536	536	540	538	538	541	543
AVX	(00)	A - E	536	536	536	540	537	538	541	543
	(PA)		536	536	536	540	537	538	541	543
	(PC)		536	536	536	540	538	538	541	543
	(PE)		536	536	536	540	538	538	541	543
	(PG)		536	536	536	540	538	538	541	543
	(PJ)		536	536	536	540	538	538	541	543

Mod.NSH	PUMP	(Version)	2202	2352	2502	2652	2802	3002	3202	3402	3602
AVX	(00)	° - L	544	545	547	549	549	552	552	557	558
	(PA)		544	546	547	549	550	553	553	557	558
	(PC)		544	546	547	549	550	553	555	557	558
	(PE)		544	546	547	549	550	553	555	557	558
	(PG)		544	546	548	550	550	553	555	557	558
	(PJ)		544	546	548	550	550	553	555	557	558
AVX	(00)	A - E	543	545	549	551	551	554	556	557	559
	(PA)		543	545	550	551	551	553	553	557	559
	(PC)		543	545	550	551	551	553	555	557	559
	(PE)		543	545	550	551	551	553	555	557	559
	(PG)		543	545	550	551	551	553	555	557	559
	(PJ)		543	545	550	551	551	553	555	557	559

FIELD	PUMPING UNIT
00	Without pump
PA	with pump A
PC	with pump C
PE	with pump E
PG	with pump G
PJ	with pump J

9. TECHNICAL DATA

9.1. NSH [°-L-A-E] from 1251 to 2002

NSH	U.M.	VERS.	1251	1401	1601	1801	1402	1602	1802	2002
Cooling capacity [1]	kW	°	245	261	297	354	242	299	343	367
		L	236	251	281	336	228	286	328	355
		A	263	282	310	366	258	316	366	385
		E	251	267	293	344	243	302	350	367
Total input power	kW	°	91	100	110	134	97	111	130	134
		L	94	105	116	140	100	118	137	137
		A	86	94	107	127	94	107	124	131
		E	91	101	115	135	100	115	131	139
Evaporator water flow	l/h	°	42140	44890	51080	60890	41620	51430	59000	63120
		L	40590	43170	48330	57790	39220	49190	56420	61060
		A	45240	48500	53320	62950	44380	54350	62950	66220
		E	43170	45920	50400	59170	41800	51940	60200	63120
Evaporator pressure drops	kPa	°	34	25	39	32	33	32	40	45
		L	32	23	35	30	30	30	37	43
		A	38	41	27	43	36	50	43	47
		E	35	37	24	38	33	46	39	43
Heating capacity [2]	kW	°/L	275	291	336	381	272	340	380	410
		A/E	281	297	332	393	281	342	395	412
Total input power	kW	°/L	92	98	110	129	97	112	128	141
		A/E	87	93	103	125	92	105	122	132
Condenser water flow	l/h	°/L	47300	50050	57790	65530	46780	58480	65360	70690
		A/E	48330	51080	57100	67600	48330	58820	67940	70690
Condenser pressure drops	kPa	°/L	45	33	53	40	44	45	52	60
		A/E	47	49	33	54	47	64	54	58
ENERGY INDEX										
EER	W/W	°	2.69	2.61	2.70	2.64	2.49	2.69	2.64	2.74
		L	2.51	2.39	2.42	2.40	2.28	2.42	2.39	2.59
		A	3.06	3.00	2.90	2.88	2.74	2.95	2.95	2.94
		E	2.76	2.64	2.55	2.55	2.43	2.63	2.67	2.64
COP	W/W	°/L	2.99	2.97	3.05	2.95	2.80	3.04	2.97	2.91
		A/E	3.23	3.19	3.22	3.14	3.05	3.26	3.24	3.11
ESEER	W/W	°	3.15	3.04	3.14	3.07	3.02	3.25	3.18	3.29
		L	3.09	2.94	2.97	2.96	2.90	3.07	3.05	3.27
		A	3.51	3.44	3.31	3.30	3.23	3.48	3.49	3.48
		E	3.36	3.21	3.09	3.10	3.05	3.29	3.33	3.30
ELECTRICAL DATA										
Power supply	**400V-3-50Hz**									
Total input current when COLD	A	°	157	174	189	226	173	192	225	232
		L	166	185	204	242	182	207	241	245
		A	149	164	185	215	168	186	216	227
		E	161	178	202	234	181	202	233	246
Total input current when HOT	A	°/L	159	171	189	218	173	193	223	242
		A/E	150	163	180	212	165	182	213	229
Maximum current	A	ALL	209	242	258	316	276	276	325	352
Peak current	A	ALL	327	387	431	472	251	251	305	313

Data declared according to ISO 14511

Nominal reference conditions:

[1] **COOLING MODE**

water input temperature	12°C
Water output temperature	7°C
External air temperature	35°C
Δt	5°C

[2] **HEATING MODE**

water input temperature	40°C
Water output temperature	45°C
External air temperature	7°C
Δt	5°C

NSH [°-L-A-E] from 1251 to 2002

NSH	U.M.	VERS.	1251	1401	1601	1801	1402	1602	1802	2002
REFRIGERANT LOAD *(The refrigerant load may be subject to variations)*										
R134a Refrigerant	kg	°/L	80	85	115	130	45 + 45	50 +50	55 + 55	55 + 70
		A/E	90	95	120	145	50 + 50	55 + 55	60 + 60	60 +75
Oil	kg	All	22	19	19	35	30	30	30	30
TWIN-SCREW COMPRESSORS										
N. compressors/circuits	n°/n°		1/1	1/1	1/1	1/1	2/2	2/2	2/2	2/2
Electric resistance (n°/power)	n°/n°	All	300	300	300	300	2 x 200	2 x 200	2 x 200	2 x 200
PARTIALISATIONS										
Partialisation of the unit	° - A	%	40-100				20-100			
FANS (STANDARD)										
Air flow rate	m³/h	°	128400	128400	120000	171200	128400	120000	171200	214000
		L	89880	89880	84000	119840	89880	84000	119840	149800
		A	117600	117600	112200	156000	117600	112200	153200	196000
		E	82320	117600	78540	109200	82320	78540	107240	137200
Number of Revs	g/1'	°/A	890	890	890	890	890	890	890	890
		L/E	590	590	590	590	590	590	590	590
Total input power	kW	°/A	10.5	10.5	10.5	14	10.5	10.5	14	17.5
		L/E	7.2	7.2	7.2	9.6	7.2	7.2	9.6	12
Total input current	A	°/A	22.2	22.2	22.2	29.6	22.2	22.2	29.6	37.0
		L/E	15.0	15.0	15.0	20.0	15.0	15.0	20.0	25.0
Quantity	n°	All	6	6	6	8	6	6	8	10
FANS (INVERTER)										
Air flow rate	m³/h	°	128400	128400	120000	171200	128400	120000	171200	214000
		L	89880	89880	84000	119840	89880	84000	119840	149800
		A	117600	117600	112200	156000	117600	112200	153200	196000
		E	82320	117600	78540	109200	82320	78540	107240	137200
Number of Revs	g/1'	°/L	1020	1020	1020	1020	1020	1020	1020	1020
		A/E	590	590	590	590	590	590	590	590
Total input power	kW	°/A	10.6	10.6	10.6	14.1	10.6	10.6	14.1	17.6
		L/E	7.2	7.2	7.2	9.6	7.2	7.2	9.6	12.0
Total input current	A	°/A	22.2	22.2	22.2	29.6	22.2	22.2	29.6	37.0
		L/E	15.0	15.0	15.0	20.0	15.0	15.0	20.0	25.0
Quantity	n°	All	6	6	6	8	6	6	8	10
Static pressures	kPal	°/A	50	50	50	50	50	50	50	50

Data declared according to ISO 14511

NSH [°-L-A-E] from 1251 to 2002

NSH	U.M.	VERS.	1251	1401	1601	1801	1402	1602	1802	2002
SHELL AND TUBE EXCHANGER										
Hydraulic attachment type	Victaulic									
Water content	dm3	°/L	103,8	101,2	98,0	138,2	103,8	101,2	143,4	143,4
		A/E	96.0	101.2	98.1	132.9	96.0	101.2	132.9	132.9
Hydraulic connections	Ø	All	6"							
Quantity	n°	All	1							
DESUPERHEATER (PLATES) ***nominal conditions referred to a water output temperature of 40°C-45°C with Δt 5°C***										
Recovered heating capacity	kW	°/A	49.5	56.4	63.3	75.3	55.2	59.8	78.2	79.4
		L/E	56.4	62.7	73.0	76.5	57.5	71.3	81.7	84.5
Quantity	n°	All	1	1	1	1	2	2	2	2
Water flow rate	l/h	°/A	8530	9720	10910	12980	9520	10310	13480	13680
		L/E	9720	10810	12590	13190	9920	12300	14080	14580
Pressure drops	kPa	°/A	5.5	6.9	6.3	6.9	3.8	4.3	5.0	5.0
		L/E	6.7	8.2	8.2	7.1	4.0	5.7	5.4	5.3
Water content	dm3	All	3.75	3.75	4.5	5.25	5	5	6	6.75
Water flow rate min	m³/h		4650	4650	5550	6450	6000	6000	7100	8200
Water flow rate max	m³/h		47200	47200	47200	47200	94400	94400	94400	94400
Hydraulic connections (VICTAULIC)	Ø	All	2"							
Electric resistance n° 1 for model of heat exchanger ***(available as an accessory)***										
Electric resistance - **KRS**	W	All	170 (shell & tube)							
Electric resistance - **KRSDES**	W	All	170 (shell & tube) + 150 (desuperheater)							
EXPANSION VESSEL										
Capacity	dm3	25								
Quantity	n°	2								
MIN. WATER CONTENT OF THE SYSTEM										
Water content of the system	l/kW **[1]**	All	7							
	l/kW **[2]**		14							
SOUND DATA ***(Sound pressure measured when in cooling mode)***										
Sound power (cooling mode) [3]	dB(A)	°/A	93,5	93.5	94.5	96	94	95	96	96.5
	dB(A)	L/E	88,5	88.5	89.5	91	89	90	91	91.5
Sound power (heating mode) [3]	dB(A)	All	93,5	93,5	94,5	96	94	95	96	96,5
Sound pressure (cooling mode)[4]	dB(A)	°/A	61.3	61.3	62.3	63.6	61.8	62.8	63.6	64.0
	db(A)	L/E	56.3	56.3	57.3	58.6	56.8	57.8	58.6	59.0
Sound pressure (heating mode)4]	dB(A)	All	61,3	61,3	62,3	63,6	61,8	62,8	63,6	64,0
DIMENSIONS										
Height	mm	All	2450	2450	2450	2450	2450	2450	2450	2450
Width	mm	All	2200	2200	2200	2200	2200	2200	2200	2200
Depth	mm	All	3780	3780	3780	4770	3780	3780	4770	5750
Empty weight	Kg	°/L	3150	3165	3340	4005	3475	3800	3930	4290
Functioning weight	Kg	°/L	3255	3265	3440	4145	3580	3900	4075	4435
Empty weight	Kg	A/E	3245	3280	3435	4115	3570	3835	4005	4385
Functioning weight	Kg	A/E	3340	3380	3535	4250	3665	3935	4140	4520

PUMP - ***Verify that the water flow rates are compatible with the features of the relative pumping unit.***						
Type		**A**	**C**	**E**	**G**	**J**
Total input power	kW	4	5,5	7,5	9,2	11
Total input current	A	5,5	7,5	10	12,5	15
Quantity	n	1	1	1	1	1
Weight	Kg	109	117	121	140	148

MIN. WATER CONTENT OF THE SYSTEM
(1) Minimum water content
(2) Minimum water content in the case of process applications or applications with low load.
Δt di progetto minore di 5°C.

[3] Nominal reference conditions
when functioning in **cooling mode**:
- Water input temperature 12 °C
- Water output temperature 7 °C
- External air temperature d.b. 35 °C
- Δt 5 °C

when functioning in **heating mode**:
- Water input temperature 40°C
- Water output temperature 45°C
- External air temperature 7°
- Δt 5 °C

[4] Sound pressure measured in free field conditions, when **functioning in cooling mode** at a distance of 10 m and directivity factor = 2. In compliance with ISO 3744 - Power Supply Voltage: **400V-3-50Hz**

Data declared according to ISO 14511

9.2. NSH [°-L-A-E] from 2202-3602

NSH	U.M	VERS.	2202	2352	2502	2652	2802	3002	3202	3402	3602
Cooling capacity **[1]**	kW	°	395	433	467	491	519	558	594	651	708
		L	381	415	446	469	492	532	562	617	672
		A	415	455	500	525	548	592	620	676	732
		E	395	436	488	507	518	560	586	637	688
Input power total	kW	°	144	166	182	193	197	210	220	244	268
		L	148	174	192	204	210	221	232	256	280
		A	137	157	172	185	194	201	214	234	254
		E	145	168	191	201	209	216	230	250	270
Evaporator water flow	l/h	°	67940	74480	80320	84450	89270	95970	102160	111970	121780
		L	65530	71380	76710	80670	84620	91500	96660	106120	115580
		A	71380	78260	86000	90300	94260	101820	106640	116270	125900
		E	67940	74990	83940	87200	89100	96320	100800	109570	118340
Evaporator pressure drops	kPa	°	40	36	41	23	25	32	39	35	32
		L	37	34	38	21	22	29	35	32	30
		A	53	37	38	40	43	34	27	35	43
		E	48	34	35	37	39	30	24	31	38
Heating capacity **[2]**	kW	°/L	435	479	523	556	588	627	672	717	762
		A/E	450	502	541	563	585	629	664	725	786
Total input power	kW	°/L	145	164	175	185	194	208	220	239	258
		A/E	139	156	169	175	183	196	206	228	250
Condenser water flow	l/h	°/L	74820	82390	89960	95630	101140	107840	115580	123320	131060
		A/E	77400	86340	93050	96840	100620	108180	114200	124700	135200
Condenser pressure drops	kPa	°/L	51	47	50	31	35	43	53	47	40
		A/E	67	49	47	49	53	41	33	43	54
ENERGY INDEX											
EER	W/W	°	2.74	2.61	2.57	2.54	2.63	2.66	2.70	2.67	2.64
		L	2.57	2.39	2.32	2.30	2.34	2.41	2.42	2.41	2.40
		A	3.03	2.90	2.91	2.84	2.82	2.95	2.90	2.89	2.88
		E	2.72	2.60	2.55	2.52	2.48	2.59	2.55	2.55	2.55
COP	W/W	°/L	3.00	2.92	2.99	3.01	3.03	3.01	3.05	3.00	2.95
		A/E	3.24	3.22	3.20	3.22	3.20	3.21	3.22	3.18	3.14
ESEER	W/W	°	3.30	3.12	3.07	3.05	3.17	3.09	3.14	3.10	3.07
		L	3.26	3.04	2.95	2.92	2.98	2.97	2.98	2.96	2.96
		A	3.56	3.41	3.44	3.36	3.33	3.37	3.31	3.31	3.30
		E	3.40	3.25	3.18	3.15	3.11	3.15	3.09	3.08	3.09
ELECTRICAL DATA											
Power supply	400V-3-50Hz										
Total input current when COLD	A	°	245	283	310	330	340	363	378	415	453
		L	259	302	333	354	368	389	407	445	484
		A	233	268	295	318	335	349	370	400	430
		E	254	293	333	349	365	380	403	436	468
Total input current when HOT	A	°/L	246	279	301	319	335	360	378	407	436
		A/E	236	267	292	303	318	342	359	391	423
Maximum current	A	°/L	370	390	410	443	476	500	516	574	631
		A/E	370	390	410	443	476	500	516	574	631
Peak current	A	°/L	350	365	436	461	521	534	578	612	653
		A/E	350	365	436	461	521	534	578	612	653

Data declared according to ISO 14511

[3] Nominal reference conditions

when functioning in **cooling mode**:

- Water input temperature 12 °C
- Water output temperature 7 °C
- External air temperature d.b. 35 °C
- Δt 5 °C

when functioning in **heating mode**:

- Water input temperature 40°C
- Water output temperature 45°C
- External air temperature 7°
- Δt 5 °C

NSH [°-L-A-E] from 2202-3602

NSH	U.M	VERS.	2202	2352	2502	2652	2802	3002	3202	3402	3602
REFRIGERANT LOAD ***(The refrigerant load may be subject to variations)***											
R134a Refrigerant	Kg	°/L	70 + 70	70 + 75	75 + 75	80 + 100	100 + 100	200	230	245	260
		A/E	75 + 75	75 + 85	85 + 85	85 + 105	105 + 105	215	240	265	290
Oil	Kg	All	30	37	44	41	38	38	38	54	70
TWIN-SCREW COMPRESSORS											
N. compressors/circuits	n°/n°		2/2								
Electric resistance (n°/power)	n°/n°	All	2 x 200	200 + 300	2 x 300	2 x 300	2 x 300	2 x 300	2 x 300	2 x 300	2 x 300
PARTIALISATIONS											
Partialisation of the unit	°-A	%	20-100								
FANS (STANDARD)											
Air flow rate	m³/h	°	214000	214000	214000	207000	200000	248400	240000	291200	342400
		L	149800	149800	149800	144900	140000	173880	168000	203840	239680
		A	196000	196000	196000	191500	187000	229800	224400	268200	312000
		E	137200	137200	137200	134050	130900	196140	157080	187740	218400
Number of Revs	g/1'	°	890	890	890	890	890	890	890	890	890
		L	590	590	590	590	590	590	590	590	590
		A	890	890	890	890	890	890	890	890	890
		E	590	590	590	590	590	590	590	590	590
Total input power	kW	°	17.5	17.5	17.5	17.5	17.5	21	21	24.5	28
		L	12	12	12	12	12	14.4	14.4	16.8	19.2
		A	17.5	17.5	17.5	17.5	17.5	21.0	21.0	24.5	28.0
		E	12	12	12	12	12	14.4	14.4	16.8	19.2
Total input current	A	°	37.0	37.0	37.0	37.0	37.0	44.4	44.4	51.8	59.2
		L	25.0	25.0	25.0	25.0	25.0	30	30	35	40
		A	37.0	37.0	37.0	37.0	37.0	44.4	44.4	51.8	59.2
		E	25.0	25.0	25.0	25.0	25.0	30	30	35	40
Quantity	n°	°	10	10	10	10	10	12	12	14	16
		L	10	10	10	10	10	12	12	14	16
		A	10	10	10	10	10	12	12	14	16
		E	10	10	10	10	10	12	12	14	16
FANS (INVERTER)											
Air flow rate	m³/h	°	214000	214000	214000	207000	200000	248400	240000	291200	342400
		L	149800	149800	149800	144900	140000	173880	168000	203840	239680
		A	196000	196000	196000	191500	187000	229800	224400	268200	312000
		E	137200	137200	137200	134050	130900	196140	157080	187740	218400
Number of Revs	g/1'	°	1020	1020	1020	1020	1020	1020	1020	1020	1020
		L	590	590	590	590	590	590	590	590	590
		A	1020	1020	1020	1020	1020	1020	1020	1020	1020
		E	590	590	590	590	590	590	590	590	590
Total input power	kW	°	17.6	17.6	17.6	17.6	17.6	21.1	21.1	24.6	28.2
		L	12.0	12.0	12.0	12.0	12.0	14.4	14.4	16.8	19.2
		A	17.6	17.6	17.6	17.6	17.6	21.1	21.1	24.6	28.2
		E	12.0	12.0	12.0	12.0	12.0	14.4	14.4	16.8	19.2
Total input current	A	°	37.0	37.0	37.0	37.0	37.0	44.4	44.4	51.8	59.2
		L	25.0	25.0	25.0	25.0	25.0	30.0	30.0	35.0	40.0
		A	37.0	37.0	37.0	37.0	37.0	44.4	44.4	51.8	59.2
		E	25.0	25.0	25.0	25.0	25.0	30.0	30.0	35.0	40.0
Quantity	n°	°/L	10	10	10	10	10	12	12	14	16
		A/E	10	10	10	10	10	12	12	14	16
Useful static pressure	kPal	All	50								

Data declared according to ISO 14511

NSH [°-L-A-E] from 2202-3602

NSH	U.M	VERS.	2202	2352	2502	2652	2802	3002	3202	3402	3602
SHELL AND TUBE EXCHANGER											
Water content	dm3	°/L	138,2	132,9	159,8	159,8	159,8	199,2	196,0	236,2	276,4
		A/E	159,8	159,8	149,9	220,7	220,7	199,3	196,2	231,0	265,8
Hydraulic connections (VICTAULIC)	Ø	°/L	6"								
		A/E									
Quantity	n°	°/L	1	1	1	1	1	2	2	2	2
DESUPERHEATER (PLATES) ***nominal conditions referred to a water output temperature of 40°C-45°C with Δt 5°C***											
Recovered heating capacity	kW	°/L	80.5	92.0	103.5	110.4	117.3	119.6	126.5	138.6	150.7
		A/E	88.6	104.1	119.6	128.8	134.6	135.7	146.05	149.5	153.0
Quantity	n°	All	2	2	2	2	2	2	2	2	2
Water flow rate	m³/h	°/A	13880	15860	17850	19040	20230	20630	21820	23890	25960
		L/E	15270	17950	20620	22210	23210	23400	25180	25780	26380
Pressure drop	kPa	°/A	3.8	4.5	4.5	5.5	5.5	6.6	6.3	6.6	6.9
		L/E	4.5	7.5	7.5	7.9	7.0	8.2	8.2	7.7	7.1
Water content	dm3	All	7.5	7.5	7.5	8.25	9	8.25	9	9.75	10.5
Water flow rate min	m³/h		9300	9300	9300	10200	11100	10200	11100	12000	12900
Water flow rate max	m³/h		94400	94400	94400	94400	94400	94400	94400	94400	94400
Hydraulic connections (VICTAULIC)	Ø	All	2"								
ELECTRIC RESISTANCE N° 1 FOR MODEL OF HEAT EXCHANGER ***(available as an accessory)***											
Electric resistance - **KRS**	W	All	170 (shell & tube)								
Electric resistance - **KRSDES**	W	All	170 (shell & tube) + 150 (desuperheater)								
EXPANSION VESSEL											
Capacity	dm3	All	25								
Quantity	n°		2	2	2	2	2	4	4	4	4
MIN. WATER CONTENT OF THE SYSTEM											
WATER CONTENT OF THE SYSTEM	l/kW **[1]**	All	7								
	l/kW **[2]**		14								
SOUND DATA ***(Sound pressure measured when in cooling mode)***											
Sound power (cooling mode) **[3]**	dB(A)	°/A	96.5	96.5	97	97	97	97.0	97.5	98.3	99.0
	dB(A)	L/E	91.5	91.5	92	92	92	92.0	92.5	93.3	94.0
Sound power (heating mode) **[3]**	dB(A)	All	96.5	96.5	97	97	97	97.0	97.5	98.3	99.0
Sound pressure (cooling mode) **[4]**	dB(A)	°/A	64.0	64.0	64.5	64.5	64.5	64.4	64.9	65.6	66.2
	db(A)	L/E	59.0	59.0	59.5	59.5	59.5	59.4	59.9	60.6	61.2
Sound pressure (heating mode) **[4]**	dB(A)	All	64,0	64,0	64,5	64,5	64,5	64,4	64,9	65,6	66,2
DIMENSIONS											
Height	mm	All	2450	2450	2450	2450	2450	2450	2450	2450	2450
Width	mm	All	2200	2200	2200	2200	2200	2200	2200	2200	2200
Depth	mm	All	5750	5750	5750	5750	5750	7160	7160	8150	9140
Empty weight	Kg	°/L	4355	4735	5090	5210	5330	6330	6555	7220	7885
Functioning weight	Kg	°/L	4495	4870	5250	5370	5490	6530	6750	7455	8160
Empty weight	Kg	A/E	4570	4940	5265	5470	5610	6540	6745	7425	8105
Functioning weight	Kg	A/E	4730	5100	5415	5690	5830	6740	6940	7655	8370

PUMP - ***Verify that the water flow rates are compatible with the features of the relative pumping unit.***						
Type		**A**	**C**	**E**	**G**	**J**
Total input power	kW	4	5,5	7,5	9,2	11
Total input current	A	5,5	7,5	10	12,5	15
Quantity	n	1	1	1	1	1
Weight	Kg	109	117	121	140	148

MIN. WATER CONTENT OF THE SYSTEM
(1) Minimum water content
(2) Minimum water content in the case of process applications or applications with low load.
Δt di progetto minore di 5°C.

