

seepex.com
all things flow

Your Pump Solution
for Advanced Sludge Handling.



State-of-the-art technology for modern waste water treatment plants.

Due to ever-advancing global practices in waste water treatment and sludge disposal there has been an increase in the advanced treatment of sewage sludge. The development of large centralized plants with new technologies for energy production has presented new challenges for progressive cavity pumps.

Dewatering of sludge at satellite works – to reduce volume and therefore transport costs – followed by rewatering or back mixing at advanced treatment plants is becoming established practice. These processes, when managed by seepex pumping and mixing solutions, produce sludge at the ideal dry solids content for further processing including sludge drying, incineration, thermal hydrolysis and biogas production.

As an international leading provider of products and services for pumping and treating viscous products, seepex makes a valuable contribution to these new technologies with a focus on high quality, cost effective solutions which are fully compliant with environmental guidelines. We have responded to the challenge of our customers' changing needs by delivering new products using state-of-the-art technology. Our range of services includes initial consultation, development of suitable equipment, process optimization, control and support packages.

The modular system consisting of eight product groups and 27 ranges allows us to offer the optimal technical and economic solution for virtually every application. Each pump is selected to the specific requirements of your sector, your company, your installation location and of course your application.

370 of the over 630 employees worldwide work at our headquarters in Bottrop to make sure this is the case. They develop, manufacture and market your pump solution – whether progressive cavity pumps, macerators or control systems.

No wonder environmental technology without our pumps is inconceivable.

55 seepex BN 130-6L pumps installed for handling sludge at the largest high-rate clarification system in North America. The pumps increased the size of the waste water treatment plant from 32,000 m³/h to 63,000 m³/h.





seepex pump with numerous controls: motor control, dry running protection (TSE), over pressure control and level control via load cells.

More than just a pump supplier.

For correct pump selection and optimum return on investment, it is important that the pump is not treated as a “stand-alone” commodity but that a thorough understanding of the product to be handled and process requirements are considered.

Our vast knowledge base and experience within the environmental industry, and subsequent development of tailor made packages, demonstrates that we have this understanding. Integration of pumps with complementary equipment, such as special live bottom hoppers, boundary layer injection systems, sludge mixing technology, together with complementary control systems, turns designs and drawings into reality.

Installation, commissioning and service packages for both pumps and controls means that the optimum performance is ensured throughout the life of the system.

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 visualisation.

Level

Control of sludge level in pump hoppers and buffer extensions via ultrasonics or load cells. A control panel with integrated PLC is used to adjust pump speed in order to maintain a constant level.

Sludge Conditioning

Level control with control of sludge additives such as quick lime depending on pump speed.

Pressure

Control system for applications requiring either constant pressure or pressure proportional flows e.g. filter press feed. A control panel with integrated PLC allows management of various pumps within a single process.

Dosing

Pumps with integrated drives and optional PI controller ensure precise metering and pulsation free injection of chemicals into sludge streams.

Mixing

Where rewatering of high dry solids content sludge 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 sludge content.

