Highly productive wastewater treatment systems up to 225 KLD (1,500 PE)

We provide clear water

No mechanical and electrical parts in the wastewater

No pumps in the wastewater

Long life time product with nearly no additional costs
KLARO in Bayreuth - KLARO in Chennai
The experience of a global player

SAFETY
NO mechanical parts, NO electrical parts and NO pumps in the wastewater

MARKETLEADER
Marketleader for SBR systems with air-lift pump technology

GLOBAL
Asia, Europe, Southamerica, Northamerica, Oceania

FLEXIBLE
Our systems are flexible, easy adaptable (concrete, plastic, GFK) and fast to assembly.

FAIR COSTS
Long life time product with nearly no additional costs.

UNDERLOAD PROOFED
In case of a low waterconsumption - highest performance. Good for leisure houses, Hotels etc.
There are currently more than 30,000 KLARO small wastewater treatment plants installed in over 34 countries all over the world. Advice, delivery and installation are always carried out on-site by qualified specialist partners regardless of the size of the treatment plant. These partners also provide regular maintenance and ensure that your KLARO small wastewater treatment plant functions without any interruptions. KLARO has been providing clear water since 2001. Is a connection to the main sewage system not possible for financial reasons? Then that’s where we come into play. Whether it’s a family home, hotel or municipality – KLARO has the perfect wastewater treatment plant for every application, from 4 to 1,225 people. The KLARO modular construction principle means the highest levels of flexibility and sustainability for the future.

KLARO India - EcoTec Engineers and Consultants is a relatively young partnership company focused inter alia in the field of wastewater treatment. KLARO India has many values - the following are just a few ones.

Collaborative
We at KLARO India believe, the Ecological crisis will only be solved by collaborative action. Our engagement with other organizations, staff and supporters underpins our success. We value their diversity.

Accountable
We are responsive and transparent to those we cooperate and serve. Our accountability to the service we provide and to one another within and outside the company is the core to our practice.

Inspiring
KLARO India is a passionate champion of the role in safe water, improved hygiene and sanitation play in improving lifestyle and health of our clients.

Courageous
We set achievable goals, raise challenging questions and work with conviction. We are assertive yet humble and respectful.
Experience and competence in wastewater treatment systems!

Be it for a single household, communal facilities, communities, hotels and restaurants, ...

Commercial wastewater, large plants,...
A competent partner in the industrial sector too!

**Office Building**

In Chennai, for an office with 100 employees the tank for this plant was constructed in front of the office entrance. The wastewater from the entire office is treated with KLARO SBR and subsequently filtered and disinfected for reuse in flushing and gardening. The quality of treated water is close to drinking water standards.

**Systems up to 1,000 PE**

In Norway, we built a 1,000 PE plant for a dockyard. The tank required for this plant was specially manufactured according to our specifications. Wastewater from the kitchen is treated along with domestic wastewater from apartments. The first treatment level is taken care of by an interconnected KLARO fat separator. Water treatment with wastewater plants up to 1,000 PE is so effective that the wastewater can simply be discharged into the fjord.
KLARO small wastewater plants can be tailored to seasonal loads through underload detection and multi-channel systems. Using photovoltaic modules, KLARO technology can also function perfectly in areas where no power supply is available. If plastic tanks are used, transportation is also not a problem. In Wallis for example, a 15 PE plant was transported to its installation location by helicopter.

Villages, regions, mountain chalets, campsites ...
The optimum solution for any spatial requirements!

**Villages and entire regions**
The inhabitants of Haibach and Wehelitz decided to go for a communal small wastewater treatment plant. So the entire village is connected to KLARO plants (40 PE and 75 PE). At Lake Walchen, residents have retro-fitted or reconstructed their own small wastewater plants on their plots of land.

**Mountain resort and lodge**
KLARO small wastewater plants can be tailored to seasonal loads through underload detection and multi-channel systems. Using photovoltaic modules, KLARO technology can also function perfectly in areas where no power supply is available. If plastic tanks are used, transportation is also not a problem. In Wallis for example, a 15 PE plant was transported to its installation location by helicopter.
KLARO - SBR process

98% cleaning performance in a mere 6 hours!

Sequencing Batch Reactor
up to 1,500 PE (225KLD)

Sophisticated technology with great potential for the future, KLARO technology can do what other technology can’t. KLARO undercuts legal thresholds with regard to wastewater quality by up to 90%. This means sustainability for the future – even in the case of wastewater treatment regulations being tightened.

