



**AUGUST**

Solutions for human and nature

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# **Wastewater treatment plant technical pass**

AT6 - AT20  
AT6<sup>+P</sup> - AT20<sup>+P</sup>  
SERIES

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# Introduction

Typical factory-made domestic wastewater treatment plants manufactured by AUGUST IR KO JSC (hereinafter referred to as the Manufacturer) are designed for domestic wastewater treatment of a population equivalent to a number of persons from 4 to 18 in private houses, hotels and boarding houses, restaurants, schools, campers, administrative buildings, etc. (hereinafter referred to as Units or Unit, depending on context). Water treated in the Units can be discharged into open water bodies, infiltrated into the soil or used as technical water. Wastewater is treated in the Units biologically, in a process where microorganisms break down and digest the contaminants in the wastewater, thus purifying the water. In addition to food, vital bacterial activity also requires oxygen; therefore, a blower, comprising an integral part of the Unit, is installed next to the Unit housing. All household chemicals (detergents, cleaning agents, etc.), if used moderately, are allowed and do not cause harmful effects on the Unit.

In order to avoid operational problems, it should be ensured that the following substances, together with wastewater, do not come into contact with the Unit:

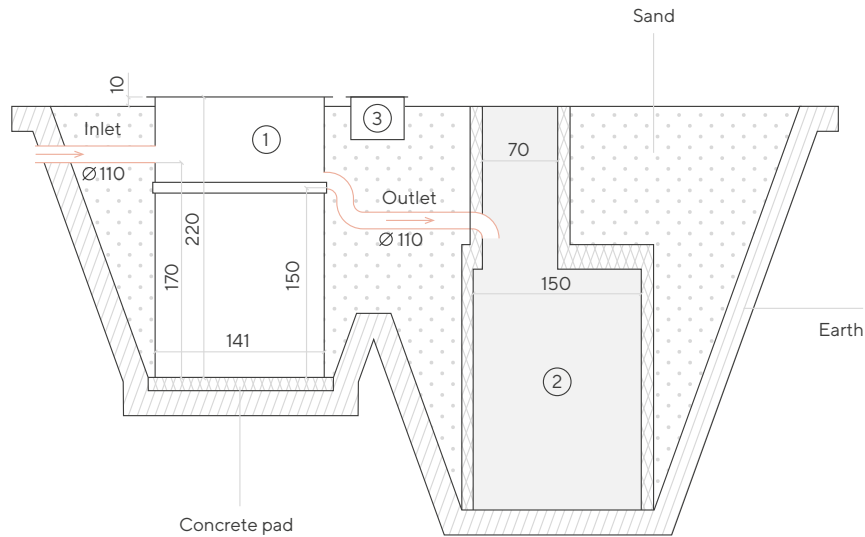
- High concentrations of grease and oil products (used oils, lubricants, etc.)
- Toxic or hazardous substances (paints and paint thinners, acids, etc.)
- Biologically non-degradable persistent substances (plastics, rubber, textiles, sanitary napkins, wood, etc.)
- Do not discharge storm water, drainage, pool water or hot water—hotter than 40 °C—wastewater from farms or animal slaughterhouses into the Unit.



## Caring for nature

When buying the Unit, you help fight environmental and water pollution. Every installed and functioning Unit contributes to reducing the 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.

# Rules for the installation of the Unit



## 1. Selection of installation location:

- 1.1 Location for installation of the Unit must be selected so that the treated water can flow automatically (see Principal diagram 1).

**IMPORTANT!** If the Unit is not mounted on reinforced concrete rings, it may not be installed on the part of the plot of land intended for transport traffic and/or parking, as well as on the part of the land where storm water or high groundwater accumulates.

- 1.2 The Unit must be easily accessible for frequent inspections.
- 1.3 It is necessary to maintain the distance from adjacent objects established by the applicable legal regulations. The Unit and the systems ensuring its functionality must be installed in accordance with the requirements of the effective legal regulations, the technical or work project of the building, instructions for installation work and these recommendations.

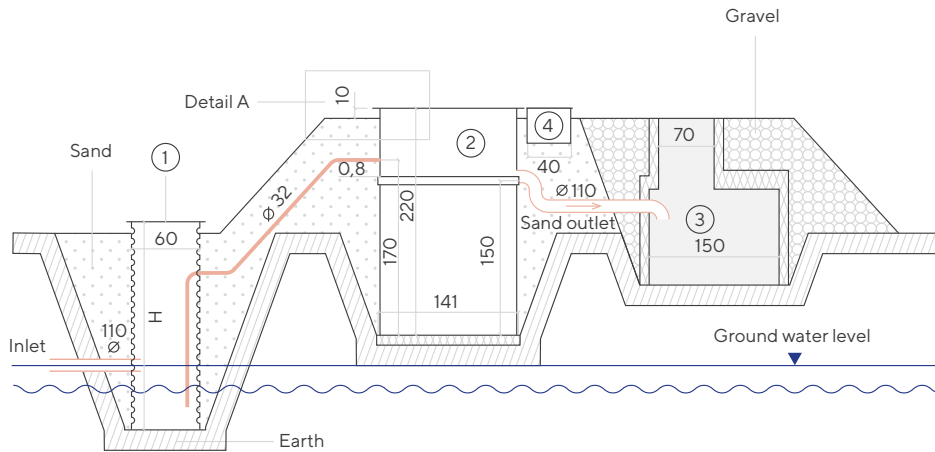
## 2. Preparation for construction:

- 2.1 The wastewater pipe from the source to the Unit must be laid with a slope suitable for gravity flow of wastewater.

