NH4PO
WASTEWATER TREATMENT PLANTS

AT oval wastewater treatment plant technical pass

Operating and installation manual

ATO30–250

Content

Introduction

The packaged AT oval (hereinafter referred to as ATO) wastewater treatment plants ATO30–250 for 30 – 250 PE serve for the treating of sewage wastewater from residential houses, apartments, hotels and pensions, restaurants, schools, caravans and camping sites, small enterprises, etc. before discharging into a receiving water, rainwater sewer, infiltration into the groundwater or reuse of the treated water after a tertiary treatment step.

Caring for nature

When buyingthe Unit, you help fight environmental and water pollution. Every installed and func- tioning Unit contributes to reducingthe amount of dirty water released into the environment. The water obtained after the treatment of wastewater in the Unit can be discharged into the ground or water bodies without affecting the ecological system. Therefore, with our built-in wastewater treatment technology, you can rest assured about the ecology and the world will be grateful for your environmentally-friendly Unit.

Description

The packaged wastewater treatment plants ATO30–250 for 30 – 250 PE use a continuous-flow activated sludge process, with a suspended growth process. The equipment is comprised of a single vertical oval tank made from polypropylene - the biological reactor, which combines the following processes in a single tank: mechanical pre-treatment, excess sludge storage, biological treatment using a low-loaded activated sludge process, separation of the treated water from activated sludge in the final clarification chamber and flow balancing of fluctuating inflow of wastewater in the retention zone.

The bioreactor tank is divided into four chambers:

- Non-aerated chamber for mechanical pre-treatment, denitrification and collection of excess sludge is composed of six (ATO30-70), ten (ATO100–150), twelve (ATO175) or fourteen compartments (ATO200–250) that form a "vertical flow labyrinth" - VFL®,
- Aerated activated sludge chamber
- Final clarification chamber
- Retention zone over the normal water level in the biological reactor up to the overflow in the flow regulator.

The raw wastewater with coarse impurities enters through inlet (1) into the first compartment of the non-aerated chamber (4) in the bioreactor where is placed the plastic basket screen (2) for mechanical pre-treatment. There is an outlet of an air-lift pump (14) below the basket screen under the surface of the water - with large bubble aeration - to break up the coarse impurities in the basket.

Alternatively in case if the WWTP is equipped with pumping station (17), the raw wastewater with coarse impurities enters into the pumping station (17), where is taking place the mechanical pretreatment by a plastic basket screen (2). Below the basket screen (2) there are coarse bubble disc diffusers (14a) and fine bubble diffuser (14b) - to break up the coarse impurities in the basket screen and mix the content of the pumping station. The control of the pump is ensured by el. switchboard (24) or a switchboard for pumps (22) connected to the main switchboard (23).

The mechanically pretreated wastewater flows into the first compartment of the non-aerated chamber (4). The pumping is ensured by a submersible pump (18).

There is an outlet from an air-lift pump (3) located above the water level in the first compartment of the non-aerated chamber (4) which pumps the mixture of sludge and water from the last compartment of the non-aerated chamber (4). Hydrodynamic forces and the recirculation of the sludge by the air-lift (3) disintegrates the coarse impurities.

The mechanically pre-treated wastewater flows into the non-aerated chamber (4) of the bioreactor, which contains 6, 10, 12 or 14 alternatively connected compartments at both the normal level of the water and at the bottom of the bioreactor forming the vertical flow labyrinth. This chamber serves for mechanical pre-treatment, denitrification and collection of excess sludge. The sludge and water mixture flows from the last compartment of non-aerated chamber (4) to the aerated activated sludge chamber (5). The activated sludge chamber (5) includes fine bubble diffusors (6) on its base. The activated sludge flows into the final clarification chamber (7), where the activated sludge is separated from the treated wastewater. The activated sludge is pumped by an air-lift pump (8) from the bottom of the final clarification chamber (7) to the non-aerated chamber (4). A flow regulator (12) is installed at the water level in the final clarification chamber (7) which serves for controlling the outflow in order to maintain the water level between the normal and maximum level in the tank (retention zone). The treated wastewater flows through the outlet (13).

The excess sludge is pumped from the last compartment to the first compartment of the non-aerated chamber (4) by an air-lift pump (3) where the sludge volume is decreased by decomposition under anaerobic-anoxic conditions and the excess sludge along with heavier primary sludge is stored in the bottom part of the non-aerated chamber (4) to be pumped out and removed depending on wastewater treatment plant loading, once a high concentration of sludge is reached. The excess sludge should be pumped out from the non-aerated chamber (4) and aerated chamber (5) by a vacuum truck or other means for disposal or reuse 1-5x per year, based on the load of the WWTP.

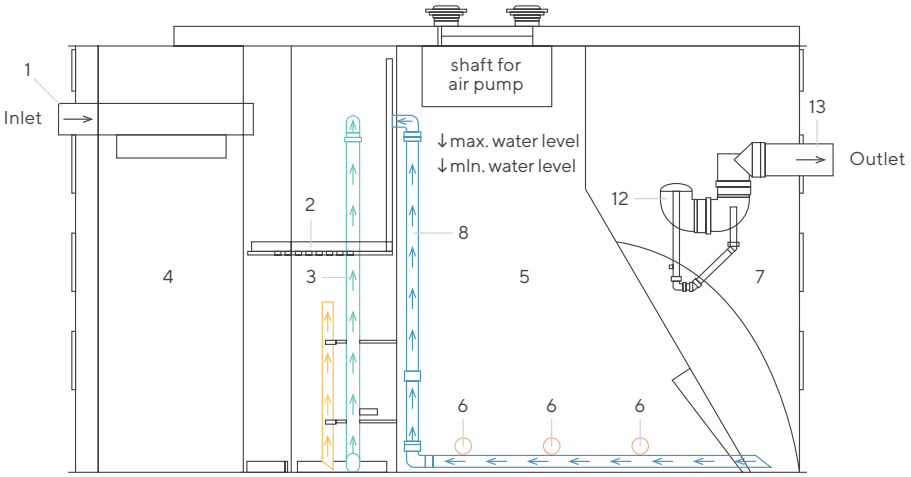
Alternatively the WWTP can be equipped with an air-lift pump for excess sludge (15), which pumps the excess sludge from the non-aerated chamber (4) into a sludge tank (16) as a part of the WWTP technology. The desludging can be controlled by a solenoid valve (I) in automatic regime of desludging. The sludge tank (16) is equipped with fine bubble diffusers (6) on its base. The supernatant flows back through the supernatant pipe (19) to the non-aerated chamber (4). The thickened excess sludge (20) from the bottom of the sludge tank (16) is to be pumped out by a vacuum truck or other means for disposal or reuse 1x-5x per year.

The pressure air for aeration of the aerated activated sludge chamber (5) and other tanks of the WWTP and for the air-lift pumps is supplied by a blower (9). The blower (9) blows the air into the air distribution panel (11) with regulation valves, which controls the air amount into the air-lift pumps (for circulation and recirculation) or into the coarse bubble and fine bubble diffusers (for aeration) accordingly to the setting of the valves (B,C,D,E,F,G,H) on the air distribution panel (11).

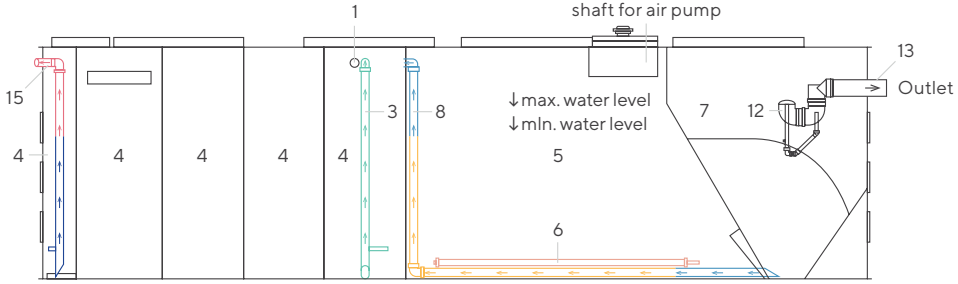
The control of the air pump (9) and the solenoid valve (I) operation can be ensured by a microprocessor control unit (10) which is connected to the main switchboard (22) or to the el.switchboard (24).

Optical and audible alarms will signal electrical device failure or a loss of electrical supply.

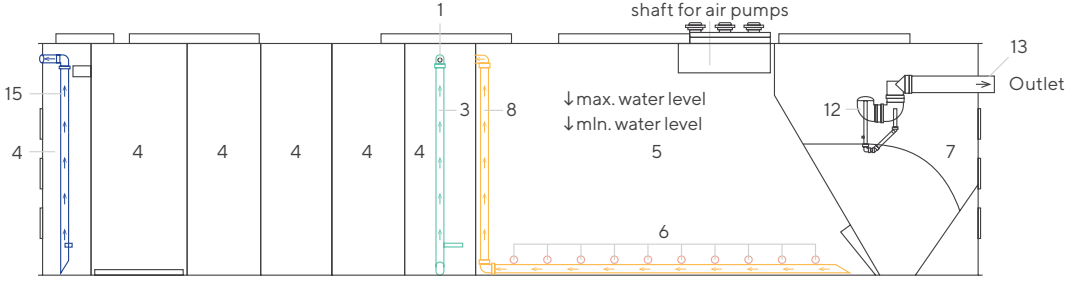
Sectional view of the biological reactor ATO30-75



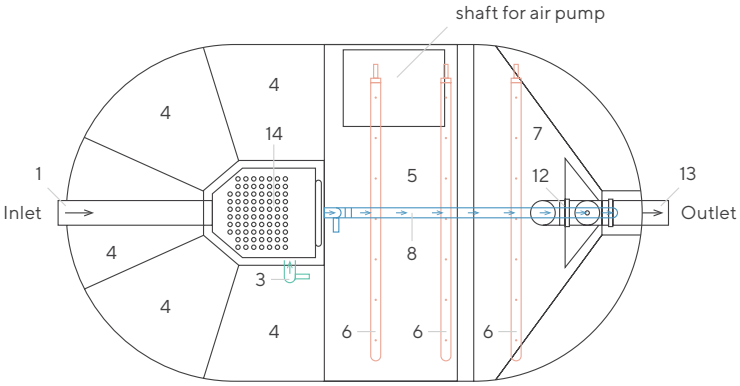
Sectional view of the biological reactor ATO100-150



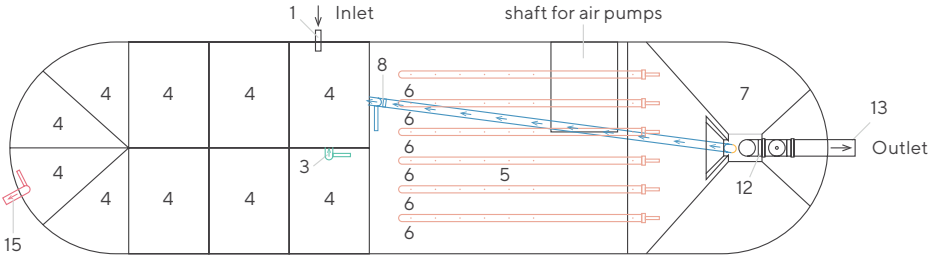
Sectional view of the biological reactor ATO175-250



