



**ProExtractionUSA**

**PELW  
Decanter Centrifuge**

**INSTRUCTION  
MANUAL**

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## Safety Notice

PELW300 Screw Conveyor of Decanter Centrifuge ( Below it's called centrifuge ) is a High-speed rotation machine. Operate and maintain this machine in accordance with operation and maintenance regulation strictly in order to ensure the machine safe and reliable running. Before transportation , all machines have been done testing and make sure reliable operation of machine . If users could observe all regulations in this manual, we are sure your machine will achieve the longest useful life.

**Dangerous:** Means has the potential to harm the person or damage equipment **Warning:** Means Equipment could lead to potential damage

**Notice:** Means very important operation and maintenance instruction.

**Leakage:** If there is a sealed problem, then clearance leakage of the solid, liquid, gas may occur, if treated material in centrifuge is toxic or harmful media, thus the user is required to take effective measures to prevent inhalation or touch leakage material directly. For example: the operator should wear protective work suit, gloves, safety glasses, gas masks, protective masks and so on. In short, the user must take effective measures to prevent the leakage medium damage to human health or damage equipment.

**Protective devices:** Centrifuge equipped with standard protection devices (These protection devices including drive belt protective cover and protection devices for potential dangerous) as long as the centrifuge put into operation, then the above-mentioned protection devices must be in place properly and are in good working condition.

**Safety regulation :** During the installation, operation and maintenance of centrifuges and related equipment, the rules to be followed. In addition, we suggest when use in practice, the following practical rules need to be followed.

Bring up (develop) a good safety habits every minute to avoid damage the body or equipment.

Users should be aware of the structure as well as familiarity with the contents of this manual before installation and maintenance of the equipment.

When operating or working near the centrifuge, security measures should be taken. Make sure cut off power supply of electrical control box 、 fuse holder or switch when dismantle / connect wire or repair centrifuge. Prior checking and repairing equipment, users must re-check to make sure power has been cut off to prevent equipment start by chance and occur an accident.

If the equipment is controlled through remote control or automatic operation, a tag should be made near the equipment where strike the eye. If the equipment start automatically without consent, it will result in personal injury or death. Wire and control components which are employed should be complied with the state electrical standards and confirm the earth wire of centrifuge and related equipment are in good condition. Electrical staff who hold certification have the right to carry on doing centrifuge and related equipment working.

When the equipment is running, it's strictly prohibited to put handcloth or other things such as other tools turn or move parts and inlet / outlet port in order to prevent casualties.

The equipment can't be started before protection devices and view hole covers are not installed. It's strictly prohibited to disassemble protection devices and view hole covers when equipment running. Protection devices and cover board should be installed after maintenance in order to ensure they are in good working condition.

Through the lifting lug which on the top of bearing seat or equipment shell and the swinging ring bolt of motor to hoist the whole centrifuge is strictly forbidden. Because the lifting lug couldn't bear the weight load of equipment. You should hoist the whole equipment through the swinging ring which on the pedestal, or else will result in personal injury and death and damage the device.

Cranes, hoisting equipment, hoisting chain, wire rope and other device which used for lifting should be inspected strictly and confirmed that the equipment is safe and feasible

and require a larger safety factor for the lifting maximum load equipment, otherwise result in personal injury and damage equipment or other equipment accident. Hoisting equipment, steel wire rope or chain should be fixed so that prevent tilt or slide when hoisting equipment. Before lifting whole equipment or large pieces from the base or the ground, you should test to see whether it's balance or touch other objects. Confirm the power supply wire of lifting equipment has been cut off, so prevent to touch the cable of equipment or near lifting area. Cut off these above wires or cables and remove them. Be careful don't put your hands and feet under hoisting equipment or the ground which used in lay the hoisting equipment.

When repair any parts of centrifuges, it is recommended to repaired by our company or under the guidance of our assigned workers.

When dealing with lubricant, solvents or parts which temperature higher than 40 °C. Be careful to avoid being scalded. Differential lubricants cannot be added too full, because too much oil (work) will lead to the differential' working temperature too high then cause trouble. Please refer to the "lubrication" content.

If the treated material in centrifuge is toxic or harmful media, it must be taken very effective measures to prevent inhalation or contact these solid, liquid or gaseous or medium toxic directly. For example: should wear protective work suit, glasses, gas masks, gas mask "three tight" and other work clothes.

Because the larger inertial of centrifuges so after cut off power supply the centrifuge will continue to operate 10-20 minutes, and only when the power supply of centrifuge has been cut off and stop rotation, this time user can carry out maintain or adjust, if not will lead to personal casualties and damage the machine or other facility accident.

User couldn't disassembly any parts of centrifuge without consult with my company otherwise will lead to personal injury or damage equipment or other equipment accident.

Before operate centrifuge, user should check and make sure lubrication system has been added correct grade of lubricant oil to the right place and check regularly in order to ensure the lubricant in good condition.

When lifting or moving motor must be carefully, the impact may be damage bearings

User can't use other specification belt pulley which supplied by other factory without our company's agreement. Differential devices shall not be disassembled, enhance maintenance to prevent leakage of lubricants. Only our trained staff can carry out disassembly and assembly (assembly) the differential.

