SIGMA Sky OH TB R6

70÷260 kW

General
Non-reversible water heat pump with scroll compressors optimized for high temperature applications. Solution designed to reach very high temperature levels.

Configurations
OH: non-reversible heat pump standard

/LN: low-noise unit

/MOIB: execution for additional hydraulic module

/PIE: Arrangement for outdoor installation

Strengths

- Production of hot water up to 80 ° C
- Alternative solution to traditional heating systems
- New business opportunities, flexibility and the creation of cascaded systems
- Wide operating range, extended operating limits
- Non-flammable refrigerant R513A, with GWP=629
- BlueThink advanced control with integrated web server. Multilogic function and Blueye® supervision system. (options)
- Flowzer: inverter driven pumps (options)

WESTERN™ AIRCONDITIONING WARMTEPOMPEN

BlueBox by Swegon

SIGMA Sky OH TB R6

SIGMA Sky OH TB R6 is a non-reversible water / water heat pump. Its operating limits allow the production of hot water up to 80°C. The function of the unit is to increase the temperature level of available medium-temperature water sources or streams to higher temperatures or to produce energy at different temperature levels in cascade.

The temperature booster series is one of the alternatives Swegon offers for replacing classic heating systems, particularly where high localised system temperatures are required.

In detail, referring to the increasingly stringent regulations pushing for total decarbonisation in the heating sector, these units can cover the temperature gap generated by medium-temperature units such as heat pumps or multi-purpose units, going as far as the production of high-temperature hot water for sanitary or process applications. The range also lends itself well to integration into a district heating network by raising the water temperature where necessary. This avoids the transport of high-temperature heat transfer fluids over long distances, e.g. generated by an upstream power station, thus avoiding large energy losses.

Finally, this solution is perfectly suited to be coupled with Swegon multi-purpose units, allowing the recovery heat of the latter to be utilised and increasing the temperature level, optimising and encouraging energy recovery.

SIGMA Sky OH TB R6 was developed with modular logic, allowing for a highly flexible and configurable product.

As this is an indoor unit, the structure has been designed to be as compact as possible (maximum 875mm wide and 1,880mm high) to allow even the largest model an easy passage through the doors of the technical compartments. Furthermore, the unit does not require manifolds for connection of the main heat exchangers and so also the installation space is further reduced.

REFRIGERANT

Refrigerant R513A (GWP=629*) standard.

The refrigerant consists in a blend of R134a (44%) and R1234yf (56%), with temperature glide equal to 0.

R513A is classified as a non hazardous fluid (Group 2 fluid under PED).

It is also included in Class A1 under the ASHRAE Standard 34:

- non-toxic;
- non-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.

This also goes to the benefit of unit installation, commissioning and maintenance as it reduces the overall management costs.

(*) GWP pursuant to F-gas Regulation (EU) 2024/573, evaluated over a span of 100 years.

STRUCTURE

The structure consists of a load-bearing frame made of epoxy polyester powder coated steel sheet, coloured with RAL 7035.

COMPRESSORS

The compressors are of the hermetic scroll type with orbiting spiral connected in tandem, optimized for heat pump applications.

SOURCE-SIDE HEAT EXCHANGER

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

Models with 2 refrigerant circuits are fitted with dual circuit heat exchanger and therefore with a single pair of hydraulic connections. This has allowed us to:

- maximize COP levels
- reduce the amount of refrigerant used in the unit
- make the unit lighter and more compact
- make its maintenance easier.

The heat exchanger is fitted with a temperature probe for freeze protection and a paddle flow switch for water flow control.(supplied loose).

USER-SIDE HEAT EXCHANGER

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

Models with 2 refrigerant circuits are fitted with dual circuit heat exchanger and therefore with a single pair of hydraulic connections.

REFRIGERANT CIRCUIT

Each refrigerant circuit of the basic unit comprises:

- shut-off valve in the liquid line
- 5/16” charging valves
- liquid sight glass
- replaceable solid cartridge dehydrator filter
- electronic expansion valve
- pressure transducers for reading the high and low pressure values and relevant evaporating and condensing temperatures
- high pressure switches
- high pressure safety valve

Compared to the mechanical expansion valve, the electronic expansion valve allows machine stability to be reached more quickly and better superheating control to maximize the use of the evaporator in all load conditions. This also acts as shut-off valve on the liquid line, as it closes during compressor stops, so preventing dangerous refrigerant migration.

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

REFRIGERANT CIRCUIT

Each refrigerant circuit of the basic unit comprises:

- shut-off valve in the liquid line
- 5/16” charging valves
- liquid sight glass
- replaceable solid cartridge dehydrator filter
- electronic expansion valve
- pressure transducers for reading the high and low pressure values and relevant evaporating and condensing temperatures
- high pressure switch
- high pressure safety valve

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

Compared to the mechanical expansion valve, the electronic expansion valve allows machine stability to be reached more quickly and better superheating control to maximize the use of the evaporator in all load conditions. This also acts as shut-off valve on the liquid line, as it closes during compressor stops, so preventing dangerous refrigerant migration.

ELECTRICAL CONTROL PANEL

The electrical control panel is made in a painted galvanized sheet-iron box.

The electrical control panel of the basic unit comprises:

- main disconnect switch
- automatic circuit breakers for compressors with fixed calibration
- fuses to protect the auxiliary circuits
- thermal magnetic circuit breakers for the pumps (if present)
- contactors for compressors and pumps (if present)
- phase monitor
- potential-free general alarm contacts
- single potential free operating contacts for compressors and pumps (if present)
- microprocessor controller with display accessible from the outside

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

The power supply of the unit is 400V/3~/50Hz.

The control allows the following functions:

CONTROLLER BLUETHINK

Main controller functions advanced

The control allows the following functions:

- water temperature adjustment, with control of the water entering the user-side heat exchanger
- freeze protection
- compressor timings
- automatic rotation of compressor starting sequence
- 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
- For further details on available functions and on displayed information, you can refer to the specific documentation of the control.

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 state of the unit: water inlet and outlet temperatures, working mode, 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

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.

CONTROLS AND SAFETY DEVICES

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

- high pressure switch with manual reset
- high pressure safety device with automatic reset, for a limited number of occurrences, managed by the controller
- low pressure safety device with automatic reset and limited tripping managed by the controller
- high pressure safety valve
- antifreeze probe at outlet of each evaporator
- compressor overtemperature protection
- mechanical paddle flow switch (supplied loose)

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 transparent polyethylene stretch film.

OPTIONS

/LN: silenced unit

Units in LN set-up are fully panelled with epoxy polyester powder coated steel sheet panels coloured with RAL 7035and lined with matting made of sound absorbing and soundproofing material.

Example of non /LN unit

Example of /LN unit

The panel consists of:

- 6 mm in sound-absorbing expanded polyurethane with a density of 30 kg / m³, 2 mm of sound-absorbing rubber sheet with a density of 3.6 kg /m2 between the layers of polyurethane and an additional layer of sound-absorbing polyurethane foam 22 mm thick. Overall thickness of 30 mm.

/PIE: Arrangement for outdoor installation

- The electrical control panel is made in a painted galvanized sheet-iron box with IP54 protection rating.
- The structure of the unit is made of galvanized sheet-iron coated with polyester powder in
- Water tightness is achieved by seals around the perimeter of the panels.

/MOIB: Basic hydraulic module

The accessory consists of a carpentry extension that allows the installation of more than two pumps inside the machine room. For more information on the variation of carpentry dimensions, contact the sales department.

All the units can be equipped with hydraulic module in various combinations on the user side and on the source side.

HYDRAULIC MODULES

Hydraulic modules with one pump have:

- one pump

Hydraulic modules with two pumps have:

- two pumps
- a check valve on the delivery side of each pump

In the version with 2 pumps of the same type (source or user), these are always one working and one in stand-by. Switching between the pumps is automatic and is done based on time (to balance the hours of operation of each) or in the event of failure.

User-side hydraulic modules

The hydraulic circuit inside the unit is completely insulated with closed cell insulation material.

The module can have the following configurations:

- /1P: hydraulic module with one pump
- /2P: hydraulic module with two pumps

All the above-mentioned modules have pumps with standard discharge head.

There are also available modules /1PM and /2PM that have pumps with increased available discharge head

The option includes:

- Expansion vessel heating side

Source-side hydraulic modules

The source side pumps are normally switched off and they are switched on a few seconds before the start of first compressor.

When reaching the set point, a few seconds after switching off the last compressor, the source side pumps are switched off again.

The hydraulic circuit inside the unit is fully insulated with closed-cell insulating material.

