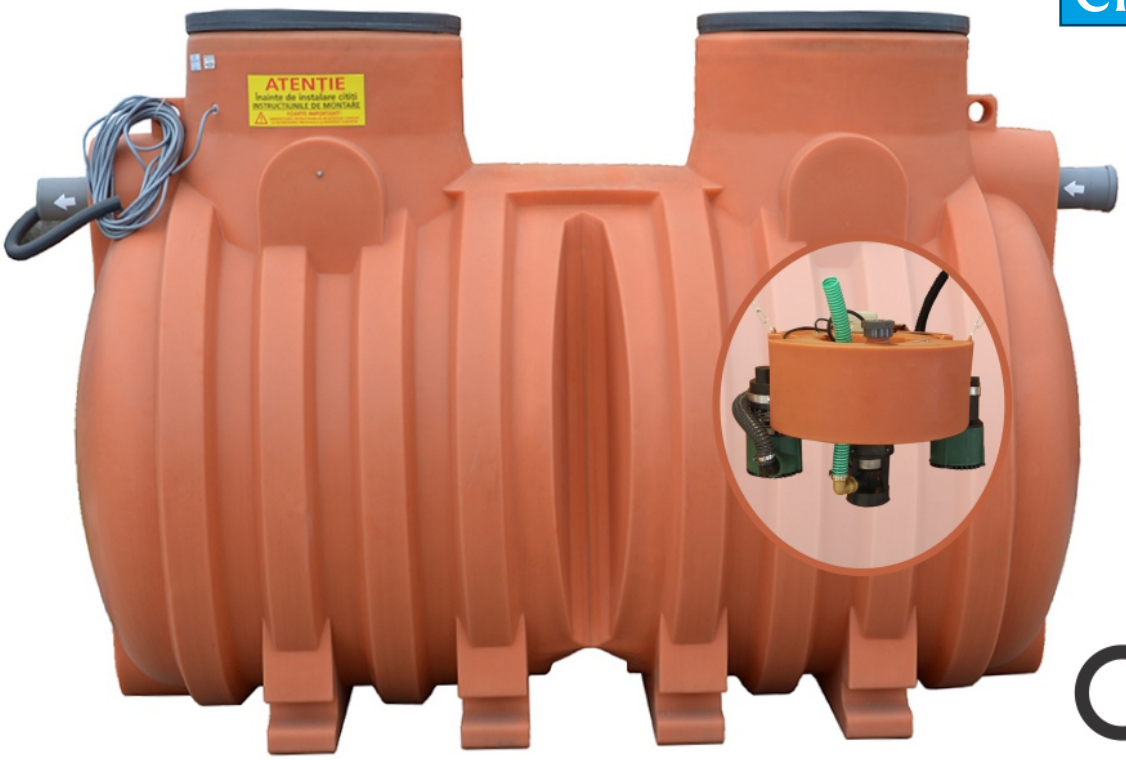
Technical manual

aquaClean® SBR 1/6 LE and SBR 7/12 LE
Wastewater Treatment Plants
for 1000l/day and 1500 l/day



VALROM INDUSTRIE

Atât de simplu.

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REG COM J40/4810/1996
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Capital social: 6.706.000 lei

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Wastewater Treatment Plants for 1000l/day and 1500 l/day



CE

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Overview

aquaClean® S/SBR series - is the new family of compact miniplants, for domestic wastewater treatment, using the SBR (sequencing batch reactor) principle. The wastewater plant and the quality of treated water meet the requirements of the national law. The reliability and capacity to ensure the requirements on the quality of the treated water depend on the chemical/ biological efficiency and on the specific operating conditions (flow and volume of discharged water, temperature, composition of inlet water - influent).

WARNING!
The system operates at optimum parameters if complied with the rules below. Please read carefully the next specifications and instructions.

