GEYSER Sky

20÷30 kW

General
Range of reversible heat pumps featuring variable speed scroll compressors with extended operating limits

Configurations
Hi HP: Reversible heat pump version, with inverter compressor

/SLN: super low-noise unit

Strengths

- Refrigerant R290 - GWP=3.The refrigerant is a pure natural fluid.
- Reduced refrigerant charge
- Extended operating limits: the ideal solution to replace boilers
- Domestic hot water managed via a 3-way valve, either built-in or external
- Production of hot water up to 78°C
- Operation down to ambient -20°C with outlet water at +60°C
- 4.3” touch screen interface
- Eurovent Certification

BlueBox by Swegon

GEYSER Sky

PRODUCT DESCRIPTION

Range of reversible heat pumps featuring variable speed scroll compressors optimised for use with natural propane refrigerant

REFRIGERANT

The models from the Geyser Sky series are available with refrigerant R290.

The use of R290 refrigerant is indicated by acronym "R0", which indicates a GWP level close to 0.

Refrigerant R290 GWP(Global Warming Potential)=3*

ODP (Ozone Depletion Potential) 0

The refrigerant is a pure natural fluid.

R290 is classified as group 1 fluid according to PED.

It is also classified as A3 according to ASHRAE standard 34:

- non-toxic;
- Highly flammable.

The excellent GWP value may be an advantage in projects where:

- min. targets are adopted for the containment of the environmental footprint;
- it is possible to receive incentives or other benefits that are applicable in some countries or are connected to specific plant design criteria.

(*) GWP (AR5), pursuant to IPCC V, evaluated over a span of 100 years.

BODY

The structure of the unit is made of galvanized sheet-iron coated with polyester powder in RAL 5017/7035 at 180°C, which makes it highly resistant to weather conditions.

The structure is a load-bearing frame, with removable panelling lined with sound absorbing expanded polyurethane matting.

All screws and bolts are stainless steel.

All bodies have a condensation collection tank with drain.

COMPRESSORS

Hermetic scroll compressor, complete with thermal overload protection included in the electric motor windings, crankcase heater and rubber vibration damping supports The compressor is specifically designed for operation in heat pump mode. Additionally, the optimized compression ratio at high operating pressures allows for higher efficiency if compared with conventional scroll compressors.

The compressor is optimised for use with propane.

The compressor is enclosed in a dedicated technical compartment, access to which is gained by removing the installed panelling.

The compressor is coupled with an inverter to perform speed modulation.

The modulating compressor is a hermetic scroll compressor with a permanent magnet brushless motor.

The speed of the modulating compressor is varied, depending on the total heat load, roughly between 30 and 105 rps. 20rps and up to 120rps

The speed of rotation of the compressor is variable in the range 1200÷7200 rpm.

The modulating compressors are driven by inverters. This also has the following functions:

- management of acceleration and deceleration ramps
- management of the operating envelope of the modulating compressor
- management of the alarms and safety devices of the modulating compressor

The use of a modulating compressor allows the total inrush current to be reduced because it is always started with an acceleration ramp.

SOURCE-SIDE HEAT EXCHANGER

It consists of a coil with copper tubes and aluminium fins having a large exchange surface with fin pitch sized to maximize heat exchange and to reduce the noise impact.

The coils have an increased fin pitch to reduce frost formation and to facilitate the outflow of condensed water during defrosting.

The finned coil is installed as standard including suitable hydrophilic treatments for easier condensed water drainage from the coil.

Options are available for installations in environments with especially aggressive atmospheres, in areas along the coast or in highly industrialized zones. Ref. section: “Description of options”.

For installations within a kilometre of the coast, the use of Cu/Al coils with anti-corrosion treatment is strongly recommended.

At the base of the coils there is a collection tray as standard which facilitates the drain of condensate during the defrost.

The unit is fitted as standard with a heating cable glued to the bottom of the condensate tray to prevent formation of ice.

RAM accessory provide an oversizes electrical heaters system.

Heaters are managed with a thermostat , activated depending on outside air temperature.

Recommended accessory for installations in regions with temperatures below -5°C or in the case of installations particularly exposed to cold winds.

USER-SIDE HEAT EXCHANGER

The exchanger is a braze-welded stainless steel plate heat exchanger, insulated with a shroud of closed-cell insulating material.

The exchanger is also equipped with thermostat-controlled anti-freeze heater to protect it from ice formation when the unit is not running.

The operation of the unit is optimized in heating mode, where the water and refrigerant fluids exchange in countercurrent inside the plate heat exchanger.

FANS

The fans are axial fans, directly coupled to a 6-pole electric motor, with integrated thermal overload protection (Klixon®) and IP 54 protection rating.

