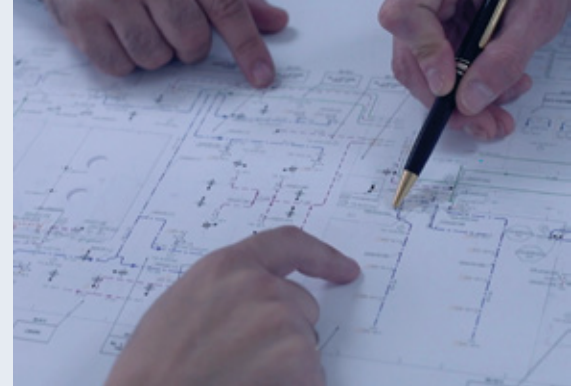




## HVAC + R SYSTEMS

NAVAL | OFFSHORE | DEFENCE | INDUSTRIAL

## MARINE HVAC EQUIPMENT





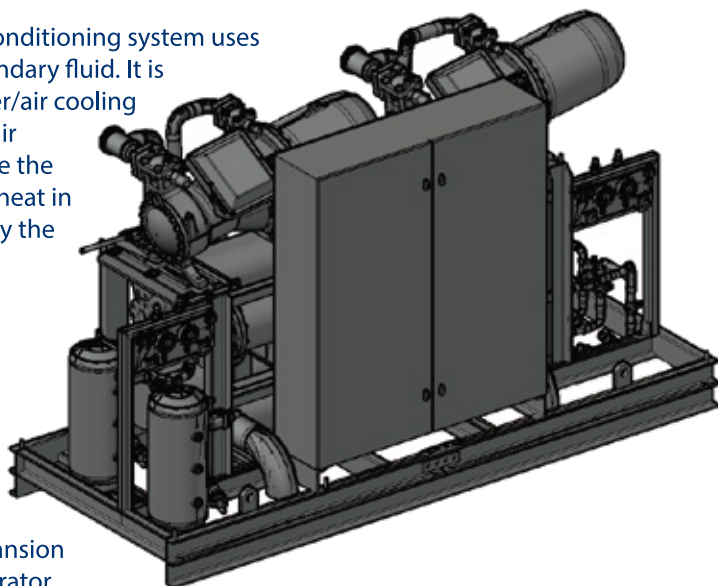
## DESCRIPTION

The Chilled Water Plant is the core of an HVAC System. This is where the glycol water is cooled by direct expansion of refrigerant in the heat exchanger.

A chilled water air conditioning system uses glycol water as secondary fluid. It is pumped to the water/air cooling coil installed in the air handling units where the sensitive and latent heat in the air is absorbed by the glycol water, returning to the cooling plant to be cooled again.

The main components of the unit are the compressor, the condenser, the expansion valve and the evaporator. According to the condensing medium available, the condenser could be designed for fresh water or sea water.

\* Control System (See page 9).



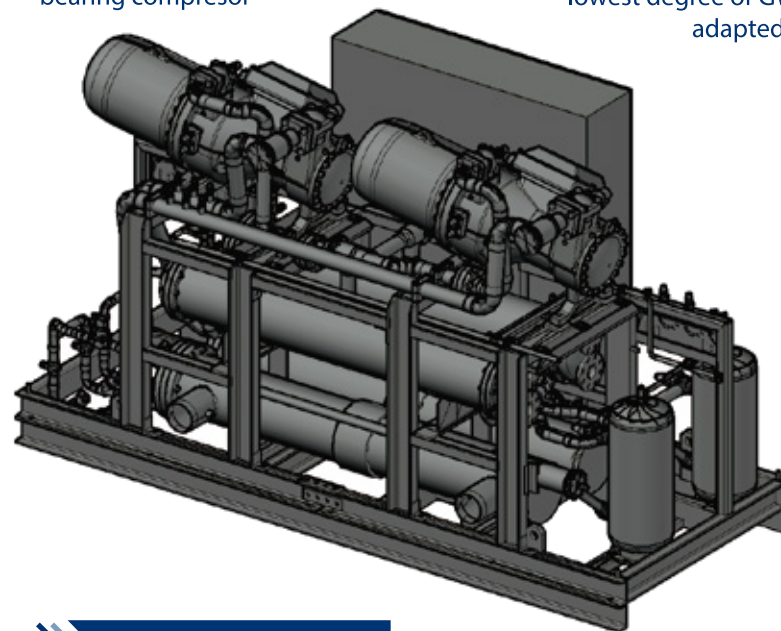
## APPLICATIONS

This system has great advantages, since, firstly, its size can be adapted to the simultaneous thermal loads foreseen in the installation and, secondly, it can be adjusted to the inertia of the system. This is the reason why chilled water plants are often used in vessels with high occupancy levels and large public spaces and also in those which have a large amount of climate-controlled technical areas (navy, hydrography and seismology areas, etc).