New generation of (mini) domestic wastewater treatment plants:

- **Versatile** - can be delivered both as a ready-to-use installation and to fit out existing plastic or concrete tanks;
- **Performance** – the biological process is controlled in this way the treatment efficiency is constant during the all process;
- **Easy to install** – the preassembled equipment pontoon with plastic tank can be fitted with minimal investment and effort;
- **Easy to maintain** – due to the treatment equipment mounted on the pontoon;
- **Minimum maintenance** - requires minimum maintenance, and the time interval needed for emptying is about 1÷2 years;
- **Economic** - minimum power consumption - the unit automatically detects the lack of supply water and switches on the holiday mode;
- **Easy to operate** - the control unit monitors the equipment, warns and records any malfunction of the equipment;
- **Auto-recovery** - in the event of a malfunction (an equipment malfunction, power failure, etc.), the control panel attempts with a certain frequency to resume normal operation regime, while indicating the malfunction.

The aquaClean waste water treatment plants meet the requirements of norm **EN 12566-3:200/A1: 2009**.

Where to use

aquaClean® S/SBR series is designed to equip new dwellings and to re-equip existing septic tanks, with minimal operations. In particular, they were designed to treat domestic wastewater from households with a capacity up to 1000 litres/24 hours with S5/SBR 1÷6, respectively 1500 l/24 hours with S 10/ SBR7÷12.

The plant can treat only domestic wastewater. Water stored inside the plant must not contain chemicals that may harm the bacterial population.

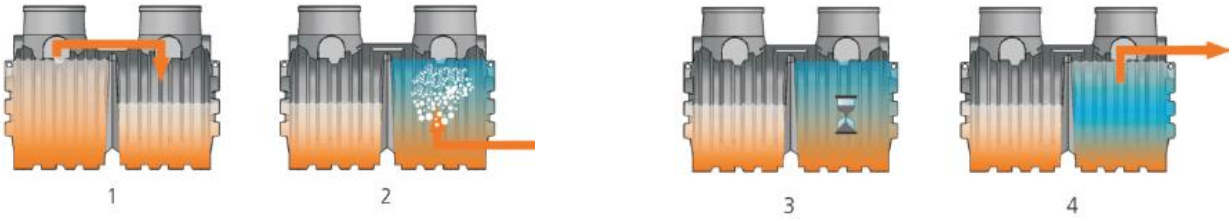
In aquaClean wastewater plant is not allowed water as:

- industrial wastewater;
- rainwater or water from swimming pools, etc.
- water containing aggressive chemicals, scrap petroleum, oils, etc.

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Description

The aquaClean® S/SBR series is operating on the SBR principle, an enhanced version of a treatment plant using a treatment with an activated sludge and physical separation by settling. This is done in 4 operating cycles/24 hours, each in four stages:



1 – Feeding – From the first chamber of tank is transferred wastewater by principle of communicating vessels.
2 - Treatment – At the same time with feeding, the aeration pump starts the air-bubbling process. In this way, amount of oxygen dissolves in the available volume of water useful for biological treatment. Due to the pontoon is ensured a homogeneous water. Oxygenation is being done alternatively with periods of rest, to ensure nitrification-denitrification conditions.
3 - Sedimentation - Aeration is switched off allowing solids to settle on the bottom of the tank. In the upper part of the tank only the clear water remains.
4 - Discharge - The clear water from the upper part is discharged from the system by pumping. After the discharged step is ended, the feed pump starts and the excess sludge is transferred into the first chamber of the tank, and the treatment cycle starts again.

Holiday mode

If supply is not detected from the first chamber, the plant switches into the holiday mode. Aeration is done in shorter and more frequent cycles in order to keep bacteria alive. Water is not discharged from the system. The plant automatically switches to normal operation once water intake from the first chamber is detected.

