

## SCHWING SLUDGE PUMP TECHNOLOGY. THE STANDARD FOR WHAT IS POSSIBLE.



### THE DISTINCT ADVANTAGES OF CONVEYING SLUDGE THROUGH PIPELINES WITH SCHWING SLUDGE PUMPS:

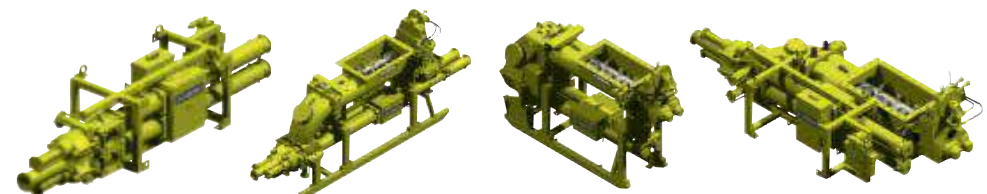
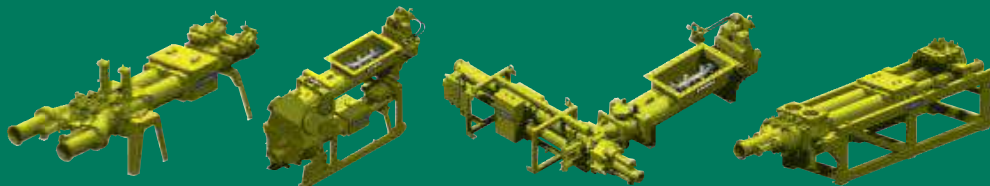
- Clean, odour-free hence environment friendly.
- Closed system preventing contact with toxic media.
- Space saving – fast and inexpensive installation.
- Easy to maintain and low in wear and tear.
- Automatic continuous operation through remote monitoring.

SCHWING has over five decades of experience in the field of hydrostatically driven piston pumps. The first oil-hydraulic twin cylinder concrete pump appeared on the market as early as 1957. In 1973, the newly formed Industrial and Environmental Technology Product Division of the SCHWING organisation started the series production of the piston sludge pumps of the KSP series, which was especially developed for industrial applications. Since that time, SCHWING sludge pumps have been successfully operating in the industrial and mining countries all over the world. It is the design of the self-priming SCHWING sludge pumps, in conjunction with a comprehensive product range of feeding equipment, drive units, delivery lines as well as gauges and regulators for continuous fully automatic operation, that has made the Schwing sludge pumps so successful.

Schwing sludge pumps are available in a standard design with a continuous electro-hydraulic adjustment of the delivery rate – which depending on the installation size ranges from 0.1 m<sup>3</sup>/h to 200 m<sup>3</sup>/h. Reliable operation with pumping pressures even above 100 bars. The convincing advantages of the SCHWING sludge pumping systems at one glance:

- Transportation by pipe is environment-friendly. No dust – no dirt. And no odour and no noise.
- Reliable and cost-effective due to a generous dimensioning and a low hydraulic pressure. A robust design allows easy repair and maintenance.
- Smooth switching and no backflow from one pumping cylinder to the other thanks to the poppet valve design. This is especially important in case of compressible sludges or high pressure heads.

- High fatigue strength and precise switching of the transfer tube is typical for the moment-free "Rock valve".
- Problem-free continuous operation even with high pumping pressures and large pumping distances. Running times of more than 50,000 hours of continuous operation are common. Their high availability makes it a reliable system for the operator.



## SCHWING SLUDGE PUMP SYSTEMS.

### TWO FOR ALL.

SCHWING offers the self-priming, fully hydraulically controlled twin cylinder piston pump in more than ten different sizes with different cylinder diameters and stroke lengths. (see KSP-product range – Technical data).

Two control systems are available. The smooth poppet valve system or the patented SCHWING transfer tube, the Rock valve.

All of these design types can be combined thanks to the SCHWING

modular system. It is possible to create more than 100 sludge pump types from the basic models. This ensures an optimum adjustment of delivery rates and pumping pressures.

