

Chillers and Air/Water heat pumps with axial fans

Technical Bulletin

Reversible heat pump

HWA1-A/H 02109÷04345



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1. UNIT DESCRIPTION AND TECHNICAL FEATURES

The HWA1-A / H air / water heat pumps have been designed for commercial and industrial applications, they are very compact but in any case equipped with large surface air side exchangers; therefore they ensure high efficiency, with COP among the highest in their category. The use of high efficiency and particularly robust scroll compressors, together with the patented oil recovery and distribution system used on tandem circuits, guarantee high reliability and constant performance.

All units are also equipped with low and high pressure transducers, NTC probes on the suction side of the compressors and a microprocessor control with integrated driver for the management of an electronic expansion valve capable of further improving the performance of the units even in the non-standard applications.

1.1 Unit structure

All units of the HWA1-A series have a structure suitable for outdoor installation, consisting of hot-galvanized steel sheet painted with polyester powders RAL 7035 / RAL 3020 (only a few details) to ensure the best resistance to atmospheric agents. All screws and inserts are in galvanized steel.

1.2 Compressors

The compressors are scroll type, specifically designed for operation with R410A, mounted on rubber anti-vibration mounts. The always present crankcase heater is activated when the compressor is off and is disabled when it starts again. We therefore invite you to power the unit electrically and put it on stand-by at least 12 hours before it starts operating. The cooling capacity control is carried out through partialisation steps equal in number to the number of compressors installed in the unit. The inspection of the compressors is easily accessible; only in the SSL version this occurs through the front panel of the compressor box.

1.3 Air side heat exchanger

The air side heat exchangers have a finned pack, made with copper pipes and aluminum fins with a corrugated surface and adequately spaced to ensure maximum heat exchange performance.

1.4 User side heat exchanger

The user side heat exchanger is of the brazed plate type and is made of AISI 316 stainless steel, insulated in the factory using closed cell material, and can be equipped with antifreeze electric heater (optional accessory KA). A differential pressure switch, installed on the water side, ensures the presence of water flow avoiding the formation of ice inside.

1.5 Fans

The fans are axial with wing profile blades. They are statically and dynamically balanced and supplied complete with protection grille and double flared profile air inlet and outlet, specially shaped to increase efficiency and reduce noise. The motor has an IP54 protection degree according to CEI EN 60529.

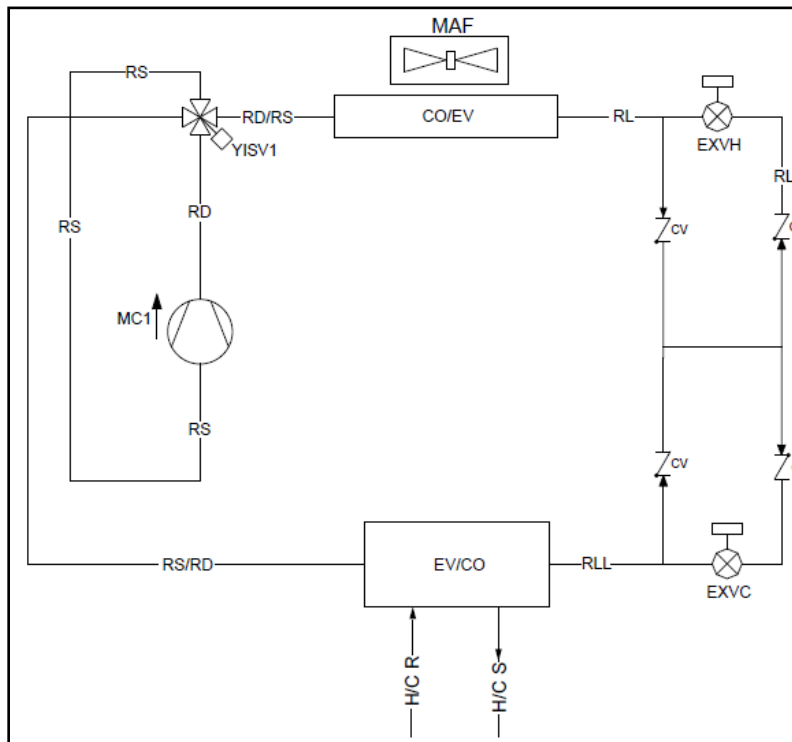
1.6 Fan speed adjustment

The regulation takes place through voltage variators, directly controlled by the control on the machine; it is particularly suitable when operation with outside air temperatures below -10 ° C is required and is supplied on request on all models. EC fans are provided as an accessory which allow to further extend the operating range.

1.7 Refrigerant circuit

The refrigerant circuit is made using components from leading international companies and according to UNI EN 13134 concerning braze welding processes. The refrigerant gas is R410A. The refrigeration circuit includes in its basic version: electronic expansion valve, inspection valves for maintenance and control, safety device compliant with current legislation (high and low pressure switch), safety valve for the refrigerant, pressure transducers to measure accurately evaporation and condensation pressures, high capacity interchangeable cartridge filter drier to avoid obstructions of the rolling valve and eliminate any humidity present in the circuit, liquid sight glass to control the refrigerant charge, solenoid valve and shut-off valves. In the heat pump versions there are also the 4-way reverse cycle valve, liquid separator, liquid receiver and the probe for measuring the outside air temperature.

The conceptual scheme of the HWA1-A / H heat pump is shown below.



MC1	Compressor	EXVH	Electronic expansion valve for heat pump operation	RL	Liquid line
CO/EV	Condenser in chiller operation	CV	Non—return valve	RLL	Laminated liquid line
EV/CO	Evaporator in chiller operation	H/CR	User side water inlet	RS	Suction line
MAF	Axial fan	H/CS	User side water outlet	RS/RD	Chiller functioning suction line
YISV1	Inversin cycle 4 way-valve	RD	delivery line	RD/RS	Chiller functioning delivery line
EVXC	Electronic expansion valve for chiller operation				

1.8 Electrical panel

The electrical panel is completely built and wired in accordance with EN 60204 and includes a power section and a control section. To access the electrical panel, the disconnector must be set to OFF (presence of a door lock system) and open the front panel after unscrewing the fixing screws. The degree of protection of the electrical panel is IP54. The electrical panel is equipped with a terminal block with clean contacts for remote ON-OFF.

1.9 Control system

All HWA1 units are equipped with a control unit equipped with a microprocessor with surheating control logic managed on the basis of the signals sent by the pressure transducers and by the temperature probes. The CPU also controls the following functions: water temperature adjustment, frost protection, compressor timing and start, fan and circulation pump management (if present), alarm reset, alarm signaling and operation LED. Upon request, the microprocessor can be connected to remote BMS control systems.

11.10 Control and protection devices

All units are equipped with the following control and protection devices: phase monitor complete with minimum and maximum voltage relays, which stops the unit if the phase sequence is incorrect or the voltage of at least one phase differs by more than 15% from the others, delivery water temperature probe (with antifreeze function), return water temperature probe (both installed inside the exchanger), low pressure transducer, high pressure translator,

delivery temperature on the compressors, safety valve on the low and high pressure side, temperature probe on the compressor delivery, external air temperature probe, fan thermal protection, thermal protection on each compressor, water side differential pressure switch to protect the evaporator, manual reset high pressure switch installed on the compressor delivery pipe, automatic reset low pressure switch installed on the compressor suction pipe.

1.11 Hyhdraulic circuit

The heat pumps of the HWA1-A / H series can be supplied with a built-in hydronic unit, which includes, in addition to the differential pressure switches, a single or double pump (one in reserve to the other) with AC motor, suitable for the use of chilled water and directly managed by the machine control.

It is also possible to install an internal inertial storage tank externally insulated with closed cell expanded material having adequate capacity to avoid excessive start and stop of the compressor.

2. VERSION DESCRIPTION AND ACCESSORIES

SERIE	Size	Version with desuperheater / Low water temperature device	Acoustic configuration	Hydronic kit
HWA1-A/H	xxxxx	-	-	-
		DS	SL	PS
		BT	SSL	PSAP
			C	PD
				PDAP
				PS/SI
				PSAP/SI
				PD/SI
				PDAP/SI

2.1 Versions

The versions available for reverse cycle heat pumps are:

- HWA1-A/H - Reverse cycle heat pump standard version
- /DS - Reverse cycle heat pump with desuperheater

The unit with the desuperheater provides for the addition of a brazed plate heat exchanger made of AISI 316 stainless steel, insulated in the factory using closed cell material. This version allows to recover about 20% of the otherwise dispersed condensation heat and to use it to power the post-heating water coils of an AHU or for a flywheel of domestic hot water or for any other process uses.

- /BT— Reverse cycle heat pump BT version (for low water temperatures)

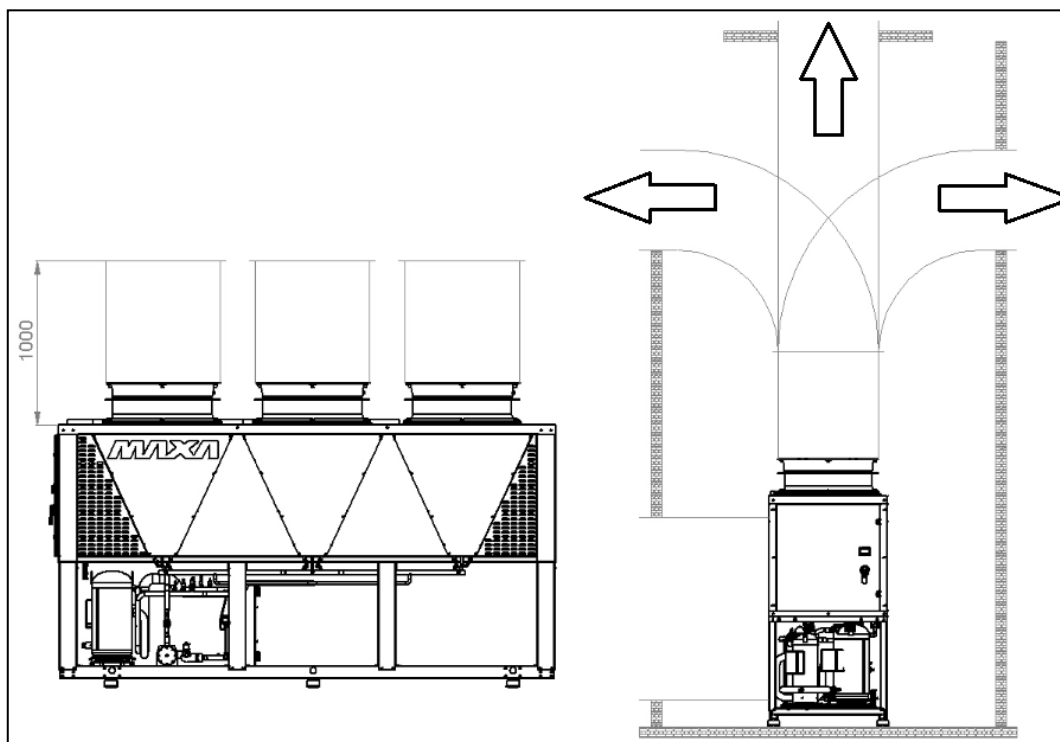
The BT version unit allows you to extend the operating range of the unit by cooling the water directly to the user down to - 8 ° C. In this case, the use of a mixture of water and glycol is envisaged. **The BT version includes the EC fan and condensation control down to -20 ° C (CC)**

2.2 Acoustic configuration

You can choose an acoustic configuration among the following:

- /SL – Silenced version
The silenced unit (equipped with SL accessory) provides an innovative thermo-acoustic cover on the compressors. This insulation allows up to 10% noise reduction at certain compressor rotation frequencies. The particular multilayer structure allows thermal insulation which at very low temperatures reduces losses by up to 2% compared to standard insulation. **The SL version includes condensation control down to -10 ° C (CT)**
- /SSL – Versione super silenziosa
The super silenced unit (equipped with SSL accessory) provides, in addition to the thermo-acoustic hood on the compressors, also a special diffuser mounted on the fan. This diffuser increases the efficiency of the fan allowing it to reduce its speed, lowering the sound pressure and energy consumption. In this way it is possible to save substantial amounts of electricity for each fan. **The SSL version includes the EC fan and condensation control down to -20 ° C (CC)**
- /C – Ducted version
With the ductable version, the diffuser is used to take advantage of the greater prevalence of the fan and possibly channel the expulsion of air. **The C version includes the EC fan and condensation control down to -20 ° C (CC)**

The figure shows an example of a possible ducted installation.



A quantitative indication of the additional head obtainable with the ductable version compared to the standard version is given, with the same flow rate and absorbed power.

Higher pressure drops on the duct do not ensure the declared performance.

In the ductable version, the declared acoustic data lose meaning and are no longer reliable.

Size HWA1-A/H	Additional head ductable version compared to standard version	
	Pa	mmH2O
02109	40,46	4,13
02121	41,96	4,28
02142	39,77	4,06
02148	39,95	4,07
02160	41,34	4,22
04176	38,47	3,92
04199	38,84	3,96
04215	39,25	4,00
04237	40,68	4,15
04273	38,7	3,95
04304	39,1	3,99
04345	40,69	4,15

2.3 Hydronic kit

A hydronic kit can be combined with the heat pump from the following:

/ PS - Reverse cycle heat pump, standard head pump version only

/ PSAP - Reverse cycle heat pump only high head pump version / PD - Reverse cycle heat pump double head standard version

/ PDAP - Reverse cycle heat pump double head version high head /

PS / SI - Reverse cycle heat pump standard head pump + tank version

/ PSAP / SI - Reverse cycle heat pump, high head pump + tank version / PD / SI - Reverse cycle heat pump, double standard pump + tank version

/ PDAP / SI - Reverse cycle heat pump double head version + high head tank

2.4 Accessories list

Listed below are the accessories available for reverse cycle heat pumps.

description	Accessory	Standard	Factory fitted	Supplied separately
SS Soft starter	X		X	
SAS Remote probe	X			X
Three-phase relay for monitoring of maximum and minimum voltage / sequence / lack		X	X	
ACK6 Summer / winter signaling	X		X	
Machine lockout signal		X	X	
defrosting signal		X	X	
Digital input for double set-point		X	X	
CM Modbus Activation	X		X	
ISK Serial converter USB/RS485	X			X
IS to Bacnet/Lonworks Gateway Modbus RTU (RS485) to BACnet / Lonworks	X			X
IS to Bacnet/Konnex Gateway Modbus RTU (RS485) to BACnet / Konnex	X			X
KA1 Plate heat exchanger electric resistance	X		X	
KA2 Pump antifreeze electric heater (KA1 included)	X		X	
KA3 Tank electric heater (KA2 and KA1 included)	X		X	
IM Magnethermic switch for compressors and fans	X		X	
Hi-T2 Touch screen display	X			X

Description	Accessory	Standard	Factory fitted	Supplied separately
i-CR Remote control	X			X
Clean on / off remote contact		X	X	
Clean contact for summer/winter selection		X	X	
Modification of the dynamic set-point - climatic curve (via external air probe present in the unit)		X	X	
LQ Electrical board lighting	X		X	
SH Schuko plug (with magnetothermal switch)	X		X	
CT Condesnation control up to -10°C	X		X	
CC Condensation control up to -20°C (only with EC fans)	X		X	
Cu/Al Heat exchanger		X	X	
TX3 Cu/Cu Heat exchanger	X		X	
TX2 Cu/Al Heat exchanger with Silver Line anti-corrosion treatment	X		X	
Liquid line solenoid valve		X	X	
Liquid / humidity indicator		X	X	
Differential pressure switch (flow presence signal)		X	X	
RFM Suction and discharge ball valve for compressors	X		X	
AG Anti-vibration rubber mounts	X			X
AM Anti-vibration spring mounts	X			X
GR1 Cooling circuit anti-intrusion grid	X		X	
GR2 Condenser anti-intrusion grid	X		X	
2SFV Double security valve with changover valve	X		X	
EEV - Electronic valve		X	X	
FY Filtro a Y	X			X
TE1 Special pump gasket seal for glycol concentration over 40%	X		X	
RV Grooved connection joint	X			X
KS Hoist ring kit	X		X	
EC fan (it includes CC accessory)	X		X	

2.5 Description of accessories

2.5.1 Factory fitted accessories

Soft starter (SS) – electronic static starter for starting management, installed inside the electrical panel, allows the reduction of the starting current and the mechanical wear of the motor windings. .



Remote probe enabling– In some system solutions it may be necessary to enable a system temperature probe so that the on-board machine controller can correctly process the management. The remote system probe controls the heat pump only during the compressor start-up phase, the shutdown is managed by the probe present on the unit return .

Three-phase relay for monitoring of maximum and minimum voltage / sequence / absence - indicates the presence of all three phases in the correct sequence and if all three phase-phase voltages are within the set limits. The maximum and minimum voltage thresholds can be set separately..

Summer / winter signaling (ACK6) - auxiliary contactors that provide a clean contact, allowing to remotely signal the operating mode (summer / winter)..

Compressor on / off signaling - auxiliary contactors that provide a clean contact, allowing remote signaling of compressor activation.

Machine lockout signal - auxiliary contactors that provide a clean contact, allowing you to remotely report the machine lockout.

defrosting signal - auxiliary contactors that provide a clean contact, allowing remote signaling of the defrost in progress..

Digital input for double set-point - input that allows you to change the set point.

Modbus activation (CM) – accessory that allows the unit to be connected to external controllers via serial cable with RS-485 electrical standard and ModBus RTU protocol.

USB Serial converter RS485 (ISK) - interface device capable of reading and writing the registers of the control via the RS485 standard and converting it into a USB port that can be connected to any supervision system. .

Gateway Modbus RTU (RS485) to BACnet / Lonworks - device that allows the conversion between Modbus RTU and BACnet / Lonworks, allowing the unit control to be configured as a normal device in the BACnet / Lonworks network.



Gateway Modbus RTU (RS485) to BACnet / Konnex—device that allows the conversion between Modbus RTU and BACnet / Konnex, allowing the unit control to be configured as a normal device in the BACnet / Konnex network.

Heat exchanger adhesive resistance (KA1) - electrical resistance placed on the front face of the plate heat exchanger, which is activated when the water temperature inside the exchanger drops below + 4 ° C.

Pump antifreeze heater (KA2) - electric heater that protects the pump from the formation of ice.

Tank resistance (KA3) - electrical resistance that protects the storage tank from the formation of ice.

Magnethermic switch for compressors and fans (IM) – Overcurrent breakers applied to compressors and fans protect the components from failures caused by possible current peaks.

Clean remote on/off contact - contact in the terminal block which allows the unit to be switched on and off.

Clean contact for summer/winter selection - possibility to manage remotely the heating or cooling operating mode of the heat pump.



Modification of the dynamic set-point - climatic curve (via external air probe present in the unit) - the regulator allows to modify the set-point by adding a value according to the temperature of the external air probe.

Condensation control down to -10 ° C (CT) (for standard AC fan) - The use of the electronic controller allows effective control of the pressure / temperature on the chiller. The regulator reduces the rotation speed of the fans up to 1/5 of the nominal allowing to keep the system condensing temperature within the limits prescribed by the compressor manufacturer even with very low external temperatures (up to -10 ° C of external air) without having to resort to continuous on-offs that involve swinging, reduced efficiency and risk of possible blockages due to low pressure alarms.

Condensation control down to -20 ° C (CC) (for EC fan) - The electric motor used is piloted in modulation with brushless EC motor, directly coupled, and equipped with integrated thermal protection. With this type of fans, regulation takes place by modulating the brushless motor directly controlled by the 0-10V signal of the controller. This adjustment is particularly suitable for heat pump units or when operation as a chiller is required with outdoor air temperatures below -10 ° C and down to -20 ° C.

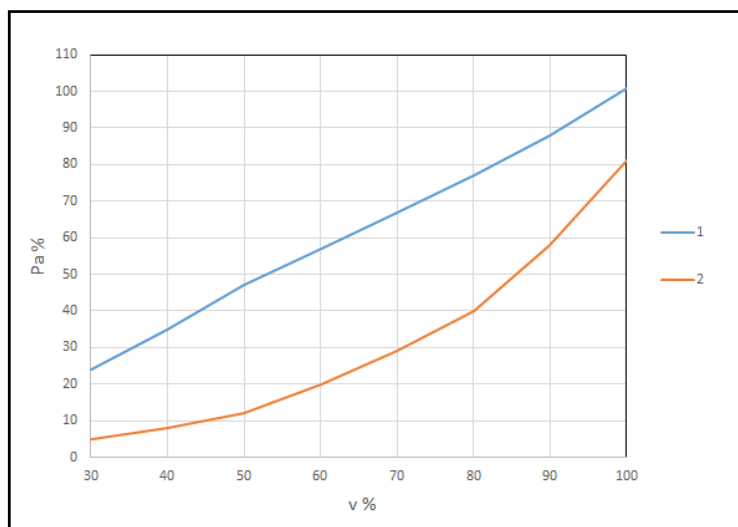
In the image you can see the % savings in terms of electrical power absorbed using the EC fan accessory, as the fan speed changes.

P_a = power absorption

v = fan speed

1 = standard fan

2 = EC fan (accessory)



Electrical board lighting (LQ) - light to illuminate the interior of the electrical panel facilitating maintenance for the operator.

Schuko plug (with magnetothermal switch) (SH) - courtesy socket on the electrical panel (maximum 16 A) protected against overcurrents and short circuits by a thermal magnetic circuit breaker.

Cu/Cu Heat exchanger (TX3)– finned pack heat exchanger with copper pipes and fins; by using a single material, galvanic corrosion is avoided.

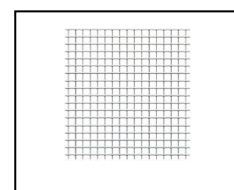
Cu/Al Heat exchanger with Silver Line anti-corrosion treatment (TX2) – finned pack heat exchanger with copper pipes and aluminum fins, subjected to treatment with a special polyurethane-based paint for corrosion protection. The protection gives the battery flexibility to resist contractions and thermal expansions, resistance to UV rays and makes it repellent to dirt. The treatment guarantees battery protection in practically all environmental conditions: from marine to rural environments, from industrial to urban areas. For specific instructions for cleaning the coils treated in this way, please refer to chapter 10.1.1 of the user-installer manual “Cleaning the finned coils treated with the anti-corrosion method”. Liquid line solenoid valve - valve inlet to the refrigerant circuit, used for pump down, to avoid the presence of liquid at the compressor inlet.

Liquid / humidity indicator - it allows a quick and safe assessment of the conditions of the refrigerant fluid on the liquid line as regards flow and humidity regularity.

Differential pressure switch (flow presence signaling) - by monitoring the pressure difference, it ensures that there is sufficient flow for correct machine operation.

Suction and discharge valve for compressors (RFM) – shut-off valve placed on the suction and delivery of compressors, allows simplification of maintenance by avoiding draining the refrigerant in the entire unit.

Cooling circuit anti-intrusion grid (GR1) – in order to prevent the intrusion of foreign bodies into the structure, it is placed on the refrigerator circuit compartment.



Condenser anti-intrusion grid (GR2) – wire mesh that prevents the intrusion of foreign bodies inside the battery and to protect the battery from accidental contact with things or people.

Double security valve with changeover valve (2SFV) – the exchange tap allows the simultaneous or alternative use of 2 safety valves facilitating periodic verification or replacement ensuring the operation of the system and the maintenance of the safety system.

EEV – electronic valve – expansion valve, designed for continuous control and regulation of the quantity of refrigerant entering the evaporator. The changes in thermal load can be followed quickly, so as to optimize consumption.

Special pump gasket seal for glycol concentration over 40% (TE1) - for mixtures of water and glycol higher than a weight percentage of 40% and up to 50%, a different mechanical seal is used to ensure correct operation of the electric pump.

Hoist ring kit (KS) – facilitate the lifting and positioning of the unit.

2.5.2 Loose accessories

Remote probe (SAS) – NTC probe co-molded with IP 67 thermoplastic rubber strip, 4 m long, operating in the temperature range -50 ° C + 120 ° C.

Touch screen remote control (Hi-T2) - it allows you to view the status of the unit remotely; to be mounted in the most convenient place for the user.

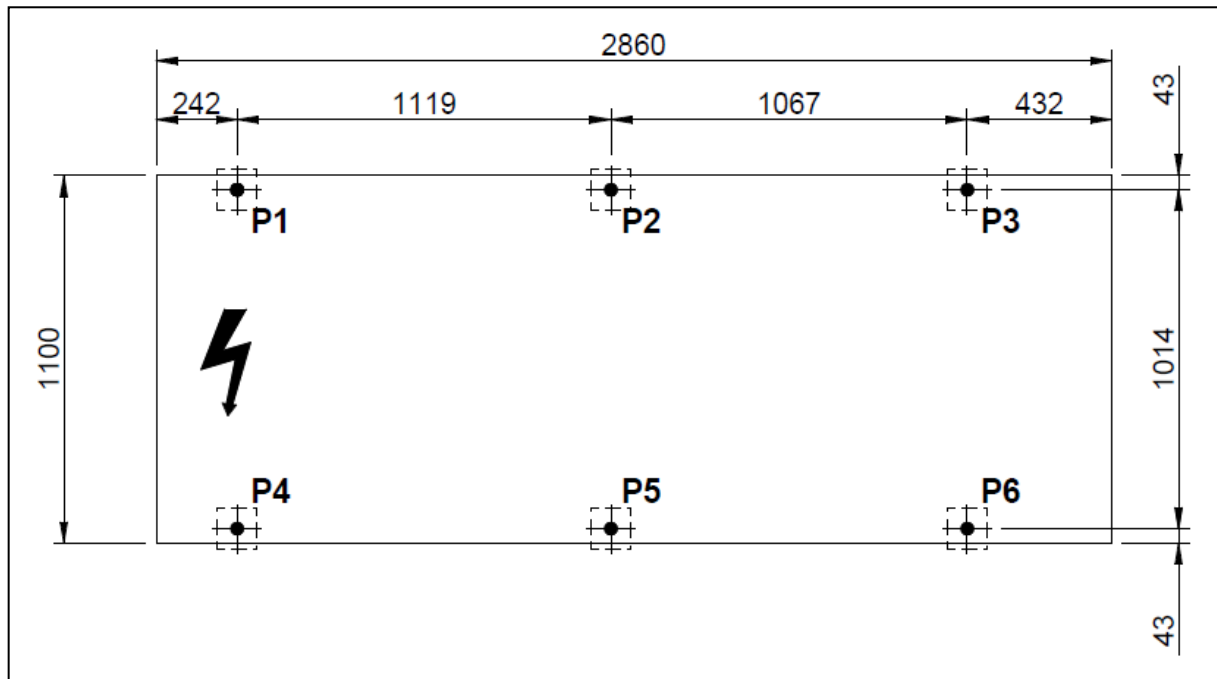


Wired remote control (i-CR) – Modbus remote control with negative LCD and capacitive keys. The device is to be used as a remote machine keyboard with local temperature detection, it replicates the functionality of the on-board control.

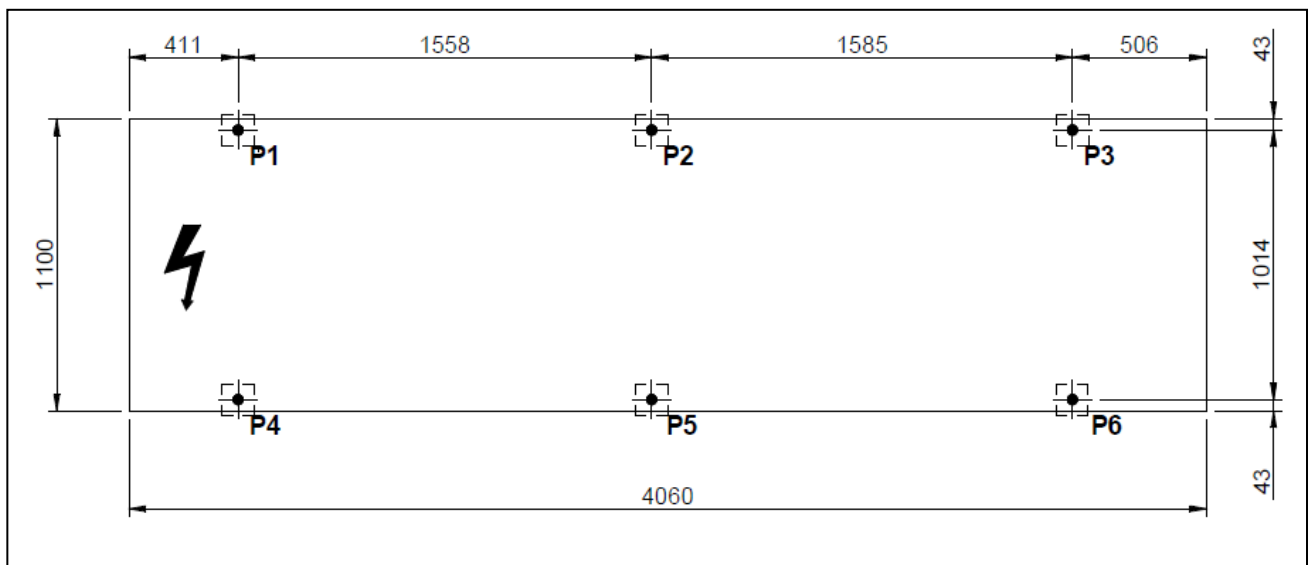


Anti-vibration rubber mounts (AG) and spring mounts (AM) — they have the purpose of not transmitting vibrations to the structure; they are to be mounted under the unit, in special holes.

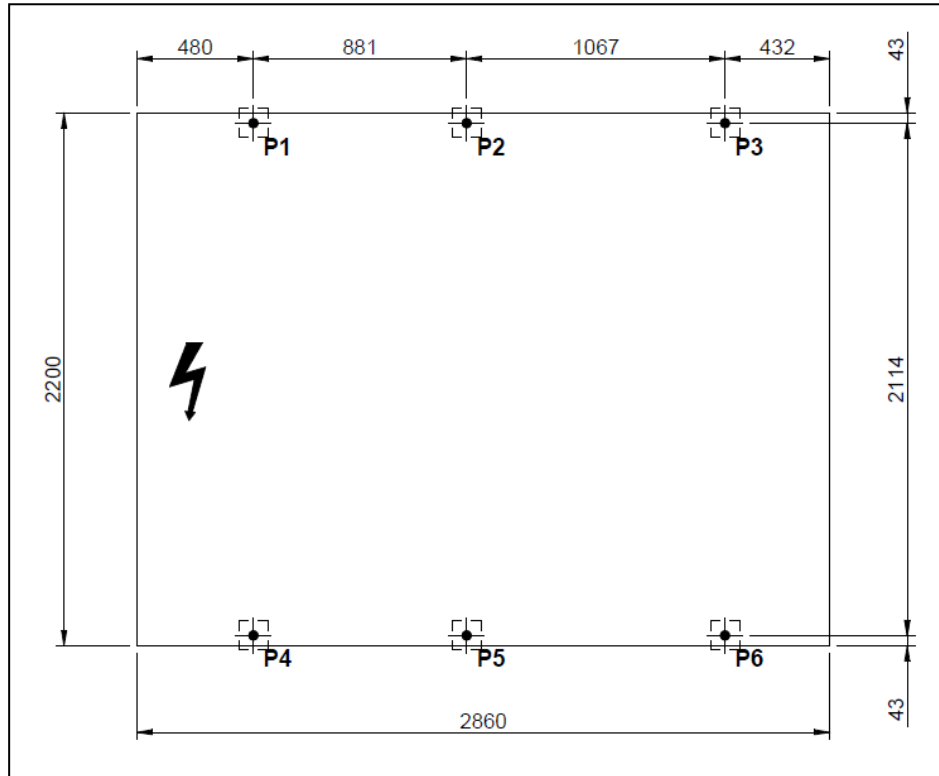
The ideal installation positions of the vibration dampers for each type of machine are shown below.



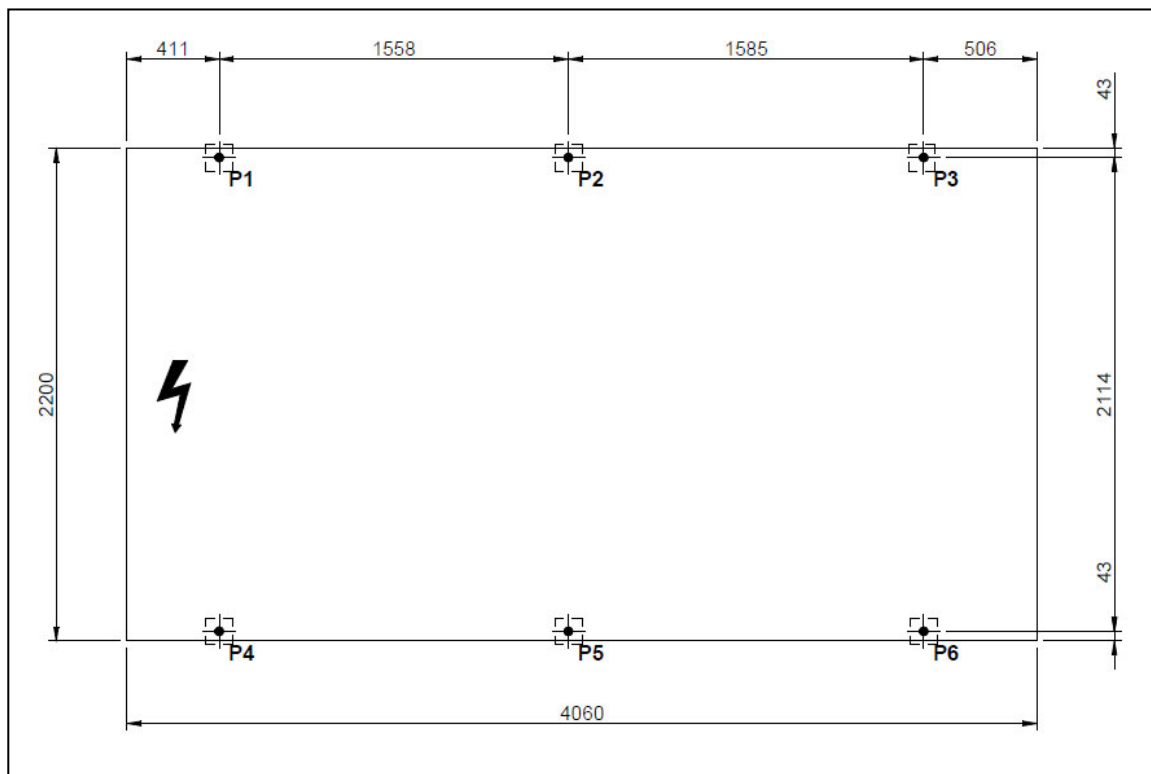
HWA1-A/H 2 Fans: 02109, 02121



HWA1-A/H 3 Fans: 02142, 02148, 02160



HWA1-A/H 4 Fans: 04176, 04199, 04215, 04237



HWA1-A/H 6 Fans: 04273, 04304, 04345

There are two types of antivibration available: in rubber and spring.

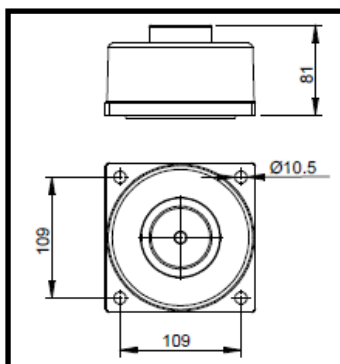
The recommended optimal flow rates are given for each of them, based on the size of the machine.

Model HWA1-A/H	Anti-vibration rubber mounts carrying capacity P1÷P6 [daN]
02109, 02121	300-400
02142, 02148, 02160, 04176, 04199, 04215, 04237, 04273	400-600
04304, 04345	600-800

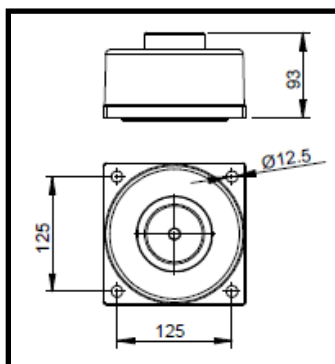


	Spring anti vibration mounts—carrying capacity P1÷P6 [daN]					
Model HWA1-A/H	P1:	P2:	P3:	P4:	P5:	P6:
02109	330	330	290	330	330	290
02121	330	330	290	330	330	290
02142	600	460	330	600	460	330
02148	600	460	330	600	460	330
02160	600	460	330	600	460	330
04176	560	510	460	560	510	460
04199	560	510	460	560	510	460
04215	600	540	460	600	540	460
04237	600	540	460	600	540	460
04273	600	540	460	600	540	460
04304	860	750	560	860	750	560
04345	860	750	560	860	750	560

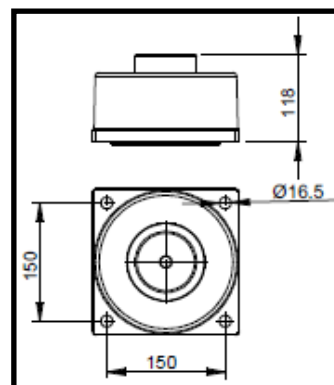
Technical details of the rubber dampers related to each chiller size



HWA1-A/H 02109, 02121

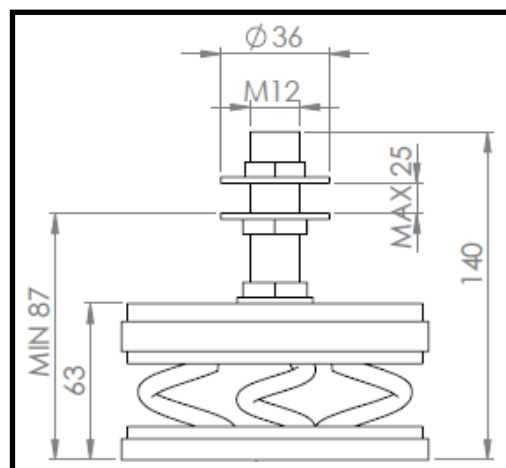
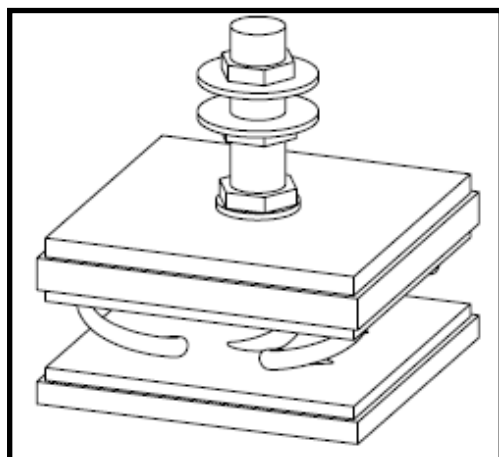


HWA1-A 02142, 02148,
02160, 04176, 04184, 04199,
04215, 04237, 04273



HWA1-A 04304, 04345

Technical details of the spring dampers.



Y filter (FY) – it contains a stainless steel mesh sieve that collects the solid materials present in the water. Filtration allows to avoid the obstruction and / or damage of the devices installed downstream of the filter.



Grooved connection joint (RV) – it joins pipes or grooved fittings, ensuring perfect seal between the two components.

IMPORTANT REMARK

ONLY THE OPTIONAL ACCESSORIES CAN BE REQUESTED SUBSEQUENTLY TO THE ORDER OF THE UNIT.
FACTORY FITTED ACCESSORIES CANNOT BE REQUESTED AFTER THE ORDER OF THE UNIT.

IT IS RECOMMENDED TO ASK FOR THE DIMENSIONAL DESIGN ONCE SELECTED THE UNIT

3. INSTALLATION

All handling, installation and maintenance operations must be carried out only by QUALIFIED PERSONNEL. Before any operation on the unit, make sure that the power supply is disconnected.

