

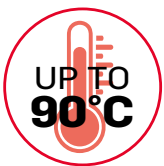
61CW-Z

VERY HIGH TEMPERATURE WATER SOURCE HEAT PUMP



AQUAFORCE.

Nominal heating capacity
410 to 735 kW



APPLICATION RANGES

- Industrial process heating
- District heating networks
- Heat source: water or brine from process heat or heat recovery

DESIGN

- Ultra low GWP R1234ze refrigerant
- Screw compressors specially designed for high temperatures for heavy-duty continuous use
- Refrigerant system with internal circuit
- Robust shell and tube heat exchangers

OUTPUT RANGE

- Heating output from 410 kW to 735 kW at W30/W90, as TWIN unit up to 1.5 MW

TECHNICAL INSIGHT

Compressor

CARRIER high temperature industrial heat pumps are fitted with a semi-hermetic screw compressor specially designed for use in heat pumps with high system temperatures. With a newly developed, asymmetrical high-performance profile, these twin shaft rotation displacement machines achieve the highest levels of efficiency and maximum service life in continuous use.

With no oscillating components, they operate with very low vibrations and virtually no wear. The roller bearings are specially designed for high temperatures and sized to ensure an extremely long service life.

A high degree of operational reliability is guaranteed by means of forced lubrication, and through an integral three-stage oil separator and sump heater on the pressure side. The oil heater ensures the lubricating properties of the oil even after long downtimes. A separate refrigerant circuit with its own oil pumps and water-cooled oil cooler ensures the required oil temperature and/or correct bearing lubrication at high operating temperatures.

The compressor casing includes a three phase asynchronous motor. The motor armature is mounted on the shaft of the main screw rotor. It is cooled with cold refrigerant vapour. The motor winding is designed especially for the specified temperature conditions. The screw compressors are fitted with a star-delta circuit to reduce the starting current.

Heat exchanger

Evaporators and condensers are used as generously sized shell and tube heat exchangers based on the counterflow principle. Shell and tube heat exchangers ensure reliability and robust operation even under difficult conditions. The design of the heat exchangers has been optimised to ensure the maximum possible transfer capacity along with the smallest possible pressure loss and minimum space requirement. The heat exchangers are not sensitive to fouling and, due to their cylindrical shape, are resistant to pressure shock. The heat exchangers are fitted with flange connections.

Refrigerant circuit/refrigerant

The refrigerant circuit is filled with a non-combustible and non-toxic safety refrigerant. The refrigerant used is CFC-free and is therefore fully futureproof. The refrigerant charge is optimised for the highest possible coefficient of performance (COP). The refrigerant circuit undergoes a pressure and leakage test using helium or forming gas.

Safety equipment

To maximise the service life of the system, particular attention has been paid to the operational reliability of the heat pump and to protecting the compressor.

Compressor protection device

CARRIER industrial heat pumps are equipped with a protection device for the screw compressor as standard. The protection device is built into the compressor connection box and is fully wired. It monitors:

- Motor and oil temperatures
- Rotational direction
- Phase failure

Additional safety equipment

- Motor protection switch for the compressor
- Overpressure safety valve in the refrigerant circuit
- High and low pressure sensors in the refrigerant circuit for electronic monitoring of the limits of use
- Oil level monitor
- Double high pressure controller
- Hot gas sensor/monitoring of compressor outlet temperature
- Flow monitor on the evaporator and condenser
- Flow switch in oil refrigerant circuit

Electrical cabinet

The control cabinet of the heat pump is mounted on the long side of the heat pump and contains the power and control unit. The customer receives fully wired electrical equipment that is ready for operation according to the international standard.

Designed with IP 54 protection rating. The heat pump requires a 3x400 V (without neutral conductor) and 1x230 V connections.

The power unit includes:

- Switching elements for the compressor: contactors for part winding or star/delta start
- Contactors for source and sink circulation pumps, depending on requirements of installation overcurrent protection devices, motor protection devices, lockable main switch, transformer for 24 V control circuit, control of solenoid valves and expansion valves, designated terminal strips with inputs and outputs for connection to the BMS (outputs potential-free).

TECHNICAL INSIGHT

Control unit

The hardware of the control unit comprises a programmable logic controller (PLC) and a Human Machine Interface (HMI). The software for the control unit was developed especially for 61CW-Z and processes the necessary number of inputs and outputs for controlling the refrigerant circuit.

