Assembly and servicing instructions
for the installer

VIESMANN

VITOCAL 100-A

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Catalogo / Catalogue / Katalog / Catalogue **BT-00**				Serie / Series / Serie / Serie / Série **AIR/WATER INVERTER-CONTROLLED CHILLERS AND HEAT PUMPS WITH AXIAL FANS**

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1. DESCRIPTION OF UNIT AND TECHNICAL SPECIFICATIONS

The Vitocal 100-A water chillers and heat pumps were designed for residential and commercial applications. They are extremely versatile and designed for heat pump operation with space heating hot water production and for domestic hot water use at a temperature of 60°C. Use of the INVERTER-controlled brushless compressor technology, coupled with electronic expansion valve, pump and variable speed fan optimises consumption and operating efficiency of the chilling components.

1.1 Framework

All the units of the range are constructed in hot galvanised sheet metal painted with polyurethane powders in kiln at 180°C to assure the best resistance to weathering. The frame is self-supporting with removable panels for easier inspection and maintenance of the inner components. All screws and rivets for outdoor installation are in galvanised steel.

1.2 Compressors

Twin rotary hermetic inverter controlled DC compressors, specifically designed to operate with R32, equipped with thermal protection and mounted on rubber vibration dampers.
The compressors are installed in a compartment separated from the air flow to reduce noise. They are also equipped with crankcase heater to prevent oil dilution which could cause the compressor to seize. This activates if the compressor is off for at least 30 minutes with a discharge temperature lower than 20 °C (with hysteresis of 2.0 °C). The crankcase heater is disabled when the compressor starts back up, as it only runs with the compressor off. The heater also runs with the unit off to prevent re-ignition issues. It is however recommended to power the unit and to put it in standby at least 12 hours before operating it, should the system be completely shut down. The temperature of the oil vessel must be at least 10°C higher than the ambient temperature.
The compressors can be inspected by removing the side and front panels of the unit, so that they can be serviced even with the units running.

1.3 Air side heat exchanger

The air heat exchangers are made of copper pipes and aluminium fins. The pipes are mechanically expanded into aluminium fins to increase the thermal exchange factor. The shape of these exchangers allows for low air side pressure drops and therefore fans can run at low speed (thus reducing unit noise). The coils are “GOLD FIN” treated to assure higher resistance to acidity and salty mist. Furthermore, the treatment increases hydrophilic ability and performance compared to a coil with simple aluminium fins

1.4 Utility side heat exchanger

The utility heat exchangers are the brazed plate type, made of stainless steel AISI 304, insulated at the factory with closed cell material. They can be equipped with anti-freeze electric heater (optional KA accessory). Each evaporator is protected by a temperature probe used as an antifreeze protective probe which, even with the unit off, switches the circulator on if the conditions set on the controller are met.

1.5 Fan

The fans are made of plastic, the axial type with airfoil blades. They are all statically and dynamically balanced and are supplied complete with protective grid according to standard IEC EN 60335-2-80 (safety of household and similar electrical appliances). The fans are installed on the unit with rubber vibration dampers applied in between to reduce noise. Only 8-pole modulating brushless electric motors are used (200/1000 rpm). The motors are directly coupled and equipped with built-in thermal protection. The motors all have an IP 44 protection rating.

1.6 Fan speed adjustment

This type of adjustment, managed by the microprocessor, is necessary to optimise evaporation/condensing pressure in summer/winter mode for the correct operation of the unit

1.7 Cooling circuit

The cooling circuit is made with components of leading international companies and in compliance with UNI EN standard 13134 on brazing procedures. The coolant is the new R32 ecological gas. The basic version of the cooling circuit includes: 4-way cycle reversing valve, electronic expansion valve, liquid separator, maintenance and control inspection valves, safety device (high-pressure switch), pressure transducers to carefully adjust evaporation and condensing pressure, filters to prevent obstructions on the thermal expansion valve.

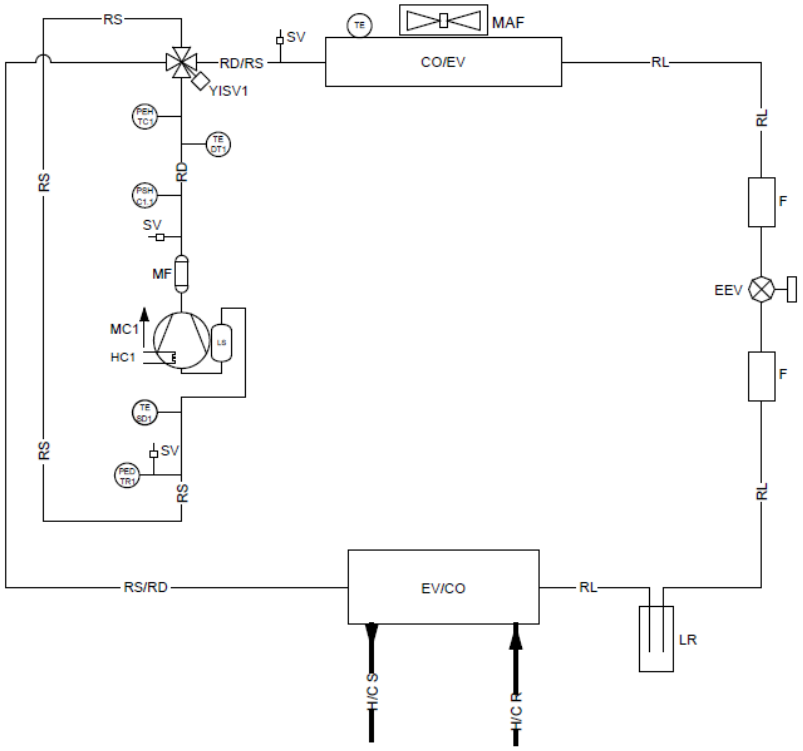
Circuit diagram

AWO-M-AC 101.A06

AWO-M-AC 101.A08

AWO-M-AC 101.A10

AWO-M-AC 101.A12



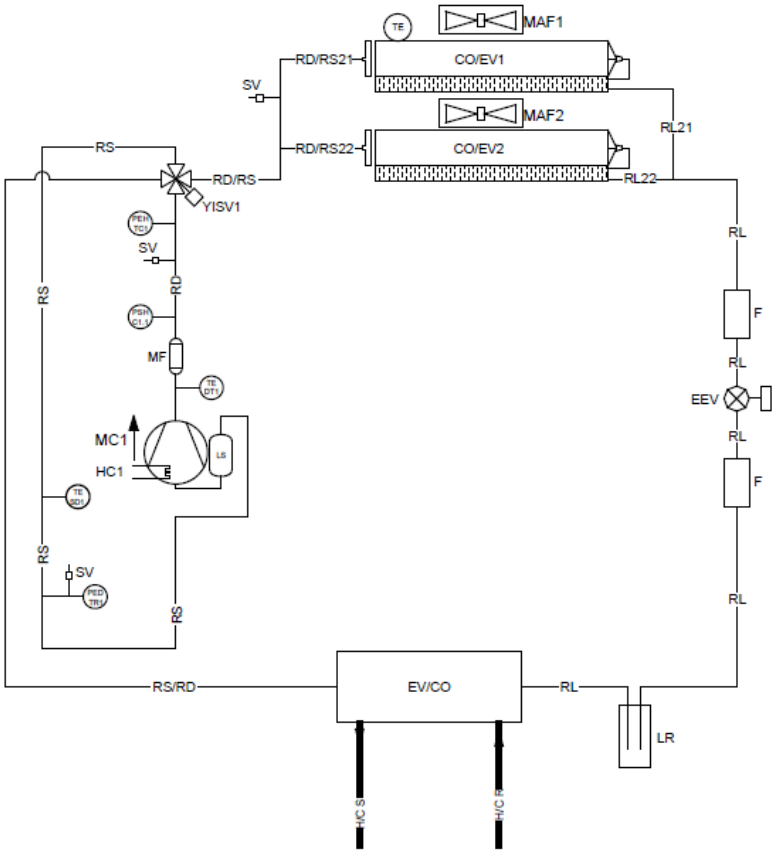
Circuit diagram

AWO-M-AC 101.A14

AWO-AC 101.A14

AWO-M-AC 101.A16

AWO-AC 101.A16



MC	COMPRESSOR	RD	DELIVERY LINE
CO/EV	CONDENSER (IN CHILLER MODE)	RL	LIQUID LINE
EV/CO	EVAPORATOR (IN CHILLER MODE)	RD/RS	DELIVERY/INTAKE LINE
EEV	ELECTRONIC EXPANSION VALVE	RS/RD	INTAKE/DELIVERY LINE
YISV	4-WAY CYCLE REVERSING VALVE	H/CS	UTILITY WATER OUTLET
LR	LIQUID RECEIVER	H/CR	UTILITY WATER INLET
F	FILTER	PEH TC	HIGH PRESSURE TRANSDUCER
SV	FILLING CONNECTION	PED TR	LOW PRESSURE TRANSDUCER
HC	CRANKCASE HEATER	TE	OUTDOOR AIR TEMPERATURE PROBE
MAF	AXIAL FAN	TE SD	INTAKE LINE TEMPERATURE PROBE
MF	MUFFLER	TE DT	COMPRESSOR DISCHARGE TEMPERATURE PROBE
LS	LIQUID SEPARATOR	PSH C	AUTOMATIC RESET HIGH-PRESSURE SWITCH
RS	INTAKE LINE		

1.8 Electric panel

The electric panel is built in compliance with current European standards. The electric panel can be accessed by removing the cover on the unit using a specific tool. The electric panel has an IP24 protection rating. The panel is also supplied with terminal block with voltage-free contacts for remote ON-OFF, summer/winter mode switching, auxiliary heater, domestic hot water sensor, external 3-way valve management and contacts for the remote control panel and to manage the double working set-point.

1.9 Control system

All Vitocal 100-A units are equipped with microprocessor with superheating control logic by means of an electronic thermostatic valve managed according to the signals sent by the pressure transducers. The CPU also controls the following functions: water temperature control, antifreeze protection, compressor timing, alarm reset, alarm management and operating LEDs. The control system, together with the INVERTER technology and onboard sensors, monitors and promptly and continuously adapts the performance of the inverter compressor, of the circulator and of the fan (2 fans in models AWO-M-AC 101.A14, AWO-AC 101.A14, AWO-M-AC 101.A16, AWO-AC 101.A16).

1.10 Control and protective devices

All the units are standard supplied with the following control and protective devices: return water temperature probe, installed on water return pipe from the plant, working and antifreeze probe installed on the water delivery pipe to the plant, high pressure transducer, low pressure transducer, inlet and outlet temperature probes from the compressor, compressor thermal protection, fan thermal protection, water side flow switch protecting the evaporator, HP pressure switch.

1.11 Water circuit

Vitocal 100-A chillers are supplied with a built-in water circuit which includes: modulating circulator with high-efficiency brushless motor (EEI≤0.23 for sizes 14 and 16, EEI≤0.20 for 06, 08, 10 and 12), suitable for the use of chilled water and managed directly by the machine's controller, plate heat exchanger, protective flow switch, expansion vessel (the capacity depends on the sizes, see the technical data), safety valve (6 bar) to be connected to a collection system and manual air venting valve.

2. DESCRIPTION OF VERSIONS AND ACCESSORIES

2.1 Versions

Vitocal 100-A - reversible heat pump with built-in hydronic unit (safety valve, pressure gauge, modulating circulator, flow switch, automatic venting valve, filling/drain valve)

Available models: 06, 08, 10, 12, 14, 16. Sizes 16 and 14 are available both single phase and three-phase. The other sizes only have single phase power supply.

The code of the unit is composed of:

- ✓ 7 fixed digits
- ✓ the symbol # as separator
- ✓ 7 variable digits (fields) identifying the sizes, power supply and factory mounted accessories
- ✓ 2 variable digits (MC field) which identify the Vitocal 100-A series in any customisations

0110419#(VR)(AE)(CT1)(KA)(CR)(AC1)(MC)

MAIN CODE	UNIT VERSION		POWER SUPPLY		THERMAL CAPACITY		ANTIFREEZE KIT		REMOTE CONTROL PANEL		ACCESSORY 1	
0110419#	VR		AE		CT1		KA		CR		AC1	
	2	Standard										
			0	Single phase								
			1	Three-phase								
					22	04 kW (*)						
					16	06 kW (*)						
					17	08 kW (*)						
					18	10 kW (*)						
					19	12 kW (*)						
					20	14 kW						
					21	16 kW						
					23	18 kW (**)						
							0	Without antifreeze kit				
							1	With antifreeze kit				
									0	None		
									2	Modbus Protocol		
											0	None
											T	Coil treatment

(*) Variants not valid for AE=1

(**) Variants not valid for AE=0

CAUTION: The antifreeze kit is a factory mounted accessory. It cannot be installed at a later time.

2.2 List of accessories

The available accessories for the Vitocal 100-A heat pumps are listed below

	Accessory	**Standard**	**Factory-fitted**	**Supplied separately**
Vibration damper kit	x			x
Antifreeze kit	x		x	
Coil anticorrosion treatment	x		x	
VDIS2 - Diverter valve (1”1/4) Kvs 19.2	x			x
Electronic throttling valve	x		x	
Antifreeze thermal drain valve	x			x
SAS - Domestic hot water probe / System remote probe	x			x
Flow switch (flow presence signal)		x	x	
Axial fan with BLDC motor		x	x	
Hi-T2 - Multi-purpose touch screen remote control	x			x
Fancoil control (Hi-T control required)	x			x
i-CR - Wall remote controller	x			x
Phase monitor (only three-phase power supply unit)		x	x	
Remote on/off voltage-free contact		x	x	
BMS connectivity arrangement - ModBus protocol included (CM)	x		x	
USB/RS485 serial converter (ISK)	x			x
Editing the set-point from 0-10V input		x	x	
Editing the dynamic set-point - climate curve (via external air probe		x	x	

fitted in the unit)				
Voltage-free contact for Summer/Winter selection		x	x	
Digital input for double set-point *		x	x	
DHW request digital input *		x	x	

* Functions can be enabled as an alternative

2.3 Description of accessories

2.3.1 Factory-fitted accessories

Antifreeze kit – It makes use of a self heating cable which is wound around the base of the external unit near the condensing coil and two heaters placed on the sides of the plate heat exchanger.

Coil anticorrosion treatment – thanks to this treatment the coil becomes flexible to withstand thermal contractions and expansions, it is mechanically resistant, protected from UV rays and dirt repellent. Heat transmission losses are very low (around 2%). The treatment assures coil protection virtually in all environmental conditions: from marine to rural settings, from industrial to urban areas.

Electronic throttling valve – expansion valve, designed for the control and continuous regulation of the amount of refrigerant fed into the evaporator. Changes in thermal load may be followed quickly, so as to achieve optimised consumption.

Flow switch (flow presence signal) – this device monitors and signals water circulation in the plate heat exchanger. This component is essential because it switches off and secures the unit preventing the formation of ice.

Axial fan with BLDC motor – Brushless modulating 8 poles (200/1000 RPM), built-in condensation/evaporation control

Phase monitor (only three-phase power supply unit) – Three-phase relay to signal incorrect phase sequence, total and partial missing phase

Remote on/off voltage-free contact – contact in the terminal block to enable the unit's switching on and off

BMS connectivity arrangement - ModBus protocol included (CM) – overcurrent switch applied to compressors and fans, installed in the electrical panel; to reset the switch in the event of overcurrent, without replacing the relevant fuses.

Editing the set-point from 0-10V input – this adjustment allows you to edit the set-point by adding (or subtracting) a value depending on the 0-10V input (if enabled).

Editing the dynamic set-point - climate curve (via external air probe fitted in the unit) – the regulator allows you to modify the set-point by adding a value according to the temperature of the outdoor air probe.

Voltage-free contact for Summer/Winter selection – option of remotely controlling the heating or cooling mode of the heat pump.