## DATA SHEET

- Cooling power according to the project calculations 10kW... 1250 kW... etc.
- Power supply 230V, 400V, 440V, 690V and 50/60Hz
- Open drive/semihermetic/hermetic compressor
- Piston/screw/centrifugal/ magnetic bearing compressor
- Sea water/fresh water/air cooled condenser
- Tube & shell heat exchangers (evaporator/condenser)
- One or several compressor(s)/ refrigerant circuit(s) adapted to the redundancy requirements
- Environmentally friendly refrigerants with the lowest degree of GWP (Global Warming Potential), adapted to the project's requirements.



## MATERIAL SPECIFICATION

- **Condenser:**
  - Copper or Cupronickel 90/10 tubes
- **Base frame:**
  - Steel
- **Refrigerant circuit:**
  - Copper / Steel
- **Finishing:**
  - Marine Painted

## SPECIAL UNITS

- Chilled water and/or sea water pumps could be integrated in the unit
- Equipment and/or components certified by the Classification Society
- Control and communication devices coordinated with ship platform management system
- Magnetic bearing compressor installed in order to fulfil the highest performance capacities
- Shock qualification according to project requirement



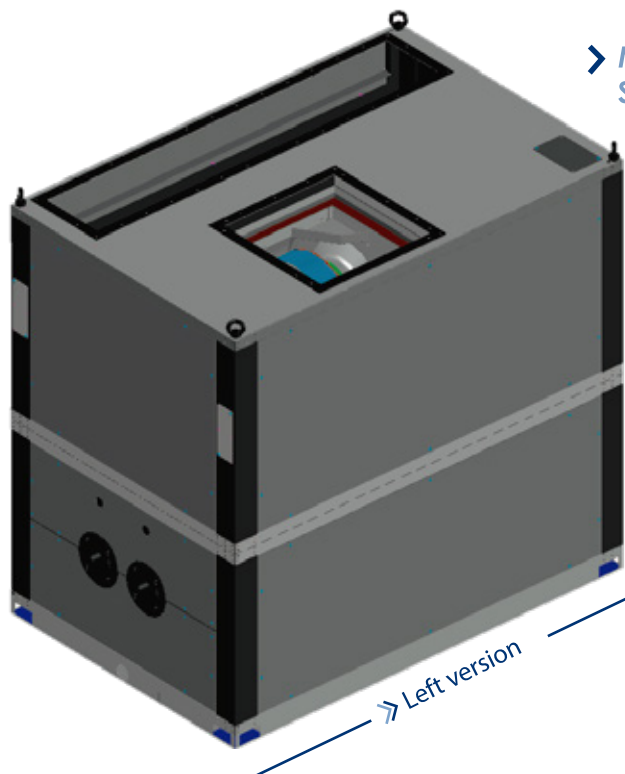
## DESCRIPTION

Fan Coil Assembly Unit is an equipment that includes elements to get the required airflow and heat transfer between the served room air and the chilled water system. It is designed for continuous operation.

Air is drawn into the unit through the inlet grill or a duct system and then passes through the filters.

The filtered air is led to the cooling section. Chilled water from the ship's chilled water system circulates through the cooling coil. A fan blows the cooled air upwards to drive into the duct the amount of conditioned air required to maintain the desired temperature within the space to be conditioned.

\*Control System (See page 9).



