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**BÖRGER**<sup>®</sup>  
*Innovation*

# Simplicity

**is simply better**

Rotary Lobe Pumps

Macerating Technology



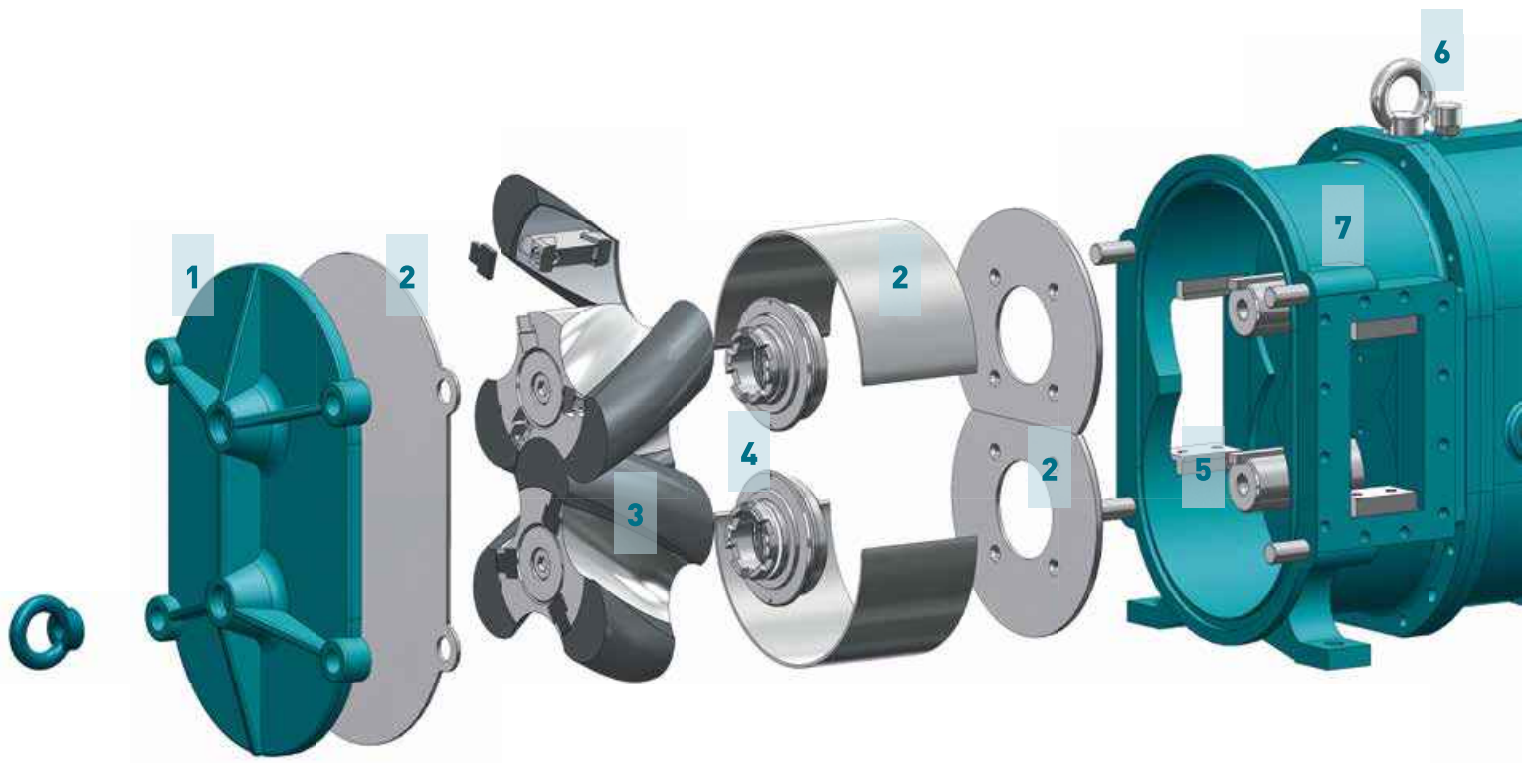
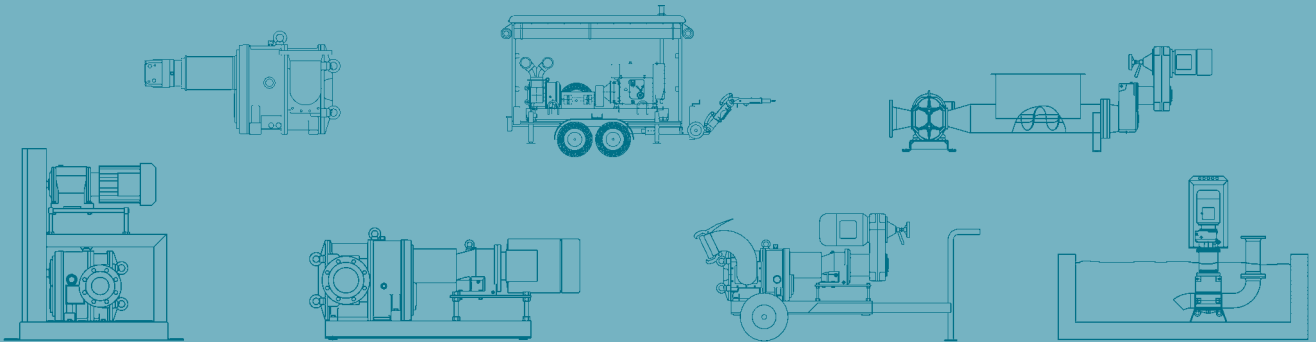
Rotary Lobe Pumps

Multicrusher

Multichopper

Rotorrake

# Börger Rotary Lobe Pump Construction, Drive and Assembly



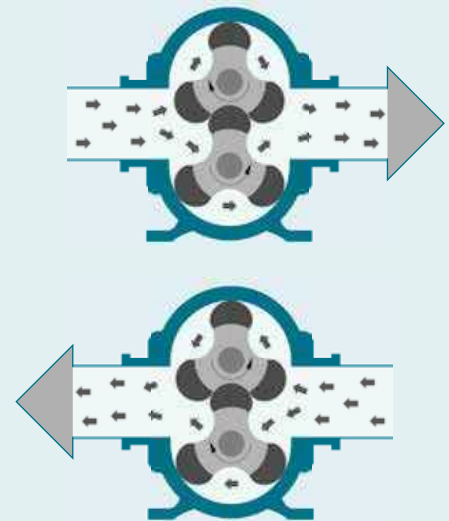
Börger Rotary Lobe Pumps are made of few individual parts. Instead of adopting the widely used segmented pump design, the different size casings and rotors are manufactured in a single-piece construction. The result: robust and compact Rotary Lobe Pumps characterized by quiet, safe and reliable operation, long service life and excellent ease of maintenance.

Wear parts can be quickly accessed or replaced by operation and maintenance staff, without the removal of piping or drive systems. This kind of simplicity is Börger's principle. The Börger Rotary Lobe Pump features a cantilevered shaft design. The pumps can be arranged in a variety of mounting positions and are suitable for multiple drive types

including electric motors, combustion engines and hydraulic motors. Even complete mobile units pose no problem and are manufactured in company-owned workshops.

# Operating Principle

Börger Rotary Lobe Pumps are self-priming, valveless, positive displacement pumps. Rotors, synchronized by the timing gear, are fastened to two parallel shafts rotating in opposite direction. As the rotor pair counter rotates, a cavity is created at the suction side. The resulting chamber fills with the pumped fluid. The medium is conveyed between lobe surfaces and the surrounding pump casing and then displaced into the casing opening at the discharge side. The flow direction can easily be reversed by changing the direction of rotation. Börger Rotary Lobe Pumps are therefore very well suited for reversing operation.



<b>1</b>	Quick-release cover	The door to the pump interior enables rapid access to all wetted parts.
<b>2</b>	Axial and radial casing protection	The casing liners are available in either wear-resistant steel, stainless steel or ceramic.
<b>3</b>	Rotors	Rotors are selected for each individual application and can be customized with a diverse selection of elastomer and plastic coatings as well as from solid metal or stainless steel materials. The sophisticated modular system allows nearly all rotors to be installed in any Börger Rotary Lobe Pump supplied.
<b>4</b>	Shaft seals	Börger incorporates three product lines: Classic, Select and Protect, each offering a unique shaft seal suitable for every application. Additional special shaft seals for special applications are available, too (e.g. packing).
<b>5</b>	Non-wetted shaft	Due to the self-sealing design, the carrier shafts of Börger Rotary Lobe Pumps do not make contact with the medium to be conveyed.
<b>6</b>	Quench and control chamber	The control fluid inside the intermediate chamber between the pump and timing gear casings ensures a high level of safety.
<b>7</b>	Pump casing in block design	The pump casing is available in high-quality grey cast iron, spheroidal iron, stainless and duplex steel as well as Hastelloy; with MIP lining for a virtually unlimited service life.
<b>8</b>	Carrier and timing gear	The carrier and timing gear features a block casing with a robust bearings and gear wheels configuration. The gear wheels guarantee a uniform, smooth run as well as a long service life.

