OPERATING MANUAL

GSP SERIES

Zerma
9120 Centerlinks Commerce Dr., Unit 4
Fort Myers, FL 33912

239-219-1500
Parts@Zerma-America.com

www.Zerma-America.com

ZERMA

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1 INFORMATION ON THIS INSTRUCTION MANUAL

Author: ZERMA Machinery & Recycling Technology

This operation manual serves to help you to get to know your machine and how to make use of its application possibilities in accordance with the regulations.

The operation manual contains important information on how to operate the machine safely, correctly and economically. Following this advice will help you to avoid danger, minimize repair costs and down times and to increase the reliability and durability of the machine.

Before you begin to work on and with the machine, please read the operation manual thoroughly. Only after you have read and understood the contents of this operation manual may you begin work on and with the machine. Keep this operation manual at the application site for future reference.

References to chapters, plans and other documents as well as key markings are written in *italics*.

🡻 Instructions on handling are marked in this way.

The machine is designed in modular system and offers a wide spectrum of variations to do justice to your expectations. In order that you receive with the delivery of your machine all the information relevant for you, this operation manual is divided into three parts:

1. Part A: Information of the basic machine.
2. Part B: Plans, operation manuals for systems from other manufacturers etc.

Should you wish to order further operation manuals, please quote the machine number.

We wish you every success with your new machine!

2 TECHNICAL DATA

2.1 GSP 600/500

Cutting chamber opening:	Data in mm:	500x700
Rotor dimension:	Diameter in mm: Width of cut in mm:	600 500
Rotor type S-3	3-knives-version	
Rotor knives:	Rows of knives:	3
	No. of rotor knives:	3x2
Rotor type S-5	5-knives-version	
Rotor knives:	Rows of knives:	5
	No. of rotor knives:	5 x 2
Stator knives:	No. of stator knives:	2
	Rows of stator knives:	2
Rotor speed	rpm	660
Width:	Data in mm:	1530
Length:	Data in mm:	2080
Height:	Data in mm:	2620
Drive motor:	Power in kW:	37; 45
Screen:	Type and screen hole size dependent on the application and customer requirements.	Manual opening of screen holder
Opening device:	Standard	Hydraulic opening
Machine weight:	In kg	Approx. 3900
Electrical connection data:	markings are attached to the machine	
Noise level: Depends on plant location and type of grinding material!	Without noise equipment, in dB(A):	Approx. 110
	With noise equipment in dB(A):	depends on type of soundproof
Dimensions:	See Layout d*rawing*	

2.2 GSP 560/700

Cutting chamber opening:	Data in mm:	700x650
Rotor dimension:	Diameter in mm: Width of cut in mm:	560 700
Rotor type S-3	3-knives-version	
Rotor knives:	Rows of knives:	3
	No. of rotor knives:	3x2
Rotor type S-5	5-knives-version	
Rotor knives:	Rows of knives:	5
	No. of rotor knives:	5 x 2
Stator knives:	No. of stator knives:	2
	Rows of stator knives:	2
Rotor speed:	rpm	660
Width:	Data in mm:	1860
Length:	Data in mm:	2230
Height:	Data in mm:	2670
Drive motor:	Power in kW:	55; 75
Screen:	Type and screen hole size dependent on the application and customer requirements.	Manual opening of screen holder
Opening device:	Standard	Hydraulic opening
Machine weight:	In kg	Approx. 4900
Electrical connection data:	markings are attached to the machine	
Noise level: Depends on plant location and type of grinding material!	Without noise equipment, in dB(A):	Approx. 110
	With noise equipment in dB(A):	depends on type of soundproof
Dimensions:	See Layout d*rawing*	

2.3 GSP 560/1000

Cutting chamber opening:	Data in mm:	560x990
Rotor dimension:	Diameter in mm: Width of cut in mm:	560 990
Rotor type S-3	3-knives-version	
Rotor knives:	Rows of knives:	3
	No. of rotor knives:	3x2
Rotor type S-5	5-knives-version	
Rotor knives:	Rows of knives:	5
	No. of rotor knives:	5 x 2
Stator knives:	No. of stator knives:	2
	Rows of stator knives:	2
Rotor speed:	rpm	660
Width:	Data in mm:	1860
Length:	Data in mm:	2230
Height:	Data in mm:	2670
Drive motor:	Power in kW:	75
Screen:	Type and screen hole size dependent on the application and customer requirements.	Hydraulic opening of screen holder
Opening device:	Standard	Hydraulic opening
Machine weight:	In kg	Approx. 6000
Electrical connection data:	markings are attached to the machine	
Noise level: Depends on plant location and type of grinding material!	Without noise equipment, in dB(A):	Approx. 110
	With noise equipment in dB(A):	depends on type of soundproof
Dimensions:	See Layout d*rawing*	

2.4 GSP 700/1400

Cutting chamber opening:	Data in mm:	560x990
Rotor dimension:	Diameter in mm: Width of cut in mm:	560 990
Rotor type S-3	3-knives-version	
Rotor knives:	Rows of knives:	3
	No. of rotor knives:	3x2
Rotor type S-5	5-knives-version	
Rotor knives:	Rows of knives:	5
	No. of rotor knives:	5 x 2
Stator knives:	No. of stator knives:	2
	Rows of stator knives:	2
Rotor speed:	rpm	660
Width:	Data in mm:	1860
Length:	Data in mm:	2230
Height:	Data in mm:	2670
Drive motor:	Power in kW:	75
Screen:	Type and screen hole size dependent on the application and customer requirements.	Hydraulic opening of screen holder
Opening device:	Standard	Hydraulic opening
Machine weight:	In kg	Approx. 6000
Electrical connection data:	markings are attached to the machine	
Noise level: Depends on plant location and type of grinding material!	Without noise equipment, in dB(A):	Approx. 110
	With noise equipment in dB(A):	depends on type of soundproof
Dimensions:	See Layout d*rawing*	

3 GENERAL INFORMATION

3.1 Copyright

ZERMA Machinery and Recycling Technology(Shanghai) Co. Ltd. holds the copyright for these operation instructions, entrusted to the owner of the granulator for his personal use. These contains technical instructions and drawings which are not be copied complete or in part, distributed or used for reasons of unauthorized competition or for informing others.

3.2 Application

The granulator is designed for size-reduction of plastic material such as PE, PP, PVC etc. The user is responsible for consequences resulting from incorrect operation: This will lead to the loss of the warranty as well as any compensation claims.

3.3 Safety

The granulator has been constructed in accordance to the general standards of technology and is fitted with safety devices to prevent accidents that could endanger the life or health of the operator. The company operating the unit is responsible for the compliance of the safety regulations. We recommend staff training courses at regular intervals subsequent to initial training during commissioning.

3.4 Inspection of goods

The goods must be inspected by the purchaser to ensure that the delivery is complete and free from damage during transport. In the event of any queries Zerma must be informed with regard to missing items or transport damage. In the event of actual transport damage, written notification including photographs should be made and sent to the transport company as well as sent to Zerma immediately after delivery.

4 GENERAL SAFETY ADVICE

4.1 Safe operation of the machine

The machine is built according to the state of the art and recognised safety regulations.

It is equipped with protective devices; however there is still the threat of danger in case of incorrect conduct or misuse:

- for the health of the operator and that of other persons,
- for the machine,
- for the environment,
- for material assets belonging to the company and the operator.

All persons involved in:

- transportation and storage,
- start-up and shutdown,
- operation,
- setting and fitting
- maintenance and waste disposal...

of the machine must carefully read and take note of the following advice. However, not only the general safety advice listed in this chapter has to be observed, but also the safety advice which is added specifically in the other chapters.

Failure to heed this safety advice can lead to loss of all compensation claims.

Furthermore, the existing rules and regulations for the prevention of accidents as well as in house company working, operational and safety regulations have to be observed.

4.2 Use in accordance with the regulations

The operational safety of the delivered machine is only guaranteed for use in accordance with the regulations!
This regulation use is only achieved if the following points are observed and fulfilled.

Manufacturing process and grinding material

The granulator is suitable exclusively for the grinding of material, which corresponds to the agreed customer-specific specifications in all points (see C*ontract of sale*).

Any other work or design will differ from the specified requirements. Zerma Machinery & Recycling Technology will not be held responsible. The specified requirements also include all information found in the owner's manual such as maintenance and service.
Any change in the specifications or requirements must be brought to the attention of Zerma.

Suction unit

If emissions occur during grinding of material, which exceed the permissible legal values for contaminants in the air, the granulator may only then be operated when the customer on site has installed a suitable air suction device.

Safety device for the in feed hopper

In the case that your design of granulator does not contain any additional in feed device (e.g. nip roll feed device), the in feed hopper must be safeguarded in a suitable way against persons reaching in or falling in.

Connection of the Emergency Stop button

The machine may only be operated with the installed Emergency Stop buttons. In case no Emergency Stop buttons have been installed, an Emergency Stop button must be mounted on the control cabinet, the second on the material in feed.

Miscellaneous:

- The working conditions and instructions specified in this operation manual must be adhered to.
- The machine is not suitable for operation in an explosive environment.
- Faults, which can impair safety, are to be reported immediately and eliminated by a trained and skilled specialist.
- The machine may only be used in the industrial application range.

General Requirements Safety Information

- The service and maintenance in this owner's manual must be performed on a regular basis.
- The machine is not designed for operation in a volatile environment.
- Faults that could be a safety factor must be reported immediately and repaired by experienced personal.
- The machine must only be installed in a production type building.

Known uses not in accordance with the regulations

Never grind grinding materials, which do not correspond to the agreed customer-specific specifications. If this occurs, there is a danger to persons and the possibility of the machine being damaged.

Informal Safety Requirements

The owner's manual should always be located near the machine. New excerpts or additions to the owners' manual must always be replaced to include any safety requirements or environmental requirements.

All safety or caution signs must be visual and easy to read.

4.3 Liability and Responsibility

The General Conditions of Sale and Delivery basically apply. These conditions apply no later then the end of the contract. Liability and or responsibility to seller do not apply to the following;

- Equipment is not properly used for its specific application.
- Non-conforming installation, commissioning or service of the machines.
- Operation of the equipment without proper safety guards.
- Not conforming to the directions of the owners' manual regarding transport, storage, installation, commissioning or servicing the equipment.
- Any designs alterations on the machine.
- Any changes on the program logic which can alter the machine operation or electrical function.
- Changes in the logic function.
- In proper maintenance or serving the machines that can lead to extraordinary wear
- In proper serving of equipment
- Spontaneous crashes caused by foreign objects falling into the machine or acts of God

We honour a 12 month guarantee valid after delivery under the conditions that originally delivery or original parts from ZERMA Machinery & Recycling Technology are used or accepted for use in accordance with our owners manual.

Otherwise the guarantee will be considered invalid. Excluded are wear and tear parts such as knives, screens, drive belts, bearings, etc.

4.4 Structural changes, spare parts, accessories

For reasons of safety, remodelling and modifications to the machine, in particular to the electrical devices, are only permissible by arrangement with the manufacturer!

Replace faulty parts immediately. Only use original spare parts or spare parts from other manufacturers, which correspond, to the original spare parts with regards to function, stress and safety. This applies in particular for reasons of EMC (electro-magnetic compatibility) for electrical components.
The use of unsuitable parts can impair resistance to rays and increase the emission of rays!
If parts are replaced which are relevant for safety, they must be checked afterwards for proper functioning.

Only use accessories, which have been approved by the manufacturer. Use of accessories can change work with the machine. You must therefore observe the additional advice for your work and your safety. Read *Part B: Accessories*, before you commission the machine.

4.5 Operation manuals from other manufacturers

Integrated in the machine are systems from other manufacturers. When working on or with these systems, please observe the advice in the operation manuals from the respective manufacturer. These operation manuals are enclosed with the machine documentation.

4.6 Noise levels and noise control measures

The GSH series granulator standard design is without a sound proof enclosure.

The noise level of the granulator at idle speed is approximately 80-85 dB(A).
Especially by rigid materials soundproofing is recommended due to a noise level of up to 120 dB(A) when in operation.
In order not to exceed the noise level of 85 dB(A) is the purchaser required to provide soundproofing.

The noise level can be affected by foundation static or dynamic, aux. blowers etc. or other additional equipment.
Therefore it is necessary to actually determine if the noise level is directly coming from the machine or another accessory equipment.

ZERMA Machinery & Recycling Technology offers the following equipment to reduce the noise levels;

- Two piece soundproof box (one piece stationary, one piece moveable) also available with soundproof hopper.
- Walk-in type soundproof enclosure.

CAUTION

The user or purchaser is responsible for compliance with the instructions and procedures !

4.7 Work stations

During normal operation, the work station is the station at the in feed of the grinding material.

For maintenance work, the whole area around the machine is at your disposal.

4.8 Remaining risks

The machine is constructed so that you are able to operate it safely. Structurally non-avoidable dangers are prevented as well as possible by the protective devices. A certain remaining risk does however always remain! Being aware of these remaining risks of the machine will help you to structure your work more safely and in so doing to avoid accidents.
To avoid danger, please observe in addition the specific safety advice in the individual chapters.

4.8.1 Mechanical dangers

Type of danger:	Danger of crushing by heavy parts falling down or falling over.
Activity:	Unloading and transporting the machine or machine components.
Possible consequences:	Serious injury could result.
Preventative measures:	Wear personal protective gear. Follow the instructions in this *Operation manual*.

Type of danger:	Danger of cutting caused by sharp cutting knives, even when the rotor is stationary.
Activity:	Knife replacement, knife setting, and knife sharpening, other maintenance work.
Possible consequences:	Serious injury, particularly to hands and fingers can result.
Preventative measures:	Wear personal protective gear. Follow the instructions in this *Operation manual*.

Type of danger:	Danger of crushing when closing the granulator upper section.
Activity:	Maintenance work.
Possible consequences:	Serious injury can result.
Preventative measures:	When closing the granulator upper section, ensure that no persons are in the danger area.

Type of danger:	Tripping over cables and other objects lying around.
Activity:	All activities.
Possible consequences:	Serious injury can result.
Preventative measures:	Lay cables in accordance with the regulations. Keep work station clean and tidy.

Type of danger:	Danger of crushing, cutting and amputation caused by up to 3 minute run down of the rotor.
Activity:	Maintenance work.
Possible consequences:	Serious injury or death can result.
Preventative measures:	The housing upper section must always be tightly locked during operation using the connecting screws. Do not make the run down safety devices ineffective by using technical aids or other manipulations. Never check by hand whether the rotor has come to a stop.

Type of danger:	Danger of pulling in caused by running "V"-belts.
Activity:	All activities.
Possible consequences:	Hair, jewellery etc. can be pulled into the machine. Serious injury can result.
Preventative measures:	Never dismount "V"-belt protection and window.

4.8.2 Electrical dangers

Danger:	Direct or indirect contact with live parts in the terminal box.
Activity:	Maintenance work, start-up.
Possible consequences:	Serious injury or death.
Preventative measures:	Trained electricians may only carry out all work on the electrical equipment. If work is necessary on parts, which conduct dangerous voltage, a second person should be called in who can break the power supply in case of emergency. The yellow-marked lines conduct voltage even when the machine is switched off (main switch to 0). Only use original safety fuses with stipulated intensity of current. Faulty electrical components must be replaced immediately. If faults occur in the electrical energy supply, switch machine off immediately. The terminal box must be locked during operation. Before opening the terminal box: Main switch to 0.

4.8.3 Dangers caused by the control system

Type of danger:	Danger caused by failure of the Emergency Stop function.
Activity:	All activities.
Possible consequences:	Serious injury or death.
Preventative measures:	It must be guaranteed that failure of an Emergency Stop button is displayed and leads to an immediate stop of the machine.

4.8.4 Thermal dangers

Type of danger:	Danger of fire and explosion caused by throwing dangerous objects (e.g. spray cans) into the granulator.
Activity:	Grinding.
Possible consequences:	Serious injury or death can result.
Preventative measures:	Only grind grinding material, which corresponds to the agreed customer-specific specifications in all points.

4.8.5 Dangers caused by noise

Type of danger:	Damage to hearing.
Activity:	All activities.
Possible consequences:	Diminished hearing, headaches, impaired balance, and deterioration of concentration.
Preventative measures:	Reduce noise emissions by taking suitable measures. Wear ear protection.

4.8.6 Dangers caused by vibration

Type of danger:	Instability of the granulator caused by vibration.
Activity:	All activities.
Possible consequences:	Serious injury can result.
Preventative measures:	Install the machine according to the instructions of this *Operation manual* and the *Assembly drawing*.

Type of danger:	Loosening of the cutting knife mountings caused by vibration.
Activity:	All activities.
Possible consequences:	Serious injury can result.
Preventative measures:	Check the cutting knife mountings regularly according to the instructions in this operation manual.

4.8.7 Dangers caused by materials and substances

Type of danger:	Inhalation of grinding dust.
Activity:	All activities.
Possible consequences:	Diseases of the respiratory tract etc.
Preventative measures:	Mount a suitable air suction device. Wear breathing equipment if necessary. When cleaning the machine do not blow out grinding dust, use suction instead.

4.8.8 Danger caused by manipulation of the protective devices

Type of danger:	Danger of crushing, cutting and amputation.
Activity:	All activities.
Possible consequences:	Serious injury or death can result.
Preventative measures:	Never make the protective devices ineffective. Check the protective devices regularly for proper functioning according to the specifications given in this operation manual.

4.9 Protective devices

The machine may under no circumstances be operated without these protective devices or with faulty or manipulated protective devices. The threaded spindles of the run down safety devices may only be rotated by hand.

4.9.1 Safety device for housing flap

Illustration:
Safety device
for housing flap

The granulator can only be operated if the housing flap is closed and the threaded spindle is rotated in completely thus deactivating the safety switch. If the housing flap is open, the threaded spindle cannot be rotated in.
If the threaded spindle is rotated out during operation, the safety switch is activated, thus switching off the machine. The run down time of the rotor is bridged by manually rotating out the threaded spindle which takes a certain amount of time, so that this is stationary, when the housing flap can be opened.

4.9.2 Safety device for the granulator upper section

The granulator upper section can be opened by means of a hydraulic system. After switching off the machine a time relay will be activated this prevents that the hydraulic system can be started before the rotor has come to a complete standstill.

Another safety switch is installed on the hinge of the granulator. This prevents the granulator being put into operation when the granulator upper section is opened.

Illustration:
Safety device
Housing opening

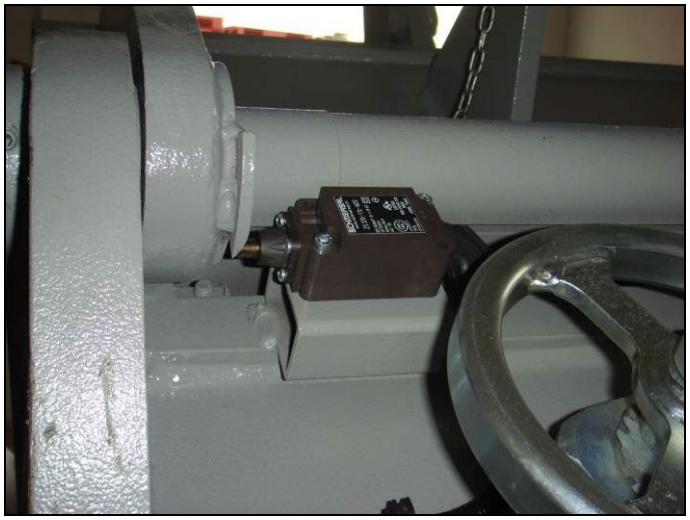


Illustration:
Opened hopper/
upper section

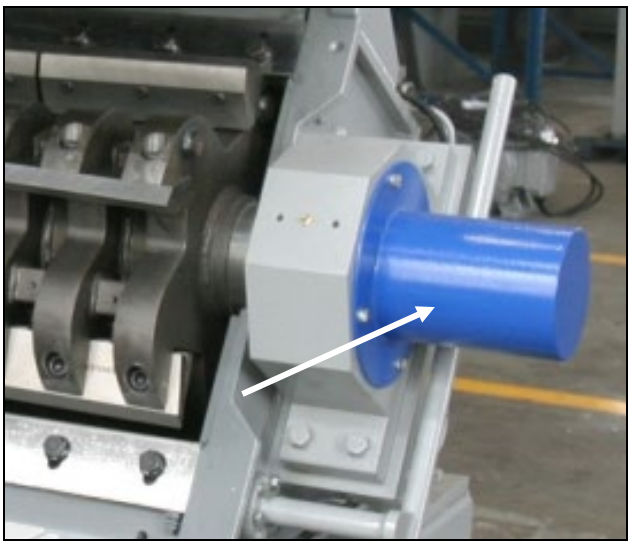
4.9.3 "V"-belts, disk flywheels and shaft protector

"V"-belt protection, disk flywheel protection (insofar as a disk flywheel is present) and shaft protector are fixedly connected to the machine. They can be dismounted for installation and maintenance work. However, this may only then be carried out when all rotating parts have come to a complete standstill.

Illustration:
V-belt cover

If machines are delivered on the request of the customer without drive motors, the operator is obliged to fit and mount the protective devices delivered together with the machine himself in line with the current legal safety regulations.

Illustration:
Shaft cover



4.9.4 Splash guard

In case that the grinding material is introduced directly via the in feed hopper, the input opening is provided with a splash guard.

Illustration:
Hopper splash guard

Attention:
Fixation of the splash guard curtains must be checked every month.

4.9.5 Safety markings

Safety markings are attached to the machine. If one of these markings becomes detached or is no longer recognisable, it must be replaced. You can order new markings at specialist shops or from us (see *Customer service and spare parts orders*).

4.10 Authorized persons

Authorized personnel may only carry out work on the machine. Observe the legally permissible minimum age!

As a basic rule, persons who have received training on the machine may only operate the machine.

Personnel, who are still to be trained or receive instruction on the machine, may only work on the machine under constant supervision by an experienced person.

The company operating the machine must make the operation manual accessible to the machine user and ensure that he has read and understood it. Only then may he put the machine into operation.

Responsibility for the different jobs on the machine must be clearly established and adhered to. There must be no unclear areas of authority, as this could endanger the safety of the machine user.

If several persons work on the machine, a detailed division of workstations should be set up.

