

# GEA varipond® – reliably controlling sludge processes

Fully automated control system simplifies  
and optimizes the decanter operation





# varipond® thinks automatically

Patented control and regulating system for decanters simplifies the infrastructure of the centrifuge, optimizes energy consumption and guarantees a stable discharge concentration

With GEA varipond®, which stands for “variable pond depth” with a running decanter centrifuge, GEA is offering a patented energy and resource-saving optimization solution for the treatment of sludge and wastewater. Operators of municipal wastewater treatment plants in particular will appreciate this – not least due to the retrofit version which is simple and economical to install.

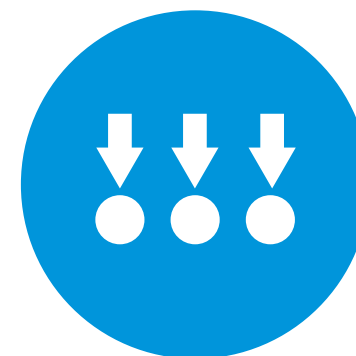
## Variable pond depth while the machine is running

For wastewater treatment plants which use anaerobic digestion, a precise and reliable process sequence must be guaranteed, even under a wide range of conditions. For example, when pre-dewatering and thickening primary and secondary sludge at wastewater treatment plants. The varipond® fully automated control and regulating system responds rapidly to changing requirements, such as during a cloudburst, and ensures the stable discharge of solids by means of a variable pond depth while the decanter is running. The manual time and cost-intensive process optimization previously required for this is no longer necessary with varipond®.

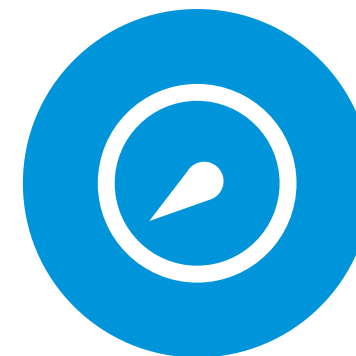
## VARIPOND® OFFERS THREE KEY BENEFITS



**No liquid overflow to the solids side when starting up and shutting down the decanter, resulting in a simplified infrastructure with no slide gate**



**Stable discharge of solids during pre-dewatering (in Cambi's Thermal Hydrolysis Process [THP]) and thickening: automatic, constant solids concentration even with a fluctuating feed**



