



# High Performance Chillers

## Aquaflair

Uniflair chillers designed for technical cooling applications in data centers, buildings, and industrial processes

 UNIFLAIR™



[www.uniflair.co.uk](http://www.uniflair.co.uk)

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# Aquaflair

Combining cutting-edge technology with energy efficiency and environmental protection is the basis of these units. Uniflair™ chillers are designed to offer a complete solution for mission-critical installations. High energy efficiency, complete reliability, and total flexibility guarantee total cost of ownership (TCO) reduction and the integration in Tier III and IV data centers and mission-critical installations.

All the units are all-in-one for easy design and installation and completely configurable to guarantee use in multiple applications and environmental conditions for a continuous and quiet operation.

The component selection includes excellent technologies such as integrated automatic transfer switches, scroll, screw, and oil-free compressors, variable speed technology driven and monitored by the chiller microprocessor control both for compressors and for pumps.

# The solution for IT mission-critical applications

## Total cost of ownership

**High performance technological solutions.** Optimize the unit operation at any load or ambient condition, guaranteeing an extremely low power consumption.

**Integrated free-cooling system.** An efficient method for reducing the energy consumption at low outside air temperatures to assist in data center or process cooling energy optimization.

**Modular strategy.** Mechanical equipments combined with control devices allow a modular installation which guarantees to follow the growth of the site, reducing the CapEx and deferring the investment throughout the years.

**Optimized management.** Connection between the computer room air conditioners and the chillers guarantees energy maximization, based on real, instantaneous load conditions.

**Quick restart.** Full-load operation in less than three minutes with specific settings permits undersizing of the storage tanks.

**Oil-free solution.** Centrifugal compressors operating without oil minimize the energy impact of the chiller.

**Tandem compressors.** Quiet and efficient operation of compressors, connected on a common circuit for staged capacity control.

**Integrated hydronics package.** Includes all the necessary components to make one connection to the chiller without the need of external connections to auxiliary equipment, such as pumps, thus increasing the speed of deployment.

**Integrated pumps adjustment system.** Onboard variable speed drive (VSD) pumps are available for adaptation to changing conditions on-site or for continuous adjustment of the available pressure (optional).

## Serviceability

**Operational service.** Allows critical components to be maintained/replaced while the system is in operation.

**Easy service access.** Allows for all serviceable components to be replaced/maintained by easily accessible panels/doors.

**Service monitoring.** All the monitoring devices onboard the unit allow for preventative maintenance and general service during system operation.

## Availability

**Compressors.** Scroll and screw compressors utilize few moving parts for increased reliability and life expectancy.

**Oil-free solution.** Centrifugal compressors which operate without oil increase operational availability.

**Modulating compressors.** Ease the mechanical and electrical stress on compressor start-up.

**Redundant components.** Single points of failure in the system have redundant components to maintain availability and reliability.

**Dual A-B power inputs.** Draws power from the secondary line for power protection with dual feeds for redundancy (optional).

**Separate power input.** Draws power from the external UPS for mainboards and heaters to monitor and protect the unit even in complete power failure mode.

**Quick restart.** Full-load operation in less than three minutes with specific arrangements guarantees continuous chilled water availability to the data center.

**Active response controls.** Monitors and actively adjusts cooling capacity to ensure proper server inlet temperatures. Through the microprocessor controller, visibility into the operation and health of the unit is provided.

**Electronic expansion valve.** Refrigerant flow optimization at any load and temperature conditions. Continuous indirect refrigerant charge monitoring.

**Wide range for ambient temperature design.** Guarantees continuous operation at ambient temperatures from -25 °C up to 50 °C. Wider limits are available upon request.

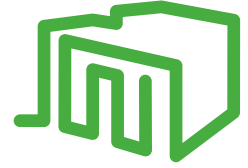
**Tier III- and IV-ready.** Units are able to be fully integrated into the latest generation of data centers for guaranteed continuous operation.

## Manageability

**Local area network.** Creates a shared communication between all available units for energy optimization and management during emergency situations.