**Loading phase**
The wastewater is initially fed into the sludge tank (1st chamber) where solid constituents are removed. From here, the wastewater is then gradually led into the SBR tank (2nd chamber).

**Aeration phase**
The SBR tank is where the actual biological treatment process takes place. Here, short aeration and rest phases alternate with one another within the scope of a controlled cleaning process. This means that the so-called activated sludge with its millions of micro-organisms can develop and treat the water thoroughly.

**Rest phase**
During the 90-minute rest phase, the activated sludge then settles on the bottom of the tank. A clear water zone forms in the upper part of the SBR tank.

**Clearwater extraction**
The separated clear water is then led from the SBR tank to the receiving water (stream, river or lake) or into a percolation system. Afterwards, the sludge is returned to the first chamber from the SBR tank and the process starts again from the beginning.

**KLARO SBR values**

<table>
<thead>
<tr>
<th>Wastewater parameter</th>
<th>KLARO Easy drainage values</th>
<th>Degree of efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>COD (chemical oxygen demand)</td>
<td>39 mg/l</td>
<td>95 %</td>
</tr>
<tr>
<td>BOD₅ (biochemical oxygen demand)</td>
<td>9 mg/l</td>
<td>97 %</td>
</tr>
<tr>
<td>NH₄-N (ammonium nitrate)</td>
<td>3.8 mg/l</td>
<td>90 %</td>
</tr>
<tr>
<td>Ptot (phosphate removal)</td>
<td>0.4 mg/l</td>
<td>95 %</td>
</tr>
<tr>
<td>SS (suspended solids)</td>
<td>15 mg/l</td>
<td>96 %</td>
</tr>
</tbody>
</table>

* Results of the practical test carried out by PIA (Prüfinsitut für Abwassertechnik GmbH), Aachen test number 2011-140B14.
AQUALISTO - SCBR® process

The energy saving principle!

Short Cycle Batch Reactor® up to 25 PE (3.75 KLD)

The AQUALISTO plant functions according to the innovative Short Cycle Batch Reactor (SCBR®) method, which combines the advantages of a continuous activated sludge plant with that of a SBR plant. So the SCBR® method provides various advantages which make it interesting in comparison with conventional wastewater treatment methods.

Feeding and aeration

The wastewater flows into the primary sedimentation chamber. The coarse solids settle here. Solid-free wastewater reaches the aerobic bioreactor via the feeding unit, without energy input. The already pre-clarified wastewater is aerated and mixed in the bioreactor by a intermittent fine-bubble aeration. The microorganisms are supplied with oxygen through the aeration. The overflow to the bioreactor is open during the aeration phase.

Sedimentation

The overflow into the bioreactor is interrupted after aeration so that the sedimentation occurs under flow-free conditions. This permits an optimised separation between the purified wastewater and the activated sludge flocks.

Extraction

The clear water is conveyed from the small wastewater treatment plant in the final step. At the same time, the arising surplus sludge is pumped back into the preliminary sedimentation chamber as secondary sludge. Both extraction processes occur via air-lift pumps. After the extraction, the entire purification cycle starts all over again.

AQUALISTO SCBR values

<table>
<thead>
<tr>
<th>Wastewater parameter</th>
<th>AQUALISTO drainage values*</th>
<th>Degree of efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>COD</td>
<td>54 mg/l</td>
<td>93 %</td>
</tr>
<tr>
<td>BOD₅</td>
<td>11 mg/l</td>
<td>97 %</td>
</tr>
<tr>
<td>NH₄-N</td>
<td>22.0 mg/l</td>
<td>42 %</td>
</tr>
<tr>
<td>P₅</td>
<td>1.5 mg/l</td>
<td>81 %</td>
</tr>
<tr>
<td>SS</td>
<td>15 mg/l</td>
<td>96 %</td>
</tr>
</tbody>
</table>

* Results of the practical test carried out by PIA (Prüfinsitut für Abwassertechnik GmbH), Aachen test number 2013-167815d
Low procurement and follow-up costs; thanks to a well-engineered product!

Why you should choose a KLARO small wastewater treatment plant.