All rotating components have been done balance before assembly. If any rotating component parts have been repaired, then all rotating parts should do balance again after assembly in order to prevent excessive vibration and unstable operation lead to equipment failure.

All the parts required correct positioning must have a circular marker or location pin, when assembly user must be according to the marking so as not to affect the balancing and cause vibration.

Every time start centrifuge, user should add feed gradually when the centrifuge achieves to working speed. It can reduce the vibration and ensure the equipment achieve to the best working condition.

It's necessary to check the equipment regularly, so prevent occur unexpected shut down, for the detail maintenance please consult us.

## **Machine Summary**

### **Performance and Function**

Centrifugal sedimentation is the working principle of this centrifuge, it can separate two phases (suspended solid liquid and liquid), and three phases (solid-liquid-liquid), solid phase is pushed out by spiral continually; this equipment is a constant and high effective equipment which used in separating solid-liquid. Characteristics as following:

1. A wide range application , it has a good applicability for many materials and can be widely used in chemical industry, light industry, food, paper, mining and other

industrial sectors. It applies to carry out separating liquid and solid of the suspension's material which weight thickness of solid phase  $\leq 10\%$  (or volume concentration of  $\leq 50\%$  after settlement 24 hours) and equivalent diameter of solid-phase particle  $\geq 0.005 \sim 2$  mm, liquid-solid density difference  $\geq 0.05$  g / cm<sup>3</sup>, such as calcium carbonate, calcium sulfate, polyvinyl chloride, lees, bean dregs, soy protein, paper pulp, vegetable oil and palm oil, kaolin, white mud, sludge from environmental protection industry and also applies to various types of chemical products which use settlement centrifugal separation principle, these material all can be carried out effectively.

2. This centrifuge can achieve to product continually, large production capacity, small energy consumption, highly automated, and particularly apply to line work of the industrial.
3. Adopt transducer to control the centrifuge and be used for stepless speed regulation, so that achieve the best separation efficiency. If the machine overload or block between spiral and drum, the electric control will alarm automatically, automatically cut off the inlet system; therefore, it can reliable running.
4. Adopt planet-gear differential for the machine, so the torque of pusher is large, use transducer driver for the differential motor, differential speed can be adjusted stepless, and have a well adaptable for materials.
5. The whole separation process is carried out in hermetic conditions, no pollution and smell. Especially suitable for pipe production.
6. It has the small and compact floor area, installed easily, maintain simply, spray high content tungsten carbide coating on the wearing parts - the outer of spiral, so increased wear resistance greatly and also increases the service life multiplied.
7. The material of all parts which contact with feed is stainless steel and has a strong corrosion resistance.

## **Working Principle**

Centrifuge is consisting of two rotors; one is the drum and the other is the screw

conveyor (For short spiral). Drum running with High-speed, the drum and slurry will rotate together and by the centrifugal force effect, this centrifugal force is larger than the weight many times, so that solid particles will be separated from the liquid, from the drum axis, then setting on the drum wall, the screw conveyor which located in the drum and rotating at the speed which lower than the speed of drum then push the solid particles to the residue discharge port. Difference speed between outside drum and screw conveyor depends on the speed of the transmission ratio of differential and its rotation speed.

Centrifuge which contact with materials are stainless steel; other parts which not direct contact with liquid, such as seat, main bearing seat etc. are steel, cast iron or other suitable types materials.

Machine seat (base): base is installed on the machine to provide a solid foundation for the main components. Base is steel weldment, by machining, the surface of the base is used to support the main bearing seat centrifuge lower shell and inlet feed pipe support base, the electrical components etc. connect with base.

**Cover:** Upper cover and lower cover consist of the whole cover; There is a gasket on the fitting surface between upper-lower cover so that prevent leakage. The material of gasket is NBR or VITON (According to the material). Cover coving the rotation parts hermetic totally just like a protective cover. Of course, the cover also has other functions such as store and flow guidance the solid particle which discharged from rotating parts. Cover is separated to two rooms one is solid residue container and the other is liquid container.

Solid, liquid or gas may be leaking out from the centrifuge, user should take effective measures to prevent inhalation of operators or contact with the toxic and harmful media directly.

**Drum:** The cylindrical - conical cylindrical rotor is composed of a cone and a cylinder. The aim for designing this shape is to obtain a better separation performance. When drum rotating at high-speed, it will drive slurry rotate, and under the centrifugal force, the heavier solid particles will be separated from the liquid. Cylindrical drum part is to facilitate the clarification of the filtrate (centrifuge), and conical part is conducive to dehydrate the solid material.

**Screw conveyor:** The function of screw conveyor is to accelerate feeding slurry and push the material which deposited on the inner wall of drum to the solid discharge port of the centrifuge. Screw conveyor is composed of spiral mandrel, spiral blade and more than two flanges for supporting the screw conveyor rotation. Spiral mandrel has the feeding room and a few holes, shaft journal of feeding end is hollow structure, the feed inlet pipe connects with feeding room through the hollow shaft journal, shaft journal of differential structure is spline and connect with differential output spline.

