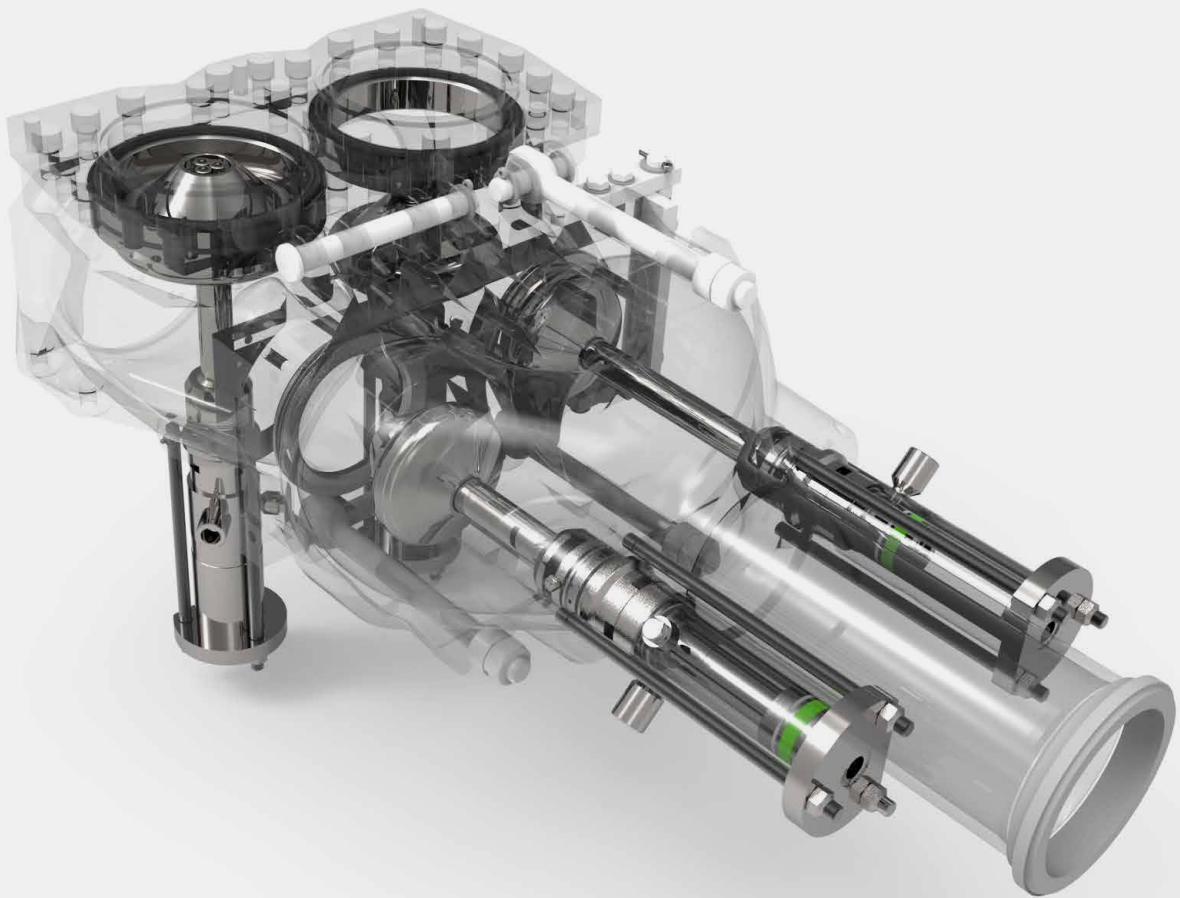


Technology

Sludge pump systems



MADE IN GERMANY
by SCHWING-Stetter 

Sludge pumps

Valve systems

Feeding devices

Hydraulic power packs

Control systems

Options and accessories

Maintenance and inspection

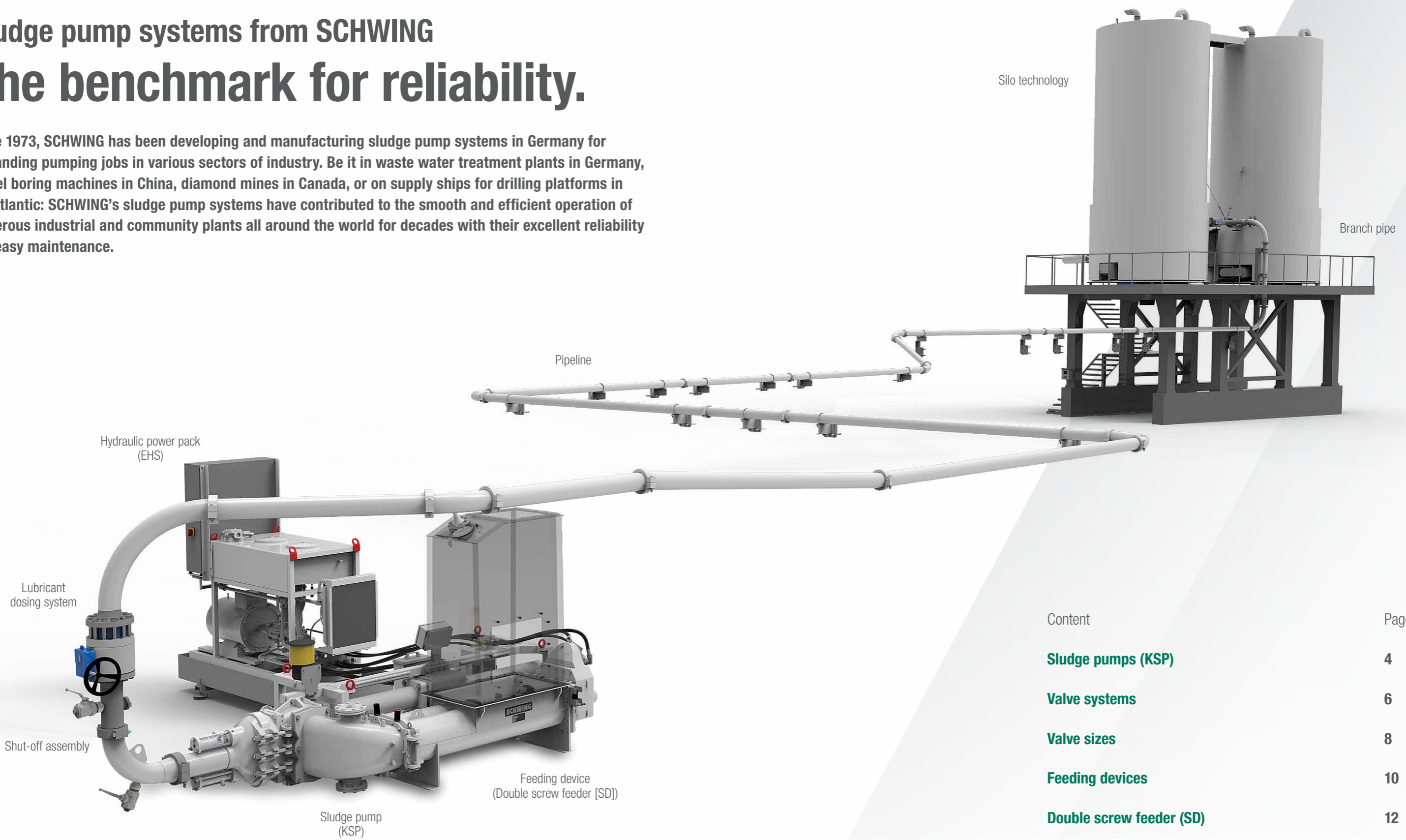


RECORD BREAKING ENGINEERING

Sludge pump systems from SCHWING

The benchmark for reliability.

Since 1973, SCHWING has been developing and manufacturing sludge pump systems in Germany for demanding pumping jobs in various sectors of industry. Be it in waste water treatment plants in Germany, tunnel boring machines in China, diamond mines in Canada, or on supply ships for drilling platforms in the Atlantic: SCHWING's sludge pump systems have contributed to the smooth and efficient operation of numerous industrial and community plants all around the world for decades with their excellent reliability and easy maintenance.