# Globally Unique: The Extensive Rotor Range



## Rotor

Dual-lobe, linear

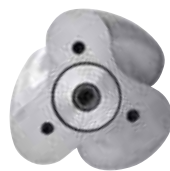
- The allrounder
- Entirely elastomer coated
- For aggressive and abrasive fluids



## Rotor

Tri-lobe, screw profile

- Entirely elastomer coated
- Non-wetted core
- Low pulsation



## Rotor

Tri-lobe, screw profile

- Made of steel or stainless steel
- Low pulsation
- Resistant to foreign bodies



## Optimum rotor\*

Dual-lobe, screw profile

- Large sealing area with effective scraper edge
- For abrasive and aggressive fluids
- Low pulsation and pressure resistant



## Rotor\*

Tri-lobe, linear

- Replaceable rotor tips
- Durable sealing lines
- Designed for solids handling



## Rotor\*

Tri-lobe, screw profile

- Replaceable rotor tips
- Designed for solids handling
- Low pulsation



## Premium PFA rotor\*

Dual-lobe, linear

- Large sealing area with effective scraper edge
- Teflon-coated
- Non-wetted core



## Premium rotor\*

Dual-lobe, linear

- Large sealing area, pressure-resistant
- For highly viscous or abrasive fluids
- Made of steel or stainless steel

\*patented

Various rotor types based on different materials (e.g. elastomers, plastics or metal) can be used, depending on the pumped medium. Liquid as well as viscous or abrasive fluids can be conveyed effortlessly, and even chemically aggressive substances

pose no problem. Thanks to the special patented construction, the robust rotor core and the shaft always remain non-wetted. Due to the many different factors involved in selecting the right rotor, the customer's specific requirements are always taken into

account. In the event of changing operating conditions at the customer's end, any new rotor can be installed in any existing pump.

# MIP = Maintenance in Place



Repairs and downtimes are time-consuming and costly, and working hours should not have to be used as maintenance hours. Following this fundamental idea, Börger has perfected the principle of the Rotary Lobe Pump further and further. The result is an extremely powerful and reliable pump with unbeatable ease of maintenance features.

All spare and wear parts are extremely resilient, durable and affordable. Börger does not offer any costly maintenance contracts – simply perform maintenance and repairs yourself! The unique MIP design of our pumps makes this possible: MIP ('Maintenance in Place') means that all wear parts can easily be replaced by the operating personnel directly at the

installation site of the pump without the need to remove the pump from piping or drive systems.

The quick-release cover provides easy access to the interior of the pump. All wetted parts can be maintained immediately, and replaced, if necessary – without having to remove any pipes or the drive system!



# Which Pump Size Are You Looking for? 20 Sizes in Six Series



AL series



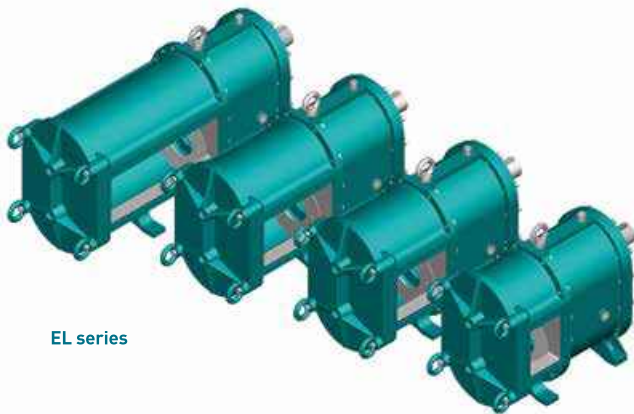
PL series



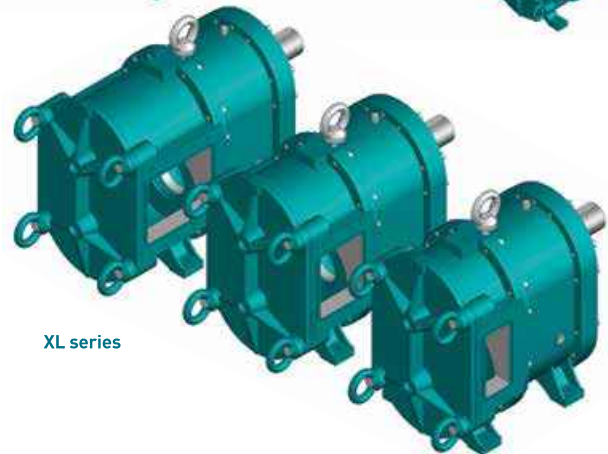
CL series



FL series



EL series



XL series



All sizes are exclusively produced as a single-piece construction – something that is not easily matched.

The AL, PL, CL, FL, EL and XL series allow for capacities between 1 – 1000 m<sup>3</sup>/h (5 – 4,400 usgpm).

Which pump size is right for you depends on the intended use, installation site and characteristics of the pumped medium. We will provide you with comprehensive and conscientious advice. The wide variety of different pump types, available

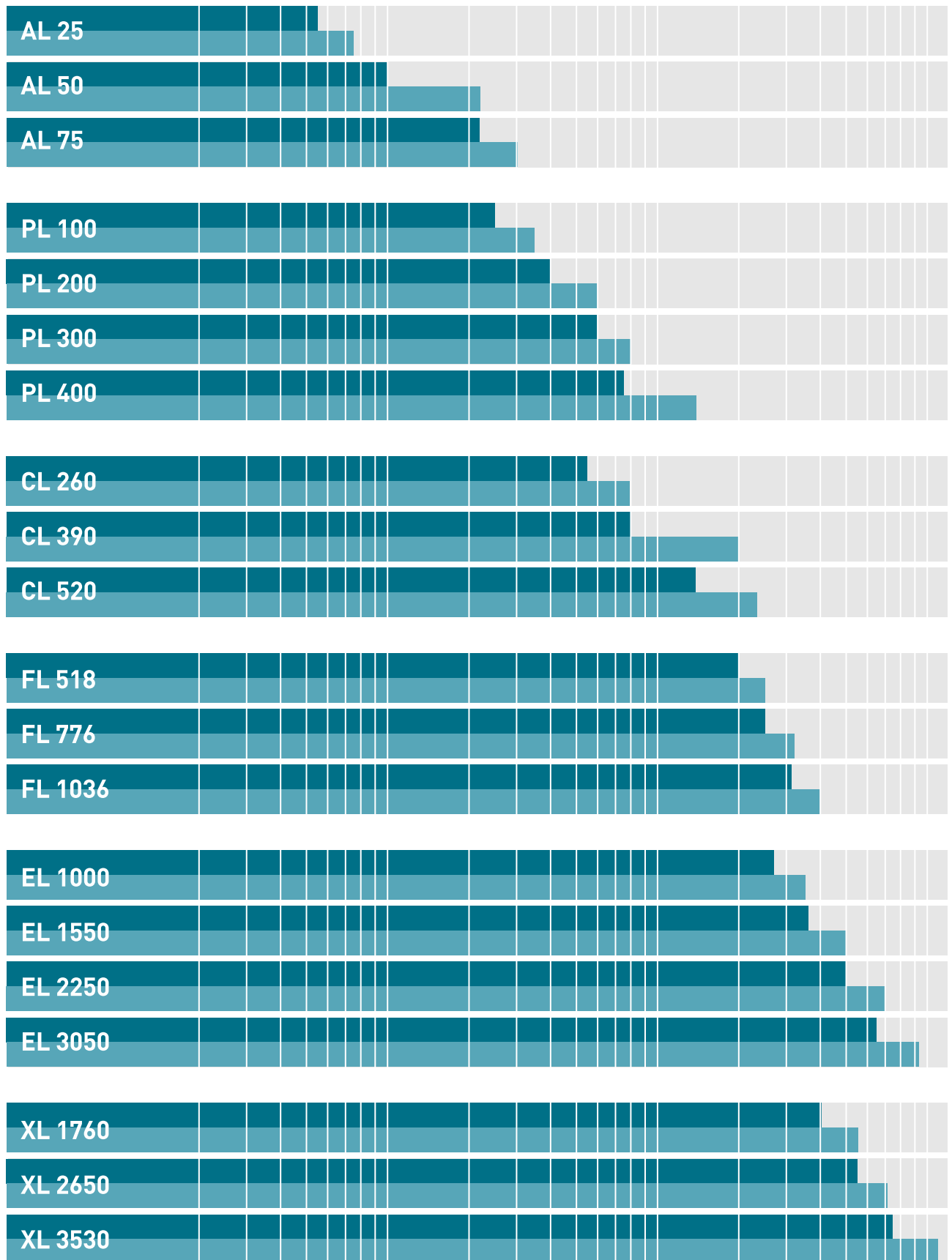
materials, including the best suited shaft seal and drive selection, ensure that your pump is built according to your specific applications. The standard pump casing is constructed using grey cast iron. It can be coated or made entirely of stainless steel to prevent abrasion. The elastomers in the sealing units are also available in different qualities. Two arguments in favor of our extremely powerful, reliable and robust pump are its guaranteed ease of maintenance due

to Maintenance in Place (MIP) and its low energy consumption resulting in greater efficiency.

