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PRODUCT DOCUMENT

NHE

CHILLERS
AND HEAT PUMPS

EN

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Technical data and information relating to the range of products contained in this document can change for product improvement purposes.

For design recommendations please always refer to the documents attached to the specific technical selection.

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1 DESCRIPTION OF THE UNIT

The NHA series units are air conditioning and water production machines designed for both residential and industrial applications with 24-hour operation. They cover a thermal power range from 100 to 650 kW, ensuring high thermodynamic efficiency and wide configurability, both in terms of accessories and refrigeration circuit.
They are therefore available in the following versions:
— NHA C, liquid cooler
— NHA H, reversible heat pump
The possible operating modes are:
— Cooling
— Heating
The NHA units are equipped with Scroll compressors with R290 refrigerant, mounted in a sturdy structure in galvanized sheet metal painted with epoxy powders in RAL9002, RAL7031 and RAL6021. All the panels are made of galvanized sheet metal painted with epoxy powders.
The different versions and the numerous power sizes available make these units particularly versatile in the various plant contexts. The sizing and choice of individual components are aimed at containing energy consumption, dimensions and with a view to energy saving not only of the individual refrigeration machine but of the entire plant system, with particular attention to the containment of noise emissions, thanks to the different levels of soundproofing.

1.1 OPERATING LIMITS

CHILLING MODE

Outside air temperature:**-10°C;+45°C**
Water temperature: **-5°C;+18°C**

HEATING MODE

Outside air temperature: **-20°C;+40°C**
Water temperature: **+25°C;+80°C**
These values may be subject to limitations depending on the external air temperature.

1.2 REGULATIONS

The unit complies with the following harmonised standards:
— **2014/68/EU** (PED Directive – Pressure Equipment);
— **EN 378–2:2017** (Refrigeration systems and heat pumps – Environmental safety requirements – Part 2: Design, construction, testing, marking and documentation);
— **2006/42/EC** (Machinery Directive);
— **2014/30/EU** (Electromagnetic Compatibility);
— **2014/35/EU** (Low Voltage Directive – LVD);
— **EN 13136:2014** (Refrigeration systems and heat pumps – Pressure relief devices and associated piping – Calculation methods);
— **EN 60204:2016** (Safety of machinery – Electrical equipment of machines).

1.3 MAIN COMPONENTS

STRUCTURE

Base in galvanized sheet metal painted with polyester powders for exteriors, color RAL7031. Carpentry in galvanized sheet metal painted with polyester powders for exteriors (color RAL9002 and RAL6021). The fastening systems are made of non-oxidizable materials in carbon steel with surface passivation treatments. The compressor compartment is completely closed and accessible on 2 sides thanks to easily removable panels to simplify all maintenance and/or control operations to the maximum. Vibration isolation can be achieved by means of rubber or spring anti-vibration mounts (available as an option). Lifting eyebolts available as standard.

HYDRONIC KITS

As standard, the units are equipped with external hydraulic connections with victaulic type connections (selectable option) located on the back of the unit, appropriately positioned air vent valves, safety valve (if pumps are present) and water paddle flow switch (to prevent too low water flow) and outlet water temperature probe with antifreeze thermostat function to avoid the possibility of freezing of the user circuit.
On request, numerous pumping groups are available as options that can be incorporated inside the machines with an extension of the dimensions of the machine:
— Single standard or high head pump (sizes 101-151 only)
— Standard or high-head pump and relative reserve pump (sizes 101-151 only)
— Single standard or high head pump with inverter
— Standard or high-head pump and relative reserve pump with inverter
Each hydronic kit includes the membrane expansion vessel. The pump group is integrated into the structure of the machine and is arranged in such a way that the pump motors are always cooled by external air. In the case of pumping groups with a reserve pump, the microprocessor manages the pumps in such a way as to equally distribute the number of operating hours, rotating the pumps in the event of an anomaly.
Optional anti-freeze kit for the water circuit, configurable according to the chosen hydronic options, with the adoption of self-regulating PTC resistors interlocked with the operation of the compressors and the temperature value of the water and air.

REFRIGERATOR CIRCUIT

The refrigeration circuit is made using only qualified operators in accordance with the Pressure Equipment Directive PED 2014/68/EU for all brazing operations.
The refrigerant circuit configuration features 2 circuits with 2 compressors per circuit for each V-module, for high system redundancy and containment of the refrigerant charge per circuit.

The number of partialization steps depends on the total number of compressors.
The main components of the refrigeration circuit are:
- Scroll compressors designed to work with R290
- Brazed plate exchanger made of AISI 316 stainless steel
- Finned condenser made of copper tube and aluminium fins
- Solid cartridge filter drier (interchangeable on all sizes)
  - Optional: dehydrator filter shut-off kit with solenoid valve and ball valve, allowing the cartridge to be replaced without draining the system
- Flow indicator with humidity indicator
- Electronic expansion valve
- Four-way valve (for heat pumps)
- Check valves (for heat pumps)
- Liquid receiver (for heat pumps)
- High and low pressure switch
- Safety valve
- Schrader valves for inspection and/or maintenance

COMPRESSORS

The compressors are high efficiency scroll type optimized for R290 refrigerant. Each compressor is equipped with a crankcase heater used to keep the oil above the minimum temperature and avoid its dilution by the refrigerant dissolved in it.
The compressors are installed on special anti-vibration feet designed to decouple the compressor from the structure and reduce vibrations.

PLATE HEAT EXCHANGERS

Only brazed plate exchangers with asymmetric channels made of AISI 316 austenitic stainless steel with AISI316L connections characterized by a reduced carbon content to facilitate brazing operations.

ELECTRONIC EXPANSION VALVE

The electronically controlled valve with external equalization and integrated MOP function is managed by the software and therefore makes the operation of the refrigeration circuit very efficient.
This adjustment allows the power consumption of the system to be reduced in the event of sudden changes in the thermal load. The shutter, located in the centre of the valve, can slide vertically over a long stroke to precisely adjust the degree of opening of the fluid passage orifice. Using this valve reduces the compressor's energy consumption when environmental conditions allow the pressure difference between the evaporator and condenser to be reduced to below 5 bar, thereby improving overall performance.

MOTOR FAN GROUP

Electronic 6-pole axial fans with airfoil blades in hybrid plastic/aluminum material, statically and dynamically balanced on two planes, equipped with a protection grille and mounted with anti-vibration rubber inserts.
The fan is housed in a special nozzle with a profile that optimizes aeraulic performance. The pressure condensation control continuously regulates the speed of the fans, limiting the acoustic emission of the unit during night-time operation and at partial loads.

FINNED PACK HEAT EXCHANGER

Made of 8 mm diameter copper tube and aluminum fins. The coil is supplied as standard with hydrophilic treated fins, to reduce the number of defrosting cycles and speed up their execution. The finned pack condensers can be equipped with an external protection grid or a filter made of metal chipboard material. Different coil treatments are available on request, such as epoxy paint or AIAX coating or hydrophilic. There is the option of choosing fins of a different material (copper) in the case of particularly corrosive environments.

ELECTRIC CONTROL BOARD

Electrical panel in compliance with EN60204-1. There is a safety power supply for refrigerant leak sensors and emergency ventilation (230/1/50Hz). The wires are numbered according to the wiring diagram and colored according to the standard for easier maintenance and troubleshooting. Electrical components are labeled according to the wiring diagram. Label also shown on the bottom plate to facilitate maintenance. The entire auxiliary and control circuit is powered by a low voltage isolation transformer to increase the level of safety. Standard power supply 400V 3~ 50Hz+N (optional without neutral). Special power supplies available on request 200-208-230-440-460-480 3~, 50 or 60 Hz, with or without neutral. All power loads are thermally and short-circuit protected with fuses or circuit breakers (optional).
Door lock switch with yellow/red handle that can be locked in the OFF position to prevent power being turned on during maintenance operations. The cabinet is ventilated and heated to control internal temperature/humidity in all climates where the machine is installed. All switchboard and distribution components have IP2x protection rating in all directions for protection against accidental direct contact.
Hard-wired interface to the BMS reported on a numbered terminal block with the following standard functions:
- Digital inputs:
  - Remote on-off
  - Secondary setpoint selection
  - Summer/winter mode selection (heat pumps and multipurpose machines)
  - External serious alarm for emergency stop
  - Limitation of the cooling capacity and maximum fan speed to reduce noise (optional)
  - Selection of photovoltaic mode (where applicable)
  - Enabling of individual users in multipurpose units.
- Analog inputs:
  - Remote setpoint variation via 4-20mA or 0-mA or 0-10V or 0-5V signal (configurable)
  - Refrigeration capacity request from external controller via 4-20mA or 0-mA or 0-10V or 0-5V signal (configurable)
- Digital outputs:
  - General alarm
  - Compressors status
  - Control of external user and/or dissipation pumps
  - Control of external water valves for hydraulic sectioning in installations with multiple machines in parallel on the user side and/or dissipation in advance of the start of the pumps and compressors.
  - Freely programmable alarm outputs for signalling:

- Specific alarm groups
- presence of alarms requiring manual reset
- occurrence of total/partial alarms
- presenza di allarmi gravi, non gravi o semplici avvisi.

— Analog outputs:
  — 0-10V signal for pumps or modulating valves for constant delta T control or constant outlet temperature on the user
  — 0-10V signal for pumps and/or modulating valves for dissipation control with the possibility of valve and pump sequential control for optimal control of the source side water

All digital outputs are voltage-free clean contacts, digital inputs are low voltage (24V).
Optoisolated communication interface to BMS with the following protocols:
— Modbus RTU over RS485
— Modbus IP over Ethernet
— BACnet over IP via Ethernet
— Bacnet MS-TP over RS485
— WEB interface TCP/IP V4 and V6 and SNMP

Power monitoring relay with control:
— Correct sequence of phases
— Missing one or more phases
— Maximum/minimum voltage (optional)
— Phase imbalance

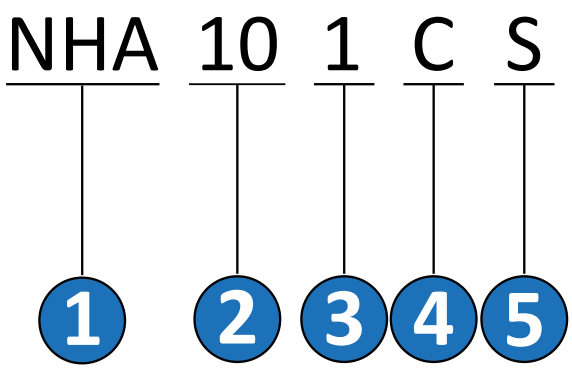
CONTROL SYSTEM

Display of all general operating values, at circuit and single compressor level and of each controlled device (valves, pumps, fans, compressor inverters, humidifier, etc.). Configurable IO mapping to suit specific machine. Evaporator frost protection function with resistance and circulation pump during periods of machine inactivity. 4 access levels info/user/maintainer/builder protected with specific passwords. Multilingual interface.
Where applicable, partial or total heat recovery management with call management with digital input or tank probe and pump and modulating valve for flow temperature control or low temperature start-up. Fast Restart function for faster start-up of compressors after a blackout (only if UPS for microprocessor is installed).
Inlet or outlet temperature control with P or PI regulation. LAN connection up to 6 units (only up to size 302), from size 353 LAN multiple unit management with HiNode.
Alarm history up to 100 records. Time slot management for setpoint change and on/off.

2 MODELS AND CONFIGURATIONS

COOLING ONLY or REVERSIBLE HEAT PUMP
Fluid chillers and heat pumps designed to cool water or mixtures of water and an antifreeze agent, intended for civil air conditioning and industrial cooling systems.
NHA chillers, available in versions with different acoustic designs ("S", "L") and cooling circuit architectures (Efficiency pack 1, 2 , 4), cover a range of cooling capacities from 100 to 590 kW, calculated with reference to standard test conditions of water 12°/7° - air entering the finned block heat exchangers 35°C.
Example of product code composition:

» Example of product code composition:



1. Identification symbol of HiRef model (e.g."NHA" unit)
2. Unit sizes expressed in rated cooling capacity x10 [kW] (e.g. 100 kW)
3. Frame and compressors/circuits number: 1 = frame 1, 1x4 = 4 compressors, 1x2 = 2 circuits
4. Unit version (e.g. "C", chiller)
5. Unit execution (e.g. "S" standard soudproofing)

Configurations:
— Cooling only >> "C"
— Heat pump >> "H"
Versions:
— Standard version >> "S"
— Low-noise version – for reduced noise levels >> "L"
— Ultra-quiet version – For extremely low noise levels >> "Q"
Frame:
— Frame 1 →2 compressors in tandem on 2 circuits
— Frame 2 →4 tandem compressors on 4 circuits
— Frame 3 →6 tandem compressors on 6 circuits
— Frame 4 →8 tandem compressors on 8 circuits

» List of all possible models, broken down by frame

Frame 1	Frame 2	Frame 3	Frame 4	Approximate cooling capacity in vers. "cooling only" [kW]
NHA101C/CL				99,3
NHA101H/HL				90,8
NHA151C/CL				148,4
NHA151H/HL				133,4
	NHA202C/CL			198,6
	NHA202H/HL			181,6
	NHA252C/C			247
	NHA252H/HL			223,6
	NHA302C/CL			296,9
	NHA302H/HL			266,8
		NHA353C/CL		346,7
		NHA353 H/HL		314,5
		NHA403C/CL		395
		NHA403 H/HL		356,6
		NHA453C/CL		445,3
		NHA453H/HL		400,3
			NHA504C/CL	494,1
			NHA504H/HL	447,1
			NHA554 C/CL	542,3
			NHA554 H/HL	489
			NHA604 C/CL	593,7
			NHA604 H/HL	533,7

» Configuration sheet for options for NHA

List of options	
Version	
Air-cooled water chiller	C
Reversible heat pump	H
Execution	
standard	S
Low noise	L

List of options	
1 – Power supply	
400/3/50 + N + Automatic breakers	5
400/3/50 no neutral + Automatic breakers	6
2 - Refrigerant charge	
R290	P
R454C	C
3 - Water pump at user side	
Not included	0
Single pump	1
Single HP pump	2
Double pump (standby rotation)	5
Double HP pump (standby rotation)	6
Single modulating pump (electr. Flow swtich included)	7
Single HP modulating pump (electr. Flow swtich included)	8
Double modulating pump (standby rotation) (electr. Flow swtich included)	9
Double HP modulating pump (standby rotation) (electr. Flow swtich included)	A
4 - Buffer tank	
Not included	0
5 - Partial Heat recovery (mandatory condensing control)	
Not included	0
6 - Air flow modulation	
Condensation control with fan modulated by "EC brushless" fans	E
7 - Anti-freezing kit	
Not included	0
Serving the base unit (the heater is only on heat exchangers)	E
Serving the water heat exchanger and pump	P
8 - Remote communication	
Ethernet board (SNMP or BACNET protocol)	4
Ethernet board (SNMP or BACNET protocol) + supervising software	5
Ethernet board (SNMP or BACNET protocol) + supervising software + RS485	6
9 - Coils	
standard	0
Copper/copper	R
Pre-painted epoxy coated fins + overall painting	B
Pre-painted coated fins + overall painting with AIAX coating	A
Hydrophilic treatment	H
10 - Packaging	
standard	0
Wooden crate	1
seaworthy	2
seaworthy + vapour barrier bag	3
11 – Basic vibration-damping mounts	
Not included	0
Rubber vibration-damping mounts	G
Antivibrating base dampers	M
12 - Maintenance kit	
Not included	0
Energy meter	1
Energy meter with MID certification	2
13 - Documentation language	
Italian	I
English	G
German	D
French	F
Spanish	S
Dutch	N
Polish	P

List of options	
Russian	R
List of accessories	
Rephasing capacitors	A
Soft-starter kit	B
Service kit (unit operating sensors)	C
Digital alarms settable board	G
Two Victaulic joints for quick IN-OUT water connections	M
Coil protection grill	P
Remote control panel for programmable microprocessor	R
Additional temperature probe for buffer tank temperature regulation	S
Current consumption metering and limitation	U

3 TECHNICAL FEATURES

» Technical/electrical specifications of the NHA C/CL water chiller

		101	151	202	252	302	353	403	453	504	554	604
Frame		1	1	2	2	2	3	3	3	4	4	4
Cooling capacity [UNI14511]	kW	99,3	148,4	198,6	247,0	296,9	346,7	395,0	445,3	494,1	542,3	593,7
Total power consumption [UNI14511]	kW	30,9	48,3	61,7	79,4	96,5	110,3	127,9	144,8	158,9	176,6	193,1
Total current drawn	A	49,5	77,4	99,0	127,4	154,8	177,0	205,1	232,2	254,8	283,2	309,6
EER [UNI 14511]		3,1	2,9	3,1	3,0	2,9	3,0	2,9	2,9	3,0	2,9	2,9
Compressors/circuits		4/2	4/2	8/4	8/4	8/4	12/6	12/6	12/6	16/8	16/8	16/8
Number of fans		2	2	4	4	4	6	6	6	8	8	8
Fans power consumption	kW	1,6	2,4	3,2	4,0	4,7	5,6	6,5	7,1	8,0	8,8	9,5
Fans absorbed current	A	2,7	3,8	5,4	6,6	7,6	9,3	10,5	11,3	13,2	14,3	15,1
Airflow	m³/h	42065	48112	84130	89505	96223	131906	136945	144355	179010	184385	192447
Water flow on the user side	l/h	17052	25489	34103	42423	50979	56537	67832	76468	84846	93135	101957
Water pressure drops on the user side	kPa	12,0	12,0	12,0	11,0	12,0	11,0	11,0	11,0	11,0	11,0	11,0
Volume of the expansion tank (optional)	dm³	25	25	25	25	25	25	25	25	25	25	25
Water connection dimensions		3″	3″	4″	4″	4″	5″	5″	5″	5″	5″	5″
Height	mm	2530	2530	2530	2530	2530	2530	2530	2530	2530	2530	2530
Length	mm	2175	2175	3575	3575	3575	4975	4975	4975	6375	6375	6375
Width	mm	2256	2256	2256	2256	2256	2256	2256	2256	2256	2256	2256
Refrigerant charge	kg	9	11	18	20	22	29	31	33	40	42	44
Total oil capacity	l	13,2	13,2	26,4	26,4	26,4	39,6	39,6	39,6	52,8	52,8	52,8

Cooling mode: outdoor air temperature 35°C, water temperature 12°C / 7°C.
Sound pressure measured at a distance of 10 m and a height of 1.5 m above ground level in an open area.
The maximum current draw is the current at which the unit's protective devices are triggered. It is the maximum current permitted within the unit.
This value must never be exceeded and must be used when sizing the power supply line and its associated protective devices.

» Technical/electrical specifications of the NHA H/HL reversible heat pump

		101	151	202	252	302	353	403	453	504	554	604
Frame		1	1	2	2	2	3	3	3	4	4	4
Heating capacity [UNI14511]	kW	109,8	161,6	219,6	272,1	323,1	380,7	433,4	484,7	544,2	594,8	646
Total power consumption [UNI14511]	kW	23,5	34,9	47,0	58,4	69,7	81,9	93,2	104,6	116,8	128,1	139
Total current drawn	A	37,7	55,9	75,4	93,6	111,8	131,3	149,5	167,7	187,3	205,4	224
COP [UNI 14511]		4,4	4,3	4,4	4,4	4,3	4,4	4,4	4,3	4,4	4,3	4
Compressors/circuits		4/2	4/2	8/4	8/4	8/4	12/6	12/6	12/6	16/8	16/8	16/8
Number of fans		2	2	4	4	4	6	6	6	8	8	8
Fans power consumption	kW	1,6	2,4	3,2	4,0	4,7	5,6	6,5	7,1	8,0	8,8	9,5
Fans absorbed current	A	2,7	3,8	5,4	6,6	7,6	9,3	10,5	11,3	13,2	14,3	15,1
Airflow	m³/h	42065	48112	84130	89841	96223	132242	138288	144335	179682	186064	192447
Water flow on the user side	l/h	19017	27982	38034	47127	55965	65938	75073	83949	94225	103019	111932
Water pressure drops on the user side	kPa	13	13	13	13	13	13	13	13	13	13	13
Volume of the expansion tank (optional)	dm³	25	25	25	25	25	25	25	25	25	25	25
Water connection dimensions		3″	3″	4″	4″	4″	5″	5″	5″	5″	5″	5″
Height	mm	2530	2530	2530	2530	2530	2530	2530	2530	2530	2530	2530
Length	mm	2175	2175	3575	3575	3575	4975	4975	4975	6375	6375	6375
Width	mm	2256	2256	2256	2256	2256	2256	2256	2256	2256	2256	2256
Refrigerant charge	kg	9	11	18	20	22	29	31	33	40	42	44
Total oil capacity	l	13,2	13,2	26,4	26,4	26,4	39,6	39,6	39,6	52,8	52,8	52,8

Cooling operation: see selection software
Heating mode: outdoor air temperature 7°C, water temperature 40°C / 45°C.
Sound pressure measured at a distance of 10 m and a height of 1.5 m above ground level in an open area.
The maximum current draw is the current at which the unit's protective devices are triggered. It is the maximum current permitted within the unit.
This value must never be exceeded and must be used when sizing the power supply line and the associated protective devices (please refer to the wiring diagram supplied with the units).

