KLARO

The sophisticated wastewater treatment system technology

We provide clear water

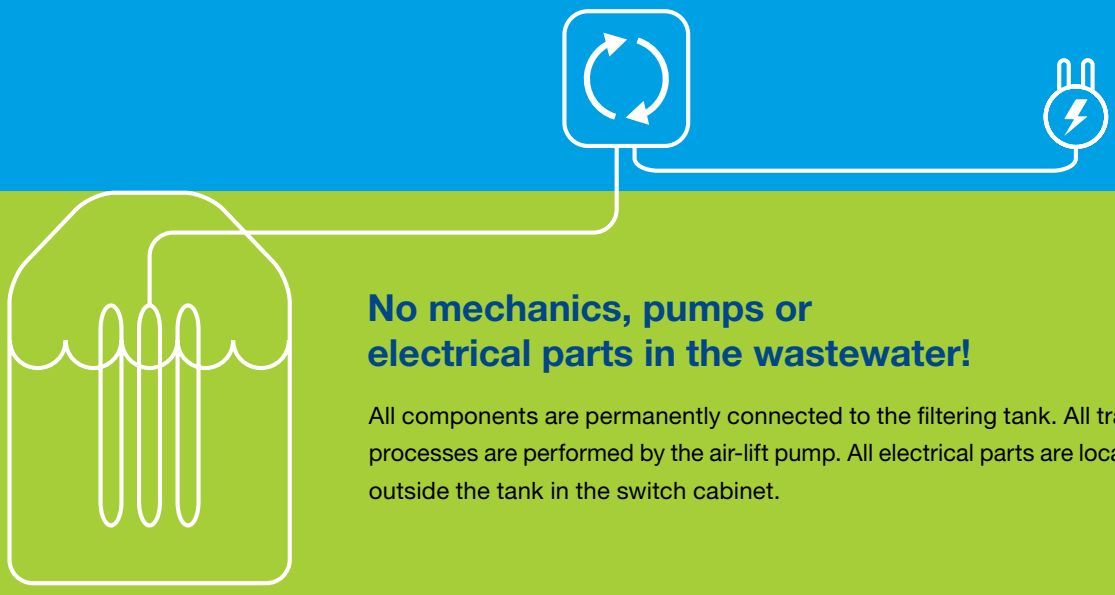
No mechanics in the wastewater

No pumps in the wastewater

No electrical parts in the wastewater

- More than 225,000 user in over 34 countries trust in KLARO
- Marketleader for SBR systems with air-lift pump technology
- KLARO-production-system: Standard products available from stock within 24h

The KLARO principle
Maximum operating reliability!



No mechanics, pumps or electrical parts in the wastewater!

All components are permanently connected to the filtering tank. All transportation processes are performed by the air-lift pump. All electrical parts are located securely outside the tank in the switch cabinet.

Our benefits

- Legal threshold values undercut by up to 90%
- 98% treatment performance in 6 hours
- TÜV-tested switch cabinets (EPP, indoor switch cabinet, outdoor switch cabinet)
- Almost all possible approvals
- Extremely short delivery times thanks to optimised production
- Certified underload detection
- Fully-biological mode of operation
- Quality products, with extremely high customer satisfaction levels
- Minimal power consumption
- All transportation processes performed by air-lift pump
- Treat water and introduce it back into the natural cycle
- Only one tank required for systems of up to 20 PE (Personnel Equivalent)
- Suitable for retrofitting to practically any tank shape
- Retrofitting possible in single, twin, triple and multi-chamber pits
- Installation possible in any type of tank, from plastic to fibreglass to concrete
- Thanks to the new and patented air barrier, the discharge of suspended matter is reduced by approx. 96% for the first critical flushing surge.

Over 225,000 people treat their water with KLARO!

Put your faith in the expertise of the market leader in small wastewater treatment plants with air-lift pump technology.

KLARO GmbH in Bayreuth. Your provider of technology and expertise!