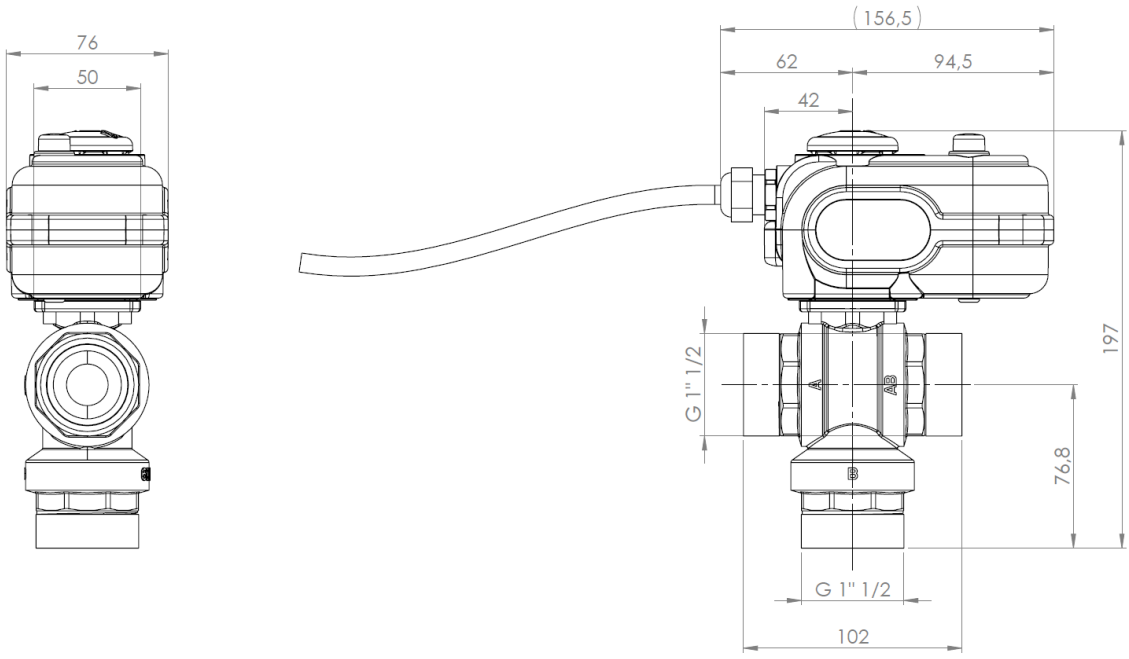
Digital input for double set-point - input to change the set point

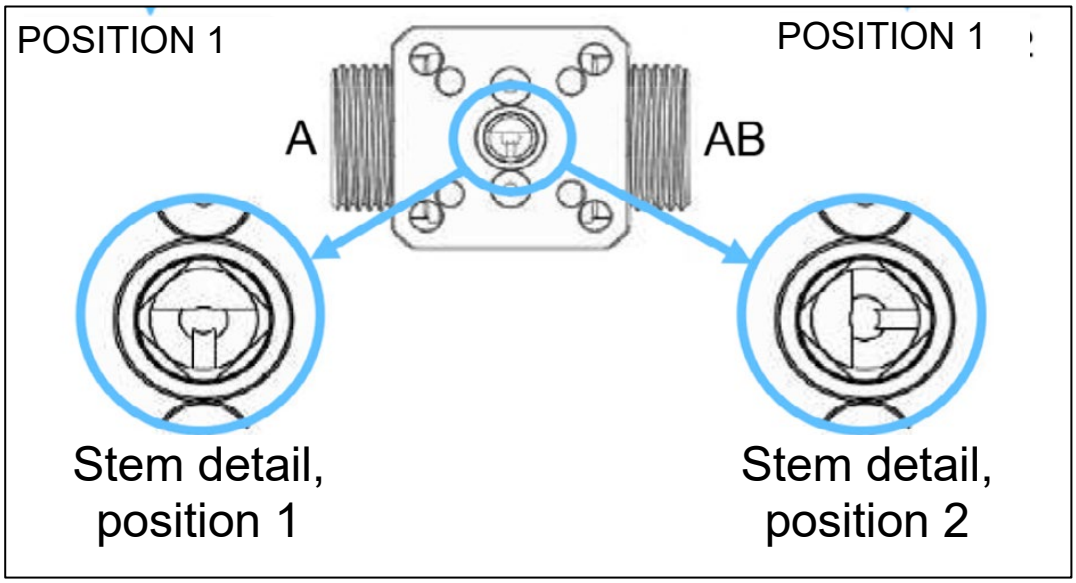
DHW request digital input – function which can be activated as an alternative to managing the double setpoint. The domestic hot water function can be enabled by closing/opening a digital input of the unit. This function is recommended in the event of using two or more heat pumps in cascade hydronically connected to the same DHW storage tank.

2.3.2 Accessories supplied separately

Vibration damper kit – they prevent transmitting vibrations to the structure; they must be fitted into the appropriate holes underneath the unit.

VDIS2 - Diverter valve (1”1/4) – DN motorised 3-way ball valve (1”1/4) Kvs 19,2, connections FFF 1” ½ FFF G complete with servo-control.





POSITION 1 = OPEN B-A
POSITION 2 = OPEN B-AB

Permitted substances:

water between -15°C and +110°C

Below 0° only for water with added antifreeze

Not suitable for group 1 and 2 gas, group 1 liquids (Directive 2014/68/EU)

Specifications of non-return spring servo-control:

Force [Nm]: 16

Stroke time: 60 s

230 VAC Power supply

IP rating: 65

Valve body specifications:

Frame: PN 40

Antifreeze thermal drain valve – valve able to open at 0°C to prevent the formation of ice inside the pipes.

SAS - Domestic hot water probe / System remote probe – In some engineering solutions (e.g. heat pump in parallel to boiler on same hydronic circuit and shut off diverter valve) it might be necessary to enable a system temperature probe so that the machine controller can correctly process the control. The plant remote probe controls the temperature of the heat pump only during the compressor start-up phase. Shutdown is managed by the probe on the heat pump delivery line.

Hi-T2 - Multi-purpose touch screen remote control – touch screen remote control for centralised management of a chiller/heat pump network. It includes humidity and temperature sensors for the thermal hygrometric analysis of the environment and for the management of the double set point for radiant floor heating systems that use a dehumidification system.

Fancoil control (Hi-T control required) – microprocessor device designed to regulate heating/cooling systems with 2 or 4 pipe fan coils, in systems with Hi-T2 remote control and air/water chillers/heat pumps.

i-CR - Wall remote controller – Modbus remote control panel with negative LCD and capacitive buttons. The device must be used as a remote keypad for the machine, it has local temperature detection and reproduces the functions of the machine's control panel.

USB/RS485 serial converter (ISK) – interface device able to read and write the control logs via the RS485 standard and convert it into a USB port that can be connected to any supervision system.

BMS connectivity arrangement – ModBus protocol included (CM) – accessory to connect the unit to external controllers via serial cable with RS-485 electric standard and ModBus RTU protocol.

3. INSTALLATION

All the handling, installation and maintenance operations must only be carried out by QUALIFIED PERSONNEL. Before any operation on the unit, make sure that power is disconnected.
The minimum temperature allowed for storing the units is 5°C.

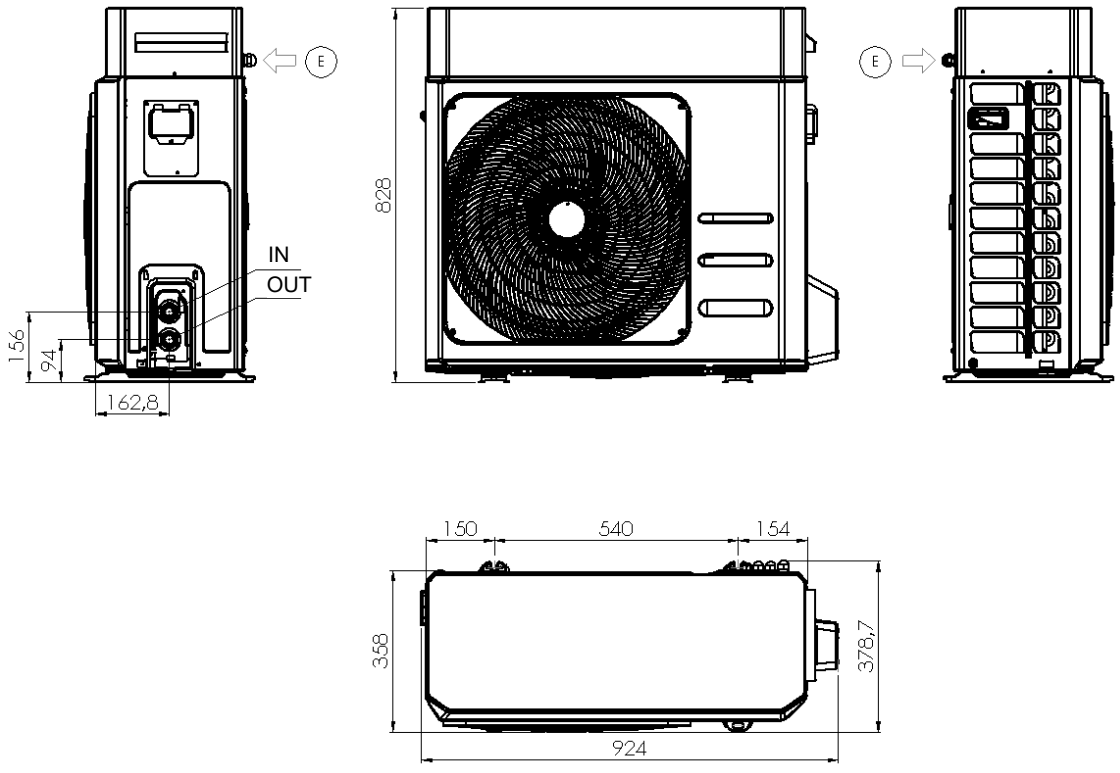
3.1 Unit dimensions, plumbing connections and weights

3.1.1 Net dimensions and with packaging

Model Vitocal 100-A	Length [mm]	Width [mm]	Height [mm]	Plumbing connections IN/OUT	Dimensions with packaging (length X width X height) [mm]
AWO-M-AC 101.A06 AWO-M-AC 101.A08	924	377	828	1”M	970 x 395 x 985
AWO-M-AC 101.A10 AWO-M-AC 101.A12	1047	455	936	1”M	1080 x 510 x 1130
AWO-M-AC 101.A14 AWO-AC 101.A14 AWO-M-AC 101.A16 AWO-AC 101.A16	1044	448	1409	1”M	1100 x 490 x 1605

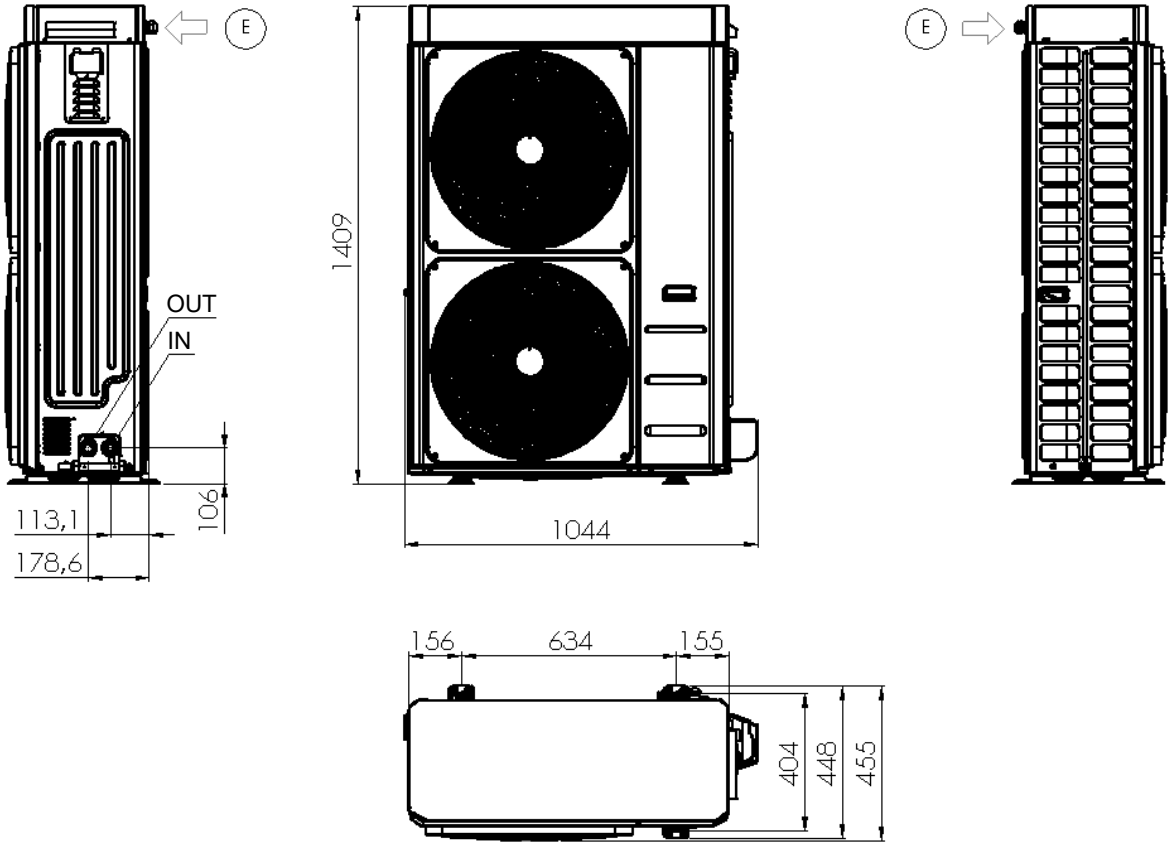
Models Vitocal 100-A 06 / 08

IN/OUT: 1”M G
E: power supply input



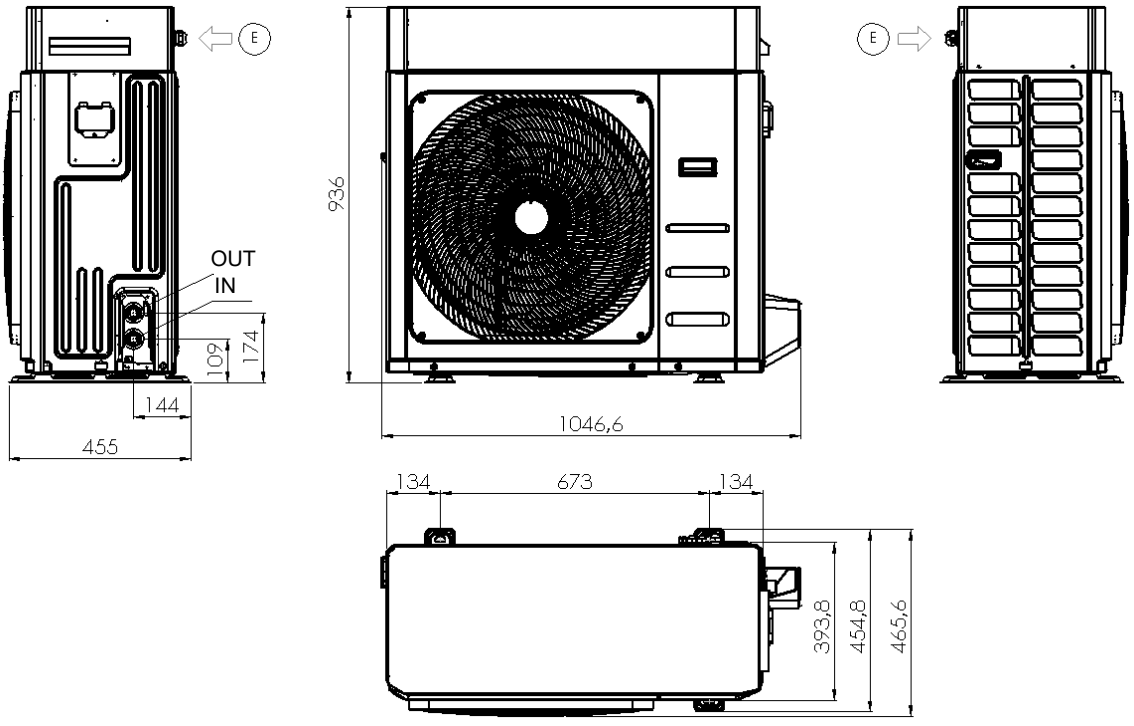
Models Vitocal 100-A 10 / 12

IN/OUT: 1”M G
E: power supply input



Models Vitocal 100-A 14 / 14 Three-phase / 16 / 16 Three-phase

IN/OUT: 1”M G
E: power supply input



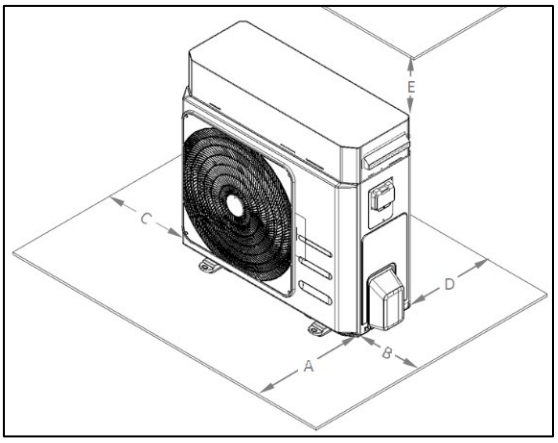
3.1.2 Weights

Model Vitocal 100-A	Shipping weight [kg]	Operating weight [kg]
AWO-M-AC 101.A06	84	72
AWO-M-AC 101.A08	84	72
AWO-M-AC 101.A10	110	96
AWO-M-AC 101.A12	110	96
AWO-M-AC 101.A14	134	121
AWO-AC 101.A14	148	136
AWO-M-AC 101.A16	140	126
AWO-AC 101.A16	154	141

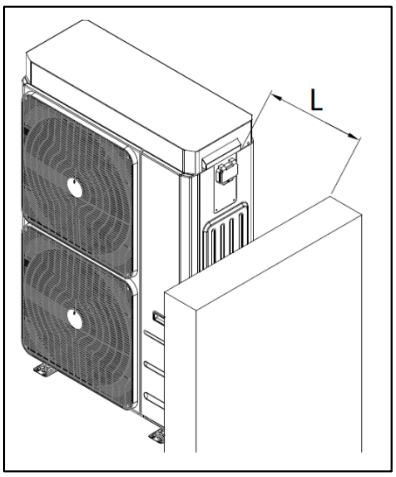
3.2 Technical clearances

The whole range is designed and constructed for outdoor installations.
At least 5 m from the appliance there must be no shafts or manholes where gases might build up and generate an explosive atmosphere.
It is advisable to create an adequately sized support base for the unit. The units transmit a small amount of vibrations to the ground: it is nonetheless advisable to apply vibration dampers between the base frame and support surface.
It is very important to avoid recirculation between intake and delivery air, so as not to downgrade performance of the unit or even to interrupt its normal operation. This is why the minimum clearances shown below must be guaranteed.

