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SEPTIC & WASTEWATER
TREATMENT SYSTEMS

KLARO WASTEWATER TREATMENT SYSTEMS

OWNER'S MANUAL





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KLARO WASTEWATER
TREATMENT SYSTEMS

WARRANTY CERTIFICATE

WARRANTY CERTIFICATE

Otto Graf GmbH
Kunststofferzeugnisse



Dear Sir or Madam,

Congratulations on purchasing a quality product from Otto Graf GmbH. We hereby confirm that there is a

3-year

warranty on the small waste water treatment system you have purchased

The warranty applies to the purifying technology only. Accessories and optional additions are not covered by the warranty. During the warranty period, Otto Graf GmbH provides free material replacement; but services extended beyond this are not covered.

Warranty conditions

The warranty applies under the following conditions:

1. The waste water treatment system must be installed and commissioned by a specialist firm. Companies certified by the DWA (German Association for Water, Wastewater and Waste) or trained by Otto Graf GmbH are recognised as specialist firms.
2. Maintenance must be carried out in accordance with the logbook and approved by a specialist. In the case of warranty claims, all maintenance reports must be submitted on request.
3. Wearing parts and any defects or damage not caused by us resulting from improper operation of the system, maintenance not being carried out, faults caused by the customer and unauthorised changes to the system are not covered by the guarantee.
4. Any follow-up costs incurred by replacing the device, shutting down the system etc. are not included in the warranty.

In addition to the warranty any legal entitlements resulting from the guarantee continue to apply without restriction.

Teningen, February 2009

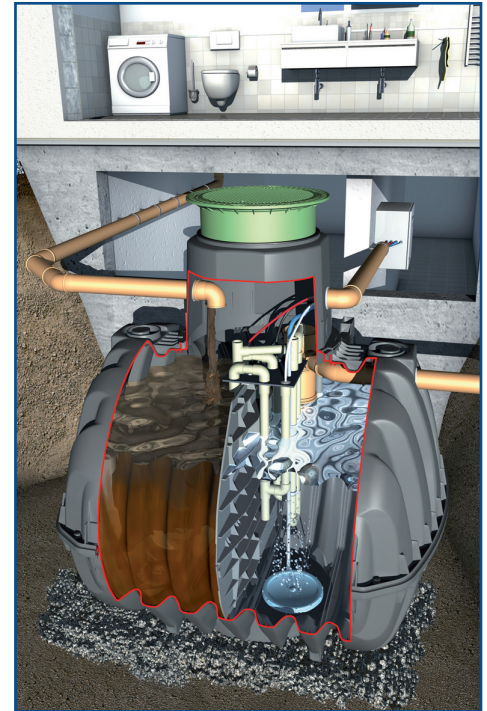
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KLARO WASTEWATER
TREATMENT SYSTEMS

System Overview & Advantages

KLARO System Overview

The KLARO is a fully biological sewage treatment plant which operates on the principle of the SBR method (Sequencing Batch Reactor procedure). The plant principally consists of two stages: a sludge storage basin with an integrated pre-buffer and an activated sludge stage in sequencing batch operation (SBR reactor).

The preceding sludge storage basin with its integrated buffer has the following functions:

- Storage of primary and secondary sludge
- Retention of sedimenting substances and floating substances
- Storage of water influx
- Adjustment of variations related to quantity or concentration in the influx of sewage water

Operation of the plant is made by micro-processing control which activates the air compressor and air diffusion for the different lifters via magnetic valves.

KLARO System Advantages

- No pumps or electrical parts inside the tank(s) - all sewage and effluent transfer done by airlift and gravity.
- Computer-controlled system and cleaning cycles with pressure and liquid level sensor that measures levels in the first chamber and also detects lower flows and automatically adjusts system cycles to save power and increase retention time.
- Controller and treatment cycle times and functions can be altered to meet specific site conditions.
- Easy servicing of blower and air valves and low overall maintenance and operation costs - 43 kWh/year, less than an energy-saving lightbulb.
- Transport advantage with Carat S Tank(s) - i.e., ship five 6500L tanks in the space of one.
- Deeper installation depth (up to five feet) thanks to the Carat S Tank(s).
- Tanks can be handled, assembled and installed all by hand if required.
- Single-reservoir solution up to four bedroom homes (compact system, less space, less cost).
- Fewer installation costs thanks to groundwater stability and anti-flotation features of Carat S Tanks.
- Possible to upgrade with Solar, GSM-modem, UV-module and Nitrogen and Phosphate Removal packages.
- Scaled down version of a Municipal Wastewater Treatment System.
- Scalable and modular for much larger systems servicing hotels, resorts, camping facilities, conference and tradeshow facilities, and office buildings.
- Multi-adjustable manway riser and lid assembly that adjusts to grade and up to a five degree slope.
- Phosphate removal, UV System and Remote Communication systems all available - all connected to and operated automatically by the central controller unit.
- Multiple fitting locations in manway and tank.
- Only plastic tanks able to be installed in vehicle traffic areas.



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Cleaning Performance & Daily Flow

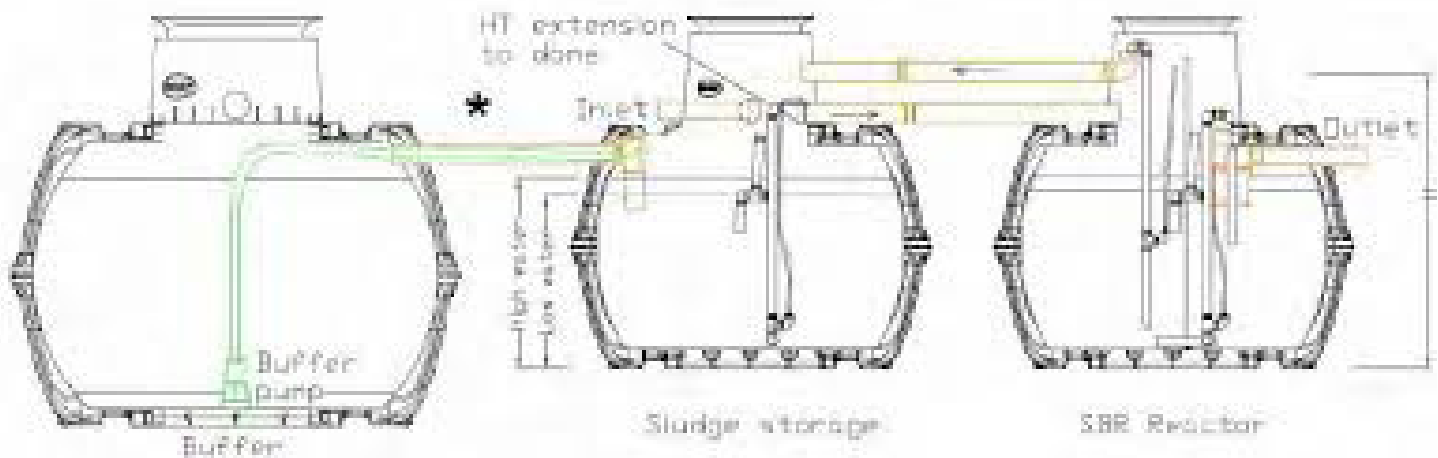
Cleaning Performance

Wastewater Parameter	Cleaning Performance	Efficiency Factor
Chemical Oxygen Demand	51 mh/l	91.9%
Biochemical Oxygen Demand	12 mh/l	95.9%
Ammonium Nitrogen	12 mh/l	65.6%
Total Suspended Solids	20 mh/l	94.4%

High Weekend Daily Flow Situations

In these situations, a larger buffer tank can be installed prior to the KLARO Treatment System to provide retention capacity for several consecutive days of higher flows (i.e., large number of weekend guests staying), or even out system performance for “weekend only use” facilities by capturing the whole weekend flow and dosing the treatment system incrementally from the buffer tank over the entire week to treat the effluent on a more consistent and manageable basis. This would allow the system to maintain peak efficiency and cleaning performance. See Diagram 1 below.

For fluctuating amounts of inhabitants, use buffer tanks with pump (controlled by KLARO control unit 1x per cycle after clear water discharge).