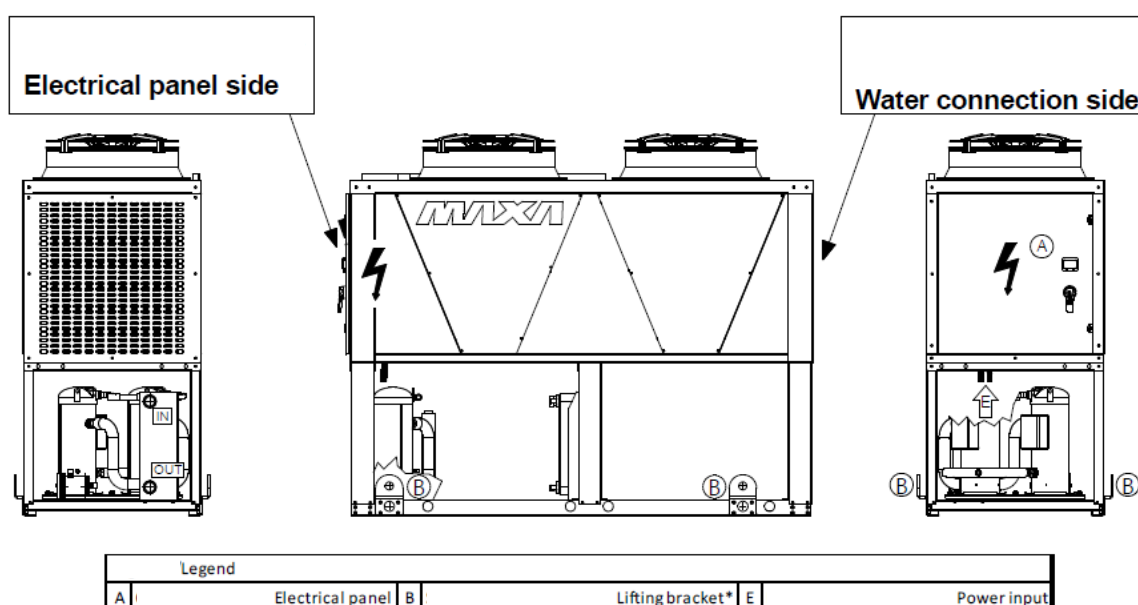
The minimum temperature allowed for the storage of the units is 5 ° C..

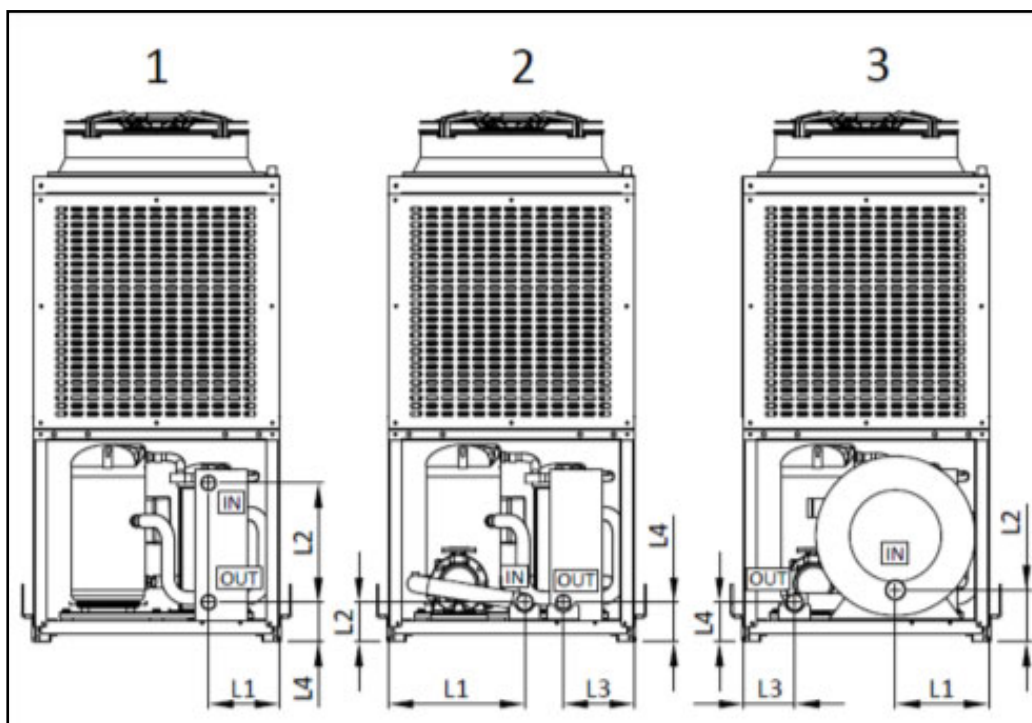
3.1 Unit dimensions, water connections, weights and barycentre position

ModelHWA1-A/H	Lenght [mm]	Width [mm]	Height [mm]	Height versioni SSL e C [mm]	Height max with packaging [mm]	Height max with packaging SSL or C version [mm]
02109, 02121	2860	1100	2350	2415	2430	2495
02142, 02148, 02160	4060	1100	2350	2415	2430	2495
04176, 04199, 04215, 04237	2860	2200	2350	2415	2430	2495
04273, 04304, 04345	4060	2200	2350	2415	2430	2495

3.1.2 Position and connection details

The table shows the connection diameters and the positions of the hydraulic connections (in / out) according to the size and configuration of the unit. All connections shown are grooved - "Victaulic" type.



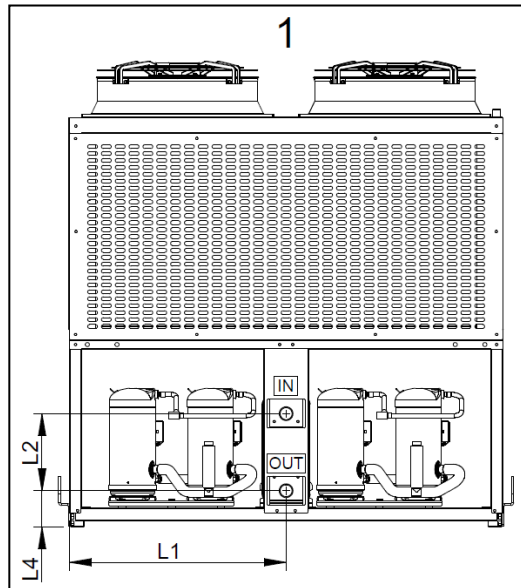


Standard

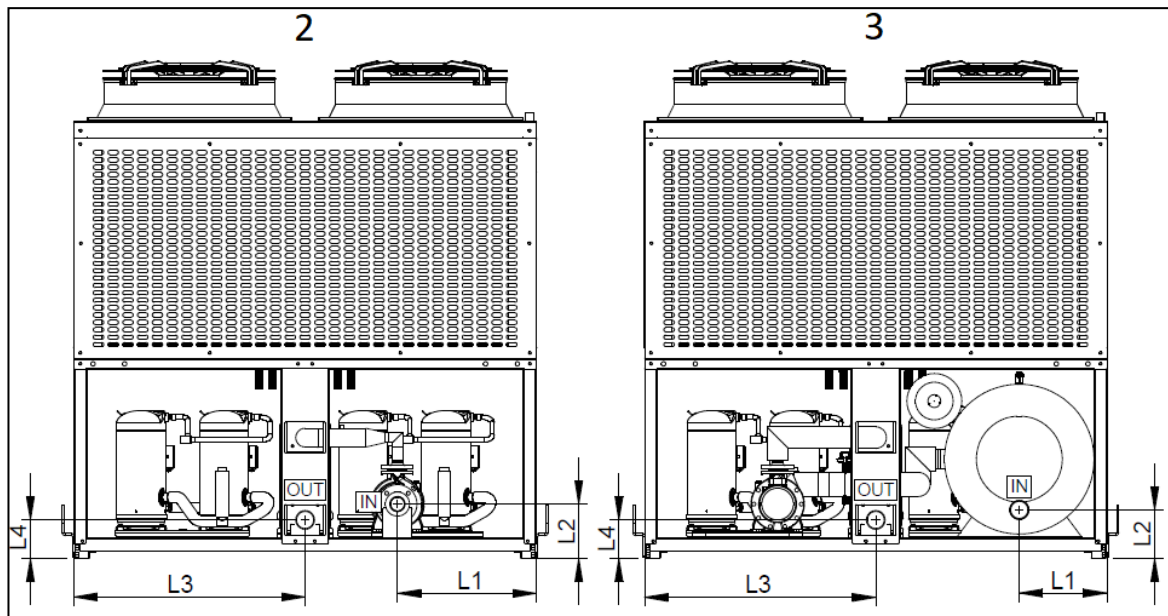
 Single/double
Pump

 Single/double Pump +
tank

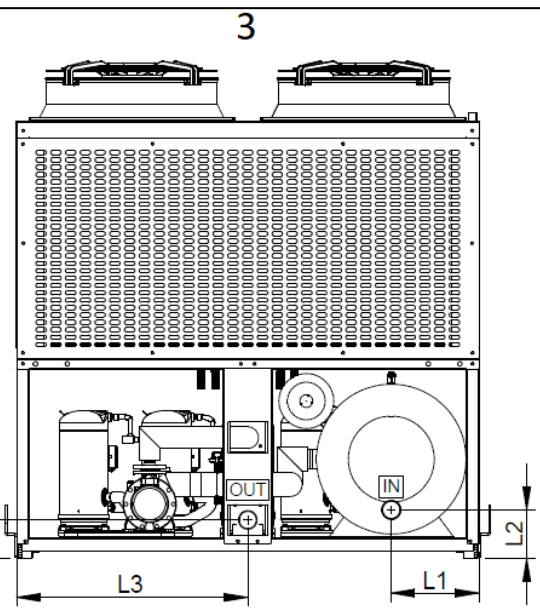
	Model	Version	Rif. Im- magine	L1 [mm]	L2 [mm]	L3 [mm]	L4 [mm]	ØIN	ØOUT
2 fans	HWA1-A/H								
	02109 02121	Standard	1	314	530	-	176	2"1/2	2"1/2
		Single/double Pump	2	573	176	314			
		Single/double Pump + tank	3	416	229	248			
3 fans	HWA1-A/H								
	02142 02148 02160	Standard	1	314	530	-	176	2"1/2	2"1/2
		Single/double Pump	2	605	176	314			
		Single/double Pump + tank	3	416	231	228		3"	



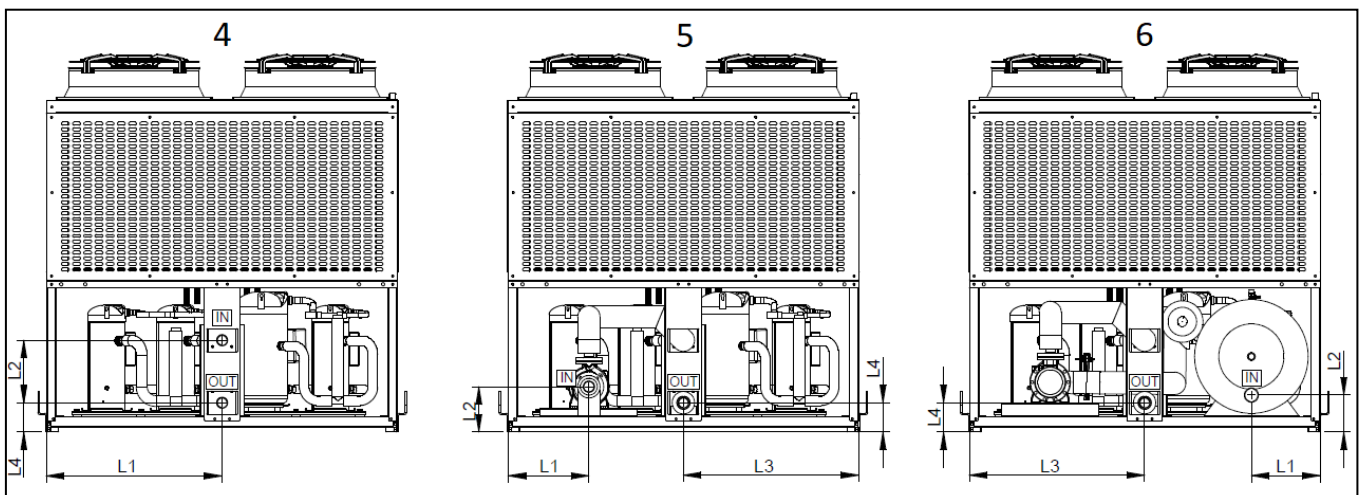
Standard



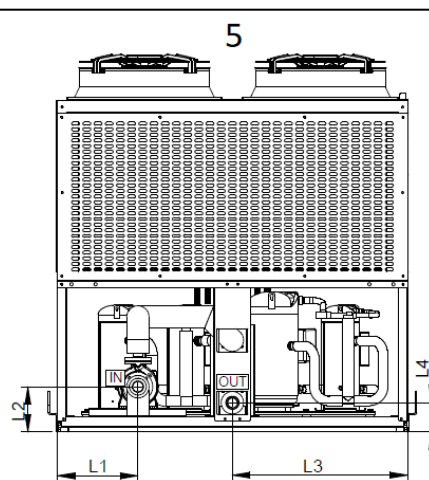
Single/double Pump



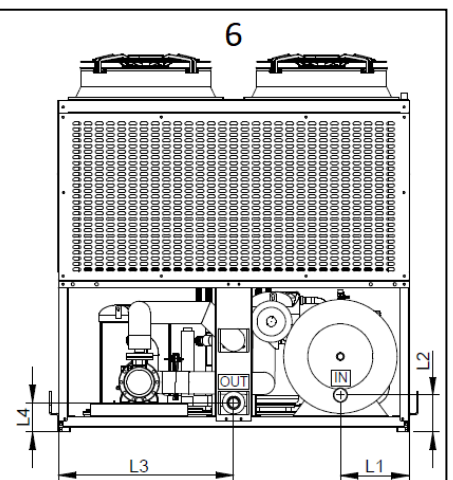
Single/double Pump + tank



Standard



Single/double Pump

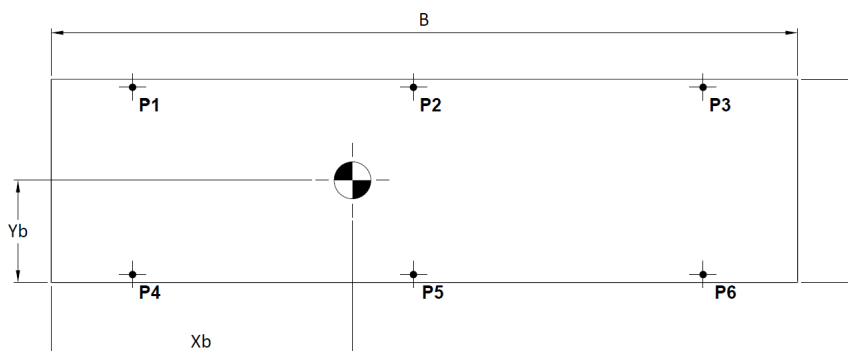


Single/double Pump + tank

	Model	Versione	Rif. Im- agine	L1 [mm]	L2 [mm]	L3 [mm]	L4 [mm]	ØIN	ØOUT
4 fans	HWA1-A/H								
	04176 04199	Standard	1	1100	390	-	183	3"	3"
		Standard head single pump	2	693	246	1100			
		High head single pump	2	658	258				
		Standard head double pump	2	547	246				
		High head double pump	2	516	258				
		Single/double Pump + tank	3	415	231				
	04215 04237	Standard	1	1100	390	-	1100	3"	3"
		Single Pump	2	658	258				
		Double Pump	2	516	258				
Single/double Pump + tank		3	415	231					
6 fans	HWA1-A/H								
	04273	Standard	4	1100	390	-	183	3"	3"
		Single/double Pump	5	506	283	1100		4"	4"
		Single/double Pump + tank	6	429	231			3"	4"
	04304	Standard	4	1100	390	-	183	3"	3"
		Standard head Single/double Pump	5	506	283	1100		4"	4"
		High head single/double pump	5	506	311			4"	4"
		Single/double Pump + tank	6	429	231			3"	4"
	04345	Standard	4	1100	390	-	183	3"	3"
		Single/double Pump	5	506	311	1100		4"	4"
Single/double Pump + tank		6	429	231	3"			4"	

3.1.3 Weights and barycentre position

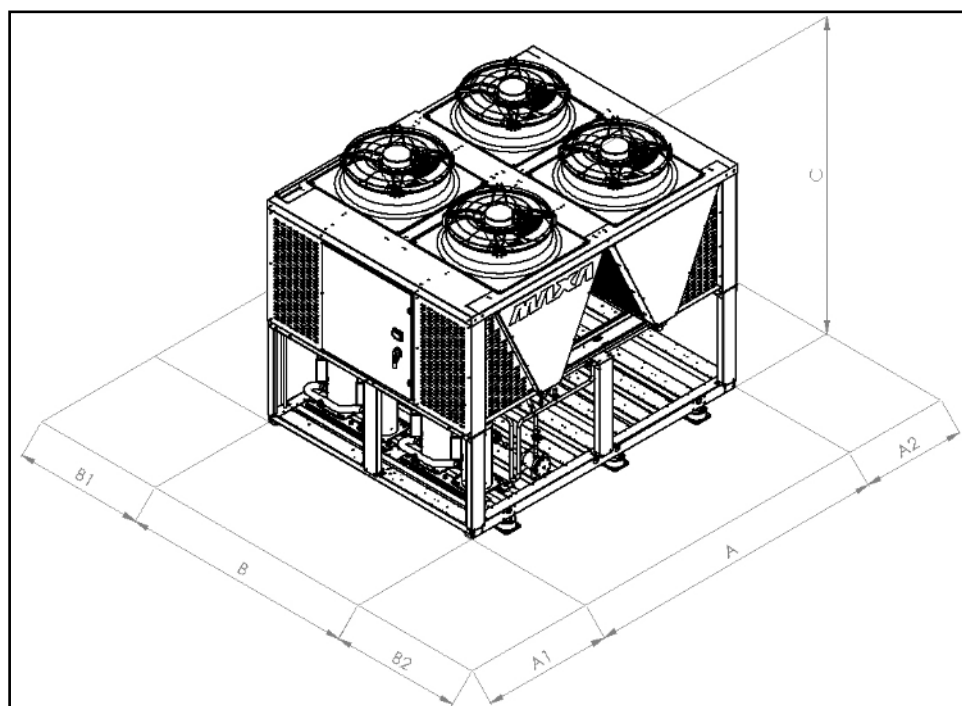
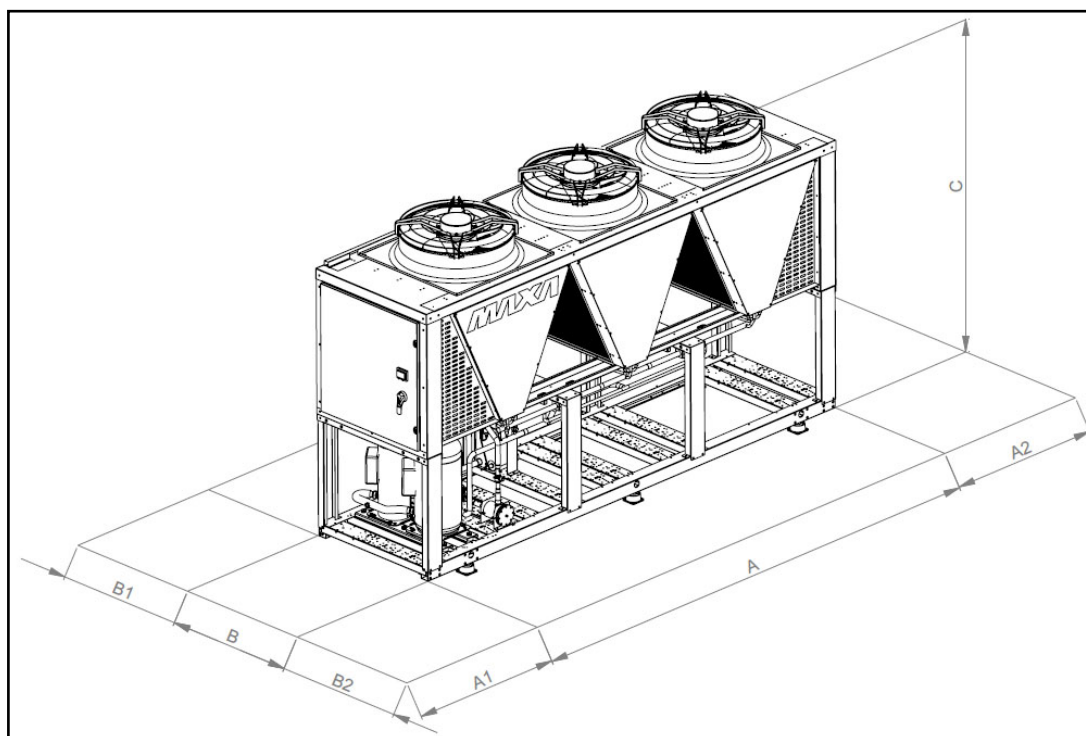
The position of the center of gravity of each machine is indicated in the tables, with reference to the dimensions shown in the image. A distinction is made between the standard version machine and the complete hydraulic circuit with double pump



ModelH-WA1-A/H	Version	Net shipping weight [kg]	Operating weight [kg]	A [mm]	B [mm]	X_b [mm]	Y_b [mm]
02109	Standard	1180	1190	1100	2860	968	571
	/PDAP/SI	1410	1810			1386	584
02121	Standard	1210	1220	1100	2860	1090	529
	/PDAP/SI	1440	1840			1378	538
02142	Standard	1470	1480	1100	4060	1621	544
	/PDAP/SI	1770	2480			2101	582
02148	Standard	1530	1540	1100	4060	1641	544
	/PDAP/SI	1880	2600			2068	573
04160	Standard	1530	1540	1100	4060	1639	553
	/PDAP/SI	1890	2600			1701	566
04176	Standard	2030	2040	2200	2860	1203	1121
	/PDAP/SI	2380	2910			1324	1136
04199	Standard	2060	2070	2200	2860	1200	1046
	/PDAP/SI	2370	2900			1451	1171
04215	Standard	2100	2110	2200	2860	1185	1095
	/PDAP/SI	2440	2970			1426	1201
04237	Standard	2130	2140	2200	2860	1180	1105
	/PDAP/SI	2460	3000			1293	1120
04273	Standard	2680	2700	2200	4060	1694	1096
	/PDAP/SI	3190	3910			1812	1115
04304	Standard	2880	2900	2200	4060	1559	1138
	/PDAP/SI	3360	4090			1974	1233
04345	Standard	2900	2930	2200	4060	1605	1069
	/PDAP/SI	3450	4180			1776	1105

3.2 Service and technical spaces

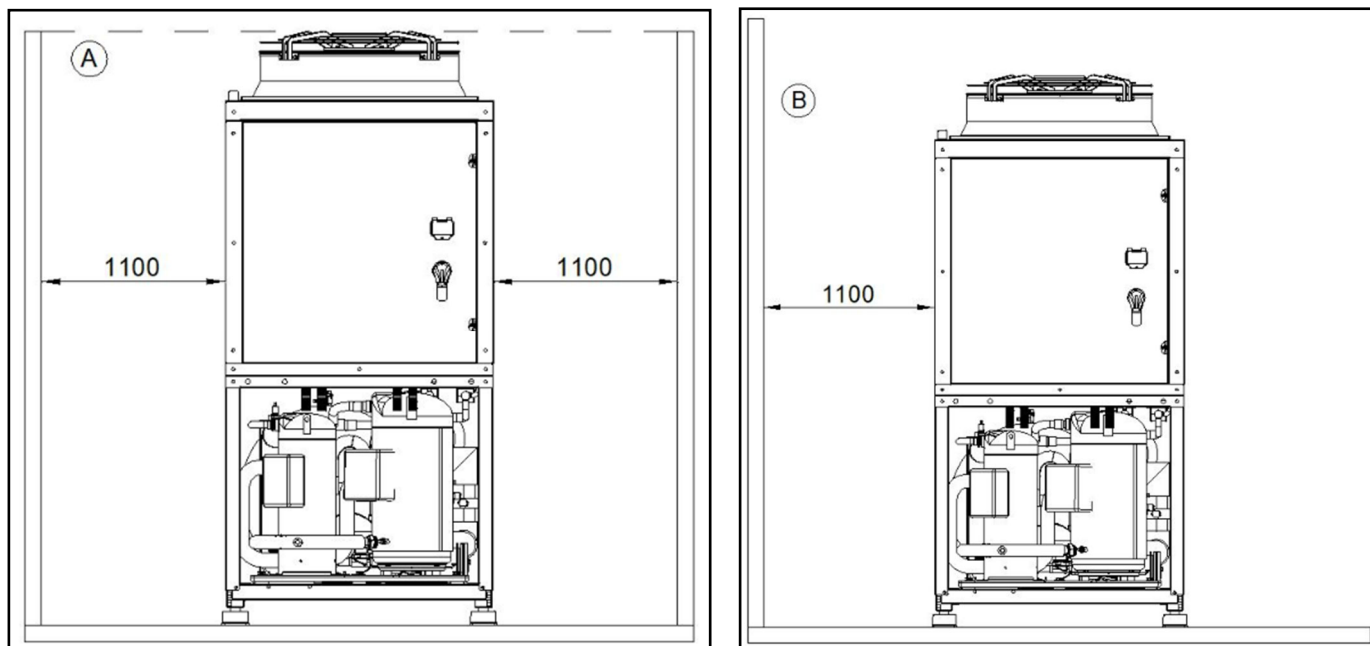
The whole series is designed and built for outdoor installations; roofing with canopies or positioning near plants or walls should be avoided in order to avoid air recirculation. It is good practice to create a support slab of a size adequate to that of the unit. The units transmit a low level of vibrations to the ground: it is however advisable to place anti-vibration supports between the base frame and the support surface. An environmental impact assessment is always required on the basis of the power and sound pressure data reported in chapter 4 "General technical data" and the noise emission limits based on the installation area of the unit, with reference to the DPCM of the 14/11/1997. An assessment must also be made if the unit is installed near workers, according to Legislative decree LGS. 81/2008 Art. 189 and following. It is very important to avoid recirculation between suction and delivery, otherwise the performance of the unit will deteriorate or even interruption of normal operation. In this regard, it is necessary to guarantee the minimum service spaces sotto riportati.



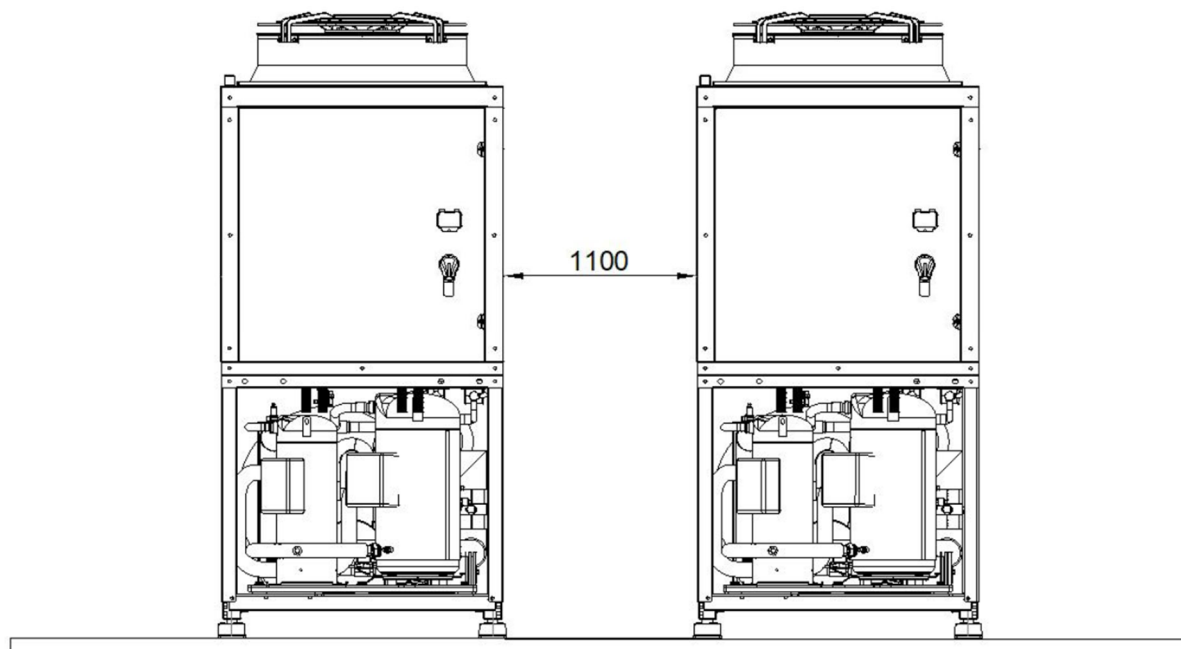
Serie	Clereance spaces			
	A1 [mm]	A2 [mm]	B1 [mm]	B2 [mm]
HWA1-A/H 02109-04345	1000	800	1000	1000

In the presence of walls or other units nearby, the spaces to be respected are shown below:

Unit with Width 1100 mm
HWA1-A 02109, 02121, 02142, 02148, 02160

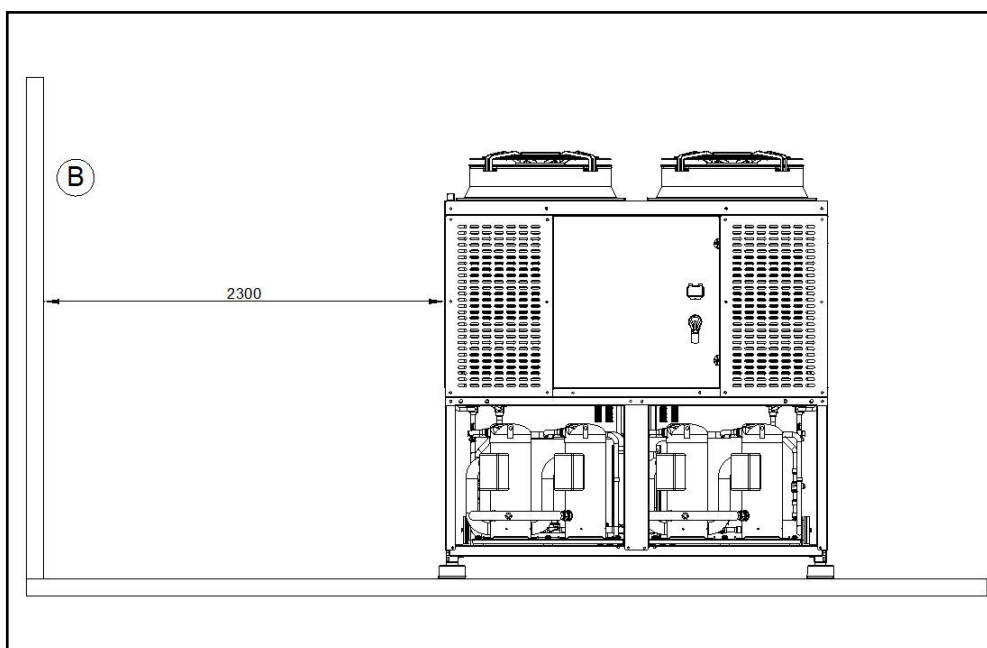
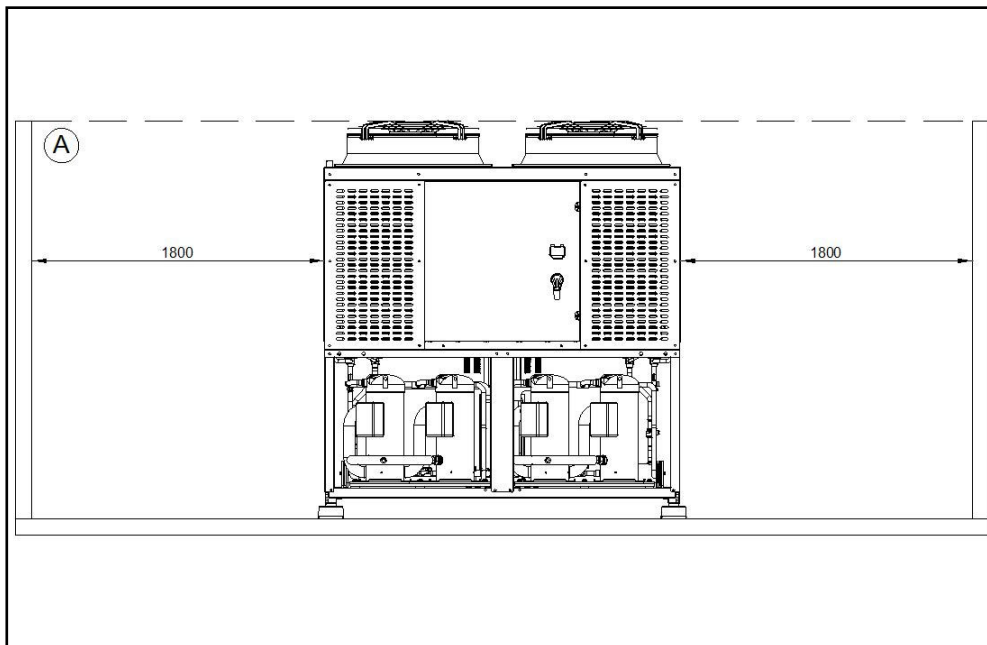


In the case of units surrounded by walls or obstacles of equal height (CASE A), the installation must take place at a distance of not less than 1100 mm on both sides while if the wall or single obstacle is greater than the height of the Height units (CASE B) use a minimum clearance of 1100 mm or contact MAXA sales technical support.

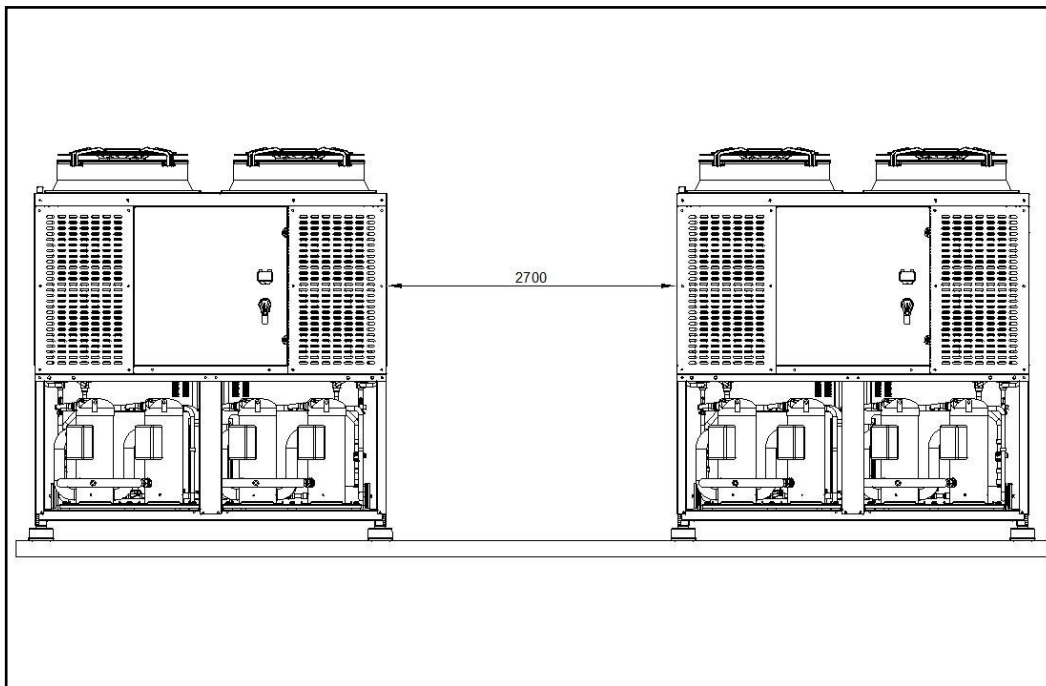


In the case of two units installed in a free field, it is recommended to maintain a minimum distance between the units of

Unit with Width 2200 mm
HWA1-A/H 04176, 04199, 04215, 04237, 04273, 04304, 04345



In the case of units surrounded by walls or obstacles of equal height (CASE A), the installation must be carried out at a distance of not less than 1800 mm on both sides while if the wall or single obstacle is greater than the height of the Height units (CASE B) use a minimum clearance of 2300 mm or contact MAXA sales technical support.



In the case of two units installed in a free field, it is recommended to maintain a minimum distance between the units of

• 3.3 3.3 Hydraulic circuit

- The hydraulic connections must be made in compliance with national and / or local regulations; the pipes can be made of steel. The pipes must be carefully sized according to the unit's nominal water flow rate and pressure drops in the hydraulic circuit. All hydraulic connections must be isolated using closed cell material of adequate thickness. The heat pump must be connected to the pipes using grooved joints. It is recommended to install the following components in the hydraulic circuit:
- Well thermometers for detecting the temperature in the circuit.
- Manual gate valves to isolate the chiller from the hydraulic circuit.
- Metal Y filter (installed on the return pipe from the system) with a metal mesh of no more than 1 mm.
- Expansion vessel of adequate capacity for the total water content of the system.