All Börger pumps can be supplied as an ATEX version.

# Pump Output

Q (m³/h)                      1    10    100    1000 m³/h



n = 300 min⁻¹  
n = 450 min⁻¹  
p = max. 12 bar | 180 psi

# Three Product Lines – Three Outstanding Solutions

Börger has been supplying high-quality Rotary Lobe Pumps for more than 25 years. From a variety of sizes, variants and materials, a suitable Rotary Lobe Pump can be configured for any application. Three product lines with different shaft seals and a wide variety of optional equipment with a standardized pump chamber are offered.

## Classic



The Classic Rotary Lobe Pump product line is the tried-and-tested standard model of the Börger Rotary Lobe Pumps. It is equipped with a large, pressure-free fluid-filled intermediate chamber.



## Select



Based on the Classic line, the Börger Rotary Lobe Pump of the Select product line is equipped with additional features such as pressurized shaft seals with individual barrier chambers.



## Protect

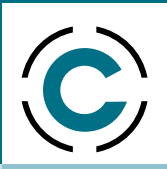


The Protect product line with double-acting mechanical seals is the perfect solution for demanding and problematic pumping tasks. The pump assembly features an open intermediate area for the installation of double-acting mechanical seals. The pressurized barrier fluid between two mechanical seals prevents the pumped medium from entering in between the sliding surfaces.



Due to the identical pump chamber in the Classic, Select and Protect product lines, a high availability of rotors and parts is guaranteed.



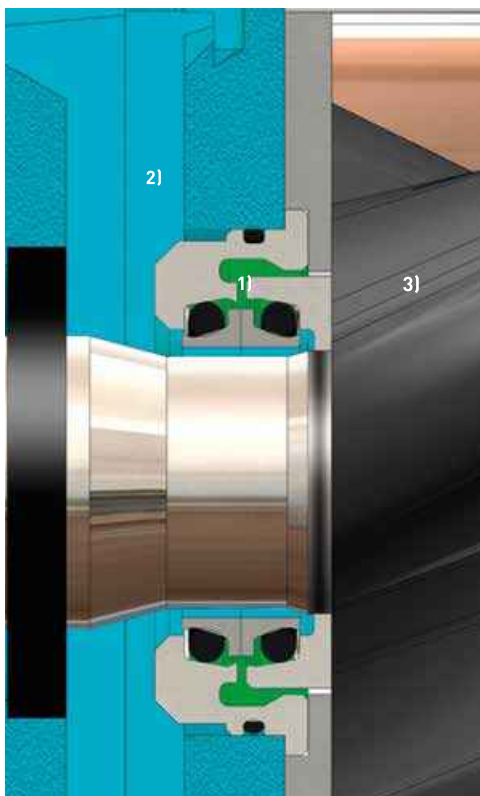


# Classic – Classically Good!

The low number and compact nature of the individual components will surprise anyone who disassembles a Börger Rotary Lobe Pump. The different sizes of the casings and rotors are manufactured in a single piece construction, quite different from the high number of components normally found in comparable pumps. The results are robust and compact Rotary Lobe Pumps, which are known for quiet, safe and reliable operation, long operational life and for ease of maintenance.



All parts exposed to the pumped medium can be replaced easily and effortlessly directly at the installation site = MIP (Maintenance in Place).



- 1) Pumped medium
- 2) Quench fluid
- 3) Pump chamber



Worldwide unique and only available from Börger: MIP is an unrivalled concept which reduces maintenance times and downtimes.

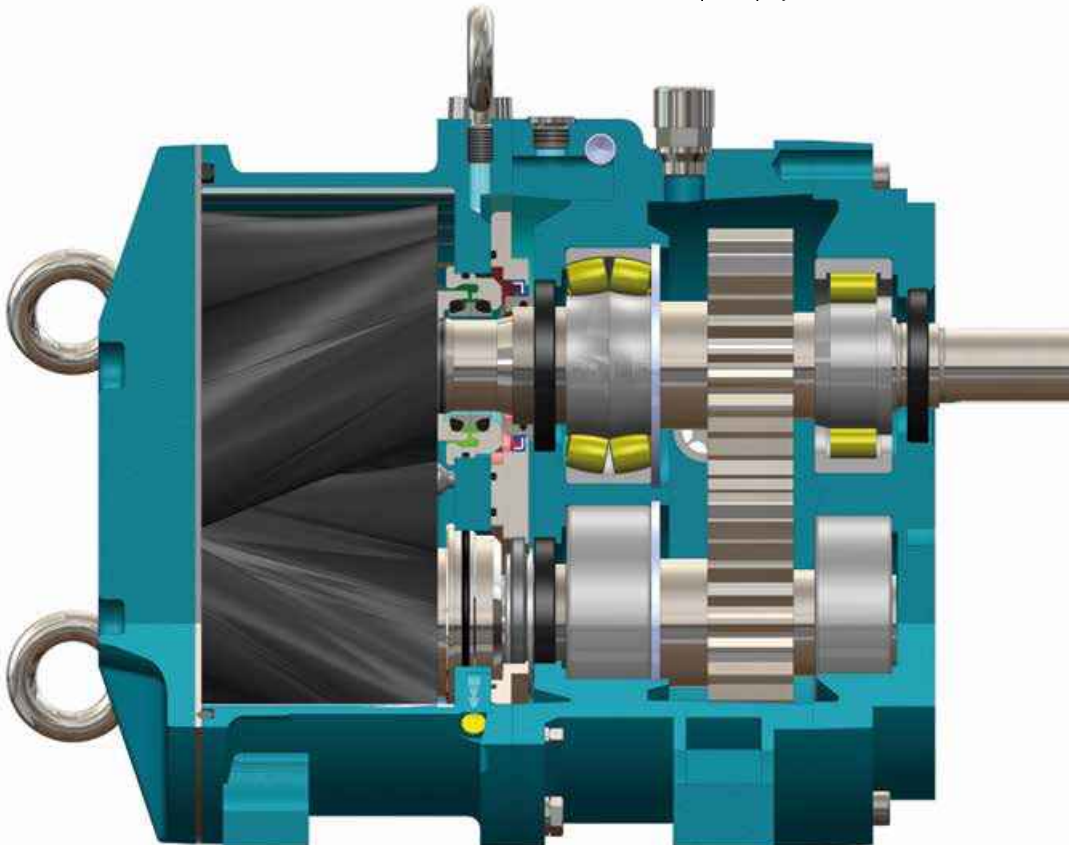


# Select – The Perfect Choice!

The Select pump is based on the Classic product line. Between the timing gear and the pump casing, the mechanical seals are individually pressurized. This version is particularly suitable for fine crystalline, toxic and sensitive media.

Pressurization prevents the medium from entering between the sealing surfaces of the mechanical seal. The medium does not come into contact with the atmosphere. Any escaping or hardening of the medium can be promptly detected

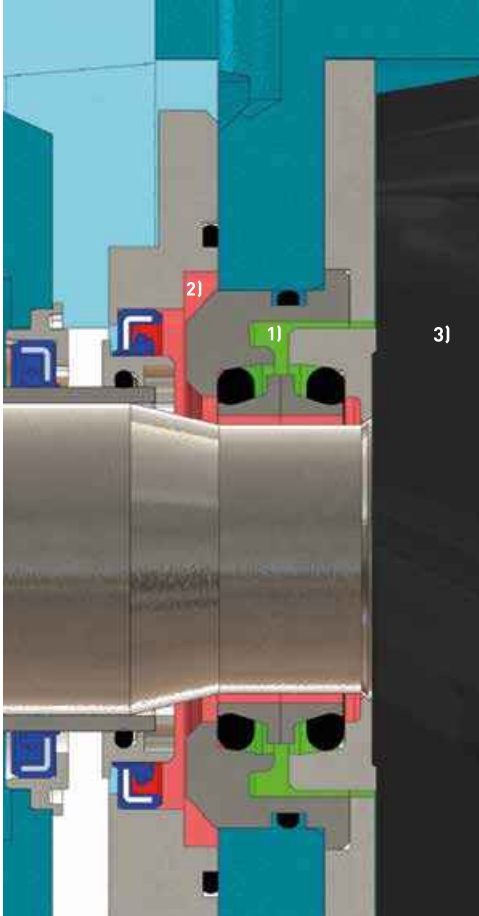
and prevented by visual and sensory monitoring of the seals. As the shaft seals are individually pressurized, each shaft seal can be controlled and visually monitored separately.



