MAXA HEATING & COOLING

Air-to-water heat pumps with axial fans

Technical Bulletin

Models

HWA2-AH 0270
HWA2-AH 0280
HWA2-AH 0290
HWA2-AH 04140
HWA2-AH 04155
HWA2-AH 04170



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BTE02700120001				**AIR-TO-WATER HEAT PUMPS WITH AXIAL FANS**

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1. DESCRIPTION OF UNIT AND TECHNICAL SPECIFICATIONS

Air-to-water heat pumps are designed for commercial and industrial applications. They feature a highly compact design while incorporating large-surface air-side heat exchangers, ensuring outstanding efficiency with some of the highest COP values in their class. The use of high-efficiency, heavy-duty scroll compressors guarantees excellent reliability and consistent performance over time.
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 FRAME

All units in the series are designed for outdoor installation and feature a frame made of hot-dip galvanized sheet steel, finished with polyester powder coating in RAL 7035 / RAL 7046 (selected components only) to ensure maximum resistance to weathering and atmospheric agents. The corrosion resistance rating is equivalent to Category C3 in accordance with EN ISO 12944-2:2017. All screws and inserts are made of galvanized steel and stainless steel.
The panel protecting the coil headers is finished in RAL 7043 (not fitted on units HWA2 0270 – 0290 equipped with a storage tank). The removable panels provide easy access for inspection and maintenance of the refrigeration and hydraulic circuit components.

1.2 COMPRESSORS

The compressors are of the scroll type, specifically designed for operation with R290, and are mounted on a double rail with rubber anti-vibration mounts. Each compressor is equipped with a crankcase heater that is energized whenever the compressor is switched off and is automatically de-energized when the compressor restarts. To ensure proper lubrication and prevent refrigerant migration, the unit should be powered and left in standby mode for at least 12 hours before being started, including after extended periods of shutdown. Cooling capacity is controlled through multiple capacity steps, the number of which depends on the quantity and size of the compressors installed in the unit. Cooling capacity is controlled through multiple capacity steps, the number of which depends on the quantity and size of the compressors installed in the unit.

1.3 AIR-SIDE HEAT EXCHANGERS

The air-side heat exchangers are manufactured with copper tubes and corrugated aluminium fins. The tubes are mechanically expanded into the fins to maximize heat transfer efficiency. The finned coil geometry has been optimized to minimize air-side pressure drop, allowing the fans to operate at lower speeds, thereby reducing the unit's sound levels. The heat exchangers are designed to minimize the refrigerant charge and are supplied as standard with a hydrophilic coating to improve cleaning during the defrost cycle.
As an optional accessory, the coils can be provided with the SILVER LINE anti-corrosion coating, offering enhanced corrosion resistance and reliable protection in virtually all environmental conditions.
Condensate collection and drainage trays are provided at the base of the heat exchangers.

1.4 USER-SIDE HEAT EXCHANGER

The load-side heat exchanger is a brazed plate heat exchanger made of stainless steel and factory-insulated with a closed-cell thermal insulation layer. Upon request, the heat exchanger can be equipped with an electric antifreeze heater (optional accessory KA1 / KA4). A differential pressure switch installed on the water side monitors the minimum water flow rate, preventing the unit from operating in the event of insufficient flow and thus avoiding ice formation.

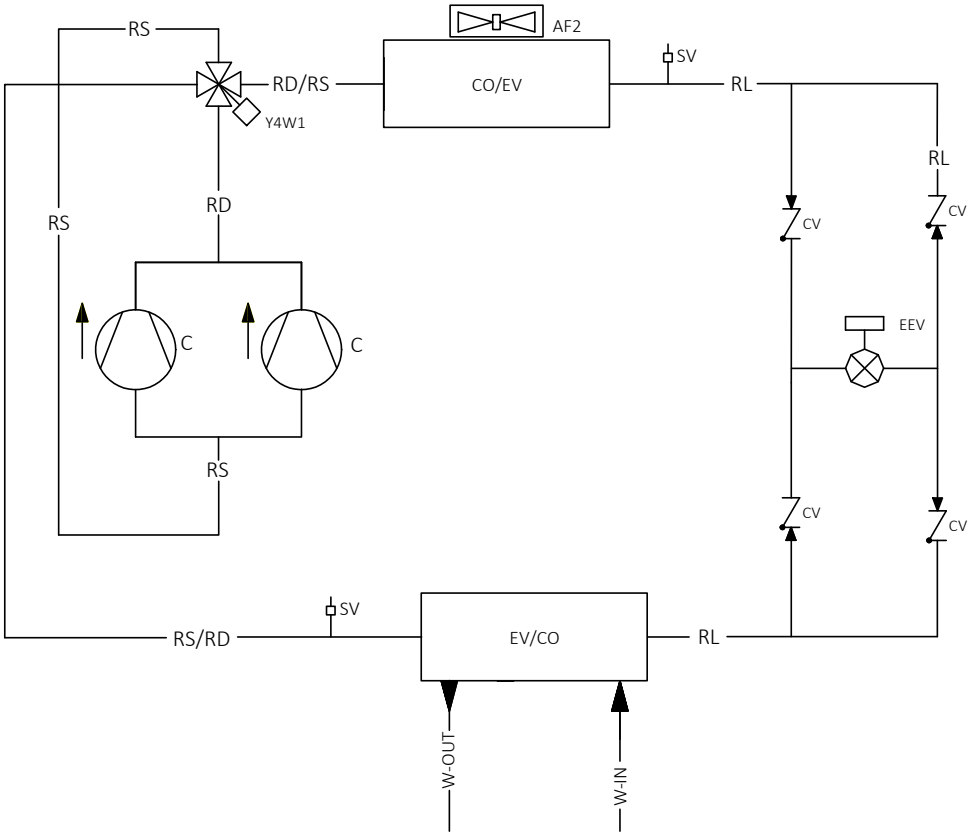
1.5 FAN

The fans are of the axial type with aerofoil-profile blades. They are statically and dynamically balanced and supplied complete with a protective grille and double-flared air inlet and outlet nozzles, specifically designed to improve efficiency and reduce noise levels. The motor has an IP54 protection rating in accordance with EN 60529.

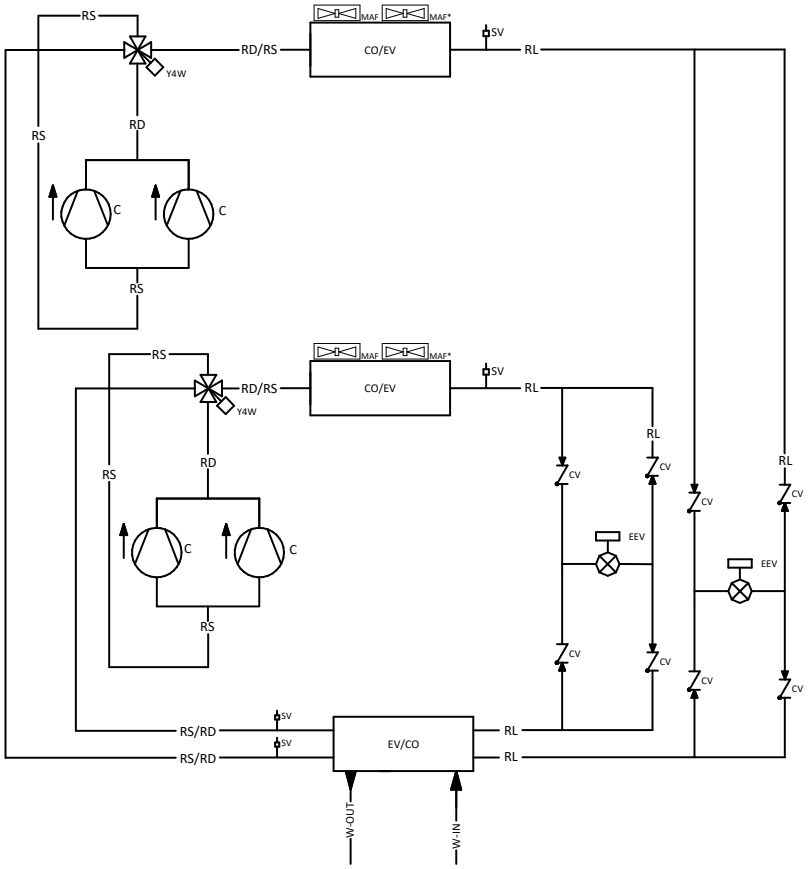
1.6 REFRIGERANT CIRCUIT

The refrigerant circuit is manufactured using components from leading international suppliers and in accordance with EN 13134. In its standard configuration, it includes: an electronic expansion valve, service valves for inspection and maintenance, safety devices compliant with current regulations (two high-pressure switches per circuit), pressure transducers for accurate monitoring of evaporation and condensation pressures, a high-capacity filter drier to prevent expansion valve blockage and remove any moisture from the circuit, a liquid sight glass for refrigerant charge inspection, a solenoid valve, a four-way reversing valve, a liquid separator, a liquid receiver, and an outdoor air temperature sensor.
The conceptual diagram of the heat pump is shown below.

Circuit diagram HWA2-AH 0270 / 0280 / 0290



Circuit diagram HWA2-AH 04140 / 04155 / 04170



LEGEND			
C	FIXED-SPEED COMPRESSOR	KAS	SUCTION LINE
CO/EV o CO	CONDENSER (IN CHILLER OPERATION)	RD	DELIVERY LINE
EV/CO o EV	EVAPORATOR (IN CHILLER OPERATION)	RD/RS	DISCHARGE/SUCTION LINE
EEV	ELECTRONIC EXPANSION VALVE	RS/RD	SUCTION/DISCHARGE LINE
AF	AXIAL FAN	RL	LIQUID LINE
SV	SERVICE CONNECTION	RLL	SERVICE CONNECTION
CV	NON RETURN-VALVE	W-IN	SYSTEM WATER INLET LINE
Y4W	4-WAY CYCLE REVERSING VALVE	W-OUT	SYSTEM WATER OUTLET LINE

1.7 ELECTRICAL PANEL

The electrical panel is fully assembled and wired in accordance with EN 60204 and includes both a power section and a control section. It is rated IP54 and is equipped with a terminal block with volt-free contacts for remote ON/OFF control.
The power section includes:

- Main disconnect switch with door interlock;
- Isolation transformer for the control power supply;
- Circuit breakers protecting the transformer, compressors, pump (where fitted) and fans;
- Phase sequence monitoring relay with minimum/maximum voltage protection settings;
- Phase sequence monitoring relay with minimum/maximum voltage protection settings;
- Safety sensor monitoring circuit.

1.8 CONTROL SYSTEM

All units are equipped with a microprocessor-based controller featuring superheat control logic managed according to the signals received from the pressure transducers and temperature sensors.
The control section includes:

- User interface terminal with alphanumeric display;
- Display of set values, analogue inputs, fault codes, alarm history and parameter index;
- ON/OFF push-button and alarm reset.
- Key combinations to force a defrost cycle and operate the pump at maximum speed.
- Local or remote unit start/stop control.
- ModBus communication interface provision.
- Alarm LED for R290 refrigerant leak detection.

The controller also manages the following functions:

- Water temperature control;
- Anti-freeze protection.
- Compressor timing and startup;
- Fan and circulation pump management (where fitted);
- Alarm reset;
- Alarms signalling;

1.9 CONTROL AND PROTECTIVE DEVICES

All units are equipped with the following control and protection devices:

- Phase monitor complete with under/over-voltage relay, which shuts down the unit if the phase sequence is incorrect or if the voltage of any phase differs by more than 10% from the others.
- Leaving water temperature sensor (with water anti-freeze protection function);
- Return water temperature sensor;
- Low-pressure transducer;
- High-pressure transducer;
- Compressor discharge temperature sensor,
- Compressor suction temperature sensor,
- Outdoor air temperature sensor,

- Circuit breakers protecting the transformer, compressors, pumps (where fitted) and fans.
- Fan thermal protection.
- Individual thermal protection for each compressor.
- Water-side differential pressure switch.
- Two manual-reset high-pressure switches installed on the compressor discharge line.

1.10 HYDRAULIC CIRCUIT

The HWA2-AH series can be supplied with a highly configurable integrated hydronic kit which, in addition to the differential pressure switch, may include either a single pump or twin pumps (one operating and one standby), suitable for chilled water with up to 50% glycol and directly controlled by the unit controller. An internally mounted buffer tank, externally insulated with closed-cell foam insulation and sized according to the unit capacity, can also be installed.
When the optional hydronic kit is fitted, the units are supplied with a 6-bar safety valve for connection to a drain system and a manual air vent valve. Additional options are described in detail in the following chapter.

1.11 R290 REFRIGERANT SAFETY

The HWA2-AH series is equipped with an automatic electronic system for detecting possible R290 refrigerant leaks.
When the R290 gas safety system is activated, the ATEX fan installed in the compressor compartment is switched on to ensure rapid dispersion and dilution of the gas. When the unit is equipped with a single-pump or dual-pump hydronic kit, a second R290 detector is provided to protect the hydronic section.

2. DESCRIPTION OF VERSIONS AND ACCESSORIES

2.1 VERSIONS

The following versions are available for the reverse-cycle heat pumps:

- HWA2-AH - Reverse-cycle heat pump.
- HWA2-AH BT - Reverse-cycle heat pump, BT version (for low water temperatures): the unit version BT extends the operating range of the unit, allowing the leaving water temperature to be reduced to as low as –8°C. In this case, the use of a water/glycol mixture is mandatory.

The unit code consists of the following elements:

- 5 fixed digits.
- Use the symbol as a separator.
- 19 variable digits (fields) identifying the unit size and factory-installed accessories.
- 2 variable digits (MC field) which identify the HWA2 series in any customisations.

02225#(RV)(PCF)(CI2)(KS)(KA)(FAN)(SIL)(EL)(TR2)(RA)(VF)(SF1)(IMB)(AC2)(MC)

Order code	02225#	HWA2-AH
Configuration	57	Reversible heat pump
	55	Reversible heat pump version BT
Model	070	0270
	080	0280
	090	0290
Hydronic configuration	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)
	5	Standard-head pump version with inverter (-PSI)
	6	High-head pump version with inverter (-PSIAP)
Tank	0	-
	2	Integrated technical storage (-SI) *
Antifreeze kit	0	-
	5	Heat exchanger and pump resistance (if present) (KA1)
	8	Heat exchanger, pump and Condensate drain (KA4)
Fan type	0	EC fan (EC) **
Acoustic insulation	0	-
	1	Silenced (-SL)
	2	Super-silenced (-SSL)
Compressor starting method	0	Standard (ON/OFF)
	1	Soft starter (SS)
Treatment	0	-
	4	Coil with Silverline treatment (TR2)
	5	With Silverline treatment on coil and treatment on sheet metal (TR2C4)
	6	Anti-corrosion treatment on sheet metal (C4)
Protective mesh guards	0	-
	1	Coil compartment protective mesh kit (GR2)
	2	Full protective mesh kit (GR4)
Refrigerator accessories	0	-
	4	Gas-side pressure gauges (MN)
Hoist ring kit	0	-
	1	Hoist ring kit (KS)
Packaging	0	-
	1	Shipping crate for container transport
	2	Container loading / unloading skid
-	0	-
-	01	-

02425#(RV)(PCF)(CI2)(KS)(KA)(FAN)(SIL)(EL)(TR2)(RA)(VF)(SF1)(IMB)(AC2)(MC)

Order code	02425#	HWA2-AH
Configuration	57	Reversible heat pump
	55	Reversible heat pump version BT
Model	414	04140
	415	04155
	417	04170
Hydronic configuration	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)
	5	Standard-head pump version with inverter (-PSI)
	6	High-head pump version with inverter (-PSIAP)
	7	Connection Stub Pipes (-KT)
Tank	0	-
	2	Integrated technical storage (-SI) *
Antifreeze kit	0	-
	5	Heat exchanger and pump resistance (if present) (KA1)
	8	Heat exchanger, pump and Condensate drain (KA4)
Fan type	0	EC fan (EC) **
Acoustic insulation	0	-
	1	Silenced (-SL)
	2	Super-silenced (-SSL)
Compressor starting method	0	Standard (ON/OFF)
	1	Soft starter (SS)
Treatment	0	-
	4	Coil with Silverline treatment (TR2)
	5	With Silverline treatment on coil and treatment on sheet metal (TR2C4)
	6	Anti-corrosion treatment on sheet metal (C4)
Protective mesh guards	0	-
	1	Coil compartment protective mesh kit (GR2)
	2	Full protective mesh kit (GR4)
Refrigerator accessories	0	-
	4	Gas-side pressure gauges (MN)
Hoist ring kit	0	-
	1	Hoist ring kit (KS)
Packaging	0	-
	1	Shipping crate for container transport
	2	Container loading / unloading skid
-	0	-
-	01	-

*Option not available if no hydronic configuration has been selected (-PS/-PSI/-PSIAP/-PD/-PDAP/-PSAP).

2.2 ACOUSTIC CONFIGURATION

One of the following acoustic configurations can be selected:

- -SL Low-noise version.
  The low-noise version features innovative acoustic insulation applied to the technical compartment panels. This system significantly reduces operating noise, improving the acoustic comfort of the surrounding environment.
- -SSL Super low-noise version.
  The super low-noise version combines the acoustic insulation applied to the technical compartment panels with a special diffuser fitted to the fans. This diffuser improves fan efficiency, allowing lower fan speeds, reducing sound pressure levels and optimizing energy consumption.

The -SSL version is equipped as standard with EC fans.

2.3 HYDRONIC KIT

The heat pump can be supplied with one of the following hydronic kits:

- -PS – Unit equipped with a fixed-speed pump.
- -PSAP – Unit equipped with a fixed-speed high-head pump.
- -PSI – Unit equipped with a pump controlled by an external inverter installed in the electrical panel.
- -PSIAP – Unit equipped with a high-head pump controlled by an external inverter installed in the electrical panel.
- -PD – Unit equipped with a fixed-speed pump and a second standby pump.
- -PDAP – Unit equipped with a fixed-speed high-head pump and a second high-head standby pump.
- **-SI - Unit equipped with an integrated storage tank; option available only when one of the available hydronic kits is selected (-PS / -PSI / -PSIAP / -PD / -PDAP / -PSAP). In this version, the unit is extended to accommodate the storage tank and the expansion vessel.

Hydronic kit characteristics			
Models	**-**	**0270 / 0280 / 0290**	**04140 / 04155 / 04170**
Tank volume	L	340	450
Expansion vessel volume	L	24	24

- -KT - Unit equipped with connection pipes that extend the heat exchanger connections to a more accessible position, facilitating installation and connection to the system. The kit also includes an air vent, a safety valve set to 6 bar, and a drain valve. This accessory is available exclusively for sizes 04140, 04155 and 04170.

2.4 ACCESSORIES LIST

The available accessories al listed below.

Description	Accessory	Standard	Factory-fitted	Supplied loose/ activable after delivery
EC - EC fan		•	•	
Liquid line solenoid valve		•	•	
Liquid / humidity indicator		•	•	
Brazed filter drier		•	•	
Differential pressure switch (flow presence signal)		•	•	
DSFR – Three-phase monitoring relay for under-/over-voltage and phase loss/phase sequence protection.		•	•	
IM - Magnethermic switch for control transformer,compressors, fans and pump (if present)		•	•	
Mechanical seal for glycol concentration up to 50%		•	•	
Condensate collection pan for defrost water		•	•	
Water-side safety valve and water filling/drain valves (only with the hydronic kit installed).		•	•	
CM – BMS connectivity via ModBus protocol.		•	•	
Remote on/off voltage-free contact		•	•	
Contact for DHW management with 3-way diverter valve		•	•	
Summer/winter collection		•	•	
Voltage-free contact for Summer/Winter selection		•	•	
Summer / Winter signalling		•	•	
Digital input for double set-point *		•	•	
Machine lockout signal *		•	•	
Defrosting signal *		•	•	
Compressor on/off signalling *		•	•	

Description	Accessory	Standard	Factory-fitted	Supplied loose/ activable after delivery
Editing the dynamic set-point - climate curve (via external air probe fitted in the unit)		•	•	
SG Ready – Contacts for interfacing the unit with the public power grid for efficient grid load management.		•	•	
KA1 – Anti-freeze heater for the heat exchanger and pump (where fitted).	•		•	
KA4 – Anti-freeze heater for the heat exchanger, pump (where fitted) and condensate collection trays.	•		•	
TR2 – Cu/Al coil with Silver Line surface treatment.	•		•	
TR2C4 - Cu/Al coil with Silver Line anti-corrosion treatment and C4-class corrosion protection for sheet metal	•		•	
C4 - Sheet metal with C4 anti-corrosion treatment and stainless steel fasteners	•		•	
Cu/Al coil with pre-painted fins	•		•	
GR2 – Coil compartment protection kit.	•		•	
GR4 – Full protection kit.	•		•	
SS - Soft starter	•		•	
KS – Lifting bracket kit.	•		•	
MN - Refrigerant-side pressure gauges.	•		•	
Shipping crate for container transport	•		•	
Container loading/unloading skid	•		•	
AG - Rubber antivibration dampers	•			•
AM - Spring antivibration dampers	•			•
FY - Y-filter	•			•
SAS - Remote probe	•			•
TQE - Electrical panel weather hood	•			•
RV - Grooved connection joint	•			•
ISK - Serial converter USB RS485	•			•
LNC – Local LAN/Wi-Fi gateway **	•			•
OVPN – Remote OpenVPN LAN/Wi-Fi/4G gateway **	•			•
Hi-TV415 - Remote display Touch screen	•			•
DA - Deaerator	•			•
FD – Magnetic dirt separator / inspectable deaerator	•			•
VSA – Anti-freeze drain valve.	•			•
VDIS5 / VDIS6 - Three-way diverting valve for DHW production	•			•

* Options that can be selected as alternatives.

** Options that cannot be selected together.

2.5 ACCESSORIES DESCRIPTION

2.5.1 Factory-installed standard accessories

DSFR – Three-phase monitoring relay for under-/over-voltage and phase loss/phase sequence protection.

It monitors the presence of all three phases in the correct sequence and verifies that all phase-to-phase voltages are within the preset limits. The under-voltage and over-voltage thresholds can be adjusted independently.

IM – Circuit breakers.

Overcurrent protection devices for the transformer, compressors, pumps (where fitted) and fans. They protect the components against damage caused by current surges.

Mechanical seal for pumps operating with glycol concentrations up to 50% (standard on all pumps).

Mechanical seal suitable for water/glycol mixtures with glycol concentrations of up to 50% by weight. The permitted combinations of water temperature and glycol concentration are listed below. For operating conditions outside these limits, please contact the factory for proper sizing according to the required operating point.

Water supply temperature	% glycol permitted
$-8°C < T_w < 5°C$	35% max.
$T_w > 5°C$	50% max.

Summer/winter mode indication.

Auxiliary relays providing volt-free contacts for remote indication of the operating mode (summer/winter).

Compressor ON/OFF signalling

Auxiliary relays providing volt-free contacts for remote indication of compressor operation.
Can be selected as an alternative (see table).

General alarm/unit lockout signalling

Auxiliary relays providing voltage-free contact for remote indication of unit lockout.
Can be selected as an alternative (see table).

Defrost indication

Auxiliary relays providing voltage-free contact for remote indication of defrost cycle in progress.
Can be selected as an alternative (see table).

Digital input for double set-point

Input allowing the set point to be changed.
Can be selected as an alternative (see table).

Remote on/off voltage-free contact

Terminal block contact for remote unit start/stop enable.

Voltage-free contact for Summer/Winter selection

Terminal block contact allowing remote selection of the heat pump operating mode (heating or cooling).

Voltage-free contact for remote sensor.

Terminal block connection for a remote sensor for either the system or the domestic hot water circuit.

Editing the dynamic set-point - climate curve (via external air probe fitted in the unit)

The controller automatically adjusts the set point by applying an offset based on the outdoor air temperature measured by the external sensor.

Domestic hot water (DHW) control contact with three-way diverter valve.

Contact for controlling the diverter valve dedicated to domestic hot water production. An auxiliary contact is also provided to power a heater installed on the valve actuator, ensuring correct operation at ambient temperatures below 0°C.

Defrost condensate drip tray

AISI 304 stainless steel condensate drip tray installed beneath the coils, designed to collect and drain defrost water. It is provided with a connection for a drain pipe and can be equipped with an electric anti-freeze heater to ensure proper drainage of defrost water in climates where the ambient temperature falls below 5°C.

Water-side safety valve.

Protects the hydraulic system against pressures exceeding 6 bar. Available only with single-pump and twin-pump hydronic kits.

Water filling/drain valve.

Valve installed at the bottom of the unit hydraulic circuit for filling and draining. Available only with single-pump and dual-pump hydronic kits.

CM – BMS connectivity via ModBus protocol.

Accessory enabling the unit to be connected to external controllers via an RS-485 serial communication line using the ModBus RTU protocol.

2.5.2 Factory-installed optional accessories

KA1 – Anti-freeze heater for the heat exchanger and pump (where fitted).

Electric heater installed on the front face of the brazed plate heat exchanger, activated when the water temperature inside the heat exchanger falls below +4°C.
When the unit is equipped with a hydronic kit including a pump, the pump is also fitted with an anti-freeze heater to protect it against ice formation.

KA4 – Anti-freeze heater for the heat exchanger, pump (where fitted) and condensate collection trays.

Electric heater installed on the front face of the brazed plate heat exchanger, activated when the water temperature inside the heat exchanger falls below +4°C.
In addition, an electric heater is installed in the condensate drip tray to ensure proper drainage of defrost water and prevent ice formation when the ambient temperature falls below 3°C.
When the unit is equipped with a hydronic kit including a pump, the pump is also fitted with an anti-freeze heater to protect it against ice formation.
Depending on the unit version, the installer must adjust the heater activation and deactivation temperatures according to the heat transfer fluid and the operating conditions. The table below provides the reference values for increasing glycol concentrations.

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 + 35% ethylene glycol	-8	-4

TR2 – Cu/Al coil with Silver Line surface treatment.

Finned heat exchangers with copper tubes and aluminium fins, treated with a special polyurethane-based coating for corrosion protection. The coating maintains sufficient flexibility to withstand thermal expansion and contraction, provides excellent UV resistance, and repels dirt. It ensures reliable coil protection in virtually all environmental conditions, from marine and rural to industrial and urban environments. For specific cleaning instructions relating to treated coils, refer to the relevant section of the User/Installer Manual. The coating has been tested for 6,000 hours in accordance with ASTM B117.

TR2C4 - Anti-corrosion treatment

Includes the TR2 coil treatment and, in addition, the hot-dip galvanized steel panels are painted to ensure suitability for installation in C4H environments in accordance with EN ISO 12944. The external fasteners are made of AISI 304 stainless steel (A2 class).

C4 – Sheet metal and stainless steel fastener treatment.

The hot-dip galvanized steel panels are painted to ensure suitability for installation in C4H environments in accordance with EN ISO 12944. The external fasteners are made of AISI 304 stainless steel (A2 class), providing excellent corrosion resistance and long service life.

GR2 – Coil compartment protection kit.

Protective grille designed to safeguard the coil area and prevent accidental contact. Available factory-installed or supplied as a separate accessory.

GR4 – Full protection kit.

Protective grille designed to prevent accidental contact with both the coil section and the hydraulic components. Available factory-installed or supplied as a separate accessory.
Material: stainless steel.

The grille kit protects the battery and hydraulic component areas against accidental contact. The lower part of the unit remains open, and the kit does not provide complete protection against animal access.

SS - Soft starter

Electronic soft starter installed inside the electrical panel, designed to reduce inrush current and minimize mechanical stress on the motor windings during start-up.
The table below shows the expected maximum inrush current values with this accessory installed. The values are indicative and include a tolerance of ±10%, depending on the actual operating conditions at start-up.

Current value		0270	0280	0290	04140	04155	04170
Maximum inrush current with soft starter (SS)	A	150	179	182	180	210	216

KS – Lifting bracket kit.

Structural components designed to ensure safe lifting and correct positioning of the unit during handling and installation.

MN - Refrigerant-side pressure gauges.

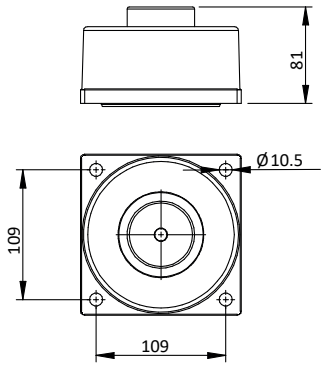
Two external pressure gauges are installed for visual monitoring of the high- and low-side refrigerant pressures, mounted on the technical compartment closing panel. One set of pressure gauges is provided for each refrigerant circuit installed on the unit.

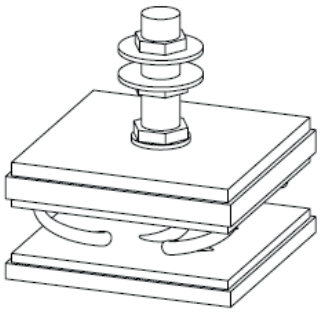
2.5.3 Optional accessories supplied separately / installable after delivery

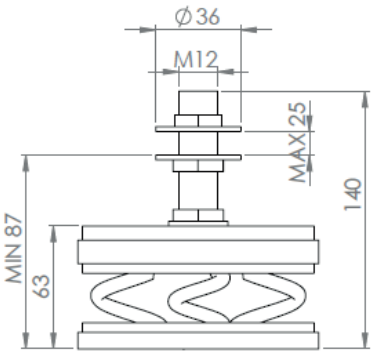
AG – Rubber anti-vibration mounts / AM – Spring anti-vibration mounts.

Designed to prevent vibration transmission to the supporting structure. They are installed beneath the unit using the dedicated mounting holes. Details of the rubber and spring anti-vibration mounts are provided below.

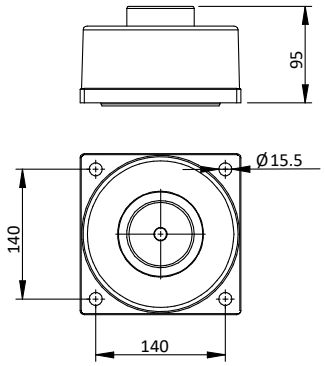
HWA2-AH 0270 / 0280 / 0290

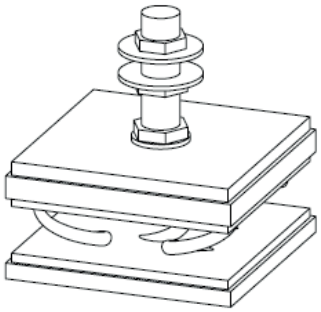


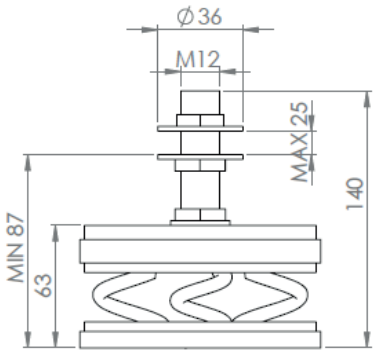




HWA2-AH 04140 / 04155 / 04170







FY - Y-filter

It contains an AISI 304 stainless steel mesh filter (800 µm filtration, PN16) that retains solid particles contained in the water. This prevents clogging and/or damage to the devices installed downstream of the filter.
The filter is supplied complete with piping and a grooved coupling, sized according to the diameter of the unit connections.

SAS - Domestic hot water probe / System remote probe

In certain system configurations (e.g. a heat pump operating in parallel with a boiler on the same hydraulic circuit and equipped with a change-over valve), it may be necessary to enable a system temperature sensor to allow the unit controller to manage operation correctly. The remote system sensor controls the heat pump only during compressor start-up, while compressor shutdown is managed by the leaving water temperature sensor installed on the heat pump.

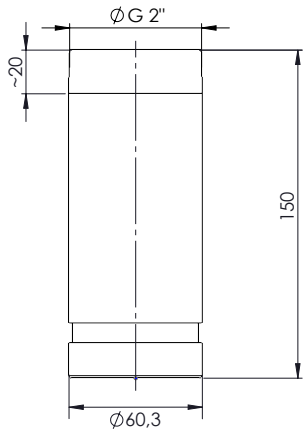
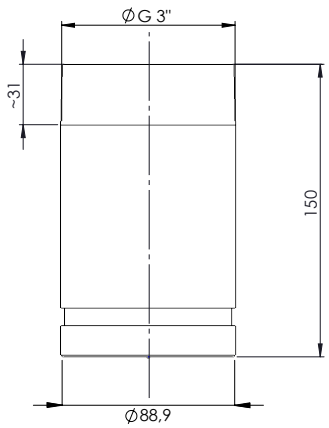
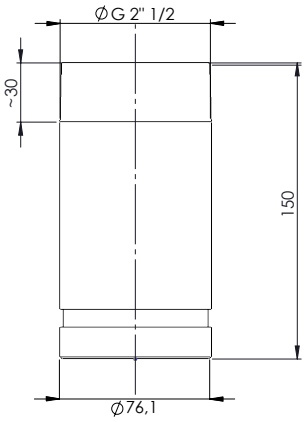
TQE - Electrical panel weather hood

Sheet metal protective roof to be installed during assembly, designed to protect the electrical panel from rain while the user is operating the control system or maintenance personnel are accessing the unit.

RV - Grooved connection joint

To simplify installation to the system, a carbon steel pipe spool is available. It features a grooved connection on one end, compatible with the unit connection and supplied with the appropriate coupling for installation, and a threaded connection on the other end. The kit includes two pipe spools and two grooved couplings for connecting the spools to the unit.

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

0270 / 0280 / 0290	04140 / 04155 / 04170 Heat Exchanger Connection	04140 / 04155 / 04170 -KT / -PS / -PSI / -PSAP / -PSIAP / -PD / -PDAP / -SI
		

ISK - USB/RS485 Serial Converter

Interface device capable of reading and writing control registers via the RS485 standard and converting it to a USB port that can be connected to any supervisory system.

LNC - LAN/Wi-Fi Local Converter

Device that allows the unit to be connected to a local network via Ethernet cable or Wi-Fi for remote monitoring.

OVPN - OpenVPN LAN/Wifi 3G Remote Converter

Device that allows remote connection to the unit through an industrial router using the secure OpenVPN service.

