seepex.com
all things flow

Your advantages: pumps in open hopper design.

As individual as your pumping process.

As a leading international supplier of products and services for the pumping and treatment of liquids, we are committed to the principle of made-to-order pumping equipment.

seepex has a presence in over 50 countries. Today, more than 600 seepex employees worldwide are working on the development, manufacture and sale of progressive cavity pumps, macerators and control systems. In addition to sophisticated and modern production facilities, and to expand our technical expertise, we have departments and laboratories for basic research, product development and planning.

Each pump is selected to the specific requirements of your sector, your company, your installation, your application and, of course, to the product being pumped. The modular system has the perfect solution for even the most extreme pumping applications.

Each solution is built on a foundation of expert, case-specific consultation, planning and project management. Our product and industry specialists develop tailor-made solutions for the most diverse requirements. The recommended pump design ensures lower energy consumption, reduced maintenance costs, increased operational safety, better utilization of capacity and higher productivity.

When things get really thick.

seepex pumps of product group T are used for products that are extremely viscous with low or no flow characteristics and a high solids content. For this reason pumps of product group T are equipped with an open hopper and an auger screw to feed highly viscous non flowable products into the pumping elements.

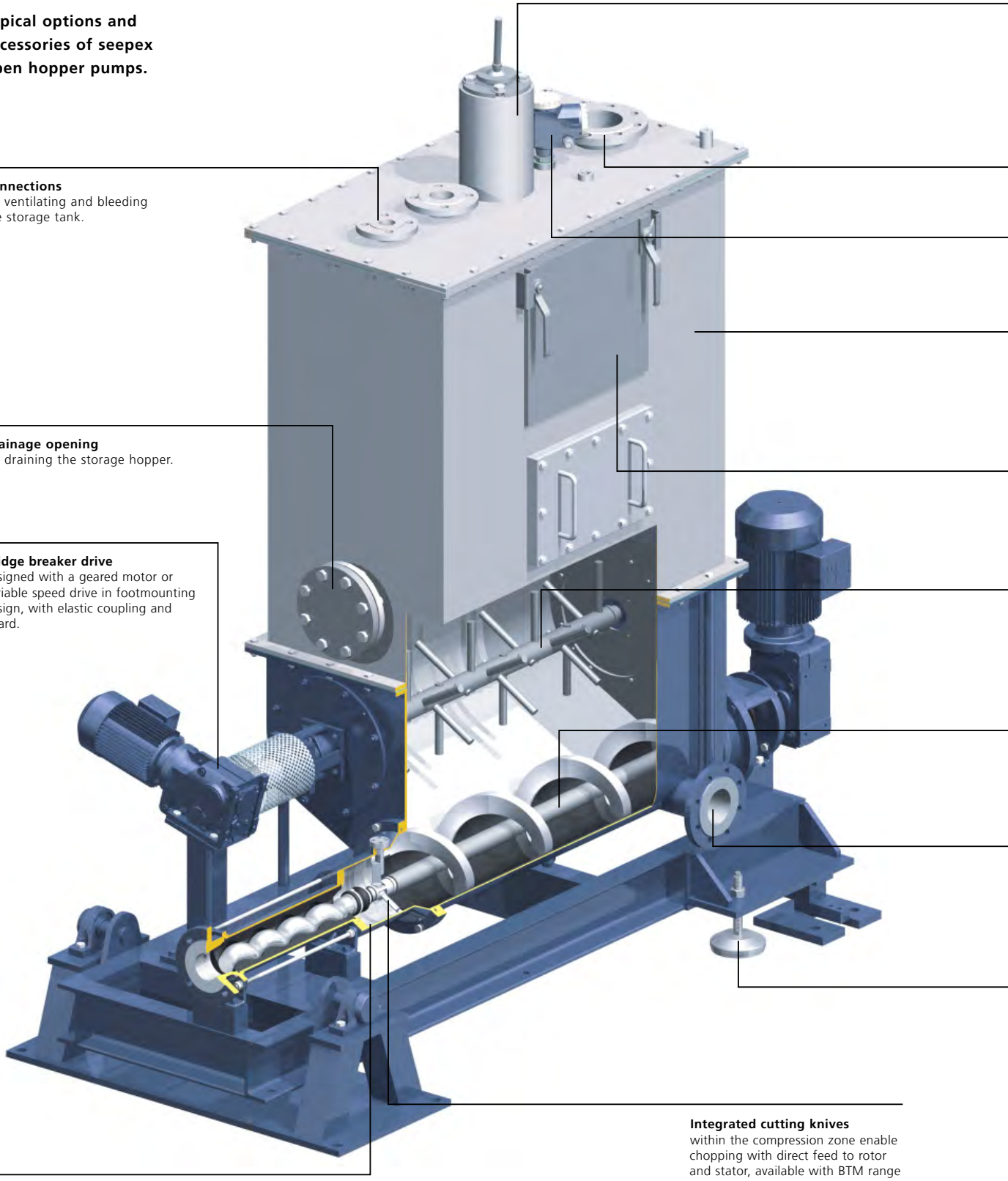
They are successfully used in industries and applications such as agriculture, biogas industry, brewing and distilling, ceramics, confectionery, construction, dewatered sludge treatment, dough processing and bakeries, dyeing and varnishing, electroplating, fish processing, fruit and vegetable processing, pharmaceutical and cosmetics, poultry and meat processing, oil, gas and petro-chemical, shipbuilding, sludge dewatering, stock preparation, textiles, waste water and sludge treatment, wood processing and wine production.

