

Air/Water heat pumps with axial fans

Technical bulletin

Models

HWA1-A/H 02109-04345



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1. UNIT DESCRIPTION AND TECHNICAL CHARACTERISTICS

The 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 the unit of 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 antivibration dampers. They 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 304 stainless steel for the monocircuit units and AISI 316 for the bicircuit units, 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

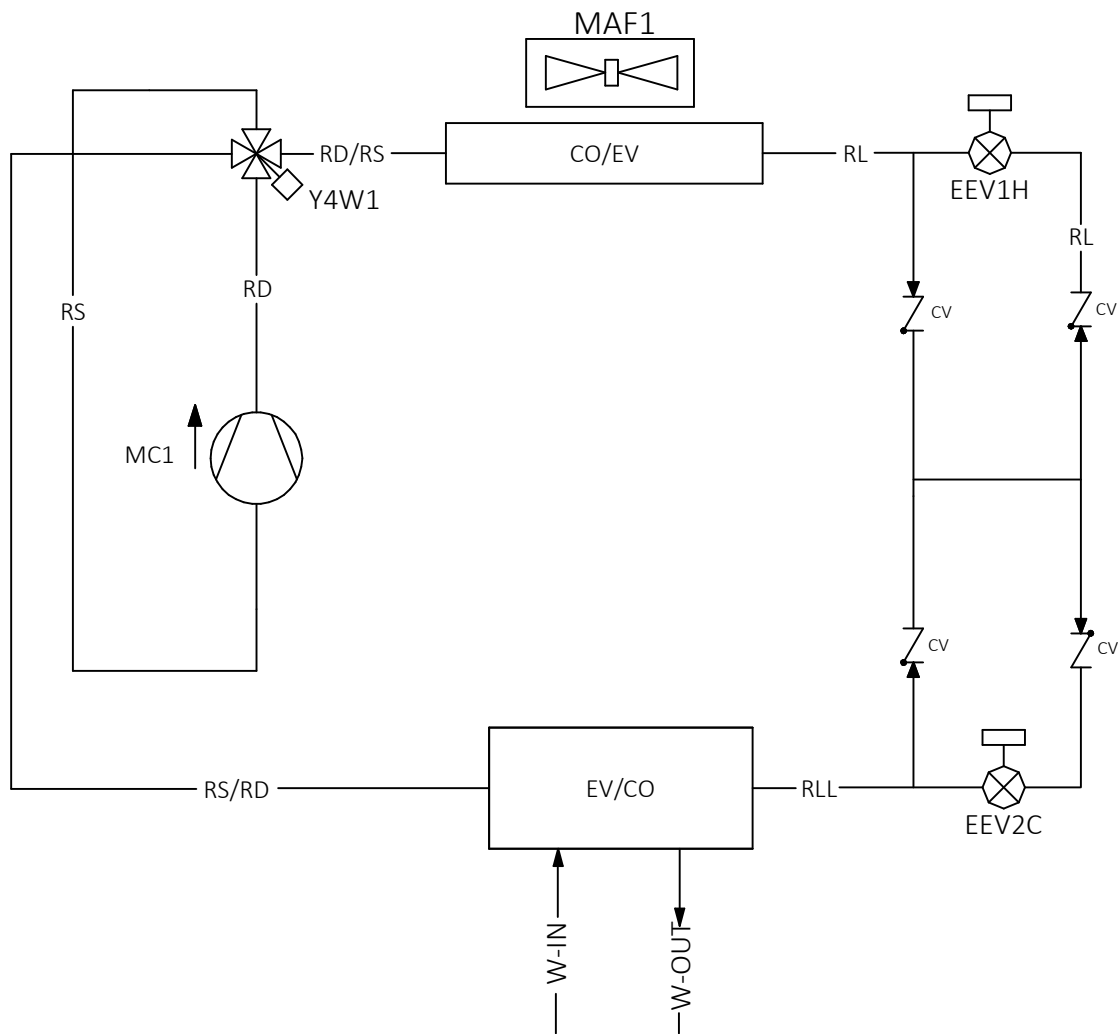
The fans are axial with wing profile blades. They are statically and dynamically balanced and supplied complete with protection grille and double flared profile air inlet and outlet, specially shaped to increase efficiency and reduce noise. The motor has an IP54 protection degree according to CEI EN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

The regulation takes place through voltage regulators, 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.

1.6 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 heat pump is shown below.



LEGEND			
MC1	Compressor	W-IN	User side water inlet
CO/EV	Condenser in chiller operation	W-OUT	User side water outlet
EV/CO	Evaporator in chiller operation	RD	Delivery line
MAF1	Axial fan	RL	Liquid line
Y4W1	Reverse cycle 4 way valve	RLL	Laminated liquid line
EEV2C	Electronic expansion valve for chiller operation	RS	Suction line
EEV1H	Electronic expansion valve for heat pump operation	RS/RD	Chiller functioning suction line
CV	Non return valve	RD/RS	Chiller functioning delivery line

1.7 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 disconnecter 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.

1.8 CONTROL SYSTEM

All units are equipped with a control unit equipped with a microprocessor with superheating 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, antifreeze 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.

1.9 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 trans-

ducer, 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.

1.10 HYDRAULIC CIRCUIT

The heat pumps of the 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	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 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 – Super silenced version

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.

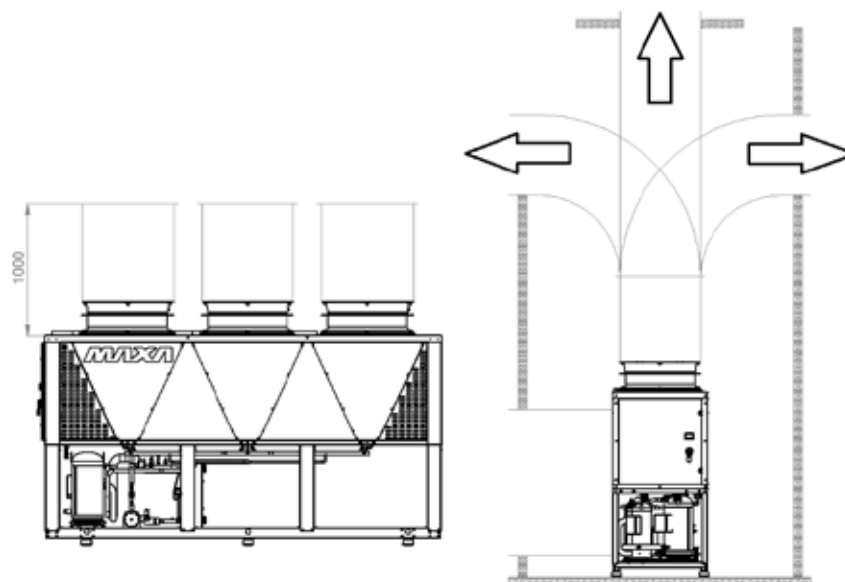
The SSL version includes the EC fan and condensation control down to - 20°C (CC)

/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.

In the C version includes the EC fan and the condensation control down to - 20°C (CC)

A possible ducted installation is shown in the figure. Before any change in the direction of the duct, the minimum length to be observed is indicated



A quantitative indication of the additional static 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.

Model HWA1-A/H	Additional static 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

/C(S) – Ducted version with compressor acoustic insulation

In addition to the ductable version, thermo-acoustic insulation are installed on the compressors.

NOTE: The acoustic data indicated in chapter “7. SOUND EMISSIONS” ARE NOT valid for ducted configurations.

2.3 HYDRONIC KIT

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

- /PS – Reverse cycle heat pump standard only head pump version.
- /PSAP – Reverse cycle heat pump only high head pump version.
- /PD – Reverse cycle heat pump double head pump standard version.
- /PDAP – Reverse cycle heat pump double high head pump version.
- /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 head standard pump + tank version.
- /PDAP/SI – Reverse cycle heat pump high head double pump + tank version

The unit code is composed of:

- nr. 5 fixed digits, different depending on the number of fans present and the type of unit:

2 fans – digit 02221

3 fans – digit 02321

4 fans – digit 02421

6 fans – digit 02521

- The # symbol as a separator
- nr. 18 variable digits (fields) that identify sizes, versions and accessories factory fitted.
- nr. 2 digits identifying any customisations

XXXXX#(RV)(PCF)(TA)(C1)(TE)(KS)(KA)(EL)(EL2)(VF)(FAN)(SIL)(TR)(AC1)(AC2)(MC)

Order code	RV		PCF	TA	C1	TE
	Configuration					
	09	/H Reversible heat pump				
	55	BT version				
02221#		109 02109	Recovery	Hydronic configuration	Specific sealing
			121 02121			
			142 02142			
02321#		148 02148			
			160 02160			
			176 04176			
02421#		199 04199			
			215 04215			
			237 04237			
			273 04273			
02521#		304 04304			
			345 04345			
			0 -			
			3 Desuperheater (DS)			
			0 -			
			1 Standard-head pump version (PS)			
			2 Standard-head double pump version (PD)			
			3 High-head pump version (PSAP)			
			4 High-head double pump version (PDAP)			
			0 -			
			1 Special seal for Gly>40% (TE1) *			

XXXXX#(RV)(PCF)(TA)(C1)(TE)		KA	EL	EL2	VF
KS					
Tank		Antifreeze kit	Electrical accessories	Electrical accessories	Refrigerator accessories
0	-				
2	Integrated technical storage (SI) **				
		0	-		
		5	Heat exchanger and pump resistance (if present) (KA1)		
		6	Heat exchanger, pump and tank (KA2) ****		
			0	-	
			1	Soft starter (SS)	
				0	-
				1	Shuko plug (SH)
				2	Internal lights for EP (LQ)
				3	Shuko plug (SH) e Internal lights for EP (LQ)
				0	-
				1	Compressors supply/suction ball valve (RFM)
				2	Double relief valve (2SFV)
				3	Compressors supply/suction ball valve (RFM) e Double relief valve (2SFV)

XXXXX#(RV)(PCF)(TA)(C1)(TE)(KS)(KA)(EL)(EL2)(VF)		SIL	TR	AC1	AC2	MC
FAN						
Fan		Muffling	Heat exchanger treatment	-	Electrical accessories	-
0	Standard (EC)					
3	Phase cut AC **					
6	Phase cut AC with condensation control (CT) **					
7	Standard EC with condensation control (CC)					
		1	Silenced (SL)			
		2	Super-silenced (SSL) ****			
		4	Ductable (C) ***			
		5	Ductable with compressor acoustic insulation (C(S)) ***			
			0	-		
			8	With Silverline treatment (TR2)		
				0	-	
				2	Circuit breakers (IM)	
				0	-	
				2	Circuit breakers (IM)	
					01	-

- * Not possible if C1=0
- ** Not possible if RV=55
- *** Not possible if FAN=3 or FAN=6
- **** Not possible if KS=0

2.4 ACCESSORIES LIST

The available accessories are listed below:

Description	Accessory	Standard	Factory fitted	Supplied separately / Activable after delivery
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 signalling	X		X	

Description	Accessory	Standard	Factory fitted	Supplied separately / Activable after delivery
Compressor on/off signalling		x	x	
Machine lockout signal		x	x	
Defrosting signal		x	x	
Digital input for double set-point		x	x	
CM Modbus enabling	x		x	
ISK Serial converter USB/RS485	x			x
KA1 Plate heat exchanger antifreeze resistance and pump (if present)	x		x	
KA2 Heat exchanger antifreeze heater, pump and tank (if present) - KA1 included	x		x	
IM Magnethermic switch for compressors and fans	x		x	
Hi-TV415 Touchscreen remote control	x			x
i-CR Wall mounted 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 Condensation control up to –10°C	x		x	
CC Condensation control up to –20°C (Only with EC fans)	x		x	
Cu/Al Battery		x	x	
TR2 Battery Cu/Al 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 Compressor delivery and suction tap	x		x	
AG Rubber antivibration dampers	x			x
AM Spring antivibration dampers	x			x
GR1 Anti-intrusion kit for refrigeration circuit compartment	x		x	
GR2 Condenser anti-intrusion grid	x		x	
2SFV Changeover tap with double safety valve	x		x	
EEV - Electronic valve		x	x	
FY Y filter	x			x
TE1 Special mechanical 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 control)	x		x	

2.5 DESCRIPTION OF ACCESSORIES

2.5.1 Factory fitted accessories

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.

Compressor on/off signalling – 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.

Defrost 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.

Clean remote on/off da 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.

Liquid line solenoid valve – inlet valve to the refrigerant circuit, used for the pump down, to prevent 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 signalling) – by monitoring the pressure difference, it ensures that there is sufficient flow for correct machine operation.

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.

2.5.2 Optional accessories factory fitted

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.

The expected values of the maximum current at starting with SS accessory are shown below. The values are indicative and consider a tolerance of 10% based on the actual starting operating condition.

		02109	02121	02142	02148	02160	04176	04199	04215	04237	04273	04304	04345
Maximm inrush current at SS	A	196,3	224,3	238,0	241,1	251,5	226,6	270,9	279,3	317,7	337,8	365,0	441,2



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

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

KA1 Heat exchanger antifreeze resistance and pump (if present) - electrical resistance on the front face of the plate heat exchanger, which is activated when the temperature of the water inside the heat exchanger falls below +4°C, and electrical resistance that protects the pump against ice formation.

KA2 Heat exchanger antifreeze resistance, pump and tank (if present) - includes KA1 - A resistance immersed in the tank is added to the KA1 accessory. The kit consists of:

- An armoured AISI 321 electric resistance
- A digital temperature regulator with parameters
- A contactor

The purpose of the tank resistance is to prevent the temperature of the water inside the tank from dropping too low. The device is activated by digital thermostat when the temperature of the water in the tank falls below a set value and remains active until a second temperature, higher than the first and also fixed. Depending on the version of the unit and the vector fluid, the temperature values for switching the resistance on and off are different, as shown in the table.

Unit version	Vector fluid	Water temperature resistance switch on [°C]	Water temperature resistance switch off [°C]
Standard	water	+4	+8
BT	water + 10% ethylene glycol	+1	+5
BT	water + 20% ethylene glycol	-4	0
BT	water + 30% ethylene glycol	-8	-4

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



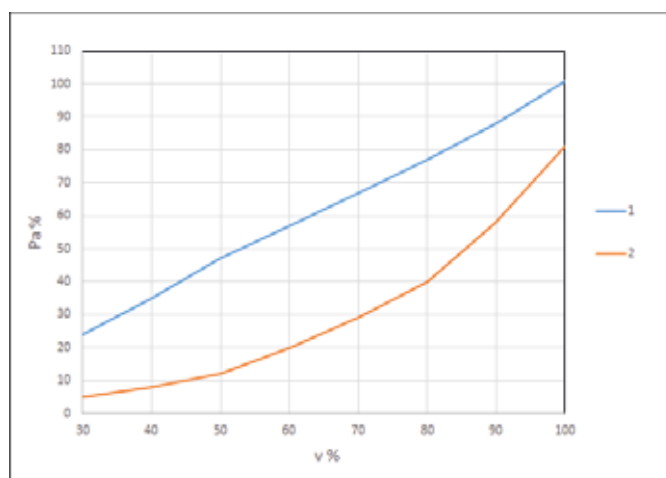
Electrical board lighting (LQ) - light to illuminate the interior of the electrical panel facilitating maintenance for the operator.

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

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.

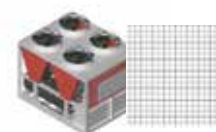
In the image you can see the % savings in terms of electrical power consumption using the EC fan accessory, as the speed of the fan varies
 P_a = power absorption
 v = fan speed
 1 = standard fan
 2 = EC fan (accessory)



Cu/Al Battery with Silver Line anti-corrosion treatment (TR2) – 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”.

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.



Battery compartment anti-intrusion kit (GR2) – wire mesh that prevents the intrusion of foreign bodies inside the battery and to protect the battery from accidental contact are things or people.

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

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.

Lifting bracket kit (KS) – facilitate the lifting and positioning of the unit.

2.5.3 Optional accessories supplied separately/activable after delivery

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

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

Touch screen remote control USB RS485 (ISK) - device interface 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.



Touchscreen remote control (Hi-TV415) - allow to visualize the remote unit status; to be mounted in the most convenient place for the user;

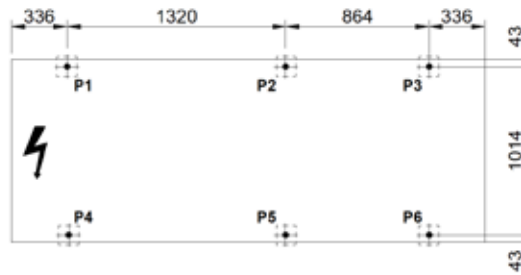


Wall-mounted remote control (i-CR) – Modbus remote control with negative LCD and capacitive keys. The device is to be used as a remote machine keyboard with local temperature detection, it replicates the functionality of the on-board control.

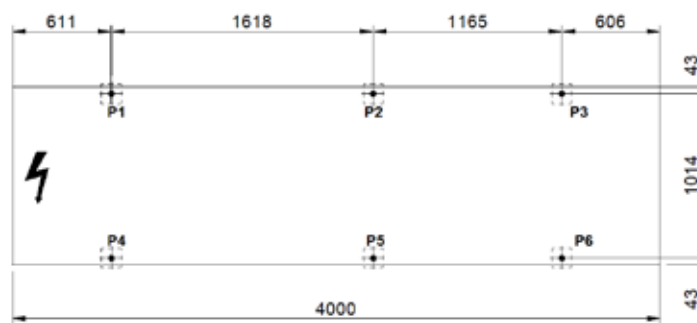


Rubber (AG) and spring vibration dampers (AM) — they have the purpose of not transmitting vibrations to the structure; they are to be mounted under the unit, in special holes. The ideal installation positions of the vibration dampers for each type of machine are shown below.

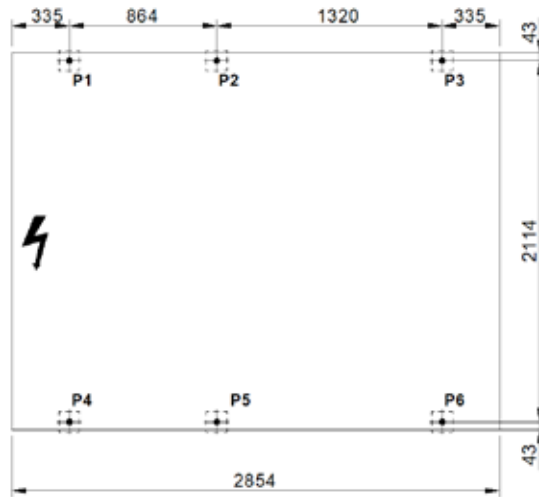
HWA1-A/H 2 fans: 02109, 02121



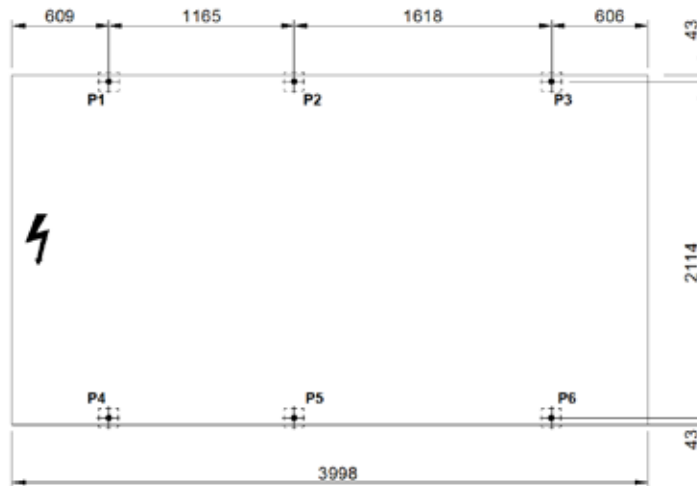
HWA1-A/H 3 fans: 02142, 02148, 02160



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



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



There are two types of antivibrations 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	Antivibration 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

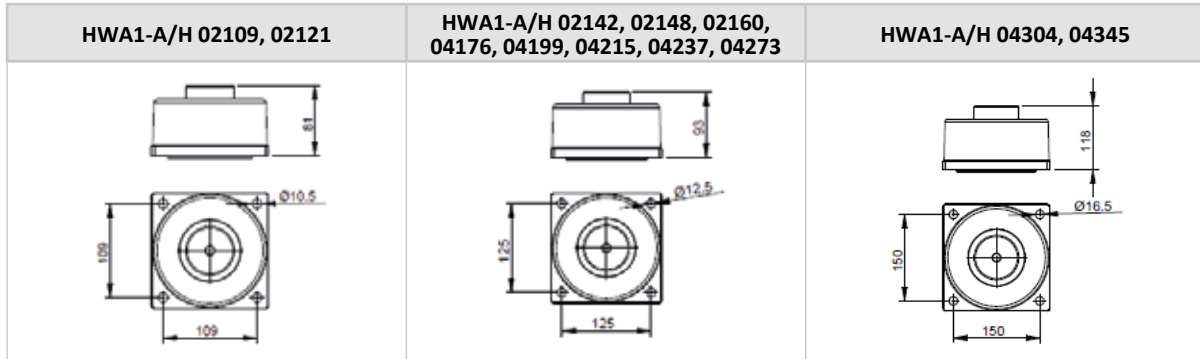


Model HWA1-A/H	Spring antivibration mounts carrying capacity P1÷P6 [daN]					
	P1:	P2:	P3:	P4:	P5:	P6:
02109	330	330	290	330	330	290
02121	330	330	290	330	330	290
02142	600	460	330	600	460	330
02148	600	460	330	600	460	330
02160	600	460	330	600	460	330
04176	560	510	460	560	510	460
04199	560	510	460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

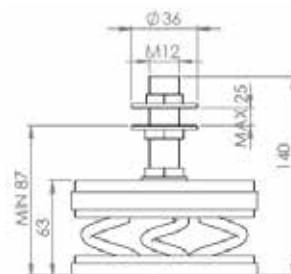
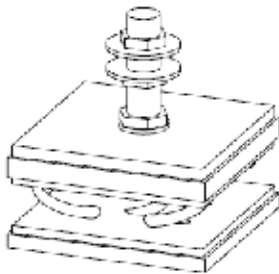


Model HWA1-A/H	Spring antivibration mounts carrying capacity P1÷P6 [daN]					
	P1:	P2:	P3:	P4:	P5:	P6:
04304	860	750	560	860	750	560
04345	860	750	560	860	750	560

Below are details of the rubber vibration dampers for each size



and the spring dampers, which are dimensionally identical for all sizes.

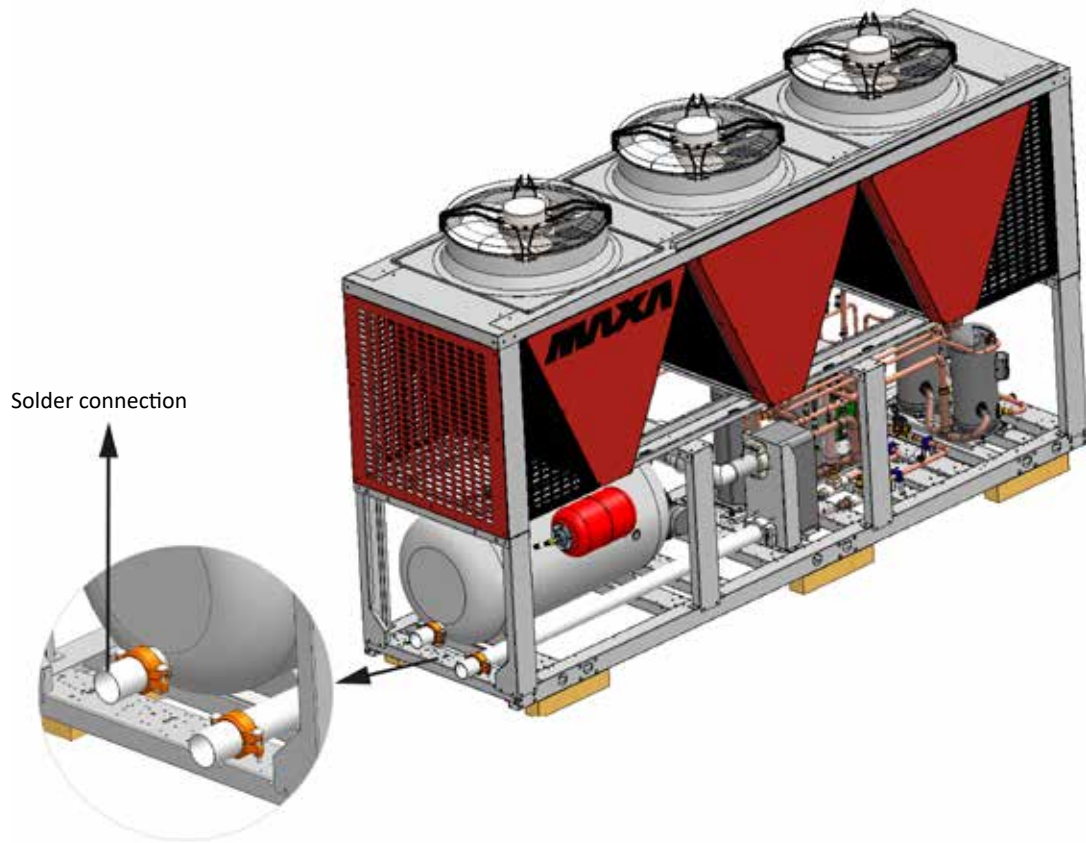


Y filter (FY) – it contains a stainless steel mesh sieve that collects the solid materials present in the water. Filtration allows to avoid the obstruction and / or damage of the devices installed downstream of the filter.

Grooved connection joint (RV) – it joins pipes or grooved fittings, ensuring perfect seal between the two components. The starter kit consists of 2 jaws and 2 smooth sockets, 120 mm long, grooved on one side and seal and soldered on the other. The recommended tightening torques for each mold should be in the range 120-150 Nm.



ATTENTION: Check, at start-up, the absence of leakage at the pipe junction points, possible caused by seal failure / misalignment / non tightening.



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.