## MATERIAL SPECIFICATION

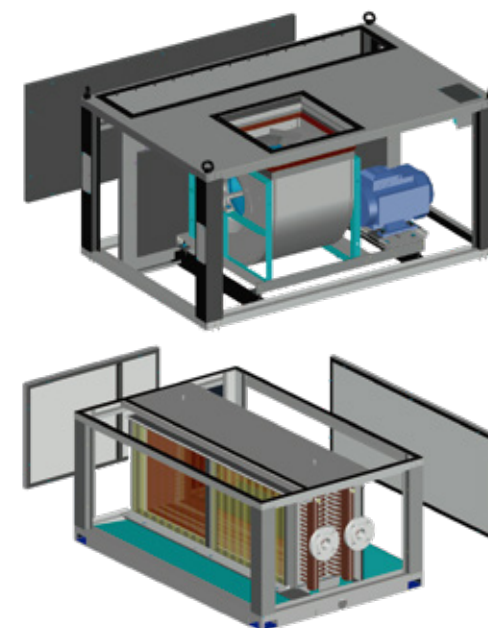
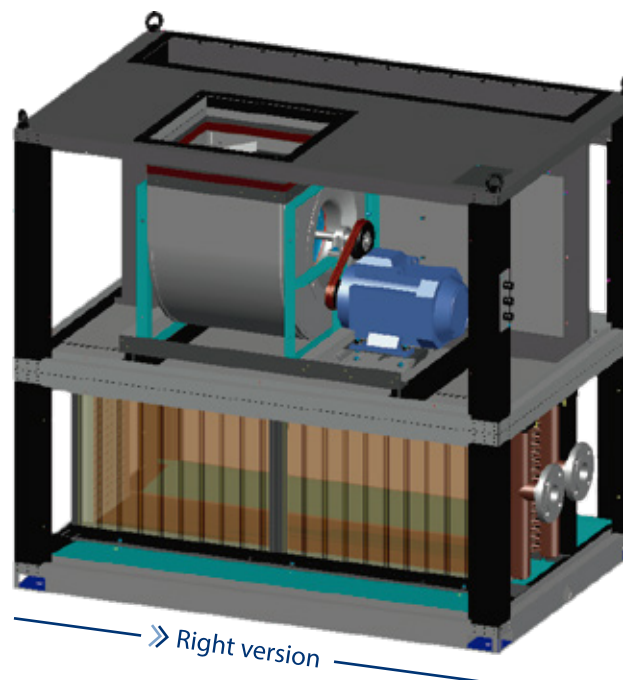
- **Cooling Coil**
  - Copper tubes
  - Copper or Aluminium fins
- **Casing**
  - Material: Aluzink coating
  - Finishing: RAL 7032 finishing
- **Insulation**
  - Marine mineral wool 25mm 100 kg/m3

## APPLICATIONS

They are designed to operate serving only one space or several spaces at the same time, usually with similar thermal conditions.

## SPECIAL UNITS:

- Tailor Made Explosion proof units, to serve hazardous areas
- Tailor made units considering the available installation and maintenance space on board and duct/water connections
- Tailor made units could be designed to fulfill specific performance requirements (airflow, cooling power...)
- Shock qualification according to project requirement



## DATA SHEET

MODEL	COOLING CAPACITY (kW)	AIRFLOW (m3/h)	APPROX. DIMENSIONS (mm) Front x Depth x Height	APPROX WEIGHT (Kg)
FC 21	12	680 - 1300	1120 x 710 x 1270	260
FC 22	20	1360 - 2140	1120 x 710 x 1270	280
FC 23	30	1700 - 3200	1220 x 810 x 1270	300
FC 24	40	2550 - 4300	1290 x 940 x 1270	410
FC 25	60	3900 - 6450	1425 x 940 x 1330	450
FC 26	75	6450 - 8000	1425 x 940 x 1610	510

## DESCRIPTION

Unit Cooler is an encased ceiling type equipment, including elements to get the required airflow and heat transfer between the served room air and the chilled water system.

The unit includes three sections:

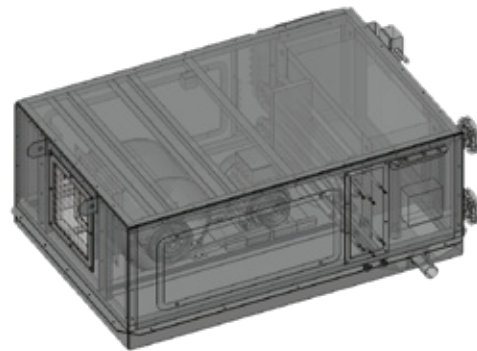
- Ventilation section. Includes a centrifugal fan, motor and a terminal box for electrical connections
- Cooling section. Water-cooling coil with condensate tray and drainage connections
- Filtration section

\*Control System (See page 9).

