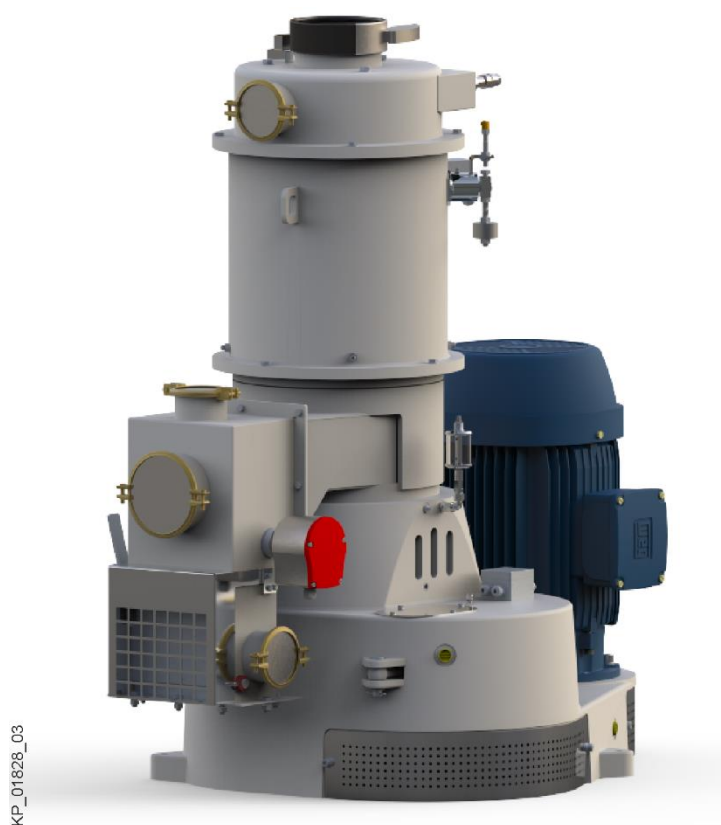


Operating Manual

Pelleting Press 33-390



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1 General Information

1.1 Information regarding this manual

This manual is part of the machine and must be accessible for the staff.

The illustrations in this manual can vary from the actual design of the machine.

In addition to this manual, the documents in the annex apply.

1.2 Design of the safety instructions

In this manual, safety instructions are marked with symbols. The safety instructions are introduced by signal words expressing the extent of the hazard. Measures and actions to avert this hazard are indicated.

Hazard levels



DANGER!

This combination of symbol and signal word refers to an imminently hazardous situation which, if not avoided, can result in death or serious injury.



WARNING!

This combination of symbol and signal word refers to a potentially hazardous situation which, if not avoided, can result in death or serious injury.



CAUTION!

This combination of symbol and signal word refers to a potentially hazardous situation which, if not avoided, can result in minor or moderate injury.



IMPORTANT!

This combination of symbol and signal word refers to a potentially hazardous situation which, if not avoided, can result in environmental and property damage.

1.3 Explanation of symbols

Special warning symbols

In order to draw your attention to special hazards, the following symbols are used in the safety instructions:



Electrical hazards are marked with this symbol.



Hazards which occur during lifting operations of loads are marked with this symbol.



Hazards due to hot surfaces are marked with this symbol.



This symbol marks hazard of entanglement by rotating components.

Symbols in the manual



This symbol highlights recommendations and background information.



Step-by-step instructions



Result of an instruction



Bullet, first level



Bullet, second level

1.4 Spare parts

**WARNING!****Risk of injury due to the use of incorrect spare parts!**

The use of incorrect or faulty spare parts can cause hazards for the staff as well as damage or complete failure of the machine.

- Only use original or manufacturer-approved spare parts.
- Contact the manufacturer in case of doubt.

Purchase spare parts from specialist dealers or from the manufacturer directly.

Spare parts order

Keep the most important spare and wear parts in stock. Please order according to our spare part lists and drawings.

For orders of spare parts we ask you to indicate the following data:

- Order number
- Machine type
- Machine number
- Part number of the machine
- Drawing number
- Item number in the spare parts drawing
- Part number of the spare part
- Designation of the spare part
- Quantity

1.5 After-sales service

If you need technical advice or wish to order spare parts, our after-sales service will be at your disposal.

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It is recommended that a "Machine journal" be kept and the most important operating parameters in dependence on the machine running time be noted. Information on the operating performance of the machine and a scheduled maintenance and repair can be deduced from this journal.

2 Safety

This chapter provides an overview of all important safety aspects for protection of the staff.

Safety instructions serve for occupational health and safety and for the prevention of accidents.

Observe the safety instructions!

Non-compliance with the operating and safety instructions included in this manual may pose a serious threat to the staff, the environment and the machine.

2.1 Designated use

The machine has been designed and built exclusively for the designated use described here.

The machine is designed for conditioning of ground domestic waste within the limits of application set by the manufacturer (see chapter "Technical data").

The following values must not be exceeded:

- Maximum hydraulic pressure: 110 bar

Use only products having the following properties:

- Input moisture: approx. 2.6 %
- Bulk density: 260 kg/m³
- Particle size: < 1 mm

The input product must be free of foreign substances such as oversized material, sand, stones, glass, ferrous and non-ferrous metals, corrosive matters, chemical additives.

The machine is ready to be installed and must be integrated in a complete plant, its control system and emergency stop chain.

Any use deviating from the designated use of the machine is considered misuse and can result in dangerous situations.

**WARNING!**
Hazards due to misuse!

Observe the following points to prevent misuse:

- Operate the machine only within the technical limits of application.
- Do not, or only briefly, operate the machine without product.
- Make sure that foreign objects or metal parts cannot get into the machine.
- Never operate the machine in reverse mode.
- Do not override the safety devices.
- Do not convert, retrofit or modify the machine or individual equipment parts.
- Do not switch the machine on and off repeatedly in case of a blocking.

2.2 Responsibility of the operating company

Operating company

The operating company is the entity that operates the machine itself for commercial or economic purposes or transfers it to a third party for use/application.

The operating company assumes legal responsibility for protecting the operator, the staff or a third party during operation of the machine.

Obligations of the operating company

The machine is used in the industrial sector. The operating company of the machine is subject to the legal duties of occupational safety.

In addition to the safety instructions in this manual, the safety regulations, the accident prevention regulations and the environmental protection regulations which are valid for the field of application of the machine have to be observed and complied with.

The operating company must ensure that all employees who handle the machine have read and understood this manual.

Technically perfect state

The operating company is responsible for ensuring that the machine is always in a technically perfect state.

- The operating company must ensure that the maintenance intervals described in this manual are observed.
- The operating company must have all safety devices checked regularly for correct function and completeness.

Integration of the machine in a plant

- The machine is part of a plant. The operating company must ensure that the necessary structural and organizational protection measures applicable at the place of installation are taken and adhered to. The operating company must ensure the safety of the plant.
- For the installation of the machine in a plant, all requirements and instructions of this manual regarding assembly and commissioning must be complied with.
- The operating company must install separate, lockable main switches for the plant parts.
- The operator must install emergency stop devices for the plant and integrate this machine in the control system and the emergency stop chain.

2.3 Staff requirements

2.3.1 Required qualifications of the staff



WARNING!

Danger of injury if the staff is insufficiently qualified!

If unqualified staff carry out work on the machine or are in the hazardous area of the machine, hazards arise which can cause serious injuries and significant property damage.

- Have any activities performed only by qualified staff.
- Keep unqualified staff away from the hazardous areas.

Only persons who are expected to perform their works reliably are permitted as staff.

Persons whose reaction capability is impaired, e.g. through drugs, alcohol or medication, are not approved.

The qualifications of the staff for the different fields of activity are specified in this manual.

Operator

The operator belongs to the staff of the operating company and has been instructed by him. The operator knows the rules applicable at the place of installation of the machine and is informed about the risks of the complete plant.

The operator was demonstrably trained by the operating company. As a result of this training, he is able

- to operate the machine,
- to remedy certain malfunctions,
- to carry out certain maintenance works.

Qualified staff

Due to their professional training, knowledge, and experience, as well as their knowledge of the relevant regulations, qualified staff are able to perform the tasks assigned to them and to recognize and avoid potential hazards on their own.

Skilled electrician

Due to his professional training, knowledge, and experience, as well as his knowledge of the relevant standards and regulations, the skilled electrician is able to perform works on electrical systems and to recognize and avoid potential hazards on his own.

The skilled electrician has been trained for the specific field of activity in which he is employed, and is familiar with the relevant standards and regulations.

Staff of the operating company

The staff of the operating company know the rules applicable at the place of installation of the plant and are informed about the hazards of the complete plant.

The responsibilities of the staff of the operating company have been clarified by the operating company.

Due to their professional training, knowledge, and experience, as well as their knowledge of the relevant regulations, the staff of the operating company are able to perform the tasks assigned to them and to recognize and avoid potential hazards on their own.

Staff of the manufacturer

The staff of the manufacturer has been trained and informed about potential hazards by the manufacturer. Due to their experience with the machine, the staff of the manufacturer are able to recognize and avoid hazards on their own.

The staff of the manufacturer are authorized:

- to assemble the machine,
- to set the machine in operation,

- to carry out maintenance works,
- to remedy malfunctions.

Work that is not described in this operating manual may only be carried out by the staff of the manufacturer.