Content	Page
Sludge pumps (KSP)	4
Valve systems	6
Valve sizes	8
Feeding devices	10
Double screw feeder (SD)	12
Hydraulic power packs (EHS) and control systems	14
Options and accessories	16
Maintenance and inspection	18

SCHWING sludge pump systems continue to function safely and reliably under the harshest of conditions. They can be operated without any additional equipment and without restrictions under operating conditions at temperatures of +5°C to +40°C. Pumping materials with a temperature of up to 100°C and a dry matter content of up to 80 % (depending on the medium) can be pumped continuously without a problem.

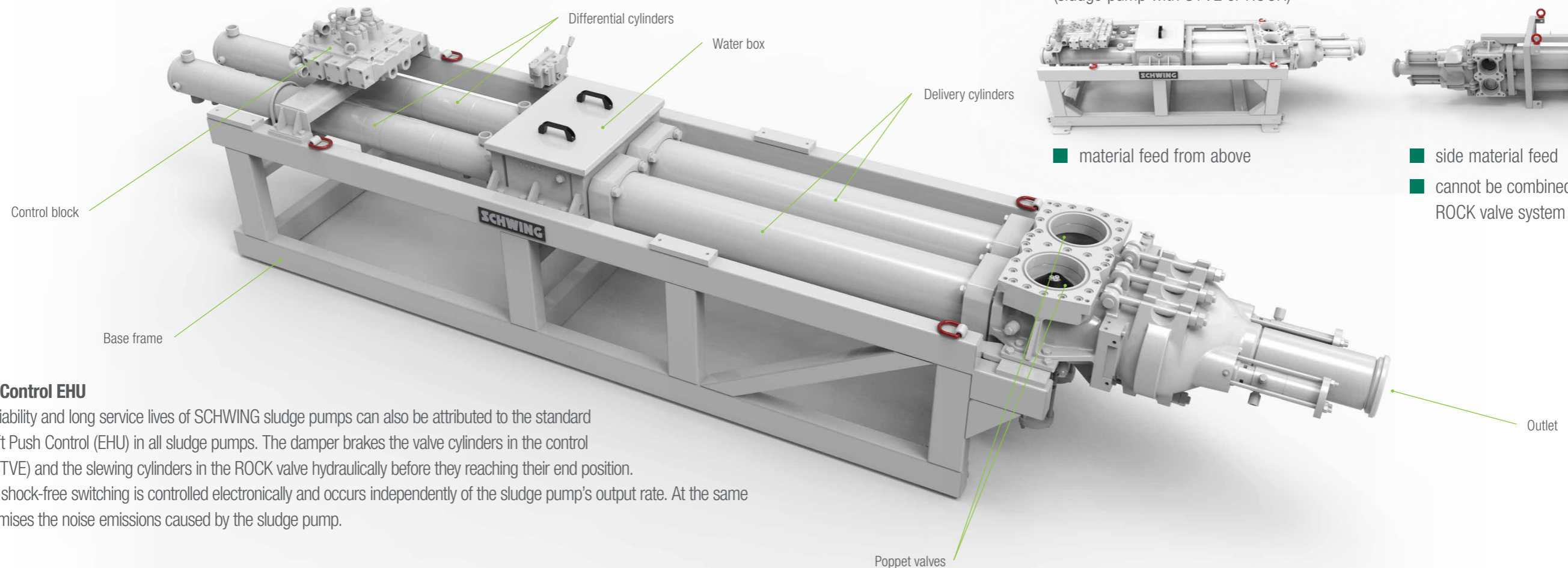
Sludge pumps (KSP)

The reliable top performers

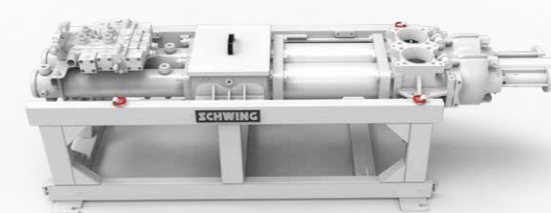
The high-performance sludge pumps are the key component in the sludge pump system. From the compact KSP 12 for low output rates to the impressive KSP 315 with an output rate of up to 230 m³ per hour, all of SCHWING's sludge pumps are designed for maximum reliability, low wear and easy maintenance. The wide range of products and diverse equipment options for each sludge pump make it possible for the entire system to be adapted optimally to the operational requirements. When pumping aggressive material, for example, all components that come into contact with the material can be constructed using stainless steel. And when pumping lime-conditioned sludge, ceramic coatings help to improve the flow of material and prevent the material from sticking. All SCHWING sludge pumps are equipped with an automatic central lubrication system as standard.

Set-up: horizontal or vertical

A sludge pump with a poppet valve system can be set up horizontally (material feed from above) or vertically (material feed from the side). The set-up of the sludge pump depends on the local conditions (space restrictions, material logistics, etc.). Whether or not it is necessary to install a double screw feeder (SD) on the sludge pump depends on the properties of the material being pumped. Due to its construction, a high filling ratio in both pumping cylinders of a ROCK valve system can only be achieved with a material feed from above. For this reason, sludge pumps with a ROCK valve system are only set up horizontally.

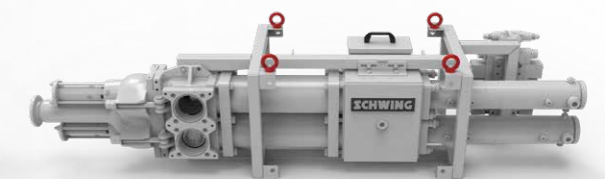


Horizontal set-up
(sludge pump with STVE or ROCK)



■ material feed from above

Vertical set-up
(sludge pump with STVE)



■ side material feed
■ cannot be combined with the ROCK valve system

Soft Push Control EHU

The high reliability and long service lives of SCHWING sludge pumps can also be attributed to the standard use of a Soft Push Control (EHU) in all sludge pumps. The damper brakes the valve cylinders in the control valve unit (STVE) and the slewing cylinders in the ROCK valve hydraulically before they reaching their end position. This gentle, shock-free switching is controlled electronically and occurs independently of the sludge pump's output rate. At the same time, it minimises the noise emissions caused by the sludge pump.

Product program

Designation		KSP 12*	KSP 12 HD*	KSP 20	KSP 25	KSP 25 HD	KSP 25 HDD	KSP 40	KSP 40 HD	KSP 45	KSP 45 HD	KSP 65	KSP 65 HD	KSP 70	KSP 70 HD	KSP 80	KSP 80 HD	KSP 110	KSP 140	KSP 220	KSP 315
Output max.	m ³ /h	15	15	20	30	30	25	35	35	40	40	55	55	65	55	55	55	110	135	140	230
Output pressure max.	bar	75	120	40	75	120	110	75	110	80	110	80	110	65	125	80	110	130	130	130	150