- 2.2 **IMPORTANT!** Burying the pipe for the discharge of wastewater to the Unit may not exceed 1 m from the ground surface, which must be taken into account in advance in the formation of the terrain. For pipes buried 1 m and more, the sewage lifting pump station must be installed upstream of the Unit.

- 2.3 The diameters of the wastewater effluent and treated water pipes **MUST** correspond to the diameter of the built-in couplings in the Unit. The depth of the wastewater pipe must match the depth of the Unit coupling.

- 2.4 The pit for the convenient installation of the Unit must be at least 150 cm wider than the diameter of the Unit. The installation site should be cleaned of debris and be free of vegetation (trees), the roots of which may interfere with the installation and subsequent operation of the Unit.



### 3. Construction:

- 3.1 Earthwork must be carried out strictly in accordance with the normative acts in force and the technical or work project of the building.
- 3.2 Pits for the Units are excavated in two steps:
- 3.2.1 In the first stage, the pit is excavated by an excavator, leaving about a 20-30 cm thick layer to the design altitude.
- 3.2.2 At the second stage, the layer of 20-30 cm is dug manually. This method of earthwork will ensure the installation of the Unit on undisturbed soil.
- 3.3 **IMPORTANT!** Pit depth depends on the depth of the wastewater pipe at the installation location. The pit must have a funnel shape: the diameter of the pit must be at least 150 cm wider than the diameter of the device at the top and 50 cm wider than the diameter of the device at the bottom.
- 3.4 **IMPORTANT!** Installations must be mounted on a reinforced concrete base in order to ensure horizontal and vertical levelling of the Units. A concrete base (about 15-20 cm thick, with reinforcement mesh) is concreted on the compacted soil, or prefabricated reinforced concrete soles can be used.
- 3.5 Units can be fully or partially buried (depending on the groundwater level). **IMPORTANT!** Units are mounted above groundwater level (see Principal diagram 2).
- 3.6 **IMPORTANT!** If there is high groundwater on the construction site, the Units are partially buried, i.e. to a certain depth, and the remaining part is covered with a gravel-sand mixture (0.4 mm fraction) by forming a dyke. In this case, the pumping stations for sewage lifting should be installed upstream of the Units. It is necessary to raise about 30 cm of undisturbed soil to the groundwater level.

- 3.7 The Unit is lowered into the pit using typical lifting mechanisms.
- 3.8 After lowering the Unit into the pit and checking the design position (depth, horizontal/vertical alignment), the inlet and outlet pipelines are connected (the pipes must be rigidly fixed and resting on a solid foundation).
- 3.9 Built into the design position, the Unit is gradually filled with water, and the space between the pit and the Unit is filled with sand layers (20-30 cm thick). Sand layers are carefully compacted (by human body weight). Water is poured into the Unit to the level of the outlet pipe.
- 3.1.0 The soil surface around the Unit is formed with a slight slope away from the Unit, to prevent the accumulation of storm water around the Unit, allowing its free flow (see Detail A).



Detail A

#### 4. Installation of the blower and the air supply pipe:

- 4.1 The location for the blower is selected in accordance with the technical requirements. The blower can be installed in a ventilated room (garage, storage, etc.) and outdoors (in the blower container). The indoor-mounted blower must not come into contact with the wall or any other building structure. If the blower is installed outdoors, it must be protected against moisture, rain and dust. A blower container should not be installed in a place where water can run on it and accumulate. High quality gaskets **MUST** be used in openings.
- 4.2 220V-3X1.5 mm<sup>2</sup> electric cable is connected to the Unit.
- 4.3 The distance from the blower to the Unit must not exceed 5 m. In order to minimise pressure losses, the turning points in the air supply line should be reduced to the minimum.
- 4.4 The air supply tube must be mounted in the protective shell and placed on a stable base, for example, on undisturbed immobile soil.

#### 5. Installation and connection of microprocessor control unit PLUS/PLUS S:

- 5.1 The Unit controller can be installed indoors (in a garage, warehouse, etc.) or in the blower container.
- 5.2 Good air circulation should be ensured so that the maximum permitted temperature of the Unit is not exceeded even during continuous operation at high ambient temperatures (max. 40 °C).
- 5.3 For indoor installation of the AUGUST BASIC Unit, two single-phase cables 3x1.5 mm **MUST** be laid to the Unit.

# Warranty terms

**IMPORTANT!** If the Buyer performs the installation of the Unit at their own cost and initiative, they undertake to perform the work in accordance with the installation rules of the Unit.

In all cases, only the manufacturer or its authorised persons are entitled to perform installation and adjustment work on the Unit.

