

Progressive Cavity Pump



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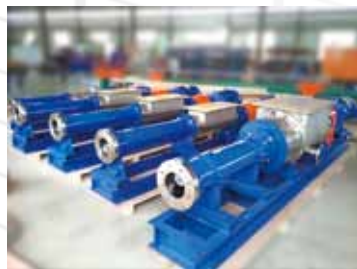
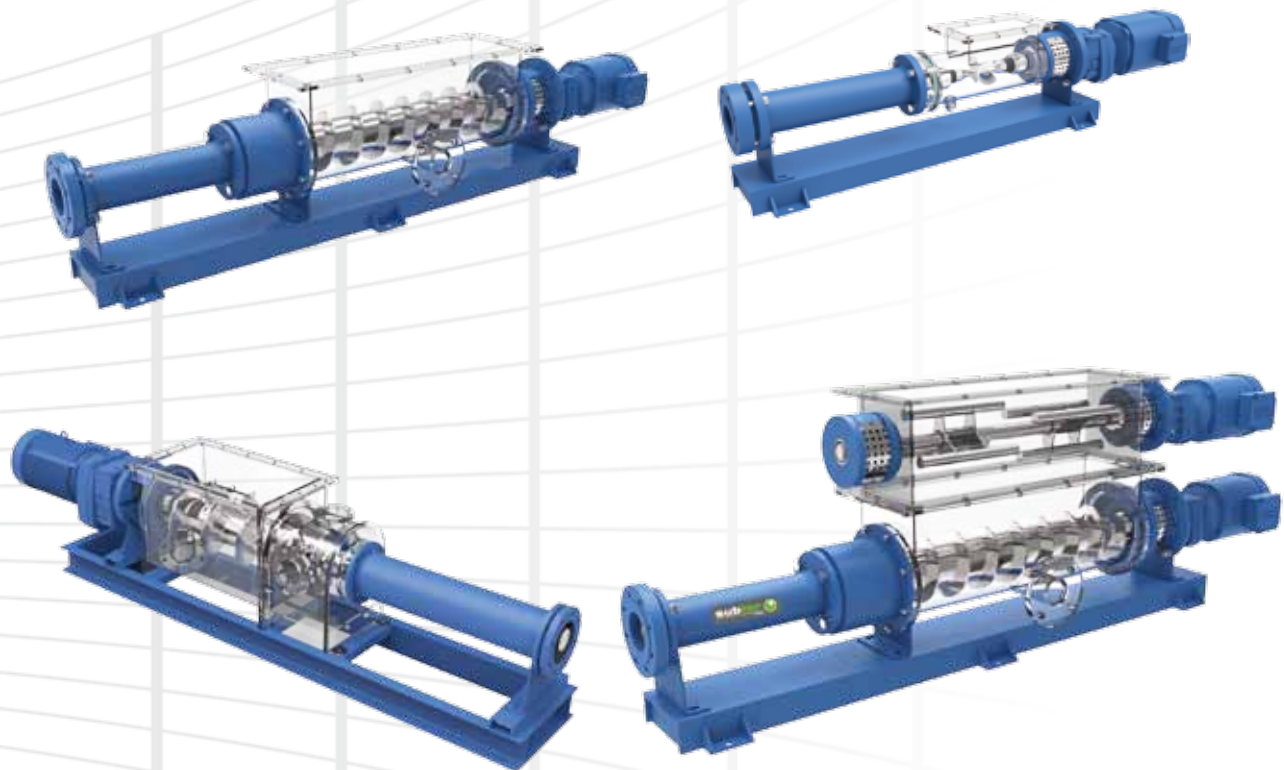
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Please scan the code to surf Subtor
official website for more information

Progressive Cavity Pump (Hopper) --- Mud Cake Transportation

Germany Technology Leading Standards Worldwide



High Performance German
Downhole and Conveying Technology





Company Profile

Weifang Subtor Rotating Precision Machinery Co.,Ltd., a joint venture between Germany Subtor GmbH in China, as a professional in research, design and production of relative products based on moineau principle. Subtor with plants and technical centers in both Germany and China, also sales offices and customer service centers in both Central America and Asia Pacific region. In addition, we have working agents and sales representatives at your service in Russia, Kazakhstan, America, Kuwait, India, South America.

Our Key Products: Progressive Cavity Pump, Grinder Macerator, Power Section for Mud Driller, Down Hole PC Pump, Stator Core and the relevant spare parts and services.