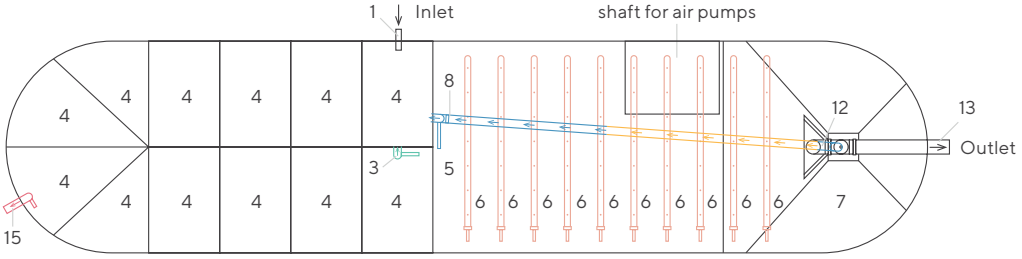
Plan view of the biological reactor ATO30-75



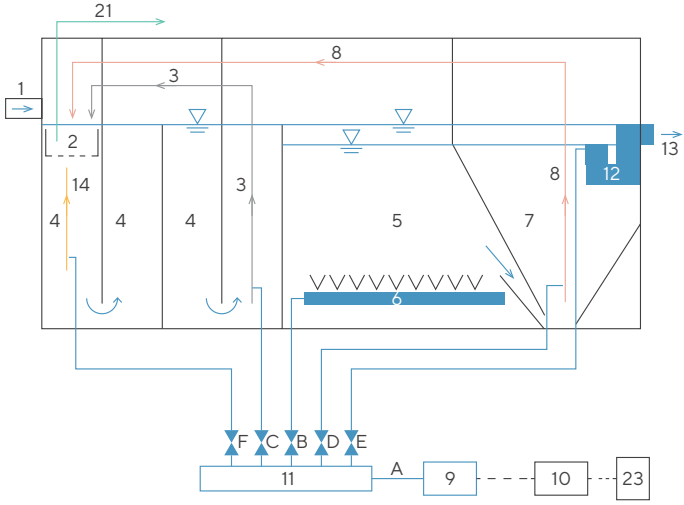
Plan view of the biological reactor ATO100–150



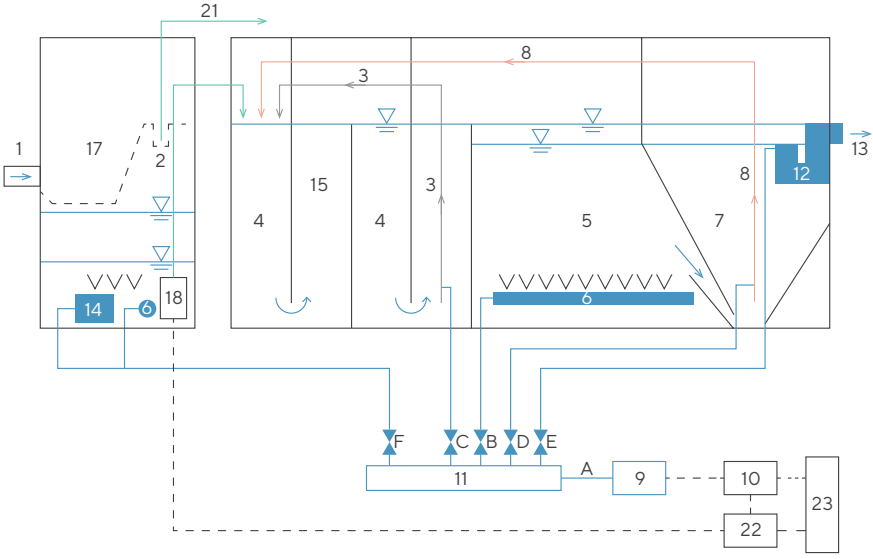
Plan view of the biological reactor ATO175–250

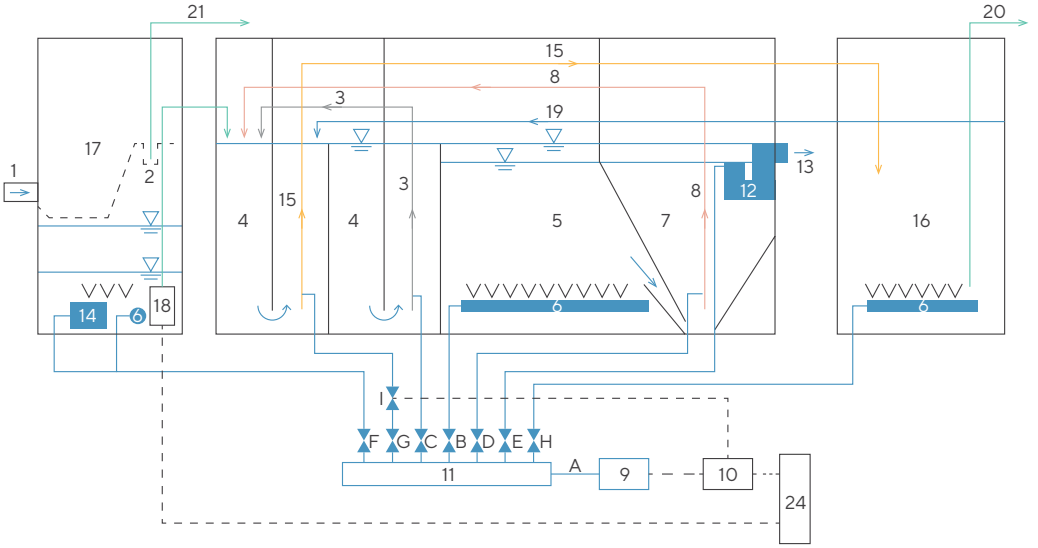


Technological scheme of WWTP ATO30–75 biological reactor (gravity inlet), without sludge tank



Technological scheme of WWTP ATO30–75 biological reactor with pumping station, without sludge tank





Technological scheme of WWTP ATO50–250 biological reactor with pumping station and sludge tank

1 —— Inlet
2 —— Plastic basket screen
3 —— Air-lift pump in the non-aerated chamber
4 —— Non-aerated chamber
5 —— Aerated chamber
6 —— Fine bubble tube diffusers
7 —— Final clarification chamber
8 —— Air-lift pump for return sludge
9 —— Air pump
10 —— Microprocessor control unit
11 —— Air distribution panel
12 —— Flow regulator
13 —— Outlet
14a —— Coarse bubble disc diffuser under the plastic basket screen
14b —— Fine bubble tube diffuser under the plastic basket screen
15 —— Air-lift pump for excess sludge
16 —— Sludge tank
17 —— Pumping station
18 —— Submersible sludge pump
19 —— Supernatant
20 —— Thickened sludge
21 —— Screenings
22 —— Swichboard for pumps
23 —— Main switchboard
24 —— El.switchboard

A —— Air supply from the air pump
B —— Air valve for the fine bubble diffusers
C —— Air valve for the air-lift pump in the non-aerated chamber
D —— Air valve for the air-lift pump for return sludge
E —— Air valve for the flow regulator
F —— Air valve for the integrated pumping station
G —— Air valve for the air-lift pump of excess sludge
H —— Air valve for the fine bubble diffusors in the sludge tank
I —— Solenoid valve for the air-lift pump of excess sludge

Dimensions and installation of the tanks of WWTP

Biological reactor

The biological reactor tank is made from polypropylene sheets (PP) by welding. The tank of biological reactor is installed below ground the way, that the top edge of the tank must be cca 50-100 mm higher than the terrain.

The maximal depth of installation without any other measures for reinforcing is 2200 mm (ATO30, ATO40), resp. 2400 mm (AT50 ovál – AT500 ovál) below ground (self-supporting design). The tank of the biological reactor must be installed on a reinforced concrete basement slab. The backfilling of the tank is with coarse sand, coarse crushed stone, 4-8 mm particle size in a thickness of 30 cm around the tanks.

In case of presence of high groundwater table, it is necessary to make a concrete encasement or backfilling with dry concrete mix of cement with gravel sand 1-4 mm, 200 kg cement to 1 m3 gravel sand) in a thickness of 30 cm around the tanks, the left part of the excavated trench can be filled with coarse sand or coarse crushed stone, 4-8 mm particle size.

In case of placing of the tank of biological reactor deeper, it must be installed below ground into a concrete basin made from concrete blocks with concrete filling and steel reinforcing. The concrete walls must reach over the ground by min.50-100 mm. The space between the plastic walls of the tank and the concrete wall must be filled with dry concrete (mix of cement with gravel sand 1-4 mm, 200 kg cement to 1 m3 gravel sand) or coarse sand, coarse crushed stone, 4-8 mm particle size. By the preparation of the concrete basin must be left enough space for connection of pipes, making breakthroughs for pipes and cables. There must be a suitable solution for the drainage of the concrete basin.

The whole surface of the biological reactor is covered by a welded polypropylene sheet with several openings covered by lockable PP or PE lids. The cover and the lids are made from UV-resistant PP or PE material and have the necessary load bearing capacity for a checking and maintenance person, however the walking through the cover and lids must be prohibited for unauthorized persons (fencing).

The shaft for air pump is integrated into the cover of the biological reactor. The shaft for the air pump is covered by a lid with venting caps.

Dimensions of the biological reactor:

TYPE	Length of the tank	Width of the tank	Height of the tank	Height of the inlet	Height of the outlet	DN inlet	DN outlet	Weight
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
ATO30	3720	2260	2250	1700	1500	150	150	750
ATO40	4660	2260	2250	1700	1500	150	150	850
ATO50	4850	2260	2500	2100	1900	150	150	940
ATO75	5160	2260	2500	2200	1900	50	150	1040
ATO100	6410	2260	2500	2200	1900	50	200	1400
ATO120	7110	2260	2500	2200	1900	50	200	1460
ATO150	8560	2260	2500	2200	1900	50	200	1750
ATO175	9760	2260	2500	2200	1900	50	200	2000
ATO200	10960	2260	2500	2200	1900	50	200	2230
ATO225	12000	2260	2500	2200	1900	50	200	2360
ATO250	13460	2260	2500	2200	1900	50	200	2800

Pumping station

The pumping station is a part of the WWTP, if the local conditions (depth of the inlet sewer pipe, high groundwater table, etc.) requires to include it. It also serves as a mechanical pretreatment unit before the biological treatment and for egalization of the inflow.

The plastic pumping stations made from polypropylene sheets (PP) or corrugated PP pipes by welding can be installed only in case, that the groundwater table is below the basement of the pumping station, in another case a concrete pumping tank should be used.

The tank of pumping station is installed below ground the way, that the top edge of the tank must be cca 50-100 mm higher than the terrain. The plastic pumping station must be installed on a reinforced concrete basement slab and backfilled by dry concrete (mix of cement with gravel sand 1-4 mm, 200 kg cement to 1 m3 gravel sand) or by making a concrete encasement in a 30 cm thickness around the tank, the left part of the excavated trench can be filled with coarse sand or coarse crushed stone, 4-8 mm particle size.

In case of placing the plastic pumping station into a concrete basin made from concrete blocks with concrete filling and steel reinforcing, the space between the plastic walls of the tank and the concrete wall must be filled with coarse sand or coarse crushed stone, 4-8 mm particle size.

The pumping station is equipped with plastic basket screen for the mechanical pretreatment of wastewater. The pumping station is equipped with a technological equipment:

Version "SIMPLE":

- Coarse bubble (2 pcs) and fine bubble (1 pc) diffusers
- 1 pc of submersible pump,
- 2 pcs of float switches,
- 1 pc of auto-coupling for pump.