Trained electricians may only carry out all work on the electrical equipment.

Authorized specialist personnel may only eliminate faults on the control system.

All work related to installation, trained specialist personnel having received instruction on the machine might only carry out fittings and maintenance of the machine.

The operator must make sure that only authorized person’s work on the machine. He is responsible for the safety of third persons in the working area of the machine.

4.11 Personal protective gear

Wear close-fitting clothing. Jewellery and hair must be worn so that they cannot be pulled into the machine by moving parts.

The following protective gear must be worn when carrying out the following tasks:

	Safety helmet	Safety boots	Safety gloves	Safety goggles	Ear muffs
Unloading machine.	x	x	x		
Connecting machine.		x			
Operation.		x	x	x	x
Cleaning.		x	x	x	
Maintenance of bearings.		x			
Screen replacement.		x	x		
Maintenance of "V"-belts.		x			
Maintenance of cutting knives.		x	x		
Knife sharpening.		x	x	x	x

If necessary, protect yourself (in addition to the air suction device) with breathing equipment before inhaling substances harmful to the health.

4.12 Safety measures at the application site

Requirements at the application site: see chapter *Initial Start-up*.
The machine must be erected horizontally on a horizontal surface and in a stable manner.
Ensure by means of appropriate in house orders and controls that the environment of the work station is always clean and clear of obstructions.

4.13 Fire fighting agents

In the case of fire, disconnect the power supply of the machine or pull out the mains plug. Extinguish the fire from a distance of several meters using a fire extinguisher suitable for the machine and the grinding material.

4.14 Cleaning agents

Only use suitable cleaning agents to clean the machine and in doing so, the advice of the manufacturer is to be heeded. Please be aware that unsuitable cleaning agents (e.g. thinners) can damage the paint of the machine as well as the cables and plastic parts.

4.15 Conduct in case of an emergency

The machine may only be operated with the installed Emergency Stop buttons. An Emergency Stop button must be mounted onto the control cabinet, the second onto the grinding material in feed.

Emergency Stop:

- In case of emergency, immediately press one of the *Emergency Stop buttons*.

CAUTION

The EMERGENCY STOP must be activated in all situations whereby injury or damage could result!

Reoperation:

- Eliminate cause of Emergency Stop.
- Unlock *EMERGENCY STOP BUTTON*.
- Acknowledge fault.

The machine is now ready for operation again.

4.16 Classification of specific safety advice

The specific safety advices in the following chapters of this operation manual are classified as follows:

⚠DANGER	
	**Indicates an immediately threatening danger. If you do not take avoiding action, death or serious injury will result.**

⚠WARNING	
	**Indicates a possibly dangerous situation. If you do not take avoiding action, death or serious injury could result.**

⚠CAUTION	
	**Indicates a possibly dangerous situation. If you do not take avoiding action, slight or minor injury could result.**

This safety advice refers to the remaining risks for certain working steps and helps you to work safely with the machine. In addition to the safety advice above, there are also the hint and the tip.

HINT

Indicates a possibly harmful situation. If you do not take avoiding action, the machine could be damaged.

TIP

Indicates application tips and other particularly useful information.

5 DESCRIPTION OF THE MACHINE

5.1 Grinding material in feed

The grinding material can be fed into the granulator in the following ways:

- Manual in feed of the grinding material directly into the in feed hopper.
- Manual in feed of the grinding material with the help of an additional in feed device (e.g. nip roll feed device).
- Automatic in feed of the grinding material by means of an additional in feed device (e.g. conveyor belt).

5.1.1 In feed hopper

The grinding material in feed ensues via an in feed hopper, which is formed so that the grinding material can be delivered correctly and safely. A splashguard at the input opening prevents thrown-back parts being able to escape. The grinding material in feed can take place manually or with the help of an additional in feed device.

⚠DANGER	
	**Material fly back can occur out of the hopper opening.** **Serious injury or death can result.** **Do not remove the splash guards from hopper or throw in material larger than the hoppers capacity** **Splash guards has to be closed during grinding**

⚠WARNING	
	**If using a hopper with side infeed or pipe hopper:** **The material shall be shorter than 80% of the side arms length!**

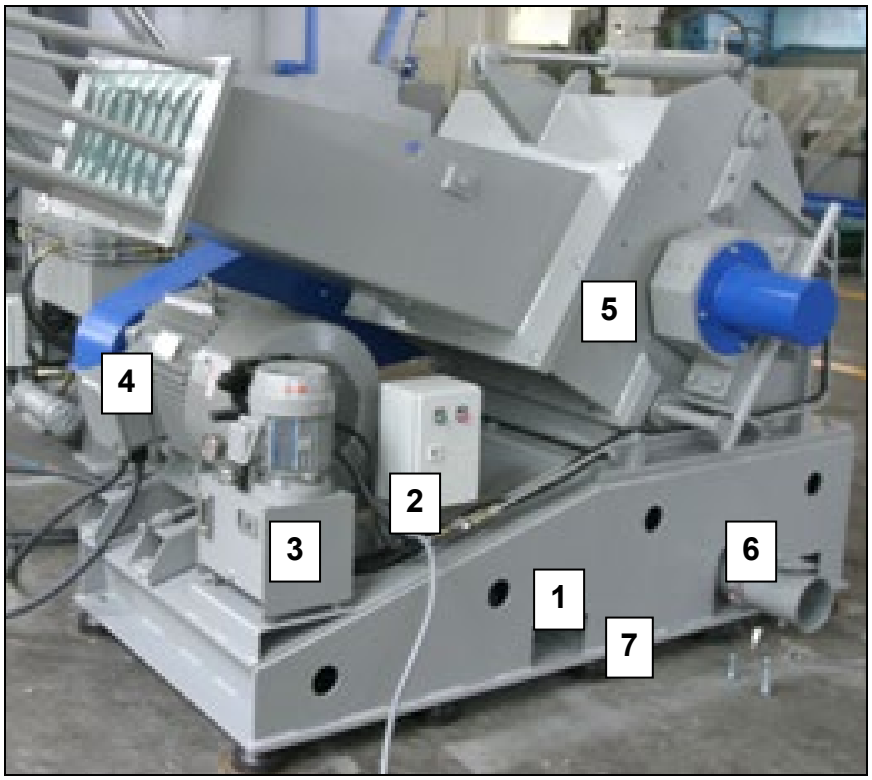
5.1.2 Additional in feed device

If your machine has an optional in feed device such as roller feeder, refer to the additional information about the accessories in the appendix.

5.2 Base frame

Illustration:

(1) Base frame
(2) Terminal box
(3) Hydraulic system
(4) Drive motor
(5) Machine housing
(6) Suction trough
(7) Pads



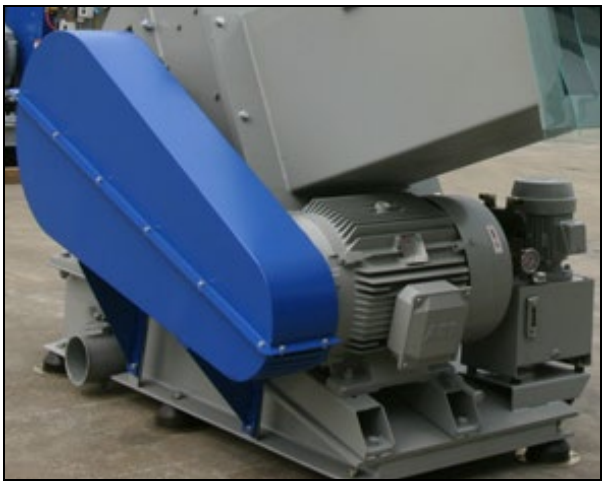
The machine housing, the suction trough, the drive motor, the hydraulic system and the terminal box, for the electrical connections, are mounted on the base frame.

The base frame is equipped with a sufficient number of vibration and noise muffling mounting pads.

5.3 Drive

The drive of the rotor ensues by means of an electric motor via "V"-belts. The motor, which is mounted on sliding rails or a motor plate, can be adjusted for regulating the tension of the "V"-belts by means of tensioning screws. The "V"-belt pulley is attached with a special tensioning element to the motor shaft.

Illustration:
Drive Motor



Please observe the operation manual from the manufacturer!

5.4 Granulator upper section

The granulator upper section can be opened or pivoted upwards for maintenance work and for cleaning. It is connected with the granulator lower section by means of a joint. Opening and closing ensues by means of a hydraulic system. The in feed hopper mounted on the granulator upper section pivots with the granulator upper section.

Illustration:
Granulator upper section (opened)

In addition, an anti-winding device is also integrated on the granulator upper section. This prevents foil strips, for example, becoming wrapped around the rotor axis and thus causing operational faults.

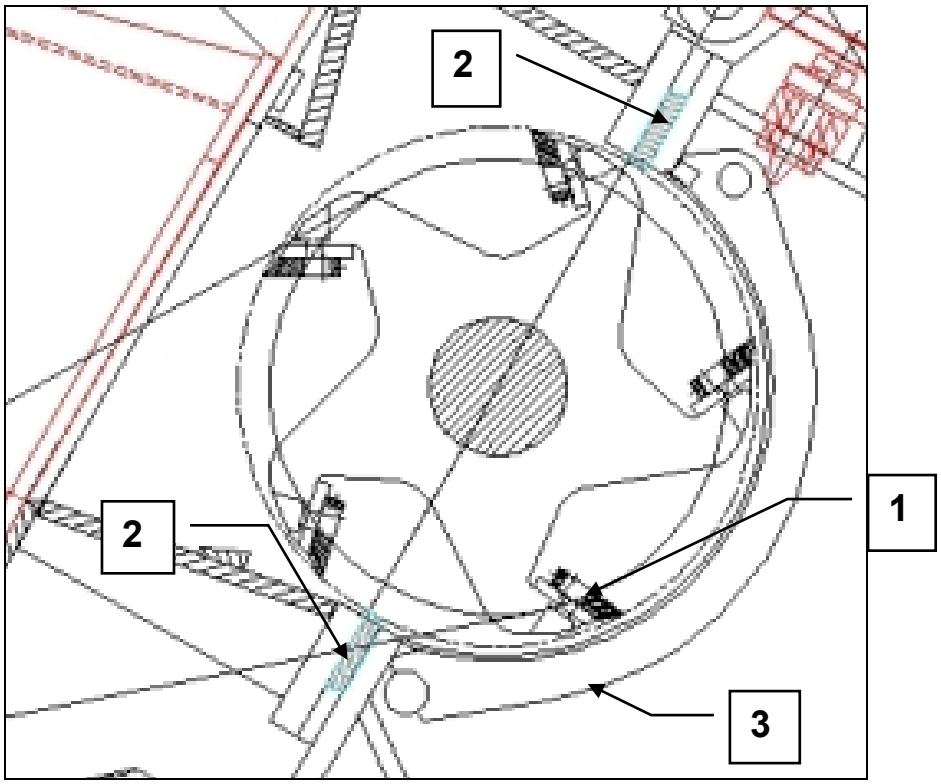
5.5 Granulator lower section

The granulator lower section and the drive are mounted onto the base frame. The rotor is arranged on bearings in the granulator lower section. The bearings lie outside the grinding chamber and are sufficiently sealed off against penetrating dirt. The stator knives which are installed in the granulator lower section are easily accessible and simple to install and dismantle. In the upper section the deflection wedge and the third stator knife are installed. The ground material falls through a screen into the suction trough mounted underneath the rotor and can be sucked off from there.

5.5.1 Rotor and cutting knives

Illustration:

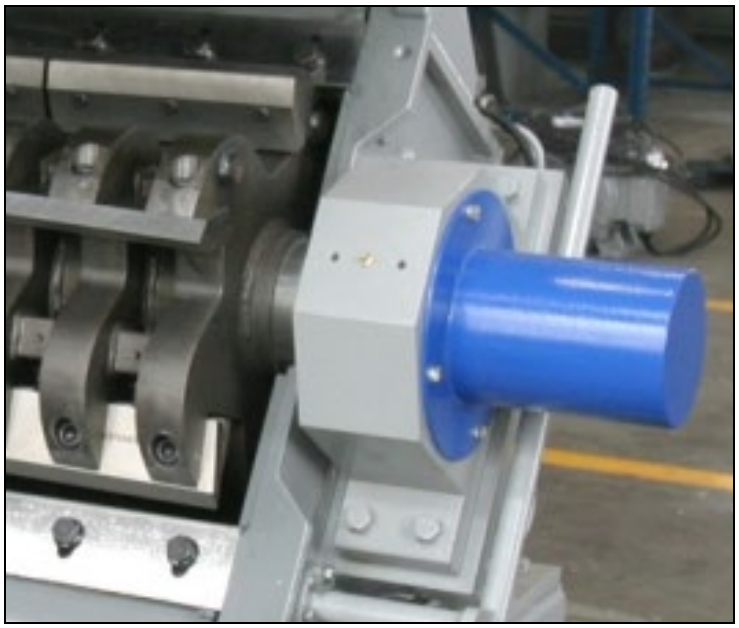
(1) Stator knives
(2) Rotor knives
(3) Screen support



The material is ground between the knives assembled on the rotor and the stator knives which are mounted in a fixed position in the housing.
All rotors are equipped with either a single or a v-shaped scissor cut to decrease the power consumption and to increase the capacity of the machine, while avoiding high amp-peaks.
The design of the rotor has a significant influence on the quality of the grinding process and it's results. The rotor construction, the type of knife mounting and the number of knives have all been exactly matched to your task allocation.

The rotor is arranged on roller bearings, which are situated outside the housing. The "V"-belt pulley is attached by means of a taper bush to the rotor axis. The rotor is dynamically counter balanced and has vibration-free concentricity. The rotor is accessible after opening the granulator upper section.

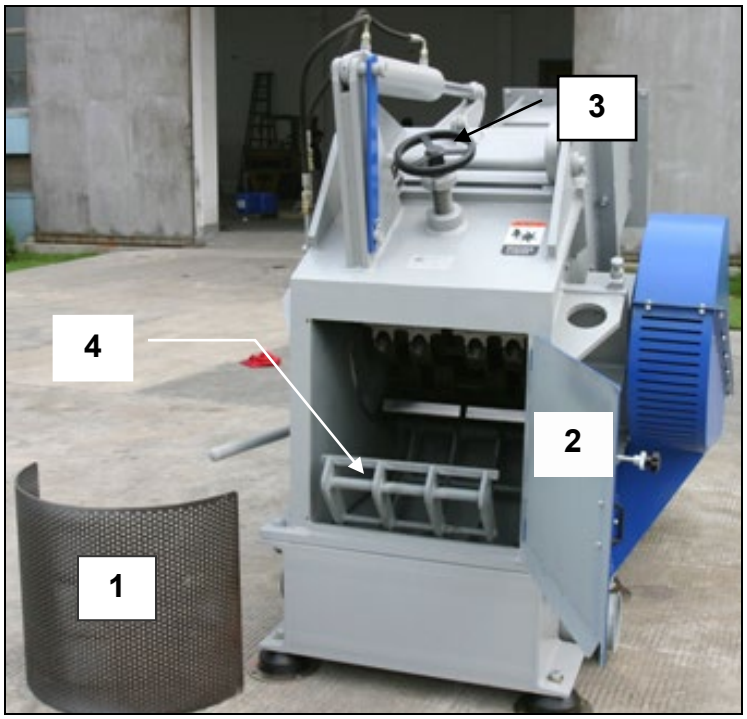
Illustration:
Bearing



5.5.2 Screen and screen support

Illustration:

(1) Screen
(2) Housing door
(3) Screw for screen support
(4) Screen support



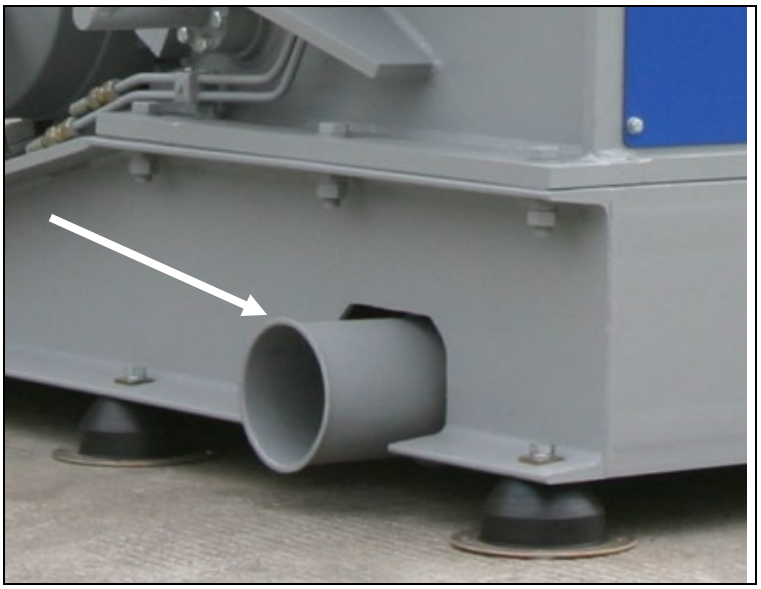
The screen lies in the supporting screen support in the granulator lower section. This screen support is arranged on bearings which can be pivoted and screwed into the working position with the granulator lower section.

The screen is slightly larger in it's radius than the cutting circle of the rotor knife. The screen perforation is selected according to the desired grain size of the grinding material. All grinding material parts which are smaller than the screen perforation fall through the screen into the suction trough. The screen is replaceable and can be taken out through the open housing flap of the granulator lower section.

5.6 Discharge of grinding material

Illustration:

Pipe connection for blower



The ground material is sucked off by means of a blower out of the suction trough of the granulator. During this process, air is sucked through the in feed hopper of the granulator and drawn through the grinding chamber. At the same time, the grinding chamber and the grinding material are cooled. In addition, a partial air current is sucked in through the by-pass flap which is located on the suction trough. This air current can be regulated with the help of an air regulating flap mounted here.

Illustration:

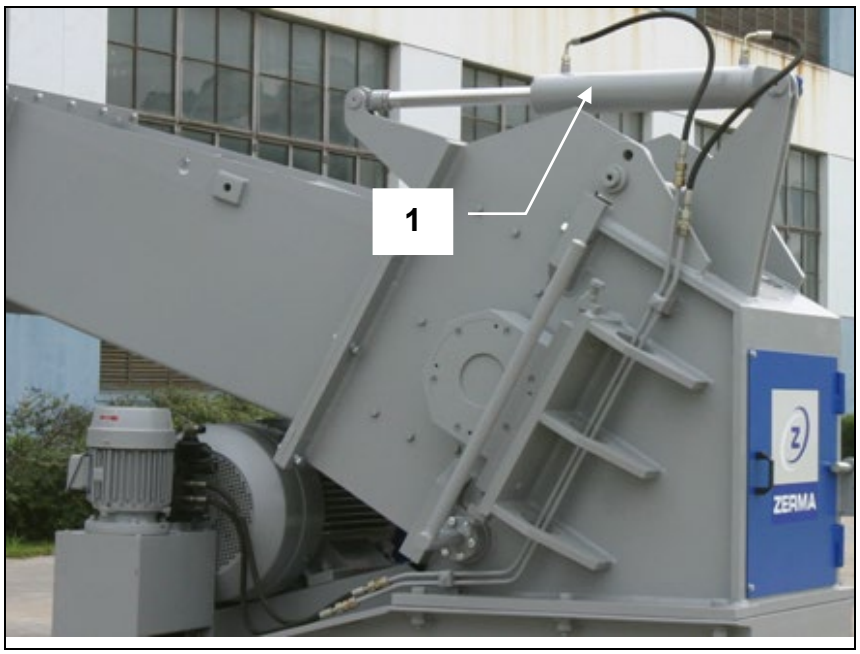
By-pass flap

If a material blower is installed in your plant configuration, please observe the additional information for work with and on the material blower in *Part B: Accessories.*

5.7 Hydraulic opening device

Illustration:

(1) Hydraulic cylinder for opening hopper and machine upper section



The granulator upper section can be opened with a hydraulic system for maintenance work and cleaning. It is connected with the lower part by means of a joint.

