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OPERATING INSTRUCTIONS



Machine-No. _____

Level 09/2010

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Annexe

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| Diagram (Table of Dimensions) | Drawing | M |
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1 Preface

With your new **Cleaning-Centrifuge** you have acquired a product that is developed on grounds of decades of experience and know-how in the construction of centrifuges and its quality will surely satisfy you.

These operating instructions help to understand the unit and - when used for the designated purposes - to profit its application. They give important advice how to run the device safely, appropriately and most economically.

Your consideration will help to avoid any risk or hazards, to minimize costs of repair and times of failure and will optimize reliability and working life of the unit.

2 General Information

First read operating instructions carefully before setting up and starting of the unit.

In any case, please take special notice of all safety regulations.

The operating instructions are to be supplemented by the respective national safety rules and regulations for accident prevention and directions of environmental aspects.

The operating instructions are to be placed next to the unit and are to be read and applied by any person in charge of carrying out work at or with the unit, such as transport, setting up, installation, starting, operation and maintenance.

| |
|---|
| Only specialists are allowed to carry out any work on the cleaning unit. |
|---|

Specialists are highly skilled and reliable persons who:

- have professional training, know-how and experience
- have knowledge of the relevant regulations, rules and safety regulations
- have been trained in setting up and operation of centrifuges
- know possible risks and can avoid them

Besides the operating instructions and the legal safety regulations of the country where the unit is in use, in addition there are the professional and technical rules for safe and professional working to be observed.

The operator has to observe the relevant legal regulation for emissions of all kinds, like air and noise, especially however concerning water and waste water. He has to take necessary measures before starting operation of the cleaning-unit.

The extent of delivery of your unit depends on your order, therefore, according to the completion some descriptions or drawings might slightly deviate.

3 Technical Data

3.1 Data of Centrifuge

Separation of solid materials not only depends on the volumetric flow rate (duration of liquid in rotor) and on viscosity of the liquid, but also on other factors like specific gravity, shape and size of the solid particles, as well as separating factor of the centrifuge.

The following data on volume flow rates in relation to the viscosity only give standard values:

| | | | | |
|--|------------------------|------------------------|------------------------|------------------------|
| Volume Flow | MZ 150 | MZ 90 | MZ 70 | MZ 35 |
| Viscosity 1 cSt (1 °E) | 150 l/min | 90 l/min | 70 l/min | 35 l/min |
| Viscosity 21 cSt (3 °E) | 120 l/min | 60 l/min | 50 l/min | 20 l/min |
| Viscosity 60 cSt (8E) | 80 l/min | 40 l/min | 30 l/min | 10 l/min |
| Driving Power | 4,0 kW | 3,0 kW | 1,1 kW | 0,75 kW |
| Rotating Speed of Rotor | 3000 min ⁻¹ | 3620 min ⁻¹ | 2720 min ⁻¹ | 4420 min ⁻¹ |
| Separating Factor | 1800 g | 1800 g | 1100 g | 2000 g |
| Capacity of Rotor | 15,0 dm ³ | 4,5 dm ³ | 4,5 dm ³ | 3,0 dm ³ |
| Capacity of Insert (Sludge Pocket) | 10,0 dm ³ | 3,0 dm ³ | 3,0 dm ³ | 1,5 dm ³ |
| Inlet Connection | d= 2" mm | d= 50 mm | HT 50 | d= ¾" mm |
| Inlet Height | | | | |
| Outlet | 0,7bar | 0,5bar | drucklos | 0,5bar |
| Dimensions | | | | |
| Net Weight | ca. 290 kg | ca. 90 kg | ca. 80 kg | ca. 42 kg |
| Equivalent permanent noise pressure level at 1 m distance and 1,6 m height | < 78dB(A) | < 75dB(A) | < 70 dB(A) | < 70dB(A) |

3.2 Data of Unit

| | |
|-----------------------|--------------------------|
| Pump P4 | Q= ___ l/min, p= ___ bar |
| Pump P1 | |
| Pump P2 | |
| Pump P3 | |
| Capacity of tank B600 | |
| Weight of Unit | ca. ___ kg |
| Dimensions | see diagrams |

3.3 Inscription plate

| | | | |
|----------------------|--|---------------------|--|
| Machine Type | | Capacity of insert | |
| Machine No.: | | Wiring Diagram No. | |
| Year of Construction | | Rated Power | |
| Rotating Speed | | Voltage | |
| Rotor ø | | Voltage of Steering | |
| Max. Rotating Speed | | Safety Fuse | |
| | | Weight of Unit | |

Subject to technical alterations!