2.3.2 Unauthorized persons



WARNING!

Danger of life for unauthorized persons in the hazardous area!

Unauthorized persons who do not meet the qualifications outlined here are not aware of the dangers in the hazardous area. Therefore, unauthorized persons are at risk of serious injuries or even death.

- Keep unauthorized persons away from the hazardous area.
- If in doubt, address the persons and direct unauthorized persons to leave the hazardous area.

2.3.3 Training by the operating company

The staff must be trained by the operating company on a regular basis.

For better tracking, the training must be recorded by the operating company.

2.4 Personal protective equipment

Personal protective equipment is used to protect the staff against hazards that might affect their safety or health at work.

When working on and with the machine, the staff must wear personal protective equipment, which will be referred to separately in the individual chapters of this manual.

- Always wear the personal protective equipment necessary for the respective work.
- Follow the instructions in the working area concerning personal protective equipment.

Description of the personal protective equipment



Protective clothing

Protective clothing is close-fitting work clothing with low tensile strength, with narrow sleeves and without protruding parts. It is used primarily for protection against being drawn in by moving machine parts. Do not wear rings, necklaces and other jewellery.



Safety shoes

Safety shoes are used for protection against heavy parts falling down and slipping on a slippery ground.



Protective gloves

Protective gloves are used to protect the hands against friction, abrasion, punctures or deeper wounds as well as against contact with hot surfaces.



Safety goggles

Safety goggles are used to protect the eyes against flying particles and liquid splashes.



Safety helmet

The safety helmet is used for protection against falling and flying parts and materials.



Hearing protection

The hearing protection is used to protect your hearing against exposure to loud sounds. At a workplace with high sound level, the use of hearing protection is required from 85 dB (A).

2.5 Residual risks

Residual risks are non-obvious risks resulting from the use of the machine. Although the machine was designed and built according to state-of-the-art technology and the generally recognised safety regulations, residual dangers cannot be entirely excluded – despite its designated use.

The following section describes the residual risks emanating from the machine.

Electrical current



DANGER!

Risk of fatal injury from electrical current!

Risk of death from electrocution if live parts are touched.

A damaged insulation or damaged electrical components can be fatal.

- Work on the electrical system must be carried out only by skilled electricians.
- In case of damage to the insulation, turn off power supply immediately and request repair.
- Prior to work on live parts, ensure absence of voltage for the duration of the work.

Observe the 5 safety rules:

- Disconnect from the power supply.
- Secure against restarting.
- Check absence of voltage.
- Earth and short-circuit.
- Provide protection against adjacent live parts.
- Never bridge fuses or put them out of function! Fuses may be replaced only by qualified electricians.
- Keep moisture away from live parts. Moisture can cause a short circuit.

Moving components



WARNING!

Risk of injury from moving components!

Rotating and/or linearly moving components can cause serious injuries.

- Do not reach into moving components.
 - Operate the machine only with mounted safety devices.
 - Do not open access points, such as maintenance flaps, while the machine is in operation.
 - Wait until the stopping time is over.
- Do not open the access points until all moving components stand still.

Hot surfaces



WARNING!

Risk of burn injuries from hot machine parts!

Parts of the machine heat up during operation. Skin contact with hot machine parts cause severe burns.

When working near hot machine parts:

- Wear clothing and gloves protecting against heat.
- Do not touch hot machine parts.

When working on hot machine parts:

- Cool the machine to ambient temperature.
- Wear gloves protecting against heat.

Hot consumables



WARNING!

Risk of burn injuries from hot consumables!

Consumables can reach high temperatures during operation.

Skin contact with hot consumables causes severe burns.

Whenever working with consumables:

- Wear clothing and gloves protecting against heat.
- Let hot consumables cool down.

2.6 Safety devices



DANGER!

Risk of fatal injury due to non-functioning safety devices!

Non-functioning safety devices can cause serious injury and even death.

- Before starting work, check whether all safety devices are in working order and properly installed.
- Never put the safety devices out of function.
- Make sure that all safety devices are accessible.

Integration in an emergency stop concept

The machine is designed for use within a plant. Before the machine is set in operation, the emergency stop devices for the machine must be installed and integrated in the safety chain of the plant control system. If the emergency stop devices are not included in the scope of supply, they must be procured and installed by the operating company (see next chapter).

The emergency stop devices must be connected so that dangerous situations for persons and property are excluded in the following cases:

- interruption of the power supply
- restoration of the power supply after an interruption

The emergency stop devices must always be freely accessible.

Equipotential bonding

In the course of the professional assembly, the machine and connected components are connected to the local equipotential busbar to prevent ignition sparks and touch voltages.

Prior to initial commissioning, the correct function of the equipotential bonding is checked.

2.6.1 Safety devices included in the scope of supply

The following components serving as safety devices are already mounted in the factory or will be installed during assembly:

Key transfer system



Some parts of the machine are secured with a key transfer system and can be opened only with a coded key.

The key is in a switch box with main switch. It can be removed only when the machine is switched off at the main switch.

2.6.2 Retrofitting safety devices (obligation of the operating company)

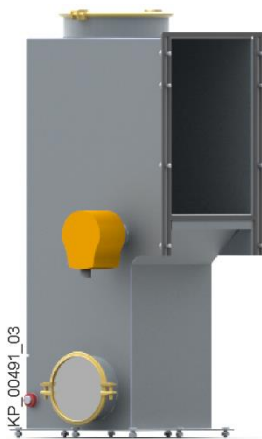
Before this machine may be put into operation, additional safety devices must be retrofitted by the operating company, which are not included in the scope of supply: The operating company must provide the required components.

All requirements on the indicated safety devices described in this chapter must be fulfilled before commissioning. The operating company shall perform all work necessary for this purpose.

Depending on the order, it is possible that certain requirements on the indicated safety devices are described in the annex under "Commissioning requirements":

- Check the section "Commissioning requirements" in the annex. Observe the available documents!

Outlet box



Pelleting presses and pan grinder mills must be equipped with an outlet box.

The outlet box prevents the operator from reaching into the machine and transports the product to the downstream machine or conveying unit.

If an outlet box is not included in the scope of supply, it must be provided by the operating company. In this case, you can find a dimension sheet with the necessary specifications in the annex.

Access lock



The access lock prevents the operator from reaching into danger zones with the machine running.

On the upper side of the dust hood there is for example a lock (Fig. 1) with inserted bolt which is welded to the proportioning system mounted on top of it using the shortest possible route.

Fig. 1: Lock with bolt



Fig. 2: Lock on the switch cabinet

The proportioning system and the dust hood can be removed only after opening the lock. If the required key is removed from the switch cabinet (Fig. 2), the machine automatically switches off.

If an access lock is not included in the scope of supply, it must be provided and mounted by the operating company. This access lock must meet the requirements of electrical interlocking systems (see chapter "Assembly", "Electrical connections").

2.7 Safeguarding against unauthorized re-start



DANGER!

Risk of fatal injury due to unauthorized re-start!

Unauthorized re-start of the machine can cause serious injury including death.

- Before starting work, switch off the machine and safeguard it against re-start!

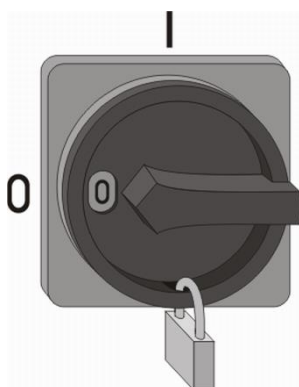


Fig. 3: Lock of main switch

Safeguarding against unauthorized re-start

- Switch off the power supply.
For this purpose turn the main switch to position "0".
- Secure the main switch with a lock (Fig. 3).
- Keep the key of the lock in a safe place.

Re-starting the machine

After having performed all work:

- Remove all tools and other objects from the machine.



DANGER!
Risk of fatal injury due to unauthorized re-start!

Unauthorized re-start of the machine can cause serious injury including death.

- Before re-start, make sure that all safety devices are mounted and fully functional and that persons are not exposed to danger.

- Remove the lock from the main switch.

2.8 Environmental protection



IMPORTANT!
Danger to the environment due to improper handling of environmentally hazardous substances!

Improper handling of environmentally hazardous substances, particularly incorrect waste disposal, may cause serious damage to the environment.

- Always observe the instructions below regarding handling and disposal of environmentally hazardous substances.
- Immediately take appropriate measures if environmentally hazardous substances escape accidentally into the environment. If in doubt, inform the responsible municipal authorities about the damage and ask about the appropriate measures to be taken.

The following environmentally hazardous substances are used:

Lubricants

Lubricants such as greases and oils contain toxic substances. Lubricants must not be allowed to escape into the environment.

Disposal must be carried out by a specialist disposal company.

Detergents

Solvent-based detergents contain toxic substances. Detergents must not be allowed to escape into the environment.

Disposal must be carried out by a specialist disposal company.

2.9 Signs

The following signs and stickers are attached to the machine and its working area. They refer to the immediate vicinity in which they are affixed.



WARNING!

Risk of injury due to illegible signs and stickers!

In the course of time, signs and stickers can get dirty or become illegible in some other way so that potential hazards will not be recognised and necessary operating instructions can no longer be followed. This will cause a risk of injury.

- Keep all safety, warning, and operating instructions always in a good, legible condition.
- Replace damaged signs or stickers immediately.