Illustration:

(1) Hydraulic pump
(2) Control box

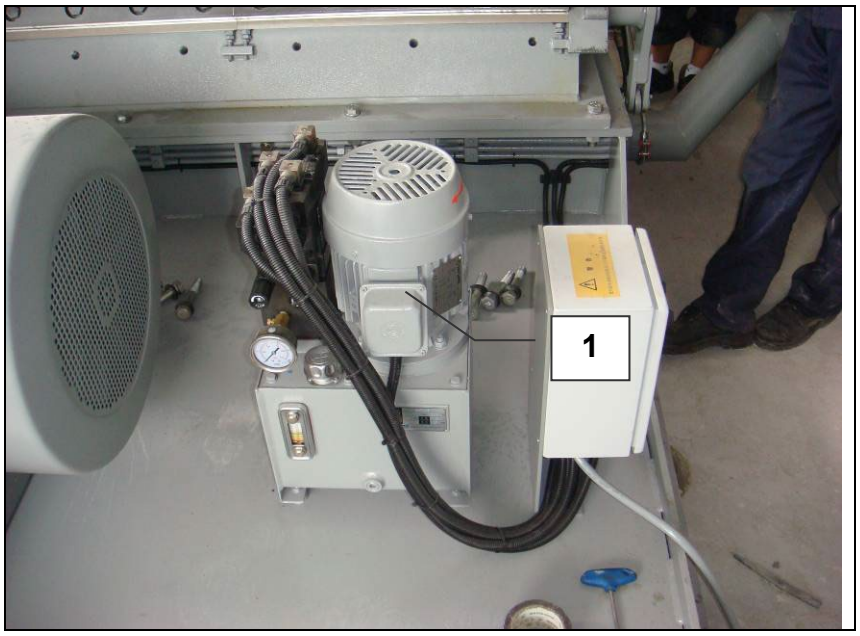
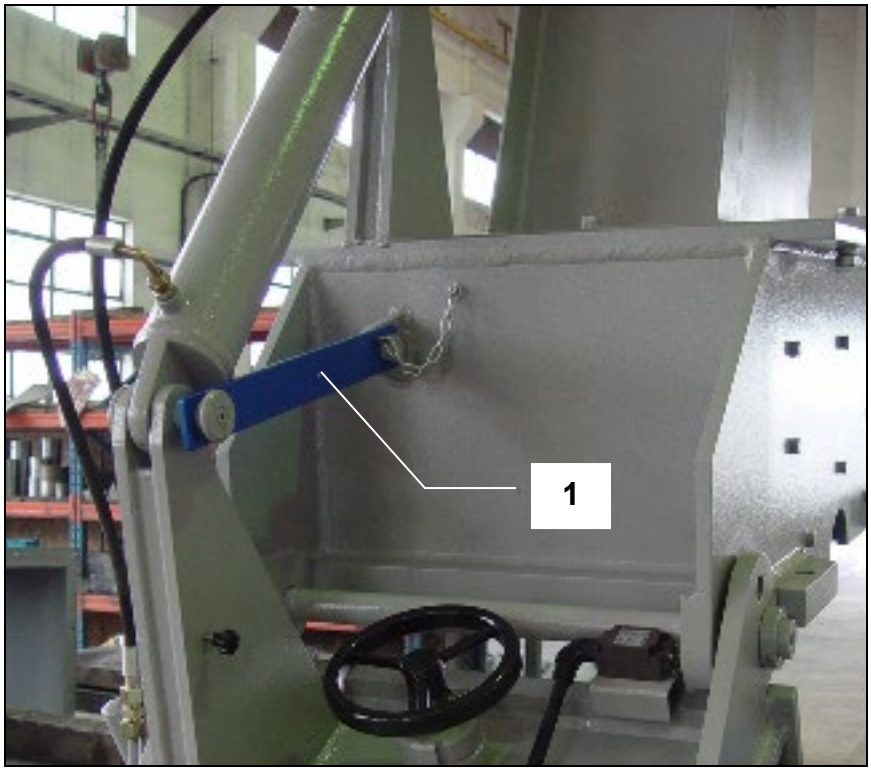


Illustration:

(1) Bar for safeguard

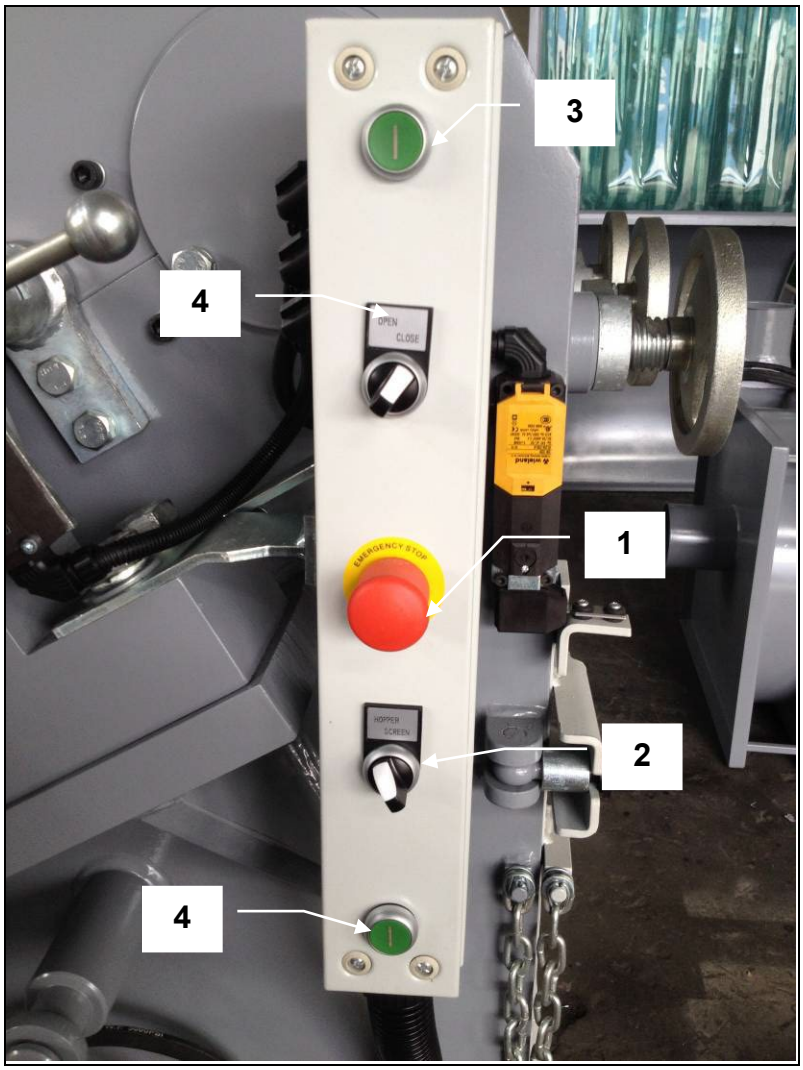


After opening the machine upper section, the cylinder should be safeguarded with the attached bar.

5.7.1 Hydraulic controls

Illustration:

(1) Emergancy STOP
(2) Selector switch SCREEN/HOUSING
(3) Selector switch OPEN/CLOSE
(4) Two hand switch start 1 and 2



The hydraulic unit is set ready for operation at ZERMA. Normally adjustment work is not necessary. On the control arm you have 2 buttons (Start) and 2 switches (hopper open/close and screen open/close).

6 INITIAL STARTUP

6.1 General Advice

All work related to start-up may only be carried out by trained specialist personnel.
Check the machine for possible transportation damage or other damage. Should you determine damage, have this confirmed by the freight company and please report this to us in writing immediately after delivery. When starting up for the first time and after setting up ready for service, you must carry out the necessary checks according to the chapter *Machine Check prior to Initial Start-up*.

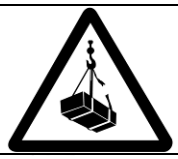
6.2 Requirements at the application site

The site of application for the machine must exhibit the following features:

- Enclosed space.
- The ground must exhibit sufficient load-bearing capacity (you can find the machine weight in the C*hapter Technical Data*). The unevenness of the ground surface may not exceed 5 mm.
- The machine must be freely accessible from all sides.
- There must be sufficient room available for operating and service personnel.
- Spatial requirements: see *Assembly drawing*. All hinged parts must be able to be opened completely.
- Vibration-free environment.
- The application site must be well-lit.
- The machine may not be exposed to direct radiation caused by radiators or the sun.
- Room temperature: +5° to +40°C
- Relative atmospheric humidity according to DIN 40040:
  15 to 70 % (indoor)
  By humidity levels higher than 70 %, apply anticorrosive agent to the metallic-finished machine parts. Insulation for the tropics is also necessary.
- The machine may not be operated within range of static discharges or strong magnetic fields as this could lead to faults in the machine control system.

6.3 Unloading and installing the machine

The machine or the machine components are packed so that they arrive with you safely. To see how the machine is packed or should be packed, please see the *Packing plan*. For unloading the packaged machine or machine components you may use a suitable crane or forklift truck.

⚠WARNING	
 	**Suspended load.** **Falling loads can cause serious injury or death.** **Only use a crane or a forklift which is suitable for the weight and the dimensions of the load.** **Also use a suitable stopping means and pay attention to the gravity centre location.** **Do not step under the suspended load.** **Wear a safety helmet in addition to your basic protective gear.**

- After unloading, remove the packaging material and all transportation safety devices.
- In the case that the granulator and its accessory components have been delivered as individual items, mount these at the site of application using the mounting screws sent with the delivery exactly in accordance with the data given in the *Assembly drawing*. Only in this way can it be guaranteed that there are sufficient delivered piping parts, tubing and cable connections and that the linking places match.

⚠WARNING	
	**Overturning or falling machine.** **Serious injury or death can result.** **In the case that you wish to erect the granulator over a pit, on a frame or on a platform, you must secure the machine by putting mounting screws through the holes on the mounting pads (see *Assembly drawing*). If assembling the machine on solid ground, this safety device is not absolutely necessary.**

- Align the machine horizontally with the help of a suitable spirit level.
  Do not use blocks to place underneath the machine, use instead metal strips in order to prevent buckling of the base frame. Make sure that an even distribution of weight is achieved on all the points of support.

6.4 Electrical connection

⚠WARNING	
	**Dangerous voltage.** **Touching live parts can lead to serious injury or death.** **All work which relates to the electricity of the machine may only be carried out by trained electricians.** **Observe the currently effective EMC regulations.**

Voltage, current, frequency and protection are marked on the *Type plate.* The voltage tolerance is ± 10%.

➧ For machines, which have been supplied none pre-wired by ZERMA the electrical connection, is to be carried out in accordance with the enclosed *Wiring diagram* in the terminal box. When doing this, the regulations of the local electricity authority are to be adhered to. The cable cross section required is to be determined according to the rated capacity of the units.

⚠WARNING	
	**When operating specific equipment caution must be taken to prevent electrical shock. Installation, service, alterations and or modifications must only be done by qualified personal and with up most safety. Not conforming to the requirements could result in bodily injury, death or costly damage.**

HINT

Alterations to the wiring diagrams from ZERMA require our approval. Failure to do this will exclude all guarantee claims.

The wiring schematics are located in the control panel in the event that the control panel is a part of the delivery.

Connection of Emergency Stop button

The machine may only be operated with installed Emergency Stop buttons. In the case that no Emergency Stop buttons have been installed at the factory, an Emergency Stop button must be installed at the control cabinet, the second at the grinding material in feed.

Checking the rotational direction

Checking the rotational direction is part of the machine checks before initial start-up (see chapter of same name). The steps prior to this check must be carried out beforehand.

Switch the machine on and then immediately off again for a short time (see Switch on machine and Switch off machine).

↓ Observe whether the discharge air fan in the drive motor is rotating in the direction of the attached direction arrow.

HINT

If running in the wrong direction, reconnect the motor connection immediately. Damage to the machine will result from operation in the wrong direction.

6.5 Machine check prior to initial start-up

Check	See chapter
1. When granulator is open, check the knife mounting screws using a torque wrench.	*Replacing and checking the cutting knife mountings.*
2. Search the grinding chamber for foreign matter.	*Closing the granulator*
3. Open the housing flap on the housing lower section and check whether the screen has been inserted in accordance with the regulations.	*Emptying the screen*
4. Close granulator upper section and fasten screws tightly.	*Opening and closing the granulator.*
5. Examine in feed device (accessories) for foreign matter.	*Part B: Accessories.*
6. Check that the *Emergency Stop buttons* are unlocked.	
7. Check all safety devices for proper functioning.	*Checking the protective devices.*
8. Switch on machine for a short time and check rotational direction. The rotational direction can be seen at the discharge air fan of the drive motor (observe running direction arrow).	*Electrical connection.*
9. Allow machine to run for approx. 10 minutes without grinding material.	*Switch on machine.*
10. Connect material blower (accessories) and in feed device (accessories), check rotational direction of blower.	*Part B: Accessories.*
11. Feed grinding material uniformly. Too much grinding material can lead to overload of the machine.	*Manual in feed of grinding material.*
12. If necessary, check the temperature of the ground material.	
13. Monitor the ammeter. This displays the present current consumption and in this way gives information on the load of the machine. The ammeter is only integrated into granulators which have been delivered with an electrical control system.	
14. Open the air regulating flap on the by-pass flap far enough so that the trough is completely emptied (do not open further!).	*Discharge of grinding material*

7 OPERATION

Have you read and understood the operation manual, in particular the safety advice in the chapter on?
You may not operate the machine until you have done so!

TIP

Should faults occur during work with the machine, please observe the advice in the chapter *Error! Not a valid result for table.*.

7.1 Machine checks before switching on the machine

Check	See
1. The knives are properly set and the screws are tightened with the specified torque.	*Replacing and checking the cutting knife mountings.*
2. The screen is inserted into the screen support in accordance with the rules and the screen support is held fixedly at the end position due to the tightened mounting screws.	*Emptying the screen.*
3. The grinding chamber is free of foreign matter.	*Closing the granulator*
4. The housing flap on the screen support is closed.	*Emptying the screen.*
5. The granulator upper section is closed and screwed to the granulator lower section.	*Opening the granulator*
6. All safety devices including those of the installed grinding material in feed and discharge devices are checked and operative.	*Checking the protective devices.*
7. The material blower is installed properly and the air regulating flap on the suction trough is set so that the grinding material can be completely sucked away.	*Part B: Accessories.*

7.2 Switch on machine

1. Switch on the grinding material discharge device.
2. Switch on the granulator (main switch to 1). Wait until the rotor has reached its full speed and switched from star to delta.
3. Switch on the grinding material in feed device (accessories).

7.3 Switch off machine

1. Switch off the grinding material in feed device (accessories).
2. Wait until the remaining grinding material has been ground, then switch off the granulator, (main switch to 0).
3. Switch off the grinding material discharge device.

7.4 Manual in feed of grinding material

⚠DANGER

Rotating knives.
Can cause serious cutting and crushing injuries, possibly leading to death.
Do not reach into the in feed hopper or lean in whilst the rotor is running (pay attention to the 3 minute run down time). Only use approved grinding material.

➧ Throw the grinding material into the grinding chamber through the splash guard.

If in your design of machine an additional in feed device is installed, please observe the additional information for work with and on the in feed device *Part B: Accessories.*

8 MAINTENANCE

8.1 Safety advice

Trained specialist personnel may only carry out work included within the framework of maintenance.
Carry out the maintenance work within the specified time and document this. The machine will thank you for this by providing high reliability.

⚠WARNING	
	**Danger caused by electrical voltage and starting the machine during maintenance work.** **Mortal danger.**
	**Therefore, as a basic rule when carrying out maintenance work:** **Main switch to 0, safeguard using padlock and attach a warning sign.**

8.2 Maintenance plan

The tasks for maintenance work are described in detail in this chapter.

Maintenance work	**Oh = Operation hours**		
	Every 7 Oh	**Every 35 Oh**	**If necessary**
Check protective devices for proper functioning.	**x**		
Clean machine.			**x**
Check cutting knife mountings.	**x**		
Check the main bearings (bearing clearance, lubricant renewal).			**x**
Lubricant replacement, lubricant renewal	**See *Lubrication intervals:***		
Check "V"-belt tension force and "V"-belt condition.		**X**	
Check condition of cutting knives.	**x**		
Check all screws of the machine for a tight fit.		**X**	
Check wearing parts.		**X**	

Yearly maintenance

The purpose of yearly maintenance of the machine is primarily to check the general condition of the machine and to arrange for the supply of any necessary replacement parts in good time. A service engineer from ZERMA Machinery & Recycling technology can also carry this out on request.

8.3 Checking the protective devices

Check the safety devices for:

- Stipulated condition,
- Stipulated location,
- Safe mounting,
- Stipulated function.

⚠WARNING	
	**Danger due to non-functioning protective devices. Serious injury or death can result.** • **Eliminate all defects before you put the machine into operation!** • **If defects occur during operation, stop the machine immediately and eliminate the defects!** • **Do not change or remove any protective devices. Do not put any protective devices out of action by modifying them.**

8.4 Opening and closing the granulator

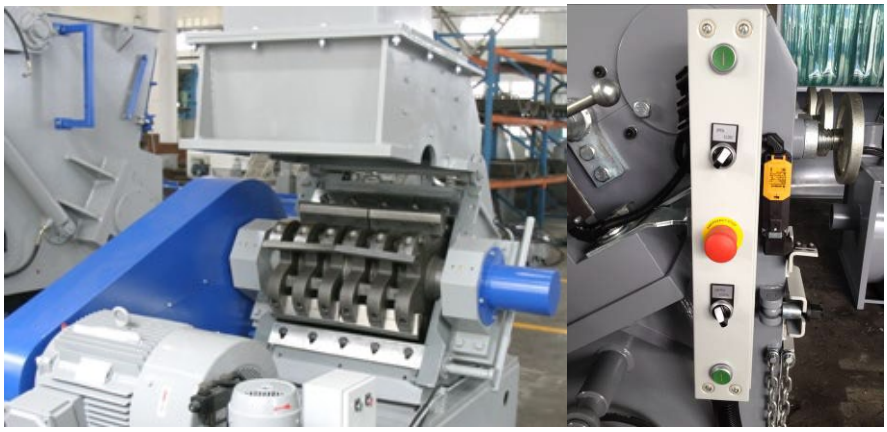
For some maintenance work it is necessary to open the granulator.

⚠WARNING	
	**Granulator upper section pivots downwards.** **Serious injury can result.** **Always open the granulator upper section completely.** **Intermediate positions are not allowed.** **Make sure when closing that no persons are in the danger area.**

8.4.1 Opening the granulator upper section

Proceed as follows:

- Switch off the granulator at the main switch
- Activate the key switch “MAINTANANCE”
- Activate the hydraulic via key switch on the control panel
- Rotate out the threaded spindle by hand and open the soundproof housing
  Open the bolts, which are connecting the lower with the upper section of the granulator.



- Open the hopper by using the hydraulic system, by pushing the start buttons of the 2 hand switch on the control arm. (Selector switch 1 at HOPPER and selector switch 2 at OPEN)

- Safeguard the hopper with the bar

8.4.2 Closing the granulator

Proceed as follows:

- Clean all surfaces between the granulator upper section and the granulator lower section with a hand brush as well as all contact surfaces on the screen.
- Check that there are no objects in the grinding chamber.
- Take off the safeguard bar
- Close the hopper slowly to ensure that all parts fit properly.
- Tighten the connecting bolts between the granulator lower section and the granulator upper section.
- Rotate the threaded spindle in completely.
- Switch of the maintenance mode
- Machine can be started again.

.

8.5 Cleaning the machine

⚠WARNING	
	**Danger of cutting caused by sharp cutting knives, even when the rotor is at a standstill.** **Serious injury, particularly to hands and fingers, can result.** **Wear protective gloves.**

Proceed as follows:

- Open granulator (see ***Error! Reference source not found.***).
- Remove the screen.
- Empty the screen.

⚠WARNING	
	**Inhalation of grinding dust which is dangerous to the health.** **This can result in injury to the respiratory tract.** **Never blow out the grinding material residue, use suction instead.** **Wear breathing protection if necessary.**

- Pre-clean the grinding chamber using a hand brush.
- Suck up the remaining grinding material residue using a suitable suction device.
- Remove clinging grinding material residue using a suitable wooden scraper.
- Put the screen into the screen support.
- Pivot the screen support into the working position using the hydraulic system and fasten with the mounting screws
- Close the granulator upper section (see *Closing the granulator*).
- Rotate in the threaded spindle completely
- Machine can be started again

8.6 Replacing the main bearings

The main bearings of the machine are dimensioned so that a bearing replacement is only necessary in exceptional cases. Dismounting and mounting of the bearings requires specialist knowledge and a careful working method. Therefore, in addition to the following advice, please observe the instructions given in the installation manual of the bearing manufacturer.

The bearings mounted in this machine are indicated in the spare parts list. A requirement for dismounting and mounting the bearings is a suitable pulling-off device.

8.6.1 Dismounting the main bearings

To dismount the bearings proceed as follows:

The parts which are marked with a piece number are illustrated in the drawings of the spare parts list!

- Dismount the "V"-belt cover.
- Dismount the "V"-belts (see

Hydraulic screen

🡻 *In order to* keep the throughput of the granulator and the quality of the grinding material constant, the condition of the screen must be checked regularly.

The screen may be damaged, dirty or not suitable for the grinding material:

- Screen holes too fine: overheating of the grinding material.
- Screen holes too course: parts in ground material which are too big.

Proceed as follows:

🡻 Switch off the granulator at the main switch, safeguard main switch using a padlock.
🡻 Switch off the granulator at the main switch
🡻 Activate the key switch “Maintenance”
🡻 Open the housing flap.
🡻 Unfasten the screen support mounting screws.

🡻 Pivot the screen support downwards, by pushing the start buttons of the 2 hand switch on the control arm. (Selector switch 1 at SCREEN and selector switch 2 at OPEN)
🡻 Remove the screen.
🡻 Put a new screen into the screen support.
🡻 Pivot the screen support into the working position, by pushing the start buttons of the 2 hand switch on the control arm. (Selector switch 1 at SCREEN and selector switch 2 at CLOSE)
🡻 Fasten the screen support by using the mounting screws.
🡻 Close the housing flap.
🡻 Deactivate the key switch “DOOR OPEN”
🡻 Granulator can be started again.

- Work on the "V"-belts).
- Loosen the tensioning element (Pos.) for the "V"-belt pulley (see*, Mounting and dismounting TAPER-LOCK tensioning element).*
- Pull the "V"-belt pulley (Pos.) off the rotor axis, do not tip up. Use suitable lifting and stopping means.
- Pull the distance sleeve (Pos.) off the rotor axis.
- If the granulator is equipped with a disk fly wheel, dismount this in the same way as the "V"-belt pulley.
- Open the granulator upper section (see ***Error! Reference source not found.***).
- Dismount the cutting knives (see *Dismounting the cutting knives*).
- Unscrew the bearing housing (Pos.) from the granulator lower section.
- Carefully lift out the complete rotor using suitable lifting and stopping means.
- Lay the rotor down in a safe location. Suitable for this are timber beams of appropriate size.
- Loose the bearings cover mounting screws and take off the bearing cover.
- Pull the bearing housing (Pos.) off with a pulling-off device.
- Pull the bearing (Pos.) off the rotor axis using a pulling-off device.

8.6.2 Mounting the main bearing

To mount the bearings proceed as follows:

- Before mounting, clean the bearing surfaces and the shaft surfaces thoroughly and grease lightly.
- Mount bearing in bearing housing.
- Attach the bearing with the bearing housing to the rotor axis.

HINT

- **During mounting, the mounting forces must always engage into the inner ring, otherwise the roller bodies will be damaged.**
- **The hardened bearing rings are sensitive to impact stress. For this reason, never hit directly on the rings with the hammer, use instead preferably a brass arbor or better still a striking bush (piping piece) made from a soft material. The inner diameter of the striking bush should be only slightly larger than the diameter of the bearing base.**
- **The bearing is then pushed onto the shaft using light blows. When doing this, the force of pressure must be evenly distributed on the circumference of the bearing ring.**
- **If the plummer block is also replaced, the rotor must be readjusted to the centre of the granulator.**

- Lift the rotor using suitable lifting and stopping equipment and put carefully into the receptacle of the granulator lower section.
- Attach the bearing housing (Pos.) to the granulator lower section using screws.
- Mount the cutting knives.
- Close the granulator upper section (see *Closing the granulator*).
- If the granulator is equipped with a disk flywheel:
  - Push the disk flywheel onto the rotor axis and tighten using the tensioning element.
  - Push the distance sleeve (Pos.) onto the rotor axis.
- Mount the "V"-belt pulley and tighten using the tensioning element. (see*, Mounting and dismounting TAPER-LOCK tensioning element*).
- Pull on "V"-belts and adjust the "V"-belt tension force (see *Retensioning and relaxing the* "V"-belt).
- Attach the "V"-belt cover.
- Carry out a test run.

