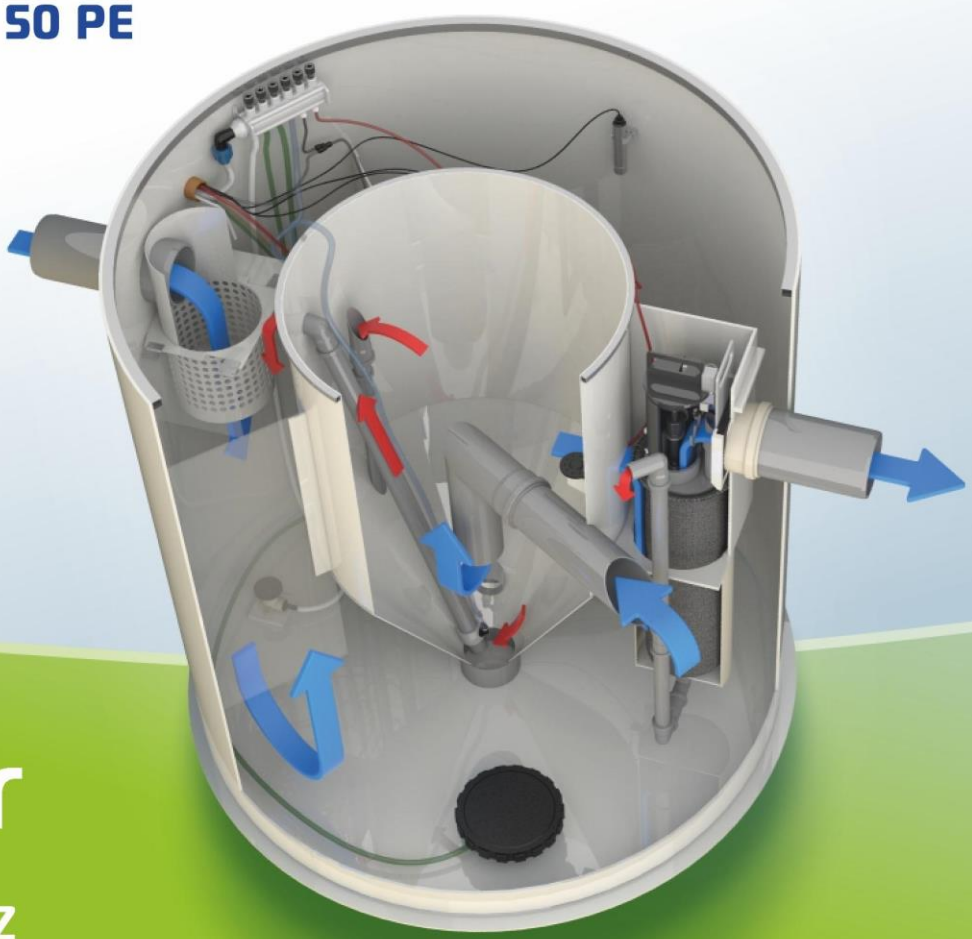
BC bio cleaner

OPERATING INSTRUCTIONS

Waste Water Treatment Plant
BC BioCleaner for 4 – 50 PE

- **BASIC**
- **OPTIMA**
- **COMFORT**
- **EXCLUSIVE**



envi pur

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This manual contains important directions and safety warnings.
Please, read this manual carefully before using the WWTP.

CE WWTP BioCleaner® is certified according to EN 12566-3+A2

Operating Rules

Identification Data	
WWTP type:	
Locality:	
Investor/Owner:	
Operator:	
Designer:	
Contractor of constructional part:	
Contractor of technological part/Supplier of WWTP:	
Person responsible for WWTP operation:	
Water law authority:	
Water law decision:	
The person appointed to perform technical revision:	

Dates and records	**Commencement**	**Termination**	**Operating Rules approval**		
			Date	**Approved by**	**Valid until**
Trial run:					
Trial run - extended:					
Permanent operation:					
Permanent operation - extended:					

Values determined by the water law decision	BOD_5	COD_{Cr}	SS	$N\text{-}NH_4^+$		
permissible value for the analyses of "p" mixed samples (mg/l)						
maximum permissible value for the analyses of "m" common samples (mg/l)						
drained amount (t/year)						

Basic data on recipient:

Name	Sewerage outlet point	Distance from WWTP
Other data:		

Important phone numbers					
Medical rescue service	Fire brigade	Police	Hygienic station		

1 TABLE OF CONTENTS

2 DESIGNATION OF COMPLIANCE ON THE PRODUCT

CE

ENVI-PUR, s.r.o. , Na Vlčovce 13/4, 160 00 Praha 6 - Dejvice
ID: 25166077

08

EN 12566-3

Biologically active sewage treatment plant

BIO CLEANER BC .. PP BASIC, BIO CLEANER BC .. PP OPTIMA, BIO CLEANER BC .. PP COMFORT, BIO CLEANER BC .. PP EXCLUSIVE - / UV

BIO CLEANER BC .. K PP BASIC, BIO CLEANER BC .. K PP OPTIMA, BIO CLEANER BC .. K PP COMFORT, BIO CLEANER BC .. K PP EXCLUSIVE - / UV

BIO CLEANER BC .. PE BASIC, BIO CLEANER BC .. PE OPTIMA, BIO CLEANER BC .. PE COMFORT, BIO CLEANER BC .. PE EXCLUSIVE - / UV

BIO CLEANER BC .. SL BASIC, BIO CLEANER BC .. SL OPTIMA, BIO CLEANER BC .. SL COMFORT, BIO CLEANER BC .. SL EXCLUSIVE - / UV

BIO CLEANER BC .. K SL BASIC, BIO CLEANER BC .. K SL OPTIMA, BIO CLEANER BC .. K SL COMFORT, BIO CLEANER BC .. K SL EXCLUSIVE - / UV

BIO CLEANER BC .. B BASIC, BIO CLEANER BC .. B OPTIMA, BIO CLEANER BC .. B COMFORT, BIO CLEANER BC .. B EXCLUSIVE - / UV

BIO CLEANER BC .. PP N BASIC, BIO CLEANER BC .. PP N OPTIMA, BIO CLEANER BC .. PP N COMFORT, BIO CLEANER BC .. PP N EXCLUSIVE - / UV

BIO CLEANER BC .. B N BASIC, BIO CLEANER BC .. B N OPTIMA, BIO CLEANER BC .. B N COMFORT, BIO CLEANER BC .. B N EXCLUSIVE - / UV

Rated daily flow rate (m^3/day):	0,6; 0,9; 1,2; 1,5; 1,8; 2,25; 2,4; 3,0; 3,75; 4,5; 5,25; 6,0; 6,75; 7,5 *
Rated organic daily load (kg of BSK_5/day)	0,24; 0,36; 0,48; 0,60; 0,72; 0,90; 0,96; 1,20; 1,50; 1,80; 2,10; 2,40; 2,70; 3,00 *
Material:	PP, PE, stainless steel, concrete *
Water tightness (water test):	it met the standard
Compressive strength (at the failure limit):	it met the calculation
Durability:	it met the standard
Fire resistance:	F
Impact of hazardous substances:	NPD

Cleaning efficiency during the test according to EN 12566-3 with the organic daily load of BOD_5 = 0,208 kg/d and with 0,306 kg/d:

Index	Values at the outlet (mg/l)	Efficiency (%)
BOD_5	XX	XX
COD_{Cr}	XX	XX
SS	XX	XX
$N\text{-}NH_4^+$ **	XX	XX
N_{total}	XX	XX
P_{total}***	XX	XX
Enteroccoci	XX (KTJ/100ml)	XX
Escherichia coli	XX (KTJ/100ml)	XX
Fek. kolif. bakt.	XX (KTJ/100ml)	XX
Coliform bacteria	XX (KTJ/100ml)	XX
Somatic coliphage	XX (PTJ/ml)	XX

*…… Depending on the WWTP size and variant
**…. At the mixed liquor temperatures above 12°C
***…. With P-Less (phosphorus precipitation equipment)
XX…. According to WWTP type with the specified additional equipment (phosphorus precipitation, UV disinfection, etc.), see chapter 23 Technical specification – parameters of cleaned water

MANUFACTURER:
ENVI-PUR, s.r.o., Na Vlčovce 13/4, 160 00 Prague 6 – Dejvice, Czech Republic
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SERVIS:
Authorized person (or authorized dealer) according to the list at www.envi-pur.cz

OR

ENVI-PUR, s.r.o., Wilsonova 420, Soběslav 392 01, Czech Republic
tel.: 381 203 211; fax: 381 251 739; e-mail: info@envi-pur.cz

3 INTRODUCTION

3.1 GENERAL

This manual should allow you to thoroughly familiarize yourself with the treatment plant and its safe and trouble-free operation.

By following these instructions, it is ensured that the rules of safe use will be followed when using the treatment plant at a level corresponding at the same time to the safety standards, regulations and correct technical procedures in force.

It is necessary to be familiarized with this manual before using the WWTP. Do not perform any operations until you have read this manual thoroughly and understood all the instructions listed in it.

3.2 GRAPHICAL LABELLING OF INSTRUCTIONS

Very important instructions and warnings are highlighted in this service manual in the following way:

Instructions, infringement of which might cause danger to people or property.

Prohibited activities.

Other important instructions.

4 USE AND GENERAL DESCRIPTION OF WWTP

The WWTP of type BC biocleaner® is a biological WWTP that works the principle of low-loaded activation with complete aerobic stabilization of the sludge. The activation is organized as a so-called D-N process, i.e. activation with nitrification and prior denitrification. The entire treatment process takes place in one tank – the BC biocleaner® biological reactor, which is divided into several sections with different technological parameters of operation.

The WWTP tank - biological reactor BC biocleaner® - consists of a plastic (or eventually stainless steel or concrete) container intended for installation into the ground. On the basis of a custom special order, the technological installation of the WWTP can be fitted into an existing concrete tank of appropriate dimensions. The basic device that ensures air supply to the system is the blower. Mixing and aeration of the activation mixture is carried out using aeration elements. Forced pumping of return sludge and floating impurities from the settling tank is ensured by use of so-called hydraulic-pneumatic pumps (hereinafter referred to as mammoth pumps).
A part of the WWTP is also a control unit or electrical switchboard (depending on the variant of the WWTP and the comfort of the operator) and the blower, which are installed near the tank, e.g. in a cellar, garage, pillar, utility room, etc.

At the customer's request, the WWTP technology can also be equipped with, for example, a dosing pump (precipitation of excess phosphorus), an oxygen probe, a tertiary filter or UV disinfection on the outlet.
In terms of construction, the WWTP can be supplemented with, for example, a sump, a septic tank or a sludge tank.

5 OPERATING CONDITIONS OF THE WWTP

The treatment plant is designed for continuous operation in such a way that it is able to treat waste water in a quantity and quality corresponding to its expected load, which results from the project documentation according to the size and type of the connected object.

For the proper function of the WWTP it is necessary to keep it on permanently.

Given that biological processes take place in the treatment plant, for the correct functioning of the treatment plant, it is necessary to prevent the introduction of substances into the treatment plant that can cause the death of living microorganisms.

It is NOT allowed to supply the sewage connected to the WWTP or the tank of the WWTP itself with:

- **Fats in higher concentration,**
- **regeneration solutions from household softeners,**
- **washing water from the filters of the domestic water treatment plant**
- **paints, varnishes and thinners,**
- **strong disinfectants, acids and alkalis**
- **waste water from condensing boilers (low pH),**
- **rain water,**
- **waste from the kitchen garbage disposal.**

The quality of waste water treatment is also negatively affected by the presence of a large amount of detergents and tensides. We recommend avoiding frequent doing laundry too frequently in a short period of time (e.g. washing several washing machines during the weekend). The negative effect is manifested by an increase in the pH value and a worse transfer of oxygen into the water, which are factors affecting the activity of microorganisms. It is more suitable to wash clothes at intervals of several days.

As for disinfectants, we generally recommend those that do not contain chlorine compounds (sodium hypochlorite).
However, during normal household operation, the usually used amount of cleaning agents should not affect the operation of the WWTP.

At the inflow to the treatment plant, coarse and floating dirt (toilet paper, kitchen waste, etc.) is caught in the screen basket, which must be removed at regular intervals (in the worst case, it can even clog the sewer).

To reduce the frequency of cleaning the bin, we recommend preventing the following from being brought into the treatment plant:

- **Plastics,**
- **rubber,**
- **textiles,**
- **food leftovers,**
- **sanitary needs (pads, tampons),**
- **condoms,**
- **diapers,**
- **wet wipes, tissues, etc.**

6 SAFETY INSTRUCTIONS

6.1 COMPETENCE REQUIREMENTS OF PERSONS (COMPANIES)

To ensure the adequate safety level of people and trouble-free operation, activities related to the operation, maintenance and servicing of the WWTP must be carried out only by persons (companies) with the appropriate competence.

Operation and maintenance of the WWTP to the extent described in these instructions may only be performed by persons over 18 years of age who are physically and mentally capable of performing the described activities and are familiar with these instructions.

Service of the WWTP can only be performed by the company ENVI-PUR, s.r.o. or a person (company) trained and authorized by ENVI-PUR, s.r.o. (hereinafter referred to as an authorized person).

Any intervention in the electrical parts of the WWTP may only be carried out by persons with appropriate electrical technical qualifications.

Pregnant (breastfeeding) women and children must not operate and maintain the WWTP.

6.2 PRINCIPLES OF SAFE USE

- **Read this manual thoroughly before using the WWTP.**
- **Do not carry out any activities in connection with the use of the WWTP that do not follow from this manual.**
- **Strictly follow the measures to protect against the dangers described in this manual, especially in chapter 6.4.**
- **Always use prescribed personal protective equipment.**

6.3 STOPPING AND SHUTDOWN

To avoid possible danger and in case of need, it is possible to turn off the WWTP:

- by turning off the circuit breaker in the electrical switchboard, or by disconnecting the blower from the electrical outlet (depending on the type of treatment plant).

6.4 PREVENTION AGAINST POSSIBLE DANGER

6.4.1 General

Although the WWTP was designed in accordance with the currently valid safety standards, regulations and correct technical procedures, during its construction it was not possible to exclude the dangers described below, which arise from the nature and purpose of use of the WWTP.

6.4.2 Contact with sewage water

Waste water in the treatment plant, sludge, rakes (substances caught in a basket or screens for coarse dirt), used work tools and clothing can be a source of various infections. When operating and maintaining the WWTP, try to avoid direct contact with waste water, sludge and rakes and observe general hygiene principles.

- **While working pay extra attention, do not eat, drink or smoke.**
- **Wear appropriate work clothes and rubber gloves.**
- **Tools and equipment that have come into contact with waste water, sludge or rakes wash thoroughly with water.**
- **Store used work clothes, gloves, tools and accessories in a suitable place.**
- **After work, wash your hands thoroughly with at least soap and warm water.**

6.4.3 Falling into the tank

After opening (removing) the cover it is possible to fall into the tank.

- **Pay extra attention while working.**
- **Do no leave the tank of the WWTP open without supervision.**
- **Do not enter the tank area (the WWTP is designed in such a way that all usual activities can be carried out from the outside area without the need to enter).**

In the case of emergency events in which it is necessary to enter the tank, follow all generally valid safety principles and regulations for entering underground structures.

- **The internal parts of the tank are not intended as walking surfaces or elements.**
- **In the case of installing the tank into a greater depth, it is necessary to solve the entrance to the tank as part of the project in accordance with the relevant safety regulations.**

6.4.4 Handling the waste

During the operation of the WWTP, waste (sludge, rakes) is generated, which must be disposed of separately in an appropriate manner.
Rakes are disposed of together with other waste by taking them to a municipal waste dump.
Excess sludge can be pumped out using a fecal truck and disposed of at a larger WWTP with a sludge terminal.
In the case of a small residential treatment plant (BC 4 or BC 6), it is also possible to store the pumped-out excess sludge in an own compost. With this method of disposal, it is recommended to sprinkle the layer of sludge with lime and then cover it with a layer of some other material (e.g. leaves, grass, etc.). Sludge should not be stored only as a top layer.
The pumped-out excess sludge must not be stored in such a way that it affects the quality of underground and surface water.
At the DUO type WWTP, the excess sludge is pumped into the primary sedimentation tank (septic tank) and, after it is filled, the sludge is taken away by a fecal truck for subsequent disposal.

The operator/owner of the WWTP is responsible for waste disposal.

Sludge and water drained from the treatment plant are considered waste and must be disposed of in accordance with applicable legal regulations.

6.4.5 Other dangers

Other dangers and protection against them are pointed out, if necessary, in the relevant parts of this manual.

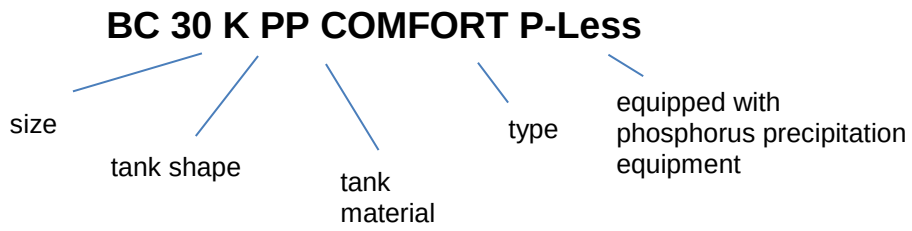
7 VARIANTS AND SIZES OF THE WWTP

7.1 GENERAL

This operating manual is made for the entire line of WWTP's type BASIC, OPTIMA, COMFORT, EXCLUSIVE, EXCLUSIVE UV, which differ in:

- size in terms of the possible waste water flow and the related construction of the tank,
- a variant in terms of static tank dimensioning,
- a variant in terms of the material design of the tank,
- a variant according to operator comfort,
- WWTP equipment.

Example of BC biocleaner WWTP labeling:



For correct orientation in this manual, it is necessary to know the size and variant of the WWTP you are operating. You can find this information in the warranty card, which is part of the service book.

Due to the variability of the WWTP type series, not all images in this manual may correspond exactly to the treatment plant you operate.

Products and machines marked with this symbol ¤) may be replaced in the future by another type or product of another manufacturer with the same characteristics.

7.2 WWTP SIZE AND OUTER TANK SHAPE

The size of the treatment plant is defined by the number after the BC designation (4, 6, 10, 12, 16, 20, 25, 30, 40, 50), which expresses the number of equivalent inhabitants (PE) in the connected facility. The treatment plant is able to work in the 50-100 % load mode.

Tank shape:

	Labeling	Variants	Labeling example
Cylindrical tank	*without labeling*	BC 4 – 30	BC 20 PP COMFORT
Rectangular tank (container)	**K**	BC 16 – 200	BC 20 **K** PP COMFORT

The different locations of individual parts of the treatment plant are related to the shape of the tank.

7.3 STATIC TANK DIMENSIONING

A self-supporting tank is a treatment plant tank designed to be placed below ground level (overfill) under specified conditions without additional static securing.

In the event of the presence of groundwater or in case of increased load on the terrain around the treatment plant, the treatment plant must always be concreted (does not apply to treatment plants in a concrete tank).

7.4 MATERIAL OF THE WWTP TANK

Labeling:
„**PP**“ polypropylene tank
„**PE**“ polyethylene tank
„**SL**“ stainless steel tank
„**B**“ concrete tank

7.5 OPERATOR COMFORT

The type in terms of operator comfort and related design modifications is defined by the marking after the nominal size number. The treatment plant is produced in basic variants:

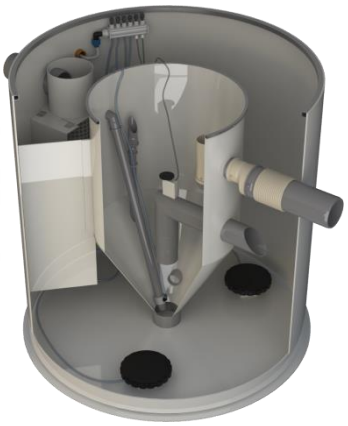
BASIC
Basic economic solution (only sizes BC 4 and BC 6) equipped with manually launched removal of floating dirt.

OPTIMA
Equipped with a more comfortable Optima control unit and manually launched floating dirt removal (sizes BC 4 and BC 6).

COMFORT, EXCLUSIVE and EXCLUSIVE UV
Equipped with a comfortable COMFORT Plus control unit and automatic removal of floating dirt (sizes BC 4 to BC 50).

7.6 WWTP EQUIPMENT

BC BASIC



Control unit:

- Timer switch (240 V, the shortest cycle 15 min) ¤)

Tank design:

Cylindrical:

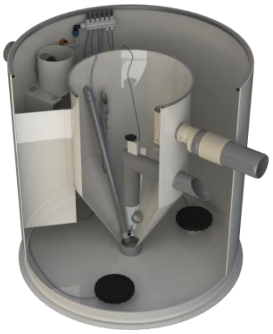
- BC 4 PP BASIC, BC 6 PP BASIC
  - tank made of 8 mm PP (self-supporting construction)
- BC 4 B BASIC, BC 6 B BASIC
  - concrete tank

BC OPTIMA

Control unit:

- **Optima**¤) (for BC 4 – 6 with Secoh blower¤) JDK 60 – JDK 80 / 240V)
  - control of the treatment plant (blower start / stop) by the control unit, on which you can set one of 10 interval programs for the blower.

Tank design:



Cylindrical:

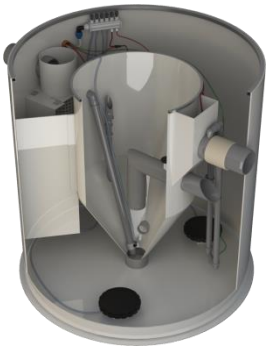
- BC 4 PP OPTIMA and BC 6 PP OPTIMA
  - tank made of 8 mm PP (self-supporting construction)
- BC 4 B OPTIMA up to BC 6 B OPTIMA
  - concrete tank

BC COMFORT

COMFORT Plus ¤) **control unit**

- 13 programmable modes – control of the WWTP (blower start / stop) by the control unit, on which you can set one of the 13 preset blower operation programs.
- Options of other modes – weekend, holiday, ...
- Possibility to add control via cell phone or WEB.
- Possibility of connecting other devices (phosphorus precipitation device, oxygen probe, …).

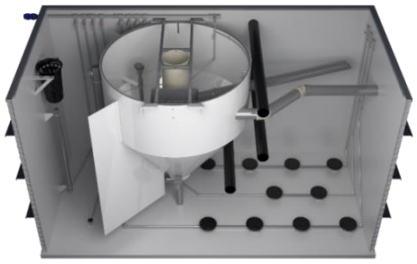
Tank design:



Cylindrical:

- BC 4 PP COMFORT up to BC 30 PP COMFORT
  - tank made of 8 mm PP (self-supporting construction)
- BC 4 B COMFORT up to BC 20 B COMFORT
  - concrete tank

Container:



- BC 16 K PP N COMFORT up to BC 50 K PP N COMFORT
  - container made of wall elements with reinforcements for concreting
- BC 16 K PP COMFORT up to BC 50 K PP COMFORT
  - container made of wall elements with reinforcements for backfill
- BC 16 K B COMFORT up to BC 50 K B COMFORT
  - concrete tank

BC EXCLUSIVE

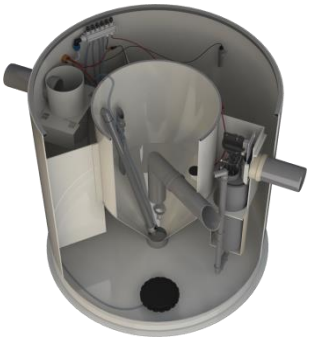
COMFORT Plus ¤) control unit

- 13 programmable modes – control of the WWTP (blower start / stop) by the control unit, on which you can set one of the 13 preset blower operation programs.
- Options of other modes – weekend, holiday, ...
- Possibility to add control via cell phone or WEB.
- Possibility of connecting other devices (phosphorus precipitation device, oxygen probe, …).

Tertiary filter on the outlet ¤) – capture of dirt larger than 0,5 mm

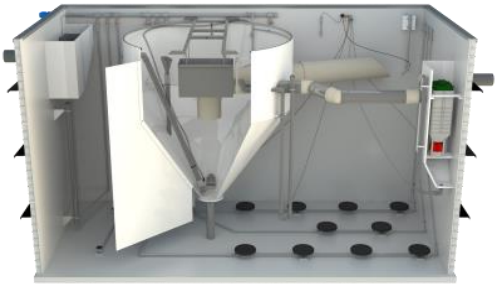
Tank design:

Cylindrical:



- BC 4 PP EXCLUSIVE up to BC 25 PP EXCLUSIVE
  - tank made of 8 mm PP (self-supporting construction)
- BC 4 B EXCLUSIVE up to BC 20 B EXCLUSIVE
  - concrete tank

Container:



- BC 16 K PP EXCLUSIVE up to BC 50 K PP EXCLUSIVE
  - container made of wall elements with reinforcements for backfill
- BC 16 K B EXCLUSIVE up to BC 50 K B EXCLUSIVE
  - concrete tank

BC EXCLUSIVE UV

COMFORT Plus ¤) control unit

- 13 programmable modes – control of the WWTP (blower start / stop) by the control unit, on which you can set one of the 13 preset blower operation programs.
- Options of other modes – weekend, holiday, ...
- Possibility to add control via cell phone or WEB.
- Possibility of connecting other devices (phosphorus precipitation device, oxygen probe, …).

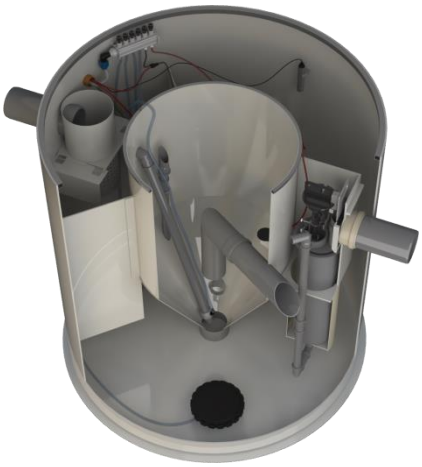
Tertiary filter on the outlet ¤) – capture of dirt larger than 0,5 mm

UV disinfection – elimination of bacteria and viruses

Tank design:

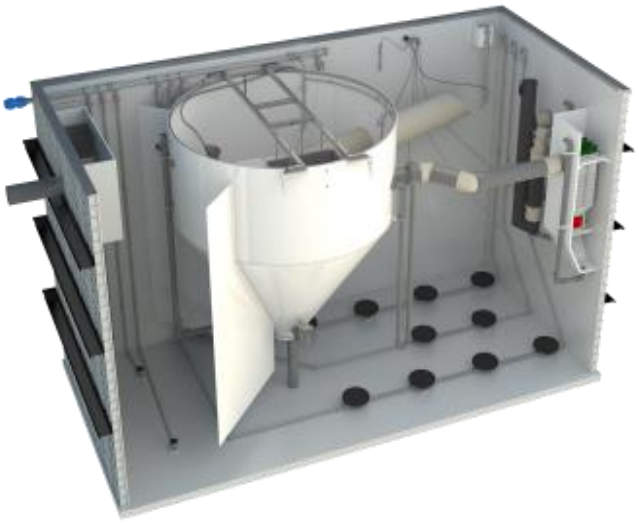
Cylindrical:

- BC 4 PP EXCLUSIVE UV up to BC 25 PP EXCLUSIVE UV
  - tank made of 8 mm PP (self-supporting construction))
- BC 4 B EXCLUSIVE UV up to BC 20 B EXCLUSIVE UV
  - concrete tank



Container:

- BC 16 K PP EXCLUSIVE UV
  up to BC 50 K PP EXCLUSIVE UV
  - container made of wall elements with reinforcements for backfill
- BC 16 K B EXCLUSIVE UV
  up to BC 50 K B EXCLUSIVE UV
  - concrete tank



Equipment overview of domestic WWTP (BC 4 – 12) by type:

WWTP type	BASIC	OPTIMA	COMFORT	EXCLUSIVE	EXCLUSIVE UV
Self-supporting tank (8 mm PP)	●	●	●	●	●
Concrete tank	◘	◘	◘	◘	◘
Double-tank BC DUO (meeting class III. according to NV 401/2015 Coll.)			◘	◘	◘
Automatic cleaning of the settling tank water surface	●**	●**	●	●	●
Lowering the settling tank level	–	–	●	●	●
Tertiary filter	–	–	–	●	●
UV disinfection				o	●
Precipitation of phosphorus (P-LESS)	o	o	o	●	●
Replaceable aerators during operation	–	–	–	●	●
Possibility of connecting an oxygen / pH probe	–	–	o	o	o
Possibility of GSM connection (remote management)	–	–	o	o	o
Possibility of operation and faults monitoring, control via an Internet server	–	–	o	o	o
● standard equipment □ o possible to order additionally ◘ optional for the new WWTP ** manual launch					
Discharge into surface water	yes	yes	yes	yes	yes
Discharge to groundwater (infiltration)	* yes	* yes	* yes	yes	yes
* if P-LESS is part of the WWTP					

8 IDENTIFICATION AND LABELLING

The WWTP is provided with production labels placed inside the tank on WWTP technology.

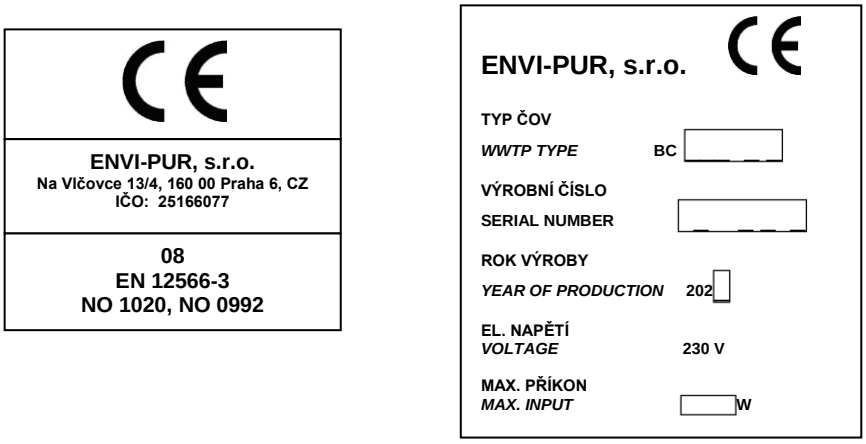


Fig. 1: Production labels

A separate Declaration of Performance (DoP) is issued for each treatment plant, which is specific to the particular treatment plant. This DoP has the same production number and also contains specific data that indicate the design of the WWTP according to the following key.

The full designation (nomenclature) includes the following:
BC "size" "tank shape" "tank material" "self-supporting capacity of the tank" "model" "P-LESS" "DUO"

Explanation of identifiers:

„**size**“	4, 6, 10,...
„**tank shape**“	K – container, without labeling – cylindrical tank
„**tank material**“	PP (polypropylene), PE (polyethylene), SL (stainless steel), B (concrete)
„**model**“	BASIC, OPTIMA, COMFORT, EXCLUSIVE, EXCLUSIVE UV
„**P-LESS**“	precipitation of phosphorus, without labeling - a WWTP without the phosphorus precipitation equipment
„**DUO**“	assembly of a WWTP with a primary sedimentation tank, without labeling - only the WWTP itself

9 INSTALLATION AND PUTTING INTO OPERATION

Installation and putting into operation of the WWTP is carried out by an authorized person. The installation must be carried out in accordance with the project documentation prepared by an authorized person based on the documents of the company ENVI-PUR, s.r.o. **After the WWTP has been installed and put into operation, an authorized person will train the operator and hand over the WWTP to the owner/operator.**

After installation, the tank is filled with clean water and the individual air valves on the air distributor are adjusted, see chapter 9.1 and 9.2. Options of the WWTP start-up are listed in chapter 19.

The following documentation was given to you during the handover of the WWTP:

- These operating instructions,
- service book (contains warranty card, tank watertightness report, electrical equipment inspection report),
- instructions for operating and maintaining the blower,
- electrical wiring diagram,
- instructions for operation and maintenance of the dosing pump, if supplied,
- instructions for operation and maintenance of the external UV disinfection (if included in the delivery).

The operating instructions can be used as the **Operating Rules of the WWTP** after completing the specific data (see page 1) relating to the installed WWTP and approval by the relevant Water Management Authority.

Do not operate the WWTP unless it has been handed over by an authorized person.

Please check:

- **Whether the type and the production number of the WWTP (on the label) corresponds to the data in the warranty card,**
- **whether the type of the WWTP corresponds to the type of the WWTP in the project documentation,**
- **whether the documentation in the above-mentioned scope was handed over to you.**

If you discover any discrepancies, contact the company ENVI-PUR, s.r.o.

9.1 RECOMMENDED AIR DISTRIBUTOR SETTINGS FOR BC 4–12 WWTP

Setting

In the new treatment plant, the valves are in the basic setting (see picture). For the correct operation of the WWTP, it is necessary to adjust the settings according to local conditions. Air flow is adjusted by turning the valves counterclockwise. The circular section marked in white shows the rotation of the valves compared to the original position (open state).

Adjust the individual valves by turning them counterclockwise by the values shown in the figure. The shown picture of the air distributor is only indicative and it is always necessary to follow the air distribution wiring diagram for the individual type of WWTP.

Explanatory notes

1. Set the coarse-bubble aeration element under the inlet basket to moderate bubbling – it ensures mixing of return sludge with waste water and aeration of the coarse mechanical impurities basket in order to grind and break these impurities.