General features

Model		S5/SBR 1-6	S10/SBR 7-12
Waste water flow / day	[litres/day]	1000	1500
BOD5	[kg/day]	0.3	0.6
Maximum number of users (never exceed the waste water flow)		6	12
No of tanks		1	
Total volume	[litres]	3000	4700
Diameter of INlet / OUTlet	[mm]	110	110
Lenght	[mm]	2650 ± 30	2760 ± 30
Width	[mm]	1400 ± 30	1760 ± 30
Height	[mm]	1760 ± 30	1930* ± 30
Weight	[kg]	192	300
Installed power	[W]	300	
Energy consumption		500 - 2000 W/day depending on the load	
Code		48600000005	48600000008

*at this dimension add 600 mm, the height of the extension shaft

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OPTIONAL - to adjust the position of cover:

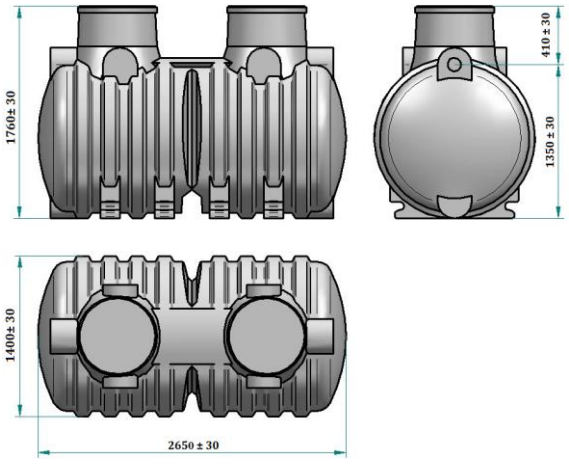
Name of product	Quantity for 1 wastewater plant		Code
Extension shaft H = 600 mm	PCS	2	48710000604
Fixing system for extension shaft	PCS	2	47901000125
Sealing gasket DN640	PCS	2	47901000116

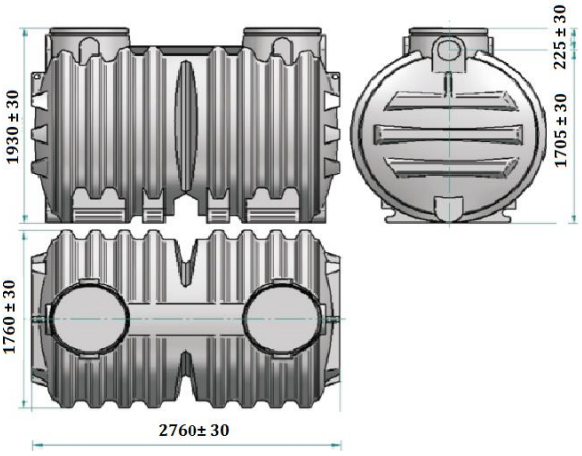
ATTENTION! Is not allowed to use 2 extensions mounted one above the other to have easy access to the equipment for maintenance.

Equipment

aquaClean® S/SBR series plants are supplied fully accessorized, all equipment is pre-assembled and ready to install.

Two-chambered polyethylene tank. The first chamber acts as a buffer volume and is used for the settling phase. The second chamber is used to treat wastewater.





Aeration Pump

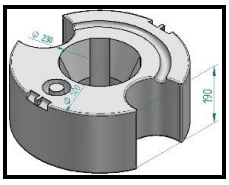
Provides air bubbling necessary for the population of micro-organisms that decompose organic substances into primary components.



Type	NOVAIR 200	
Power P1 /P2	[W]	280/180
Maximum air flow	[m³ /h]	6
Dimensions ∅ × h	[mm]	106 x 330
Weight	[kg]	3,5

Pontoon

All equipment is mounted on a floating support, almost cylindrical shape named pontoon. The pontoon is supported by the walls of the tank through chains. The minimum and maximum flotation height is set such as to cover the calculated water flow.



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Clear water drain pump and feeding pump



The drain pump discharges clear water from the wastewater plant.
The feeding pump discharges some active sludge from the treatment chamber to the first chamber and after that assure transfer of the water through it to the treatment chamber based on the principle of communicating vessels.

