

Operating Manual

PHANTOR 6000

THE MOBILE WATER GIANT



Document signature and imprint

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1. General information:

This document is an integral part of the Phantor 6000 device. The operating manual as well as all additionally supplied documentation and instructions must be kept at the place of installation of the Phantor 6000 at all times.

For information about potential dangers and their prevention, this operating manual can be duplicated and passed on.



All rights of this document belong to Imhotep.Industries GmbH.

We reserve the right to make technical and editorial changes without prior notice!

Imhotep.Industries GmbH reserves the right to modify and optimize the Phantor 6000 series and documentation.

a) Legend of symbols

In this documentation, the following special characters and symbols are used to indicate potentially hazardous situations and important safety instructions.

Action required by the operator or operating staff in accordance with the specifications.



- Important information for the operator and the operating staff.



DANGER

Type of danger!

- Take measures at danger symbols to prevent or minimize hazards.
- Apply the described protective measures in the event of danger.

**CAUTION****Type of danger!**

- Take measures at danger symbols to prevent or minimize hazards.
- Apply the described protective measures in the event of danger.

b) Technical documentation:

All documents, drawings and data are subsequently referred to collectively as the "Phantor 6000 Technical Documentation". The technical documentation of the Phantor 6000 included in the scope of delivery consists of the documents listed in table 1:

Document name	Content and application
Operating manual Phantor 6000	Explanation Phantor 6000
Test book	Documentation of recurring inspections
Operating manual liquid cooling unit	Explanation liquid cooling set

Table 1: Documents Technical Documentation Phantor 6000



- The technical documentation of the Phantor 6000 may contain further documents in case of additional equipment.
- The complete technical documentation must be handed over to the new operator if the Phantor 6000 is passed on or sold.
- This document must be read completely and carefully before start-up of the Phantor 6000 and must be kept in a safe place.
- Follow the instructions given in the entire technical documentation when working on the Phantor 6000.
- To operate and control the Phantor 6000, it is necessary to read the operating and maintenance instructions incl. all associated parts completely and carefully before start-up.
- Keep the operating instructions and operating manual accessible to the operating staff.

c) Conformity of the Phantor 6000

EC/EU Declaration of Conformity of the Phantor 6000

Imhotep.Industries GmbH carries out all the measures prescribed for the design, construction and manufacture of the Phantor 6000 at the plant.

With the EC/EU Declaration of Conformity for the Phantor 6000, Imhotep.Industries GmbH confirms that the Phantor 6000 and its components comply with the essential health and safety requirements of all European directives and regulations, i.e. that it is in conformity with them.

An EC/EU declaration of conformity is a special form of a declaration of conformity in the legally regulated area of the European Union (EU). The EC/EU declaration of conformity is also used in the states of the European Free Trade Association (EFTA) and Turkey. The EC/EU Declaration of Conformity is the prerequisite for the CE marking of the Phantor 6000.

If the Phantor 6000 is installed or integrated into a master technical system, it may be necessary to take measures to ensure the conformity of the entire technical system. This is also necessary in the case of significant changes to the Phantor 6000.

2. Product description

a) General description

Phantor 6000 is a high efficiency, mobile atmospheric water generator (AWG) built in a 20ft All Access Container housing.

The basic principle of water extraction is that warm air is drawn in and cooled until it falls below the dew point and the air humidity condenses out.

The necessary cooling energy is provided by means of a highly efficient refrigerating machine (see operating manual liquid chiller). The refrigerant used is R-134A. Via an intermediate brine circuit (25% antifreeze concentrate-water mixture filled), the heat from the air cooling coil is supplied to the refrigerating machine. Via the refrigerant circuit, the heat from the cooling register is released back to the environment via the condenser (see operating manual liquid chiller).

The Phantor 6000 is equipped with a water treatment system in addition to the water extraction system. The water extracted from the air is collected in the condensate tray, pumped into a 600-liter storage tank and temporarily stored until extraction. When the water is extracted, it is filtered through an activated carbon filter, UV sterilized, deacidified and mineralized. Finally, a fine filter ensures the separation of any impurities larger than 5 microns.

Numerous parameters are continuously recorded in the individual process steps by means of measurement, control and regulation technology and evaluated by specially developed software. The Phantor 6000 can be monitored and controlled remotely via remote access.



- It is not possible to list all the technical data of the individual components in this document due to the variety of possible combinations of components within the Phantor 6000 series.
- Further details can be found in the other documents of the technical documentation or on the nameplates of the components.

b) Designated use

Deviation from the information in this operating manual is considered improper operation and is not permitted. Deviations must be checked and confirmed by Imhotep.Industries GmbH!

The Phantor 6000 may only be used to extract water from natural ambient air - by means of cooling below the dew point. All other applications of the Phantor 6000 do not correspond to the intended use.



DANGER

Danger to persons, property and the environment due to unauthorized use and improper operation of the Phantor 6000 possible!

- Only use the Phantor 6000 as specified in the operating manual.
- Ensure compliance with national and local rules and regulations.



- Imhotep.Industries GmbH does not assume any responsibility or warranty for damage caused by non-permitted use or improper operation.

c) Application limits

The operating limits are basically determined by the minimum partial load of all components and the thermal operating limits of the components.

The upper limit of use due to the thermal load capacity during operation is max. 50°C outside temperature. Temperatures inside the system must not exceed 45°C.

The lower operating limit is 0°C to prevent freezing of the drinking water pipes or the tank.

The lower operating limit is determined by the minimum partial load of the individual aggregates - in particular that of the refrigerating machine. This means that if the outside temperature and humidity fall below a certain level, the required cooling energy drops to a level below the minimum possible partial load of the refrigerating machines. The developed software automatically regulates the two refrigerating machines to the optimum operating point depending on the outside temperature. If the capacity requirement is reduced, initially both compressors are regulated downwards, and if the capacity requirement is reduced further, one of the two refrigerating machines is switched off. If the minimum partial load range of the refrigerating in operation is also reached, this refrigerating machine runs in bypass mode. The minimum partial load depends on the respective ambient temperature (condensing temperature).

d) Production capacity

The production capacity is basically related to the humidity contained in the air. The greater the absolute humidity the better the water yield and also the energy efficiency.

The further the air is cooled, the more water can be condensed out of the air, but at the same time the amount of energy required increases.

The drawn air can be dehumidified down to a residual humidity of 5.5g of water per kg of air, depending on the operating point. The higher the value of the drawn air is above this 5.5g/kg, the more water can be gained.

The daily water production volume of the Phantor 6000 depending on the ambient conditions is between 200l/24h and 6000l/24h.

Note: Air can store little water at low temperatures ($<15^{\circ}\text{C}$), so accordingly little water can be extracted at low temperatures even in combination with high relative humidity values, and the energy input per liter of water increases.

3. Technical data

Length:	6.058 m
Width:	2.438 m
Height:	2.896 m
Weight:	11,000 kg
Power supply:	105kW 160A (400V, 50Hz), clockwise rotating field, TNS network
Refrigerating machine:	Semi-hermetic piston compressors; Refrigerant: R-134A Brine: 25% antifreeze concentrate-water mixture
Water treatment:	Activated carbon filter, UV disinfection, deacidification/mineralization, fine filter
Integrated water tank:	600 liters
Housing:	C5 coated 20ft HC All Access See container resp. C5 powder coated fins and recirculating chiller housing
Ambient temperatures:	At least > 0°C; Maximum + 50°C

a) Nature and quality of the refrigerant (brine) in the cooling circuit

The quality and chemical composition of the brine have a great influence on the lifetime and heat transfer and thus on the performance of the Phantor 6000. In principle, all types of suspended matter should be avoided. An accumulation of suspended solids in the heat exchanger will impair the heat transfer and thus the performance of the Phantor 6000. The composition of the brine can be found in table 2. Deviations in the case of new fillings/re-fillings by the customer must be checked and confirmed by Imhotep.Industries GmbH.