## APPLICATIONS

Unit Coolers are installed inside the served space.

They are usually installed where the installation of fan coil assemblies and duct system is not adequate.



## MATERIAL SPECIFICATION

### Cooling Coil

- Copper tubes
- Copper or Aluminium fins

### Casing

- Painted galvanized steel or Stainless Steel

### Insulation

- Closed-cell foam

## DATA SHEET

MODEL	COOLING CAPACITY (kW)	AIRFLOW (m <sup>3</sup> /h)	APPROX. DIMENSIONS (mm) Front x Depth x Height	APPROX WEIGHT (kg)
51 UC	3	365	1046 x 784 x 418	85
52 UC	4	580	1046 x 784 x 418	85
53 UC	5	870	1046 x 784 x 418	85
54 UC	7	1275	1095 x 1271 x 418	120
55 UC	11	1900	1095 x 1271 x 418	120

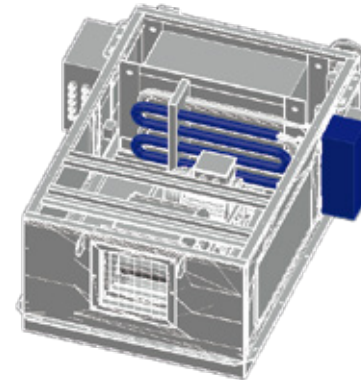
## SPECIAL UNITS

### HEATING

As optional, it could be installed a heater to provide heating performance.

#### Special features

- Stainless Steel frame and junction Box
- Automatic safety protection
- 1.5 Kw, 2.5 Kw, 3 Kw, 3x440 V
- Shock qualification according to project requirement



### UC RADAR

Units serving outdoor technical spaces could be installed on an exposed deck. In this case, external profile is adapted in order to fulfil radar cross section requirements.

#### Special features

- Shock qualification according to project requirement
- Floor mounting
- External casing



### UC SILENT

When noise requirements of served room are lower than the standard, this special unit is provided with noise reduction due to the specific analysis of the insulation and fan performance.

#### Special features

- Low - speed fan
- Mineral wool insulation
- Shock qualification according to project requirement



## DESCRIPTION

Gravity Coil is an equipment provided with a coil which acts as a heat exchanger, cooling the space where it is installed and fitted as high as possible in the ceiling.

Ambient heat is absorbed by the chilled water, thus the atmosphere is cooled.

This unit includes a condensate drip pan with drain connections.

\*Control System  
(See page 9).



## MATERIAL SPECIFICATION

- **Cooling Coil**
  - Copper tubes and fins
- **Drain Pan**
  - Stainless Steel
- **Finishing:**
  - Prepainted



## APPLICATIONS

Gravity Coils are used primarily in spaces where the thermal load is small and electrical equipment (that could spark) would constitute a hazard, such as magazines where air conditioning is required.

## DATA SHEET

MODEL	COOLING CAPACITY (kW)	APPROX. DIMENSIONS (mm) Front x Depth x Height	APPROX WEIGHT (Kg)
3G	1,0	1050 x 740 x 270	45
5G	1,5	1050 x 740 x 270	48



## SPECIAL UNIT:

Tailor Made wall version, to be installed in rooms where the space under the ceiling is limited.

