

# **Operating Instructions**

for

**4-roller-mill**

**20/30-4**

**20/60-4**

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# 1 Machine description

## 1.1 Application

The 4-roller malt mill has to be used for grinding barley-malt.  
When modifying several parameters, other cereals could be grinding too.

## 1.2 Dified application

The 4-roller malt mill has to be used exclusively for grinding of cleaned, classified and stoned malt for which the 4-roller malt mill has been designed. Each other or additional use cannot be considered as a defined application. The manufacturer cannot assume any liability for resulting damages to the appliance, person and buildings.

The defined application comprises also that the operating, maintenance and repair conditions prescribed by the manufacturer observed. The 4-roller malt mill must be mounted, used, maintained and repaired exclusively by persons familiar with the operating instructions who have been informed about possibly occurring risks and who have the required special qualifications.

The usual regulations for the prevention of accidents as well as all other generally accepted regulations relating to safety and industrial medicine must be observed. The manufacturer is not liable for damages resulting from unauthorized modifications to the machine.

## 1.3 Functional description

The machine casing of solid and torsional-rigid steel construction. The pairs of rolls are assembled to blocks. Rolls are running in largely dimensioned roller bearings, the reduction gears of roller pairs are binary gears.

Adjustments of milling gap are done manually by means of a hand wheel with indicator.

The vibrating screen between the two pairs of rolls is cleaned by rubber balls.

The machine is driven by a three-phase standard motor by V – belts to the pair of husk rolls and the precrushing rolls.

Other equipment features:

- installed feed roll with separate drive
- easily adjustable swing-slide which guarantees continuous output
- base frame of hardwood
- 1 set of tools
- easily detachable lining facilitates maintenance

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## 1.4 Storage instructions

These instructions are valid for the mill as well as for its spare parts and service means.

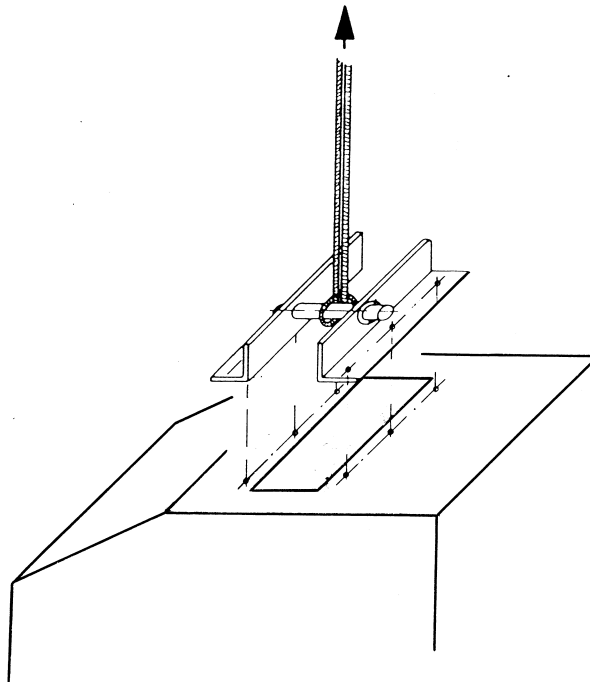
If the machine is not brought to its place of installation at once after arrival at site, please pay attention to the following few points:

- Do not put the machine out of packing. If the packing is already opened, it should be closed again workmanlike or rainproof covered by tarpaulins.
- The machine has to be stored at a dry place, that means it has to be protected against humidity. In our factory, the rolls have got a protection against corrosion which has to be removed before commissioning.
- The ambient temperature should not be less than  $-10\text{ °C}$  and not more than  $+40\text{ °C}$ .
- The packed machine must not be tilted or crashed, or loaded in any other way. Transport should be done usual orientation.

## 2 Installation

### 2.1 Transport

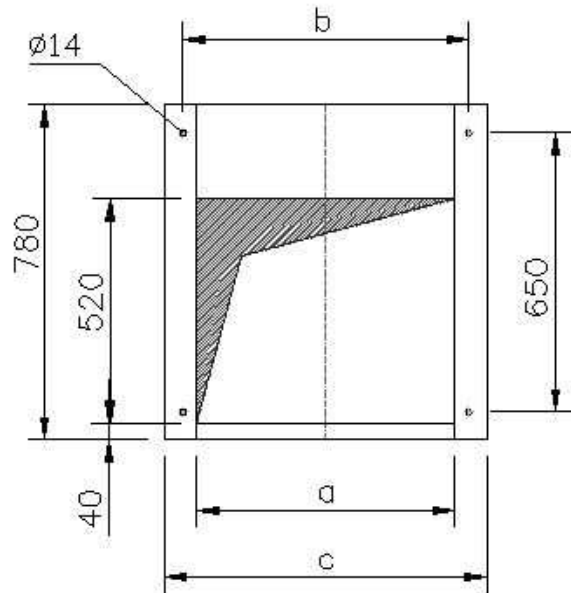
For hanging the machine, screw the transport device to the inlet. The machine can then be transported by means of ropes, chosen according to the weight of the machine. After placing, the transport device has to be removed and the intake hopper has to be bolted on.



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## 2.2 Foundation

Sufficient bearing capacity of the foundation is an essential condition for a silent run of the machine. The foundation must not only bear the weight of the mill, but also absorb the oscillations during service.