**Building management system integration.** Units are able to send alarms and data points to a single system in order to manage critical building infrastructure from a remote location.

**Network interface.** Provides management by connecting the device directly to the network with a dedicated IP address, avoiding the need for a proxy such as a server. Monitoring is available via Web browser.



Aquaflair chillers are designed combining cutting-edge technology with extensive tests for energy efficiency and continuous availability

Energy savings, complete reliability, and total flexibility guarantee TCO reduction and integration in Tier III and IV data centers.

The all-in-one design and the complete configurability allow easy installation and tailored solutions to meet the specific needs of each critical application.

*Some of the features described may be available only for some models or configurations. Please refer to the products' technical section for details.*

# -30%

of annual energy consumption\* thanks to the integrated free-cooling.

\* Average value in a medium DC in Europe.

# 99.99%

is the reliability of Tier III and Tier IV\* data centers according to Uptime Institute certification standards.

\* Aquaflair chillers are Tier III- and Tier IV-ready design.

# The issue-free chiller solution for industrial processes

## Multiple processes adaptability

**Wide range of operation features.** Units are able to adapt to a large variety of industrial processes at any external conditions.

**Engineering-to-order design.** Cooling system design can be adjusted to fit a specific application.

**Multiple set point for water temperatures.**

Guarantees different settings for multiple processes stages such as plastic manufacturing, healthcare equipment manufacturing, and food and beverage applications.

**Wide range for ambient temperature design.**

Guarantees continuous operation from -40 °C up to 50 °C.

**Integrated hydronics package.** Includes all the components required to make one connection to the chiller, thus increasing the speed of deployment.

**High head pressure pumps.** Are available to be integrated and managed by the chiller.

**Integrated primary and secondary loop.** Enables quick and easy design and installation for all applications.

**Close control on water temperature.** Enables the use on high-precision applications like laser manufacturing or biomedical devices.

**Continuous load adaption.** Is available on the whole range to follow all phases of the manufacturing process.

**Non-ferrous materials.** Available for water circuits where ferrous materials must not be present.

**Heat exchangers treatment.** Protects air side heat exchangers in saline or aggressive environments.

## Reliability

**Safe and reliable design.** Guarantees operation in the most varied working conditions thanks to the use of cutting-edge solutions and to the availability of a wide range of accessories and options.

**Pretested and validated solution.** All units are tested at the end of the manufacturing process.

**Compressors.** Utilize few moving parts for increased reliability and life expectancy.

**Redundant components.** Redundancy is applied on the critical sections of the units to maintain availability on 24/7 operating processes.

**Electrical panel.** Units are equipped with double closure panels, certified for outdoor use and manufactured in compliance with all safety standards.

**Dual A-B power inputs.** Draws power from the secondary line for power protection with dual feeds for redundancy.

**Quick restart.** Full-load operation in less than three minutes with specific arrangements guarantees continuous chilled water availability to the data center.

**Active response controls.** Monitor and actively adjust the cooling capacity to ensure proper temperatures. Through the microprocessor controller, visibility into the operation and health of the unit is provided.

**Current monitoring.** Allows continuous monitoring of the current absorbed from the compressors to signal any difference from default values.

## Total cost of ownership

**No waste of water.** Thanks to the use of water in a closed circuit.

**High performance technological solutions.** Optimizes the unit operation at any load or ambient condition, guaranteeing extremely low power consumption.

**Undersize for storage tanks.** Quick restart allows full-load operation in less than three minutes with specific settings.

**Integrated free-cooling system.** An efficient method for reducing the energy consumption at low outside air temperatures to assist in energy optimization.

## Serviceability

**Reduced maintenance.** Closed circuit operation, proven technology, and design and test of all refrigeration circuits reduces maintenance over the lifetime of the unit.

**Operational service.** Critical components can be maintained/replaced while the system is working.

**Service monitoring.** All the onboard monitoring devices allow preventive maintenance and check of the operation while the system is working.

