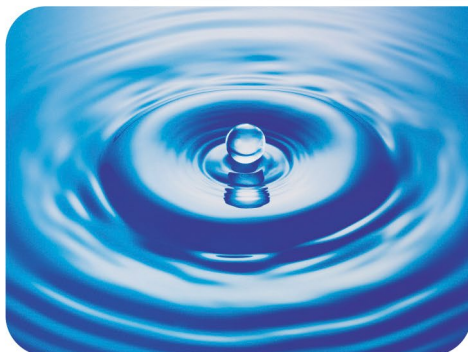


ALTA BIO Stations for deep biochemical treatment of domestic wastewater



Alta Bio Stations for deep biochemical treatment of domestic wastewater

Alta Bio Stations for treatment of domestic wastewater are intended for full bio-chemical treatment of domestic wastewater and other wastewater of similar constitution from free-standing residential buildings, infrastructure facilities, and other autonomous (decentralized) sewage networks.

The Stations are easy to install and take up a minimal amount of yard space, while also guaranteeing the total absence of odors during operation. Normal operation of the systems does not require continuous supervision.

The biofiltration of wastewater in **Alta Bio** occurs with the aid of a unique biological load, developed by the **Alta Group Company**. The biological load consists entirely of polymer, and possesses a service lifetime comparable to that of the entire **Alta Bio** Station which is over 60 years. In the course of treatment, water travels through a biofilter containing an active biofilm upon which occurs the bio-oxidation process, which is fed with oxygen taken from the immediate environment.

In **Alta Bio**, all three methods of wastewater treatment are utilized: mechanical and biological, also, a chemico-physical method of treatment (coagulation) is added.

For chemico-physical treatment of wastewater, the tableted precipitating agent **Doctor Septik** is used. It increases the effectiveness of treatment and precipitates phosphorus, high concentrations of which are hazardous to the environment.

Coagulant **Doctor Septik** is added to the wastewater by placing the container with the agent inside the toilet bowl. When water is flushed from the toilet, a part of the reagent ends up in the Sludge Settlement Tank, where it saturates the waste with the agent.

In systems with the UV-disinfection feature, with either the **Alta Bio 7 UV+** and **10 UV+** capacity, liquid precipitant **Eco Membrana** is installed into a special compartment in the housing of the Station and is dosed automatically in strict synchronization with the real-time performance of the Station, which not only conserves the precipitating agent, but also upholds the specified level of treatment during peak load times and prolongs the service life of the filtration element of the pressure filter block of UV-disinfection system.

Benefits:

- no restrictions on dumping of household waste
- no restrictions for using kitchen garbage disposals
- no need for maintenance servicing
- no need for continuous supervision
- can operate in an energy independent mode
- can connect to washing and dishwashing machines

Model Lineup

👤👤👤	👤👤👤👤👤	👤👤👤👤👤👤👤	👤👤👤👤👤👤👤👤👤👤	👤👤👤👤👤👤👤👤👤👤👤👤👤👤👤
Alta Bio 3	Alta Bio 5	Alta Bio 7	Alta Bio 10	Alta Bio 15
Alta Bio 3+	Alta Bio 5+	Alta Bio 7+	Alta Bio 10+	
	Alta Bio 5 OR	Alta Bio 7 OR	Alta Bio 10 UV+	
	Alta Bio 5 OR +	Alta Bio 7 UV+		
	Alta Bio 5 Low			
	Alta Bio 5+ Low			

Alta Bio – name of the Station, the number after the name (3; 5; 7; 10; 15) - signifies the number of continuous users.

«+» – treated water from the Station is **pumped out**, while the absence of the «+» symbol indicates that treated water exits the Station in a **free flow mode**.

Low – the Station housing is **of a reduced height** to facilitate mounting in challenging circumstances such as difficult terrain, high groundwater levels, quicksand, rocky soil, etc.

OR – the Station is housed **in a circular section** for mounting inside a concrete well or in difficult terrain where the equipment will be significantly embedded in the ground, and also for mounting under pathways and pedestrian zones.

UV – the Station **has a built in block for UV-disinfection** of treated water to enable recycling the treated water back into the water reservoir.