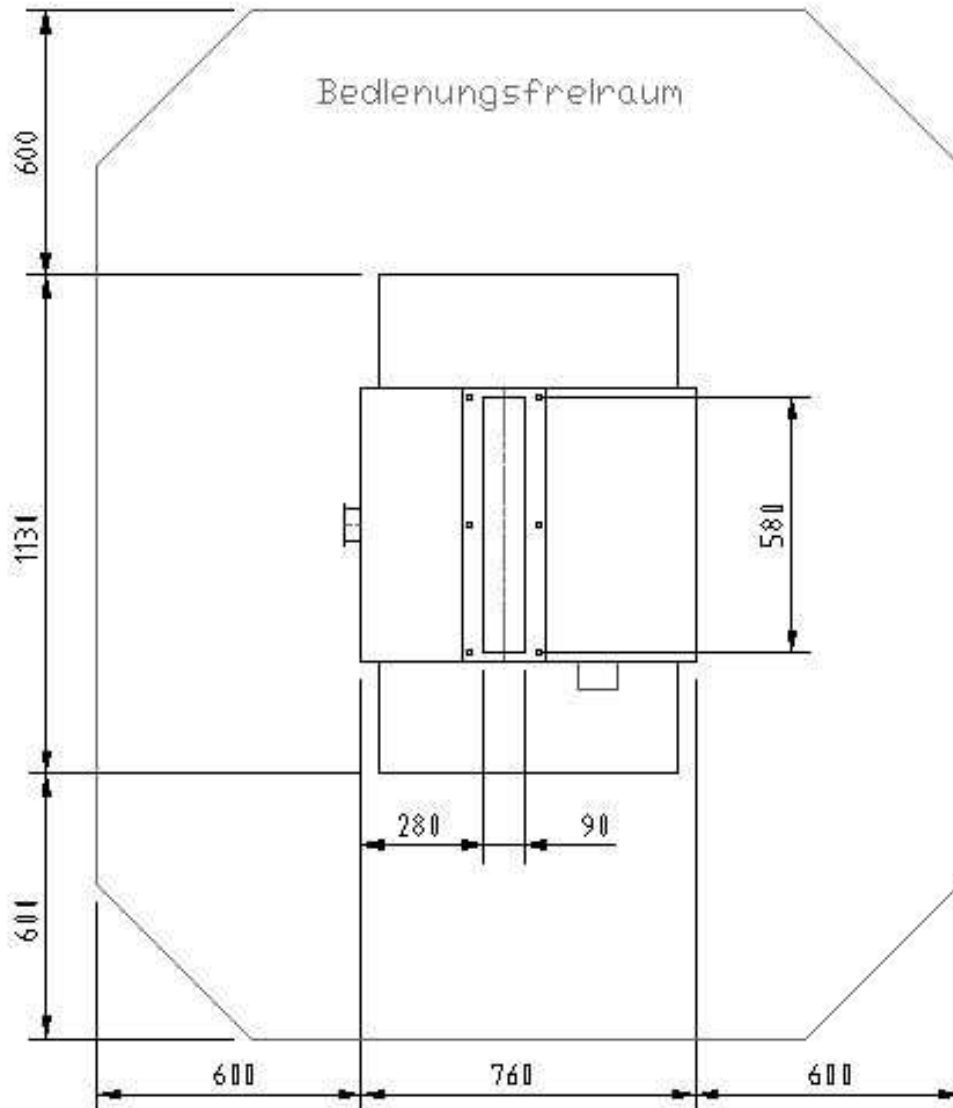
	20/30 A	20/60 A
a	305	605
b	365	665
c	455	755

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### 2.3 Minimum distances

On choosing the erection place and determining the pass opening, attention must be paid to the minimum distances according to fig. 3.

It is also necessary to provide sufficient space above the machine.



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## 2.4 Fixation

Fastening holes are made into the foundation, whereby the machine frame can be used as guide for the dimension.

A permanent-elastic sealing should be applied to the location surface between foundation and machine frame. Then the frame is placed onto the foundation and levelled in both planes by means of a water-level. Finally the mill will be placed and bolted.

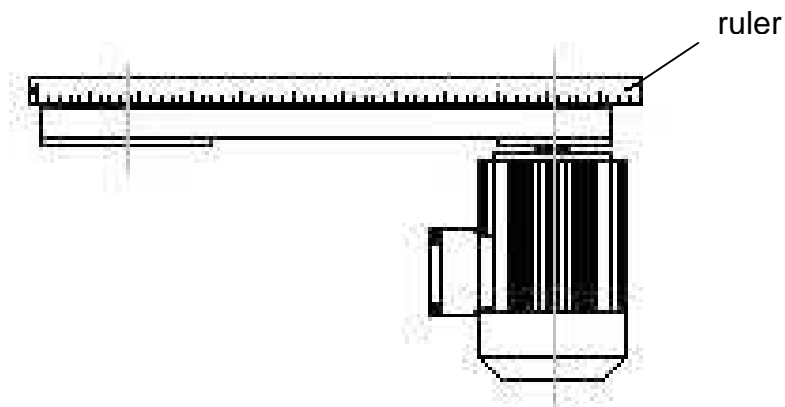
The space underneath the machine must be kept absolutely free for airing.

## 2.5 Drives

The rollers and the screen are driven by one motor by using V-belts.

The feed roller is driven by a separate motor by using a roller chain.

If one of the motors had been dismantled, make sure that the belt pulleys are aligned accurately when remounting it. For that a long ruler is needed which has to be put to the sides of the belt pulley.



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### 3 Start-up and operation

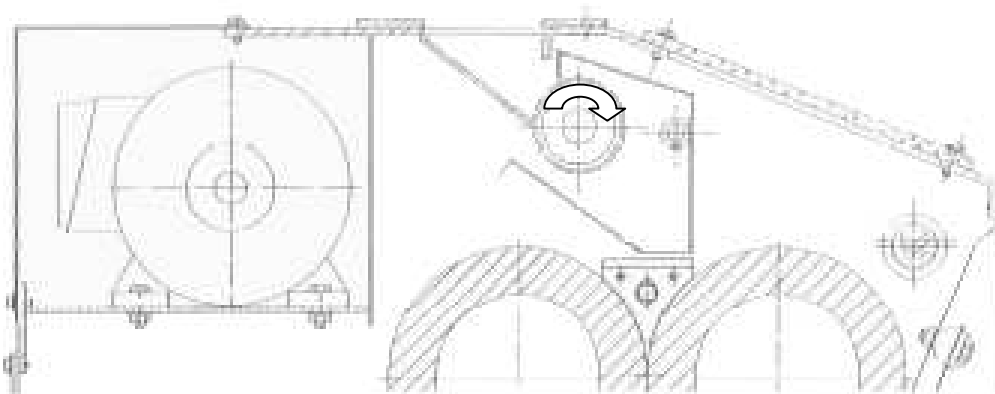
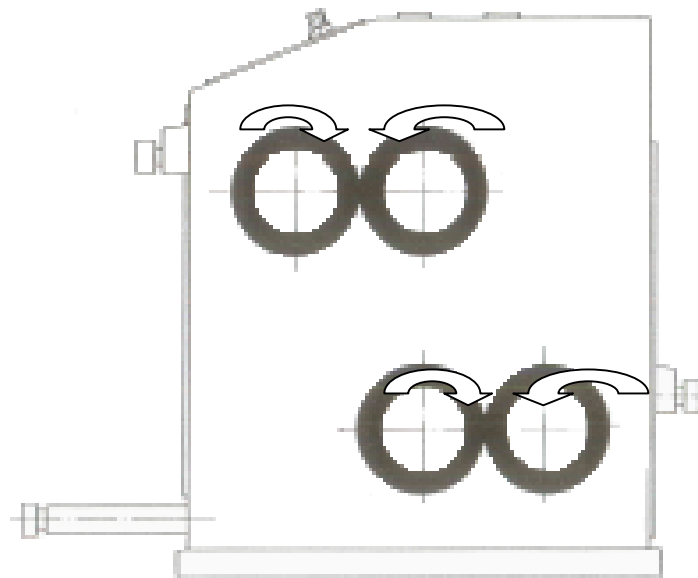
#### 3.1 Electrical connection