## Manageability

**Easy to use.** The local user terminal displays all unit settings and data points. The most used parameters are visible on the main screen.

**Network interface.** Provides management by connecting the device directly to the network or to the management system avoiding the need of a proxy such as a server.



The use of chilled water is essential in many industrial production and transformation processes.

Needs vary from heat absorption to the necessity to keep components, rooms, and working phases at controlled temperature conditions.

Reliability and easy adjustment of the cooling system to the specific application are key factors to ensure an uninterrupted production and to optimize the process reducing costs.

# -10 °C

Water inlet temperature up to 30 °C and outlet temperature down to -10 °C allow application in many industrial processes.

# ±0.2 °C

Close control water temperature guarantees use in high-precision applications like laser machineries or biomedical devices.

# Cooling and heating for innovative building systems

## Operative cost OpEx

**High efficiency technological solutions.** Optimize the unit operation at any load or ambient condition, guaranteeing an extremely low power consumption.

**Excellent performance at any load or temperature conditions.** All the ranges, and particularly the modulating units, are characterized by high efficiency at part loads or at low ambient conditions with a short payback time compared to conventional chillers, reducing consistently the operational costs.

**Modulating compressors.** VSD centrifugal compressors are able to modulate the cooling capacity to match the actual thermal load, therefore minimizing energy consumption of the chiller and requiring little to no backup water tanks.

**Heat pumps.** Allows 65 percent heating produced via renewable energy. Modulating heat pumps guarantee 30 percent reduction compared to a traditional solution.

**Heat recovery.** Optimize the energy usage in reheating and heating systems.

**Geothermal applications.** Are available for installation with complete renewable energies usage.

**Oil-free solution.** Centrifugal compressors operating without oil minimize the energy impact of the chiller.

**User-friendly control system.** Contains all necessary operating and safety controls with a simple interface and a large screen for quick and easy checks on unit operation and maintenance.

**Underflow air distribution.** Is an efficient solution to provide cooling and heating in the building.

**BMS integration.** Units are able to send alarms and data points to a single system (natively integrated with Schneider Electric SmartStruxure platform or using specific adaptor for other BMS platforms) in order to manage critical building infrastructure from a remote location.

**Innovative defrosting system.** Occurs only in necessary conditions, reducing the energy consumption on heat pumps, and improves heating operation.

**Chilled beams and radiant panels optimization.** The units are designed to operate with smart cooling and heating systems, maximizing the efficiency at the typical water set points for those applications.

**Integrated shifting set point system.** Adapts the water temperature to the ambient conditions with a consequent reduction in energy consumption.

## Investment optimization CapEx

**Low noise impact.** Allows installation in different areas, limiting the expense for noise barriers or louvers.

**Package solution.** Includes all the necessary components to make one connection to the chiller without the need of external connections to auxiliary equipment, such as pumps, thus increasing the speed and reducing cost of deployment.

**Underflow air distribution.** Enables quick and low-cost modifications of the internal building layout.

**Low starting current.** VSD and oil-free technology on compressors allow for low starting currents. A soft starter is also possible to add to the unit.

**Water heat recovery.** Integrated to provide water for sanitary uses without boilers or heaters.

**Easy and quick installation.** The units are totally assembled, cabled, and refrigerant and oil charged in the factory. They are complete with all the control and protection devices necessary. Only electrical and hydraulic connections are made on-site.

**Reduced mandatory controls.** Reduces the ordinary checks cost when compared to boilers or other.

**Tax reduction.** Is possible thanks to heat pumps or renewable energies.

**Existing plant reconversion.** Using high water temperature heat pumps (up to 55 °C water).

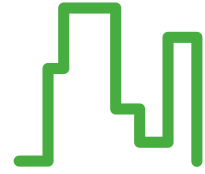
## Quiet operations

**Low noise operation.** Both standard Low Noise and optional Ultra-Low Noise versions guarantee very low acoustic impact, guaranteeing a wide range of installations, even where the noise restrictions are very tight (hospitals, hotels, etc.).