3.1 Seasonal Energy Efficiency under the ErP Directive

This section presents the seasonal values for SCOP, SEER and SEPR, calculated in accordance with the ERP regulations and temperature distributions.

NHA con refrigerante R290 - calcolo SEER

» NHA101C SEER

Article	Symbol	Value	Unit	Article	Symbol	Value	Unit
Rated cooling capacity	Prated,c	99,43	kW	**Seasonal energy efficiency of cooling**	ηs,c	189,13	%
Declared seasonal cooling energy efficiency for partial load at specific outdoor temperatures Tj				Declared energy efficiency ratio or gas utilisation efficiency/auxiliary energy factor for partial load at specified outdoor temperatures Tj			
Tj = + 35 °C	Pdc	99,43	kW	**Tj = + 35 °C**	EERd	3,04	-
Tj = + 30 °C	Pdc	73,25	kW	**Tj = + 30 °C**	EERd	4,03	-
Tj = + 25 °C	Pdc	47,06	kW	**Tj = + 25 °C**	EERd	5,12	-
Tj = + 20 °C	Pdc	20,88	kW	**Tj = + 20 °C**	EERd	5,63	-
Degradation factor for chillers (*)	CDC	0,9	-				

» NHA151C SEER

Article	Symbol	Value	Unit	Article	Symbol	Value	Unit
Rated cooling capacity	Prated,c	148,34	kW	**Seasonal energy efficiency of cooling**	ηs,c	185,11	%
Declared seasonal cooling energy efficiency for partial load at specific outdoor temperatures Tj				Declared energy efficiency ratio or gas utilisation efficiency/auxiliary energy factor for partial load at specified outdoor temperatures Tj			
Tj = + 35 °C	Pdc	148,34	kW	**Tj = + 35 °C**	EERd	2,91	-
Tj = + 30 °C	Pdc	109,28	kW	**Tj = + 30 °C**	EERd	3,95	-
Tj = + 25 °C	Pdc	70,21	kW	**Tj = + 25 °C**	EERd	5,03	-
Tj = + 20 °C	Pdc	31,15	kW	**Tj = + 20 °C**	EERd	5,52	-
Degradation factor for chillers (*)	CDC	0,9	-				

» NHA202C SEER

Article	Symbol	Value	Unit	Article	Symbol	Value	Unit
Rated cooling capacity	Prated,c	198,94	kW	**Seasonal energy efficiency of cooling**	ηs,c	189,75	%
Declared seasonal cooling energy efficiency for partial load at specific outdoor temperatures Tj				Declared energy efficiency ratio or gas utilisation efficiency/auxiliary energy factor for partial load at specified outdoor temperatures Tj			
Tj = + 35 °C	Pdc	198,94	kW	**Tj = + 35 °C**	EERd	3,05	-
Tj = + 30 °C	Pdc	149,01	kW	**Tj = + 30 °C**	EERd	4,03	-
Tj = + 25 °C	Pdc	94,17	kW	**Tj = + 25 °C**	EERd	5,03	-
Tj = + 20 °C	Pdc	41,78	kW	**Tj = + 20 °C**	EERd	5,79	-
Degradation factor for chillers (*)	CDC	0,9	-				

» NHA252C SEER

Article	Symbol	Value	Unit	Article	Symbol	Value	Unit
Rated cooling capacity	Prated,c	246,9	kW	**Seasonal energy efficiency of cooling**	ηs,c	184,21	%
Declared seasonal cooling energy efficiency for partial load at specific outdoor temperatures Tj				Declared energy efficiency ratio or gas utilisation efficiency/auxiliary energy factor for partial load at specified outdoor temperatures Tj			
Tj = + 35 °C	Pdc	246,9	kW	**Tj = + 35 °C**	EERd	2,94	-
Tj = + 30 °C	Pdc	181,88	kW	**Tj = + 30 °C**	EERd	3,94	-
Tj = + 25 °C	Pdc	116,86	kW	**Tj = + 25 °C**	EERd	4,99	-
Tj = + 20 °C	Pdc	51,85	kW	**Tj = + 20 °C**	EERd	5,51	-
Degradation factor for chillers (*)	CDC	0,9	-				

» NHA302C SEER

Article	Symbol	Value	Unit	Article	Symbol	Value	Unit
Rated cooling capacity	Prated,c	296,67	kW	**Seasonal energy efficiency of cooling**	ηs,c	184,91	%
Declared seasonal cooling energy efficiency for partial load at specific outdoor temperatures Tj				Declared energy efficiency ratio or gas utilisation efficiency/auxiliary energy factor for partial load at specified outdoor temperatures Tj			
Tj = + 35 °C	Pdc	296,67	kW	**Tj = + 35 °C**	EERd	2,91	-
Tj = + 30 °C	Pdc	218,55	kW	**Tj = + 30 °C**	EERd	3,95	-
Tj = + 25 °C	Pdc	140,43	kW	**Tj = + 25 °C**	EERd	4,92	-
Tj = + 20 °C	Pdc	62,3	kW	**Tj = + 20 °C**	EERd	5,62	-
Degradation factor for chillers (*)	CDC	0,9	-				

» NHA353C SEER

Article	Symbol	Value	Unit	Article	Symbol	Value	Unit
Rated cooling capacity	Prated,c	346,48	kW	**Seasonal energy efficiency of cooling**	ηs,c	189,12	%
Declared seasonal cooling energy efficiency for partial load at specific outdoor temperatures Tj				Declared energy efficiency ratio or gas utilisation efficiency/auxiliary energy factor for partial load at specified outdoor temperatures Tj			
Tj = + 35 °C	Pdc	346,48	kW	**Tj = + 35 °C**	EERd	2,98	-
Tj = + 30 °C	Pdc	255,24	kW	**Tj = + 30 °C**	EERd	3,94	-
Tj = + 25 °C	Pdc	164	kW	**Tj = + 25 °C**	EERd	5,09	-
Tj = + 20 °C	Pdc	72,76	kW	**Tj = + 20 °C**	EERd	5,97	-
Degradation factor for chillers (*)	CDC	0,9	-				

» NHA403C SEER

Article	Symbol	Value	Unit	Article	Symbol	Value	Unit
Rated cooling capacity	Prated,c	394,99	kW	**Seasonal energy efficiency of cooling**	ηs,c	188,31	%
Declared seasonal cooling energy efficiency for partial load at specific outdoor temperatures Tj				Declared energy efficiency ratio or gas utilisation efficiency/auxiliary energy factor for partial load at specified outdoor temperatures Tj			
Tj = + 35 °C	Pdc	394,99	kW	**Tj = + 35 °C**	EERd	2,93	-
Tj = + 30 °C	Pdc	290,98	kW	**Tj = + 30 °C**	EERd	3,94	-
Tj = + 25 °C	Pdc	186,96	kW	**Tj = + 25 °C**	EERd	5,07	-
Tj = + 20 °C	Pdc	82,95	kW	**Tj = + 20 °C**	EERd	6,00	-
Degradation factor for chillers (*)	CDC	0,9	-				

» NHA453C SEER

Article	Symbol	Value	Unit	Article	Symbol	Value	Unit
Rated cooling capacity	Prated,c	445,01	kW	**Seasonal energy efficiency of cooling**	ηs,c	188,56	%
Declared seasonal cooling energy efficiency for partial load at specific outdoor temperatures Tj				Declared energy efficiency ratio or gas utilisation efficiency/auxiliary energy factor for partial load at specified outdoor temperatures Tj			
Tj = + 35 °C	Pdc	445,01	kW	**Tj = + 35 °C**	EERd	2,91	-
Tj = + 30 °C	Pdc	327,82	kW	**Tj = + 30 °C**	EERd	3,96	-
Tj = + 25 °C	Pdc	210,64	kW	**Tj = + 25 °C**	EERd	5,05	-
Tj = + 20 °C	Pdc	93,45	kW	**Tj = + 20 °C**	EERd	6,00	-
Degradation factor for chillers (*)	CDC	0,9	-				

» NHA504C SEER

Article	Symbol	Value	Unit	Article	Symbol	Value	Unit
Rated cooling capacity	Prated,c	493,77	kW	**Seasonal energy efficiency of cooling**	ηs,c	188,65	%
Declared seasonal cooling energy efficiency for partial load at specific outdoor temperatures Tj				Declared energy efficiency ratio or gas utilisation efficiency/auxiliary energy factor for partial load at specified outdoor temperatures Tj			
Tj = + 35 °C	Pdc	493,77	kW	**Tj = + 35 °C**	EERd	2,94	-
Tj = + 30 °C	Pdc	363,74	kW	**Tj = + 30 °C**	EERd	3,94	-
Tj = + 25 °C	Pdc	233,72	kW	**Tj = + 25 °C**	EERd	5,07	-
Tj = + 20 °C	Pdc	103,69	kW	**Tj = + 20 °C**	EERd	5,98	-
Degradation factor for chillers (*)	CDC	0,9	-				

» NHA554C SEER

Article	Symbol	Value	Unit	Article	Symbol	Value	Unit
Rated cooling capacity	Prated,c	542,24	kW	**Seasonal energy efficiency of cooling**	ηs,c	188,22	%
Declared seasonal cooling energy efficiency for partial load at specific outdoor temperatures Tj				Declared energy efficiency ratio or gas utilisation efficiency/auxiliary energy factor for partial load at specified outdoor temperatures Tj			
Tj = + 35 °C	Pdc	542,24	kW	**Tj = + 35 °C**	EERd	2,91	-
Tj = + 30 °C	Pdc	399,45	kW	**Tj = + 30 °C**	EERd	3,95	-
Tj = + 25 °C	Pdc	258,37	kW	**Tj = + 25 °C**	EERd	5,05	-
Tj = + 20 °C	Pdc	113,87	kW	**Tj = + 20 °C**	EERd	5,99	-
Degradation factor for chillers (*)	CDC	0,9	-				

» NHA604C SEER

Article	Symbol	Value	Unit	Article	Symbol	Value	Unit
Rated cooling capacity	Prated,c	593,07	kW	**Seasonal energy efficiency of cooling**	ηs,c	185,9	%
Declared seasonal cooling energy efficiency for partial load at specific outdoor temperatures Tj				Declared energy efficiency ratio or gas utilisation efficiency/auxiliary energy factor for partial load at specified outdoor temperatures Tj			
Tj = + 35 °C	Pdc	593,07	kW	**Tj = + 35 °C**	EERd	2,83	-
Tj = + 30 °C	Pdc	436,9	kW	**Tj = + 30 °C**	EERd	3,86	-
Tj = + 25 °C	Pdc	280,72	kW	**Tj = + 25 °C**	EERd	4,97	-
Tj = + 20 °C	Pdc	124,54	kW	**Tj = + 20 °C**	EERd	5,97	-
Degradation factor for chillers (*)	CDC	0,9	-				

NHA with R290 refrigerant – SEPR calculation

» NHA101C SEPR

Article	Symbol	Value	Unit
Operating temperature	t	7	°C
Seasonal energy performance certificate	SEPR	5,47	[-]
Annual electricity consumption	Q	134751	kWh/year
Full-load parameters and reference ambient temperature at test point A			
Nominal cooling capacity	PA	99,43	kW
Rated input power	DA	32,65	kW
Estimated energy efficiency rating	EERDC,A	3,04	[-]
Parameter at test point B			
Rated cooling capacity	PB	96,12	kW
Rated input power	DB	27,22	kW
Declared energy efficiency rating	EERDC,B	3,53	[-]
Parameter at test point C			
Rated cooling capacity	PC	92,8	kW
Rated input power	DC	22,65	kW
Declared energy efficiency rating	EERDC,C	4,09	[-]
Parameter at test point D			
Rated cooling capacity	PD	89,75	kW
Rated input power	DD	18,83	kW
Declared energy efficiency rating	EERDC,D	4,76	[-]

» NHA151C SEPR

Article	Symbol	Value	Unit
Operating temperature	t	7	°C
Seasonal energy performance certificate	SEPR	5,43	[-]
Annual electricity consumption	Q	202284	kWh/year
Full-load parameters and reference ambient temperature at test point A			
Nominal cooling capacity	PA	148,34	kW
Rated input power	DA	50,88	kW
Estimated energy efficiency rating	EERDC,A	2,91	[-]
Parameter at test point B			
Rated cooling capacity	PB	143,4	kW
Rated input power	DB	42,0	kW
Declared energy efficiency rating	EERDC,B	3,41	[-]
Parameter at test point C			
Rated cooling capacity	PC	138,45	kW
Rated input power	DC	34,58	kW
Declared energy efficiency rating	EERDC,C	4,00	[-]
Parameter at test point D			
Rated cooling capacity	PD	135,5	kW
Rated input power	DD	29,27	kW
Declared energy efficiency rating	EERDC,D	4,63	[-]

» NHA202C SEPR

Article	Symbol	Value	Unit
Operating temperature	t	7	°C
Seasonal energy performance certificate	SEPR	5,5	[-]
Annual electricity consumption	Q	267848	kWh/year
Full-load parameters and reference ambient temperature at test point A			
Nominal cooling capacity	PA	198,94	kW
Rated input power	DA	65,07	kW
Estimated energy efficiency rating	EERDC,A	3,05	[-]
Parameter at test point B			
Rated cooling capacity	PB	96,12	kW
Rated input power	DB	27,22	kW
Declared energy efficiency rating	EERDC,B	3,53	[-]
Parameter at test point C			
Rated cooling capacity	PC	185,68	kW
Rated input power	DC	45,09	kW
Declared energy efficiency rating	EERDC,C	4,11	[-]
Parameter at test point D			
Rated cooling capacity	PD	179,56	kW
Rated input power	DD	37,47	kW
Declared energy efficiency rating	EERDC,D	4,79	[-]

» NHA252C SEPR

Article	Symbol	Value	Unit
Operating temperature	t	7	°C
Seasonal energy performance certificate	SEPR	5,4	[-]
Annual electricity consumption	Q	338588	kWh/year
Full-load parameters and reference ambient temperature at test point A			
Nominal cooling capacity	PA	246,9	kW
Rated input power	DA	83,79	kW
Estimated energy efficiency rating	EERDC,A	2,94	[-]
Parameter at test point B			
Rated cooling capacity	PB	238,67	kW
Rated input power	DB	69,74	kW
Declared energy efficiency rating	EERDC,B	3,42	[-]
Parameter at test point C			
Rated cooling capacity	PC	230,44	kW
Rated input power	DC	57,92	kW
Declared energy efficiency rating	EERDC,C	3,98	[-]
Parameter at test point D			
Rated cooling capacity	PD	222,21	kW
Rated input power	DD	47,8	kW
Declared energy efficiency rating	EERDC,D	4,65	[-]

» NHA302C SEPR

Article	Symbol	Value	Unit
Operating temperature	t	7	°C
Seasonal energy performance certificate	SEPR	5,44	[-]
Annual electricity consumption	Q	403786	kWh/year
Full-load parameters and reference ambient temperature at test point A			
Nominal cooling capacity	PA	296,67	kW
Rated input power	DA	101,69	kW
Estimated energy efficiency rating	EERDC,A	2,91	[-]
Parameter at test point B			
Rated cooling capacity	PB	286,78	kW
Rated input power	DB	83,93	kW
Declared energy efficiency rating	EERDC,B	3,41	[-]
Parameter at test point C			
Rated cooling capacity	PC	276,9	kW
Rated input power	DC	69,08	kW
Declared energy efficiency rating	EERDC,C	4,00	[-]
Parameter at test point D			
Rated cooling capacity	PD	271,01	kW
Rated input power	DD	58,46	kW
Declared energy efficiency rating	EERDC,D	4,63	[-]

» NHA353C SEPR

Article	Symbol	Value	Unit
Operating temperature	t	7	°C
Seasonal energy performance certificate	SEPR	5,4	[-]
Annual electricity consumption	Q	475569	kWh/year
Full-load parameters and reference ambient temperature at test point A			
Nominal cooling capacity	PA	346,48	kW
Rated input power	DA	116,26	kW
Estimated energy efficiency rating	EERDC,A	2,98	[-]
Parameter at test point B			
Rated cooling capacity	PB	334,93	kW
Rated input power	DB	96,9	kW
Declared energy efficiency rating	EERDC,B	3,45	[-]
Parameter at test point C			
Rated cooling capacity	PC	323,38	kW
Rated input power	DC	80,44	kW
Declared energy efficiency rating	EERDC,C	4,02	[-]
Parameter at test point D			
Rated cooling capacity	PD	311,84	kW
Rated input power	DD	66,78	kW
Declared energy efficiency rating	EERDC,D	4,67	[-]

» NHA403C SEPR

Article	Symbol	Value	Unit
Operating temperature	t	7	°C
Seasonal energy performance certificate	SEPR	5,42	[-]
Annual electricity consumption	Q	539976	kWh/year
Full-load parameters and reference ambient temperature at test point A			
Nominal cooling capacity	PA	394,99	kW
Rated input power	DA	134,74	kW
Estimated energy efficiency rating	EERDC,A	2,93	[-]
Parameter at test point B			
Rated cooling capacity	PB	381,83	kW
Rated input power	DB	112,33	kW
Declared energy efficiency rating	EERDC,B	3,4	[-]
Parameter at test point C			
Rated cooling capacity	PC	368,66	kW
Rated input power	DC	92,61	kW
Declared energy efficiency rating	EERDC,C	3,98	[-]
Parameter at test point D			
Rated cooling capacity	PD	355,5	kW
Rated input power	DD	76,26	kW
Declared energy efficiency rating	EERDC,D	4,66	[-]

» NHA453C SEPR

Article	Symbol	Value	Unit
Operating temperature	t	7	°C
Seasonal energy performance certificate	SEPR	5,45	[-]
Annual electricity consumption	Q	605459	kWh/year
Full-load parameters and reference ambient temperature at test point A			
Nominal cooling capacity	PA	445,01	kW
Rated input power	DA	152,5	kW
Estimated energy efficiency rating	EERDC,A	2,91	[-]
Parameter at test point B			
Rated cooling capacity	PB	437,27	kW
Rated input power	DB	128,55	kW
Declared energy efficiency rating	EERDC,B	3,4	[-]
Parameter at test point C			
Rated cooling capacity	PC	415,34	kW
Rated input power	DC	103,58	kW
Declared energy efficiency rating	EERDC,C	4,01	[-]
Parameter at test point D			
Rated cooling capacity	PD	406,51	kW
Rated input power	DD	87,65	kW
Declared energy efficiency rating	EERDC,D	4,63	[-]

» NHA504C SEPR

Article	Symbol	Value	Unit
Operating temperature	t	7	°C
Seasonal energy performance certificate	SEPR	5,41	[-]
Annual electricity consumption	Q	676836	kWh/year
Full-load parameters and reference ambient temperature at test point A			
Nominal cooling capacity	PA	493,77	kW
Rated input power	DA	167,55	kW
Estimated energy efficiency rating	EERDC,A	2,94	[-]
Parameter at test point B			
Rated cooling capacity	PB	477,31	kW
Rated input power	DB	139,43	kW
Declared energy efficiency rating	EERDC,B	3,42	[-]
Parameter at test point C			
Rated cooling capacity	PC	460,85	kW
Rated input power	DC	115,78	kW
Declared energy efficiency rating	EERDC,C	3,98	[-]
Parameter at test point D			
Rated cooling capacity	PD	444,39	kW
Rated input power	DD	95,53	kW
Declared energy efficiency rating	EERDC,D	4,65	[-]

» NHA554C SEPR

Article	Symbol	Value	Unit
Operating temperature	t	7	°C
Seasonal energy performance certificate	SEPR	5,43	[-]
Annual electricity consumption	Q	740299	kWh/year
Full-load parameters and reference ambient temperature at test point A			
Nominal cooling capacity	PA	542,24	kW
Rated input power	DA	185,99	kW
Estimated energy efficiency rating	EERDC,A	2,91	[-]
Parameter at test point B			
Rated cooling capacity	PB	529,79	kW
Rated input power	DB	156,2	kW
Declared energy efficiency rating	EERDC,B	3,39	[-]
Parameter at test point C			
Rated cooling capacity	PC	506,09	kW
Rated input power	DC	126,94	kW
Declared energy efficiency rating	EERDC,C	3,98	[-]
Parameter at test point D			
Rated cooling capacity	PD	488,02	kW
Rated input power	DD	104,97	kW
Declared energy efficiency rating	EERDC,D	4,65	[-]

» NHA604C SEPR

Article	Symbol	Value	Unit
Operating temperature	t	7	°C
Seasonal energy performance certificate	SEPR	5,27	[-]
Annual electricity consumption	Q	833009	kWh/year
Full-load parameters and reference ambient temperature at test point A			
Nominal cooling capacity	PA	593,07	kW
Rated input power	DA	207,63	kW
Estimated energy efficiency rating	EERDC,A	2,83	[-]
Parameter at test point B			
Rated cooling capacity	PB	573,3	kW
Rated input power	DB	171,77	kW
Declared energy efficiency rating	EERDC,B	3,31	[-]
Parameter at test point C			
Rated cooling capacity	PC	555,43	kW
Rated input power	DC	142,42	kW
Declared energy efficiency rating	EERDC,C	3,87	[-]
Parameter at test point D			
Rated cooling capacity	PD	541,71	kW
Rated input power	DD	120,31	kW
Declared energy efficiency rating	EERDC,D	4,47	[-]