China Factory



Quality Inspection



Production Workshop



PS1000 Multifunctional Helicoidal CNC

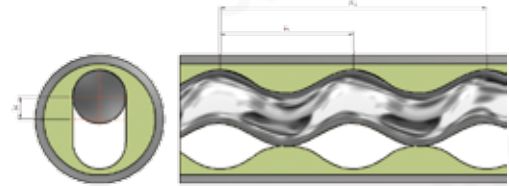
Quality Assurance System

- ISO 9001 Quality Management System
- ISO 14001 Environment Management System
- OHSAS18001 Occupation Health and Safety Management System
- To ensure all the production procedures being completely under the control of quality management system is the basic guarantee for quality products in Subtor.

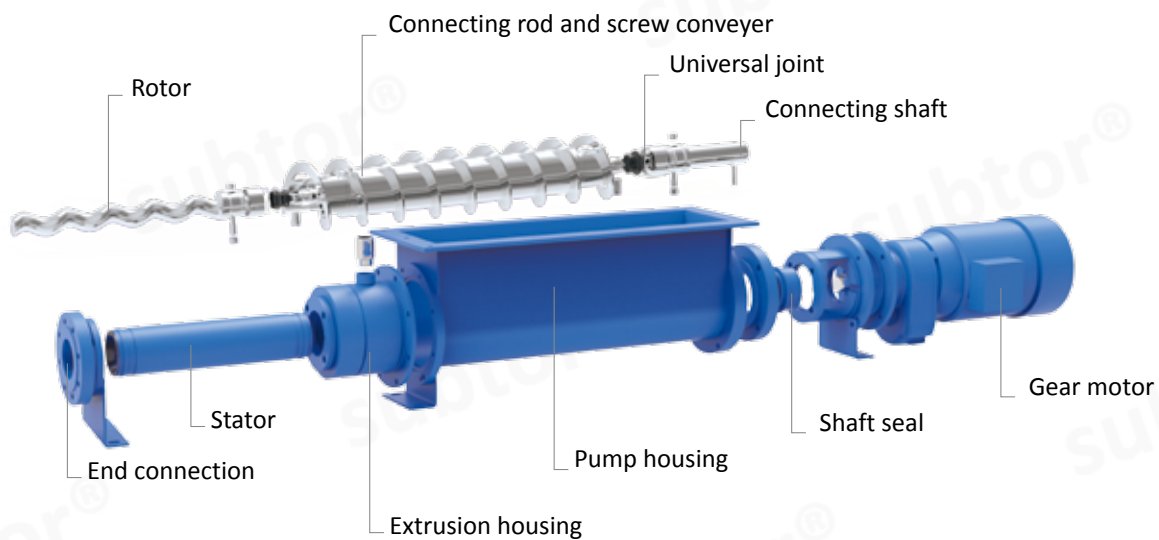


Working Principle and Structure of PC Pump

PC pump as a type of positive displacement pump works based on the interference fit between the fixed stator and the eccentric running rotor. This interference movement forms several separated and air-proof cavities, running from the inlet to outlet along the axis because of the rotor's turning, which results in the medium's continuous conveyance in cavities.



For the special structure and working principle, PC pump is the most suitable for the conveyance of various medium with solid particle, fiber, gas, viscous, corrosive, shear-sensitive and different temperature.



Key Characteristics of PC Pump

- High efficiency, volumetric efficiency up to 95%, mechanical efficiency up to 65 to 85%, saving energy.
- Pulsation free, no shear, no extrusion, no damage to medium's physical property.
- Pump flow rate is directly proportional to rotating speed, which can be used for metering, with measuring accuracy tolerance +/- 1%.
- Low vibration, low noise, continuous conveyance during working.
- Suitable for medium with temperature range from -20 ° C to +180 ° C.
- Suitable for medium with high solid content up to 65%.
- Suitable for medium with viscosity up to 1,000,000 cp.
- Suitable for medium mixed with fiber, grass and gas.
- Suitable for the shear-sensitive or centrifugal force-sensitive polymer medium.
- Suitable for the multiphase medium mixed with gas, solid and liquid.
- Excellent self-priming capacity, suction height 5-6 meter water column.
- Simple structure, easy to maintain, no need of special tools to maintain.



Hopper PC Pump

Stator Rubber Material

Rubber is imported from Germany. In general application NBRH rubber is selected in sewage treatment for the outstanding properties of anti-abrasion, oil resistance, anti-corrosion, aging-bearing and enduring temperature up to 120°C .