Feeding Room accepting slurry and flow into drum through holes. These four feeding holes are distributed equality along the circle of spiral shaft journal so that make the slurry which added to outer drum distributed stably, at the same time the feeding holes also accelerate (increase) the slurry speed goes into the outer drum.

The screw parts of screw conveyor is composed of spiral blade which twist around mandrel of screw conveyor and combined as multi-level spiral structure in order to achieve the purpose of discharging. The minimum distance (clearance) between the O.D of screw conveyor blade and inner wall of outer drum must be controlled in the range of 1 mm -3 mm so that ensure a good discharge performance.

**Feed inlet pipe:** the function of feed inlet pipe is to put slurry to feed room which in the mandrel of screw conveyor; the material of feed inlet pip is stainless steel and its flange connect with metal hose, thread joints of the other end of metal hose weld with feed inlet pipeline.

**Bearings:** The bearings are all rolling bearings and support the whole rotor components, the bearings are assembled as bearing base components, after precise center and pin located of bearing base components, then fastening to the centrifuge base.

The material of bearing base is cast steel, the bearing of feed inlet is radial ball bearing, it limits the axial movement of drum, bearing of differential is discharge roller bearing, which allows axial movement due to centrifuges thermal expansion and contraction.

**Differential:** Differential drive screw conveyor and make it rotate at a constant speed relatively outer drum, differential speed ratio and input bearing rotating speed of outer

drum and differential decide the speed difference of outer drum and screw conveyor; In addition to the replace lubricants, the differential can only be maintained by trained personnel of our factory to complete. Gear ratio of transmission has been selected, and screw conveyor can achieve the rotation speed which is able to meet the requirements of disposal solid and separation efficiency.

Difference rotation speed=( outer drum rotation speed-differential input axis speed)/  
differential speed ratio

**Main Technical Parameter:**

Select working parameter

SRSLW220		
Diameter of the drum	300	
Length of the drum	1200	
Separation speed	0-4200 RPM	
Separation factor	3000G	
Differential speed	2~25	
Water Capacity	1-1.5 m3/ h	
	Main motor: 11 KW 480V AC Three-phase 60HZ	Auxiliary motor: 4 KW
Dimension:	2680×830×1280mm L*W*H	
Noise	≤85dB(A)	
Vibration intensity	≤5mm/s	

**Notice:** The real capacity depends on the material.

Users can consider according to the physical properties, separation requirements, processing capacity, process requirements and other factors of the separated materials (suspension). Reasonable choice a good centrifuge operating parameter can make users get more satisfaction separation results and economic benefits.

**Characteristic of suspension feed:**

1. In the material, larger solid particles easier separated, when the size of solid particles not the same, so small particle solid phase decides the final separating effect This equipment can remove the solid particle which is over than 5 $\mu$ m, if the solid phase particles is very small, so it can't be separated through settlement and it will be discharged together with clear liquid, so the final separating effect is depend on the distribution of solid phase particle. Too much particles' size over  $\mu$ m, the separating effect is better, on the other hand the separating effect maybe worse .
2. Generally crystalline solid phase and fibrous solid phase are easier to separated, floc and paste solid- phase are difficult separated, due to max. water-solubility of floc paste is too large, when spiral pushing residue, it will skid and impact separation effect. When separating solid phase like floc and paste, the flow rate should not too large.
3. If density difference of solid phase and liquid phase much greater, the separation is better, otherwise the separation is worse.
4. Liquid viscosity more smaller and more easily separated, If liquid viscosity more higher, so the solid phase which in clear liquid may be increased, the separation effect will become worse, at this time user should increase the material temperature and reduce viscosity to improve the separation efficiency (Max. feeding temperature should not more than 95 °C).

Select inlet flow rate (i.e. Capacity) From a separation standpoint the smaller of the feed inlet flow rate, the smaller the axial velocity of material flow in the drum, the longer the detention time of material in the drum, and the better the separating effect. On the other hand, as the feed inlet flow rate increases, axial velocity flow increases, the detention time of material in the drum becomes shorter, making the separating effect become poorer. Feed inlet flow rate is also limited by the maximum discharge ability of the spiral. When the feed inlet flow rate is too large, the dregs separated cannot be discharged promptly, causing material clogging in the drum. Therefore, an appropriate feed inlet flow rate should be selected according to product characteristics separating

requirements solid content of the material, density difference between two liquid phases when use. Generally, a small feed inlet flow rate is suggested for materials difficult to separate, while a large one is suggested for those easy to separate, with attention to the maximum discharge ability of the spiral in case of material clogging.

#### Overflow Diameter

The smaller the interior diameter of overflow weir plate of drum, the larger the settlement area, the smaller the dry area, the higher the moisture content of the solid phase dregs, the cleaner the clarifying solution, the better the separating effect. Contrarily, the larger the interior diameter of overflow weir plate, the dryer the dregs, the poorer the separating effect. In actual use, the proper selecting of the interior diameter of overflow weir plate should be based on the requirements for the moisture content of the solid phase dregs and operational experiment. The interior diameter of overflow weir plate can be adjusted by altering the overflow weir plate of the big end cover of the revolving drum.