Maintenance of Alta Bio Stations

Maintenance of **Alta Bio** autonomous treatment systems is sufficiently simple. For regular maintenance, it is necessary to pump out the accumulated sludge from the Sludge Settlement Tank once a year. In conjunction with this, it is necessary to rinse out the filters with clean water from the hose. Also, it is necessary to add the depleted amount of the agent **Doctor Septik** to the toilet bowl on a regular basis. The agent comes in containers which are easy to attach to the inside of the toilet bowl.

Alta Bio 7 UV+ and **Alta Bio 10 UV+** Systems come with a container of liquid coagulant which should be installed in a special compartment inside the Station housing. The liquid coagulant is dosed into the system automatically.

The built-in UV-disinfection block is serviced in accordance with industry regulations.

Alta Bio Station with the capacity to pump out treated water

In **Alta Bio Stations 3, 5, 5 Low, 5 OR, 7, 7 OR, 10 and 15**, treated water exits in a free flow mode.

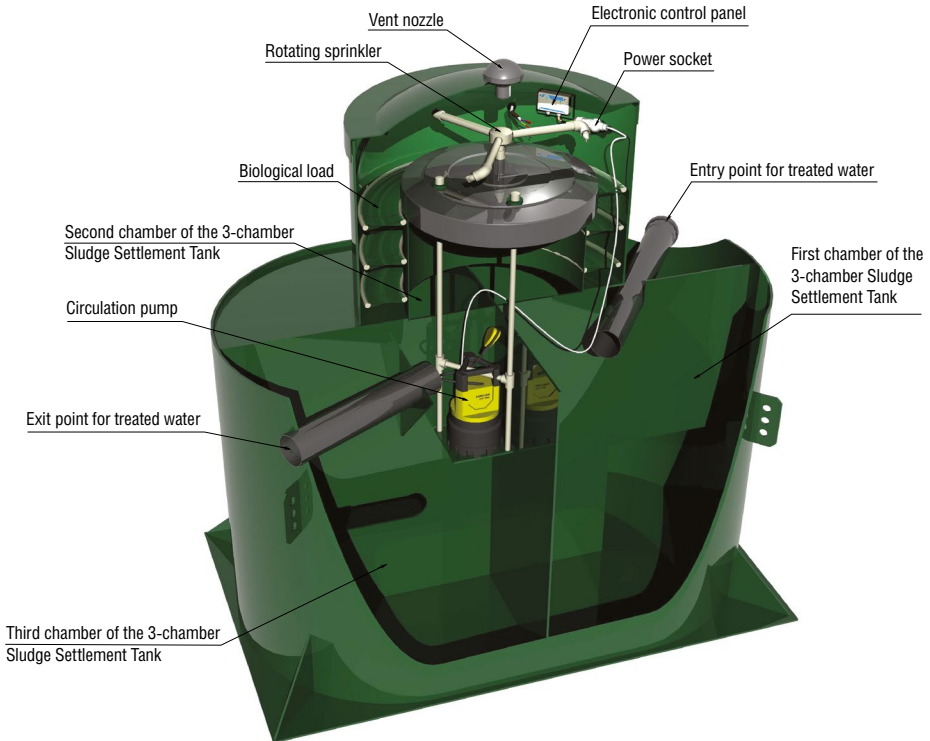


Figure 1. Functional diagram of the **Alta Bio Station**

Wastewater treatment in Alta Bio Station occurs in two main phases:

The first phase consists of the settlement of suspended particles inside the 3-chamber Sludge Settlement Tank.

The Sludge Settlement Tank (bottom part of the Station) consists of three chambers with overflow channels, over which domestic wastewater flows. The overflow channels are positioned such that the wastewater flows with the lowest possible flowrate, which ensures that coarsely distributed floating particles are settled at the bottom. The volume of the first chamber constitutes 50%, while the second and third chamber each constitutes 25% of the total volume of the Sludge Settlement Tank.

The total volume of the Sludge Settlement Tank is designed to sustain processing of sewage for two days.

The second phase – posttreatment in the biofilter. From the third chamber of the Sludge Settlement Tank, cleared up waste water, with the aid of the drain pump which is controlled by the electronics block, is pumped into the upper part of the Station and is then sprayed out in an even distribution over the biological load (biofilter) through the rotating sprinkler. The filter is inhabited with microorganisms. In the course of spraying, wastewater is saturated with oxygen and filtered through the loaded material.

The circulation pump is activated by the control block, which is located inside the bioreactor of the Station.