2. – 4. Fine-bubble aeration elements – open the valves fully (360° opening) – ensure mixing of the activation mixture in the nitrification zone.
5. The return sludge mammoth pump is adjusted to such a power that the recirculated activation mixture flows evenly from the pipe and the stream does not splash all the way to the basket – it ensures that the return sludge is pumped from the settling tank back to the denitrification zone.
6. Clearing the water surface of the settling tank – a slight bubbling is set, and if no surface dirt is formed, it closes completely – it ensures the breaking of surface dirt.
7. Connected only to EXCLUSIVE or EXCLUSIVE UV WWTPs. Adjust so that the water flows out moderately. It is used to desludge the tertiary filter box.

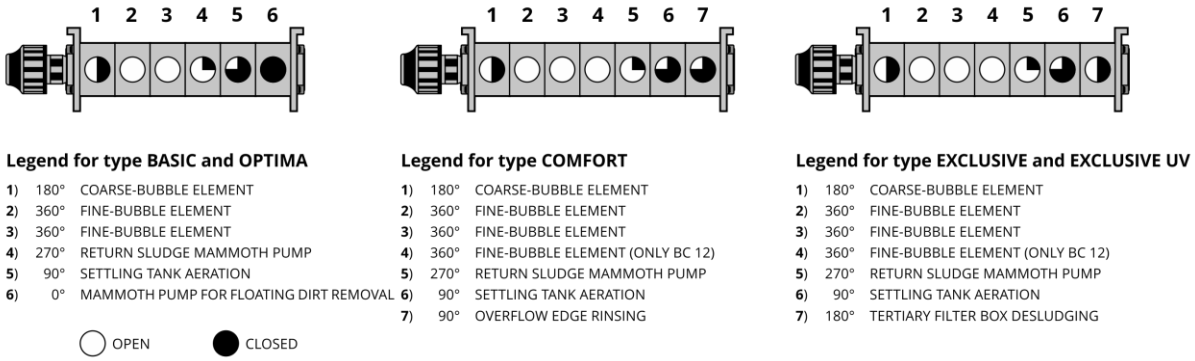


Fig. 2: Setting of the valves on the air distributor for WWTP 4–12

A small air leak from the air system does not affect the functionality of the WWTP.

Note: The setting according to the picture cannot be considered absolute, it may differ for each WWTP installation. The valve is in the closed position if it does not let through any amount of air, but when the valve is turned 5° counterclockwise from this position, air must pass through.

9.2 RECOMMENDED AIR DISTRIBUTOR SETTINGS FOR BC 16–50 WWTP

1. Aeration of the settling tank - Set the coarse-bubble aerator so that the surface layer of floating impurities is broken. ONLY mild bubbling is recommended (Sludge is supposed to settle in the settling tank, therefore it is inappropriate to let excessive amounts of air into this zone and swirl it unnecessarily. Bubbling is only used to break up the sludge layer on the surface). Bubbling in the sedimentation zone is not always needed.
2. Fine-bubble elements / grate in the nitrification zone - open the valves fully.
3. Return sludge mammoth pump - set a uniform flow - approx. 1/2 the diameter of the pipe, water must not be splashing.
4. Set the coarse-bubble aeration elements under the inlet basket to mild bubbling. Used for mixing sludge.
5. Basket – set a mild bubbling. It is used to grind the contents of the basket.

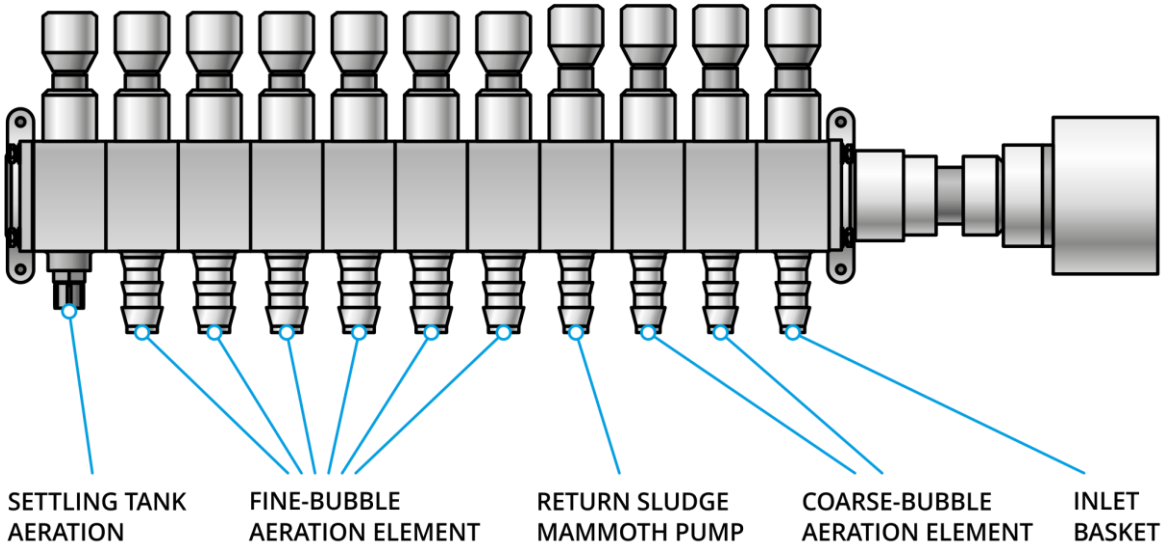


Fig. 3: Description of the air distributor for

9.3 THE REFERENCE VALUES OF DISSOLVED OXYGEN IN INDIVIDUAL ZONES (OPERATING CONDITIONS)

Measuring with the oxygen probe:

Denitrification zone	0,5 – 1 mg/l
Activation/nitrification zone	1–3 mg/l
Sedimentation zone	1 mg/l

10 BRIEF DESCRIPTION OF THE WWTP

10.1 GENERAL

This chapter provides a description of the WWTP. It is necessary to be familiarized with it before carrying out operation and maintenance.

The basic parts of the WWTP are:

- The **BC biocleaner® reactor** is a cylindrical or square tank equipped with technological partitions, built-ins and equipment, where the entire process of water purification takes place. The tank is situated below ground level, above ground level it is covered with a laminate lid. The tank is made of polypropylene (BC...PP), stainless steel (BC...SL) or concrete (BC...B), alternatively polyethylene (BC...PE). Under special conditions, the BC biocleaner® reactor can be installed only as a technological installation in a concrete tank or concrete sump (e.g., in the original sump of the septic tank).
- **Blower** serves as an air source for the WWTP; placed in a building (e.g., in a garage, basement) or in a pillar, wooden technical house, etc.
- **Timer switch/time relay, electrical switchboard with control unit** used to control WWTP operation; placed in a building (e.g., in a garage, basement) or in a pillar or technical house.
- **The air supply** to the BC biocleaner® biological reactor is conducted using a PVC hose and possibly also PP hoses placed in a protective cover below ground level.
- **Pumps – mammoths**
  In the BC biocleaner® reactor, if necessary, pumping is done using a hydro-pneumatic pump (the so-called mammoth pump), i.e., a device that uses the difference in density of its own liquid and the mixture of liquid and air for pumping. The mammoth pump function is simplified in the following figure:

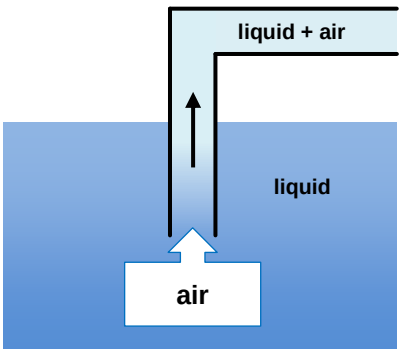


Fig. 4: Mammoth pump function description

10.2 BIOLOGICAL REACTOR BC BIOCLEANER®

A biological reactor consists of a plastic (or stainless steel or concrete) tank, in which a built-in made of plastic is placed. All metal parts of the construction are made of stainless steel.

Installation in the tank creates 3 hydraulically separate zones:

- **Inlet area (denitrification zone),**
- **activation area (nitrification zone),**
- **settling area (settling zone).**

Waste water is brought to the WWTP through the sewer system. Under the sewer inlet pipe, there is a removable screen basket (hereinafter referred to as the "basket") with holes with a diameter of approx. 16 mm. An aeration element is placed under the basket for better elimination of captured organic impurities. The amount of air under the basket is manually regulated by a separate valve. The amount of air should only be such as to ensure sufficient breakup of trapped impurities (e.g., toilet paper). It is not advisable to let an excessive amount of air under the basket, because then there will not be enough air for the other elements of the air system!

Denitrification zone
The inlet area is used for the first step of biological removal of nitrogen pollution from waste water in the absence of atmospheric oxygen. Waste water, return sludge and any floating impurities from the settling area are brought into this part of the tank. Mixing of return sludge with waste water is ensured by means of a coarse-bubble aeration element, which also aerates the basket of coarse impurities. The mixing intensity is adjusted using a control valve.

From the WWTP size BC 16 EO, one pipe element ensures aeration of the basket, and another 1-2 coarse-bubble elements ensure mixing of the denitrification zone. The amount of air should be such that "geysers" do not form on the surface during mixing.

Nitrification zone
The nitrification zone occupies a part of the biological reactor between the walls of the tank, the denitrification and settling zone. The 2nd step of nitrogen removal in the presence of oxygen takes place here. The mixing and oxygenation of the activation mixture is ensured here by blowing air into the fine-bubble aeration elements that are attached to the bottom. The individual air supplies to the elements must always be fully opened.

Sedimentation zone
The settling tank is made of plastic. Activated sludge is being separated (sedimentation) from purified water in the settling tank. The water surface of the settling tank is being clarified using a coarse-bubble aerator to prevent the formation of a crust of floating impurities.

In the case of the BASIC and OPTIMA type, treated water flows freely below the surface into the outlet pipe.

As for the other variants, the outlet of treated water is regulated by means of an overflow edge, a slot on the outlet pipe. A bore wall is placed in front of the outlet pipe to capture floating impurities.

WWTPs of the EXCLUSIVE/EXCLUSIVE UV type have a tertiary filter on the outlet to capture impurities in the treated water.

Each WWTP is equipped with a return sludge mammoth pump, which pumps part of the settled sludge from the settling tank back into the inlet zone. This mammoth pump must always be running when the blower is running!

A mammoth pump is installed in the settling tank to remove any impurities from the surface. For the BASIC and OPTIMA WWTP type, the mammoth pump is only started manually. As for the other types of the WWTPs, the removal is automatic and includes a mammoth pump that periodically lowers the operating water level.

Aeration and mixing equipment, mammoth pump
A fine-bubble aeration system is used to ensure the supply of oxygen for the biological cleaning process and to keep the activation mixture afloat. A blower serves as the air source.

The aeration system is created using several fine-bubble disc aeration elements, 1-2 pieces of coarse-bubble elements and possibly one pipe element - depending on the type of the WWTP.

A mammoth pump is used to pump the settled sludge from the settling tank back to the denitrification zone and to pump out floating impurities.

The air supply to the WWTP to the aeration system and to the mammoth pump is regulated using valves located on the air distributor.

10.3 ABOVE-STANDARD EQUIPMENT OPTIONS

- ***Phosphorus Precipitation (Optional accessories)***

Excess phosphorus, which can no longer be removed biologically, is chemically precipitated by dosing aluminum salts in the form of commercially available solutions. The dosing assembly is supplied as a complete set – dosing pump, canister and catch basin. This entire set is installed together with the blower in the space of the garage, cellar, pillar or wooden technical house. The dosing pump should not be more than 10 m away from the WWTP.
Detailed description is given in Chapter 18.

- ***Tertiary Final Treatment - Mechanical Filter (Accessory of the EXCLUSIVE and EXCLUSIVE UV type)***

A mechanical filter can be installed on the outlet from the WWTP, which ensures the capture of any impurities that may have escaped from the settling tank. The filter is placed in a separate box on the outlet pipe. Impurities that get caught on the filter or settle in the box are automatically pumped back to the activation area by the mammoth pump.
We recommend checking the filter once a month and, if necessary, rinsing it manually in a bucket of water or with a stream of clean water from a hose.
Detailed description is given in chapter 18.

- ***UV Disinfection***

The EXCLUSIVE WWTP type can be additionally extended with an UV disinfection lamp, which is installed in the plastic box of the mechanical filter or behind the mechanical filter (depends on the size of the WWTP).

- ***Oxygen/pH probe***

The oxygen probe (oximeter) is used to control the operation of the blower according to the current need for oxygen in the nitrification zone, which leads not only to a reduction in blower operation costs compared to control with time intervals, but also to achieving optimal conditions for the activation process.

It is advisable to install the pH probe in a WWTP with no inlet of standard waste water - e.g., inlet of industrial waste water. The pH probe can be used to monitor water quality and possibly optimize the pH value in the activation process. pH values outside the optimal range of 6-8 can inhibit or stop waste water treatment processes.

- ***Possibility of GSM Connection (Remote Management)***

A WWTP equipped with a COMFORT plus control unit with GSM can be controlled using command SMS sent from a cell phone. At the same time, the WWTP can send a notification in the form of an SMS message to the selected mobile number in the event of a malfunction.

- ***Possibility of operation and faults monitoring, control via an Internet server***

For the WWTP equipped with the COMFORT Plus control unit with GSM, the WWTP control system can be put into operation via the web interface through the GSM data transfer. A WWTP equipped with the COMFORT plus control unit with GSM, is possible to be operated via the web interface using GSM data transmission.

- ***PRIM primary sedimentation tank (WWTP meeting class III. requirements)***

A primary sedimentation tank (hereafter referred to as PRIM) is installed in front of the WWTP's own tank. Waste water supplied through the sewage system first flows into this tank, which serves as the primary sedimentation of coarse impurities. Water freed from gross impurities flows into the biological reactor by gravity overflow.
Excess sludge from the WWTP is pumped into the PRIM tank.

- ***Replaceable aerators during operation***

WWTPs BC 4-10 can be equipped with a system of replaceable aerators during operation. This is standard equipment for BC 4 – BC 10 EXCLUSIVE and EXCLUSIVE UV treatment plants. Aerators should be replaced by an authorized person.

10.4 WWTP FUNCTION

Waste water treatment takes place in the BC biocleaner® reactor, which is divided into individual functional zones using partitions and built-ins according to the following scheme:

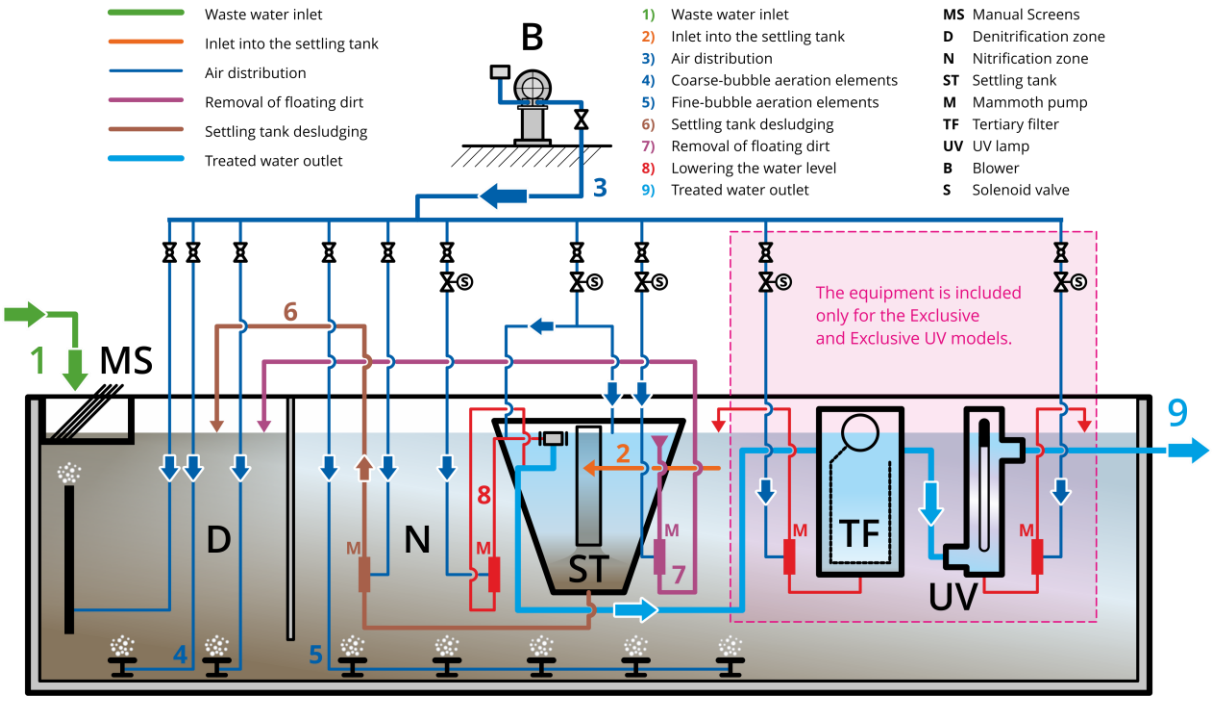
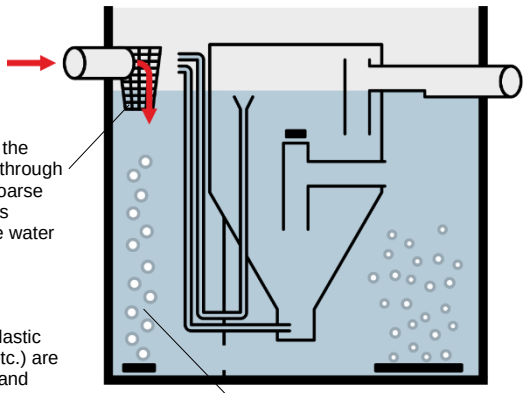


Fig. 5: Technological scheme of the WWTP

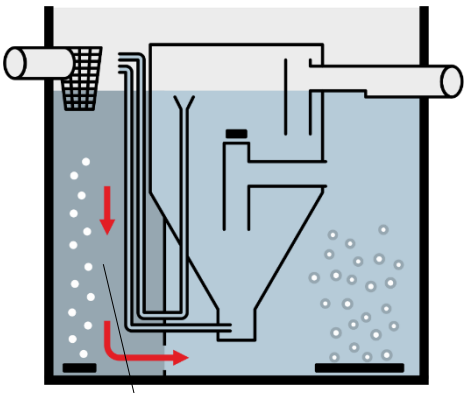
BASIC and OPTIMA type



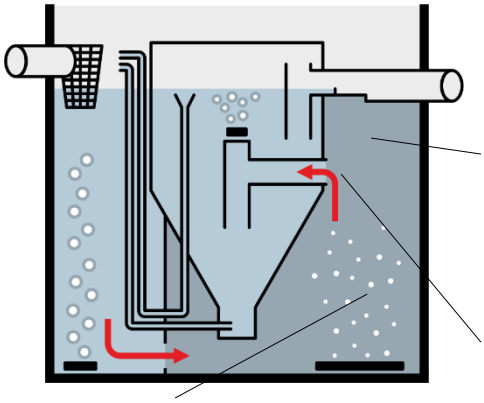
The waste water from the sewage system flows through the basket, in which coarse impurities and particles contained in the waste water are captured.

Non-biodegradable substances (rubber, plastic and textile products, etc.) are trapped in the basket and must be removed at regular intervals.

The content of the basket is being grinded up from below by the air from the coarse-bubble element.



Mechanically pretreated water from the basket flows into the denitrification zone. This is where the 1st phase of biological nitrogen removal takes place. The water flows through an opening in the partition into the nitrification zone.



In the nitrification zone, the 2nd phase of biological removal of organic pollution takes place (by oxidation of ammoniacal nitrogen).

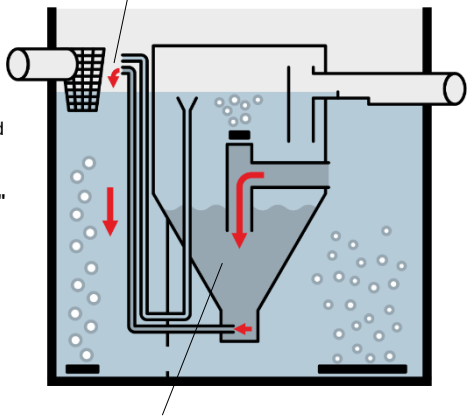
A mixture of water and activated sludge is created in the zone.

Activated sludge is a mixture of microorganisms that "feed" on organic substances from waste water and at the same time consume oxygen.

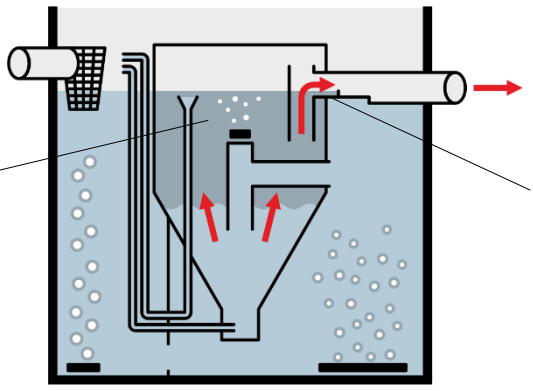
Water with activated sludge flows into the settling zone.

A high concentration of oxygen is maintained in the zone by supplying air using a fine-bubble aerator located at the bottom.

Part of the settled sludge is taken back to the denitrification zone by a mammoth pump.



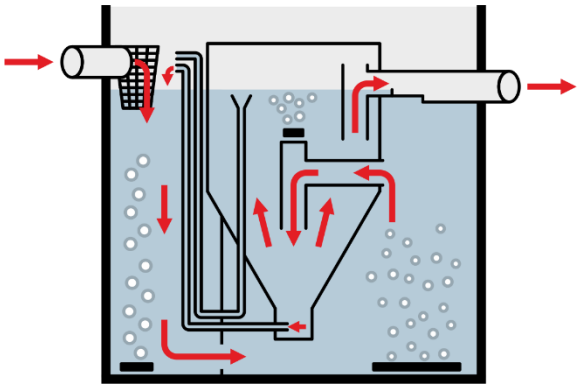
In the settling zone, the treated water and activated sludge are separated by sedimentation. Sludge accumulates at the bottom.



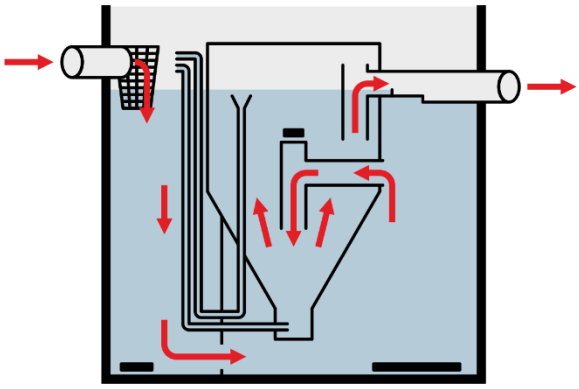
Treated water accumulates in the upper part of the settling zone and flows into the outlet pipe.

Treated water flows out of the outlet pipe.

During the treating period, 2 phases **C1** and **C2** alternate cyclically. During phase **C1**, the blower is switched on (thus aerating), during phase **C2** the blower is switched off. Turning on (off) the blower is controlled using a timer switch for the type **BASIC** or a timer switch/time relay or control unit for the **OPTIMA** type.

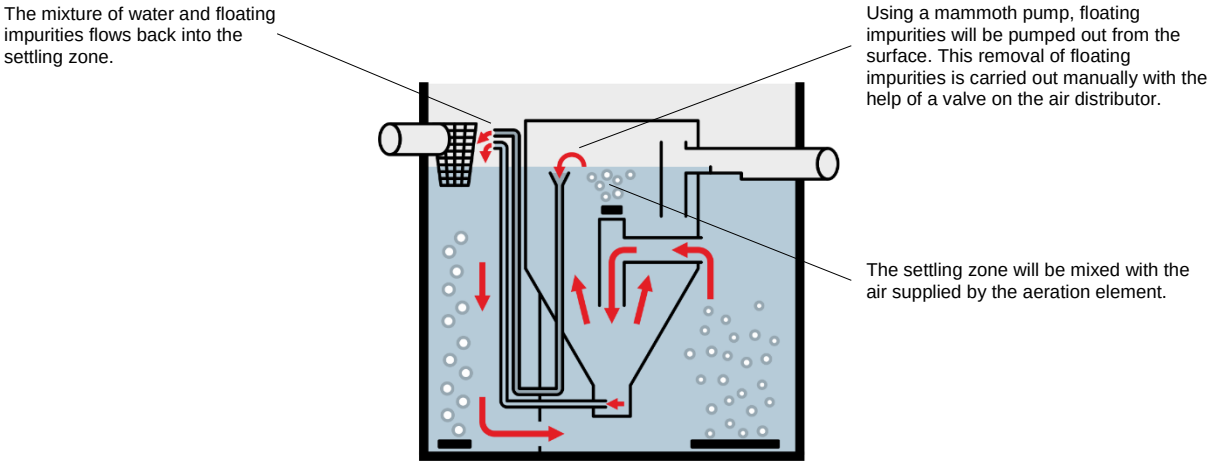


Phase **C1** – blower on



Phase **C2** – blower off

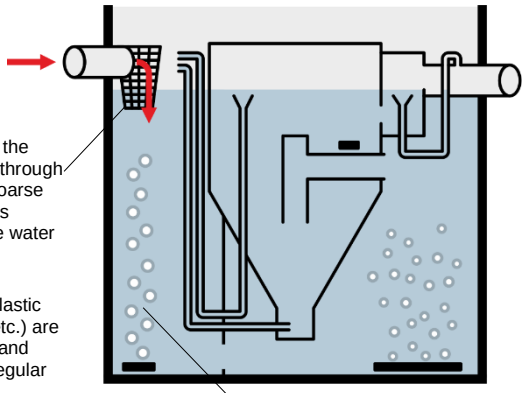
During phases **C1** and **C2**, floating impurities may accumulate in the settling zone. Therefore, if necessary, the pumping out of these floating impurities can be manually started using the valve on the air distributor (phase **C3**).



Phase **C3** – removal of floating impurities

COMFORT type

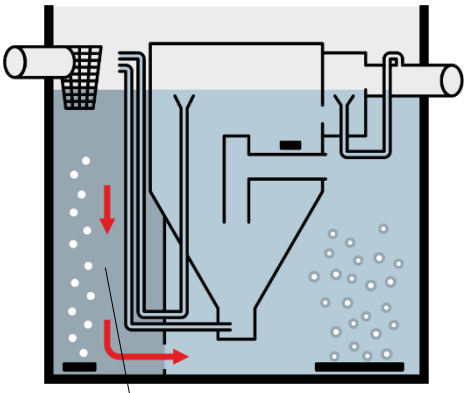
Waste water treatment takes place in the BC biocleaner® reactor, which is divided into individual functional zones using partitions and built-ins according to the following scheme:



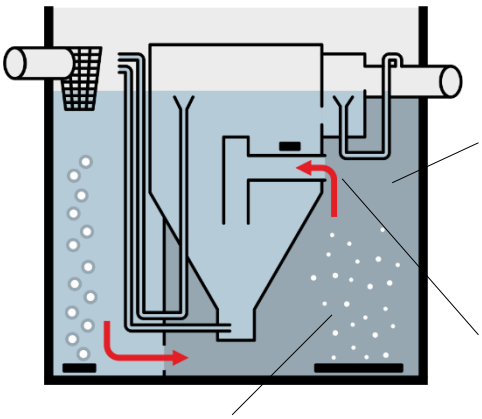
The waste water from the sewage system flows through the basket, in which coarse impurities and particles contained in the waste water are captured.

Non-biodegradable substances (rubber, plastic and textile products, etc.) are trapped in the basket and must be removed at regular intervals.

The basket is aerated from below, and this results in the degradation (decomposition) of biodegradable substances trapped in the basket. Air is supplied under the basket using an aerator located at the bottom.



Mechanically pretreated water from the basket flows into the denitrification zone. This is where biological nitrogen removal takes place. The water flows through the opening in the partition into the activation-nitrification zone.



In the nitrification zone, biological removal of organic pollution from water and oxidation of ammoniacal nitrogen takes place.

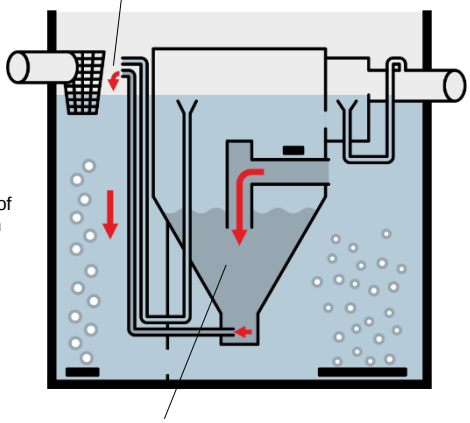
A mixture of water and **activated sludge** is created in the zone.

Activated sludge is a mixture of microorganisms **that "feed" on organic substances from waste water and at the same time consume oxygen.**

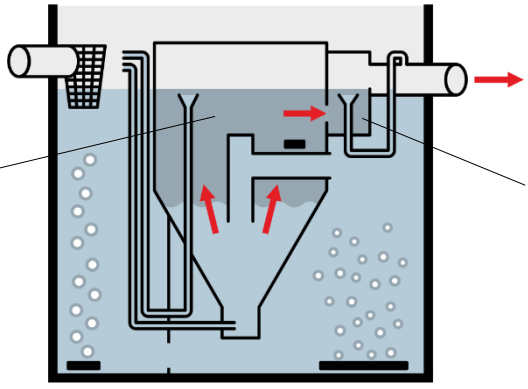
Water with activated sludge flows into the settling zone.

A high concentration of oxygen is maintained in the zone by supplying air using a fine-bubble aerator located at the bottom.

Part of the settled sludge is brought to the denitrification zone using a mammoth pump.



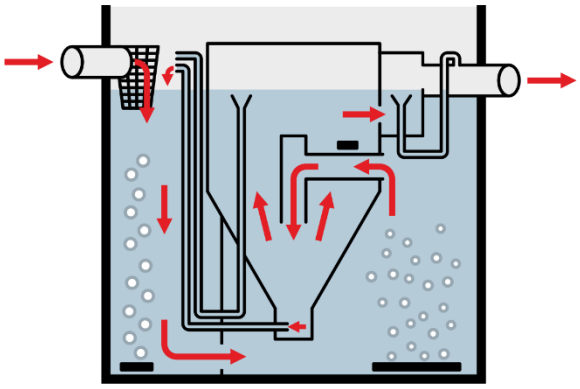
In the settling zone, the treated water and activated sludge are separated by sedimentation. Sludge accumulates at the bottom.



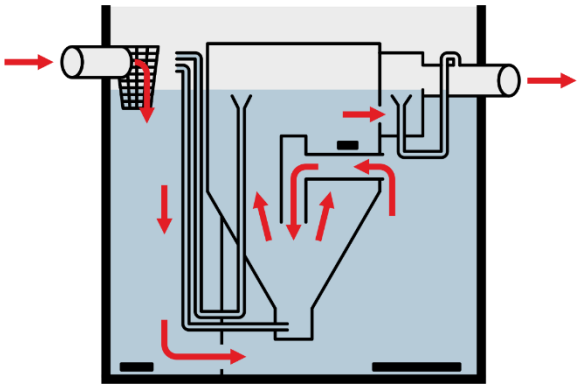
Treated water accumulates in the upper part of the settling zone and flows into the outlet pipe.

Treated water flows out of the outlet pipe into the sewer.

During the treating period, 2 phases **C1** and **C2** alternate cyclically. During phase **C1**, the blower is switched on (thus aerating), during phase **C2** the blower is switched off.

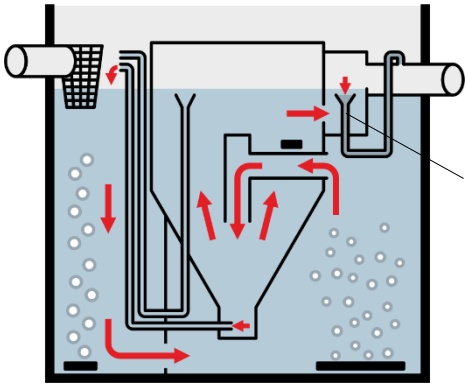


Phase **C1** – blower on



Phase **C2** – blower off

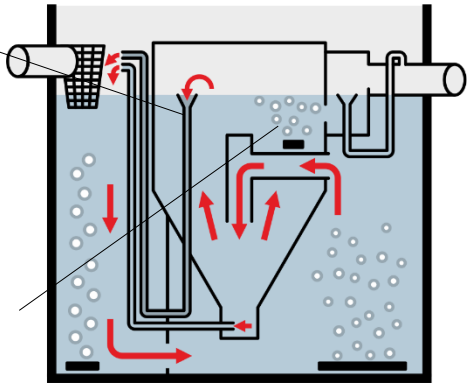
During phases **C1** and **C2**, floating impurities may accumulate in the settling zone. That is why the settling zone is cleaned automatically with a frequency of 1x to 12x per day (depending on the setting). Cleaning is divided into phases marked **C3** to **C6** in the following text and proceeds according to the following scheme:



Using the mammoth pump, impurities are pumped out from the surface for the first time.

With the help of a mammoth pump, a part of the treated water is pumped out, thereby lowering the level in the entire tank.

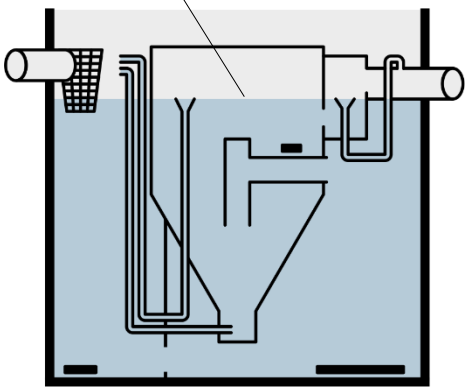
The settling zone will be mixed with the air supplied by the aeration element.