8.7 Lubricating the main bearings

An important requirement for high operational safety and long service life of the arrangement of bearings is the correct lubricant supply. Every ZERMA machine is greased and checked in test runs before delivery.

HINT

Unsuitable lubricant, lubricant deficiency, excessive lubrication or impurities in the lubricant lead to overheating and thus extreme wear of the bearings.

8.7.1 Lubrication intervals:

Shift operation	Replace lubricant	Check
One shift operation:	every 18 months	monthly
Two shift operation:	every 9 months	monthly
Three shift operation:	every 6 months	monthly

8.7.2 Check lubricant quality

You can judge whether the lubricant needs to be replaced by checking for the following features:

- change in consistency,
- discolouration,
- degree of soiling.

8.7.3 Replacing or refilling lubricant

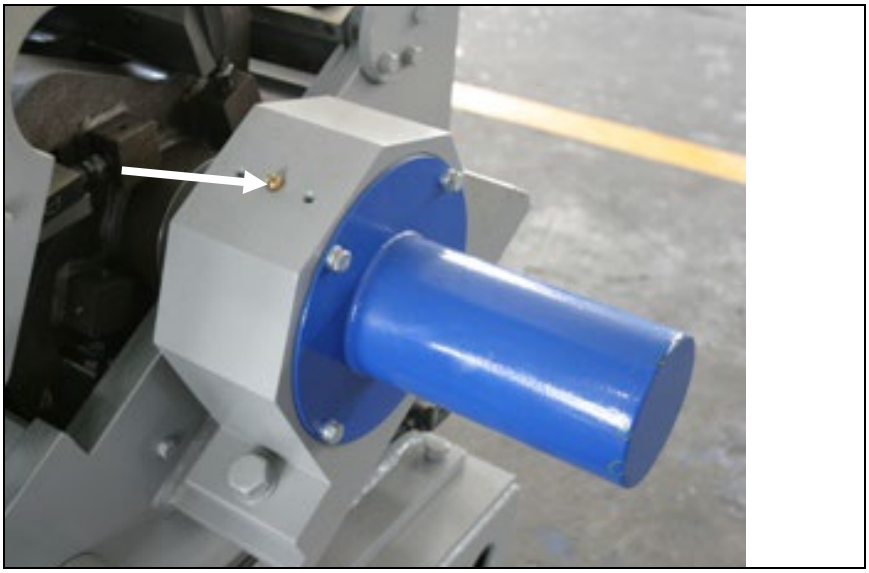
HINT

- **Fill the bearings uniformly with grease, so that all operating surfaces are well greased.**
- **For the rotor bearings, a lubricant quantity of one third to a maximum of half of the bearing volume per bearing is required. If too much grease is filled in, the lubricant will become unusable as a result of excessive temperature.**
- **Only one type of grease may be used, mixing different types of grease is not allowed. The bearings have been filled at the factory with lithium base saponification roller bearing grease F3.**
- **To find out which lubricants from which manufacturers you can use, look in the *List of lubricants*.**

Refilling lubricant

The grease reaches through the circulating grooves and bores via lubrication nipples into the interior of the bearing.
The greasing quantity is 60 to 100 g roller bearing grease F3 per bearing.

Illustration:
Grease nipple



Replacing lubricant

Only in the case of unusual bearing noises or overheating is it also necessary to renew the lubricant between the specified intervals.
Mounting and dismounting of the bearings is to be carried out in accordance with the instructions in this operation manual (see *Replacing the main bearing*).

- Open the bearing.
- Remove the bearing casing and the bearing cover.
- Clean the bearing carefully using petroleum ether.
  Petroleum ether, petroleum, spirit, aqueous neutral or alkaline cleaning agents may be used to clean the bearings. After washing out, the bearing must immediately be preserved using lubricant, in order to avoid corrosion.
- Fill bearing with approved lubricant (see *List of lubricants*).

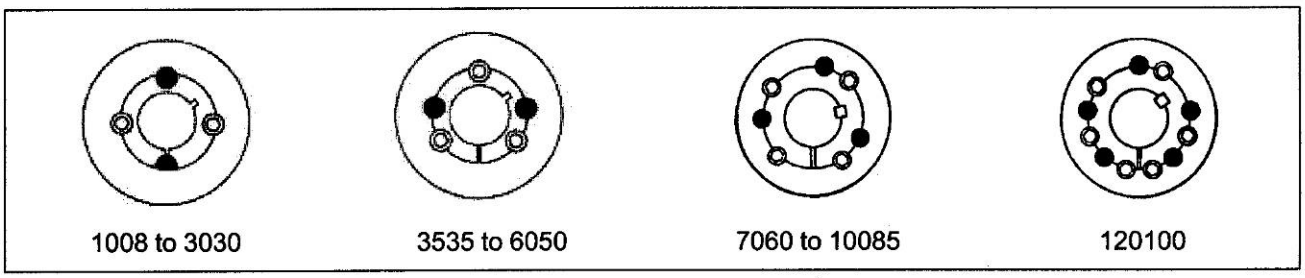
8.7.4 List of lubricants

Country of manufacture / manufacturer	Roller bearing grease
ARAL	ARAL Grease HL 3
BP	BP ENERGREASE LS 3
CASTROL	CASTROL SPHEEROL AP 3
ESSO	Beacon 3
FUCHS	FUCHS Grease 1200 FUCHS Grease FWA 220
SHELL	SHELL Alvania Grease 3
MOBIL-OIL	MOBILUX 3
WISURA	WISURA Liba L 3
Zeller & Gmelin	ZET GE Grease M 50
FAG	FAG L 71
ANTAR Petroles de l'Antlantique	ROLEXA
Holland, Beverol	Beverol Multi Purpose Grease
Italy, Agip	AGIP Grease 33 FD
Swede, NYNÄS	Nynäs FI 3-42

8.8 Mounting and dismounting TAPER-LOCK tensioning element

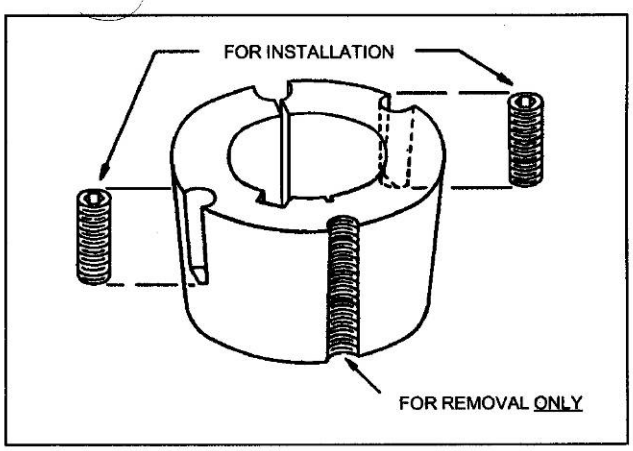
The motor-"V"-belt pulley is attached onto the shaft by means of a TAPER-LOCK tensioning element. The disks must be dismounted for certain maintenance work.

IMPORTANT: Follow all instructions in this manual carefully. This is necessary to insure satisfactory performance.



To Install:

1. Clean shaft, bore, and outside of bushing, and bore of hub (taking bushing from hub if already assembled). Remove any oil, lacquer, or dirt. Place bushing in hub and match half holes to make complete holes (each complete hole will be threaded on one side only).
2. Oil thread and point of set screws or thread and under head of cap screws. Place screws loosely in holes that are threaded on hub side (shown thus ◎ in diagram).
3. Make sure bushing is free in hub. Slip assembly onto shaft and locate in position desired.
4. Tighten screws (see note*) alternately and evenly until all are pulled up very tightly. Use a piece of pipe on wrench to increase leverage. (See table for wrench torque on reverse side.)
5. Hammer against large end of bushing using hammer and block or sleeve to avoid damage. Screws can now be turned a little more using the specified wrench torque. Repeat this alternate hammering and screw re-tightening until the specified wrench torque no longer turns the screws after hammering.
6. After drive has ben running under load for a short time stop and check tightness of screws. Fill other holes with grease to exclude dirt.



To Remove:

1. Remove all screws. Oil thread and point of set screws or thread and under head of cap screws.
2. Insert screws in holds that are threaded on bushing side (shown thus • in diagram). In sizes where washers are found under screw heads, be sure to use these washers. Note that one screw in each hub is left over and is not used in this loosening operation.
3. Tighten screws alternately until bushing is loosened in hub. If bushing does not loosen immediately, tap on hub.

8.8.1 Table for the tightening torque of the screws

Tensioning element (Type)	Screws-Tightening torque in Nm	Screw details	
		Number	Size (BSW)
1008	5,6	2	1/4"
1108	5,6	2	1/4"
1310	20	2	3/8"
1315	20	2	3/8"
1210	20	2	3/8"
1215	20	2	3/8"
1610	20	2	3/8"
1615	20	2	3/8"
2012	31	2	7/16"
2017	31	2	7/16"
2517	48	2	1/16"
2525	48	2	1/16"
3020	90	2	5/8"
3030	90	2	5/8"
3535	60	3	1/2"
4040	102	3	5/8"
4545	155	3	3/4"
5050	185	3	7/8"

8.8.2 Mounting the TAPER-LOCK tensioning element

Proceed as follows:

- Remove the protective coating from the bore and outside of bush, and bore of hub. After ensuring that the mating tapered surfaces are completely clean and free from oil or dirt. Insert bush in hub so that holes line up.
- Sparingly oil thread and point of grub screws, or thread and under head on cap screws. Place screws loosely in holes threaded in hub, shown thus ◎ in.
- Clean shaft and fit hub to shaft as one unit and locate in position desired, remembering that bush will hip the shaft first and then will be slighting drawn on the bush.
- Using a hexagon wrench tighten screws gradually and alternately to certain torque.
- Hammer against large-end of bush, using a block or sleeve to prevent damage.(This will ensure that the bush is seated squarely in the bore). Screws will now turn a little more. Repeat this alternate hammering and screw tightening once or twice to achieve maximum grip on the shaft.

- If a key is to be fitted place it in the shaft keyway before fitting the bush. It is essential that it is a parallel key and side fitting only and has TOP CLEARANCE.
- After drive has been running under load for a short time stop and check tightness of screws.
- Fill empty holes with grease to exclude dirt.

8.8.3 Dismounting the TAPER-LOCK tensioning element

Proceed as follows:

- Slacken all screws by several turns, remove one or two according to number of jacking off holes shown thus • in the illustration. Insert screws in jacking off holes after oiling thread and point of grub screws or thread and under head of cap screws.
- Tighten screws alternately until bush is loosened in hub and assembly is free on the shaft.
- Remove assembly from shaft.

8.9 Replacing the screen

8.9.1 Manual screen

In order to keep the throughput of the granulator and the quality of the grinding material constant, the condition of the screen must be checked regularly.

The screen may be damaged, dirty or not suitable for the grinding material:

- Screen holes too fine: overheating of the grinding material.
- Screen holes too course: parts in ground material which are too big.

Proceed as follows:

- Switch off the granulator at the main switch, safeguard main switch using a padlock.
- Rotate out the threaded spindle by hand.
- Open the housing flap.
- Unfasten the screen support mounting screws while holding the screen support lever.

- Pivot the screen support downwards.
- Remove the screen.
- Put a new screen into the screen support.
- Pivot the screen support into the working position and fasten using the mounting screws.
- Close the housing flap.
- Rotate the threaded spindle in completely by hand.
- Granulator can be started again.

8.9.2 Hydraulic screen

In order to keep the throughput of the granulator and the quality of the grinding material constant, the condition of the screen must be checked regularly.

The screen may be damaged, dirty or not suitable for the grinding material:

- Screen holes too fine: overheating of the grinding material.
- Screen holes too course: parts in ground material which are too big.

Proceed as follows:

- Switch off the granulator at the main switch, safeguard main switch using a padlock.
- Switch off the granulator at the main switch
- Activate the key switch “Maintenance”
- Open the housing flap.
- Unfasten the screen support mounting screws.

- Pivot the screen support downwards, by pushing the start buttons of the 2 hand switch on the control arm. (Selector switch 1 at SCREEN and selector switch 2 at OPEN)
- Remove the screen.
- Put a new screen into the screen support.
- Pivot the screen support into the working position, by pushing the start buttons of the 2 hand switch on the control arm. (Selector switch 1 at SCREEN and selector switch 2 at CLOSE)
- Fasten the screen support by using the mounting screws.
- Close the housing flap.
- Deactivate the key switch “DOOR OPEN”
- Granulator can be started again.

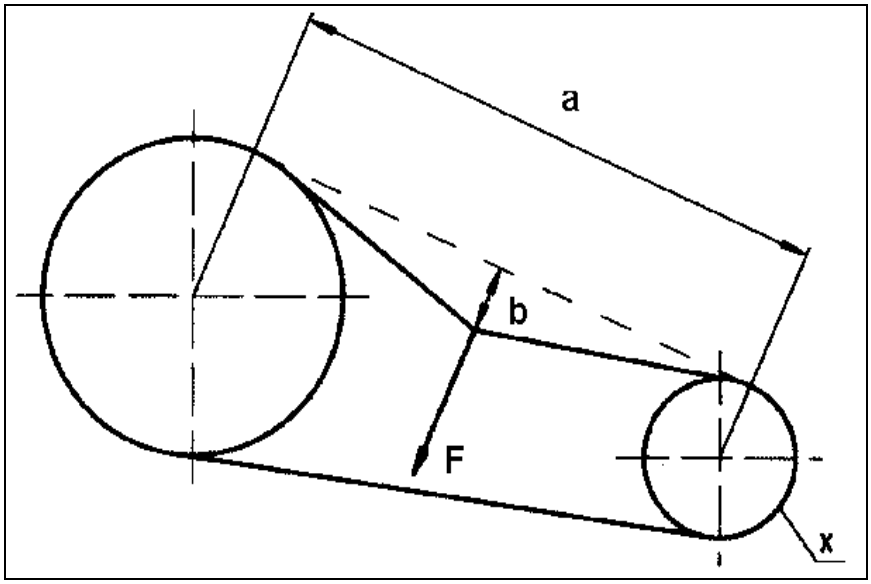
8.10 Work on the "V"-belts

"V"-belts are wearing parts, which stretch and must be retensioned. In order to guarantee a long service life of the "V"-belts, regular checks on the tension force of the "V"-belts and the condition of the "V"-belts are necessary.

8.10.1 Checking the tension force of the "V"-belt

Illustration:

a: Distance between roller centres
b: Sag
F: Force(direction)



- Remove the "V"-belt cover.
- Measure the distance between the roller centres.
- Determine the belt sag force F for each belt at 16 mm sag if sag "b" is equal to 1 m distance between roller centres. Do this by measuring at the middle of the distance between roller centres at a right angle to the "V"-belt.

		Force required for 1 m distance between roller centres and 16 mm sag	
Profile section	**Efficiency of x in mm**	**P in Newton**	**P in lbs**
SPA	100 - 132	20 - 27	4,4 - 5,9
SPA	140 - 200	27 - 35	5,9 - 7,7
SPB	160 - 224	35 - 50	7,7 - 11
SPB	236 - 315	50 -65	11 - 14,3
SPC	224 - 355	60 - 90	13,2 - 19,8
SPC	375 - 560	90 - 120	19,8 - 26,4
XPB	224 - 250	25 - 35	5,5 - 7,7

- Compare determined value with the value in the above table.

If the value lies below the lowest tolerance limit, the "V"-belt must be retensioned. If the value lies above the highest tolerance limit, the "V"-belt must be relaxed.

8.10.2 Retensioning and relaxing the "V"-belt

Enlarging or decreasing the centre distance “A” into which the drive motor is shifted carries out tensioning or relaxing the “V” -belt.

Proceed as follows:

- Loosen the tensioning screw.
- Shift the drive motor as required onto the sliding rails.
- Lock the drive motor into new position using both tensioning screws in such a way that the motor shaft is parallel to the rotor axis and aligned.
- Check the tension force of the "V"-belt (see *Checking the tension force of the "V"-belt*).
- Mount the "V"-belt cover.

8.10.3 Checking "V"-belt condition, replacing "V"-belt

⚠CAUTION	
	**Danger of pulling into machine caused by running "V"-belts.** **Hair, jewellery etc. can be pulled into the machine. Serious injury can result.** **Never dismount the "V"-belt cover and window during operation.**

If a "V"-belt is porous or ripped, it must be replaced as follows:

- Remove the "V"-belt cover.
- Loosen the front and rear tensioning screw.
- Relax the "V"-belt by shifting the drive motor.
- Put new "V"-belt in.
- Tension the "V"-belt (see *Retensioning and relaxing the "V"-belt*).
- Mount the "V"-belt cover.

8.11 Working on the cutting knives

In the case of granulators, the correct grinding properties, correct setting and mounting of the cutting knives are important factors to ensure perfect functioning and economic operation of the machine.

8.11.1 Replacing and checking the cutting knife mountings

Due to their function, certain machine parts are subject to stress in their operating state as a result of vibrations, which can lead to loosening of the screw connections. Therefore, it is absolutely necessary to check the cutting knife mounting screws in accordance with the *Maintenance plan*.

➧ Tighten the mounting screws on the cutting knives using a torque wrench which is set to the required torque for the screw size.
The required torque for the knife fixing bolts is 580 Nm.

You can find out the required torque from the following table. Take note too that the tightening capacity decreases of screws which have been loosened and tightened again several times.
New screws of the same material quality must therefore replace the cutting knife mounting screws after they have been loosened and tightened several times.

Torque:

Bolt type	Grade 8.8		Grade 10.9		Grade 12.9	
	Nm	lbf ft	Nm	lbf ft	Nm	lbf ft
M8	25	18.4	35	25.8	41	30.2
M10	49	36.1	69	50.9	83	61.2
M12	86	63.4	120	88.5	145	106
M16	210	154	295	217	355	261
M20	410	302	580	428	690	508
M24	710	523	1000	737	1200	885

8.11.2 Checking the condition of the cutting knives

⚠WARNING	
	**Danger of cutting caused by sharp knives, even when the rotor is at a standstill.** **Serious injury, particularly to hands and fingers, can result.** **Wear protective gloves.**

The cutting knives become blunt after a certain number of operation hours. Therefore they should be checked regularly.

Using blunt knives has the following consequences:

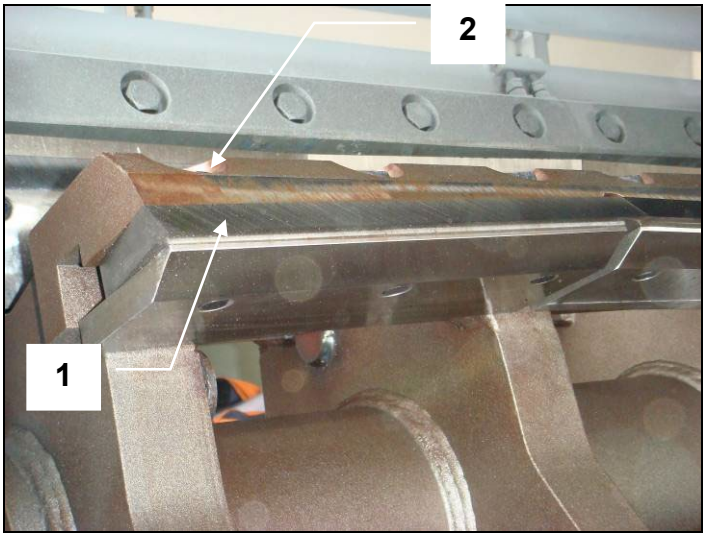
- Decreased grinding capacity.
- Increased current consumption of the drive motor.
- Inexact cut.
- Overheating of the ground material.

8.11.3 Dismounting the cutting knives

⚠WARNING	
	**Danger of cutting caused by sharp knives, even when the rotor is at a standstill.** **Serious injury, particularly to hands and fingers, can result.** **Wear protective gloves.**

Proceed as follows:

Illustration:
(1) Rotor knife
(2) Knife mounting screws



- Open the granulator (see ***Error! Reference source not found.***).
- Safeguard the rotor against torsion. To do this, clamp a suitable timber beam between the rotor (inside of two rows of knives) and granulator housing.
- Loosen the knife mounting screws.
- Take out the knife capping and knives.

8.11.4 Mounting the cutting knives

⚠WARNING

Danger of cutting caused by sharp knives, even when the rotor is at a standstill.
Serious injury, particularly to hands and fingers, can result.
Wear protective gloves.

HINT

The cutting knives, in particular the rotor knives, should only be sharpened or replaced in sets. There is a danger of balance error if a combination of rotor knives from different knife sets is used.

Proceed as follows:

- Clean the knife supporting surface and threaded holes.
- Insert sharp and preset knives and push against the setting surface.
- If locking screws for the cutting knives are provided, these must be adjusted so that they fit against the front edge of the steel rail when inserting the cutting knives. This happens during presetting in the knife setting calibre.
- Put on the knife capping.
- Screw in the mounting screws and tighten using a torque wrench.

  The required torque for all knife mounting bolts is 580 Nm (also see the table under *Replacing and checking the cutting knife mountings)*.
- **Check whether the cutting gap is correct and whether the cutting knives do not collide as the rotor turns.**

TIP

Stator knives from ZERMA have two symmetrical cutting edges.
This makes it possible to turn the knives and only to sharpen after every second knife change.

- Remove tools and other objects from the grinding chamber.
- Close the granulator upper section (see *Closing the granulator*).
- Switch on the granulator for a short time without grinding material and listen for noises. If you hear unusual noises, determine the cause and eliminate it.

8.11.5 Sharpening cutting knives

TIP

Specialist sharpening of the cutting knives is part of the service offer of ZERMA.

