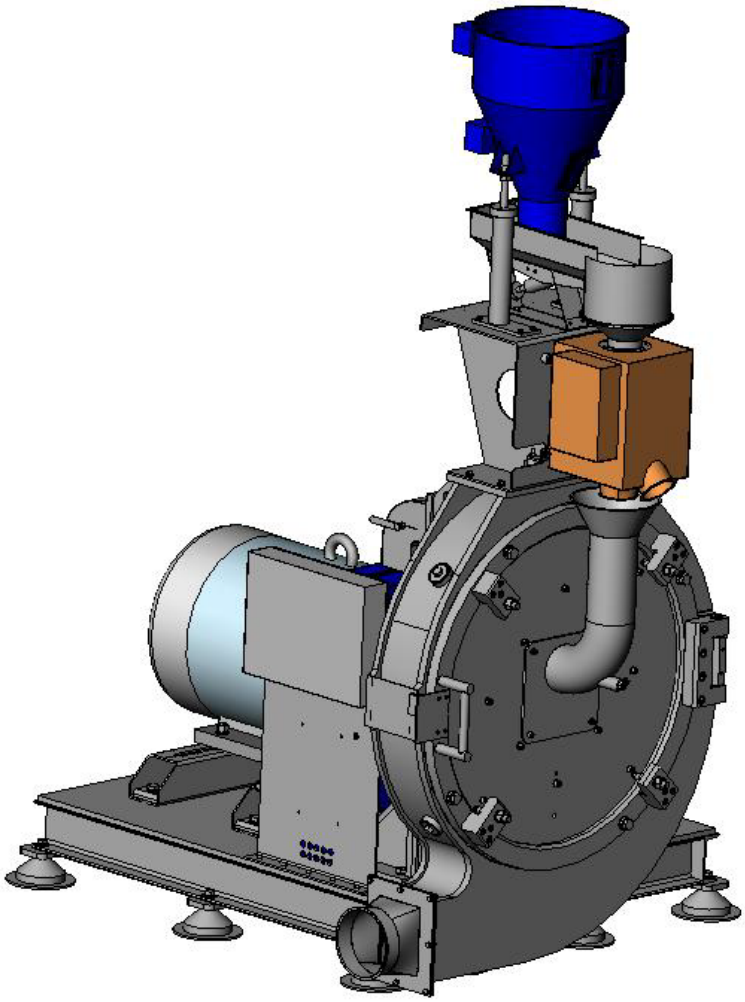
# OPERATING MANUAL

## PM SERIES



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ZERMA

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# 1 INFORMATION ON THIS INSTRUCTION MANUAL

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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

## PM 300

| | | |
|---|---|---|
| In feed opening (chute): | Data in mm: | 200 |
| Outlet opening: | Data in mm: | 100x130 |
| Rotating grinding disc: | Diameter in mm: | 300 |
| Stationary grinding disc: | Diameter in mm: | 300 |
| Gap setting: | Data in mm: | 0.5 |
| Rotating disc speed (50 Hz): | rpm | 6000 |
| Width: | Data in mm: | 1550 |
| Length: | Data in mm: | 1370 |
| Height: | Data in mm: | 1850 |
| Drive motor: | Power in kW: | 22 |
| | | |
| Machine weight: | In kg | Approx. 1200 |
| | | |
| Electrical connection data: | markings are attached to the machine | |
| Noise level:<br>Depends on plant location and type of grinding material! | Without noise equipment, in dB(A): | Approx. 95 |
| | With noise equipment in dB(A): | depends on type of soundproof |

## PM 500

| | | |
|---|---|---|
| In feed opening (chute): | Data in mm: | 200 |
| Outlet opening: | Data in mm: | 135x150 |
| Rotating grinding disc: | Diameter in mm: | 500 |
| Stationary grinding disc: | Diameter in mm: | 500 |
| Gap setting: | Data in mm: | 0.5 |
| Rotating disc speed (50 Hz): | rpm | 3482 |
| Width: | Data in mm: | 1680 |
| Length: | Data in mm: | 1800 |
| Height: | Data in mm: | 2100 |
| Drive motor: | Power in kW: | 55 |
| | | |
| Machine weight: | In kg | Approx. 1900 |
| | | |
| Electrical connection data: | markings are attached to the machine | |
| Noise level:<br>Depends on plant location and type of grinding material! | Without noise equipment, in dB(A): | Approx. 90 |
| | With noise equipment in dB(A): | depends on type of soundproof |

## PM 800

| | | |
|---|---|---|
| In feed opening (chute): | Data in mm: | 232 |
| Outlet opening: | Data in mm: | 160x200 |
| Rotating grinding disc: | Diameter in mm: | 800 |
| Stationary grinding disc: | Diameter in mm: | 800 |
| Gap setting: | Data in mm: | 0.8 |
| Rotating disc speed (50 Hz): | rpm | 2000 |
| Width: | Data in mm: | 1750 |
| Length: | Data in mm: | 2150 |
| Height: | Data in mm: | 2450 |
| Drive motor: | Power in kW: | 90 |
| | | |
| Machine weight: | In kg | Approx. 3200 |
| | | |
| Electrical connection data: | markings are attached to the machine | |
| Noise level:<br>Depends on plant location and type of grinding material! | Without noise equipment, in dB(A): | Approx. 95 |
| | With noise equipment in dB(A): | depends on type of soundproof |

# 3 GENERAL INFORMATION

## 3.1 Copyright

ZERMA Machinery and Recycling Technology holds the copyright for these operation instructions, entrusted to the owner of the pulverizer 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 pulverizer is designed for grinding of medium hard impact resistant and friable plastic material such as PE, PP and 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 pulverizer 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 pulverizer 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 pulverizer may only then be operated when the customer on site has installed a suitable air suction device.

**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 PM series pulverizer standard design is without a sound proof enclosure.

The noise level of the pulverizer at idle speed is approximately 85 – 95 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 90 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 accessory equipment.

**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 discs, even when the rotor disc is stationary. |
| **Activity:** | Disc replacement, disc setting and disc 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 front door. |
| **Activity:** | Maintenance work. |
| **Possible consequences:** | Serious injury can result. |
| **Preventative measures:** | When closing the front door, ensure that nobody take his fingers inside. |

| | |
|---|---|
| **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 disc. |
| **Activity:** | Maintenance work. |
| **Possible consequences:** | Serious injury or death can result. |
| **Preventative measures:** | The front door 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 disc 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.<br>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.<br>The yellow-marked lines conduct voltage even when the machine is switched off (main switch to 0).<br>Only use original safety fuses with stipulated intensity of current.<br>Faulty electrical components must be replaced immediately.<br>If faults occur in the electrical energy supply, switch machine off immediately.<br>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 pulverizer. |
| **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 pulverizer 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 disc mountings caused by vibration. |
| **Activity:** | All activities. |
| **Possible consequences:** | Serious injury can result. |
| **Preventative measures:** | Check the cutting disc 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.<br>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

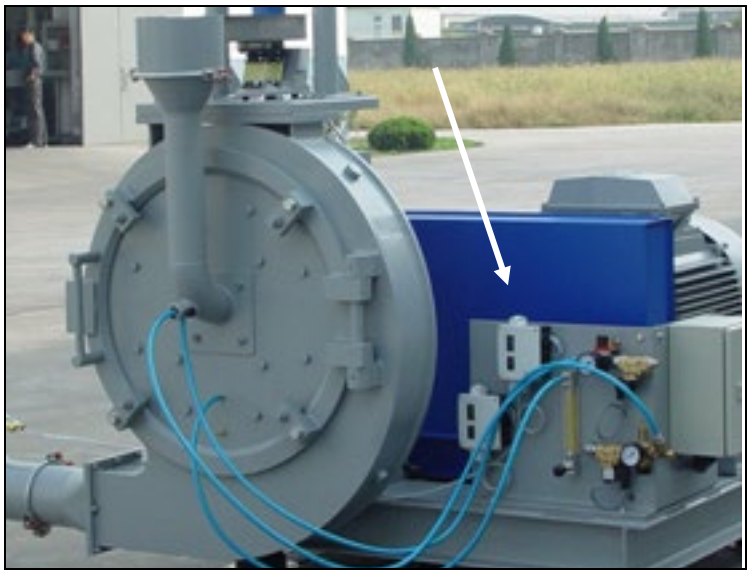
Illustration:
Safety device
for housing flap

The pulverizer can only be operated if the housing flap is closed and the magnetic switch is activated. A time relay makes sure that the door can only be opened after the rotor disc has come to a complete stop. Otherwise the safety switch is locked with a bolt and the door cannot be opened.

### 4.9.2 "V"-belts protector

"V"-belt protection 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.

### 4.9.3 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.

## 4.10 Authorized persons

Only authorized personnel may carry out work on the machine. Observe the legally permissible minimum age!

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

Only trained electricians may carry out all work on the electrical equipment.

Only authorized specialist personnel may eliminate faults on the control system.

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

The operator must make sure that only authorized personnel work on the machine. The operator 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 | | | |
| Maintenance of "V"-belts. | | x | | | |
| Maintenance of cutting discs. | | x | x | | |
| Cutting discs sharpening. | | x | x | x | x |

If necessary, protect yourself with breathing equipment (in addition to the air suction device) 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.**

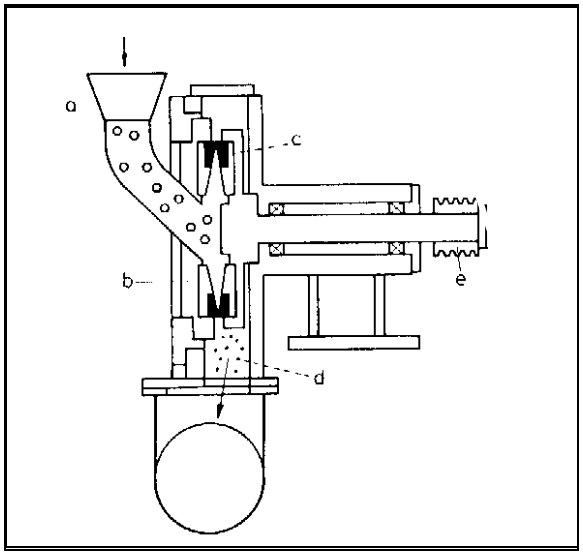
**TIP**

**Indicates application tips and other particularly useful information.**

# 5 DESCRIPTION OF THE MACHINE

The pre-grinded material is fed through a funnel to the center of the pulverizer.
The feeding has to be done with a load limited dosing unit to prevent damage to the machine. Centrifugal forces are pushing the resins between the two serrated discs and the material is grounded from the stationary and the rotating grinding discs. The output size is according to the gap setting.

Illustration:
a. Material in feed
b. Stator disc
c. Rotor disc
d. Material output
e. Drive




Normally the processed material is evacuated by means of a blower, which helps to increase the output and on the other hand the air stream is cooling down the granule as well as the pulverizer.

## 5.1 Grinding material in feed

The grinding material can be fed into the pulverizer 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. vibratory feeder).
- Automatic in feed of the grinding material by means of an additional in feed device (e.g. blower).
- Automatic in feed of the grinding material by means of an additional in feed device (e.g. auger conveyor).

### 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. The grinding material in feed can take place manually or with the help of an additional in feed device.

### 5.1.2 Additional in feed device

If your machine has an optional in feed device such as vibratory feeder or auger conveyor please refer to the additional information about the accessories in the appendix.

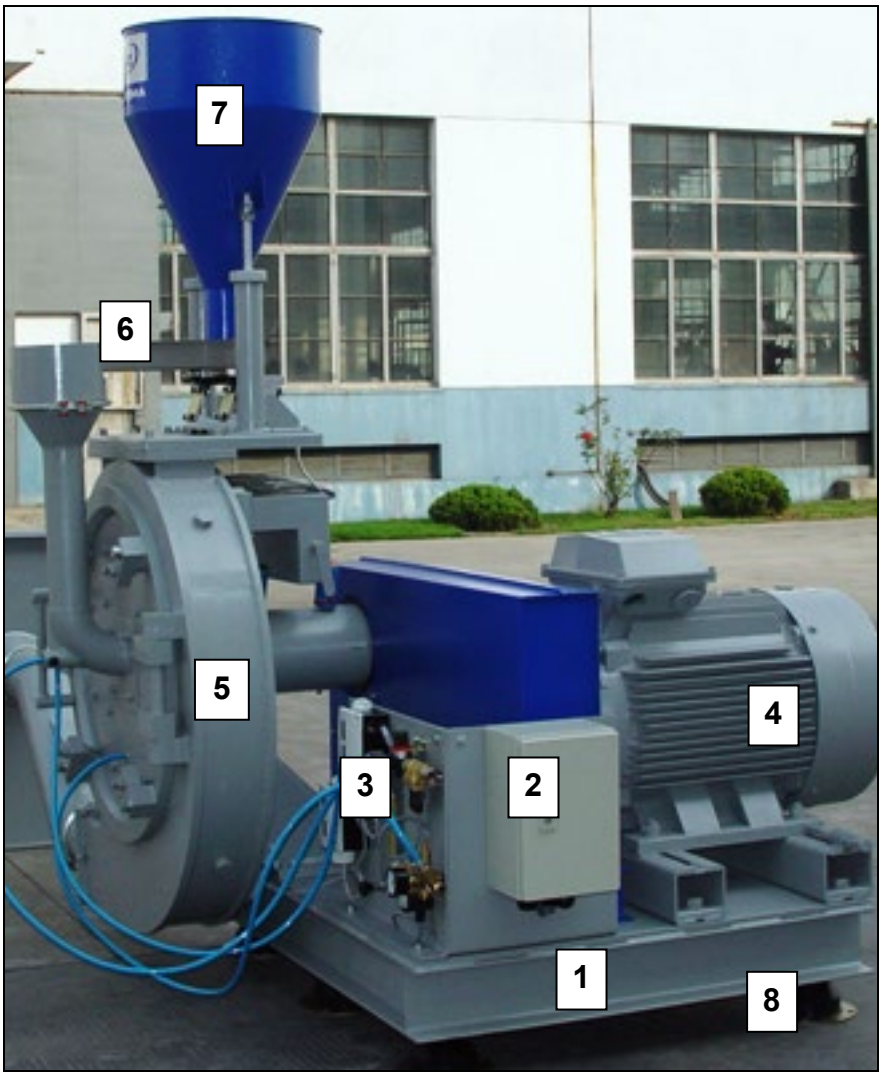
Illustration:

(1) Vibro feeder

## 5.2 Base frame

Illustration:

(2) Base frame
(3) Terminal box
(4) Water cooling system
(5) Drive motor
(6) Cutting chamber
(7) Vibratory feeder
(8) Hopper
(9) Pads



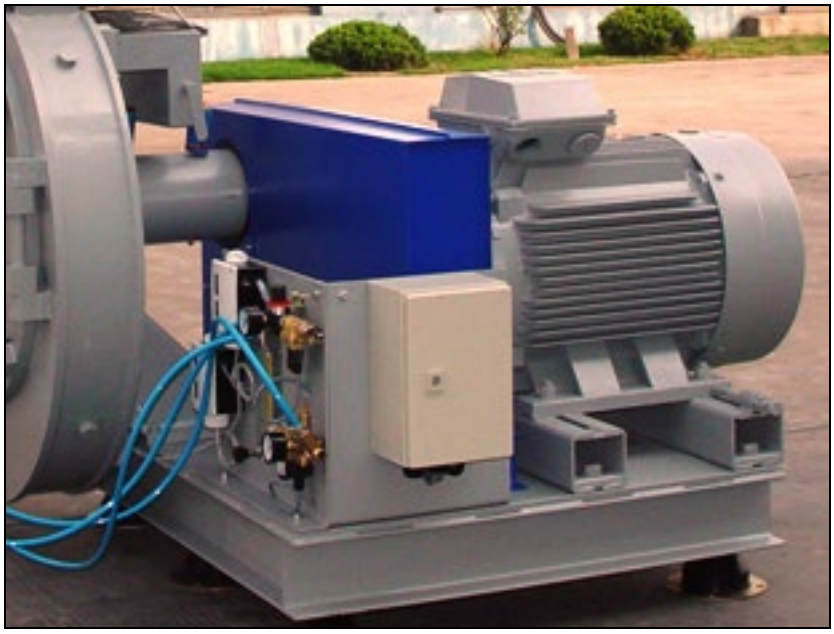

The cutting chamber, drive motor, water cooling system and terminal box, for the electrical connections, are mounted on the base frame.