Advantages and Characteristics

- Pumps of product group T incorporate an open hopper and an auger feed screw which feeds highly viscous products into the pumping elements, the rotor and the stator.
- The pitch and the diameter of the auger feed screw can be adjusted according to operating conditions for optimal product feed.
- The open hopper can be designed to suit diverse applications.
- Feed hoppers can be fitted with integral bridge breakers with either single or double paddle shaft design.
- Range BTM pumps incorporate patented cutting knives for chopping and crushing the pumped product.
- Pumps of product group T are service-friendly due to the ability to change the rotor and stator without pipe work removal and without silo emptying.

Product group T – Open hopper pumps.

Typical options and accessories of seepex open hopper pumps.



Connections
for ventilating and bleeding the storage tank.

Drainage opening
for draining the storage hopper.

Bridge breaker drive
designed with a geared motor or variable speed drive in footmounting design, with elastic coupling and guard.

Integrated cutting knives
within the compression zone enable chopping with direct feed to rotor and stator, available with BTM range pumps.

Compression zone
with flanges at both ends for quick dismantling when replacing the rotor, hand hole upon request.

Ultrasonic level measuring
For optimum mixing of additional products, a constant level of the pumped material is required in the feed hopper. The level can be reliably measured using an ultrasonic sensor and transmitted to a control through a measuring transmitter.

Connection for CH4 measuring head
for measuring the methane gas content.

Vibration limit switch
for switching off the pump in case of storage hopper overflow.

Storage hopper
dimensions and fill volume are adaptable to individual conditions.

Earth connection
for storage hopper and pump, supplied separately.

Inspection opening
optionally with quick release handles, for inspection purposes and for cleaning the inside of the hopper.

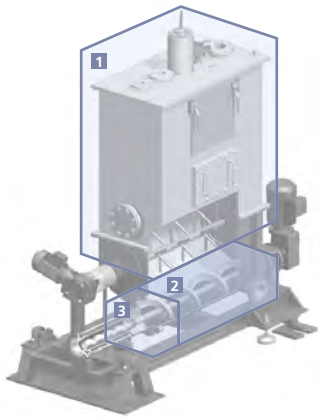
Paddle shaft
counter rotating shaft pushes the product into the auger to prevent bridging.

Coupling rod
with ribbon screw for power transmission and optimal product feed. Alternatively separately driven, concentrically rotating ribbon screw for pump range BTH, see also pages 6 and 11.

Flushing connection
for draining and cleaning the internal parts of the pump.

Load cells
for measuring the level inside the hopper.

Several areas of a seepex pump of product group T and their typical functions.

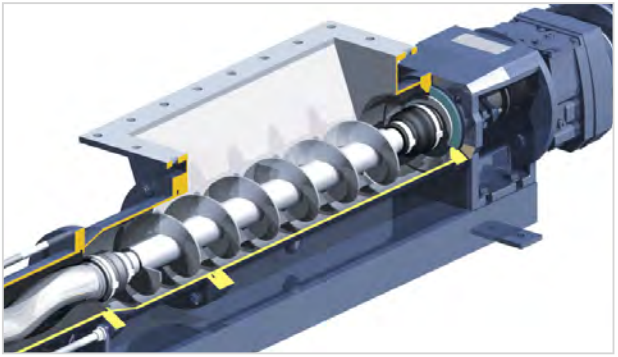


1 **Getting the product into the pump**
Feed hopper, bridge breaker and auger feed screw designs

2 **Mixing and cutting**
Auger feed screw designs and integral knife designs

3 **Getting the product into the pumping elements**
Compression zone designs

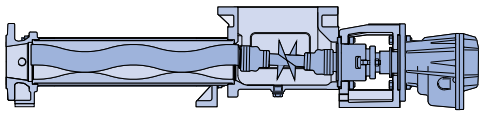
Detail: Standard hopper design



An overview of the ranges.

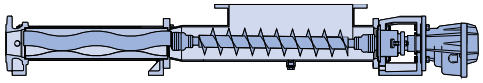
Pumps of the BTQ range are the same length as BN range pumps. They have a square cross section inlet and an auger feed screw for enhanced product feed. They are used for pumping medium to highly viscous products with a low degree of flowability.

Range BTQ



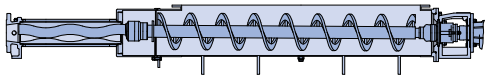
Pumps of the BT range feature a rectangular feed hopper with a compression zone and an auger feed screw. The length of the hopper opening is variable to suit the application conditions. They are used for pumping highly viscous products with a low degree of inherent flowability.