	ATTENTION: Make sure, when sizing the pipes, not to exceed the maximum loss on the system side shown in the technical data table (see useful head).
	ATTENTION: in the HWA1-A / H series models with configuration in which the tank is not present, the expansion tank integrated on the system side is not present. The installer is responsible for checking the actual capacity of the system and providing an expansion tank of adequate volume.
	ATTENTION: The return pipe from the system must be in correspondence with the "WATER INLET" label otherwise the evaporator could freeze.
	ATTENTION: It is mandatory to install a metal filter (with mesh no greater than 1 mm) on the return pipe from the system labeled "WATER INLET". If the flow switch is manipulated or altered, or if the metal filter is not present on the system, the warranty expires immediately. The filter must be kept clean, therefore it must be ensured that after installation of the unit it is still clean and periodically checked.
	ATTENTION: All units leave the company equipped with a flow switch (factory installed). If the flow switch is altered, removed, or if the water filter is not present in the unit, the warranty will not be considered valid. Refer to the wiring diagram attached to the unit for connecting the flow switch.
	ATTENTION: The water on the loading / replenishment line must be properly pre-filtered from any impurities and suspended particles using a cartridge filter (washable, wrapped wire, etc.) of at least 100 microns.
	ATTENTION: Check the hardness of the water with which to load and top up the system. With particularly hard water, the use of a water softener is required. For the treatment of the system water, however, refer to the UNI 8065 standard and the characteristics shown below.
	ATTENTION: Both for new installations and in the case of replacing a previously installed machine, it is necessary to carry out a system wash beforehand in order to prevent any residues from clogging the plate heat exchanger. .
	ATTENTION: Following breakage of the plate heat exchanger due to: tampering with the flow switch, continuous manual restarts after alarm of the flow switch, lack of washing of the system or lack / tampering with the Y filter the company reserves the right not to pass the replacement of the component as a guarantee

3.3.1 Plant water characteristics

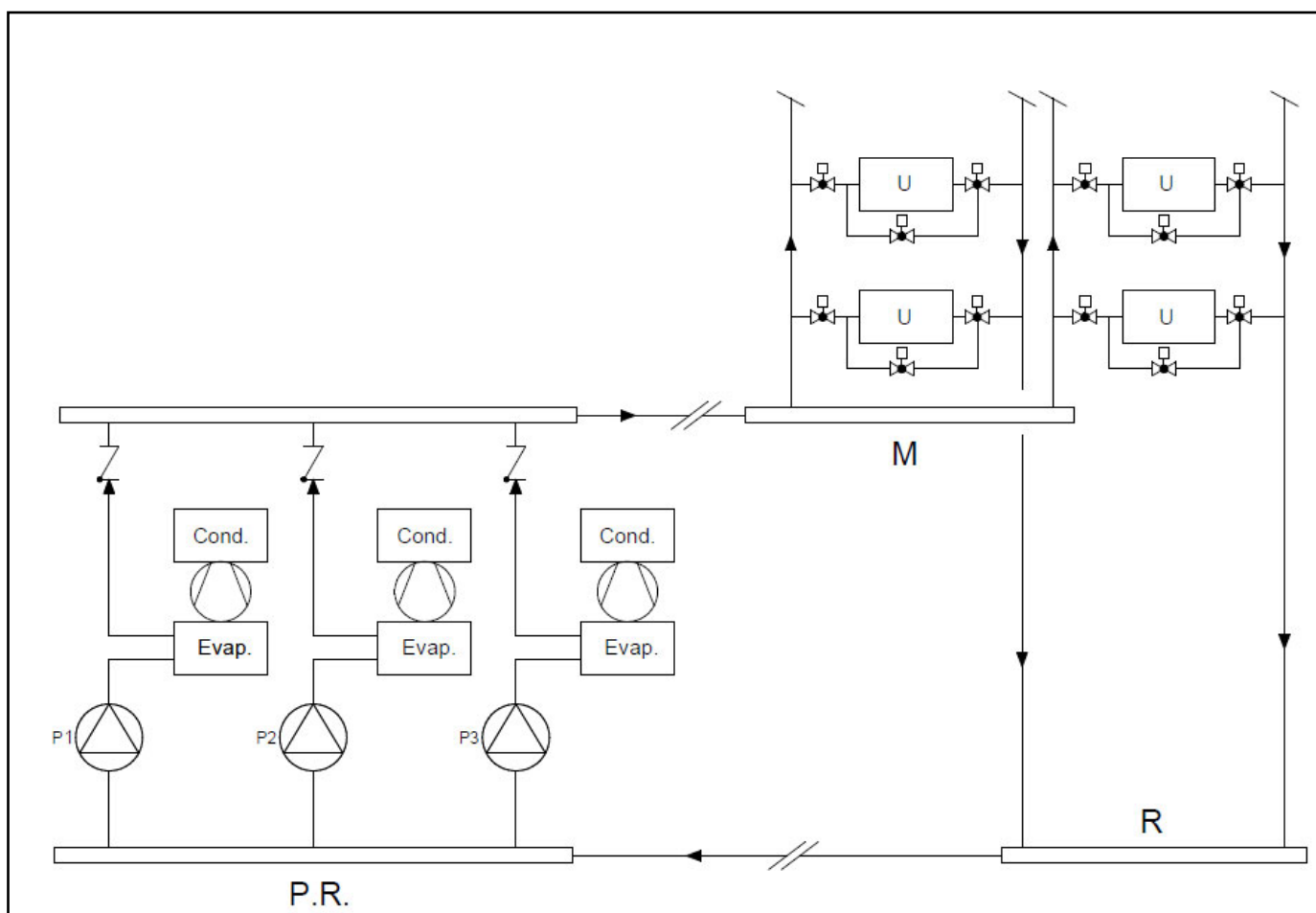
To ensure the correct operation of the unit, the water must be adequately filtered (see what is reported at the beginning of this paragraph) and that the quantities of dissolved substances must be minimal. Below are the maximum allowed values

Maximum chemical-physical characteristics allowed for the plant water	
PH	7,5 - 9
Electrical conductivity	100 - 500 $\mu\text{S}/\text{cm}$
Total hardness	4,5 – 8,5 dH
Temperature	< 65°C
Oxygen content	< 0,1 ppm
Glycole Max quantity	50 %
Phosphates (PO_4)	< 2ppm
Manganese (Mn)	< 0,05 ppm
Iron (Fe)	< 0,3 ppm
Alkalinity (HCO_3)	70 – 300 ppm
Chlorine ions (Cl^-)	< 50 ppm
Sulphate ions (SO_4)	< 50 ppm
Sulfide ions (S)	Nessuno
Ammonium ion (NH_4)	Nessuno
Silica (SiO_2)	< 30 ppm

3.3.2 Hydraulic scheme type

Possible hydraulic schemes are shown below when the associated hydronic kit is present. Remember that the input filter is MANDATORY, on request it is supplied as an accessory.

Coupled primary and secondary circuit — one Pump for each refrigeration unit



P. R. = chillers pumps (constant flow)

U = user side

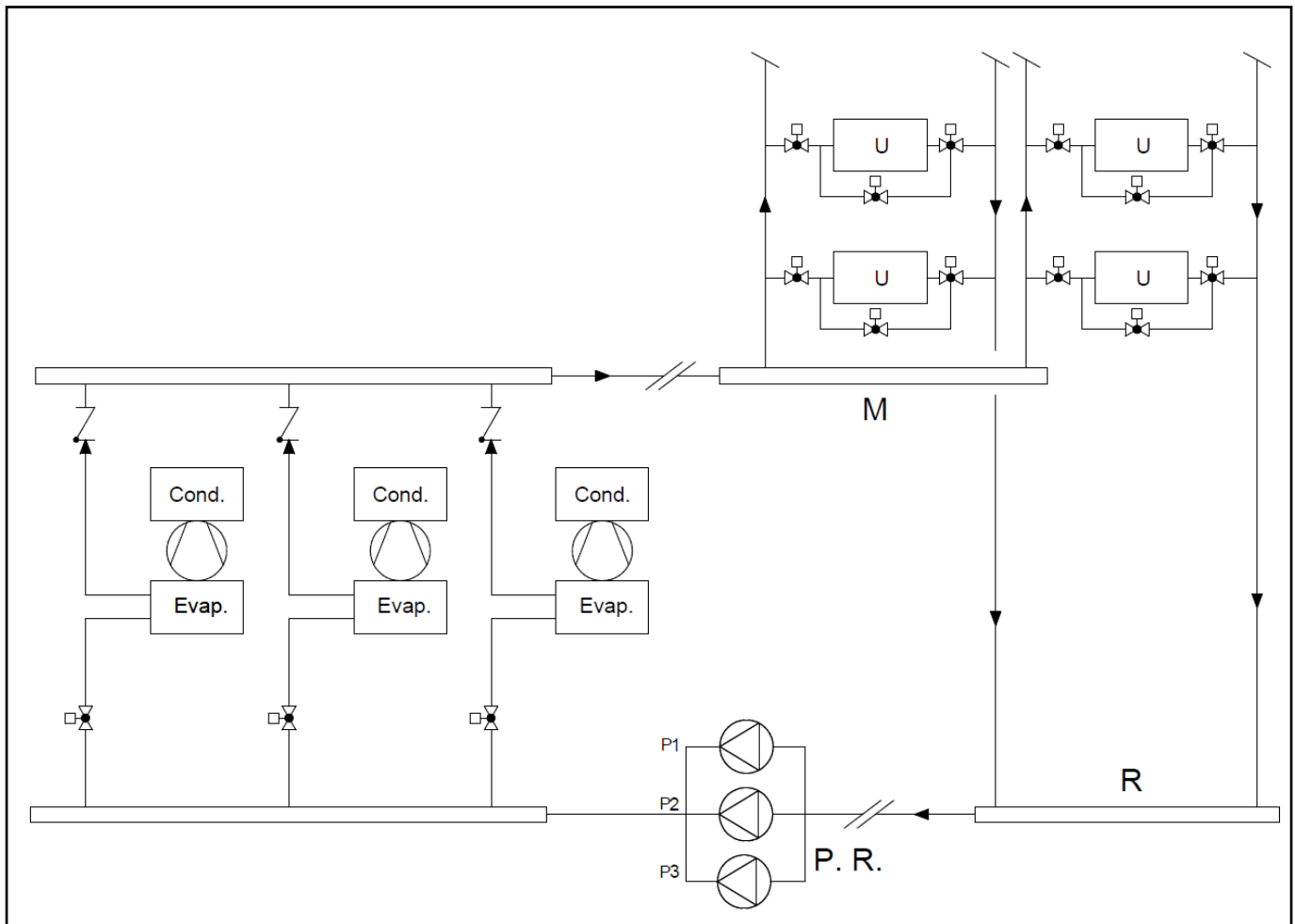
M = supply

R = return

Since there is no division between the primary and secondary circuit, the flow rate of the pumps must be sized on the sum of the design flow rates of all the terminals, without considering contemporaneity.

- The flow rate circulating in the system is constant in any operating condition.
- The units must always be all functional; stopping one of them would lose control of the water delivery temperature.

Coupled primary and secondary circuit— shared pumps for the refrigeration units



P. R. = chillers pumps (constant flow)

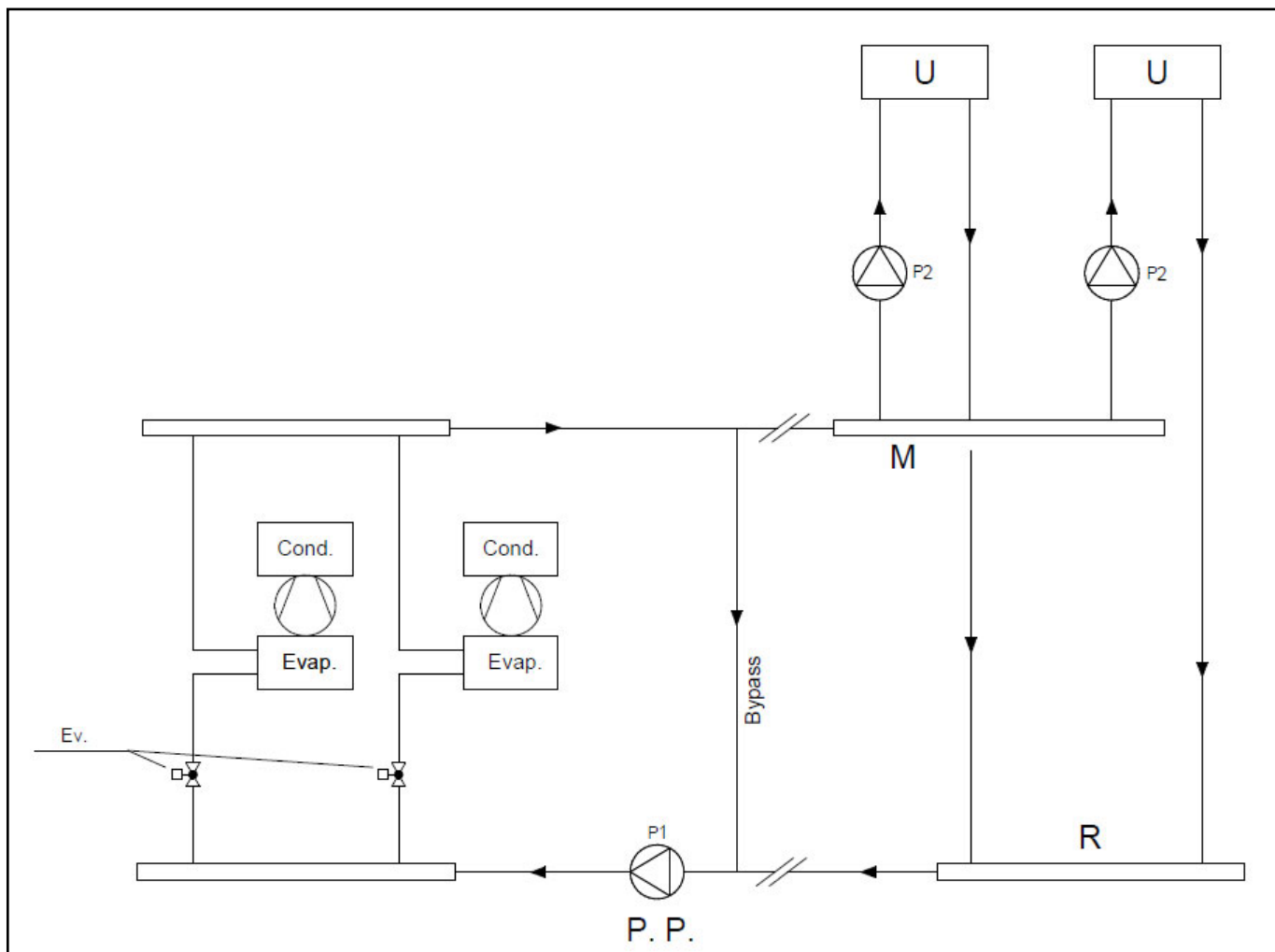
U = user side

M = supply

R = return

- Since there is no division between the primary and secondary circuit, the flow rate of the pumps must be sized on the sum of the design flow rates of all the terminals, without considering contemporaneity.
- The flow rate circulating through each chiller is constant in any load condition.
- The flow rate circulating in the system is constant in any operating condition.
- Thanks to the use of common pumps, it is necessary to insert only one chiller reserve pump. The shut-off valves only start operating in an emergency, to exclude a single unit.
- The units must always be all functional; stopping one of them would lose control of the water delivery temperature.

decoupled primary and secondary circuit - single pump for refrigeration and secondary groups with own pump



P. P. = primary pump (constant flow)

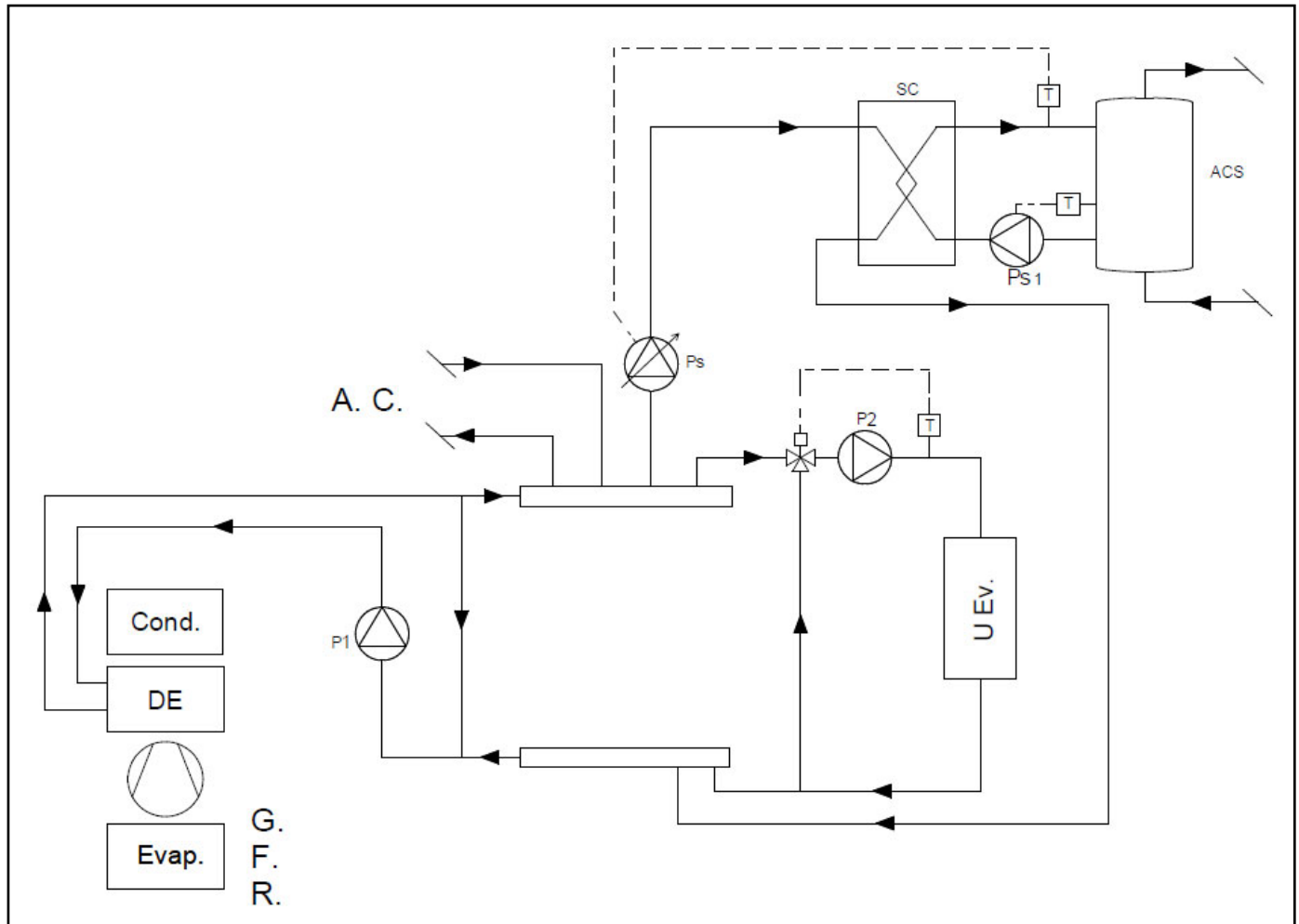
Ev. = potential

M = supply

R = return

- The scheme is suitable for equal refrigeration units and for both constant and variable flow users.
- The flow rate of the primary pump P1 must be greater than the sum of the flow rates of the pumps P2 in any condition: in the by-pass section the flow rate must flow from the delivery to the return.
- The flow rate circulating through each chiller is constant in any load condition.
- The units must always be all functional; stopping one of them would lose control of the water delivery temperature.

Production of domestic hot water from partial or total recovery chillers



DE = Desuperheater

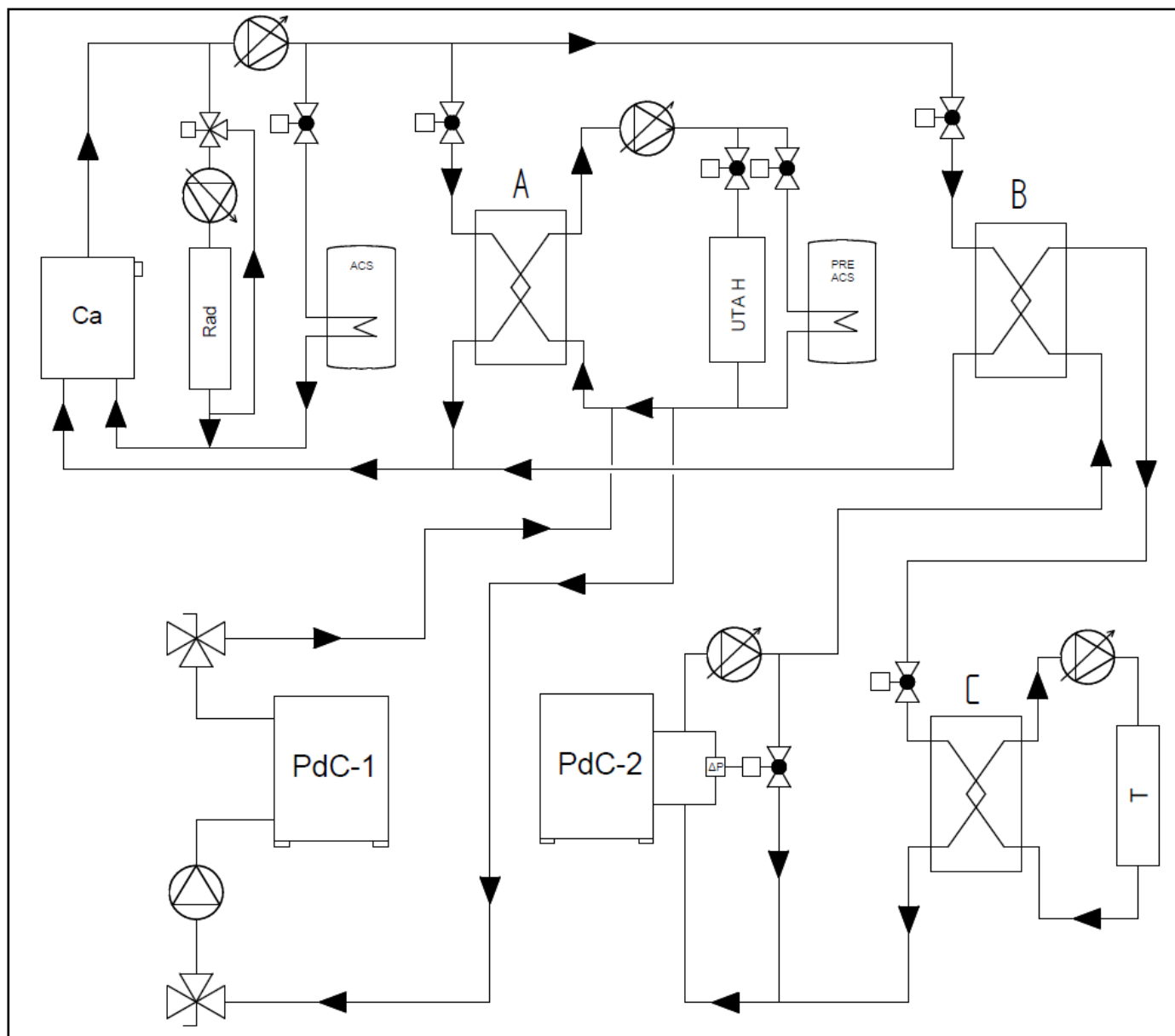
G. F. R. = Recovery chiller

A. C. = to the boiler

U Ev. = other hypothetical user sides

- With the use of desuperheaters, it is possible to raise the temperature of the domestic hot water.
- The SC exchanger is used to avoid scale deposits caused by limescale which is deposited on the recovery exchanger of the refrigeration unit and must always be provided.
- Pump P1 activates and switches off based on the temperature of the sanitary water in the storage tank, while Pump Ps is controlled to maintain the desired set-point value at the outlet of the SC exchanger.

Thermo-refrigerating plant serving primary primary air-conditioning systems plus radiant panels or cold beams - system with reversible heat pump refrigeration units



Ca = boiler

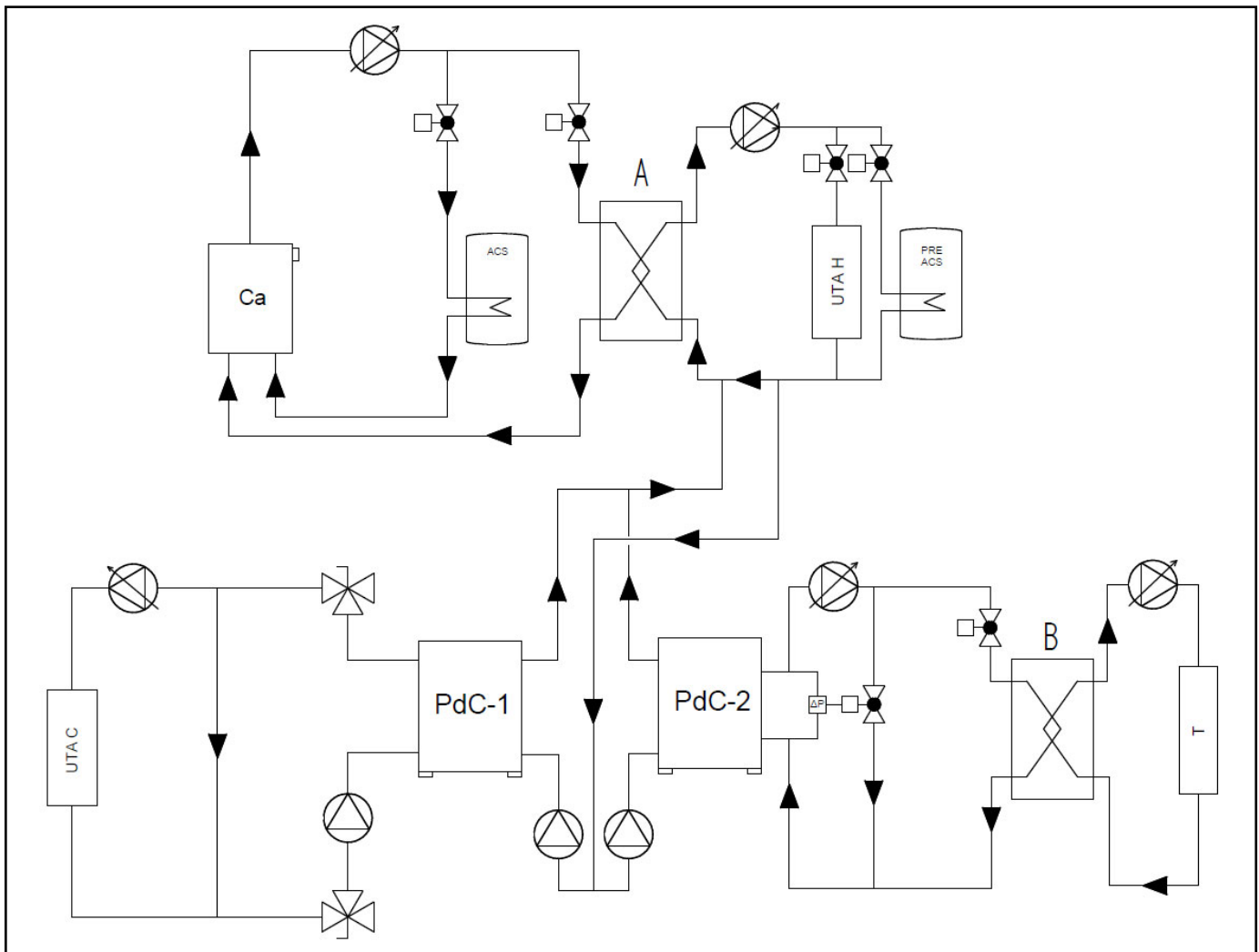
Rad = radiators

UTA H = heating AHU

T = terminals

- The heat generators feed the high temperature circuits consisting of the heating systems and those for the production of domestic hot water.
- The PdC-1 group produces hot water which is introduced into the low temperature network that supplies the hot batteries of the air treatment units (AHU) and the preheating of the domestic hot water. If the efficiency of the heat pump is too low, then the system is not sufficiently efficient, or in the event of a fault, the hot water is produced entirely via exchanger A powered by the boilers.
- The PdC-2 group also produces hot water at low temperature, which passes through the exchanger B and feeds the C. Also in this case, in the absence of convenience or due to faults, hot water is produced by the exchanger B powered by the boilers.

Thermo-refrigerating plant serving primary primary air-conditioning systems plus radiant panels or cold beams - system with reversible heat pump refrigeration units



Ca = boiler

UTA H = heating AHU

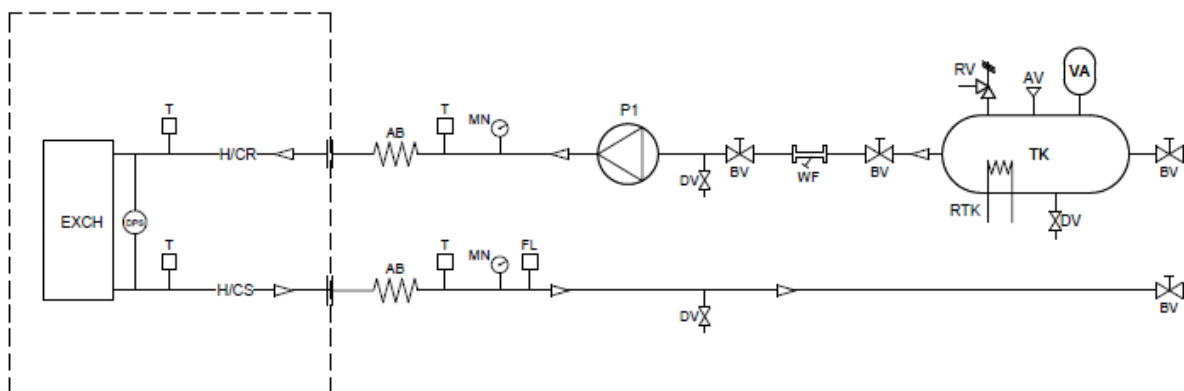
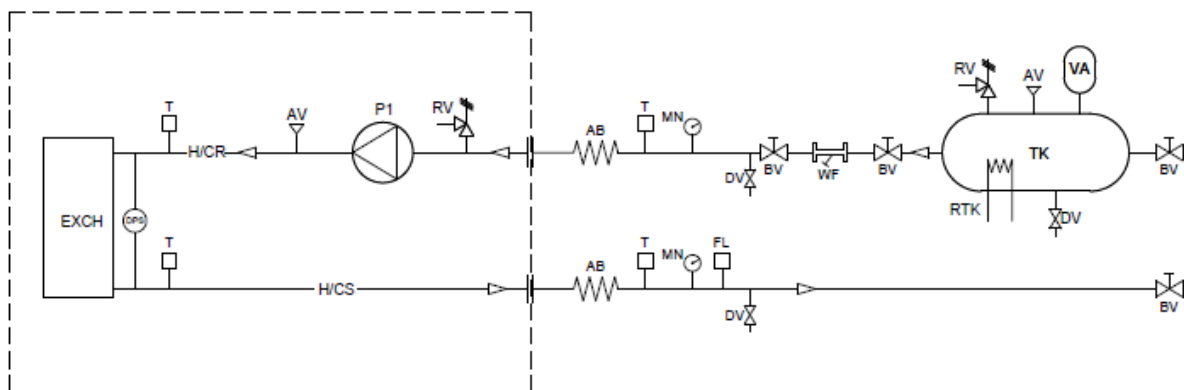
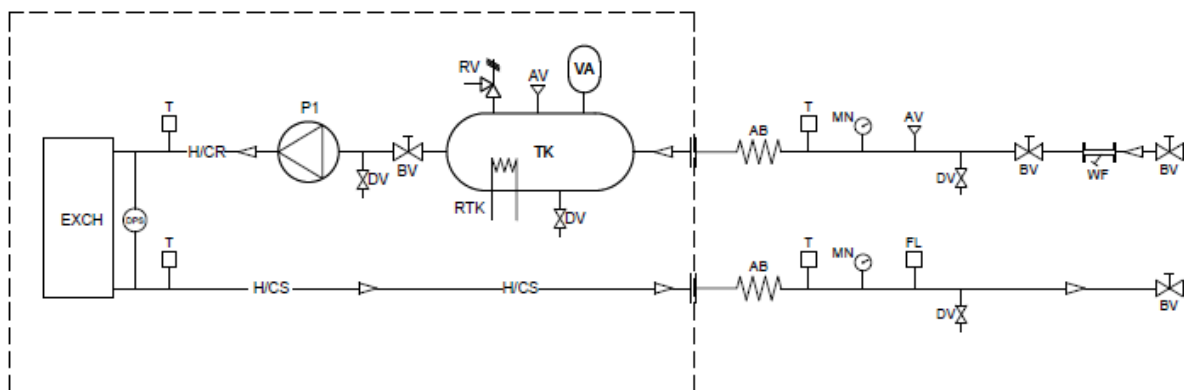
UTA C = cooling AHU

T = terminals

- The heat generators work to integrate, if necessary, renewable sources present and any post-heaters. The PdC-1 group works as a water chiller producing water for the cold batteries of the AHU.
- It is good to equip the two heat pump refrigeration units with desuperheaters to power the reheating batteries (if present) and to preheat the DHW. The PdC-2 group produces chilled water at a temperature higher than that produced by group 1; the water feeds the exchanger B.
- It is not possible to carry out a direct coupling between group 2 and terminals, as these provide lower summer temperature values than the minimum 4 °C accepted by the chillers.

3.3.3 Hydraulic diagram inside the unit

Below are the hydraulic connection diagrams for the unit, respectively for units with PS / SI hydronic kit (Pump and tank), units with PS kit (single Pump) and units without hydronic kit. The dotted area delimits the machine in the various configurations, what is outside is to be considered as recommended and is not supplied



EXCH	Brazed plate heat exchanger	TK	Inertial tank
DPS	Differential pressure switch	AV	Air vent valve
T	Temperature sensor	VA	Expansion vessel
P1	Pump	MN	Manometer
DV	Discharge tap	FL	Flow switch
BV	Interception valve	WF	Water filter
RV	Safety valve	H/CR	User water inlet
RTK	Tank electric element	H/CS	Water outlet
AB	Anti vibration mounts		

Each unit equipped with a hydronic kit with tank (PS / SI, PSAP / SI, PD / SI, PDAP / SI configurations) includes an expansion tank and a safety valve. The expansion tank is single or double based on the size of the unit. Here are the main features:

- membrane resistant to peaks of 130 ° C;
- pre-charge pressure 2,5 bar; g
- lycol percentage up to 100%;
- Maximum pressure 10 bar.

HWA1-A / H	02109	02121	02142	02148	02160	04176	04199	04215	04237	04273	04304	04345
Number of expansion	1	1	2	2	2	1	1	1	1	2	2	2
Expansion vessels volume [l]	25											

In ogni unità provvista di kit idronico senza tank (configurazioni PS, PSAP, PD, PDAP) è compresa comunque una valvola di sicurezza con pressione di apertura 6 bar.

3.3.4 Minimum water content and hydraulic circuit volumes

The table shows the minimum recommended water content of the system per unit and the volume of the storage tank (if any). The volume of the hydraulic circuit is also indicated in the case of units with the Pump + tank hydronic kit (configurations PS / SI, PSAP / SI, PD / SI, PDAP / SI). If this volume is lower than the minimum recommended water content, it is necessary to make sure that the pipes connecting to the unit have sufficient capacity to compensate for this difference. The necessary supplementary volume is shown in the table.

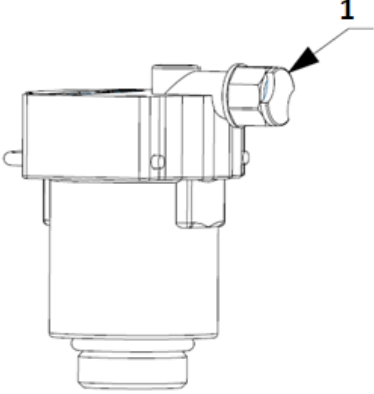
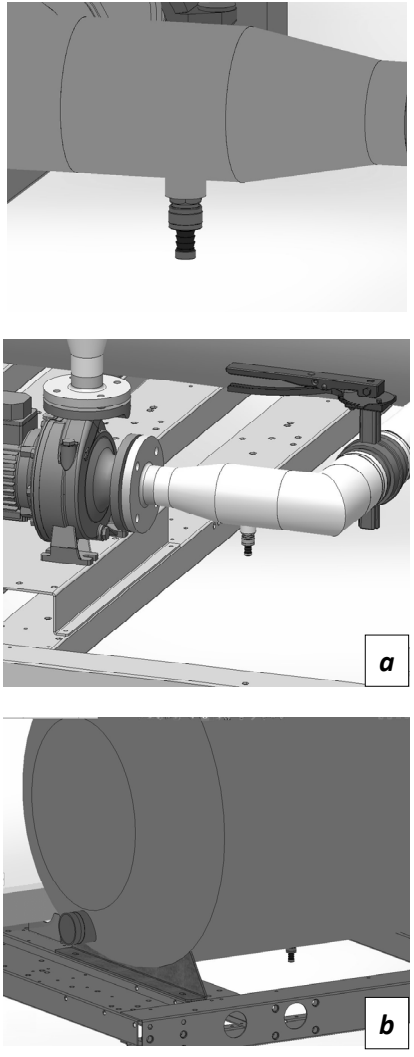
HWA1-A/H	02109	02121	02142	02148	02160	04176	04199	04215	04237	04273	04304	04345
Plant minimum content of water [l]	501	633	633	831	831	494	626	626	791	1039	1039	1316
Tank volume [l]	390	390	705	705	705	520	520	520	520	705	705	705
Hydraulic circuit volume [l]	414	414	730	733	743	550	550	553	557	752	786	787
Additional external volume [l]	87	219	-	98	88	-	76	73	234	287	253	529

3.3.5 Condensate drain system

All HWA1-A / H units are equipped with holes on the base for the discharge of any condensate that may percolate from the pipes of the hydraulic system and the gas circuit, to discharge the condensate that is formed during the defrosting cycles. FOR HEAT PUMP UNITS, IN A PARTICULARLY RIGID CLIMATE, INSTALLATION ON ELEVATION SUPPORTS IS RECOMMENDED TO ALLOW THE FORMATION OF ICE UNDER THE UNIT WITHOUT THE DAMAGE TO IT BEING DAMAGED.

3.3.6 Plant load

	ATTENTION: supervise all loading / replenishment operations.
	ATTENTION: before loading / replenishing the system, disconnect the power supply to the units.
	ATTENTION: the loading / replenishment of the system must always take place under controlled pressure conditions (max 1 bar). Make sure that a pressure reducer and a safety valve has been installed on the load / make-up line.
	ATTENTION: the water on the loading / replenishment line must be properly pre-filtered from any impurities and suspended particles. Make sure that a removable cartridge filter has been installed.
	ATTENTION: before proceeding with loading / replenishing the system, unscrew the cap of the air vent valve. Screw the cap back on once the plant loading / replenishment operations are complete.

	During loading / replenishment operations, the vent valve cap must be partially unscrewed to allow air to flow freely outside the valve. (1) vent valve cap
	If it is necessary to top up the system, drain the quantity of water inside the system or adjust the percentage of glycol, you can use the service tap. This tap has a different location depending on the hydronic kit present: Absence of hydronic kit - tap not present; - Hydronic kit with single / double Pump - tap along the suction section of the Pump (im. A); - Hydronic kit with single / double Pump + tank - tap under the tank (im. B). To perform one of the aforementioned operations, unscrew the tap of the service tap and connect a 14 mm tube (internal diameter) connected to the water supply to the hose connector, then load the system by unscrewing the appropriate ring nut. After the operation, retighten the ring nut and screw the cap back on. In any case, it is recommended to use an external tap to load the system, the preparation of which is the responsibility of the installer..

3.3.7 Plant discharge

If the unit has to be completely drained, first close the manual inlet and outlet gate valves (not supplied) and then disconnect the pipes arranged externally on the water inlet and outlet so as to drain the liquid contained in the unit (to make easy operation, it is advisable to install two drain cocks placed between the unit and the manual gate valves externally on the water inlet and outlet).