Rubber injection machine



Rubber compounding process

To meet various working conditions, anti-acid and alkali EPDM rubber, high temperature bearing FKM rubber, HNBR rubber with acid alkali and high temperature enduring, PTFE rubber with both high temperature(up to250C) and chloride ion resistance are all available.

Rotor Material

In sewage treatment industry, high tensile strength alloy carbon steel 42CrMo is usually used with surface chromeplated treatment. Tool steel Cr12MoV with surface vacuum quenching treatment (hardness HRC65-66°) is chosen for the high solid content abrasive mud cake. The rotor can also be treated by WC or CrC spraying welding technology, spraying welding layer thickness 0.6-2mm, surface hardness HRC 67-70° .The ability of anti-abrasion and service life have been greatly improved.



Rotor with vacuum quenching treatment



Rotor with WC or CrC spraying welding treatment



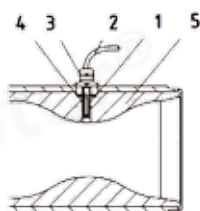
Rotor being polished

The contrast between spraying welding and vacuum hardening

Type	Thickness	Hardness	Wear resistance
Spray welding	0.6-2.0mm	HRC 67-70	2.99×10 ⁻³ mm ³
Vacuum hardening	5-6mm	HRC 65-66	3.55×10 ⁻³ mm ³
Chrome plating	150um	HRC 56-60	13.38×10 ⁻³ mm ³

Stator Dry-Run Protection Device

It's used to measure the rubber's temperature, and the pump will give alarm or stop automatically when the actual temperature exceeds the pre-set value to avoid dry-run and prolong stator's service life.



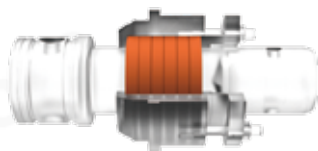
- 1— Temperature Sensor
- 2— Sensor Wire
- 3— Cable Protection Union
- 4— Thermal Conductive Catheter
- 5— Stator



•Packing Seal

Packing seal is divided into two types: one with water flushing system and the other without water flushing system. The sealing section of connecting shaft is usually treated by CrC thermal spraying welding technology, with surface hardness HRC65-66, excellent abrasion resistance property. Small leakage of packing seal is permitted to lubricate the connecting shaft and take away the heat caused by friction to protect connecting shaft and stuffing from dry running.

Packing seal is strongly recommended in sewage treatment industry for the outstanding advantages of compact structure, convenient detachment, easy maintenance and repair.



Installation of packing seal



Connecting shaft with spray welding treatment

•Mechanical Seal

Mechanical seal is offered too according to customer's requirement.

Two types are for choice: single acting mechanical seal and double acting mechanical seal. Various structure and material of mechanical seal is chosen base on different working conditions.



M7N single acting mechanical seal



MG1 single acting mechanical seal



Back to Back double acting mechanical seal

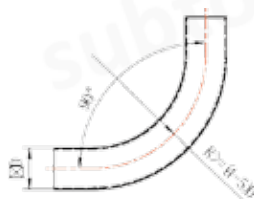


M74D double acting mechanical seal

•Pipeline Selection of Mud Cake

Stainless steel pipe is recommended as the first choice to reduce the pipe resistance. For carbon steel pipe, ensure the inner pipe wall are as smooth as possible with no rust. Also the turning radius is at least 4-5 times than the pipeline's radius. Ninety degree elbow, plastic pipe and piping with low pressure resistance are all forbidden in such application of mud cake.

Suggestion: The diameter should be at least DN150 for hopper pump pipeline, According to different conditions, pipelines with diameter DN150-300 are all suitable. Pipelines with diameter DN125 and DN350 are not recommended.



The shorter of outlet pipeline and fewer pieces of elbow, the better conveying performance, that is to say, to reduce the length of pipeline and the amount of elbow as much as possible. Usually 2-4 bar pressure will be deducted for each elbow, and the pressure loss caused by potential energy also need to be considered for vertical lift.

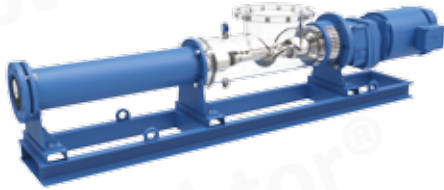




Hopper PC Pump

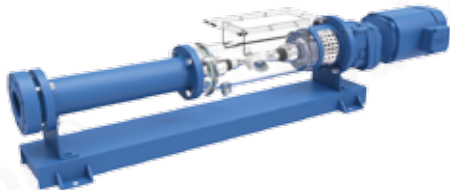
M0 Type Flange Pump

Designed with flange hopper and small feeding screw, suitable for conveying condensate mud with solid content 8%-15%.