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

## 5.3 Drive

The rotor is driven 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



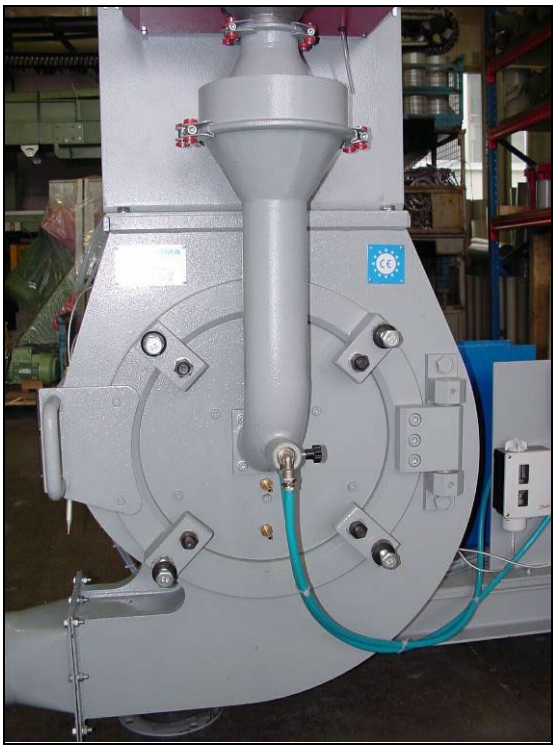
Please observe the operation manual from the manufacturer!

## 5.4 Housing

The housing is a sturdy, welded, compact steel construction. The housing door can be opened, so that the grinding chamber is accessible easily. Please refer to chapter “Opening of the housing door “.

The grinding process results from the interaction of the rotating rotor disc and the stator disc mounted on the housing door. The grinding gap can be adjusted by setting screws.
Please refer to chapter “Setting of the grinding gap”
The rotor disc is dynamically balanced.

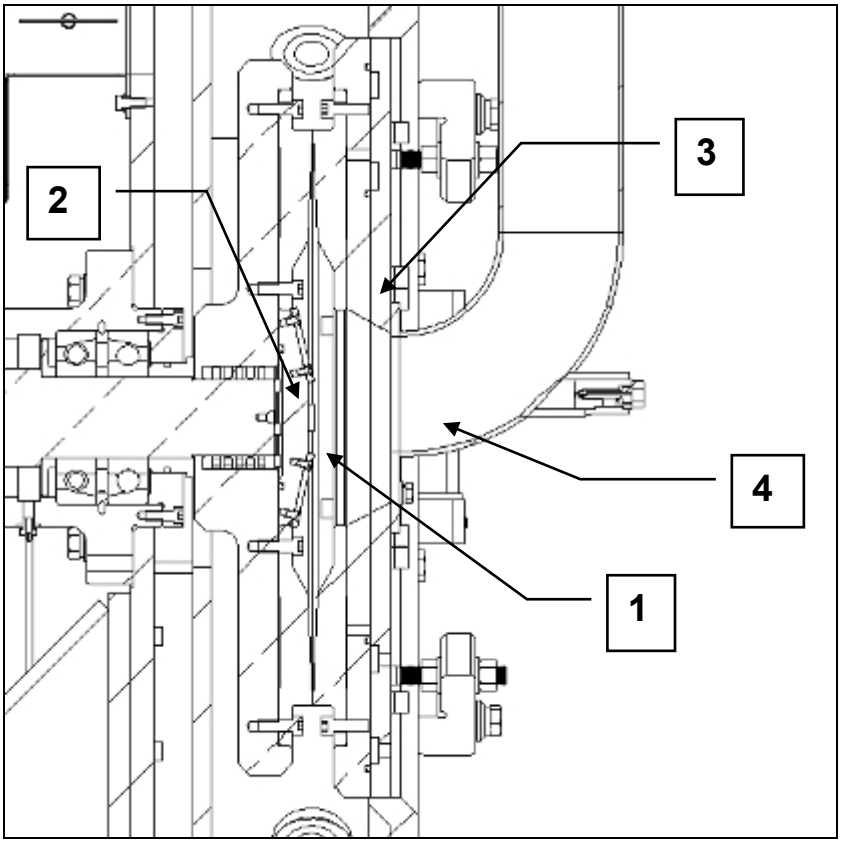
Illustration:
Grinding chamber



## 5.5 Rotor and grinding discs

Illustration:

(1) Stator disc
(2) Rotor disc
(3) Housing door
(4) Material in feed




The material is ground between the grinding disc assembled on the rotor and the stator grinding disc which is mounted in a fixed position in the housing door.
The grinding discs are either in one piece or in segments.
The discs are equipped with a special serrated geometry to decrease the power consumption and to increase the capacity of the machine, while avoiding high amp-peaks.
The design of the discs has a significant influence on the quality of the grinding process and its results.
The rotor disc is mounted on the drive shaft which is arranged on a special bearing system, which is positioned outside the housing.
The machine is equipped with a special bearing greasing system.
The "V"-belt pulley is attached by means of a taper bush to the rotor axis. The rotor disc is dynamically counter balanced and has vibration-free concentricity. The rotor disc is accessible after opening the front door.

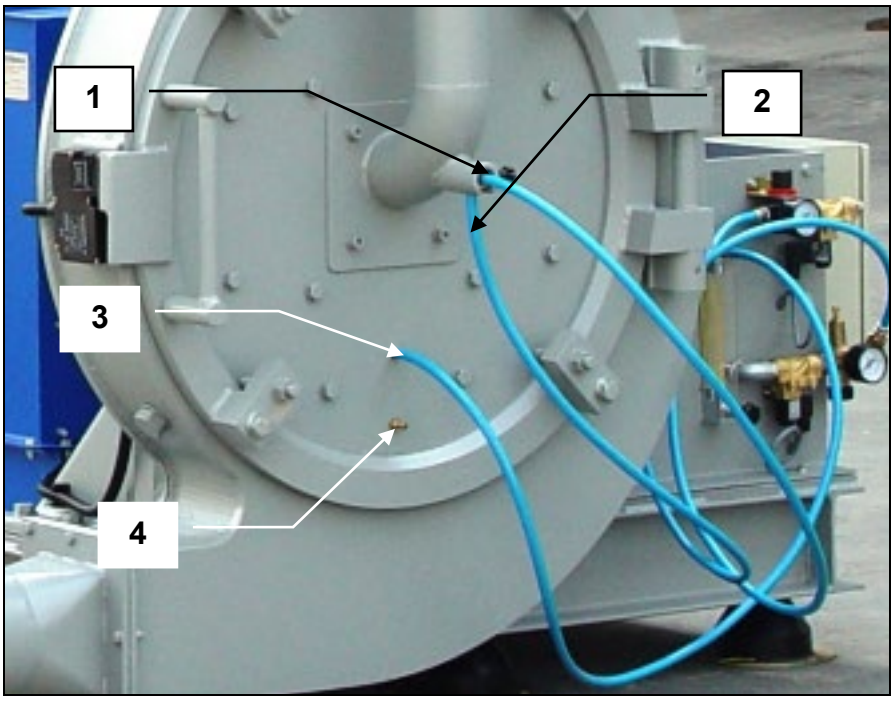
Illustration:
Bearing greasing system

## 5.6 Water cooling system

The PM series is equipped with a water spraying system for cooling the in feed material and with a water cooling system for cooling the disc.

Illustration:

(1) Air inlet (spraying system)
(2) Water inlet (spraying system)
(3) Water inlet (cooling system)
(4) Water outlet (cooling system)




The water spraying system is installed in the middle of the in feed funnel. It is necessary for temperature-sensitive materials.
The water cooling system for the disc can be connected at the front door.

A thermostat at the control panel controls the cooling system by a PT100 probe located at the material discharge pipe. There can be adjusted 2 alarm settings
Setting No.1 starts the water flow
Setting No.2 stops the material in feed

The material in-feed will resume after a temperature decrease of 5°C.
Temperature set points to be determined by customer tests.
Typical temperatures for grinding PE are +35°C for No.1 and 65°C for No.2.
For grinding PVC typical set points are +45°C for No.1 and 75°C for No.2.

Illustration:

(1) Regulator for vibro feeder
(2) Regulator for Water spray pressure
(3) Air connection
(4) Water connection
(5) Water flow for water spray
(6) Junction box

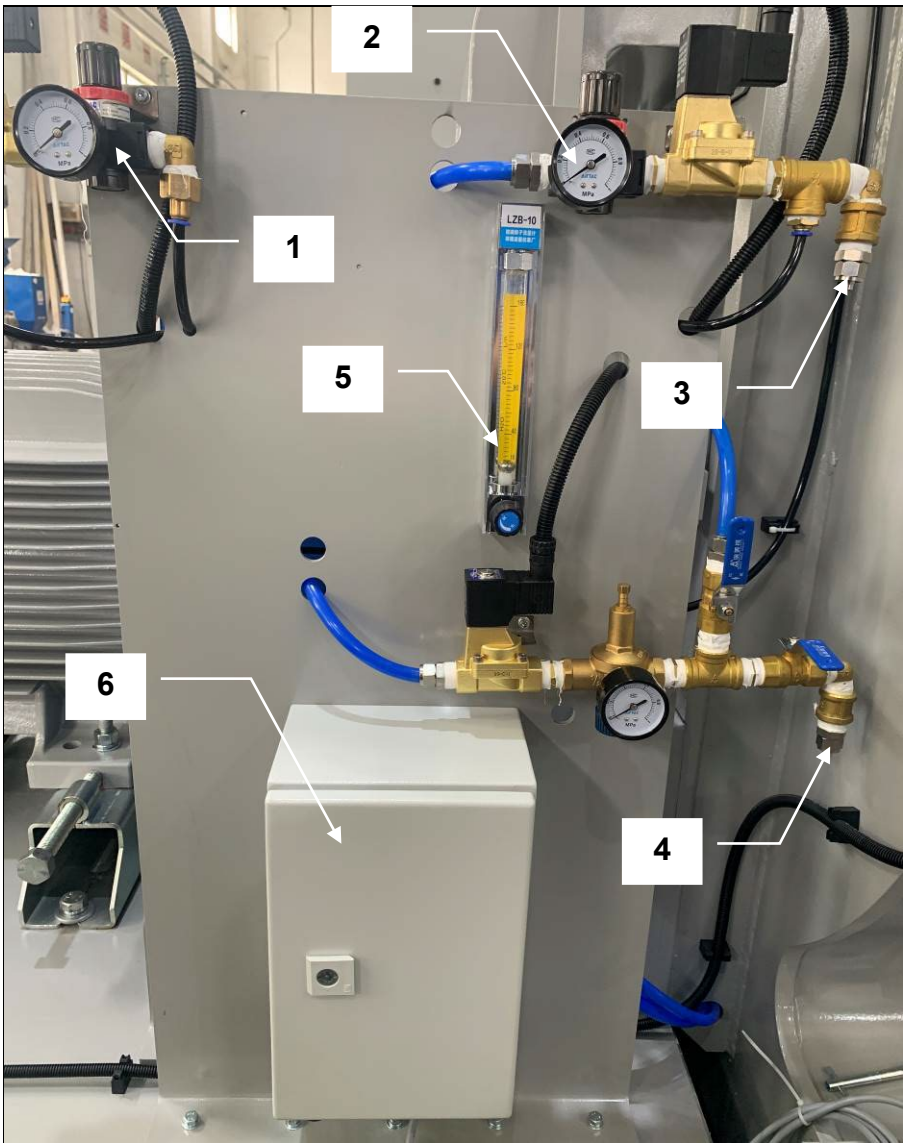


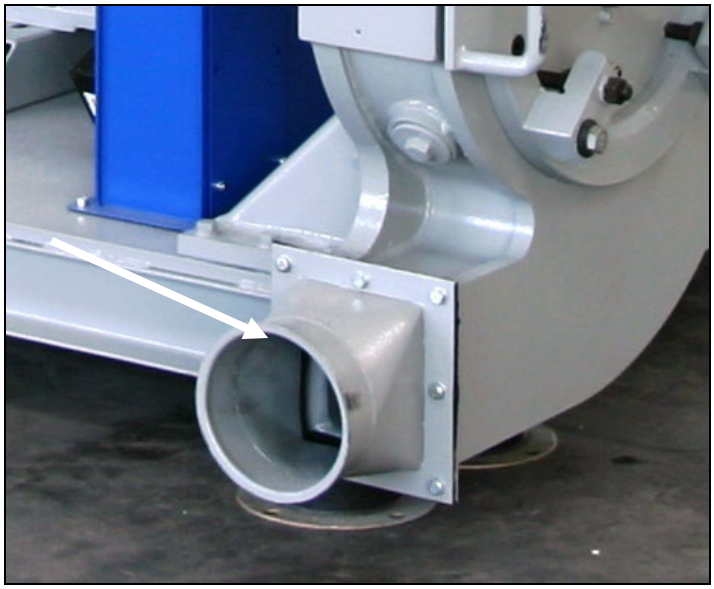

Illustration:

Z-pipe with thermostat support for PT100

## 5.7 Discharge of grinding material

Illustration:

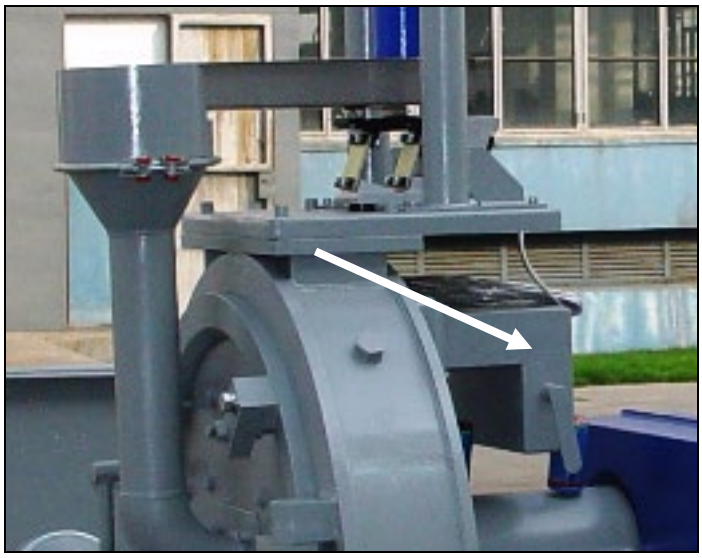
Pipe connection for blower



The ground material is evacuated by means of a blower out of the suction trough of the pulverizer. During this process, air is sucked through the in feed hopper of the pulverizer 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 backside of the grinding chamber. 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.*

