

Instruction manual

Uniflair

BCEC

Air-cooled water chillers

BCEF

Air-cooled water chillers with free-cooling system



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The technical data in this manual is not binding. The pictures shown in this manual are intended to describe and illustrate the product. Therefore they may differ from the specific model chosen. Uniflair pursues a policy of constant technological innovation and reserves the right to modify the characteristics shown without prior notice. All rights are reserved. Any reproduction, even if partial, is forbidden.

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General Instructions

Information included in this manual

This manual describes the BCEC air-cooled water chiller and the BCEF air-cooled water chiller with the free-cooling system.

This manual provides general information and regulations concerning safety, transportation and installation of the units, including all use instructions.






It is an integral part of the unit.

The descriptions and illustrations in this publication are not binding; the manufacturer reserves the right to make modifications that may improve the product without updating this document.

The illustrations and images included in this manual are only examples and may differ from practical situations.

Conventions

The graphic and language conventions used in this manual are listed below:

	ELECTRICAL HAZARD: Indicates an electrical hazard that if not prevented could cause injury or death.
	CAUTION: Indicates a hazard that if not prevented could cause injury or death.
	CAUTION: Indicates a potentially hazardous situation, that if not prevented could damage equipment or other goods.
	NOTE: Indicates important information.
	Indicates that more information is available on the same subject in other parts of this manual or on other documents.

Storage

Follow the instructions below if the appliance is new and needs to be stored for a long period:

- the packaging must be intact;
- the place of storage must be dry (<85% RH) and in the shade (-15 +50 ° C).

Setting aside

The appliance must be packed if it is to be set aside for a long period.

Scrapping

The appliance is mainly made of recyclable materials that must be separated before disposal.

Safety

General instructions



WARNING! Removal or tampering of safety devices is an infringement of the EU SAFETY REGULATIONS.

The manufacturer declares that this product complies with the following European directives:

- 2006/42/CE
- 2006/95/EC
- 2004/108/CE
- 97/23/CE

The manufacturer is liable for safety, reliability and performance of the machine if:

- repair operations have been carried out by personnel authorized by the manufacturer;
- the electrical system of the installation complies with the regulations in force;
- the unit is installed and used in accordance with the instructions in this manual;

Carefully read the instruction manual before using or carrying out any maintenance work on the units.

Installation, maintenance and use of the unit must be carried out in compliance with all workplace safety regulations.

The operator assigned to the above mentioned services must have the expertise required and must be acquainted with the devices.

The manufacturer cannot be held liable for damage to persons or goods resulting from non-compliance with safety standards.

Lifting and transportation warnings

Unit lifting and transporting operations must be performed by skilled personnel according to the methods described in the respective chapters.

The load should always be solidly anchored to a bearing element of the lifting and transportation means.

No person should be near suspended loads and however never in the field of action of the crane, forklift or any other lifting and transportation means.

Take all precautions required by safety regulations in order to prevent damage to persons or goods.

Installation warnings

Any work on the electrical system must be performed only by expert and qualified technicians.

If required, earthing of the devices must be checked by qualified personnel using suitable equipment.

Use warnings

Do not use the machine for purposes other than those for which they are intended and for which they have been designed.

Safety warnings for maintenance

All repairs must be performed by qualified personnel authorized by the manufacturer and professionally qualified.

Disconnect the machine from the power supply before carrying out maintenance.

All the operations that fall within ordinary maintenance have been taken into account while drawing up this manual.

Do not to perform any service that is not specified in this manual.



This equipment is subject to the European Community Directive 97/23/EC for Pressure Equipment.

This equipment has been subjected to risk assessment according to Directive 98/37/EC (Machinery Directive 89/392/EC) and the technical solutions adopted during design are listed in its Technical File.

This machine is under the EU Directive 97/23/EC for pressure vessels.

Any work on the pressure circuit must be expressly authorized by Uniflair and personnel must be approved by Uniflair.

If any of the following components: compressors, liquid tanks, safety valves, pressure switches for cooling need to be replaced, it is essential to communicate to Uniflair the serial number of the new device and the one of the device replaced, otherwise Uniflair cannot guarantee integrity of the equipment.



Moreover, if you need to repair any welded joint on the site, Uniflair must be immediately informed on which joint needs to be repaired and the name of the technician who will perform the repair.

This unit contains cooling gas circuits and pressurised cooling water, electrical components, hot surfaces, sharp edges (the fins of the finned coils) and rotating devices such as fans.



All service and maintenance activities that require entering inside the unit must be carried out by qualified and skilled personnel aware of all safety precautions that are to be taken.



Before entering inside the unit, disconnect it from the power supply.



Within the meaning of the EU directive 94/9/EC these machines are not suitable for use in potentially explosive atmospheres.

In case of fire, do not use water and other conductive substances to extinguish the flames near electrical components. This warning must be displayed on the instructions available where the unit is installed.

The coolants decompose if they get in contact with fire producing acids and other irritants. The smell of these substances, even when the concentration is below danger levels, gives a warning soon enough to allow the evacuation of the area.



Make sure that the power supply of the unit is the same as the one indicated on the plate.

The Free Cooling system must be filled with an antifreeze mixture.

If the unit is equipped with an optional heating cable, it must be turned off without disconnecting the main power supply.

Install a metal filter in the length of the piping near the entrance of the machine to prevent the heat exchanger from getting clogged by welding residuals or metal debris coming from the main water network.

Install a flexible coupling in the section of pipe near the entrance of the machine in order to prevent the transmission of vibrations and to compensate thermal expansions.

Low outdoor air temperature

Units without free-cooling: drain all water from the system before the winter season in order to prevent freezing.

In periods when the outdoor temperature falls below 0 ° C, empty the unit in order to avoid severe damage caused by the formation of ice.

This precaution is not necessary if the unit is filled with suitable antifreeze.

The air-cooled water chillers with free-cooling system must be filled with antifreeze.

Identification plate







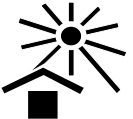






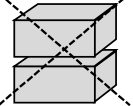
The unit is identified by the data plate on the switchboard of the machine. The model and the accessories installed are marked with an "X" in the corresponding box.

The label includes the following data:

- model and serial number of the machine
- type of power source
- current absorbed by the unit and by each component
- power absorbed by the unit and by each component
- type and amount of coolant (in kg) of each circuit

TENS.		400V/3Ph50Hz		ALRC 230/24		VOLT		SERIAL No.	rev.
		NO.	TENS.	ON	FLA	LRA	kW TOR		
		(/0)	(/0)	(/0)	(/0)	(/0)	(/0)		
COMPRESSOR 1		1	400/3	100,0	210	231	130,0	API	STOP: 10,0 bar; MAN. RESET.
COMPRESSOR 2		1	400/3	100,0	210	231	130,0	VSA	SAFETY VALVE ORNATE 20 bar
COMPRESSOR 3		1	400/3	100,0	210	231	130,0	VSB	SAFETY VALVE ORNATE 16 bar
FANS (STD.)		16	400/3	4,3			32,0		
FANS (EC)		16	400/3	4,5			45,8		
<input type="checkbox"/> PUMP (OPTION)		1+1	400/3		42	375	25,0		
<input type="checkbox"/> FREE-COOLING PUMP		1	400/3		34	306	20,5		
								<input type="checkbox"/> R314a	
								FACTORY CHARGE	
								kg, ORC. 1	
								Isc=160A (CEIEN 00947-2)	
								(*) nominal absorbed power	
								<input type="checkbox"/> BCEE1103A (VENT. STD. - STD. FANS)	
								422+25 PUMP (OPTION)	
								<input type="checkbox"/> BCEE1103A (VENT. EC - EC FANS)	
								435,76+25 PUMP (OPTION)	
								<input type="checkbox"/> BCEE1103A (VENT. STD. - STD. FANS)	
								442,5+25 PUMP (OPTION)	
								<input type="checkbox"/> BCEE1103A (VENT. EC - EC FANS)	
								455,26+25 PUMP (OPTION)	
TOTAL (kW)	MOD.								

Signs applied on the machine and on the package

	PERICOLO
	IMPORTANT NOTICE
	HIGH VOLTAGE – ELECTRICAL SHOCK HAZARD
	FRAGILE: handle with care.
	KEEP AWAY FROM HUMIDITY: the unit packed for storage must be kept in a dry place.
	CENTER OF GRAVITY: indicates the centre of gravity of the packed unit..
	KEEP AWAY FROM HEAT SOURCES: the unit must be kept away from all heat sources.
	PARTS IN MOTION
	HOT SURFACES- BURN HAZARDS
	SHARP SURFACES
	THIS SIDE UP shows the correct position of the packed unit.
	TEMPERATURE RANGE: the unit must be stored within this temperature range.
	DO NOT USE HOOKS: do not use hooks to lift the unit
	DO NOT STACK the units one upon the other.

Main parts

Size		0301A	0401A	0532A	0632A	0752A	0903A	1103A
Power supply	V/ph/ Hz	400/3/50						
Coolant		R134a						
Fans	Nr	6	6	8	10	12	14	16
Standard motor	Type	Axial AC						
	Poles	6						
EC Motor	Type	EC axial (electronically commutated)						
Cooling circuit	Nr	1						
Compressors	Nr	1	1	2	2	2	3	3
	Type	Centrifugal ,oil free, magnetic levitation						
Evaporator	Type	Shell and tube flooded						

Dimensions and weight

BCEC-F		0301A	0401A	0532A	0632A	0752A	0903A	1103A
Height ^(*)	mm	2510	2510	2510	2510	2510	2510	2510
Depth	mm	5000	5000	6430	7860	9290	10720	12150
Width	mm	2200	2200	2200	2200	2200	2200	2200

Weight (BCEC)								
Weight (basic version without hydraulic kit) ^(*)	kg	3568	3817	4811	5465	6041	7511	8635
Weight (basic version only with side connections) ^(*)								
Weight (basic version with qty 1 pump) ^(*)	kg	3769	4017	5012	5664	6238	7801	8919
Weight (basic version with qty 2 pumps) ^(*)	kg	3934	4182	5178	5832	6406	8088	9209

Weight (BCEF)								
Weight (basic version without hydraulic kit) ^(*)	kg	4317	4763	5902	6571	7559	9358	10712
Weight (basic version with qty 1 pump) ^(*)	kg	4517	4963	6101	6772	7761	9648	11002
Weight (basic version with qty 2 pumps) ^(*)	kg	4682	5128	6265	6938	7926	9941	11289

^(*) with hydraulic circuit empty

^(*) without antivibration supports

Installation

Transportation and handling

Move the unit as close as possible to the installation site before removing the packaging. The unit should be lifted using the equipment and procedures described in the drawings of the attached documents.

Check the drawings attached to the unit or the ones relating to the installation included in the machine documents.

The dimensions of the unit are provided on the technical data tables and on the installation drawings included.

Receipt and storage of the unit

Each unit leaves the factory in perfect conditions. Be sure to check the unit carefully upon delivery and inform the shipping company in writing if there has been any damage during transportation.



Observe the storage temperature: -15 ° C +50 ° C.

Check that the load capacity of the floor is sufficient to bear the weight of the unit.

The unit must be placed on a sturdy and level surface. Once positioned, level the unit with a spirit level by adjusting the feet and adding wedges if necessary: in any case the slope shall not exceed 0.5 degrees.

The unit must not be positioned on a side and it must not be turned upside down.



How to position the unit – work space

To lift the unit refer to the drawings attached to the documents.

This unit is designed for outdoor installation and therefore, with a free flow of air to the condensing coil.

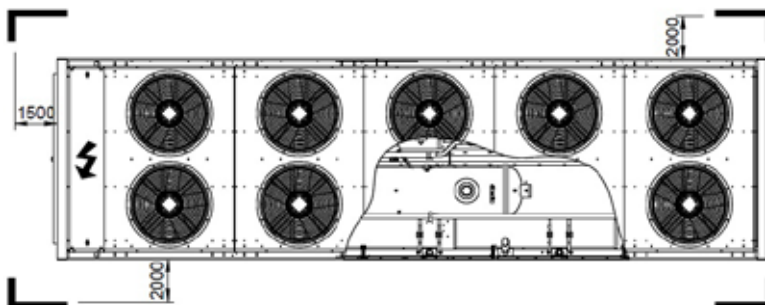
The flow of air drawn in by the fan through the condensing coil should not be obstructed, as to not affect adversely the efficiency of the unit and to prevent intervention of the safety devices.