NHA with R290 refrigerant – SCOP calculation

» NHA101H SCOP

Article		Symbol	Value	Unit	Article		Symbol	Value	Unit
Nominal heat output	Medium	Prated	69,6	kW	**Seasonal energy efficiency for space heating**	Medium	η_s	175,63	%
	Heating		96,3	kW		Heating		210,82	%
	Cold		-	kW		Cold		-	%
Rated capacity for part-load heating with an indoor temperature of 20 °C and an outdoor temperature of Tj					**Declared coefficient of performance (COP) or primary energy ratio at partial load with an indoor temperature of 20 °C and an outdoor temperature Tj**				
Tj = - 7 °C		PDH	61,6	kW	**Tj = - 7 °C**		COP_d	3,29	-
Tj = + 2 °C		PDH	37,5	kW	**Tj = + 2 °C**		COPd	4,48	-
Tj = + 7 °C		PDH	24,1	kW	**Tj = + 7 °C**		COP_d	5,20	-
Tj = + 12 °C		PDH	10,7	kW	**Tj = + 12 °C**		COP_d	5,23	-
Tj = Bivalent temperature	Medium	PDH	69,6	kW	**Tj = Bivalent temperature**	Medium	COP_d	2,99	-
	Heating	PDH	96,3	kW		Heating	COP_d	3,91	-
	Cold	PDH	69,6	kW		Cold	COP_d	2,99	-
Tj = Maximum operating temperature		PDH	69,6	kW	**Tj = Maximum operating temperature**		COP_d	2,99	-
For air-to-water heat pumps: T_j = -15 °C (if TOL < -20 °C)		PDH	-	kW	**For air-to-water heat pumps: T_j = -15 °C (if TOL < -20 °C)**		COP_d	-	-
Dual-temperature	Medium	T_{biv}	-10,0	°C	**For air-to-water heat pumps:**		TOL	-10	°C
	Heating		2,0	°C					
	Cold		-10,0	°C	**Maximum operating temperature**				
Cyclic heating capacity		Pcych	62,6	kW	**Cycling interval efficiency**		COPcyc	2,69	-
Degradation coefficient		Cdh	0,9	-	**Maximum operating temperature of the heating water**		WTOL	35	°C
Power consumption in modes other than active mode					**Additional heater**				
Off mode	Medium	P_{OFF}	0,2	kW	**Nominal heat output**		P_{sup}	-	kW
	Heating		0,2	kW	**Type of energy input**		-		
	Cold		0,2	kW					
How to switch off the thermostat	Medium	P_{TO}	0,2	kW					
	Heating		0,2	kW	**Energy efficiency class**		A+++		
	Cold		0,2	kW					
Standby mode	Medium	P_{SB}	0,2	kW		Medium	SCOP	4,47	-
	Heating		0,2	kW		Heating		5,35	-
	Cold		0,2	kW		Cold		-	-
Crankcase heating method	Medium	P_{CK}	0,2	kW	**Annual energy consumption for space heating**	Medium	Qn	32205	kWh
	Heating		0,2	kW		Heating		24040	kWh
	Cold		0,2	kW		Cold		-	kWh

» NHA151H SCOP

Article		Symbol	Value	Unit	Article		Symbol	Value	Unit
Nominal heat output	Medium	Prated	102,7	kW	**Seasonal energy efficiency for space heating**	Medium	η_s	176,27	%
	Heating		143,3	kW		Heating		211,60	%
	Cold		-	kW		Cold		-	%
Rated capacity for part-load heating with an indoor temperature of 20 °C and an outdoor temperature of Tj					**Declared coefficient of performance (COP) or primary energy ratio at partial load with an indoor temperature of 20 °C and an outdoor temperature Tj**				
Tj = - 7 °C		PDH	176,27	kW	**Tj = - 7 °C**		COP_d	3,26	-
Tj = + 2 °C		PDH	211,60	kW	**Tj = + 2 °C**		COP_d	4,49	-
Tj = + 7 °C		PDH	176,27	kW	**Tj = + 7 °C**		COP_d	5,24	-
Tj = + 12 °C		PDH	211,60	kW	**Tj = + 12 °C**		COP_d	5,29	-
Tj = Bivalent temperature	Medium	PDH	102,7	kW	**Tj = Bivalent temperature**	Medium	COP_d	2,96	-
	Heating	PDH	143,3	kW		Heating	COP_d	3,91	-
	Cold	PDH	102,7	kW		Cold	COP_d	2,96	-
Tj = Maximum operating temperature		PDH	211,60	kW	**Tj = Maximum operating temperature**		COP_d	2,96	-
For air-to-water heat pumps: T_j = -15 °C (if TOL < -20 °C)		PDH	176,27	kW	**For air-to-water heat pumps: T_j = -15 °C (if TOL < -20 °C)**		COP_d	-	-
Dual-temperature	Medium	T_{biv}	-10,0	°C	**For air-to-water heat pumps:**		TOL	-10	°C
	Heating		2,0	°C					
	Cold		-10,0	°C	**Maximum operating temperature**				
Cyclic heating capacity		Pcych	176,27	kW	**Cycling interval efficiency**		COPcyc	2,66	-
Degradation coefficient		Cdh	211,60	-	**Maximum operating temperature of the heating water**		WTOL	35	°C
Power consumption in modes other than active mode					**Additional heater**				
Off mode	Medium	P_{OFF}	0,2	kW	**Nominal heat output**		P_{sup}	-	kW
	Heating		0,2	kW	**Type of energy input**		-		
	Cold		0,2	kW					
How to switch off the thermostat	Medium	P_{TO}	0,2	kW					
	Heating		0,2	kW	**Energy efficiency class**		A+++		
	Cold		0,2	kW					
Standby mode	Medium	P_{SB}	0,2	kW		Medium	SCOP	4,48	-
	Heating		0,2	kW		Heating		5,36	-
	Cold		0,2	kW		Cold		-	-
Crankcase heating method	Medium	P_{CK}	0,2	kW	**Annual energy consumption for space heating**	Medium	Qn	47349	kWh
	Heating		0,2	kW		Heating		35646	kWh
	Cold		0,2	kW		Cold		-	kWh

» NHA202H SCOP

Article		Symbol	Value	Unit
Nominal heat output	Medium	Prated	139,2	kW
	Heating		192,5	kW
	Cold		-	kW
Rated capacity for part-load heating with an indoor temperature of 20 °C and an outdoor temperature of Tj				
Tj = - 7 °C		PDH	123,1	kW
Tj = + 2 °C		PDH	74,9	kW
Tj = + 7 °C		PDH	48,2	kW
Tj = + 12 °C		PDH	21,4	kW
Tj = Bivalent temperature	Medium	PDH	139,2	kW
	Heating	PDH	192,5	kW
	Cold	PDH	139,2	kW
Tj = Maximum operating temperature		PDH	139,2	kW
For air-to-water heat pumps: T_j = -15 °C (if TOL < -20 °C)		PDH	-	kW
Dual-temperature	Medium	T_{biv}	-10,0	°C
	Heating		2,0	°C
	Cold		-10,0	°C
Cyclic heating capacity		Pcych	125,3	kW
Degradation coefficient		Cdh	0,9	-
Power consumption in modes other than active mode				
Off mode	Medium	P_{OFF}	0,2	kW
	Heating		0,2	kW
	Cold		0,2	kW
How to switch off the thermostat	Medium	P_{TO}	0,2	kW
	Heating		0,2	kW
	Cold		0,2	kW
Standby mode	Medium	P_{SB}	0,2	kW
	Heating		0,2	kW
	Cold		0,2	kW
Crankcase heating method	Medium	P_{CK}	0,2	kW
	Heating		0,2	kW
	Cold		0,2	kW

Article		Symbol	Value	Unit
Seasonal energy efficiency for space heating	Medium	η_s	171,54	%
	Heating		206,94	%
	Cold		-	%
Declared coefficient of performance (COP) or primary energy ratio at partial load with an indoor temperature of 20 °C and an outdoor temperature Tj				
Tj = - 7 °C		COP_d	3,30	-
Tj = + 2 °C		COPd	4,32	-
Tj = + 7 °C		COP_d	4,96	-
Tj = + 12 °C		COP_d	5,41	-
Tj = Bivalent temperature	Medium	COP_d	2,99	-
	Heating	COP_d	3,91	-
	Cold	COP_d	2,99	-
Tj = Maximum operating temperature		COP_d	2,99	-
For air-to-water heat pumps: T_j = -15 °C (if TOL < -20 °C)		COP_d	-	-
For air-to-water heat pumps:		TOL	-10	°C
Maximum operating temperature				
Cycling interval efficiency		COPcyc	2,69	-
Maximum operating temperature of the heating water		WTOL	35	°C
Additional heater				
Nominal heat output		P_{sup}	-	kW
Type of energy input			-	
Energy efficiency class			A++	
	Medium	SCOP	4,36	-
	Heating		5,25	-
	Cold		-	-
Annual energy consumption for space heating	Medium	Qn	65953	kWh
	Heating		48963	kWh
	Cold		-	kWh

» NHA252H SCOP

Article		Symbol	Value	Unit	Article		Symbol	Value	Unit
Nominal heat output	Medium	Prated	172,3	kW	**Seasonal energy efficiency for space heating**	Medium	η_s	172,57	%
	Heating		238,6	kW		Heating		208,06	%
	Cold		-	kW		Cold		-	%
Rated capacity for part-load heating with an indoor temperature of 20 °C and an outdoor temperature of Tj					**Declared coefficient of performance (COP) or primary energy ratio at partial load with an indoor temperature of 20 °C and an outdoor temperature Tj**				
Tj = - 7 °C		PDH	152,2	kW	**Tj = - 7 °C**		COP_d	3,27	-
Tj = + 2 °C		PDH	92,7	kW	**Tj = + 2 °C**		COP_d	4,35	-
Tj = + 7 °C		PDH	59,6	kW	**Tj = + 7 °C**		COP_d	5,02	-
Tj = + 12 °C		PDH	26,5	kW	**Tj = + 12 °C**		COP_d	5,45	-
Tj = Bivalent temperature	Medium	PDH	172,3	kW	**Tj = Bivalent temperature**	Medium	COP_d	2,97	-
	Heating	PDH	238,6	kW		Heating	COP_d	3,90	-
	Cold	PDH	172,3	kW		Cold	COP_d	2,97	-
Tj = Maximum operating temperature		PDH	172,3	kW	**Tj = Maximum operating temperature**		COP_d	2,97	-
For air-to-water heat pumps: T_j = -15 °C (if TOL < -20 °C)		PDH	-	kW	**For air-to-water heat pumps: T_j = -15 °C (if TOL < -20 °C)**		COP_d	-	-
Dual-temperature	Medium	T_{biv}	-10,0	°C	**For air-to-water heat pumps:**		TOL	-10	°C
	Heating		2,0	°C					
	Cold		-10,0	°C	**Maximum operating temperature**				
Cyclic heating capacity		Pcych	155,1	kW	**Cycling interval efficiency**		COPcyc	2,67	-
Degradation coefficient		Cdh	0,9	-	**Maximum operating temperature of the heating water**		WTOL	35	°C
Power consumption in modes other than active mode					**Additional heater**				
Off mode	Medium	P_{OFF}	0,2	kW	**Nominal heat output**		P_{sup}	-	kW
	Heating		0,2	kW	**Type of energy input**		-		
	Cold		0,2	kW					
How to switch off the thermostat	Medium	P_{TO}	0,2	kW					
	Heating		0,2	kW	**Energy efficiency class**		A++		
	Cold		0,2	kW					
Standby mode	Medium	P_{SB}	0,2	kW		Medium	SCOP	4,39	-
	Heating		0,2	kW		Heating		5,28	-
	Cold		0,2	kW		Cold		-	-
Crankcase heating method	Medium	P_{CK}	0,2	kW	**Annual energy consumption for space heating**	Medium	Qn	80977	kWh
	Heating		0,2	kW		Heating		60415	kWh
	Cold		0,2	kW		Cold		-	kWh

» NHA302H SCOP

Article		Symbol	Value	Unit	Article		Symbol	Value	Unit
Nominal heat output	Medium	Prated	205,5	kW	**Seasonal energy efficiency for space heating**	Medium	η_s	171,55	%
	Heating		286,5	kW		Heating		207,24	%
	Cold		-	kW		Cold		-	%
Rated capacity for part-load heating with an indoor temperature of 20 °C and an outdoor temperature of Tj					**Declared coefficient of performance (COP) or primary energy ratio at partial load with an indoor temperature of 20 °C and an outdoor temperature Tj**				
Tj = - 7 °C		PDH	181,6	kW	**Tj = - 7 °C**		COP_d	3,28	-
Tj = + 2 °C		PDH	110,5	kW	**Tj = + 2 °C**		COPd	4,33	-
Tj = + 7 °C		PDH	71,1	kW	**Tj = + 7 °C**		COP_d	4,98	-
Tj = + 12 °C		PDH	31,6	kW	**Tj = + 12 °C**		COP_d	5,45	-
Tj = Bivalent temperature	Medium	PDH	205,5	kW	**Tj = Bivalent temperature**	Medium	COP_d	2,96	-
	Heating	PDH	286,5	kW		Heating	COP_d	3,91	-
	Cold	PDH	205,5	kW		Cold	COP_d	2,96	-
Tj = Maximum operating temperature		PDH	205,5	kW	**Tj = Maximum operating temperature**		COP_d	2,96	-
For air-to-water heat pumps: T_j = -15 °C (if TOL < -20 °C)		PDH	-	kW	**For air-to-water heat pumps: T_j = -15 °C (if TOL < -20 °C)**		COP_d	-	-
Dual-temperature	Medium	T_{biv}	-10,0	°C	**For air-to-water heat pumps:**		TOL	-10	°C
	Heating		2,0	°C					
	Cold		-10,0	°C	**Maximum operating temperature**				
Cyclic heating capacity		Pcych	184,9	kW	**Cycling interval efficiency**		COPcyc	2,66	-
Degradation coefficient		Cdh	0,9	-	**Maximum operating temperature of the heating water**		WTOL	35	°C
Power consumption in modes other than active mode					**Additional heater**				
Off mode	Medium	P_{OFF}	0,2	kW	**Nominal heat output**		P_{sup}	-	kW
	Heating		0,2	kW	**Type of energy input**		-		
	Cold		0,2	kW					
How to switch off the thermostat	Medium	P_{TO}	0,2	kW					
	Heating		0,2	kW	**Energy efficiency class**		A++		
	Cold		0,2	kW					
Standby mode	Medium	P_{SB}	0,2	kW		Medium	SCOP	4,36	-
	Heating		0,2	kW		Heating		5,26	-
	Cold		0,2	kW		Cold		-	-
Crankcase heating method	Medium	P_{CK}	0,2	kW	**Annual energy consumption for space heating**	Medium	Qn	97242	kWh
	Heating		0,2	kW		Heating		72929	kWh
	Cold		0,2	kW		Cold		-	kWh

» NHA353H SCOP

Article		Symbol	Value	Unit	Article		Symbol	Value	Unit
Nominal heat output	Medium	Prated	242,0	kW	**Seasonal energy efficiency for space heating**	Medium	η_s	181,79	%
	Heating		335,8	kW		Heating		218,68	%
	Cold		-	kW		Cold		-	%
Rated capacity for part-load heating with an indoor temperature of 20 °C and an outdoor temperature of Tj					**Declared coefficient of performance (COP) or primary energy ratio at partial load with an indoor temperature of 20 °C and an outdoor temperature Tj**				
Tj = - 7 °C		PDH	213,8	kW	**Tj = - 7 °C**		COP_d	3,28	-
Tj = + 2 °C		PDH	130,2	kW	**Tj = + 2 °C**		COP_d	4,54	-
Tj = + 7 °C		PDH	83,7	kW	**Tj = + 7 °C**		COP_d	5,55	-
Tj = + 12 °C		PDH	37,2	kW	**Tj = + 12 °C**		COP_d	6,46	-
Tj = Bivalent temperature	Medium	PDH	242,0	kW	**Tj = Bivalent temperature**	Medium	COP_d	2,98	-
	Heating	PDH	335,8	kW		Heating	COP_d	3,91	-
	Cold	PDH	242,0	kW		Cold	COP_d	2,98	-
Tj = Maximum operating temperature		PDH	242,0	kW	**Tj = Maximum operating temperature**		COP_d	2,98	-
For air-to-water heat pumps: T_j = -15 °C (if TOL < -20 °C)		PDH	-	kW	**For air-to-water heat pumps: T_j = -15 °C (if TOL < -20 °C)**		COP_d	-	-
Dual-temperature	Medium	T_{biv}	-10,0	°C	**For air-to-water heat pumps:**		TOL	-10	°C
	Heating		2,0	°C					
	Cold		-10,0	°C	**Maximum operating temperature**				
Cyclic heating capacity		Pcych	217,8	kW	**Cycling interval efficiency**		COPcyc	2,68	-
Degradation coefficient		Cdh	0,9	-	**Maximum operating temperature of the heating water**		WTOL	35	°C
Power consumption in modes other than active mode					**Additional heater**				
Off mode	Medium	P_{OFF}	0,2	kW	**Nominal heat output**		P_{sup}	-	kW
	Heating		0,2	kW	**Type of energy input**		-		
	Cold		0,2	kW					
How to switch off the thermostat	Medium	P_{TO}	0,2	kW					
	Heating		0,2	kW	**Energy efficiency class**		A+++		
	Cold		0,2	kW					
Standby mode	Medium	P_{SB}	0,2	kW		Medium	SCOP	4,62	-
	Heating		0,2	kW		Heating		5,54	-
	Cold		0,2	kW		Cold		-	-
Crankcase heating method	Medium	P_{CK}	0,2	kW	**Annual energy consumption for space heating**	Medium	Qn	108309	kWh
	Heating		0,2	kW		Heating		80868	kWh
	Cold		0,2	kW		Cold		-	kWh

» NHA403H SCOP

Article		Symbol	Value	Unit	Article		Symbol	Value	Unit
Nominal heat output	Medium	Prated	275,5	kW	**Seasonal energy efficiency for space heating**	Medium	η_s	181,72	%
	Heating		380,4	kW		Heating		218,19	%
	Cold		-	kW		Cold		-	%
Rated capacity for part-load heating with an indoor temperature of 20 °C and an outdoor temperature of Tj					**Declared coefficient of performance (COP) or primary energy ratio at partial load with an indoor temperature of 20 °C and an outdoor temperature Tj**				
Tj = - 7 °C		PDH	243,5	kW	**Tj = - 7 °C**		COP_d	3,28	-
Tj = + 2 °C		PDH	148,2	kW	**Tj = + 2 °C**		COPd	4,58	-
Tj = + 7 °C		PDH	95,3	kW	**Tj = + 7 °C**		COP_d	5,50	-
Tj = + 12 °C		PDH	42,4	kW	**Tj = + 12 °C**		COP_d	6,47	-
Tj = Bivalent temperature	Medium	PDH	275,5	kW	**Tj = Bivalent temperature**	Medium	COP_d	2,97	-
	Heating	PDH	380,4	kW		Heating	COP_d	3,89	-
	Cold	PDH	275,5	kW		Cold	COP_d	2,97	-
Tj = Maximum operating temperature		PDH	275,5	kW	**Tj = Maximum operating temperature**		COP_d	2,97	-
For air-to-water heat pumps: T_j = -15 °C (if TOL < -20 °C)		PDH	-	kW	**For air-to-water heat pumps: T_j = -15 °C (if TOL < -20 °C)**		COP_d	-	-
Dual-temperature	Medium	T_{biv}	-10,0	°C	**For air-to-water heat pumps:**		TOL	-10	°C
	Heating		2,0	°C					
	Cold		-10,0	°C	**Maximum operating temperature**				
Cyclic heating capacity		Pcych	247,9	kW	**Cycling interval efficiency**		COPcyc	2,67	-
Degradation coefficient		Cdh	0,9	-	**Maximum operating temperature of the heating water**		WTOL	35	°C
Power consumption in modes other than active mode					**Additional heater**				
Off mode	Medium	P_{OFF}	0,2	kW	**Nominal heat output**		P_{sup}	-	kW
	Heating		0,2	kW	**Type of energy input**		-		
	Cold		0,2	kW					
How to switch off the thermostat	Medium	P_{TO}	0,2	kW					
	Heating		0,2	kW	**Energy efficiency class**		A+++		
	Cold		0,2	kW					
Standby mode	Medium	P_{SB}	0,2	kW		Medium	SCOP	4,62	-
	Heating		0,2	kW		Heating		5,53	-
	Cold		0,2	kW		Cold		-	-
Crankcase heating method	Medium	P_{CK}	0,2	kW	**Annual energy consumption for space heating**	Medium	Qn	123206	kWh
	Heating		0,2	kW		Heating		92193	kWh
	Cold		0,2	kW		Cold		-	kWh