The module can have the following configurations:

- /1S: hydraulic module with one pump
- /2S: hydraulic module with two pumps

All the above-mentioned modules have pumps with standard discharge head.

The following are also available:

modules /1SM and /2SM that have pumps with increased available discharge head

FVP FLOWZER VP - Inverter for manual pump adjustment

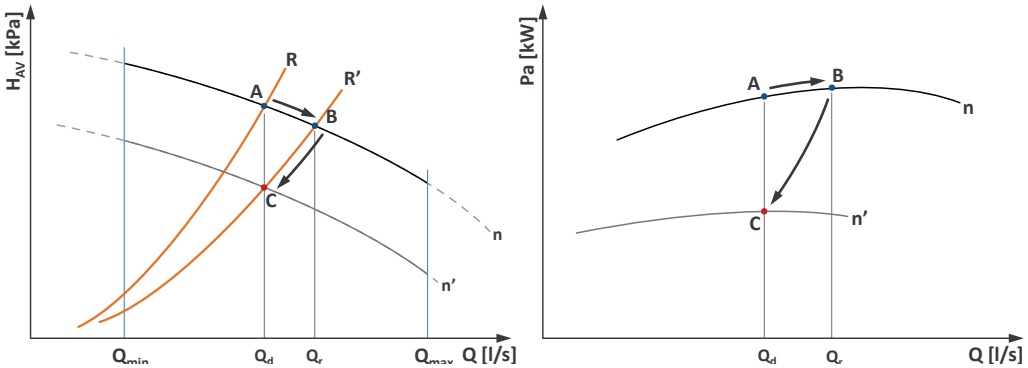
The accessory consists of inserting an inverter in the machine to manually adjust the speed of the pump (or pumps) in order to calibrate the pump flow rate on the head losses of the system.

This accessory is to be combined with one of the integrated hydraulic modules that can be selected for the unit.

Units equipped with integrated hydraulic module allow a certain level of available discharge head (point A) to be obtained under nominal flow rate conditions Qd.

But the actual head loss level of the system (e.g. characteristic curve R') normally causes the pump to find a different equilibrium point (point B), with a flow rate Qr higher than Qd.

In this condition, in addition to having a different flow from the nominal one (therefore also a different temperature jump), there is also a greater absorption of electric power from the pump itself.



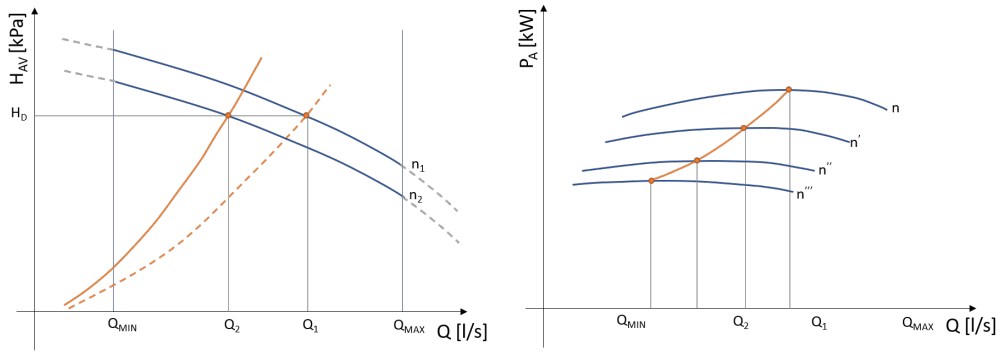
The use of the Flowzer allows the pump speed to be set manually (e.g. at speed n' instead of n) to obtain the design water flow rate and thermal gradient (point C). Once the adjustment procedure has been carried out, the pump will always work at a fixed flow rate.

The adoption of the VP Flowzer allows to considerably reduce the electrical power consumption of the pump with a consequent energy saving. By way of example, a reduction in the flow rate of 10% leads to a reduction in power consumption of around 27%.

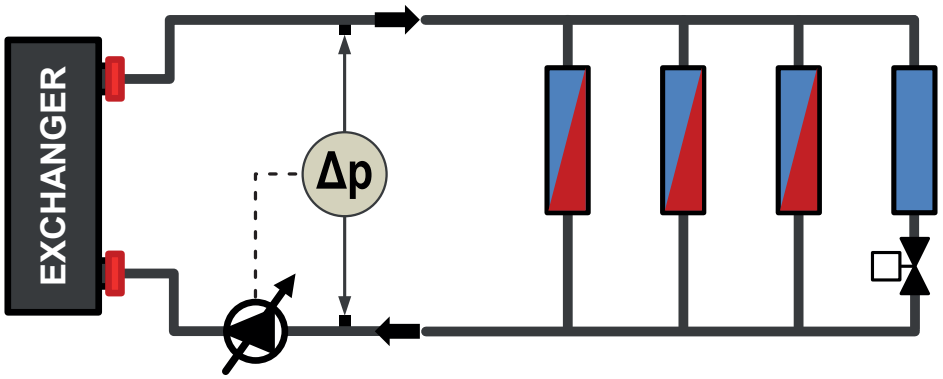
For the freecooling units the Flowzer VP is able to manage two different speeds of the pump automatically compensating the pressure drops of the water coil.

FVD FLOWZER VD - control of available pump discharge head for variable flow systems without monitoring the flow rate limits;

Flowzer VD requires two pressure transducers to be installed in the machine. Through these transducers, the inverter can gauge the actual pressure at the ends of the system and it can automatically adapt the pump speed to obtain a set available discharge head value. Flowzer VD must be combined with Flowzer VP. This accessory therefore allows a constant pressure system to be achieved.



With the Flowzer VD, the customer can set, directly on the display, the available discharge head value (Hd) that the unit must maintain. As can be seen from the graph as the user request decreases, the resistant curve of the plant moves to the left, consequently the inverter reduces the speed of the pump in order to maintain the useful head necessary for the unit. With this system a significant reduction in electrical power is achieved. The customer will have to check that, in minimum flow rate conditions (that is, with the maximum number of user points closed), this is always higher than or equal to the minimum flow rate allowed by the unit.



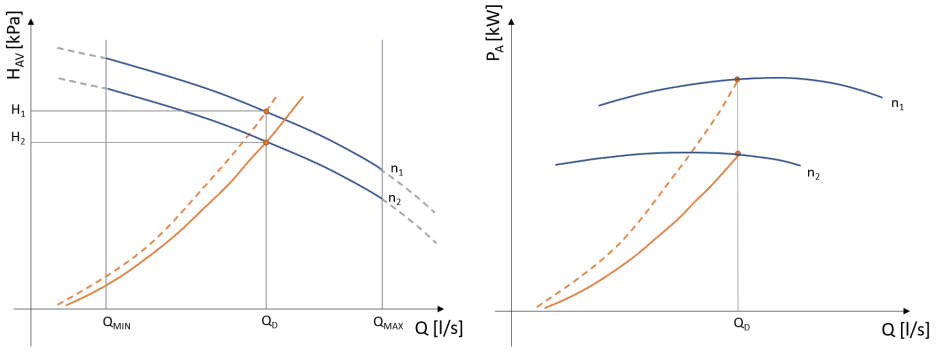
This accessory is useful when the total head losses of the circuit are slightly variable or when they change depending on the seasons (for example, some user points are active only during summer operation and not during winter operation).

The use of this accessory also allows the pump speed to be adapted to possible fouling of the filter on the hydraulic circuit.

The option is not compatible with the Multilogic version. Please refer to the HYZER solutions for the compatibility between variable flow systems and multi-machine systems.

FVDE **FLOWZER VDE - flow rate control to keep the flow rate constant as the external working conditions of the system change;**

Flowzer VDE requires a differential pressure transducer to be installed in the machine. Through this transducer, the inverter can gauge the actual pressure at the ends of the heat exchanger installed in the machine and it can automatically adapt the pump speed for a constant flow value under all conditions. Flowzer VDE must be combined with Flowzer VP.



Flowzer VDE is used to automatically adjust the pump speed. As the graph shows, the inverter trips and increases the pump speed if a different condition occurs which would cause an undesired drop in the flow rate (e.g. operation of an external dry cooler). This is a more accurate solution than the VP option alone as it always provides for the water flow (Qd) required by the design conditions.

VSWU **User-side safety valve**

With this accessory, a safety valve is inserted in the hydraulic circuit of the unit: when the calibration pressure is reached, the valve opens and, by discharging (to be routed by the customer), prevents the system pressure from reaching limits that are dangerous for the components present in the system. The valves have positive action, that is, performance is guaranteed even if the diaphragm deteriorates or breaks.