The control also performs all non-mechanical safety functions of the refrigerant circuit, e.g.: frost protection alarm or field rotation monitoring on the compressor motor.

The HMI has a 10" touchscreen for entering control commands, target values and parameters. For visualisation of system statuses and actual values, these can be represented on a refrigerant circuit schematic on the display.

Via pop-up menus, detailed information on various components of the heat pump can be called up.

Any alarms are displayed. All measured values are continuously monitored by the control in real time. Interfaces for remote maintenance or a higher level BMS are available.

Controller functions/safety functions

- Long-term recording of operating conditions
- Hours run counter for compressor
- Monitoring of minimum compressor downtime and runtime
- Actuation of solenoid valves for output control
- Management of actuated component alarms

Temperature control

The heat pump can provide various temperatures at the condenser or evaporator outlet depending on demand. The following options are available for such temperature requirements:

- Fixed target value
- 0-10 V analogue input
- 4-20 mA analogue input

Operating modes

The heat pump can be used for the following operating modes:

- Heating mode with monitoring of condenser outlet temperature

Additional functions can be implemented on the control (on request):

- Power supply and actuation of the circulation pumps for heat source and/or user loop
- Buffer tank control strategy (DHW)
- Power supply and actuation of the 3-way mixing valves on the evaporator and/or condenser

Frame

Special emphasis is placed on a robust, space saving and economical design. The heat pump components are mounted on a base frame and on the shell and tube heat exchangers, where they are partly self-supporting. Rubber/metal vibration dampers matched to the weight of the heat pump reliably isolate the heat pump from the installation location and therefore prevent structure-borne noise transmission to the foundations.

On request, the heat pump can be equipped with a complete SOUND INSULATING ENCLOSURE.

PHYSICAL DATA

Single Stage Water to Water - Highest Temperature Industrial Heat Pumps

Unit		61CW-Z392	61CW-Z472	61CW-Z572	61CW-Z742	
Performance data⁽¹⁾						
Heating Capacity	kW	294,0	336,0	433,0	524,0	
Power Consumption	W10/W75	kW	110,0	127,0	156,0	
Coefficient of Performance		-	2,7	2,6	2,8	
Drawn Current		A	177,6	206,7	252,6	304,5
Heating Capacity	W29/ W90	kW	408,0	467,0	604,0	736,0
Power Consumption		kW	146,0	173,0	205,0	255,0
Coefficient of Performance		-	2,8	2,7	2,9	2,9
Drawn Current		A	235,9	279,9	332,4	413,5
Technical data						
Dimensions (LxWxH) ⁽²⁾	mm	4005 x 1876 x 1857	4414 x 2009 x 1942	4431 x 1966 x 1945	4630 x 2088 x 1951	
Weight ⁽²⁾	kg	3600	4200	4600	4800	
Refrigerant	-	R1234ze (GWP=7 following AR4, ODP=0)				
Refrigerant charge ⁽²⁾	kg	125	160	180	200	
	teqCO ₂	0,9	1,1	1,3	1,4	
Voltage/ Frequency	V/Hz	400/50	400/50	400/50	400/50	
Rotor starting current Y/Δ	A	558/1675	558/1675	875/2625	875/2625	
Max. Operating current	A	310	380	450	580	
Compressor						
Quantity	-	1				
Type	-	Fixed-speed screw compressor				
Evaporator						
Temperature difference ⁽³⁾	K	5	5	5	5	
Water flow ⁽³⁾	m ³ /h	36,7	41,4	55,4	67,0	
Internal pressure drop ⁽³⁾	mbar	300,0	290,0	290,0	330,0	
Fluid type	-	Water				
Minimum flow rate	m ³ /h	19,4	22,0	27,4	31,0	
Maximum flow rate	m ³ /h	75,2	83,9	108,4	126,7	
Operating range	°C	+11/+29				
Min. operating pressure	bar	2,2				
Max. operating pressure	bar	10,0				
Condenser						
Temperature difference ⁽³⁾	K	5	5	5	5	
Water flow ⁽³⁾	m ³ /h	57,6	66,2	85,3	103,3	
Internal pressure drop ⁽³⁾	mbar	310,0	290,0	280,0	260,0	
Fluid type	-	Water				
Minimum flow rate	m ³ /h	32,8	38,1	50,8	62,6	
Maximum flow rate	m ³ /h	81,8	95,7	127,0	156,6	
Operating range	°C	+57/+90				
Min. operating pressure	bar	2,2				
Max. operating pressure	bar	16,0				