» NHA453H SCOP

Article		Symbol	Value	Unit	Article		Symbol	Value	Unit
Nominal heat output	Medium	Prated	308,2	kW	**Seasonal energy efficiency for space heating**	Medium	η_s	180,32	%
	Heating		429,8	kW		Heating		217,17	%
	Cold		-	kW		Cold		-	%
Rated capacity for part-load heating with an indoor temperature of 20 °C and an outdoor temperature of Tj					**Declared coefficient of performance (COP) or primary energy ratio at partial load with an indoor temperature of 20 °C and an outdoor temperature Tj**				
Tj = - 7 °C		PDH	272,4	kW	**Tj = - 7 °C**		COP_d	3,29	-
Tj = + 2 °C		PDH	165,8	kW	**Tj = + 2 °C**		COP_d	4,51	-
Tj = + 7 °C		PDH	106,6	kW	**Tj = + 7 °C**		COP_d	5,45	-
Tj = + 12 °C		PDH	47,4	kW	**Tj = + 12 °C**		COP_d	6,52	-
Tj = Bivalent temperature	Medium	PDH	308,2	kW	**Tj = Bivalent temperature**	Medium	COP_d	2,96	-
	Heating	PDH	429,8	kW		Heating	COP_d	3,91	-
	Cold	PDH	308,2	kW		Cold	COP_d	2,96	-
Tj = Maximum operating temperature		PDH	308,2	kW	**Tj = Maximum operating temperature**		COP_d	2,96	-
For air-to-water heat pumps: T_j = -15 °C (if TOL < -20 °C)		PDH	-	kW	**For air-to-water heat pumps: T_j = -15 °C (if TOL < -20 °C)**		COP_d	-	-
Dual-temperature	Medium	T_{biv}	-10,0	°C	**For air-to-water heat pumps:**		TOL	-10	°C
	Heating		2,0	°C					
	Cold		-10,0	°C	**Maximum operating temperature**				
Cyclic heating capacity		Pcych	277,4	kW	**Cycling interval efficiency**		COPcyc	2,66	-
Degradation coefficient		Cdh	0,9	-	**Maximum operating temperature of the heating water**		WTOL	35	°C
Power consumption in modes other than active mode					**Additional heater**				
Off mode	Medium	P_{OFF}	0,2	kW	**Nominal heat output**		P_{sup}	-	kW
	Heating		0,2	kW	**Type of energy input**		-		
	Cold		0,2	kW					
How to switch off the thermostat	Medium	P_{TO}	0,2	kW					
	Heating		0,2	kW	**Energy efficiency class**		A+++		
	Cold		0,2	kW					
Standby mode	Medium	P_{SB}	0,2	kW		Medium	SCOP	4,58	-
	Heating		0,2	kW		Heating		5,50	-
	Cold		0,2	kW		Cold		-	-
Crankcase heating method	Medium	P_{CK}	0,2	kW	**Annual energy consumption for space heating**	Medium	Qn	138966	kWh
	Heating		0,2	kW		Heating		104463	kWh
	Cold		0,2	kW		Cold		-	kWh

» NHA504H SCOP

Article		Symbol	Value	Unit	Article		Symbol	Value	Unit
Nominal heat output	Medium	Prated	344,5	kW	**Seasonal energy efficiency for space heating**	Medium	η_s	182,32	%
	Heating		477,1	kW		Heating		219,28	%
	Cold		-	kW		Cold		-	%
Rated capacity for part-load heating with an indoor temperature of 20 °C and an outdoor temperature of Tj					**Declared coefficient of performance (COP) or primary energy ratio at partial load with an indoor temperature of 20 °C and an outdoor temperature Tj**				
Tj = - 7 °C		PDH	304,4	kW	**Tj = - 7 °C**		COP_d	3,28	-
Tj = + 2 °C		PDH	185,3	kW	**Tj = + 2 °C**		COPd	4,58	-
Tj = + 7 °C		PDH	119,1	kW	**Tj = + 7 °C**		COP_d	5,51	-
Tj = + 12 °C		PDH	52,9	kW	**Tj = + 12 °C**		COP_d	6,68	-
Tj = Bivalent temperature	Medium	PDH	344,5	kW	**Tj = Bivalent temperature**	Medium	COP_d	2,97	-
	Heating	PDH	477,1	kW		Heating	COP_d	3,90	-
	Cold	PDH	344,5	kW		Cold	COP_d	2,97	-
Tj = Maximum operating temperature		PDH	344,5	kW	**Tj = Maximum operating temperature**		COP_d	2,97	-
For air-to-water heat pumps: T_j = -15 °C (if TOL < -20 °C)		PDH	-	kW	**For air-to-water heat pumps: T_j = -15 °C (if TOL < -20 °C)**		COP_d	-	-
Dual-temperature	Medium	T_{biv}	-10,0	°C	**For air-to-water heat pumps:**		TOL	-10	°C
	Heating		2,0	°C					
	Cold		-10,0	°C	**Maximum operating temperature**				
Cyclic heating capacity		Pcych	310,0	kW	**Cycling interval efficiency**		COPcyc	2,67	-
Degradation coefficient		Cdh	0,9	-	**Maximum operating temperature of the heating water**		WTOL	35	°C
Power consumption in modes other than active mode					**Additional heater**				
Off mode	Medium	P_{OFF}	0,2	kW	**Nominal heat output**		P_{sup}	-	kW
	Heating		0,2	kW	**Type of energy input**		-		
	Cold		0,2	kW					
How to switch off the thermostat	Medium	P_{TO}	0,2	kW					
	Heating		0,2	kW	**Energy efficiency class**		A+++		
	Cold		0,2	kW					
Standby mode	Medium	P_{SB}	0,2	kW		Medium	SCOP	4,63	-
	Heating		0,2	kW		Heating		5,56	-
	Cold		0,2	kW		Cold		-	-
Crankcase heating method	Medium	P_{CK}	0,2	kW	**Annual energy consumption for space heating**	Medium	Qn	153642	kWh
	Heating		0,2	kW		Heating		114640	kWh
	Cold		0,2	kW		Cold		-	kWh

» NHA554H SCOP

Article		Symbol	Value	Unit	Article		Symbol	Value	Unit
Nominal heat output	Medium	Prated	378,2	kW	**Seasonal energy efficiency for space heating**	Medium	η_s	182,16	%
	Heating		522,0	kW		Heating		218,90	%
	Cold		-	kW		Cold		-	%
Rated capacity for part-load heating with an indoor temperature of 20 °C and an outdoor temperature of Tj					**Declared coefficient of performance (COP) or primary energy ratio at partial load with an indoor temperature of 20 °C and an outdoor temperature Tj**				
Tj = - 7 °C		PDH	334,5	kW	**Tj = - 7 °C**		COP_d	3,28	-
Tj = + 2 °C		PDH	203,6	kW	**Tj = + 2 °C**		COP_d	4,60	-
Tj = + 7 °C		PDH	130,9	kW	**Tj = + 7 °C**		COP_d	5,49	-
Tj = + 12 °C		PDH	58,2	kW	**Tj = + 12 °C**		COP_d	6,63	-
Tj = Bivalent temperature	Medium	PDH	378,2	kW	**Tj = Bivalent temperature**	Medium	COP_d	2,97	-
	Heating	PDH	522,0	kW		Heating	COP_d	3,89	-
	Cold	PDH	378,2	kW		Cold	COP_d	2,97	-
Tj = Maximum operating temperature		PDH	378,2	kW	**Tj = Maximum operating temperature**		COP_d	2,97	-
For air-to-water heat pumps: T_j = -15 °C (if TOL < -20 °C)		PDH	-	kW	**For air-to-water heat pumps: T_j = -15 °C (if TOL < -20 °C)**		COP_d	-	-
Dual-temperature	Medium	T_{biv}	-10,0	°C	**For air-to-water heat pumps:**		TOL	-10	°C
	Heating		2,0	°C					
	Cold		-10,0	°C	**Maximum operating temperature**				
Cyclic heating capacity		Pcych	340,4	kW	**Cycling interval efficiency**		COPcyc	2,67	-
Degradation coefficient		Cdh	0,9	-	**Maximum operating temperature of the heating water**		WTOL	35	°C
Power consumption in modes other than active mode					**Additional heater**				
Off mode	Medium	P_{OFF}	0,2	kW	**Nominal heat output**		P_{sup}	-	kW
	Heating		0,2	kW	**Type of energy input**		-		
	Cold		0,2	kW					
How to switch off the thermostat	Medium	P_{TO}	0,2	kW					
	Heating		0,2	kW	**Energy efficiency class**		A+++		
	Cold		0,2	kW					
Standby mode	Medium	P_{SB}	0,2	kW		Medium	SCOP	4,63	-
	Heating		0,2	kW		Heating		5,55	-
	Cold		0,2	kW		Cold		-	-
Crankcase heating method	Medium	P_{CK}	0,2	kW	**Annual energy consumption for space heating**	Medium	Qn	168810	kWh
	Heating		0,2	kW		Heating		125684	kWh
	Cold		0,2	kW		Cold		-	kWh

» NHA604H SCOP

Article		Symbol	Value	Unit
Nominal heat output	Medium	Prated	411,0	kW
	Heating		573,1	kW
	Cold		-	kW
Rated capacity for part-load heating with an indoor temperature of 20 °C and an outdoor temperature of Tj				
Tj = - 7 °C		PDH	363,2	kW
Tj = + 2 °C		PDH	221,1	kW
Tj = + 7 °C		PDH	142,1	kW
Tj = + 12 °C		PDH	63,2	kW
Tj = Bivalent temperature	Medium	PDH	411,0	kW
	Heating	PDH	573,1	kW
	Cold	PDH	411,0	kW
Tj = Maximum operating temperature		PDH	411,0	kW
For air-to-water heat pumps: T_j = -15 °C (if TOL < -20 °C)		PDH	-	kW
Dual-temperature	Medium	T_{biv}	-10,0	°C
	Heating		2,0	°C
	Cold		-10,0	°C
Cyclic heating capacity		Pcych	369,9	kW
Degradation coefficient		Cdh	0,9	-
Power consumption in modes other than active mode				
Off mode	Medium	P_{OFF}	0,2	kW
	Heating		0,2	kW
	Cold		0,2	kW
How to switch off the thermostat	Medium	P_{TO}	0,2	kW
	Heating		0,2	kW
	Cold		0,2	kW
Standby mode	Medium	P_{SB}	0,2	kW
	Heating		0,2	kW
	Cold		0,2	kW
Crankcase heating method	Medium	P_{CK}	0,2	kW
	Heating		0,2	kW
	Cold		0,2	kW

Article		Symbol	Value	Unit
Seasonal energy efficiency for space heating	Medium	η_s	180,83	%
	Heating		217,74	%
	Cold		-	%
Declared coefficient of performance (COP) or primary energy ratio at partial load with an indoor temperature of 20 °C and an outdoor temperature Tj				
Tj = - 7 °C		COP_d	3,30	
Tj = + 2 °C		COPd	4,54	
Tj = + 7 °C		COP_d	5,46	
Tj = + 12 °C		COP_d	6,62	
Tj = Bivalent temperature	Medium	COP_d	2,96	
	Heating	COP_d	3,91	
	Cold	COP_d	2,96	
Tj = Maximum operating temperature		COP_d	2,96	
For air-to-water heat pumps: T_j = -15 °C (if TOL < -20 °C)		COP_d	-	
For air-to-water heat pumps:		TOL	-10	
Maximum operating temperature				
Cycling interval efficiency		COPcyc	2,66	
Maximum operating temperature of the heating water		WTOL	35	
Additional heater				
Nominal heat output		P_{sup}	-	kW
Type of energy input			-	
Energy efficiency class			A+++	
	Medium	SCOP	4,60	-
	Heating		5,52	-
	Cold		-	-
Annual energy consumption for space heating	Medium	Qn	184787	kWh
	Heating		139217	kWh
	Cold		-	kWh

4 CALCULATION FACTORS

BUILT-IN HEATING

When operating in heat pump mode (heating), the actual efficiency of the units may be lower than the values shown in the table due to the defrost cycle. To obtain the actual heating capacity, multiply the capacity values by the correction factors listed below.

	Dry-bulb air temperature (°C)			
	- 5	**0**	**5**	**> 5**
Power factor	0,91	0,9	0,94	1

VARIATION IN OPERATING PARAMETERS WHEN THE TEMPERATURE DIFFERENCE IS OTHER THAN 5 °C

Once the unit's capacity has been determined based on the desired outlet water temperature, adjust it by multiplying it by the correction factors shown in the table.

A water temperature difference other than 5 °C						
Water temperature differential	3	4	5	6	7	8
Output power correction factor	0,975	0,990	1,000	1,015	1,030	1,040
Axial power correction factor	1,000	1,000	1,000	1,000	1,000	1,000
Water-holding capacity correction factor	1,630	1,240	1,000	0,850	0,740	0,650
Pressure drop correction factor	2,640	1,530	1,000	0,720	0,540	0,420

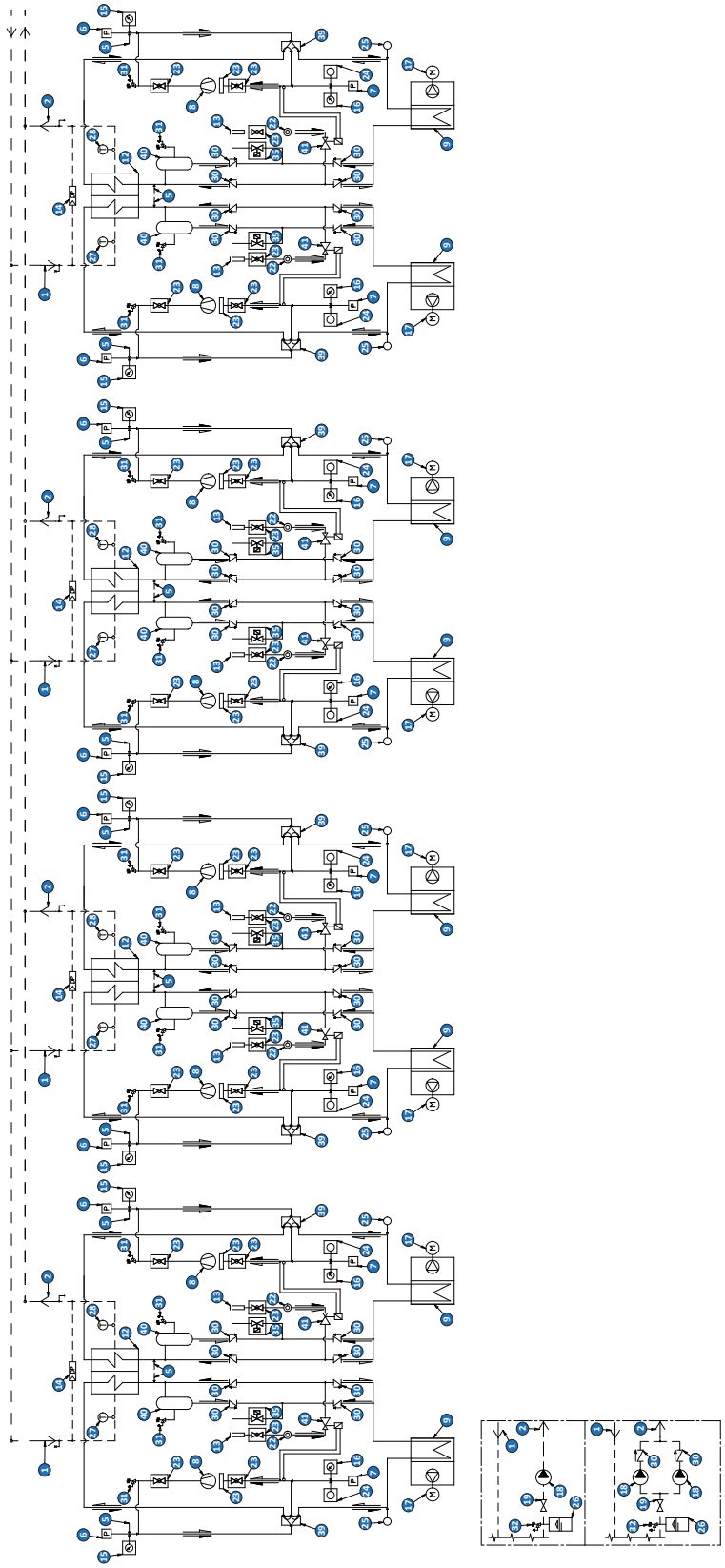
WATER-GLYCOL MIXTURE

Based on the minimum water temperature, the percentage of ethylene glycol and the correction factor must be calculated using the table opposite.

Operates using a mixture of water and ethylene glycol					
Glycol percentage	**0 %**	**10 %**	**20 %**	**30 %**	**40 %**
Minimum temperature of the hot water produced (°C)	5	2	-5	-10	-15
Mixture freezing temperature (°C)	0	-4	-14	-18	-24
Output power correction factor	1,000	0,998	0,994	0,989	0,983
Water-holding capacity correction factor	1,000	1,047	1,094	1,140	1,199
Pressure drop correction factor	1,000	1,157	1,352	1,585	1,860

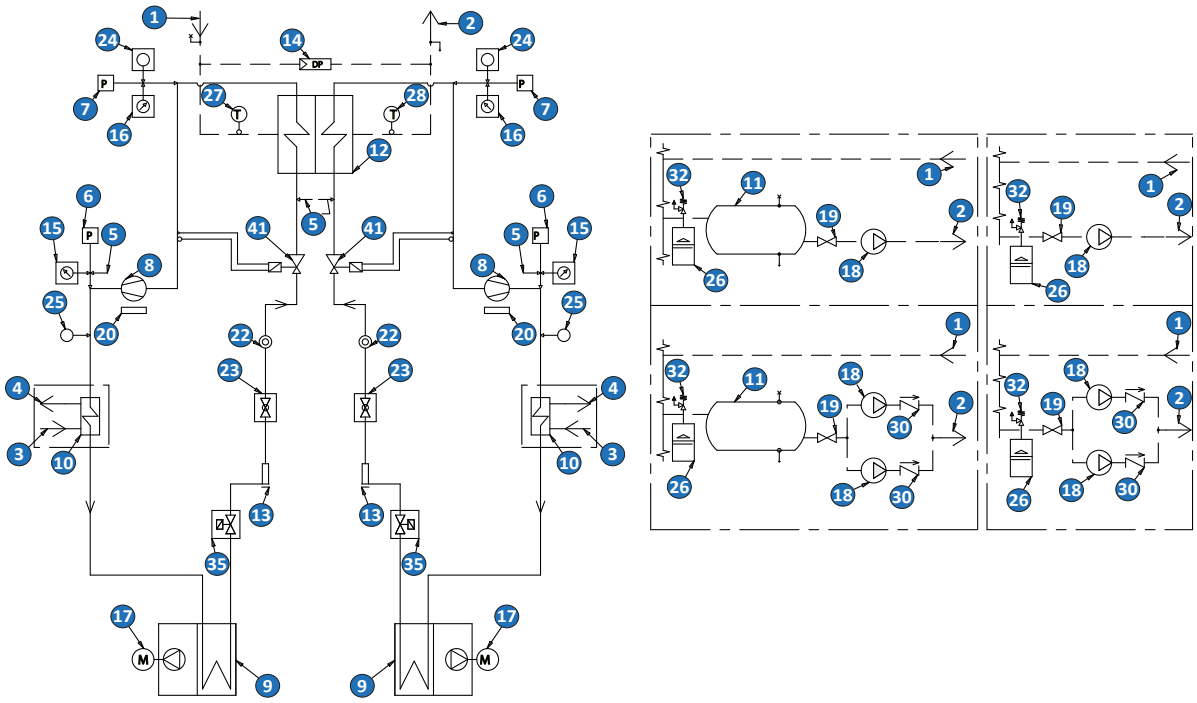
5 REFRIGERATION AND HYDRAULIC CIRCUIT

» Example of a circuit with a reversible heat pump



1 CHILLED WATER INLET
2 CHILLED WATER OUTLET
3 INLET FOR COOLED WATER
4 WATER OUTLET FROM THE WATER HEATER
5 CHARGE ATTACK
6 HIGH-PRESSURE SWITCH
7 LOW-PRESSURE SWITCH
8 COMPRESSOR
9 CONDENSER
10 DE-SUPERHEATER
11 BUFFER TANK
12 EVAPORATOR
13 FILTER-DRYER
14 FLOW SWITCH
15 HIGH-PRESSURE GAUGE
16 LOW-PRESSURE GAUGE
17 FAN MOTOR
18 CHILLED WATER CIRCULATION PUMP
19 GATE VALVE
20 CRANKCASE HEATER
21 ENERGY-SAVING COIL
22 FLOW INDICATOR
23 SHUT-OFF VALVE
24 EVAPORATING PRESSURE PROBE
25 CONDENSING PRESSURE PROBE
26 EXPANSION TANK
27 WATER INLET TEMPERATURE SENSOR
28 WATER OUTLET TEMPERATURE SENSOR
29 OUTDOOR AIR TEMPERATURE SENSOR
30 CHECK VALVE
31 SAFETY VALVE
32 WATER SAFETY VALVE
33 THERMOSTATIC VALVE
34 CONDENSATION CONTROL VALVE
35 SOLENOID VALVE
36 PARTIALIZATION SOLENOID VALVE
37 Condensing water inlet CONDENSING WATER INLET
38 CONDENSING WATER OUTLET
39 4-WAY VALVE
40 LIQUID RECEIVER
41 ELECTRONIC EXPANSION VALVE

» Example of a cooling-only circuit



1 CHILLED WATER INLET
2 CHILLED WATER OUTLET
3 INLET FOR COOLED WATER
4 WATER OUTLET FROM THE WATER HEATER
5 CHARGE ATTACK
6 HIGH-PRESSURE SWITCH
7 LOW-PRESSURE SWITCH
8 COMPRESSOR
9 CONDENSER
10 DE-SUPERHEATER
11 BUFFER TANK
12 EVAPORATOR
13 FILTER-DRYER
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15 HIGH-PRESSURE GAUGE
16 LOW-PRESSURE GAUGE
17 FAN MOTOR
18 CHILLED WATER CIRCULATION PUMP
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23 SHUT-OFF VALVE
24 EVAPORATING PRESSURE PROBE
25 CONDENSING PRESSURE PROBE
26 EXPANSION TANK
27 WATER INLET TEMPERATURE SENSOR
28 WATER OUTLET TEMPERATURE SENSOR
29 OUTDOOR AIR TEMPERATURE SENSOR
30 CHECK VALVE
31 SAFETY VALVE
32 WATER SAFETY VALVE
33 THERMOSTATIC VALVE
34 CONDENSATION CONTROL VALVE
35 SOLENOID VALVE
36 PARTIALIZATION SOLENOID VALVE
37 Condensing water inlet CONDENSING WATER INLET
38 CONDENSING WATER OUTLET
39 4-WAY VALVE
40 LIQUID RECEIVER
41 ELECTRONIC EXPANSION VALVE

6 NOISE LEVEL

LEGEND

LPA A-weighted overall sound pressure level, calculated at a distance of 10 m with a directivity factor of 2.
LWA A-weighted overall sound power level.
The data reported below are the result of acoustic simulations and are in accordance with the EN 3744 standard. Tolerance: ±3 dB(A).