VSS **Source-side safety valve**

With this accessory, a safety valve is inserted in the hydraulic circuit of the unit: when the calibration pressure is reached, the valve opens and, by discharging (to be routed by the customer), prevents the system pressure from reaching limits that are dangerous for the components present in the system. The valves have positive action, that is, performance is guaranteed even if the diaphragm deteriorates or breaks.

COID **Upward hydraulic connections**

This accessory includes the supply of the semi-finished products necessary for turning the hydraulic connections of the unit upwards. The installation of semi-finished products outside the machine is to be carried out by the customer.

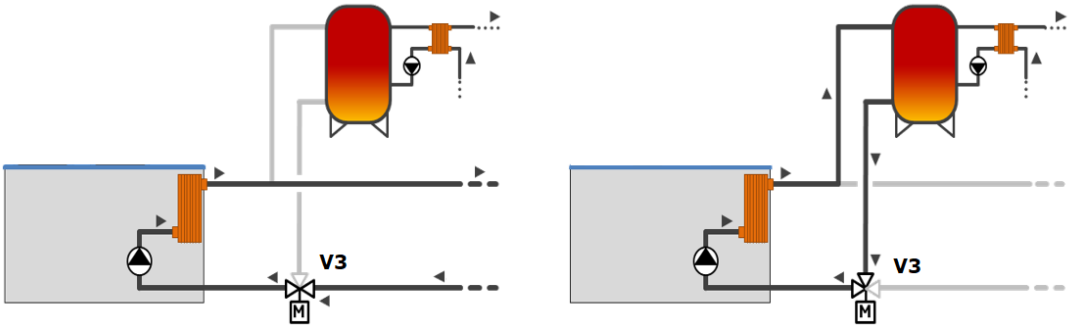
Accessory supplied loose.

V3 Three-way valve for domestic hot water management

This is a three-way on-off valve, complete with servo control. The unit controller can manage two separate hydraulic circuits through this valve: one for comfort and one for domestic hot water production.

The valve and the servo control are for indoor installation and they require the ambient temperature not to drop below -10°C.

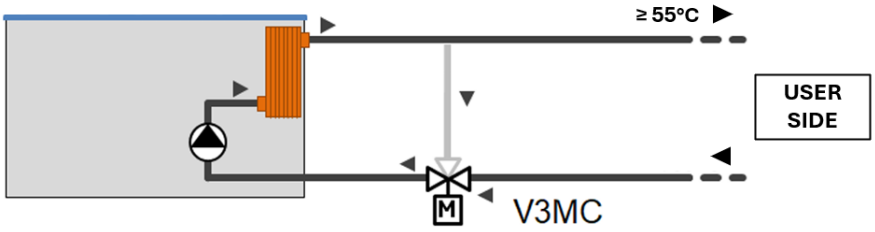
Accessory supplied loose. Installation by the customer.



V3MC 3-way modulating valve on hot circuit

The accessory involves the supply of a 3-way modulating valve to be inserted on the hot circuit in order to check that the temperature of the water leaving the exchanger is always higher than the minimum allowed.

Accessory supplied loose. Installation by the customer.



Refrigerant circuit accessories

DVS **Double safety valve**

With this accessory, instead of each individual safety valve per circuit, there is a "candelabrum" with two safety valves and a diverter valve for choosing the valve in operation. This allows the safety valves to be replaced without having to drain the machine and without having to stop it.

RUB **Compressor suction and delivery valves**

The valves situated on the delivery side and on the suction side of the compressors allow the compressor to be isolated from the rest of the refrigerant circuit, so making the maintenance operations quicker and less invasive

BC **Capacitive backup battery for electronic expansion valve**

When the compressors stop, the controller always closes the electronic expansion valve to prevent dangerous refrigerant migration. The presence of the backup battery ensures that the electronic valve is kept in closed position even when there is no power supply

This option uses a condenser as energy storage, and not an ordinary coil. In this way, it is not affected by the memory effect of normal coils and the need for maintenance is avoided.

Applies to units with advanced controller.

RPP **Refrigerant leak detector with automatic pump down**

This accessory includes a refrigerant leak detector located inside each compressor compartment. The detection of a refrigerant leak is managed by the control through a specific alarm and its shown on the display of the control with a specific icon. Furthermore the alarm starts, for all the circuits of the unit, the unit stops and starts the pump down procedure, confining all the refrigerant in the exchangers.

The accessory includes the capacitive backup battery.

RPR **Refrigerant leak detector**

With this accessory, a refrigerant leak detector is placed inside each compressor compartment.

For units supplied with advanced controller, the detection of a refrigerant leak is managed by the controller through a specific alarm and display of a specific icon on the display of the controller. This alarm stops the unit.

For units supplied with parametric controller, a LED light goes on outside the electrical panel to warn about the leak. Provision is made for a potential-free contact to trigger the alarm.

MAFR **Pressure gauges**

The operating pressures of each circuit of the unit can be displayed on the control by accessing the relevant screens. Also, the machine can be fitted with pressure gauges (two for each circuit) installed in a clearly visible position. These allow reading in real time of the working pressures of the refrigerant gas on the low pressure side and on the high pressure side of each refrigerant circuit.

Electrical accessories

SETD Double set point from digital input

The accessory allows you to preset two different operating set points and manage the change from one to the other through a digital signal.

The set point temperatures must be specified when ordering.

Unless otherwise specified in the order, the controller will be set at the factory with the following temperatures:

- set point 1 at 45 ° C and set point 2 at 40 ° C

For operating conditions other than standard, unless otherwise specified in the order for the second set point, the controller will be set at the factory:

- by subtracting 5°C from the main set point

If necessary this value will however be limited to remain within the operating limits of the unit.

SETV Variable set point with remote signal

The accessory allows the set point to be varied continuously between two preset values, a maximum and a minimum, depending on an external signal that can be of the 0-1V, 0-10V or 4-20mA type.

The set point temperatures and the type of signal to use for the adjustment must be specified when ordering.

Unless otherwise specified in the order, the controller will be set at the factory with 0-10V analogue input and with the following temperatures:

- 0V will correspond to the 45 ° C set point and 10V will correspond to a 40 ° C set point

For operating conditions other than standard, unless otherwise specified in the order for the variable set point, the controller will be set at the factory:

- by subtracting 5°C (10V) from the main set point (0V)

If necessary this value will however be limited to remain within the operating limits of the unit.

LIID Limitation of the current absorbed by digital input

When this accessory is requested, a digital input is prepared in the terminal board to activate the forced capacity reduction of the unit to a set fixed level.

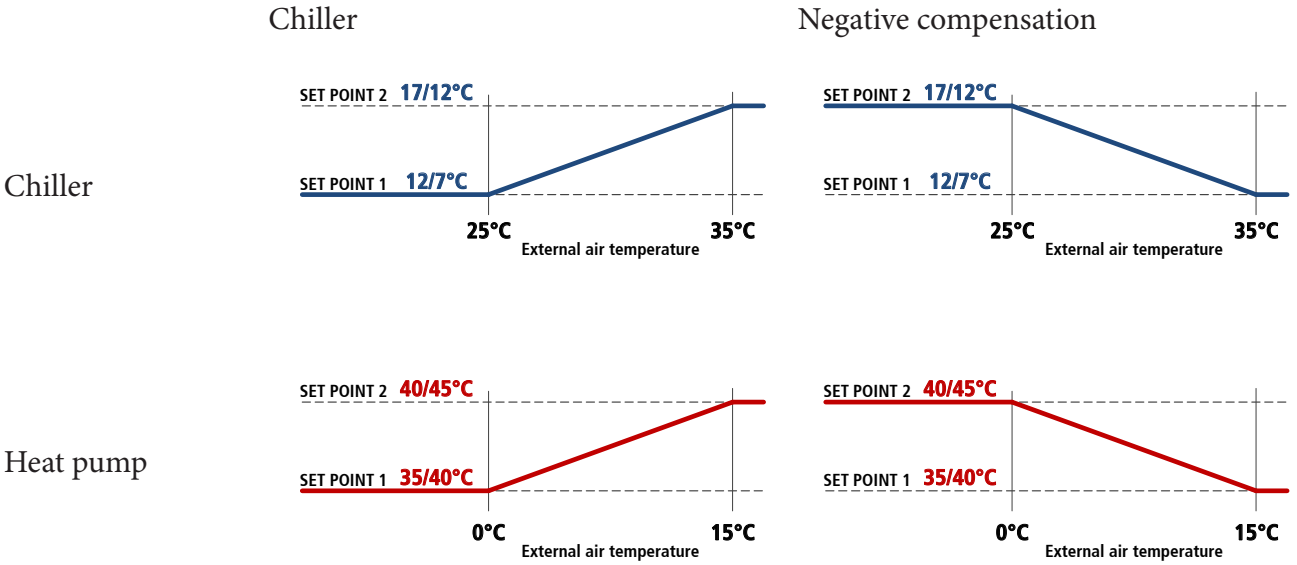
This accessory is useful when there is a need to necessarily limit the power absorbed by the unit as regards particular conditions.