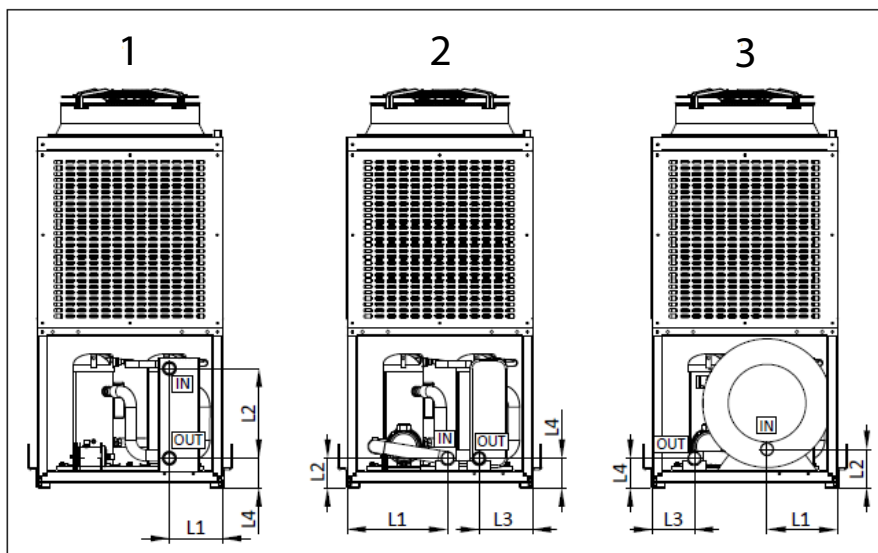
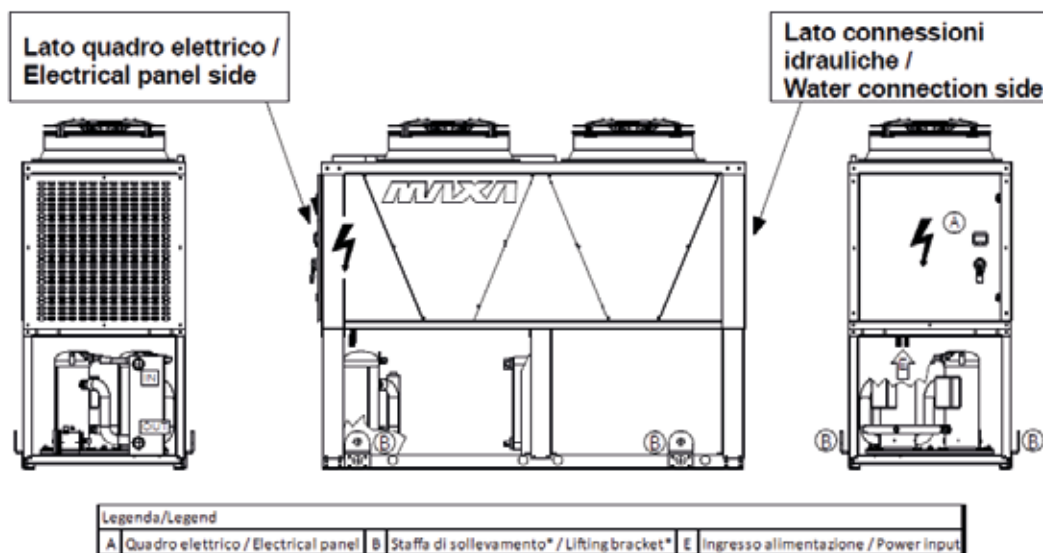
3.1 UNIT DIMENSIONS, WATER CONNECTIONS, WEIGHTS AND CENTRE OF GRAVITY POSITION

3.1.1 Net dimensions and packaging

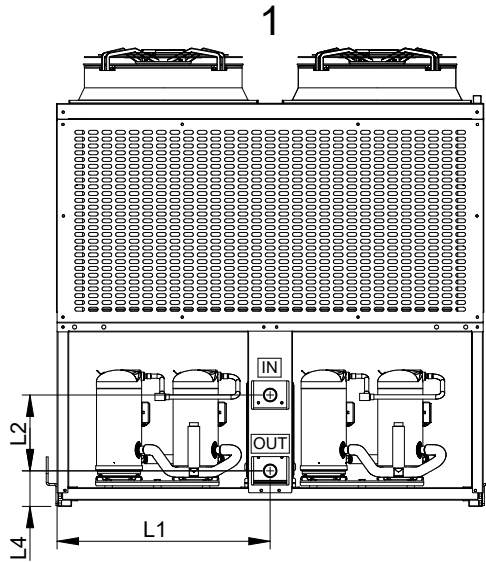
Model HWA1-A/H	Length [mm]	Width [mm]	Height [mm]	Height SSL and C versions [mm]	Height max with packaging [mm]	Height max with packaging SSL or C versions [mm]
02109, 02121	2860	1100	2350	2415	2430	2495
02142, 02148, 02160	4060	1100	2350	2415	2430	2495
04176, 04199, 04215, 04237	2860	2200	2350	2415	2430	2495
04273, 04304, 04345	4060	2200	2350	2415	2430	2495

3.1.2 Position and connections details

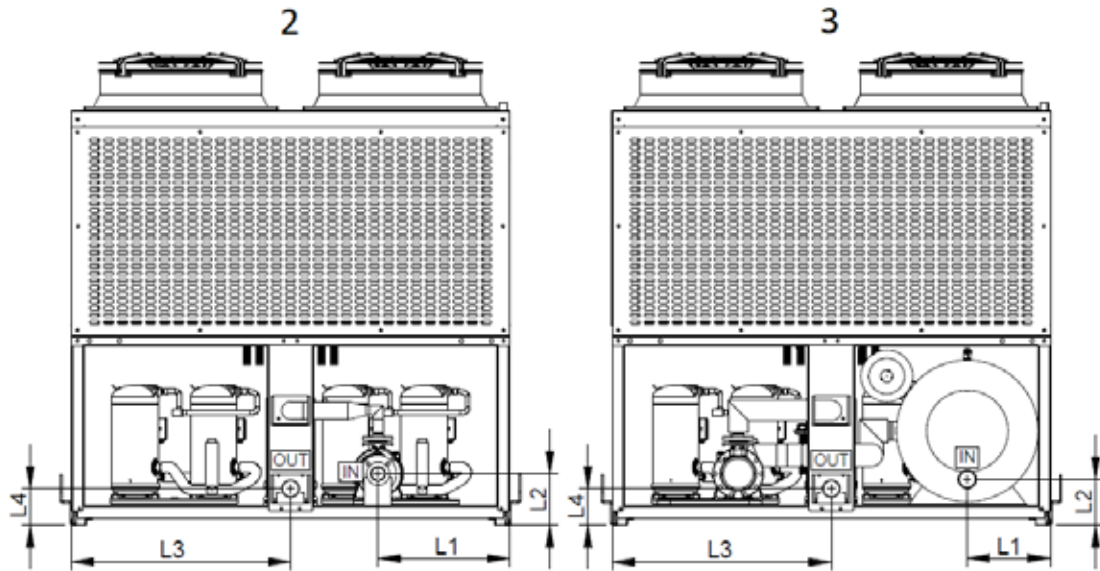
The table shows the connection diameters and the positions of the hydraulic connections (in/out) according to the size and configuration of the unit. All connections shown are grooved — “Victaulic” type. The location of the hydraulic connections is highlighted in the image below.



	Model	Version	Ref. Image	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 + tank	2	573	176	314			
3 fans	HWA1-A/H								
3 fans	02142 02148 02160	Standard	1	314	530	-	176	2"1/2	2"1/2
		Single/double pump	2	605	176	314		3"	
		Single/double pump + tank	3	416	231	228			

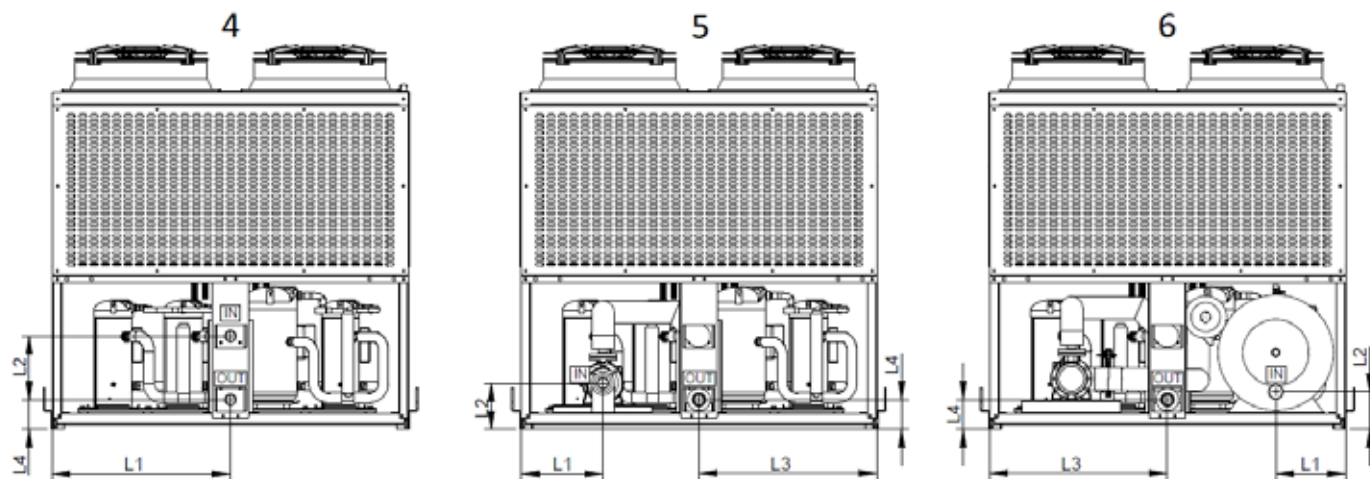


Standard



Single/double pump

Single/double pump + tank



Standard

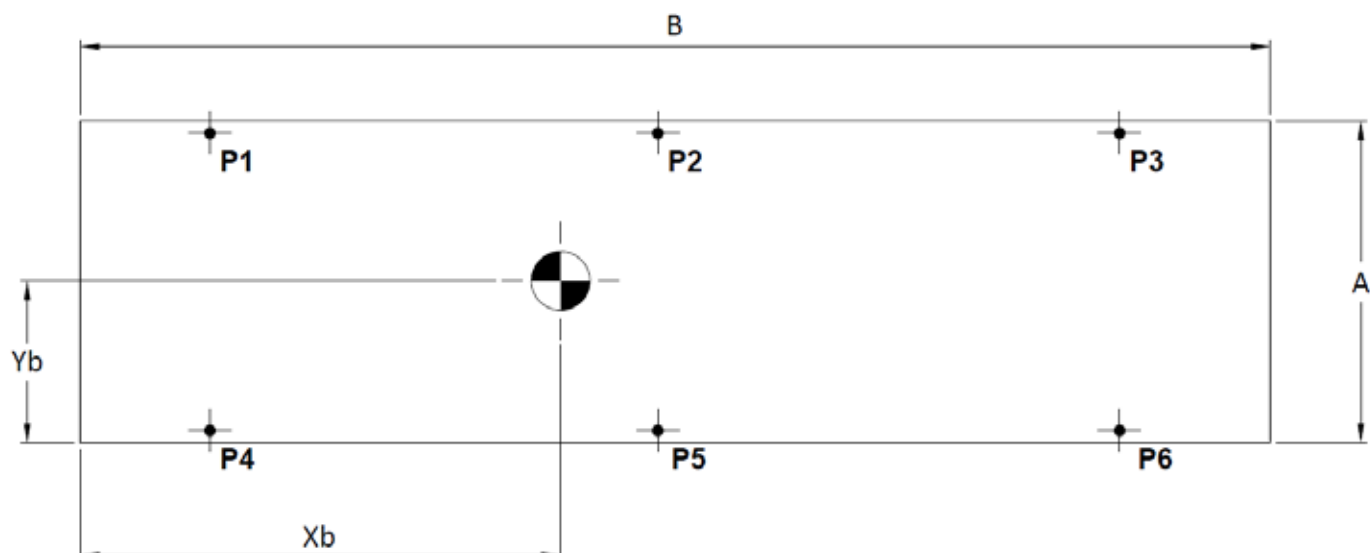
Single/double pump

Single/double pump + tank

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

3.1.3 Weights and position of the centre of gravity

The position of the centre of gravity of each machine is indicated in the table, 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 and tank.



Model HWA1-A/H	Version	Net shipping weight [kg]	Operating weight [kg]	A [mm]	B [mm]	Xb [mm]	Yb [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
02160	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




Model HWA1-A/H	Version	Net shipping weight [kg]	Operating weight [kg]	A [mm]	B [mm]	Xb [mm]	Yb [mm]
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 SPACE

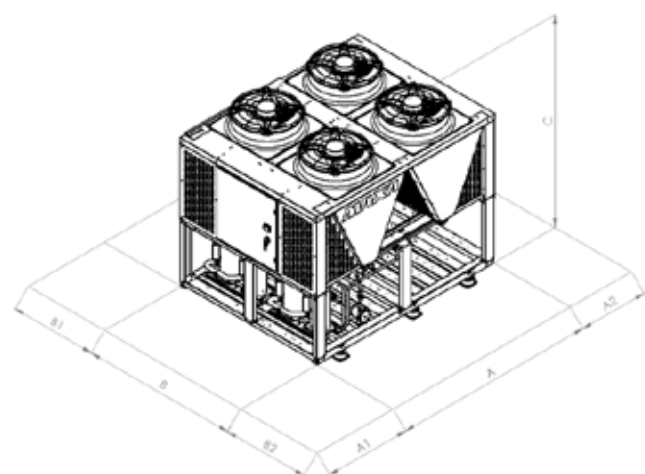
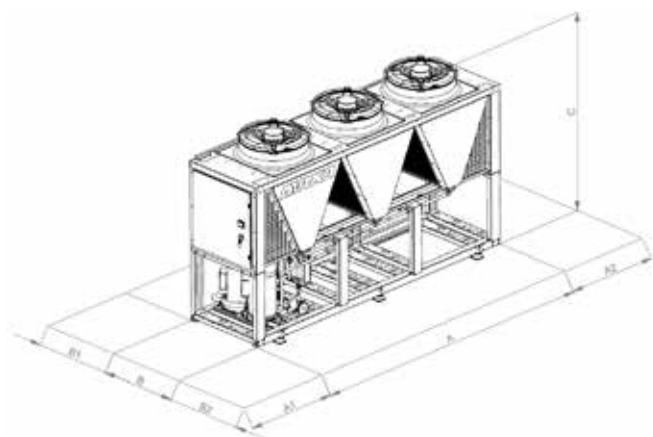
The whole series is designed and built for outdoor installations.

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.

	<p>The support surface must have a sufficient capacity to support the weight of the unit, which can be seen both on the technical label affixed to the machine and in this manual in the dedicated chapter.</p> <p>The support surface must not be inclined to ensure the correct operation of the unit and to prevent it from tipping over.</p> <p>The installation surface of the unit must not be smooth, in order to avoid the deposit of water/ice, a potential source of danger.</p>
	<p>The installation site of the unit must be free of foliage, dust, etc. which could clog or cover the heat exchangers coils.</p> <p>Installation in areas subject to stagnation or falling water, e.g. from gutters, should be avoided.</p> <p>Also, avoid locations subject to snow accumulation (such as corners of buildings with sloping roofs). When installing in areas subject to snowfall, mount the unit on a base 20-30 cm above the ground to prevent snow accumulation around the unit.</p>
	<p>Installation of the unit under covers of any kind, such as roofs, canopies should be avoided.</p>

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.

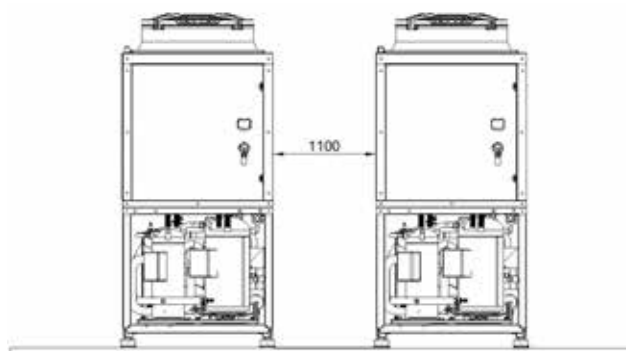


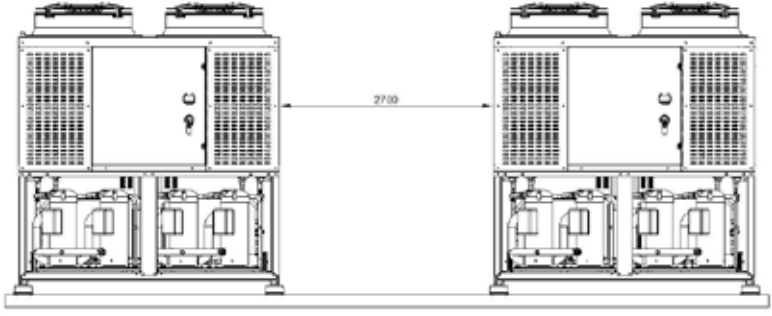

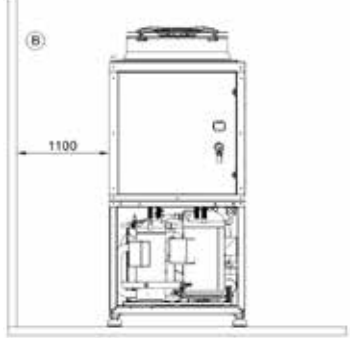
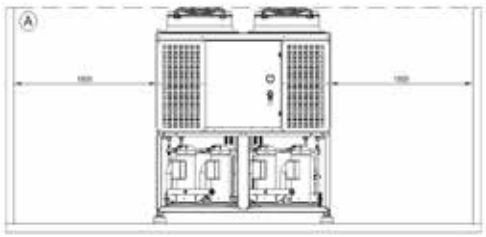
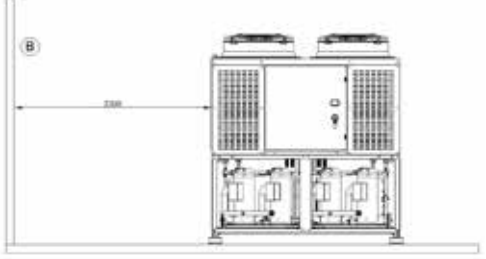
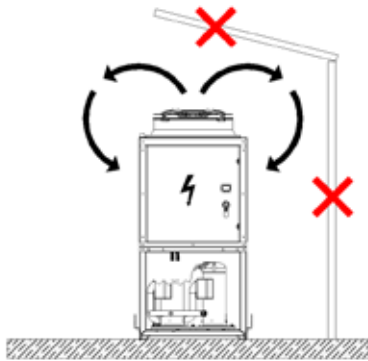
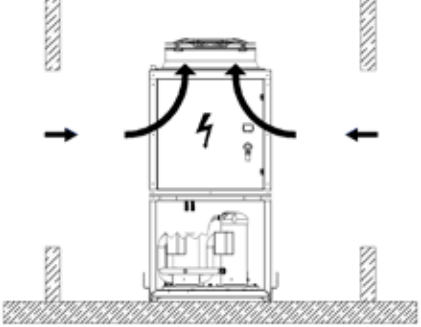
Model		A1	A2	B1	B2
HWA1-A/H	mm	1000	800	1000	1000



For installations in locations with strong winds refer to the area classification according to the Beaufort scale. If the value is ≥ 7 (strong wind, average wind speed = 13,9-17,1 m/s) it is strictly necessary to maintain the fan powered at all times, in order to prevent its unintentional rotation.

In case of units placed side by side, the minimum distance L_{min} to be observed between them is 1100 mm for units with a width of 1100 mm:
HWA1-A/H 02109, 02121, 02142, 02148, 02160












<p>2700 mm for unit with width 2200 mm: HWA1-A/H 04176, 04199, 04215, 04237, 04273, 04304, 04345</p>		
<p>Unit with width 1100 mm: HWA1-A/H 02109, 02121, 02142, 02148, 02160</p> <p>In case of units surrounded by walls or obstacles of equal height (CASE A), the installation should be at a distance of no less 1100 mm on either side. If the height of the wall or single obstacle is greater than the unit height (CASE B) use a minimum distance of 1100 mm or contact MAXA technical sales support.</p>		
<p>Units with width 2200 mm: HWA1-A/H 04176, 04199, 04215, 04237, 04273, 04304, 04345</p> <p>In case of units surrounded by walls or obstacles of equal height (CASE A), the installation should be at a distance of no less 1800 mm on either side. If the height of the wall or single obstacle is greater than the unit height (CASE B) use a minimum distance of 2300 mm or contact MAXA technical sales support.</p>		
<p>Covering with canopies or positioning near plants or walls should be avoided in order to prevent air circulation.</p>		
<p>In case of winds with speeds in excess to 13,9-17,1 m/s (strong winds according to the Beaufort scale) the use of windbreaks is recommended.</p>		

Always make an environmental impact evaluation based on the power and sound pressure data given in the technical data chapter and the sound emission limits based on the installation area of the unit, with reference to the DPCM of 14/11/1997. An evaluation must also be made if the unit is installed in the vicinity of workers, according to D. LGS. 81/2008 Art. 189 and following.

3.3 HYDRAULIC CIRCUIT

The hydraulic connections must be made in compliance with national 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 unit 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 and a defangator (installed on the return pipe from the system) with a metal mesh of no more than 1 mm (mandatory to maintain the validity of the guarantee).
- Expansion vessel of adequate capacity for the total water content of the system.
- Anti vibration joints of adequate diameter to the pipes to prevent the transfer of vibrations of the system.
- Pressure gauge for the measuring the outlet water pressure and the approximate determination of the water flow.
- Loading group and discharge valve where necessary.

	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: Check, at start-up, that there are no leaks at the junction points between the pipes, possibly caused by seal failure/ misalignment / non-tightening. The technical bulletin contains the recommended tightening torques for each size.
	ATTENTION: Create a suitable outlet for the safety valve.
	ATTENTION: An automatic air vent valve must be installed at the highest point of system.
	ATTENTION: In the 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 a mesh size of no more than 1 mm) and a defangator on the return pipe from the installation labelled "WATER INPUT". If the metal filter and the defangator are not present on the installation, the warranty will be immediately void. The filter and defangator must be kept clean, so make sure they are still clean after the unit is installed and check them periodically.
	All units leave the factory with a differential pressure switch (factory installed). If the differential pressure switch is tampered with or removed, the warranty will be void. Refer to the wiring diagram enclosed with the unit for the connection of the differential pressure switch. Never jumper the differential pressure switch connections in the terminal block.
	The heating system and safety valves must comply with the requirements EN 12828.

3.3.1 System 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.

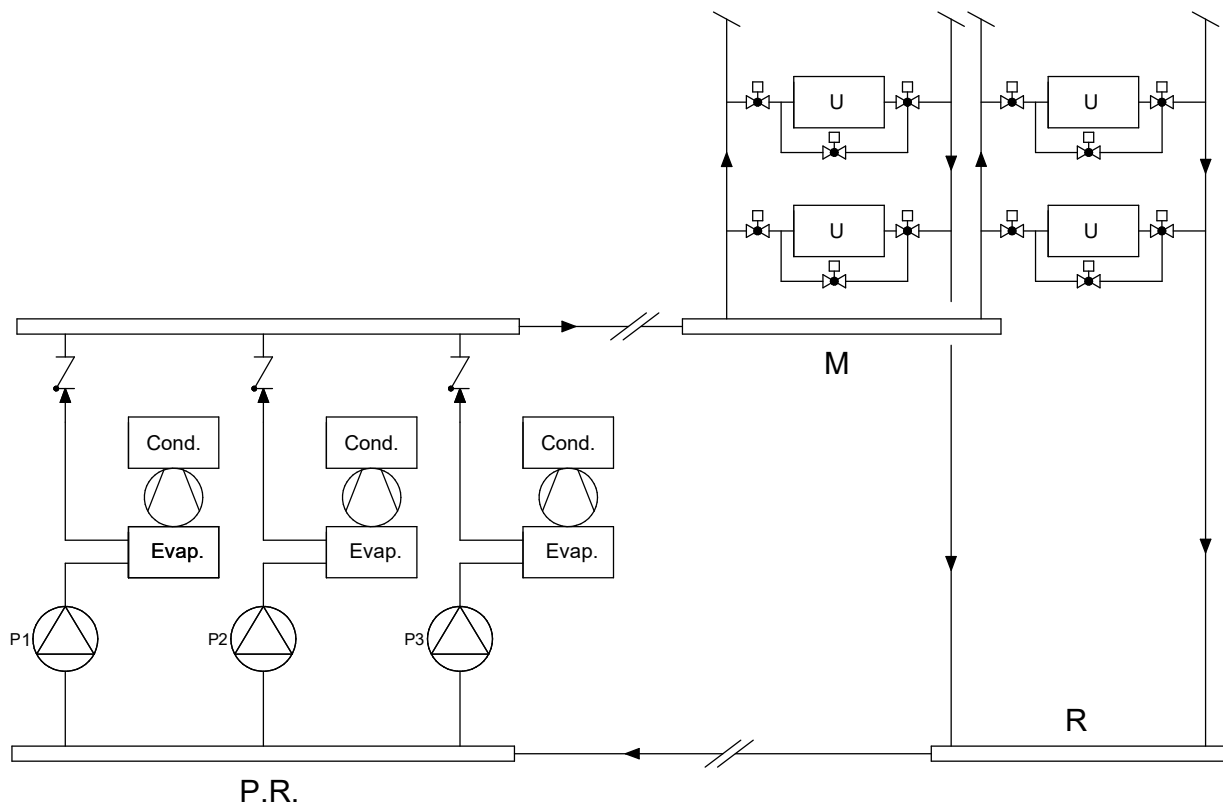
MAXIMUM CHEMICAL-PHYSICAL CHARACTERISTICS ALLOWED FOR THE SYSTEM WATER	
PH	7,5 - 9
Electrical conductivity	100 - 500 µS/cm
Total hardness	4,5 – 8,5 dH
Temperature	< 65°C
Oxygen content	< 0,1 ppm
Glycol Max quantity	50 %*

MAXIMUM CHEMICAL-PHYSICAL CHARACTERISTICS ALLOWED FOR THE SYSTEM WATER	
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)	None
Ammonium ion (NH ₄)	None
Silica (SiO ₂)	< 30 ppm

* In case of units with hydronic kit, pay attention to the maximum quantity of glycol present in the system: if more than 40% use accessory TE1 (Special mechanical seal for glycol above 40%).