NHA C/H VERSIONS – STANDARD NOISE LEVEL

» Sound level NHA...S, STANDARD version [100%]

Size	L_{WA}						L_{WA}	L_{PA}
	250 Hz	500 Hz	1,000 Hz	2,000 Hz	4,000 Hz	8,000 Hz	dB(A)	dB(A)
101	67,9	73,4	78,6	76,4	73,0	68,0	82	50
151	71,4	76,0	80,5	79,6	75,9	67,7	85	53
202	70,9	76,4	81,6	79,4	76,0	71,0	85	53
252	73,0	77,9	82,6	81,3	77,7	70,9	87	55
302	74,4	79,0	83,5	82,6	78,9	70,7	88	56
353	74,2	79,2	84,1	82,5	79,0	72,7	88	56
403	75,3	80,1	84,7	83,6	79,9	72,6	89	57
453	76,2	80,8	85,2	84,4	80,7	72,5	90	58
504	76,0	80,9	85,6	84,3	80,7	73,9	90	58
554	76,8	81,5	86,1	85,0	81,4	73,8	90	58
604	77,4	82,0	86,5	85,7	81,9	73,7	91	59

» Sound level NHA...S, STANDARD version [75%]

Size	L_{WA}						L_{WA}	L_{PA}
	250 Hz	500 Hz	1,000 Hz	2,000 Hz	4,000 Hz	8,000 Hz	dB(A)	dB(A)
101	66,8	72,3	77,4	75,2	71,8	66,8	81	49
151	70,4	74,9	79,3	78,4	74,7	66,5	84	52
202	69,9	75,3	80,4	78,2	74,8	69,8	84	52
252	72,0	76,8	81,4	80,1	76,5	69,7	86	54
302	73,4	77,9	82,3	81,4	77,7	69,6	87	55
353	73,2	78,1	82,9	81,3	77,8	71,5	87	55
403	74,3	79,0	83,5	82,4	78,7	71,4	88	56
453	75,2	79,7	84,0	83,2	79,5	71,3	88	56
504	75,0	79,8	84,4	83,1	79,5	72,7	89	57
554	75,8	80,4	84,9	83,8	80,2	72,6	89	57
604	76,4	80,9	85,3	84,5	80,7	72,6	90	58

» Sound level NHA...S, STANDARD version [50%]

Size	L_{WA}						L_{WA}	L_{PA}
	250 Hz	500 Hz	1,000 Hz	2,000 Hz	4,000 Hz	8,000 Hz	dB(A)	dB(A)
101	65,5	70,8	75,7	73,5	70,2	65,1	79	47
151	69,1	73,4	77,6	76,8	73,1	64,9	82	50
202	68,5	73,8	78,7	76,6	73,2	68,1	82	50
252	70,6	75,3	79,8	78,5	74,9	68,0	84	52
302	72,1	76,4	80,6	79,8	76,1	67,9	85	53
353	71,8	76,6	81,2	79,7	76,1	69,8	85	53
403	72,9	77,5	81,8	80,7	77,1	69,7	86	54
453	73,9	78,2	82,4	81,6	77,8	69,7	87	55
504	73,7	78,3	82,8	81,5	77,9	71,0	87	55
554	74,4	78,9	83,2	82,2	78,5	71,0	88	56
604	75,1	79,4	83,6	82,8	79,1	71,0	88	56

» Sound level NHA...S, STANDARD version [25%]

Size	L_{WA}						L_{WA}	L_{PA}
	250 Hz	500 Hz	1,000 Hz	2,000 Hz	4,000 Hz	8,000 Hz	dB(A)	dB(A)
101	62,5	67,8	72,7	70,5	67,1	62,1	76	44
151	66,1	70,4	74,6	73,8	70,0	61,9	79	47
202	65,5	70,8	75,7	73,5	70,2	65,1	79	47
252	67,6	72,3	76,8	75,5	71,8	65,0	81	49
302	69,1	73,4	77,6	76,8	73,1	64,9	82	50
353	68,8	73,6	78,2	76,7	73,1	66,8	82	50
403	69,9	74,5	78,8	77,7	74,0	66,7	83	51
453	70,8	75,2	79,4	78,6	74,8	66,7	84	52
504	70,6	75,3	79,8	78,5	74,9	68,0	84	52
554	71,4	75,9	80,2	79,2	75,5	68,0	85	53
604	72,1	76,4	80,6	79,8	76,1	67,9	85	53

NHA C/H VERSIONS – LOW NOISE LEVEL

» Sound level NHA...L, LOW NOISE version [100%]

Size	L_{WA}						L_{WA}	L_{PA}
	250 Hz	500 Hz	1,000 Hz	2,000 Hz	4,000 Hz	8,000 Hz	dB(A)	dB(A)
101	66,7	70,7	73,3	71,8	67,8	61,8	78	46
151	70,8	73,7	75,4	74,8	70,8	63,6	81	49
202	69,7	73,7	76,4	74,8	70,8	64,8	81	49
252	72,2	75,4	77,5	76,5	72,6	65,8	82	50
302	73,8	76,7	78,4	77,8	73,9	66,6	84	52
353	73,3	76,7	78,9	77,8	73,8	67,2	84	52
403	74,6	77,7	79,6	78,7	74,8	67,8	85	53
453	75,5	78,4	80,2	79,5	75,6	68,4	85	53
504	75,2	78,4	80,5	79,5	75,6	68,8	85	53
554	76,1	79,1	81,0	80,2	76,3	69,2	86	54
604	76,8	79,7	81,4	80,8	76,9	69,6	87	55

» Sound level NHA...L, LOW NOISE version [75%]

Size	L_{WA}						L_{WA}	L_{PA}
	250 Hz	500 Hz	1,000 Hz	2,000 Hz	4,000 Hz	8,000 Hz	dB(A)	dB(A)
101	65,7	69,6	72,3	70,7	66,7	60,7	77	45
151	69,8	72,7	74,3	73,7	69,8	62,5	80	48
202	68,7	72,6	75,3	73,7	69,7	63,7	80	48
252	71,2	74,4	76,4	75,5	71,5	64,7	81	49
302	72,8	75,7	77,3	76,7	72,8	65,5	83	51
353	72,3	75,7	77,8	76,7	72,8	66,2	83	51
403	73,6	76,6	78,5	77,7	73,7	66,8	84	52
453	74,6	77,4	79,1	78,5	74,5	67,3	84	52
504	74,2	77,4	79,4	78,5	74,5	67,7	84	52
554	75,1	78,1	79,9	79,1	75,2	68,2	85	53
604	75,8	78,7	80,3	79,7	75,8	68,6	86	54

» Sound level NHA...L, LOW NOISE version [50%]

Size	L_{WA}						L_{WA}	L_{PA}
	250 Hz	500 Hz	1,000 Hz	2,000 Hz	4,000 Hz	8,000 Hz	dB(A)	dB(A)
101	64,4	68,3	70,8	69,3	65,3	59,1	75	43
151	68,5	71,4	72,9	72,3	68,3	61,1	78	46
202	67,4	71,3	73,8	72,3	68,3	62,1	78	46
252	70,0	73,1	75,0	74,0	70,1	63,3	80	48
302	71,5	74,4	75,9	75,3	71,3	64,2	81	49
353	71,0	74,3	76,4	75,3	71,3	64,7	81	49
403	72,3	75,3	77,0	76,2	72,3	65,3	82	50
453	73,3	76,1	77,6	77,0	73,1	65,9	83	51
504	73,0	76,1	78,0	77,0	73,1	66,3	83	51
554	73,8	76,8	78,5	77,7	73,8	66,7	84	52
604	74,5	77,4	78,9	78,3	74,3	67,2	84	52

» Sound level NHA...L, LOW NOISE version [25%]

Size	L_{WA}						L_{WA}	L_{PA}
	250 Hz	500 Hz	1,000 Hz	2,000 Hz	4,000 Hz	8,000 Hz	dB(A)	dB(A)
101	61,4	65,3	67,8	66,3	62,3	56,1	72	40
151	65,5	68,3	69,9	69,3	65,3	58,1	75	43
202	64,4	68,3	70,8	69,3	65,3	59,1	75	43
252	66,9	70,1	72,0	71,0	67,1	60,3	77	45
302	68,5	71,4	72,9	72,3	68,3	61,1	78	46
353	68,0	71,3	73,4	72,3	68,3	61,7	78	46
403	69,3	72,3	74,0	73,2	69,3	62,3	79	47
453	70,3	73,1	74,6	74,0	70,1	62,9	80	48
504	70,0	73,1	75,0	74,0	70,1	63,3	80	48
554	70,8	73,8	75,4	74,7	70,7	63,7	81	49
604	71,5	74,4	75,9	75,3	71,3	64,2	81	49

7 ELECTRICAL DATA

» Electrical specifications (excluding pumps) – C and H versions

Size	Frame	Electrical specifications (excluding pumps)			
		FLA [A]	LRA [A]	LRAs (con softstarter) [A]	Maximum power [kW]
101	1	95	203	159	63
151	1	136	274	215	90
202	2	190	273	-	126
252	2	231	344	-	153
302	2	272	372	-	180
353	3	326	414	-	216
403	3	367	442	-	243
453	3	408	470	-	270
504	4	462	512	-	306
554	4	503	540	-	333
604	4	544	568	-	360

8 OPERATING LIMITS

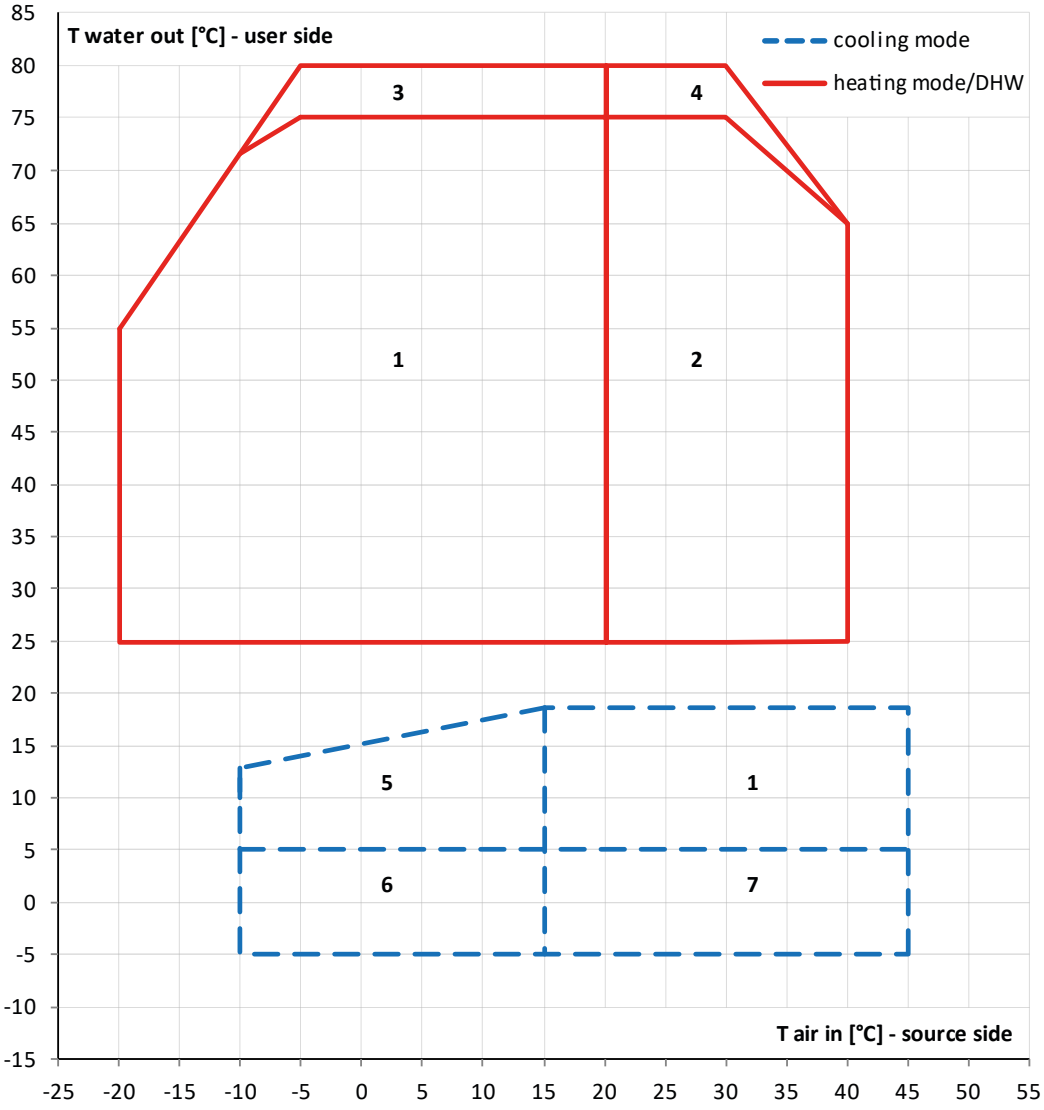
The graph below shows the unit's continuous operating limits in relation to the water outlet temperature and the outside air temperature.
The graphs are based on a temperature difference of 5 K between the inlet and outlet. For different temperature differences, the operating envelope may vary.
The maximum and minimum permitted temperature differences are as follows:

— Maximum temperature difference: 10 K (cooling) 20 K (heating)
— Minimum temperature difference: 3 K

ATTENTION

The units are designed to operate within the specified water and air temperature limits. Operation outside these limits could cause irreparable damage to the units.

» NHA OPERATING LIMITS



1 Standard unit
2 Evaporation control
3 DeltaT=10°C user side / inverter pump(s)
4 DeltaT=10°C user side / evaporation control / inverter pump(s)
5 Condensation control
6 glycol mix on user side / condensation control
7 Glycol mix on user side

HEAT TRANSFER FLUID

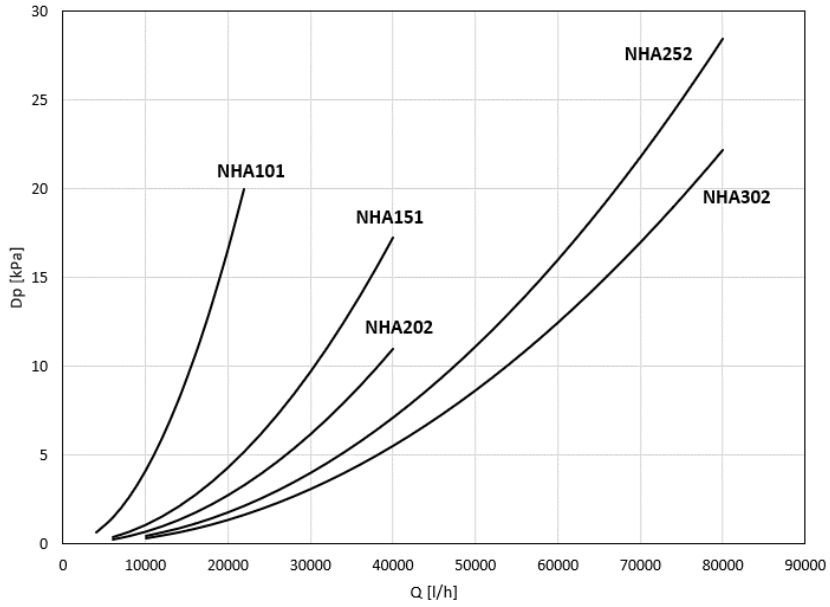
NHE Units can operate with mixtures of water and glycol, with glycol content of up to 40%.

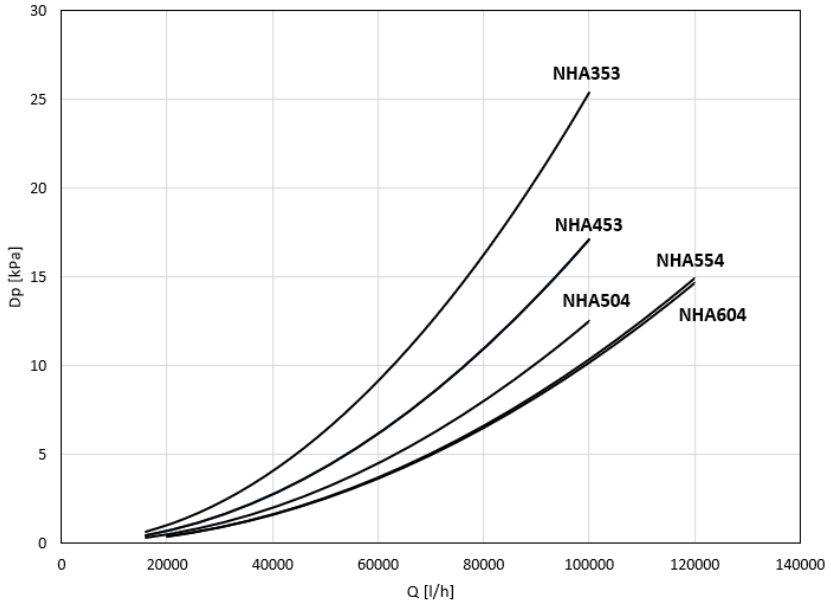
» Heat transfer fluid

% by weight of glycol	Freezing temperature of the mixture with ethylene glycol (°C)	Freezing temperature of the mixture with propylene glycol (°C)
0	0	0
10	-3	-3
15	-5	-5
20	-8	-7
25	-11	-10
30	-14	-13
40	-22	-21
50	-34	-33
60	-48	-51

9 PRESSURE DROPS IN THE WATER-COOLED HEAT EXCHANGER

NHA C-H



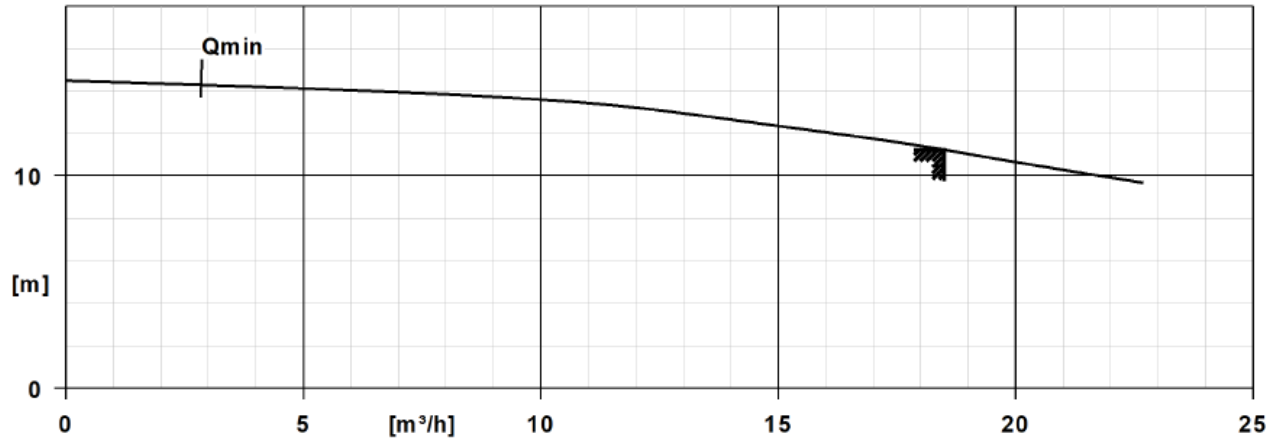


10 HYDRAULIC PUMPS

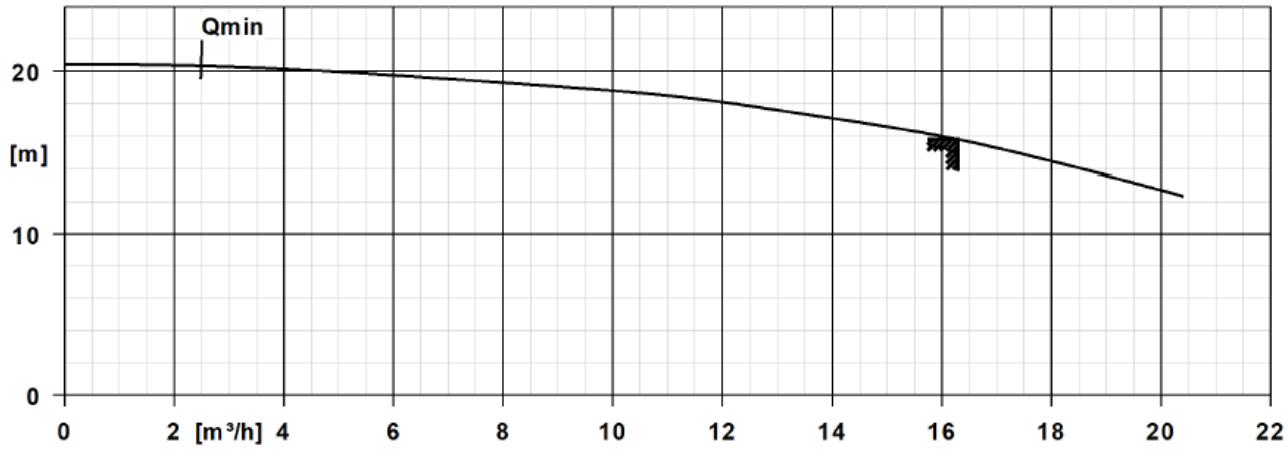
10.1 Performance curves of the hydraulic pumps assigned to the units

To calculate the effective head of the pump, subtract the pressure drop value calculated in section 3 Technical features p. 10 from the total head determined from the graph.