**Energy optimization: reduction of up to 30 % of the specific energy consumption by the decanter for thickening**





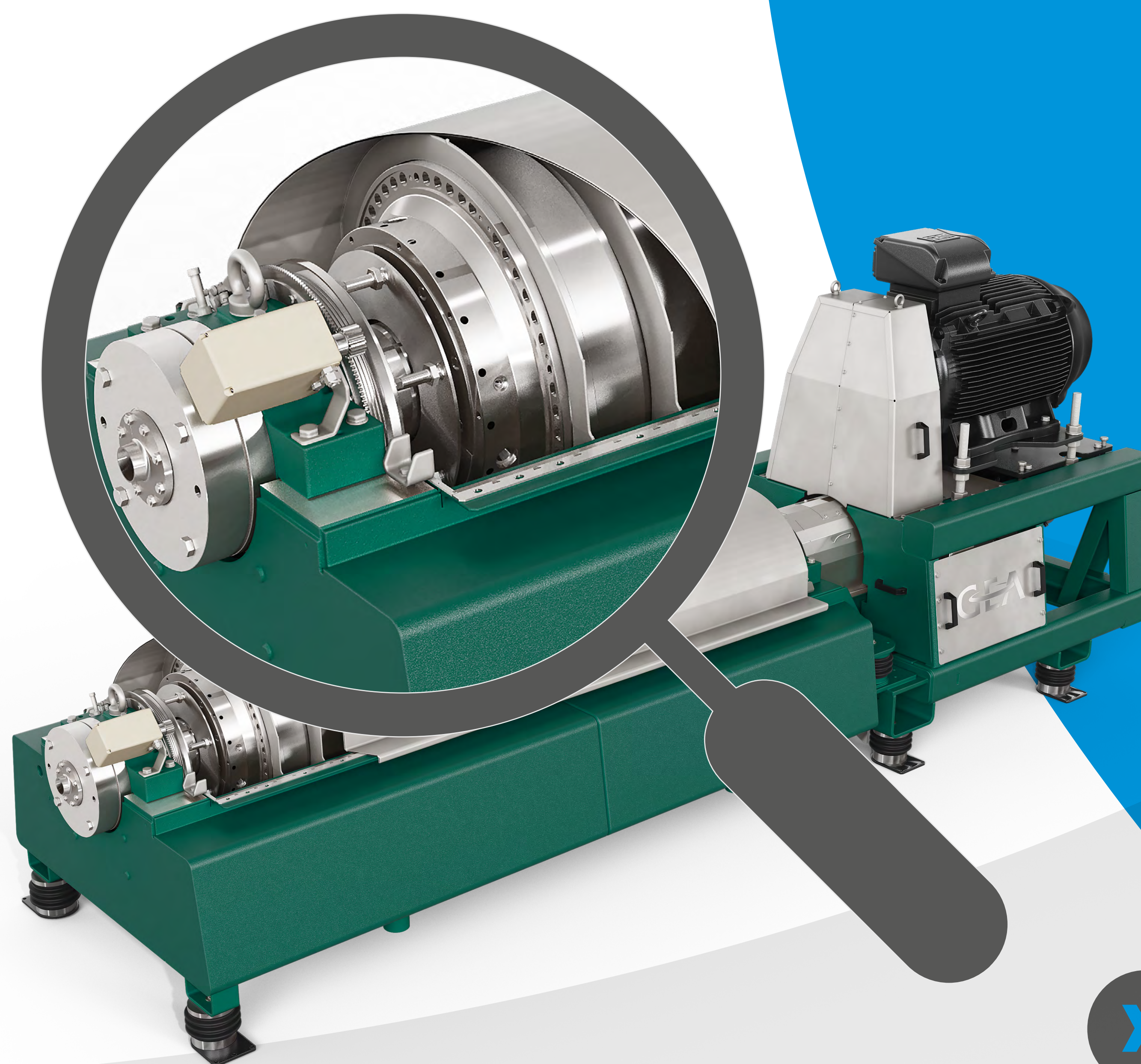
# varipond®: how it works

Previously, varying feed conditions meant that decanters had to be stopped and mechanically altered by hand. With **varipond®**, this adjustment now occurs fully automatically.

As standard, decanters have replaceable weir disks which can be used to change the water level in the bowl should varying feed conditions necessitate this. In that case, the decanter must be stopped and the weir disks changed by hand – which costs time and money. With **varipond®**, the adjustment to a change in sludge consistency occurs automatically while the machine is running.

Wherever the clarified liquid is discharged from the decanter bowl, there is an axially adjustable throttle valve which determines the gap width of the outlet aperture. A small gap means greater resistance, lower water discharge and a higher liquid level. Intelligent sensor technology recognizes the throughput volume required at a specific instant and regulates the gap width fully automatically according to the desired liquid level in the decanter bowl by moving the throttle plate into the optimum position while the machine is running.

The **varipond®** process ensures that the infrastructure around the decanter consists of fewer components and guarantees optimum efficiency combined with a clear reduction in operating and maintenance costs. All downstream processes are thus also optimized.





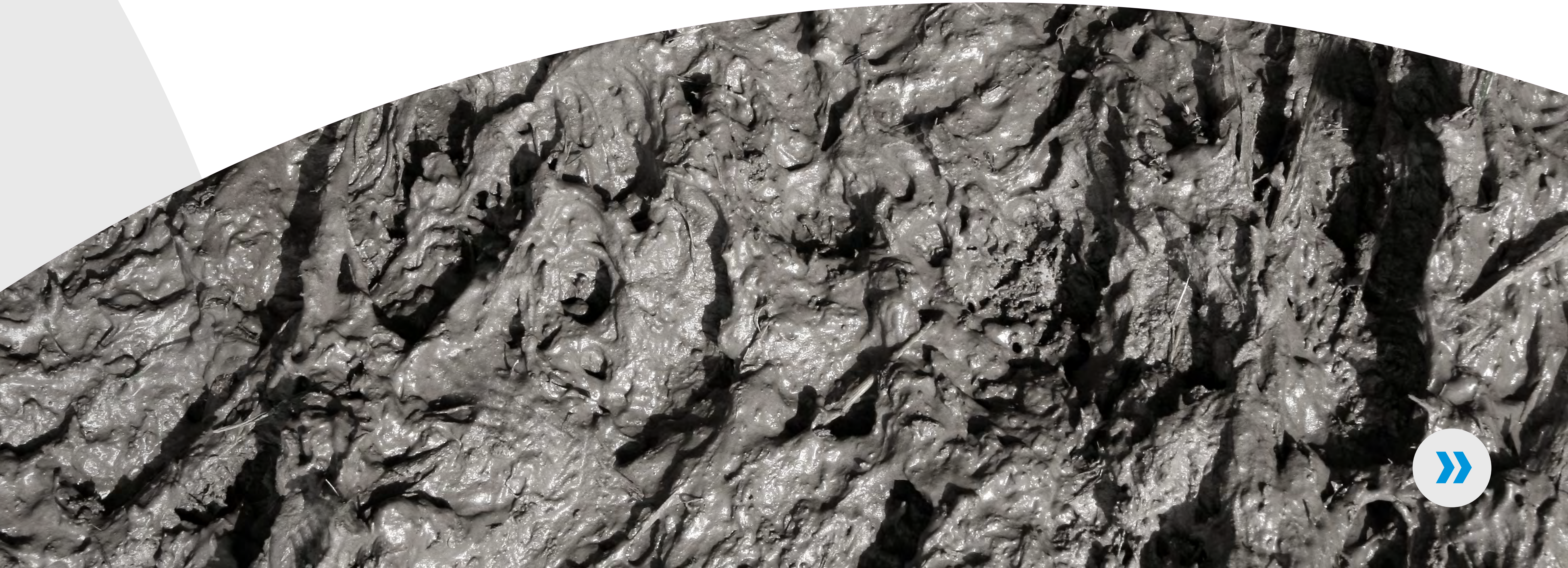
# The right model for every use

GEA offers a wide range of decanter models equipped with **varipond**® for customized (pre-)dewatering and thickening of sludge.

With **varipond**®, GEA biosolids Decanter prime find specific separation solutions to various performance requirements. GEA biosolids Decanter prime thereby always ensure a constant concentration for downstream processes, for example, in order to constantly feed digestion towers after sludge thickening with a precisely defined solids concentration that achieves a maximum gas yield.

## Retrofit – available at any time

**varipond**® can be easily integrated into existing GEA decanters. For the operator, this means that no new decanters are necessary, there are no long stagnation periods and a complete conversion is not needed. By retrofitting with **varipond**®, it is possible to optimize processes and products which were previously always associated with large financial investments and were very labor intensive.