In any case, the safety standards on the installation site must be respected and the same applies to the minimum distances indicated in the figure.

These elements must also be respected in order to facilitate maintenance.

Avoid installation in confined spaces (in this case, contact the manufacturer for technical solutions.)

The rubber or spring suspensions (both optional) reduce the transmission of vibrations to the supporting slab.



Note: Dimensions are in mm.

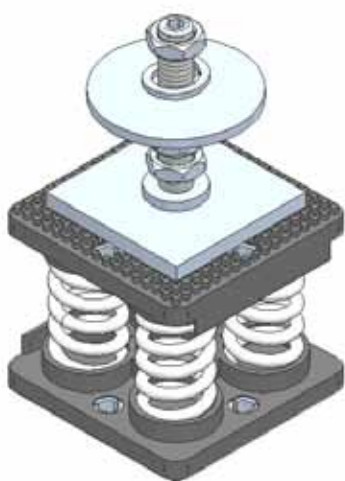
Anti-vibration supports



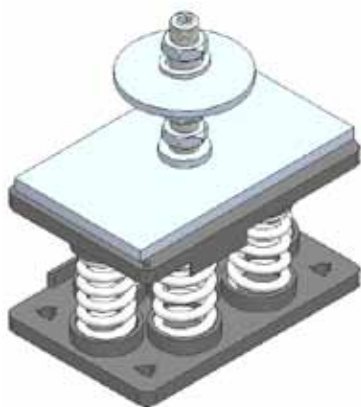
Check unit positioning on the roof / floor. The unit must be placed on anti-vibration supports (rubber or springs depending on the type of application) in order to reduce levels of vibration. The unit must be positioned perfectly horizontal.



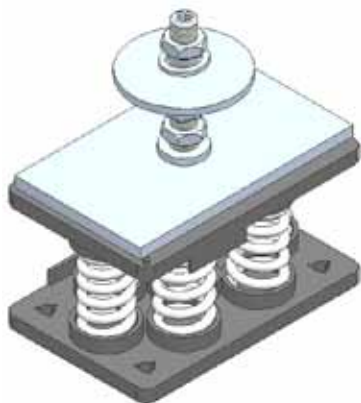
For the capacity, location and the amount of supports see the installation drawing included in the box.



Quantity of springs	qty	5
Height	mm	163
Materials	Spring	Harmonic steel
	Base	Galvanized steel + polymer coating
	Plate	Galvanized steel
Maximum deflection	mm	18,6
Average deflection	mm	12-15
Frequency	Hz	4-5
Maximum capacity	Kg	833
Elastic constant	Kg/mm	44,8



Quantity of springs	qty	8
Height	mm	165
Materials	Spring	Harmonic steel
	Base	Galvanized steel + polymer coating
	Plate	Galvanized steel
Maximum deflection	mm	18,6
Average deflection	mm	12-15
Frequency	Hz	4-5
Maximum capacity	Kg	893
Elastic constant	Kg/mm	48



Quantity of springs	qty	8
Height	mm	165
Materials	Spring	Harmonic steel
	Base	Galvanized steel + polymer coating
	Plate	Galvanized steel
Maximum deflection	mm	18,6
Average deflection	mm	12-15
Frequency	Hz	4-5
Maximum capacity	Kg	1406
Elastic constant	Kg/mm	75,6

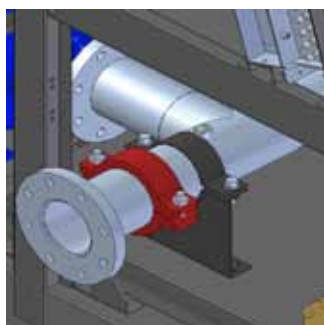
Hydraulic connections

For hydraulic welded piping use the piece of pipe with Victaulic roll supplied with the unit or connect the unit directly using Victaulic roll grooved pipes and Victaulic jaws, making sure that the gaskets are properly inserted and fixed.

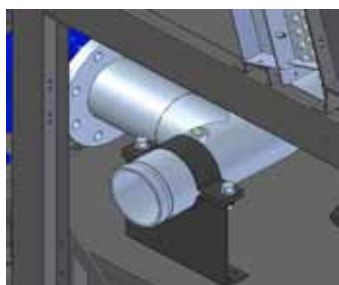
BCEC-F	0301A	0401A	0532A	0632A	0752A	0903A	1103A
Main hydraulic connections	5” OD 139,7					6” OD 168.3	
Type	Victaulic						

BCEF	0301A	0401A	0532A	0632A	0752A	0903A	1103A
Intelligent free-cooling hydraulic connections	DN 100					DN 125	
Type	Flanged						

Example of flanged water connections



Example of Victaulic water connections



- Verify that the section of the chilled water piping and the characteristics of the circulation pump installed are appropriate: a poor water flow rate reduces the cooling capacity of the cooler.

- verify the direction of the water flow. The unit is provided with labels that clearly indicate the evaporator water input / output connections as shown in the figures below.

- connect the chiller with flexible or elastic joints to avoid the



WATER INLET










WATER OUTLET

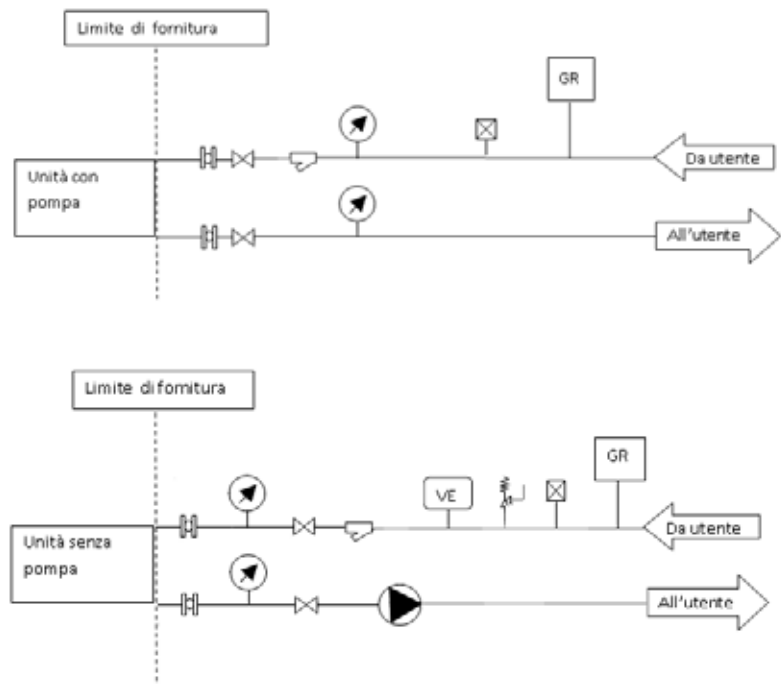
transmission of vibrations and by inserting the shut-off valves that allow isolating the machine from the hydraulic circuit;

- insulate the chilled water pipes to prevent condensation;
- insert thermometric wells on the piping near the input and output connections;
- install a metal filter in the section of the pipe near the entrance of the unit to prevent welding debris or rust from entering the heat exchanger;
- prepare drainage well, so that the unit can be emptied.

Example of unit installation with or without a pump

Legend

VE	VASO DI ESPANSIONE
GR	FILLING
	PUMP
	AUTOMATIC AIR VALVE
	ELASTIC COUPLING
	SAFETY VALVE
	VALVE
	MECHANICAL FILTER
	PRESSURE GAUGE

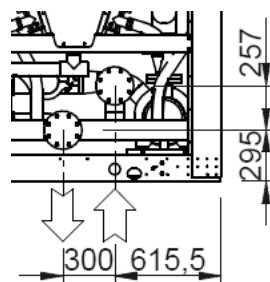
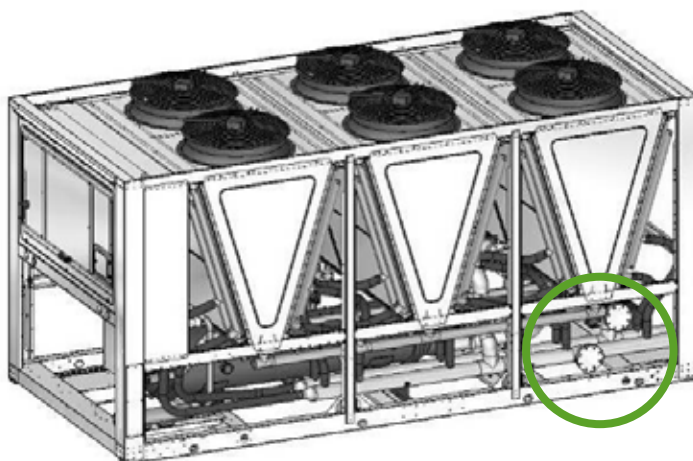


Intelligent free-cooling connection positions

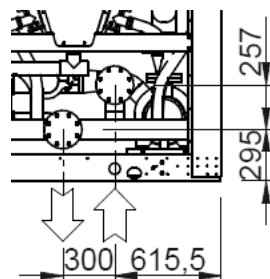
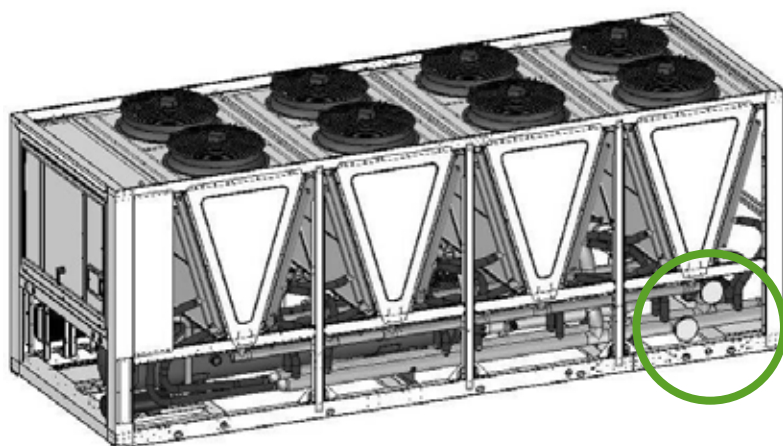


connect the intelligent freecooling paying attention to leave it clear from slags and residual

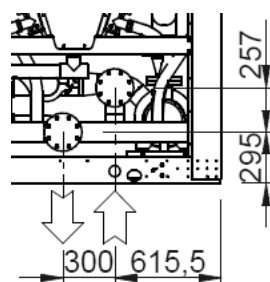
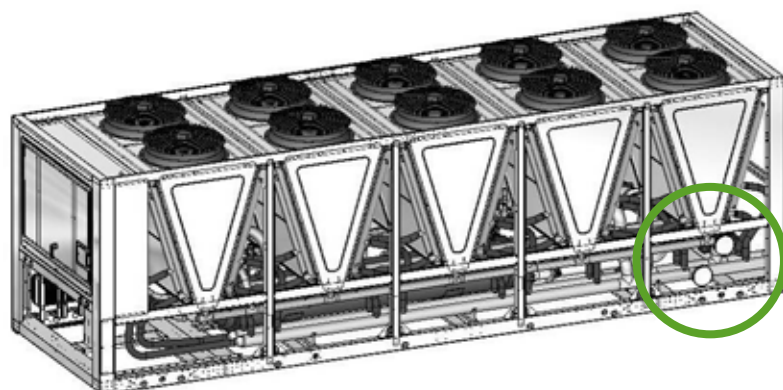
BCEF 0301-0401



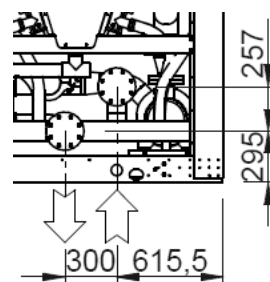
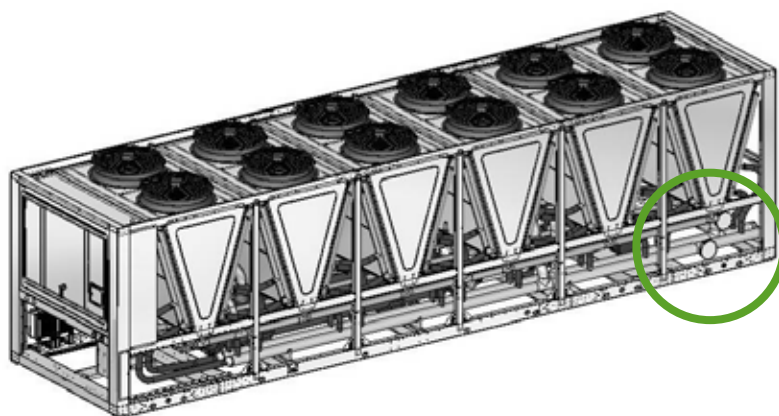
BCEF 0532