Range BT



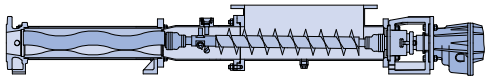
The BTES range is specifically designed to be installed within the base of a silo thereby eliminating the need for separate extraction screws. Features include optimized hopper to auger ratio and shut-off device to enable replacement of rotor and stator with a full silo.

Range BTES



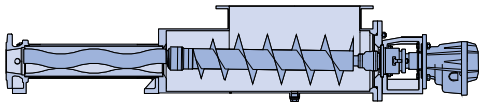
A special characteristic of the BTM range are the patented cutting knives integrated into the compression zone. The knives on the rotating auger feed screw chop the products in combination with the static knives fixed in the compression zone.

Range BTM



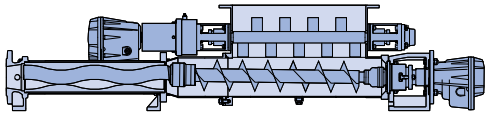
Pumps of the BTE range feature a rectangular feed hopper and a compression zone with an enlarged cross-section as well as an auger feed screw with a longer pitch and enlarged diameter. The length of the hopper opening is variable to suit the application conditions. Pumps of this range are used for pumping highly viscous plug forming products that do not tend to bridge.

Range BTE



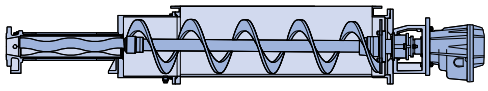
Pumps of the BTI range feature a rectangular feed hopper with integrated bridge breaker. The compression zone is detachable for easy maintenance and the length of the hopper opening is variable to suit the application conditions. Pumps of this range are used for pumping highly viscous/plug forming products that tend to form bridges above the auger feed screw. An additional feature of this design is the ability to mix powders or liquids into the main product.

Range BTI



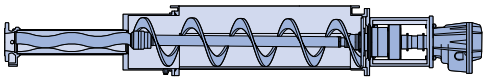
Pumps of range BTHE/BTH have a wider feed hopper with vertical walls and a large-diameter, long-pitch open ribbon auger that rotates concentrically on a liner. This guarantees optimum emptying of the hopper and feed of the product into the rotor and stator of the pump. The length of the hopper opening is variable to suit the respective application conditions. Even products that tend to form bridges can be handled with ease due to the large auger diameter.

Range BTHE



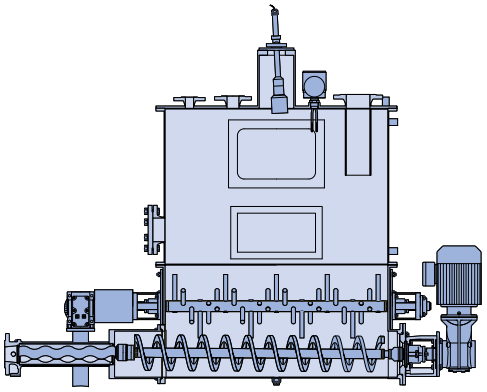
The BTH range combines the various advantages of product group T. It is characterized by a separately driven, concentrically rotating ribbon auger with a maximized diameter and a long pitch. Through separate control of the conveying auger speed, the BTH pump can be used to convey most products or alternatively to create maximum mixing effects. The variable speed enables optimum filling of the rotor and stator without causing excess capacity in the compression zone. The BTH range is the best technical solution for conveying shear sensitive products.

Range BTH



The BTEI range is a further development of the proven BTI and BTE ranges. In addition to a bridge breaker/mixing device, it features a hopper that can be adapted to the application conditions on site. This replaces a separate storage hopper and thus saves space within the system.

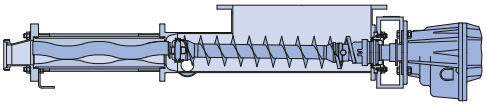
Range BTEI



The BTCS range is certified according to the high standards of the "3-A Sanitary Standards (USA)" and designed based on "EHEDG" guidelines. These pumps are optionally equipped with open, service-friendly joints or with proven, closed pin joints.

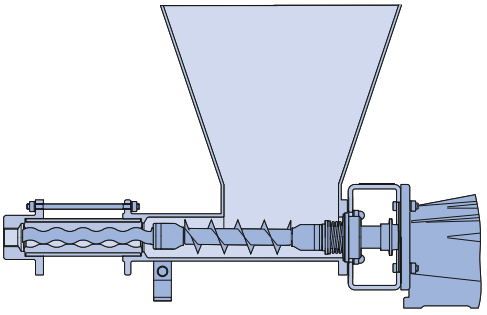
They feature a rectangular feed hopper with a compression zone and an auger feed screw. The length of the hopper opening is variable to suit the application conditions. They are used for pumping highly viscous products with a low degree of inherent flowability.