*also available as a single-piston pump EKSP 12 and EKSP 12 HD

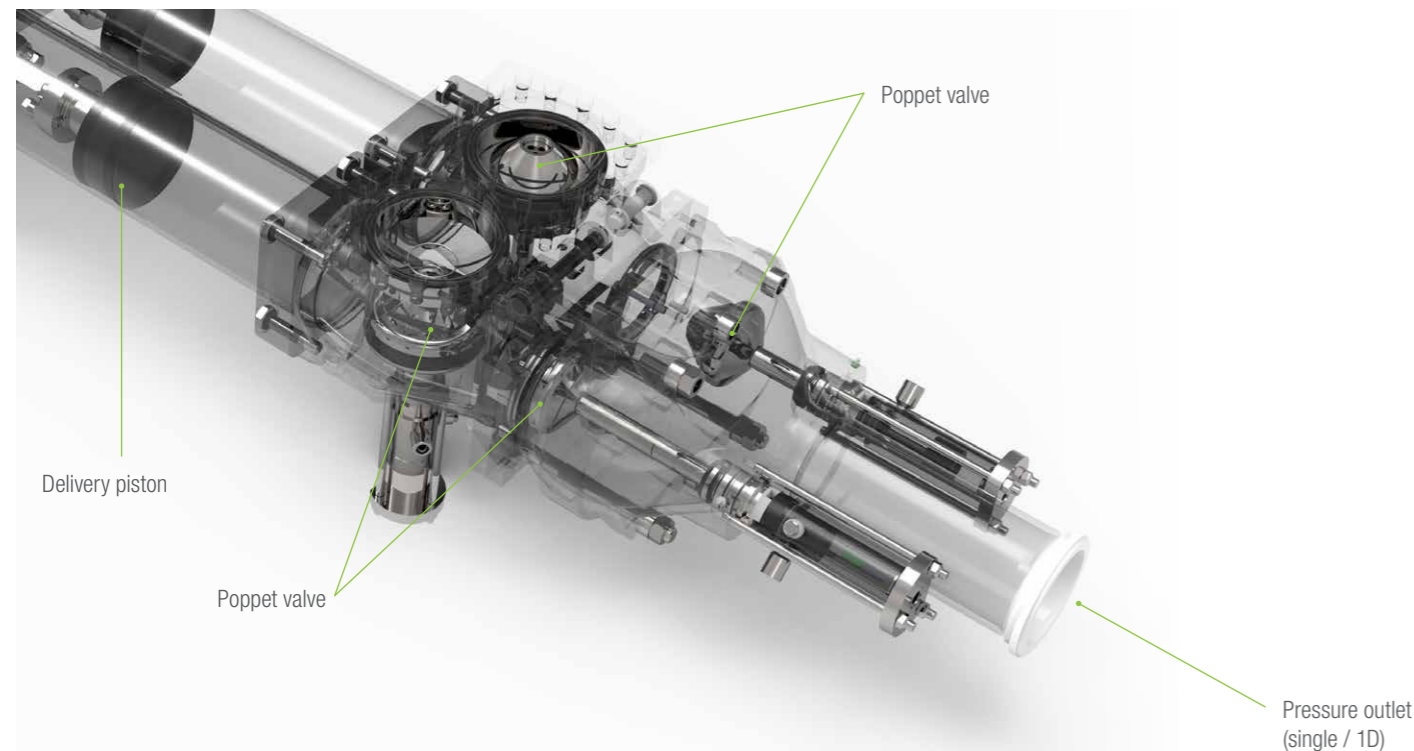
Maximum output and maximum output pressure cannot be achieved simultaneously.

Valve systems for sludge pumps

Two systems for all materials

The poppet valve system (STVE)

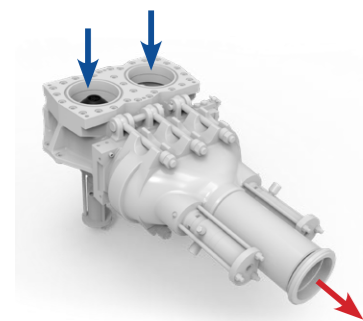
The poppet valve system (STVE) developed by SCHWING is used to pump fine-grained, pasty sludge. For decades, the proven design and the resulting long service life of SCHWING's poppet valve system has ensured the reliability of the sludge pump system. The low maintenance requirements and easy-to-replace wear parts provide for low operating and maintenance costs.



Pressure outlet: single or double

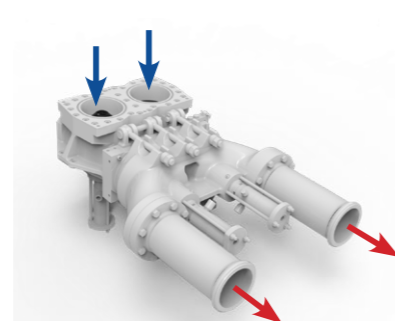
The poppet valve system can be outfitted with either a single (1D) or double pressure outlet (2D). With the double outlet (2D), a sludge pump can pump the material simultaneously to two feeding points intermittently. The single pressure outlet (1D) allows the material to be pumped continuously to one feeding point.

Single pressure outlet (1D)



- Pumping of material with a sludge pump to one feeding point
- Continuous pumping

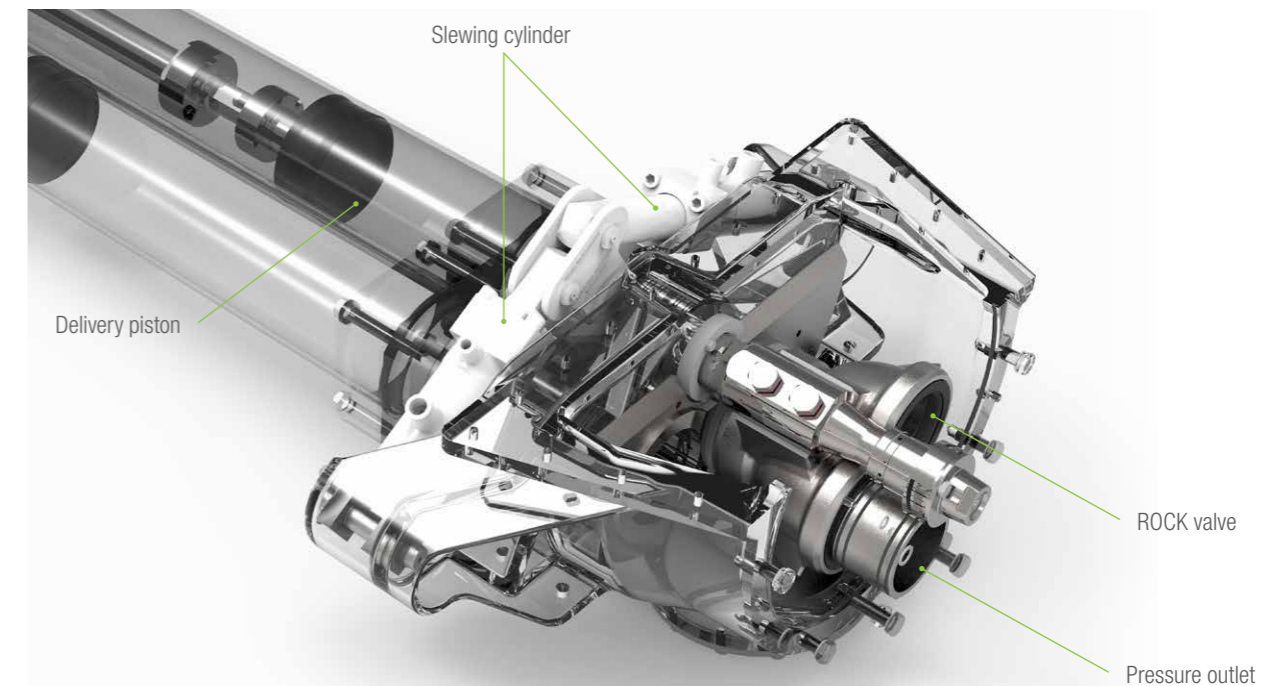
Double pressure outlet (2D)



- Pumping of material with a sludge pump to two separate feeding points simultaneously
- Intermittent pumping
- Output rate can be set separately for each pressure outlet

The ROCK valve system

The ROCK valve system developed by SCHWING is the perfect valve system solution for pumping sludge with coarse contamination and large foreign objects. Thanks to the powerful and swift shifting of the ROCK valve, even sludge containing large foreign objects (with a diameter of up to 50 mm) can be pumped safely and reliably. Furthermore, the ROCK valve's long service life, low wear and easy maintenance are compelling features.



Valve system comparison

	Poppet valve (STVE)	ROCK valve
Application	pumping of fine-grained high-viscous materials	pumping of material with rough contaminations and large foreign bodies
Advantages	<ul style="list-style-type: none"> • reliable separation of the pressure side from the suction side during the switching prevents the backflow of the pumped material from the pipeline into the pump • quiet, low-pulsing pump operation • low maintenance effort • long lifetime 	<ul style="list-style-type: none"> • handling of foreign bodies of grain size up to 50 mm • low maintenance effort • long lifetime
Output	up to 230 m³/h	up to 130 m³/h
Out pressure	up to 150 bar	up to 100 bar

Valve sizes at a glance

The valve size for the two valve systems STVE and ROCK is based on the size of the sludge pump. In addition, the size of the valve in the STVE system depends on the consistency of the material and the dry matter content. The sludge pump is equipped with the ROCK valve system for sludge containing a high share of foreign objects.