Damaged signs or stickers



Damaged signs or stickers can be reordered indicating the corresponding spare parts number.

Direction arrow

The direction arrow indicates the necessary direction of rotation of the driven shafts.

Signs and stickers with warnings



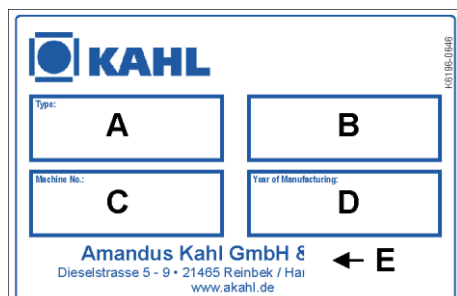
Fig. 4: Warning symbols on signs

The warnings apply to the complete machine!

The signs are mounted centrally. The position is no indication of a specific hazard area.

Missing or damaged signs must be replaced!

2.10 Type plate



The type plate contains the following information:

- A Type designation of the machine
- B Additional information
- C Machine number
- D Year of construction
- E Manufacturer and contact data

Fig. 5: Type plate

3 Technical Data

Pelleting press 33- 390

K3111-0641	Value	Unit
Weight (fully assembled)	1,225	kg
Dynamic load	18.4	kN
Emission sound pressure level	≤ 70	dB(A)



See dimension sheet for further details, such as dimensions or space requirement.

Drive motor

K7102-1280	Value	Unit
Size	200 L flange FF 350	
Type	IE3-W22	
Power	30.0	kW
Speed	1,470	1/min
Voltage	400	V AC
Frequency	50	Hz
Protection type	IP55	
Insulation class	F	
Type of construction	V1	
Axle load	3.5 kN on shaft centre	
Qty.	1	

Hydraulic unit

K6423-1007	Value	Unit
Maximum hydraulic pressure (preset)	110	bar
Oil quantity	approx. 8	l
Motor		
See type plate		
Pressure limiting valve		
Pressure setting range	up to 120	bar
Voltage	24	V DC
Input signal	4	mA
Control current	4- 20	mA

 Test record, terminal diagram, hydraulic diagram are located in the terminal box.

3.1 Operating conditions

Environment

Indication	Value	Unit
Ambient temperature	12 - 40	°C
Relative air humidity, max.	60	%

Operation period

Indication	Value	Unit
Maximum operation period without interruption	designed for continuous operation	

3.2 Operating principle of the machine

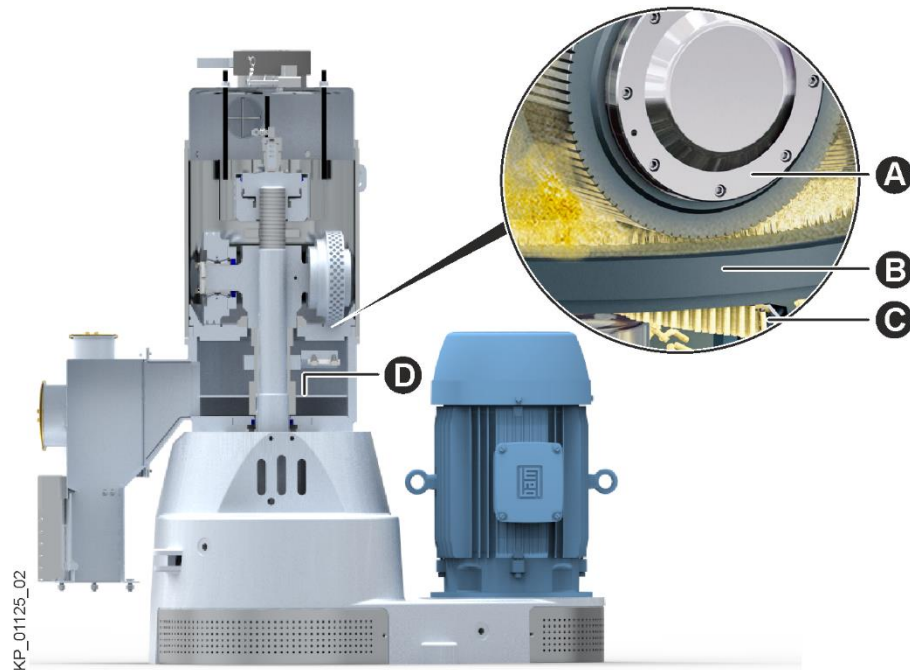


Fig. 6: Overview of the function

The pan grinder rollers (Fig. 6/A) and the die (Fig. 6/B) are the main components of a pelleting press. The pan grinder rollers and the die are the tools for the production of pellets.

All other parts of the pelleting press are used for support and drive, for feeding the product to be pelleted and for discharging the finished pellets.

The product, which is fed vertically from above into the interior, forms a product layer on the die that is rolled over continuously by the pan grinder rollers. As a consequence, the product is pre-compacted and pressed into the effective bores of the die.

These effective bores are designed in such a way that the product is further compacted and a cylindrical strand emerges below the die.

A breaking-off device below the die (Fig. 6/C) breaks the solidified "endless" strand to the desired length.

Via the discharge device (Fig. 6/D) the pellets are transported to the outlet.

4 Design and Function

Pelleting press 33-390

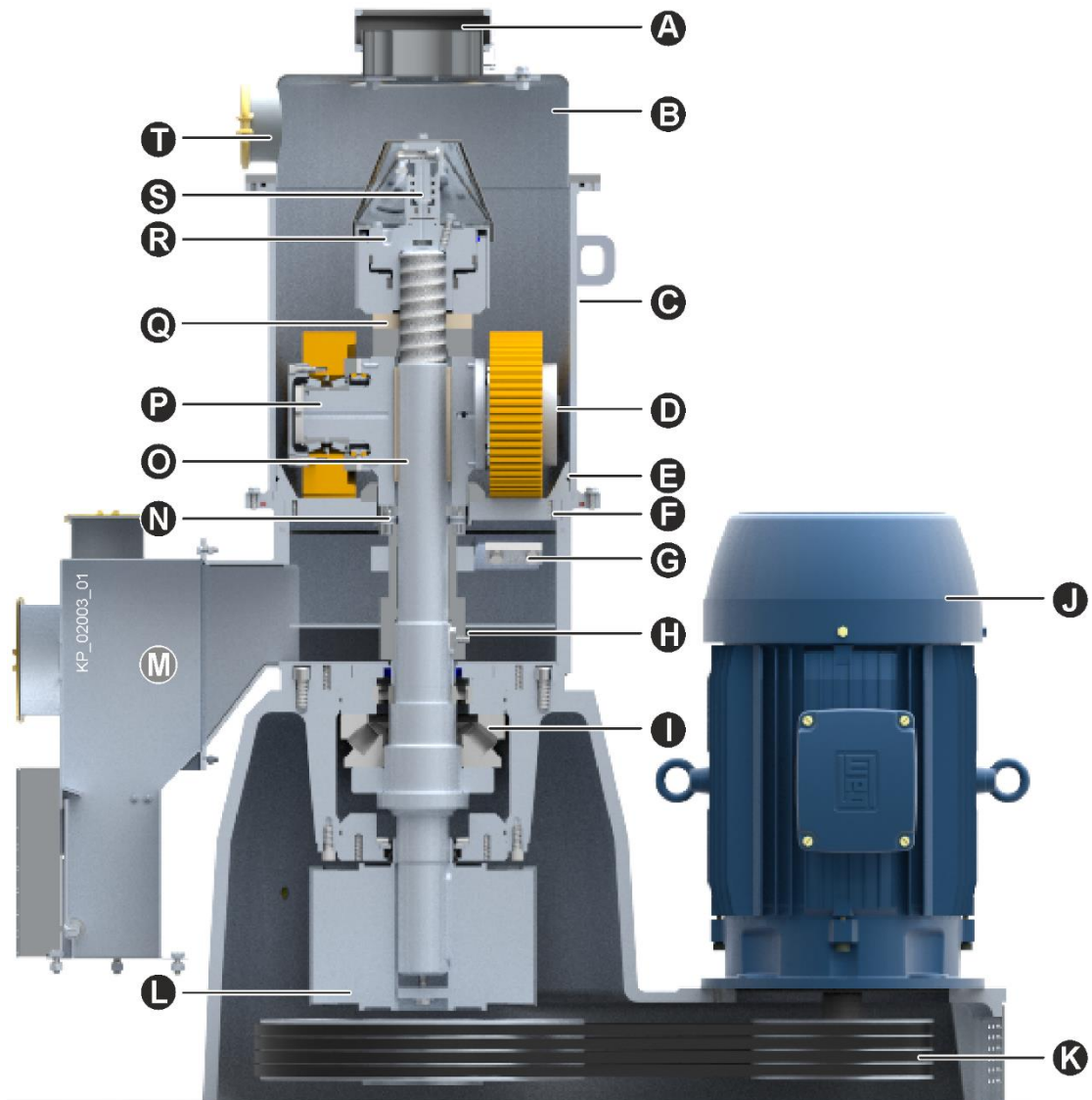


Fig. 7: Overview of the components

Diagram legend

A	Product inlet with bent-lever closure	B	Dust hood
C	Upper part	D	Pan grinder roller
E	Outer die ring	F	Die
G	Breaking-off device	H	Discharge device
I	Main bearing of the main shaft	J	Drive motor
K	V-belt drive	L	Spur gear

M	Outlet box	N	Pan grinder head stop
O	Main shaft	P	Pan grinder head
Q	Spacer rings	R	Hydraulic nut
S	Simple revolute joint	T	Aspiration connection

4.1 Description of the components of the machine

Auxiliary units



Fig. 8: Hydraulic unit

Hydraulic unit

The hydraulic unit supplies the hydraulic pressure for the hydraulic nut which presses the pan grinder head against the die.