# Optimizing operating costs sustainably with varipond®

Efficiency gains over the entire life cycle of the system

The efficiency gains which can be achieved with varipond®, particularly with regard to process reliability, product quality, and energy and resource consumption, optimize the operating costs of treating wastewater and sludge in a sustainable manner. This is a valuable aid which ensures competitiveness for the operator over the entire life cycle of the system. In this respect, GEA decanters equipped with varipond® also occupy a leading position worldwide.

## Key benefits at a glance

- Automatic pond depth while the machine is running
- Simplified infrastructure without slide gate and return pipework for liquid overflow when starting up and shutting down
- Energy and resource-saving start-up and shut-down without liquid overflow on the solids side
- Simple, precise pre-dewatering and thickening with stable discharge concentration
- Accuracy  $\pm 0.3\%$  DS, infinitely adjustable
- Thickening without polymers possible
- Highest possible throughput for the decanter
- Energy savings of up to 30%
- Optimization of all subsequent processes
- Minimal wear and tear, long service life
- Unsupervised operation at night or at weekends possible
- Can be retrofitted economically at any time







engineering for  
a better world



# Dewatering: no liquid overflow to the solids end when starting up and shutting down the decanter

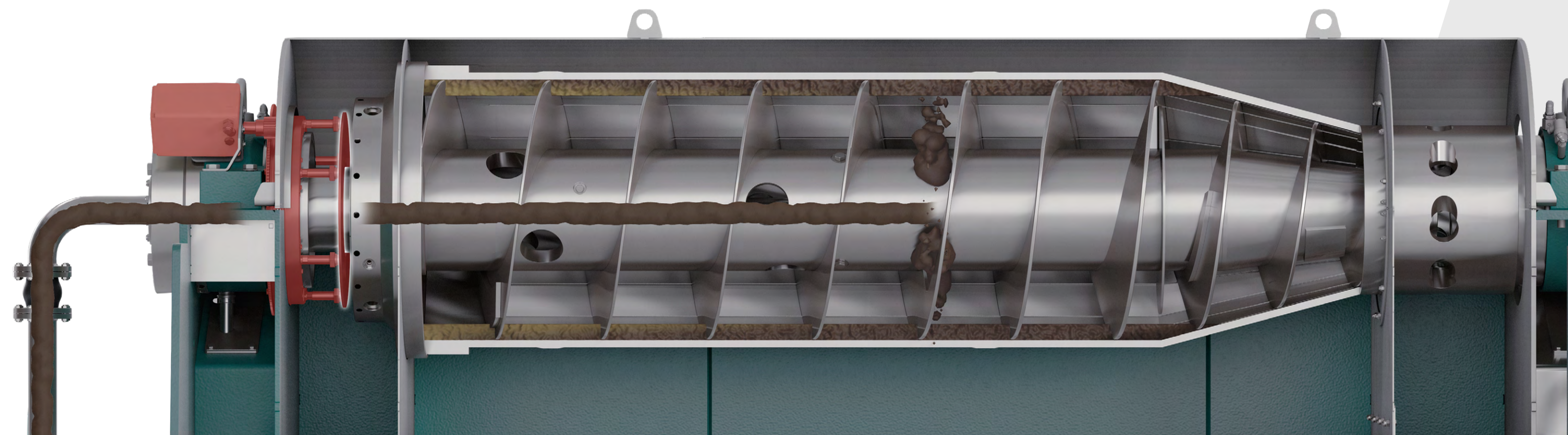


With its variable pond depth, **varipond®** offers a simplified infrastructure and operation when starting up and shutting down the decanter with no liquid overflow to the solids end – with use of the maximum g-volume of approx. 90 %. It is no longer necessary to install a solids end with pipework and flushing water for liquid overflow. The start-up and shut-down process is also simpler and more cost-effective without the solids valve.

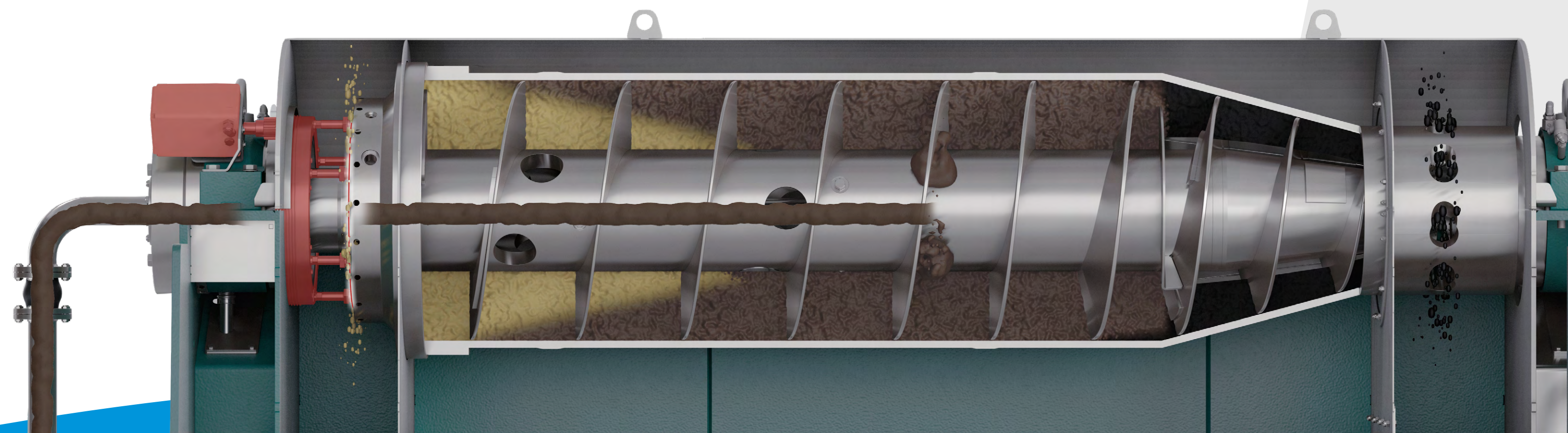
## How it works

- When starting up the decanter, **varipond®** is open and the liquid level is therefore above the opening for the solids discharge
- The sludge settles in the bowl and the clarified liquid is drained exclusively on the centrate side
- A solids seal is formed on the solids side preventing the overflow of liquid
- **varipond®** closes, the liquid level rises up to the scroll body and therefore beneath the opening for the solids discharge (negative operation)
- No liquid overflows through to the solids end and the maximum g-volume is used

If the decanter is shut down, the same process takes place in reverse order.