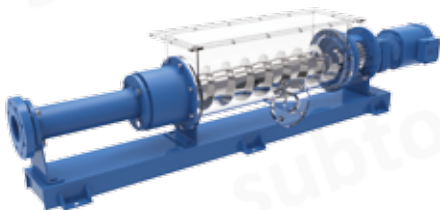
M1 Type Hopper Pump

The pump is designed with small rectangle hopper and feeding screw blade, quite suitable for transporting the mud with solid content 13-18%.



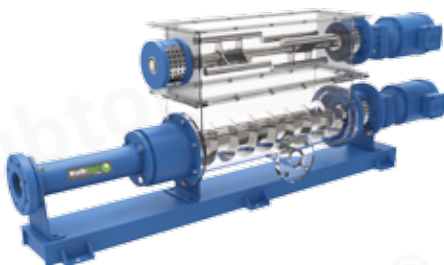
M2 Type Hopper Type

Big rectangle hopper is designed as pump housing, suitable for medium with high viscosity, high solid content and poor fluidity. Coupling rod with propulsion unit by feeding screw blade, effectively feeding fluid into the conveying elements, preventing accumulation at the entrance. Suitable for mud cake with solid content 18%-30%. The size of rectangle hopper can be customized according to different installation conditions.



M3 Type Hopper Pump

On the basis of M2 type, an additional bridge breaker is added which can help the high viscous medium entering into the casing and avoid bridging phenomenon. Suitable for transporting mud cake with solid content 30%-45%.



M5 Type Hopper Prolonged Pump

Hopper and extrusion housing are prolonged for better transportation mediums with poor fluidity and easy dehydration, like photo residue, starch, sugar beet pulp, vinasse, bean dregs, apple residue and so on.



MX Type Mixture Convey Pump

Specially designed for biogas industry, equipped with enhanced rectangle hopper and screw conveyer. Used to mix and convey straw, animal waste and biogas slurry or to convey the viscous high solid content kitchen garbage.



SM Type Slant Hopper Type Pump and VM Type Vertical Hopper Type Pump

Specially designed for paint coating industry and food industry, slant or vertical hopper, vehicle mounted structure, easy to move and repair. Widely used to transfer viscous medium like paint, ink, coating, shampoo, lubricating oil, cable compound, red bean puree, moon cake stuffing, condensed juice, various sauce and so on.



SM Type Hopper Pump

VM Type Vertical Pump





Hopper PC Pump

Notes on Hopper Pump Type Selection

• In sewage treatment factory, solid content of mud cake treated by water extractor is about 18%-45%. Based on our experience, solid content of mud cake treated by belt press and centrifugal machine is about 18%-27% and M2 hopper type is used to convey this kind of mud cake.

Solid content of mud cake treated by plate and frame filter press is about 28%-45% and M3 hopper pump is used.



M2 Type Hopper Type



M2 Hopper Pump Usage in Site



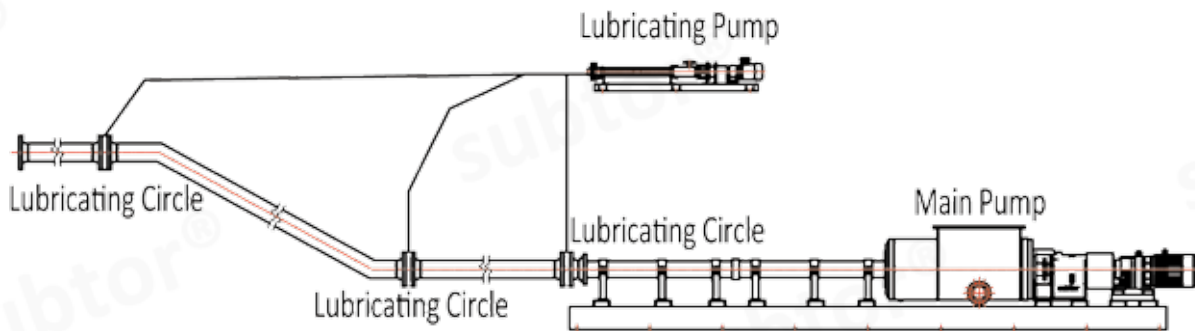
M3 Type Hopper Pump

• Usually, mud cake's flow rate depends on the solid content. Flow rate is recommended at 0.2-0.5m/s, no more than 0.8m/s. Pump rotating speed is about 100-180rpm.