[3] Nominal reference conditions
when functioning in **cooling mode:**
- Water input temperature 12 °C
- Water output temperature 7 °C
- External air temperature d.b. 35 °C
- Δt 5 °C

when functioning in **heating mode:**
- Water input temperature 40°C
- Water output temperature 45°C
- External air temperature 7°
- Δt 5 °C

[4] Sound pressure measured in free field conditions, when **functioning in cooling mode** at a distance of 10 m and directivity factor = 2. In compliance with ISO 3744 - Power Supply Voltage: 400 V-3-50Hz

Data declared according to ISO 14511

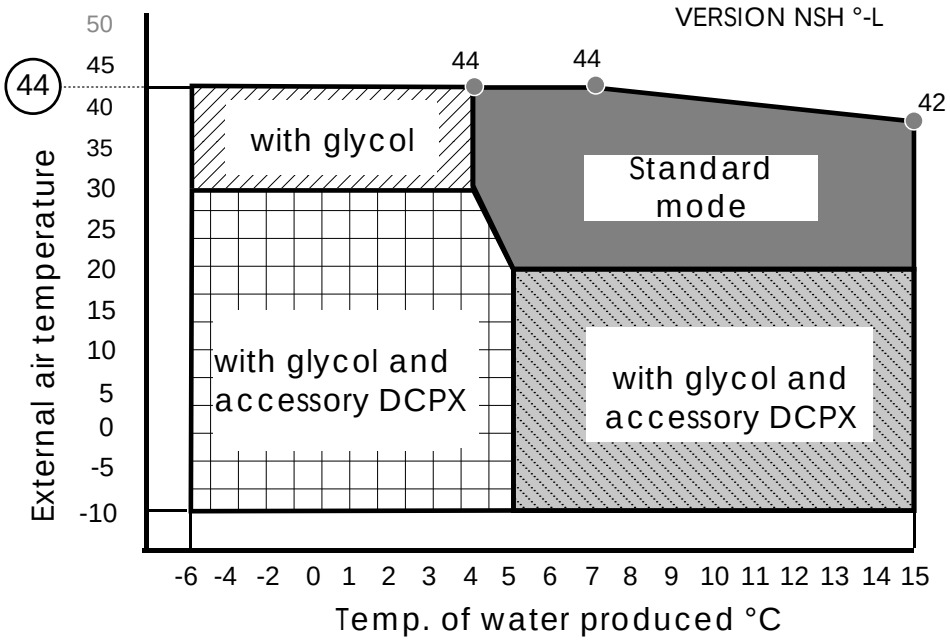
10. FUNCTIONING LIMITS

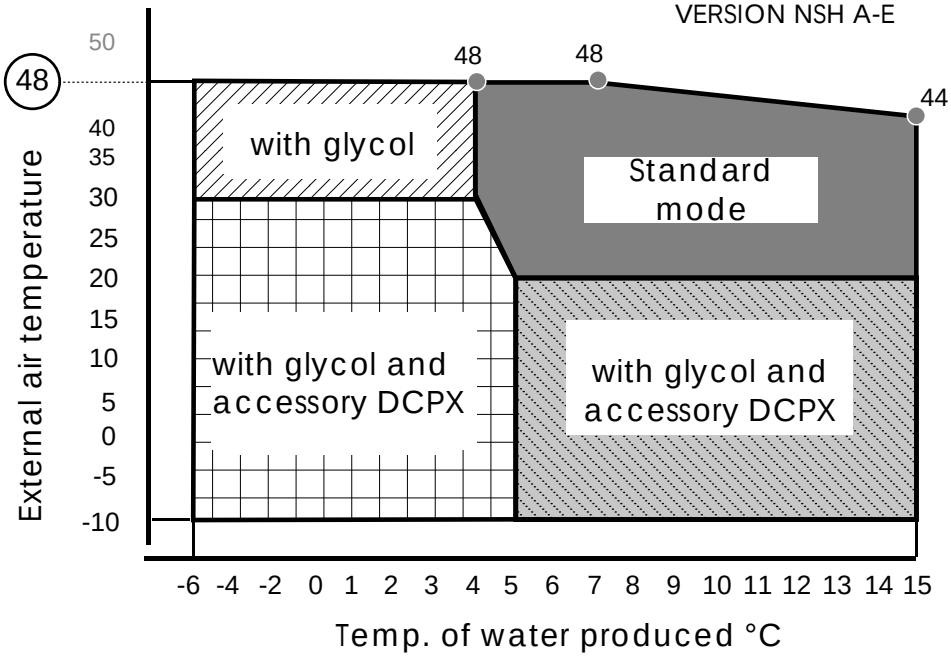
The units, in standard configuration, are not suitable for installation in salty environments .
For functioning limits, please refer to the diagram, valid for Δt = 5°C.

NOTE
If the unit is to function beyond the operational limits, we recommend you first contact our technical-sales service

If the unit is installed in particularly windy areas, we recommend providing for windbreak barriers to prevent the DCPX from malfunctioning.

COOLING MODE



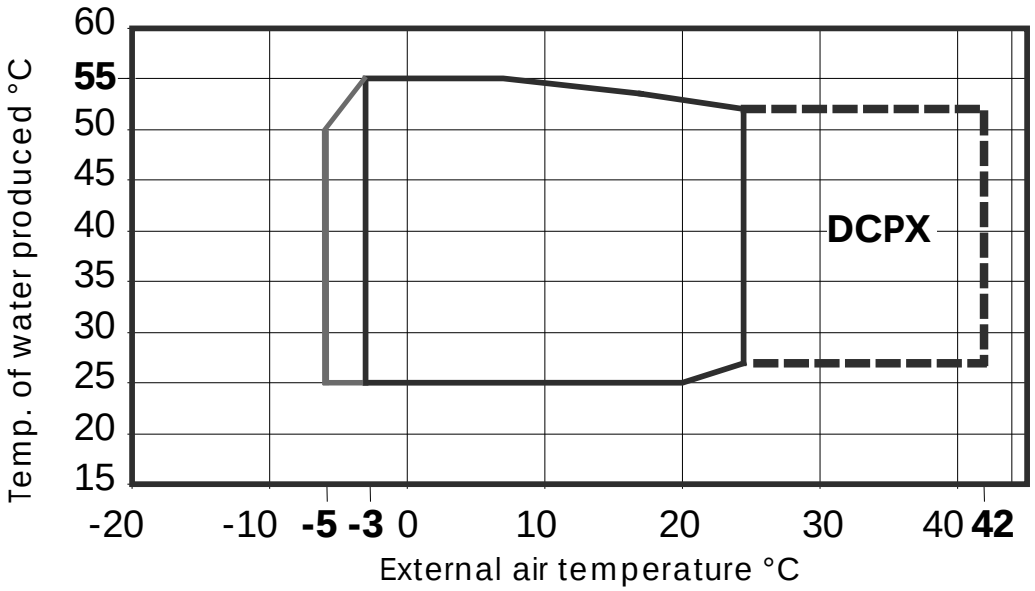


10.1. PROJECT DATA

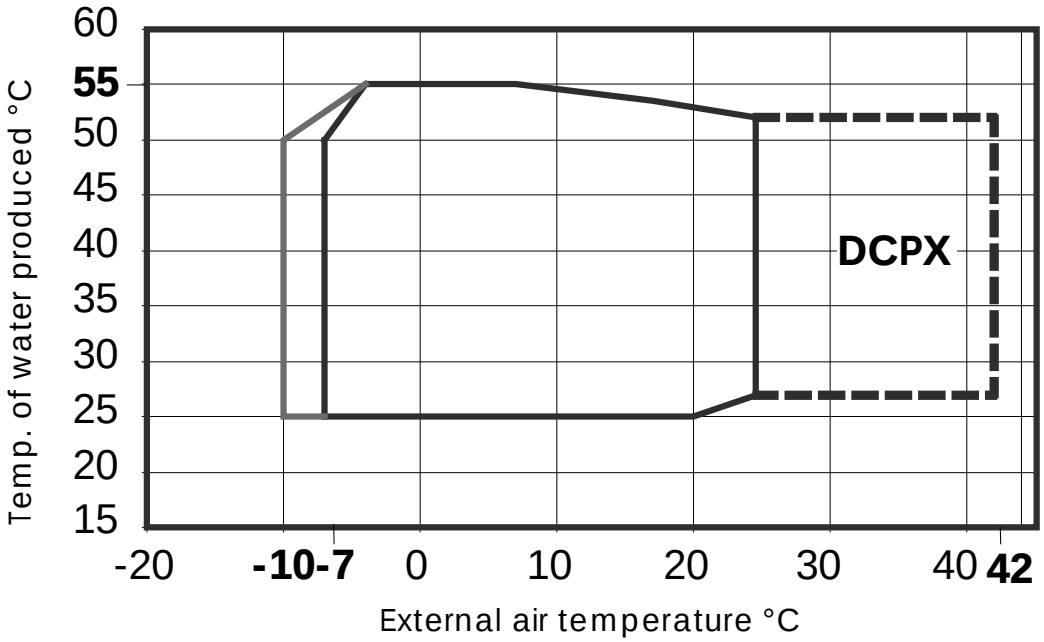
COOLING-HEATING	U.M.	High pressure side	Low pressure side
Acceptable maximum pressure	bar	22	16,5
Acceptable maximum temperature	°C	125	55
Acceptable minimum temperature	°C	-10	-10

HEATING MODE

VERSION NSH °-L



VERSION NSH A-E



extension limit with partload compressor

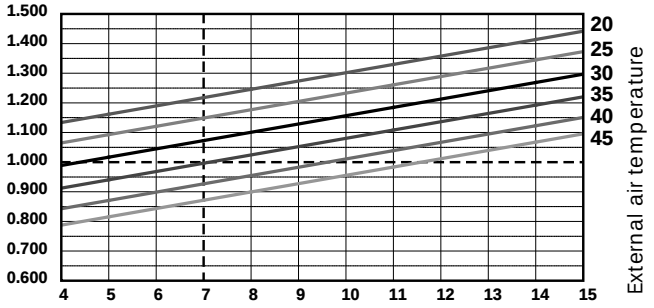
operating mode with DCPX

Standard operating mode

11. PERFORMANCE IN COOLING MODE VERSION °/A - L/E

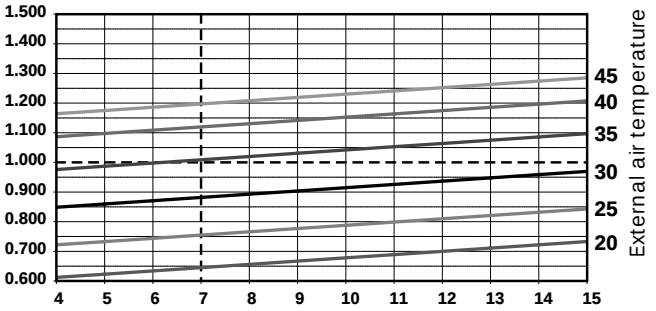
11.1. NSH VERSION °/A

Corrective coefficients (Cf)
of the cooling capacity (Pc)



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

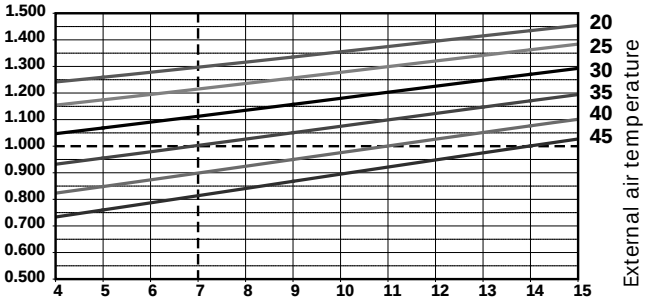
Corrective coefficients (Ca)
of the input power (Pe)



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

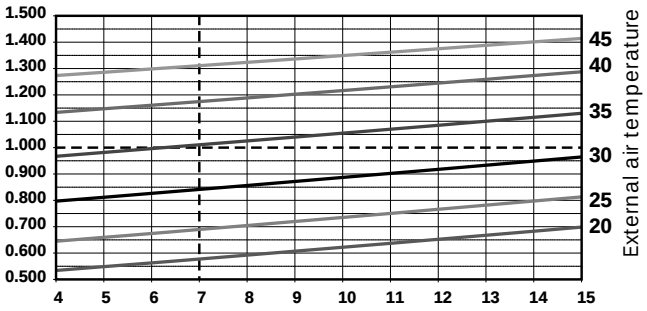
11.2. NSH VERSION L/E

Corrective coefficients (Cf)
of the cooling capacity (Pc)



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

Corrective coefficients (Ca)
of the input power (Pe)



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

The cooling capacity and electrical input power in conditions other than normal conditions are obtained by multiplying the nominal values of the Pc and Pe (see technical data) by the respective coefficient correctives (Cf, Ca).

Pc=Cooling capacity
Pe=Input power

Nominal reference conditions:

COOLING	
water input temperature	***12 °C***
Water output temperature	***7 °C***
External air temperature	***35 °C***
Δt	***5 °C***

⚠ ***Attention:***
The versions with desuperheater (D) have the same co-efficients as NSH °/A - NSH L/E versions

11.3. FOR ΔT DIFFERENT FROM THE NOMINAL

The performances provided in the technical data refer to Δt 5°C.
Use the table below to obtain the corrective factors of a cooling capacity and input power other than Δt 5°C.

Corrective coeff. for Δt different from the nominal value (Δt=5°C)

Heat drop value Δt	3	5	8	10
Cooling capacity correction factors	0.99	1	1.02	1.03
Input power correction factors	0.99	1	1.01	1.02

11.4. FOR DEPOSIT FACTORS DIFFERENT FROM THE NOMINAL

The performances provided in the technical data refer to clean tubes with deposit factor=1.
For different deposit factor values, multiply the performance data in the table by the coefficients shown.

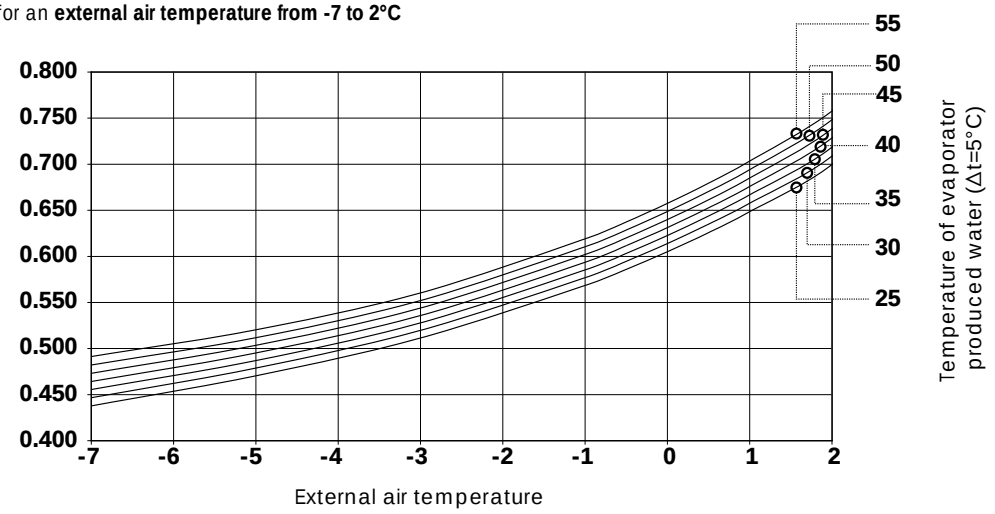
Corrective coeff. for deposit factors different from the nominal value (0.00005)

Deposit factor[K*m²]/[W]	0.00005	0.0001	0.0002
Cooling capacity correction factors	1	0.98	094
Input power correction factors	1	0.98	0.95

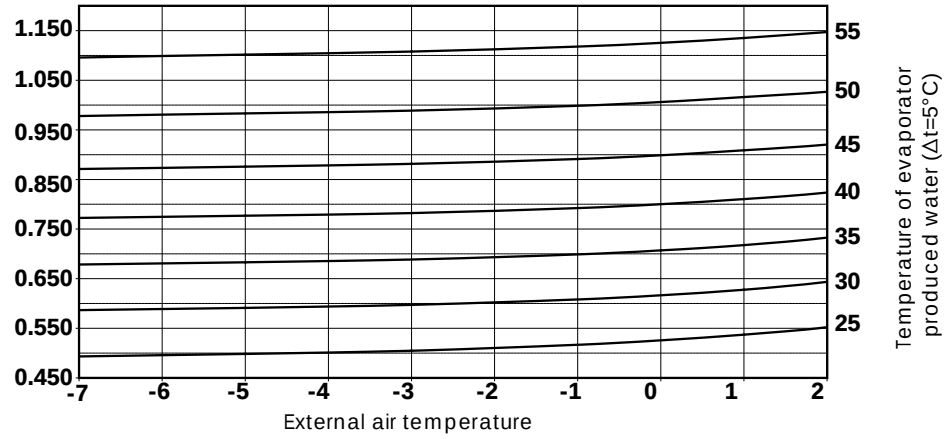
12. PERFORMANCE IN HEATING MODE (ALL VERSION)

Corrective coefficients (Ct) of the heating capacity (Ph)

for an **external air temperature from -7 to 2°C**



Corrective coefficients (Ca)
of the input power (Pe)



The heating capacity and electrical input power in conditions other than normal conditions are obtained by multiplying the nominal values of the Ph and Pe (see technical data) by the respective coefficient correctives (Ct, Ca).

Ph=Heating capacity
Pe=Input power

Nominal reference conditions when functioning in heating mode:

- ***Water input temperature*** ***40°C***
- ***Water output temperature*** ***45°C***
- ***External air temperature*** ***7°***
- ***Δt*** ***5 °C***

⚠ ***Attention:***
The versions with desuperheater (D) have the same co-efficients as NSH °/A - NSH L/E versions

12.1. FOR ΔT DIFFERENT FROM THE NOMINAL

The performances provided in the technical data refer to Δt 5°C.
Use the table below to obtain the corrective factors of a cooling capacity and input power other than Δt 5°C.

Corrective coeff. for Δt different from the nominal value (Δt=5°C)

Heat drop value Δt	3	5	8	10
Heating capacity correction factors	0.99	1	1.02	1.03
Input power correction factors	0.99	1	1.01	1.02

12.2. FOR DEPOSIT FACTORS DIFFERENT FROM THE NOMINAL

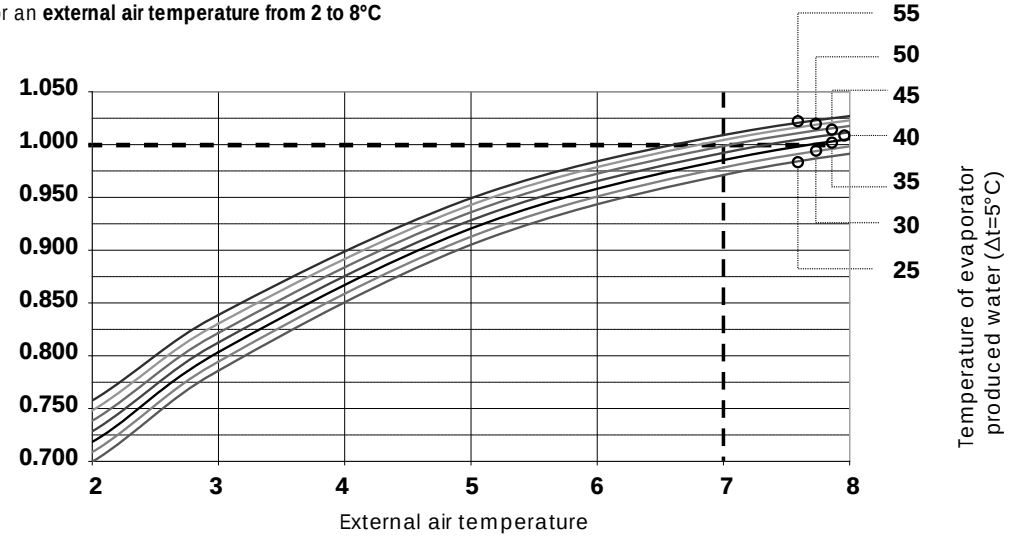
The performances provided in the technical data refer to clean tubes with deposit factor=1.
For different deposit factor values, multiply the performance data in the table by the coefficients shown.