Next, part of the water, saturated with bio-organisms, is returned to the first chamber, which enables the disintegration of floating particles to be accelerated.

The microorganisms accelerate the biomass disintegration process, after which occurs the oxidation of any matter containing chemically-bound nitrogen, up to **nitrites** and **nitrates** with the subsequent release of nitrogen gas into the first chamber of the system.

The major part of treated water is returned to the third chamber. Treated water is taken from the middle part of the third chamber and is released from the Station. This design prevents settled residue left at the bottom and colonies of dead bacteria floating on the surface from being released from the Station.

The sorption and destruction processes of polluted wastewater in biological filters are largely similar to the processes of soil treatment in irrigation fields and filtration fields. However, the processes of biological oxidation of organic contaminants inside biofilters proceed with greater intensity due to the increased area of the loaded material compared to the interstices of the soil. The area of the biological load is dozens of times larger than the area of the interstices of sand, which is one of the best natural materials for irrigation fields.

As it is being filtered through the load in the biofilter, the waste water leaves undissolved impurities in the load, while colloidal and dissolved substances are absorbed by the biofilm. It would not do, when considering the term ‘filtration’, to simply think of mechanical straining through the mass of the loaded material. The biofilter is the facility for biofiltration using a fixed biomass, affixed to the surface of habitat (the loaded material), which executes the extraction and complex biological processing of contaminations present in the wastewater.

Biofilm microorganisms oxidize organic matter via enzymatic reactions, during the course of which they receive sustenance and energy necessary for their continued existence. The microorganisms use a part of the organic matter to augment their own biomass. In this way, in the course of metabolic reactions occurs the conversion of contaminants into simple chemical compounds (water, minerals and gases), and as a result organic contaminants are removed from the wastewater, process of denitrification occur and the mass of the active biofilm expands in the biofilter.

Alta Bio – biochemical installation for the treatment of wastewater. The agent used in the stations, **Doctor Septik** (or similar), is installed in the toilet and is released upon contact with water. Delivery of the agent is simple and reliable, and does not require the utilization of an external power source. Application of the dry precipitating agent does not require any modification to the existing sewage system and functions in all wastewater treatment facilities, enhancing their effectiveness.

Added to the wastewater the moment it is formed, the precipitating agent can act for a prolonged period of time, thus, when wastewater is admitted from the sewage system into the Sludge Settlement Tank, phosphorus, which is a part of the composition of phosphates, produces molecules which are water-insoluble and precipitates in the Sludge Settlement Tank as sludge. In this way, the dry precipitating agent decidedly improves the effectiveness of treatment, facilitating the acceleration of the rate at which wastewater is processed.

Alta Bio Station with the capacity to pump out treated water

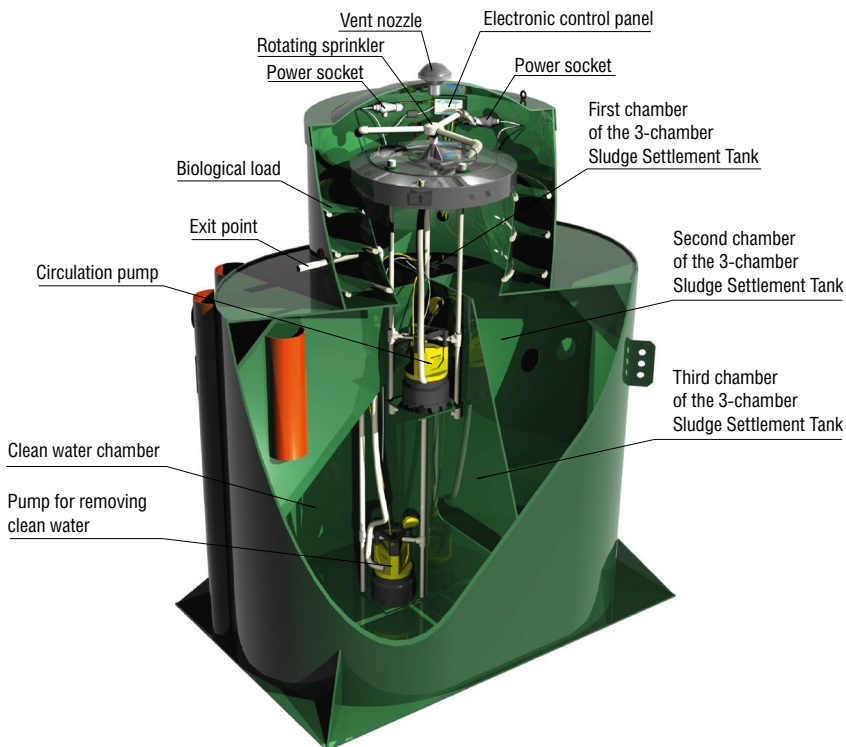


Figure 2. Functional diagram of the **Alta Bio** Station with built in storage well for treated water and the capacity to pump out treated water

