

SEEPEX.
An Ingersoll Rand Business

YOUR PUMP SOLUTION **ENVIRONMENTAL** **ENGINEERING**



SERVING THE ENVIRONMENT.

MODULAR PUMP SYSTEM

**MARKET-SPECIFIC
PRODUCT GROUPS
WITH HIGH-
PERFORMANCE
RANGES**

CUSTOMER-SPECIFIC SOLUTIONS

- Application-specific solutions
- Innovative designs
- Reduced life cycle costs
- High energy efficiency
- First-class range of services

CONVEYING CAPACITIES

**0.06 L/H TO
500 M³/H
(0.016 USGPH-
2,200 USGPM)**

DIFFERENTIAL PRESSURES

**UP TO 96 BAR
(1400 PSI)**

Protecting the environment is one of the most important issues of our time. Consequently, environmental technology has become one of the main industries today – presenting various challenges for pump manufacturers.

SEPEX, as a worldwide leading specialist in progressive cavity pump technology has been addressing these challenges since 1972 – offering the most technical and economical solutions for the environmental industry.

One key task is wastewater treatment, especially from municipal and industrial sources. The aim of treatment is to extract the waste content and restore the natural water quality, using chemical, biological and mechanical processes, while following strict environmental guidelines to ensure high operational reliability and safety.

Our modular pump system with a variety of market-specific product groups and high-performance ranges, together with macerators and control systems, is used in virtually all processes within sludge treatment and disposal. Primary and secondary, thickened and dewatered sludge and the metering of chemicals are handled using SEPEX pumps. Each pump is selected according to the requirements of the application; neutralization, separation of liquids from solids, reduction of organic fractions and nitrogen and phosphate elimination.

We enjoy responding to challenges using state-of-the art technology and offer a full service portfolio, all of which ensures compliance with global and country specific regulations.

Reliability is maximized by a comprehensive range of services for all phases of the pump life. This ensures the lowest life-cycle costs and optimum uptime over the lifetime of the pump.



WASTEWATER AND SLUDGE TREATMENT.

CONVEYED PRODUCT

- Domestic sewage
- Imported sludge
- Primary sludge
- Secondary or activated sludge
- Thickened sludge
- Chemicals and flocculants

KEY SPECIFICATIONS

PUMPING OF VARIABLE DS% SLUDGE CONTAINING SOLIDS

REVERSIBLE FLOW

COST SAVINGS

- Increased productivity
- Lower energy use with SCT
- Reduced lifecycle costs with SCT

BACKGROUND

The input to treatment plants can be from a variety of sources: directly from a pumping station, from inlet channels or from sludge tankers. It can be produced from municipal or industrial processes. Wastewater contains assorted solids of different size and consistency which have to be removed from the water in this first stage of treatment.

TASK

Primary and secondary or activated sludge, containing solids of varying sizes, with a variable dry solids (ds) content, is pumped from the base of settlement tanks to the next stage of the process. Waste activated sludge, imported sludge and settled primary sludge are thickened to reduce their volume, requiring feed pumps to thickening devices. Thickened sludge of typically 6–10% ds content is pumped from the thickener output to further processing, dewatering and anaerobic digestion. It is essential that the pumping solution selected has the capability to handle these demands.

SOLUTION

Stable, variable flow rates with minimal pulsation, installation flexibility, excellent suction lift capability and solids handling ability mean that SEEPEX pumps offer the best pumping solutions for a wide variety of sludge applications, including primary, secondary and thickened sludge.

Customized BE range pumps, vertically mounted, transfer primary and secondary sludge to mechanical thickening equipment.

BN range pumps fitted with Smart Conveying Technology (SCT) are able to transfer sludge with varying ds content to and from thickening devices. Flocculants to aid thickening are accurately metered into the sludge using pumps from product groups D and N.

Macerators from product group M protect pumps from blockages by reducing the size of the solids.