The feed roll motor and the main motor are wired up to a common terminal box. If the mill will be delivered according UL-Standards, the motors are not wired to the terminal box.

Terminal marking is:

UVW – protective conductor. Originally the motors are connected for working voltage of 380 V. In case of diverging voltage the motors must be connected accordingly.

When connecting the motors, attention must be paid to their sense of rotation.



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When connecting the motors attention has to be paid to the regulations of the local electricity supply authorities. All motors have to be protected by thermal overcurrent releases or protective motor switches.

The machine must be connected to a protective conductor ( connection to neutral or protective earth ) according to the instructions, given by the competent electricity supply authorities.

Only qualified electricians or persons instructed and supervised by qualified electricians are allowed to carry out works at electrical appliances or equipment corresponding to the relevant electrical rules.

### **3.2 Switching on**

First start main motor. After a security period of ab. 1 minute start the feed roll motor.

This switching an sequence must strictly be kept in order to prevent obstruction of the machine.

### **3.3 Switching off**

After finishing the crushing process, first switch off the feed roller motor. The main motor remains running to evacuate the product entirely of the machine.

Overrun should last about 5 minutes.

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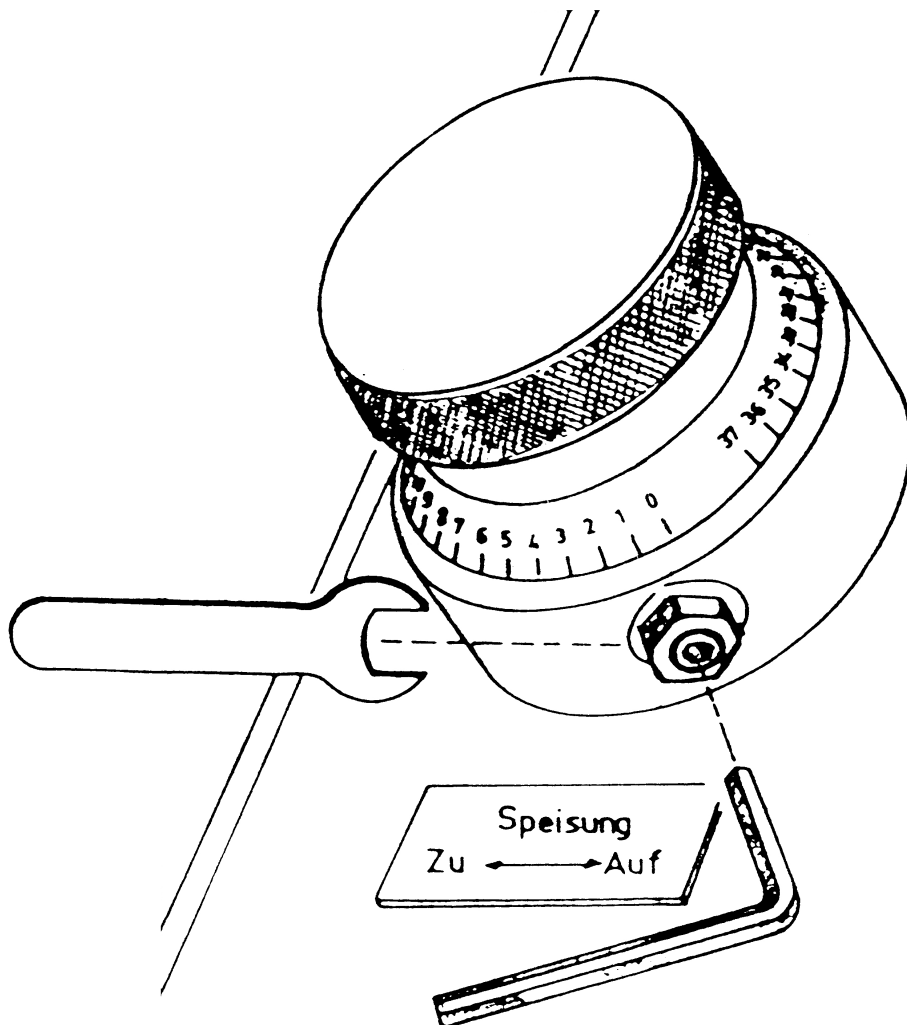
### 3.4 Adjusting of feeding capacity

In feed regulation is effected by a feed slide, operated by its control element. For adjusting, the safety screw and nut have to be slackened. Then the knob must be turned to "0" at the scale ( feeding closed ). Then start the machine as described in item 3.2.

Open feed slide slowly until the required capacity is reached.

The output will be ascertained by means of a time/weight comparison, whereby the malt balance will be of help, or by checking the power consumption of the roller drive motor.

After adjustment, the screw has to be tightened and secured by the lock nut. The Swing slide can remain in the determined position for further milling Operations.