1. The Manufacturer's quality warranty (hereinafter the Warranty) for the underground part of the Unit housing is 10 years from the date of the sale or transfer of the Unit (whichever occurs earlier) to the Buyer.
2. The Manufacturer undertakes to rectify any quality defects in the underground part of the Unit housing that appear during the Warranty period, resulting from reasons directly attributable to the Manufacturer, and if necessary, to perform the start-up and tuning of the Unit within a reasonable and technically feasible period free of charge.

3. The Warranty covers any defects in the underground housing part of the Unit that occurred during the Warranty term due to substandard quality of materials used by the Manufacturer and/or shortcomings of Unit design, which were notified in writing by the Manufacturer within the Warranty term.

4. The Warranty applies and is valid only if:

- 4.1. From the date of installation, the Unit has been stored in a closed room with an average air temperature of -25 °C to +30 °C and protected from climatic effects; and
- 4.2. The Unit was transported protected from climatic effects and was lashed to the vehicle by means of anchorages that prevent damage to the Unit during transportation; and

4.3. Since the moment of its commissioning (launch), the Unit has been operated and maintained in strict accordance with the Service and Maintenance Instructions of the Unit prepared by the Manufacturer, which in each case is handed over to the Buyer together with the Unit; and

4.4. The installation work of the Unit has been carried out by the Manufacturer or its authorised person, or by a contractor having the necessary qualifications and the right to perform work for the construction of engineering networks, or by the builder under the supervision of a skilled technical supervisor of the construction of the building qualified to carry out the technical supervision of the construction; and

4.5. The Unit start-up and tuning work have been performed by the Manufacturer or its authorised person; and

4.6. Unit repairs (if any) were carried out by the Manufacturer or its authorised person, or by a person duly qualified to perform such work, and only the materials and/or parts that are identical to or better than those used by the Manufacturer were used for repairs of the Unit.

5. To be eligible for the Warranty service, the operator of the Unit must:

5.1. Notify the Seller of the defect in writing no later than 10 business days from the moment of detection of the defective part of the Unit buried underground, about the detection of such a defect; and

5.2. Submit the following to the Seller of the Unit:

5.2.1. Documents confirming the purchase of the Unit along with timely and complete settlement for it (certified copies thereof);

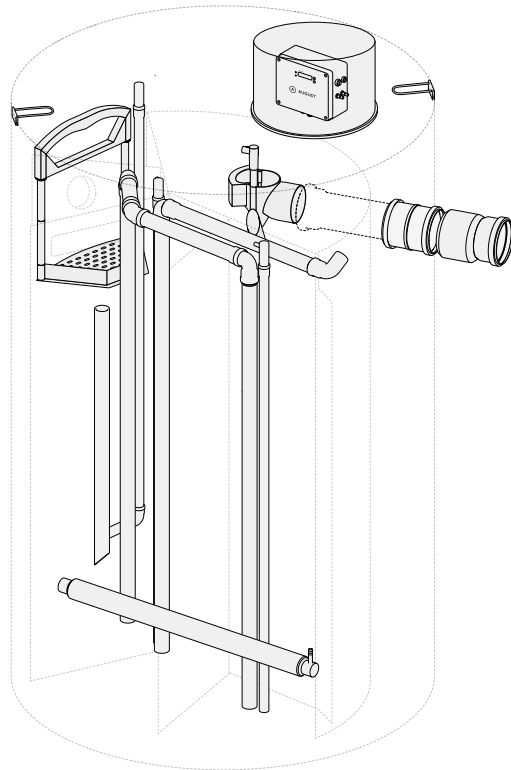
5.2.2. Documents confirming the installation and commissioning of the Unit (copies thereof);

5.2.3. Documentation (copies of documents) confirming the proper installation and operation of the Unit.

6. The terms and conditions of the quality Warranty of other components of the Unit (other than the underground body part of the Unit) are set out in the Unit Technical Passport prepared by the Manufacturer, which in each case is handed over to the Buyer together with the Unit.

# Unit diagram

The tank of the wastewater treatment unit is made of plastic (Polypropylene) and supplied as an integral unit together with the lid.



# Technical parameters of the wastewater treatment plants

TYPE	AT6	AT8	AT10	AT12	AT15	AT20
H (mm)	1800	2200	2200	2200	2200	2700
Ø (mm)	1400	1400	1600	1750	2050	2050
Inlet H (mm)	1300	1700	1700	1700	1700	2200
Outlet H (mm)	1150	1500	1500	1500	1500	2000
Average el. consumption programa STANDART (kWh/d)	0,4	0,6	1,0	1,6	1,9	2,1

H (mm) - total height of unit  
 Ø (mm) - diameter of bottom  
 H inlet (mm) - height of inlet from bottom  
 H outlet (mm) - height of outlet from bottom



# Treatment process

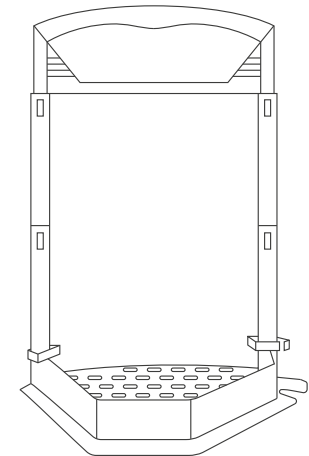
Typical AT series wastewater treatment units of AUGUST IR KO JSC are supplied in a single container, comprising: anaerobic-anoxic zones (1a-d), aeration zone (2) and secondary settler (3). The anaerobic-anoxic zone is divided by partitions into the descending and ascending flow sections (1a, 1b, 1c and 1d), creating the so-called "vertical flow labyrinth". The secondary settler (3) is equipped with a flow regulator protecting the Unit against the negative effects of peak flows.