#### Rotating Speed of Drum

The higher rotating speed of drum, the bigger separating factor, the better separating effect. However, in the meantime, the vibration and noise of centrifuge also increase, and life of bearing is reduced. Therefore, the choice of over high rotating speed is not economical. On an ordinary premise, an appropriate rotating speed should be selected as the operating rotating speed

#### Differential Speed of Spiral and Drum

The higher differential speed, the stronger discharge ability of the spiral, but the moisture content of dregs increases, and the agitation of spiral on material becomes greater, the separating effect becomes poorer. However, for materials easy to separate, a high differential speed can be adopted to enhance the discharge ability of spiral and handling capacity, but the moisture content of dregs increases. Therefore, the differential speed should be decided according to material separation test and technological requirements.

## **Installation**

Summarization: centrifuge installation must be carried out on-site under guidance of our assigned technician, and before operating centrifuges both sides technicians must inspect mechanical and electrical.

Reference drawing: Outline and foundation installation drawing

Centrifuge is transported in complete condition, so users needn't dismount any parts when install centrifuge.

**Installation location:** Prior to the install centrifuges users must seriously consider the installation position and priority consider the following principles: centrifuge installation location must be convenient to operate and maintenance, the design of connection pipelines must ensure flow rate of the medium flowing into centrifuges meets the requirements but do not baffle the medium flowing, lay out of inlet / outlet pipeline of centrifuge has an impact on the performance of centrifuges.

**Warning:** Install according to outline and foundation installation drawing, set aside left-right and top-bottom space for dismounting feed pipe. Install a sling chain crane monorail road over the center line of centrifuge, the design of monorail road must be met when suspend rotating parts away from frame base, they can be placed in a clean location to make maintenance convenient.

**Base:** Before shipping centrifuge is strictly balanced, but as a result of process material properties and other reasons make the centrifuges have a load imbalance by chance during operation process. Therefore, the strength of base must be sufficient to bear the above load.

Foundation location is referring to "Foundation installation drawing"; foundation can be concrete or steel structure, the user can choose the most suitable for a foundation. Adopt a flexible foundation for the machine, main body and transmission parts (motors, differential) are installed on under frame, with 4 sets shock absorber installed on foundation.

Electrical Installation: Install and check electrical circuits, motors turning. All the wires

and tube joints connected to the centrifuge must be flexible joints, which does not affect the movement of centrifuge.

**(Installation) protective cover:** All exposed rotating parts should be installed security protective cover, before starting, users should confirm all safety protective cover are in place and intact.

**Belt tensioning force:** install belts, press the perpendicular force on belt, request adjusting belt tensioning, and standard of tensioning is press 1.5-3.5cm, do not too tight, and check whether the belt damage or cracking.

Typically, in the first 24-48 hours operation, adjusted the belt tension will hang down (or too loose) after this period of time "running-in", a belt and pulley groove is running and will not stretch, so after the initial "running-in", according to the following steps to check and re-adjust the belt tension force.

Mechanical and electrical inspection: Prior to shipment, all centrifuges have been carried out commissioning, users needed to take the necessary measures in order to transport, long-term storage of centrifuges, before start centrifuge the following inspection should be done strictly:

Before starting up, check the leakage (seal) of all inlet and outlet feeding pipelines. Check if tensioning of transmission belt suitable.

Check and confirm all protective cover are installed in place and in good condition. Confirm that the rotating parts rotate freely.

Check if entire operation area of centrifuge accord to safe operation requirements.

Inspect all feeding and liquid flowing pipelines and confirmed no plug phenomenon and all valves in pipeline system are opened according to requirement.

Check solid material handling equipment and confirm that it will timely processing

(removal) the cake from the centrifuge.

Start-up and confirmed the turning of centrifuge rotor should be the same with the turning of the arrow which indicated on belt protective cover, make the centrifuge running ( temperature rise ) 15 minutes, observe and record current when no-load.

Recommended under the following conditions, that is not to feeding centrifuges including not input washing water, let the centrifuge running three hours to observe the adjustment bearings and oil situation.

Records of all temperature for reference.

## **Debugging**

### **Check installation conditions.**

1. Exposed bolts of the centrifuge should be tightening (including the electrical installation bolts and the main belt pulley bolt).
2. The standard of belt tightness is extended downward 1.5-3.5cm under pressing, and check whether the belt damage and cracking.
3. Check the drum flexibility, move easily without friction, there is rebound phenomenon when quiescent.

### **Empty Commissioning**

1. Open auxiliary motor then opens the main motor, so the machine starts running slowly, observing the running direction of centrifuge, the marking should be the same with shield marking.
2. After the rotation direction is correct, increase the speed of main equipment to working speed, speed up time shall be not less than eight minutes to ensure a smoothly start of centrifuge.
3. Users should observe the running cooperation when centrifuge start up and speed up, if you find the machine vibrating badly or friction and other noise, the machine should

be stopped immediately, after troubleshooting, the machine can be started again.

4. Checking the vibration of machine, vibration intensity which on the shaft line height point of main bearing should not over than 7.1mm/s.
5. Observe the motor current, no-load current of the main motor should not over than 17.5A, no-load current of auxiliary motor does not exceed 6.7A.
6. Running two hours later, checking the temperature of two main bearing shell and it is not more than 70°C, temperature rise is not more than 35 °C, the temperature of differential shell is not more than 70 °C, temperature rise is not more than 40 °C.