• For the strong abrasion property, every stage of pump can be chosen as 3-4 bar pressure resistance to assure longer stator service life. One stage pump is not recommended for mud cake. The power of motor should be 1.5-1.6 times than the shaft power.



• A small size pump is usually used to lubricate pipeline with water or waste polymer solution for long distance transportation. In this way, the friction can be reduced by 40%-60%. There can be 1-4 lubricating points depend on the pipeline's length. The lubricating pump should be the same stage with the main convey pump. Frequency converter is recommended for lubricating pump to adjust the flow rate. Check valve can be installed at the outlet pipeline to prevent lubricate backflow.

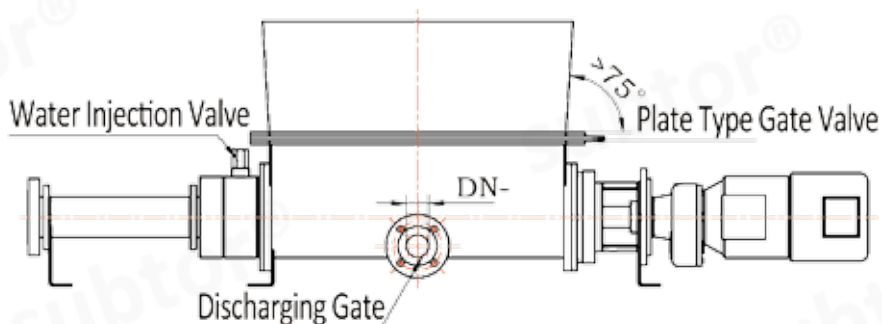


Pump for Mud Cake Convey and Lubricating System

- Please clean the pump and pipeline if the pump is not to operate for a long time. Also please add water into pump housing for lubrication and to avoid dry-run.

- A big mud hopper is usually installed on the top of suction housing for the medium more smooth entrance into the pump. It's recommended that the angle between hopper outer wall and horizon should be at least 75 degree for better product entry into pump and to avoid accumulation and bridging.

One plate type gate valve can be installed between the hopper and pump housing to separate medium for convenient repair. Illustration is as following:



A small ball valve is installed on the top of extrusion housing for water injection and avoiding dry-run. The clean out flange with DN50 or DN65 size at the bottom of pump housing can be used for drainage, and flushing of suction housing before maintenance.



Pump for Mud Cake Transportation Installed before Incinerator

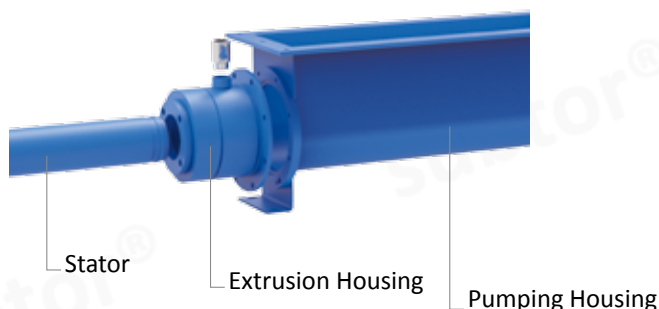


Pump Tested with Mud Cake 28% Solid Content

- The extrusion housing and pump housing are detachable and connected with bolts. During replacement of rotor, user can just open the extrusion housing for faster and easier maintenance process.