In **Alta Bio** Stations **3+**, **5+**, **5 Low+**, **5 OR+**, **7+** and **10+** possess a built in storage well for treated water and the capacity to pump out treated water.

Inside the additional chamber in the Station, a float drainage pump (see fig. 2) is installed in order to guarantee the pressurized ejection of treated water without reliance on the lay of the land or a roadside ditch.

Stations with the built in well and pump for the pressurized ejection of treated water are necessary in conditions when water removing is not possible in a free flow mode.

Alta Bio Stations **3+**, **5+**, **5 Low+**, **5 OR+**, **7+** и **10+** are equipped with an emergency free flow outlet for treated water. This system allows for additional protection of the equipment from flooding in case of power outage, a fault in the pumping apparatus or in the diverting pipeline.

Alta Bio Stations with built in UV-disinfection block

Alta Bio Stations **7 UV+** и **10 UV+** feature an integrated UV-disinfection block for disinfection of treated water and for ensuring water removing directly into the water reservoir, including fisheries.

After the biofilter, treated water enters into the filtration system, which consists of a mechanical filter for fine treatment and a pressure sorption filter utilizing a special load – **Alta Sorbent**. Next the water proceeds to the UV-disinfection phase conducted with the help of a UV lamp.

In the filtration system block occurs the final posttreatment of water up to the required concentrations of suspended matter, which correspond to the requirements for releasing water into the water reservoir of fisheries. In the filtration system, water is pumped using pumps allocated into the following groups: primary and reserve. The six-way valve for washing the biological load is located on the pressure sorption filter. The time of the washing is determined by the values on the manometer.

The **Alta BioClean** UV-disinfection block enables the destruction of virtually all pathogenic microorganisms. Continuous emitters of ultraviolet light are used in the bactericidal installations, which act on the environment in the water via a special material at the 180-300 nm wavelength spectrum.

Alta Bio Stations **7 UV+** and **10 UV+** feature a unique system of disinfecting the settled sludge from tapeworm eggs, which promotes their destruction and guarantees personal safety when servicing the station, and also enables the further utilization of the sludge, which for instance can be composted into fertilizer.

The dosing of the regular disinfecting agent for disinfecting the sludge from tapeworm eggs is configured to occur automatically and in strict synchronization with the real-time performance of the Station, which enables the specified level of treatment to be maintained during peak load times and conserves the agent when there is not enough wastewater flow.

It is recommended to use the liquid precipitating agent **Alta Eco Membrana** in the capacity of precipitating agent in **Alta Bio** Stations **7 UV+** and **10 UV+**.

The dosing of the precipitating agent in **Alta Bio** Stations **7 UV+** and **10 UV+** is configured to occur automatically and in strict synchronization with the real-time performance of the Station, which not only allows for the conservation of the agent, but also maintains the designated level of treatment during peak load times, and also prolongs the service life of the filtration element of the pressure filter block of UV-disinfection system.

Alta Bio Stations **7 UV+** and **10 UV+** canisters for the ovicidal and precipitating agents are installed in a special compartment inside the equipment chamber of the Station, see Fig. 3.