Depending upon the ds content and viscosity of the thickened sludge, BN range or BTQ and BT open hopper pumps, transfer the thickened sludge to further treatment or storage facilities. These pumps together with control systems from product group CO are optimized to the output of the thickener.



BENEFITS

- Lower energy requirements
- Ability to handle varying ds contents and viscosity
- High self-priming capabilities even with a mixture of liquid and air/gas up to a 9 m (29.5 ft.) water column
- Ease of maintenance and extended pump life
- Integrated pump and control systems to maximize productivity
- Flexible installation, horizontal or vertical configurations
- Accurate metering of flocculants
- Comprehensive range of SEEPEX support and services

SLUDGE DEWATERING.

CONVEYED PRODUCT

- Thickened sludge
- Flocculants
- Dewatered sludge with ds content up to 45%
- Polymer for boundary layer injection

KEY SPECIFICATIONS

HIGH SOLIDS TRANSFER

AUTOMATED SYSTEMS LINKED TO DEWATERING DEVICES

LONG DISTANCE PUMPING

COST SAVINGS

- Automated systems improve reliability
- Boundary layer injection reduces costs
- Lower energy use compared to other pumps

BACKGROUND

Dewatering helps to achieve a reduction in sludge volume, enabling disposal into the agricultural industry, drying or incineration. Dewatered sludge may also be removed from site and transferred to a central processing plant, in this case dewatering reduces the cost of transport.

TASK

To dewater the sludge flocculants are added and free water removed by decanter centrifuges, belt presses, chamber and membrane filter presses and other various dewatering machines. A dry solids (ds) content of 20-45% can be achieved depending on the organic matter and ratios of primary/secondary sludge.

Pump solutions selected to handle sludge with a variable consistency must have flexibility to meet the demands of reliable transfer to and from dewatering devices.

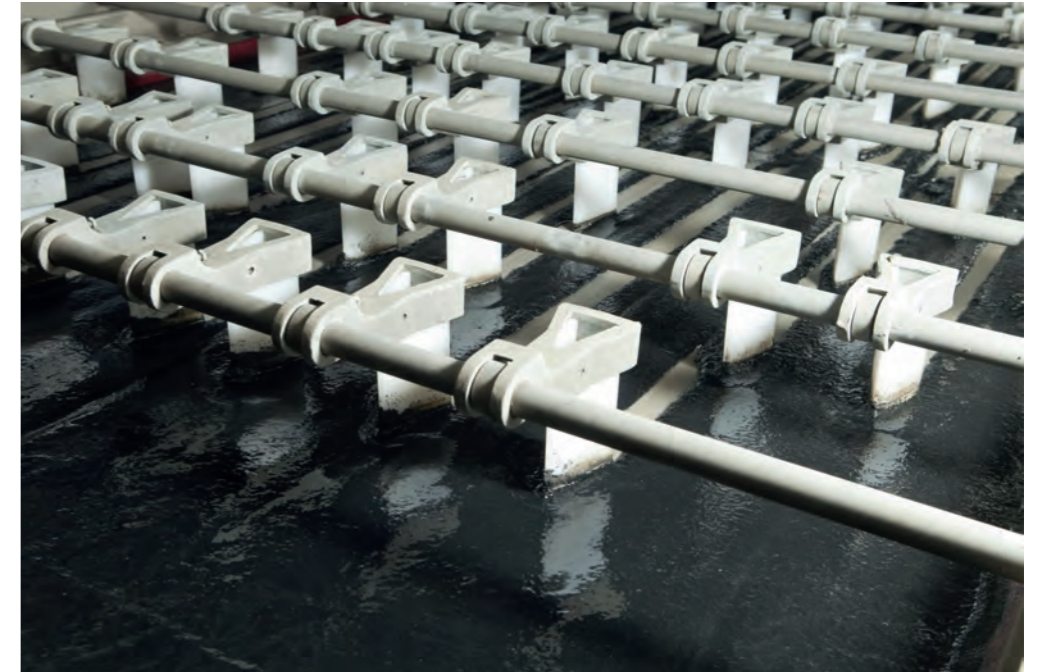
SOLUTION

BN range pumps, fitted with SCT and combined with macerators for solids reduction, transfer flowable sludge to dewatering devices.