⚠WARNING

Danger of cutting caused by sharp knives, even when the rotor is at a standstill.
Serious injury, particularly to hands and fingers, can result.
Wear protective gloves.

HINT

The cutting knives, in particular the rotor knives, should only be sharpened or replaced in sets. There is a danger of balance error if a combination of rotor knives from different knife sets is used.

Proceed as follows:

- Dismount the cutting knives (see *Dismounting the cutting knives*).
- Sharpen the cutting knives.
  A specialist in accordance with the sharpening plan using particular care should uniformly sharpen the cutting knives mechanically. It is important to make sure that sharpening takes place with small grinding allowance and sufficient coolant supply. The sharpening process is finished when the cutting edge is sharply cut. Not all indentations must be ground out, otherwise the number of possibilities for sharpening is unnecessarily reduced. For the sharpening process, use soft grinding wheels (Quality 40 H or 46 K). Knives, which have grinding cracks, are not to be reused due to danger of breakage during operation.
- Whet the cutting edges of the cutting knives using a whetstone.
  By taking these measures, the service life of the cutting knives can be increased.
- Set the cutting knives (see *mounting the cutting knives*).
- Mount the cutting knives (see *mounting the cutting knives*).

Illustration: *Resharpening plan rotor knife*

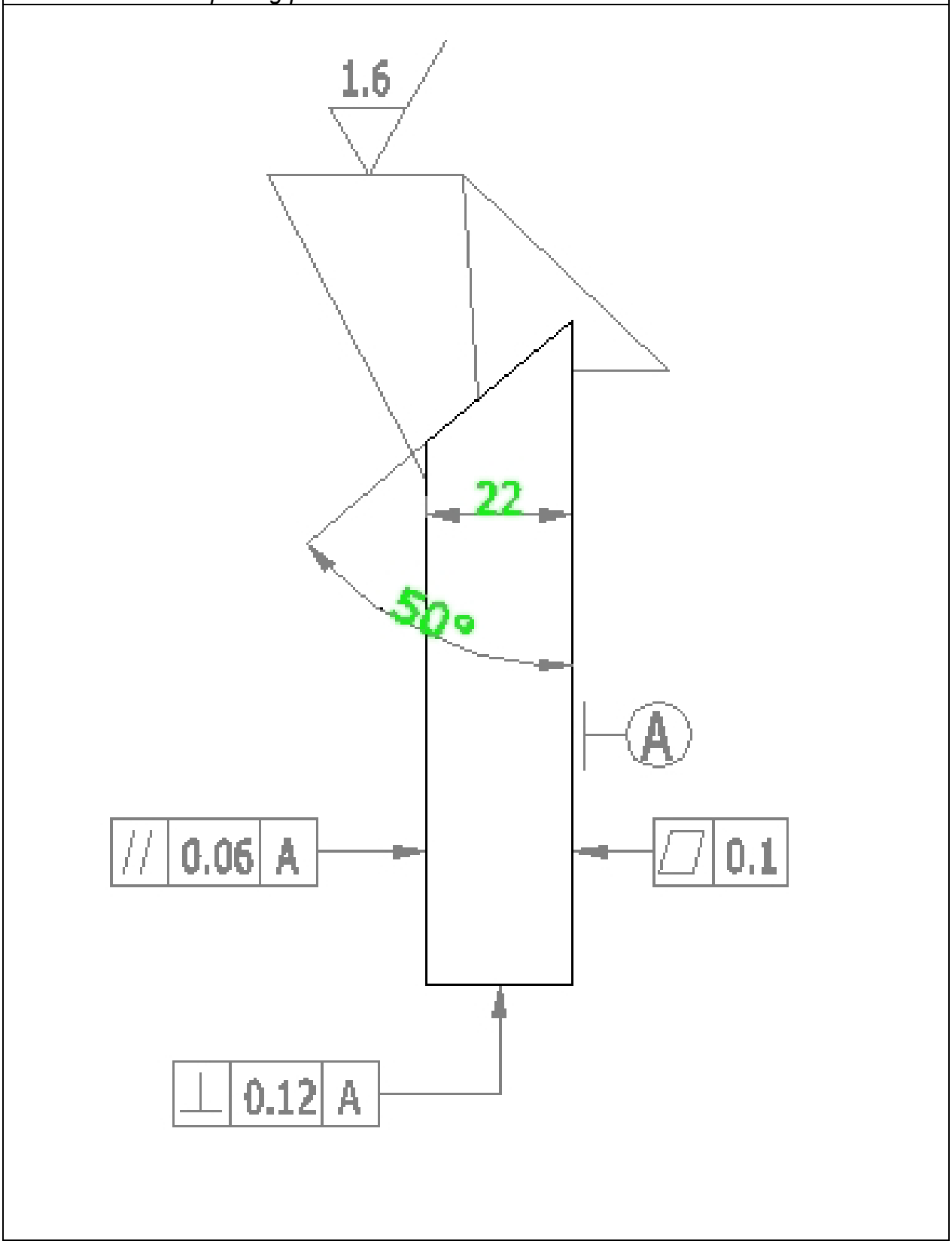
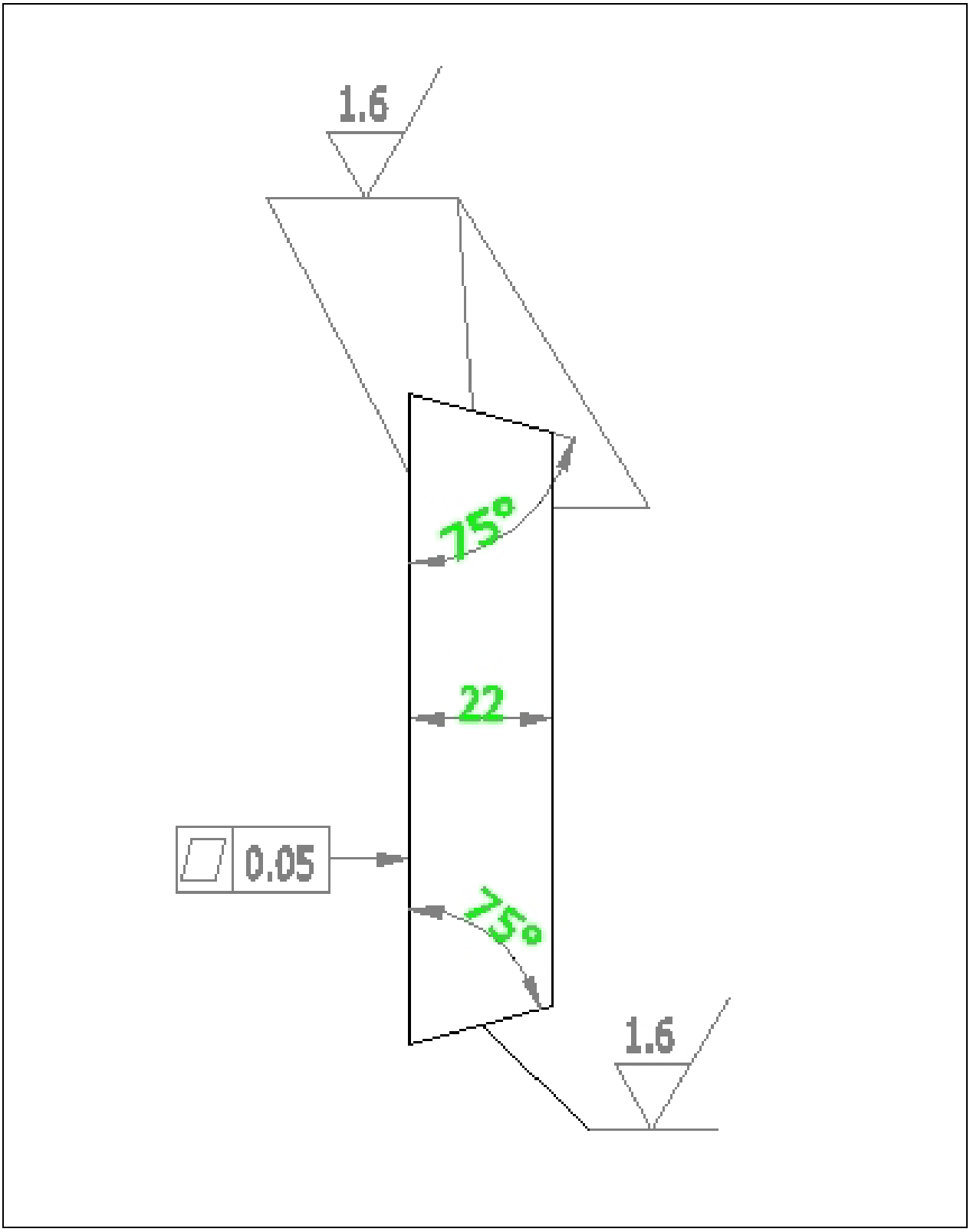


Illustration: *Resharpening plan stator knife*



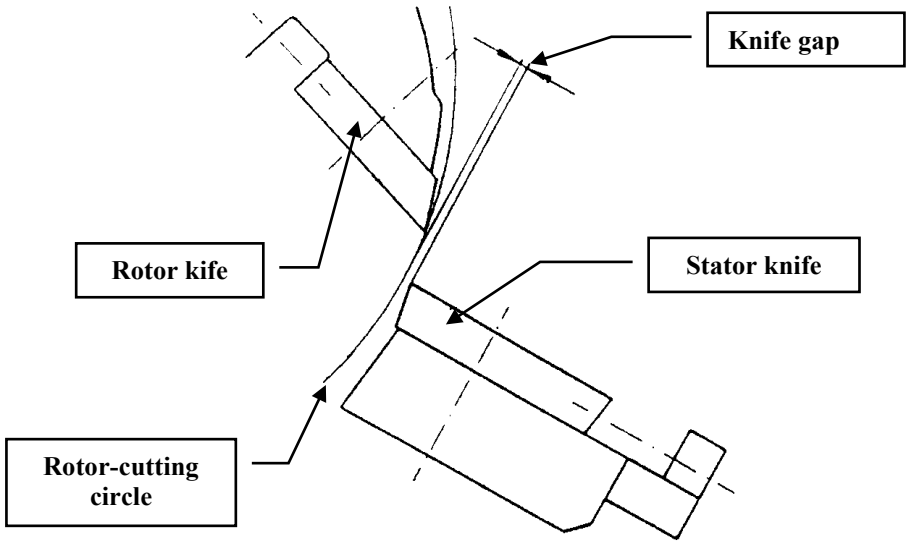
8.11.6 Setting the cutting knives

⚠WARNING

Danger of cutting caused by sharp cutting knives.
Serious injury, in particular to hands and fingers, can result.
Wear protective gloves.

To simplify knife setting and shorten standstill periods when replacing the knives, a knife setting device is delivered together with rotors with adjustable knives.
Knife setting can be carried out easily outside the machine using this setting device. If you have several knife sets, you will also avoid standstill periods of the machine.
Correct and careful setting of the gap between the rotor knives and the bed knives (cutting gap) is an important requirement for the productive capacity of the granulator.
Factors for the size of the knife gap are the size of the rotor, the design of the rotor and the material to be ground.
The cutting gap is set using the knife gap of the rotor knives in the knife-setting device.

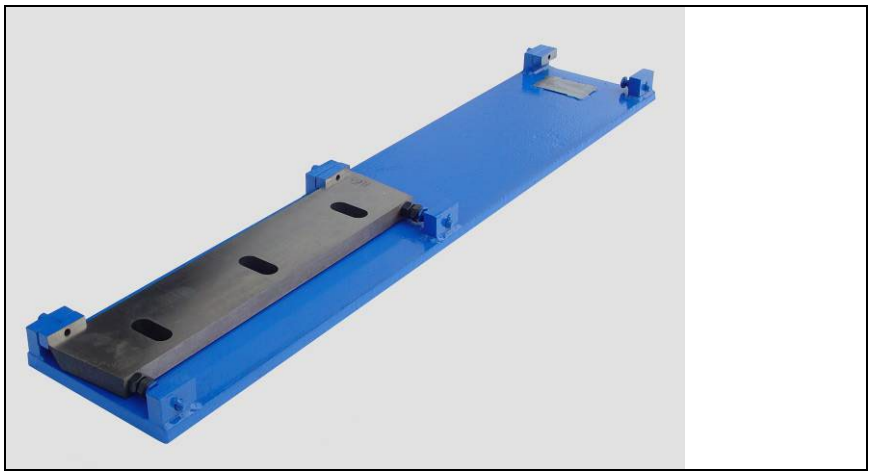
Illustration: *Cutting gap*

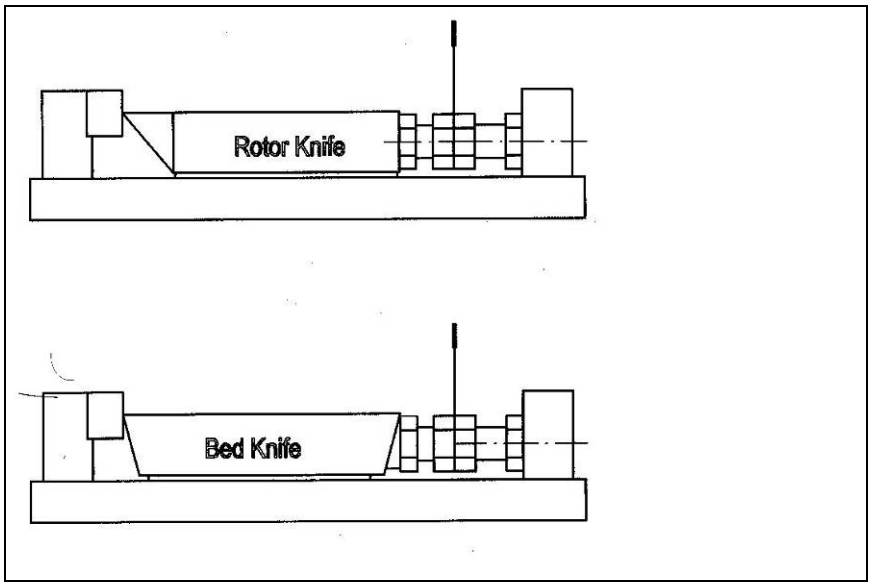


For setting the rotor knives, proceed as follows:

Illustration:

Knife setting device





- Insert the knives into the knife setting device as shown.
- Select the guide calibre appropriate for the size of the knife gap from the delivered guide calibre set.
  The guide calibres are marked with numbers, which when divided by 100, give the thickness in mm.

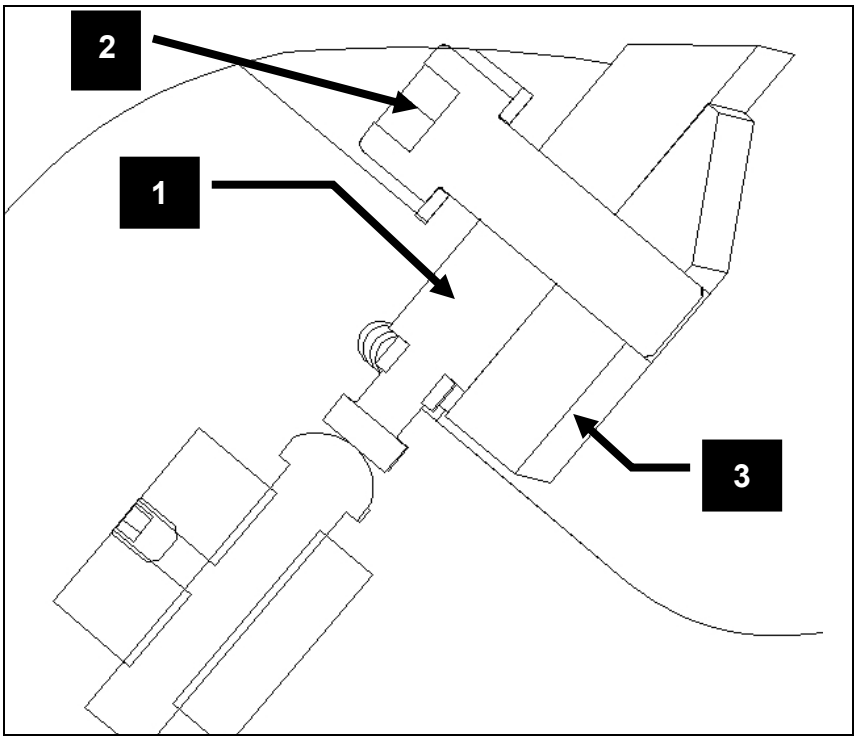
Further procedure for each setting screw:

- Push the guide calibre between the stopper of the knife setting device and the setting screw of the cutting knife.
  Doing this, the knife edge must lie against the stopper.
- Unscrew the setting screw of the knife so far that the feeler gage is gently squeezed.
- Tighten the counter nut.
- Set all the setting screws as described.
  Check the knife gap at the end of setting and correct if required.

Recommended knife gap: 0,3mm

Illustration:

(1) Rotor knife
(2) Knife fixing bolt
(3) Cover plate



HINT

In operating state, the granulator heats up and expands unevenly. Therefore, if the knife gap is too small this can lead to machine damage caused by the knives colliding.

8.11.7 Transporting and storing the cutting knives

⚠WARNING	
	**Danger of cutting caused by sharp cutting knives.** **Serious injury, in particular to hands and fingers, can result.** **Only transport and store the cutting knives packaged.** **Grease the cutting knives well, so that they do not rust. Protect the cutting edges with doubled cardboard and use adhesive tape to safeguard the knives against slipping out of the sides of the sheath.** **After unpacking, you must degrease the cutting knives so that they can be gripped safely.**

9 TROUBLESHOOTING

9.1 Machine blocks or switches itself off

No.	Possible causes	Remedy required
9.1.1	Too much feed material.	Reduce grinding material in feed.
9.1.2	Screen blocked.	Clean screen, check condition, if necessary select larger screen perforation.
9.1.3	"V"-belts slip.	Check "V"-belt tension and condition and retighten if necessary or replace.
9.1.4	Knife condition.	Check knives and resharpen or replace if needed.
9.1.5	Cutting gap.	Check cutting gap and set according to the instructions in this operation manual.
9.1.6	Suction trough blocked.	Change in rotational direction of blower needed. Replace fan blades if necessary. Open the air regulating flap on the suction trough as far as necessary. Check discharge air flow from cyclone for blockages.
9.1.7	Current failure.	Check limit switch for defective contact. Check electrical connection, if necessary tighten limit switch.
9.1.8	Fuse too small.	Fit larger fuse. **Only after consulting the service department of ZERMA.**
9.1.9	Frequent peak loads.	Install disk flywheel.
9.1.10	Rotational direction of rotor.	Check motor and reverse polarity if necessary.
9.1.11	Rotor speed.	Change rotor speed. **Only after consulting the service department of ZERMA.**
9.1.12	Bed knives mounted mirror inverted.	Knife tip must protrude in direction of rotation.

9.2 Rotor does not grip bulky material

No.	Possible causes	Remedy required
9.2.1	Knife condition.	Check and sharpen if needed according to the instructions in this operation manual.
9.2.2	Protruding bed knife.	Chamfer bed knives, consult with service department of ZERMA.

9.3 Overheating of the grinding material

No.	Possible causes	Remedy required
9.3.1	See 9.1.1 to 9.1.5. See 9.1.11 and 9.1.12.	See 9.1.1 to 9.1.5. See 9.1.11 and 9.1.12.
9.3.2	Screen perforation too small.	Insert a screen with larger perforation.
9.3.3	Knives wrongly sharpened.	Modify knife finish. **Only after consulting the service department of ZERMA.**
9.3.4	Suction air.	Close air-regulating flap on suction trough step by step.
9.3.5	Material rubs against the housing wall.	Fit anti-winding device.
9.3.6	Insufficient cooling.	Fit water-spraying device, increase air intake (larger suction fan).
9.3.7	Suction fan rotates in wrong direction.	Check connection, if required reverse polarity.

9.4 Unusual vibrations

No.	Possible causes	Remedy required
9.4.1	Rotor out of balance.	Weigh knives, balance rotor.
9.4.2	Bearing damage.	Check bearings, replace bearings if necessary.
9.4.3	Mounting pads defective (vibration elements).	Check mounting pads and renew these if necessary.

9.5 Extreme cutter wear

No.	Possible causes	Remedy required
9.5.1	Bearing damage.	Check bearings, replace bearings if necessary.
9.5.2	Knife finish.	Check knife and sharpen or replace if necessary.
9.5.3	Wrong cutting angle.	Modify cutting angle after consulting ZERMA service department.
9.5.4	Wrong cutting angle.	Check cutting gap and set according to the instructions in this operation manual.
9.5.5	Foreign matter.	Fit feed device with a metal detector.

9.6 Bearings too hot

No.	Possible causes	Remedy required
9.6.1	Too much grease in bearing.	Reduce amount of grease.
9.6.2	"V"-belts too tight.	Reduce tension.
9.6.3	Rubbing on housing sealing ring.	Check sealing ring, oil or replace.
9.6.4	Bearing damage.	Check bearings, replace if necessary.
9.6.5	No grease in bearing.	Lubricate bearing.

9.7 Too many fines in grinding material

No.	Possible causes	Remedy required
9.7.1	Type of material.	Fit fines separator under cyclone.
9.7.2	Screen worn.	Renew screen, possibly using manganese steel.
9.7.3	Unsuitable screen perforation.	Replace screen after consulting ZERMA service department.
9.7.4	Suction unit too weak.	Change rotor speed. **Only after consulting the service department of ZERMA.**

9.8 Cutting gap alters during operation

No.	Possible causes	Remedy required
9.8.1	Knife mounting screws not tight.	Retighten using torque wrench in accordance with table in operation manual.
9.8.2	Screw fatigue.	Fit new screws.
9.8.3	Cover disks or plate deformed.	Insert new cover disks or plate.
9.8.4	Supporting surfaces not clean.	Clean and de-rust supporting surfaces.
9.8.5	Threads in housing worn.	Fit new bushes in housing.

9.9 Screen damage

No.	Possible causes	Remedy required
9.9.1	Screen inserted wrongly.	Fit screen correctly.
9.9.2	Screen support buckled.	Replace screen support.