MODEL	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]
AWO-M-AC 101.A06	1500	500	400	400	500
AWO-M-AC 101.A08	1500	500	400	400	500
AWO-M-AC 101.A10	1500	500	400	400	500
AWO-M-AC 101.A12	1500	500	400	400	500
AWO-M-AC 101.A14 AWO-AC 101.A14	1500	500	400	400	500
AWO-M-AC 101.A16 AWO-AC 101.A16	1500	500	400	400	500

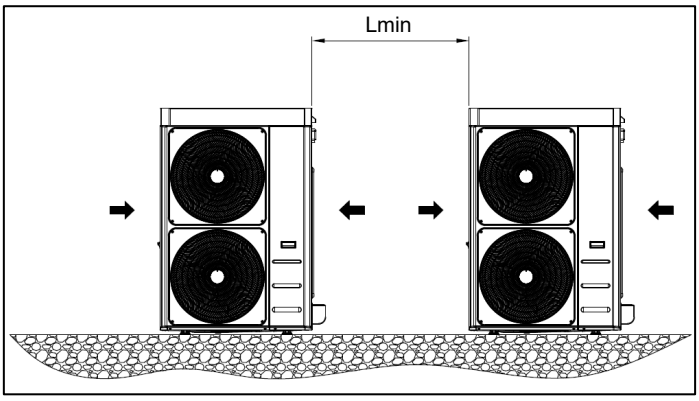


Do not obstruct or cover the vents on the top cover.

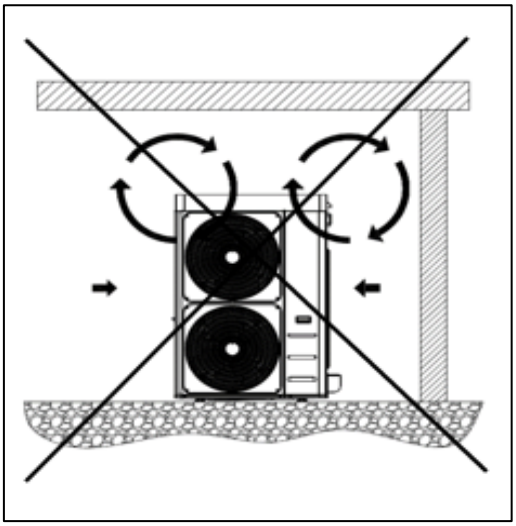


MODEL	L [mm]
AWO-M-AC 101.A06	500
AWO-M-AC 101.A08	500
AWO-M-AC 101.A10	500
AWO-M-AC 101.A12	500
AWO-M-AC 101.A14 AWO-AC 101.A14	500
AWO-M-AC 101.A16 AWO-AC 101.A16	500

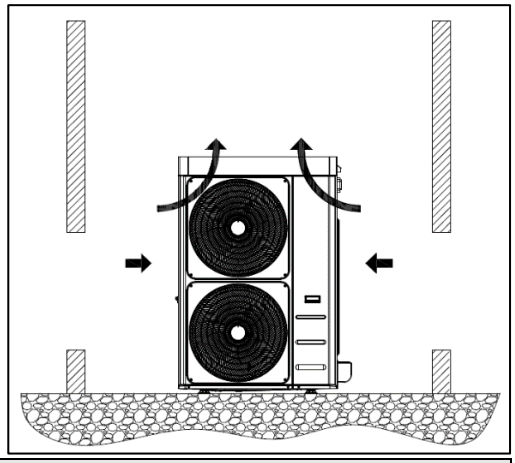
In the event of side-by-side units, the minimum Lmin distance between them is 1 m.



Covering with canopies or placing near plants or walls should be avoided to prevent air recirculation.



In the event of winds stronger than 2.2 m/s the use of wind barriers is recommended.



	CAUTION: It is mandatory to install the unit on a stable base capable of bearing its weight. Considering the weight of the unit, possible vibrations and the ensuing generation of noise, it should not be installed suspended; the company in this case will not be held liable for damage or discomfort resulting thereof.

3.3 Water circuit

The plumbing connections must be done in accordance with national and/or local regulations; pipes can be made of steel, galvanised steel or PVC. Pipes must be accurately sized according to the nominal water flow rate of the unit and the pressure drops of the water circuit. All pipes must be insulated with closed-cell material of adequate thickness. The chiller must be connected to the pipes using flexible joints. The water circuit should include the following components:

- Well thermometers to monitor the circuit's temperature.
- Manual gate valves to isolate the chiller from the water circuit.
- Metal Y filter (installed on the return pipe) with metal mesh no larger than 1 mm.
- Loading group and exhaust valve where necessary.
- Correctly sized expansion vessel.

	CAUTION: when sizing the pipes, make sure not to exceed the maximum pressure drop on plant side reported in the technical data table in Paragraph *Error! Reference source not found.* ***(see useful head).***
	CAUTION: connect the pipes to their fittings always using the key to key method.
	CAUTION: the expansion vessel on the unit has a limited capacity. The installer is in charge of making sure that the expansion vessel is suited to the real capacity of the system, and if not, of providing an additional expansion vessel.
	CAUTION: The return pipe from the system must be installed near the label "WATER INLET" otherwise the evaporator could freeze.
	CAUTION: It is mandatory to install a metal filter (with mesh no larger than 1 mm) and a dirt separator on the return pipe from the system labelled "WATER INLET". If the flow switch is manipulated or altered, or if the metal filter and dirt separator are missing, the warranty will terminate immediately. The filter and dirt separator must be kept clean. Therefore after installing the unit, you must make sure that they are still clean and check them regularly.
	All of the units leave the company supplied with flow switch (installed in factory). If the flow switch is altered or removed or if the water filter and dirt separator are missing from the unit, the guarantee will be void. Refer to the wiring diagram attached to the unit to connect the flow switch.
	The heating system and the safety valves must comply with the requirements of standard EN 12828.

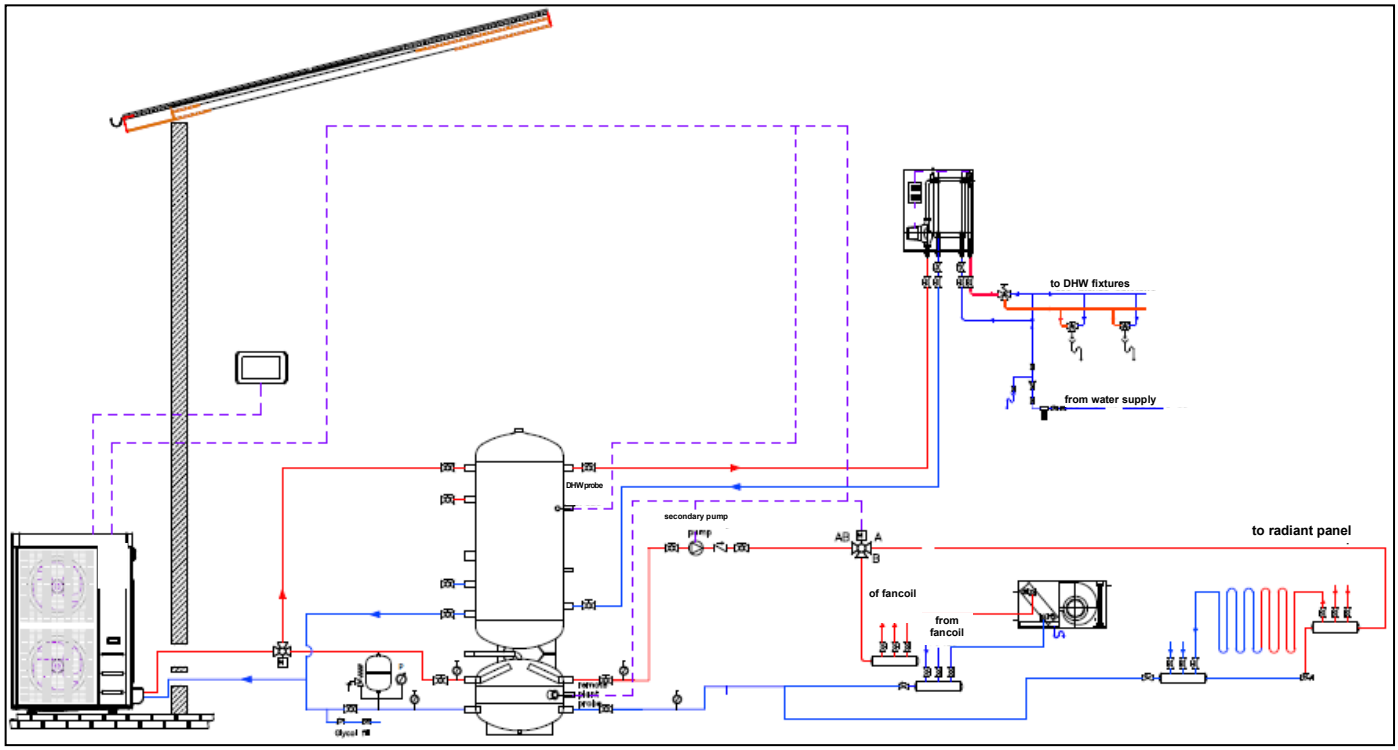
3.3.1 Specifications of the circuit water

To guarantee correct operation of the unit, the water must be appropriately filtered (see the instructions at the start of this paragraph) and there must be only a minimum amount of dissolved substances. The maximum allowed values are shown below

MAXIMUM CHEMICAL-PHYSICAL PROPERTIES ALLOWED FOR THE CIRCUIT WATER	
PH	7.5 - 9
Electrical conductivity	100 - 500 µS/cm
Total hardness	4.5 – 8.5 dH
Temperature	< 65°C
Oxygen content	< 0.1 ppm
Max glycol quantity	40 %

Phosphates (PO4)	< 2ppm
Manganese (Mn)	< 0.05 ppm
Iron (Fe)	< 0.3 ppm
Alkalinity (HCO3)	70 – 300 ppm
Chloride ions (Cl-)	< 50 ppm
Sulphate ions (SO4)	< 50 ppm
Sulphide ions (S)	None
Ammonium ions (NH4)	None
Silica (SiO2)	< 30 ppm

3.3.2 Typical plumbing diagram

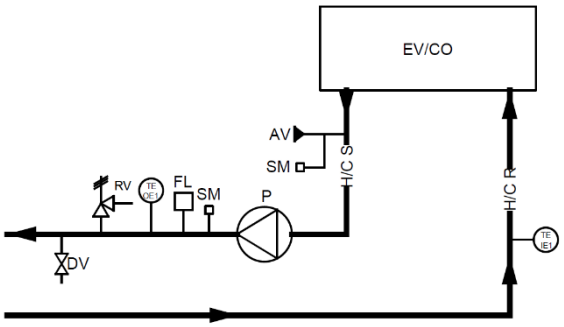


A recommended connection diagram is shown below.

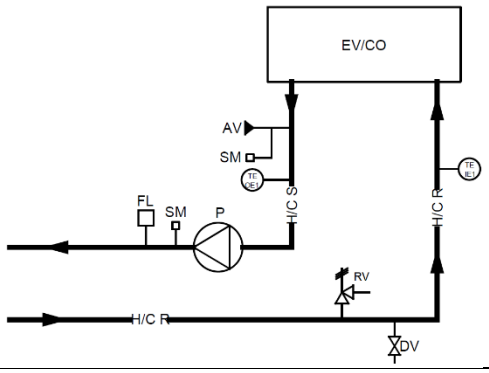
3.3.3 Plumbing diagram inside unit

The unit plumbing connection diagrams are provided below.

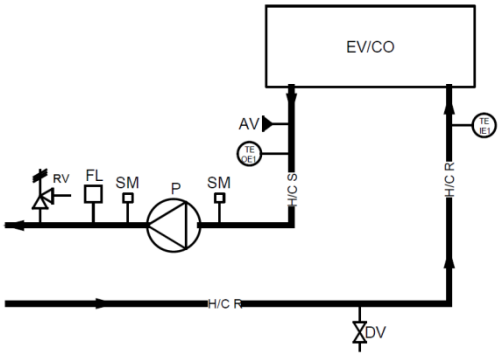
Models Vitocal 100-A 06 / 08



Models Vitocal 100-A 10 / 12



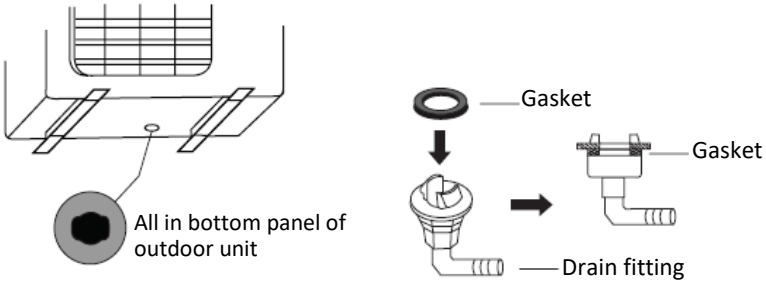
Models Vitocal 100-A 14 / 14T / 16 / 16T



TE	UTILITY INLET TEMPERATURE PROBE
TE SD	UTILITY OUTLET TEMPERATURE PROBE
DV	DRAIN VALVE
RV	SAFETY VALVE
FL	FLOW SWITCH
P	PUMP
AV	AUTOMATIC AIR VENTING VALVE
SM	SERVICE SLEEVE

3.3.4 Condensation drain system

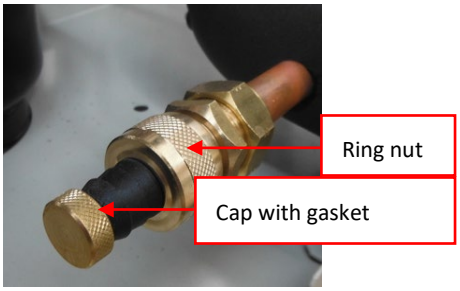
All iVitocal 100-A units are built so that their base works as a condensate drip tray. A plastic fitting is standard supplied to be connected below the base in the appropriate arrangement to connect a pipe which channels the condensate.



Each unit is therefore fitted with a hole on the base of the hydronic kit (on the coil side) to drain condensation which could drip from the pipes of the plumbing system. Since these pipes are well insulated, a minimum amount of condensation is produced anyway and therefore it is not mandatory to connect a drain pipe to this fitting.

3.3.5 Filling the system

CAUTION: supervise all filling/top-up operations.
CAUTION: before filling/topping up the system, disconnect power to the units.
CAUTION: the system must always be filled/topped up in controlled pressure conditions (max 1 bar). Make sure that a pressure reducer and safety valve have been installed on the filling/top-up line.
CAUTION: the water on the filling/top-up line must be appropriately pre-filtered from any impurities and suspended particles. Make sure that a removable cartridge filter and dirt separator are installed on the line.
CAUTION: regularly check and vent the air built up in the system.