## 5.8 Control panel

Illustration:
Control panel

(1) Main switch
(2)

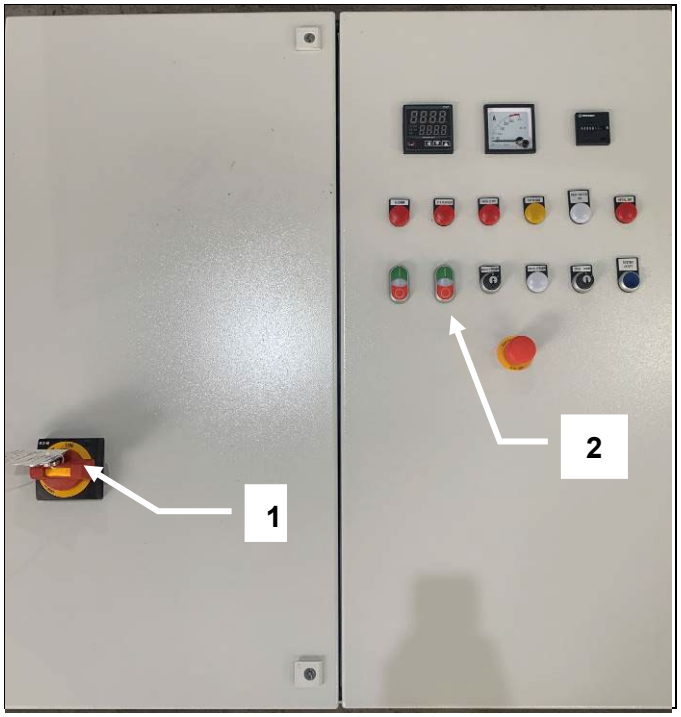
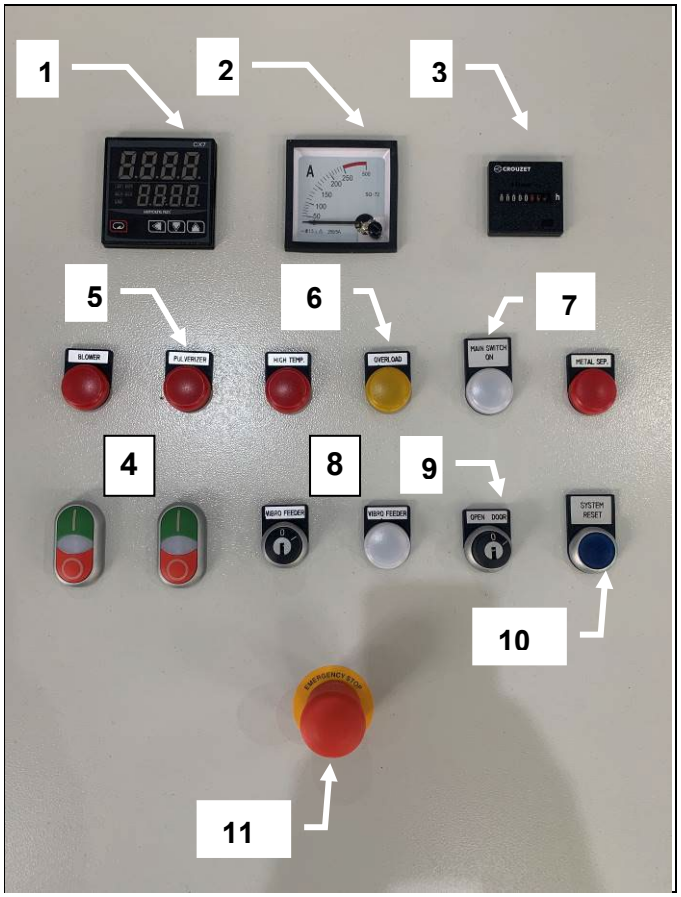



Illustration:
2

(1) Thermostat
(2) Ampere meter
(3) Elapsed hour counter
(4) Start/Stop for PM and blower
(5) Error light
(6) High temperature alarm
(7) Main power signal light
(8) Feeding system on/off
(9) Maintenance door
(10) System reset
(11) E-Stop



# 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

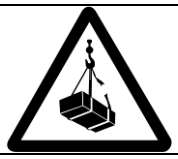
The site of application for the machine must exhibit the following features:

- 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 will arrive to 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.

**⚠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 pulverizer 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 pulverizer 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.**<br>**Touching live parts can lead to serious injury or death.**<br>**All work which relates to the electricity of the machine may only be carried out by trained electricians.**<br>**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 not been 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 high regard for 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

Rotational direction of the motors must be checked before initial start-up. The steps prior to this check must be completed.

- Switch the machine on and then immediately off again (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 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 the pulverizer is opened, check the knife mounting screws using a torque wrench. | *Replacing and checking the cutting disc mountings.* |
| 2. Search the grinding chamber for foreign matter. | *Cleaning the pulverizer.* |
| 3. Close pulverizer front door and fasten screws tightly. | *Opening the housing door* |
| 4. Examine in feed device (accessories) for foreign matter. | *Part B: Accessories.* |
| 5. Check that the *Emergency Stop buttons* are unlocked. | |
| 6. Check all safety devices for proper functioning. | *Checking the protective devices.* |
| 7. Connect water cooling system and check for proper functioning. | *Water cooling system* |
| 8. Check Thermostats temperature set points | *Water cooling system* |
| 9. 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. |
| 10. Allow machine to run for approx. 10 minutes without grinding material. | *Switch on machine.* |
| 11. Connect material blower (accessories) and in feed device (accessories), check rotational direction of blower. | *Part B: Accessories.* |
| 12. Feed grinding material uniformly. Too much grinding material can lead to overload of the machine. | *Manual in feed of grinding material.* |
| 13. If necessary, check the temperature of the ground material. | |
| 14. 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 pulverizer which has been delivered with an electrical control system. | |
| 15. 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 Four?**
**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 *Troubleshooting*.**

## 7.1 Machine checks before switching on the machine

| Check | See |
|---|---|
| 1. The grinding discs are properly set and the screws are tightened with the specified torque. | *Replacing and checking the cutting disc mountings.* |
| 2. The grinding chamber is free of foreign matter. | *Cleaning the machine.* |
| 3. The housing door is closed. | *Cleaning the machine.*<br>*Opening the housing door.* |
| 4. The water and air supply is connected and the cooling system is working properly. | *Water cooling system.* |
| 5. All safety devices, including those of the installed grinding material in feed and discharge devices, are checked and operative. | *Checking the protective devices.* |
| 6. The material blower is installed properly and the air regulating flap on the backside of the machine is set so that the grinding material can be evacuated completely. | *Part B: Accessories.* |

## 7.2 Switch on machine

1. Switch on the grinding material discharge device.
2. Open water and air supply.
3. Switch on the pulverizer (main switch to 1). Wait until the rotor has reached its full speed and switched from star to delta.
4. Switch on the grinding material in feed device (vibratory feeder).

## 7.3 Switch off machine

1. Switch off the grinding material in feed device (vibratory feeder).
2. Wait until the remaining grinding material has been ground, and then switch off the granulator, (main switch to 0).
3. Switch off the grinding material discharge device.
4. Close water and air supply

## 7.4 Manual in feed of grinding material

| ⚠DANGER | |
|---|---|
|  | **Rotating grinding discs.**<br>**Can cause serious cutting and crushing injuries, possibly leading to death.**<br>**Do not reach into the in feed hopper or put in hand or feet 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 in feed hopper.

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.**<br>**Mortal danger.** |
|  | **Therefore, as a basic rule when carrying out maintenance work:**<br>**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** | | | |
|---|---|---|---|
| | **Every Day** | **Every Week** | **Every Month** |
| Check protective devices for proper functioning. | **x** | | |
| Clean machine. | | | **x** |
| Check cutting disc mountings. | **x** | | |
| Check the main bearings (bearing clearance, lubricant renewal). | | | **x** |
| Lubricant replacement, lubricant renewal | **See Lubricating the main bearings** | | |
| Check "V"-belt tension force and "V"-belt condition. | | **X** | |
| Check condition of cutting discs. | **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

For this, see also the chapter *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.**<br>• **Eliminate all defects before you put the machine into operation!**<br>• **If defects occur during operation, stop the machine immediately and eliminate the defects!**<br>• **Do not change or remove any protective devices. Do not put any protective devices out of action by modifying them.** |

## 8.4 Opening the housing door

For cleaning the machine, changing the discs and some other maintenance work it is necessary to open the pulverizer.
This door is safeguarded by a magnetic switch.
The pulverizer can only be operated if the housing door is closed and the magnetic switch is activated. A time relay makes sure that the door can only be opened after the rotor disc has come to a complete stop. Otherwise the safety switch is locked with a bolt and the door cannot be opened.

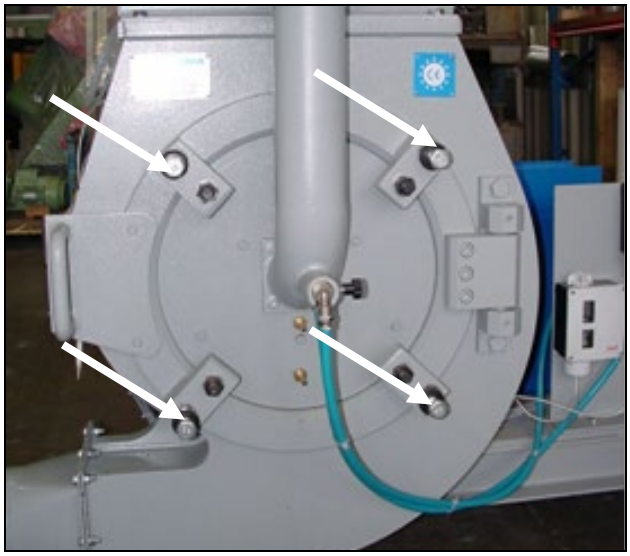
| ⚠WARNING | |
|---|---|
|  | **Risk of crushing to hands and fingers.**<br>**Serious injury can result.**<br>**Always open the door completely.**<br>**Intermediate positions are not allowed.**<br>**Make sure when closing that nobody takes his hands or feet in the danger area.** |

### 8.4.1 Opening the housing door

**<u>Proceed as follows:</u>**

- Switch off the pulverizer at the main switch
- Safeguard main switch using a padlock.
- Wait until the rotor has stopped completely
- Open the four bolts, which are connecting the door with the cutting chamber

Illustration:
Housing door



- Open the door manually

### 8.4.2 Closing the housing door

**Proceed as follows:**

- Clean all surfaces between the cutting chamber and the door using a hand brush.
- Check that there are no foreign objects in the grinding chamber.
- Close the door slowly to ensure that all parts fit properly.
- Tighten the connecting bolts between the door and the cutting chamber.
- Machine can be started again.

## 8.5 Cleaning the machine

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

**Proceed as follows:**

- Switch off the pulverizer at the main switch
- Safeguard main switch using a padlock.
- Wait until the rotor has stopped completely
- Open housing door

| ⚠WARNING | |
|---|---|
|  | **Inhalation of grinding dust which is dangerous to the health.**<br>**This can result in injury to the respiratory tract.**<br>**Never blow out the grinding material residue, use suction instead.**<br>**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.
- Close the housing door
- 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, please ask Zerma service department for help.

After 10000 operation hours, the bearing system has to be replaced by ZERMA service personal.

## 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.
The Zerma PM Series pulverizer is equipped with an auto-greasing system (Perma star). The lubricator is set to the specified working conditions and working hours on the production site. The greasing system can be used for 12 month on the PM 300 and PM 500 and 6 month on the PM 800. Then the grease cartridge has to be changed. When changing the cartridge please follow the instruction manual of the manufacturer

**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 Lubricator cartridge changing intervals:

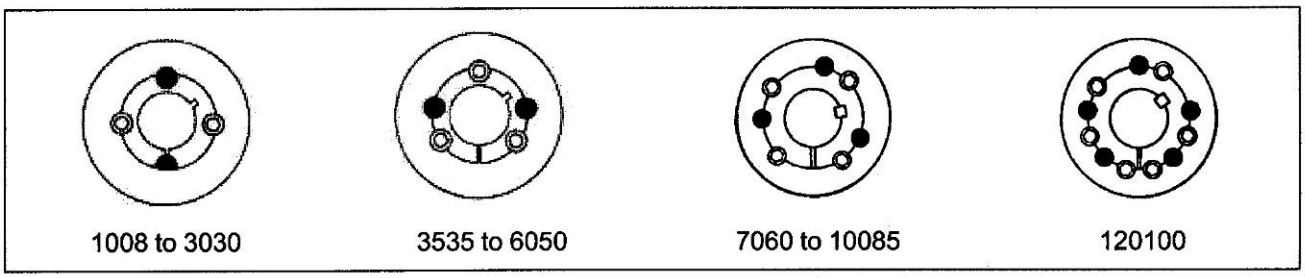
| Machine | Replace cartridge | Check |
|---|---|---|
| PM 800 | After 6 months | Weekly |

Illustration:
Bearing greasing system

## 8.8 Mounting and dismounting TAPER-LOCK tensioning element

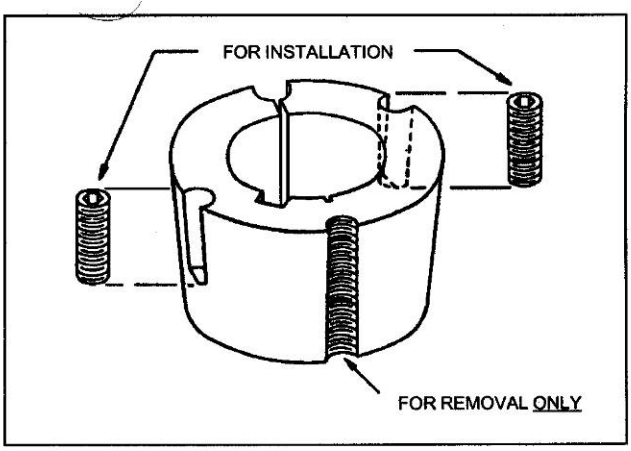
The motor-"V"-belt pulley is attached onto the shaft by means of a TAPER-LOCK tensioning element. The disks must be dismounted for certain maintenance work.

**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) |
| 2517 | 48 | 2 | 1/16" |
| 3020 | 90 | 2 | 5/8" |
| 3535 | 60 | 3 | 1/2" |

### 8.8.2 Mounting the TAPER-LOCK tensioning element

**Proceed as follows:**

- Remove the protective coating from the bore and outside of bushing, and bore of hub. After ensuring that the mating tapered surfaces are completely clean and free from oil or dirt. Insert bushing 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 bushing 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 bushing, using a block or sleeve to prevent damage. (This will ensure that the bushing 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 bushing. 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 bushing is loosened in hub and assembly is free on the shaft.
- Remove assembly from shaft.