Different needs require different materials and shapes. Börger makes use of a wide variety of materials. The pump casings are available from grey cast iron up to duplex steel, the casing protection plates provide materials up to ceramic and the rotors include a wide range of geometries and materials (elastomer coated, PUR, PFA up to stainless steel).



**Worldwide unique** and only available from Börger: MIP is an unrivalled concept which reduces maintenance times and downtimes.

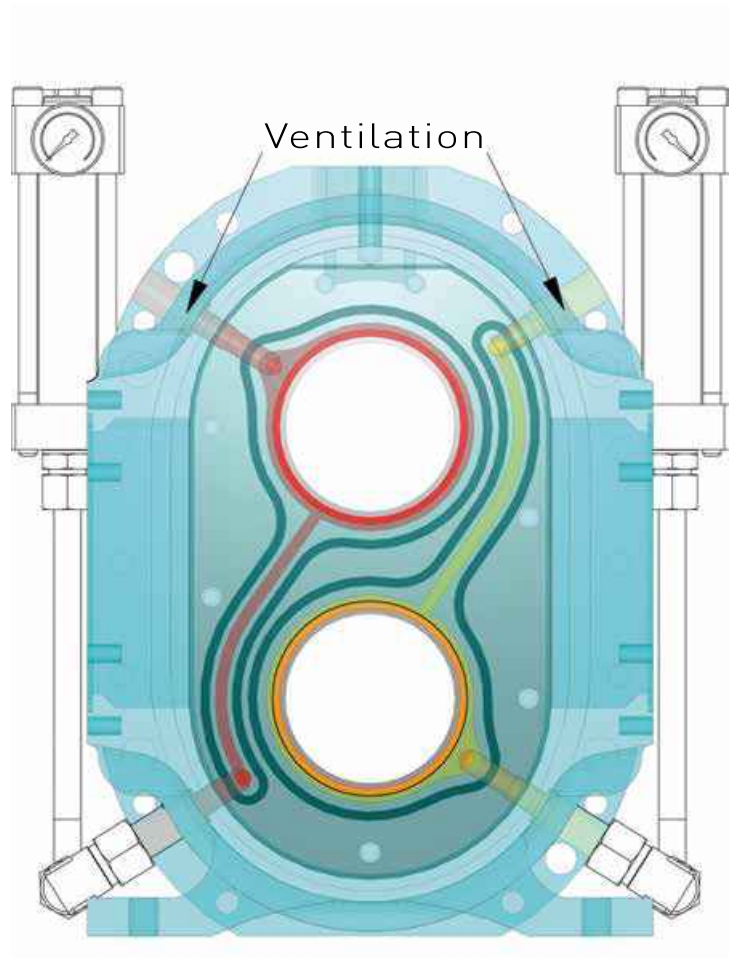


### Design of the seal

Pressurization of the barrier fluid prevents the medium from entering between the sealing surfaces of the mechanical seal. The medium does not come into contact with the atmosphere. Any heat generated at the seal is transferred by the barrier fluid. All parts of the seal are accessible and replaceable via the pump chamber (MIP = Maintenance in Place).

- 1) Pumped medium
- 2) Barrier fluid
- 3) Pump chamber

The barrier fluid or the pressurized flushing liquid is fed in from the lowest point. This is made possible by the special intermediate plate. Vent and drain connections are mounted at the top. Our product range also includes sight glasses (Level Control) with important fittings and connections.



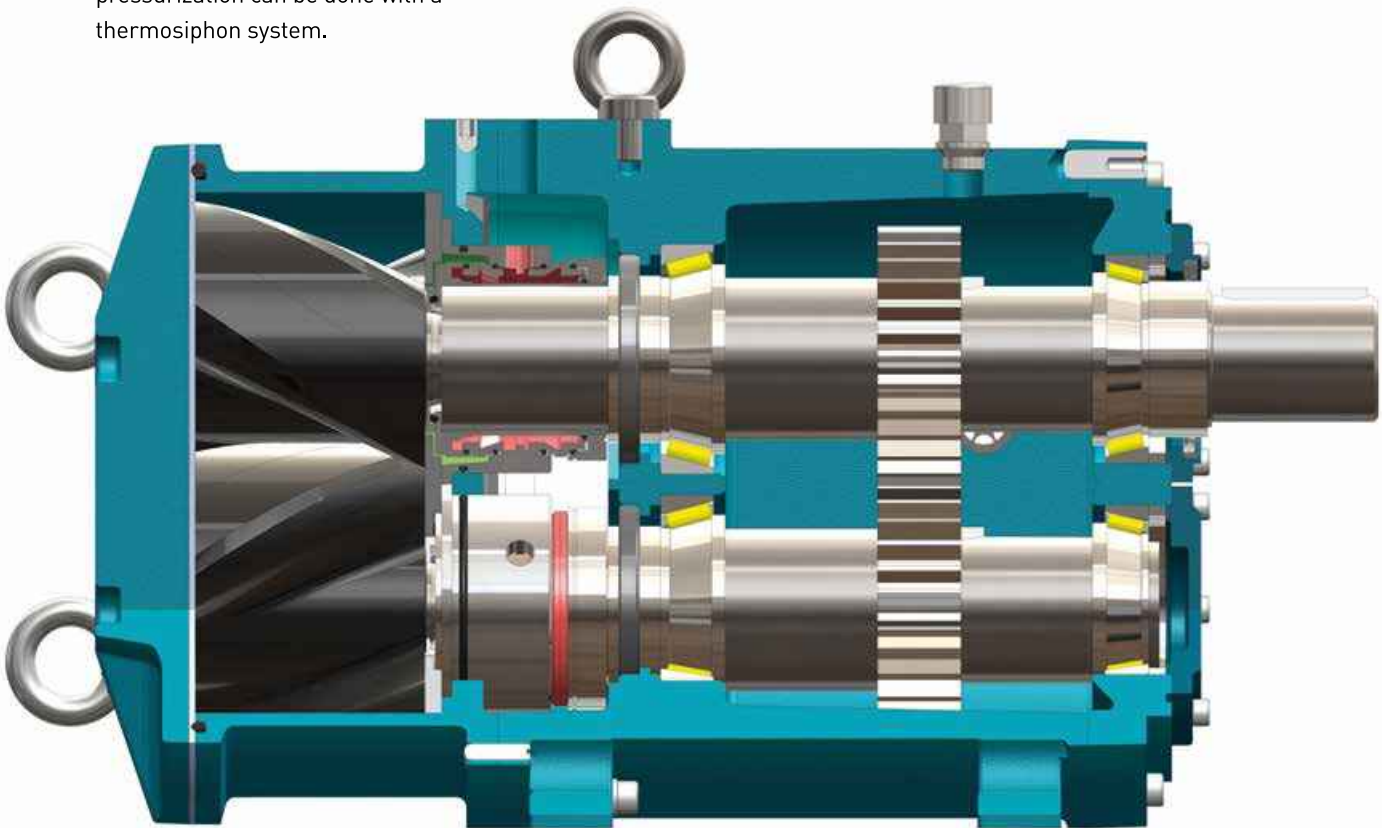


# Protect – Double Action, Double S

The Protect version is the pro among the Börger Rotary Lobe Pumps, offering maximum operational safety of the mechanical seals with problematic fluids. The timing gear with optimum axial tolerances is separated from the pump chamber. The intermediate area houses double-acting mechanical seals which are kept under pressure. The pressurization can be done with a thermosiphon system.

The Protect pumps are particularly suitable for critical pumped fluids (such as toxic or explosive pumped media) which must not leak under any circumstances, as well as highly abrasive media. Protect pumps are also suitable for pumping latex, which would form deposits when penetrating between the sliding surfaces.

It is essential that the pressure of the clean barrier fluid is kept higher than the pressure in the pump chamber. In this way the double-acting mechanical seals reliably prevent the medium from leaking out of the pump chamber. The barrier fluid also prevents the pumped medium from entering between the sliding surfaces.