Hi-TV415 - Multifunctional touch screen remote control

Touchscreen remote controller for the centralized management of a heat pump network. It integrates humidity and temperature sensors for thermo-hygrometric analysis of the environment and supports dual setpoint management for underfloor radiant systems equipped with a dehumidification system. It can manage a cascade of chillers/heat pumps with up to 7 units.

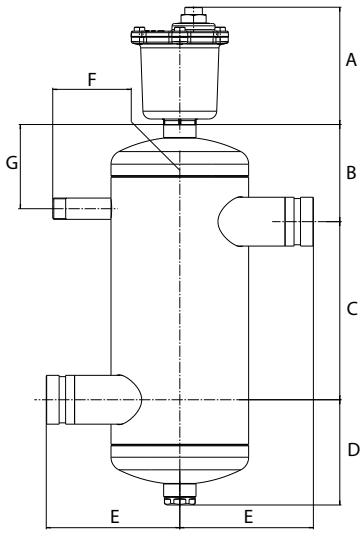
DA - Deaerator

WARNING: The system designer is responsible for assessing and managing the risk of propane migrating into the heat transfer fluid and being carried into the occupied areas of air-conditioned buildings. This risk can be mitigated by installing the optional air separator or by using an intermediate heat exchanger to separate the primary circuit from the secondary circuit serving the building. Any additional risk mitigation measures shall be determined by the system designer based on their own assessment.

Component designed to separate, collect and automatically discharge large quantities of air and other gases dissolved in the water from the very first passage of the fluid through the hydraulic circuit. Its high removal efficiency ensures optimum system operation. The air separator is also equipped with a dedicated safety valve.

Technical characteristics	HWA2-AH	
	0270 / 0280 / 0290	04140 / 04155 / 04170
Material	Stainless steel (body) / Brass (air vent valve) / EPDM (seals)	
Application fluid	Water (*)	
Maximum operating pressure	6 bar	
Maximum operating temperature	90 °C	
Connections	DN 50 Victaulic	DN 100 Victaulic
Kv	65 m^3/h	130 m^3/h

(*) When using water/glycol mixtures, the installation of an intermediate heat exchanger is recommended to avoid reducing the efficiency of the air separator.



Dimensions		HWA2-AH	
		0270 / 0280 / 0290	04140 / 04155 / 04170
DN	mm	50	100
A	mm	145	158
B	mm	120	206,5
C	mm	220	400
D	mm	130	206,5
E	mm	165	260
F	mm	157	157
G	mm	104	206,5
Weight	kg	6,6	20,7

VDIS5 / VDIS6 - Three-way diverting valve for DHW production

Valve that diverts the water flow produced by the heat pump between the system circuit and a buffer tank for domestic hot water (DHW) production. Motorized three-way ball valve, complete with actuator and spacer to ensure proper operation with glycol-water mixtures.

Technical characteristics	HWA2-AH	
	0270 / 0280 / 0290	04140 / 04155 / 04170
DN	Threaded F 2”	Threaded F 3”
Kvs	45	65



CAUTION: Install the valve outside the hazard and safety zones specified in Chapter 3.3.

VSA – Anti-freeze drain valve.

Accessory designed to protect the unit when exposed to low outdoor air temperatures. Refer to the dedicated chapter for further details.

2.5.4 Available configurations

The following section describes the available configuration combinations according to the selected options.

Legend	
A-F	Factory enabled
A	Can be enabled
NC	Not configurable
A*	Mutually exclusive options (enabling one disables the other)
A**	Mutually exclusive options (enabling one disables the other)

Unit type	Available function										
	On/off contact	SG Ready	Contact for DHW management	Summer/winter collection	Remote probe contact	Dynamic set-point	Compressor ON/OFF signalling	General alarm/unit lockout signalling	Defrost indication	Summer/winter mode indication.	Second set-point management
Standard unit	A-F	NA	A*	A	A	A*	A*	A*	A*	A	A*

2.6 SAFETY INSTRUCTIONS FOR THE TRANSPORT AND STORAGE OF R290 UNITS

Before opening the unit's packaging, check for gas leaks in the area using an appropriate gas detector. Ensure there are no ignition sources near the unit.
Do not smoke near the unit;
Units must be transported and stored in accordance with current national regulations. Specifically, according to the provisions of ADR, which regulates the transport of goods by road and rail in Europe, the maximum total quantity per transport unit in terms of net mass in kg for flammable gases is 333. In addition, for road transport, use vehicles that are preferably open or equipped with a ventilation system and operated by trained personnel.
The units are R290 heat pumps and, according to the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), are assigned UN number 3358 (REFRIGERATING MACHINES containing flammable, non-toxic, liquefied gas). As the refrigerant charge is less than 12 kg per circuit, compliance with the ADR requirements is not necessary.
For prerequisites on the transport by sea of equipment charged with flammable refrigerant, refer to the International Maritime Dangerous Goods Code (IMDG), and for transport by air check the regulations prescribed by the International Air Transport Organisation (IATA).
If the unit must be stored for medium- to long-term periods, observe the following precautions:

- if stored in a closed location, leave the machine in a dedicated place that is always dry, cool, well ventilated and protected from possible ignition sources, direct sunlight or other heat sources. We also recommend using one flammable gas detection sensor every 36-40 m^2. Always refer to national regulations;
- if stored in an open area, observe the minimum safety distances from drains, cisterns, sewers and other underground areas, in accordance with current national regulations;
- do not remove covers and packaging;
- ensure that all panels are correctly mounted;
- do not obstruct the openings and holes made in the machine panels;
- avoid cleaning the unit with aggressive detergents or chemicals;
- We recommend removing any heating water inside the unit to prevent possible corrosion or, in cold climates, damage to components caused by freezing.



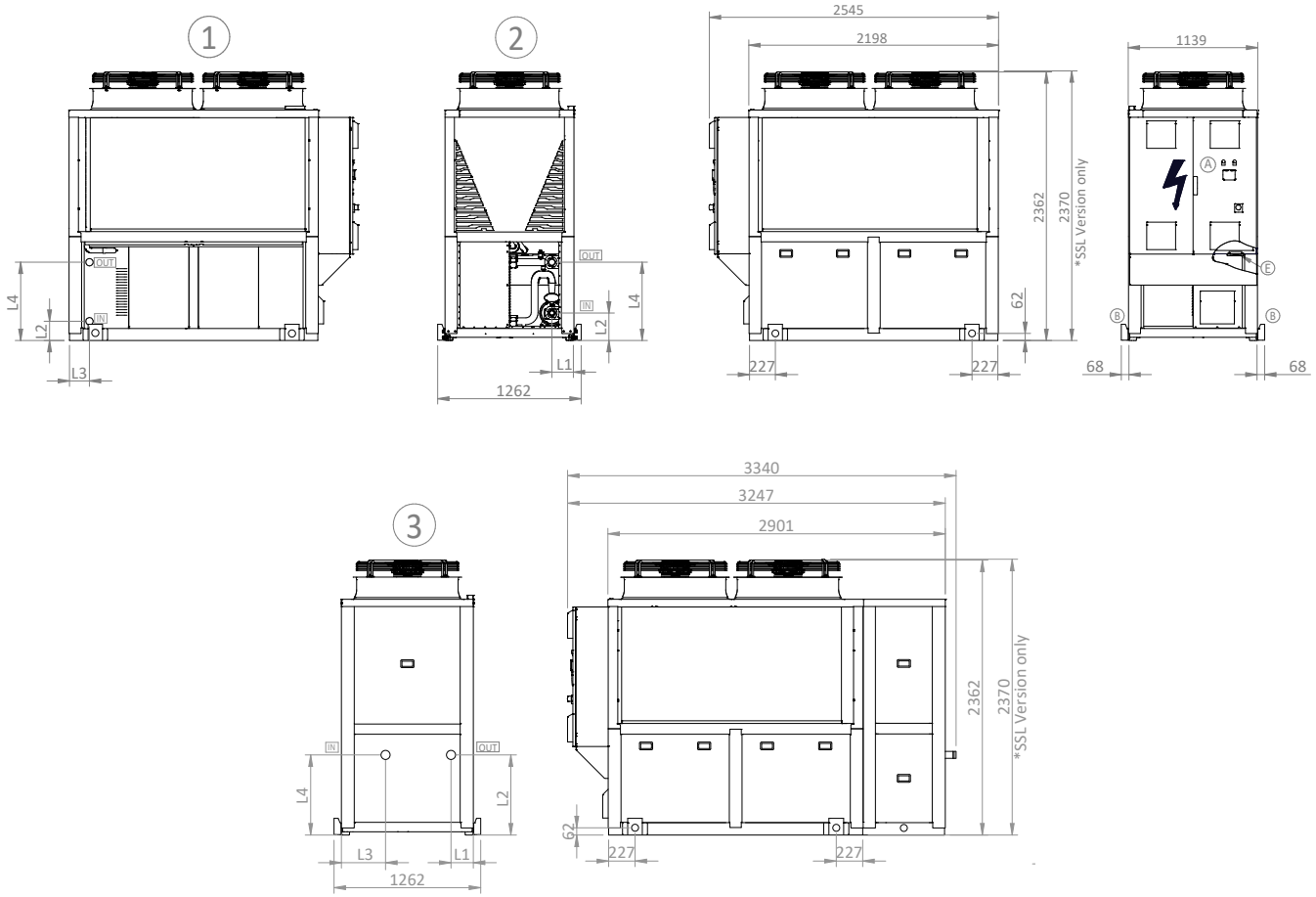
CAUTION: When transporting and storing the unit, beware of possible refrigerant gas leaks that could start a fire.

3. INSTALLATION

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

3.1.1 Models HWA2-AH 0270 / 0280 / 0290

Model HWA2-AH with packaging	Lenght max with packaging [mm]	Width max with packaging [mm]	Height max with packaging [mm]
0270 / 0280 / 0290	2600	1300	2500
0270 / 0280 / 0290 with tank kit (-SI)	3400	1300	2500



Legend	
Electrical panel	A
Lifting bracket	B
Power supply input	E
* Accessory	

Version		L1 [mm]	L2 [mm]	L3 [mm]	L4 [mm]	IN / OUT
1	Standard	-	170	176	690	2” Victaulic
2	Single pump – Dual pump	190	245	-	170	
3	Single pump – dual pump with tank	190	690	370	690	

3.1.2 Models HWA2-AH 04140 / 04155 / 04170

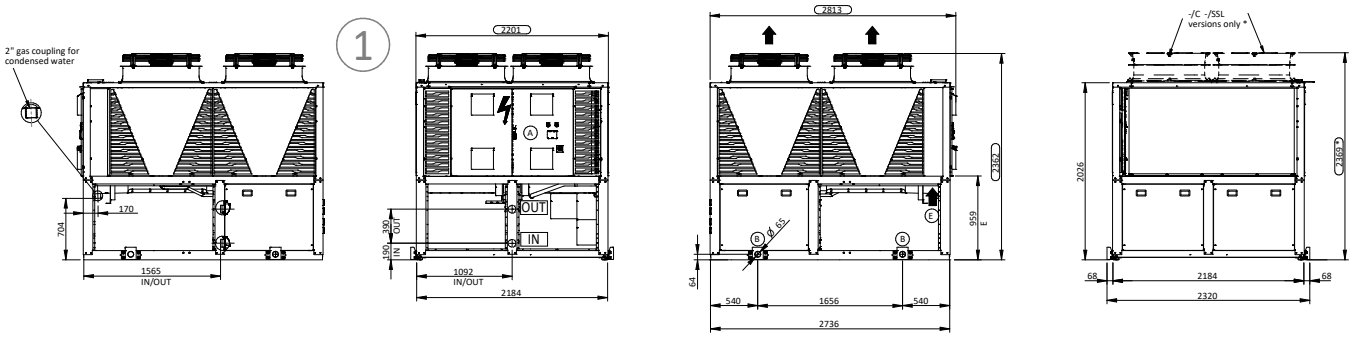
The following shows the standard dimensions and position of the connections. The unit is supplied as standard with the water connections oriented towards the right-hand side (front view — electrical panel side). During installation, the connections can also be rotated towards the front or towards the left-hand side of the unit. For the relevant dimensions and views of the different configurations, refer to the specific dimensional drawings.

Legend	
Electrical panel	A
Lifting bracket	B

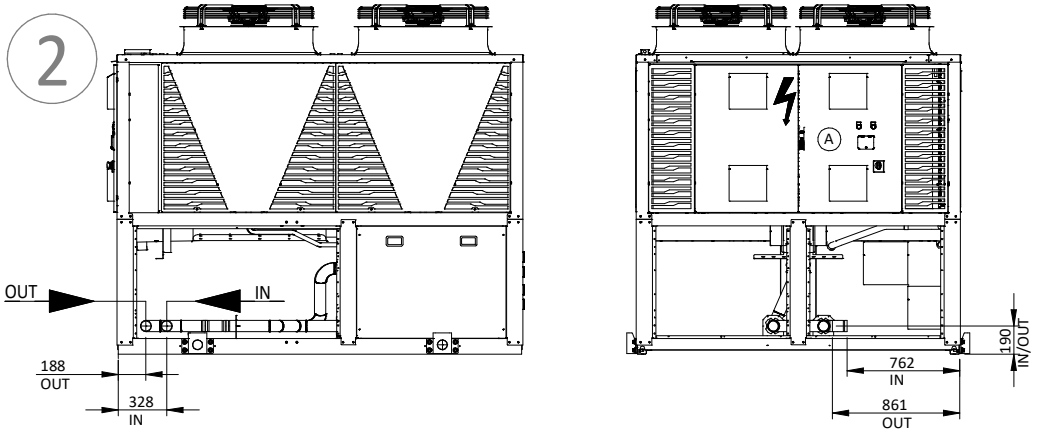
Legend	
Power supply input	E
* Accessory	

Version		IN / OUT
1	Standard	3” Victaulic
2	Connection pipes	2” ½ Victaulic
3	Single pump – Dual pump	
4	Single pump – dual pump with tank	

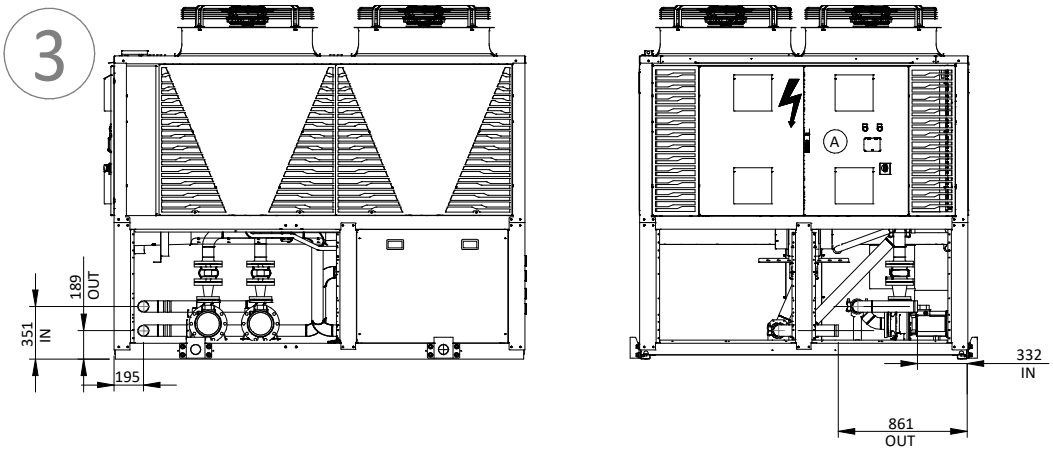
Standard version



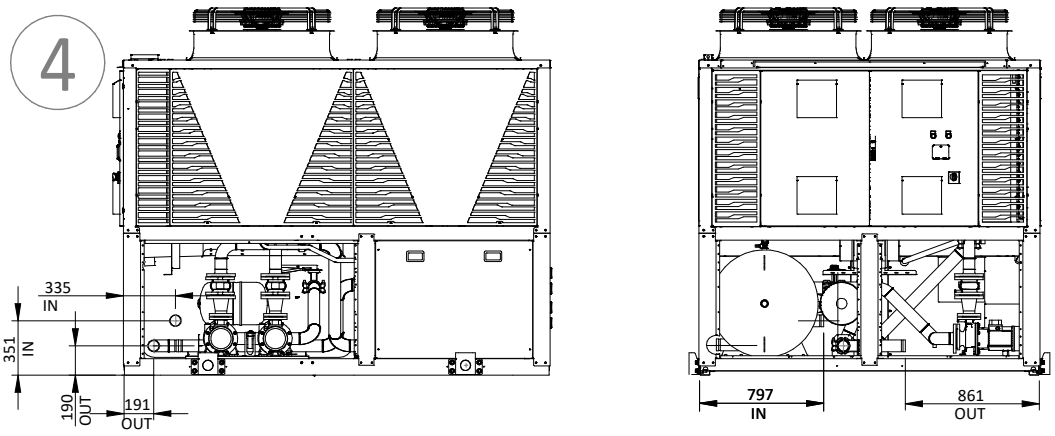
Connection pipes



Single pump – Dual pump



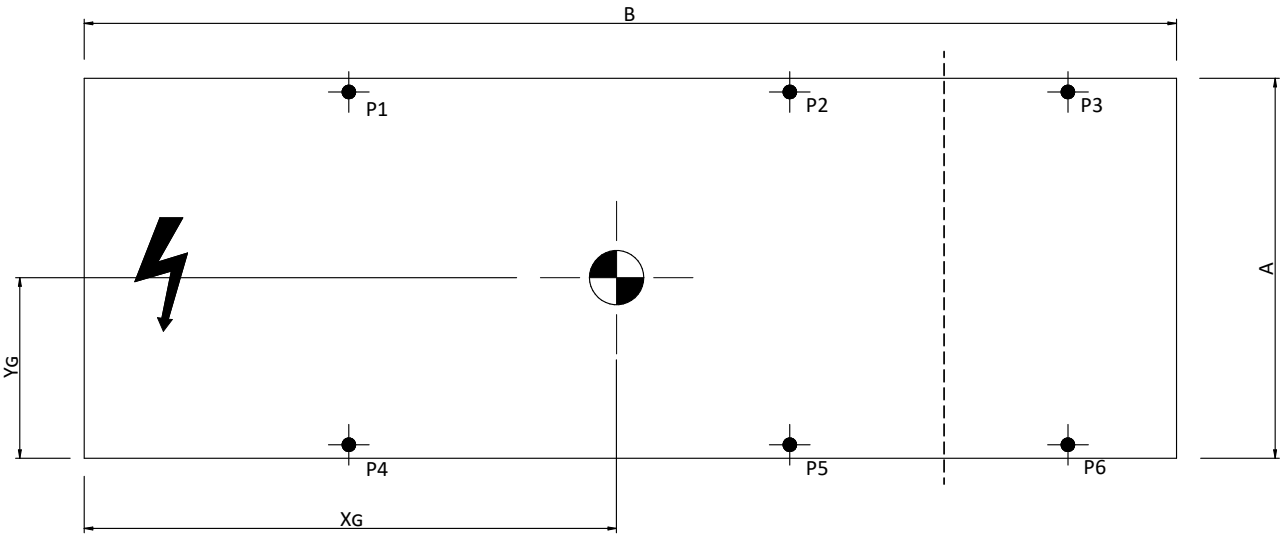
Single pump – dual pump with tank



3.1.3 Weights and location of the centre of gravity

The center of gravity position of each unit is indicated in the tables, with reference to the dimensions shown in the figure. A distinction is made between the standard unit, the unit equipped with a hydronic kit, and the unit with both hydronic kit and tank installed.

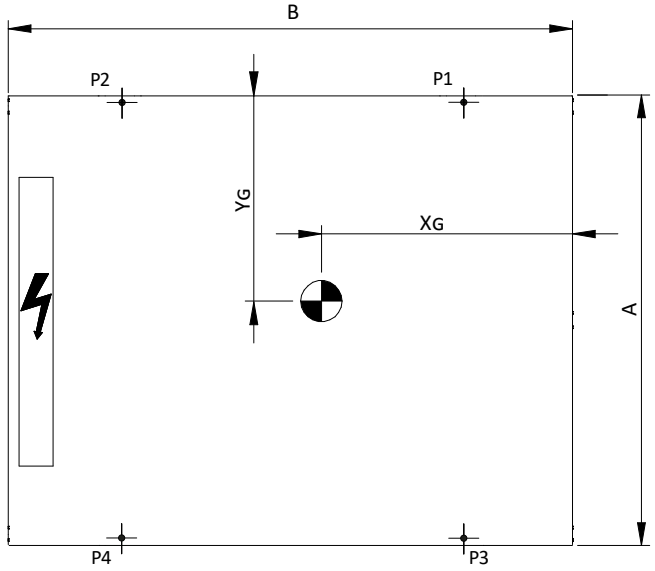
Models HWA2-AH 0270 / 0280 / 0290



Model HWA2-AH	Version	A [mm]	B [mm]	X [mm]	Y [mm]
0270 / 0280 / 0290	Standard	1262	2545	1210	450
	Single pump – Dual pump -PS/-PSI/-PSAP/-PSIAP/-PD/-PDAP			1260	485
	Single pump – dual pump with tank -PS/-PSI/-PSAP/-PSIAP/-PD/-PDAP -SI		3340	1535	495

Version	Models	Standard	with pump / dual pump	with pump / dual pump and tank
HWA2-AH 0270 / 0280 / 0290	Shipping weight [kg]	960	1060	1260
	Operating weight [kg]	970	1070	1600

Models HWA2-AH 04140 / 04155 / 04170



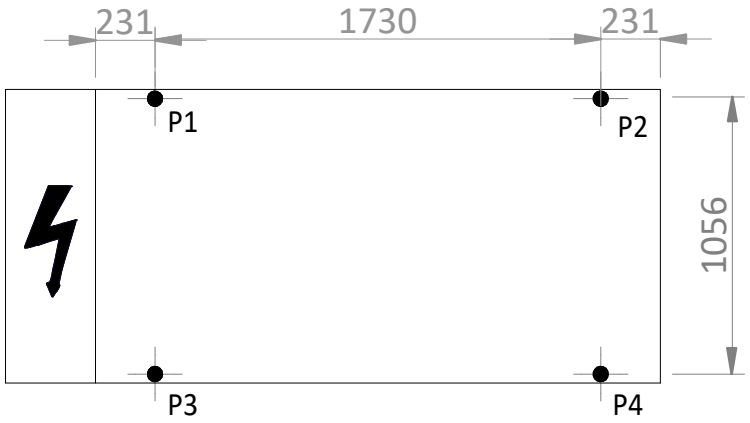
Model HWA2-AH	Version	A [mm]	B [mm]	X_G [mm]	Y_G [mm]	Z_G [mm]
04140	Standard	2184	2736	1172	1096	1033
04155				1173	1096	1034
04170				1170	1096	1030
04140	Connection pipes			1193	1096	1009
04155				1194	1096	1010
04170				1191	1096	1006
04140	Single pump – Dual pump (-PS/-PSI/-PSAP/-PSIAP/-PD/-PDAP)			1253	1148	957
04155				1260	1154	951
04170				1258	1153	950
04140	Single pump – dual pump with tank (-PS/-PSI/-PSAP/-PSIAP/-PD/-PDAP -SI)			1394	996	852
04155				1398	1002	849
04170				1396	1002	848

Version	Models	Standard	Connection pipes	with pump / dual pump	with pump / dual pump and tank
HWA2-AH 04140	Shipping weight [kg]	1795	1835	1980	2055
	Operating weight [kg]	1805	1855	2010	2525
HWA2-AH 04155	Shipping weight [kg]	1800	1835	2000	2075
	Operating weight [kg]	1805	1860	2030	2550
HWA2-AH 04170	Shipping weight [kg]	1805	1845	2010	2085
	Operating weight [kg]	1815	1870	2040	2560

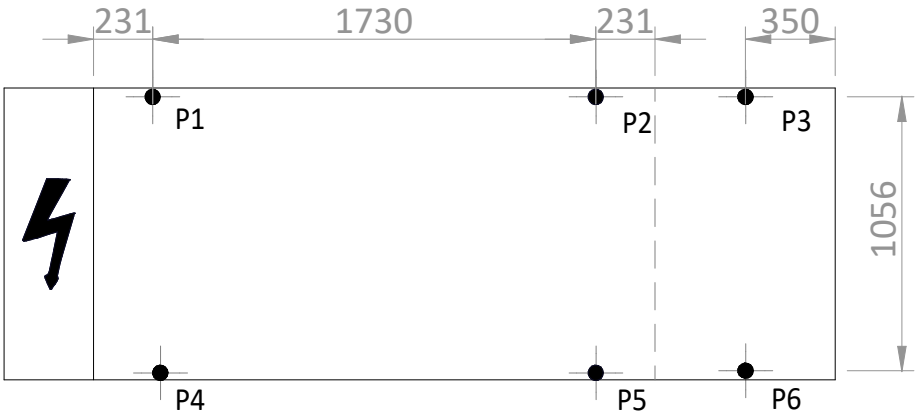
3.1.4 Position of vibrations dampers

The installation positions of the anti-vibration mounts for each unit configuration are shown in the following figures.
The dimensions refer to the top view.

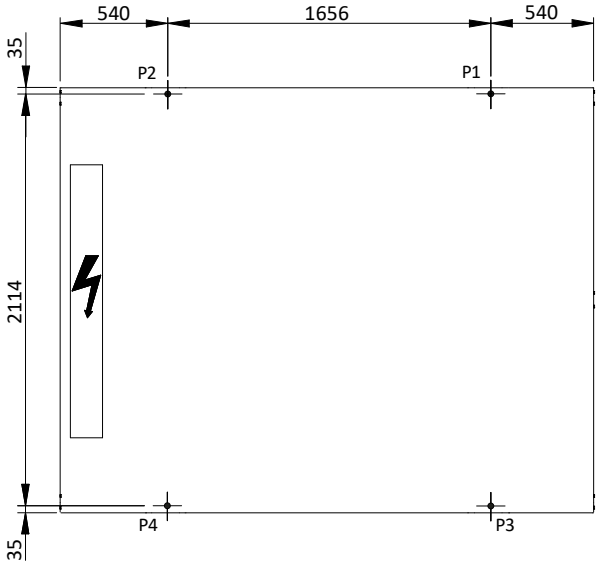
Standard unit
Models HWA2-AH 0270 / 0280 / 0290



Unit with hydronic kit
Models HWA2-AH 0270 / 0280 / 0290



Standard unit and unit with hydronic kit
Models HWA2-AH 04140 / 04155 / 04170

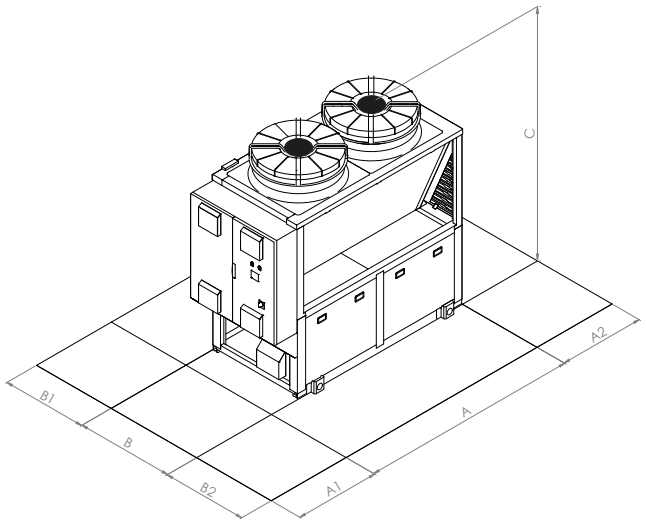


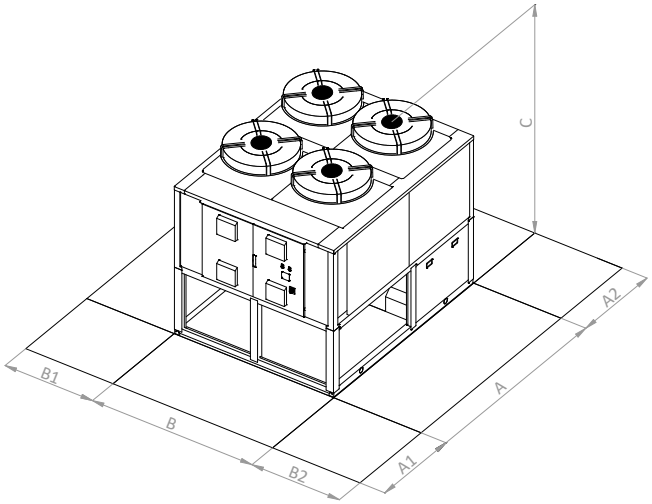
3.2 TECHNICAL SERVICE AREAS

All models in the HWA2 series are designed and constructed for outdoor installation. The company is not liable for any damage to property, animals and/or persons resulting from failure to comply with the instructions on installing the unit given in this manual.
It is good practice to create an adequately sized support base for the unit. The units transmit a small amount of vibrations to the ground: however, it is advisable to place anti-vibration mounts between the base frame and the supporting surface. It is preferable to install the unit away from places sensitive to noise and vibration (e.g. windows and glass panes).
Always conduct an environmental impact assessment based on the power and sound pressure data given in chapter and the sound emission limits according to the unit's installation area, with reference to the DPCM of 14/11/1997. An assessment must also be conducted if the unit is installed near workers, according to LEG. DEC. 81/2008 Art. 189 and subsequent amendments.

	**The unit is designed for installations in class III (see specifications and definitions given in EN 378-3 and Clause 5.3 of EN 378-1) with access category "b" (supervised access; see Clause 5.11 of EN 378-1). Installation with access category "a" (general access) is not permitted, as the unit charge is > 5 kg per circuit.**
	**As this is an occupied area with supervised access (category "b"), appropriate measures must be implemented to restrict access to authorised personnel only.**
	**The installation location must be selected in compliance with the refrigerant charge limits specified in EN 378-1, Annex C.**
	**Suspended installation is forbidden.**
	**The supporting surface must have sufficient load-bearing capacity to support the weight of the unit, as indicated both on the technical data label affixed to the machine and in Chapter 4 of this manual. The supporting surface must not be tilted to ensure the unit works properly and does not tip over. The supporting surface must not be smooth, to avoid water/ice deposits which are potential sources of danger.**
	**The unit's installation site must be free from foliage, dust, etc., which could clog or cover the coils. Installation in areas subject to water stagnation or fall, for example from gutters, should be avoided. Also avoid areas subject to snow accumulation (such as corners of buildings with sloping roofs). Also avoid positioning near lightning towers or other objects that can attract an electric shock.**
	**It is recommended to ensure sufficient air exchange to dilute the R32 gas in case of accidental leakage, to avoid the formation of explosive atmospheres. For this reason, a minimum distance must be maintained (depending on the unit) from openings or wells, where the gas could accumulate.**
	**The units are suitable for installation in urban, industrial, coastal and rural areas. If the unit is installed in an environment with aggressive atmospheres, the air drawn in by the fan may contain substances that can cause damage to the panels, grilles and internal components of the unit. In this case, the service life of the unit will be limited.**
	**Do not install the unit under roofs of any kind, such as roofs, canopies and similar**
	**Do not install the unit below ground level (such as cellars, underground car parks, basement or underground work rooms, etc.).**

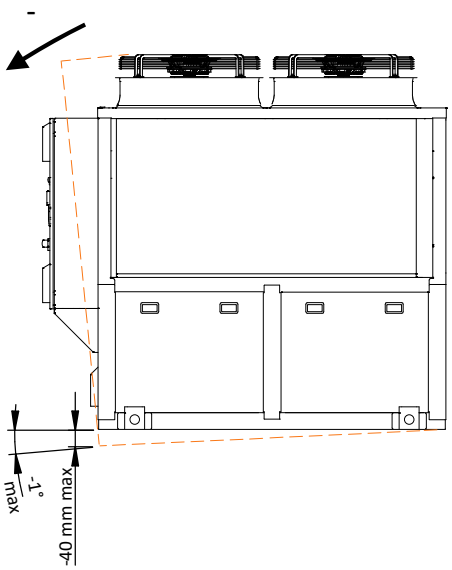
It is very important to avoid recirculation between suction and discharge, otherwise the performance of the unit will deteriorate or even interrupt normal operation.
This is why the minimum clearances shown below must be strictly guaranteed.

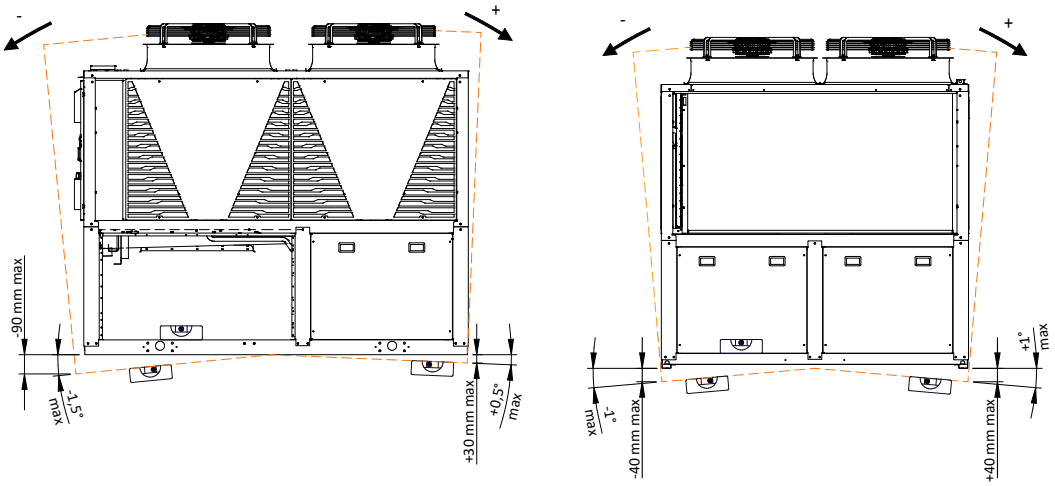




HWA2-AH		A1	A2	B1	B2
-	mm	1200	1200	1200	1200

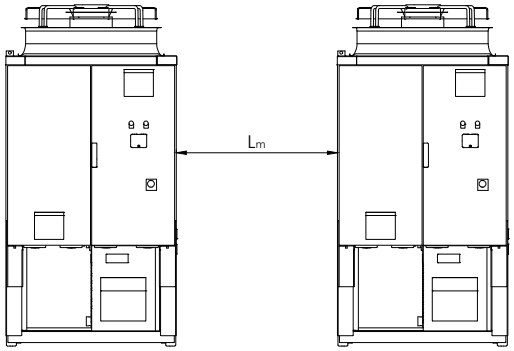
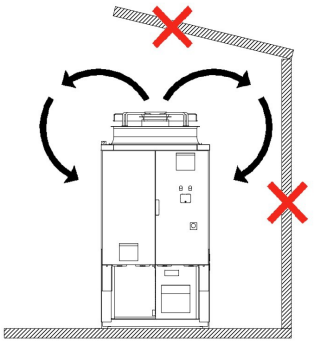
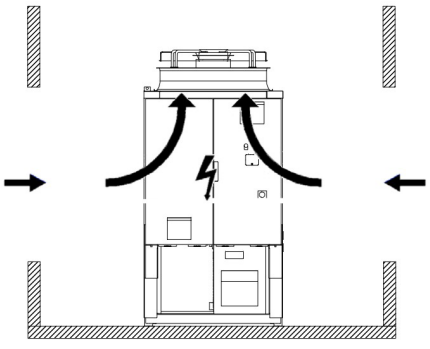
CAUTION
To ensure proper drainage of defrost water, the unit must be installed level. Only the maximum inclinations specified below are permitted, and only in the direction indicated.Installation with inclinations exceeding the specified limits, or with inclination in any other direction, may impair proper water drainage and result in water accumulation or leakage.