5 Transport, Packing, and Storage

5.1 Safety instructions for transport

Suspended loads



DANGER!

Risk of fatal injury due to suspended loads!

During lifting operations, loads can fall down and cause serious personal injury or even death.

- Never stand or work under suspended loads!
- Keep clear of the transport routes for suspended loads!
- Observe the load during all lifting operations. If the view is obstructed, follow the instructions of the loading supervisor when moving the load.
- Use only approved lifting gears and slinging means of sufficient carrying capacity.
- Do not use damaged or worn ropes, chains or belts.
- Do not fix the ropes, chains or belts on sharp edges or corners, do not knit them together or twist them.
- Put down the load before leaving the workplace.

Improper transport



IMPORTANT!

Risk of property damage caused by improper transport!

In case of improper transport, the transport items can fall or tilt. This can result in considerable property damage.

- Transport the transport items carefully.
- Observe the symbols and information on the packing!
- Use only the slinging points provided for this purpose.
- Remove packing only shortly before assembly.

Suspended loads



DANGER!

Risk of fatal injury due to suspended loads!

During lifting operations, loads can fall down and cause serious personal injury or even death.

- Never stand or work under suspended loads!
- Keep clear of the transport routes for suspended loads!
- Observe the load during all lifting operations. If the view is obstructed, follow the instructions of the loading supervisor when moving the load.
- Use only approved lifting gears and slinging means of sufficient carrying capacity.
- Do not use damaged or worn ropes, chains or belts.
- Do not fix the ropes, chains or belts on sharp edges or corners, do not knit them together or twist them.
- Put down the load before leaving the workplace.

Offset centre of gravity



WARNING!

Risk of injury due to falling or tilting packages!

Packages can have an offset centre of gravity. If the package is not slung correctly, it can tilt and fall. Falling or tilting packages can cause serious injuries.

- Observe the marks and information concerning the centre of gravity on the packages.
- In case of transport by crane, fasten the crane hook at the centre of gravity of the package.

Swinging transport item



WARNING!

Risk of injury due to uncontrolled swinging of the transport item!

During transport by crane, the transport item can swing and cause serious personal injury and significant property damage.

- Make sure that there are no persons, objects or obstacles in the hazardous area during transport.

Wear the following personal protective equipment:



5.2 Transport inspection

Check delivery immediately upon receipt for completeness and transport damage on the basis of the accompanying documents.

Proceed as follows in case of externally visible transport damage:

- Do not accept the delivery or only accept it under reserve.
- Note the extent of damage on the accompanying documents or on the delivery note of the forwarding agent.
- Submit a complaint.

5.3 Packing of the machine

The packing is to protect the individual components against damage until assembly. Therefore, do not destroy the packing and only remove it immediately before assembly.

Handling of the packing materials



IMPORTANT!
Environmental damage by improper disposal!

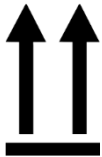
- Dispose of packing materials in an environmentally sound manner.
- Observe the local waste disposal regulations. As necessary, entrust a specialized firm with the disposal.

5.4 Symbols on the packaging

The following symbols can be affixed on the packaging.

Observe the symbols during transport and storage!

This way up



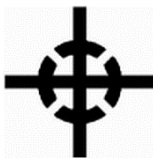
The arrowheads of this symbol mark the top of the packing piece. The arrows must always point upwards; otherwise the contents might be damaged.

Sling here



Fasten sling chains, ropes or belts only at the points marked with this symbol!

Centre of gravity



This symbol marks the centre of gravity of packing pieces. Observe the position of the centre of gravity when lifting and transporting packing pieces!

5.5 Transport weights

The following table shows the weights of the transport groups. These weights form the basis for the selection of the lifting gears.

Transport groups	Weight [kg]	Required carrying capacity of the lifting gears [kg]
Machine (fully assembled)	1225	2000
Upper part	60	100
Pan grinder head	80	500
Die	30	50

5.6 Transporting the machine



IMPORTANT!

Risk of property damage caused by improper transport!

When transported in unsuitable transport units, the machine may be damaged.

- Disassemble the machine in the recommended transport units before transport.
- Read and observe additional documentation of the individual components.

Transport units and attachment points

The machine is transported in the units shown below.

- The transport units must be transported by qualified staff at the attachment points (A):

Machine

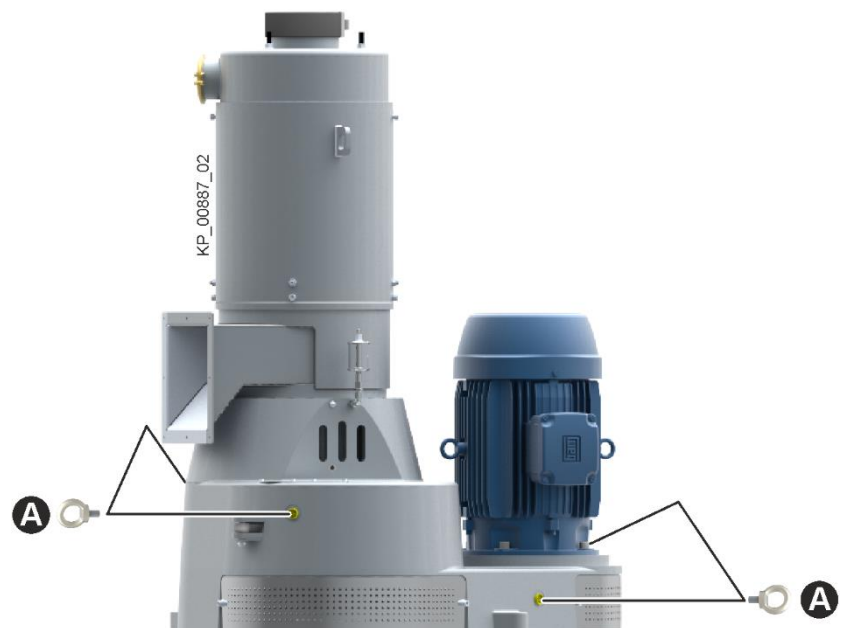


Fig. 9: Attachment points of the machine

- Mount eye bolts to the attachment points (Fig. 9/A).

5.7 Storage

Storage of packing pieces

If the machine or the assembly components are not mounted immediately after delivery, storage of the packing pieces must fulfil the following conditions:

- Do not store outdoors.
- Store in a dry and dust-free location.
- Do not expose to aggressive media.
- Avoid mechanical vibrations.

Recommended storage conditions:

- Ambient temperature: 15 to 35 °C
- Relative air humidity: max. 60 %

If these values cannot be met, contact the manufacturer!

Preservation

The machine is delivered with a preservative coating of the corrosion-prone parts.

- In case of a longer intermediate storage, check the general condition of all parts and the packaging at regular intervals.
- If necessary, pay attention to sufficient preservation.

At the factory, a heavy-duty anti-corrosive agent is used, for example "GÜSOL Heavy-Duty Rust Guard" or "DEPAC 305 Heavy-Duty Rust Guard".

6 Assembly

6.1 Safety instructions for the assembly



WARNING!

Risk of injury due to improper assembly!

Improper assembly can result in serious injury and significant property damage.

- The assembly work must be performed by employees of the manufacturer or by persons authorized by the manufacturer.
- Mount the components properly.
- Only use screws and assembly material of the manufacturer.
- Ensure sufficient space before starting work.
- Be careful with sharp-edged components.
- Secure the components so that they cannot fall down or tip over.

Electrical current



DANGER!

Risk of fatal injury from electrical current!

Contact with live components can be fatal.

- Before starting work, switch off the electrical supply and safeguard the machine against restart!

Suspended loads



DANGER!

Risk of fatal injury due to suspended loads!

During lifting operations, loads can fall down and cause serious personal injury or even death.

- Never stand or work under suspended loads!
- Keep clear of the transport routes for suspended loads!
- Observe the load during all lifting operations. If the view is obstructed, follow the instructions of the loading supervisor when moving the load.
- Use only approved lifting gears and slinging means of sufficient carrying capacity.
- Do not use damaged or worn ropes, chains or belts.
- Do not fix the ropes, chains or belts on sharp edges or corners, do not knit them together or twist them.
- Put down the load before leaving the workplace.

Swinging transport item



WARNING!

Risk of injury due to uncontrolled swinging of the transport item!

During transport by crane, the transport item can swing and cause serious personal injury and significant property damage.

- Make sure that there are no persons, objects or obstacles in the hazardous area during transport.

Hydraulic unit



WARNING!

Risk of injury due to hydraulic energy!

Hydraulically moved components can cause severe injuries.

- Work on hydraulic components must be performed by qualified staff specialised in hydraulics.
- Do not reach into moving components.
- Operate the machine only with mounted safety devices.
- Do not open access points, such as maintenance flaps, while the machine is in operation.

Prior to any work on the machine:

- Depressurize the hydraulic system completely. Release the pressure accumulator completely.