#### POPPET VALVE SYSTEM

This control valve unit is made of pressure-resistant cast steel and consists of a suction valve and pressure valve housing that houses poppet valves driven by four external hydraulic cylinders.

The SCHWING poppet valve control system has the following special characteristics:

- Completely secure separation of the pressure side from the suction side during the switch-

over and thus no backflow from the pressure line into the suction zone.

- Quiet, shock-free pump operation, especially in case of compressible filter cakes and high pumping pressures.
- Oversized, durable valve rod seals with doubled, redundant sealing elements and barrier chambers.
- Self-priming up to a 7 m water column.

- Only minor pressure loss thanks to large-sized valve and housing cross-sections. Even isolated foreign material is not a problem. Areas of application: sludges and filter cakes of all kinds, sludges capable of flow, pumping pressures of up to 130 bars.

#### ROCK VALVE SYSTEM

Patented transfer tube system with tilting moment compensation and sludge flow guidance which is favourable in terms of feed and wear (medium-to-medium contact in the centre of the pivoting body).

Further characteristics:

- The SCHWING transfer tube is reliable even under difficult conditions.
- No tilting as it is free of any tilting moments.

- Large-sized flow cross-sections.
- Handles sludges with rough contaminations and large foreign particles according to the pipe cross-section and also sludges with concrete-like particle size distribution.
- Inversion of the direction of the delivery piston takes place automatically only after the transfer tube has completed its full switching cycle.

- High tightness: cutting ring keeps the contact to the spectacle plate during the entire service life. Controlled contact pressure even during the switching operation.
- An automatic adjustment that actually works.



POPPET VALVE SYSTEM

ROCK VALVE SYSTEM

## SCHWING HYDRAULIC SYSTEM.

### SIMPLE IS BETTER.

Whether you are using a poppet valve system or a Rock valve (transfer tube), the fully hydraulic control is of decisive importance for the supreme reliability of SCHWING sludge pumps:

1. Open-circuit hydraulics means: a simple, clearly arranged and robust system with the highest degree of operating reliability and problem-free setup options of the drive unit far away from the SCHWING pump (up to 50 m).

2. Single-circuit hydraulics means: Only a few connecting lines between the unit and the pump (pressure and return line; two small control lines for operating the new generation of control block valves). Additional lines only for additional hydraulic drives such as agitator and twin screw feeder.

3. All-hydraulic pump control with the control block activated hydraulically in end position with

large, flow-facilitating cross-sections – developed and manufactured by SCHWING.

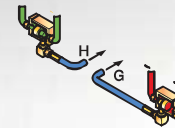
4. Large-sized hydraulic drive cylinders for low hydraulic pressures ensure especially long service lives of the drive components.

5. Constant fine filtering of the hydraulic oil via filters in the main flow. This principle provides a 100% protection of the hydraulics against cavitation.

6. Standard manual adjustment of the pumping direction "Pumping-Stop-Reverse".

7. Continuously variable delivery rate adjustment as a standard feature. Maximum reliability of adjustment mechanism even under more difficult operating conditions. The electro-hydraulic adjustment of the hydraulic pump pivoting angle controls the hydraulic oil delivery rate and thus the lifting speed of the delivery piston.

Best possible adjustment accuracy even with remote adjustment through inching operation or electronic pilot signal 4-20 mA.





## SCHWING HYDRAULIC UNITS. THE POWER PLANTS..

SCHWING hydraulic units, driven electrically or by a Diesel engine, supply the SCHWING sludge pump with pressure oil at the required flow rate.

They are designed especially for industrial applications where reliability, long service life and a high degree of automation is required.

Drive units and pump are separated from each other as a standard feature.

This has the following advantages:

- Improved access to the sludge pump for maintenance and repair.
- Installation of the drive unit, for example, away from the pumps (noise protection or explosion protection provisions).
- Maximum space utilization in case of cramped site conditions

- Distance between pump and drive unit can be 50 m or more.

- Alternatively, one unit can drive two pumps (one in operation, one in stand-by).

- Each pump type can be combined with at least four different drive units and/or drive capacities.

Simpler, more clearly arranged maintenance-friendly design in three type series:

A) Small-type series with overhead oil tank for drive capacities of 5.5 to 55 kW.