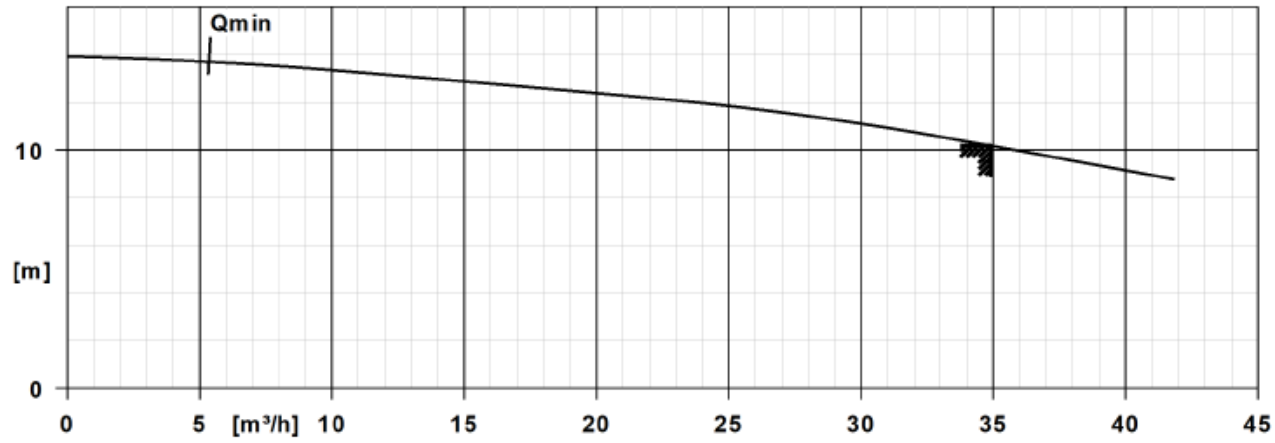
NHA101 LOW-PREVALENCE



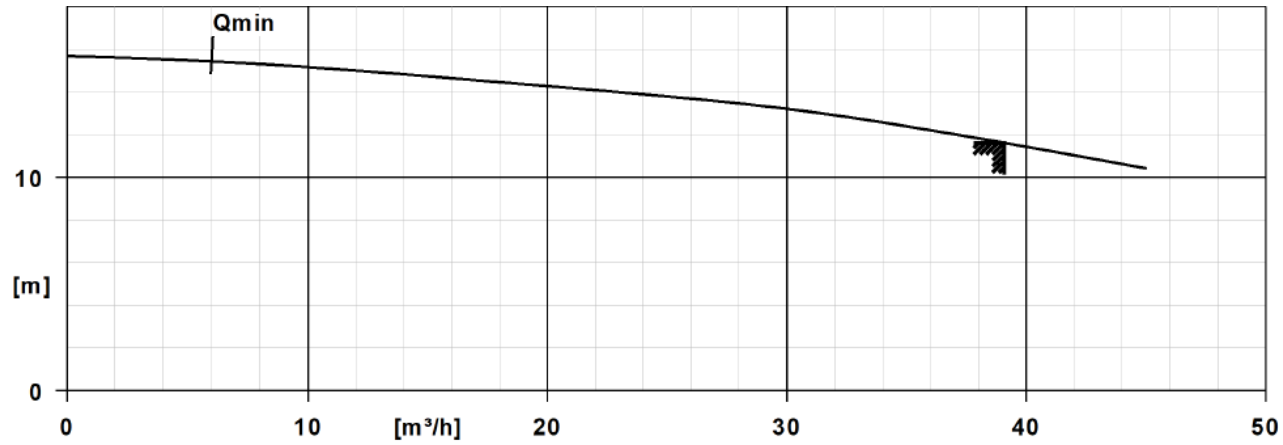
NHA101 HIGH PREVALENCE



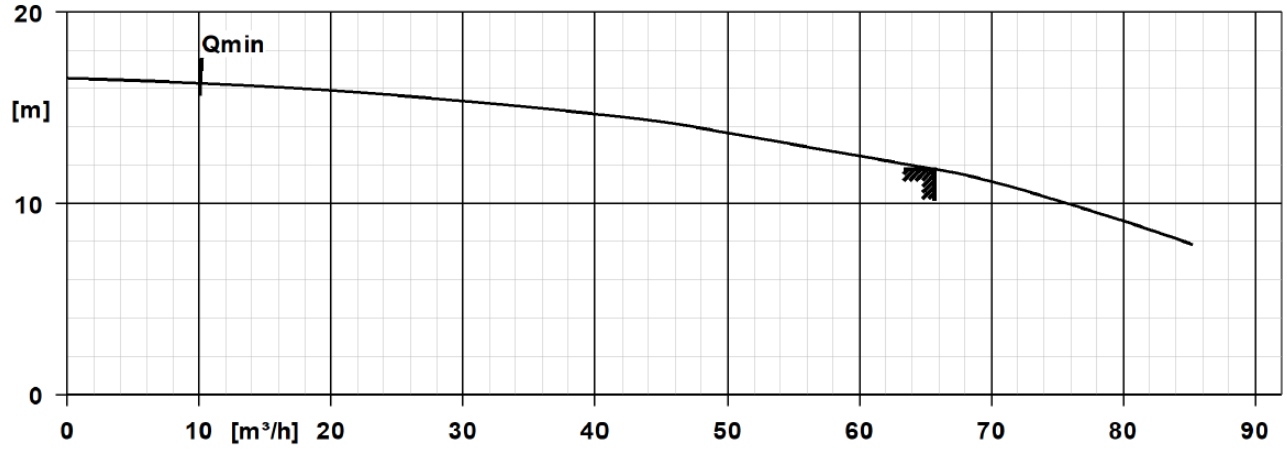
NHA151 – NHA202 LOW PREVALENCE



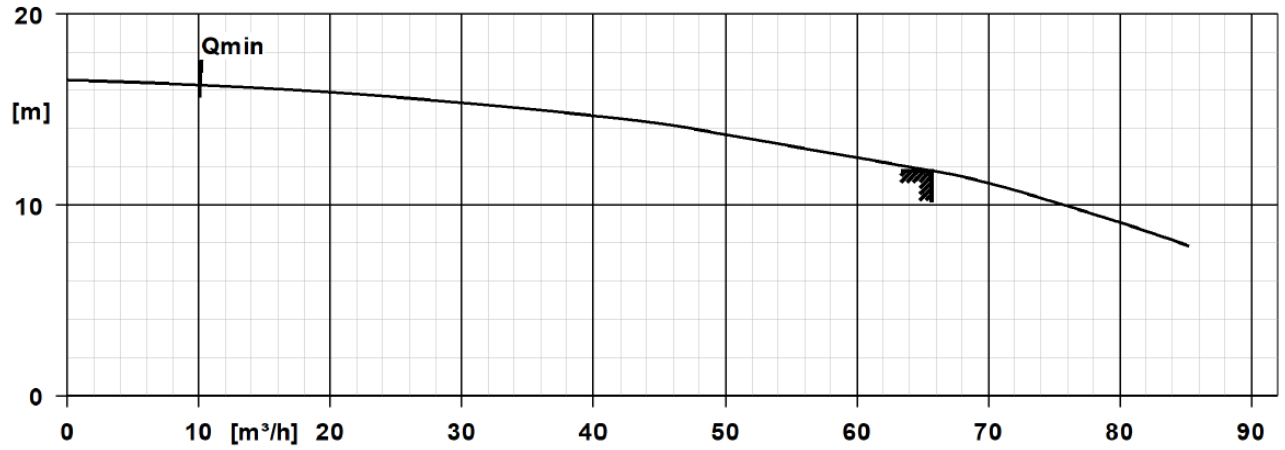
NHA151 – NHA202 HIGH PREVALENCE



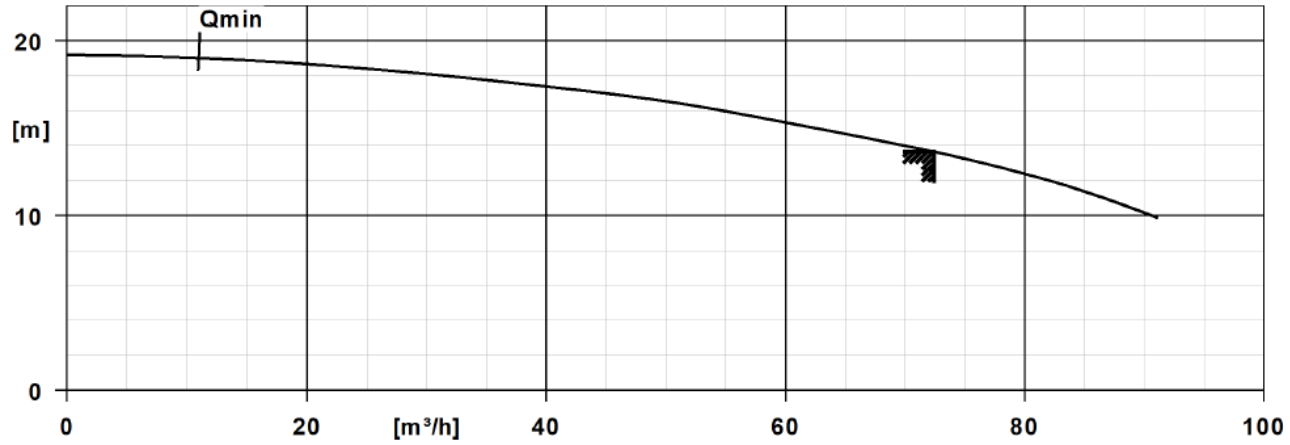
NHA252



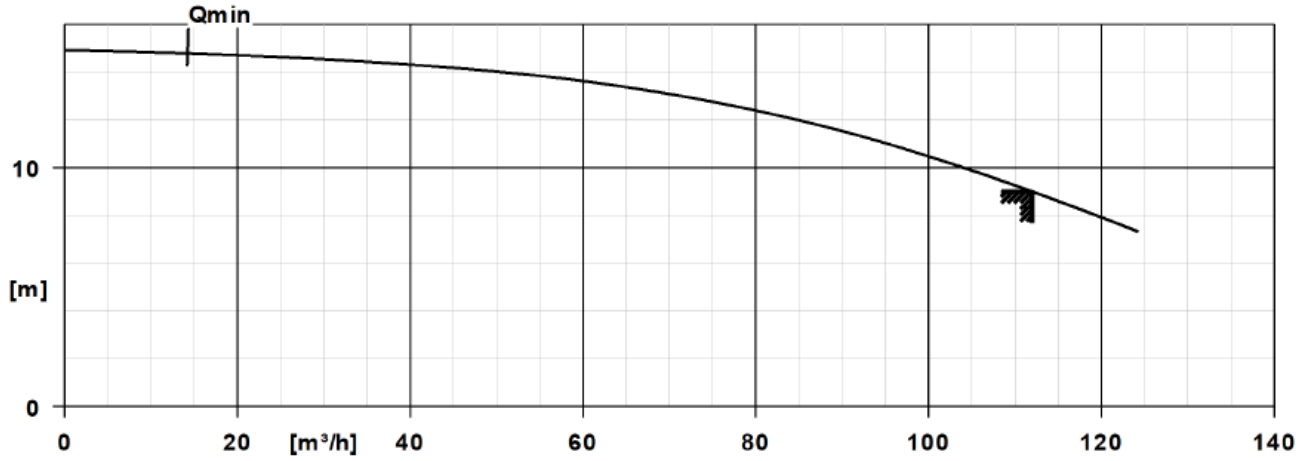
NHA302 LOW HEAD



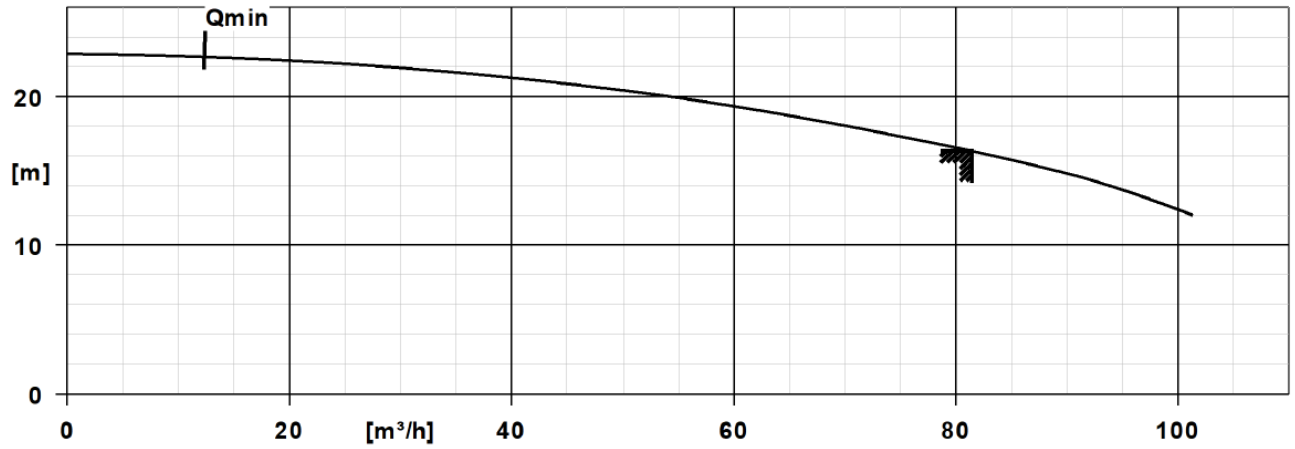
NHA302 HIGH PREVALENCE



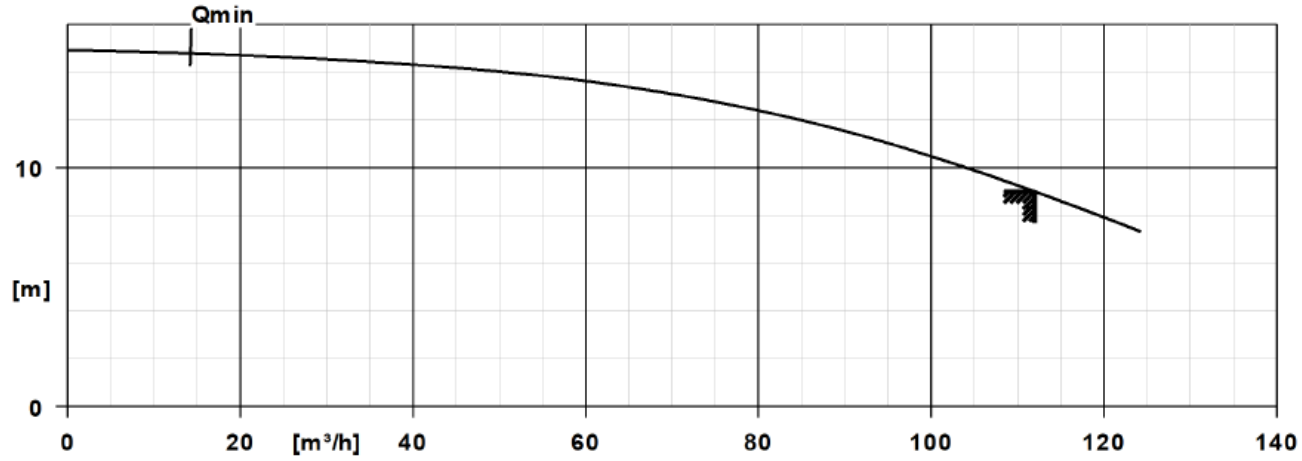
NHA353–NHA403 LOW HEAD



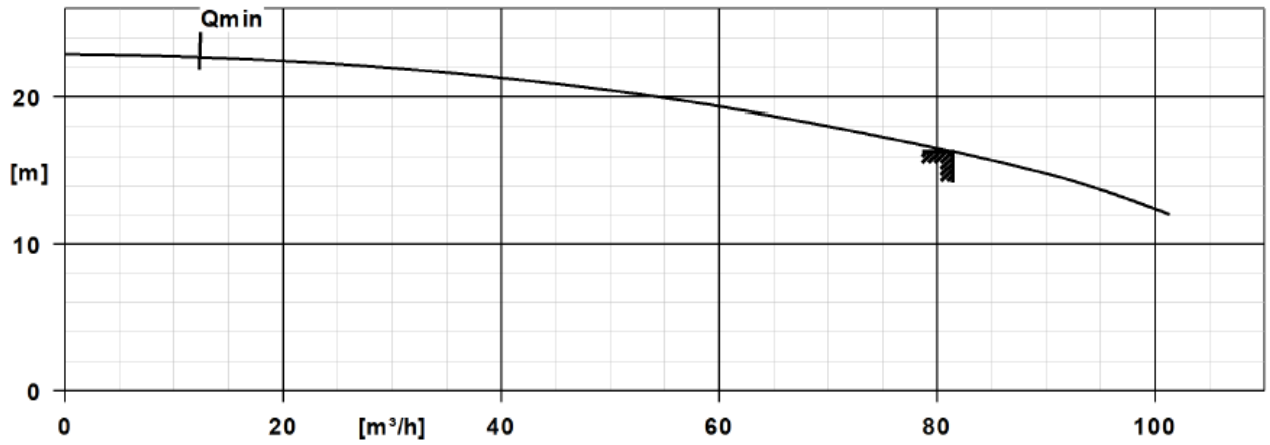
NHA353-NHA403 HIGH PREVALENCE



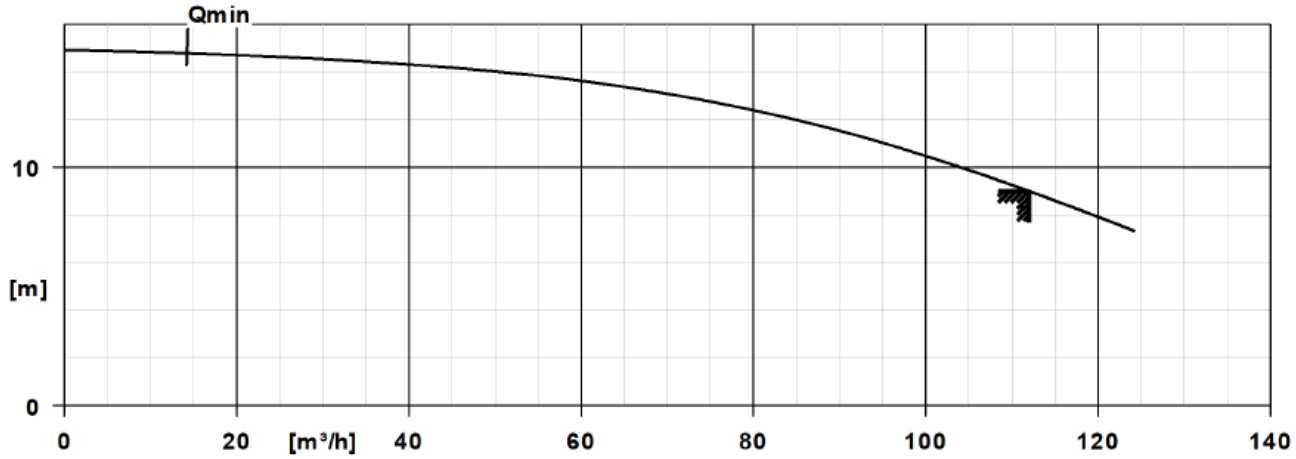
NHA453-NHA504 LOW HEAD



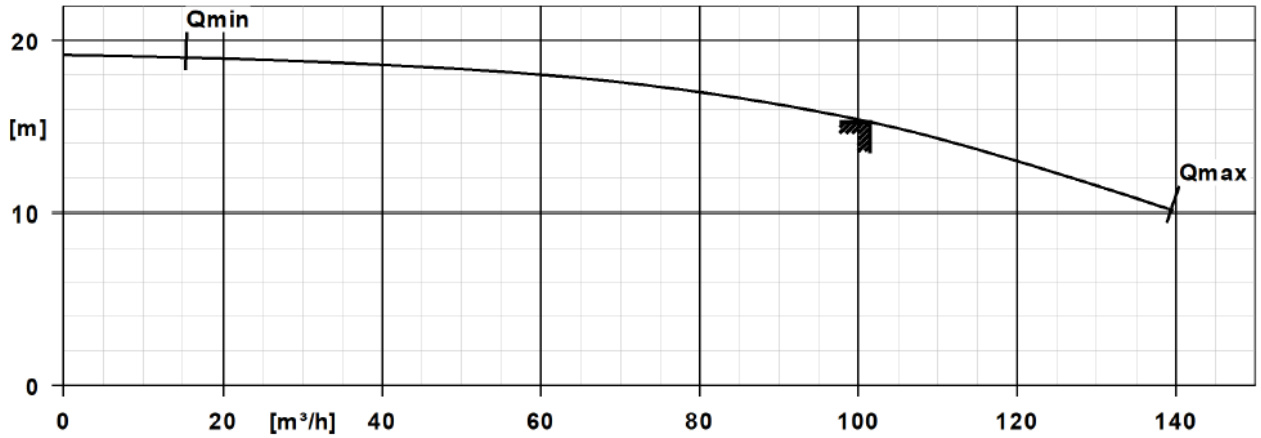
NHA453-NHA504 HIGH PREVALENCE



NHA554–NHA604 LOW HEAD



NHA554–NHA604 HIGH HEADROOM



10.2 Pump specifications

» Pump specifications

Size	Single LP pump / "OR" LP twin pump		Single HP pump / "OR" HP twin pump	
	FLA	P max	FLA	P max
101	2,5	1,1	3,3	1,5
151	3,3	1,5	4,6	2,2
202	3,3	1,5	4,6	2,2
252	5,9	3	5,9	3
302	5,9	3	8	4
353	8	4	8	4
403	8	4	8	4
453	8	4	8,7	5,5
504	8	4	8,7	5,5
554	8	4	8,7	5,5
604	8	4	8,7	5,5

11 RECOMMENDED WATER CIRCUIT

ATTENTION

During hydraulic connection operations, never work with naked flames near or inside the unit.

The recommended hydraulic circuit is shown in figure Recommended water circuit. It is equipped with:
— valves for regulating (VI) the unit on the water pipes, immediately upstream and downstream from the unit itself, to be used in the event maintenance work is required;
— a mechanical filter (F) (MANDATORY!) on the pipe at machine inlet next to it;