The fan includes the shroud, designed to optimize its efficiency and reduce noise emission to a minimum, and the safety guard.

The control manages the speed of the fans through a phase cutting speed adjuster, in order to optimize the operating conditions and efficiency of the unit.

The fan speed regulator is supplied standardly.

This control also has the effect of reducing the noise level of the unit: in fact, the typical conditions under which the control will be modulating the speed of the fans are those of the night, spring and autumn.

For units equipped with EC fans (option), the same function is carried out using the electronically commutated motor of the fans.

REFRIGERANT CIRCUIT

Each refrigerant circuit comprises:

- charging valve
- liquid sight glass
- non-return valve
- 4-way reversing valve
- dehydrating filter
- liquid receiver
- electronically-controlled thermostatic expansion valve
- pressure transducer
- high pressure switch with manual reset
- suction liquid separator
- safety valves

The copper pipes are sized with increased thicknesses in order to ensure greater reliability and durability over time.

The pipes of the circuit and the exchanger are insulated with extruded closed-cell expanded elastomer.

The refrigeration circuit is enclosed in a compartment that contains an ATEX certified leak sensor and an ATEX certified extraction fan.

The hydronic module, if present, is also enclosed in the compartment that contains the ATEX certified leak sensor and the ATEX certified extraction fan.

ELECTRICAL CONTROL PANEL

The electrical control panel is made in a painted galvanized sheet-iron box with forced ventilation and IP54 protection rating.

The electrical panel is made following the EN60204-1 standard.

The electrical panel is separated from the compressor compartment.

The electrical control panel comprises:

- general disconnect switch three-phase line
- a compressor contactor;
- fan contactors
- fuses to protect the compressors, fans and auxiliary circuits
- a fan speed regulator for condensate control;
- thermal magnetic circuit breakers for pumps (if present)
- phase monitor
- general alarm potential free contacts.
- single potential free operating contacts for compressors, fans and pumps (when present)
- external air temperature probe

The electronic controller is designed for management of the following functions:

- water temperature regulation, with outgoing water control;
- freeze protection;
- compressor time setting;
- alarm signals;
- alarm resetting;
- summer/winter selection by digital input
- digital input for external ON-OFF switching.

The display shows the following parameters:

- output water temperature;
- temperature and differential setpoints;
- alarms description.

All the electrical cables inside the panel are numbered and the terminal board dedicated to the customer's connections is coloured orange so that it can be quickly identified in the panel.

The unit power supply is 400V/3~+N/ 50Hz for all models.

The graphic terminal is a 4.3” touch screen panel.

The touch screen panel is also designed for easier man-machine

CONTROL BLUETHINK

The unit is supplied as standard with an advanced controller.

The control allows the following functions:

- water temperature regulation, with outgoing water control;
- freeze protection
- recording of the log of all machine inputs, outputs and states
- automatic rotation of compressor starting sequence
- recording of the alarm log
- RS485 serial port with Modbus protocol
- Ethernet serial port with Modbus protocol and integrated web server preloaded web page
- digital input for general ON/OFF
- digital input for Summer/Winter selection

For further details on available functions and on displayed information, refer to the specific documentation of the controller.

By default, the serial connections present as standard are enabled only for reading from BMS. Enabling of writing from BMS is to be requested when ordering.

Main functions of the webserver

As standard, the Bluethink controller integrates a webserver with a preloaded web page that is accessed via password.

The web page allows the following functions to be carried out (some of these are available only for users with advanced level rights):

- display of the main functions of the unit such as unit serial n°, size, refrigerant
- display of the general status of the machine: water inlet and outlet temperatures, external air temperature, mode (chiller or heat pump), evaporating and condensing pressures, suction and discharge temperatures
- display of the status of compressors, pumps, expansion valves
- display in real time of the graphs of the main quantities
- display of the graphs of logged quantities
- display of alarm log
- management of users on several levels
- remote ON/OFF
- remote set point change
- remote time band change
- remote summer winter mode selection

Human-Machine Interface

The control has a graphic display that allows the following information to be displayed:

- water inlet and outlet temperature
- set temperature and differential set points
- description of alarms
- hour meter of operation and number of start-ups of the unit, the compressors and the pumps (if present)
- high and low pressure values, and relevant condensing and evaporating temperatures
- external air temperature
- superheating at compressor suction.

Management of defrost cycles

For defrost management, the control of the unit uses a sliding intervention threshold, depending on the pressures inside the unit and the external air temperature. By putting together all this information, the control can identify the presence of ice on the coil and activates the defrosting sequence only when necessary, so as to maximize the energy efficiency of the unit.

Sliding management of the defrost threshold ensures that, as the absolute humidity of outdoor air decreases, the frequency of the defrost cycles gradually decreases because they are carried out only when the ice formed on the coil actually penalizes performance.