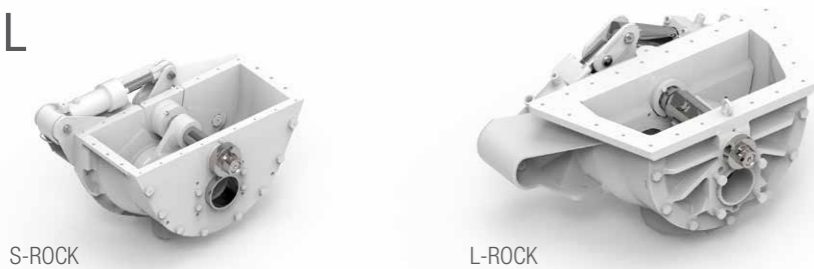
Poppet valve system (STVE) S / L / XL



		STVE S	STVE L	STVE XL
Inlet	mm	2 x 125 ¹	2 x 210 ¹	2 x 280 ¹
Outlet	mm	2 x 100	2 x 150	2 x 250
Pressure outlet (D1 / D2) Ø	DN	100 / 2 x 100	180 / 2 x 180	200 / -
Grain size max.	mm	20*	40*	60*

*max. 5% foreign matter content in the conveying material

ROCK valve system S / L



Animationen ROCK

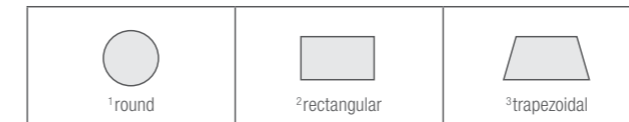
		S-ROCK	L-ROCK
Inlet	mm	740 x 300 ²	792/630 x 330 ³
Outlet	mm	-	-
Pressure outlet (D1 / D2) Ø	DN	125 / -	150 / -
Grain size max.	mm	30	50

Use of valve systems in sludge pumps

	Abbr.	KSP 12*	KSP 20	KSP 25	KSP 40	KSP 45	KSP 65	KSP 70	KSP 80	KSP 110	KSP 140	KSP 220	KSP 315
StvE S	S	1D/2D	-	1D/2D	1D/2D	-	-	-	-	-	-	-	-
StvE L	L	1D/2D	1D/2D	1D/2D	1D/2D	1D/2D	1D/2D	1D/2D	1D/2D	1D/2D	1D/2D	1D/2D	-
StvE XL	XL	-	-	-	-	1D	1D	1D	1D	1D	1D	1D	1D
S-ROCK	S-R	1D	-	1D	1D	-	-	-	-	-	-	-	-
L-ROCK	L-R	-	-	-	-	1D	1D	1D	1D	1D	1D	1D	-

1D = single pressure outlet; 2D = double pressure outlet

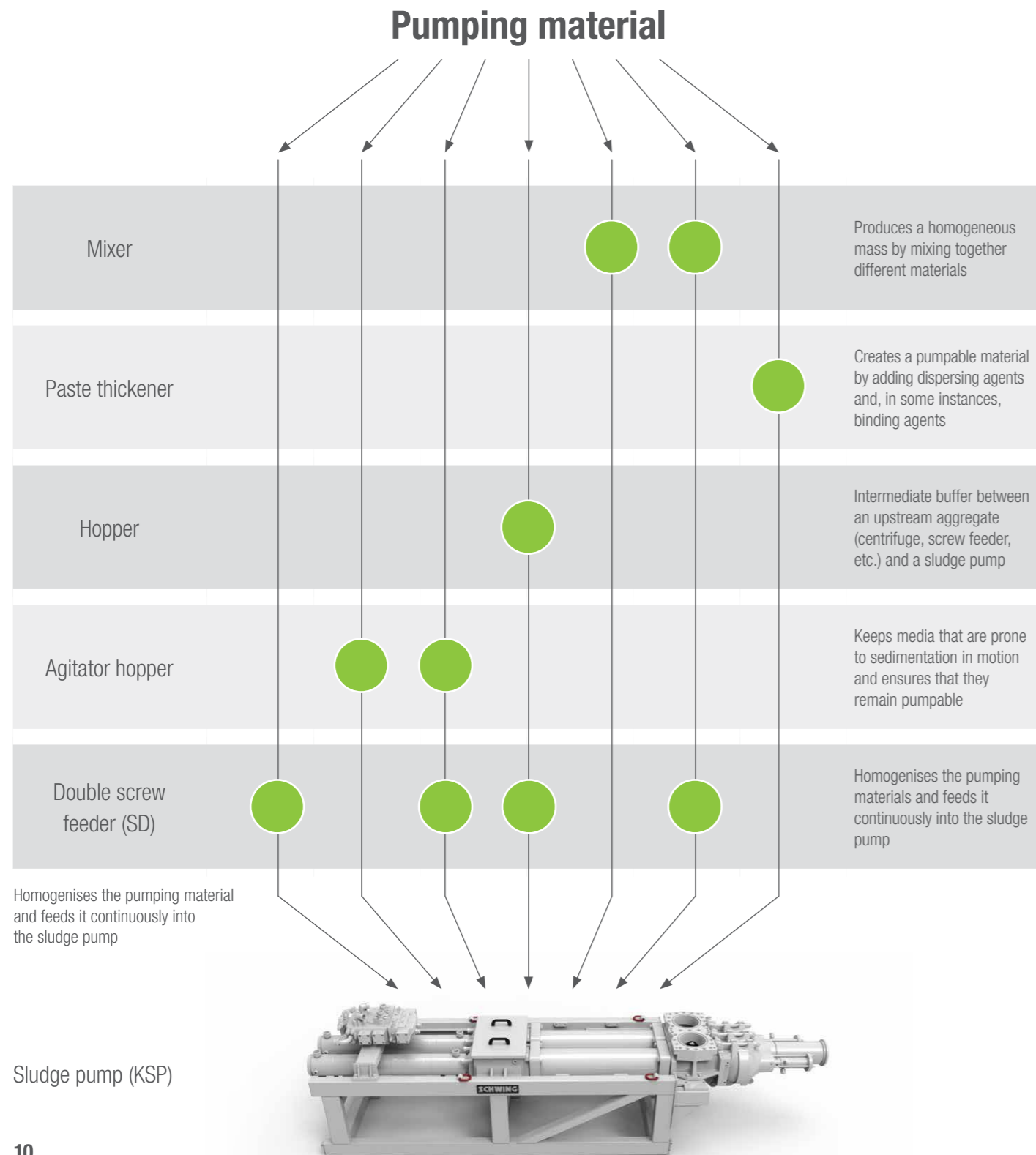
Shape of the inlet



Feeding devices

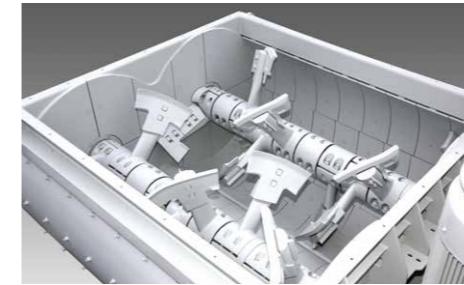
Feeding devices are used in front of sludge pumps to optimise the pump's filling ratio, to mix pumping materials from different sources or to increase pumpability. In order to pump certain materials effectively, it may be necessary to combine various feeding devices.

Function and combination of feeding devices



Technology Sludge pump systems

Examples of feeding devices in detail



Mixer (continuous mixer, pan mixer, etc.)

Mixers create a homogeneous mass from various types of media (e.g., mixture of biological sludge and oil sludge in a refinery), which is then pumped.



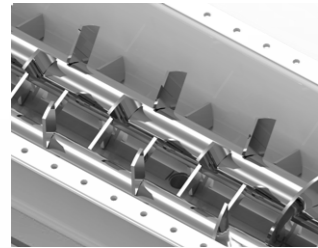
Agitator hopper

Certain media, such as drilling sludge (drill cuttings) and mining residue (tailings), are prone to sedimentation (sinking of heavy components in the pumping material). An agitator hopper keeps the material in motion, thus maintaining the material's pumpability.