*Buffer tank connection via an emergency overflow from sludge storage



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Choosing Your System

Residential Systems for 1 to 8 Bedroom Homes

Based on Daily Design Flows:

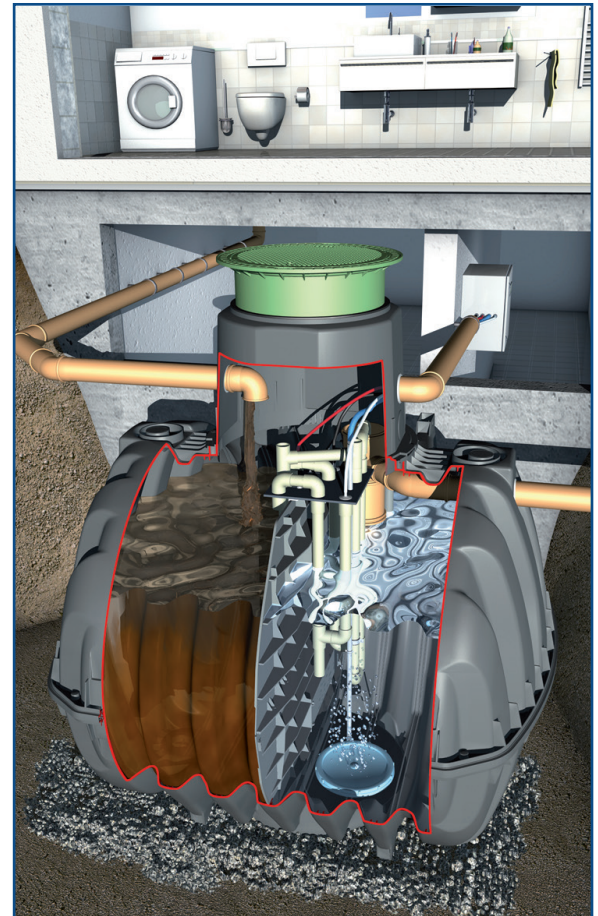
1. 2700 L Single Tank System for 1 Bedroom Home	750 LPD	200 USG
2. 3750 L Single Tank System for 1-2 Bedroom Home	1,200 LPD	320 USG
3. 4800 L Single Tank System for 2-3 Bedroom Home	1,500 LPD	400 USG
4. 6500 L Single Tank System for 3-4 Bedroom Home	2,100 LPD	460 USG
5. 2 x 2700 L 2 - Tank System for 2-3 Bedroom Home	1,500 LPD	400 USG
6. 2 x 3750 L 2 - Tank System for 4-5 Bedroom Home	2,400 LPD	640 USG
7. 2 x 4800 L 2 - Tank System for 5-6 Bedroom Home	3,300 LPD	870 USG
8. 2 x 6500 L 2 - Tank System for 7-8 Bedroom Home	4,200 LPD	1,110 USG

Choosing Your System

1. Choose the tank(s) size according to the number of inhabitants using it
2. Choose Tank Dome Mini (12" H) or Maxi (24" H), and 12" Extension(s) if required.
3. Telescoping Riser and Lid Assembly, Mini (3" - 10" of Ht.) or Maxi (4" - 15" of Ht.).
4. Choose the 1/2 position baffle for the specific tank size needed if a single tank system.
5. Setup kit for the appropriate sized single or two-tank system.
6. Internal or External Control Cabinet with Compressor Package to go with setup kit chosen.

Add these six above component prices together for your complete package pricing for a residential wastewater treatment plant.

Example: a four-bedroom home, with an internal cabinet (ZK-Plus Model) would be the single 6500 litre tank #372027; Tank Dome Mini #371041; Telescopic Dome Shaft Green #371010; sealed structural baffle #375027; set up kit #CAN103; internal cabinet LA 80 ZK Plus #107450.

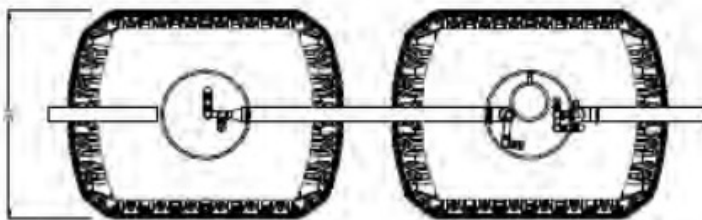
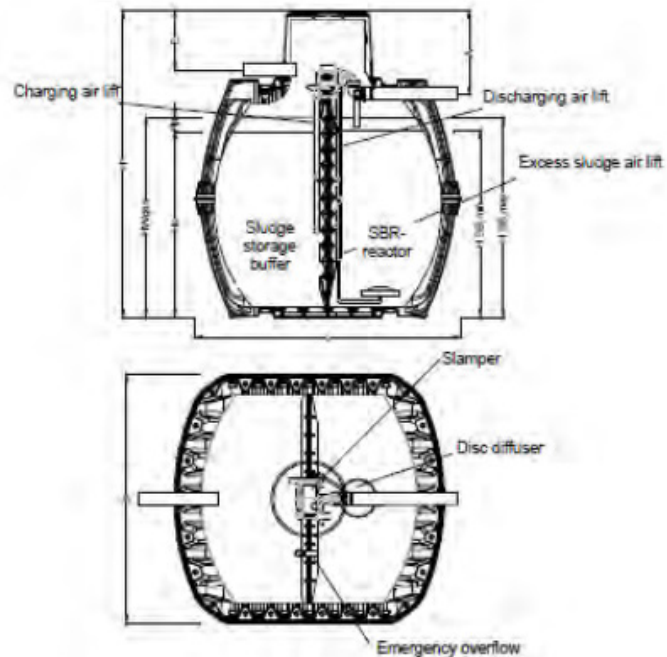


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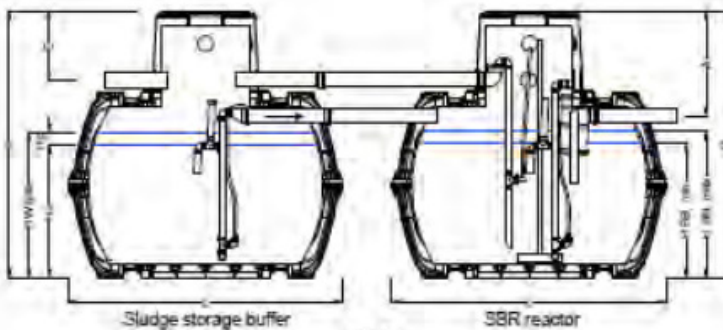
Choosing Your System

One- and Two-Reservoir Systems in Carat Underground Tank

One-Reservoir System
in a Carat Underground Tank



Two-Reservoir System
in a Carat Underground Tank





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Delivery

Delivery of Components

The sewage treatment plant principally consists of the two components: the clarification tank and control cabinet. These two main components are connected to one another via air hoses which are laid in the ground.

The clarification tank/s is/are divided in two sections: the sludge storage basin and buffer in the inlet area and the SBR reactor in the outlet area. In the case of a one-chamber plant (for up to 20 PE) these two stages are placed in one tank and separated from one another by a separation wall. With a multi-chamber plant the sludge storage basin - buffer and the bioreactor are in a separate tank each. In the sludge storage basin there is a charging lifter in the form of an air lift pump with air supply of its own.

The bioreactor contains:

- An air diffusing system made of stainless steel with membrane pipes or aeration discs.
- An air supply feed system made of stainless steel with a membrane from EPDM, with fine perforation.
- A discharging lifter in the form of an air lift pump with air supply of its own (marked black).
- A secondary sludge lifter in the form of an air lift pump with air supply of its own (marked white).
- Integrated samplers (only included in Klaro Professional single-chamber set-up kits!).

For final assembly on site there is a bag on one down pipe with all required connecting pieces and connecting elements.

The control cabinet for indoor wall mounting and the control column for outdoor mounting contains:

- A low-noise and low-maintenance air compressor
- A valve unit
- A control unit corresponding to the regulations according to VDE 0113 part 1 and VBG 4.

If requested, the plant can be equipped with an integrated sampling device from which a water sample can be taken.



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Treatment Stages

Plants for the decomposition of organic substances in the water (carbon reduction: discharge classes C)

The process is a sequence of 5 stages which proceed in succession and are repeated several times a day (usually 4 times).

Stage 1: Charging

The raw sewage water which is temporarily stored in the sludge storage basin is fed into the SBR reactor by a compressed air lifter. This lifter is designed in such a way that only water without solid substances is pumped. Due to special construction of a lifter a minimal water level in the sludge storage basin is guaranteed. Therefore a limitation of the water level by other components (e.g. a float switch) is not necessary.

Stage 2: Aeration

In this stage the sewage water is aerated and mixed. Aeration is made by membrane pipes or membrane discs which are mounted at the chamber bottom. The aeration equipment of the plant is supplied with ambient air an externally installed switch cabinet. The required compressed air is generated by an air compressor. Aeration is usually intermittent.



Two effects are caused by aeration:

1. The micro-organisms of the activated sludge are supplied with oxygen which is required for their metabolic activity and thus for the reduction of pollutants.
2. There is an intense contact between sewage water and bacteria.



Stage 3: Sedimentation

This stage is a resting phase in which there is no aeration. The activated sludge can settle based on the principle of gravity (sedimentation phase). In the upper section a clarified water zone and on the bottom a sludge layer will develop. Floating sludge, which may possibly occur, is above the clarified water zone.

Treatment Stages

Stage 4: Extraction of Clarified Water

In this phase the biologically treated sewage water (clarified water) from the SBR stage is extracted. This pumping process is made possible by compressed air according to the principle of the air lift pump (compressed air lifter). The compressed air lifter is constructed in such a way that any floating sludge on the clarified water layer is not pumped off, a minimal water level in the SBR stage is maintained without further components.