# Mechanical and electrical devices

Mechanical equipment consists of the solids bag (integrated in a domestic sewage treatment plant), a blower, an air distribution manifold with valves, airlifts 1, 2, 3 and aeration elements.

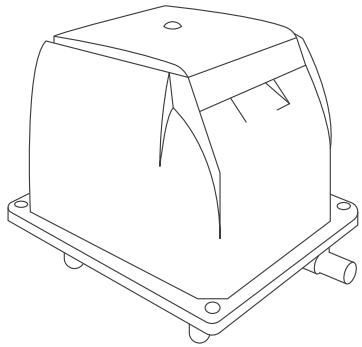
## Solids bag

The solids bag is used for separation of gross solids from wastewater (biodegradable, soluble solids (paper, kitchen waste, etc.). Only non-degradable materials (textiles, wood, bone, etc.) remain in the solids bag, and must be removed later. The solids bag is lifted by pulling the handle, and cleaned.



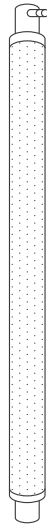
### Blower

The blower is an electromagnetic diaphragm compressor, which is characterised by longevity, low maintenance timing and low maintenance costs. The performance and power of the blower vary depending on the model of the cleaning unit.



### Diffuser

The number and length of aeration elements vary in wastewater treatment plants depending on the amount of oxygen needed to dissolve. High quality aeration elements are made with a non-clogging membrane, polypropylene and stainless steel parts.



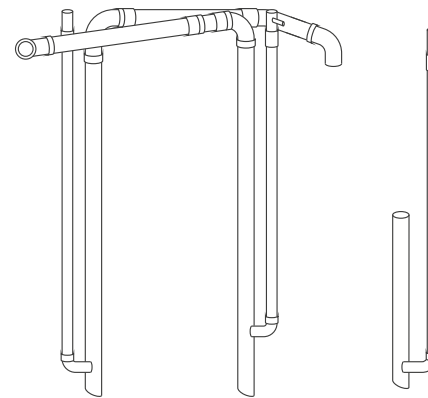
### Airlifts

Mixing, circulation and activated sludge and wastewater recirculation in the system are ensured by airlifts 1, 2 and 3.

Airlift 1 – mixing in the solids bag

Airlift 2 – sludge return from secondary settler

Airlift 3 – internal recirculation

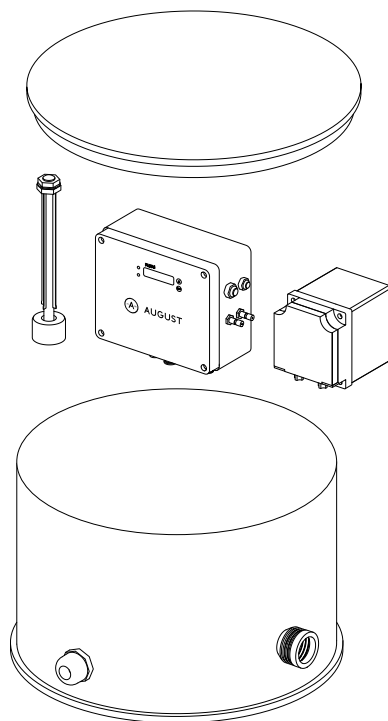


### AT6<sup>+P</sup> - AT20<sup>+P</sup> dosing set for chemical precipitation of phosphorus

The tank for air pump with dosing set is a double bottom tank. In the upper part are placed the air pump, control unit, peristaltic dosing pump and the filling opening of the compartment for chemical agent. In the lower part is the compartment for chemical agent, which is filled through the filling opening with a cap. There also a level sensor in the lower part for signaling the low level of precipitant. The dosing pump is controlled by the control panel which controls with the selected program the operating cycles of the dosing pump. The critical lowering of the level of chemical and the failure of the dosing pump is signaled with optical and audible alarms.

The dosing hose should be pass through the connecting protecting pipe between the tank for air pump and the biological reactor. The chemical agent is dosed into the aerated part of the biological reactor, e.g. the aperture of the dosing hose must be fixed over the water level of the aerated part.

The plastic tank for air pump with the dosing set should be placed on a concrete slab below ground the way, that the top edge of the tank of unit must be approx. 50-100 mm higher than the terrain. The tank must be backfilled by coarse sand 4-8 mm, coarse crushed stone 4-8 mm or dry concrete.