Range BTCS



The pumps of the MDT range deliver accurate, virtually pulse free flow and are ideal for applications where precision metering of highly viscous product is required. They are available in hygienic design to the standards of the BTCS range.

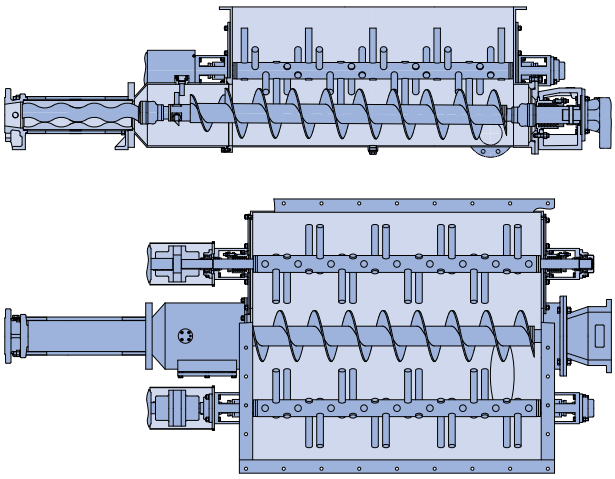
Range MDT



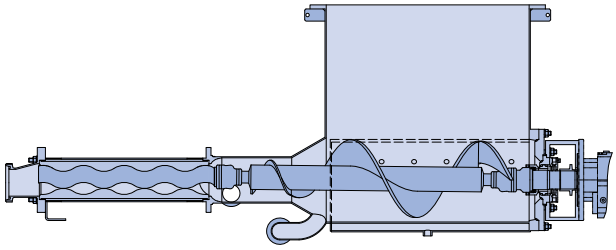
Customized solutions.

Pumps of product group T have the greatest demand for customized solutions due to the variety of customer requirements. Each pump is designed to give the optimum pumping performance taking into account both product characteristics and process requirements. Expert, case specific, consultation, planning and project management mean that solutions can be found for the most diverse requests.

In the food industry pumps of range BTCS have been customized for specific products. Hygienic design has been combined with special features to provide product handling solutions to meet customer demands.They are certified according to the 3-A Sanitary Standard of the US and designed in compliance with the EHEDG directives.

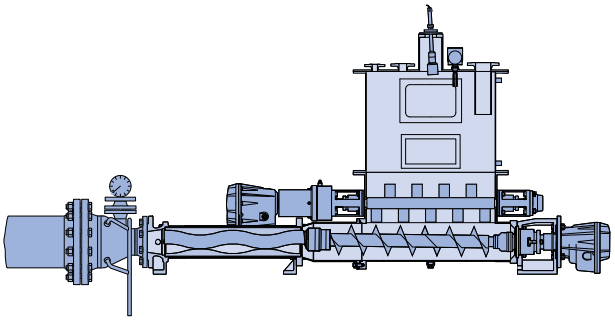


Pump of range BTEIM with two paddle shafts, special hopper design, enlarged cross section and conveying screw with integral knives in the compression zone handling food waste.



Pump of range BTCS for hard fat products. The pump casing parts and the stator are equipped with a heated double jacket to melt the large blocks of fat/lard prior to onward processing.