Wear the following personal protective equipment:



6.2 Conditions for assembly

Installation conditions

- A secure location and fastening is ensured.
- Escape routes and rescue equipment are freely accessible.
- The safety of the staff is ensured at the place of installation.
- Adequate lighting is available.
- All plant and machine parts are easily accessible.
- Sufficient space for assembly, maintenance and tool change is available.
- The local power supply complies with the data on the type plate and the specifications in the technical data.
- The responsibilities during assembly and initial commissioning are specified.
- If the machine is mounted on a concrete floor, the foundation must be cured and loadable.

- Power and hydraulic pressure (if necessary) are available as specified in the technical data.
- Already connected components and all plant parts connected with the pelleting press or pan grinder mill are switched off and safeguarded against restart.
- The assembly work requires at least two skilled workers.
- Required tools and machines.
 - Mobile crane, crane truck or fork lift truck
 - Lifting ropes and slings

6.3 Securing screwed connections with Loctite

Adhesive

Loctite No.	Temperature range	Handling strength / full strength after
RC 243	max. + 150 °C	10 - 30 min. / 3 hours

Cleaner

 Do not use moisturizing cleaners, such as diluent for cellulose lacquers.

Recommended cleaning agents:

- Acetone
- Fast cleaner spray Loctite
 - fast evaporation = No. 706 36 AC
 - slow evaporation = No. 706 36 IP
- Glue remover spray Loctite No. 806 46

 Pay attention to the processing and security information on the package or package insert of the recommended cleaning agent.

Activator

The activator N Loctite can be used to shorten the curing time until handling strength is reached.

The activator shortens the curing time until reaching handling strength to 5 to 15 minutes.

 The activator does not reduce the curing time until reaching full strength.

6.3.1 Gluing screws

- Clean the gluing surfaces mechanically (brushing, grinding) and degrease them.

The more thorough the gluing surfaces are cleaned, the better the glued joints.



Pay attention to the processing and security information on the package or package insert of the adhesive and activator.

- Treat the gluing surfaces with adhesive and activator according to the manufacturer's instructions.

Wait for the end of the prescribed curing time (handling strength / full strength).

Do not move the glued parts before handling strength of the glued joint has been reached.

6.3.2 Loosening the glued joint

- Loosen the glued screwed connection.

6.4 Assembly instructions



Read the documentation of the components included in the delivery. It contains more detailed information on assembly and operation.

- Observe the indications on the dimension sheet.
- Observe the layout plan of the plant.
 - Consider the arrangement of the upstream and downstream plant parts or machines.
 - Make sure during assembly that the escape routes are kept free from obstacles.
- The machine must be integrated by the operating company in a complete plant, its control system and emergency stop chain.
- Mount protection devices against accidental contact on all components which get hot during operation and are freely accessible. Protection devices against accidental contact are not included in the scope of supply.
- Mount the machine freely accessible so that it can be operated and maintained.

- The components which are provided by the operating company must comply with the specifications of the machine manufacturer. If the specifications are not known, contact the manufacturer.

Reference values for tightening torques

Set screws with standard metric thread, property class 8.8 (VDI 2230)

Thread	Tightening torque [Nm]	Thread	Tightening torque [Nm]
M 5	5.9	M 12	84
M 6	10.1	M 16	206
M 8	24.6	M 20	415
M 10	48	M 24	714

6.5 Installing the machine

Install the machine and the motor according to the dimension sheet.

A horizontal, solid ground is required. Usually the machine is installed on a concrete floor with a level difference of ± 0.5 mm, maximum ± 1 mm. Installation on a steel structure is also possible. The belt forces must be considered.

The following data are indicated on the dimension sheet:

- Dimensions for fastening the machine on a foundation or steel structure
- Dimensions
- Weights
- Loads
- Dimensions for connection of a feeding device
- Dimensions for connection of a discharge device

Assembly on a concrete floor

- Provide the machine base plate with threaded bushings for the foot fastening screws.



- Check the horizontal alignment of the machine with a water level. The upper edge (Fig. 10/A) of the upper part is used as reference level.
- Compare the machine type with the data in the table.
- Drill holes for the shear connectors.
- Glue the shear connectors in place using a mortar cartridge.
- Observe the curing and drying times.
- Insert the centring ring into the foot holes of the machine.
- Screw on the machine with the foundation nuts.

Fig. 10: Alignment

Assignment of the fastening elements

Machine type	Foot hole (mm)	Qty.	Shear connector & mortar cartridge		Hole for shear connector (mm)	Additional centring ring for the foot holes	
			Dimension	Part No.:		Dimension (mm)	Part No.:
33-500	18	3x	M 16 x 185/3	6196-0469	18 x 125	---	
33-390							

Assembly on a steel structure



IMPORTANT!

Risk of property damage caused by insufficient rigidity of the steel structure!

The steel structure must have sufficient rigidity. See the dynamic load on the dimension sheet. An insufficiently rigid steel structure can cause vibration and damage to the machine.

– Consult the manufacturer.



- Provide holes for fastening the machine with screws on the steel structure (see the dimension sheet).
- Align the machine and fasten it with screws.
- Check the horizontal alignment of the machine with a water level. The upper edge (Fig. 11/A) of the upper part is used as reference level.

i Optionally, a rubber-bonded-to-metal frame can be ordered from the manufacturer. It protects the machine environment against vibrations coming from the pelleting process.

Fig. 11: Alignment

6.6 Checking the V-belt tension



IMPORTANT!

Risk of property damage caused by slipping V-belts!

Pay attention to the tension of the V-belts (Fig. 12/A). The V-belts must not slip during operation. Property damage may be the result.

- Check the tension regularly.

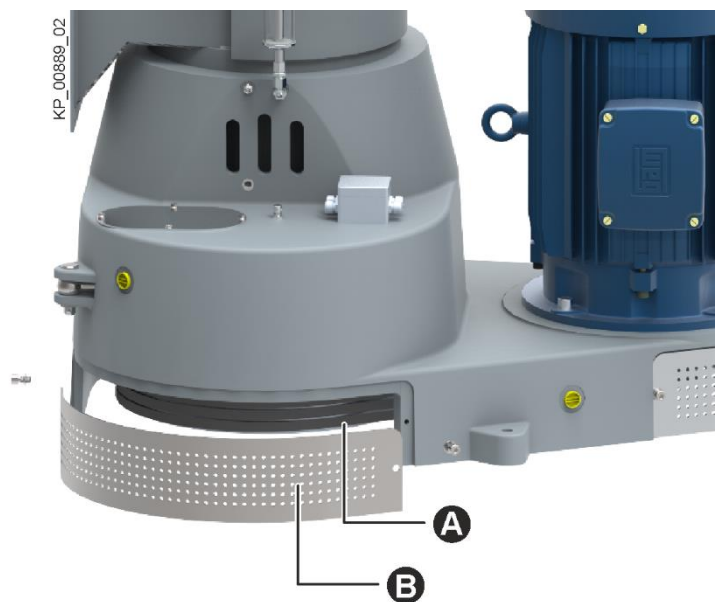


Fig. 12: V-belt tension

- Remove the V-belt guard (Fig. 12/B) from the lower part.

With a test pressure of 7.5 kg (strong thumb pressure) (Fig. 12/A), the V-belts must give way as follows at half centre distance:

- 13 to 18 mm (new V-belts)
- 17 to 22 mm (V-belts which have already run)
- Mount the V-belt guard (Fig. 12/B) to the lower part again.
- Check new V-belts after 1 to 4 hours and then regularly every 1,000 operating hours.

If the belt tension is too low:

- Retighten the V-belts (see "Repair").

6.7 Carrying out the direction-of-rotation test

**DANGER!****Unlocked operation of machines.**

In the unlocked mode, all protective devices and the process interlocking are out of function.

- Keep the safety distance to all moving machine parts.
- Do not open the access points until all moving components stand still.
- Wait until the stopping time is over.
- Make sure that nobody is in the hazardous area of the machine.

**WARNING!****Risk of entanglement by rotating shafts!**

Rotating shafts can cause severe injuries.

- Do not reach into rotating shafts.
- Wait for complete stop. Rotating shafts can run on after shutdown.

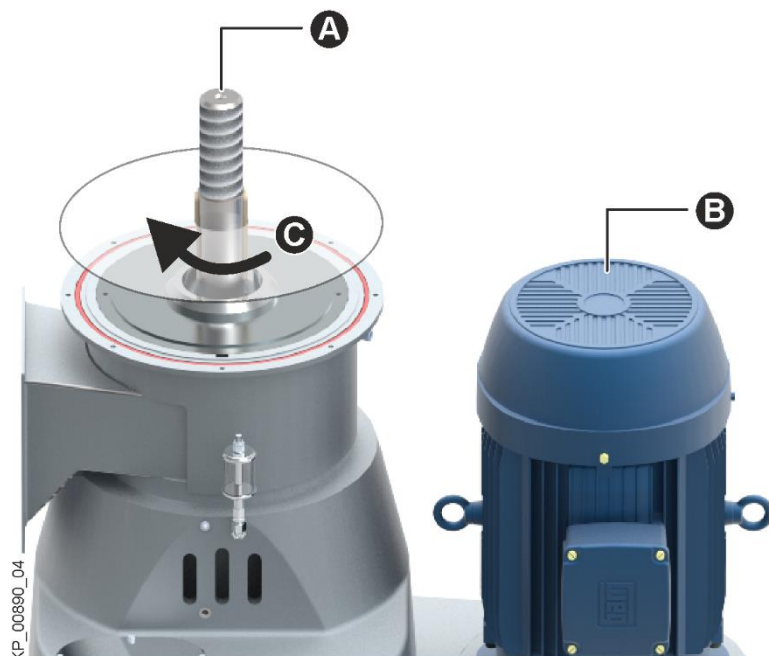


Fig. 13: Direction of rotation of the machine

- Switch on the drive motor (Fig. 13/B) for a short time.