(1) Technical data with tolerance ±10%

(2) Reference values; the main dimensions/mass depends on the operating points and the calculated heat exchangers

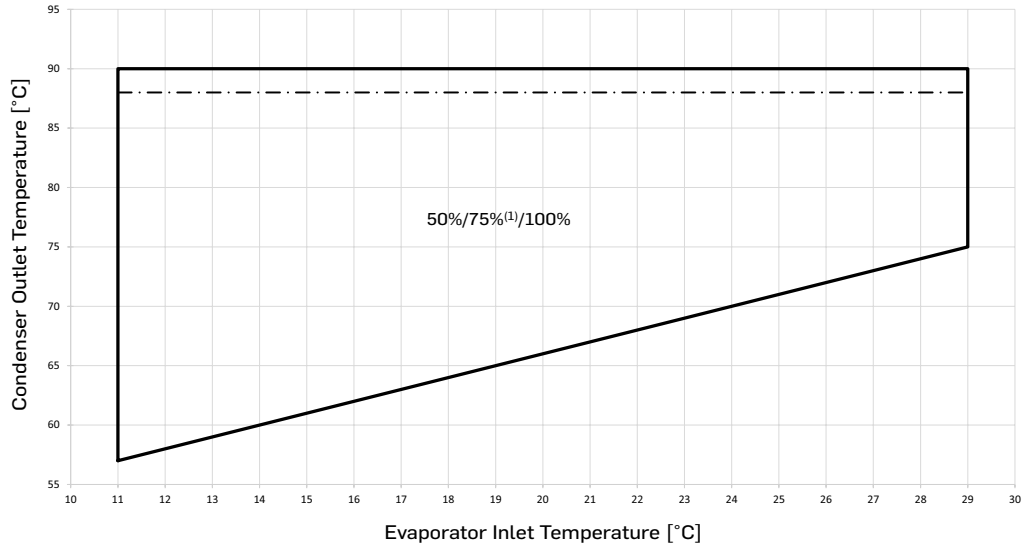
(3) Data at W10/W75

Pressure drop as well as the minimum and maximum flow rate of the evaporator and the condenser will be calculated customized after order intake.

OPERATING MAP

Operating limits 61CW-Z

High Temperature Heat Pump with ECO Heat source water



Evaporator $\Delta T=5K$
Condenser $\Delta T=5K$

— Without hydraulic instabilities, slowly increasing temp. at condenser/decreasing temp. at evaporator while start-up (without overshooting)
- - - Temperature setting point controlled, slight overshooting (<2K) occurs

(1) Valid for 61CW-Z570 and 61CW-Z740

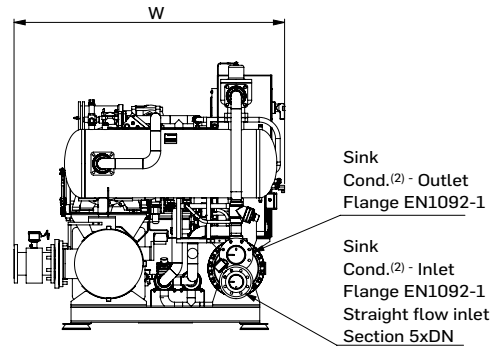
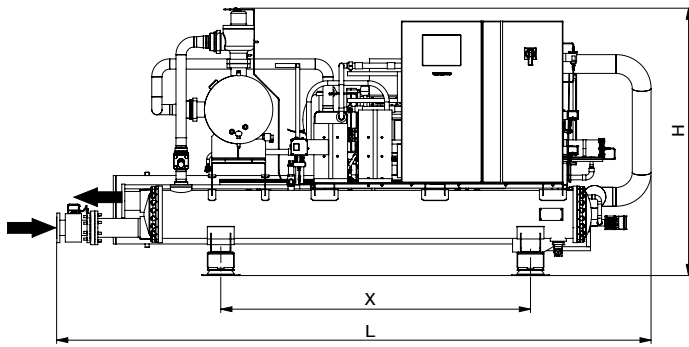
The limits of use defined in the operating map above represents the switch-off values of the heat pump.

We recommend a maximum hot water set-point 2°C below the switch-off value for optimized heat pump operation.