### **Load Test**

1. After finishing empty testing, first input water in the machine and test, all sealing parts shall be no visible leakage phenomenon.
2. Input Water equally, valves should be open from small flow to rating flow, forbid opening valve large suddenly.
3. After input water, users should observe all motor current, main motor current should not larger than 17.5A , and auxiliary motor current should not over than 6.7A.
4. Checking the vibration of machine when loading, vibration intensity which on the shaft line height point of main bearing should not over than 11.2 mm/s.
5. Running four hours later, checking the temperature of two main bearing shell and it is not more than 75 °C , temperature rise is not more than 40 °C
6. The new belt after using 1-2 days, users should re-adjust the belt's tightness.

### **Application Operation**

1. Start machine. After the machine runs to its speed, monitor the motor current does not exceed no-load rated current value of the machine.
2. After running 3 to 5 minutes then inlet water, cleaning 5-10 minutes later input materials.
3. Strictly control inlet valve, feeding should be gradually increased from small to large till to working flow rate, attention to monitoring the electrical current, the main motor

current does not more than 18A, auxiliary motor current does not exceed 7 A.

### **Stop**

1. Stop must be in strict accordance with the following order:
2. Close inlet valve
3. Press cleaning button to decrease the machine running speed to cleaning speed.
4. Open cleaning valve and enter water about 3 minutes.
5. Close cleaning valve
6. Close motor

**Warning:** Do not enter water and washing centrifuge after stop the machine, in order to avoid water entering the bearings.

### **Note:**

1. Cleaning process must be repeated 2 or 3 times, until the clear liquid clarification.
2. Treat soy protein and other materials which are viscous or easy to produce foam, should reinforce cleaning work. After the machine continuous operating 72 hours, you must stop, open the shell casing to clean the waste on the drum surface, the internal casing, liquid outlet port, discharge residue port, sealed at both ends of casing.

## Usage of Machinery

**Summarization:** Centrifuge is designed for treating slurry with residue. Centrifuge has been assembled as per process regulation before transportation. But in order to obtain the ideal performance of the centrifuge, users must do some adjustability adjustment. Feeding centrifuge as starting point for considering its operation principle, feeding and accepting treated material are connected with centrifuge, Slurry principles of its work to consider as a starting point into the centrifuge to centrifuge feed and receive the material handling associated with the centrifuges, equipment operation, even if the whole process they are an important component of the consideration is not so.

This chapter only explains how to separate materials, and if the installation and operation of the centrifuge is correct.

**Feeding:** Slurry from feeding equipment enters feeding chamber which in mandrel of rotating screw discharge through static feeding.

**Feeding chamber:** In feeding chamber, before slurry enters drum by means of feeding holes which distribute on mandrel of screw discharge, slurry speed will be speed up and approach to drum rotation speed when flowing pass the feed chamber, distribution feeding holes will make slurry flow into drum evenly, and at the same time will help speed up the slurry.

**Drum:** Drum rotating with high-speed, slurry will be throwing into the inner chamber of drum under centrifuge's action. Because the specific gravity of solid is the heaviest, Screw discharge is driven by the differential rotating at the speed which is lower than outer drum speed and collect the solid material to solid discharge area (Cone parts of outer drum) then discharge it.

**Screw discharge:** The structure of screw discharge and drum is special designed. It has a good solid discharging performance, solid-liquid back mixing minimum, clear liquid will be transparent and high-efficiency solid cake.

**Solid Discharge:** When the solid cake arrived in solid discharge area (cone-shaped part), cake will be pushed against direction of clear liquid by screw discharge, and further dehydration (get rid of clear liquid or moisture of solid or cake) and then, solid cake will fall into the bottom of the cover under gravity action through the slag holes of drum end.

**Dangerous:** Be careful do not input too much feed in the centrifuges, otherwise it will lead to plug feed export of feed chamber or occur alarm and shutdown because of excessive current of motor.

**Slurry feed:** Generally, do not start the centrifuge when there is material in it. After starting the centrifuge, the flow of feed should be smaller at beginning, and then increased to the normal flow rate which meet for the capacity requirement. Operator should be proficient in operation of feeding controlling process, because of the screw-pitch line number and rotation speed of screw discharge are fixed, so the discharge capacity cannot be more than the design largest discharge capacity, the largest capacity of centrifuges is not all depend on the discharge ability of screw discharge, but depend on the ability of drive load, clarify (purify) and other various factors.

**Result analysis:** After the centrifuge running stability, need to ensure whether there is a need for further regulation. Speed adjustment: Practice has proved: during centrifuge start and running, by adjusting the centrifuge's speed to obtain the best rotation speed, compare the cake moisture content and clear liquid solid content which get at different rotation speed, ensure the most suitable speed for process requirements. Normally, increase the outer drum speed will reduce cake moisture (water rate) and the clear liquid solid content, but some material is lower the outer drum speed to reduce the cake moisture content.

**the maximum rotation speed of centrifuge shall not exceed the specified value on the nameplate. (It is the maximum operating frequency of inverter is 60HZ).**

**Dangerous:** Before centrifuge rotor does not stop, the centrifuge has not been isolated and cut off the power, users could not do any adjustments for centrifuge, or dismounting work, such as shields or cover.