## Technical parameters of the dosing pump

TYPE	AT6	AT8	AT10	AT12	AT15	AT20
No. of cycles	8	8	8	8	8	8
Cycle length	11	16	22	27	35	46
Consumption of chemical agent (l/year)	15	20	30	35	45	55
Volume of the compartment for chemical agent (l)	30	30	30	30	30	30
Average el. consumption programa STANDART (kWh/d)	1 x year	1 x year	1 x year	2 x year	2 x year	2 x year

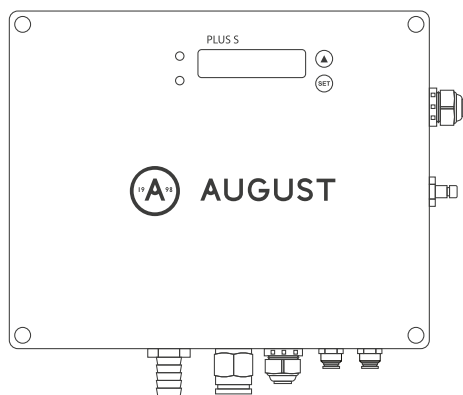
TYPE	Injecta NKNS001HA1100
number	1 pc
flow rate	1,5 l.h <sup>-1</sup>
input / voltage	8W / 230 V / 50 Hz
IP protection	IP65
content	42% ferric(III)sulphate
density	1460-1510 kg.m <sup>-3</sup> at 20oC

# Microprocessor control unit PLUS/PLUS S

## 1. Application

The microprocessor control unit PLUS/ PLUS S serves for controlling the aeration and recirculation in the range of AT and AT P+ wastewater treatment plants AT6-20. The microprocessor control unit PLUS/ PLUS S 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, which is transformed to 24V switching current for the solenoid valve. The microprocessor control unit PLUS/ PLUS S regulates the technological processes in the WWTP, automates, simplifies and cheapens the operation. The microprocessor control unit PLUS/PLUS S is completely manufactured, tested and certified in Slovak republic. 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 the START mode and 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 damaged solenoid valve or the air pump, the control unit sends acoustic and visual signal. After the failure is removed, the control unit switch in the original mode automatically.



## 2. General instructions

- This installation and maintenance manual is only applicable to the MCU PLUS/ PLUS S microprocessor controllers.
- 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).

## 2.2. 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.

## 2.3. 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 and AT<sup>+P</sup> line of household 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.

## 3. Technical description

### 3.1. General description

The MCU PLUS/PLUS S 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, further ports to connect the air hoses from "A" up to "F" and with manually adjustable throttling valves "G", "H". In case of MCU PLUS/PLUS S 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 valves are pre-set in the manufacture and secured against unintentional mistuning, but it could be necessary to adjust them during the start-up of the WWTP by a serviceman.

The MCU PLUS/PLUS S works as a system for allocation of time for the 3-way solenoid valve, the air pump works intermittently. The display shows the actual date, real time and the selected mode. The control unit senses the connection of the solenoid valve and air pump as well as an additional device, and distinguish between the states connected/disconnected/short circuit on the wires.

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 and two manually adjustable throttling valves on the MCU PLUS/PLUS S:

- Button ▲ serves for moving in the menu, dismiss the acoustic signalization and setting the current date and time, eventually the day of the week.
- Button **SET** serves for selection of items in the menu and confirmation of the values.
- Manually adjustable throttling valves "G", "H" serve for the setting of air-flow through the ports "E" and "F", from which one serves for the setting of air-flow into the flow regulator (12) and the second for the setting of air-flow into the air-lift pump (14) below the basket screen for large bubble aeration - to break up the coarse impurities in the basket.

### 3. 2. Basic technical parameters

TYPE	PLUS	PLUS S
Switched/supply voltage – nominal	230V/50Hz	230V/50Hz
Possible load	min.40 W, max.250 W	min.40 W, max.250 W
Additional device	NO	YES
Possible load for additional device	-	min.3 W, max.250 W
Control unit input	50 W	50 W
Protection	IP 44	IP 44
Ambient temperature	from -5°C to 40°C	from -5°C to 40°C
Relative moisture	up to 95%	up to 95%
Dimensions LxWxH/mm/	270x240x100	270x240x100
Lifetime	70 000 hours	70 000 hours

### 4. Installation and connection

The installation and connection of MCU PLUS/ PLUS S can be made only by an instructed person. The control unit can be installed only at this purpose designated dry, sheltered and ventilated underground plastic tank of air pump (delivered together with WWTP). The control unit is laid down onto a console. 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 PLUS/PLUS S 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.