4. TECHNICAL GENERAL DATA

4.1 Standard version

Technical features		Unit of measure	Model HWA1-A/H					
			02109	02121	02142	02148	02160	04176
Cooling	Cooling capacity (1)	kW	102,8	113,1	131,8	137,9	148,1	165,3
	Total absorbed power (1)	kW	33,8	38,9	41,3	44,4	49,8	52,6
	EER (1)	W/W	3,05	2,90	3,19	3,11	2,97	3,14
	Cooling capacity (2)	kW	139,0	150,6	177,0	187,8	202,4	223,6
	Total absorbed power (2)	kW	36,5	42,7	44,1	47,7	53,0	55,7
	EER (2)	W/W	3,81	3,53	4,01	3,94	3,82	4,01
	SEER (5)	W/W	4,35	4,36	4,38	4,73	4,50	4,61
	Water flow (1)	l/s	4,92	5,41	6,31	6,61	7,09	7,90
	Exchanger pressure drops on the user side(1)	kPa	21,65	20,13	26,53	24,3	20,21	21,7
Heating	Heating capacity (3)	kW	112,6	125,1	147,8	154,1	166,2	187,6
	Total absorbed power (3)	kW	27,6	30,9	36,6	37,7	41,4	46,0
	COP (3)	W/W	4,09	4,05	4,04	4,08	4,01	4,08
	Heating capacity (4)	kW	108,3	120,1	141,5	147,9	159,7	179,1
	Total absorbed power (4)	kW	32,9	37,5	43,9	45,3	49,4	55,9
	COP (4)	W/W	3,30	3,20	3,22	3,26	3,23	3,21
	SCOP (6)	W/W	3,72	3,77	3,62	3,69	3,68	3,90
	Water flow (4)	l/s	5,20	5,78	6,80	6,96	7,68	8,62
	Exchanger pressure drops on the user side(4)	kPa	24,16	22,92	30,61	28,4	24,03	26,63
	Water energy efficiency 35°C/55° C	classe	A+/A+	A+/A+	A+/A+	A+/A+	A+/A+	A++/A+
Compressor	Type of compressors		SCROLL					
	Type of refrigerant oil		Emkarate RL 32 3MAF					
	Compressors number	Nr	2	2	2	2	2	2
	Cpacity steps	Nr	2	3	2	3	3	4
	Oil charge (Circuit 1)	l	4,44 + 4,44	4,44 + 4,44	4,44 + 4,44	6,3 + 4,44	6,3 + 4,44	3,25 + 3,25
	Oil charge (Circuit 2)	l	-	-	-	-	-	3,25 + 3,25
	Refrigerant circuits	Nr	1 40	1	1	1	1	2

Technical features		Unit of measure	ModelHWA1-A/H					
			02109	02121	02142	02148	02160	04176
Refrigerant	Type		R410A					
	Refrigerant load (Circuit 1) (7)	kg	28,0	32,0	34,5	42,0	42,0	22,0
	Refrigerant load (Circuit 2) (7)	kg	-	-	-	-	-	22,0
	Equivalent CO ₂ tons (7)	ton	58,5	66,8	72,0	87,7	87,7	91,9
	Project pressure (high/low)	bar	40,5/2,5	40,5/2,5	40,5/2,5	40,5/2,5	40,5/2,5	40,5/2,5
External fans	Fans type		ASSIALE					
	Fans number	Nr	2	2	3	3	3	4
	Nominal power (1)	kW	1,4	1,4	1,4	1,4	1,4	1,4
	Max power	kW	3,80	3,80	5,70	5,70	5,70	7,60
	Max absorbed power	A	3,9	3,9	3,9	3,9	3,9	3,9
	Standard air flow	l/s	10021	9984	15109	15088	15045	20954
Internal heat exchanger	Internal heat exchanger type		PLATE HEAT EXCHANGER - A PIASTRE					
	Number of internal heat exchanger	Nr	1	1	1	1	1	1
	Water content	l	6,87	6,87	7,88	7,88	8,89	11,40
Hydraulic circuit	Water side max pressure	bar	12	12	12	12	12	12
	Maximum hydronic kit pressure (safety valve calibration)	bar	6	6	6	6	6	6
	Water connections		2" 1/2	2" 1/2	2" 1/2	2" 1/2	2" 1/2	3"
	Plant minimum water type (8)	l	490	630	630	820	820	480
Noise emissions	Sound power (9)	dB (A)	88 std/ 87 SL/ 84 SSL	88 std/ 87 SL/ 84 SSL	88 std/ 87 SL/ 84 SSL	88 std/ 87 SL/ 84 SSL	88 std/ 87 SL/ 84 SSL	89 std/ 88 SL/ 85 SSL
	Sound pressure (10)	dB (A)	56 std/ 55 SL/ 52 SSL	56 std/ 55 SL/ 52 SSL	55,9 std/ 54,9 SL/ 51,9 SSL	55,9 std/ 54,9 SL/ 51,9 SSL	55,9 std/ 54,9 SL/ 51,9 SSL	56,9 std/ 55,9 SL/ 52,9 SSL
Electrical data	Electrical supply		400V/3P/50Hz					
	Unit without accessories max absorber power	kW	48,9	55,0	63,1	66,9	73,0	87,9
	Unit without accessories max absorber power	A	83,0	93,4	107,1	113,5	123,9	149,2
	Unit without accessories max inrush current	A	285,6	332,3	346,0	358,1	368,5	289,2
Dimensions and weights	A - Length	mm	2860	2860	4060	4060	4060	2860
	B - Width	mm	1100	1100	1100	1100	1100	2200
	C - Height	mm	2350	2350	2350	2350	2350	2350
	Net transport weight	kg	1180	1210	1470	1530	1530	2030
	Operating weight	kg	1190	1220	1480	1540	1540	2040

Technical features		Unit of measure	ModelHWA1-A/H					
			04199	04215	04237	04273	04304	04345
Cooling	Cooling capacity (1)	kW	186,9	208,3	224,8	259,6	289,1	324,6
	Total absorbed power (1)	kW	59,4	67,2	77,5	80,6	92,9	111,9
	EER (1)	W/W	3,15	3,10	2,90	3,22	3,10	2,90
	Cooling capacity (2)	kW	252,0	282,0	301,1	351,2	387,5	433,8
	Total absorbed power (2)	kW	63,8	71,6	83,2	87,0	100,5	121,8
	EER (2)	W/W	3,95	3,94	3,62	4,04	3,86	3,56
	SEER (5)	W/W	4,64	4,71	4,53	4,65	4,73	4,42
	Water flow (1)	l/s	8,94	9,97	10,76	12,42	13,81	15,53
	Exchanger pressure drops on the user side (1)	kPa	26,48	24,66	27,21	18,78	24,85	17,91
Heating	Heating capacity (3)	kW	207,3	223,0	245,9	285,8	316,1	356,1
	Total absorbed power (3)	kW	50,7	54,8	61,1	69,2	78,3	88,5
	COP (3)	W/W	4,09	4,07	4,02	4,13	4,04	4,02
	Heating capacity (4)	kW	198,1	214,1	236,7	273,0	303,3	344,4
	Total absorbed power (4)	kW	61,5	66,0	74,0	83,8	94,7	107,6
	COP (4)	W/W	3,22	3,24	3,20	3,26	3,20	3,20
	SCOP (6)	W/W	3,84	3,96	4,00	3,92	3,95	4,01
	Water flow (4)	l/s	9,54	10,29	11,38	13,13	14,59	16,57
	Exchanger pressure drops on the user side (4)	kPa	31,94	27,61	30,53	22,86	29,13	22,26
	Water energy efficiency 35° C/55°C	classe	A++/A+	A++/A+	A++/A+	A++/A+	A++/A+	A++/A+
Compressor	Type of compressors		SCROLL					
	Type of refrigerant oil		Emkarate RL 32 3MAF					
	N° compressori	Nr	4	4	4	4	4	4
	Capacity steps	Nr	6	4	6	5	5	5
	Oil charge (Circuit 1)	l	4,44 + 3,25	4,44 + 4,44	4,44 + 4,44	6,3 + 4,44	6,3 + 6,3	6,3 + 6,3
	Oil charge (Circuit 2)	l	4,44 + 3,25	4,44 + 4,44	4,44 + 4,44	4,44 + 4,44	4,44 + 4,44	4,44 + 4,44
	Refrigerant circuits	Nr	2	2	2	2	2	2

Technical features		Unità di misura	Model HWA1-A/H					
			04199	04215	04237	04273	04304	04345
Refrigerant	Type		R410A					
	Refrigerant charge (Circuit 1) (7)	kg	22,0	30,0	30,0	43,0	47,0	54,0
	Refrigerant charge (Circuit 2) (7)	kg	22,0	30,0	30,0	41,0	45,0	30,0
	CO ₂ Tons equivalent (7)	ton	91,9	125,3	125,3	175,4	192,1	175,4
	Project pressure (high/low)	bar	40,5/2,5	40,5/2,5	40,5/2,5	40,5/2,5	40,5/2,5	40,5/2,5
External area fans	Fans type		AXIAL					
	Fans number	Nr	4	4	4	6	6	6
	Nominal power (1)	kW	1,4	1,4	1,4	1,4	1,4	1,4
	Max power	kW	7,60	7,60	7,60	11,40	11,40	11,40
	Max absorbed power	A	3,9	3,9	3,9	3,9	3,9	3,9
	Standard air flow	l/s	20888	20815	20738	31370	31264	31109
Internal heat exchanger	Internal heat exchanger		PHE - A PIASTRE					
	Number of internal heat exchangers	Nr	1	1	1	1	1	1
	Water content	l	11,40	11,40	15,50	15,50	22,10	22,10
Hydraulic circuit	Water side max pressure	bar	12	12	12	12	12	12
	Maximum hydronic kit pressure (safety valve calibration)	bar	6	6	6	6	6	6
	Water connections		3"	3"	3"	3"	3"	3"
	Minimum system water content (8)	l	610	610	780	1020	1020	1290
Noise emissions	Sound power (9)	dB (A)	89 std/ 88 SL/ 85 SSL	89 std/ 88 SL/ 85 SSL	90 std/ 89 SL/ 86 SSL	90 std/ 89 SL/ 86 SSL	91 std/ 90 SL/ 87 SSL	92 std/ 91 SL/ 88 SSL
	Sound pressure (10)	dB (A)	56,9 std/ 55,9 SL/ 52,9 SSL	56,9 std/ 55,9 SL/ 52,9 SSL	57,9 std/ 56,9 SL/ 53,9 SSL	57,9 std/ 56,9 SL/ 53,9 SSL	58,8 std/ 57,8 SL/ 54,8 SSL	59,8 std/ 58,8 SL/ 55,8 SSL
Electrical data	Power supply		400V/3P/50Hz					
	Version without accessory max absorbed power	kW	92,8	97,8	110,0	123,8	139,8	160,1
	Version without accessory max absorbed power	A	157,6	166,0	186,8	210,2	237,4	271,8
	Version without accessory max inrush power	A	360,2	368,6	425,7	454,8	482,0	597,2
Dimensions and weights	A - Length	mm	2860	2860	2860	4060	4060	4060
	B - Width	mm	2200	2200	2200	2200	2200	2200
	C - Height	mm	2350	2350	2350	2350	2350	2350
	Net transport weight	kg	2060	2100	2130	2680	2880	2900
	Operating weight	kg	2070	2110	2140	2700	2900	2930

Performance referred to the following conditions:

- 1) Internal exchanger water temperature = 12/7 ° C, air entering the external exchanger 35 ° C.
- 2) Internal exchanger water temperature = 23/18 ° C, air entering the external exchanger 35 ° C.
- (3) Internal exchanger water temperature = 30/35 ° C, air temperature entering the external exchanger = 7 ° C D.B./6°C W.B.
- (4) Internal exchanger water temperature = 40/45 ° C, air temperature entering the external exchanger = 7 ° C D.B./6°C W.B.
- (5) Internal exchanger water reference temperature = 12/7 ° C.
- (6) Average climatic conditions; T_{biv} = -7 ° C, internal exchanger water temperature = 30/35 ° C.
- (7) Indicative data and subject to variation. For the correct data, always refer to the technical label on the unit .
- (8) The calculated value of the minimum volume of water to the system does not consider the volume of water contained in the internal exchanger (evaporator). With applications with low outdoor air temperature or low average loads required, the minimum volume of water to the system is obtained by doubling the indicated value .
- (9) Condition (3); value Determined on the basis of measurements carried out in accordance with UNI EN ISO 9614-2, in compliance with the requirements of the Eurovent certification.
- (10) Value calculated from the sound power level using ISO 3744: 2010, referred to 10 m distance from the unit.

The performance data shown are indicative and may be subject to change. The yields declared in points (1), (2), (3), (4) are to be understood referring to the instantaneous power according to EN 14511. The data declared in points (5), (6) are determined according to UNI EN 14825.

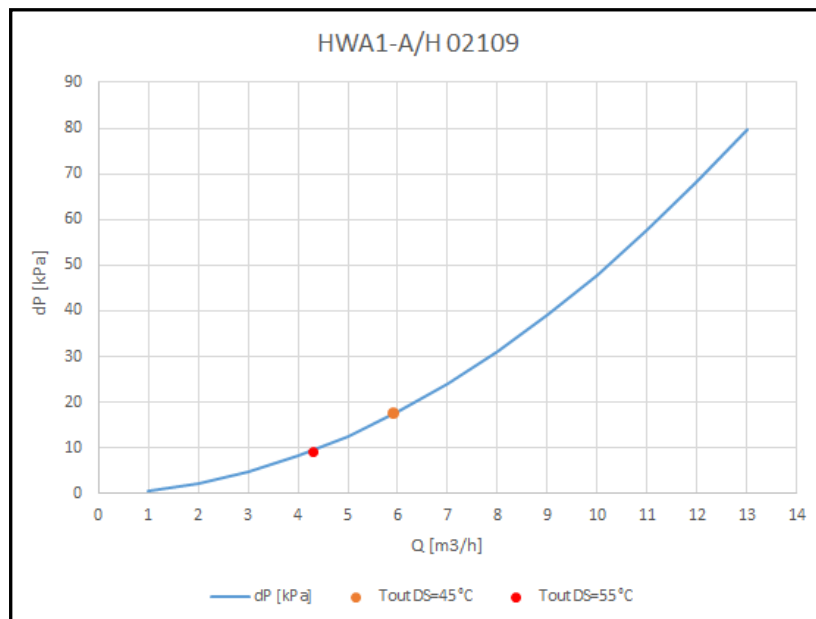
4.2 Version with Desuperheater

The performances are reported below under the conditions (1) of the previous technical data sheets, in the case of units equipped with a desuperheater, for water temperatures leaving the desuperheater of 45 ° C and 55 ° C, with input-output temperature difference of 5 ° C.

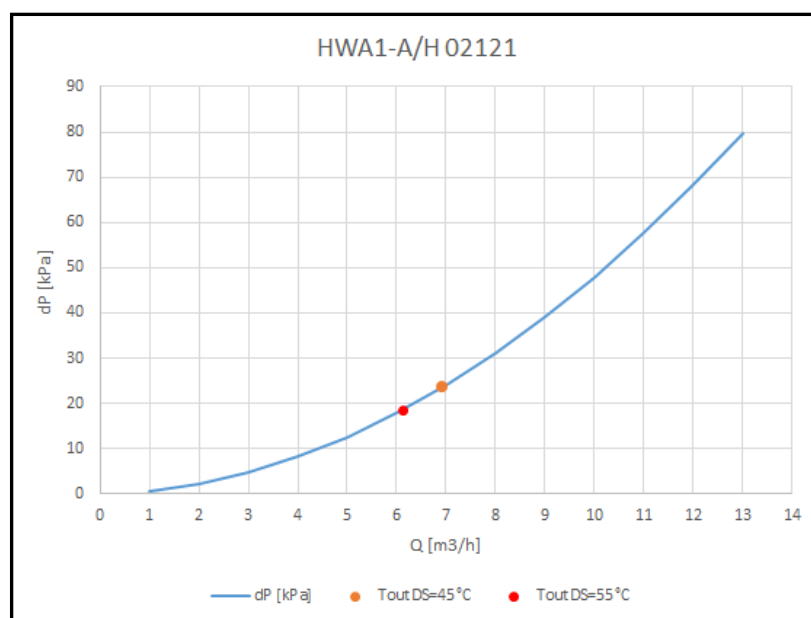
The unit with this version has no hydraulic circuit and no control, therefore it is the responsibility of the designer to verify that partial recovery is effective in any operating condition.

Model HWA1-A/ H	T _{out} DS=45°C					T _{out} DS=55°C				
	Cooling capacity [kW]	Absorbed power [kW]	EER [W/W]	Heating capacity DS [kW]	Pressure drops DS [kPa]	Cooling capacity [kW]	Absorbed power [kW]	EER [W/W]	Heating capacity DS [kW]	Pressure drops DS [kPa]
02109	113,2	29,9	3,79	34,4	20,8	111,4	30,7	3,63	24,9	11,3
02121	123,2	35,2	3,50	40,2	31,0	118,9	36,8	3,23	35,5	20,1
02142	142,4	36,7	3,88	41,2	16,3	136,4	39,7	3,44	35,0	11,1
02148	148,6	40,4	3,68	51,2	21,2	146,9	41,2	3,57	36,9	11,1
02160	163,4	43,9	3,72	70,0	18,6	161,6	44,9	3,60	39,3	9,3
04176	169,7	49,6	3,42	62,4	16,5	166,8	50,7	3,29	45,8	9,3
04199	201,6	53,1	3,80	57,3	15,3	193,6	56,9	3,40	49,2	10,3
04215	224,5	61,6	3,65	79,3	23,5	219,2	63,4	3,46	58,2	13,7
04237	244,0	70,8	3,45	92,3	31,7	243,2	71,0	3,43	59,7	16,1
04273	278,7	72,4	3,85	89,7	14,9	272,9	75,6	3,61	67,9	8,0
04304	314,7	82,5	3,81	104,5	19,0	302,7	88,4	3,43	85,6	12,3
04345	362,5	97,0	3,74	123,8	23,7	344,6	104,9	3,29	108,4	16,6

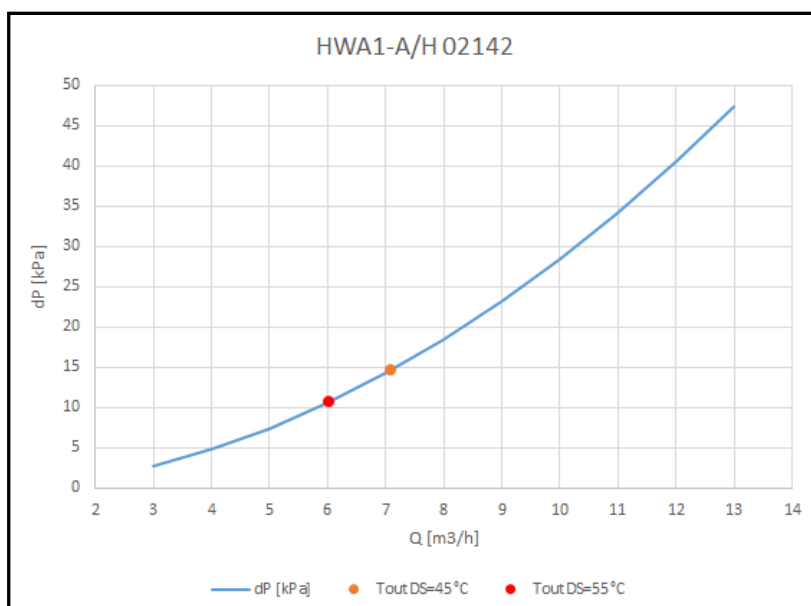
HWA1-A/H 02109	
Water flow DS [m ³ /h]	Pressure drops DS [kPa]
1,0	0,62
2,0	2,14
3,0	4,68
4,0	8,16
5,0	12,57
6,0	17,88
7,0	24,09
8,0	31,18
9,0	39,16
10,0	48,01
11,0	57,72
12,0	68,30
13,0	79,73



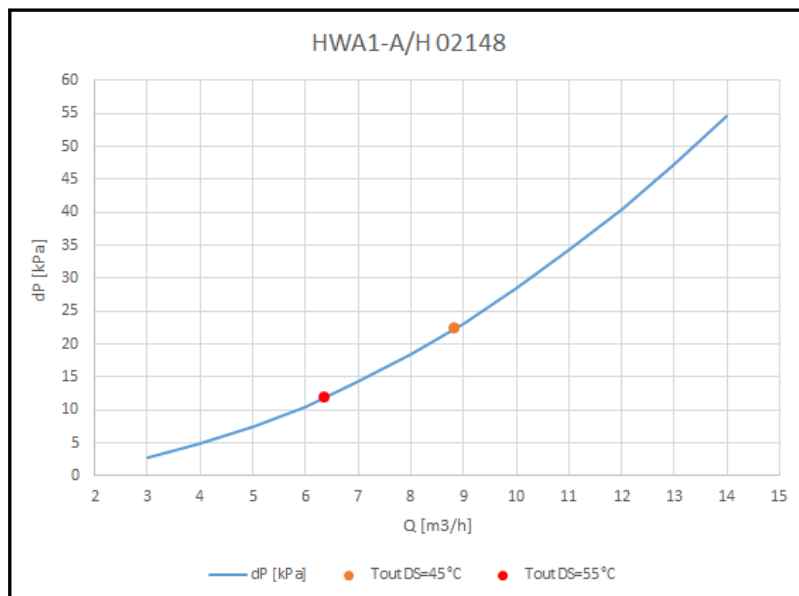
HWA1-A/H 02121	
Water flow DS [m ³ /h]	Pressure drops DS [kPa]
1,0	0,62
2,0	2,14
3,0	4,68
4,0	8,16
5,0	12,57
6,0	17,88
7,0	24,09
8,0	31,18
9,0	39,16
10,0	48,01
11,0	57,72
12,0	68,30
13,0	79,73



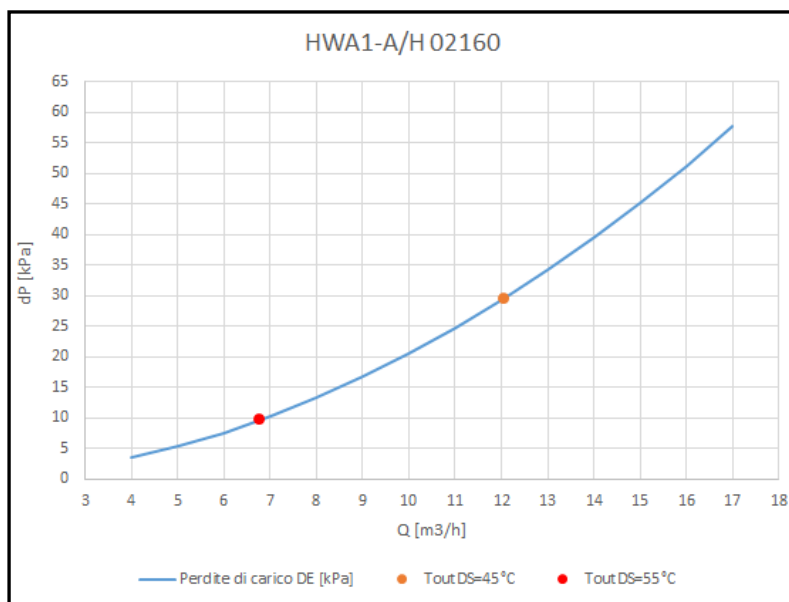
HWA1-A/H 02142	
Water flow DS [m ³ /h]	Pressure drops DS [kPa]
3,0	2,76
4,0	4,82
5,0	7,42
6,0	10,57
7,0	14,25
8,0	18,46
9,0	23,20
10,0	28,46
11,0	34,24
12,0	40,53
13,0	47,34



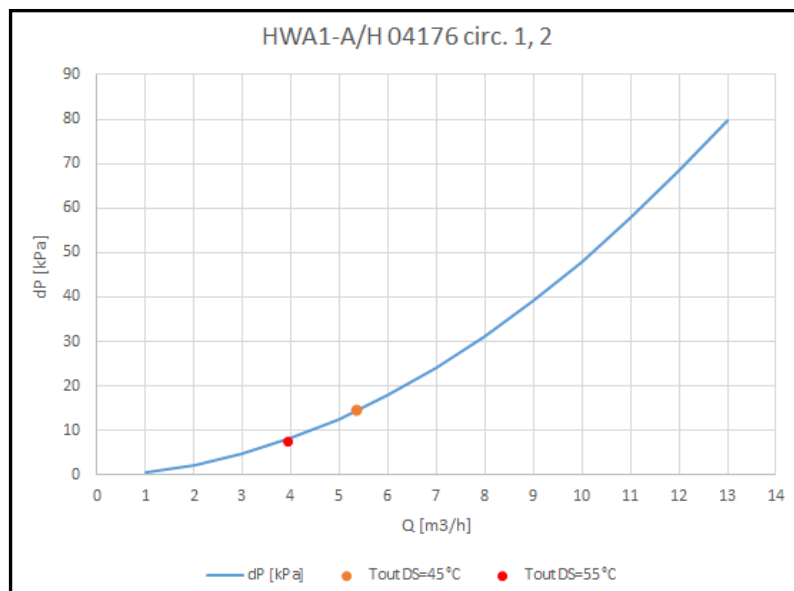
HWA1-A/H 02148	
Water flow DS [m ³ /h]	Pressure drops DS [kPa]
3,0	2,76
4,0	4,82
5,0	7,42
6,0	10,57
7,0	14,25
8,0	18,46
9,0	23,20
10,0	28,46
11,0	34,24
12,0	40,53
13,0	47,34
14,0	54,65



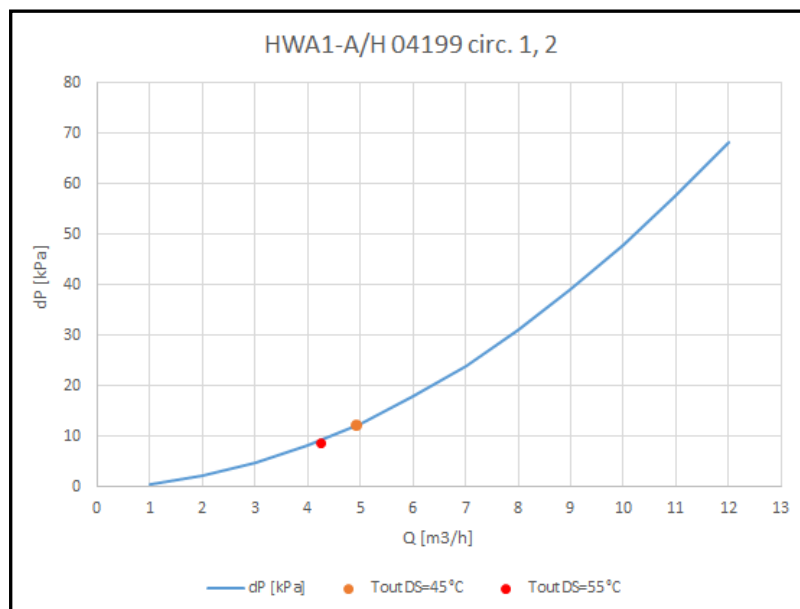
HWA1-A/H 02160	
Water flow DS [m ³ /h]	Pressure drops DS [kPa]
4,0	3,57
5,0	5,34
6,0	7,61
7,0	10,27
8,0	13,31
9,0	16,74
10,0	20,55
11,0	24,73
12,0	29,29
13,0	34,22
14,0	39,53
15,0	45,21
16,0	51,25
17,0	57,67



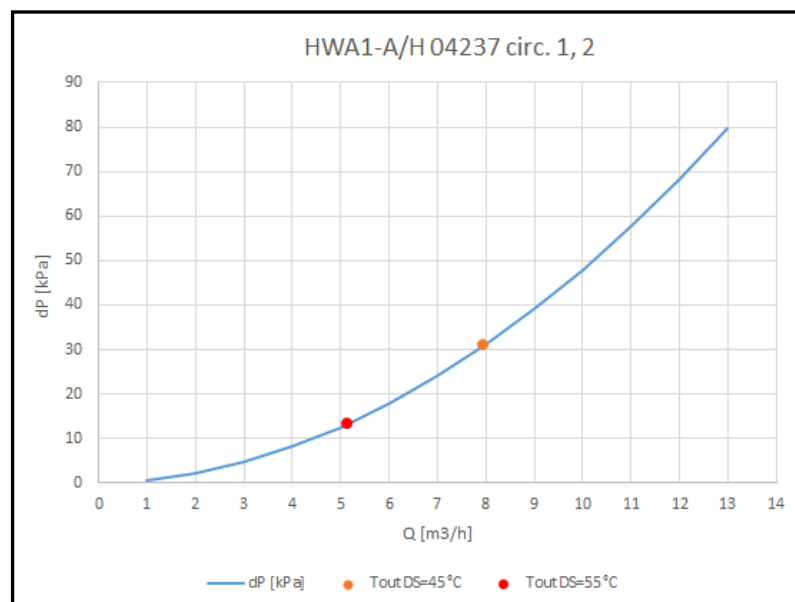
HWA1-A/H 04176 circuit 1 e 2	
Water flow DS [m ³ /h]	Pressure drops DS [kPa]
1,0	0,62
2,0	2,14
3,0	4,68
4,0	8,16
5,0	12,57
6,0	17,88
7,0	24,09
8,0	31,18
9,0	39,16
10,0	48,01
11,0	57,72
12,0	68,30
13,0	79,73



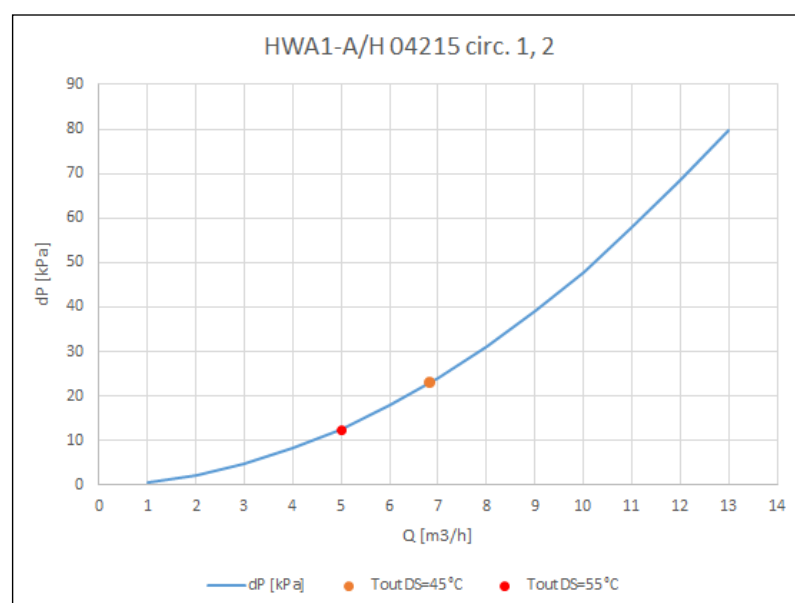
HWA1-A/H 04199 circuit 1 e 2	
Water flow DS [m ³ /h]	Pressure drops DS [kPa]
1,0	0,62
2,0	2,14
3,0	4,68
4,0	8,16
5,0	12,57
6,0	17,88
7,0	24,09
8,0	31,18
9,0	39,16
10,0	48,01
11,0	57,72
12,0	68,30



HWA1-A/H 04215 circuit 1 e 2	
Water flow DS [m ³ /h]	Pressure drops DS [kPa]
1,0	0,62
2,0	2,14
3,0	4,68
4,0	8,16
5,0	12,57
6,0	17,88
7,0	24,09
8,0	31,18
9,0	39,16
10,0	48,01
11,0	57,72
12,0	68,30
13,0	79,73



HWA1-A/H 04237 circuit 1 e 2	
Water flow DS [m ³ /h]	Pressure drops DS [kPa]
1,0	0,62
2,0	2,14
3,0	4,68
4,0	8,16
5,0	12,57
6,0	17,88
7,0	24,09
8,0	31,18
9,0	39,16
10,0	48,01
11,0	57,72
12,0	68,30
13,0	79,73

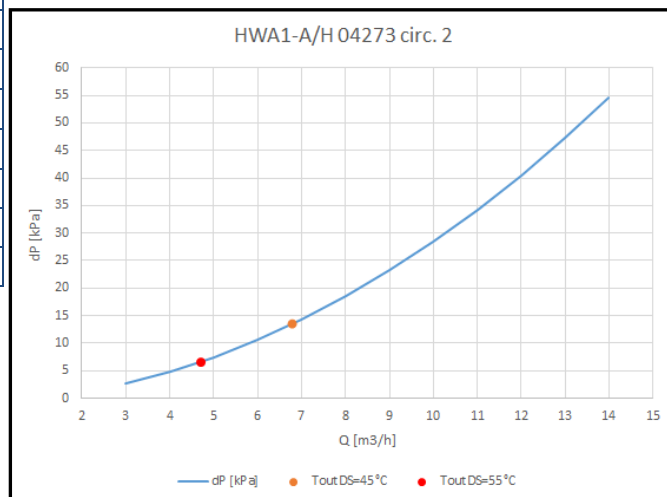
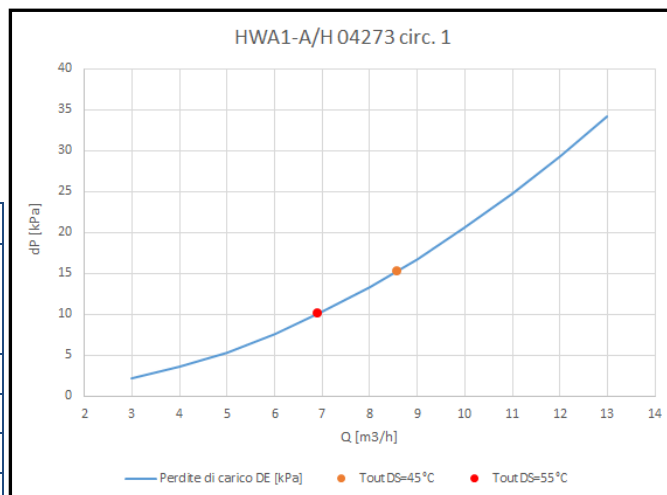


HWA1-A/H 04273 circuit 1

Water flow DS [m ³ /h]	Pressure drops DS [kPa]
3,0	2,12
4,0	3,57
5,0	5,34
6,0	7,61
7,0	10,27
8,0	13,31
9,0	16,74
10,0	20,55
11,0	24,73
12,0	29,29
13,0	34,22

HWA1-A/H 04273 circuit 2

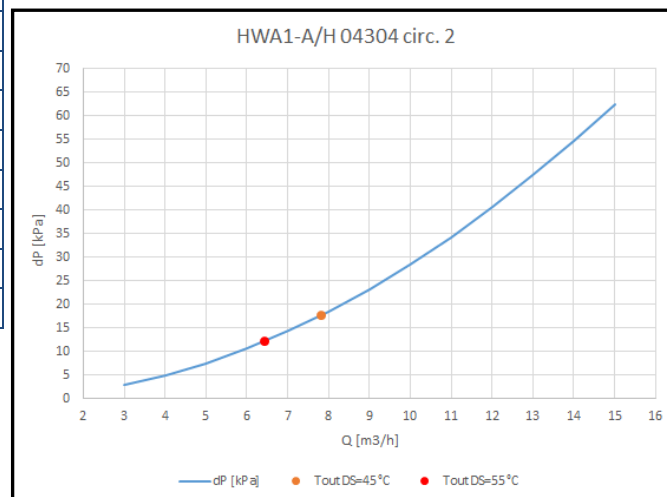
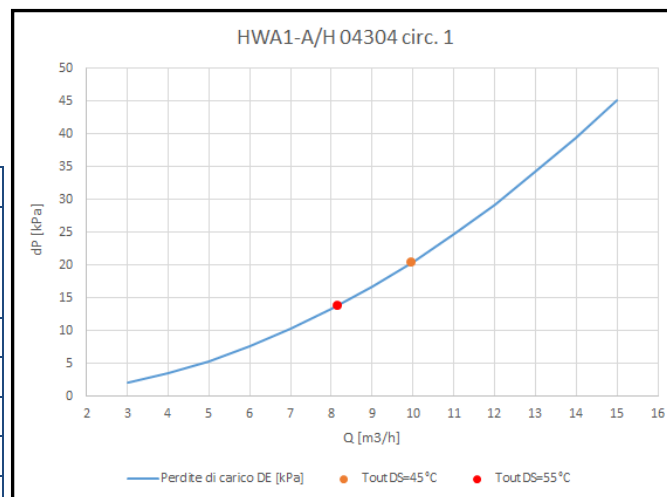
Water flow DS [m ³ /h]	Pressure drops DS [kPa]
3,0	2,76
4,0	4,82
5,0	7,42
6,0	10,57
7,0	14,25
8,0	18,46
9,0	23,20
10,0	28,46
11,0	34,24
12,0	40,53
13,0	47,34


HWA1-A/H 04304 circuit 1

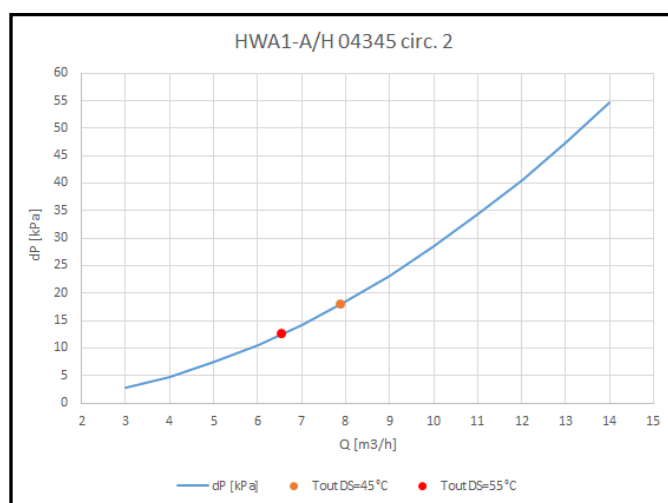
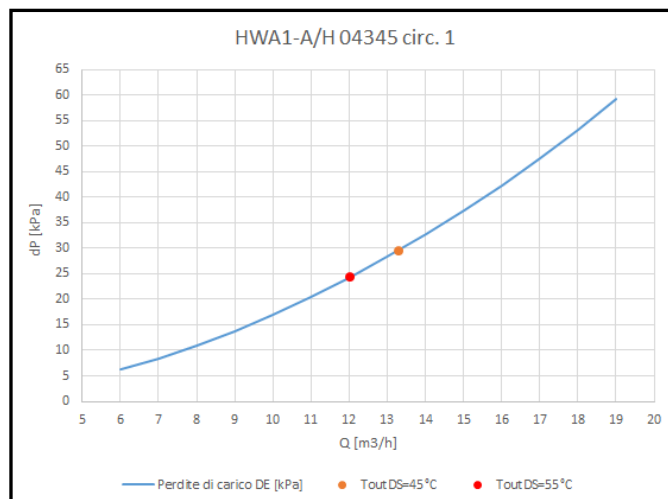
Water flow DS [m ³ /h]	Pressure drops DS [kPa]
3,0	2,12
4,0	3,57
5,0	5,34
6,0	7,61
7,0	10,27
8,0	13,31
9,0	16,74
10,0	20,55
11,0	24,73
12,0	29,29
13,0	34,22
14,0	39,53
15,0	45,21

HWA1-A/H 04304 circuit 2

Water flow de [m ³ /h]	Pressure drops DS [kPa]
3,0	2,76
4,0	4,82
5,0	7,42
6,0	10,57
7,0	14,25
8,0	18,46
9,0	23,20
10,0	28,46
11,0	34,24
12,0	40,53
13,0	47,34
14,0	54,65
15,0	62,48



HWA1-A/H 04345 circuit 1		HWA1-A/H 04345 circuit 2	
Water flow DS [m ³ /h]	Pressure drops DS [kPa]	Water flow DS [m ³ /h]	Pressure drops DS [kPa]
6,0	6,27	3,0	2,76
7,0	8,46	4,0	4,82
8,0	10,97	5,0	7,42
9,0	13,80	6,0	10,57
10,0	16,95	7,0	14,25
11,0	20,41	8,0	18,46
12,0	24,18	9,0	23,20
13,0	28,27	10,0	28,46
14,0	32,66	11,0	34,24
15,0	37,36	12,0	40,53
16,0	42,37	13,0	47,34
17,0	47,69	14,0	54,65
18,0	53,31	15,0	62,48
19,0	59,23	16,0	70,81



4.3 Electrical and auxiliary data

Unit electrical supply	V/~ /Hz	400/3+PE/50
On board control circuit	V/~ /Hz	12/1/50
On board control circuit	V/~ /Hz	12/1/50
Fans supply	V/~ /Hz	230/1/50

Electrical data are subject to change by update. It is therefore always necessary to refer to the technical features label applied on the side panel of the unit

Measures	Unit of measure	Model HWA1-A/H					
		02109	02121	02142	02148	02160	04176
F.L.A. Absorbed power at maximum operating working conditions allowed							
F.L.A. Compressor 1	A	38,2	48,6	48,6	65,4	65,4	34,0
F.L.A. Compressor 2	A	38,2	38,2	48,6	38,2	48,6	34,0
F.L.A. Compressor 3	A	-	-	-	-	-	34,0
F.L.A. Compressor 4	A	-	-	-	-	-	34,0
F.L.A. Fans	A	6,6	6,6	9,9	9,9	9,9	13,2
L.R.A. Inrush current (with blocked rotor)							
L.R.A. Compressor 1	A	240,8	287,5	287,5	310,0	310,0	174,0
L.R.A. Compressor 2	A	240,8	240,8	287,5	240,8	287,5	174,0
L.R.A. Compressor 3	A	-	-	-	-	-	174,0
L.R.A. Compressor 4	A	-	-	-	-	-	174,0
Total unit							
Max absorbed power	kW	48,9	55,0	63,1	66,9	73,0	87,9
Max absorbed current	A	83,0	93,4	107,1	113,5	123,9	149,2
L.R.A.	A	285,6	332,3	346	358,1	368,5	289,2
F.L.A.	A	83,0	93,4	107,1	113,5	123,9	149,2
F.L.I.	kW	41,7	44,7	47,3	50,7	56,9	60,6

Dimensions	Unit of measure	ModelHWA1-A/H					
		04199	04215	04237	04273	04304	04345
F.L.A. Absorbed power at maximum operating working conditions allowed							
F.L.A. Compressor 1	A	38,2	38,2	48,6	65,4	65,4	82,6
F.L.A. Compressor 2	A	34,0	38,2	38,2	48,6	65,4	82,6
F.L.A. Compressor 3	A	38,2	38,2	38,2	38,2	38,2	38,2
F.L.A. Compressor 4	A	34,0	38,2	48,6	38,2	48,6	48,6
F.L.A. Fans	A	13,2	13,2	13,2	19,8	19,8	19,8
L.R.A. Inrush current (with blocked rotor)							
L.R.A. Compressor 1	A	240,8	240,8	287,5	310,0	310,0	408,0
L.R.A. Compressor 2	A	174,0	240,8	240,8	287,5	310,0	408,0
L.R.A. Compressor 3	A	240,8	240,8	240,8	240,8	240,8	240,8
L.R.A. Compressor 4	A	174,0	240,8	287,5	240,8	287,5	287,5
Total unit							
Max absorbed power	kW	92,8	97,8	110,0	123,8	139,8	160,1
Max absorbed current	A	157,6	166,0	186,8	210,2	237,4	271,8
L.R.A.	A	360,2	368,6	425,7	454,8	482,0	597,2
F.L.A.	A	157,6	166,0	186,8	210,2	237,4	271,8
F.L.I.	kW	68,2	76,8	89,1	92,6	106,8	130,0

5. CORRECTIVE FACTORS

5.1 Corrective factors for the use of a mixture of glycol water

The correction factors of the water flow and pressure drops must be applied to the values obtained without the use of glycol. The water flow rate correction factor is calculated so as to maintain the same temperature difference that would be obtained without the use of glycol. The pressure drops correction factor is applied to the correct water flow rate value

Percentage by mass of ethylene glycol	Freezing point (°C)	Yield correction factor	Correction factor of absolute power	Correction factor of water flow	Correction factor for pressure drops
10%	-3,2	0,985	1	1,02	1,08
20%	-7,8	0,98	0,99	1,05	1,12
30%	-14,1	0,97	0,98	1,10	1,22
40%	-22,3	0,965	0,97	1,14	1,25
50%	-33,8	0,955	0,965	1,2	1,33

5.2 Scale correction factors

We report the correction factors due to the soiling of the internal gas / water exchanger.

m ² °C / kW	Correction factor of power output	Correction factor of the absorbed power
0,44 x 10 ⁻¹	1,00	1,00
0,88 x 10 ⁻¹	0,99	1,00
1,76 x 10 ⁻¹	0,98	1,00

5.3 Calibrations and controls protections

Description	Value
High pressure safety valve	45 bar
High pressure switch	41,5 bar
High pressure alarm	41 bar
Low pressure switch	2,5 bar
Low pressure alarm	3,5 bar
Low pressure safety valve	29,5
Maximum number of restarts after low pressure alarm	3
Frost protection set (except BT version)	+3°C
Hydronic circuit safety valve (present with hydronic kit)	6 bar
Maximum water circuit pressure without hydronic kit	25 bar

5.4 Correction factors according to altitude

The correction factors of the performance according to the altitude are calculated for cooling under conditions (1) and for heating under conditions (3) of the previous technical data tables and are provided for altitudes of 500, 1000, 1500 and 2000 m.