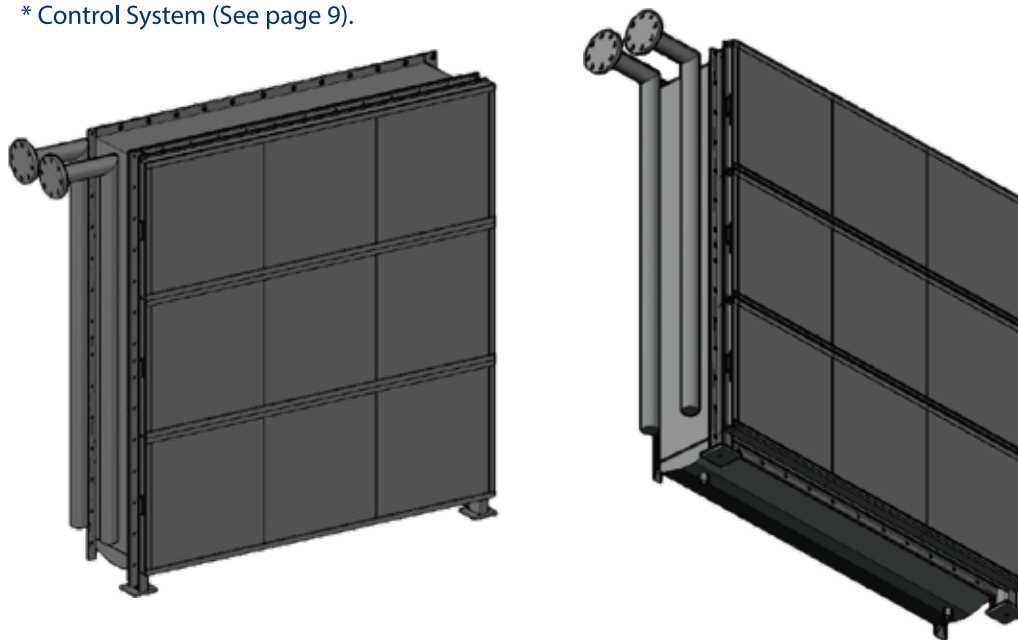




## DESCRIPTION

Sea Water Cooling Coil is an equipment provided with a coil which acts as a heat exchanger, cooling the air passing through the duct/trunk/air intake device where it is installed. Cooling coils are finned tube coils fitted inside the recirculation/air intake ducts. Inside these finned tubes, seawater flows as the cooling medium from the ship's fire extinguishing system or a dedicated sea water pump.

\* Control System (See page 9).



## APPLICATIONS

Ventilation in the Machinery Rooms is achieved by means of intake and exhaust fans.

During the normal operating condition, intake fans supply outside air in order to remove the heat radiated by the main engines, diesel-generators and other equipment, with the aim to maintain the design temperature in the machinery room. This system is complemented with these sea water coils and thanks to these equipment the flow temperature can be reduced.

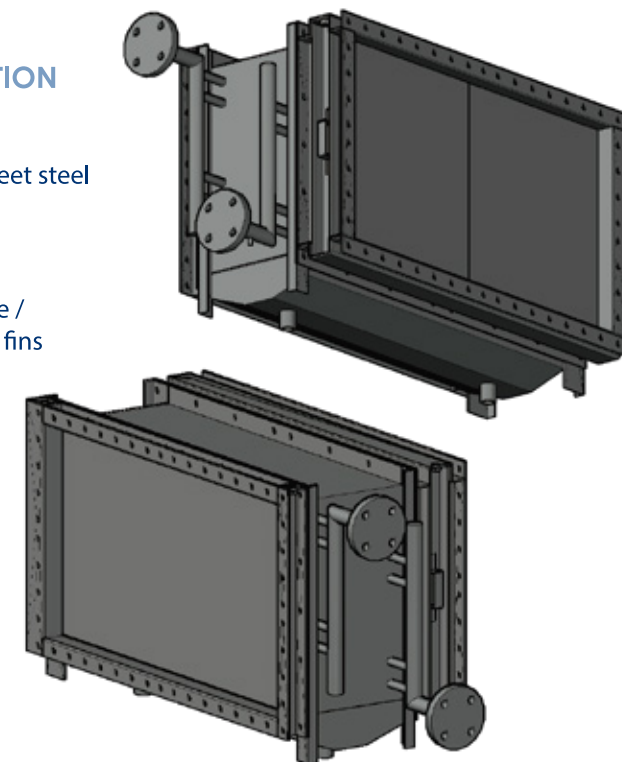
In the closed condition (NBC), no outside air is introduced the air from the engine room casing will be taken by the recirculation fans, cooled down by these sea water cooling coils and supplied back in the room.