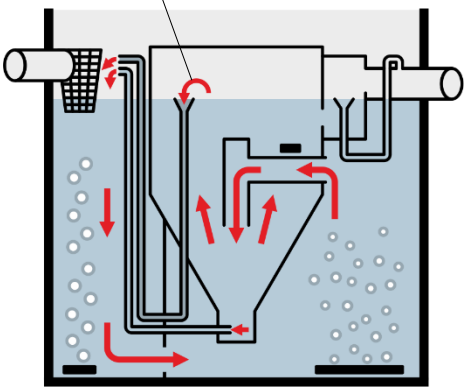
Phase **C3**

Phase **C4**

When the membrane blower is switched off, the mixture in the settling zone calms down and impurities are brought to the surface.



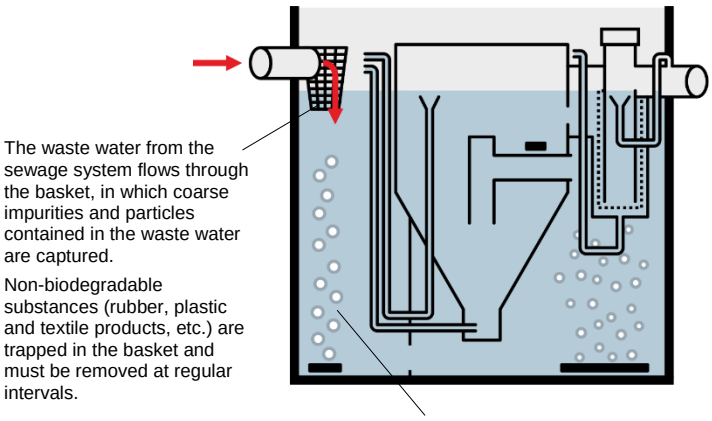
With the help of a mammoth pump, second pumping out of impurities from the surface takes place.



Phase **C5**

Phase **C6**

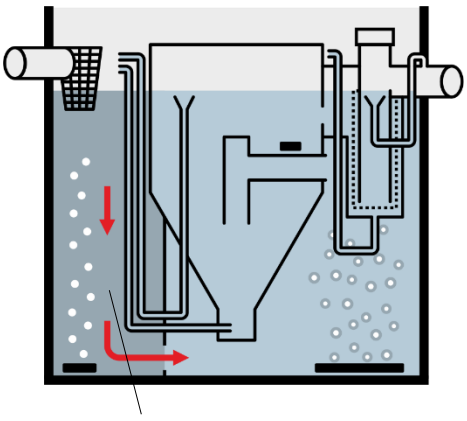
EXCLUSIVE and EXCLUSIVE UV type



The waste water from the sewage system flows through the basket, in which coarse impurities and particles contained in the waste water are captured.

Non-biodegradable substances (rubber, plastic and textile products, etc.) are trapped in the basket and must be removed at regular intervals.

The content of the basket is being grinded up from below by the air from the coarse-bubble element.



Mechanically pretreated water from the basket flows into the denitrification zone. This is where the 1st phase of biological nitrogen removal takes place. The water flows through an opening in the partition into the nitrification zone.

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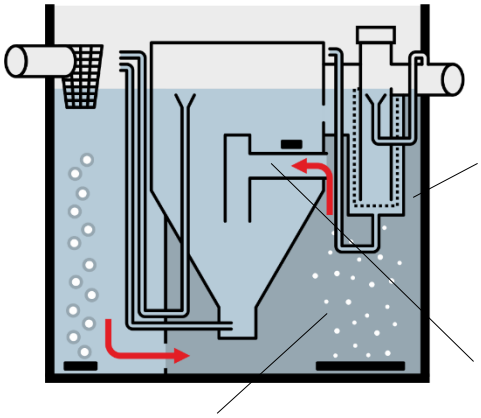
Part of the settled sludge is taken back to the denitrification zone by a mammoth pump.



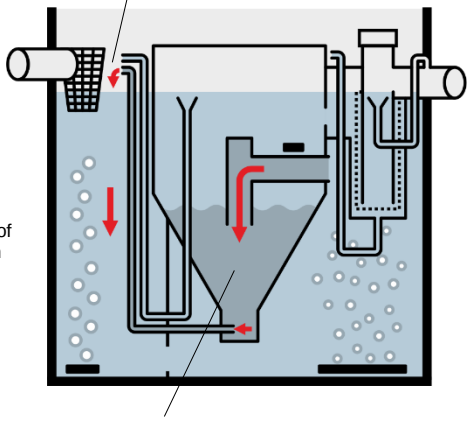
In the nitrification zone, the 2nd phase of biological removal of organic pollution takes place (by oxidation of ammoniacal nitrogen).

A mixture of water and **activated sludge** is created in the zone.

Activated sludge is a mixture of microorganisms **that "feed" on organic substances from waste water and at the same time consume oxygen.**

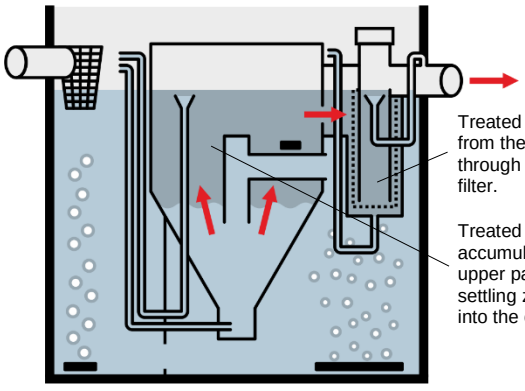
Water with activated sludge flows into the settling zone.

A high concentration of oxygen is maintained in the zone by supplying air using a fine-bubble aerator located at the bottom.



In the settling zone, the treated water and activated sludge are separated by sedimentation. Sludge accumulates at the bottom.

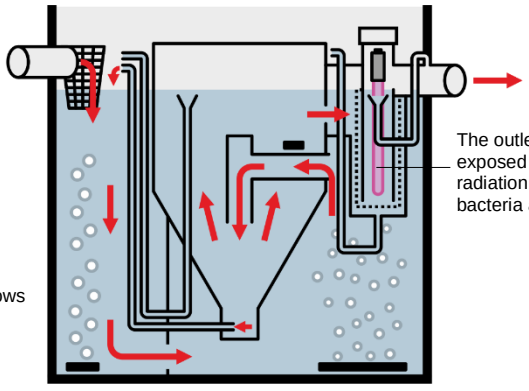
WWTP EXCLUSIVE and EXCLUSIVE UV
is equipped with a tertiary filter on the outlet



Treated water flows from the outlet pipe through the tertiary filter.

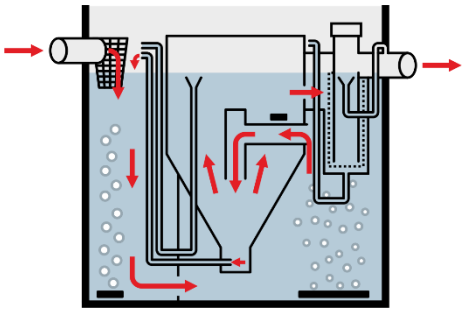
Treated water accumulates in the upper part of the settling zone and flows into the outlet pipe.

WWTP EXCLUSIVE UV
is additionally equipped with a UV lamp

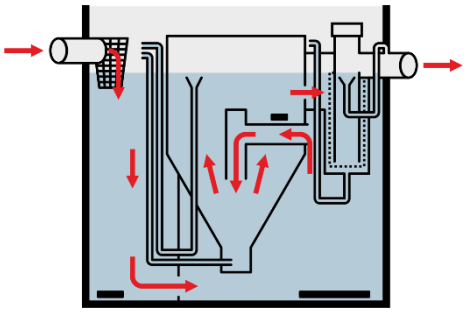


The outlet water is exposed to UV radiation, which kills bacteria and viruses.

During the treating period, 2 phases **C1** and **C2** alternate cyclically. During phase **C1**, the blower is switched on (thus aerating), during phase **C2** the blower is switched off.

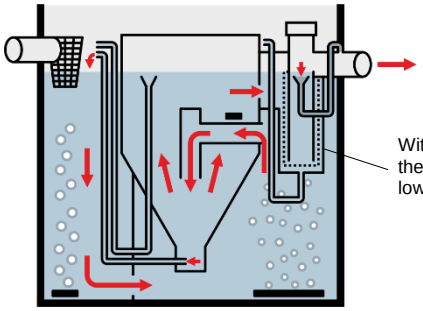


Phase **C1** – blower on



Phase **C2** – blower off

During phases **C1** and **C2**, floating impurities may accumulate in the settling zone. That is why the settling zone is cleaned automatically with a frequency of 1x to 12x per day (depending on the setting). Cleaning is divided into phases marked **C3** to **C6** in the following text and proceeds according to the following scheme:

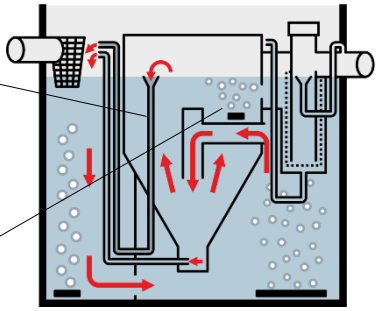


Phase **C3**

Using the mammoth pump, impurities are pumped out from the surface for the first time.

With the help of a mammoth pump, a part of the treated water is pumped out, thereby lowering the level in the entire tank.

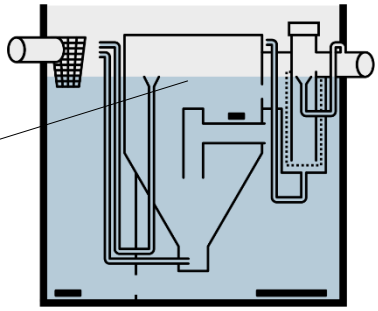
The settling zone will be mixed with the air supplied by the aeration element.



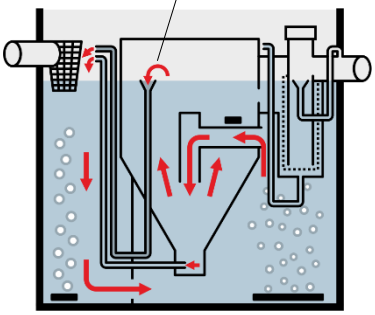
Phase **C4**

With the help of a mammoth pump, second pumping out of impurities from the surface takes place.

When the membrane blower is switched off, the mixture in the settling zone calms down and impurities are brought to the surface.



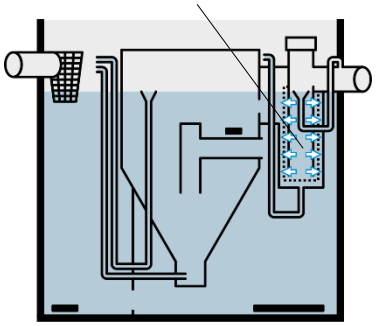
Phase **C5**



Phase **C6**

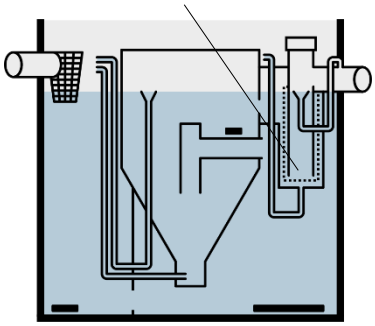
The following are the phases of the tertiary filter cleaning:

Cleaning the tertiary filter with an air stream



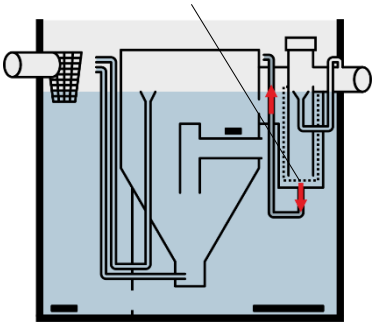
Phase **C7**

Sludge settling in the tertiary filter box



Phase **C8**

Pumping out the sludge from the tertiary filter box



Phase **C9**

11 WWTP BASIC

This is the basic type of WWTP. The individual parts and elements of the WWTP are shown in the following figure.

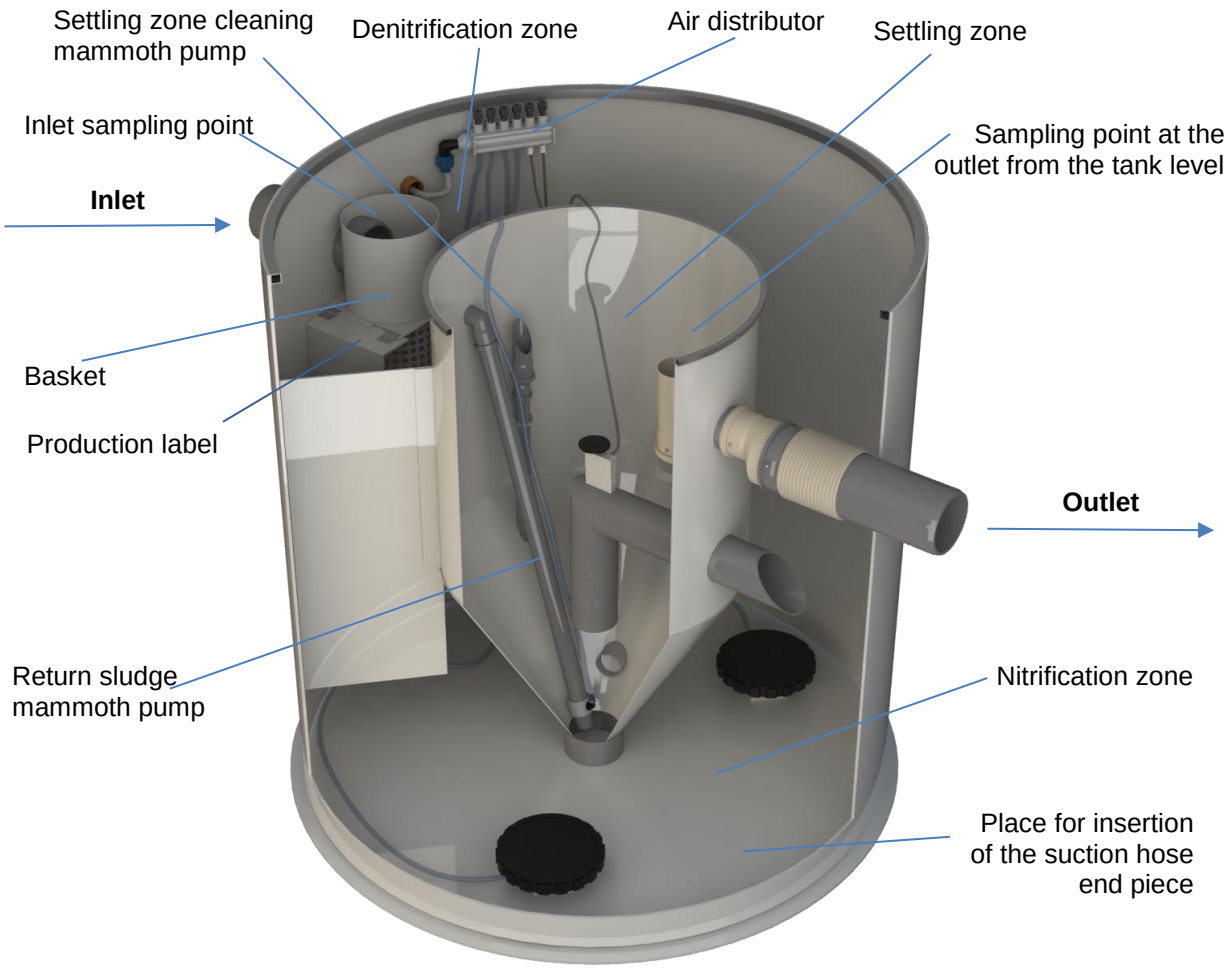


Fig. 6: WWTP BASIC in a PP tank

11.1 WWTP OPERATION CONTROL

When the treatment plant was put into operation, the expected optimal setting of the blower operation was carried out. Do not arbitrarily change this setting without consulting an authorized dealer or manufacturer, as inappropriate setting may cause the WWTP to malfunction.

The operation of the WWTP is ensured by the intermittent blower operation. The intermittent operation of the blower is provided by a timer switch, into which the blower mains cord is connected. On the timer switch, the running time (i.e. phase **C1**) and the interruption time (i.e. phase **C2**) are set. The basic interval setting is a 15 min. course and a 15 min. interruption (this setting is only applicable for the start-up period of the WWTP), then a time mode is set to ensure an optimal WWTP function (most often mode C1/C2 – 15/30). During night hours or hours when there is no inflow to the WWTP (e.g. you are at work, at school...) it is possible to set operation 15/45 (on/off). Be careful, this setting probably will not be sufficient on a weekend or holiday spent at home. Insufficient aeration time will be demonstrated by smell of the WWTP!

The setting times can be changed in the cases further described in this manual (see Chapter 21) or depending on the specific operating conditions of the WWTP based on the measurement of the O_2 concentration.

In no case may the interruption time exceed 2 hours.

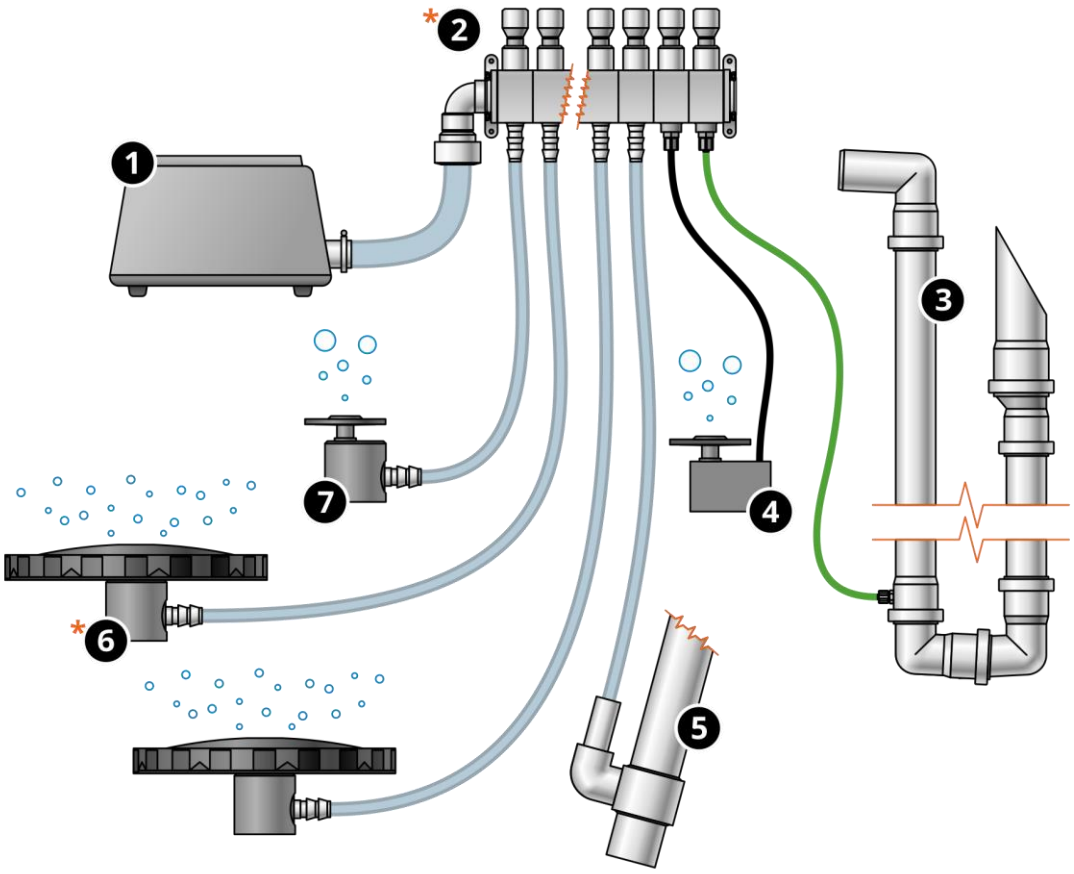
11.1.1 Timer switch (on/off) setting procedure

Current time setting
Turn the rotary ring with the pins in the direction of the arrow until the pointer on the central part of the device points to the current time. By plugging the device into the socket, the timer starts.

Setting the switching program
The timer switch has a pin ring of blue or gray color. By flipping one or more pins inside the circle, the device is set to switch on in the given time period.

Fig. 7: Timer switch ¤)

11.2 AIR DISTRIBUTION



* The number of elements varies according to the size of the WWTP.

- Transparent braided hose
- White translucent tube
- Black tube
- Red tube
- Green tube
- Blue tube

1) Blower
2) Air distributor
3) Removal of floating dirt
4) Mixing of the settling tank water surface
5) Sludge removal from the settling tank
6) Fine-bubble aeration element
7) Coarse-bubble aeration element

Fig. 8: WWTP BASIC Air distribution wiring scheme (BC 4-6)

12 WWTP OPTIMA

Compared to the BASIC type, the OPTIMA type WWTP is additionally equipped with an OPTIMA control unit. Like the BASIC model, the OPTIMA is also equipped with a mammoth pump for floating dirt removal (manual control only) and an overflow edge on the outlet pipe. The individual parts of the WWTP are shown in the following figure.

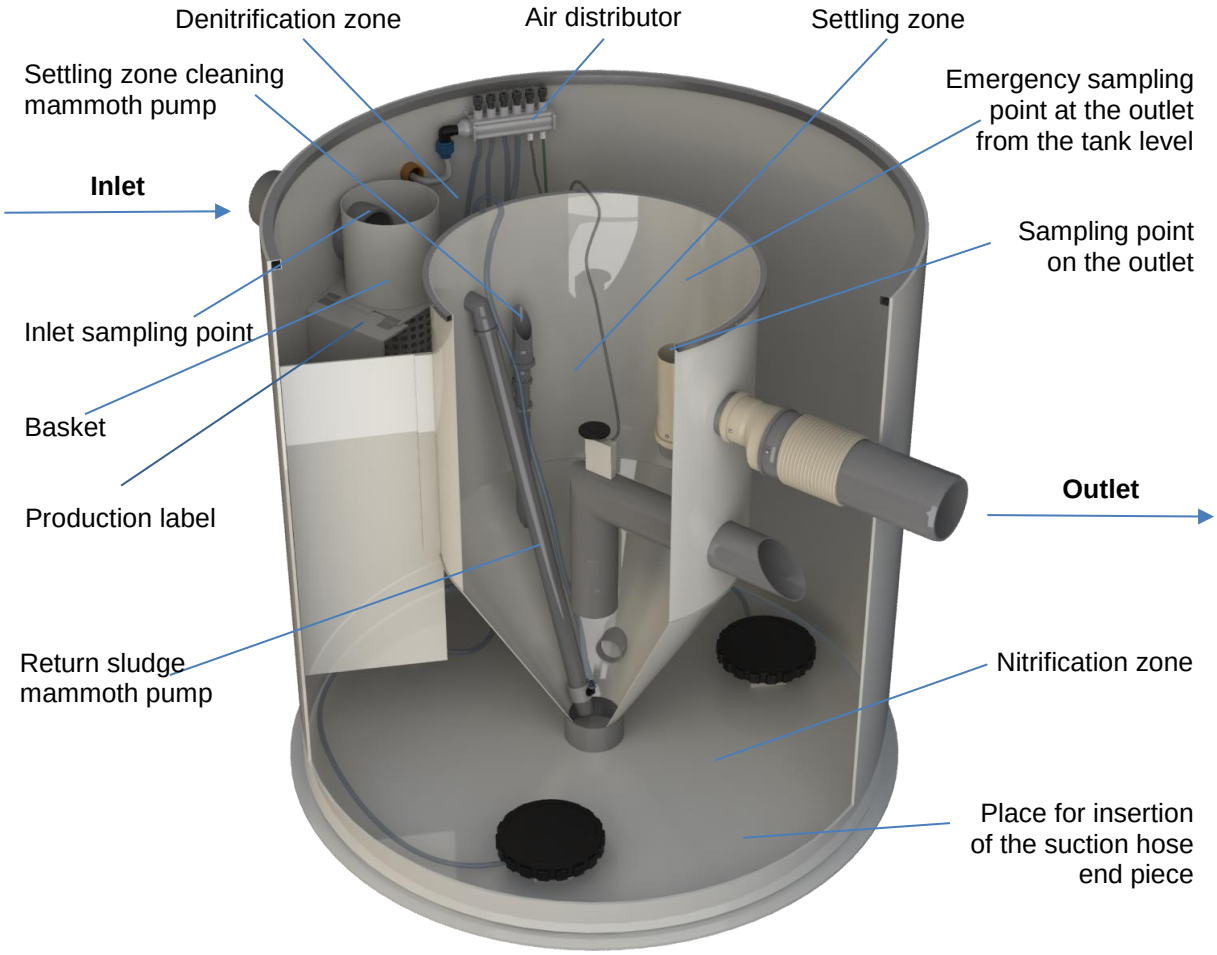


Fig. 9: WWTP type OPTIMA in a plastic (PP) tank

12.1 WWTP OPERATION CONTROL

The operation of the WWTP is ensured by the intermittent blower operation. The intermittent operation of the blower is ensured by a simple “OPTIMA” control unit with 10 preset programs.

When the treatment plant was put into operation, the expected optimal setting of the blower operation was carried out. Do not arbitrarily change this setting without consulting an authorized dealer or manufacturer, as inappropriate setting may cause the WWTP to malfunction.

12.1.1 OPTIMA [x] control unit

The operation of the treatment plant, i.e., switching on and off the blower, is controlled by the control unit, into which the mains cord of the blower is plugged in. Using the control unit, it is possible to set one of the interval programs of running time (i.e., phase **C1**) and interruption time (i.e., phase **C2**).

The display of the device alternately shows the selected program and the time in minutes remaining until the end of the running time; or interruption of the connected blower. The glowing dot behind the right digit indicates that the blower is running.
Maximum permissible socket load: 230V / 2.5A.

Fig. 10: OPTIMA [1)] control unit

12.1.2 Setting the time intervals of phases C1 and C2

Each time you press some of the device‘s keys, the program will be switched by one step, and at the same time, the dot behind the letter P will light up, which signals the device‘s setting mode. After 3 seconds from the last pressing of the keyboard, the last selected program is stored in the memory. The selected program remains stored in the device even after a power failure. When changing the program, the new program always starts with the running phase, i.e., phase **C1**. Select the program according to the following table:

Mode	**c**ode _ _	**00**	**01**	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**
P1 _ _	C1 (min)	10	10	10	10	10	15	20	30	40	60
	C2 (min)	120	30	20	15	10	10	10	10	10	5

Mode "00" is only used in case of short-term shutdown of the WWTP (= zero inflow to the WWTP, e.g., during holiday).

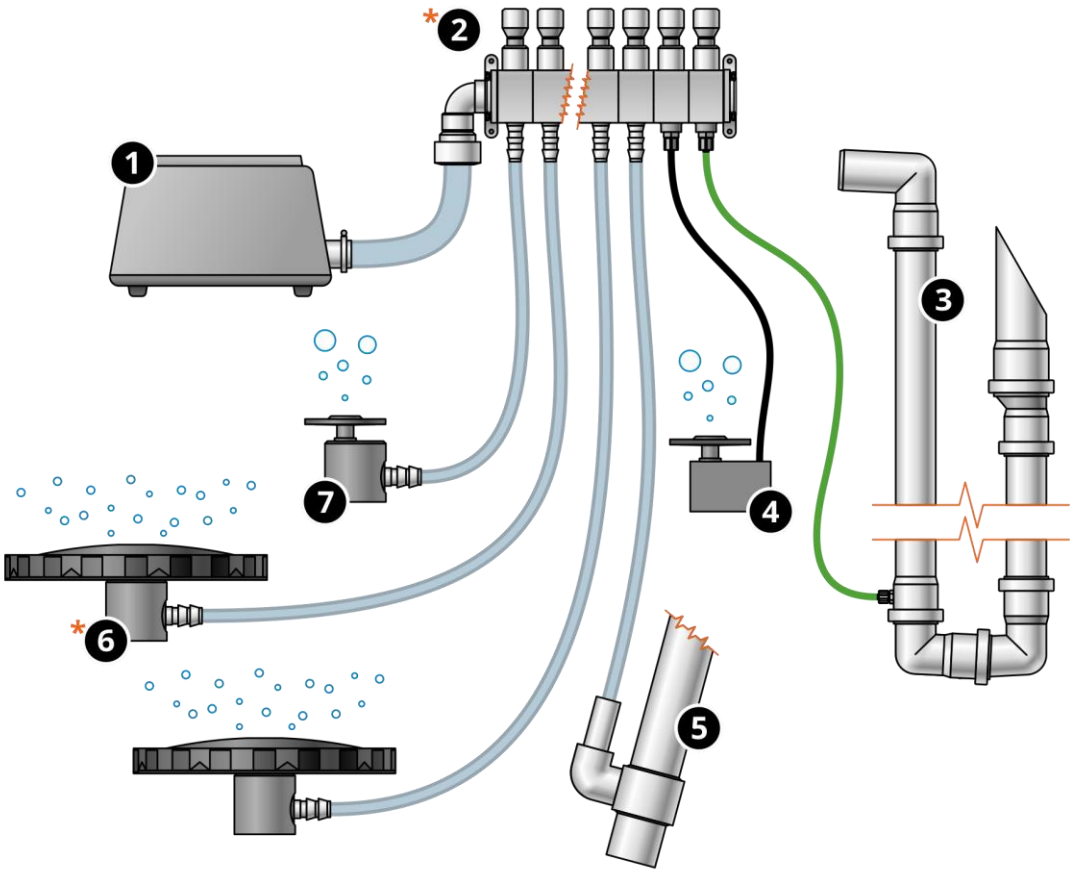
12.1.3 Replacing the fuse

If necessary, replace the fuse as follows:

- Before replacing a fuse, always pull the mains cord of the device from the socket.
- Unscrew the fuse cap and replace the fuse with the prescribed type (T250V / 0,1 A).
- Screw the cap with the new fuse back into the device and only then plug the mains cord into the socket.

- **Before replacing the fuse, always pull the mains supply cord from the socket,**
- **do not confuse the mains supply cord with the mains cord of the blower,**
- **always use a fuse of the same type and nominal value.**

12.2 AIR DISTRIBUTION



* The number of elements varies according to the size of the WWTP.

- Transparent braided hose
- White translucent tube
- Black tube
- Red tube
- Green tube
- Blue tube

1) Blower
2) Air distributor
3) Removal of floating dirt
4) Mixing of the settling tank water surface
5) Sludge removal from the settling tank
6) Fine-bubble aeration element
7) Coarse-bubble aeration element

Fig. 11: Air distribution wiring scheme BC 4 – 6 OPTIMA

13 WWTP COMFORT

The WWTP technology, unlike the previous types, is equipped with automatic level lowering in the settling tank and subsequent removal of floating dirt using a mammoth pump; and the operation is controlled by the COMFORT+ control unit. ¤)

The individual parts of the WWTP are shown in the following figure.

