SMART COOLING

Instructions and Service Maintenance Manual for Adiabatic Pre-cooling Smart Cooling™ System

www.smartcooling.us

Dear Customer,

We congratulate you on choosing this product.

We provide customers with advanced pre-cooling adiabatic systems that reduce energy consumption, boost chiller capacity, and protect chiller condensers.

Follow this procedure for assistance

1. Make a video with voice comments
2. Send it to the WhatsApp support number below
3. Our technicians will contact you shortly

WhatsApp support at **+ 371 26 81 14 52**

OR

Email support at **support@smartcooling.us**

We are here to help you!

This is maintenace manual for adiabatic pre-cooling system Smart Cooling.

Smart Cooling system is powered by PRO10 control panel.

For system startup and adjustment please see PRO10 manual.

Manufacturer: Blue Energy Global, Skolas street 18, Ogre, Latvia, LV5001

REQUIREMENTS

ATTENTION!

Wear safety clothing and protective equipment at all times always.

Before installing and operating the device, read these operating instructions thoroughly and save them for future reference. Before operating the unit, make sure the installation has been carried out correctly by an authorized dealer and all installation instructions have been followed precisely.

The information in this manual is aimed at experienced technicians only, not for the general public. This manual does not contain warnings advising unskilled personnel of potential dangers in attempting to install the device. Any attempt to install, operate or service the device without the proper technical expertise may result in serious injuries or death.

Intended use and working principle

Note that the Smart Cooling™ device's primary function is to improve the efficiency of air conditioning and freezing devices and reduce energy consumption.

The adiabatic pre-cooling system concept behind Smart Cooling™ is based on adiabatic evaporative cooling: the delicate process of spraying treated water using a fine water mist to cool intake air flowing into the condensers in advance without damaging or incurring efficiency loss on the condensers.

Water purification also plays a significant role, therefore Smart Cooling™ has a four-step water treatment module to safeguard condensers from dust, calcium, and mineral deposits, algae and bacteria. The pressure in the adiabatic system ranges from 70 to 140 bar and provides highly effective water spraying and evaporation.

The PRO 10 controller provide ensures the operation of the adiabatic system is maximized while maintaining minimal water consumption. The controller analyzes air temperature, air humidity, chiller load and its daily cycle. Based on these finely measured parameters, the PRO 10 automatically alternates operating modes resulting in 100% water evaporation and maximum efficiency.

For optimum performance, it is important to make sure that the condenser coils and filters of the cooler are clean, and the correct load for the device is being generated.

1. It is necessary to clean the condenser using non-toxic cleaning agents.
2. Make sure the condenser must be completely clean, with no deposits on the tubes.

By following these guidelines and regularly servicing your Smart Cooling™ device, you prolong the life of your cooling equipment and significantly reduce energy consumption.

Make a thorough check of the equipment delivered on site. Use professional tools and materials for proper results.

ATTENTION! - Do not operate pre-cooling system when the ambient temperature are below 0° or over +65°C. Do not leave the pump exposed to very low temperatures as it may freeze*. If there is a possibility of freezing, the system must be prepared for temperatures below 0 ° C, more information on preparing the system can be found in the this manual section “Preparing system for winter”. As the pre-cooling system in operation uses water, the operation below 0° degrees will damage the pumps and can break or crack the hoses and pipes. Operation of the device above 65° C can cause the motor to overheat when the device is operating.

*DAMAGE CAUSED BY FROST IS NOT COVERED BY WARRANTY.

IMPROPER / INCORRECT USAGE

Improper usage of the equipment is the usage thereof for purposes the device is not intended for. The examples of improper usage are the operation of the device during rain or storm.

The incorrect usage of our devices is defined as the usage thereof in violation of the rules provided for by the operation and maintenance manual. Failure to comply with the provided instructions may cause harm to the user or damage to the device. Below we provide a number of examples of incorrect usage:

- INCORRECT CONNECTION / USAGE OF THE ENCLOSED APPLIANCES
- INCORRECT PERFORMANCE OF OPERATIONAL ACTIONS
- FAILURE TO USE ORIGINAL SPARE PARTS
- LAUNCHING THE DEVICE WITHOUT WATER
- MAINTENANCE WORKS ON THE DEVICE PERFORMED BY UNQUALIFIED PERSONNEL
- USAGE OF THE DEVICE FOR THE PURPOSES IT IS NOT INTENDED FOR
- LACK OF MAINTENANCE

PROHIBITED ACTIONS – PRECAUTIONS

ATTENTION! - You must comply with the following instructions thoroughly in order to avoid damage that the user may suffer due to the malfunction of the device. By performing any prohibited actions, you violate the warranty terms; the manufacturer bears no responsibility for damage of any kind resulting from the performance of prohibited actions.

- Do not obstruct the flow of water from the high-pressure hose. Otherwise, the hose may be ruptured, which puts the user of the device in danger.
- Do not remove the inner protective film of the device while the pump is in operation.
- Do not use the power cord or connective hoses to haul the device.
- Do not use the electricity plug to turn the device on or off.
- Do not place the device onto wet surfaces, or where puddles are possible during rain.
- Do not activate the device when you are not wearing appropriate footwear.
- The device runs on clean water; never use water from sinks, lakes, ponds etc. - impurity damages damage the shutters and cause irreparable damage to the device.
- Spraying cleaning agents that contain asbestos or other substances hazardous for human health is strictly prohibited.
- Do not cover the device and never place the device in places with poor ventilation.
- Be sufficiently alert when operating the device. Do not use the device if you feel tired or when being under the influence of alcohol or medications.
- Do not perform repairs on the pump when in operation or powered.
- Do not attempt repairs on the power cord or try to repair any damage on your own. If damaged, the power cord will be replaced completely by the technical support service.
- Do not aim the water hose at the device or any components thereof (cables, plugs). This may cause electric damage and injure the user.
- Each electric component must be protected against drops of water in order to avoid short circuits.
- Do not place any heavy objects onto the device.
- Never operate the pump without water; it may damage the internal components of the pump.
- Never touch the electric plug or plug sleeve with wet hands.
- Never add or use the following substances in the cleaning vessel or water supply system: solvents, color oils, fuel, etc., or any other flammable liquids, even dissolved in water: the fumes that will occur while the liquid is sprayed under high pressure will also be easily combustible and highly dangerous. This may also cause irreparable damage to the device.

WARNING:

In case the device is out of service or malfunctioning e.g. water or oil leak occurs, turn the device off immediately using the on/off switch and inform qualified personnel. Power down the device, disconnect it from the power and water supplies and do not attempt any repairs on your own. Contact qualified personnel immediately!

PRECAUTIONS

The high-pressure hose (not connected) has undergone intensive testing. Any damage thereof may easily be averted by taking the following precautions:

- Stretch the hose before operation.
- Do not make or allow any knots, keep the hose straight.
- Do not wipe or tie the hose with anything.
- Do not pull or haul the device by the hose.

Apart from the aforementioned, do not use the hose with damaged insulation or if any other damage is present. Do not attempt to repair or replace the damaged hose on your own.

ACCESSORIES

If you want to use any accessories, make sure you adhere precisely to the instructions. Always make sure that the accessories match the requirements pertaining to high-pressure circumstances in which these will be used. **The manufacturer bears no responsibility for the usage of inappropriate details that may damage the device or inflict injury to the user.**

WASTE MANAGEMENT INSTRUCTIONS

- ✓ Metal materials, aluminum, steel and recyclables must be delivered for processing to an authorized metal collection center.
- ✓ Plastic materials not degradable in the soil must be delivered to a specialized processing center.

MAINTENANCE

Strict adherence to the instructions provided along with our materials is the key element to the operation of your device and for ensuring complete safety. Smart Cooling is not liable in case of improper or incorrect usage of our devices. In order to provide due guidance for the operator, we shall describe certain examples of risky actions.

The end-user is not allowed to carry out any kind of repair on the Unit. Otherwise, the warranty shall immediately become null and void. In case repair is needed, contact your supplier or request the assistance of a qualified technician explicitly authorized in writing by the manufacturer.

This manual contains maintenance information for the following components:

1. Water filtration
2. Daily maintenance
3. Pump Oil
4. Pump gasket
5. Protective membrane
6. Nozzles

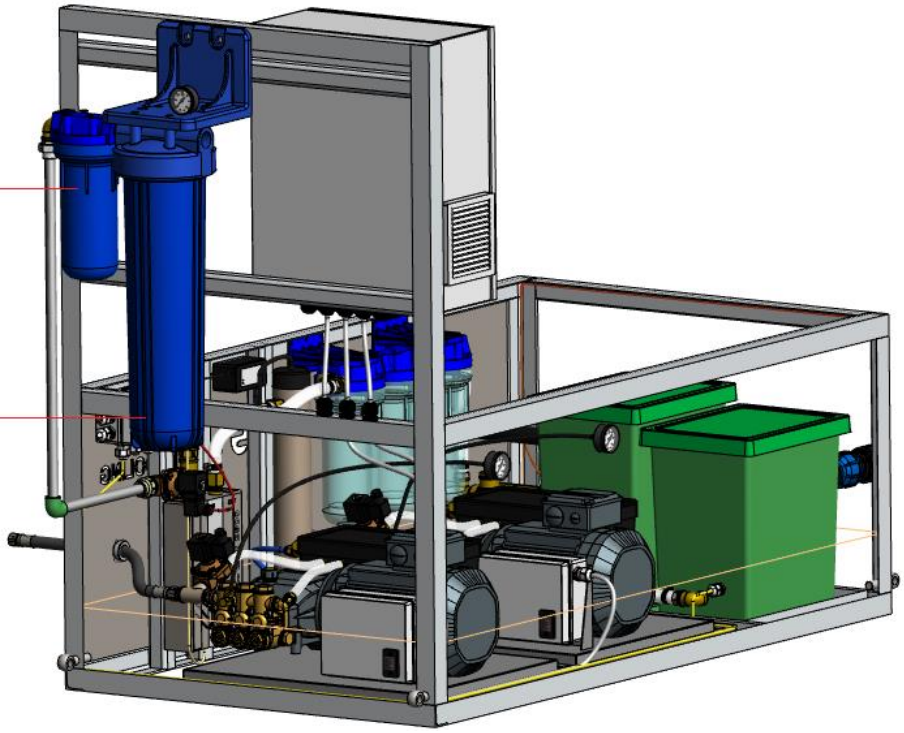
WARNING: All the following actions may be carried out only when the device is turned off!