For installations in locations with strong winds, please 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 keep the fan powered at all times, thus preventing unintentional fan rotation.

If the unit is installed at a distance of less than 1 km from coastal and maritime areas, the presence of salt and sand in the air greatly increases the likelihood of corrosion. Install the unit so that it is protected from direct sea wind if necessary, provide windbreaks on site (observing the minimum distances indicated).

In the case of side-by-side units, the minimum distance L_{min} between them is 2,2 m.	
Avoid covering with canopies or placing near plants or walls to prevent air recirculation.	
In the event of winds stronger than 13.9-17.1 m/s the use of wind barriers is recommended.	

3.3 DANGER AND SAFETY ZONES

The units of the HWA2 series contain R290 refrigerant gas. The density of this gas is higher than that of air; therefore, in the event of a leak, it tends to disperse by accumulating in niches, ground depressions, or underground areas.
When installing the units, the danger and safety zones set out in this manual must be observed.
These zones have been defined in accordance with EN 60079-10-1 by evaluating different scenarios and estimating:

- a refrigerant leak rate from 0.1 to 3 g/s
- an air velocity from 0.1 to 0.5 m/s

The resulting area classification is:

- Zone type (lower degree of dilution): 2
- Gas group and temperature class: IIA T2.

Our risk analysis has defined an EPL (Equipment Protection Level) Gc in accordance with EN 60079-14.
A **danger zone** is defined as a area around the machine in which, in the event of a refrigerant gas leak, a flammable atmosphere is formed for a short time, within which it is necessary to implement all the precautions described in the manual. In the absence of specific standards or regulations, when using the unit in an industrial or working environment, the classification of explosion hazard locations should be carried out as per the ATEX Directive 2014/34/UE and Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work.



The areas reported in the following chapters are based on conservative assumptions, considering an air velocity of 0.1 m/s and the most severe leakage scenario applicable to the unit.
Any reductions in safety distances must be justified by a specific risk analysis carried out by the designer in accordance with EN 60079-10-1, under their full responsibility.

There must NOT be any ignition sources in the danger zones, including:

- flammable gases and sprays, self-igniting powders;
- electrical equipment that is not suitable for use in potentially explosive areas (zone 2);
- Open flames, hot surfaces (maximum surface temperature 360°C), and hot work operations are prohibited; smoking, including electronic cigarettes, must also be prohibited.
- sparks, electrostatic charges, direct and indirect lightning effects, eddy currents and cathodic protection;
- ignition sources due to remote processes (ionising and non-ionising radiation);
- permanent electrical sources (switches, lamps, etc.) or other possible triggers;

In addition, the danger zones must NOT:

- contain potentially dangerous areas or elements such as wells, manholes, openings to the sewage system and other openings to underground places and premises (e.g. garages), river drains, power lines, flammable deposits, electrical installations, etc.;
- include doors, windows or glass panes, to prevent the possible return of the gas inside the building;
- extend towards neighbouring residential properties, parking areas, public access sites, roads or railways.

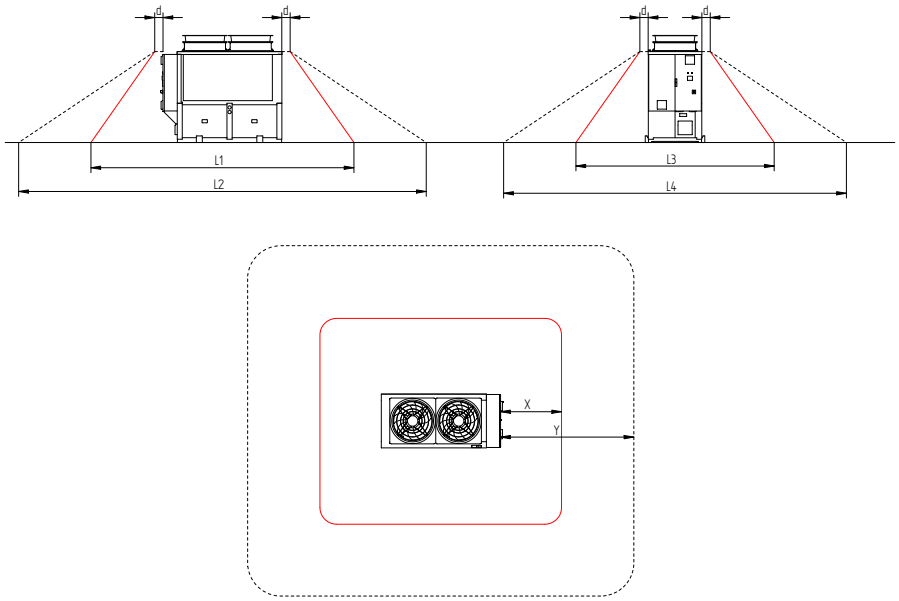
A **safety zone** extending beyond the danger zone must also be identified. Within the safety zone, in the event of a refrigerant leak, the concentration of the gas in the air is typically below the critical levels for the formation of flammable or hazardous atmospheres. The following provisions must be complied with:

- prevent accumulation and stagnation in underground spaces, drains, manholes, cellars, etc.;
- do not place building vents inside or near the safety zone;
- do not use naked flames and other direct heat sources.

In any case, comply with national and local regulations on the installation of machinery (where applicable) in order to prevent the formation of fire hazards and to prevent gases from seeping underground into openings to the ground or floors below.
No structural modifications may be made in the danger and safety zones that would alter their extent or change the behaviour of the air-refrigerant mixture.
Do not tamper with, alter, remove or compromise, even partially, the functionality of the devices, guards and provisions provided for the safety of property and persons.
Various types of outdoor installation are considered in this manual, as indicated in the following paragraphs.

3.3.1 Free-field ground installation

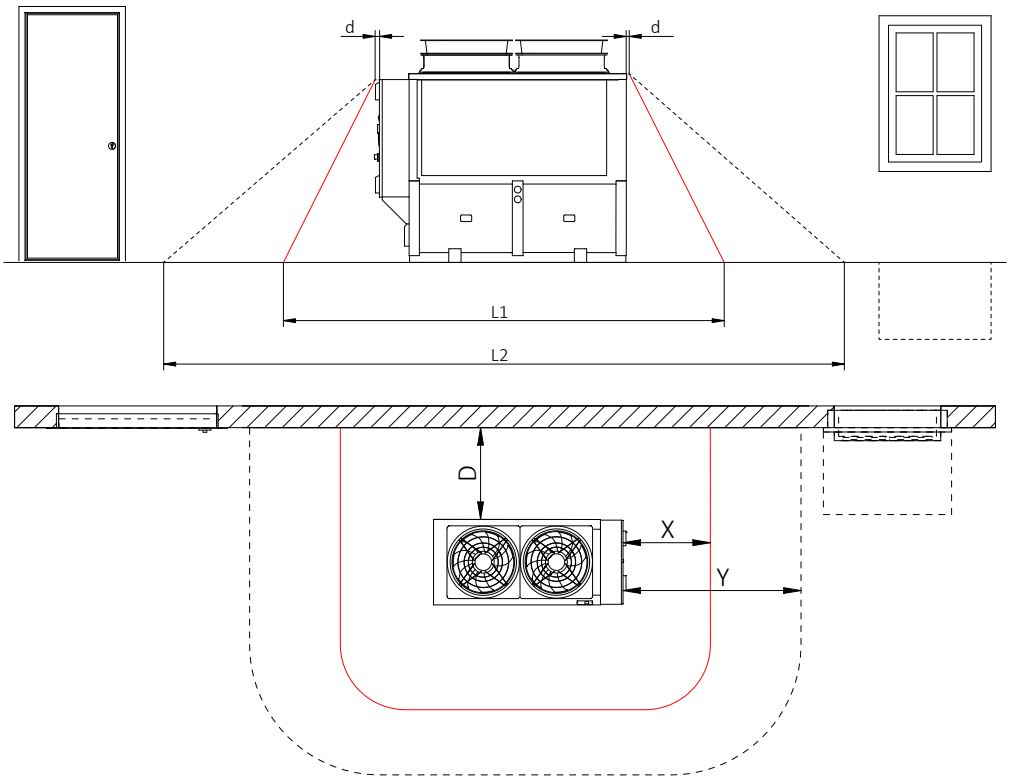
For units installed on free-field terrain, the danger (continuous red line) and safety zones (dashed black line) are shown in the figures below:



MODEL HWA2		X	Y	L1	L2	L3	L4	d
0270 / 0280 / 0290	mm	1500	3000	5600	8600	4100	7100	250
04140 / 04155 / 04170	mm	1500	3000	5800	8800	5300	8300	250

3.3.2 Ground installation in front of a wall

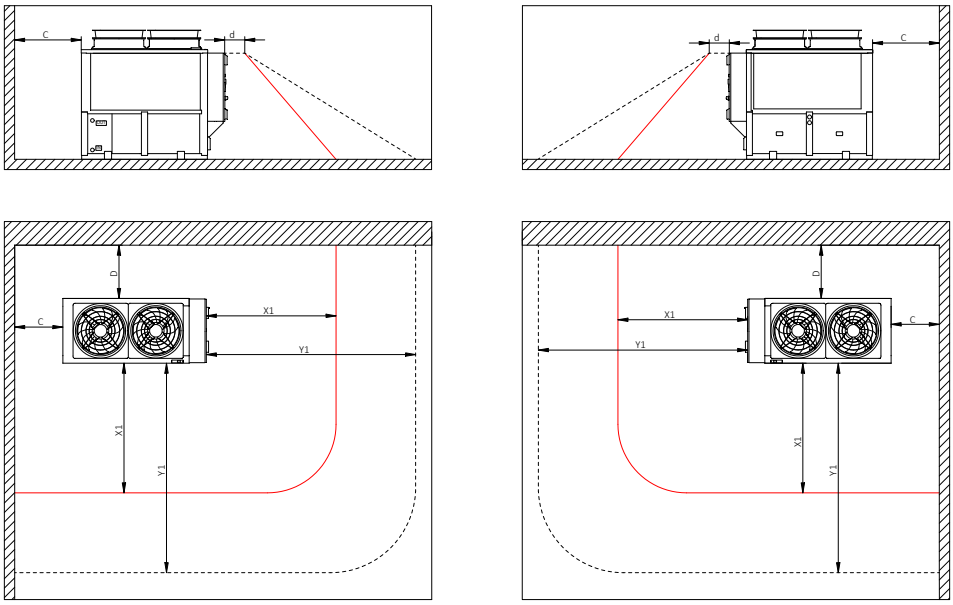
For units installed on the ground in front of a wall, the danger (continuous red line) and safety zones (dashed black line) are shown in the figures below:



MODEL HWA2		X	Y	L1	L2	D	d
0270 / 0280 / 0290	mm	1500	3000	5600	8600	1500	250
04140 / 04155 / 04170	mm	1500	3000	5800	8800	1500	250

3.3.3 Ground installation in a corner

For units installed on the ground in a corner, the danger (continuous red line) and safety zones (dashed black line) are shown in the figures below:



MODEL HWA2		X1	Y1	C	D	d
0270 / 0280 / 0290 **04140 / 04155 / 04170**	mm	2800	4300	1200	1500	250

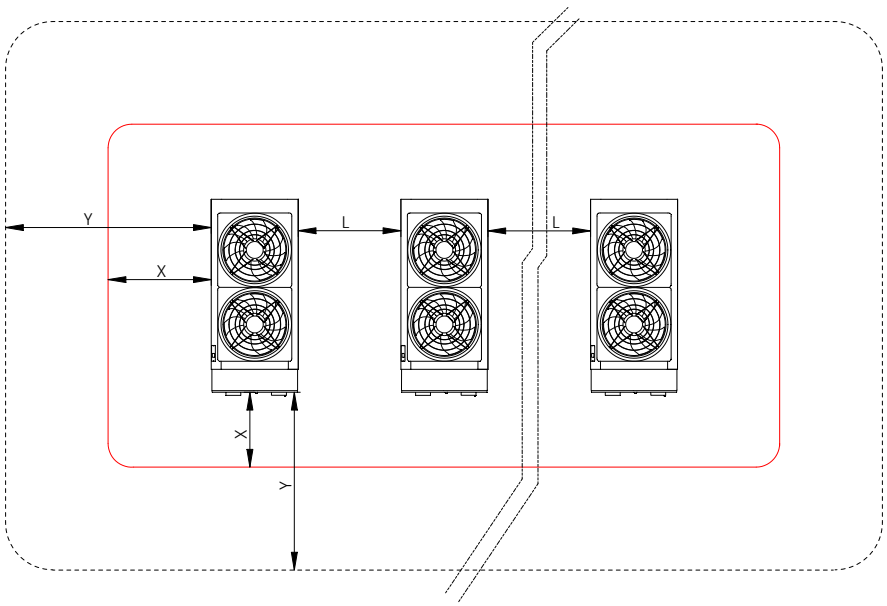
3.3.4 Flat roof installation

The installation configuration on a flat roof is similar to that on free-field terrain, although some additional aspects must be considered:

- place the machine at a sufficient distance from side walls and protrusions, which must therefore be beyond the safety zone;
- ensure that the structure of the building's roof is solid;
- choose a location where no snow, dust or foliage can accumulate;
- pay attention to noise emissions and maintain an adequate distance from surrounding buildings;
- if high air velocities are detected, install the protections listed in the previous chapter.

3.3.5 Multiple installation

When installing several machines side by side, follow the above configurations and, in addition, maintain a buffer of L between each machine.
As an example, see the following buffer zones (danger and safety) for a generic number "n" units installed on free-field terrain:
For other types of installation not covered in this manual, contact technical support. If in doubt about the installation of the units, request a technical assessment by the fire brigade or a fire prevention expert.



MODEL HWA2		X	Y	L
0270 / 0280 / 0290 **04140 / 04155 / 04170**	mm	1500	3000	2200

3.4 HYDRAULIC CIRCUIT

Hydraulic connections must be carried out in accordance with applicable national or local regulations; piping may be made of steel. The piping must be carefully sized according to the unit nominal water flow rate and the pressure losses of the hydraulic circuit. All hydraulic connections must be insulated using closed-cell insulation material of suitable thickness. The chiller must be connected to the piping system using new flexible joints; reused joints are not permitted. The following components are recommended for installation in the hydraulic circuit:

- Well thermometers to monitor the circuit's temperature.
- Manual gate valves to isolate the chiller from the water circuit.
- Y-type metal filter or dirt separator (installed on the system return pipe), with a mesh size not exceeding 1 mm.
- Charging group and exhaust valve where necessary.

	**When selecting components and piping, verify the compatibility of materials with the working fluid, paying particular attention in the case of water-glycol mixtures.**
	**When sizing the piping, ensure that the maximum system-side pressure drop specified in the technical data table in Chapter 4 is not exceeded.**
	**At start-up, check for the absence of leaks at pipe joints, which may be caused by gasket failure, misalignment, or insufficient tightening.** **In this regard, the recommended tightening torque values are provided in the technical bulletin.**
	**Provide a suitable drain for the water safety valve.** **Only when the hydronic kit is installed, the unit is equipped with a safety valve set at 6 bar. Before installation, qualified technical personnel must verify that the valve is adequately sized for the application and complies with the applicable regulations. If the valve is found to be unsuitable, a suitably sized safety valve must be installed on the system.**
	**An automatic air vent must be installed at the highest point of the system.**

	**CAUTION: The expansion vessel, if present on the unit (check the hydraulic diagram), has a limited capacity. It is the installer's responsibility to check that the expansion vessel is adequate for the actual capacity of the system, otherwise an additional expansion vessel must be provided.**
	**CAUTION: Place the return pipe from the system at the "WATER INLET" label, otherwise the evaporator may freeze.**
	**A metal strainer (with a mesh size of no more than 1 mm) must be installed on the system return pipe labelled "WATER INLET". Alternatively, a dirt separator with a filtration rating of 1 mm or finer may be installed; in this case, the Y-strainer is no longer required. If the metal strainer or dirt separator is not installed in the system, the warranty shall be immediately void. The strainer (or dirt separator) must be kept clean; therefore, it must be ensured that they remain clean after unit installation and are inspected periodically.**
	**All units are supplied with a differential pressure switch (factory-installed). If the differential pressure switch is tampered with or removed, the warranty shall be considered void. Refer to the wiring diagram supplied with the unit for connection of the differential pressure switch. Never bridge the differential pressure switch terminals in the terminal block.**
	**The heating system and the safety valves must comply with the requirements of standard EN 12828.**
	**CAUTION: The weight of the system piping must not be transferred to the hydraulic connections or to the unit structure. Install adequate supports for the piping near the unit. In versions equipped with the optional hydronic kit, the supplied brackets are intended exclusively for positioning the hydraulic connections and must not be used as supports for the connecting piping. Failure to support the system piping may compromise the correct operation of the anti-vibrations dampers.**

3.4.1 System water characteristics

To guarantee proper unit operations, the water must be appropriately filtered (see the instructions at the start of this paragraph) and the amount of dissolved substances must be minimal. The maximum permitted values are shown below:

MAXIMUM CHEMICAL-PHYSICAL PROPERTIES ALLOWED FOR THE SYSTEM WATER	
PH	7,5 - 9
Electrical conductivity	100 - 500 µS/cm
Total hardness	4.5 – 8.5 dH
Temperature	≤ 78 °C
Oxygen content	< 0,1 ppm
Max glycol quantity (*)	50 %
Phosphates (PO_4)	< 2 ppm
Manganese (Mn)	< 0.05 ppm
Iron (Fe)	< 0.3 ppm
Alkalinity (HCO_3)	70 – 300 ppm
Chloride ions (Cl^-)	< 50 ppm
Sulphate ions (SO_4)	< 50 ppm
Sulphide ions (S)	None
Ammonium ions (NH_4)	None
Silica (SiO_2)	< 30 ppm

(*) For units equipped with a hydronic kit, pay attention to the maximum glycol concentration allowed in the system.

3.4.2 Hydraulic diagram inside the unit

The hydraulic connection diagrams for all available unit versions are shown below, together with the legend applicable to all diagrams.

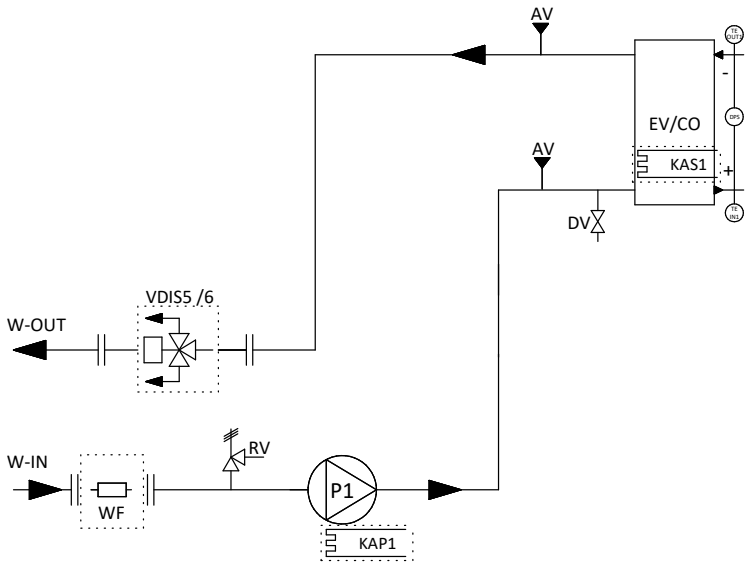
Legend			
EV/CO	Plate heat exchanger	WF	Y-filter*
DV	Discharge valve *	DPS	Differential pressure switch
RV	Safety valve *	W-IN	Water input
BV	Shut-off valve *	W-OUT	Water output
KAS1	Heat exchanger resistance *	VDIS5 / VDIS6	3way valve *
KAP1	Pump resistance *	CV	Non-return valve *
BSV	Shut-off valve	P	Pump *
VE	Expansion vessel *	AV	Automatic air vent valve *
TE IN	Return temperature sensor	TE OUT	Supply temperature sensor
*	Optional (depending on the selected hydronic kit)	TK	Tank *
_ _ _	Separately supplied accessory to be installed outside the unit		

NOTICE – Configuration with Internal Tank (-SI) and 3-Way Valve for DHW

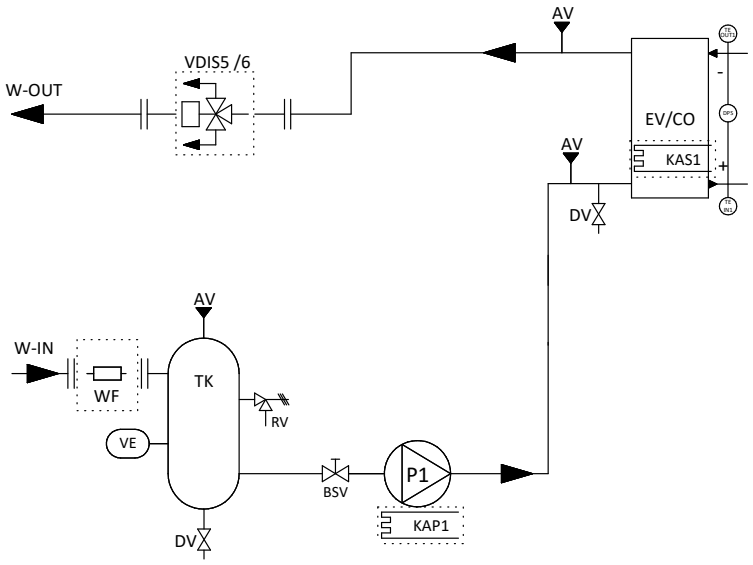
For units equipped with an internal tank and a 3-way valve to divert the flow between the system circuit and the DHW (domestic hot water) circuit, the effects of the return water temperature on the unit must be taken into account.
In particular:
- **During summer operation, the return water may cause the internal tank to heat up;**
- **During winter operation, the return water may alter the unit's return water temperature.**

When using the 3-way valve for DHW production, it is recommended to take the above considerations into account and to assess the use of a tank external to the unit on the system circuit, as an alternative to the -SI kit with internal tank.

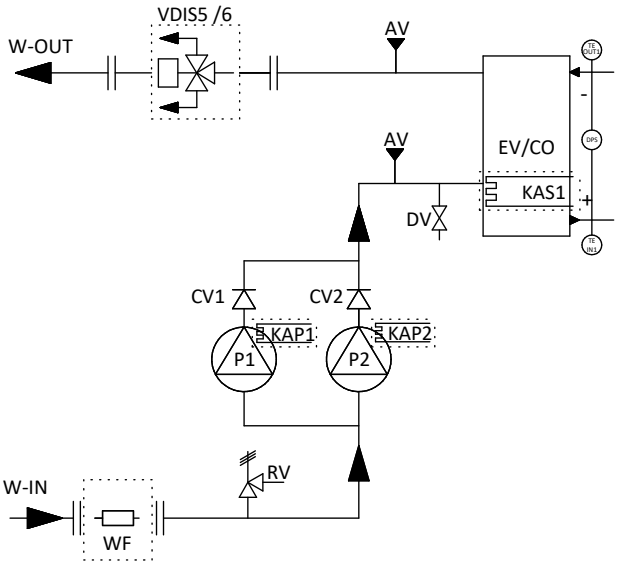
HWA2-AH - Single pump version



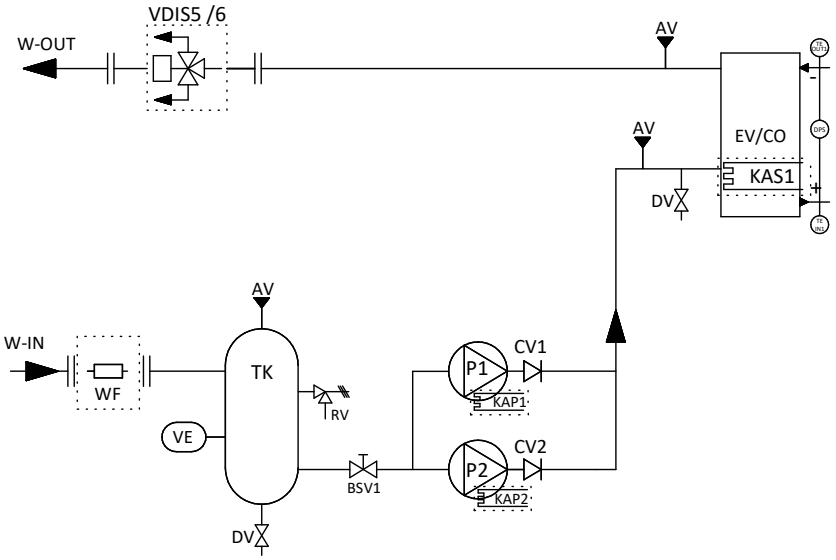
HWA2-AH - Single pump version with tank



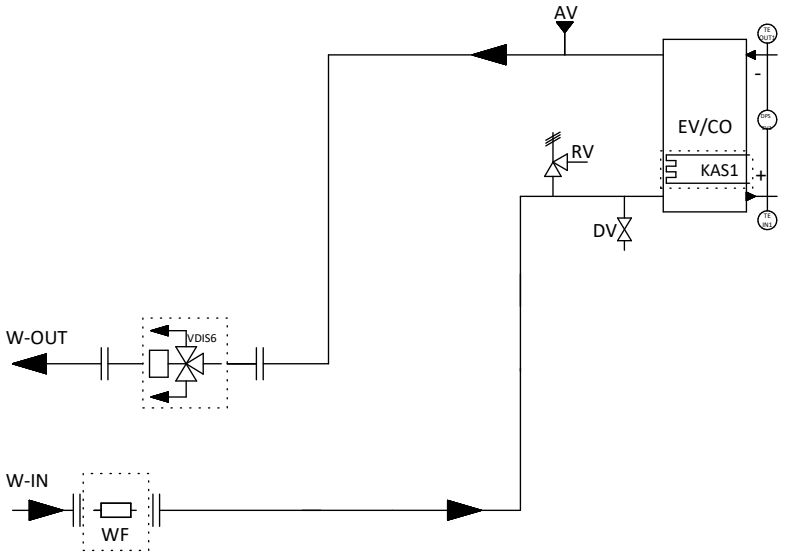
HWA2-AH - Dual pump version



HWA2-AH - Dual pump version with tank



HWA2-AH - Version with connection pipes (available only for sizes 04140 / 04155 / 04170)



Every unit equipped with a hydronic kit and tank includes an expansion vessel and a safety valve with an opening pressure of 6 bar.
Main characteristics of the expansion vessel:

- Operating temperature: -10 / +99 °C;
- Pre-charge pressure: 1.5 bar;
- Glycol concentration: up to 50%
- Maximum pressure: 10 bar
- Volume: 24 liters

Every unit equipped with a hydronic kit without a tank also includes a safety valve with an opening pressure of 6 bar.

3.4.3 Minimum water content and hydraulic circuit volumes

The table shows the minimum recommended plant water content and the tank volume (if present) for units. In order to ensure the proper functioning of the heat pump, this minimum content must be met. Taking into consideration the volume of water in the primary circuit piping, size the thermal flywheel to achieve the specified volume.

HWA2-AH	0270	0280	0290	04140	04155	04170
Minimum system water content [L]	390	460	470	390	460	460
Water circuit volume [L]	6,7	6,7	6,7	13	14	15
Hydraulic circuit volume with -KT kit [L]	-	-	-	26	27	28
Hydraulic circuit volume with -PS/-PSI/-PSAP/-PSIAP/-PD/-PDAP [L]	14	14	14	31	33	34
Hydraulic circuit volume with -PS-PSI-PSAP-PSIAP-PD-PDAP kit and -SI tank [L]	378	378	378	476	477	478

3.4.4 Condensate drainage system

As the pipes are properly insulated, condensate formation is minimal and does not result in water accumulation inside the refrigeration compartment. All heat pump units are provided with drain holes in the base frame to allow condensate drainage onto the ground surrounding the unit.

Do not obstruct the holes in the base for condensate drainage.

In particularly cold climates, installation on raised supports is recommended to prevent unit damage due to ice formation.

WARNING: A limited amount of water (possibly ice during the winter period) from the condensate drainage system may accumulate near the unit, creating a risk of slipping/falling.

In the event of a leak, refrigerant gas may escape from the unit through the openings in the base panel. Therefore, it is recommended to always direct condensate drainage toward an open area near the unit (within the hazardous zone defined in chapter 3.3). For ground-mounted installations, condensate may also be discharged into a gravel or crushed stone drainage bed.

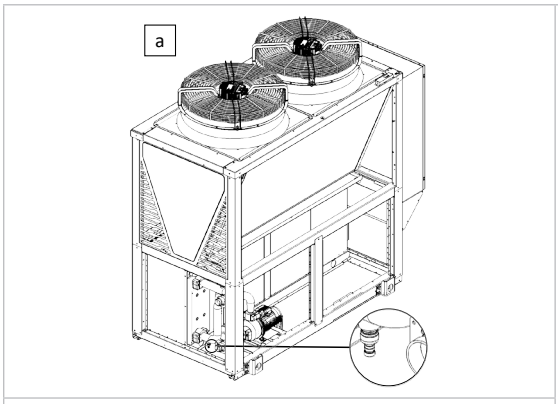
3.4.5 Condensate drain pans for heat exchange coils

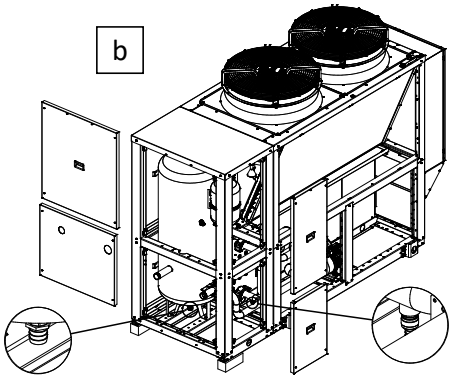
Heat pump units are equipped with a condensate collection pan to collect water generated during the defrost cycle. Thanks to the pan slope, the water is directed toward a drain outlet, which should be connected to a suitable drainage system.
To prevent ice formation caused by water accumulation and stagnation in the drain pan and drain line when the outdoor temperature falls below 5 °C, installation of an electric heater (accessory) is mandatory. The heater is sized to prevent ice formation in the pan and in the initial section of the drain line.

	**The installation of any supplementary heaters provided by the customer shall comply with ATEX regulations if such heaters remain energised in the event of a refrigerant leak.**
	**Installation of the electric heater in the condensate drain pan is mandatory for all units installed in environments where the temperature may fall below 5 °C, in order to prevent ice formation.**
	**It is mandatory to keep the drain pan and drain outlet clean, removing leaves or any debris that could cause blockage.**
	**The drain piping must be installed in accordance with the instructions provided in chapter 3.3 – danger and safety zones.**
	**A trap or equivalent solution must be provided to prevent propane, in the event of a leak, from being conveyed into gullies or other underground drainage systems.**

3.4.6 System charge

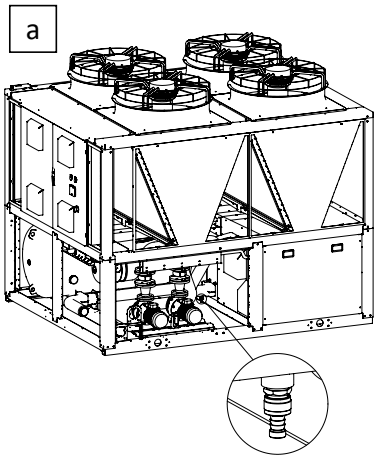
	**CAUTION: Supervise all charging/top-up operations.**
	CAUTION: Before charging/topping up the system, disconnect power to the units.
	CAUTION: The system must always be charged/topped up under controlled pressure (max. 1 bar). Ensure that a pressure reducer and safety valve are installed on the charging/top-up line.
	CAUTION: The water in the charging/top-up line must be properly pre-filtered from impurities and suspended particles. Ensure that a removable cartridge filter and a dirt separator are installed.
	CAUTION: Regularly check and vent the air built up in the system.
	CAUTION: Install an automatic air valve at the highest point of the system.