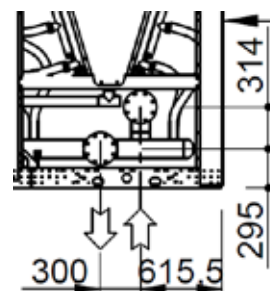
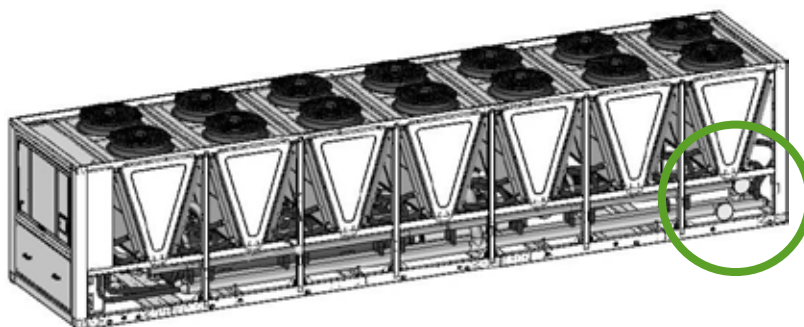
BCEF 0632



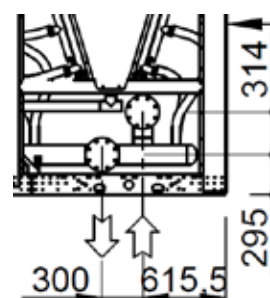
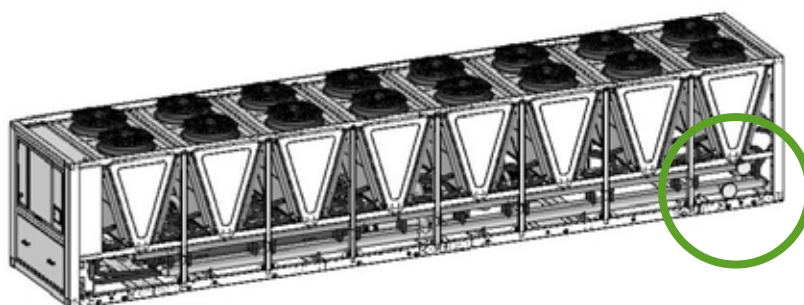
BCEF 0752



BCEF 0903



BCEF 1103



How to fill up the hydraulic circuit



The machine has been designed to cool fluids like water or aqueous mixtures of ethylene glycol or propylene glycol. The use of different fluids could cause corrosion and deterioration.



The machine is not suitable for operation in harsh industrial and civilian environments.



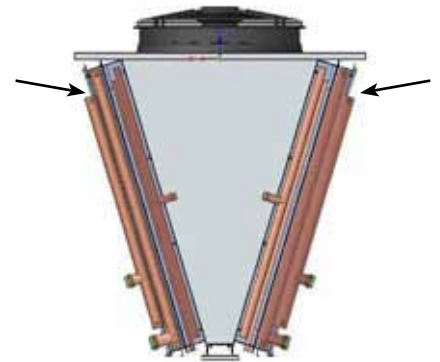
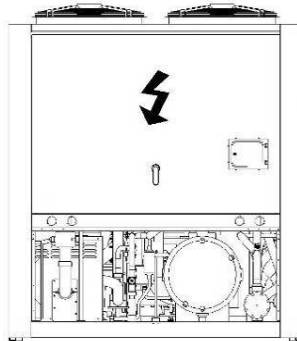
The water filled into the hydraulic circuit must be filtered.



The hydraulic circuit must be filled by a qualified plumber.

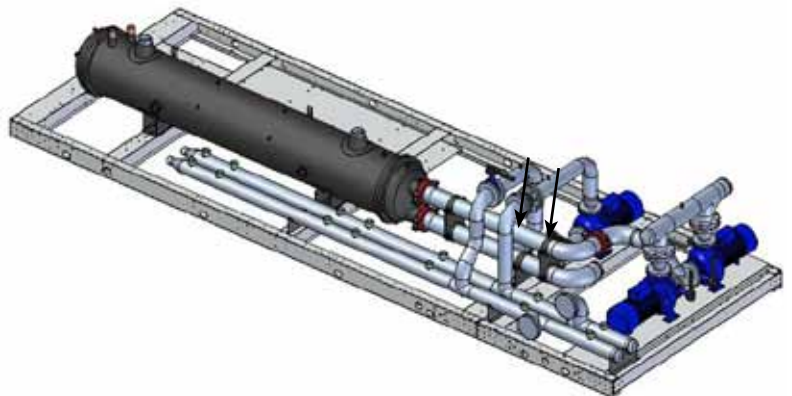


Before performing any operation, check that the system is disconnected from the power supply mains.



To avoid the risk of freezing the stagnant water in the free-cooling circuit, you must start the free-cooling pump while filling glycol.

While filling the free-cooling circuit it is also necessary to vent the pipes above the pump to prevent cavitation and consequent damage.



Empty the hydraulic circuit and add the necessary amount of glycol to the water that remains inside the machine if the unit is to be placed out of service during the winter.

The mixture of water and glycol can be cooled down to -15 °C provided that the water inside the circuit contains enough anti-freeze to prevent freezing in the evaporator.

Temperature of the fluid with the unit in operation	5,0 °C	3,0 °C	-5,0 °C	-10,0°C	-18,0°C	-28,0°C
Freezing temperature	0 °C	-4,4 °C	-9,6 °C	-16,1°C	-24,5°C	-35,5°C
Percentage of ethylene glycol by weight	0%	10%	20%	30%	40%	50%

Corrosion resistance of the exchangers

The following table shows some substances that if present in the water inside the hydraulic circuit can generate the phenomena of pure copper corrosion.

The table shows a list of substances that may cause corrosion problems. This table cannot assure that this phenomenon will not occur since several and complex chemical reactions are involved in each situation.



The following data cannot take into account the effects due to possible organic pollution in the water, therefore the manufacturer cannot be held liable.

Shell and tube heat exchanger, pipes and flooded heat exchanger	Approx. Area of concentration	Compatibility with standard heat exchanger
	[mg/l]	
Ph values	7 ÷ 9 (Value)	OK
Chloride Cl^-	< 3 3 ÷ 50	*
Free chloride Cl_2	<0, 5	OK
Sulphates SO_4^{--}	< 50 50 ÷ 100	OK *
Free carbon dioxide CO_2	< 5 5 ÷ 50	OK *
$\text{HCO}_3^- / \text{SO}_4^{--}$	> 1 (Value)	OK
Nitrates	< 100	OK
Hydrogen sulphide H_2S	< 0,05	OK
Oxygen O_2	< 0,1 0,1 ÷ 2	OK *
Ammonium NH_4^+	<2 2 ÷ 20	OK *
Phosphates PO_4^{3-}	< 2	OK
Iron and Manganese $\text{Fe}^{3+} / \text{Mn}^{++}$	< 0,5	OK
Organic deposits	0 (Value)	**
Hardness	4 ± 8,5dH	OK

Nominal performance data calculated with a fouling factor of 0.043m² °C / kW

* Corrosion Problems can arise especially if more factors are present contemporarily.

** Their presence may cause corrosion problems especially in particular situations

Electrical connection



The connection to the electrical power supply must be carried out by a qualified electrician.



The power supply main must be prepared in compliance with IEC standards.



Disconnect the power supply line from the mains before making the electrical connections. Also make sure that the power supply cannot be reconnected during the works.



Disconnect the electrical power before accessing internal components.

Follow the instructions below to connect the machine to the electrical power:

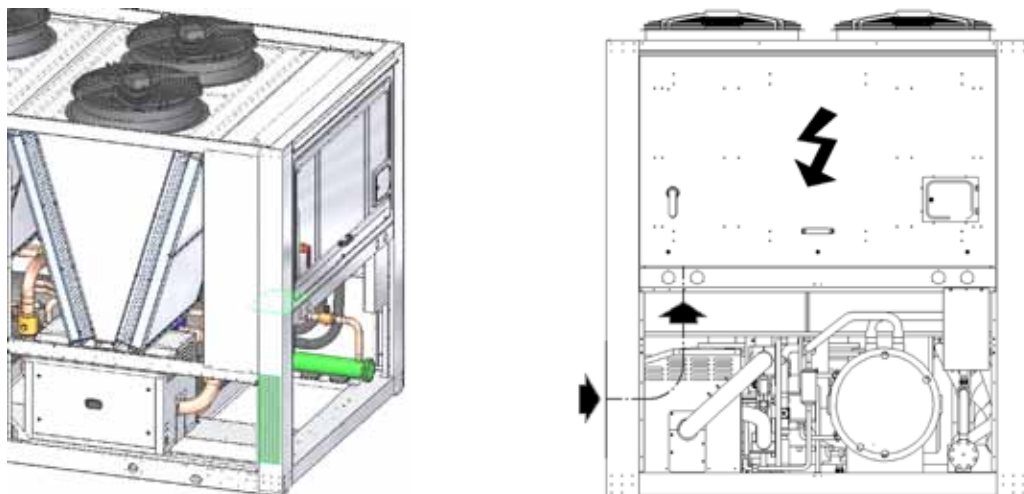
- check perfect efficiency of the earthing system with appropriate instruments;
- check that the voltage and frequency correspond to the ones of the machine (see the identification plate);
- open the switchboard door;
- remove the plastic shield of the switchboard.

There is a flange on the left of the switchboard base and two holes on the right side that allow the passage of the power supply and signalling cables of the switchboard:

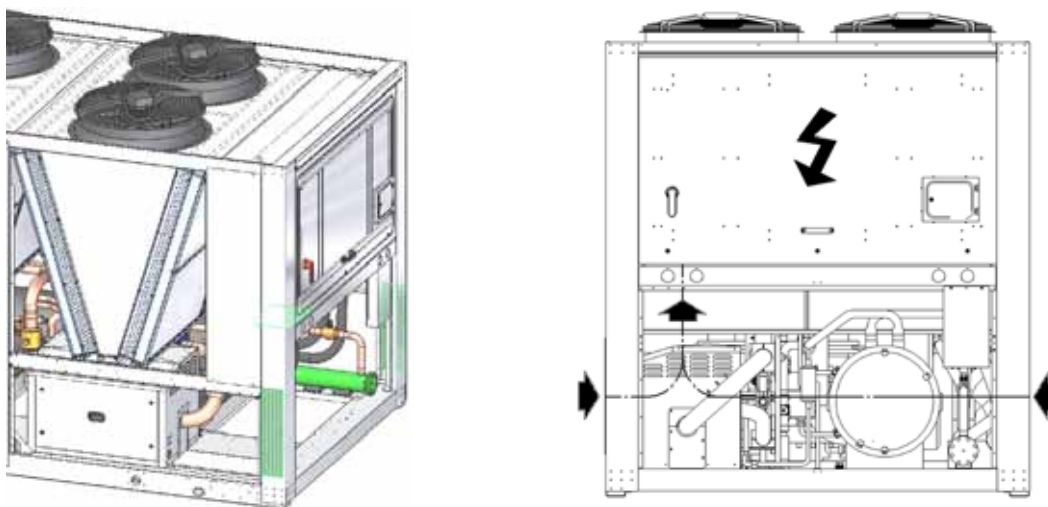
- for power supply cables that are to be connected to the terminals on the IG master switch on the left side of the switchboard, unscrew the flange and drill it in order to install the relevant cable glands;
- for signal cables that are to be connected to the terminals on the microprocessor board on the right side of the switchboard, just remove the plugs from the holes that have been previously made in the factory.