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 small wastewater treatment plant for every application, from 1 to 1,225 people. The KLARO modular construction principle means the highest levels of flexibility and sustainability for the future.
225,000 people have already put their trust in KLARO technology. With 25 employees with a wide range of areas of expertise, we always create an optimal and practical solution for your requirements.

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.

Experience and competence in wastewater treatment systems!

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

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 (40 PE and 75 PE) for the entire village.
At Lake Walchen, residents have retro-fitted or reconstructed their own small wastewater plants on their plots of land.

Mountain chalets, campsites...

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.

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

Commercial wastewater

At Lake Geneva, KLARO built a wastewater treatment plant (80 PE) for a vineyard. The plant treats both the domestic wastewater as well as the commercial wastewater thoroughly. Seasonal fluctuations, such as during periods of grape harvesting or wine tasting, were also included in the calculations.

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.

Special climatic conditions, special requirements. Our system is suitable for any weather conditions and almost any chamber pit!

Special climatic conditions

In some countries, humidity is extremely high whereas in others the temperature is extremely low. These conditions, along with high solar radiation, snow, heat, etc. have absolutely no effect on KLARO technology – because our plants are installed underground in a protected environment.

„Single-chamber pit“

There are still many simple wastewater and slurry tank systems around.
And KLARO can help here too – provided that the tank is sealed. KLARO can turn the pit into a fully-biological small wastewater treatment plant and save the operator expensive excavation work.

98 % cleaning performance in a mere 6 hours!

A KLARO small wastewater plant is based on the tried and tested SBR treatment principle and undercuts legal threshold values by up to 90%.

CE

Put your faith in the SBR process. SBR stands for Sequencing Batch Reactor.

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.

Wastewater parameter	KLARO Easy drainage values*	Degree of efficiency
COD (chemical oxygen demand)	39 mg/l	94,6 %
BOD_5 (biochemical oxygen demand)	9 mg/l	97,3 %
NH_4-N (ammonium nitrate)	3,8 mg/l	89,9 %
P_{ges} (phosphate removal)	0,4 mg/l	95,0%
SS (suspended solids)	15 mg/l	96,2 %

* Results of the practical test carried out by PIA (Prüfinstitute für Abwassertechnik GmbH), Aachen test number 2011-140B14

„When I purchased my wastewater treatment plant, my highest priority was reliability. I went for a KLARO small wastewater treatment plant three years ago and that is something I have never regretted!"

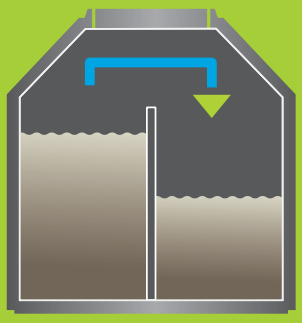
KLARO

We treat water for our environment

Back to nature – the natural cycle

Every single person in Germany uses an average of 130 litres of water per day – water which then needs to be treated after use. KLARO small wastewater systems bring domestic wastewater back into nature without posing any kind of risk and therefore harmonising the natural cycle.

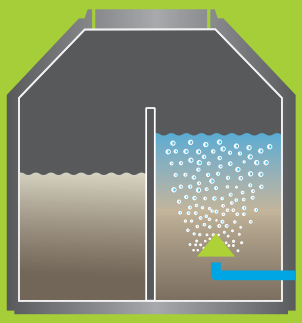
1



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).

2



Aeration phase

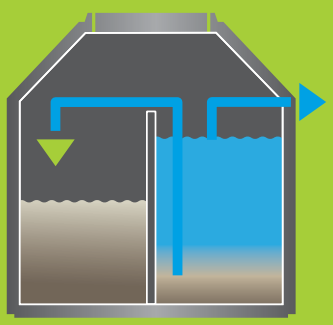
The SBR tank is where the actual biological treatment process takes place. Here, short aeration and rest phases alternate with one another within the scope of a controlled cleaning process. This means that the so-called activated sludge with its millions of micro-organisms can develop and treat the water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

3

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.