Ensure that only ready-mixed and non-toxic, ecologically safe brine is filled in - e.g. Glysofor L; Wittig Umweltchemie.

pH value	7.5 – 8.5	pH
Germ count	< 1,000	CFU/ml
Electrical conductivity without inhibitors	< 1,600	µS/cm
Electrical conductivity with inhibitors	< 2,200	µS/cm
Carbonate hardness	< 4	°dH
Carbonate hardness with addition of inhibitors	< 20	°dH
Chloride content	< 100	mg/l
Chloride content (for austenitic steels)	< 50	mg/l
Sulfate content	< 200	mg/l
Iron	< 0.3	mg/l
Suspended solids	< 50	mg/l

Table 2: Recommended guide values



DANGER

Danger to persons, property and the environment due to unauthorized use and improper operation of the Phantor 6000 possible!

- If toxic antifreeze concentrate mixtures are used, it can lead to severe poisoning in the event of a fault.
- Ensure compliance with national and local rules and regulations.



- Imhotep.Industries GmbH does not assume any responsibility or warranty for damage caused by unauthorized use or improper operation.

4. Qualification and protective equipment of the staff

a) Qualification of the staff

The Phantor 6000 may only be operated by staff who meet the following requirements:

- Staff who has been instructed on the Phantor 6000 by an authorized employee of Imhotep.Industries GmbH or service partner.
- Staff familiar with the Phantor 6000 operating manual and related documents.
- Staff trained in safety measures and security on the Phantor 6000.
- Staff regularly trained in accordance with national and local rules and regulations.

Any work on the Phantor 6000 and especially on the refrigerating machine may only be carried out by competent staff for refrigeration systems and heat pumps (refrigeration fitter).

Special knowledge and qualifications of the staff are required for work on the Phantor 6000. All work listed in this operating manual may only be carried out by trained staff who observe the relevant regulations and have been trained for the work concerned. The operator of the Phantor 6000 is responsible for complying with the qualifications.

Only staff qualified in refrigeration technology may work on the refrigeration circuit of the Phantor 6000 and check for leaks.

Only electrotechnically trained and qualified staff may carry out work on the power supply.



DANGER

Danger to persons, property and environment possible due to insufficiently qualified staff!

- Ensure that the staff is qualified according to national regulations.

b) Protective equipment for the staff

Important notes on protective equipment

The operator of the Phantor 6000 is responsible for ensuring that suitable protective equipment is provided for the staff in sufficient numbers and ready for use and that it is used in the event of danger.

The personal protective equipment listed in table 3 must be immediately accessible and usable by all staff at all times in sufficient numbers.

Safety shoes	Protection against crushing, bumping, and falling objects Non-slip foot protection with secure grip and metal sheathing
Safety glasses	Chemical resistant basket glasses with additional face protection Made of plastic with side shields to protect against particles, dust, splinters, flying sparks and splashing liquids
Hearing protection	Protection against noise exposure
Safety gloves	Chemical resistant gloves with protection against frostbite Protection when gripping hot, cold, sharp, and pointed objects Non-slip gloves made of leather or plastic with a secure grip
Safety helmet	Protection against falling objects
Skin protection	Match skin protection/skin care products to other hazardous substances

Table 3: Personal protective equipment

Emergency and first aid equipment

The emergency and first aid equipment listed in table 4 is required in addition to the general personal protective equipment and must be provided outside the hazardous area of the Phantor 6000.

First aid kit	Dressing material, plasters, wound dressings, scissors, triangular cloth, etc.
Breathing apparatus	Ambient air self-contained breathing apparatus
Protective suit	Chemical protective suit with protection against frostbite
Additional equipment	Stretcher for transporting seriously injured persons Pad for laying down severely injured persons Protective foil against hypothermia

Table 4: Emergency and first aid equipment

5. Risk and safety statements

a) Important safety information

The operator of the Phantor 6000 is responsible for the safety of the Phantor 6000. Suitable measures must be taken to prevent and exclude damage to persons, property and the environment.

b) Measures in case of refrigerant leakage

- Make sure that there is no one inside the Phantor 6000 resp. that everyone leaves the inner area immediately.
- Switch off refrigerating machine (main switch refrigerating machine or power supply).
- Do not enter the danger zone alone.
- Ventilate the danger area until the refrigerant concentration has fallen below the AGW limit value.
- Close shut-off valves in the refrigerating machine piping to prevent further refrigerant leakage.
- The leakage of liquid refrigerant into the ground or into the sewage system must be reported immediately to the fire department and the responsible authorities, and further action must be agreed upon.
- The service department of Imhotep.Industries GmbH must be notified for the elimination of leaks and repair.

c) Fire fighting on the Phantor 6000 and its surroundings

Refrigerants R-134a and R-513A are non-flammable, therefore all known extinguishing agents are suitable for fire fighting.

The Phantor 6000 contains pressure vessels and piping, so in the event of a fire, the Phantor 6000 must be protected against excessive pressure provided this can be done without endangering yourself. In case of contact with fire or very hot surfaces, refrigerants may chemically decompose and form harmful gases. The following measures are required for fire fighting on the Phantor 6000.

- Call the fire department and inform them of the location of the fire, the type of refrigerant, and any further hazards.
- Disconnect the power supply of the Phantor 6000.



DANGER

Risk of explosion when exposed to heat due to fire!

- Cool the heat exchangers with water spray from a protected position.
- If the maximum permissible operating pressure (PS) is exceeded, leave the danger zone immediately!

Risk of poisoning in case of fire possible!

- In the event of a fire, clear the danger area immediately.
- Use respirators that are independent of the ambient air.

Danger to life from electric shock!

- The current country-specific applicable safety regulations for fire fighting of electrical switchgear must be adhered to.

d) First aid for injured persons

In the case of injured persons, first aid must be administered immediately in accordance with national or local regulations. A doctor must then be called immediately.

First aid for inhalation of refrigerant R-134a, R-513A or R-1234ze

- Apply first aid measures.
- Take person out for fresh air.
- Seek medical attention if irritation persists.

First aid for eye injuries caused by refrigerant R-134a, R-513A or R-1234ze

- Apply first aid measures.
- Do not rub eyes.
- Carefully remove glasses and contact lens. Do not forcibly remove frozen glasses or contact lenses!
- Lift eyelid and rinse eye thoroughly under running clean water (approx. 10 minutes).
- Immediately refer injured person to specialist after rinsing.
- Inform doctor about injuries, refrigerants, and other possible hazardous substances.

First aid for skin icing and frostbite

- Apply first aid measures.
 - Thoroughly rinse affected skin areas under running clean water.
 - Do not cover affected skin areas with clothing, bandages, oil, or similar items.
 - Protect injured person from hypothermia and care for until rescue service arrives.
- Inform doctor about injuries, location, refrigerant and other hazardous substances.

6. Installation and assembly

a) Unpacking

The Phantor 6000 is integrated in a CSC certified 20ft HC All Access seecontainer. This container forms both the cladding and the transport packaging for the system components inside - delivery Phantor see figure1. Phantor in assembled condition - see figure 2.



Figure 1: Delivery of Phantor 6000 in closed condition



Figure 2: Phantor 6000 in open condition

a) Installation site

Phantor 6000 may only be installed up to a maximum altitude of 1000m above sea level!

It is necessary for the water extraction to suck in up to 15,000m³ of air per hour. It must be ensured that the suction cross-section is free at a distance of approx. 10m to enable unhindered suction.

Up to 60,000m³ of air per hour is drawn in for recooling in the area of the condenser (up to 30,000m³ per hour each on the left and right). It must be ensured that the intake cross-section is free at a distance of 5m so that unhindered intake is possible. Above the recooling, the heated air (up to 60,000m³/h) is blown out. It is important to ensure that the air is blown out freely upwards (no superstructure) so that the entire thermal output is dissipated and to prevent thermal short circuits between the warm exhaust air and the product air respectively the cooling air for the recooling.

The ambient temperature must not fall below 0°C at any time, otherwise frost damage may occur. Furthermore, the ambient temperature must not exceed 50°C, otherwise damage to the system may occur.