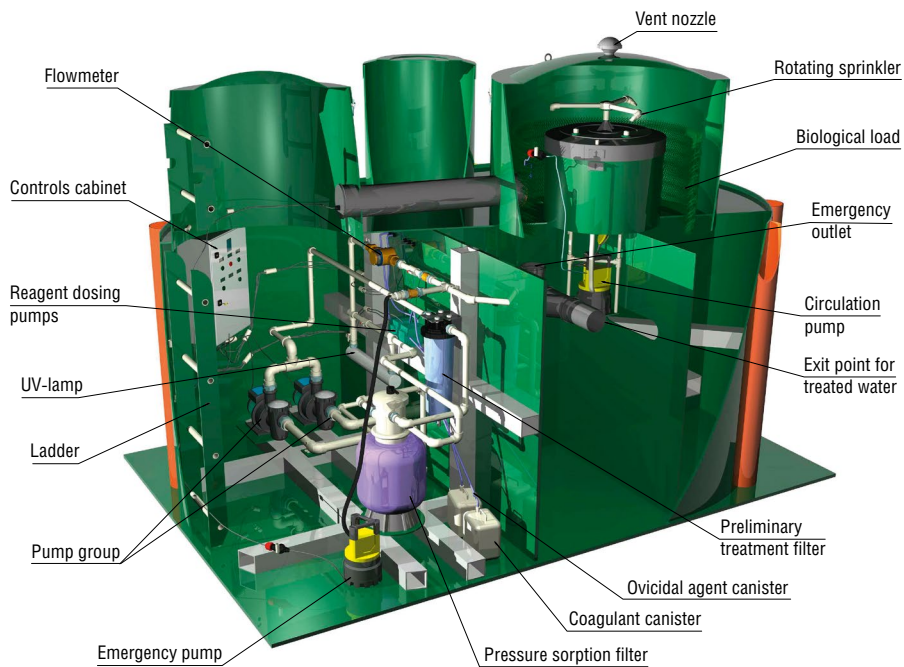


Figure 3. Functional diagram of the **Alta Bio** Station with built in UV-disinfection block of treated water

Alta Bio Stations designed for installation in challenging circumstances

Alta Bio Stations **5 OR**, **5 OR +**, **7 OR**, and also **Alta Bio 5 Low** and **5 Low +** are available in special shapes and sizes, which enable the installation of the Stations in challenging and atypical circumstances.

Alta Bio Stations **5 OR**, **5 OR +**, **7 OR** are produced with circular housing sections, adapted for installation inside a concrete well.

Such installation, are applicable in the presence of high groundwater levels, significantly unstable ground, when it is necessary to significantly embed the Station in the ground, for instance, in challenging climatological circumstances where there is significant freezing of the soil.

If there is a driveway or a parking lot located above the station, or if there is a need to arrange a pedestrian area, it is necessary to install a relieving platform above the Station in order to distribute the weight and ensure the structural integrity of the Station housing.

In such conditions, it is also feasible to install the Alta Bio Station inside a concrete well, on the wall of which is installed a relieving platform (standard reinforced concrete cover with a hatch).

Alta Bio Stations **Bio 5 Low** and **5 Low+** are produced with a significantly reduced in height housing, which facilitates installation in especially difficult terrain with high groundwater levels, in the presence of quicksand, or in rocky soil.

In order to install **Alta Bio** Stations **Bio 5 Low** and **5 Low+** it is sufficient to excavate a ditch of minimal depth.

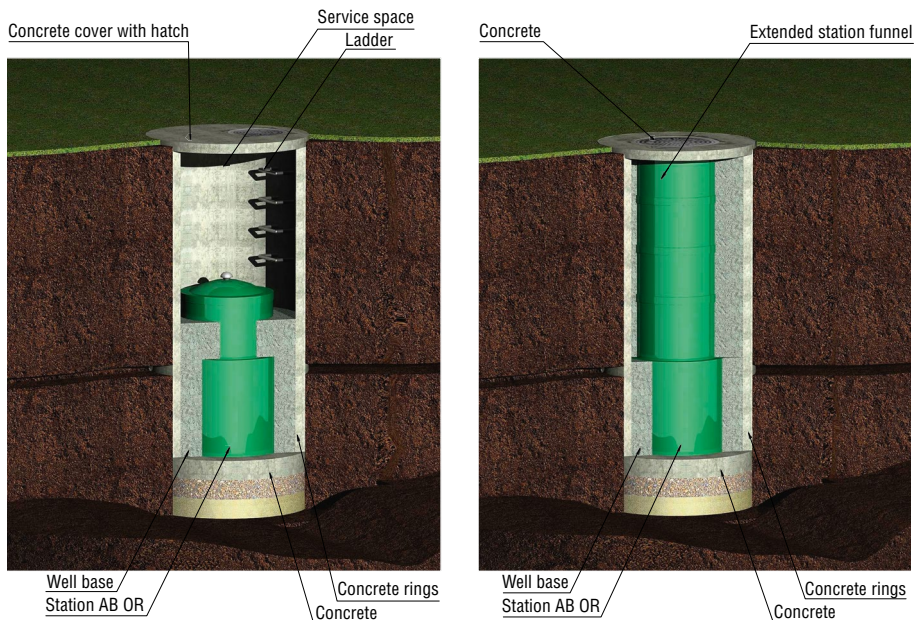


Figure 4. Example depiction of the installation of **Alta Bio** Stations **Bio 5 OR**, **5 OR +**, **7 OR** inside a concrete well