**Oil-free solution.** Magnetic bearing compressors allow extremely quiet operation.

**Variable speed fans.** Variable speed fans reduce noise impact during off-peak cooling periods. Benefits are maximized with electronic commutated motor fans, available on all the range.

**Internal installation.** Backward curved centrifugal fans are available in the middle range allowing the possibility to install the chiller inside building where the air is taken/discharged through duct or plenums.



Aquaflair systems offer an efficient, quiet, and flexible solution for buildings.

Where high performance cooling is crucial, Uniflair long experience on mission-critical installations guarantees investment optimization, short design and on-site operation, ease of maintenance, complete flexibility, and quiet operation.

Aquaflair units are usually installed in hospitals, hotels, and small and large buildings designed for smart operation.

Completely configurable units allow tailored solutions to meet the specific needs of each application.

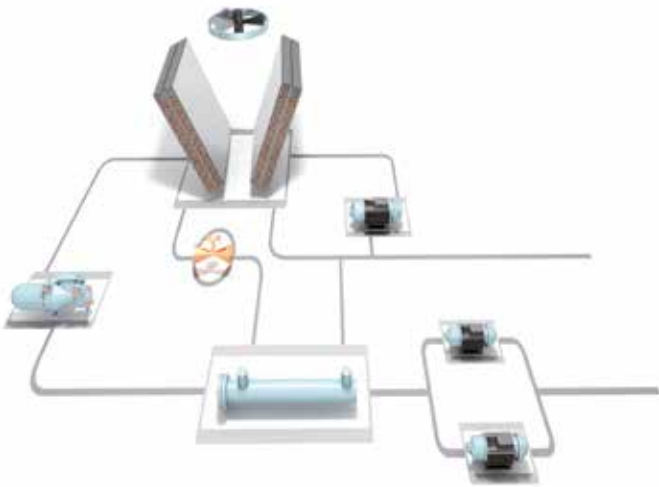
# 45 dB(A)

Is the limit for most residential areas during night.

# -30%

Is the annual energy reduction allowed by variable speed technology compared to traditional heat pumps.

# Integrated free-cooling system



Free-cooling is an efficient method to reduce energy consumption at low outside air temperatures. It enhances energy optimization in data center and process cooling.

According to the ambient temperature, the chilled water is partially or totally produced exploiting the thermal exchange with the external air. This significantly reduces the chillers' energy impact.

When the external air temperature is low enough, the microprocessor control system activates the free-cooling pump, which circulates water inside special heat exchange coils. Water is cooled by external air brought in by the fans, which, together with the pump, are the only components that absorb energy.

## Intelligent free-cooling (IFC)

Designing a reliable system means choosing units which are both intrinsically reliable and including "N+1" or "N+N" redundancy logic.

With IFC, all the available units are connected allowing chilled water to circulate through all the free-cooling coils, thus increasing the free-cooling surface and the benefit in terms of thermal dissipation:

**+7%** on Schneider Electric free-cooling\*  
**+35%** on traditional systems\*

\* Average values.

## Glycol-free installations

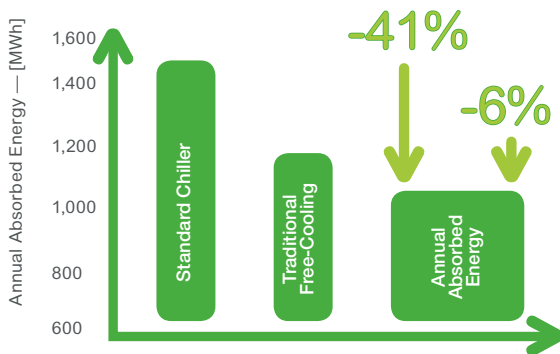
Designed for applications where the use of glycol is not allowed in the data center, this solution uses an intermediate heat exchanger to limit glycol in free-cooling circuit only, while using water in the main circuit.

The careful selection and position of the intermediate heat exchanger allows the installation of the onboard main pump too, to minimize the efficiency losses typical of intermediate heat exchangers.