REPLACE ALL WATER FILTERS EVERY 30 DAYS!

1. Turn off the pump stations, close the water supply valve.
2. Place the Biochemical cartridge into the blue filter case.
3. Open the large filter case with the key, remove the used cartridge and insert a new one. Close the filter case.

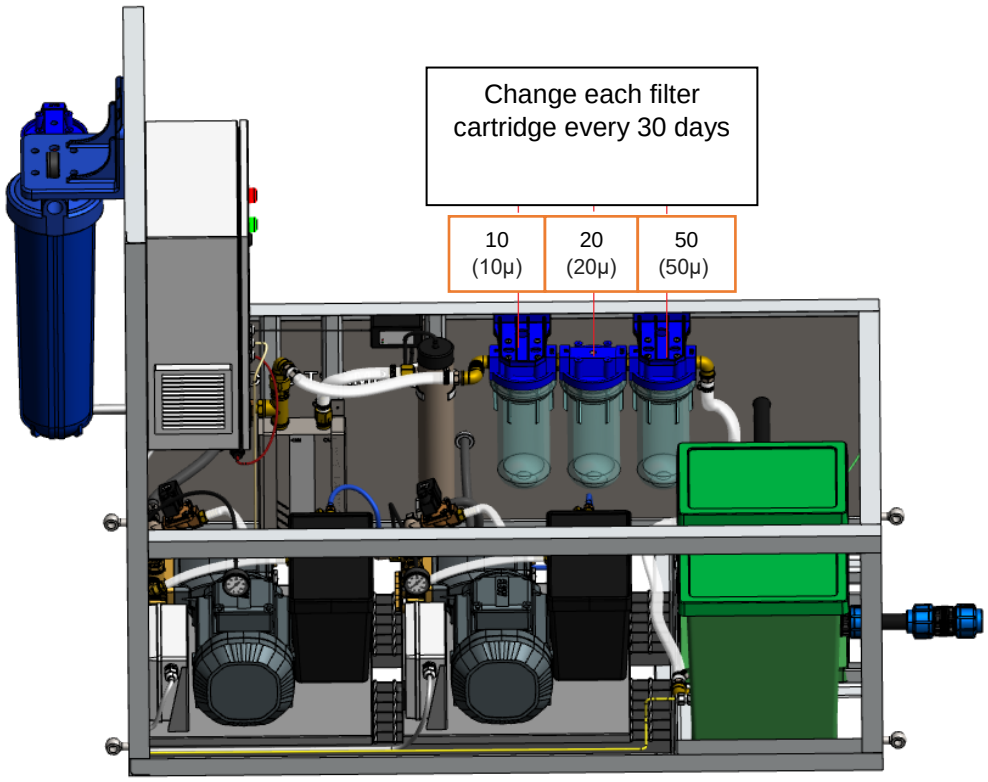
Change 10 micron filter every 30 days

Change cartridge filter every 30 days

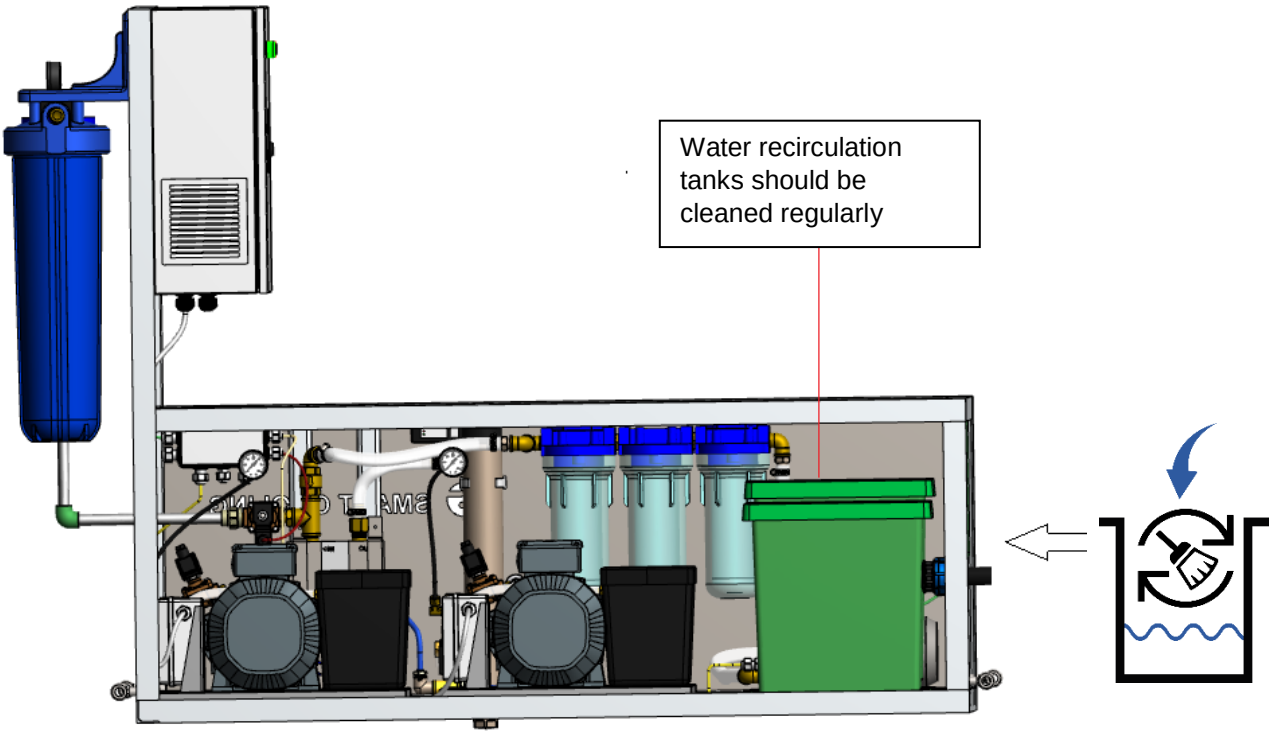


Replace the 50-20-10-micron water filter every 30 days!

1. Open the case with the key, remove the used filter element.
2. Use a new one and close the filter case.
3. Make sure that the water filter element and the water tank is FULLY clean.
4. After each cleaning, flush the water filtration system.
5. Make sure that the case is tightly closed and no water is leaking.
6. Bleed the water filtration system after each filter change.



Clean the water recirculation tanks every 30 days!



1. Open the water tank, remove the used filter element.
2. Clean water filter element with water stream.
3. Make sure that the water filter element and water tank is FULLY clean.
4. After every cleaning, flush the water filtration system.

TROUBLESHOOTING

In the event of anomalous operation, refer to the following table. Should trouble persist, refer to an expert technician authorized by the manufacturer.

Warning:

Before taking any action, unplug the device of the electric power supply.

TROUBLE	CAUSES	REMEDIES
The pump turns but fails to reach the prescribed pressure	The pump draws in air	Clean or replace the drain valve
	Worn or dirty suction/delivery valves	Clean or replace
	Inadequate or worn nozzle	Check and/or replace
	Worn gaskets	Check and/or replace
	Clogged suction filter	Clean or replace
	Adjustment valve core	Clean or replace
Irregular swings in pressure	Worn or dirty suction/delivery valves	Check/clean or replace
	Air intake	Check the suction pipes
	Worn gaskets	Check and/or replace
Drop in pressure	Worn nozzle	Change nozzle
	Suction/delivery valves dirty	Check/clean or replace
	Adjustment valve core worn or jammed	Check and/or replace
	Worn gaskets	Check and/or replace
Noise level	Air intake	Check suction pipes
	Suction/delivery valves worn, dirty or jammed	Check clean and/or replace
	Worn bearings	Check and/or replace
Water in oil	Worn water-oil seal rings	Check and/or replace
Water leakage from head	Worn gaskets	Replace
	Worn O-rings	Replace

Oil leakage	Worn oil seal rings	Replace
Motor fails to start	Plug not inserted properly	Check plug, cable, switch
	No current	Check plug, cable, switch
Motor hums but fails to start	Voltage lower than prescribed	Check the electrical system is adequate
	Pump is jammed or frozen	Turn the motor by hand (see MAINTENANCE section)
	Electrical extension of inadequate cross-section	Replace the extension
The motor stops suddenly	The thermal cut-out has tripped due to overheating	Check if the voltage is as required. Turn off the switch and leave it to cool for a few minutes

These operations must be carried out exclusively by technical personnel

PREVENTIVE MAINTENANCE

	CAUTION: The following operations should be carried out in order to avoid damage to the highly stressed mechanical parts and to preserve the performance of your high-pressure pump. For all maintenance work on the high-pressure pump and the device in general, it is necessary to call specialized personnel or the authorized technical support services.