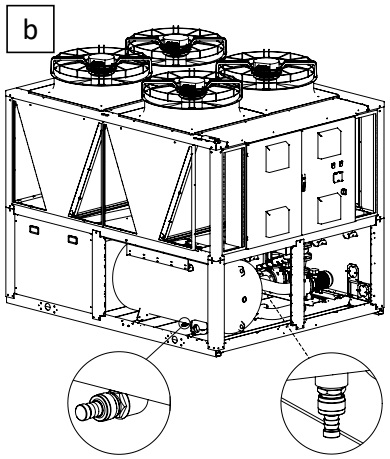




For system filling, it is recommended that the installer provide an external filling valve.
Only units equipped with a hydronic kit include an integrated valve, which can be used for system filling, draining the water contained in the system, or adjusting the water/glycol mixture.
The valve location depends on the hydronic kit configuration:

- No hydronic kit → valve not provided
- Hydronic kit with single/double pump → valve installed on the pump suction line (see figure a)
- Hydronic kit with single/double pump and tank → valve installed on the pump suction line and an additional valve located below the tank (see figure b)

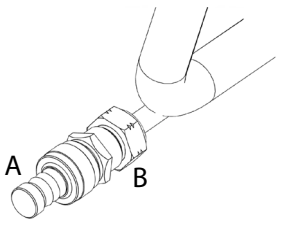




3.4.7 System discharge

If the unit needs to be drained completely, first close the manual inlet and outlet gate valves (not provided) and then detach the pipes on the outside of the water inlet and outlet to drain liquid from the unit (to make this operation easier, we recommend installing two drain valves between the unit and the manual gate valves on the outside of the water inlet and outlet).

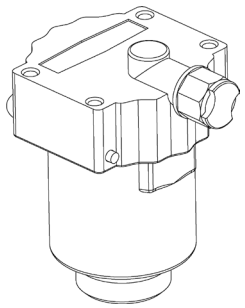
If system adjustment or glycol concentration adjustment is required, the service valve may be used. Unscrew the service valve cap (A) and connect a 14 mm or 12 mm hose (internal diameter – verify the valve model installed on the unit) to the hose fitting and to the water supply network. Then fill the system by loosening the dedicated ring nut (B). Once the operation is complete, tighten the ring nut (B) and reinstall the cap (A). In any case, the use of an external filling valve, provided by the installer, is recommended for system filling.



3.4.8 Air valve

The air vent valve is installed only on units equipped with a hydronic kit.

The unit is fitted with an air venting valve to automatically remove air that has built up in the circuit, preventing undesirable effects such as premature corrosion and wear, lower performance and low exchange output.
The device also performs a safety function: in the event of heat exchanger failure, it allows the refrigerant gas to be discharged to the outdoor air, preventing its transfer to the indoor terminals. However, this function alone is not sufficient to guarantee complete safety; therefore, additional protection measures (such as an air separator or hydraulic circuit decoupling) are recommended.
The valve can be kept in a closed position by closing the plug on the drain; by loosening the plug, the valve remains in open position and air is discharged automatically.



If you notice a water leak, you must replace the component by unscrewing it with a spanner, as shown in the image below.



3.4.9 Deaerator

WARNING: In the event of heat exchanger failure, propane may mix with the secondary fluid and be carried into the conditioned spaces. The unit is not inherently protected against this risk. It is the responsibility of the system designer to assess the hazard and implement suitable design measures to minimize this event.

Among the available accessories, an air separator suitably sized to separate any propane that may mix with the secondary fluid in the event of a heat exchanger failure is available. The installation position must be between the unit outlet and the point where the piping enters enclosed spaces. Please note that the area surrounding this component must be treated as a hazardous zone, and the same precautions required for unit installation must be adopted. Installation close to the unit is recommended to optimize hazardous and safety zones.
An alternative solution for ensuring the safety of occupied spaces is to hydraulically separate the unit secondary circuit from an additional circuit dedicated to transporting the heated fluid indoors, by installing an additional plate heat exchanger between the two circuits.
Refer to the installation positions shown in the drawing in the following chapter. The diagram is for illustrative purposes only and is not intended as a system construction drawing.

3.4.10 Antifreeze drain valve

WARNING: If the unit is locked out due to activation of the R290 sensor, the heat pump is completely disconnected from the electrical supply; therefore, any anti-freeze kits are also deactivated. Under these conditions, combined with low outdoor air temperatures (< 5°C), the water inside the circuit may freeze, causing damage to piping and components, such as the heat exchanger.
If installed in locations where the temperature drops below 5°C, the installation of antifreeze drain valves in the system is mandatory.

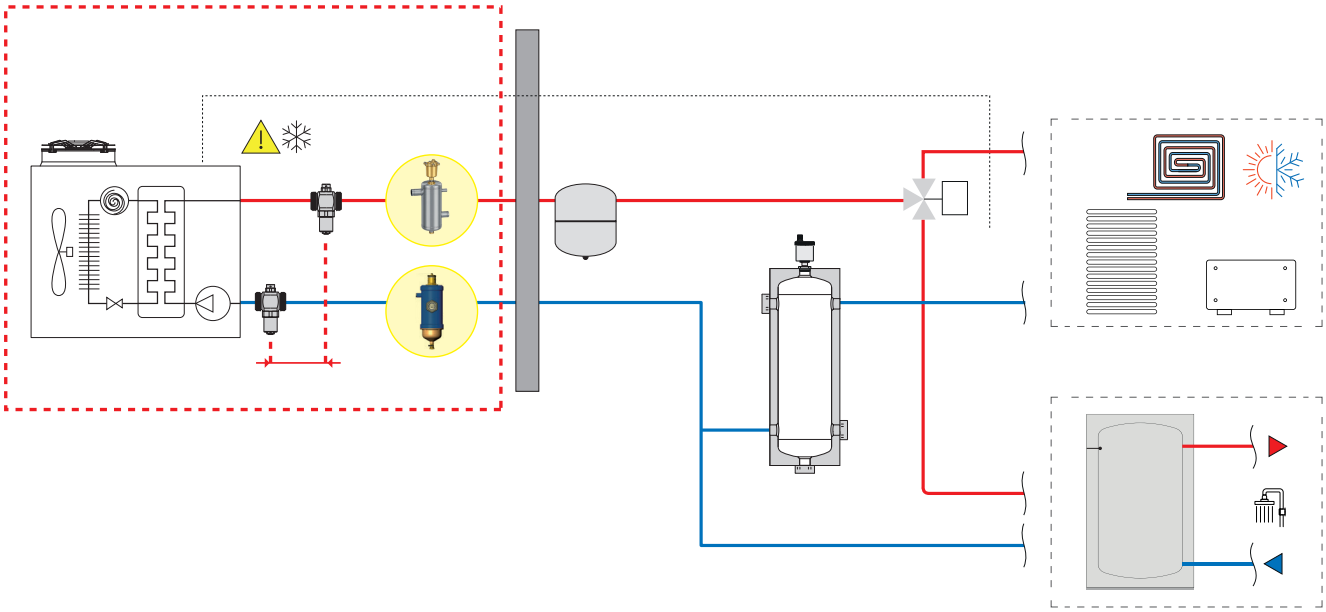
The antifreeze drain valves must be installed outdoors, in the coldest part of the system exposed to freezing risk, and must be installed on both pipes to ensure better drainage flow.

Installation rules:

- Maintain a minimum clearance of 15 cm from the ground to prevent any ice column forming underneath from obstructing water discharge from the valve.
- Maintain a minimum distance of 20 cm between the antifreeze valves.
- The device must be installed only in a vertical position to ensure that discharged water can flow freely downward.
- Avoid trap-type connections that may create hazardous water stagnation.

It is recommended to keep the system permanently pressurized, even during device drainage, to ensure the proper operation of the antifreeze drain valve.

For proper system operation, the valve must be left free from insulation.
If installed in an open-air environment, the antifreeze valve must be protected from rain, snow, and direct sunlight.



Illustrative diagram only – not intended for construction purposes.

3.4.11 Minimum water flow rate and water volume

The design water flow rate must comply with the values specified in the tables in Chapter 8 and must be maintained even under varying system operating conditions. The minimum water content required to prevent frequent compressor start-stop cycles is also specified in this chapter and must be ensured.

3.4.12 Frost risk

When outdoor temperatures are close to 0°C, preventive measures must be adopted to avoid freezing of the system water. Water may be mixed with glycol, piping may be protected with heating cables installed under the insulation, or the system may be drained in case of long shutdown periods.
If glycol is added, ensure that it is non-corrosive and compatible with the components of the hydraulic circuit. When water-glycol mixtures are used, unit performance differs from the declared values and must be recalculated using appropriate correction factors based on the glycol concentration. These coefficients are provided in Chapter 5.

When a water-glycol mixture is used as the heat transfer fluid, the air separator does not ensure the safety function required for the circuit and therefore cannot be considered the system's protective device.
The designer must assess the risks associated with this condition and define appropriate design solutions, providing for an alternative safety system.
For further information, refer to Chapters 3.4.9 and 3.4.5.

4. TECHNICAL DATA

Performance under the following conditions, according to standard UNI EN 14511:2022:

(1) Cooling: outdoor air temperature 35°C; in/out water temperature 12/7°C.
(2) Cooling: outdoor air temperature 35°C; in/out water temperature 23/18°C.
(3) Heating: outdoor air temperature 7 °C b.s. 6 °C b.u.; inlet/outlet water temp. 30/35°C.
(4) Heating: outdoor air temperature 7 °C b.s. 6 °C b.u.; inlet/outlet water temp. 47/55°C.
(5) Cooling: low temperature, variable output, fixed flow rate.
(6) Heating: average climatic conditions; T_{biv}=-4°C; low temperature, variable output, fixed flow rate.
(7) Indicative data subject to change. For the correct value, always refer to the technical label on the unit.
(8) The volume indicated refers to the total required, the designer must meet it considering the quantity already present inside the unit depending on the hydronic kit chosen (please check this value in the data sheet).
(9) Condition (1); value determined based on measurements carried out in accordance with UNI EN ISO 9614-2, in compliance with Eurovent certification requirements.
(10) Sound pressure: calculated value from the sound power level in accordance with ISO 3744: 2010, referred to 10 m away from the unit.
(11) Cooling, BT version: outdoor air temperature 35 °C; water inlet/outlet temperature -3/-8 °C. Treated fluid with 35% ethylene glycol.
(12) Heating: outdoor air temperature 7 °C D.B., 6 °C W.B.; water inlet/outlet temperature 55/65 °C.
* Excluded from the scope of Regulation (EU) No. 811/2013.

The performance data reported are indicative and may be subject to variation. Furthermore, the capacities declared in items (1), (2), (3), and (4) refer to instantaneous power in accordance with UNI EN 14511:2022. The data declared in items (5) and (6) are determined in accordance with UNI EN 14825:2022.
The performance data reported refer to the unit equipped with variable-speed fans.

TECHNICAL CHARACTERISTICS		Unit	HWA2-AH		
			0270	0280	0290
Cooling	Cooling capacity (1)	kW	62,7	68,9	72,9
	Input power (1)	kW	19,2	21,3	23,4
	EER (1)	W/W	3,27	3,23	3,12
	Cooling capacity (2)	kW	77,3	86,2	90,6
	Input power (2)	kW	20,4	22,7	25,0
	EER (2)	W/W	3,79	3,80	3,62
	SEER (5)	W/W	4,62	4,54	4,45
	Cooling capacity (11)	kW	35,7	39,5	42
	Input power (11)	kW	18,1	19,7	21,3
	EER (11)	W/W	1,97	2,01	1,97
	Water flow rate (1)	L/s	3,00	3,29	3,48
	User side heat exchanger pressure drops (1)	kPa	15,4	18,5	20,6
Heating	Heating power (3)	kW	73,1	78,1	84,3
	Input power (3)	kW	17,2	17,6	19,7
	COP (3)	W/W	4,25	4,44	4,28
	Heating power (4)	kW	66,7	72,5	77,5
	Input power (4)	kW	22,8	23,5	25,4
	COP (4)	W/W	2,93	3,09	3,05
	Heating power (12)	kW	63,9	69,6	74,5
	Input power (12)	kW	26,3	27,8	30,6
	COP (12)	W/W	2,43	2,50	2,43
	SCOP (6)	W/W	3,52	3,57	3,68
	Water flow rate (3)	L/s	3,49	3,73	4,03
	User side heat exchanger pressure drops (3)	kPa	18,9	21,5	24,9
	Energy efficiency water 35°C / 55°C	Class	A+/A+	A+/A+	A+/A+
Compressor	Type		Scroll		
	Refrigerant oil (type)		POE 160SZ		
	Number		2	2	2
	Capacity steps Std		2	3	2
	Refrigerant oil (quantity)	mL	6,6	6,6	6,6
	Refrigerant circuits		1	1	1
Refrigerant	Type		R290		
	Refrigerant quantity (7)	kg	6,5	6,5	6,5
	Equivalent CO_2 tonnes (7)	ton	0,00013	0,00013	0,00013
	Design pressure (high/low)	bar	33,0 / 1,7 (cooling) 0,7 (heating)		
External zone fans	Type		AXIAL - EC		
	Number		2	2	2
	Nominal power input (1)	kW	1,6	1,6	1,6
	Maximum input power	kW	1,9	1,9	1,9
	Maximum input current	A	3,9	3,9	3,9
	Nominal air flow	m^3/h	42000	42000	42000
Internal heat exchanger	Internal heat exchanger type		Plates / BPHE		
	N° internal heat exchangers		1	1	1
	Water content	L	6,7	6,7	6,7
Hydraulic circuit	Maximum water side pressure	bar	6	6	6
	Maximum pressure hydronic kit (safety valve setting)	bar	6	6	6
	Plumbing fittings	inch	2"	2"	2"
	Minimum water volume (8)	L	390	460	470
Noise level	Sound power level (9)	dB(A)	83	83	83
	Sound power level (9) configuration -SL	dB(A)	82	82	82
	Sound power level (9) configuration -SSL	dB(A)	81	81	81
	Sound pressure (10)	dB(A)	51	51	51
	Sound pressure (10) configuration -SL	dB(A)	50	50	50
	Sound pressure (10) configuration -SSL	dB(A)	49	49	49
Electrical data	Power supply		400V~/3~/50Hz		
	Maximum input power (without accessories)	kW	42	46	49
	Maximum input current (without accessories)	A	67	72	77
	Max starting current (without accessories)	A	196	235	240
	Short-circuit current (I_{cc})	kA	10	10	10

Technical characteristics		Unit of measurement	Model HWA2-AH		
			04140	04155	04170
Cooling	Cooling capacity (1)	kW	121	128	145
	Input power (1)	kW	39,5	42,4	47,2
	EER (1)	W/W	3,06	3,02	3,07
	Cooling capacity (2)	kW	152	164	181
	Input power (2)	kW	42,3	45,1	50,6
	EER (2)	W/W	3,59	3,64	3,58
	SEER (5)	W/W	4,34	4,35	4,30
	Cooling capacity (11)	kW	71,4	74,2	85,1
	Input power (11)	kW	36,4	37,5	41,3
	EER (11)	W/W	1,96	1,98	2,06
	Water flow rate (1)	l/s	5,78	6,11	6,93
	User side heat exchanger pressure drops (1)	kPa	18,8	17,1	35,2
Heating	Heating power (3)	kW	146	159	169
	Input power (3)	kW	35,5	37,2	41,4
	COP (3)	W/W	4,11	4,27	4,08
	Heating power (4)	kW	134	144	155
	Input power (4)	kW	46,8	49,2	54,4
	COP (4)	W/W	2,86	2,93	2,85
	Heating power (12)	kW	129	137	149
	Input power (12)	kW	54,0	56,6	62,1
	COP (12)	W/W	2,39	2,42	2,40
	SCOP (6)	W/W	3,45	3,48	3,58
	Water flow rate (3)	l/s	7,01	7,63	8,11
	User side heat exchanger pressure drops (3)	kPa	24,7	22,9	44,3
	Energy efficiency at 35°C/55°C water temperature	class	NA	NA	NA
Compressor	Type		SCROLL		
	Refrigerant oil (type)		POE 160SZ		
	Number	Nr	4	4	4
	Capacity steps Std	Nr	4	6	4
	Oil charge (quantity)	l	13,2	13,2	13,2
	Refrigerant circuits	Nr	2	2	2
Refrigerant	Type		R290		
	Refrigerant charge (7) – Circuit 1	kg	6,65	6,65	6,65
	Refrigerant charge (7) – Circuit 2	kg	6,50	6,50	6,50
	Equivalent CO_2 tonnes (7)	ton	0,0001	0,0001	0,0001
	Design pressure (high/low)	bar	33,0 / 1,7 (cooling) 0,7 (heating)		
External zone fans	Type		AXIAL - EC		
	Number	Nr	4	4	4
	Nominal power input (1)	kW	0,9	0,9	0,9
	Max. power	kW	2,55	2,55	2,55
	Maximum input current	A	4	4	4
	Nominal air flow rate	m^3/h	110000	115000	115000
Internal heat exchanger	Internal heat exchanger type		Plates / BPHE		
	N° internal heat exchangers	Nr	1	1	1
	Water content	l	12,6	13,9	15,1
Hydraulic circuit	Maximum water side pressure	bar	6	6	6
	Maximum pressure hydronic kit (safety valve setting)	bar	6	6	6
	Plumbing fittings		3”	3”	3”
	Hydraulic connections with hydronic kit		2” 1/2	2” 1/2	2” 1/2
	Minimum water volume (8)	l	390	460	460
Noise level	Sound power level (9)	dB(A)	83	83	84
	Sound power level (9) configuration -SL	dB(A)	82	82	83
	Sound power level (9) configuration -SSL	dB(A)	81	81	82
	Sound pressure (10)	dB(A)	50,9	50,9	51,9
	Sound pressure (10) configuration -SL	dB(A)	49,9	49,9	50,9
	Sound pressure (10) configuration -SSL	dB(A)	48,9	48,9	49,9
Electrical data	Power supply		400V~/3~+PE/50Hz		
	Maximum input power (without accessories)	kW	85	91	98
	Maximum input current (without accessories)	A	134	144	154
	Max starting current (without accessories)	A	263	307	317
	Short-circuit current (I_{cc})	kA	10	10	10

4.1 UNIT AND AUXILIARY ELECTRICAL DATA

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

Note: Electric data may change for updating. It is therefore necessary to refer always to the technical data label sticked on right-side panel of the unit.

Parameters	Unit of measurement	Model HWA2-AH					
		0270	0280	0290	04140	04155	04170
F.L.A. Maximum permissible current							
F.L.A. Compressor 1	A	29	29	34	29	29	34
F.L.A. Compressor 2	A	29	34	34	29	34	34
F.L.A. Compressor 3	A	-	-	-	29	29	34
F.L.A. Compressor 4	A	-	-	-	29	34	34
F.L.A. EC Fans	A	11	11	11	24,7	24,7	24,7
L.R.A. Locked Rotor Current (starting current)							
L.R.A. Compressor 1	A	158	158	197	158	158	197
L.R.A. Compressor 2	A	158	197	197	158	197	197
L.R.A. Compressor 3		-	-	-	158	158	197
L.R.A. Compressor 4		-	-	-	158	197	197
L.R.A. EC Fans	A	-	-	-	-	-	-
Total unit							
Fully equipped version, with EC fans							
Maximum input power	kW	47	50	53	88	95	102
M.S.C.	A	232	276	281	277	323	333
F.L.A.	A	74	79	84	148	160	170
F.L.I.	kW	35	35	41	74	77	84

Code		Description
F.L.A.	Full Load Ampere	Maximum current draw: current required by the motor under the most severe operating conditions.
M.S.C.	Maximum Starting Current	Maximum starting current
L.R.A.	Locked Rotor Current	Locked Rotor Current (L.R.A.): initial current required at start-up with the rotor stationary.
F.L.I.	Full Load Input	Maximum allowable power input: maximum electrical power that the motor can draw before the protection devices trip.

5. CORRECTION FACTORS

5.1 CORRECTION FACTORS FOR USE OF WATER-GLYCOL MIXTURE

The correction factors for water flow rate and pressure drop must be applied to the values obtained without the use of glycol. The correction factor for water flow rate shall be calculated to maintain the same temperature difference as would be obtained without the use of glycol. The pressure drop correction factor is applied to the water flow rate value corrected by the water flow rate correction factor.

Glycol percentage	Freezing point [°C]	Performance correction factor	Absorbed power correction factor	Water flow correction factor	Pressure drops correction factor
10%	-3,2	0,985	1,00	1,02	1,08
20%	-7,8	0,98	0,99	1,05	1,12
30%	-14,1	0,97	0,98	1,10	1,22
40%	-22,3	0,965	0,97	1,14	1,25
50%	-33,8	0,955	0,965	1,20	1,33

5.2 SCALING CORRECTION FACTOR

The correction factors due to fouling of the internal gas/water heat exchanger are reported below.

m^2 °C/kW	Output power correction factor	Absorbed power correction factor
0.44×10^{-1}	1,00	1,00
0.88×10^{-1}	0,99	1,00
1.76×10^{-1}	0,98	1,00

5.3 CALIBRATIONS AND PROTECTIONS CONTROL

Description	Value
High pressure switch	33 bar
High pressure alarm	31 bar
Low pressure alarm	0,7 bar heating / 1,7 bar cooling
Maximum number of restarts/hour after low pressure	3
Antifreeze protection (except BT version)	4°C
Hydronic circuit safety valve (only with hydronic kit)	6 bar
Maximum water circuit pressure without hydronic kit	6 bar

5.4 CORRECTION FACTORS DEPENDING ON ALTITUDE

The performance correction factors according to altitude are calculated for cooling at conditions (1) and for heating at 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 output correction factor	0,9964	0,9941	0,9888	0,9869
Power input correction factor in heating	0,9931	0,9841	0,9853	0,9755
Cooling output correction factor	0,9888	0,9762	0,9618	0,9466
Power input correction factor in cooling	1,0106	1,0235	1,0386	1,0560

6. HYDRONIC UNIT DATA

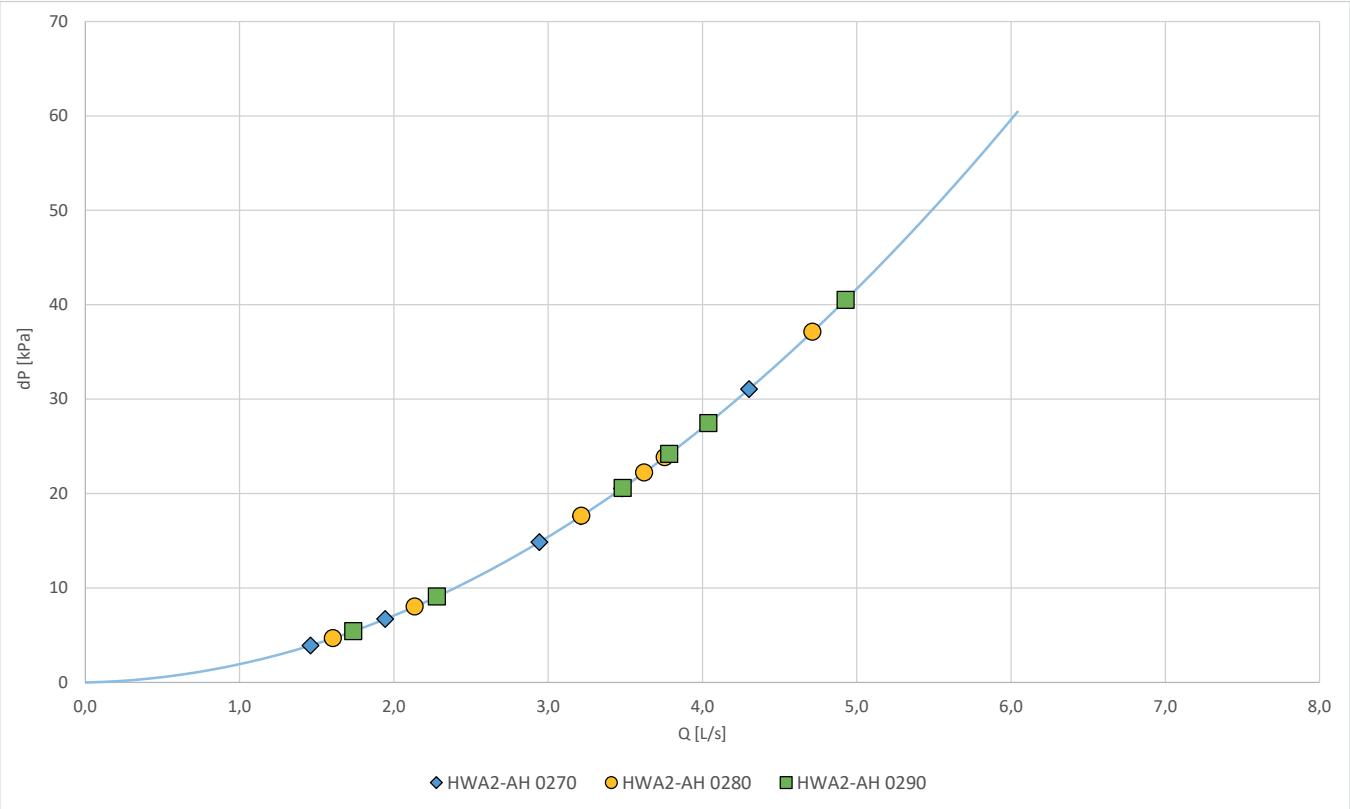
6.1 PRESSURE DROP

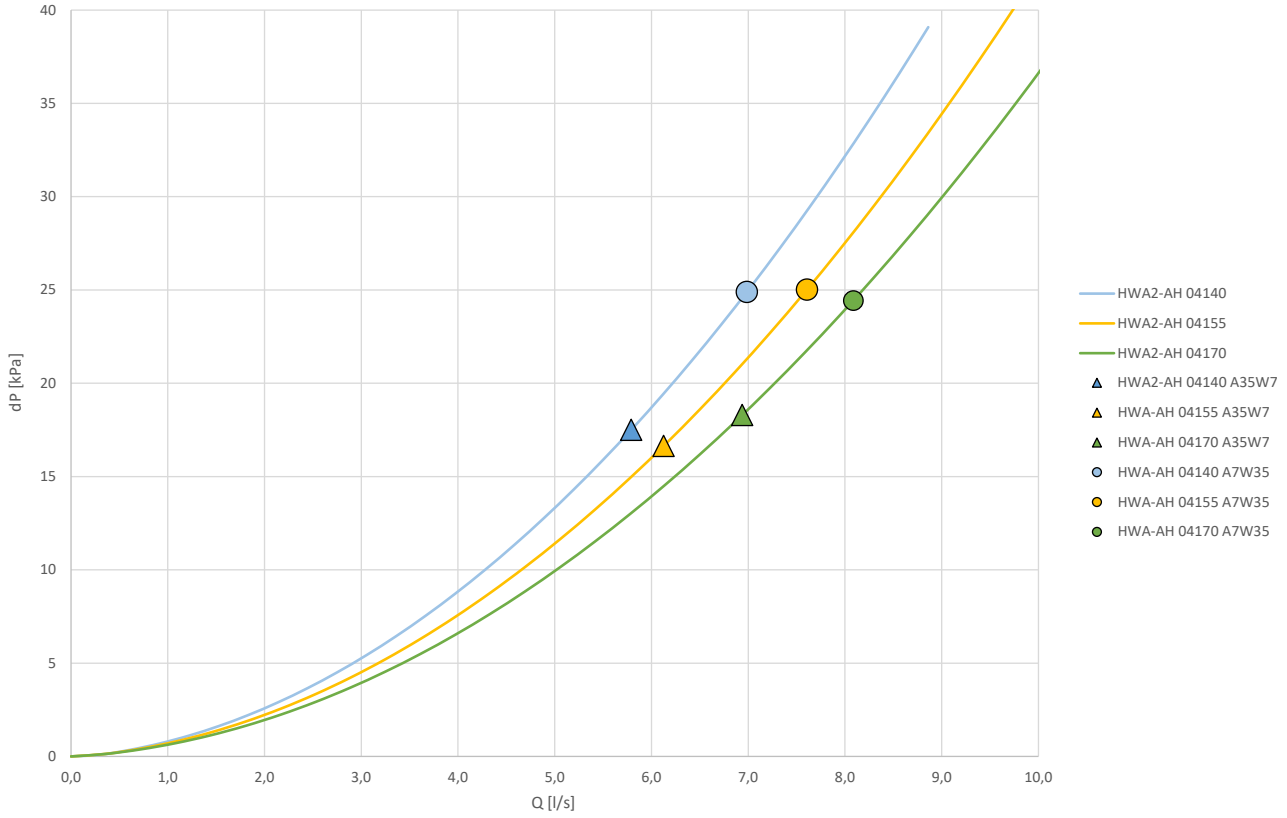
The pressure drops of the hydraulic circuit on the user side according to the flow rate are showm, both for water and a 35% water–ethylene glycol solution.
The characteristic pressure drop curves are shown below. Each curve shows the optimum operating point at the conditions specified at the apex (1), (2), (3), (4) and (5) in the technical data table.

HWA2-AH	Flow rate [L/s]	Water pressure drop [kPa]	Pressure drop with 35% water–ethylene glycol solution [kPa]
0270 / 0280 / 0290	0,0	0,0	0,0
	0,4	0,5	0,5
	0,9	1,6	1,8
	1,3	3,3	3,8
	1,8	5,7	6,5
	2,2	8,7	10,0
	2,7	12,3	14,2
	3,1	16,6	19,1
	3,6	21,4	24,7
	4,0	27,0	31,1
	4,4	33,1	38,2
	4,9	39,9	46,0
	5,3	47,3	54,5
	5,8	55,4	63,8
	6,2	64,0	73,8
	6,7	73,3	84,5
04140	0,5	0,3	1,1
	1,1	0,9	2,6
	1,6	1,8	5,3
	2,2	3,0	9,2
	2,7	4,4	14,2
	3,3	6,1	20,4
	3,8	8,1	27,7
	4,4	10,4	36,2
	4,9	13,0	45,9
	5,5	15,8	56,7
	6,0	18,9	68,7
	6,6	22,3	81,8
	7,1	26,0	96,1
	7,7	29,9	111,6
	8,3	34,1	128,2
	8,8	38,6	146,0
04155	0,5	0,2	1,0
	1,2	0,9	2,7
	1,8	1,9	5,8
	2,5	3,2	10,3
	3,1	4,8	16,2
	3,8	6,8	23,5
	4,4	9,1	32,2
	5,1	11,8	42,4
	5,7	14,7	53,9
	6,4	18,0	66,8
	7,0	21,6	81,2
	7,7	25,6	97,0
	8,4	29,9	114,2
	9,0	34,5	132,7
	9,7	39,4	152,7
	10,3	44,7	174,1

HWA2-AH	Flow rate [L/s]	Water pressure drop [kPa]	Pressure drop with 35% water–ethylene glycol solution [kPa]
04170	0,5	0,2	1,0
	1,2	0,8	2,5
	1,8	1,6	5,2
	2,5	2,8	9,2
	3,1	4,2	14,4
	3,8	5,9	20,8
	4,4	7,9	28,6
	5,1	10,2	37,5
	5,7	12,8	47,7
	6,4	15,7	59,2
	7,0	18,8	71,9
	7,7	22,3	85,8
	8,4	26,0	101,0
	9,0	30,0	117,5
	9,7	34,3	135,2
	10,3	38,9	154,1

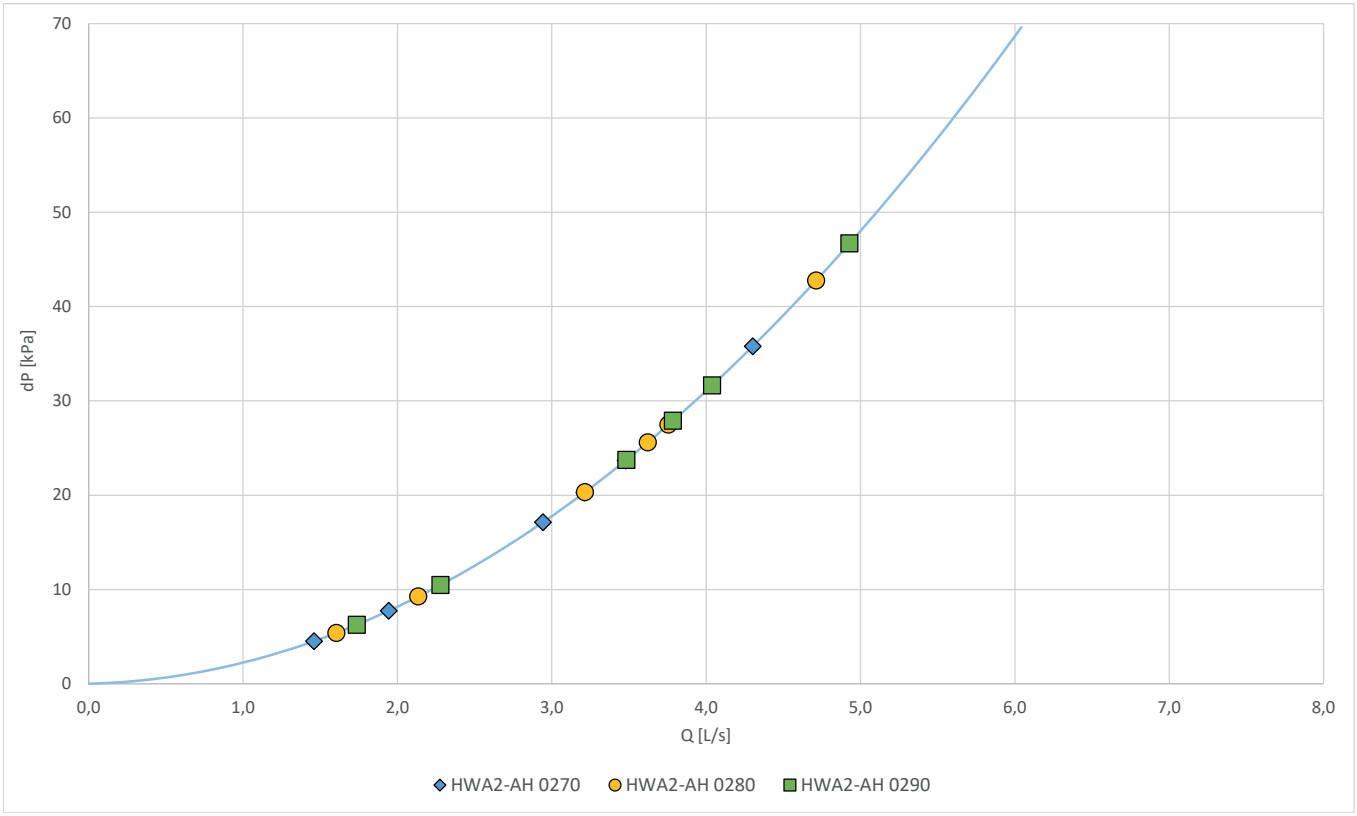
Carrier fluid = water

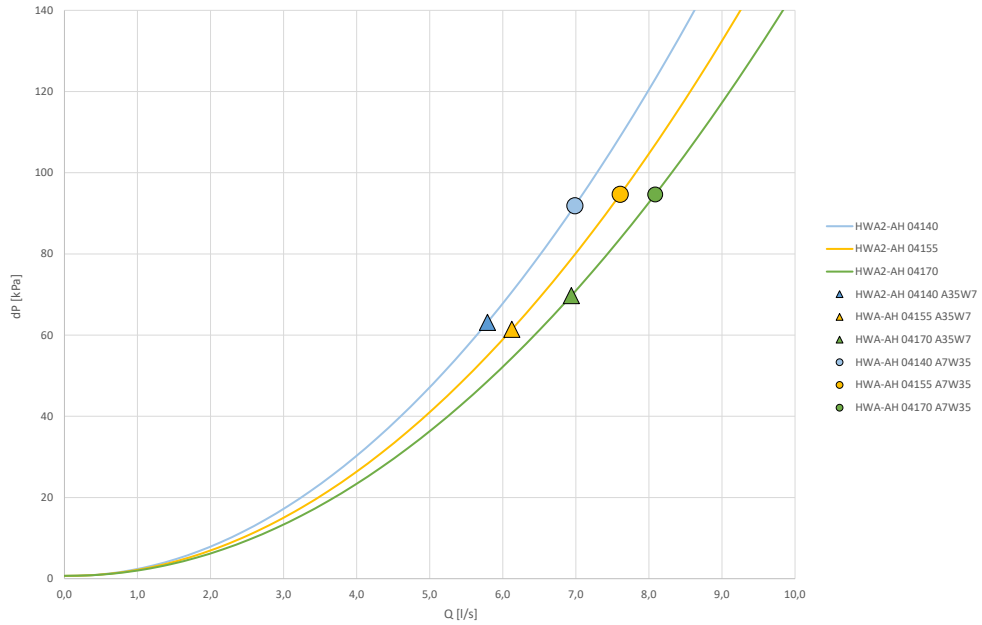




dP [kPa]	PHE water-side pressure drop
Q [L/s]	Water flow rate

Carrier fluid = water + 35% ethylene glycol





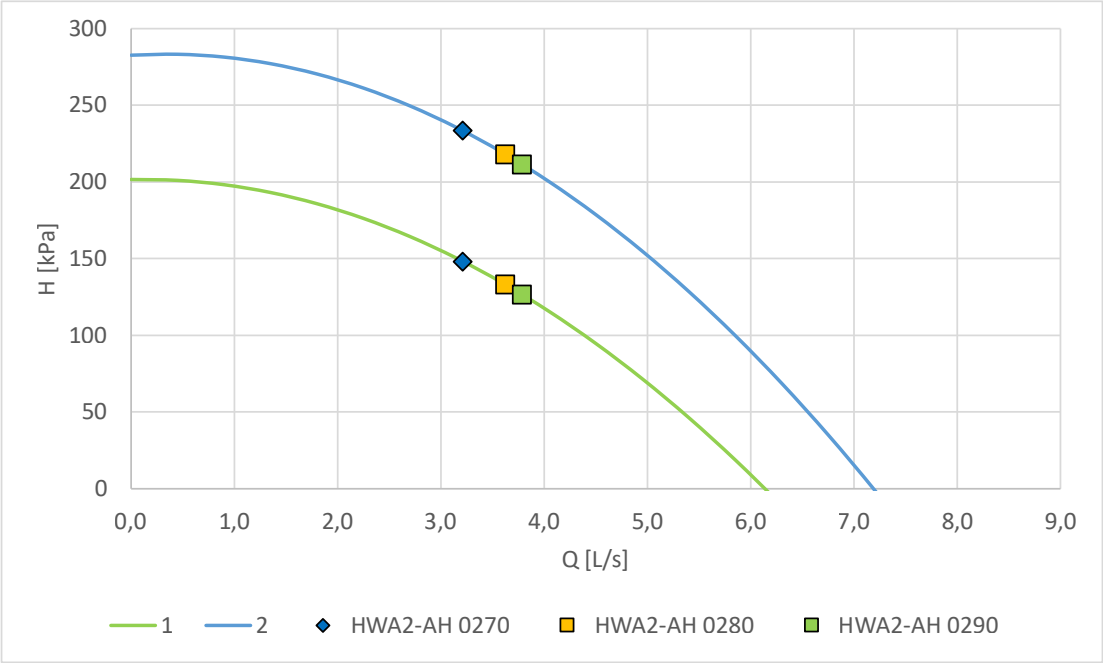
dP [kPa]	PHE water-side pressure drop
Q [L/s]	Flow rate with water + % ethylene glycol

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. On each curve, the optimal operating point is shown under the conditions (1) of the technical data.
Curve number 1 is referred to the standard pump; curve number 2 is referred to the high pressure pump.
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.