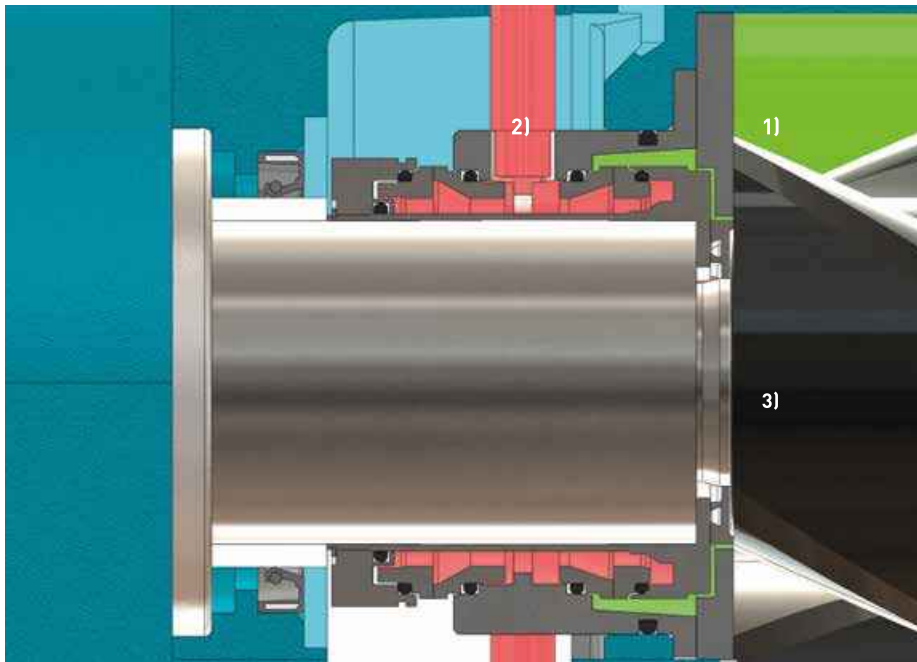
As with the Classic and Select product lines, the pump casing as well as the rotors are available in a wide range of materials. The pump casings are available from grey cast iron up to duplex steel, the casing protection plates provide materials up to ceramic and the rotors include a wide range of geometries and materials (elastomer coated, PUR, PFA up to stainless steel).



**Worldwide unique** and only available from Börger: MIP is an unrivalled concept which reduces maintenance times and downtimes.

# safety, Double Protection!

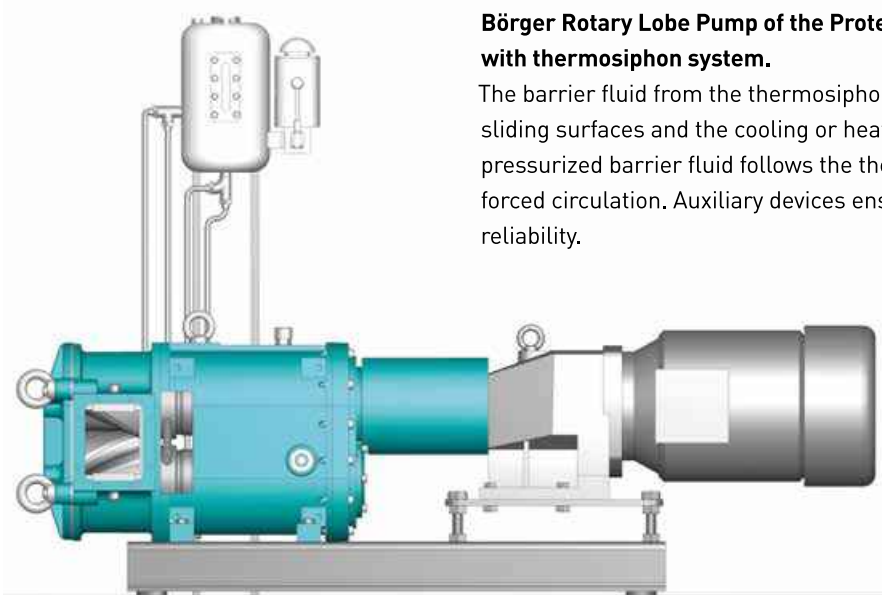
Design of the double-acting mechanical seal



- 1) Pumped medium
- 2) Barrier fluid
- 3) Pump chamber

## **Böinger Rotary Lobe Pump of the Protect product line with thermosiphon system.**

The barrier fluid from the thermosiphon system serves the lubrication of the sliding surfaces and the cooling or heating of the seal. The circulation of the pressurized barrier fluid follows the thermosiphon principle or is the result of forced circulation. Auxiliary devices ensure easy operation and increase the reliability.



# We Love Challenges

## Selected Constructive Solutions

We continually explore new application fields and adapt our products to new application requirements. That is what we understand by customized manufacturing.

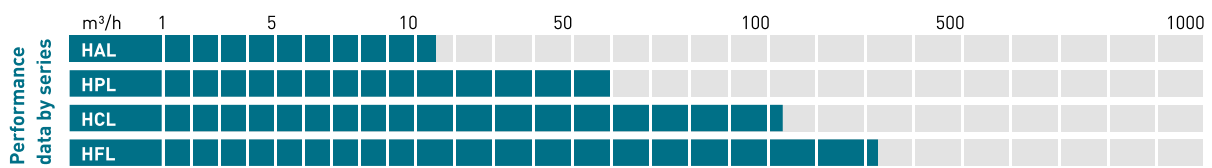


# Börger Macerating Technology At a Glance



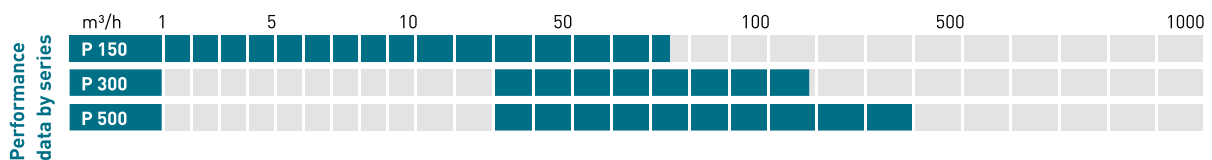
## Multicrusher Dual-Shaft Grinder

- Various sizes
- Flow rates of up to 320 m<sup>3</sup>/h (1,400 usgpm)
- Space-saving, compact design
- Degree of maceration variable thanks to choice of blade combinations



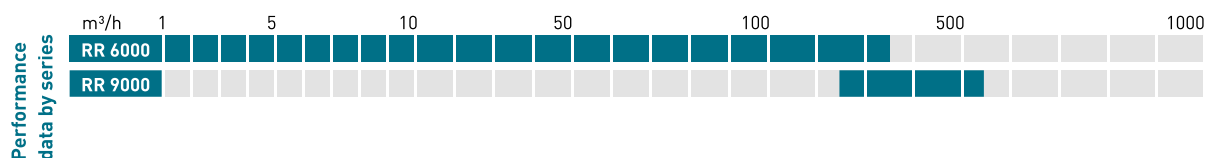
## Multichopper Single-Shaft Macerator

- Design with or without debris collector
- Flow rates up to 400 m<sup>3</sup>/h (1,750 usgpm)
- Degree of maceration variable thanks to choice of perforated disks and flow speed