9.10 Granulator does not start

No.	Possible causes	Remedy required
9.10.1	Limit switches not activated.	Check position of limit switch and correct.
9.10.2	Main and control fuses.	Replace fuse.
9.10.3	Feed device not connected.	Switch on in sequence.
9.10.4	Residue material in granulator.	Empty granulator before switching on.
9.10.5	Star delta connection.	Correct wiring on motor.
9.10.6	Motor protection switches off.	Check motor relay for correct setting and increase if necessary.
9.10.7	Star delta time relay.	Correct time.

9.11 Granulator blocks when under load

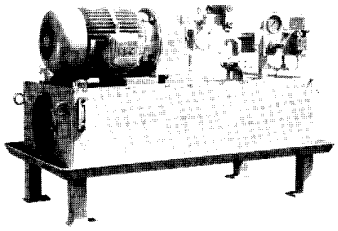
No.	Possible causes	Remedy required
9.11.1	Feed starts too early.	Start feed only after switch over from star to delta.
9.11.2	Limit switch loose or wrongly set.	Reposition and tighten limit switch.
9.11.3	Fuse defective.	Replace fuse. Fit larger fuse. **Only after consulting the service department of ZERMA GmbH.**
9.11.4	Motor fuse switches off - red indicator.	Reduce feed quantity of the grinding material, correct setting, replace fuse.

9.12 Frequent switching off of grinding material in feed device

No.	Possible causes	Remedy required
9.12.1	Current relay switches off.	Correct setting.

10 HYDRAULIC MAINTENANCE

Package systems installation and maintenance manual



This booklet is provided to help you to obtain long trouble free life from your new Vickers package system. These recommendations apply to most systems but it is very important that special instructions related to specific components are carefully followed.

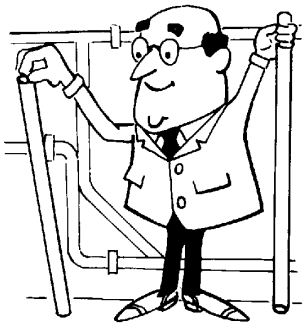
Installation

Your package system is provided with lifting points, but make sure that slings do not strain the pipework and never lift a system by the pipework, or the motor.

The location of the package system should be indicated on the machine layout, but make sure that there will be good access for maintenance when all adjacent equipment and pipework is finally installed. Pay particular attention to access for routine maintenance such as checking and maintaining fluid level, changing filter elements and, if a water cooler is fitted, leave enough room for the pipe fitter who has to instali the water pipes and control valves.

Try to keep your package system clean and in a well ventilated atmosphere. In difficult environments where it could be subjected to coolant spray, dirt or radiated heat, some special protection may be necessary, and be sure that mountings for the tank and pipework do not amplify noise.

When the package system is finally located in position make quite sure that it is on a level and firm foundation and that it is not distorted. Only use shims or wedges that cannot work loose.



Piping-up

The pipework connecting the package system to the machine actuators should be undertaken by skilled hydraulic pipe fitters. The piping and fittings used must be suitable for the pressure rating of the equipment and all pipework must be securely supported by properly designed mounting brackets which must not impose unnecessary stresses on the pipework.

Piping should be kept short and direct and unnecessary elbows and bends should be avoided. Always keep the numbers of fittings to a minimum as each fitting is a possible leak point. The length and size of all connecting pipes must be in line with the requirements specified on the circuit diagram. The use of pipes with too small a bore or which are longer than specified will create power losses which will detract from the efficiency of the system.

Preparation of pipes

It is most important that all pipework used in a hydraulic system is internally clean and completely free from rust or scale and tubing must not be welded or brazed after assembly. All piping must be accurately fitted so that it will not be necessary to spring it into place and all sharp edges and burrs must be removed from the ends of pipes. Threaded fittings should be inspected for cleanliness and when a tape or liquid sealant is used, the two end threads should be left bare. PTFE

tape is an excellent lubricant so be careful that fittings sealed with this material are not over-tightened, producing distortions of the unit into which they are fitted.

Always leave the temporary seals that we have provided in the ports of the package system until you are just ready to fit the appropriate pipework. This will help to keep the system clean.

Commissioning

Alignment

If you are fitting your own electric motor, make sure that the pump half of the coupling is a push fit on the pump shaft. Hammering or pressing it on to the shaft will damage the pump. When we have fitted the motor, the coupling will have been correctly aligned at our factory, but, unless the pump is mounted on a bell housing, this alignment could have been disturbed during transit so before running the system, check that the alignment is correct. For most couplings the alignment should be within 0.05 mm to 0.1 mm and this should be checked with all the pipework in position and tightened up.

Electric Supply

Check that the voltage and current specified on the electric motor and other electro-hydraulic components correspond with the supply.

Running the pump dry or turning the wrong way for more than a few seconds can severely damage the pump, so jog the motor for the shortest practical time to check the direction of rotation and correct it if necessary.

Accumulators

Before starting up a system, gas loaded accumulators must be precharged to the correct pressure, and their venting and isolating valves correctly set, as shown on the circuit diagram. Unless otherwise specified use nitrogen as the charging medium and adhere strictly to the manufacturers recommendations for methods of filling, mounting and servicing accumulators.

Filling the system

Cleanliness

Ensure that the system is thoroughly cleaned internally before filling it with oil. Examine the tank, the suction line strainer or filter, if one is fitted, and the suction line, especially between the filter and the pump inlet. Ensure that the tank cover and the air filter are mounted in such a way that unfiltered air cannot enter the hydraulic system. The cleaner a system is when it is put into service, the greater will be the life expectancy of the parts liable to wear.

The hydraulic fluid is the lifeblood of your system—treat it with the respect it deserves. Be sure that you have the correct fluid and that it is really clean. Dirt that you can see and feel can become completely invisible when it is mixed with oil, so do not be misled by the appearance of the fluid. Large particles of dirt can cause sudden and catastrophic failure but even very fine dust, too fine to be seen by the naked eye, may cause slow wear in pumps and erratic operation of valves. Do not take chances. No system ever failed because it was too clean.

When transferring fluid from the barrel to the system every possible precaution should be taken to prevent dirt entering the system. Start off by cleaning around the end of the barrel before removing the bung and then inspect the contents to see that it has not already been contaminated, by condensation for example. See that the tank filler entry and the equipment to be used for the fluid transfer are scrupulously clean. Wherever practical the transfer of fluid is best accomplished by using a portable pumping unit incorporating an efficient and fine filter. After filling make sure that the filler caps are correctly replaced.

Flushing the system

Flush all parts of the system thoroughly before putting the equipment on full load.

Ideally, flushing should be carried out with the same type of fluid that is going to be used when the system is in normal use and if possible a flushing pump should be used which will create fluid velocities higher than those which would normally be present in the system. In a newly built system, no matter how carefully constructed, most of the dirt will be in the pipework and during the process of flushing this out, temporary bridging loops must be used at the actuator ends, and sensitive valves should be replaced by bridging plates so that the contaminant is not flushed into these units. If it is possible, installing temporary filters in the bridging loops will help to speed up the flushing process.

If the package system pump has to be used for the flushing operation, make sure that it pumps only clean fluid and operates at low pressure. If a flushing fluid, compatible with the working fluid, has been used the majority of it must be drained from the system, but if the correct working fluid has been used for flushing, once the system is clean there is no need to change the fluid again as this could introduce additional contaminant into the tank. During flushing make sure that the clean-up filters are not by-passing and after flushing fit new filter elements, making sure that there is no dirty fluid left in the bottom of the filter bowl.

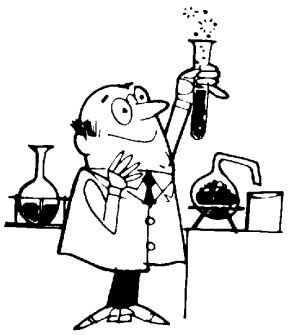
Fluid Level

When a system is first started the fluid level will fall as the pipework and actuators are filled up and the fluid should be replenished as soon as possible. Subsequently the fluid level should be checked at regular intervals, it should never be allowed to fall below the minimum level.

The hydraulic fluid

Hydraulic oil

High quality oil kept clean and operated within the recommended temperature range will give long trouble free life to your hydraulic equipment and any reputable oil producer will help you select the correct premium grade for your application.



These high quality hydraulic oils contain many additives but the most important is the anti wear additive which should

have a level of effectiveness equivalent to the SAE J183 classification SC, SD or SE (these new classifications supersede the API MS grade).

The viscosity of the oil will depend on the exact type of equipment and the starting and working temperatures but as a general guide the viscosity at working temperature should be between 13 and 55 centistrokes (70 to 250 SUS). More specific recommendations are given in Vickers leaflet B-920 .

Store your oil in a clean undercover environment preferably at a workshop temperature to avoid the formation of condensation.

Barrels should rest on their side to avoid collecting contamination on the barrel end.

Fire resistant fluids

If your package system has been designed to run on mineral oil it is unlikely that it will adapt to any fire resistant fluid without significant alteration.

Package systems designed for use on a specific type of fire resistant fluid will probably not be suitable for use on a different fluid and the fluids must not be mixed.

Water containing fluids will need careful and regular check on the percentage of water in the fluid.

If you intended to use a fire resistant fluid, obtain advice from your fluid supplier and the makers of the equipment to help you select the right grade, give advice on its compatibility with all your existing equipment and guidance regarding maintenance of the fluid.

It is good practice to fix a permanent instruction plate close to the reservoir filling point which gives clear directions for filling and maintaining the fluid level and which states the correct fluid to be used.

Starting-up

Prior to starting-up

1. Check the fluid level in the tank.
2. If there are shut off valves in the suction lines, check that these valves are fully open.
3. Fill the casings of all piston units with clean hydraulic fluid.
4. Make sure that the machine is safe to start and that personnel are clear of possible hazard areas.

Starting

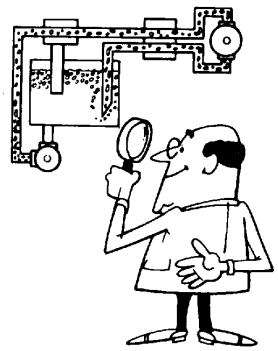
1. Jog start the electric motor and check that the direction of rotation is correct for the pumps.
2. If automatic air bleed is not fitted, loosen a joint in the pump discharge line or open bleed valves to facilitate pump priming and bleeding of air from the system.
3. Operate the system manually at low pressure to expel air. Bleed points should emit a steady stream of fluid free from bubbles.
4. Allow the system to run in for a period at low pressure. This will be a final cleansing operation before putting the pump on full load, providing that during the running in period fluid is flowing through the system filter.
5. Set pressure controls at the lowest possible setting compatible with satisfactory operation. On systems with compensated pumps and relief valves ensure that relief valves are set at least 10 bar above the compensator settings.
6. Re-check the fluid level in the tank.
7. When normal operating temperature is reached check all pipework couplings and fixing bolts and tighten where necessary. Some of the equipment on the packages system may have become slack during transport and handling.
8. When the system has been running for a short period check that the filters are still clean. If they are bypassing, change the elements. Once a system is properly cleaned the time between element changes will be greatly increased.
9. Record timings, temperature, pressure and any other information which will be required for future maintenance records.
10. After taking pressure readings it is good practice to shut off pressure gauge valves when the gauges read zero, to prolong the gauge life.

Trouble shooting

Excessive noise

In a new system the most likely cause of a noisy pump is the presence of air in the fluid. Aeration may be caused by:

1. The fluid level being too low.
2. Inadequate bleeding allowing air bubbles to circulate. Air is sometimes trapped in external suction line strainers.
3. Small air leaks into suction lines. Look first at the pipe joints, particularly if an external strainer is fitted.



A temporary check can be made by covering suspect joints with heavy grease.

4. During start-up, pockets of air will gradually be cleared from the system and will enter the tank as fine bubbles. These can usually be seen. Allow time for them to settle out.

Pump cavitation or starvation can also cause noise. The likely causes are:

1. The fluid is too viscous. This could be caused by the selection of the wrong viscosity grade or because the fluid temperature in the tanks is too low for a satisfactory start-up.
2. With water based fluids the viscosity can be adversely affected if the oil-to-water ratio is incorrect.
3. If inadequate precautions are taken during commissioning the suction strainers can easily become heavily contaminated – remove them and clean them and be sure you replace them properly.

Noise may also be caused by a misaligned or out-of-balance coupling, and loose coupling guards can produce a rattle that is sometimes difficult to trace.

Relief valves blowing continuously can cause unnecessary noise which can be due to incorrect setting.

Lack of pressure

1. Re-check the direction of rotation of the pump.
2. Check that the pump has been correctly primed and that the relief or pump compensator settings are correct.
3. A pump can only generate pressure if there is a resistance to its output flow. Many systems contain open centre valves which allow fluid circulation at very low pressure, regardless of relief valve or compensator settings.
4. Make sure that you are reading pressure from the correct part of the system.

Excessive temperature

1. If a water cooler is fitted make sure the water supply is flowing through it. The water outlet pipe should feel warmer than the inlet, and the fluid outlet pipe should feel cooler than the fluid inlet.
2. If an air cooler is fitted, is the fan rotating in the right direction, and check that the air ducts are not blocked.
3. The fluid pressure may be unnecessarily high. Check that all pressure control valves are set correctly to the pressures shown on the circuit diagram.
4. Make sure that any unloading system, such as a vented relief valve, is working properly.
5. When compensated pump systems are fitted with a relief valve the

relief must be set at least 10 bar above the compensator.
6. Check that the fluid viscosity is correct to specification.

Routine maintenance

The practice of planned maintenance at fixed intervals using a log book is strongly recommended.

The following list suggests some of the items which should be checked regularly.

Check and record:

1. The machine time cycle.
2. The running temperature of the fluid.
3. The readings of the various pressure gauges.
4. Unusual noise.
5. Measure the leakage rate from piston unit casings under indentical pressure and temperature conditions. Changes in this leakage give a good indication of the condition of the unit.

Significant changes in any of the above five items may require further investigation regarding their cause and the service necessary to correct them.

6. Clean the exterior of all equipment to check for leakage. Tighten joints where necessary and replace any fittings and associated pipes which leak persistently.
7. Check the cooling system for cleanliness and leakage.
8. Sample the hydraulic fluid and check for chemical condition and level of contamination.
9. Clean or replace filters as necessary.
10. Inspect air breather elements for build-up of contaminant and clean or replace.
11. If gas loaded accumulators are used, check that the gas precharge pressure is correct. Always follow the accumulator manufacturer's instructions if you need to add more gas.

Periodic maintenance

If after several years of use, routine service inspections show that the equipment performance is not quite up to the specified standard, a thorough overhaul of the equipment may prove economically desirable.

This is a good opportunity for a really thorough clean up of all the equipment, especially the inside of the tank. The use of a soft plastic scraper is to be recommended for cleaning flat surfaces, as cloth can leave particles of lint which will clog up strainers and generally cause trouble when the system is refilled.

Before undertaking a major overhaul, it may be prudent to contact your local Vickers organization to obtain advice on the servicing or replacement of suspect equipment and to obtain a new set of seals as, after several years these tend to harden, and their replacement will greatly reduce the risk of future leaks.

Hoses in pump inlet lines and seals preventing the entry of dirt around pipes returning to unit, are often overlooked and can have worn or contain surface cracks.

When reassembling the equipment make sure you follow all the service instructions and take every possible precaution to keep the inside of your hydraulic equipment spotlessly clean.

Safety

When starting or servicing any machinery always take every reasonable safety precaution. The following hints may serve as reminders.

- Be sure that lifting tackle is strong enough for the job and is safely applied.
- See that coupling or belt guards are in place and securely fastened.
- Securely prop or wedge slides or weights that could fall or move when hydraulic power or pipework is removed.
- Removing the main fuses removes many risks during servicing.
- Make certain that an accumulator has been completely vented before removing any associated pipework.

Presented by:

HYDRAULIC OIL RECOMMENDATIONS FOR INDUSTRIAL MACHINERY

Unit type	Viscosity	Oil type
Inline Piston (Pumps & Motors)	● Viscosity Grades: 32-68 cSt @ 40°C. Running: 13-54 cSt ▲ At Start Up: 220 cSt Max.	
Angle Piston Vane (Except MHT) Gear (Pumps & Motors)	Viscosity Grades: 32-68 cSt @ 40°C. Running: 13-54 cSt ▲ At Start Up: 860 cSt Max.	Antiwear type industrial hydraulic oils or automotive crankcase oils having letter designations 'SC', 'SD', or 'SE'. Per SAE Technical Report J-183a.
♦ MHT (High Torque/ Low Speed Vane Motors)	● Viscosity Grades: 32-68 cSt @ 40°C. Running: 13-54 cSt ▲ At Start up: ★ 110 cSt Max.	
HAS Drives (Hydraulic Adjustable Speed Drives	● Viscosity Grade; 68 cSt @ 40°C.	SAE 20-20W. Automotive crankcase oils designated 'SC', 'SD', or 'SE'. antiwear type industrial hydraulic oils.

cSt–Centistokes.
▲See section headed 'VISCOSITY' for further advice about start-up limitations.
★ On start-up or idle running of MHT Motors adhere to the minimum case flow requirements of the installation drawing or contact your Vickers representative.
● Viscosity Grades are the standard viscosity grades listed in the 'ISO 3448 industrial liquid lubricants–ISO viscosity classification', but any intermediate viscosity is acceptable.
♦ Adhere to the oil recommendations for MHT units rather than the pumps involved.

Selection of Viscosity Grades

The following tabulation is an indication of the temperature extremes between which the viscosity grades can be used to remain within Vickers start-up and running viscosity range recommendations.

The SAE 10W grades fall between the 32 cSt and 46 cSt grades and the SAE 20-20W approximates the 68 cSt grade.

Viscosity Grade @ 40°C.	Start up 860 cSt	Start up 220 cSt	Start up 110 cSt	Running 54 cSt Max.	Running 13 cSt min.
32 cSt	–12°C	6°C.	14°C.	27°C.	62°C.
46 cSt	–6°C.	12°C.	22°C.	34°C.	71°C.
68 cSt	0°C.	19°C.	29°C.	42°C.	81°C.

General Data

Oil in hydraulic systems performs the dual function of lubrication and transmission of power. It constitutes a vital factor in a hydraulic system, and careful selection of it should be made with the assistance of a reputable supplier. Proper selection of oil assures satisfactory life and operation of the system components with particular emphasis on hydraulic pumps and motors. Any oil selected for use with pumps or motors is acceptable for use with valves.

Some factors especially important in the selection of oil for use in an industrial hydraulic system are:

1. The oil must contain the necessary additives to ensure high antiwear characteristics. Not all hydraulic oils contain these in sufficient amounts.
2. The oil must have proper viscosity to maintain adequate sealing and lubricating quality at the expected operating temperature of the hydraulic system.
3. The oil must have rust and oxidation inhibitors for satisfactory system operation.

Two specific types of oil meet the requirements of the modern industrial hydraulic systems:

1. Antiwear type industrial hydraulic oils. A new generation of industrial hydraulic oils containing adequate quantities of antiwear compounds is recommended by Vickers for general hydraulic service. These oils are generally developed and evaluated on the basis of pump wear tests such as CETOP RP67H. These oils offer superior protection against pump and motor wear and the advantage of long service life. In addition, they provide good demusibility as well as protection against rust.
2. Automotive type crankcase oils having letter designation 'SC', 'SD', or 'SE' per SAE Technical Report J-183a.

The above classes of oils in the 10W and 20-20W SAE viscosity ranges are excellent for severe hydraulic service where there is little or no water present. The only adverse effect is that the 'detergent' additive tends to hold water in tight emulsion and prevents separation of water even on long time standing. It should be noted that very few water problems have been experienced to date in the use of these crankcase oils in machinery hydraulic systems. Normal condensation has not been a problem.

Over the years, Vickers hydraulic oil recommendations have been based on oils that (1) provide adequate wear protection, (2) have proper viscosity, and (3) are sufficiently stable to withstand the chemical, thermal, and mechanical stresses of severe hydraulic service. There are many engine oils that are outside of the SC, SD and SE classes that meet the above basis of recommendation with lower concentrations of some of the less critical additives (such as the detergent-dispersants) and result in lower costs. The other classes in SAE J-183a do not have performance criteria limiting valve train wear, although many of the oils in all of the classes (with the exception of SA) *may* be good candidates for hydraulic service. The selection of engine oils for hydraulic service requires careful review of the oil's formulation with the supplier. It is highly desirable to have data from pump wear tests similar to CETOP RP67H.

Viscosity

Viscosity is the measure of resistance to flow. The selection of a hydraulic oil of a specific viscosity range must be based on the needs of the system, limitations of possible critical components, or proper performance of specific types of units. Vickers recommends that certain maximum and minimum viscosity ranges of the oil at start-up and during running be maintained. (See chart.) Very high viscosities at start-up temperatures can cause noise and cavitational damage to pumps. Continuous operation at moderately high viscosities will tend to hold air in suspension in the oil while passing through the reservoir which can cause noise and early failure of

pumps, motors and erosion of valves. Low viscosities result in decreased system efficiency and impairment of dynamic lubrication.

Choose the proper oil viscosity for your particular system so that over the entire temperature range encountered the start-up viscosity and the running viscosity range shown in the chart is met.
However, sometimes the limiting start-up viscosity must be lower than shown there. In some systems the pump inlet vacuum limit (see pump installation drawing) may be reached at a lower viscosity (higher temperature) because of the latter's combined effect with:

- inlet pipe length and bore.
- number and size of any bends or restrictions in the inlet line.
- vertical distance between pump centreline and the free surface of the oil in the reservoir.

Similar limitations can apply with a hydraulic motor under braking and/or overrunning conditions if the inlet line is not adequately supercharged under low temperature conditions. Viscosity selection relative to the working temperature range is important, and assurance should be obtained from your oil supplier that the viscosity of the oil being used will not be less than the minimum recommended at maximum oil temperature encountered.

A number of antiwear hydraulic oils containing polymeric thickeners (V.I. improvers) are available. The temporary and permanent viscosity loss of some of these oils at operating temperature may be sufficient to affect the life and performance of components. Be certain you know the extent of loss of viscosity of polymer containing oils under hydraulic service before using them so that you do not operate below the recommended minimum viscosity.