**delta T = 2 °C**  
 in the heat exchanger\*

\* Average values.

## Schneider Electric free-cooling OpEx savings



		STANDARD CHILLER	STANDARD FREE-COOLING	SE FREE-COOLING
Energy consumption	kWh	1,424,766	1,193,799	1,160,297
Energy saving	%	0	19%	23%
Cost saving	€	0	-25,406	-29,092

Load: 750 kW  
 Location: Paris  
 €/kWh: 0.1  
 Design water temperature: 10 °C/15 °C

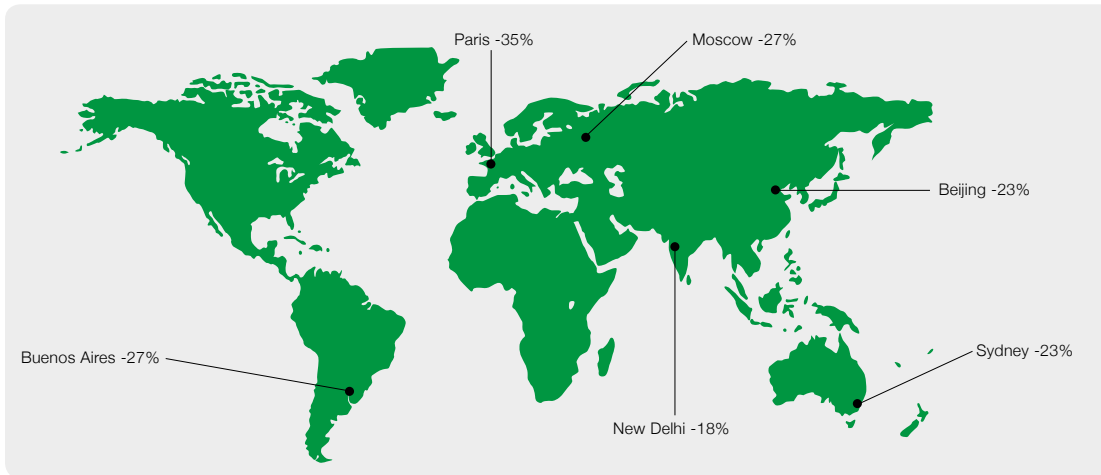
# Adiabatic cooling system

Adiabatic cooling is based on the natural process of water evaporation, to shift average suction condensing and free-cooling coils air temperature to the wet bulb conditions. As water evaporates, energy is dissipated by the air and temperature is reduced, which means operating conditions are improved and energy efficiency is maximized.

This, combined with high chilled water temperature, results in significant OPEX reduction for next generation datacenters.

Schneider Electric applies these concepts on mid-large air-cooled and free-cooling chillers.

## Energy Saving



Data comparing traditional free-cooling units at 18/24°C water temperature with free-cooling adiabatic chillers at 18/28°C water temperatures.

## Main Benefits

- The system is applicable on chillers and free-cooling chillers (>300kW)
- Improved cooling capacity with lower CAPEX (up to 10% cost saving)
- Increased efficiency in summer mode, lower OPEX (between 10 to 15% less, depending on the climatic zone)
- Extended free-cooling operation, (up to 3°C more economization hours)
- Factory fitted and tested
- Ready for standard ISO container shipping
- Easy maintenance
- Completely accessible unit

## How it's made

- Nozzles: their position has been defined in order to optimize the drops distribution
- Layout: the "V" shape arrangement for coils and free-cooling coils allows for integrated installation
- Protective filter: prevents non-evaporated water from damaging the internal components and the coils.
- Embedded control system: controls and optimizes the unit operation, including adiabatic pre-cooling.