**Discharge Time Adjustment:** For some slurry, centrifuge speed changes will not obviously affect the moisture content of cake. Practice has proved that in this condition, the other measures to reduce the cake moisture is to increase the length of the solid ( cake) discharge (unload) in order to drain away clear liquid, and its specific measures is increase the diameter of overflow weir plate, or reduce the depth of liquid pool.

**Depth of liquid pool is too shallow and will not get satisfy clarity of the clear liquid.**

#### **How to clean centrifuge:**

We suggest: no matter when your shutdown, users should clean the internal parts of centrifuges. In addition, if the centrifuge is running unstable, scraggy solid may be stick on the wall of outer drum or screw conveyor, it should be washed off, as the washing number depends on the material properties is treated by the centrifuge, if the material is more easily agglomerate or stick together, then the more washing number and quantity.

#### **Lubrication**

Summarization: it's very important to establish a reasonable lubrication order. A reasonable lubrication order will enable the bearing, differential and other mechanical components to obtain the longest service life. This chapter provides an overview of lubrication order to play a guiding role under typical operating conditions. And applicable to user's centrifuge for ideal lubrication order, it should be based on actual operating experience to propose (and improve).

Lubricant:

Spiral bearing	Shell Alvania2 lithium lubricating grease	Input u n t il discharge hole leak oil	Half a month
Differential	Shell 150 extreme pressure gear oil	80%	Per Quarter
Lubrication parts	Lubricants	Adding lubricant quantity	Lubricati on cycle
Main bearings	Shell Alvania2 lithium lubricating grease	3-5ml 3-5ml every shift	Every shift

**Warning:** Lubrication cycle and adding lubricant quantity which specified in the table can be used as general reference and should be modified and improved based on specific service conditions.

**Main Bearing Lubrication:** main bearing lubrication should be improved based on the process situation, too much or too less oil will result in bearing temperature rise excessive. In general, input oil to main bearing every shift, each 3~5 ml (after Oil Cup grease filled then screw lid under the 2 / 3) in the case of machine running continuously, users should add oil every 24 hours. Reasonable add oil cycle and oil quantity should be continuous improved based on the actual service conditions of machine.

**Planetary gear differential:** All lubricating oil in differential must be replaced when new machines running one week. There are two oiling holes on symmetrical distribution of differential excircle (or end). Dismounting plugs of two oiling holes, turn the differential to the vertical plane, discharge waste oil empty. Flushing inner chamber using petrol before input Lubrication. Then, screw one plug of oiling hole, and turn another hole to 10 minutes flat, add 150# Shell EP gear oil to 10 o'clock plane (about 80% ~ 85% of differential inner chamber). Add too much or too less oil in differential will caused differential's temperature rise while it's working. After finish input oil, users should

repeated check whether the plug of oiling hole screwed well. Under Normal operation, users should check the conditions of lubrication oil which in differential every two months, if it's metamorphism or discoloration, users must replace oil. The lubricant must be replaced after using six months.

**Note:** Every time open the two plugs of oiling hole, generally the plug sealing washer should be replaced in order to avoid deterioration of sealing performance of gaskets and lead to leak oil.

**Note:** After replace lubrication oil, the machine running within first four hours, users should pay close attention to whether the differential leaks oil, if the differential leaks oil, users should stop the machine and inspect immediately.

**Note:** After the centrifuge running and lubricants tepid, differential lubricant is easiest discharged.

**Dangerous:** When deal with lubricants, solvents, or parts which temperature exceeds 40 °C (below 120 °C), be careful so that avoid scald and burn.

**Dangerous:** do not input too much lubricant to the differential. Otherwise, it will lead to operating temperature too high and make differential failure.

In the initial stage of differential operation, users should examine the liquid level of lubricant regularly, in accordance with practical experience to guide the oil level inspection cycle.

Users should replace lubricant at least every six months, it is proposed to record and keep every replace period.

Spiral bearings: Oiling hole of spiral bearing is located on shaft journal which between two end caps of drum and bearing seat. At ordinary times, oiling hole is blocked by screw. For easy to add oil, please open the upper cover, and rotate drum manually, then you can see two plug screws which on both ends and symmetrical distribution, dismantling the screw, connect oil pipe into screw hole and use oil gun inject lubricant grease until the other oil hole overflow oil. Spiral bearing oil should be changed every six months, and also inject

oil until the other oil hole overflow new oil, it is proposed to record and keep every replace period.

## **Maintenance**

General: separator should be checked regularly; the actual checking intervals should be better in accordance with the actual process requirements and operating conditions. It is recommended to check the rotating components in the initial one-month interval is good, with the accumulation of experience, inspection intervals can be extended. Machine check interval should be no more than 2000 hours, or no more than a year interval of this use.

### **Do not interchange any parts of machines, because a single component has been done balance**

Inspection steps: stopping the machine and all power supply of electrical equipment has been cut off, open the machine upper cover, check the joint of drum cover and flange which in both two-side solid end and upper end cover of liquid end, inspect drum end cover. In addition, solid material plug holes of machine should be checked, double-check all the wear and tear, cracks, or corrosion components which can be seen, any parts was found need to be maintained and must be repaired before re-use, in addition to do above examinations, user should double-check the wear condition of screw conveyer and all outlet opening, any wear components must be repaired or replaced.