4 Transport, Installation and Initial Operation



Normally the unit is delivered on a wooden pallet. Easily it can be moved by a fork-lifter to its operational place.

-Caution: Secure unit sufficiently!

The mobile models can be moved small distances by shifting with hands.

The centrifuge has to be installed at a suitable and easily accessible place. It must not be placed in regions that are subject to danger of explosion, in wet rooms or in the open air. The ambient temperature must be over +5 °C and under +40 °C.

The unit must be placed on a solid and plane ground. The ceiling or floor carrying capacity must be sufficient. An uneven setting-up ground can cause irregular operation.

Any handling at the electric equipment of the units must be carried out only by an electrician or by instructed persons under direction, supervision and control of an electrician according to the electro technical rules.

The operating company is responsible for the installation of the necessary feed lines for electricity (according to the electric plan enclosed) including main fuses, as well as air and if necessary fresh water in adequate volume and subject to the legal rules. All direct inlet and outlet lines to and from the centrifuge must be flexible tube connections that will avoid any vibrations of the centrifuge being transmitted to the unit and the pipes.

On the diagram the supply (inlet) of the contaminated liquid and the outlet of the cleaned liquid out of the centrifuge is shown. Because of the low height of the machine, the contaminated liquid can be supplied to the centrifuge in direct fall.

The contaminated liquid should flow directly into the centrifuge without passing any intermediate tank. In any case, a regulator and stopping valve (e.g. ball tap) should be installed at the inlet pipe.

The liquid is supplied into the centrifuge through the housing cover by the inlet pipe. The inlet pipe must be flexible and of generous length, so that the pipe can follow the tilting movements without any risks when opening the cover.

The rotor of the centrifuge must turn clockwise (when looking from above onto the housing cover). The unit is installed in the right rotary field. Prior to connecting the centrifuge please check the rotary field by means of a rotary field testing instrument. The unit cannot be started in the left rotary field. In case of left rotary field a fault sign appears (Fault No. 1 is shown on the platine).

Please Note: In dead circuit (i.e. power failure) the cover of the centrifuge cannot be opened. The retainer mechanism of the cover is also effective in conditions without power. Only after connection to the electric circuit and standstill of the rotor the cover can be opened.



Within a period of one hour, the centrifuge must not be switched on or broken down more than 4 times max.

Through repeated switching on and off (breaking down) the engine of the centrifuge heats up. The temperature monitoring gets working and announces a disturbance.

5 Operational Possibilities

With this unit only liquids with no risk to burning and explosion must be separated, like emulsions, oils, electrolytes, vibro-finishing waste water and other media with a pH-value between 5,5 and 9,5. The solids to be separated must be specifically heavier than the liquid.

6 Design and Mode of Operation

6.1 Main Indications

6.1.1 Construction

The rotor of the centrifuge is disposed coaxial on top of the driving motor. Inlet of liquid in free fall or by pumping, outlet of liquid without pressure.

Outflow of remaining liquid at standing rotor into the tank.

6.1.2 Outlet Pipe

The outlet pipe swivels into the rotor when closing the housing cover and during separation dips into the rotating ring of liquid. The rotating liquid produces an impact pressure, which allows the cleaned liquid to be diverted on a higher level.

6.1.3 Lid catch / Cover lock of the centrifuge

The cover can be opened only when rotor is at standstill. The cover can be opened by pushing the button „COVER OPEN“ by hand. When pressing this button the cover lid is unbolt for approx 5sec. During this time the cover can be opened. The green light (LED) flashes while the security switch is unbolt. With the cover open the current is disconnected, the centrifuge cannot be started.