3.3.2 Hydraulic scheme type

Possible hydraulic schemes are shown when the associated hydronic kit is present. Remember that the input filter is MANDATORY, on request it is supplied as an accessory. The following diagrams are conceptual and purely indicative; they cannot be used as an executive document for the realisation of a project. Please contact a specialised thermo-technical engineer in order to obtain a suitable hydraulic diagram for your specific requirements.



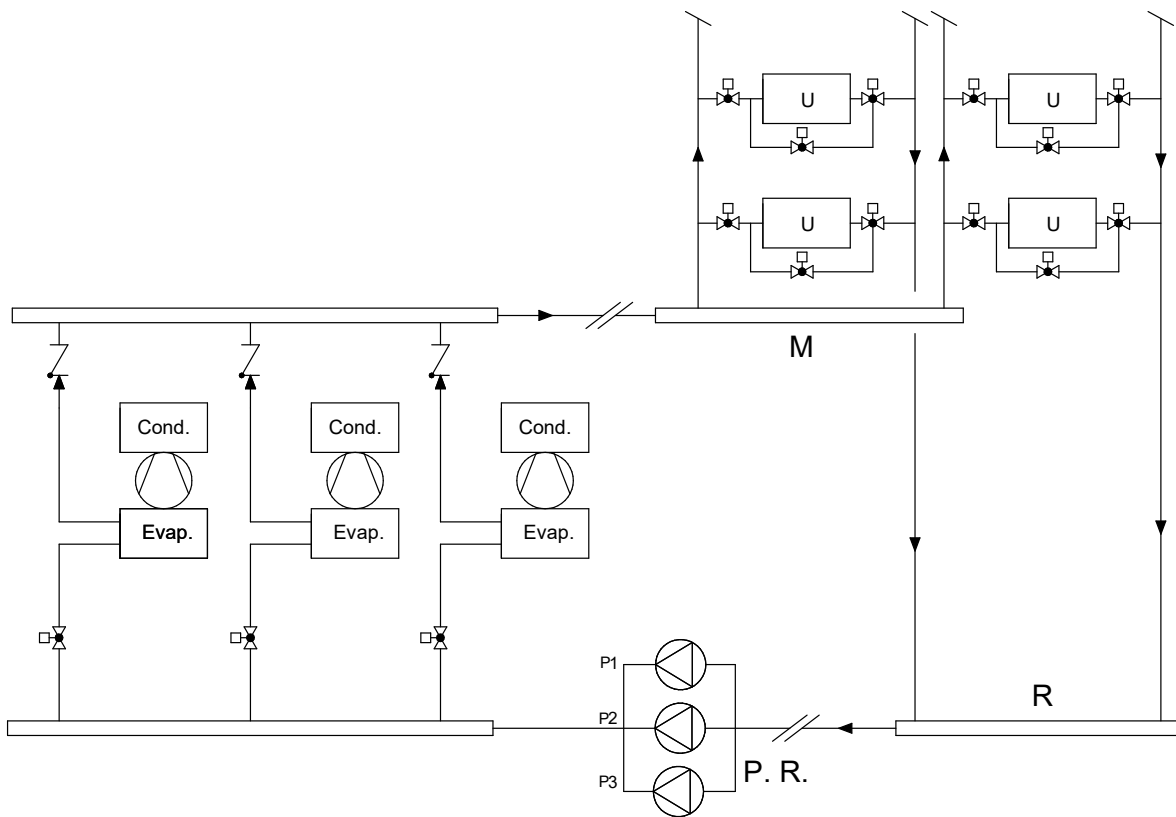
P. R. = chiller flow (constant flow)

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.



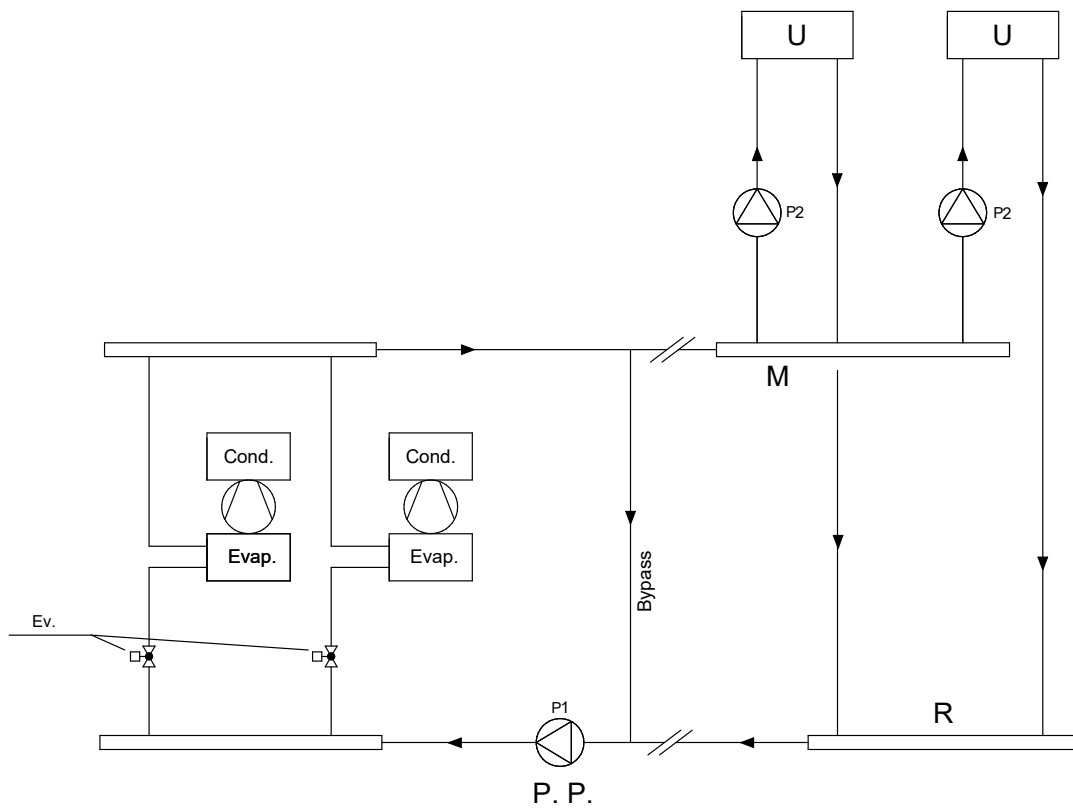
P. R. = chillers pumps (constant flow)

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.



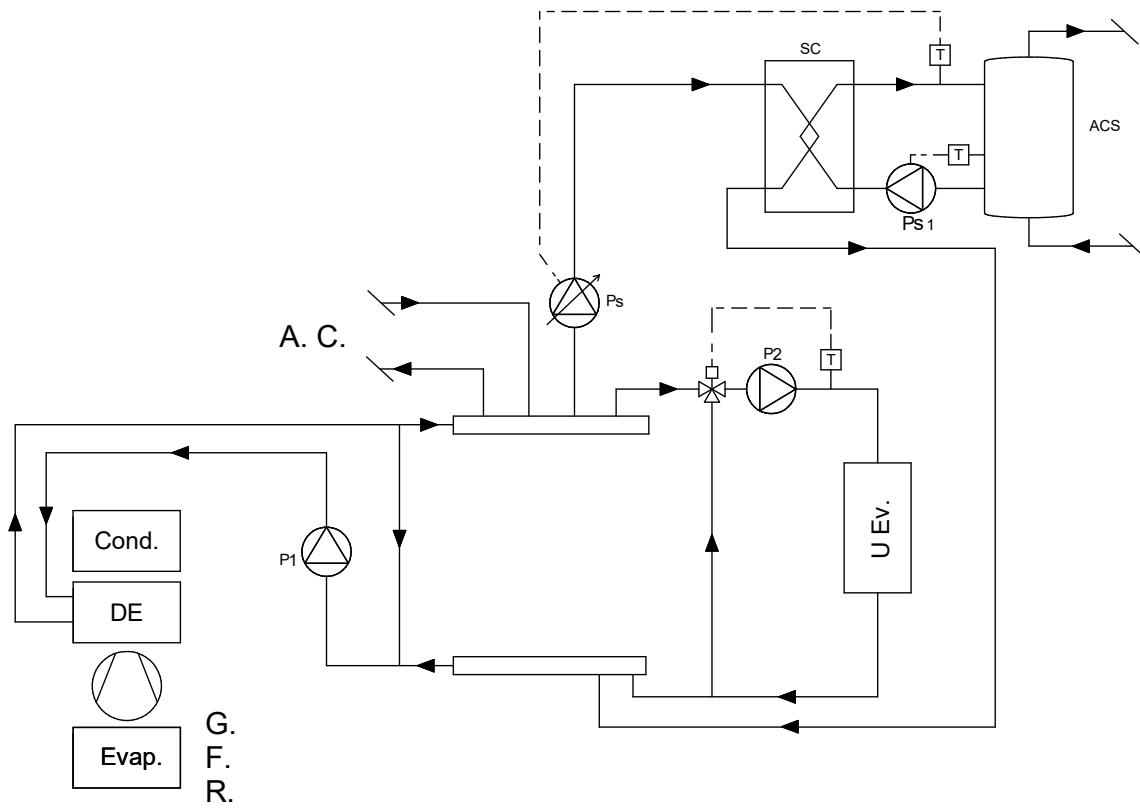
P. P. = primary pump (constant flow)

Ev. = potential

M = supply

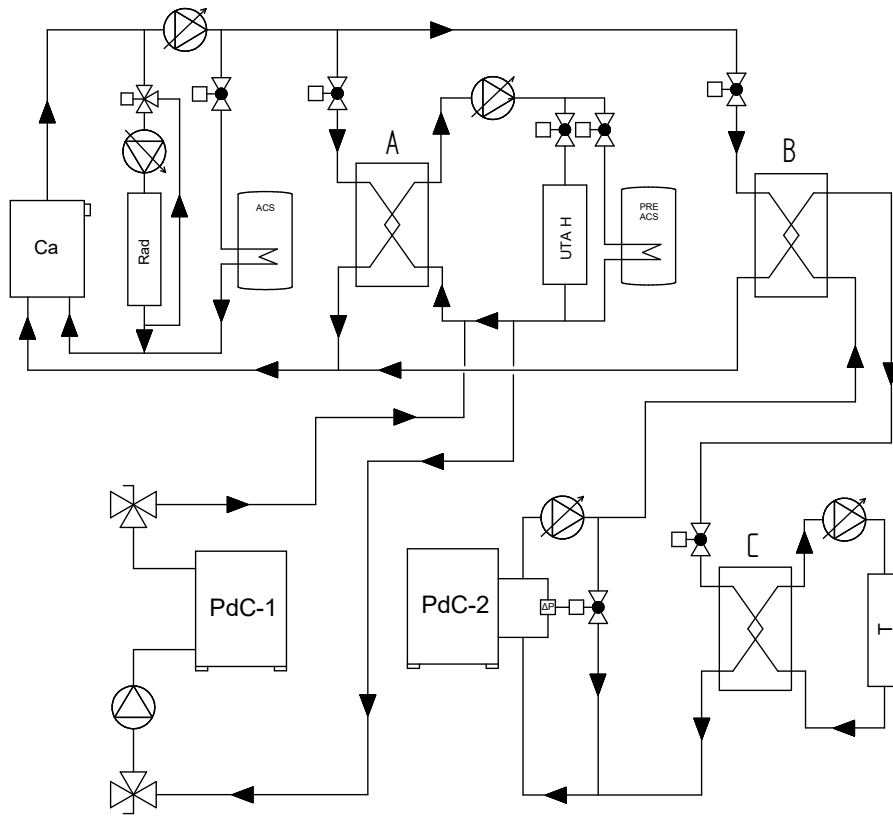
R = return

- 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.



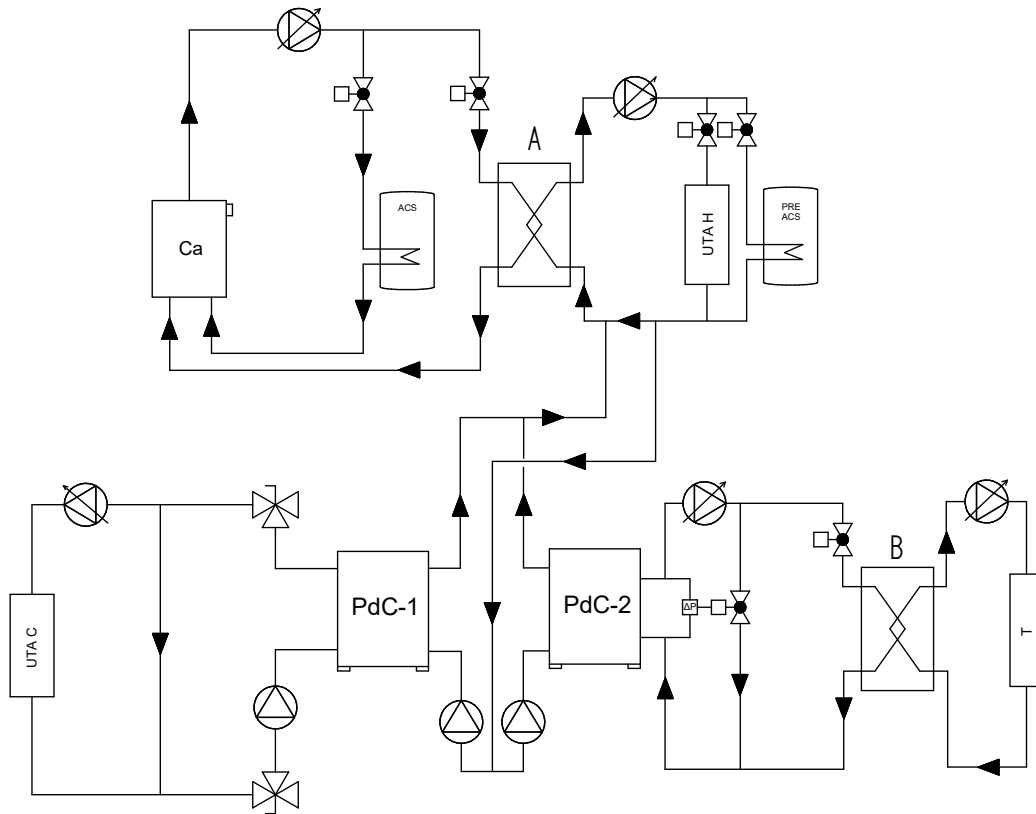
DE = desuperheater
 G. F. R. = Recovery chiller
 A. C. = to the boiler
 U Ev. = other hypothetical user sides

- With the use of the 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 Ps pump is controlled to maintain the desired set-point value at the outlet of the SC exchanger.



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.

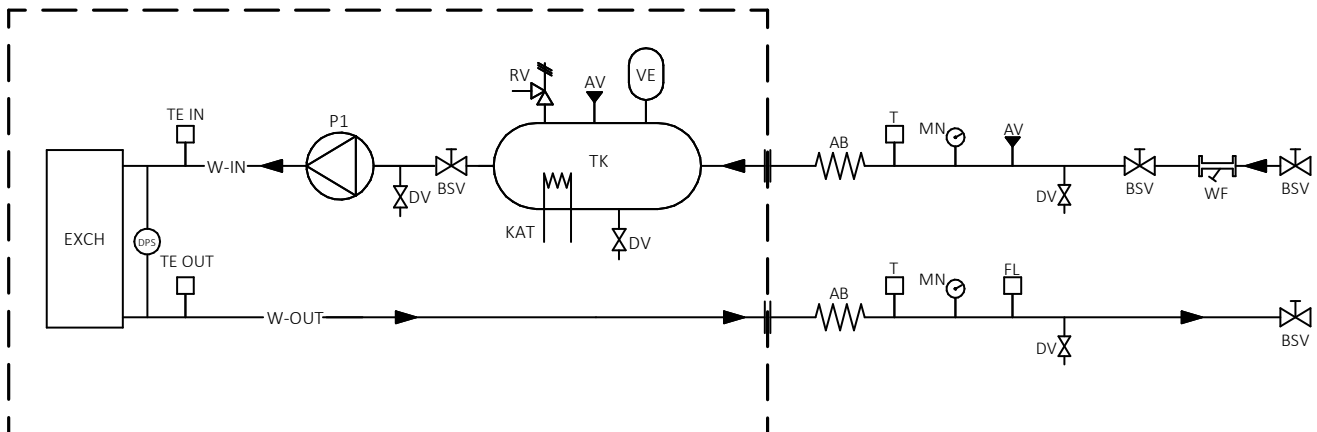


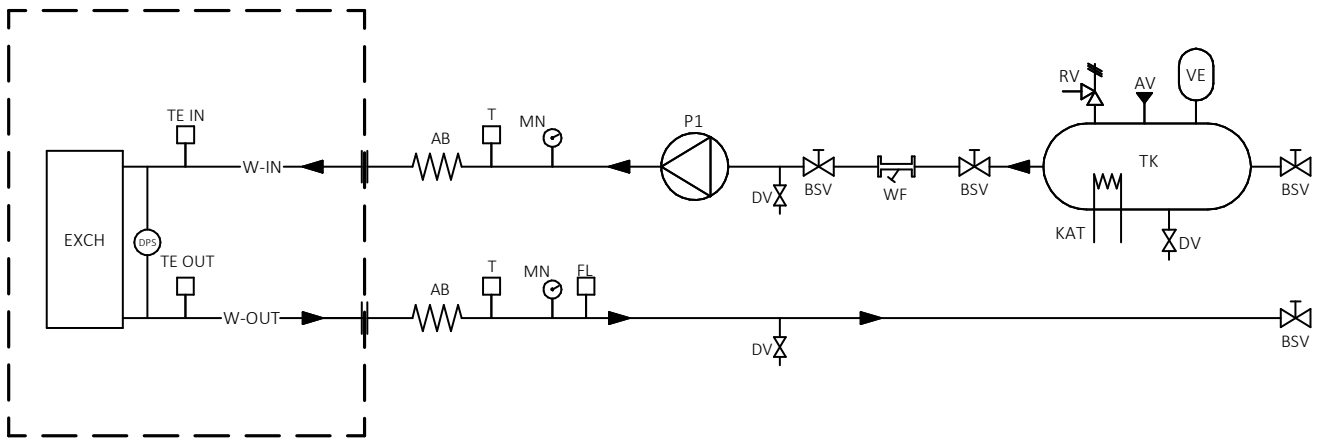
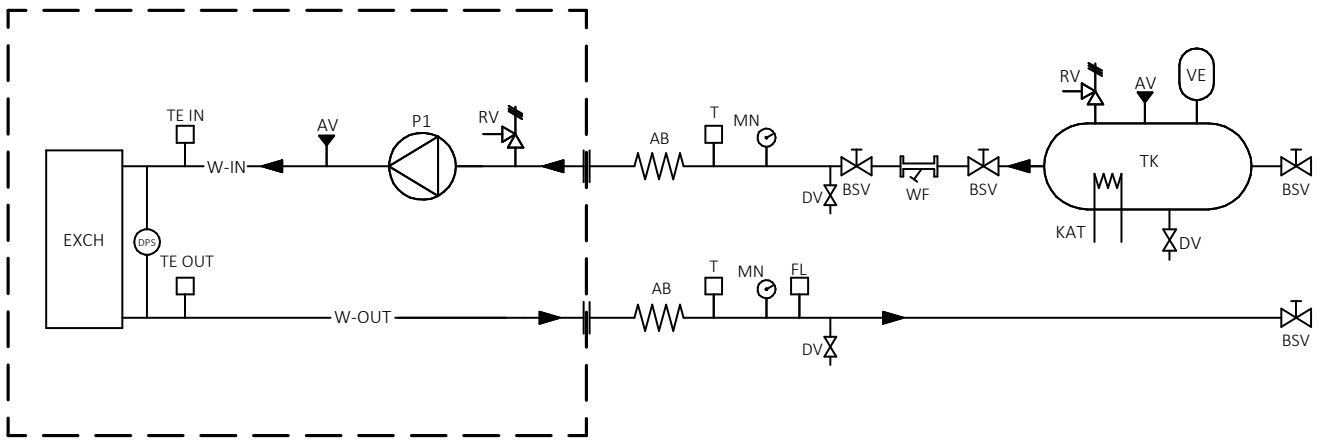
Ca = boiler
 UTA H = heating AHU
 UTA C = cooling AHU
 T = terminals

- 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 make a direct coupling between group 2 and the terminals, as these have lower summer temperature difference 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.





Legend			
EXCH	Plate heat exchanger	TK	Inertial tank
DPS	Differential pressure switch	AV	Air vent valve
T	Temperature sensor	VE	Expansion vessel
P1	Pump	MN	Manometer
DV	Discharge tap	FL	Flow switch
BSV	Interception valve	WF	Water filter
RV	Safety valve	W-IN	User water inlet
KAT	Tank electric element	W-OUT	User water outlet
TE IN	Plant inlet temperature probe	TE OUT	Plant outlet temperature probe
AB	Antivibration dampers		

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;
- glycol 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 expansions vessels	1	1	2	2	2	1	1	1	1	2	2	2
Expansion vessels volume [l]	25											

Each unit equipped with a hydronic kit without tank (PS, PSAP, PD, PDAP configurations) a safety valve with an opening pressure of 6 bar is included.

3.3.4 Minimum water content and hydraulic circuit volumes


The table shows the minimum recommended water content of the system for unit and the volume of the storage tank (if present). The volume of the hydraulic circuit is also indicated in the case of units with the pump + tank (PS/SI, PSAP/SI, PD/SI, PDAP/SI configurations). 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 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
Necessary external volume [l]	87	219	-	98	88	-	76	73	234	287	253	529

3.3.5 Condensate drain system


Any condensation that may percolate from the pipes of the hydraulic system and gas circuit, and in the heat pump versions for draining the condensation that forms during defrosting cycle, is free to fall on the unit's support surface, as there is no containment base, but the water drains directly onto the ground.

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.



ATTENTION: water (possible ice in the winter period) may be deposited on the base of the supporting structure and around the unit which could result in a slipping/falling hazard.

3.3.6 Plant load / unload



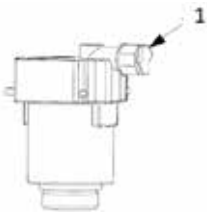
ATTENTION: supervise all loading / reintegration operations.

ATTENTION: before loading /reintegration the system, disconnect the power supply to the units.

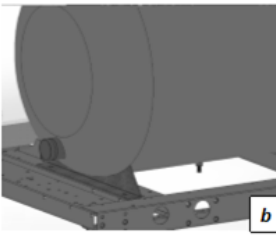
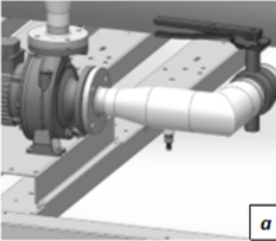
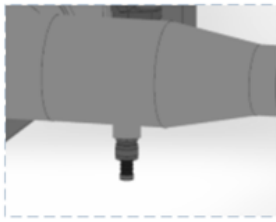
ATTENTION: the loading / reintegration of the system must always take place under controlled pressure conditions (1÷3 bar). Ensure that a pressure reducer and safety valve is installed on the filling/reintegration line.

ATTENTION: the water on the loading / reintegration line must be properly pre-filtered from any impurities and suspended particles. Make sure that a removable cartridge filter has been installed and a defangator.

ATTENTION: periodically check and vent the air that accumulates in the system.



During loading / reintegration operations, the vent valve cap must be partially unscrewed to allow air to flow freely outside the valve.
(1) vent valve tap



It is recommended to use an external tap to fill the system, which must be prepared by the installer.

Only if the unit is equipped with a hydronic kit is there a tap to be used if it is necessary to top up/download the amount of water in the system or adjust the percentage of glycol, it is possible to 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 (imm. a);
- Hydronic kit with single / double pump + tank — tap under the tank (imm. b).

To perform one of the above operations it is necessary to unscrew the cap of the service tap and connect a 14 mm pipe (internal diameter) to the hose connector connected to the water mains, then fill the system by unscrewing the ring nut. After this operation, tighten the ring nut and screw the cap back on.

If it is necessary to top up the system or adjust the glycol content, the service tap can be used. Unscrew the cap of the service tap (A) and connect a 14 or 12 mm pipe (internal diameter measurements – check the tap model installed on your unit) to the hose connector connected to the water mains, then fill the system by unscrewing the ring nut (B). After this operation, tighten the ring nut (B) again and screw the cap (A) back on. In any case, it is advisable to use an external tap to fill the system which is the responsibility of the installer.



If the unit must be completely drained, first close the manual inlet and outlet gates (not supplied) and then disconnect the pipes externally on the water inlet and outlet in order to drain the liquid contained in the unit (to make this operation easier, it is advisable to install two external drain cocks on the water inlet and outlet between the unit and the manual gates).

3.3.7 Air vent valve

The unit is equipped with an air vent valve that automatically eliminates the air accumulated inside the circuit, avoiding: undesirable effects such as premature corrosion and wear, lower efficiency and reduced exchange yield.

The device also has a safety function in that, in the event of a break in the exchanger, it allows the refrigerant gas to escape into the outside air, preventing it from being transported to the internal terminals.

It is possible to leave the valve in the closed position by closing the cap on the outlet; by loosening the cap the valve remains in the open position and the air is discharged automatically.



In case of water leakage you must replace the component, by unscrewing it with a spanner, as shown in the picture below.