The defrost cycle is fully automatic: during the initial stage, a defrost is carried out by cycle reversal with the fans stopped. As soon as the frost on the coil has molten to a suitable level, the unit resumes operation in heat pump mode.

Management of an additional external heat source

The controller is designed to control an external heat source which can be used in integrative mode or as a backup system, depending on the hydraulic connections. The diagram below, for instance, shows a boiler used as a backup system to the heat pump, when necessary.

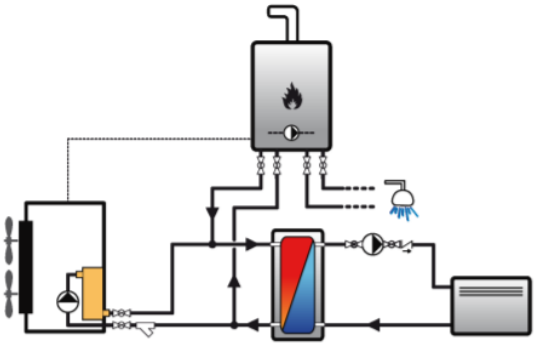
Activation of the auxiliary source takes place when the temperature of the outside air falls below a minimum temperature threshold that can be set in the controller and when the heat pump alone is insufficient to meet the required load. Activation takes place by closing a potential free contact.

It is also possible to set the unit so that the controller switches off the compressors when the unit is operating in heat pump mode and the outside air temperature falls below a minimum set point: the controller will stop the compressors before the unit goes into low pressure alarm, which would require a manual restart of the unit.

This function is particularly useful when the heat pump is installed in areas where the outside air temperature will certainly fall below the minimum temperature allowed for correct operation (in accordance with the predefined set point). When the temperature of the outside air exceeds again the minimum threshold for correct operation, the unit will resume correct operation in heat pump mode, without requiring any action.

If the unit is supplied with an on-board pump, the pump will continue to operate and to circulate the water, thus preventing the formation of ice and at the same time providing for correct reading of the water temperature and correct reading by the freeze safety probes.

The stopping temperature must be set up based on the temperature of the highest set point and in line with the operating limit of the unit. The stopping temperature can be different from the predefined temperature, provided that it is in any case in line with the temperature limits of the machine. If the unit must be also used for the production of domestic hot water, the stopping temperature must be set up according to the highest water set point and the allowed operating limits.



OPTIONS

/SLN: super low noise unit

The standard unit requires all compressors to be enclosed within a fully acoustically insulated compartment with sound-absorbing material with interposed sound-proofing material.

The SLN version units use fans with speed regulators with reduced air flow in chiller operation. The speed reduction of the fans is such that, under nominal operating conditions, the air flow rate and noise level are lower than those of the basic version of the unit.

In any case, the use of the speed adjuster to reduce the air flow rate allows rotation of the fans at maximum speed when external air temperature conditions are particularly critical and therefore guarantees the same operating limits as the high efficiency version.

In heating mode, the fans always run at 100% speed.

HYDRAULIC MODULES

All units can be fitted with hydraulic module in various configurations:

- /1P: hydraulic module with one pump
- /1PS: hydraulic module with one pump and buffer tank

Hydraulic modules with tank also have:

- a gate valve at the inlet of the pump or the suction manifold
- a tank with drain valve and air valve

INSPECTIONS AND SAFETY

All the units are fitted with the following control and safety components:

- user-side water temperature probe
- antifreeze probe on the user side heat exchanger
- high pressure switch with manual reset
- low pressure safety device with automatic reset, for a limited number of occurrences, managed by the controller
- compressor overtemperature protection
- fan overtemperature protection
- differential flow switch
- ATEX certified leakage sensor
- ATEX certified extraction fan

In the event that the leak detector identifies a gas leak, the following safety procedures are implemented:

- immediate shutdown of the unit
- interruption of the three-phase main power supply
- activation of the extraction fan
- activation of the ventilation fans of the electrical panel

TESTING

All the units are factory-tested and supplied complete with oil and refrigerant.

PACKAGING

The unit is made and shipped on a wooden pallet that allows the unit to be handled using a forklift truck.

The unit is wrapped in a protective transparent polyethylene stretch film.