We point out that, in some conditions (for example, during defrosting, oil return cycles or hourly compressor rotation procedures), the controller could force the unit to operate at full capacity for limited periods of time.

CSP Set point compensation depending on external air temperature

For units fitted with this accessory, the set point of the unit is set so that it can vary between two values, a maximum and a minimum, depending on the external air temperature. The compensation ramp and the maximum and minimum values of the set point can be changed by the user.

Unless otherwise specified in the order, the controller will be set to implement a positive compensation logic according to the temperatures shown in the following diagrams:



RMMT **Maximum and minimum voltage relay**

This accessory constantly monitors the voltage value and the unit's power supply phase sequence. If the supply voltage does not fall within the set parameters or there is a phase reversal, an alarm is generated that stops the machine to prevent damage to its main parts

TERM **Remote-controlled user terminal panel**

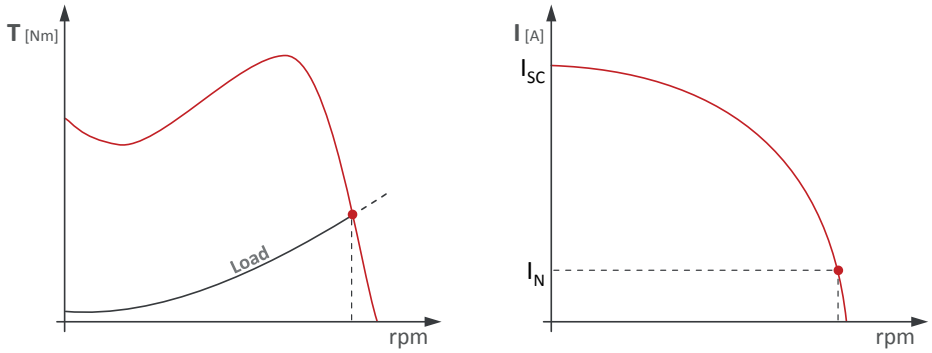
This accessory allows the terminal normally situated on the machine to be replicated on a support situated at a distance. It is particularly suitable when the unit is placed in an area that is not easily accessible.

The accessory is supplied loose and is to be installed by the customer at a maximum distance of 120m from the unit. We advise using a cable of the following type: "TECO O.R. FE 2x2xAWG24 SN/ST/PUR".

For this accessory, there is a dedicated serial port.

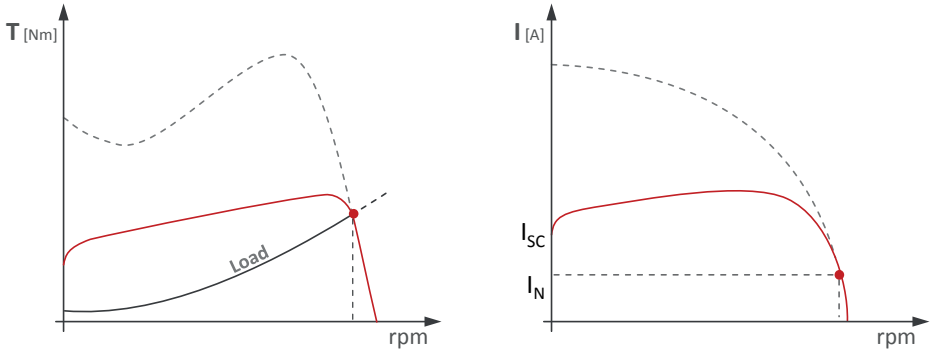
SOFT **Electronic soft-starter**

The scroll compressors have DOL (Direct On Line) starting and their torque (T) and current (I) characteristics are shown in the following diagrams:



For an individual compressor, the normal starting current ISC will be 4-5 times its rated current IN.

If the unit is equipped with the electronic soft-starter accessory, the starting of each compressor is done with an acceleration ramp that allows the effective value (rms value) of the inrush current of the individual compressor to be lowered.



R1PU **Relay for management of 1 external user-side pump**

This accessory can be requested for units without user-side pumps and allows a pump outside the machine to be controlled.

R2PU **Relay for management of 2 external user-side pumps**

This accessory can be requested for units without user-side pumps and allows two pumps outside the machine to be controlled with a running/stand-by logic by implementing a rotation on the hours of operation.

The two pumps are controlled by two separate relays.

RE1S **Relay for management of 1 external source-side pump**

This accessory can be requested for units without source-side pumps and allows a pump outside the machine to be controlled.

RE2S **Relay for management of 2 external source-side pumps**

This accessory can be requested for units without source-side pumps and allows two pumps outside the machine to be controlled with a running/stand-by logic by implementing a rotation on the hours of operation.

The two pumps are controlled by two separate relays.

COTW Outgoing water temperature control

With this accessory, outgoing instead of incoming water temperature control is used.

IA Automatic circuit breakers (instead of fuses)

This accessory requires the installation of automatic circuit breakers, instead of fuses, for the protection of auxiliary loads. Also, the same accessory uses automatic circuit breakers with adjustable thermal overload protection to protect the compressors.

RIF Power factor correction to cosφ ≥ 0.95

With this accessory, an electrical control panel (IP54 protection rating), containing power factor correction capacitors to make the cosφ of the unit greater than or equal to 0.95, is supplied with the unit. The capacitors should be connected (by the customer) to the electrical control panel of the unit in the specially prepared terminal board.

Besides reducing the absorbed reactive power, the use of this accessory also allows the maximum absorbed current to be lowered.

SFU User-side remote-controlled operating probe

With this accessory, the operating probe is to be placed on a tank outside the machine. When the set point temperature is reached in the tank, the unit also stops the pumps to guarantee the maximum energy saving.

The circulation of water in the tank to the system is to be provided by the customer.

The accessory is available only for units with built-in user-side hydraulic module or with the "Relay for management of 1/2 external user-side pumps" accessory.

ENT Energy trend

This function estimates the energy consumption and the cooling and heating production of the unit. The efficiency of the unit is calculated ("EER" for cooling operation or "COP" for heating operation).

Data are calculated in real time according to the working conditions of the unit (evaporation and condensing pressure, external air temperature).

Data are also displayed in the unit user interface in a dedicated "Energy Trend" mask.

Following data are also recorded in the logs in the controllers memory:

- "EnergyTrendHours" contains records of the values of energy absorbed and produced for each hour
- "EnergyTrendHistory" contains records of the values of energy absorbed and produced for each day

The "logs" can then be downloaded via a USB pendrive or from the WEB pages.

AS Automatic management of domestic hot water

This function enables the unit to control the temperature inside a domestic hot water storage tank and to manage a 3-way valve outside the unit (available as an accessory).

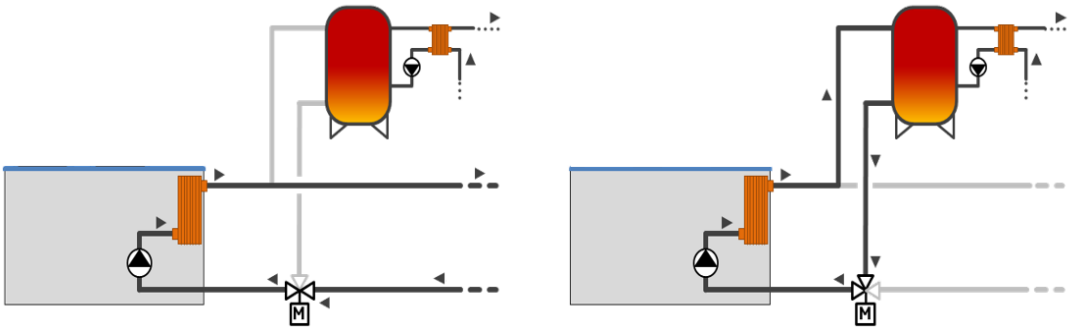
The water temperature in the domestic hot water tank is controlled through a dedicated probe situated in the tank.

Normally, the heat pump operates on the system to meet the comfort requirements of the building, but when the water temperature in the domestic hot water tank falls below a set threshold, the controller switches to domestic hot water production.

If the unit is operating as heat pump for heating, the 3-way valve will be switched and the set point changed.

Once the temperature in the domestic hot water tank has reached the set value, the unit automatically returns to producing water for the heating or air conditioning system.