Open hopper pumps from product group T are designed to remove the sludge, which has a high ds content and is highly viscous and non-flowable, from a variety of dewatering devices. Hopper and auger configurations are designed to match the characteristics of sludge in specific applications.

To reduce friction losses and the energy demands of the pump, boundary layer fluid is injected into discharge pipework by MD and BN range pumps. This enables transfer over long distances with reduced system costs and extended pump life.

As well as pumps, SEEPEX control systems match pump speed to the output of dewatering devices and control injection of the boundary layer liquid to optimize efficiency of the whole system. BTES range silo pumps transfer sludge from silos throughout the process, removing the need for separate conveyors and simplifying control systems.



BENEFITS

- Pumping dewatered sludge at high ds content over long distances
- Boundary layer systems reduce system and operating costs
- Pump and control package designed by application experts
- Transport of dewatered sludge in a fully enclosed system through the process
- Predictable flows, despite varying solids or viscosities

SLUDGE MIXING.

CONVEYED PRODUCT

- Dewatered sludge cake
- Liquid sludge
- Thickened sludge
- Polymer for boundary layer injection
- Dewatered sludge with quicklime

KEY SPECIFICATIONS

MIXING LIQUID WITH DEWATERED SLUDGE CAKE

CONTROL SYSTEMS FOR SYSTEM EFFICIENCY

PUMPING OVER LONG DISTANCES

COST SAVINGS

- Energy efficiency with boundary layer injection
- In pump mixing reduces capital costs
- Accurate system control improves productivity

BACKGROUND

Centralized treatment centers receive dewatered sludge cake from smaller satellite works. The cake is delivered into reception bunkers and mixed as required with liquid sludge to produce the correct ds content and consistency for further processing.

TASK

Accurate flow control and efficient mixing of liquid with dewatered sludge is essential to produce sludge with the required ds content for a variety of further processing options. This demand for consistency, despite variations in the original sludge solids content, presents challenges to be overcome by pump and control technology.

SOLUTION

A SEEPEX system comprised of a mixing pump and liquid feed pump is used to produce sludge with the correct ds content. The combination of variable liquid addition flow rates and the ability to handle non-flowable products provides the best solution for back mixing to specified ds content.

BN range pumps proportion the correct amount of liquid into the hopper of pumps of product group T where it is mixed with dewatered sludge before being pumped. SEEPEX control systems monitor the output and adjust liquid addition accordingly, producing the ideal sludge consistency.