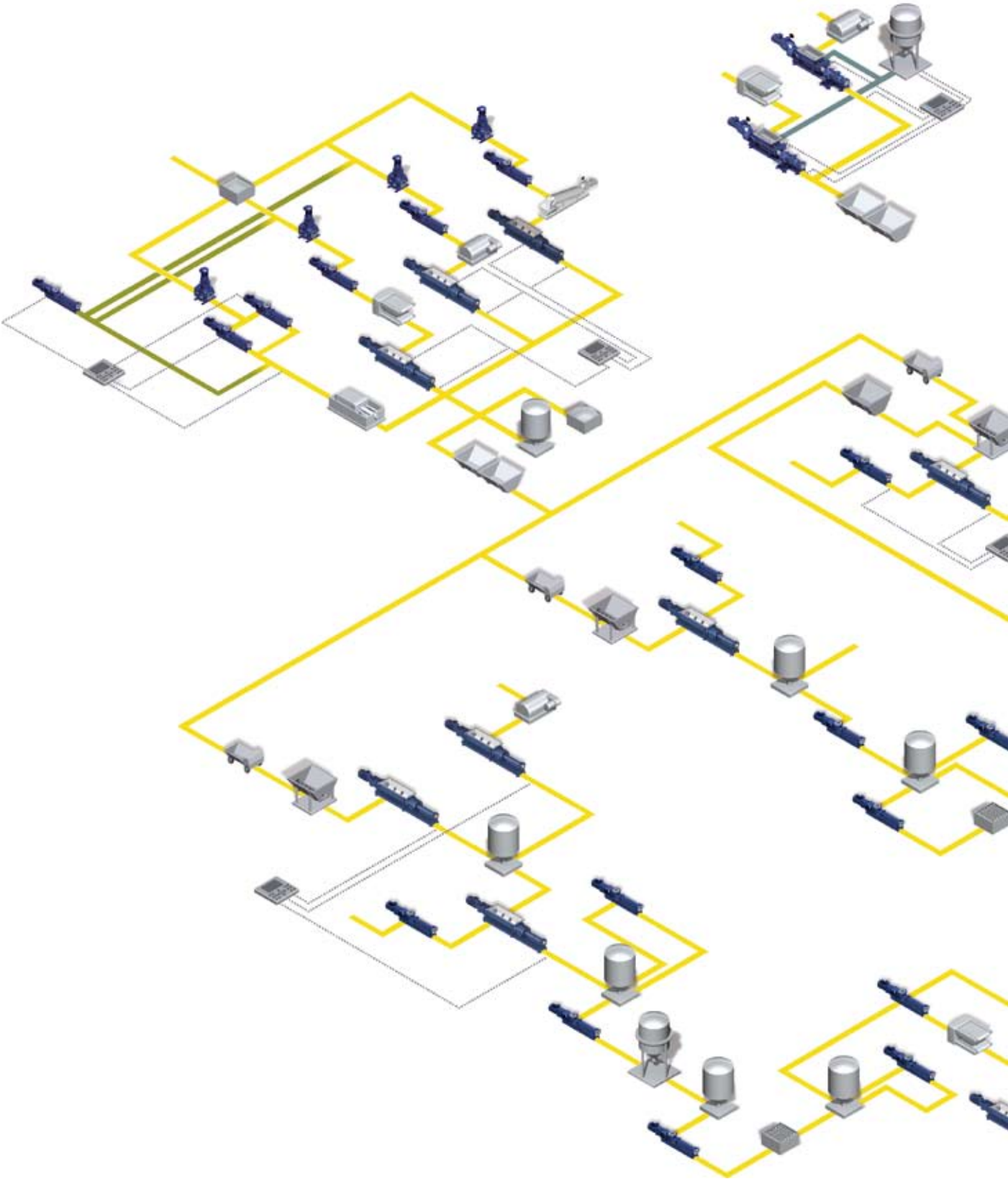
Friction loss reduction

Control and reduction of pipework friction loss when pumping high solids content sludge incorporates a boundary layer pump, pressure switch and controller to minimize the useage of boundary layer liquid.

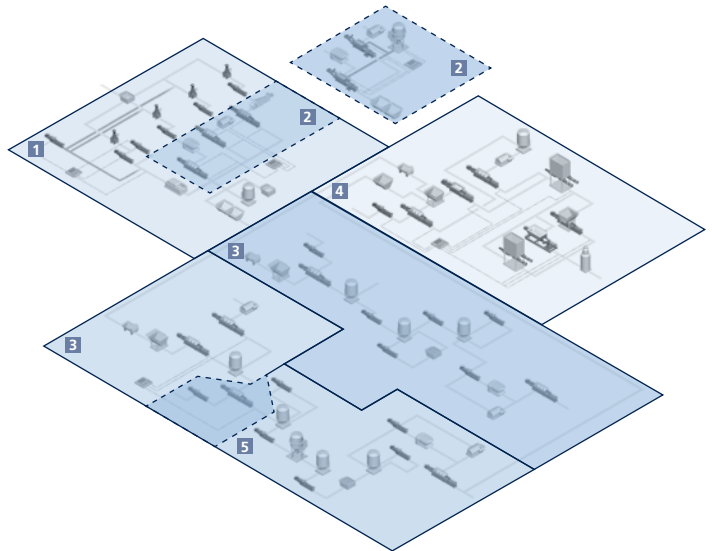
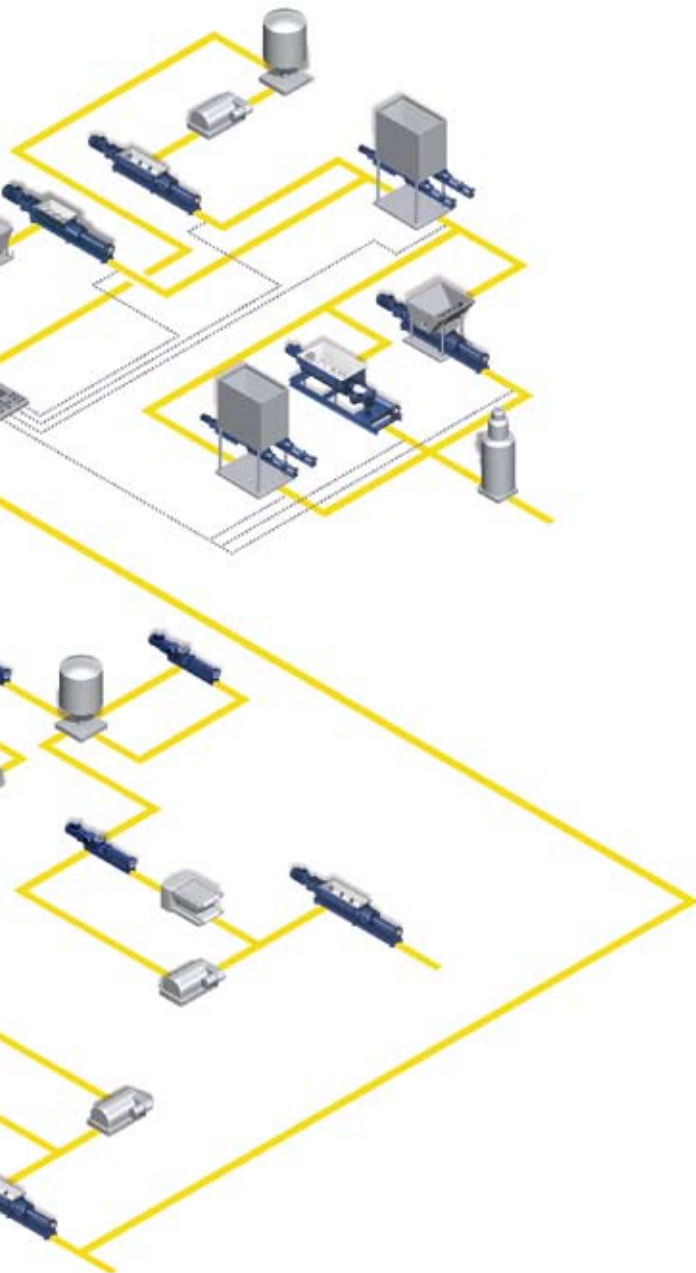


Load cells, flow and pressure control

Sewage treatment plant installation – overview.