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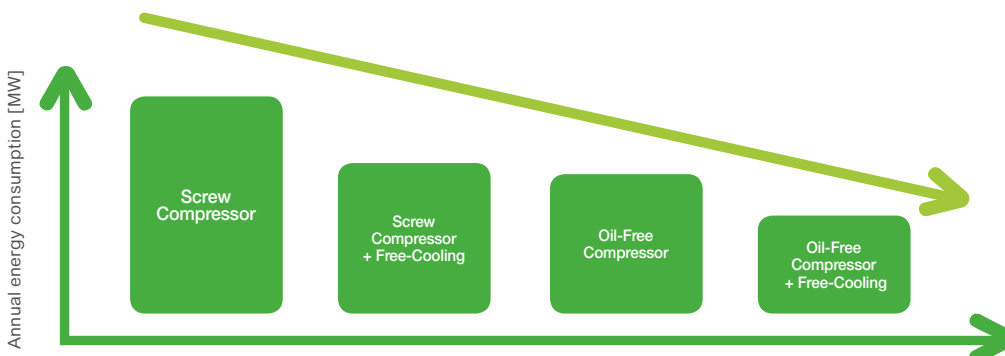
# Variable speed compressors

## Inverter scroll and oil-free centrifugal solutions

Variable speed compressors, normally driven by inverter, are among the most interesting solutions that characterize modern chillers. There are different solutions according to the application size, i.e., inverter-driven scroll or oil-free centrifugal compressors, but all of them provide a high level of reliability and may be implemented in a wide range of applications and operating parameters.

### Main benefits of variable speed compressors

- Increased efficiency at partial loads thanks to the continuous regulation of the cooling capacity and installation of the compressors on the same cooling circuit.
- Energy efficiency is maintained even during mixed-mode operation by optimizing compressor usage in conjunction with free-cooling at full load.
- Regulation of the cooling capacity over a wide operating range, i.e., from 10% to 100% continuously.
- High precision on chilled water temperatures ( $\pm 0.2$  °C), thanks to continuous regulation by means of an inverter.
- Limitation of the maximum absorbed current (LRA) since the inverter-driven compressor can always be started up at low speed.
- Limitation of noise level.
- Increased system reliability thanks to the reduction in compressor inrush current, thus reducing mechanical and electrical stress.
- Reduction or elimination of water tanks on the hydraulic lines.



Based on 1 MW free-cooling chillers at the climatic profile of Paris. Nominal conditions: water 10/15 °C, 20% glycol.

Type of chiller	100 Kw	Paris	Frankfurt	Milan	Madrid
Traditional unit	kWh	57,271	56,524	57,261	58,095
Unit with inverter	kWh	46,843	46,183	46,778	47,763
	%	-18%	-18.3%	-18.3%	-17.8%

Type of heat pump	100 Kw	Paris	Frankfurt	Milan	Madrid
Traditional unit	kWh	24,184	33,853	16,154	29,572
Unit with inverter	kWh	16,252	24,377	11,226	20,163
	%	-32.8%	-28%	-30.5%	-31.8%

Comparison of annual energy consumption of a traditional unit and a unit equipped with a variable speed compressor (note: traditional unit has two ON/OFF scroll compressors placed on the same refrigerant circuit; modulating unit is equipped with two scroll compressors, one of which is variable speed, on the same refrigerant circuit).



[Modulating water-cooled water chillers for indoor installation]