- Installation of the Phantor 6000 in areas protected from direct sunlight leads to better efficiency.
- Obstruction of the air flow in the suction area leads to a lower water yield and increased energy consumption.
- To increase the service life of the air filters and to protect the downstream system components, the system must be set up in such a way that clean ambient air can be drawn in without contamination.
- Obstruction of the air flow in the intake area of the condenser (in front of or on the intake fins) leads to increased energy consumption and reduced re-cooling capacity. This can lead to system shutdowns within the operating limits.
- The fins of the recirculating cooler must be protected against damage. Bent fins lead to increased energy consumption and lower recooling

performance. Bent fins must be straightened by a qualified person using a fin comb.

- Ensure that the Phantor 6000 is set up protected from unauthorized access.
- Ensure that the danger zones of the Phantor 6000 cannot be entered without authorization.
- Ensure that only authorized staff has access to the Phantor 6000 respectively into the Phantor 6000.
- Ensure that the installation site is no more than 1,000 m above sea level.
- Phantor 6000 must not be operated in potentially explosive atmospheres.
- Lightning protection is required for installation, especially on roofs or in exposed, elevated positions.



DANGER

Danger to Phantor 6000, persons, property and environment possible due to inadmissible ambient conditions of the Phantor 6000!

- Only use Phantor 6000 within the specified ambient conditions, otherwise damage may occur due to frost (risk of bursting) or overheating.
- If there is a risk of frost, the entire drinking water system (tank, pipes, pumps, filters, etc.) must be drained professionally and blown out with air several times.
- Ensure that the Phantor 6000 is only used in non-aggressive and non-corrosive environments, otherwise damage to the equipment may occur.

b) Type of installation

The Phantor 6000 must be installed on a paved surface with all axes horizontal. If there is a deviation of 1 degree, a warning is issued and if there is a deviation of 2 degrees from the horizontal, the system is shut down respectively the system cannot be started. It must be ensured that the base frame lies flat on the substrate (foundation plate or on-site supports) to prevent twisting.

For installation on longitudinal strip foundations, the following static requirements must be met: $b \times d = 50/50\text{cm}$; concrete quality C25/30; BST 550; $c = 5.5\text{cm}$; reinforcement top and bottom $3 \times 10\text{mm}$ each + stirrup $8\text{mm}/25$; quality of the substrate: $EV1 > 30\text{MN/m}^2$ $EV1 / EV2 < 2.5$ anchoring to the foundations by means of through bolts M12 every 3m is recommended.

When installing on strip foundations, the following static requirements must be met: $d = 18\text{cm}$; concrete quality C25/30; BST 550; $c = 5.5\text{cm}$; top and bottom probation each AQ60; quality of the subsoil: $EV1 > 30\text{MN/m}^2$ $EV1 / EV2 < 2.5$ anchoring to the foundations by means of M12 push-through anchors every 3m is recommended.

When mounting on cross profiles, use at least 3 cross profiles at equal intervals (every 2.2m).



DANGER

Danger to life due to insufficient static strength during installation!

- Ensure that the installation site is sufficiently statically dimensioned according to the local requirements.
- Ensure that wind and snow loads are considered.
- The deviation from the horizontal in all axes must not exceed 2 degrees, otherwise the system cannot be started resp. stops automatically. A warning is given starting from +/- 1 degree.

- Ensure that the Phantor 6000 is supported flat along the entire base frame, otherwise damage may occur due to twisting or deflection.



- After unpacking and setting up, check all doors, trim parts for transport damage and for tight fit.
- Pipes and heat exchangers inside the system must be visually inspected for leaks.

c) Establishing the electrical connection:

The electrical connection box is integrated at the front of the Phantor 6000. Electrical connection box as shown in fig. 3 The Phantor 6000 must be connected to the local power supply by a qualified person using a single cable or a parallel system via the lateral cable entries in the base frame of the Phantor. Cable entry see fig. 4.



Figure 3: Electrical junction box at the front with cable entry (arrow)



Figure 4: Cable entries below

For the connection work, open the left distribution cabinet - see figure 5 on the front side of the Phantor and connect the 5 conductors (L1, L2, L3, N, PE) of the supply line according to the labeling.



Figure 5: Electrical junction box interior view

The 3 phases must be passed individually through the 3 current transformers as shown in figure 6 and then connected to the terminals as shown in figure 7.

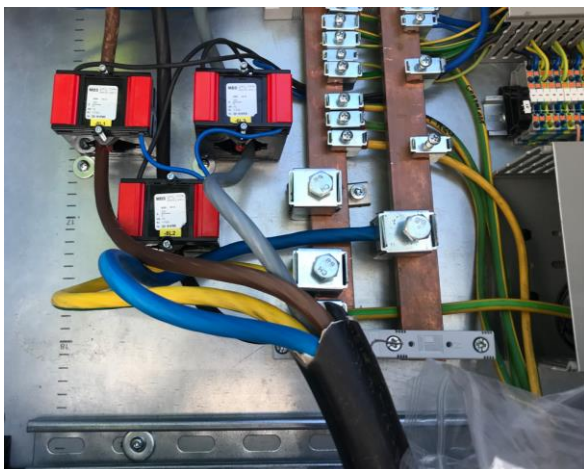


Figure 6: Current transformer



Figure 7: Terminals

The electrical connection and work on electrical components may only be carried out by a qualified electrician in compliance with the electrotechnical regulations.

Check the installation and prepare an acceptance report according to the specifications of the network operator and any regional specifications. Recommendation: Use the templates of VDE-AR-N 4105, 4100 respectively 4110 or equivalent as a basis.

- Ensure that the insulation resistance, short-circuit resistance and loop resistance comply with national and local standards and regulations.
- Ensure that the electrical supply corresponds to the TNS network type. Other types of power supply must be approved by Imhotep.Industries GmbH.
- Checking the rotating field before on-safety (clockwise rotating field is absolutely necessary for correct function).
- Establish professional equipotential bonding and connect it to the Phantor 6000. The connection to the equipotential bonding rail is made with single-core copper cables, which may be insulated or marked green-yellow. Their cross-section must have a certain minimum value according to DIN VDE 0100 Part 540. The potential equalization line from the system to the main potential equalization rail must also comply with the locally applicable standards.
- Perform electrical connections according to specifications.
- Ensure correct phase sequence (clockwise rotating field).
- Label electrical cables according to national and local regulations.
- Wired lines must not create tripping hazards or other hazards.
- Dimension and fuse electrical lines according to requirements.

**DANGER****Danger to life from electric shock!**

- Danger from the main electrical supply!
- Danger due to missing or improper electrostatic grounding of the Phantor 6000!
- There are components in the switching cabinet that can be under voltage even when switched off!
- Ensure that the main switch on the Phantor 6000 is switched off and secured against being switched on again.
- Ensure that only electrotechnically qualified staff work.
- Ensure that the uninterruptible power supply (UPS) is interrupted and secured against restarting.
- After disconnecting the power supply, wait at least 10 minutes until the capacitors have discharged.

Risk of equipment damage!

- Ensure that rotation field is clockwise.
- Ensure that the electrical supply complies with the TNS network form.

d) Lightning protection:

The system must be protected by a lightning protection system in compliance with the applicable local regulations. Air-termination systems must be installed to prevent direct lightning strikes on the system. A test report for this must be included in the system log book.

7. Start-up

a) Preparation for start-up

Before the start-up, the system must be prepared for start-up. In particular, the corresponding doors must be opened and fixed, and the two condensers must be extended.

1. Open the container doors on the front side as well as the left main electrical distributor behind them (front side, which is close to the cable entry on the floor frame) -see item 6.d.
2. Check the E-feeding.
3. Open the opposite front container doors so that the air intake can take place unhindered - see figure 8.



Figure 8: Air intake

4. Open the two container doors on the long side (2 door parts each on the left and right) which connect to the front side of the container with the E-distributor to enable the condensers to be moved out in the next step - see figure 9.



Figure 9: Opening the two longitudinal container doors in front of the condensers

5. Open the container door in front of the water kiosk (on the side of the container where the cable entry is located in the floor) - see figure 10.



Figure 10: Container door in front of water kiosk

6. Securing the open container doors to each other respectively to the container with tension belts, so that an unintentional swinging of the doors due to gusts of wind and similar is prevented.
7. Flip out the condensers on both sides using the key switch as shown in figure 11. Make sure that the condensers can be extended freely without any obstacles and no unauthorized persons are in the vicinity to prevent the risk of crushing. To extend, operate the key switch until the condenser is fully extended as shown in figure 12 and figure 13. Repeat the procedure on the second side. To retract, operate the key switch in the opposite direction until the condenser is fully inserted again.