Several sectors and alternatives of sludge handling



1 Sludge dewatering

Pumping of:

- Digested sludge
- Flotation sludge
- Primary sludge
- Thickened sludge
- Sludge circulation
- Surplus activated sludge
- Dewatered sludge with a ds content of 20 – 40 %

2 Lime stabilization

Pumping and conditioning of:

- Dewatered sludge with quick lime for pathogen kill and agricultural usage

3 Sludge mixing, sludge back mixing

- Remixing of dewatered sludge with a ds content of 20 – 30 % for further processing with advanced digestion

4 Sludge drying and incineration

Pumping of:

- Dewatered sludge with a ds content of 25 – 45 %

5 Advanced digestion

Pumping of:

- Dewatered sludge with a ds content of approx. 20 – 40 %
- Re-mixing of dewatered sludge to a ds content of 14 – 16 % ds to feed thermal hydrolysis plant
- Hot sludge
- Digester feed
- Digester circulation

Pumping solutions for sludge dewatering.

After sludge treatment, sludge volume is reduced by dewatering. Polymer is added and the free water removed by mechanical means such as belt presses, centrifuges, filter presses or other dewatering devices. A dry solids content of 18 – 45 % is achieved dependent upon the organic matter and the primary/secondary sludge ratios. The physical characteristics of the sludge will vary and it may be very sticky which can have a detrimental effect on system performance. It is therefore essential that the pumping solution selected has the flexibility to handle these demands.

This enables the following disposal or utilization options:

- Landfill
- Agricultural use
- Off site removal to central process facility
- On site processing: thermal drying, incineration, biogas production

Applications (see flow chart on next page)

- 1 BN range pumps feed dewatering devices like filter presses, belt presses, centrifuges or screw presses
- 2 M group macerators homogenize and prevent build up of fibrous matter in digested sludge
- 3 BTHE range pumps transport dewatered sludge from filter presses, belt presses, centrifuges or screw presses to intermediate storage facilities
- 4 Control system FPPU of product group CO for controlling, adjusting and monitoring while feeding filter presses
- 5 Control system of product group CO for controlling, adjusting and monitoring boundary layer injection (BLI), hopper level control, pressure control and/or dry running protection device (TSE)

Features

- High solids pumping over a long distance
- Advanced auger feed screw design
- Pump and hopper designed to application requirements
- Boundary layer injection system to reduce friction loss and whole life costs
- Fully automated control systems to match sludge cake pump to dewatering equipment output
- Transporting dewatered sludge in a fully enclosed system to final location
- Viscosity is not a limitation



Pump of range THE 70-48

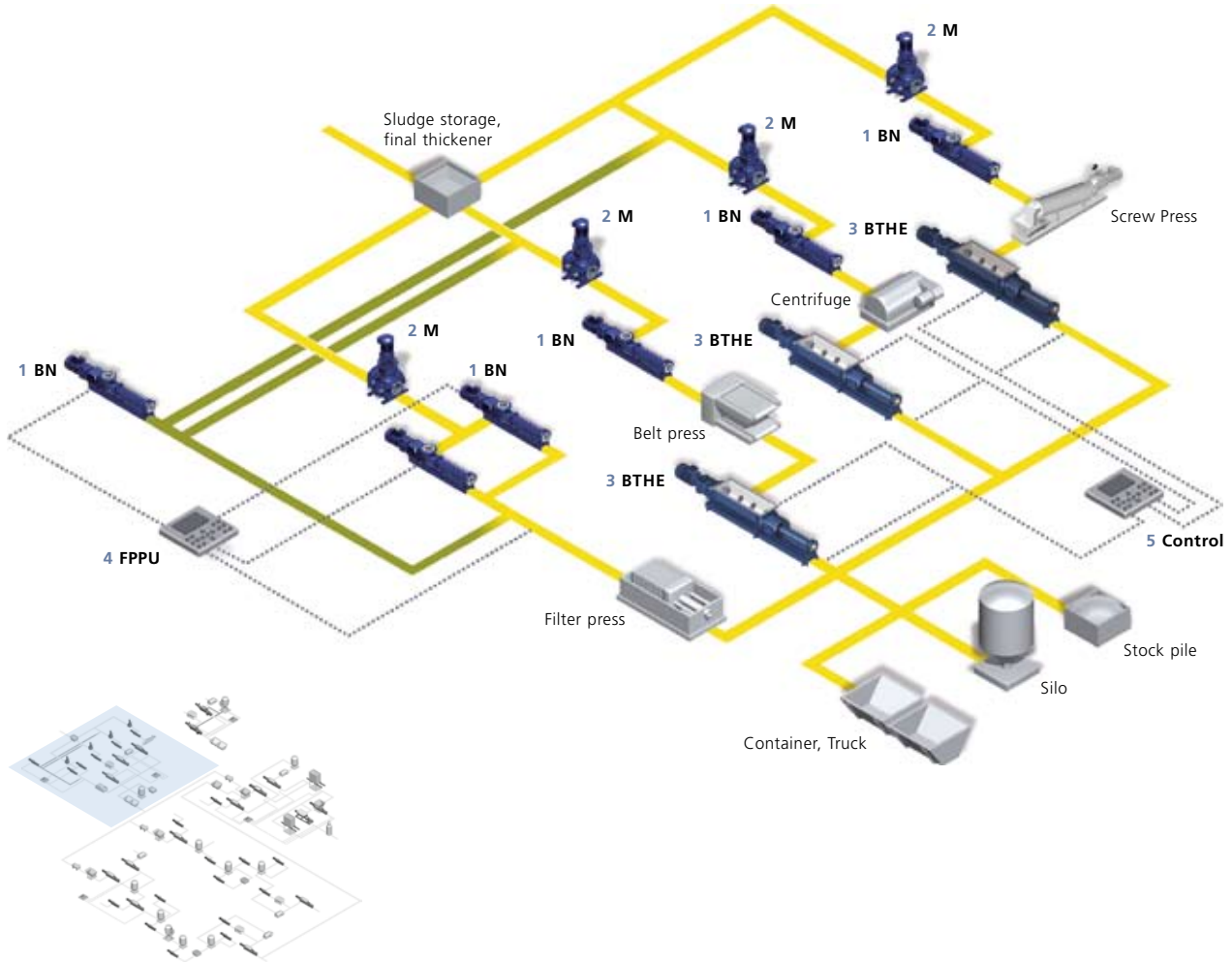
Conveying product: Dewatered/thickened sludge from the centrifuge with a ds content of 7 – 28 % • Conveying capacity: 3 – 31 m³/h (13 – 136 GPM) • Pressure: 36 bar (522 PSI) • Temperature: 20 °C (68 °F)