H [kPa]	Useful head
Q [L/s]	Water flow rate
1	Standard-head pump curve
2	High-head pump curve

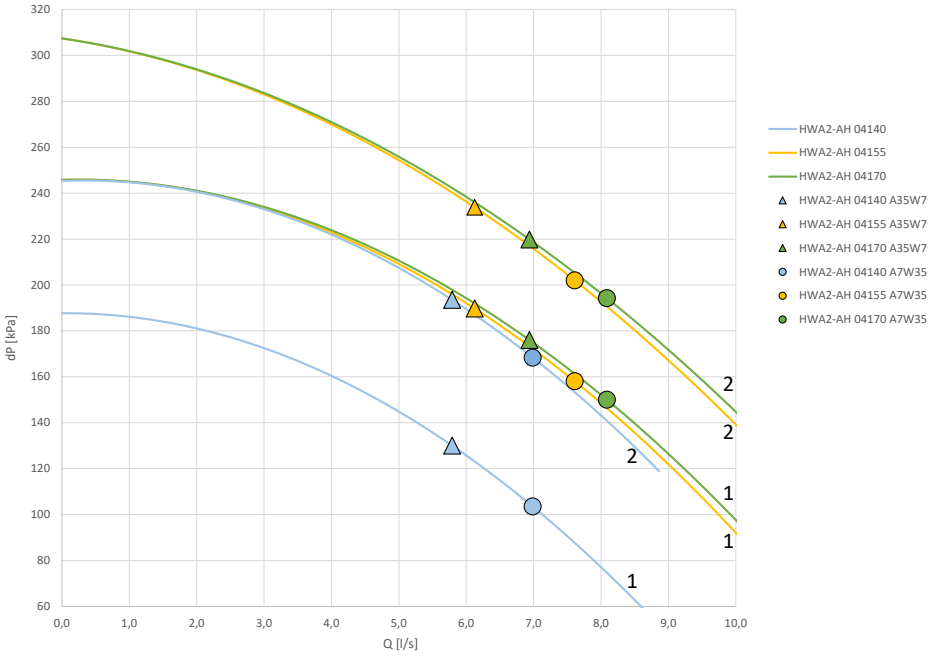
HWA2-AH 0270 / 0280 / 0290			
Standard-head pump		**High-head pump**	
Flow rate [L/s]	**Useful head [kPa]**	**Flow rate [L/s]**	**Useful head [kPa]**
0,0	202	0,0	283
0,5	201	0,5	283
0,9	198	0,9	281
1,4	193	1,4	277
1,8	186	1,8	270
2,3	176	2,3	261
2,7	164	2,7	250
3,2	150	3,2	235
3,6	134	3,6	219
4,1	115	4,1	200
4,5	95	4,5	179
5,0	72	5,0	155
5,4	46	5,4	128
5,9	19	5,9	100



HWA2-AH 04140			
Standard-head pump		High-head pump	
Flow rate [L/s]	Useful head [kPa]	Flow rate [L/s]	Useful head [kPa]
0,5	187	0,5	245
1,1	186	1,2	244
1,6	183	1,9	241
2,2	180	2,7	236
2,7	175	3,4	229
3,3	170	4,1	221
3,8	163	4,8	210
4,4	155	5,5	198
4,9	146	6,3	184
5,5	136	7,0	169
6,0	125	7,7	151
6,6	113	8,4	132
7,1	100	9,1	111
7,7	85	9,9	88
8,3	70	10,6	63
8,8	53	11,3	37

HWA2-AH 04155			
Standard-head pump		High-head pump	
Flow rate [L/s]	Useful head [kPa]	Flow rate [L/s]	Useful head [kPa]
0,5	246	0,5	305
1,2	244	1,4	299
1,8	242	2,2	292
2,5	238	3,1	282
3,1	232	3,9	271
3,8	226	4,8	258
4,4	217	5,6	244
5,1	208	6,5	227
5,7	197	7,3	209
6,4	185	8,2	189
7,0	171	9,0	167
7,7	156	9,9	143
8,4	139	10,7	118
9,0	122	11,6	91
9,7	102	12,4	61
10,3	82	13,3	31

HWA2-AH 04170			
Standard-head pump		High-head pump	
Flow rate [L/s]	Useful head [kPa]	Flow rate [L/s]	Useful head [kPa]
0,5	246	0,5	305
1,2	245	1,4	299
1,8	242	2,2	292
2,5	238	3,1	283
3,1	233	3,9	272
3,8	226	4,8	260
4,4	219	5,6	246
5,1	209	6,5	230
5,7	199	7,3	212
6,4	187	8,2	193
7,0	174	9,0	172
7,7	159	9,9	149
8,4	143	10,7	124
9,0	126	11,6	98
9,7	108	12,4	70
10,3	88	13,3	40



6.3 USEFUL HEAD FOR WATER + 35% ETHYLENE GLYCOL 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. On each curve is highlighted the minimum possibile working point with BT configuration (Tout=-8°C).

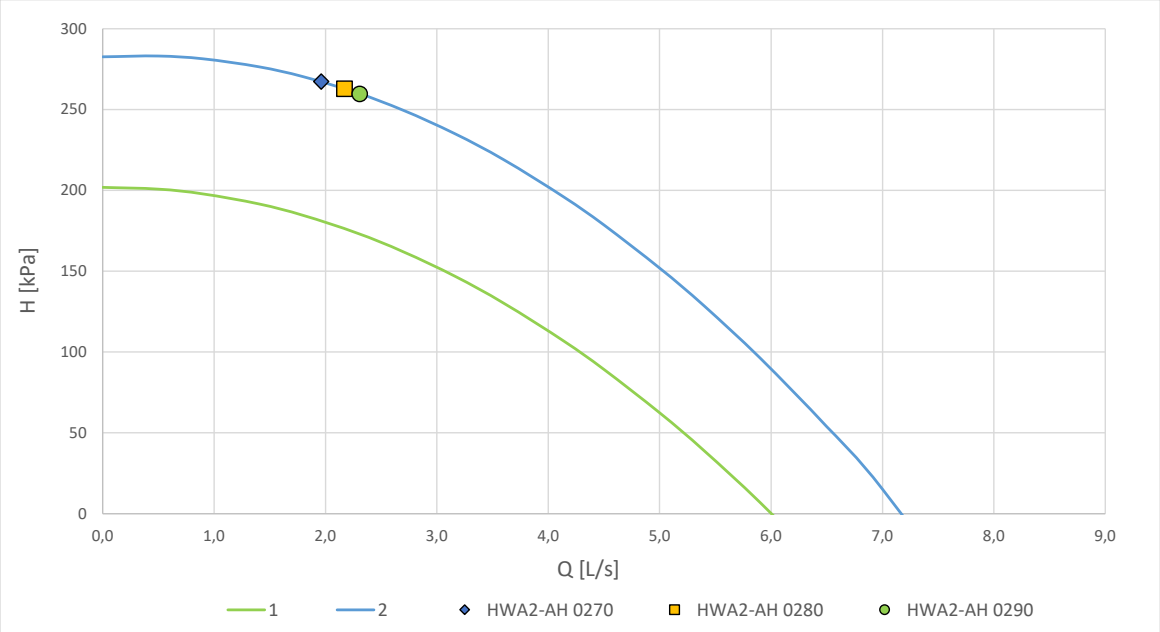
Note: When selecting accessory BT, refer only to the points on Curve 2.

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 + 35% ethylene glycol as carrier fluid.
Refer to these curves also in case of standard units working with glycol (maximum percentage 50%) in Tout higher than 4°C.

H [kPa]	Useful head
Q [L/s]	Water flow rate
1	Standard-head pump curve
2	High-head pump curve Pump curve for versions BT

HWA2-AH 0270 / 0280 / 0290			
Standard-head pump		High-head pump	
Flow rate [L/s]	Useful head [kPa]	Flow rate [L/s]	Useful head [kPa]
0,0	202	0,0	283

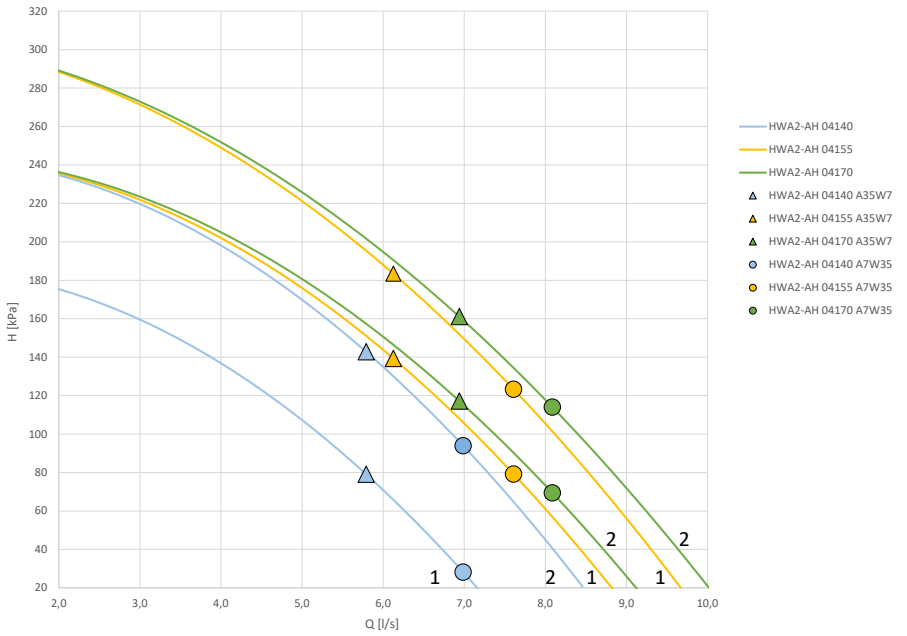
HWA2-AH 0270 / 0280 / 0290			
Standard-head pump		High-head pump	
Flow rate [L/s]	Useful head [kPa]	Flow rate [L/s]	Useful head [kPa]
0,5	201	0,5	283
0,9	198	0,9	281
1,4	192	1,4	276
1,8	185	1,8	268
2,3	174	2,3	259
2,7	162	2,7	246
3,2	147	3,2	232
3,6	130	3,6	215
4,1	111	4,1	195
4,5	89	4,5	173
5,0	65	5,0	149
5,4	39	5,4	122
5,9	10	5,9	93



HWA2-AH 04140			
Standard-head pump		High-head pump	
Flow rate [L/s]	Useful head [kPa]	Flow rate [L/s]	Useful head [kPa]
0,5	186	0,5	245
0,9	185	1,0	243
1,4	182	1,6	239
1,8	178	2,1	234
2,2	173	2,6	226
2,6	166	3,1	217
3,1	158	3,7	206
3,5	149	4,2	193
3,9	139	4,7	178
4,4	127	5,3	161
4,8	114	5,8	143
5,2	100	6,3	122
5,6	85	6,8	100
6,1	68	7,4	76
6,5	50	7,9	50
6,9	31	8,4	22

HWA2-AH 04155			
Standard-head pump		High-head pump	
Flow rate [L/s]	Useful head [kPa]	Flow rate [L/s]	Useful head [kPa]
0,5	245	0,5	304
1,1	243	1,1	299
1,6	239	1,7	292
2,2	234	2,3	284
2,7	226	2,9	273
3,3	217	3,5	260
3,8	206	4,1	246
4,4	193	4,7	229
4,9	178	5,3	211
5,5	161	5,9	190
6,0	142	6,5	168
6,6	122	7,1	143
7,1	99	7,8	117
7,7	75	8,4	89
8,3	49	9,0	58
8,8	21	9,6	26

HWA2-AH 04170			
Standard-head pump		High-head pump	
Flow rate [L/s]	Useful head [kPa]	Flow rate [L/s]	Useful head [kPa]
0,5	245	0,5	304
1,1	243	1,1	299
1,6	240	1,7	293
2,2	235	2,3	285
2,7	228	2,9	275
3,3	219	3,5	263
3,8	209	4,1	249
4,4	197	4,7	233
4,9	183	5,3	216
5,5	167	5,9	197
6,0	149	6,5	176
6,6	130	7,1	153
7,1	109	7,8	128
7,7	86	8,4	102
8,3	62	9,0	73
8,8	35	9,6	43



6.4 PUMP ABSORPTION

The pumps nominal absorptions are shown below.

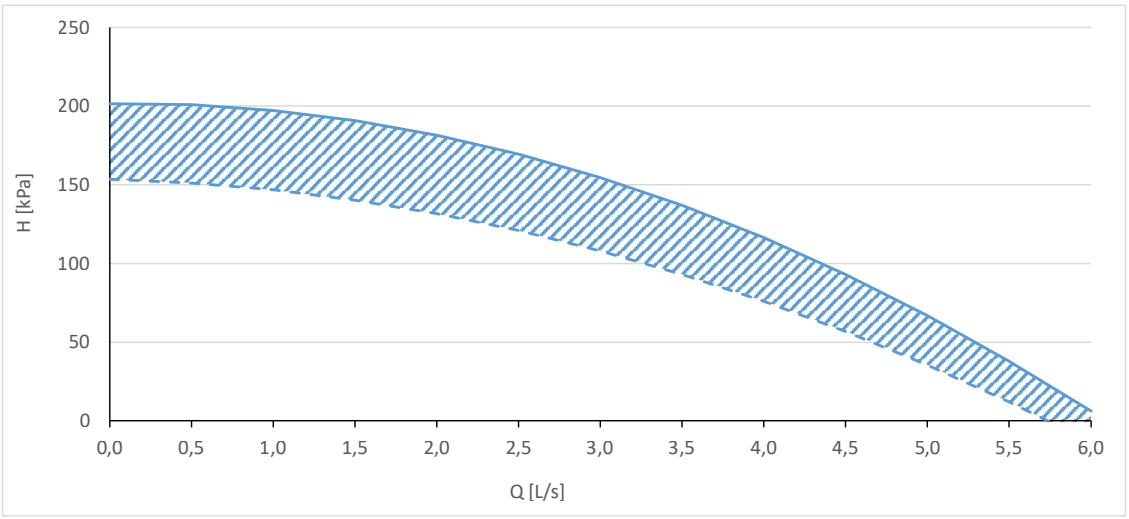
HWA2-AH		0270	0280	0290	04140	04155	04170
Standard-head pump	kW	1,1	1,1	1,1	1,5	2,2	2,2
	A	2,39	2,39	2,39	3,3	4,7	4,7
High-head pump	kW	2,2	2,2	2,2	2,2	3	3
	A	4,56	4,56	4,56	4,7	6,4	6,4
Pump for version BT	kW	1,5	1,5	1,5	2,2	3	3
	A	3,17	3,17	3,17	4,7	6,4	6,4

6.5 PUMP CURVES FOR WATER AS CARRIER FLUID

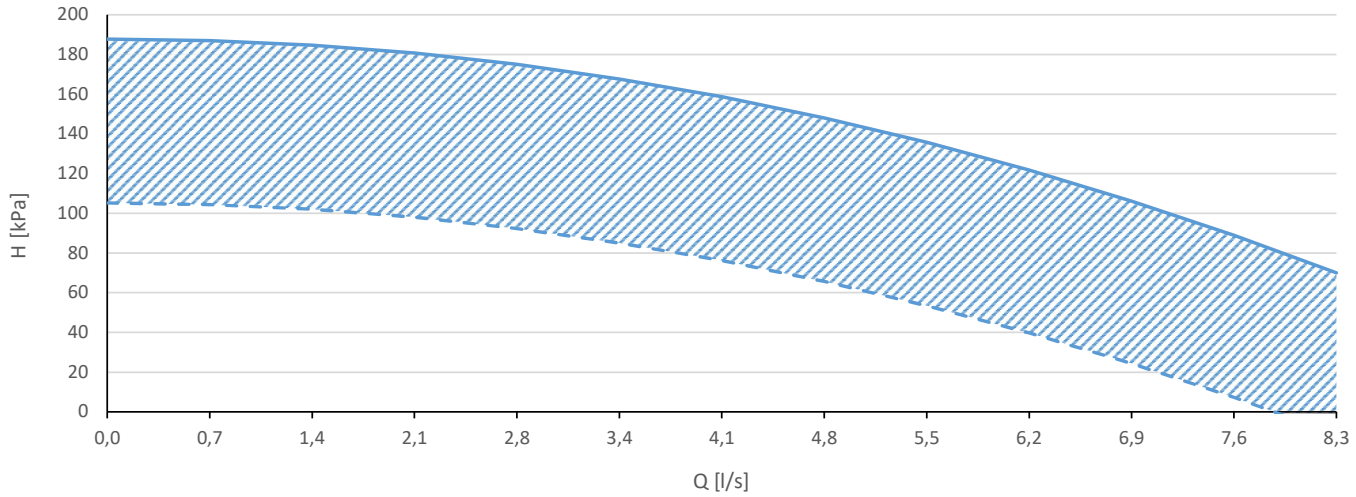
We report the range of useful heads that the machine guarantees during pump modulation (in case of chosen accessory).

6.5.1 Area for kit -PSI

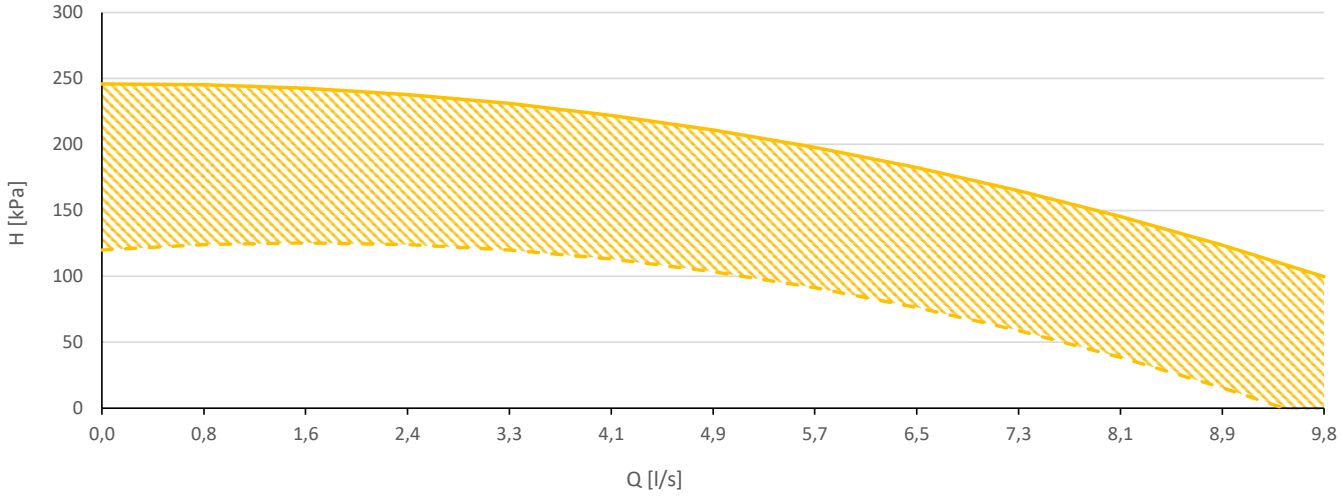
Operating area HWA2-AH 0270 / 0280 / 0290 -PSI



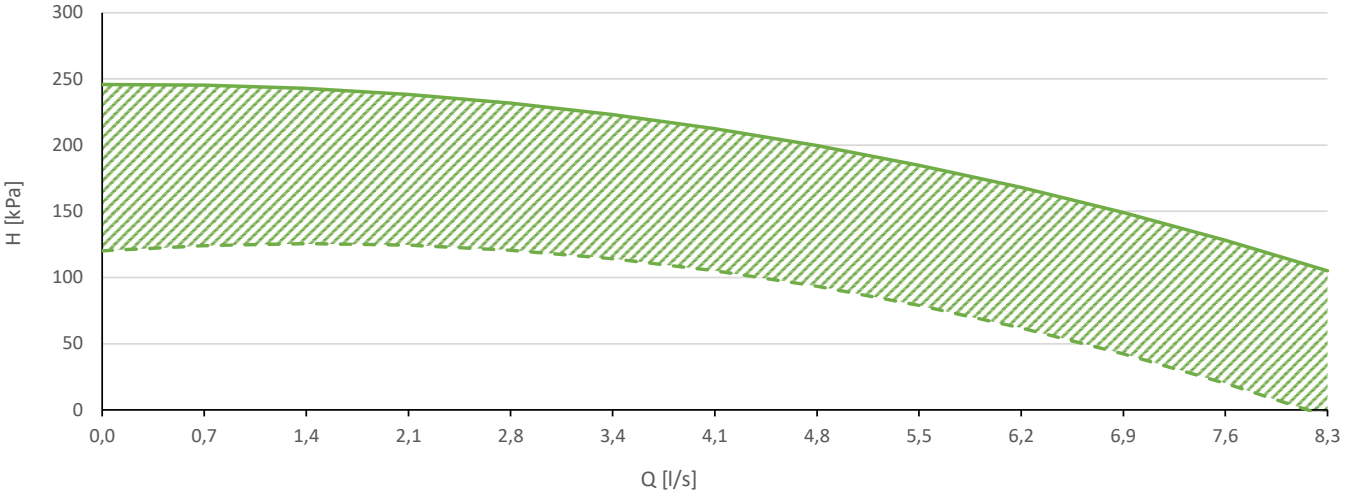
Operating area HWA2-AH 04140 -PSI



Operating area HWA2-AH 04155 -PSI

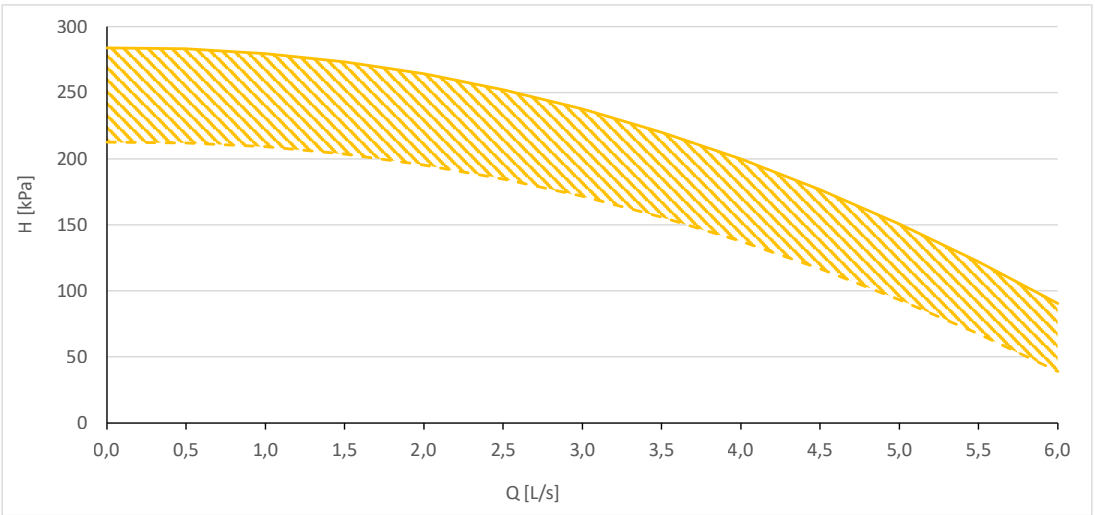


Operating area HWA2-AH 04170 -PSI

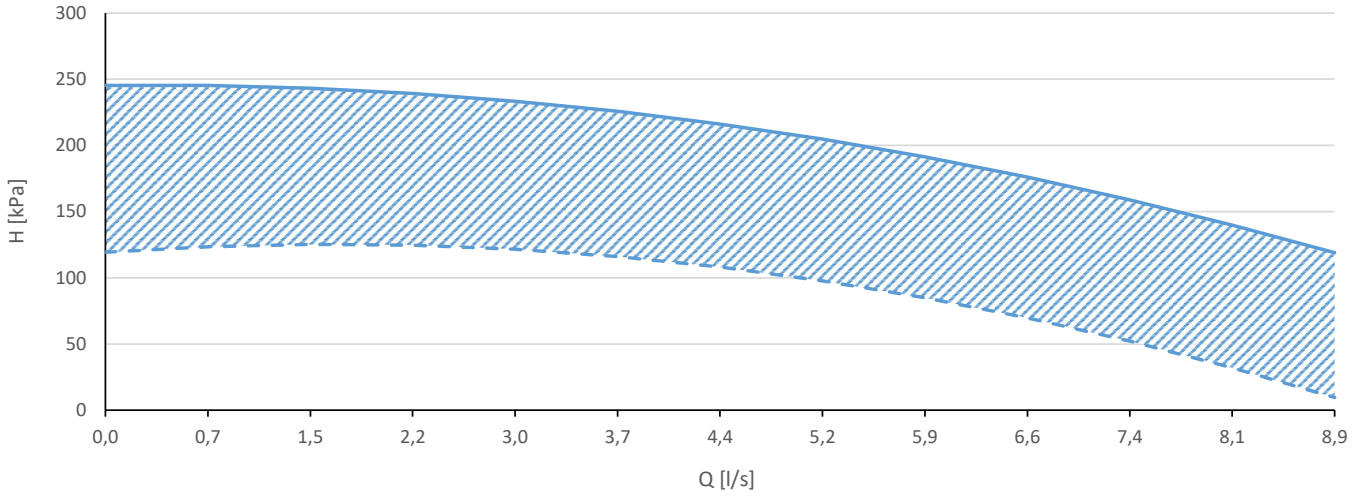


6.5.2 Area for kit -PSIAP

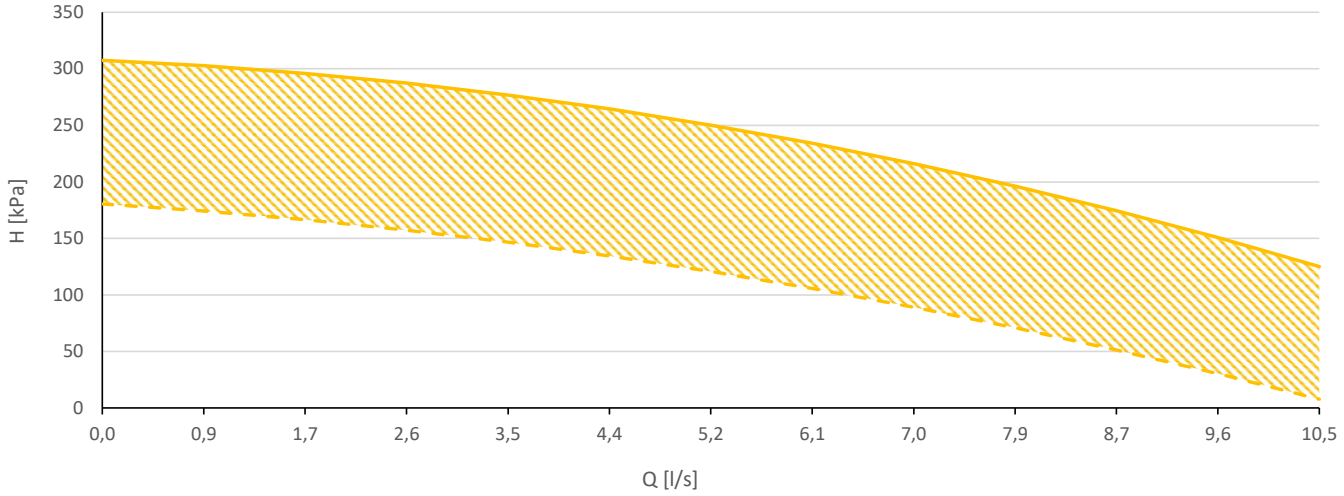
Operating area HWA2-AH 0270 / 0280 / 0290 -PSIAP



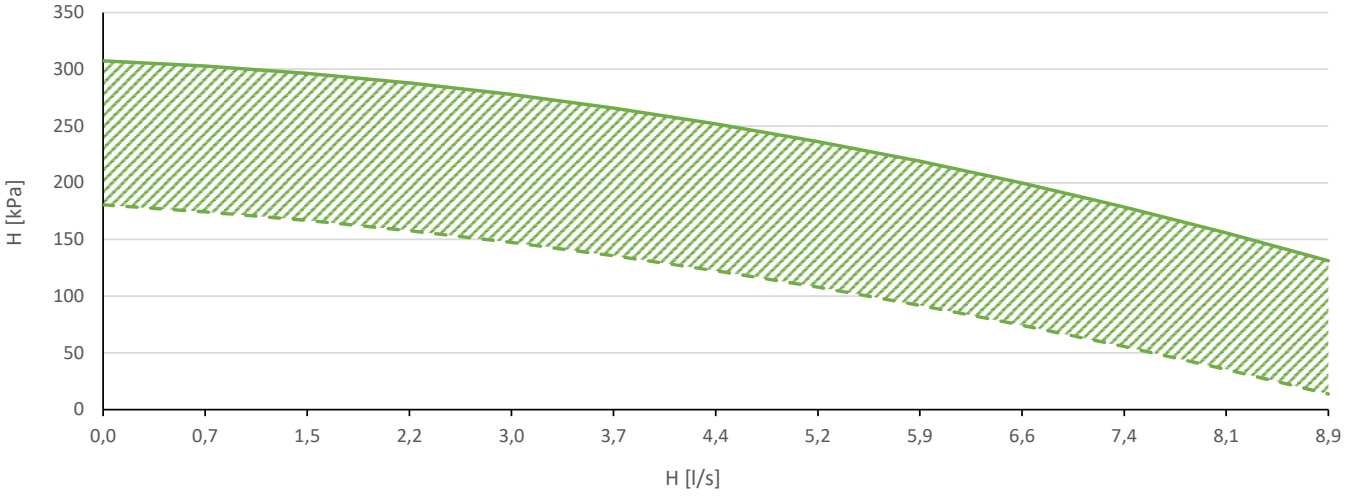
Operating area HWA2-AH 04140 -PSIAP



Operating area HWA2-AH 04155 -PSIAP



Operating area HWA2-AH 04170 -PSIAP



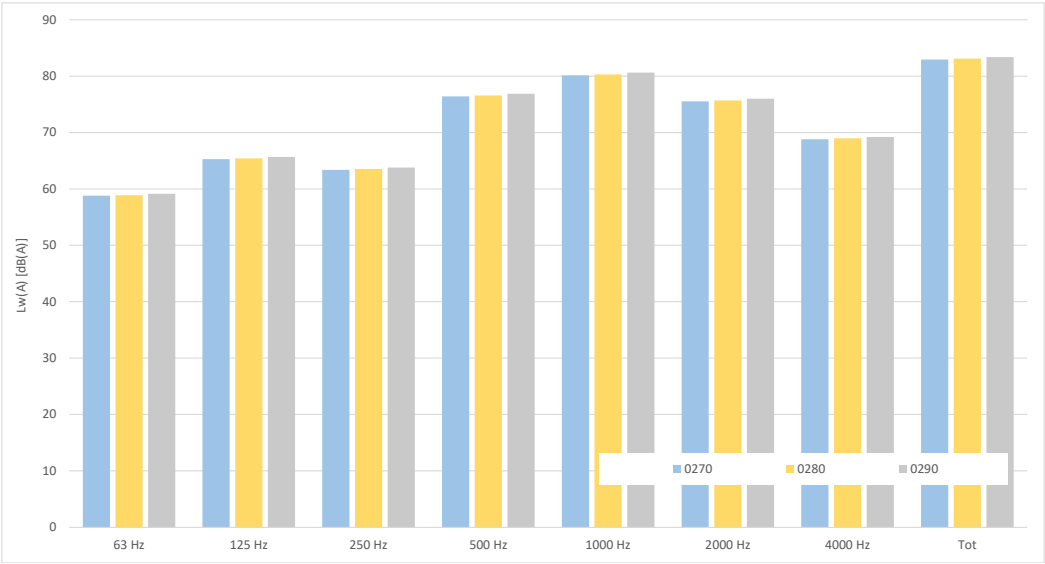
7. SOUND EMISSIONS

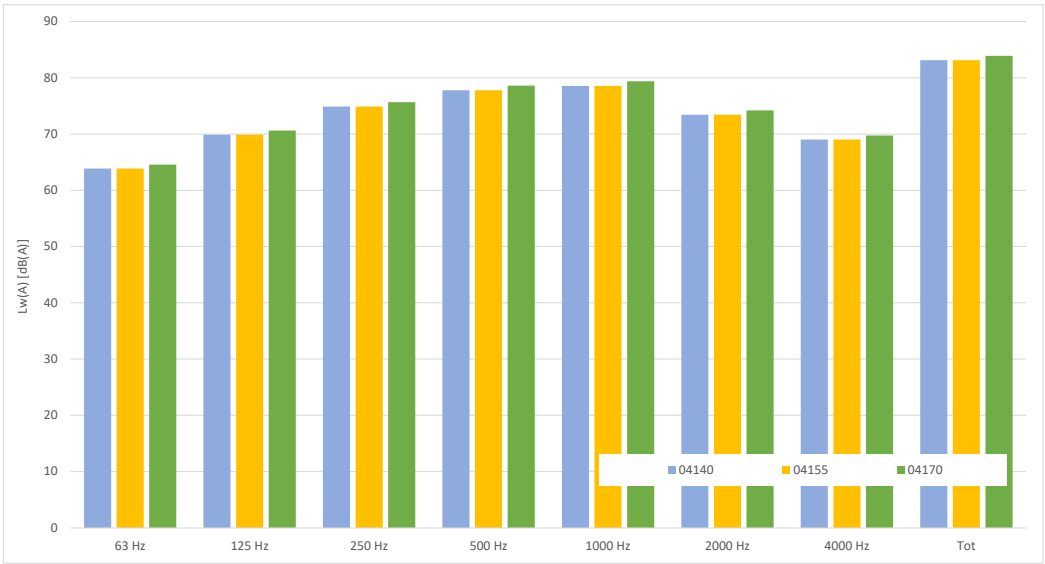
7.1 FULL LOAD UNIT

Sound levels refer to unit at full load and under normal test conditions in cooling mode, (outdoor air b.s. (b.u.) temperature = 35 °C (24), inlet-outlet water temperature = 12-7 °C). The tolerance on the total sound power level value is 2 dB(A). The value is determined in accordance with EN 12102-1:2022, used in conjunction with EN ISO 9614-1:2019, which describes the test methods and techniques for measuring sound power using the intensimetric method.
The sound pressure values are calculated from the sound power level using ISO 3744:2010, considering units operating in the open area.