Type	Nova 180 (DAB)	
Power P1 /P2	[W]	100/200
Speed	[rpm]	2850
Maximum flow rate	[m^3 /h]	4.5
Dimensions ∅ × h	[mm]	148 x 253
Weight	[kg]	4,5

Control panel



The whole process is controlled and supervised by a microprocessor, mounted inside a control panel. The screen displays the current stage of the treatment process and status of equipment. Self-diagnostic equipment state functions and automatic operation error recovery are implemented.

Compliance and certifications

aquaClean® S/SBR series plants comply with the requirements of SR EN 12566-3:"small wastewater treatment plants of up to 50PTE: Part 3: Domestic wastewater treatment plants ready to use or assembled in place" and their performance has been verified by ICECON TEST Institute, notified at the European Commission as Notified Body no. 1803.

Safety, handling and transportation

This booklet contains basic instructions on installation, operation and maintenance of series S/SBR wastewater treatment plants. The personnel that installs, uses and ensures maintenance is strongly advised to read these instructions before carrying out any operations.

Personnel's duties and obligations

S/SBR series was designed and built in compliance with standards and laws applicable at this time. Given that the operating and intervention procedures are beyond the control of VALROM Industrie, the user is required to ensure that:

- the equipment complies with its designed purpose (do not use the plant for any other purpose other than the designed one);
- annual maintenance and inspection operations have been executed;
- any intervention is performed only by personnel qualified and trained for this purpose.

WARNING!
Danger of slipping and falling into the tank – the personnel installing or performing maintenance operations will wear protection equipment and avoid as much as possible entering into the tank.

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Toxic gases - the atmosphere inside the tank may contain toxic gases (carbon monoxide, methane, dioxide carbon, etc.). Only the personnel providing maintenance and the personnel from the manufacturing company are allowed to inspect the tank on the inside and only following adequate ventilation. If you feel nausea or vomiting leave the area immediately. Eligible limits for gas are: H_2S >10 ppm; CO>40 ppm; CH_4 4,4% explosion limit.

Assistance - every time a person enters the tank he will be assisted by another one from the outside. Never enter the tank after a person that is unconscious, always try to pull that person out first. In either situation immediately seek help.

Cleanup - always wear protective equipment during interventions - clothing, shoes and gloves. Avoid contact with wastewater as much as possible. For cleaning the drinking water facility is enough, you don't need high pressure water system.

Handling and transportation

To prevent equipment damage during handling and transportation:

- operations will be conducted only by qualified personnel in compliance with these instructions;
- points of attachment for equipment handling should be limited to those provided on the tank.

Inspect equipment before and after being unloaded from the transportation vehicle. Any damage occurred during transportation should be noted and reported to the manufacturer. Check if delivery is complete by comparing the equipment list in the supplied documents with the existing items.

In case installation is not performed on the spot, stores the equipment in a location that will shelter them from extreme temperatures (recommended interval 5÷30°C) and direct sunlight exposure.

Installation prerequisites

Installation should be performed in accordance with these instructions. If the installation was not performed as such, VALROM Industrie does not assume any responsibility for the appropriate operation and generated outcome.