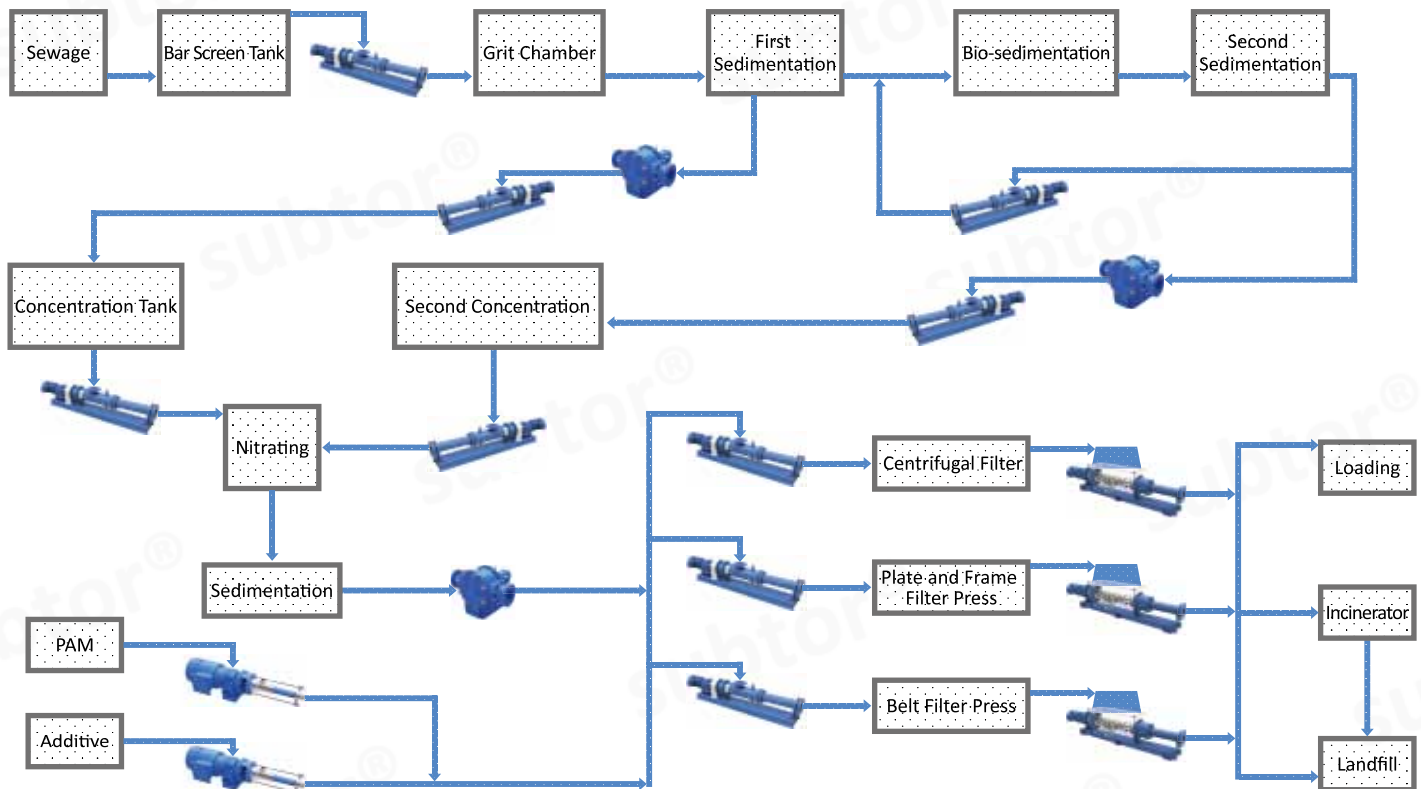
Detachable Extrusion Housing





Hopper PC Pump

Sewage Treatment Flow Chart



In the traditional sewage treatment industry, mud cake (solid content 20%-35%) is usually buried after natural drying, which may pollute the water and soil extensively. So now landfill treatment has been forbidden by law. The mud cake must be dehydrated for the second time with the solid content about 40%-45%, with heavy metal and other poisonous harmful substance being removed. After treatment, it can be used for gardening or being burned for power generation.

The traditional screw convey for mud cake has been replaced for the short transfer distance and open conveying pipeline. PC pumps have been more and more widely used for the advantages of closed pipeline, high efficient and environment friendly transportation.

PC pumps with various rectangle hoppers offered by Subtor have been widely used to transfer mud cake with viscosity 100, 000-500,000 cp, solid content 15%-45%, furthest distance 500 meter, head up to 80 meter, maximum flow rate 30M³/h and maximum pressure 72 bar.

Spare Parts

Common used wear parts are kept in stock; aimed to deliver to the client soonest when needed.

- Rotor, Stator
- Shaft, universal joint and coupling rod, flexible rod
- Universal joint outer and inner rubber seal sleeve, skeleton oil seal and mechanical seal
- Other spare parts, like round pin, spacer sleeve, long and short sleeve, clamp spring and so on



After-sale service

Our professional service engineers are ready to serve you 24/7.

- On site training and guidance
- Help and guide customers to solve the problems as soon as possible
- Commissioning, maintenance and repair at site
- Technical consultation and spare parts purchase suggestion
- Reaching the site to offer service within 24 hours from notification.