Pump of range BTHE 10-24

Conveying product: Dewatered sludge with a ds content of 20 – 30 % • Conveying capacity: 2 m³/h (8.8 GPM) • Pressure: 4 bar (58 PSI) • Temperature: 5 – 40 °C (41 – 104 °F)

Flow chart based on sludge dewatering



Long distances
seepex pumps convey dewatered sludge over long distances – even over 200 m (650 ft).



Long distances – even vertically
seepex pumps not only convey dewatered sludge horizontally over long distances. Vertical head – 30 m (98 ft) to silo top – is not a limitation.

Pumping solutions for lime stabilization.

Mixing additives into dewatered sludge can improve the chemical and physical properties to enable alternative agricultural disposal. Quicklime (CaO) is used because it produces an exothermal reaction which reduces moisture content, increases temperature and pH value thereby reducing pathogens.

A seepex enclosed system offers a safe and effective method of mixing quicklime into sludge with no odor release. The optimum use of quicklime is controlled by the seepex dosing system. Consistent mixing is ensured by the action of bridge breaker paddle shafts, auger feed screw and rotor/stator pump action.

Applications (see flow chart on next page)

- 1 BTI range pumps transport dewatered sludge from belt presses and centrifuges to intermediate storage facilities, mix quicklime within the pump and optimize the sludge for agricultural applications
- 2 Control system SLCO of product group CO for controlling, adjusting and monitoring our pumps in dewatered sludge treatment

Features

- High solids pumping over long distances
- Advanced auger feed screw design
- Pump and hopper tailor-made to application requirements
- Boundary layer injection system to reduce friction loss and power requirements
- Mixing and transporting of conditioned sludge in an enclosed system
- Fully automated control system to match sludge cake pump to dewatering equipment output, ensures correct ratio of quicklime mixed with sludge and process control
- Viscosity is not a limitation
- Lower capital and operating costs than mechanical conveyors



Pump of range BTI 17-24

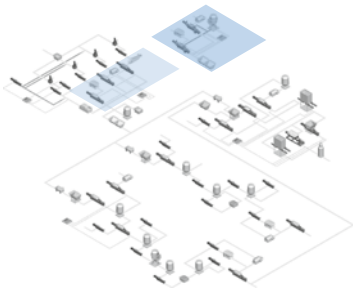
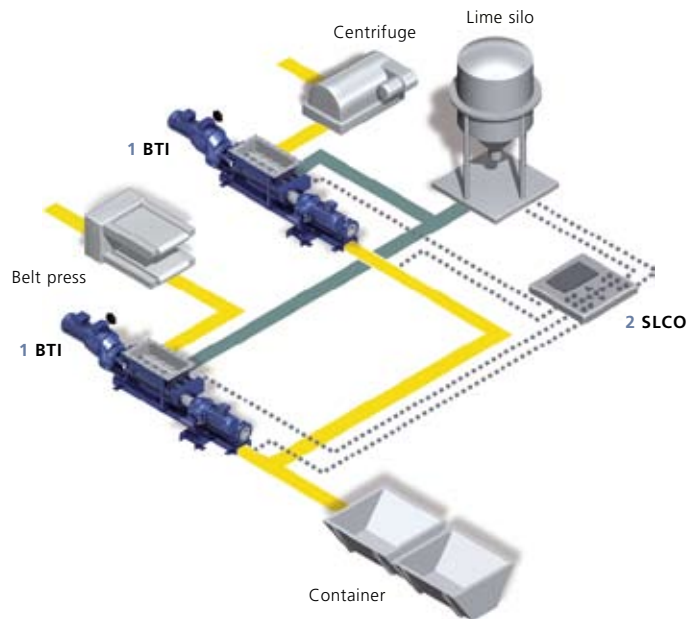
Conveying product: Dewatered sludge with a ds content of 25 %
Conveying capacity: 3 m³/h (13 GPM) • Pressure: 11 bar (159 PSI)
Temperature: 20 °C (68 °F)



Pump of range BTEI 17-12 with special integrated buffer hopper

Conveying product: Dewatered sludge with a ds content of 30 %
Conveying capacity: 1 – 2.8 m³/h (4.4 – 12 GPM) • Pressure: 5 bar (72 PSI)
Temperature: 20 °C (68 °F)

Flow chart based on lime stabilization of dewatered sludge



Pump of range BTI 35-24

Conveying product: Dewatered sludge with a ds content of 27 – 35 %
 Conveying capacity: 1 – 6 m³/h (4.4 – 26 GPM)
 Pressure: 16 – 20 bar (232 – 290 PSI) • Temperature: 20 °C (68 °F)



Stock pile

Enhanced sludge structure, almost without infection risk and more acceptable for further use.

Pumping solutions for sludge mixing.