BENEFITS

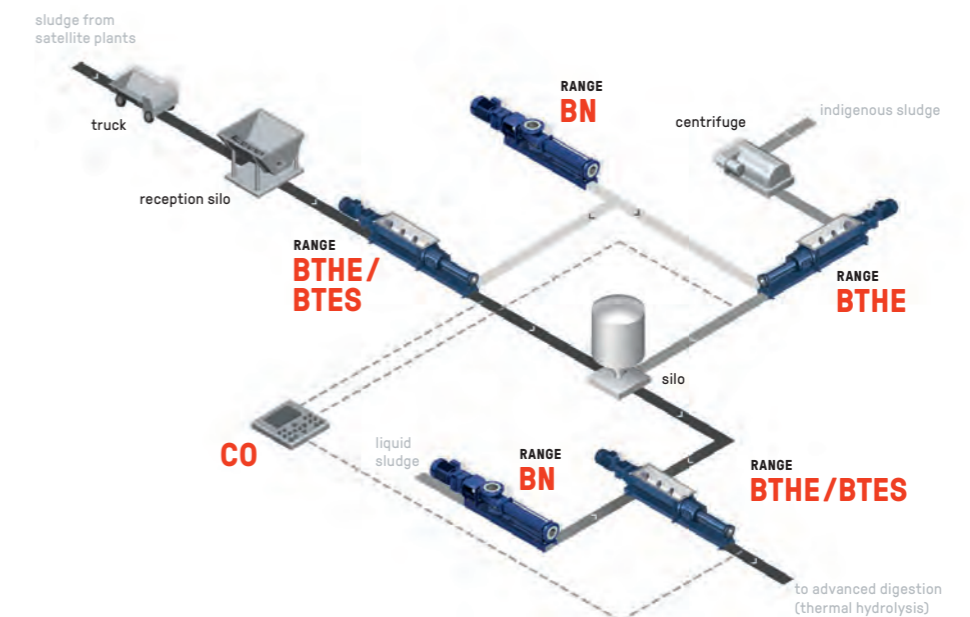
- Efficiency mixing in pump to achieve desired output ds content
- Pump hoppers designed to meet application requirements
- Pumping of sludge with high ds content – even over long distances
- Boundary layer injection reduces energy requirements
- SEEPEX integrated controls improve efficiency



SLUDGE MIXING FLOW CHART

APPLICATIONS

1. BTHE/BTES pumps transfer sludge with a ds content of 18-35% to storage tanks
2. BN range pumps with SCT transfer liquid sludge into the BTHE mixer pump
3. BTHE pumps mix dewatered sludge with liquid sludge to achieve ds content suitable for further processing.
4. BN range pumps add polymer for boundary layer injection
5. CO control systems monitor the boundary layer injection, hopper level and pressure control and/or dry-running protection device (TSE)



SLUDGE DRYING AND INCINERATION.

CONVEYED PRODUCT

- Dewatered sludge
- Liquid sludge
- Boundary layer liquid

KEY SPECIFICATIONS

LONG DISTANCE PUMPING

FLEXIBLE PUMP HOPPER CONFIGURATIONS

HIGH SOLIDS TRANSFER

COST SAVINGS

- Optimum feed rates for efficient dryer operation
- Boundary layer reduces energy costs
- Silo discharge pumps reduce system costs

BACKGROUND

After sludge has been dewatered, thermal drying plants remove the remaining water to produce a finished product of 90-95% dry solids, which is pressed into pellets. These pellets are incinerated for energy or used as fertilizer.

TASK

Dewatered sludge with a high ds content is transferred from buffer or main storage silos into a sludge dryer or incinerator. Accurate transfer at a constant rate is essential to ensure optimal dryer or incinerator performance. There is a specific need for pump systems that can be engineered and adapted to suit individual projects while providing lowest cost in use solutions.

SOLUTION

SEPEX has both engineering and application expertise along with a wide range of open hopper pumps for high solids pumping. The flexibility of product group T, in terms of hopper and auger configuration, offers the potential for integration into different silo and reception bunkers.

The ability to accurately meter high volumes of high ds content sludge ensures the efficient operation of the process.

SEPEX control systems monitor and control hopper levels and match pump flow rate to the demands of dryers and incinerators.

BENEFITS

- Continuous metering high ds content sludge into the dryer or incinerator
- High solids pumping over long distances
- Boundary layer injection reduces friction losses
- Pump and hopper configurations designed to application requirements
- Fully automated control systems match pump speed to process demands



ADVANCED DIGESTION, THERMAL HYDROLYSIS.

CONVEYED PRODUCT

- Liquid sludge
- Hot sludge
- Dewatered sludge
- Digested sludge
- Flocculant

KEY SPECIFICATIONS

HOT SLUDGE TRANSFER

MIXING TO ACHIEVE CORRECT PROCESS FEED PUMPING

HIGH SOLIDS PUMPING

COST SAVINGS

- Increased gas yield from optimized solids content
- In pump mixing reduces capital costs

BACKGROUND

Anaerobic digestion is a proven technology used to breakdown organic matter and produce biogas which is converted to green energy. Advanced digestion, incorporating thermal hydrolysis, increases biogas production producing a reduced volume of pathogen free end product that is easier to dewater. More energy and less waste - a perfect environmental solution.