Figure 11: Key switch (arrow) for extending the condenser



Figure 12: Condenser right in extended state



Figure 13: Condenser left in extended state

8. Unlocking and folding out intake grille (unlocking by means of square key) in the lower part of the condensers as shown in figure 14. For visual inspection of the technology inside and for inserting the components for water treatment as shown in figure 15.



Figure 14: Intake grille folded out



Figure 15: Water treatment (filter, UV disinfection, deacidification/mineralization)

**DANGER**

Personal injury, property damage and environmental damage possible due to improper start-up!

- Ensure that all doors are sufficiently fixed to prevent damage to the equipment or injury to persons due to unintentional swinging of the doors.
- Ensure that no unauthorized persons are in the immediate vicinity when unfolding the condensers to prevent the danger of crushing.

b) Initial start-up

The initial start-up of the Phantor 6000 after transport and installation may only be carried out by employees of Imhotepe Industries GmbH or by authorized persons.

**DANGER**

Personal injury, property damage and environmental damage possible due to improper start-up!

- Ensure that only qualified staff start up the Phantor 6000.
- Ensure that all inspection openings are closed during start-up and operation. Opening during operation is not permitted - due to the overpressure inside the Phantor 6000, otherwise damage to the doors or injuries to the operating personnel may occur.

c) Check water quality

Before the water extracted from the air is used as drinking water, the water quality must be checked by a certified measuring laboratory for compliance with the regional drinking water regulations.

After longer standstill periods, it may be necessary to disinfect the entire drinking water circuit respectively all surfaces that come into contact with drinking water with a suitable solution to destroy any bacteria/biofilms.

**DANGER**

Personal injury due to non-compliance with drinking water hygiene regulations!

- Ensure that all drinking water filters are in place, UV disinfection is working and drinking water meets appropriate standards.

d) Start-up after longer standstill

For the start-up after a longer standstill, the service of Imhotep.Industries GmbH should be commissioned.

The following activities must be performed during start-up after a longer standstill period:

- Ensure that the Phantor 6000 is free of damage.
- Ensure that all maintenance doors and inspection openings are closed.
- Ensure that the front intake lamellas are free of any objects or impurities obstructing the air flow.
- Ensure that the intake fins of the recirculating cooler are free of any objects respectively impurities obstructing the air flow.
- Ensure that the discharge openings on the roof of the recirculating cooler are free of any objects respectively impurities that could obstruct the air flow.
- Check refrigerant circuit and brine circuit for leaks.
- Ensure that the brine circuit is appropriately filled and that all drain cocks are closed.
- Clean the system from dirt and debris.
- Ensure that the system is accessible all around.

- Ensure that all protective devices on the Phantor 6000 are functional.
- Ensure that all electrical connections are established.
- Ensure that the brine circuit pump is ready for operation.
- In case of standstill > 4 months, run fan at full speed for at least 3 hours to evaporate any condensate that has entered the system.
- Disinfection of the drinking water circuit and control of drinking water quality.

e) Restart after power failure

After a failure of the electrical power supply and recovery of the power supply, the Phantor 6000 switches on again automatically, provided that the following conditions are met:

- The release message of the higher-level controller is present.
- The feedback on the operation of the pumps of the brine circuit is present.
- The feedback of the flow monitors of the brine circuit is present.

An interruption of the power supply has no influence on the data storage of the Phantor 6000. The PLC program respectively the software and all entered parameters are saved.

8. Operation

a) Operation and maintenance openings

Phantor 6000 container doors can be opened on all sides for maintenance purposes. Furthermore, the intake grilles in the lower area of the condenser and the covers in the area of the air treatment can be opened as shown in figure 16.



Figure 16: Phantor 6000 with open inspection ports

b) Water withdrawal

Water can be withdrawn at the water kiosk as shown in figure 17 - using an RFID card when the water buffer is full. The card must be registered in the system for this to work.



Figure 17: Water kiosk with RFID card reader (arrow)

If everything runs correctly, the water withdrawal can be started by means of the RFID card and magnet. To do this, hold the RFID card up to the card reader, which is located behind the glass pane next to the water kiosk. This releases the drinking water dispenser. If the card is now taken away again, the water withdrawal stops. For a further tapping, it must be started again by means of the RFID card.

Alternatively, the dispensing process can be started via the touch panel. In the settings (pop-up button "Water preparation"), there is the option to select different operating modes of the water preparation:

Circulate: The produced water is circulated to prevent the development of germs and bacteria.

Output: Water is dispensed at the water kiosk.

Auto: Water circulation for quality assurance of the produced water repeatedly runs at a certain interval and the water is provided only when requested by placing the RFID card at the output terminal.

c) Control engineering

The system basically runs automatically and tries to cover the water demand in the best possible way. This is made possible by measuring the level in the water tank. If the water level in the tank drops, the system switches on as required and fills the water tank again. Too short running times of the water production are avoided.

The control of water production is regulated to the best operating point based on environmental conditions.

If problems occur, the control system first tries to solve them itself. However, this is not possible for all problems. Information is only provided to the operator if this is not possible.

If faults occur in the control technology, it must be enabled again by means of the reset button on the system switch cabinet after the respective fault has been cleared.

d) Fault messages control Phantor 6000

Clicking the pop-up button marked in red in figure 18 in the visualization displays an overview of all current warnings and alarms.

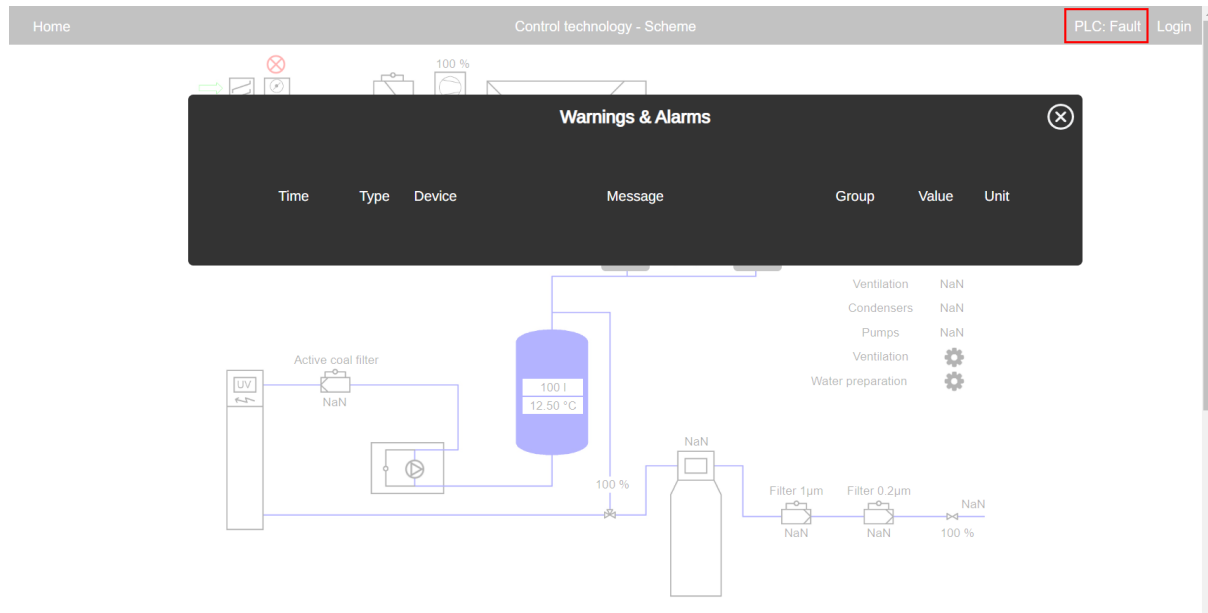


Figure 18: Overview warnings and alarms

The following tables 5 to 10 list the possible error messages:

Common:

Device - Message	Remedy
Circuit breakers – Not ok	Check whether the fuses 15F1, 16F2, 22F1 and 22F2 have dropped.
Overvoltage protection – Not ok	Check whether the fuse 9F1 has dropped out or the surge arrester 9N1 has tripped.
24V supply – Not ok	Check if the fuse 16F1 has dropped out or if the power supply 103G1 respectively the load circuit monitoring 103F1 emits an alarm.
24V buffer battery - Alarm	Check whether the fuse 16F1 has dropped or the uninterruptible power supply 103G2 emits an alarm.
Phase sequence – Not ok	The main connection must be changed or reconnected to provide a clockwise rotating field.