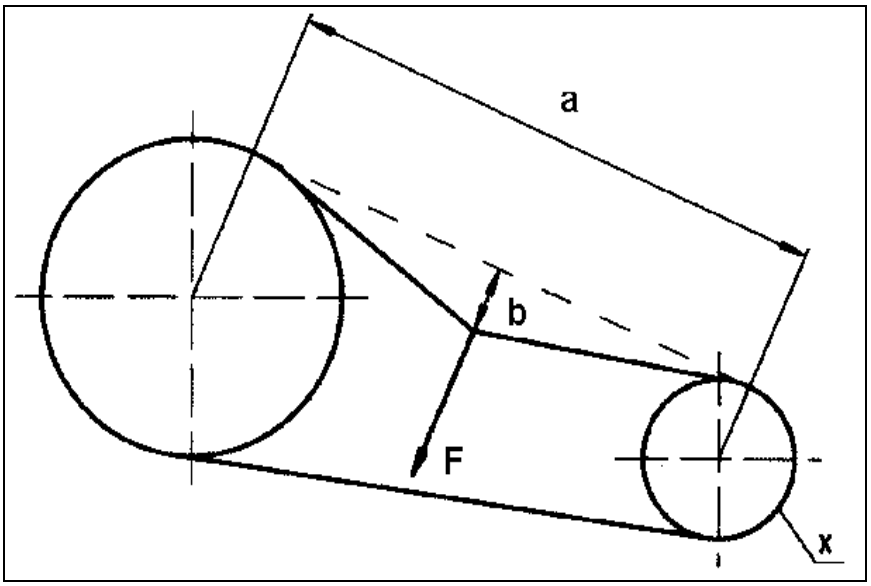
## 8.9 Work on the "V"-belts

"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.

### 8.9.1 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** |
| SPB | 160 - 224 | 35 - 50 | 7,7 - 11 |
| SPB | 236 - 315 | 50 -65 | 11 - 14,3 |

- 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.

### 8.9.2 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.

### 8.9.3 Checking "V"-belt condition, replacing "V"-belt

| ⚠CAUTION | |
|---|---|
|  | **Danger of pulling into machine caused by running "V"-belts.**<br>**Hair, jewellery etc. can be pulled into the machine. Serious injury can result.**<br>**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.

## 8.10 Working on the cutting discs

The correct grinding properties, correct setting and mounting of the cutting discs are important factors to ensure perfect functioning and economic operation of the machine.

### 8.10.1 Replacing and checking the cutting disc 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 discs using a torque wrench which is set to the required torque for the screw size.

You can find out the required torque from the following table. Take note also 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 disc 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 |

## Checking the condition of the cutting discs

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

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

**Using blunt discs has the following consequences:**

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

### 8.10.2 Dismounting the cutting discs

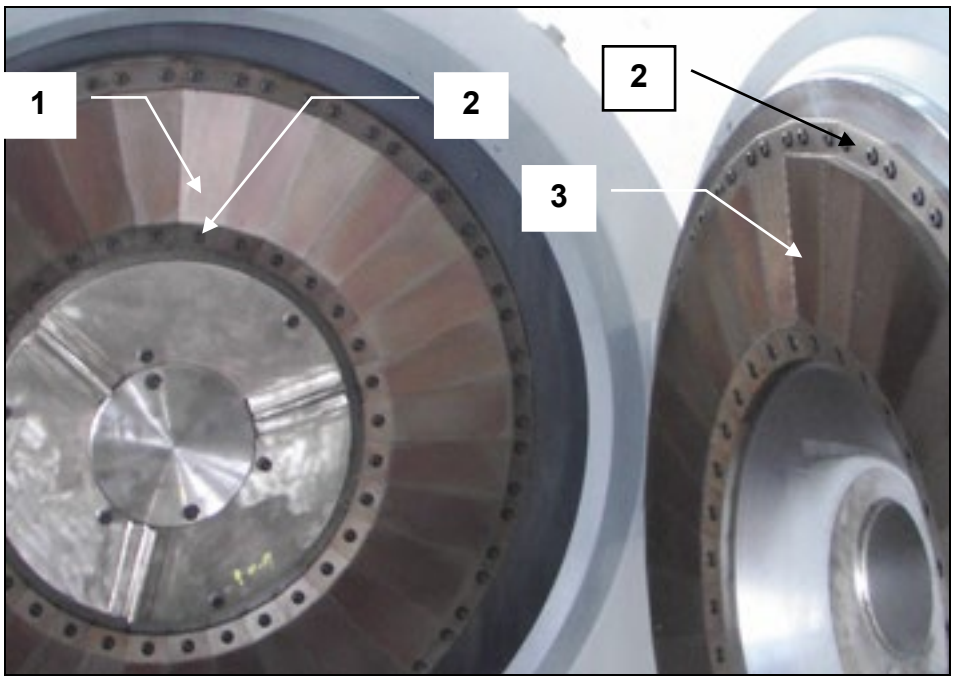
| ⚠WARNING | |
|---|---|
|  | **Danger of cutting caused by sharp discs, even when the rotor is at a standstill.**<br>**Serious injury, particularly to hands and fingers, can result.**<br>**Wear protective gloves.** |

**Segment disc:**

**Proceed as follows:**

Illustration:

(1) Rotor segment disc
(2) Disc mounting screws
(3) Stator segment disc



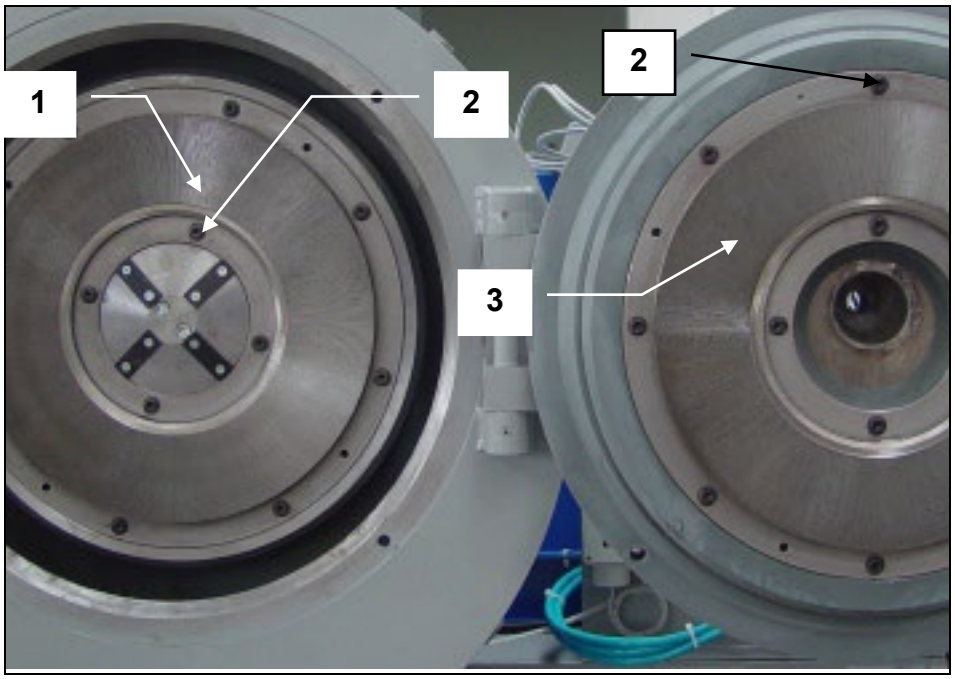

- Open the housing door
- Safeguard the rotor disc against torsion.
- Loosen the disc mounting screws.
- Take out the segments and screws

**Normal disc:**

**Proceed as follows:**

Illustration:

(1) Rotor disc
(2) Disc mounting screws
(3) Stator disc




- Open the housing door
- Safeguard the rotor disc against torsion.
- Suspend discs with suitable lifting equipment
  (Weight of discs: PM 800=99 kg )
- 
- Loosen the disc mounting screws.
- Take out the discs and screws

### 8.10.3 Mounting the cutting discs

**⚠WARNING**

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

**HINT**

**The segment cutting discs should only be sharpened or replaced in sets. There is a danger of balance error if a combination of segments from a different set is used.**

**Proceed as follows:**

- Clean the disc supporting surface and threaded holes.
- Insert sharp discs and push against the setting surface.
- Screw in the mounting screws and tighten using a torque wrench.

**The required torque for the disc mounting bolts is:**

| Machine | Type of bolt | Torque in Nm |
|---|---|---|
| PM 300 standard disc | DIN912-M8x30-12.9 | 41 |
| PM 500 standard disc | DIN912-M10x30-12.9 | 83 |
| PM 800 standard disc | DIN912-M12x30-12.9 | 145 |
| PM 500 segment disc | DIN912-M8x25-12.9 | 41 |
| PM 800 segment disc | DIN912-M8x25-12.9 | 41 |

- (Also see the table under *Replacing and checking the cutting disc mountings)*.

- Remove tools and other objects from the grinding chamber.
- Close the housing door.
- Set the cutting gap
- **Check whether the cutting gap is correct and whether the cutting knives do not collide as the rotor turns.**

- Switch on the pulverizer for a short time without grinding material and listen for noises. If you hear unusual noises, determine the cause and eliminate it.

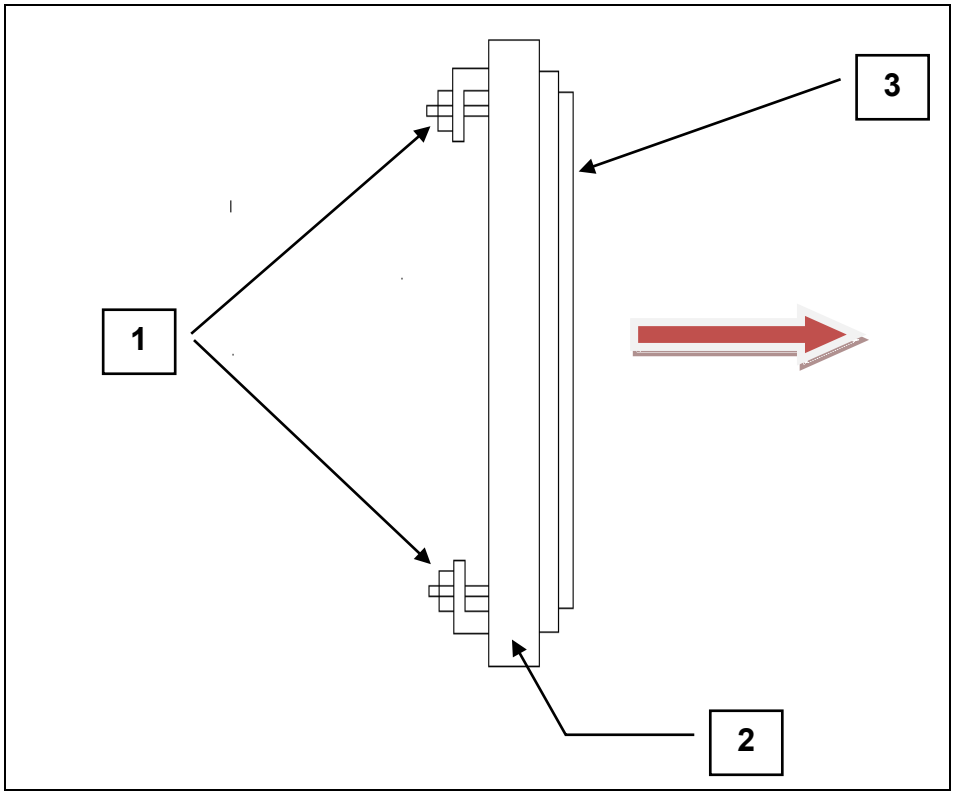
## 8.10.4 Changing the mounting plate

**Stator disc:**

**Proceed as follows:**

Illustration:

(1) Adjusting bolts and nuts
(2) Door frame
(3) Stator disc + disc mounting plate



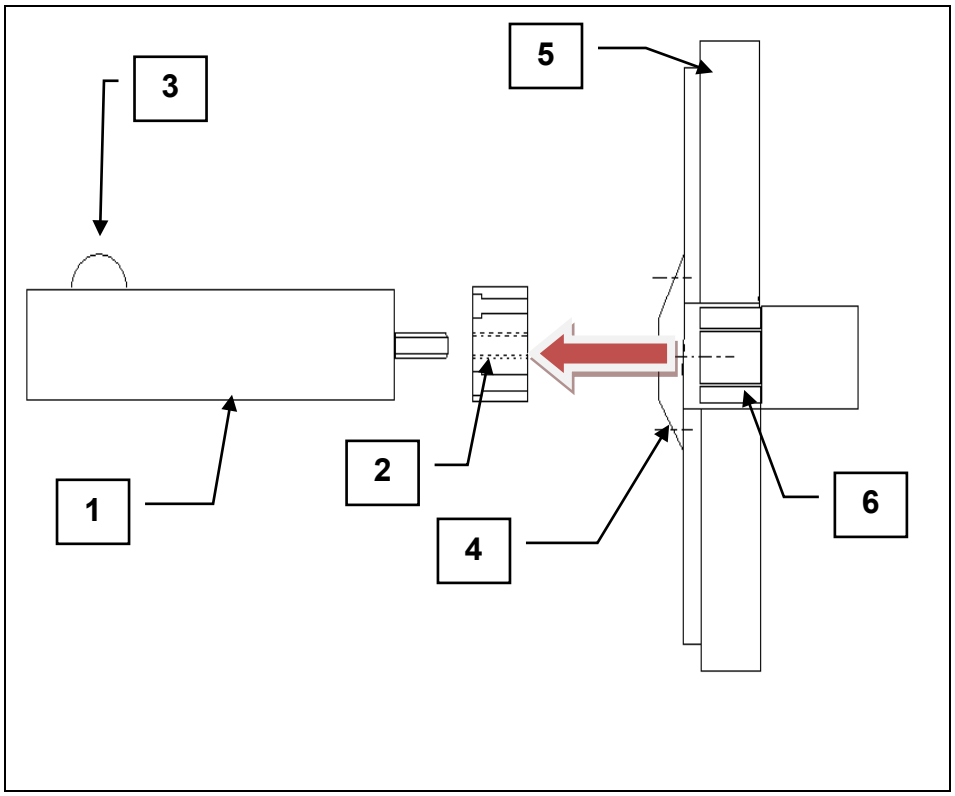

- Remove the 4 adjusting bolt nuts.
- Push carefully against the bolts so that the disc holding plate moves out of the door frame.
- Hold the disc holding plate with a shaft or something similar, which you insert in the middle of the disc.
- Mount the new segment disc and disc holding plate into the door frame.
- Fix the 4 adjusting bolt nuts.

## Rotor disc:

### Proceed as follows:

Illustration:

(1) Extracting tool part 1
(2) Extracting tool part 2
(3) Hook
(4) Spinner
(5) Rotor disc mounting plate
(6) Clamping sleeve




- Remove the 2 screws which hold the spinner.
- Prepare the special extracting tool (1+2). (Notice the parts 1 and 2 should be a little bit smaller in the diameter as the clamping sleeve).
- Mount the extracting tool part 1+2 on the motor shaft.(notice if the motor shaft has a middle hole only use part 1 of the extracting tool)
- Hold the hook with a crane or something similar.
- Pull carefully the rotor disc holding plate towards the part 1.
- Mount the new segment rotor disc holding plate.
- Mount the spinner.
- Adjust cutting gab between rotor and stator disc.