— a mechanical filter (F) (MANDATORY!) and a check valve (VR), on the supply line upstream from the filling tap (RC);
— an air vent in the highest point of the installation, to allow for air bleeding;
— safety valve conveyor pipe (VS), which, if the valve is opened, directs the water jet to areas where it cannot damage people or property (Important!);
— anti-vibration joints (AV) on the pipes to prevent vibration transmission to the system.

ATTENTION

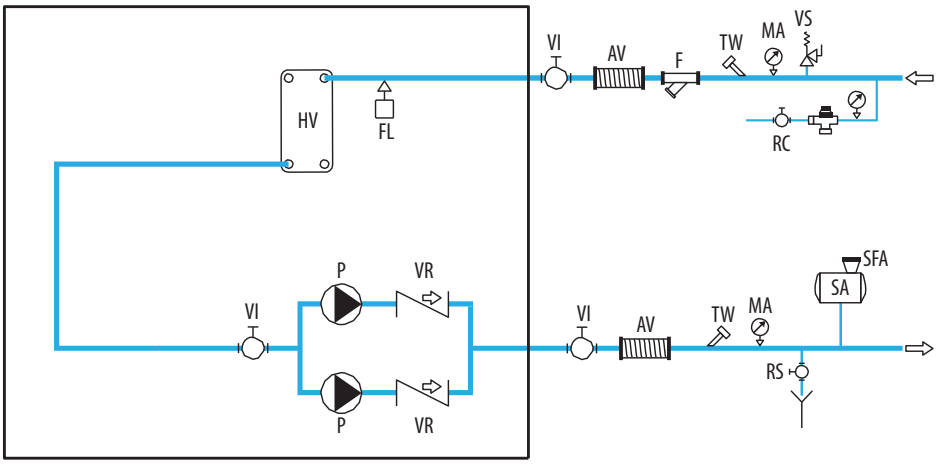
Regarding the choice of mechanical filters, the degree of filtration adopted, expressed as "maximum particle size" (mm), is as follows:
— 0.9 mm up to size 302
— 1.1 mm from size 353 onwards.
It is a good rule for the pipes departing from and returning to the unit not have a smaller diameter than the unit hydraulic connections'.
During the winter months, the system (or the chiller unit alone) must be drained to prevent frost damage; alternatively, the system should be filled with a mixture of water and glycol in an appropriate ratio, selected on the basis of the lowest expected temperature.

ATTENTION

In case an anti-freezing agent of a different type must be used, please contact the office.

Failure to install filters and anti-vibration mounts can cause obstruction, breakage and noise problems for which the manufacturer may not be held responsible.

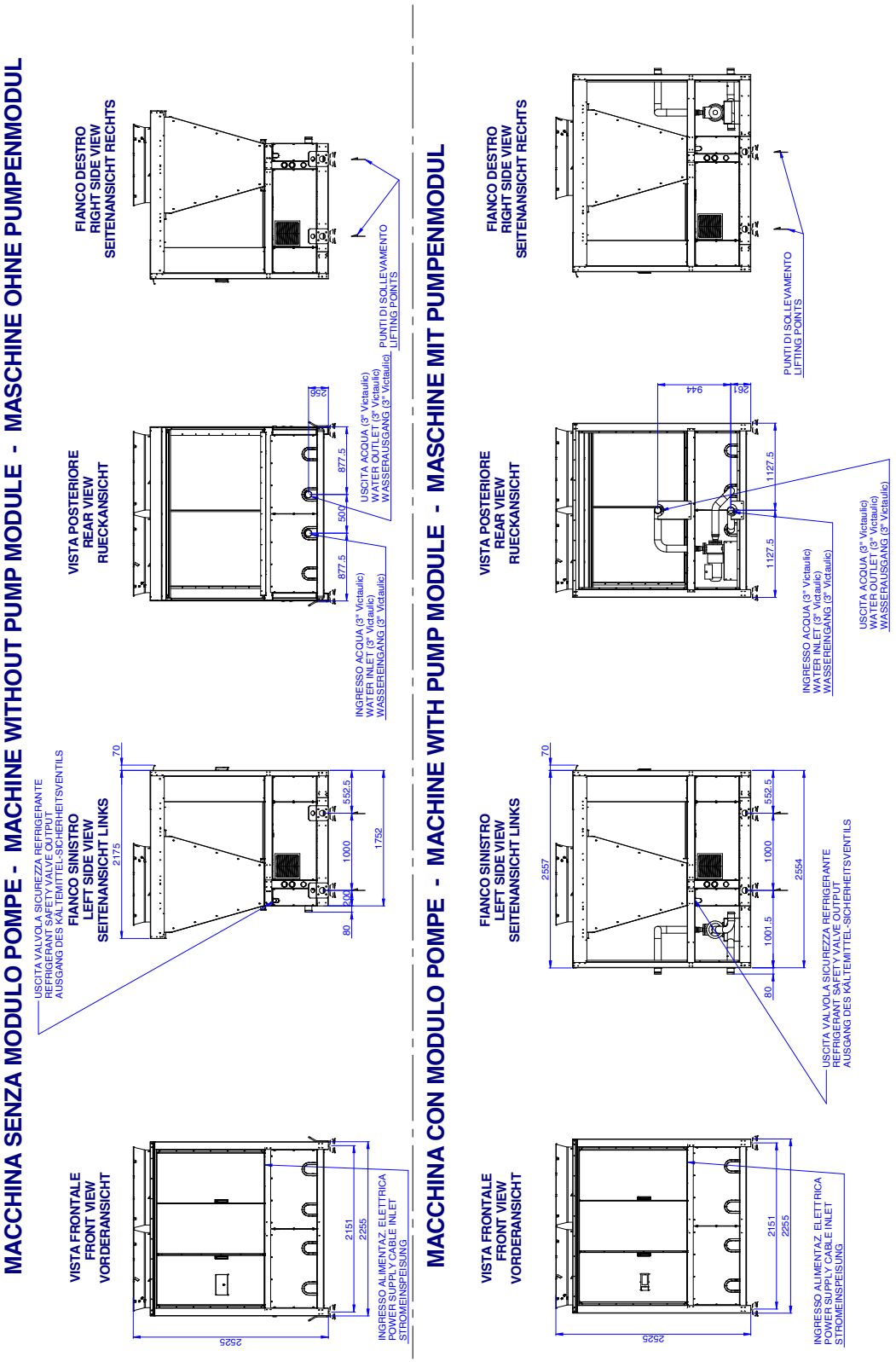
» Recommended water circuit



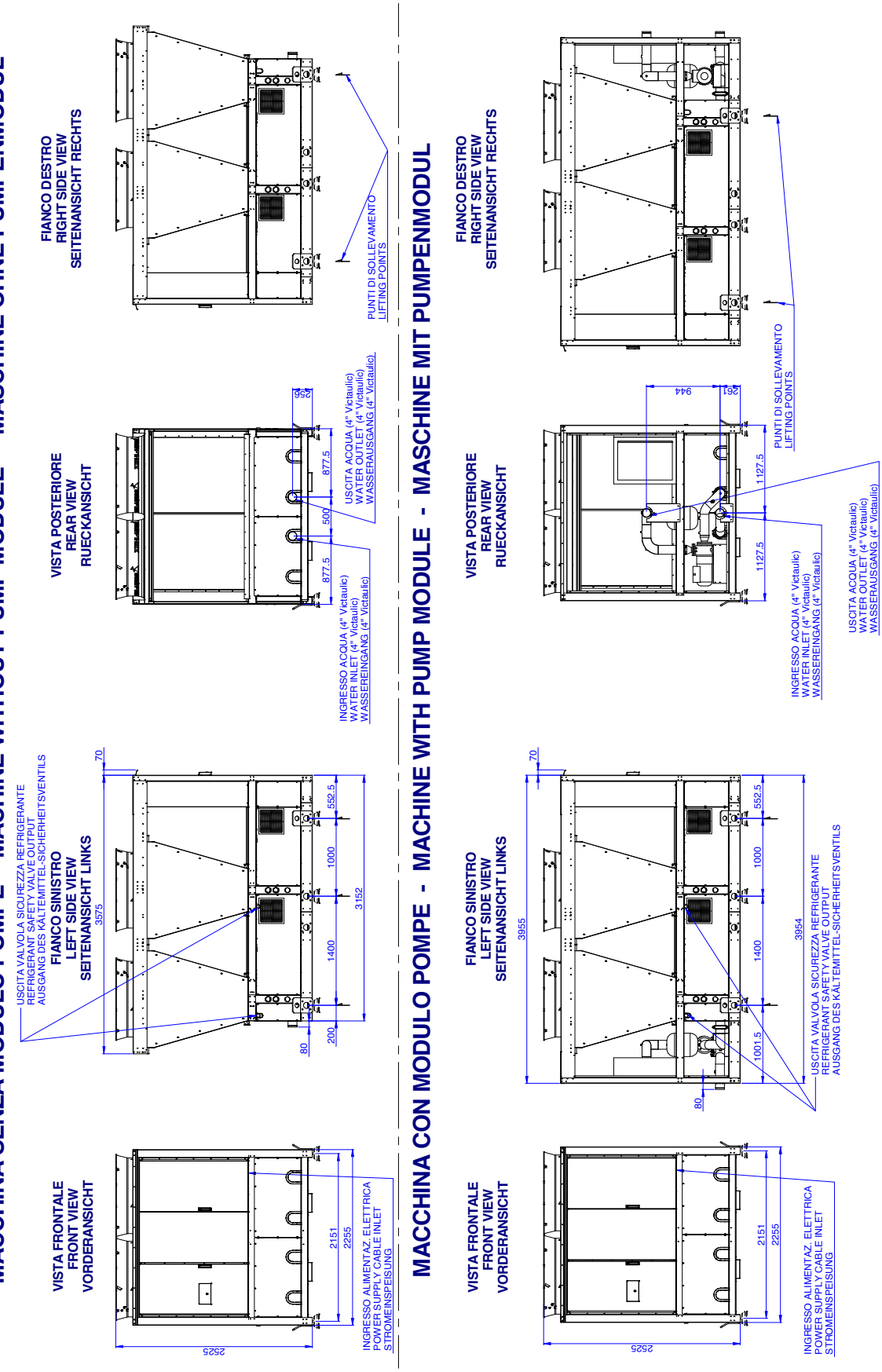
HV	Evaporator	F	Metal filter
FL	Flow switch	VS	Spring safety valve
RC	Filling cock	GR	Filling group
VI	Shut-off valve	SA	Air separator
VR	Check valve	TW	Water temperature detection trap
P	Circulation pump	MA	Pressure gauge
AV	Anti-vibration mount		