Common – No cooling machines available	No refrigerating machine is currently available because either no release has been issued by the HMI, a fault is present or the switch-on lock is active.
--	---

Table 5: Error messages "Common" Phantor 6000

Water treatment:

Device - Message	Remedy
Water active coal filter – Not ok -> replace it	The differential pressure of the activated carbon filter exceeds the defined limits - the filter must be checked.
Water filter 1µm - Not ok -> replace it	The differential pressure of the fine filter 1µm exceeds the defined limits - the filter must be checked.
Water filter 0.2µm - Not ok -> replace it	The differential pressure of the fine filter 0.2µm exceeds the defined limits - the filter must be checked.
Pump droplet separator - Fault	Check if the fuse 30F1 has dropped out.
Pump energy recovery - Fault	Check if the fuse 31F1 has dropped out.
Ultraviolet sterilisation - Fault	Check if the 46F1 fuse has dropped out or if the UV sterilization is issuing a fault.
Pump domestic waterworks - Fault	Check if the fuse 45F1 has dropped out.

Table 6: Error messages "Water treatment" Phantor 6000

Ventilation:

Device - Message	Remedy
Ventilation filter – Not ok -> replace it	The differential pressure of the outside air filter exceeds the defined limits - the filter must be checked.
Ventilation cooling register – Not ok	The differential pressure across the cooling register exceeds the defined limits - the cooling register must be checked for contamination or clogging.

Table 7: Error messages „Ventilation“ Phantor 6000

Vaporiser:

Device - Message	Remedy
Vaporiser pump - Fault	Check if fuse 41F1 has dropped out or if a fault is active at the frequency converter of the evaporator circuit pump which must be eliminated respectively acknowledged.

Table 8: Error messages "Vaporiser" Phantor 6000

Cooling machine 1:

Device - Message	Remedy
Cooling machine 1 - Alarminput compressor	Check if the NH fuses 33F1 have tripped or if a fault is active at the frequency inverter 33A1 which must be eliminated respectively acknowledged.
Cooling machine 1 - Alarminput expansion valve	The expansion valve has 183Y2 gives a fault message - inspection is required.
Cooling machine 1 - Alarminput condenser	Check why the condenser 36M1 issues a fault message.
Cooling machine 1 - Alarminput high pressure sensor	The high pressure switch has tripped. There may be problems with the condenser.
Cooling machine 1 - Alarminput safety high pressure sensor	The safety high pressure switch has tripped. There may be problems at the condenser.
Cooling machine 1 - Alarminput pressure overheat sensor	Check why the compressor is overheating.
Cooling machine 1 - Low pressure 1.1 bar	Check why there is a low pressure fault.
Cooling machine 1 - Too high pressure gas temp. 100°C	Check why the compressed gas temperature exceeds the defined limits.
Cooling machine 1 - Compressor feedback faulty	Check why the compressor does not start operating after at least 10 seconds of active enabling, and issues an operating message.
Cooling machine 1 - Too low oil diff. Pressure 1.4 bar	Check why the oil differential pressure at the compressor does not meet the defined minimum limit.
Cooling machine 1 - Too low suction gas overheat 2 Kelvin	Check why the defined minimum limit for suction gas superheat is not observed.
Cooling machine 1 - Too low condenser pressure 2.5 bar	Check why the condenser pressure does not comply with the defined minimum limit.

Cooling machine 1 - Frostprotection vaporiser -5°C	Check why the cold water temperature falls below the defined limit.
--	---

Table 9: Error messages "Cooling machine 1" Phantor 6000

Cooling machine 2:

Device - Message	Remedy
Cooling machine 2 - Alarminput compressor	Check if the NH fuses 37F1 have tripped or if a fault is active at the frequency inverter 37A1 which must be eliminated respectively acknowledged.
Cooling machine 2 - Alarminput expansion valve	The expansion valve 191Y2 issues a fault message and must be checked.
Cooling machine 2 - Alarminput condenser	Check why the condenser 40M1 issues a fault message.
Cooling machine 2 - Alarminput high pressure sensor	The high pressure switch has tripped. There may be problems with the condenser.
Cooling machine 2 - Alarminput safety high pressure sensor	The safety high pressure switch has tripped. There may be problems at the condenser.
Cooling machine 2 - Alarminput pressure overheat sensor	Check why the compressor is overheating.
Cooling machine 2 - Low pressure 1.1 bar	Check why there is a low pressure fault.
Cooling machine 2 - Too high pressure gas temp. 100°C	Check why the compressed gas temperature exceeds the defined limits.
Cooling machine 2 Compressor feedback faulty	Check why the compressor does not start operation after at least 10 seconds of active enabling, and issues an operating message.
Cooling machine 2 - Too low oil diff. Pressure 1.4 bar	Check why the oil differential pressure at the compressor does not meet the defined minimum limit.
Cooling machine 2 - Too low suction gas overheat 2 kelvin	Check why the defined minimum limit for suction gas superheat is not adhered to.
Cooling machine 2 - Too low condenser pressure 2.5 bar	Check why the condenser pressure does not comply with the defined minimum limit.
Cooling machine 2 - Frostprotection vaporiser -5°C	Check why the cold water temperature falls below the defined limit.

Table 10: Error messages "Cooling machine 2" Phantor 6000

e) Visualization general

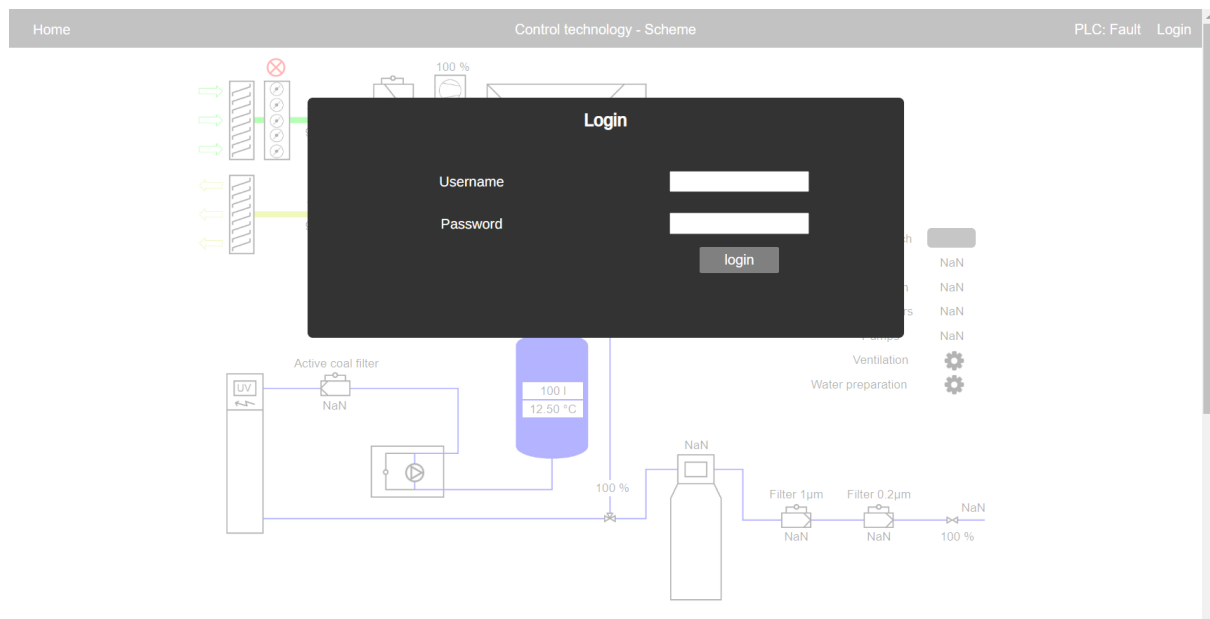


Figure 19: Overview visualization

The operator is required to enter the user and the corresponding password to enable access when the visualization is started. It is possible to set up three different user levels as shown in table 11, which differ in the following properties:

Level 1	Highly restricted view:	Only the viewing of the visualization and the alarm list are possible.
Level 2	Partially restricted view:	The operator can switch the machine on and off. It is possible to: - switch individual devices of the periphery manually - limit values for e.g. filter monitors can be changed - change modes for water output
Level 3	Unrestricted view:	It is possible to: - the same points as in user level 2 can be made - reset operating hours - control parameters can be changed

Table 11: User levels settings

In principle, only trained specialist personnel may make changes and settings and operate the system manually.