### 8.10.5 Sharpening cutting discs

# TIP

**Specialist sharpening of the cutting discs is part of the service offer of ZERMA.**

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

# HINT

**The segment cutting discs should only be sharpened or replaced in sets. There is a danger of balance error if a combination of segments from different segment sets is used.**

**<u>Proceed as follows:</u>**

- Dismount the cutting discs (see *Dismounting the cutting discs*).
- Sharpen the cutting discs.
  A specialist in accordance with the sharpening plan using particular care should uniformly sharpen the cutting discs 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 Borazon discs for grinding. Use regrinding discs with the same profile as the cutting discs. Discs, which have grinding cracks, are not to be reused due to danger of breakage during operation. Discs can be resharpened up to maximum 3 mm.
- By taking these measures, the service life of the cutting discs can be increased.
- Mount the cutting discs (see *mounting the cutting discs)*.

Illustration: *Resharpening plan standard disc*

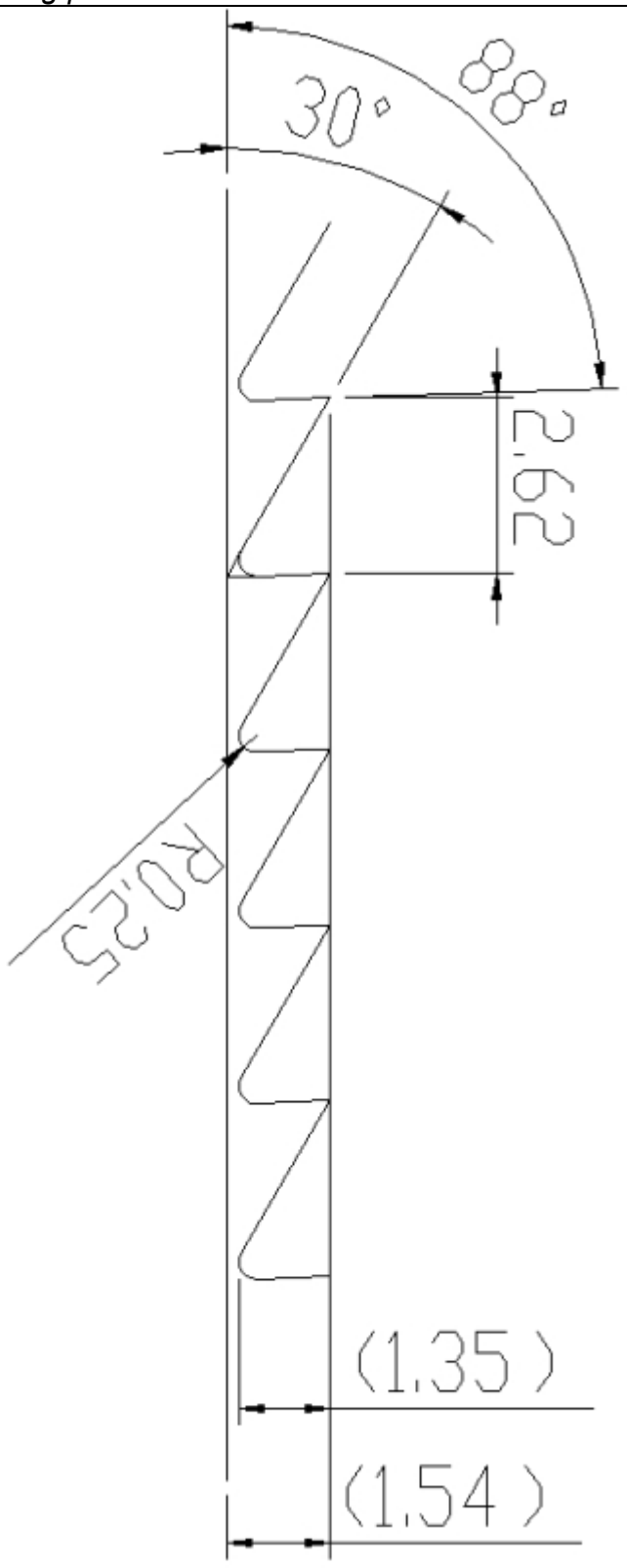
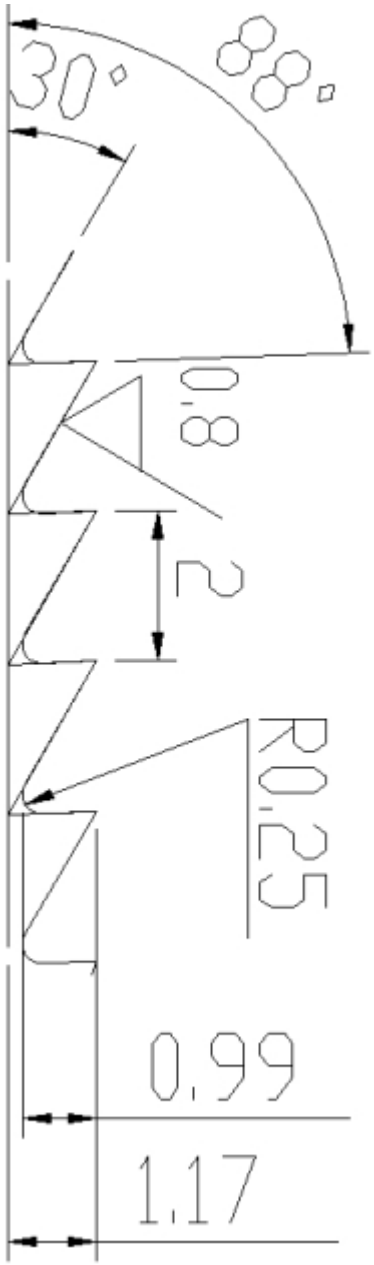


Illustration: *Resharpening plan segment disc*



### 8.10.6 Setting the cutting gap

| ⚠WARNING | |
|---|---|
|  | **Danger of cutting caused by sharp cutting discs.**<br>**Serious injury, in particular to hands and fingers, can result.**<br>**Wear protective gloves.** |

Correct and careful setting of the gap between the rotor disc and the stator disc (cutting gap) is an important requirement for the productive capacity of the pulverizer.
Factors for the size of the cutting gap are the size of the rotor, the geometry of the disc and the material to be ground.
The cutting gap is set by moving the stator disc.

**For setting the cutting gap, proceed as follows:**

Illustration:
Cutting gap

- Switch off the pulverizer at the main switch
- Safeguard main switch using a padlock.
- Wait until the rotor has stopped completely
- Open the four maintenance holes on the side of the cutting chamber

Illustration:

Maintenance holes

➧ Select the guide calibre appropriate for the size of the cutting gap from the delivered guide calibre set.
The guide calibres are marked with numbers, which when divided by 100, give the thickness in mm.

Illustration:

Cutting gap adjustment

**Setting a smaller cutting gap:**

- Push the guide calibre inside the cutting gap
- Open the counter nut to the left and turn the setting nut also to the left. When turning the setting nut to the left the stator disc is pressed towards the interior of the pulverizer.
- After setting the smaller gap tighten the counter nut carefully and check the gap again.
- Reset if necessary!

**Setting a bigger cutting gap:**

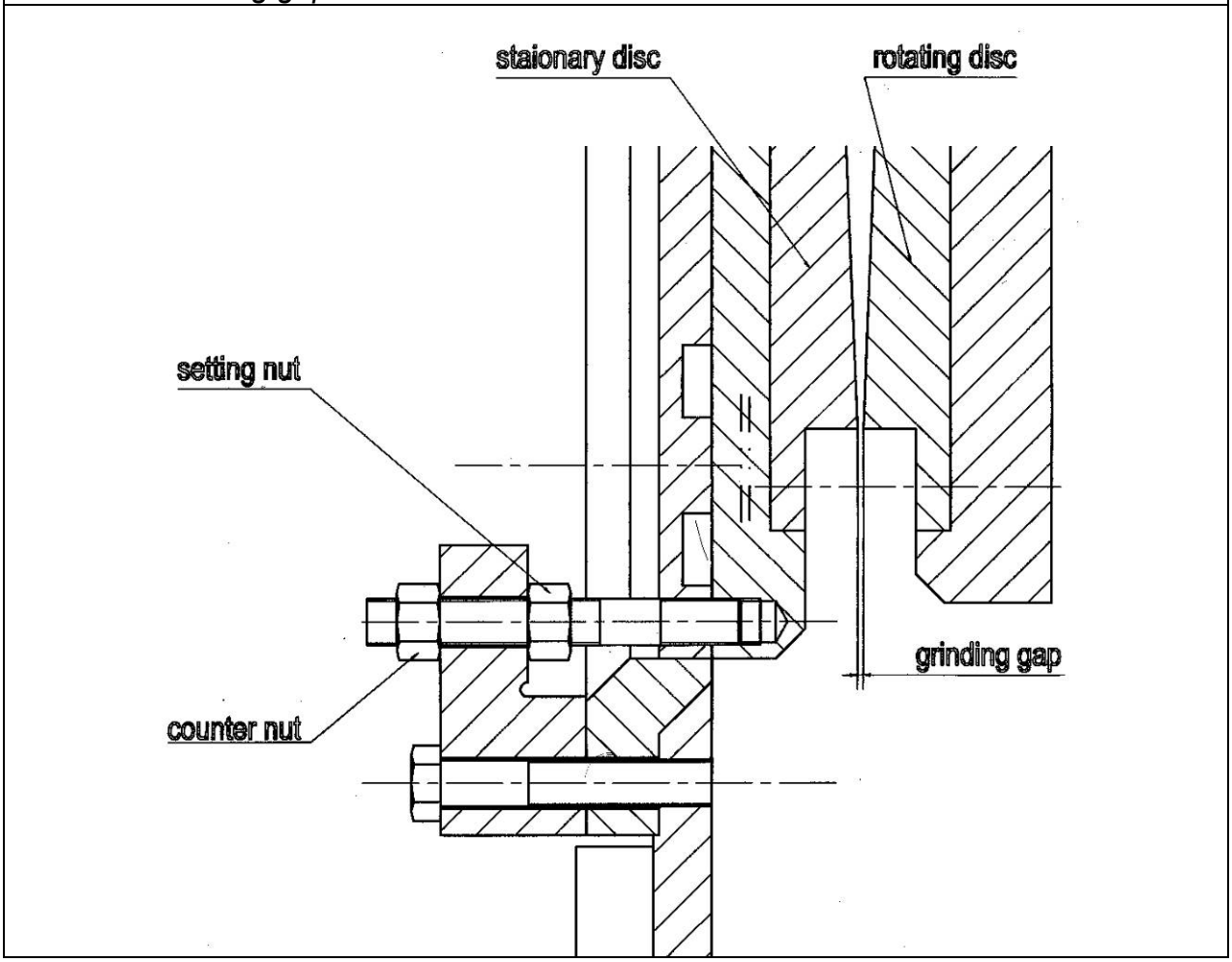
- Push the guide calibre inside the cutting gap
- Open the setting nut to the right and turn the counter nut also to the right. When turning the counter nut to the right the stator disc is pulled away from the rotor disc.
- After setting the larger gap tighten the setting nut carefully and check the gap again.
- Reset if necessary!

**Smallest possible cutting gap:**

| **Machine** | |
|---|---|
| PM 300 | 0.2 mm |
| PM 500 | 0.3 mm |
| PM 800 | 0.4 mm |

- Dismount the V-belt cover.
- Turn the rotor several times by hand
- Check the gap again with a feeler gauge
- Tighten all screws
- Mount the V-belt cover
- Switch on the pulverizer for a short time without grinding material and listen for noises. If you hear unusual noises, determine the cause and eliminate it.

Illustration: *Cutting gap*




**In operating state, the pulverizer heats up and expand unevenly. Therefore, if the cutting gap is too small this can lead to machine damage caused by the discs colliding.**

### 8.10.7 Transporting and storing the cutting discs

| ⚠WARNING | |
|---|---|
|  | **Danger of cutting caused by sharp cutting discs.**<br>**Serious injury, in particular to hands and fingers, can result.**<br>**Only transport and store the cutting discs packaged.**<br>**Grease the cutting discs well, so that they do not rust. Protect the cutting edges with doubled cardboard and use adhesive tape to safeguard the disc against slipping out of the sides of the sheath.**<br><br>**After unpacking, you must degrease the cutting discs 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 | "V"-belts slip. | Check "V"-belt tension and condition and retighten if necessary or replace. |
| 9.1.3 | Cutting disc condition. | Check cutting discs and resharpen or replace if needed. |
| 9.1.4 | Cutting gap. | Check cutting gap and set according to the instructions in this operation manual. |
| 9.1.5 | Suction trough blocked. | Change in rotational direction of blower needed.<br>Replace fan blades if necessary.<br>Open the air regulating flap on the back of the machine as far as necessary.<br>Check discharge air flow from cyclone for blockages. |
| 9.1.6 | Current failure. | Check limit switch for defective contact.<br>Check electrical connection, if necessary tighten limit switch. |
| 9.1.7 | Fuse too small. | Fit larger fuse. **Only after consulting the service department of ZERMA.** |
| 9.1.8 | Rotational direction of rotor. | Check motor and reverse polarity if necessary. |
| 9.1.9 | Rotor speed. | Change rotor speed. **Only after consulting the service department of ZERMA.** |

## 9.2 Overheating of the grinding material

| No. | Possible causes | Remedy required |
|---|---|---|
| 9.2.1 | Water supply not opened. | Open water supply. |
| 9.2.2 | Air supply not opened. | Open air supply. |
| 9.2.3 | Low water pressure. | Increase system water pressure. |
| 9.2.4 | Water cooling system clogged. | Clean cooling system. |
| 9.2.5 | Cutting discs worn out. | Change cutting discs or resharpen. |
| 9.2.6 | Low suction air. | Close air-regulating flap on suction trough step by step. |
| 9.2.7 | Suction fan rotates in wrong direction. | Check connection, if required reverse polarity. |

## 9.3 Unusual vibrations

| No. | Possible causes | Remedy required |
|---|---|---|
| 9.3.1 | Rotor out of balance. | Weigh discs, balance rotor. |
| 9.3.2 | Bearing damage. | Check bearings, replace bearings if necessary. |
| 9.3.3 | Mounting pads defective (vibration elements). | Check mounting pads and renew these if necessary. |
| 9.3.4 | Cutting gap too small | Change bigger gap. |

## 9.4 Extreme cutter wear

| No. | Possible causes | Remedy required |
|---|---|---|
| 9.4.1 | Bearing damage. | Check bearings, replace bearings if necessary. |
| 9.4.2 | Cutting discs blunt. | Check cutting discs and sharpen or replace if necessary. |
| 9.4.3 | Wrong cutting gap. | Check cutting gap and set according to the instructions in this operation manual. |
| 9.4.4 | Foreign matter. | Fit feed device with a metal detector. |

## 9.5 Bearings too hot

| No. | Possible causes | Remedy required |
|---|---|---|
| 9.5.1 | Too much grease in bearing. | Reduce amount of grease. |
| 9.5.2 | "V"-belts too tight. | Reduce tension. |
| 9.5.3 | Rubbing on housing sealing ring. | Check sealing ring, oil or replace. |
| 9.5.4 | Bearing damage. | Check bearings, replace if necessary. |
| 9.5.5 | No grease in bearing. | Lubricate bearing. |

## 9.6 Too many fines in grinding material

| No. | Possible causes | Remedy required |
|---|---|---|
| 9.6.1 | Type of material. | Add screening machine. |
| 9.6.2 | Cutting gap too small. | Set a bigger cutting gap. |
| 9.6.3 | Suction unit too weak. | Change bigger blower. |
| 9.6.4 | Disc design. | Change disc design. **Only after consulting the service department of ZERMA.** |

## 9.7 Too many coarse in grinding material

| No. | Possible causes | Remedy required |
|---|---|---|
| 9.7.1 | Type of material. | Add screening machine. |
| 9.7.2 | Cutting gap too big. | Set a smaller cutting gap. |
| 9.7.3 | Suction unit too strong. | Change smaller blower. |
| 9.7.4 | Disc design. | Change disc design. **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 Pulverizer 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 pulverizer. | Empty pulverizer 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. |

## 9.10 Pulverizer blocks when under load

| No. | Possible causes | Remedy required |
|---|---|---|
| 9.11.1 | Feed starts too early. | Start feed only after the rotor has reached its full speed and switched 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.<br>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. |

## 9.11 Frequent switching off of grinding material in feed device

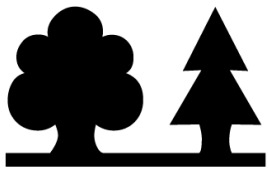
| No. | Possible causes | Remedy required |
|---|---|---|
| 9.12.1 | Current relay switches off. | Correct setting. |

# 10 STORAGE, DISPOSAL, TRANSPORTATION

## 10.1 Storage

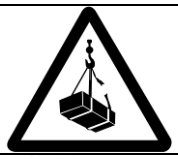
Clean the machine (see Cleaning the machine). Preserve all polished metal surfaces using a suitable rust preventing agent. Store the machine in an enclosed, dry place. Cover the machine completely with a plastic sheet.