4. TECHNICAL DATA

4.1 HEAT PUMP DATA SHEET

Performance referred to the following conditions, according to standard 14511:2018:

- (1) Cooling: external air temperature 35°C; inlet/outlet water temperature 12/7°C.
- (2) Cooling: external air temperature 35°C; inlet/outlet water temperature 23/18°C.
- (3) Heating: Outdoor air temperature 7°C b.s. 6°C b.u.; inlet/outlet water temperature 30/35°C.
- (4) Heating: Outdoor air temperature 7°C b.s. 6°C b.u.; inlet/outlet water temperature 40/45°C.
- (5) Cooling: inlet/outlet water temperature 7/12°C.
- (6) Cooling: Average climatic conditions; $T_{biv} = -7^{\circ}\text{C}$; inlet/outlet 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 volume indicated refers to the total required, the designer must satisfy this by considering the quantity already present inside the unit depending on the hydronic kit chosen. (control this value in the technical sheet).
- (9) Condition (1); this value is determined on the basis of measurements taken in accordance with the UNI EN ISO 9614-1
- (10) Value calculated from the sound power level using ISO 3744: 2010, referred to 10 m distance from the unit.
- (11) BT version cooling: external air temperature 35 ° C, internal exchanger water temperature = -3 / -8 ° C. Fluid treated with ethylene glycol 30%

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

Technical specifications		Unit	HWA1-A/H model					
			02109	02121	02142	02148	02160	04176
Cooling	Cooling capacity (1)	kW	103	113	132	138	148	165
	Total power input (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	151	177	188	202	224
	Total power input (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
	Cooling capacity (11)	kW	63,0	68,4	78,9	82,4	90,6	97,4
	Total power input (11)	kW	30,2	34,8	37,6	40,1	44,8	48,7
	EER (11)	W/W	2,09	1,97	2,10	2,05	2,02	2,00
Water flow (1)	l/s	4,9	5,4	6,3	6,6	7,1	7,9	
Press. drop on use-side heat exch. (1)	kPa	21,7	20,1	26,5	24,3	20,2	21,7	
Heating	Heating capacity (3)	kW	113	125	148	154	166	188
	Total power input (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	120	142	148	160	179
	Total power input (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
	Press. drop on use-side heat exch. (4)	kPa	24,2	22,9	30,6	28,4	24,0	26,6
	Water heating energy eff. 35°C/55°C	classe	A+/A+	A+/A+	A+/A+	A+/A+	A+/A+	A++/A+
Compressor	Type		SCROLL					
	Refrigerant oil (type)		Emkarate RL 32 3MAF					
	Number	Nr	2	2	2	2	2	2
	Capacity steps Std	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	1	1	1	1	2
Refrigerant	Type		R410A					
	Refrigerant charge (Circuit 1) (7)	kg	26,5	27,0	34,5	42,0	40,0	22,0
	Refrigerant charge (Circuit 2) (7)	kg	-	-	-	-	-	22,0
	Quantity of CO2 equivalent (7)	ton	55,3	56,4	72,0	87,7	83,5	91,9
	Design 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 zone fan motors	Type		ASSIALE					
	Number of fans	Nr	2	2	3	3	3	4
	Rated power (1)	kW	1,4	1,4	1,4	1,4	1,4	1,4
	Max power input	kW	3,80	3,80	5,70	5,70	5,70	7,60
	Max input current	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		PHE - 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	Max pressure on water side	bar	12	12	12	12	12	12
	Max press. on hydronic kit side (relief 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"
	Min content of water plant (8)	l	490	630	630	820	820	480
Sound levels	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	Power supply		400V/3P/50Hz					
	Max power input (no access. version)	kW	48,9	55,0	63,1	66,9	73,0	87,9
	Max curr. input (no access. version)	A	83,0	93,4	107,1	113,5	123,9	149,2
	Max start-up curr. (no access. version)	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
	Shipping net weight	kg	1180	1210	1470	1530	1530	2030
	Weight in operation	kg	1190	1220	1480	1540	1540	2040

Technical specifications		Unit	HWA1-A/H model					
			04199	04215	04237	04273	04304	04345
Cooling	Cooling capacity (1)	kW	187	208	225	260	289	325
	Total power input (1)	kW	59,4	67,2	77,5	80,6	92,9	112
	EER (1)	W/W	3,15	3,10	2,90	3,22	3,10	2,90
	Cooling capacity (2)	kW	252	282	301	351	388	434
	Total power input (2)	kW	63,8	71,6	83,2	87,0	101	122
	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
	Cooling capacity (11)	kW	111	129	140	155	177	203
	Total power input (11)	kW	54,3	60,0	69,4	72,3	84,2	99,9
	EER (11)	W/W	2,04	2,15	2,02	2,14	2,10	2,03
Water flow (1)	l/s	8,9	10,0	10,8	12,4	13,8	15,5	
Press. drop on use-side heat exch. (1)	kPa	26,5	24,7	27,2	18,8	24,9	17,9	
Heating	Heating capacity (3)	kW	207	223	246	286	316	356
	Total power input (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	214	237	273	303	344
	Total power input (4)	kW	61,5	66,0	74,0	83,8	94,7	108
	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
	Press. drop on use-side heat exch. (4)	kPa	31,9	27,6	30,5	22,9	29,1	22,3
	Water heating energy eff. 35°C/55°C	classe	A++/A+	A++/A+	A++/A+	A++/A+	A++/A+	A++/A+
Compressor	Type		SCROLL					
	Refrigerant oil (type)		Emkarate RL 32 3MAF					
	Number	Nr	4	4	4	4	4	4
	Capacity steps Std	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
Refrigerant	Type		R410A					
	Refrigerant charge (Circuit 1) (7)	kg	18,0	25,5	28,5	43,0	47,0	50,0
	Refrigerant charge (Circuit 2) (7)	kg	18,0	24,0	28,5	36,0	34,0	30,0
	Quantity of CO2 equivalent (7)	ton	75,2	103,4	119,0	165,0	169,1	167,0
	Design 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 zone fan motors	Type		ASSIALE					
	Number of fans	Nr	4	4	4	6	6	6
	Rated power (1)	kW	1,4	1,4	1,4	1,4	1,4	1,4
	Max power input	kW	7,60	7,60	7,60	11,40	11,40	11,40
	Max input current	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 type		PHE - A PIASTRE					
	Number of internal heat exchanger	Nr	1	1	1	1	1	1
Hydraulic circuit	Water content	l	11,40	11,40	15,50	15,50	22,10	22,10
	Max pressure on water side	bar	12	12	12	12	12	12
	Max press. on hydronic kit side (relief valve calibration)	bar	6	6	6	6	6	6
	Water connections		3"	3"	3"	3"	3"	3"
	Min content of water plant (8)	l	610	610	780	1020	1020	1290
Sound levels	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	57,8 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					
	Max power input (no access. version)	kW	92,8	97,8	110,0	123,8	139,8	160,1
	Max curr. input (no access. version)	A	157,6	166,0	186,8	210,2	237,4	271,8
	Max start-up curr. (no access. version)	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
	Shipping net weight	kg	2060	2100	2130	2680	2880	2900
	Weight in operation	kg	2070	2110	2140	2700	2900	2930

4.2 DATA SHEET FOR UNIT WITH DESUPERHEATER

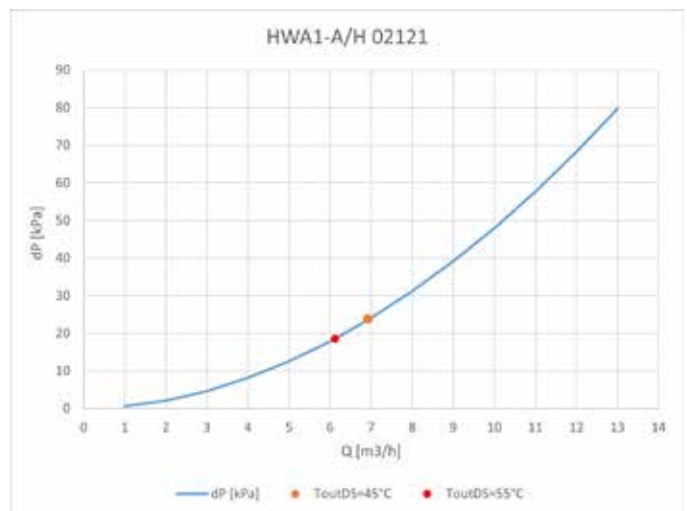
The performances are reported below under the conditions (1) of the previous technical data sheets, in the case of units equipped with a desuperheater, for water temperatures leaving the desuperheater of 45°C and 55°C, with input-output temperature difference of 5°C. The unit with this version has no 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]	Power input [kW]	EER [W/W]	Heating capacity DS [kW]	Pressure drops DS [kPa]	Cooling capacity [kW]	Power input [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

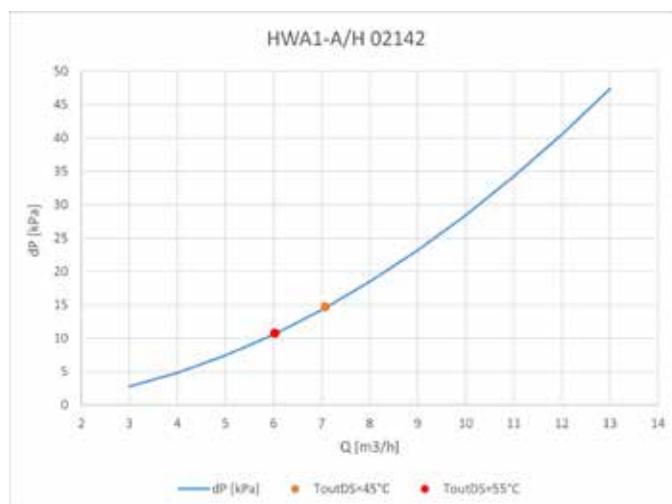
Water flow rate DS [m3/h]	Pressure drops DS [kPa]
1,0	0,62
2,0	2,14
3,0	4,68
4,0	8,16
5,0	12,57
6,0	17,88
7,0	24,09
8,0	31,18
9,0	39,16
10,0	48,01
11,0	57,72
12,0	68,30
13,0	79,73



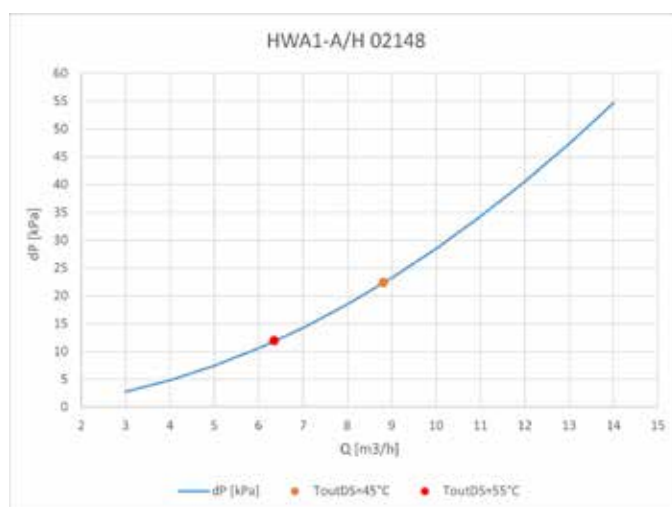
Water flow DS [m3/h]	Pressure drops DS [kPa]
1,0	0,62
2,0	2,14
3,0	4,68
4,0	8,16
5,0	12,57
6,0	17,88
7,0	24,09
8,0	31,18
9,0	39,16
10,0	48,01
11,0	57,72
12,0	68,30
13,0	79,73



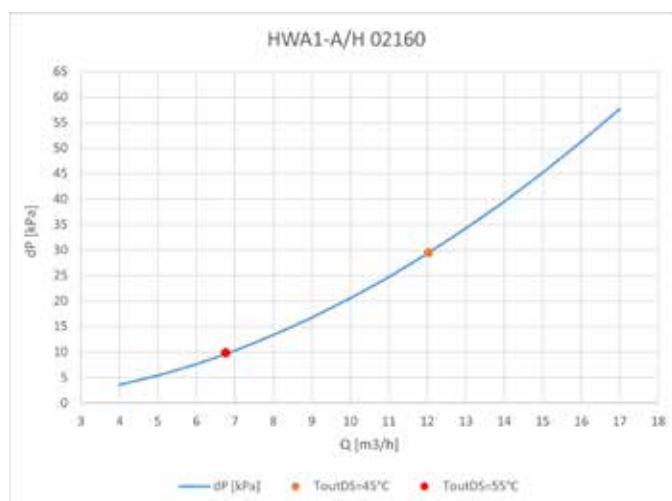
HWA1-A/H 02142	
Water flow DS [m3/h]	Pressure drops DS [kPa]
3,0	2,76
4,0	4,82
5,0	7,42
6,0	10,57
7,0	14,25
8,0	18,46
9,0	23,20
10,0	28,46
11,0	34,24
12,0	40,53
13,0	47,34



HWA1-A/H 02148	
Water flow DS [m3/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



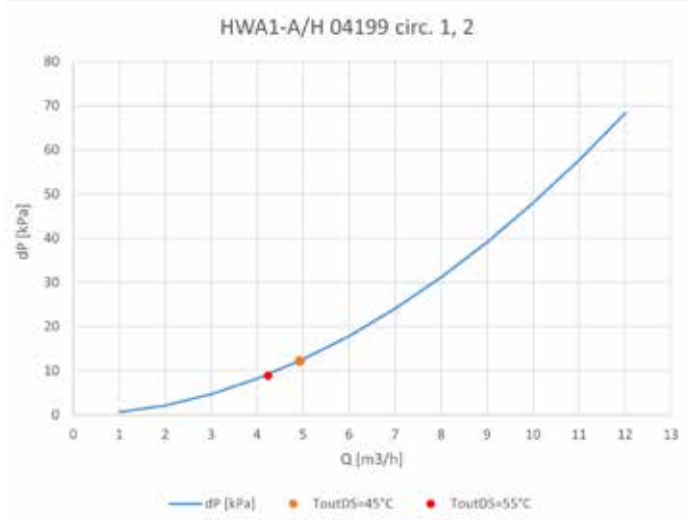
HWA1-A/H 02160	
Water flow rate DS [m3/h]	Pressure drops DS [kPa]
4,0	3,57
5,0	5,34
6,0	7,61
7,0	10,27
8,0	13,31
9,0	16,74
10,0	20,55
11,0	24,73
12,0	29,29
13,0	34,22
14,0	39,53
15,0	45,21
16,0	51,25
17,0	57,67



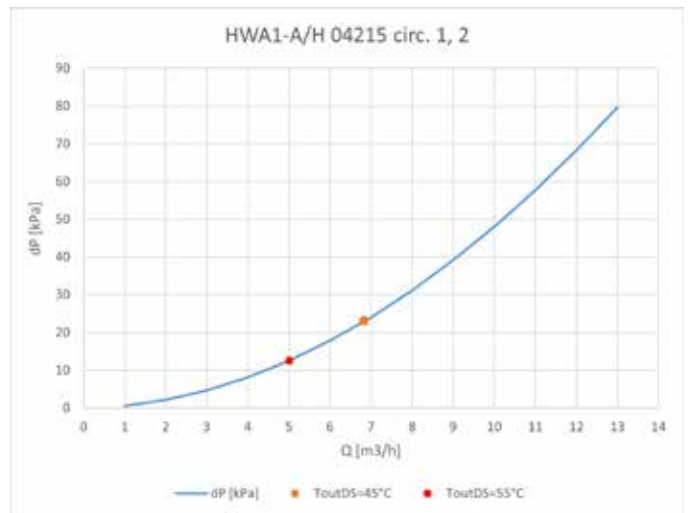
HWA1-A/H 04176 circuit 1 and 2	
Water flow rate DS [m ³ /h]	Pressure drops DS [kPa]
1,0	0,62
2,0	2,14
3,0	4,68
4,0	8,16
5,0	12,57
6,0	17,88
7,0	24,09
8,0	31,18
9,0	39,16
10,0	48,01
11,0	57,72
12,0	68,30
13,0	79,73



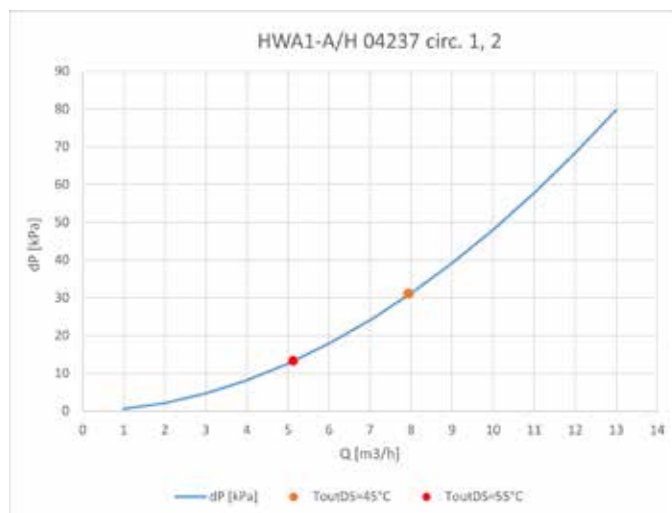
HWA1-A/H 04199 circuit 1 and 2	
Water flow rate DS [m ³ /h]	Pressure drops DS [kPa]
1,0	0,62
2,0	2,14
3,0	4,68
4,0	8,16
5,0	12,57
6,0	17,88
7,0	24,09
8,0	31,18
9,0	39,16
10,0	48,01
11,0	57,72
12,0	68,30



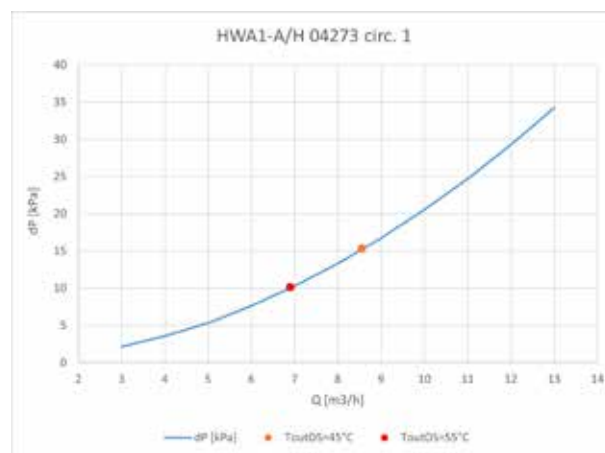
HWA1-A/H 04215 circuit 1 and 2	
Water flow rate DS [m ³ /h]	Pressure drops DS [kPa]
1,0	0,62
2,0	2,14
3,0	4,68
4,0	8,16
5,0	12,57
6,0	17,88
7,0	24,09
8,0	31,18
9,0	39,16
10,0	48,01
11,0	57,72
12,0	68,30
13,0	79,73



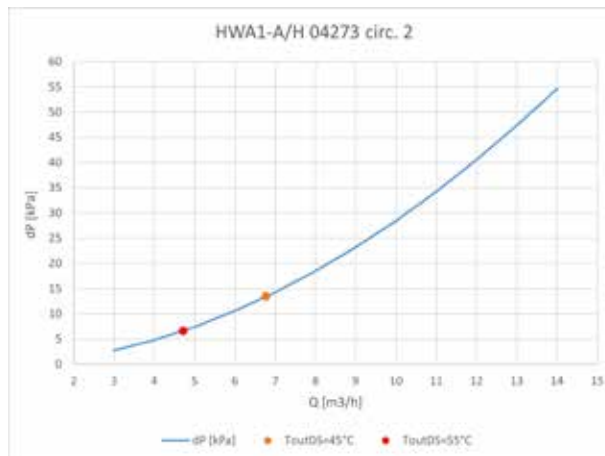
HWA1-A/H 04237 circuit 1 and 2	
Water flow rate DS [m ³ /h]	Pressure drops DS [kPa]
1,0	0,62
2,0	2,14
3,0	4,68
4,0	8,16
5,0	12,57
6,0	17,88
7,0	24,09
8,0	31,18
9,0	39,16
10,0	48,01
11,0	57,72
12,0	68,30
13,0	79,73



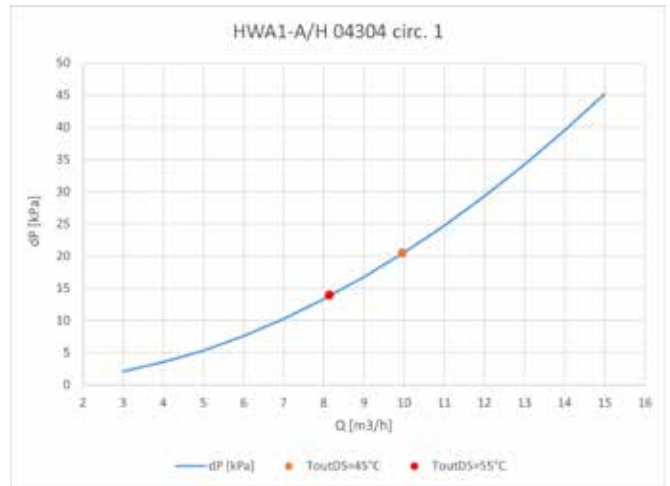
HWA1-A/H 04273 circuit 1	
Water flow rate DS [m ³ /h]	Pressure drops DS [kPa]
3,0	2,12
4,0	3,57
5,0	5,34
6,0	7,61
7,0	10,27
8,0	13,31
9,0	16,74
10,0	20,55
11,0	24,73
12,0	29,29
13,0	34,22



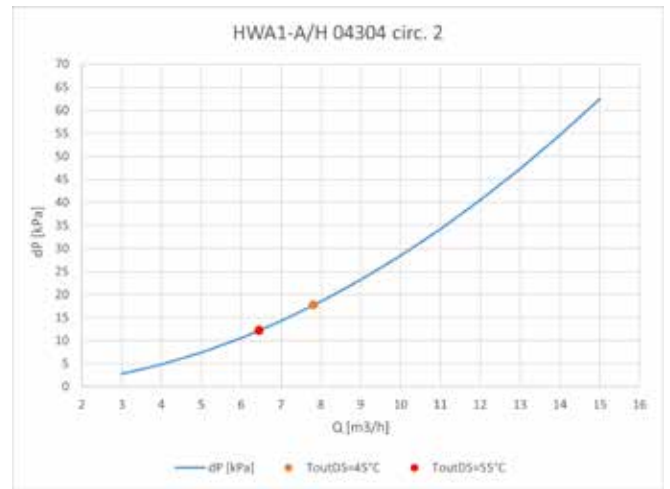
HWA1-A/H 04273 circuit 2	
Water flow rate DS [m ³ /h]	Pressure drops DS [kPa]
3,0	2,76
4,0	4,82
5,0	7,42
6,0	10,57
7,0	14,25
8,0	18,46
9,0	23,20
10,0	28,46
11,0	34,24
12,0	40,53
13,0	47,34



HWA1-A/H 04304 circuit 1	
Water flow rate DS [m3/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



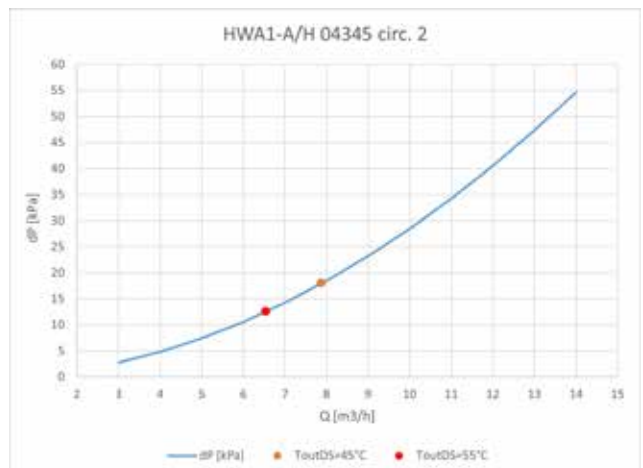
HWA1-A/H 04304 circuit 2	
Water flow rate DS [m3/h]	Pressure drops DS [kPa]
3,0	2,76
4,0	4,82
5,0	7,42
6,0	10,57
7,0	14,25
8,0	18,46
9,0	23,20
10,0	28,46
11,0	34,24
12,0	40,53
13,0	47,34
14,0	54,65



HWA1-A/H 04345 circuit 1	
Water flow rate DS [m3/h]	Pressure drops DS [kPa]
6,0	6,27
7,0	8,46
8,0	10,97
9,0	13,80
10,0	16,95
11,0	20,41
12,0	24,18
13,0	28,27
14,0	32,66
15,0	37,36
16,0	42,37



HWA1-A/H 04345 circuit 2	
Water flow rate DS [m3/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



4.3 ELECTRICAL AND AUSILIARY DATA

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

NOTE: 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.

Dimensions	Unit	HWA1-A/H model					
		02109	02121	02142	02148	02160	04176
F.L.A. Input current input at the maximum allowable conditions							
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. Fan motors	A	6,6	6,6	9,9	9,9	9,9	13,2
L.R.A. Startup current (locked 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
Whole unit							
Max power input	kW	48,9	55,0	63,1	66,9	73,0	87,9
Max current input	A	83,0	93,4	107,1	113,5	123,9	149,2
L.R.A.	A	285,6	332,3	346,0	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	HWA1-A/H model					
		04199	04215	04237	04273	04304	04345
F.L.A. Input current input at the maximum allowable conditions							
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. Fan motors	A	13,2	13,2	13,2	19,8	19,8	19,8
L.R.A. Startup current (locked 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
Whole unit							
Max power input	kW	92,8	97,8	110	124	140	160
Max current input	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	107	130

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 of the water flow rate connection factor.

Percentage of glycol	Freezing point [°C]	Yeld correction factor	Correction factor of power input	Fattore di correzione della portata d'acqua	Fattore di correzione delle perdite di carico
10%	-3,2	0,985	1	1,02	1,08
20%	-7,8	0,98	0,99	1,05	1,12

Percentage of glycol	Freezing point [°C]	Yeld correction factor	Correction factor of power input	Fattore di correzione della portata d'acqua	Fattore di correzione delle perdite di carico
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.

$m^2 \text{ } ^\circ\text{C}/\text{kW}$	Correction factor of power output	Correction factor of the power input
$0,44 \times 10^{-1}$	1,00	1,00
$0,88 \times 10^{-1}$	0,99	1,00
$1,76 \times 10^{-1}$	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	40,5 bar (± 1)
Low pressure alarm	2,5 bar
Low pressure safety valve	29,5 bar
Maximum number of restarts after low pressure alarm	3
Antifreeze protection kit (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.