	CAUTION: install an automatic air venting valve at the highest point of the system.
	When it is required to top up the circuit or to adapt the glycol level, please use the service valve. Unscrew and remove the cap from the service valve and connect a 14 or 12 mm pipe (inside diameter - check the valve model installed on your unit), connected to the water mains, to the hose connector and then drain the circuit by unscrewing the specific ring nut. After the end of the operation, retighten the ring nut and screw the cap back on. In any case it is recommended to use an external valve to fill the system which can be set up by the installer.

3.3.6 Draining the system

If the unit needs to be drained completely, first close the manual inlet and outlet gate valves (not included in supply) 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, it is recommended to install two drain valves between the unit and manual gate valves on the outside of the water inlet and outlet).

4. GENERAL TECHNICAL DATA

4.1 Data table

TECHNICAL SPECIFICATIONS		Unit of measurement	Vitocal 100-A			
			AWO-M-AC 101.A06	AWO-M-AC 101.A08	AWO-M-AC 101.A10	AWO-M-AC 101.A12
Cooling	Cooling capacity (1) min/nom/max	kW	3.20 / 5.02 / 5.52*	3.80 / 6.08 / 6.69*	4.66 / 7.53 / 8.28*	4.55 / 8.51 / 9.36*
	Input power (1)	kW	1.60	1.99	2.39	2.79
	E.E.R. (1)	W/W	3.14	3.05	3.15	3.05
	Cooling capacity (2) min/nom/max	kW	4.82 / 6.18 / 6.80*	4.91 / 7.72 / 8.49*	6.22 / 9.50 / 10.45*	6.41 / 11.60 / 12.76*
	Input power (2)	kW	1.28	1.76	2.15	2.79
	E.E.R. (2)	W/W	4.82	4.38	4.41	4.16
	SEER (5)	W/W	4.12	4.25	4.15	4.25
	Water flow rate (1)	L/s	0.24	0.28	0.36	0.41
	User side heat exchanger pressure drops (1)	kPa	2.0	2.8	6.9	8.8
	Nominal useful head (1)	kPa	78.8	76.0	68.9	63.4
Heating	Heating capacity (3) min/nom/max	kW	3.95 / 6.08 / 6.99*	3.95 / 7.81 / 8.98*	5.33 / 10.10 / 11.62*	5.33 / 11.80 / 13.57*
	Input power (3)	kW	1.35	1.78	2.28	2.73
	C.O.P. (3)	W/W	4.51	4.38	4.43	4.32
	Heating capacity (4) min/nom/max	kW	3.82 / 5.88 / 6.76*	3.80 / 7.58 / 8.72*	5.18 / 9.76 / 11.22*	5.13 / 11.47 / 13.19*
	Input power (4)	kW	1.66	2.17	2.80	3.33
	C.O.P. (4)	W/W	3.54	3.50	3.48	3.44
	SCOP (6)	W/W	4.46	4.46	4.53	4.47
	Water flow rate (4)	L/s	0.28	0.37	0.47	0.55
	User side heat exchanger pressure drops (4)	kPa	2.1	3.3	9.7	13.1
	Nominal useful head (4)	kPa	75.8	66.3	55.2	43.4
	Energy efficiency water 35°C / 55°C	Class	A+++/A++	A+++/A++	A+++/A++	A+++/A++
Compressor	Type		Twin Rotary DC Inverter	Twin Rotary DC Inverter	Twin Rotary DC Inverter	Twin Rotary DC Inverter
	Refrigerant oil (type)		ESTEL OIL RB74AF	ESTEL OIL	ESTEL OIL VG74	ESTEL OIL VG74
	Number of compressors		1	1	1	1
	Oil charge (amount)	L	0.67	0.67	1	1
	Refrigerant circuits		1	1	1	1
Refrigerant	Type		R32	R32	R32	R32
	Refrigerant charge (7)	kg	1.5	1.5	2.5	2.5
	Amount of refrigerant in equivalent CO2 tonnes (7)	ton	1.0	1.0	1.7	1.7
	Design pressure (high/low) heat pump mode	bar	42.8/1.3	42.8/1.3	42.8/1.3	42.8/1.3
	Design pressure (high/low) chiller mode	bar	42.8/3.5	42.8/3.5	42.8/3.5	42.8/3.5
External zone fans	Type		DC Brushless motor	DC Brushless motor	DC Brushless motor	DC Brushless motor
	Number		1	1	1	1
Internal heat exchanger	Internal heat exchanger type					
	No. internal heat exchangers		1	1	1	1
	Water content	L	0.9	0.9	1.2	1.2
Water circuit	Water content of hydronic circuit	L	1.4	1.4	1.8	1.8
	Maximum water side pressure	bar	6	6	6	6
	Plumbing fittings	inch	1"M	1"M	1"M	1"M
	Minimum water volume	L	40	40	50	60
	Nominal circulator output	kW	0.075	0.075	0.075	0.075
	Maximum circulator output	kW	0.075	0.075	0.075	0.075
	Max circulator absorbed current	A	0.38	0.38	0.38	0.38
	Energy Efficiency Index (EEI) circulator		≤ 0.21	≤ 0.21	≤ 0.21	≤ 0.21
Noise level	Sound power level Lw (8)	dB(A)	64	64	64	65
	Sound pressure level at a distance of 1m Lp1 (9)	dB(A)	49.8	49.8	49.4	50.4
	Sound pressure level at a distance of 10m Lp10 (9)	dB(A)	32.8	32.8	32.7	33.7
Electrical data	Power supply				230V/1/50Hz	
	Maximum input power	kW	3.5	3.9	4.6	5.1
	Maximum input current	A	15.1	17.0	20.2	22.1

	Maximum input power with antifreeze kit	kW	3.6	4.0	4.8	5.2
	Maximum input current with antifreeze kit	A	15.6	17.6	20.7	22.7
Dimensions and weights	A - Length	mm	924	924	1047	1047
	B - Depth	mm	377	377	455	455
	C - Height	mm	828	828	936	936
	Shipping weight	kg	84	84	110	110
	Operating weight	kg	72	72	96	96

TECHNICAL SPECIFICATIONS		Unit of measurement	Vitocal-100A			
			AWO-M-AC 101.A14	AWO-AC 101.A14	AWO-M-AC 101.A16	AWO-AC 101.A16
Cooling	Cooling capacity (1) min/nom/max	kW	6.87 / 11.48 / 12.05*	6.87 / 11.48 / 12.05*	5.99 / 13.80 / 14.49*	5.99 / 13.80 / 14.49*
	Input power (1)	kW	3.53	3.53	4.38	4.38
	E.E.R. (1)	W/W	3.25	3.25	3.15	3.15
	Cooling capacity (2) min/nom/max	kW	9.17 / 14.00 / 14.70*	9.17 / 14.00 / 14.70*	9.20 / 15.80 / 16.59*	9.20 / 15.80 / 16.59*
	Input power (2)	kW	2.59	2.59	3.15	3.15
	E.E.R. (2)	W/W	5.40	5.40	5.02	5.02
	SEER (5)	W/W	4.62	4.62	4.80	4.80
	Water flow rate (1)	L/s	0.55	0.55	0.66	0.66
	User side heat exchanger pressure drops (1)	kPa	12.9	12.9	17.5	17.5
	Nominal useful head (1)	kPa	75.0	75.0	62.3	62.3
Heating	Heating capacity (3) min/nom/max	kW	7.54 / 14.10 / 15.23*	7.54 / 14.10 / 15.23*	7.36 / 16.30 / 17.60*	7.36 / 16.30 / 17.60*
	Input power (3)	kW	2.91	2.91	3.49	3.49
	C.O.P. (3)	W/W	4.85	4.85	4.67	4.67
	Heating capacity (4) min/nom/max	kW	7.23 / 13.56 / 14.64*	7.23 / 13.56 / 14.64*	7.06 / 15.77 / 17.03*	7.06 / 15.77 / 17.03*
	Input power (4)	kW	3.55	3.55	4.24	4.24
	C.O.P. (4)	W/W	3.82	3.82	3.72	3.72
	SCOP (6)	W/W	4.48	4.48	4.49	4.49
	Water flow rate (4)	L/s	0.65	0.65	0.76	0.76
	User side heat exchanger pressure drops (4)	kPa	13.0	13.0	17.6	17.6
	Nominal useful head (4)	kPa	63.6	63.6	48.5	48.5
	Energy efficiency water 35°C / 55°C	Class	A+++/A++	A+++/A++	A+++/A++	A+++/A++
Compressor	Type		Twin Rotary DC Inverter	Twin Rotary DC Inverter	Twin Rotary DC Inverter	Twin Rotary DC Inverter
	Refrigerant oil (type)		ESTEL OIL VG74	ESTEL OIL VG74	ESTEL OIL VG74	ESTEL OIL VG74
	Number of compressors		1	1	1	1
	Oil charge (amount)	L	1.4	1.4	1.4	1.4
	Refrigerant circuits		1	1	1	1
Refrigerant	Type		R32	R32	R32	R32
	Refrigerant charge (7)	kg	3.6	3.6	4	4
	Amount of refrigerant in equivalent CO_2 tonnes (7)	ton	2.4	2.4	2.7	2.7
	Design pressure (high/low) heat pump mode	bar	42.8/1.3	42.8/1.3	42.8/1.3	42.8/1.3
	Design pressure (high/low) chiller mode	bar	42.8/3.5	42.8/3.5	42.8/3.5	42.8/3.5
External zone fans	Type		DC Brushless motor	DC Brushless motor	DC Brushless motor	DC Brushless motor
	Number		2	2	2	2
Internal heat exchanger	Internal heat exchanger type		Plate			
	No. internal heat exchangers		1	1	1	1
	Water content	L	1.7	1.7	1.7	1.7
Water circuit	Water content of hydronic circuit	L	3.0	3.0	3.0	3.0
	Maximum water side pressure	bar	6	6	6	6
	Plumbing fittings	inch	1"M	1"M	1"M	1"M
	Minimum water volume	L	60	60	70	70
	Nominal circulator output	kW	0.14	0.14	0.14	0.14
	Maximum circulator output	kW	0.14	0.14	0.14	0.14

	Max circulator absorbed current	A	1.10	1.10	1.10	1.10
	Energy Efficiency Index (EEI) circulator		≤ 0.23	≤ 0.23	≤ 0.23	≤ 0.23
Noise level	Sound power level L_w (8)	dB(A)	68	68	68	68
	Sound pressure level at a distance of 1m Lp1 (9)	dB(A)	52.7	52.7	52.7	52.7
	Sound pressure level at a distance of 10m L_{p10} (9)	dB(A)	36.6	36.6	36.6	36.6
Electrical data	Power supply		230V/1/50Hz	400V/3P+N+T/50Hz	230V/1/50Hz	400V/3P+N+T/50Hz
	Maximum input power	kW	6.6	6.6	7.0	7.0
	Maximum input current	A	28.6	9.5	30.4	10.1
	Maximum input power with antifreeze kit	kW	6.7	6.7	7.1	7.1
	Maximum input current with antifreeze kit	A	29.2	9.7	31.0	10.3
Dimensions and weights	A - Length	mm	1044	1044	1044	1044
	B - Depth	mm	448	448	448	448
	C - Height	mm	1409	1409	1409	1409
	Shipping weight	kg	134	148	140	154
	Operating weight	kg	121	136	126	141

Performance referring to the following conditions, according to standard 14511:2018:
(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 db 6°C db; in/out water temp 30/35°C.
(4) Heating: outdoor air temperature 7°C db 6°C db; in/out water temp 40/45°C.
(5) Cooling: in/out water temperature 7/12°C.
(6) Heating: average climatic conditions; Tbiv=-7°C; in/out water temp 30/35°C.
(7) Indicative data subject to changes. For the correct value, always refer to the technical label on the unit.
(8) Sound power level: heating mode condition (3); value calculated based on measurements made in accordance with standard UNI EN ISO 9614-2, compliant with the requirements of the Eurovent certification.
(9) Sound pressure level: value calculated from the sound power level using ISO 3744:2010.
(*) activating the maximum Hz function

N.B. performance data are indicative and are subject to change. Furthermore the performance declared in points (1), (2), (3) and (4) is intended to refer to instantaneous power according to EN 14511. The value declared in point (5) and (6) is determined according to UNI EN 14825.

4.2 Electrical and auxiliary data

Unit power supply	V/~/Hz	230/1PH+PE/50*-400/3PH+PE/50**	**Remote controller circuit**	V/~/Hz	12/1/50
On board controller circuit	V/~/Hz	12/1/50	**Fans power supply**	V/~/Hz	230/1/50

For sizes 06, 08, 10, 12, 14 and 16* - For sizes 14T, 16T

NOTE: The electrical data are subject to change due to updates. It is therefore always necessary to refer to the technical specifications label applied on the right side panel of the unit.

5. CORRECTION FACTORS

5.1 Correction factors for use of glycol water mixture

The correction factors of the water flow rate and pressure drops must be applied to the values obtained without use of glycol. The water flow rate correction factor is calculated to retain the same temperature difference which would be achieved without using glycol. The pressure drop correction factor is applied to the correct water flow rate value of the water flow rate correction factor.

Glycol percentage	Freezing point (°C)	Performance correction factor	Absolute power correction factor	Water flow rate correction factor	Pressure drops correction factor
10%	-3.2	0.985	1	1.02	1.08
20%	-7.8	0.98	0.99	1.05	1.12
30%	-14.1	0.97	0.98	1.10	1.22
40%	-22.3	0.965	0.97	1.14	1.25
50%	-33.8	0.955	0.965	1.2	1.33

5.2 Scaling correction factors

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

m^2 °C / kW	Output power correction factor	Input 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 Instrumentation calibrations and protections

Description	Value
High pressure switch	42.8 bar
High pressure alarm	41.5 bar
Low pressure alarm	Depends on the unit
Maximum number of restarts after high/low pressure alarm (manual reset)	3
Antifreeze protection	Alarm triggered: 4 °C Alarm ceases: +7°C
Safety valve of hydronic circuit	6 bar

5.4 Correction factors according to altitude

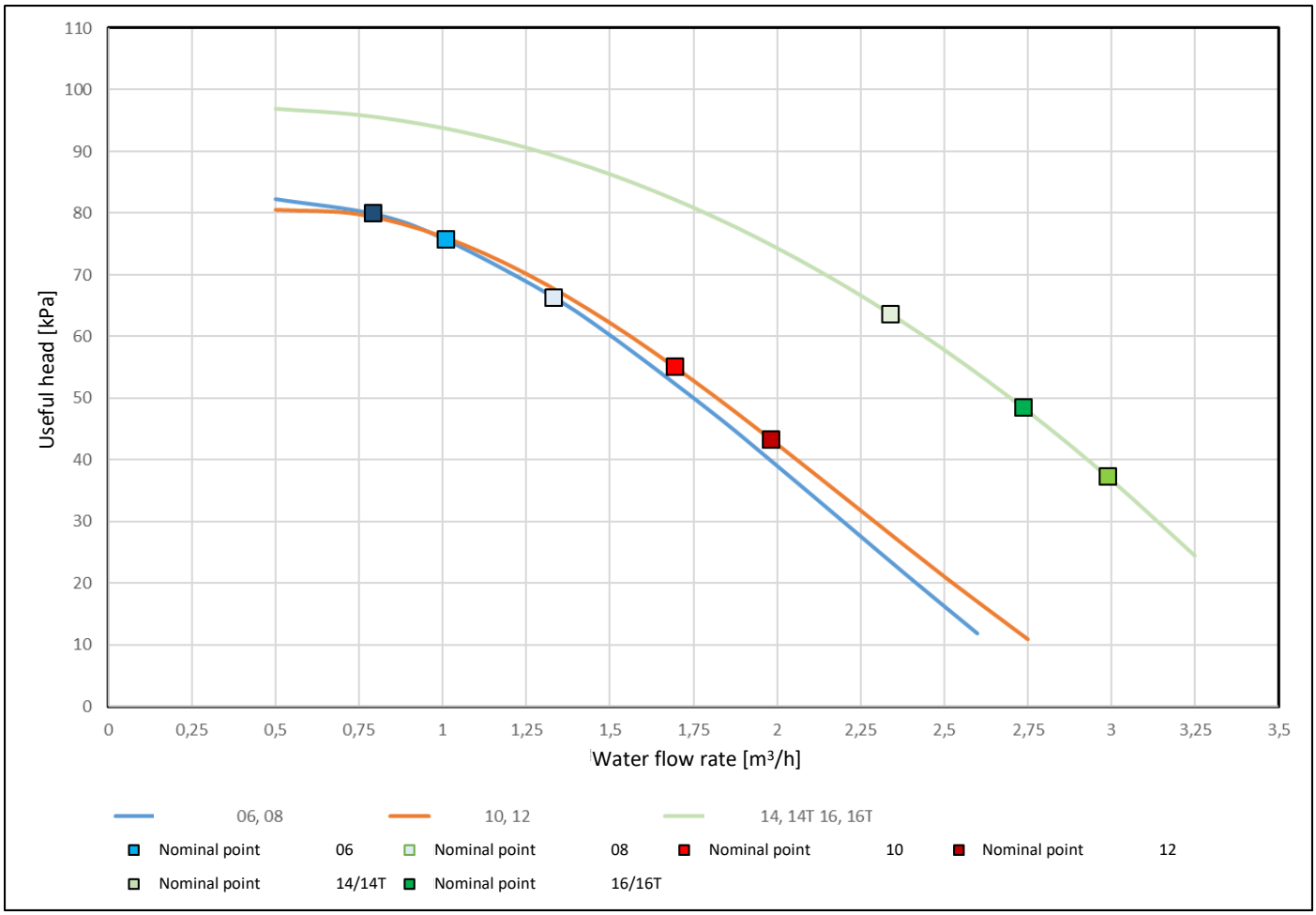
The performance correction factors according to altitude are calculated for cooling at conditions (1) and for heating at conditions (3) of the previous technical data tables and are provided for altitudes of 500, 1000, 1500 and 2000 m.