- Check the direction of rotation of the main shaft (Fig. 13/A).

The drive motor must drive the main shaft (Fig. 13/A) of the machine clockwise (Fig. 13/C).

- Switch off the drive motor again.

If the direction of rotation is wrong:

- Reverse the polarity of the drive motor.

6.8 Inserting spacer rings for roller gap adjustment

Inserting the spring assembly with spacer sheets and spacer rings

The number of spacer sheets and spacer rings required depends on the die thickness and the distance between pan grinder rollers and die. The appropriate height must be determined; see "Checking the setting of the spring assembly".

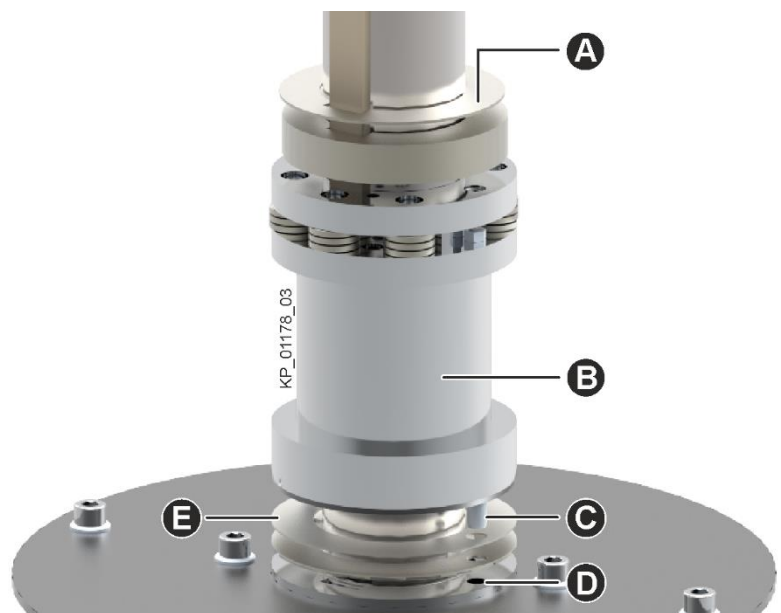


Fig. 14: Spring assembly with spacer rings

- Put all spacer sheets (Fig. 14/C) with bores for the dowel pins (Fig. 14/F) on the discharge device (Fig. 14/E).
- Place the spring assembly (Fig. 14/B) on the spacer sheets.

- Insert the dowel pins of the pan grinder head stop in the bores of the spacer sheets.
- Place spacer rings (Fig. 14/A) on the spring assembly (depending on the die thickness).
- Spacer rings are included in the scope of supply. Thickness and number can be found in the spare part list.

6.9 Adjusting the breaking-off device



IMPORTANT!

Risk of property damage caused by an improperly adjusted distance

The minimum distance (Fig. 15/X) between the upper edge of the knives (Fig. 15/A) and the lower edge of the die (Fig. 15/B) must be 2 mm.

- Check the distance and adjust it if necessary.

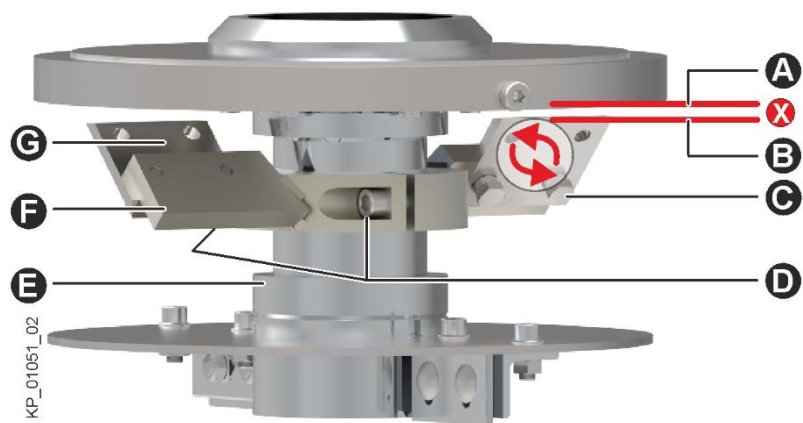
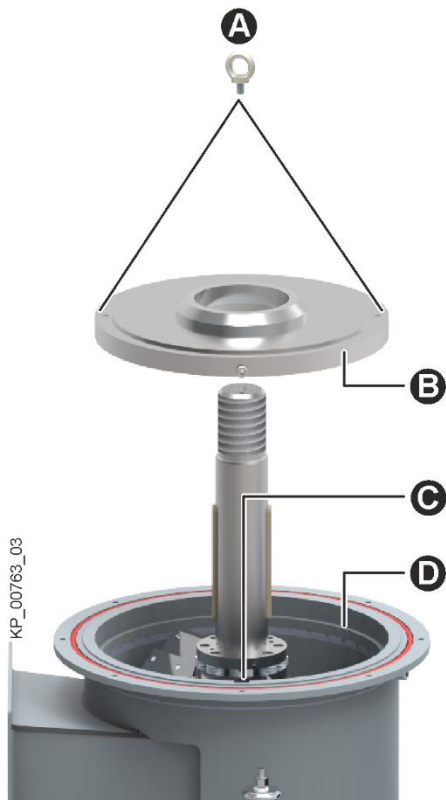


Fig. 15: Breaking-off device

- Mount the breaking-off device (Fig. 15/F) to the pan grinder head stop or spring assembly (Fig. 15/E).
- Tighten the screws (Fig. 15/D) slightly.
- Adjust the height of the breaking-off device (Fig. 15/F).
- Retighten the screws (Fig. 15/D).

6.10 Mounting the die



- Clean the die support and the lateral die guide (Fig. 16/D) thoroughly.
- Fasten the eye bolts (Fig. 16/A) to the die.
- Insert the die (Fig. 16/B) with a suitable lifting gear and align it centrally.
- If available: Insert the lateral screw (anti-twist device) into the groove (Fig. 16/C).
- Remove the eye bolts (Fig. 16/A).

Fig. 16: Mounting the die

6.11 Mounting the upper part

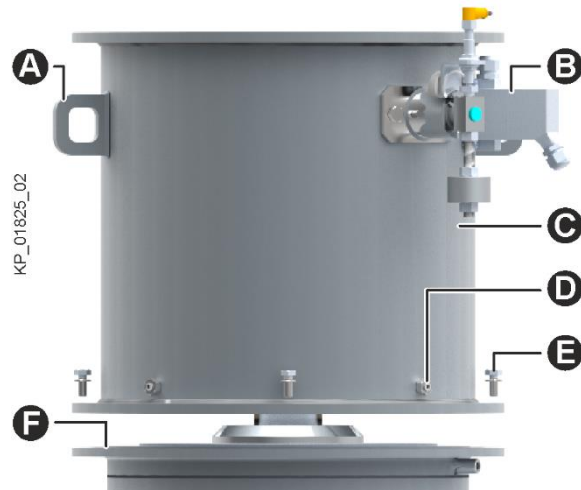


Fig. 17: Overview of the upper part

Mounting the upper part

- Suspend the lifting gear into the bows (Fig. 17/A) of the upper part (Fig. 17/B).
- Pay attention to the correct position of the seal (Fig. 17/F) between the centre part and the upper part of the machine.
- Put on the upper part (Fig. 17/C).
- Check the screws of the outer die ring (Fig. 17/D):
 - The nuts of the threaded pins must be tightened.
- Tighten all fastening screws (Fig. 17/E).

6.12 Mounting the pan grinder head



DANGER!

Risk of fatal injury due to insufficient lifting gear!

Pay attention to the weight of the complete pan grinder head (see transport weights). Death or serious injury can result from the use of an insufficient lifting gear.

- Use a lifting gear with sufficient carrying capacity.

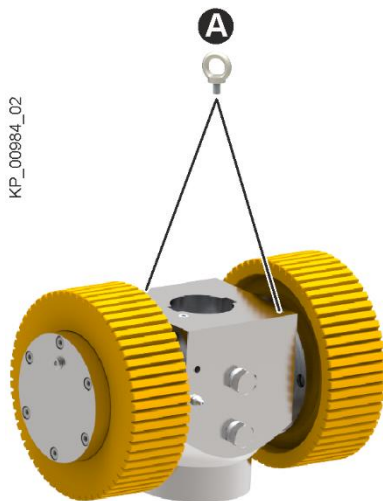


Fig. 18: Lowering the pan grinder head

- Screw eye bolts (Fig. 18/A) into the provided bores at the pan grinder head.
- Coat the main shaft and the bore of the pan grinder head with a corrosion-proof anti-seize lubricant.

