



Economic system solutions

Conveying, mixing, transportation – from one source



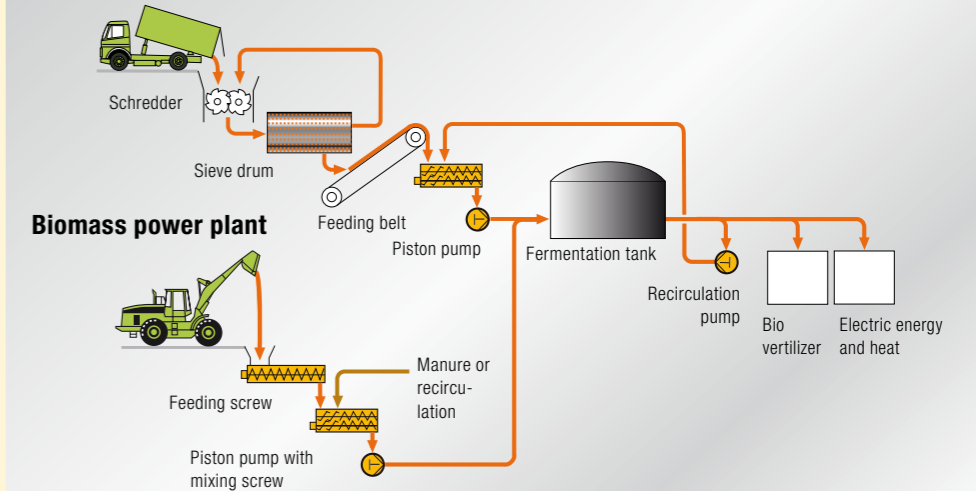
Conveyance of various types of biomasses

Putzmeister industrial engineering has experience with the conveyance of biomass since the end of the 80's. The unique design of the pumps enables to convey various types of biomasses, even when containing foreign bodies such as knives, spoons, bottle caps or glass, which can dramatically disturb the fermentation process.

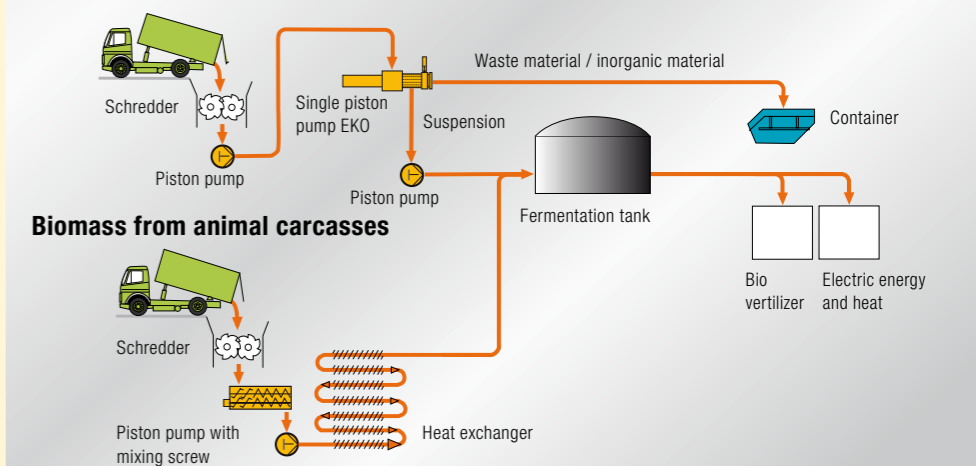
Opposed to other conveying systems, the treatment of biomass with reduced lifecycle costs is guaranteed when using hydraulically-driven piston pumps. Furthermore Putzmeister also developed a process to separate out foreign particles during the pump process.

A fault-free and non-stalling construction of the pump and feed lines is necessary when pumping biomass, biowaste and foodwaste from households, supermarkets, restaurants or other sources. Everything that disturbs the flow can lead to clogging or blockages.

Dry-anaerobic fermentation of biomass



Biomass from food remains and wrapped food



KOS 25100 with hydraulic power pack and twin-screw feeding device, transporting biomass to the fermentation tank



Biogas from waste – for a cleaner environment

An EKO 1060 PP in a biomethanisation plant (Kössen, Austria) for unwrapping and transporting foods past expiry date



Conveyance of pasty material with large grain size

In accordance with EU 1774, using leftover foods as animal food is no longer allowed in Europe. These are now converted into electrical energy and heat in biogas plants. The KOS twin-cylinder piston pump can pump bulky, wet and pasty material with large grain size.

- **KOS twin-cylinder piston pumps have been pumping more than 160000 hours without any major interruptions.**

The KOV twin-cylinder piston pump can convey wet material. Due to having a large inlet and outlet opening, this pump type can also digest large particles without disturbing the pumping process.

- **KOV twin-cylinder piston pumps have been pumping more than 100,000 hours without any major interruptions.**

The alternative option for producing electricity and heat out of biomass



Efficiency through the separation of foreign particles

During the methanisation of biomass (left-over and/or expired foods or other organic waste), inert foreign bodies such as wrappings/packagings, plastic trays, glass, cans, or metal can disturb the biogas process since those foreign bodies reduce the active volume in the fermenters.

With the EKO single cylinder piston pump, in order to improve the fermentation process, it is possible to reliably separate foreign bodies before feeding the organic waste into the fermenter. The EKO can deal with wet material, as well as sludges containing large foreign bodies.

- **EKO single-piston pumps have been pumping more than 60000 hours without any major interruptions.**



Biowaste recycling plant in Varenne-Jarcy, France: KOS 2180 pumping biomass into a fermentation plant



Leftovers and expired foods before processing



Substrate of the biomass after the pressing process of the EKO 1060 PP



Remaining packaging and foreign bodies



Sewage treatment plants – the economical and reliable solution

Disposal of sewage sludges

In sewage treatment plants, Putzmeister solids pumps will help dispose of the thickest types of sludge. Even solid content as high as 45 % are not an issue. Plants impose strict requirements when it comes to running a fault-free continuous operation. This is precisely where Putzmeister solids pumps have proved themselves world-wide, proving their economic efficiency in the conveyance of mechanically dewatered sewage sludges.