B) Medium-type series also with overhead oil tank for drive capacities of 45 to 132 kW.

C) Large-type series of 75 to over 800 kW with laterally installed oil tank.

Standard equipment includes:

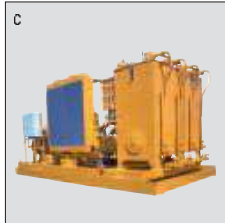
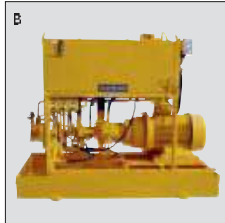
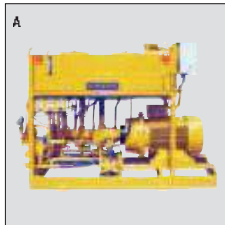
- Standard electro-hydraulic delivery rate adjustment.
- Control cabinet, incident control and detection system for oil level, oil temperature, hydraulic pressure, motor current, motor starter

- No-load electric motor start-up.

- On / Off function of pump can be controlled via remote control.

- Monitoring and remote control possible for all functions from central control room.

Hydraulic auxiliary drives in different designs for agitator or twin screw feeder drive available in a maintenance-friendly, separate arrangement as a standard feature.



## SCHWING SLUDGE PUMPS. THE FEEDING DEVICES.

Depending on the consistency of the medium

A) FLOWABLE

B) PASTE-LIKE / EASY TO DEFORM

C) STIFF / DIFFICULT TO DEFORM

SCHWING has developed a comprehensive system of sludge feeding devices which covers in conjunction with the numerous pump types, all application requirements and ensures the maximum integration of the pump system into existing or future equipment.

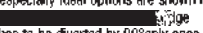
The feeding elements from SCHWING are available for sludges of the following categories:

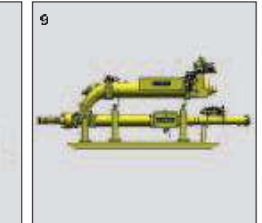
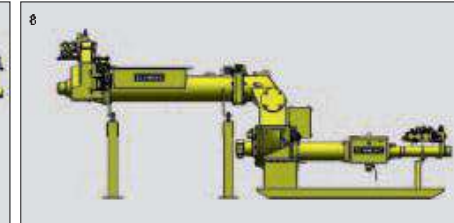
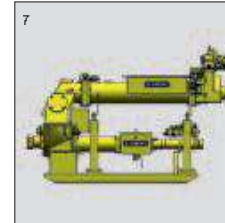
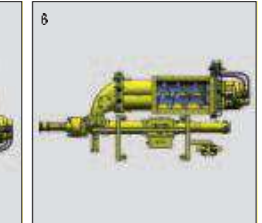
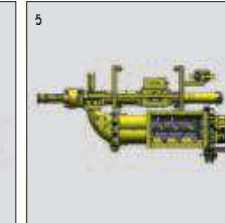
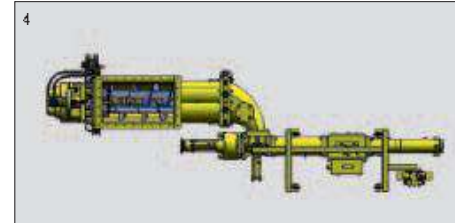
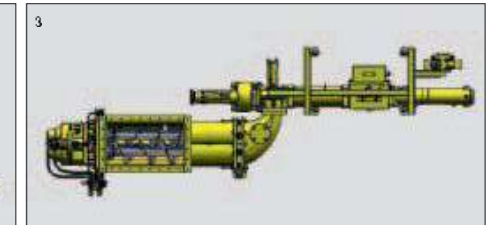
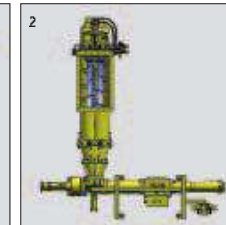
A) Suction pipe, suction shaft or hopper. SCHWING pumps are self-priming up to a 7m water column.

B) Hopper with vertical agitator. Advantageous in terms of both purchase and operation.