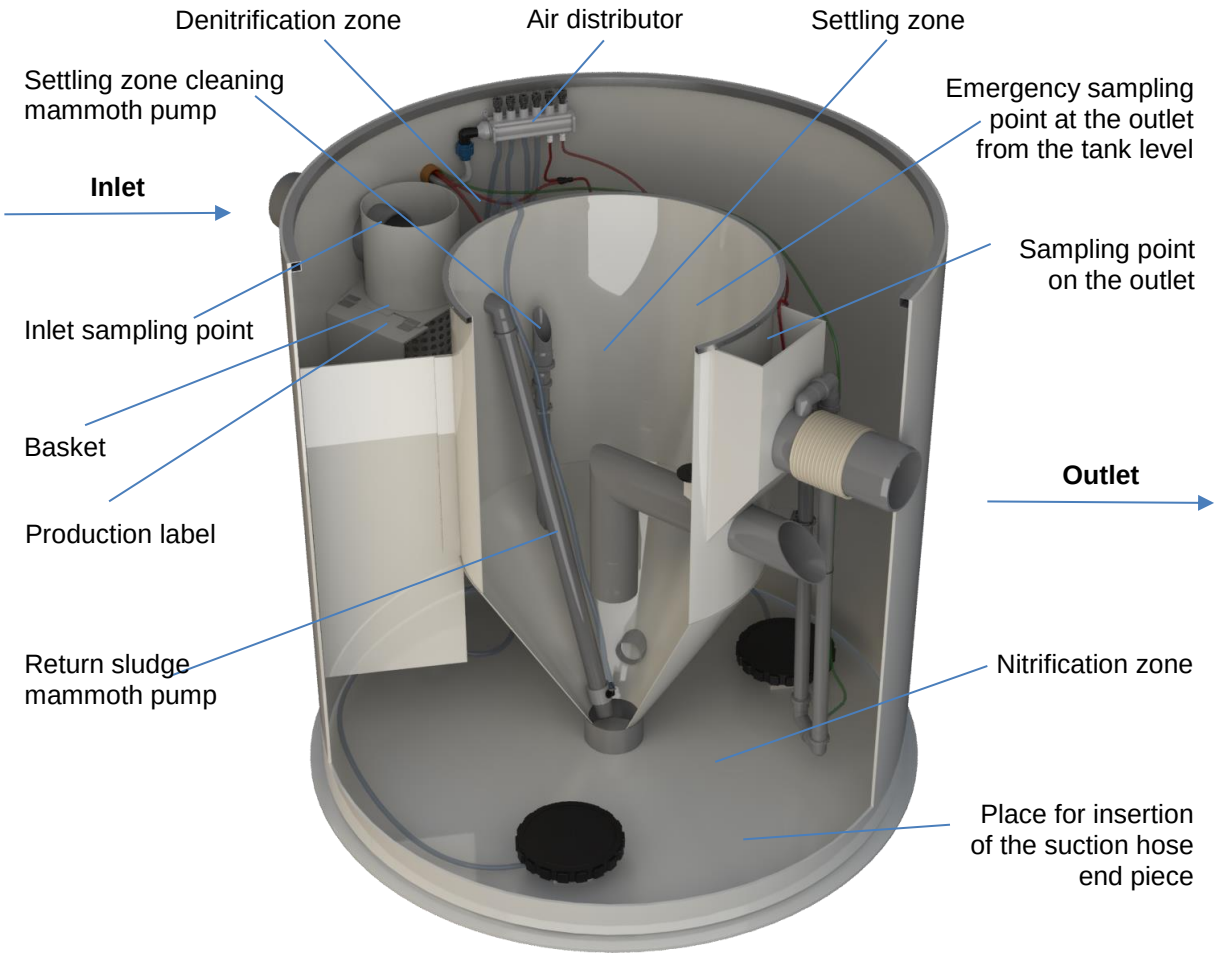


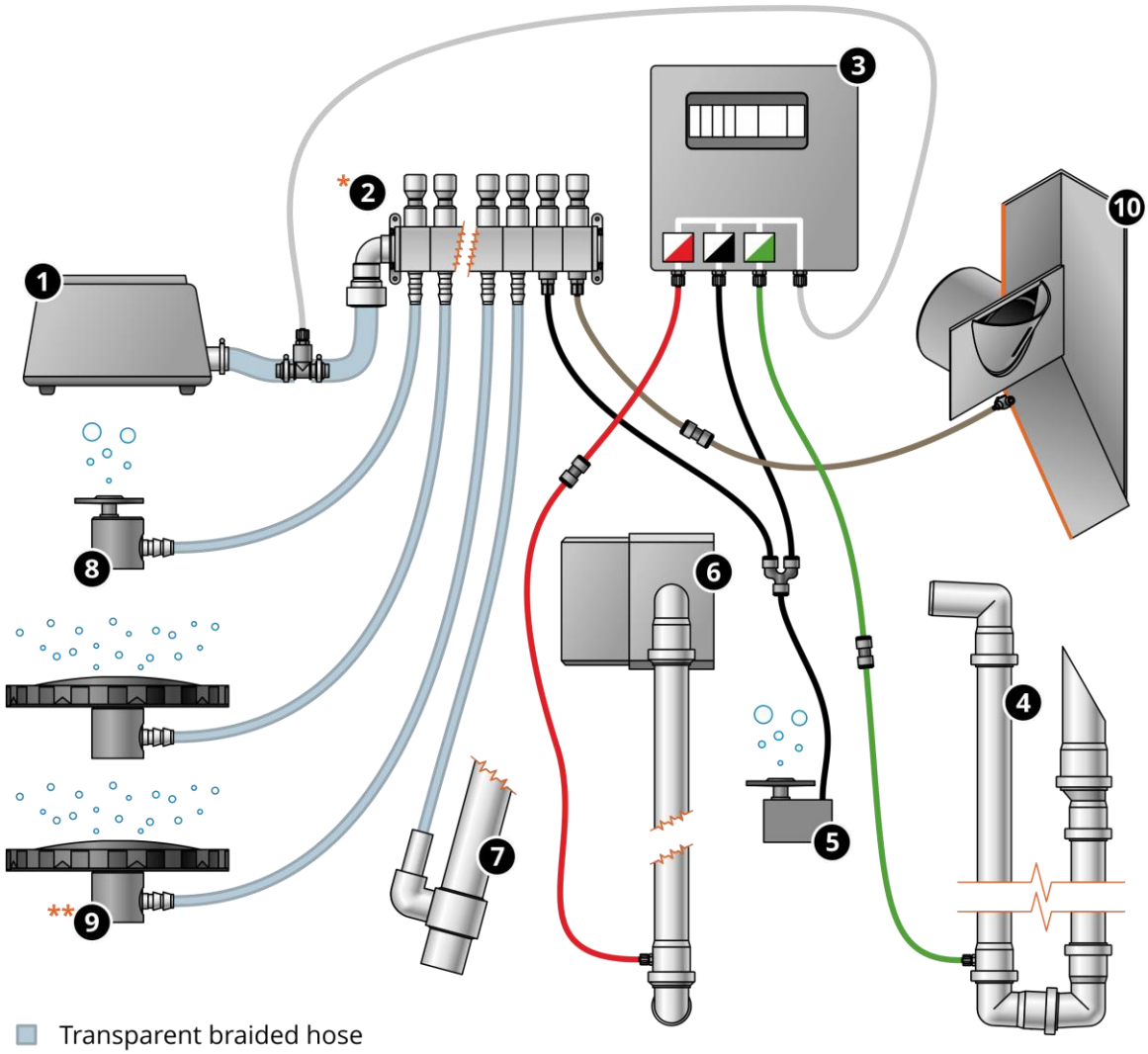
Fig. 12: WWTP type COMFORT

13.1 WWTP OPERATION CONTROL

13.1.1 COMFORT Plus control unit

This type of WWTP is equipped with a COMFORT PLUS control unit. The control of this unit is described in detail in chapter 14.2.1.

13.2 AIR DISTRIBUTION



- Transparent braided hose
- White translucent tube
- Black tube
- Red tube
- Green tube
- Blue tube
- Brown tube

* The switchboard may differ depending on the size and type of the WWTP.

** The number of elements varies according to the size of the WWTP.

1) Blower
2) Air distributor
3) Electrical switchboard
4) Removal of floating dirt
5) Mixing of the settling tank water surface
6) Treated water extraction
7) Sludge removal from the settling tank
8) Fine-bubble aeration element
9) Coarse-bubble aeration element
10) Overflow edge rinsing

Fig. 13: Air distribution wiring scheme BC 4 – 10 COMFORT

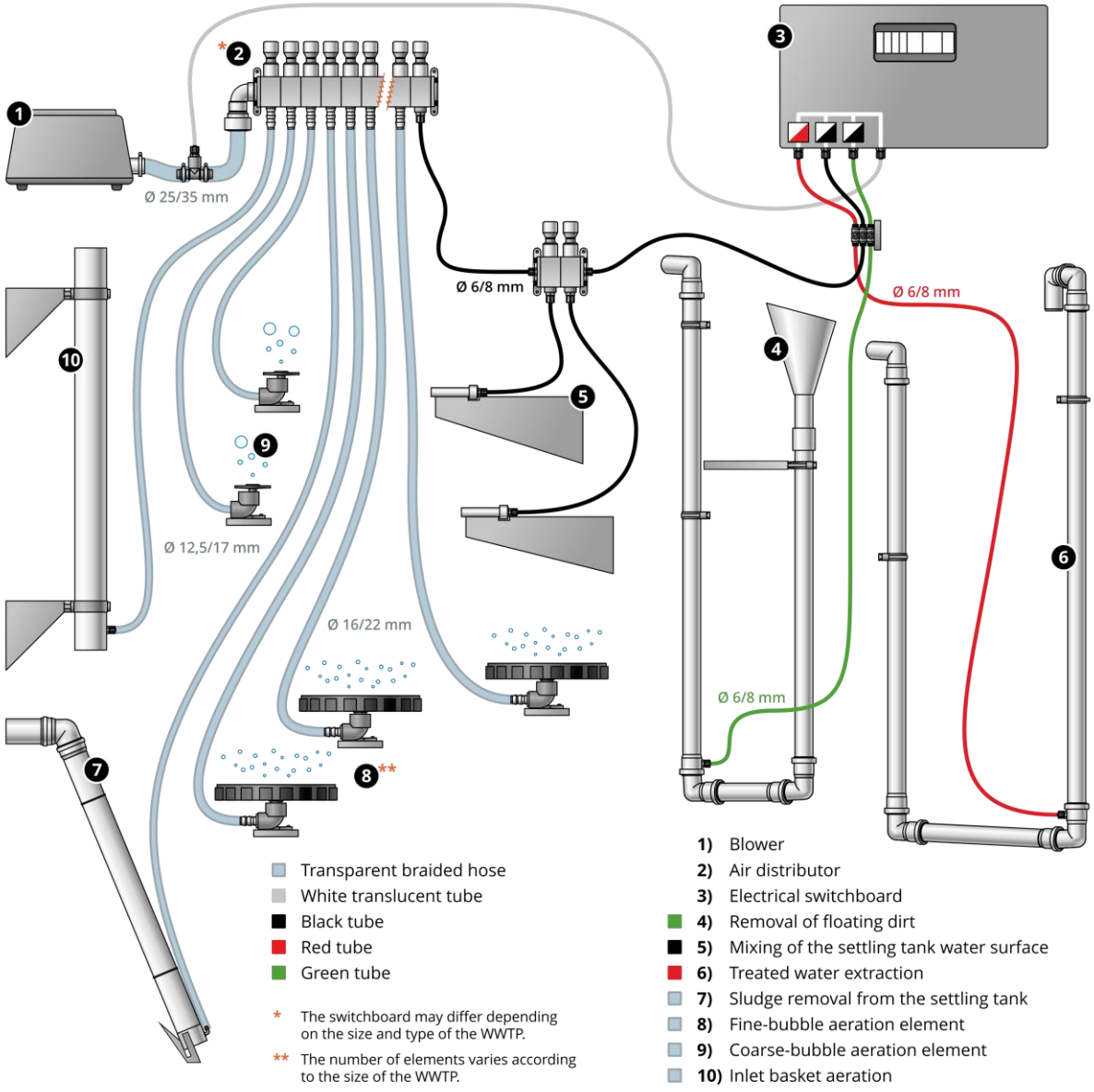


Fig. 14: Air distribution wiring scheme BC 16, 20, 25, 30 COMFORT

14 WWTP EXCLUSIVE

This WWTP type is extra equipped with the tertiary final treatment at the outlet and with the set for precipitation of excessive phosphorus. Mechanical tertiary filter improves catchment of possible impurities escaped from the secondary settling tank. The filter is fitted in a separate plastic box on the outlet pipe and works on the basis of gravity flow.

The filter consists of a plastic supporting structure, on which a mesh with a mesh size of 0.5 mm is installed. Impurities that are caught on the filter are automatically shaken off into the box, the volume of which is then automatically pumped back to activation by the mammoth pump.

Filter cleaning is controlled automatically from the WWTP control unit, which opens and closes individual solenoid valves at set intervals. This automatic cleaning is set on the control unit using parameter P10. For more information see Chapter 14.2.1.

For the correct operation of the WWTP, it is necessary to carry out regular maintenance of the tertiary filter. Instructions are given in Chapter 21.7.

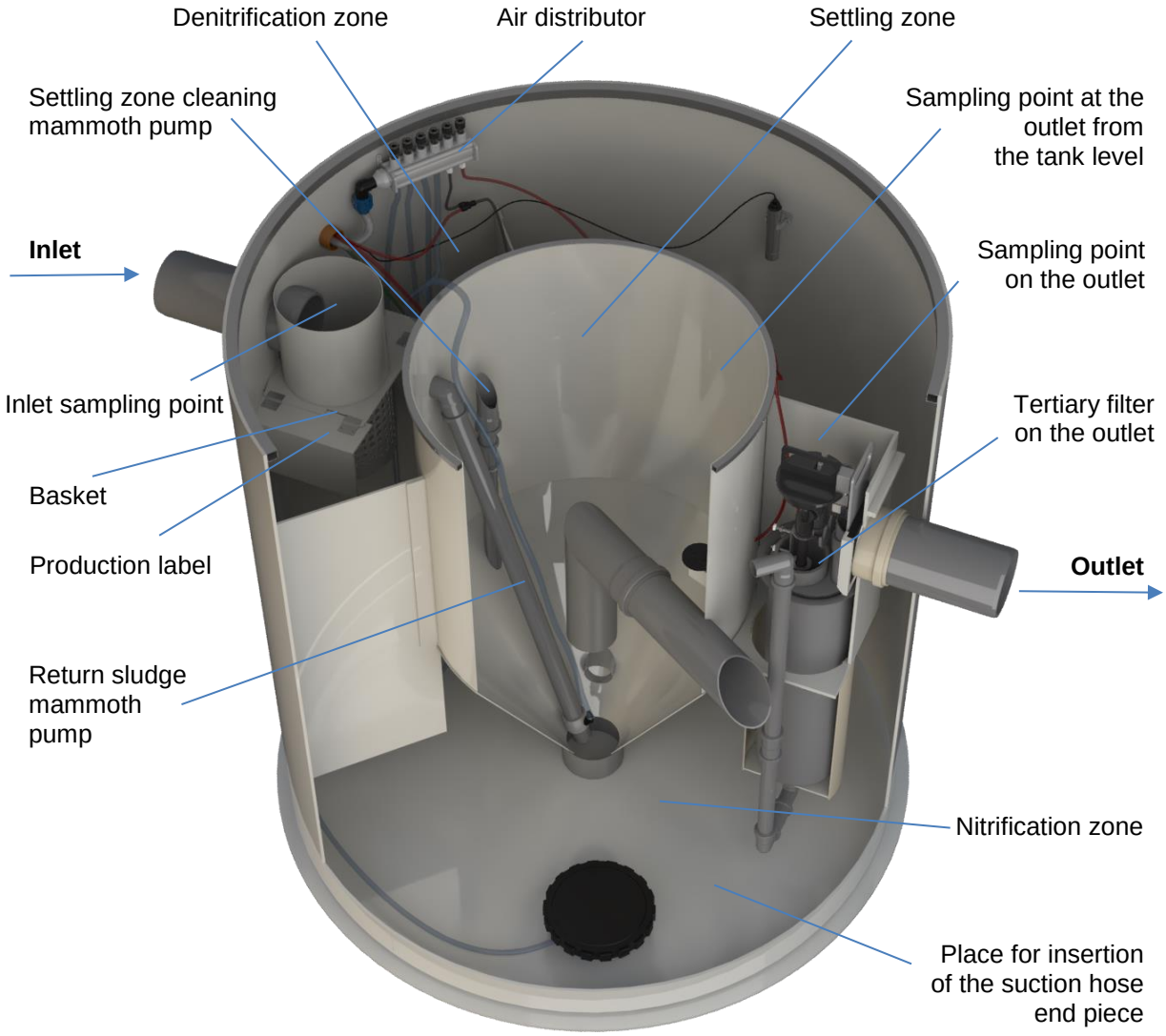


Fig.15: WWTP type Exclusive

14.1 AIR DISTRIBUTION

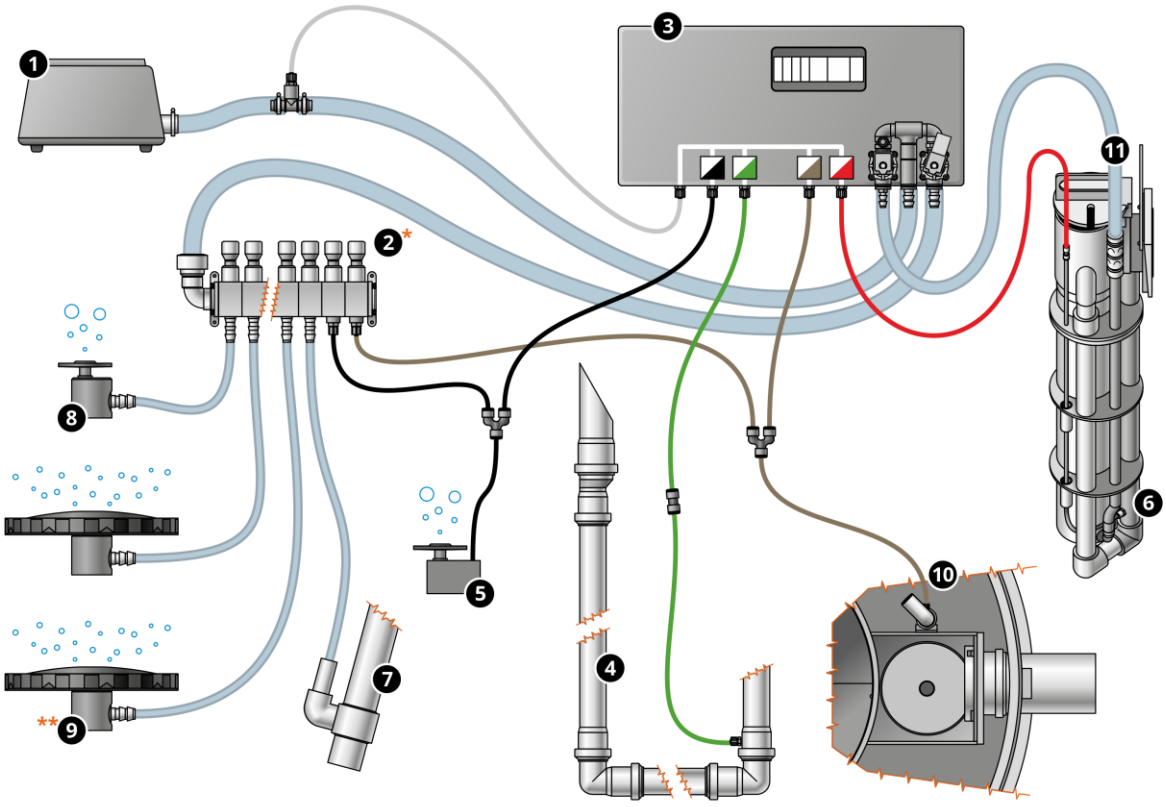


Fig. 16: Air distribution wiring scheme BC 4–12 EXCLUSIVE

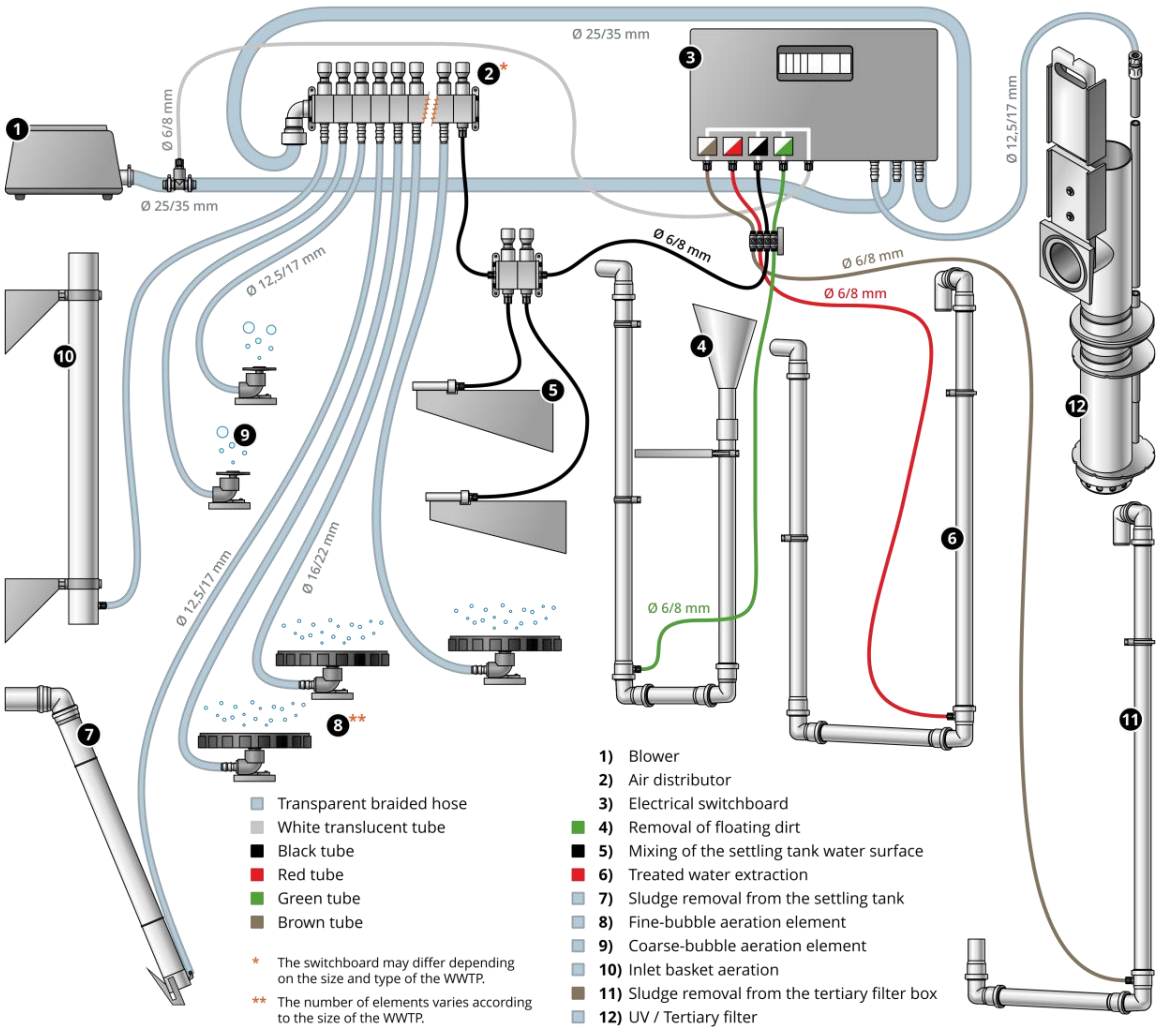


Fig. 17: Air distribution wiring scheme for WWTP type BC 16, 20, 25 EXCLUSIVE

14.2 WWTP OPERATION CONTROL

14.2.1 COMFORT Plus [¤)] control unit

The electrical switchboard contains electrical elements and parts that are used to turn the blower on and off and to open and close the air supply to selected parts of the treatment plant. On the front part of the electrical switchboard there is a circuit breaker for turning off/on all electrical parts of the treatment plant and the control panel of the control unit. On the lateral side of the electrical switchboard there is a socket to plug in the blower, dosing pump, UV lamp, etc...

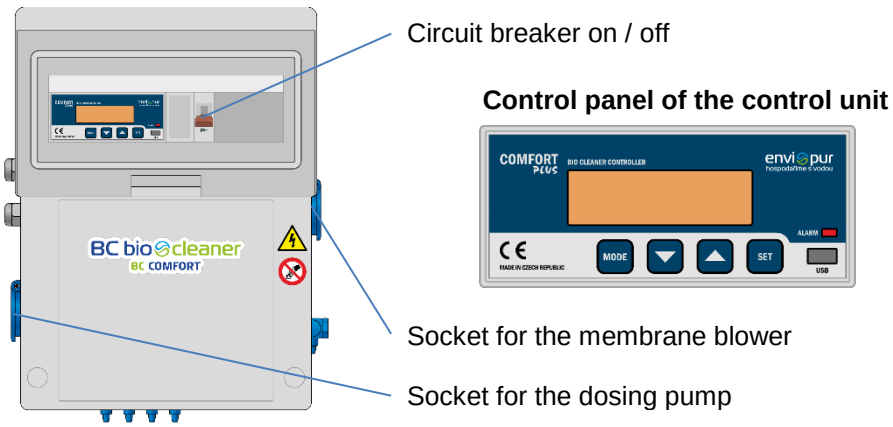
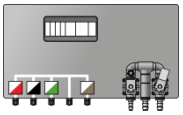
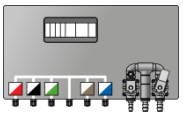


Fig. 18: COMFORT PLUS control unit description

COMFORT Plus control unit modes and their use for BC treatment plants

	WWTP		Control unit mode *	Control unit design	Difference in modes compared to the COMFORT settings	Air connection to the electrical switchboard
Size	Type					
BC 4–30 (Cylindrical)	COMFORT		BCC COMFORT	Plastic		
	EXCLUSIVE	(filter)	BCC COMFORT++	Metal	P10 – filter desludging	
	EXCLUSIVE UV	(filter+UV)	BCC COMFORT++	Metal	P10 – filter + UV desludging	
BC 16–50 K (Container)	COMFORT		BCC COMFORT	Plastic		
	EXCLUSIVE	(filter)	BCC COMFORT+	Plastic	P8 – filter desludging	
	EXCLUSIVE UV	(filter+UV)	BCC COMFORT++	Plastic	P10 – filter + UV desludging	
BC 16–30 DUO (Cylindrical)	COMFORT DUO		BCC COMFORT	Plastic	P11 – setting of sludge pumping from the settling tank to the PRIM tank	
	EXCLUSIVE DUO	(filter)	BCC COMFORT++	Metal	P10 – filter desludging, P11 – setting of sludge pumping from the settling tank to the PRIM tank	
	EXCLUSIVE UV DUO	(filter+UV)	BCC COMFORT++	Metal	P10 – filter + UV desludging, P11 – setting of sludge pumping from the settling tank to the PRIM tank	

* The mode in which the control unit works, appears on the display when the control unit is switched on.

The control unit is used to control the WWTP operation (for gradual execution of phases **C1** to **C9**. Using the control panel, it is possible to monitor and possibly change the functions described below. The control unit can operate in two operation modes:

- Control mode,
- setting mode.

14.2.2 Control mode

This is the normal operating state in which the unit is always after the circuit breaker has been switched on; and after exiting the setting mode. The mode is indicated by displaying the current phase **C1** to **C9** on the display and the number of minutes remaining until its end (the minutes are counting down).

Description of the control unit phases, parameters C1 to C9 for WWTP BC 4-50 (cylindrical tank):

Parameter	Description	WWTP type
C1	blower ON	COMFORT, EXCLUSIVE, EXCLUSIVE UV
C2	blower OFF	
C3	cleaning of the reactors' settling zone - pumping out part of the treated water to lower the water level - blower ON	
C4	cleaning of the reactors' settling zone - clearing of the surface with air with the simultaneous first pumping out of impurities from the surface – blower ON	
C5	cleaning of the reactors' settling zone – water calming break – blower OFF	

C6	cleaning of the reactors' settling zone – second pumping out of impurities from the surface – blower ON	
C7	time for cleaning of the tertiary filter with air	EXCLUSIVE, EXCLUSIVE UV
C8	rest period – sludge settling in the tertiary filter box	
C9	time for pumping out the sludge from the tertiary filter box	

Description of the control unit phases, parameters C1 to C9 for WWTP BC 16-50 (angular tank):

Parameter	Description	WWTP type
C1	blower ON	COMFORT, EXCLUSIVE, EXCLUSIVE UV
C2	blower OFF	
C3	cleaning of the reactors' settling zone - pumping out part of the treated water to lower the water level - blower ON	
C4	cleaning of the reactors' settling zone - clearing of the surface with air with the simultaneous first pumping out of impurities from the surface – blower ON	
C5	cleaning of the reactors' settling zone – water calming break – blower OFF	
C6	cleaning of the reactors' settling zone – second pumping out of impurities from the surface – blower ON	
C7	time for desludging of the tertiary filter box	EXCLUSIVE, EXCLUSIVE UV
C8	rest period	EXCLUSIVE UV
C9	time for UV lamp box desludging	

14.2.3 Setting mode

Setting is carried out using the buttons on the control unit panel by selecting the appropriate mode and parameter. The selected mode and parameters are shown on the display. Both mode and parameter can be changed. The changed parameter is darkly shaded.

Functions of the individual buttons of the control unit:

MODE	ARROW DOWN ▽	ARROW UP △	SET
Mode selection	Changing the set parameter; end of action in START mode		confirmation of the selected mode or the value of the set parameter

If no button is pressed, the unit automatically switches to Control Mode after 30 seconds.

Control unit menu:

COMFORT Plus control unit modes			
BCC Comfort	**BCC Comfort+**	**BCC Comfort++**	**Mode description**
Diagnostics			Displaying and entering information about the operation of the WWTP (settling test, desludging, sampling, equipment service, ...)
P1			Setting the time intervals of phases C1 (blower ON), C2 (blower OFF)
Mixing			Setting the mixing interval of the nitrification zone
P2			Setting the daily start time of stages C3 to C6 (cleaning of the reactors' settling zone)
P3			Setting the frequency (interval) of starting phases C3 to C6 (cleaning of the reactors' settling zone)
P4			Secondary mode – setting night and weekend operation

P5	Secondary mode – setting the time intervals of phases C1, C2 (Blower ON / OFF)
P6	Setting the operation of the dosing pump (running time / repetition interval)
P8	Tertiary filter and UV desludging setting – cycle length, repetition interval (only BC 16-50 K EXCLUSIVE) The first desludging will take place 30 minutes after the main cycle and then in the set period.
P10	Tertiary filter and UV desludging setting (only BC 4-50 EXCLUSIVE, BC 4-50 EXCLUSIVE UV a BC 4-50 K EXCLUSIVE UV). The first desludging will take place 30 minutes after the main cycle and then in the set period.
P11	Pumping out – automatic removal of excess sludge from the settling tank (BC 4-50 DUO)
Current time	Correction of the control unit's current time
New password	Entering a password for access to editing the settings of the control unit
Modem	Sending and receiving data from the web server
Identification	Control unit parameters for communication with the web server

Blower failure evaluation. The control unit is equipped with an input for connecting a pressure switch at the blower outlet. A switch is required to be connected, which is **open when there is no pressure and closed when there is operating pressure**.

Failure signaling and siren outputs. The control unit has two outputs for failure signaling, LED signaling on the panel (ALARM) and, in the version with a GSM module, sending an SMS message about the failure. The fault is simultaneously signaled on the unit's display and by the intermittent light of the LED diode marked ALARM. Siren failure signaling can be temporarily disabled by pressing the "SET" button. The signaling on the display will remain active. If the malfunction is not removed within 10 days, the siren signaling will be automatically restored.

P1 – Setting the time intervals for Phases C1, C2 (blower ON/OFF)

- Select mode **P1** with the **MODE** button and confirm with the **SET** button. The current settings are displayed. Use the arrows to change the **code C1, C2** according to the following table and confirm with the **SET** button.

Mode	Code	0	1	2	3	4	5	6	7	8	9	10	11	12	Oxygen probe
P1	C1 (min)	10	10	10	10	10	10	10	10	15	20	30	40	60	The blower operation is controlled only by an oxygen probe – it is not controlled by time
	C2 (min)	120	60	50	40	30	20	15	10	10	10	10	10	5	

- Code 0 to 12 is only used for time management of the treatment plant. By choosing the **oxygen probe** code, the operation of the treatment plant is controlled only by means of the oxygen probe (located in the nitrification part of the WWTP).
- When choosing the operation by means of the **oxygen probe**, we set the parameter – **limit and hysteresis** – using the arrows.
- Using the arrows keys and the **SET** button, set the parameters – **limit and hysteresis** – to the required values (basic values are already preset), limit 1,5 mg/l and hysteresis 0,5 mg/l. The blower turns on when the amount of dissolved oxygen falls below 1,5 mg/l and turns off when it exceeds 2 mg/l.
- After selecting and conforming the mode, parameters can be changed using the up and down arrows keys. After selecting the desired parameter, confirm with the **SET** button and confirm by pressing the **SET** button again to return to **MODE** selection.

- Using the arrow keys and the **SET** button, continue to set the **AERATION** parameter and set it to values of 20 seconds (blower operation) and 10 minutes (pause). Setting of these parameters is in operation, regardless the amount of dissolved oxygen.
- After selecting and conforming the mode, parameters can be changed using the up and down arrows keys. After selecting the desired parameter, confirm with the **SET** button and confirm by pressing the **SET** button again to return to **MODE** selection.
- Using the arrow keys and the **SET** button, continue to set the **DENITRIFICATION** parameter. Set it to a value of 40 minutes (blower operation blocking) and 120 minutes (regular repetition period). NOTE: The regular aeration function remains active even during the blocking time.

After selecting and confirming the mode, parameters can be changed using the up and down arrow keys. After selecting the desired parameter, confirm with the **SET** button and confirm by pressing the **SET** button again to return to **MODE** selection.

Mixing – The function is used to mix the sludge in activation with a longer aeration delay than 10 min.

- Using the arrow keys choose the desired parameter, confirm with the **SET** button and confirm by pressing the **SET** button again to return to **MODE** selection.

  Recommended setting – mix for 10 seconds every 10 minutes of the rest period.

Setting the parameters of phases C3 to C6 (cleaning the settling zone of the reactor)

P2 – startup of C3 – C6 (setting the hour when cleaning starts)

- Using the **MODE** button and the **ARROW KEYS** choose mode **P2** and confirm with the **SET** button. The mode will appear on the display along with the current time at which cleaning will begin.

  Example: P2, 23 o'clock means that Phase C3 is to be activated at 11 p.m.
- Using the arrow keys choose the desired hour, confirm with the **SET** button and confirm by pressing the **SET** button again to return to **MODE** selection.

P3 – frequency of C3-C6 (setting the cleaning repeat period)

- Using the **MODE** button and the **ARROW KEYS** select **P3** mode and confirm with the **SET** button. The mode appears on the display along with the parameter setting (1, 2, 3 hours to 24 hours or the START parameter.).

  Example: E.g. code "12" means starting phases **C3-C6** after 12 hours.
- Using the arrow keys select the desired period length and confirm with the **SET** button, then confirm by pressing the **SET** button again to return to **MODE** selection.

  The **START** option is used to test the operation of individual phases C1-C6. The previous settings remain unchanged. Use the arrow keys to skip through the individual phases.

Setting the night and weekend operation (secondary timing)

P4 – secondary mode

- Using the **MODE** and **ARROW KEYS** select mode **P4** and confirm with the **SET** button. The current mode appears on the display.

Parameter P4	Meaning
0	Secondary mode is OFF
1	Secondary timing mode daily from 23:00 to 5:00
2	Secondary timing mode from Saturday 0:00 to Monday 0:00
3	Combination 1 + 2 (night and weekend)
4	Secondary timing mode when DV4 input is active

- Using the arrow keys select the desired parameter 1-4 and confirm with the **SET** button, then confirm by pressing the **SET** button again to return to **MODE** selection.