6.1.4 Control of Standstill

The standstill of the rotor is controlled by a sensor and is bolted to the lid catch. In accordance to the current accident prevention and safety regulations.

6.2 Design

The rotor of the centrifuge is built into a casing. The casing is connected to the undercarriage with vibration damper. It also can be set up directly onto a tank without the undercarriage, i.e. Types MZ : _____

The rotor is placed on the main axle, which has (additionally) a double bearing in the casing. Due to the great distance of the bearings an operation with very poor oscillation and a high working life of the centrifuge is guaranteed.

A protecting switch controls the driving motor against overloading.

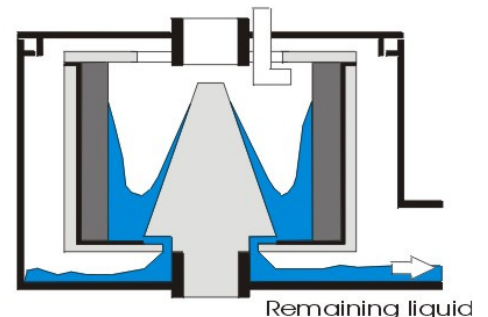
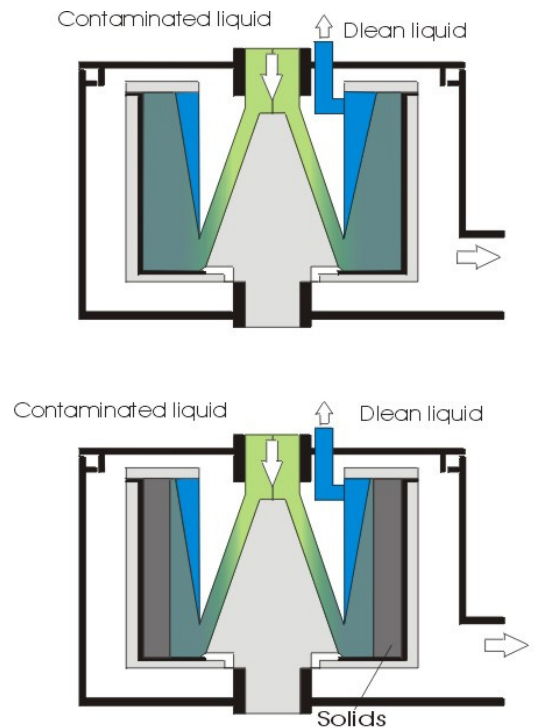
Note: The pedestal of the centrifuge also serves as a shock protection of the oar under the floor slab. If only a loosely centrifuge is obtained (without pedestal or container) there be a shock protection appropriated by the customer.

6.3 Mode of Operation

The centrifuge separates solids from liquids with centrifugal forces. The contaminated liquid is cared centrally into the bowl through the rotor cover and thus falls onto the bottom of the solids insert inside the bowl.

By centrifugal forces the liquid is spinned off centre outwards and rises towards the top of the inner wall of the bowl. The cleaned liquid is removed into a tank. On their way to the top the heavy solids are forced to the periphery and settle on the wall of the bowl insert. When the insert is full, it is removed and replace by an empty one which is ready for use.

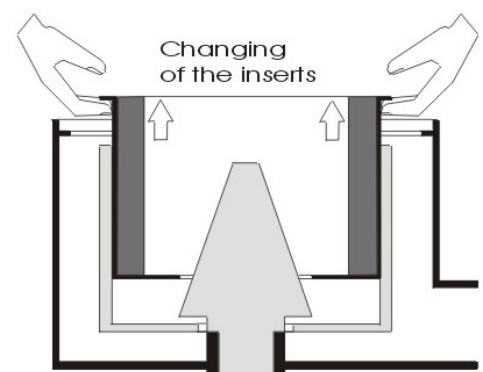
Note: The grade of cleaning is becoming better by reducing the weight rate of flow. There should not be more admission to the centrifuge than there is actually needed.