Conveyance through a closed pipeline

- **Odourless**
- **No environmental pollution**
- **Space-saving and can be adjusted to fit the existing structure of the buildings**
- **High metering accuracy**
- **Pipeline is not subject to wear**
- **Low-maintenance and low-wear technology**
- **Maximum availability for continuous unmanned operation**
- **Remote supervision from the control room**
- **Stiff, liquid and sticky sludges can be transported**

Leaders in pump and silo technology

The best features of Putzmeister piston pumps:

- **Robust design**
- **Flow-optimised suction characteristics**
- **Continuously filled, circular suction cross section in the S-transfer tube**
- **High volumetric efficiency for the delivery cylinders**
- **Long piston strokes**

To improve the efficiency, it is possible to extend the Putzmeister piston pumps with a feeding device which is equipped with self-cleaning augers and supports the optimal filling of the delivery cylinders.



KOS 1050 solids pumps in the ProReno sewage treatment plant in Basel

Putzmeister's silo technology

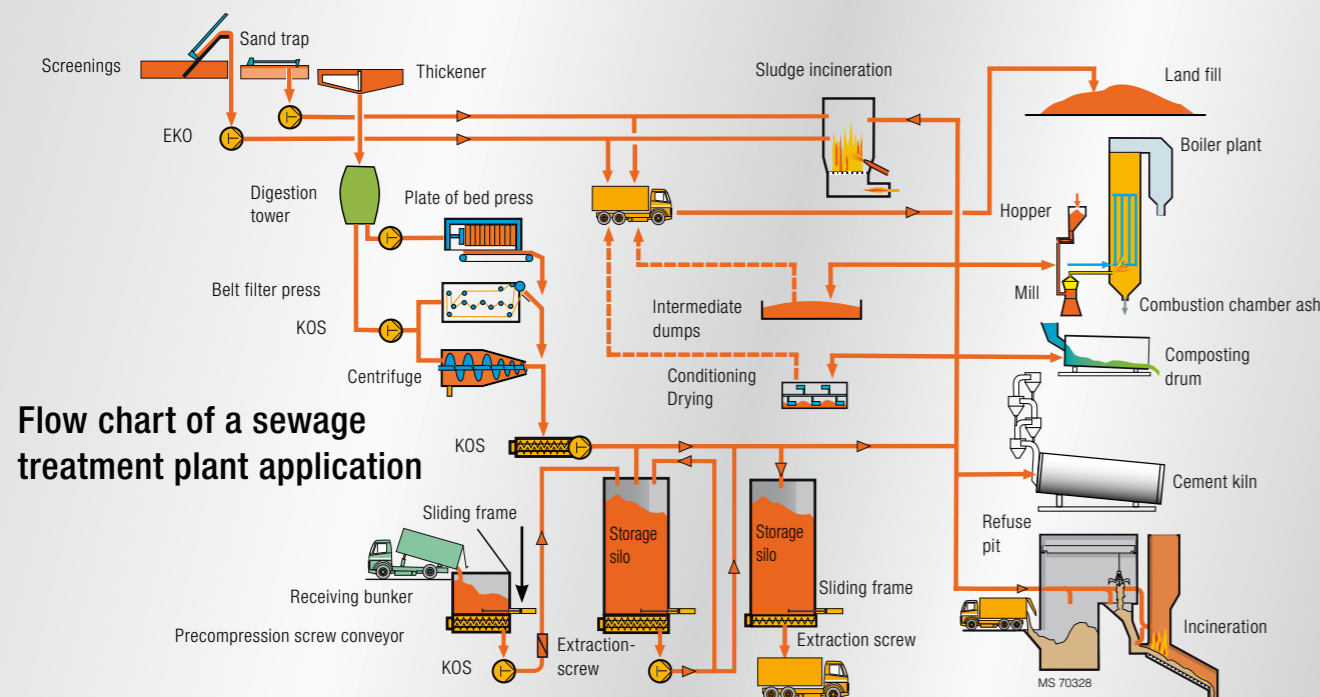
The silo technology with sliding frame has been especially developed for dewatered sewage sludge. The silo can take up to 1000 m³ sludge and reliably feeds it to the pumps. From the various pump models to the silos and the corresponding fittings and accessories, Putzmeister can provide complete solutions for conveyance tasks in wastewater treatment plants.



Sewage sludge reception station consisting of reception and storage silos: Incineration of foreign sludge at the main wastewater treatment plant of Stuttgart-Mühlhausen

Advantages of the system

- **Low life-cycle costs**
- **High operational reliability**
- **Extremely quiet in operation**
- **Can handle the stiffest sludges, even hot (up to 100 °C)**



Flow chart of a sewage treatment plant application

Pumping screenings (Coney Island, New York)



Screenings



Sewage sludge dewatered by a chamber filter press: Solids content > 35 % DS



Co-Incineration – efficient energy generation

Organic materials

Conveyance of sewage sludge and household waste

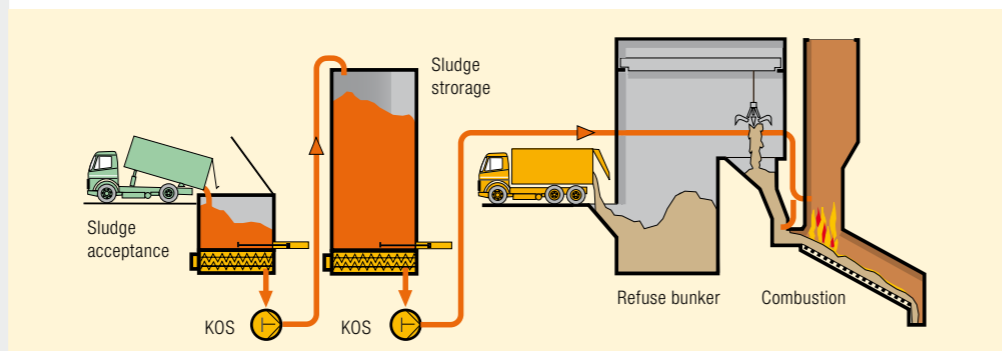
The disposal of dehydrated sewage sludge in household waste incineration plants is nowadays a very environmental friendly and economical procedure.