P5 – C1, C2 in secondary mode (Setting time intervals C1, C2 in secondary mode)

- Using the **MODE** button and the **ARROW KEYS** select mode **P5** and confirm with the **SET** button. Current mode will appear on the display along with the code of the set parameter according to the following table:

Mode	Code	0	1	2	3	4	5	6	7	8	9	10	11	12	Oxygen probe
P1	C1 (min)	10	10	10	10	10	10	10	10	15	20	30	40	60	The blower operation is controlled only by an oxygen probe – it is not controlled by time
	C2 (min)	120	60	50	40	30	20	15	10	10	10	10	10	5	

- Select the desired code and confirm with the **SET** button, then confirm by pressing the **SET** button again to return to **MODE** selection.

P6 – dosing (dosing pump operation setting – dosing of phosphorus precipitation chemicals)

- The switching time in seconds (dose size) and the repetition period in hours are adjustable. Setting either time to 0 disables the dosing function. The first switching of the dosing relay happens one minute after the control unit is switched on; or the parameter settings are changed.

- Using the **MODE** button and the **ARROW KEYS** select mode **P6** and confirm with the **SET** button. The mode appears on the display along with the set current dosing time (in seconds) and the set current delay time for switching the dosing pump (in hours).

- Using the arrow keys select the desired code and confirm with the **SET** button, then confirm by pressing the **SET** button again to return to **MODE** selection.

P8 – desludging of the tertiary filter (for treatment plants BC 16–50 K EXCLUSIVE)

- Time-adjustable filter desludging using menu **P8** by switching relay RE7. The switching time in seconds and the repetition period in hours are adjustable. When the RE7 relay switches on, the signaling on the LCD control unit switches on as well. The first desludging will take place minutes after the main cycle and then in the set period.

- Using the **MODE** button and the **ARROW KEYS** select mode **P8** and confirm with the **SET** button. The mode appears on the display along with the set current desludging time (in seconds) and the set current delay time for switching desludging (in hours).

- After selecting and confirming the mode, parameters can be changed using the up and down arrow keys. After selecting the desired parameter, confirm with the **SET** button, then confirm by pressing the **SET** button again to return to MODE selection.

P10 – tertiary filter + UV desludging

- Using the **MODE** button select parameter **P10** and confirm with the **SET** button. The current cleaning process repeat interval setting is displayed (e.g. 03 h means the cleaning process is repeated every 3 hours). The parameter can be changed using the arrows and is confirmed by the **SET** button.

  Press the **SET** button again, the parameters for setting the C7-C9 intervals will be displayed.

  Setting phases C7-C9 for BC 4-25 EXCLUSIVE, BC 4-25 EXCLUSIVE UV (in a cylindrical tank)
  The first numerical value represents the setting of phase **C7 (blowing off of the filter),**
  the second numerical value is used to set the phase **C8 (rest period)**, the third numerical value represents the setting of phase **C9 (pumping out of the settled dirt from the tertiary filter box)**.

Setting phases C7-C9 for BC 30-50 K EXCLUSIVE UV (in a container)
The first numerical value is used to set the phase **C7 (tertiary filter box desludging)**, the second numerical value is used to set the phase **C8 (rest period)**, the third numerical value is used to set the phase **C9 (pumping out of the settled dirt from the UV lamp tube)**.

Use the **UP** and **DOWN ARROW KEYS** set the phase value:
C7 range 0–999 s, C8 range 0–99 min, C9 range 0–999 s.
To save the set values and end the setting of phases C7-C9 press the **SET** button.

The zero value in Parameters C7 to C9 means the given cycle was omitted!

Basic settings during the start-up period are as follows:

Repetition interval of the cleaning process – 4 h

C7 – 180 s; C8 – 8 min; C9 – 25 s

Current time (setting and correcting the current time of the control unit)

- Using the **MODE** button and the **ARROW KEYS** select mode Current time and confirm with the **SET** button. Mode appears on the display in the order DAY, MONTH, YEAR, HOURS and MINUTES.
- Using the **SET** button select the parameter that is to be set. Using the arrow keys set the desired parameter and confirm with the **SET** button. Continue this way to the current setting of the selected time and date.
- After selecting and confirming the mode, parameters can be changed using the up and down arrow keys. After selecting the desired parameter, confirm with the **SET** button, then confirm by pressing the **SET** button again to return to the MODE selection.

15 WWTP EXCLUSIVE UV

This is the EXCLUSIVE type WWTP, which also has an extra UV lamp inserted into the tertiary filter plastic box.

The UV lamp provides disinfection of treated waste water from a microbiological point of view. It is located on the outlet of treated water from the WWTP in the area of the mechanical filter facility. It is put into operation with the treatment plant.

The UV lamp is constantly in operation and has no adjustment options. If the WWTP control unit is in operation, the UV lamp is in operation as well.

15.1 UV RADIATION

The equipment is fitted with a UV lamp that emits type C UV radiation. This radiation can cause damage to sight, skin and alternatively other organs. To prevent exposure to radiation the reactor is closed by cover with a safety switch that cuts off the power supply to the UV lamp once the cover is opened.

- **Always switch off the power supply before opening the lid.**
- **Never switch on the power supply unless the UV lamp is installed in the reactor.**
- **Never operate the equipment with a damaged cover or a safety switch.**

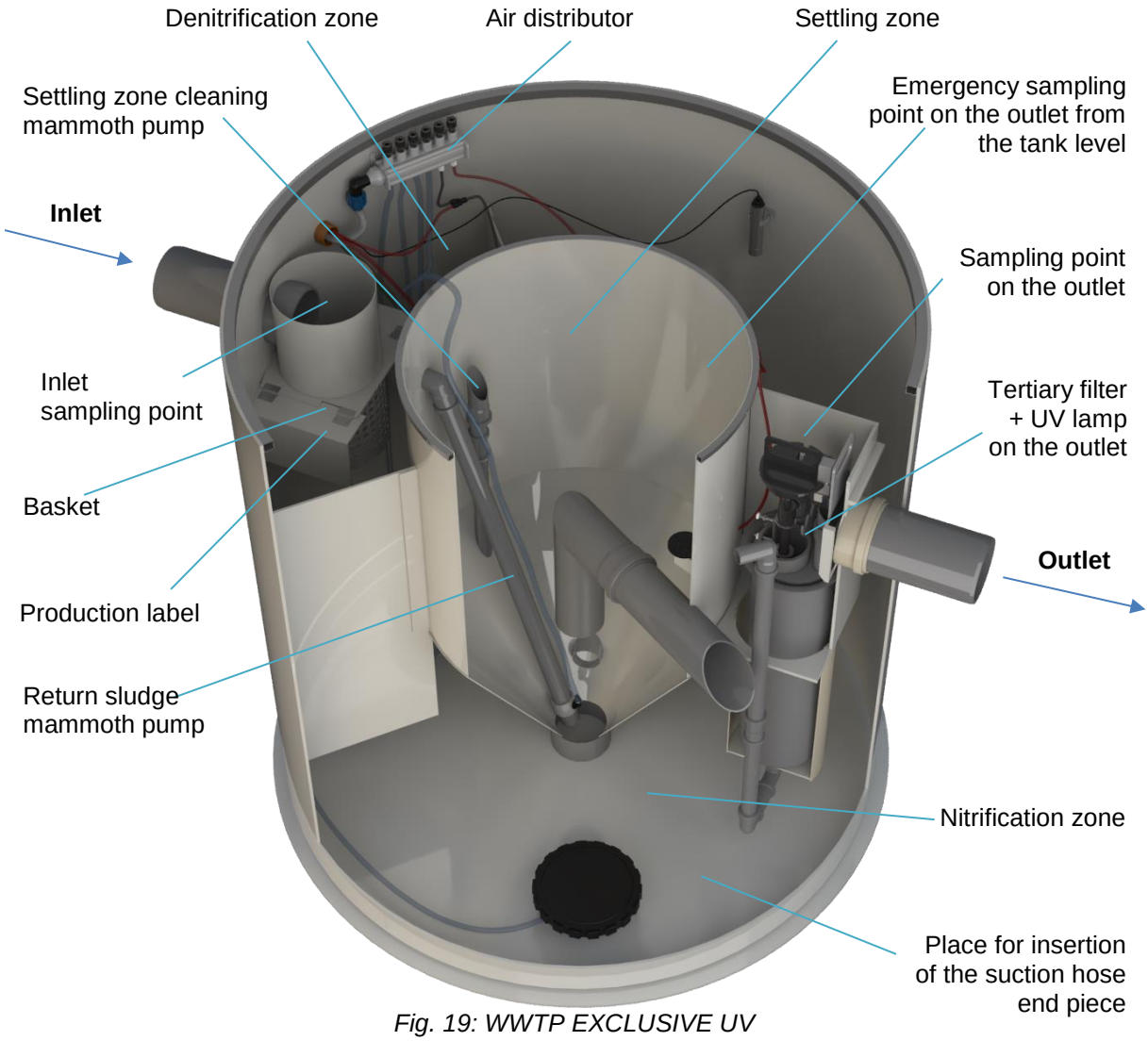
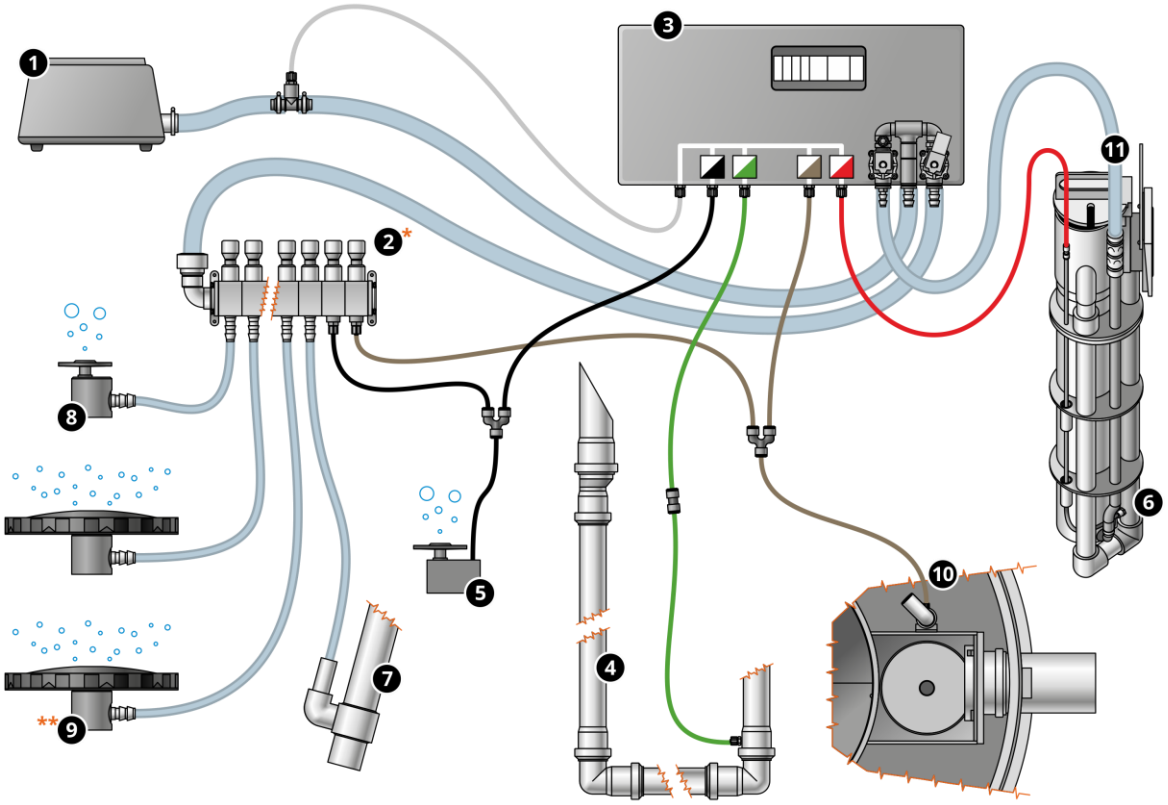


Fig. 19: WWTP EXCLUSIVE UV

15.2 AIR DISTRIBUTION



- Transparent braided hose
- White translucent tube
- Black tube
- Red tube
- Green tube
- Blue tube
- Brown tube

* The switchboard may differ depending on the size and type of the WWTP.

** The number of elements varies according to the size of the WWTP.

1) Blower
2) Air distributor
3) Electrical switchboard
4) Removal of floating dirt
5) Mixing of the settling tank water surface
6) Treated water extraction
7) Sludge removal from the settling tank
8) Fine-bubble aeration element
9) Coarse-bubble aeration element
10) Sludge removal from the tertiary filter
11) Aeration / cleaning of the tertiary filter

Fig. 20: Air distribution scheme BC 4–12 EXCLUSIVE UV

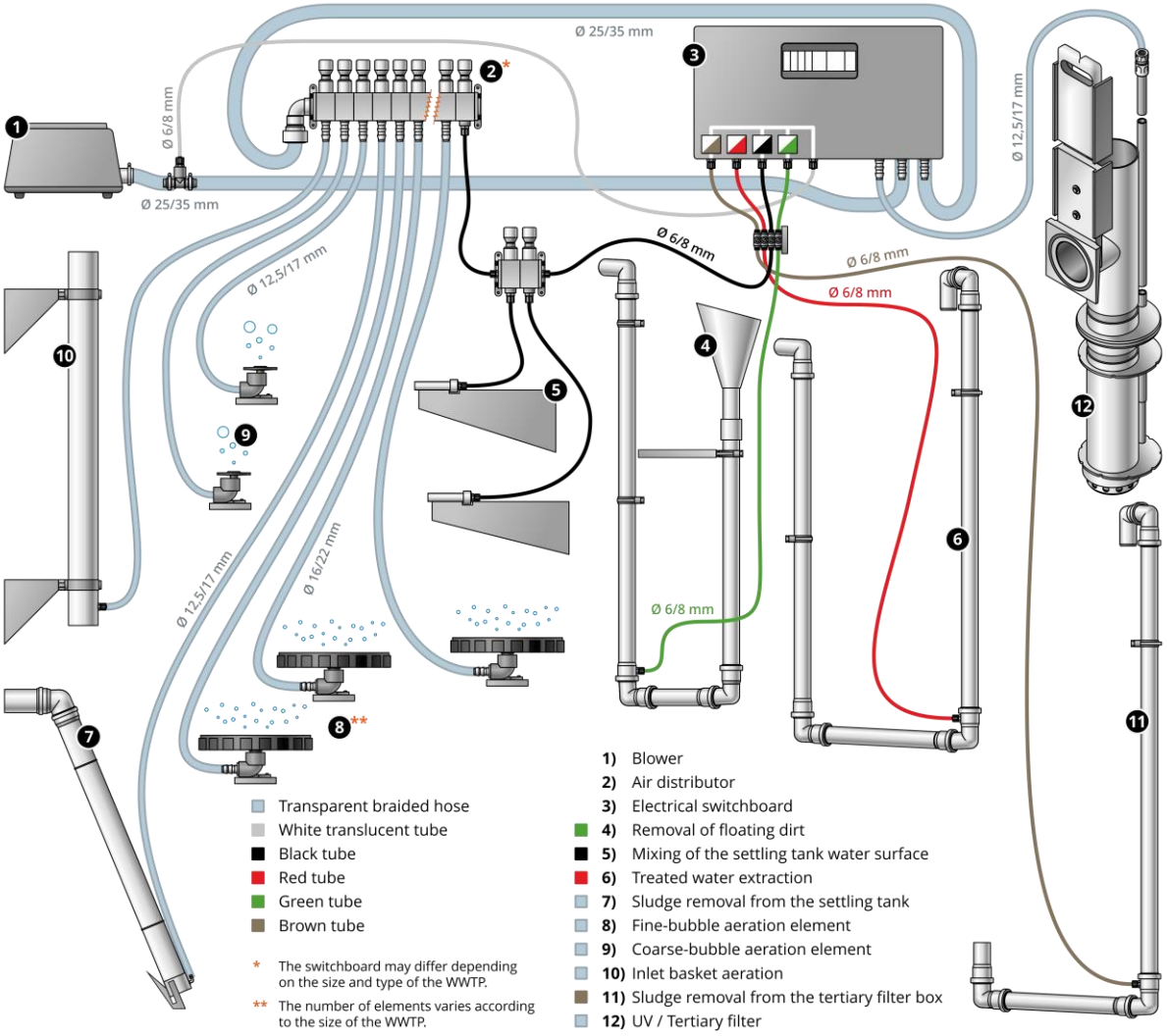


Fig. 21: Air distribution scheme BC 16–30 EXCLUSIVE UV

15.3 WWTP OPERATION CONTROL

The WWTP operation is controlled by the COMFORT PLUS control unit – see Chapter 14.2.

To ensure high efficiency of the UV lamp, it is necessary to check its cleanliness once a month (or depending on the WWTP operation load) and, if necessary, wipe off – spray the impurities with water.

Before removing the UV lamp from the protective cover it is absolutely necessary to put the UV lamp out of operation by turning it off or turning off the main circuit breaker of the WWTP control unit. (See Chapter 20.8).

The expected lifetime of UV lamps is 1 year. If the lamp is used for a longer period of time, there may be a significant reduction in its efficiency, which results in a worsening of the microbiological picture of the effluent from the WWTP. We recommend changing the UV lamp after 1 year of continuous operation.

The electrical switchboard contains the electrical parts necessary for the power supply and operation of the UV lamp. There is a circuit breaker for turning the device on/off and a monitoring current relay that triggers an acoustic signal in the event of a UV lamp failure.

UV lamp's operation and maintenance is described in Chapter 20.8.

For replacement, always use original spare parts supplied by ENVI-PUR, s.r.o. or an authorized person.

16 WWTP DUO

The WWTP facility consists of two interconnected tanks. The first tank – PRIM – is used for primary sedimentation of settleable impurities and floating substances from waste water and at the same time serves as a tank for accumulation of primary and secondary sludge. The latter is the own tank of the COMFORT, EXCLUSIVE or EXCLUSIVE UV treatment plant.

The waste water flows into the PRIM tank, where the waste water is pre-treated. This tank serves as the primary sedimentation of coarse impurities that sink to the bottom of the tank. At the same time, floating impurities (e.g. fats) will also be captured here. Water freed of coarse impurities flows into the biological reactor (the treatment plant's own tank) by gravity overflow.

The mammoth pump for floating dirt removal and a sludge removal mammoth pump from the settling tank are flown into the primary sedimentation tank. The tank also serves as an accumulation sump for excess sludge.

The layout of the WWTP's own tank is similar to that of the COMFORT type. Only at the inlet there is no screen basket, because it is not necessary (dirt is collected in the PRIM tank). The primary sedimentation tank is gravitationally connected to the treatment plant's own tank. The treatment plant is equipped with overflow edges with a calibrated opening designed for the necessary accumulation of inflowing waste water, ensuring the accumulation of inflowing waste water, namely at least 50 % of the one-day capacity of the maximum production of waste water for which the treatment plant is designed.

The WWTP operation is controlled by the COMFORT PLUS control unit.

The basic equipment of the DUO type WWTP also includes the set for precipitation of excess phosphorus.

The WWTP layout is depicted in the figure below.

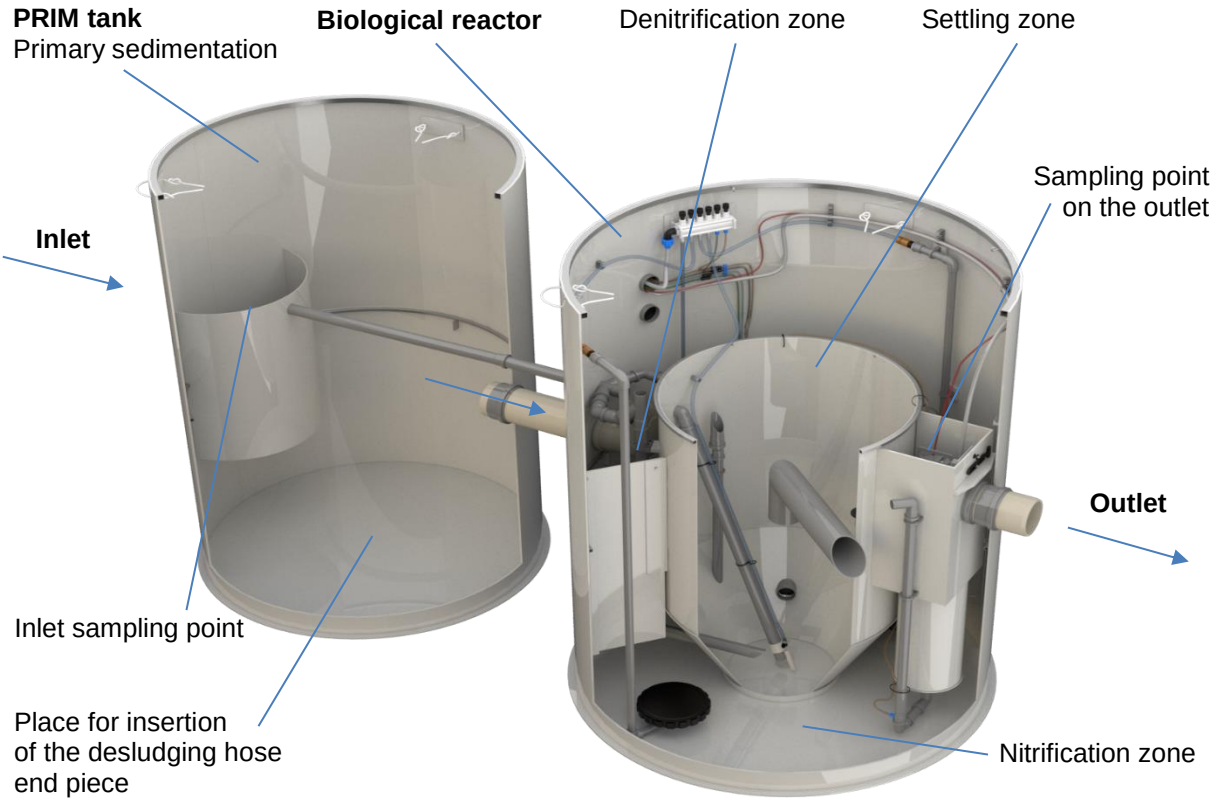


Fig. 22: WWTP type DUO

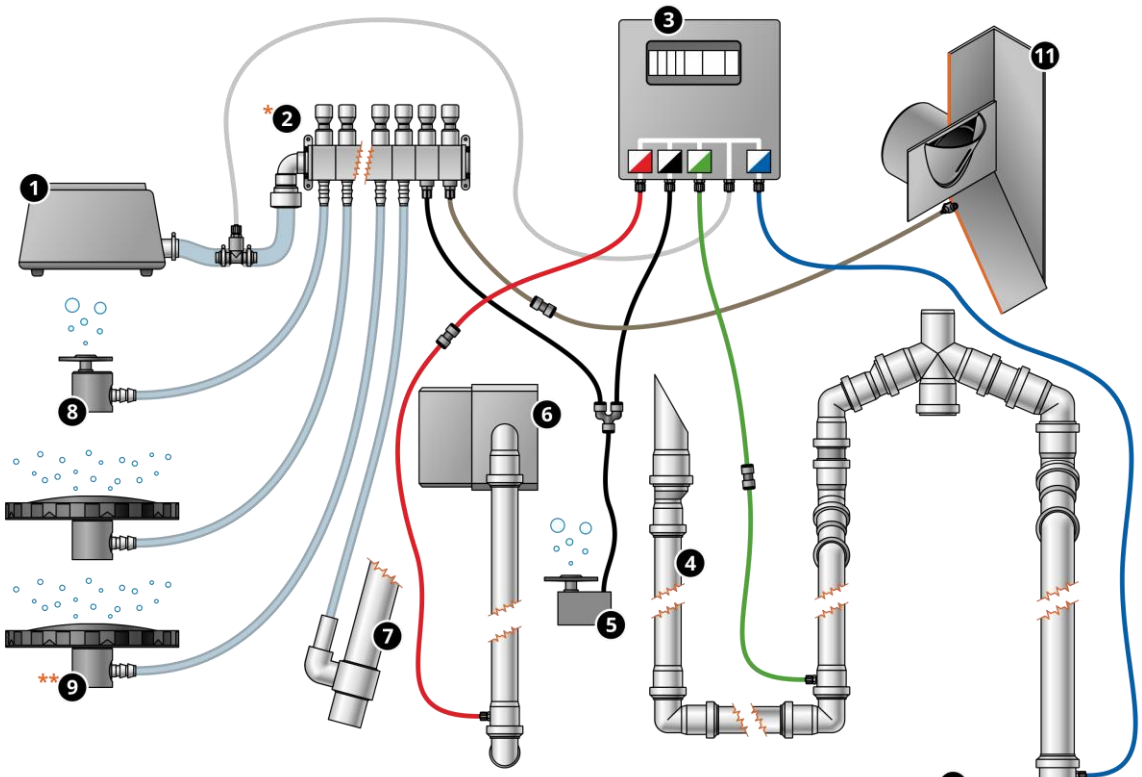
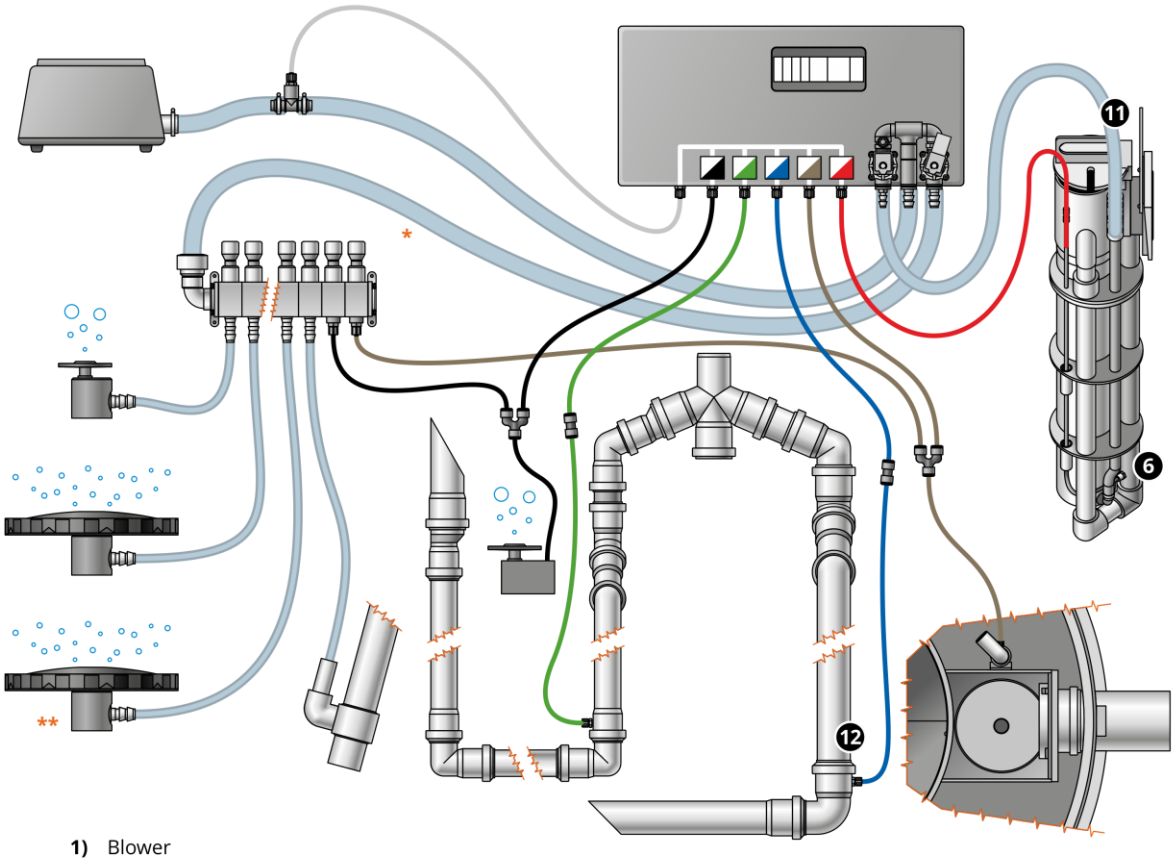


Fig. 23: Air distribution scheme WWTP type BC 4-12 COMFORT DUO



1) Blower
2) Air distributor
3) Electrical switchboard
4) Removal of floating dirt
5) Mixing of the settling tank water surface
6) Treated water extraction
7) Sludge removal from the settling tank
8) Fine-bubble aeration element
9) Coarse-bubble aeration element
10) Sludge removal from the tertiary filter
11) Aeration / cleaning of the tertiary filter
12) Sludge removal from the settling tank into the PRIM tank

Transparent braided hose
White translucent tube
Black tube
Red tube
Green tube
Blue tube
Brown tube

* The switchboard may differ depending on the size and type of the WWTP.

** The number of elements varies according to the size of the WWTP.

Fig. 24: Air distribution scheme WWTP type BC 4-12 EXCLUSIVE / EXCLUSIVE UV DUO

16.1 WWTP OPERATION CONTROL

When the treatment plant was put into operation, the expected optimal setting of the blower operation was carried out. Do not willfully change this setting without consulting an authorized dealer or manufacturer, as inappropriate settings may cause the WWTP to malfunction.

WWTP operation is ensured by the intermittent operation of the blower that is controlled by the control unit. The control unit type depends on the WWTP type that is used as the biological reactor.

The control of the control unit and air distribution connection - see Chapter 14.1 with the description of the WWTP used as biological reactor (COMFORT, EXCLUSIVE, EXCLUSIVE UV).

The electrical switchboard with control unit has either a socket for connecting the pump (to pump out the sludge with a pump) or an output for connecting the air tube to the pump-out mammoth.

16.1.1 Setting mode

A modified COMFORT Plus[¤)] control unit (preparation for a pump) is delivered to the treatment plant with a sludge sump, which has extended functionality to control the pump or the excess sludge pumping mammoth pump.

The settings are made using the buttons on the control unit panel by selecting the appropriate mode and parameter. The selected mode and parameters are shown on the display, the parameter that can be changed flashes.

Continue with mode P11 pumping (excess sludge pump):

- Time setting of the pump using menu **P11** by switching relay RE2.
- The switching time in second sis adjustable from **2** to **300** seconds (the setting step is after 2 seconds) and the repetition period in hours from **6** to **168** hours (the setting step is after 2 hours).
- Before pumping is initiated, the treatment plant is put in a rest period for a period of 30 minutes.
- Using the **MODE** button and the **ARROW KEYS** select mode **P11** and confirm with the **SET** button. The mode will appear on the display along with the current set pumping time (in seconds) and the current set pump switching delay time (in hours).
- After selecting and confirming the mode, parameters can be changed using the up and down arrow keys. After selecting the desired parameter, confirm with the **SET** button, then confirm by pressing the **SET** button again to return to **MODE** selection.
- You can continue by selecting the next mode using the **ARROW KEYS**, or stop setting and the unit will automatically switch to Control Mode after 30 seconds.

17 CONTAINERIZED WWTPS

If requested, the WWTP technology can be fitted into a rectangular tank made of polypropylene (PP), stainless steel (SL) or concrete (B). The schematic layout of individual parts and technological elements of the WWTP is shown in Figures 25 and 27.

Depending on the WWTP technology control type, the container WWTP can be of COMFORT, EXCLUSIVE or EXCLUSIVE UV type. Description of control of the individual WWTP types is described in the previous chapters.

17.1 WWTP TYPE COMFORT

The WWTP technology is extra equipped with an automatic level lowering level in the settling tank and the subsequent removal of floating impurities using a mammoth pump, and the operation is controlled by the COMFORT Plus control unit (see chapter 14.1).

The individual technological parts of the WWTP are described in the following figure.