Sludge treatment centers receive imported sludge cake that has been dewatered at smaller satellite works. The imported sludge cake is typically discharged by truck into a reception bunker which can be installed above or below ground level depending upon the application.

Where there is a requirement for back mixing sludge, a seepex system comprised of a mixing pump and liquid feed pump is used to produce the correct feedstock for a variety of further processing options. Precise control can be achieved regardless of variations in original sludge solids contents.

Applications (see flow chart on next page, above)

- 1 BTHE range pumps transport sludge with a ds content of 18 – 35 % from satellite plants to intermediate storage facilities
- 2 BTHE range pumps transport indigenous sludges with a ds content of 18 – 35 % from dewatering devices to intermediate storage facilities
- 3 BN range pumps transport liquid sludge into BTHE range pumps
- 4 BTHE range pumps mix dewatered sludge to achieve a ds content of 14 – 18 % to feed a thermal hydrolysis plant
- 5 Control system of product group CO for controlling, adjusting and monitoring boundary layer injection (BLI), hopper level control, pressure control and/or dry running protection device (TSE)



Pumps of range BTHE 70-24 with hopper level controlled via load cells
Conveying product: Dewatered sludge with a ds content of up to 20 – 35 %
Conveying capacity: 10 m³/h (44 GPM) • Pressure: 14 bar (203 PSI)
Temperature: 20 °C (68 °F)

(see flow chart on next page, below)

- 1 BN range pumps transport liquid sludge with a ds content of 1 – 2 % into BTHE range pumps
- 2 BTHE range pumps transport sludge to achieve a ds content of 4 – 6 % for onward processing
- 3 BN range pumps transport raw sludge
- 4 BN range pumps recirculate thickened raw sludge through pre-heater, temperature of 60 – 80 °C
- 5 BN range pumps transport thickened raw sludge with a temperature of 60 – 80 °C to digester
- 6 BN range pumps for digester recirculation
- 7 BN range pumps for feeding dewatering equipment
- 8 BTHE range pumps transport sludges from post digestion dewatering devices to thermal drying or incineration processes

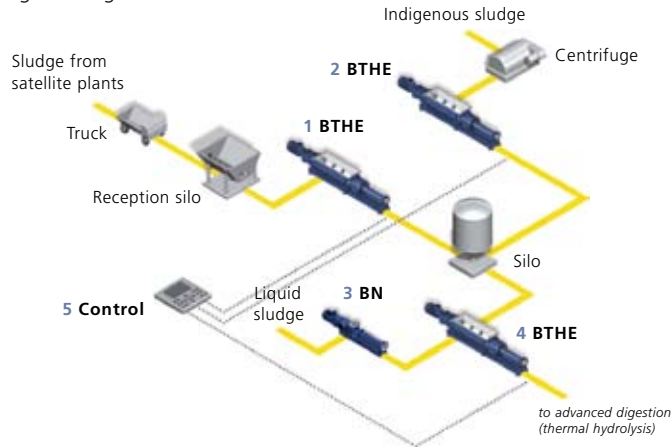
Features

- High solids pumping over a long distance
- Advanced auger feed screw design
- Pump and hopper designed to application requirements
- Boundary layer injection system to reduce friction loss and power requirements
- Viscosity is not a limitation
- Mixing of sludge to achieve desired output of feed stock
- Constant flow independent of head

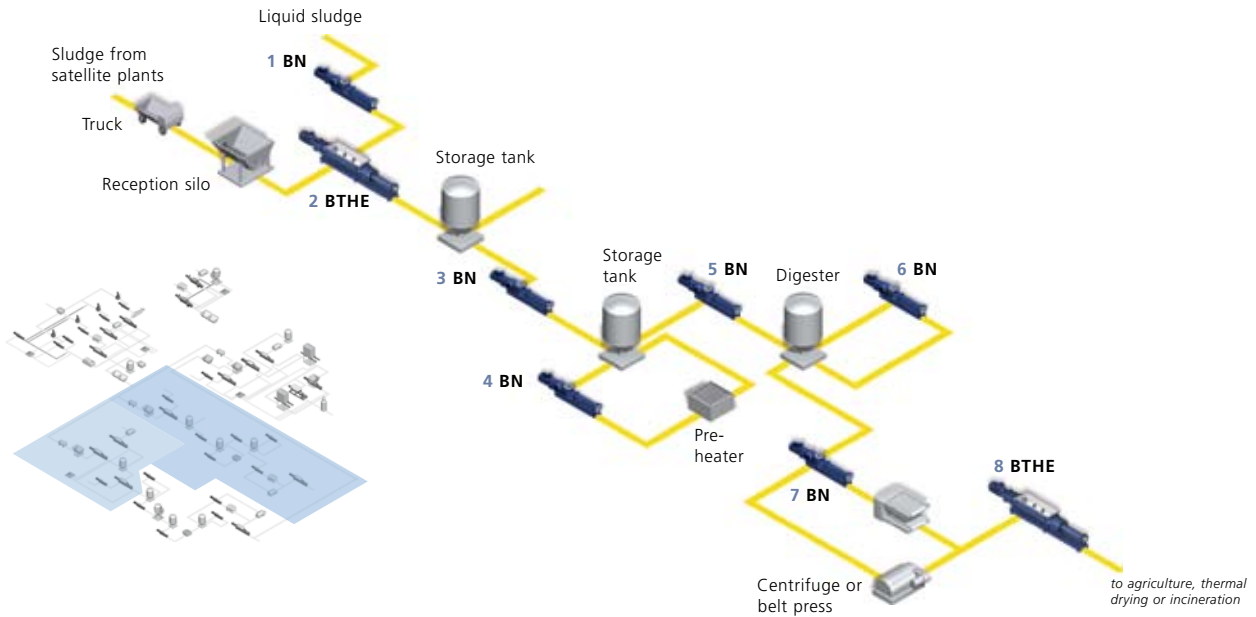


Pumps of range BTI 35-48
Conveying product: Dewatered sludge
Conveying capacity: 16 m³/h (70 GPM) • Pressure: 35 bar (507 PSI)
Temperature: 20 °C (68 °F)