## SPECIAL UNITS

➤ Shock qualification according to project requirement

## MATERIAL SPECIFICATION

- **Basic casing:**
  - External galvanized sheet steel
  - Stainless Steel
- **Cooling coil:**
  - Cupronickel 90/10 tube / prepainted aluminium fins
- **Housing:**
  - Galvanised sheet steel
- **Main drip pan:**
  - Stainless steel
- **Filter element:**
  - Stainless steel



## DATA SHEET

Wide range of products, adapted to each project requirements:

Cooling power according to the project calculations 10kW...100 kW.

➤ Examples

MODEL	COOLING CAPACITY (kW)	AIRFLOW (M3/H)
FRIZONIA FZSWR9	9	3615
FRIZONIA FZSWR42	42	17000
FRIZONIA FZSWR102	102	41000

## DESCRIPTION

Sea Water Fan Cooler is an equipment provided with a coil which acts as a heat exchanger, cooling the air passing through the equipment and blown back in the room.

Cooling coils are finned tube coils inside these finned tubes, seawater flows as the cooling medium from the ship's fire extinguishing system or a dedicated seawater pump.

These units are fitted with a fan blowing directly into the served room, since they are not connected to the duct system.

\*Control System (See page 9).



## APPLICATIONS

Ventilation in the Machinery Rooms is achieved by means of intake and exhaust fans.

In case of high outdoor air temperature and/or high cooling power requirements the ventilation system is complemented with these seawater fan coolers.

In the closed condition (NBC), no outside air is introduced directly therefore the use of these seawater fan coolers is an adequate solution.

## DATA SHEET

Wide range of products, adapted to each project requirements:

Cooling capacity according to the room where the equipment is installed.

6kW...120 kW...customized.

Power supply 230V...400V...440V...690V and 50/60Hz

## SPECIAL UNITS

- › Equipment and/or components certified by the selected Classification Society
- › Dangerous atmosphere equipment available proxy
- › Shock qualification according to project requirement

## MATERIAL SPECIFICATION

### › Casing:

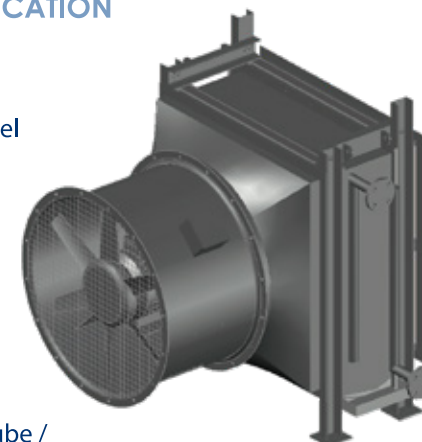
- Galvanized sheet steel
- Stainless Steel

### › Support frame:

- Painted steel

### › Cooling coil:

- Cupronickel 90/10 tube / prepainted aluminium fins / stainless steel frame



### › Fan with housing:

- Galvanized sheet steel
- Stainless Steel

### › Main drip pan:

- Stainless steel AISI 304L

### › Filter element:

- Stainless steel

› Examples

MODEL	AIRFLOW (m <sup>3</sup> /h)	COOLING CAPACITY (kW)	ELECTRIC POWER (kW)
FZSWF6	5800	6	3 / 1
FZSWF23	22000	23	5 / 1
FZSWF28	27000	28	5 / 1
FZSWF47	17685	47	4 / 1
FZSWF117	45000	117	15 / 3



## DESCRIPTION

The NBC-Filter is an equipment used to filter and decontaminate the air during an NBC attack in combat situation.

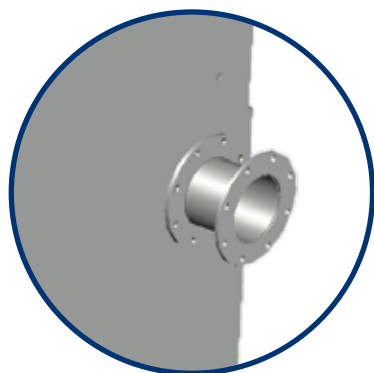
This equipment has a stainless steel casing which is mounted into the bulkhead. In the casing all components required for the air cleaning and decontamination are mounted: water separator, blast valves, pre-filter, preheater, NBC filters and high pressure fan.

\* Control panel is included in the unit.