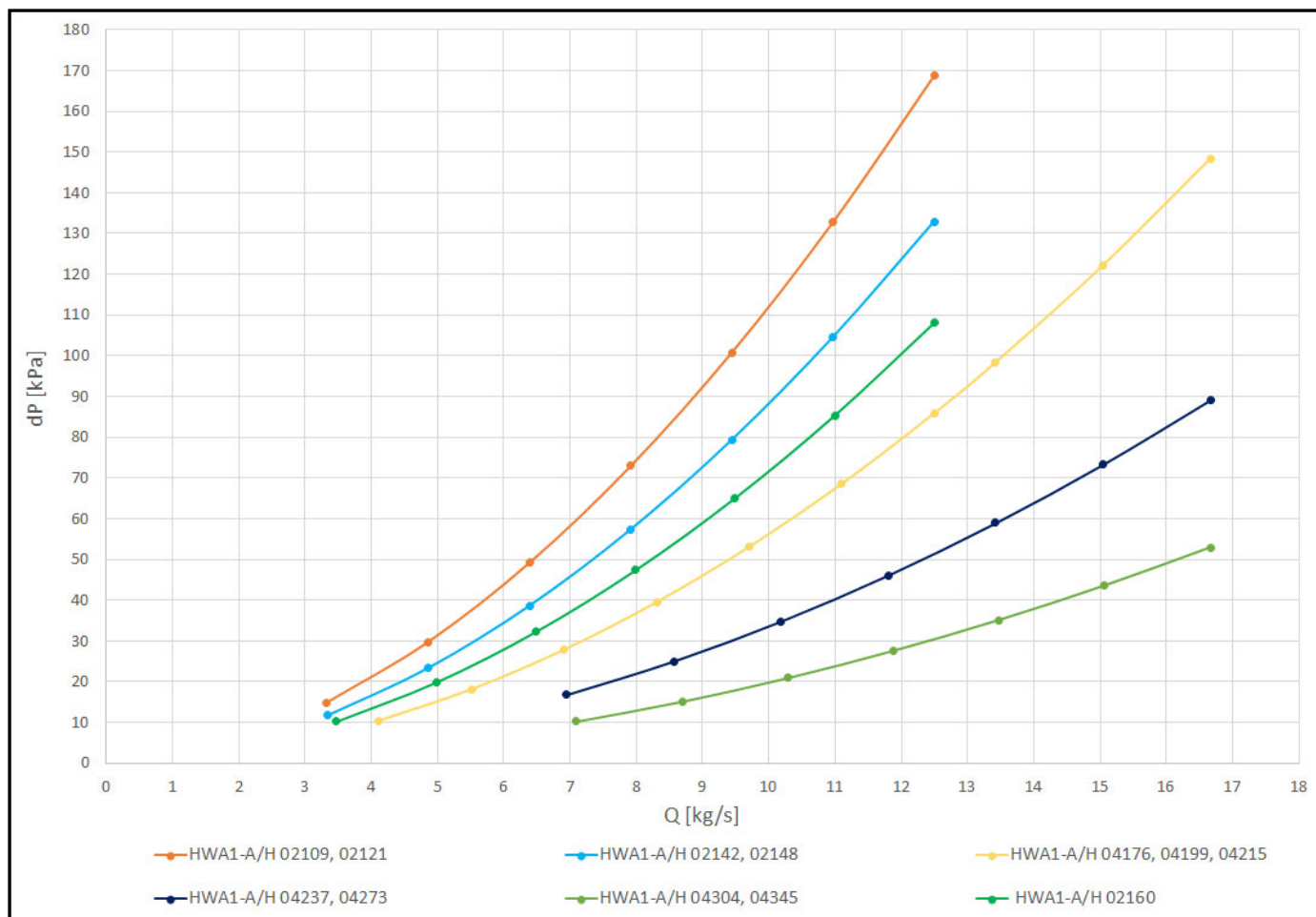
HWA1-A/H				
Altitude [m]	500	1000	1500	2000
Thermal yield corrective factor	0,9964	0,9941	0,9888	0,9869
Correction factor for power absorbed in heating	0,9931	0,9841	0,9853	0,9755
Corrective factor for cooling	0,9888	0,9762	0,9618	0,9466
Correction factor for power absorbed in cooling	1,0106	1,0235	1,0386	1,0560

6. HYDRONIC MODULE DATA

6.1 Pressure drops

The pressure drops of the heat exchangers on the user side according to the flow rate are shown.

	Flow [kg/s]	Pressure drops [kPa]
HWA1-A/H 02109, 02121	3,3	14,8
	4,9	29,7
	6,4	49,2
	7,9	72,9
	9,4	100,7
	11,0	132,7
	12,5	168,7
HWA1-A/H 02142, 02148	3,3	11,7
	4,9	23,4
	6,4	38,7
	7,9	57,4
	9,4	79,4
	11,0	104,6
	12,5	132,9
HWA1-A/H 02160	3,5	10,2
	5,0	19,8
	6,5	32,3
	8,0	47,4
	9,5	65,1
	11,0	85,4
	12,5	108,1
HWA1-A/H 04176, 04199, 04215	4,1	10,4
	5,5	18,1
	6,9	27,8
	8,3	39,5
	9,7	53,1
	11,1	68,5
	12,5	85,8
	13,4	98,3
	15,0	122,1
	16,7	148,3
HWA1-A/H 04237, 04273	6,9	16,8
	8,6	25,0
	10,2	34,8
	11,8	46,1
	13,4	58,9
	15,0	73,3
	16,7	89,1
HWA1-A/H 04304, 04345	7,1	10,2
	8,7	15,1
	10,3	20,9
	11,9	27,6
	13,5	35,1
	15,1	43,6
	16,7	52,8



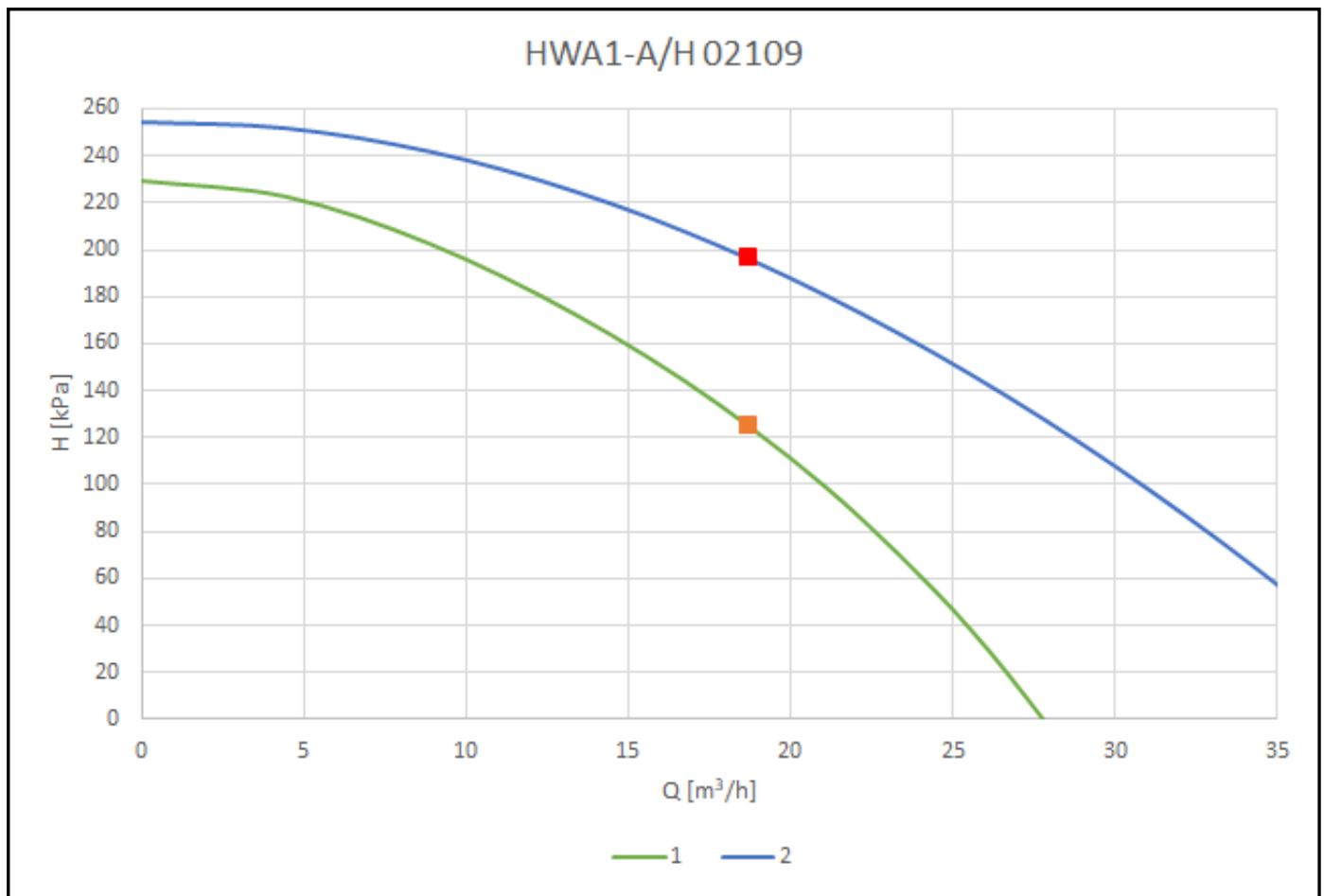
dP = pressure drop on user side of the plate heat exchanger

Q = water flow

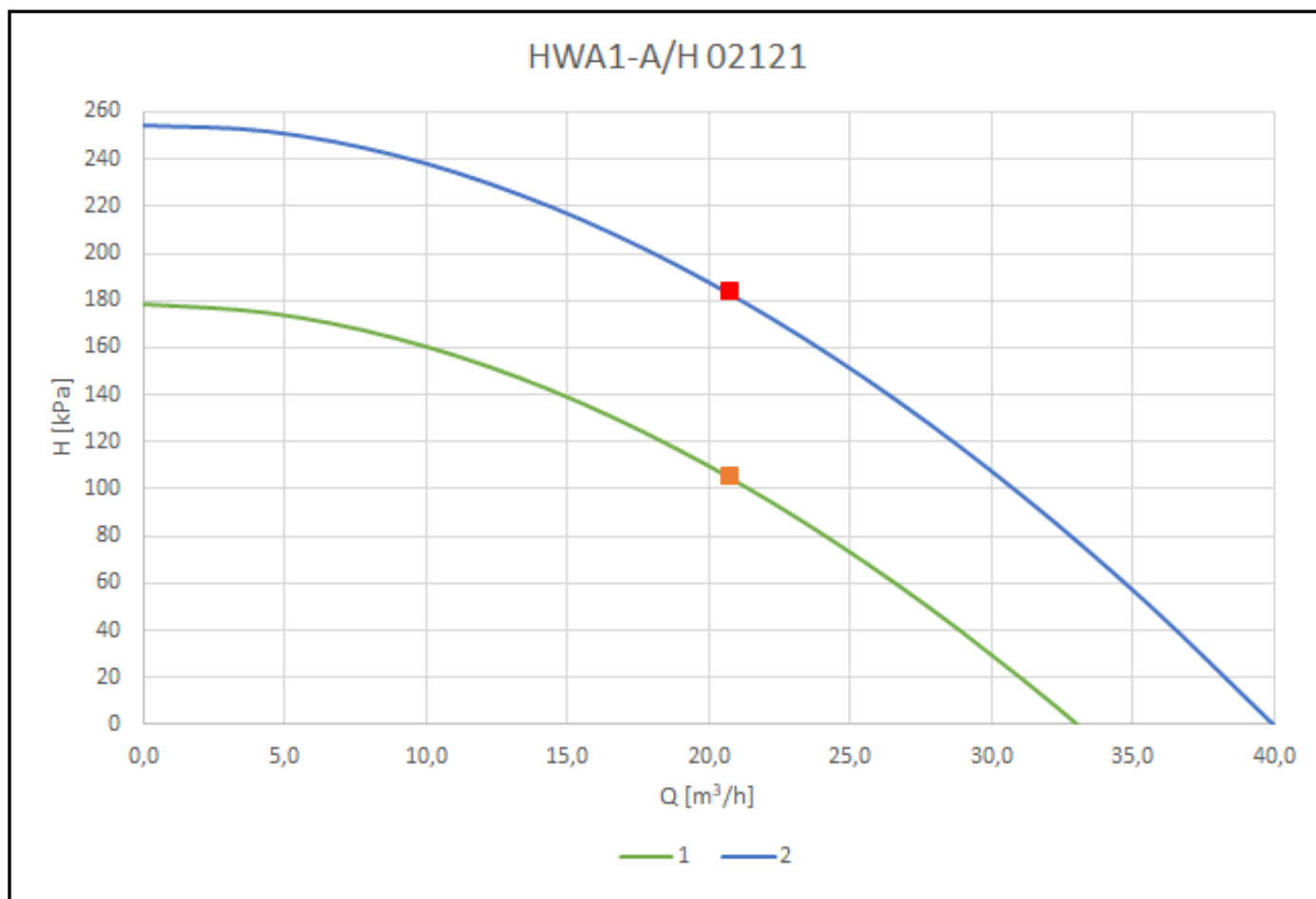
6.2 Useful head

The head-flow characteristic curves net of the pressure drops of the hydronic kit with the circulator at maximum speed are shown below. Curve number 1 is referred to the standard pump; curve number 2 is referred to the high pressure pump. On each curve, the optimal operating point is shown under the conditions (4) of the technical data. The system **MUST** be designed so as to guarantee the nominal flow rate relative to the work points shown below.

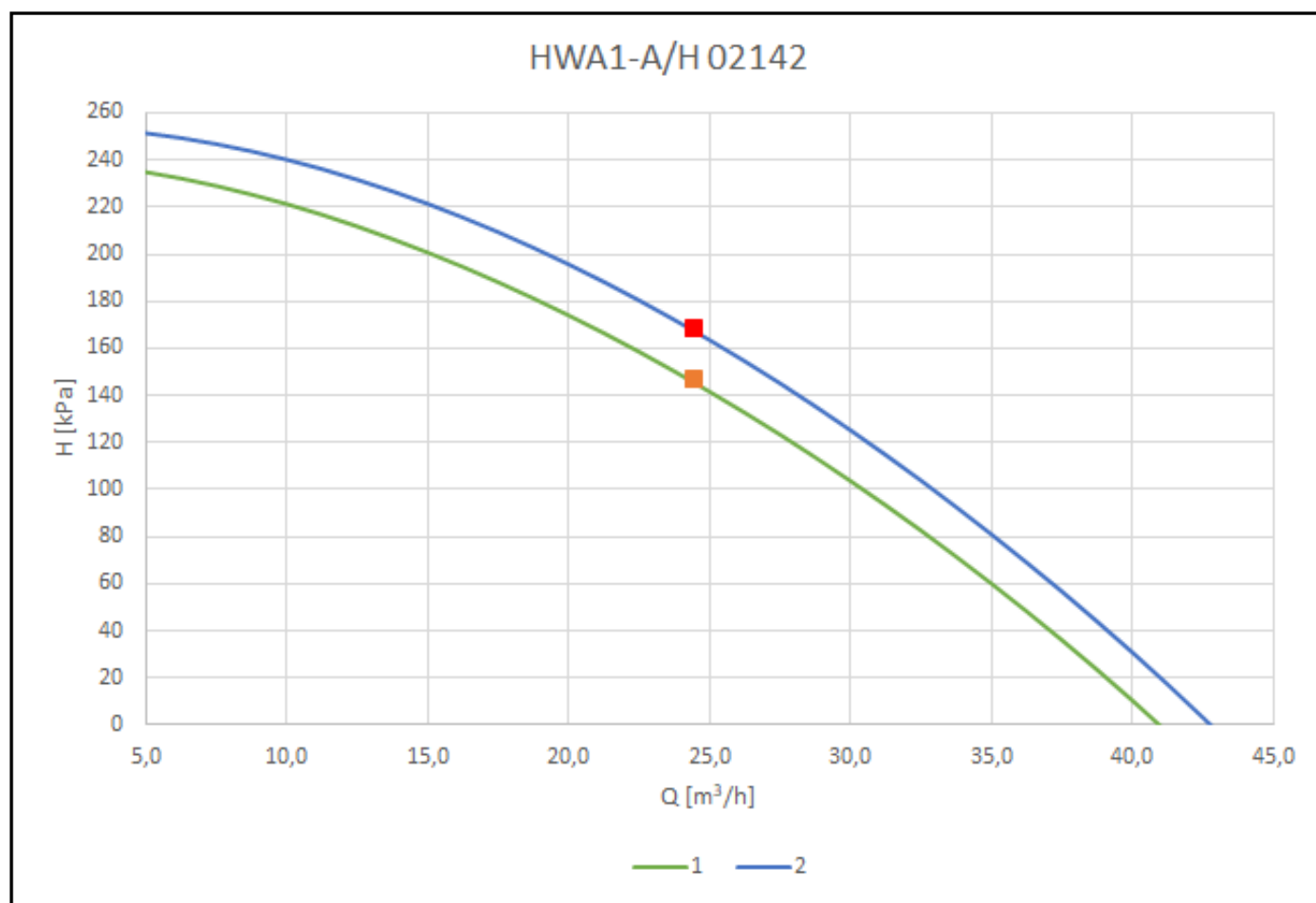
HWA1-A/H 02109			
Available head pressure standard pump		High available head pressure pump	
Flow [m ³ /h]	Useful head [kPa]	Flow [m ³ /h]	Useful head [kPa]
0,0	229,5	0,0	254,7
4,4	222,9	4,4	252,2
8,9	202,7	8,9	242,2
13,3	172,9	13,3	225,3
17,8	134,4	17,8	202,1
22,2	85,1	22,2	172,9
26,7	19,9	26,7	137,9



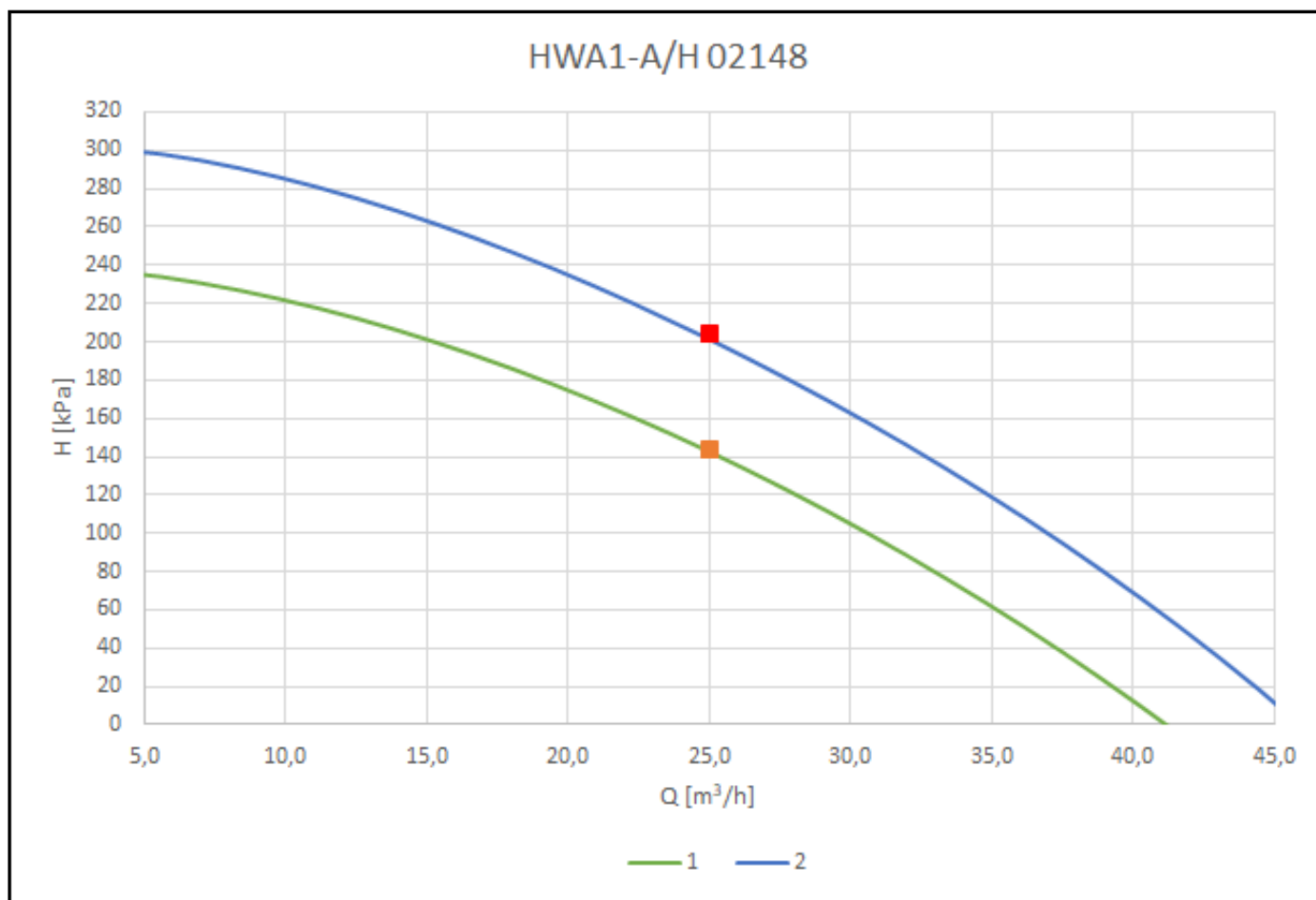
HWA1-A/H 02121			
Available head pressure standard pump		High available head pressure pump	
Flow [m ³ /h]	Net head prss [kPa]	Flow [m ³ /h]	Prevalenza utile [kPa]
0,0	178,1	0,0	254,7
4,4	174,4	4,4	252,2
8,9	163,9	8,9	242,2
13,3	146,9	13,3	225,3
17,8	123,6	17,8	202,1
22,2	94,4	22,2	172,9
26,7	59,6	26,7	137,9
31,1	19,4	31,1	97,4



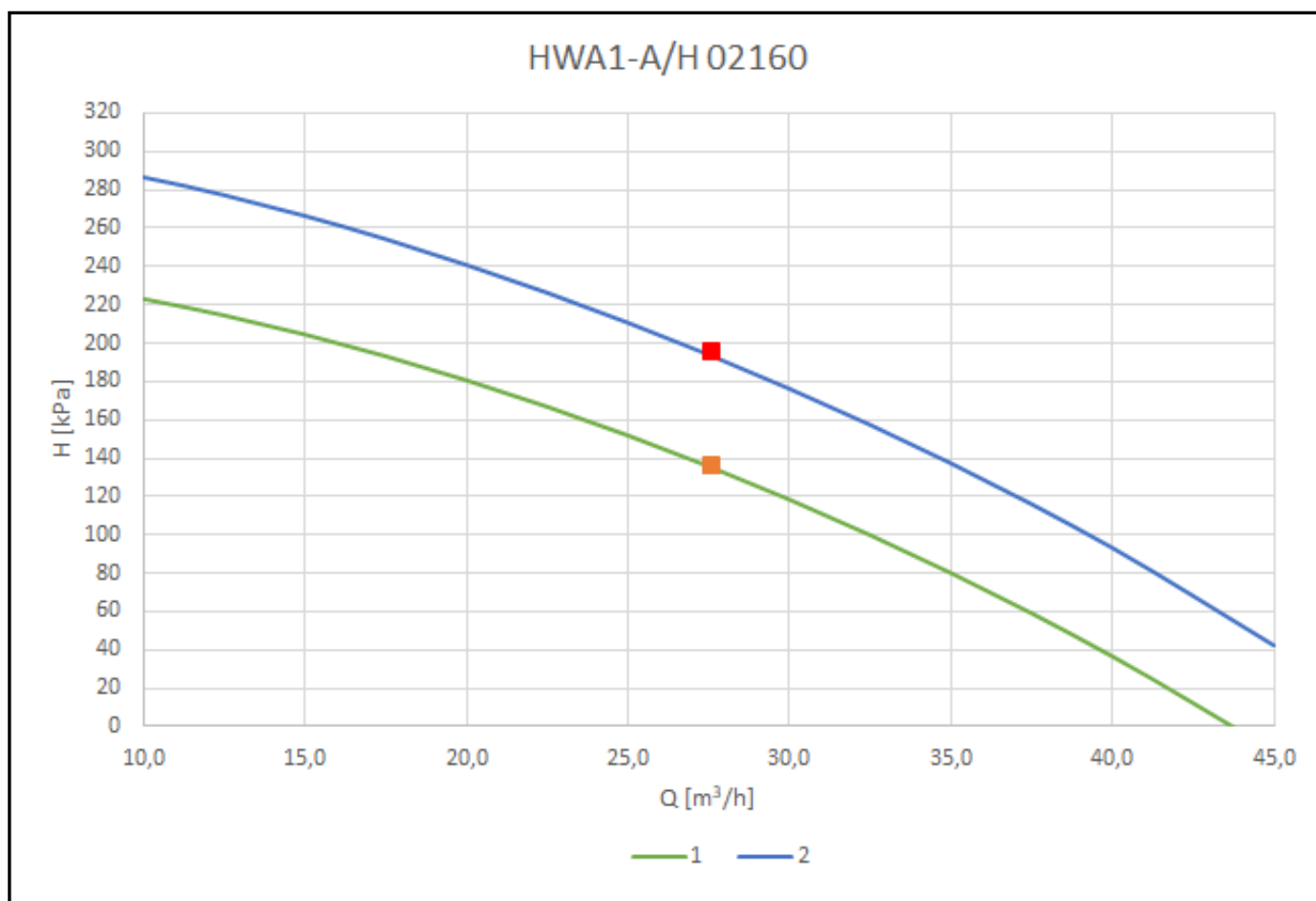
HWA1-A/H 02142			
Available head pressure standard pump		High available head pressure pump	
Portata [m ³ /h]	Prevalenza utile [kPa]	Portata [m ³ /h]	Prevalenza utile [kPa]
0,0	241,0	0,0	254,7
5,0	235,3	5,0	251,8
10,0	221,6	10,0	240,5
15,0	201,1	15,0	221,7
20,0	174,3	20,0	195,9
25,0	141,9	25,0	163,7
30,0	103,9	30,0	125,4
35,0	60,3	35,0	81,1
40,0	10,7	40,0	30,9



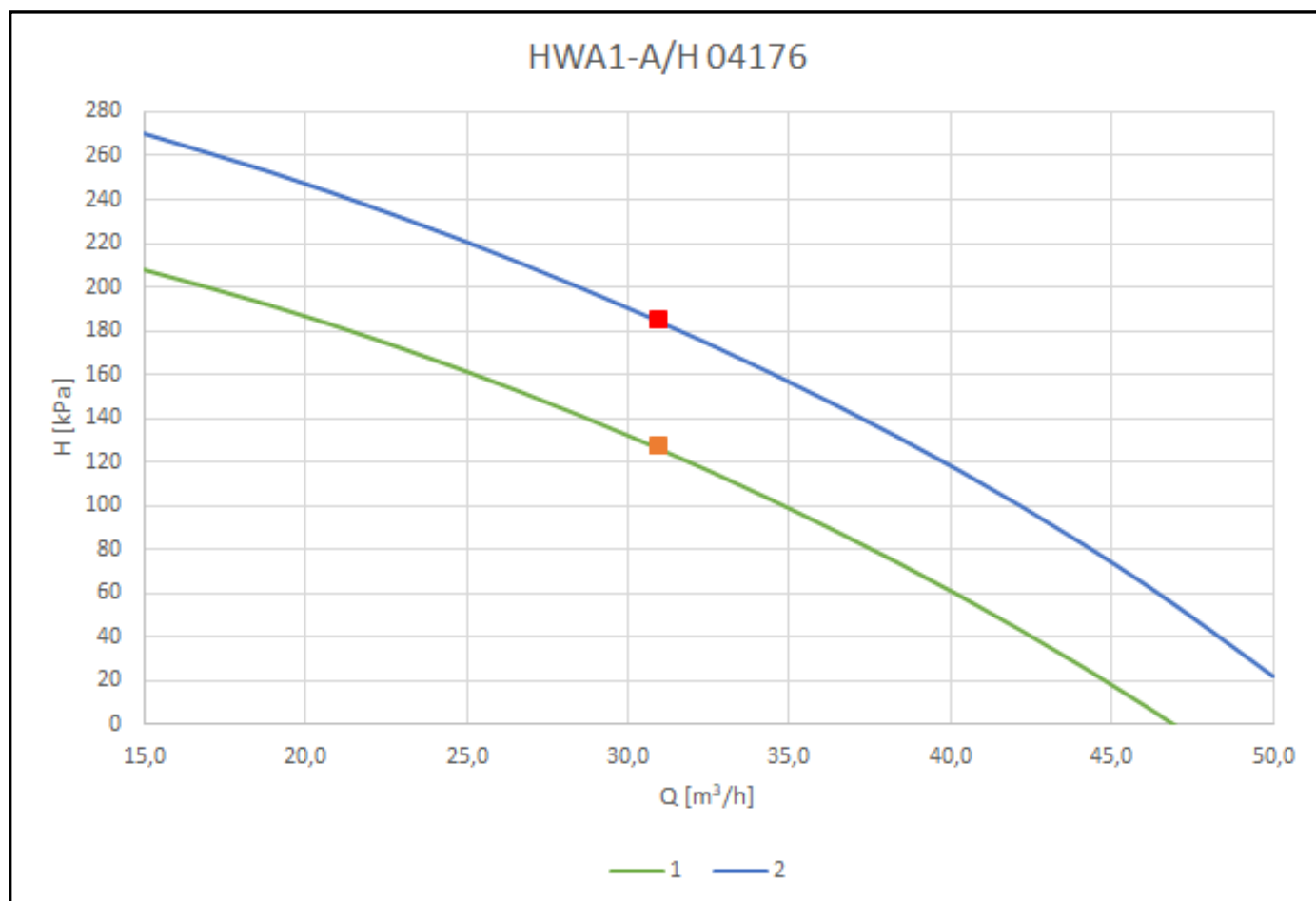
HWA1-A/H 02148			
Available head pressure standard pump		High available head pressure pump	
Portata [m ³ /h]	Prevalenza utile [kPa]	Portata [m ³ /h]	Prevalenza utile [kPa]
0,0	241,0	0,0	304,0
5,6	234,2	5,6	298,6
11,1	217,8	11,1	281,3
16,7	193,1	16,7	254,8
22,2	161,2	22,2	221,0
27,8	122,4	27,8	180,8
33,3	76,9	33,3	134,4
38,9	24,1	38,9	81,0



HWA1-A/H 02160			
Available head pressure standard pump		High available head pressure pump	
Portata [m ³ /h]	Prevalenza utile [kPa]	Portata [m ³ /h]	Prevalenza utile [kPa]
0,0	241,0	0,0	304,0
5,0	235,7	5,0	300,1
10,0	223,2	10,0	287,1
15,0	204,7	15,0	266,9
20,0	180,7	20,0	241,3
25,0	151,9	25,0	211,0
30,0	118,4	30,0	176,4
35,0	80,0	35,0	137,4
40,0	36,4	40,0	93,0



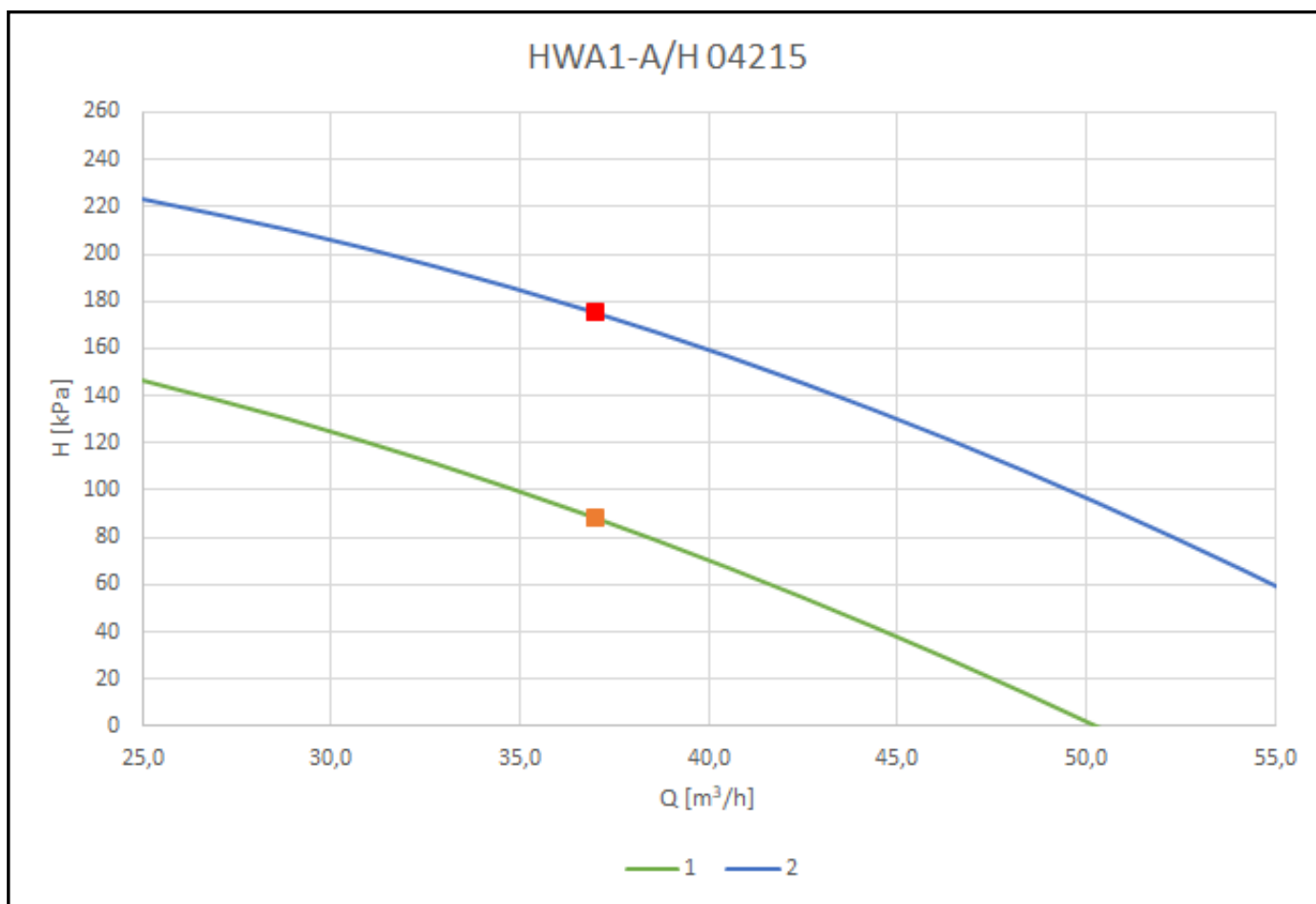
HWA1-A/H 04176			
Available head pressure standard pump		High available head pressure pump	
Portata [m ³ /h]	Prevalenza utile [kPa]	Portata [m ³ /h]	Prevalenza utile [kPa]
15,0	208,2	15,0	270,5
18,9	192,1	18,9	253,0
22,8	173,5	22,8	233,2
26,7	152,5	26,7	211,2
30,6	129,2	30,6	187,1
34,4	103,3	34,4	160,7
38,3	74,8	38,3	131,7
42,2	43,3	42,2	99,5
46,1	8,5	46,1	63,2