**Note:** All maintenance should be carried out by our company. Place of parts which need to be repaired have a big difference according to different process, however, the main rules to be followed is: when screw conveyor's wear is 3 times than its original components space, that is, if the space of original rotor and blades is 1mm, but after wear and tear the space is 3mm, the spiral must be repaired.

### **Disassembly Centrifuge:**

Disassembly order: According to the following operating procedures to disassemble. Cut off electromotor controller power supply Disassembly all protective encloser and cover Disassembly all pipes which connect with machine.

Before disassembling, user should install a suitable lifting device, must have a overhead crane lifting devices which is fixed and equilibrium with drum axial line.

Loose drive belt and removed from driving wheel, do not squeeze belt. Removed bolts of main bearing base at both ends, pull out main bearing pin, and then put steel wire rope into trunnion of rotating drum. Lifting drum parts to a enough disassembly space, the drum parts should be placed on the board or protective wooden stand.

Disassembly drum cone end: screw the bolts into push-out screw holes which located in differential connection flange, unload differential coupling screw, make differential deviate location through use push-out bolt.

Remove fixed gland of differential connection flange, draw flange out by drawplate, dismounting flat keys, then removed cover of main bearing base, draw main bearing base by drawplate.

**Disassemble big end of drum:**

1. Dismounting fastening screw from drum Big-end bearing and big end cover, equip push-out screw into push-out hole, remove the drum big end caps and feed inlet/outlet pipes and centripetal pump. Dismounting tightening screw from drum big-end caps and drum, quip push-out screw into push-out hole, draw out drum big end caps together with screw conveyor.
2. Remove two plugs screws from drum big-end caps surface, removed six fastening screws from bearing gland which in the screw conveyor through two screw holes, removed two scraper board between screw conveyor and overflow weir, then dismounting drum big cover caps together with bearing from screw conveyor.
3. Release four screws which on feed inlet pipe connection flange, then remove connection flange.
4. Disassembling retaining rings for shaft, then remove connection flange base and joystick. Remove another retaining rings of shaft, release four screws of heavy phase outlet seat plane and four screws which on the arc, dismounting heavy phase outlet seat then draw out feed inlet/outlet pipe sand centripetal pump.
5. Dismounting nine screws which on connection seat and connection seat. Dismounting six screws from Belt pulley hold-down plate, using drawplate pull belt pulley down, disassemble flat keys, then dismounting main bearing seat end cover and pull the main bearing seat down by drawplate.
6. If you find it's difficult to draw out screw conveyor, it is necessary to wash the material which stick to drum wall, and finally dismounting the drum and place on an appropriate protective board.

**Warning:**

For some models of screw conveyer, on its outer edge inlaid some hard metal tip or wear-resistant ceramic plate, do not impact because of it will caused wear-resistant film broken, if need to repair, the damage must be implemented by our company.

**Notice:**

Do not use wedge or other tools to separate end cover, because it will distortion and damage the machine severely.

**Reassembly:**

1. Cleaning bearing, bearing base
2. According to disassembly contrary steps to assemble every part.
3. Replace bearing base bolts then tightening.
4. Rotating drum device manually, so ensure its freedom and flexibility.
5. Rotating the input shaft of differential to 50-100 rotation, so ensure conveyor flexibly.

**Maintain differential devices:** through adding appropriate lubrication to maintain it, differential devices rarely have problems. But carry out a periodic check every six months is still necessary, if differential device is found noise or hot, oil leak from lubrication checking port, oil dirty or deteriorated, it should be carried out a thorough inspection. Send differential devices to the plant for maintenance and inspection. Users shouldn't discharge lubrication of device, otherwise it may be rust. If you need to repair on site, please contact with our factory, we recommend that you asked our technical maintain it with you.

High-speed running creates inevitable result, some parts and components are rubbed and heavy load, they need to be maintained and replaced timely. It is recommended to carry out thorough inspection for drum parts after new parts running up to 2000 hours or one year. It is necessary to do above-mentioned visual inspection and link bolts double-check in critical scope.

The scope of this manual cannot be mentioned at any time every possible need to repair or need other types of maintenance work, but based on many years work experience, the manual is basically involved in maintenance procedures and can be suitable for your machine which needs repair.

If the machine is blocked during inlet slurry, after blocking, the solid material in rotor will fill up the whole rotor until the rotor stop entirely. Before restart machine, reverse rotate differential input shaft

manually in order to remove the accumulated solid materials.

**Replace main bearings:** selection of the main bearings, the real load will be greater than its actual load, so the main bearing rarely has a fault. The main bearing failure almost due to improper lubricate, impurities, non-axial stress action, or similar factors. After hanging out drum parts, dismantling belt pulley and differential connection flange according to bearing which need to be replace. As steps described in the previous chapters to dismantling bearing. Convexity side of belt pulley and differential flange connection flange are equipped with screw holes for push-out screw. On some conditions, add a appropriate pad is necessary, because these parts are push down on corresponding shaft sleeve with a huge pressure.