12 DIMENSIONS

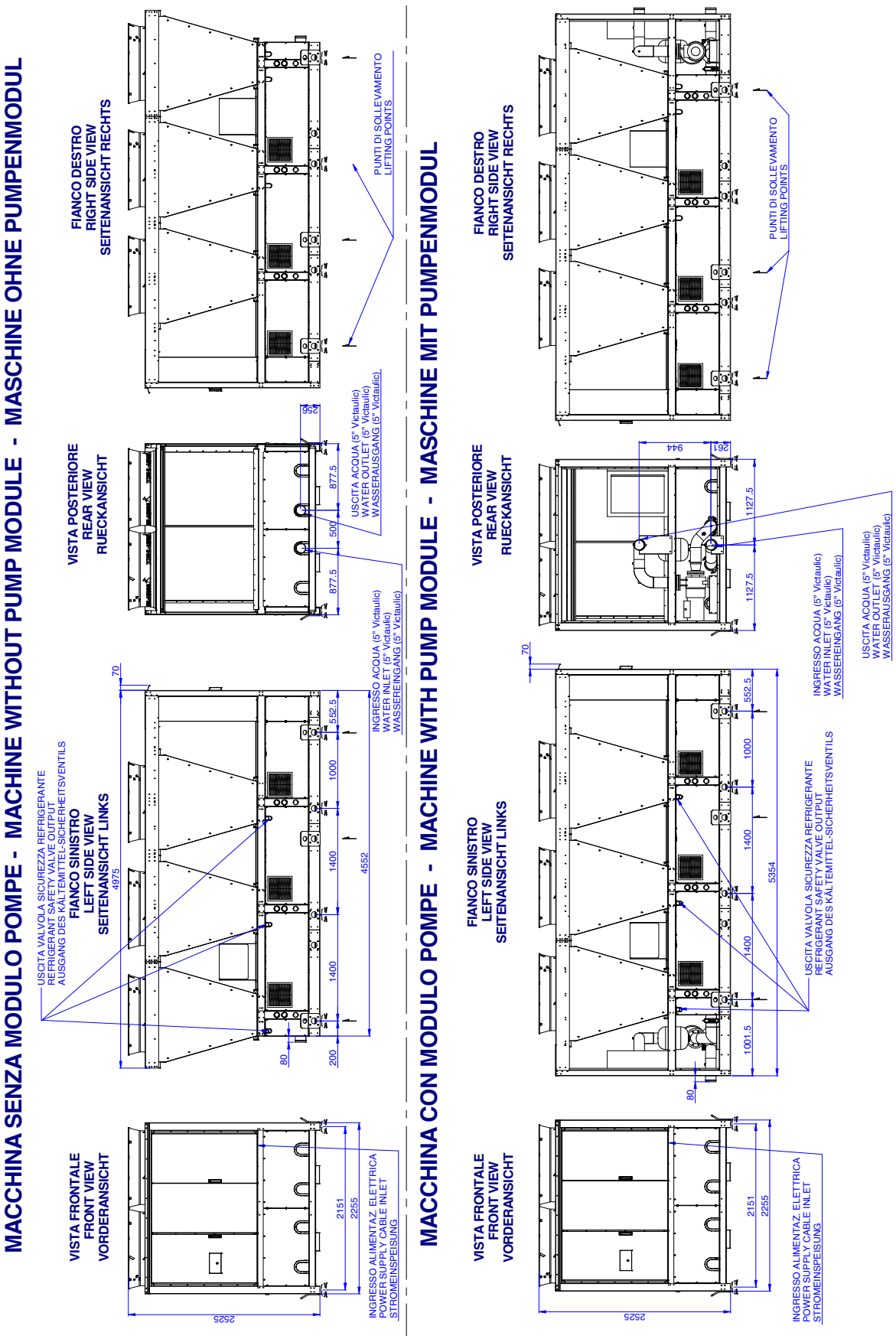
12.1 Frame 1



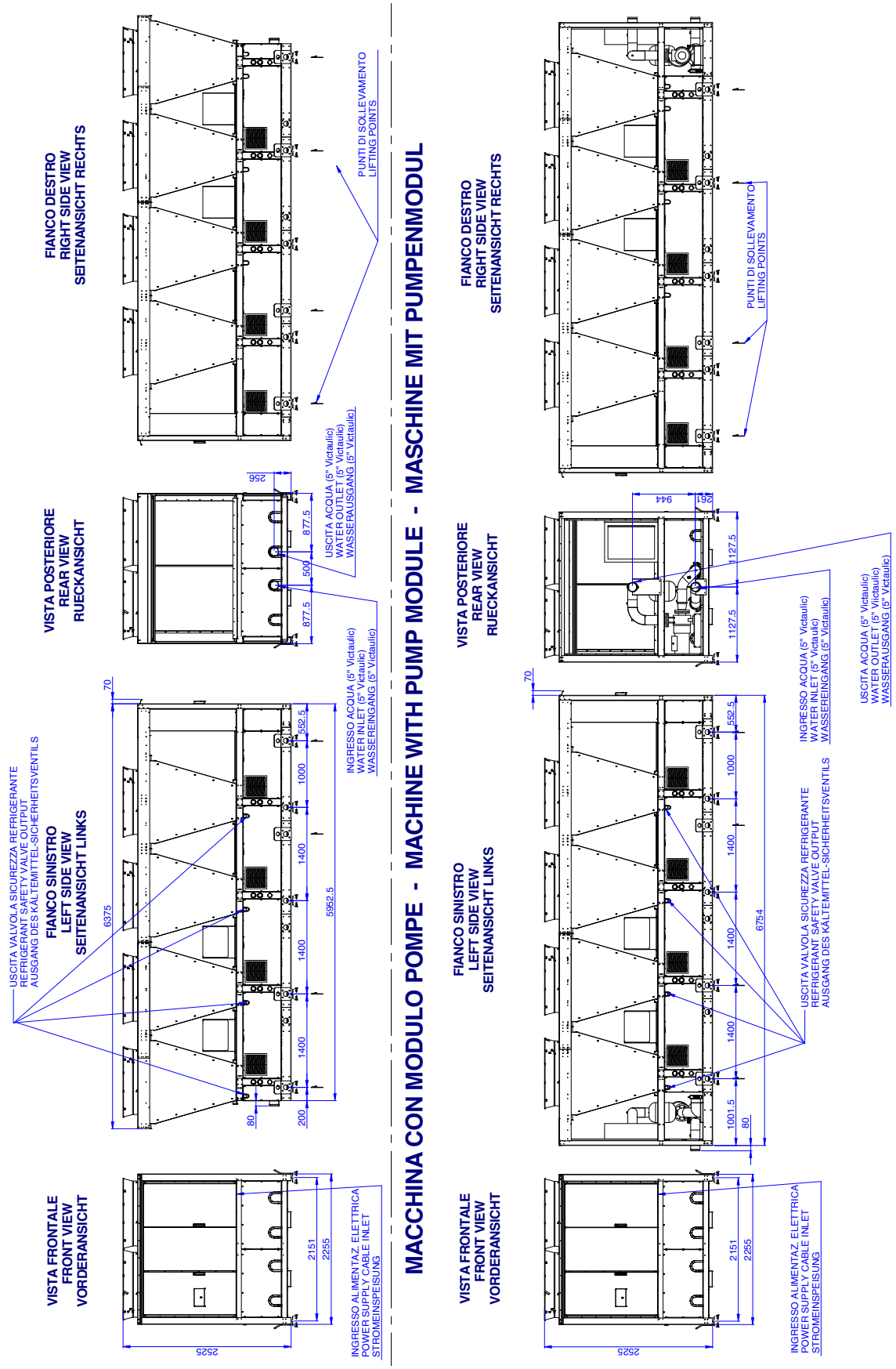
12.2 Frame 2


MACCHINA SENZA MODULO POMPE - MACHINE WITHOUT PUMP MODULE - MASCHINE OHNE PUMPENMODUL
VISTA FRONTALE
FRONT VIEW
VORDERANSICHT
INGRESSO ALIMENTAZ. ELETTRICA
POWER SUPPLY CABLE INLET
STROMEINSPEISUNG
2525
2151
2255
FIANCO SINISTRO
LEFT SIDE VIEW
SEITENANSICHT LINKS
USCITA VALVOLA SICUREZZA REFRIGERANTE
REFRIGERANT SAFETY VALVE OUTPUT
AUSGANG DES KÄLTEMITTEL-SICHERHEITSVENTILS
3575
70
552.5
1000
1400
3152
80
200
VISTA POSTERIORE
REAR VIEW
RUECKANSICHT
55
50
877.5
500
877.5
USCITA ACQUA (4" Victaulic)
WATER OUTLET (4" Victaulic)
WASSERAUSGANG (4" Victaulic)
INGRESSO ACQUA (4" Victaulic)
WATER INLET (4" Victaulic)
WASSEREINGANG (4" Victaulic)
FIANCO DESTRO
RIGHT SIDE VIEW
SEITENANSICHT RECHTS
PUNTI DI SOLLEVAMENTO
LIFTING POINTS
MACCHINA CON MODULO POMPE - MACHINE WITH PUMP MODULE - MASCHINE MIT PUMPENMODUL
VISTA FRONTALE
FRONT VIEW
VORDERANSICHT
INGRESSO ALIMENTAZ. ELETTRICA
POWER SUPPLY CABLE INLET
STROMEINSPEISUNG
2525
2151
2255
FIANCO SINISTRO
LEFT SIDE VIEW
SEITENANSICHT LINKS
3955
70
552.5
1000
1400
1001.5
3954
80
USCITA VALVOLA SICUREZZA REFRIGERANTE
REFRIGERANT SAFETY VALVE OUTPUT
AUSGANG DES KÄLTEMITTEL-SICHERHEITSVENTILS
VISTA POSTERIORE
REAR VIEW
RUECKANSICHT
55
50
944
1127.5
1127.5
INGRESSO ACQUA (4" Victaulic)
WATER INLET (4" Victaulic)
WASSEREINGANG (4" Victaulic)
USCITA ACQUA (4" Victaulic)
WATER OUTLET (4" Victaulic)
WASSERAUSGANG (4" Victaulic)
FIANCO DESTRO
RIGHT SIDE VIEW
SEITENANSICHT RECHTS
PUNTI DI SOLLEVAMENTO
LIFTING POINTS

12.3 Frame 3


MACCHINA SENZA MODULO POMPE - MACHINE WITHOUT PUMP MODULE - MASCHINE OHNE PUMPENMODUL
VISTA FRONTALE
FRONT VIEW
VORDERANSICHT
FIANCO SINISTRO
LEFT SIDE VIEW
SEITENANSICHT LINKS
VISTA POSTERIORE
REAR VIEW
RUECKANSICHT
FIANCO DESTRO
RIGHT SIDE VIEW
SEITENANSICHT RECHTS
INGRESSO ALIMENTAZ. ELETTRICA
POWER SUPPLY CABLE INLET
STROMEINSPEISUNG
USCITA VALVOLA SICUREZZA REFRIGERANTE
REFRIGERANT SAFETY VALVE OUTPUT
AUSGANG DES KÄLTEMITTEL-SICHERHEITSVENTILS
INGRESSO ACQUA (5" Victaulic)
WATER INLET (5" Victaulic)
WASSEREINGANG (5" Victaulic)
USCITA ACQUA (5" Victaulic)
WATER OUTLET (5" Victaulic)
WASSERAUSGANG (5" Victaulic)
PUNTI DI SOLLEVAMENTO
LIFTING POINTS
MACCHINA CON MODULO POMPE - MACHINE WITH PUMP MODULE - MASCHINE MIT PUMPENMODUL

12.4 Frame 4


MACCHINA SENZA MODULO POMPE - MACHINE WITHOUT PUMP MODULE - MASCHINE OHNE PUMPENMODUL
VISTA FRONTALE
FRONT VIEW
VORDERANSICHT
FIANCO SINISTRO
LEFT SIDE VIEW
SEITENANSICHT LINKS
VISTA POSTERIORE
REAR VIEW
RUECKANSICHT
FIANCO DESTRO
RIGHT SIDE VIEW
SEITENANSICHT RECHTS
USCITA VALVOLA SICUREZZA REFRIGERANTE
REFRIGERANT SAFETY VALVE OUTPUT
AUSGANG DES KÄLTEMITTEL-SICHERHEITSVENTILS
INGRESSO ALIMENTAZ. ELETTRICA
POWER SUPPLY CABLE INLET
STROMEINSPEISUNG
INGRESSO ACQUA (5" Victaulic)
WATER INLET (5" Victaulic)
WASSEREINGANG (5" Victaulic)
USCITA ACQUA (5" Victaulic)
WATER OUTLET (5" Victaulic)
WASSERAUSGANG (5" Victaulic)
PUNTI DI SOLLEVAMENTO
LIFTING POINTS
MACCHINA CON MODULO POMPE - MACHINE WITH PUMP MODULE - MASCHINE MIT PUMPENMODUL
VISTA FRONTALE
FRONT VIEW
VORDERANSICHT
FIANCO SINISTRO
LEFT SIDE VIEW
SEITENANSICHT LINKS
VISTA POSTERIORE
REAR VIEW
RUECKANSICHT
FIANCO DESTRO
RIGHT SIDE VIEW
SEITENANSICHT RECHTS
USCITA VALVOLA SICUREZZA REFRIGERANTE
REFRIGERANT SAFETY VALVE OUTPUT
AUSGANG DES KÄLTEMITTEL-SICHERHEITSVENTILS
INGRESSO ALIMENTAZ. ELETTRICA
POWER SUPPLY CABLE INLET
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INGRESSO ACQUA (5" Victaulic)
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USCITA ACQUA (5" Victaulic)
WATER OUTLET (5" Victaulic)
WASSERAUSGANG (5" Victaulic)
PUNTI DI SOLLEVAMENTO
LIFTING POINTS

13 WATER CONTENT

» Water content

Size		101	151	202	252	302	353	403	453	504	554	604
Frame		1	1	2	2	2	3	3	3	4	4	4
Water content with pumps	kg	22	31	53	62	71	108	117	126	146	155	165
Water content without pumps	kg	24	34	58	68	78	118	128	138	161	171	181

» Minimum water content in the system

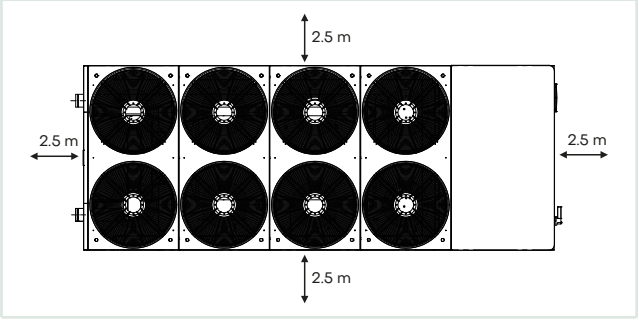
Size		101	151	202	252	302	353	403	453	504	554	604
Minimum water content [H version]	kg	350	350	500	500	500	600	600	600	800	800	800
Minimum water content [L version]	kg	1000	1500	1800	2500	2500	3000	3000	3000	4000	4000	4000

14 INSTALLATION CLEARANCE REQUIREMENTS

Please bear the following points in mind when choosing the best location for installing the unit and its connections:
— the size and origin of the water pipes;
— location of the power supply;
— accesso per manutenzione o riparazioni;
— stability of the support surface;
— air-cooled condenser ventilation and required clearance;
— prevailing wind direction: avoid positioning the unit in such a way that prevailing winds cause air to flow back towards the condenser coils; a wind speed of 8 m/s (28.8 km/h) already generates sufficient stagnation pressure to ensure approximately 60% of the nominal air flow rate. In situations where draughts are unavoidable and temperatures are below -5 °C, the low-outdoor-temperature condensation control must be of the "flooding" type or include a condenser throttling device (contact the technical department for further details);
— possible reverberation of sound waves.

Ensuring sufficient clearance spaces is of critical importance as it ensures an adequate volume of air at both the intake and the delivery ends of the external heat exchangers and avoids recirculation between the two airflows. Failure to do so would result in poorer unit performance or even discontinuance of normal operation. An adequate service space also allows for ordinary maintenance operations to be carried out.
The distances to be observed are the following:
— All sides: minimum 2.5 m;
— Top side: there must be no obstacle to air outlet.

In special cases these requirements can be changed according to design department decisions.



DANGER

During normal operation, human traffic in the area around the machine must be prevented up to at least the required buffer spaces.

Units charged with A3 gas (flammable) must be installed away from drains, manholes, drainage channels, and any other elements that may serve as a pathway for potential leaks of the aforementioned gases, which should always be considered as FLAMMABLE and heavier than air. According to Proklima's guidelines, the minimum distance to maintain from the above prescriptions is 2.5 meters; within this safety zone, smoking, the use of open flames, and any work that may generate flames, arcs, or sparks are strictly prohibited.

At the end of the lifting and positioning operations, verify the absence of leaks using suitable portable leak detectors and LFL detectors; such leaks may occur due to the stresses applied during the aforementioned operations. In case leaks are detected, installation operations must be immediately stopped, the area must be segregated and secured to prevent approach. Immediate assistance service intervention must be requested.

ATTENTION

In case of installation of several machines close together, the clearances between the machines must be 2.5m.

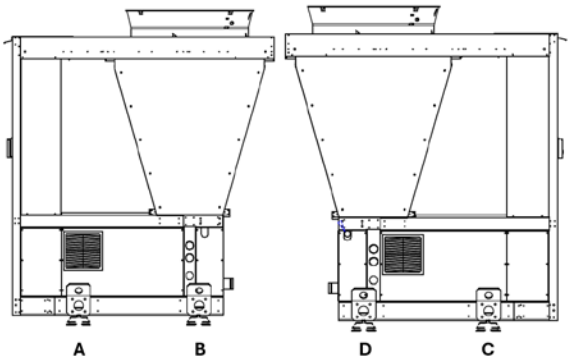
15 WEIGHTS

The following images highlight the parts of the unit for which the weights of the basic version – both the cooling and heat pump versions – have been calculated, as shown in the tables below.

☞ NOTE

The weight values for the hydronic modules must be added to the standard weight values for their respective basic versions (cooling only and heat pump).

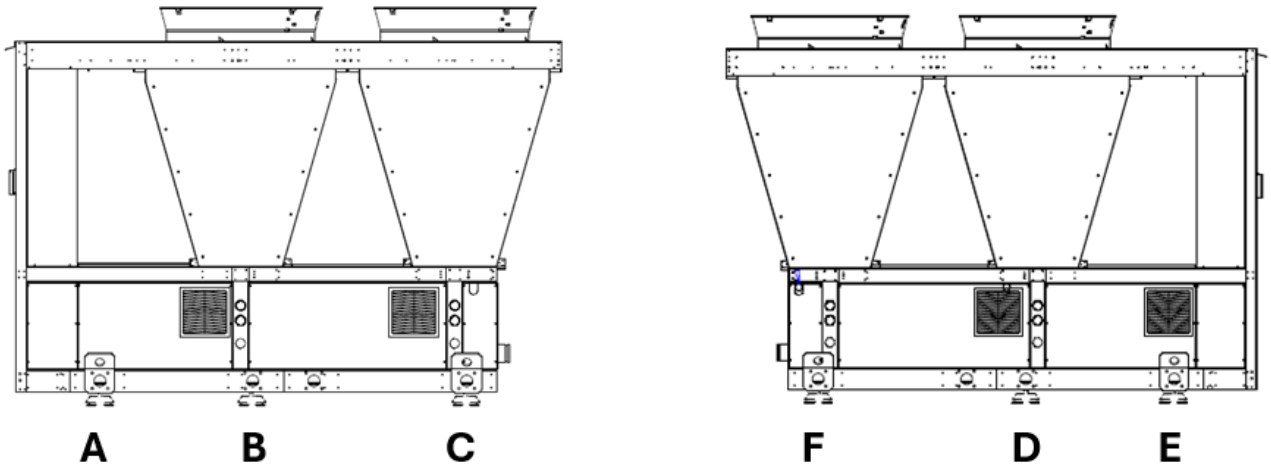
FRAME 1



» Frame 1 weights

Dimension	A	B	C	D
NHA101	330	495	330	495
NHA151	350	525	350	525
NHA101 with hydronic module	370	555	370	555
NHA151 with hydronic module	390	585	390	585

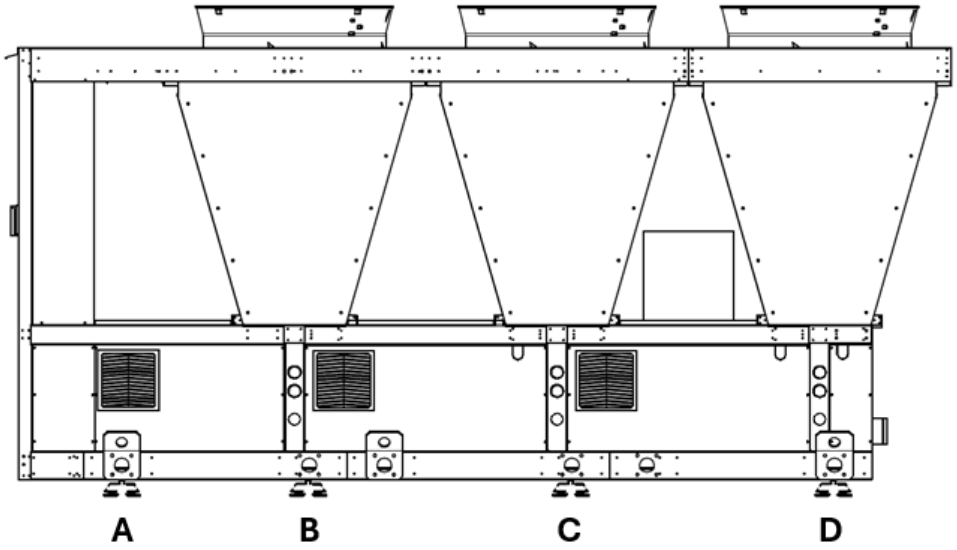
FRAME 2

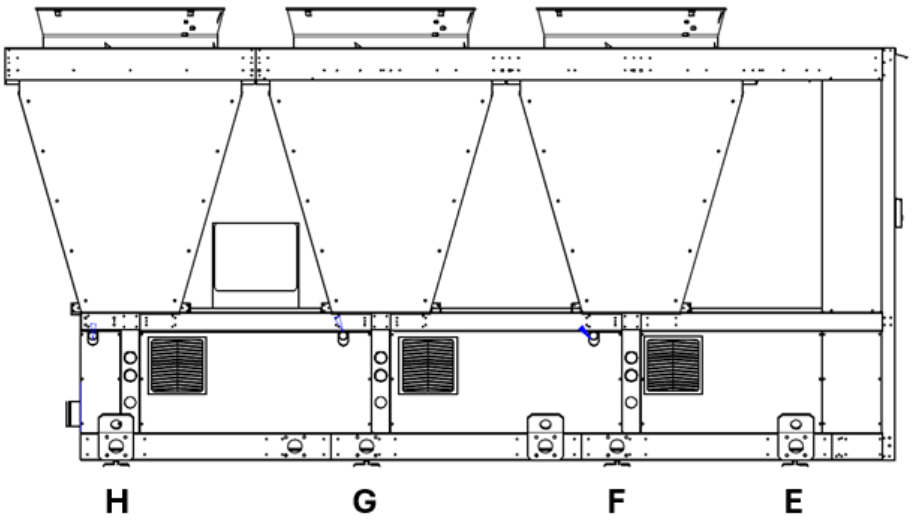


» Frame 2 weight

Dimension	A	B	C	D	E	F
NHA202	330	610	610	330	610	610
NHA252	330	635	635	330	635	635
NHA302	350	650	650	350	650	650
NHA202 with hydronic module	370	640	640	370	640	640
NHA252 with hydronic module	370	665	665	370	665	665
NHA302 with hydronic module	390	680	680	390	680	680

FRAME 3

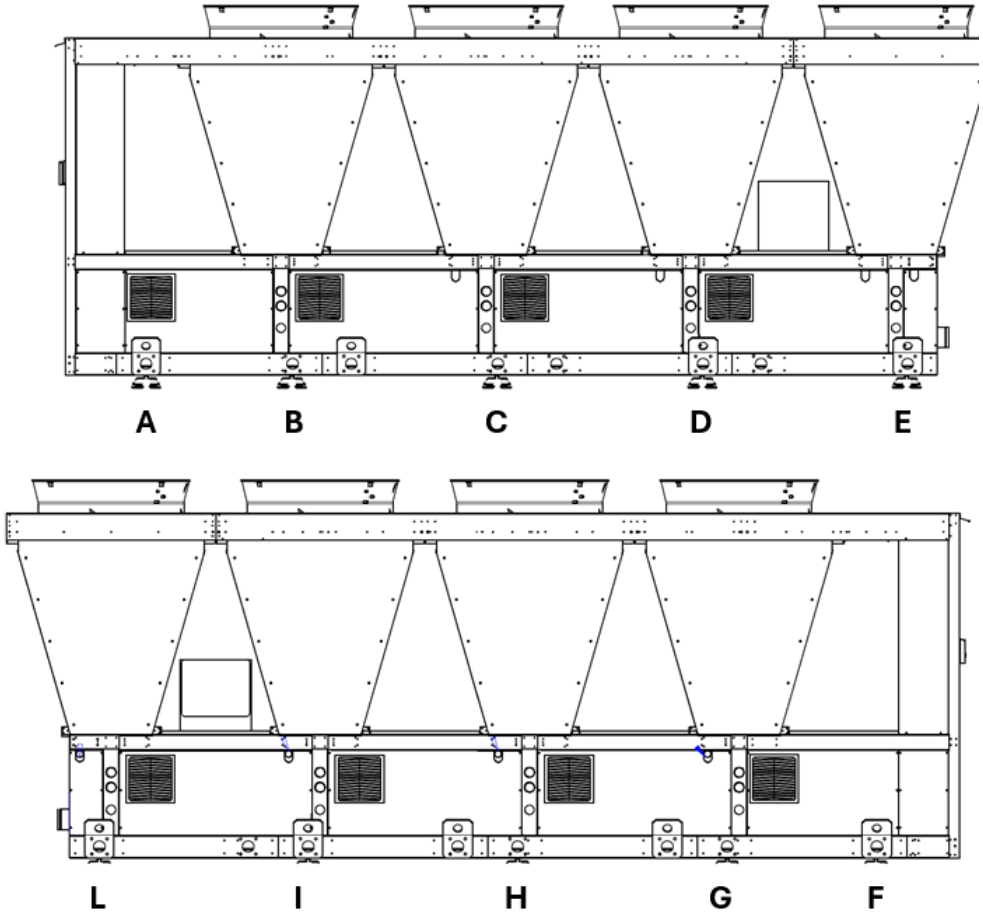




» Frame 3 weights

Dimension	A	B	C	D	E	F	G	H
NHA353	350	658	658	658	350	658	658	658
NHA403	350	675	675	675	350	675	675	675
NHA453	350	692	692	692	350	692	692	692
NHA353 with hydronic module	390	687	687	687	390	687	687	687
NHA403 with hydronic module	390	703	703	703	390	703	703	703
NHA453 with hydronic module	390	720	720	720	390	720	720	720

FRAME 4



» Frame 4 weights

Dimension	A	B	C	D	E	F	G	H	I	L
NHA504	350	688	688	688	688	350	688	688	688	688
NHA554	350	700	700	700	700	350	700	700	700	700
NHA604	350	713	713	713	713	350	713	713	713	713
NHA504 with hydronic module	390	709	709	709	709	390	709	709	709	709
NHA554 with hydronic module	390	721	721	721	721	390	721	721	721	721
NHA604 with hydronic module	390	734	734	734	734	390	734	734	734	734

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