Power supply cable routes

ECB * 0301/0401 single / separate power supply



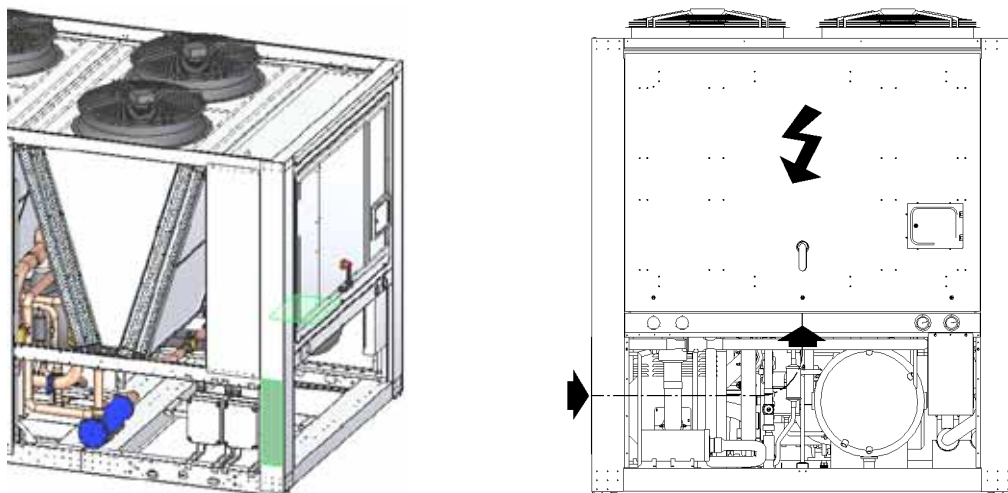
ECB * 0301/0401 dual / separate power supply



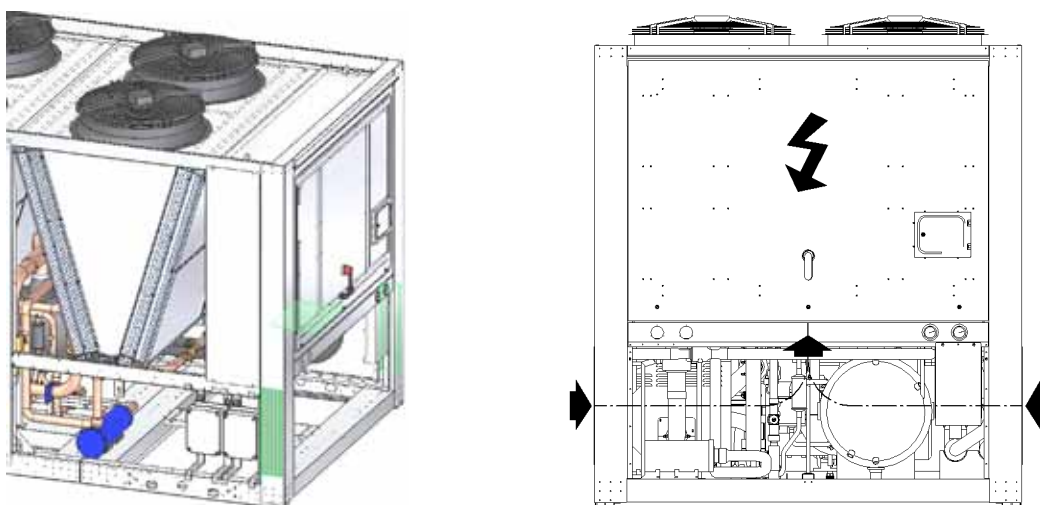
Dimensions of the electrical power supply input flange

BCE*Models	Switchboard input	Single/Separate power supply Lhs column input	Dual power supply Rhs column input
0301.0401	mm 410x280	mm 140x600	mm 140x600

BCE* 0532/0632/0752 single / separate power supply



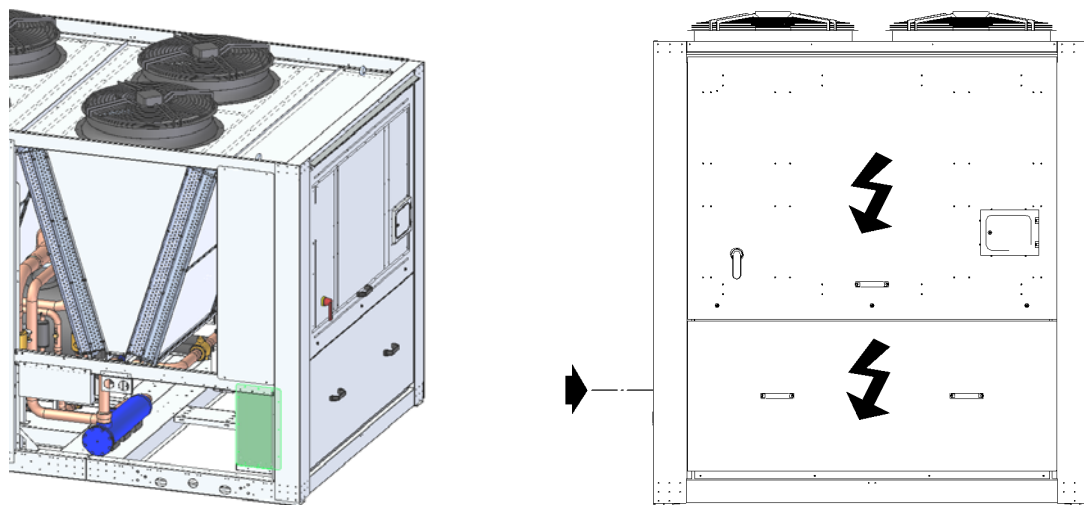
BCE* 0532/0632/0752 dual / separate power supply



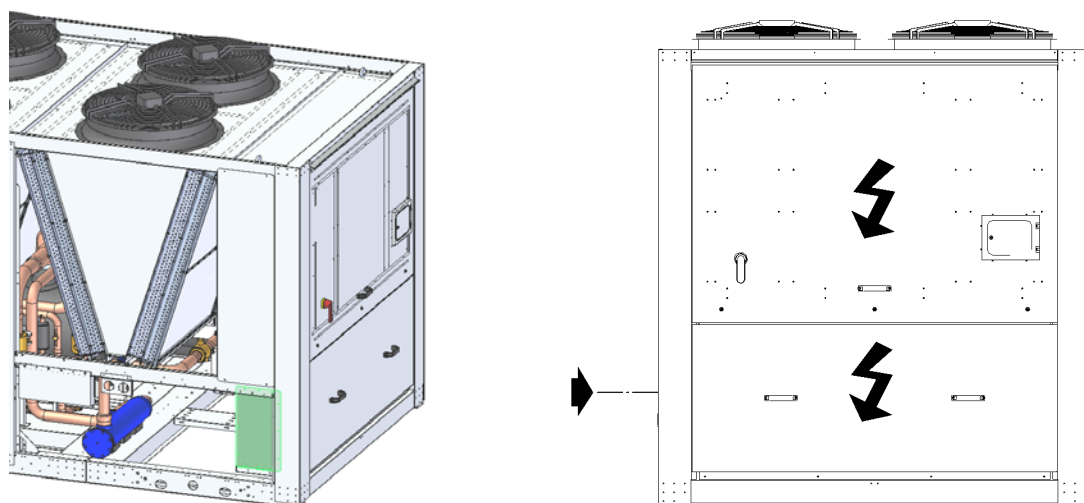
Dimensions of the electrical power supply input flange

BCE*Models	Switchboard input	Single/Separate power supply Lhs column input	Dual power supply Rhs column input
0532.0632.0752	mm 510x330	mm 140x600	mm 140x600

BCE* 0903/1103 single / separate power supply



BCE* 0903/1103 dual / separate power supply



BCE*Models	Switchboard input
0903.1103	mm 300x560

The power supply cable is not provided by the manufacturer and it must be suitably sized by the installer.

The section of the power cable must be chosen according to its length and to the type of installation, according to the maximum current absorbed by the chiller and in such a way as to avoid an excessive voltage drop ($\pm 10\%$ of nominal value).



Connect the three phases of the power supply to the master switch making sure that none of the electrical components are live.

If you want to control the switching on and off of the machine using remote switches:

- connect the ON-OFF remote control switch to terminals 20-50 of the switchboard terminal box.

If you want to have a remote alarm signal (if there is no remote user terminal box):

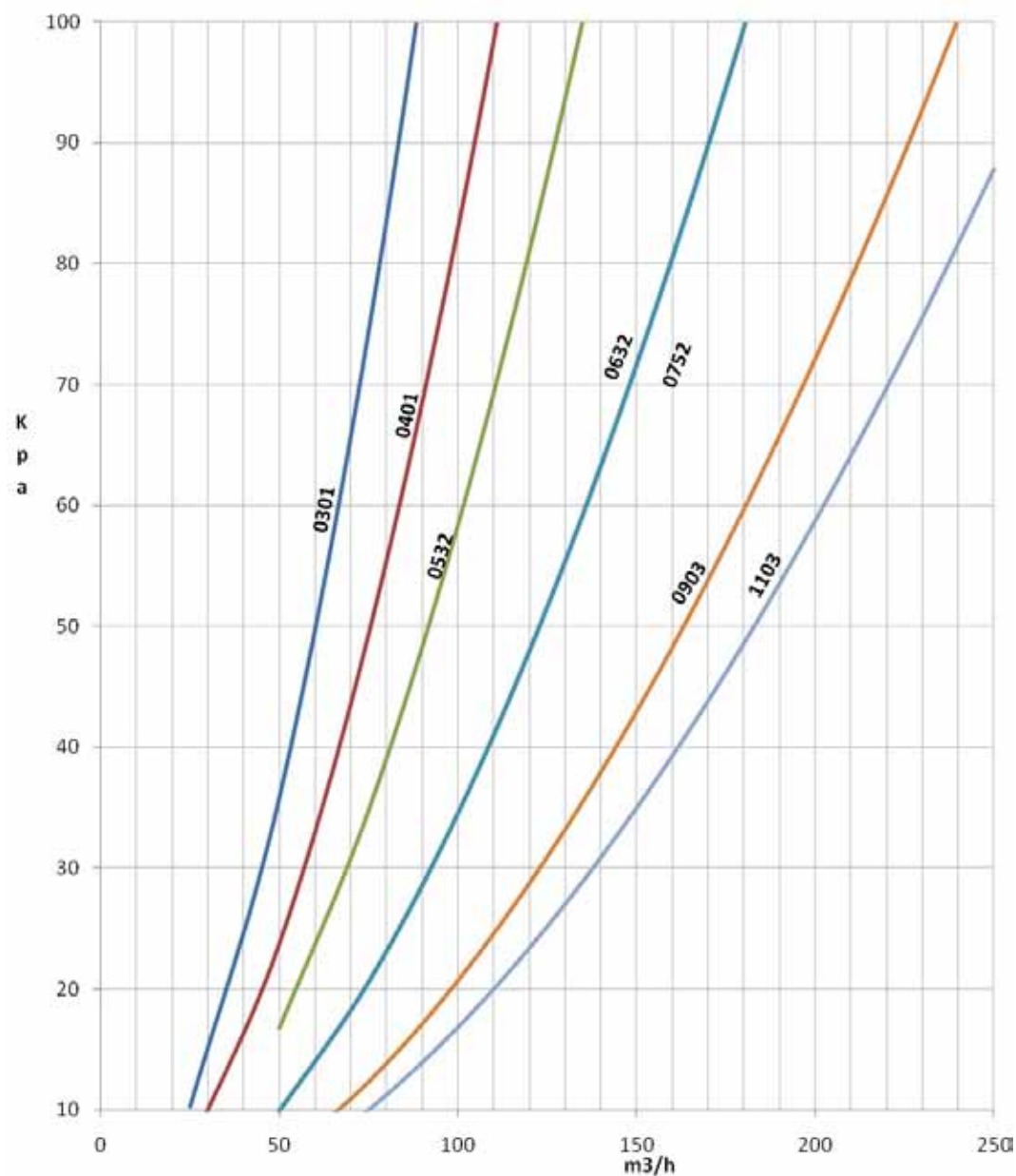
- use the exchange contact terminals 960,961,962 for type A alarm signals and terminals 970,971,972 for type B alarms (see the control manual).