Before any maintenance work on the device:

1 - Switch off the pump (turn to OFF/0 position).

2 - Disconnect the device (unplug from electricity outlet).

3 - Shut off the water tap.

4 - Discharge the residual pressure.

PREVENTIVE MAINTENANCE TABLE

DESCRIPTION	Hours worked								
	Every day	First 50	Every 50	First 100	Every 200	Every 300	Every 500	Every 1000	Every 1500
Pump oil	1	3							3
Water filter	2								
High pressure hose (winter time)	6								
Line pressure				1					
Pipeline leaks			1						
Pump seals									3

PREVENTIVE MAINTENANCE OPERATION CODES

Code	Operation
1	Check
2	Clean
3	Replace
4	Lubricate
5	Tighten
6	Empty

NOTE: Follow the instructions of this manual or additional documentation to carry out the maintenance.

PUMP MAINTENANCE

1) The pump oil level should be regularly checked; it must always be above the marker. Replace the oil after 50 working hours, and successively every 1500 hours; use oil type SAE **20/30.** To check the oil level, unscrew the grips and lift the cover vertically upwards. Unscrew the oil cap and check if the oil level is above the minimum marker. If the oil level is low, do not restart the device.

2) Do not exceed the ambient temperature range from 0° - 65° C. Do not leave the pump exposed to very low temperatures as it may freeze. Stopping the device at temperatures below 0°C can cause damage or breakage to the pump and hoses. Operation of the device above 65° C can cause the motor to overheat when the device is operating. DAMAGE CAUSED BY FROST IS NOT COVERED BY WARRANTY.

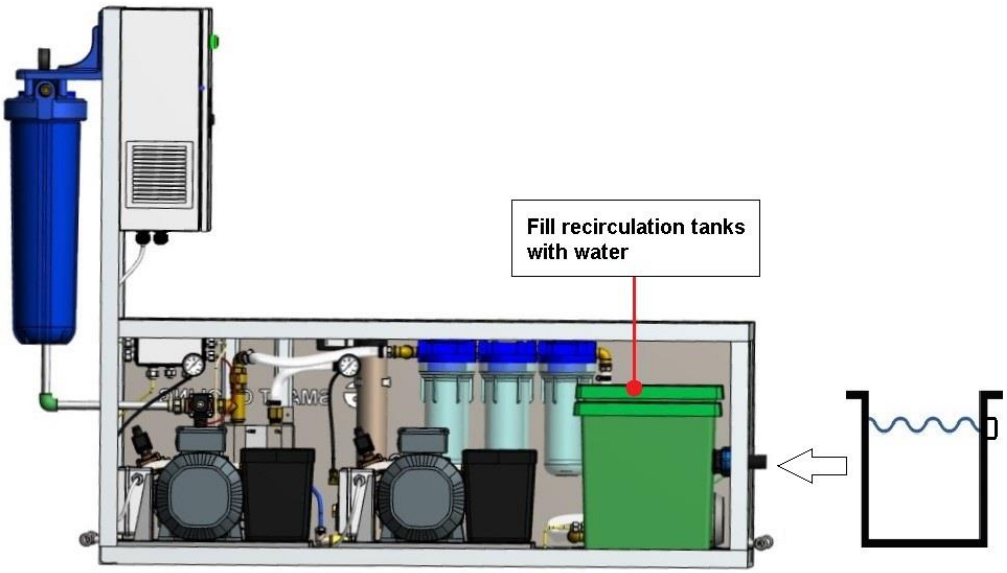
3) When the pump is not used for a long period, scale may form and make the instant start of the electric motor difficult. In this case, to avoid anomalous current absorption with consequent voltage drop, we advise moving the driving shaft by using a screwdriver before starting the motor (Important: this must be done when the device is not connected to the power supply). This will let you check why the motor is jammed (caused by frost, scale, etc.) and take appropriate measures.

4) Replace the high-pressure water pipe if it is damaged or raddled. The new pipe must be marked with the maximum allowed pressure and the manufacturer's name or a suitable symbol. Before use, check the pressure values of the new hose as they must correspond to those of the pump.

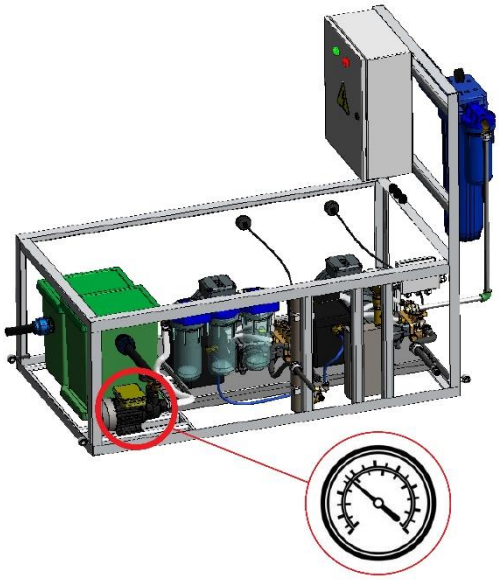
RECIRCULATION PUMP DEAERATION

It's very important to perform recirculation pump deaeration after every maintenance or before the first system startup.

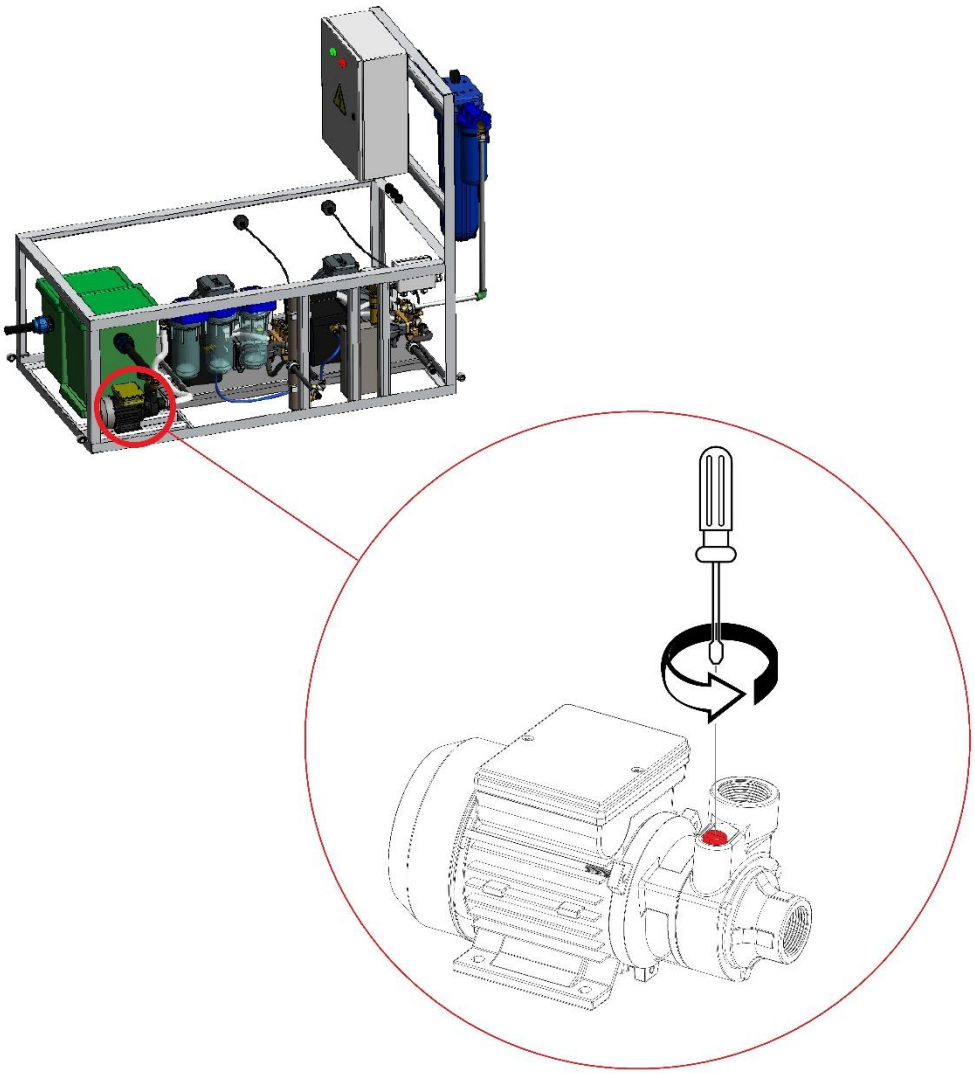
1. You must completely fill the recirculation tanks with water



2. Start the system
3. Check if the recirculation pump is started
4. Check if the recirculation pump manometer shows pressure