*varipond® fully open: starting up and shutting down the decanter with no liquid overflow on the solids end*

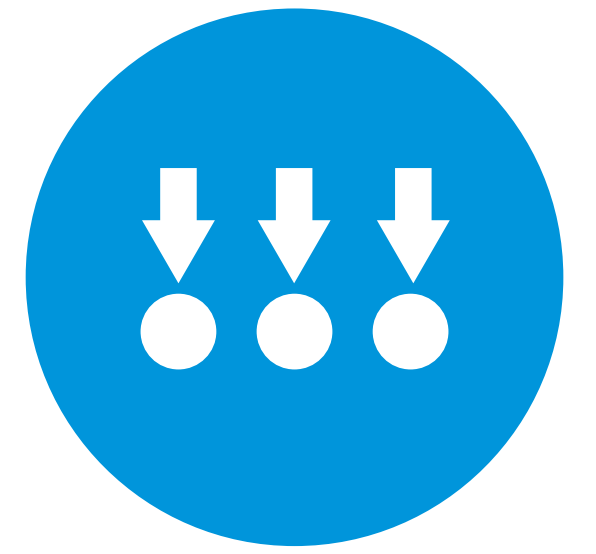


*varipond® fully closed: continuous operation of the decanter with maximum g-volume (g-volume = content x bowl speed)*