7.1.1 Sound power and sound pressure levels – standard version

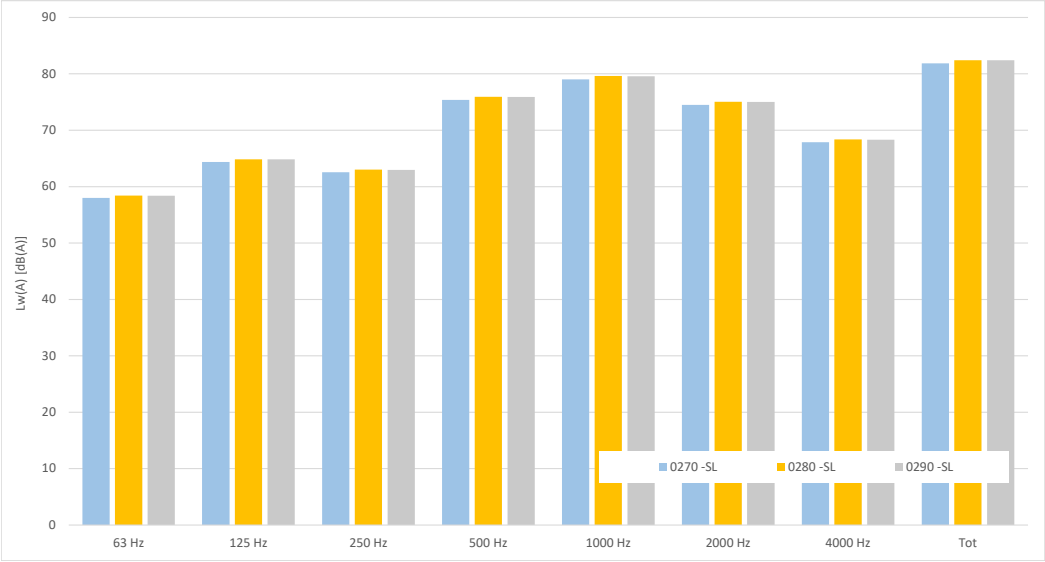
Model HWA2-AH	Octave band sound power level [dB(A)]							Sound power level L_w(A) [dB(A)]	Sound pressure level at 1m [dB(A)]	Sound pressure level at 10m [dB(A)]
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz			
0270	58,8	65,3	63,4	76,4	80,1	75,5	68,8	83	64,8	51,1
0280	58,9	65,4	63,5	76,6	80,3	75,7	69,0	83	64,8	51,1
0290	59,1	65,7	63,8	76,9	80,6	76,0	69,2	83	64,8	51,1
04140	63,9	69,9	74,9	77,8	78,6	73,4	69,0	83	64,0	50,9
04155	63,9	69,9	74,9	77,8	78,6	73,4	69,0	83	64,0	50,9
04170	64,6	70,6	75,7	78,6	79,4	74,2	69,7	84	65,0	51,9

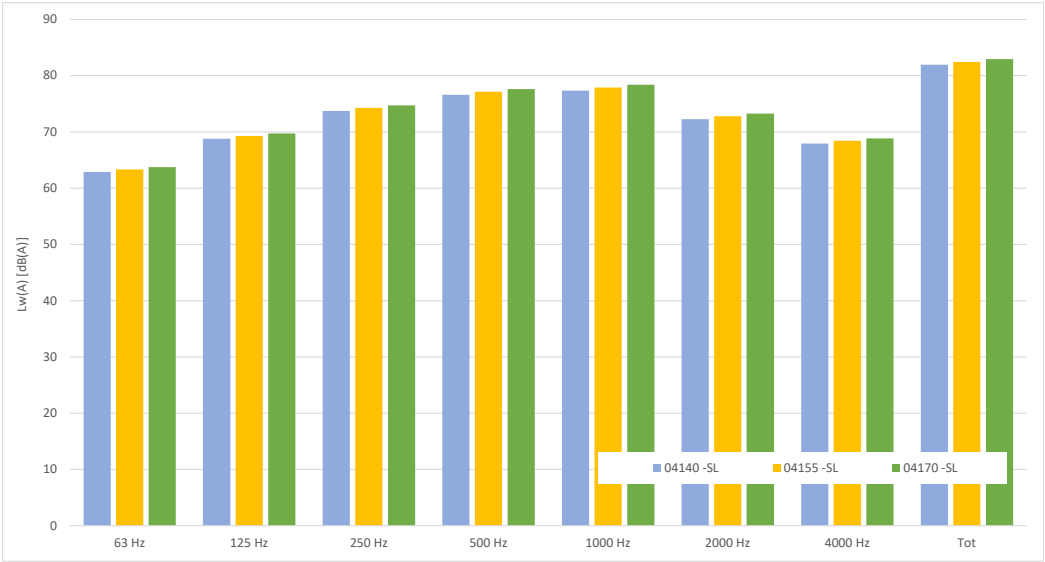




7.1.2 Sound power and sound pressure levels – Low-noise version (-SL)

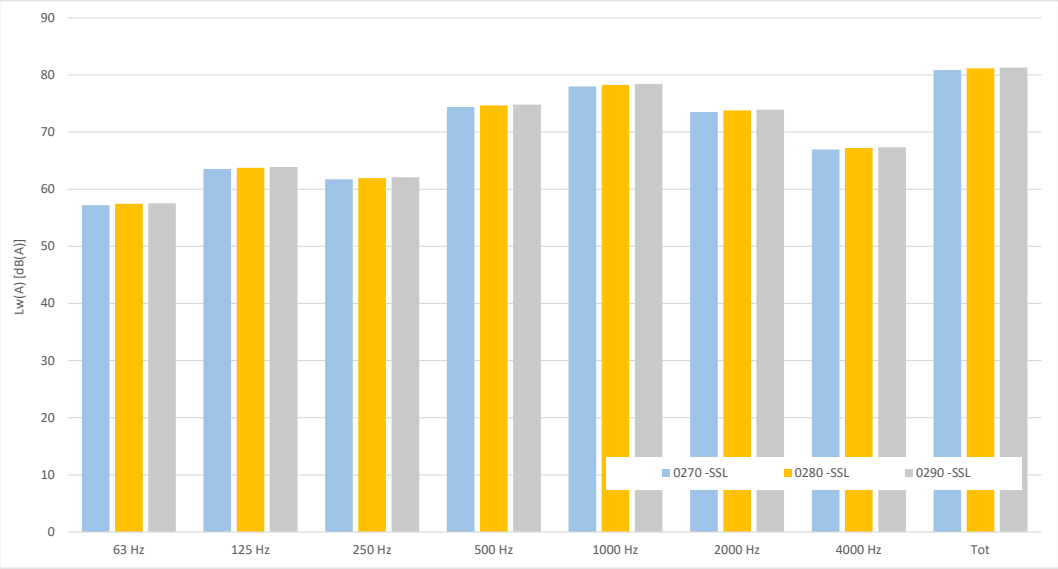
Model HWA2-AH	Octave band sound power level [dB(A)]							Sound power level L_w(A) [dB(A)]	Sound pressure level at 1m [dB(A)]	Sound pressure level at 10m [dB(A)]
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz			
0270 -SL	58,0	64,4	62,6	75,4	79,0	74,5	67,9	82	63,8	50,1
0280 -SL	58,4	64,9	63,0	75,9	79,6	75,1	68,4	82	63,8	50,1
0290 -SL	58,4	64,8	63,0	75,9	79,6	75,0	68,4	82	63,8	50,1
04140 -SL	62,9	68,8	73,7	76,6	77,3	72,3	67,9	82	63,0	49,9
04155 -SL	63,3	69,3	74,3	77,1	77,9	72,8	68,4	82	63,0	49,9
04170 -SL	63,7	69,7	74,7	77,6	78,4	73,3	68,9	83	64,0	50,9

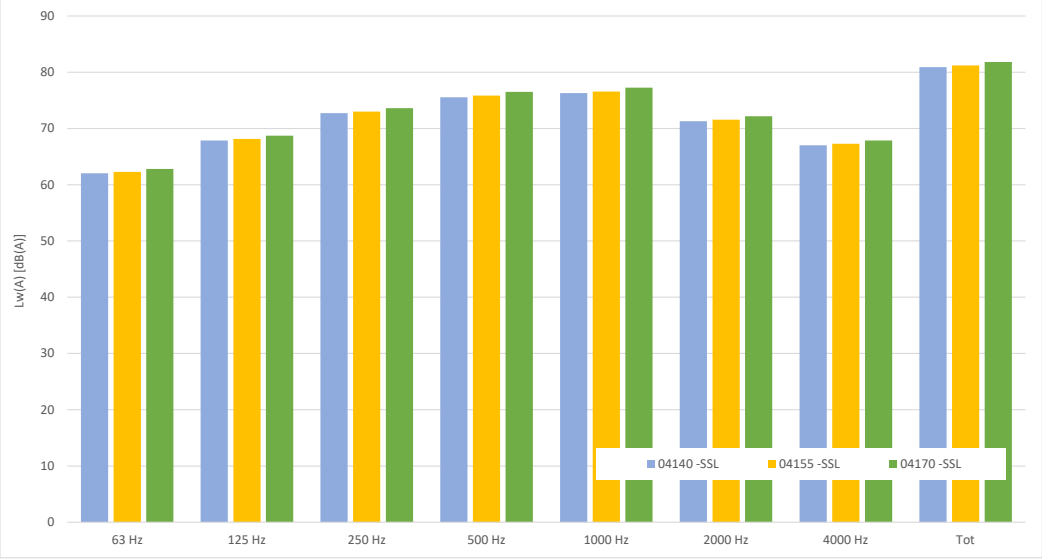




7.1.3 Sound power and sound pressure levels – Super low-noise version (-SSL)

Model HWA2-AH	Octave band sound power level [dB(A)]							Sound power level L_w(A) [dB(A)]	Sound pressure level at 1m [dB(A)]	Sound pressure level at 10m [dB(A)]
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz			
0270 -SSL	57,2	63,5	61,7	74,4	78,0	73,5	67,0	81	62,8	49,1
0280 -SSL	57,4	63,8	61,9	74,7	78,3	73,8	67,2	81	62,8	49,1
0290 -SSL	57,5	63,9	62,1	74,8	78,4	73,9	67,4	81	62,8	49,1
04140 -SSL	62,0	67,9	72,7	75,6	76,3	71,3	67,0	81	62,0	48,9
04155 -SSL	62,3	68,1	73,0	75,8	76,6	71,6	67,3	81	62,0	48,9
04170 -SSL	62,8	68,7	73,6	76,5	77,2	72,2	67,9	82	63,0	49,9





8. OPERATING LIMITS

8.1 WATER FLOW RATE AT THE EVAPORATOR

The nominal water flow rate refers to a temperature difference between the evaporator inlet and outlet of 5°C. The maximum permitted flow rate corresponds to a 3°C temperature difference, while the minimum corresponds to a 10°C temperature difference under nominal conditions, as reported in the technical data sheet.



Insufficient water flow rates can cause excessively low evaporation temperatures, triggering safety devices and shutting down the unit and, in some extreme cases, leading to ice formation in the evaporator and consequent serious faults in the refrigeration circuit.

For greater accuracy, tables are provided below showing the minimum flow rates to be ensured to the plate heat exchanger in order to guarantee proper operation, depending on the model (note: the safety device is intended to prevent failure of the antifreeze probe due to lack of flow, but it does not guarantee the minimum water flow rate required for correct unit operation).

Model HWA2-AH	0270	0280	0290	04140	04155	04170
Minimum water flow rate to be guaranteed in chiller mode (condition (1) data sheet) [l/s]	1,9	2,1	2,2	3,6	3,8	4,3
Maximum water flow rate to be guaranteed in chiller mode (condition (1) data sheet) [l/s]	5,0	5,5	5,8	9,6	10,2	11,5
Differential pressure switch trip flow rate – decreasing flow* [L/s]	1,70	1,70	1,70	1,56	1,68	1,78
Differential pressure switch trip flow rate – increasing flow [L/s]	1,78	1,78	1,78	1,67	1,79	1,90

When the flow rate falls below the indicated limit (differential pressure switch trip point – decreasing flow), the differential pressure switch signals an alarm, which can only be reset when the differential pressure switch trip point – increasing flow – is reached.



Pay attention to the pressure levels in the hydraulic system: too low values can cause the unit to malfunction.

It is good practice to periodically bleed the system, especially when significant temperature differences are observed between water inlet and outlet, as this may indicate the presence of air in the circuit, which reduces the available water flow.



ATTENTION:
In the event of a minor propane leak into the water circuit, propane may be released into the surrounding area during system venting. It is the responsibility of the system designer to assess the installation location of any additional air vents, which must be positioned in safe areas and provided with suitable warning labels indicating the hazard and requiring that no spark-generating devices be present.

8.2 CHILLER WATER PRODUCTION (SUMMER OPERATION)

The minimum allowed evaporator outlet temperature is 5°C for units with standard configuration. In case of units with BT configuration (low temperature) the limit drops to -8°C. In this case the use of glycol water is necessary.The maximum temperature that can be manteined at steady state at the evaporator outlet is 25°C.
In case of lower air temperatures, please contact our Technical Department for feasibility assessment and evaluation of any required modifications based on application requirements.

8.3 HOT WATER PRODUCTION (WINTER OPERATION)

Once the system has reached steady-state operation, the water inlet temperature must not fall below 20°C **: lower values, not related to transient or start-up conditions, may cause system malfunctions with possible compressor damage. The maximum outlet water temperature must not exceed 78°C.
Temperatures higher than those indicated, especially in conjunction with low water flow rates, could lead to malfunctioning of the unit, or in the most critical cases safety devices could trip.



Connection of heat sources with water temperatures above 78 °C is prohibited.
Above this value, the unit is no longer covered by the applicable pressure equipment safety regulations.
When an external heat source is present, installation of a safety device compliant with the applicable regulations and suitable for ensuring safe operating conditions is mandatory.

8.4 AMBIENT AIR TEMPERATURE AND SUMMARY TABLE

Heat pump units are designed and manufactured to operate in summer conditions with condensation control. For the cooling-only version, the outdoor air temperature may reach up to 46°C. In heat pump operation, the permissible outdoor air temperature range is from -20°C to +40°C, depending on the outlet water temperature, as shown below.
** The minimum and maximum permissible temperatures depend on the outside air temperature. Set the desired value considering the envelope.

Operating limits

Water chiller mode		
Standard version ambient temperature.	Minimum -10°C	Maximum +46°C
Outlet water temperature standard version	Minimum +5°C	Maximum +20°C
Ambient temperature BT	Minimum -10°C	Maximum +46°C
Outlet water temperature BT	Minimum -8°C	Maximum +20°C

Heat pump mode		
Ambient temperature	Minimum -20°C (with EC fan)	Maximum +40°C
Outlet water temperature	Minimum +25°C	Maximum +78°C **

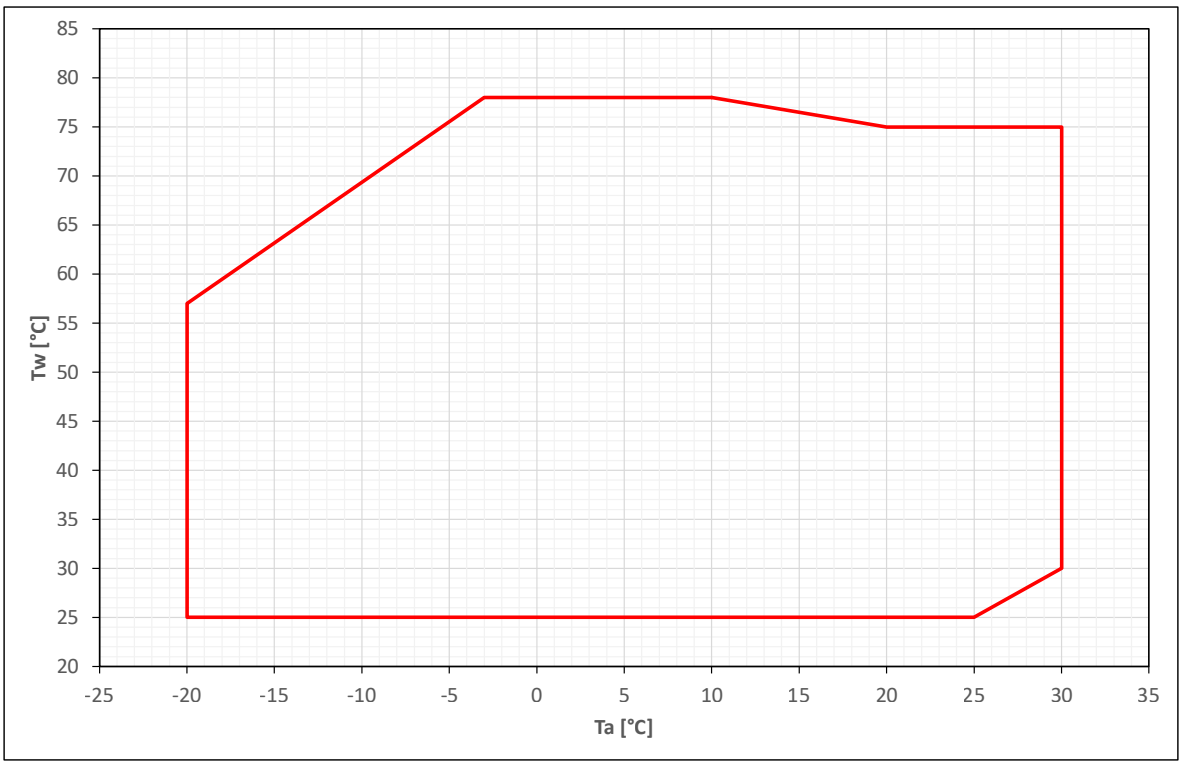
Heat pump mode for domestic hot water		
Ambient temperature with a maximum water temperature of +57°C	Minimum -20°C	Maximum +40°C
Ambient temperature with a maximum water temperature of +65°C	Minimum -13°C	Maximum +40°C
Ambient temperature with a maximum water temperature of +78°C	Minimum -3°C	Maximum +10°C

Altitude limit

Limit of installability	
Maximum altitude	2000 m a.s.l.
Refer to chapter 5.4 of document BTE02070100000 for capacity derating as a function of altitude.	

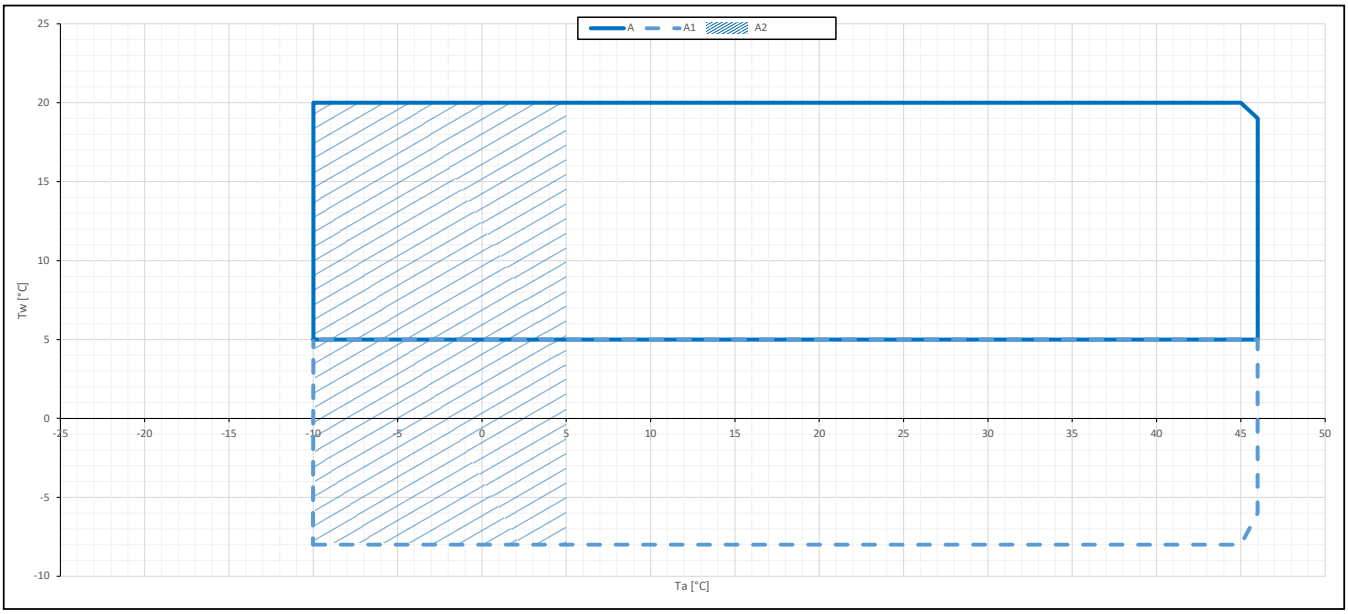
Graphs showing the operating limits for heating, cooling and domestic hot water production are shown below. Note that operating the unit outside the operating limits given causes blocking alarms that lead to the product shutting down, with possible damage to components and/or safety devices.

HEAT PUMP MODE

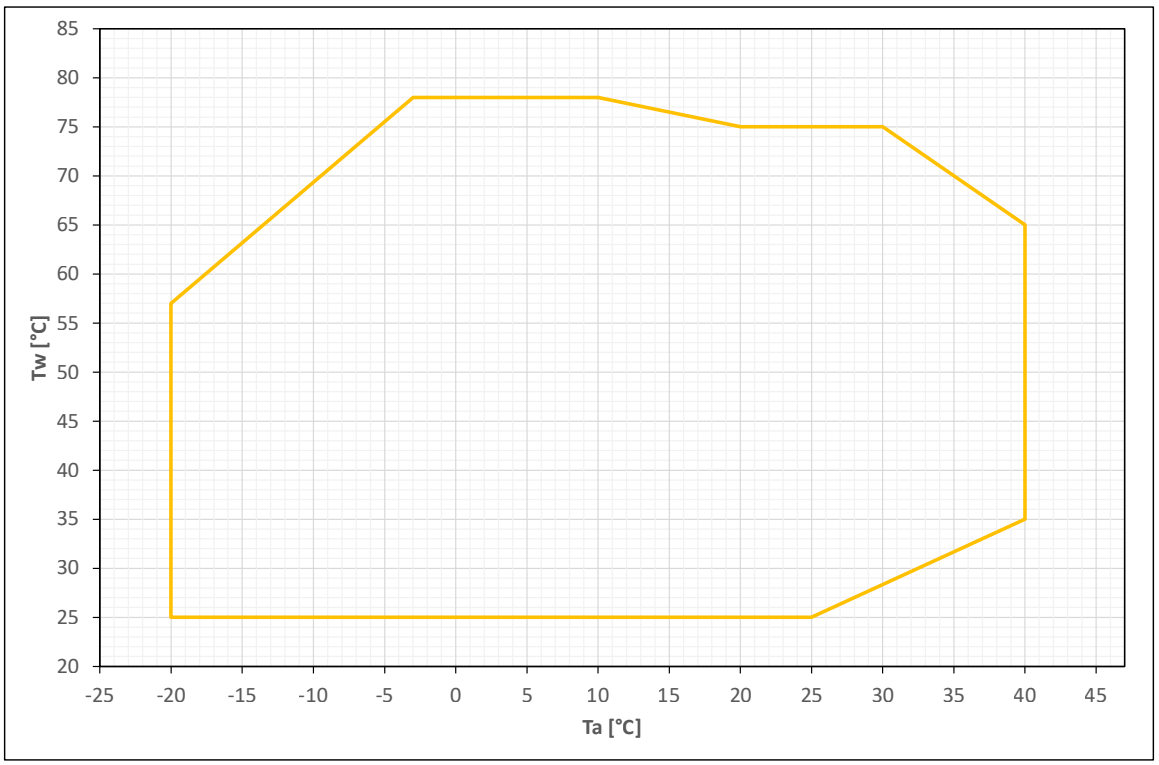


CHILLER MODE

A = HWA2-AH cooling
A1 = HWA2-AH BT
A2 = Operation of the unit in this area is permitted exclusively with a water-glycol mixture



DOMESTIC HOT WATER MODE



9. PERFORMANCE TABLES

The tables show the capacity, power input and efficiency values for different outside air temperatures. The data shown are calculated according to EN 14511:2022. They are indicative and may be subject to change.