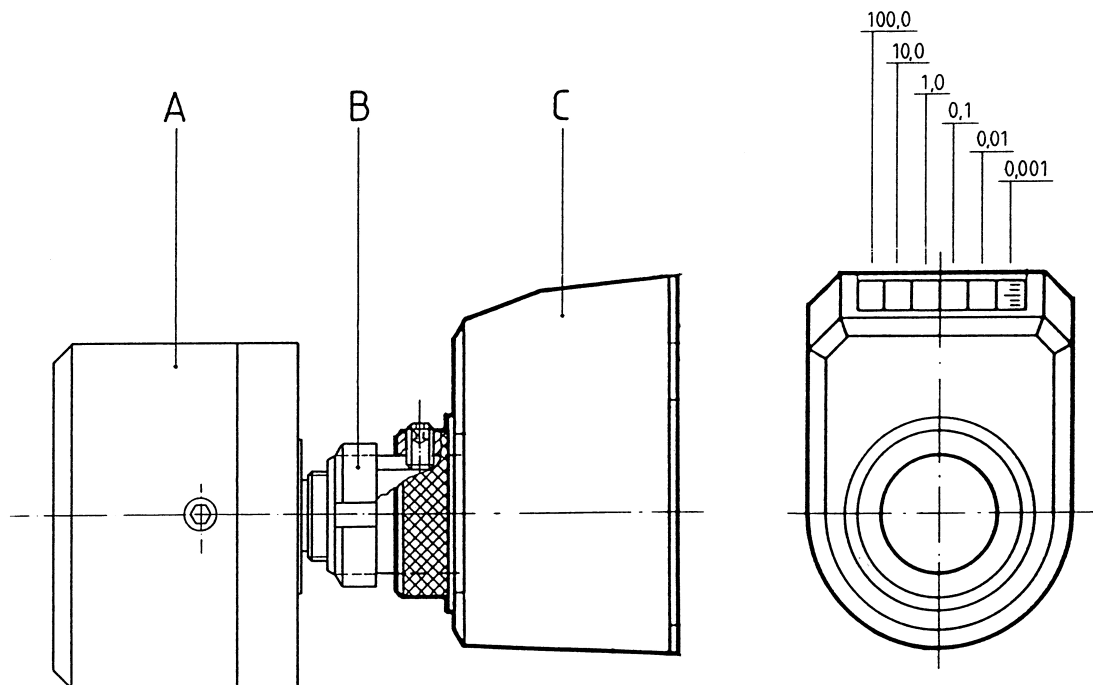


### 3.5 Adjusting of milling gaps

The milling gaps are adjusted at factory as follows, based on a coarse lautertun grist:

Pre-crush	distance ab. 1,5 mm
Husk.crush	distance ab. 0,6 mm

These gaps are only meant as recommendation and may be changed according to the respective grist composition. Adjustment by means of the associated control element, according the following patters:



- Loosen lock nut “B” by hook-key to the left. Then turn knob “A” for decreasing the gap to the left, for enlarging to the right (notice indicator labels for rotation sense).
- Gap adjustment can be seen at the scale of the position indicator “C”.
- If the required milling gap is adjusted, secure the adjustment by turning lock nut “B” to the right while fixing the adjusted gap with knob “A”.

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### 3.6 Taking of grist samples

Before taking a sample, the sampler should be emptied. This will be done by turning the handle “A” (cover of the sampling tube “B”) to the right until it stops. Also turn sampler “B” so, that the marking “” points downward. This will empty the sampler.

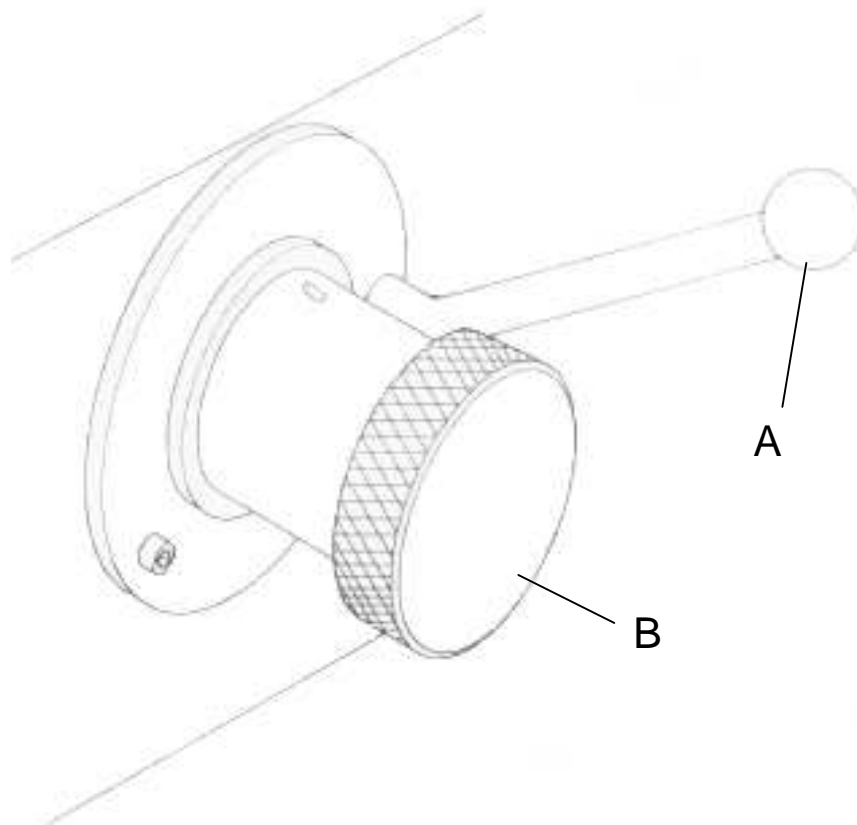
For taking a sample, make shure that the sampler “B” is empty, insert it all the way and fix it with one hand with the marking “” upwards. Now move handle “A” by the other hand to the left until it stops (open the cover), allowing grist to fall into the sampler and turn it back to the right immediately (closes the cover).

**!!! IT IS IMPORTANT TO AVOID OVERFILLING OF THE SAMPLER !!!**

(Usually husks with the lowest density fill first)

Now you may pull out the sampler “B” check, that it is not overfilled and empty it outside the mill.

For an analysis by using the “MEBAK-Shifter” or the “Pfungstadt-Shifter” the sample should have about 100g to 150g. To acive this, several proper samples should be taken.



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## 4 Maintenance

### !!! ATTENTION !!!

For all maintenance work the machine must be stopped and secured against succidental switches on. The best way to do this, is to remove the fuses or cut off and lock the main switch off the electricity supply.

Also notice the safety advices to prevent personal harms.

### 4.1 Lubrication

#### **Roller bearings:**

At work all roller bearings receive a filling with a special grease offering a long-time lubrication. For further lubrication please use only special grease for roller bearings on basis of lithium (see item 4.2)

#### **Lubrication interval:**

6 months

#### **Quantity of grease:**

A few strokes of the grease gun. Do not grease excessively to avoid increasing temperatures within the bearing.