Temperature

To obtain optimum service life from both the oil and the hydraulic system, operate between 49°C and 54°C, but 66°C normally is the maximum oil temperature recommended. Vickers HAS Drives operate at a slightly higher temperature, but this is permissible because of controlled design.

MHT Motors are permitted to operate at higher temperatures, but this is permissible by meeting special application requirements. Pumps can be approved to operate MHT Motors at these higher temperatures. Contact your Vickers representative.

Cleanliness

Thorough precautions should always be observed to ensure that the hydraulic system is clean:

1. Clean (flush) entire system to remove paint, metal chips, welding shot, lint, etc.
2. Filter each change of oil to prevent introduction of contaminant into the system.
3. Provide continuous oil filtration to remove sludge and products of wear and corrosion generated during the life of the system.
4. Provide continuous protection of system from entry of airborne contamination by proper filtration of air through breathers.
5. During usage, proper oil filling of reservoir and servicing of filters, breathers, reservoirs, etc., cannot be over emphasized.
6. Refer to installation data for recommended filtration.

For a comprehensive guide to the selection and location of filters ask for our publication 'Effective contamination control in fluid power systems'.

Sound Level

Noise is only indirectly affected by the fluid selection, but the condition of the fluid is of paramount importance in obtaining the optimum reduction of system sound levels.

Some of the major factors affecting the fluid conditions that cause the loudest noises in a hydraulic system are:

1. Very high viscosities at start-up temperatures can cause pump noises due to cavitation.
2. Running with a moderately high viscosity fluid will impede the release of entrained air. The fluid will not be completely purged of such air in the time it remains in the reservoir before recycling through the system.
3. Aerated fluid can be caused by ingestion of air through the pipe joints of inlet lines, high velocity discharge lines, cylinder rod packings, or by fluid discharging above the fluid level in the reservoir. Air in the fluid causes a noise similar to cavitation.
4. Contaminated fluids can cause excessive wear of internal pump parts which may result in increased sound levels.
5. Systems using water based fluids are susceptible to noise created by vapourization of the fluid if excessive vacuums and temperatures are encountered.

Fire Resistant Fluids

Hydraulic systems using fire resistant fluids require special engineering consideration.

Proper design, operation and maintenance of fluid power systems is of paramount importance to obtain the optimum performance of fire resistant fluids such as synthetics, water glycol and water in oil emulsion types.

The comments in the earlier section headed 'VISCOSITY' can apply also to fire resistant fluids. In addition, the specific gravity of an f.r. fluid can further lower the start-up viscosity limit because all common f.r. fluids are in some degree heavier than oil.

For general information about fire resistant fluids and their use consult the following:

UK Publications

'Code of practice for the use of fluids in industrial hydraulic systems' A.H.E.M., London.
'Fire resistant fluids data sheets' A.H.E.M., London.

U.S.A. Publications

'ANSI B93 5-19 ★ ★-Standard practice for use of fire resistant fluids for fluid power systems' ANSI, New York.

For specific applications of fire resistant fluids consult your Vickers representative.

Low viscosity hydraulic fluids

There are today two groups available for particular applications:
1. High water base fluids (HWBF).Nominally new generation 5% concentrate-in-95% water as emulsions or solutions.

2. Special purpose fluids such as aluminium rolling oils.

Always consult your Vickers representative whenever you contemplate using such fluids. He will then be able to advise you on the state-of-the-art in relation to the standard and special hydraulic units currently available and about the techniques and practices that will help you obtain the best results.

High water base fluids (HWBF)

Basically, there are two classes:

- Oil-in-water emulsions and micro-emulsions.

95% water and 5% oil additives including emulsifiers, antiwear additives, rust and oxidation inhibitors, vapour phase inhibitors and bactericides. Minute droplets of oil are dispersed throughout the water forming a milky-white oil-in-water emulsion or, in the case of the micro-emulsions, an almost clear oil-in-water emulsion.

- Synthetic solutions

95% water and 5% chemical solution additives, including antiwear additives, rust and oxidation inhibitors, vapour phase inhibitors and bacerticides. The additives are dissolved in the water, forming a true clear solution. Dyes are sometimes added to make the fluid more visible.

To assure an effective emulsion or solution the water should not have excessive hardness (limits are specified by the fluid supplier) or have an acid nature, and should preferably be distilled or deionized. When preparing the mixtures, the concentrate should *always* be added to the water while maintaining good fluid agitation. The water should *never* be added to the concentrate. *Do not mix different types, or brands, of concentrate.*

Proper maintenance of the amount of concentrate in the emulsion or solution requires periodic testing for alkaline pH and amount of concentrate. The alkaline pH should be maintained at 8.0-9.2 pH in accordance with the suppliers recommendation.

Low Viscosity Petroleum Products

Aluminium rolling oil of the mineral seal type containing 10% butyl stearate lubricity additive may also be used as the fluid medium.

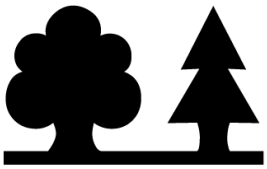
The right to modification for technical improvement is reserved.

11 STORAGE, DISPOSAL, TRANSPORTATION

11.1 Storage

Clean the machine (see *Cleaning the machine*). Preserve all polished metal surfaces using a suitable rust preventing agent. Store the machine in an enclosed, dry place. Cover the machine completely with a plastic sheet.

11.2 Disposal



Protect the environment.
The disposal of machines, machine components and process materials is partially subject to legal controls. More detailed information is given at the relevant administrative authority (e.g. regional and national Water Conservation Bureaux and Environmental Protection Agencies). Only deposit the material to be disposed of at authorized drop-off points.

11.3 Transportation

⚠WARNING	
	**Suspended load.** **Falling loads can cause serious injury or death.** **Only use a crane or forklift truck, which is suitable for the weight and dimensions of the loads.** **Also use suitable stopping means and pay attention to the gravity centre location.** **Do not step under the suspended load.** **Wear a protective helmet in addition to your basic protective gear.**
	

12 CUSTOMER SERVICE AND SPARE PARTS ORDERS

Should problems occur during operation of the machine or if you have general questions about the machine which this operation manual cannot answer, please do not hesitate to contact us. We would be pleased to help you further in order to solve your problem as quickly as possible.

You can identify the spare parts you require using the spare parts list. Please quote the following information when making your order so that we can deliver the spare parts to you quickly:

- Company name and address.
- Contact person.
- Machine type.
- Machine number.
- Piece number of the spare part.
- Spare part reference.
- Subject number.
- Order quantity.

Zerma America
9120 Centerlinks Commerce DR., Unit 4
Fort Myers, FL 33912

Phone: +1-239-219-1500
Parts@Zerma-America.com

www.Zerma-America.com

TIP

The easiest way to order your spare parts is to copy the spare parts list and to fill in the order amount after the respective spare part.

13 SPARE PARTS LIST

13.1 GSP 600/500

Pos.	Pc	Description/Standard	Partnumber/SAP	Order
100		**Machine complete**		
101	1	Standard hopper	20400100	
102	1	PVC-curtain 1	80012240	
103	1	Cover plate	80008440	
104	1	PVC-curtain 2	80012240	
105	1	Cover plate	80008440	
106	1	PP-curtain	80012220	
107	1	Shaft for PP-curtain	80008990	
108	1	Housing upper section	20401500	
109	2	Wearing plate upper section	20403000+20403100	
110	1	Housing lower section	20404000	
111	2	Wearing plate lower section	20406000	
112	1	Door	20406300	
113	1	Threaded spindle	20007800	
114	1	Base frame	20409500	
115	1	Suction trough	20411900	
116	10	Anti vibration pad	80012740	
117	4	Connecting bolts upper section-lower section DIN 933 M20x100		
200		**Screen complete**		
201	1	Screen support	20406100	
202	2	Screen support spindle	20105900	
203	1	Screen adjusting bolt		
204	1	Screen	20410200	
205	1	Closing lever		
300	2	**Bearing**		
301	2	Bearing housing SN320	20072600	
302	2	Bearing 22320/W33	80002990	
303	3	Bearing Cover A	20058700	
304	1	Bearing Cover B	20058900	
305	4	Sealing	80004030	
306	2	Key	80003420	
400		**Drive**		
401	1	Motor 37 kW	80000140	
		Motor 45 kW	80000110	
		Motor 55 kW	80000080	
402	1	Rotor pulley SPC 530-5	80001970	
403	1	Rotor pulley taper bush TB 4545-100	80002250	

404	5	V-Belt SPC 3150	80002610	
405	1	Motor pulley SPC 236-5	80002010	
406	1	Motor pulley taper bush TB 3535-55	80002360	
		Motor pulley taper bush TB 3535-60	80002350	
		Motor pulley taper bush 3535-65	80002340	
407	1	Pulley cover	20410600	
408	1	Shaft cover	20109400	
409	1	Sleeve 1		
410	1	Sleeve 2		
411	1	Sleeve 3		
500	1	**S-3 rotor**		
501	6	Rotor knife 250x90x22	80000960	
502	12	Fixing Bolt M20x60/DIN 912/12.9		
503	12	Washer		
504	12	Adjusting bolt M12x40/flat head/12.9		
505	12	Nut M12/DIN 934/12.9		
506	12	Adjusting bolt M12x40/ball head/12.9		
507	5	Cover plate (Rotor knife) R		
508	5	Cover plate (Rotor knife) L		
500	1	**S-5 rotor**		
501	10	Rotor knife 250x90x22	80000960	
502	20	Fixing Bolt M20x60/DIN 912/12.9	80011352	
503	20	Washer	80010780	
504	20	Adjusting bolt M12x40/flat head/12.9	20031600	
505	20	Nut M12/DIN 934/12.9	80010470	
506	20	Adjusting bolt M12x40/ball head/12.9	20212500	
507	5	Cover plate (Rotor knife) R	80001590	
508	5	Cover plate (Rotor knife) L	80001580	
600		**Stator knife complete**	80001000	
601	2	Stator knife 526x100x22	80001100	
602	8	Fixing Bolt M20x60/DIN 933/12.9	80010010	
603	8	Washer	80012930	
604	4	Adjusting bolt M12x40/flat head/12.9	20031600	
605	4	Nut M12/DIN 934/12.9	80010470	
606	4	Wedge Washer	80012950	
607	4	Adjusting bolt M10x30/ball head/12.9	20267900	
800		**Hydraulic**		
801	1	Cylinder upper housing opening	80001790	
802	1	Cylinder screen opening		
803	1	Piping 1	80001640	
804	1	Piping 2	80001650	
805		Connectors	80001700	

806		Hydraulic unit		
900		**Electrical parts**		
901	3	Safety switch ZS336	80005600	
902	1	Control panel		

13.2 GSP 560/700

Pos.	Pc	Description/Standard	Partnumber/SAP	Order
100		**Machine complete**		
101	1	Standard hopper		
102	1	PVC-curtain 1	80012240	
103	1	Cover plate	80008430	
104	1	PVC-curtain 1	80012240	
105	1	Cover plate	80008430	
106	1	PP-curtain	80012220	
107	1	Shaft for PP-curtain	80009010	
108	1	Housing upper section		
109	2	Wearing plate upper section		
110	1	Housing lower section		
111	2	Wearing plate lower section		
112	1	Door		
113	1	Threaded spindle	20007800	
114	1	Base frame		
115	1	Suction trough		
116	10	Anti vibration pad	80010310	
117	4	Connecting bolts upper section-lower section DIN 933 M20x100		
200		**Screen complete**		
201	1	Screen support		
202	2	Screen support spindle	20105900	
203	1	Screen adjusting bolt		
204	1	Screen		
205	1	Closing lever		
300	2	**Bearing**		
301	2	Bearing housing SN324	20031800	
302	2	Bearing 22324/W33	80002980	
303	1	Bearing Cover A	20011700	
304	2	Bearing Cover B	20011800	
305	1	Bearing Cover C	20012000	
306	4	Sealing	80004040	
307	2	Key	80040342	
400		Drive		
401	1	Motor 55 kW		
		Motor 75 kW 400V/50Hz	80000050	
402	1	Rotor pulley SPC 530-5		
403	1	Rotor pulley taper bush TB 4545-90		
404	5	V-Belt SPC 3750		

405	1	Motor pulley SPC 236-5		
406	1	Motor pulley taper bush TB 3535-75		
		Motor pulley taper bush TB 3535-80		
407	1	Pulley cover		
408	1	Shaft cover	20109400	
409	1	Sleeve 1		
410	1	Sleeve 2		
411	1	Sleeve 3		
500	1	**S-3 rotor**		
501	6	Rotor knife 310x100x22		
502	12	Fixing Bolt M20x60/DIN 912/12.9		
503	12	Washer DIN433-21 300HV		
504	12	Adjusting bolt M12x40/flat head/12.9	20031600	
505	12	Nut M12/DIN 934/12.9	80010470	
506	12	Adjusting bolt M16x45/ball head/12.9	20031500	
507	3	Cover plate (Rotor knife) R		
508	3	Cover plate (Rotor knife) L		
509	12	DIN914 M10x12		
500	1	**S-5 rotor**		
501	10	Rotor knife 310x100x22		
502	20	Fixing Bolt M20x60/DIN 912/12.9		
503	20	Washer		
504	20	Adjusting bolt M12x40/flat head/12.9		
505	20	Nut M12/DIN 934/12.9		
506	20	Adjusting bolt M16x45/ball head/12.9		
507	5	Cover plate (Rotor knife) R		
508	5	Cover plate (Rotor knife) L		
509	20	DIN914 M10x12		
600		**Stator knife complete**		
601	2	Stator knife 646x100x22		
602	10	Fixing Bolt M20x60/DIN 933/12.9	80010160	
603	10	Washer	80010780	
604	4	Adjusting bolt M12x40/flat head/12.9	20031600	
605	4	Nut M12/DIN 934/12.9	80010470	
606	4	Wedge Washer	80012950	
607	4	Adjusting bolt M10x30/ball head/12.9	20031400	
800		**Hydraulic**		
801		Cylinder		
802		Piping		
803		Connectors		
804		Hydraulic unit		

900		**Electrical parts**		
901	3	Safety switch ZS336	80005600	
903	1	Control panel		

13.3 GSP 560/1000

Pos.	Pc	Description/Standard	Partnumber/SAP	Order
100		**Machine complete**		
101	1	Standard hopper		
102	1	PVC-curtain 1	80012240	
103	1	Cover plate	80008430	
104	1	PVC-curtain 2	80012240	
105	1	Cover plate	80008430	
106	1	PP-curtain	80012220	
107	1	Shaft for PP-curtain	80009010	
108	1	Housing upper section		
109	2	Wearing plate upper section		
110	1	Housing lower section		
111	2	Wearing plate lower section		
112	1	Door		
113	2	Threaded spindle	20007800	
114	1	Base frame		
115	1	Suction trough		
116	10	Anti vibration pad	80010310	
117	4	Connecting bolts upper section-lower section DIN 933 M20x100		
118	1	Second in feed hopper		
200		**Screen complete**		
201	1	Screen support		
202	3	Screen support spindle		
203	1	Screen adjusting bolt		
204	1	Screen		
300	2	**Bearing**		
301	2	Bearing housing SN324	20031800	
302	2	Bearing 22324/W33	80002980	
303	1	Bearing Cover A	20011700	
304	2	Bearing Cover B	20011800	
305	1	Bearing Cover C	20012000	
306	4	Sealing	80004040	
307	2	Key	80040342	
400		**Drive**		
401	1	Motor 75 kW 400V/50Hz	80000050	
402	1	Rotor pulley SPC 630-5		
403	1	Rotor pulley taper bush TB 5050-120		
404	5	V-Belt SPC 4000		
405	1	Motor pulley SPC 280-5		
406	1	Motor pulley taper bush TB 3535-75		

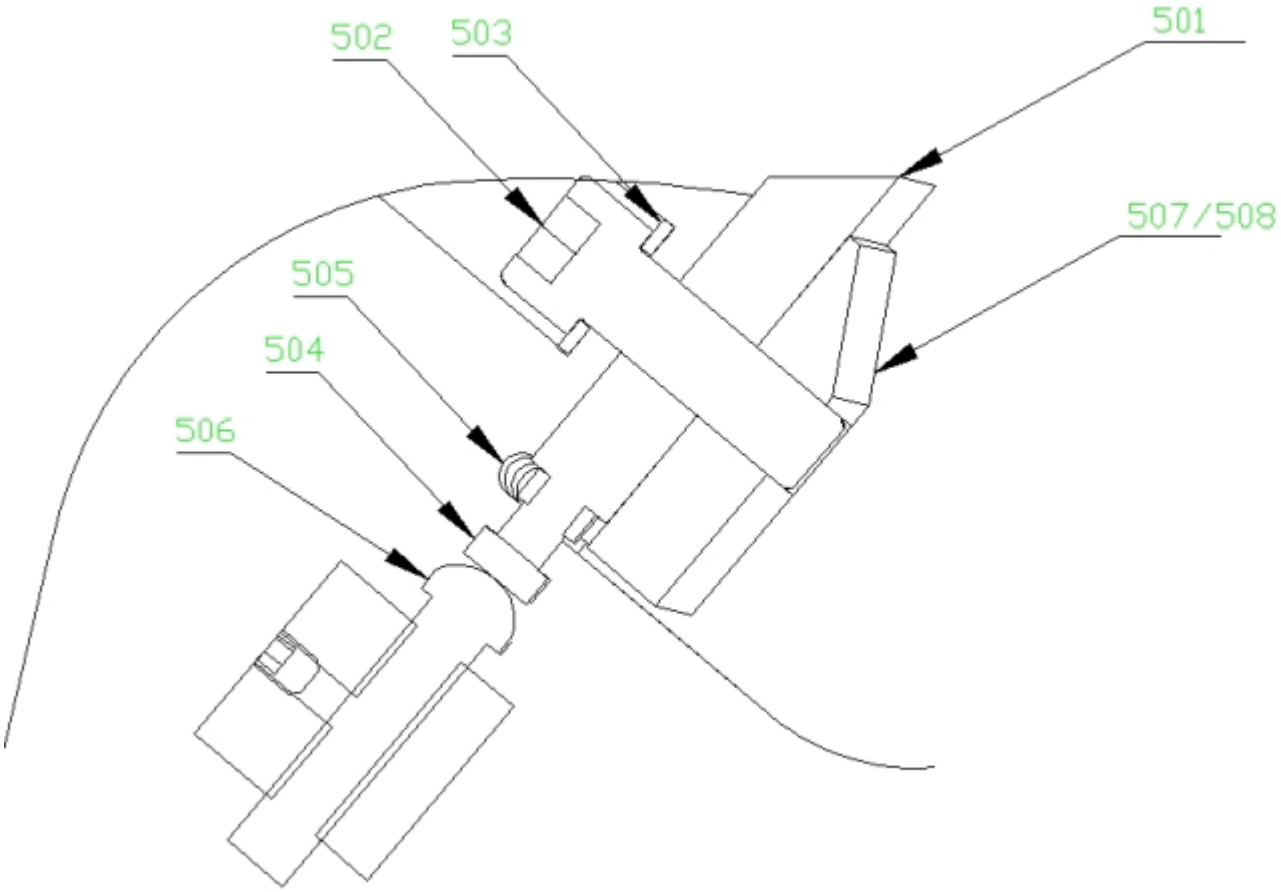
407		Pulley cover		
408		Shaft cover	20109400	
409		Sleeve 1		
410		Sleeve 2		
411		Sleeve 3		
500	1	**S-5 rotor**		
501	10	Rotor knife 485x100x22	80000910	
502	30	Fixing Bolt M20x60/DIN 912/12.9		
503	30	Washer DIN433-21 300HV		
504	20	Adjusting bolt M12x40/flat head/12.9	20031600	
505	20	Nut M12/DIN 934/12.9	80010470	
506	20	Adjusting bolt M12x40/ball head/12.9	20031500	
507	5	Cover plate (Rotor knife) R	80001530	
508	5	Cover plate (Rotor knife) L	80001520	
509	20	DIN914 M10x12		
600		**Stator knife complete**		
601	2	Stator knife 995x100x22	80001060	
602	16	Fixing Bolt M20x65/DIN 933/12.9	80010160	
603	16	Washer	80010780	
604	4	Adjusting bolt M12x40/flat head/10.9	20031600	
605	4	Nut M12/DIN 934/10	80010470	
606	4	Wedge Washer	80012950	
607	4	Adjusting bolt M10x40/ball head/10.9	20031400	
608	2	Cover plate	20110000	
800		**Hydraulic**		
801	1	Cylinder hopper opening		
802	1	Cylinder screen opening		
803	1	Piping 1	80001640	
804	1	Piping 2	80001650	
804	10	Connectors	80001700	
805	1	Hydraulic unit		
		1.5KW/400V-50HZ/220V	80001900	
900		**Electrical parts**		
901	2	Safety switch (Threaded Spindle) ZS336	80005600	
902	2	Safety switch CAZ15zvrk	80005560	
903	1	Control panel		