This process can be integrated in newly planned plants, as well as retrofitted in older plants. The addition of sewage sludge does not affect the reception of household waste or the discharge and metering of rubbish into the the combustion chambers. Besides the fact that both materials are burnt together, there is no common interface between both disposal lines.

Putzmeister offers complete turnkey solutions for storage, transport and feeding of refuse in the combustion chambers.



Two KOS 1030 with HA 22 for feeding sewage sludge into the refuse incinerator (Dinan, France)



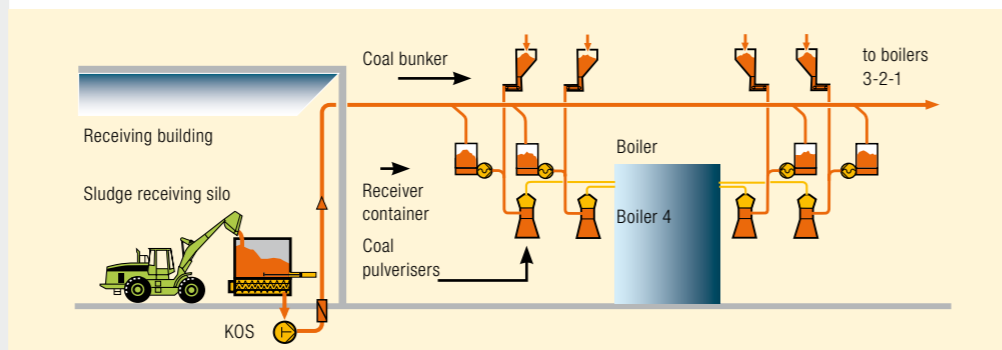
Flow chart: Sewage sludge co-incineration in household incineration plant

Efficient coalfuelled power plants

The co-incineration of mechanically dewatered sewage sludge in existing coal-fuelled power stations with highly effective flue gas pollution control is also an economic and meaningful alternative that do not pose a threat to the environment compared to the previous disposal methods.



Co-incineration of sewage sludge in the coal-fuelled power plant of Zolling (Germany): KOS 2180



Flow chart: Co-incineration of sewage sludge in a coal fired power plant

Well-thought-out planning process

Recycling the amounts of received sewage sludge from municipal and industrial plants has become an important issue for sewage treatment companies.

Due to political framework conditions (prohibition of dumping sewage sludge, limitations placed on agricultural use, etc.), the choice of a thermal incineration to dispose of sewage sludge has become inevitable.

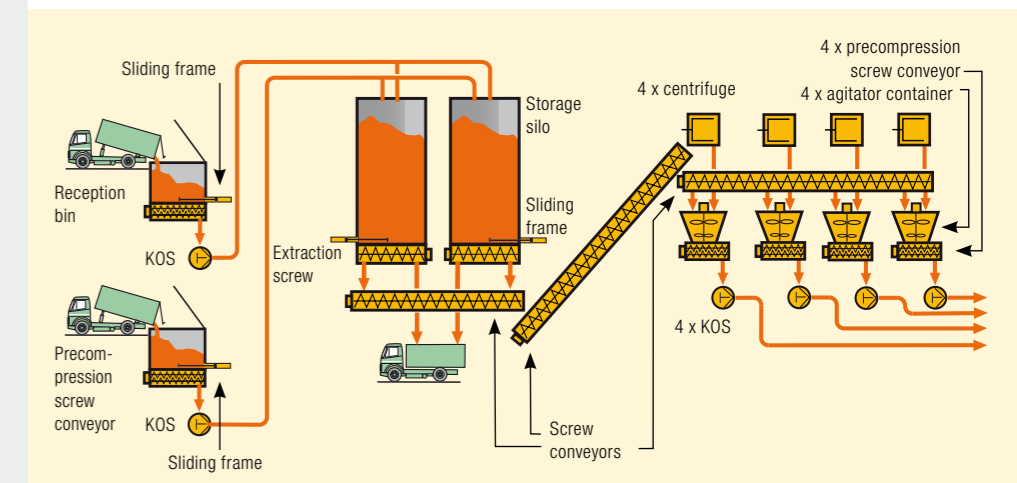
To ensure that the multiple hearth furnaces are used to their full capacity, not only one's own sewage sludge can be handled but also external sludge from surrounding wastewater treatment plants can be receptioned and treated. Putzmeister Solid Pumps offers complete sludge handling systems for such purposes.

A special advantage of the KOS S-tube pump without valves

- Foreign bodies contained in the sludge can be conveyed without interference thanks to the large cross-section opening of the S-tube pump.



Erzo Oftringen sewage treatment plant (Switzerland): rotary kiln for the incineration of sewage sludge



Flow chart: Reception of foreign sludge and handling one's own sludge in a sewage treatment plant



Two 200 m³ storage silos for sewage sludge storage (Pro Rheno, Switzerland)

Pumps for this application: ■ KOS

KOS pumps



Oil-hydraulic double-piston pump with S-transfer tube

In the KOS series, the intake (for connection of the delivery line) and the delivery cylinders are connected by an S-transfer tube. This enables a freeflowing conveyance of the material without the use of valves. Foreign bodies up to 2/3 of the size of the discharge outlet can be conveyed without any issue.