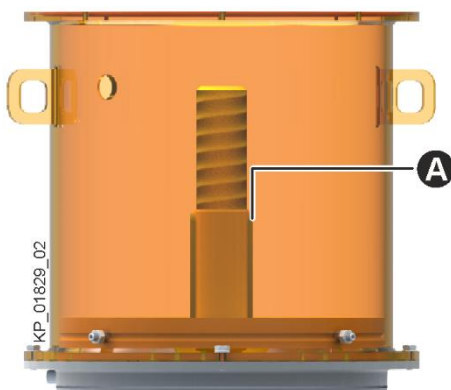


Fig. 19: Basic machine

- Check the feather keys (Fig. 19/A) for correct seating.
- Lift the pan grinder head carefully over the shaft using a suitable lifting gear.
- Lower the pan grinder head slowly. When lowering:
 - Thread the feather keys of the main shaft into the grooves of the pan grinder head bore.

6.13 Inserting spacer rings between pan grinder head and hydraulic nut / grooved nut

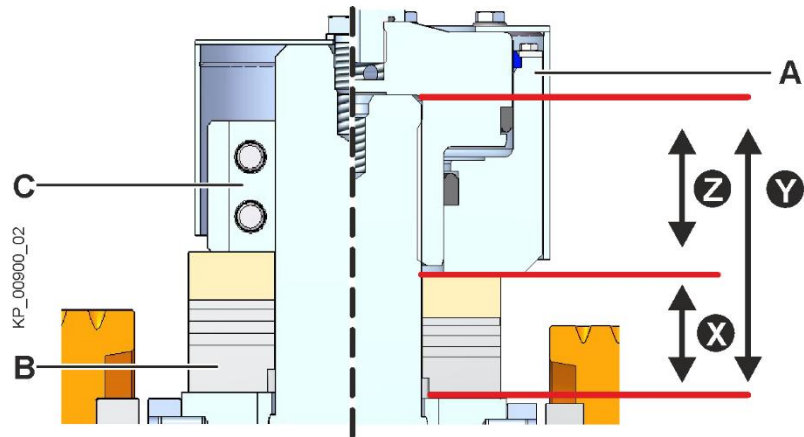


Fig. 20: Control dimension

- Put spacer rings onto the pan grinder head.
- Comply with the order shown:
 - The offset spacer ring (Fig. 20/B) must be inserted first.
 - For spacer ring sets with plastic rings and a metal ring, the metal ring is inserted last.

The dimension (Fig. 20/Z) between upper edge of the spacer rings and upper edge of the main shaft is about 87 mm. This dimension is deducted from the total dimension (Fig. 20/Y). The result is the necessary height of the spacer rings (Fig. 20/X).

- Mount the grooved nut (Fig. 20/C) or hydraulic nut (Fig. 20/A) (see section in the chapter "Assembly").
 - ⇒ If the spacer rings are correctly inserted, there is a gap of 5 - 10 mm between the hydraulic nut and the spacer rings.

6.14 Mounting the hydraulic nut



IMPORTANT!

Risk of property damage to the hydraulic nut!

Lock screws which are not turned back can cause severe damage.

- Before screwing on the hydraulic nut, turn back the lock screws (Fig. 21/A) to such an extent that they do not protrude (Fig. 21/D).

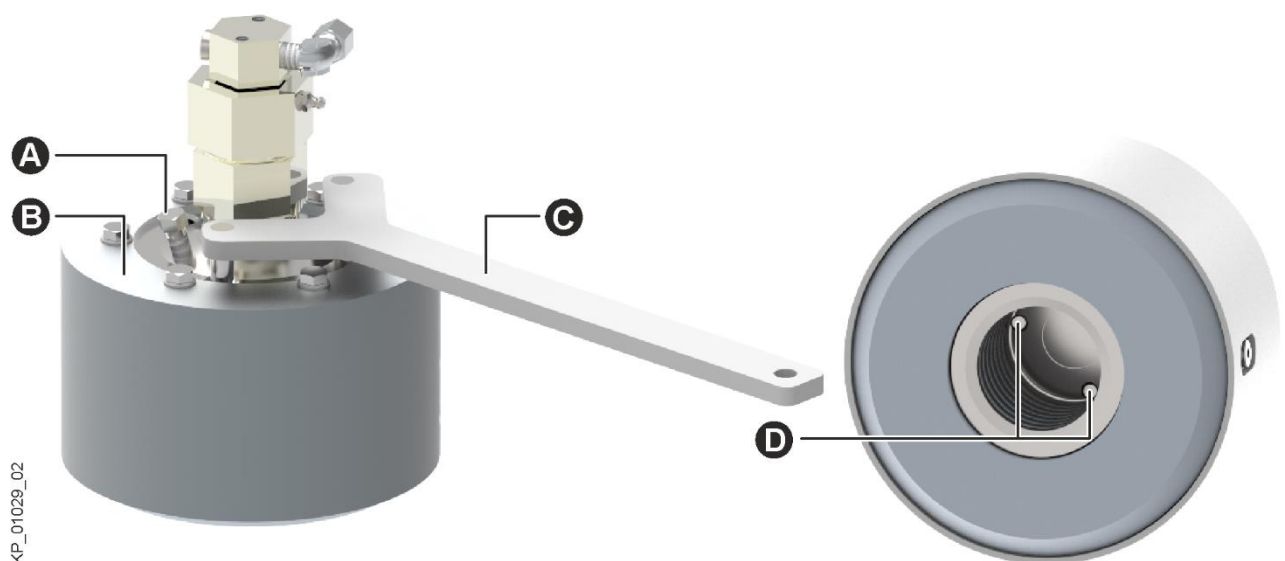


Fig. 21: Hydraulic nut with lock screws

- Grease the thread of the main shaft with a corrosion-proof lubricant.
- Put on the hydraulic nut (Fig. 21/B).
- First turn the hydraulic nut anti-clockwise until the thread snaps into place.
- Then tighten the hydraulic nut clockwise using the provided open-ended spanner (Fig. 21/C).
- Tighten the lock screws (Fig. 21/A).

6.15 Mounting the cover cone



➤ Put the cover cone (Fig. 22/B) on the hydraulic nut.

➤ Pay attention to correct position of the hoses.

The hoses must be fed through the opening in the cover cone.

➤ Screw the cover cone (Fig. 22/B) on the revolute joint (Fig. 22/C).

Fig. 22: Cover cone

6.16 Mounting the dust hood

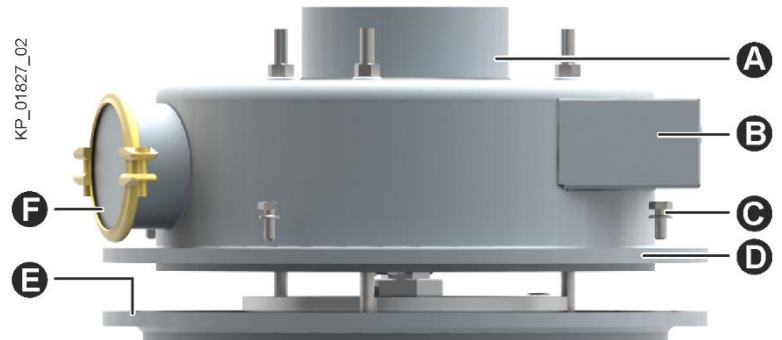


Fig. 23: Mounting the dust hood

Mounting the dust hood

- Put on the dust hood (Fig. 23/D):
 - Pay attention to the position of the seal (Fig. 23/E) in the upper part!
- Fasten the dust hood (Fig. 23/D) at the upper part with screws (Fig. 23/C).
- Reach through the product inlet (Fig. 23/A) and pull the hoses of the hydraulic nut laterally through the opening in the dust hood (Fig. 23/B) and secure them with spring plugs.

6.17 Connecting the hydraulic unit

-  Read the documentation supplied with the hydraulic unit. It contains more detailed information on assembly and operation.

Flexible hydraulic hoses belong to the scope of supply:

- To extend the hydraulic lines use only static piping systems.



IMPORTANT!

Risk of property damage caused by modifications of the hydraulic system!

The installation of components between the hydraulic unit and hydraulic cylinder, which are not provided by the manufacturer, can be the reason for malfunction and damage of the hydraulic system and the machine.

- Do not mount additional components such as shut-off cocks between the hydraulic unit and the hydraulic nut.



Fig. 24: Connecting the hydraulic unit

Connecting the hydraulic hose

- Connect the hydraulic unit and the hydraulic connection at the dust hood with the hydraulic hose.

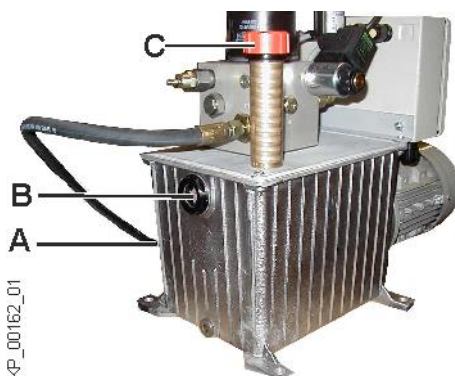


Fig. 25: Filling hydraulic oil

Filling hydraulic oil

- Fill in hydraulic oil via the cap of the return filter (Fig. 25/C) up to the maximum mark at the inspection glass (Fig. 25/B):
 - For approved oil types, see the chapter "Maintenance"!
 - For the quantity of oil required, see the chapter "Technical Data".
- Screw on the cap and firmly tighten it.
- Remove possible leakages.