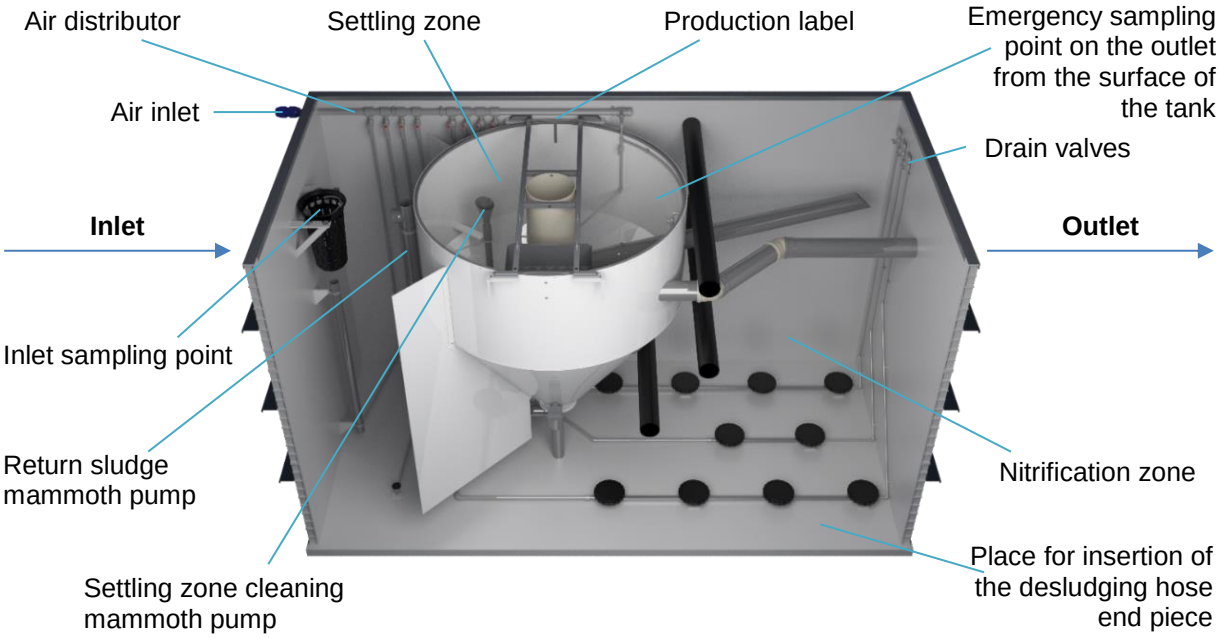


Fig. 25: Containerized WWTP in PP (COMFORT)

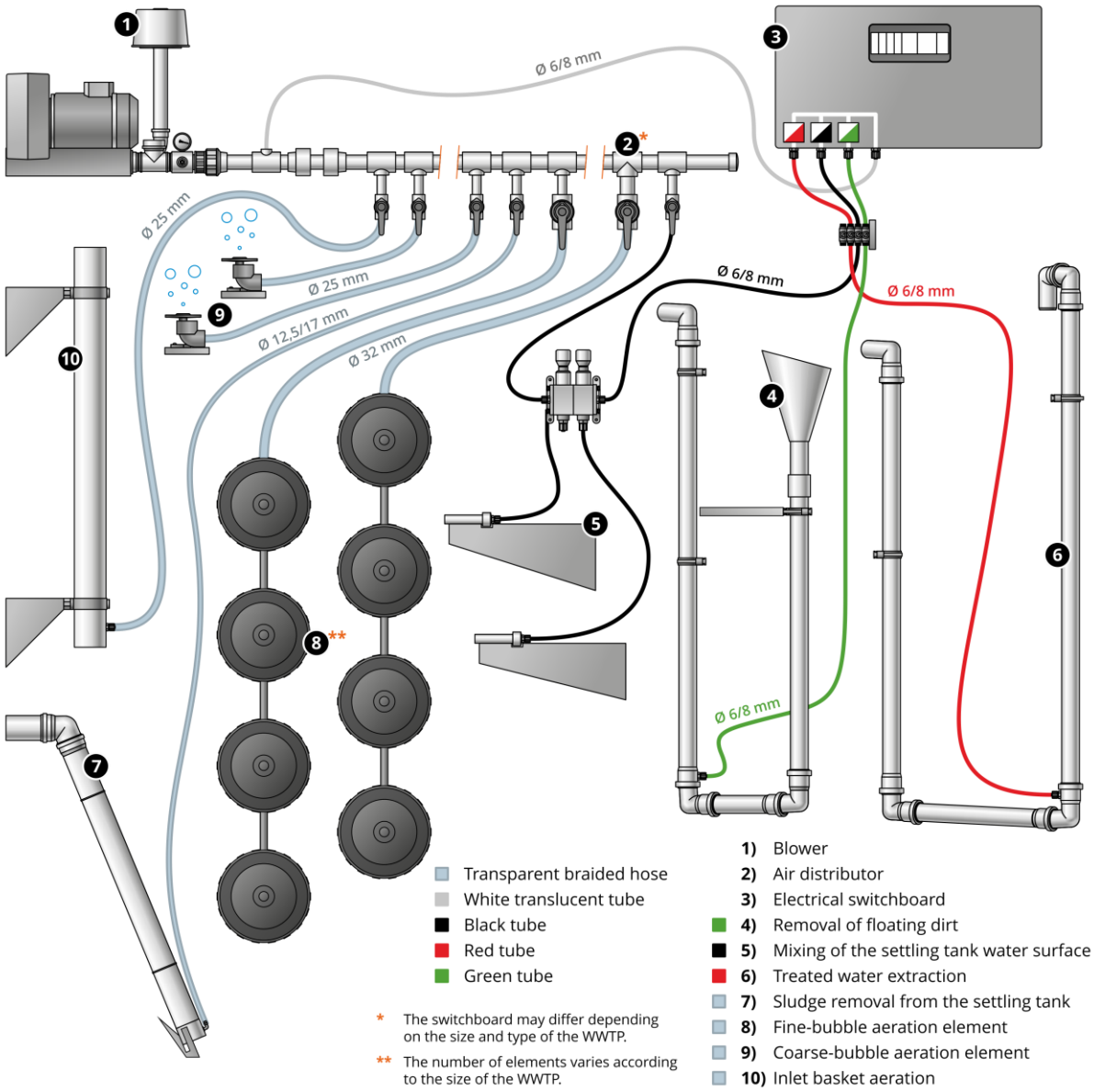


Fig. 26: Air distribution scheme WWTP type BC 20K, 25K, 30K, 40K, 50K COMFORT

17.2 WWTP TYPE EXCLUSIVE/EXCLUSIVE UV

The EXCLUSIVE type is extra equipped with a tertiary treatment on the outlet and a set for precipitation of excess phosphorus. A mechanical tertiary filter ensures the capture of any impurities that may have escaped from the settling tank. The filter is fitted in a separate plastic box on the outlet pipe and works on the basis of gravity flow.

The filter consists of a plastic supporting structure, on which a mesh with a mesh size of 0.5 mm is installed. Impurities that are caught on the filter are automatically shaken off into the box, the volume of which is then automatically pumped back to activation by the mammoth pump.

The EXLUSIVE UV type is extra equipped with a UV lamp.

The operation is controlled by the COMFORT Plus¤) control unit (see chapter 14.1).

The individual technological parts of the WWTP are described in the following figure.

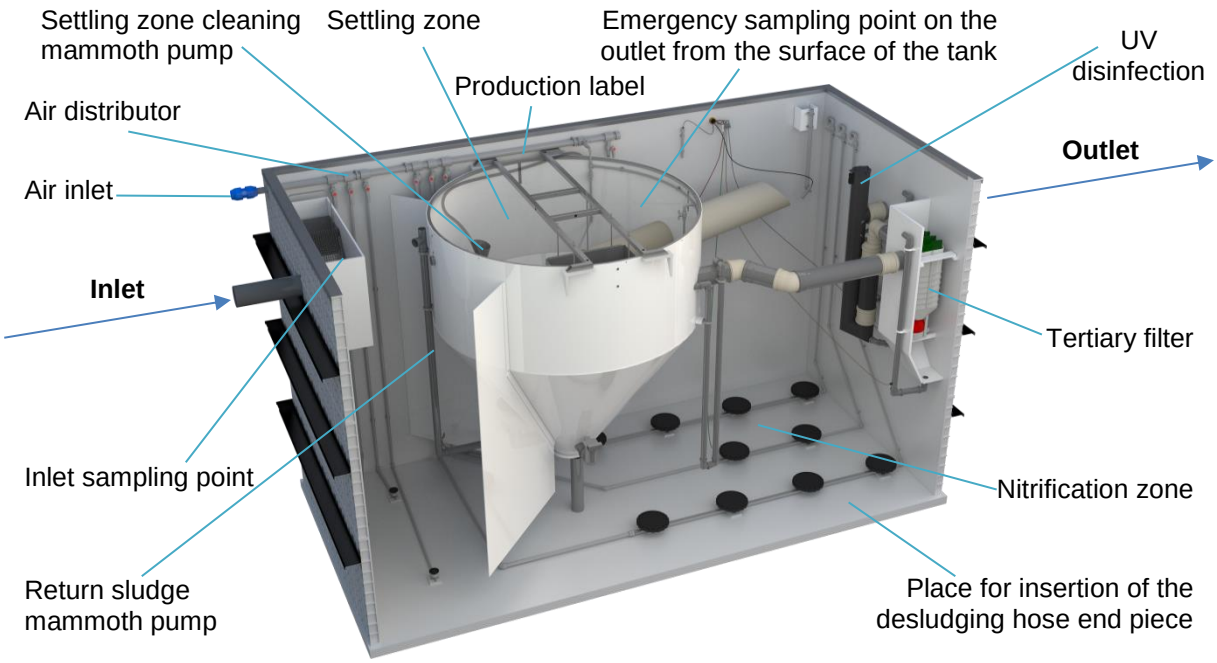


Fig. 27: Containerized WWTP in PP (EXCLUSIVE, EXCLUSIVE UV)

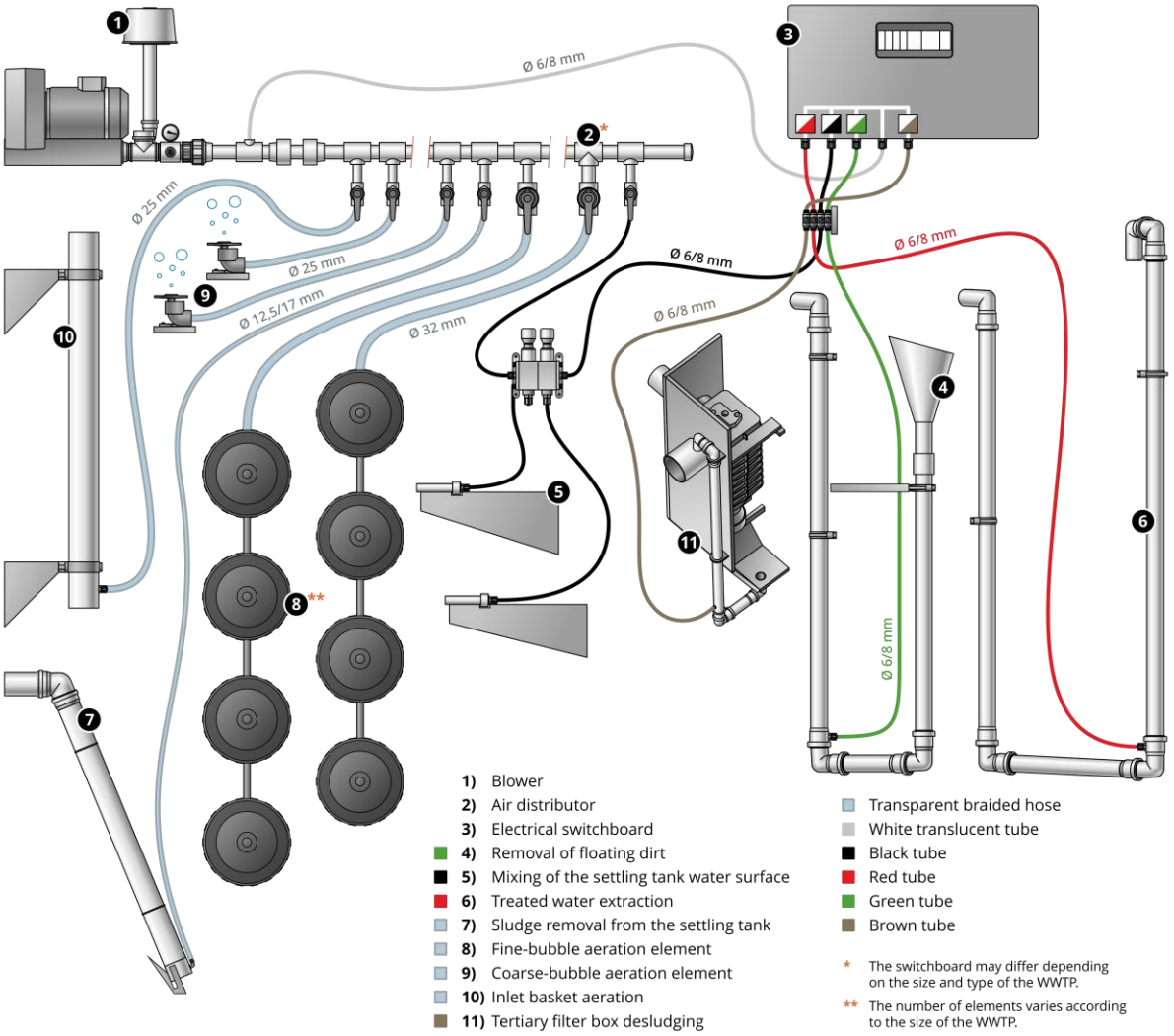


Fig. 28: Air distribution scheme WWTP BC 20K, 25K, 30K, 40K, 50K EXCLUSIVE

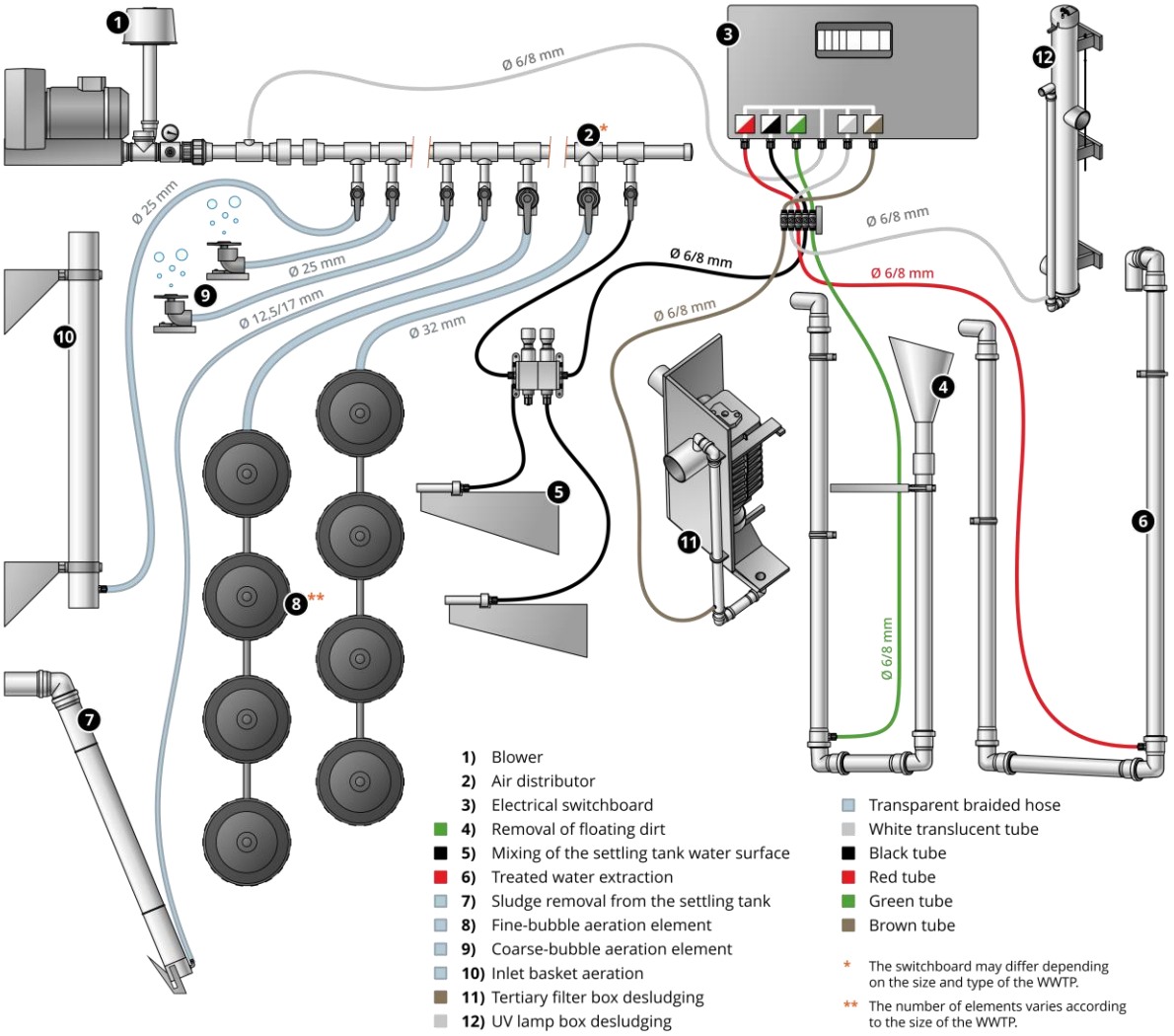


Fig. 29: Air distribution scheme WWTP BC 20K, 25K, 30K, 40K, 50K EXCLUSIVE UV

18 DOSING EQUIPMENT FOR PRECIPITATION OF PHOSPHORUS

WHEN WORKING WITH PAX FLOCULANT, TAKE EXTRA CAUTION, USE PERSONAL PROTECTIVE EQUIPMENT AND FOLLOW ALL WORK SAFETY RULES!!! PAX FLOCULANT IRRITATES EYES AND SKIN!!! FOLLOW THE INSTRUCTIONS GIVEN IN THE SAFETY DATA SHEET!

18.1 DESCRIPTION

Excess phosphorus, which can no longer be removed biologically, is chemically precipitated by dosing the concentrated solution of liquid PAX Flocculant.

18.2 PACKAGING, STORING

18.2.1 Packaging

1		Peristaltic dosing pump ¤) with accessories (suction hose 4x6 (2 m), discharge hose 4x6 (2 m), suction basket and injection valve)
2		Digital timer switch ¤)
3		Storage canister with liquid PAX Flocculant 18 (13 kg)
4		Catch tray
5		Discharge hose 10 m

Peristaltic pump has a maximum output of 1.0 l/h (depending on the installation distance from the WWTP), power input 3.5 W, 230 V. The standard pump accessories include a suction basket and an injection valve, a suction hose 4x6 (2 m) and a discharge hose 4x6 (2 m).

Flocculant PAX 18 is supplied in 13 kg canisters.

To ensure the correct functioning of the WWTP, use only PAX flocculant approved by the manufacturer!

Catch tray prevents the PAX Flocculant solution from leaking into the environment in the event of damage to the canister.

18.2.2 Storing

Store the PAX flocculant only in its original packaging. Limited storage life of 6 months.

18.3 PLACEMENT AND INSTALLATION OF THE DOSING EQUIPMENT

18.3.1.1 Placement

We recommend placing the dosing equipment in areas protected from the weather. The dosing pump should not be placed no more than 10 meters away from the WWTP.

18.3.1.2 Outdoor placement

We recommend placing the equipment into an ENVI-PUR wooden technical house.

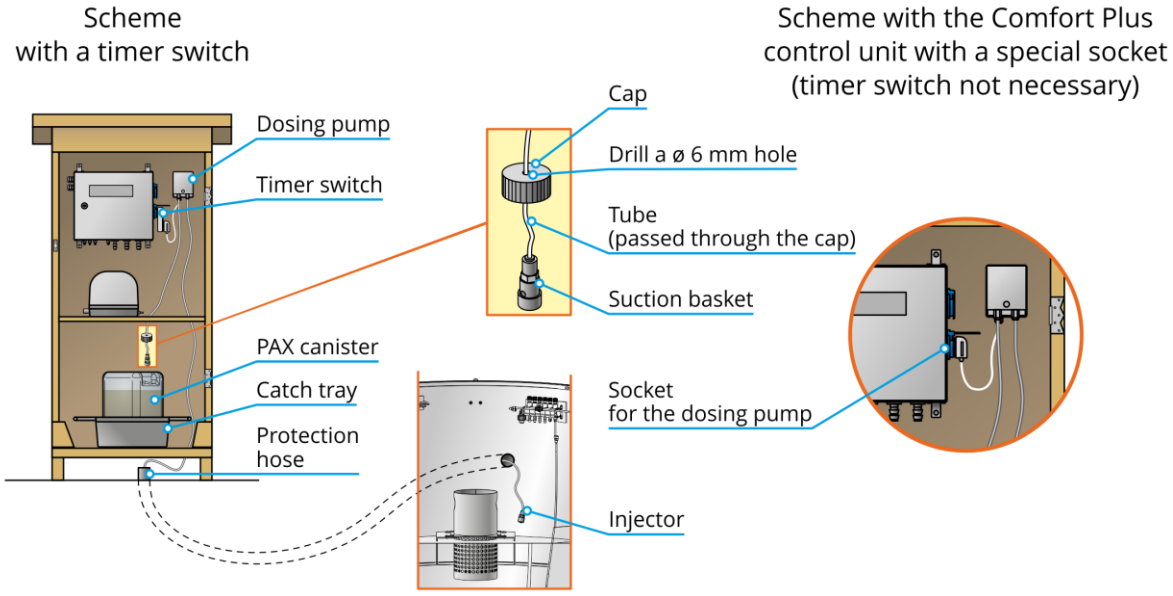


Fig. 30: ENVI-PUR wooden house

18.3.1.3 Indoor placement

Placement in a garage, basement or other suitable indoor space, near the control unit or BC biocleaner® WWTP.

18.3.2 Installation

1) Follow the peristaltic pump manual to attach the pump to the wall.
2) Place the catch tray under the pump (or nearby).
3) Place the canister with PAX flocculant into the catch tray.
4) Remove the lid of the PAX flocculant canister and drill the ø6mm hole into it.
5) Push the suction hose through the hole drilled into the lid.
6) Assemble the tubes following the manual attached to the pump. Connect the suction basket to the suction hose and immerse the basket into the canister. The discharge hose must be pushed through the protection hose together with the air hose from the blower to the WWTP. Then discharge hose is fitted with an **injection valve**, which is **fixed above the nitrification (aerated) part's level** in the WWTP. The injection valve is not submerged, PAX flocculant is dosed into the free nitrification level. It is mixed thanks to the fitted aeration element.

Suction basket  *Injection valve* 

7) Following Chapter 18.4, set the pump operation on the digital timer switch. If the WWTP is equipped with the Comfort Plus control unit with a socket for a dosing pump. Dosing can be set on the control unit, replacing the function of the digital timer switch.
   The amount of the PAX flocculant required is in the order of milliliters. Since this is a very small amount, the dosing pump operation must be time controlled. The smallest time unit that can be set on the digital timer switch is 1 minute.
8) Connect the pump to the socket on the digital timer switch, then connect it to the power socket. In the Comfort Plus control unit with the dosing pump socket, connect the pump directly to this socket. In this case, the digital timer switch is not used.

18.4 DOSING

WHEN WORKING WITH PAX FLOCULANT, TAKE EXTRA CAUTION, USE PERSONAL PROTECTIVE EQUIPMENT AND FOLLOW ALL WORK SAFETY RULES!!! CONCENTRATED PAX FLOCULANT IS IRRITANT!!!

The following table shows the daily doses of PAX flocculant to achieve a final phosphorus concentration on the outlet from the WWTP of approximately 3 mg/l. The calculation considered an input phosphorus concentration of 17 mg/l (80 % phosphorus removal efficiency). The actual dose required can be higher or lower depending on the input phosphorus concentration.

We recommend setting the initial dose lower and adjusting the dosage based on the results of an analysis. The dose should be distributed evenly throughout the entire day.

Never dose a larger amount into the WWTP than necessary! Increased doses of PAX flocculant may inappropriately lower the pH in the WWTP, which would result in the inhibition of the treatment processes. As the dose increases, formation of sludge increases as well (inorganic ballast) and the WWTP needs to be desludged more often.

PE (number of inhabitants)	Amount of water (m^3/d)	PAX dose (l/d)
4	0,60	0,064
6	0,90	0,096
8	1,20	0,128
10	1,50	0,160
12	1,80	0,192
16	2,40	0,256
20	3,00	0,320
25	3,75	0,400
30	4,50	0,480
40	6,00	0,640
50	7,50	0,800

The peristaltic pump has a maximum output of 1.0 l/h, depending on the distance of installation from the WWTP. After switching on the dosing pump, it is necessary to measure the actual dosed amount of PAX flocculant into the WWTP. The necessary dosing interval per day must be set based on this measurement.
Ex.: The most common setting of the pump operation for BC 4 with the timer switch will be 2–4 times per day for a period of 1 minute. For the Comfort Plus control unit, it is necessary to select the desired interval according to the table in the manual.

18.5 OPERATION AND MAINTENANCE

18.5.1 Checking the amount of PAX flocculant

Visual inspection – once a month:

- **Checking the amount of PAX flocculant in the canister.**
  The content of the canister should last for 2-5 months of operation, depending on the size and load of the WWTP.
- **Checking the tightness of the canister.**
- **Checking the catch tray for possible occurrence of the PAX flocculant.**

To ensure the correct functioning of the equipment, the flocculant supplied by Envi-Pur s.r.o. must be used exclusively!

18.5.2 Dosing pump operation

The operation requires special measures and attention with regard to the dosed medium.
During operation, the PAX flocculant dosing function is checked, to the point of the inflow to the WWTP.

Visual check, once a month:

- **tightness of the dosing hose,**
- **impurities in the dosing hose and the suction basket.**

Regular maintenance:

- **after 4-6 months, lubricate the silicone tube in the dosing pump with a silicone-based gel,**
- **replace the tube after 1-2 years (the spare tube can be ordered from the WWTP manufacturer).**

Switching off the dosing pump
There is a switch on the dosing pump that can be used to switch it off. It is also possible to disconnect the pump from electricity.

When shutting down the WWTP, the pump must be switched off!

18.6 OCCUPATIONAL SAFETY AND HEALTH WHEN WORKING WITH PRECIPITANT

An aqueous solution of PAX flocculant is used as a precipitant (coagulant). The chemical composition is specified in the safety data sheet, which is supplied as an annex to the supplied medium.

It is necessary to observe all hygienic measures for working with irritating chemicals. In case of skin contact, the area must be rinsed with a sufficient stream of clean, potable water and washed with soap. In case of contact with the eye, it is necessary to immediately start rinsing with a stream of cold water and seek professional medical help without delay. Use the nearest drinking water source. In case of ingestion, do not induce vomiting, seek professional medical help immediately. All containers containing a precipitant must be visibly marked with the appropriate pictogram for irritating chemicals and must not be confused with food and beverage packaging! When working near the spray nozzles at the dosing points and when assembling and disassembling the dosing pumps, the inflow from the storage tank must be stopped and a warning sign must be displayed on the device and controls – Work in progress on the equipment, do not switch on!

18.7 MINIMUM PROTECTIVE EQUIPMENT FOR PRECIPITATOR HANDLING

- Rubber gloves
- protective glasses,
- firm footwear.

19 START-UP OF THE WWTP

Waste water treatment is a biological process dependent, among other things, on the multiplication of microorganisms. Therefore, the required level of treatment is achieved only after a certain period of regular operation of the treatment plant with the designed load. The period of time from putting into operation to achieving full cleaning efficiency lasts about 3 to 8 weeks and is dependent on the quality of the waste water on the inflow and its temperature. This period is technically called the start-up period. During the start-up period, the settings, the operation (phase C1) and interruption (phase C2) times are different from the normal operation of the treatment plant. During the start-up period, it is necessary to supply a larger amount of air to the WWTP than during normal operation. **We recommend that this operation be performed by an authorized person or manufacturer.**

In order to treat the waste water to the required level specified in the operating rules, it is necessary to start up the biological process. The biological process can be started up in two ways:

- Gradual start-up, i.e. inflow of waste water and constant loading even above the set technological parameters,
- import of activated sludge from another biological WWTP, so-called inoculation sludge.

In both cases, it is necessary that all elements of the air system are opened in the right position (see Chapter 9.1, 9.2, 10.2). The aeration system, the return sludge mammoth pump and the basket/denitrification zone aeration must be in operation.

The start-up mode was set when the treatment plant was put into operation. In the case of repeated putting into operation of the WWTP (e.g. after a long-term shutdown from permanent operation), it must be set repeatedly.

During the gradual start-up, a mixture of activated sludge - bacteria, which enter the WWTP from the human intestinal tract - is gradually formed in the WWTP. It gradually multiplies in the waste water.

When seeding the WWTP with inoculation sludge, it is important to select activated sludge from another well-functioning treatment plant. The sludge must settle well. When inoculating, it is advisable to use such an amount of the return sludge that corresponds to about ¼ of the WWTP volume.

When inoculating the WWTP BC 4 and 6, about 50 – 150 l of the return sludge will be enough.

The start-up of the WWTP was done well, if the result of the sedimentation test is about 25-30 % of the sludge. (Settling test, see Chapter 20.5.4).

After the start-up, it is necessary to set the running time and interruption of the blower operation according to the actual material and hydraulic load based on long-term monitoring of the WWTP operation. We recommend that this operation be performed by an authorized person or manufacturer.

20 OPERATION AND MAINTENANCE

20.1 GENERAL

Operation and maintenance of the WWTP is not time consuming or does not require technical skills, but it is the basic prerequisite for the proper functioning of the WWTP.

- **Carry out all the activities described below on time and carefully.**
- **In case of any confusion, please contact ENVI-PUR, s.r.o. or an authorized person.**

20.2 TOOLS

For the proper and simple operation and maintenance of the WWTP, you will need the following tools:

- Rubber gloves,
- perforated ladle,
- long-handled brush,
- 1 L measuring cylinder,
- pH papers,
- shovel,
- ladle for activated sludge.

20.3 SWITCHING ON AND OFF OF THE WWTP

Type **BASIC** - Switch on (off) by plugging in (pulling out) the plug of the blower's mains cord into the socket of the timer switch inserted into the installation socket for the supply of electricity to the WWTP.

Type **OPTIMA** - Switch on (off) by plugging (pulling out) the plug of the power cord of the control unit into the installation socket for the supply of electricity to the WWTP.

Type **COMFORT, EXCLUSIVE**, **EXCLUSIVE UV** - Switch on (off) using the circuit breaker on the electrical switchboard.

20.4 SUMMARY OF ACTIVITIES PERFORMED DURING OPERATION AND MAINTENANCE

The summary of individual performed activities is given in the following table:

interval					activity	
day	**week**	**month**	**half year**	**other**	**name**	**procedure**
x					daily check	20.5.1
	x				weekly check	20.5.2
	x				pH measuring	20.5.3
		x			sludge concentration measuring	20.5.4
			x	if necessary	sludge removal	20.5.5
				if necessary	waste water sampling	20.5.6
		x		if necessary	check, alternatively cleaning of the tertiary filter (applies in case the WWTP is equipped with a tertiary filter)	20.7
		x		if necessary	check, alternatively cleaning of the UV lamp (applies in case the WWTP is equipped with a UV lamp)	20.8
				1 year	UV lamp replacement after 1 year (applies in case the WWTP is equipped with a UV lamp)	20.8.4

				1 – 2 years	blower inspection, alternatively filter and membrane replacement	See the Blower Operation and Maintenance Manual
				3 – 4 months	blower filter cleaning	

20.5 DESCRIPTION OF ACTIVITIES PERFORMED DURING OPERATION AND MAINTENANCE

20.5.1 Daily check

As part of the daily check, it is necessary to check whether the WWTP is in operation and whether there has been no malfunction of the electrical equipment. During the check, it is not necessary to open the BC biocleaner® reactor, it is carried out in the room where the blower is placed.

During inspection, check:

- that the blower is plugged in the socket,
- that the circuit breaker on the electrical switchboard is switched on *****,
- that the membrane blower is switched on in Phase C1,
- for possible occurrence of a fault message *****,
- whether the noise level or the temperature of the blower has increased significantly,
- that the precipitation solution supply is sufficient and the canister is tight,
- for the pressure loss check on the blower filter (if the EFFEPIZETA blower is installed) ¤).

  (* this applies for the type COMFORT, EXCLUSIVE, EXCLUSIVE UV)

In the event of a malfunction, proceed according to Chapter 21.

20.5.2 Weekly check

As part of the weekly check, in addition to the daily check, it is necessary to visually check the function of the WWTP and, if necessary, clean some parts. When checking, it is necessary to open the BC biocleaner® reactor.

As part of the check, the following parts of the treatment plant must be inspected:

A. <u>Basket for catching coarse dirt on the inlet</u>

Coarse dirt is caught in the basket and paper and biodegradable substances are ground up with the help of the air supplied under the basket to the denitrification zone. It is necessary to check that the basket is not clogged and that its aeration works well.

- Wait until the WWTP goes to phase C1, during which the blower is switched on.
- Check for distinct air bubbles passing through the basket. If this is not the case, **slightly** increase the air flow under the basket by turning the appropriate valve on the air distributor.
- If there are large pieces of non-biodegradable substances in the basket (plastics, rubber, textiles) or the water level in the basket is higher than the water level in the denitrification zone, clean the basket.

During the cleaning of the basket, ensure that no waste water is supplied to the treatment plant (do not use appliances connected to the sewer system that flow into the treatment plant).

While cleaning the basket, follow these steps:

- Slide the basket out of the guide grooves and remove it from the tank,
- empty the contents of the basket (hereafter referred to as “rakes”) into the prepared container,

- if necessary, remove trapped dirt mechanically,
- insert the basket back into the guide grooves.

Sprinkle the rakes with chlorine lime or a similar disinfectant and place them in a municipal waste container.

B. Return sludge mammoth pump

The mammoth pump ensures pumping out of the activated sludge from the settling zone. It is necessary to check if it has not been blocked.

- Wait until the WWTP goes to phase C1, during which the blower is switched on.
- check whether the water flows out of the return sludge mammoth pump in the denitrification zone so that the flow is uniform, but does not necessarily splash all the way to the basket,
- if this is not the case, proceed according to Chapter 21.

The operation of the return sludge mammoth pump conditions the correct operation of the WWTP. The mammoth pump must always pump when the blower is on.

The outlet opening of the mammoth pump must not be clogged or blocked!

C. Settling zone

There should not be large pieces of sludge or a layer of dirt on the surface of the settling zone. The water should be transparent and clear, and below the surface the clear water/sludge boundary line should be visible. Large amounts of floating dirt should not be caught in the drain.

- Check the cleanliness of the drain canal in the settling zone and if larger amount of dirt appears, clean it with a ladle and move it to the denitrification zone.
- Check the purity of the water in the settling zone and formation of the water/sludge boundary line. Water should be transparent and clear, and below the water surface the boundary line of clear water and sludge should be visible. If not, follow chapter 21.
- Check the cleanliness of the outlet pipe, in case of dirt, clean it with a ladle and move it to the denitrification zone. In the case of repeated, larger occurrences of dirt, proceed according to Chapter 21.
- If this situation recurs regularly, for the type **COMFORT, EXCLUSIVE, EXCLUSIVE UV** try the cleaning of the settling zone function instead of removing the dirt from the water level manually. To test the cleaning function, proceed as follows:
    - In the setting mode start cleaning (mode P3, parameter START),
    - check, whether the tank water level drops during phase C3,
    - check, whether the content of the zone mixes and whether the dirt on the water surface is pumped out during phase C4,
    - check, whether the dirt rises to the water surface after finishing phase C5,
    - check, whether the dirt is pumped out of the water surface during phase C6.