How to calibrate safety devices

The operating parameters set on the microprocessor control are provided in the instruction manual enclosed with the unit. The following table shows the settings of the safety devices; this information is also indicated on the data plate located on the machine.

Component		
Pressure switch for high pressure	barg	18
High pressure safety valve	barg	20
Low pressure safety valve	barg	16

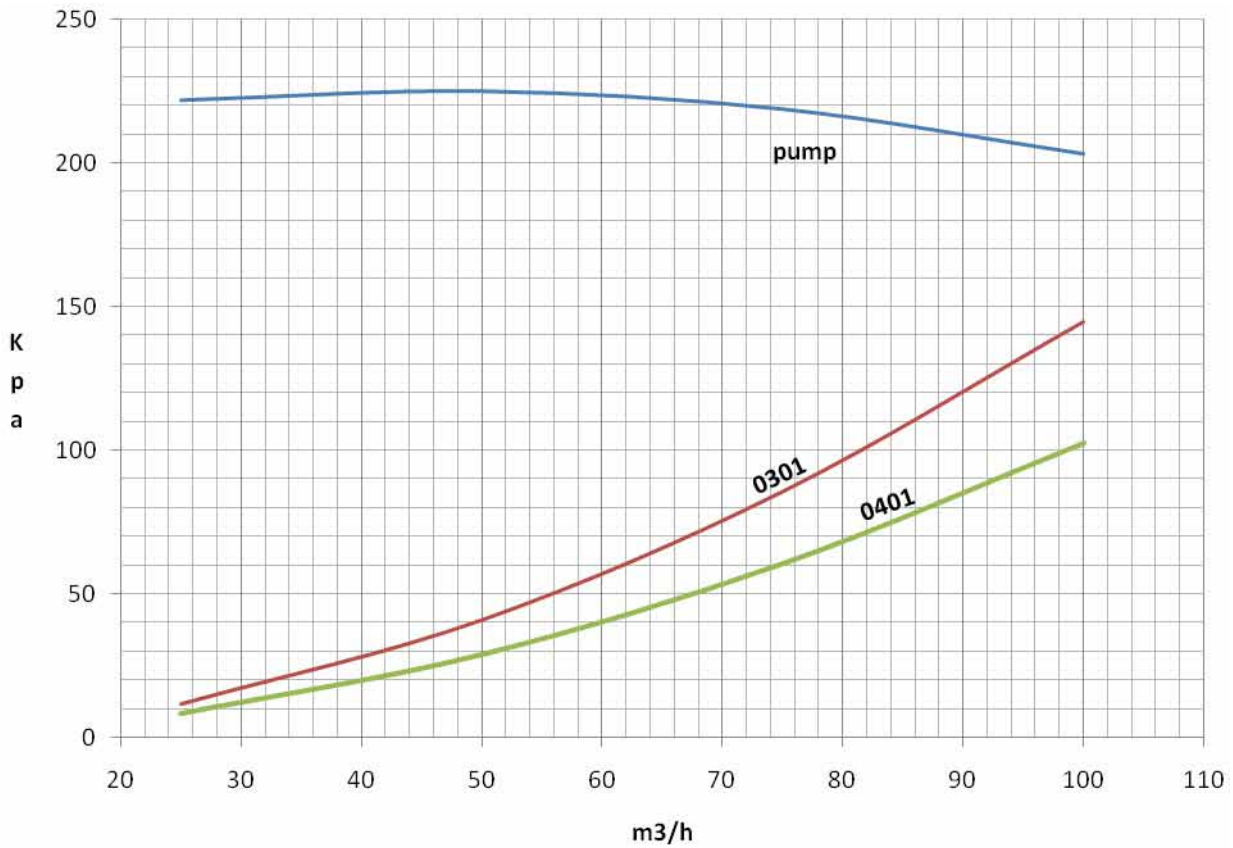
Pressure drop of the evaporator



Data referred to 0% of glycol.

Pump total head and pressure drop of the unit

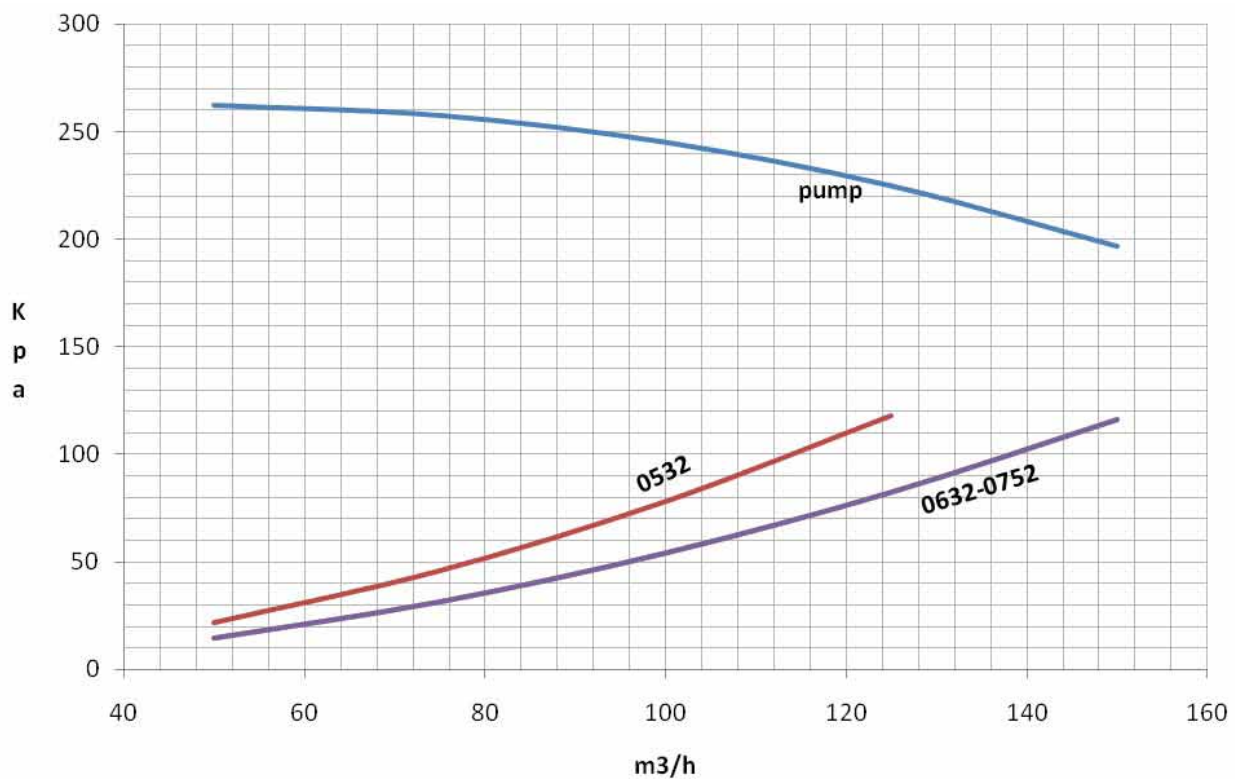
Unit with pump/pumps incl.



Data referred to 0% of glycol. The total head available is the difference between the “pump head pressure” curves and the pressure drop curves.

The values of variable speed pumps refer to the maximum speed.

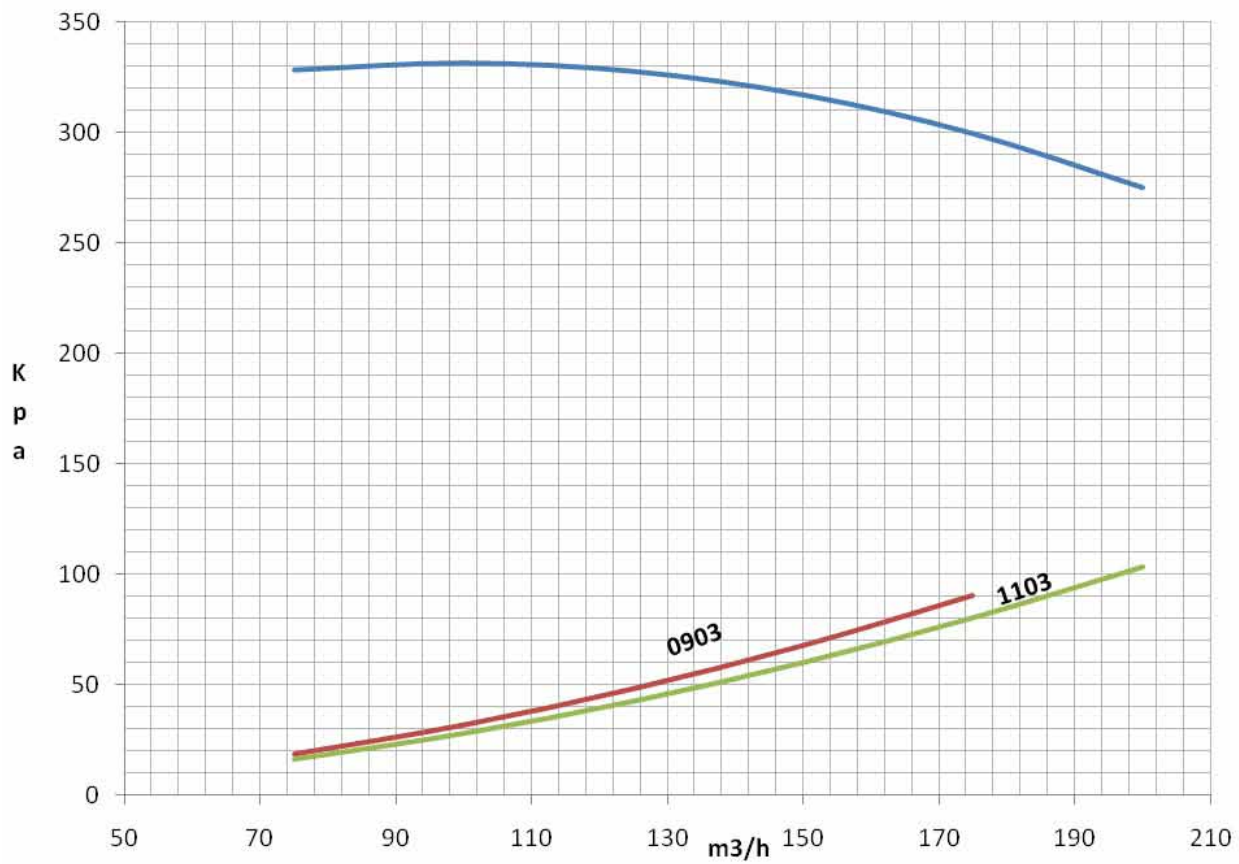
Unit with pump /pumps incl.



Data referred to 0% glycol. The total head available is the difference between the “pump head pressure” curve and the curves of the pressure drop.

The values of variable speed pumps refer to the maximum speed.