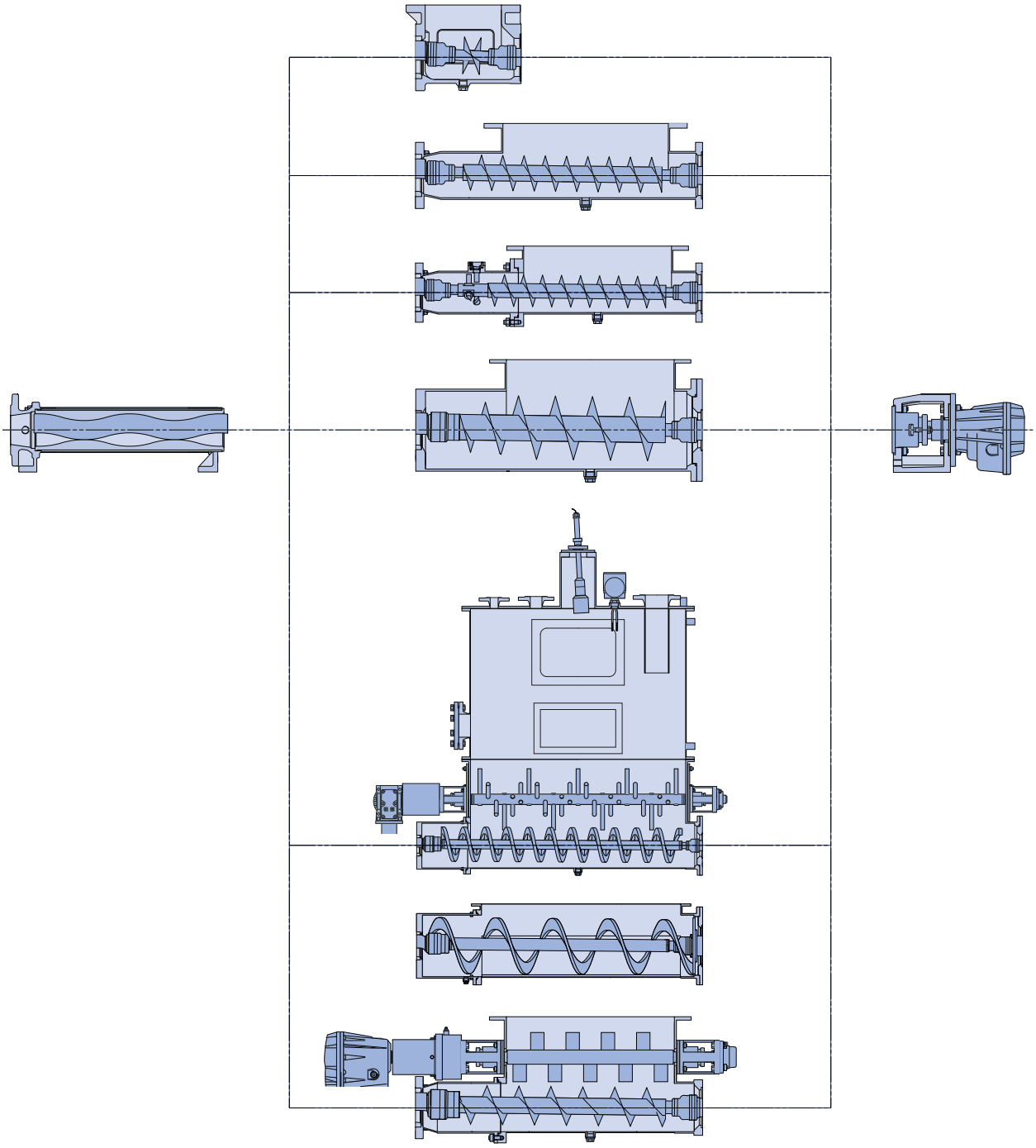
To optimize the filling of the pumping elements, the rotor and stator, a specially designed auger feed screw is incorporated within the pump open hopper.



System solution with a BTI range pump with additional storage hopper and integrated level control, dry run protection (TSE) and boundary injection system.

The advantages in detail.
Modular system and diversity.

The modular design of the product group T allows standard rotors and stators, together with standard drives to be combined with specific hopper and auger feed screw configurations. Optimum product handling in the auger feed screw and the feed hopper is therefore combined with pumps designed to ensure low energy consumption, reduced maintenance costs and better utilization of capacity to give higher productivity for our customers.

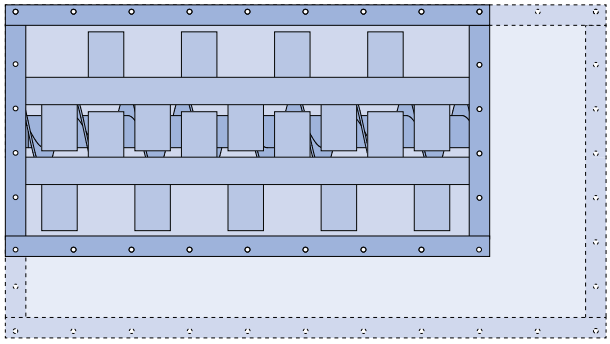


The advantages in detail – feed hopper and auger feed screw. Getting the product into the pump.

A key feature of all pumps of product group T is the open hopper and the auger feed screw. As product viscosity and shear resistance increases, the possibility of bridging above the auger increases. The pumps of product group T feature generously proportioned rectangular feed hoppers of various designs to suit the application and conditions.

Feed Hopper
Pumps of product group T can be supplied with feed hoppers of flexible length and width dimensions to suit the customer´s application and conditions. For applications requiring buffer storage above the pump, the hopper capacity can be optimized by increasing the hopper width and height.

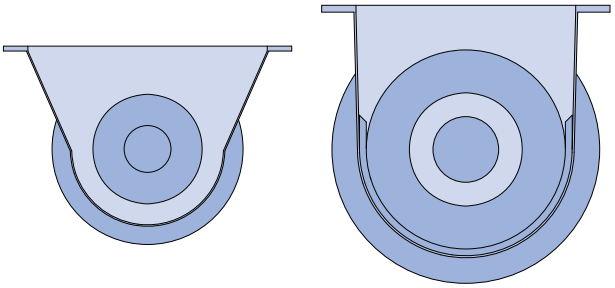
Bridge Breaker
Pumps of product group T can additionally be fitted with either single or double counter-rotating paddle shafts driven independently of the pump for applications where extreme product characteristics or mixing requirements demand.



Top view inside the feed hopper:
Individual length and width of the feed hopper can be adapted to customer´s conditions. If necessary, a second paddle shaft can be delivered.

Auger feed screw
Pumps of range BT have an auger feed srew which is part of the pumps coupling rod and thus rotates eccentrically. This design rotates with a clearance between the auger and the hopper wall.