Flow chart based on sludge mixing



Flow chart based on sludge back mixing



Pump of range THE 300-12TU

Conveying product: Dewatered sludge with a ds content of 25 – 30 % mixed to 4 – 6 % for advanced digestion • Conveying capacity: 55 – 150 m³/h (242 – 660 GPM) • Pressure: 12 bar (174 PSI) • Temperature: 20 °C (68 °F)



Pumps of range BTHE 70-24 under silo

Conveying product: Dewatered sludge with a ds content of 25 – 30 % mixed to 4 – 6 % • Conveying capacity: 22 m³/h (96 GPM) • Pressure: 11 bar (159 PSI) • Temperature: 20 °C (68 °F)

Pumping solutions for sludge drying and incineration.

Sludge drying and incineration plants are typically installed at regional sludge treatment centers where the removal of the remaining water to produce a finished product of normally around 90 – 95 % dry solids is achieved. These treatment centers not only process their own indigenous dewatered sludge cake but additionally receive imported sludge cake from satellite works. The imported sludge can be raw, biological, mixed or digested depending upon the processes employed.

Dewatered sludge handling requirements will vary in the sludge treatment center but will typically consist of:

- Reception bunker discharge to main storage silo
- Reception bunker mixing of raw sludge
- Indigenous dewatered sludge handling from dewatering equipment to storage silos
- Main storage silo discharge to thermal dryer or incinerator
- Various options of small buffer silos with capacities up to 10 m³
- Mixing of ground dryer material into the “wet” dewatered sludge to improve dryer performance

All the above requirements have specific needs and require a pump system that can be engineered and adapted to suit the individual project.

Applications (see flow chart on next page)

- 1 BN range pumps transport liquid sludges received from satellite plants into BTHE range pump
- 2 BTHE range pumps transport mix imported dewatered sludge with liquid sludge to feed digester
- 3 BTHE range pumps transport imported dewatered sludge from intermediate storage facilities to large push floor silos
- 4 BTHE range pumps transport imported dewatered sludge from dewatering devices to large push floor silos
- 5 BTES range pumps transport sludge to different pump/silo combinations and then to dryer or incinerator
- 6 Pump/silo combinations consisting of different pump ranges like BTHE or BTEI and different silo types
- 7 Control system of product group CO for controlling, adjusting and monitoring boundary layer injection (BLI), hopper level control, pressure control and/or dry running protection device (TSE)

Features

- High solids pumping over a long distance
- Advanced auger feed screw design
- Pump and hopper designed to application requirements
- Fully automated control systems to match sludge cake pump to dewatering equipment output
- Hot sludge elastomer compatibility