TECHNICAL SPECIFICATIONS

GEYSER SKY Hi HP R0

			20	25	30
Cooling					
Refrigeration capacity	(1)	kW	16.3	22.5	27
Total absorbed power	(1)	kW	6.5	8.7	10.8
EER	(1)		2.5	2.6	2.5
Heating					
Heating capacity	(1)	kW	19.9	25.1	30.8
Total absorbed power	(1)	kW	6.9	9	11
COP	(1)		2.9	2.8	2.8
Compressors					
Compressors/Circuits		n°	1/1	1/1	1/1
Minimum capacity reduction step	(7)	%	17	17	17
Refrigerant charge HP	(3)	kg	1.6	2	2.4
Fans					
Quantity		n°	2	2	2
Total air flow rate HP		m³/h	19600	19600	19600
User-side heat exchanger					
Quantity		n°	1	1	1
Water flow rate CH	(1)	m³/h	2.8	3.9	4.7
Pressure drop CH	(1)	kPa	11.5	11.1	13.1
Water flow rate HP	(1)	m³/h	3.4	4.3	5.3
Pressure drop HP	(1)	kPa	14.4	14.7	17.8
Noise levels					
Sound power level cooling	(4)	dB(A)	82	82	85
Sound pressure level cooling	(6)	dB(A)	50.4	50.4	53.4
Dimensions and weights**					
Length		mm	1715	1715	1715
Depth		mm	700	700	700
Height		mm	1738	1738	1738
Operating weight		kg	410	414	415

CH: chiller unit; HP: heat pump unit; MCHX: unit with microchannel coils
(1) External air temperature of 35°C and user-side heat exchanger water inlet-outlet temperature of 12-7°C. Values compliant with standard EN 14511
(2) Outside air temperature 7°C DB, 6°C WB; condenser inlet/outlet water temperature 40/45°C. Values compliant with standard EN 14511
(3) Theoretical values referred to the basic unit. The amount of gas actually charged in the unit may differ.
(4) Unit operating at rated capacity, with no accessories of any kind - external air temperature 35°C and water input/output temperature from/to heat exchanger and user equal to 12/7°C. Values taken by measurements made in accordance with standard ISO 3744 and the Eurovent certification programme, where applicable. Binding values See NOISE LEVELS section.
(5) unit operating at nominal operating capacity, with no accessories of any kind, with external air temperature of 7°C (6°C WB) and user-side heat exchanger water inlet/outlet temperature of 40/45°C. Values obtained from measurements carried out in accordance with standard ISO 3744.
(6) Values obtained from the sound power level (conditions: note 4), related to a distance of 10 m from the unit in free field with directivity factor Q=2. Non-binding values See NOISE LEVELS section.
(7) Approximate value. The minimum capacity reached by the unit depends on the operating conditions. The value shown may not be suitable for calculating the minimum volume of water: to do this, consult the "Minimum water content in the system" section.
** Basic unit without included accessories

GEYSER SKY Hi HP SLN R0

			20	25	30
Cooling					
Refrigeration capacity	(1)	kW	16.4	21.2	25.7
Total absorbed power	(1)	kW	6.4	8.7	10.9
EER	(1)		2.6	2.4	2.4
Heating					
Heating capacity	(1)	kW	19.9	25.1	30.8
Total absorbed power	(1)	kW	6.9	9	11
COP	(1)		2.9	2.8	2.8
Compressors					
Compressors/Circuits		n°	1/1	1/1	1/1
Minimum capacity reduction step	(7)	%	17	17	17
Refrigerant charge HP	(3)	kg	1.6	2	2.4
Fans					
Quantity		n°	2	2	2
Total air flow rate HP		m³/h	19600	19600	19600
User-side heat exchanger					
Quantity		n°	1	1	1
Water flow rate CH	(1)	m³/h	2.8	3.5	4.4
Pressure drop CH	(1)	kPa	11.5	11.1	13.1
Water flow rate HP	(1)	m³/h	3.4	4.3	5.3
Pressure drop HP	(1)	kPa	14.4	14.7	17.8
Noise levels					
Sound pressure lev. SLN vers.	(4)	dB(A)	80	80	83
Sound pressure lev. SLN vers.	(6)	dB(A)	48.4	48.4	51.4
Dimensions and weights**					
Length		mm	1715	1715	1715
Depth		mm	700	700	700
Height		mm	1738	1738	1738
Operating weight		kg	410	414	415

CH: chiller unit; HP: heat pump unit; MCHX: unit with microchannel coils
(1) External air temperature of 35°C and user-side heat exchanger water inlet-outlet temperature of 12-7°C. Values compliant with standard EN 14511
(2) Outside air temperature 7°C DB, 6°C WB; condenser inlet/outlet water temperature 40/45°C. Values compliant with standard EN 14511
(3) Theoretical values referred to the basic unit. The amount of gas actually charged in the unit may differ.
(4) Unit operating at rated capacity, with no accessories of any kind - external air temperature 35°C and water input/output temperature from/to heat exchanger and user equal to 12/7°C. Values taken by measurements made in accordance with standard ISO 3744 and the Eurovent certification programme, where applicable. Binding values See NOISE LEVELS section.
(5) unit operating at nominal operating capacity, with no accessories of any kind, with external air temperature of 7°C (6°C WB) and user-side heat exchanger water inlet/outlet temperature of 40/45°C. Values obtained from measurements carried out in accordance with standard ISO 3744.
(6) Values obtained from the sound power level (conditions: note 4), related to a distance of 10 m from the unit in free field with directivity factor Q=2. Non-binding values See NOISE LEVELS section.
(7) Approximate value. The minimum capacity reached by the unit depends on the operating conditions. The value shown may not be suitable for calculating the minimum volume of water: to do this, consult the "Minimum water content in the system" section.
** Basic unit without included accessories