Corrective coeff. for deposit factors different from the nominal value (0.00005)

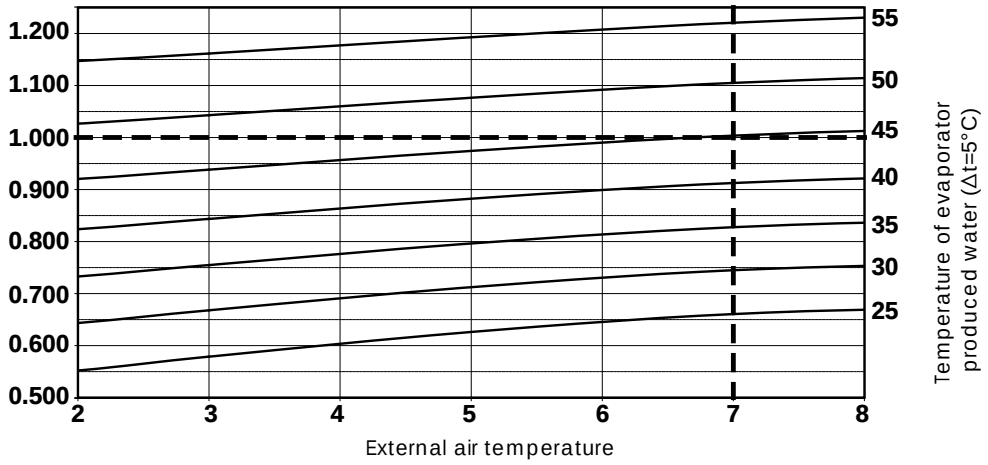
Deposit factor[K*m²]/[W]	0.00005	0.0001	0.0002
Heating capacity correction factors	1	0.98	094
Input power correction factors	1	0.98	0.95

Corrective coefficients (Ct) of the heating capacity (Ph)

for an **external air temperature from 2 to 8°C**



Corrective coefficients (Ca)
of the input power (Pe)



The heating capacity and electrical input power in conditions other than normal conditions are obtained by multiplying the nominal values of the Ph and Pe (see technical data) by the respective coefficient correctives (Ct, Ca).

Ph=Heating capacity
Pe=Input power

Nominal reference conditions when functioning in heating mode:

- ***Water input temperature*** ***40°C***
- ***Water output temperature*** ***45°C***
- ***External air temperature*** ***7°***
- ***Δt*** ***5 °C***

⚠ ***Attention:***
The versions with desuperheater (D) have the same co-efficients as NSH °/A - NSH L/E versions

12.3. FOR ΔT DIFFERENT FROM THE NOMINAL

The performances provided in the technical data refer to Δt 5°C.
Use the table below to obtain the corrective factors of a cooling capacity and input power other than Δt 5°C.

Corrective coeff. for Δt different from the nominal value (Δt=5°C)

Heat drop value Δt	**3**	**5**	**8**	**10**
Heating capacity correction factors	0.99	1	1.02	1.03
Input power correction factors	0.99	1	1.01	1.02

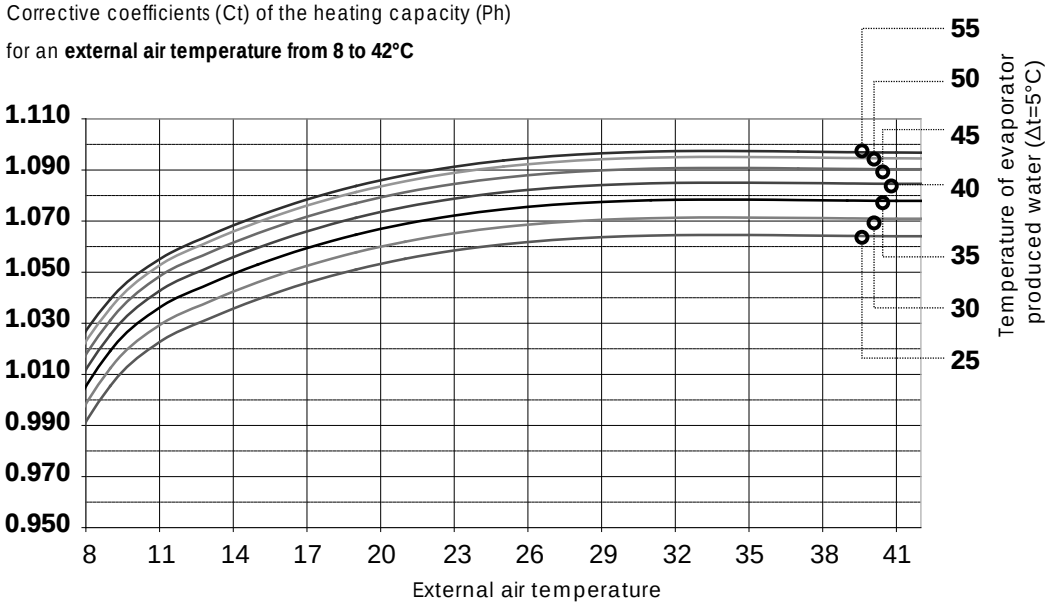
12.4. FOR DEPOSIT FACTORS DIFFERENT FROM THE NOMINAL

The performances provided in the technical data refer to clean tubes with deposit factor=1.
For different deposit factor values, multiply the performance data in the table by the coefficients shown.

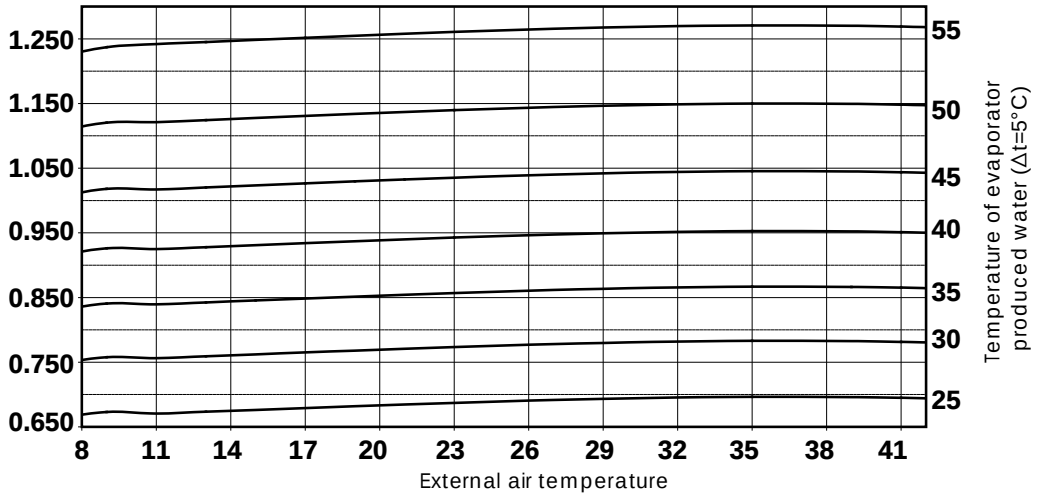
Corrective coeff. for deposit factors different from the nominal value (0.00005)

Deposit factor[K*m²]/[W]	**0.00005**	**0.0001**	**0.0002**
Heating capacity correction factors	1	0.98	094
Input power correction factors	1	0.98	0.95

Corrective coefficients (Ct) of the heating capacity (Ph)
for an **external air temperature from 8 to 42°C**



Corrective coefficients (Ca)
of the input power (Pe)



The heating capacity and electrical input power in conditions other than normal conditions are obtained by multiplying the nominal values of the Ph and Pe (see technical data) by the respective coefficient correctives (Ct, Ca).

Ph=Heating capacity
Pe=Input power

Nominal reference conditions when functioning in heating mode:

- ***Water input temperature*** ***40°C***
- ***Water output temperature*** ***45°C***
- ***External air temperature*** ***7°***
- ***Δt*** ***5 °C***

⚠ Attention:
The versions with desuperheater (D) have the same co-efficients as NSH °/A - NSH L/E versions

12.5. FOR ΔT DIFFERENT FROM THE NOMINAL

The performances provided in the technical data refer to Δt 5°C.
Use the table below to obtain the corrective factors of a cooling capacity and input power other than Δt 5°C.

Corrective coeff. for Δt different from the nominal value (Δt=5°C)

Heat drop value Δt	3	5	8	10
Heating capacity correction factors	0.99	1	1.02	1.03
Input power correction factors	0.99	1	1.01	1.02

12.6. FOR DEPOSIT FACTORS DIFFERENT FROM THE NOMINAL

The performances provided in the technical data refer to clean tubes with deposit factor=1.
For different deposit factor values, multiply the performance data in the table by the coefficients shown.

Corrective coeff. for deposit factors different from the nominal value (0.00005)

Deposit factor[K*m²]/[W]	0.00005	0.0001	0.0002
Heating capacity correction factors	1	0.98	094
Input power correction factors	1	0.98	0.95

13. GLYCOL

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

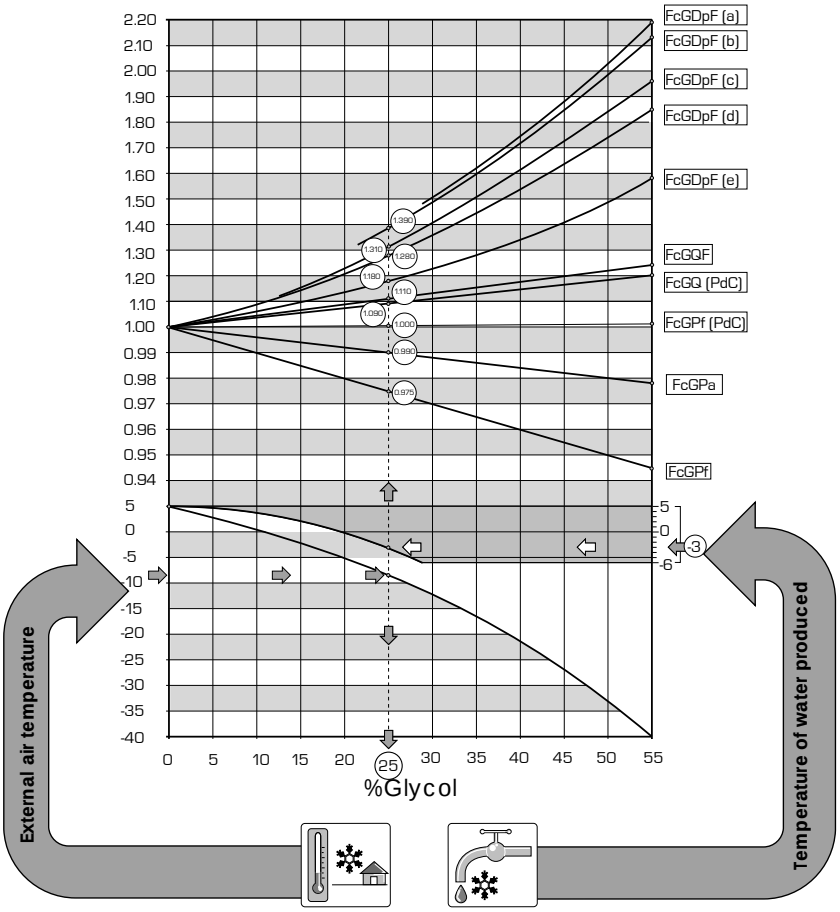
NOTE
On the following page an example is given to help graph reading.
to determine the percentage of glycol required, see diagram below; this percentage calculation can take into consideration one of the following factors:
Depending on which fluid is considered (water or air), the graph is interpreted by the right or left side at the crossing point on the curves with the external temperature line or the water produced line. A point from which the vertical line will pass is obtained and this will distinguish both glycol percentage and relative correction coefficients.

13.1. HOW TO INTERPRET GLYCOL CURVES

The curves shown in the diagram summarise a significant number of data, each of which is represented by a specific curve. In order to use these curves correctly it is first necessary to make some initial reflections.

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

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



KEY:

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

NOTE
Although the graph shows a max external air temperature of -40°C, the unit operational limits must be complied with.

14. HYDRAULIC DATA NSH °/L

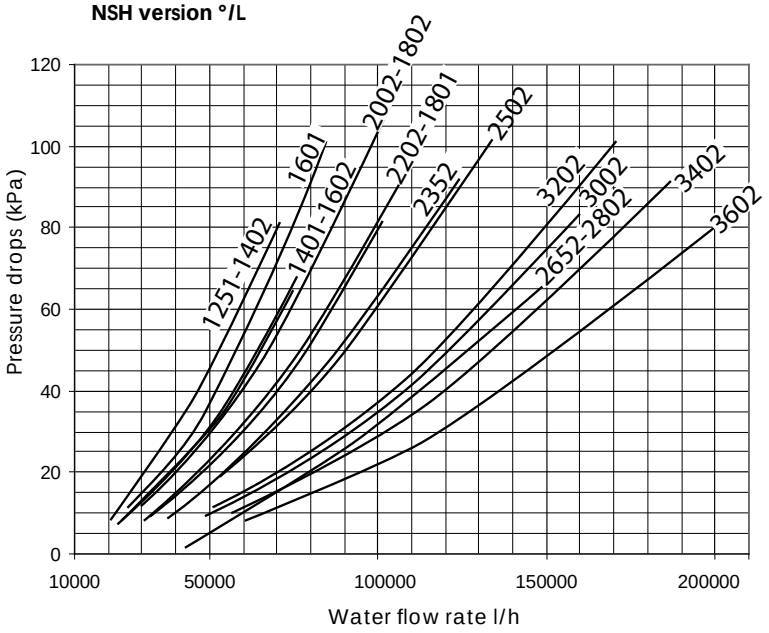
14.1. EVAPORATOR PRESSURE DROPS IN COOLING FUNCTIONING MODE

The pressure drops in the diagram are relative to an average water temperature of 10 °C.
The table shows the correction to apply to the pressure drops on variation of the average water temperature.

Nominal reference conditions:

COOLING	
water input temperature	***12 °C***
Water output temperature	***7 °C***
External air temperature	***35 °C***
Δt	***5°C***

NSH version °/L



Corrective coefficients to apply to the pressure drops							
Average water temperature °C	**5**	**10**	**15**	**20**	**30**	**40**	**50**
Multiplicative coefficient	1.02	**1**	0.985	0.97	0.95	0.93	0.91

15. HYDRAULIC DATA NSH A/E

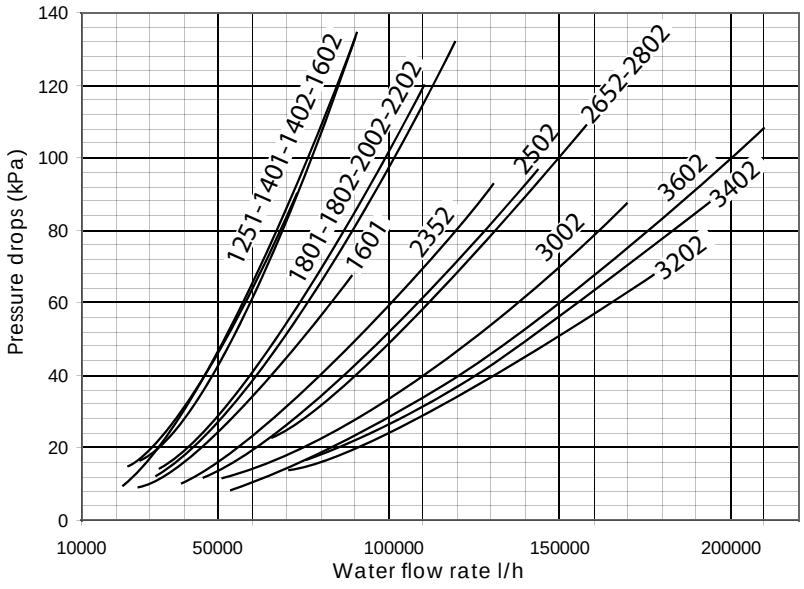
15.1. EVAPORATOR PRESSURE DROPS IN COOLING FUNCTIONING MODE

The pressure drops in the diagram are relative to an average water temperature of 10 °C.
The table shows the correction to apply to the pressure drops on variation of the average water temperature.

Nominal reference conditions:

COOLING	
water input temperature	***12 °C***
Water output temperature	***7 °C***
External air temperature	***35 °C***
Δt	***5°C***

NSH version A/E



Corrective coefficients to apply to the pressure drops							
Average water temperature °C	**5**	**10**	**15**	**20**	**30**	**40**	**50**
Multiplicative coefficient	1.02	**1**	0.985	0.97	0.95	0.93	0.91

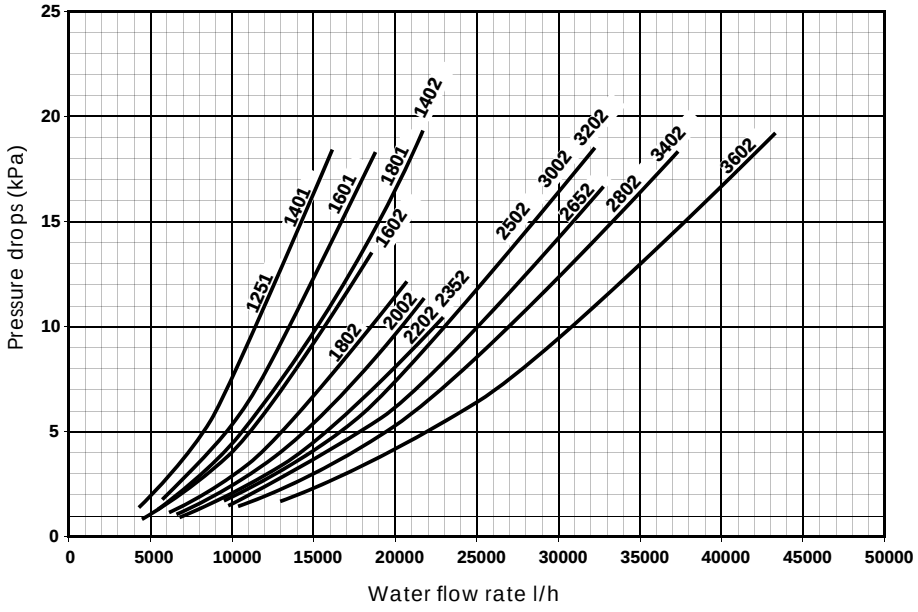
16. DESUPERHEATER PRESSURE DROPS

The NSH models with partial recovery can have up to 2 desuperheaters, 1 per circuit, according to the size.

NOTE
THE PARALLEL HYDRAULIC INSTALLATION IS THE RESPONSIBILITY OF THE INSTALLER.

NOTE:
The features of the desuperheaters and the pressure drop curves are given below. For temperature values of produced water different from 45 °C, multiply the result obtained by the corrective factor shown in table

Nominal value referred to:
Air temperature ..... 35°C
Water to the desuperheater..... 40/45°C
Δt ..... 5°C



Corrective coefficients to apply for temperature values of produced water different from 45 °				
Average water temperature °C	**30**	**40**	**45**	**50**
Multiplicative coefficient	1.03	1.01	1	0.99

17. PUMPS

17.1. PUMP SELECTION

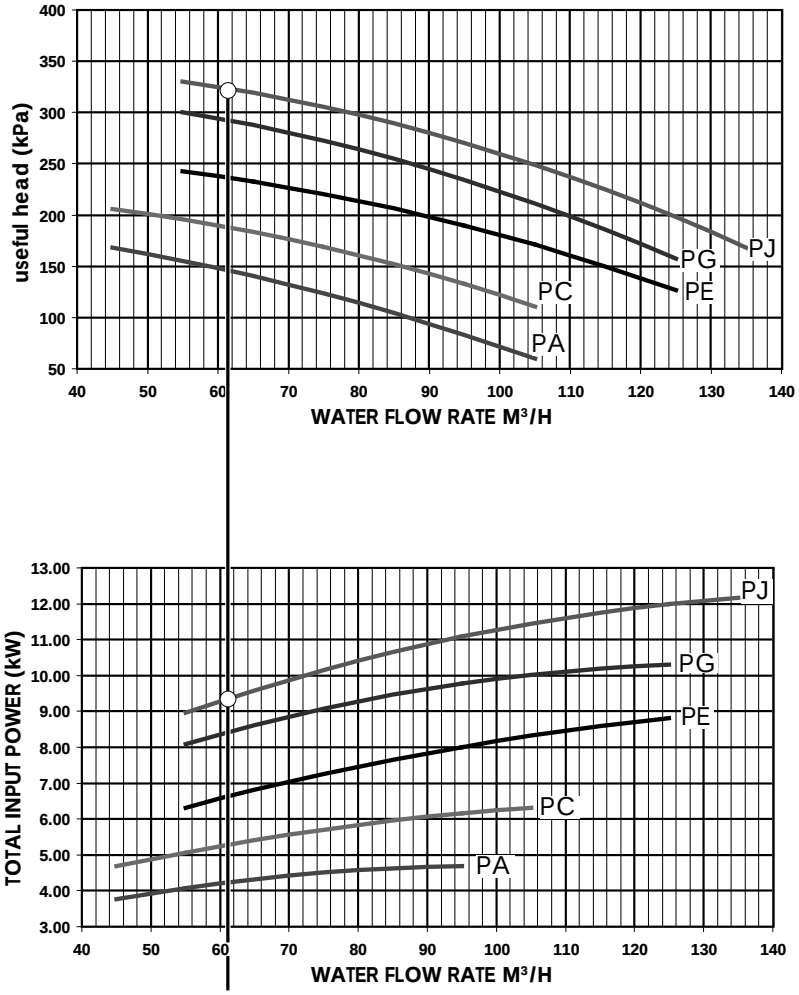
NOTE
The pump will be selected by dividing the total water flow rate shown in the technical data table by the number of the hydraulic circuits.
Pump selection example

NS 3202 (2 HYDRAULIC CIRCUITS)
Useful static pressure required 300 kPa.
Nominal water flow rate = 121780 m3/h
Nominal pressure drop = 32 kPa per circuit.

Procedure:
1. **Divide the nominal flow rate by 2** (2 circuits) 121780 /2 = 60890 m3/h ≈ 60 m3/h

Enter the water flow rate obtained (60 m3/h) **into the graph as shown in the example at the side**, which leads to the result that pump J must be used in order to meet a **useful static pressure of 300 kPa**, which offers:
Pump J = 345 kPa
kW absorbed by pump 8

2. At this point, in order for the system to reach a useful static pressure, simply **deduct the evaporator pressure drop from the pump static pressure:**
kPa pump (PJ) - Nominal pressure drops 345kPa - 30kPa = 315 kPa of useful static pressure to the system. (15 kPa exceeding the requirement).



⚠ ***ATTENTION:***

The pump is selected for each NSH model, i.e. the pump will be the same for all the circuits that make up the selected model.