TASK

For maximum gas generation the optimum feed sludge is produced by back-mixing dewatered sludge with liquid to produce the correct ds content for processing. Thermal pre-treatment produces hot sludge at temperatures up to 120°C which is circulated and pumped through the process. Thermal treatment alters sludge properties - which imposes greater demands on the pumps and materials.

SOLUTION

SEPEX develops customized solutions to meet these high process demands - even for high temperature high ds content sludges. The solids handling and mixing capability of pumps from product group T, combined with liquid addition by BN pumps, deliver the best solution for back mixing.

SEPEX control systems monitor the output and adjust liquid addition accordingly, producing the ideal sludge consistency.

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.

BENEFITS

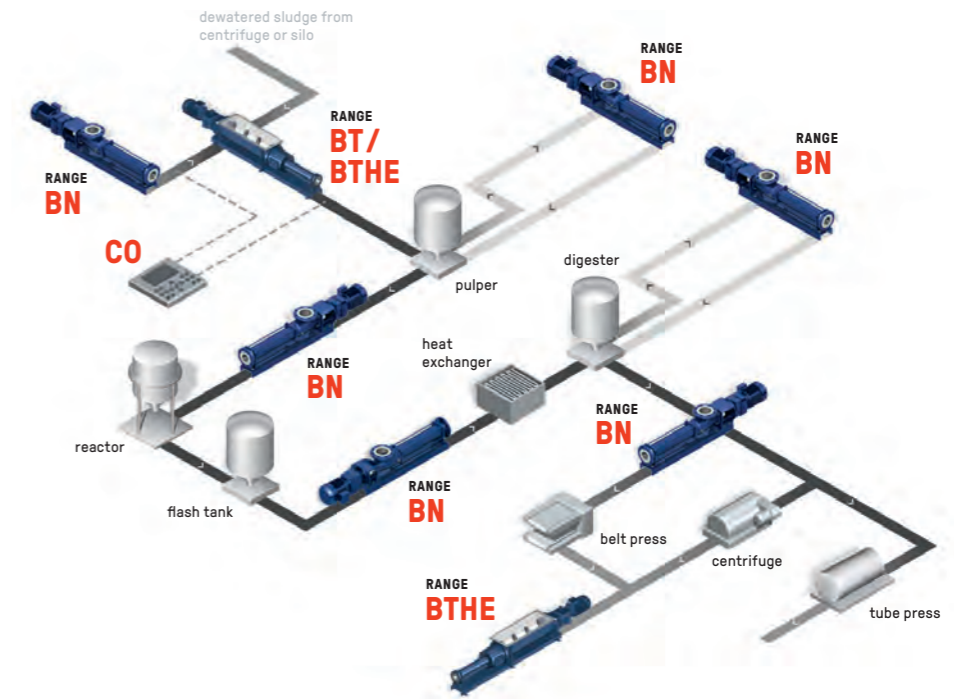
- Pumps designed to transfer hot sludge
- Sludge mixing to achieve the desired ds content
- Pump and hopper designed to suit application requirements
- Pumping dewatered sludge with a high ds content



ADVANCED DIGESTION FLOW CHART

APPLICATIONS

1. BN range pumps transfer sludge with ds content of 1-2% to BTHE pumps for backmixing
2. BTHE range pumps mix dewatered sludge with liquid to ds content of 14-18% to feed a thermal hydrolysis system
3. BN range pumps transfer sludge between heating tanks, reactors and digestion tanks
4. BN range pumps transfer sludge from the digester to dewatering devices such as a belt press, centrifuge or tube press
5. BTHE range pumps transfer pathogen free "Class A sludge" in accordance with US directives to further processing
6. CO control systems monitor and control hopper level control, pressure control and dry-running devices



METERING CHEMICAL ADDITIVES.