The KOS pump is particularly suitable for conveying highly viscous sludges and other material with a high proportion of extraneous material. The main fields of application of the KOS are with materials which present the most extreme requirements, such as dewatered sludges containing solids, oil sludges, high-viscosity solids and so on.

For extreme applications, a wide range of task-specific components and functions are available from Putzmeister.

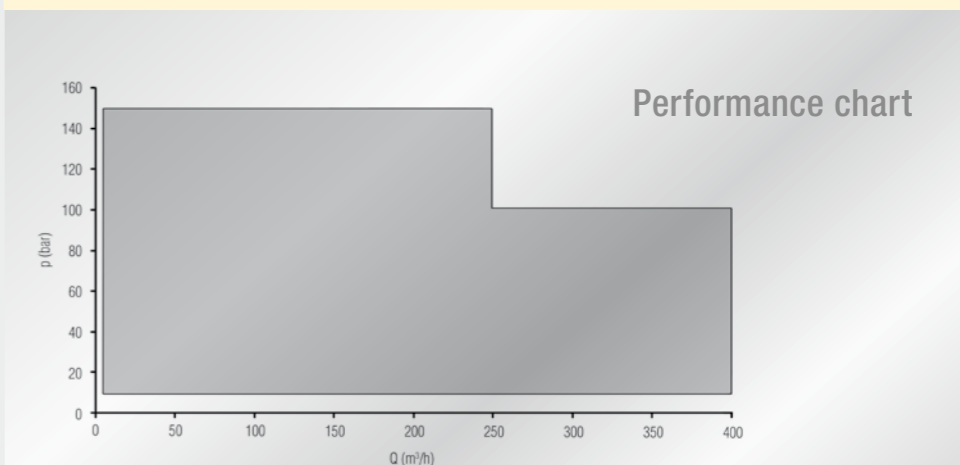
The pump's simple design and the few wear parts offers a very robust, low maintenance pump with low operating costs.

For further information please refer to our IP 1082 GB brochure



Features and advantages

- For conveying coarse sludges or slurries with a high grain-size content
- Low maintenance and wear due to fewer moving parts
- Less suction resistance thanks to larger inlet permitting constant freeflow of the material
- Continuous material flow due to the large discharge diameter
- The hydraulic circuit of the S-tube does not come in contact with the material being pumped
- Delivery rates up to 400 m³/h
- Delivery pressures up to 150 bar



HSP pumps

Pump technology

Oil-hydraulic piston pump with seat valves

The seat valve pump is used for heavy tasks. The HSP series is used with paste-like and highly viscous material with a low content of foreign bodies and small particle sizes (< 8 mm).

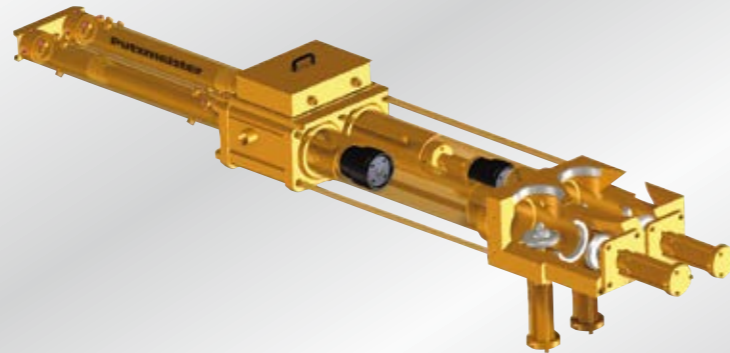
Precise sealing of the valves means that extremely high pumping pressures can be achieved. The principle behind the design of the hydraulic and pumping pistons is the same as in the Putzmeister KOS and KOV series. This ensures maximum reliability and availability.

Two special features of the Putzmeister design are that not only is it a simple matter to replace the valves but the design also means a long service life for all wearing parts. Valves and valve seatings are made of highly wear-resistant steels and can be partly used at either end. This doubles their service life. Valves can be easily replaced without dismantling the delivery lines.

All of the familiar Putzmeister options and variations are available with the HSP series as well.

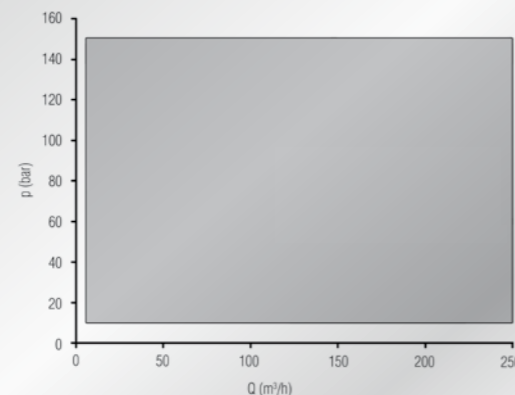
A pulsation-free conveyance can be achieved with the PCF system (Pressure Constant Flow)

For further information please refer to our IP 1971 GB brochure



Features and advantages

- For conveying fine-grained sludges or slurries
- Switch-over without shorting
- No backflow at high pressures
- Easy installation of damping tanks
- PCF system for an almost pulsation-free conveyance
- Outputs up to 250 m³/h
- Delivery pressures up to 150 bar



Performance chart

KOV pumps

Pump technology

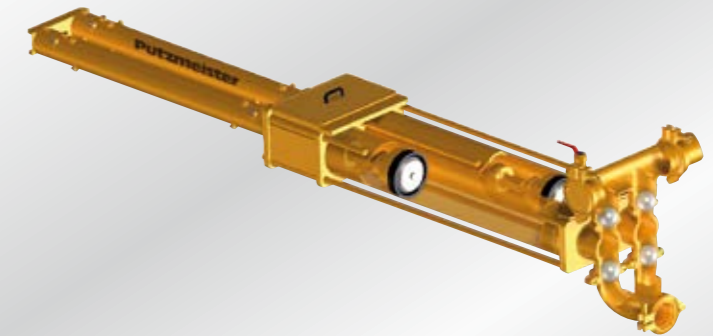
Oil-hydraulic piston pump with ball valves

The KOV series is characterized by its straightforward design and high reliability. The suction and delivery cylinders are connected by indirectly operated balls.