Stage 5: Excess Sludge Return

In this stage the excess activated sludge from the SBR reactor chamber is returned by compressed air lifter to the sludge storage chamber and is stacked there. This excess sludge is extracted at the bottom of the SBR chamber.

After completion of stage 5 the clarification process can start again with stage 1.

Every day usually 4 cycles are processed as described above. An individual adjustment of cycle times and cycle numbers is possible after consulting with your authorized maintenance company.

Moreover it is possible to reset the plant manually to the vacation operation mode.

The vacation operation is an extremely reduced mode of operation of the plant during longer periods without sewage water discharge.

Important: all chambers/tanks have to be aerated. This is usually achieved by using the sewage water pipe which is deaerated over the roof. If necessary, additional aeration pipes or aeration opening have to be installed. Aeration pipes have to be arranged in such a way that natural aeration (chimney effect) is possible.

Treatment Stages

Plants with additional nitrate elimination (discharge class D)

Nitrate reduction is also achieved by certain strains of micro-organisms. With particularly intense aeration the plants with additional nitrification create optimal living conditions for nitrifying bacteria which transform ammonium into nitrate. In case of plants which are also intended for additional denitrification, short blasts of air at the beginning of the aeration phase cause a circulation of the water and a stimulus for the denitrifying bacteria, which transform nitrate into elementary nitrogen.

Plants with additional phosphate elimination (filtration level D+P)

Phosphate precipitation occurs due to the addition of polyaluminum chloride in the SBR reactor. The phosphate precipitant equipment includes a removeable holding platform in the dome or on the tank's partition wall. The precipitant canister is housed on this platform. The system's control cabinet features a metering pump. This pumps the precipitant out of the precipitant canister and releases it in the SBR reactor. The precipitant is added during the reactor's feed phase. The volume of precipitant needed can be adjusted using the metering pump. It is mixed during the ventilation phase. The precipitant joins with the phosphate



Control & Switch Cabinet

All mechanical and electrical components of the system are installed in a switch cabinet. The cabinet for indoor installation is made of expanded polypropylene (EPP; is employed in wastewater treatment systems in sizes from 4-18 persons) or of powder-coated metal (in treatment plants for above 25 persons). In case of outdoor mounting the components are installed in a column made of plastic. The cabinet contains the control unit as well as all required machine elements. The cabinet is opened with the key, which is also included in the delivery, by turning the key clockwise.

Technical Components

The essential components of the switch unit are:

- Low-noise air compressor
- Valve unit with 4 magnetic valves for air diffusion for aeration and lifting operation via compressed air lifter (charging, discharging, sludge return)
- Control unit for automatic operation with pre-set work cycles
- Cooling ventilator (only with plants with a rotary vane blower)
- Pump for phosphate precipitant (optional)
- Communication module GPRS (optional)

The externally visible components of the control unit are:

- Keyboard for operating the control unit
- Liquid crystal display for two-digit indication of operating situations and fault reports
- One light emitting diode (operation control) for optical indication of operation (green/red)

Indoor Switch Cabinets

The indoor cabinets may only be installed in dry, dust-free and well-ventilated rooms (cellar, technical room or garage). A 230 V (16A, slow blow) plug socket must be located near the cabinet. Additional current consumers on the same fuse may cause interruptions in operation.

The cabinets should be freely accessible at all times, in particular the ventilation openings must always be kept free.

Control & Switch Cabinet

EPP Cabinet

The machine cabinet of EPP is fastened to a wall using the hanger bolts supplied. The hanger bolts must be screwed into the wall with the dowels with a horizontal spacing of 280 mm. The cabinet is then attached to the bolts and secured with the wing nuts.

The hose connections are located on the underside of the cabinet; this must be taken into consideration when selecting the installation location.



Metal Cabinet

The switch cabinet is prepared for wall mounting. For this purpose the wall holders, which are included in the delivery, have to be fixed on the back of the cabinet. A socket 230 V (16A, slow-blow fuse) must be situated close to the cabinet. At the right-hand side there is a feedline with a main switch and an aeration grid. At the left-hand side the hose connections and an aeration grid as well are mounted.

Large plants for more than 40 PE are delivered with a two-door cabinet for ground-mounting.

Plants which are operated with 380 V three-phase current have to be connected by an electrician according to a terminal connection diagram which is also included in the delivery. The direction of rotation of the compressor has to be considered at any rate.





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Control & Switch Cabinet

Outdoor Switch Cabinets

The plastic cabinet intended for outdoor mounting has to be placed in the ground up to the mark at the front side of the cabinet (see mounting instructions for plastic column). For this purpose a sufficiently deep excavation has to be provided.

In order to exchange the aeration grid at the back of the column, the column must be mounted with at least 10 cm space from the grid. The location should be cool and protected against direct sunlight during the summer months. If the operator wants to apply shading equipment, it has to be open on the sides to provide sufficient aeration of the cabinet and avoid pent-up heat.

The outdoor column has to be put in the ground up to the mark. The excavation finally has to be filled professionally so that the column is safe, fixed, and vertical in the ground.

As of compressor size DT 4.16 a cabinet made of fair-faced concrete is necessary. For this cabinet a concrete foundation is required.

1. Main Switch
2. Control Unit
3. Valve Bar w/ 4 Magnetic Valves
4. Air Compressor
5. Cabinet Aeration (on back of cabinet)
6. Junction box

After having laid the four air hoses in the ground from the plant to the switch cabinet, they have to be shortened to the required length and fixed at or in the switch cabinet. When connecting them please make sure that the hoses are fixed to the nozzles with the correct colour mark. Connections with the same colours must be joined and fixed with the hose clip.

After having laid and connected the hoses, the empty conduit has to be closed gas-tight with a sealing insert by GRAF or PU foam so that a gas exchange through this conduit is excluded (ex-protection, dampness, smells!).



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Initial Operation

When commissioning the plant (i.e. after mounting is finished) all chambers, if not filled already, have to be filled up to the bottom edge of the outlet.

Caution: As the sludge storage basin and the SBR reactor are not communicating, they have to be filled separately.

When the system has been connected to the mains power supply, it performs a short self-test (in the case of switch cabinets with master switch, the switch must be turned to position "1"). This test takes a few seconds, then the system goes automatically into normal operating mode (Automatic). During the test the indication "SYSTEM TEST ... OK", the program version, and the serial number of the control unit will appear in the display for a short period of time. Afterwards the current operational state of the plant is shown in the liquid crystal display. If a battery has not yet been inserted in the control unit and date and time have not yet been set, the control unit indicates fault reports. These can be acknowledged by pressing the Esc key. Afterwards date and time can be set using the menu (see further down).

Afterwards a functional test of the control unit, the three lifters, the aeration and the cabinet aeration, in case there is one, should be made. This test can be made via the menu item "manual operation" provided in the control unit.

Caution: operation of the lifters is only possible when the tanks are filled. After a successful check of the plant it has to be reset to automatic operation.

If the plant is separated from the power supply system (e.g. due to power failure) the control programme and the counted operating hours will remain in the plant's control unit memory. There is an intermittent warning sound. This warning sound will only start after a few seconds' delay (see point 10.3, power failure warning device). If the plant is supplied with power again, an automatic start of the plant will occur as mentioned above. It is a precondition that a sufficiently charged battery was set in the control unit.

Important note:

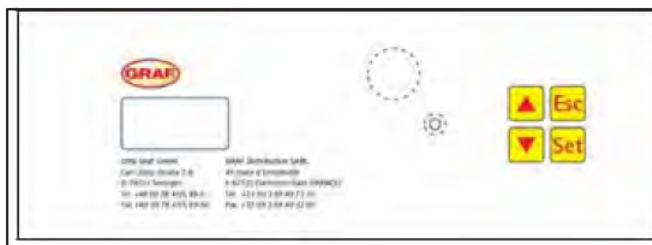
If the plant is separated from the power supply system for more than 24 hours, clarification of the existing sewage water is not possible or can only be achieved at a much lesser extent.

Operation of the Control Unit

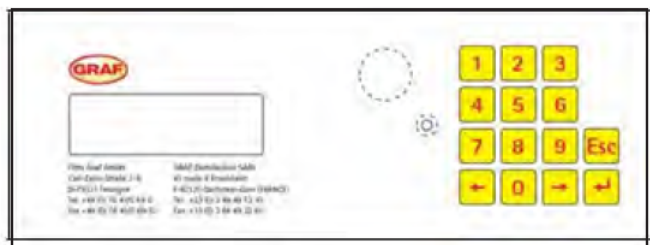
Control Unit Settings

Operation of the plant is executed by the control unit in the cabinet door (or inside the cabinet in case of outdoor cabinets). It allows the setting of operational parameters, the display of operating situations and reading of information on plant parameters as well as programming of operating periods by an expert company. With indoor switch cabinets the cabinet does not have to be opened for operating the plant.