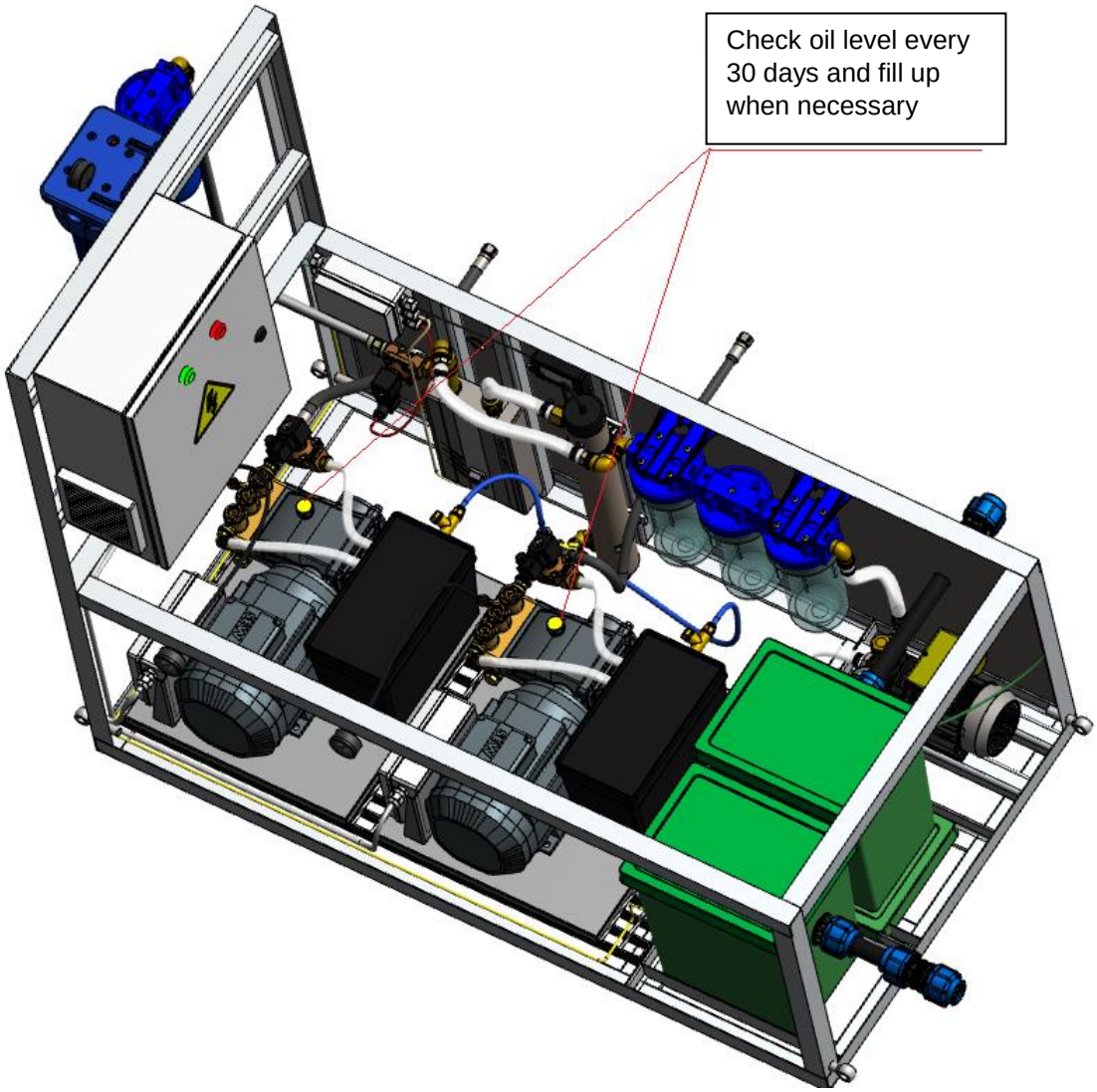


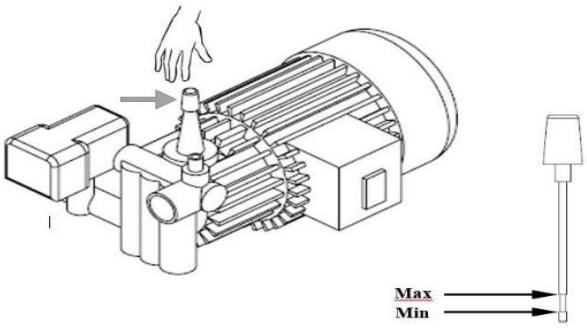
5. If the recirculation pump manometer does not show pressure, you must perform deaeration for the recirculation pump. In detail, please note the recirculation pump and the red dot indicating the screw which must be unscrewed to remove all air from the pump.



If deaeration is not performed, the pump will be damaged!

Check pump oil every 30 days!

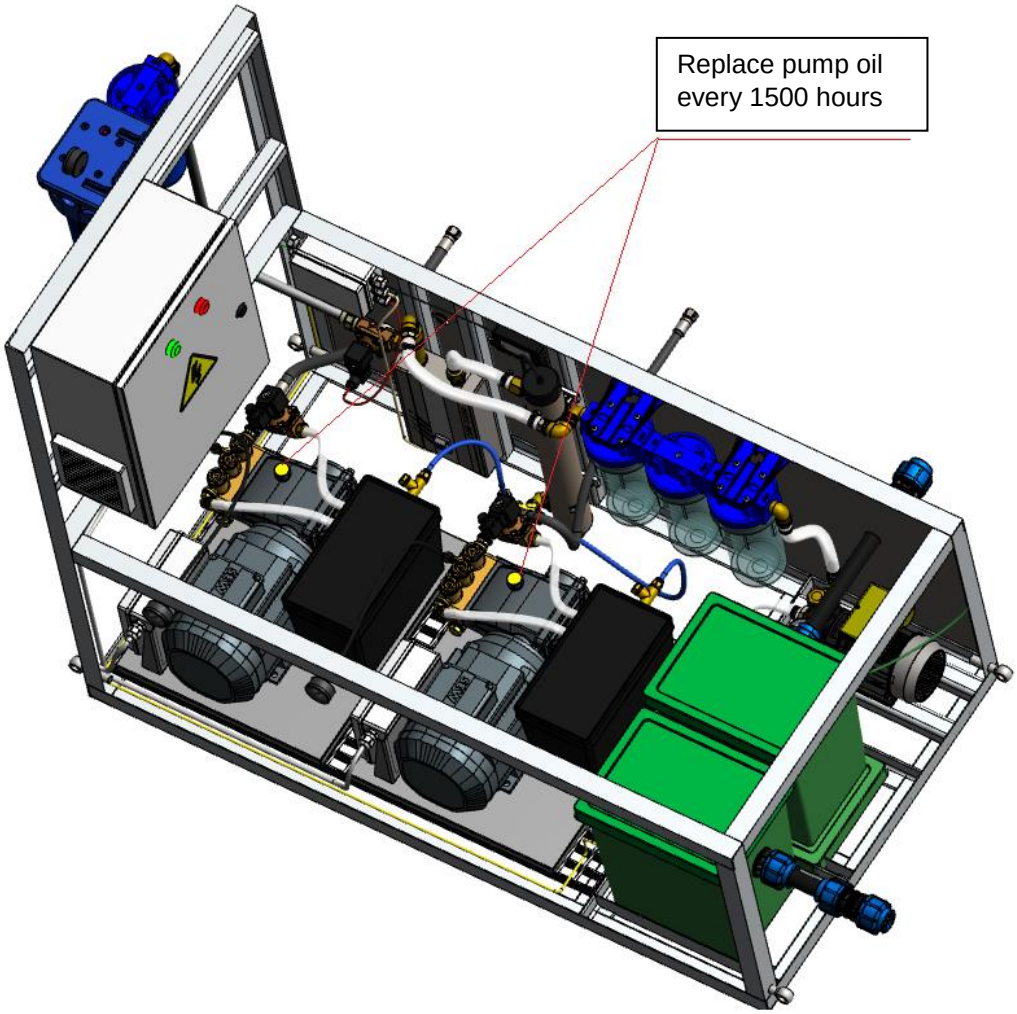




Oil level. MINIMUM - MAXIMUM

Check pump gaskets every 1500 hours!
Replace pump oil every 1500 hours!