No elements are actively operated, which makes it an inexpensive pump with maximum availability. There are no issues or complications when pumping paste-like material such as mortar or bentonite, even when they contain foreign bodies up to 10 mm in size. Pumping pressures up to 80 bar and an output of 70 m³/h can be achieved.

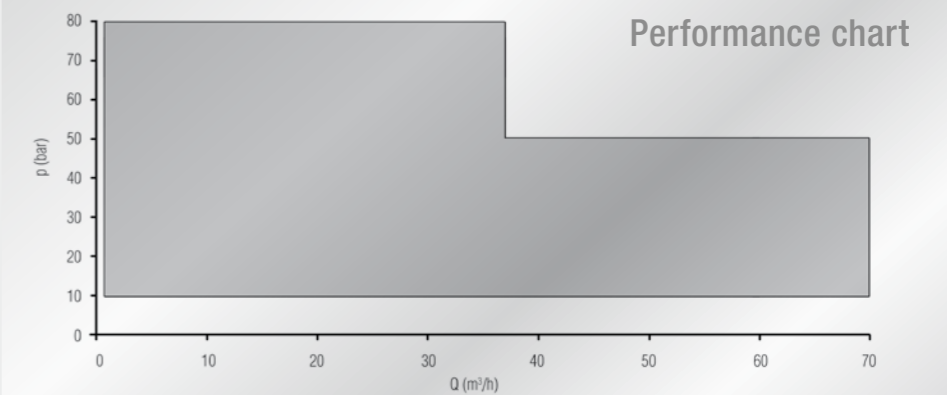
Depending on the specific individual case, the balls and seat valves can be supplied in different materials and coatings. A maintenance aperture allows an easy and rapid replacement of the ball valves.

For further information please refer to our IP 1027 GB brochure



Features and advantages

- For conveying fine-grained pastes
- Simple design
- Minimal of moving parts
- Very easy to maintain
- Outputs up to 70 m³/h
- Delivery pressures up to 80 bar



Performance chart

EKO pumps

Pump technology

The oil-hydraulic single-piston pump

The EKO series is designed for the most extreme pumping tasks. The open hoppers allow extremely dry material containing a high proportion of foreign bodies to be fed into the pump. Materials which were un-pumpable until now, such as highly de-watered paper sludges, are thrust by the hydraulically driven piston into the delivery line.

The EKO Crown model is equipped with a delivery piston with a hardened toothed cutting crown. This pump is used when the material contains large-sized foreign bodies, which would swiftly result in blockages in other systems. The EKO pumps and cuts in one single operation. The most difficult materials, such as sewage treatment plant screenings or shredded barrel waste in special waste incineration plants, can be pumped without issue into the delivery line.

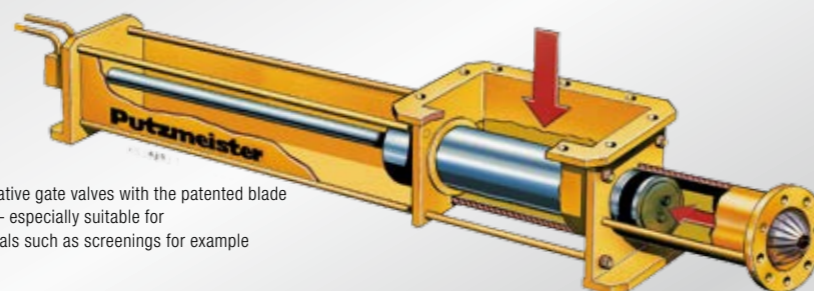
A near continuous operation is also possible with the double EKO version.

For further information please refer to our IP 2253 GB brochure

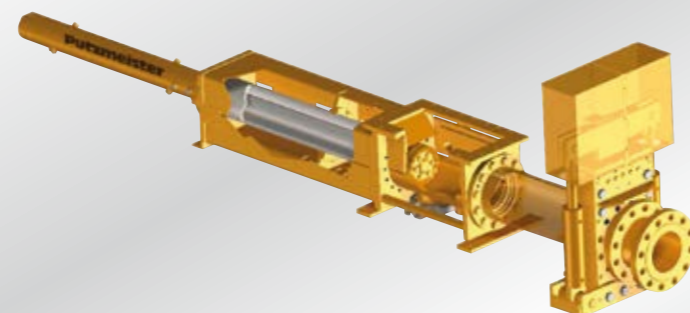


Features and advantages

- For conveying large-sized and coarse foreign bodies
- For conveying extremely stiff material
- Crown version – pumping and cutting in one stroke
- Simple design
- Delivery pressures up to 60 bar
- Cutting force up to 80 t
- Outputs up to 14 m³/h



Alternative gate valves with the patented blade valve – especially suitable for materials such as screenings for example



Power pack units

Pump technology

The heart of every piston pump

These power packs have proved their effectiveness more than 10,000 times with concrete pumps and now they power up industrial pumps that convey the material.

They drive the following:

- High density solids pumps of type KOS, HSP, KOV, EKO
- Screw conveyors of type THS, SHS
- Silo sliding-frame of type PDL, PDF, PDS-L, PDS-F
- Accessories such as gate valve or silo-lid, etc.
- Performance classes from 5,5 kW up to 1800 kW and more are available

Efficiency of the hydraulic system design

Depending on the quantity of oil needed, an open or closed oil-circuit can be used. The closed oil-circuit is used when reaching large delivery capacities, which means considerable cost-savings.