#### **Sliding bearings:**

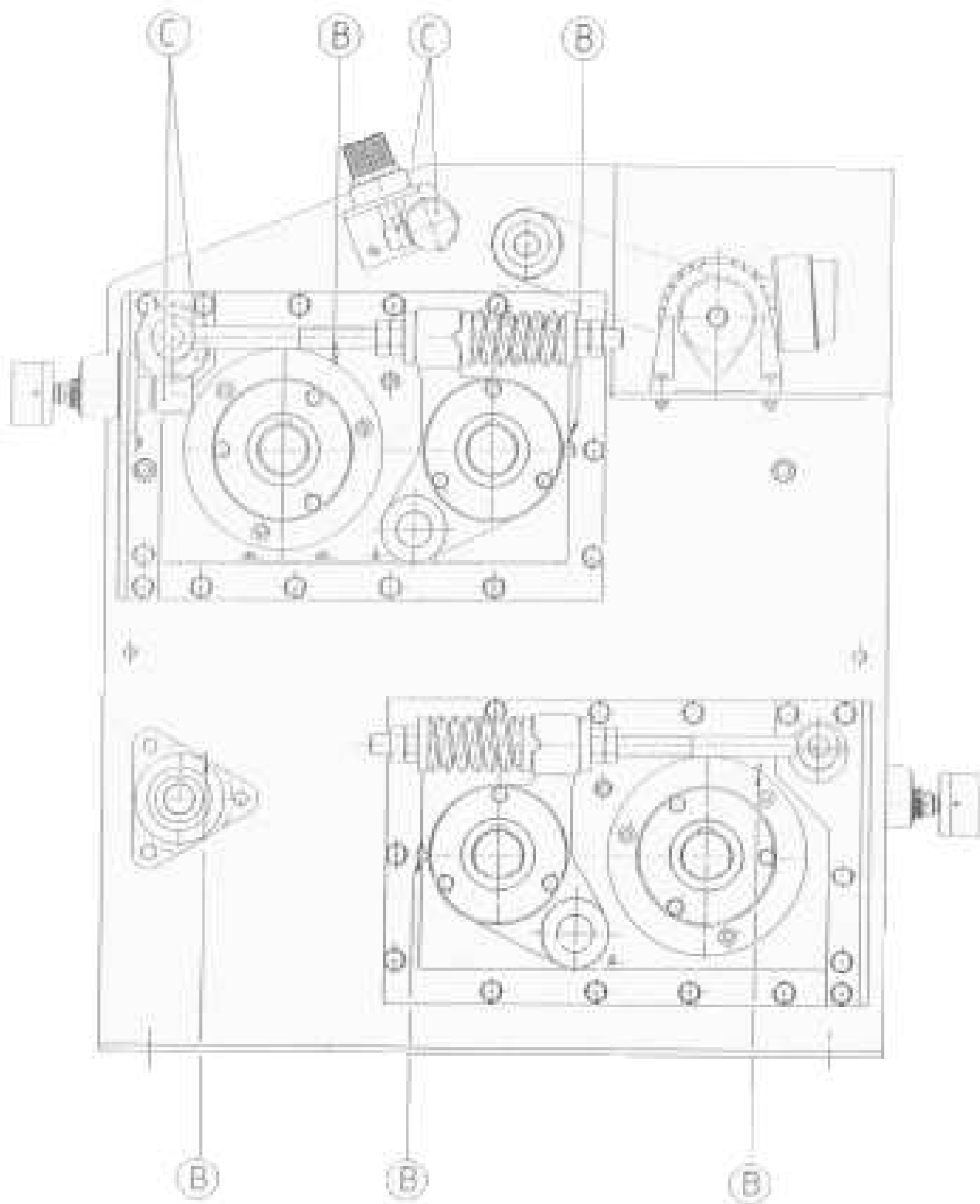
Procedure as above

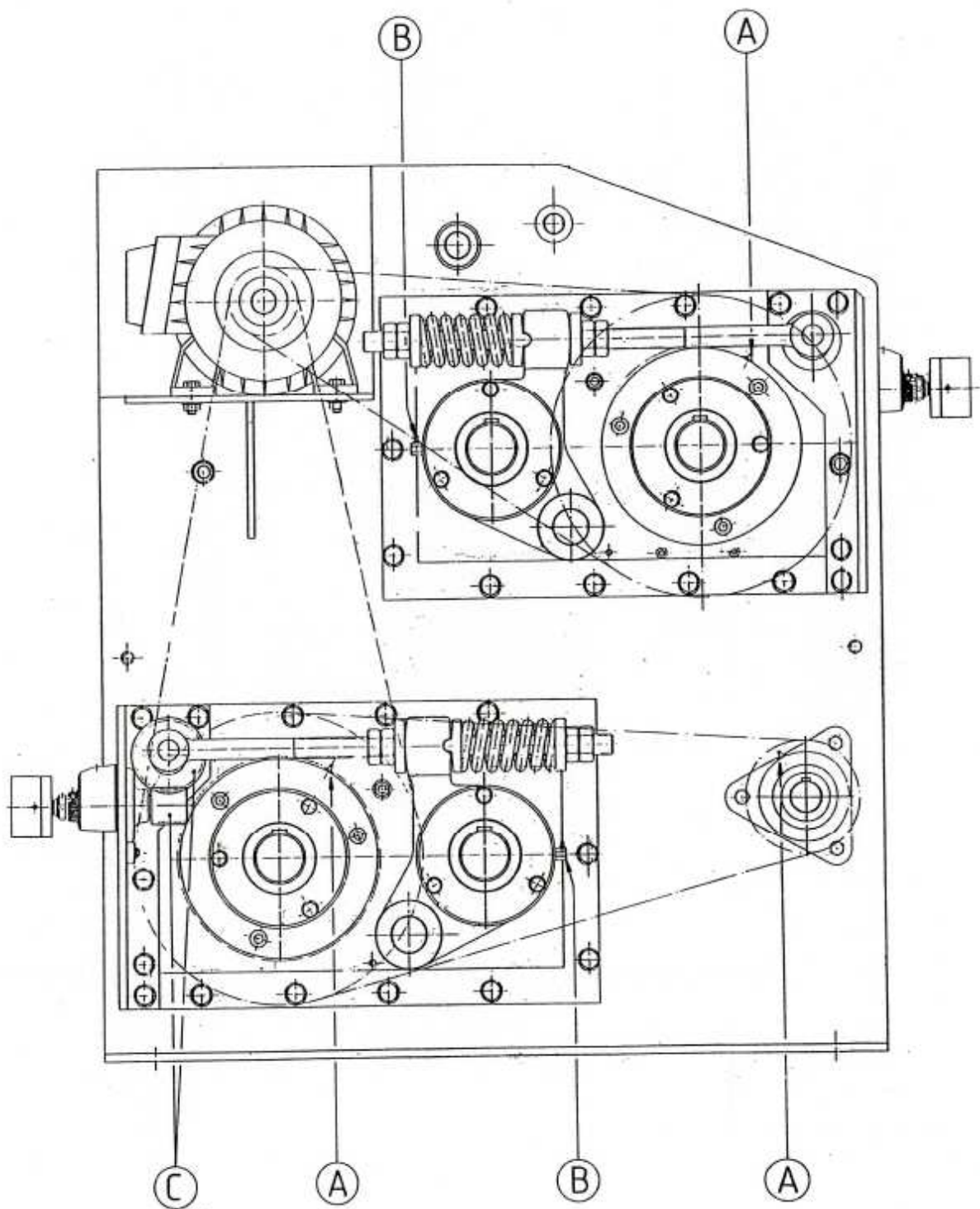
#### **Reduction gears at the rollers:**