CONVEYED PRODUCT

- Polymer concentrate and solution
- Sodium Hypochlorite
- Fe and Al salts
- Lime milk solution
- pH control
- Odor control chemicals
- Algaecides
- Misc. chemicals

KEY SPECIFICATIONS

**LOW FLOW RATES
WITH HIGH
TURNDOWN RATIO**

**ACCURATE AND
REPEATABLE
METERING**

**VISCOUS, ABRASIVE
AND CORROSIVE
CHEMICALS HANDLED**

COST SAVINGS

- Reduced chemical consumption
- Lower capital and operating costs
- Reduced maintenance and calibration time

BACKGROUND

In wastewater treatment various flocculants and chemical additives are used in both biological and mechanical processes to support liquid solid separation, process efficiency and disinfection.

TASK

Precise metering of chemicals together with control and calibration to match process conditions and environmental variation is essential. Pumps must be able to handle a wide range of chemicals which may be corrosive, abrasive or highly viscous and may also contain solids.

SOLUTION

SEEPEX pumps handle high and low viscosity products and abrasive and corrosive chemicals, even those containing solids. BN and MD range pumps are particularly suited for accurate metering; Virtually pulsation free flow, linear accuracy $\pm 1\%$ and flow control proportional to motor speed all provide precise metering and easy calibration.

Chemically compatible materials of construction, vertical or horizontal configurations to provide compact installation where needed and intelligent control systems, complete the metering package.

BENEFITS

- Virtually pulsation free flow – no pulsation dampeners needed
- Infinite turndown for wide range of metering applications
- High metering accuracy (deviation $\pm 1\%$)
- Constant flow independent of pressure
- Low shear flow characteristic
- Service-friendly through plug-in connection
- Material combinations available for a large variety of media types
- BN and MD range pumps: Short, compact design with direct flanged-mounted drive



CO – CONTROL SYSTEMS.

SEPEX control systems are available for a wide range of process requirements to enhance the performance of the pump and to optimize the process. These systems are available as standardized safety modules or as system solutions.

Components of the control unit are available individually, or as part of a fully assembled, ready to use turnkey system including pump and control panel on the same base plate, or as a complete ready to use package.

Furthermore in addition to system design, SEPEX offers qualified support for the commissioning of pump and control system. In short: SEPEX provides expert support – from the development stage, to pump installation and start-up.

BENEFITS

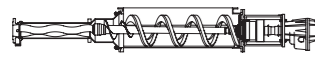
- Proprietary solutions for lime mixing into biosolids, feeding filter presses, load cell or level sensor operation of cake pumps and boundary layer injection systems
- Standardized control functions and electronics
- Network-capable compact control systems
- Easy integration with a customer's existing DCS or SCADA system
- Customer-specific solutions: SEPEX can customize a control system for every unique application

Contact us for a best fit solution offer.

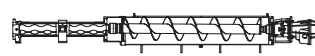


YOUR PUMP SOLUTIONS AT A GLANCE.

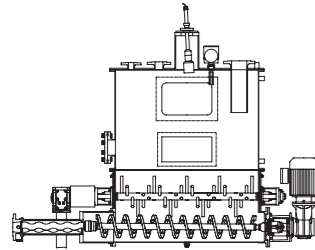
BTHE RANGE



BTES RANGE



BTEI RANGE



BTEX RANGE



SEEPEX pumps transport thin to highly viscous products with or without solids at low to high temperatures, gently, with minimal pulsation and low shear. They are specifically designed to accurately meter and convey problematic media, such as dewatered sludge and abrasive or corrosive chemical additives. Additionally they are used to mix viscous products with liquids.