The following pictures show the composition of the control units:



Control unit for KLARO



Control unit for KLARO PLUS

The operational state of the plant is indicated by the light-emitting diode (green = operation / red = fault) and as text on the LC screen.

In the normal operational mode (aeration mode) the liquid crystal display looks as follows:

Aerate
120.10m

Aeration
Rest: 120.10 min

In automatic operation the liquid crystal display indicates the current work phase and the time remaining in this work stage.

If a fault occurs, the liquid crystal display will indicate which component is affected by the fault (e.g. error compressor).

Operation of the Control Unit

Control Unit Settings

Display	Operation Carried Out	Display
Charge	Valve 1 is activated, the charging lifter conveys sewage water for clarification from the sludge storage basin in the bioreactor	Charging
Denitr.	Valve 2 is activated intermittently, the activated sludge is mixed briefly with the sewage water. Long pauses follow (reaction periods).	Denitrification
Aerate	Valve 2 is activated, the bioreactor is aerated at intervals	Aeration
Sediment	No valve is activated, the activated sludge settles in the bioreactor	Sedimentation
Discharge	Valve 3 is activated, the clarified water is pumped in the outlet	Discharging
Exc.sl.return	Valve 4 is activated, the excess water is pumped from the reactor in the sludge storage basin	Sludge-return
Pause	Valve 2 is activated, the bioreactor is aerated at intervals (considerably lower aeration than in the "aeration" phase).	Cycle-Pause
Vacation	Valve 2 is activated, the bioreactor is aerated at intervals, no clarification cycle is processed.	Vacation Operation
xx day	Indication of remaining time	Rest: xx days









KLARO
System



KLARO PLUS
System



Picture 9 View of control panel

Symbol	Keypad mode	Function	Symbol
	Enter	Selection of operating mode, confirmation of entries	
 	Scroll	Indication of operating modes and reading information	 
	Acknowledge	Fault signals, acknowledging entries without storing them acknowledging fault reports	
—	Numerical keys	Programming of the plant via entry of numbers	0 ... 9

Operation of the Control Unit

Control Unit Settings Continued

On the back of the control unit Klaro and on the bottom side of the control unit Klaro light the connecting plugs and fuses are to be found.

Caution: when performing any kind of work at the electrical system, the main switch has to be turned to position "0" (OFF) and the power plug must be disconnected!



Back of control unit ZK



Back of control unit ZK PLUS

Connections:

1. Connection for power line 230 V AC ~ 50 Hz
2. X1: bayonet cap for the magnetic valves
3. X2: shockproof coupling for the connection of the air compressor
4. COM: connection for communication module, (optional) for interface for PC
5. F1: T8A fuse 8 ampere, medium slow-blow, for the connected consumers
6. F2: T2A fuse 2 ampere, slow-blow, for the connected consumers
7. Batt: battery compartment for 9V battery (Recommended: alkali-manganese battery)

Connections:

1. Connection for power line 230 V AC ~ 50 Hz
2. X1: bayonet cap for the magnetic valves
3. X2: shockproof coupling for the connection of the air compressor
4. COM: connection for communication module, (optional) for interface for PC
5. F1: T8A fuse 8 ampere, medium slow-blow, for the connected consumers
6. F2: T2A fuse 2 ampere, slow-blow, for the connected consumers
7. Batt: battery compartment for 9V battery (Recommended: alkali-manganese battery)
8. Connection for temperature sensor
9. X3: Connection for extension cable ZK plus
10. P: connection for pressure-measuring hose

Operation of the Control Unit

Changing Fuses

Before changing the fuses the plant has to be switched off by using the red main switch!

In order to change or check the fuses, the switch and control cabinet has to be opened with the key included in the delivery. On the back of the control unit there are the microfuses described on previous page.

To change the microfuses:

1. Turn the head of the fixture with a screw-driver (exerting slight pressure) by one quarter-turn to the left (counter-clockwise)
2. Remove the head of the fixture with the fuse
3. Change the fuse
4. Put the head with the fuse in the opening of the fixture
5. Press slightly on the head of the fixture with a screw-driver and fix the fuse by turning the head by one quarter-turn to the right (clockwise)

Microfuse	230V / 50Hz
Feed line F1	8 A, medium slow-blow
Consumer F2	2 A, slow-blow

Battery for Power Failure Warning Device

When the plant is delivered to the customer, the battery for the power failure warning device of the control unit is in the assembly kit attached to the control cabinet. The battery has to be inserted in the compartment on the back of the control unit. You can do so before or after turning on the control unit. If no battery is inserted before turning on the control unit, there will be a fault report which may be acknowledged by pressing **Esc**. In case of power failure a charged battery is sufficient for signalling the power failure for approx. 35 hours. If the battery is not used up by power failures, natural self-discharging will occur. If the control unit does not automatically indicate that the battery has to be changed (fault report, "change battery"), a change of battery is recommended after 2 years. Due to longer durability and less self-discharge 9V alkali-manganese-batteries (alkaline battery 6LR61 e.g. Duracell type MN1604) should be used.

Important note: even in case of a missing or discharged battery the control unit remains fully operative. Only the setting of time/date is lost during power failure. All stored data such as operating hours, programme settings etc. remain stored.







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Control Unit Readings

ZK & ZK Plus Control Unit

On the ZK Control Unit, by pressing , you reach the first operating level. You may now receive the different readings by pressing the two arrow keys   and subsequent pressing of :

On the ZK Plus Control Unit, by pressing , you reach the first maintenance level.

You may now receive the different readings by pressing the two arrow keys  

Display	What It Means (ZK)	What It Means (ZK Plus)
Operational Set	Current work phase	Current work phase
Remaining Time	Remaining time	Remaining time
Indicate Operating Hours	Indication of operating hours of the individual valves and compressor	Indication of operating hours of the individual valves, the compressor, the cabinet aeration, the UV reactors, and the pump for phosphate precipitation
Manual Operation	Manual activation of the valves	Manual activation of the valves
hh:mm:dd dd-mm-yy	Current time, day and date can be set via 	N/A
Date Time	N/A	Current time and date can be set via 
Enter Vacation	Setup of vacation operation (maximum of 90 days)	Enter date for vacation operation
Setup	Via arrow keys the current settings can be viewed	N/A
Indicate Settings	N/A	Via arrow keys the current settings can be viewed
Operation Code	For qualified personnel	For qualified personnel
Service Mode	For qualified personnel	For qualified personnel
Manual Operation	N/A	Manual operation of the valves








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Control Unit Readings

Reading of Operating Hours




ZK Control Unit


Press the  key. On the screen will appear: Indicate operat. hours

By pressing  again, you will received the operating hours for the valves 1-4 successively by pressing the arrow keys  . Afterwards the total number of operating hours of the compressor will be indicated. By pressing  once, you will return to "indicate operating hours". By pressing , you will reach the menu "manual operation".

ZK Plus Control Unit

Press the  key. On the screen will appear: Operating hours Meter reading

By pressing  again, the number of operating hours of valve 1 (charging) will be indicated. By pressing the arrow keys  , you will successively receive the operating hours of the other valves, of the compressor, the cabinet aeration, the UV light, and the pump for phosphate precipitation.

By pressing  once, you will return to the maintenance level. By pressing the key once more, automatic operation will be set again.

Note: if you do not press a key for 10 minutes, normal operation will be set automatically.



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Control Unit Readings



Manual Activation of the Valves

The voltage of the battery which supplies the control should the mains fail is checked by selecting manual mode. The "Change battery" message may therefore appear when manual mode is selected. This message can be acknowledged using the Esc button. If the level measurement is active when valve 1 is switched on, the control automatically measures the water level in the sludge accumulator buffer. If the measurement is deactivated, the valves are activated as normal. Each valve should run for at least 5 seconds when testing because it takes some time to monitor the power consumption of valves before a fault is detected. After the valves, the cabinet fan (if fitted) can also be activated and checked. Notes: if no button is pressed for 10 min., the control automatically switches back to automatic mode.

ZK Control Unit


Press **Set** in automatic operation, then press the  arrow key until the following will appear in the display:




Manual operation. By pressing the **Set** key again, you will receive the following indication:



By pressing **Set**, you can switch on or off the selected valve. By pressing the arrow keys  , the individual valves can be activated. By pressing **Esc** once, you will return to the indication "manual operation".

Important note: when leaving the menu *manual operation*, all valves should be set to "OFF".

ZK PLUS Control Unit

Press , then press the arrow key until the following will appear in the display: **Manual operat. Function**.

By pressing  again and selection with the arrow keys  , manual operation for all operating modes can now be set. For valve 1, for example, the screen indication will read as follows: **Manual operat. Valve1: OFF**. By pressing the

numbers "1" for "ON" and "0" for "OFF", you can switch on or off valve 1 by manual operation. The same procedure applies to the other valves. The selection is made as described above by the arrow keys  .