Vitocal 100-A				
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

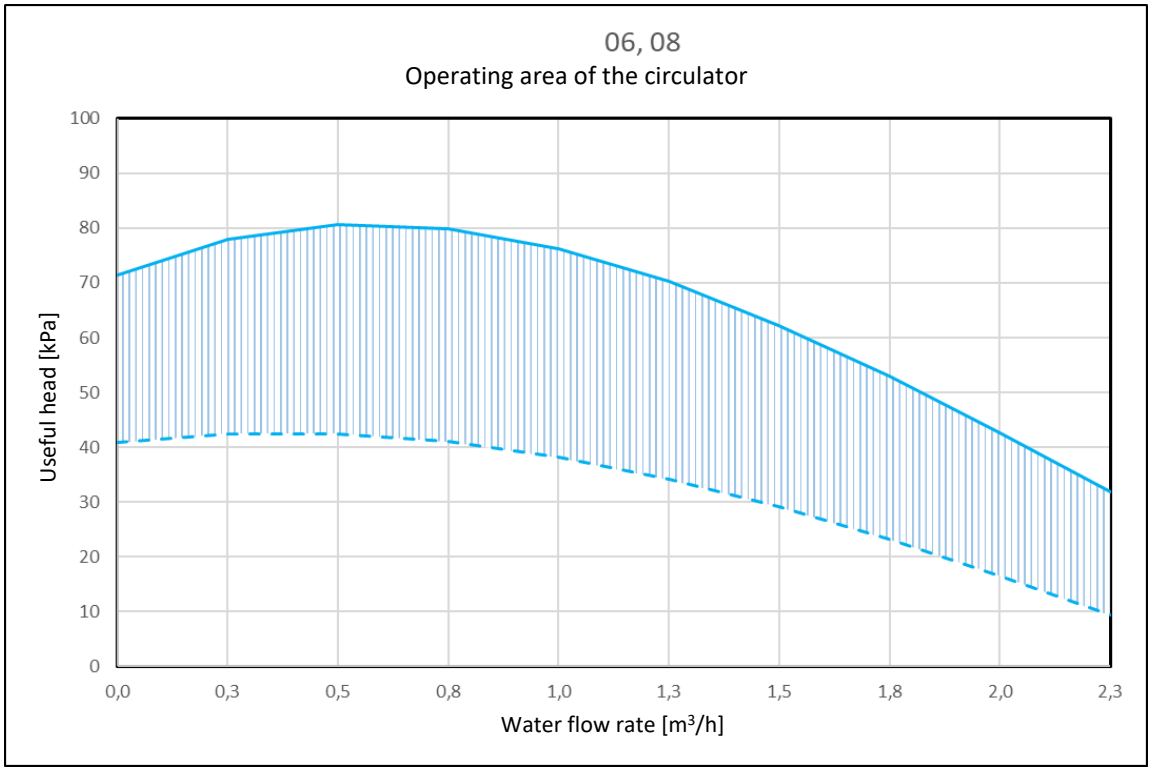
6.1 Useful heads

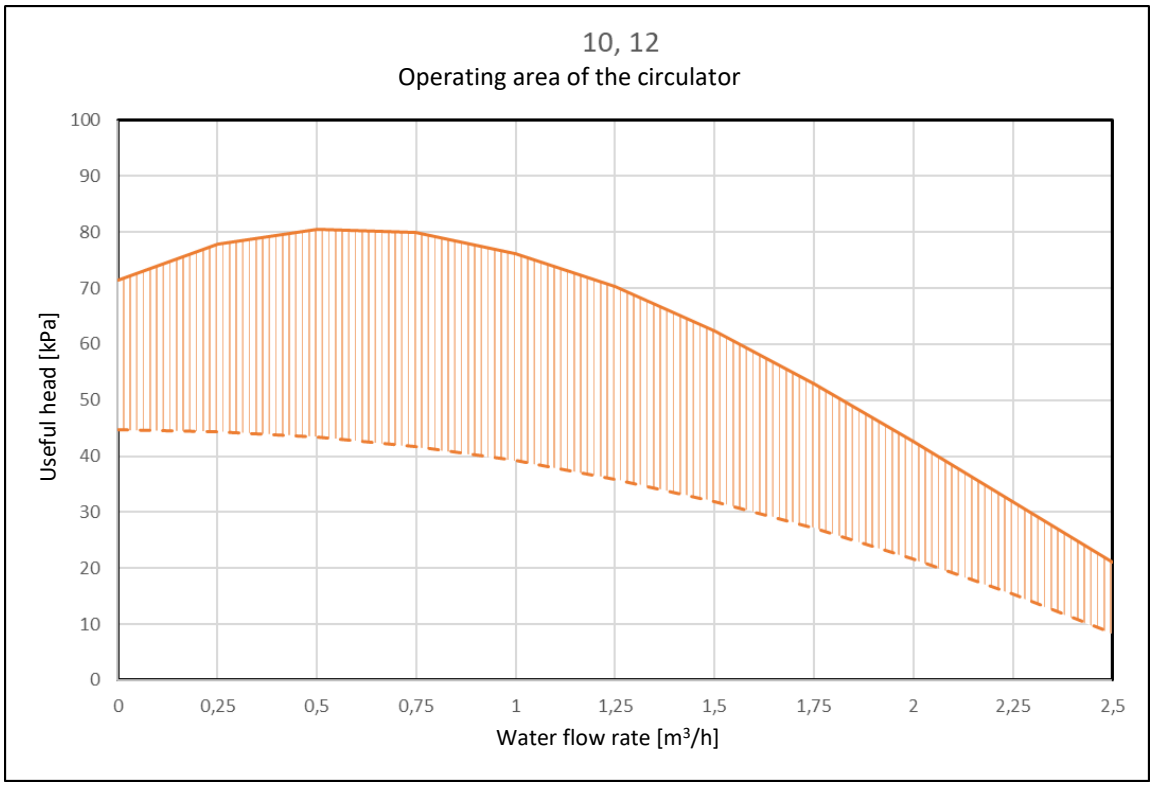
The following are the characteristic curves of the head-flow rate net of the pressure drops of the hydronic kit. It highlights the ideal working point on each curve at the conditions specified at the apex (4) shown in the technical data table.
The system must be designed to guarantee the nominal flow rate relative to the working points shown below.

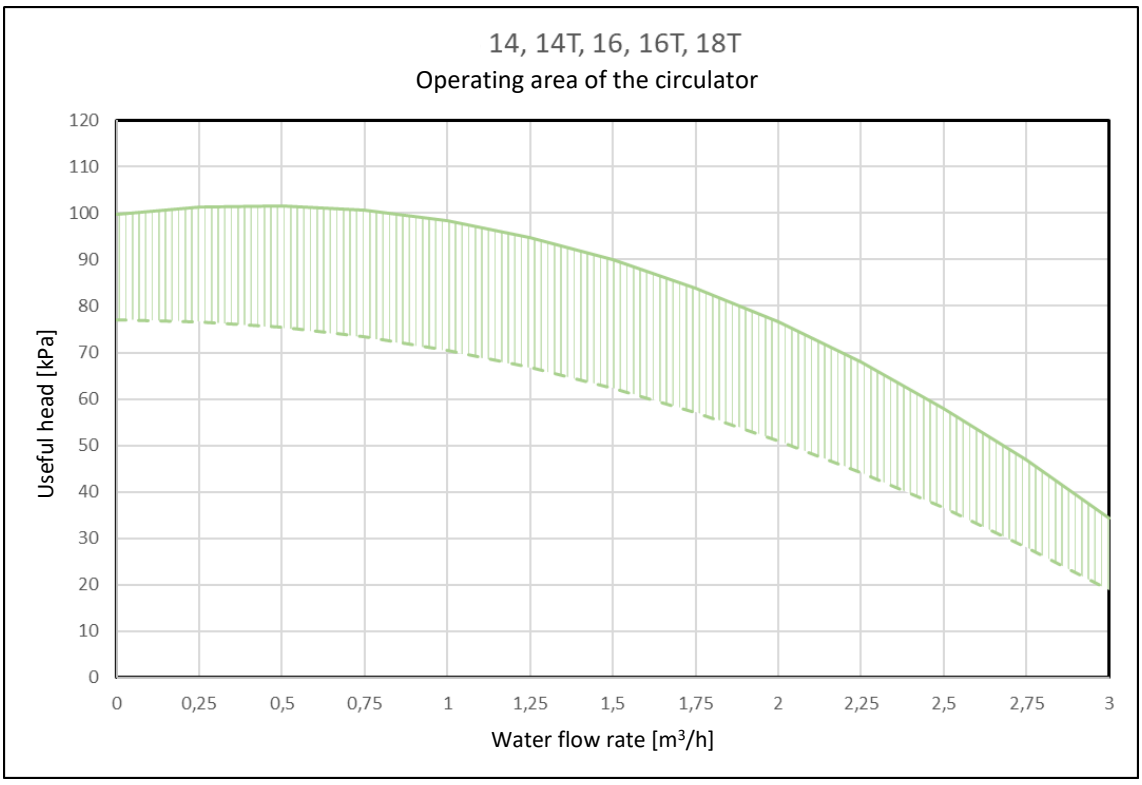


6.2 Characteristic curves of circulators

Below is the range of useful heads which guarantee the unit during modulating of the circulator.






14, 14T, 16, 16T, 18T
Operating area of the circulator
Useful head [kPa]
120
110
100
90
80
70
60
50
40
30
20
10
0
0
0,25
0,5
0,75
1
1,25
1,5
1,75
2
2,25
2,5
2,75
3
Water flow rate [m³/h]

7. NOISE LEVEL

The sound levels refer to the unit at full load and in normal test conditions in heating mode. The value is calculated based on the measurements made according to standard UNI EN ISO 9614-2, in compliance with the requirements of the Eurovent certification, which sets forth a 3 dB(A) tolerance on the total sound power level (the only value considered certified).

7.1 Sound power and pressure levels

The sound pressure data are calculated from the sound power level using ISO 3744:2010.

Size	Sound power level [LW(A)]	Sound pressure level at 1 m	Sound pressure level at 10 m
AWO-M-AC 101.A06	64	49.8	32.8
AWO-M-AC 101.A08	64	49.8	32.8
AWO-M-AC 101.A10	64	49.4	32.7
AWO-M-AC 101.A12	65	50.4	33.7
AWO-M-AC 101.A14	68	52.7	36.6
AWO-AC 101.A14	68	52.7	36.6
AWO-M-AC 101.A16	68	52.7	36.6
AWO-AC 101.A16	68	52.7	36.6

8. OPERATING LIMITS

8.1 Evaporator water flow

The nominal water flow rate refers to a 5°C temperature difference between the evaporator inlet and outlet. The maximum permitted flow rate features a 3°C temperature difference while the minimum one has an 8°C temperature difference at the nominal conditions as shown in the technical sheet.

Insufficient water flow rates can cause excessively low evaporation temperatures causing the safety devices to trigger and stopping the unit and, in some extreme cases, forming ice in the evaporator and resulting in serious failures to the cooling circuit.

For greater details, we have attached a table below with the minimum flow rates for the plate heat exchanger to guarantee proper operation according to the model (please note: the water flow switch is applied to protect against failed triggering of the antifreeze probe due to the lack of flow but does not guarantee the minimum water flow rate required for correct operation of the unit).

Model	06	08	10	12	14	14T	16	16T
Minimum water flow to be assured in chiller mode (condition (1) technical sheet) [l/s]	0.15	0.17	0.23	0.25	0.34		0.34	
Maximum water flow to be assured in chiller mode (condition (1) technical sheet) [l/s]	0.40	0.46	0.60	0.68	0.92		0.92	
Flow switch trip flow rate – decreasing flow* [l/s]	0.117	0.117	0.153	0.153	0.153		0.262	
Flow switch trip flow rate – increasing flow* [l/s]	0.132	0.132	0.175	0.175	0.175		0.293	

* When the flow rate drops below the indicated limit (flow switch trip flow rate – decreasing flow) the flow switch issues an alarm, which may be reset only upon reaching the flow switch trip flow rate – increasing flow.

As an approximation, and without any other measurement systems, the correct flow rate to guarantee the best performance of the unit can be verified with the circulator at maximum speed, by looking at the pressure gauges to check the pressure difference between the water return and delivery on the external plumbing fittings of the unit and making sure that this reading is equal to or lower than the useful head indicated on the curves shown in Paragraph 6.2 for the respective models.

8.2 Cold water production (summer mode)

A minimum temperature of 5°C is allowed at the evaporator outlet: for lower temperatures, contact the Technical Department. In this case contact our technical department to study the feasibility and assess the changes to be made according to demands. A maximum temperature of 25°C can be maintained at the evaporator outlet in steady-state operation. Higher temperatures (up to a maximum of 40°C) can however be tolerated in transients and in reaching steady-state phases.

8.3 Hot water production (winter mode)

When the system has reached steady state, the water inlet temperature must not drop below 25°C: lower values, not due to transient phases or reaching steady-state, can cause system failures and could possibly break the compressor. The maximum outlet water temperature must not exceed 60°C. At this temperature, power absorption and COP are optimised if the outdoor temperature is higher than 5°C, even though the unit is capable of working at the limit temperatures shown in the envelope.

There could be failures to the regular operation of the unit or, in more critical cases, the safety devices could be triggered due to temperatures higher than those indicated, especially if coupled with reduced water flow rates.