Damage/defects to the equipment due to incorrect operation



DANGER

- Ensure that only trained and qualified staff operate the system in manual mode.

The main user interface of the Phantor 6000 offers four different elements see table 12:

1.)	Measured value display	green
2.)	Measured value displays with integrated pop-up button for retrieving further details	blue
3.)	Button for switching	orange
4.)	Pop-up button for accessing settings	pink

Table 12: Elements of the main Phantor 6000 user interface

The following figure 20 shows some of these elements marked in the colors indicated.

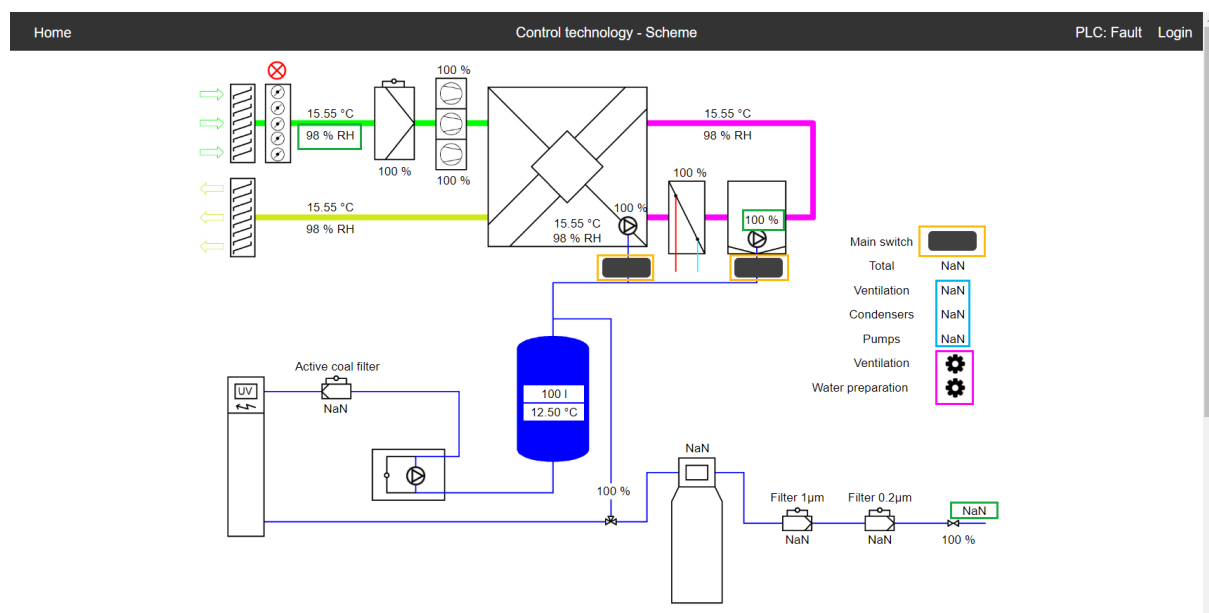


Figure 20: Overview elements main user interface

f) Pop-ups in the visualization

If you click on a pop-up button to open the corresponding settings window (figure 21), you will see two more types of operating elements:

1.)	Selection switch	orange
2.)	Setpoint or limit value specifications	blau

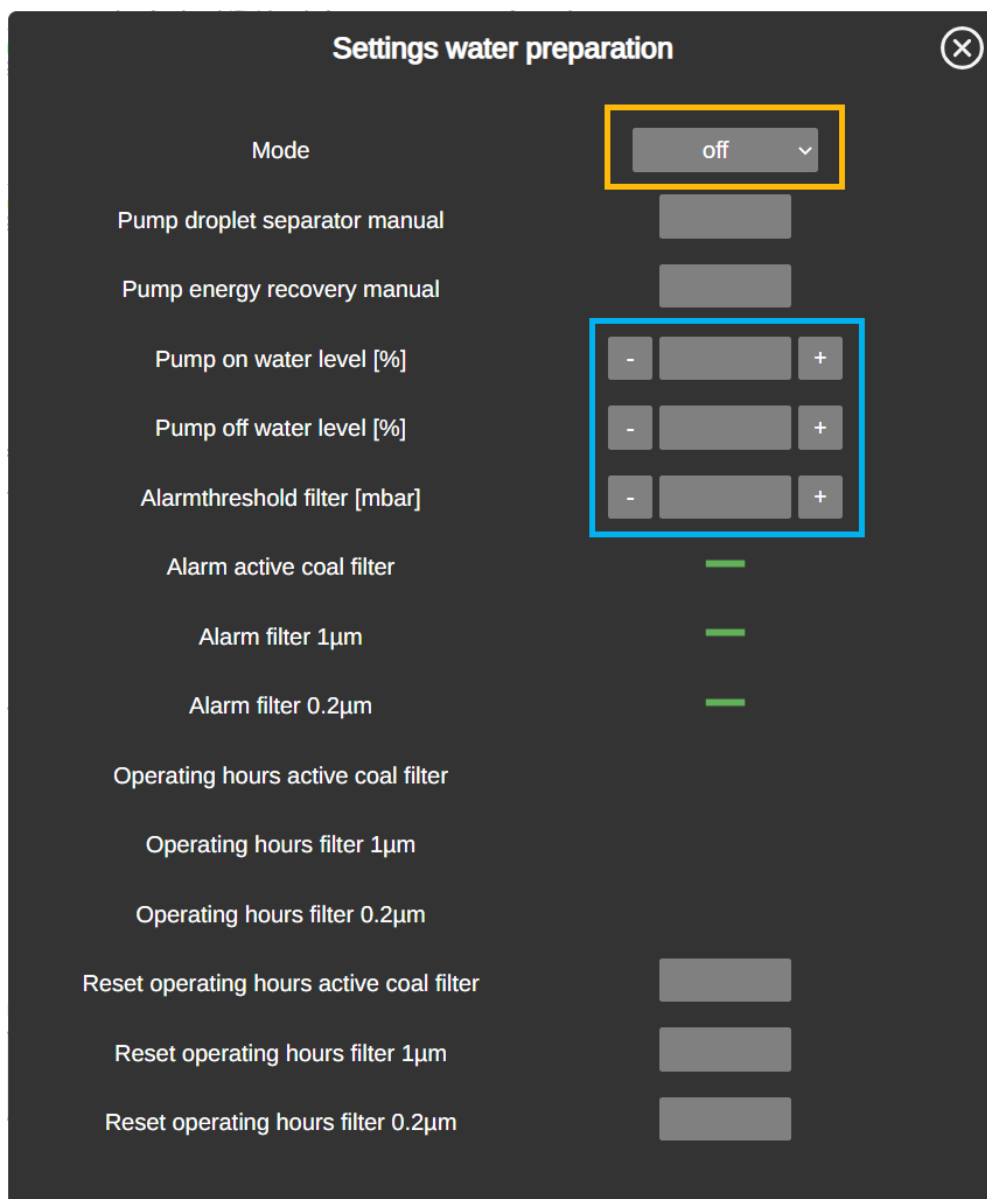


Figure 21: Overview elements pop-ups

g) Air treatment and water treatment

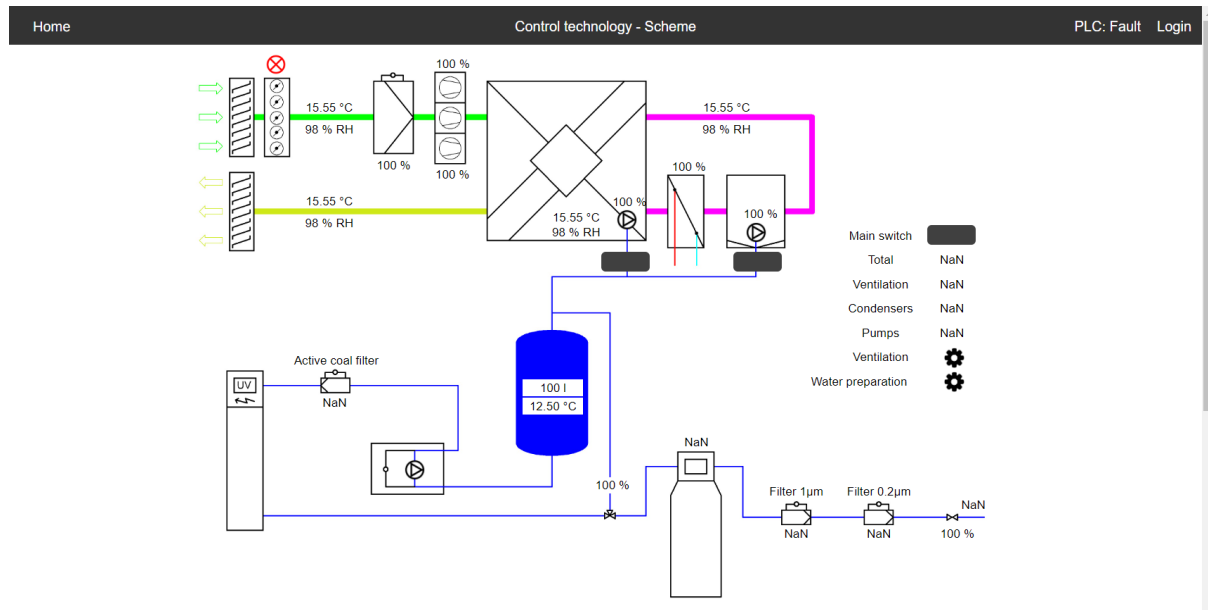


Figure 22: Visualization air treatment and water treatment

The first page of the Phantor 6000 visualization is shown in figure 22, which is divided into the "Air treatment" and "Water treatment" sections.

General:

On this page, the entire machine can be put into operation by actuating the "Main switch". Under the main switch, the current individual powers as well as the current total power can be read. For more details, the corresponding pop-ups can be opened by clicking on the power displays of the individual consumers (Ventilation, Condensers, Pumps).

Ventilation:

This indicates whether the air treatment is running and, if so, with which volume flow. By calling up the settings (pop-up button "Ventilation"), the air treatment can also be set to manual mode and thus also the target volume flow of the system. The limit value for the filter monitor alarm, for example, can also be adjusted. The cooling register is supplied by the refrigeration system under point h).

Water treatment:

It is possible to determine here to what extent the integrated water tank is already filled and what the condition of the individual filters is. In the settings (pop-up button "Water preparation"), the pumps in the individual catch basins of the air treatment can be operated manually. Furthermore, the settings offer the possibility to select different operating modes of the water preparation:

Circulate: The produced water is circulated to prevent the development of germs and bacteria.

Output: The water is dispensed at the dispensing terminal.

Auto: Water circulation for quality assurance of the produced water repeatedly runs in a certain interval and the water is provided only when requested by placing the RFID card on the output terminal.

h) Cooling system

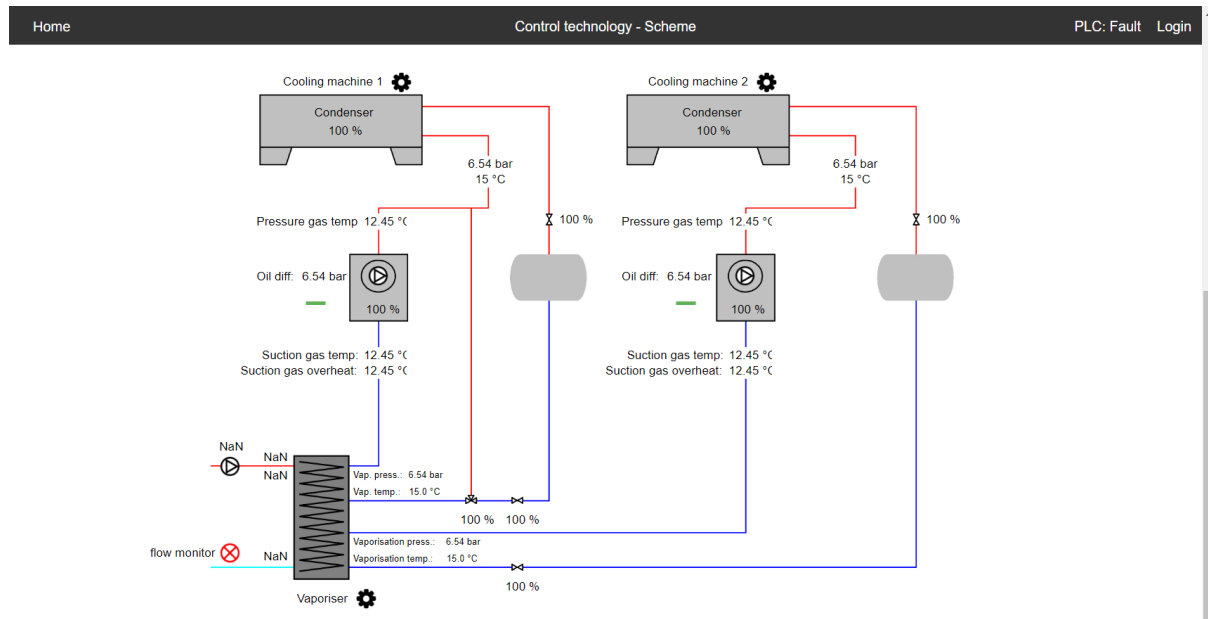


Figure 23: Visualization cooling system

The second page of the Phantor 6000 visualization, which shows the refrigeration system, is shown in figure 23.

Vaporiser:

The pump can be deactivated in the settings (pop-up button "Vaporiser") respectively it can be determined with how much % the pump should be activated. In addition, control parameters for the cooling generation can be adjusted.

Cooling machine 1&2:

Diverse values and control parameters for the operation of the condensers and the expansion valve can be adjusted in the settings (pop-up buttons "Cooling machine 1" and "Cooling machine 2").

9. Maintenance

The Phantor 6000 must be serviced and maintained regularly in order to ensure its function, performance and safety. Only regular professional maintenance will ensure a long service life of the Phantor 6000. The operator is responsible for regular professional maintenance. Attention must be paid to compliance with national and local accident prevention regulations.

a) Measures for maintenance and service

The tasks listed in table 13 "Maintenance work by operating staff" may only be carried out by qualified operating staff. The maintenance work must be carried out by the operating staff at the specified intervals. If defects are found or repairs are necessary, the responsible Imhotep.Industries GmbH service department must be notified.

In addition to the maintenance measures by the operator, the Phantor 6000 must be serviced annually by competent staff of Imhotep.Industries GmbH.

Maintenance proofs by service staff authorized by Imhotep.Industries GmbH are a prerequisite for claiming warranty during the warranty period. Violations of the maintenance instructions can lead to rejection of the warranty claim!

It is recommended to conclude a maintenance contract with the service of Imhotep.Industries GmbH; both during and after the expiry of the warranty period!

Maintenance measures by operating staff	As required respectively upon information by MSR	weekly	monthly	semi-annually	yearly
Cooling machine	According to operating manual cooling machine				
Cleaning the suction lamellas/ sand trap	X				
Air filter change	X				
Combi water filter change	X				
Fine filter change	X				
Change UV lamp	X				
Change granule mineralization	X				
Visual inspection of the entire system (damage, contamination, insulation, corrosion,...)		X			
Visual inspection (check for leaks) of the chilled water circuit and the recooling circuit		X			
Clean the brine circuit strainer					X
Check visualization for fault messages		X			
Check pumps for abnormal noise		X			
Check ventilating fans for abnormal noise generation		X			
Clean the condensate pan of the ventilation system				X	
Cleaning water tank				X	
Venting the brine circuit				X	
Water quality analysis	After the start of operation every 2 months respectively in case of change of ambient conditions				

Table 13: Maintenance measures by operating staff

**DANGER**

Danger to persons, property and environment possible due to improper maintenance!