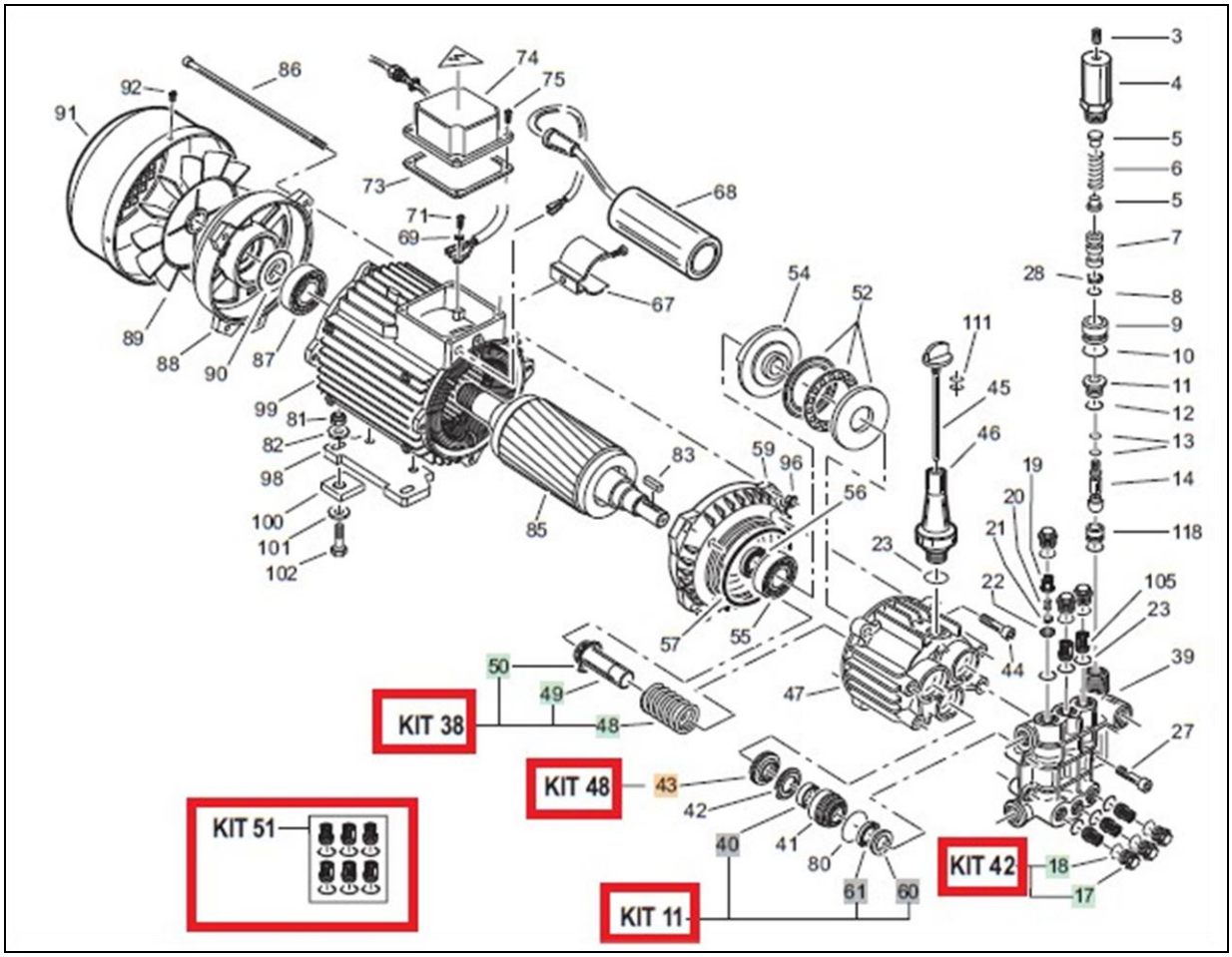
Check, and if necessary, replace gasket after 1500 hours (KIT 11), (KIT 38), (KIT 42), (KIT 48), (KIT 51)



Check pump gaskets every 1500 hours!

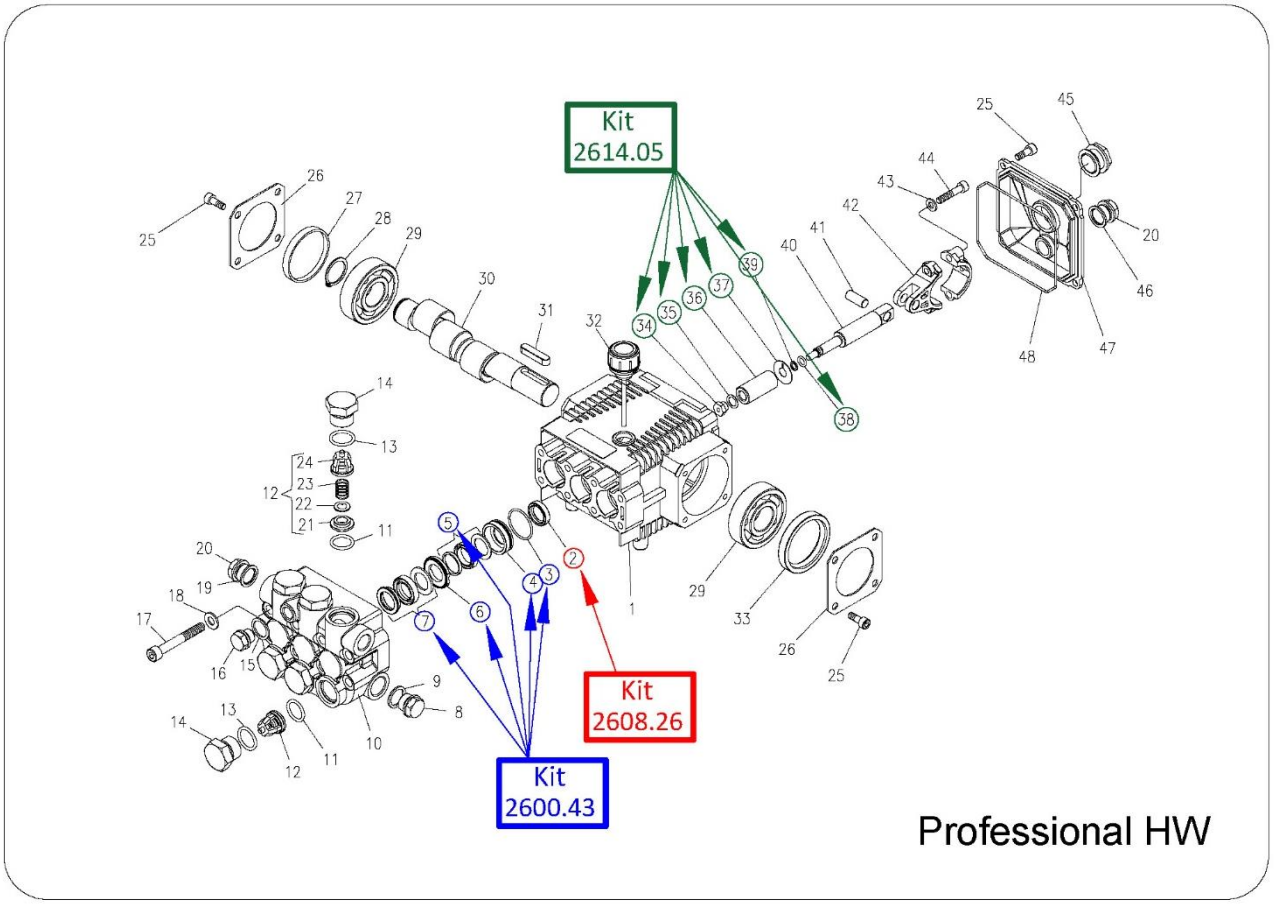
After every 1500 hours running, check the gaskets, if you see any water in oil or oil leakage, please replace gaskets or call your service maintenance company!

Premium - Evolution



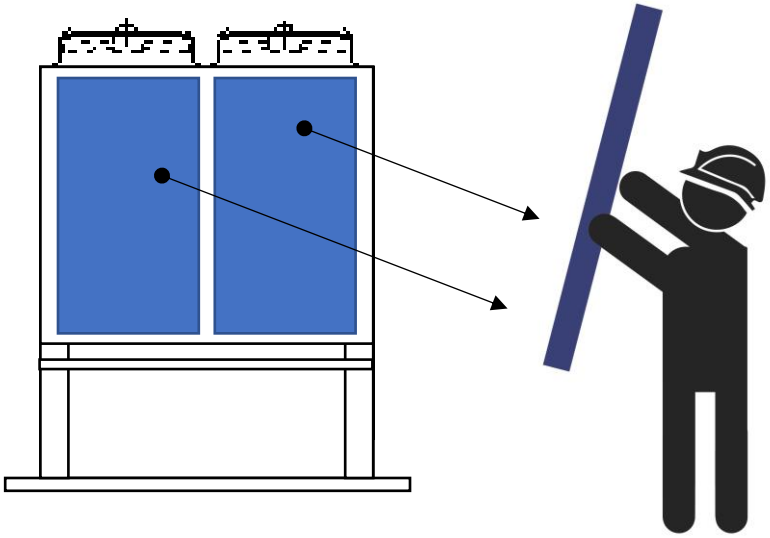
Check pump gaskets every 1500 hours!

After every 1500 hours running, check the gaskets, if you see any water in oil or oil leakage, please replace gaskets or call your service maintenance company!



Clean the membrane and condenser every 30 days!