Domestic hot water production is always given priority.



This accessory provides for the presence in the electrical panel of two digital inputs for disabling, respectively, the production of domestic hot water and the production of water for the heating system.

When the unit is working in "domestic hot water only" mode, the pump is normally off and is switched on only for the time required to meet the demand for domestic hot water production.

When this accessory is fitted, the machine must have control of pump operation. This means that either the unit is equipped with one of the hydronic modules available in the catalogue (therefore with at least one pump installed on it) or the relay for external pump management must be requested as accessory.

The probe to be placed in the sanitary tank is supplied with a 12m long cable. The probe is used to measure the water temperature in the hottest part of the tank, so it must be positioned in a specially prepared pocket and secured using heat conducting paste. Installation by the customer.

In case of management with variable water flow, the installation must necessarily be made with the derivation towards the domestic hot water tank upstream of any bypass valve or channel.

SV3 Signal for 3-way modulating valve

In the electrical control panel, a 0-10V output is preset to be used to control a 3-way modulating valve inserted on the hot circuit.

If the temperature of the water entering the hot exchanger is too low (for example, after the machine has been stopped for an extended period), through this signal, the controller of the unit will control the valve so as to recirculate part of the flow rate at the outlet and ensure that the unit always works within the operating limits.

The 3-way modulating valve is not included in this accessory, but can be requested as further accessory.

Network accessories

SMAR Smartlink function predisposition

This accessory makes it possible to connect the controller of the unit with the controller of a Swegon GOLD™ air handling unit via a simple serial cable, so allowing their operating logics to be merged into a single consciousness that pursues the maximum energy efficiency of the system. The RS485 serial interface is already included and dedicated to connection with Swegon units.

The option is incompatible with:

- double set point
- variable set point with remote signal
- summer/winter selection by digital input
- set point compensation depending on external air temperature
- multilogic
- all communication protocols.

SMAP Setup of Smartlink+ functions

This option is used to connect the controller in the unit with the controller of a Swegon GOLD™ air handling unit via the Ethernet port TCP/IP, so allowing the operating logics of hydronic and ventilation systems to be merged into a single logic for the achievement of maximum energy efficiency and comfort. This option is only available for units featuring an advanced controller and it is compatible with Multilogic and Hyzer systems only if the machine is the Master.

The option is incompatible with:

- double set point
- variable set point with remote signal
- set point compensation depending on external air temperature
- all communication protocols.

PSN SNMP protocol

The accessory consists of a gateway that allows Ethernet connection to a SNMP manager supervision system.

The use of this accessory causes the RS485 serial port to be unavailable.

SW4P Network switch with 4 ports

The accessory includes installation in DIN rail of a professional 4-port network switch.Requires Blueye via Ethernet.

SW8P Network switch with 8 ports

The accessory includes installation in DIN rail of a professional 8-port network switch.

Requires Blueye via Ethernet.

GLO Modbus Lonworks Gateway

With this accessory, a RS485/Lon gateway is installed inside the electrical control panel.

By default, the programming gives read-only access to the control of the unit. Reading / writing access is activable on field with a service level.

PBA BACnet protocol over IP (Ethernet)

The controller is set for use, in read and write mode, of the BACnet port on IP protocol.

By default, the programming gives read-only access to the control of the unit. Reading / writing access is activable on field with a service level.

FMx Multilogic Function

The Multilogic function allows management of up to 32 units equipped with advanced Bluethink controller and connected in hydraulic parallel with each other.

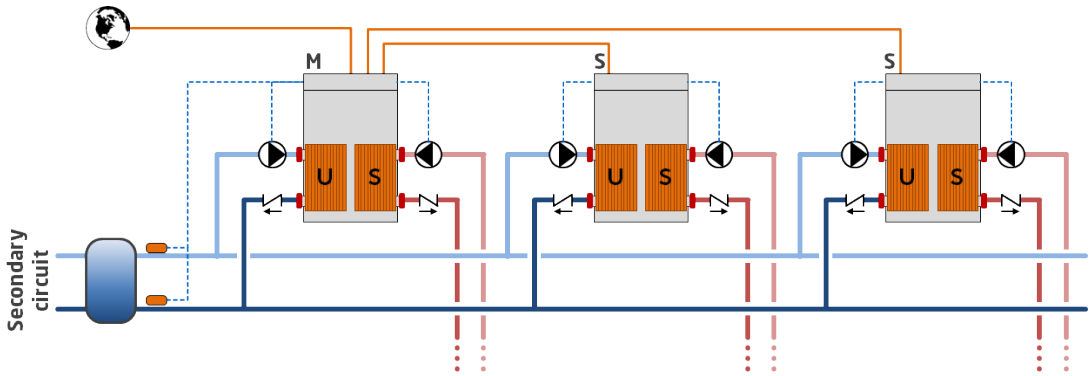
Multilogic systems only operate with the "Ipro" advanced controller and if the connected units have the same software version. A Multilogic network cannot operate with different software versions/releases.

On the basis of the information recorded by the temperature probes installed on the delivery and return manifolds of the system, with the master unit, a capacity request is generated that is distributed among the units connected in the Multilogic network according to settable priority and optimization logics.

If communication between the units fails or if the master is off-line, the slave units can continue to work according to the set thermoregulation parameters.

The connected units can be different from each other, in terms of capacity and set-up, provided the following rules are complied with:

- if there are both chiller units and heat pumps in the Multilogic network, the Master unit must obligatorily be one of the HP units
- if there are both free cooling and non free-cooling units in the Multilogic network, the Master unit must obligatorily be one of the free-cooling units.



The Multilogic function that can be requested with the unit can be:

- **FM0:** Multilogic function for Slave unit
- **FM2:** Multilogic function for Master unit for managing up to 2 Slaves
- **FM6:** Multilogic function for Master unit for managing up to 6 Slaves

If you need to connect more than 6 slaves (up to 31), you can ask for a quotation from our sales department.

For the slave units, the accessory includes:

- programming of the unit as slave of a system of machines in Multilogic network

For the master units, the accessory includes:

- programming of the unit as master of a system of machines in Multilogic network
- entering of the parameters necessary for connection with the individual slave units
- installation in the electrical control panel of a network switch to allow the units to be connected in a LAN network.
- the supply of 2 temperature probes to be positioned on the delivery and return manifold of the system (supplied separately with it, installation and wiring by the customer)

The connection between the master unit and the slave units made with a CAT cable. 5E/UTP (prepared by the customer) with RJ45 connectors. Maximum cable length 100m.

For further details, please refer to the controller manual.

BEET Blueye® via Ethernet

Blueye® is a supervision platform that enables remote monitoring of one or more units in the same system interconnected through a network with Modbus protocol.

This accessory features the Blueye device, as already installed and wired in the unit.

The critical variables to be monitored over time are identified for each connected device. These variables are sampled and saved to the cloud so that they are accessible at all times through a web portal or a mobile APP (available for Android and iOS).

The following options can be selected for connection to the internet:

- a LAN (Ethernet) connection - available in the system;
- a connection to a mobile network - at least 3G. The data SIM card is not included.

Three different types of contracts can be signed.

Blueye® Cloud Basic:

- to monitor a max. of 20 variables in total over max. 5 units/peripherals;
- to set a min. sampling frequency of 60 seconds.

Blueye® Cloud Advanced:

- to monitor a max. of 200 variables in total over max. 10 units/peripherals;
- to set a min. sampling frequency of 5 seconds.

Blueye® Connect:

- To monitor up to 10 units/peripherals.

Subscribing to any of the **Blueye® Cloud** enables:

- viewing the history of the monitored variables, in the form of both numerical values and graphs;
- downloading the history of variables in CSV format;
- the creation of automatic reports;
- setting notifications (via APP or mail) with settable thresholds for each variable;
- switching the unit ON/OFF remotely;;
- changing the set point remotely;
- selection of SUMMER/WINTER mode remotely (for reversible units only).

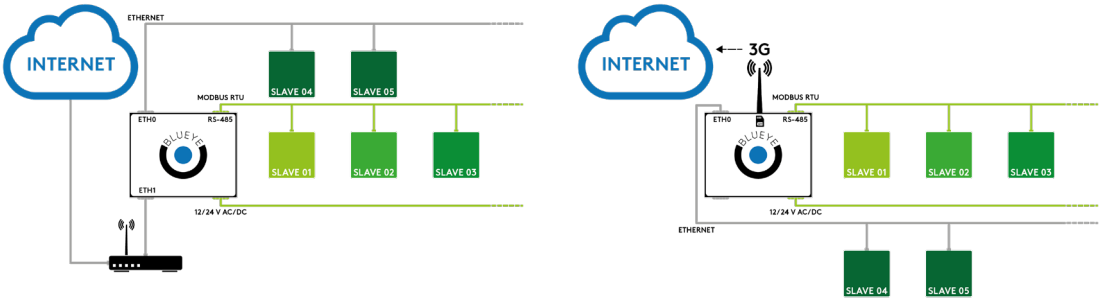
The subscription to the **Blueye® Connect** service offers the advantages below:

- a safe connection (tunnelling) between the user and the remote unit through the Blueye® portal;
- full access to the remote controller;
- real time monitoring;
- software upgrading.