Installation and method of water disposal

The Stations are delivered fully assembled and ready to use, excluding instances where delivery without funnels is requested, contingent on the conditions for transport of an oversize load.

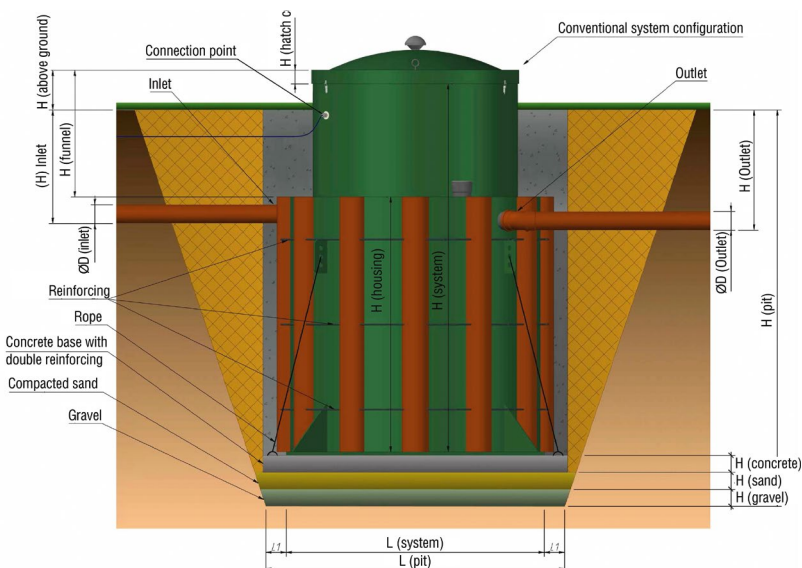
Main structure of **Alta Bio** Stations – a self-sustaining reservoir made of sturdy plastic. The integrity of the housing is assured by the employment of 8 mm thick plastic, which possesses very high mechanical strength characteristics, and by the presence of internal technological partitions and crossbars.

The Station is installed onto the flat bottom of the pit, such that the distance between each wall of the Station and the edges of the pit is no less than 25 cm, and that the hatch cover is 0.2 m above ground level. When installing the system, it is necessary to plan ahead as far as possible in regards to any increase in the ground level (for example, landscaping work in the area) and how that might affect the distance between the ground and the hatch cover. Ground leveling should be implemented in such a way that surface waters will not flood the Station in case of rain or melting snow.

The station is installed on a 150 mm thick concrete base with double reinforcing. The station possesses special mounting hinges for anchoring to the base plate (with anchor elements) using synthetic ropes.

Tilt during the installation of the Station is not permissible. The station is installed on a strictly horizontal level.

After installing the station onto the base plate, it is necessary to simultaneously fill the Station with water as the mixture of sand and cement is being dumped in a ratio of 5/1. The height of the groundwater level has no bearing on the operation of the Station.



Simple free-flow release into a roadside ditch, ravine, rainwater drainage system, as well as directly onto the ground, where the lay of the land permits.

Outlet pipe is laid with a slope of 1.5 - 2%.

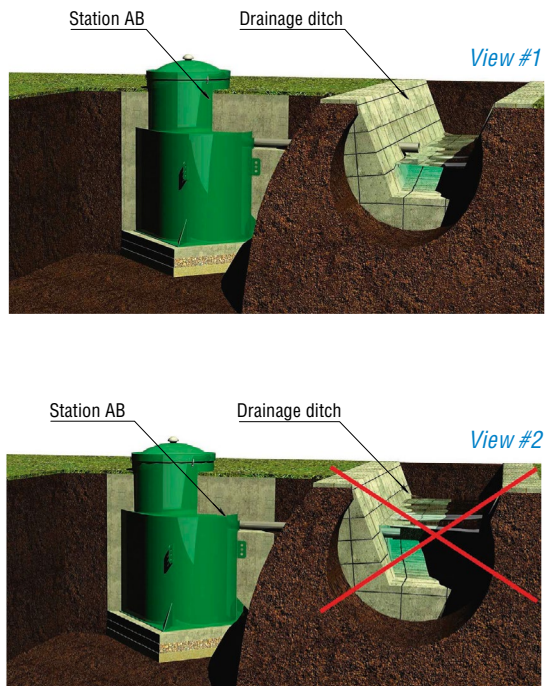


Figure 5. Example illustration of simple free-flow release of treated water into a drainage ditch