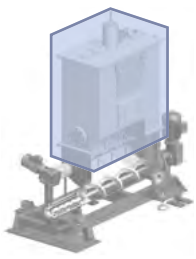
Pumps of range BTH/BTHE have increased width feed hoppers with vertical hopper walls and a large diameter, long-pitch ribbon auger rotating concentrically on a liner. The enlarged auger pitch and self cleaning contact with the liner prevents both primary bridging of product above the auger itself and secondary bridging initiated by product build up between the feed auger and the hopper walls. The auger feed screw of BTH range pumps is driven independently of the pump allowing fine control of feed rates or even batch mixing. A further advantage of a concentrically driven auger is the ability to drain liquid from the pump hopper during equipment start up, eliminating the need for expensive slide valves.



Range BT Range BTH/BTHE

The BTH/BTHE large diameter, long pitch ribbon auger runs concentrically against a liner and together with vertical hopper walls reduces the possibility of bridging.

Key advantages
- Flexible hopper dimensions to suit customer´s applications.
- Vertical hopper walls.
- Large diameter concentrically rotating auger eliminates bridging.
- Single or double bridge breaker paddle shafts.
- Storage hoppers for specific applications.



The advantages in detail – auger feed screw.
Mixing and cutting.

The individual design features of auger feed screw, feed hopper and compression zone enhance the capability of the pump. Processes which traditionally required more than one piece of equipment can now be combined into a single unit.

Mixing

The diameter and the pitch of the auger feed screw, together with the design of the compression zone, can be varied depending on the mixing result required and the product characteristics. Shear rate, back flow and controlled overfilling of the compression zone are optimized to assist the mixing action through the pump. The fed product can be mixed with the viscous product at any point in the hopper or in the compression zone to ensure optimum mixing.

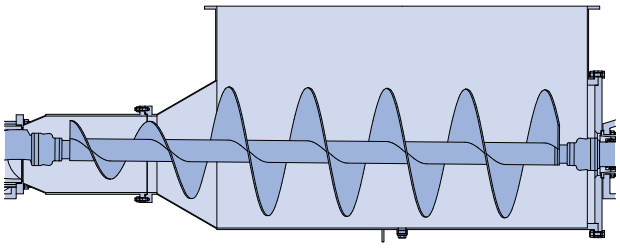
The BTH range pumps have a separately driven and reversible ribbon auger that can mix either liquids or powders into viscous products. The concentric action of the auger running on a liner prevents the build up of solids in the feed hopper.

Cutting

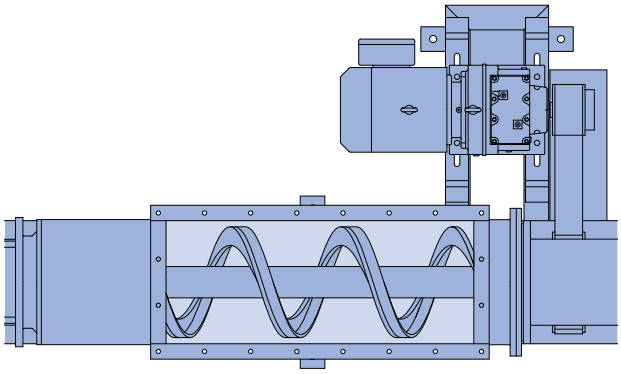
A special characteristic of the BTM range is the patented cutting knives integrated into the compression zone. The knives on the rotating auger feed screw chop the products in combination with the static knives fixed in the compression zone. The knives, together with the action of the auger, enable products of a size that would normally block the rotor and the stator to be chopped and subsequently pumped. Products such as whole cabbages, most fruit and vegetables, or even whole chickens can all be pumped using this design. This feature enables products to be chopped and pumped into an enclosed system.

Key advantages

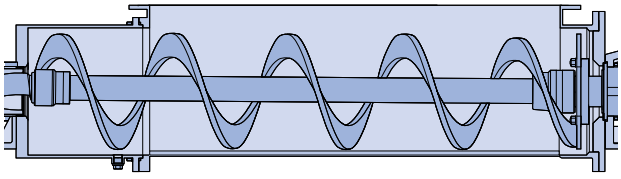
- Single pump simplifies complete system.
- Variable pitch auger and compression zone optimize shear rate and mixing capabilities.
- Independently driven concentric auger eliminates bridging and optimizes mixing.
- Chopping of whole/solid products to reduce particle size prior to pumping.



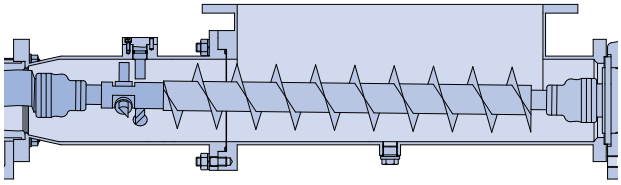
Special coupling rod, designed to create high shear.