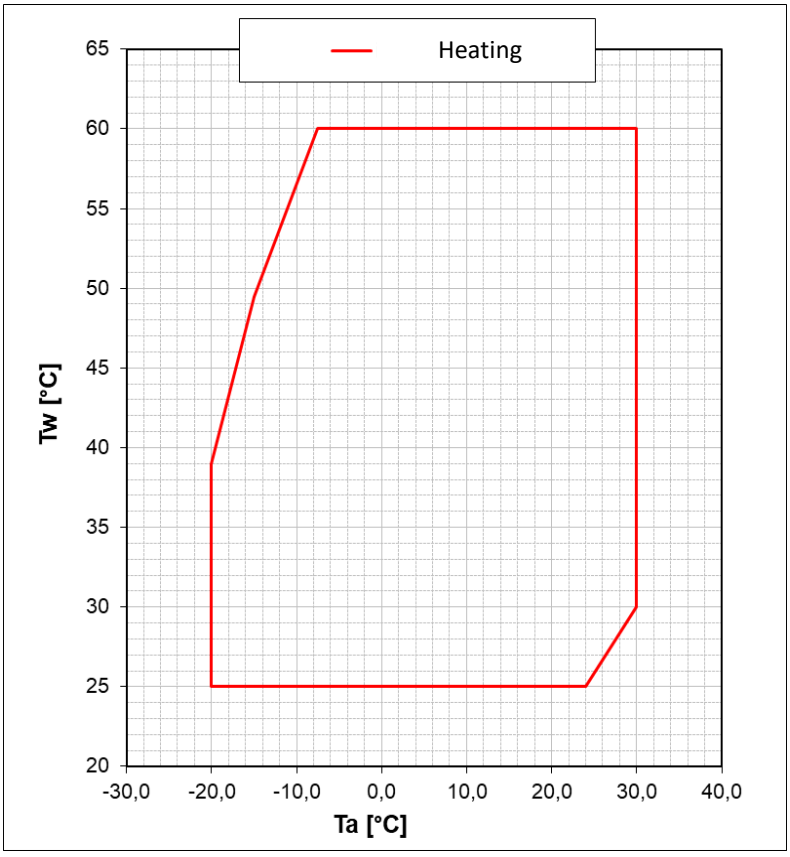
8.4 Ambient air temperature and summary table

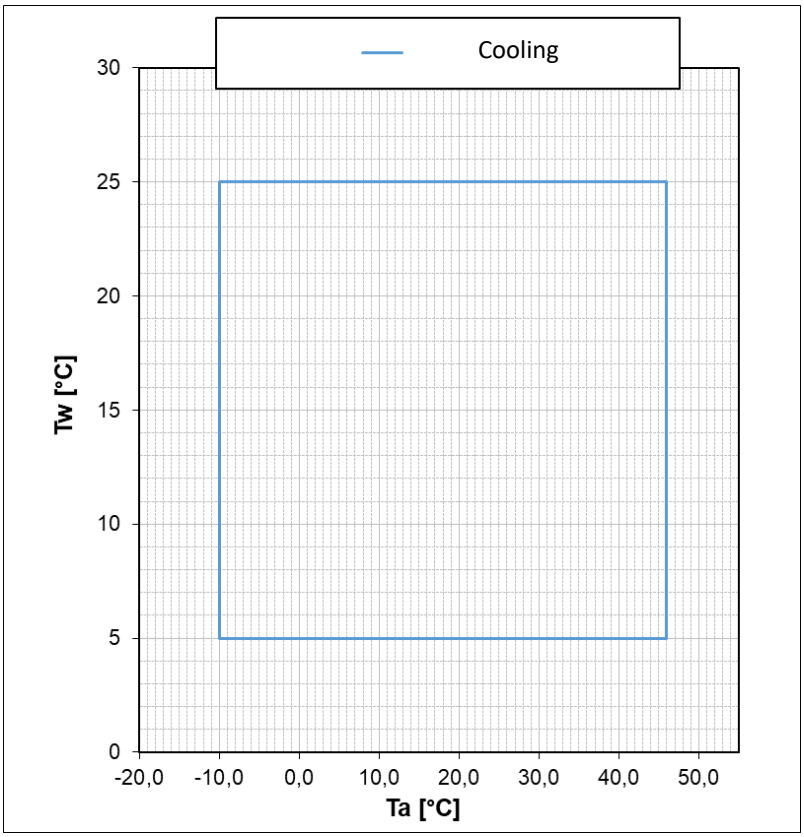
The units are designed and built to operate in summer mode, with condensation control, at outdoor air temperatures between -10°C and 46°C. In heat pump mode, the allowed temperature range of the outdoor air goes from-20°C to +40°C depending on the outlet water temperature as shown in the table below.

Water chiller mode		
Room temperature	Minimum -10°C	Maximum +46°C
Outlet water temperature	Minimum +5°C	Maximum +25°C
Heat pump mode		
Room temperature	Minimum -20°C	Maximum +30°C
Outlet water temperature	Minimum +25°C	Maximum +60°C
Heat pump mode for domestic hot water		
Room temperature with water at maximum 39°C	Minimum -20°C	Maximum +40°C
Room temperature with water at maximum 55°C	Minimum -10°C	Maximum +35°C
Outlet water temperature	Minimum +25°C	Maximum +60°C

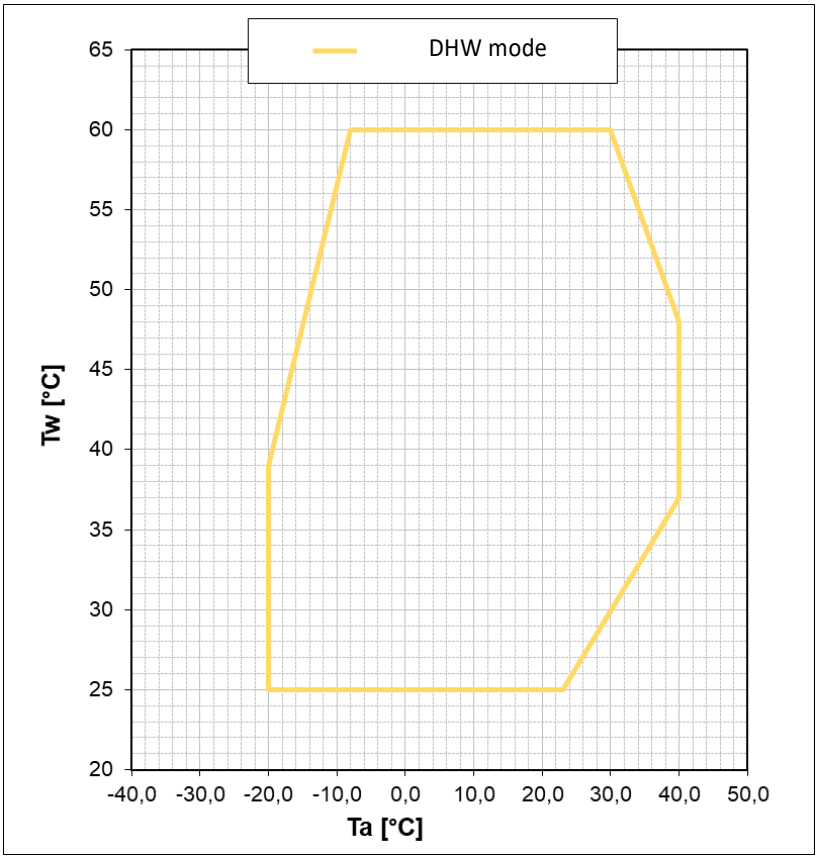
(*) unit setting 57°C, the maximum temperature value considers the hysteresis of 1°C on the parameter.

8.5 Envelope in Heating and Cooling





8.6 Envelope in DHW



9. PERFORMANCE TABLES

9.1 Heating

The tables show the heating power, input power and COP values at various outdoor air temperatures. The technical data are indicative and are subject to change. They always refer to the instantaneous power and are calculated for a 5°C inlet/outlet temperature difference, according to EN 14511:2018.

Modello *Model*	**T aria esterna** *Outdoor air T* [°C]	Tout [°C]																				
		25			30			35			40			45			50			55		
		Potenza termica *Heating capacity* [kW]	Potenza assorbita *Input power* [kW]	COP [W/W]	Potenza termica *Heating capacity* [kW]	Potenza assorbita *Input power* [kW]	COP [W/W]	Potenza termica *Heating capacity* [kW]	Potenza assorbita *Input power* [kW]	COP [W/W]	Potenza termica *Heating capacity* [kW]	Potenza assorbita *Input power* [kW]	COP [W/W]	Potenza termica *Heating capacity* [kW]	Potenza assorbita *Input power* [kW]	COP [W/W]	Potenza termica *Heating capacity* [kW]	Potenza assorbita *Input power* [kW]	COP [W/W]	Potenza termica *Heating capacity* [kW]	Potenza assorbita *Input power* [kW]	COP [W/W]
AWO-M-AC 101.A06	-10	5,95	1,77	3,35	5,87	1,94	3,02	5,82	2,11	2,76	5,82	2,35	2,48	5,83	2,50	2,33	5,83	2,76	2,11	5,84	2,90	2,01
	-7	5,96	1,67	3,57	5,92	1,84	3,22	6,00	2,10	2,86	5,86	2,19	2,67	5,85	2,39	2,44	5,89	2,62	2,25	5,84	2,87	2,03
	-2	5,95	1,45	4,10	5,89	1,64	3,60	5,92	1,84	3,22	5,77	1,97	2,93	5,86	2,20	2,67	5,78	2,36	2,45	5,76	2,65	2,17
	2	5,92	1,23	4,79	5,93	1,39	4,26	6,07	1,59	3,82	5,85	1,75	3,34	5,77	1,88	3,06	6,00	2,17	2,76	5,99	2,32	2,58
	7	6,21	1,05	5,93	6,13	1,19	5,14	6,08	1,35	4,51	6,04	1,53	3,93	5,88	1,66	3,54	6,07	1,93	3,15	6,03	2,14	2,82
	12	6,68	0,91	7,37	6,65	1,07	6,22	6,57	1,25	5,25	6,55	1,41	4,64	6,53	1,63	4,02	6,38	1,79	3,56	6,31	1,98	3,19
AWO-M-AC 101.A08	-10	6,63	2,02	3,29	6,60	2,19	3,01	6,59	2,44	2,70	6,52	2,63	2,48	6,48	2,79	2,32	6,52	3,02	2,16	6,53	3,34	1,96
	-7	6,64	1,90	3,50	6,64	2,09	3,17	6,60	2,29	2,88	6,49	2,42	2,68	6,57	2,71	2,42	6,51	2,88	2,26	6,54	3,13	2,09
	-2	6,70	1,69	3,97	6,66	1,86	3,59	6,56	2,07	3,17	6,53	2,29	2,86	6,55	2,46	2,67	6,52	2,69	2,42	6,49	2,99	2,17
	2	6,70	1,42	4,73	6,74	1,62	4,17	6,61	1,77	3,72	6,59	1,96	3,37	6,58	2,13	3,08	6,60	2,35	2,81	6,67	2,63	2,53
	7	7,74	1,32	5,86	7,78	1,54	5,05	7,81	1,78	4,38	7,70	1,97	3,91	7,58	2,17	3,50	7,55	2,40	3,15	7,55	2,65	2,85
	12	8,27	1,17	7,10	8,27	1,37	6,04	8,16	1,56	5,22	8,09	1,78	4,55	7,98	1,97	4,05	7,87	2,20	3,57	7,79	2,45	3,18
AWO-M-AC 101.A10	-10	8,33	2,52	3,30	8,22	2,72	3,03	8,22	2,99	2,75	8,19	3,28	2,50	8,17	3,53	2,31	8,22	3,86	2,13	8,11	4,05	2,00
	-7	8,41	2,38	3,54	8,42	2,65	3,18	8,30	2,86	2,90	8,35	3,18	2,63	8,23	3,38	2,44	8,25	3,69	2,23	8,26	4,00	2,06
	-2	8,63	2,16	3,99	8,52	2,38	3,58	8,56	2,68	3,19	8,51	2,94	2,89	8,40	3,21	2,61	8,35	3,52	2,37	8,31	3,82	2,18
	2	9,15	1,89	4,85	9,22	2,15	4,29	9,50	2,51	3,78	9,18	2,69	3,41	9,41	3,11	3,03	9,28	3,37	2,75	9,01	3,63	2,48
	7	10,23	1,75	5,84	10,17	2,02	5,04	10,10	2,28	4,43	10,03	2,58	3,89	9,76	2,80	3,48	9,79	3,17	3,09	9,73	3,50	2,78
	12	10,92	1,53	7,12	10,83	1,79	6,04	10,74	2,09	5,14	10,63	2,39	4,45	10,49	2,69	3,90	10,36	2,99	3,47	10,21	3,31	3,09
AWO-M-AC 101.A12	-10	8,95	2,76	3,25	8,93	3,07	2,91	8,86	3,29	2,70	8,92	3,65	2,44	8,83	3,88	2,27	8,71	4,12	2,11	8,85	4,52	1,96
	-7	9,01	2,59	3,47	8,93	2,83	3,15	8,90	3,12	2,85	8,85	3,39	2,61	8,91	3,73	2,39	8,75	3,96	2,21	8,85	4,34	2,04
	-2	9,54	2,43	3,92	9,50	2,73	3,48	9,40	2,98	3,16	9,45	3,41	2,77	9,25	3,55	2,61	9,19	3,90	2,36	9,15	4,18	2,19
	2	10,24	2,20	4,66	10,16	2,44	4,17	10,30	2,78	3,71	10,38	3,12	3,33	10,39	3,45	3,02	10,05	3,65	2,75	10,19	4,09	2,49
	7	12,01	2,13	5,63	11,89	2,40	4,95	11,80	2,73	4,32	11,71	3,03	3,87	11,47	3,33	3,44	11,46	3,69	3,11	11,37	4,10	2,78
	12	12,49	1,75	7,12	12,39	2,07	5,99	12,28	2,38	5,15	12,11	2,70	4,48	11,97	3,04	3,94	11,84	3,40	3,48	11,67	3,72	3,14
AWO-M-AC 101.A14 AWO-AC 101.A14	-10	10,70	3,23	3,31	10,65	3,55	3,00	10,64	3,90	2,73	10,65	4,27	2,49	10,50	4,55	2,31	10,48	4,93	2,13	10,28	5,12	2,01
	-7	10,90	3,01	3,62	10,78	3,31	3,26	10,70	3,63	2,95	10,72	4,00	2,68	10,65	4,36	2,44	10,68	4,83	2,21	10,58	5,05	2,09
	-2	11,24	2,65	4,25	11,47	3,08	3,72	11,38	3,41	3,34	11,25	3,73	3,02	11,17	4,08	2,74	11,11	4,43	2,51	10,98	4,72	2,33
	2	12,43	2,41	5,16	12,54	2,81	4,46	13,02	3,24	4,02	12,50	3,46	3,62	12,69	3,92	3,24	12,40	4,21	2,95	12,40	4,57	2,71
	7	14,26	2,24	6,36	14,09	2,56	5,51	14,10	2,91	4,85	13,87	3,23	4,30	13,56	3,55	3,82	13,62	4,00	3,41	13,44	4,35	3,09
	12	15,00	1,83	8,20	14,88	2,18	6,83	14,74	2,48	5,94	14,58	2,83	5,15	14,43	3,19	4,52	14,14	3,53	4,00	13,96	3,92	3,56
AWO-M-AC 101.A16 AWO-AC 101.A16	-10	11,85	3,71	3,20	11,84	4,07	2,91	11,79	4,42	2,67	11,75	4,82	2,44	11,61	5,15	2,25	11,64	5,56	2,09	11,30	5,88	1,92
	-7	12,30	3,56	3,45	12,19	3,90	3,13	12,00	4,20	2,86	11,99	4,61	2,60	11,86	4,86	2,44	11,80	5,33	2,21	11,79	5,75	2,05
	-2	12,68	3,18	3,99	12,88	3,57	3,61	12,81	3,97	3,23	12,65	4,30	2,94	12,56	4,68	2,68	12,45	5,07	2,45	12,39	5,51	2,25
	2	14,03	2,90	4,83	14,17	3,29	4,30	14,05	3,62	3,88	14,04	4,02	3,49	14,36	4,59	3,13	14,10	4,91	2,87	14,15	5,44	2,60
	7	16,58	2,74	6,05	16,39	3,09	5,30	16,30	3,49	4,67	16,13	3,90	4,13	15,77	4,24	3,72	15,84	4,77	3,32	15,63	5,18	3,02
	12	16,42	2,08	7,91	16,29	2,45	6,65	16,13	2,79	5,77	15,95	3,18	5,02	15,79	3,57	4,43	15,47	3,94	3,93	15,27	4,35	3,51

9.2 Cooling

The tables show the cooling power, input power and EER values at various outdoor air temperatures. The technical data are indicative and are subject to change. They always refer to the instantaneous power and are calculated for a 5°C inlet/outlet temperature difference, according to EN 14511:2018.