Version "FULL I" and "FULL II":

- Coarse bubble (2 pcs) and fine bubble (1 pc) diffuserss
- 1 or 2 psc of submersible pumps,
- 3 pcs of float switches,
- 1 or 2 pcs ofauto-couplings for pumps.

The pumping station has an UV-resistant lid from PP or PE.

Recommended dimensions of the pumping station:

TYPE	Diameter of the tank	Diameter of the bottom of the tank	Height of the tank	Maximal height of the tank	Minimal height of inlet pipe to PS from the bottom	Minimal usable volume of PS
	[mm]	[mm]	[mm]	[mm]	[mm]	[m³]
ATO30	1350	1450	2250	3500	1120	1,4
ATO40	1350	1450	2250	3500	1120	1,4
ATO50	1350	1450	2500	3500	1120	1,4
ATO75	1350	1450	2500	3500	1120	1,4
ATO100	1350	1450	2500	3500	1120	1,7
ATO120	1600	1700	2500	3500	1120	2,5
ATO150	1600	1700	2500	3500	1120	2,5
ATO175	2200	2300	2500	3500	1120	4,7
ATO200	2200	2300	2500	3500	1120	4,7
ATO225	2200	2300	2500	3500	1120	4,7
ATO250	2200	2300	2500	3500	1120	4,7

Mechanical and electrical equipment of the WWTP

The mechanical equipment consists of

- the air distribution panel with regulation valvesand solenoid valve,
- coarse bubble and fine bubble aeration system inthe pumping station,
- fine bubble aeration system in the biologicalreactor and sludge tank,
- air-lift pumps for circulation and recirculation ofthe activated sludge,
- low regulator,
- air pumps and
- submersible pumps.

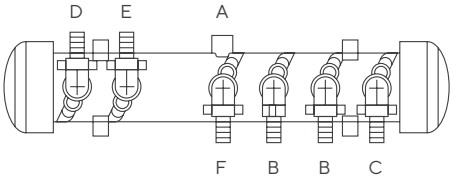
The electrical part is comprised of

- microprocessorcontrol unit for air pumps,
- switchboard for pumps and
- main switchboard or el.switchboard

The wastewater treatment systems comprised of the biological reactors from ATO30 to ATO250 can be gradually expanded by installing several units in parallel.

Air distribution panel with regulation valves and solenoid valve

Air distribution panel for ATO30–50



„A“

supply of air from the air pump.

Valves „B“

(2 pcs) controls the volume of air supplied into the fine bubble diffusers on the bottom of the aerated chamber. Valve fully open – on the water surface of the aerated activated sludge chamber is seen a fine bubbling.

Valve „C“

controls the volume of air supplied to the air-lift pump in non-aerated chamber for pumping the activated sludge from last to the first compartment of the non-aerated chamber. Valve partially open – the flow between the overflowed walls of non-aerated part of the reactor must be visible. The activated sludge must flow continually, the flow must not be nor weak neither strong.

Valve „D“

controls the volume of air supplied into the air-lift pump for return sludge, which serves for sludge recirculation from the bottom of final clarification chamber into non-aerated chamber. Valve partially open – the activated sludge must flow continually, the flow must not be nor weak neither strong.

Valve „E“

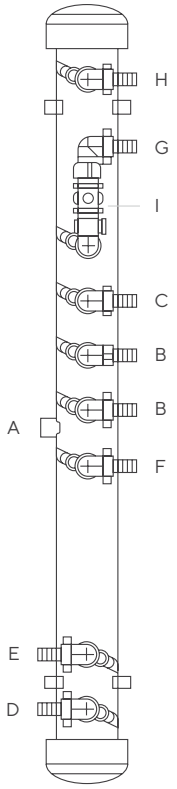
controls the volume of air supplied into the flow regulator. When opened fully, serves for cleaning the flow regulator unit occasionally. In standard operation is set the way that approx. once in 1 – 2 seconds is released one bubble for automatically cleaning of the screen on the flow regulator. This bubble ruffles the water surface and at the same time automatically cleans the screen on the flow regulator. Valve minimal open.

Valve „F“

controls the amount of air supplied to the pumping station for coarse bubble and fine bubble aeration and mixing of the content of basket screen and the content of pumping station. Valve partially open – on the water surface of the pumping station is seen a coarse bubbling and fine bubbling. There are in the pumping stations valves, which serve for dividing the air amount into the coarse bubble diffusers and fine bubble diffuser.

During servicing of the plant could be necessary to change the setting of the air by the valves, because of the rising amount of sludge in the system or by another technological reasons.

Air distribution panel for ATO30–50 iPS with sludge tank



„A“

supply of air from the air pump.

Valves „B“

(2 pcs) controls the volume of air supplied into the fine bubble diffusers on the bottom of the aerated chamber. Valve fully open – on the water surface of the aerated activated sludge chamber is seen a fine bubbling.

Valve „C“

controls the volume of air supplied to the air-lift pump in non-aerated chamber for pumping the activated sludge from last to the first compartment of the non-aerated chamber. Valve partially open – the flow between the overflowed walls of non-aerated part of the reactor must be visible. The activated sludge must flow continually, the flow must not be nor weak neither strong.

Valve „D“

controls the volume of air supplied into the air-lift pump for return sludge, which serves for sludge recirculation from the bottom of final clarification chamber into non-aerated chamber. Valve partially open – the activated sludge must flow continually, the flow must not be nor weak neither strong.

Valve „E“

controls the volume of air supplied into the flow regulator. When opened fully, serves for cleaning the flow regulator unit occasionally. In standard operation is set the way that approx. once in 1 – 2 seconds is released one bubble for automatically cleaning of the screen on the flow regulator. This bubble ruffles the water surface and at the same time automatically cleans the screen on the flow regulator. Valve minimal open.

Valve „F“

controls the amount of air supplied to the pumping station for coarse bubble and fine bubble aeration and mixing of the content of basket screen and the content of pumping station. Valve partially open – on the water surface of the pumping station is seen a coarse bubbling and fine bubbling. There are in the pumping stations valves, which serve for dividing the air amount into the coarse bubble diffusers and fine bubble diffuser.

Valve „G“

controls the amount of air supplied to the air-lift pump for excess sludge for the desludging of the biological reactor into the sludge tank. It is opened only in case of the desludging mode. Valve partially open.

Valve „H“

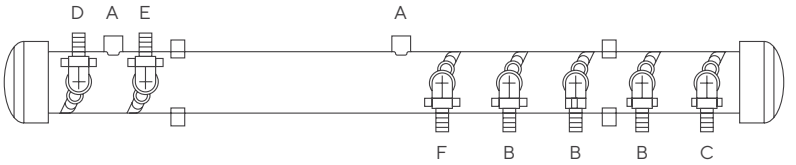
controls the volume of air supplied into the fine bubble diffuser on the bottom of the sludge tank. Valve partially open – on the water surface of the sludge tank is seen a fine bubbling.

Solenoid valve „I“

controls the work of air-lift pump for excess sludge for the desludging of the biological reactor into the sludge tank in automatic mode of desludging.

During servicing of the plant could be necessary to change the setting of the air by the valves, because of the rising amount of sludge in the system or by another technological reasons.

Air distribution panel for ATO75–250 without sludge tank



„A“

(2 or 3 pieces) supply of air from the air pump.

Valves „B“

(3 pcs) controls the volume of air supplied into the fine bubble diffusers on the bottom of the aerated chamber. Valve fully open – on the water surface of the aerated activated sludge chamber is seen a fine bubbling.

Valve „C“

controls the volume of air supplied to the air-lift pump in non-aerated chamber for pumping the activated sludge from last to the first compartment of the non-aerated chamber. Valve partially open – the flow between the overflowed walls of non-aerated part of the reactor must be visible. The activated sludge must flow continually, the flow must not be nor weak neither strong.

Valve „D“

controls the volume of air supplied into the air-lift pump for return sludge, which serves for sludge recirculation from the bottom of final clarification chamber into non-aerated chamber. Valve partially open – the activated sludge must flow continually, the flow must not be nor weak neither strong.

Valve „E“

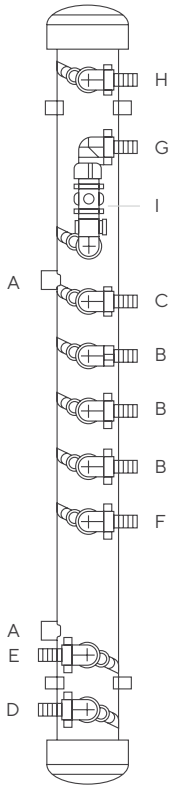
controls the volume of air supplied into the flow regulator. When opened fully, serves for cleaning the flow regulator unit occasionally. In standard operation is set the way that approx. once in 1 – 2 seconds is released one bubble for automatically cleaning of the screen on the flow regulator. This bubble ruffles the water surface and at the same time automatically cleans the screen on the flow regulator. Valve minimal open.

Valve „F“

controls the amount of air supplied to the pumping station for coarse bubble and fine bubble aeration and mixing of the content of basket screen and the content of pumping station. Valve partially open – on the water surface of the pumping station is seen a coarse bubbling and fine bubbling. There are in the pumping stations valves, which serve for dividing the air amount into the coarse bubble diffusers and fine bubble diffuser.

During servicing of the plant could be necessary to change the setting of the air by the valves, because of the rising amount of sludge in the system or by another technological reasons.

Air distribution panel for ATO75–250 with sludge tank



„A“

supply of air from the air pump.

Valves „B“

(2 pcs) controls the volume of air supplied into the fine bubble diffusers on the bottom of the aerated chamber. Valve fully open – on the water surface of the aerated activated sludge chamber is seen a fine bubbling.

Valve „C“

controls the volume of air supplied to the air-lift pump in non-aerated chamber for pumping the activated sludge from last to the first compartment of the non-aerated chamber. Valve partially open – the flow between the overflowed walls of non-aerated part of the reactor must be visible. The activated sludge must flow continually, the flow must not be nor weak neither strong.

Valve „D“

controls the volume of air supplied into the air-lift pump for return sludge, which serves for sludge recirculation from the bottom of final clarification chamber into non-aerated chamber. Valve partially open – the activated sludge must flow continually, the flow must not be nor weak neither strong.

Valve „E“

controls the volume of air supplied into the flow regulator. When opened fully, serves for cleaning the flow regulator unit occasionally. In standard operation is set the way that approx. once in 1 – 2 seconds is released one bubble for automatically cleaning of the screen on the flow regulator. This bubble ruffles the water surface and at the same time automatically cleans the screen on the flow regulator. Valve minimal open.

Valve „F“

controls the amount of air supplied to the pumping station for coarse bubble and fine bubble aeration and mixing of the content of basket screen and the content of pumping station. Valve partially open – on the water surface of the pumping station is seen a coarse bubbling and fine bubbling. There are in the pumping stations valves, which serve for dividing the air amount into the coarse bubble diffusers and fine bubble diffuser.

Valve „G“

controls the amount of air supplied to the air-lift pump for excess sludge for the desludging of the biological reactor into the sludge tank. It is opened only in case of the desludging mode. Valve partially open.

Valve „H“

controls the volume of air supplied into the fine bubble diffuser on the bottom of the sludge tank. Valve partially open – on the water surface of the sludge tank is seen a fine bubbling.

Solenoid valve „I“

controls the work of air-lift pump for excess sludge for the desludging of the biological reactor into the sludge tank in automatic mode of desludging.

During servicing of the plant could be necessary to change the setting of the air by the valves, because of the rising amount of sludge in the system or by another technological reasons.