9.1 HEATING

HEATING																							
Model HWA2-AH	T air outdoor [°C]	T_{out} [°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]
0270	-20	38,8	16,1	2,41	38,4	17,2	2,23	38,2	18,3	2,09	35,6	19,1	1,86	33,1	20,0	1,66	33,2	21,4	1,55	33,3	23,0	1,45
	-15	43,1	16,2	2,66	42,7	17,3	2,47	42,3	18,4	2,30	39,3	19,3	2,04	36,5	20,2	1,81	36,3	21,6	1,68	36,3	23,1	1,57
	-10	47,6	16,3	2,92	47,1	17,4	2,71	46,5	18,5	2,51	43,2	19,4	2,23	39,9	20,3	1,97	39,7	21,7	1,83	39,5	23,3	1,70
	-7	51,7	16,3	3,17	51,0	17,4	2,93	50,3	18,6	2,70	46,2	19,4	2,38	42,3	20,3	2,08	41,9	21,7	1,93	41,6	23,3	1,79
	-2	57,6	15,6	3,69	56,8	16,7	3,40	56,0	17,9	3,13	52,4	19,2	2,73	49,0	20,7	2,37	48,5	22,1	2,19	48,0	23,7	2,03
	2	65,2	15,1	4,32	64,3	16,2	3,97	63,4	17,4	3,64	60,4	19,1	3,16	57,5	21,0	2,74	56,8	22,5	2,52	56,2	24,1	2,33
	7	76,1	14,9	5,11	74,6	16,0	4,66	73,1	17,2	4,25	71,5	18,5	3,86	69,8	20,0	3,49	68,1	21,5	3,17	66,5	23,2	2,87
	12	85,3	13,5	6,32	83,6	14,7	5,69	81,8	16,0	5,11	79,9	17,4	4,59	78,0	18,8	4,15	75,9	20,5	3,70	73,9	22,3	3,31
	15	87,3	13,3	6,56	85,5	14,6	5,86	83,8	15,8	5,30	81,9	17,2	4,76	80,0	18,7	4,28	77,9	20,4	3,82	75,9	22,2	3,42
	20	90,8	13,1	6,93	88,9	14,3	6,22	87,0	15,7	5,54	85,0	17,1	4,97	83,2	18,6	4,47	81,1	20,2	4,01	79,2	22,0	3,60
0280	-20	40,8	16,2	2,52	40,5	17,3	2,34	40,2	18,4	2,18	38,0	19,2	1,98	35,9	20,0	1,80	38,5	22,4	1,72	41,2	25,1	1,64
	-15	45,2	16,3	2,77	44,7	17,4	2,57	44,3	18,6	2,38	41,7	19,4	2,15	39,3	20,2	1,95	41,8	22,6	1,85	44,5	25,2	1,77
	-10	49,6	16,4	3,02	49,0	17,5	2,80	48,4	18,7	2,59	45,5	19,5	2,33	42,7	20,3	2,10	45,2	22,7	1,99	47,8	25,4	1,88
	-7	53,2	16,5	3,22	52,4	17,6	2,98	51,7	18,8	2,75	48,5	19,6	2,47	45,4	20,4	2,23	48,0	22,8	2,11	50,5	25,4	1,99
	-2	59,9	15,7	3,82	59,1	16,8	3,52	58,2	18,0	3,23	55,1	19,3	2,85	52,1	20,8	2,50	53,6	22,8	2,35	55,0	25,1	2,19
	2	69,6	15,9	4,38	68,7	17,1	4,02	67,7	18,3	3,70	64,1	19,7	3,25	60,6	21,2	2,86	60,1	22,8	2,64	59,7	24,6	2,43
	7	81,3	15,3	5,31	79,7	16,4	4,86	78,1	17,6	4,44	76,4	19,1	4,00	74,7	20,7	3,61	73,5	22,3	3,30	72,3	24,0	3,01
	12	91,4	14,0	6,53	89,5	15,2	5,89	87,5	16,5	5,30	85,4	18,0	4,74	83,3	19,6	4,25	81,7	21,3	3,84	80,1	23,1	3,47
	15	93,5	13,8	6,78	91,5	15,1	6,06	89,5	16,3	5,49	87,4	17,8	4,91	85,3	19,4	4,40	83,7	21,2	3,95	82,1	23,0	3,57
	20	97,3	13,6	7,15	95,3	14,8	6,44	93,2	16,1	5,79	91,0	17,6	5,17	88,8	19,2	4,62	87,1	21,0	4,15	85,4	23,0	3,71
0290	-20	43,4	16,5	2,63	43,1	17,6	2,45	42,8	18,8	2,28	40,9	20,2	2,02	39,1	21,7	1,80	42,5	24,7	1,72	43,1	27,1	1,59
	-15	47,9	16,6	2,89	47,4	17,8	2,66	46,9	19,0	2,47	44,6	20,3	2,20	42,5	21,8	1,95	45,8	24,9	1,84	46,2	27,2	1,70
	-10	52,5	16,8	3,12	51,8	18,0	2,88	51,2	19,2	2,67	48,5	20,6	2,35	45,8	22,0	2,08	49,2	25,0	1,97	49,3	27,3	1,81
	-7	56,3	16,9	3,33	55,5	18,1	3,07	54,7	19,3	2,83	51,7	20,7	2,50	48,9	22,1	2,21	52,2	25,1	2,08	50,8	26,2	1,94
	-2	64,2	17,2	3,73	63,3	18,4	3,44	62,4	19,7	3,17	58,9	21,0	2,80	55,7	22,5	2,48	57,1	24,6	2,32	57,7	26,6	2,17
	2	74,0	17,5	4,23	72,9	18,8	3,88	71,9	20,1	3,58	68,0	21,5	3,16	64,2	23,0	2,79	63,5	24,4	2,60	66,7	27,2	2,45
	7	86,8	17,2	5,05	85,9	18,4	4,67	84,3	19,7	4,28	82,3	21,3	3,86	80,4	23,0	3,50	78,8	24,3	3,24	77,2	25,9	2,98
	12	98,5	15,9	6,19	96,5	17,2	5,61	94,3	18,5	5,10	92,3	20,1	4,59	89,9	21,9	4,11	87,8	23,3	3,77	85,7	25,1	3,41
	15	101	15,7	6,43	99,1	17,0	5,83	96,8	18,4	5,26	94,4	20,0	4,72	92,0	21,7	4,24	89,9	23,2	3,88	87,7	25,0	3,51
	20	105	15,4	6,82	103	16,8	6,13	101	18,2	5,55	98,5	19,8	4,97	96,0	21,5	4,47	93,7	23,1	4,06	91,4	24,9	3,67
04140	-20	67,0	36,4	1,84	66,5	38,4	1,73	65,9	40,4	1,63	65,6	42,6	1,54	65,5	45,2	1,45	65,8	48,0	1,37	66,4	51,5	1,29
	-15	76,2	36,3	2,10	75,4	38,5	1,96	74,6	40,8	1,83	73,8	42,9	1,72	73,3	45,2	1,62	73,2	48,2	1,52	73,4	51,3	1,43
	-10	86,5	36,3	2,38	85,2	38,4	2,22	84,0	40,6	2,07	82,9	43,0	1,93	82,0	45,3	1,81	81,4	48,5	1,68	81,1	51,7	1,57
	-7	92,5	36,4	2,54	91,0	38,6	2,36	90,0	40,7	2,21	88,1	43,2	2,04	86,8	45,7	1,90	85,9	48,5	1,77	85,2	52,0	1,64
	-2	101	34,4	2,94	99,1	36,4	2,72	97,1	38,8	2,50	95,3	41,3	2,31	93,5	43,9	2,13	92,2	46,8	1,97	90,9	50,2	1,81
	2	122	32,3	3,78	121	34,6	3,50	117	37,1	3,15	114	39,6	2,88	112	42,3	2,65	110	45,3	2,43	109	48,9	2,23
	7	154	30,3	5,08	151	32,8	4,60	146	35,5	4,11	142	38,1	3,73	141	40,8	3,46	136	44,2	3,08	133	47,7	2,79
	12	175	28,6	6,12	171	31,2	5,48	166	33,9	4,90	161	36,6	4,40	157	39,5	3,97	156	42,9	3,64	150	46,4	3,23
	15	183	28,2	6,49	178	30,8	5,78	173	33,6	5,15	169	36,3	4,66	164	39,2	4,18	160	42,6	3,76	156	46,3	3,37
	20	192	27,7	6,93	187	30,3	6,17	182	33,2	5,48	177	36,0	4,92	176	38,8	4,54	168	42,3	3,97	166	46,0	3,61

HEATING																					
Model HWA2-AH	T air outdoor [°C]	T_{out} [°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]
04155	-20	75,7	36,7	2,06	73,9	38,9	1,90	73,2	41,1	1,78	72,8	43,6	1,67	73,8	46,7	1,58	72,7	49,8	1,46	73,5	53,6	1,37
	-15	82,5	36,8	2,24	81,4	39,1	2,08	80,3	41,4	1,94	79,8	43,8	1,82	79,4	46,7	1,70	79,0	50,0	1,58	78,6	53,5	1,47
	-10	91,0	37,3	2,44	89,2	39,5	2,26	87,6	41,7	2,10	86,2	44,2	1,95	85,5	47,2	1,81	84,4	50,5	1,67	83,5	54,2	1,54
	-7	95,7	37,5	2,55	94,1	39,7	2,37	92,1	42,1	2,19	90,3	44,7	2,02	89,2	47,7	1,87	87,9	50,8	1,73	86,0	54,4	1,58
	-2	106	34,4	3,08	102	37,1	2,75	99,4	39,4	2,52	97,3	41,9	2,32	95,2	44,9	2,12	93,4	47,9	1,95	91,8	51,3	1,79
	2	113	32,9	3,43	111	35,2	3,15	108	37,8	2,86	106	40,3	2,63	103	43,1	2,39	101	46,1	2,19	99,0	49,7	1,99
	7	167	32,1	5,20	163	34,6	4,71	159	37,2	4,27	155	39,5	3,92	151	43,1	3,50	147	46,4	3,17	143	50,2	2,85
	12	191	30,4	6,28	186	33,1	5,62	181	35,8	5,06	176	38,8	4,54	170	41,9	4,06	165	45,3	3,64	161	48,9	3,29
	15	199	30,0	6,63	194	32,7	5,93	188	35,5	5,30	183	38,5	4,75	178	41,7	4,27	173	45,1	3,84	167	48,8	3,42
	20	214	29,3	7,30	210	32,1	6,54	204	35,0	5,83	198	38,1	5,20	194	41,3	4,70	188	44,9	4,19	182	48,7	3,74
04170	-20	80,0	39,0	2,05	78,2	41,4	1,89	77,5	43,8	1,77	77,2	46,8	1,65	78,5	50,3	1,56	79,0	53,7	1,47	79,6	58,1	1,37
	-15	90,5	39,2	2,31	89,1	41,4	2,15	88,5	44,0	2,01	87,7	46,9	1,87	87,1	50,1	1,74	87,9	53,9	1,63	87,2	57,7	1,51
	-10	103	39,5	2,61	101	41,7	2,42	99,7	44,3	2,25	98,4	47,3	2,08	97,2	50,6	1,92	96,5	53,9	1,79	96,0	57,8	1,66
	-7	110	39,7	2,77	108	42,0	2,57	106	44,5	2,38	104	47,7	2,18	103	51,0	2,02	101	54,3	1,86	100	58,1	1,72
	-2	119	39,3	3,03	116	41,7	2,78	115	43,7	2,63	113	46,7	2,42	109	50,5	2,16	109	53,2	2,05	106	57,6	1,84
	2	131	37,2	3,52	128	39,8	3,22	125	42,4	2,95	122	45,5	2,68	120	48,8	2,46	118	52,2	2,26	117	56,0	2,09
	7	178	35,8	4,97	174	38,6	4,51	169	41,4	4,08	161	44,6	3,61	161	48,1	3,35	158	51,6	3,06	154	55,6	2,77
	12	204	34,4	5,93	198	37,3	5,31	193	40,3	4,79	188	43,6	4,31	182	47,2	3,86	178	50,9	3,50	176	54,7	3,22
	15	218	33,9	6,43	207	37,0	5,59	201	40,1	5,01	196	43,4	4,52	190	46,9	4,05	185	50,5	3,66	181	54,7	3,31
	20	228	33,6	6,79	226	36,6	6,17	217	39,9	5,44	211	43,1	4,90	206	46,7	4,41	200	50,5	3,96	197	54,7	3,60

HEATING																					
Model HWA2-AH	T air outdoor [°C]	T_{out} [°C]																			
		47-55			60			65			55-65			70			75			78		
		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]
0270	-20	33,3	22,5	1,48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-15	36,3	22,8	1,59	36,3	24,9	1,46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-10	39,5	23,0	1,72	39,4	25,0	1,58	39,5	27,0	1,46	39,5	27,0	1,46	-	-	-	-	-	-	-	-	-
	-7	41,7	23,0	1,81	41,4	25,1	1,65	41,3	27,0	1,53	41,3	27,0	1,53	41,2	29,1	1,42	-	-	-	-	-	-
	-2	48,1	23,4	2,06	47,6	25,6	1,86	47,4	27,5	1,72	47,4	27,5	1,72	47,1	29,7	1,59	47,1	32,1	1,47	47,1	33,7	1,40
	2	56,3	23,8	2,37	55,7	26,0	2,14	55,3	28,0	1,98	55,3	28,0	1,98	54,9	30,2	1,82	54,6	32,6	1,67	54,6	34,2	1,60
	7	68,7	23,1	2,97	64,9	25,1	2,59	63,5	27,2	2,33	65,7	26,8	2,45	62,2	29,4	2,12	60,9	31,9	1,91	60,3	33,5	1,80
	12	74,2	21,8	3,40	72,0	24,3	2,96	70,1	26,4	2,66	70,1	26,4	2,66	68,3	28,8	2,37	66,6	31,4	2,12	-	-	-
	15	76,2	21,7	3,51	73,9	24,1	3,07	72,0	26,3	2,74	72,0	26,3	2,74	70,3	28,7	2,45	68,8	31,2	2,21	-	-	-
	20	79,4	21,5	3,69	77,4	24,0	3,22	75,7	26,2	2,89	75,7	26,2	2,89	74,1	28,5	2,60	72,6	31,1	2,33	-	-	-

HEATING																						
Model HWA2-AH	T air outdoor [°C]	T_{out} [°C]																				
		47-55			60			65			55-65			70			75			78		
		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]
0280	-20	41,1	24,6	1,67	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-15	44,5	24,8	1,79	42,0	26,7	1,57	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-10	47,8	25,0	1,91	44,9	26,8	1,68	42,1	28,4	1,48	42,1	28,4	1,48	-	-	-	-	-	-	-	-	-
	-7	50,5	25,1	2,01	47,2	26,9	1,75	44,0	28,4	1,55	44,0	28,4	1,55	47,4	30,3	1,56	-	-	-	-	-	-
	-2	55,1	24,8	2,22	52,5	26,9	1,95	50,0	28,9	1,73	50,0	28,9	1,73	51,8	30,7	1,69	53,7	32,6	1,65	53,7	34,2	1,57
	2	59,8	24,2	2,47	58,9	26,9	2,19	58,0	29,5	1,97	58,0	29,5	1,97	57,2	31,1	1,84	56,6	32,8	1,73	56,4	34,4	1,64
	7	72,9	24,0	3,04	70,6	26,2	2,69	69,1	28,7	2,41	71,2	27,9	2,55	67,5	30,2	2,24	66,1	31,9	2,07	65,5	33,4	1,96
	12	80,4	22,6	3,56	78,0	25,4	3,07	76,1	28,0	2,72	76,1	28,0	2,72	74,1	29,6	2,50	72,3	31,3	2,31	-	-	-
	15	82,5	22,5	3,67	80,0	25,3	3,16	78,0	27,9	2,80	78,0	27,9	2,80	75,9	29,5	2,57	74,0	31,2	2,37	-	-	-
	20	85,8	22,5	3,81	83,2	25,3	3,29	81,2	27,9	2,91	81,2	27,9	2,91	79,3	29,6	2,68	77,5	31,3	2,48	-	-	-
0290	-20	43,0	26,6	1,62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-15	46,1	26,7	1,73	45,1	29,3	1,54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-10	49,3	26,9	1,83	47,8	29,4	1,63	46,5	31,7	1,47	46,5	31,7	1,47	-	-	-	-	-	-	-	-	-
	-7	50,9	25,8	1,97	49,5	28,6	1,73	48,3	31,3	1,54	48,3	31,3	1,54	47,3	34,3	1,38	-	-	-	-	-	-
	-2	57,8	26,3	2,20	55,9	29,0	1,93	54,3	31,7	1,71	54,3	31,7	1,71	52,9	34,7	1,52	52,7	37,6	1,40	52,7	39,5	1,33
	2	66,8	26,8	2,49	64,4	29,6	2,18	62,4	32,3	1,93	62,4	32,3	1,93	60,6	35,3	1,72	60,3	38,2	1,58	60,3	40,1	1,50
	7	78,1	26,4	2,96	75,6	28,6	2,64	74,0	31,5	2,35	74,2	30,7	2,42	72,6	34,8	2,09	71,4	37,6	1,90	70,8	39,4	1,80
	12	86,0	24,5	3,51	83,6	27,8	3,01	81,6	30,8	2,65	81,6	30,8	2,65	79,8	34,1	2,34	78,1	37,0	2,11	-	-	-
	15	88,1	24,4	3,61	85,8	27,7	3,10	83,8	30,7	2,73	83,8	30,7	2,73	81,9	34,1	2,40	79,9	36,9	2,17	-	-	-
	20	91,8	24,4	3,76	89,1	27,7	3,22	87,2	30,7	2,84	87,2	30,7	2,84	85,3	34,1	2,50	83,5	37,0	2,26	-	-	-
04140	-20	66,3	50,6	1,31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-15	73,4	50,6	1,45	73,8	55,1	1,34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-10	81,2	51,1	1,59	81,0	55,5	1,46	81,1	59,2	1,37	81,1	57,5	1,41	-	-	-	-	-	-	-	-	-
	-7	85,3	51,4	1,66	84,7	55,7	1,52	84,4	59,4	1,42	84,6	57,9	1,46	84,0	64,1	1,31	-	-	-	-	-	-
	-2	91,1	49,8	1,83	89,9	53,8	1,67	89,0	57,4	1,55	89,6	56,4	1,59	88,0	62,0	1,42	87,1	66,5	1,31	86,8	70,0	1,24
	2	113	48,1	2,35	108	52,7	2,05	110	56,7	1,94	108	55,4	1,95	109	61,2	1,78	108	65,1	1,66	106	69,3	1,53
	7	134	46,9	2,86	131	51,4	2,55	128	55,7	2,30	129	54,0	2,39	126	60,3	2,09	123	64,1	1,92	122	68,5	1,78
	12	153	45,3	3,38	146	50,3	2,90	143	54,6	2,62	144	52,7	2,73	139	59,4	2,34	138	64,2	2,15	-	-	-
	15	158	45,1	3,50	155	50,2	3,09	149	54,4	2,74	151	52,6	2,87	145	59,2	2,45	141	64,1	2,20	-	-	-
	20	165	45,0	3,67	161	50,0	3,22	159	54,3	2,93	160	52,3	3,06	157	59,0	2,66	148	64,3	2,30	-	-	-
04155	-20	73,5	52,9	1,39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-15	77,9	52,6	1,48	78,6	57,8	1,36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-10	83,1	53,6	1,55	82,9	58,0	1,43	82,7	62,7	1,32	82,2	60,9	1,35	-	-	-	-	-	-	-	-	-
	-7	86,6	53,8	1,61	85,6	58,2	1,47	84,9	62,4	1,36	85,0	61,2	1,39	84,5	67,1	1,26	-	-	-	-	-	-
	-2	94,1	50,3	1,87	92,7	54,5	1,70	91,0	58,7	1,55	89,4	58,4	1,53	88,6	63,7	1,39	89,3	68,2	1,31	87,9	72,0	1,22
	2	94,9	49,7	1,91	97,4	53,5	1,82	96,0	57,8	1,66	96,2	57,3	1,68	94,4	62,1	1,52	93,4	67,2	1,39	93,0	70,5	1,32
	7	144	49,1	2,93	141	53,6	2,63	136	58,4	2,33	137	56,6	2,42	133	63,3	2,10	131	68,6	1,91	129	72,1	1,79
	12	162	47,9	3,38	156	53,1	2,94	152	57,6	2,64	160	55,6	2,88	148	62,4	2,37	144	67,6	2,13	-	-	-
	15	168	47,9	3,51	163	52,9	3,08	158	57,5	2,75	159	55,6	2,86	154	62,3	2,47	150	67,6	2,22	-	-	-
	20	184	47,5	3,87	176	52,9	3,33	171	57,4	2,98	172	55,5	3,10	166	62,4	2,66	164	67,5	2,43	-	-	-

HEATING																					
Model HWA2-AH	T air outdoor [°C]	T_{out} [°C]																			
		47-55			60			65			55-65			70			75			78		
		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]
04170	-20	79,4	57,1	1,39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-15	86,4	56,8	1,52	87,0	62,1	1,40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-10	95,5	56,8	1,68	95,8	62,2	1,54	96,7	66,7	1,45	95,4	64,9	1,47	-	-	-	-	-	-	-	-	-
	-7	101	57,4	1,76	100	62,5	1,60	99,5	66,8	1,49	101	65,2	1,55	99,2	72,4	1,37	-	-	-	-	-	-
	-2	106	57,0	1,86	105	61,8	1,70	105	65,6	1,60	104	65,0	1,60	103	71,0	1,45	103	75,7	1,36	101	80,2	1,26
	2	105	55,3	1,90	113	60,1	1,88	114	64,8	1,76	114	63,3	1,80	114	69,9	1,63	113	75,3	1,50	113	79,0	1,43
	7	155	54,4	2,85	154	59,5	2,59	154	63,9	2,41	149	62,1	2,40	151	68,9	2,19	142	74,3	1,91	140	78,7	1,78
	12	177	53,5	3,31	169	59,1	2,86	165	63,7	2,59	173	61,3	2,82	161	68,8	2,34	163	74,4	2,19	-	-	-
	15	182	53,4	3,41	176	58,9	2,99	172	63,7	2,70	174	61,5	2,83	167	68,7	2,43	163	74,8	2,18	-	-	-
	20	198	53,2	3,72	190	59,0	3,22	185	63,8	2,90	186	61,4	3,03	180	69,0	2,61	179	74,9	2,39	-	-	-

9.2 COOLING

COOLING																					
Model HWA2-AH	T air outdoor [°C]	T_{out} [°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]			
0270	-10	74,0	11,1	6,67	79,0	11,1	7,12	85,4	11,1	7,69	87,0	11,1	7,84	88,8	11,2	7,93	90,5	11,2	8,08			
	0	72,6	11,6	6,26	77,6	11,7	6,63	83,8	11,8	7,10	85,3	11,8	7,23	87,0	11,8	7,37	88,7	11,9	7,45			
	10	70,5	12,5	5,64	75,3	12,6	5,98	81,3	12,8	6,35	82,6	12,8	6,45	84,3	12,9	6,53	85,9	13,0	6,61			
	20	67,0	14,1	4,75	71,5	14,2	5,04	77,4	14,4	5,38	78,6	14,5	5,42	80,0	14,6	5,48	81,8	14,8	5,53			
	25	64,6	15,3	4,22	68,9	15,5	4,45	74,7	15,8	4,73	76,1	15,9	4,79	78,4	16,1	4,87	80,7	16,3	4,95			
	30	61,8	17,0	3,64	66,0	17,2	3,84	71,8	17,5	4,10	73,3	17,6	4,16	76,2	17,9	4,26	79,2	18,1	4,38			
	35	58,7	19,0	3,09	62,7	19,2	3,27	68,5	19,7	3,48	70,2	19,8	3,55	73,7	20,1	3,67	77,3	20,4	3,79			
	40	55,5	21,5	2,58	59,3	21,7	2,73	65,1	22,0	2,96	66,8	22,1	3,02	69,8	22,6	3,09	74,4	22,6	3,29			
	46	51,0	24,0	2,12	54,5	24,2	2,25	60,2	24,5	2,46	62,0	24,5	2,53	65,9	24,8	2,66	70,0	25,0	2,80			
0280	-10	79,6	12,6	6,32	84,8	12,7	6,68	94,8	13,0	7,29	98,0	13,1	7,48	103,0	13,2	7,80	107,0	13,4	7,99			
	0	78,0	13,3	5,86	83,6	13,4	6,24	91,9	13,7	6,71	95,9	13,8	6,95	100,0	14,0	7,14	105,0	14,2	7,39			
	10	75,1	14,4	5,22	80,1	14,6	5,49	89,3	15,0	5,95	91,9	15,1	6,09	96,0	15,3	6,27	100,0	15,6	6,41			
	20	70,8	16,3	4,34	75,6	16,5	4,58	84,0	17,0	4,94	86,5	17,2	5,03	90,4	17,4	5,20	94,3	17,7	5,33			
	25	69,1	17,5	3,95	73,8	17,7	4,17	81,5	18,3	4,45	84,4	18,5	4,56	88,2	18,7	4,72	92,0	19,0	4,84			
	30	67,0	19,0	3,53	71,5	19,3	3,70	79,2	19,9	3,98	81,8	20,1	4,07	85,5	20,4	4,19	89,2	20,7	4,31			
	35	64,5	21,0	3,07	68,9	21,3	3,23	76,4	21,8	3,50	78,9	22,1	3,57	82,4	22,4	3,68	86,2	22,7	3,80			
	40	61,1	23,4	2,61	65,2	23,6	2,76	72,3	24,1	3,00	74,9	24,3	3,08	78,4	24,5	3,20	82,0	24,8	3,31			
	46	56,2	25,8	2,18	60,1	26,1	2,30	66,8	26,6	2,51	69,4	26,7	2,60	72,9	27,0	2,70	76,5	27,2	2,81			

COOLING																		
Model HWA2-AH	T air outdoor [°C]	T_{out} [°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]
0290	-10	85,9	14,2	6,05	91,7	14,4	6,37	102,0	14,6	6,99	105,0	14,7	7,14	109,0	14,7	7,41	114,0	14,9	7,65
	0	84,4	14,9	5,66	90,0	15,1	5,96	99,4	15,4	6,45	102,0	15,5	6,58	107,0	15,7	6,82	111,0	15,8	7,03
	10	81,3	16,0	5,08	86,7	16,3	5,32	95,8	16,7	5,74	98,8	16,9	5,85	103,0	17,0	6,06	107,0	17,2	6,22
	20	77,0	17,9	4,30	81,9	18,2	4,50	90,8	18,8	4,83	93,7	19,0	4,93	97,7	19,2	5,09	102,0	19,5	5,23
	25	74,5	19,3	3,86	79,3	19,6	4,05	88,4	20,2	4,38	90,6	20,4	4,44	94,5	20,6	4,59	98,4	20,9	4,71
	30	71,5	21,0	3,40	76,3	21,3	3,58	84,0	21,9	3,84	87,1	22,2	3,92	90,9	22,5	4,04	94,7	22,8	4,15
	35	68,2	23,1	2,95	72,9	23,4	3,12	80,6	24,1	3,34	83,3	24,3	3,43	86,9	24,7	3,52	90,6	25,0	3,62
	40	64,5	25,5	2,53	68,8	25,8	2,67	76,2	26,4	2,89	78,9	26,6	2,97	82,5	26,9	3,07	86,2	27,2	3,17
	46	59,4	28,1	2,11	63,4	28,5	2,22	70,6	29,1	2,43	73,1	29,4	2,49	76,8	29,7	2,59	80,5	30,1	2,67
04140	-10	76	9,6	7,88	81	9,9	8,22	89	10,0	8,86	93	10,1	9,21	98	10,1	9,61	102	10,2	9,96
	0	73	10,9	6,68	78	11,1	7,03	86	11,3	7,54	90	11,4	7,84	94	11,5	8,11	98	11,6	8,42
	10	139	25,4	5,47	148	25,8	5,74	163	26,5	6,15	170	26,7	6,37	178	27,0	6,59	185	27,2	6,80
	20	130	29,7	4,38	138	30,2	4,57	153	31,0	4,94	158	31,8	4,97	165	32,1	5,14	172	32,5	5,29
	25	125	32,6	3,83	132	33,2	3,98	146	34,1	4,28	152	34,5	4,41	159	34,9	4,56	166	35,3	4,70
	30	119	35,5	3,35	127	36,1	3,52	140	37,1	3,77	146	37,6	3,88	153	38,0	4,03	159	38,5	4,13
	35	114	38,9	2,93	121	39,5	3,06	133	40,8	3,26	139	41,2	3,37	145	41,8	3,47	152	42,3	3,59
	40	107	42,6	2,51	113	43,3	2,61	125	44,5	2,81	131	45,0	2,91	137	45,5	3,01	144	46,2	3,12
	46	97,8	47,0	2,08	104	47,7	2,18	115	48,7	2,36	121	49,2	2,46	127	49,6	2,56	133	50,4	2,64
04155	-10	77,0	12,2	6,32	82,0	12,2	6,74	91,0	12,4	7,36	96,0	12,4	7,73	102	12,4	8,18	106	12,4	8,54
	0	75,0	13,0	5,79	79,5	13,1	6,05	88,0	13,4	6,59	93,5	13,5	6,92	99	13,5	7,30	103	13,5	7,63
	10	144	29,0	4,97	153	29,4	5,20	169	30,0	5,63	178	30,3	5,87	189	30,5	6,20	197	30,6	6,44
	20	136	32,8	4,15	144	33,4	4,31	159	34,2	4,65	168	34,6	4,86	178	34,9	5,10	186	35,1	5,30
	25	131	35,3	3,71	140	36,0	3,89	154	36,9	4,17	162	37,3	4,34	171	37,6	4,55	179	37,8	4,74
	30	126	38,2	3,30	133	38,9	3,42	147	39,9	3,68	156	40,4	3,86	165	40,8	4,04	172	40,9	4,21
	35	120	41,7	2,88	128	42,4	3,02	141	44,1	3,20	148	44,4	3,33	156	45,0	3,47	164	45,1	3,64
	40	110	45,6	2,41	117	46,4	2,52	130	47,6	2,73	137	48,2	2,84	146	48,8	2,99	153	49,2	3,11
	46	98,9	50,5	1,96	105	51,2	2,05	117	52,2	2,24	124	53,0	2,34	132	53,4	2,47	139	53,9	2,58
04170	-10	91	12,6	7,22	97	13,1	7,39	105	13,7	7,60	108	13,9	7,77	115	14,0	8,18	120	14,1	8,49
	0	87	14,4	6,01	92	14,6	6,29	101	15,0	6,74	107	15,2	7,02	111	15,3	7,24	116	15,4	7,49
	10	166	32,3	5,14	176	32,9	5,35	193	33,8	5,71	203	34,2	5,94	211	34,5	6,12	220	34,9	6,30
	20	155	36,6	4,23	165	37,4	4,41	182	38,5	4,73	190	39,0	4,87	198	39,4	5,03	207	39,8	5,20
	25	150	39,3	3,82	159	40,1	3,97	174	41,8	4,16	182	42,3	4,30	190	42,7	4,45	198	43,2	4,58
	30	143	42,7	3,35	152	43,7	3,48	164	44,7	3,67	174	45,5	3,82	182	46,0	3,96	190	46,5	4,09
	35	136	46,3	2,94	145	47,2	3,07	157	48,3	3,25	167	49,3	3,39	174	50,1	3,47	181	50,6	3,58
	40	127	50,0	2,54	136	50,9	2,67	148	52,3	2,83	156	53,2	2,93	164	53,9	3,04	172	54,8	3,14
	46	117	54,7	2,14	124	55,4	2,24	138	57,0	2,42	144	57,6	2,50	151	58,5	2,58	159	59,3	2,68

9.3 SANITARY

HEATING																							
Model HWA2-AH	T air outdoor [°C]	T_{out} [°C]																					
		45			50			55			60			65			70			75			
		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]
0270	20	83,2	18,6	4,47	81,1	20,2	4,01	79,2	22,0	3,60	77,4	24,0	3,22	75,7	26,2	2,89	74,1	28,5	2,60	72,6	31,1	2,33
	25	88,7	18,5	4,79	86,4	20,2	4,28	84,3	22,0	3,83	82,1	24,0	3,42	80,0	26,2	3,05	78,0	28,6	2,73	76,0	31,2	2,44
	30	92,4	18,5	4,99	90,0	20,2	4,46	87,5	22,0	3,98	85,1	24,1	3,53	82,7	26,3	3,14	80,7	28,7	2,81	79,2	31,4	2,52
	35	95,8	18,5	5,18	94,0	20,3	4,63	92,2	22,2	4,15	90,4	24,3	3,72	88,5	26,6	3,33	86,8	29,0	2,99	-	-	-
	40	104	18,7	5,56	102	20,5	4,98	99,8	22,4	4,46	97,7	24,5	3,99	95,5	26,9	3,55	-	-	-	-	-	-
0280	20	88,8	19,2	4,62	87,1	21,0	4,15	85,4	23,0	3,71	83,2	25,3	3,29	81,2	27,9	2,91	79,3	29,6	2,68	77,5	31,3	2,48
	25	95,0	19,1	4,97	93,0	20,9	4,45	91,1	23,0	3,96	88,7	25,4	3,49	86,3	28,0	3,08	83,9	29,7	2,82	81,6	31,4	2,60
	30	99,4	19,0	5,23	97,2	20,9	4,65	95,0	23,1	4,11	92,2	25,5	3,62	89,5	28,1	3,19	86,8	29,8	2,91	84,2	31,6	2,66
	35	103	19,0	5,42	100	20,9	4,78	97,8	22,9	4,27	96,1	25,5	3,77	94,4	28,4	3,32	92,3	30,2	3,06	-	-	-
	40	110	19,3	5,70	108	21,0	5,14	106	23,0	4,61	104	25,7	4,05	102	28,8	3,54	-	-	-	-	-	-
0290	20	96,0	21,5	4,47	93,7	23,1	4,06	91,4	24,9	3,67	89,1	27,7	3,22	87,2	30,7	2,84	85,3	34,1	2,50	83,5	37,0	2,26
	25	103	21,4	4,81	100	23,1	4,33	97,7	25,0	3,91	95,3	27,8	3,43	93,0	30,9	3,01	90,7	34,3	2,64	88,5	37,2	2,38
	30	108	21,3	5,07	105	23,2	4,53	102	25,1	4,06	99,4	28,0	3,55	96,7	31,1	3,11	94,1	34,5	2,73	91,5	37,4	2,45
	35	112	21,4	5,23	109	23,3	4,68	106	25,3	4,19	103	28,1	3,67	100	31,3	3,19	98,6	34,8	2,83	-	-	-
	40	117	21,6	5,42	115	23,6	4,87	113	25,6	4,41	111	28,6	3,88	109	31,8	3,43	-	-	-	-	-	-
04140	20	176	38,8	4,54	168	42,3	3,97	166	46,0	3,61	161	50,0	3,22	159	54,3	2,93	157	59,0	2,66	148	64,3	2,30
	25	183	38,7	4,73	179	42,1	4,25	175	45,9	3,81	172	49,9	3,45	168	54,2	3,10	164	59,0	2,78	159	64,4	2,47
	30	198	38,5	5,14	194	42,0	4,62	190	45,9	4,14	185	50,0	3,70	181	54,4	3,33	176	59,3	2,97	172	64,7	2,66
	35	211	38,4	5,49	208	42,0	4,95	202	46,0	4,39	198	50,1	3,95	193	54,7	3,53	188	59,5	3,16	-	-	-
	40	223	38,4	5,81	218	42,1	5,18	213	46,1	4,62	207	50,2	4,12	203	54,9	3,70	-	-	-	-	-	-
04155	20	194	41,3	4,70	188	44,9	4,19	182	48,7	3,74	176	52,9	3,33	171	57,4	2,98	166	62,4	2,66	164	67,5	2,43
	25	203	41,2	4,93	198	44,8	4,42	193	48,7	3,96	188	53,0	3,55	182	57,4	3,17	178	62,5	2,85	173	67,8	2,55
	30	220	41,2	5,34	214	44,9	4,77	208	48,8	4,26	202	53,2	3,80	197	57,8	3,41	192	63,0	3,05	186	68,4	2,72
	35	234	41,2	5,68	228	45,0	5,07	222	49,0	4,53	216	53,5	4,04	209	58,2	3,59	203	63,2	3,21	-	-	-
	40	247	41,2	6,00	241	45,1	5,34	234	49,3	4,75	227	53,7	4,23	220	58,5	3,76	-	-	-	-	-	-
04170	20	206	46,7	4,41	200	50,5	3,96	197	54,7	3,60	190	59,0	3,22	185	63,8	2,90	180	69,0	2,61	179	74,9	2,39
	25	217	46,7	4,65	211	50,6	4,17	206	54,8	3,76	202	59,2	3,41	197	64,0	3,08	192	69,3	2,77	186	75,9	2,45
	30	233	46,9	4,97	228	50,9	4,48	223	55,2	4,04	219	59,7	3,67	212	64,4	3,29	206	69,8	2,95	201	75,6	2,66
	35	250	47,2	5,30	243	51,3	4,74	237	55,6	4,26	233	60,2	3,87	226	65,1	3,47	220	70,5	3,12	-	-	-
	40	262	47,4	5,53	257	51,6	4,98	250	56,1	4,46	244	60,7	4,02	238	65,7	3,62	-	-	-	-	-	-

9.4 MINIMUM LOAD

The following tables show the values of minimum capacity, power input and efficiency for different outdoor air and water outlet temperatures. The data are useful to understand the minimum capacity of the heat pump and are essential for the correct choice of unit.
Failure to meet the minimum load on the heat pump results in intermittent operation with numerous restarts and a reduction in compressor life.
The data are obtained with a fixed water flow rate and a fixed outlet water temperature (Tout) of 35/45/55/65°C in heating mode and 7/18°C in cooling mode.
The heating data also take into account any defrosting.