OPTIONS

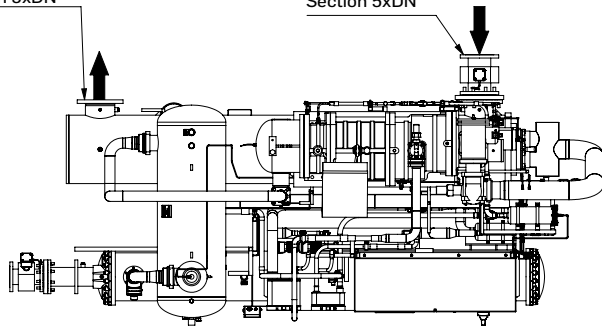
Options	N°	Description	Advantages	Aquaforce 61CW-Z
Softstarter	25	Electronic starter on each compressor	Reduced start-up current	392-742
Modbus interface (RS 485)	149B	Unit control compatible with the bus interface RS485 Modbus RTU. Other bus interfaces on request	The heat pump control unit with communication capability is easily integrated into the building management system	392-742
Gas detector (kit)	159C	Unit equipped with refrigerant leak detector Alarms are visual and acoustic. Regular checking of the gas detector is not included in the offer	Immediate customer notification of refrigerant losses to the atmosphere, allowing timely corrective actions	392-742
Remote access	275	The touchscreen has two 10/100 Mbit. Ethernet ports (RJ45) with an integral switch. Using an Ethernet patch cable, the touchscreen can be connected to the customer company network. The operator/customer must provide a secure VPN tunnel to the customer network.	Allow remote control & Check of the unit and its operating parameters from anywhere in the world and to change/optimize any settings.	392-742
Compressor acoustic enclosure	257	Compressor sound enclosure	Efficient reduction in sound emissions across the entire frequency range Noise level reduction approx. 8 dB(A)	392-742
Sound enclosure	258	Complete enclosure for effective sound insulation of the heat pump at the installation site. Self-supporting aluminium sheet elements, filled with sound absorbing mineral wool and connected with quick-release clamps. Enclosure can be dismantled into individual parts. The individual elements have rubber elements to decouple structure-borne noise. Must be installed on a flat surface. Exclusive installation of the sound insulating enclosure at the installation site.	Sound pressure level reduction by approx. 10 -15 dB(A) Fire behaviour according to EN 13501-1: class A1, non-flammable, no flammable components.	392-742
Electric energy meter	294	Display of energy consumption of the unit, instantaneous (U, V, I) and cumulated (kWh) of the unit	Permits the acquisition & monitoring of energy used.	392-742

DIMENSIONAL DRAWINGS



Source
Evap.⁽¹⁾ - Outlet
Flange EN1092-1
Straight flow outlet
Section 5xDN

Source
Evap.⁽¹⁾ - Inlet
Flange EN1092-1
Straight flow inlet
Section 5xDN



Type	L	W	H	X	Evap. in	Evap. out	Cond. in	Cond. out
61CW-Z392	4050	1900	1900	2190	DN150	DN200	DN100	DN100
61CW-Z472	4450	2050	2000	2300	DN150	DN200	DN100	DN125
61CW-Z572	4450	2000	2000	2300	DN150	DN200	DN100	DN125
61CW-Z742	4650	2050	2000	2300	DN150	DN200	DN150	DN150

COMPLETE CARRIER RANGES OF HIGH TEMPERATURE HEAT PUMP FOR COMMERCIAL APPLICATIONS UP TO 80°C

AquaSnap 61CG



**High temperature
water source heat pumps**
30 to 130 kW
Hot water up to 80°C

AquaSnap 61WG



**High temperature
water source heat pumps**
20 to 190 kW
Hot water up to 65°C

AquaSnap 61AF



**High temperature
air source heat pumps**
22 to 105 kW
Hot water up to 65°C

COMPLETE CARRIER RANGES OF HIGH TEMPERATURE INDUSTRIAL HEAT PUMP FOR DISTRICT HEATING AND PROCESS APPLICATIONS UP TO 120°C

AQUAFORCE 61XWHZE



**High temperature
water source heat pumps**
300 to 1570 kW
Hot water up to 85°C

AQUAFORCE 61CW-Z



**Very high temperature
water source heat pumps**
410 kW to 735 kW
Hot water up to 90°C

AQUAFORCE 61CWD



**Ultra high temperature
water source heat pumps**
110 kW to 540 kW
Hot water up to 120°C