Coarse bubble and fine bubble aeration system in the pumping station

The aeration system in the pumping station consists of 2 pcs of coarse bubble disc diffusers, 1 pc of fine bubble diffuser, which are connected with air pipes (flexible PE pipes or PP pipes) to the air distribution panel in the pumping station and air pipes between the air distribution panel in the pumping station and the air distribution panel in the air pump shaft in the biological reactor (flexible PE pipe or PP pipe) for the version of PS "SIMPLE" and "FULL I" resp. between the air distribution panel in the pumping station and the air pump for PS in the cabinet of el.switchboard (for the version of PS "FULL II"). The coarse bubble disc diffusers serves for the aeration and mixing of the content of basket screen and the fine bubble diffuser for the aeration and mixing of the content of pumping station. There are installed on the bottom of the pumping station. There are simple, highly efficient diffusers, made from non-clogging silicone membrane or elastic polyurethane membrane. The other materials used are glass fiber reinforced plastics, polypropylene, stainless steel. The life time of the membrane is more than 7 years.

Fine bubble aeration system in the biological reactor and sludge tank

The fine bubble aeration system consists of 4 pcs of fine bubble tube diffusers, which are connected with air pipes (flexible PE pipes or PP pipes) to the air distribution panel and air pipes between the air distribution panel and the air pumps (flexible PE pipes or PP pipes). The diffusers serve for the fine bubble aeration in the aerated chamber or in the sludge tank. There are installed on the bottom of the tank of biological reactor in the aeration chamber or the sludge tank. If air leaks somewhere, it should be quickly sealed, air leakage will cause pressure drop across the system, which may cause less intensive aeration or air-lift running, which directly affects the cleaning efficiency of the plant. It may also be that the inlet pipe from the air pumps to the air distributor panel is damaged or breaks. If we notice very large bubbles or very intense swirling in some part of the aerated chamber of the reactor, this may indicate a breakage of the diffuser or a loosening of the diffuser clamping. In this case, proceed according to the relevant part of these operating rules (troubleshooting). It is a simple, highly efficient diffuser, made from non-clogging elastic polyurethane membrane. The other materials used are polypropylene, stainless steel. The life time of the membrane is more than 7 years.

Air-lift pumps

The mixing, circulation, recirculation of activated sludge and wastewater in the system is ensured by 3 pcs of air-lift pumps:

- air-lift pump in non-aerated chamber for pumping the activated sludge from last to the first compartment of the non-aerated chamber,
- air-lift pump for return sludge,
- air-lift pump for excess sludge for the desludging of the biological reactor into the sludge tank.

They can be regulated by valves (C,D,G) and solenoid valve (I). In case of their clogging is necessary to fix this problem, because it can worsen the efficiency of the treatment. The troubleshooting of the air-lift pumps is in the appropriate section of this manual.

Flow regulator

The flow regulator serves for controlling the outflow in order to maintain the water level between the normal and maximum level in the tank (retention zone). It is periodically cleaned by the release of coarse bubbles during the running phase of the air pump. It should be periodically checked for free flow through the throttling hole and through the sieve, the treated water should not flow permanently through the emergency overflow.

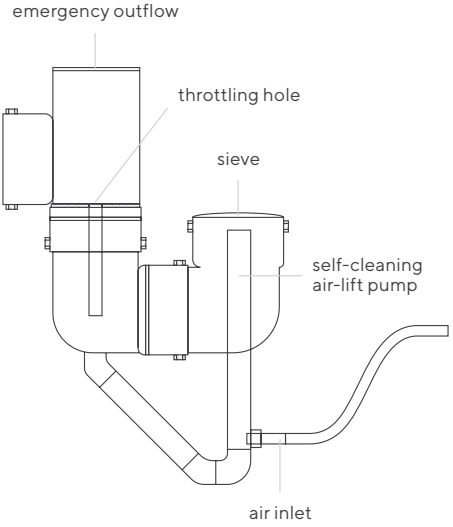
Cleaning of this equipment is done by fully opening the valve „E" for a while on the air distribution panel, which causes withdrawal of settled sludge from the body of the flow regulator and simultaneously cleaning of the screen with large bubbles of water flux through the sieve. After cleaning the flow regulator is necessary to regulate the air volume in the way that once in 1 – 2 seconds is released one air bubble so the automatic cleaning of the screen is guaranteed.

In case the flow regulator is clogged very frequently, there is excessive sludge production in the plant, it is necessary to remove it, wash it with a stream of water and find out the reason of excessive sludge production. The reason could be an overloading of the plant.

Air pumps for biological reactors

The air pumps are placed in the shaft of air pump, which is integrated into the cover of the biological reactor. The shaft for the air pumps is covered by a lid with venting caps.

The socket-outlet circuit, in which is connected the microprocessor control unit AUGUST BASIC and the air pump is protected with an independent circuit breaker in the connection box (also placed in the shaft for air pump), or in an electric control panel to the pumping station or in the served building. overloading of the plant.



Technical parameters of the air pumps

TYPE	Type of air pumps	Number of pieces	Voltage	Noise level	Capacity of air pump		
		[pc]		[dB(A)]	[mbar]	[l/min]	[m^3/h]
ATO30	JDK-400	1	230 V/50Hz	54	150	460	27,6
ATO40	JDK-500	1	230 V/50Hz	58	150	545	32,7
ATO50	JDK-500	1	230 V/50Hz	58	200	500	30
ATO75	JDK-400	2	230 V/50Hz	54	200	800	48
ATO100	JDK-400	2	230 V/50Hz	54	200	800	48
ATO120	JDK-500	2	230 V/50Hz	58	200	1000	60
ATO150	JDK-400	3	230 V/50Hz	54	200	1200	72
ATO175	JDK-400	3	230 V/50Hz	54	200	1200	72
ATO200	JDK-500	3	230 V/50Hz	58	200	1500	90
ATO225	JDK-500	3	230 V/50Hz	58	200	1500	90
ATO250	JDK-500	3	230 V/50Hz	58	200	1500	90

TYPE	Type of air pumps	Number of pieces	Installed power	Hours of aeration per day	Average consumption of electricity	
		[pc]	[kW]	[h]	[kWh/d]	[kWh/year]
ATO30	JDK-400	1	0,36	18	6,5	2365
ATO40	JDK-500	1	0,45	18	8,1	2957
ATO50	JDK-500	1	0,45	20,4	9,2	3351
ATO75	JDK-400	2	0,72	18	13,0	4730
ATO100	JDK-400	2	0,72	20,4	14,7	5361
ATO120	JDK-500	2	0,90	18	16,2	5913
ATO150	JDK-400	3	1,08	18	19,4	7096
ATO175	JDK-400	3	1,08	20,4	22,0	8042
ATO200	JDK-500	3	1,35	18	24,3	8870
ATO225	JDK-500	3	1,35	20,4	27,5	10052
ATO250	JDK-500	3	1,35	20,4	27,5	10052

Air pump for the pumping station

In case of the version of PS "FULL II" the air pump for the mixing of the content of basket screen and the content of the pumping station is placed in the lower part of cabinet of el.switchboard. It supplies the air into the 2 pcs of coarse bubble diffusers and 1 pc of fine bubble diffuser through an air distribution panel with valves.

The manual is in the annex:

Instruction manual for electromagnetic air pump, model EL-S-60N

TYPE	Type of air pumps	Number of pieces	Installed power	Hours of aeration per day	Average consumption of electricity	
		[pc]	[kW]	[h]	[kWh/d]	
ATO30	EL-S-60N	1	0,076	24	1,8	666
ATO40	EL-S-60N	1	0,076	24	1,8	666
ATO50	EL-S-60N	1	0,076	24	1,8	666
ATO75	EL-S-60N	1	0,076	24	1,8	666
ATO100	EL-S-60N	1	0,076	24	1,8	666
ATO120	EL-S-60N	1	0,076	24	1,8	666
ATO150	EL-S-60N	1	0,076	24	1,8	666
ATO175	EL-S-60N	1	0,076	24	1,8	666
ATO200	EL-S-60N	1	0,076	24	1,8	666
ATO225	EL-S-60N	1	0,076	24	1,8	666
ATO250	EL-S-60N	1	0,076	24	1,8	666

Submersible pumps

The submersible pumps (1 or 2 pieces) are installed in the pumping station. They are controlled by float switches (2 or 3 pcs) by the water level (switch on-off) and by switching board for pumps resp. by el.switchboard. The switching board for pumps is placed in the shaft of air pumps in the cover of the biological reactor (version of PS "SIMPLE" and "FULL I". The el.switchboard (version of PS "FULL II") is installed on the plastic pumping station.
The pumps are connected to DN50 PP pipes.

The manuals are in the annex:

HCP PUMPS,

TYPE GF – OPERATION MANUAL,

OPERATION AND ASSEMBLY INSTRUCTION GRUNDFOS PUMPS,

TYPE SEG – INSTALLATION AND OPERATING INSTRUCTIONS

KSB PUMPS,

TYPE AMA-PORTER – INSTALLATION/ OPERATING MANUAL

Technical parameters of the submersible grinder pump HCP

TYPE	Type of PS	Type of pump	Number of pieces
			[pcs]
ATO30	SIMPLE	32GF21.0	1
ATO40	SIMPLE	32GF21.0	1
ATO50	SIMPLE	32GF21.0	1
ATO75	SIMPLE/FULL I/FULL II	32GF21.0/40GF21.5	1
ATO100	SIMPLE/FULL I/FULL II	32GF21.0/40GF21.5	1
ATO120	SIMPLE/FULL I/FULL II	32GF21.0/40GF21.5	1
ATO150	FULL I/FULL II	32GF21.0/40GF21.5	2(1+1)
ATO175	FULL I/FULL II	32GF21.0/40GF21.5	2(1+1)
ATO200	FULL I/FULL II	32GF21.0/40GF21.5	2(1+1)
ATO225	FULL I/FULL II	32GF21.0/40GF21.5	2(1+1)
ATO250	FULL I/FULL II	32GF21.0/40GF21.5	2(1+1)

Technical parameters of the submersible grinder pump HCP

TYPE	Head	Capacity	Installed power	Working power	Voltage	Time of pumping per day	Consumption of electricity	
	[m]	[m3/h]	[kW]	[kW]	[V]	[h]	[kWh/d]	[kWh/ year]
ATO30	4	7,8	1,0	1,0	230	0,6	0,6	211
ATO40	4	7,8	1,0	1,0	230	0,8	0,8	281
ATO50	4	7,8	1,0	1,0	230	1,0	1,0	351
ATO75	4	7,8	1,0	1,0	230/400	1,4	1,4	526
ATO100	4	7,8	1,0	1,0	230/400	1,9	1,9	702
ATO120	4	7,8	1,0	1,0	230/400	2,3	2,3	842
ATO150	4	7,8	2,0	1,0	230/400	2,9	2,9	1053
ATO175	4	7,8	2,0	1,0	230/400	3,4	3,4	1228
ATO200	4	7,8	2,0	1,0	230/400	3,8	3,8	1404
ATO225	4	7,8	2,0	1,0	230/400	4,3	4,3	1579
ATO250	4	7,8	2,0	1,0	230/400	4,8	4,8	1755