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 input in cooling	1,0106	1,0235	1,0386	1,0560

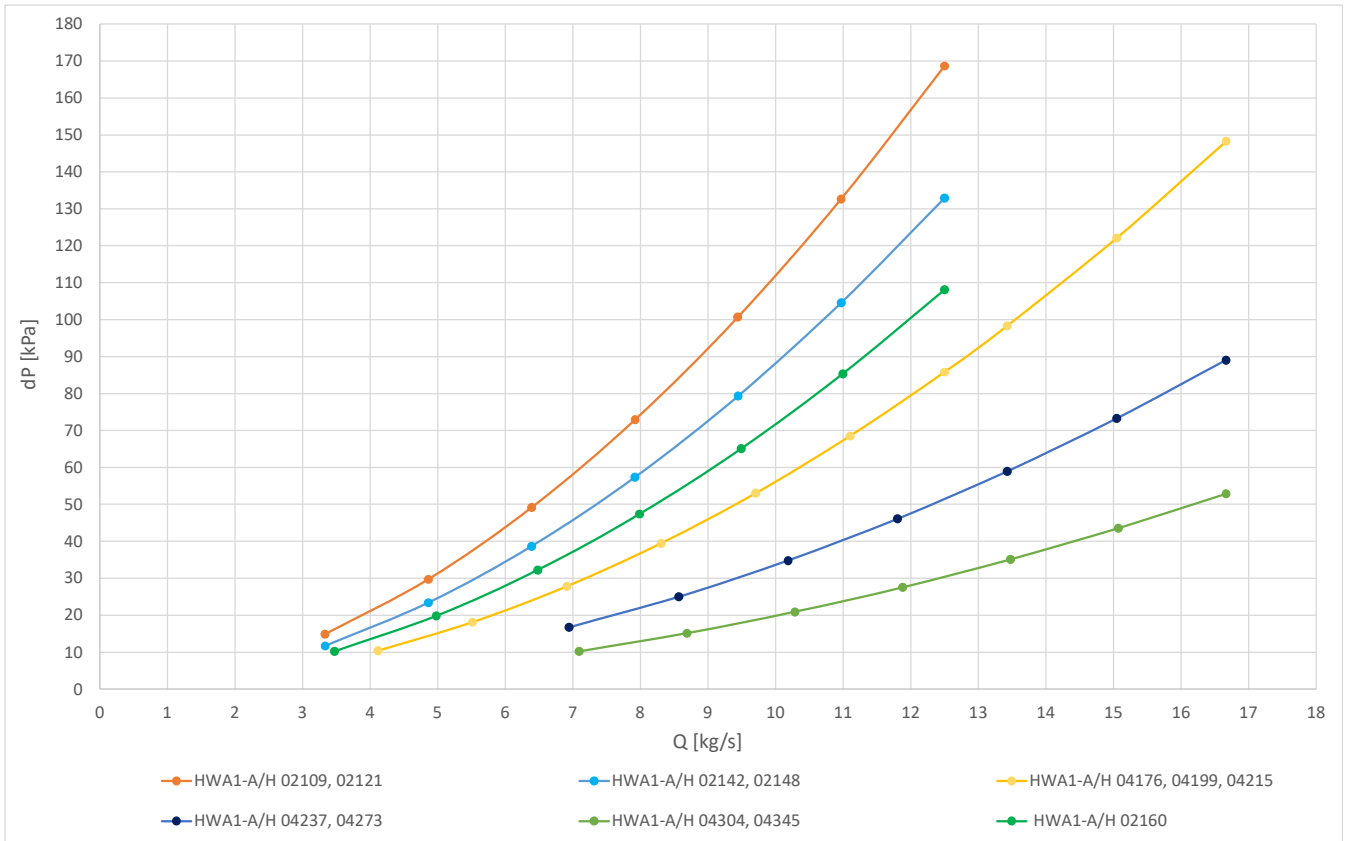
6. HYDRONIC GROUP DATA

6.1 PRESSURE DROPS

The pressure drops of the heat exchangers on the user side according to the flow rate are shown, both for water and 30% ethylene glycol. Note: Flow rates are expressed in kg/s in order to correctly compare the two fluids, which have different densities.

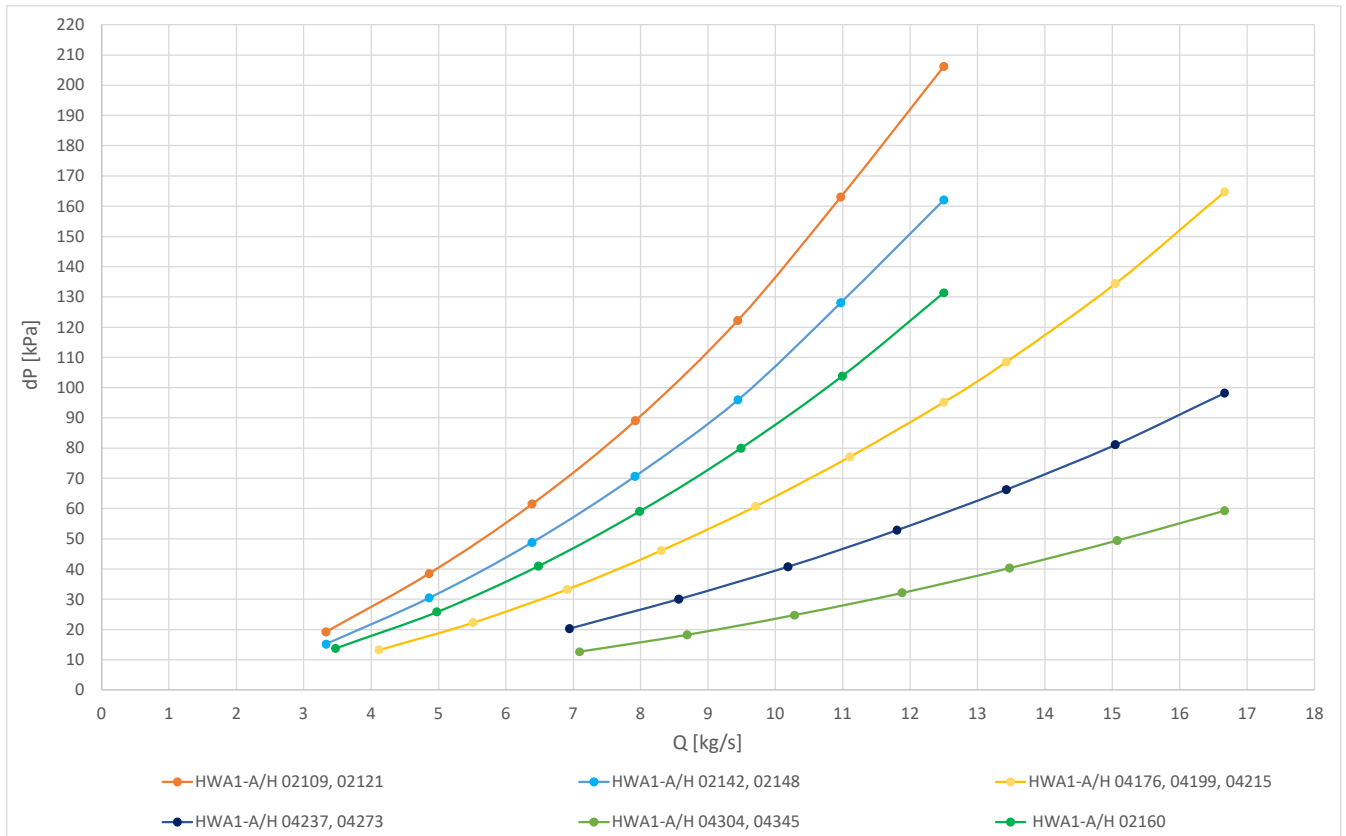
	Flow [kg/s]	Water pressure drops [kPa]	Water + 30% ethylene glycol pressure drops [kPa]
HWA1-A/H 02109, 02121	3,3	14,8	19,2
	4,9	29,7	38,5
	6,4	49,2	61,5
	7,9	72,9	89,1
	9,4	100,7	122,2
	11,0	132,7	163,1
	12,5	168,7	206,2
HWA1-A/H 02142, 02148	3,3	11,7	15,2
	4,9	23,4	30,5
	6,4	38,7	48,8
	7,9	57,4	70,7
	9,4	79,4	96,0
	11,0	104,6	128,1
	12,5	132,9	162,0
HWA1-A/H 02160	3,5	10,2	13,8
	5,0	19,8	25,8
	6,5	32,3	41,0
	8,0	47,4	59,1
	9,5	65,1	80,0
	11,0	85,4	103,8
	12,5	108,1	131,4
HWA1-A/H 04176, 04199, 04215	4,1	10,4	13,3
	5,5	18,1	22,3
	6,9	27,8	33,2
	8,3	39,5	46,1
	9,7	53,1	60,7
	11,1	68,5	77,1
	12,5	85,8	95,2
	13,4	98,3	108,5
	15,0	122,1	134,4
	16,7	148,3	164,8
HWA1-A/H 04237, 04273	6,9	16,8	20,3
	8,6	25,0	30,1
	10,2	34,8	40,8
	11,8	46,1	52,8
	13,4	58,9	66,3
	15,0	73,3	81,1
	16,7	89,1	98,2
HWA1-A/H 04304, 04345	7,1	10,2	12,7
	8,7	15,1	18,3
	10,3	20,9	24,8
	11,9	27,6	32,1
	13,5	35,1	40,4
	15,1	43,6	49,4
	16,7	52,8	59,3

Carrier fluid = water



dP = pressure drop on user side of the plate heat exchanger
 Q = water flow rate

Carrier fluid = water + 30% ethylene glycol

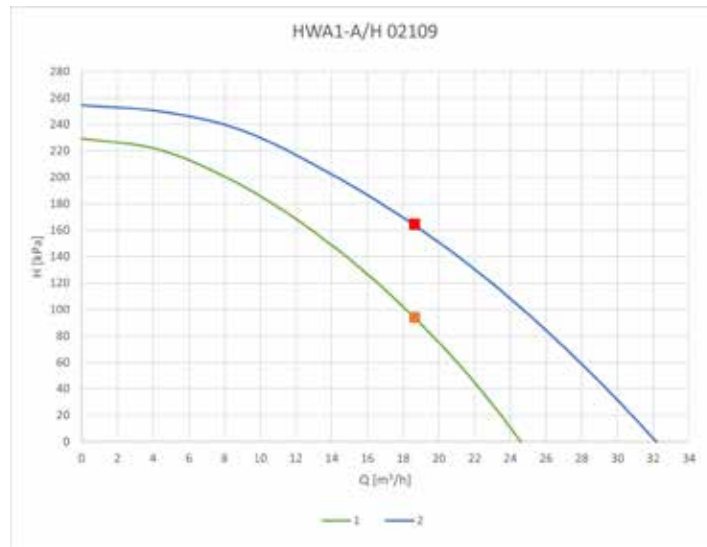


dP = pressure drop on user side of the plate heat exchanger
 Q = water + 30% ethylene glycol flow rate

6.2 USEFUL HEAD FOR WATER AS CARRIER FLUID

the head-flow characteristic curves net of the pressure drops of the hydronic kit with the pump 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. Data are referred to water as carrier fluid.

HWA1-A/H 02109			
Standard pressure pump		High pressure pump	
Flow rate [m ³ /h]	Useful head [kPa]	Flow rate [m ³ /h]	Useful head [kPa]
0,0	229,5	0,0	254,7
4,4	220,5	4,4	249,8
8,9	194,4	8,9	236,0
13,3	155,6	13,3	207,3
17,8	105,0	17,8	171,5



HWA1-A/H 02121			
Standard pressure pump		High pressure pump	
Flow rate [m ³ /h]	Useful head [kPa]	Flow rate [m ³ /h]	Useful head [kPa]
0,0	178,1	0,0	254,7
4,4	172,0	4,4	249,8
8,9	156,3	8,9	236,0
13,3	128,7	13,3	207,3
17,8	93,3	17,8	171,5
22,2	49,9	22,2	128,1



HWA1-A/H 02142			
Standard pressure pump		High pressure pump	
Flow rate [m ³ /h]	Useful head [kPa]	Flow rate [m ³ /h]	Useful head [kPa]
0,0	241,0	0,0	254,7
5,0	232,5	5,0	249,0
10,0	210,2	10,0	231,7
15,0	178,7	15,0	199,4
20,0	137,7	20,0	158,9
25,0	87,0	25,0	108,7
30,0	26,7	30,0	48,3



HWA1-A/H 02148			
Standard pressure pump		High pressure pump	
Flow rate [m ³ /h]	Useful head [kPa]	Flow rate [m ³ /h]	Useful head [kPa]
0,0	241,0	0,0	304,0
5,6	231,2	5,6	295,6
11,1	206,0	11,1	271,5
16,7	170,6	16,7	232,8
22,2	124,6	22,2	184,3
27,8	67,4	27,8	125,9
33,3	0,1	33,3	58,4



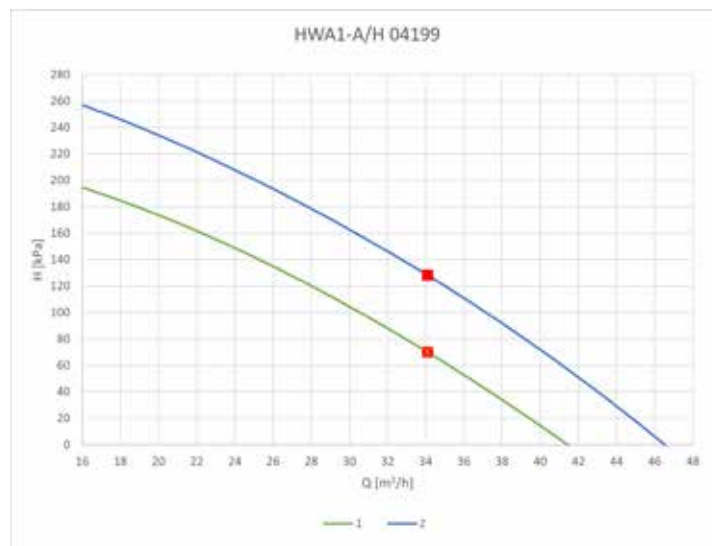
HWA1-A/H 02160			
Standard pressure pump		High pressure pump	
Flow rate [m ³ /h]	Useful head [kPa]	Flow rate [m ³ /h]	Useful head [kPa]
0,0	241,0	0,0	304,0
5,0	234,1	5,0	298,5
10,0	216,5	10,0	282,7
15,0	192,6	15,0	255,7
20,0	162,0	20,0	222,5
25,0	124,5	25,0	183,3
30,0	80,1	30,0	138,5
35,0	29,4	35,0	87,7



HWA1-A/H 04176			
Standard pressure pump		High pressure pump	
Flow rate [m ³ /h]	Useful head [kPa]	Flow rate [m ³ /h]	Useful head [kPa]
15,0	200,7	15,0	262,6
18,9	180,6	18,9	240,9
22,8	156,7	22,8	216,2
26,7	130,0	26,7	188,6
30,6	99,9	30,6	158,2
34,4	66,9	34,4	125,1
38,3	30,7	38,3	88,6



HWA1-A/H 04199			
Standard pressure pump		High pressure pump	
Flow rate [m ³ /h]	Useful head [kPa]	Flow rate [m ³ /h]	Useful head [kPa]
15,0	199,5	15,0	262,6
18,9	179,9	18,9	240,9
22,8	156,7	22,8	216,2
26,7	130,0	26,7	188,6
30,6	99,9	30,6	158,2
34,4	66,9	34,4	125,1
38,3	30,7	38,3	88,6



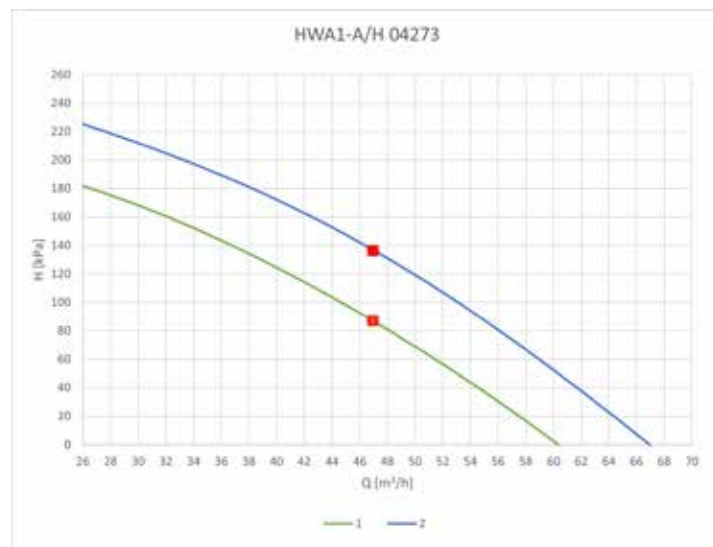
HWA1-A/H 04215			
Standard pressure pump		High pressure pump	
Flow rate [m ³ /h]	Useful head [kPa]	Flow rate [m ³ /h]	Useful head [kPa]
25,0	124,5	25,0	203,4
28,9	102,1	28,9	182,3
32,8	76,0	32,8	159,2
36,7	46,7	36,7	133,4
40,6	14,5	40,6	104,8



HWA1-A/H 04237			
Standard pressure pump		High pressure pump	
Flow rate [m ³ /h]	Useful head [kPa]	Flow rate [m ³ /h]	Useful head [kPa]
15,0	164,5	15,0	256,2
21,1	150,7	21,1	231,0
27,2	125,4	27,2	204,8
33,3	91,4	33,3	175,1
39,4	50,7	39,4	140,1
45,6	4,3	45,6	98,2



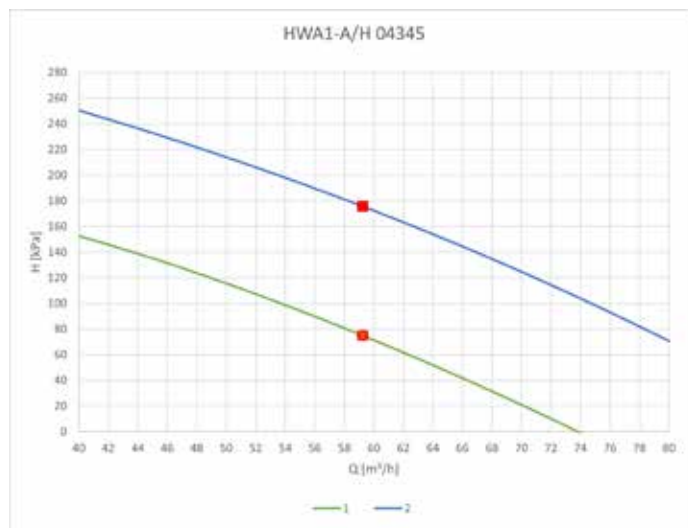
HWA1-A/H 04273			
Standard pressure pump		High pressure pump	
Flow rate [m ³ /h]	Useful head [kPa]	Flow rate [m ³ /h]	Useful head [kPa]
25,0	185,0	25,0	228,6
30,0	168,2	30,0	212,0
35,0	147,9	35,0	193,5
40,0	124,4	40,0	172,3
45,0	98,1	45,0	147,6
50,0	69,0	50,0	119,4
55,0	37,2	55,0	87,6
60,0	2,6	60,0	52,6



HWA1-A/H 04304			
Standard pressure pump		High pressure pump	
Flow rate [m ³ /h]	Useful head [kPa]	Flow rate [m ³ /h]	Useful head [kPa]
20,0	202,3	20,0	307,3
26,1	189,2	26,1	292,5
32,2	170,8	32,2	275,0
38,3	148,2	38,3	253,7
44,4	121,8	44,4	227,9
50,6	91,8	50,6	197,4
56,7	58,5	56,7	162,3
62,8	21,5	62,8	123,0



HWA1-A/H 04345			
Standard pressure pump		High pressure pump	
Flow rate [m ³ /h]	Useful head [kPa]	Flow rate [m ³ /h]	Useful head [kPa]
40,0	152,8	40,0	250,5
45,0	135,3	45,0	232,8
50,0	115,8	50,0	214,0
55,0	94,4	55,0	193,8
60,0	71,5	60,0	172,3
65,0	47,0	65,0	149,3
70,0	21,1	70,0	124,7
75,0	-6,3	75,0	98,6



6.3 USEFUL HEAD FOR WATER + 30% ETHYLENE GLYCOL AS CARRIER FLUID

The following are the characteristic curves of the power H - rate Q net of load losses of the hydronic kit with pump at maximum speed. Curve 1 refers to standard pressure pump, curve 2 to high pressure pump.

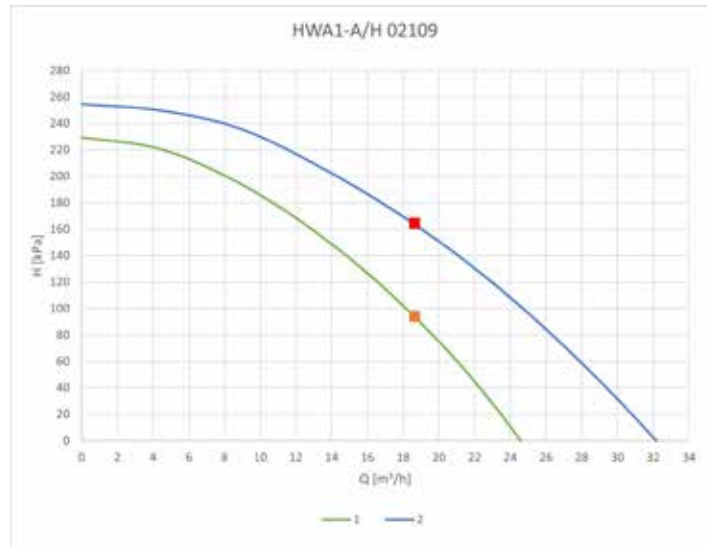
On each curve is highlighted the minimum possible working point with BT configuration (T_{out}=-8°C).

Refer to these curves also in case of standard units working with glycol (maximum percentage 30%) in T_{out} higher than 4°C.



ATTENTION: In this case it is necessary to carefully evaluate the volumetric flow rate of the working point and verify the resulting pressure. In most cases only the high pressure pump (hydronic kit /PSAP, /PDAD, /PSAP/SI, /PDAP/SI) satisfy the needs.

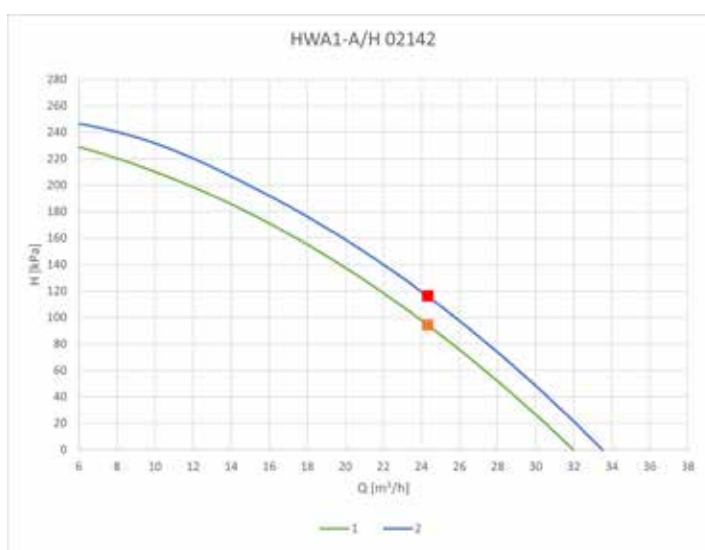
HWA1-A/H 02109			
Standard pressure pump		High pressure pump	
Flow rate [m3/h]	Useful head [kPa]	Flow rate [m3/h]	Useful head [kPa]
0,0	229,5	0,0	254,7
4,4	218,8	4,4	248,1
8,9	190,0	8,9	231,7
13,3	147,3	13,3	198,9
17,8	91,7	17,8	158,2
22,2	22,3	22,2	109,2



HWA1-A/H 02121			
Standard pressure pump		High pressure pump	
Flow rate [m ³ /h]	Useful head [kPa]	Flow rate [m ³ /h]	Useful head [kPa]
0,0	178,1	0,0	254,7
4,4	170,3	4,4	248,1
8,9	151,2	8,9	229,5
13,3	121,2	13,3	199,7
17,8	80,9	17,8	159,4
22,2	31,6	22,2	110,1



HWA1-A/H 02142			
Standard pressure pump		High pressure pump	
Flow rate [m ³ /h]	Useful head [kPa]	Flow rate [m ³ /h]	Useful head [kPa]
0,0	241,0	0,0	254,7
5,0	231,8	5,0	248,3
10,0	208,1	10,0	229,6
15,0	174,9	15,0	195,6
20,0	131,2	20,0	152,4
25,0	77,1	25,0	98,8
30,0	12,8	30,0	34,5



HWA1-A/H 02148			
Standard pressure pump		High pressure pump	
Flow rate [m ³ /h]	Useful head [kPa]	Flow rate [m ³ /h]	Useful head [kPa]
0,0	241,0	0,0	304,0
5,6	229,3	5,6	293,7
11,1	200,9	11,1	266,4
16,7	160,7	16,7	222,9
22,2	108,9	22,2	168,6
27,8	45,0	27,8	103,4



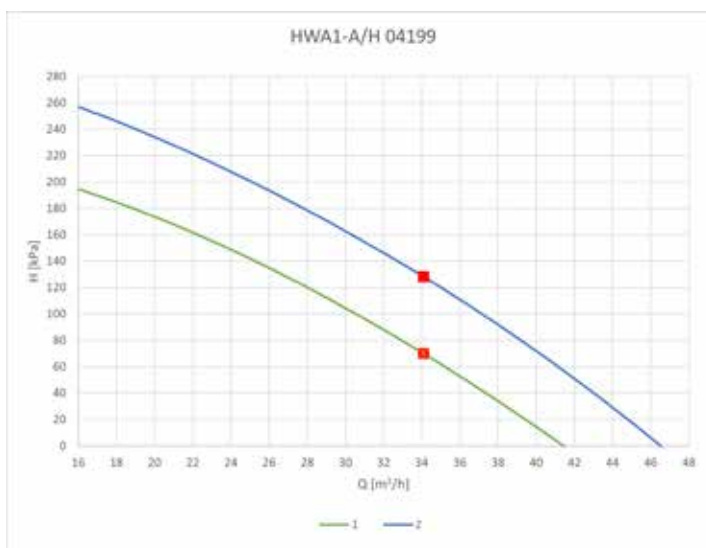
HWA1-A/H 02160			
Standard pressure pump		High pressure pump	
Flow rate [m ³ /h]	Useful head [kPa]	Flow rate [m ³ /h]	Useful head [kPa]
0,0	241,0	0,0	304,0
5,0	232,5	5,0	297,0
10,0	213,0	10,0	279,2
15,0	185,9	15,0	249,0
20,0	151,4	20,0	211,9
25,0	109,5	25,0	168,3
30,0	60,1	30,0	118,4
35,0	3,9	35,0	62,1