By pressing **Esc** once, you will return to the maintenance level. By pressing the key once more, automatic operation will be set again. NOTE: when leaving the menu manual operation, all valves should be set to "OFF".



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Control Unit Readings

Setting Up Date & Time




ZK Control Unit

Press , then press the arrow keys   until the following will appear on the screen (example):





20:15 Mo
19-12-07

By pressing , time and date can be set. To confirm the correction,  has to be pressed each time as well. By pressing  once, you will move on to vacation operation. By pressing , you will return to manual operation.

ZK Plus Control Unit

Press , then press the arrow keys   until the following will appear on the screen (example):

19-12-2007 Mo
20:15:56

By pressing , time and date can be set. To confirm the correction,  has to be pressed each time as well. By pressing , you will move on to vacation operation. By pressing , you will return to manual operation.

For fault-free operation of the plant a correct setting of time and date is not required. Time and date are only necessary in order to trace faults, if any.

Note: if you do not press a key for 10 minutes, normal automatic operation will be set automatically.



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Control Unit Readings

Vacation Operation

Vacation operation results in a reduced operation of the sewage treatment plant. Vacation operation should only be set if no sewage water is discharged in the sewage treatment plant in the chosen period of time. Sewage water which is discharged into the plant during vacation operation is not clarified. Vacation operation is automatically switched on and off on the dates you entered.

ZK Control Unit - Beginning of Vacation

Press **Set**, then press the arrow keys **▲** **▼** until the following will appear on the screen: Vacation setup

By pressing **Set** again, the setup of vacation dates is confirmed

Beginning of vacation:

By pressing day, month and year will be set in the DD-MM-YY format. After each entry of day, month or year has to be pressed.

ZK Control Unit - End of Vacation

By pressing **▲** **▼** day, month and year are entered in the DD-MM-YY format.

After each setup of day, month or year **Set** has to be pressed.

By pressing **Set**, you will end the setup of dates of vacation operation and store them.

By pressing **Esc**, you will return to the indication of automatic operation.




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Control Unit Readings

Vacation Operation


ZK PLUS Control Unit - Beginning of Vacation

By pressing  , day, month and year will be set in the DD-MM-YY format.

After each entry of day, month or year  has to be pressed.

Press , then press the arrow keys   until the following will appear on the screen

Setup
Vacation Date


By pressing the  key again, the setup of vacation dates is confirmed.


Vacation
Beg: 21-05-2015

ZK PLUS Control Unit - End of Vacation

Press the  key again and enter the ending date of vacation operation with the numerical keys:

Vacation
End: 21-05-2015

Store the setup of dates for vacation operation by pressing the  key and exit this mode. Note: vacation operation can be set for a maximum of 90 days.

By pressing  once, you will return to the maintenance level. Pressing the key once more will reset the plant to automatic operation. In order to jump back to automatic operation during vacation operation, the number "0" has to be pressed.

Note: if you do not press a key for 2 minutes, normal operation will automatically be reset without storing the date just entered.

Detecting Underload-ZK Plus

ZK Plus Control Unit

The ZK plus control unit is fitted with a pressure sensor as standard and this can be used to establish the level in the first chamber. This function is used to save energy when the flow of waste water is low. This function is deactivated when the system is supplied. During commissioning, the system runs in automatic mode regardless of the volume of waste water flowing in.

Level-dependent operations should be activated by a maintenance fitter or an expert.

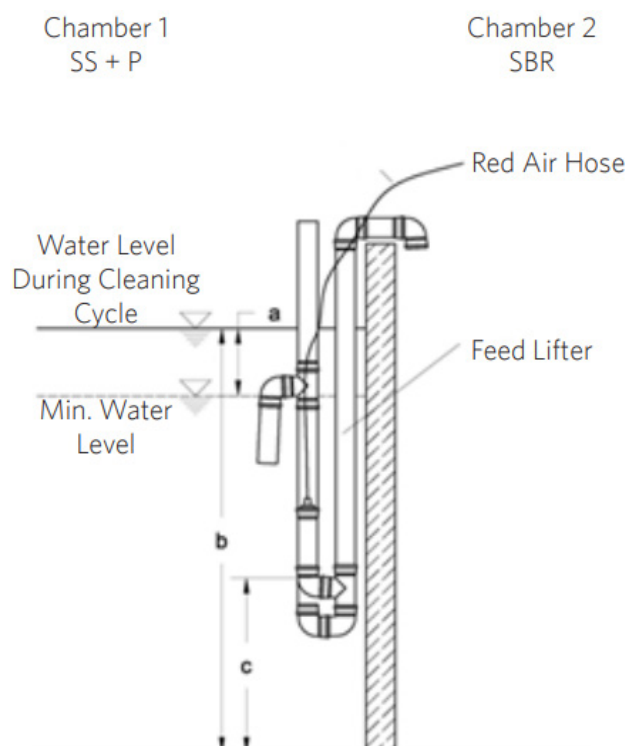
Functionality: the water level is measured using the pressure in the feed lifter during the feed phase and follows a patented procedure. If the water level in the sludge accumulator/buffer (chamber 1) exceeds a preset level, the system starts a cleaning cycle. If the level is not reached, the system goes into cycle pause for 6 hours. In this mode, the SBR reactor is only vented sporadically to keep the bacteria alive.

When supplied the level measurement is not activated. Please note that this cannot be done when in manual mode. The control unit uses the normal program which is controlled by time alone. The level measurement must be calibrated and adjusted locally.

Commissioning

The first chamber (SS/buffer), where you will find the feed lifter, must be filled with water up to the point at which a cleaning cycle is to be triggered. This level depends on the geometry of the tank and the number of inhabitants connected. The recommended water level on activation of the cleaning cycle *b* is specified in the following table.


Inhabitants	Type	a (in)	b (in)
5	2700 L	15	90
8	3750 L	20	105
10	4800 L	22	122
14	6500 L	27	142
10	2 x 2700 L	15	90
16	2 x 3750 L	20	103
22	2 x 800 L	24	119
28	2 x 6500 L	27	142






Detecting Underload-ZK Plus


Step 1: Calibrating the Pressure Sensor




It is essential that the sensor is calibrated for initial commissioning. To do this, please carefully follow the points below in the order given:

Select the "SERVICE CODE INPUT" menu item, press the  key and when prompted enter the following code: 9 9 9 9

Use the arrow keys   to select "Level measurement setting" and confirm by pressing the  key.


Three measurement processes run automatically.

Enter the current level b of chamber 1 that you have measured with a rule (measured from base of tank to water surface) and confirm by pressing .


The measurement now stated is the distance c between the tank base and blow-in point for the lifter. Use the arrow keys   to select "Save Yes" and confirm by pressing the  key. Calibration is then complete and you can exit this menu using the "ESC" key.



Step 2: Setting the Control Unit Parameter

It is essential that the control unit parameters for the level measurement are set for the system to function correctly. To do this, please carefully follow the points below in the order given:

Select the "SERVICE CODE INPUT" menu item, press the  key and when prompted enter the general service code.

Use the left-pointing arrow  to select "Level measurement setting" and confirm by pressing the  key.

Enter the water level b from which a clarifying cycle is to be started. Confirm by pressing the  key.

Use the numerical keys to enter the value "2 min" and confirm by pressing the  key. The settings required are then complete and you can exit the menu using .

NOTE: the bottleneck warning message does not have to be activated for the system to function correctly. If a value of 000cm is saved, this warning message remains deactivated.



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Detecting Underload-ZK Plus

Function Check

The level measurement can now also be run as a check in manual code. The feed lifter (vave 1) must be activated using "1" for this purpose. The control unit automatically takes a measurement. The value measured appears after this process. The battery's charge level is measured at the same time. If this is too low, a warning message about the battery charge level is output at the same time.

Deactivating the Level Measurement

To deactivate the level measurement and allow the cycles to return to running in a time-dependent manner, you will have to repeat the 2nd step described above. The water level b must be set to 0 cm. Recirculation can remain set a 2 minutes.

Safety and Fault Messages

When the sensor measures a value of less than 40 mbar, the following message appears in the display: "Fault: Filling level". In this case, the system switches back to normal time-controlled operation. The cause of this is either a too-low water level in the sludge reservoir/buffer, or leak in the pressure or measuring line. In this case, we recommend that you contact the manufacturer.