They also serve as buffers on the inflow side. They ensure complete filling of the sludge pump. Ideal conditions for the proven SCHWING level measuring system.

C) Twin screw feeder with pre-pressing effect. Due to the forced feeding of the medium, the sludge pump operates in a reliable way and with optimum filling degree. A MUST in case of firm, difficult to deform sludges and filter cakes. Often equipped with a discharge chute and level measuring system as a connecting element to the different dewatering systems.

Examples for the manifold attachment options of the twin screw feeder to a SCHWING sludge pump: Pictures 1-6 (top view) show possible setups in case sufficient space is available. The advantage of this is a very low input height into the screw feeder. The especially ideal options are shown in . Sludge has to be diverted by 90° only once. Pictures 7-9 (lateral views) show the stacked setup options, which are used in cramped conditions.



## SCHWING APPLICATION TECHNOLOGY.

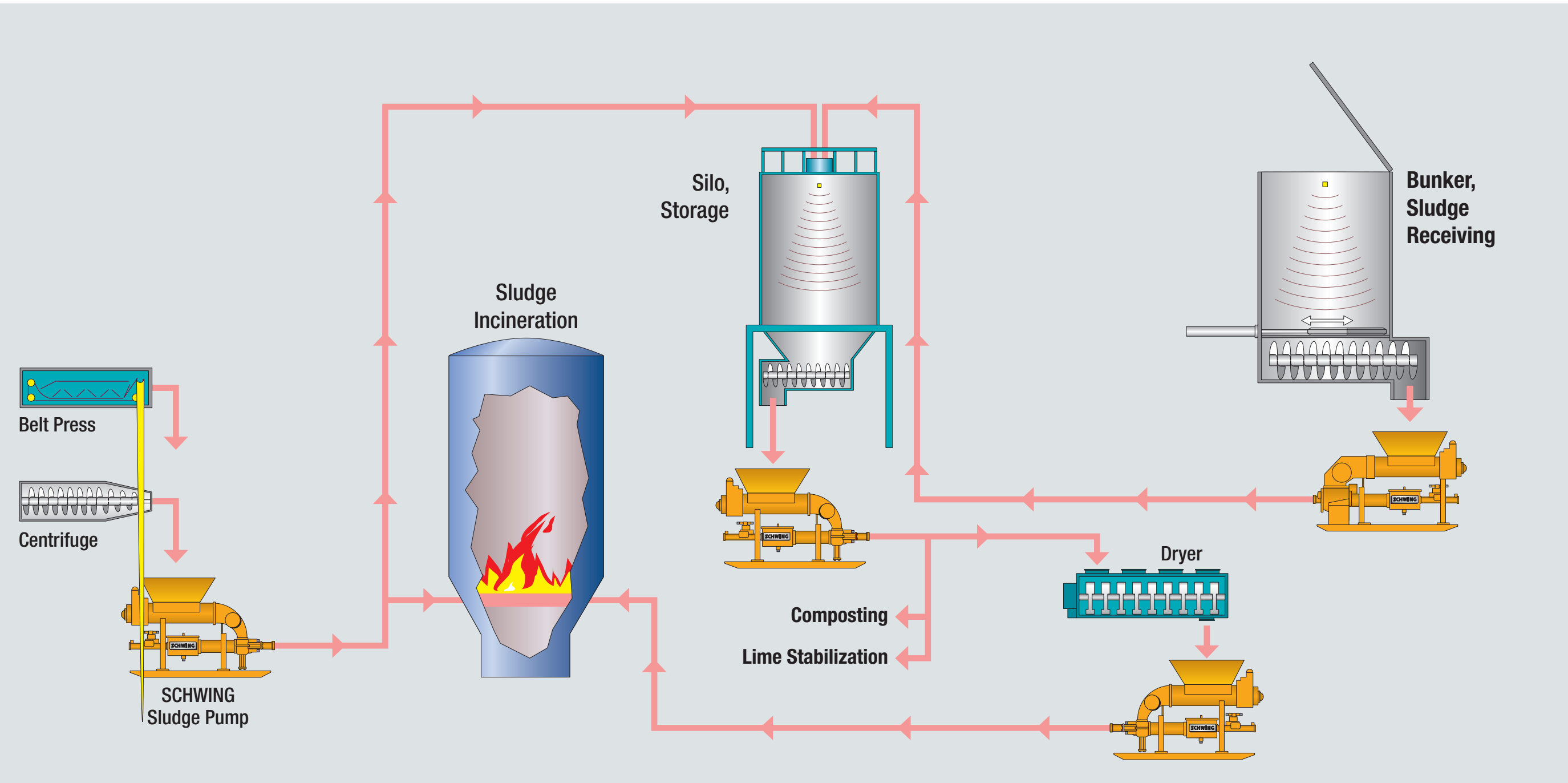
### YOUR TASK – OUR CONSULTATION – THE SOLUTION.