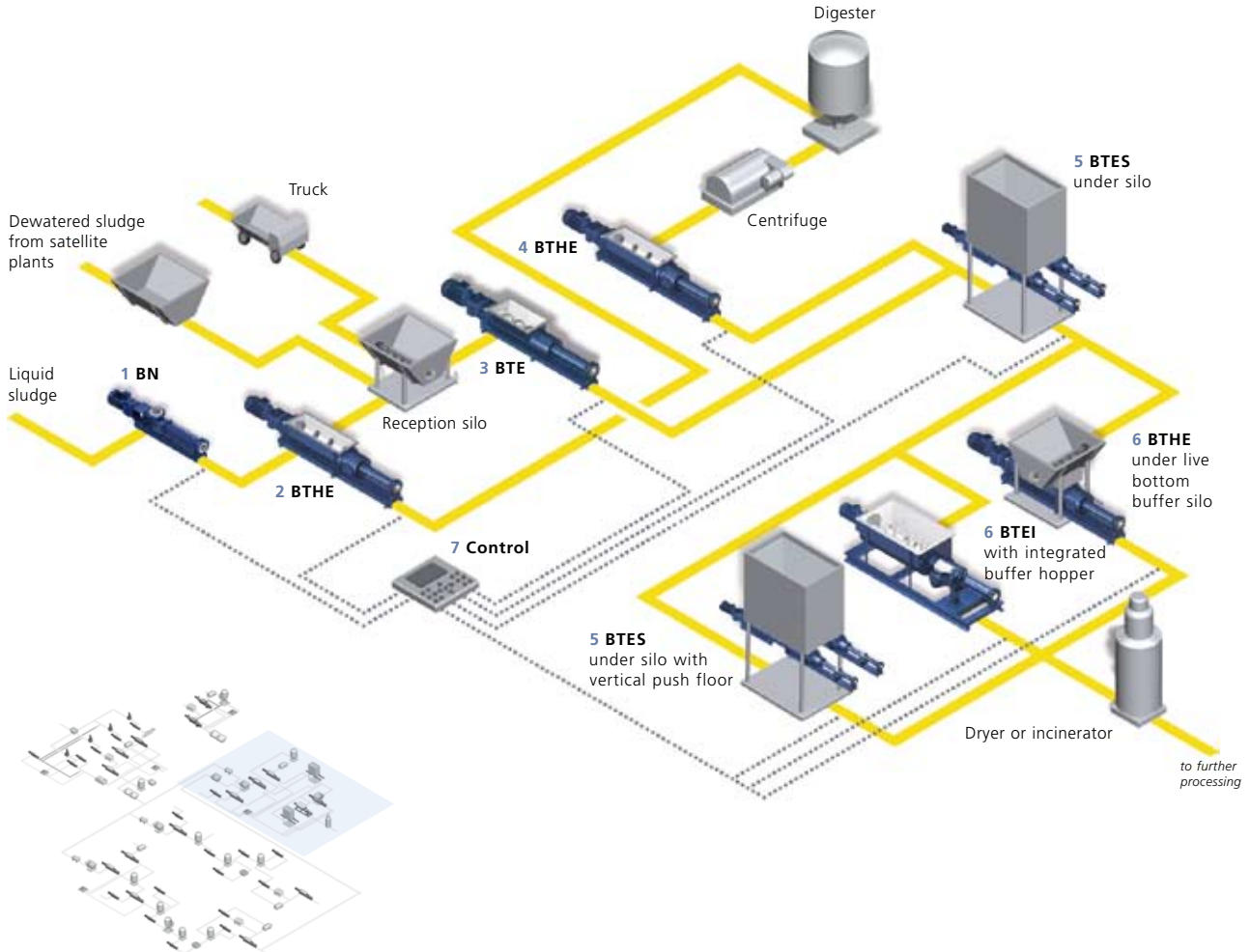


Pumps of range BTEI 17-48 with 6 t buffer hopper with live bottom
Conveying product: Dewatered sludge with a ds content of 16 – 18 %
Conveying capacity: 4 m³/h (17 GPM) • Pressure: 24 bar (348 PSI)
Temperature: 20 °C (68 °F)



Pumps of range BTEI 17-24 installed under reception silo
Conveying product: Oily sludge cake with a ds content of 60 %
Conveying capacity: 4 m³/h (17 GPM) • Pressure: 16 bar (232 PSI)
Temperature: 5 – 40 °C (41 – 104 °F)

Flow chart based on sludge drying and incineration



Pumps of range THE 300-27TH

Conveying product: Dewatered sludge with a ds content of 15 – 30 %
 Conveying capacity: 65 m³/h (288 GPM) • Pressure: 17 bar (246 PSI)
 Temperature: 70 – 100 °C (158 – 212 °F)



Pump of range BTE 70-24

Conveying product: Dewatered sludge with a ds content of 20 – 35 %
 Conveying capacity: 10 – 25 m³/h (44 – 110 GPM)
 Pressure: 10 – 20 bar (145 – 290 PSI) • Temperature: 20 °C (68 °F)

Pumping solutions for advanced digestion.

Anaerobic digestion is a proven technology used to break down organic matter and to produce biogas which is then used to generate green energy. Advanced anaerobic digestion is one of the latest processes being recognized as the technology of choice. For sludge treatment it is used to increase biogas production and produce a pathogen free end product, which is easier to dewater thus resulting in less sludge volume for disposal.

Advanced anaerobic digestion can involve thermal pre-treatment of sludge with resultant changes to sludge characteristics that have challenged pump designs. Our vast application knowledge, together with R & D capabilities and a commitment to working with our customers, has led to the development of tailor-made equipment to meet the high demands of this process technology.

Applications (see flow chart on next page)

- 1 BN range pumps transport sludge with a ds content of 1 – 2 % into BT or BTHE range pumps
- 2 BT or BTHE range pumps mix dewatered sludge to a ds content of 14 – 18 % to feed a thermal hydrolysis plant
- 3 BN range pumps work as circulation pumps
- 4 BN range pumps transport sludge from a pulper to a reactor and flash tank
- 5 BN range pumps transport sludge from the flash tank to a heat exchanger to a digester
- 6 BN range pumps transport sludge from the digester to dewatering devices
- 7 BTHE range pumps transport pathogen-free “Class-A” sludge to further processing
- 8 Control system of product group CO for controlling, adjusting and monitoring boundary layer injection (BLI), hopper level control, pressure control and/or dry running protection device (TSE)

Features

- Hot sludge elastomer compatibility
- Mixing of sludge to achieve desired output of feed stock
- High solids pumping over a long distance
- Advanced auger feed screw design
- Viscosity is not a limitation
- Pump and hopper designed to application requirements
- Transporting dewatered sludge in a fully enclosed system to final location



Pump of range THE 130-24

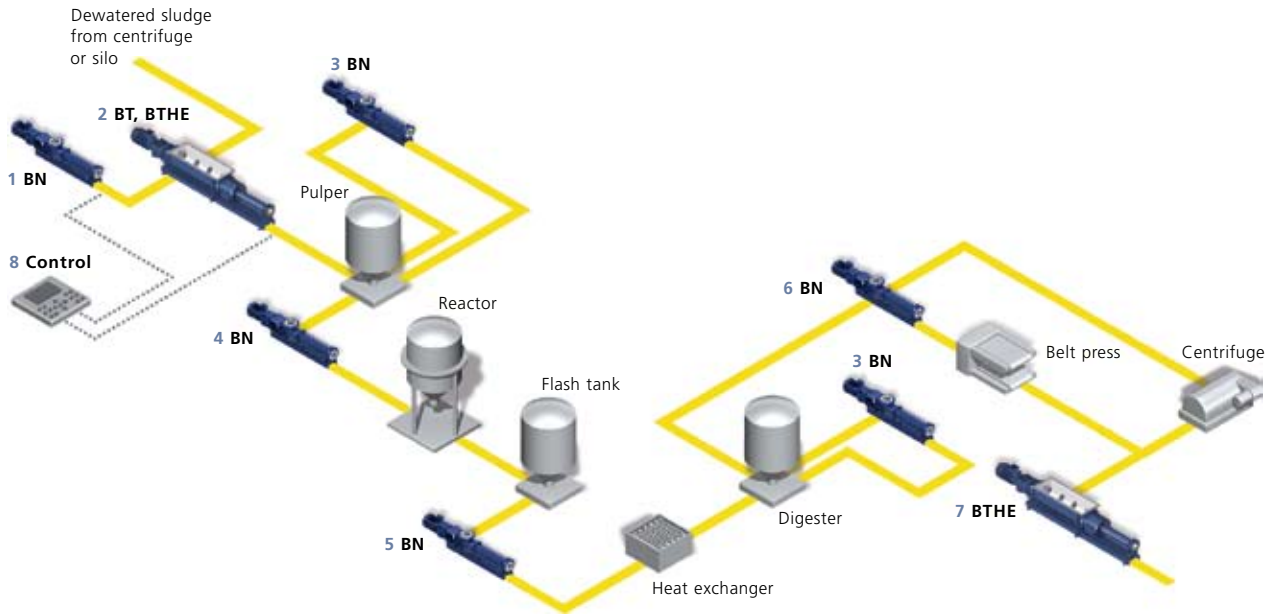
Conveying product: Dewatered sludge with a ds content of 25 % mixed to 14 – 16 % • Conveying capacity: 22 m³/h (96 GPM)
Pressure: 10 bar (145 PSI) • Temperature: 20 °C (68 °F)