# Uniflair BCWC



## Range

Cooling capacity: 300 ÷ 1,300 kW

## Available versions

- Basic
- Sea water condensers\*

## Refrigerant R134a

Oil-free centrifugal compressors  
with magnetic bearings

## Standard features

- Self-supporting metal frame in galvanized steel finished in epoxy powders (color RAL9022).
- Between one and four oil-free centrifugal compressors with magnetic bearings equipped with:
  - Internal thermal protection
  - Protection and control of the rotation axis position
  - Brushless synchronized DC motor
  - Integrated control system
  - Speed control with inverter
  - Soft start start-up
  - Phase sequence control
  - Pre-rotation valve
  - Temperature and pressure sensors
  - Two centrifugal compressor stages
  - Anti-vibration supports.
- Single refrigerant circuit conforming to EC standards (PED 97/23/CE Directive) with copper tubing including: filter dryer, liquid sight glass, electronic expansion valve controlled by a level sensor, discharge and suction taps on the compressor, pressure switches, high and low pressure transducers, and gauges.
- Bypass line for vacuum start-up with high pressure ratio.
- Shell and tube evaporator featuring an integrated demister to prevent the formation of droplets: the exchanger is insulated with closed cell expanded polyurethane.
- Differential water pressure switch for the evaporator and the condenser.
- Shell and tube condenser.
- Electric panel conforming to EC standards. (2006/95 /EC and EMC 2004/108/EC Directives) with EMC integrated filter for protection of the harmonics, maximum internal temperature control, auxiliary transformer, general auxiliary cut-off switch, fuses on the compressors, and remote control cut-off switches.
- Line reactance for each compressor to stabilize the power supply.
- Phase sequence control and minimum/maximum power supply and voltage.
- Microprocessor control system including:
  - Continuous control of the cooling capacity by means of an inverter and IGV (inlet guide vane)
  - Local user terminal with external display
  - Outlet chilled water temperature regulation by means of an exclusive PID algorithm
  - Integrated LAN card for connecting more than one unit to the local area network
  - Acquisition and management of main electrical data
  - Direct decoding of all the compressor signals on the human interface to simplify service operations
  - Clock card.
- Microprocessor control system, in addition, allows:
  - USB card for easy download of the operating parameters
  - Management of double set point from remote control
  - Fast restart procedure
  - Free contact for general alarm and two for addressable alarms
  - Remote ON-OFF switch
  - Integrated RS485 serial card for direct connection to external BMS
  - Direct interface with serial BMS with Modbus protocol
  - Interface with main BMS protocols, such as BACnet, LonWorks, Trend, Metasys, SNMP/TCP-IP, and KNX.

\* On request.

Technical Data					
BCWC Model		0320A	0630A	0950A	1250A
Power supply	V/ph/Hz	400/3/50			
Compressors	nr. x mod.	1 x centrifugal	2 x centrifugal	3 x centrifugal	4 x centrifugal
Evaporator	nr. x mod.	1 x flooded			
Condensers	nr. x mod.	1 x shell and tube			
Cooling only unit (BCWC)					
Cooling capacity (1)	kW	320	630	950	1250
Absorbed power (1)(2)	kW	67,5	133,8	198,0	258,3
EER (1)(2)		4,74	4,71	4,80	4,84
Noise Pressure Levels					
Noise pressure level (3)	dB(A)	67,3	70,3	72,1	73,3
Dimensions					
Height	mm	2028	2130	1924	1924
Depth	mm	1061	1022	1544	1505
Width	mm	2640	2940	3294	4591

1. Data refer to nominal conditions: evaporator in/out temperature 12/7 °C, condenser in/out temperature 30/35 °C, glycol 0%, refrigerant R134a, fouling factor 0.0 m<sup>2</sup> °C/W

2. Data refer to total absorbed power

3. Data refer to free field at 1 meter from the unit operating without pump at nominal conditions, Q=2 directional factor. At different conditions and with different configurations, noise values may vary

\* Data are currently under revision and must be confirmed by Schneider Electric

### Construction options

- Separate power supply for control board and heaters / Quick restart included (full load capacity within 3 minutes)
- Double power supply with automatic integrated management on the active line and integrated condenser for control. /Quick restart included (full load capacity within 3 minutes)
- Condenser for sea water use\*.
- RS485 serial card for connection to Uniflair supervision system or an external BMS.
- LON FFT-10 serial card for connection to an external BMS with LON protocol.

\* On request.

### Options

The units can be supplied with the following external accessories:

- Remote user terminal PDG1 (up to 200 meters with shielded cable) for:
  - Entering of commands
  - Display unit status of alarms
- Additional RS485 serial adaptor used to communicate with external BMS.
- LON FTT-10 serial adaptor used to communicate with external BMS managed with LON protocol.
- TCP/IP serial adaptor used to communicate with external BMS managed with SNMP protocol.
- Neoprene anti-vibration supports.