RAFFRESCAMENTO / *COOLING*																			
Modello *Model* **i-32V5**	**T aria esterna** *Outdoor air T* [°C]	T_{out} [°C]																	
		5			**7**			**10**			**12**			**15**			**18**		
		Potenza frigorifera *Cooling power* [kW]	Potenza assorbita *Input power* [kW]	EER [W/W]	Potenza frigorifera *Cooling power* [kW]	Potenza assorbita *Input power* [kW]	EER [W/W]	Potenza frigorifera *Cooling power* [kW]	Potenza assorbita *Input power* [kW]	EER [W/W]	Potenza frigorifera *Cooling power* [kW]	Potenza assorbita *Input power* [kW]	EER [W/W]	Potenza frigorifera *Cooling power* [kW]	Potenza assorbita *Input power* [kW]	EER [W/W]	Potenza frigorifera *Cooling power* [kW]	Potenza assorbita *Input power* [kW]	EER [W/W]
AWO-M-AC 101.A06	20	4,91	1,00	4,90	5,26	1,02	5,13	5,80	1,00	5,80	5,91	0,89	6,61	6,08	0,74	8,26	6,50	0,72	8,98
	25	4,92	1,20	4,10	5,26	1,20	4,40	5,82	1,23	4,75	5,88	1,09	5,39	5,98	0,89	6,70	6,38	0,88	7,22
	30	4,86	1,39	3,49	5,19	1,41	3,69	5,75	1,43	4,03	5,81	1,29	4,51	5,90	1,08	5,47	6,32	1,09	5,81
	35	4,70	1,58	2,98	5,02	1,60	3,14	5,55	1,63	3,40	5,64	1,49	3,79	5,78	1,28	4,54	6,18	1,28	4,82
	40	4,42	1,72	2,57	4,72	1,76	2,69	5,23	1,79	2,92	5,32	1,65	3,23	5,46	1,43	3,82	5,83	1,44	4,05
	45	4,14	1,86	2,22	4,42	1,90	2,32	4,90	1,96	2,51	4,99	1,80	2,77	5,13	1,57	3,27	5,48	1,59	3,45
AWO-M-AC 101.A08	20	6,16	1,34	4,62	6,58	1,34	4,91	7,26	1,34	5,43	7,43	1,22	6,09	7,68	1,05	7,34	8,24	1,04	7,90
	25	6,17	1,56	3,96	6,59	1,59	4,15	7,28	1,60	4,55	7,42	1,47	5,06	7,62	1,27	6,02	8,19	1,30	6,33
	30	6,02	1,78	3,39	6,43	1,81	3,55	7,08	1,85	3,82	7,24	1,71	4,23	7,49	1,51	4,97	8,00	1,53	5,24
	35	5,61	1,97	2,86	6,08	1,99	3,05	6,71	2,04	3,28	6,92	1,92	3,60	7,25	1,74	4,17	7,72	1,76	4,38
	40	5,33	2,14	2,50	5,71	2,18	2,62	6,26	2,24	2,80	6,49	2,11	3,07	6,84	1,93	3,54	7,29	1,95	3,73
	45	5,03	2,30	2,19	5,36	2,35	2,28	5,91	2,42	2,44	6,12	2,30	2,66	6,42	2,11	3,05	6,85	2,14	3,20
AWO-M-AC 101.A10	20	7,20	1,48	4,86	7,79	1,50	5,20	8,61	1,47	5,85	8,74	1,37	6,36	8,93	1,23	7,29	9,78	1,22	8,00
	25	7,49	1,86	4,04	7,83	1,76	4,46	8,82	1,86	4,73	8,88	1,74	5,11	8,97	1,55	5,79	9,87	1,52	6,49
	30	7,21	2,13	3,39	7,78	2,10	3,71	8,72	2,17	4,02	8,85	2,05	4,32	9,06	1,86	4,86	9,78	1,83	5,35
	35	7,03	2,37	2,97	7,53	2,39	3,15	8,25	2,42	3,41	8,42	2,31	3,64	8,67	2,14	4,05	9,50	2,15	4,41
	40	6,78	2,61	2,59	7,22	2,64	2,73	7,93	2,69	2,95	8,07	2,57	3,14	8,28	2,40	3,45	8,97	2,43	3,70
	45	6,28	2,86	2,19	6,77	2,89	2,34	7,47	2,95	2,54	7,62	2,83	2,70	7,86	2,65	2,97	8,44	2,68	3,15
AWO-M-AC 101.A12	20	8,60	1,89	4,54	9,17	1,85	4,96	10,06	1,84	5,48	10,26	1,71	5,99	10,55	1,53	6,91	11,64	1,54	7,56
	25	8,35	2,09	3,99	8,97	2,14	4,20	10,04	2,16	4,65	10,29	2,05	5,01	10,66	1,89	5,64	11,71	1,89	6,20
	30	8,30	2,43	3,42	8,80	2,41	3,66	9,79	2,49	3,94	10,08	2,37	4,26	10,51	2,19	4,80	11,47	2,21	5,19
	35	7,78	2,74	2,84	8,51	2,79	3,05	9,60	2,86	3,36	10,06	2,82	3,57	10,74	2,75	3,90	11,60	2,79	4,16
	40	7,62	3,02	2,52	8,17	3,07	2,66	8,99	3,15	2,85	9,45	3,11	3,03	10,14	3,06	3,32	10,88	3,10	3,51
	45	7,21	3,29	2,19	7,52	3,33	2,26	8,34	3,42	2,44	8,79	3,39	2,59	9,46	3,35	2,82	10,27	3,41	3,01
AWO-M-AC 101.A14 AWO-AC 101.A14	20	10,39	2,02	5,14	11,33	2,05	5,53	12,30	2,02	6,08	13,14	1,87	7,04	14,40	1,64	8,81	15,60	1,61	9,71
	25	10,78	2,51	4,30	11,61	2,51	4,62	12,74	2,55	5,01	13,25	2,30	5,76	14,02	1,93	7,26	15,05	1,89	7,98
	30	11,19	3,07	3,65	12,04	3,19	3,77	13,10	3,23	4,05	13,34	2,85	4,69	13,71	2,27	6,05	14,76	2,26	6,53
	35	10,88	3,48	3,13	11,48	3,53	3,25	12,77	3,59	3,56	12,89	3,19	4,04	13,07	2,58	5,06	14,00	2,59	5,40
	40	10,25	3,80	2,70	10,94	3,88	2,82	11,93	3,96	3,02	12,10	3,53	3,43	12,35	2,89	4,28	13,25	2,91	4,55
	45	9,58	4,12	2,32	10,18	4,20	2,43	11,21	4,30	2,61	11,33	3,86	2,94	11,52	3,19	3,61	12,44	3,23	3,86
AWO-M-AC 101.A16 AWO-AC 101.A16	20	12,14	2,42	5,02	12,85	2,38	5,39	14,08	2,34	6,03	14,48	2,12	6,83	15,08	1,80	8,40	16,23	1,75	9,26
	25	12,14	2,86	4,24	12,91	2,83	4,56	14,30	2,90	4,93	14,54	2,61	5,58	14,89	2,17	6,87	16,00	2,12	7,54
	30	12,80	3,60	3,55	13,59	3,62	3,75	15,00	3,65	4,11	14,89	3,23	4,62	14,73	2,59	5,69	16,02	2,60	6,16
	35	12,86	4,32	2,98	13,80	4,38	3,15	15,05	4,49	3,35	14,94	3,94	3,79	14,77	3,11	4,75	15,80	3,15	5,02
	40	12,17	4,70	2,59	13,10	4,80	2,73	14,21	4,91	2,90	14,11	4,33	3,26	13,95	3,47	4,02	14,96	3,50	4,28
	45	11,43	5,07	2,26	12,23	5,17	2,37	13,55	5,34	2,54	13,33	4,72	2,82	13,01	3,80	3,42	14,04	3,86	3,64

9.3 DHW

The tables show the heating capacity, input power and COP values at various outdoor air temperatures during summer for technical water at 45 / 50 / 55°C for domestic hot water production. The technical data are indicative and are subject to change. They are always intended as referring to instantaneous power.

HEATING										
Model ***Model*** **Vitocal 100-A**	**Outdoor air T** ***T air outdoor*** **[°C]**	**T_{out} [°C]**								
		45			**50**			**55**		
		Heating capacity *Heating capacity* [kW]	Consumed power *Power input* [kW]	COP [W/W]	Heating capacity *Heating capacity* [kW]	Consumed power *Power input* [kW]	COP [W/W]	Heating capacity *Heating capacity* [kW]	Consumed power *Power input* [kW]	COP [W/W]
04	20	4.88	0.89	5.48	4.81	1.00	4.79	4.76	1.13	4.21
	25	5.10	0.80	6.35	5.02	0.90	5.56	4.99	1.03	4.85
	30	5.19	0.68	7.67	5.10	0.79	6.47	5.05	0.90	5.62
	35	5.38	0.61	8.76	5.27	0.70	7.50	-	-	-
06	20	6.13	1.33	4.61	6.04	1.49	4.04	5.95	1.66	3.59
	25	6.19	1.20	5.16	6.11	1.36	4.48	6.01	1.52	3.94
	30	6.39	1.12	5.70	6.34	1.29	4.90	6.23	1.47	4.25
	35	6.58	1.05	6.27	6.45	1.21	5.34	-	-	-
08	20	7.66	1.71	4.47	7.58	1.94	3.91	7.50	2.15	3.49
	25	7.76	1.55	4.99	7.73	1.76	4.40	7.60	2.02	3.76
	30	8.17	1.50	5.46	8.10	1.72	4.71	8.03	1.94	4.14
	35	8.55	1.44	5.93	8.43	1.65	5.12	-	-	-
10	20	10.25	2.35	4.36	10.11	2.64	3.83	9.98	2.96	3.37
	25	10.17	2.10	4.84	10.04	2.37	4.24	9.87	2.67	3.70
	30	10.62	2.02	5.25	10.38	2.28	4.55	10.28	2.59	3.96
	35	11.13	1.92	5.78	10.97	2.21	4.97	-	-	-
12	20	10.55	2.35	4.50	10.43	2.62	3.97	10.27	2.92	3.52
	25	10.30	2.03	5.08	10.15	2.27	4.46	9.99	2.58	3.87
	30	10.73	1.93	5.56	10.49	2.18	4.82	10.38	2.46	4.22
	35	11.25	1.82	6.17	11.08	2.11	5.25	-	-	-
14 / 14T	20	14.22	2.61	5.46	14.06	2.93	4.80	13.87	3.25	4.27
	25	14.47	2.27	6.37	14.27	2.57	5.55	14.01	2.86	4.90
	30	15.45	2.06	7.51	15.08	2.38	6.33	14.84	2.69	5.52
	35	16.19	1.90	8.51	15,90	2.21	7.19	-	-	-
16 / 16T	20	14.94	2.79	5.35	14.77	3.13	4.72	14.57	3.48	4.19
	25	14.74	2.31	6.39	14.54	2.64	5.50	14.28	2.94	4.86
	30	15.77	2.18	7.23	15.39	2.46	6.27	15.15	2.76	5.50
	35	16.56	1.98	8.35	16.26	2.25	7.23	-	-	-
18T	20	16.99	3.53	4.82	16.59	3.89	4.26	16.45	4.32	3.81
	25	16.92	3.06	5.54	16.62	3.42	4.86	16.32	3.81	4.28
	30	17.89	2.88	6.20	17.58	3.26	5.39	17.29	3.63	4.76
	35	18.83	2.72	6.93	18.63	3.14	5,94	-	-	-

Caution. DHW production must be carried out in an adequate storage tank with heat exchanger or in a fast producer.

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

Additional data are provided for Vitocal 100-A heat pumps to calculate the energy performance of buildings, according to UNI/TS 11300 part 4.

The characteristic values to be provided for each model are shown below.

Key:

T_{design}	Design temperature (for climate A – average, defined by UNI EN 14825 equal to -10°C)
A, B, C, D	Operating conditions of reference to assess performance according to UNI EN 14825
T_{air}	Outdoor air temperature of reference
T_{water}	Heating water delivery temperature
PLR	*Partial Load Ratio* - climatic load factor
DC	*Declared Capacity* - heat pump capacity in operating conditions A, B, C, D
COP_{DC}	COP of heat pump referring to nominal DC conditions
COP_{PL}	COP of heat pump in partial load conditions defined by standard UNI EN 14825

Model AWO-M-AC 101.A06

Operating limits

COLD source:		OUTDOOR AIR
Operating temperature (cut-off)	min	-20°C
	max	30°C

HOT source:		WATER
Operating temperature (cut-off)	min	25°C
	max	60°C

Useful heating capacity / COP in nominal conditions with defrosting contribution

Useful heating capacity [kW]			
T_{air} (cold source)	$T_{water\ (hot\ source)}$		
	35	**45**	**55**
-7	6.0	5.85	5.84
2	6.07	5.77	5.99
7	6.08	5.88	6.03
12	6.57	6.53	6.31

COP_{DC}			
T_{air} (cold source)	$T_{water\ (hot\ source)}$		
	35	**45**	**55**
-7	2.86	2.44	2.03
2	3.82	3.06	2.58
7	4.51	3.54	2.82
12	5.25	4.02	3.19

Performance data measured in partial load conditions, according to UNI EN 14825

Operating conditions	**F**	**A (E)**	**B**	**C**	**D**
T_{air} [°C]	-10	-7	2	7	12
PLR [%]	100	88	54	35	15
DC Power (Declared Capacity) [kW]	6,12	6.07	3.68	3.16	3.69
COP_{PL}	2.73	2.96	4.36	5.56	7.88
COP_{DC}	2.76	2.86	3.82	4.51	5.25

Performance

35°C		
SCOP	**η_s**	**Energy class**
4.46	175%	A+++

Model AWO-M-AC 101.A08

Operating limits

COLD source:		OUTDOOR AIR
Operating temperature (cut-off)	min	-20°C
	max	30°C

HOT source:		WATER
Operating temperature (cut-off)	min	25°C
	max	60°C

Useful heating capacity / COP in nominal conditions with defrosting contribution

Useful heating capacity [kW]			
T_{air} (cold source)	$T_{water\ (hot\ source)}$		
	35	**45**	**55**
-7	6.6	6.57	6.54
2	6.61	6.58	6.67
7	7.81	7.58	7.55
12	8.16	7.98	7.79

COP_{DC}			
T_{air} (cold source)	$T_{water\ (hot\ source)}$		
	35	**45**	**55**
-7	2.88	2.42	2.09
2	3.72	3.08	2.53
7	4.38	3.50	2.85
12	5.22	4.05	3.18

Performance data measured in partial load conditions, according to UNI EN 14825

Operating conditions	**F**	**A (E)**	**B**	**C**	**D**
T_{air} [°C]	-10	-7	2	7	12
PLR [%]	100	88	54	35	15
DC Power (Declared Capacity) [kW]	6.52	6.52	3.97	3.14	3.67
COP_{PL}	2.70	2.95	4.37	5.55	7.86
COP_{DC}	2.70	2.88	3.72	4.38	5.22

Performance

35°C		
SCOP	**η_s**	**Energy class**
4.46	176%	A+++

Model AWO-M-AC 101.A10

Operating limits

COLD source:		OUTDOOR AIR
Operating temperature (cut-off)	min	-20°C
	max	30°C

HOT source:		WATER
Operating temperature (cut-off)	min	25°C
	max	60°C

Useful heating capacity / COP in nominal conditions with defrosting contribution

Useful heating capacity [kW]			
T_{air} (cold source)	$T_{water\ (hot\ source)}$		
	35	**45**	**55**
-7	8.3	8.23	8.26
2	9.50	9.41	9.01
7	10.10	9.76	9.73
12	10.74	10.49	10.21

COP_{DC}			
T_{air} (cold source)	$T_{water\ (hot\ source)}$		
	35	**45**	**55**
-7	2.90	2.44	2.06
2	3.78	3.03	2.48
7	4.43	3.48	2,78
12	5.14	3.90	3.09

Performance data measured in partial load conditions, according to UNI EN 14825

Operating conditions	**F**	**A (E)**	**B**	**C**	**D**
T_{air} [°C]	-10	-7	2	7	12
PLR [%]	100	88	54	35	15
DC Power (Declared Capacity) [kW]	8.31	8.33	5.34	4.21	4.92
COP_{PL}	2.71	2.93	4.32	6.01	8.08
COP_{DC}	2.75	2.90	3.78	4.43	5.14

Performance

35°C		
SCOP	**η_s**	**Energy class**
4.53	178%	A+++

Model AWO-M-AC 101.A12

Operating limits

COLD source:		OUTDOOR AIR
Operating temperature (cut-off)	min	-20°C
	max	30°C

HOT source:		WATER
Operating temperature (cut-off)	min	25°C
	max	60°C

Useful heating capacity / COP in nominal conditions with defrosting contribution

Useful heating capacity [kW]			
T_{air} (cold source)	$T_{water\ (hot\ source)}$		
	35	**45**	**55**
-7	8.9	8.91	8.85
2	10.3	10.39	10.19
7	11.8	11.47	11.37
12	12.28	11.97	11.67

COP_{DC}			
T_{air} (cold source)	$T_{water\ (hot\ source)}$		
	35	**45**	**55**
-7	2.85	2.39	2.04
2	3.71	3.02	2.49
7	4.32	3.44	2,78
12	5.15	3.94	3.14