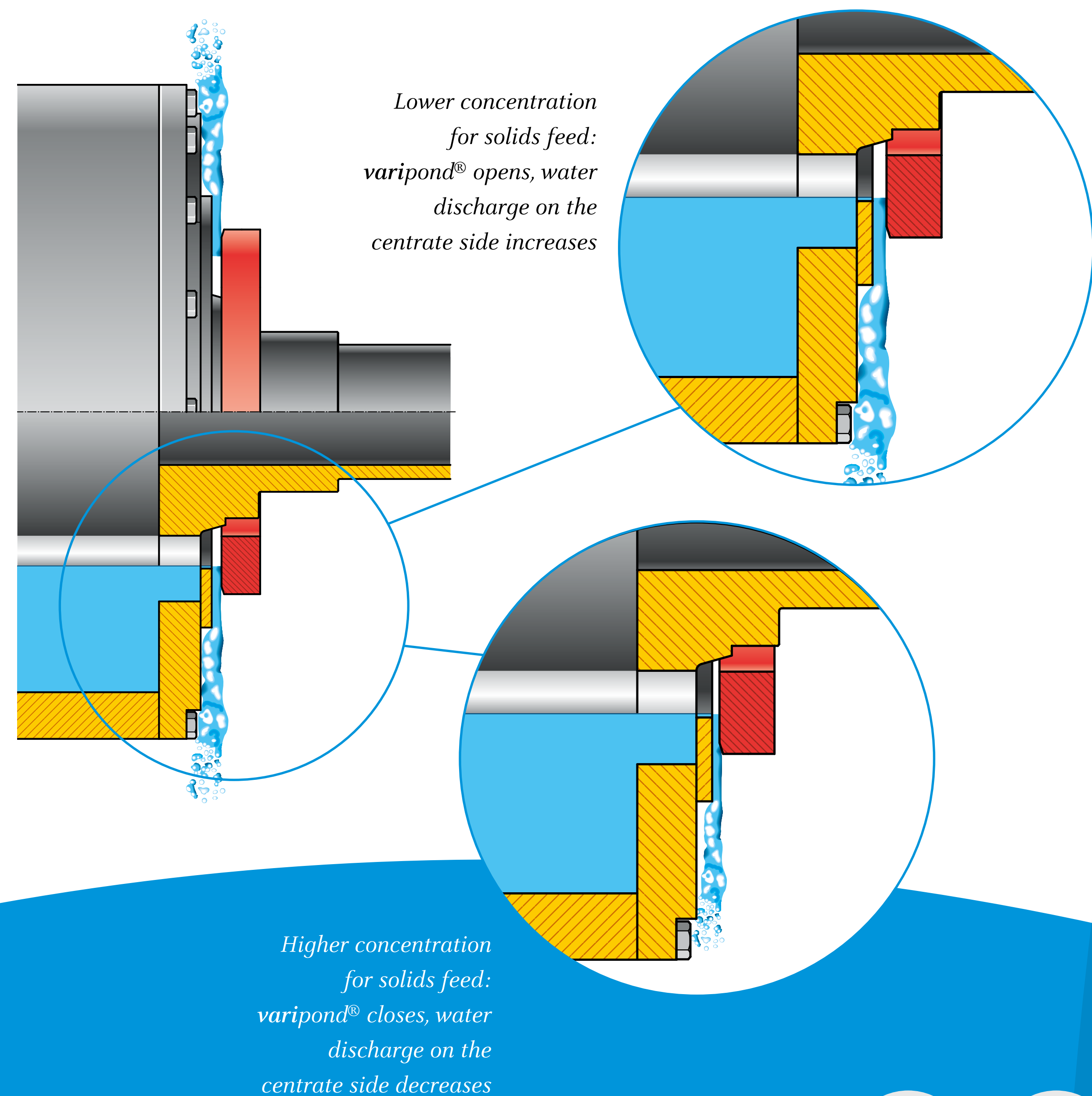




# Automatic, stable discharge of solids with pre-dewatering and thickening

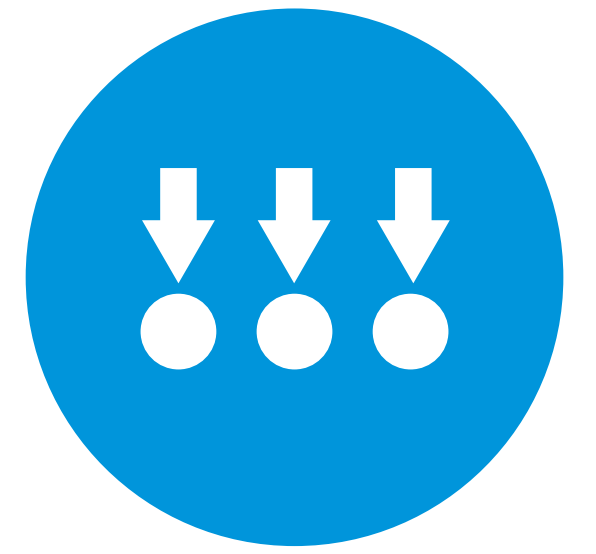


With varipond®, the GEA engineers have developed a process solution, which automatically ensures that the decanter is adjusted perfectly to the modified feed conditions during plant operation. In this way, varipond® regulates the liquid level in the bowl so precisely that the concentration of the thickened solids is adjusted to a constant value and is maintained exactly. Optical sensors measure the solids content of the thickened sludge, comparing it with the preset target value and the regulating facility keeps the concentration constant – all fully automatically. This means that unsupervised operation at night or at weekends is also possible.

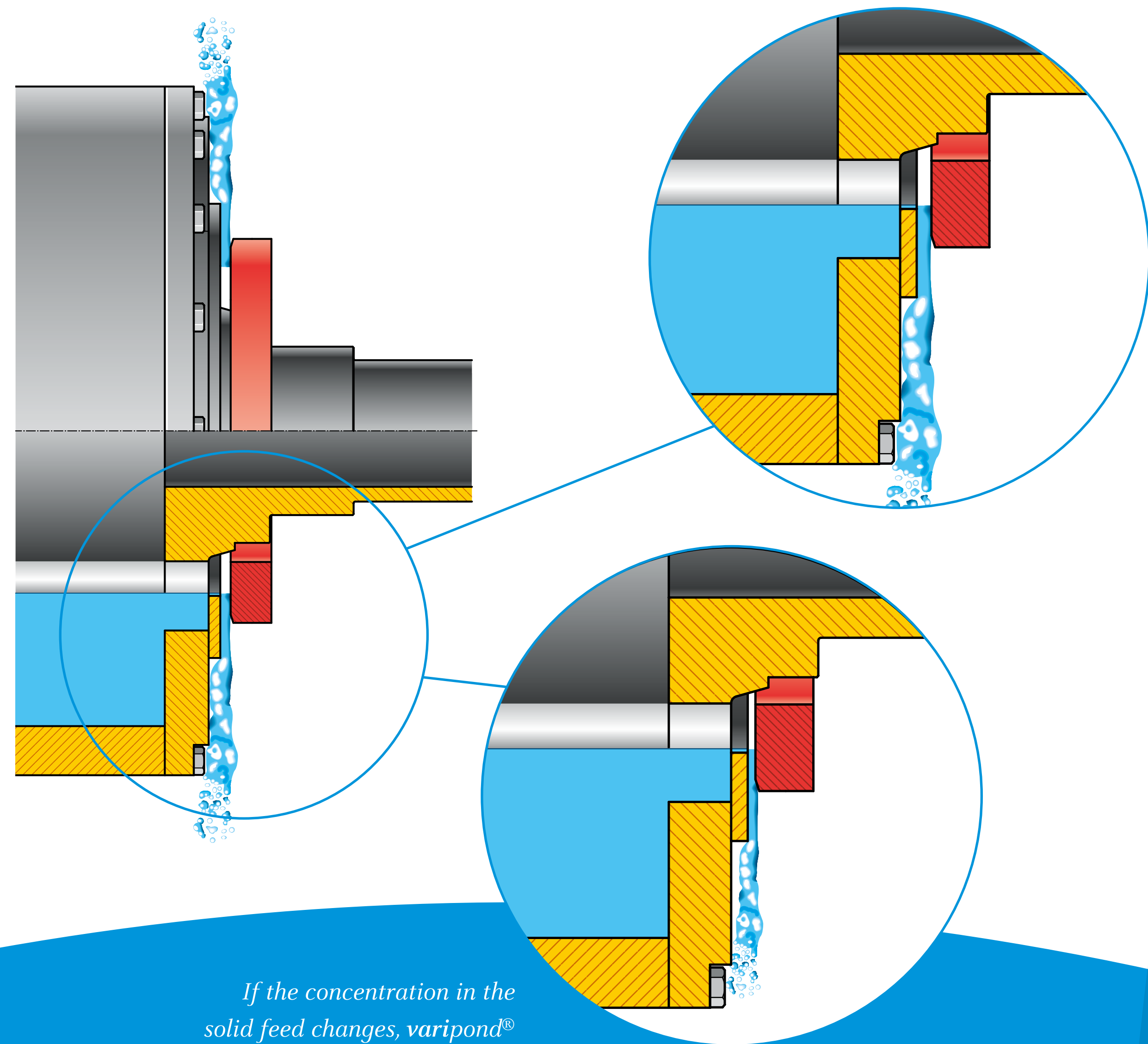




# Best practice: pre-dewatering in the Cambi process with 16.5 % dry substance discharge



With the Thermal Hydrolysis Process (THP) from Norwegian specialist Cambi, a highly efficient technology for cost-saving anaerobic digestion of sludge is on the road to worldwide success. For THP, the precise machine performance is essential for the treatment of sludge – in particular the automatically controlled constant discharge of exactly 16.5 % dry substance (DS) in the pre-dewatering. A THP specification that has thus far not been met by any other decanter supplier with the level of reliability provided by GEA.