- Ensure compliance with national and local codes and regulations.
- Ensure that the staff is skilled and qualified according to the operations.

Personal injury, property damage and environmental damage possible due to refrigerant leaking!

- The refrigerants R-134a, R-513A and R-1234ze displace oxygen from the ambient air and thus have a suffocating effect.
- Harmful impact on the environment by contributing to the global greenhouse effect.

Danger to life due to electric shock!

- Attention! Voltage at terminals and connections even when the machine is switched off!
- Ensure that the main switch on the Phantor 6000 is switched off and secured against being switched on again.

Risk of burns due to hot components!

- Cool down all fluid circuits to below 50 °C before starting work.

Risk of injury from rotating parts!

- Reaching through the fan protection grilles can cause injury from the rotor and impeller.
- Do not operate the recirculating cooler fans without the protective grille in place!
- Removal of the protective grids of the fans as well as maintenance work on the ventilation is only permitted when the power is switched off (voltage-free state) and secured against unexpected start-up.
- Do not wear loose or hanging body clothing, long hair must be protected.

Risk of injury from sharp edges and corners and falling objects!

- The fins of the recirculating cooler and the cladding panels can cause cuts if touched.
- Wear protective gloves and helmet.

10. Transport

a) Important information about the transport

The system may be transported in a filled state from a technical point of view. This means that both the brine circuit and the refrigerant circuit do not have to be emptied for transport in technical terms. The refrigerant charge of the Phantor 6000 totals approx. 85 kg.

Depending on the regulations in the respective countries, it may be necessary to mark the vehicle as transporting dangerous goods when transporting the factory-filled Phantor 6000 with refrigerant on public roads. This does not apply to unfilled Phantor 6000 units. Instructions for transport with refrigerant can be found in the safety data sheet. Imhotep.Industries GmbH recommends to commission a specialist company for the delivery and removal as well as the internal transport.

Before transport, all parts must be checked to ensure that they are properly mounted, fixed and secured. All doors must be checked to ensure that they are firmly closed.



DANGER

Danger to life from falling parts!

- Transport only in tightly closed condition, otherwise there is a risk that detached parts may fall down and cause damage.

The equipment must be properly fixed to the truck trailer at the points provided for this purpose (corner castings) to prevent it from slipping or must be fixed at suitable points by means of tension belts.

- Tighten the load to the loading area in a way that prevents it from slipping.
- Do not damage any components of the Phantor 6000 when applying the tensioning straps.

b) Lifting instructions

The Phantor 6000 may only be lifted as specified in the lifting instructions. The center of gravity of the Phantor 6000 is approximately in the middle. The Phantor 6000 may only be lifted in a completely closed state without exception.

A 4-strand hanger can be attached to the 4 upper corners of the container (corner castings) for lifting the entire system. Take care that the 4 strand hanger is attached in such a way that the Phantor 6000 is lifted horizontally.

- All 4 corner castings (4-strand hangers) must be used without exception - a crane lift with only 3 or fewer lifting eyes is not permitted!
- Use a pendant of sufficient length to provide an angle of $\geq 60^\circ$ between the roof and the pendant. Alternatively, suspended trusses are to be used.

The Phantor 6000 can also be lifted by means of a forklift truck/container stacker. When lifting with a forklift, use the openings provided for this purpose in the bottom frame of the container as shown in figure 24. The two openings labeled "EMPTY LIFT ONLY" must not be used.



Figure 24: Lifting openings for lifting by forklift truck



- Ensure compliance with national and local rules and regulations.

**DANGER**

Danger to life and property and environmental damage possible due to improper transport/crane lifting.

- Use only approved and undamaged lifting equipment and slings.
- Ensure that the staff is sufficiently qualified.
- Do not walk on the roof of the Phantor 6000 - danger of breaking through and falling
- Wear safety shoes, safety gloves and safety helmet.

c) Transport damage upon delivery

Upon delivery, the Phantor 6000 must be checked immediately for damage. Damage caused by the transport company or the forwarding agent must be confirmed by the signature of the responsible fitter or the driver.

The damage are to be documented with photos and immediately reported to the Imhotep.Industries GmbH contact person or the supplier.

11. Decommissioning and proper storage

Longer standstill

To prevent damage, the Phantor 6000 heat exchangers should be flushed with clean coolant and dried before extended downtimes. For professional emptying and drying of the heat exchangers on the water side, the Imhotep.Industries service should be commissioned.

In the case of temporary storage or downtimes with a risk of frost, the following information must be observed.

When storing the Phantor 6000, ensure that the storage location is dry and that the ambient temperature does not rise above 55 °C. If the Phantor 6000 contains refrigerant during storage, the storage regulations and the safety data sheet for the refrigerant must be complied with.

- Protect device from dust.
- Ensure that the storage place is dry and frost-free.
- Check factory-filled inert gas or refrigerant charge regularly (monthly) and log it.



DANGER

Danger to Phantor 6000, persons, property and environment possible due to inadmissible ambient conditions of the Phantor 6000!

- Store Phantor 6000 only within the specified ambient conditions, otherwise damage may occur due to frost (risk of bursting) or overheating.
- If there is a risk of frost, the entire drinking water system must be drained professionally and blown out with air several times.
- Ensure that Phantor 6000 is only used in non-aggressive and/or non-corrosive environments, otherwise damage to the system may occur.

12. Disposal

a) Previous activities

Before starting any disassembly work, the Phantor 6000 must be switched off and disconnected from the power supply by a qualified person.



DANGER

Danger to life from electric shock!

- Danger from the main electrical supply!
- There are components in the switching cabinet that may be under voltage even when switched off!
- Ensure that the main switch on the Phantor 6000 is switched off and secured against being switched on again.
- Ensure that only electrotechnically qualified staff operates.
- Ensure that the uninterruptible power supply (UPS) is interrupted and secured against restarting.
- After disconnecting the power supply, wait at least 10 minutes until the capacitors have discharged.

Extracting the refrigerant from the Phantor 6000

When handling and disposing of the refrigerant, the information in the safety data sheet must be complied with.

It is recommended to commission Imhotep.Industries GmbH Service to extract the refrigerant and dispose of it in a professional and environmentally friendly manner.

Service valves on the heat exchangers allow the refrigerant to be extracted. When extracting the refrigerant, it must be ensured that the refrigerant cannot escape into the atmosphere.

The refrigerant must be safely filled into a suitable and approved container and clearly labeled. Empty compressed gas cylinders and storage containers for gases must be labeled to avoid confusion.

**DANGER**

Personal injury, property damage and environmental damage possible due to escape of refrigerant!

- Ensure that the refrigerant cannot escape into the atmosphere.
- Use only suitable and approved extraction equipment and storage containers.
- Ensure that the staff is appropriately qualified.

Risk of frostbite!

- Never touch liquid refrigerant.
- Never spray water on liquid refrigerant.
- Wear gloves and safety glasses!

Risk of suffocation!

- The refrigerants R-134a, R-513A and R-1234ze displace oxygen from the ambient air and can therefore have a suffocating effect.

b) Disassembly of the pipelines

To disassemble the pipelines, perform the following activities.

- Emptying the heat exchangers and the connected pipelines. For emptying, the drain and vent connections on the heat exchangers must be opened.
- Loosen all flanges of the refrigerant and heat transfer lines.

It is recommended to use the services of Imhotep.Industries GmbH for the disassembly of the pipelines.



DANGER

Personal injury and property damage possible due to disassembly!

- Wear gloves, safety shoes and hard helmet.

c) Disposal

The professional and environmentally sound disposal of the Phantor 6000 must be carried out by an authorized disposal company. Imhotep.Industries GmbH recommends to commission the service of Imhotep.Industries GmbH for the coordination of the professional and environmentally sound disposal of the Phantor 6000.

The Phantor 6000 must be disposed of in accordance with national and local regulations.

13. Contact

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