Technical parameters of the submersible grinder pump Grundfos

TYPE	Type of PS	Type of pump	Number of pieces
			[pcs]
ATO30	SIMPLE	SEG.40.09.2.1.502	1
ATO40	SIMPLE	SEG.40.09.2.1.502	1
ATO50	SIMPLE	SEG.40.09.2.1.502	1
ATO75	SIMPLE/FULL I/FULL II	SEG.40.09.2.1.502/SEG.40.09.2.50B	1
ATO100	SIMPLE/FULL I/FULL II	SEG.40.09.2.1.502/SEG.40.09.2.50B	1
ATO120	SIMPLE/FULL I/FULL II	SEG.40.09.2.1.502/SEG.40.09.2.50B	1
ATO150	FULL I/FULL II	SEG.40.09.2.1.502/SEG.40.09.2.50B	2(1+1)
ATO175	FULL I/FULL II	SEG.40.09.2.1.502/SEG.40.09.2.50B	2(1+1)
ATO200	FULL I/FULL II	SEG.40.09.2.1.502/SEG.40.09.2.50B	2(1+1)
ATO225	FULL I/FULL II	SEG.40.09.2.1.502/SEG.40.09.2.50B	2(1+1)
ATO250	FULL I/FULL II	SEG.40.09.2.1.502/SEG.40.09.2.50B	2(1+1)

Technical parameters of the submersible grinder pump Grundfos

TYPE	Head	Capacity	Installed power	Working power	Voltage	Time of pumping per day	Consumption of electricity	
	[m]	[m3/h]	[kW]	[kW]	[V]	[h]	[kWh/d]	[kWh/ year]
ATO30	4	12,2	1,3	1,3	230	0,4	0,5	175
ATO40	4	12,2	1,3	1,3	230	0,5	0,6	233
ATO50	4	12,2	1,3	1,3	230	0,6	0,8	292
ATO75	4	12,2	1,3	1,3	230/400	0,9	1,2	438
ATO100	4	12,2	1,3	1,3	230/400	1,2	1,6	583
ATO120	4	12,2	1,3	1,3	230/400	1,5	1,9	700
ATO150	4	12,2	2,6	1,3	230/400	1,8	2,4	875
ATO175	4	12,2	2,6	1,3	230/400	2,2	2,8	1021
ATO200	4	12,2	2,6	1,3	230/400	2,5	3,2	1167
ATO225	4	12,2	2,6	1,3	230/400	2,8	3,6	1313
ATO250	4	12,2	2,6	1,3	230/400	3,1	4,0	1459

Technical parameters of the submersible sludge pump KSB with high solid passage

TYPE	Type of PS	Type of pump	Solids passage	Number of pieces
			[mm]	[pcs]
ATO30	SIMPLE	Ama-Porter 6 01 NE	60	1
ATO40	SIMPLE	Ama-Porter 6 01 NE	60	1
ATO50	SIMPLE	Ama-Porter 6 01 NE	60	1
ATO75	SIMPLE/FULL I/FULL II	Ama-Porter 6 01 NE	60	1
ATO100	SIMPLE/FULL I/FULL II	Ama-Porter 6 01 NE	60	1
ATO120	SIMPLE/FULL I/FULL II	Ama-Porter 6 01 NE	60	1
ATO150	FULL I/FULL II	Ama-Porter 6 01 NE	60	2(1+1)
ATO175	FULL I/FULL II	Ama-Porter 6 01 NE	60	2(1+1)
ATO200	FULL I/FULL II	Ama-Porter 6 01 NE	60	2(1+1)
ATO225	FULL I/FULL II	Ama-Porter 6 01 NE	60	2(1+1)
ATO250	FULL I/FULL II	Ama-Porter 6 01 NE	60	2(1+1)

Technical parameters of the submersible sludge pump KSB with high solid passage

TYPE	Head	Capacity	Installed power	Working power	Voltage	Time of pumping per day	Consumption of electricity	
	[m]	[m3/h]	[kW]	[kW]	[V]	[h]	[kWh/d]	[kWh/ year]
ATO30	4	18	1,25	1,25	230	0,3	0,3	114
ATO40	4	18	1,25	1,25	230	0,3	0,4	152
ATO50	4	18	1,25	1,25	230	0,4	0,5	190
ATO75	4	18	1,25	1,25	230	0,6	0,8	285
ATO100	4	18	1,25	1,25	230	0,8	1,0	380
ATO120	4	18	1,25	1,25	230	1,0	1,3	456
ATO150	4	18	2,50	1,25	230	1,3	1,6	570
ATO175	4	18	2,50	1,25	230	1,5	1,8	665
ATO200	4	18	2,50	1,25	230	1,7	2,1	760
ATO225	4	18	2,50	1,25	230	1,9	2,3	855
ATO250	4	18	2,50	1,25	230	2,1	2,6	951

Electrical part of the WWTP

Power supply - internal area distribution network, connected to the existing switchboard in the service building. Voltage system: 3/PEN AC 400 V / 230V / 50 Hz / TN-C-S

The power supply will be the proposed el.supply cable, which will be fed to the main switchboard in the shaft of air pumps in the cover of the biological reactor or to the el.switchboard at the pumping station. The control of air pumps and additional devices is ensured by a microprocessor control unit, which is placed in the shaft for air pump in the cover of the biological reactor.

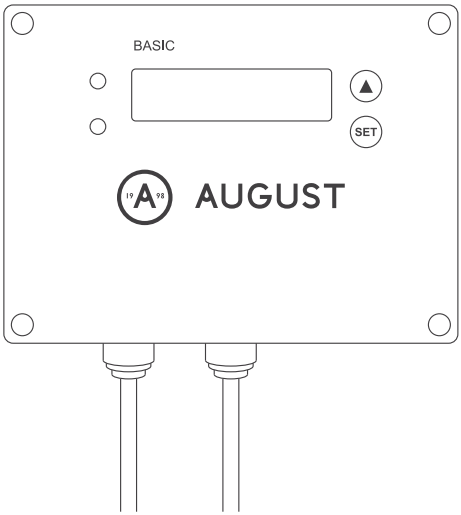
Installed power and el. supply cable

TYPE	Total installed power	Maximal input	Electricity consumption		El. supply cable
	[kW]	[kW]	[kWh/day]	[kW]	
ATO30	1,66	1,66	7,0	2540,2	CYKY-J 5CX2,5
ATO40	1,75	1,75	8,7	3189,9	CYKY-J 5CX2,5
ATO50	1,75	1,75	10,0	3642,4	CYKY-J 5CX2,5
ATO75	2,10	2,10	16,0	5833,7	CYKY-J 5CX2,5
ATO100	2,10	2,10	18,1	6610,3	CYKY-J 5CX2,5
ATO120	2,28	2,28	19,9	7278,8	CYKY-J 5CX2,5
ATO150	3,76	2,46	23,7	8636,5	CYKY-J 5CX2,5
ATO175	3,76	2,46	26,7	9728,4	CYKY-J 5CX2,5
ATO200	4,03	2,73	29,3	10702,1	CYKY-J 5CX2,5
ATO225	4,03	2,73	33,0	12030,5	CYKY-J 5CX2,5
ATO250	4,03	2,73	33,4	12176,4	CYKY-J 5CX2,5

Control unit August Basic

The control unit is connected into a socket-outlet circuit of the main switchboard, which is also placed in the shaft of air pump or is connected into an external el. Switchboard at the pumping station.

The control unit AUGUST BASIC controls the aeration and recirculation of activated sludge for the biological reactors. The unit works as a system for allocation of time for the air pumps.



Types of microprocessor control unit and optimal modes of operation

TYPE	Type of MCU	Number of pieces	Aeration time per day	Mode of operation
		[pc]	[h]	
ATO30	AUGUST BASIC 600W PZ	1	18	standard
ATO40	AUGUST BASIC 600W PZ	1	18	standard
ATO50	AUGUST BASIC 600W PZ	1	20,4	standard+1
ATO75	AUGUST BASIC 2x600W PZ	1	18	standard
ATO100	AUGUST BASIC 2x600W PZ	1	20,4	standard+1
ATO120	AUGUST BASIC 2x600W PZ	1	18	standard
ATO150	AUGUST BASIC 2x600W PZ	1	18	standard
ATO175	AUGUST BASIC 3x600W PZ	1	20,4	standard+1
ATO200	AUGUST BASIC 3x600W PZ	1	18	standard
ATO225	AUGUST BASIC 3x600W PZ	1	20,4	standard+1
ATO250	AUGUST BASIC 3x600W PZ	1	20,4	standard+1

Application

The microprocessor control unit AUGUST BASIC (MCU AUGUST BASIC) serves for controlling the aeration and recirculation in the range of AT wastewater treatment plants ATO30-ATO50. MCU AUGUST BASIC with additional device (PZ) serves also for controlling of one additional device. The additional device could be a sludge pump, a dosing pump or a solenoid valve, which serve for desludging of a sand filter, or dosing of P-precipitation agent, or for desludging of the biological reactor into the sludge tank by air lift pump.

The control unit must be connected into the el. network of the object through an individual circuit breaker with AC 230V 50Hz.

The MCU AUGUST BASIC regulates the technological processes in the WWTP, automates, simplifies and cheapens the operation.

The quality of the used material, design of the control unit and its configuration allows for error-free function also in wet environment (IP44). The control unit contains several standard modes of the plant operation, but also supplementary modes, as the Holiday mode or the so-called Weekend-house mode, which makes available an adaptation of the operation mode of the treatment plant to individual conditions. By the comfortable selection among standard modes it is possible to adjust the capacity of the plant to the current load. In case of a failure, the control unit sends acoustic and visual signal. After the failure is removed, the control unit switch in the original mode automatically and the failure is recorded in the unit internal memory.

Safety warnings/ safety instructions

General instructions

This installation and maintenance manual is only applicable to the MCU AUGUST BASIC. All instructions contained in this manual must be followed.
The manual is an integral part of the equipment so please store it carefully.
Failure to follow the instructions contained in this manual will void all warranty claims.
We are not liable for material damage or injury caused by unprofessional handling or the failure to follow safety instructions. Such circumstances void all warranty claims.
Any modifications, add-ons and changes to the equipment are prohibited for safety reasons and due to registration (CE).

Safety warnings

Safety warnings serve to protect people and ensure the technical safety of operations. Safety warnings are indicated by a special warning triangle with the text:

ATTENTION	indicates the potential for minor material damage
WARNING	indicates the potential for a minor injury or major material damage.
DANGER	indicates the risk of a major injury. A fatal injury may occur in extraordinarily serious cases.

Safety instructions

Only instructed persons who are completely familiar with this manual and the function of the device are permitted to install, connect, set-up and operate the equipment.

Only persons with suitable electrical qualifications as defined in applicable standards and regulations may perform electrical installation work.

Follow all valid and applicable regulations, including those defined by local power suppliers, during electrical installation work.

Only operate the equipment within the scope defined in the technical description.

Do not use the equipment for any purpose other than controlling activated mixture aeration and recirculation in the AT type wastewater treatment systems.

The device is designed for connection to single phase AC mains and must be installed in accordance with the regulations and standards applicable in the given country of installation.

Only a qualified professional as defined in applicable standards and regulations may open the wiring box. Disconnect power before opening the box by removing the plug on the wiring box cord from the mains.

Flawless operation of the device is dependent upon previous transport, storage and handling. Do not install this device and file a claim with the manufacturer/seller if you discover any evidence of damage, deformation, malfunction or a missing part.

Treat the product as electronic waste once removed from service.

Check to ensure the equipment is not damaged before placing it into operation.

Technical description

General description

The MCU AUGUST BASIC is manufactured in a box with a cable with a fitted plug connector to connect in the power supply network and a cable with a fitted socket to connect the air pump. In case of MCU AUGUST BASIC with additional device (PZ) there are also other two cables ended with connectors, through which is the additional device connected – sludge pump, dosing pump or solenoid valve – cable on the bottom of the control unit, floating switch – cable on the side of the control unit. The floating switch is not connected in case of connecting a sludge pump or solenoid valve.