T – OPEN HOPPER PUMPS

Open hopper pumps in product group T handle highly viscous and non-flowable media. T pumps incorporate an open hopper and designs of auger feed screws to suit specific applications. They are ideal for pumping thickened, pre-dewatered sludge up to 14% ds content and floating sludge or dewatered sludge, with or without quicklime up to 45% ds content.

- Conveying capacity: up to 500 m³/h (2,200 USGPM)
- Pressure: up to 36 bar (525 psi)

Example of ranges

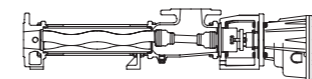
BTHE range pumps feature a feed hopper with vertical hopper walls and a ribbon screw rotating concentrically. This guarantees optimum emptying of the feed hopper and optimized feed of the product into the conveying elements of the pump.

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 full silos. Liquid addition to the pump is possible meaning that they can also be used for backmixing dewatered sludge directly from the silo.

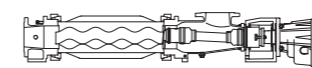
The BTEI range is an ideal choice where an intermediate buffer silo is required. Storage capacity within the pump and hopper of up to 10 m³ is available. The pumps are fully automated with measurement and control devices, guaranteeing consistent product level and continuous feed rates.

BTEX range pumps have a robust design and reinforced components for abrasive and highly viscous products with potential for hard solids contamination. Liquid addition and backmixing of dewatered sludge with a ds content up to 45% is possible and a removable compression housing simplifies maintenance.

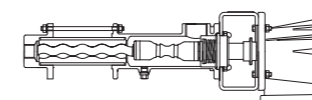
BN RANGE



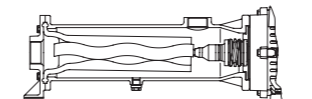
SCT



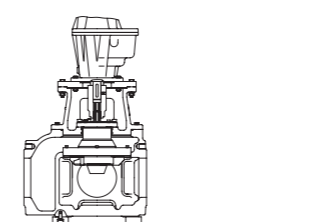
MD RANGE



BW RANGE



I RANGE



ADDITIONAL PRODUCT GROUPS

Product group N pumps are used in virtually all industries. They convey thin to viscous media, with or without solids, up to approx. 10% ds content. They are also used in metering applications e.g for dosing lime milk, chemicals precipitation and flocculation agents.

- Conveying capacity: up to 500 m³/h (2,200 USGPM)
- Pressure: up to 96 bar (1400 psi)

Smart Conveying Technology (SCT) means faster maintenance as the time to replace the rotor and stator can be reduced by 85%. The patented, award winning design of SCT enables the stator to be adjusted to suit the application and to adjust for wear – leading to double the lifetime of the rotor and stator.

- Conveying capacity: 130 m³/h (572 USGPM)
- Pressure: up to 8 bar (120 psi)

Product group D pumps are available for metering small quantities in virtually all industry sectors. They are especially suited for low pulsation conveying of low to high viscosity media, solids containing media, and chemically aggressive media, such as precipitation and flocculation agents. Maximum repeatable metering accuracy is guaranteed, as the flow has virtually no pulsation.

- Conveying capacity: 0.06–1,000 l/h (0.016–264 USGPH)
- Pressure: up to 24 bar (350 psi)

Product group W wobble pumps in space-saving block design transfer liquids of any viscosity, even with high solids content. They are easy to handle and very economical, as they only have one joint – which is why they ‘wobble’.

- Conveying capacity: up to 10 m³/h (44 USGPM)
- Pressure: up to 4 bar (60 psi)

SEEPEX macerators cut and chop solid and fibrous material in pumped media, increasing the operational reliability and lifespan of pumps and other downstream equipment. They are available as inline designs with integrated solid separators, as well as a universal version to install on different solids separators each with a direct connection to a SEEPEX pump.

- Flow rate: 2–150 m³/h (8.8–660 USGPM)

SEEPEX.

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SEEPEX GmbH

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