Performance data measured in partial load conditions, according to UNI EN 14825

Operating conditions	**F**	**A (E)**	**B**	**C**	**D**
T_{air} [°C]	-10	-7	2	7	12
PLR [%]	100	88	54	35	15
DC Power (Declared Capacity) [kW]	8.82	8.86	5.39	4.27	4.86
COP_{PL}	2.64	2.88	4.31	5.82	7.81
COP_{DC}	2.70	2.85	3.71	4.32	5.15

Performance

35°C		
SCOP	**η_s**	**Energy class**
4.47	176%	A+++

Model AWO-M-AC 101.A14, AWO-AC 101.A14

Operating limits

COLD source:		OUTDOOR AIR
Operating temperature (cut-off)	min	-20°C
	max	30°C

HOT source:		WATER
Operating temperature (cut-off)	min	25°C
	max	60°C

Useful heating capacity / COP in nominal conditions with defrosting contribution

Useful heating capacity [kW]			
T_{air} (cold source)	**$T_{water\ (hot\ source)}$**		
	35	**45**	**55**
-7	10.7	10.65	10.58
2	13.02	12.69	12.40
7	14.1	13.56	13.44
12	14.74	14.43	13.96

COP_{DC}			
T_{air} (cold source)	**$T_{water\ (hot\ source)}$**		
	35	**45**	**55**
-7	2.95	2.44	2.09
2	4.02	3.24	2.71
7	4.85	3.82	3.09
12	5,94	4.52	3.56

Performance data measured in partial load conditions, according to UNI EN 14825

Operating conditions	**F**	**A (E)**	**B**	**C**	**D**
T_{air} [°C]	-10	-7	2	7	12
PLR [%]	100	88	54	35	15
DC Power (Declared Capacity) [kW]	10.52	10.71	6.52	5.78	6.68
COP_{PL}	2.69	2.98	4.20	5.98	8.16
COP_{DC}	2.73	2.95	4.02	4.85	5,94

Performance		
35°C		
SCOP	**η_s**	**Energy class**
4.48	176%	A+++

Model AWO-M-AC 101.A16, AWO-AC 101.A16

Operating limits

COLD source:		OUTDOOR AIR
Operating temperature (cut-off)	min	-20°C
	max	30°C

HOT source:		WATER
Operating temperature (cut-off)	min	25°C
	max	60°C

Useful heating capacity / COP in nominal conditions with defrosting contribution

Useful heating capacity [kW]			
T_{air} (cold source)	**$T_{water\ (hot\ source)}$**		
	35	**45**	**55**
-7	12.0	11.86	11.79
2	14.05	14.36	14.15
7	16,3	15.77	15.63
12	16.13	15.79	15.27

COP_{DC}			
T_{air} (cold source)	**$T_{water\ (hot\ source)}$**		
	35	**45**	**55**
-7	2.86	2.44	2.05
2	3.88	3.13	2.60
7	4.67	3.72	3.02
12	5.77	4.43	3.51

Performance data measured in partial load conditions, according to UNI EN 14825

Operating conditions	**F**	**A (E)**	**B**	**C**	**D**
T_{air} [°C]	-10	-7	2	7	12
PLR [%]	100	88	54	35	15
DC Power (Declared Capacity) [kW]	11.69	11.95	7.27	5.70	6.67
COP_{PL}	2.60	2.88	4.33	5.83	8.12
COP_{DC}	2.67	2.86	3.88	4.67	5.77

Performance

35°C		
SCOP	**η_s**	**Energy class**
4.49	177%	A+++

9.5 EER data to calculate the energy performance of buildings, according to UNI/TS 11300-3

The EER coefficients under partial load conditions for Vitocal 100-A reversible heat pumps are provided.

The conditions of reference under partial load specified by standard UNI/TS 11300-3 for air-water reversible chillers and heat pumps are shown below.

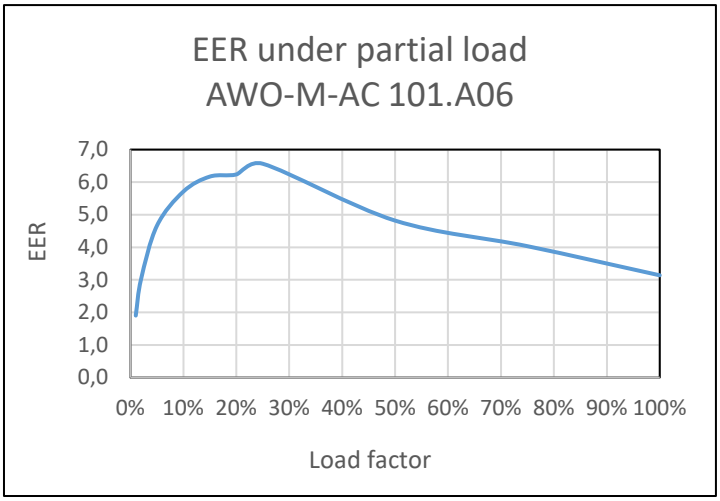
The EER are also provided for load factors lower than 25%.

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

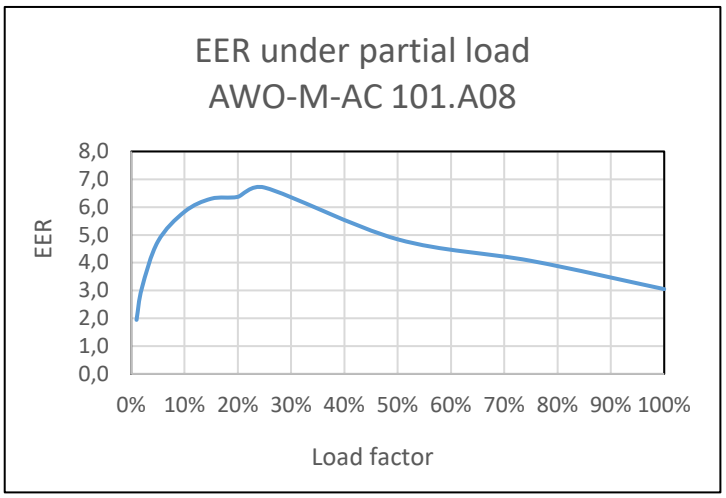
Model AWO-M-AC 101.A06

AWO-M-AC 101.A06		
Outdoor air dry bulb temperature [°C]	**Load factor**	**EER**
35	100%	3.14
30	75%	4.03
25	50%	4.82
20	25%	6.57
C	**Load factor**	**EER @20°C x C**
0.95	20%	6.24
0.94	15%	6.17
0.87	10%	5.71
0.71	5%	4.66
0.46	2%	3.02
0.29	1%	1.90



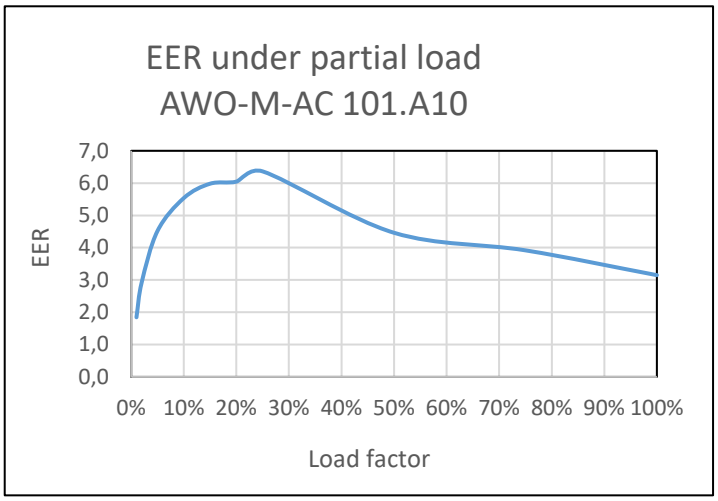
Model AWO-M-AC 101.A08

AWO-M-AC 101.A08		
Outdoor air dry bulb temperature [°C]	**Load factor**	**EER**
35	100%	3.05
30	75%	4.07
25	50%	4.84
20	25%	6.70
C	**Load factor**	**EER @20°C x C**
0.95	20%	6.37
0.94	15%	6.30
0.87	10%	5.83
0.71	5%	4.76
0.46	2%	3.08
0.29	1%	1.94



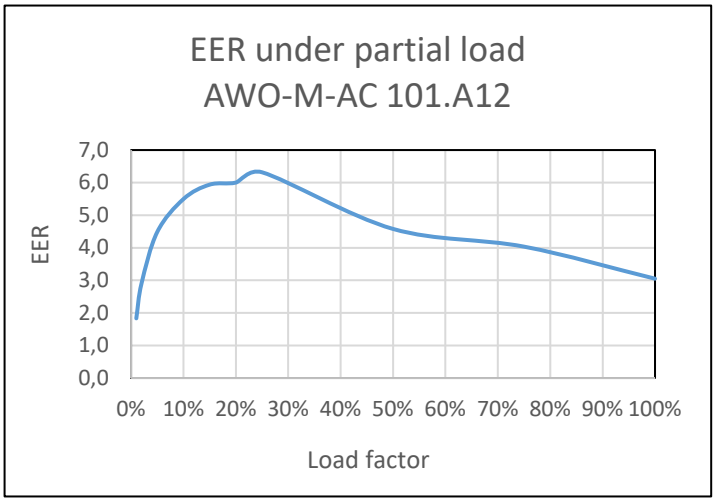
Model AWO-M-AC 101.A10

AWO-M-AC 101.A10		
Outdoor air dry bulb temperature [°C]	**Load factor**	**EER**
35	100%	3.15
30	75%	3.92
25	50%	4.46
20	25%	6.36
C	**Load factor**	**EER @20°C x C**
0.95	20%	6.04
0.94	15%	5.98
0.87	10%	5.54
0.71	5%	4.52
0.46	2%	2.93
0.29	1%	1.85



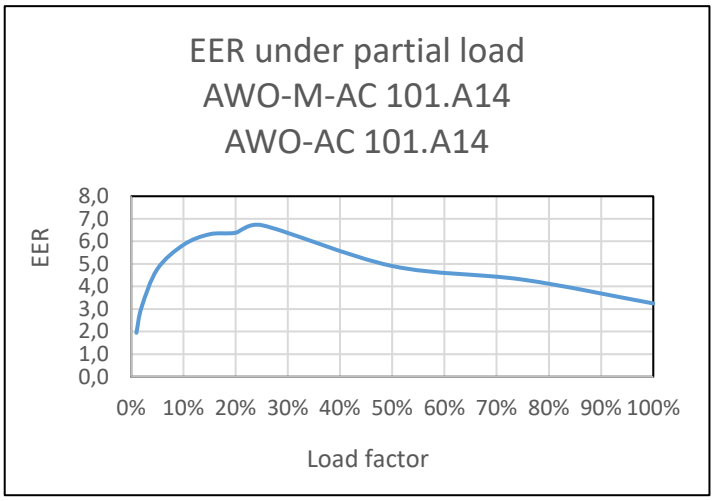
Model AWO-M-AC 101.A12

AWO-M-AC 101.A12		
Outdoor air dry bulb temperature [°C]	**Load factor**	**EER**
35	100%	3.05
30	75%	4.03
25	50%	4.58
20	25%	6.32
C	**Load factor**	**EER @20°C x C**
0.95	20%	6.00
0.94	15%	5,94
0.87	10%	5.50
0.71	5%	4.49
0.46	2%	2.91
0.29	1%	1.83



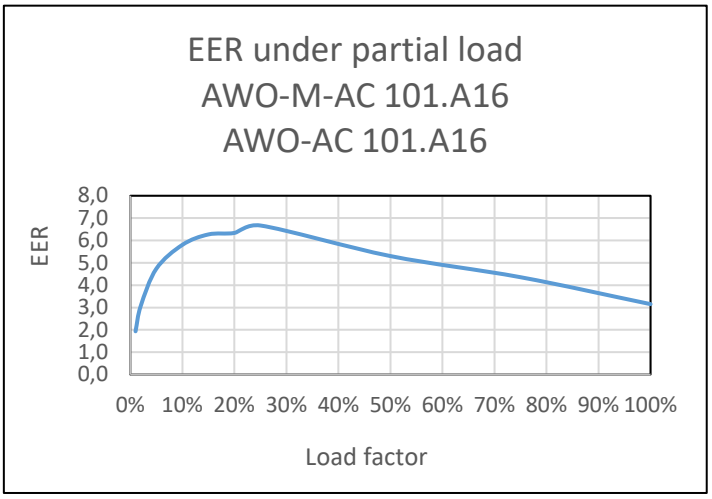
Model AWO-M-AC 101.A14, AWO-AC 101.A14

AWO-M-AC 101.A14, AWO-AC 101.A14		
Outdoor air dry bulb temperature [°C]	**Load factor**	**EER**
35	100%	3.25
30	75%	4.31
25	50%	4.91
20	25%	6.72
C	**Load factor**	**EER @20°C x C**
0.95	20%	6.38
0.94	15%	6.31
0.87	10%	5.84
0.71	5%	4.77
0.46	2%	3.09
0.29	1%	1.95



Model AWO-M-AC 101.A16, AWO-AC 101.A16

AWO-M-AC 101.A16, AWO-AC 101.A16		
Outdoor air dry bulb temperature [°C]	**Load factor**	**EER**
35	100%	3.15
30	75%	4.36
25	50%	5.30
20	25%	6.67
C	**Load factor**	**EER @20°C x C**
0.95	20%	6.34
0.94	15%	6.27
0.87	10%	5.80
0.71	5%	4.73
0.46	2%	3.07
0.29	1%	1.93



10. REFRIGERANT SAFETY DATA SHEET

Name:	R32.
	HAZARDS IDENTIFICATION
Main hazards:	Asphyxiation.
Specific hazards:	Quick evaporation could cause it to freeze.
	FIRST AID MEASURES
General information:	Do not administer to people who are unconscious.
Inhalation:	Immediately remove to fresh air. Use oxygen or artificial respiration as required. The use of adrenaline or similar drugs should be avoided.
Eye contact:	Carefully rinse with plenty of water for at least 15 minutes and get medical attention.
Skin contact:	Wash immediately with plenty of water for at least 15 minutes. Apply a sterile gauze. Immediately remove contaminated clothing.
	FIRE FIGHTING MEASURES
Extinguishing media:	Water spray, dry powder.
Specific hazards:	Breakage or explosion of vessel.
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 RELEASE MEASURES
Personal precautions:	Try to stop the leak. Evacuate personnel to safety areas. Eliminate the ignition sources. Ventilate appropriately. Use personal protective equipment.
Environmental precautions:	Try to stop the leak.
Cleaning methods:	Ventilate the area.
	HANDLING AND STORAGE
Handling: technical measures/precautions:	Allow efficient air exchange and/or suction the work environments.
advice for safe use:	Do not breath in fumes or aerosol.
Storage:	Close carefully and store in a cool, dry and well ventilated area. Keep in original containers. Incompatible products: explosive, flammable materials, organic peroxide
	EXPOSURE CONTROLS/PERSONAL PROTECTION
Control parameters:	OEL – data not available. DNEL: Derived no effect level (workers) long-term – systemic effects, inhalation = 7035 mg/m^3. PNEC: Predicted no-effect concentration water (fresh water) = 0.142 mg/l aquatic, intermittent releases = 1.42 mg/l sediment, fresh water = 0.534 mg/kg dry weight
Respiratory protection:	Not required.
Eye protection:	Safety goggles.

Hand protection:	Latex gloves.
Hygienic measures:	No smoking.
PHYSICAL AND CHEMICAL PROPERTIES	
Colour:	Colourless.
Odour:	Ethereal. Hard to perceive at low concentrations.
Boiling point:	-51.7°C at atm. press.
Flash point:	648 °C.
Relative gas density (air =1)	1.8.
Relative liquid density (water =1)	1.1.
Solubility in water:	280000 mg/l.
STABILITY AND REACTIVITY	
Stability:	Stable under normal conditions.
Materials to avoid:	Air, oxidizing agents, humidity.
Decomposition products hazardous:	Under normal storage and use conditions, hazardous decomposition products should not be generated.
TOXICOLOGICAL INFORMATION	
Acute toxicity:	LD/LC50/inhalation/4 hours/on rat >1107000 mg/m^3.
Local effects:	No known effect.
Long-term toxicity:	No known effect.
ECOLOGICAL INFORMATION	
Global warming potential GWP (R744=1):	675
Ozone Depletion Potential ODP (R11=1):	0
Disposal considerations:	Refer to the supplier's gas retrieval program. Avoid direct release into the atmosphere.

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