D. Nitrification zone

The nitrification zone should be aerated evenly.

- Wait until the WWTP goes to phase C1, during which the blower is on.
- Check whether evenly distributed air bubbles are visible on the water surface of the nitrification zone. If not, follow chapter 21.

- Every week, it is advisable to open the drainage valve(s) on the aeration grates for a container WWTP to drain any possible condensate. If the condensate is not drained, the efficiency of the aeration will be reduced.
- Check the injection valve of the precipitator dosing hose (PAX) to see whether the solution is correctly dosed when the dosing pump is in operation; and whether the solution does not flow through involuntarily when the dosing pump is turned off. If not, proceed as instructed in Chapter 21. Then check the injection valve for any dirt (sludge) occurrence and remove, if necessary.

E. General condition of WWTP
Check whether there is any event that has not occurred before or that seems unusual to you. If so, follow chapter 21.

20.5.3 pH measuring

It's strongly recommended measuring the pH once a week at least using paper indicators. When measuring the pH, use a water sample from the nitrification zone. The pH value should be a neutral range. The activated sludge can be adapted to pH values in the range of 6.5 – 9.0.

During the removal of dirt in the nitrification zone, hydrogen ions are released, which reduce the alkalinity of the waste water. With insufficient alkalinity, nitrification can lead to a spontaneous drop in pH to process-inhibiting values. During the inflow of ordinary sewage water into the WWTP, there is a partial increase in alkalinity in the denitrification area (inflow area), thereby compensating for a possible drop in pH during nitrification.

The pH value can be suddenly and drastically reduced by incorrect dosing of the phosphorus precipitator (PAX) or spontaneous leakage of the solution through a damaged injection valve or a broken tube with the solution. If this happens, it is necessary to arrange an immediate fixing (replacement of the valve or tubing, adjustment of the dosage setting) and increase the pH according to the following procedure. Follow the safety instructions when handling the PAX solution!
In the case of inflow of waste water with a low buffering capacity (mostly when using "soft" water, water after ionex treatment, rainwater), waste water with a higher content of ammoniacal nitrogen or with a low C:N ratio, or in a treatment plant with a proportion of industrial waste water of low pH, this balance may be disturbed. The cloudy effluent from the WWTP and the supernatant (settled water) during the settling test can serve as an indicator (sludge is in the form of small flakes that do not sediment). If the pH value is found to be below 6.5, it is necessary to start dosing the alkalizing chemical (lime) into the activation nitrification zone. Instructions for this procedure are given in the following text. If you are not sure, we recommend that you consult an authorized person or WWTP manufacturer about this issue.

Instructions for increasing the pH:

Tools:
A bag with slaked lime, shovel, pH indicator papers (or the pH meter).

Procedure:
Use the indicator paper to determine the pH in the WWTP (measure in the aerated nitrification zone. If the pH is lower than 6.5, throw a shovel with slaked lime over the surface of the **aerated part**. After half an hour of operation of the treatment plant, measure the pH again. If the pH value is in the range of 7.5–8.0, you can stop dosing, if not, proceed analogically until you reach pH values of 7.5–8.0. The pH value in the treatment plant **must not exceed the value of 8.5**!
Gradually measure the pH in the treatment plant at intervals of one or two days (depending on the rate of the pH drop) until the pH of approx. 6.5 is reached. Then neutralize to pH 7.5–8.0 in the same way. Next step involves dosing half the dose of lime than was needed to achieve pH 7.5–8.0 at half the interval of the time it took to fall from pH 7.5–8.0 to a pH below 6.5.
After reaching the required pH value, check the pH value every two weeks. If the value is around 7, there is no need to dose lime. If lower or higher values are detected, slightly increase or decrease the dosed amount of lime. The interval between dosing cannot be extended by increasing the dose of lime!
If the operator of the treatment plant has already found the optimal procedure lime dosing, he does not necessarily need to dose on the water surface of the treatment plant, but anywhere in the sewage network prior to the treatment plant, if sufficient waste water flow is ensured in this part.
In principle, other alkalizing agents such as sodium hydroxide can also be used for the neutralization of the treatment plant. However, the use of strong alkalis entails the risk of overdose and the subsequent collapse of the treatment plant, so extra care and caution must be taken when determining the

appropriate dose. In general, the dosed quantity is considerably lower than that of slaked lime and ranges in the order of units of grams, with the dosing interval being shorter. The advantage of this procedure is the possibility of easy dosing directly into the toilet, sink drain, etc. When working with these products, you must follow the work safety rules stated in the package leaflet of the product. If the operating mode of the treatment plant changes (e.g. long-term change in load, change in the composition of waste water, etc.), it is necessary to repeat the procedure to find the right dose amount and the dosing interval, or to interrupt the dosing of alkali.

20.5.4 Sludge concentration measuring – the settling test

For the proper functioning of the treatment plant, it is necessary that there is an optimal concentration of microorganisms in the nitrification zone, which cause the biological purification of the water itself (so-called activated sludge).

- Wait for the C1 operation phase (aeration should be running for at least 5 minutes),
- Fill a measuring cylinder with water from the nitrification zone, or other cylindrical transparent container with a volume of approx. 1 l.
- Leave the cylinder or container still for 30 min in a shady, level place.
- Determine, whether a clear boundary line of sludge and clear water is formed. If not, proceed according to Chapter 21.
- Measure the sludge height. If the height is greater than approx. 70 % of the total water level height, perform desludging – see 20.5.5. The ideal sludge height is 30 % - 70 % of the total water level height, the presupposed desludging interval is approx. 2 times a year (depending on the WWTP load, the frequency can be higher or lower).

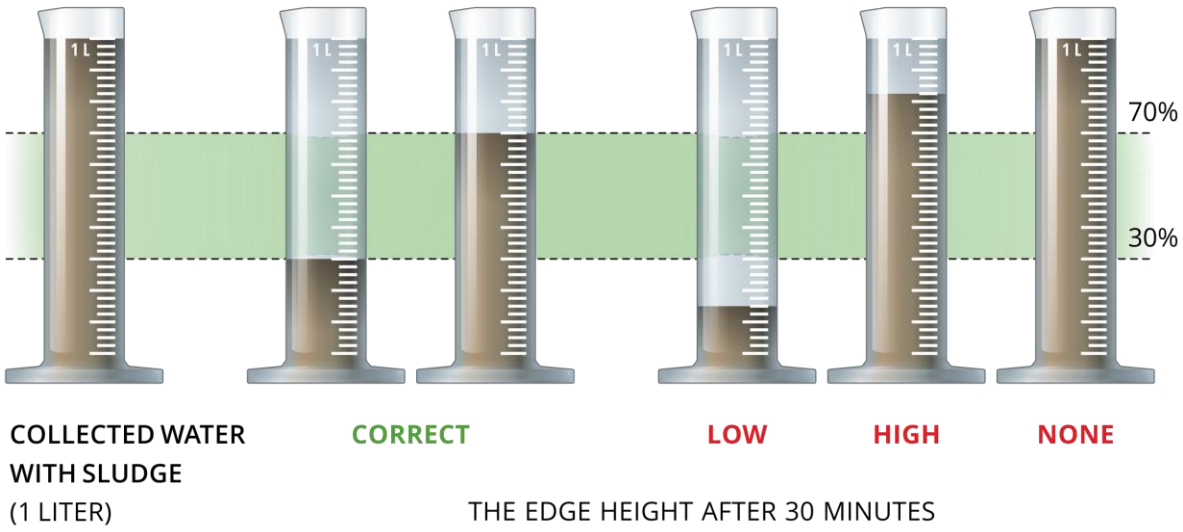


Fig. 31: Possible results of the settling test after 30 minutes

20.5.5 Pumping out of the sludge

In the course of the WWTP operation, sludge accumulates in the nitrification zone and must be pumped out.

Sludge and water pumped out of the WWTP are considered waste and must be disposed of in accordance with relevant legislation.

During the desludging process, proceed as follows:

- Turn the WWTP into mode C1 or connect the blower to the power socket so that the entire volume of activation is mixed evenly (approx. 1 min).
- Carefully insert the end of the suction hose of the fecal truck or other pumping equipment into the nitrification zone (**Be careful! There are aeration elements attached to the bottom!**).
- Slowly pump about 1/5 to 1/2 of the tank volume.
- **In the process of pumping, the difference between the water level in the nitrification zone and the settling tank must not be greater than 40 cm, otherwise the settling tank may get damaged.**
- Take out the ending of the suction hose of the fecal truck or other pumping equipment.
- Switch on the WWTP.
- To verify, that a sufficient amount of sludge has been pumped out, perform the settling test the very next day.
- If there is no change in the result of the settling test, repeat the same procedure again.

- **Pay extra attention to the handling of the hose and its ending, so that it does not damage the reactor.**
- **Refill the pumped volume immediately after the pumping.**

20.5.5.1 The desludging procedure for the DUO Type WWTP

We recommend to desludge the PRIM tank once a year. Pump out the entire tank, only in the event of an increased groundwater level. Pump out enough water, so that the water level in the tank is always higher than the groundwater level (in case of non-compliance, there is a risk of destruction or floating of the tank).

- **Immediately after the desludging is completed, the tank must be refilled or filled with water up to the point of the operational water level.**
- **The built-in tank must not remain empty for a long time.**

In the second tank, pumping is carried out only if necessary based on the results of the settling test (see chapter 20.5.4). We recommend doing the settling test every 2 months.
Excess sludge can be pumped directly into the primary sedimentation tank. See chapter 20.5.5 for the procedure.

20.5.6 Sampling

The collection of samples and the subsequent analyzes of the waste water will allow to obtain information about the function of the treatment plant. You can do them for your own use or because it is required by the relevant water management authority. The collected samples must always be analyzed in a laboratory specialized in waste water analysis. Five-day biological oxygen demand (BOD_5), chemical oxygen demand (COD) and suspended solids (SS) determinations are usually sufficient.

Before taking the samples yourself, always first agree with the laboratory that will perform the analyses, on the number and quantity of samples taken. At the same time, the laboratory should give you sample boxes (special bottles) in which you will transport the samples to the laboratory and detailed instructions for collection.

Samples can be collected using a PVC bottle attached to a pole approx. 1.5 meters long. Before sampling, rinse the bottle with clean water and let it dry.

- Collect the inlet sample right below the inlet pipe.
- Collect the outlet samples from the measuring object, which should be placed behind the WWTP as part of the project design of the WWTP.
- In case the WWTP is not equipped with a measuring object, it is possible to take the sample from the outlet canal or, in an emergency, from the settling zone.

In case of collecting from the settling zone, make sure that floating impurities from the surface do not get into the sample. It is necessary to submerge the collection container only slightly below the surface, otherwise the already settled sludge in the settling tank will be stirred up and the results will be distorted.

- Pour the collected sample into the sample box and transport it to the laboratory as soon as possible. Store the sample boxes with the collected samples protected from sunlight, preferably at a temperature of up to 5 °C.

In general, it is possible to take either a so-called spot sample or a mixed sample. A spot sample means that the amount required for analysis is collected at one time. In the case of a mixed sample, the amount required for analysis is gradually poured from smaller one-time collected samples of equal amount in a given time interval. Usually, 8 samples of equal volume collected at intervals of 15 min., i.e. for a period of 2 hours, are poured.

- **It is the duty of the WWTP operator to collect samples and ensure their analysis based on the decision of the relevant authority.**
- **Specified sampling and analysis information can be found in the water law decision. In the case of installation of a WWTP according to § 15a of the Water Act (on notification), it is not necessary to carry out analyses. Every 2 years, however, the WWTP must be inspected by a person authorized by the Ministry of the Environment. (* May vary according to local legislation)**

20.6 OPERATION AND MAINTENANCE OF THE BLOWER

Under no circumstances must the blower operate with a closed discharge pipe!

Operation and maintenance of the blower is carried out according to the supplied technical documentation. Only some information is specified in this document, which **does not replace** the "Operation and maintenance manual" of the given blower.
Before starting maintenance, the blower must always be disconnected from the electrical network (remove the plug from the socket, disconnect the circuit breaker).

Membrane blower SECOH ¤) Blower EFFEPIZETA ¤)

Fig. 32: Blowers

20.6.1 Blower SECOH¤)

Regularly check the noise level and the temperature of the blower, and that the mains supply is not damaged. The dust filter must be cleaned once every 3 months.
The JDK ¤) blower is equipped with a signalization of damaged membrane. In case of damage, a red light on the outer cover of the blower lights up.
If you need to replace the membranes, please contact ENVI-PUR, s.r.o. (Soběslav plant - see page 4).

20.6.2 Blower EFFEPIZETA

The blower must be placed in a well-ventilated area with a temperature of up to 40 °C. If placed outdoors, the blower must be protected from direct sunlight, moisture and water. Both the inlet and the ambient air temperature must be between -15 °C and +40 °C.
Clean the mesh filter after 10-15 days of operation. In a dusty environment, the filter needs to be cleaned more often. A dirty filter can increase suction resistance and consequently increase operating pressure, operating temperature and dust suction. Clogging of the filter is visualized by an additional device with a cone, which moves out as the filter gradually becomes clogged and shows the degree of clogging. When the cone is in the red field, it is absolutely necessary to clean the dust filter!

The Effepizeta blower also includes a safety valve, the function of which is to protect the blower from overheating and subsequent seizure. The safety valve reduces the air pressure in the system and it is very important that this valve is opened. Air escaping through the safety valve is a manifestation of its correct function. Restricting the air flow through this valve can lead to the destruction of the blower.

20.7 MECHANICAL FILTER OPERATION AND MAINTENANCE

The operation of the WWTP is ensured by the intermittent operation of the blower. The intermittent operation of the blower is ensured by the control unit in the electrical switchboard. A detailed description of the control unit settings is described in chapter 14.2. Individual phases of filter cleaning ensure gradual opening and closing of solenoid valves, which are controlled by the control unit.

When the treatment plant was put into operation, the expected optimal setting of the program was carried out. Do not willfully change this setting without consulting an authorized dealer or manufacturer, as inappropriate settings may cause the WWTP to malfunction.

However, this setting may vary depending on the treatment efficiency of individual WWTPs. The most variable parameter is the C7 phase, when it is necessary to monitor the required length of the filter blow, when the mesh is sufficiently shaken off and cleaned with air.

20.7.1 Mechanical filter operation and maintenance

- **Solenoid Valves**
  Solenoid valves that are used for the cleaning of the tertiary filter are located in the electrical switchboard. When the valve is in operation, check at least once a month that it opens and closes properly. A metallic click means the valve is working.
  Follow the instructions in the solenoid valve operating manual. During the warranty period, all service work must be performed by an authorized person or manufacturer.

20.7.2 Mechanical tertiary filter

The tertiary filter maintenance consists of regular visual inspection of the filter. The operator checks the sufficiency of the automatic cleaning and, if necessary, adjusts the intervals of the individual phases. Once a month, we recommend removing the filter from the WWTP, checking whether the mesh is in order and rinsing it completely either in a container of water or with a not too intense stream of water from the hose (so as not to damage the mesh).

Before removing the tertiary filter from the WWTP, it is necessary to lower the water level in the tank by approx. 5 cm. On the control unit, use the "Tertiary filter service" mode and the START parameter, which will start pumping the treated water into the outlet.

If manual cleaning is necessary, it is possible to manually start the filter box cleaning mammoth pump by opening the appropriate valve on the air distributor (see Fig. 20-23 or Chapters 9.1 and 9.2).

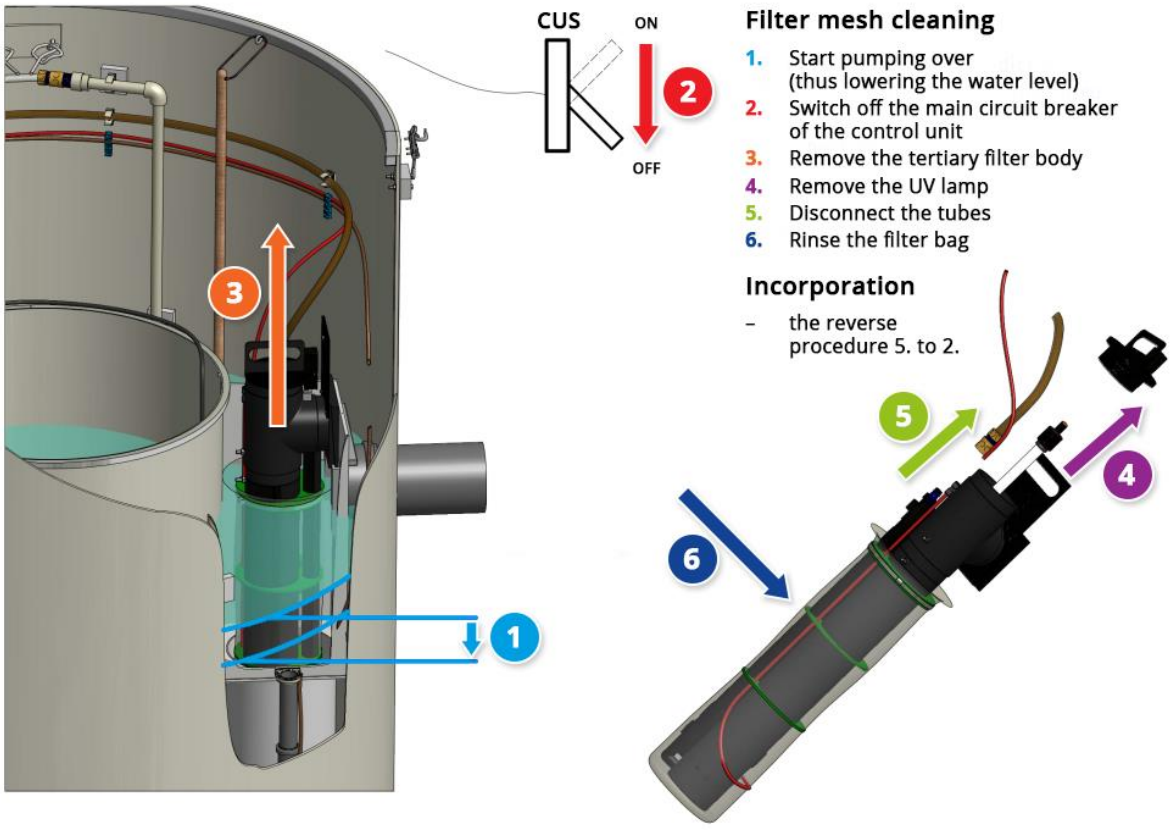


Fig. 33: Tertiary filter cleaning

20.8 UV LAMP OPERATION AND MAINTENANCE

The WWTP can be optionally equipped with a germicidal UV lamp that ensures disinfection of the treated waste water from a microbiological point of view. It is located on the outlet of treated water from the WWTP. It is put into operation with the treatment plant.

An overview of the individual activities performed is given:

activity					
day	**week**	**month**	**other**	**name**	**procedure**
x				daily check	20.8.1
	x			weekly check	20.8.2
		x		inspection and cleaning of the protective hose	20.8.3
		x	once a year	replacement of the UV lamp	20.8.4

20.8.1 Daily check

As part of the daily check, it is necessary to check whether the device is switched on and whether a malfunction has not occurred. During the inspection, it is not necessary to open the shaft of the device, it is carried out at the location of the switchboard. Check if the circuit breaker is on or if it has tripped.

20.8.2 Weekly check

As part of the weekly check, in addition to the daily check, it is necessary to visually check the condition of the device. When checking, it is necessary to open the shaft of the device. Check that the device is not mechanically damaged and that there is no occurrence of any event that did not occur before or that seems unusual to you.

20.8.3 Protective tube inspection and cleaning

In order to ensure high efficiency of the UV lamp, it is necessary to check once a month (or according to the load of the WWTP) the cleanliness of the UV lamp protective tube and, if necessary, wipe off - spray dirt with water.

When working, proceed as follows:

- Reduce the water level in the WWTP.

Before removing the tertiary filter from the treatment plant, it is necessary to lower the water level in the tank by approx. 5 cm. On the control unit, use the "Tertiary filter service" mode and the START parameter, which will start the pumping of treated water to the outlet and lower the water level in the treatment plant.

- Turn off the control unit of the WWTP.

Switch off the device using the circuit breaker (switching off the entire WWTP).

- Remove the tertiary filter body according to Fig. 33.
- Pull out the tube with the UV lamp.
- Check that there is no damage to the supply cable or the tube itself, or that no water has entered the tube.
- If the surface of the tube is not clean, clean it with water and a soft cloth.

- Insert the tube back into the tertiary filter, i.e. into the operating position.
- Turn on the circuit breaker again and check whether an error message appears on the control panel screen (e.g. the UV lamp is connected incorrectly).

20.8.4 Replacement of the UV lamp

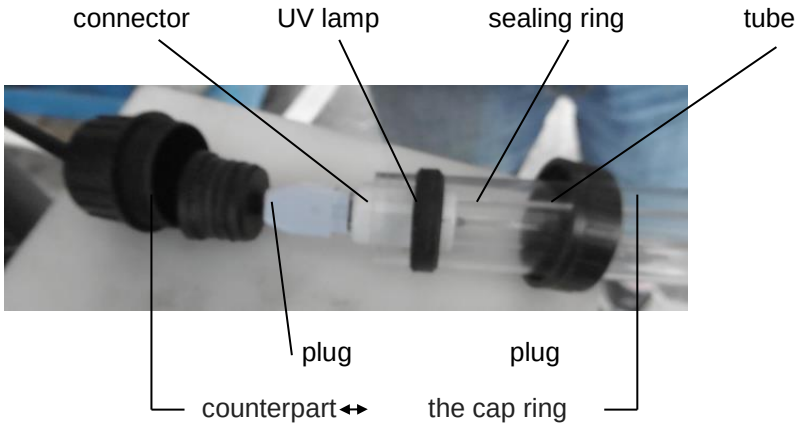
The UV lamp has a projected lifetime of approx. 10,000 to 12,000 hours. After this time, the efficiency of UV emission decreases, although the lamp emits light. For this reason, it is necessary to replace the UV lamp once a year.

Never look directly at the UV lamp when it is on. Risk of eye damage!

We recommend having the UV lamp replaced by an authorized person as part of the equipment service.

For the self-help replacement, proceed as follows:

- Take out the tube as when it cleaning it using the procedure according to Chapter 20.8.3,
- dismount the cap ring from the counterpart,
- take out the rubber seal plug from the tube (by doing so the UV lamp is also extracted),
- disconnect the cable connector from the lamp,
- connect a new lamp to the connector,
- insert the lamp and plug with seal into the tube,
- mount the cap ring onto the counterpart and tighten it,
- insert the tube back into the pipe by following the procedure in 20.8.3.



- **Always use only the UV lamp supplied as a spare part for the device.**
- **Never pull the plug with the UV lamp by pulling the supply cable.**
- **Never remove the sealing ring from the tube.**
- **If you discover damage to any individual part, do not operate the equipment and contact ENVI-PUR, s. r. o. or an authorized person.**

If during manipulation you find damage to any part of the tube, including the supply cable, if water has entered the tube or if the safety switch or the cable to the switch has been damaged, immediately stop operating the UV device and contact ENVI-PUR, s. r. o. or an authorized person.

- **Do not clean the tube with sharp objects or materials - avoid scratching it.**
- **Be careful when handling the tube to avoid damaging it.**
- **Use gloves when working – never touch the glass cover of the UV lamp with your bare hands (grease will remain on the glass, which reduces the effectiveness of the UV radiation).**
- **In case of staining the glass cover of the UV lamp or the UV lamp itself, use technical alcohol to cleaning it.**

20.9 OPERATION IN WINTER

The WWTP tank is installed underground and no additional insulation is required for the winter operation. In the winter period, it is necessary to pay extra attention to compliance with health and safety regulations. In particular, it is necessary to ensure that access to operated equipment and objects is kept in a serviceable condition (remove snow and dispose of ice by gritting).
Before the winter season, it is advisable to desludge the WWTP, if necessary. The appropriate amount of sludge for winter operation is approx. 40-50 %. In winter, the temperature of the waste water in the WWTP decreases and thus the activity of bacteria also decreases. The cleaning efficiency is lower during this period and the temperature of the waste water should not fall below 5 °C.
If sewage water is continuously supplied to the WWTP and the blower is in operation, there is no risk of the technology freezing.
However, pay extra attention to checking the blower, if it is placed in a pillar or in another object, e.g. in the ground. We also recommend checking that there is no condensation water on the "discharge pipe" from the blower to prevent freezing.

20.10 KEEPING THE OPERATION DOCUMENTS

According to the regulations, we recommend keeping written records of the operation of the treatment plant in the form of a **WWTP Operation Log**. It is enough to keep the diary in the form of a separate notebook. At least the following must be recorded in the operating logbook:

- Performing weekly maintenance,
- occurrence of faults,
- sludge pumping,
- settling test results,
- sampling + test results,
- performed service and repairs,
- changes to settings of the control unit,
- WWTP shut down.

- **The WWTP operator is responsible for keeping records.**
- **The records are checked by the relevant Water Management Authority.**
- **The operator of the WWTP will provide these records to the supplier in the event of a warranty claim.**

If the operator does not present the WWTP Operation Log to the manufacturer when applying the warranty repair, the claim may not be accepted!

21 FAILURES AND TROUBLESHOOTING

21.1 GENERAL

Functional or technological malfunctions may occur during the operation of the WWTP. Functional malfunctions usually lead to the immediate shutdown of the treatment plant, technological malfunctions lead to a short-term or long-term deterioration of the cleaning efficiency.

21.2 FUNCTIONAL FAILURES

21.2.1 Secoh blower failure [x)]

Light signaling (for the COMFORT and EXCLUSIVE WWTP) or sound signaling (for the EXCLUSIVE UV WWTP) of the membrane air pump failure means blower failure. In this case, it is necessary to contact the manufacturer or an authorized person as soon as possible.

21.2.2 Effepizeta blower failure [x)]

A motor starter failure is signaled by light on the switchboard. In case of its failure, tighten it again. If the motor starter fails more often (e.g. even after several minutes or seconds), an electrical check of the blower is necessary. Only an authorized technician can perform this check. Contact the WWTP manufacturer.

21.2.3 Indicated faults – COMFORT Plus control unit

Malfunctions are signaled on the display of the control unit. Overview of faults and how to solve them:

Indication	Cause	Solution
Display off	Circuit breaker switched off	Switch on the circuit breaker
Real time clock not running	Control unit is not working	Turn off, then turn on the circuit breaker after 5 s, wait for the unit time to appear. If it does not correspond, set it in the menu.
No outputs switching	Control unit is not working	Turn off and after 5 s turn on the circuit breaker, wait for the first switch of the blower operation. I.e. approx. 30 s after switching on the circuit breaker. Check the settings of all parameters in menu P1 to P11.
Treating cycle C1 – C6 not running	Control unit is not working	Turn off and after 5 s turn on the circuit breaker, wait for the first switch of the blower operation. I.e. approx. 30 s after switching on the circuit breaker. Check the settings of all parameters in menu P1 to P11.
Display shows message “E1 <Pressure“	Blower failure	Check the operation of the blower, contact the service.
Display shows message “E2 UV“	UV lamp failure	Check the operation of the UV lamp, contact the service.
Display shows message “E9 Lith Bat.“	Real time clock backup battery is flat	Replace the CR2032 battery, check the settings of the real time clock and all parameters in the menu P1 to P11.
Display shows message “E10“	Interrupted data flow. Probe disconnected.	Check the connection of the oxygen probe, contact the service.
Display shows message “E20“	Control sum error communicating with the smart probe	Check the connection of the oxygen probe, contact the service.
Display shows message “E51“	RS485 communication temporarily disabled	Temporary error that does not signal any malfunction.

Indication	Cause	Solution
Display shows message “E52“	Short or no response from the sensor with the MODBUS_RTU protocol (broken cable, sensor power supply error)	Check the connection of the oxygen probe, contact the service.
Display shows message “E53“	Different request and response address of the sensor with the MODBUS_RTU protocol (disruption of communication)	If it occurs permanently, check the connection of the oxygen probe, contact the service.
Display shows message “E54“	General error response of the sensor with the MODBUS_RTU protocol (communication OK, the error is in the sensor)	Turn off, then turn on the circuit breaker after 5 s, wait for the unit time to appear. If the error persists, contact service.
Display shows message “E55“	Incorrect CRC of sensor responses with MODBUS_RTU protocol (communication disruption)	If it occurs permanently, check the connection of the oxygen probe, contact the service.
Display shows message “E56“	Different code of the request and response function of the sensor with the MODBUS_RTU protocol (communication disruption)	If it occurs permanently, check the connection of the oxygen probe, contact the service.
Display shows message “E57“	Control reading error of written sensor data with MODBUS_RTU protocol (communication disruption)	If it occurs permanently, check the connection of the oxygen probe, contact the service.
Display shows message “E255“	Unoccupied measuring channel	Incorrect parameterization, check the parameter settings, or perform a parameter reset to factory settings.

21.2.4 Other failures

Failures and malfunctions can be detected visually during operation and maintenance. These can be caused by a malfunction of the blower itself, an interruption of the air supply to the reactor, a failure of some functional part of the reactor, a malfunction of the dosing pump or the UV lamp.

21.3 TECHNOLOGICAL FAILURES

Technological malfunctions can be caused by a load on the treatment plant that does not correspond to the project documentation (a large amount of water supplied to the treatment plant, the supply of water with a composition that does not correspond to domestic waste water or a different composition of the supplied industrial water) or neglect of operation and maintenance. Technological failures can be manifested by:

- an inadequate amount of activated sludge (see Chapter 20.5.4),
- the presence of white foam on the water surface of the nitrification zone,
- a bad smell of water in the reactor,
- increased presence of dirt on the water surface of the settling zone,
- increased presence of small flocs in the outlet,
- non-compliance with guaranteed parameters in the discharged waste water detected during sampling.

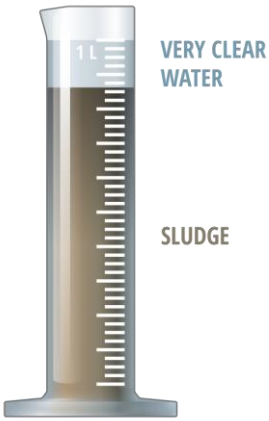
In case of occurrence or suspicion of technological failure, proceed as follows:

- Check whether a functional failure has occurred (if so, fix it),
- check whether substances that can destroy the living microorganisms have not been fed into WWTP (see Chapter 5).

In case of insufficient amount of activated sludge:

- Check the amount of activated sludge in the WWTP by settling test:
  1. The amount of sludge under 30 %: *Insufficient concentration of sludge in the tank.* This phenomenon during the start-up period means that the activated sludge has not yet formed. During the operation of an already started-up WTTP, this is a sign that the sludge has either died (inflow of toxic substances) or has been washed out (excessive amount of waste water flowing into the WWTP) or all the sludge has been pumped out during desludging. Try to find the cause and arrange to fix it. Wait approx. 2 weeks and perform a settling test again to see whether the sludge is already forming.
  2. The amount of sludge above 70 %: *High concentration of activated sludge is present in the tank.* Pump out the excess sludge by chapter 20.5.5.
  3. The amount of sludge above 70 % although the WWTP has been desludged in the recent weeks: *The WWTP was recently insufficiently desludged or so-called sludge bulking occurred.* Desludge the WWTP again. If the level of sludge is still high after the second desludging, the cause is sludge bulking, when there is an overgrowth of filamentous bacteria. Filamentous bacteria keep the sludge flocs afloat and they do not settle. The supernatant (settled water), on the other hand, is very clear. Thick foam may form in activation zone. Filamentous bacteria usually proliferate (they always occur to a lesser extend in the activated sludge), if the operation conditions of the WWTP change (excessive loading of the WWTP, toxic substances, FAT!, change of temperature, low pH, over-aged sludge, inappropriate aeration). In case of problems with fat, please contact the manufacturer, who will then recommend an appropriate grease trap.

     Fibrous microorganisms can be suppressed by chlorination or by loading the sludge with a precipitant (by dosing PAX) or by pumping out of the whole WWTP, cleaning it and incorporating it again. Consult the suitable fixing with the service technician or with the manufacturer.



SLUDGE BULKING
– Bound water
– Filamentous bacteria

In case of presence of white foam on the water surface of the nitrification zone:

- Check the amount of activated sludge in the WWTP by settling test.
- A large amount of white and very light foam is formed during the start-up of the WWTP or when the concentration of sludge in the system is low. During normal operation, this foam can indicate that too much sludge has been pumped out or that there is a massive leakage of undissolved substances in the settling tank. The foam will disappear spontaneously, when enough amount of sludge is formed – approx. 20–30 %.
- An excessive discharge of soaps, detergents (washing powder etc.) or various industrial waters can represent another reason for the formation of white light foam In this case, limit their use.

In case of smell from the WWTP:

- In most cases, smell from the WWTP indicates a shortage of oxygen!
- Check the blower and its operation - if it is ok, proceed as instructed below:
- Check, whether the aeration elements are bubbling sufficiently, whether a sufficient amount of air is supplied to them (e.g. a more open tap at the air supply to the mammoth pump takes a large amount of air and, as a result, the aeration elements oxygenate the waste water insufficiently).
- For the WWTP type **BASIC**, set the blower operation interval by approx. 15 min/h longer on the timer switch/time during the day.
- For the WWTP type **OPTIMA**, set the program one level higher.

- For the WWTP type **COMFORT/EXCLUSIVE/EXCLUSIVE UV**, set the P1 mode parameter one level higher.
- Check the amount of sludge in the WWTP using the settling test to check whether there is an excessive amount of sludge that consumes the supplied oxygen more quickly. If the amount of sludge exceeds 70 %, perform desludging.