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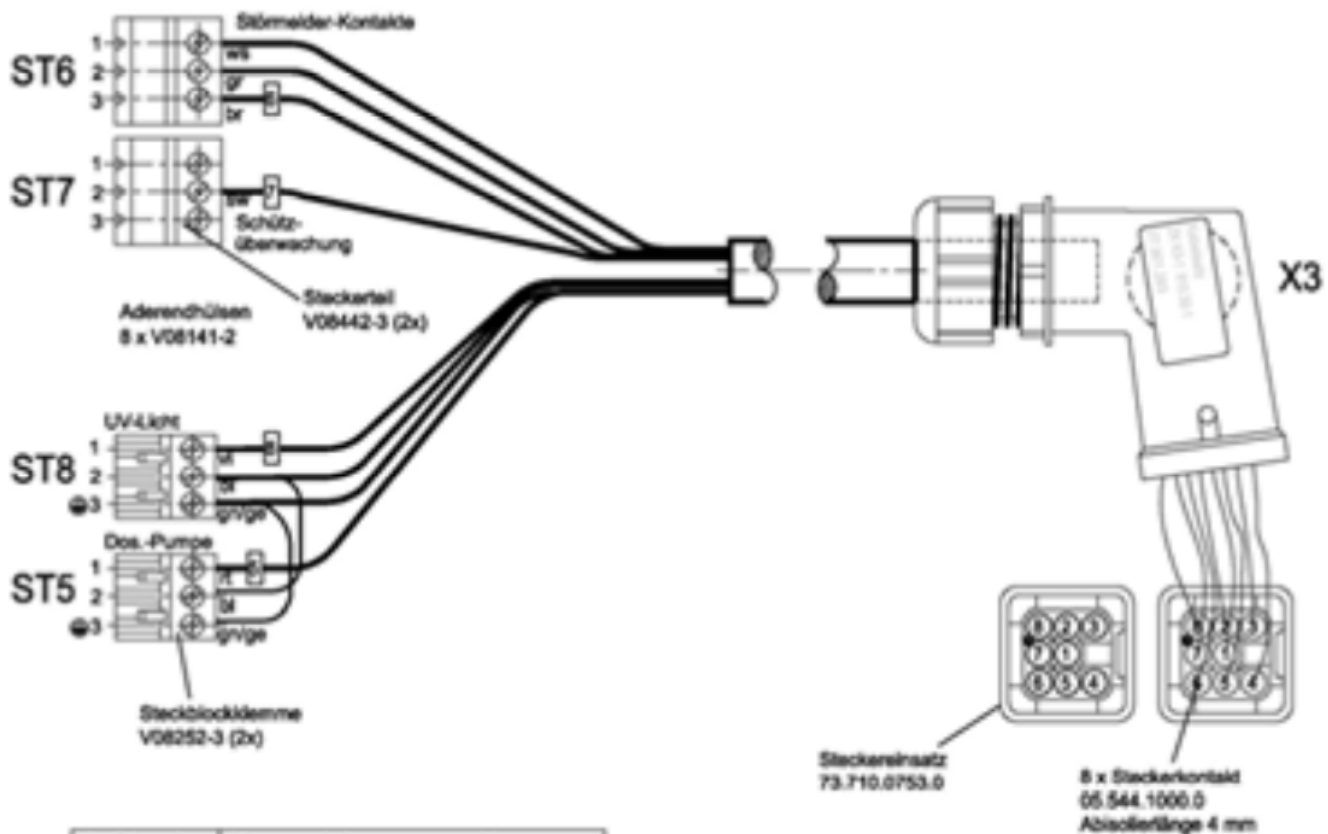
Additional Functions

Additional Functions of the ZK PLUS Control Unit

By connecting an additional cable to the X3 connection, the functions of the control unit can be extended.

The follow extensions are possible:

- ST5 connection of a phosphate dosing pump
- ST6 connection of an external warning device
- ST7 monitoring of protection for three-phase current compressor
- ST8 connection of a UV reactor



Aufdruck	Kennzeichnungsmarkierer
5	N11499-5 / RN.114.9905.0
6	N11499-6 / RN.114.9906.0
7	N11499-7 / RN.114.9907.0
8	N11499-8 / RN.114.9908.0

Von	Farbe	Nach	Bemerkung
X3.1	br	ST6.3	Schmelzer Schließer
X3.2	ws	ST6.1	Schmelzer Öffner
X3.3	gr	ST6.2	Schmelzer Mittelkontakt
X3.4	bl	ST8.2 → ST5.2	
X3.5	sw	ST7.2	
X3.6	rt	ST5.1	
X3.7	vi	ST8.1	
X3.8	gn/ge	ST8.3 → ST5.3	



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Additional Functions

Additional Functions of the ZK PLUS Control Unit

Connection of an external warning device

An external warning device, such as a warning lamp mounted outside the cabinet, can be connected via the floating output ST6.

Further details can be found in the assembly instructions for external alarms.

Connection of a UV Reactor

A downstream UV reactor can be attached to the controller via the connection ST8. Further details can be found in the assembly instructions for UV systems.

Phosphate precipitation with dosing pump

Attention: ferric chloride is harmful to health when swallowed and irritates the skin. There is the danger of serious eye injuries. There is a danger of explosion in conjunction with alkali metals, allyl chloride, and ethylene oxide. Before using phosphate precipitants, read the associated safety data sheet! Wear protective clothing when handling ferric chloride. Keep the precipitant container out of reach of children and third parties.

Systems delivered with the phosphate precipitation function have a peristaltic pump in the cabinet for this. A suction hose and a pressure hose are connected to the pump.

For both types of peristaltic pump, the pumping volume is initially determined by the running time of valve 1 (feeding). The quantity of precipitant added is thus dependent on the set pumping duration of the feeding siphon.

In the case of the SR 15, the flow rate can additionally be increased by changing the diameter of the pump hose.

The Concept pump has two potentiometers (P1 and P2) for fine and coarse adjustment. These are accessed by removing the white cover. The above-mentioned table provides an overview of the dosing possibility with P1, if the fine adjustment P2 is at maximum.

The necessary respective dosing quantity is to be taken from the building authority approval.



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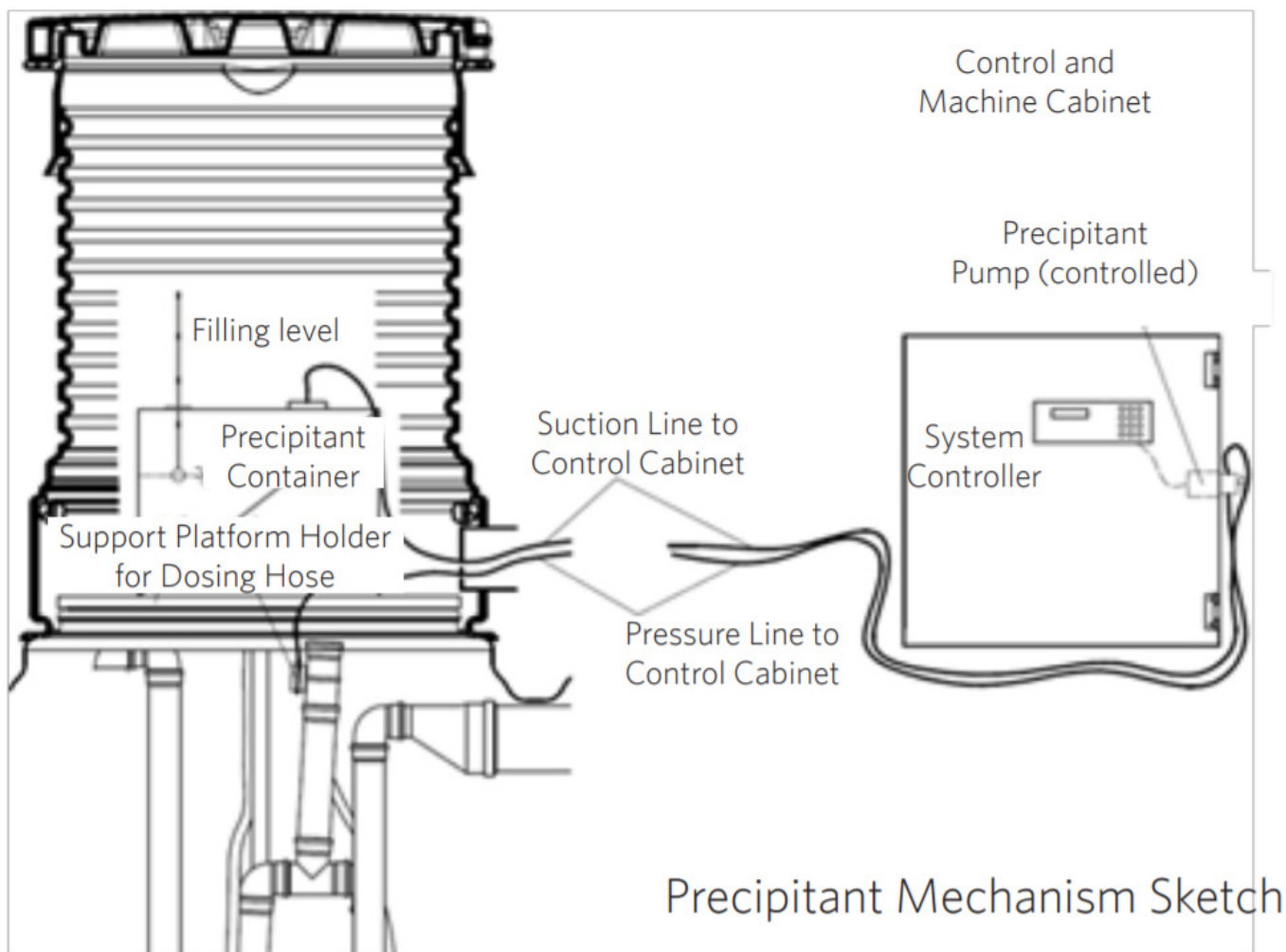
Additional Functions

Additional Functions of the ZK PLUS Control Unit

For the commissioning of the precipitant mechanism, the container with the precipitant is to be housed in a frost-free place (e.g. machine cabinet, on the partition wall or in the dome shaft of the system).