**KLARO set-up equipment**
- Suitable for installation into tanks made of plastic, concrete, etc.
- Suitable for all new installations and retrofits
- All transfer processes carried out using compressed air
- No wear, no blockages
- Integrated sampling
- Thanks to the new and patented air barrier, the discharge of suspended matter is reduced by approx. 96% for the first critical flushing surge.
- All components are made from wastewater-resistant plastic or stainless steel

**Controller KLbasic**
- New display with light blue background illumination
- New gas-tight membrane keyboard
- Relay for compressor control doubled to 16 A
- Capacitor buffering instead of a block battery
- With isolated contacts

**Controller KLplus**
- SD card slot for easy reading of data
- Automatic underload detection
- Additional menu points
- As well as all improvements that have been made in the KLbasic
- COM connection and T-sensor moved
- Bushing X3 for P-module and UV-module
- Bushing X4 for isolated contact and protection monitoring
- Connection for measuring hose as bulkhead connector
KLARO EPP indoor switch cabinet
- Cabinet sizes up to 8 PE
- Minimal space required: 40 cm x 54 cm x 29 cm (w x h x d)
- Silent air compressor – as quiet as a refrigerator

KLARO metal indoor switch cabinet
- Suitable for all system sizes for up to 125 PE
- Sizes upwards of 50 cm x 50 cm x 30 cm (w x h x d)
- Varied equipment options

KLARO outdoor switch cabinet
- Suitable for all system sizes for up to 50 PE
- Sizes upwards of 37 cm x 80 cm x 38 cm (w x h x d)
- Easy installation

KLARO combined with photovoltaics or solar module

The modular concept from KLARO allows you to combine the small wastewater treatment plant with a photovoltaic or solar module. A solar module makes your wastewater treatment plant independent from the public power supply system and hedges the plant from any fluctuations.
Concrete tanks
- Up to 20 PE in one tank
- Low-cost
- Variable sizes and designs for all types of use
- With or without buoyancy safeguards
- Monolithic reinforced concrete
- Pre-fabricated and ready-to-use when delivered to the building site

Plastic tanks*
- Very good price/performance ratio
- Lightweight tank
- Installation possible without need for a crane
- Long life span even in the case of frequent use
- Extremely stable – able to bear HGV load with suitable covering

Concrete on-site
- KLARO plan and calculate the dimensions for you

GFK Tanks
- System can be also placed in GFK tanks

* Example tank from GRAF Germany
Low procurement and follow-up costs; thanks to a well-engineered product!

Why you should choose a AQUALISTO small wastewater treatment plant too.

AQUALISTO set-up equipment
- Suitable for installation into tanks made of plastic, concrete, etc.
- Suitable for all new installations and retrofits
- All transfer processes carried out using compressed air
- No wear, no blockages
- All components are made from wastewater-resistant plastic or stainless steel
- Low energy consumption

AQUALISTO EPP indoor switch cabinet
- Cabinet sizes up to 25 PE
- Minimal space required: 40 cm x 54 cm x 29 cm (w x h x d)
- Silent air compressor – as quiet as a refrigerator

Tanks
- System can be placed in plastic tanks
- System can be placed in concrete tanks
- System can be placed in GFK tanks
- System can be placed in tanks made of concrete on-site
The wastewater treatment plant is queried everyday and reports automatically when something isn’t right - definitely!

The KLARO WebMonitor® saves time, work and money

Advantages for the Operator

- No monitoring on-site
- Automatic data storage
- Monitoring when absent
- Remote of outdoorcabinets

Advantages for the partner

- Overview of all plants
- Direct access via internet
- Email-notification in the case of an error
- Continuous automatic monitoring

The KLARO WebMonitor® is an internet portal that gives maintenance companies and operators the option to monitor small wastewater treatment plants online, regardless of where they are.
Remote control for more security!

The KLARO WebMonitor saves time and work

The KLARO WebMonitor® takes over the legally stipulated daily controls and automatically saves the plant data once a month. This means that the operator is relieved of its monitoring duties. The KLARO WebMonitor® performs this task on the operator’s behalf by calling the plant on a daily basis to check its operational status. In the event of errors in the plant the KLARO WebMonitor® sends an error notification to the address stored in the system by Email.

The partner can then act upon this immediately in the plant. Errors can be acknowledged and settings can be changed. Travelling time and costs no longer apply and the operator receives direct and fast assistance. All events are automatically saved in the KLARO WebMonitor® and made available to download.