The MCU AUGUST BASIC works as a system for allocation of time for the air pump, the air pump works intermittently. The display shows the actual date, real time and the selected mode. The control unit senses the connection of air pump, as well as an additional device.

In case of connection with additional device, the user can activate or deactivate the additional device. The setting of the additional device can be done only in the service menu by an authorized person. If an additional device is activated, there is an asterisk * by the selected program.

There are two buttons on the MCU AUGUST BASIC:

- (▲) Button ▲ serves for moving in the menu, dismiss the acoustic signalization and setting the current date and time, eventually the day of the week.
- (SET) Button SET serves for selection of items in the menu and confirmation of the values

Basic technical parameters

TYPE	Type of PS	Type of pump
Switched/supply voltage – nominal	230V/50Hz	230V/50Hz
Possible load	min.40 W, max.600 W	min.40 W, max.600 W
Additional device	NO	YES
Possible load for additional device	-	min.3 W, max.250 W
Control unit input	2,5 W	5 W
Protection	IP 44	IP 44
Ambient temperature	from -5 °C to 40 °C	from -5 °C to 40 °C

Installation and connection

The installation and connection of MCU AUGUST BASIC can do only an instructed person. The control unit is placed into a this purpose designated dry, sheltered and ventilated underground plastic tank of air pump (delivered together with WWTP) or into an another dry, sheltered and ventilated place. A proper installation must ensure a perfect air circulation, so the allowed maximal temperature of the unit is not exceeded even by high ambient temperatures at permanent operation.

The installation and connection of MCU AUGUST BASIC with additional device (PZ) can be accomplished only by authorized person or service organization with suitable electrical qualifications.

The installation of el. supply cable can be accomplished only by authorized person or service organization with suitable electrical qualifications.

⚠ DANGER – Electrical shock!
Before installation disconnect the supply voltage (230V) to the control unit.

⚠ WARNING!
The control unit must be connected into the el. network of the object through an individual circuit breaker.

First connect the air pump and the additional device respectively the float switch, only then connect the device into the network. The additional device and the float switch can be installed into the control unit only by a qualified person. Connect the air pump inserting the air pump plug in the socket in the MCU AUGUST BASIC, the additional device connect with the sockets on the cables of the control unit. After connecting the air pump and additional device connect the control unit into the el. network.

Setting and control

First run

At the first run of the unit, the display offers choice of language. Set the language by ▲, and confirm the selection with SET.

Then a requirement to set the current date appears. Set the value of the flashing digit using ▲(the date is in format dd-mm-yy, e.g. April 19, 2017 is 19.04.17), confirm the selection with SET, after pressing SET the cursor moves automatically to the next digit.

And finally, the system will ask for setting the current time. Set the value of the flashing digit using ▲(the time is in format hh-mm-ss, e.g. 18.45 is 18.45.00), confirm the selection with SET, after pressing SET, the cursor moves automatically to the next digit.

After the language, date and time and eventually the day of week are fixed the display shows "August", and the unit switches automatically into the pre-set standard mode.

Change of mode (programs)

The microprocessor control unit AUGUST has the pre-set standard mode, in which it is ready to control the operation of the plant without other settings. The display shows date and time and program STANDARD.

The user- owner of the plant can change the program, particularly in these cases:

- according to instructions of an authorized serviceman or a representative of the manufacturer (e.g. after start-up of the plant, in case of necessary "remote" service interventions and the like)
- when using programs HOLIDAY and WEEKEND HOUSE

It is not necessary neither advisable to change the set program frequently, it can be necessary just in the case when some fault has appeared – unusual smell or visually sensed worse quality of treated water, excessive foam and the like.

Change of mode/program:

By pressing SET we enter into the menu of the control unit. The first item in the menu is OPERATING MODE SELECT. By a next pressing SET we enter into the selection of programs, there we can move with ▲. If we want to select a program, select by ▲ and then confirm it with SET.

The unit has 7 standard programs:

STANDARD, STANDARD-3, STANDARD-2, STANDARD-1, STANDARD+1, STANDARD+2, STANDARD+3.

These programs differs particularly in duration of air pump run. Sections with interrupted run (the air pump is ON for several minutes and then OFF for several minutes) and sections with uninterrupted run (the air pump is ON) occur during each standard program.

Description of programs:

- program STANDARD – pre-set program with average air pump run for 18 hours daily. Suitable in most cases.
- program STANDARD-3 – minimum program with minimum air pump run for some 10 hours daily. It suits when the device is loaded very little.
- program STANDARD-2 – minimum program with minimum air pump run for some 12 hours daily. It suits when the device is loaded little.
- program STANDARD-1 – program with air pump run for some 15 hours daily. It suits when the device is loaded less than standard.
- program STANDARD+1 – program with air pump run for some 20 hours daily. It suits when the device is loaded more than standard.
- program STANDARD+2 – program with air pump run for some 22 hours daily. It suits when the device is loaded heavily.
- program STANDARD+3 – maximum program with air pump run for some 23 hours daily. It suits when the device is loaded very heavily.

The unit has 3 non-standard programs:

- program HOLIDAY - it is advisable to set just before leaving for holiday. The device will work during absence of the inhabitants in the saving mode, i.e. with interrupted run. This will save not only the power, but the device will adjust even to lacking waste water which is the source of nutrients for friendly microorganisms in the equipment. After returning from the holiday, it is enough to click ▲ and the microprocessor switches automatically to the pre-set standard program.

- program WEEKEND HOUSE - this was designed for treatment of waste water from weekend houses with occupation on weekends or once in a month. Before leaving such an object, program WEEKEND HOUSE is set. After returning, it is enough to click ▲ and the microprocessor returns automatically to the pre-set standard program.
Other settings, information

Other settings, information

Be side selection of programs, other items appear in the menu:

- DATE AND TIME SETUP – by selecting of this item the set date and time with a flashing digit is displayed. By multiple pushing SET is possible to jump from digit to digit or by ▲ to set the required digit.

- OPERATING HOURS – can be deleted only by a serviceman. It serves for checking during the service work.

- READ LOG – the shut-down and failure events are logged here, available only for checking during the service work.

- SERVICE MENU – available only after entering a password, reserved for service

- LANGUAGE SELECT - by entering into this item is possible by pushing ▲ and confirming by SET to select from the following languages: Slovak, English, Czech, Hungarian, German, French, Slovenian, Italian, Croatian, Bulgarian and Romanian.

- ADDITIONAL DEVICE STATUS (A.D. STATUS) – the user can by ▲ activate or deactivate the additional device. Pushing SET the selection is confirmed.

- LEAVE MENU – pushing SET we leave the menu and coming back to the displaying of actual date, time and mode.
Optical signalization and failure messages

The microprocessor control unit AUGUST BASIC has two kinds of signalization, acoustic and optical. The optical signalization is working all the time. The acoustic signalization starts at disconnection of the air pump or additional device, respectively at the disconnection of control unit from the el. network. The acoustic signalization can be dismissed by pushing ▲.

Signalization of operation by light signal:

Green light is burning – the operation of the air pump is interrupted for a while (does not mean a failure).

Green light is flashing – the air pump is in operation. Signalization of failure by light signal, message on the display

Red light is burning - Disconnected air pump- means disconnecting or failure of air pump or additional device. In case of air pump or additional device failure, service must be called as soon as possible.

Red light is flashing - Power failure- the control unit signalizes the power failure acoustically and optically. The duration of this signalization can last several hours (depending on the battery charging level). At the low level of battery charging the microprocessor control unit switch into the sleeping mode. After re-launching of the el.power the control unit switch on after a 2 minute period, with remembering the last selected mode. If the batteries were too low, it can happen that the displayed time is not the same as the real time, in this case the setting of actual time is necessary.

In case of failure of the control unit it is necessary to disconnect the air pump from the control unit and connect it directly into the electrical network.

⚠ WARNING!
it is forbidden to open the box of the control unit in case of malfunction!
In case of failure call the service.

Messages about the service intervals

Warning CHANGE FILTER – warns the owner/user that the cleaning or changing of the filter in air pump is necessary after 6 months of air pump operation. It is necessary to confirm the cleaning or changing the filter on the display: push the button ▲ and again ▲, where the message NO should be changed to YES and confirm by SET

Warning CHANGE MEMBRANE – warns the owner/user that the changing of membrane in air pump is necessary after 2 years of air pump operation. It is necessary to confirm the changing of membrane on the display: push the button ▲ and again ▲, where the message NO should be changed to YES and confirm by SET

Sleeping mode of the microprocessor control unit

If you plan to shut-down the WWTP resp. the microprocessor control unit, it is necessary to set the sleeping mode of the control unit. Push at once the ▲ and SET buttons and hold for 10 seconds. Consequently displays the question "ARE YOU SURE?" By pushing "YES" the control unit switch into the sleeping mode. For the switching on the control unit is enough to connect it into the el. network.

Manipulation, transport and storage

There is necessary to take care in respect the plastic material (relatively low resistance to damage at low temperatures). Before manipulation with the biological reactor check the whole tank of biological reactor and is necessary to pump out the rainwater from the tank. At temperatures below -5 °C is not recommended to manipulate with the tank anymore for possible damage of the tank. The domestic wastewater treatment plants AT is delivered as a completely assembled unit. During the transport and storage is necessary to put the tank onto a plane and firm surface and protecting from defects and manipulating by other people must be guaranteed till the time the plant is delivered. With long-term storage (more than 2 months) it is necessary to put a cover to protect the unit from solar radiation.

Installation

1. General consideration

As the installation details largely depend on the local conditions, the design should always be performed, or reviewed by an engineer. Factors to consider when installing the unit include:

1.1 There should be a source of fresh water for filling of the unit after its placing.

1.2 The tank of biological reactor is not designed for loading caused by tire pressure of vehicles, base of buildings, and soil pressure from the slope, etc.

1.3 The tanks of the WWTP from polypropylene have a self-supporting design intended for installing below ground the way, that the top edge of the tank must be cca 50-100 mm higher than the terrain. The tanks of the WWTP from polypropylene must be installed on a reinforced concrete basement slab and backfilled with coarse sand or coarse crushed stone, 4-8 mm particle size or by dry concrete (mix of cement with gravel sand 1-4 mm, 200 kg cement to 1 m3 gravel sand) in a thickness of 30 cm around the walls of the tanks.

1.4 The reinforced concrete slab must be statically suitable for the conditions at the installation site, based on the design of a responsible structural engineer.

1.5 In case of placing the biological reactor deeper as 2200 mm (ATO30, ATO40) resp. 2450 mm (ATO50–250) into the ground is necessary to install the tank of the biological reactor into a concrete basin made from concrete blocks with

concrete filling and steel reinforcing. The concrete walls must reach over the ground by min.50-100 mm. The space between the plastic walls of the tank and the concrete wall must be filled with coarse sand or coarse crushed stone, 4-8 mm particle size. By the preparation of the concrete basin must be left enough space for connection of pipes, making breakthroughs for pipes, cables. There must be a suitable solution for the drainage of the concrete basin.

1.6 The walking through the top-wall of the biological reactor must be prohibited for unauthorized persons.

1.7 In case of high groundwater level (WET conditions) must be considered a use of pumping station at the inlet and the placing of the polypropylene tanks of the WWTP over the groundwater level.

1.8 The pumping station made from polypropylene can be installed only in case, that the groundwater table is below the basement of the pumping station, in another case a concrete pumping tank should be used.