Absorption systems are applicable in conditions where there are low groundwater levels and the soil possesses a good level of water absorption (sandy soil, sandy soil with little inclusion of loam).

The Absorption Well can be made from concrete rings or by using a plastic well with perforated base and walls.

When installing the absorption well, it is recommended to install a back-flow prevention valve onto the outlet pipe to protect the Station from flooding during periods of active snowmelt or a rainy off-season.

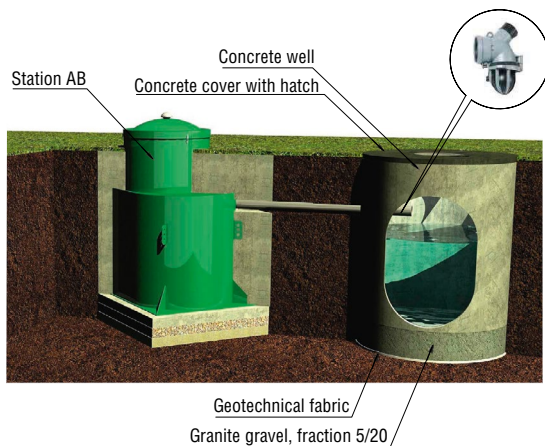


Figure 6. Absorption system, absorption well

The absorption field is a closed system of absorption; it significantly decreases space requirement at the site, but is more susceptible to flooding during conditions when the groundwater level rises.

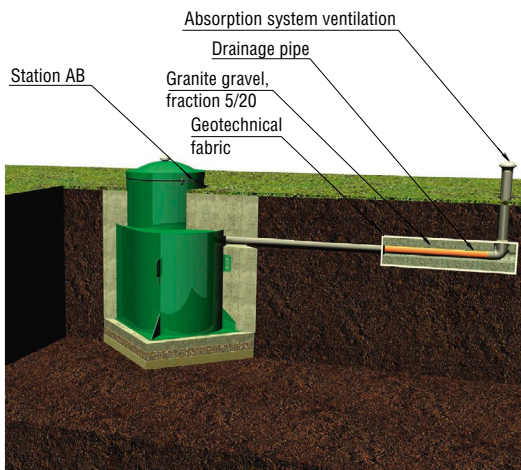


Figure 7. Absorption system, absorption field

When water removing is not possible in a free flow mode (high groundwater levels, lack of drainage ditches and rainwater drainage systems of sufficient depth, and incompatible soil in terms of water absorption), water should be configured for pressurized ejection, provided an **Alta Bio** Station with «+» designation has been installed.

Primary technical specifications




Model	Alta Bio 3	Alta Bio 5	Alta Bio 5 Low
Appearance			
Productivity, m ³ /day	0,6	1	1
Users, people	up to 3	up to 5	up to 5
Maximum discharge volume, L	120	210	210
Size of the base, mm	1200x1200	1980x1200	2000x1300
Overall height of the Station, mm	1840	2040	1390
Funnel diameter, mm	955	955	955
Weight, kg	100	136	130
Depth / inlet diameter, mm*	585 / 110	585 / 110	435 / 110
Depth / outlet diameter, mm	625 / 110	625 / 110	475 / 110
Depth / emergency outlet diameter, mm	--	--	--
Area for installation of the system, m ²	2	3,1	3,3
Excavation volume, m ³	3,6	6	4,9
Electrical equipment	Submersible drainage pump	Submersible drainage pump	Submersible drainage pump
Installed power, kW	0,32	0,32	0,32
Power consumption, kW/h	0,08	0,08	0,08
Voltage, V	220	220	220
Recommended parameters of the electric supply cable	3x1,5	3x1,5	3x1,5