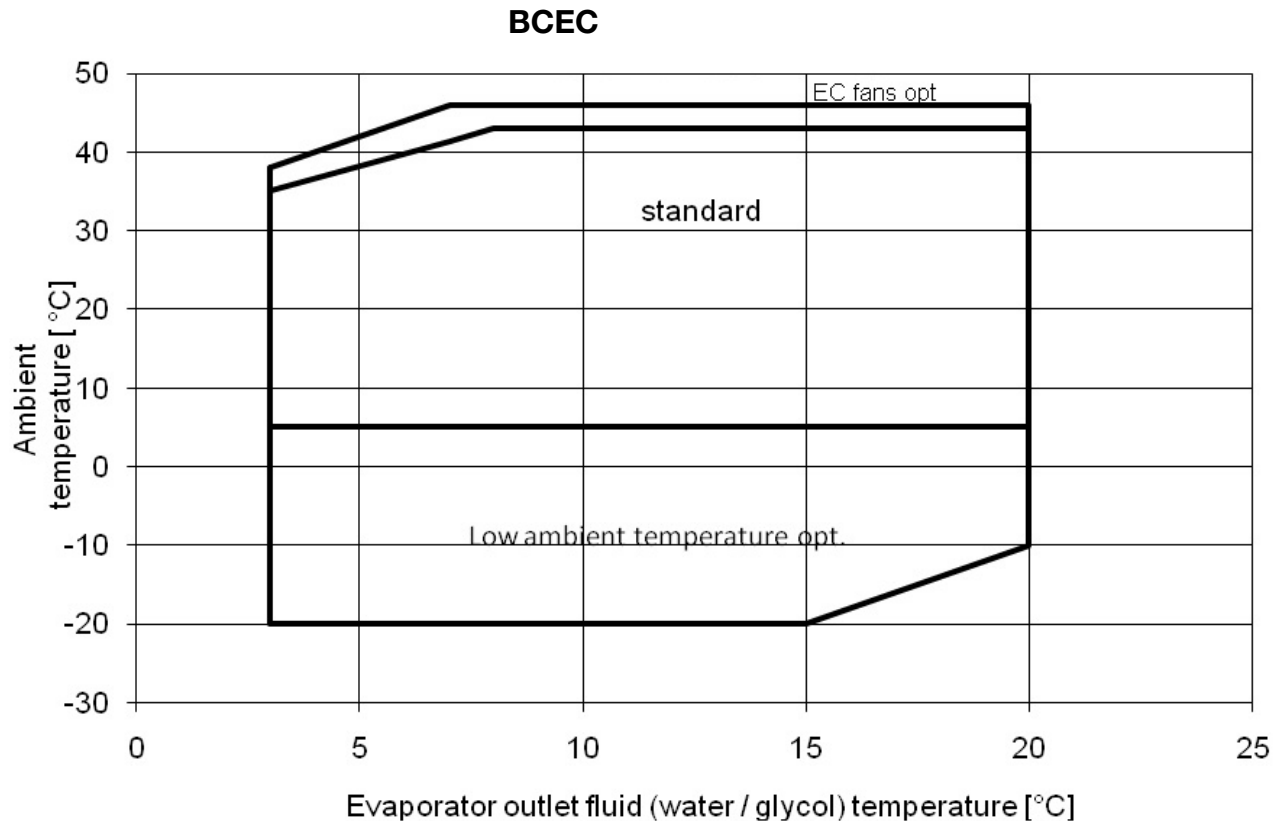
Unit with pump / pumps incl.



Data referred to 0% glycol. The total head available is the difference between the “pump head pressure” curve and the curves of the pressure drop.

The values of variable speed pumps refer to the maximum speed.

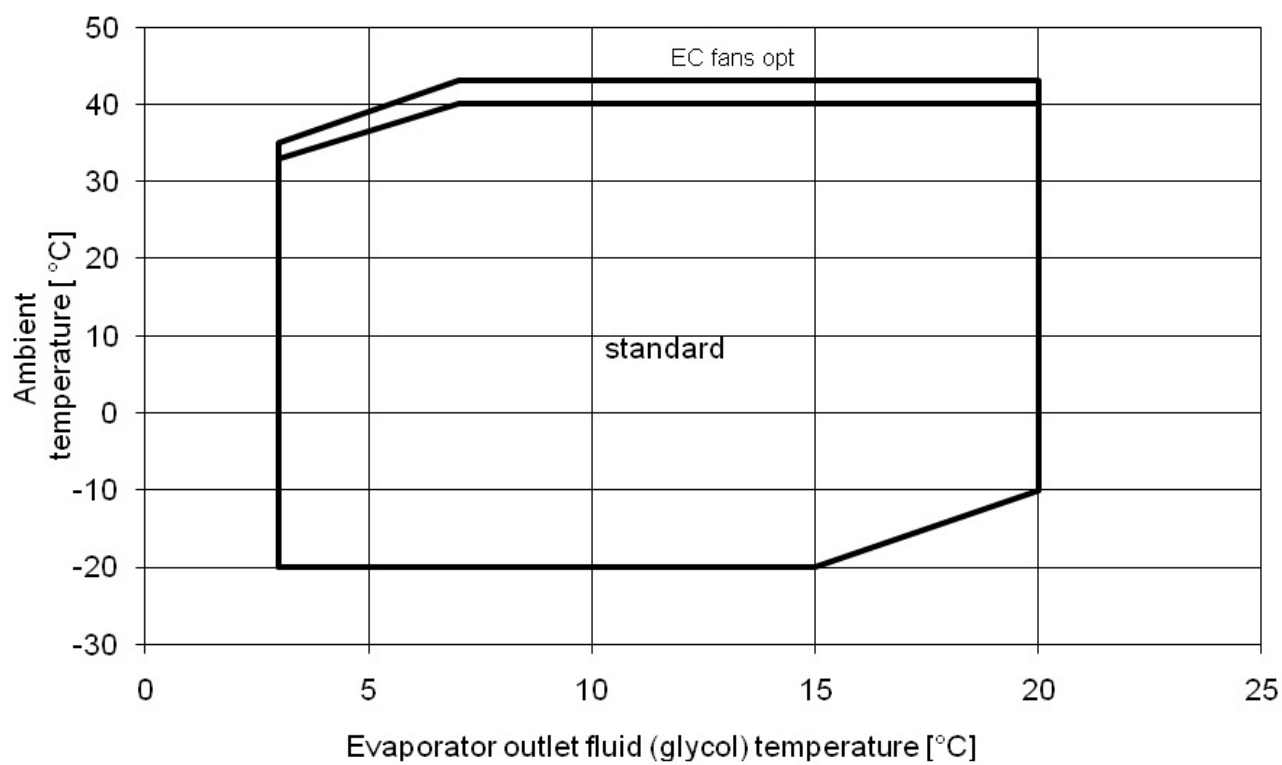
Operating limits



Mixtures of water and glycol can be cooled down to -10 ° C provided that the water inside the circuit contains antifreeze in an amount sufficient to prevent freezing in the evaporator.

Minimum fluid temperature while the unit is operating	5,0 °C	3,0 °C	-5,0 °C	-10,0 °C	-18,0 °C	-28,0°C
Freezing temperature	0 °C	-4,4 °C	-9,6 °C	-16,1 °C	-24,5 °C	-35,5 °C
Percentage of ethylene glycol	0%	10%	20%	30%	40%	50%

BCEF – free-cooling unit

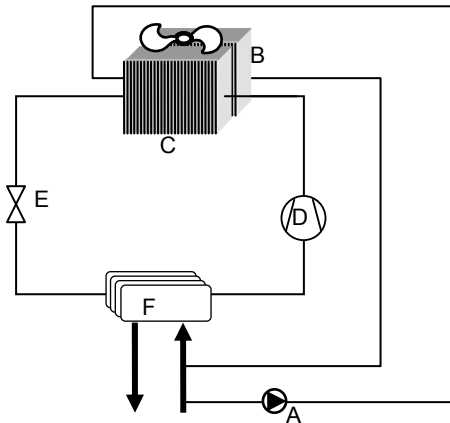


Outdoor temperature regulation

The BCEC / F units are equipped with a modulating control of condensation, therefore, the influence of outdoor temperature variations on the condensing pressures are controlled by changing the speed of the ventilation sections.

If the outdoor temperatures are such that the maximum pressure of condensation is reached even with the fan at maximum speed, the control software automatically reduces the capacity of the compressors and keeps the unit in operation, even if with a lower capacity (partialization).

Free Cooling



You will have chilled water available at no cost.

- A. Free-cooling pump
- B. Free-cooling coil
- C. Condensing coils
- D. compressor
- E. Expansion valve
- F. Evaporator

When the system is interlocked to technological systems or industrial processes that operate throughout the year, and therefore with low outdoor temperatures, it is energetically very convenient to use systems designed to take advantage of these conditions: a typical solution is a chiller with free-cooling device. The principle of the free-cooling operation is to produce chilled water using the outside air instead of direct expansion operation.

The BCEF chillers belong to this type, and if the outdoor temperature is sufficiently low, it is possible, according to the outdoor temperature to use less or at all the “cooling” part of the chiller, or rather the compressors that cause most energy consumption, depending on the outside temperature. The water circulates inside the relevant heat exchanger coils through the free-cooling pump and it is cooled from the outside air forced by the fans that are the only components that along with the pump absorb energy.

The water is then re-introduced in the circuit and supplied to the user.

The thermal load of a system or rather the amount of “cold” energy required, depends on the heat generated inside it (so machines, people, lights ...) and on the outdoor temperature; therefore generally in the summer the heat load will be greater than in the winter season.

From this premise we can reasonably assume that, if in the hottest months the outgoing water needs to be chilled at a temperature of about 7 ° C, in the colder months outgoing water T = 10 ° C may be sufficient.

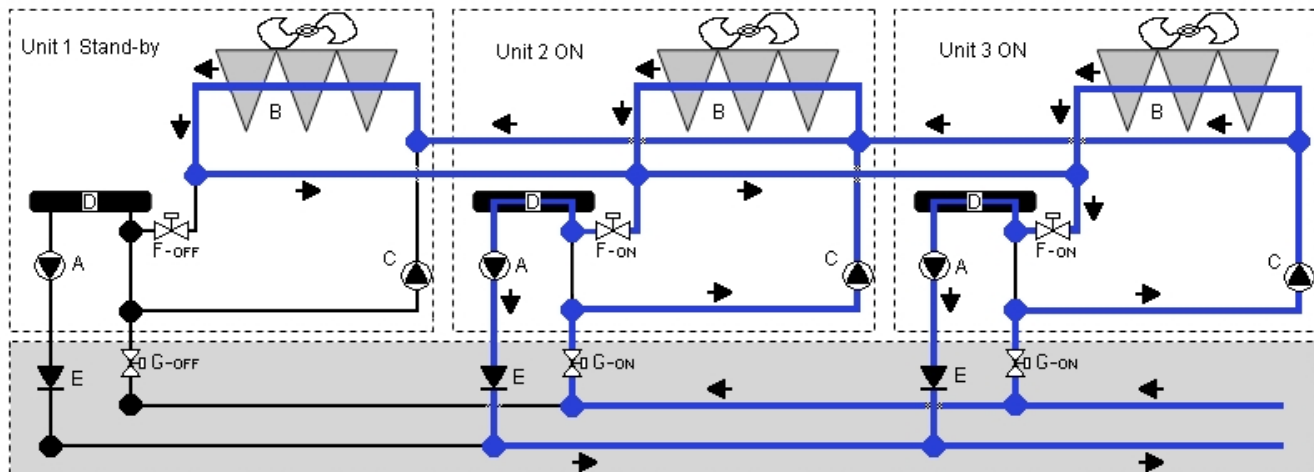
With these assumptions, the unit can operate in full free-cooling already with an outdoor T of 5 ° C.

Generally, it is possible to divide the operating ranges of the BCEF units into:

- Free-cooling, with outdoor T < 5 ° C
- Mixed with 5 ° C < outdoor T < 12 ÷ 15 ° C
- Mechanical cooling (direct expansion), with outdoor T > 12 to 15 ° C

Intelligent free-cooling

The figure below shows an example where the first unit is on stand-by and units 2 and 3 in operation and connected with an intelligent free-cooling solution. If the outdoor temperature allows free-cooling activation, the control system of the units in operation controls the switching of the unit fans on stand-by (1) and the ignition of the free-cooling pumps (C) of the units in operation (2 and 3). In this way, the water coming from the system is sent to all the free-cooling coils available.



- A: The main pump on the machine
- B: Free-cooling coils
- C: Free-cooling pump
- Q: Evaporator
- E: Check valve
- F: Motorised free-cooling valve
- G: Motorised valve on customer side



: Customer side

With intelligent free-cooling operation the quantity of machines on stand-by must be less or equal to the quantity of machines operating. This limitation is due to the free-cooling pump.

Technical data

Water circuit capacity

The following table shows the capacity (litres) of the water circuit in the basic unit.

BCEC		0301A	0401A	0532A	0632A	0752A	0903A	1103A
Evaporator	litres	132	142	181	211	211	289	317

The following table shows the capacity (litres) of the water circuit in the basic "Free-Cooling" unit.

BCEF		0301A	0401A	0532A	0632A	0752A	0903A	1103A
Evaporatore	litres	132	142	181	211	211	289	317
Free-cooling coils	litres	287	350	443	438	638	799	908

Maximum hydraulic operating pressure

Maximum working pressure of the hydraulic circuit	barg	10
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Content of the coolant

The following table shows the content of the coolant (expressed in kg) for each cooling circuit.

The data refer to the standard version and may vary depending on the configuration of the unit.

The values are approximate and quantities may slightly vary as a result of changes made during factory testing.