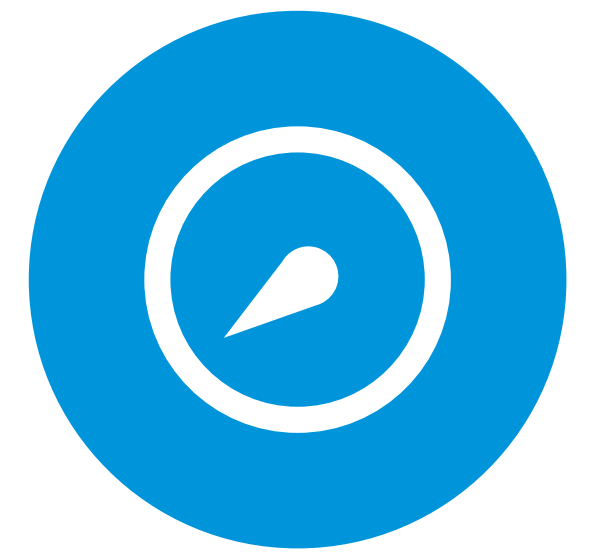


*If the concentration in the solid feed changes, varipond® ensures the exact discharge of 16.5 % DS by means of fully automatic opening or closing.*





# Energy optimization: reduction of up to 30 % of the specific energy consumption by the decanter



One source of energy consumption in a decanter centrifuge is the power required to discharge the clarified liquid. This can represent up to 50 % of the decanter's total energy requirement.

In order to achieve the ideal separating capacity for dewatering and thickening, specific G-values are required within a defined range depending on the sludge quality and flow volume. This means that continuously maintaining the maximum G-value is often not necessary; the bowl speed could be reduced accordingly. This was not the case in practice until now, with valuable energy-saving potential left unexploited. This energy-saving potential will now be „leveraged“ with **varipond®** thanks to an energy optimizer. A special control loop uses a sensor to register unnecessarily high bowl speeds and optimizes them by constantly maintaining the stipulated output concentration. The rotor geometry brings additional energy savings.

The design of the bowls in the GEA **deep-pond** model ensures that the flow behavior is optimized, the clarification effect is improved and less energy is required to discharge the product.

In short, this means that, depending on the decanter model used, the specific energy consumption may be reduced by up to 30 %.



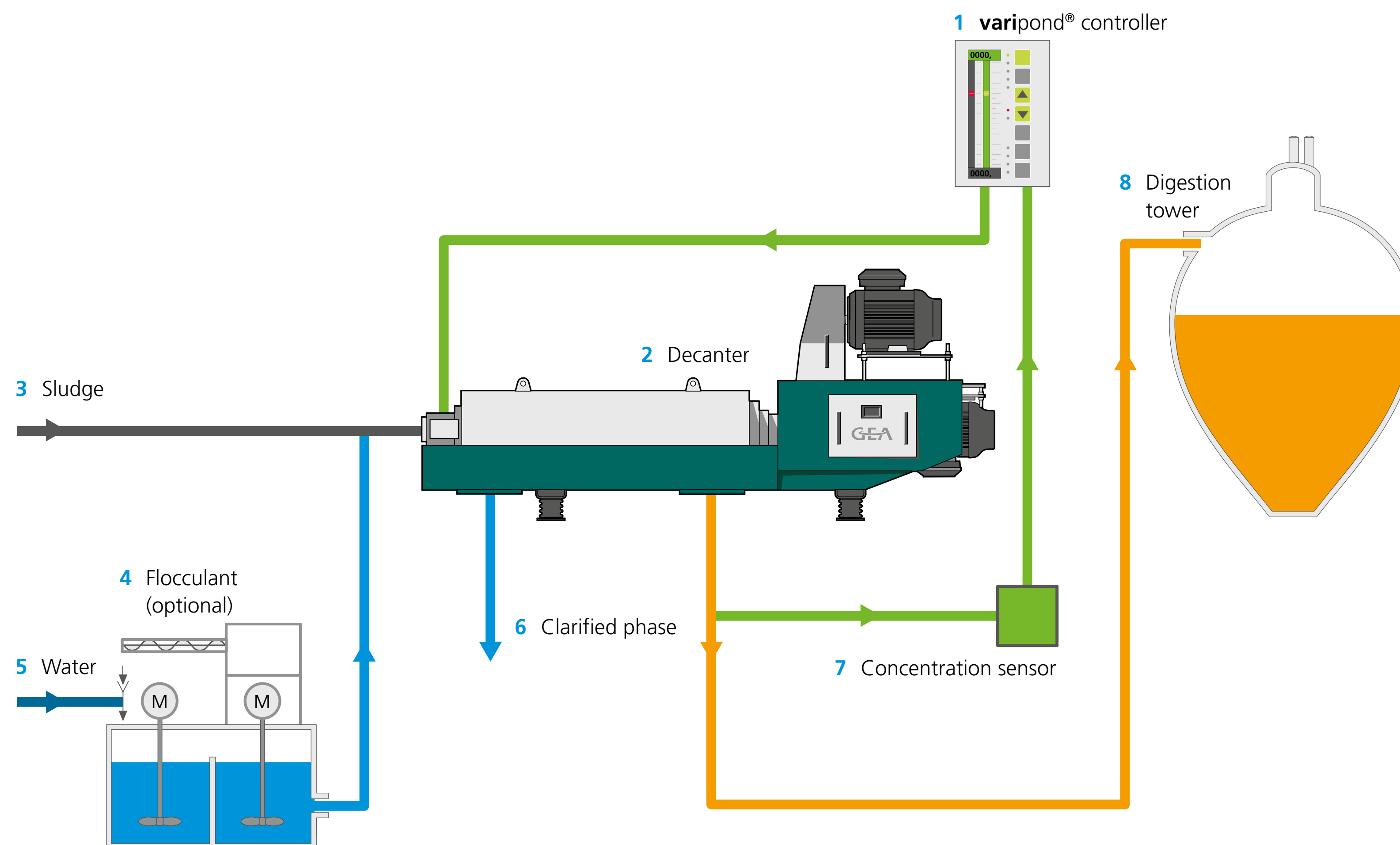
*varipond® with energy optimizer:  
slower decanter bowl speed saves up to 20 %  
of operating costs by minimizing energy  
consumption and reducing the effects of wear.*