The oil-circuits are designed for hydraulic pressures of up to 300 bar. This equals delivery capacities of up to 150 bar, for a short time up to 160 bar.



Features and advantages

- The power of the hydraulic gives the delivery cylinder the necessary pressure to pump the material into the delivery line.

Equipment (partly as option)

- Electric motor for all common voltages and frequencies (up to 10 kV, 50 or 60 Hz)
- Diesel engine
- Oil/air cooler
- Oil/water cooler
- Oil pan / separation bar for hydraulic connections
- Sound insulation
- Inline design of hydraulic pumps
- Monitoring sensors (pressure, temperature, filling level)
- Oil filter
- Terminal box
- Manometer



Receiving bunker with rectangular sliding frames and pump feeding

Storage silo with truck loading

Storage silo discharging directly into a pump

Combination – pump and silo

Putzmeister silos have been designed especially for highly dewatered and viscous sludges. Since the pump and silo come from the same manufacturer, the customer enjoys important benefits:

- **The shared silo discharge and pump feeding auger reduces costs and increases availability.**
- **The perfect tuning between pump and silo leads to an overall optimized concept.**
- **No interface clarification necessary, the customer does not have to deal with sub-suppliers.**
- **Individual installation planning, tailored to the space available and the customer-specific requirements**

Sliding frame systems

The Putzmeister sliding frame system has been designed especially to meet the requirements of harsh three-shift operation. Thanks to modern Finite Element Analysis and proven Putzmeister hydraulic components the sliding frame's design, as well as its service life is optimized.

One major feature is the space-saving design emplacement of the sliding frame's piston rod which is located on the silo floor.

Ladder systems / discharge systems for round silo

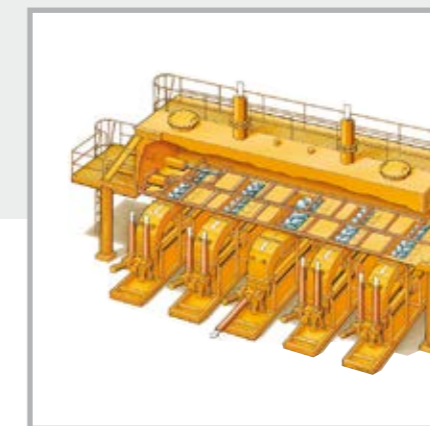
Depending on your application, the sliding frame can take the form of a ladder system (PDL) or a cylindrical silo discharge system (PDF). The ladder system with multiple parallel sliding frames is particularly suitable for wide or long receiving bunkers. This ensures an efficient transmission of force and increases the availability of the system thanks to the redundancy.

The product range includes silos and bunkers from 10 m³ to 1,000 m³ for loading trucks and for feeding sludges to solids pumps and their onward conveyance.

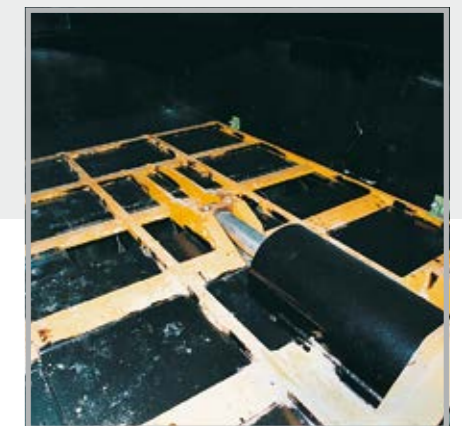
Material is discharged from the silos by means of specially adapted screw conveyors, with a lateral or central discharge. If several end users have to be supplied, multiple discharge augers can be used.



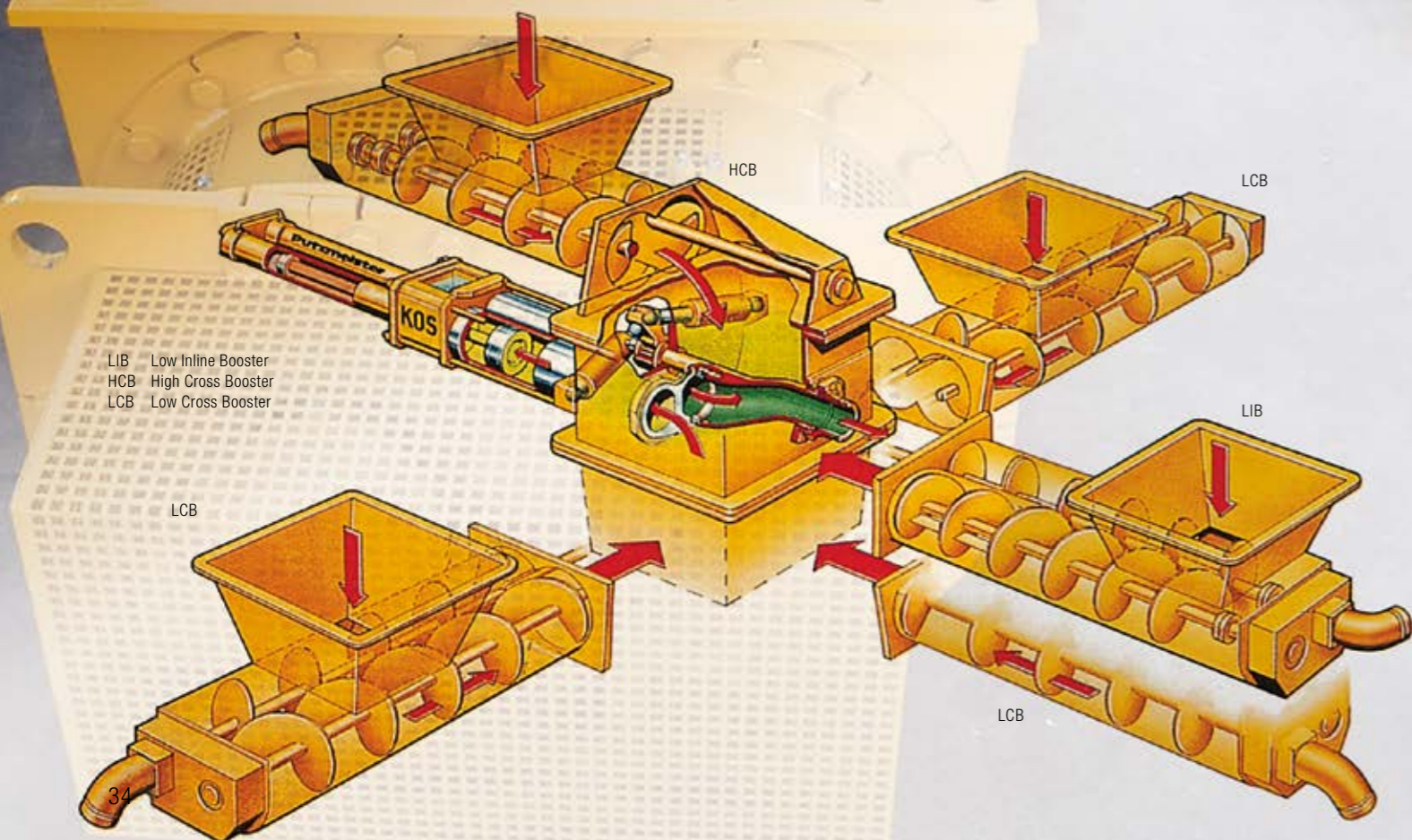
Finite element analysis for the sliding frame