Prerequisites

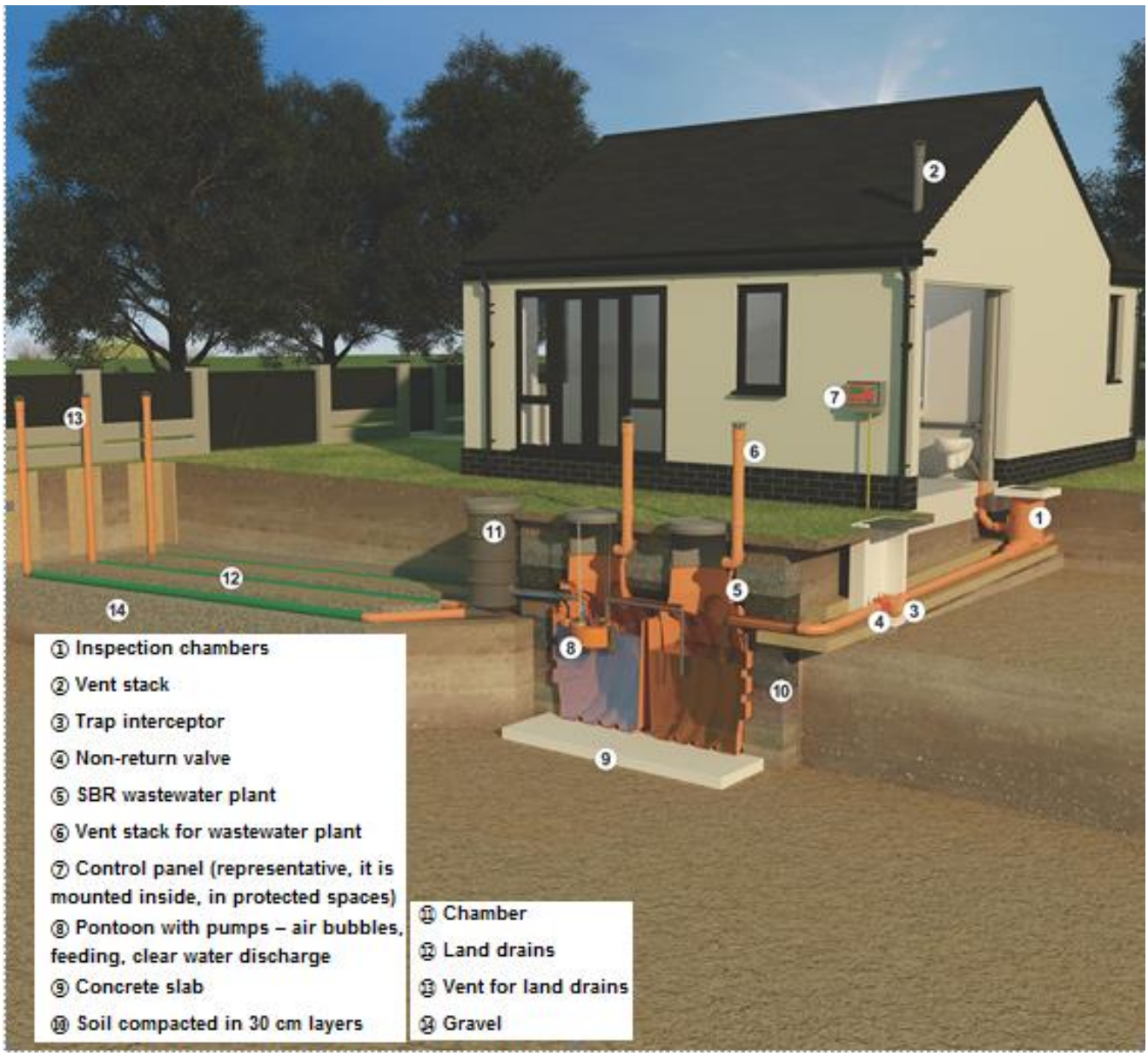
- check if the tank is empty, clean and tight (there is no visible sign of damage due to transportation);
- check the integrity of the equipment - pontoon, pumps, connections, etc.
- check if the sewage pipeline is executed until to location for wastewater plant, and if it is not blocked with construction debris or other materials;
- check that the soil and space available is capable to drain the treated water in any season. As option, the treated water can drain in soil (infiltration fields, seepage pit or combined solution) or evacuate in natural emissaries (watercourses) with the consent of the administrator of that course (eg. Romanian Waters Administration);
- make sure there is a current source/plug available in the vicinity of the assembly site;
- check the installation depth - must be between minimum 80 cm (the frost limit in Romania) and maximum 100 cm, measured from the ground level to the inlet of the supply pipe;
- check that the installation scheme is provided with ventilation of the entire sewer system; Because it is a biological process, the sewage system with wastewater plant has to ventilate. The first symptom of the lack of ventilation is a bad smell appeared near the plant or in the bathroom. The ventilation system consist in tubes as a stack vent that mount in front and after the plant on the drainage system.