Pumps of range BN 110-12T

Conveying product: Mixed sludge with a ds content of 6 – 10 %
Conveying capacity: 25 m³/h (110 GPM) • Pressure: 8 bar (116 PSI)
Temperature: 50 – 110 °C (122 – 230 °F)

Flow chart based on thermal hydrolysis



Pump of range BTEI 17-48

Conveying product: Dewatered sludge with a ds content of 30 %
 Conveying capacity: 3 m³/h (13 GPM) • Pressure: 24 bar (348 PSI)
 Temperature: 20 °C (68 °F)



Pumps of range BTHE 130-24R

Conveying product: Imported sludge cake with a ds content of 25 – 30 %
 Conveying capacity: 20 m³/h (88 GPM) • Pressure: 10 bar (145 PSI)
 Temperature: 20 – 30 °C (68 – 86 °F)

Your pump solutions at a glance.

seepex pumps gently transport thin to high-viscosity products with and without solids over a wide temperature range with low pulsations and low shear. They also feature excellent metering accuracy and can easily pump media such as de-watered sludge and chemical additives.

Product group N pumps with two ranges are used in virtually all industry sectors to convey thin to high viscosity materials with or without solids for up to 15 %. They are also used in metering applications e.g. to meter water, lime milk and flocculants.

- > Conveying capacity: 30 l/h – 500 m³/h (0.13 GPM – 2,200 GPM), Pressure: up to 48 bar (720 PSI)

Range BN



Nine ranges of product group T open hopper pumps are available. They are used to handle highly viscous, non-flowable products. T range pumps incorporate an open hopper and variants of auger feed screws are available to suit specific applications. They are therefore ideal for pumping thickened, pre-dewatered sludge with up to 18 % solids and dewatered sludge with and without quicklime up to 45 % solids.

- > Conveying capacity: 0.5 m³/h – 130 m³/h (2.2 GPM – 572 GPM), Pressure: up to 36 bar (540 PSI)

Range BTH/BTHE

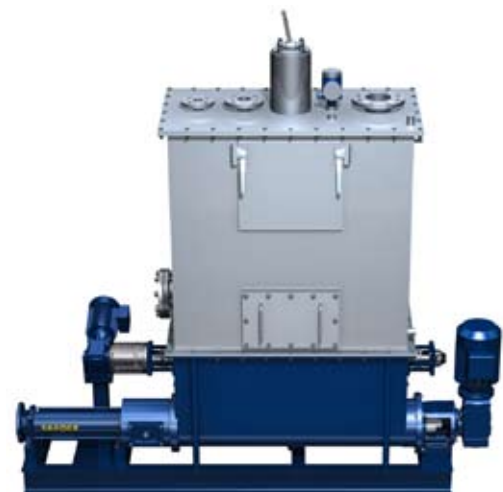


Due to low investment costs and the ease in upgrading older plants with this new technology, the BTEI range of pumps are the perfect choice where an intermediate buffer silo is required. Storage capacities of up to 10 m³ are available.

These plants are fully automated with various measurement and control devices. Optionally available ultrasonic level measurement integrated in the BTEI storage hopper guarantees consistent product level and continuous feed.

- > Conveying capacity: 0.5 m³/h – 100 m³/h (2.2 GPM – 440 GPM), Pressure: up to 36 bar (540 PSI)

Range BTEI



The BTES range pumps can be fitted under push floor (live bottom) silos. They are equipped with a shut off system which allows for pump maintenance under filled silos.

- > Conveying capacity: 0.5 m³/h – 130 m³/h (2.2 GPM – 572 GPM), Pressure: up to 24 bar (360 PSI)

Range BTES



Product group D metering pumps are available in six different ranges for pumping and dosing small quantities in virtually all industries. They are especially suited for low pulsation metering of low to high viscosity media containing solids and chemically aggressive media with a high accuracy. Typical products handled are flocculants, coagulants and chloramine.

- > Conveying capacity: 0.2 l/h – 1,000 l/h (up to 380 GPH), Pressure: up to 24 bar (360 PSI)

Range MD



seepex macerators are available in two ranges, these are mainly used in municipal and industrial waste water applications to reduce the size of solids and fibers in the pumped product increasing the reliability of pumps and other downstream equipment. They are available as inline designs with integrated solid separators and universal versions for direct installation in a pipeline or with a supply container with a direct connection to one of our pumps.

- > Flow rate: up to 150 m³/h (660 GPM)

Range I



See our "Product groups and ranges" brochure for further solutions for a wide range of applications.

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

Or visit www.seepex.com

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