6.4 Discharge of Solids

For the discharge of the solids please observe the following instructions:

- Switch off the inflowing liquid
- Switch off the centrifuge
- After standstill of rotor open cover
- Unlock the cover by opening the locking bolts with socket head key
- and take out cover
- Take out the insert filled with solids
- Re-inset the emptied insert or an other empty insert
- Put back cover and lock bolts
- Close cover and lock
- Switch on the centrifuge
- Open and start inlet of liquid (by valve or pump)



The changing of the inserts takes approx. 3 minutes.



Note: When centrifuging substances hazardous to health or the environment, it must be ensured that risk to the operator (wear suitable protective clothing) and the environment is precluded. The centrifuged material must be disposed of according to the statutory regulations.

The time needed for the changing of the insert depends on the grade of contamination of the liquid.

At the start of operation the optimum time of centrifugal running is determined by opening the centrifuge in short time cuts and watching the resulting amount of solids. With fairly constant amount of solids the time can be determined that is needed until approx. 10 (3,1,5) dm³ solids are separated. According to this time interval the solids have to be emptied regularly. If the maximum sludge capacity is obtained, the liquid is no longer cleaned.

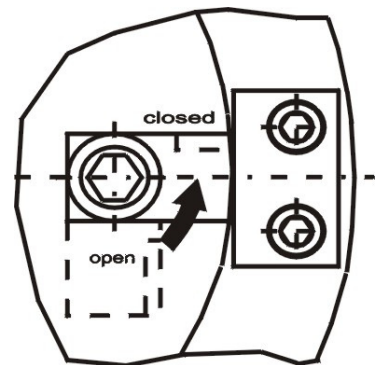
Whenever the centrifuge is switched off, the solids should be removed. In any case whenever an unbalance/vibration occurs after the centrifuge is switched on again.

The inlet of liquid must only be started with running rotor. Thus, with running rotor the inlet can be interrupted any time (even for a longer period).

6.5 Cover of rotor



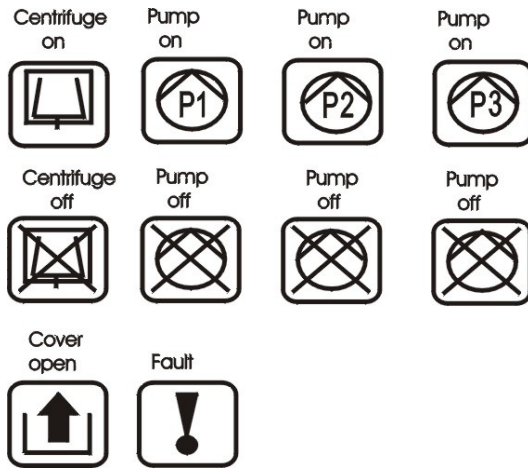
IMPORTANT: Please make sure that the insert and the cover are fitted properly and that the locking bolts are completely locked. Solids must be accurately removed from insert. Sealing surface on insert and cover must be clean.



Please note that before switching on of the centrifuge the centrifuge rotor must be correctly locked!

7 Steering

7.1 Control Device



7.1.1 Description

By pushing the button „CENTRIFUGE ON“, the machine will start if cover is locked properly. This condition is shown by a light (LED). The cover cannot be opened when centrifuge is running. The pump can only be started when centrifuge is working by pushing the button „PUMP ON“ (with LED) resp. stopped by pushing the button “PUMP OFF“. By pushing the button „CENTRIFUGE OFF“ , the centrifuge and the pumps are switched off, as well as the brake of the current circuit is effective. A sensor controls the standstill of the rotor and takes off the circuit brake.

At standstill of the rotor the button “COVER OPEN” is glowing. By pushing this button you can open the cover by hand. During the open cover can neither then centrifuge nor the pumps switching on. Interferences are showed by another LED.

7.2 Tank and Pump System

As a complete cleaning unit the centrifuge is built with steering, tank and pump system. This offers a unit which is space-saving and easy to connect. The shape and size of the tank and the efficiency of the pump can be designed according to customer’s requirements. The operation instructions for the pump can be found in annexe.