Table 1. Alta Bio Stations with free-flow release of treated water

Alta Bio 5 OR	Alta Bio 7	Alta Bio 7 OR	Alta Bio 10	Alta Bio 15
				
1	1,4	1,4	2	3
up to 5	up to 7	up to 7	up to 10	up to 15
210	270	270	550	750
Ø1300	1700x1500	Ø1500	2100x1500	3000x1200
2440	2440	2440	2440	2440
1220	1220	1220	1220	2x1220
125	155	145	237	300
685 / 110	685 / 110	685 / 110	685 / 110	505/110
725 / 110	725 / 110	725 / 110	725 / 110	545/110
--	--	--	--	--
2,3	3,3	2,9	4	3,6
4,6	7,5	6,7	9	7,9
Submersible drainage pump	Submersible drainage pump	Submersible drainage pump	Submersible drainage pump	Two submersible drainage pumps
0,32	0,32	0,32	0,32	0,64
0,08	0,08	0,08	0,08	0,16
220	220	220	220	220
3x1,5	3x1,5	3x1,5	3x1,5	3x1,5




Model	Alta Bio 3+	Alta Bio 5+	Alta Bio 5+ Low
Appearance			
Productivity, m ³ /day	0,6	1	1
Users, people	up to 3	up to 5	up to 5
Maximum discharge volume, L	120	210	210
Size of the base, mm	1390x1200	1820x1200	2300x1500
Overall height of the Station, mm	2040	2340	1390
Funnel diameter, mm	955	955	955
Weight, kg	120	150	160
Depth / inlet diameter, mm*	585 / 110	585 / 110	435 / 110
Depth / outlet diameter, mm	295 / 25	295 / 25	190 / 25
Depth / emergency outlet diameter, mm	625 / 110	625 / 110	475 / 110
Area for installation of the system, m ²	2,3	2,8	4,3
Excavation volume, m ³	4,3	6,3	6
Electrical equipment	Two submersible drainage pumps	Two submersible drainage pumps	Two submersible drainage pumps
Installed power, kW	0,64	0,64	0,64
Power consumption, kW/h	0,082	0,082	0,082
Voltage, V	220	220	220
Recommended parameters of the electric supply cable	3x1,5	3x1,5	3x1,5

Table 2. Alta Bio Stations with pressurized ejection of treated water

Alta Bio 5 OR +	Alta Bio 7+	Alta Bio 10+
		
1	1,4	2
up to 5	up to 7	up to 10
210	270	550
Ø	2000x1500	2400x1500
2440	2440	2440
1220	1220	1220
140	170	254
685 / 110	685 / 110	685 / 110
395 / 25	395 / 25	395 / 25
725 / 110	725 / 110	725 / 110
2,9	3,8	4,5
6,7	8,6	10,4
Two submersible drainage pumps	Two submersible drainage pumps	Two submersible drainage pumps
0,64	0,64	0,64
0,082	0,082	0,082
220	220	220
3x1,5	3x1,5	3x1,5

Table 3. **Alta Bio** Stations with built in UV-disinfection block

Model	Alta Bio 7 UV+	Alta Bio 10 UV+
Appearance		
Productivity, m ³ /day	1,4	2
Users, people	up to 7	up to 10
Maximum discharge volume, L	270	550
Size of the base, mm	3000x2000	3500x2000
Overall (transportation) dimensions (LxWxH), mm	3000x2160x2440	3500x2160x2440
Funnel diameter, mm	1220; 955	630; 955; 1220
Weight, kg	320	410
Depth / inlet diameter, mm*	685 / 110	685 / 110
Depth / outlet diameter, mm	725 / 110	725 / 110
Area for installation, m ²	7,1	8,2
Excavation volume, m ³	16,5	19
Electrical equipment	Work and emergency pumps – 3	Work and emergency pumps – 3
	UV sterilizer	UV sterilizer
	Dosing pumps – 2	Dosing pumps – 2
Installed power, kW	1,3	1,3
Power consumption, kW/h	0,3	0,35
Voltage, V	220	220
Recommended parameters of the supply electric cable	3x2,5	3x2,5

* – The maximum depth of the inlet pipe for **Alta Bio** Stations is 1,5 m; however in certain conditions, it is possible to install the Stations with the depth of inlet collector being up to 3 meters.



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Additional equipment

- Control cabinets
- Subsurface modules
- Cable wells

Alta Group Company sales offices