A machine – in our case a sludge pump – turns into a system – in our case a sludge conveying system. The problems facing our customers have changed gradually over the last decades and according to the above mentioned pattern. A small example of the requirements is shown in the illustration below. Your task begins, for example, with the transportation by truck and ends

with the (almost) complete disposal of the sludge. At Schwing, you will find competent dialogue partners who understand your problem in a personal meeting and who will prepare solutions together with you. The pipe transport of sludges showing very different consistencies and compositions is such a complex field that it makes system design based on experience a prime neces-

sity. SCHWING has gained extensive experience through decades of involvement in this area. In addition, we have developed important basic data and principles through selected research-based investigations, for example regarding pressure loss, filling degree, rheologic behaviour of sludges as a function of pumping pressure, pumping distance and pumping speed.

The know-how gained at SCHWING and by its staff ensures a customized, economic and environment-friendly solution to the pumping problem.



## SCHWING SLUDGE PUMPS.

### ACCESSORIES AND SPECIAL DESIGNS.

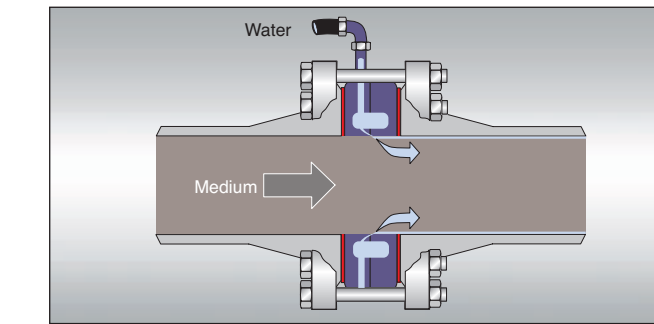
Thanks to continuous development and consistent quality management, in conjunction with what is probably the longest experience in the field of pumping delivery, SCHWING is able to offer an extensive accessory program that meets the highest requirements of power plants or sewage treatment plants.

Example:  
Non-contact level measurement as a basic component of different operating modes as a sensor for:

- Straight pumping tasks.
- Precise dosing relating to plant requirements or due to official requirements.
- Stroke counting device.

- Evaluation of stroke counting and simultaneous monitoring of the filling, professionally combined in the MDS system to determine the true delivery rate.
- Pulsation damper (for damping water hammers in the case of non-viscous media).

- Drive units in explosion- or sound-proof design.
- Special designs of electric control, e.g. in compliance with US or Canadian standards- in sound- or explosion-proof design.



**LUBRICANT DOSING DEVICE**  
The length of the feed pipe and the friction resistance of the medium at the tube wall affect the required pumping pressure which the sludge pump has to deliver. In case of very dry sludges, the pres-

sure can be reduced by approx. 20% by adding a thin water film at the beginning of the pipeline thus providing a lubricant between tube wall and sludge. ↑

**SEQUENCE VALVE CONTROL**  
The hydraulically activated sequence valves ensure an optimal sludge distribution even in case of arrival points with different distances. Tried-and-proven poppet valves that are found in all control valve housings and which offer cycle times of 5 seconds, are used for the switching operation. ↑

**WAY-SWITCH SYSTEM**  
Modern sewage treatment plants often have to coordinate very different sludge flows. The illustrated three-way switches allow, for example, the sludge pump to either feed a silo, a downstream dryer or directly the incineration facility. ↓