HEATING – MINIMUM LOAD													
Model HWA2-AH	T air outdoor [°C]	T_{out} [°C]											
		35			45			55			65		
		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]
0270	-20	15,2	11,4	1,33	12,7	12,1	1,05	12,8	13,5	0,95	-	-	-
	-15	17,0	11,3	1,50	14,1	12,1	1,17	13,9	13,5	1,03	-	-	-
	-10	19,2	11,3	1,70	15,7	12,1	1,30	15,3	13,5	1,13	15,2	15,3	0,99
	-7	21,2	11,3	1,88	16,9	12,1	1,40	16,4	13,5	1,21	16,1	15,3	1,05
	-2	24,4	10,6	2,30	20,4	12,0	1,70	19,6	13,4	1,46	19,0	15,2	1,25
	2	29,2	9,36	3,12	25,4	11,2	2,27	24,3	12,6	1,93	23,3	14,5	1,61
	7	30,9	8,85	3,49	29,1	10,3	2,83	27,2	11,9	2,29	25,5	13,9	1,83
	12	34,5	8,31	4,15	32,5	9,80	3,32	30,3	11,4	2,66	28,2	13,5	2,09
	15	35,6	8,19	4,35	33,5	9,69	3,46	31,3	11,3	2,77	29,3	13,3	2,20
	20	38,7	7,92	4,89	36,5	9,45	3,86	34,2	11,1	3,08	32,0	13,1	2,44
	25	42,4	7,67	5,53	40,4	9,24	4,37	38,3	10,9	3,51	36,0	12,9	2,79
	30	45,2	7,53	6,00	43,0	9,15	4,70	40,8	10,8	3,78	38,5	12,9	2,98
	35	47,6	7,43	6,41	45,0	9,09	4,95	42,5	10,8	3,94	39,6	12,9	3,07
	40	48,6	7,38	6,59	45,7	9,07	5,04	42,9	10,8	3,97	40,2	12,9	3,12
0280	-20	14,0	10,9	1,28	12,0	11,5	1,04	14,2	13,8	1,03	-	-	-
	-15	15,6	10,8	1,44	13,2	11,5	1,15	15,5	13,8	1,12	-	-	-
	-10	17,6	10,8	1,63	14,7	11,4	1,29	17,1	13,7	1,25	14,2	15,1	0,94
	-7	19,0	10,8	1,76	15,9	11,4	1,39	18,3	13,7	1,34	15,1	15,1	1,00
	-2	22,4	10,0	2,24	19,2	11,3	1,70	20,4	13,3	1,53	17,8	15,0	1,19
	2	28,1	9,22	3,05	23,9	10,6	2,25	23,0	12,1	1,90	21,8	14,3	1,52
	7	28,9	8,24	3,51	27,3	9,76	2,80	26,1	11,3	2,31	24,6	13,5	1,82
	12	32,2	7,75	4,15	30,3	9,27	3,27	28,9	10,8	2,68	27,0	13,1	2,06
	15	33,3	7,63	4,36	31,3	9,15	3,42	29,8	10,8	2,76	27,9	13,0	2,15
	20	36,2	7,38	4,91	34,1	8,88	3,84	32,4	10,6	3,06	30,2	12,9	2,34
	25	39,7	7,15	5,55	37,8	8,64	4,38	36,3	10,4	3,49	34,0	12,7	2,68
	30	42,3	7,03	6,02	40,2	8,51	4,72	38,6	10,3	3,75	36,4	12,7	2,87
	35	44,5	6,94	6,41	42,3	8,45	5,01	40,0	10,2	3,92	37,4	12,7	2,94
	40	45,4	6,90	6,58	42,8	8,45	5,07	40,2	10,0	4,02	37,9	12,7	2,98
0290	-20	18,1	11,5	1,57	16,1	13,0	1,24	17,9	15,6	1,15	-	-	-
	-15	20,2	11,5	1,76	17,7	12,9	1,37	19,4	15,6	1,24	-	-	-
	-10	22,7	11,5	1,97	19,7	12,9	1,53	21,3	15,5	1,37	19,6	17,7	1,11
	-7	24,7	11,6	2,13	21,3	13,0	1,64	22,1	14,9	1,48	20,5	17,4	1,18
	-2	30,0	11,6	2,59	25,7	13,0	1,98	26,4	14,9	1,77	24,2	17,4	1,39
	2	36,8	10,9	3,38	31,8	12,4	2,56	32,8	14,2	2,31	29,7	16,7	1,78
	7	38,5	9,92	3,88	36,4	11,7	3,11	34,5	13,0	2,65	32,6	15,8	2,06
	12	43,6	9,43	4,62	40,9	11,2	3,65	38,4	12,7	3,02	36,0	15,5	2,32
	15	44,9	9,33	4,81	42,3	11,1	3,81	39,7	12,6	3,15	37,2	15,4	2,42
	20	48,1	9,16	5,25	45,6	10,9	4,18	43,1	12,5	3,45	40,4	15,3	2,64
	25	52,4	8,98	5,84	49,8	10,8	4,61	47,3	12,5	3,78	44,8	15,3	2,93
	30	55,8	8,87	6,29	53,0	10,7	4,95	50,3	12,4	4,06	47,6	15,4	3,09
	35	59,1	8,78	6,73	55,9	10,7	5,22	52,8	12,5	4,22	50,2	15,4	3,26
	40	61,8	8,69	7,11	58,1	10,6	5,48	54,5	12,4	4,40	50,9	15,4	3,31

HEATING – MINIMUM LOAD													
Model HWA2-AH	T air outdoor [°C]	T_{out} [°C]											
		35			45			55			65		
		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]
04140	-20	16,8	14,0	1,20	16,7	15,1	1,11	16,9	16,7	1,01	-	-	-
	-15	19,0	13,9	1,37	18,7	15,0	1,25	18,6	16,5	1,13	-	-	-
	-10	21,5	13,8	1,56	20,9	14,9	1,40	20,6	16,5	1,25	20,5	18,4	1,11
	-7	22,8	13,7	1,66	22,1	14,9	1,48	21,6	16,5	1,31	21,3	18,4	1,16
	-2	24,8	12,3	2,02	23,8	13,5	1,76	23,1	15,0	1,54	22,5	16,9	1,33
	2	32,6	11,3	2,88	31,1	12,5	2,49	30,0	14,2	2,11	29,1	16,2	1,80
	7	38,6	9,93	3,89	36,6	11,3	3,24	35,0	12,9	2,71	33,4	15,0	2,23
	12	43,7	9,12	4,79	41,6	10,5	3,96	39,6	12,2	3,25	37,4	14,3	2,62
	15	45,2	8,96	5,04	42,6	10,4	4,10	40,7	12,1	3,36	38,5	14,2	2,71
	20	47,1	8,79	5,36	44,4	10,2	4,35	42,1	12,0	3,51	40,0	14,1	2,84
	25	51,5	8,41	6,12	48,8	9,88	4,94	46,4	11,7	3,97	44,1	13,8	3,20
	30	56,5	8,13	6,95	53,4	9,66	5,53	50,9	11,5	4,43	47,7	13,7	3,48
	35	60,7	7,94	7,64	57,3	9,53	6,01	54,5	11,4	4,78	51,6	13,6	3,79
	40	64,5	7,81	8,26	60,6	9,46	6,41	57,1	11,4	5,01	53,5	13,6	3,93
04155	-20	17,2	13,4	1,28	17,0	14,6	1,16	16,9	16,2	1,04	-	-	-
	-15	18,8	13,4	1,40	18,4	14,5	1,27	18,2	16,1	1,13	-	-	-
	-10	20,5	13,3	1,54	19,8	14,5	1,37	19,3	16,1	1,20	19,1	18,1	1,06
	-7	21,6	13,2	1,64	20,8	14,4	1,44	20,1	16,0	1,26	19,7	17,9	1,10
	-2	24,0	11,3	2,12	23,0	12,5	1,84	22,1	14,0	1,58	21,3	15,9	1,34
	2	31,7	10,5	3,02	30,5	11,7	2,61	28,1	13,4	2,10	28,4	15,4	1,84
	7	39,6	9,46	4,19	37,6	10,8	3,48	35,5	12,5	2,84	33,5	14,5	2,31
	12	45,3	8,64	5,24	42,4	10,1	4,20	40,1	11,8	3,40	37,5	13,9	2,70
	15	46,7	8,49	5,50	44,1	10,0	4,43	41,1	11,7	3,51	38,7	13,8	2,80
	20	48,0	8,39	5,72	45,6	9,83	4,64	42,9	11,5	3,73	39,7	13,7	2,90
	25	52,4	8,04	6,52	49,7	9,52	5,22	47,3	11,3	4,19	44,0	13,4	3,28
	30	57,6	7,78	7,40	54,5	9,34	5,84	51,2	11,1	4,61	48,1	13,3	3,62
	35	62,0	7,61	8,15	58,4	9,21	6,34	54,9	11,0	4,99	51,5	13,3	3,87
	40	65,6	7,50	8,75	61,8	9,11	6,78	58,0	11,0	5,27	53,6	13,2	4,06
04170	-20	20,1	14,9	1,35	20,1	16,6	1,21	20,3	18,5	1,10	-	-	-
	-15	22,7	14,9	1,52	22,4	16,4	1,37	22,3	18,2	1,23	-	-	-
	-10	25,7	14,8	1,74	25,0	16,4	1,52	24,5	18,1	1,35	24,4	20,4	1,20
	-7	27,3	14,8	1,84	26,5	16,4	1,62	25,6	18,1	1,41	25,3	20,3	1,25
	-2	29,6	13,6	2,18	28,4	15,1	1,88	27,5	16,8	1,64	26,6	19,0	1,40
	2	38,5	12,6	3,06	33,2	14,3	2,32	32,1	16,0	2,01	34,3	18,2	1,88
	7	46,2	11,6	3,98	44,0	13,2	3,33	41,8	15,1	2,77	39,7	17,3	2,29
	12	53,4	10,8	4,94	49,5	12,6	3,93	48,1	14,4	3,34	44,5	16,8	2,65
	15	54,5	10,8	5,05	51,9	12,4	4,19	49,1	14,4	3,41	46,2	16,7	2,77
	20	56,3	10,7	5,26	53,9	12,3	4,38	50,8	14,3	3,55	47,3	16,6	2,85
	25	61,9	10,3	6,01	58,5	12,1	4,83	55,1	14,1	3,91	52,2	16,5	3,16
	30	66,9	10,1	6,62	63,6	12,0	5,30	60,5	14,1	4,29	56,7	16,4	3,46
	35	71,8	10,0	7,20	68,4	11,9	5,75	64,5	14,0	4,61	60,9	16,5	3,69
	40	76,3	9,85	7,75	71,9	11,9	6,04	68,2	14,1	4,84	64,2	16,6	3,87

COOLING – MINIMUM LOAD							
Model HWA2-AH	T air outdoor [°C]	T_{out} [°C]					
		7			18		
		Cooling capacity [kW]	Power input [kW]	EER [W/W]	Cooling capacity [kW]	Power input [kW]	EER [W/W]
0270	-10	42,3	4,01	10,5	47,6	3,43	13,9
	0	40,7	4,72	8,62	46,2	4,77	9,69
	10	38,9	5,50	7,07	44,3	5,62	7,88
	20	36,6	6,65	5,50	41,7	6,86	6,08
	25	35,0	7,46	4,69	41,0	7,74	5,30
	30	33,4	8,41	3,97	40,1	8,79	4,56
	35	31,6	9,53	3,32	39,0	10,0	3,90
	40	29,9	11,0	2,72	37,6	11,4	3,30
	46	27,7	13,0	2,13	35,7	13,4	2,66
0280	-10	41,9	4,14	10,1	51,9	3,62	14,3
	0	40,3	4,87	8,28	50,4	5,03	10,00
	10	38,3	5,71	6,71	47,8	5,95	8,03
	20	35,7	6,96	5,13	44,5	7,29	6,10
	25	34,6	7,71	4,49	43,2	8,08	5,35
	30	33,5	8,59	3,90	41,8	9,00	4,64
	35	32,2	9,61	3,35	40,2	10,1	3,98
	40	30,5	11,0	2,77	38,5	11,4	3,38
	46	28,3	12,9	2,19	36,3	13,3	2,73
0290	-10	50,2	5,51	9,11	61,7	5,00	12,30
	0	48,7	6,16	7,91	59,9	6,23	9,61
	10	46,5	7,12	6,53	57,3	7,31	7,84
	20	43,6	8,48	5,14	53,8	8,80	6,11
	25	41,9	9,33	4,49	51,9	9,72	5,34
	30	40,0	10,3	3,88	49,7	10,8	4,60
	35	38,1	11,4	3,34	47,5	12,0	3,96
	40	36,1	12,9	2,80	45,4	13,5	3,36
	46	33,5	15,1	2,22	42,8	15,7	2,73
04140	-10	43,3	5,66	7,65	52,2	6,05	8,63
	0	41,5	5,65	7,34	51,2	5,96	8,59
	10	39,2	5,69	6,89	48,8	6,07	8,03
	20	36,8	6,87	5,36	45,9	7,12	6,45
	25	35,4	7,60	4,66	44,4	7,92	5,61
	30	34,0	8,45	4,02	42,4	8,93	4,75
	35	32,4	9,52	3,40	40,7	10,0	4,08
	40	30,3	10,6	2,86	38,6	11,2	3,45
	46	28,0	12,2	2,30	35,9	12,8	2,80
04155	-10	37,5	5,72	6,56	48,2	5,55	8,68
	0	37,5	5,73	6,54	48,0	5,56	8,63
	10	37,2	5,88	6,33	47,3	5,90	8,02
	20	35,3	6,79	5,20	45,1	6,89	6,55
	25	34,4	7,41	4,64	43,6	7,54	5,78
	30	32,9	8,19	4,02	42,0	8,36	5,02
	35	31,7	9,15	3,46	40,3	9,35	4,31
	40	29,1	10,2	2,85	37,6	10,6	3,55
	46	26,1	11,9	2,19	34,4	12,4	2,77

COOLING – MINIMUM LOAD								
Model HWA2-AH	T air outdoor [°C]	T_{out} [°C]						
		7			18			
		Cooling capacity [kW]	Power input [kW]	EER [W/W]	Cooling capacity [kW]	Power input [kW]	EER [W/W]	
04170	-10	52,7	7,23	7,29	63,4	7,29	8,70	
	0	50,0	7,12	7,02	61,6	7,32	8,42	
	10	46,6	7,50	6,21	58,0	7,83	7,41	
	20	43,9	8,63	5,09	55,0	9,07	6,06	
	25	42,5	9,36	4,54	53,1	9,87	5,38	
	30	40,8	10,3	3,96	50,9	10,8	4,71	
	35	39,0	11,3	3,45	48,5	12,0	4,04	
	40	36,5	12,4	2,94	46,1	13,3	3,47	
	46	33,3	14,1	2,36	42,9	15,1	2,84	

10. SEASONAL PERFORMANCE AT DIFFERENT TEMPERATURE LEVELS

The values of the seasonal performance coefficients SCOP, heating energy efficiency $\eta_{s,h}$ and design heat output P_{design} for the HWA2-AH series units are shown. The data are calculated for three temperature levels according to UNI EN 14825: low (LT), medium (MT) and high (HT).

- LT: Heating in medium climate conditions, T_{biv} = -4 °C, low temperature (35 °C), variable output, fixed flow rate.
- MT: Heating in medium climate conditions, T_{biv} = -4 °C, medium temperature (55 °C), variable output, fixed flow rate.
- HT: Heating in medium climate conditions, T_{biv} = -4 °C, high temperature (65 °C), variable output, fixed flow rate.

Model HWA2-AH	P_{design} (LT)	SCOP (LT)	$\eta_{s,h}$ (LT)	P_{design} (MT)	SCOP (MT)	$\eta_{s,h}$ (MT)	P_{design} (HT)	SCOP (HT)	$\eta_{s,h}$ (HT)
	kW	W/W	%	kW	W/W	%	kW	W/W	%
0270	70	3,52	138	59	2,84	111	59	2,40	93
0280	71	3,57	140	66	2,86	111	68	2,54	98
0290	73	3,68	144	68	2,95	115	67	2,60	101
04140	123	3,45	135	117	3,02	118	118	2,67	104
04155	127	3,48	136	119	3,04	119	118	2,70	105
04155	149	3,58	140	137	3,05	119	151	2,77	108

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

The supplementary data of heat pumps for the calculation of the energy performance of buildings according to UNI/TS 11300 part 4 are given below.
The characteristics quantities that will be provided for each model are explained below, according to statement 31 of the standard.

		A T_{bival}	B	C	D
Reference temperature	-10°C	-7°C	2°C	7°C	12°C
PLR (T_{des} = -10°C)	100%	88%	54%	35%	15%
Power DC at full load		$DC_A = DC_{bival}$	DC	DC	DC
COP at partial load		COP	COP	COP	COP
COP at full load		COP'	COP'	COP'	COP'
CR	>1	1	(0.54 x P_{des}) / DC	(0.35 x P_{des}) / DC	(0.15 x P_{des}) / DC
Correction factor Fp	1	1	COP/COP'	COP/COP'	COP/COP'
PLR	part load ratio - climatic load factor				
CR	heat pump load factor				
DC	full load power at indicated temperatures				
DC_{bival}	full load power at -7/35°C				
P_{design}	full load with climate A				
COP	COP with CR load at the same temperature conditions as COP'				
COP'	COP at full load under the same temperature conditions as COP				

10.1.1 Model HWA2-AH 0270

Operating limits

COLD source	OUTDOOR AIR	
Operating temperature (cut-off)	min	-20°C
	max	+40°C

HOT source	WATER	
Operating temperature (cut-off)	min	+25°C
	max	+78°C

Performance data measured in 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%
Power DC at full load	50,3	63,4	73,1	81,8
COP at partial load	2,68	3,12	3,47	4,04
COP at full load	2,68	3,62	4,25	5,14
CR	1,00	0,48	0,27	0,11
Correction factor Fp	1,00	0,86	0,82	0,78

10.1.2 Model HWA2-AH 0280

Operating limits

COLD source	OUTDOOR AIR	
Operating temperature (cut-off)	min	-20°C
	max	+40°C

HOT source	WATER	
Operating temperature (cut-off)	min	+25°C
	max	+78°C

Performance data measured in 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%
Power DC at full load	51,7	67,7	78,1	87,5
COP at partial load	2,72	3,19	3,49	4,06
COP at full load	2,72	3,68	4,44	5,37
CR	1,00	0,46	0,26	0,10
Correction factor Fp	1,00	0,87	0,79	0,76

10.1.3 Model HWA2-AH 0290

Operating limits

COLD source	OUTDOOR AIR	
Operating temperature (cut-off)	min	-20°C
	max	+40°C

HOT source	WATER	
Operating temperature (cut-off)	min	+25°C
	max	+78°C

Performance data measured in 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%
Power DC at full load	54,7	71,9	84,3	94,3
COP at partial load	2,79	3,38	3,85	4,47
COP at full load	2,79	3,56	4,28	5,12
CR	1,00	0,46	0,25	0,10
Correction factor Fp	1,00	0,95	0,90	0,87

10.2 MODEL HWA2-AH 04140

Operating limits

COLD source	OUTDOOR AIR	
Operating temperature (cut-off)	min	-20°C
	max	+40°C

HOT source	WATER	
Operating temperature (cut-off)	min	+25°C
	max	+78°C

Performance data measured in 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%
Power DC at full load	89,4	117	146	166
COP at partial load	2,19	3,06	4,05	4,71
COP at full load	2,19	3,15	4,11	4,90
CR	1,00	0,47	0,24	0,09
Correction factor Fp	1,00	0,97	0,98	0,96

10.3 MODEL HWA2-AH 04155

Operating limits

COLD source	OUTDOOR AIR	
Operating temperature (cut-off)	min	-20°C

COLD source	OUTDOOR AIR	
	max	+40°C

HOT source	WATER	
Operating temperature (cut-off)	min	+25°C
	max	+78°C

Performance data measured in 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%
Power DC at full load	92,1	108	159	181
COP at partial load	2,18	3,05	4,04	5,08
COP at full load	2,18	2,86	4,27	5,06
CR	1,00	0,52	0,23	0,09
Correction factor Fp	1,00	1,07	0,95	1,01

10.3.1 Model HWA2-AH 04170

Operating limits

COLD source	OUTDOOR AIR	
Operating temperature (cut-off)	min	-20°C
	max	+40°C

HOT source	WATER	
Operating temperature (cut-off)	min	+25°C
	max	+78°C

Performance data measured in 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%
Power DC at full load	106	125	169	193
COP at partial load	2,38	3,27	4,25	4,83
COP at full load	2,38	2,93	4,08	4,79
CR	1,00	0,52	0,25	0,10
Correction factor Fp	1,00	1,12	1,04	1,01

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

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

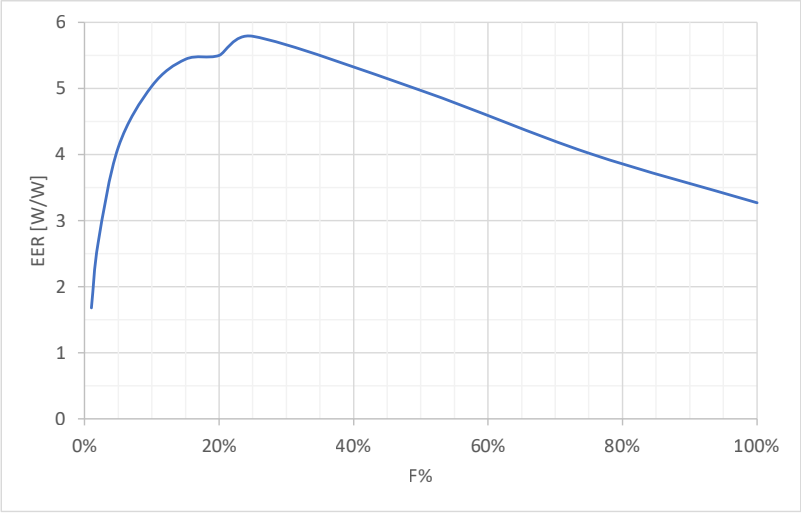
Test	Load factor	Outdoor air dry bulb temperature	Chilled water temperature on fan coil input/output
1	100%	35	12/7
2	75%	30	(*)/7
3	50%	25	(*)/7
4	25%	20	(*)/7

(*) temperature set by the full load water flow rate.

10.4.1 Model HWA2-AH 0270

Outside air dry bulb temperature [°C]	Load factor F%	EER
35	100%	3,27
30	75%	4,02
25	50%	4,97
20	25%	5,79

C	Load factor F%	EER @20°C xC
0,95	20%	5,50
0,94	15%	5,44
0,87	10%	5,04
0,71	5%	4,11
0,46	2%	2,66
0,29	1%	1,68

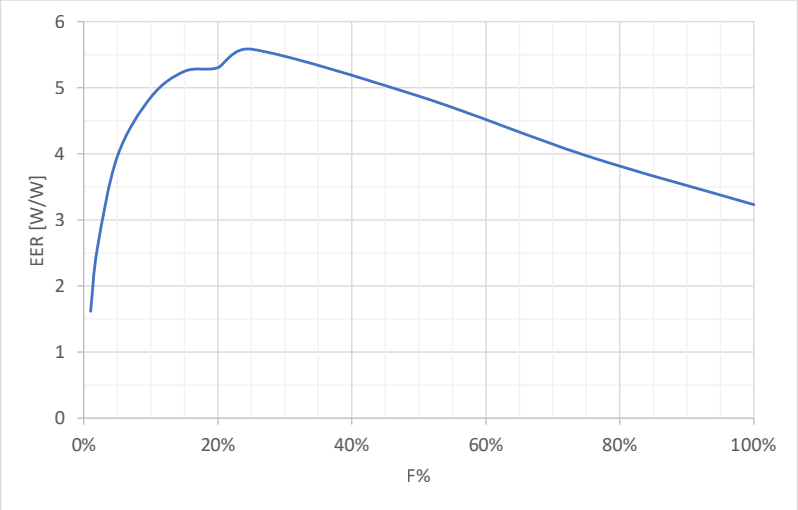


10.4.2 Model HWA2-AH 0280

Outside air dry bulb temperature [°C]	Load factor F%	EER
35	100%	3,23
30	75%	3,97
25	50%	4,87
20	25%	5,58

C	Load factor F%	EER @20°C xC
0,95	20%	5,30
0,94	15%	5,25
0,87	10%	4,85
0,71	5%	3,96

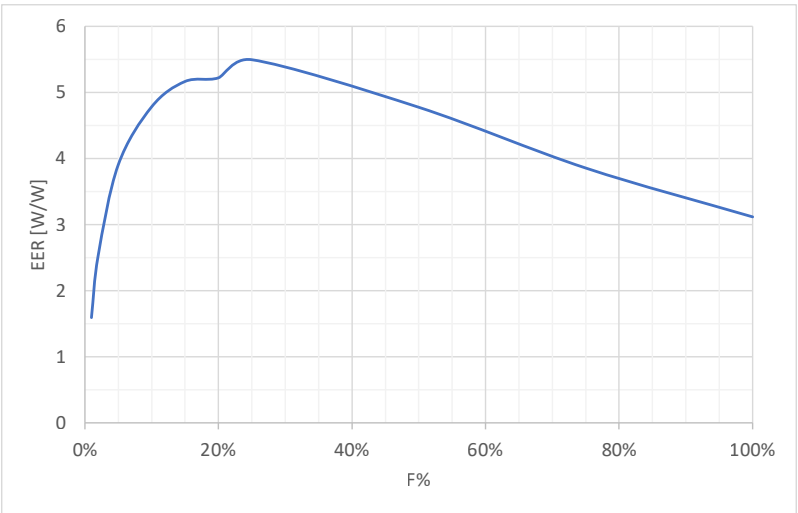
C	Load factor F%	EER @20°C xC
0,46	2%	2,57
0,29	1%	1,62



10.4.3 Model HWA2-AH 0290

Outside air dry bulb temperature [°C]	Load factor F%	EER
35	100%	3,12
30	75%	3,86
25	50%	4,78
20	25%	5,50

C	Load factor F%	EER @20°C xC
0,95	20%	5,23
0,94	15%	5,17
0,87	10%	4,79
0,71	5%	3,91
0,46	2%	2,53
0,29	1%	1,60

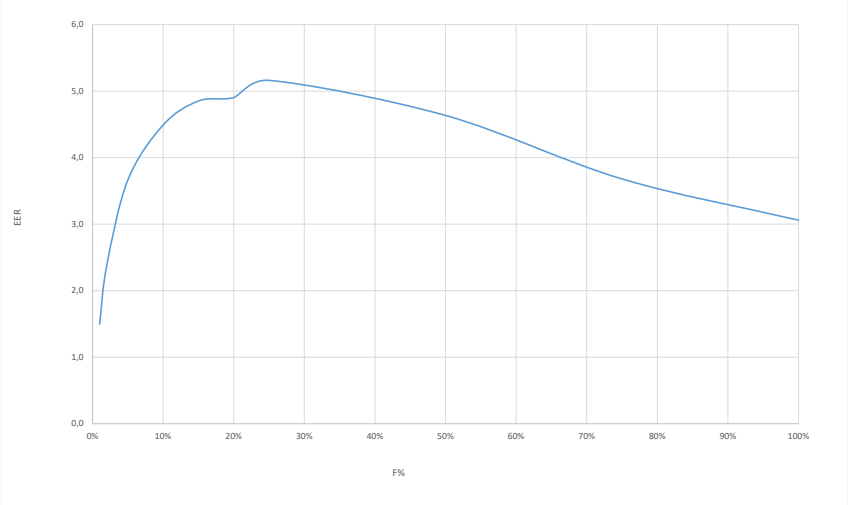


10.4.4 Model HWA2-AH 04140

Outside air dry bulb temperature [°C]	Load factor F%	EER
35	100%	3,06
30	75%	3,68
25	50%	4,63

Outside air dry bulb temperature [°C]	Load factor F%	EER
20	25%	5,16

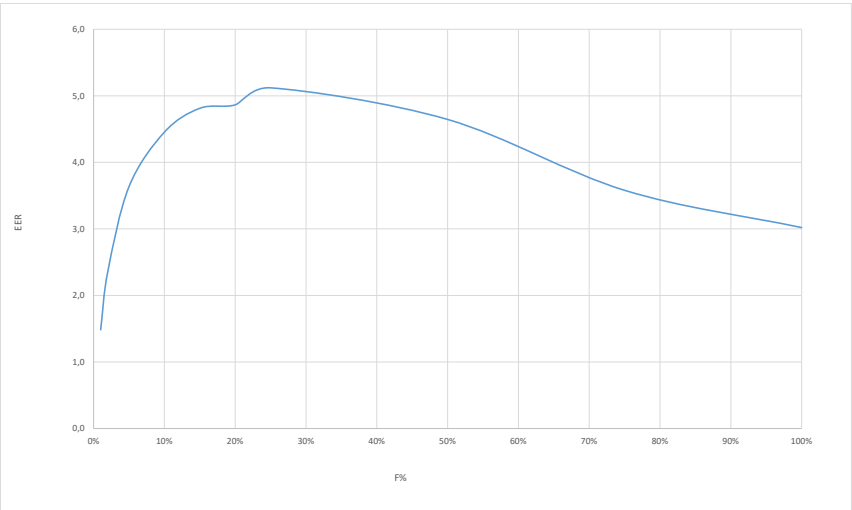
C	Load factor F%	EER @20°C xC
0,95	20%	4,90
0,94	15%	4,85
0,87	10%	4,49
0,71	5%	3,66
0,46	2%	2,37
0,29	1%	1,50



10.4.5 Model HWA2-AH 04155

Outside air dry bulb temperature [°C]	Load factor F%	EER
35	100%	3,02
30	75%	3,58
25	50%	4,65
20	25%	5,12

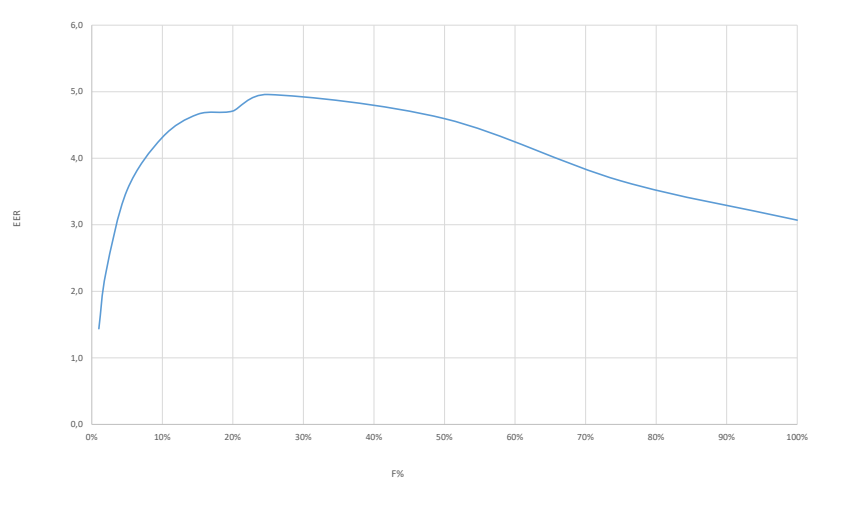
C	Load factor F%	EER @20°C xC
0,95	20%	4,86
0,94	15%	4,81
0,87	10%	4,45
0,71	5%	3,64
0,46	2%	2,36
0,29	1%	1,48



10.4.6 Model HWA2-AH 04170

Outside air dry bulb temperature [°C]	Load factor F%	EER
35	100%	3,07
30	75%	3,66
25	50%	4,60
20	25%	4,96

C	Load factor F%	EER @20°C xC
0,95	20%	4,71
0,94	15%	4,66
0,87	10%	4,31
0,71	5%	3,52
0,46	2%	2,28
0,29	1%	1,44



11. REFRIGERANT SAFETY DATA SHEET

Name:	R290
HAZARDS IDENTIFICATION	
Main hazards:	Highly flammable gas. Vapours are heavier than air and can cause asphyxiation due to reduced oxygen levels.
Specific hazards:	Contact with the liquid can cause ice burns.
FIRST AID MEASURES	
General information:	In high concentrations it can cause asphyxia. Symptoms may include loss of mobility and/or consciousness. In low concentrations it may have a narcotic effect.
Inhalation:	Move the victim to an uncontaminated area while wearing self-contained breathing apparatus. Use oxygen or artificial respiration if necessary. Keep the patient lying down and warm. Call a doctor.
Eye contact:	Carefully rinse with plenty of water for at least 15 minutes.
Skin contact:	Wash immediately with plenty of water for at least 15 minutes. Immediately remove contaminated clothing.
FIRE FIGHTING MEASURES	
Extinguishing media:	Water spray, dry powder.
Specific hazards:	Exposure to flames may cause the vessel to rupture or explode.
Specific methods:	Cool down the containers with a water spray from a safe position. Stop the product leakage if possible. Use water spray, if possible, to abate the fumes. Move the vessels away from the area of the fire if this can be done without posing any risks.
ACCIDENTAL LEAKAGE MEASURES	
Personal precautions:	Try to stop the leak. Evacuate personnel to safe areas. Eliminate the ignition sources. Ensure proper ventilation. Avoid entering sewers, basements, excavations and areas where accumulation can be dangerous. Use personal protective equipment. Remain upwind.
Environmental precautions:	Try to stop the leak.
Cleaning methods:	Ventilate the area.
HANDLING AND STORAGE	
Handling: technical measures/precautions:	Ensure sufficient air exchange and/or suction in the working area. Do not smoke. Keep away from sources of ignition (including electrostatic charges). Use only appropriate equipment, suitable for the product.
Advice for safe use:	Do not inhale the gas.
Storage:	Close carefully and store in a cool and well ventilated area. Storage containers should be checked periodically. Do not store with other oxidants in general or other combustible substances. Containers must not be stored in conditions that could lead to corrosion. All electrical equipment in the storage area should be compatible with the risk of forming an explosive atmosphere.
EXPOSURE CONTROLS/PERSONAL PROTECTION	
Control parameters:	OEL: data not available. DNEL: data not available. PNEC: data not available.
Respiratory protection:	Filter masks can be used if the ambient conditions and duration of use are known.
Eye protection:	Safety goggles.
Hand protection:	Work gloves.
Hygiene measures:	Do not smoke.
PHYSICAL AND CHEMICAL PROPERTIES	
Colour:	Colourless.
Odour:	Odourless.
Boiling point:	-42.1 °C at atm press.
Auto-ignition temperature:	470°C
Relative gas density (air=1) Relative liquid density (water=1)	1,50 0,58
Solubility in water:	75 mg/l.
STABILITY AND REACTIVITY	
Stability:	Stable under normal conditions.
Materials to avoid: Hazardous decomposition products:	Air, oxidising agents. Keep away from heat sources/sparks/open flames/heated surfaces. Under normal conditions of storage and use, dangerous decomposition products should not be generated.
TOXICOLOGICAL INFORMATION	
Acute toxicity: Local effects: Long term toxicity:	CL50/inhalation/4 hours/on rat = 20000 ppm. No known effect. No known effect.
ECOLOGICAL INFORMATION	
Global warming potential GWP (R744=1):	0,02
Ozone Depletion Potential ODP (R11=1):	0
Notes on disposal:	Refer to the supplier's gas recovery programme. Avoid direct discharge into the atmosphere. Do not discharge where accumulation may be dangerous. Ensure that the emissions limits required by local regulations or specified in authorizations are not exceeded.

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