These gears must not be greased. Greasing will damage this gears! ! !

### 4.2 Marking of lubrication points

Mark	Lubrication point	Kind if grease
A	Roller bearings and sliding bearings covered by wheels	Special grease for roller bearings, e.g. Shell-Alvania, FAG-BL 111
B	Roller bearings and sliding bearings with free access	Special grease for roller bearings, e.g. Shell-Alvania, FAG-BL 111
C	Roller bearings and sliding bearings without maintenance	No lubrication necessary





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### 4.3 Feed roll motor

The gear of the feed roll motor is already filled with grease. All parts of the drive and bearings are sufficiently lubricated by this filling.

You will find the special operating and maintenance manual for the drive motor attached to this manual.

### 4.4 Feed roller bearings

The bearings of the feed roller are insensitive to dust and require no lubrication. They're also insensitive to oil and grease.

### 4.5 V-belts

#### Characteristics of the V-belt

The used V-belts "SPA" must be kept away of moisture, steam, rottenness, oil, grease, fuel, chemicals and solvents.

#### Maintenance of the V-belts

The V-belts require no maintenance.

We recommend, that the V-belt should be checked in regular intervals, at least every 3 months, for tension and damage.

To avoid expensive stand-stills of the mill, the V-belts should be changed, depending on the operating time of the machine, about once a year.

### 4.6 Screen

Within regular intervals determined by the brewery, but at least every 6 months, the screen should be taken out and cleaned outside the machine. Please pay attention to defective parts of the wire netting.

Please also take care, not to damage the wire netting while transporting, cleaning or mounting the screen.

#### Unmounting of the screen

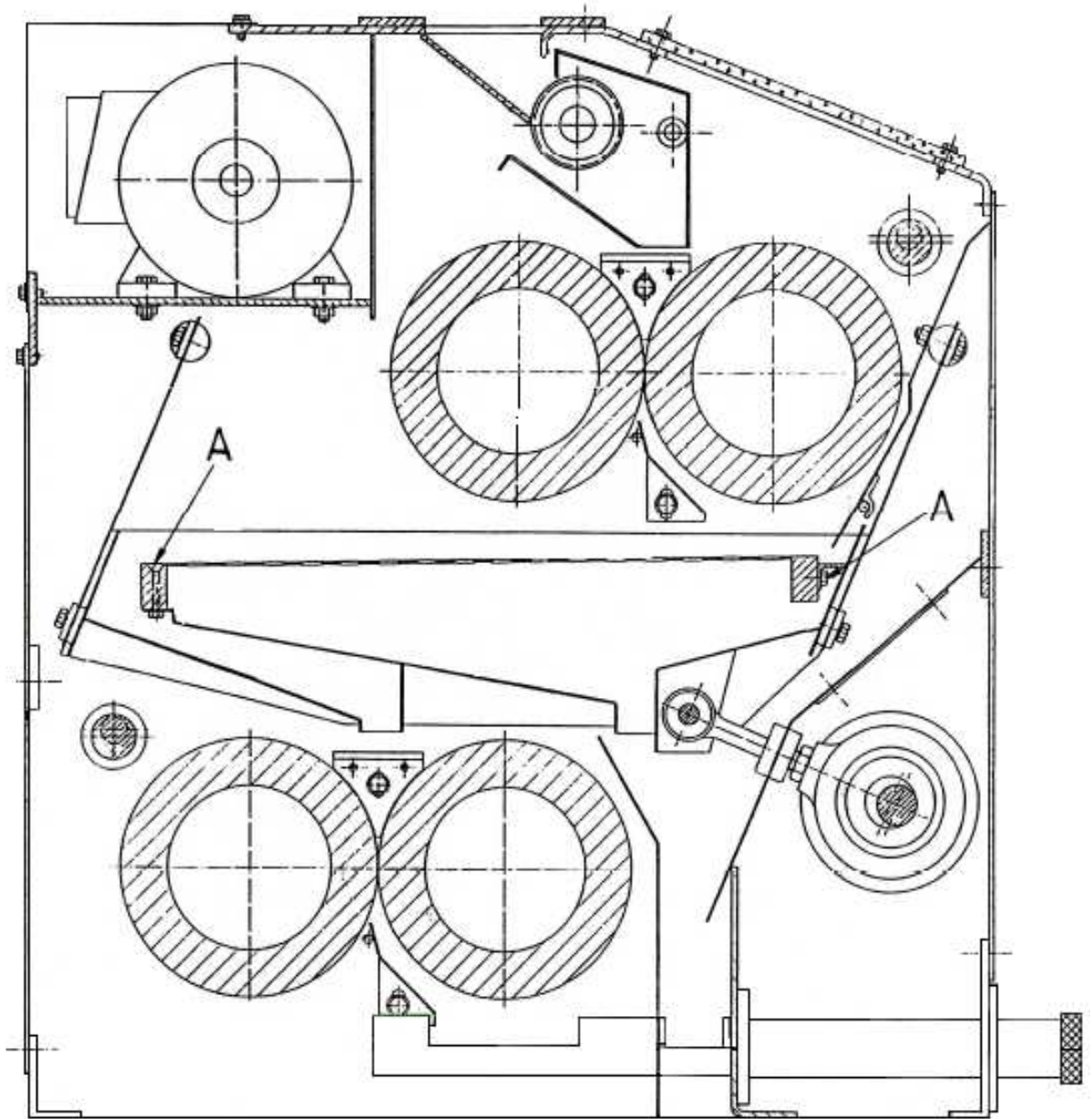
To enable this work, remove the front- and back-covers of the machine casing first.