4



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.

Low procurement and follow-up costs thanks to a well-engineered product!

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

KLARO set-up equipment

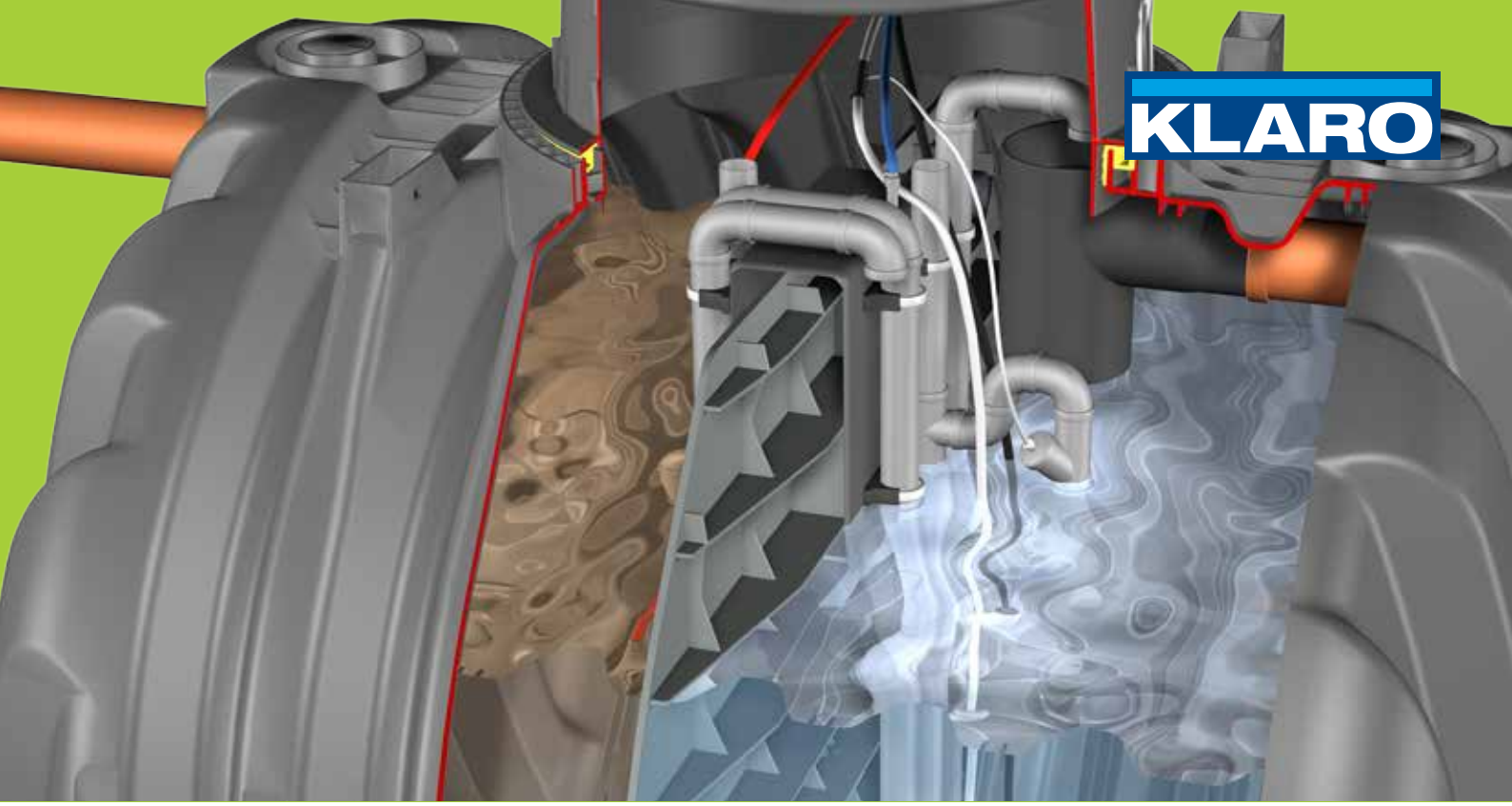
- Suitable for installation into tanks made of plastic, concrete, etc.
- Suitable for all new installations and retrofits
- All transfer processes carried out using compressed air
- No wear, no blockages
- Integrated sampling
- Thanks to the new and patented air barrier, the discharge of suspended matter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