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The distance of the 2 vent stacks is maximum 15 m. You must consider, also, the direction of the wind blowing.

- check that the installation scheme is provided with sampling chamber;
- installation will be done in green areas, exceptions areas maximum category B 125 (12.5 tons). If other covers are chosen, these covers must have a clear opening (access area) minimum 600mm.

Installation scheme (with infiltration field)



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Installation

For a smooth installation, follow the rules:

- wear a safety belt to avoid falling inside or outside the tank;
- handle equipment carefully, lift the tank using authorized lifting equipment.

Installation stages

1. Select an installation place close to the point of discharge from the household in order to reduce the drainage distance. The recommended distance from the house is 5 meters.

Attention!

The installation site should provide enough space for emptying, checking and maintenance, etc.

The burying depth should be minimal to ease access to the equipment during maintenance (minimum 80, maximum 100 cm measured from the ground level to the inlet pipe).

2. Dig a hole large enough to fit the tank and such as to remain an area of about 30÷50 cm around it.

3. The bottom of the hole should be flat. Pour the concrete slab of about 10 to 30 cm at the bottom of the tank pit that supports firmly. The concrete slab will be built in order to avoid the risk of sinking into the ground and imbalance of the tank. Sizing will be carried out according to hydrogeological conditions.

4. Lower the tank into the hole by anchoring it with ropes from its handling ears. Set it and make sure it is in a stable and firm position.

5. In case if is possible increase in the ground-water level and the tank could be taken out by the buoyant force, anchor the tank at the concrete slab. Anchoring should be done symmetrically - for this purpose use the handling ears or the clippings at the toe of the tank and pour concrete around the tank. The concrete level will be at least 10 cm above the level of increase of phreatic water. Concreting shall be done in steps (layers of about 30 cm), and to balance the pressure exerted on the walls by poured concrete, tank will be filled with water.

6. Connect it to the sewerage, and the treated water drainage system. Make sure all passages are sealed, including the connection between the tank and the extension shaft.

7. Place the pontoon with equipment in the right operating position:

- Lift by chain the pontoon with equipment and suspend using the hooks provided at the tank. The chain is marked.
- Release the float and let it hang freely.
- Check that the hose connections are as loose as possible, and without a lot of loops.
- Pull the supply cord through the jack up to the mark and screw on it firmly. The cable must not be maximum stretched inside the tank, so as to enable pull out the equipment for the maintenance.

8. Carry out the electric power installation.

The plant is supplied together with a 15 m cable (type 7x1.5). It does not come together with cable protection tubes. The cable have to laid in a protection tube with diameter DN 100/110. No bends greater than 30°!

Install the control panel in a dry and sheltered space - connect it to the equipment and then to the network.

A 230 V power line is laid to the position of the control unit and is fused separately as follows: B 16 and an Fl residual current circuit breaker 25 A/30 mA. The connection scheme is displayed on the lid (inside) of the panel.

WARNING!

The electrical work will be carried out ONLY by the authorized personnel.

9. Mount the extension shaft (if is necessary).

The sealed between the extension shaft and tank will be done using gasket DN 640 and it will be fastened in the proper position with tightened collar (fixing system for extension shaft).