Remove fixing nuts "A" and the backward screen spring. Then the screen can be taken out of the machine upward-backwards.

When reinstalling the screen, please take care that the screen and the screen springs will be fixed tightly.

After ab. 60 operating hours and then in regular intervals the fixing screws of the screen should be checked. Also the nuts of the screen support and the push-bar(s) should be checked.

The printed numbers on the front of the screen shows the type of the wire netting.



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## 5 Important notice

### 5.1 Safety advice

The 4-roller malt mill has to be used exclusively for grinding of cleaned, classified and stoned malt for which the 4-roller malt mill has been designed.

Any other use of the machine may be dangerous.

Correct installation, adjustments and maintenance will reduce this risks.

The manufacturer of the machine reduced this risk partly by correct design of the machine.

As the installation and the operating of the machine will be out of the control of the manufacturer, the operator must operate the machine in a way, which quarantees highest possible security.

Inner, movable parts of the machine are dangerous. While cleaning and during maintenance works the machine must be stopped and secured against accidental switching on. The best way to do this is, to remove the fuses or to cut off and lock the main switch of the electrical supply of the machine.

All safety devices must be installed before starting the machine.

Never do any cleaning or maintenance while the machine is running.

Never put one´s hand into the mill inlet or outlet.

### 5.2 Safety for workers

The 4-roller malt mill is manufactured according to the state of the art and is operationally reliable, if the operating instructions in hand are observed. Inexpert and improper use results in a faulty operation accompanied by risks for person and objects. In case of an inexpert or improper use the manufacturer is not liable for the resulting damages. The operating instructions in hand are binding for every person transporting, mounting, dismounting, remounting, starting, operating and maintaining (inspection, maintenance, repair) the machine and its pertaining components in the using company´s factory. Each person carrying out this tasks must have read the complete operating instructions and must know them. It is recommended to the using company that they ask the corresponding persons to confirm this regularly in writing.

As a matter of principle the product supplied must be used for the application determined in the contract. Each other application is considered as improper. The manufacturer is not liable for resulting damages; in this case the using company bears all risks. It is not allowed to transmit the product to a third party, if additional risks could arise.

The appropriate use also includes the unrestricted compliance with the operating instructions.

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The machine and its pertaining components may be transported, mounted, started, operate, maintained and repaired exclusively by authorized, trained and instructed employees. These employees must have been instructed in accordance with these operating instructions about possible risks. The competences for transporting, mounting, dismounting, remounting, starting, operating and maintaining the machine must be determined clearly and have to be adhered to. With regard to the safety it is not admissible that there are any doubts relating to these competences. The supervising persons must be named clearly.

For all works concerning the mounting, dismounting, remounting, starting, operating, if necessary, modification, adjustment and maintenance of the machine, the connecting and disconnecting procedures indicated in the operating instructions of the entire plant into which this machine is integrated must be taken into consideration.

It is not allowed to operate the machine in any mode affecting the safety of the machine and its pertaining components. The operator must see to it that no unauthorized persons work at the machine. The operator is obliged to inform the using company immediately about all changes at the machine affecting its safety. The using company is obliged to inform the manufacturer in writing about every defect. This must be done immediately or at the latest two week after the corresponding defect has been determined. The operator using company is obliged to operate the delivered machine always in perfect condition.

Unauthorized modifications affecting the functioning and / or the safety to the machine and / or its pertaining components are not allowed.

As a matter of principle all works at the machine must be carried out always with the machine disconnected, stopped and secured. This applies particularly, if the safety devices and covers are removed.

It is not allowed to remove the information, mandatory and prohibitive signs from the machine.

Before starting the necessary works at the machine its energy supplies including all additional devices must be secured against intended and unintended connection.

Before restarting the machine after completing the maintenance measures it is indispensable to verify whether all protection and safety devices have duly been mounted. The mounting area must be made safe. Inspection and cleaning openings may also be opened only with the machine stopped and secured.

The machine may only be lifted by instructed employees at the provided points (see point 2.1)

If electrical equipment has been fitting or repaired, the used electrical safety devices must be tested.

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In any case all special regional safety regulations and regulations for the prevention of accidents are applying for the operation of the 4-roller malt mill.

The safety regulations in hand have been issued taking into consideration the following safety laws:

- Act on appliance safety (GSG)
- General regulatory order to the GSG
- 1<sup>st</sup> ordinance to the GSG
- EC directive on product liability of 25.07.1988
- EC directive “machines”
- DIN V 8418 – user information, notes relating to the issue
- Product liability as per §823 of the German Civil Code
- Act on product liability of 01.01.1990

### **5.3 Electrical requirements**

All electrical works must be carried out according to the VDE rules. After restarting the machine after a longer standstill the insulation of the electrical components must be checked. If necessary, damp components must be dried by means of warm air.

It is not admissible that the cooling of the motors is affected by modifications or alterations.

Special features relating to the control, such as the kind of connection and starting time, have been determined by the manufacturer and must not be manipulated.

It is indispensable to adhere to the safety measures according to point 5.2.

### **5.4 Noise**

The noise, produced by the mill, depends on the given installation situation as well as if the machine operates with or without malt.

Under certain circumstances, the noise produced will exceed 85 d(A). In this case, the operators must wear an earprotection.

### **5.5 Notice for destruction**

If, after many years of operation, the mill will be destructed, it had to be dismantled and refused, without any harms to the environment.

After dismantling, the several different materials, e.g. steel, cast iron, plastic, drive motors a. s. o. have to be sorted and refused according the actual valid regulations.