# Operating principle of varipond®

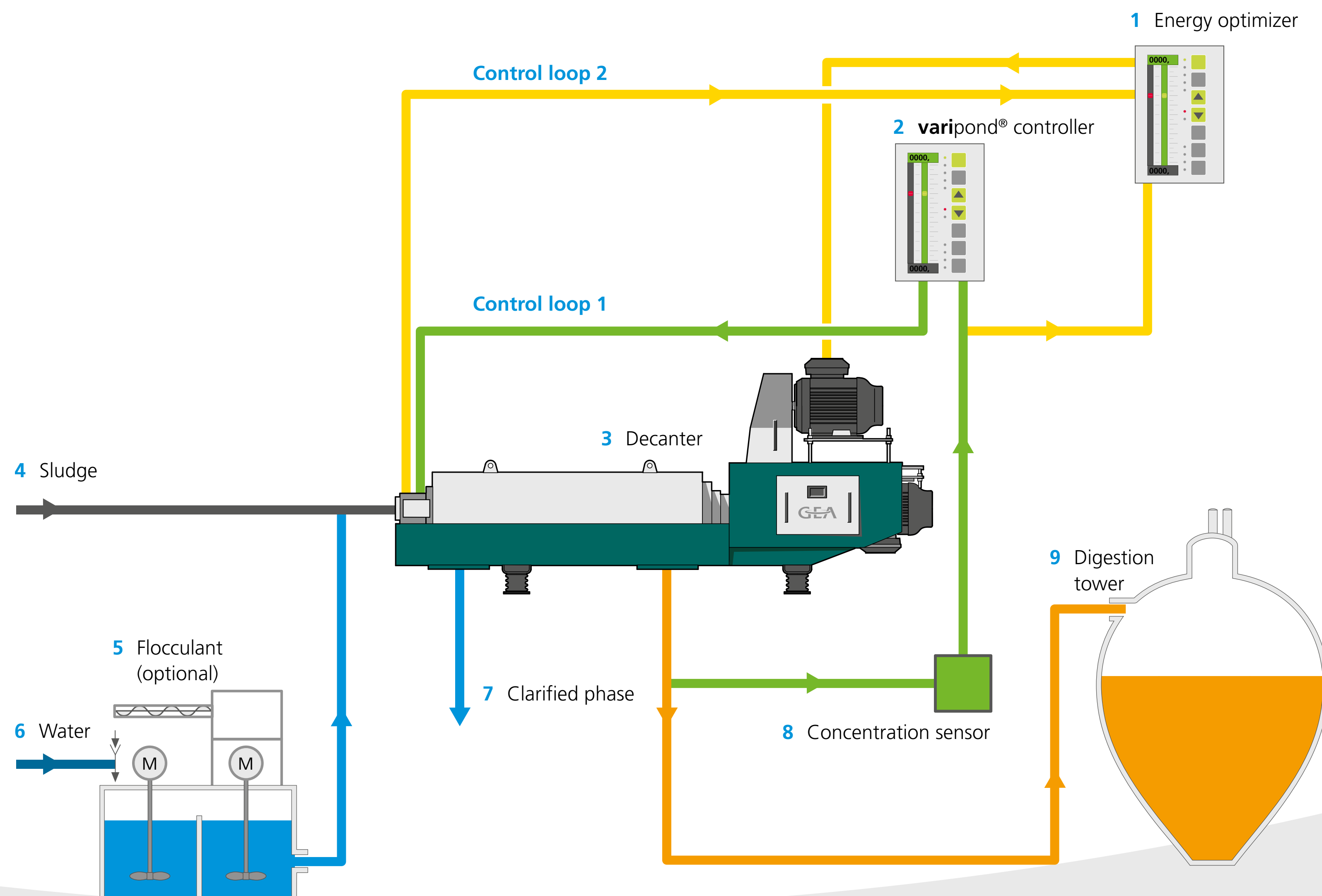
Precise automatic regulation in real time achieves optimum process results with minimum energy input.