Intermediate silo with double rectangular sliding frames for charging five Putzmeister solids pumps



PDL rectangular discharge sliding frame



Filling through screw conveyors

Highly-viscous sludges have to be fed to the pump if they cannot flow by themselves into the pump. This task is best resolved with twin-screw augers. The latter will generate a pressure in order to fill the pump more efficiently with the material to be conveyed. A further positive effect is that the twin-screw augers are self-cleaning since they are meshingly inter-connected. They are driven hydraulically.



Twin-screw auger feeding device with mixing paddles in the supply chute



Advantage of the hydraulic system

- In every speed range, the screw conveyor's drive can exert its maximum torque on the material to be conveyed



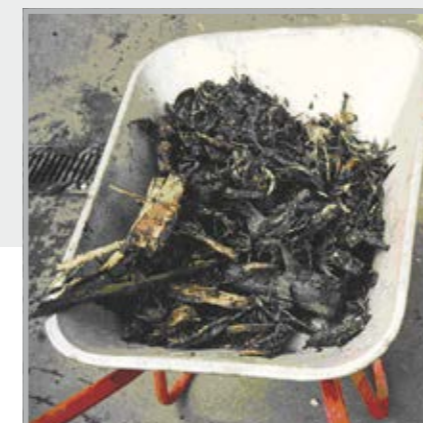
Twin-screw conveyor SHS 3262 SH

Foreign body separators enable a continuous flow of material

Putzmeister's FKA 200 is successfully used with the conveyance of sludges containing foreign bodies. This system protects downstream machines from disturbing materials. Thus, when incinerating sewage sludge in coal-fired power plants, problems

can be avoided in the downstream operating coal-fired boiler. In the direction of the flow, the foreign bodies will be caught by a grid. The foreign body separator is equipped with a quick-release fastener which can be opened through a single-lever operation.

The quick-release fastener system ensures additional safety during the cleaning operation of the foreign body separator