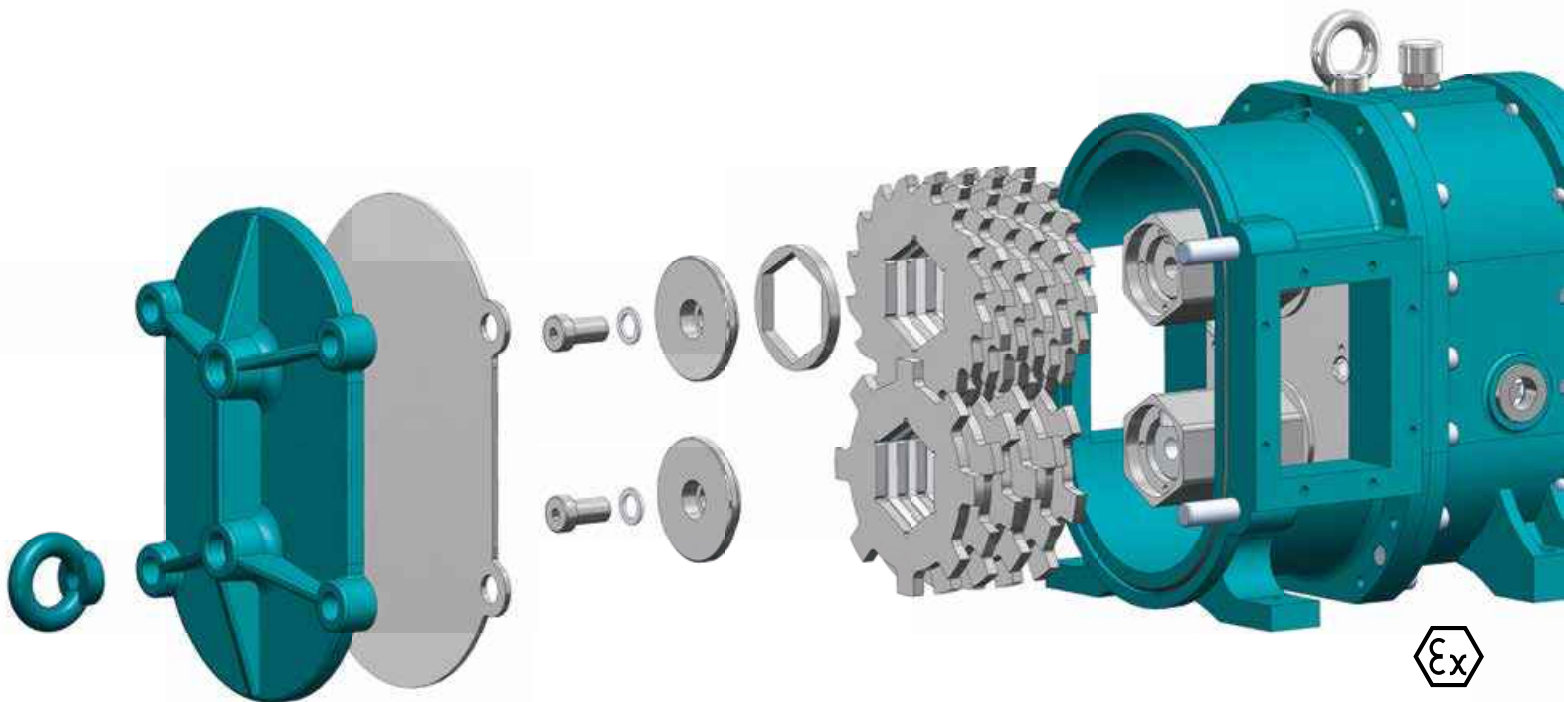
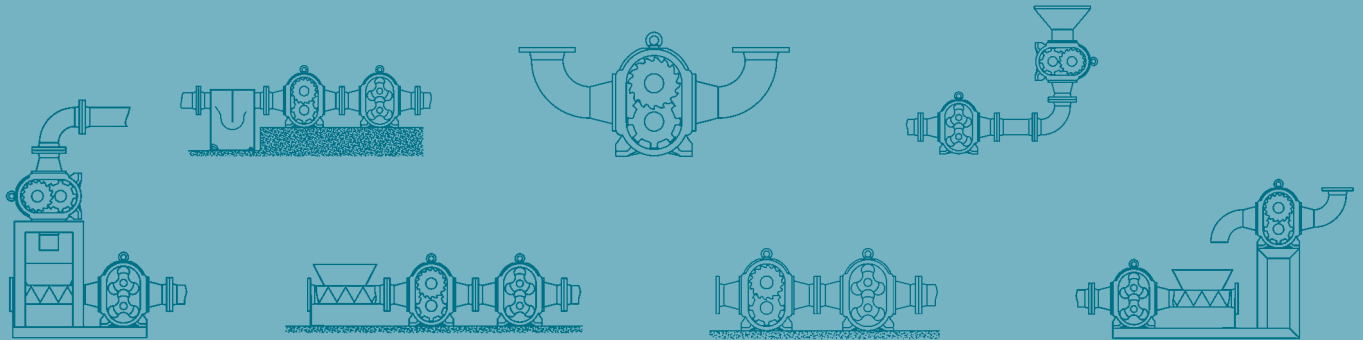
## Rotorrake Single-Shaft Coarse Macerator

- Various sizes
- Flow rates up to 540 m<sup>3</sup>/h (2,400 usgpm)
- Compact design
- Debris collector



# Börger Multicrusher

## Construction, Drive and Assembly



The Multicrusher is an effective, universally applicable macerating unit based on the proven design of the Börger Rotary Lobe Pump. The cantilevered shafts, bearings, shaft seals and casing are identical to the Rotary Lobe Pump which means you can rely on the robust technology and, above all, on the unmatched ease of maintenance! If you already have a Börger Rotary Lobe Pump installed, you will be able to use many

of the same consumables for your Multicrusher. Both the Börger Rotary Lobe Pump and the Multicrusher share the same unique MIP advantage: MIP (Maintenance in Place) means that all wear parts can be replaced on-site by operating personnel without the removal of pipe or drive systems. This unmatched ease of maintenance guarantees low costs and short downtimes! Whether you integrate the Multicrusher into a pump circuit

or use it as a standalone device – its flexibility is unique! Quick access to the blades permits a situation-dependent blade selection and thus variable cut qualities: The required particle size can be achieved by selecting different blade combinations, blade tooth profiles and blade thickness.



# Convincing Arguments

## Macerating elements

The blades are assembled on the hexagonal shaft in a fixed sequence. A single central screw connection keeps them engaged. Through the quick-release cover, the parts can be exchanged in minimal time. Several blade designs are available.

## Shaft seal

The unit is equipped with a robust mechanical seal as standard. The intermediate chamber filled with barrier fluid provides seal lubrication and prevents fluid penetration into the drive unit.

## Block casing

The bolt connected grinder and gear casing are both designed in a compact block casing construction. The Multicrusher, combined with a drive and connected through a flexible coupling, presents a compact macerating unit.

## Rotational speeds

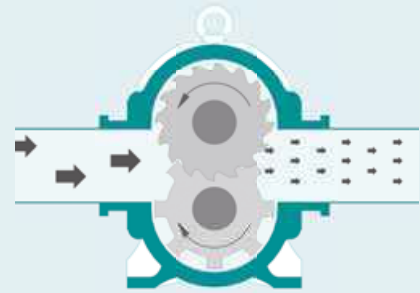
Since the design of the Multicrusher does not favor a specific drive design, any customer preferred drive type can be used. A small, lightweight drive with low speeds is particularly well suited for water-like fluids. Higher speeds and torques are needed if materials require strong maceration.

## Bearing

The shaft has a bearing on one side. The gear unit is a sealed component with robust gears and bearings.

## Special designs

The dual-shaft grinder incorporates a strong 'Pull-in function'. Börger offers ideal solutions with various feeding devices such as feed augers in connection with demand-regulated pumps and drives.



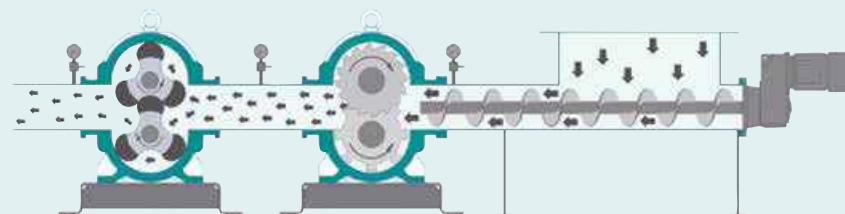
### Flow direction

The absolutely symmetrical design of the Börger Multicrusher allows the reversal of the flow direction in any operating condition by simply turning the blades and simultaneously changing the direction of rotation.