Note: The flow rate of the pumps is adjusted using the control valve (ball valve, slide valve, etc.) in the pumps’ pressure pipe. The pumps must be adjusted as given in the technical data (see Chapter 3.2). The characteristic curves for the pumps are given in the Appendix to the operating instructions. The characteristic curves show the pumping capacity (flow rate) rate of the pumps, dependent on the pressure, for water. A factor of approx. 0.85 must be taken into consideration for oil.

7.3 Level monitoring

The level of the liquid in the inlet vessel is monitored using a float switch – see the drawing in the Appendix. The maximum level in the inlet vessel causes a malfunction and switches the system pumps P2/P3 off. This fault signal is fed to the terminal for external signal analysis for the machine tool.

8 Safety Instructions



The construction of the centrifuge complies to the German Accident Prevention Stipulations.

In Germany Section (VBG 7Z) of the Accident Prevention Stipulations

The centrifuge can only be started after the housing cover is locked (cover locking mechanism). With the housing cover open, the current circuit is broken.

The cover cannot be opened before the rotor has come to complete standstill (cover retainer mechanism, control of standstill), which is also effective when no power is applied.

If any unbalance/vibration of the centrifuge occurs, immediately stop machine and eliminate cause of disturbance.

Maintenance covers of all kinds must only be taken off when centrifuge is at standstill and power is switched off. Switch on the centrifuge only after all maintenance covers have been fitted correctly and the housing cover is locked.

Never put hand into a turning rotor!

According to the testing stipulations of the above Accident Prevention Stipulations (UVV) the centrifuge must be checked in decomposed condition by a competent person with regard to its operational security whenever it may be required, however, at least every 3 years.

The results and findings of the control checks must be recorded in a test log which must be kept at the operation place of the centrifuge and must be presented to the technical examinations authorities upon request. The test log is available from producer.

Any technical modifications that may influence the operational safety of the centrifuge, especially modifications of the rotor speed and the mechanical and electrical safety equipment must not be carried out on any account.

For the event of a possible failure of the centrifuge, security measures must be taken to prevent overflowing or escaping of the liquid (collecting tanks, level controller or similar equipment).

9 Security Advices

9.1 For correct application



The unit has been designated and built according to the latest technical standards as well as the latest safety guidelines. Nevertheless, its use may constitute a risk to life and limb of the user or third parties, or may cause damage to the machine or other materials.

The unit must be used in perfect technical condition only and exclusively for its designated purpose in accordance to the operating instructions and the safety rules. Any cause of disorder, especially when affecting the safety, should be eliminated immediately.

The unit is designated exclusively for the separation of solids from the liquid as specified in or for the order. Using the unit for other purposes than those mentioned above is considered to be contrary to its designated use. The manufacturer/supplier is not liable for any damage resulting from such use. Responsibility bears the user only.

To operate the unit within the limits of its designated use also acquires observance of the operating instructions and also the inspection and maintenance instructions.

9.2 Organizational Measures:

The operating instructions must always be kept next to the unit, ready to be used. In addition to the operating instructions, observance and instruction of all other in general applicable and all legal regulations concerning the safety (accident prevention and environmental protection) is necessary. These regulations also refer to the handling of hazardous materials/substances and the disposal and wearing of personal protective equipment.

The operating instructions are to be supplemented by instructions covering the obligations of supervision and reporting of the individual organisations, such as organisation of jobs, working methods, job descriptions and the personnel in charge.

The personnel in charge of any work on the unit must have read the operating instructions and in particular the safety instructions before starting work. Reading the instructions after work has begun, is too late!

This concerns especially to persons who work only occasionally on the unit, e.g. during setting up or maintenance.

For reasons of security: when working on the unit, long hair must be tied back or otherwise secured, garments must be close-fitting and no jewellery, especially no rings, may be worn. Accident and injury may result from being caught up in the machinery or from rings catching on moving parts.

Observe all safety instructions and warnings attached onto the unit. All safety instructions and warnings attached to the unit must be kept complete and clearly legible.