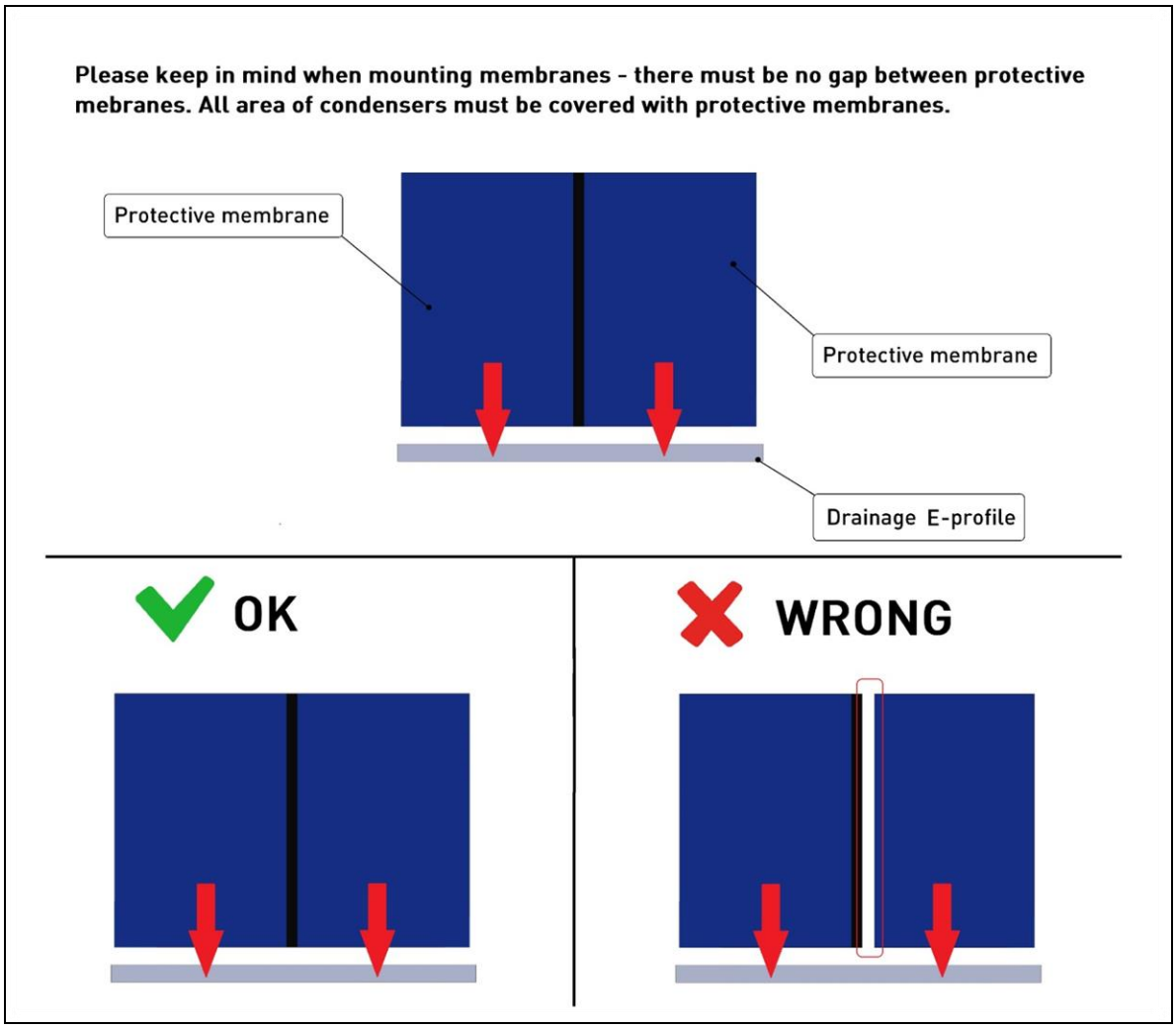
1. **Turn OFF cooling unit**
2. **Uninstall protective membranes (figure)**



Membrane **Cleaning Tools**

1. Wash protective membranes with waterjet under pressures 200 to 400 PSI -- **Attention! Waterjet pressure over 28bar will damage the membrane.**
2. A membrane must be cleaned every time impurity is visible or every 30 days, depending on the severity of pollution.
3. Use high-pressure water to clean the membrane.
4. Never clean membranes with chemical substances.
5. Install protective membranes back onto the cooling unit and tighten them.

Mounting membranes after cleaning



Attention!
All the activities referred above must be carried out in the presence of a qualified pecialist.

During maintenance work on the system all equipment must be disconnected from the power supply!

CLEANING AND REPLACING NOZZLES

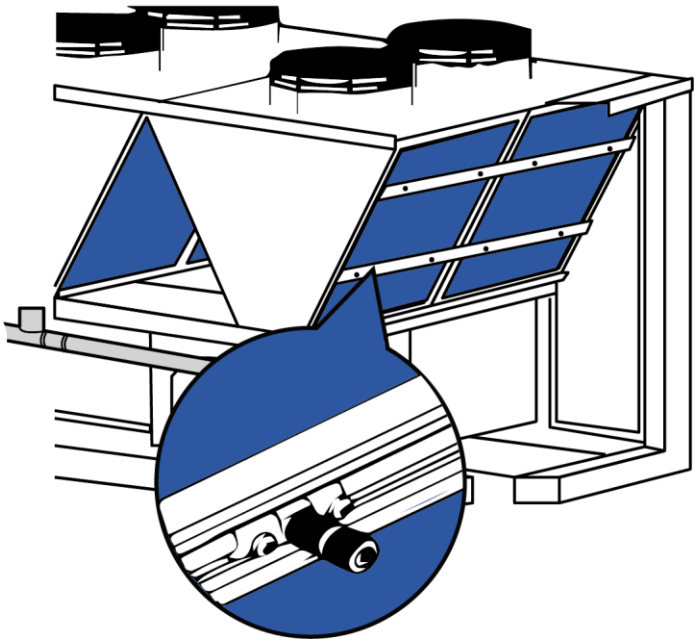
Flawless operation of spray nozzles is critical, as it ensures safe and proper operation of your high pressure pump. Waste, deposits and residues can obstruct the nozzle, which, in turn, will lead to pump malfunction, loss of pressure, water leaks from the hose, or jet irregularity.

CLEANING NOZZLES

In case a nozzle is clogged, it must be cleaned with an anti-lime agent. To perform cleaning, remove all parts of the nozzle and soak these in an anti-lime agent for several minutes. Then the nozzle must be rinsed and installed back. Launch the system and check whether the spraying is even.

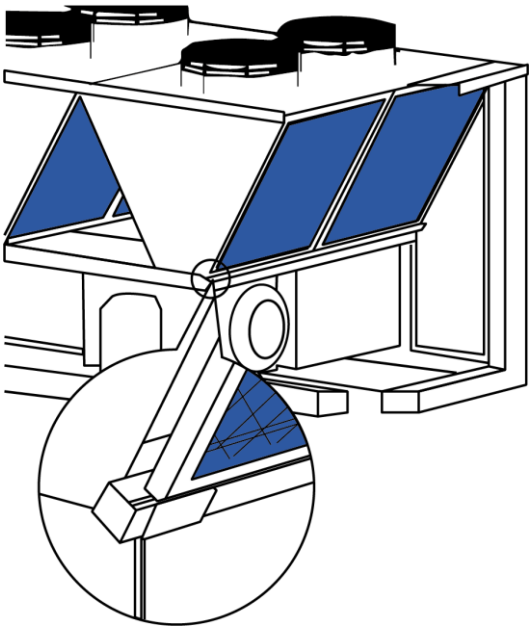
NOZZLE REPLACEMENT

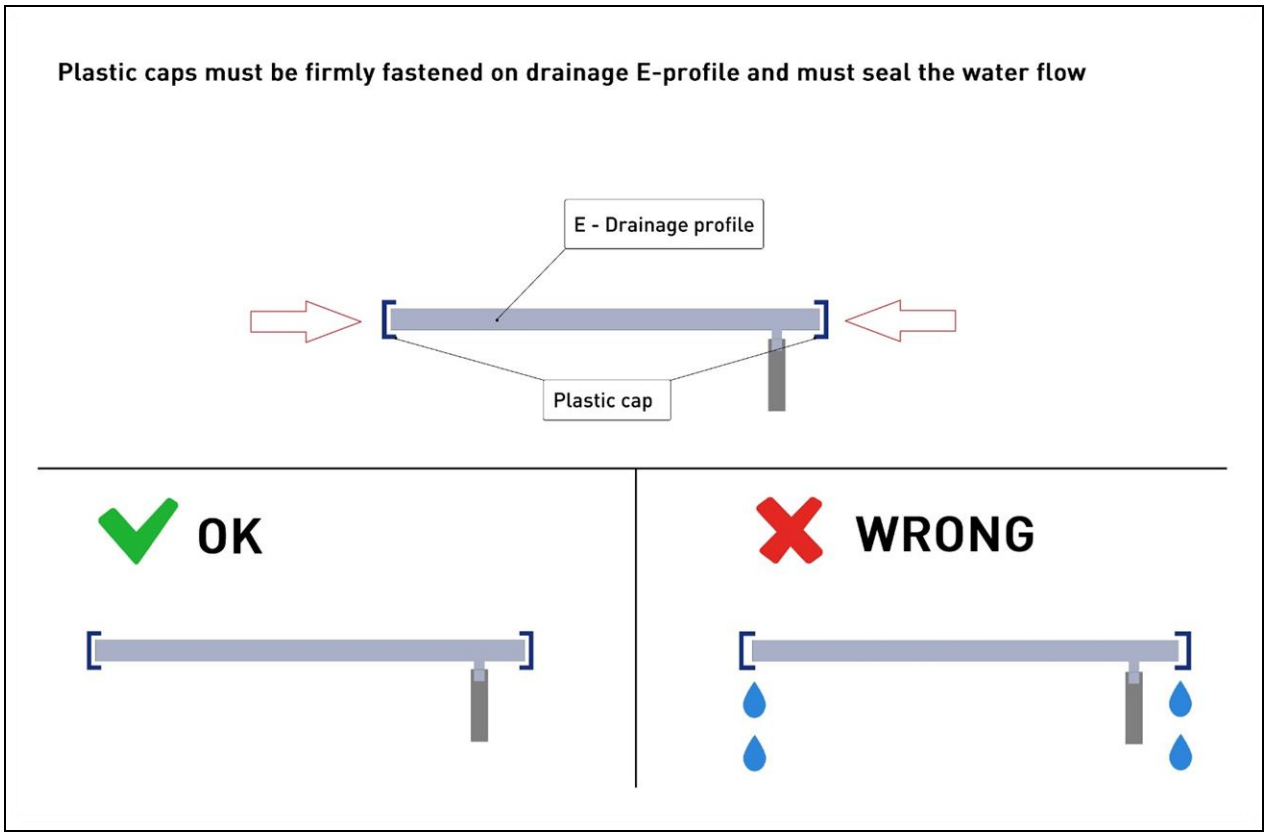
In case the spraying remains uneven despite nozzle cleaning, the respective spray nozzle must be replaced. The spray nozzle must be identical to the one previously installed. In case of any doubt, please contact the service center.