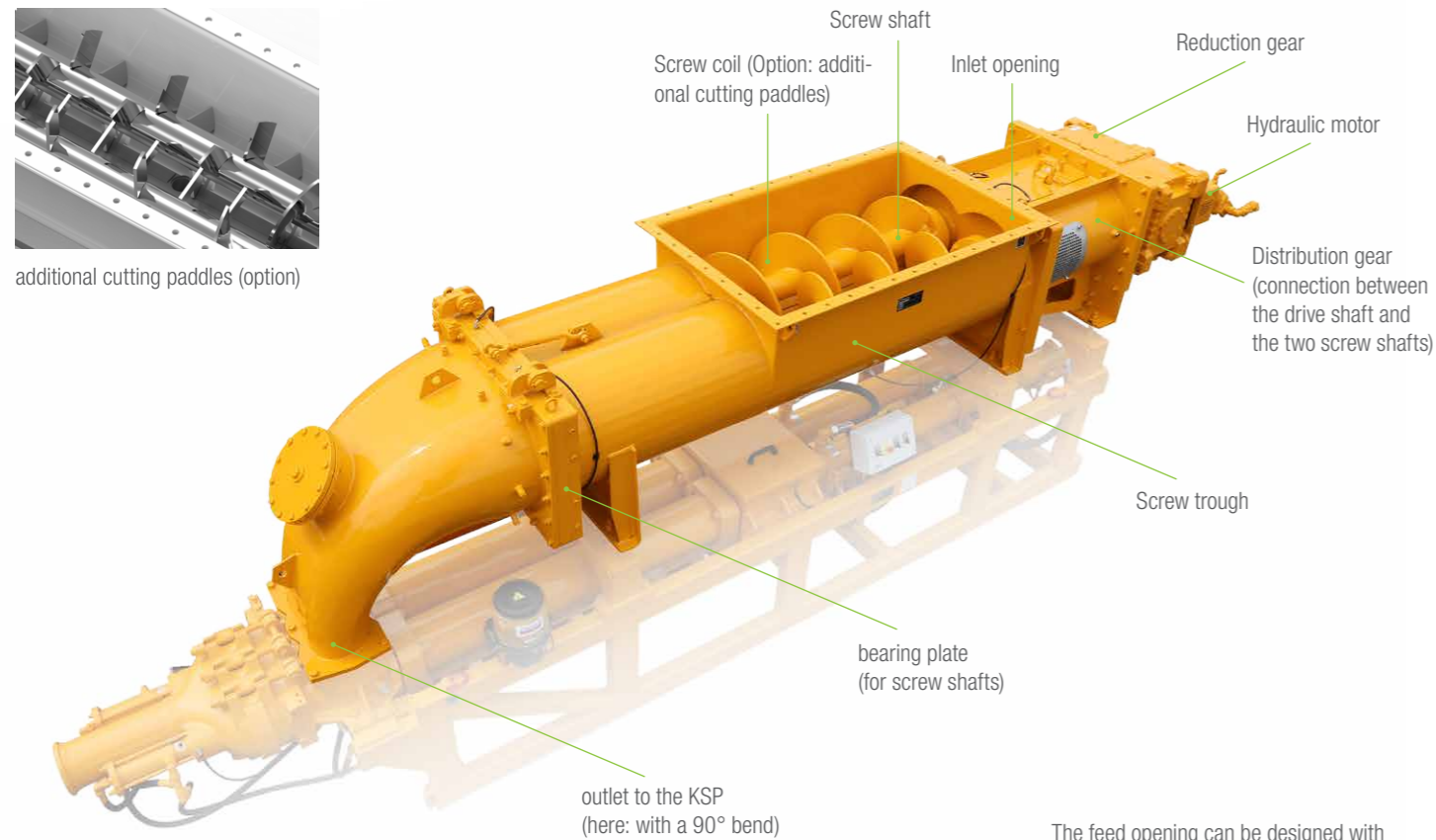


Double screw feeder (SD)

SCHWING's powerful double screw feeder homogenises the pumping material and generates a precharge pressure of up to 6 bar in order to ensure the continuous and variable feed of the material into the sludge pump. The optimised filling ratio created in the pumping cylinders as a result allows for a high output even with highly viscous media. High-pressure variants of the double screw feeder are available for pasty media with a high dry matter content that are particularly difficult to pump (e.g., sludge from drying facilities). All SCHWING double screw feeders are equipped with an automatic central lubrication system as standard.



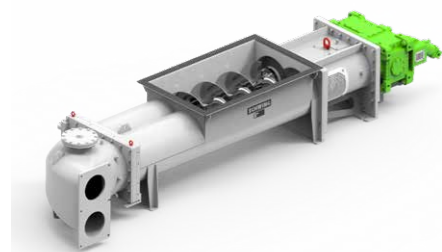
additional cutting paddles (option)



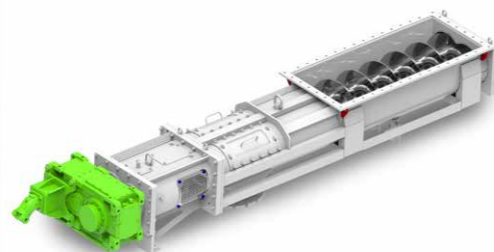
The feed opening can be designed with a length between 500 mm and 10,000 mm (lengths available in 100 mm increments).

Front or rear drive

SCHWING's standard double screw feeder feature a rear drive. In the event of confined space conditions at the installation site, the drive can be positioned on the front of the double screw feeder (front drive). The drive power and output is identical with both the front and rear drive.



Rear drive (standard)



Front drive (option)

Technology Sludge pump systems

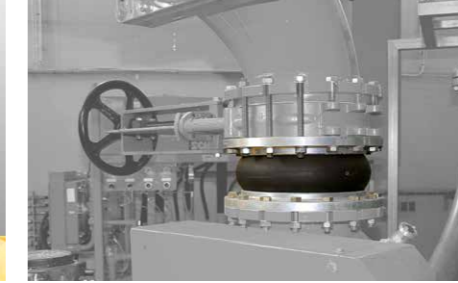
Optional equipment

Pressure sensor on outlet



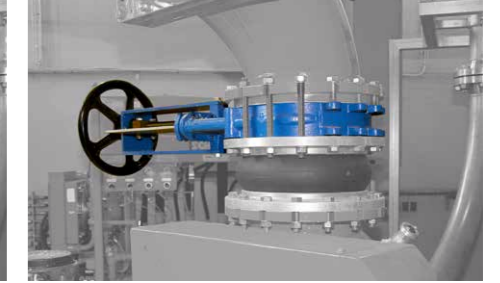
The pressure sensor on the outlet stops the sludge pump if there is a lack of material flow (dry-run protection).

Compensator



The compensator mechanically decouples the double screw feeder from the movements of the sludge pump.

Intermediate flange valve



Installing an intermediate flange valve behind the double screw feeder makes it easier to perform maintenance on the sludge pump.

Product program

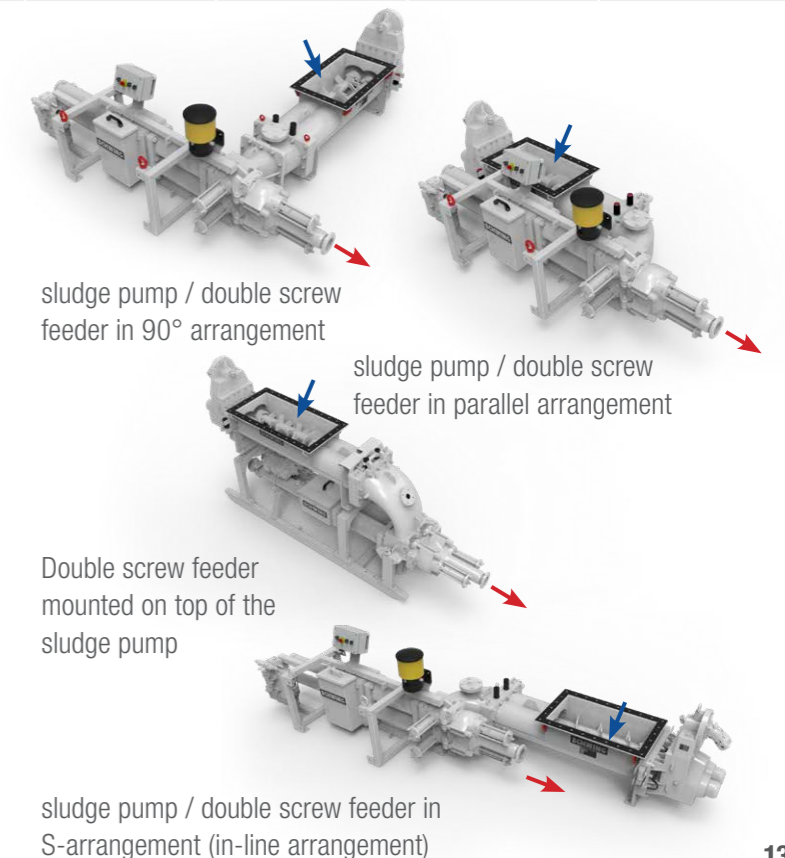
Designation		SD 250	SD 250 HD	SD 350	SD 350 HD	SD 500	SD 500 HD
Performance							
Output*	m ³ /h	0,4-16	0,4-16	1-40	1-40	5-113	5-108
Output pressure	bar	3	5	2,5	6	3	6
Inlet opening							
Length	mm	from 500	from 500	from 500	from 500	from 500	from 500
Width	mm	400	400	600	600	880	880

*with a 40 % filling ratio

Flexible installation: double screw feeder and sludge pump

The sludge pump (KSP) and double screw feeder (SD) can be flexible arranged. This allows for optimum adaptation to almost any situation. There can be installation and arrangement restrictions due to the properties of the material being pumped.