Connection

The plant is monitored remotely in-ternet connection. The LAN- adapter required for the internet connection is connected between the control system and the router. It is also possible to use WLAN or dLAN.

Circle of users

- Operators
- Tourism partners
- Service and maintenance companies
- Commercial partners
- Authorities

* local authorities, water conservation agencies
** businesses, companies, planning offices
*** hotels, holiday apartments, campsites
Our wastewater treatment plant technology also functions during underload operation!

KLARO provides complete purification performance, even during underloading.

In a practical test conducted by the PIA over the course of 10 weeks, the system was tested and awarded the “Underload Certified“ certificate.

**Underload detection**

The “KLplus“ control mechanism checks the fill level in the first chamber every 6 hours with an integrated pressure sensor. In the event of little or no inflow or low fill level, a purification cycle is not operated, but the system is merely marginally aerated. So electricity is saved and yet the batteries are preserved. The plant’s lifespan is independently adapted to the actual volume of wastewater with the automatic underload detection.

**Certificate**

**Recirculation**

If no purification cycle has been operated three times in succession (i.e. a total break of 18 hours), the control mechanism activates the surplus sludge lifter and transports water from the SBR chamber back into the 1st chamber. The duration and quantity is adjustable. Through this recirculation the first chamber fills and a normal purification cycle is started afterwards. Consequently, the batteries are provided with “fodder“ once a day.

**Examples of application**

- Long-term under-occupancy (single-person household)
- Very low water consumption
- Weekend houses
- Holiday homes
- Restaurants
“Additional feeding“ in extreme cases or “Multiple lines“

“Additional feeding“
Feeding a highly concentrated nutrient solution to the bioreactor is additionally possible with only sporadic or seasonal volume of wastewater. The consumption of the agent is minimal. Moreover, this is completely harmless, cost-effective and easy to handle. An adequate quantity of activated sludge, which furthermore features excellent settling properties, can be kept available with this agent.

One is independent from volume of wastewater with this method. Consequently, a KLARO plant can also be employed in cases in which one merely considered a pit without outlet to be possible. We already have several years of experience with the “additional feeding method“, and we will gladly demonstrate various reference objects to you in this connection.

Multiple lines
In extreme cases the plants are installed redundantly with multiple lines. The tanks are then set up in such a way that the biological cleaning takes place in two separate SB reactors. In low-season the SBR tank remains shut down. This is re-commissioned when the high-season begins. Activated sludge is then fed through from the operational tank to the tank that was previously shut down. Therefore, it is 100 % operational immediately.

Examples of application
- Holiday homes
- Garden allotments
- Underload in connection with increased requirements

Examples of application
- Camping
- Hotels
KLARO and AQUALISTO: long life time products with nearly no additional costs

Quality creates trust.
Trust in products from KLARO Germany / India.

It is always easy to find a cheap product.
But quality saves costs for years?

KLARO and AQUALISTO are MADE in GERMANY.
We only use quality products, like the compressor and the controller, from partners who have the same attitude like we have about the products - Quality saves costs, because you need less spare parts in the following years. Furthermore, we only use material in the wastewater, which is nearly not destroyable and free of corrosion. That also includes, that there is no technique inside the tank - so nothing what can be broken. Nevertheless, there are nearly no wear parts in our products, just a few cheap ones.
Not only the hardware safe costs, but also the software - our well educated staff.

We provide customers with an individual planning and calculation for each plant - we do not serve ready-made products. Until the customer does not give his full agreement, we do not deliver a plant or write a bill.
The power consumption of our plants is also very low as you see in the table.

Annual power consumption of small wastewater plants per PE

<table>
<thead>
<tr>
<th>Plant Type</th>
<th>Power Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional SBR plant</td>
<td>93 kWh</td>
</tr>
<tr>
<td>Fluidised bed reactor</td>
<td>147 kWh</td>
</tr>
<tr>
<td>Fixed bed reactor</td>
<td>157 kWh</td>
</tr>
<tr>
<td>Sludge activation plant</td>
<td>217 kWh</td>
</tr>
<tr>
<td>9W energy-saving bulb</td>
<td>78 kWh</td>
</tr>
</tbody>
</table>

1) At an electricity rate of around € 0.25/kWh
Re-use with KLARO India

Sustainable water reuse achieves water security

KLARO India promotes reuse and recycle of treated water

Water Conservation measures is promoted and implemented in more projects with highly sophisticated KLARO-treatment followed by advanced filtration systems up to 70% of the water can be reused. Treated water is used for flushing, gardening, car wash and non-portable applications. Automation technology used ensures efficient and effective treatment avoiding human errors where skilled labour is rare. Treated water from KLARO SBR procedure is safe for disposal to the environment. Treated water is safe for recharging ground water. The layers of soil acts as a filter media for further water purification. Furthermore reuse and recycle is achieved by multi-level filtration and disinfection using advanced technology. The system chosen for each application is designed as per requirement.