DRAINAGE PROFILES

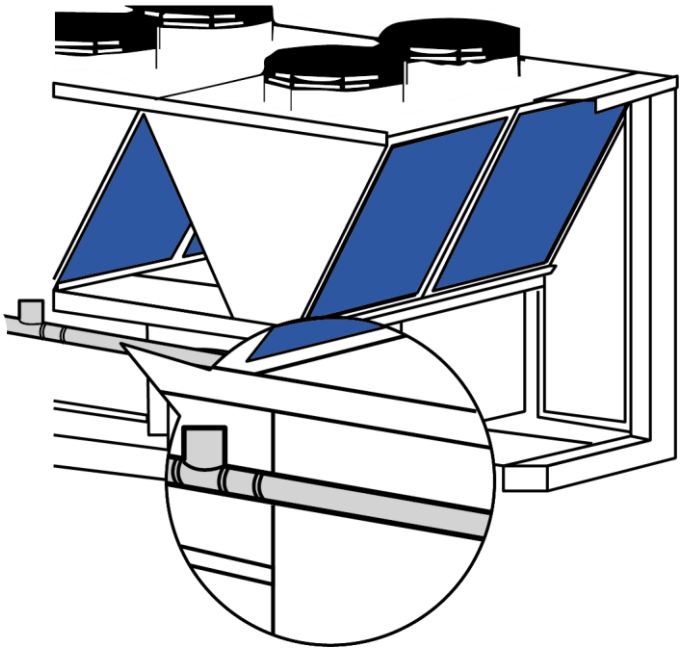
Clean the drainage profiles every 30 days.





DRAINAGE PIPE

Clean the main drainage pipe every 30 days.



CONDENSERS

Check the condition of the condensers every 30 days.

Clean condensers every 30 days.

HIGH PRESSURE PIPE LINE – What to do in case of leaks

1. In case a pipe joint gets disconnected during activation, stop the pump unit, power it down, remove the lid of the nozzles panels and reconnect the component securely. In case the connection is damaged, replace it with a spare connection that comes complete with the device.
2. After all the components are interconnected, make sure that power is supplied from the main control box.
3. Lights must go on at the panel of the control box.
4. Activate the pump unit by turning the switch into the position "on".
5. When operating in test mode, set the temperature below that of the environment, so that the device could start working. After the actions referred to herein are completed, the device must be in operation.

PREPARING PUMP STATION

Position the pump station in the selected place, on a flat surface.

During operation, the device must be equipped with:

- electricity supply, according to the model (see the technical specifications on the data plate on front cover of pump station.

- water supply, according to the model (see the technical specifications on the data plate on front cover of pump station.

Performance of the actions referred to herein is vital for regular operation of the device.

ATTENTION! The device stops working when the power supply is off. If the device has not been turned off, it restarts automatically as soon as the power supply is resumed.

ATTENTION! The device stops working when there is no water supply. If the device has not been turned off, it restarts automatically as soon as the water supply is resumed.

The asynchronous engine of the device does not affect radio and TV broadcast signals or any other high-frequency devices.

STOPPAGE PHASES

1) Turn the on/off switch into the "off"/0 position.
2) Close the water supply valve.
3) Wait for a few seconds for the water and pressure in the hoses to be expelled.

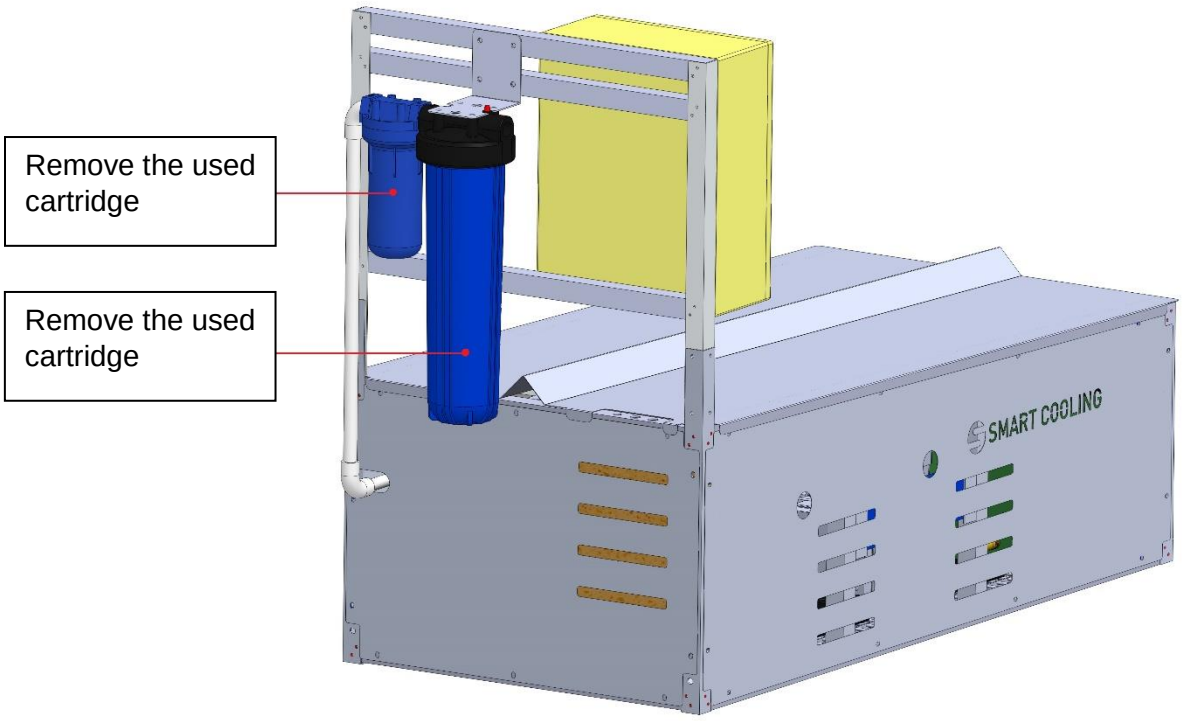
The device is equipped with an S1 engine designed for sustained operation and fitted with overload protection. In case the device is under the risk of overloading, overheating or other harmful effects, power supply to the engine is cut off automatically. In this case, turn the on/off switch into the "off"/0 position and wait a few minutes for the engine to cool down. Then you may restart the device (but only after the engine cools down). The device is shut down for your own safety.

WARNING: Activation is only permissible after all the paragraphs of the manual are performed and checked.

Preparing system for winter

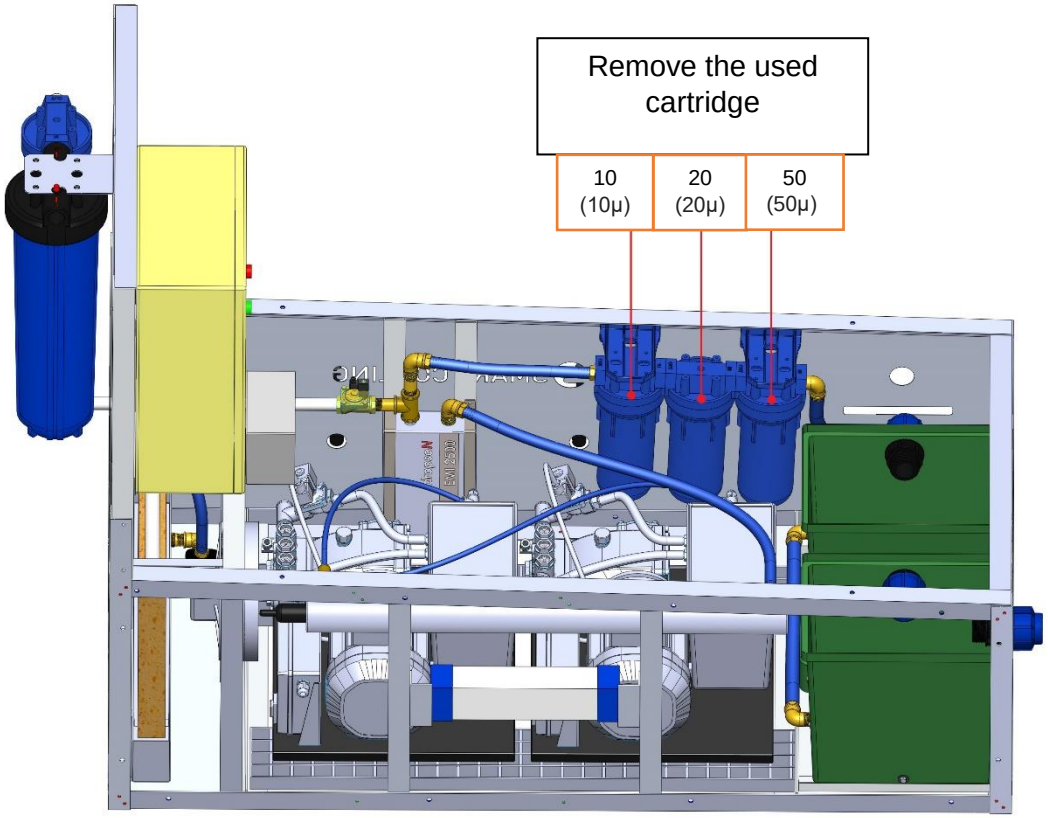
When ambient temperature drops under +5°C, all system must be clear of water, all nozzle panels must be blown with compressed air to remove all remaining water, after that all pump station components must be filled with 40% ethylene glycol liquid. To do so, please follow the instructions below.