Field	Pumping unit
00	Without pump
PA	with pump A
PC	with pump C
PE	with pump E
PG	with pump G
PJ	with pump J

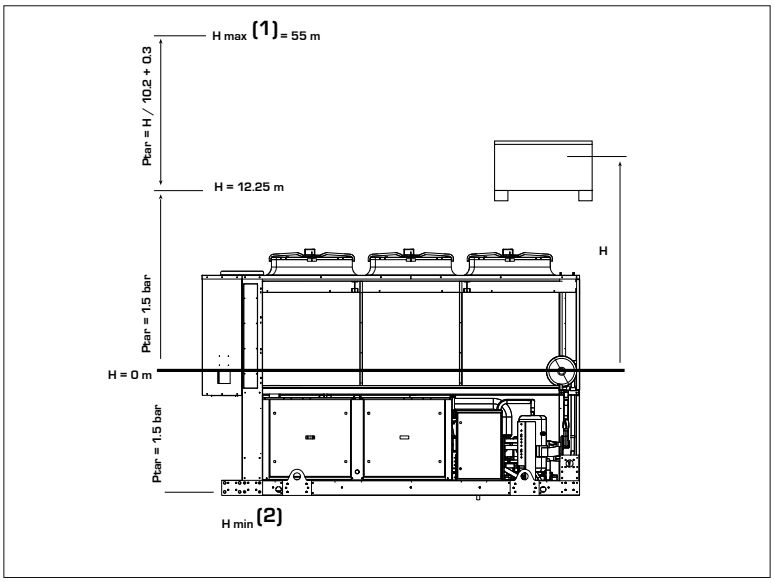
NOTE
Where the switch-over with the reserve pump is set-up, this occurs via a switch inside the electric box.

⚠ ***Verify that the water flow rates are compatible with the features of the relative pumping unit.***

17.2. EXPANSION VESSEL CALIBRATION

Standard pressure value of the expansion vessel when empty is 1.5 bar, whereas their volume is 25 litres and the maximum value is 6 bar.
Calibration of the tank must be regulated according to the maximum level difference (H) of the user (see the diagram) applying the following formula:
p (calibration) [bar] = H [m] / 10.2 + 0.3.

For example: if level difference (H) is equal to 20 m, the calibration value of the vessel will be 2.3 bar.
If calibration value obtained from formula is less than 1.5 bar (that is for H < 12.25), keep calibration as standard.



Key:
[1] Verify that the highest installation does not exceed 55 metres

[2] Verify that the lowest installation can withstand the overall pressure in the given point

Hydraulic height.	**H m**	**30**	**25**	**20**	**15**	**≥ 12.25**
Calibration of expansion vessel.	bar	3.2	2.8	2.3	1.8	1.5
Recommended values of water content.	l (1)	2.174	2.646	3.118	3590	3852
Recommended values of water content.	l (2)	978	1190	1404	1616	1732

18. SOUND DATA

18.1. SOUND DATA NSH [° - A]

Sound power
Aermec determines the value of the sound power according to the measurements taken, in compliance with 9614-2, according to that required by the Eurovent certification.

Sound Pressure
Sound pressure measured in free field conditions with a reflective surface (directivity factor Q=2), in compliance with the ISO 3744 Standard.
Nominal value referred to:
Evaporator water temperature 12/7 °C
Condenser air temperature 35 °C
Δt 5°C

NSH	Vers	Sound power dB(A)	Sound pressure dB(A)		Sound power for central band frequency [dB]						
			10 m	1m	125	250	500	1000	2000	4000	8000
1251	°/A	93,5	61,3	73,8	89,7	88,3	89,4	89,5	86,9	81,5	73,2
1401		93,5	61,3	73,8	89,4	88,1	89,3	89,5	86,9	81,5	72,9
1601		94,5	62,3	74,8	90,3	88,9	90,3	90,5	87,9	82,5	73,9
1801		96	63,6	75,8	92,2	90,6	91,5	91,9	89,8	83,8	77,1
1402		94	61,8	74,3	90,0	88,5	89,8	90,0	87,5	82,0	74,0
1602		95	62,8	75,3	91,2	89,6	90,7	90,9	88,5	83,5	75,0
1802		96	63,6	75,8	92,4	90,6	91,5	91,9	89,8	83,8	77,1
2002		96,5	64,0	75,9	93,2	91,4	92,1	92,4	90,2	84,2	77,1
2202		96,5	64,0	75,9	93,2	91,4	92,1	92,4	90,2	84,2	77,1
2352		96,5	64,0	75,9	93,2	91,4	92,1	92,4	90,2	84,2	77,1
2502		97	64,5	76,4	93,8	91,9	92,6	92,8	90,8	84,7	77,6
2652		97	64,5	76,4	93,8	91,9	92,6	92,8	90,8	84,7	77,6
2802		97	64,5	76,4	93,8	91,9	92,6	92,8	90,8	84,7	77,6
3002		97	64,4	75,8	92,9	91,5	92,8	93,0	90,4	85,0	76,4
3202		97,5	64,9	76,3	93,3	91,9	93,3	93,5	90,9	85,5	76,9
3402		98,3	65,6	76,8	94,4	92,8	94,0	94,3	92,0	86,2	78,8
3602		99	66,2	77,2	95,2	93,6	94,5	94,9	92,8	86,8	80,1

18.2. SILENCED NSH [L - E] SOUND LEVELS

NSH	Vers	Sound power dB(A)	Sound pressure dB(A)		Sound power for central band frequency [dB]						
			10 m	1m	125	250	500	1000	2000	4000	8000
1251	L/E	88,5	56,3	68,8	83,8	84,3	85,6	84,3	81,3	75,1	66,4
1401		88,5	56,3	68,8	83,5	84,1	85,5	84,3	81,3	75,1	66,1
1601		89,5	57,3	69,8	84,4	84,9	86,5	85,3	82,3	76,1	67,1
1801		91	58,6	70,8	86,3	86,6	87,7	86,7	84,2	77,4	70,3
1402		89	56,8	69,3	84,1	84,5	86,0	84,8	81,9	75,6	67,2
1602		90	57,8	70,3	85,3	85,6	86,9	85,7	82,9	77,1	68,2
1802		91	58,6	70,8	86,5	86,6	87,7	86,7	84,2	77,4	70,3
2002		91,5	59,0	70,9	87,3	87,4	88,3	87,2	84,6	77,8	70,3
2202		91,5	59,0	70,9	87,3	87,4	88,3	87,2	84,6	77,8	70,3
2352		91,5	59,0	70,9	87,3	87,4	88,3	87,2	84,6	77,8	70,3
2502		92	59,5	71,4	87,9	87,9	88,8	87,6	85,2	78,3	70,8
2652		92	59,5	71,4	87,9	87,9	88,8	87,6	85,2	78,3	70,8
2802		92	59,5	71,4	87,9	87,9	88,8	87,6	85,2	78,3	70,8
3002		92	59,4	70,8	87,0	87,5	89,0	87,8	84,8	78,6	69,6
3202		92,5	59,9	71,3	87,4	87,9	89,5	88,3	85,3	79,1	70,1
3402		93,3	60,6	71,8	88,5	88,8	90,2	89,1	86,4	79,8	72,0
3602		94	61,2	72,2	89,3	89,6	90,7	89,7	87,2	80,4	73,3

Data declared according to ISO 14511

Nominal reference conditions
when functioning in **cooling mode:**
- Water input temperature 12 °C
- Water output temperature 7 °C
- External air temperature d.b. 35 °C
- Δt 5 °C
-

Sound pressure measured in free field conditions, when **functioning in cooling mode** at a distance of 10 m and directivity factor = 2. In compliance with ISO 3744 - Power Supply Voltage: 400 V-3-50Hz

18.3. SOUND DATA NSH WITH ACCESSORY AK IN COOLING MODE

NSH	Vers	Sound power dB(A)	Sound pressure dB(A)		Sound power for central band frequency [dB]						
			10 m	1m	125	250	500	1000	2000	4000	8000
1251	AK	83,5	51,3	63,8	77,3	79,9	81,0	79,1	76,2	70,2	61,2
1401		83,5	51,3	63,8	77,0	79,7	80,9	79,1	76,2	70,2	60,9
1601		84,5	52,3	64,8	77,9	80,5	81,9	80,1	77,2	71,2	61,9
1801		86	53,8	66,3	79,8	82,2	83,1	81,5	79,1	72,5	65,1
1402		84	51,8	64,3	77,6	80,1	81,4	79,6	76,8	70,7	62,0
1602		85	52,8	65,3	78,8	81,2	82,3	80,5	77,8	72,2	63,0
1802		86	53,8	66,3	80,0	82,2	83,1	81,5	79,1	72,5	65,1
2002		86,5	54,3	66,8	80,8	83,0	83,7	82,0	79,5	72,9	65,1
2202		86,5	54,3	66,8	80,8	83,0	83,7	82,0	79,5	72,9	65,1
2352		86,5	54,0	65,9	80,8	83,0	83,7	82,0	79,5	72,9	65,1
2502		87	54,5	66,4	81,4	83,5	84,2	82,4	80,1	73,4	65,6
2652		87	54,5	66,4	81,4	83,5	84,2	82,4	80,1	73,4	65,6
2802		87	54,5	66,4	81,4	83,5	84,2	82,4	80,1	73,4	65,6
3002		87	54,4	65,8	80,5	83,1	84,4	82,6	79,7	73,7	64,4
3202		87,5	54,9	66,3	80,9	83,5	84,9	83,1	80,2	74,2	64,9
3402		88,3	55,6	66,8	82,0	84,4	85,6	83,9	81,3	74,9	66,8
3602		89	56,2	67,2	82,8	85,2	86,1	84,5	82,1	75,5	68,1

18.4. SOUND DATA NSH IN HEATING MODE

NSH	Vers	Sound power dB(A)	Sound pressure dB(A)		Sound power for central band frequency [dB]						
			10 m	1m	125	250	500	1000	2000	4000	8000
1251	All	93,5	61,3	73,8	89,7	88,3	89,4	89,5	86,9	81,5	73,2
1401		93,5	61,3	73,8	89,4	88,1	89,3	89,5	86,9	81,5	72,9
1601		94,5	62,3	74,8	90,3	88,9	90,3	90,5	87,9	82,5	73,9
1801		96	63,6	75,8	92,2	90,6	91,5	91,9	89,8	83,8	77,1
1402		94	61,8	74,3	90,0	88,5	89,8	90,0	87,5	82,0	74,0
1602		95	62,8	75,3	91,2	89,6	90,7	90,9	88,5	83,5	75,0
1802		96	63,6	75,8	92,4	90,6	91,5	91,9	89,8	83,8	77,1
2002		96,5	64,0	75,9	93,2	91,4	92,1	92,4	90,2	84,2	77,1
2202		96,5	64,0	75,9	93,2	91,4	92,1	92,4	90,2	84,2	77,1
2352		96,5	64,0	75,9	93,2	91,4	92,1	92,4	90,2	84,2	77,1
2502		97	64,5	76,4	93,8	91,9	92,6	92,8	90,8	84,7	77,6
2652		97	64,5	76,4	93,8	91,9	92,6	92,8	90,8	84,7	77,6
2802		97	64,5	76,4	93,8	91,9	92,6	92,8	90,8	84,7	77,6
3002		97	64,4	75,8	92,9	91,5	92,8	93,0	90,4	85,0	76,4
3202		97,5	64,9	76,3	93,3	91,9	93,3	93,5	90,9	85,5	76,9
3402		98,3	65,6	76,8	94,4	92,8	94,0	94,3	92,0	86,2	78,8
3602		99	66,2	77,2	95,2	93,6	94,5	94,9	92,8	86,8	80,1

Data declared according to ISO 14511

Nominal reference conditions

when functioning in **cooling mode:**

- Water input temperature 12 °C
- Water output temperature 7 °C
- External air temperature d.b. 35 °C
- Δt 5 °C

when functioning in **heating mode:**

- Water input temperature 40°C
- Water output temperature 45°C
- External air temperature 7°
- Δt 5 °C

Sound pressure measured in free field conditions, when **functioning in cooling mode** at a distance of 10 m and directivity factor = 2. In compliance with ISO 3744 - Power Supply Voltage: 400 V-3-50Hz

19. CALIBRATION OF SAFETY AND CONTROL PARAMETERS

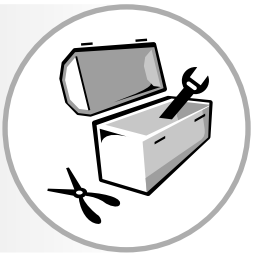
CONTROL PARAMETERS			
Cooling Set	Water input temperature in cooling functioning mode.	**MIN.**	4°C
		MAX.	15°C
		DEFAULT	7.0°C
Heating Set	Water input temperature in heating functioning mode	**MIN.**	30°C
		MAX.	50°C
		DEFAULT	45°C
Anti-freeze intervention	Intervention temperature of the anti-freeze alarm on the EV side (water output temperature).	**MIN.**	-9°C
		MAX.	4°C
		DEFAULT	3°C
Total differential	Proportional temperature band within which the compressors are activated and deactivated.	**MIN.**	3°C
		MAX.	10°C
		DEFAULT	5°C
Autostart	Auto		

NSH SIZE 1251,1401, 1601, 1801, 1402,1602,1802, 2002

STANDARD FAN MAGNET CIRCUIT BREAKERS	U.M.	**1251**	**1401**	**1601**	**1801**	**1402**	**1602**	**1802**	**2002**
FANS	n°	6	6	6	6	6	6	6	8
MTV	A	27	27	27	34	28	28	36	46
INVERTER FAN MAGNET CIRCUIT BREAKERS									
MTV	A	26	26	26	34	34	34	48	48
COMPRESSOR MAGNET CIRCUIT-BREAKERS 400V									
COMPRESSORS	n°	1/1	1/1	1/1	1/1	2/2	2/2	2/2	2/2
MTC1	A	182	196	214	280	124	124	144	144
MTC2		/	/	/	/	124	124	144	162
COMPRESSOR CIRCUIT BREAKER RELAY									
RT1	A	115	125	136	178	78	78	91	91
RT2		**/**	**/**	**/**	**/**	78	78	91	91
COMPRESSOR FUSES									
F1	A	200	250	250	315	160	160	160	160
F2		/	/	/	/	160	160	160	200
MAIN SWITCH									
IG	A	250	315	315	400	315	315	400	400
PRESSURE SWITCHES AND TRANSDUCERS									
DOUBLE HIGH PRESSURE SWITCH (AP)	bar	18/19	18/19	18/19	18/19	18/19	18/19	18/19	18/19
HIGH PRESSURE TRANSDUCER (TAP)		18	18	18	18	18	18	18	18
LOW PRESSURE TRANSDUCER (TBP)		0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2
COOLING CIRCUIT SAFETY DEVICES									
LOW PRESSURE VALVE	bar	16,5	16,5	16,5	16,5	16,5	16,5	16,5	16,5
HIGH PRESSURE VALVE		22	22	22	22	22	22	22	22

STANDARD FAN MAGNET CIRCUIT BREAKERS	U.M.	2202	2352	2502	2652	2802	3002	3202	3402	3602
FANS	n°	10	10	10	10	10	12	12	14	16
MTV	A	46	46	46	46	46	54	54	61	68
INVERTER FAN MAGNET CIRCUIT BREAKERS										
MTV	A	48	48	48	48	48	52	52	60	68
COMPRESSOR MAGNET CIRCUIT-BREAKERS 400V										
COMPRESSORS	n°	2/2								
MTC1	A	162	162	182	182	196	196	214	214	280
MTC2		162	182	182	196	196	214	214	280	280
COMPRESSOR CIRCUIT BREAKER RELAY										
RT1	A	103	103	115	115	125	125	136	136	178
RT2		103	115	115	125	125	136	136	178	178
COMPRESSOR FUSES										
F1	A	200	200	200	200	250	250	250	250	315
F2		200	200	200	250	250	250	250	315	315
MAIN SWITCH										
IG	A	400	630	630	630	630	630	630	630	800
PRESSURE SWITCHES AND TRANSDUCERS										
DOUBLE HIGH PRESSURE SWITCH (AP)	bar	18/19	18/19	18/19	18/19	18/19	18/19	18/19	18/19	18/19
HIGH PRESSURE TRANSDUCER (TAP)		18	18	18	18	18	18	18	18	18
LOW PRESSURE TRANSDUCER (TBP)		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
COOLING CIRCUIT SAFETY DEVICES										
LOW PRESSURE VALVE	bar	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5
HIGH PRESSURE VALVE		22	22	22	22	22	22	22	22	22

FOR THE INSTALLER



20. SELECTION AND PLACE OF INSTALLATION

Before beginning the installation process, decide with the client where the unit is to be installed, whilst paying attention to the following:

- the support surface must withstand the weight of the unit;
- the safe distances (fig.2) between the units and other appliances or structures must be strictly complied with for the inlet and outlet air from the fans to circulate freely.
- The unit must be installed by a qualified technician in compliance with national laws in the country of destination.

The unit must be installed by a qualified and suitably trained technician, in compliance with the national legislation in force in the country of destination (Ministerial Decree 329/2004).
AERMEC will not assume any responsibility for damage due to failure to follow these instructions.

Before beginning any operation, READ THESE INSTRUCTIONS CAREFULLY AND CARRY OUT THE SAFETY CHECKS TO REDUCE ALL RISK OF DANGER TO A MINIMUM. All the personnel 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.

21. POSITIONING

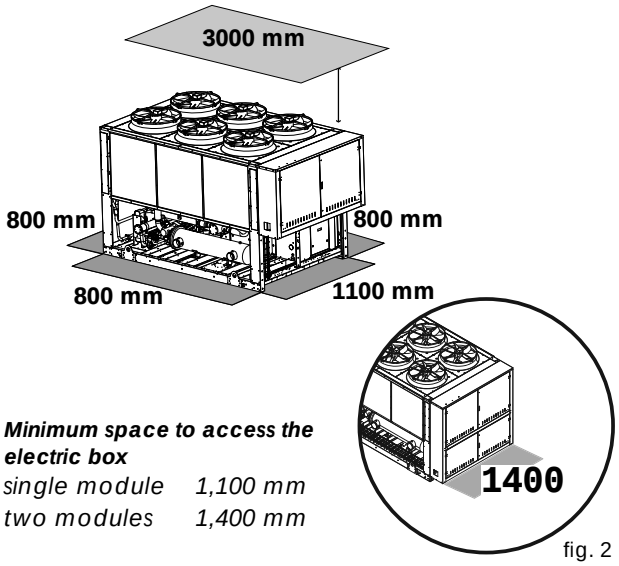
The machine is wrapped in estincoil before being dispatched from the factory.
Before handling the unit, verify the lifting capacity of the machines used. After removing the packaging, the unit must be handled by qualified and adequately equipped personnel. To handle the machine:

- Hook the lifting belts to the eyebolts (see fig.3).

⚠ ***ATTENTION**: ALWAYS USE ALL THE EYEBOLTS AVAILABLE.*

- To ensure that the structure of the unit is not damaged, place protections between the lifting belts and the machine. It is strictly prohibited to stand beneath the unit.
- Remember that whilst the chiller is running, it can transmit vibrations; therefore, it is recommended to fasten anti-vibration mounts (AVX accessories) to the holes on the base according to the assembly layout.
- It is mandatory to foresee the necessary technical space in order to allow ROUTINE AND EXTRAORDINARY MAINTENANCE interventions.
- Fasten the unit whilst verifying it is level. Make sure that the hydraulic and electric parts can be easily reached.

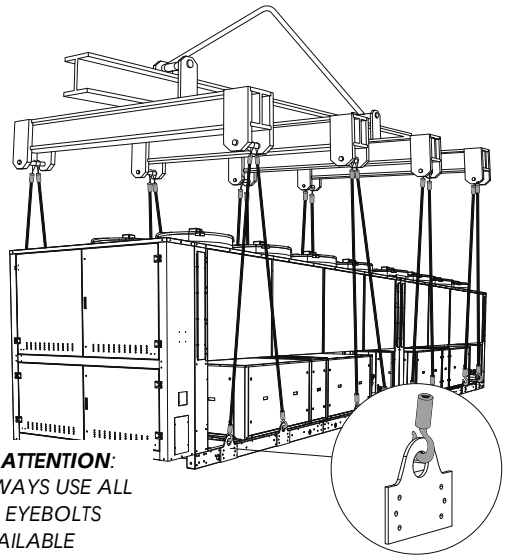
21.1. MINIMUM TECHNICAL SPACES (mm)



Minimum space to access the electric box

single module 1,100 mm
two modules 1,400 mm

fig. 2



⚠ ***ATTENTION**: ALWAYS USE ALL THE EYEBOLTS AVAILABLE*

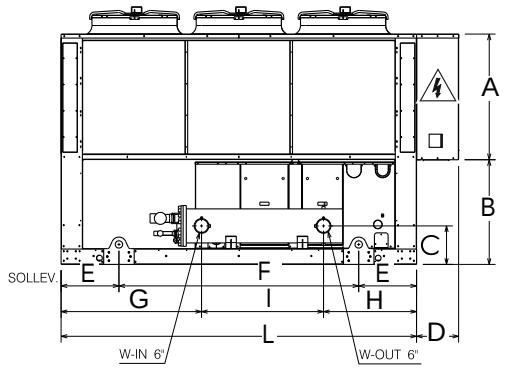
fig. 3

22. DIMENSIONAL TABLES

22.1. HIGH EFFICIENCY NSH VERSION (A)

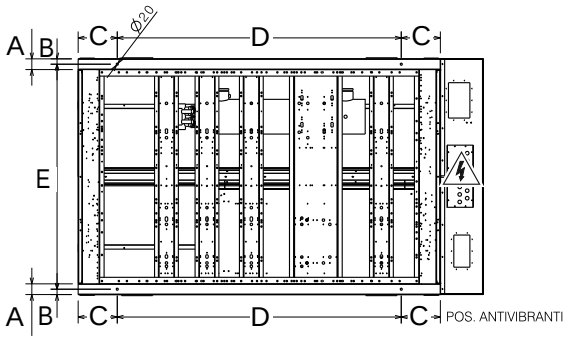
SIZES 1251-1401-1402-1601-1602

Lateral view/ Position of hydraulic connections



Model	U.M.	NSH 1251	NSH 1401	NSH 1402	NSH 1601	NSH 1602
A	mm	1195	1195	1195	1195	1195
B		995.5	995.5	995.5	995.5	995.5
C		366	378	366	378	378
D		400	400	400	400	400
E		550	550	550	550	550
F		2280	2280	2280	2280	2280
G		1335.5	1356	1412	1356	1433
H		884.5	904	808	904	827
I		1160	1120	1160	1120	1120
L		3380	3380	3380	3380	3380

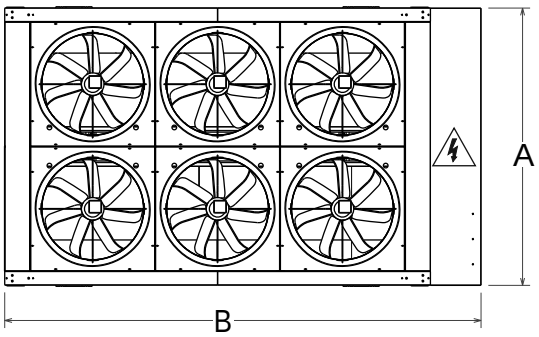
AVX position



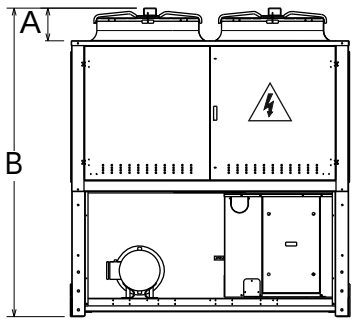
Model	U.M.	NSH 1251	NSH 1401	NSH 1402	NSH 1601	NSH 1602
A	mm	100	100	100	100	100
B		50	50	50	50	50
C		365	365	365	365	365
D		2650	2650	2650	2650	2650
E		2100	2100	2100	2100	2100

Diameter of the hydraulic connections

Model	U.M.	NSH 1251	NSH 1401	NSH 1402	NSH 1601	NSH 1602
EVAPORATOR (plates)						
Water IN/OUT Victaulic connections	Ø	6"	6"	6"	6"	6"



Model		NSH 1251	NSH 1401	NSH 1402	NSH 1601	NSH 1602
A	mm	2200	2200	2200	2200	2200
B		3780	3780	3780	3780	3780



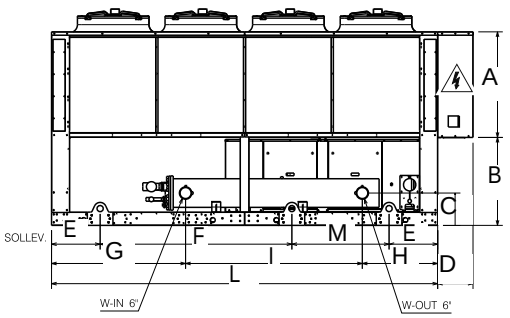
Model		NSH 1251	NSH 1401	NSH 1402	NSH 1601	NSH 1602
A	mm	260	260	260	260	260
B		2450	2450	2450	2450	2450

⚠ ***ATTENTION***:
The diagrams are indicative and do not reflect all the models in the catalogue.