BCEC		0301A	0401A	0532A	0632A	0752A	0903A	1103A
Coolant R134a	Kg	170	170	250	250	250	330	330

BCEC electrical data

Compressors

Model		0301A	0401A	0532A	0632A	0752A	0903A	1103A
Compressor 1								
OP	kW	75,3	110,4	72,9	82,5	99,6	81,5	99,6
OA	A	116,9	171,0	113,1	128,9	155,2	127,2	155,2
FLI	kW	85,0	130,0	85,0	85,0	130,0	85,0	130,0
FLA	A	135,0	210,0	135,0	135,0	210,0	135,0	210,0
Compressor 2								
OP	kW	-	-	72,9	82,5	99,6	81,5	99,6
OA	A	-	-	113,1	128,9	155,2	127,2	155,2
FLI	kW	-	-	85,0	85,0	130,0	85,0	130,0
FLA	A	-	-	135,0	135,0	210,0	135,0	210,0
Compressor 3								
OP	kW	-	-	-	-	-	81,5	99,6
OA	A	-	-	-	-	-	127,2	155,2
FLI	kW	-	-	-	-	-	85,0	130,0
FLA	A	-	-	-	-	-	135,0	210,0

Fans with asynchronous motor

Model		0301A	0401A	0532A	0632A	0752A	0903A	1103A
Q.ty		6	6	8	10	12	14	16
OP	kW	1,7	1,7	1,7	1,7	1,7	1,7	1,7
OA	A	3,2	3,3	3,3	3,3	3,3	3,3	3,3
FLA	A	4,3	4,3	4,3	4,3	4,3	4,3	4,3
OP tot	kW	10,0	10,3	13,7	17,1	20,5	23,9	27,7
OA tot	A	19,2	19,7	26,3	32,9	39,5	46,1	53,3
FLA tot	A	25,8	25,8	34,4	43,0	51,6	60,2	68,8

Fans electronically commutated (EC)

Model		0301A	0401A	0532A	0632A	0752A	0903A	1103A
Q.ty		6	6	8	10	12	14	16
OP	kW	1,6	1,7	1,7	1,7	1,7	1,7	1,7
OA	A	2,5	2,6	2,6	2,6	2,6	2,6	2,6
FLA	A	4,5	4,5	4,5	4,5	4,5	4,5	4,5
OP tot	kW	9,7	10,2	13,6	17,0	20,4	23,8	27,7
OA tot	A	14,8	15,5	20,7	25,8	31,0	36,2	42,1
FLA tot	A	27,0	27,0	36,0	45,0	54,0	63,0	72,0

Main pumps

Model		0301A	0401A	0532A	0632A	0752A	0903A	1103A
OP	kW	8,2	9,1	10,3	11,0	11,6	19,3	21,4
OA	A	14,4	16,0	18,1	19,3	20,5	34,0	37,7
FLI	KW	10,5	10,5	13,0	13,0	13,0	23,0	23,0
FLA	A	18,5	18,5	22,4	22,4	22,4	42,0	42,0
LRA	A	153,6	153,6	188,2	188,2	188,2	378,0	378,0
Note: for pumps with variable speed the values refer to the maximum speed								

Separate electrical power supply- data of the secondary main (*)

Model		0301A	0401A	0532A	0632A	0752A	0903A	1103A
Tensione di alimentazione		230/1/50						
OP	kW	2,9	2,9	2,9	2,9	2,9	3,4	3,4
OA	A	12,6	12,6	12,6	12,6	12,6	14,8	14,8
(*) Optional								

BCEC – complete unit without pumps

Model		0301A	0401A	0532A	0632A	0752A	0903A	1103A
OP	kW	85,3	120,6	159,5	182,2	219,6	268,6	326,4
OA	A	136,1	190,8	252,5	290,7	349,8	427,0	518,8
SC	A	5,0	5,0	10,0	10,0	10,0	15,0	15,0
FLI	kW	97,0	142,0	186,0	190,0	284,0	283,0	422,0
FLA	A	160,8	235,8	304,4	313,0	471,6	465,2	698,8
COS φ		0,90	0,91	0,91	0,90	0,91	0,91	0,91

BCEC – complete unit with pumps incl.

Model		0301A	0401A	0532A	0632A	0752A	0903A	1103A
OP	kW	93,5	129,7	169,8	193,2	231,3	287,9	347,8
OA	A	150,5	206,8	270,6	310,0	370,3	461,6	556,4
SC	A	5,0	5,0	10,0	10,0	10,0	15,0	15,0
FLI	kW	107,5	152,5	199,0	203,0	297,0	306,0	445,0
FLA	A	179,3	254,3	326,8	335,4	494,0	507,2	740,8
COS φ		0,90	0,91	0,91	0,90	0,90	0,90	0,90

BCEC – complete unit without pumps and EC fans

Model		0301A	0401A	0532A	0632A	0752A	0903A	1103A
OP	kW	85,0	120,6	159,4	182,1	219,5	268,4	326,4
OA	A	131,7	186,5	246,9	283,6	341,3	417,7	507,6
SC	A	5,0	5,0	10,0	10,0	10,0	15,0	15,0
FLI	kW	102,2	147,2	192,9	198,6	294,3	295,0	435,8
FLA	A	162,0	237,0	306,0	315,0	474,0	468,0	702,0
COS φ		0,93	0,93	0,93	0,93	0,93	0,93	0,93

BCEC – complete unit with pumps and EC fans incl.

Model		0301A	0401A	0532A	0632A	0752A	0903A	1103A
OP	kW	93,2	129,7	169,7	193,1	231,2	287,8	347,8
OA	A	146,1	202,5	265,0	302,9	361,8	451,7	545,2
SC	A	5,0	5,0	10,0	10,0	10,0	15,0	15,0
FLI	kW	112,7	157,7	205,9	211,6	307,3	318,0	458,7
FLA	A	180,5	255,5	328,4	337,4	496,4	510,0	743,0
COS φ		0,92	0,92	0,92	0,92	0,92	0,92	0,92

BCEF electrical data

Compressors

Model		0301A	0401A	0532A	0632A	0752A	0903A	1103A
Compressor 1								
OP	kW	70,0	99,6	65,3	76,8	89,8	75,7	88,7
OA	A	108,7	155,2	101,5	119,3	141,4	117,5	139,7
FLI	kW	85,0	130,0	85,0	85,0	130,0	85,0	130,0
FLA	A	135,0	210,0	135,0	135,0	210,0	135,0	210,0
Compressor 2								
OP	kW	-	-	65,3	76,8	89,8	75,7	88,7
OA	A	-	-	101,5	119,3	141,4	117,5	139,7
FLI	kW	-	-	85,0	85,0	130,0	85,0	130,0
FLA	A	-	-	135,0	135,0	210,0	135,0	210,0
Compressor 3								
OP	kW	-	-	-	-	-	75,7	88,7
OA	A	-	-	-	-	-	117,5	139,7
FLI	kW	-	-	-	-	-	85,0	130,0
FLA	A	-	-	-	-	-	135,0	210,0

Fans with asynchronous motor

Model		0301A	0401A	0532A	0632A	0752A	0903A	1103A
Q.ty		6	6	8	10	12	14	16
OP	kW	1,7	1,7	1,7	1,7	1,7	1,7	1,7
OA	A	3,2	3,3	3,3	3,3	3,3	3,3	3,3
FLA	A	4,3	4,3	4,3	4,3	4,3	4,3	4,3
OP tot	kW	10,0	10,3	13,7	17,1	20,5	23,9	27,7
OA tot	A	19,2	19,7	26,3	32,9	39,5	46,1	53,3
FLA tot	A	25,8	25,8	34,4	43,0	51,6	60,2	68,8

Fans with electronic commutation (EC)

Model		0301A	0401A	0532A	0632A	0752A	0903A	1103A
Q.ty		6	6	8	10	12	14	16
OP	kW	1,6	1,7	1,7	1,7	1,7	1,7	1,7
OA	A	2,5	2,6	2,6	2,6	2,6	2,6	2,6
FLA	A	4,5	4,5	4,5	4,5	4,5	4,5	4,5
OP tot	kW	9,7	10,2	13,6	17,0	20,4	23,8	27,7
OA tot	A	14,8	15,5	20,7	25,8	31,0	36,2	42,1
FLA tot	A	27,0	27,0	36,0	45,0	54,0	63,0	72,0

Main pump

Model		0301A	0401A	0532A	0632A	0752A	0903A	1103A
OP	kW	8,2	9,1	10,3	11,0	11,6	19,3	21,4
OA	A	14,4	16,0	18,1	19,3	20,5	34,0	37,7
FLI	KW	10,5	10,5	13,0	13,0	13,0	23,0	23,0
FLA	A	18,5	18,5	22,4	22,4	22,4	42,0	41,0
LRA	A	153,6	153,6	188,2	188,2	188,2	378,0	378,0
Note: for pumps with variable speed the values refer to the maximum speed								

Free-cooling pump

Model		0301A	0401A	0532A	0632A	0752A	0903A	1103A
OP	kW	6,0	6,9	10,7	11,4	12,0	17,5	18,1
OA	A	10,6	12,1	18,8	20,1	21,1	30,8	31,9
FLI	kW	8,0	8,0	13,0	13,0	13,0	19,0	19,0
FLA	A	15,1	15,1	22,4	22,4	22,4	34,0	34,0
LRA	A	132,9	132,9	188,2	188,2	188,2	306,0	306,0

Separate electrical power supply – data of the secondary main (*)

Model		0301A	0401A	0532A	0632A	0752A	0903A	1103A
Power supply		230/1/50						
OP	kW	2,9	2,9	2,9	2,9	2,9	3,4	3,4
OA	A	12,6	12,6	12,6	12,6	12,6	14,8	14,8
(*) Optional								

BCEC – complete unit without pumps

Model		0301A	0401A	0532A	0632A	0752A	0903A	1103A
OP	kW	80,0	109,9	144,2	170,7	200,2	251,0	293,7
OA	A	127,8	175,0	229,2	271,6	322,2	398,6	472,5
SC	A	5,0	5,0	10,0	10,0	10,0	15,0	15,0
FLI	kW	97,0	142,0	186,0	190,0	284,0	283,0	422,0
FLA	A	160,8	235,8	304,4	313,0	471,6	465,2	698,8
COS φ		0,90	0,91	0,91	0,91	0,90	0,91	0,90

BCEC – complete unit with pumps incl.

Model		0301A	0401A	0532A	0632A	0752A	0903A	1103A
OP	kW	88,2	118,9	154,5	181,7	211,8	270,3	315,1
OA	A	142,3	191,0	247,4	290,9	342,7	432,6	510,1
SC	A	5,0	5,0	10,0	10,0	10,0	15,0	15,0
FLI	kW	107,5	152,5	199,0	203,0	297,0	306,0	445,0
FLA	A	179,3	254,3	326,8	335,4	494,0	507,2	739,8
COS φ		0,89	0,90	0,90	0,90	0,89	0,90	0,89

BCEC – complete unit without pumps and EC fans

Model		0301A	0401A	0532A	0632A	0752A	0903A	1103A
OP	kW	79,7	109,8	144,1	170,6	200,1	250,8	293,7
OA	A	123,4	170,7	223,6	264,5	313,7	388,6	461,2
SC	A	5,0	5,0	10,0	10,0	10,0	15,0	15,0
FLI	kW	102,2	147,2	192,9	198,6	294,3	295,0	435,7
FLA	A	162,0	237,0	306,0	315,0	474,0	468,0	702,0
COS φ		0,93	0,93	0,93	0,93	0,92	0,93	0,92

BCEC – complete unit with pumps and EC fans incl.

Model		0301A	0401A	0532A	0632A	0752A	0903A	1103A
OP	kW	87,9	118,9	154,4	181,6	211,7	270,2	315,1
OA	A	137,9	186,7	241,7	283,8	334,2	422,7	498,9
SC	A	5,0	5,0	10,0	10,0	10,0	15,0	15,0
FLI	kW	112,7	157,7	205,9	211,6	307,3	318,0	458,7
FLA	A	180,5	255,5	328,4	337,4	496,4	510,0	743,0
COS φ		0,92	0,92	0,92	0,92	0,91	0,92	0,91

Maintenance and replacement of main components



Unplug the unit from the power supply before working on internal components.



All maintenance works and service must be performed by qualified personnel aware of the safety precautions that are to be taken.