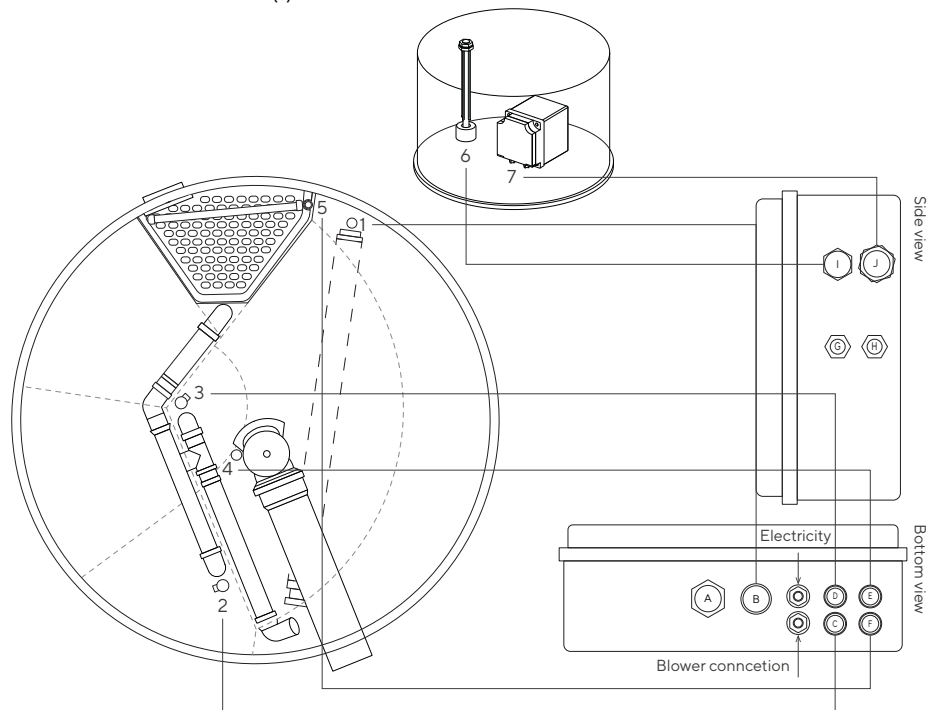
**WARNING** The control unit must be connected into the el. network of the object through an individual circuit breaker.

#### **DANGER – ELECTRICAL SHOCK!**

Before installation disconnect the supply voltage (230V) to the control unit.

#### 4.1. The procedure of connecting

- Connect the tank for air pump with the biological reactor.
- Connecting of air hoses to the rapid air connectors in the biological reactor:  
Insert air hose PA Ø 16 mm into the rapid air connector for diffuser (1)
- Insert the two air hoses PA Ø 8 mm into the rapid air connector for air lift pump (2) for recirculation in non-aerated part and for air lift pump (3) for recirculation of return sludge.



- Insert the two air hoses PA Ø 8 mm into the rapid air connector for flow regulator (4) and into the rapid air connector for air lift pump (5) for mixing the content of the basket screen
  - Connecting the air hoses into the MCU PLUS/PLUS S:  
The air hoses get through the connecting protecting pipe PP-HT DN 50. Take care of the cranking of hoses! The hoses must not be tense and should have a natural curve!
  - The hose PA Ø 16 mm (from 1) insert into the air outlet „B” on the control unit.
  - The hoses PA Ø 8 mm (from 2 and 3) insert into the air outlets „C” and „D” on the control unit.
  - The hoses PA Ø 8 (from 4 and 5) mm insert into the air outlets „E” and „F” on the control unit.
  - The hose PE Ø 19 mm from air pump insert into the air outlet „A” on the control unit.
  - Placing of PLUS/PLUS S on the console in the tank for air pump.  
Take care of the cranking of hoses!  
The hoses must not be tense and should have a natural curve!
  - Connecting of el. supply cables:  
First connect the air pump and the additional device respectively the float switch, only then connect the device into the network. Connect the air pump inserting the air pump plug in the socket in the PLUS/PLUS S, 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.
  - After connecting the air pump and additional devices into the control unit, connect the control unit into the electrical network by inserting the plug on the MCU into the socket of the feeding cable.
  - Setting the throttling valves „G”, „H”:  
For mixing the content of the basket screen (5)  
For cleaning of the flow regulator (4) with large bubbles of water flux the way that once in 1 – 2 seconds is released one air bubble so the automatical cleaning of the flow regulator is guaranteed.
- Additional connections for PLUS S  
“I” connection for dosing liquid level sensor (6).  
“J” connection for peristaltic pump (7)

## 5. Setting and control

### 5.1. 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 mode. After the first connecting to the el. network, the control unit is in the START mode for a period of 2 months. After this period, the unit switches into the mode STANDARD.

### 5.2. Change of mode (program)

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 6 standard programs:

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

The air pump works intermittently. There alternate the phase of aeration, phase of recirculation and mixing and stop phase. The pressure air from the air pump is divided by a three-way solenoid valve alternately either to the aeration circuit or to the circuit of recirculation by airlift pumps. These programs differs particularly in duration of phase of aeration, recirculation and stop phase, wherein one aeration phase, one recirculation and mixing phase and one stop phase represent a single cycle which is repeated the whole day. During the night is one 30 minute long stop phase between 2.00-2.30.

### Description of programs:

- Program STANDARD – pre-set program for average (nominal) load, time of air pump working is 19 hours per day.
- Program STANDARD-3 – used for 25% of average load, time of air pump working is 6.3 hours per day. Suitable when the WWTP load is very low.
- Program STANDARD-2 – used for 50% of average load, time of air pump working is 11 hours per day. Suitable when the WWTP load is low.
- Program STANDARD-1 – used for 75% of average load, time of air pump working is 17 hours per day. Suitable when the WWTP loaded less than the average load.
- Program STANDARD+1 – used for 110% of average load, time of air pump working is 21.7 hours per day. Suitable when the WWTP is highly loaded.
- Program STANDARD+2 – used for 125% of average load, time of air pump working is 23 hours per day. Suitable when the WWTP is loaded very heavily.