Remove inlet water filter cartridge



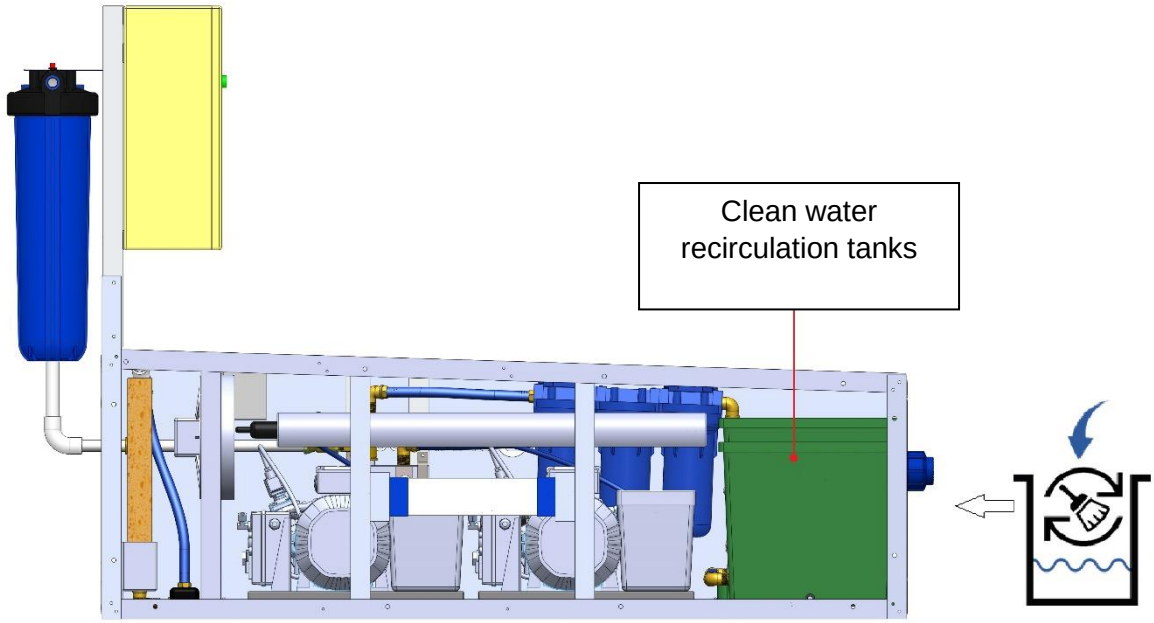
1. Turn off the pump station, close the water supply valve.
2. Disconnect water supply hose.
3. Open the filter case with the key, remove the used cartridge.
4. Remove water from filter cases.
5. Make sure that water filter tanks are clean, if they are not clean, please clean them.
6. Close filter case.

Remove 50 – 20 – 10 micron water filter cartridge



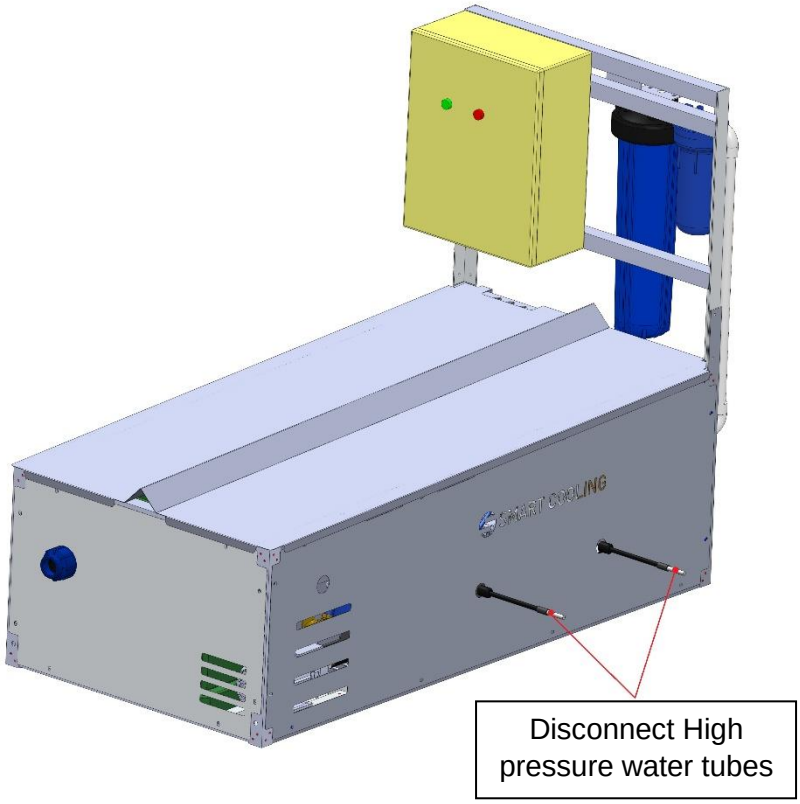
1. Open the filter case, remove the used filter cartridge.
2. Remove water from filter cases.
3. Make sure that water filter tanks are clean, if they are not clean, please clean them.
4. Close filter case, but leave them empty – without filter cartridges.

Clean water recirculation tanks



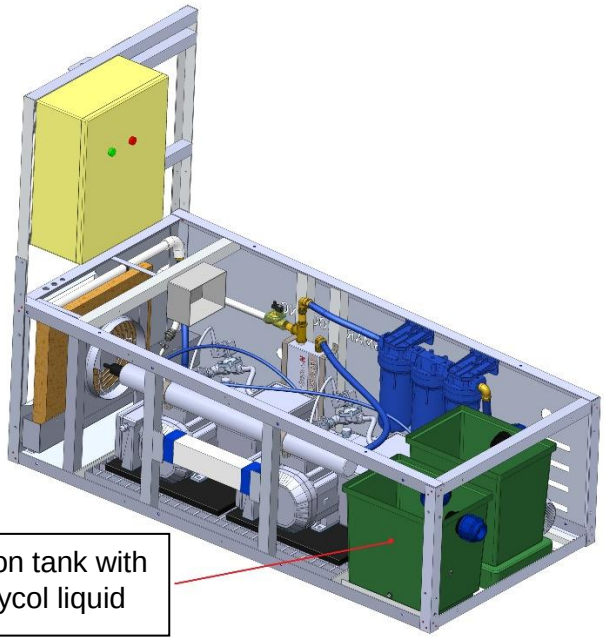
1. Open the water tanks, remove the used filter element.
2. Remove all water from water tanks.
3. Clean water filter element with water stream.
4. Make sure that water filter element and water tank is clean, if they are not clean, please clean them.

Disconnect high pressure water tubes



1. Disconnect high pressure water tubes, which goes to nozzle panels, from high pressure water hoses, which are connected with HP pumps.
2. Let water to drain out from all tubes.
3. Blow out the remaining water with compressed air from nozzle panels and from all stainless steel tubes which connect nozzle panels.

Fill system with 40% ethylene glycol liquid



Fill this recirculation tank with 40% ethylene glycol liquid

1. Fill lowest recirculation tank with 40% ethylene glycol liquid.
2. Switch on system.
3. Start system rinsing, by pressing (**ESC + ►**) for 3 seconds on PRO10 control panel. **(Image 1)**
4. Rinse system until you see that ethylene glycol liquid blows out of high pressure pump outlet hoses.
5. Now your system is filled with 40% ethylene glycol liquid, please keep in mind that all system must be filled with ethylene glycol, to prevent it from freezing and damaging pump station components.

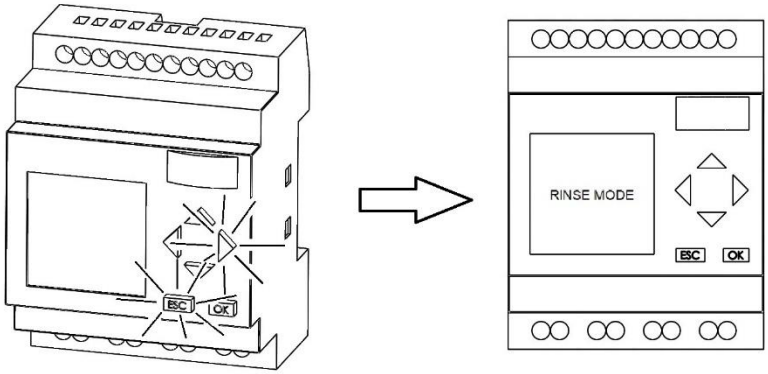


Image 1

Answers to questions

- ## How much 40% ethylene glycol liquid I need?

  For one pump station it will be about 30 liters of 40% ethylene glycol liquid to fill full system.

- ## What to do after the winter when the system needs to start working?

  After winter, when the system needs to start working, you need to do the same process like before winter when you removed all water from system. Now you need to remove all ethylene glycol liquid from system.

  When you are removed all ethylene glycol liquid from system, you need to put in all filter catridges in filter cases.

  After installing filter cartridges you need to connect water supply, open vater supply valve and now you can start the system.

Follow this procedure for assistance

1. Make a video with voice comments
2. Send it to the WhatsApp support number below
3. Our technicians will contact you shortly

WhatsApp support at **+ 371 26 81 1452**

OR

Email support at **support@smartcooling.us**

We are here to help you!

This is maintenace manual for adiabatic pre-cooling system Smart Cooling™.

Smart Cooling system is powered by PRO10 control panel.

For system startup and adjustment please see PRO10 manual.

Manufacturer: Blue Energy Global, Skolas street 18, Ogre, Latvia, LV5001