## 10.2 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 Bureau and Environmental Protection Agencies). Only deposit the material to be disposed of at authorized drop-off points.

## 10.3 Transportation

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

# 11 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.**

# 12 SPARE PARTS LIST

## 12.1 PM300

| Pos. | Pc | Description/Standard | Partnumber/SAP | Order |
|---|---|---|---|---|
| 100 | | **Machine complete** | | |
| 101 | 1 | In feed funnel | | |
| | | In feed funnel with metal detector | | |
| 102 | 1 | Hopper | | |
| 103 | 1 | Vibratory-feeder | | |
| 104 | 1 | Front door | | |
| 105 | 1 | Housing | | |
| 106 | 1 | Base frame | | |
| 107 | 1 | Connector for suction | | |
| 108 | 7 | Anti vibration pad | | |
| 109 | 4 | Fixing bolt front door DIN 934-M 16x110-8.8 | | |
| 110 | 1 | Screw for maintenance hole DIN 910-M48x2 | | |
| 111 | 1 | Air inlet | | |
| 112 | 2 | Handle | | |
| 113 | 1 | Hinge | | |
| | | | | |
| 300 | 1 | **Bearing** | | |
| 301 | 1 | Bearing housing | | |
| 302 | 2 | Bearing 7209 BEDBP | | |
| 303 | 1 | Bearing NU2209ECP | | |
| 304 | 1 | Bearing Cover A | | |
| 305 | 1 | Bearing Cover B | | |
| 306 | 1 | Shaft | | |
| 307 | 8 | Fixing bolt DIN 912 – M 8 x 25 8.8 | | |
| 308 | 1 | Sleeve for pulley | | |
| 309 | 1 | Sleeve for rotor | | |
| 310 | 1 | Small sleeve for bearing | | |
| 311 | 1 | Big sleeve for bearing | | |
| 312 | 2 | Spacer disk for leak tightness | | |
| 313 | 2 | Sealing ASD66 | | |
| 314 | 2 | Connector for lubrication | | |
| 315 | 2 | Air escape valve | | |
| 316 | 1 | Lubrication system Perma Star | | |
| | | | | |
| 400 | | **Drive** | | |
| 401 | 1 | Motor 22 kW 2B3 400V | | |
| 402 | 1 | Base frame for motor | | |
| 403 | 1 | Rotor pulley SPZ 100-6 | | |
| 404 | 1 | Washer | | |
| 405 | 6 | V-Belt SPZ 1400 | | |
| 406 | 1 | Motor pulley SPZ 200-6 (50Hz) | | |

| | | | | |
|---|---|---|---|---|
| | | Motor pulley SPZ 170-6 (60Hz) | | |
| 407 | 1 | Motor pulley taper bush 2517-48 | | |
| 408 | 1 | Pulley cover | | |
| 409 | 2 | Fixing bolt DIN 912 – M 12 x 45 8.8 | | |
| 410 | 6 | Fixing bolt DIN 933 – M 10 x 35 8.8 | | |
| 411 | 2 | Washer DIN127 – A 12 | | |
| 412 | 6 | Washer DIN127 – A 10 | | |
| 413 | 6 | Washer DIN125 – A 10 | | |
| | | | | |
| 500 | 1 | **Rotor disc assembly (standard)** | | |
| 501 | 1 | Fly wheel for rotor disc | | |
| 502 | 1 | Rotor disc | | |
| 503 | 0 | Clamping sleeve | | |
| 504 | 0 | Fixing bolt DIN 912 – M 6 x 60 8.8 | | |
| 505 | 1 | Spinner | | |
| 506 | 4 | Spinner blade | | |
| 507 | 8 | Adjusting bolt DIN 7991 – M 6 x 12 12.9 | | |
| 508 | 1 | Sealing DIN 3771 – 115 x 5.3 | | |
| 509 | 12 | Fixing bolt DIN 912 – M 8 x 30 12.9 | | |
| | | | | |
| 600 | | **Stator disc assembly (standard)** | | |
| 601 | 1 | Stator disc | | |
| 602 | 1 | Stator disc holder plate | | |
| 603 | 1 | Holder plate mounting surface | | |
| 604 | 4 | Threaded bolt M 16 x 130 | | |
| 605 | 1 | Door frame | | |
| 606 | 8 | Adjusting nut DIN 934 – M 16 | | |
| 607 | 8 | Washer DIN 125 – A 16 | | |
| 608 | 1 | Hinge | | |
| 609 | 1 | Doorknob | | |
| 610 | 4 | Fixing Bolt DIN 933 – M 16 x 110 8.8 | | |
| 611 | 12 | Fixing Bolt DIN 912 – M 8 x 30 12.9 | | |
| 612 | 4 | Fixing Bolt DIN 933 – M 8 x 20 8.8 | | |
| 613 | 6 | Fixing Bolt DIN 912 – M 8 x 30 8.8 | | |
| 614 | 3 | Fixing Bolt DIN 912 – M 12 x 45 8.8 | | |
| 615 | 2 | Fixing Bolt DIN 933 – M 16 x 40 8.8 | | |
| 616 | 6 | Washer DIN 127 – B 8 | | |
| 617 | 4 | Washer ø 17 x 36 x 8 | | |
| 618 | 6 | Washer DIN 127 – B 16 | | |
| 619 | 4 | Washer DIN 125 – A 8 | | |
| 620 | 4 | Washer DIN 127 – B 8 | | |
| 621 | 1 | Sealing DIN 3771 | | |
| 622 | 1 | Sealing DIN 3771 | | |
| | | | | |
| 800 | | **Cooling system** | | |
| 801 | 1 | Injector spraying system | | |

| | | | | |
|---|---|---|---|---|
| 802 | 1 | Input/output stator disc cooling | | |
| 805 | 1 | Probe PT100 | | |
| 806 | 1 | Main air valve | | |
| 807 | 1 | Air valve for vibratory-feeder | | |
| 808 | 1 | Water valve for material cooling | | |
| 809 | 1 | Flow meter | | |
| 810 | 1 | Control box | | |
| 811 | 3 | Solenoid valve | | |
| 812 | 2 | Pressure adjustor & pressure meter | | |
| 813 | 2 | Ball valve | | |
| 814 | 1 | Water valve & pressure meter | | |
| 815 | 4 | Connector 1 | | |
| 816 | 5 | Connector 2 | | |
| 817 | 3 | Connector 3 | | |
| 818 | 4 | Connector 4 | | |
| 819 | 5 | Connector 5 | | |
| 820 | 3 | Connector 6 | | |
| | | | | |
| 900 | | **Electrical parts** | | |
| 901 | 1 | Safety switch AZM 160 lly | | |
| 902 | 1 | Control panel | | |
| | | | | |

## 12.2 PM500

| Pos. | Pc | Description/Standard | Partnumber/SAP | Order |
|---|---|---|---|---|
| 100 | | **Machine complete** | | |
| 101 | 1 | In feed funnel | | |
| | | In feed funnel with metal detector | | |
| 102 | 1 | Hopper | | |
| 103 | 1 | Vibratory-feeder | | |
| 104 | 1 | Front door | | |
| 105 | 1 | Housing | | |
| 106 | 1 | Base frame | | |
| 107 | 1 | Connector for suction | | |
| 108 | 7 | Anti vibration pad | | |
| 109 | 4 | Fixing bolt front door DIN 934-M 16x110-8.8 | | |
| 110 | 1 | Screw for maintenance hole DIN 910-M48x2 | | |
| 111 | 1 | Air inlet | | |
| 112 | 2 | Handle | | |
| 113 | 1 | Hinge | | |
| | | | | |
| 300 | 1 | **Bearing** | | |
| 301 | 1 | Bearing housing | | |
| 302 | 2 | Bearing 7314 BEDBP | | |
| 303 | 1 | Bearing NU314 ECP | | |
| 304 | 1 | Bearing Cover A | | |
| 305 | 1 | Bearing Cover B | | |
| 306 | 1 | Shaft | | |
| 307 | 8 | Fixing bolt DIN 912 – M 8 x 25 8.8 | | |
| 308 | 1 | Sleeve for pulley | | |
| 309 | 1 | Sleeve for rotor | | |
| 310 | 1 | Small sleeve for bearing | | |
| 311 | 1 | Big sleeve for bearing | | |
| 312 | 2 | Spacer disk for leak tightness | | |
| 313 | 2 | Sealing ASD95 | | |
| 314 | 2 | Connector for lubrication | | |
| 315 | 2 | Air escape valve | | |
| 316 | 1 | Lubrication system Perma Star | | |
| | | | | |
| 400 | | **Drive** | | |
| 401 | 1 | Motor 55 2B3 kW 400V50HZ | | |
| 402 | 1 | Base frame for motor | | |
| 403 | 1 | Rotor pulley SPB 200-6 | | |
| 404 | 1 | Washer | | |
| 405 | 6 | V-Belt SPB 1800 | | |
| 406 | 1 | Motor pulley SPB 212-6 (50Hz) | | |
| | | Motor pulley SPB 170-6 (60Hz) | | |
| 407 | 1 | Motor pulley taper bush 3535-60 (50Hz) | | |

| | | | | |
|---|---|---|---|---|
| | | Motor pulley taper bush 3020-60 (60Hz) | | |
| 408 | 1 | Pulley cover | | |
| 409 | 2 | Fixing bolt DIN 912 – M 12 x 35 8.8 | | |
| 410 | 6 | Fixing bolt DIN 933 – M 16 x 40 8.8 | | |
| 411 | 2 | Washer DIN127 – A 12 | | |
| 412 | 6 | Washer DIN127 – A 16 | | |
| 413 | 6 | Washer DIN125 – A 16 | | |
| | | | | |
| 500 | 1 | **Rotor disc assembly (standard)** | | |
| 501 | 1 | Fly wheel for rotor disc | | |
| 502 | 1 | Rotor disc | | |
| 503 | 1 | Clamping sleeve 65 mm | | |
| 504 | 6 | Fixing bolt DIN 912 – M 6 x 60 8.8 | | |
| 505 | 1 | Spinner | | |
| 506 | 4 | Spinner blade | | |
| 507 | 8 | Adjusting bolt DIN 7991 – M 6 x 12 12.9 | | |
| 508 | 1 | Sealing DIN 3771 | | |
| 509 | 14 | Fixing bolt DIN 912 – M 10 x 30 12.9 | | |
| | | | | |
| 500 | 1 | **Rotor disc assembly (segments)** | | |
| 501 | 1 | Fly wheel for rotor disc | | |
| 502 | 32 | Rotor segments | | |
| 503 | 1 | Clamping sleeve 65 mm | | |
| 504 | 6 | Fixing bolt DIN 912 – M 6 x 60 8.8 | | |
| 505 | 1 | Spinner | | |
| 506 | 4 | Spinner blade | | |
| 507 | 8 | Adjusting bolt DIN 7991 – M 6 x 12 12.9 | | |
| 508 | 1 | Sealing DIN 3771 | | |
| 509 | 64 | Fixing bolt DIN 912 – M 8 x 20 12.9 | | |
| 510 | 64 | Insert nut M 8 – M 16 x 1.5 | | |
| | | | | |
| 600 | | **Stator disc assembly (standard)** | | |
| 601 | 1 | Stator disc | | |
| 602 | 1 | Stator disc holder plate | | |
| 603 | 1 | Holder plate mounting surface | | |
| 604 | 4 | Threaded bolt M 16 x 130 | | |
| 605 | 1 | Door frame | | |
| 606 | 8 | Adjusting nut DIN 934 – M 8 | | |
| 607 | 10 | Washer DIN 125 – A 16 | | |
| 608 | 1 | Hinge | | |
| 609 | 1 | Doorknob | | |
| 610 | 4 | Fixing Bolt DIN 933 – M 16 x 110 8.8 | | |
| 611 | 64 | Fixing Bolt DIN 912 – M 8 x 20 12.9 | | |
| 612 | 4 | Fixing Bolt DIN 933 – M 10 x 30 8.8 | | |
| 613 | 12 | Fixing Bolt DIN 912 – M 12 x 35 8.8 | | |
| 614 | 3 | Fixing Bolt DIN 912 – M 12 x 50 8.8 | | |

| | | | | |
|---|---|---|---|---|
| 615 | 2 | Fixing Bolt DIN 933 – M 16 x 40 8.8 | | |
| 616 | 12 | Washer DIN 127 – B 12 | | |
| 617 | 4 | Washer ø 17 x 36 x 8 | | |
| 618 | 6 | Washer DIN 127 – B 16 | | |
| 619 | 4 | Washer DIN 125 – A 10 | | |
| 620 | 4 | Washer DIN 127 – B 10 | | |
| 621 | 1 | Sealing DIN 3771 | | |
| 622 | 1 | Sealing DIN 3771 | | |
| | | | | |
| 600 | | **Stator disc assembly (segments)** | | |
| 601 | 32 | Stator segments | | |
| 602 | 1 | Stator disc holder plate | | |
| 603 | 1 | Holder plate mounting surface | | |
| 604 | 4 | Threaded bolt M 16 x 130 | | |
| 605 | 1 | Door frame | | |
| 606 | 8 | Adjusting nut DIN 934 – M 8 | | |
| 607 | 10 | Washer DIN 125 – A 16 | | |
| 608 | 1 | Hinge | | |
| 609 | 1 | Doorknob | | |
| 610 | 4 | Fixing Bolt DIN 933 – M 16 x 110 8.8 | | |
| 611 | 12 | Fixing Bolt DIN 912 – M 10 x 30 8.8 | | |
| 612 | 4 | Fixing Bolt DIN 933 – M 10 x 30 8.8 | | |
| 613 | 12 | Fixing Bolt DIN 912 – M 12 x 35 8.8 | | |
| 614 | 3 | Fixing Bolt DIN 912 – M 12 x 50 8.8 | | |
| 615 | 2 | Fixing Bolt DIN 933 – M 16 x 40 8.8 | | |
| 616 | 12 | Washer DIN 127 – B 12 | | |
| 617 | 4 | Washer ø 17 x 36 x 8 | | |
| 618 | 6 | Washer DIN 127 – B 16 | | |
| 619 | 4 | Washer DIN 125 – A 10 | | |
| 620 | 4 | Washer DIN 127 – B 10 | | |
| 621 | 1 | Sealing DIN 3771 | | |
| 622 | 1 | Sealing DIN 3771 | | |
| 623 | 64 | Insert nut M 8 – M 16 x 1.5 | | |
| | | | | |
| 800 | | **Cooling system** | | |
| 801 | 1 | Injector spraying system | | |
| 802 | 1 | Input/output stator disc cooling | | |
| 805 | 1 | Probe | | |
| 806 | 1 | Main air valve | | |
| 807 | 1 | Air valve for vibratory-feeder | | |
| 808 | 1 | Water valve for material cooling | | |
| 809 | 1 | Flow meter | | |
| 810 | 1 | Control box | | |
| 811 | 3 | Solenoid valve | | |
| 812 | 2 | Pressure adjustor & pressure meter | | |
| 813 | 2 | Ball valve | | |

| | | | | |
|---|---|---|---|---|
| 814 | 1 | Water valve & pressure meter | | |
| 815 | 4 | Connector 1 | | |
| 816 | 5 | Connector 2 | | |
| 817 | 3 | Connector 3 | | |
| 818 | 4 | Connector 4 | | |
| 819 | 5 | Connector 5 | | |
| 820 | 3 | Connector 6 | | |
| | | | | |
| 900 | | **Electrical parts** | | |
| 901 | 1 | Safety switch AZM 160 lly | | |
| 902 | 1 | Control panel | | |
| | | | | |