# Operating principle of varipond® with energy optimizer

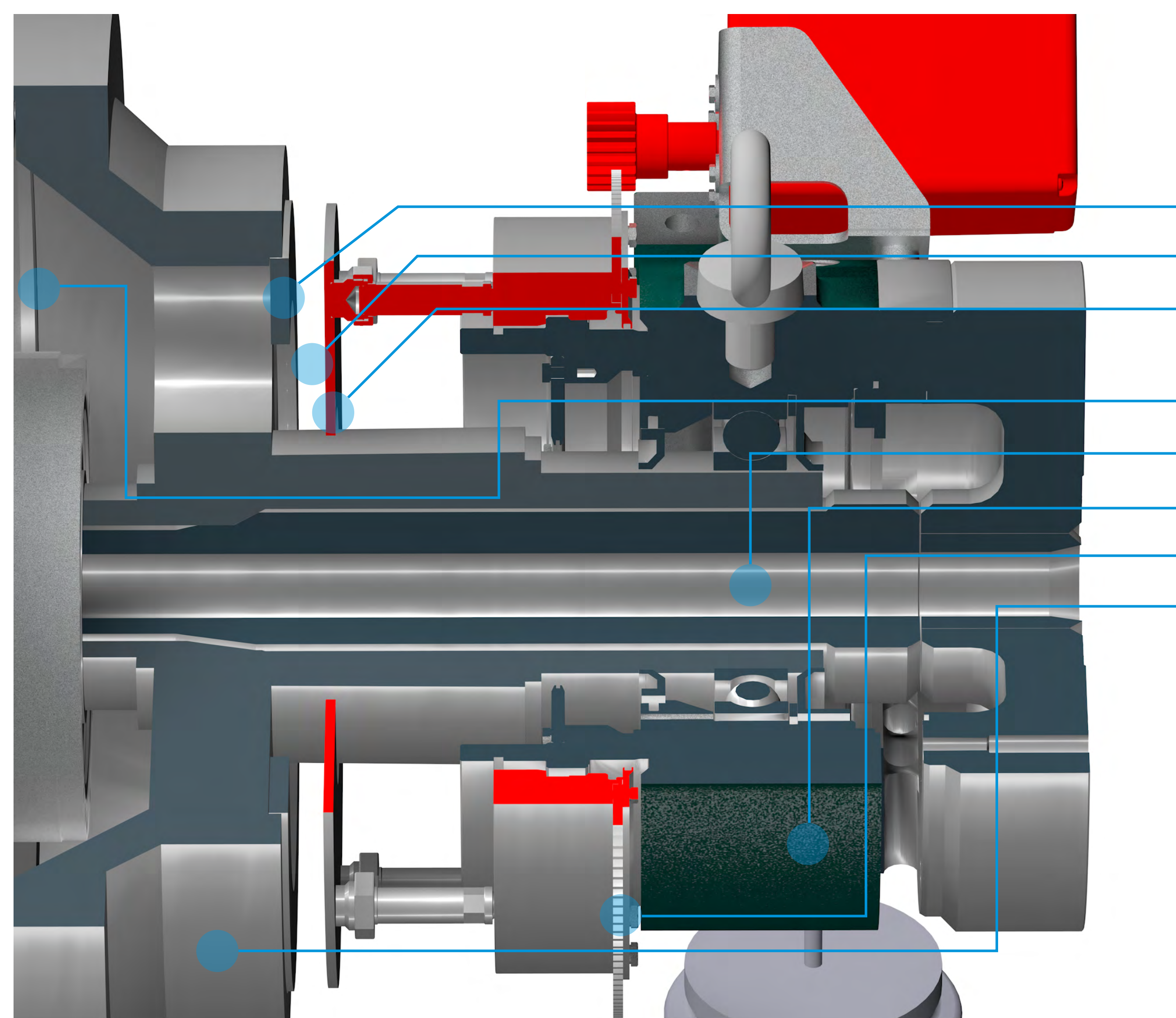
The energy optimizer uses a sensor to register unnecessarily high bowl speeds via a control circuit, optimizes them by constantly maintaining the stipulated output concentration and thus reduces the specific energy consumption of the decanter by up to 30 %.





# Operation of the varipond® control in the decanter

The throttle plate, which can be shifted axially, is moved into the optimum position by means of intelligent sensors while the machine is running.



- 1 Regulating plate (rotating)
- 2 **varipond®** gap
- 3 Throttle plate (not rotating, but movable on an axis)
- 4 Scroll
- 5 Inlet tube
- 6 Bearing housing
- 7 Toothed rim
- 8 Bowl

**varipond®** automatically regulates the gap width of the opening on the centrate side:

*Open during start-up:  
the liquid level is above the opening  
for the solids discharge*

*Closed during continuous operation:  
the liquid level rises up to the scroll  
body beneath the opening for  
solids discharge (negative operation  
utilizing the maximum g-volume)*





# varipond® – usage options for GEA biosolids Decanter prime

Decanter type	Dewatering capacity [m³/h]	nom. DS [kg/h]	Thickening capacity [m³/h]
GEA biosolids Decanter prime 4000	20 – 35	400 – 600	20 – 45
GEA biosolids Decanter prime 5000	25 – 45	500 – 1000	25 – 45
GEA biosolids Decanter prime 6000	30 – 75	1000 – 2200	50 – 90
GEA biosolids Decanter prime 7000	50 – 100	1500 – 3000	60 – 120
GEA biosolids Decanter prime 8000	90 – 140	2000 – 3500	120 – 180
GEA biosolids Decanter prime 10,000	150 – 200	3500 – 5000	150 – 300

*\*The decanter performance data given in the table is dependent on specific operating conditions and can differ according to application.*

The decanter solutions with **varipond**® designed for individual customer use always meet the highest industry standards and ensure compliance with all applicable standards and laws – without compromising on the performance and lifespan of the systems.