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
- Plastic tank waterproofness guaranteed for 25 years
- Long life span even in the case of frequent use
- Extremely stable – able to bear HGV load with suitable covering



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 metal indoor switch cabinet

- Suitable starting from a size of 125 PE
- Size 114 cm x 120 cm x 75 cm (w x h x d)
- With skirting board

KLARO metal outdoor switch cabinet

- Suitable starting from a size of 50 PE
- Size 120 cm x 110 cm x 80 cm (w x h x d)
- Weight reduction of more than 50 % as against concrete switch cabinet

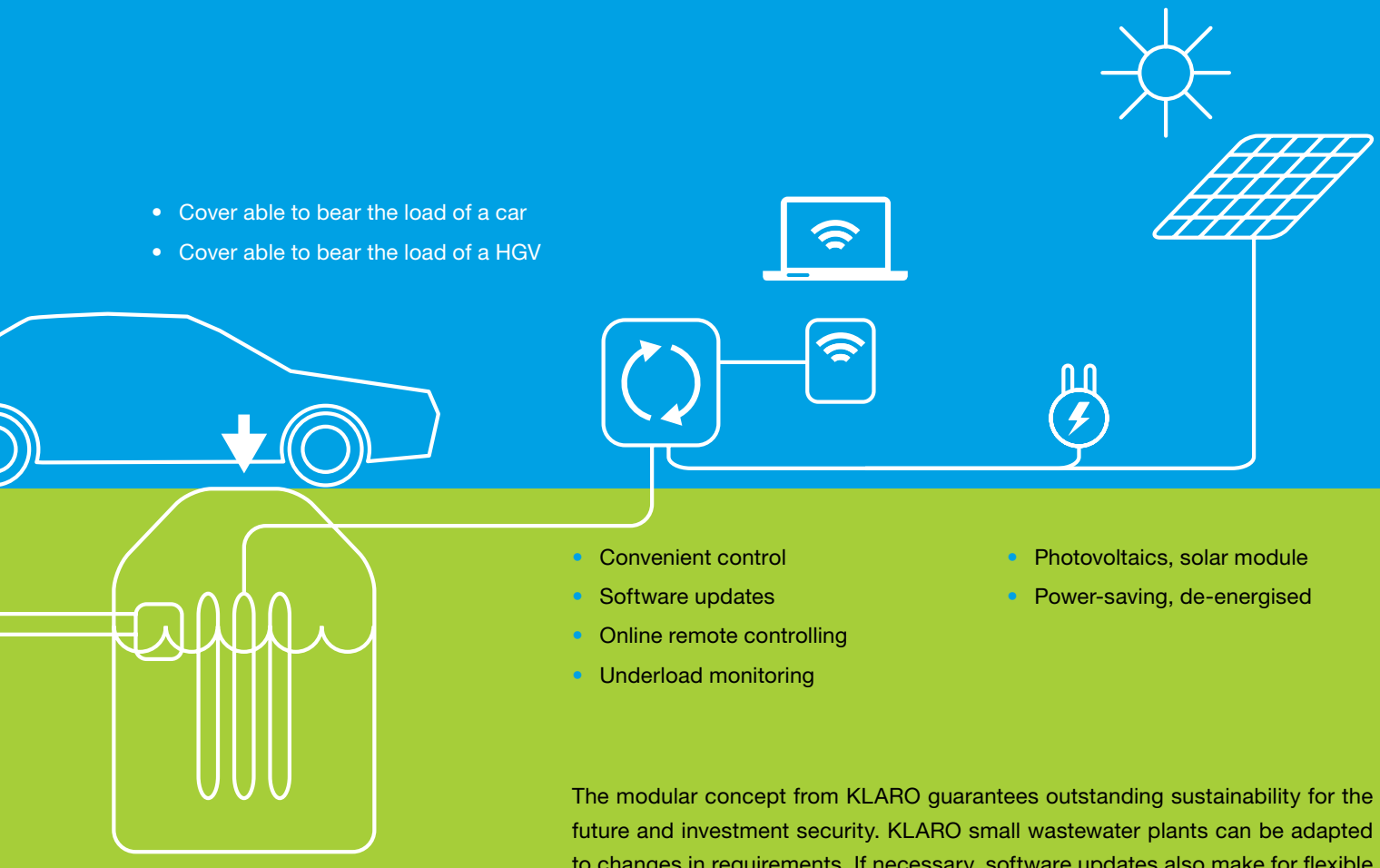
KLARO concrete outdoor switch cabinet

- Suitable starting from a size of 50 PE
- Sizes upwards of 132 cm x 110 cm x 64 cm (w x h x d)
- Particularly robust and weather-proof construction

Sustainable in the future thanks to modular construction concept!

A KLARO small wastewater treatment plant can be adapted flexibly to the requirements of tomorrow.

- Cover able to bear the load of a car
- Cover able to bear the load of a HGV



- 4 to 1,225 PE
- New constructions, retrofitting
- Plastic tanks, concrete tanks, etc.
- Integrated sampling
- Drainage classes: C, N, D, C+P, D+P, C+P+H, D+H and more

- Convenient control
- Software updates
- Online remote controlling
- Underload monitoring

- Photovoltaics, solar module
- Power-saving, de-energised

The modular concept from KLARO guarantees outstanding sustainability for the future and investment security. KLARO small wastewater plants can be adapted to changes in requirements. If necessary, software updates also make for flexible adaptation.