The following figures show examples of the arrangement of the sludge pump and double screw feeder. More than ten further arrangement variations are possible.



Hydraulic power packs (EHS)

SCHWING's electro-hydraulic systems (EHS) deliver high performance while simultaneously offering low energy consumption for powering sludge pump systems. Only electric motors with the highest efficiency class currently available are used as drive motors, whose drive power is efficiently transformed into pumping power by the SCHWING hydraulic system. They are controlled by default via the control on the switch cabinet directly on the aggregate or from a central control room upon request. As an alternative, the switch cabinet can be set up separately from the aggregate for both variants. The wide product program made in Germany by SCHWING makes it possible to dimension the drive system optimally and to adjust it accurately to the pumping system.



Hydraulic unit EHS 300 with 30 kW electrical power and overhead hydraulic tank (up to 1000 litre tank capacity)



Hydraulic unit EHS 300 with 30 kW electrical power and overhead hydraulic tank (up to 1000 litre tank capacity)

Product program

Designation		EHS 100 - EHS 8000
Drive power	kW	5,5 - 1,600 (2 x 800)
Hydraulic tank	l	100 - 8,000
Oil cooler		air-cooled / water-cooled*

*water connection is required and must be supplied by the customer

Standard equipment

- Electro-hydraulic output rate regulator
- Switch cabinet with PLC (programmable logic controller) from Siemens
- Hour meter, notification system for oil level, oil temperature, hydraulic pressure, and motor current
- Electric motor with star/delta starter
- Sludge pumping system can be switched on and off remotely
- Default protection class: IP 55 (other protection classes upon request)
- Emergency-stop device

The sludge pump and the power pack are set up next to each other as standard. Optionally, the two components can be set up 50 m away from each other (e.g., due to lack of space or to noise protection). In order to reduce noise emissions, the hydraulic unit can be equipped with a sound-absorbing hood upon request.

Control systems

Technology Sludge pump systems

The control units for the sludge pump systems are developed and manufactured by SCHWING in Germany. The product range includes electronic control units for systems with a connected load of 5.5 to 1,000 kW, which can be tailored to suit each individual sludge pumping system. They allow the sludge pump's operations to be controlled, regulated and monitored fully automatically, while ensuring safety and reliability. With its engineers and skilled workers, SCHWING offers a complete range of services, from consulting, planning and engineering, to the delivery and initial commissioning of the control unit.



Control units for SCHWING sludge pumping systems

- Standard PLC (programmable logic controller) from Siemens (also available from other manufacturers upon request)
- Electronic control units for 5.5 to 1,000 kW systems
- Fully automatic control, regulation and monitoring of sludge pump's operations
- Display and operation via a colour touchscreen
- Upon request, the control unit can be operated remotely from a control room (connection via Ethernet, PROFIBUS, Modbus, or ETC)
- Switchgear available in compliance with all international standards
- Setup and wiring of entire switch cabinet by SCHWING, among other things
- Easy integration into existing systems
- Upon request, the hydraulic unit and sludge pump can be supplied with terminal boxes to connect to the customer's control unit (functional description and electrical circuit diagrams are provided by SCHWING along with the delivery for safe and easy installation)

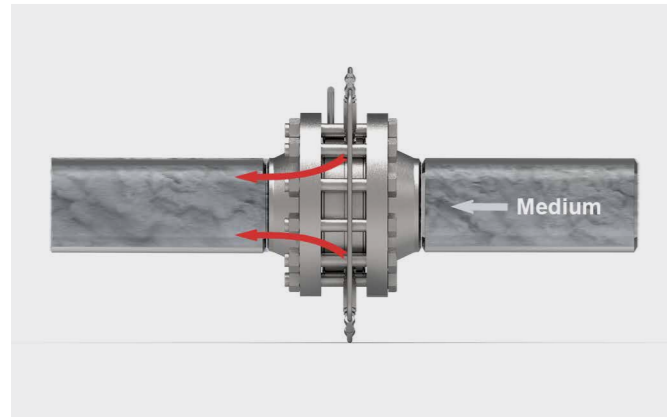


Touch panel on PLC control unit for operating the sludge pumping system

Options and accessories

All from one source

Lubricant dosing



When pumping extremely dry sludge and/or over great distances, an annular lubricant dosing system inside the delivery line can add lubricant (water or a polymer/water mixture) in order to create a film of lubricant between the pipe wall and the pumping material. This in turn can reduce the required pumping pressure by up to 20 %.

Separator



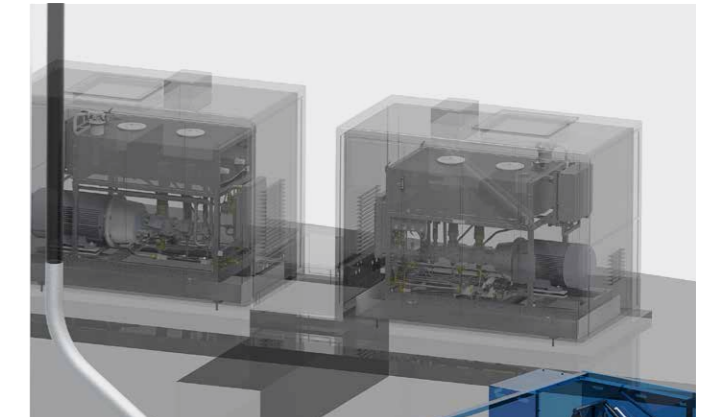
A separator can be used to protect the aggregates downstream from the sludge pump system from any hidden foreign bodies in the pumping material. Foreign bodies that exceed the mesh width of the screen basket are retained securely. The following mesh widths are available: 25 mm, 35 mm, 50 mm (other mesh widths upon request).

Continuous flushing for water box



The sludge pump's water box ensures that the hydraulic oil is separated securely from the pumped material and cools the entire system at the same time. The optional continuous flushing function to be connected by the customer for the water box ensures sufficient cooling even when pumping hot sludge (up to 100°C) and prevents ice from forming at low ambient temperatures.

Sound-absorbing hood for hydraulic power pack



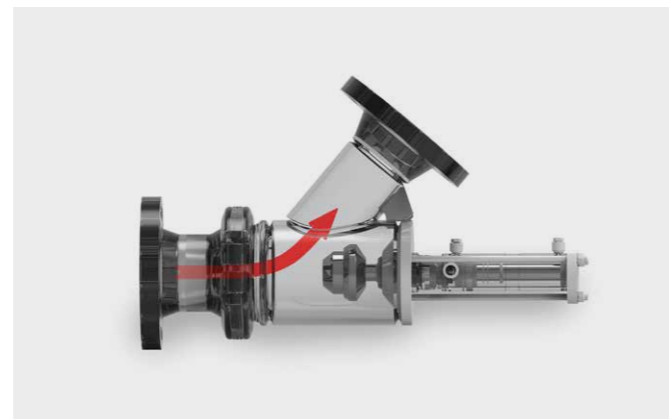
In order to reduce the noise emissions of the hydraulic power pack (EHS) in noise-sensitive areas, each power pack can be outfitted with an appropriate sound-absorbing hood.

Branch pipes



Modern treatment plants in particular often have to coordinate a wide variety of different sludge flows. By using 2-way or 3-way branches, the delivery stream can be conveyed from a sludge pump to alternating delivery points (e.g., storage silo, downstream dryer, incinerator).

Sequence valve



The hydraulically actuated sequence valves ensure that the sludge is distributed optimally, even with destination points at varying distances along the pumping route. The conventional poppet valves from the poppet valve system (STVE) are used for the switching process. This guarantees high reliability and allows for cycles lasting as little as 5 seconds.