22.2. HIGH EFFICIENCY NSH VERSION (A)

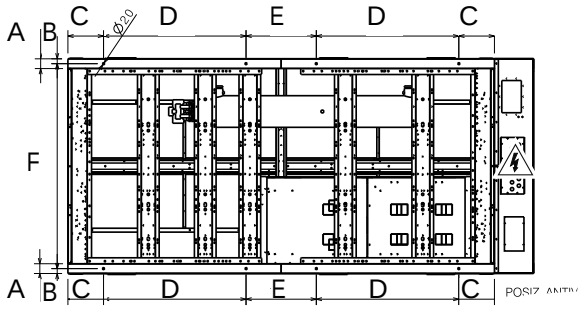
SIZES 1801-1802

Lateral view/ Position of hydraulic connections



Model	U.M.	NSH 1801	NSH 1802
A	mm	1195	1195
B		995.5	995.5
C		366	366
D		400	400
E		550	550
F		2170	2170
G		1517	1551
H		853	819
I		2000	2000
L		4370	4370
M		1100	1100

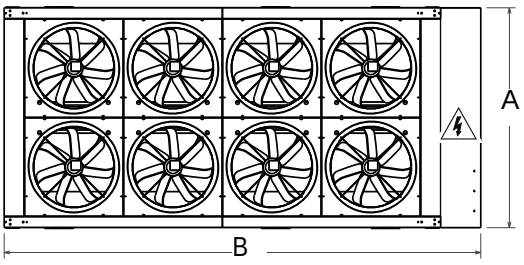
AVX position



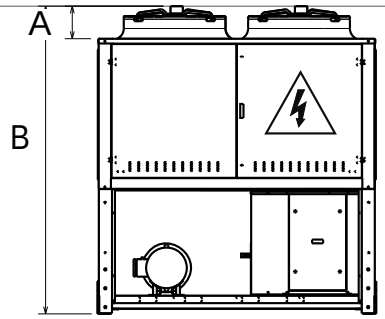
Model	U.M.	NSH 1801	NSH 1802
A	mm	100	100
B		50	50
C		365	365
D		1460	1460
E		720	720
F		2100	2100

Diameter of the hydraulic connections

Model	U.M.	NSH 1801	NSH 1802
EVAPORATOR (plates)			
Water IN/OUT Victaulic connections	Ø	6"	6"



Model	U.M.	NSH 1801	NSH 1802
A	mm	2200	2200
B		4770	4770



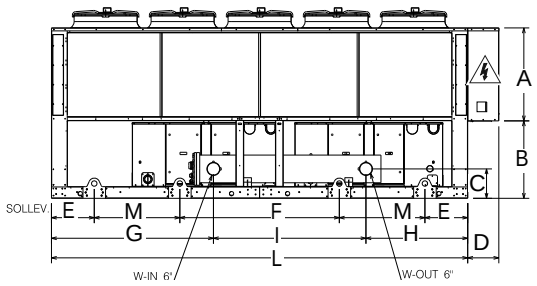
Model	U.M.	NSH 1801	NSH 1802
A	mm	260	260
B		2450	2450

⚠ ***ATTENTION***:
The diagrams are indicative and do not reflect all the models in the catalogue.

22.3. HIGH EFFICIENCY NSH VERSION (A)

SIZES 2002-2202-2352-2502-2652-2862

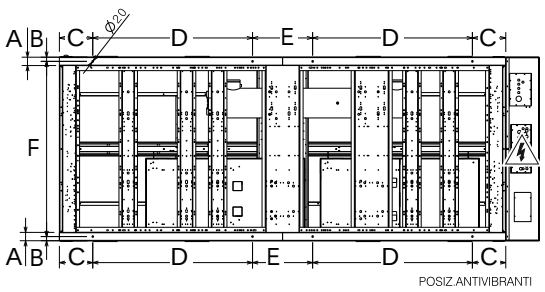
Lateral view/ Position of hydraulic connections



Model	U.M.	NSH 2002	NSH 2202	NSH 2352
A	mm	1195	1195	1195
B		995.5	995.5	995.5
C		366	378	378
D		400	400	400
E		550	550	550
F		2050	2050	2050
G		2232.5	2232.5	2082
H		1117.5	1960	1308
I		2000	2000	1960
L		5350	5350	5350

Model	U.M.	NSH 2502	NSH 2652	NSH 2862
A	mm	1195	1195	1195
B		995.5	995.5	995.5
C		378	397	397
D		400	400	400
E		550	550	550
F		2050	2050	2050
G		2087	2089.5	2089.5
H		1303	1287.5	1287.5
I		1960	1973	1973
L		5350	5350	5350

AVX position

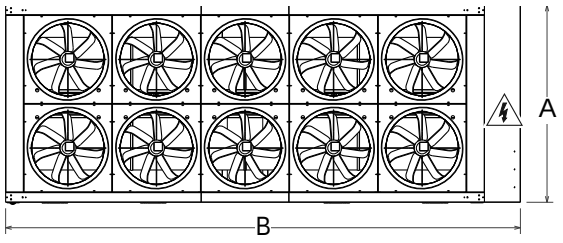


Model	U.M.	NSH 2002	NSH 2202	NSH 2352
A	mm	100	100	100
B		50	50	50
C		400	400	400
D		1915	1915	1915
E		720	720	720
F		2100	2100	2100

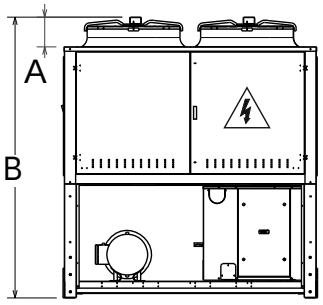
Model	U.M.	NSH 2502	NSH 2652	NSH 2862
A	mm	100	100	100
B		50	50	50
C		400	400	400
D		1915	1915	1915
E		720	720	720
F		2100	2100	2100

Diameter of the hydraulic connections

NSH Model	U.M.	2002	2202	2352	2502	2652	2862
EVAPORATOR (plates)							
Water IN/OUT Victaulic connections	Ø	6"	6"	6"	6"	6"	6"



Model NSH	U.M.	2002	2202	2352	2502	2652	2862
A	mm	2200	2200	2200	2200	2200	2200
B		5750	5750	5750	5750	5750	5750

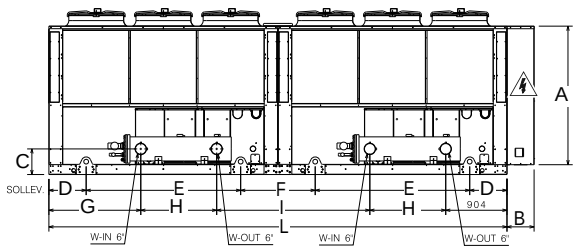


Model NSH	U.M.	2002	2202	2352	2502	2652	2862
A	mm	260	260	260	260	260	260
B		2450	2450	2450	2450	2450	2450

⚠ ***ATTENTION***:
The diagrams are indicative and do not reflect all the models in the catalogue.

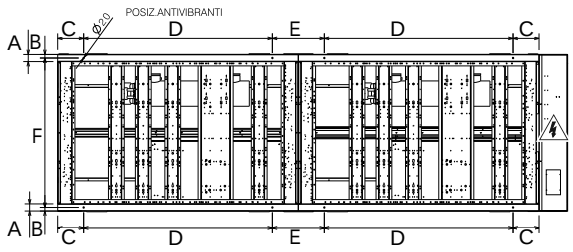
22.4. HIGH EFFICIENCY NSH VERSION (A) SIZES 3002-3202

Lateral view/ Position of hydraulic connections



Model	U.M.	NSH 3002	NSH 3202
A	mm	2045	2045
B		378	400
C		378	378
D		550	550
E		2280	2280
F		1100	1100
G		1356	1356
H		1120	1120
I		2260	2260
L		6760	6760

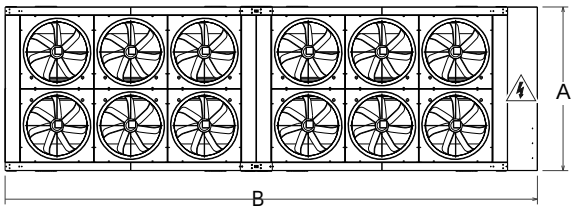
AVX position



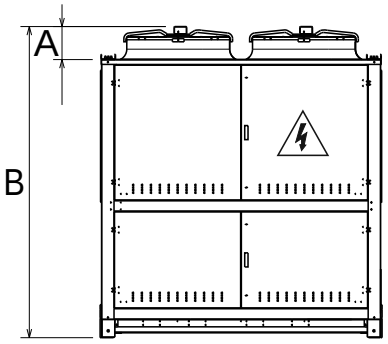
Model	U.M.	NSH 3002	NSH 3202
A	mm	100	100
B		50	50
C		365	365
D		2650	2650
E		730	730
F		2100	2100

Diameter of the hydraulic connections

Model	U.M.	NSH 3002	NSH 3202
EVAPORATOR (plates)			
Water IN/OUT Victaulic connections	Ø	6"	6"



Model	U.M.	NSH 3002	NSH 3202
A	mm	2200	2200
B		7160	7160

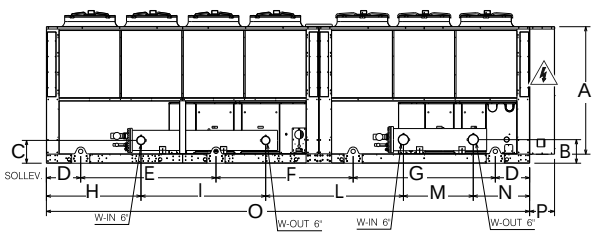


Model	U.M.	NSH 3002	NSH 3202
A	mm	260	260
B		2450	2450

⚠ ***ATTENTION***:
The diagrams are indicative and do not reflect all the models in the catalogue.

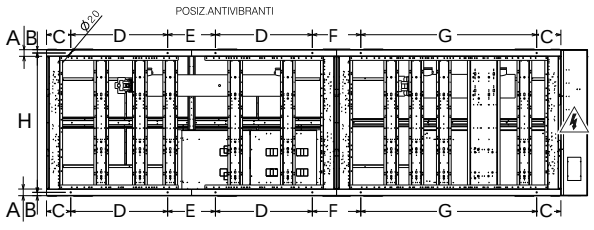
22.5. HIGH EFFICIENCY NSH VERSION (A) SIZE 3402

Lateral view/ Position of hydraulic connections



Model	U.M.	NSH 3402
A	mm	2045
B		378
C		378
D		550
E		2280
F		1100
G		1356
H		1120
I		2260
L		6760

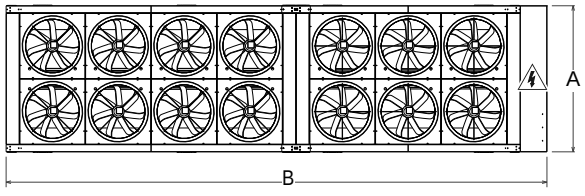
AVX position



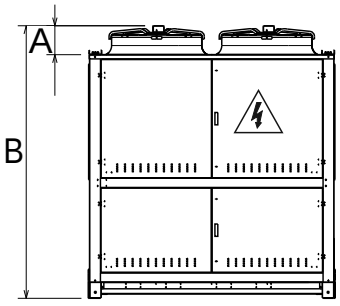
Model	U.M.	NSH 3402
A	mm	100
B		50
C		365
D		2650
E		730
F		2100

Diameter of the hydraulic connections

Model	U.M.	NSH 3402
EVAPORATOR (plates)		
Water IN/OUT Victaulic connections	Ø	6”



Model	U.M.	NSH 3402
A	mm	2200
B		8150

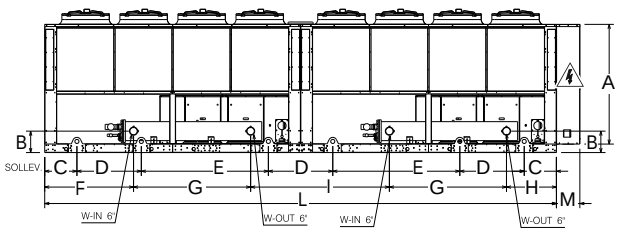


Model	U.M.	NSH 3402
A	mm	260
B		2450

***ATTENTION**:*
The diagrams are indicative and do not reflect all the models in the catalogue.

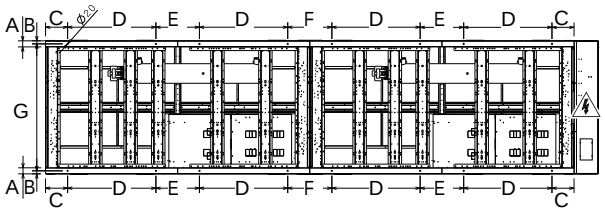
22.6. HIGH EFFICIENCY NSH VERSION (A) SIZE 3602

Lateral view/ Position of hydraulic connections



Model	U.M.	NSH 3602
A	mm	2045
B		366
C		550
D		1100
E		2170
F		1517
G		2000
H		853
I		2370
L		8740
M		400

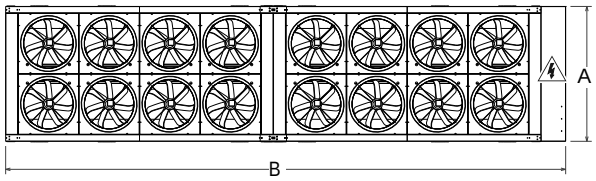
AVX position



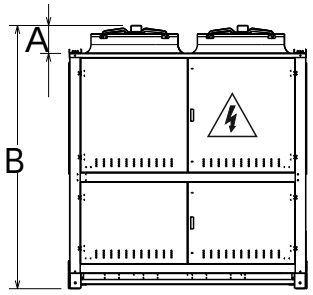
Model	U.M.	NSH 3602
A	mm	100
B		50
C		365
D		1460
E		720
F		730
G		2100

Diameter of the hydraulic connections

Model	U.M.	NSH 3602
EVAPORATOR (plates)		
Water IN/OUT Victaulic connections	Ø	6"



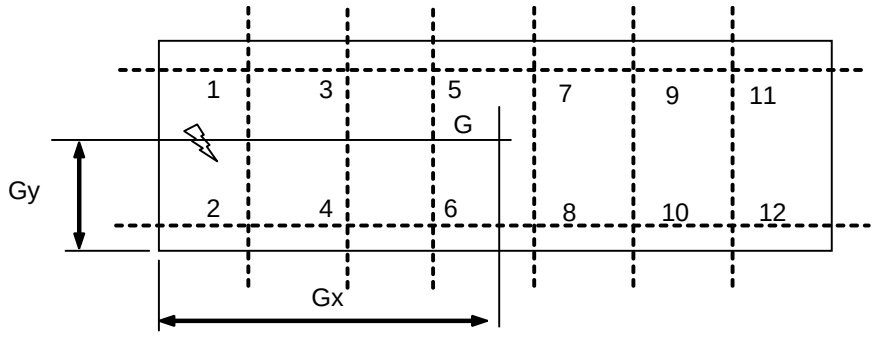
Model	U.M.	NSH 3602
A	mm	2200
B		9140



Model	U.M.	NSH 3602
A	mm	260
B		2450

⚠ ***ATTENTION***:
The diagrams are indicative and do not reflect all the models in the catalogue.

23. BARYCENTRES AND WEIGHT DISTRIBUTION

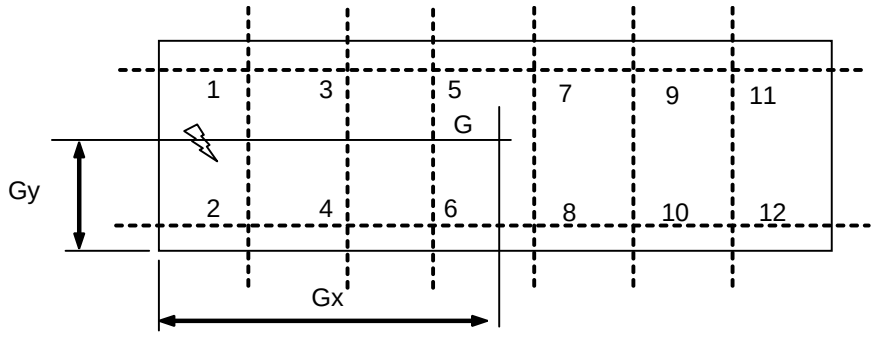


STANDARD VERSION (°)