KLARO already undercuts legal threshold requirements in terms of wastewater quality by up to 90%. This means sustainability for the future – even in the event of tighter regulations concerning wastewater.

KLARO WebMonitor

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

Phosphate precipitation

The phosphate content of the wastewater is regulated by implementing a second metering pump which releases a special precipitant. This variation has also been tested and approved for application in sensitive areas.

KLARO metering pump

- Supplementary component within a modular concept
- Retrofitting possible
- Long life span thanks to simple technology
- Easy to maintain
- Metering simple to regulate

Remote monitoring

For use, wherever the highest degree of operational safety is required. The plant can be monitored remotely by a maintenance company thanks to a remote diagnosis system. Intervention in the case of faults is possible immediately.

KLARO WebMonitor

- Increased efficiency and operational safety
- Optimized service intervals
- Increased customer benefit thanks to monitoring services
- Low-priced remote diagnosis in the event of a fault

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


PIA

PRÜFZEUGNIS

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.

Examples of application

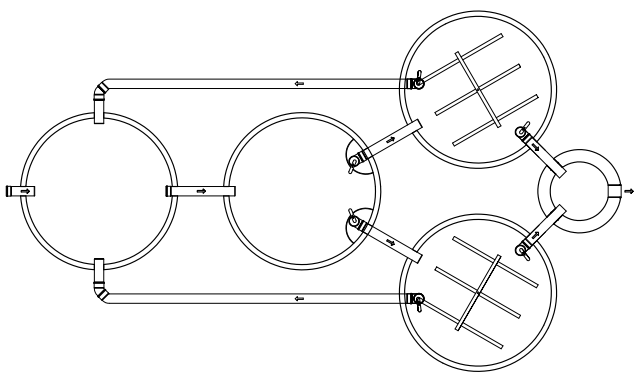
- Holiday homes
- Garden allotments
- Underload in connection with increased requirements