Blueye® via Ethernet is only available for units supplied with an advanced controller and does not include any type of service. This service must be purchased separately based on the number of units/devices to be connected and the number of variables to be monitored. In order to connect multiple units to **Blueye® device, the network switch is required (this accessory is sold separately).**

Units can also be connected to the Blueye device through the RS485 network featuring a Modbus RTU protocol (for this option, refer to BERS accessory).

For further details, refer to the specific Blueye® documentation.



Other accessories

AG **Rubber anti-vibration mounts**

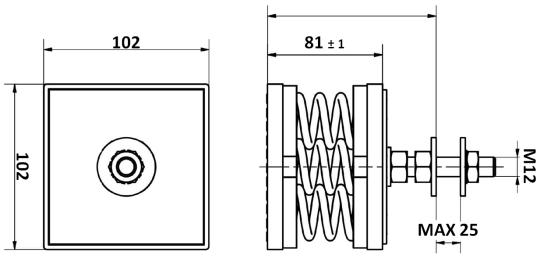
These allow you to reduce the vibrations transmitted from the unit to the surface it is standing on.

Accessory supplied loose.

AM **Spring anti-vibration mounts**

These allow you to reduce the vibrations transmitted from the unit to the surface it is standing on.

Accessory supplied loose.



GABB Packaging in wooden crate

The unit is protected by a custom-made wooden cage, including a wooden sled designed for loading into containers and a fixing system. The accessory can be used for container shipping. Loading on containers must be carried out at the factory. The accessory is incompatible with "Skid for shipping in containers".

KFW **Water filter kit**

To protect the elements of the hydraulic circuit (in particular, the exchangers), there are Y filters that can stop and settle the particles that are normally present in the water flow and would otherwise settle in the more delicate parts of the hydraulic circuit and damage its heat exchange capacity.

The kit involves the supply of a filter for each exchanger present in the machine.

Installation of the water filter is mandatory even when it is not supplied as an accessory.

Accessory supplied loose.

BOO BoosterLink

BoosterLink is the ideal solution to manage the "Temperature Booster" unit when using a Swegon heat pump as a source. The use of the "Boosterlink" guarantees the correct management of the units and prevents inefficiencies in the hydraulic system and failures.

BoosterLink consists of an independent electrical panel which contains a programmable controller with dedicated software, a 4.3” Touch interface and an Ethernet switch.

BoosterLink connects via Ethernet to the "Temperature Booster" unit and to the source heat pump unit.

Main features of BoosterLink:

- 3-way mixing valve management installed on the source side of the "Temperature Booster" in order to correctly adjust the temperature of the evaporator inlet water
- Automatic compensation of the water production set point of the "Temperature Booster" in order to avoid excessive cooling of the evaporator side circuit which could cause malfunctions on the source heat pump
- Synchronization of the start-up and shutdown phases of the 2 units ("temperature Booster" and source heat pump)
- Set-point configuration and alarm display of the two units

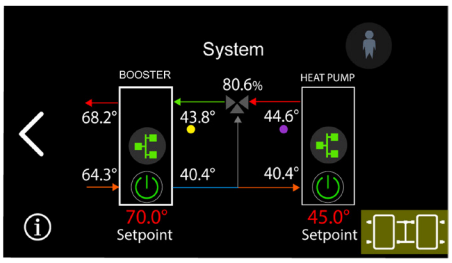
BoosterLink is equipped with a user friendly Touch interface that allows you to configure the system and monitor its operation through a synoptic that displays the user-side and source-side system water temperatures and the percentage of opening of the mixing valve.

The application with the BoosterLink manager is designed for systems for operation in combination with heating-only source (heat pump in heating mode or the hot side heat exchanger of a multi-purpose).

The source side unit must not be used for the production of chilled water, and must be equipped with the "PBL - Arrangement for connection to BoosterLink" accessory.

On the source side it is possible to use a multi-machine system with the Multilogic option. The BoosterLink will be connected to the Master unit.

On the user side it is not possible to create a multi-machine system.



V3B 3-way valve for BoosterLink

It is a modulating three-way valve complete with actuator. This valve is controlled using the "BoosterLink" accessory in order to correctly adjust the inlet water temperature to the evaporator of the "Temperature Booster" unit in systems where a Swegon heat pump is used as the source unit.

The valve and the servo control are for indoor installation and they require the ambient temperature not to drop below -10°C.

Accessory supplied. Installation by the customer.

TECHNICAL SPECIFICATIONS

SIGMA Sky OH TB R6

			7.2	8.2	10.2	11.2	13.2	15.4	17.4	19.4	22.4	26.4
Heating												
Heating capacity	(1)	kW	73.7	86	97	110	130	149	174	196	222	263
Total absorbed power	(1)	kW	18.4	21.1	23.9	27.5	32.5	37.2	42.6	48.1	55.1	65.8
COP	(1)		4.01	4.08	4.06	4		4.01	4.08	4.07	4.03	4
Compressors												
Compressors/Circuits		n°	2/1					4/2				
Minimum capacity reduction step	(5)	%	50					25				
Refrigerant charge HP	(2)	kg	12.5	13.5	14.5	15.2	16	25	27	29	30.4	32
User-side heat exchanger												
Quantity		n°	1									
Water flow rate HP	(1)	m³/h	8.1	9.4	10.6	12	14.3	16.4	19.1	21.5	24.3	28.9
Pressure drop HP	(1)	kPa	14	17	16	14	13	11	12	11	10	
Source-side heat exchanger												
Quantity		n°	1									
Water flow rate HP	(1)	m³/h	9.7	11.3	12.8	14.3	17	19.5	22.9	25.8	29	34.4
Pressure drop HP	(1)	kPa	27	26	25	21		16	17	22	18	23
Noise levels												
Sound power level heating	(3)	dB(A)	77		78	82	85	80		81	85	88
Sound pressure level in heating	(4)	dB(A)	62		63	67	70	63		64	68	71
Sound power level of vers. LN heating	(3)	dB(A)	72		73	77	80	75		76	80	83
Sound pressure level in heating (LN)	(4)	dB(A)	57		58	62	65	58		59	63	66
Dimensions and weights**												
Length		mm	1633					2017				
Depth		mm	792					872				
Height		mm	967					1880				
Operating weight		kg	560	565	590	620	640	920	935	970	1035	1090

(1) Source-side heat exchanger inlet-outlet water temperature 45/40°C; user-side heat exchanger inlet-outlet water temperature 70/78°C. Values compliant with standard EN 14511

(2) The indicated refrigerant charge is calculated. The refrigerant charge can vary according to different versions/accessories and product updates.

(3) Unit operating at nominal operating capacity, without any accessories, with source-side heat exchanger inlet-outlet water temperature45-40°C and user-side heat exchanger inlet-outlet water temperature 70-78°C.Binding values. Values obtained from measures taken according to standard ISO 3744 and to the Eurovent certification programme where applicable.

(4) Values obtained from the sound power level (conditions: note 4), related to a distance of 1 m from the unit in free field with directivity factor Q=2. Non-binding values See NOISE LEVELS section.

(5) 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.

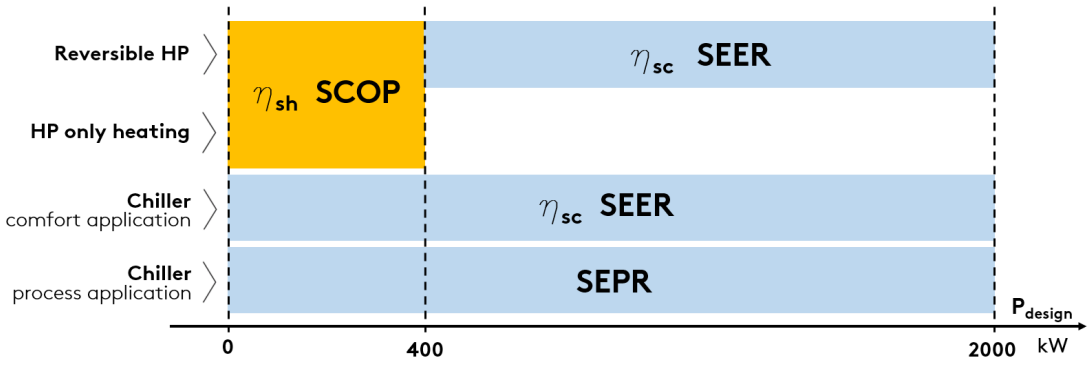
The Directive contains various regulations; as regards chiller products and heat pumps, the regulations of interest are the following:

- 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.