1.9 The design of the wall from concrete blocks must be evaluated by a responsible structural engineer, taking into account the local installation conditions.

1.10 The plastic pumping station is suitable for installation if the maximum groundwater level is below the ground level. In case of a higher groundwater level, it is necessary to consider an appropriately statically designed concrete pumping station.

2. Preparing and construction work before placing of the biological reactor with self-supporting design

2.1 In case of the presence of groundwater during the installation, it is necessary to decrease the groundwater level below the bearing surface.

2.2 For installation of the unit is necessary to excavate a pit with the needed dimensions.

2.3 Make a reinforced concrete basement slab made in level to within 5 mm from edge to edge.

2.4 Check the level of the bearing surface (must be within 5 mm from edge to edge), in case that is not within the allowed tolerance, stop the installation. There is needed to prepare a cement layer or sand layer and level the bearing surface.

2.5 Check that the tank does not contain rainwater or waste, empty if needed.

2.6 Check the integrity of the tank. If the tank is damaged, do not continue with the placing.

2.7 Check the presence of stones, dirt, etc. on the surface of the bearing surface, clean the surface if necessary.

2.8 Ensure fresh water for the filling of the tank with water – drinking water, water from creek or river, never use wastewater.

3. Preparing and construction work before placing of the biological reactor into concrete basin from concrete blocks

3.1 In case of the presence of groundwater during the installation, it is necessary to decrease the groundwater level below the bearing surface.

3.2 For installation of the unit is necessary to excavate a pit with the needed dimensions.

3.3 Make a reinforced concrete basement slab made in level to within 5 mm from edge to edge.

3.4 Make the concrete basin from concrete blocks with concrete filling and steel reinforcing.

3.5 Make the holes for inlet and outlet pipes, drainage pipe, and electricity cables through the concrete walls.

3.6 Check the level of the bearing surface (must be within 5 mm from edge to edge), in case that is not within the allowed tolerance, stop the installation. There is needed to prepare a cement layer or sand layer and level the bearing surface.

3.7 Check that the tank does not contain rainwater or waste, empty if needed.

3.8 Check the integrity of the tank. If the tank is damaged, do not continue with the placing.

3.9 Check the presence of stones, dirt, etc. on the surface of the bearing surface, clean the surface if necessary.

3.10 Ensure fresh water for the filling of the tank with water – drinking water, water from creek or river, never use wastewater.

4. Placing and backfilling of the tanks of WWTP

4.1 Placing of the tank into the pit on the bearing surface - a hoist or a crane can be used.

4.2 Make watertight connections to the inlet, outlet pipeline, connections between the tanks, air conducts, sealing with silicon sealant.

4.3 Ensure the el. supply cable to the place, where the air pump or the el. control panel is placed. The installation of the feeding cable must be made only by a qualified professional in line with the corresponding standards and regulations.

4.4 Install the technological equipment into the pumping station (pump, float switches). The installation and connection of the electrical devices (air pumps, pumps, float switches) and the el. control units (control unit AUGUST Basic, el. control panel) can be made only by a qualified professional in line with the corresponding standards and regulations. See the details in the annex.

4.5 The tank of the biological reactor evenly fill with water up to the height of 750-1000 mm from the bottom – take care that the differences of water level between the chambers should be no more than 30 cm during the filling . It can be done by fresh water (drinking water, water from a well, surface water from creek, river) it cannot be wastewater.

4.6 Fill the pumping station and sludge tank with water up to the height of 750-1000 mm from the bottom.

4.7 The backfilling with the backfilling material around the tank up to the water level in the tanks 750-1000 mm.

4.8 Thickness of the backfill around the plastic tanks - at least 7-20 cm if the concrete blocks are made.

4.9 Thickness of the backfill around the plastic tanks- in the case of self-supporting design is at least 30 cm.

4.10 The backfilling material should be coarse sand 4-8 mm or 8-16 mm, coarse crushed stone 4-8 mm or 8-16 mm, dry concrete. In case of WET conditions is necessary to use dry concrete or a concrete encasement.

4.11 When preparing a concrete encasement, the layers of concrete must be done in 300 mm thick layers, one can make a new layer after hardening of the previous layer.

4.12 When tapping or concreting the tanks, be careful not to damage the plastic tanks by the proximity of the construction machines and to prevent the falling of the backfill material into the tanks.

4.13 Finish the connection of water pipes between the tanks (pumping station-biological reactor, biological reactor-sludge tank), air pipes between the tanks (tank of air pump - biological reactor, biological reactor - sludge tank, biological reactor – pumping station), electrical cables to the tank of air pump and tank of pumping station.

4.14 Repeat the procedure of filling the tanks with water and backfilling around the tanks in layers 300-500 mm up to the level of outlet pipe. Backfill up to the height of the tank walls.

4.15 After filling check the water tightness.

4.16 Install the switchboard cabinet.
or river, never use wastewater.

5. Terrain arrangement

5.1 After backfilling or reinforcing of the tanks should be done the terrain arrangement. The terrain around the tanks must have a slope which allows the rainwater flow away. Around the tanks must be enough place and access for servicing and sludge removal.

5.2 The cover of biological reactor should be protected against the direct sunlight. Make a thin layer (1-2 cm thick) of coarse sand 4-8 mm or coarse crushed stone 4-8 mm or wood chips on the surface of the WWTP area, or make a roofed construction over the whole area of the WWTP.

5.3 The walking through the cover of the biological reactor must be prohibited for unauthorized persons – making a fence around the area of the WWTP or other measure should be taken.

6. Start-up of the WWTP

The start-up of the WWTP is an important step for good operation of the unit, for this reason it is necessary that this must be done by the manufacturer/authorized distributor, respective their qualified service partner or a trained person/user.

There are 3 possibilities for start-up of the SWTP after its installation.

6.1 Start-up with seed activated sludge

The start-up is performed by inoculation the unit with activated sludge from a well-operating biological treatment plant, the start-up period is 2-4 weeks:

6.1.1 Set the recommended mode of operation in the control unit AUGUST BASIC,

6.1.2 Checking the setting of the valves on air distribution panel.

6.1.3 Ensuring seed activated sludge cca 5-10 m3, carried out from a well operating communal wastewater treatment plant. Optimally, after seeding, at least 200-300 ml / l of sludge is obtained in the reactor after a 30 minute sedimentation test (description of the test in the troubleshooting section).

6.1.4 Pump or discharge the seed activated sludge from the lorry slowly or in steps into the first non-aerated section of biological reactor so, that no sludge lost occurs from the final clarification chamber, stop the discharge, if sludge flocs occurs on the top of the final clarification chamber.

6.1.5 Set the optimal mode of operation of air pumps in control unit.

6.1.6 Ensure as soon as possible the loading of WWTP with sewage.

6.2 Start-up with the biological enzyme product "BIO-P6 WASTEWATER TREATMENT SYSTEMS"

By the start-up of the WWTP the tank of WWTP should be filled with water, the inlet, outlet pipes should be connected and the WWTP should be loaded with wastewater from the building. The control unit must be ON.

Dosing in start-up phase:

TYPE OF WWTP	Dosing for start-up	Vessel for preparation of suspension
ATO30	300 g	min. 6 liter (2-liter plastic bottle)
ATO40	400 g	min. 8 liter (10-liter plastic bucket)
ATO50	500 g	min. 10 liter (10-liter plastic bucket)
ATO75	600 g	min. 12 liter (2x10-liter plastic bucket)
ATO100	800 g	min. 16 liter (2x10-liter plastic bucket)
ATO120	900 g	min. 18 liter (2x10-liter plastic bucket)
ATO150	1100 g	min. 22 liter (3x10-liter plastic bucket)
ATO175	1400 g	min. 28 liter (3x10-liter plastic bucket)
ATO200	1500 g	min. 30 liter (3x10-liter plastic bucket)
ATO225	1700 g	min. 34 liter (4x10-liter plastic bucket)
ATO250	1900 g	min. 38 liter (4x10- liter plastic bucket)

Procedure:

The powder put into the plastic vessel. Pour tepid water (at about 30oC) into the vessel, mix it and allow of the mixture for 15-30 minutes to activate. Do not use metal vessel or metallic parts for mixing, the best are wooden or plastic. After staying 15-30 minutes the suspension can be poured into the aerated part of the WWTP.

Safety:

The product is not classified as hazardous to human health or to environment. Follow the general occupational health and safety rules, environment protection and instructions for disposal when working with chemical substances and mixtures.

6.3 Spontaneous start-up

At spontaneous start-up without seed activated sludge or biological enzyme must be taken into account, that the start-up period will be longer, from 1-2 months up to 6 months.

Optimal modes of operation of the air pumps set in MCU for all start-up possibilities:

TYPE	During start-up phase	
ATO30-250	Standard+2 or standard+3	Up to the forming of at least 200-300 ml/l activated sludge in the aerated part, approx. 2-6 months

Operating instructions and maintenance

The plant does not need a permanent presence of oversight, works automatically. It is necessary to do activities essential for operational control and periodical maintaining in mentioned intervals.

Operational control (by owner/user)

TYPE OF ACTIVITY	Activity interval
Visual control of operation of WWTP and the microprocessor control unit resp. switchboard for pumps and main switchboard	1x / day
Visual control of the basket screen or the pumping station	1x / week
Visual control of the presence of floating sludge	1x / week
Visual control of the flow regulator at the outlet and the treated water	1x / week
Visual control of the air pumps	1x / week
Clean the basket screen	at need based on visual control

Maintenance (by servicing company or trained operator)

TYPE OF ACTIVITY	Activity interval
Cleaning of the basket screen or the pumping station	at need based on visual control
Measuring of settled sludge volume	1x /4 months
Control and setting the regulation valves	1x /4 months
Cleaning of the flow regulator	1x /4 months
Taking away the excess sludge	at need (approx. 1x-5x/ year)
Cleaning the air filter in the air pump	1x /4 months
Changing of the membrane in the air pump	(approx. 1x/year)
Replacing the grinder system in the pumps	Every 3rd year of operation
Replacing the oil in the pumps	Every 3rd year of operation
Replacing the diffusers	Every 7th year of operation
Taking samples – analyzing of samples	based on local regulations
Evaluation of the plant operation	based on local regulations

Visual control of the operation

We recommend to keep an operating diary based on local regulations about the defects, their removals, change of spares, servicing at a time, etc.

Basket screen – should not be full or clogged.

Pumping station – there should be no deposits of debris, screenings outside the screen basket in the pumping station.

Mixing the content of the basket screen with coarse air bubbles – there must be visible the whirling and mixing in the basket screen in the pumping station during the running phase of the air pump, caused by the working of disk diffuser below the basket screen. The whirling should not be too strong or too week.

Mixing the content of the pumping station with fine air bubbles – there must be visible the whirling and mixing in the pumping station during the running phase of the air pump, caused by the working of tube diffuser below the basket screen. The whirling should not be too strong or too week.

Air-lift pump in the non-aerated chamber - there must be a visible flow from the outlet of the air-lift pump in the first compartment of non-aerated chamber and the wastewater-sludge mixture must flow through the cascades made by the overflowed walls of the compartments in the non-aerated chamber.

Fine bubble diffuser in the aerated chamber – intensive and evenly bubbling and mixing is visible on the whole surface of the aerated chamber during the running phase of air pump, no big bubbles in one or other side.

Fine bubble diffuser in the sludge tank – bubbling and mixing is visible on the central surface of the sludge tank during the running phase of air pump, no big bubbles in one or other side.