13.4 GSP 700/1400

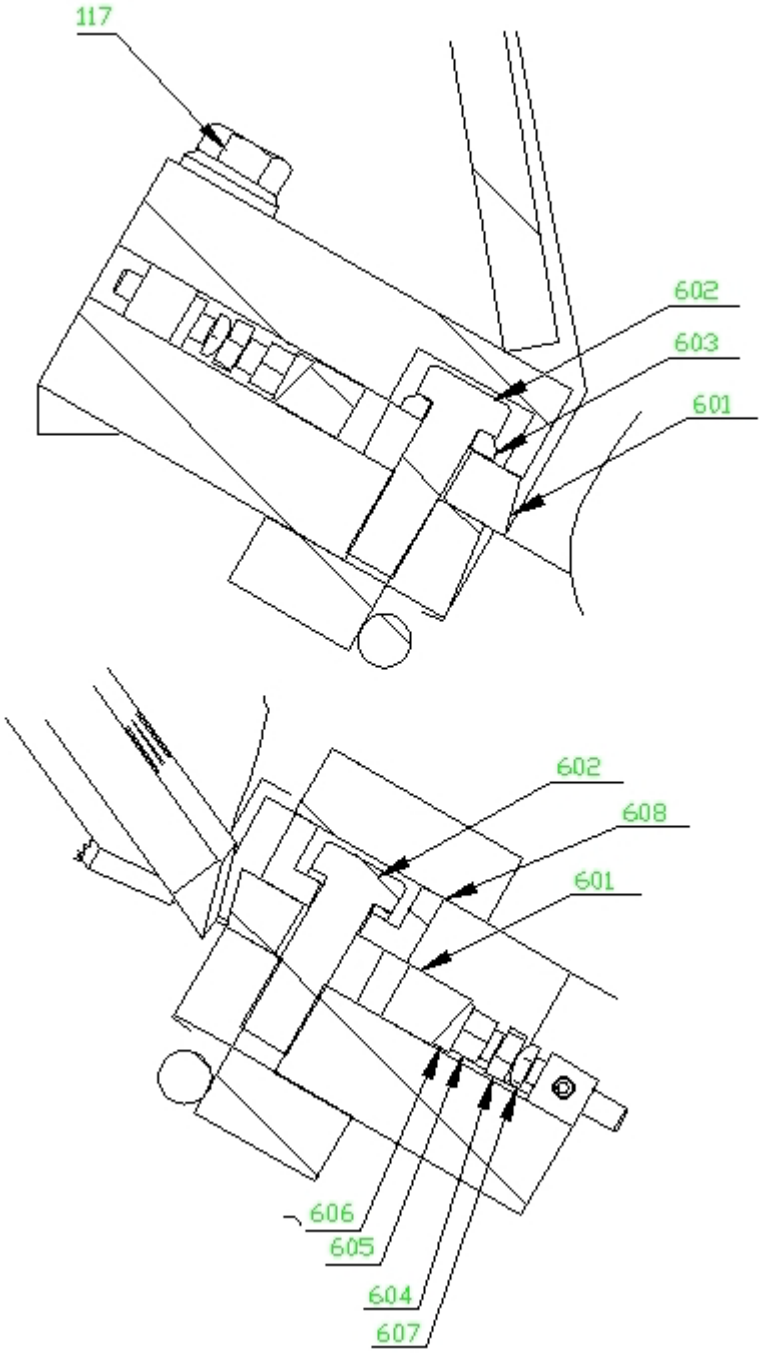
Pos.	Pc	Description/Standard	Partnumber/SAP	Order
100		**Machine complete**		
101	1	Standard hopper		
102	1	PVC-curtain 1		
103	1	Cover plate		
104	1	PVC-curtain 2		
105	1	Cover plate		
106	1	PP-curtain		
107	1	Shaft for PP-curtain		
108	1	Housing upper section		
109	2	Wearing plate upper section		
110	1	Housing lower section		
111	2	Wearing plate lower section		
112	1	Door		
113	2	Threaded spindle		
114	1	Base frame		
115	1	Suction trough		
116	10	Anti vibration pad		
117	4	Connecting bolts upper section-lower section DIN 933 M20x100		
118	1	Second in feed hopper		
200		**Screen complete**		
201	1	Screen support		
202	3	Screen support spindle		
203	1	Screen adjusting bolt		
204	1	Screen		
300	2	**Bearing**		
301	2	Bearing housing SN324		
302	2	Bearing 22324/W33		
303	1	Bearing Cover A		
304	2	Bearing Cover B		
305	1	Bearing Cover C		
306	4	Sealing		
307	2	Key		
400		**Drive**		
401	1	Motor 75 kW 400V/50Hz		
402	1	Rotor pulley SPC 630-5		
403	1	Rotor pulley taper bush TB 5050-120		
404	5	V-Belt SPC 4000		
405	1	Motor pulley SPC 280-5		
406	1	Motor pulley taper bush TB 3535-75		

407		Pulley cover		
408		Shaft cover		
409		Sleeve 1		
410		Sleeve 2		
411		Sleeve 3		
500	1	**S-5 rotor**		
501	10	Rotor knife 485x100x22		
502	30	Fixing Bolt M20x60/DIN 912/12.9		
503	30	Washer DIN433-21 300HV		
504	20	Adjusting bolt M12x40/flat head/12.9		
505	20	Nut M12/DIN 934/12.9		
506	20	Adjusting bolt M12x40/ball head/12.9		
507	5	Cover plate (Rotor knife) R		
508	5	Cover plate (Rotor knife) L		
509	20	DIN914 M10x12		
600		**Stator knife complete**		
601	2	Stator knife 995x100x22		
602	16	Fixing Bolt M20x65/DIN 933/12.9		
603	16	Washer		
604	4	Adjusting bolt M12x40/flat head/10.9		
605	4	Nut M12/DIN 934/10		
606	4	Wedge Washer		
607	4	Adjusting bolt M10x40/ball head/10.9		
608	2	Cover plate		
800		**Hydraulic**		
801	1	Cylinder hopper opening		
802	1	Cylinder screen opening		
803	1	Piping 1		
804	1	Piping 2		
804	10	Connectors		
805	1	Hydraulic unit		
		1.5KW/400V-50HZ/220V		
900		**Electrical parts**		
901	2	Safety switch (Threaded Spindle) ZS336		
902	2	Safety switch CAZ15zvrk		
903	1	Control panel		

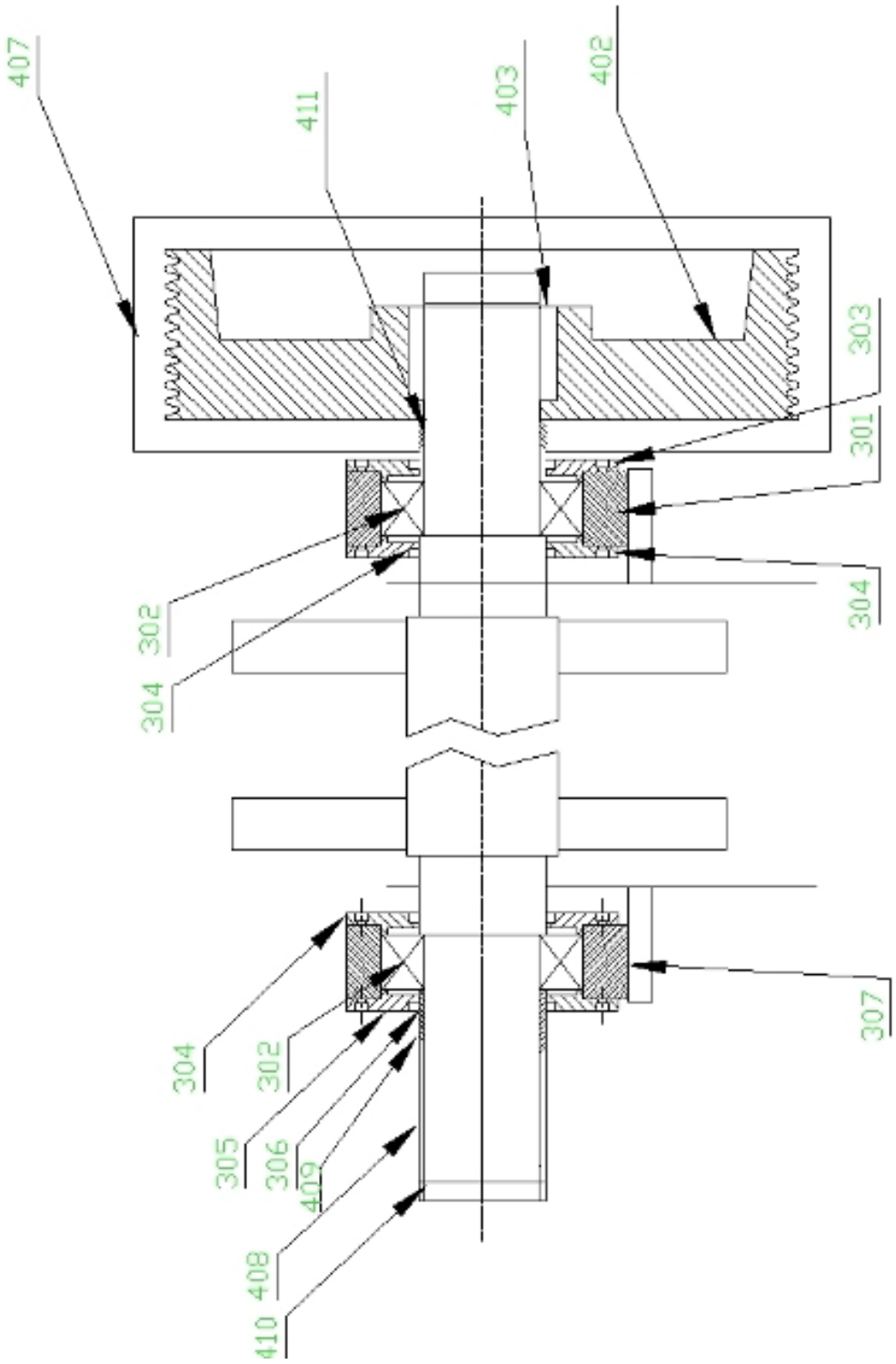
13.5 Rotor knife



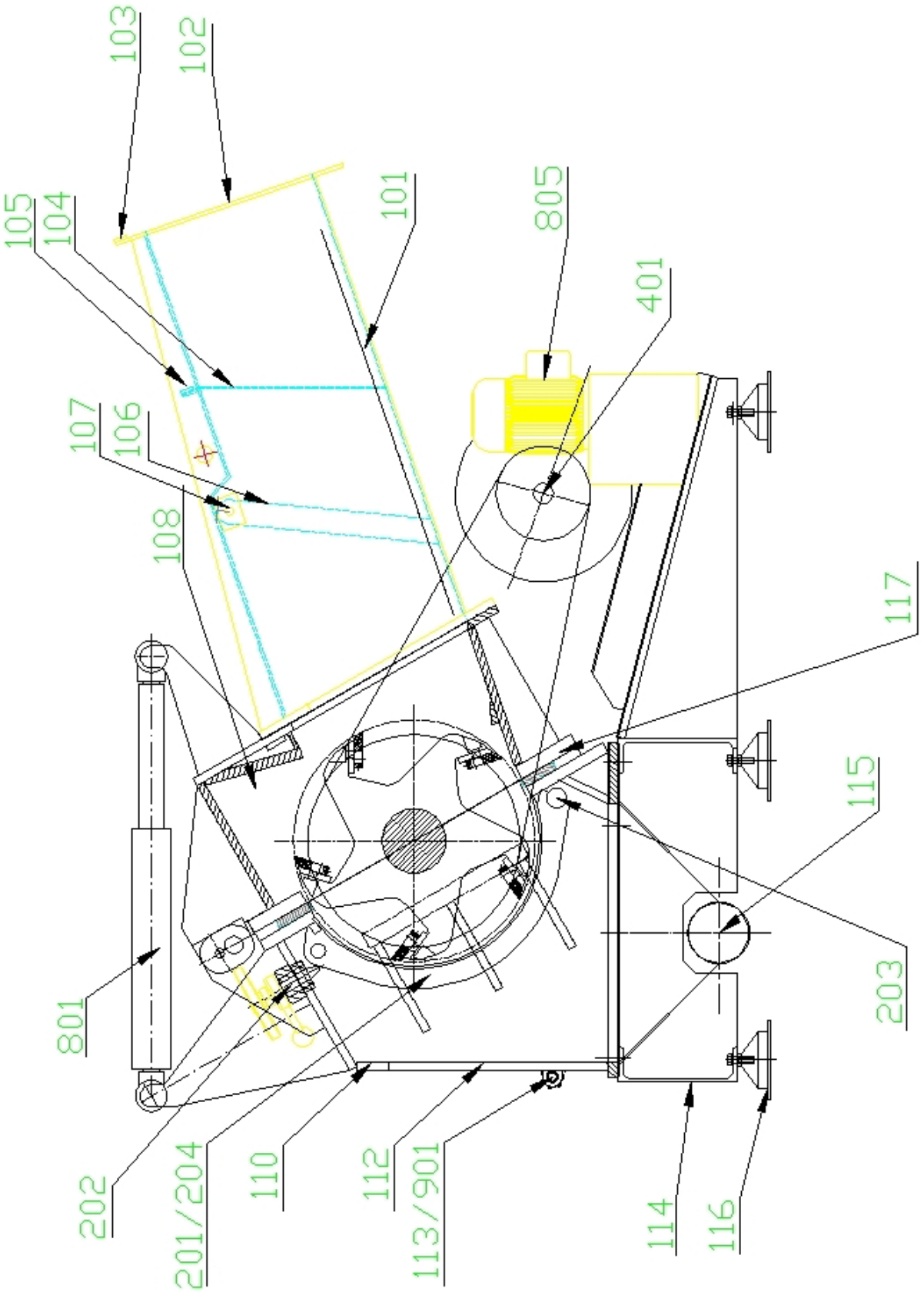
13.6 Stator knife



13.7 Rotor assembly

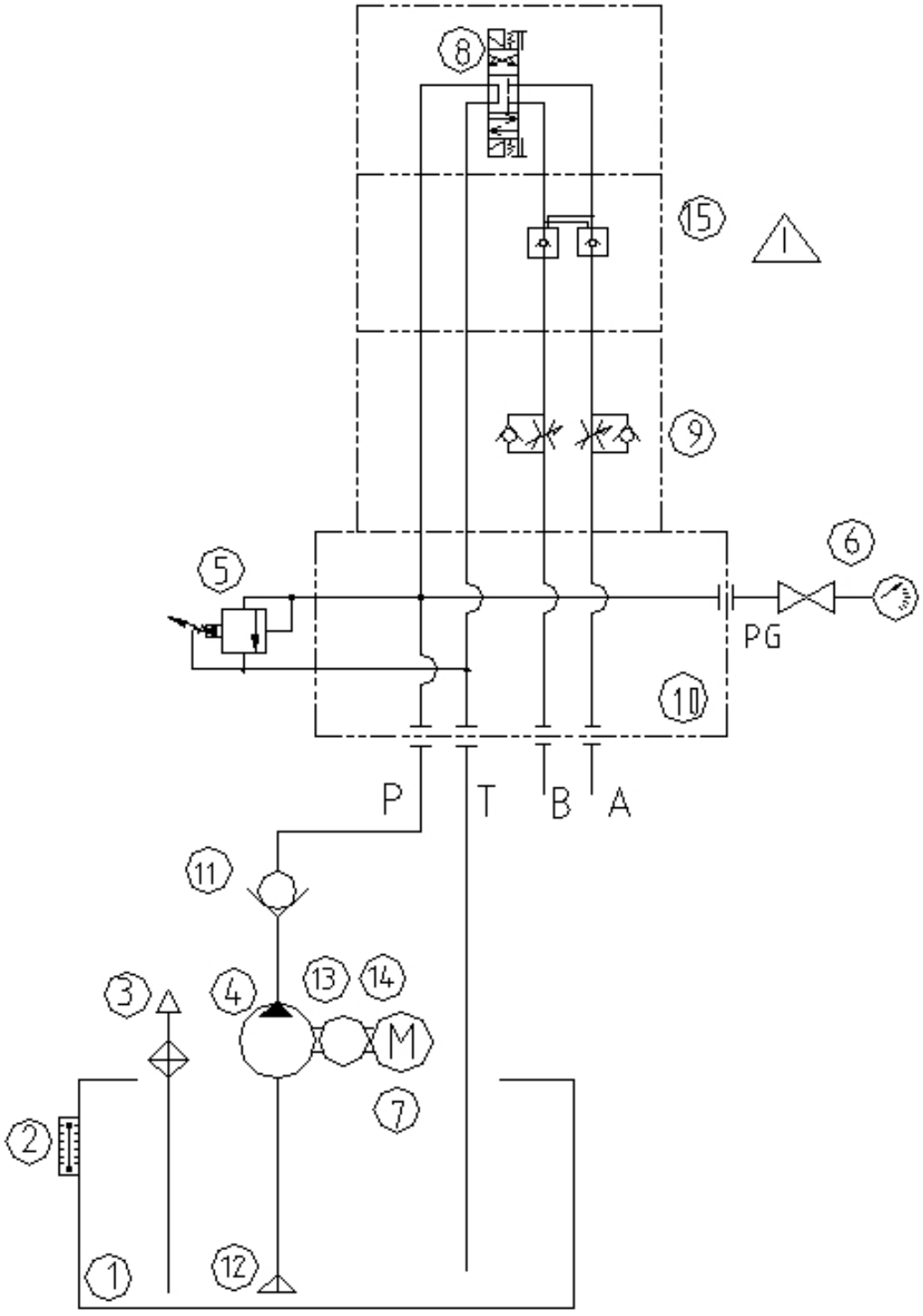


13.8 Machine complete



14 HYDRAULIC UNIT

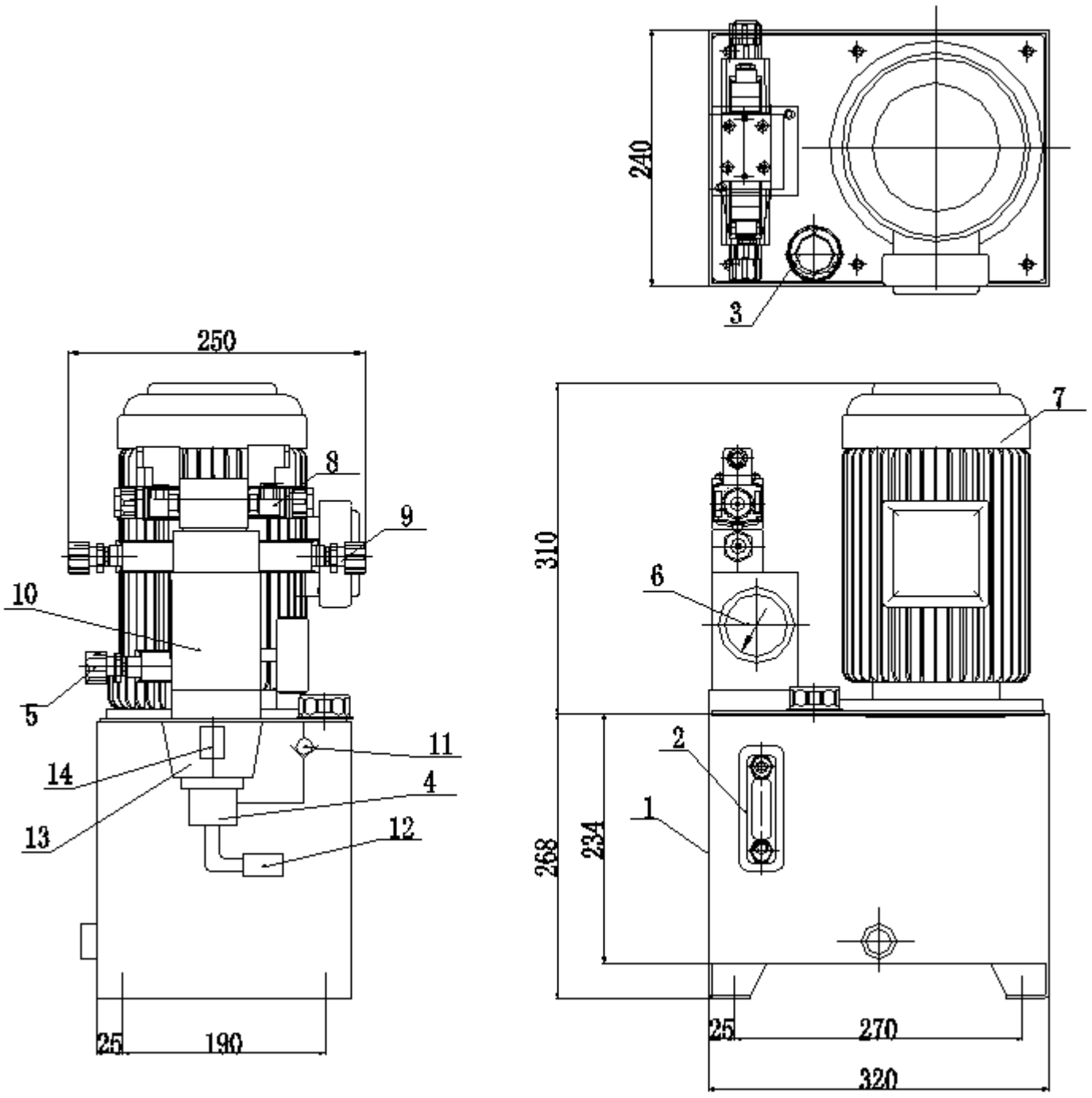
14.1 Hydraulic Diagram



14.2 Spare parts list hydraulic unit

Pos	Description	Standard	Pc	Supplier
1	Tank	320x240x268	1	7Ocean
2	Level gauge	LS-3”	1	CLC
3	Oil lubricator	AB-1162	1	CLC
4	Pump	HGP-1A-F4-R	1	Xin Hong
5	Cartridge relief valve	CRV-60-A-10	1	7Ocean
6	Pressure gauge	AT-63x250kg/cm²	1	7Ocean
7	Electric motor	1.5 kW; 2HP-4P	1	ABB
8	Solenoid valve	DSD-G02-8C-DC24-31	1	7Ocean
9	Modular throttle check valve	MTC-02-W-0-10	1	7Ocean
10	Valve block	MFB-165-03-A	1	7Ocean
11	Check valve	CIT-03	1	7Ocean
12	Suction filter	MF-04	1	7Ocean
13	Cover		1	Ke Xian
14	Coupling	ML1	1	Ke Xian
15	Modular pilot check valve	MPC-02-W-1-10	2	7Ocean
16	Oil discharge plug	PT3-4	1	7Ocean

14.3 Hydraulic Unit



15 CLARIFICATION FOR PERSONAL TRAINING

This is to certify that I have attended an in company training for service and operation of the granulator and understand all safety regulations. Further to this I have read and understand the owners' manual.

City	Date	Printed name	Signature

16 ELECTRICAL CONNECTION

The machine should be wired by a qualified electrician.

Please refer to the wiring diagram.

17 DIMENSIONS OF STANDARD MACHINE

Granulator Type GSP ….

Please see Layout

18 ADDITION

Documentation Main Drive Granulator
(PART B)
Delivery documentation

ATTENTION:

The wiring schematics are located in the control panel in the event that the control panel is a part of the delivery

Zerma
9120 Centerlinks Commerce Dr., Unit 4
Fort Myers, FL 33912

239-219-1500
Parts@Zerma-America.com

www.Zerma-America.com