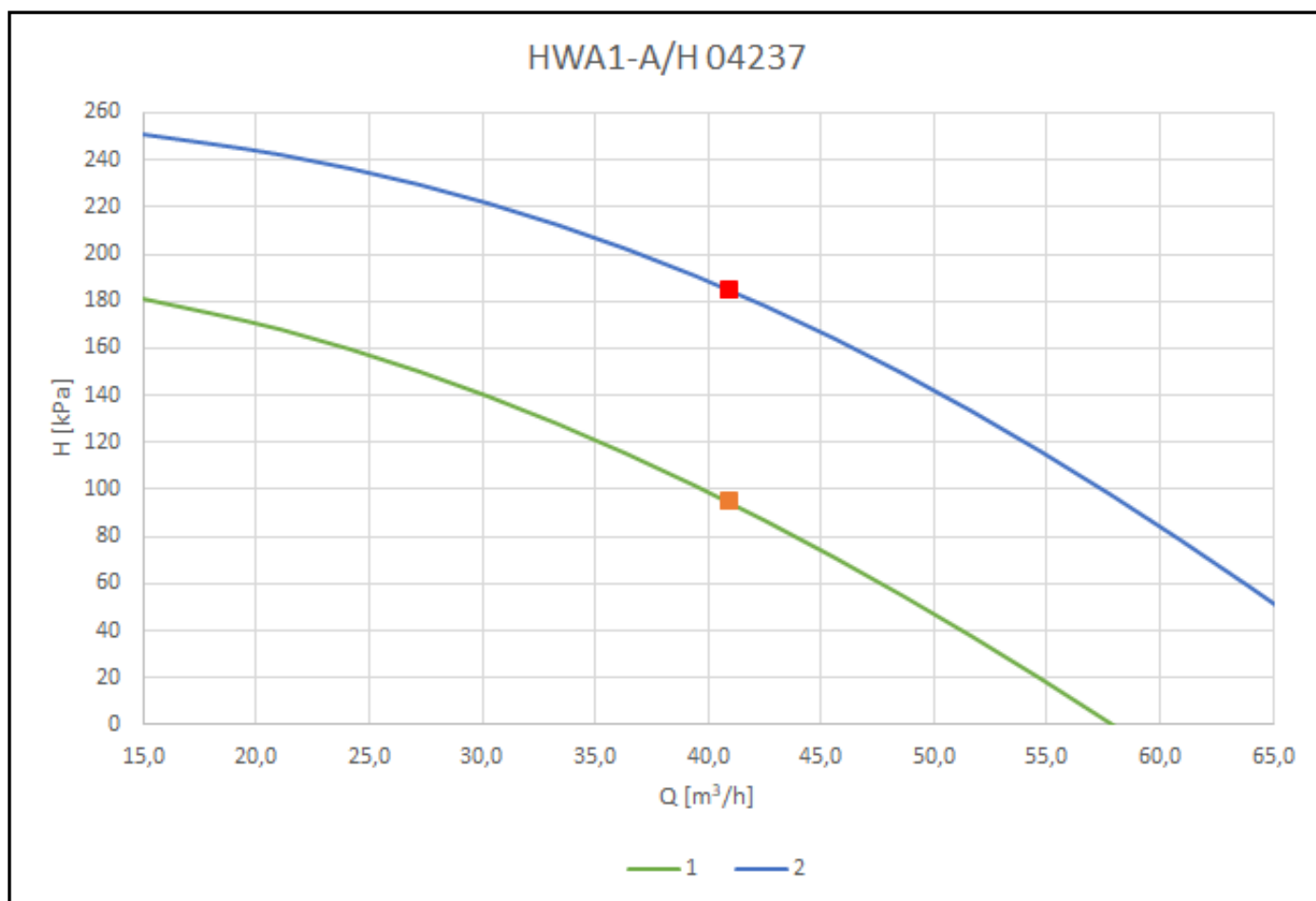
HWA1-A/H 04199			
Available head pressure standard pump		High available head pressure pump	
Portata [m ³ /h]	Prevalenza utile [kPa]	Portata [m ³ /h]	Prevalenza utile [kPa]
15,0	208,2	15,0	270,5
18,9	192,1	18,9	253,0
22,8	173,5	22,8	233,2
26,7	152,5	26,7	211,2
30,6	129,2	30,6	187,1
34,4	103,3	34,4	160,7
38,3	74,8	38,3	131,7
42,2	43,3	42,2	99,5
46,1	8,5	46,1	63,2



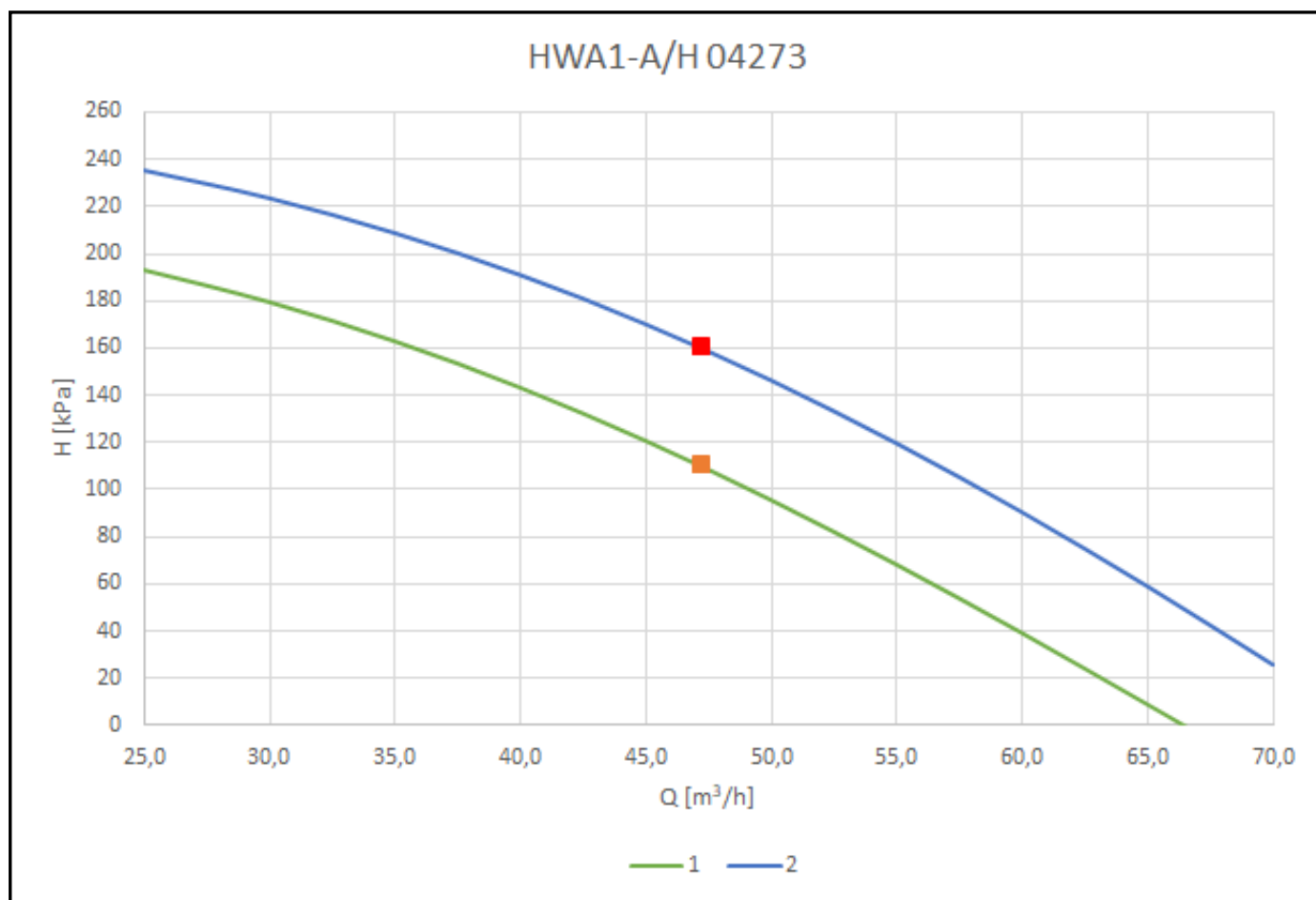
HWA1-A/H 04215			
Available head pressure standard pump		High available head pressure pump	
Portata [m ³ /h]	Prevalenza utile [kPa]	Portata [m ³ /h]	Prevalenza utile [kPa]
25,0	146,1	25,0	223,3
28,9	129,7	28,9	210,2
32,8	110,9	32,8	194,8
36,7	89,8	36,7	176,9
40,6	66,6	40,6	156,5
44,4	41,4	44,4	133,7
48,3	14,1	48,3	108,4



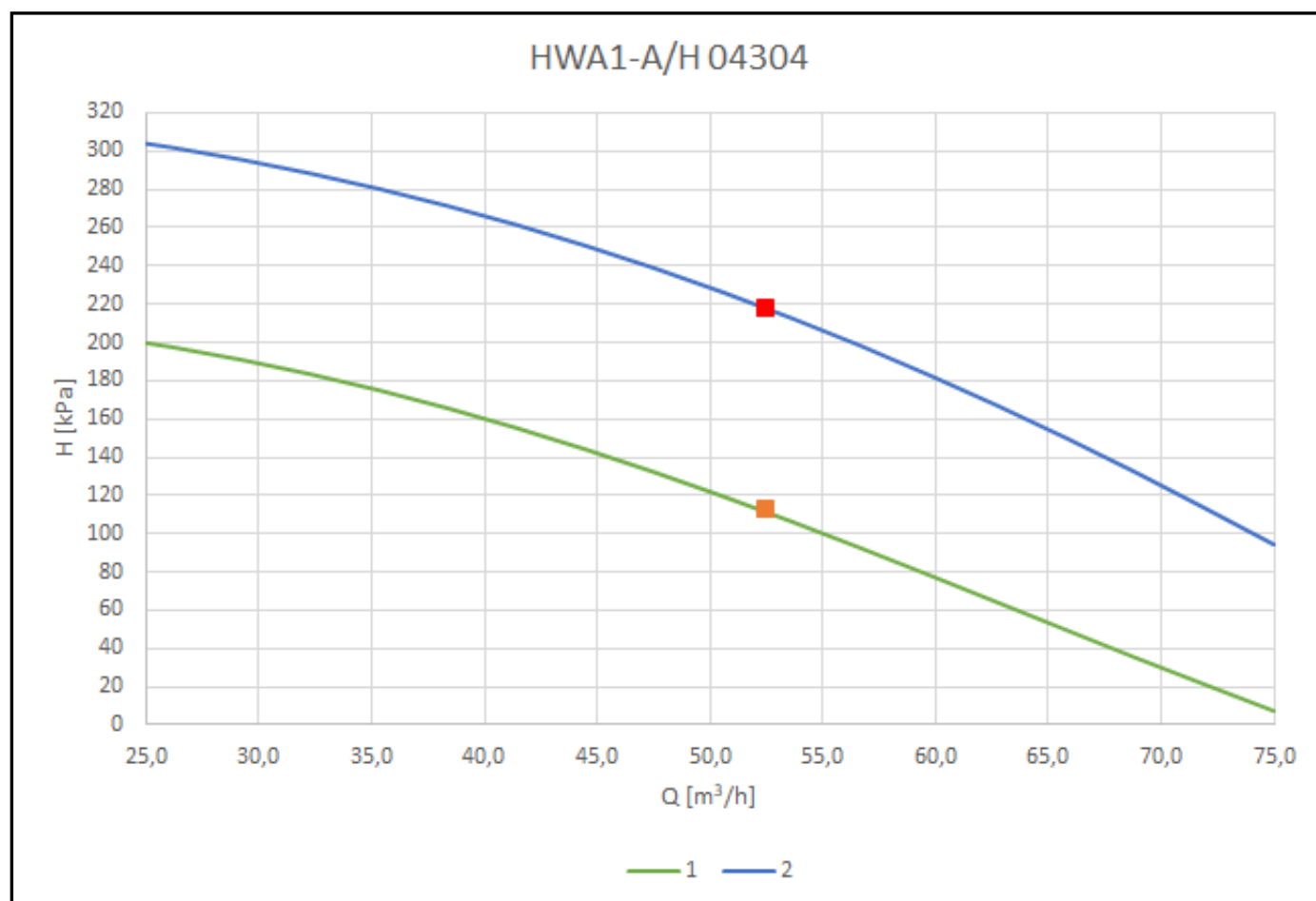
HWA1-A/H 04237			
Available head pressure standard pump		High available head pressure pump	
Portata [m ³ /h]	Prevalenza utile [kPa]	Portata [m ³ /h]	Prevalenza utile [kPa]
15,0	181,3	15,0	250,9
21,1	168,3	21,1	242,2
27,2	150,5	27,2	229,6
33,3	128,2	33,3	212,6
39,4	101,7	39,4	190,8
45,6	71,5	45,6	164,4
51,7	37,7	51,7	133,4
57,8	0,8	57,8	98,2



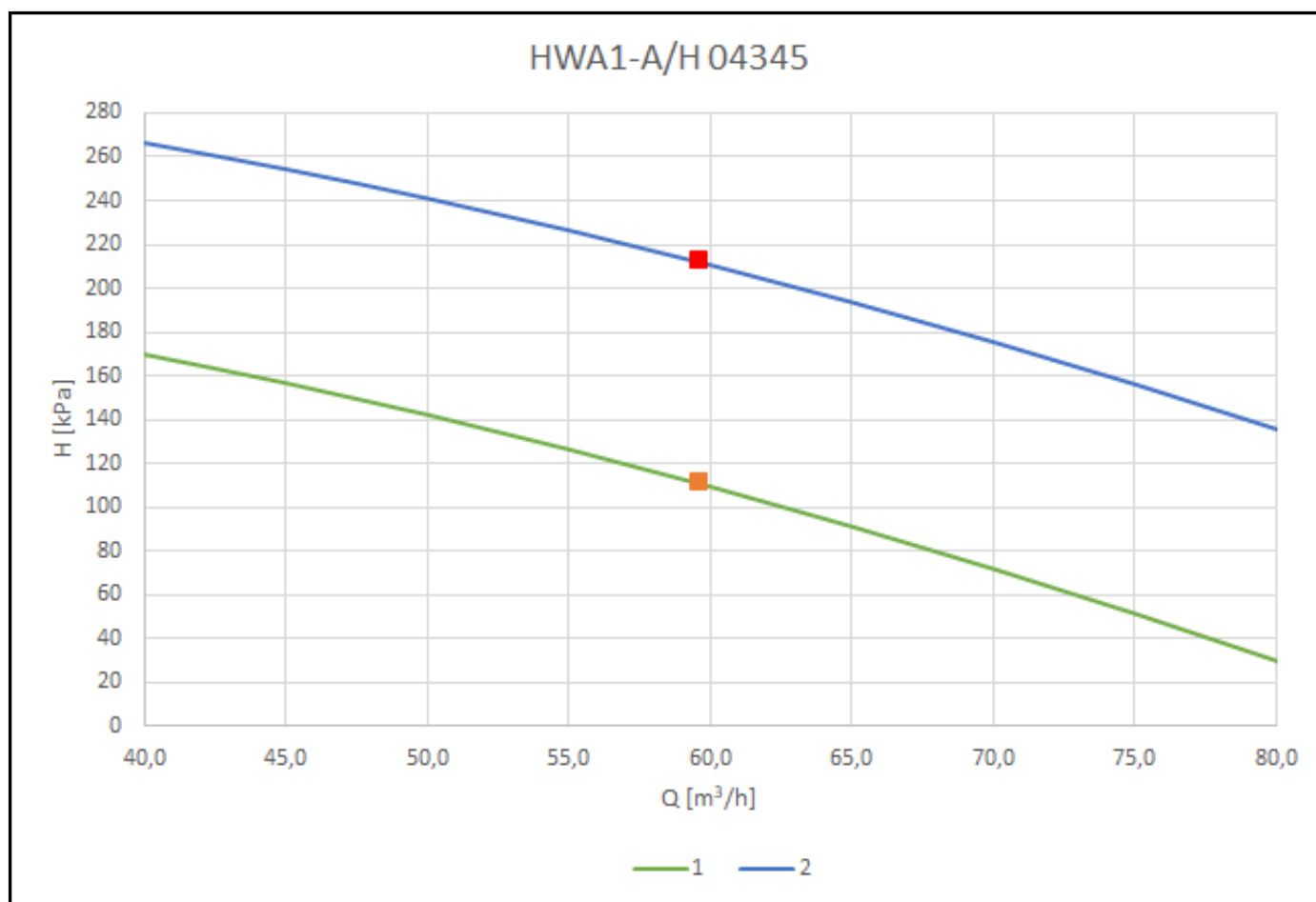
HWA1-A/H 04273			
Available head pressure standard pump		High available head pressure pump	
Portata [m ³ /h]	Prevalenza utile [kPa]	Portata [m ³ /h]	Prevalenza utile [kPa]
25,0	193,3	25,0	235,7
30,0	179,8	30,0	223,9
35,0	163,1	35,0	209,1
40,0	143,5	40,0	191,3
45,0	121,0	45,0	170,4
50,0	95,8	50,0	146,5
55,0	68,5	55,0	119,7
60,0	39,4	60,0	90,4
65,0	9,2	65,0	58,9



HWA1-A/H 04304			
Available head pressure standard pump		High available head pressure pump	
Portata [m ³ /h]	Prevalenza utile [kPa]	Portata [m ³ /h]	Prevalenza utile [kPa]
20,0	208,0	20,0	311,5
26,1	197,7	26,1	301,5
32,2	183,7	32,2	288,1
38,3	165,8	38,3	271,0
44,4	144,4	44,4	250,3
50,6	119,8	50,6	225,9
56,7	92,8	56,7	197,9
62,8	64,2	62,8	166,4
68,9	35,4	68,9	131,7
75,0	7,7	75,0	94,1



HWA1-A/H 04345			
Available head pressure standard pump		High available head pressure pump	
Water flow [m ³ /h]	Available head pressure [kPa]	Water flow [m ³ /h]	Available head pressure [kPa]
40,0	170,2	40,0	266,7
45,0	157,2	45,0	254,7
50,0	142,7	50,0	241,4
55,0	126,9	55,0	226,8
60,0	109,9	60,0	211,0
65,0	91,7	65,0	194,0
70,0	72,3	70,0	175,8
75,0	51,9	75,0	156,5
80,0	30,4	80,0	136,0
85,0	7,8	85,0	114,4



7. NOISE EMISSIONS

The sound levels refer to units with full load and under normal test conditions in heating mode, according to the provisions of EU Regulation 813/2013 (temperature bs (bu) outdoor air = 7 ° C (6 ° C), inlet water temperature -output = 30-35 ° C). The tolerance on the value of the total sound power level is 3 dB (A). The value is determined in accordance with EN 12102-1: 2017, used in conjunction with UNI EN ISO 9614-2 which describes the test methods with the Intensimetric method. The sound pressure values are calculated from the sound power level using ISO 3744: 2010, considering the units operating in the open field, both for standard machines and for SL and SSL accessories installed.

7.1 Powers and sound pressures standard version

ModelHWA 1-A/H	Sound power level per octave band [dB(A)]							Sound power level Lw (A) [dB(A)]	Sound pressure level at 1m [dB(A)]	Sound pressure level at 10m [dB(A)]
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz			
02109	55,9	74,9	79,4	80,8	84,8	78,2	67,5	88,0	69,6	56,0
02121	55,8	76,2	79,3	80,8	84,7	78,1	67,7	88,0	69,6	56,0
02142	57,1	77,7	79,7	81,1	84,3	77,8	68,2	88,0	69,0	55,9
02148	56,4	75,8	81,0	82,8	83,3	77,7	68,3	88,0	69,0	55,9
02160	56,3	76,6	80,9	82,7	83,2	77,6	68,4	88,0	69,0	55,9
04176	58,2	77,0	81,8	82,5	84,9	79,1	69,9	89,0	69,9	56,9
04199	58,1	76,9	81,6	82,6	84,9	79,1	70,1	89,0	69,9	56,9
04215	57,2	76,4	80,8	82,0	85,8	79,4	69,0	89,0	69,9	56,9
04237	57,8	78,5	81,6	82,9	86,7	80,2	70,0	90,0	70,9	57,9
04273	58,7	78,7	82,8	84,2	85,8	79,9	70,3	90,0	70,3	57,8
04304	59,0	79,4	84,1	85,7	86,2	80,6	71,3	91,0	71,3	58,8
04345	58,3	78,9	83,1	88,1	87,3	81,3	71,0	92,0	72,3	59,8

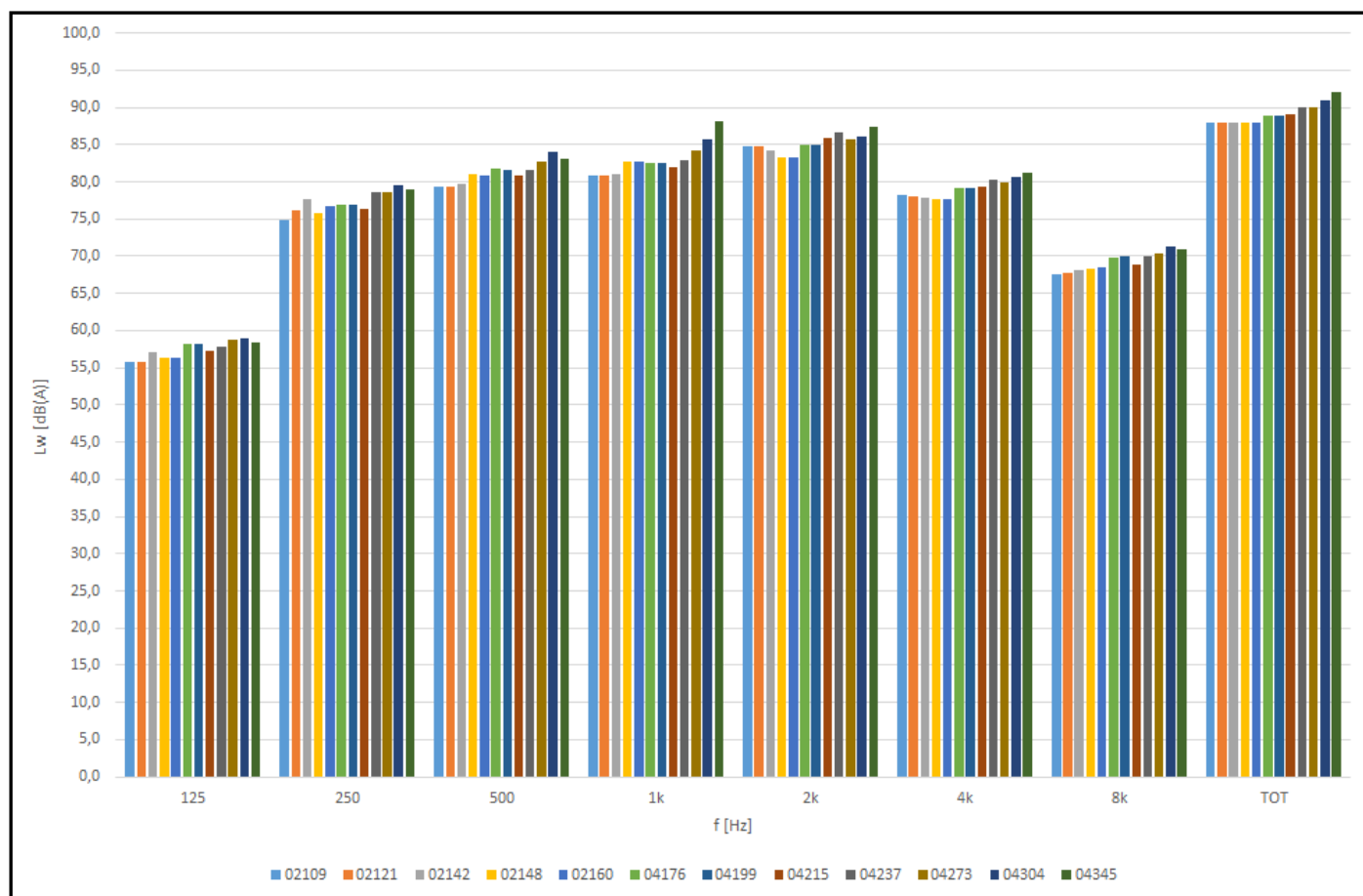
7.2 Powers and sound pressures silenced version SL

ModelHW A1-A/H	Sound power level per octave band[dB(A)]							Sound power level Lw (A) [dB(A)]	Sound pressure level 1m [dB(A)]	Sound pressure level at 10m [dB(A)]
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz			
02109	55,8	74,5	78,6	80,0	83,5	77,3	66,5	87,0	68,6	55,0
02121	55,8	75,8	78,4	79,9	83,4	77,2	66,8	87,0	68,6	55,0
02142	57,0	77,3	78,8	80,2	82,9	76,9	67,2	87,0	68,0	54,9
02148	56,3	75,4	80,1	81,8	81,9	76,7	67,3	87,0	68,0	54,9
02160	56,2	76,2	80,0	81,8	81,8	76,7	67,4	87,0	68,0	54,9
04176	58,2	76,6	80,9	81,6	83,5	78,2	68,9	88,0	68,9	55,9
04199	58,1	76,5	80,7	81,7	83,6	78,2	69,1	88,0	68,9	55,9
04215	57,2	76,0	79,9	81,1	84,5	78,5	68,0	88,0	68,9	55,9
04237	57,8	78,1	80,7	82,0	85,4	79,3	69,0	89,0	69,9	56,9
04273	58,6	78,2	81,9	83,3	84,4	78,9	69,3	89,0	69,3	56,8
04304	58,9	79,0	83,2	84,8	84,7	79,7	70,3	90,0	70,3	57,8
04345	58,2	78,5	82,1	87,2	85,9	80,4	70,0	91,0	71,3	58,8

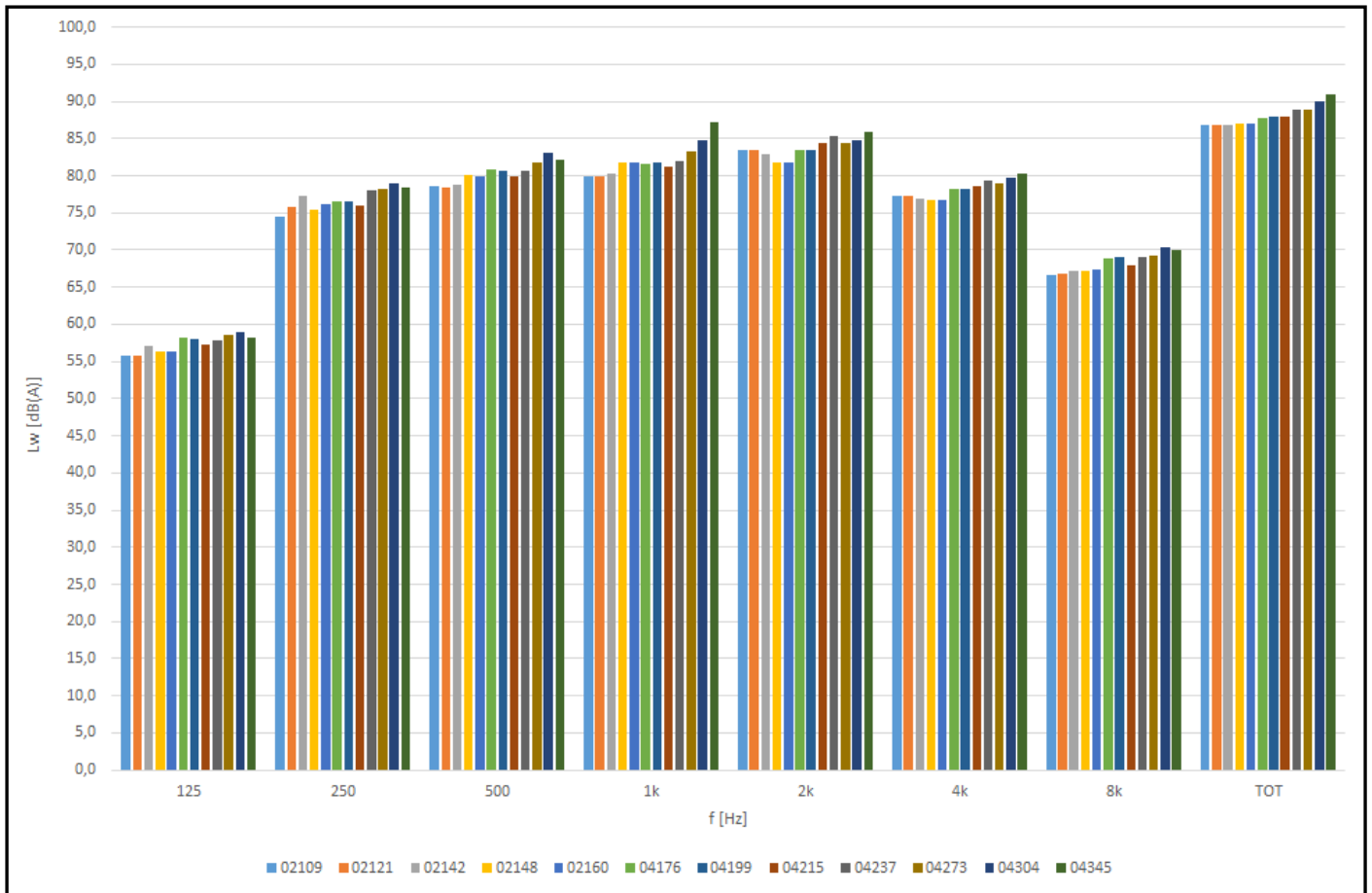
7.3 Powers and sound pressures silenced version SSL

ModelHW A1-A/H	Sound power level per octave band[dB(A)]							Sound power level Lw (A) [dB(A)]	Sound pressure level at 1m [dB(A)]	Sound pressure level at 10m [dB(A)]
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz			
02109	56,3	73,1	76,3	76,2	80,1	74,3	63,4	84,0	65,6	52,0
02121	56,2	74,4	76,1	76,2	80,0	74,1	63,6	84,0	65,6	52,0
02142	57,4	76,0	76,4	76,2	79,5	73,7	63,8	84,0	65,0	51,9
02148	56,6	73,9	77,8	78,3	78,3	73,5	64,0	84,0	65,0	51,9
02160	56,5	74,7	77,6	78,2	78,2	73,4	64,2	84,0	65,0	51,9
04176	58,6	75,2	78,6	77,6	80,1	75,0	65,7	85,0	65,9	52,9
04199	58,5	75,2	78,4	77,8	80,1	75,1	65,9	85,0	65,9	52,9
04215	57,6	74,6	77,6	77,4	81,1	75,5	64,9	85,0	65,9	52,9
04237	58,2	76,8	78,3	78,2	81,9	76,2	65,8	86,0	66,9	53,9
04273	58,9	76,8	79,5	79,6	80,9	75,7	66,1	86,0	66,3	53,8
04304	59,2	77,5	80,8	81,2	81,2	76,4	67,1	87,0	67,3	54,8
04345	58,4	77,0	79,8	84,0	82,4	77,2	66,9	88,0	68,3	55,8

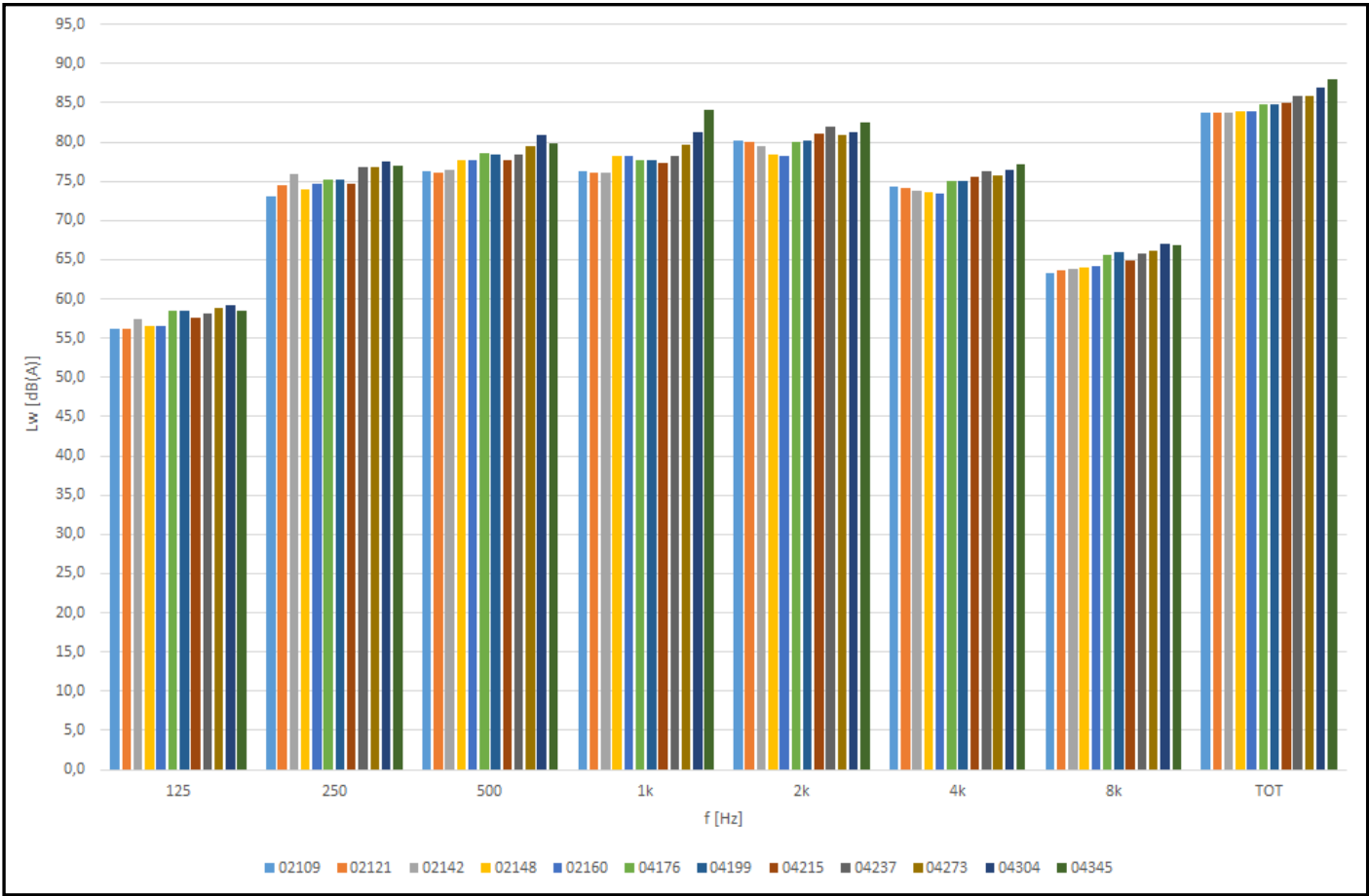
HWA1-A/H standard version without any noise reduction device



HWA1-A/H + SL noise reduction device



HWA1-A/H + SSL noise reduction device



8. OPERATING LIMITS

8.1 Evaporator water flow

The nominal water flow rate refers to a temperature difference between the evaporator inlet and outlet of 5 ° C. The maximum admissible flow is the one with a temperature difference of 3 ° C. Higher values can cause too high pressure drops. The minimum permitted water flow is that with a temperature drop of 8 ° C. Insufficient water flow rates can cause, depending on the operating status, evaporation temperatures too low, implying the intervention of the safety devices and the shutdown of the unit and, in some borderline cases, the formation of ice in the evaporator and consequent serious breakdowns of the refrigeration circuit, or increase of the connection pressure with risk of stopping the unit and probable damage to the compressor.

For greater precision, below are the tables with the minimum flow rates to be ensured for the plate heat exchanger to ensure correct operation in function of the Model (note: the water flow switch is used to avoid failure of the antifreeze probe due to lack of flow, but does not guarantee the minimum water flow required for the correct functioning of the unit).

The minimum flow rates have been calculated in the conditions (1) and (4) of the technical data tables for the heat pump operating in cold and hot respectively.

Model HWA1-A/H heating mode	02109	02121	02142	02148	02160	04176
Cooling capacity of reference[kW]	108,3	120,1	141,5	147,9	159,7	179,1
Minimum water flow to guarantee[L/s]	3,2	3,6	4,2	4,4	4,8	5,3

Model HWA1-A/H heating mode	04199	04215	04237	04273	04304	04345
Cooling capacity of reference [kW]	198,1	214,1	236,7	273,0	303,3	344,4
Minimum water flow to guarantee[L/s]	5,9	6,4	7,1	8,2	9,1	10,3

Model HWA1-A/H cooling mode	02109	02121	02142	02148	02160	04176
Cooling capacity di riferimento [kW]	102,8	113,1	131,8	137,9	148,1	165,3
Minimum water flow to guarantee[L/s]	3,1	3,4	3,9	4,1	4,4	4,9

Model HWA1-A/H cooling mode	04199	04215	04237	04273	04304	04345
Cooling capacity di riferimento [kW]	186,9	208,3	224,8	259,6	289,1	324,6
Minimum water flow to guarantee[L/s]	5,6	6,2	6,7	7,8	8,6	9,7

8.2 Chilled water production (summer operation)

The minimum temperature allowed at the evaporator outlet is + 4 ° C: for lower temperatures there is the BT version - low temperature, which guarantees operation for external temperatures down to -8 ° C. In the case of lower water temperatures, contact our technical office for the feasibility study and evaluation of the changes to be made according to the requests. The maximum temperature that can be kept steady at the outlet of the evaporator is 18 ° C.

8.3 Hot water production (winter operation)

Once the system has reached steady state, the water inlet temperature **MUST NOT** fall below 25 ° C: lower values, not due to transient or normal phases, can cause system anomalies with the possibility of breakages del compressor. The maximum temperature of the leaving water **MUST NOT** exceed 58 ° C. At this temperature, the electrical absorption and the COP performance are optimized if the external temperature is above 5 ° C, even if the unit is still able to work up to the limit of - 10 ° C (-20 ° C with accessory CC).

For temperatures higher than those indicated, especially if in conjunction with reduced water flow rates, there may be anomalies in the regular operation of the unit, or in the most critical cases, safety devices could intervene.

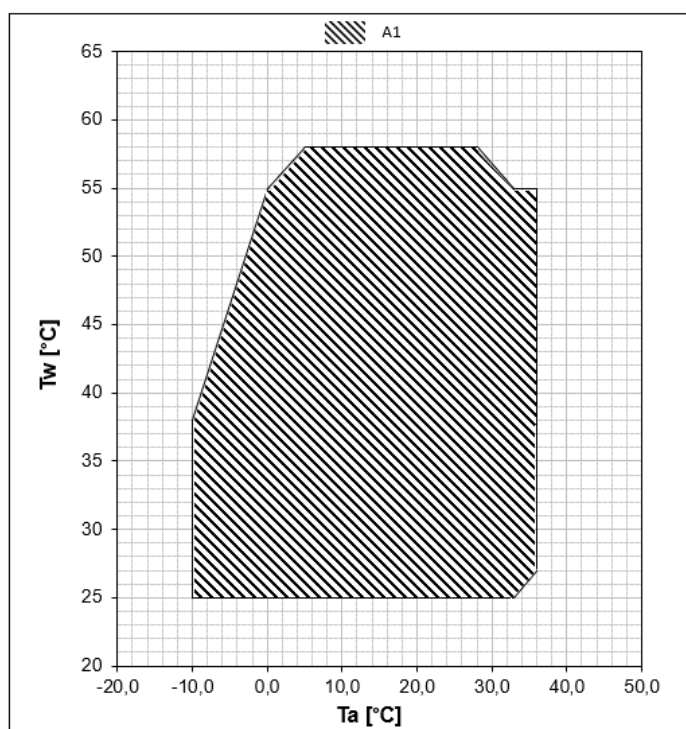
The maximum absorption, of the heat pump only, occurs in heat pump operation with water at 58 ° C at the outlet and external temperature of 5 ° C.