## Börger shows teeth to problem cases.

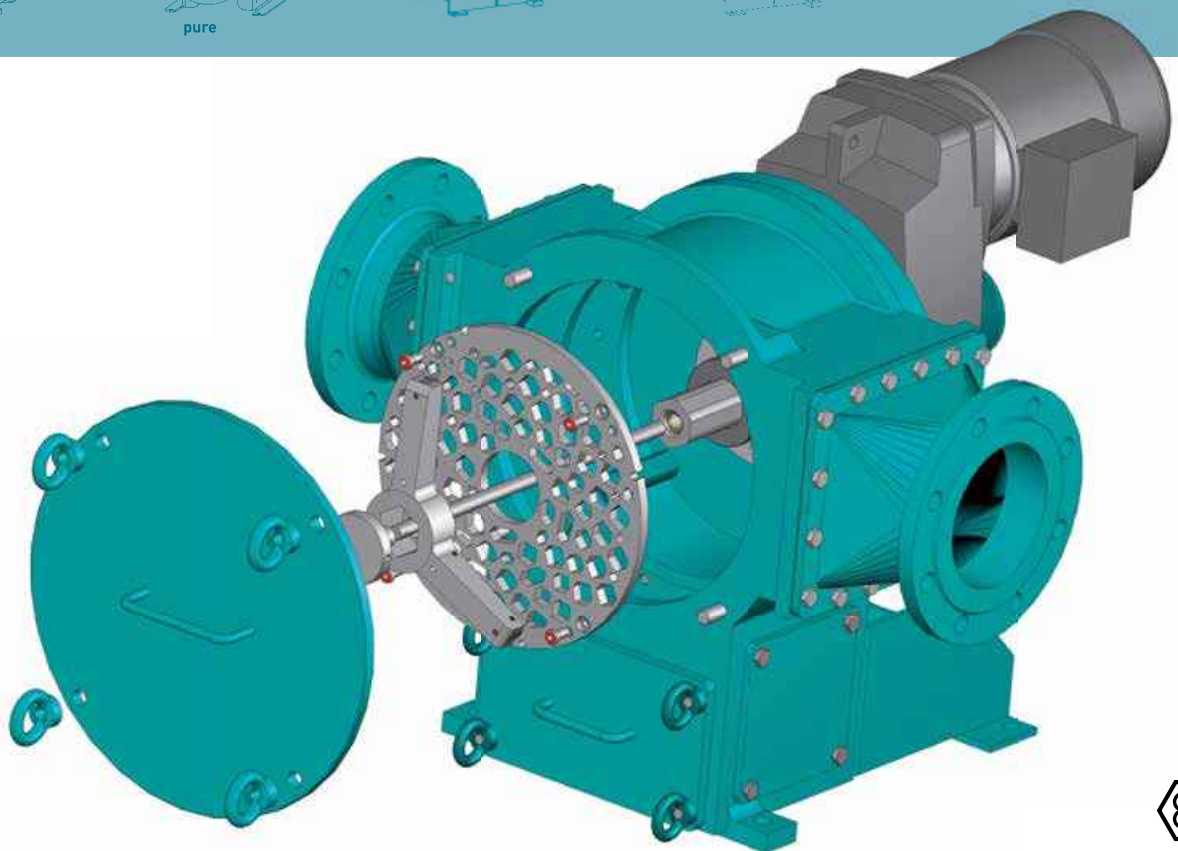
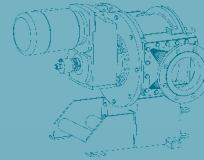
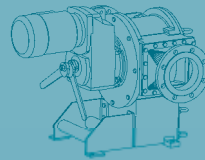
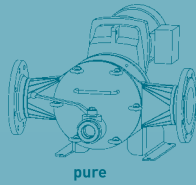
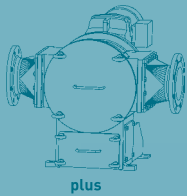
The degree of maceration of the Börger Multicrusher depends on the blade selection, the selected blade tooth shapes, the blade thickness and the operational speed. Depending on the application, 9 blade pairs are currently available. The different circumferential speeds of the shafts create a tearing/cutting result. The use of hardened steel ensures the blades are kept sharp for longer.



Worldwide unique and only available from Börger: MIP is a unrivalled concept which reduces maintenance times and downtimes.



# Börger Multichopper Construction, Drive and Assembly



The Börger Multichopper incorporates advantageous technical and operational design features. The preloading of the multi-vane blade is adjusted from outside the unit. A special technology ensures that the axially fixed blade is pressed against the perforated disk which can be used from both sides. The shaft seal is supplied as a mechanical seal as standard. The Multichopper incorporates Börger's well-known maintenance-friendly

design. All macerating elements can be removed from their positions by releasing a single clamping unit situated on the outside of the device. No special tools are required for making adjustments or performing service operations. The Börger Multichopper is available in two designs: The Multichopper plus is equipped with a debris collector for solids which cannot be macerated, while the Multichopper pure is designed to have no cavities

in which the medium can become entrapped. Hence the Multichopper pure is built without a debris collector. The Multichopper is available in gray cast iron and stainless steel materials.

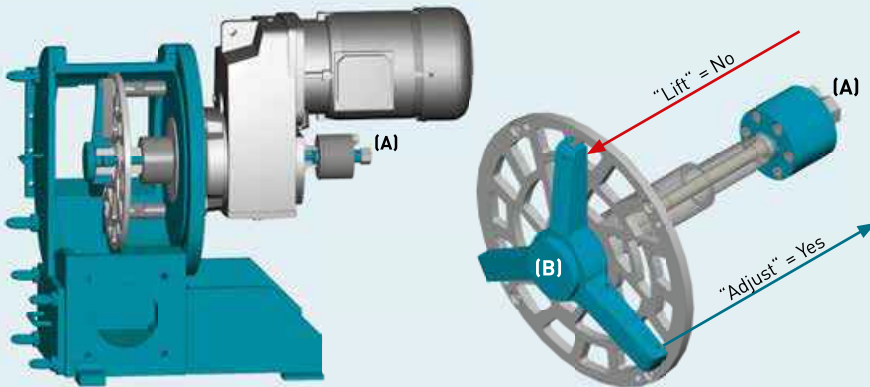
**A well thought-through system developed by practitioners.**

# MCA = Mechanical Cut Adjustment

Automatic adjustment unit ensures constant cut performance

**Multichopper plus** – in gray cast iron or stainless steel design, with large-volume debris collector

**Multichopper pure** – in stainless steel design, without debris collector, ensuring no deposits



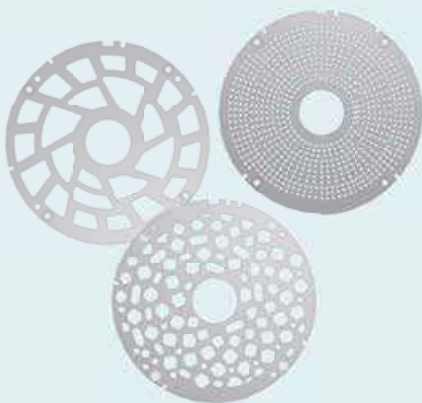
## At a glance

- The MCA unit is fitted externally, in axial direction to the blade unit (B).
- The MCA technology uses a clamping axle to hold the blade unit against the perforated disk with minimal preloading.
- The MCA unit only allows one adjustment direction. The design prevents the blades from lifting.
- The blade unit, clamping axle and MCA form one ingenious unit which rotates as a whole.

The **MCA** unit is a blade adjustment unit which works automatically. The rotating **MCA** cylinder **(A)**, attached externally and connected to the central clamping unit in axial direction, works with a constant cutting load and pulls the blades onto the perforated disk with the minimum force necessary. Only a small amount of force is used so that the cutting blades are only lightly held against the perforated disk

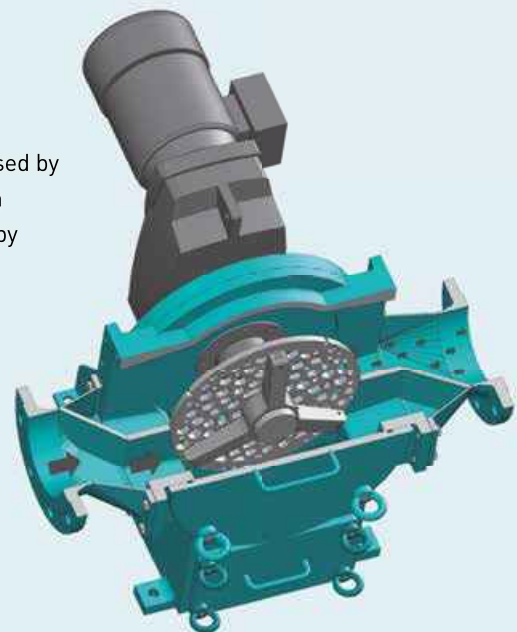
with low stress in working position. When the blades and perforated disk are worn, the axial traction ensures that the cutting play between the blades and the perforated disk is always ideally set, guaranteeing that the Multichopper retains an optimal cutting effect. The cutting preload is set completely independently. This technology is absolutely maintenance-free. Intelligent technology in the

adjustment cylinder **(MCA)** prevents the blades from lifting and resetting. The MCA unit is located outside the casing. The blade holder as such requires no attachment of further parts, and the entire interior of the Multichopper is free from oils or other aids. Here, the entire space is available for the medium to be macerated.



## Reversible flow direction

The flow direction can be reversed by simply changing the connection flanges (Multichopper plus) or by rotating the casing by 180° (Multichopper pure).