The pressure and suction hoses are also to be protected against frost. The pressure hose must be fed into the SBR reactor and must be placed in the reactor in such a way that the outlet opening is above the reactor basin, thus ensuring that the precipitant falls directly into the waste water to be treated and does not wet structural elements (aggressive chemical: danger of damage to structural elements!).

The outlet opening must never be submerged in water!



Additional Functions

Additional Functions of the ZK PLUS Control Unit

1. Feed the suction hose into the precipitant container far enough to ensure suction from the base.
2. Connect the suction and pressure hoses to the hose nozzles of the pump and fix them with the cap nuts.
3. Switch the phosphate pump on via the menu item "Manual Operation" and check that the precipitant is sucked in correctly. Swap the hose connections if necessary.



P	ml/min
1	1.5
2	5.5
3	11
4	15
5	19
6	22.5
7	26
8	30.5
9	35
10	37.5

Maintenance

Tasks of the Operator

Measured values, deviations from setpoint values and operating faults must be entered in an operations book. The water authority can demand to inspect this operations journal. The following inspections must be carried out in order to guarantee fault-free operation:

1. Daily Inspections

It is necessary to check whether the plant is operating correctly. This is the case if the operating monitor is illuminated green and no warning signal can be heard. A fault is displayed as described in the Plant Control chapter. In the even of a fault, we request that you read off the liquid crystal display and notify the service staff of the displayed fault or, if possible, remedy it yourself.

2. Weekly Inspections

- Check the water levels. There must be no uncontrolled entry of sludge into the SBR chamber
- Check the infeeds and outlets for blockages (visual inspection)
- Read off the hourmeters for the air compressor (total operating hours), the ventilation (Valve 2), the sludge return (Valve 4) and, if necessary, the other units also. Note the readings in the operations journal.
- Check the function of the siphons and the ventilation via the "Manual mode" setting

3. Monthly Inspections

- Visual inspection for any disturbed sludge, cloudiness or discoloration in the outlet.
- Check the infeeds and outlets for blockages (visual inspection).
- Read off the hourmeters for the air compressor (total operating hours), the ventilation (Valve 2), the sludge return (Valve 4) and, if necessary, the other units also. Note the readings in the operations journal.
- Inspection of the phosphate precipitator (if present): Check off the function of the precipitant pump and the filling level of the precipitant tank.
- Functional check of the mains failure warning indicator.
- Air filter inspection: the filter of the control cabinet ventilator (ventilation grille on the left and right in the housing wall in the case of the inner cabinet, and on the rear side in the case of the outer cabinet) must be inspected, and cleaned/replaced as necessary. This requires removal of the grille on the outside of the cabinet. The clip fastener can be released by gently pressing it with a screwdriver, and the grille can be removed manually. The filter mat is not secured in the ventilation shaft by any other means, and can be shaken or blown out. When the air compressor's filter must be cleaned or replaced depends on the extent of the contamination caused by the atmospheric conditions during use.

Maintenance

Tasks of the Operator - Continued

4. Sludge emptying

The maintenance specialist measures the level of the sludge collected in the sludge reservoir using a sludge plunging siphon. The plant is designed so that the sludge reservoir space is sufficient for at least 12 months under permanent full-load operation and with all operator and maintenance obligations being met. This period is extended accordingly under lower load. According to DIN, "de-sludging as required" applies, i.e. if an increased sludge level is detected during maintenance, the plant must be shut down for this purpose. Allowance must also be made for the floating sludge when measurements are taken. The sludge must be disposed of no later than when the sludge reservoir is 70% full. The operator must arrange for disposal of the sludge.

If maintenance and sludge removal coincide, the sludge must be removed following the maintenance. Sludge removal must be noted in the operations book. Please also follow the instructions of your specialist company here.

The following points must be noted for sludge removal:

- Firstly, the floating sludge is sucked off the surface, then the suction pipe is applied to the bottom of the pit.
- A residual amount of water (approx. 10 cm) should be left at the bottom in the preliminary settling tank.
- After emptying, the preliminary settling tank must be refilled with fresh water!

Maintenance

Tasks of the Maintenance Expert

Maintenance has to be executed at least twice (or three times) per year (at intervals of approx. 4/6 months) by an authorized company (expert company)* depending on the chosen discharge class. Moreover the time intervals and required tasks stipulated in the discharge approval by the local water authority are applicable. For this purpose the owner of the plant has to conclude a maintenance contract with a qualified expert.

*Expert companies are companies independent of the plant's operator; based on their vocational training and participation in pertinent qualification measures, their staff (expert personnel) has the required qualification for the operation and maintenance of small sewage treatment plants.

1. Inspection of the operating manual and ascertainment of regular operation (target-performance comparison).
2. Control of the air filter of the air compressor and check of the air supply and exhaust openings of the switch cabinet.
3. Maintenance of the air compressor according to the manufacturer's stipulations (see attachments!).
4. Function control of the important operative machine, electronic and other components of the plant such as: ventilator, lifter, control unit, valves, alarm device, and battery of the power failure warning device.
5. Control of the sludge level in the sludge storage basin. If necessary, the operator has to initiate the discharge of sludge.
6. Execution of general cleaning work, e.g. the removal of deposits
7. Inspection of the state of the plant's components
8. Control of sufficient aeration and deaeration
9. Check in the activation basin:
10. Oxygen concentration ($O_2/I > 2 \text{ mg}$) if necessary adjustment of the compressor's operating hours
11. Portion of sludge in volume ($< 400 \text{ ml/l}$)
12. If the sludge volume exceeds 400 ml/l , the duration of sludge discharge has to be increased after coordination with your supplier
13. Sampling from the outlet and analysis of the following values:


- Temperature of the sewage water
- Sedimenting substances
- pH value
- Smell
- Colour
- Water transparency
- BOD5 (in every 2nd maintenance)
- COD value
- NH_4-N (if required)
- Nanorg (if required)
- P (if required)

Executed maintenance work as well as any possible damages found, executed repair and other measures have to be summarized by the maintenance company in a maintenance report. A corresponding form is attached. The results of the inspections also have to be documented in the maintenance report. The maintenance report has to be handed to the plant's operator so that it can be submitted to the water authority in charge upon request. The maintenance report has to be attached to the operating manual. Please keep your operating manual ready and accessible.

Fault Indications & Repair

Fault Signals

Technical faults of the plant's operation (failure of an aggregate) are indicated optically as well as acoustically.

The acoustic fault signal of the control unit can be turned off by pressing . The optical fault indication is

acknowledged only after pressing  a second time. In case of a power supply failure an integrated

network-independent power failure warning device emits an acoustic warning signal. In this case no optical indications will appear on the control unit. Is it a precondition that the control unit is equipped with a sufficiently charged battery.

ZK Display	ZK PLUS Display	Possible Cause	How to Remove
No display indication	No display indication	Power supply interrupted	<ul style="list-style-type: none"> Check power supply to the plant and the control unit Check fine fuse F1 at the feed line Check position of the main switch
Change batt.	Change batt.	No battery in battery compartment of control unit	Insert 9V battery block in the control unit (without inserted battery a power failure is neither indicated automatically nor optically)
Set clock	Set clock	Internal date/clock not set	Set date & time via menu
Compressor Error	**Error** Compressor Error	Compressor not receiving power/inoperative	<ul style="list-style-type: none"> Check main fuse F1 Check compressor by manual operation
Valve 1 Error	**Error* Valve 1	Valve 1 inoperative	<ul style="list-style-type: none"> Check valve 1 by manual op. Check fine fuse of consumers F2
Valve 2 Error	**Error* Valve 2	Valve 2 inoperative	<ul style="list-style-type: none"> Check valve 2 by manual op. Check fine fuse of consumers F2
Valve 3 Error	**Error* Valve 3	Valve 3 inoperative	<ul style="list-style-type: none"> Check valve 3 by manual op. Check fine fuse of consumers F2
Valve 4 Error	**Error* Valve 4	Valve 4 inoperative	<ul style="list-style-type: none"> Check valve 4 by manual op. Check fine fuse of consumers F2
	Error Dosing Pump	Dosing pump inoperative	<ul style="list-style-type: none"> Check dosing pump by manual op. Check hose for bends, etc.