NSH (°)	Version	Weights (kg) Barycentres (mm) when EMPTY			Weights (kg) at FULL LOAD				PERCENTAGE OF WEIGHT DISTRIBUTION ON SUPPORTS (AT FULL LOAD)												AVX
		kg	Xg	Xy	kg	Xg	Xy	Water	1	2	3	4	5	6	7	8	9	10	11	12	
1251	00	3150	1325	995	3255	1328	1015	105	29.4%	34.3%	16.8%	19.6%	-	-	-	-	-	-	-	-	536
	PA	3265	1304	1023	3410	1303	1051	145	30.6%	33.4%	17.2%	18.8%	-	-	-	-	-	-	-	-	
	PC	3270	1337	1025	3415	1355	1053	145	30.0%	32.7%	17.9%	19.5%	-	-	-	-	-	-	-	-	
	PE	3280	1338	1027	3425	1356	1055	145	30.0%	32.6%	17.9%	19.5%	-	-	-	-	-	-	-	-	
	PG	3300	1336	1031	3450	1356	1060	150	30.2%	32.4%	18.0%	19.4%	-	-	-	-	-	-	-	-	
	PJ	3310	1335	1033	3460	1355	1061	150	30.2%	32.4%	18.0%	19.3%	-	-	-	-	-	-	-	-	
1401	00	3165	1325	996	3265	1328	1016	100	29.4%	34.3%	16.8%	19.6%	-	-	-	-	-	-	-	-	536
	PA	3280	1304	1024	3420	1304	1051	140	30.6%	33.4%	17.2%	18.8%	-	-	-	-	-	-	-	-	
	PC	3285	1337	1025	3425	1355	1053	140	30.0%	32.7%	17.9%	19.5%	-	-	-	-	-	-	-	-	
	PE	3295	1338	1028	3435	1356	1055	140	30.0%	32.6%	17.9%	19.5%	-	-	-	-	-	-	-	-	
	PG	3315	1336	1032	3460	1356	1060	145	30.2%	32.4%	18.0%	19.4%	-	-	-	-	-	-	-	-	
	PJ	3325	1335	1034	3470	1355	1062	145	30.2%	32.4%	18.0%	19.3%	-	-	-	-	-	-	-	-	
1601	00	3340	1362	1012	3440	1364	1030	100	29.2%	33.1%	17.7%	20.0%	-	-	-	-	-	-	-	-	536
	PA	3455	1341	1038	3595	1339	1063	140	30.3%	32.4%	18.0%	19.3%	-	-	-	-	-	-	-	-	
	PC	3460	1372	1040	3600	1388	1065	140	29.7%	31.7%	18.7%	19.9%	-	-	-	-	-	-	-	-	
	PE	3470	1373	1042	3610	1389	1067	140	29.8%	31.6%	18.7%	19.9%	-	-	-	-	-	-	-	-	
	PG	3490	1371	1046	3635	1388	1072	145	29.9%	31.5%	18.8%	19.8%	-	-	-	-	-	-	-	-	
	PJ	3500	1370	1048	3645	1387	1073	145	30.0%	31.5%	18.8%	19.8%	-	-	-	-	-	-	-	-	
1801	00	4005	1704	964	4145	1715	986	140	15.1%	18.6%	21.8%	26.9%	7.9%	9.7%	-	-	-	-	-	-	539
	PA	4120	1689	987	4300	1703	1016	180	15.6%	18.2%	22.7%	26.4%	7.9%	9.2%	-	-	-	-	-	-	
	PC	4125	1702	988	4305	1721	1017	180	15.3%	17.8%	22.9%	26.7%	8.0%	9.3%	-	-	-	-	-	-	540
	PE	4135	1703	990	4315	1722	1019	180	15.3%	17.7%	23.0%	26.6%	8.0%	9.3%	-	-	-	-	-	-	
	PG	4155	1699	994	4340	1719	1023	185	15.4%	17.7%	23.1%	26.6%	8.0%	9.2%	-	-	-	-	-	-	
	PJ	4165	1698	995	4350	1718	1024	185	15.4%	17.7%	23.1%	26.5%	8.0%	9.2%	-	-	-	-	-	-	
1402	00	3475	1491	944	3580	1486	964	105	25.3%	32.4%	18.5%	23.8%	-	-	-	-	-	-	-	-	537
	PA	3590	1465	971	3735	1455	998	145	26.7%	32.1%	18.7%	22.5%	-	-	-	-	-	-	-	-	
	PC	3595	1496	973	3740	1504	1000	145	25.9%	31.1%	19.5%	23.4%	-	-	-	-	-	-	-	-	
	PE	3605	1497	975	3750	1505	1002	145	26.0%	31.0%	19.6%	23.4%	-	-	-	-	-	-	-	-	
	PG	3625	1494	979	3775	1503	1007	150	26.1%	30.9%	19.7%	23.3%	-	-	-	-	-	-	-	-	538
	PJ	3635	1493	981	3785	1502	1009	150	26.2%	30.9%	19.7%	23.2%	-	-	-	-	-	-	-	-	
1602	00	3800	1559	989	3900	1553	1006	100	25.2%	29.9%	20.5%	24.3%	-	-	-	-	-	-	-	-	538
	PA	3915	1534	1013	4055	1522	1036	140	26.5%	29.8%	20.6%	23.1%	-	-	-	-	-	-	-	-	
	PC	3920	1562	1015	4060	1567	1038	140	25.8%	28.9%	21.4%	24.0%	-	-	-	-	-	-	-	-	
	PE	3930	1563	1016	4070	1567	1040	140	25.8%	28.8%	21.4%	23.9%	-	-	-	-	-	-	-	-	
	PG	3950	1560	1020	4095	1566	1044	145	26.0%	28.7%	21.5%	23.8%	-	-	-	-	-	-	-	-	
	PJ	3960	1559	1022	4105	1565	1046	145	26.0%	28.7%	21.5%	23.8%	-	-	-	-	-	-	-	-	
1802	00	3930	2054	1002	4075	2052	1025	145	10.2%	11.7%	24.7%	28.4%	11.7%	13.4%	-	-	-	-	-	-	541
	PA	4045	2028	1025	4230	2027	1053	185	10.7%	11.7%	25.5%	27.8%	11.6%	12.7%	-	-	-	-	-	-	
	PC	4050	2041	1026	4235	2046	1054	185	10.4%	11.3%	25.8%	28.0%	11.8%	12.8%	-	-	-	-	-	-	
	PE	4060	2041	1028	4245	2045	1056	185	10.4%	11.2%	25.8%	28.0%	11.8%	12.8%	-	-	-	-	-	-	
	PG	4080	2036	1031	4270	2041	1060	190	10.5%	11.2%	26.0%	27.9%	11.8%	12.7%	-	-	-	-	-	-	
	PJ	4090	2033	1033	4280	2039	1062	190	10.5%	11.3%	26.0%	27.9%	11.8%	12.6%	-	-	-	-	-	-	
2002	00	4290	2379	1001	4435	2377	1022	145	14.5%	16.7%	14.4%	16.6%	8.3%	9.5%	9.3%	10.8%	-	-	-	-	542
	PA	4405	2351	1022	4590	2350	1048	185	15.0%	16.5%	15.1%	16.6%	8.3%	9.1%	9.3%	10.2%	-	-	-	-	543
	PC	4410	2358	1023	4595	2360	1049	185	14.8%	16.2%	15.2%	16.7%	8.4%	9.2%	9.2%	10.1%	-	-	-	-	
	PE	4420	2357	1025	4605	2359	1051	185	14.8%	16.2%	15.3%	16.7%	8.4%	9.2%	9.2%	10.1%	-	-	-	-	
	PG	4440	2351	1028	4630	2353	1055	190	14.9%	16.2%	15.4%	16.7%	8.4%	9.1%	9.2%	10.0%	-	-	-	-	
	PJ	4450	2349	1029	4640	2351	1056	190	14.9%	16.2%	15.5%	16.8%	8.4%	9.1%	9.2%	10.0%	-	-	-	-	
2202	00	4355	2368	1003	4495	2359	1023	140	14.6%	16.8%	15.0%	17.3%	7.5%	8.6%	9.4%	10.8%	-	-	-	-	544
	PA	4470	2338	1023	4650	2329	1049	180	15.2%	16.7%	15.8%	17.4%	7.4%	8.1%	9.3%	10.2%	-	-	-	-	
	PC	4475	2348	1025	4655	2343	1050	180	14.9%	16.4%	15.8%	17.3%	7.7%	8.4%	9.3%	10.2%	-	-	-	-	
	PE	4485	2347	1026	4665	2343	1051	180	15.0%	16.3%	15.9%	17.3%	7.7%	8.4%	9.3%	10.1%	-	-	-	-	
	PG	4505	2341	1030	4690	2337	1055	185	15.1%	16.3%	16.0%	17.4%	7.6%	8.3%	9.3%	10.1%	-	-	-	-	
	PJ	4515	2339	1031	4700	2335	1056	185	15.1%	16.4%	16.1%	17.4%	7.6%	8.2%	9.3%	10.0%	-	-	-	-	
2352	00	4735	2448	981	4870	2438	999	135	13.3%	16.0%	13.5%	16.2%	9.3%	11.2%	9.3%	11.1%	-	-	-	-	545
	PA	4850	2418	1000	5025	2406	1024	175	13.9%	16.0%	14.2%	16.4%	9.2%	10.6%	9.2%	10.6%	-	-	-	-	546
	PC	4855	2428	1002	5030	2420	1025	175	13.6%	15.6%	14.3%	16.4%	9.5%	10.9%	9.2%	10.5%	-	-	-	-	
	PE	4865	2427	1003	5040	2419	1027	175	13.7%	15.6%	14.3%	16.4%	9.5%	10.8%	9.2%	10.5%	-	-	-	-	
	PG	4885	2421	1006	5065	2414	1030	180	13.8%	15.6%	14.5%	16.4%	9.4%	10.7%	9.2%	10.4%	-	-	-	-	
	PJ	4895	2419	1008	5075	2411	1031	180	13.8%	15.6%	14.5%	16.4%	9.4%	10.7%	9.2%	10.4%	-	-	-	-	

STANDARD VERSION (°)

NSH (°)	Version	Weights (kg) Barycentres (mm) when EMPTY			Weights (kg) at FULL LOAD				PERCENTAGE OF WEIGHT DISTRIBUTION ON SUPPORTS (AT FULL LOAD)												AVX
		kg	Xg	Xy	kg	Xg	Xy	Water	1	2	3	4	5	6	7	8	9	10	11	12	
2502	00	5090	2388	960	5250	2383	981	160	13.2%	16.5%	14.6%	18.2%	8.2%	10.2%	8.5%	10.6%	-	-	-	-	
	PA	5205	2364	978	5405	2358	1004	200	13.7%	16.4%	15.2%	18.1%	8.2%	9.8%	8.5%	10.1%	-	-	-	-	547
	PC	5210	2371	979	5410	2369	1005	200	13.5%	16.1%	15.3%	18.2%	8.4%	9.9%	8.5%	10.1%	-	-	-	-	
	PE	5220	2370	981	5420	2368	1006	200	13.5%	16.1%	15.4%	18.2%	8.4%	9.9%	8.5%	10.1%	-	-	-	-	
	PG	5240	2365	984	5445	2363	1010	205	13.6%	16.1%	15.5%	18.2%	8.3%	9.8%	8.5%	10.0%	-	-	-	-	548
	PJ	5250	2363	985	5455	2361	1011	205	13.7%	16.1%	15.5%	18.2%	8.3%	9.8%	8.5%	10.0%	-	-	-	-	
2652	00	5210	2396	950	5370	2390	971	160	13.0%	16.5%	14.4%	18.2%	8.2%	10.4%	8.5%	10.8%	-	-	-	-	
	PA	5325	2371	968	5525	2366	994	200	13.5%	16.5%	14.9%	18.1%	8.3%	10.0%	8.5%	10.3%	-	-	-	-	549
	PC	5330	2379	969	5530	2376	995	200	13.3%	16.2%	15.0%	18.2%	8.4%	10.2%	8.4%	10.2%	-	-	-	-	
	PE	5340	2378	971	5540	2375	996	200	13.4%	16.1%	15.1%	18.2%	8.4%	10.1%	8.4%	10.2%	-	-	-	-	
	PG	5360	2373	973	5565	2370	1000	205	13.4%	16.1%	15.2%	18.3%	8.4%	10.0%	8.4%	10.1%	-	-	-	-	550
	PJ	5370	2370	975	5575	2368	1001	205	13.5%	16.2%	15.2%	18.3%	8.3%	10.0%	8.4%	10.1%	-	-	-	-	
2802	00	5330	2404	965	5490	2398	985	160	13.2%	16.3%	14.5%	17.9%	8.3%	10.3%	8.7%	10.8%	-	-	-	-	549
	PA	5445	2379	983	5645	2374	1007	200	13.7%	16.2%	15.0%	17.8%	8.4%	9.9%	8.7%	10.3%	-	-	-	-	
	PC	5450	2387	984	5650	2384	1008	200	13.5%	15.9%	15.2%	17.9%	8.5%	10.0%	8.7%	10.3%	-	-	-	-	
	PE	5460	2386	985	5660	2383	1010	200	13.5%	15.9%	15.2%	17.9%	8.5%	10.0%	8.7%	10.2%	-	-	-	-	550
	PG	5480	2381	988	5685	2378	1013	205	13.6%	15.9%	15.3%	17.9%	8.5%	9.9%	8.7%	10.2%	-	-	-	-	
	PJ	5490	2379	989	5695	2376	1014	205	13.6%	15.9%	15.4%	18.0%	8.4%	9.9%	8.7%	10.1%	-	-	-	-	
3002	00	6330	3404	1009	6530	3407	1029	200	15.0%	17.1%	10.3%	11.8%	12.5%	14.3%	8.9%	10.2%	-	-	-	-	552
	PA	6560	3394	1037	6840	3401	1063	280	15.3%	16.4%	10.5%	11.2%	13.3%	14.2%	9.2%	9.8%	-	-	-	-	
	PC	6570	3416	1039	6850	3434	1065	280	15.2%	16.2%	10.9%	11.6%	12.9%	13.8%	9.4%	10.0%	-	-	-	-	
	PE	6590	3418	1041	6870	3436	1067	280	15.2%	16.1%	11.0%	11.6%	12.9%	13.7%	9.4%	10.0%	-	-	-	-	553
	PG	6630	3416	1045	6920	3435	1072	290	15.3%	16.0%	11.0%	11.6%	13.1%	13.7%	9.4%	9.9%	-	-	-	-	
	PJ	6650	3415	1047	6940	3434	1074	290	15.3%	16.0%	11.0%	11.5%	13.1%	13.7%	9.4%	9.9%	-	-	-	-	
3202	00	6555	3380	1012	6750	3384	1030	195	15.2%	17.2%	10.6%	12.0%	12.3%	14.0%	8.8%	10.0%	-	-	-	-	552
	PA	6785	3371	1038	7060	3379	1064	275	15.5%	16.5%	10.8%	11.5%	13.0%	13.9%	9.1%	9.7%	-	-	-	-	553
	PC	6795	3392	1040	7070	3411	1066	275	15.3%	16.3%	11.2%	11.9%	12.7%	13.5%	9.2%	9.8%	-	-	-	-	
	PE	6815	3394	1042	7090	3413	1067	275	15.4%	16.3%	11.2%	11.9%	12.7%	13.5%	9.3%	9.8%	-	-	-	-	555
	PG	6855	3392	1046	7140	3412	1072	285	15.4%	16.2%	11.2%	11.8%	12.8%	13.5%	9.3%	9.8%	-	-	-	-	
	PJ	6875	3391	1048	7160	3412	1074	285	15.4%	16.2%	11.2%	11.8%	12.9%	13.5%	9.3%	9.7%	-	-	-	-	
3402	00	7220	3678	985	7455	3691	1006	235	12.9%	15.3%	12.1%	14.3%	5.8%	6.9%	10.5%	12.5%	4.4%	5.3%	-	-	
	PA	7450	3671	1010	7765	3693	1037	315	13.2%	14.8%	12.6%	14.1%	6.0%	6.7%	10.9%	12.2%	4.5%	5.1%	-	-	
	PC	7460	3680	1012	7775	3704	1039	315	13.1%	14.6%	12.9%	14.4%	5.6%	6.3%	11.1%	12.4%	4.5%	5.1%	-	-	557
	PE	7480	3681	1013	7795	3704	1041	315	13.1%	14.6%	13.0%	14.4%	5.6%	6.2%	11.2%	12.4%	4.5%	5.1%	-	-	
	PG	7520	3678	1017	7845	3702	1045	325	13.1%	14.5%	13.0%	14.4%	5.6%	6.2%	11.2%	12.4%	4.5%	5.0%	-	-	
	PJ	7540	3676	1019	7865	3701	1047	325	13.2%	14.5%	13.0%	14.3%	5.7%	6.2%	11.2%	12.4%	4.5%	5.0%	-	-	
3602	00	7885	4091	964	8160	4088	987	275	9.8%	12.1%	10.4%	12.8%	2.8%	3.4%	9.0%	11.1%	8.5%	10.5%	4.3%	5.3%	
	PA	8115	4095	987	8470	4108	1016	355	10.1%	11.7%	10.5%	12.3%	3.0%	3.5%	9.3%	10.8%	8.7%	10.2%	4.6%	5.3%	
	PC	8125	4095	989	8480	4103	1018	355	9.9%	11.5%	10.9%	12.6%	3.0%	3.5%	9.0%	10.4%	9.1%	10.5%	4.4%	5.1%	558
	PE	8145	4096	990	8500	4104	1019	355	9.9%	11.5%	10.9%	12.6%	3.0%	3.5%	9.0%	10.4%	9.1%	10.5%	4.4%	5.1%	
	PG	8185	4093	994	8550	4103	1024	365	9.9%	11.4%	11.0%	12.6%	3.0%	3.4%	9.1%	10.4%	9.2%	10.5%	4.4%	5.1%	
	PJ	8205	4092	996	8570	4101	1025	365	10.0%	11.4%	11.0%	12.6%	3.0%	3.4%	9.1%	10.4%	9.2%	10.5%	4.4%	5.1%	



High Efficiency Version(A)

NSH (A)	Version	Weights (kg) Barycentres (mm) when EMPTY			Weights (kg) at FULL LOAD				PERCENTAGE OF WEIGHT DISTRIBUTION ON SUPPORTS (AT FULL LOAD)												AVX
		kg	Xg	Xy	kg	Xg	Xy	Water	1	2	3	4	5	6	7	8	9	10	11	12	
1251	00	3245	1334	1000	3340	1337	1019	95	29.3%	34.0%	17.0%	19.7%	-								536
	PA	3360	1313	1027	3495	1313	1053	135	30.8%	33.5%	17.1%	18.6%	-	-	-	-	-	-	-	-	
	PC	3365	1346	1029	3500	1363	1055	135	29.9%	32.5%	18.1%	19.6%	-	-	-	-	-	-	-	-	
	PE	3375	1347	1031	3510	1364	1057	135	29.9%	32.4%	18.1%	19.6%	-	-	-	-	-	-	-	-	
	PG	3395	1345	1035	3535	1364	1062	140	30.1%	32.2%	18.2%	19.5%	-	-	-	-	-	-	-	-	
	PJ	3405	1344	1037	3545	1363	1063	140	30.1%	32.2%	18.2%	19.4%	-	-	-	-	-	-	-	-	
1401	00	3280	1335	1005	3380	1338	1024	100	29.5%	33.8%	17.1%	19.6%	-	-	-	-	-	-	-	-	536
	PA	3395	1314	1032	3535	1313	1058	140	30.9%	33.3%	17.2%	18.6%	-	-	-	-	-	-	-	-	
	PC	3400	1346	1034	3540	1363	1060	140	30.0%	32.3%	18.1%	19.5%	-	-	-	-	-	-	-	-	
	PE	3410	1348	1036	3550	1365	1062	140	30.1%	32.2%	18.2%	19.5%	-	-	-	-	-	-	-	-	
	PG	3430	1345	1040	3575	1364	1067	145	30.2%	32.1%	18.3%	19.4%	-	-	-	-	-	-	-	-	
	PJ	3440	1344	1042	3585	1363	1068	145	30.3%	32.1%	18.3%	19.4%	-	-	-	-	-	-	-	-	
1601	00	3435	1368	1020	3535	1370	1038	100	29.3%	32.8%	17.9%	20.0%	-	-	-	-	-	-	-	-	536
	PA	3550	1347	1045	3690	1345	1070	140	30.6%	32.4%	18.0%	19.0%	-	-	-	-	-	-	-	-	
	PC	3555	1378	1047	3695	1393	1071	140	29.8%	31.4%	18.9%	19.9%	-	-	-	-	-	-	-	-	
	PE	3565	1379	1049	3705	1394	1073	140	29.8%	31.3%	18.9%	19.9%	-	-	-	-	-	-	-	-	
	PG	3585	1377	1053	3730	1394	1078	145	30.0%	31.2%	19.0%	19.8%	-	-	-	-	-	-	-	-	
	PJ	3595	1376	1055	3740	1393	1079	145	30.0%	31.2%	19.0%	19.8%	-	-	-	-	-	-	-	-	
1801	00	4115	1717	969	4250	1726	990	135	15.1%	18.4%	21.9%	26.8%	8.0%	9.8%	-	-	-	-	-	-	540
	PA	4230	1702	991	4405	1714	1018	175	15.5%	18.0%	22.7%	26.3%	8.1%	9.3%	-	-	-	-	-	-	
	PC	4235	1715	993	4410	1732	1020	175	15.2%	17.6%	22.9%	26.6%	8.2%	9.5%	-	-	-	-	-	-	
	PE	4245	1715	994	4420	1733	1021	175	15.2%	17.5%	23.0%	26.5%	8.2%	9.5%	-	-	-	-	-	-	
	PG	4265	1711	998	4445	1730	1025	180	15.3%	17.5%	23.1%	26.5%	8.2%	9.4%	-	-	-	-	-	-	
	PJ	4275	1710	999	4455	1729	1027	180	15.3%	17.5%	23.1%	26.4%	8.2%	9.4%	-	-	-	-	-	-	
1402	00	3570	1495	950	3665	1490	968	95	25.3%	32.2%	18.7%	23.8%	-	-	-	-	-	-	-	-	537
	PA	3685	1470	976	3820	1460	1002	135	26.7%	32.0%	18.8%	22.5%	-	-	-	-	-	-	-	-	
	PC	3690	1500	978	3825	1507	1003	135	26.0%	30.9%	19.7%	23.4%	-	-	-	-	-	-	-	-	538
	PE	3700	1501	980	3835	1508	1005	135	26.0%	30.9%	19.7%	23.4%	-	-	-	-	-	-	-	-	
	PG	3720	1498	984	3860	1507	1010	140	26.1%	30.8%	19.8%	23.3%	-	-	-	-	-	-	-	-	
	PJ	3730	1496	986	3870	1506	1012	140	26.2%	30.8%	19.8%	23.2%	-	-	-	-	-	-	-	-	
1602	00	3835	1557	995	3935	1551	1012	100	25.4%	29.8%	20.6%	24.2%	-	-	-	-	-	-	-	-	538
	PA	3950	1532	1019	4090	1521	1042	140	26.7%	29.7%	20.6%	23.0%	-	-	-	-	-	-	-	-	
	PC	3955	1560	1020	4095	1565	1043	140	26.0%	28.8%	21.5%	23.8%	-	-	-	-	-	-	-	-	
	PE	3965	1561	1022	4105	1565	1045	140	26.0%	28.7%	21.5%	23.8%	-	-	-	-	-	-	-	-	
	PG	3985	1558	1026	4130	1564	1049	145	26.1%	28.6%	21.6%	23.7%	-	-	-	-	-	-	-	-	
	PJ	3995	1556	1027	4140	1562	1051	145	26.2%	28.6%	21.6%	23.6%	-	-	-	-	-	-	-	-	
1802	00	4005	2055	1007	4140	2053	1028	135	10.2%	11.7%	24.8%	28.2%	11.7%	13.4%	-	-	-	-	-	-	541
	PA	4120	2030	1029	4295	2029	1055	175	10.8%	11.7%	25.5%	27.7%	11.7%	12.7%	-	-	-	-	-	-	
	PC	4125	2043	1030	4300	2048	1057	175	10.4%	11.2%	25.8%	27.9%	11.9%	12.8%	-	-	-	-	-	-	
	PE	4135	2043	1032	4310	2047	1058	175	10.4%	11.2%	25.8%	27.9%	11.9%	12.8%	-	-	-	-	-	-	
	PG	4155	2038	1035	4335	2043	1062	180	10.5%	11.2%	26.0%	27.8%	11.8%	12.7%	-	-	-	-	-	-	
	PJ	4165	2036	1037	4345	2041	1064	180	10.5%	11.2%	26.0%	27.8%	11.8%	12.6%	-	-	-	-	-	-	
2002	00	4385	2384	991	4520	2382	1010	135	14.3%	16.8%	14.2%	16.7%	8.2%	9.7%	9.3%	10.9%	-	-	-	-	543
	PA	4500	2356	1011	4675	2355	1036	175	14.8%	16.6%	14.8%	16.7%	8.3%	9.3%	9.2%	10.3%	-	-	-	-	
	PC	4505	2364	1013	4680	2365	1038	175	14.6%	16.3%	15.0%	16.8%	8.4%	9.4%	9.2%	10.3%	-	-	-	-	
	PE	4515	2363	1014	4690	2364	1039	175	14.6%	16.3%	15.1%	16.8%	8.4%	9.4%	9.2%	10.3%	-	-	-	-	
	PG	4535	2357	1018	4715	2359	1043	180	14.7%	16.3%	15.2%	16.8%	8.3%	9.3%	9.2%	10.2%	-	-	-	-	
	PJ	4545	2354	1019	4725	2356	1044	180	14.7%	16.3%	15.2%	16.9%	8.3%	9.2%	9.2%	10.2%	-	-	-	-	
2202	00	4570	2384	1014	4730	2378	1036	160	14.6%	16.4%	14.6%	16.5%	8.4%	9.4%	9.5%	10.6%	-	-	-	-	543
	PA	4685	2356	1033	4885	2350	1060	200	15.2%	16.3%	15.3%	16.4%	8.4%	9.0%	9.4%	10.1%	-	-	-	-	
	PC	4690	2364	1035	4890	2362	1061	200	14.9%	16.0%	15.4%	16.6%	8.5%	9.1%	9.4%	10.0%	-	-	-	-	
	PE	4700	2363	1036	4900	2361	1062	200	14.9%	16.0%	15.5%	16.6%	8.5%	9.1%	9.4%	10.0%	-	-	-	-	
	PG	4720	2358	1039	4925	2356	1066	205	15.0%	16.0%	15.6%	16.6%	8.5%	9.0%	9.3%	9.9%	-	-	-	-	
	PJ	4730	2355	1040	4935	2353	1067	205	15.1%	16.0%	15.7%	16.6%	8.5%	9.0%	9.3%	9.9%	-	-	-	-	
2352	00	4940	2459	991	5100	2451	1012	160	13.4%	15.7%	13.2%	15.5%	10.1%	11.8%	9.3%	11.0%	-	-	-	-	545
	PA	5055	2432	1009	5255	2422	1035	200	13.9%	15.7%	13.8%	15.5%	10.1%	11.4%	9.3%	10.4%	-	-	-	-	
	PC	5060	2440	1011	5260	2434	1036	200	13.7%	15.4%	13.9%	15.7%	10.2%	11.5%	9.3%	10.4%	-	-	-	-	
	PE	5070	2439	1012	5270	2433	1037	200	13.7%	15.3%	14.0%	15.7%	10.2%	11.5%	9.3%	10.4%	-	-	-	-	
	PG	5090	2433	1015	5295	2427	1041	205	13.8%	15.3%	14.1%	15.7%	10.2%	11.3%	9.3%	10.3%	-	-	-	-	
	PJ	5100	2431	1016	5305	2425	1042	205	13.8%	15.4%	14.1%	15.7%	10.2%	11.3%	9.2%	10.3%	-	-	-	-	