UV sanitation

Water pollution control and the protection of the environment in sensitive areas with the strictest of requirements. When clear water is drained, it is irradiated with UV light which reliably kills micro-organisms within a matter of seconds.

KLARO UV module

- Simple, retrofittable
- Easy application
- No environmental pollution
- Low operating costs
- Can be integrated into a SBR tank or into a tank connected downstream
1. How often does the sludge have to be discharged from the sludge storage tank?
Usually this is simply done as and when required.
If a high level of sludge is determined during maintenance (70% including the floating sludge), discharge must be performed.

2. For how long does the sludge storage tank guarantee full plant functionality in the case of uninterrupted full-load operation?
KLARO small wastewater treatment plants are designed to guarantee full functionality for at least 12 months during permanent full-load operation, provided that operational and maintenance obligations are met. In the case of lower loads, this period of time is extended accordingly. Alternatively, a tank can be selected with a larger sludge storage capacity so that the sludge discharge intervals are longer.

3. Does sludge have to be pumped out of the SBR in order to guarantee small wastewater treatment plant operations?
No! The build-up of too much sludge in the SBR aeration tank is prevented by the automatic, continual sludge recovery directly from the floor of the tank. Specialist personnel can fine tune the plant during maintenance by changing the sludge discharge intervals.

4. Why does the small wastewater treatment plant work in portions even though there is no float gauge in the plant?
The maximum amount of water is determined for each cycle through the defined runtime of the compressor for the pump process. Thanks to the special air-lift pump construction, it is ensured that the water level in the buffer tank cannot be exceeded. As the point at which the air-lift pump sucks the water out of the tank is a considerable distance underneath the lowest water level, no floating sludge is able to be sucked up. This all happens without any flaps, mechanics, electrical pumps or float gauges.

5. What needs to be done if the small wastewater treatment plant is operated at low load for a sustained period of time?
We recommend our KLplus control system with automatic underload detection. Water continues to be circulated during spells of particularly low loads or long periods of absence. This way, the bacteria necessary for the treatment process are automatically activated and kept alive.

6. What are the advantages of the holiday settings of small wastewater treatment plants?
They can save costs at exactly the right time. With the KL control system, holiday operation is set manually whereas with KLplus this is done automatically.
7. How often does maintenance have to be carried out on the small wastewater treatment plant and how extensive is said maintenance?
For a KLARO small wastewater treatment plant with power failure detection as standard, maintenance only has to be carried out twice a year following technical approval. This maintenance work usually concerns functional checks of the plant, checking and if necessary re-setting the control cycles and taking a water sample to examine drainage quality. The compressed-air-powered KLARO small wastewater treatment plant is particularly maintenance-friendly and cost-saving as there are no mechanical or electrical units inside the treatment tank.

8. How much energy does the KLARO small wastewater treatment plant consume?
Compared to many other plants using SBR technology, KLARO has the potential to make energy savings of up to 75% thanks to the use of intelligent control systems and automatic underload detection. The energy consumption of just over € 10^3 per year per population equivalent makes KLARO one of the most efficient small wastewater treatment plants in the world.

9. How complicated is it to retrofit a small wastewater treatment plant?
Retrofitting an existing plant requires consultation from our partners. The structure must be examined and the outside seals and inter-chamber seals must be assured. This is the only way that the legal requirements concerning drainage values can be complied with in the long term.

10. If something goes wrong, how can the extent of the repair work be estimated?
The extent of necessary repair work is rather low! As the technological components and the wastewater are kept separate from each other, if a technical component fails, then all that needs to be done is replace the component in the switch cabinet. No-one has to go down into the pit and no cables have to be disconnected as all plug connections are VDO/VDE standard.
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