8.4 Ambient air temperature and summary table

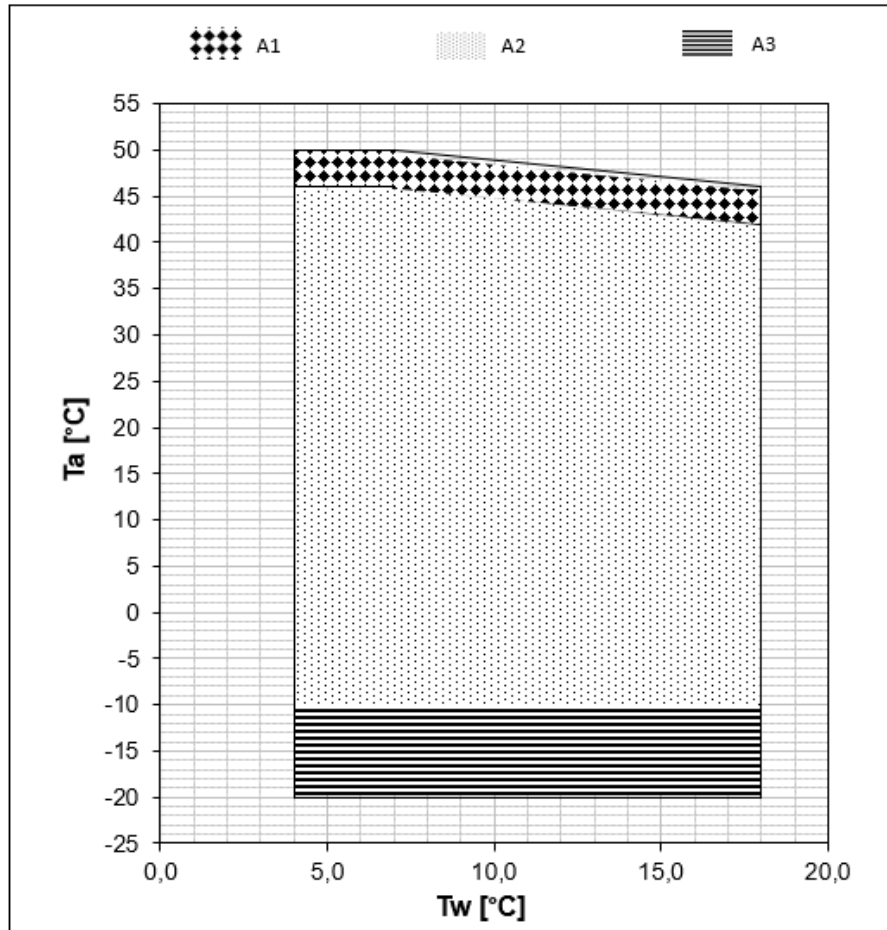
The HWA1-A / H units are designed and built to operate in summer mode, with connection control. In heat pump operation, the permitted temperature range of the outside air varies from -10 ° C (-20 ° C with CC accessory) to + 36 ° C depending on the temperature of the leaving water, as shown in table and in the following graphs.

HWA1-A/H cooling mode	
Ambient temperature standard version (with CC condensation control)	Minimum -10°C (-20°C with CC accessory) Maximum +46°C
Standard version outlet water temperature	Minimum +4°C Maximum +18°C
HWA1-A/H Heat pump mode	
Ambient temperature	Minimum -10°C Maximum +36°C
Water outlet temperature	Minimum +25°C Maximum +58°C

8.5 Envelope in Heating e Cooling



A1 = HWA1-A/H Heating



A1 = HWA1-A/H cooling partial load

A2 = HWA1-A/H cooling full load

A3 = HWA1-A/H cooling with CC condensation control up to -20°C

9. PERFORMANCE TABLE

9.1 Heating

The tables show the heating capacity, absorbed power and COP values for various outdoor air temperature conditions. The data are always referred to the instantaneous power and include defrosting; they are calculated for an input / output temperature difference of 5 ° C. The following is indicative and may be subject to change. The data are calculated according to the latest version of EN 14511.

HEATING / HEATING																						
Model HWA1-A/ H	T External air T air outdoor [°C]	T _{out} [°C]																				
		25			30			35			40			45			50			55		
		Heating capacity Heating capacity [kW]	Potenza assorbita Power input [kW]	COP [W/W]	Heating capacity Heating capacity [kW]	Potenza assorbita Power input [kW]	COP [W/W]	Heating capacity Heating capacity [kW]	Potenza assorbita Power input [kW]	COP [W/W]	Heating capacity Heating capacity [kW]	Potenza assorbita Power input [kW]	COP [W/W]	Heating capacity Heating capacity [kW]	Potenza assorbita Power input [kW]	COP [W/W]	Heating capacity Heating capacity [kW]	Potenza assorbita Power input [kW]	COP [W/W]	Heating capacity Heating capacity [kW]	Potenza assorbita Power input [kW]	COP [W/W]
02109	-10	68,9	21,3	3,23	68,1	23,5	2,89	67,3	25,7	2,62	-	-	-	-	-	-	-	-	-	-	-	-
	-7	73,2	21,5	3,40	72,4	23,6	3,07	71,5	25,7	2,79	70,6	28,3	2,50	-	-	-	-	-	-	-	-	-
	-2	81,4	21,4	3,81	80,4	23,3	3,45	79,1	25,6	3,09	77,9	28,1	2,77	76,7	31,0	2,48	75,4	33,9	2,22	-	-	-
	2	99,3	22,1	4,49	100,6	24,7	4,08	98,8	27,1	3,64	97,6	29,7	3,29	95,8	32,8	2,92	94,0	36,1	2,60	92,2	39,7	2,32
	7	116,6	22,8	5,13	114,9	24,9	4,61	112,6	27,6	4,09	110,5	30,3	3,65	108,3	32,9	3,30	105,9	36,3	2,92	103,5	40,1	2,58
	12	134,0	23,2	5,77	131,6	25,4	5,18	128,9	27,8	4,64	125,8	30,2	4,17	122,9	33,2	3,70	119,8	36,6	3,27	116,6	40,5	2,88
	15	137,4	23,2	5,92	135,0	25,3	5,33	132,3	27,7	4,77	129,6	30,1	4,31	126,5	33,2	3,81	122,7	36,6	3,35	119,4	40,2	2,97
	20	144,1	23,4	6,16	141,9	25,5	5,57	138,8	27,9	4,98	135,6	30,3	4,47	132,5	33,1	4,00	129,0	36,2	3,57	125,8	39,6	3,18
	25	157,7	22,9	6,90	154,6	24,8	6,22	151,3	26,8	5,64	147,3	29,4	5,01	143,0	32,5	4,40	139,0	35,5	3,91	134,6	39,2	3,44
	30	168,3	22,2	7,57	165,2	24,5	6,75	161,2	26,7	6,03	157,0	29,3	5,36	152,6	32,1	4,75	148,0	35,2	4,21	143,0	38,9	3,68
35	176,7	21,9	8,08	172,7	24,2	7,14	171,5	26,5	6,46	167,2	28,9	5,79	162,3	31,7	5,12	156,4	35,0	4,46	151,0	38,6	3,91	
02121	-10	77,8	24,5	3,17	77,0	26,9	2,87	76,2	29,4	2,59	-	-	-	-	-	-	-	-	-	-	-	-
	-7	82,1	24,4	3,37	81,2	26,8	3,03	80,3	29,4	2,73	79,5	32,4	2,46	-	-	-	-	-	-	-	-	-
	-2	91,4	24,3	3,76	90,0	26,9	3,34	88,6	29,4	3,02	87,4	32,2	2,71	86,1	35,7	2,41	85,2	39,4	2,16	-	-	-
	2	102,9	24,8	4,15	102,8	27,4	3,76	103,9	30,5	3,41	105,7	33,7	3,14	106,1	37,3	2,85	105,0	41,2	2,55	103,6	45,5	2,28
	7	128,9	26,1	4,95	127,3	28,6	4,46	125,1	30,9	4,05	122,5	33,9	3,61	120,1	37,5	3,20	117,9	41,8	2,82	115,7	45,7	2,53
	12	147,6	26,2	5,63	144,8	28,9	5,01	142,3	31,4	4,54	139,4	34,8	4,01	136,7	37,6	3,64	133,0	41,6	3,20	129,9	45,8	2,83
	15	151,1	26,3	5,75	148,6	28,8	5,17	146,0	31,3	4,67	142,9	34,4	4,15	139,9	37,8	3,70	136,8	41,4	3,31	133,1	45,6	2,92
	20	158,6	26,4	6,01	155,6	28,8	5,40	152,7	31,6	4,83	149,9	34,3	4,37	146,6	37,7	3,89	143,0	41,7	3,43	139,7	45,4	3,07
	25	172,8	26,8	6,45	170,4	28,4	5,99	166,7	31,1	5,36	162,5	34,0	4,78	159,1	36,7	4,34	154,5	40,6	3,81	150,2	44,7	3,36
	30	183,1	27,2	6,73	180,8	28,7	6,30	178,5	30,2	5,91	173,6	33,5	5,18	169,2	36,6	4,63	164,5	40,1	4,10	159,5	44,2	3,61
35	190,7	26,9	7,09	189,1	29,0	6,52	187,5	31,1	6,02	184,1	33,3	5,54	179,2	36,5	4,92	174,1	39,9	4,36	168,4	44,3	3,80	
02142	-10	90,4	28,8	3,14	89,5	31,3	2,86	88,3	34,3	2,58	-	-	-	-	-	-	-	-	-	-	-	-
	-7	96,4	28,6	3,37	95,1	31,2	3,05	93,6	34,5	2,71	92,4	37,4	2,47	-	-	-	-	-	-	-	-	-
	-2	106,9	28,7	3,72	105,3	31,1	3,39	103,4	34,3	3,01	101,7	37,2	2,73	99,7	41,2	2,42	98,4	45,0	2,19	-	-	-
	2	134,3	30,3	4,44	132,2	33,1	4,00	130,2	36,3	3,58	127,7	39,4	3,24	125,3	43,2	2,90	122,7	47,9	2,56	120,6	52,3	2,31
	7	152,9	30,7	4,99	150,6	33,6	4,49	147,8	36,6	4,04	144,7	39,7	3,64	141,5	43,9	3,22	138,0	48,1	2,87	135,0	52,5	2,57
	12	174,5	31,0	5,63	171,7	33,6	5,11	167,8	37,1	4,53	164,3	40,1	4,10	160,7	43,5	3,70	156,5	47,7	3,29	151,9	52,3	2,90
	15	179,3	31,1	5,77	176,2	33,8	5,21	172,7	36,8	4,70	168,5	40,2	4,19	164,4	43,5	3,78	160,0	47,5	3,37	155,6	51,9	3,00
	20	187,4	30,7	6,10	184,3	33,3	5,54	180,6	36,0	5,01	176,8	39,2	4,51	172,6	42,6	4,05	168,6	46,4	3,63	164,3	50,9	3,23
	25	202,5	30,1	6,72	199,4	32,3	6,18	194,7	35,2	5,53	189,9	38,5	4,94	185,2	41,8	4,43	180,3	45,6	3,95	175,1	50,1	3,50
	30	215,2	30,0	7,18	211,5	32,3	6,55	207,8	34,6	6,01	203,1	37,4	5,43	197,0	41,4	4,76	191,5	45,1	4,25	185,5	49,5	3,74
35	227,9	29,4	7,75	223,1	32,2	6,93	218,3	35,0	6,24	213,5	37,8	5,65	207,8	41,2	5,04	201,7	45,1	4,48	195,6	49,2	3,98	
02148	-10	93,9	29,7	3,16	92,9	32,4	2,87	91,8	35,8	2,57	-	-	-	-	-	-	-	-	-	-	-	-
	-7	100,0	29,7	3,37	98,8	32,3	3,06	97,6	35,6	2,74	96,3	39,2	2,46	-	-	-	-	-	-	-	-	-
	-2	111,1	29,6	3,75	109,5	32,1	3,41	107,7	35,7	3,02	106,0	38,9	2,72	104,2	42,9	2,43	102,5	47,5	2,16	-	-	-
	2	139,8	31,1	4,50	137,6	34,0	4,05	135,5	37,7	3,60	133,0	41,2	3,23	130,5	45,1	2,89	128,1	50,1	2,56	125,7	55,7	2,26
	7	160,3	31,7	5,06	157,1	34,5	4,55	154,1	37,7	4,08	151,0	41,9	3,60	147,9	45,3	3,26	144,5	50,3	2,87	141,0	55,6	2,54
	12	184,5	32,4	5,70	179,9	35,5	5,07	176,0	38,6	4,56	172,0	41,9	4,10	168,1	45,7	3,68	163,7	50,3	3,25	158,6	55,8	2,84
	15	189,2	32,6	5,80	185,4	35,3	5,26	181,2	38,5	4,71	177,0	41,9	4,22	172,2	45,8	3,76	167,1	50,8	3,29	162,9	55,3	2,95
	20	198,7	32,6	6,10	194,3	35,2	5,52	190,5	37,7	5,05	185,4	41,4	4,48	180,9	45,1	4,01	176,4	49,4	3,57	171,8	54,3	3,16
	25	215,8	32,3	6,67	212,3	34,1	6,23	206,1	37,3	5,52	200,6	40,6	4,94	195,1	44,3	4,41	189,3	48,6	3,90	183,6	53,5	3,43
	30	230,5	32,2	7,16	225,4	34,6	6,51	220,3	37,1	5,94	214,2	40,4	5,31	208,2	44,0	4,74	201,7	48,2	4,19	194,9	53,1	3,67
35	247,9	31,1	7,97	240,8	33,5	7,18	233,7	37,0	6,32	226,6	40,4	5,61	220,9	43,5	5,07	213,2	48,1	4,43	205,8	52,8	3,89	
02160	-10	102,4	32,3	3,17	101,2	35,5	2,85	100,3	39,1	2,56	-	-	-	-	-	-	-	-	-	-	-	-
	-7	108,9	32,3	3,37	107,5	35,7	3,01	106,2	38,9	2,73	105,1	42,9	2,45	-	-	-	-	-	-	-	-	-
	-2	120,6	32,1	3,76	118,9	35,5	3,35	117,2	39,0	3,01	115,3	42,6	2,71	113,4	47,6	2,39	111,7	52,1	2,14	-	-	-
	2	150,2	34,1	4,40	148,6	37,5	3,97	145,9	40,8	3,57	143,9	44,6	3,23	141,4	49,6	2,85	138,8	54,5	2,55	136,6	60,6	2,25
	7	172,6	34,4	5,01	169,1	37,7	4,49	166,2	41,4	4,01	162,9	45,6	3,57	159,7	49,4	3,23	156,1	55,0	2,84	152,5	60,8	2,51
	12	197,7	35,1	5,63	193,9	38,3	5,07	189,4	42,0	4,51	184,9	46,2	4,01	180,8	50,6	3,57	176,3	54,8	3,22	172,0	60,5	2,85
	15	202,7	35,3	5,74	198,8	38,4	5,18	195,3	41,3	4,73	189,6	45,6	4,18	185,8	50,2	3,70	180,4	55,4	3,26	176,1	60,5	2,91
	20	213,2	35,2	6,05	209,2	38,3	5,47	203,9	42,0	4,85	199,9	45,1	4,44	194,5	49,7	3,91	189,8	54,2	3,50	185,2	59,5	3,11
	25	231,2	35,3	6,55	227,1	37,6	6,04	221,0	41,0	5,39	215,6	44,8	4,82	209,7	48,8	4,30	203,8	53,5	3,81	198,2	58,5	3,39
	30	245,7	35,6	6,90	241,5	37,8	6,39	237,3	40,0	5,93	229,92											

HEATING / HEATING																						
Model Model HWA1- A/H	T Externa l air T air outdoor [°C]	T _{out} [°C]																				
		25			30			35			40			45			50			55		
		Heating capacity Heating capacity [kW]	Potenza assorbita Power input [kW]	COP [W/W]	Heating capacity Heating capacity [kW]	Potenza assorbita Power input [kW]	COP [W/W]	Heating capacity Heating capacity [kW]	Potenza assorbita Power input [kW]	COP [W/W]	Heating capacity Heating capacity [kW]	Potenza assorbita Power input [kW]	COP [W/W]	Heating capacity Heating capacity [kW]	Potenza assorbita Power input [kW]	COP [W/W]	Heating capacity Heating capacity [kW]	Potenza assorbita Power input [kW]	COP [W/W]	Heating capacity Heating capacity [kW]	Potenza assorbita Power input [kW]	COP [W/W]
04176	-10	115,4	36,3	3,18	113,8	39,7	2,87	112,1	43,6	2,57	-	-	-	-	-	-	-	-	-	-	-	-
	-7	121,4	35,9	3,39	119,9	39,4	3,04	118,1	43,9	2,69	116,6	47,9	2,43	-	-	-	-	-	-	-	-	-
	-2	134,6	35,7	3,77	132,4	39,2	3,38	130,4	43,0	3,03	128,5	47,2	2,73	126,0	52,5	2,40	124,2	58,1	2,14	-	-	-
	2	146,5	35,6	4,12	147,5	38,7	3,81	149,1	43,4	3,44	151,6	48,7	3,11	153,5	55,2	2,78	152,9	60,9	2,51	150,8	67,6	2,23
	7	189,5	37,8	5,02	185,9	41,4	4,50	187,6	46,0	4,08	178,9	50,1	3,57	179,1	55,9	3,21	171,7	61,1	2,81	168,2	67,5	2,49
	12	216,4	38,1	5,68	212,1	41,2	5,16	207,3	45,7	4,54	202,8	50,1	4,05	198,2	55,2	3,59	193,5	60,7	3,19	189,0	67,1	2,81
	15	231,7	38,2	6,07	226,0	42,0	5,38	220,4	46,1	4,78	215,1	50,2	4,28	208,4	55,7	3,74	202,5	61,2	3,31	196,6	67,5	2,91
	20	243,3	37,6	6,47	237,7	41,0	5,80	232,7	44,3	5,25	226,0	49,4	4,58	220,3	54,1	4,07	214,6	59,4	3,61	208,7	65,6	3,18
	25	262,2	37,1	7,07	257,6	39,5	6,53	250,2	43,6	5,74	243,6	47,7	5,11	236,4	52,6	4,50	228,6	58,7	3,89	221,9	64,5	3,44
	30	278,2	37,2	7,49	272,7	39,9	6,84	267,2	42,6	6,27	259,0	47,2	5,49	251,4	51,9	4,85	242,6	57,5	4,22	234,7	63,8	3,68
	35	290,2	38,4	7,56	285,3	41,1	6,94	280,4	43,6	6,43	275,5	46,1	5,98	265,3	51,8	5,12	256,8	57,1	4,50	248,0	63,3	3,92
04199	-10	126,6	39,9	3,17	125,0	43,9	2,84	123,6	48,3	2,56	-	-	-	-	-	-	-	-	-	-	-	
	-7	134,7	39,9	3,38	133,0	43,8	3,04	131,2	48,2	2,73	129,5	53,0	2,44	-	-	-	-	-	-	-	-	
	-2	150,2	39,5	3,81	147,6	43,3	3,41	145,1	47,7	3,04	142,7	52,4	2,72	140,3	58,0	2,42	137,9	64,1	2,15	-	-	-
	2	188,0	41,8	4,50	185,3	46,0	4,03	181,7	50,3	3,61	178,5	55,6	3,21	175,4	61,0	2,87	172,2	67,6	2,55	169,2	74,7	2,27
	7	215,1	42,0	5,12	211,3	46,3	4,57	207,3	50,7	4,09	202,5	55,8	3,63	198,1	61,5	3,22	194,2	67,4	2,88	189,7	74,9	2,54
	12	246,6	42,7	5,77	241,8	46,7	5,18	236,8	50,9	4,66	231,3	55,8	4,14	225,7	61,4	3,68	218,9	68,2	3,21	212,8	75,6	2,82
	15	254,1	42,8	5,93	248,6	46,9	5,30	243,1	51,4	4,73	237,3	56,3	4,21	231,8	61,5	3,77	225,8	67,8	3,33	219,5	74,6	2,94
	20	267,4	43,0	6,21	262,0	46,6	5,63	256,0	50,9	5,03	249,7	55,8	4,47	243,9	60,6	4,02	237,3	67,1	3,54	231,8	73,2	3,17
	25	289,4	42,4	6,82	284,1	45,4	6,26	277,5	49,4	5,62	271,0	53,6	5,05	262,8	59,4	4,43	255,2	65,3	3,91	247,6	72,0	3,44
	30	308,4	42,2	7,31	302,1	45,6	6,63	295,8	49,0	6,04	288,9	53,0	5,45	279,4	59,0	4,73	271,2	64,6	4,20	262,7	71,3	3,68
	35	325,8	42,5	7,67	318,9	45,9	6,95	312,0	49,6	6,29	305,1	53,2	5,73	295,6	58,8	5,03	286,7	64,4	4,45	277,3	71,0	3,91
04215	-10	137,0	42,9	3,19	135,2	46,8	2,89	133,6	51,7	2,59	-	-	-	-	-	-	-	-	-	-	-	
	-7	145,3	42,8	3,39	143,6	46,7	3,07	141,8	51,3	2,76	139,9	56,3	2,48	-	-	-	-	-	-	-	-	-
	-2	161,5	42,5	3,80	159,5	46,5	3,43	157,1	51,4	3,06	154,3	56,1	2,75	152,0	61,6	2,47	149,7	68,3	2,19	-	-	-
	2	192,0	44,1	4,36	194,8	48,7	4,00	193,5	53,5	3,62	192,7	59,3	3,25	188,8	65,1	2,90	185,6	71,9	2,58	182,6	79,1	2,31
	7	230,4	45,4	5,08	226,7	49,7	4,57	223,0	54,8	4,07	218,6	59,7	3,66	214,1	66,0	3,24	209,5	71,5	2,93	204,5	79,8	2,56
	12	264,7	46,2	5,73	260,2	50,5	5,15	254,6	55,0	4,63	248,8	60,5	4,12	243,3	66,1	3,68	237,1	72,8	3,26	230,5	79,8	2,89
	15	271,5	46,1	5,89	266,6	50,3	5,30	261,8	54,5	4,80	255,5	60,3	4,24	249,4	66,2	3,77	243,7	72,2	3,37	236,8	80,0	2,96
	20	286,2	46,5	6,16	280,8	50,6	5,55	275,5	55,3	4,98	270,0	60,4	4,47	263,1	66,0	3,98	256,3	72,3	3,55	249,6	79,2	3,15
	25	312,6	45,8	6,83	307,4	49,1	6,26	299,6	54,0	5,55	292,8	58,6	5,00	284,8	64,2	4,44	275,7	71,2	3,87	267,4	78,3	3,42
	30	334,2	45,3	7,39	327,6	49,0	6,68	321,0	52,8	6,08	311,6	58,5	5,33	303,0	64,0	4,74	293,7	70,3	4,18	284,1	77,6	3,66
	35	357,8	44,7	8,00	348,8	48,5	7,19	339,8	53,2	6,39	330,8	57,8	5,72	320,6	63,8	5,02	310,8	69,9	4,45	300,6	76,9	3,91
04237	-10	154,6	48,1	3,21	152,8	52,8	2,90	151,1	58,2	2,60	-	-	-	-	-	-	-	-	-	-	-	
	-7	162,6	47,8	3,40	160,7	52,6	3,05	158,9	58,0	2,74	157,3	63,6	2,47	-	-	-	-	-	-	-	-	-
	-2	180,2	47,8	3,77	177,9	52,7	3,37	175,6	58,0	3,03	172,9	63,6	2,72	170,5	69,6	2,45	168,0	77,2	2,18	-	-	-
	2	195,7	47,7	4,10	193,3	52,8	3,70	193,9	57,3	3,39	197,5	64,5	3,06	200,6	71,7	2,80	203,8	80,2	2,54	203,1	89,3	2,28
	7	254,4	51,0	4,99	250,0	56,3	4,44	245,9	61,1	4,02	241,4	67,2	3,59	236,7	74,0	3,20	232,2	81,3	2,86	227,5	89,8	2,53
	12	290,5	51,6	5,63	285,4	56,9	5,02	280,6	62,2	4,51	274,2	67,8	4,05	268,4	74,9	3,58	261,3	82,4	3,17	255,7	89,8	2,85
	15	297,9	51,5	5,79	293,1	56,1	5,22	287,7	61,4	4,68	281,6	67,3	4,19	274,9	74,4	3,70	268,2	82,0	3,27	261,6	90,2	2,90
	20	313,1	52,1	6,01	307,9	56,9	5,41	302,2	62,3	4,85	296,0	68,0	4,35	289,6	74,6	3,88	282,9	82,3	3,44	275,2	90,5	3,04
	25	343,3	52,0	6,60	337,1	56,5	5,97	329,9	61,6	5,36	322,2	67,2	4,80	314,4	73,0	4,31	305,8	80,0	3,82	296,3	88,6	3,34
	30	376,3	50,5	7,45	364,1	55,6	6,55	351,9	60,7	5,80	343,3	66,4	5,17	333,9	72,8	4,59	324,5	79,6	4,08	314,6	87,5	3,60
	35	391,8	50,1	7,82	383,0	55,2	6,94	374,2	60,3	6,20	365,4	65,5	5,58	355,2	71,8	4,95	343,7	78,8	4,36	331,9	87,4	3,80
04273	-10	173,7	54,7	3,18	171,6	60,1	2,86	169,9	66,0	2,58	-	-	-	-	-	-	-	-	-	-	-	
	-7	185,0	54,6	3,39	182,5	59,9	3,05	180,2	65,7	2,74	177,9	72,4	2,46	-	-	-	-	-	-	-	-	-
	-2	205,8	54,4	3,78	202,8	59,3	3,42	199,1	65,5	3,04	195,7	71,7	2,73	192,2	79,2	2,43	188,9	87,3	2,17	-	-	-
	2	259,0	57,4	4,51	254,8	62,8	4,05	250,5	69,1	3,63	246,2	75,6	3,26	240,9	83,5	2,89	236,4	91,7	2,58	232,0	101,1	2,29
	7	296,4	58,3	5,08	291,3	63,5	4,59	285,8	69,2	4,13	279,6	75,8	3,69	273,0	83,8	3,26	266,7	91,6	2,91	259,5	101,9	2,55
	12	341,2	58,9	5,79	333,6	64,2	5,20	326,4	70,1	4,66	318,3	76,9	4,14	310,1	84,1	3,69	301,6	92,9	3,25	292,8	101,6	2,88
	15	348,5	59,1	5,89	341,3	64,1	5,32	334,5	69,1	4,84	325											

HEATING / HEATING																							
Model Model HWA1- A/H	T External air T air outdoor [°C]	T _{out} [°C]																					
		25			30			35			40			45			50			55			
		Heating capacity [kW]	Potenza assorbita Power input [kW]	COP [W/W]	Heating capacity [kW]	Potenza assorbita Power input [kW]	COP [W/W]	Heating capacity [kW]	Potenza assorbita Power input [kW]	COP [W/W]	Heating capacity [kW]	Potenza assorbita Power input [kW]	COP [W/W]	Heating capacity [kW]	Potenza assorbita Power input [kW]	COP [W/W]	Heating capacity [kW]	Potenza assorbita Power input [kW]	COP [W/W]	Heating capacity [kW]	Potenza assorbita Power input [kW]	COP [W/W]	
		Heating capacity [kW]	Power input [kW]		Heating capacity [kW]	Power input [kW]		Heating capacity [kW]	Power input [kW]		Heating capacity [kW]	Power input [kW]		Heating capacity [kW]	Power input [kW]		Heating capacity [kW]	Power input [kW]		Heating capacity [kW]	Power input [kW]		
04345	-10	222,7	69,3	3,21	221,0	76,3	2,90	219,1	85,1	2,58	-	-	-	-	-	-	-	-	-	-	-	-	
	-7	234,6	69,0	3,40	232,5	76,2	3,05	230,6	84,6	2,73	228,7	93,7	2,44	-	-	-	-	-	-	-	-	-	
	-2	260,3	68,4	3,80	257,2	75,8	3,40	254,4	82,8	3,07	250,6	92,9	2,70	247,9	103,0	2,41	245,2	114,4	2,14	-	-	-	
	2	288,9	69,3	4,17	290,8	76,9	3,78	293,8	85,9	3,42	297,2	95,3	3,12	300,6	107,0	2,81	300,9	120,1	2,51	297,3	133,9	2,22	
	7	367,1	73,4	5,00	362,6	80,5	4,51	356,1	88,5	4,02	350,5	97,8	3,58	344,4	107,6	3,20	337,3	120,7	2,80	331,2	133,9	2,47	
	12	422,1	74,8	5,65	414,8	82,0	5,06	406,4	89,7	4,53	398,0	98,7	4,03	389,8	108,1	3,61	380,7	120,5	3,16	371,7	134,1	2,77	
	15	433,2	74,8	5,79	425,3	81,6	5,21	417,5	88,9	4,70	407,9	98,7	4,13	399,5	108,4	3,69	390,0	120,6	3,23	381,4	133,2	2,86	
	20	456,1	75,5	6,04	447,8	82,4	5,44	439,1	90,1	4,87	430,0	98,9	4,35	420,9	108,8	3,87	411,0	119,9	3,43	401,0	133,1	3,01	
	25	497,5	77,6	6,41	491,1	81,0	6,07	480,0	88,2	5,44	467,3	97,3	4,80	455,5	106,7	4,27	443,2	117,7	3,77	431,1	130,2	3,31	
	30	534,3	79,1	6,76	523,1	83,4	6,27	511,9	87,7	5,83	498,5	96,4	5,17	484,2	106,3	4,56	471,2	116,5	4,04	457,3	129,1	3,54	
	35	570,2	79,2	7,20	556,9	83,6	6,66	543,6	89,4	6,08	530,3	95,2	5,57	513,8	105,6	4,87	498,8	116,0	4,30	483,2	128,4	3,76	

9.2 Cooling

The tables show the values of cooling capacity, absorbed power and EER for various external air temperature conditions. The data are always referred to the instantaneous power and are calculated for an input / output temperature difference of 5 °C. The following is indicative and may be subject to change. The data are calculated according to the latest version of EN 14511.

COOLING / COOLING																			
Model Model HWA1- A\H	T External air T air outdoor [°C]	T _{out} [°C]																	
		5			7			10			12			15			18		
		Cooling capacity Cooling capacity [kW]	Potenza assorbita Power input [kW]	EER [W/ W]	Cooling capacity Cooling capacity [kW]	Potenza assorbita Power input [kW]	EER [W/W]	Cooling capacity Cooling capacity [kW]	Potenza assorbita Power input [kW]	EER [W/W]	Cooling capacity Cooling capacity [kW]	Potenza assorbita Power input [kW]	EER [W/W]	Cooling capacity Cooling capacity [kW]	Potenza assorbita Power input [kW]	EER [W/W]	Cooling capacity Cooling capacity [kW]	Potenza assorbita Power input [kW]	EER [W/W]
02109	20	113,9	25,4	4,48	120,9	25,9	4,67	132,4	26,4	5,02	139,8	27,0	5,18	152,1	27,7	5,49	164,9	28,5	5,79
	25	109,8	27,4	4,00	116,6	27,9	4,19	127,4	28,6	4,46	134,9	29,0	4,65	146,6	29,9	4,91	159,0	30,7	5,19
	30	105,1	30,0	3,51	111,6	30,4	3,67	121,5	31,1	3,91	128,3	31,6	4,06	138,8	32,5	4,27	149,2	33,5	4,45
	35	98,0	33,0	2,97	102,8	33,8	3,05	113,1	34,2	3,31	119,5	34,7	3,44	129,4	35,6	3,63	139,0	36,5	3,81
	40	90,4	36,4	2,49	95,8	36,9	2,60	104,6	37,7	2,78	110,6	38,2	2,90	119,9	39,1	3,06	129,7	40,1	3,23
02121	20	125,5	29,6	4,23	133,1	30,1	4,42	145,1	30,8	4,71	153,1	31,5	4,87	166,4	32,3	5,16	179,9	33,2	5,42
	25	120,8	32,0	3,78	128,1	32,5	3,95	139,6	33,3	4,19	147,6	33,9	4,36	160,2	34,6	4,63	172,3	35,7	4,82
	30	115,0	34,8	3,30	121,7	35,4	3,44	132,0	36,3	3,64	139,2	36,9	3,77	149,7	38,1	3,94	161,5	39,0	4,14
	35	106,7	38,4	2,78	113,1	38,9	2,90	122,8	39,8	3,08	129,5	40,5	3,20	139,7	41,7	3,35	150,6	42,7	3,53
	40	98,3	42,3	2,32	104,3	42,9	2,43	113,3	43,9	2,58	119,7	44,6	2,68	129,5	44,9	2,88	142,3	45,9	3,10
02142	20	142,0	31,4	4,52	150,9	31,8	4,75	164,5	32,3	5,09	174,1	32,7	5,32	189,5	33,2	5,71	204,6	34,0	6,02
	25	137,5	33,9	4,05	145,0	34,6	4,19	158,4	35,3	4,49	167,7	35,6	4,71	182,2	36,2	5,03	197,5	36,9	5,35
	30	130,9	37,4	3,50	139,3	37,8	3,69	151,7	38,5	3,94	160,2	39,3	4,08	174,4	39,7	4,39	188,6	40,4	4,67
	35	123,6	41,1	3,01	131,8	41,3	3,19	142,2	42,4	3,36	151,0	42,7	3,54	163,1	43,6	3,75	177,0	44,1	4,01
	40	114,5	45,1	2,54	121,7	45,6	2,67	135,1	46,6	2,90	139,7	47,1	2,97	151,7	47,7	3,18	164,9	48,4	3,41
02148	20	151,1	33,2	4,55	160,6	33,7	4,77	175,9	34,5	5,10	186,0	35,2	5,28	204,3	35,7	5,72	221,8	36,8	6,03
	25	144,9	36,3	3,99	153,8	36,9	4,17	168,5	37,6	4,49	179,1	38,1	4,70	195,1	39,0	5,01	212,4	39,9	5,32
	30	138,2	39,9	3,46	146,8	40,5	3,62	160,5	41,5	3,87	170,3	41,9	4,07	185,5	42,7	4,35	201,3	43,6	4,62
	35	130,6	43,6	2,99	137,9	44,4	3,11	150,6	45,2	3,33	158,6	46,0	3,45	172,6	46,8	3,69	187,8	47,7	3,94
	40	119,9	48,4	2,48	127,6	48,7	2,62	139,0	49,9	2,79	146,0	50,8	2,87	159,7	51,5	3,10	174,8	52,2	3,35
02160	20	164,7	37,2	4,43	175,3	37,6	4,67	191,2	38,7	4,94	203,6	38,9	5,23	220,9	40,1	5,51	238,4	41,4	5,75
	25	157,8	40,6	3,89	167,8	41,1	4,08	183,4	41,9	4,38	194,3	42,5	4,58	212,6	43,1	4,93	230,0	44,6	5,16
	30	150,4	44,5	3,38	159,7	45,2	3,53	174,3	46,0	3,79	184,6	46,5	3,97	200,3	47,5	4,22	217,8	48,2	4,52
	35	139,9	49,2	2,84	148,1	49,8	2,97	162,2	50,5	3,21	171,7	51,1	3,36	186,7	52,0	3,59	202,4	53,0	3,82
	40	129,5	54,1	2,39	136,4	55,0	2,48	149,3	55,8	2,68	158,4	56,3	2,81	172,9	57,2	3,02	187,6	58,3	3,22
04176	20	180,5	39,4	4,59	191,6	39,8	4,81	209,1	40,5	5,16	221,3	41,0	5,39	240,7	41,8	5,75	260,7	42,7	6,11
	25	173,5	42,8	4,05	184,2	43,3	4,26	200,9	44,1	4,56	212,9	44,6	4,78	231,8	45,3	5,11	251,3	46,2	5,44
	30	165,3	47,0	3,51	175,9	47,5	3,70	192,1	48,3	3,97	203,2	48,9	4,16	221,4	49,7	4,45	240,0	50,7	4,74
	35	155,9	52,0	3,00	165,3	52,6	3,14	180,5	53,3	3,39	190,7	53,9	3,54	206,8	54,8	3,77	223,6	55,7	4,01
	40	143,4	57,6	2,49	152,5	58,1	2,63	166,4	58,9	2,83	176,2	59,5	2,96	191,4	60,4	3,17	207,0	61,5	3,37
04199	20	203,9	45,0	4,54	216,5	45,6	4,75	236,3	46,6	5,07	249,9	47,3	5,28	272,0	48,2	5,64	294,2	49,6	5,93
	25	196,1	48,8	4,02	208,4	49,4	4,22	227,7	50,4	4,52	241,0	51,1	4,72	261,9	52,2	5,02	283,8	53,4	5,31
	30	187,6	53,3	3,52	199,1	54,1	3,68	217,6	55,1	3,95	230,7	55,8	4,14	249,9	57,0	4,39	269,8	58,2	4,64
	35	176,6	58,6	3,01	186,9	59,4	3,15	203,4	60,5	3,36	214,8	61,4	3,50	233,2	62,5	3,73	252,0	63,8	3,95
	40	162,4	64,8	2,51	172,5	65,5	2,63	188,3	66,6	2,83	198,9	67,5	2,95	215,7	68,9	3,13	233,4	70,2	3,33
04215	20	230,5	50,3	4,58	245,1	50,9	4,81	267,2	52,0	5,14	283,3	52,9	5,36	306,2	54,3	5,64	333,3	55,3	6,03
	25	220,9	54,9	4,02	235,0	55,6	4,23	256,4	56,6	4,53	271,4	57,4	4,73	294,4	58,8	5,01	319,4	60,2	5,31
	30	210,9	60,3	3,50	223,6	61,1	3,66	243,9	62,1	3,93	257,8	62,8	4,10	279,3	64,1	4,36	300,7	65,8	4,57
	35	203,9	66,4	3,07	208,3	67,2	3,10	226,9	68,3	3,32	240,1	69,1	3,47	260,6	70,3	3,71	282,0	71,6	3,94
	40	183,1	72,5	2,53	191,8	74,3	2,58	209,7	75,3	2,78	221,9	76,1	2,92	241,5	77,4	3,12	261,4	78,9	3,32
04237	20	252,0	58,0	4,34	266,7	59,3	4,50	289,4	60,9	4,76	306,7	61,3	5,00	330,7	63,3	5,23	356,4	64,8	5,50
	25	240,5	63,5	3,79	255,3	64,3	3,97	278,4	65,5	4,25	295,9	65,7	4,50	320,2	67,6	4,74	346,8	68,8	5,04
	30	228,4	69,6	3,28	241,9	70,4	3,44	263,0	71,7	3,67	277,7	72,6	3,83	301,9	73,7	4,10	319,3	76,0	4,20
	35	212,0	76,7	2,76	224,8	77,5	2,90	244,5	78,8	3,10	258,3	79,8	3,24	278,4	81,8	3,40	301,1	83,2	3,62
	40	195,0	84,8	2,30	207,1	85,6	2,42	225,8	86,9	2,60	238,6	88,0	2,71	257,7	90,1	2,86	279,2	91,9	3,04
04273	20	285,8	59,9	4,78	302,8	61,2	4,95	331,1	62,4	5,31	351,0	63,1	5,56	382,0	64,9	5,89	413,6	67,7	6,11
	25	273,7	65,8	4,16	291,4	66,5	4,39	318,5	68,2	4,67	337,4	69,1	4,89	367,7	71,1	5,17	402,1	71,7	5,61
	30	261,8	72,4	3,62	277,9	73,5	3,78	304,8	74,1	4,11	320,6	75,8	4,23	348,5	77,3	4,51	377,9	78,8	4,79
	35	244,9	79,6	3,08	259,6	80,6	3,22	284,0	81,7	3,48	300,4	82,8	3,63	328,9	83,8	3,93	351,2	87,0	4,04
	40	228,8	86,6	2,64	240,9	88,4	2,73	262,9	90,1	2,92	278,2	91,3	3,05	303,2	92,8	3,27	328,7	94,4	3,48
	45	208,1	96,9	2,15	220,6	97,9	2,25	241,6	98,9	2,44	-	-	-	-	-	-	-	-	-

COOLING / COOLING																				
Model Model HWA1- A\H	T External air T air outdoor [°C]	T _{out} [°C]																		
		5			7			10			12			15			18			
		Cooling capacity Cooling capacity [kW]	Potenza assorbita Power input [kW]	EER [W/W]	Cooling capacity Cooling capacity [kW]	Potenza assorbita Power input [kW]	EER [W/W]	Cooling capacity Cooling capacity [kW]	Potenza assorbita Power input [kW]	EER [W/W]	Cooling capacity Cooling capacity [kW]	Potenza assorbita Power input [kW]	EER [W/W]	Cooling capacity Cooling capacity [kW]	Potenza assorbita Power input [kW]	EER [W/W]	Cooling capacity Cooling capacity [kW]	Potenza assorbita Power input [kW]	EER [W/W]	
04304	20	321,6	69,6	4,62	340,5	71,5	4,76	371,4	72,5	5,12	393,2	73,6	5,34	427,2	75,5	5,66	462,8	78,0	5,93	
	25	307,9	75,8	4,06	326,9	77,0	4,24	356,8	78,9	4,52	377,7	80,1	4,72	409,2	82,3	4,97	438,8	85,5	5,13	
	30	295,1	82,4	3,58	311,2	84,0	3,70	337,3	86,6	3,90	357,2	87,1	4,10	385,2	89,6	4,30	413,8	92,6	4,47	
	35	272,7	91,8	2,97	289,1	92,9	3,10	319,0	95,0	3,36	336,7	96,4	3,49	363,0	98,9	3,67	387,5	100,5	3,86	
	40	250,9	101,7	2,47	266,7	102,4	2,60	292,6	103,4	2,83	307,3	105,6	2,91	331,9	108,3	3,07	359,8	110,1	3,27	
	45	229,8	111,6	2,06	244,2	112,7	2,17	266,7	113,3	2,35	-	-	-	-	-	-	-	-	-	
04345	20	360,1	84,1	4,28	381,5	85,6	4,46	415,2	87,8	4,73	440,0	88,8	4,96	473,7	92,8	5,10	513,2	94,6	5,43	
	25	346,4	91,1	3,80	369,0	91,7	4,03	400,4	94,3	4,25	424,6	95,3	4,45	460,7	97,5	4,73	497,7	100,6	4,95	
	30	330,0	99,9	3,30	349,7	101,1	3,46	380,6	103,1	3,69	399,2	105,6	3,78	434,8	106,9	4,07	471,5	109,1	4,32	
	35	306,1	110,8	2,76	324,6	111,9	2,90	353,2	114,2	3,09	372,8	115,8	3,22	403,8	118,0	3,42	433,8	121,8	3,56	
	40	282,2	122,9	2,30	299,0	124,4	2,40	325,9	126,2	2,58	344,1	128,2	2,68	372,6	131,0	2,84	405,2	132,2	3,06	
	45	259,3	135,4	1,92	274,6	136,2	2,02	300,3	138,2	2,17	-	-	-	-	-	-	-	-	-	

9.3 Data for the energy certification of buildings according to UNI / TS 11300-4 for heat pumps

The supplementary data of the HWA1-A / H heat pumps for the calculation of the energy performance of the buildings are reported, according to UNI / TS 11300 part 4.