ECODESIGN

INTRODUCTION

The Ecodesign/ErP Directive (2009/125/EC) lays down new standards for more efficient energy use.

The Directive contains various regulations; as regards chiller products and heat pumps, the regulations of interest are the following:

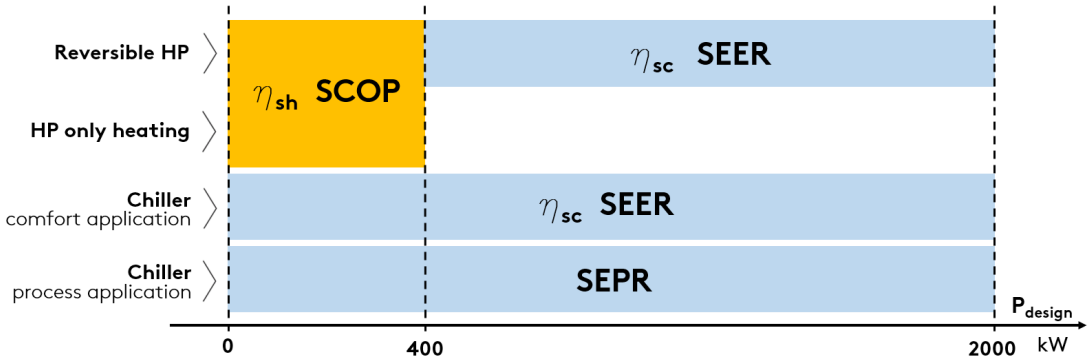
- Regulation 2013/813, for small heat pumps (Pdesign ≤ 400 kW)
- Regulation 2016/2281, for chillers and heat pumps with Pdesign > 400 kW
- Regulation 2013/811, for heat pumps with Pdesign ≤ 70 kW.

The last-mentioned regulation (2013/811) regards the labelling (Ecolabel certification) of small heat pumps.
The other two regulations (2013/813 and 2016/2281) set seasonal efficiency targets that the products must comply with to be sold and installed in the European Union (essential requirement for CE marking).
These efficiency limits are defined through ratios, which are respectively:

- ηsh (SCOP), with reference to regulation 2013/813
- ηsc (SEER) for comfort applications and SEPR for process applications, with reference to regulation 2016/2281.

As regards regulation 2016/2281, with effect from 1st January 2021, the required minimum efficiency limit will be raised (Tier 2) from the current threshold (Tier 1).

The figure below schematically illustrates the correspondence between product and reference energy ratio.



Some notes and clarifications:

For comfort applications, regulation 2016/2281 sets the ηsc (SEER) ratio in two different operating conditions:

- SEER calculated with machine inlet/outlet water temperature of 12/7°C (low temperature application),
- SEER calculated with machine inlet/outlet water temperature of 23/18°C (medium temperature application).

The minimum efficiency requirement is the same, but can be met at condition 12/7°C or at condition 23/18°C, depending on the application envisaged for the machine.

Regulation 2013/813 distinguishes two different types: at low temperature and at medium temperature.
The following refer to the application at low temperature: (low temperature application) all heat pumps whose maximum delivery temperature for heating purposes is lower than 52°C with source at temperature of -7°C and -8°C wet bulb (air-water unit) or inlet 10°C (water-water unit), at the reference design conditions for an average climate.For these, the efficiency ratio is "low temperature application" (outlet water temperature 35°C).
For all the other heat pumps, the efficiency ratio is related to "medium temperature application" (outlet water temperature 55°C).
The ratios must be calculated according to the reference European heating season in average climatic conditions.

The minimum efficiency requirements set by the regulations are indicated below.