Air-lift pump for return sludge – there must be a visible flow from the outlet of the air lift pump into the non-aerated chamber.

Flow regulator – The sieve of the flow regulator must be clean at about 30% of its surface, the treated water must flow freely through the throttling hole in the flow regulator, and treated water should not permanently flow through the emergency overflow in the flow regulator. Coarse bubbles must be released periodically which clean the surface of the sieve and slightly waving the water surface. The waving and bubbling on the surface of water in the final clarification should not be too strong or too week.

Floating sludge, excessive foaming – floating sludge may emerge on the surface of the compartments of non-aerated chamber, and final clarification chamber. Floating sludge in non-aerated chamber may happen also in normal operational circumstances – mainly if the plant is underloaded, it has no influence on the treatment efficiency. A little floating sludge on the final clarification surface may happen also in normal operational circumstances. Excessive foaming on the surface of the aerated chamber may happen also in normal operational circumstances (light white foam during the start-up period and brown foam during the normal operation).

Eliminating of defects

Full, overflowed basket screen – empty the basket, the content of the basket can be emptied into the garbage.

Full inlet part of the pumping station – clean and pump out the content of the pumping station by a vacuum truck.

Mixing the content of the basket screen with coarse air bubbles and the content of the pumping station with fine air bubbles does not work – setting the air flow by opening the valve "F". If does not help, check the possible clogging of the air hose, clean it with pressure air if necessary.

Air-lift pump in the non-aerated chamber does not work – setting the air flow by opening the valve "C". If does not help, check the possible clogging of the air hose or pipe of the air-lift pump, clean it with pressure air or water if necessary.

Air-lift pump for return sludge does not work – setting the air flow by opening the valve "D". If does not help, check the possible clogging of the air hose or pipe of the air-lift pump, clean it with pressure air or water if necessary.

No bubbles in the aerated chamber or big bubbles on one side – close all valves on the air distribution panel except the valves "B". If does not help, check the possible clogging of the air hose, clean it with pressure air if necessary. If does not help, check the air flow from the air pump or clean the filter in the air pump. If the air flow is all right and the diffuser still not working, please contact your supplier. In case of big bubbles and intensive whirling contact your supplier.

No bubbles in the sludge tank or big bubbles on one side – setting the air flow by opening the valve "C". Close all valves on the air distribution panel except the valves "G". If does not help, check the possible clogging of the air hose, clean it with pressure air if necessary. In case of big bubbles and intensive whirling close the valve "G" and contact your supplier.

Air-lift pump for excess sludge does not work – setting the air flow by opening the valve "G" and check the working of the solenoid valve "I". In case of a malfunction of solenoid valve "I" (do not open), contact your supplier and replace it. If does not help, check the possible clogging of the air hose or pipe of the air-lift pump, clean it with pressure air or water if necessary.

Clogged throttling hole or the sieve in the flow regulator, permanently high water level, which flows through the emergency overflow – temporarily increase the air flow by opening the valve „E". If does not help, clean the throttling hole by a stick or dismantle it and clean it manually by stream of water.

Walls of the plant, inlet, outlet and the piping in the biological reactor should be kept clean by occasional cleaning with stream of water or by brushing.

Removal of excess sludge

Excess sludge must be removed periodically from the system. The frequency of desludging depends on the load of the treatment plant and the correctly selected capacity, but also on the correct adjustment of the control valves and the control unit. The biological sludge resulting from the purification process is aerobically stabilized, no further degradation and odor. It can be directly applied as a fertilizer with valuable organic substances directly to the soil.

Measuring of settled sludge volume

Settled Sludge Volume (SSV): SSV or settle ability of mixed liquor is determined by recording the volume occupied by the sludge in 1000 ml sedimentation test cylinder or a transparent bottle after allowing it to settle for 30 minutes. (If the sludge does not settle in the sedimentation test bottle it may be due to inflow of toxic substances into the plant or low dissolved oxygen content). Take a sample of 1 l of activated sludge mixture from the aerated chamber and pour into a transparent cylinder, glass or bottle. The sample is to be taken from depth of min. 1 m below the surface, when the air pump is working. Let it settle for 30 min. After 30 min count out the volume of settled sludge (visible border line between water and sludge). This value should be in interval 200 – 700 ml sludge per 1 l water. In this condition the plant reaches the highest efficiency of cleaning.

Sludge removal from the biological reactor

If the sludge content in the plant exceeds 700 ml sludge/ l of mixture, the excess sludge should be removed from the system. The frequency of removal depends on the plant loading. Since the system's sludge age is at least 30 days, the sludge is fully aerobically stabilized and not subject to further odor-causing biological degradation.

Ways of excess sludge removal

- By usage of a submersible sludge pump. The stabilized sludge can be used as fertilizer in the garden if the local legislative allow such a usage.
- Taking away of the sludge by specialized firms by vacuum trucks, which have the necessary approvals from the authorities.

Production of sludge:

TYPE	Production of sludge	Dry matter	Volume of sludge tank	Frequency of desludging
	[m3/year]	[%]	[m3]	[per year]
ATO30	7,5	1	-	2
ATO40	10,0	1	-	2
ATO50	12,5	3	4,2	3
ATO75	13,8	3	5,7	2
ATO100	18,4	3	5,7	3
ATO120	21,9	3	5,7	4
ATO150	27,6	3	8,0	3
ATO175	32,2	3	8,0	4
ATO200	36,8	3	8,0	5
ATO225	41,4	3	8,0	5
ATO250	46,0	3	8,0	6

Important: in case of high groundwater ensure that the tank is not inadvertently emptied when removing excess sludge. the tank may lift out of the ground or the walls may collapse.

Way of sludge removal from biological reactor:

Disconnect the control unit or air pump from electrical network and let to settle the content of the biological reactor approx. for 30 min. Carefully put the suction pipe or the submersible pump alternatively into the compartments of non-aerated chamber and the aerated chamber of the biological reactor and pump away the settled sludge (the highest concentration of sludge is in the non-aerated chamber). The sludge must be pumped away evenly from the compartments and chambers of the biological reactor the way not to cause water level difference between the compartments higher than 15 cm . Take care of the diffusers and piping at the bottom of the tank. Fully empty the non-aerated chamber and let about 20 cm of water in the aerated chamber. After this operation the biological reactor should be filled with water up to the operating water level – take care of the water level difference between the compartments and chambers lower than 15 cm during the filling.

The concentration of sludge in the biological reactor after sludge removal should not be lower than 150 ml/L.

Sludge removal from the sludge tank

The sludge removal from the sludge tank should be performed periodically based on the recommendations of the supplier or based on measuring of the settled sludge volume in the activated chamber of the biological reactor. Taking away of the sludge by specialized firms by vacuum trucks, which have the necessary approvals from the authorities.

Sludge removal mode - manually:

In manual sludge removal mode the air-lift pump of excess sludge is put into operation by opening the valve "G" on the air distribution unit into the air-lift pump of excess sludge. The air-lift pump for excess sludge will pump the mixture from the non-aerated chamber of biological reactor into the sludge tank. The aeration of the content of sludge tank is also operated (settling by valve "H"). The aeration can be stopped before removal the sludge from the sludge tank in order to receive a more thickened sludge. If the intensity of pumping by the air-lift of excess sludge is set a right way, the sludge is thickened in the sludge tank and the supernatant is flowing back into the biological reactor. In this way can be the air-lift pump for excess sludge operated also continually, just the closing of aeration in the sludge tank is not recommended for a long time. During start-up phase, low loading, low concentration of activated sludge in the biological reactor can be the sludge removal mode stopped by closing the valve "G". If there is sludge in the sludge tank, preferably the aeration should be maintained in the sludge tank, however lower intensity of aeration can be set by valve "H".

Sludge removal mode - automatically:

The automatic sludge removal mode is based on controlling the supply of compressed air to the solenoid valve ("I") to the air-lift pump of excess sludge. The control of the opening of the solenoid valve ("I") and periodic pumping of the excess sludge into the sludge tank is performed by the AUGUST Basic PZ 600W microprocessor control unit. The control unit is set by the manufacturer or an authorized service center. Automatic desludging can also be switched on and off by the operator (owner) of the WWTP on the control unit by turning the additional device on or off in the control unit menu (see the operating instructions).

In the automatic desludging mode, the excess sludge pump is permanently put into operation by opening the air inlet "G" to the air-lift of excess sludge, pumping the sludge from the non-aerated part of biological reactor into the sludge tank according to the setting. Sludge aeration is performed in the sludge tank („H" setting). The aeration can be stopped before removal the sludge from the sludge tank in order to receive a more thickened sludge. If the intensity of pumping by the air-lift of excess sludge is set a right way, the sludge is thickened in the sludge tank and the supernatant is flowing back into the biological reactor. In this way can be the air-lift pump for excess sludge operated also continually, just the closing of aeration in the sludge tank is not recommended for a long time. During start-up phase, low loading, low concentration of activated sludge in the biological reactor can be the sludge removal mode stopped in the menu of the control unit. If there is sludge in the sludge tank, preferably the aeration should be maintained in the sludge tank, however lower intensity of aeration can be set by valve "H".

Way of sludge removal from sludge tank:

Connect the suction pipe of the vehicle to the suction pipe of the sludge tank. Fully empty the sludge tank. After this operation the sludge tank should be filled with water up to the operating water level.

Important: in case of high groundwater ensure that the tank is not inadvertently emptied when removing excess sludge. the tank may lift out of the ground or the walls may collapse.

Adverse aspects influencing the operation

You have to take care of the plant carefully and to provide for optimal failure-free state. The plant operates on the biological principle. That is the reason why it is necessary to save from disturbing influences that can influence its operation negatively.

To ensure trouble free operation, it is essential that the following materials are not present in the influent wastewater:

- remains of chemicals, medicaments, etc.,
- toxic materials – solvents, inflammables, fixtures for the plant protection, motor oil,
- indecomposable materials – nappies, bond paper, newspaper, wet paper rolls, foils, impregnated paper, cigarette butts,
- oils and grease in high concentration,
- Cleaning and disinfecting substances containing sodium hypochlorite in high amounts.

Excessive foaming in aerated chamber

This is normal during the start-up period for several weeks. Add activated sludge into the system or wait several weeks the sludge arises. Avoid the excessive use of detergents and laundry agents. It is enough to wash the foam by a stream of water.

Safety and health protection at work

- Service is allowed to be operated by the person over 18 years old who is mentally and physically capable to do this work. The person must be trained and familiar with operating instructions.
- Any contacts with electrical parts of the plant are operated only by a person with electro-technical qualification.
- Use specified protective means at work with the wastewater.
- Wash hands and disinfect them after the contact with wastewater.
- Keep excess road without ice and snow.

Personal and protective means

It is necessary to use following personal and protective means:laundry agents. It is enough to wash the foam by a stream of water.

- Working clothes, shoes,
- Protective rubber gloves.

Recommended tools for maintenance:

- Transparent bottle 1000 ml (glass or plastic) for measuring of settled sludge volume.
- Rubber gloves.
- Brush with long handle.
- Rake for cleaning the screen bar in the pumping station.

Warranty

Warranty for the blower is 24 months.

If warranty is meant to be in force, the condition is that the unit is installed, operated and maintained in compliance with this Installation and Operating manual and construction design.

Warranty is not in force if:

- the plant was not put into operation by an authorized firm/trained person,
- the plant was not placed in terms of Installation and Operating manual,
- the plant is not operated in terms of Installation and Operating manual.

NH4PO

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