10. Fill the space between the walls of the hole and the walls of the tank with 25-30 cm layers of filling materials. Each layer must be carefully compacted until the proper 95% Proctor degree for the land is

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reached. The filling material will be vegetable soil or sand (4/16) with no stones or other bulging particles that might scratch the walls of the tank. When backfilling, pay special attention to the space on the bottom. Using manual aids, fill in and consolidate the entire empty space, thus preventing potential subsequent deformation of the bottom. Simultaneously with backfilling the body of the tank, water must be poured into the tank itself, so that the level of the backfill material equals the water level in the tank. When the water reaches to the pontoon, check if it float and the chains become loose.

Note:

During tank installation, this must be covered with cover.

In areas with clay soil or risk of rain water infiltration around the tank, the backfilling material must be stabilized sand.

IMPORTANT!
Compliance with the labour protection norms is MANDATORY for the execution of the construction works.

Commissioning of the wastewater treatment plant

- The commissioning of the plant must be done by a person trained.
- Check if in the tank is water and the pontoon is floating and the chains are loose and well fixed.
- Check the cable – has to enable to take out the pontoon.
- Check hose connections - have be as loose as possible, and without a lot of loops.
- Check if the float hangs freely.
- Check if the installation is ventilated correct.
- Plug the control panel. From now on the plant is operational and can be used.

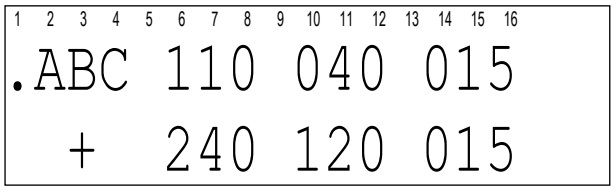
WARNING! After commissioning a plant, a period of 1÷4 weeks is required for priming (development of biomass providing treatment) that depending on the environmental temperature. During this period try to limit - if possible water consumption.

Operation, inspection and maintenance

Operation

aquaClean® S/SBR series plants are operated and controlled automatically by a control panel. The device has got a display for the process parameters, a cycle reset button, and a RS232 connector for PC connection or the programming device.

Data displayed on the first line from left to right:



- Symbol "**.**" blinking - the program runs;
- ABC refers to the equipment (A = clear water drain pump, B= feeding pump, C = aeration pump).
- Time for the clear water drain pump, expressed in seconds;
- Time for the feeding pump, expressed in seconds;
- Time for the aeration pump on a phase, in minutes. A cycle has more phases of aeration.

Data displayed on the second line from left to right:

- If is displayed this symbol "Pv" means the holiday mode is enabled (the level sensor has been activated);
- Under the icon of the working equipment display one of the symbols: "**+**" or "**x**". When the symbol is "**!^**" the pump doesn't work properly and the "." from the first line became "**!**".

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- Aeration time (in minutes) – in this time, aeration takes place intermittently;
- Sedimentation time - no equipment will be activated;
- Pause of aeration in a cycle, in minutes. Aeration takes place intermittently in a cycle.

There are on front of control panel 1 or 2 LEDs:

- Version 1 LED (**STATE**): if the light is green means that the equipment works normaly, if the light blinks the system works in holiday mode or the level sensor has an error; if the light is red, one of the pumps failure.
- Version 2 LEDs (**ECHIP/OK**): if the "ECHIP" lights means that the equipment works normaly. The LED labeled "OK" turns off if a fault occurs.

In the event of equipment failure the symbol "**!^**" will be displayed under the related damaged pump (overcurrent, blocked pump, etc.), the operating cycle being interrupted. The device will issue warning sound signals every 5 seconds. In the event of a malfunction (an equipment malfunction, power failure, etc.), the control panel attempts using a certain frequency to resume normal operation regime, while indicating malfunction.

After the failure is remedied the "**Reset**" button is pressed thus resetting the alarm and resuming the program. If you press "Reset" button, the treatment cycle will begin with stage water discharge from plant. In normal use, do not need to press the "RESET".

ATTENTION!