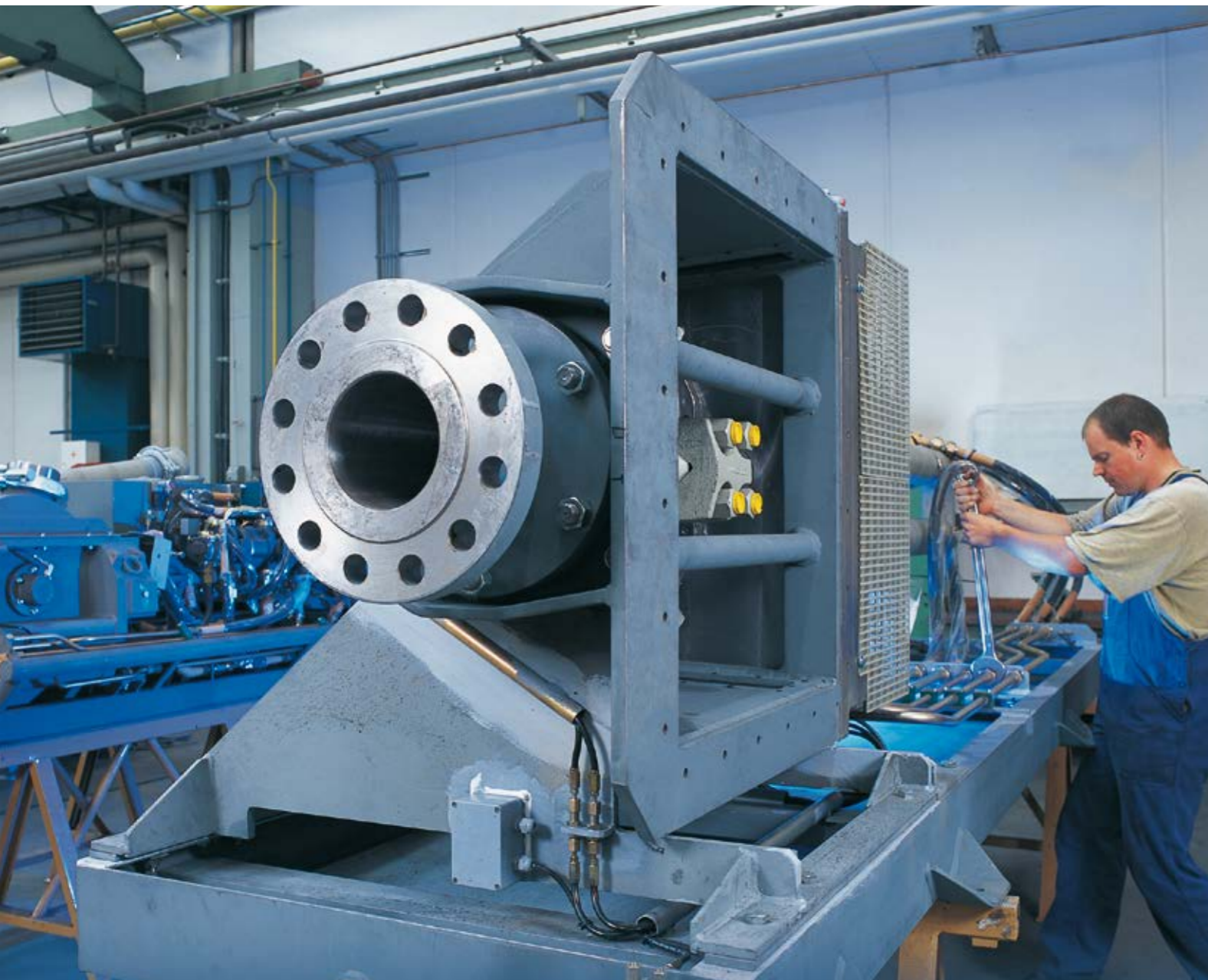
Left: Retained foreign bodies
Right: Foreign body separator in a power plant

Systems engineering from a single source

Service

Service

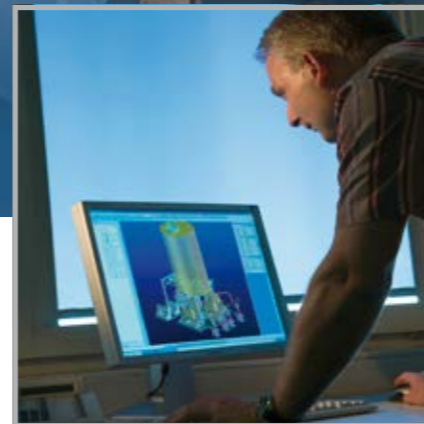
Service



Supply of turnkey systems



Transparency and adherence to deadlines in project management



Increased safety and efficiency through modern design processes

Putzmeister supplies complete systems for the transportation and storage of sludges and solids. The scope of services includes the planning and engineering of conveying tasks, consultation services regarding the transportation's process engineering, the supply of pumps, silos, bunkers as well as pipes and fittings, installation and commissioning at customer site and also complete services after handover of the system.

System planning, development and control

Modern automation and visualization systems are used for controlling the plant unit. These systems control and monitor the plant from the reception of the sludge in the pump up to the metering of the sludge into the incineration furnace or the final place of use. The Finite Element Method is used in our design calculations and state-of-the-art CAD systems for realizing and implementing the designs. This ensures an effective and high-quality solution.

Knowledge Transfer

We offer plant-related in-house trainings as well as on-site seminars.

User-friendly documentation

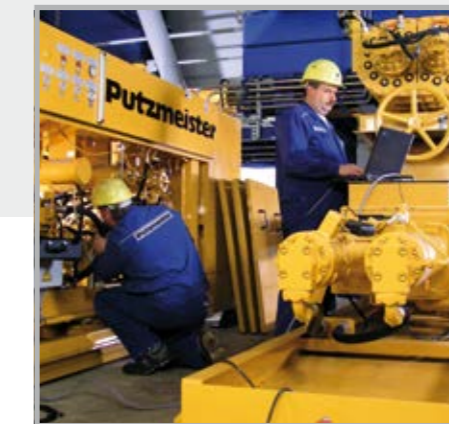
Thanks to professional and comprehensive documentation, system operators can count on a simple operation of the plant and easy trouble-shooting.

Reliable service

A major factor of Putzmeister's services is an efficient and powerful sales management. In addition to a telephone hotline, we supply parts on short notice and also carry out maintenance works as part of a contract.



Technical training at customer premises



Rapid response assistance from Putzmeister's after-sales service

Plant delivery from a general contractor

- Highest level functional reliability
- Less time spent with order processing and interface co-ordination
- Perfect harmony between all functional units
- Less spare parts and storage requirements due to the use of versatile common parts in the system components
- Simplified servicing and maintenance thanks to standardized control and maintenance elements
- Clear assignment of responsibilities means rapid solutions to problems in the event of a malfunction

The plants supplied meet EU directives, also specific standards and certifications

- EC machinery directive
- EC Atex directive
- EC pressure equipment directive
- EG Low voltage directive
- DIN / EN / ISO
- UL / CSA / ANSI / ASME / API
- NORSOK / GOST / RTN
- Local regulations
- ISO 9001
- SCC

Innovations – made in Germany



Putzmeister headquarter in Aichtal

BEASLEY'S

HYDRAULICS ♦ PNEUMATICS ♦ ENGINEERING



Putzmeister Solid Pumps GmbH

Max-Eyth-Straße 10 · 72631 Aichtal / Germany

P.O. Box 2152 · 72629 Aichtal / Germany

Tel. +49 (7127) 599-500 · Fax +49 (7127) 599-988

psp@pmw.de · www.pmsolid.com