HWA1-A/H 04176			
Standard pressure pump		High pressure pump	
Flow rate [m ³ /h]	Useful head [kPa]	Flow rate [m ³ /h]	Useful head [kPa]
0,0	241,0	0,0	304,0
5,0	233,8	5,0	298,3
10,0	218,7	10,0	282,6
15,0	196,1	15,0	258,3
20,0	167,2	20,0	227,7
25,0	132,8	25,0	191,8
30,0	93,1	30,0	151,1
35,0	48,1	35,0	105,4



HWA1-A/H 04199			
Standard pressure pump		High pressure pump	
Flow rate [m ³ /h]	Useful head [kPa]	Flow rate [m ³ /h]	Useful head [kPa]
0,0	241,0	0,0	304,0
5,0	233,8	5,0	298,3
10,0	218,7	10,0	282,6
15,0	196,1	15,0	258,3
20,0	167,2	20,0	227,7
25,0	132,8	25,0	191,8
30,0	93,1	30,0	151,1
35,0	48,1	35,0	105,4



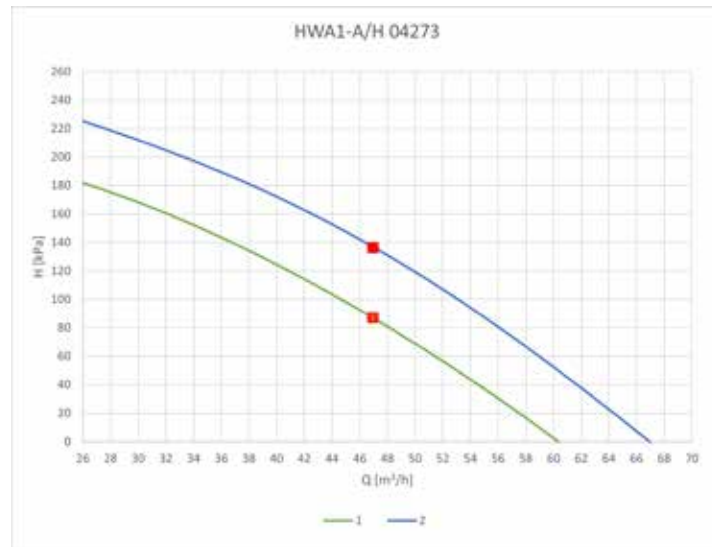
HWA1-A/H 04215			
Standard pressure pump		High pressure pump	
Flow rate [m ³ /h]	Useful head [kPa]	Flow rate [m ³ /h]	Useful head [kPa]
0,0	191,2	0,0	259,9
5,6	188,2	5,6	254,8
11,1	177,2	11,1	244,8
16,7	157,9	16,7	228,6
22,2	131,5	22,2	206,4
27,8	98,0	27,8	177,6
33,3	58,1	33,3	142,5
38,9	11,8	38,9	100,5



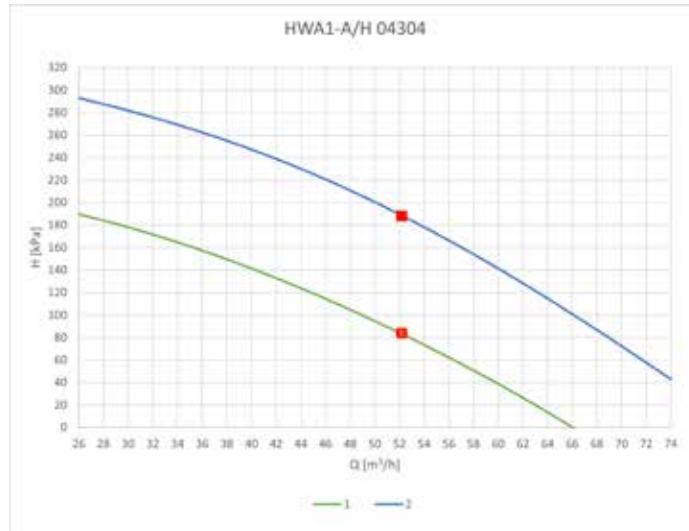
HWA1-A/H 04237			
Standard pressure pump		High pressure pump	
Flow rate [m ³ /h]	Useful head [kPa]	Flow rate [m ³ /h]	Useful head [kPa]
0,0	191,2	0,0	259,9
5,6	189,2	5,6	255,8
11,1	180,7	11,1	248,3
16,7	165,0	16,7	235,6
22,2	143,1	22,2	218,0
27,8	115,1	27,8	194,8
33,3	81,7	33,3	166,1
38,9	42,7	38,9	131,4



HWA1-A/H 04273			
Standard pressure pump		High pressure pump	
Flow rate [m ³ /h]	Useful head [kPa]	Flow rate [m ³ /h]	Useful head [kPa]
10,0	213,4	10,0	252,5
14,4	206,5	14,4	246,2
18,9	196,9	18,9	237,6
23,3	184,7	23,3	226,6
27,8	169,5	27,8	212,8
32,2	151,6	32,2	196,6
36,7	130,7	36,7	177,3
41,1	107,2	41,1	155,4
45,6	81,0	45,6	130,6
50,0	52,7	50,0	103,3



HWA1-A/H 04304			
Standard pressure pump		High pressure pump	
Flow rate [m ³ /h]	Useful head [kPa]	Flow rate [m ³ /h]	Useful head [kPa]
10,0	208,5	10,0	318,4
15,6	206,1	15,6	311,7
21,1	197,3	21,1	301,4
26,7	183,3	26,7	287,6
32,2	165,1	32,2	270,2
37,8	143,0	37,8	249,1
43,3	117,9	43,3	224,3
48,9	89,6	48,9	195,7
54,4	58,6	54,4	163,6
60,0	24,4	60,0	127,8



HWA1-A/H 04345			
Standard pressure pump		High pressure pump	
Flow rate [m ³ /h]	Useful head [kPa]	Flow rate [m ³ /h]	Useful head [kPa]
20,0	196,5	20,0	292,2
24,4	188,7	24,4	283,9
28,9	178,5	28,9	273,7
33,3	166,3	33,3	261,8
37,8	152,1	37,8	248,2
42,2	136,2	42,2	233,2
46,7	118,6	46,7	216,5
51,1	99,6	51,1	198,6
55,6	79,0	55,6	179,0
60,0	57,2	60,0	158,3



6.4 PUMP ABSORPTION

The pumps nominal absorptions are shown below.

HWA1-A/H		02109	02121	02142	02148	02160	04176	04199	04215	04237	04273	04304	04345
Standard pressure pump	kW	1,72	1,72	2,55	2,55	2,55	2,55	2,55	2,55	2,55	3,44	3,44	4,56
	A	3,8	3,8	3,8	4,7	3,8	4,7	4,7	4,7	4,7	6,4	6,4	8,7
High pressure pump	kW	3,44	3,44	3,44	3,44	3,44	3,44	3,44	4,52	4,52	4,52	6,09	8,26
	A	6,4	6,4	6,4	6,4	6,4	6,4	6,4	8,7	8,7	8,7	10,6	13,6

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 b.s. (b.u.) 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 describe 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 POWER AND SOUND PRESSURES STANDARD VERSION

Model HWA1-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

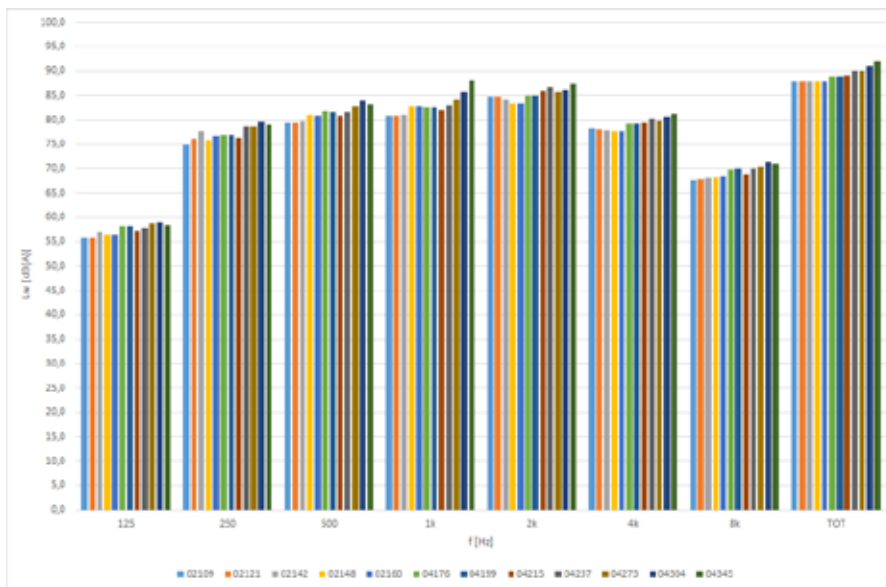
7.2 POWER AND SOUND PRESSURES SILENCED VERSION SL

Model HWA1-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	55,8	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

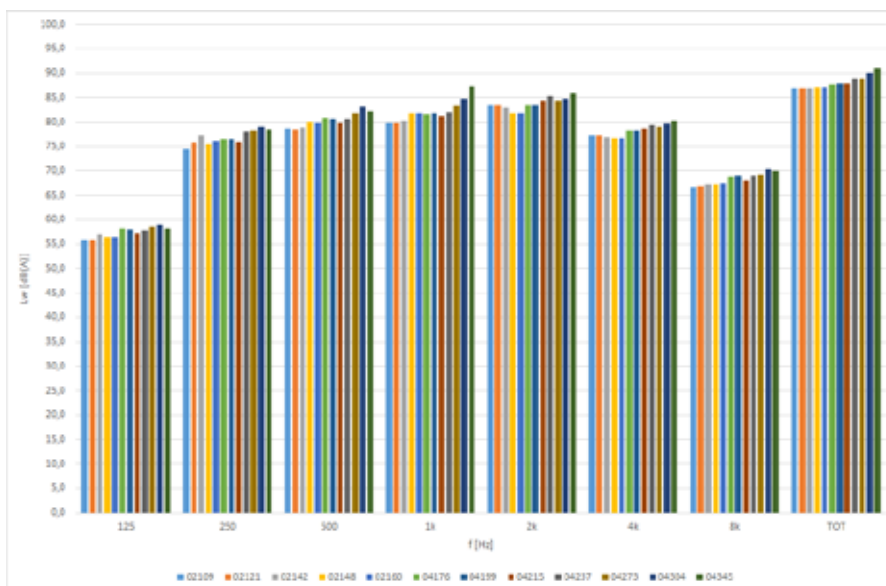
7.3 POWER AND SOUND PRESSURES SILENCED VERSION SSL

Model HWA1-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

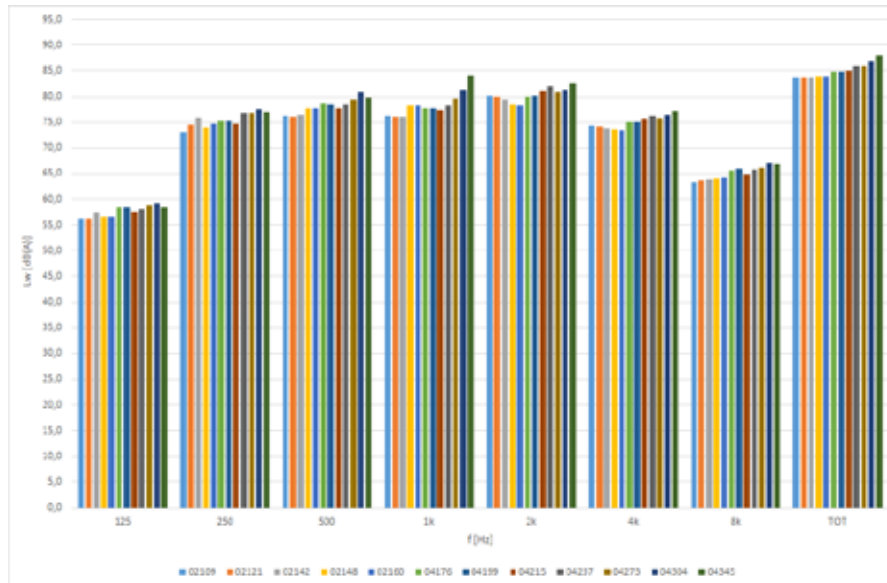
HWA1-A/H Standard version



HWA1-A/H Silenced version



HWA1-A/H super silenced version



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 while the minimum is the one with a temperature difference of 8°C at nominal conditions as stated in the data sheet.

For greater precision, we enclose below 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 safety device 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).

HWA1-A/H model	02109	02121	02142	02148	02160	04176	04199	04215	04237	04273	04304	04345
Minimum water flow to be assured in chiller mode (condition (1) technical sheet) [l/s]	3,1	3,4	3,9	4,1	4,4	4,9	5,6	6,2	6,7	7,8	8,6	9,7
Maximum water flow to be assured in chiller mode (condition (1) technical sheet) [l/s]	8,2	9,0	10,5	11,0	11,8	13,2	14,9	16,6	17,9	20,7	23,0	25,8
Minimum safety device water flow rate* [l/s]	1,72	1,72	1,96	1,96	2,20	2,62	2,62	2,62	3,44	3,44	4,55	4,55
Maximum safety device water flow rate* [l/s]	1,85	1,85	2,11	2,11	2,36	2,81	2,81	2,81	3,69	3,69	4,89	4,89

* When the flow rate falls below the indicated limit (safety device intervention flow rate – decreasing flow) the safety device signals an alarm, which can only be reset when the safety device intervention flow rate - increasing flow- is reached.

As a first approximation, for units equipped with an on-board pump, and in the absence of other detection systems, the correct flow rate to guarantee the best performance of the unit can be verified, in correspondence with the maximum speeds of the pump, by checking with the pressure gauges the difference in pressure between the return and delivery of the water on the hydraulic connections installed outside the unit and making sure that this value is equal to or less than the useful head indicated on the curves shown in the technical bulletin for the respective models and if necessary modifying the settings regarding the circulator which can be viewed in the MCO manual.

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.

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.

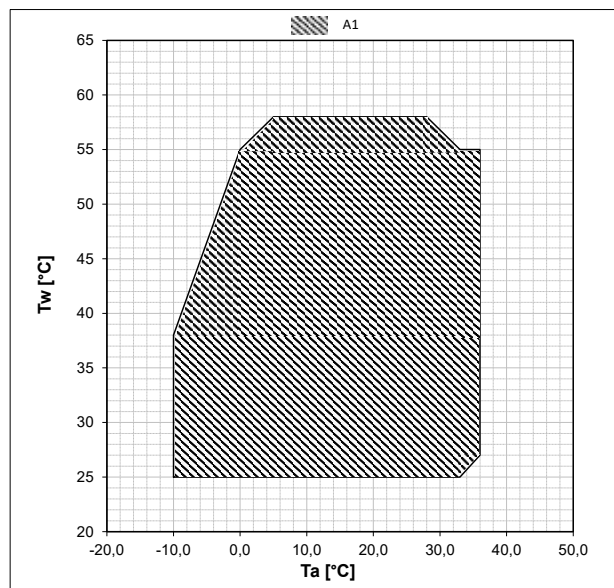
8.4 AMBIENT AIR TEMPERATURE AND SUMMARY TABLE

The 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 to +36°C depending on the temperature of the leaving water, as shown in table and in the following graphs.

Water chiller mode		
Ambient temperature standard version	Minimum -10°C (-20°C with CC accessory)	Maximum 46°C
Standard version outlet water temperature	Minimum 4°C	Maximum 18°C
Ambient temperature BT version	Minimum -20°C	Maximum +46°C
Outlet water temperature BT version	Minimum -8°C	Maximum +18°C
Heat pump mode		
Ambient temperature	Minimum -10°C	Maximum 36°C
Outlet water temperature	Minimum 25°C	Maximum 58°C

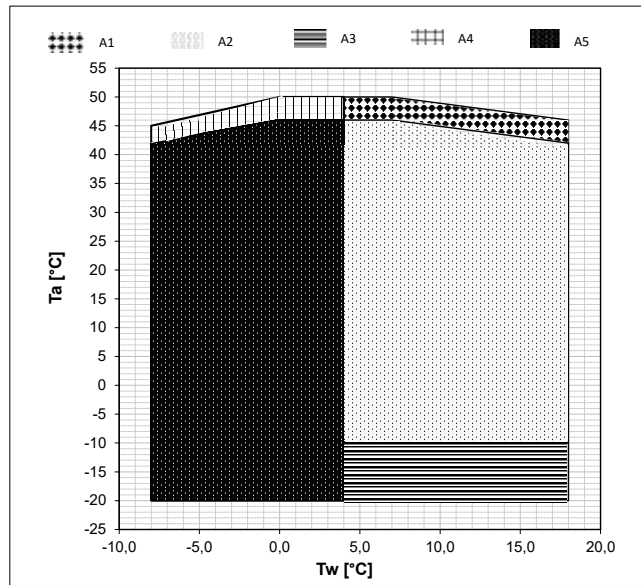
Below are graphed operating limits.

HEAT PUMP MODE



A1 = HWA1-A/H heating

CHILLER MODE



- 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
- A4 = HWA1-A/H BT partial load
- A5 = HWA1-A/H BT

9. PERFORMANCE TABLE

The tables show the heating capacity, absorbed power and efficiency for various outdoor air temperature conditions. The data are calculated according to EN 14511:2018. They are indicative and may be subject to change.

9.1 HEATING

Model HWA1-A/H		HEATING																				
		T air outdoor [°C]	Tout [°C]																			
			25			30			35			40			45			50				
Heating capacity [kW]	Power input [kW]	COP [W/W]	Heating capacity [kW]	Power input [kW]	COP [W/W]	Heating capacity [kW]	Power input [kW]	COP [W/W]	Heating capacity [kW]	Power input [kW]	COP [W/W]	Heating capacity [kW]	Power input [kW]	COP [W/W]	Heating capacity [kW]	Power input [kW]	COP [W/W]	Heating capacity [kW]	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	101	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	117	22,8	5,13	115	24,9	4,61	113	27,6	4,09	111	30,3	3,65	108	32,9	3,30	106	36,3	2,92	104	40,1	2,58
	12	134	23,2	5,77	132	25,4	5,18	129	27,8	4,64	126	30,2	4,17	123	33,2	3,70	120	36,6	3,27	117	40,5	2,88
	15	137	23,2	5,92	135	25,3	5,33	132	27,7	4,77	130	30,1	4,31	127	33,2	3,81	123	36,6	3,35	119	40,2	2,97
	20	144	23,4	6,16	142	25,5	5,57	139	27,9	4,98	136	30,3	4,47	133	33,1	4,00	129	36,2	3,57	126	39,6	3,18
	25	158	22,9	6,90	155	24,8	6,22	151	26,8	5,64	147	29,4	5,01	143	32,5	4,40	139	35,5	3,91	135	39,2	3,44
	30	168	22,2	7,57	165	24,5	6,75	161	26,7	6,03	157	29,3	5,36	153	32,1	4,75	148	35,2	4,21	143	38,9	3,68
	35	177	21,9	8,08	173	24,2	7,14	172	26,5	6,46	167	28,9	5,79	162	31,7	5,12	156	35,0	4,46	151	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	103	24,8	4,15	103	27,4	3,76	104	30,5	3,41	106	33,7	3,14	106	37,3	2,85	105	41,2	2,55	104	45,5	2,28
	7	129	26,1	4,95	127	28,6	4,46	125	30,9	4,05	123	33,9	3,61	120	37,5	3,20	118	41,8	2,82	116	45,7	2,53
	12	148	26,2	5,63	145	28,9	5,01	142	31,4	4,54	139	34,8	4,01	137	37,6	3,64	133	41,6	3,20	130	45,8	2,83
	15	151	26,3	5,75	149	28,8	5,17	146	31,3	4,67	143	34,4	4,15	140	37,8	3,70	137	41,4	3,31	133	45,6	2,92
	20	159	26,4	6,01	156	28,8	5,40	153	31,6	4,83	150	34,3	4,37	147	37,7	3,89	143	41,7	3,43	140	45,4	3,07
	25	173	26,8	6,45	170	28,4	5,99	167	31,1	5,36	163	34,0	4,78	159	36,7	4,34	155	40,6	3,81	150	44,7	3,36
	30	183	27,2	6,73	181	28,7	6,30	179	30,2	5,91	174	33,5	5,18	169	36,6	4,63	165	40,1	4,10	160	44,2	3,61
	35	191	26,9	7,09	189	29,0	6,52	188	31,1	6,02	184	33,3	5,54	179	36,5	4,92	174	39,9	4,36	168	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	107	28,7	3,72	105	31,1	3,39	103	34,3	3,01	102	37,2	2,73	99,7	41,2	2,42	98,4	45,0	2,19	-	-	-
	2	134	30,3	4,44	132	33,1	4,00	130	36,3	3,58	128	39,4	3,24	125	43,2	2,90	123	47,9	2,56	121	52,3	2,31
	7	153	30,7	4,99	151	33,6	4,49	148	36,6	4,04	145	39,7	3,64	142	43,9	3,22	138	48,1	2,87	135	52,5	2,57
	12	175	31,0	5,63	172	33,6	5,11	168	37,1	4,53	164	40,1	4,10	161	43,5	3,70	157	47,7	3,29	152	52,3	2,90
	15	179	31,1	5,77	176	33,8	5,21	173	36,8	4,70	169	40,2	4,19	164	43,5	3,78	160	47,5	3,37	156	51,9	3,00
	20	187	30,7	6,10	184	33,3	5,54	181	36,0	5,01	177	39,2	4,51	173	42,6	4,05	169	46,4	3,63	164	50,9	3,23
	25	203	30,1	6,72	199	32,3	6,18	195	35,2	5,53	190	38,5	4,94	185	41,8	4,43	180	45,6	3,95	175	50,1	3,50
	30	215	30,0	7,18	212	32,3	6,55	208	34,6	6,01	203	37,4	5,43	197	41,4	4,76	192	45,1	4,25	186	49,5	3,74
	35	228	29,4	7,75	223	32,2	6,93	218	35,0	6,24	214	37,8	5,65	208	41,2	5,04	202	45,1	4,48	196	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	29,7	3,37	98,8	32,3	3,06	97,6	35,6	2,74	96,3	39,2	2,46	-	-	-	-	-	-	-	-	
	-2	111	29,6	3,75	110	32,1	3,41	108	35,7	3,02	106	38,9	2,72	104	42,9	2,43	103	47,5	2,16	-	-	-
	2	140	31,1	4,50	138	34,0	4,05	136	37,7	3,60	133	41,2	3,23	131	45,1	2,89	128	50,1	2,56	126	55,7	2,26
	7	160	31,7	5,06	157	34,5	4,55	154	37,7	4,08	151	41,9	3,60	148	45,3	3,26	145	50,3	2,87	141	55,6	2,54
	12	185	32,4	5,70	180	35,5	5,07	176	38,6	4,56	172	41,9	4,10	168	45,7	3,68	164	50,3	3,25	159	55,8	2,84
	15	189	32,6	5,80	185	35,3	5,26	181	38,5	4,71	177	41,9	4,22	172	45,8	3,76	167	50,8	3,29	163	55,3	2,95
	20	199	32,6	6,10	194	35,2	5,52	191	37,7	5,05	185	41,4	4,48	181	45,1	4,01	176	49,4	3,57	172	54,3	3,16
	25	216	32,3	6,67	212	34,1	6,23	206	37,3	5,52	201	40,6	4,94	195	44,3	4,41	189	48,6	3,90	184	53,5	3,43
	30	231	32,2	7,16	225	34,6	6,51	220	37,1	5,94	214	40,4	5,31	208	44,0	4,74	202	48,2	4,19	195	53,1	3,67
	35	248	31,1	7,97	241	33,5	7,18	234	37,0	6,32	227	40,4	5,61	221	43,5	5,07	213	48,1	4,43	206	52,8	3,89