The following items are forbidden from being flushed into the toilet:

Item	Effect	Collection
Ashes, burning debris	Not biodegradable	Domestic waste
Napkins	Clogs the sewerage	
Various chemicals	Contaminates water	Collection point
Disinfectants	Kill biomass	Do not use!
Dyes	Contaminate water	Collection point
Photo chemicals		
Frying fats	Pipe deposits	Domestic waste
Patches	Pipe clogging	
Cat sand		
Bottle corks	Deposit inside the plant	
Varnishes and paints	Contaminate water	Collection point
Pills		Collection point (pharmaceuticals)
Motor oil		Collection point (oils)
Oil and food scraps		Collection point
Cotton swabs	Plant deposits	Domestic waste
Pesticides	Contaminate water	Collection point
Cleaning agents		
Razor blades	Plant deposits	Domestic waste – accident hazard!
Sink unclogging substance	Contaminate water	Do not use!
Pesticides		Collection point
Pads and diapers	Deposit inside the plant	Domestic waste
Cooking oil	Risk of clogging the plant	
Food scraps		
Glue and other adhesives		Collection point
Textiles (cleaning cloth, etc.)		Domestic waste/ collection point

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Thinners	Contaminate water	Collection point
Seeds	Risk of clogging the plant	Domestic waste
Toilet soap	Contaminate water	Do not use!
Cigarette stumps	Deposit inside the plant	Domestic waste
Silicone	Risk of clogging the plant	Collection point

Maintenance

Proper maintenance is a condition required to provide the features for the effluent and to avoid operating problems.

WARNING!

- Maintenance and upkeep operations will be performed only by qualified and trained personnel.
- Restrict access in the wastewater plant area throughout the maintenance period.
- Use only original spare parts (specified by the manufacturer).

Owner's responsibilities

It is the responsibility of the users of S/SBR wastewater plants to daily check:

- the error messages displayed on the control panel;

It is the responsibility of the users of S/SBR wastewater plants to weekly check:

- the level of the water - the abnormal high level of the water inside the plant (an indicator of a possible clogging);
- quality of the treatment process (presence of the foam at the surface, its colour, possible clogging of the input/output pipes or circuits, etc.).
- and monthly check of: the sludge level in the first compartment,

Six monthly maintenance operations:

- check the error messages recorded on the control panel;
- check the operation status - mechanical or electrical of the pumps;
- check state of the connections in the connection box;
- check the quality and stability of the inlet and outlet hoses connections;
- check the operating parameters and their adjustment to possible changes in the operating mode;
- check the ventilation capacity of the plant.
- check the level of sludge in the first chamber and in the case of excess sludge emptying of the first compartment is necessary, sludge level must be maximum 1/3 of level of water;
- clean the sampling chamber.

During maintenance operations there will also be measured:

- the concentrations of the dissolved oxygen.

In case that legal requirements are imposed, samples will be taken and analyse in an accredited laboratory:

- pH
- solid suspensions;
- chemical oxygen demand;
- biochemical oxygen demand.

Every 2 years maintenance operations

- emptying the first chamber of the tank;
- cleaning the equipment and replacing the worn equipment (pumps and aerator);
- cleaning the feed and discharge circuits, including the soil infiltration system;
- cleaning the possible deposits on the walls of the tank.

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Temporary stop of the plant

If the wastewater plant will not be operational for a certain amount of time, precautions have to be taken.
For periods of maximum 10 days: just before leaving home, introduce in the plant - via toilet, substances with a high nutrient content (beer, remnants of dairy products - milk, whey, etc). They will provide the environment necessary for the survival of biomass during this period.
For period exceeding 30 days:

- empty the plant;
- unplug the plant and place the equipment in a stable position on the bottom of the tank.

When you return, put it back into operation by following the steps of commissioning.

Availability at the end of lifetime

Waste and products at the end of life must be recycled if possible. Recycling is done by specialized firms. Approach as garbage is discouraged. Compliance with applicable legislation is mandatory.