### The unit has 3 non-standard programs:

- Program HOLIDAY - it is advisable to set just before leaving for holiday. The WWTP will work during absence of the inhabitants in the saving mode, with working time of air pump for 5.4 hours per day. 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 preset standard program.
- Program WEEKEND HOUSE - this was intended for treatment of waste water from weekend houses with occupation on weekends or once in a month. The WWTP will work during absence of the inhabitants in the saving mode, with working time of air pump for 5.4 hours per day. 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.
- Program START - After the first connecting to the el. network, the control unit is in the START mode for a period of 2 months. The working time of air pump is 23 hours per day. After this period, the unit switches into the mode STANDARD.

### 5.3. Other settings, information

Beside 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 languages.
- 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** leaves the menu and comes back to the displaying of actual date, time and mode.
- WARNING - it is forbidden to open the box of the control unit in case of malfunction! Messages about the service intervals

### 6. Warranty

The products are manufactured according to harmonized European standards, inspected and supplied according to the approved manufacturing documentation and procedures given in the Quality Manual. The manufacturer is responsible for technical parameters during the whole warranty period. The warranty period is 24 months since performance of supply providing that the failure has not been caused by unqualified intervention or handling.

# Operation and maintenance instructions

## Unit shutdown:

If you plan to shut-down the WWTP resp. the microprocessor control unit, it is necessary to disconnect from the supply voltage and set the sleeping mode of the control unit. Push at once the LI 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.

## Launching the Unit:

- Setting the microprocessor control unit
- Connecting the blower
- Adjusting the air distribution manifold valves
- Filling activated sludge (0.25 m<sup>3</sup>-4 m<sup>3</sup>, depending on sewage treatment plant model and sludge concentration)

## The list of necessary maintenance tasks:

The Unit operates automatically and requires no continuous maintenance, but the owner should periodically perform the inspection and maintenance.

## During the inspection, the owner should:

METHOD OF CONTROL MAINTENANCE	FREQUENCY OF CONTROL MAINTENANCE
Check the Unit for foul odour	periodically
Check the operation of the blower	periodically
Check for foam and carried sludge on the water surface	1 x month
Check the airlift operation, aeration, current regulator	1 x month
Check the solids bag	1 x month
Cleaning the air filter in the air pump	1 x 6 month

## Important points of control:

**Solids bag** - cannot be clogged.  
Remove non-degradable materials.

**Operation of airlift 1** - mixing in the solids bag.  
The flow should not be too strong or too weak.  
The flow generated by airlift must be sufficient for efficient agitation.

**Aeration work** - air bubbles appearing on the surface of the aeration chamber during blower operation must be fine.

**Operation of airlift 2** - this airlift pumps the settled sludge from the secondary settler into the non-aerated and aeration chamber. Pumping of the sludge mixture must always take place during the operation of the blower.

**Operation of airlift 3** - internal recirculation in the non-aerated (anaerobic) chamber. Pumping of the sludge mixture must always take place during the operation of the blower.

**Foam in the non-aerated chamber** - can be formed from household chemicals; foam can dissipate automatically within a few hours. This is a possible phenomenon during the start-up/tuning operations or after excessive reduction of sludge concentration.

**Brown foam** - may be caused by several reasons, please contact the Manufacturer or its authorised representative immediately for maintenance of the Unit.

**Floating sludge in the secondary settler** - if the sludge occupies more than half of the surface area of the secondary settler, contact the responsible service representative.

**Foul odour** - strong unpleasant odour is not normal. Contact the Manufacturer or its authorised representative who is authorised to operate the Unit.

**Blower control** - the blower must always be connected to the power source. The blower runs periodically, using the BASIC controller; the maximum resting time is several minutes. If the blower is not working, please contact the Manufacturer or its authorised representative urgently to perform the Unit maintenance.

## Controller's error messages

**There are two types of alarm in the controller** - acoustic and optical. The optical alarm system operates continuously. The audible alarm will be triggered if the blower or controller is malfunctioning or in case of power failure. The audible alarm can be interrupted by pressing ▲.

## Optical alarm

**Constant green** - blower operation is temporarily paused (this is not a malfunction).

**Flashing green** - blower operating.

**Constant red** - blower disconnected - meaning the disconnection or failure of the blower or auxiliary device (non-standard). In the event of failure of the blower or auxiliary device, contact the Manufacturer or its authorised representative who is authorised to operate the Unit.

**Flashing red** - power failure - the controller signals this fault by sound and image. This alarm may last for several hours (depending on the battery charge level). When the batteries run out, the controller will switch to standby mode. When the power supply is restored, the controller will turn on after 2 minutes, with the last selected mode recorded in the memory. If the battery is excessively depleted, the displayed time may not match actual time. In such case, set the actual time.

## Controller notifications of maintenance

**REPLACE FILTER warning** – warns the user to clean or replace filter after half a year of blower operation. Cleaning or replacement of the filter must be confirmed on screen: press the ▲ button and ▲ again to change the message NO to YES, and confirm with **SET**.

**CHANGE MEMBRANE warning** – warns the user for the replacement of the membrane after 1 year of operation of the blower. Replacement of the membrane must be confirmed on screen: press the ▲ button and ▲ again to change the message NO to YES, and confirm with **SET**.