Model HWA1-A/H		HEATING																				
		T air outdoor [°C]	Tout [°C]																			
			25			30			35			40			45			50			55	
Heating capacity [kW]	Power input [kW]	COP [W/W]	Heating capacity [kW]	Power input [kW]	COP [W/W]	Heating capacity [kW]	Power input [kW]	COP [W/W]	Heating capacity [kW]	Power input [kW]	COP [W/W]	Heating capacity [kW]	Power input [kW]	COP [W/W]	Heating capacity [kW]	Power input [kW]	COP [W/W]	Heating capacity [kW]	Power input [kW]	COP [W/W]		
02160	-10	102	32,3	3,17	101	35,5	2,85	100	39,1	2,56	-	-	-	-	-	-	-	-	-	-	-	
	-7	109	32,3	3,37	108	35,7	3,01	106	38,9	2,73	105	42,9	2,45	-	-	-	-	-	-	-	-	
	-2	121	32,1	3,76	119	35,5	3,35	117	39,0	3,01	115	42,6	2,71	113	47,6	2,39	112	52,1	2,14	-	-	
	2	150	34,1	4,40	149	37,5	3,97	146	40,8	3,57	144	44,6	3,23	141	49,6	2,85	139	54,5	2,55	137	60,6	2,25
	7	173	34,4	5,01	169	37,7	4,49	166	41,4	4,01	163	45,6	3,57	160	49,4	3,23	156	55,0	2,84	153	60,8	2,51
	12	198	35,1	5,63	194	38,3	5,07	189	42,0	4,51	185	46,2	4,01	181	50,6	3,57	176	54,8	3,22	172	60,5	2,85
	15	203	35,3	5,74	199	38,4	5,18	195	41,3	4,73	191	45,6	4,18	186	50,2	3,70	180	55,4	3,26	176	60,5	2,91
	20	213	35,2	6,05	209	38,3	5,47	204	42,0	4,85	200	45,1	4,44	195	49,7	3,91	190	54,2	3,50	185	59,5	3,11
	25	231	35,3	6,55	227	37,6	6,04	221	41,0	5,39	216	44,8	4,82	210	48,8	4,30	204	53,5	3,81	198	58,5	3,39
	30	246	35,6	6,90	242	37,8	6,39	237	40,0	5,93	230	44,3	5,18	225	47,7	4,70	216	53,2	4,07	210	58,0	3,63
35	263	35,6	7,38	257	37,8	6,80	251	40,6	6,18	245	43,5	5,63	237	47,6	4,98	229	52,8	4,35	222	57,7	3,85	
04176	-10	115	36,3	3,18	114	39,7	2,87	112	43,6	2,57	-	-	-	-	-	-	-	-	-	-	-	
	-7	121	35,9	3,39	120	39,4	3,04	118	43,9	2,69	117	47,9	2,43	-	-	-	-	-	-	-	-	
	-2	135	35,7	3,77	132	39,2	3,38	130	43,0	3,03	129	47,2	2,73	126	52,5	2,40	124	58,1	2,14	-	-	
	2	147	35,6	4,12	148	38,7	3,81	149	43,4	3,44	152	48,7	3,11	154	55,2	2,78	153	60,9	2,51	151	67,6	2,23
	7	190	37,8	5,02	186	41,4	4,50	188	46,0	4,08	179	50,1	3,57	179	55,9	3,21	172	61,1	2,81	168	67,5	2,49
	12	216	38,1	5,68	212	41,2	5,16	207	45,7	4,54	203	50,1	4,05	198	55,2	3,59	194	60,7	3,19	189	67,1	2,81
	15	232	38,2	6,07	226	42,0	5,38	220	46,1	4,78	215	50,2	4,28	208	55,7	3,74	203	61,2	3,31	197	67,5	2,91
	20	243	37,6	6,47	238	41,0	5,80	233	44,3	5,25	226	49,4	4,58	220	54,1	4,07	215	59,4	3,61	209	65,6	3,18
	25	262	37,1	7,07	258	39,5	6,53	250	43,6	5,74	244	47,7	5,11	236	52,6	4,50	229	58,7	3,89	222	64,5	3,44
	30	278	37,2	7,49	273	39,9	6,84	267	42,6	6,27	259	47,2	5,49	251	51,9	4,85	243	57,5	4,22	235	63,8	3,68
35	290	38,4	7,56	285	41,1	6,94	280	43,6	6,43	276	46,1	5,98	265	51,8	5,12	257	57,1	4,50	248	63,3	3,92	
04199	-10	127	39,9	3,17	125	43,9	2,84	124	48,3	2,56	-	-	-	-	-	-	-	-	-	-	-	
	-7	135	39,9	3,38	133	43,8	3,04	131	48,2	2,73	130	53,0	2,44	-	-	-	-	-	-	-	-	
	-2	150	39,5	3,81	148	43,3	3,41	145	47,7	3,04	143	52,4	2,72	140	58,0	2,42	138	64,1	2,15	-	-	
	2	188	41,8	4,50	185	46,0	4,03	182	50,3	3,61	179	55,6	3,21	175	61,0	2,87	172	67,6	2,55	169	74,7	2,27
	7	215	42,0	5,12	211	46,3	4,57	207	50,7	4,09	203	55,8	3,63	198	61,5	3,22	194	67,4	2,88	190	74,9	2,54
	12	247	42,7	5,77	242	46,7	5,18	237	50,9	4,66	231	55,8	4,14	226	61,4	3,68	219	68,2	3,21	213	75,6	2,82
	15	254	42,8	5,93	249	46,9	5,30	243	51,4	4,73	237	56,3	4,21	232	61,5	3,77	226	67,8	3,33	220	74,6	2,94
	20	267	43,0	6,21	262	46,6	5,63	256	50,9	5,03	250	55,8	4,47	244	60,6	4,02	237	67,1	3,54	232	73,2	3,17
	25	289	42,4	6,82	284	45,4	6,26	278	49,4	5,62	271	53,6	5,05	263	59,4	4,43	255	65,3	3,91	248	72,0	3,44
	30	308	42,2	7,31	302	45,6	6,63	296	49,0	6,04	289	53,0	5,45	279	59,0	4,73	271	64,6	4,20	263	71,3	3,68
35	326	42,5	7,67	319	45,9	6,95	312	49,6	6,29	305	53,2	5,73	296	58,8	5,03	287	64,4	4,45	277	71,0	3,91	
04215	-10	137	42,9	3,19	135	46,8	2,89	134	51,7	2,59	-	-	-	-	-	-	-	-	-	-	-	
	-7	145	42,8	3,39	144	46,7	3,07	142	51,3	2,76	140	56,3	2,48	-	-	-	-	-	-	-	-	
	-2	162	42,5	3,80	160	46,5	3,43	157	51,4	3,06	154	56,1	2,75	152	61,6	2,47	150	68,3	2,19	-	-	
	2	192	44,1	4,36	195	48,7	4,00	194	53,5	3,62	193	59,3	3,25	189	65,1	2,90	186	71,9	2,58	183	79,1	2,31
	7	230	45,4	5,08	227	49,7	4,57	223	54,8	4,07	219	59,7	3,66	214	66,0	3,24	210	71,5	2,93	205	79,8	2,56
	12	265	46,2	5,73	260	50,5	5,15	255	55,0	4,63	249	60,5	4,12	243	66,1	3,68	237	72,8	3,26	231	79,8	2,89
	15	272	46,1	5,89	267	50,3	5,30	262	54,5	4,80	256	60,3	4,24	249	66,2	3,77	244	72,2	3,37	237	80,0	2,96
	20	286	46,5	6,16	281	50,6	5,55	276	55,3	4,98	270	60,4	4,47	263	66,0	3,98	256	72,3	3,55	250	79,2	3,15
	25	313	45,8	6,83	307	49,1	6,26	300	54,0	5,55	293	58,6	5,00	285	64,2	4,44	276	71,2	3,87	267	78,3	3,42
	30	334	45,3	7,39	328	49,0	6,68	321	52,8	6,08	312	58,5	5,33	303	64,0	4,74	294	70,3	4,18	284	77,6	3,66
35	358	44,7	8,00	349	48,5	7,19	340	53,2	6,39	331	57,8	5,72	321	63,8	5,02	311	69,9	4,45	301	76,9	3,91	

Model HWA1-A/H		HEATING																				
		T air outdoor [°C]	Tout [°C]																			
			25			30			35			40			45			50			55	
Heating capacity [kW]	Power input [kW]	COP [W/W]	Heating capacity [kW]	Power input [kW]	COP [W/W]	Heating capacity [kW]	Power input [kW]	COP [W/W]	Heating capacity [kW]	Power input [kW]	COP [W/W]	Heating capacity [kW]	Power input [kW]	COP [W/W]	Heating capacity [kW]	Power input [kW]	COP [W/W]	Heating capacity [kW]	Power input [kW]	COP [W/W]		
04237	-10	155	48,1	3,21	153	52,8	2,90	151	58,2	2,60	-	-	-	-	-	-	-	-	-	-	-	
	-7	163	47,8	3,40	161	52,6	3,05	159	58,0	2,74	157	63,6	2,47	-	-	-	-	-	-	-	-	
	-2	180	47,8	3,77	178	52,7	3,37	176	58,0	3,03	173	63,6	2,72	171	69,6	2,45	168	77,2	2,18	-	-	-
	2	196	47,7	4,10	195	52,8	3,70	194	57,3	3,39	198	64,5	3,06	201	71,7	2,80	204	80,2	2,54	203	89,3	2,28
	7	254	51,0	4,99	250	56,3	4,44	246	61,1	4,02	241	67,2	3,59	237	74,0	3,20	232	81,3	2,86	228	89,8	2,53
	12	291	51,6	5,63	285	56,9	5,02	281	62,2	4,51	274	67,8	4,05	268	74,9	3,58	261	82,4	3,17	256	89,8	2,85
	15	298	51,5	5,79	293	56,1	5,22	288	61,4	4,68	282	67,3	4,19	275	74,4	3,70	268	82,0	3,27	262	90,2	2,90
	20	313	52,1	6,01	308	56,9	5,41	302	62,3	4,85	296	68,0	4,35	290	74,6	3,88	283	82,3	3,44	275	90,5	3,04
	25	343	52,0	6,60	337	56,5	5,97	330	61,6	5,36	322	67,2	4,80	314	73,0	4,31	306	80,0	3,82	296	88,6	3,34
	30	376	50,5	7,45	364	55,6	6,55	352	60,7	5,80	343	66,4	5,17	334	72,8	4,59	325	79,6	4,08	315	87,5	3,60
35	392	50,1	7,82	383	55,2	6,94	374	60,3	6,20	365	65,5	5,58	355	71,8	4,95	344	78,8	4,36	332	87,4	3,80	
04273	-10	174	54,7	3,18	172	60,1	2,86	170	66,0	2,58	-	-	-	-	-	-	-	-	-	-	-	
	-7	185	54,6	3,39	183	59,9	3,05	180	65,7	2,74	178	72,4	2,46	-	-	-	-	-	-	-	-	
	-2	206	54,4	3,78	203	59,3	3,42	199	65,5	3,04	196	71,7	2,73	192	79,2	2,43	189	87,3	2,17	-	-	-
	2	259	57,4	4,51	255	62,8	4,05	251	69,1	3,63	246	75,6	3,26	241	83,5	2,89	236	91,7	2,58	232	101	2,29
	7	296	58,3	5,08	291	63,5	4,59	286	69,2	4,13	280	75,8	3,69	273	83,8	3,26	267	91,6	2,91	260	102	2,55
	12	341	58,9	5,79	334	64,2	5,20	326	70,1	4,66	318	76,9	4,14	310	84,1	3,69	302	92,9	3,25	293	102	2,88
	15	349	59,1	5,89	341	64,1	5,32	335	69,1	4,84	326	75,9	4,29	317	83,2	3,81	308	91,1	3,38	298	100	2,98
	20	367	58,1	6,32	360	63,2	5,69	352	68,5	5,14	344	74,9	4,59	335	82,0	4,08	326	89,1	3,67	317	98,2	3,23
	25	399	57,3	6,96	391	61,5	6,36	381	67,2	5,67	371	73,0	5,08	360	80,2	4,49	349	88,1	3,96	339	96,6	3,51
	30	428	55,7	7,68	417	61,2	6,81	406	66,7	6,09	396	72,1	5,49	383	79,0	4,85	371	87,0	4,26	358	95,7	3,74
35	458	55,1	8,32	445	60,6	7,35	432	66,2	6,53	419	71,8	5,84	406	79,1	5,13	392	86,9	4,51	379	95,3	3,97	
04304	-10	195	61,8	3,15	192	67,7	2,84	190	74,7	2,55	-	-	-	-	-	-	-	-	-	-	-	
	-7	206	61,5	3,36	204	67,5	3,02	202	74,4	2,71	200	82,1	2,43	-	-	-	-	-	-	-	-	
	-2	229	61,2	3,74	226	66,9	3,38	223	73,2	3,05	219	81,6	2,69	216	90,1	2,39	212	99,7	2,13	-	-	-
	2	282	64,0	4,41	282	70,8	3,98	278	77,8	3,57	273	85,7	3,18	268	94,2	2,85	264	105	2,52	259	116	2,23
	7	329	65,4	5,03	322	71,5	4,51	316	78,3	4,04	310	86,2	3,59	303	94,7	3,20	297	105	2,83	291	115	2,52
	12	377	66,9	5,64	371	72,5	5,11	362	79,1	4,57	353	86,5	4,08	344	95,7	3,59	335	105	3,18	326	116	2,80
	15	389	68,1	5,72	381	74,0	5,15	372	80,3	4,64	363	87,7	4,14	354	95,3	3,71	345	104	3,31	334	115	2,91
	20	411	67,6	6,09	402	73,2	5,49	394	78,6	5,02	384	86,0	4,47	376	93,1	4,03	365	102	3,57	356	112	3,18
	25	444	67,6	6,57	438	70,7	6,19	427	76,5	5,59	416	83,0	5,01	404	90,7	4,46	391	100	3,91	380	110	3,47
	30	476	67,9	7,02	466	71,6	6,51	456	75,3	6,05	444	81,5	5,44	429	90,0	4,77	416	98,8	4,20	403	108	3,73
35	508	68,2	7,44	495	71,9	6,89	483	76,6	6,30	470	81,4	5,78	454	89,8	5,06	440	98,2	4,48	426	108	3,96	
04345	-10	223	69,3	3,21	221	76,3	2,90	219	85,1	2,58	-	-	-	-	-	-	-	-	-	-	-	
	-7	235	69,0	3,40	233	76,2	3,05	231	84,6	2,73	229	93,7	2,44	-	-	-	-	-	-	-	-	
	-2	260	68,4	3,80	257	75,8	3,40	254	82,8	3,07	251	92,9	2,70	248	103	2,41	245	114	2,14	-	-	-
	2	289	69,3	4,17	291	76,9	3,78	294	85,9	3,42	297	95,3	3,12	301	107	2,81	301	120	2,51	297	134	2,22
	7	367	73,4	5,00	363	80,5	4,51	356	88,5	4,02	351	97,8	3,58	344	108	3,20	337	121	2,80	331	134	2,47
	12	422	74,8	5,65	415	82,0	5,06	406	89,7	4,53	398	98,7	4,03	390	108	3,61	381	121	3,16	372	134	2,77
	15	433	74,8	5,79	425	81,6	5,21	418	88,9	4,70	408	98,7	4,13	400	108	3,69	390	121	3,23	381	133	2,86
	20	456	75,5	6,04	448	82,4	5,44	439	90,1	4,87	430	98,9	4,35	421	109	3,87	411	120	3,43	401	133	3,01
	25	498	77,6	6,41	491	81,0	6,07	480	88,2	5,44	467	97,3	4,80	456	107	4,27	443	118	3,77	431	130	3,31
	30	534	79,1	6,76	523	83,4	6,27	512	87,7	5,83	499	96,4	5,17	484	106	4,56	471	117	4,04	457	129	3,54
35	570	79,2	7,20	557	83,6	6,66	544	89,4	6,08	530	95,2	5,57	514	106	4,87	499	116	4,30	483	128	3,76	

9.2 COOLING

Model HWA1-A/H		COOLING																		
		T air outdoor [°C]	Tout [°C]																	
			5			7			10			12			15			18		
Cooling capacity [kW]	Power input [kW]	EER [W/W]	Cooling capacity [kW]	Power input [kW]	EER [W/W]	Cooling capacity [kW]	Power input [kW]	EER [W/W]	Cooling capacity [kW]	Power input [kW]	EER [W/W]	Cooling capacity [kW]	Power input [kW]	EER [W/W]	Cooling capacity [kW]	Power input [kW]	EER [W/W]			
02109	20	114	25,4	4,48	121	25,9	4,67	132	26,4	5,02	140	27,0	5,18	152	27,7	5,49	165	28,5	5,79	
	25	110	27,4	4,00	117	27,9	4,19	127	28,6	4,46	135	29,0	4,65	147	29,9	4,91	159	30,7	5,19	
	30	105	30,0	3,51	112	30,4	3,67	122	31,1	3,91	128	31,6	4,06	139	32,5	4,27	149	33,5	4,45	
	35	98,0	33,0	2,97	103	33,8	3,05	113	34,2	3,31	120	34,7	3,44	129	35,6	3,63	139	36,5	3,81	
	40	90,4	36,4	2,49	95,8	36,9	2,60	105	37,7	2,78	111	38,2	2,90	120	39,1	3,06	130	40,1	3,23	
	45	83,0	40,2	2,07	87,9	40,5	2,17	96,5	40,8	2,36	-	-	-	-	-	-	-	-	-	
02121	20	126	29,6	4,23	133	30,1	4,42	145	30,8	4,71	153	31,5	4,87	166	32,3	5,16	180	33,2	5,42	
	25	121	32,0	3,78	128	32,5	3,95	140	33,3	4,19	148	33,9	4,36	160	34,6	4,63	172	35,7	4,82	
	30	115	34,8	3,30	122	35,4	3,44	132	36,3	3,64	139	36,9	3,77	150	38,1	3,94	162	39,0	4,14	
	35	107	38,4	2,78	113	38,9	2,90	123	39,8	3,08	130	40,5	3,20	140	41,7	3,35	151	42,7	3,53	
	40	98,3	42,3	2,32	104	42,9	2,43	113	43,9	2,58	120	44,6	2,68	130	44,9	2,88	142	45,9	3,10	
	45	90,4	46,3	1,95	96,1	46,9	2,05	105	47,2	2,23	-	-	-	-	-	-	-	-	-	
02142	20	142	31,4	4,52	151	31,8	4,75	165	32,3	5,09	174	32,7	5,32	190	33,2	5,71	205	34,0	6,02	
	25	138	33,9	4,05	145	34,6	4,19	158	35,3	4,49	168	35,6	4,71	182	36,2	5,03	198	36,9	5,35	
	30	131	37,4	3,50	139	37,8	3,69	152	38,5	3,94	160	39,3	4,08	174	39,7	4,39	189	40,4	4,67	
	35	124	41,1	3,01	132	41,3	3,19	142	42,4	3,36	151	42,7	3,54	163	43,6	3,75	177	44,1	4,01	
	40	115	45,1	2,54	122	45,6	2,67	135	46,6	2,90	140	47,1	2,97	152	47,7	3,18	165	48,4	3,41	
	45	107	48,9	2,18	111	50,4	2,21	123	50,9	2,41	-	-	-	-	-	-	-	-	-	
02148	20	151	33,2	4,55	161	33,7	4,77	176	34,5	5,10	186	35,2	5,28	204	35,7	5,72	222	36,8	6,03	
	25	145	36,3	3,99	154	36,9	4,17	169	37,6	4,49	179	38,1	4,70	195	39,0	5,01	212	39,9	5,32	
	30	138	39,9	3,46	147	40,5	3,62	161	41,5	3,87	170	41,9	4,07	186	42,7	4,35	201	43,6	4,62	
	35	131	43,6	2,99	138	44,4	3,11	151	45,2	3,33	159	46,0	3,45	173	46,8	3,69	188	47,7	3,94	
	40	120	48,4	2,48	128	48,7	2,62	139	49,9	2,79	146	50,8	2,87	160	51,5	3,10	175	52,2	3,35	
	45	110	53,3	2,07	117	53,7	2,18	128	55,1	2,32	-	-	-	-	-	-	-	-	-	
02160	20	165	37,2	4,43	175	37,6	4,67	191	38,7	4,94	204	38,9	5,23	221	40,1	5,51	238	41,4	5,75	
	25	158	40,6	3,89	168	41,1	4,08	183	41,9	4,38	194	42,5	4,58	213	43,1	4,93	230	44,6	5,16	
	30	150	44,5	3,38	160	45,2	3,53	174	46,0	3,79	185	46,5	3,97	200	47,5	4,22	218	48,2	4,52	
	35	140	49,2	2,84	148	49,8	2,97	162	50,5	3,21	172	51,1	3,36	187	52,0	3,59	202	53,0	3,82	
	40	130	54,1	2,39	136	55,0	2,48	149	55,8	2,68	158	56,3	2,81	173	57,2	3,02	188	58,3	3,22	
	45	118	60,0	1,97	126	60,5	2,08	137	60,9	2,26	-	-	-	-	-	-	-	-	-	
04176	20	181	39,4	4,59	192	39,8	4,81	209	40,5	5,16	221	41,0	5,39	241	41,8	5,75	261	42,7	6,11	
	25	174	42,8	4,05	184	43,3	4,26	201	44,1	4,56	213	44,6	4,78	232	45,3	5,11	251	46,2	5,44	
	30	165	47,0	3,51	176	47,5	3,70	192	48,3	3,97	203	48,9	4,16	221	49,7	4,45	240	50,7	4,74	
	35	156	52,0	3,00	165	52,6	3,14	181	53,3	3,39	191	53,9	3,54	207	54,8	3,77	224	55,7	4,01	
	40	143	57,6	2,49	153	58,1	2,63	166	58,9	2,83	176	59,5	2,96	191	60,4	3,17	207	61,5	3,37	
	45	131	63,9	2,04	139	64,4	2,16	153	65,2	2,34	-	-	-	-	-	-	-	-	-	
04199	20	204	45,0	4,54	217	45,6	4,75	236	46,6	5,07	250	47,3	5,28	272	48,2	5,64	294	49,6	5,93	
	25	196	48,8	4,02	208	49,4	4,22	228	50,4	4,52	241	51,1	4,72	262	52,2	5,02	284	53,4	5,31	
	30	188	53,3	3,52	199	54,1	3,68	218	55,1	3,95	231	55,8	4,14	250	57,0	4,39	270	58,2	4,64	
	35	177	58,6	3,01	187	59,4	3,15	203	60,5	3,36	215	61,4	3,50	233	62,5	3,73	252	63,8	3,95	
	40	162	64,8	2,51	173	65,5	2,63	188	66,6	2,83	199	67,5	2,95	216	68,9	3,13	233	70,2	3,33	
	45	149	71,7	2,07	158	72,5	2,18	173	73,7	2,34	-	-	-	-	-	-	-	-	-	
04215	20	231	50,3	4,58	245	50,9	4,81	267	52,0	5,14	283	52,9	5,36	306	54,3	5,64	333	55,3	6,03	
	25	221	54,9	4,02	235	55,6	4,23	256	56,6	4,53	271	57,4	4,73	294	58,8	5,01	319	60,2	5,31	
	30	211	60,3	3,50	224	61,1	3,66	244	62,1	3,93	258	62,8	4,10	279	64,1	4,36	301	65,8	4,57	
	35	204	66,4	3,07	208	67,2	3,10	227	68,3	3,32	240	69,1	3,47	261	70,3	3,71	282	71,6	3,94	
	40	183	72,5	2,53	192	74,3	2,58	210	75,3	2,78	222	76,1	2,92	242	77,4	3,12	261	78,9	3,32	
	45	168	80,2	2,09	178	81,3	2,19	193	81,9	2,36	-	-	-	-	-	-	-	-	-	
04237	20	252	58,0	4,34	267	59,3	4,50	289	60,9	4,76	307	61,3	5,00	331	63,3	5,23	356	64,8	5,50	
	25	241	63,5	3,79	255	64,3	3,97	278	65,5	4,25	296	65,7	4,50	320	67,6	4,74	347	68,8	5,04	
	30	228	69,6	3,28	242	70,4	3,44	263	71,7	3,67	278	72,6	3,83	302	73,7	4,10	319	76,0	4,20	
	35	212	76,7	2,76	225	77,5	2,90	245	78,8	3,10	258	79,8	3,24	278	81,8	3,40	301	83,2	3,62	
	40	195	84,8	2,30	207	85,6	2,42	226	86,9	2,60	239	88,0	2,71	258	90,1	2,86	279	91,9	3,04	
	45	179	92,3	1,94	190	92,9	2,05	208	93,5	2,23	-	-	-	-	-	-	-	-	-	

COOLING																			
Model HWA1-A\H	T air outdoor [°C]	Tout [°C]																	
		5			7			10			12			15			18		
		Cooling capacity [kW]	Power input [kW]	EER [W/W]	Cooling capacity [kW]	Power input [kW]	EER [W/W]	Cooling capacity [kW]	Power input [kW]	EER [W/W]	Cooling capacity [kW]	Power input [kW]	EER [W/W]	Cooling capacity [kW]	Power input [kW]	EER [W/W]	Cooling capacity [kW]	Power input [kW]	EER [W/W]
04273	20	286	59,9	4,78	303	61,2	4,95	331	62,4	5,31	351	63,1	5,56	382	64,9	5,89	414	67,7	6,11
	25	274	65,8	4,16	291	66,5	4,39	319	68,2	4,67	337	69,1	4,89	368	71,1	5,17	402	71,7	5,61
	30	262	72,4	3,62	278	73,5	3,78	305	74,1	4,11	321	75,8	4,23	349	77,3	4,51	378	78,8	4,79
	35	245	79,6	3,08	260	80,6	3,22	284	81,7	3,48	300	82,8	3,63	329	83,8	3,93	351	87,0	4,04
	40	229	86,6	2,64	241	88,4	2,73	263	90,1	2,92	278	91,3	3,05	303	92,8	3,27	329	94,4	3,48
	45	208	96,9	2,15	221	97,9	2,25	242	98,9	2,44	-	-	-	-	-	-	-	-	-
04304	20	322	69,6	4,62	341	71,5	4,76	371	72,5	5,12	393	73,6	5,34	427	75,5	5,66	463	78,0	5,93
	25	308	75,8	4,06	327	77,0	4,24	357	78,9	4,52	378	80,1	4,72	409	82,3	4,97	439	85,5	5,13
	30	295	82,4	3,58	311	84,0	3,70	337	86,6	3,90	357	87,1	4,10	385	89,6	4,30	414	92,6	4,47
	35	273	91,8	2,97	289	92,9	3,10	319	95,0	3,36	337	96,4	3,49	363	98,9	3,67	388	101	3,86
	40	251	102	2,47	267	102	2,60	293	103	2,83	307	106	2,91	332	108	3,07	360	110	3,27
	45	230	112	2,06	244	113	2,17	267	113	2,35	-	-	-	-	-	-	-	-	-
04345	20	360	84,1	4,28	382	85,6	4,46	415	87,8	4,73	440	88,8	4,96	474	92,8	5,10	513	94,6	5,43
	25	346	91,1	3,80	369	91,7	4,03	400	94,3	4,25	425	95,3	4,45	461	97,5	4,73	498	101	4,95
	30	330	99,9	3,30	350	101	3,46	381	103	3,69	399	106	3,78	435	107	4,07	472	109	4,32
	35	306	111	2,76	325	112	2,90	353	114	3,09	373	116	3,22	404	118	3,42	434	122	3,56
	40	282	123	2,30	299	124	2,40	326	126	2,58	344	128	2,68	373	131	2,84	405	132	3,06
	45	259	135	1,92	275	136	2,02	300	138	2,17	-	-	-	-	-	-	-	-	-

9.3 DATA FOR THE ENERGY CERTIFICATION OF BUILDINGS ACCORDING TO UNI/TS 11300-4 FOR HEAT PUMPS

Supplementary data on heat pumps for calculating the energy performance of buildings are given, according to UNI/TS 11300 part 4. The following are the characteristic quantities that will be provided for each model, according to schedule 31 of the standard.