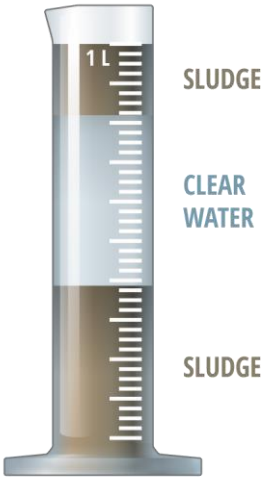
When the WWTP smells and the sludge already has a grey or black color:

- **For the WWTP type BASIC, turn the blower on to a continuous operation 24 h/d.**
- **For the WWTP type OPTIMA, set the program "9" to 24 h/d.**
- **For the WWTP type COMFORT/EXCLUSIVE/EXCLUSIVE UV, it is necessary to turn the blower on to program P1 "9".**

This special mode must be maintained for at least 1 week (until the WWTP stops smelling and the sludge starts to turn brown).

In case of an increased occurrence of floated sludge (i.e. the surfaced dirt) on the surface of the settling zone:

- Use the settling test to check the amount of sludge in the WWTP,
- if the amount of sludge exceeds 70 %, perform desludging,
- if the amount of sludge is lower or the result is similar as that in the given figure, this is probably due to over-oxygenation of the nitrification zone or insufficient sludge recirculation by the return sludge mammoth pump.



FLOATING SUBSTANCES
– Denitrification

For the WWTP types BASIC, OPTIMA

- Slightly increase the pumping of return sludge from the settling tank (= adding more air by turning the appropriate valve on the air distributor – this will reduce the time the sludge stays in the settling tank).

OR

- For the WWTP type BASIC, set a longer blower switch-off intervals on the timer switch/time relay (Attention! The maximum length of the blower switch-off interval during the day can be 45 min, or 60 min at night)**.**
- For the WWTP type OPTIMA, set the program one or two levels lower.

Always try one procedure first, if it fails to fix the problem, try the other.

For the WWTP types COMFORT/EXCLUSIVE/EXCLUSIVE UV

- On the control unit, set the parameter in P1 mode one level lower. If the situation repeats increase the cleaning period by changing the code in P3 mode (cleaning frequency of the settling tank level).

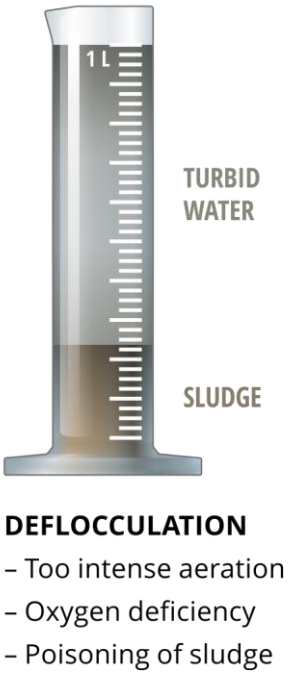
OR

- Slightly increase the pumping of return sludge from the settling tank (= adding a larger amount of air by turning the appropriate valve on the air distributor – this will reduce the time the sludge stays in the settling tank).

Always try one procedure first, if it fails to fix the problem, try the other.

In case of an increased occurrence of small flakes in the outlet (turbid outlet):

- This condition may appear during the start-up period when the sludge is formed by small light-weight flakes. After the start-up, the turbidity in the outlet disappears.
- If this condition occurred at an started-up WWTP, it may mean a sudden change in the waste water quality on the inlet (low pH, temperature reduction, inlet of toxic substances, an increased frequency of washing) by an excessive aeration of activation, when the flakes break down, or by excessive over-sludging of the WWTP (excessive amount of sludge).
- Try to identify the cause and eliminate it. Measure the pH and, if necessary, increase its value according to 20.5.3. In case of an excessive washing frequency, the water in the WWTP smells "soapy“. Limit the number of washing periods and turn on the blower at the maximum output for about 1 week (detergents limit the oxygen transfer from air into water). If the WWTP is over-aerated, set the program one level lower for the WWTP type OPTIMA and COMFORT, reduce the blower operation time during the day by a total of about 2 – 3 h/24 h for the WWTP type BASIC.
- If turbidity in the outlet is permanent, it is likely the WWTP has been overloaded for a long period of time.
- Turbidity in the outlet may also occur in the event of insufficient aeration when the sludge color also changes to grey or to black, and the water starts to smell.



- If you are not sure how to fix this problem, contact your service technician or manufacturer.

In the event of non-compliance with the guaranteed indicators in the discharged waste water detected during sampling:

- This condition may appear during the start-up period when samples should not be taken.
- The cause is likely to be one of the faults listed above.

- **In all cases, wait for the next weekly check to see, whether the operation of the treatment plant is adjusted.**
- **If the faults have not been eliminated, request a service intervention.**

21.3.1 UV Lamp

The failure of the UV lamp or its power supply circuit will be manifested by tripping of the circuit breaker. In this case, turn it on again. If it falls out again, it is possible to replace the UV lamp according to the procedure in chapter 20.8.3.

If the failure is not eliminated by replacing the UV lamp, do not operate the device and contact ENVI-PUR, s. r. o. or an authorized person.

22 INTERRUPTING AND STOPPING OPERATION

22.1 GENERAL

In the event that waste water will not be supplied to the reactor for a longer period of time (e.g. during a long holiday or during seasonal operation), it is necessary to take measures that will allow the treatment plant to be put back into operation without any problems.

22.2 SHORT-TERM SHUTDOWN

Stopping the influent within three weeks (e.g. during holiday) will not affect the operation of the WWTP. It is advisable to set up:
Stopping the inflow for a maximum of three weeks (e.g., during a holiday) will not affect the operation of the WWTP. For this short period, it is recommended to:

- set the time interval of the blower operation (phase C1) to the shortest possible time (e.g., 15 minutes of operation + 75 minutes of blower at standstill) for the WWTP type BASIC,
- set the program 0 for the WWTP type OPTIMA,
- set the time intervals for phase C1 and C2 in P1 mode to code 0 on the control unit for the WWTP type COMFORT. Turn off the dosing pump for PAX.

After the inflow is restored, do not forget to set the original time intervals of the blower on and off phases.

In the event of a long-term stoppage of the inflow to the WWTP, it is necessary to shut it down (see Chap. 22.3).

22.3 COMPLETE SHUTDOWN

In case of a complete shutdown, it is necessary to:

- Turn off the power supply completely (switch off the circuit breaker).
- Completely wash the PAX dosing route with clean water (dip the suction basket into clean water and turn on the dosing pump until clean water flows out from the injection valve in the WWTP, clean the suction basket and the injection valve), if WWTP is shut down in the winter season, it is advisable to drain all the water from the dosing route (remove the suction basket from the water, leave it in the air and switch on the pump, until all the water is forced out of the hose), after that you can switch off the dosing pump.
- Completely pump out the entire reactor in the manner consistent to 20.5.5.
- Clean the reactor by rinsing it with clean water and pump the water out again.
- Fill the reactor with clean (non-potable) water.

When putting the WWTP back into operation, the WWTP must be started-up again. See Chapter 1.

23 OPTIONAL ACCESSORIES

23.1 GERMICIDAL UV LAMP INSIDE THE WWTP

Accessories for WWTP type BC EXCLUSIVE.

It is possible to supply the WWTP with a tertiary filter with a modification for an immersion germicidal UV lamp, which ensures the disinfection of treated waste water from a microbiological point of view. It is put into operation with the WWTP.
For the purpose of connecting the UV lamp, it is necessary to replace the existing electrical switchboard with an electrical switchboard with modifications for a UV lamp and a tertiary filter, and pull the cables for controlling and powering the UV lamp through into the switchboard.

23.2 OXYGEN SENSOR

The accessories for WWTP type BC COMFORT, EXCLUSIVE, EXCLUSIVE UV.

The oxygen probe (oxymeter) is used to control the operation of the blower according to the current need for oxygen in the nitrification zone, which leads not only to a reduction in the costs of operating the blower compared to control by time intervals, but also to more ideal conditions of the activation process. The setting of the oxygen probe is discussed in the Chapter 14.2. Maintenance consists of occasional spraying with water - as needed. The probe is set up by an authorized person.

23.3 SLUDGE TANK FOR EXCESS SLUDGE PUMPING

The accessories for WWTP type BC COMFORT, EXCLUSIVE, EXCLUSIVE UV.

If it is necessary to increase the capacity of the storage volume of excess sludge and thereby extend the interval for pumping excess sludge from the treatment plant, the WWTP can be equipped with a sludge sump. Excess sludge is pumped from the WWTP into the sludge sump using a pump (submersible electric) or a mammoth pump. The settled sludge is disposed of in accordance with applicable legislation.

23.4 PUMP SUMP

The pump sump serves primarily to equalize the hydraulic load of the WWTP over time (eliminates the unevenness of the inflow), or the unevenness of the terrain. Consult an authorized person about the use and maintenance of the sump.

23.5 PRIM - PRIMARY SEDIMENTATION TANK

The primary sedimentation tank serves to balance the hydraulic load of the WWTP over time (eliminates inflow unevenness). The PRIM tank also serves to reduce the load on the WWTP mainly for COD and suspended solids parameters. It can also serve to retain excess sludge from the WWTP (the so-called desludging into the septic tank). In this case, the PRIM tank can be used partially as a sludge sump.

23.6 SLUDGE DEWATERING PLANT (SDP)

The sludge dewatering equipment is intended for dewatering primary, stabilized or raw activated or mixed sludge. It is characterized by simplicity, universality, operational reliability and low energy consumption. Dewatering equipment can be used not only for new WWTPs, but also for the modernization of existing WWTPs. Sludge dewatering is made possible by using special filter bags with the addition of polyflocculant into the supplied sludge.

24 TECHNICAL SPECIFICATIONS

24.1 HYDROTECHNICAL PARAMETERS

Overview of the basic parameters of BC biocleaner® BC 4-50, BC 4-50 DUO:

BC biocleaner®	**BC 4**	**BC 6**	**BC 10**	**BC 12**	**BC 16**	**BC 20**	**BC 25**	**BC 30**	**BC 40**	**BC 50**
WWTP capacity and loading										
Number of connected inhabitants (EO)[1)]	**4**	**6**	**10**	**12**	**16**	**20**	**25**	**30**	**40**	**50**
Possible number of connected persons[2)]	≤ 4	≤ 6	≤ 10	≤ 12	≤16	≤ 20	≤ 25	≤ 30	≤ 40	≤ 50
Nominal value of waste water (m^3/day)	0,6	0,9	1,5	1,8	2,4	3,0	3,75	4,5	6,0	7,5
Nominal WWTP loading in BOD_5 (g/day)	240	360	600	720	960	1200	1500	1800	2400	3000
Optimal concentration of dissolved O_2										
Denitrification zone (mg/l)	0 – 0,5									
Activation-nitrification zone (mg/l)	1,5 – 2,5									
Parameters of the treated water from BASIC P-LESS, OPTIMA P-LESS, COMFORT P-LESS										
Parameter	**Output values**						**Efficiency**			
COD (mg/l)	29						96 % [4)]			
BOD_5 (mg/l)	4						98 % [4)]			
SS (mg/l)	10						97 % [4)]			
$N\text{-}NH_4^+$ (mg/l) *)	16						71 % [4)]			
N total (mg/l) [3)] **)	25						64 % [4)]			
P total (mg/l) ***)	1,1						94 % [4)]			
Parameters of the treated water from EXCLUSIVE P-LESS										
Parameter	**Output values**						**Efficiency**			
COD (mg/l)	32						95 % [4)]			
BOD_5 (mg/l)	5						98 % [4)]			
SS (mg/l)	17						95 % [4)]			
$N\text{-}NH_4^+$ (mg/l) *)	15						73 % [4)]			
N total (mg/l) [3)] **)	25						64 % [4)]			
P total (mg/l) ***)	1,5						91 % [4)]			
Parameters of the treated water from EXCLUSIVE UV P-LESS										
Parameter	**Output values**						**Efficiency**			
COD (mg/l)	32						95 % [4)]			
BOD_5 (mg/l)	5						98 % [4)]			

SS (mg/l)	17	95 % [4]
$N\text{-}NH_4^+$ (mg/l) *)	15	73 % [4]
N total (mg/l) [3] **)	25	64 % [4]
P total (mg/l) ***)	1,5	91 % [4]
Enterococci ****)	3 KTJ/100 ml [5]	99,99 %
Escherichia coli ****)	2 KTJ/100 ml [5]	99,99 %
Fecal coliform bacteria ****)	7 KTJ/100 ml [5]	99,99 %
Coliform bacteria ****)	48 KTJ/100 ml [5]	99,99 %
Somatic coliphages ****)	0 PTJ/100 ml [5]	100 %
Parameters of the treated water from BASIC P-LESS DUO, OPTIMA P-LESS DUO, COMFORT P-LESS DUO		
Parameter	**Output values**	**Efficiency**
COD (mg/l)	24	97 % [4]
BOD_5 (mg/l)	3	99 % [4]
SS (mg/l)	8	98 % [4]
$N\text{-}NH_4^+$ (mg/l) *)	13	80 % [4]
N total (mg/l) [3] **)	28	59 % [4]
P total (mg/l) ***)	0,9	95 % [4]
Parameters of the treated water from EXCLUSIVE P-LESS DUO		
Parameter	**Output values**	**Efficiency**
COD (mg/l)	31	96 % [4]
BOD_5 (mg/l)	4	98 % [4]
SS (mg/l)	20	94 % [4]
$N\text{-}NH_4^+$ (mg/l) *)	15	81 % [4]
N total (mg/l) [3] **)	28	59 % [4]
P total (mg/l) ***)	1,6	90 % [4]
Parameters of the treated water from EXCLUSIVE UV P-LESS DUO		
Parameter	**Output values**	**Efficiency**
COD (mg/l)	31	96 % [4]
BOD_5 (mg/l)	4	98 % [4]
SS (mg/l)	20	94 % [4]
$N\text{-}NH_4^+$ (mg/l) *)	15	81 % [4]
N total (mg/l) [3] **)	28	59 % [4]
P total (mg/l) ***)	1,6	90 % [4]
Enterococci ****)	0 KTJ/100 ml [5]	100 %
Escherichia coli ****)	0 KTJ/100 ml [5]	100 %
Fecal coliform bacteria ****)	1 KTJ/100 ml [5]	100 %
Coliform bacteria ****)	5 KTJ/100 ml [5]	100 %

Somatic coliphages ****)	0 PTJ/100 ml [5)]	100 %
Parameters of the treated water from BASIC, OPTIMA, COMFORT		
Parameter	**Output values**	**Efficiency**
COD (mg/l)	49	92 %
BOD_5 (mg/l)	5,6	98 %
SS (mg/l)	13	96 %
$N\text{-}NH_4^+$ (mg/l)*)	10	77 %
N total (mg/l)	-	-
P total (mg/l)	-	-
Parameters of the treated water from BASIC DUO, OPTIMA DUO, COMFORT DUO		
Parameter	**Output values**	**Efficiency**
COD (mg/l)	27	94 %
BOD_5 (mg/l)	3	99 %
SS (mg/l)	7	97 %
$N\text{-}NH_4^+$ (mg/l) *)	2,4	96 %
N total (mg/l) [3)] **)	44	51 %
P total (mg/l)	7,9	19 %

Note:

The stated values that correspond to the "Declaration of Properties“ are the values obtained according to ČSN EN 12566-3+A2

[1)] PE = equivalent resident is defined by the production of contaminants amounting to 60 g BSK_5 a day and the production of waste water of 150 l/day

[2)] the rated substance and hydraulic load of the WWTP must not be exceeded

[3)] with the input load N, a maximum total of 11 g/resident*day

[4)] the mean value of all the results

[5)] geometrical mean

*) if the waste water temperature at the outlet from the biological stage is not lower than T > 12 °C

**) if the waste water temperature is within the value range of T_{min} = 3.4 °C; T_{max} = 19.8 °C

***) with the equipment for chemical precipitation of phosphorus

****) with the UV device for disinfection of the treated waste water

Comment to the efficiencies of the waste water treatment:

The given parameters of the domestic waste water treatment plant of biocleaner BC type corresponds to the given model with the mentioned supplemented additional equipment (for phosphorus precipitation, UV disinfection, etc.).

The BC 4-50 and BC 4-50 DUO model above will enable compliance of all the parameters imposed by the applicable legislative regulations as amended:

- Government Decree No. 401/2015 Coll., on indicators and values of permissible pollution of surface water and waste water, details of the permission of waste water discharge into surface water and sewage systems, and about sensitive areas.

Government Decree No. 57/2016 Coll., on indicators and values of acceptable waste water pollution and requisites of a permit to discharge waste water into groundwater.

24.2 VOLUMES AND WEIGHTS

WWTP biocleaner® BC 4-12 PP, BC 4-12 PP DUO (cylindrical):

BC biocleaner®	**BC 4 PP**	**BC 6 PP**	**BC 10 PP**	**BC 12 PP**
Primary sedimentation zone volume (m^3)	1,14	1,85	2,82	3,62
Denitrification zone volume (m^3)	0,46	0,54	0,92	1,27
Nitrification zone volume (m^3)	0,94	1,27	2,15	2,63
Settling zone volume (m^3)	0,37	0,50	0,97	1,05
Total volume of the reactor (m^3)	1,77	2,31	4,04	4,95
The area of the settling tank (m^2)	0,43	0,68	0,72	0,82
Maximum weight of the tank without filling and the primary sedimentation tank (kg)	150	165	180	200

Note: the domestic waste water treatment plants designated as BC 4-12 PP DUO are delivered with the tank for the primary sedimentation.

WWTP biocleaner® BC 16-50 PP, BC 16-30 PP DUO (cylindrical):

BC biocleaner®	**BC 16 PP**	**BC 20 PP**	**BC 25 PP**	**BC 30 PP**
Primary sedimentation zone volume (m^3)	4,07	5,08	6,32	7,51
Denitrification zone volume (m^3)	1,46	1,80	2,05	2,67
Nitrification zone volume (m^3)	3,45	4,43	4,97	6,21
Settling zone volume (m^3)	1,59	1,80	2,45	3,05
Total volume of the reactor (m^3)	6,50	8,03	9,47	11,93
The area of the settling tank (m^2)	1,09	1,37	1,72	2,06
Maximum weight of the tank without filling and the primary sedimentation tank (kg)	310	370	470	540

Note: the domestic waste water treatment plants designated as BC 16-30 PP DUO are delivered with the tank for the primary sedimentation.

WWTP biocleaner® BC 16-50 K PP, BC 16-30 K PP DUO (containerized):

BC biocleaner®	**BC 16 K PP**	**BC 20 K PP**	**BC 25 K PP**	**BC 30 K PP**	**BC 40 K PP**	**BC 50 K PP**
Primary sedimentation zone volume (m^3)	4,02	5,41	6,32	8,20	10,30	12,83
Denitrification zone volume (m^3)	1,46	1,80	2,24	2,66	3,58	4,58
Nitrification zone volume (m^3)	3,49	4,33	5,46	6,31	8,56	10,68
Settling zone volume (m^3)	1,55	1,90	2,30	2,95	3,66	4,72
Total volume of the reactor (m^3)	6,50	8,03	10,00	11,92	15,80	19,98
The area of the settling tank (m^2)	1,09	1,37	1,72	2,06	2,60	3,14
Maximum weight of the tank without filling and the primary sedimentation tank (kg)	900	1 000	1 300	1 400	1 900	2 000

Note: the domestic waste water treatment plants designated as BC 16-50 PP DUO are delivered with the tank for the primary sedimentation.

WWTP biocleaner® BC 4-20 B, BC 4-12 B DUO (cylindrical):

BC biocleaner®	**BC 4 B**	**BC 6 B**	**BC 12 B**	**BC 16 B**	**BC 20 B**
Primary sedimentation zone volume (m^3)	1,25	1,59	3,32	--	--
Denitrification zone volume (m^3)	0,46	0,54	1,34	1,46	1,80
Nitrification zone volume (m^3)	0,94	1,27	2,72	3,45	4,43
Settling zone volume (m^3)	0,37	0,50	1,22	1,59	1,80
Total volume of the reactor (m^3)	1,77	2,31	5,28	6,50	8,03
The area of the settling tank (m^2)	0,40	0,42	0,81	1,08	1,35
Maximum weight of the tank without filling and the primary sedimentation tank (kg)	2 200	3 650	4 700	5 000	5 000

Note: the domestic waste water treatment plants designated as BC 4-12 B DUO are delivered with the tank for the primary sedimentation.

WWTP biocleaner® BC 16-50 K B, BC 16-50 K B DUO (containerized):

BC biocleaner®	BC 16 K B	BC 20 K B	BC 25 K B	BC 30 K B	BC 40 K B	BC 50 K B
Primary sedimentation zone volume (m^3)	4,54	5,69	6,32	10,43	16,20	15,20
Denitrification zone volume (m^3)	1,46	2,11	2,24	2,87	3,58	6,56
Nitrification zone volume (m^3)	3,49	4,82	5,46	6,64	8,56	14,64
Settling zone volume (m^3)	1,55	2,03	2,30	3,05	3,66	4,72
Total volume of the reactor (m^3)	6,50	8,96	10,00	12,56	15,80	25,92
The area of the settling tank (m^2)	1,08	1,35	1,69	2,03	2,59	4,74
Maximum weight of the tank without filling and the primary sedimentation tank (kg)	5 970	7 500	11 090	13 960	13 960	20 870

Note: the domestic waste water treatment plants designated as BC 16-50 B DUO are delivered with the tank for the primary sedimentation

24.3 NOISE EMISSIONS

The noise pollution for the BC biocleaner® BC 4-50, BC 16-50 K (containerized) WWTP:

BC biocleaner®	BC 4	BC 6	BC 10	BC 12	BC 16	BC 16 K	BC 20	BC 20 K	BC 25	BC 25 K	BC 30	BC 30 K	BC 40 K	BC 50 K
Blower type	JDK 60	JDK 80	JDK 120	JDK 150	JDK 200	JDK 200	JDK 250	JDK 300	JDK 300	JDK 400	JDK 400	FPZ R 20 MD	FPZ R 20 MD	FPZ R 30 MD
Noise pollution (Lp) dB (A)	36	38	45	44	45	46	52	52	52	54	54	65	65	68

Note: The given values measured at a distance of 1 m from the machine set are in compliance with the technical certificates handed over by the equipment manufacturer.

The blower represents the only source of noise in BC biocleaner® BC 4-50 WWTP.

24.4 MAXIMUM CAPPING HEIGHT AND MAXIMUM ADMISSIBLE PEDESTRIAN LOAD

BC biocleaner®	BC 4 to BC 50 (identical for all the types)
Maximum height of the capping	0,0 m
Maximum acceptable load by pedestrians	2,5 kN/m^2

24.5 ELECTRICAL INSTALLATION

Basic parameters for connection to the electrical installation:

BC biocleaner®	Blower type	Installed power input *)	Voltage	Feeder cable protection	Feeder cable	Connection of the WWTP switchboard
BC 4	**JDK 60**	**40 W**	**230 V / 50 Hz**	**10 A**	**CYKY-J 3x2,5**	**Connection using a protected 230 V socket, connected via a circuit breaker.**
BC 6	**JDK 80**	**50W**	**230 V / 50 Hz**	**10 A**	**CYKY-J 3x2,5**	
BC 10	**JDK 120**	**95 W**	**230 V / 50 Hz**	**10 A**	**CYKY-J 3x2,5**	
BC 12	**JDK 150**	**115 W**	**230 V / 50 Hz**	**10 A**	**CYKY-J 3x2,5**	
BC 16	**JDK 200**	**180 W**	**230 V / 50 Hz**	**13 A**	**CYKY-J 3x2,5**	
BC 16 K	**JDK 200**	**180 W**	**230 V / 50 Hz**	**13 A**	**CYKY-J 3x2,5**	
BC 20	**JDK 250**	**225W**	**230 V / 50 Hz**	**13 A**	**CYKY-J 3x2,5**	
BC 20 K	**JDK 300**	**230 W**	**230 V / 50 Hz**	**13 A**	**CYKY-J 3x2,5**	
BC 25	**JDK 300**	**230 W**	**230 V / 50 Hz**	**13 A**	**CYKY-J 3x2,5**	
BC 25 K	**JDK 400**	**360 W**	**230 V / 50 Hz**	**13 A**	**CYKY-J 3x2,5**	
BC 30	**JDK 400**	**360 W**	**230 V / 50 Hz**	**13 A**	**CYKY-J 3x2,5**	
BC 30 K	**FPZ R 20 MD**	**750 W**	**230 V / 50 Hz**	**3 x 10 A**	**CYKY-J 5x2,5**	Connection using an electric cable to the electrical switchboard.
BC 40 K	**FPZ R 20 MD**	**750 W**	**230 V / 50 Hz**	**3 x 10 A**	**CYKY-J 5x2,5**	
BC 50 K	**FPZ R 30 MD**	**1 100 W**	**400 V / 50 Hz**	**3 x 10 A**	**CYKY-J 5x2,5**	

Note: *) Installed power of only blowers supplied to BC biocleaner® WWTPs.

24.6 STANDARDS AND REGULATIONS

24.6.1 Design standards and regulations

WWTP BC biocleaner® conforms to its design and execution in particular to the following regulations and standards:

- Government Regulation No. 176/ 2008 Coll. as amended that complies with Directive 2006/42/EC on machinery,
- Government Regulation No. 117/2016 Coll. that complies with Directive 2004/108/EC on electromagnetic compatibility,
- Government Regulation No. 100/2013 Coll. on technical requirements for products,
- ČSN EN 12566-3+A2,
- ČSN EN ISO 12100,
- ČSN EN 60335-1 ed. 3,
- ČSN EN 61000-6-3 ed. 2,
- ČSN EN 61000-6-1 ed. 2,
- ČSN EN 1992-1-1,
- ČSN 33 2000-4-41 ed. 2.

24.6.2 Operating standards and regulations

When operating the equipment, observe these instructions and the generally applicable regulations and standards relating in particular to:

- The occupational safety and health,
- machine and equipment operation,
- electrical equipment operation.

The instructions in this technical sheet are compiled based on our experience and with the aim of achieving optimal results when using the product. We bear no responsibility for damages caused by incorrect product selection, incorrect use or due to poor quality workmanship. This technical sheet supplements and replaces all previous editions, the manufacturer reserves the right to possible later changes and additions.

Declaration of Properties

No:

envi pur
rethinking water

1. Unique product type identification code

Identifier	A			B	C	D	E		F
BIO CLEANER BC*	4	15	35	no marking (circular)	no marking	no marking	BASIC	BASIC DUO	no marking (no phospsorus precipitation)
	6	16	40	K (rectangular)	PE	with a lid	OPTIMA	OPTIMA DUO	P-LESS (with phosphor precipitation)
	8	20	45		PP	with an attachment	COMFORT	COMFORT DUO	
	10	25	50		SL	N (not self-supporting)	EXCLUSIVE	EXCLUSIVE DUO	
	12	30			B		EXCLUSIVE UV	EXCLUSIVE UV DUO	

* according to the specified identifier

2. Type, series or serial number or any other element identifying construction products according to Art. 11, Section 4:
Serial Number: see the number of the Declaration

3. Intended use or intended uses of the construction product in compliance with the relevant harmonized technical specification according to the qualification of the Producer: Biological Activation Wastewater Treatment Plant

4. Name, business or registered trademark and contact address of the Producer according to Art. 11, Section 5:
ENVI-PUR, s.r.o., Na Vlcovce 13/4, 160 00 Prague 6 – Dejvice, Czech Republic

5. Name and contact address of an authorized representative with power of attorney related to the tasks specified in Art. 12, Section 2: ENVI-PUR Belgorod

6. System or systems of assessing and verifying the stability of the properties of construction products as specified in Annex V: 3

7. In case of a declaration of properties regarding a construction product which the harmonized standard applies to:
The Prague Technical and Testing Institute for Construction, Notified Body No. 1020, Prosecka 76, Prague 9, company identification code: 00015679, executed an initial test of the product type according to System 3 and issued a Properties Assessment Report No. 1020 – CPR – 090038112.

8. In case of a declaration of properties regarding a construction product which a European technical assessment has been issued for: -

9. Properties specified in the Declaration

Basic Characteristics	Property	BASIC, OPTIMA, COMFORT	BASIC DUO, OPTIMA DUO, COMFORT DUO	BASIC P-LESS, OPTIMA P-LESS, COMFORT P-LESS	EXCLUSIVE P-LESS	BASIC DUO P-LESS, OPTIMA DUO P-LESS, COMFORT DUO P-LESS	EXCLUSIVE DUO P-LESS	EXCLUSIVE UV P-LESS	EXCLUSIVE UV DUO P-LESS	Harmonized Technical Specifications
Purification efficiency degree	COD (mg/l)	92%	94%	96 % [4)]	95 % [4)]	97 % [4)]	96 % [4)]	95 % [4)]	96 % [4)]	EN 12566-3 + A2:2013
	BOD_5 (mg/l)	98%	99%	98 % [4)]	98 % [4)]	99 % [4)]	98 % [4)]	98 % [4)]	98 % [4)]	
	SS (mg/l)	96%	97%	97 % [4)]	95 % [4)]	98 % [4)]	94 % [4)]	95 % [4)]	94 % [4)]	
	$N\text{-}NH_4^+$ (mg/l) [11)]	77%	96%	71 % [4)]	73 % [4)]	80 % [4)]	81 % [4)]	73 % [4)]	81 % [4)]	
	N_{total} (mg/l) 3) [12)]	-	51%	64 % [4)]	64 % [4)]	59 % [4)]	59 % [4)]	64 % [4)]	59 % [4)]	
	P_{total} (mg/l) [13)]	-	19% [12)]	94 % [4)]	91 % [4)]	95 % [4)]	90 % [4)]	91 % [4)]	90 % [4)]	
	Enteroccod [14)]	-	-	-	-	-	-	99,99 %	100 %	
	Escherichia coli [14)]	-	-	-	-	-	-	99,99 %	100 %	
	Fecal coliform bacteria [14)]	-	-	-	-	-	-	99,99 %	100 %	
	Coliform bacteria [14)]	-	-	-	-	-	-	99,99 %	100 %	
	Somatic coliphage [14)]	-	-	-	-	-	-	100 %	100 %	
Rated organic daily load	0.24 / 0.36 / 0.48 / 0.60 / 0.72 / 0.90 / 0.96 / 1.20 / 1.50 / 1.80 / 2.10 / 2.40 / 2.70 / 3.00 kg BSK_5/day [6)]									
Rated daily flow	0.6 / 0.9 / 1.2 / 1.5 / 1.8 / 2.25 / 2.4 / 3.0 / 3.75 / 4.5 / 5.25 / 6.0 / 6.75 / 7.5 m^3/day [6)]									
Water tightness	Passed the water test									
Holding capacity	Passed the calculation for load by hydrostatic pressure, soil (1850 kg/m^3; 36°), DRY / load by hydrostatic pressure, soil (1850 kg/m^3; 36°), DRY/ load by hydrostatic pressure, soil (1800 kg/m^3; 42°), lids (1.5 kN/m^2), DRY/ load by hydrostatic pressure, soil (1800 kg/m^3; 42°), lids (2.5 kN/m^2), DRY/ load by hydrostatic pressure, soil (1800 kg/m^3; 36°), lids (2.5 kN/m^2), DRY/ NPD / NPD / load by hydrostatic pressure, soil (1850 kg/m^3; 42°), lids (2.5 kN/m^2), DRY/load by hydrostatic pressure, soil (1850 kg/m^3; 42°), lids (2.5 kN/m^2), DRY WET 0.5 for version B [7)]									
Durability	Passed the test for PP / PE / stainless steel/concrete [8)]									
Fire resistance	F									
Effect of dangerous substances	NPD									

Comment: the values mentioned in "Declaration of properties", are achieved according to the EN 12566-3+A2

1) EP = equivalent person is defined pollution value 60 g BOD_5 per day and waste water value 150 l/day
2) WWTP rated polluting mater and hydraulic load must not be exceeded
3) initial load N_{total} max. 11 g/person*d
4) average value from all measured values
5) geometric mean
6) according to Identifier A for 4 / 6 / 8 / 10 / 12 / 15 / 16 / 20 / 25 / 30 / 35 / 40 / 45 / 50
7) according to Identifier A for 4 / A+C pro 6, 8, 10, 12, 16 PP / A+C+D for 4, 6, 8, 12, 15 PE with a lid / A+C+D for 4, 6, 8, 12, 15 PE with an attachment / A+B+C+D for 4, 6, 8, 12, 15 PE with an attachment / A+B+C+D for 16, 20, 25, 30, 40, 50 K PP / A+B+C+D for 16, 20, 25, 30, 40, 50 K PP N (not self-supporting) / A+C for 16, 20, 25, 30, 35 40, 45, 50 PP N (not self-supporting) / C for SL / C for B
8) according to Identifier A for 4 / C for PP / C for PE / C for SL / C for B
11) water temperature on the outlet is not under 12°C
12) T_{min} = 3,4°C; T_{max} = 19,8°C
13) with P-LESS (phosphorus precipitation)
14) with UV disinfection of purified waste water

ENVI-PUR, s.r.o.
Na Vlčovce 13/4, 160 00 Praha
Provozovna
Wilsonova 420, 392 01 S...
Tel.: 381 203 256, fax: ...

10. The product property specified in Item 1 and 2 is in accordance with the property specified in Item 9.
This Declaration of Properties is issued at the sole responsibility of the Producer specified in Item 4.

Signed for and on behalf of the Producer:

In Soběslav on 1. 4. 2020

Milan Drda
Executive and Technical Director

More than 25 YEARS on the market

ENVI-PUR, s.r.o.
Na Vlčovce 13/4
CZ-160 00 Praha 6
Czech Republic

Reg. no: 251 66 077 VAT no: CZ25166077
File number 167596C, registered in the Commercial Register at the Municipal Court in Prague

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