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	
SOURCE	**Pdesign**	**ηsc [%]**	**SEER**
air	< 400 kW	161	4,1
air	≥ 400 kW	179	4,55
water	< 400 kW	200	5,075
water	≥ 400 kW and < 1500 kW	252	6,375
water	≥ 1500 kW	272	6,875

REGULATION 2016/2281, process application

TYPE OF UNIT		MINIMUM REQUIREMENT
SOURCE	**Pdesign**	**SEPR**
air	< 400 kW	5
air	≥ 400 kW	5,5
water	< 400 kW	7
water	≥ 400 kW and < 1500 kW	8
water	≥ 1500 kW	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

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.

SIGMA SKY R6 OH TB RANGE

Specifically, as regards the SIGMA Sky OH TB range, the regulations of interest are as follows:

- regulation 2013/813 from size 7.2 to 26.4
- regulation 2013/811 for units from size 7.2 to 13.2

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

SIGMA Sky OH TB R6

			7.2	8.2	10.2	11.2	13.2	15.4	17.4	19.4	22.4	26.4
REGULATION 2013/813			-									
Standard Unit												
Pdesign	(3)	kW	38	44.3	50	56.6	67.2	77.1	90	102	115	136
ηsh	(3)	%	164	166	167.9	168.3	169.3	169.9	172.1	174.2	174.5	175
SCOP MT	(3)		4.3	4.35	4.4	4.41	4.43	4.45	4.5	4.55	4.56	4.57
Compliance	(3)		Y									
REGULATION 2013/811			-									
Standard Unit												
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.
(2) Energy efficiency class in reference to regulation 2013/811 (medium temperature applications).
(3) User-side heat exchanger water inlet/outlet temperature 47/55°C, Average climate profile, with reference to regulation 2013/813 and norm EN 14825.

ELECTRICAL SPECIFICATIONS

SIGMA Sky OH TB R6

			7.2	8.2	10.2	11.2	13.2
General electrical specifications							
Max. absorbed power (FLI)	(1)	kW	20.3	23.7	26.9	30.5	36.3
Max. absorbed current (FLA)	(1)	A	32.6	38.7	44.4	52.2	63.6
Nominal current (Inom)	(2)	A	30.1	35.6	40.4	47.8	58.8
cosφ standard unit	(2)		0.89	0.88	0.87	0.84	0.82
Nominal current with power factor correction (Inom)	(2)	A	27.6	32.8	35.6	41.8	49.7
cosφ unit with power factor correction	(2)		0.97	0.96	0.98	0.96	0.97
Maximum inrush current (MIC)	(3)	A	127.3	137.33	140.2	166.1	205.8
Maximum inrush current with soft-starter (MIC)	(4)	A	82.9	90.1	93	110.1	136.2
Power supply		V/ph/Hz	400/3~/50				
Power supply for auxiliary circuits		V/ph/Hz	230-24/1~/50				
Suggested line section	(5)	mm²	3x10 + 1G10 mm2	3x16 + 1G16 mm2		3x25 + 1G16 mm2	3x35 + 1G25 mm2
Suggested line protection	(6)		NH00gG 50A	NH00gG 63A		NH00gG 80A	NH00gG 100A

			15.4	17.4	19.4	22.4	26.4
General electrical specifications							
Max. absorbed power (FLI)	(1)	kW	40.6	47.4	53.8	61	72.6
Max. absorbed current (FLA)	(1)	A	65.2	77.3	88.9	104.5	127.2
Nominal current (Inom)	(2)	A	60.3	71.2	80.8	95.6	117.6
cosφ standard unit	(2)		0.89	0.88	0.87	0.84	0.82
Nominal current with power factor correction (Inom)	(2)	A	55.2	65.6	71.1	83.7	99.7
cosφ unit with power factor correction	(2)		0.97	0.96	0.98	0.96	0.97
Maximum inrush current (MIC)	(3)	A	159.9	176	184.7	218.4	269.4
Maximum inrush current with soft-starter (MIC)	(4)	A	115.5	128.8	137.5	162.4	199.8
Power supply		V/ph/Hz	400/3~/50				
Power supply for auxiliary circuits		V/ph/Hz	230-24/1~/50				
Suggested line section	(5)	mm²	3x35 + 1G25 mm2		3x50 + 1G25 mm2	3x70 + 1G35 mm2	3x95 + 1G50 mm2
Suggested line protection	(6)		NH00gG 100A		NH00gG 125A	NH00gG 160A	NH1gG 200A

(1) Data regarding the unit without accessories working in maximum power absorption conditions
(2) Datum related to the unit without accessories working in standard conditions
(3) Maximum effective RMS value of the current when the last compressor starts (FLA of the entire unit - FLA of the largest compressor + LRA of the largest compressor)
(4) Maximum effective RMS value of the current when the last compressor starts (FLA of the entire unit - FLA of the largest compressor + 0.6 x LRA of the largest compressor)
(5) These values are determined for cables with operating temperature of 40°C, EPR insulation and a line with a maximum length of 50m. The line section must be determined by a qualified technician based on the protection devices, the length of the line, the type of cable used and the type of installation.
(6) The correct line protection part must be determined by a qualified technician based on the length of the line, the type of cable used and the type of installation.

HYDRAULIC MODULES

SIGMA Sky OH TB R6

			7.2	8.2	10.2	11.2	13.2	15.4	17.4	19.4	22.4	26.4
Volume of the expansion vessel		l	18									
User-side hydraulic modules												
Standard pumps												
Pump model 1S, 2S			CIE 210/4				CIE 370/3	3D 40 125/2.2				3D 40 160/3.0
Available head 1P	(1)	kPa	216	210	209	201	193	213	205	199	192	221
Available head 2P	(1)	kPa	209	200	205	195	185	207	198	190	180	212
Oversize pumps												
Pump model 1PM, 2PM			CIE 210/5				CIE 370/5	3D 40 160/3.0				3D 40 160/4.0
Available head 1PM	(1)	kPa	249	244	243	236	246	259	250	243	236	299
Available head 2PM	(1)	kPa	242	234	239	231	239	253	243	234	224	291
Source-side hydraulic modules												
Standard pumps												
Pump model 1S, 2S			CIE 210/3			CIE 370/2		3D 40 125/1.5	3D 40 125/2.2			
Available head (1S)	(1)	kPa	161	158	147	156	145	138	190	180	171	142
Available head (2S)	(1)	kPa	150	153	141	148	139	130	180	167	163	130

(1) Source-side heat exchanger inlet-outlet water temperature 45/40°C; user-side heat exchanger inlet-outlet water temperature 70/78°C. Values compliant with standard EN 14511

USER-SIDE EXCHANGER FLOW RATE FIELDS

The units are sized and optimized for the following nominal conditions:

- Source exchanger inlet-outlet water temperature 45/40 ° C;
- user exchanger inlet-outlet water temperature 70/78 ° C.