Further options

Equipment

- Pipeline
- Coarse particle separator
- Lubricant dosing system
- Vertical agitator
- Reservoir tank
- Shut-off valve
- Ball valves
- Branch pipes
- Intermediate flange valves, round
- Compensators, round
- Pig (sponge ball)
- Coupling system
- DIN flanges and special flanges
- Sound insulation
- Central lubricating system
- ...

Measurement technology

- Level indication (level measuring)
- Pressure transducer (pressure measuring)
- Pressure transmitter (dry-run protection)
- Soft-push control (EHU)
- ...

Silo technology

- Storage silo
- Reception bunker
- Discharge system sliding frame
- Discharge screw conveyors
- Rectangular valves
- Compensators, angular
- Fluidisation
- ...

Software

- Stroke valve control
- Output rate measurement
- Process control
- ...

Maintenance and inspection

SCHWING's sludge pump systems are designed for maximum reliability, a long lifetime and easy maintenance. Hence, they show an extremely low level of wear and boast long maintenance intervals even when operated continuously 24/7 and with almost 8,000 operating hours per year. Whether using the ROCK valve system or the poppet valve system (STVE): the number of wear parts is minimal and they can be easily replaced within a very short amount of time. As a result, the availability of the SCHWING sludge pump system remains high and the maintenance costs low.

Poppet valve system (STVE)

Wear parts

The following main components in the poppet valve system are subject to wear depending on the material:

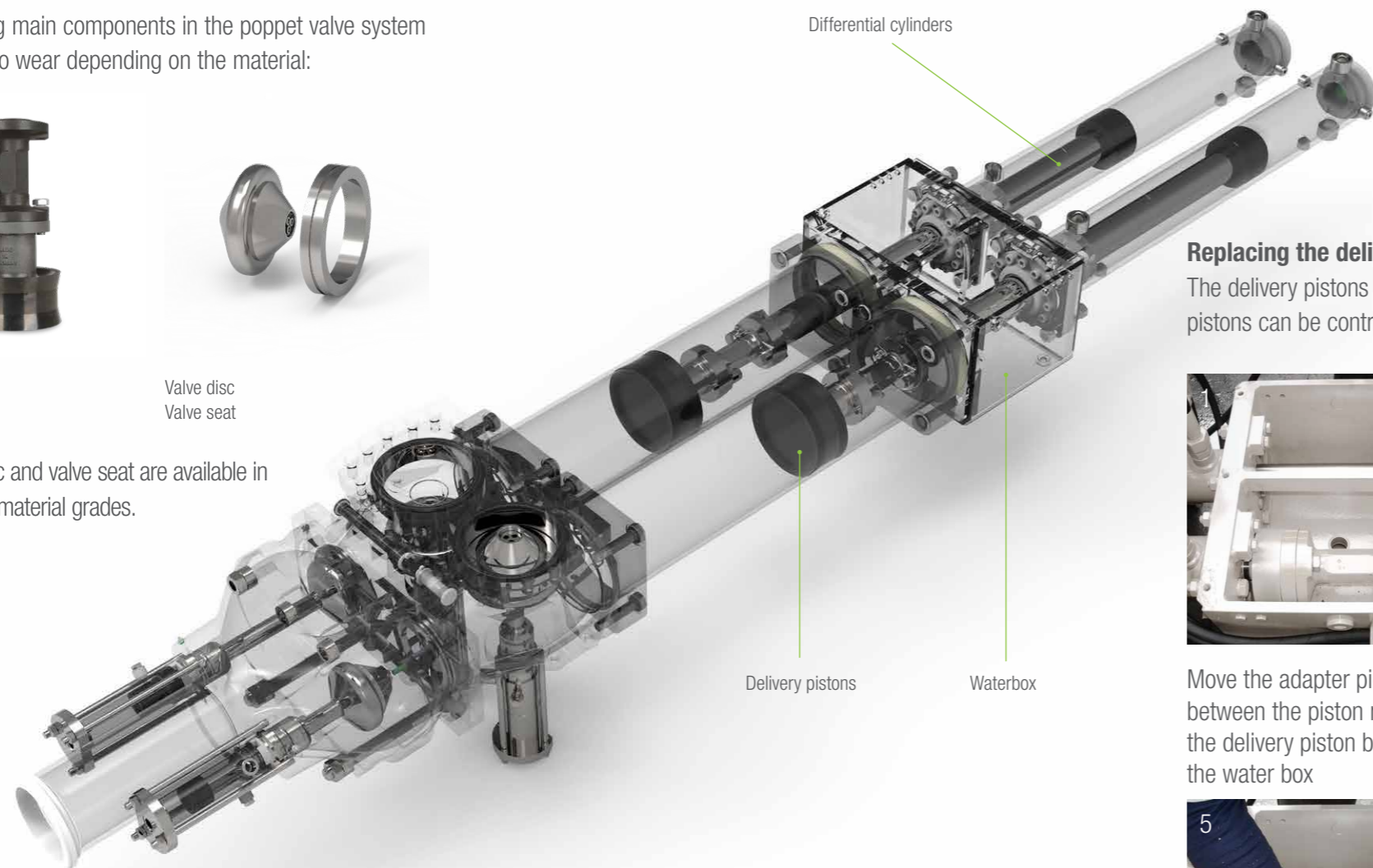


Delivery piston



Valve disc
Valve seat

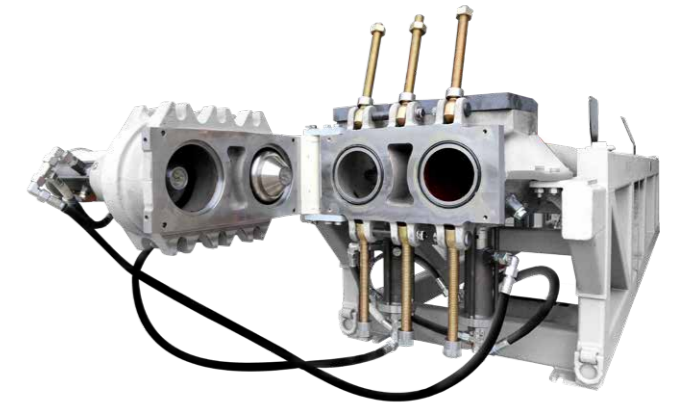
The valve disc and valve seat are available in two different material grades.



Water box as a service indicator

The water box between the sludge pump's differential cylinders (drive) and the delivery cylinders provides cooling for the entire system. At the same time, the water box also serves as a service indicator for the sludge pump. Residual material in the water is a sign of potential wear on the delivery pistons. Oil streaks on the surface of the water can be a sign of leaks between the differential cylinder and the water box. Performing regular visual inspections of the water in the water box can help to prevent damage and failures.

Technology Sludge pump systems

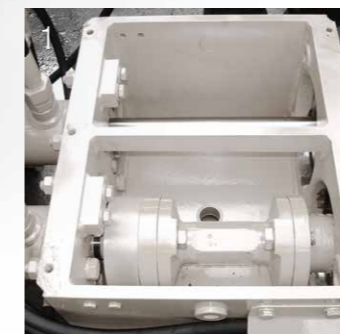


Servicing poppet valves

In order to perform maintenance on the poppet valves, the pressure housing can simply be folded to the side after loosening the screws. Afterwards, the valve disc and valve seat can be rotated, depending on their level of wear, and replaced if necessary. Pre-flushing the sludge pump with water is recommended before performing maintenance.

Replacing the delivery pistons

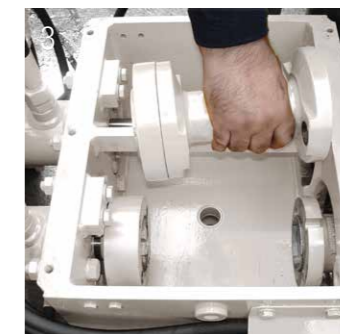
The delivery pistons can be replaced via the water box in the sludge pump. The piston rod movements required to replace the pistons can be controlled at the sludge pump's terminal box using a secure two-hand operation.