REGULATION 2016/2281, comfort application

TYPE OF UNIT		MINIMUM REQUIREMENT			
		Tier 1		Tier 2 (2021)	
SOURCE	**Pdesign**	**ηsc [%]**	**SEER**	**ηsc [%]**	**SEER**
air	< 400kW	149	3,8	161	4,1
air	≥ 400kW	161	4,1	179	4,55
water	< 400kW	196	4,975	200	5,075
water	≥ 400kW and < 1500kW	227	5,75	252	6,375
water	≥ 1500kW	245	6,2	272	6,875

REGULATION 2016/2281, process application

TYPE OF UNIT		MINIMUM REQUIREMENT	
		Tier 1	Tier 2 (2021)
SOURCE	**Pdesign**	**SEPR**	**SEPR**
air	< 400kW	4,5	5
air	≥ 400kW	5	5,5
water	< 400kW	6,5	7
water	≥ 400kW and < 1500kW	7,5	8
water	≥ 1500kW	8	8,5

REGULATION 2013/813

SOURCE	APPLICATION	MINIMUM REQUIREMENT	
		ηsh [%]	**SCOP**
air	low temperature application	125	3,2
water	low temperature application	125	3,325
air	medium temperature application	110	2,825
water	medium temperature application	110	2,95

The conformity of the product must be checked according to the type of application, whether comfort or process, and at the required outlet water temperature.

The two schematic tables below, respectively for comfort application and for process application, indicate the reference of the required conformity according to the type of product and the set point temperature (reference to regulations 2016/2281 and 2013/813).

Important note: for mixed comfort and process applications, the reference application for conformity is the comfort application.

COMFORT APPLICATION

PRODUCT	OUTLET WATER TEMPERATURE	COMPLIANCE INDEX	REGULATION
Chiller	< 18°C	SEER/ηsc low temperature application	2016/2281
	≥ 18°C	SEER/ηsc medium temperature application	2016/2281
Heat pumps (reversible and only heating) Pdesign≤400kW		SCOP/ηsh	2013/813
Reversible heat pumps Pdesign>400kW	< 18°C	SEER/ηsc low temperature application	2016/2281
	≥ 18°C	SEER/ηsc medium temperature application	2016/2281
Heat pumps only heating Pdesign>400kW		-	-

- = exemption from Ecodesign

PROCESS APPLICATION

PRODUCT	OUTLET WATER TEMPERATURE	COMPLIANCE INDEX	REGULATION
Chiller	≥ +2°C , ≤ 12°C	SEPR	2016/2281
	> 12°C	-	-
	> -8°C , < +2°C	-	-

- = exemption from Ecodesign

Some specifications and notes follow.

Partly completed machinery

The term partly completed machinery refers to all units without a user-side or source-side heat exchanger, and therefore to all LC, LE, LC/HP and LE/HP versions. Since these are "non-complete" machines, conformity with Ecodesign depends on combination with the remote heat exchanger.

All the partly completed machinery is CE marked and accompanied by a declaration of conformity. Installation in European Union countries is therefore allowed; correct selection and installation of the remote heat exchanger must be ensured, in accordance with the above cases.

EC fans:

The only option that positively affects the performance of the unit, by increasing its seasonal energy efficiency ratio, is the VEC accessory.

GAMMA GEYSER SKY

Regulation 2013/813 applies specifically to the Geyser Sky range.

The tables below give information on the conformity of the units and the seasonal energy performance ratios with regard to the reference regulation.

GEYSER SKY Hi HP R0

			20	25	30
REGULATION 2013/813			-		
Pdesign	(1)	kW	14.99	18.76	23.1
COMFORT					
Standard Unit					
ηsh	(1)	%	166.2	175.8	179
SCOP	(1)		4.23	4.47	4.55
Unit with EC fans (VEC)					
ηsh	(1)	%	181	188.6	189.4
SCOP	(1)		4.6	4.791	4.809
REGULATION 2013/811			-		
Standard Unit					
Ecolabel	(2)		A++	A+++	
Unit with EC fans (VEC)					
Ecolabel	(2)		A+++		

Y = unit in compliance with Ecodesign at the indicated condition. N = unit not in compliance with Ecodesign at the indicated condition: it can be installed only in non-EU countries.
(1) User-side heat exchanger water inlet/outlet temperature 30/35°C, Average climate profile, with reference to regulation 2013/813 and norm EN 14825.
(2) Energy efficiency class with reference to regulation 2013/811 (low temperature applications).

GEYSER SKY Hi HP SLN R0

			20	25	30
REGULATION 2013/813			-		
Pdesign	(1)	kW	14.99	18.76	23.1
COMFORT					
Standard Unit					
ηsh	(1)	%	166.2	175.8	179
SCOP	(1)		4.23	4.47	4.55
Unit with EC fans (VEC)					
ηsh	(1)	%	181	188.6	189.4
SCOP	(1)		4.6	4.791	4.809
REGULATION 2013/811			-		
Standard Unit					
Ecolabel	(2)		A++	A+++	
Unit with EC fans (VEC)					
Ecolabel	(2)		A+++		

Y = unit in compliance with Ecodesign at the indicated condition. N = unit not in compliance with Ecodesign at the indicated condition: it can be installed only in non-EU countries.
(1) User-side heat exchanger water inlet/outlet temperature 30/35°C, Average climate profile, with reference to regulation 2013/813 and norm EN 14825.
(2) Energy efficiency class with reference to regulation 2013/811 (low temperature applications).