The units can work at design conditions different from nominal conditions, provided that:

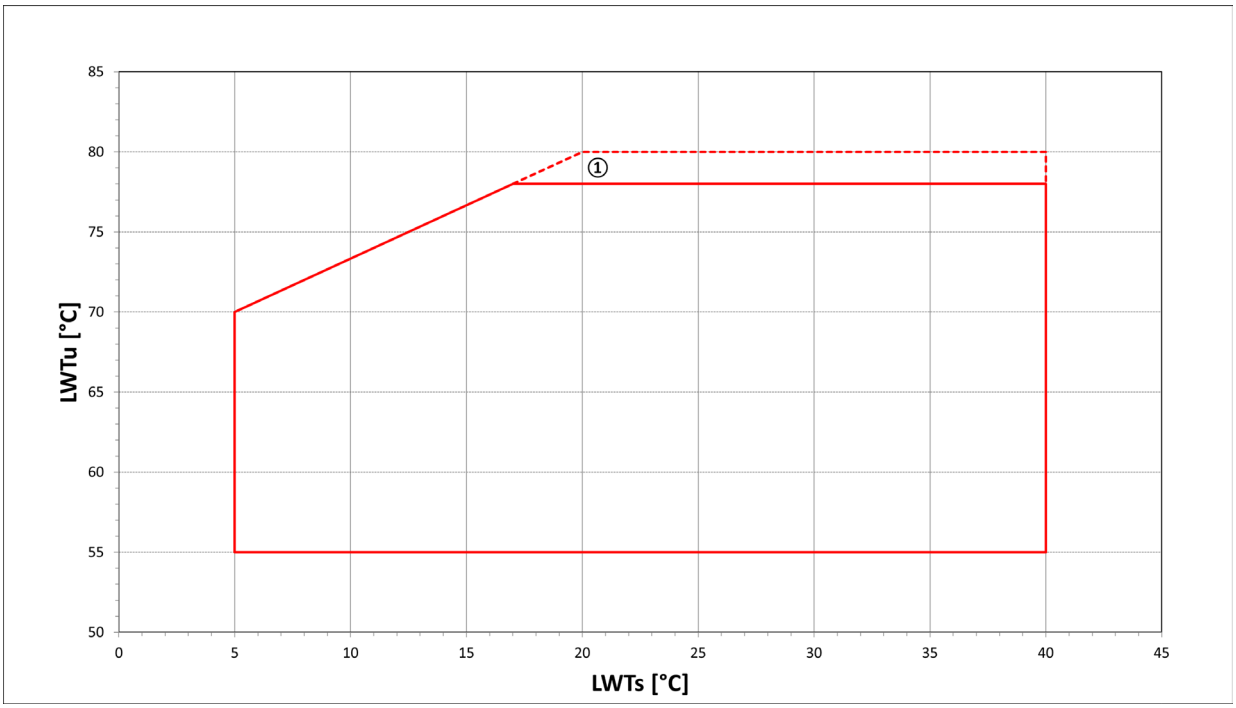
- the design condition falls within the operating limits specified below
- the unit is equipped with all the accessories necessary for operation (e.g. brine kit, fan speed adjuster)
- the flow rate at design conditions (that is, of the specific application) must always come within the allowed flow rate ranges specified below.If the design conditions require a water flow rate that does not come within the allowed operating range, you must contact our sales department that will identify the most suitable solution for the specific application.

SIGMA Sky OH TB R6

	User-side heat exchanger		Source-side heat exchanger	
	Qmin	**Qmax**	**Qmin**	**Qmax**
	m³/h	m³/h	m³/h	m³/h
7.2	4,4	14,9	5,5	13,3
8.2	5	17	6,3	15,2
10.2	5,8	19,7	6,3	17,7
11.2	6,3	24,5	7,8	21,8
13.2	7,5	29,4	8,2	26
15.4	10,6	29,8	11	26,6
17.4	12	33,9	12,3	30,5
19.4	13,9	39,4	13,7	35,4
22.4	17,4	49	15,9	43,5
26.4	20,8	58,8	16	52

OPERATING LIMITS
SIGMA SKY OH TB R6

HEATING



LWTs: water outlet temperature from the source-side heat exchanger

LWTu: water outlet temperature from the user-side heat exchanger

1: Refer to the dashed operating envelope where temperature difference between the delivery and the return temperature needs to be bigger than a 8°C.

The inlet and outlet temperatures of the user-side exchanger must be given on ordering to allow correct setting of the alarm parameters and verification of the sizing of the expansion valve.

The unit will be optimized to operate at the set point temperatures communicated to the order. For different set points, the thermal power supplied and the efficiency level of the machine could decrease as you move away from these conditions.

SIGMA Sky OH TB R6

Octave bands [dB] **Total**

	63 Hz		125 Hz		250 Hz		500 Hz		1000 Hz		2000 Hz		4000 Hz		8000 Hz		[dB(A)]	
	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp
7.2	67	51	82	66	74	59	73	58	71	56	70	55	65	49	59	43	**77**	**62**
8.2	69	53	80	64	73	58	73	58	73	58	69	54	62	47	60	45	**77**	**62**
10.2	66	50	82	66	77	62	74	59	70	55	72	57	67	51	60	44	**78**	**63**
11.2	71	55	89	73	78	63	79	64	77	62	73	57	71	56	63	48	**82**	**67**
13.2	77	61	91	75	85	70	80	65	78	63	77	62	76	60	67	51	**85**	**70**
15.4	71	54	84	67	75	58	77	60	75	58	74	57	67	50	59	42	**80**	**63**
17.4	68	51	86	69	74	57	78	61	75	58	72	55	69	52	60	43	**80**	**63**
19.4	69	52	86	69	81	64	77	60	77	60	73	56	68	51	61	44	**81**	**64**
22.4	77	60	92	75	84	67	82	65	79	62	76	59	74	57	66	49	**85**	**68**
26.4	79	62	95	78	84	67	84	67	80	63	83	66	75	58	67	50	**88**	**71**

Reference conditions: source-side heat exchanger input/output water temperature 45/40°C; user-side heat exchanger input/output water temperature 70/78°C; unit operating at rated capacity, without any option.
Lw: sound power levels.Values obtained from measures taken according to standard ISO 3744.Lw_tot is the only binding value.
Lp: sound pressure levels.Values obtained from the sound power level, related to a distance of 1 m from the unit in free field with directivity factor Q=2. Non-binding values.
The acoustic data are related to standard conditions in referable and reproducible operating conditions. All data with the exception of Lw_tot are provided for illustrative purposes only and can not be used for forecasting purposes or for the verification of binding limits.With special reference to noise emissions, the Manufacturer takes liability for their conformity, limited to the declared Lw_tot value. Any and all other Manufacturer's liability for the impact of such emissions in relation to the location of the machine and other conditions related to machine installation is excluded. The environment and the installation conditions, as well as the operating modes, can alter the sound emissions. Any assessment concerning these conditions falls within the area of competence of the plant designer and/or the fitter.

SIGMA Sky OH TB R6 LN

Octave bands [dB] **Total**

	63 Hz		125 Hz		250 Hz		500 Hz		1000 Hz		2000 Hz		4000 Hz		8000 Hz		[dB(A)]	
	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp
7.2	60	44	81	66	71	56	71	55	66	51	60	45	51	36	49	33	**72**	**57**
8.2	58	42	83	68	70	55	69	53	66	51	61	46	50	35	47	32	**72**	**57**
10.2	59	43	80	64	70	55	71	56	69	53	61	45	54	38	51	35	**73**	**58**
11.2	64	48	87	72	78	63	75	60	69	54	66	50	58	43	52	36	**77**	**62**
13.2	67	52	91	75	80	64	78	63	73	57	70	54	57	41	57	42	**80**	**65**
15.4	65	48	84	67	76	59	74	57	68	51	64	47	55	38	54	37	**75**	**58**
17.4	63	46	85	68	73	56	75	58	67	50	61	44	52	35	49	32	**75**	**58**
19.4	66	49	84	67	74	57	74	57	72	55	62	45	56	39	52	35	**76**	**59**
22.4	67	50	90	73	80	63	78	61	74	57	70	53	61	44	57	40	**80**	**63**
26.4	72	55	93	76	84	67	81	64	76	59	74	57	65	48	61	44	**83**	**66**

Reference conditions: source-side heat exchanger input/output water temperature 45/40°C; user-side heat exchanger input/output water temperature 70/78°C; unit operating at rated capacity, without any option.
Lw: sound power levels.Values obtained from measures taken according to standard ISO 3744.Lw_tot is the only binding value.
Lp: sound pressure levels.Values obtained from the sound power level, related to a distance of 1 m from the unit in free field with directivity factor Q=2. Non-binding values.
The acoustic data are related to standard conditions in referable and reproducible operating conditions. All data with the exception of Lw_tot are provided for illustrative purposes only and can not be used for forecasting purposes or for the verification of binding limits.With special reference to noise emissions, the Manufacturer takes liability for their conformity, limited to the declared Lw_tot value. Any and all other Manufacturer's liability for the impact of such emissions in relation to the location of the machine and other conditions related to machine installation is excluded. The environment and the installation conditions, as well as the operating modes, can alter the sound emissions. Any assessment concerning these conditions falls within the area of competence of the plant designer and/or the fitter.

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.

The following experimental formula allows to calculate the minimum water volume of the plant.

$$Vmin = \frac{P_{tot} \cdot 1000}{N} \cdot \frac{180}{\Delta T\ \rho\ C_p} + P_{tot} \cdot 0.25$$

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 is equal to the number of compressors installed in the unit.

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.

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 heat exchangers

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
- must allow the unit to be installed in a level position

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 to the machine before positioning the unit on the ground.

TC_0000_SIGMA Sky R6_EN_Rev01_20250314

WESTERN™
AIRCONDITIONING
WARMTEPOMPEN

BlueBox
by Swegon