High Efficiency Version (A)

NSH (A)	Version	Weights (kg) Barycentres (mm) when EMPTY			Weights (kg) at FULL LOAD				PERCENTAGE OF WEIGHT DISTRIBUTION ON SUPPORTS (AT FULL LOAD)												AVX
		kg	Xg	Xy	kg	Xg	Xy	Water	1	2	3	4	5	6	7	8	9	10	11	12	
2502	00	5265	2397	966	5415	2392	985	150	13.3%	16.4%	14.6%	18.0%	8.3%	10.2%	8.7%	10.7%	-	-	-	-	549
	PA	5380	2372	983	5570	2367	1007	190	13.8%	16.3%	15.1%	17.9%	8.3%	9.9%	8.6%	10.2%	-	-	-	-	550
	PC	5385	2380	985	5575	2377	1008	190	13.5%	16.0%	15.2%	18.0%	8.4%	10.0%	8.6%	10.2%	-	-	-	-	
	PE	5395	2379	986	5585	2376	1010	190	13.6%	16.0%	15.3%	18.0%	8.4%	10.0%	8.6%	10.2%	-	-	-	-	
	PG	5415	2374	989	5610	2372	1013	195	13.6%	16.0%	15.4%	18.0%	8.4%	9.9%	8.6%	10.1%	-	-	-	-	
	PJ	5425	2372	990	5620	2370	1014	195	13.7%	16.0%	15.4%	18.0%	8.4%	9.8%	8.6%	10.1%	-	-	-	-	
2652	00	5470	2396	962	5690	2386	989	220	13.1%	16.1%	15.1%	18.6%	8.1%	9.9%	8.6%	10.5%	-	-	-	-	551
	PA	5585	2372	979	5845	2362	1010	260	13.6%	16.1%	15.7%	18.5%	8.1%	9.5%	8.5%	10.0%	-	-	-	-	
	PC	5590	2380	980	5850	2373	1011	260	13.4%	15.8%	15.8%	18.6%	8.2%	9.7%	8.5%	10.0%	-	-	-	-	
	PE	5600	2379	982	5860	2372	1012	260	13.4%	15.8%	15.8%	18.6%	8.2%	9.7%	8.5%	10.0%	-	-	-	-	
	PG	5620	2374	984	5885	2368	1016	265	13.5%	15.8%	15.9%	18.6%	8.2%	9.6%	8.5%	9.9%	-	-	-	-	
	PJ	5630	2372	986	5895	2366	1017	265	13.5%	15.8%	16.0%	18.6%	8.2%	9.5%	8.5%	9.9%	-	-	-	-	
2802	00	5610	2405	980	5830	2395	1005	220	13.3%	15.9%	15.3%	18.2%	8.2%	9.8%	8.8%	10.5%	-	-	-	-	551
	PA	5725	2381	996	5985	2370	1026	260	13.8%	15.8%	15.8%	18.1%	8.2%	9.4%	8.8%	10.0%	-	-	-	-	
	PC	5730	2389	997	5990	2381	1027	260	13.6%	15.5%	15.9%	18.2%	8.4%	9.6%	8.8%	10.0%	-	-	-	-	
	PE	5740	2388	998	6000	2380	1028	260	13.6%	15.5%	16.0%	18.2%	8.4%	9.6%	8.8%	10.0%	-	-	-	-	
	PG	5760	2383	1001	6025	2376	1031	265	13.7%	15.5%	16.1%	18.2%	8.3%	9.5%	8.8%	9.9%	-	-	-	-	
	PJ	5770	2381	1002	6035	2374	1032	265	13.7%	15.5%	16.1%	18.2%	8.3%	9.4%	8.8%	9.9%	-	-	-	-	
3002	00	6540	3406	1017	6740	3408	1035	200	15.1%	16.9%	10.4%	11.7%	12.6%	14.2%	9.0%	10.1%	-	-	-	-	554
	PA	6770	3396	1043	7050	3403	1069	280	15.4%	16.3%	10.6%	11.2%	13.4%	14.1%	9.3%	9.8%	-	-	-	-	553
	PC	6780	3417	1045	7060	3435	1071	280	15.2%	16.1%	11.0%	11.6%	13.0%	13.7%	9.4%	9.9%	-	-	-	-	
	PE	6800	3419	1047	7080	3436	1072	280	15.2%	16.0%	11.0%	11.6%	13.0%	13.7%	9.4%	9.9%	-	-	-	-	
	PG	6840	3417	1051	7130	3436	1077	290	15.3%	16.0%	11.1%	11.5%	13.1%	13.7%	9.5%	9.9%	-	-	-	-	
	PJ	6860	3416	1053	7150	3435	1079	290	15.3%	15.9%	11.1%	11.5%	13.2%	13.7%	9.5%	9.8%	-	-	-	-	
3202	00	6745	3388	1020	6940	3392	1038	195	15.2%	17.0%	10.7%	12.0%	12.4%	13.9%	8.9%	10.0%	-	-	-	-	556
	PA	6975	3379	1045	7250	3387	1070	275	15.5%	16.4%	10.9%	11.5%	13.1%	13.9%	9.2%	9.7%	-	-	-	-	553
	PC	6985	3400	1047	7260	3418	1072	275	15.4%	16.2%	11.2%	11.8%	12.8%	13.5%	9.3%	9.8%	-	-	-	-	555
	PE	7005	3402	1049	7280	3420	1074	275	15.4%	16.1%	11.3%	11.8%	12.8%	13.4%	9.4%	9.8%	-	-	-	-	
	PG	7045	3400	1053	7330	3419	1078	285	15.4%	16.1%	11.3%	11.7%	12.9%	13.4%	9.4%	9.7%	-	-	-	-	
	PJ	7065	3399	1055	7350	3419	1080	285	15.5%	16.0%	11.3%	11.7%	13.0%	13.4%	9.4%	9.7%	-	-	-	-	
3402	00	7425	3678	990	7655	3690	1010	230	12.8%	15.1%	12.4%	14.6%	5.6%	6.6%	10.7%	12.6%	4.4%	5.2%	-	-	557
	PA	7655	3671	1014	7965	3691	1041	310	13.2%	14.7%	12.9%	14.3%	5.8%	6.4%	11.1%	12.3%	4.5%	5.0%	-	-	
	PC	7665	3680	1016	7975	3702	1042	310	13.0%	14.5%	13.2%	14.6%	5.4%	6.0%	11.3%	12.5%	4.5%	5.0%	-	-	
	PE	7685	3681	1018	7995	3702	1044	310	13.1%	14.5%	13.2%	14.7%	5.4%	6.0%	11.3%	12.5%	4.5%	4.9%	-	-	
	PG	7725	3678	1022	8045	3701	1048	320	13.1%	14.4%	13.3%	14.6%	5.4%	6.0%	11.4%	12.5%	4.5%	4.9%	-	-	
	PJ	7745	3676	1023	8065	3699	1050	320	13.1%	14.4%	13.3%	14.6%	5.4%	6.0%	11.4%	12.5%	4.5%	4.9%	-	-	
3602	00	8105	4107	969	8370	4104	990	265	9.8%	11.9%	10.4%	12.7%	2.9%	3.6%	8.9%	10.8%	8.6%	10.5%	4.4%	5.4%	559
	PA	8335	4111	991	8680	4123	1019	345	10.0%	11.6%	10.6%	12.2%	3.1%	3.6%	9.1%	10.6%	8.8%	10.2%	4.7%	5.4%	
	PC	8345	4111	993	8690	4118	1020	345	9.8%	11.4%	10.9%	12.6%	3.2%	3.7%	8.9%	10.2%	9.2%	10.6%	4.5%	5.2%	
	PE	8365	4112	995	8710	4119	1022	345	9.8%	11.3%	10.9%	12.6%	3.2%	3.7%	8.9%	10.2%	9.2%	10.6%	4.5%	5.2%	
	PG	8405	4109	998	8760	4118	1026	355	9.9%	11.3%	11.0%	12.6%	3.2%	3.6%	8.9%	10.2%	9.2%	10.6%	4.5%	5.1%	
	PJ	8425	4108	1000	8780	4117	1028	355	9.9%	11.3%	11.0%	12.5%	3.1%	3.6%	9.0%	10.2%	9.2%	10.5%	4.5%	5.1%	

24. HYDRAULIC CIRCUIT

The NSH can have one or two circuits with the following (according to the size):

STANDARD VERSION

- **Evaporator 1 x circuit**
  supplied with stub pipe and victaulic connections
- **Differential pressure switch**
- **SIW water inlet probe**
- **SUW water outlet probe**

NOTE:

In the two-module units, the water outlet probe (SUW) together with its sump is free, nearby the electric box. Remember to insert it in the collector of the outlet hydraulic parallel, first providing a ½-inch sleeve.

VERSION WITH PUMPS

the following are supplied additionally with the Standard version:

- 2 x 25 l expansion vessels
- Loading unit
- Safety valve
- Pumps

24.1. RECOMMENDED EXTERNAL HYDRAULIC CIRCUIT

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

Before connecting the pipes make sure that they do not contain stones, sand, rust, sludge or foreign bodies that could damage the system. It is good practice to set up a unit by-pass to be able to wash the pipes without having to disconnect the appliance. The connection piping must be adequately supported so that its weight does not rest on the appliance.

⚠ It is recommended to install the following tools on the water circuit, whenever not envisioned in the version in your possession:

- Water filter
- Storage tank
- Flow meter
- Safety valve/s
- High pressure flexible joints
- Air vent valve
- Manual cut-off valves
- Manometer
- Pump/s
- Loading unit
- Expansion vessels
- Safety valve

⚠ WARNING: It is necessary that the water flow rate complies with the relative values in the performance tables. The hydraulic pipes must be sized in order to guarantee suitable water flow to the exchangers.

⚠ WARNING: Verify that the water flow rates are compatible with the features of the relative pumping unit.

Water disconnectors must be used in systems loaded with anti-freeze or where particular legal provisions apply.

Supply/reintegration water details, must be conditioned with appropriate treatment systems.

24.2. LOADING THE SYSTEM

- Before loading, check that the system drain cock is closed.
- Open all vent valves of the system and the relative terminals.
- Open the system cut-off devices.
- Start filling by slowly opening the system water loading cock outside the appliance.
- When water starts to escape from the terminal vent valves, close them and continue loading until the value of 1.5 bar is read on the manometer.

The system must be loaded at a pressure between 1 and 2 bar.

It is recommended to repeat this operation after the appliance has functioned for a few hours and to periodically check the system pressure, reintegrating it if it drops below 1 bar.

Check the hydraulic sealing of the joints.

24.3. EMPTYING THE SYSTEM

When to empty the system:

1. Whenever a prolonged winter standstill is envisioned in order to prevent the water from freezing **(operation not necessary if glycol is used).**
2. Whenever a fault occurs or operations must be performed in the system.

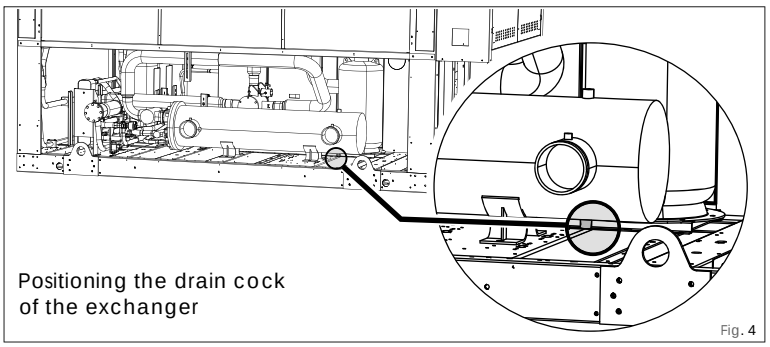
- Before emptying, set the master switch to "OFF" and disconnect the voltage.
- Discharge the differential pressure switch.
- Check that the loading/water system reintegration cock is closed.
- Open the drain cock outside the appliance and all the vent valves of the system and the relative terminals.
- Open the cock positioned under the shell and tube heat exchanger (see fig. 4).
- It is recommended to use compressed air to blow the heat exchanger in order to remove any water.

⚠ Attention

If anti-freeze is used in the system, it must not be disposed of freely as it is harmful to the environment. It should be collected and if possible reused.

24.3.1. WATER FEATURES

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

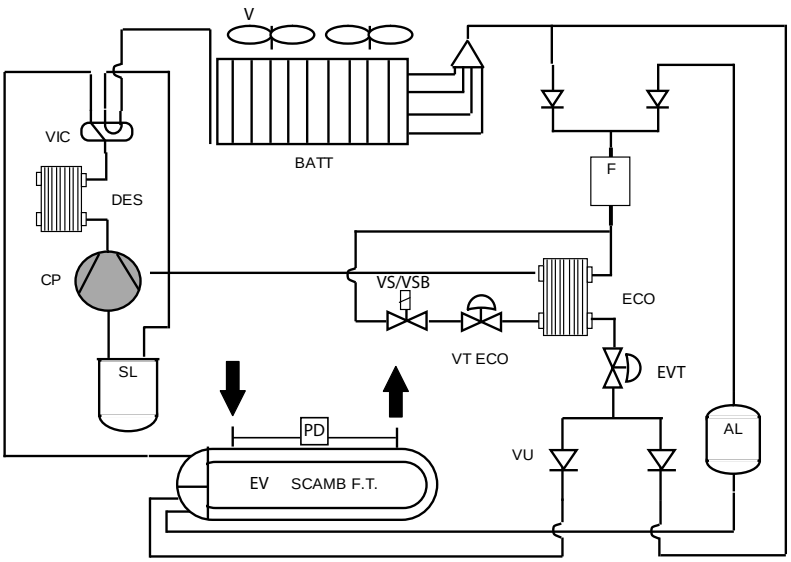


Positioning the drain cock of the exchanger

Fig. 4

25. COOLING CIRCUIT LAYOUT

NSH version with desuperheater



⚠ ***WARNING:***
The diagram is indicative and does not reflect all the sizes in the catalogue

Key	
AL	LIQUID ACCUMULATOR OR STORAGE TANK
BATT	COIL
CP	COMPRESSOR
DES	DESUPERHEATER
ECO	ECONOMISER
EV	EVAPORATOR (SHELL AND TUBE EXCHANGER)
EVT	ELECTRONIC THERMOSTATIC VALVE
F	DEHYDRATOR FILTER
SL	LIQUID SEPARATOR
V	FAN
VIC	CYCLE REVERSING VALVE
VS, VSB	SOLENOID VALVE AND BY-PASS SOLENOID VALVE
VT ECO	ECONOMISER ELECTRONIC THERMOSTATIC VALVE
VU	ONE-WAY VALVE

26. ELECTRIC CONNECTIONS

All the electrical operations must be carried out bySTAFF IN POSSESSION OF THE NECESSARY QUALIFICATIONS BY LAW, 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 SYSTEMS, in compliance with the international and national regulations of the place of installation of the unit and in compliance with the regulations in force at the moment of installation

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

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

The NSH chillers are completely wired at the factory and only require connection to the electrical mains, downstream from a unit switch, according to that envisioned by the Standards in force on this subject in the country of installation.
It s also advised to check that:

- the electrical mains features are suitable for the absorption values indicated in the electrical data table, also taking into consideration any other machines operating at the same time.
- The unit is only powered when installation has been completed (hydraulic and electric).
- Respect the connection indications of the phase, and earth wires.
- The power supply line must have a relevant protection mounted upstream against short circuits and dispersions to earth, which isolates the system with respect to other utilities.
- The voltage must be within a tolerance of ±10% of the nominal power supply voltage of the machine (for unbalanced three-phase unit max 3% between the phases). Whenever these parameters are not respected, contact the electric energy public body. For electric connections, use the cables with double isolation according to the Standards in force on this subject in the different countries.
- The use of an omnipolar magnet circuit breaker switch is mandatory, in compliance with the IEC-EN Standards (contact opening at least 3 mm), with suitable cut-off power and differential protection on the basis of the electric data table shown below, installed as near as possible to the appliance.
- It is mandatory to make an effective earth connection. The manufacturer cannot be held responsible for any damage caused by the lack of or ineffective appliance earth connection.
- For units with three-phase power supply, check the correct connection of the phases.

⚠ ***WARNING:***
It is prohibited to use the water pipes to earth the appliance.

26.1. ELECTRICAL DATA TABLE

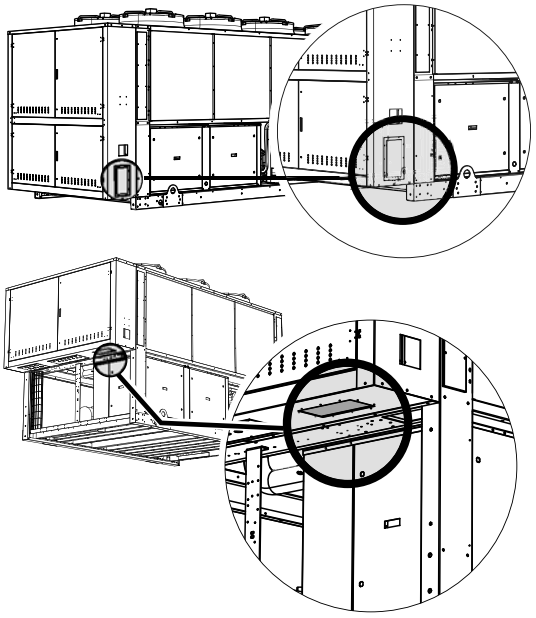
The cable sections shown in the table are recommended for maximum lengths of 50m.

NSH		Recommended cables section			
		SEC A	SEC B	EARTH	IL
		[mm²]	[mm²]	[mm²]	[A]
NSH1251	400V-3	150	1.5	70	250
NSH1401	400V-3	150	1.5	70	315
NSH1601	400V-3	185	1.5	95	315
NSH1801	400V-3	240	1.5	120	400
NSH1402	400V-3	240	1.5	120	315
NSH1602	400V-3	240	1.5	120	315
NSH1802	400V-3	240	1.5	120	400
NSH2002	400V-3	2x150	1.5	150	400
NSH2202	400V-3	2x150	1.5	150	400
NSH2352	400V-3	2x150	1.5	150	630
NSH2502	400V-3	2x150	1.5	150	630
NSH2652	400V-3	2x185	1.5	185	630
NSH2802	400V-3	2x185	1.5	185	630
NSH3002	400V-3	2x240	1.5	240	630
NSH3202	400V-3	2x240	1.5	240	630
NSH3402	400V-3	3x185	1.5	2x150	630
NSH3602	400V-3	3x240	1.5	2x185	800

KEY

Sec A: Power supply
Sec B: Controls and safety devices connection
Earth: Earth wire to connect to unit
IL: Master switch

Electric power supply input



For longer lengths or different cable laying, it is up to the PLANNER to calculate the appropriate line switch, the power supply line as well as the connection to the earth wire and connection cables depending on:

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

ATTENTION:
Check the tightening of all power wire clamps on commissioning and after 30 days from start-up. Subsequently, check the tightening of all the power clamps every six months.
Loose terminals can cause overheating of the cables and components.

26.2. ELECTRIC POWER CONNECTION TO THE ELECTRICAL MAINS

1. Before connecting the unit to the power supply mains , ensure that the isolating switch is open.
2. Open the front panel.
3. Use the holes for the main electric power supply cable and for the cables of the other external connections under the responsibility of the installer.
4. It is forbidden to access with electric cables in positions not specifically envisioned in this manual.
5. Avoid direct contact with non insulated copper piping and with compressor.
6. Identify the clamps for the electric connectionand always refer to the wiring diagram supplied with the unit.
7. For the functional connection of the unit, take the power supply cable to the electric control board inside the unit and connect to clamps L1-L2-L3 and PE respectingthe polarities,
8. L1-L2-L3 asphases, and PE as earth see figure.
9. Re-position the inspection panels.
10. Ensure that all protections removed for the electric connection have been restored before powering the unit.
11. Position the system master switch (external to the appliance) to “ON”. (Fig 1).

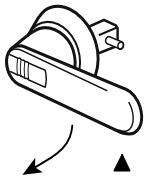


Fig. 1

27. CONTROL AND COMMISSIONING

27.1. PREPARATION FOR COMMISSIONING

Please note that, on request by the Aermec customer or the legitimate owner of the machine, the units in this series can be started up by the AERMEC After-Sales Service in your area (valid only on Italian territory).
The start of operation must be scheduled in advance based on the time frame for the completion of works for the system. Prior to the intervention, all other works (electrical and hydraulic hook-ups, priming and bleeding of air from the system) must have been completed.

27.2. AUXILIARY CONNECTIONS IF ENVISIONED, BY THE INSTALLER

The terminal board connected to the PCO3 board, mounted on the NSH units, offers the possibility of connecting the following auxiliary devices (according to the particular unit question):

–Enabling the second set (SET)
–Remote switch-on/off (0/1)
–Multifunction auxiliary exclusion (AMF)
–Season changeover (E/I)
–Recuperator flow meter connection (FLR)
–Connection to control the pump (MPO)
–External peripheral connections (e.g. computers, with a max power supply of 230V50Hz)
–Compressor exclusion (ECP)
–Multifunction input (MULTI IN):
a multifunction input is available where it is possible to select 4 different functions, but only 1 can be set:
1 - 0-10V variable set-point
2 - Max. power requested (0-10V) power from 0 to 100%
3 - Min. power limit (0-10V) power from 0 to 100%
4 - Compensation set-point
–Low pressure switch (BP)
–Evaporator pump circuit breaker protection (TMP)

Refer to the wiring diagrams on board the machine regarding the connections.