## MATERIAL SPECIFICATION

### Casing:

- Stainless Steel

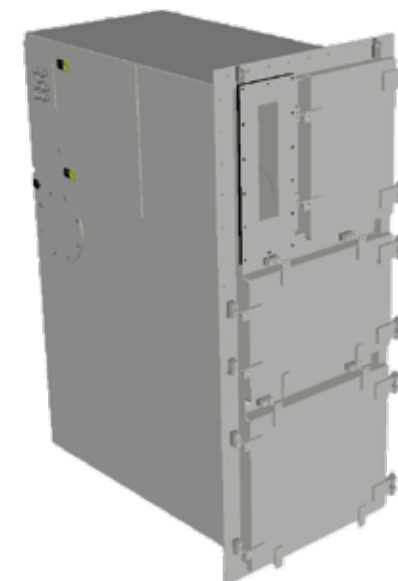


## APPLICATIONS

The NBC unit is designed to supply clean air to the citadel. The unit provides an amount of cleaned air per hour depending on its size.

## SPECIAL UNITS

- Chilled water cooling coil installed inside the equipments
- Control and communication devices agreed with the Vessel platform
- Splitted units to be installed on board where there is not an available space to install a compact one
- Shock qualification according to project requirement



## DATA SHEET

Power supply 400V... 440V...690V... and 50/60Hz

MODEL	APPROX. DIMENSIONS (mm) Front x Depth x Height	AIRFLOW (M3/H)	APPROX WEIGHT (Kg)
NBC 900	930 x 1390 x 2150	900	1000
NBC 1200	930 x 1390 x 2150	1200	1033
NBC 1800	1780x 1170 x 2150	1800	1500

Examples

FRIZONIA's engineering department could adapt the best control solution for each project requirement:

- Thermostatic 2-way/3 way valves to be installed in the chilled water circuit
- Electrically controlled 2-way/3 way valves
- Flow control valves
- Control panel including control and monitoring devices, also communication via Modbus/Profibus/Hardwired and the most up-to-date technologies available
- Digital Twin Solutions

» **APPLICABLE TO ALL THE FOLLOWING EQUIPMENT:**

» **EXAMPLES:**

» **Control Panel with PLC**



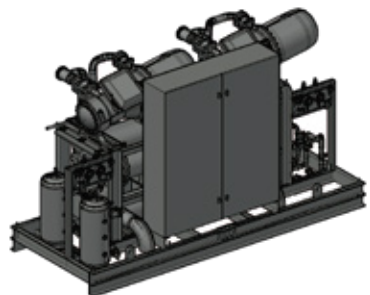
» **Control Panel without PLC**



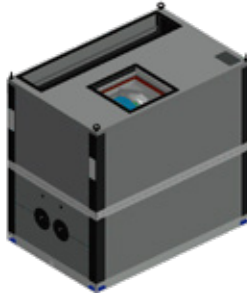
» **Water Valve**



**CHILLED WATER PLANTS**



**FAN COILS**



**UNITS COOLERS**



**GRAVITY COILS**



**SEA WATER COOLING COILS**



**SEA WATER FAN COOLER**



## » HVAC “Turn-Key” systems

### › Design & Engineering of the system

- Basic and detailed Engineering
- 3D modeling and integration
- Digital Twin

### › Manufacturing of Tailor Made Equipment

- Chilled Water Plants & Condensing Units
- Air Handling Units, Fan Coils, Cooling Coils  
Gravity Coils, Sea Water Fan Coolers

### › Supply of complete HVAC+R package

### › Full installation of the systems

### › Commissioning and final delivery

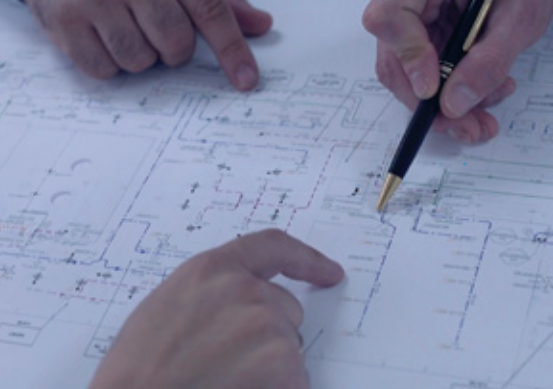
- Mechanical Completion & Test
- Final Delivery to the client

### › After-sales service

- Integrated Logistics Support
- Training courses







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