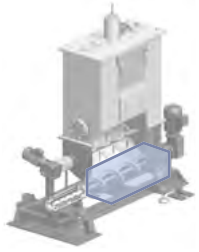
The separately driven auger feed screw of pump range BTH is independent of the pump speed.



The auger feed screw design of pump range BTHE incorporates a large diameter, long pitch ribbon design.



Additional knives within the compression zone of pump range BTM.



The advantages in detail – compression zone.
Getting the product into the pumping elements.

A key feature in the design of open hopper pump is the compression zone. Enclosing the end of the auger feed screw allows it to generate positive pressure at the entrance to the rotor and the stator, ensuring that the cavities are fully filled. The degree of pressurization may be varied by altering the auger displacement relative to the rotor/stator displacement.

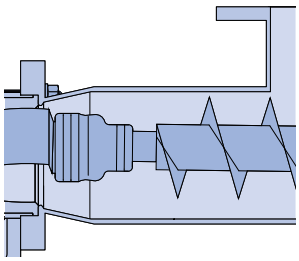
Removable compression zone
The compression zone is detachable from the main pump hopper enabling simple and easy rotor replacement. Pumps of the BTE range feature a compression zone with an enlarged cross-section compared to the standard BT pump range.

Special compression zone designs
For products with very high solids content, or where the presence of fiber leads to high shear strength, the area at the head of the rotor again becomes more critical, with a need for positive mechanical handling right up to the entrance of the rotor and the stator to ensure good feeding efficiency. Specific designs have been developed to overcome this:

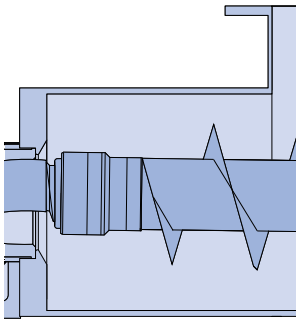
- For the BTH/BTHE range pumps, a reduced diameter compression zone with tapered end and a secondary auger on the coupling rod within the compression zone. The special universal joint protection sleeve is additionally fitted with auger flights to optimize the product feed into the stator.
- A retracted rotor head moves the rotor head away from the rotor and the stator entrance and allows the auger to extend to the stator inlet giving an uninterrupted feed path. This is ideal for handling products that tend to "pack out" and dewater. The conveying capacity of the auger within the compression zone can be optimized to suit the product being handled.

Key advantages

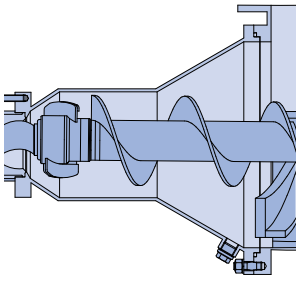
- Optimized feeding of product into the pumping elements.
- Control of product "packing out".
- Handling high solids and viscous products of up to 45 %.
- Removable compression zone simplifies maintenance.



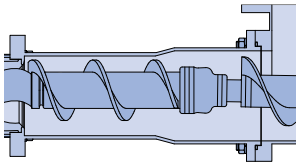
Standard compression zone of pump range BT.



Enlarged compression zone of pump range BTE.



Compression zone in special design with conical compression zone.



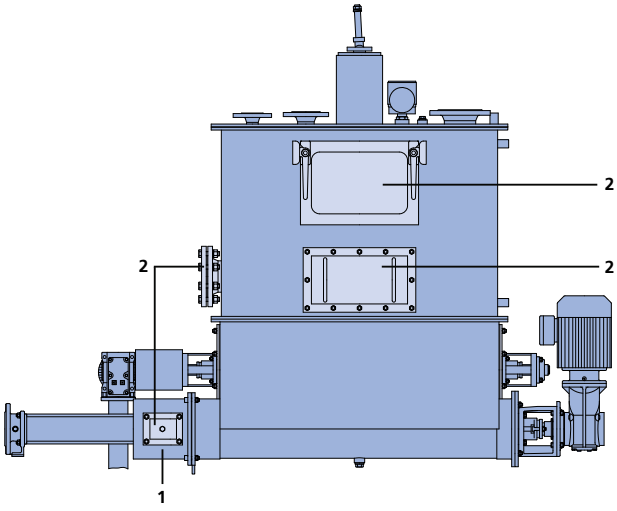
Compression zone in special design and retracted joint head.

The advantages in detail – inspection devices.
Ease of maintenance.

Pumps of product group T are often installed in large complex systems where silos cannot be emptied easily and where pump removal for maintenance is not possible. We have developed devices which are designed to make in place maintenance, inspection and cleaning as simple as possible.