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Fault Indications & Repair

Fault Signals Continued

ZK Display	ZK PLUS Display	Possible Cause	How to Remove
-	**Error** UV Light	UV light inoperative	Check UV light remaining durability
-	**Error** Water Level Min	Compressed air line not tight from control unit to charging lifter (e.g. loose hose)	Check hose for untight spots
-	**Error** Water Level Max.	Compressed air line congested (e.g. bent hose)	Check hose for bent spots
-	Temperature Max.	<ul style="list-style-type: none">• Cabinet aeration inoperative• Filters in cabinet/compressor congested• Direct sunlight• Air compressor defective	<ul style="list-style-type: none">• Check operability of the cabinet aeration• Check air filter in the cabinet• Provide shadow for location• Provide cool air• Check air filter in the air compressor• Check air compressor by manual operation• Have maintenance company check set temperature



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Fault Indications & Repair

Unusual Water Levels - Fault Repair

Fault Noticed	Possible Cause	How to Remove
The water level in the pre-treatment basin is unusually high and in the activation basin the water is normal	<ul style="list-style-type: none">• The lifter of the valve 1 is not activated.• The pumping time setup for lifter 1 is too short.• The charging lifter is congested.• The air supply line to the charging lifter is leaky.	<ul style="list-style-type: none">• Activate valve 1 by manual operation and check function of lifter• Have operating period for valve 1 increased by service company• Have pre-treatment basin pumped off and clean lifter• Have pre-treatment basin pumped off and seal hose connections
The water level in the pre-treatment and activation basin is unusually high	<ul style="list-style-type: none">• The plant is running in vacation operation.• Control settings are incorrect.• The charging lifter is congested.• The air hose leading to the charging lifter is leaky.• The control unit is defective.	<ul style="list-style-type: none">• Stop vacation operation.• Check of control settings by maintenance expert.• Have SBR reactor pumped off and clean lifter.• Have SBR reactor pumped off and seal hose connections.• Contact maintenance company.
The plant is smelly, the clarified sewage water is turbid or discoloured.	<ul style="list-style-type: none">• Insufficient amount of air entering the plant.• Uneven aeration due to defective membrane unit.	<ul style="list-style-type: none">• Have aeration period increased by service company.• Check of visible impression of aeration, contact maintenance company.
Aeration appears to be uneven and large air bubbles ascend in some places.	<ul style="list-style-type: none">• The membrane unit is defective.• The aeration bar seal is leaky.	<ul style="list-style-type: none">• Contact maintenance company.
Magnetic valves are unusually loud when switched.	The valve seat of the magnetic valve is soiled.	<ul style="list-style-type: none">• Unscrew and clean magnetic valve.

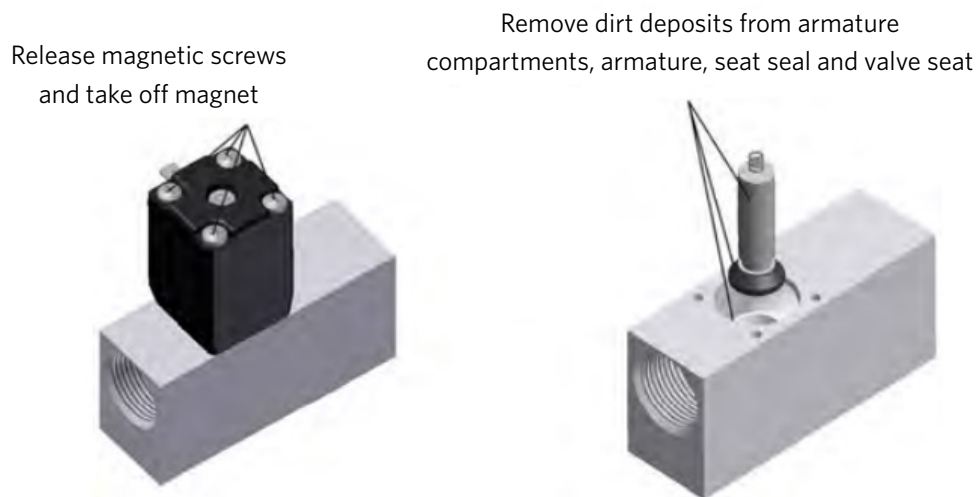


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Fault Indications & Repair

Cleaning Solenoid Valves

Following extended use, dirty switching elements can impair perfect functioning. One indication of this can be an increased noise level in the actuated solenoids. The solenoid valves must be unscrewed in order to clean them. When assembling them, make sure that the anchor and the return spring are positioned straight.



Mode of Operation of the Power Failure Warning Device

Regardless of the cause of the power failure (also blowing of internal fuse or separation from the plug) the warning device sounds acoustic signals when detecting a power failure in the control unit.

With a 5-second delay the device responds to a power failure. This is to avoid that short failure, which for instance occur several times during a thunderstorm but do not impair the overall function of the sewage treatment plant, are unnecessarily signalled.

After the 5-second delay there is an intermittent beep with a 10-second delay for approx. 35 hours (when the battery is fully charged). The signal can be stopped by pressing **Esc**. After that three short beeps per hour signal the power failure. These short beeps, however, cannot be stopped. After pressing **Esc** for 5 seconds,

the signal will be completely deactivated. Turning off the device is only possible after taking out the battery. The return of power supply will reset the device to the monitoring state without pressing any further keys. The fuses can be changed as already described.



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KLARO WASTEWATER
TREATMENT SYSTEMS

Proper Use of the KLARO

Accepted Substances for Domestic Sewage Water

Only substances with characteristics corresponding to domestic sewage water are supposed to be discharged into the plant.

Biocides, toxic or biologically incompatible or non-decomposable substances must not be discharged into the plant as they cause problems in the biological processes. The following, in particular, must not be discharged into the plant:

- Rain water from roofs or courtyards
- Miscellaneous water (e.g. drain water)
- Solid and liquid remains from animal husbandry
- Commercial or agricultural sewage water, unless comparable to domestic sewage water
- Chemicals, pharmaceuticals, mineral oils, solvents
- Cooling water
- Rough substances such as food remains, plastics and sanitary products, coffee filter bags, bottle caps and other household articles
- Milk and dairy products
- Outlet water of swimming pools
- Larger quantities of blood

If larger quantities of grease or vegetable oils accumulate, it is recommended to clarify the sewage water containing grease in a grease separator which is preceding the sewage treatment plant (CAUTION: no feces may be discharged into the grease separator!).

The KLARO Wastewater Treatment System works most efficiently when treated with the proper care as outlined in this manual. The chart on the next page lists individual substances which must not be discharged into the sewage treatment plant.



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Proper Use of the KLARO

Don't Throw in Toilet/Sink	Item's Effect	Where to Dispose
Ashes	Do not decompose	Dustbin
Chemicals	Contaminate the sewage water	Garbage collection point
Paint	Contaminates the sewage water	District garbage collection
Photo-chemicals	Contaminate the sewage water	District garbage collection
Frying grease	Causes sediments in pipes and leads to congestions	Dustbin
Adhesive plaster	Congests pipes	Dustbin
Cat litter	Congests pipes	Dustbin
Cigarette stubs	Causes sediments in the plant	Dustbin
Condoms	Congestions	Dustbin
Corks	Cause sediments in the plant	Dustbin
Lacquers	Contaminate the sewage water	District garbage collection
Pharmaceuticals	Contaminate the sewage water	Garbage collection points, pharmacies
Motor oils	Contaminates the sewage water	Garbage collection points, gas stations
Waste containing oil	Contaminates the sewage water	Garbage collection points, gas stations
Pesticides	Contaminate the sewage water	District garbage collection
Paintbrush cleansers	Contaminate the sewage water	District garbage collection
Cleansers, unless chlorine-free	Contaminate the sewage water, make pipes and seals corrode	District garbage collection
Razor blades	Risk of injury for workers in the sewer system and sewage works	Dustbin
Tube cleaners	Make pipes and seals corrode, contaminate the sewage water	District garbage collection
Insecticides	Contaminate the sewage water	District garbage collection
Sanitary pads	Cause congestions, non-decomposable plastic foil spoils rivers & lakes	Dustbin
Edible oil	Causes sediments and congested pipes	District garbage collection
Food remains	Cause congestions, attract rats	Dustbin
Wallpaper paste	Causes congestions	District garbage collection
Textiles (e.g. nylon stockings, rags, etc)	Congest pipes, may stop a pumping station	Collection of old clothes
Diluters	Contaminate the sewage water	District garbage collection
Bird grit, cat litter	Cause sediments and congested pipes	Dustbin
Cotton swabs	Congest the plant	Dustbin
Toilet bowl deodorizers	Contaminate the sewage water	Do not use them
Diapers	Congest the pipes	Dustbin
Cement water	Causes sediments, creates concrete layer	Get an expert company to dispose of it