For the electric connections use double isolated cables in compliance with the Standards in force on this subject in the countries where the unit will be installed.
ALWAYS REFER TO THE WIRING DIAGRAM SUPPLIED WITH THE MACHINE.

Commissioning must be performed with standard settings. Only when the inspection has been completed can the functioning Set Point values be changed.
Before start-up, power the unit for at least 12-24 hours positioning the protection magnet circuit breaker switch and the door lock isolating switch at ON
Make sure that the control panel is off in order to allow the compressor oil sump to heat.

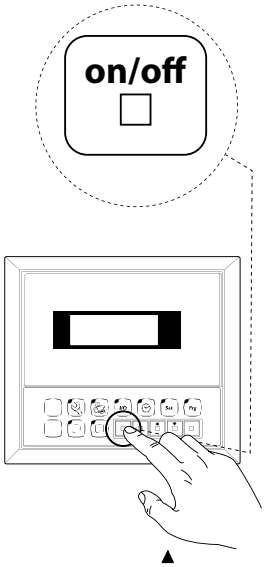


Fig. 2

27.3. START -UP

27.3.1. Preliminary operations to be performed with no voltage present

Control:

1. All safety conditions have been respected
2. The unit is correctly fixed to the support surface
3. The minimum technical spaces have been respected;
4. That the main power supply cables have appropriate section, which can support the total absorption of the unit. (see electric data sections) and that the unit has been duly connected to the ground.
5. That all the electrical connections have been made correctly and all the terminals adequately tightened.

27.3.2. The following operations are to be carried out when the unit is live.

1. Supply power to the unit by turning the master switch to the ON position, see **(fig1.)** The display will come on a few seconds after voltage has been supplied; check that the operating status is on OFF.(OFF BY KEY B on lower side of the display).
2. Use a tester to check that the value of the power supply voltage to the RST phases is equal to 400V ±10%; also verify that the unbalance between phases is no greater than 3%.
3. Check that the connections made by the installer are in compliance with the documentation.
4. Verify that the resistor of the compressor sump is working by measuring the increase in temperature of the oil pan. The resistance/s must function for at least 12 hours before start-up of the compressor and in all cases the temperature of the oil pan must be 10 - -15°C higher than the room temperature.

HYDRAULIC CIRCUIT

1. Check that all hydraulic connections are made correctly, that the plate indications are complied with and that a mechanical filter has been installed at the evaporator inlet. (Mandatory component for warranty to be valid).
2. Check that the hydraulic system is filled and under pressure and also make sure that no air is present; if so, bleed it.
3. Verify that any on-off valves present in the system are correctly opened.
4. Make sure that the circulation pump/s is operating and that the flow rate of the water is sufficient to close the contact of the flow/pressure switch.
5. Check the water flow rate, measuring the pressure difference between input and output of the evaporator and calculate the flow rate using the **EVAPORATOR PRESSURE DROP** diagram present in this documentation.
6. Check the correct functioning of the flow meters, if installed. Close the cut-off valve at the output of the heat exchanger. The unit control panel must display the block. Reopen the valve and rearm the block.

WARNING: Before carrying out the controls indicated below, make sure that the unit is disconnected from the power mains. Make sure that the master switch is locked in the OFF position and an appropriate sign is affixed. Before starting the operations, check that there is no voltage present using a voltmeter or a phase indicator.

27.4. MACHINE COMMISSIONING

After having performed all preliminary controls, it is possible to start the unit by pressing the ON button. The display shows the temperature of the water and machine functioning mode. Check the operating parameters (setpoint) and reset any alarms present. After a few minutes, the unit will begin operating.

27.4.1. With the machine on, check

COOLING CIRCUIT

CHECK:

- **That the compressor input current** is lower than the maximum indicated in the technical data table.
- **That in models with three-phase power supply**, the compressor noise level is not abnormal. If this is the case, invert a phase.
- **That the voltage value lies within the pre-fixed limits** and that unbalance between the three phases (three-phase power supply) is not above 3%.
- **The presence of any refrigerant GAS leaks** particularly with reference to pressure plugs, pressure transducers and pressure switches. (VIBRATIONS DURING TRANSPORTATION MAY LOOSEN CONNECTIONS).
- **After a brief functioning period, the oil level in the compressor** and that there are no air pockets in the liquid indicator glass. The continuous passage of steam pockets can mean that the load of refrigerant is insufficient or that the thermostatic valve is incorrectly adjusted. The brief presence of vapour is however possible.
- **Overheating**
  Comparing the temperature read using a contact thermostat positioned on the compressor intake with the temperature shown on the low pressure manometer (saturation temperature corresponding to the evaporation pressure). The difference between these two temperatures gives the overheating value. Optimal values are between 4 and 8°C.
- **Subcooling**
  Comparing the temperature measured with a contact thermostat situated on the pipe at the outlet of the condenser with the temperature shown on the high pressure manometer (saturation temperature corresponding to the condensation pressure). The difference between these two temperatures gives the subcooling value. Optimal values are between 4 and 5°C.

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

CONTROL AND SAFETY DEVICES

CHECK:

- **The double high pressure switch (manual + tool)**
  That stops the compressor, generating the respective alarm, when the delivery pressure exceeds the setpoint value. The control of its correct functioning can be performed by closing the air intake to the exchanger (in cooling mode) and keeping the high pressure manometer under control, check the intervention in correspondence of the calibration value. Caution: In the event of failure to intervene at the calibration value, stop the compressor immediately and check the cause. The reset is manual and can only be performed when the pressure falls below the differential value. (For the set and differential values, consult the technical manual).

- **The low pressure switch (if envisioned)**
  That stops the compressor, generating the respective alarm, when the intake pressure drops below the set-point value. The control of its correct functioning can only be performed after about 5 minutes of functioning. Closing the cock slowly on the liquid piping and keeping the low pressure manometer under control, Check the intervention in correspondence of the value calibrated. Caution: In the event of failure to intervene at the calibration value, stop the compressor immediately and check the cause. The reset is manual and can only be performed when the pressure falls below the differential value. (For the set and differential values, consult the technical manual).

- **The anti-freeze control**
  The anti-freeze control managed by the electronic regulation and by the temperature probe located at the outlet of the evaporator is to prevent the formation of ice when the water flow rate is too low. Correct operation can be checked by progressively increasingly the anti-freeze set-point until it passes the outlet water temperature and keeping the water temperature controlled with a high precision thermometer, verify that the unit is off and generates the respective alarm. After this operation, take the anti-freeze set-point back to its original value.

All the units undergo rigorous tests in the factory, before delivery.
In all cases it is good practice to check all control and safety devices. All control operations must be performed by qualified staff, the incorrect settings of the above-mentioned devices can cause serious damage to the unit.

28. FUNCTIONING FEATURES

28.1. SET POINT IN COOLING MODE

(Factory set) = 7°C, Δt = 5°C.

28.2. SET POINT IN HEATING MODE

(Factory set) = 45°C, Δt = 5°C.
If the unit power supply is restored after a temporary interruption, the set mode will be kept in the memory.

28.3. COMPRESSOR START-UP DELAY

Two functions have been prepared to prevent compressor start-ups that are too close.
- Minimum time from last switch-off 60 seconds in cooling mode.
- Minimum time from last switch-on 300 seconds in heating mode.

28.4. CIRCULATION PUMPS

The circuit board envisions outputs for the management of the circulation pumps. The pump starts immediately after the first 30 seconds of functioning. When the water flow rate reaches normal working conditions, the flow meter control functions are activated (if envisioned).
Below find the compressor start-up procedure, by switching the source side pump on with flow meter check if enabled after 20 seconds.
Whenever alarms do not occur, the compressor starts.

28.5. ANTI-FREEZE ALARM

The anti-freeze alarm is active if the machine is off or in stand-by mode. In order to prevent the heat exchanger from breaking due to the water it contains freezing, envision compressor block (if the machine is on below 3.5 °C) and ignition of the resistance (if standby below 5 °C).
If the temperature detected by the probe positioned in output of the heat exchanger and in inlet to the chiller is less than +3.8°C.

⚠ ***WARNING***
THIS ANTI-FREEZE SET TEMPERATURE CAN ONLY BE VARIED BY AN AUTHORISED AFTER-SALES CENTRE AND ONLY AFTER HAVING CHECKED THAT THERE IS ANTI-FREEZE SOLUTION IN THE WATER SYSTEM.
The intervention of this alarm determines compressor block and not pump block, which remains active along with the switch-on of the resistance if installed.
To restore normal functions the temperature of the outlet water must rise above +4°C.
Rearm is manual.

ATTENTION:
WHENEVER THIS ALARM INTERVENES, WE ADVISE YOU TO CALL THE NEAREST AFTER-SALES SERVICE IMMEDIATELY.

28.6. WATER FLOW RATE ALARM

The unit manages a water flow rate alarm controlled by the differential pressure switch installed in series on the machine. This type of safety device intervenes after the first 30 seconds of pump functioning, if the water flow rate is not sufficient.
The intervention of this alarm determines compressor and pump block.

29. ROUTINE MAINTENANCE

WARNING
Inspection, maintenance and eventual repair work must be carried out only by a legally qualified technician.

Lack of control/maintenance can cause damage to persons or objects.

For appliances installed near the sea, the maintenance intervals must be halved.

All cleaning is prohibited until the unit has been disconnected from the electric power supply mains.
Make sure there is no voltage present before operating.
Periodic maintenance is fundamental to keep the unit perfectly efficient under a functional and energetic point of view.
It is therefore essential to carry out periodic yearly controls for the:

29.6.1. Hydraulic circuit

CHECK:
- Water circuit refill
- Cleaning the water filter
- Control of flow switch
- No air in the circuit (bleed)
- The water flow rate to the evaporator is constant
- The thermal insulation state of the hydraulic piping
- The percentage of glycol where necessary

29.6.2. Electrical circuit

CHECK:
- Safety efficiency
- Electric supply pressure
- Electrical Input
- Connection tightness
- Functioning of the compressor guard resistance

29.6.3. Cooling circuit

CHECK:
- State of compressor
- Efficiency of the plate heat exchanger resistance
- Work pressure
- Leak test for watertightness control of the cooling circuit
- Functioning of high and low pressure pressure switches
- Carry out the appropriate checks on the filter dryer to check efficiency

29.6.4. Mechanical checks

CHECK:
- tightening of the screws the compressors and the electrical box, as well as the exterior panelling of the unit. Insufficient fastening can lead to undesired noise and vibrations.
- The condition of the structure. Treat any oxidised parts with suitable paint to eliminate or reduce oxidation.

30. EXTRAORDINARY MAINTENANCE

The NSH chillers are filled with R134a gas and are inspected at the factory. Under normal conditions they do not require Technical Assistance related to control of refrigerant gas. Through time gas leakage may be generated from the joints, causing refrigerant to escape and discharge the circuit, causing appliance malfunctioning.

In these cases the leakage points are to be discovered and repaired and the cooling circuit is to be replenished, respecting Law n°549 dated 28 December 1993.

30.6.1. Loading procedure

The loading procedure is as follows:

- Empty and dry the entire cooling circuit using a vacuum pump connected to the low and high pressure socket until 10 Pa is read on the vacuum meter. Wait a few minutes and check that this value does not rise above 50 Pa.
- Connect the refrigerant gas cylinder or a load cylinder to the socket on the low pressure line.
- Load the amount of refrigerant gas indicated on the appliance features plate.
- After a few hours of functioning, check that the liquid indicator indicates the dry circuit (dry-green). In the case of partial loss, the circuit must be emptied completely before being re-loaded.
- The R134A refrigerant must only be loaded in the liquid state.
- Functioning conditions that are different to the nominal conditions can give rise to values that are greatly different.
- The sealing test or the search for leaks must only be performed using R134a refrigerant gas, using a suitable leak detector.
- In the cooling circuit it is prohibited to use oxygen or acetylene or other inflammable or poisonous gases because they are a cause of explosions or intoxication.

We recommend to envision a machine book (not supplied, but the user's responsibility), which allows to keep track of the interventions performed on the unit. In this way it will be easy to suitably organise the interventions making research and the prevention of any machine breakdowns easier.
Use the date to record date, type of intervention made (routine maintenance, inspection or repairs), description of the intervention, measures actuated, etc.

IT IS forbidden to RELOAD the circuit with a refrigerant gas different to the one indicated. Using a different refrigerant gas can cause serious damage to the compressor.

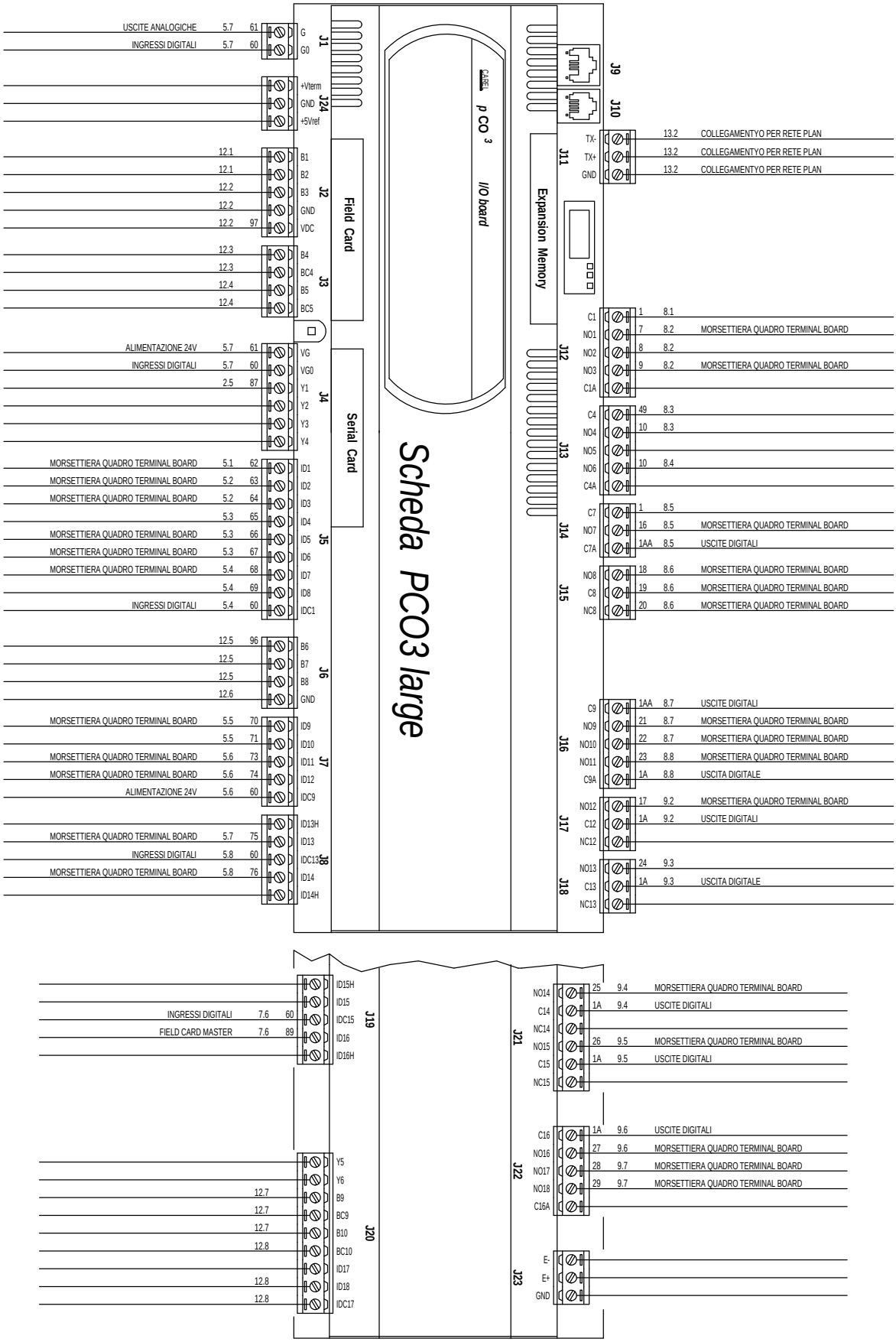
DISPOSAL
The unit must be disposed of in conformity with the Standards in force in the different countries.

31. ANOMALIES

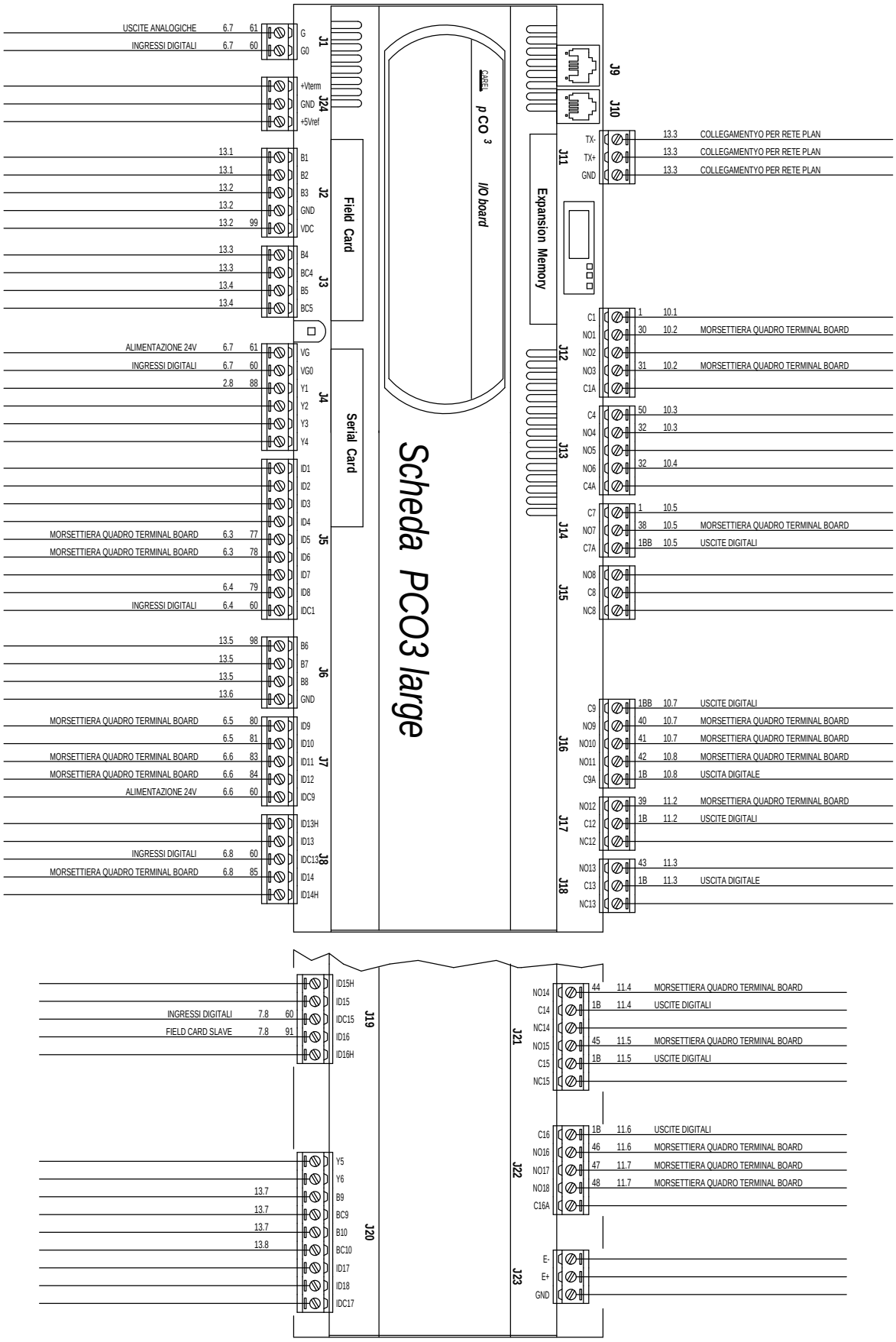
ANOMALY	CAUSE	REMEDY
The chiller does not start-up	• No electric voltage	• Check the presence of voltage • Check the safety systems upstream from the appliance
	• Master switch at OFF • Remote switch at OFF (if present) • Control panel at OFF • Main switch at OFF • Compressor magnet circuit breaker at OFF	• Position at ON
	• Power supply voltage too low	• Check power supply line
	• Remote control switch coil broken • Circuit board broken • Peak condenser broken • Compressor broken	• Replace the component
Insufficient yield	• No refrigerant • Appliance dimensioning • Functioning outside of operational limits	• Check
Noisy compressor	• Liquid return to the compressor • Inadequate fixing	• Check
	• Phase inverted (in three-phase versions only)	• Invert a phase
Noise and vibrations	• Contacts between metal bodies	• Check
	• Weak rest	• Restore
	• Loose screws	• Tighten the screws
The compressor stops due to intervention of the protections	• Excessive flow pressure • Low intake pressure • Power supply voltage low • Electric connections fastened badly • Functioning outside of operational limits	• Check
	• Pressure switch functions badly	• Replace the component
	• Circuit breaker protection intervention	• Check power supply voltage • Check electric isolation of the windings
High discharge pressure	• High external air temperature • High water input temperature	• Check
	• Insufficient air flow • Insufficient water flow	• Check fan functioning • Check pump functioning
	• Fan regulation anomalous functioning	• Check
	• Air in the hydraulic system	• Bleed
	• Excessive gas load	• Check
Low discharge pressure	• Low external air temperature • Low water input temperature	• Check
	• Humidity in the cooling circuit	• Empty and restore the gas load
	• Anomalous functioning of fan regulation (if envisioned)	• Check
	• Air in the hydraulic system	• Bleed
	• Insufficient gas load	• Check
High intake pressure	• High external air temperature • High water input temperature • Thermostatic expansion valve too open or damaged	• Check
Low intake pressure	• Low external air temperature • Low water input temperature • Thermostatic expansion valve damaged or blocked • Water filter blocked • Plate heat exchanger blocked	• Check
	• Insufficient air flow • Insufficient water flow	• Check fan functioning • Check pump functioning

For further information regarding operations that can be performed on the user and installer parameters, refer to the unit user manual.

MASTER PCO3 BOARD



SLAVE PCO3 BOARD



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