In the event of the malfunction of the controller, disconnect the blower from the controller and connect directly to the mains.

## Inspection and service are carried out only by AUGUST specialists or authorised representatives:

MAINTENANCE MODE	MAINTENANCE INTERVALS
Check sludge concentration	1 x 6 months
Sludge removal	1 - 2 x years
Replacement of membrane in the blower	1 x year
Check the airlift operation, aeration, flow regulator	1 x 6 months
Check the solids bag	1 x 6 months
Clean the air filter in the blower	1 x 6 months

All tasks performed must be recorded in the Unit maintenance documents.

# Removal of excess sludge

## Measurement of settled sludge content

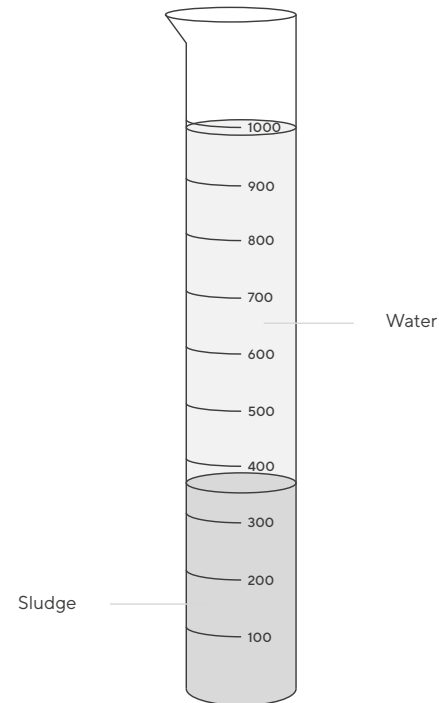
The amount of settled sludge or the settling of the mixture is determined by a sedimentation test flask (1000 ml) or a transparent vessel allowing the sludge to settle for 30 minutes. If the sludge does not settle in the sedimentation test flask, contact the Manufacturer or its representative who is authorised to perform the maintenance of the Unit. Take 1 litre of the activated sludge mixture from the aerated chamber and transfer to the sedimentation test flask. The sample is collected with the blower operating. Allow the mixture to settle for 30 minutes. After this period, check the amount of settled sludge (a clear difference between water and sludge should be visible). This should be 300–600 ml of sludge/1 l of water (most optimal: 400–500 ml of sludge/1 l of water). In such a ratio, the Unit achieves the highest treatment efficiency. The amount of settled sludge should be measured every six months, and the results should be recorded in the Unit maintenance register.

## Removal of excess sludge

If the amount of sludge in the biological reactor of the Unit exceeds 600 ml of sludge/1 l of water, the excess sludge must be removed from the Unit. The intervals and amount of removal depend on the load on the Unit. As the age of the sludge in the Unit is at least 30 days, it means that the sludge is aerobically stabilised and harmless.

**IMPORTANT:** For high groundwater level, the Unit tank may not be completely emptied, as the Unit may be raised or the tank walls may be deformed (crushed).

## Process of excess sludge removal from the Unit



- Blower is off. Aeration and agitation in the biological reactor is stopped. Also, the operation of airlifts 1, 2 and 3 is stopped.
- The contents of the biological reactor must be settled for 30 minutes. The settled sludge must then be pumped out of the bottom of the biological reactor chambers.
- Make sure that the water level between the biological reactor chambers during the removal does not exceed 15 cm, otherwise it may result in damage to the internal partitions of the Unit.
- After removal, the biological reactor chambers must be filled with water to the previous level. When filling with water, all chambers must be filled evenly, maintaining the water level difference between the chambers up to 15 cm.
- The sludge concentration in the biological reactor of the Unit after removal must not be less than 300 ml/l.
- The pump pipe for pumping excess sludge must be placed carefully into the biological reactor of the Unit without damaging the aeration elements or other internal equipment.

- The Unit may be serviced by a person aged 18 or over who is objectively able to perform this job. Such a person must be familiar with the operating procedures.
- Any work on the electrical part of the Unit must be carried out by a qualified electrician in accordance with legal regulations and standards in force.
- Use recommended tools and means when working on the Unit.
- Wash and disinfect hands after work on the Unit.
- Access to the Unit may not be covered with ice or snow.
- It is forbidden to walk on the Unit cover. The maximum cover load is 50 kg.

### **Household wastewater may contain organisms that are pathogenic to humans, and therefore, when working with the Unit, make sure to protect yourself:**

- Wear clothing with long sleeves and long trousers to avoid skin contact with the household wastewater system.
- Use rubber gloves.
- It is forbidden to keep food or drinks near the sewage samples (never store food and sewage samples in the same refrigerator).
- Remove splashed or wet clothes as soon as possible and put on clean garments, wash with disinfectant soap.
- Be sure to treat body cuts or scratches with antiseptics and protect them properly.

### **Personal and protective equipment**

- Personal and protective equipment must be used:
- Work clothes, shoes.
- Protective rubber gloves.

### **Recommended tools for the Unit maintenance:**

- Sedimentation test flask - 1000 ml (plastic or glass) for settled sludge measurement.
- Rubber gloves.
- Brush with a long handle.



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