The other useful technology is that use dry ice in the drum cover shaft sleeve so that make bearings cold and shrink. Before installing the bearings, the bearings position and bearing against the shoulder of shaft sleeve should be clean and burr-free, and also remove some other barriers that may baffle bearing on correct position. In order to facilitate installation, user could immerse bearings into oil which temperature not exceeding 120 °C. After heated shaft sleeve, so its diameter can install bearing easily. Do not reduce or use other methods to decrease the diameter of rotor shaft to facilitate installation new bearing, and do not use hammer and other methods to assemble in order to avoid break bearing.

Replace bearing seals: on every seal points of end cover are equipped with skeleton oil seal. This seal is usually installed as, a seal faces the material in order to isolate the contact between materials and bearings, another one seal faces shaft sleeve to keep the lubricating oil in good condition. When dismantling and replace the machine, user should check the lip seal once a year at least. When removal seals, disassembling the fixed plate which is fixed on rotor inner surface by screws, and then pull the two seals device and spacer ring, and enclose a new sealing gaskets and seals, confirm all parts are aligned and no any fault. Users also should examine with assembly drawings to ensure the correct installation of the seal; we must ensure that the sealing device are not be damaged in the assembly process.

**Note:** After running a long time (more than one week) then stop, user should rotate centrifuge drum manually, because main bearing of centrifuge supporting one-point long times will damage bearing.

## Troubleshooting

S/N	Trouble Phenomena	Cause	Remedy
1	Motor couldn't be start-up	<ol style="list-style-type: none"> <li>1. No electricity</li> <li>2. One phase and two phases of power supply no electricity</li> </ol>	<ol style="list-style-type: none"> <li>1. Check the power supply condition.</li> <li>2. Check if transducer working normally; if there are any alarm phenomena</li> </ol>
2	Main bearing is too hot, and temperature increase too highly	<ol style="list-style-type: none"> <li>1. Inappropriate oil in bearing. (Too much or too less oil)</li> <li>2. Bearing matched to tight</li> <li>3. Bearing ring</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust the adding oil</li> <li>2. quantity</li> <li>3. Repair the matching of bearing seat</li> <li>4. 3. Replace the bearing</li> </ol>
3	Too much vibration when equipment empties.	<ol style="list-style-type: none"> <li>1. Feed plug up the drum and Spiral</li> <li>2. Flange which connect with differential is loosen</li> <li>3. when maintain and assembly, misalignment of drum scale line will destroy the Balancing accuracy.</li> <li>4. Main bearing and spiral supporting damaged.</li> <li>5. Rigidity joint between Inlet/ outlet</li> <li>6. piping .</li> </ol>	<ol style="list-style-type: none"> <li>1. Clear up sediment</li> <li>2. Measure the concentricity of differential; replace spare parts</li> <li>3. Re-align the scale line.</li> <li>4. Replace bearings</li> <li>5. Use softness joint instead. 6、</li> <li>6. Send back to manufacturer, then repair spiral.</li> </ol>

4	Too high current when equipment empty.	<ol style="list-style-type: none"> <li>1. Voltage is lower</li> <li>2. Belt is too tight</li> <li>3. Differential and main bearing are damaged</li> <li>4. Friction between Rotary parts and cover</li> </ol>	<ol style="list-style-type: none"> <li>1. 460V Voltage should</li> <li>2. not lower than 460V</li> <li>3. Loosen appropriately</li> <li>4. Check and replace</li> <li>5. Stop the machine and eliminate</li> </ol>
5	Drum vibrates intensify when feeding	<ol style="list-style-type: none"> <li>1. Adding feed</li> <li>2. irregularly or has impacted</li> <li>3. Spiral wears out badly</li> <li>4. Auxiliary motor not working; make the drum and spiral working synchronization so that cause material block.</li> <li>5. Liquid outlet pipe is very thin and too much back pressure caused stir friction between liquid and drum in casing.</li> </ol>	<ol style="list-style-type: none"> <li>1. Add feed</li> <li>2. regularly, decrease pulse</li> <li>3. Stop running and Examine</li> <li>4. Examine auxiliary motor; clear up sediment.</li> <li>5. Make pipeline bolt or add a piping pump in order to reduce back pressure.</li> </ol>

## Wearingparts

Wearing parts content (User defined)

S/N	Description	Dimensions	Qty	Remark
1	Oil seal	80×100×10	1	Spiral cone end
2	Oil seal	60×80×12	1	Spiral cone end
3	Oil seal	75×95×10	2	Spiral big end
4	Oil seal	95×120×12	1	Spiral big end
5	Bearing	SKF 7015AC	1	Spiral big end
6	Bearing	SKF 6315	2	Main Bearing
7	Copper sleeve	80×93×32	1	Spiral cone end
8	Copper sleeve	87×102×30	1	Spiral big end
10	Triangle belt	SPA	3	

## **Documents**

- A. Packing list
- B. Instruction manual of PELW300 Horizontal Screw Discharge Centrifuge 1 (Piece)
- C. Manual of control box

## **Attached drawing**

- A. Assembly foundation drawing