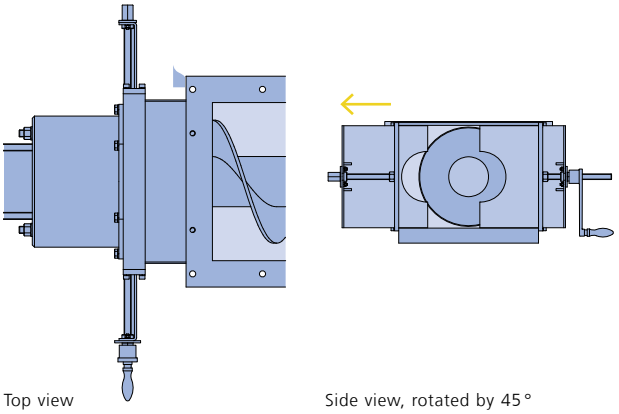
Compression zone (1)
All open hopper pumps are available with a detachable compression zone to allow access to the rotor joint without the need to remove the complete feed hopper.

Inspection ports (2)
These can be positioned either in the main pump hopper, the extension hopper or in the compression zone. These large ports have quick release handles which allow inspection and cleaning of the pump internal hopper and auger feed screw.



Additional feed hopper with options for cleaning, draining and servicing.

Shut off isolation device
The BTES silo pump range is available with a slide shut-off device to isolate the compression zone from the main hopper, thus allowing maintenance, including rotor and stator change without the need to empty the silo. The compression zone may be withdrawn with the stator in place, allowing the rotor and the stator to be moved as a unit if needed.

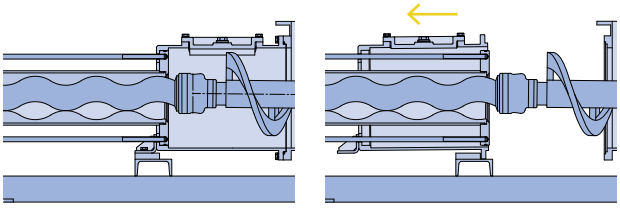


Top view Side view, rotated by 45°

Shut-off device for servicing the pump without the need of emptying the silo.

Maintenance without pipe work removal
A special feature is the ability to withdraw the compression zone over the stator allowing access to the rotor-sided universal joint enabling the rotor and stator to be removed together without removing any pipe work.

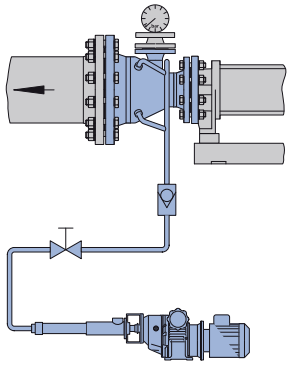
Key Advantages
- Detachable compression zone.
- Thorough inspection and cleaning.
- Rotor and stator maintenance without pipe work removal.



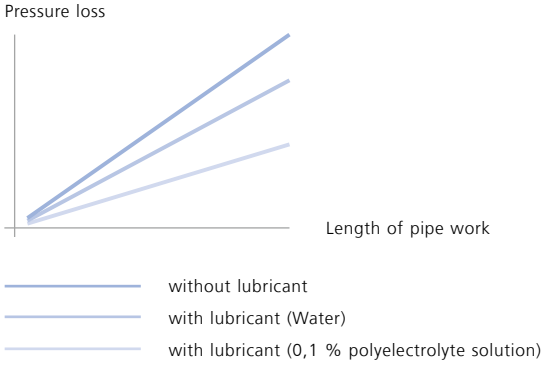
Removable compression zone to enable rotor and stator to be changed without removal of pipe work.

The advantages in detail – control systems.
Process and life cycle optimization.

Our control and monitoring systems are designed for specific applications and range from basic modules, which protect against overpressure and dry running, to complex control solutions with process visualization.



Boundary layer injection system for reduction of friction loss.



In above diagram the quantity of the lubricant is approx. 0.2 % of the main product.

Level/weight control
For many pumping applications a constant level of product is required in the feed hopper. With our control systems the level can be reliably measured using either ultrasonics which measure the level in the pump hopper, or load cells which measure product weight. A control panel with integrated programmable logic controllers (PLC) is used to adjust the pump speed in order to maintain a constant level in the hopper.

Additive control
Proportional mixing can be controlled with levels of additives like dry powders linked to the flow rate of the main product.

Pressure
A control system for applications requiring either constant pressure or pressure proportional flows. A control panel with integrated programmable logic controllers (PLC) allows management of various pumps within a single process. Over pressure protection systems are available.

Friction loss reduction
When pumping high solids contents and viscous products the pipe work friction loss can be reduced by a boundary layer injection to lubricate the interface between the product and the pipe. The control system measures the pressure in line by a pressure transducer and then controls the boundary layer pump to optimize the use of lubricant.

Mixing
Where re-watering of a high dry solids content product is required, an integrated control of the seepex mixing pump with the liquid addition pump gives precise control of final dry solids content regardless of original product content. The control system enables individual, need based, feeding of solid and liquid products with optimized mixing times. The controller is also easy to integrate into a higher level plant control system.

Key advantages
- Wide range of control and monitoring systems.
- Control systems designed to optimize pump performance.

seepex.com
all things flow

And what can we get flowing for you? Your nearest contact:

Or visit www.seepex.com

ADV_T 12.11E