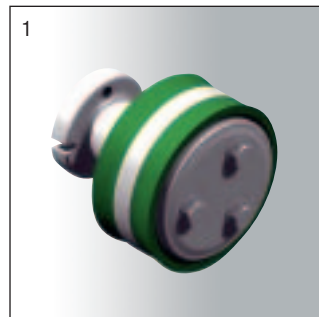
**REJECT SEPARATOR**  
In case of delivered foreign sludge, there is a risk of hidden coarse material. That's why the delivery starts with a SCHWING Rock valve sludge pump immediately followed by a SCHWING reject separator. As shown in the illustration, any coarse material larger than the mesh width of the screening basket is retained and the downstream units thus protected. ←



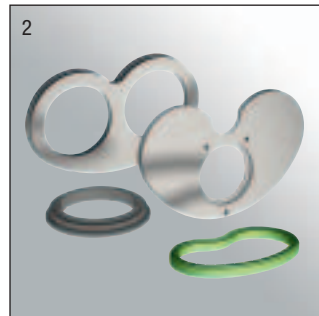


**MAINTENANCE AND REPAIR.  
AN IMPORTANT ASPECT.**

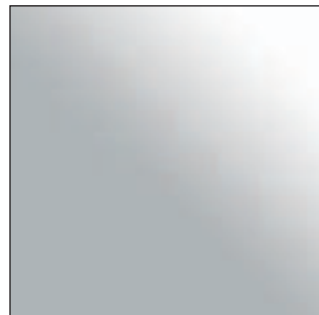
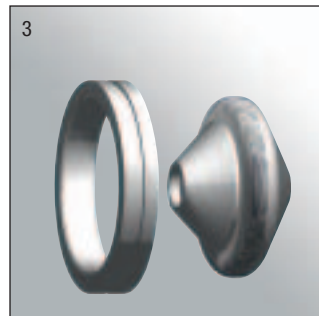
The current KSP sludge pump generation has been further optimized in regard to durability of the wear parts, easy and quick replacement of these parts and the longevity of the entire system. This has some significance as the SCHWING sludge pumps of the first generation have already reached more than 60.000 operating hours without problems.



Picture 1:  
A multitude of pumping pistons are available for all kinds of media and applications. For example: plunger made of buna N. Also available in special ring insert design with variable sealing ring qualities.

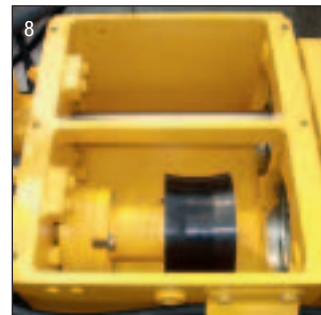
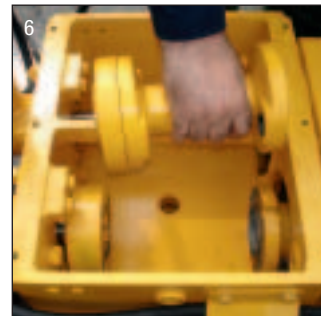
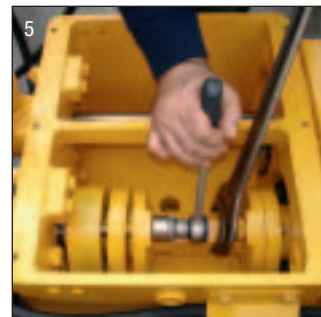


Picture 2 and 3:  
In case of the Rock valve as well as the poppet valve, it is remarkable how very few parts are exposed to the unavoidable wear during the pumping operation. Whether cutting ring, spectacle plate insert, sealing rings and valve seatings – all parts are made of high-strength, hardened materials thus achieving maximum service lives.