		A T_{bival}	B	C	D
Reference temperatures	-10°C	-7°C	2°C	7°C	12°C
PLR ($T_{des} = -10^{\circ}\text{C}$)	100%	88%	54%	35%	15%
DC power at full load		$DC_A = DC_{bival}$	DCB	DCC	DCD
COP at partial load		COPA	COPB	COPc	COPd
COP at full load		COP'A	COP'B	COP'c	COP'd
CR	>1	1	$(0,54 \times P_{des}) / DCB$	$(0,35 \times P_{des}) / DCC$	$(0,15 \times P_{des}) / DCD$
Corrective factor Fp	1	1	COPB/COP'B	COPc/COP'c	COPd/COP'd
PLR	part load ratio or climatic load factor				
CR	heat pump load factor				
DC	full load power at specified temperatures				
DC_{bival}	full load power at -7/35°C				
P_{design}	at full load with climate A				
COP	COP at CR load at same temperature conditions as COP'				
COP'	COP at full load at the same temperature conditions as COP				

9.3.1 Model HWA1-A/H 02109

Operating limits

COLD source:		EXTERNAL AIR	
Temperature of operation (cut-off)		min	-10°C
		max	36°C
HOT source		WATER	
Temperature of operation (cut-off)		min	25°C
		max	58°C

Yield data measured under partial load conditions, according to UNI/TS 11300-4

	A T_{bival}	B	C	D
Reference temperatures	-7°C	2°C	7°C	12°C
PLR ($T_{des} = -10^{\circ}\text{C}$)	88%	54%	35%	15%
DC power at full load	71,5	98,8	113	129
COP at partial load	2,76	3,58	3,74	3,33
COP at full load	2,79	3,64	4,09	4,64
CR	1	0,44	0,25	0,10
Corrective factor Fp	1	0,97	0,91	0,70

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

Yield data measured under partial load conditions, according to UNI/TS 11300-4

	A T_{bival}	B	C	D
Reference temperatures	-7°C	2°C	7°C	12°C
PLR ($T_{des} = -10^{\circ}\text{C}$)	88%	54%	35%	15%

	A T_{bival}	B	C	D
DC power at full load	80,3	104	125	142
COP at partial load	2,72	3,61	3,80	3,45
COP at full load	2,73	3,41	4,05	4,54
CR	1	0,48	0,25	0,10
Corrective factor Fp	1	1,06	0,94	0,75

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

Yield data measured under partial load conditions, according to UNI/TS 11300-4

	A T_{bival}	B	C	D
Reference temperatures	-7°C	2°C	7°C	12°C
PLR (T des = -10°C)	88%	54%	35%	15%
DC power at full load	93,6	130	148	168
COP at partial load	2,76	3,43	3,58	3,26
COP at full load	2,71	3,58	4,04	4,53
CR	1	0,44	0,25	0,10
Corrective factor Fp	1	0,96	0,88	0,70

9.3.4 Model HWA1-A/H 02148

Operating limits

COLD source		EXTERNAL AIR	
Temperature of operation (cut-off)		min	-10°C
		max	36°C
HOT source		WATER	
Temperature of operation (cut-off)		min	25°C
		max	58°C

Yield data measured under partial load conditions, according to UNI/TS 11300-4

	A T_{bival}	B	C	D
Reference temperatures	-7°C	2°C	7°C	12°C
PLR (T des = -10°C)	88%	54%	35%	15%
DC power at full load	97,6	136	154	176
COP at partial load	2,72	3,42	3,68	3,63
COP at full load	2,74	3,60	4,08	4,56
CR	1	0,44	0,25	0,10
Corrective factor Fp	1	0,94	0,90	0,78

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

Yield data measured under partial load conditions, according to UNI/TS 11300-4

	A T _{bival}	B	C	D
Reference temperatures	-7°C	2°C	7°C	12°C
PLR (T des = -10°C)	88%	54%	35%	15%
DC power at full load	106	146	166	189
COP at partial load	2,71	3,54	3,69	3,44
COP at full load	2,73	3,57	4,01	4,51
CR	1	0,44	0,25	0,10
Corrective factor Fp	1	0,99	0,92	0,75

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

Yield data measured under partial load conditions, according to UNI/TS 11300-4

	A T _{bival}	B	C	D
Reference temperature	-7°C	2°C	7°C	12°C
PLR (T des = -10°C)	88%	54%	35%	15%
DC power at full load	118	149	188	207
COP at partial load	2,68	3,49	3,86	3,98
COP at full load	2,69	3,44	4,08	4,54
CR	1	0,44	0,25	0,10
Corrective factor Fp	1	0,97	0,94	0,85

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

Yield data measured under partial load conditions, according to UNI/TS 11300-4

	A T _{bival}	B	C	D
Reference temperatures	-7°C	2°C	7°C	12°C
PLR (T des = -10°C)	88%	54%	35%	15%

	A T_{bival}	B	C	D
DC power at full load	131	182	207	237
COP at partial load	2,70	3,47	3,85	4,03
COP at full load	2,73	3,61	4,09	4,66
CR	1	0,44	0,25	0,10
Corrective factor Fp	1	0,97	0,94	0,87

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

Yield data measured under partial load conditions, according to UNI/TS 11300-4

	A T_{bival}	B	C	D
Reference temperatures	-7°C	2°C	7°C	12°C
PLR (T des = -10°C)	88%	54%	35%	15%
DC power at full load	142	194	223	255
COP at partial load	2,74	3,64	3,99	4,00
COP at full load	2,76	3,62	4,07	4,63
CR	1	0,45	0,25	0,10
Corrective factor Fp	1	1,01	0,97	0,85

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

Yield data measured under partial load conditions, according to UNI/TS 11300-4

	A T_{bival}	B	C	D
Reference temperatures	-7°C	2°C	7°C	12°C
PLR (T des = -10°C)	88%	54%	35%	15%
DC power at full load	159	194	246	281
COP at partial load	2,76	3,68	4,07	4,09
COP at full load	2,74	3,39	4,02	4,51
CR	1	0,50	0,25	0,10
Corrective factor Fp	1	1,11	1,01	0,90

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

Yield data measured under partial load conditions, according to UNI/TS 11300-4

	A T _{bival}	B	C	D
Reference temperatures	-7°C	2°C	7°C	12°C
PLR (T des = -10°C)	88%	54%	35%	15%
DC power at full load	180	251	286	326
COP at partial load	2,75	3,48	3,72	3,93
COP at full load	2,74	3,63	4,13	4,66
CR	1	0,44	0,25	0,10
Corrective factor Fp	1	0,96	0,90	0,84

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

Yield data measured under partial load conditions, according to UNI/TS 11300-4

	A T _{bival}	B	C	D
Reference temperatures	-7°C	2°C	7°C	12°C
PLR (T des = -10°C)	88%	54%	35%	15%
DC power at full load	202	278	316	362
COP at partial load	2,69	3,55	3,84	3,78
COP at full load	2,71	3,57	4,04	4,57
CR	1	0,44	0,25	0,10
Corrective factor Fp	1	0,99	0,95	0,82

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

Yield data measured under partial load conditions, according to UNI/TS 11300-4

	A T _{bival}	B	C	D
Reference temperatures	-7°C	2°C	7°C	12°C
PLR (T des = -10°C)	88%	54%	35%	15%

	A T_{bival}	B	C	D
DC power at full load	231	294	356	406
COP at partial load	2,73	3,65	4,09	4,34
COP at full load	2,73	3,42	4,02	4,53
CR	1	0,48	0,25	0,10
Corrective factor Fp	1	1,07	1,01	0,95

9.4 EER VALUES FOR THE CALCULATION OF ENERGY PERFORMANCE OF BUILDINGS ACCORDING TO UNI/TS 11300-3

The cooling capacity values and EER coefficients under partial load conditions are shown. The reference conditions at partial load specified by the UNI/TS 11300-3 standard are illustrated below. EER are also provide for load factors below 25%.

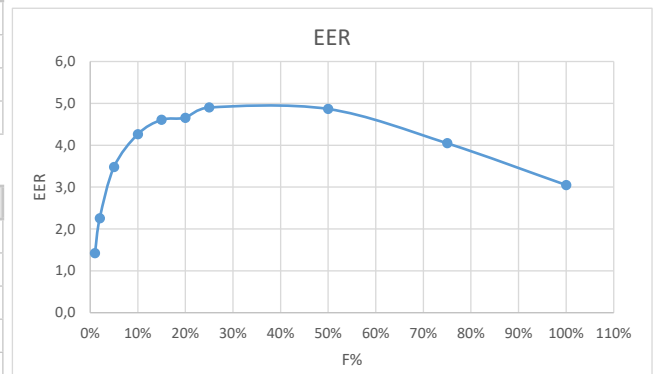
Test	Load factor	Dry bulb outdoor temperature	Chilled water temperature at fan inlet/outlet
1	100%	35	12/7
2	75%	30	*)/7
3	50%	25	*)/7
4	25%	20	*)/7

*) temperature determined by water flow rate at full load.

9.4.1 Model HWA1-A/H 02109

Outside air dry bulb temperature [°C]	Lod factor F%	EER
35	100%	3,05
30	75%	4,05
25	50%	4,87
20	25%	4,90

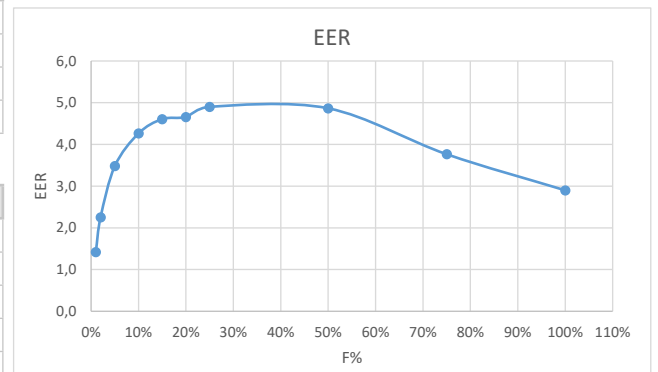
C	Load factor F%	EER @20°C xC
0,95	20%	4,66
0,94	15%	4,61
0,87	10%	4,26
0,71	5%	3,48
0,46	2%	2,25
0,29	1%	1,42



9.4.2 Model HWA1-A/H 02121

Outside air dry bulb temperature [°C]	Load factor F%	EER
35	100%	2,90
30	75%	3,77
25	50%	4,87
20	25%	4,90

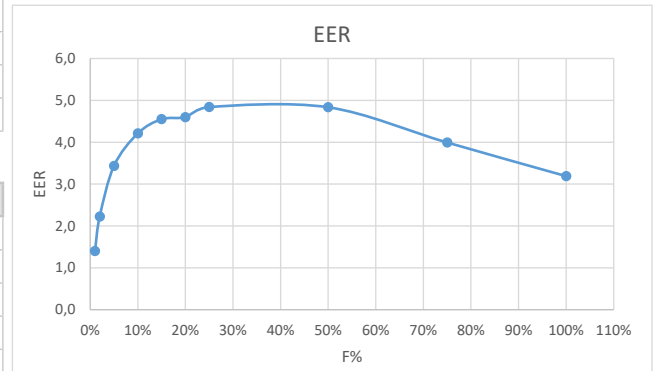
C	Load factor F%	EER @20°C xC
0,95	20%	4,66
0,94	15%	4,61
0,87	10%	4,26
0,71	5%	3,48
0,46	2%	2,25
0,29	1%	1,42



9.4.3 Model HWA1-A/H 02142

Outside air dry bulb temperature [°C]	Load factor F%	EER
35	100%	3,19
30	75%	3,99
25	50%	4,84
20	25%	4,84

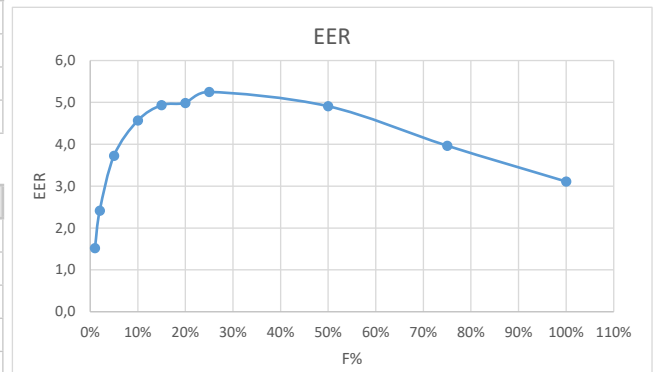
C	Load factor F%	EER @20°C xC
0,95	20%	4,60
0,94	15%	4,55
0,87	10%	4,21
0,71	5%	3,44
0,46	2%	2,23
0,29	1%	1,40



9.4.4 Model HWA1-A/H 02148

Outside air dry bulb temperature [°C]	Load factor F%	EER
35	100%	3,11
30	75%	3,97
25	50%	4,91
20	25%	5,25

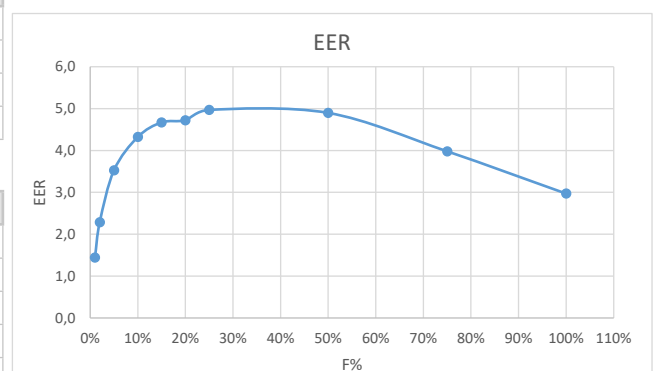
C	Load factor F%	EER @20°C xC
0,95	20%	4,99
0,94	15%	4,94
0,87	10%	4,57
0,71	5%	3,73
0,46	2%	2,42
0,29	1%	1,52



9.4.5 Model HWA1-A/H 02160

Outside air dry bulb temperature [°C]	Load factor F%	EER
35	100%	2,97
30	75%	3,98
25	50%	4,90
20	25%	4,97

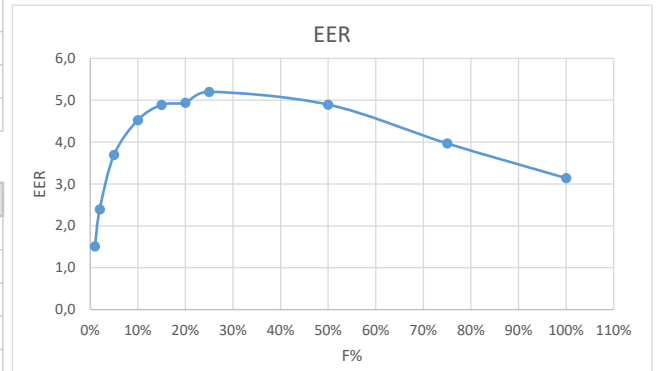
C	Load factor F%	EER @20°C xC
0,95	20%	4,72
0,94	15%	4,67
0,87	10%	4,32
0,71	5%	3,53
0,46	2%	2,29
0,29	1%	1,44



9.4.6 Model HWA1-A/H 04176

Outside air dry bulb temperature [°C]	Load factor F%	EER
35	100%	3,14
30	75%	3,97
25	50%	4,90
20	25%	5,20

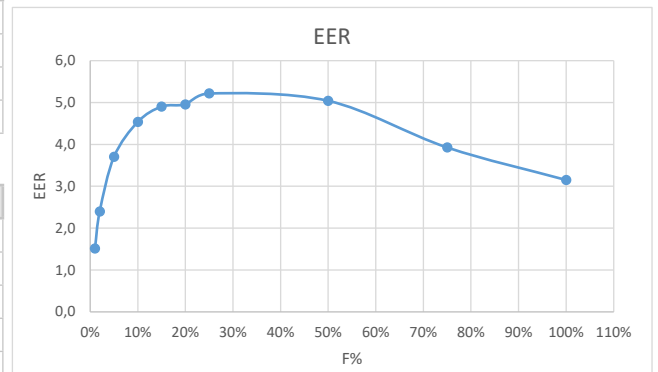
C	Load factor F%	EER @20°C xC
0,95	20%	4,94
0,94	15%	4,89
0,87	10%	4,53
0,71	5%	3,69
0,46	2%	2,39
0,29	1%	1,51



9.4.7 Model HWA1-A/H 04199

Outside air dry bulb temperature [°C]	Load factor F%	EER
35	100%	3,15
30	75%	3,93
25	50%	5,04
20	25%	5,22

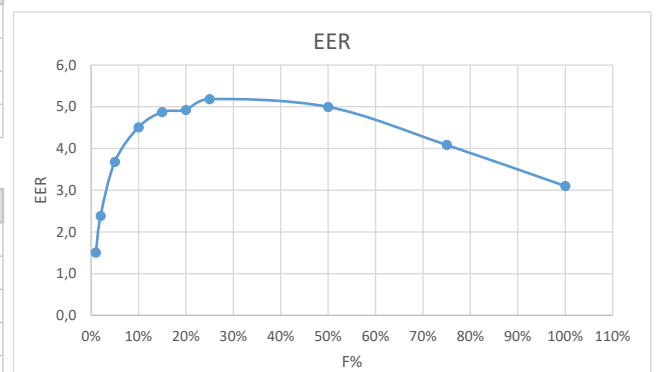
C	Load factor F%	EER @20°C xC
0,95	20%	4,96
0,94	15%	4,90
0,87	10%	4,54
0,71	5%	3,70
0,46	2%	2,40
0,29	1%	1,51



9.4.8 Model HWA1-A/H 04215

Outside air dry bulb temperature [°C]	Load factor F%	EER
35	100%	3,10
30	75%	4,09
25	50%	5,00
20	25%	5,18

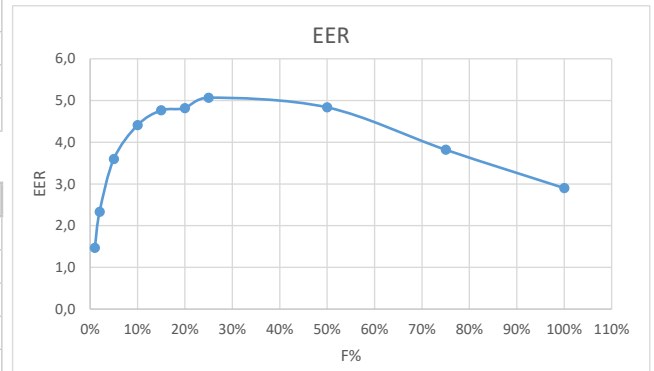
C	Load factor F%	EER @20°C xC
0,95	20%	4,92
0,94	15%	4,87
0,87	10%	4,51
0,71	5%	3,68
0,46	2%	2,38
0,29	1%	1,50



9.4.9 Model HWA1-A/H 04237

Outside air dry bulb temperature [°C]	Load factor F%	EER
35	100%	2,90
30	75%	3,82
25	50%	4,84
20	25%	5,07

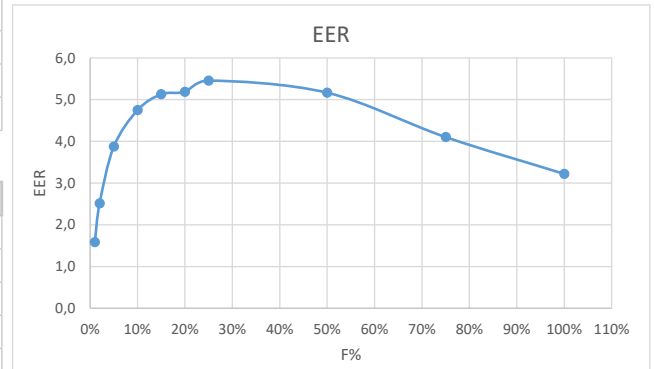
C	Load factor F%	EER @20°C xC
0,95	20%	4,81
0,94	15%	4,76
0,87	10%	4,41
0,71	5%	3,60
0,46	2%	2,33
0,29	1%	1,47



9.4.10 Model HWA1-A/H 04273

Outside air dry bulb temperature [°C]	Load factor F%	EER
35	100%	3,22
30	75%	4,10
25	50%	5,17
20	25%	5,46

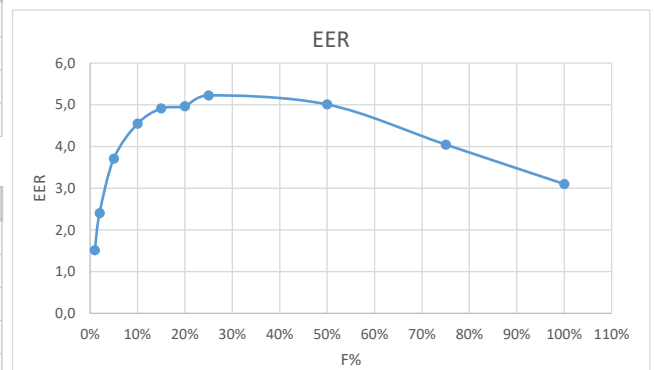
C	Load factor F%	EER @20°C xC
0,95	20%	5,18
0,94	15%	5,13
0,87	10%	4,75
0,71	5%	3,87
0,46	2%	2,51
0,29	1%	1,58



9.4.11 Model HWA1-A/H 04304

Outside air dry bulb temperature [°C]	Load factor F%	EER
35	100%	3,10
30	75%	4,05
25	50%	5,01
20	25%	5,23

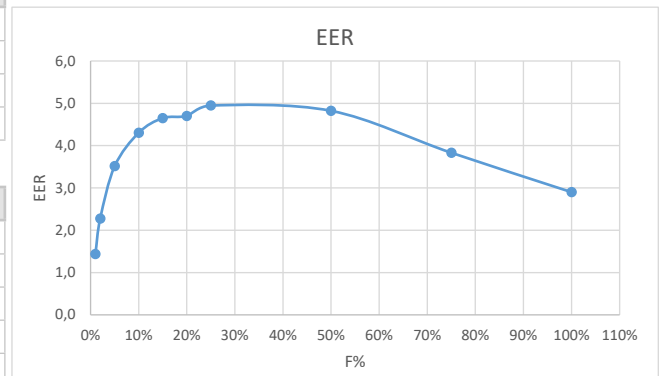
C	Load factor F%	EER @20°C xC
0,95	20%	4,96
0,94	15%	4,91
0,87	10%	4,55
0,71	5%	3,71
0,46	2%	2,40
0,29	1%	1,52



9.4.12 Model HWA1-A/H 04345

Outside air dry bulb temperature [°C]	Load factor F%	EER
35	100%	2,90
30	75%	3,83
25	50%	4,82
20	25%	4,95

C	Load factor F%	EER @20°C xC
0,95	20%	4,70
0,94	15%	4,65
0,87	10%	4,30
0,71	5%	3,51
0,46	2%	2,28
0,29	1%	1,43



10. REFRIGERATN SAFETY DATA SHEET

Name:	R410A (50% Difluoromethane (R32); 50% Pentafluoroethane (R125).
RISKS INDICATIONS	
Major risks:	Asphyxia
Specific risks:	The rapid evaporation may cause freezing.
FIRST AID	
General information:	Never give anything by mouth to an unconscious person.
Inhalation:	Move to fresh air. Oxygen or artificial respiration if necessary. Do not administer adrenaline or similar drugs.
Eyes contact:	Rinse carefully with water for at least 15 minutes and consult a doctor.
Contact with skin:	Wash immediately with plenty of water. Take off immediately the contaminated clothing.
FIRE PREVENTION	
Extinguishing Media:	Whatever.
Specific risks:	Increasing in pressure.
Specific methods:	Use water spray to cool containers.
ACCIDENTAL RELEASE ACTIONS	
Personal precautions:	Evacuate personnel to safe areas. Provide adequate ventilation. Use personal protective equipment.
Environmental precautions:	Evaporate.
Cleaning method:	Evaporate.
HANDLING AND STORAGE	
Manipulation Action/technical precautions:	Provide sufficient air exchange and/or suction in work places.
Recommendations for safe use:	Do not breathe vapors or aerosol.
Storage:	CClose tightly and store in a cool, dry and well ventilated place. Store in original container. Incompatible products: explosive, flammable materials, Organic peroxide.
EXPOSURE CONTROL / PERSONAL PROTECTION	
Control parameters:	AEL (8-h e 12-h TWA) = 1000 ml/m ³ for each of the two components.
Respiratory protection:	For rescue and maintenance operation in storage tanks use self-contained respirator apparatus. The vapors are heavier than air and can cause suffocation by reducing oxygen available for breathing.
Eyes protection:	Safety glasses.
Protection of hands:	Rubber gloves.
Hygiene measures:	Do not smoke.
PHYSICAL AND CHEMICAL PROPERTIES	
Color:	Colorless.
Odor:	Light.
Boiling point:	-52.8°C at atmospheric pressure.
Lighting point:	It does not ignite.
Density:	1.08 kg/l at 25°C.
Solubility in water:	Negligible.
STABILITY AND REACTIVITY	
Stability:	No reactivity when used with the appropriate instructions.
Materials to avoid:	Highly oxidizing materials. Incompatible with magnesium, zinc, sodium, potassium and aluminum. The incompatibility is more serious if the metal is present in powdered form or if the surfaces were, recently, unprotected.
Decomposition products	These products are halogenated compounds, hydrogen fluoride, carbon oxides (CO, CO ₂) and 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 may cause narcotic effects. Inhalation of decomposed products of high concentrations may cause respiratory failure (pulmonary edema).
Long term toxicity:	Did not show any carcinogenic potential, teratogenic or mutagenic effects in animal experiments.
ECOLOGICAL INFORMATION	
Global Warming Potential GWP (R744=1):	2088
Ozone Depletion Potential ODP (R11=1):	0
Disposal considerations:	Usable with reconditioning.

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