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## 5.6 Personal protection: safety measures for preventing personal injuries

- The machines and equipments fabricated by KÜNZEL are equipped with all safety devices required by the relevant regulations for the prevention of accidents taking into consideration the purpose of the machine.
- It is expected that the company operating the machine observes the following rules in order to achieve a maximum degree of safety.
- The safety devices for belts and chains must always be mounted and closed. Open or missing safety devices frequently cause serious accidents.
- The main switches, closing cylinders, speed monitors, control appliances, solenoid valves or mounting locks used for closing the doors always be in an operative state. The main switches may never be sorted or put out of function in any other way.
- As a rule safety grates and safety hooks are permanently fastened at the machine. They can only be removed by using tools. Machines equipped with these safety devices may only be operated, if these safety devices are mounted and are functioning correctly.
- The company operating the machine must ensure any time that the machine and its pertaining equipment are always serviced and kept in a perfect condition as long as they are in use.
- When mounting, inspecting, servicing or repairing the machine the driving motor must be disconnected by interrupting all phases. This is achieved by integrating a key-operated switch which isolates all phases.  
The contact breaker is mounted next to the machine at the control board or the control panel.  
It is not sufficient to remove the fuses.  
It must be ensured that all additionally integrated plant components have been disconnected.
- If the machine is driven by other sources of power, for example compressed air, hydraulic equipment, steam, etc. these supply lines must also be interrupted.  
If the machine is driven by weight, spring or other charged sources of energy, these energies must be released.
- Heated machine components or parts cooling down must be treated carefully in order to avoid the risk of burns.
- If the machine has been stopped by means of the emergency breaker, it is not allowed to start it again by resetting the emergency breaker.

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- It is not admissible that the machine can be started without previously switching back the principal contact breaker.
  - One has to be careful when using machines equipped with break system, for instance, presses. The instructions attached to these machines must exactly be adhered to. When operating machines with make-and-break contacts one has to be prepared for the built-up pressure, vacuum, temperature, etc. appearing in certain time intervals.
  - If the service staff cannot read or write, the superior must inform the staff about the existing risks and give them special instructions.
  - The machine may only be cleaned or lubricated, if they are out of action.  
If it is necessary to step on or into the machines, it is generally indispensable to disconnect the driving motors, to interrupt the poles and to close the corresponding service contact breakers.
  - If samples must be taken from a machine, this must be done very carefully in order to avoid risks. Frequently it is possible to taken the samples from an outlet instead of from the machine itself.
  - Remove always dust, dirt and deposits of material from the machine.  
Clean machines and plant components increase their operational reliability and safety.  
The cleaning helps to avoid dust explosions.  
When working in a dusty environment a respiratory equipment must be used.
  - If a machine loses oil or grease, this must be removed and the leakage has to be repaired. Oil and grease on the floor increase considerably the risk of accidents.
  - The safety instructions must always be updated and may never be removed.
  - When integrating the machine into another existing plant, for instance in case of combining it with other machines, it is indispensable to adhere to the national regulations.
  - For further safety regulations we refer to the safety instructions in the corresponding manuals.
  - The machine must be operated exclusively by instructed staff members.
  - Before starting an inspection, maintenance works or repairs you must inform all persons possibly working in the corresponding area.
  - In certain cases the noise level of the machine can exceed 85 dB(A). In this case the service staff must wear earprotectors.

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- If the machine is finally shut down, environmental and recycling aspects must be taken into consideration:  
Liquids like oil, cooling liquid, brake fluid, etc. must be filled into specially approved vessels and be transported to the place where they will be processed.  
Toxic waste, for example batteries, are disposed of in accordance with the national legal provisions.  
Plastics are separate and transported to the place where they will be recycled.  
Metals are separated and scrapped.
  - KÜNZEL accept no responsibility, if the above regulations are not adhered to.

## **5.7 Explosion protection: Safety measures for preventing dust fires and dust explosions**

### **5.7.1 General instructions and purity**

The purity of the working rooms where combustible dusts are handled is an essential condition for the safety of the plant.

Stocks of bags must be avoided; moreover it must be avoided that bulk stocks are stored in the machine.

In order to reduce the emission of dust laden air into the environment all plant components such as conveying devices, cleaning machines, filters and other must be serviced regularly and thoroughly.

The motors must be kept free of dust deposits.

### **5.7.2 Permanent inspections and maintenance**

In order to avoid an overheating due to sliding belts, all V-belt and flat belt drives must be inspected regularly, at least once a week.

Speed monitors, off-track running monitors and similar safety equipments must be inspected regularly, at least once a week.

All magnetic separators, stone separators and screen devices must be inspected and cleaned at least once a day.

In order to avoid an overheating of the shafts and bearings, they must be inspected at least once a week with regard to their correct functioning; if necessary, they must also be lubricated.

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### 5.7.3 Electrical installation

All electrical installations and objects must be inspected regularly. Pay attention to the following:

- Don't use hand lamps and light fixtures without a shield or a protecting glass.
- Don't use extension leads, electrical heaters.
- Defective installations or appliances must be repaired or exchanged immediately.
  
- Don't lay cables loosely on the floor.
- Out of the working hours the network required for the machine must be disconnected.
- The entire network must be checked at least once a year by an authorized electrical fitter with regard to insulation defects. In doing so, he must observe the valid guidelines.

### 5.7.4 Smoking and welding

In all working rooms smoking is not allowed. This not only applies to the company staff, but also to guests, clients, craftsman from external companies, etc.

Repair and mounting works for which welding machines, soldering lamps, spark-emitting grinding and cutting tools etc. are used must be carried out in specially equipped workshops or at specially prepared work sites.

If, by way of exception, welding or cutting works must be carried out directly in the production and storage rooms, the shop manager must give previously his written permission. It is allowed to carry out the work, only if special safety measures have been taken and if the surroundings have been covered means of moist or special tarpaulins and fire-extinguishers have been placed next to the work.

The welding site and its surroundings must be supervised for at least 10 hours after the work have been completed. The welding beads sprayed during the flame-cutting can cause a smoldering fire. For this reason one has to be extremely careful within a radius of 10m.

Under no circumstances welding works can be carried out at conveying systems in operation.

When carrying out such works after the appliances have been disconnected and carefully cleaned, both sides of the welding place should be closed, for instance by plugging them up tightly with mineral wool. Thus the connection with other conveying elements, silos and vessels is interrupted. For works down pipes and conveying pipes these parts must be dismantled previously and treated outside the danger area.

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### 5.7.5 Electrostatic charge

In order to guarantee an electrostatic discharge, coats of paint in the bridging area must be removed.