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

- Camping
- Hotels



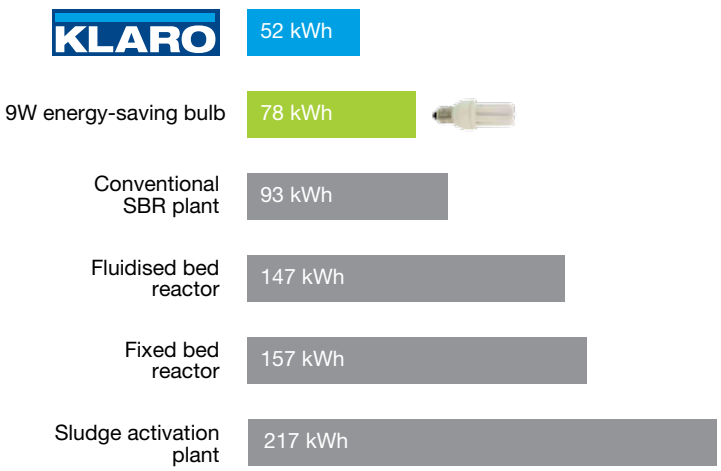
KLARO – saves a third more energy than an energy-saving lamp!

The small high-performance compressor in the KLARO switch cabinet saves CO_2 and is as quiet as a refrigerator.

Intelligent adaptation to actual usage reduces energy consumption.

How can a wastewater treatment plant be operated without a single pump? The solution is simple but ingenious: A small high-performance compressor produces compressed air which is used to transfer water within the KLARO system. This means that all the necessary transportation processes are managed without any sensitive pump technology. The result: Energy consumption of just over € 12[1)] per year per population equivalent makes KLARO one of the most efficient small wastewater treatment plants in the world. Thanks to the use of modern control technology and intelligent software, the necessary life span of the system is tailored to the usage profile. The plant also has automatic underload detection thanks to the optional KLplus control unit meaning that the plant can also be operated at optimum capacity over longer periods of low usage. This results in optimum energy savings whilst the biological processes are maintained. Compared with other wastewater treatment plants, you could make energy savings of up to 75%.

Annual power consumption of small wastewater plants per PE[2)]



[1)]At an electricity rate of around € 0.25/kWh

[2)]The graphic shows the annual electricity consumption of a variety of wastewater systems. Source: wwt magazine, issue 6/2007 „Die Kleinkläranlage als Dauerlösung“, page 15, table 3, Praxisdaten; KLARO: Prüfbericht PIA Prüfinstitut für Abwassertechnik GmbH, Aachen, Prüfnummer 2006-009

„I wanted a wastewater treatment plant that wouldn‘t drive my electricity bill sky high. That‘s why I chose KLARO.“

Wastewater treatment systems from 50 to 1,225 PE

Individual solutions for wastewater treatment!

Large plants from 50 PE to 1,225 PE for commercial applications, kitchens and restaurants, municipalities, campsites and much more.

SBR technology from KLARO is also perfectly suited for small wastewater treatment plants from 50 to 1,225 PE.

Benefits of wastewater treatment plants from KLARO

- Strict legal requirements are met
- Adjustment of drainage values possible for stricter requirements
- Adjustments in accordance with the discharge situation possible – especially beneficial in businesses where the plant is only „operational“ for around 10 hours a day.
- Sludge storage capacity can be adjusted to the discharge interval
- Underground construction saves space
- Very good price/performance ratio
- More than 300 wastewater treatment systems have been installed so far all over the world – from Germany to Norway to Vietnam.

Interesting information!

Answers to the most important questions.

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[1)] 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.

KLARO GmbH
Spitzwegstraße 63
95447 Bayreuth

Telephone: +49 (0) 921 16279-0
Fax: +49 (0) 921 16279-100
E-Mail: info@klaro.eu

More information at
www.klaro.eu

Technical hotline
+49 (0) 921 16279-330