INSTALLATION ADVICE

The units described in this document are, by nature, strongly affected by the characteristics of the system, the working conditions and the installation site.

Remember that the unit must be installed by a qualified and skilled technician, and in compliance with the national legislation in force in the destination country.

The installation must be done in such a way that it will be possible to carry out all routine and non-routine maintenance operations.

Before starting any work, you must carefully read the "Installation, operation and maintenance manual" of the machine and do the necessary safety checks to prevent any malfunctioning or hazards.

We give some advice below that will allow you to increase the efficiency and reliability of the unit and therefore of the system into which it is inserted.

Water characteristics

To preserve the life of the exchangers, the water is required to comply with some quality parameters and it is therefore necessary to make sure its values fall within the ranges indicated in the following table:

Total hardness	2,0 ÷ 6,0 °f
Langelier index	- 0,4 ÷ 0,4
pH	7,5 ÷ 8,5
Electrical conductivity	10÷500 µS/cm
Organic elements	-
Hydrogen carbonate (HCO3-)	70 ÷ 300 ppm
Sulphates (SO42-)	< 50 ppm
Hydrogen carbonate / Sulphates (HCO3-/SO42-)	> 1
Chlorides (Cl-)	< 50 ppm
Nitrates (NO3-)	< 50 ppm
Hydrogen sulphide (H2S)	< 0,05 ppm
Ammonia (NH3)	< 0,05 ppm
Sulphites (SO3), free chlorine (Cl2)	< 1 ppm
Carbon dioxide (CO2)	< 5 ppm
Metal cations	< 0,2 ppm
Manganese ions (Mn++)	< 0,2 ppm
Iron ions (Fe2+ , Fe3+)	< 0,2 ppm
Iron + Manganese	< 0,4 ppm
Phosphates (PO43-)	< 2 ppm
Oxygen	< 0,1 ppm

Installation of water filters on all the hydraulic circuits is obligatory.

The supply of the most suitable filters for the unit can be requested as accessory. In this case, the filters are supplied loose and must be installed by the customer following the instructions given in the installation, operation and maintenance manual.

Glycol mixtures

With temperatures below 5°C, it is mandatory to work with water and anti-freeze mixtures, and also change the safety devices (anti-freeze, etc.), which must be carried out by qualified authorised personnel or by the manufacturer.

Liquid outlet temperature or minimum ambient temperature	°C	0	-5	-10	-15	-20	-25	-30	-35	-40
Freezing point	°C	-5	-10	-15	-20	-25	-30	-35	-40	-45
Ethylene glycol	%	6	22	30	36	41	46	50	53	56
Propylene glycol	%	15	25	33	39	44	48	51	54	57

The quantity of antifreeze should be considered as % on weight

Minimum water content in the system

For correct operation of the unit, it is necessary to ensure a buffering on the system such as to comply with the minimum operating time considering the greater between the minimum OFF time and the minimum ON time. In short, these contribute to limiting the number of times the compressors are switched on per hour and to preventing undesired deviations from the set point of the delivered water temperature.

Larger amounts of water are in any case always preferable, because they allow a smaller number of starts and switch-offs of the compressors, less wear of them and an increase in the efficiency of the system as a consequence of a reduction in the number of transients.

It should also be pointed out that, for air-water units working in heat pump mode, the minimum amount of water must consider the need of the unit to carry out defrosting. Having an adequate buffering volume will allow prevention of too high drifts of the delivered water temperature at the end of the defrost cycle.

Please check "water Volume Design" Tool for a correct estimation of minimum water content of the system in "heat pump" working mode.

The following experimental formula allows to calculate the minimum water volume of the plant. The formula only refers to the operation of the unit in cooling mode.

$$V_{min} = \frac{P_{tot} \cdot 1.000}{N} \cdot \frac{300}{\Delta T \cdot \rho \cdot c_p} + P_{tot} \cdot 0{,}25$$

where

Vmin is the minimum water content of the system [l]

Ptot is the total cooling capacity of the machine [kW]

N: number of capacity reduction steps

ΔT: differential allowed on the water temperature. Unless otherwise specified, this value is considered to be 2.5K

ρ: density of the heat-carrying fluid. Unless otherwise specified, the density of water is considered

cp: specific heat of the heat-carrying fluid. Unless otherwise specified, the specific heat of water is considered