## Börger has razor sharp solutions!

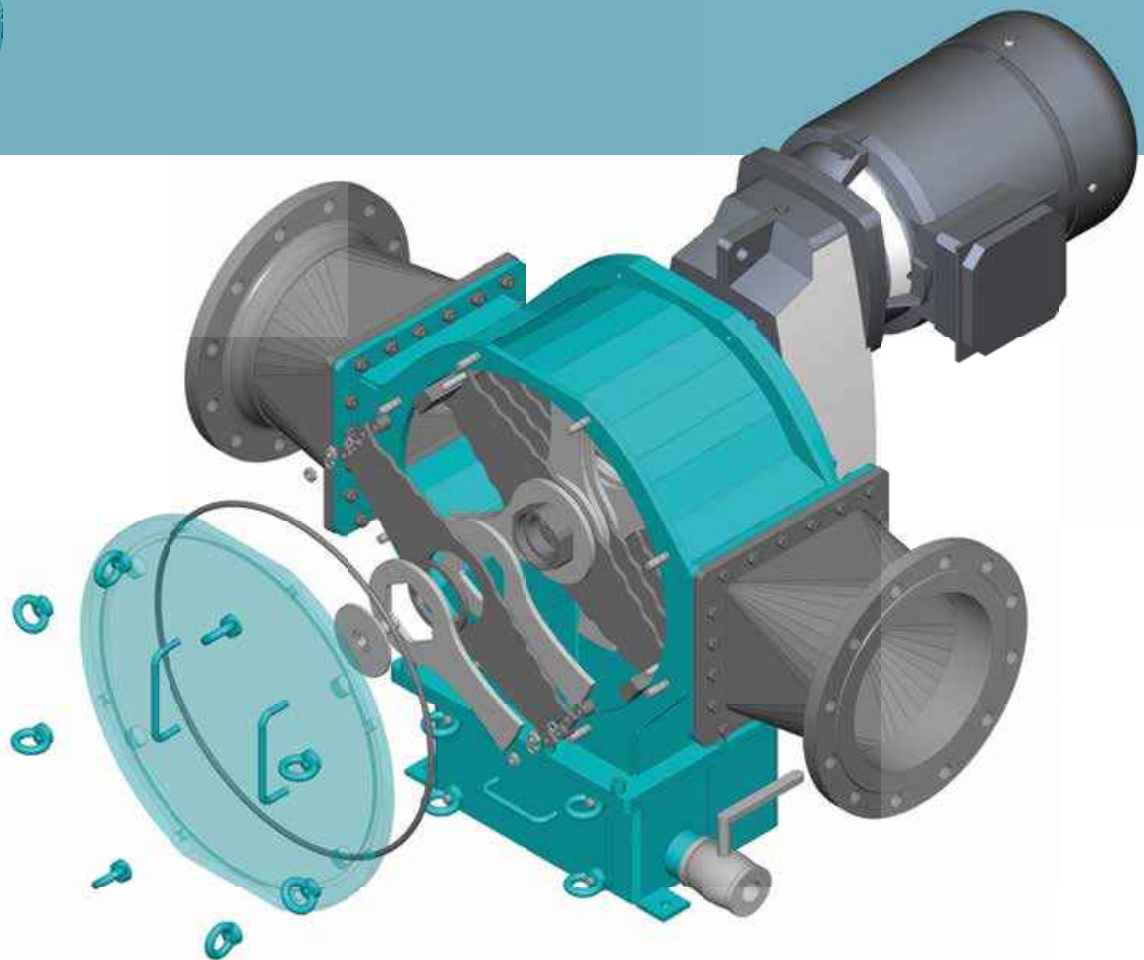
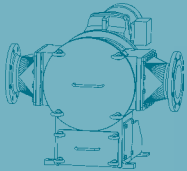
The Multichopper is a perforated disk macerator with a central perforated disk and high performance blades for solids contained in liquids. The design of the perforated disk, the rotational speed and the flow rate have a significant impact on the maceration result.



## Worldwide unique and only available from Börger:

MIP is an unrivalled concept which reduces maintenance times and downtimes. All wetted parts can be maintained and replaced if necessary by in-house personnel directly on-site – **fast, effortlessly and cost-effectively.**

# Börger Rotorrake Construction and Principle

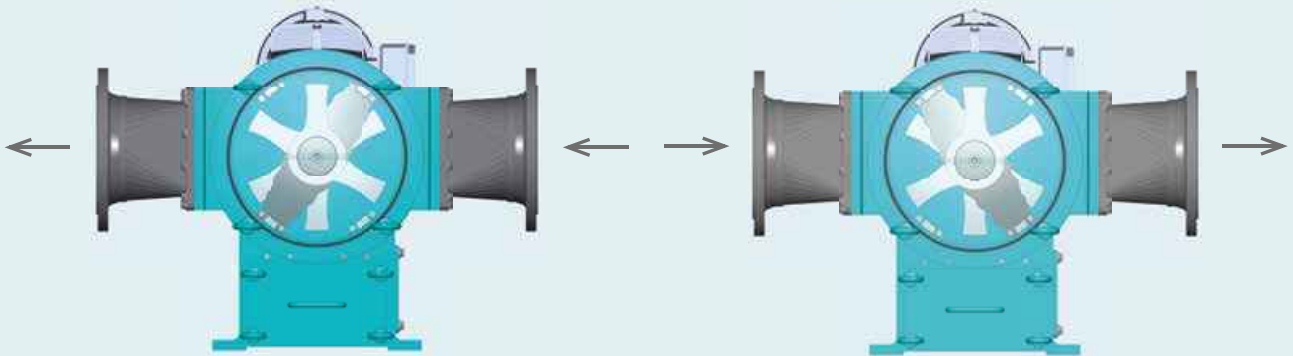


The Rotorrake is a robust macerating unit using inline design. Blades and counter blades are pushed onto the carrier shaft alternately. The counter blades are fastened in such a way that they cannot twist. The rotating shaft is driven directly via the drive and bearing assembly. The Rotorrake with its rough macerating effect allows for high throughput capacities. Solids-

laden fluids are fed into the Rotorrake. Separation of hard particles is achieved by blade rotation in flow direction. Stones drop into the debris collector. If the medium contains solids to be macerated, then the blades turn in the opposite direction to the flow direction. Both blades and counter blades can be turned round and used from both sides.

**An ingenious procedure developed by practitioners. Clever technology.**

# Changing the Flow Direction

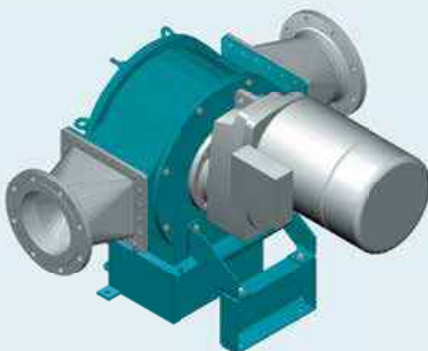


The Rotorrake has a modular design and can be used in reverse mode for different maceration tasks.

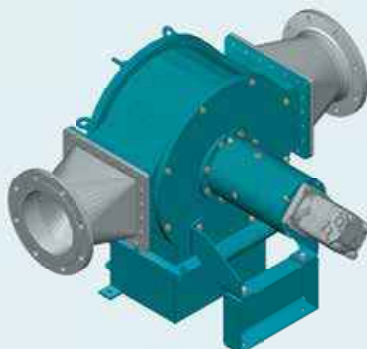
## Convincing Arguments

- Flow rates of up to 540 m<sup>3</sup>/h (2,400 usgpm) (depending on model)
- Rotorrake – compact, space-saving device
- Variable flow direction due to cutting unit adjustment
- Rotating shaft in oil-filled drive unit
- Equipped with the proven Börger mechanical seal as standard
- Quench chamber between product and drive guarantees safety
- Blades and counter blades can be turned round to use on both sides

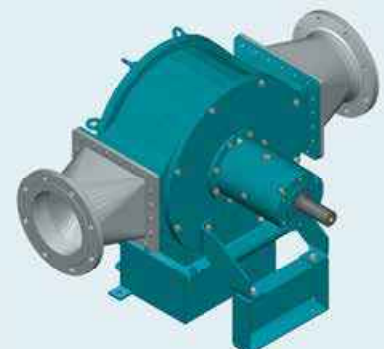
## Drive Variants



Parallel shaft helical gear motor



Hydraulic motor



Bearing assembly  
with bare drive shaft

# Mobile Pumps Ready for all Applications

The proven principle applies: Börger didn't invent the Rotary Lobe Pump; but turned it into something special! Each mobile pump is something special – custom-made at Börger's own production site according to the customer's specifications, and to the same high-quality standard you get from any Börger product! Requirements can be as versatile as construction options.



# Control Technology 'Made by Börger'

The control units and control cabinet technology for pumps, macerators, etc. are manufactured by Börger. This allows us to meet our customers' individual requirements almost 'single-handedly'.





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