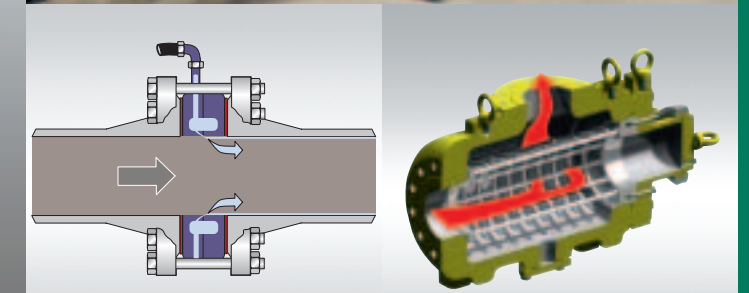
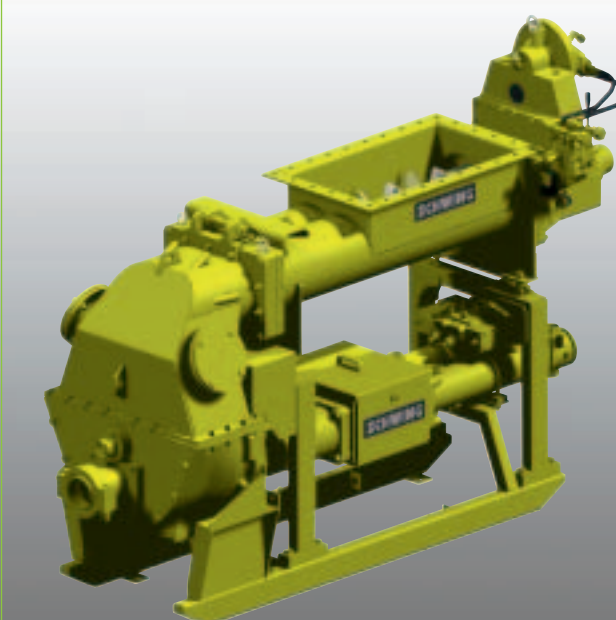
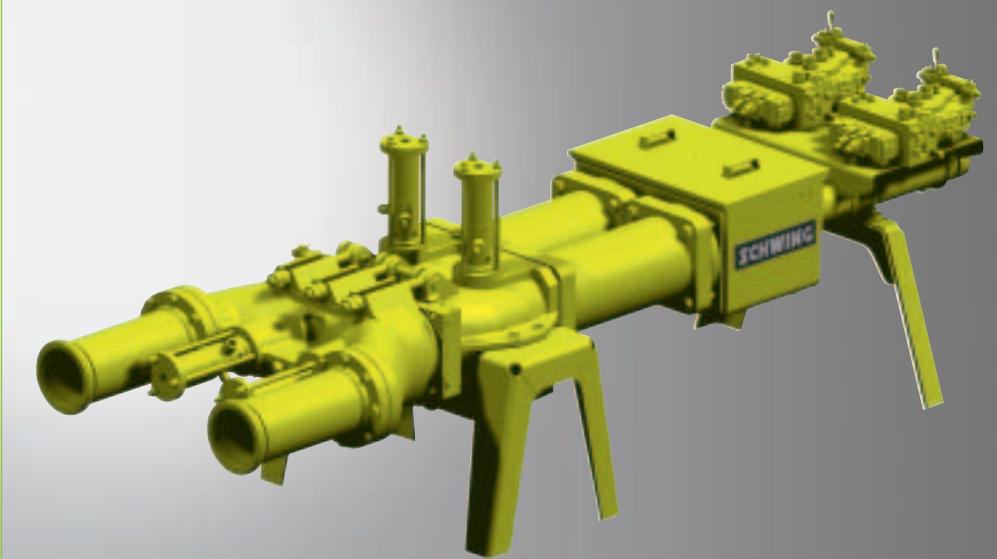
Picture 4:  
Easy and convenient access to the poppet valves by opening the pressure or suction valve housing.

Pictures 5 to 8:  
Replacement of pumping piston – no problem. For this, the connecting piece between piston and piston rod is removed. The piston is then connected directly with the piston rod, pulled into the water box and removed. The new piston will be installed by proceeding in the reverse order.



**SCHWING SLUDGE PUMPS.  
FROM A REPUTABLE COMPANY WITH A WORLDWIDE PRESENCE.**

**SLUDGE PUMP  
TECHNOLOGY**



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Subject to modifications in the interest of technical progress. The exact scope of standard delivery is detailed in the offer.