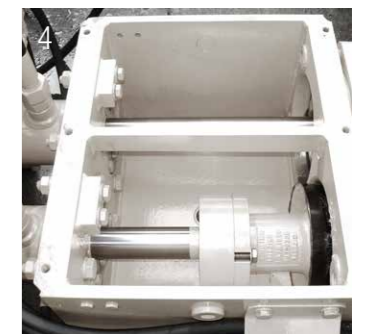
1 Move the adapter piece between the piston rod and the delivery piston back to the water box



2 Release the screw connection of the adapter piece



3 Remove the adapter piece, move the piston rod up to the delivery piston and screw it tight



4 Move delivery piston out of delivery cylinder



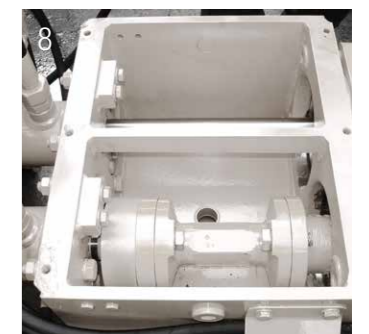
5 Remove used delivery piston, insert new delivery piston



6 Lubricate delivery piston all around and retract into delivery cylinder



7 Lubricate delivery piston all around and retract into delivery cylinder



8 Screw adapter piece to piston rod and delivery piston

Technology

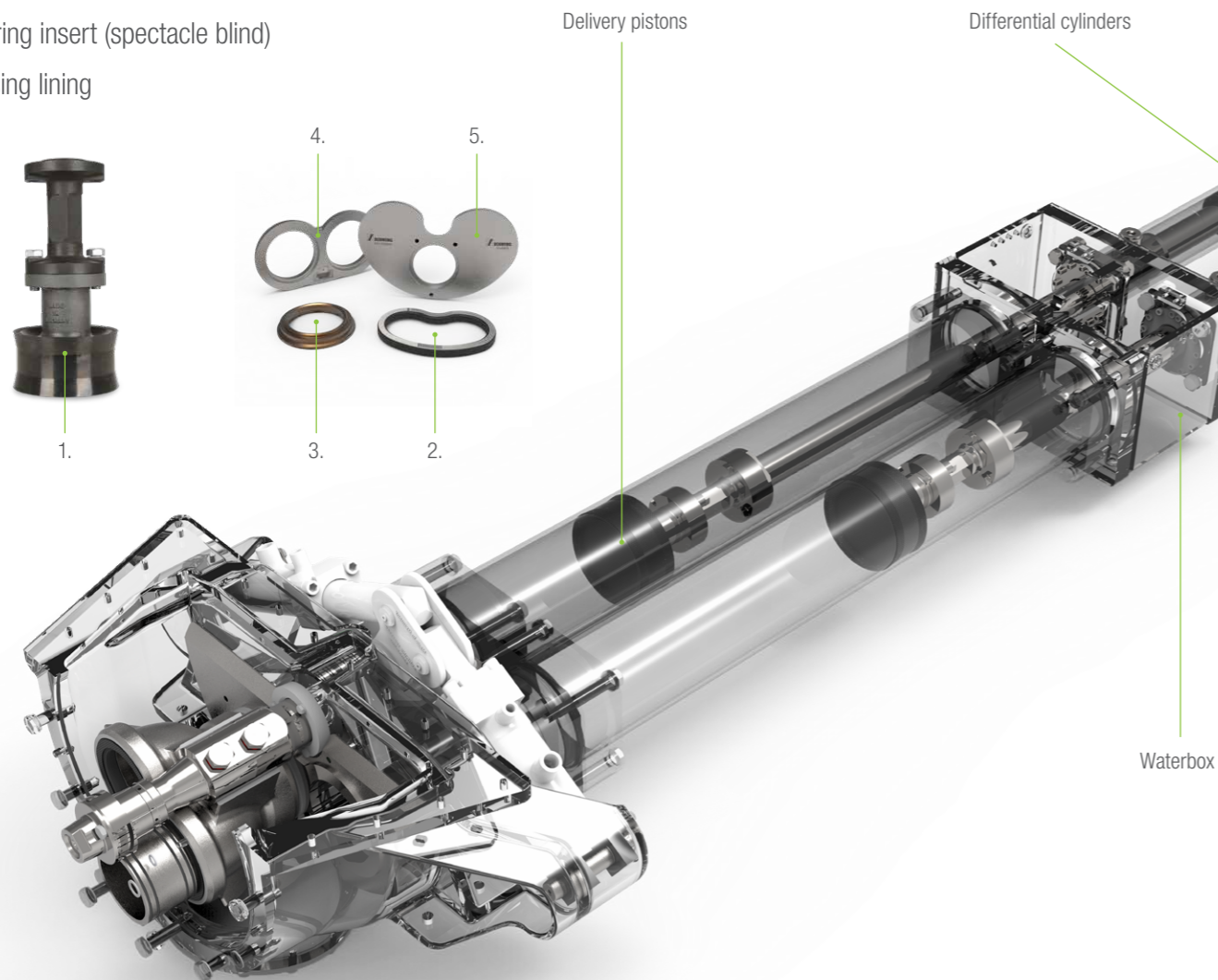
Sludge pump systems

ROCK valve system

Wear parts

The following components in the ROCK valve system are subject to wear depending on the material:

1. Delivery pistons
2. Kidney seal
3. Cutting ring
4. Wearing insert (spectacle blind)
5. Housing lining



Water box as a service indicator

The water box between the sludge pump's differential cylinders (drive) and the delivery cylinders provides cooling for the entire system. At the same time, the water box also serves as a service indicator for the sludge pump. Residual material in the water is a sign of potential wear on the delivery pistons. Oil streaks on the surface of the water can be a sign of leaks between the differential cylinder and the water box. Performing regular visual inspections of the water in the water box can help to prevent damage and failures.

Technology

Sludge pump systems

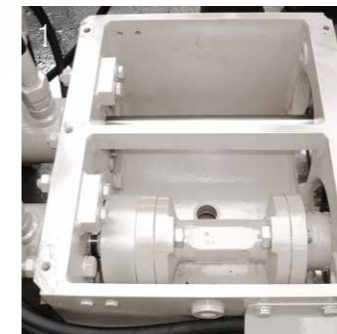
Servicing ROCK valve

In order to perform maintenance on the ROCK valve, the screws on the cover of the housing are replaced with long screws. The cover of the housing can then be removed safely by pulling it forward. Afterwards, the wear parts can be replaced with ease. Pre-flushing the sludge pump with water is recommended before performing maintenance.



Replacing the delivery pistons

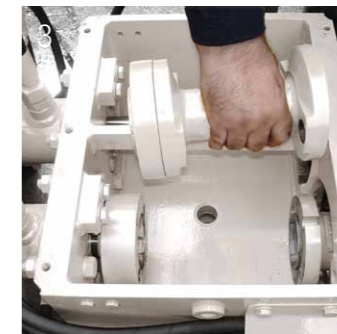
The delivery pistons can be replaced via the water box in the sludge pump. The piston rod movements required to replace the pistons can be controlled at the sludge pump's terminal box using a secure two-hand operation.



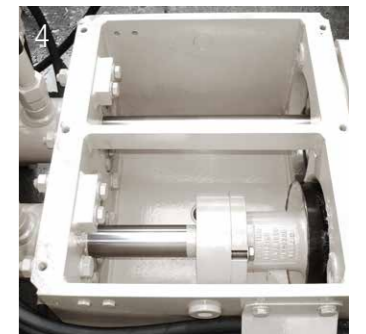
1 Move the adapter piece between the piston rod and the delivery piston back to the water box



2 Release the screw connection of the adapter piece



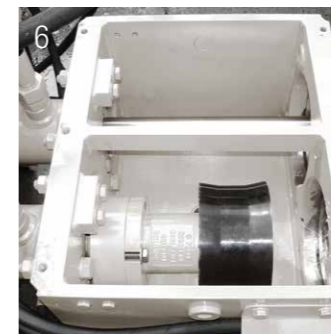
3 Remove the adapter piece, move the piston rod up to the delivery piston and screw it tight



4 Move delivery piston out of delivery cylinder



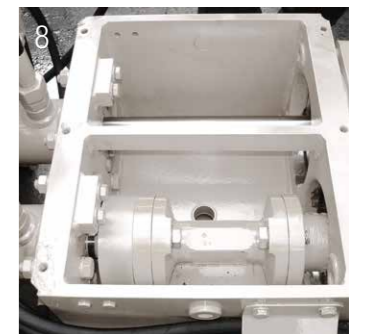
5 Remove used delivery piston, insert new delivery piston



6 Lubricate delivery piston all around and retract into delivery cylinder



7 Lubricate delivery piston all around and retract into delivery cylinder



8 Screw adapter piece to piston rod and delivery piston

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