## 12.3 PM 800

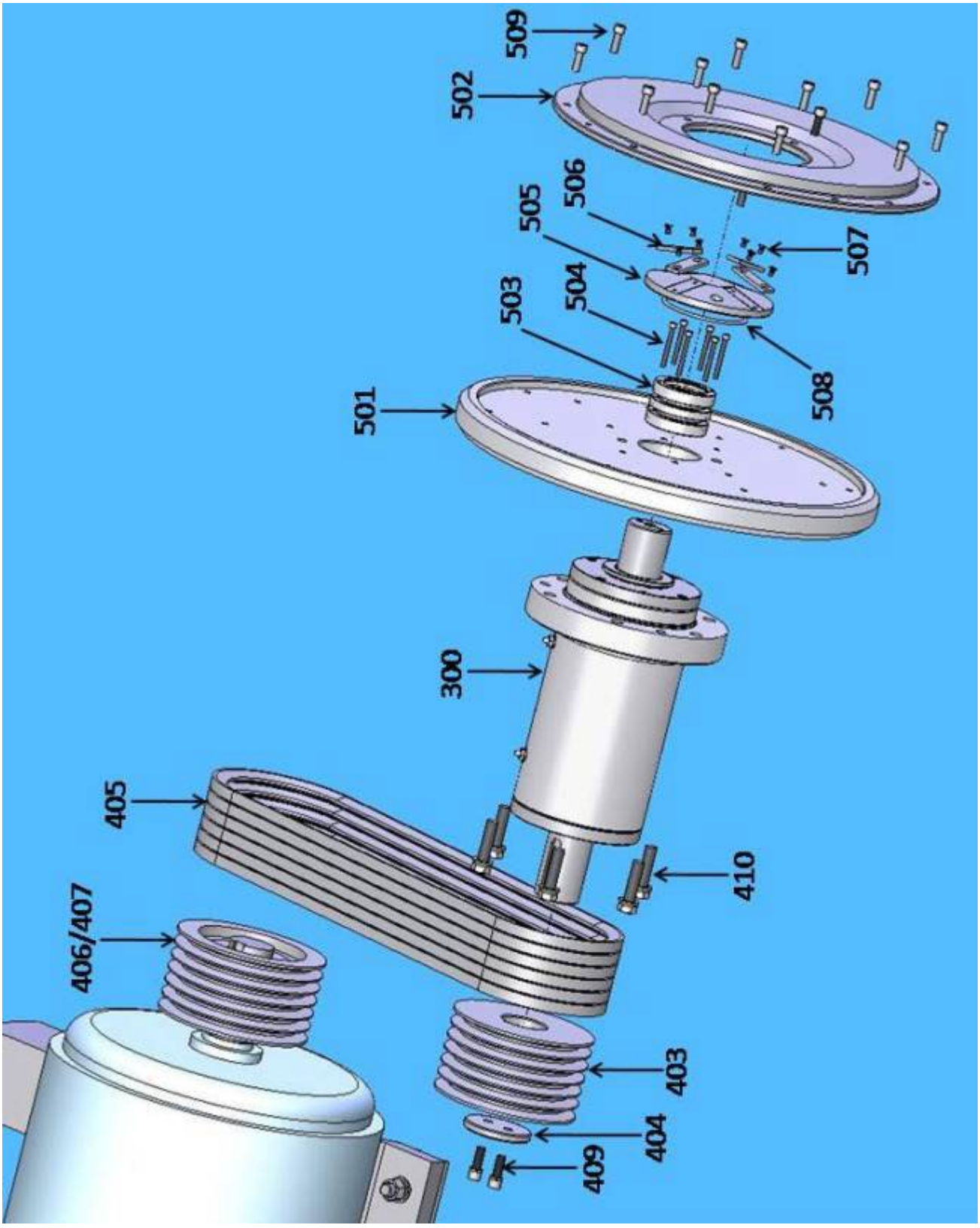
| Pos. | Pc | Description/Standard | Partnumber/SAP | Order |
|---|---|---|---|---|
| 100 | | **Machine complete** | | |
| 101 | 1 | In feed funnel | | |
| | | In feed funnel with metal detector | | |
| 102 | 1 | Hopper | | |
| 103 | 1 | Vibratory-feeder | | |
| 104 | 1 | Front door | | |
| 105 | 1 | Housing | | |
| 106 | 1 | Base frame | | |
| 107 | 1 | Connector for suction | | |
| 108 | 7 | Anti vibration pad | | |
| 109 | 4 | Fixing bolt front door DIN 934-M 20x110-8.8 | | |
| 110 | 4 | Screw for maintenance hole DIN 910-M48x2 | | |
| 111 | 1 | Air inlet | | |
| 112 | 2 | Handle | | |
| 113 | 1 | Hinge | | |
| | | | | |
| 300 | 1 | **Bearing** | | |
| 301 | 1 | Bearing housing | | |
| 302 | 1 | Bearing SKF3316A | | |
| 303 | 1 | Bearing NU316ECJ | | |
| 304 | 1 | Bearing Cover A | | |
| 305 | 1 | Bearing Cover B | | |
| 306 | 1 | Shaft | | |
| 307 | 8 | Fixing bolt DIN 912 – M 8 x 30 8.8 | | |
| 308 | 1 | Sleeve for pulley | | |
| 309 | 1 | Sleeve for rotor | | |
| 310 | 0 | Small sleeve for bearing | | |
| 311 | 0 | Big sleeve for bearing | | |
| 312 | 2 | Spacer disk for leak tightness | | |
| 313 | 2 | Sealing ASD95 | | |
| 314 | 2 | Connector for lubrication | | |
| 315 | 2 | Air escape valve | | |
| 316 | 1 | Lubrication system Perma Star | | |
| | | | | |
| 400 | | **Drive** | | |
| 401 | 1 | Motor 90 kW 2B3 400V | | |
| 402 | 1 | Base frame for motor | | |
| 403 | 1 | Rotor pulley SPB 212-8 | | |
| 403.1 | 1 | Rotor pulley taper bush CL75-115B | | |
| 404 | 1 | Washer | | |
| 405 | 8 | V-Belt SPB 1800 | | |

| | | | | |
|---|---|---|---|---|
| 406 | 1 | Motor pulley SPB 280-8 (50Hz) | | |
| | | Motor pulley SPB 236-8 (60Hz) | | |
| 407 | 1 | Motor pulley taper bush 3535-75 | | |
| 408 | 1 | Pulley cover | | |
| 409 | 2 | Fixing bolt DIN 912 – M 12 x 35 8.8 | | |
| 410 | 6 | Fixing bolt DIN 933 – M 20 x 70 8.8 | | |
| 411 | 2 | Washer DIN127 – A12 | | |
| 412 | 6 | Washer DIN127 – A 20 | | |
| 413 | 6 | Washer DIN125 – A 20 | | |
| | | | | |
| 500 | 1 | **Rotor disc assembly (standard)** | | |
| 501 | 1 | Fly wheel for rotor disc | | |
| 502 | 1 | Rotor disc | | |
| 503 | 1 | Clamping sleeve 75 mm | | |
| 504 | 6 | Fixing bolt DIN 912 – M 6 x 75 8.8 | | |
| 505 | 1 | Spinner | | |
| 506 | 4 | Spinner blade | | |
| 507 | 8 | Adjusting bolt DIN 7991 – M 6 x 12 12.9 | | |
| 508 | 1 | Sealing DIN 3771 – 115 x 5.3 | | |
| 509 | 24 | Fixing bolt DIN 912 – M12 x 30 12.9 | | |
| | | | | |
| 500 | 1 | **Rotor disc assembly (segments)** | | |
| 501 | 1 | Fly wheel for rotor disc | | |
| 502 | 32 | Rotor segment | | |
| 503 | 1 | Clamping sleeve 75 mm | | |
| 504 | 6 | Fixing bolt DIN 912 – M 6 x 75 8.8 | | |
| 505 | 1 | Spinner | | |
| 506 | 4 | Spinner blade | | |
| 507 | 8 | Adjusting bolt DIN 7991 – M 6 x 12 12.9 | | |
| 508 | 1 | Sealing DIN 3771 | | |
| 509 | 96 | Fixing bolt DIN 912 – M8 x 20 12.9 | | |
| 510 | 96 | Insert nut M 8 - M16 x 1.5 | | |
| | | | | |
| 600 | | **Stator disc assembly (standard)** | | |
| 601 | 1 | Stator disc | | |
| 602 | 1 | Stator disc holder plate | | |
| 603 | 1 | Holder plate mounting surface | | |
| 604 | 4 | Threaded bolt M 20 x 1.5 x 188 | | |
| 605 | 1 | Door frame | | |
| 606 | 8 | Adjusting nut DIN 934 – M 20 | | |
| 607 | 10 | Washer DIN 125 – A 20 | | |
| 608 | 1 | Hinge | | |
| 609 | 1 | Doorknob | | |
| 610 | 4 | Fixing Bolt DIN 933 – M 20 x 110 8.8 | | |
| 611 | 12 | Fixing Bolt DIN 912 – M 12 x 30 8.8 | | |
| 612 | 4 | Fixing Bolt DIN 933 – M 10 x 30 8.8 | | |

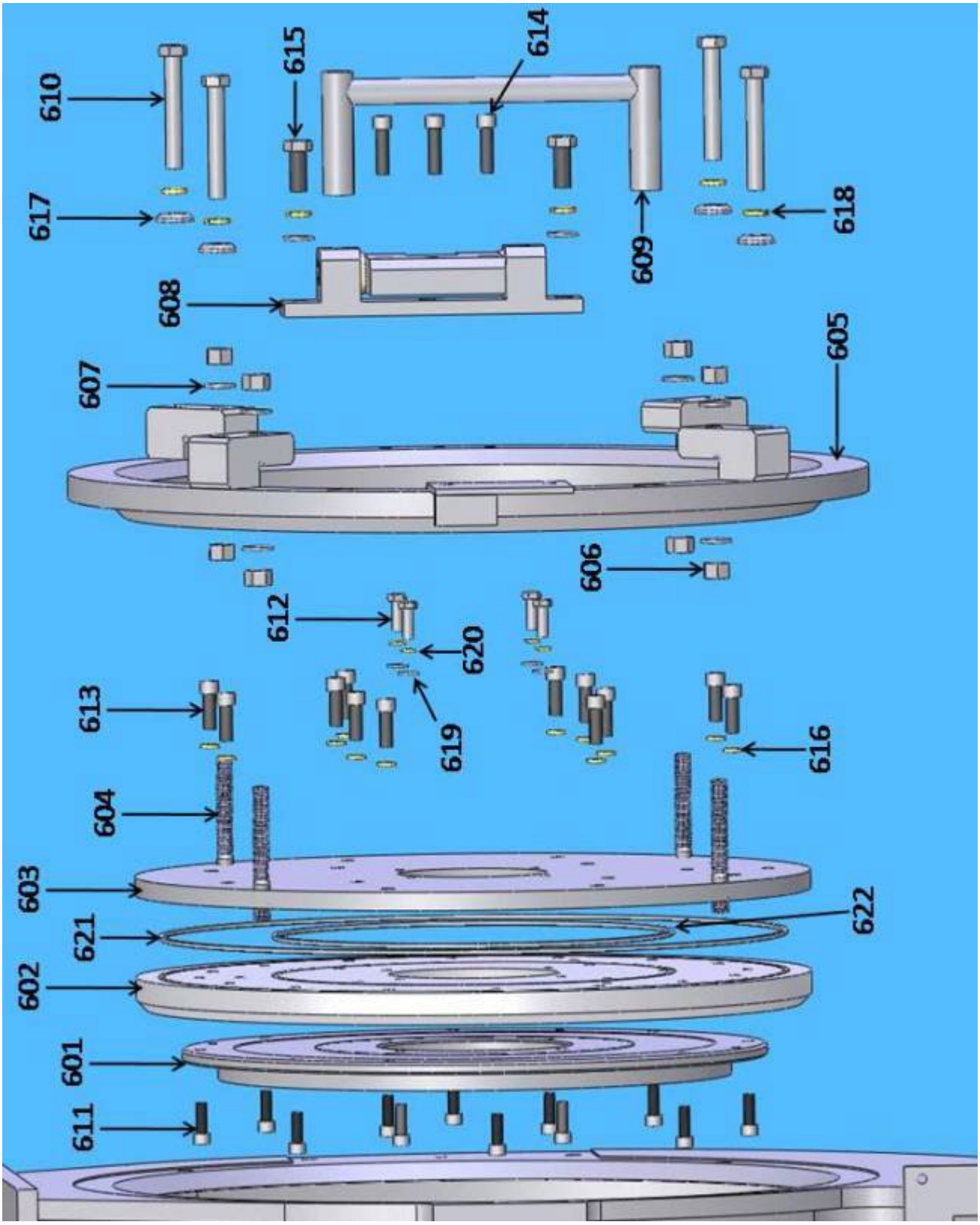
| | | | | |
|---|---|---|---|---|
| 613 | 12 | Fixing Bolt DIN 912 – M 12 x 35 8.8 | | |
| 614 | 4 | Fixing Bolt DIN 912 – M 12 x 50 8.8 | | |
| 615 | 4 | Fixing Bolt DIN 933 – M 16 x 40 8.8 | | |
| 616 | 12 | Washer DIN 127 – B 12 | | |
| 617 | 4 | Washer ø 20.5 x 40 x 8 | | |
| 618 | 4 | Washer DIN 127 – B 20 | | |
| 619 | 4 | Washer DIN 125 – A 10 | | |
| 620 | 4 | Washer DIN 127 – B 10 | | |
| 621 | 1 | Sealing DIN 3771 | | |
| 622 | 1 | Sealing DIN 3771 | | |
| | | | | |
| 600 | | **Stator disc assembly (segments)** | | |
| 601 | 32 | Stator segments | | |
| 602 | 1 | Stator disc holder plate | | |
| 603 | 1 | Holder plate mounting surface | | |
| 604 | 4 | Threaded bolt M 20 x 1.5 x 188 | | |
| 605 | 1 | Door frame | | |
| 606 | 8 | Adjusting nut DIN 934 – M 20 | | |
| 607 | 10 | Washer DIN 125 – A 20 | | |
| 608 | 1 | Hinge | | |
| 609 | 1 | Doorknob | | |
| 610 | 4 | Fixing Bolt DIN 933 – M 20 x 110 8.8 | | |
| 611 | 96 | Fixing Bolt DIN 912 – M 8 x 20 8.8 | | |
| 612 | 4 | Fixing Bolt DIN 933 – M 10 x 30 8.8 | | |
| 613 | 12 | Fixing Bolt DIN 912 – M 12 x 35 8.8 | | |
| 614 | 4 | Fixing Bolt DIN 912 – M 12 x 50 8.8 | | |
| 615 | 4 | Fixing Bolt DIN 933 – M 16 x 40 8.8 | | |
| 616 | 12 | Washer DIN 127 – B 12 | | |
| 617 | 4 | Washer ø 20.5 x 40 x 8 | | |
| 618 | 4 | Washer DIN 127 – B 20 | | |
| 619 | 4 | Washer DIN 125 – A 10 | | |
| 620 | 4 | Washer DIN 127 – B 10 | | |
| 621 | 1 | Sealing DIN 3771 | | |
| 622 | 1 | Sealing DIN 3771 | | |
| 623 | 96 | Insert nut M 8 – M 16 x 1.5 | | |
| | | | | |
| 800 | | **Cooling system** | | |
| 801 | 1 | Injector spraying system | | |
| 802 | 1 | Input/output stator disc cooling | | |
| 805 | 1 | Probe PT100 | | |
| 806 | 1 | Main air valve | | |
| 807 | 1 | Air valve for vibratory-feeder | | |
| 808 | 1 | Water valve for material cooling | | |
| 809 | 1 | Flow meter | | |
| 810 | 1 | Control box | | |
| 811 | 3 | Solenoid valve | | |