In the event of safety-relevant modifications or changes in the performance of the machine during operation, stop the machine immediately and report the fault to the competent authority or person.

Do not make any modifications, additions or conversions on the unit which might affect safety without the supplier's approval. This also applies to the installation and adjustment of safety devices and valves and any welding work on load-bearing elements of the unit.

Spare parts must meet the technical requirements specified by the manufacturer. This is guaranteed for all spare parts of the original manufacturers' equipment.

Never modify software programme of programmable control systems. Observe intervals for routine checks and inspections as specified or recommended in the operating instructions.

The personnel must be trained in the operation of fire-extinguishers and must know their locations.

Observance and training of all fire-warning and fire-fighting procedures!

9.3 Safety Instructions for Specific Operational Phases

Avoid any operational mode that might not meet safety standard.

Take precautions to ensure that the unit is only used when in safe and reliable state.

Operate the unit only if all protective and safety-relevant devices, such as removable safety equipment, emergency shut-off equipment, sound-proofing elements and exhausters are in place and fully functional.

Check the unit at least once per working shift for obvious damage and defects. Report any changes (including changes in the working performance of the machine) to the competent authority/person immediately. If necessary, immediately stop and secure machine.

In the event of malfunctions, immediately stop and secure machine. Eliminate any defects immediately.

Watch start-up and/or shut-off procedures and indicators according to the operation instructions.

Before starting-up or setting the machine in motion, make sure that nobody is exposed to danger.

9.4 Special work in conjunction with the utilization of the unit

Maintenance and repair work during operation; disposal of parts

If the unit is completely shut-off for maintenance and repair work, inadvertent starting must be prevented by

e.g.

- pulling power-supply plug
- locking up the principal control elements, remove ignition key
- attaching a warning sign to the main switch

To avoid any risk of accidents, individual parts and large assemblies being moved for replacement purposes should carefully be attached to lifting tackle and secured. Use only suitable and technically perfect lifting gear and suspension systems with adequate lifting capacity.

| |
|--|
| Never stand or work underneath suspended loads. |
|--|

Always tighten any screwed connections that have been loosened during maintenance and repair. Any safety devices removed for set-up, maintenance or repair purposes must be refitted and checked immediately after completion of the maintenance and repair work.

9.5 Warning of Special Dangers

Electric energy:

Use only original fuses with the specified current rating. Switch off the unit immediately if any trouble occurs in the electric system.

Work on the electric system or equipment must only be carried out by a skilled electrician or by specially instructed personnel under the control and supervision of an electrician and in accordance with the applicable electro technical rules.

All parts of the machine or plant, on which inspection, maintenance and repair work is to be carried out, must be cut off from the power supply.

Before starting any work, first check the de-energized parts for the presence of electric power, ground and short-circuit them in addition to insulating adjoining parts and elements.

Fire risk:

Any welding, flame-cutting and grinding work on the unit can only be carried out when expressly authorized, as there may be a risk of explosion and fire.

Before carrying out welding, flame-cutting or grinding work, clean the unit and its surroundings from dust and other flammable substances and make sure there is sufficient ventilation (risk of explosion).

10 Elimination of Faults



The signal lamp „disturbance “on the keyboard field shines:

In the switchgear cabinet the disturbances on the plate are indicated over digital numbers.

| | |
|-------------|--|
| Fault No. 1 | Lid catch / Cover lock of the centrifuge |
| Fault No. 2 | Sensor defectively |
| Fault No. 3 | Protective contact of the Motor Centrifuge |
| Fault No. 4 | Protective contact of the Motor Pump |
| Fault No. 5 | Max. Niveau (Option) |
| Fault No. 6 | Min. Niveau (Option) |
| Fault No. 7 | Vibration (Option) |
| Fault No. 8 | Leakage (Option) |

Disturbance reset:

Disturbance eliminate, afterwards signal lamp operate and/or main switches off switch

Possible causes of malfunction

➤ The centrifuge isn't starting:

- Power failure
- Housing cover not closed
- Sensor defectively
- Oar is broken

➤ Indication of security switch of motor:

- measure current consumption of induction motor or pump
- Set on rated current (according to sign of motor type). By regulating the ball tap (or valve) of the supply (inlet) pipe to the centrifuge resp. the pressure of the pump, the current consumption is adjusted by the volume flow.
- motor is damaged
- check electric wiring

➤ Grade of cleaning is not:

- satisfying empty insert with solids
- reduce weight rate of flow
- Discharge pipe adjusts or defectively

| |
|---|
| <p>➤ Centrifuge is overflowing:</p> <ul style="list-style-type: none"> • Reduce weight rate of flow, maximum volume flow can be adjusted by current consumption of induction motor. • Check jointing between rotor and rotor cover. Clean sealing surface or replace sealing material. • Seal and sealing surfaces clean or replace. • Discharge pipe adjusts or defectively |
| <p>➤ Cover cannot be opened:</p> <ul style="list-style-type: none"> ▪ power failure ▪ sensor for standstill control is damaged • protecting switch is damaged |
| <p>➤ Vibration:</p> <ul style="list-style-type: none"> ▪ Empty insert with solids. |
| <p>➤ Max. level in the inlet tank (error No. 5)</p> <ul style="list-style-type: none"> • System pump P2 and supplying pump P1 are not correctly adjusted. Pump P1 must always somewhat more promote than pump P2. • Wake quantity from the production system too largely. Centrifuge somewhat to run after leave. • Pump P1 does not promote. • Level control in the inlet tank damaged. |

Any more problems?



Customer's service:

Tel: 0778 64679-0

Fax: 0778 64679-20

E-Mail: info@ruma-zentrifugen.de

11 Lubrication and Maintenance



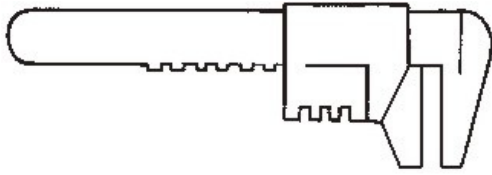
Owing to the special construction of the RumA-centrifuge, the wear-resistant DC breaking to the motor and the life lubrication of the bearings as well as the non-tangent labyrinth sealings no extra maintenance is required. Special care must be taken that insert for solids, cover of rotor and the locking mechanism of the housing cover are constantly in satisfactory and fault free condition. Whenever strong unbalance/vibration occurs, the centrifuge must be switched off immediately and the cause eliminated.

Insert for solid is as necessary to empty.

Float switch or level sensors are on a weekly basis to check for function and dirtiness and if required clean it. (Cleaning is only in currentless condition. Main switch is off).

12 Setting up Directions

12.1 Dismounting of Rotor



- open housing cover
- remove central cylinder screw (left-hand thread) inside the rotor
- remove bearing head and sealing rubber
- lift up rotor

12.2 Dismounting of Cone Belt

- loosen all 4 cylinder screws and the 1 tightening screws at the motor bracket
- push motor towards centrifuge, thereby the cone belt is released and can be taken off the disks
- apply new cone belt easily and unconstrained without the help of any tools
- first stretch the belt with the 1 tightening screws and secure with counter nuts. Then tighten the 4 cylinder screws.



IMPORTANT: After a running in for approx. 15 minutes the cone belt has fixed itself, reached a first tension and needs retightening. A first tension of 0,5 - 1% relating to the length of the belt, is standard value.

12.3 Dismounting of Outlet Pipe

The outlet pipe is fixed by the supplier. However through wearing a change might become necessary.

- open housing cover, lead outlet pipe with clamping ring from below through the cover
- slightly bolt up with 4 cylinder screws from above through the cover
- Place outlet pipe so that by carefully closing the housing cover there is a gap of approx. 2 mm to the inner surface of the rotor cover.
- Tightens the 4 cylinder screws firmly.
- Close housing cover and turn cone belt to check that outlet pipe does not touch anywhere.
- Fix outlet pipe.



NOTE: The outlet pipe has to dip tangential into the rotating liquid. Inside the turning rotor and when opening the cover it must not brush against anything.