How to fill with coolant

The machine is prefilled at the factory and no other coolant needs to be filled unless trouble occurred during transportation and installation or if the safety valve is activated.

Maintenance and replacement of components

Unplug the power supply before working on the unit ("IG" isolating switch in position "O").

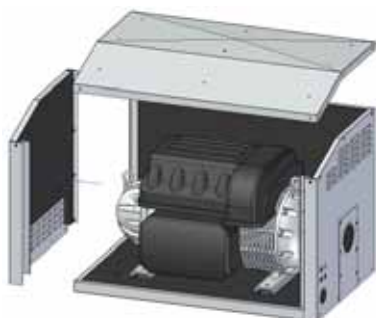
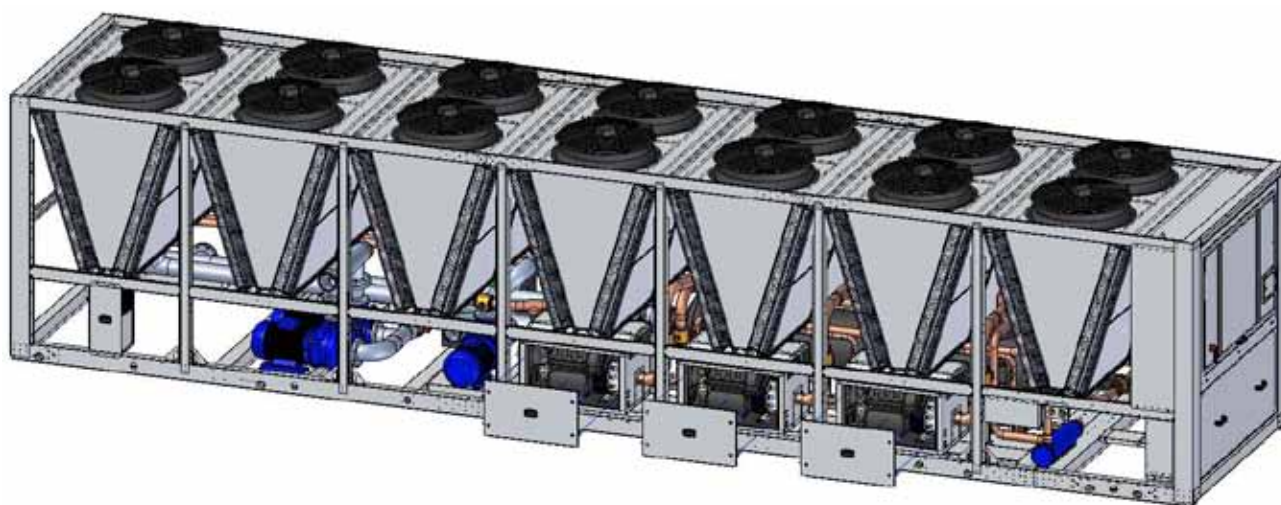
Compressors

To access the compressor remove the front panel of the hood.

Remove the lid and the left side of the hood.

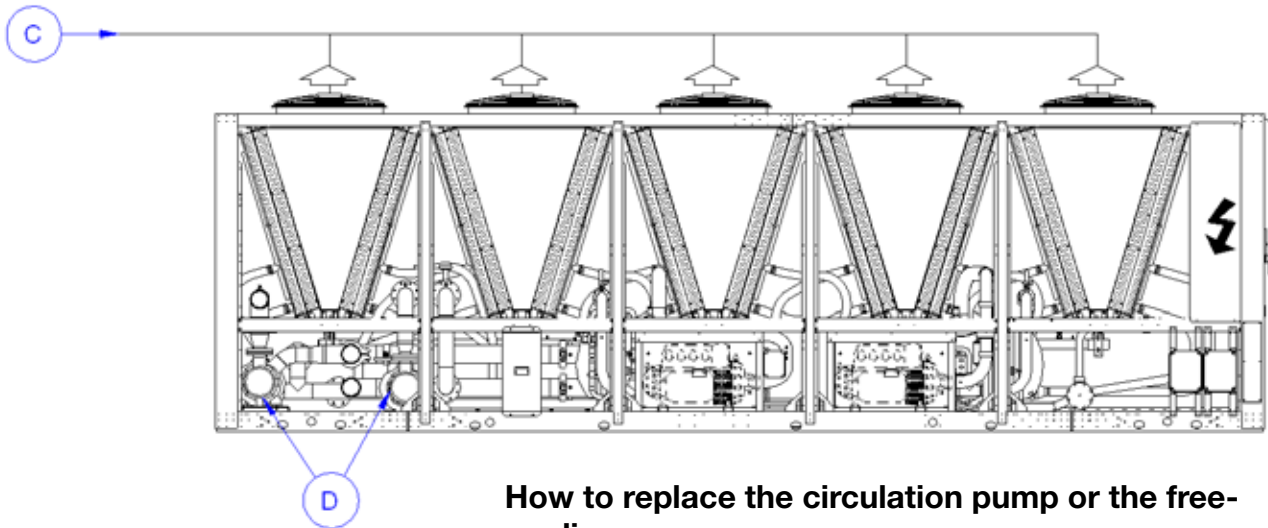
Close the shut-off valves (or taps) and exhaust the localized part of the circuit.

Disconnect the electrical connections, unscrew the flanges of the suction / delivery pipes, the anti-vibration supports and then lift properly and slide out (outwards) the compressor.



How to replace the fans

“C” fans can be replaced by working from the side or from above the unit, in this case being careful to trample only in the reinforced points.



How to replace the circulation pump or the free-cooling pump.

“D” pumps can be removed from the unit by disconnecting them from the system and making them slide along the side using suitable equipment.

How to replace the air and water coils

On the side of the connections remove the interior panels to reach the coil that needs to be replaced. Remove the brackets that connect the coils and all the rivets that keep it fastened. Remove the water coil by sliding it on the supporting guide. Remove the gas coil only after removing the water coil following the same procedure.

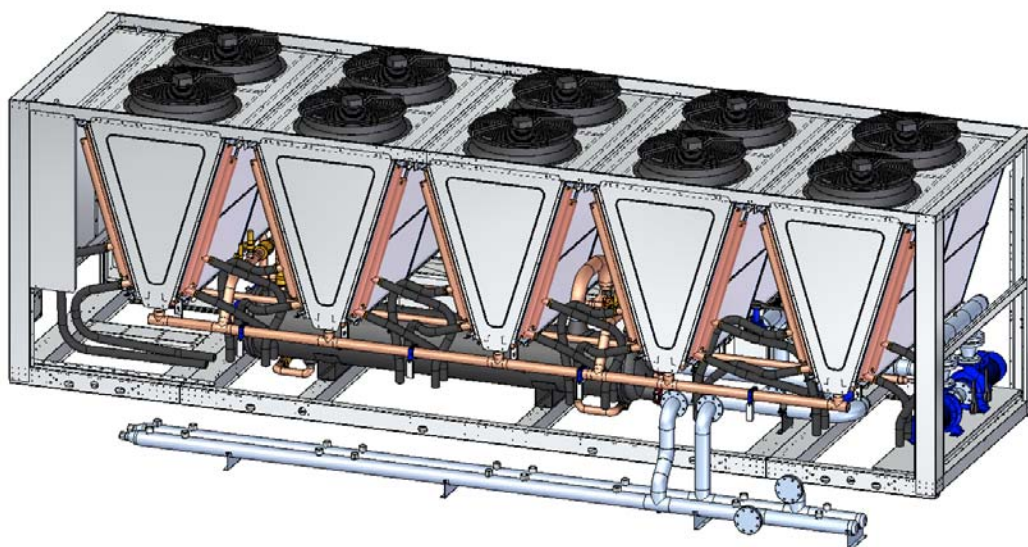
How to replace the evaporator

Intercept the cooling system and the hydraulic system by closing all the taps.

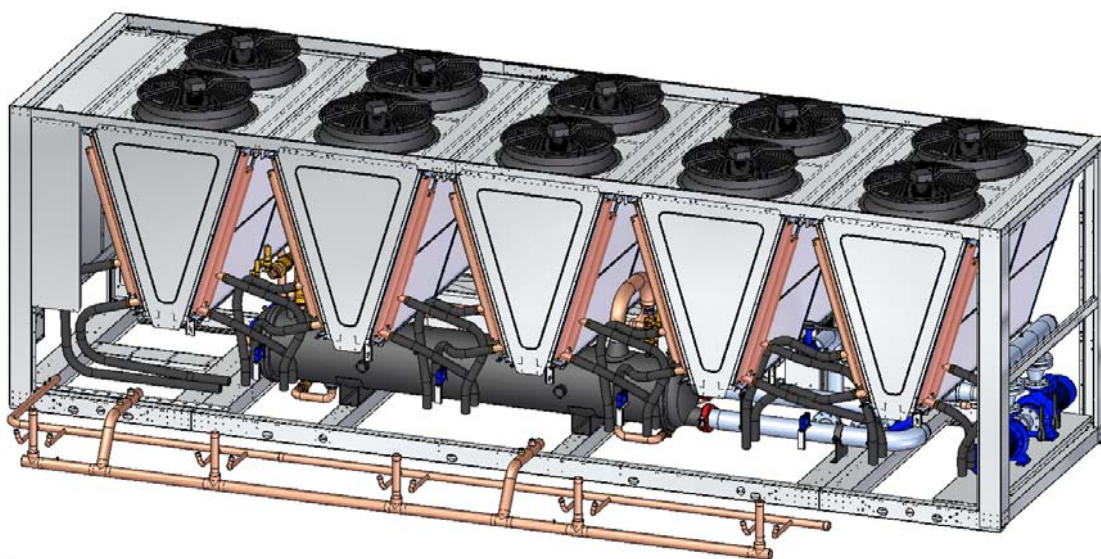
Exhaust the circuits, remove the screws of the brackets and disconnect all the connections.

Provide the centre columns to support the condensing section after removing the side columns on the right side (looking at the machine from the switchgear side).

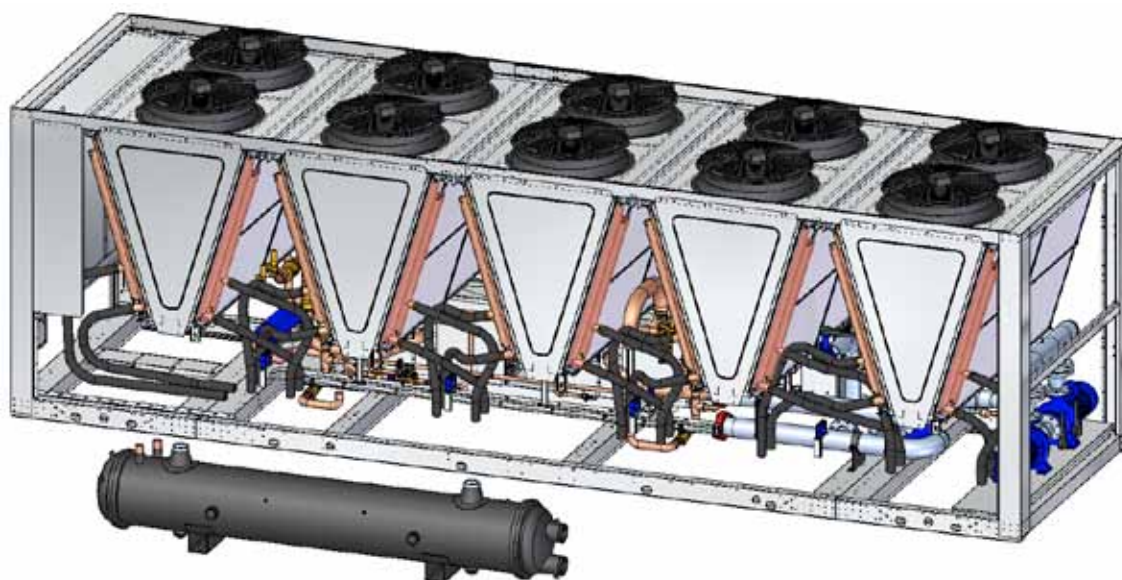
For BCEF free-cooling units disconnect all rubber pipes and remove the water coil collector.



Remove the collector and the liquid from the condenser coils.



Then finally remove the evaporator from the right hand side.
■ valves.



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