| | | | | |
|---|---|---|---|---|
| 812 | 2 | Pressure adjustor & pressure meter | | |
| 813 | 2 | Ball valve | | |
| 814 | 1 | Water valve & pressure meter | | |
| 815 | 4 | Connector 1 | | |
| 816 | 5 | Connector 2 | | |
| 817 | 3 | Connector 3 | | |
| 818 | 4 | Connector 4 | | |
| 819 | 5 | Connector 5 | | |
| 820 | 3 | Connector 6 | | |
| | | | | |
| 900 | | **Electrical parts** | | |
| 901 | 1 | Safety switch AZM 160 lly | | |
| 902 | 1 | Control panel | | |
| | | | | |
| | | | | |

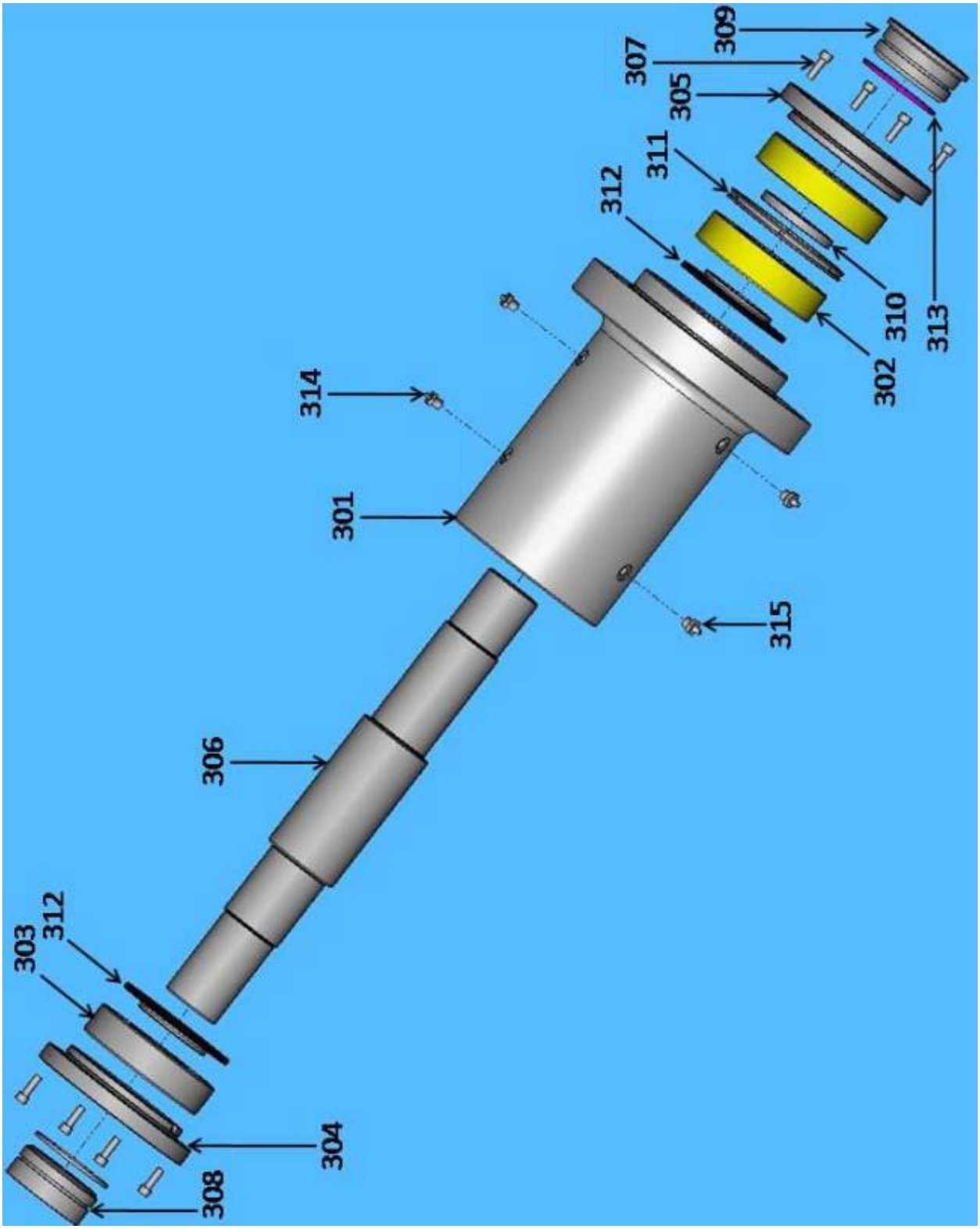
## 12.4 Rotor disc assembly



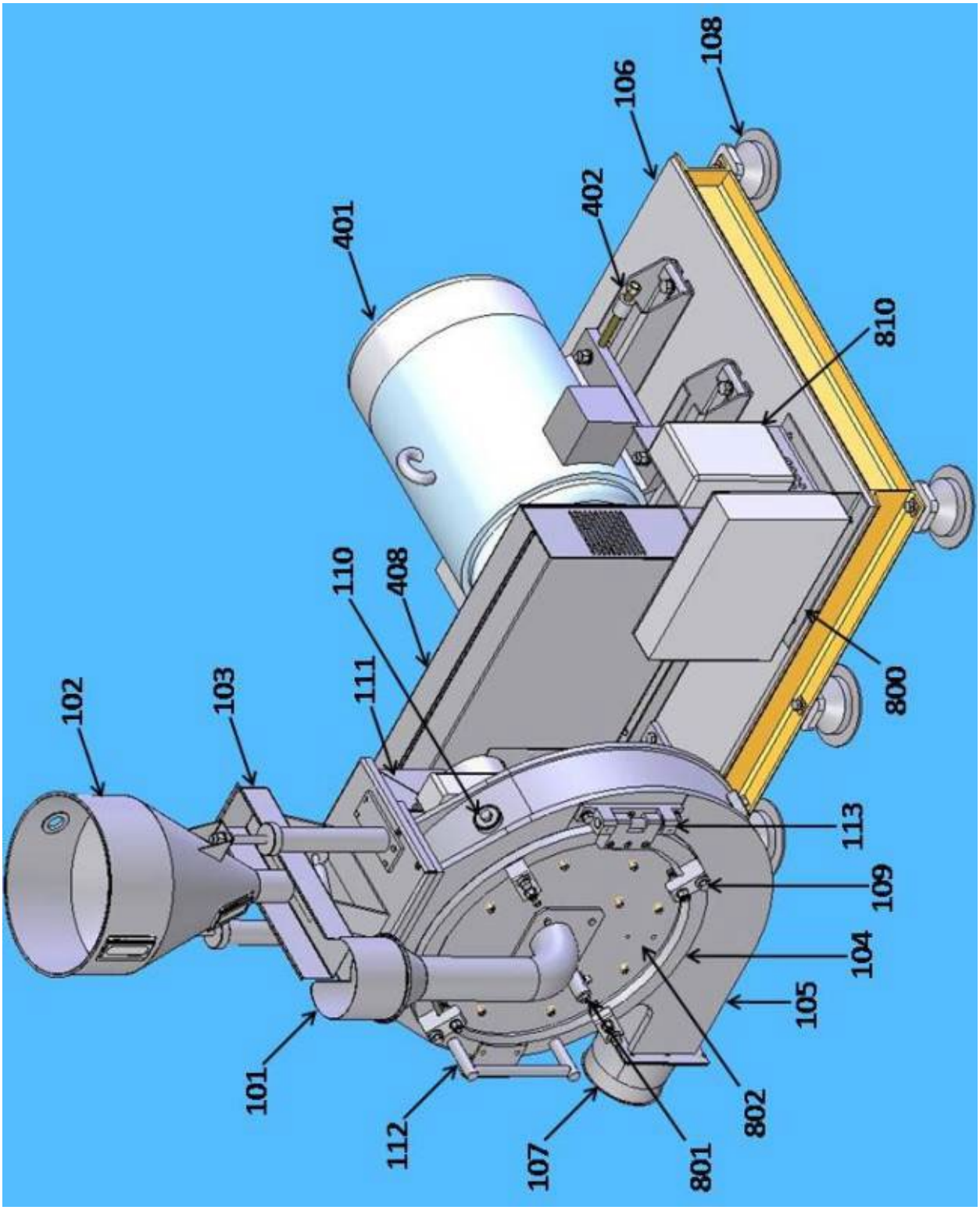
## 12.5 Stator disc assembly



## 12.6 Bearing assembly

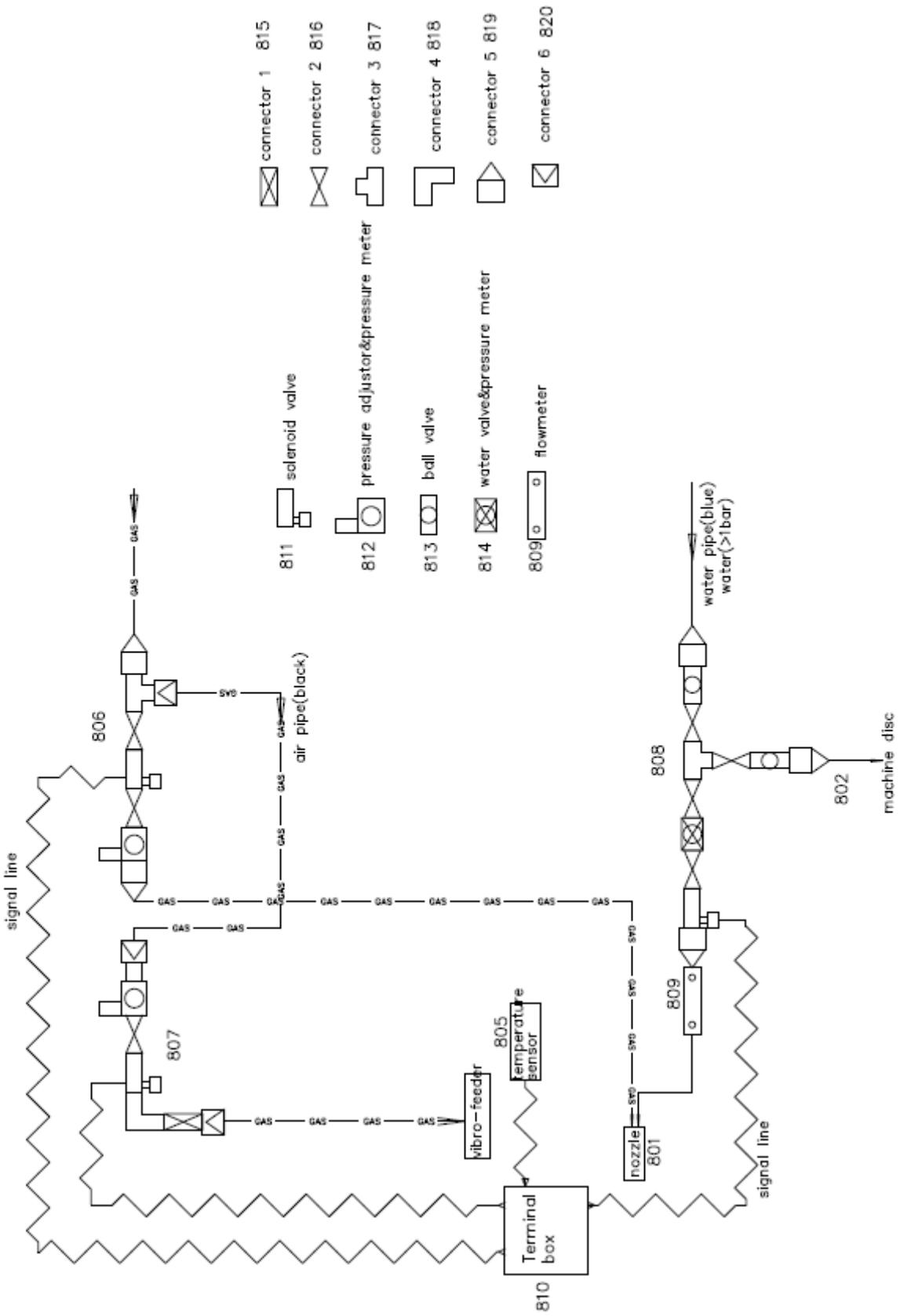


## 12.7 Machine complete



# 13 WATER COOLING SYSTEM

## 13.1 Flow Diagram



## 13.2 Water cooling system

# 14 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 |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

# 15 ELECTRICAL CONNECTION

The machine should be wired by a qualified electrician.

Please refer to the wiring diagram.

# 16 ADDITION

Documentation Main Drive Granulator
(PART B)
Delivery documentation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