Considering the use of water and grouping together some terms, the formula can be re-written as follows:

$$V_{min} = \frac{P_{tot}}{N} \cdot 17{,}2 + P_{tot} \cdot 0{,}25$$

N may take the following values:

- N=3 for units featuring one inverter-piloted compressor only;

Installation site

To determine the best installation site for the unit and its orientation, you should pay attention to the following points:

- compliance with the clearance spaces indicated in the official dimensional drawing of the unit must be guaranteed so as to ensure accessibility for routine and non-routine maintenance operations
- you should consider the origin of the hydraulic pipes and their diameters because these affect the radiuses of curvature and therefore the spaces needed for installing them
- you should consider the position of the cable inlet on the electrical control panel of the unit as regards the origin of the power supply
- if the installation includes several units side by side, you should consider the position and dimensions of the manifolds of the user-side exchangers and of any recovery exchangers
- if the installation includes several units side by side, you should consider that the minimum distance between units is 3 metres
- you should avoid all obstructions that can limit air circulation to the source-side exchanger or that can cause recirculation between air supply and intake
- you should consider the orientation of the unit to limit, as far as possible, exposure of the source-side exchanger to solar radiation
- if the installation area is particularly windy, the orientation and positioning of the unit must be such as to avoid air recirculation on the coils. If necessary, we advise making windbreak barriers in order to prevent malfunctioning.

Once the best position for the unit has been identified, you must check that the support slab has the following characteristics:

- its dimensions must be proportionate to those of the unit: if possible, longer and wider than the unit by at least 30 cm and 15/20cm higher than the surrounding surface
- it must be able to bear at least 4 times the operating weight of the unit
- it must allow level installation of the unit: although the unit is installed on a horizontal base, make slopes in the support surface to convey rain water or defrost water to drains, wells or in any case to places where it cannot generate an accident hazard due to ice formation. All heat pump version units are equipped with discharge manifolds for the condensed water; these can be manifolded to facilitate condensate discharge.

The units are designed and built to reduce to a minimum the level of vibration transmitted to the ground, but it is in any case advisable to use rubber or spring anti-vibration mounts, which are available as accessory and should be requested when ordering.

The anti-vibration mounts must be fixed on before positioning the unit on the ground.

In the event of installation on roofs or intermediate floors, the pipes must be isolated from the walls and ceilings.

It is advisable to avoid installation in cramped places, to prevent reverberations, reflections, resonances and acoustic interactions with elements outside the unit.

It is essential that any work done to soundproof the unit does not affect its correct installation or correct operation and, in particular, does not reduce the air flow rate to the source-side exchanger.

Installations that require the use of treated coils

If the unit has to be installed in an environment with a particularly aggressive atmosphere, coils with special treatments are available as options.

- coils with anti-corrosion treatment;

A description of the individual accessories is available in the "Description of accessories" section.

The type of coil treatment should be chosen with regard to the environment in which the unit is to be installed, through observation of other structures and machinery with exposed metal surfaces present in the destination environment.

The cross observation criterion is the most valid method of selection currently available without having to carry out preliminary tests or measurements with instruments. The identified reference environments are:

- coastal/marine
- industrial
- urban with a high housing density
- rural

Please note that in cases where different conditions co-exist, even for short periods, the choice must be suitable for preserving the exchanger in the harsher environmental conditions and not in conditions between the worst and best situation.

Particular attention must be given in cases where an environment that is not particularly aggressive becomes aggressive as a consequence of a concomitant cause, for example, the presence of a flue outlet or an extraction fan.

We strongly suggest choosing one of the treatment options if at least one of the points listed below is verified:

- there are obvious signs of corrosion of the exposed metal surfaces in the installation area
- the prevailing winds come from the sea towards the unit
- the environment is industrial with a significant concentration of pollutants
- the environment is urban with a high population density
- the environment is rural with the presence of organic discharges and effluents

In particular, for installations near the coast, the following instructions apply:

- **for units to be installed between 1 and 20 km from the coast, the use of the option "Coil treated with anti-corrosion paints" is strongly recommended;**
- **for units to be installed within one kilometre from the coast, the use of the option "Coil treated with anti-corrosion paints" is strongly recommended.**

To protect the exchangers from corrosion and ensure optimal operation of the unit, we advise following the recommendations given in the user, installation and maintenance manual for cleaning the coils.

TC_0000_Geyser SKY_EN_Rev01_20220504

Swegon Operations s.r.l.
Via Valletta, 5 - 30010
Cantarana di Cona, (VE) Italy - T. +39 0426 921111 - F. +39 0426 302222
www.blueboxcooling.com - info@bluebox.it

BlueBox by Swegon

Swegon Operations s.r.l. a socio unico - P.IVA 02481290282
Company directed and coordinated by Investment Latour (Sweden)