The following are the characteristic quantities that will be provided for each model.

T_{design}	Design temperature (for climate A - average, defined by UNI EN 14825 equal to -10 ° C)
A, B, C, D	Operating conditions of reference for the assessment of performance according to UNI EN 14825
T_{air}	External reference air temperature
T_{water}	Heating water delivery temperature
PLR	<i>Partial Load Ratio</i> - climatic load factor
DC	<i>Declared Capacity</i> - heat pump power in operating conditions A, B, C, D
COP_{DC}	COP of the heat pump referred to nominal conditionsDC
COP_{PL}	COP of the heat pump in partialization conditions of Defined by the standard UNI EN 14825

9.3.1 ModelHWA1-A/H 02109

Operating limits

COLD source:		EXTERNAL AIR	
Temperature of operation (cut-off)		min	-10°C
		max	36°C

HEAT source:		WATER	
Temperature of operation (cut-off)		min	25°C
		max	58°C

Available heating capacity / COP in nominal conditions with defrosting

Available heating capacity [kW]			
T _{air}	T _{water} (heat source)		
(cold source)	35	45	55
-7	71,5	-	-
2	98,9	95,5	92,1
7	112,6	108,3	103,5
12	129,0	122,6	116,4

COP _{DC}			
T _{air}	T _{water} (heat source)		
(cold source)	35	45	55
-7	2,79	-	-
2	3,68	2,91	2,31
7	4,09	3,30	2,58
12	4,75	3,70	2,90

Yield data measured under partial load conditions, according to UNI EN 14825

Working conditions	F	A (E)	B	C	D
T _{air} [°C]	-10	-7	2	7	12
PLR [%]	100	88	54	35	15
Power DC (Declared Capacity) [kW]	67,3	71,5	98,9	112,6	129,0
COP _{PL}	2,62	2,79	3,58	3,74	3,33
COP _{DC}	2,62	2,79	3,68	4,09	4,75

Performance

35°C		
SCOP	η _s	Energy Class
3,72	147%	A+

9.3.2 Model HWA1-A/H 02121

Operating limits

COLD source:	EXTERNAL AIR	
Temperature of operation (cut-off)	min	-10°C
	max	36°C

HEAT source:	WATER	
Temperature of operation (cut-off)	min	25°C
	max	58°C

Available heating capacity / COP under nominal conditions with defrosting

Available heating capacity [kW]			
T _{air}	T _{water} (heat source)		
(cold source)	35	45	55
-7	80,3	-	-
2	102,7	106,1	103,5
7	125,1	120,1	115,7
12	142,1	136,4	129,7

COP _{DC}			
T _{air}	T _{water} (heat source)		
(cold source)	35	45	55
-7	2,73	-	-
2	3,41	2,83	2,27
7	4,05	3,20	2,53
12	4,56	3,65	2,84

Yield data measured under partial load conditions, according to UNI EN 14825

Operating conditions	F	A (E)	B	C	D
T _{air} [°C]	-10	-7	2	7	12
PLR [%]	100	88	54	35	15
Power DC (declared Capacity) [kW]	76,2	80,3	102,7	125,1	142,1
COP _{PL}	2,59	2,73	3,61	3,80	3,45
COP _{DC}	2,59	2,73	3,41	4,05	4,56

Performance

35°C		
SCOP	η _s	Energy class
3,78	148%	A+

9.3.3 Model HWA1-A/H 02142

Operating limits

COLD source:		EXTERNAL AIR	
Temperature of operation (cut-off)		min	-10°C
		max	36°C

Sorgente CALDA:		WATER	
Temperature of operation (cut-off)		min	25°C
		max	58°C

Available heating capacity / COP under nominal conditions with defrosting

Heating capacity utile [kW]			
T _{air}	T _{water} (HEAT source)		
(COLD source)	35	45	55
-7	93,6	-	-
2	129,9	124,8	120,5
7	147,8	141,5	135,0
12	168,4	160,4	151,7

COP _{DC}			
T _{air}	T _{water} (HEAT source)		
(COLD source)	35	45	55
-7	2,71	-	-
2	3,59	2,87	2,30
7	4,04	3,22	2,57
12	4,68	3,70	2,90

Yield data measured under partial load conditions, according to UNI EN 14825

Condizioni di esercizio	F	A (E)	B	C	D
T _{air} [°C]	-10	-7	2	7	12
PLR [%]	100	88	54	35	15
Power DC (Declared Capacity) [kW]	88,3	93,6	129,9	147,8	168,4
COP _{PL}	2,58	2,71	3,43	3,58	3,26
COP _{DC}	2,58	2,71	3,59	4,04	4,68

Performance

35°C		
SCOP	η _s	Energy class
3,61	142%	A+

9.3.4 Model HWA1-A/H 02148

Operating limits

COLD source:		EXTERNAL AIR	
Temperatura di funzionamento (cut-off)		min	-10°C
		max	36°C

HEAT source:		WATER	
Temperatura di funzionamento (cut-off)		min	25°C
		max	58°C

Available heating capacity / COP under nominal conditions with defrosting

Heating capacity utile [kW]			
T _{air}	T _{water} (HEAT source)		
(COLD source)	35	45	55
-7	97,6	-	-
2	135,4	130,3	125,8
7	154,1	147,9	141,0
12	176,0	167,8	158,3

COP _{DC}			
T _{air}	T _{water} (HEAT source)		
(COLD source)	35	45	55
-7	2,74	-	-
2	3,64	2,88	2,26
7	4,08	3,26	2,54
12	4,65	3,69	2,84

Yield data measured under partial load conditions, according to UNI EN 14825

Condizioni di esercizio	F	A (E)	B	C	D
T _{air} [°C]	-10	-7	2	7	12
PLR [%]	100	88	54	35	15
Power DC (Declared Capacity) [kW]	91,8	97,6	135,4	154,1	176,0
COP _{PL}	2,57	2,74	3,42	3,68	3,63
COP _{DC}	2,57	2,74	3,64	4,08	4,65

Performance

35°C		
SCOP	η _s	Energy class
3,69	145%	A+

9.3.5 Model HWA1-A/H 02160

Operating limits

COLD source:		EXTERNAL AIR	
Temperature of operation (cut-off)		min	-10°C
		max	36°C

HEAT source:		WATER	
Temperature of operation (cut-off)		min	25°C
		max	58°C

Available heating capacity / COP under nominal conditions with defrosting

Heating capacity utile [kW]			
T _{air}	T _{water} (HEAT source)		
(COLD source)	35	45	55
-7	106,2	-	-
2	146,0	141,2	136,5
7	166,2	159,7	152,5
12	189,6	180,3	171,4

COP _{DC}			
T _{air}	T _{water} (HEAT source)		
(COLD source)	35	45	55
-7	2,73	-	-
2	3,57	2,83	2,25
7	4,01	3,23	2,51
12	4,59	3,61	2,82

Yield data measured under partial load conditions, according to UNI EN 14825

Condizioni di esercizio	F	A (E)	B	C	D
T _{air} [°C]	-10	-7	2	7	12
PLR [%]	100	88	54	35	15
Power DC (Declared Capacity) [kW]	100,3	106,2	146,0	166,2	189,6
COP _{PL}	2,56	2,73	3,54	3,69	3,44
COP _{DC}	2,56	2,73	3,57	4,01	4,59

Performance

35°C		
SCOP	η _s	Energy class
3,68	144%	A+

9.3.6 Model HWA1-A/H 04176

Operating limits

COLD source:	EXTERNAL AIR	
Temperature of operation (cut-off)	min	-10°C
	max	36°C

HEAT source:	WATER	
Temperature of operation (cut-off)	min	25°C
	max	58°C

Available heating capacity / COP under nominal conditions with defrosting

Heating capacity utile [kW]			
T _{air}	T _{water} (HEAT source)		
(COLD source)	35	45	55
-7	118,1	-	-
2	165,0	158,6	151,9
7	187,6	179,1	168,2
12	214,0	203,0	192,0

COP _{DC}			
T _{air}	T _{water} (HEAT source)		
(COLD source)	35	45	55
-7	2,69	-	-
2	3,59	2,84	2,21
7	4,08	3,21	2,49
12	4,68	3,64	2,83

Yield data measured under partial load conditions, according to UNI EN 14825

Condizioni di esercizio	F	A (E)	B	C	D
T _{air} [°C]	-10	-7	2	7	12
PLR [%]	100	88	54	35	15
Power DC (Declared Capacity) [kW]	112,1	118,1	165,0	187,6	214,0
COP _{PL}	2,57	2,69	3,49	3,86	3,98
COP _{DC}	2,57	2,69	3,59	4,08	4,68

Performance

35°C		
SCOP	η _s	Energy class
3,83	150%	A++

9.3.7 Model HWA1-A/H 04199

Operating limits

COLD source:	EXTERNAL AIR	
Temperature of operation (cut-off)	min	-10°C
	max	36°C

HEAT source:	WATER	
Temperature of operation (cut-off)	min	25°C
	max	58°C

Available heating capacity / COP under nominal conditions with defrosting

Heating capacity utile [kW]			
T _{air}	T _{water} (HEAT source)		
(COLD source)	35	45	55
-7	131,2	-	-
2	181,7	175,4	169,3
7	207,3	198,1	189,7
12	236,5	225,8	213,2

COP _{DC}			
T _{air}	T _{water} (HEAT source)		
(COLD source)	35	45	55
-7	2,73	-	-
2	3,59	2,86	2,26
7	4,09	3,22	2,54
12	4,65	3,69	2,84

Yield data measured under partial load conditions, according to UNI EN 14825

Condizioni di esercizio	F	A (E)	B	C	D
T _{air} [°C]	-10	-7	2	7	12
PLR [%]	100	88	54	35	15
Power DC (Declared Capacity) [kW]	123,6	131,2	181,7	207,3	236,5
COP _{PL}	2,56	2,73	3,47	3,85	4,03
COP _{DC}	2,56	2,73	3,59	4,09	4,65

Performance

35°C		
SCOP	η _s	Energy class
3,84	151%	A++

9.3.8 Model HWA1-A/H 04215

Operating limits

COLD source:	EXTERNAL AIR	
Temperature of operation (cut-off)	min	-10°C
	max	36°C

HEAT source:	WATER	
Temperature of operation (cut-off)	min	25°C
	max	58°C

Available heating capacity / COP under nominal conditions with defrosting

Heating capacity utile [kW]			
T _{air}	T _{water} (HEAT source)		
(COLD source)	35	45	55
-7	141,8	-	-
2	193,4	188,5	182,1
7	223,0	214,1	204,5
12	254,6	242,8	229,8

COP _{DC}			
T _{air}	T _{water} (HEAT source)		
(COLD source)	35	45	55
-7	2,76	-	-
2	3,59	2,88	2,29
7	4,07	3,24	2,56
12	4,70	3,69	2,87

Yield data measured under partial load conditions, according to UNI EN 14825

Condizioni di esercizio	F	A (E)	B	C	D
T _{air} [°C]	-10	-7	2	7	12
PLR [%]	100	88	54	35	15
Power DC (Declared Capacity) [kW]	133,6	141,8	193,4	223,0	254,6
COP _{PL}	2,59	2,76	3,64	3,99	4,00
COP _{DC}	2,59	2,76	3,59	4,07	4,70

Performance

35°C		
SCOP	η _s	Energy class
3,96	155%	A++

9.3.9 Model HWA1-A/H 04237

Operating limits

COLD source:		EXTERNAL AIR	
Temperature of operation (cut-off)		min	-10°C
		max	36°C

HEAT source:		WATER	
Temperature of operation (cut-off)		min	25°C
		max	58°C

Available heating capacity / COP under nominal conditions with defrosting

Heating capacity utile [kW]			
T _{air}	T _{water} (HEAT source)		
(COLD source)	35	45	55
-7	158,9	-	-
2	194,3	200,3	202,9
7	245,9	236,7	227,5
12	279,5	267,7	255,2

COP _{DC}			
T _{air}	T _{water} (HEAT source)		
(COLD source)	35	45	55
-7	2,74	-	-
2	3,33	2,77	2,26
7	4,02	3,20	2,53
12	4,56	3,61	2,85

Yield data measured under partial load conditions, according to UNI EN 14825

Condizioni di esercizio	F	A (E)	B	C	D
T _{air} [°C]	-10	-7	2	7	12
PLR [%]	100	88	54	35	15
Power DC (Declared Capacity) [kW]	151,1	158,9	194,3	245,9	279,5
COP _{PL}	2,60	2,74	3,68	4,07	4,09
COP _{DC}	2,60	2,74	3,33	4,02	4,56

Performance

35°C		
SCOP	η _s	Energy class
4,00	157%	A++

9.3.10 Model HWA1-A/H 04273

Operating limits

COLD source:	EXTERNAL AIR	
Temperature of operation (cut-off)	min	-10°C
	max	36°C

HEAT source:	WATER	
Temperature of operation (cut-off)	min	25°C
	max	58°C

Available heating capacity / COP under nominal conditions with defrosting

Heating capacity utile [kW]			
T _{air}	T _{water} (HEAT source)		
(COLD source)	35	45	55
-7	180,2	-	-
2	249,3	239,9	230,3
7	285,8	273,0	259,5
12	324,6	308,6	290,7

COP _{DC}			
T _{air}	T _{water} (HEAT source)		
(COLD source)	35	45	55
-7	2,74	-	-
2	3,63	2,90	2,29
7	4,13	3,26	2,55
12	4,69	3,71	2,89

Yield data measured under partial load conditions, according to UNI EN 14825

Condizioni di esercizio	F	A (E)	B	C	D
T _{air} [°C]	-10	-7	2	7	12
PLR [%]	100	88	54	35	15
Power DC (Declared Capacity) [kW]	169,9	180,2	249,3	285,8	324,6
COP _{PL}	2,58	2,74	3,48	3,72	3,93
COP _{DC}	2,58	2,74	3,63	4,13	4,69

Performance

35°C		
SCOP	η _s	Energy class
3,92	154%	A++

9.3.11 Model HWA1-A/H 04304

Operating limits

COLD source:		EXTERNAL AIR	
Temperature of operation (cut-off)		min	-10°C
		max	36°C

HEAT source:		WATER	
Temperature of operation (cut-off)		min	25°C
		max	58°C

Available heating capacity / COP under nominal conditions with defrosting

Heating capacity utile [kW]			
T _{air}	T _{water} (HEAT source)		
(COLD source)	35	45	55
-7	201,6	-	-
2	277,3	267,9	258,8
7	316,1	303,3	290,6
12	361,1	343,8	326,3

COP _{DC}			
T _{air}	T _{water} (HEAT source)		
(COLD source)	35	45	55
-7	2,71	-	-
2	3,58	2,83	2,23
7	4,04	3,20	2,52
12	4,60	3,64	2,83

Yield data measured under partial load conditions, according to UNI EN 14825

Condizioni di esercizio	F	A (E)	B	C	D
T _{air} [°C]	-10	-7	2	7	12
PLR [%]	100	88	54	35	15
Power DC (Declared Capacity) [kW]	190,1	201,6	277,3	316,1	361,1
COP _{PL}	2,55	2,71	3,55	3,84	3,78
COP _{DC}	2,55	2,71	3,58	4,04	4,60

Performance

35°C		
SCOP	η _s	Energy class
3,95	155%	A++

9.3.12 Model HWA1-A/H 04345

Operating limits

COLD source:		EXTERNAL AIR	
Temperature of operation (cut-off)		min	-10°C
		max	36°C

HEAT source:		WATER	
Temperature of operation (cut-off)		min	25°C
		max	58°C

Available heating capacity / COP under nominal conditions with defrosting

Heating capacity utile [kW]			
T _{air}	T _{water} (HEAT source)		
(COLD source)	35	45	55
-7	230,6	-	-
2	292,6	300,1	297,1
7	356,1	344,4	331,2
12	406,0	389,2	371,9

COP _{DC}			
T _{air}	T _{water} (HEAT source)		
(COLD source)	35	45	55
-7	2,73	-	-
2	3,42	2,79	2,23
7	4,02	3,20	2,47
12	4,58	3,61	2,80

Yield data measured under partial load conditions, according to UNI EN 14825

Condizioni di esercizio	F	A (E)	B	C	D
T _{air} [°C]	-10	-7	2	7	12
PLR [%]	100	88	54	35	15
Power DC (Declared Capacity) [kW]	219,1	230,6	292,6	356,1	406,0
COP _{PL}	2,58	2,73	3,65	4,09	4,34
COP _{DC}	2,58	2,73	3,42	4,02	4,58

Performance

35°C		
SCOP	η _s	Energy class
4,01	157%	A++

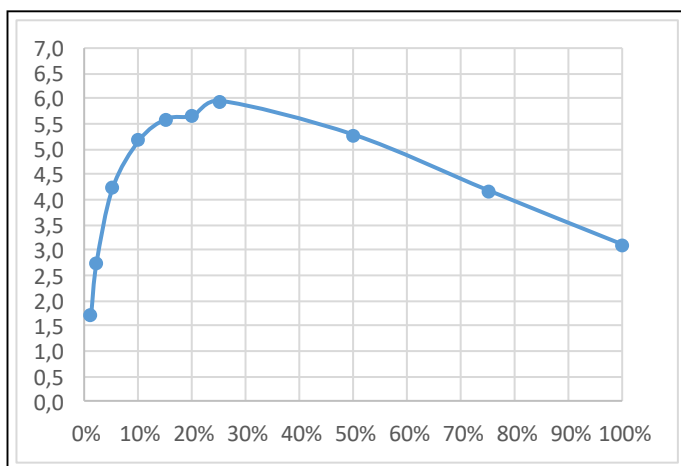
9.4 EER values for the calculation of energy performance of buildings according to UNI/TS 11300-3

Here the partial loads efficiencies EER .

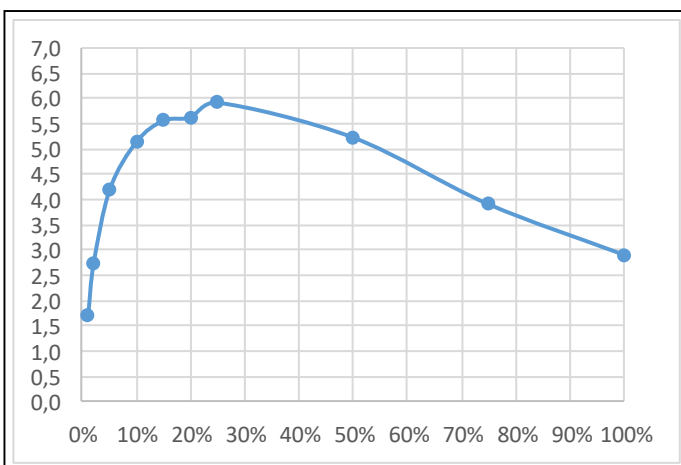
Test	Load factor	Dry bulb outdoor temperature	Input/output water temperature
1	100%	35	12/7
2	75%	30	*\)/7
3	50%	25	*\)/7
4	25%	20	*\)/7

*) temperature value due to the full load test.

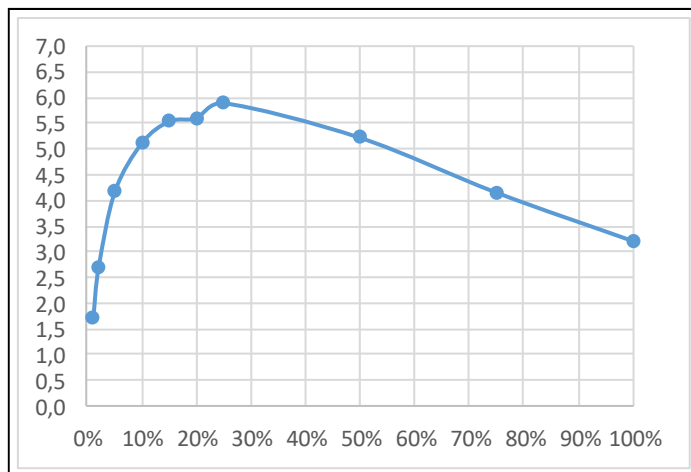
HWA1-A/H 02109		
Dry bulb outdoor air temperature[°C]	Load factor	EER
35	100%	3,10
30	75%	4,17
25	50%	5,27
20	25%	5,95
C	Load factor	EER @20°C x C
0,95	20%	5,65
0,94	15%	5,59
0,87	10%	5,17
0,71	5%	4,22
0,46	2%	2,74
0,29	1%	1,72



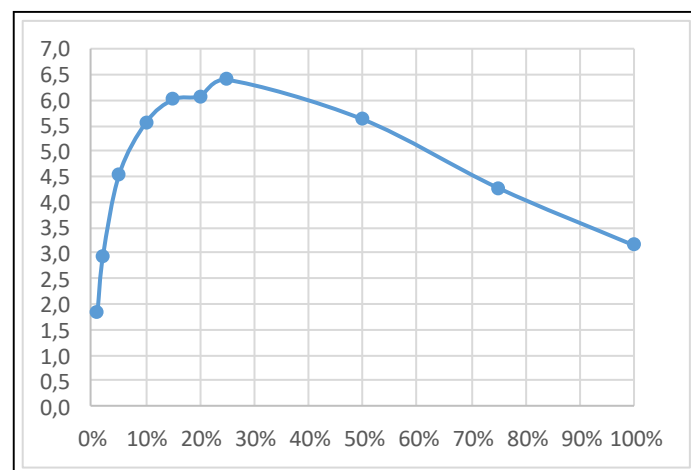
HWA1-A/H 02121		
Dry bulb outdoor air temperature[°C]	Load factor	EER
35	100%	2,91
30	75%	3,91
25	50%	5,23
20	25%	5,92
C	Load factor	EER @20°C x C
0,95	20%	5,63
0,94	15%	5,57
0,87	10%	5,15
0,71	5%	4,20
0,46	2%	2,72
0,29	1%	1,72



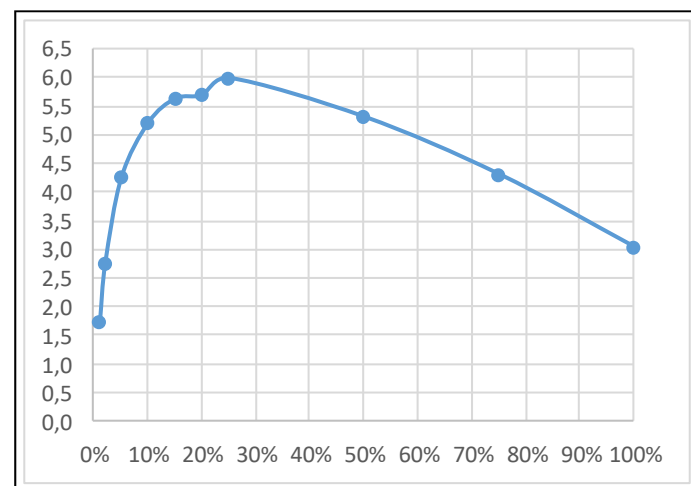
HWA1-A/H 02142		
Dry bulb outdoor air temperature[°C]	Load factor	EER
35	100%	3,22
30	75%	4,16
25	50%	5,23
20	25%	5,91
C	Load factor	EER @20°C x C
0,95	20%	5,61
0,94	15%	5,55
0,87	10%	5,14
0,71	5%	4,19
0,46	2%	2,72
0,29	1%	1,71



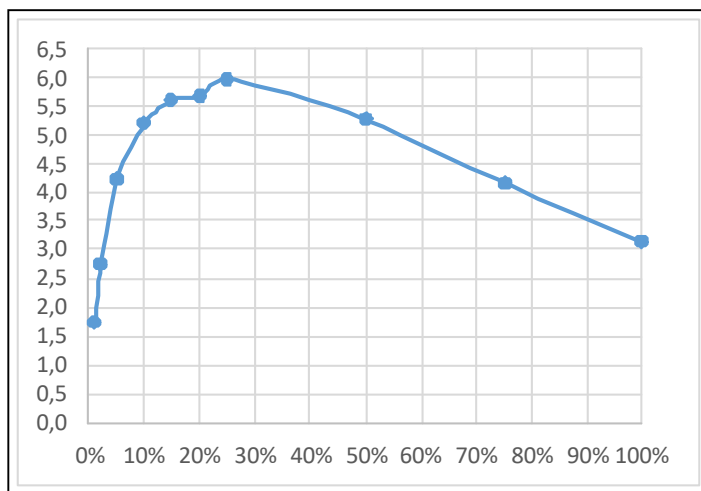
HWA1-A/H 02148		
Dry bulb outdoor air temperature[°C]	Load factor	EER
35	100%	3,16
30	75%	4,28
25	50%	5,63
20	25%	6,41
C	Load factor	EER @20°C x C
0,95	20%	6,09
0,94	15%	6,02
0,87	10%	5,57
0,71	5%	4,55
0,46	2%	2,95
0,29	1%	1,86



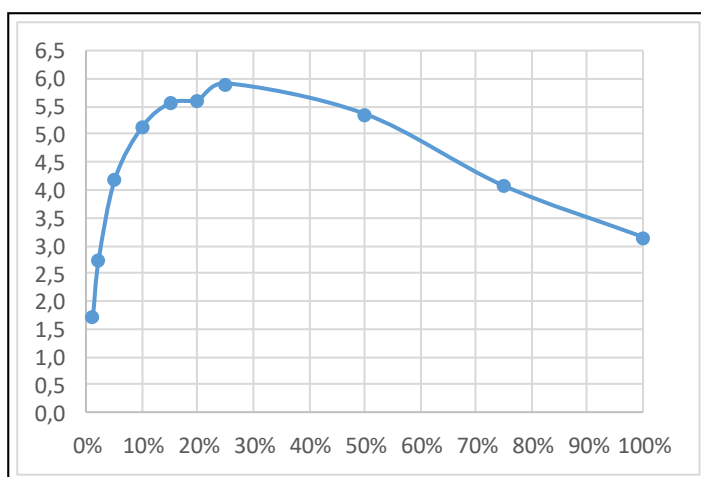
HWA1-A/H 02160		
Dry bulb outdoor air temperature[°C]	Load factor	EER
35	100%	3,04
30	75%	4,31
25	50%	5,31
20	25%	5,99
C	Load factor	EER @20°C x C
0,95	20%	5,69
0,94	15%	5,63
0,87	10%	5,21
0,71	5%	4,25
0,46	2%	2,75
0,29	1%	1,74



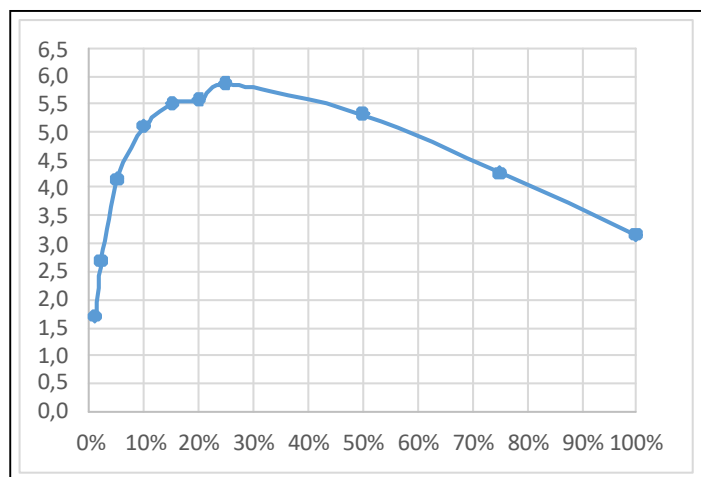
HWA1-A/H 04176		
Dry bulb outdoor air temperature[°C]	Load factor	EER
35	100%	3,15
30	75%	4,16
25	50%	5,26
20	25%	5,97
C	Load factor	EER @20°C x C
0,95	20%	5,68
0,94	15%	5,62
0,87	10%	5,20
0,71	5%	4,24
0,46	2%	2,75
0,29	1%	1,73



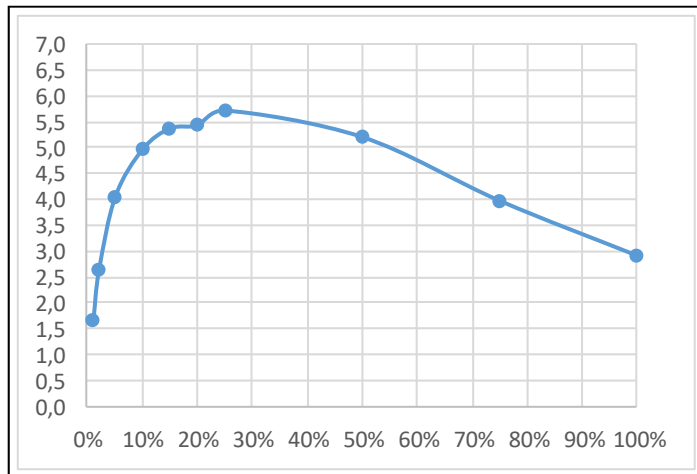
HWA1-A/H 04199		
Dry bulb outdoor air temperature[°C]	Load factor	EER
35	100%	3,14
30	75%	4,07
25	50%	5,36
20	25%	5,90
C	Load factor	EER @20°C x C
0,95	20%	5,61
0,94	15%	5,55
0,87	10%	5,14
0,71	5%	4,19
0,46	2%	2,72
0,29	1%	1,71



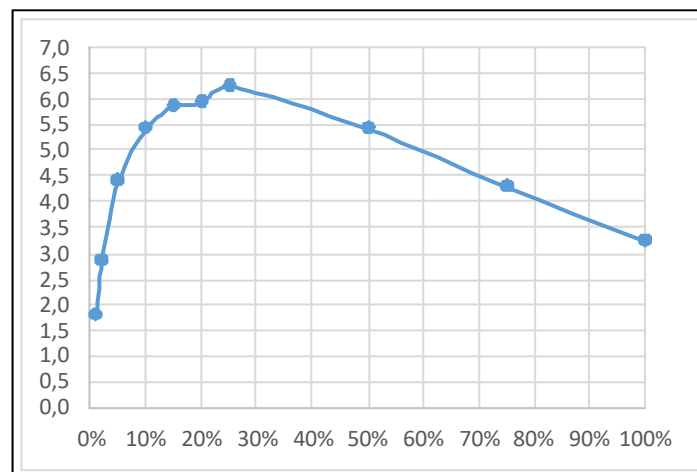
HWA1-A/H 04215		
Dry bulb outdoor air temperature[°C]	Load factor	EER
35	100%	3,16
30	75%	4,27
25	50%	5,33
20	25%	5,89
C	Load factor	EER @20°C x C
0,95	20%	5,59
0,94	15%	5,53
0,87	10%	5,12
0,71	5%	4,18
0,46	2%	2,71
0,29	1%	1,71



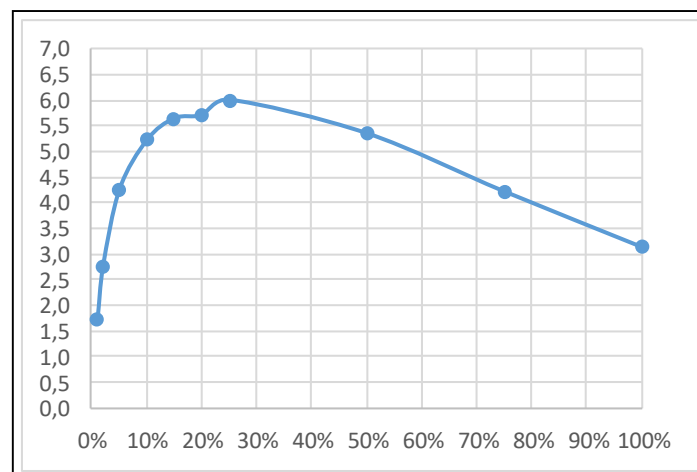
HWA1-A/H 04237		
Dry bulb outdoor air temperature[°C]	Load factor	EER
35	100%	2,92
30	75%	3,97
25	50%	5,20
20	25%	5,71
C	Load factor	EER @20°C x C
0,95	20%	5,43
0,94	15%	5,37
0,87	10%	4,97
0,71	5%	4,06
0,46	2%	2,63
0,29	1%	1,66



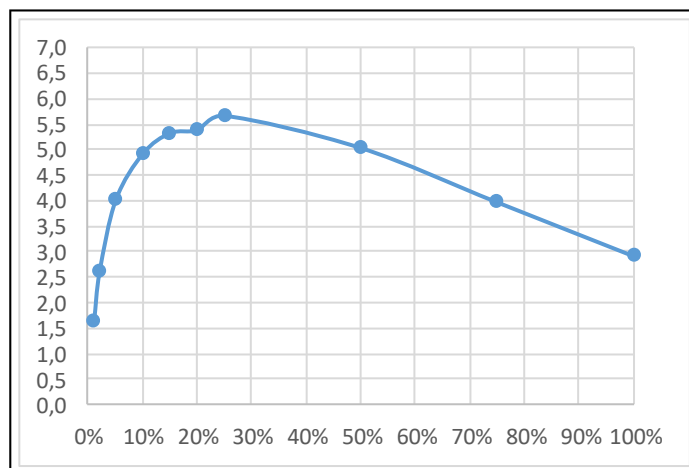
HWA1-A/H 04273		
Dry bulb outdoor air temperature[°C]	Load factor	EER
35	100%	3,25
30	75%	4,30
25	50%	5,43
20	25%	6,26
C	Load factor	EER @20°C x C
0,95	20%	5,94
0,94	15%	5,88
0,87	10%	5,44
0,71	5%	4,44
0,46	2%	2,88
0,29	1%	1,81



HWA1-A/H 04304		
Dry bulb outdoor air temperature[°C]	Load factor	EER
35	100%	3,13
30	75%	4,21
25	50%	5,34
20	25%	5,99
C	Load factor	EER @20°C x C
0,95	20%	5,69
0,94	15%	5,63
0,87	10%	5,21
0,71	5%	4,26
0,46	2%	2,76
0,29	1%	1,74



HWA1-A/H 04345		
Dry bulb outdoor air temperature[°C]	Load factor	EER
35	100%	2,93
30	75%	3,98
25	50%	5,04
20	25%	5,67
C	Load factor	EER @20°C x C
0,95	20%	5,39
0,94	15%	5,33
0,87	10%	4,94
0,71	5%	4,03
0,46	2%	2,61
0,29	1%	1,65



10. SAFETY DATA SHEET OF THE REFRIGERANT

Denomination:	R410A (50% Difluoromethane (R32); 50% Pentafluoroethane (R125)).
INDICATION OF DANGERS	
Major dangers:	Asphyxia.
Specific hazards:	Rapid evaporation can cause freezing.
FIRST AID MEASURES	
General information:	Do not give anything to passed out people.
Inhalation:	Transport in the open air. Use oxygen or artificial respiration if necessary. Do not administer adrenaline or similar substances.
Eye contact:	Rinse thoroughly with plenty of water for at least 15 minutes and seek medical attention.
Skin contact:	Wash immediately with plenty of water. Take off contaminated clothing immediately.
FIRE-FIGHTING MEASURES	
Extinguishing media:	Any.
Specific hazards:	Increased pressure.
Specific methods:	Cool the containers with water spray.
ACCIDENTAL RELEASE MEASURES	
Individual precautions:	Evacuate personnel to safe areas. Provide adequate ventilation. Use personal protective equipment.
Environmental precautions:	Evaporates.
Cleaning methods:	Evaporates.
HANDLING AND STORAGE	
Handling	
technical measures / precautions:	Ensure sufficient air exchange and / or aspiration in the workplace.
tips for safe use:	Do not breathe vapor or aerosol.
Storage:	Close carefully and store in a cool, dry and well-ventilated place. Store in original containers. Incompatible products: explosive, flammable materials, Organic peroxide
EXPOSURE CONTROLS / PERSONAL PROTECTION	
Control parameters:	AEL (8-h and 12-h TWA) = 1000 ml / m3 for each of the two components.
Respiratory protection:	For rescue and maintenance work in tanks use an autonomous respiratory system. The vapors are heavier than air and can cause suffocation by reducing the oxygen available for breathing.
Eye protection:	Safety glasses.
Hand protection:	Rubber gloves.
Hygiene measures:	Do not smoke.
PHYSICAL AND CHEMICAL PROPERTIES	
Color:	Colorless.
Odor:	Slight.
Boiling point	-52.8 ° C at press. ATM.
Ignition point:	Does not ignite.
Density:	1.08 kg/l a 25°C.
Solubility in water:	Negligible
STABILITY AND REACTIVITY	
Stability:	No reactivity when used with the specific instructions.
Materials to avoid:	Highly oxidizing materials. Incompatible with magnesium, zinc, sodium, potassium and aluminum. The incompatibility is made more serious if the metal it is present in the form of powders or if the surfaces have recently been unprotected.
Hazardous decomposition products:	These products are halogenated compounds, hydrofluoric acid, carbon oxides (CO, CO2), carbonyl halides.
TOXICOLOGICAL INFORMATION	
Acute toxicity:	(R32) LC50 / inhalation / 4 hours / on rat> 760 ml / l (R125) LC50 / inhalation / 4 hours / on rat> 3480 mg / l
Local effects:	Concentrations substantially above the TLV can cause narcotic effects. Inhalation of high concentration decomposition products can cause respiratory failure (pulmonary edema).
Long-term toxicity:	Did not show carcinogenic, teratogenic or mutagenic effects in animal experiments.
ECOLOGICAL INFORMATION	
Global warming potential GWP	2088
Depletion potential	0
ozone ODP (R11 = 1):	
Disposal considerations:	usable with reconditioning.

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