Connecting the hydraulic unit electrically

The following components must be connected by a qualified electrician:

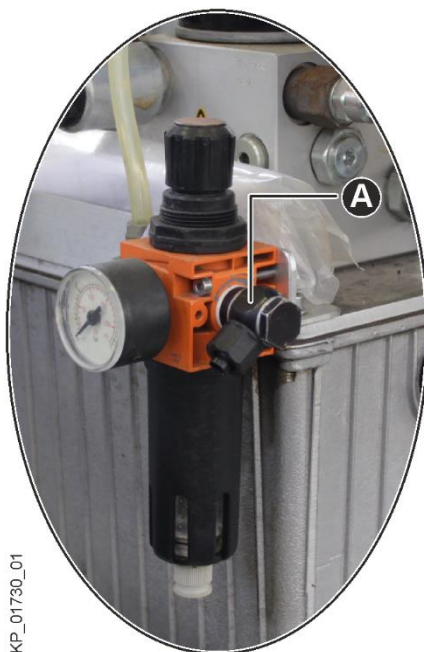
- Motor of the hydraulic pump
- Cable box
- Connect the motor electrically according to the manufacturer's documentation.
- Check the direction of rotation of the motor according to the manufacturer's documentation.
- Connect the cable box with the control system according to the manufacturer's documentation.

Connecting compressed air

Compressed air with the following properties may be used only:

Compressed air according to ISO 8573-1 class 4:

- Oil content $< 5 \text{ mg/m}^3$
- Maximum particle size $< 1000 \text{ }\mu\text{m}$
- Unsaturated compressed pressure with approx. $+ 35 \text{ }^\circ\text{C}$
- Maximum water absorption of 5.953 g/m^3
- Pressure condensation point $+ 3 \text{ }^\circ\text{C}$
- min. 3 - 6 bar max.



KP_01730_01

Fig. 26: Pressure reducer at the hydraulic unit

- Connect compressed air to the connection of the hydraulic unit (Fig. 26/A).

6.18 Venting the hydraulic system

- Vent the hydraulic unit after assembly.

 For this work, the documentation of the control system must be observed!



CAUTION!

Risk due to separately starting drives!

In the service mode, all drives can be switched on by pressing the corresponding buttons at the local switch cabinet. Risk of injury due to starting drives.

- Keep the area of the drives clear of personnel.

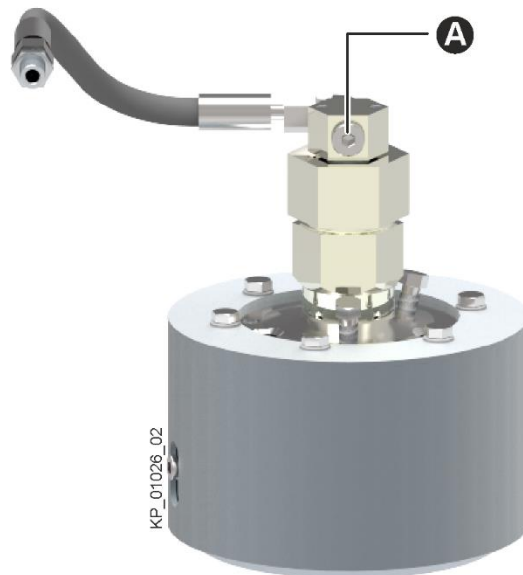


Fig. 27: Hydraulic nut with revolute joint

- Switch on the service mode at the control system.
 - ⇒ The solenoid quick-action relief valve of the hydraulic unit is switched on.
- Increase the hydraulic pressure to abt. 20 to 40 bar at the control system.

At the hydraulic nut (Fig. 27/B):

- Open the screw plug at the revolute joint (Fig. 27/A) until the oil-air mixture begins to escape.

- If necessary, readjust the hydraulic pressure value preset at the measuring device.
- When the oil is free of air, the ventilation process is completed.
- Tighten the screw plug (Fig. 27/A) firmly.
- Check the oil level in the hydraulic unit.
- If necessary, refill oil up to the maximum mark of the level indicator via the built-in hand pump.
- Check the screwed connections and joints for leaks. Retighten them if necessary and remove any leaked oil.
- Switch off the service mode at the control system.

6.19 Connecting the steam discharge piping

-  Design and construction of the steam discharge piping are not included in the scope of supply. Piping and transition pieces depend on local conditions and must be fabricated and mounted by the operating company.

Requirements on transition pieces and steam discharge piping

- Adhere to the indications on the dimension sheet.
- Design the transition pieces in such a way that reaching into the machine will not be possible.
- Fabricate short and straight transition pieces.
- Insulate the piping to prevent condensation.
- Design the piping in such a way that secondary air is sucked in.

Connecting the steam discharge piping

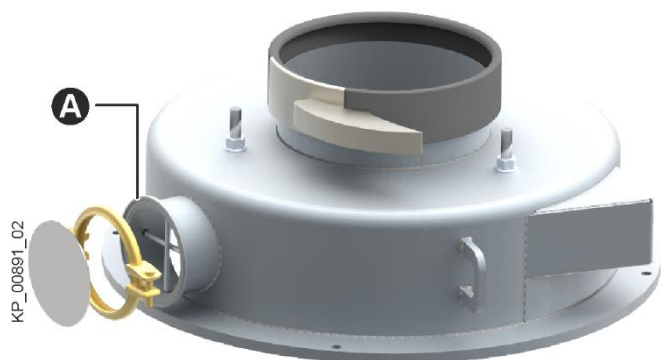


Fig. 28: Dust hood

- Remove the cover (Fig. 28/A) depending on the design.
- Connect the transition piece with the connection for the steam discharge piping.
- Connect the transition piece with the steam discharge piping.

6.20 Mounting the outlet box



DANGER!

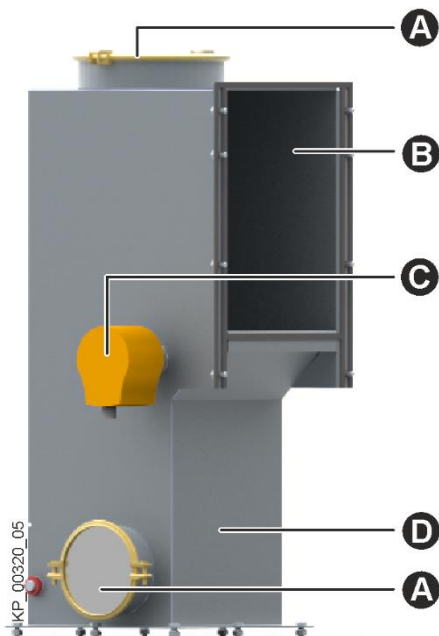
Risk of injury due to missing outlet box!

If the outlet box is missing, reaching into the machine will be possible. Serious injury can result.

- Make sure that the outlet box has been mounted and connected to the downstream machine prior to commissioning of the machine.



If the outlet box is provided by the customer, the design must comply with the specifications of the manufacturer. Dimension sheet with specifications: see annex.



- Align the outlet box (Fig. 29) at the outlet of the machine. Pay attention to an even alignment!
- Screw the outlet box to the outlet of the machine.
- Connect the outlet box with the downstream machine (Fig. 29/B).
- Mount a level indicator on the outlet box (see the operating manual in the annex).
- Connect the level indicator (Fig. 29/C):
 - Adjust the level indicator (see chapter "Repair").
- Connect the aspiration system (Fig. 29/A).

Fig. 29: Outlet box (example)

6.21 Mounting the proportioning system

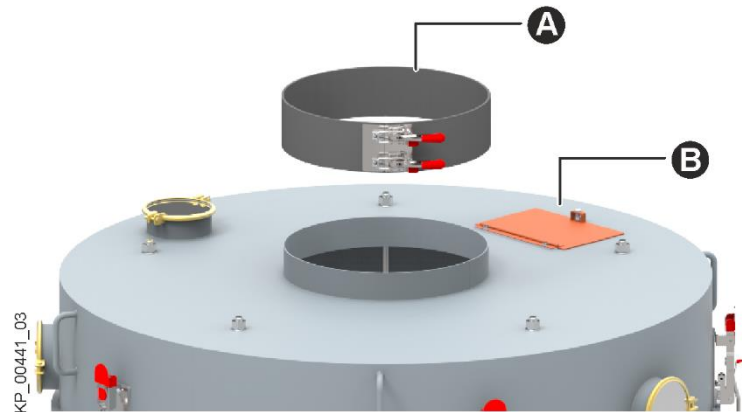


Fig. 30: Connecting the proportioning system

- Connect the proportioning system or inlet distributor via the elastic bent-lever closure (Fig. 30/A) with the dust hood (Fig. 30/B).

Fastening the access lock

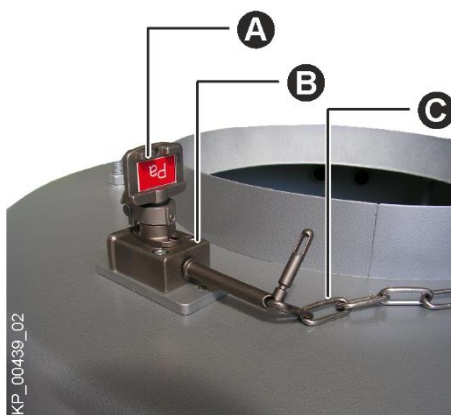


Fig. 31: Access lock

- Weld the chain (Fig. 31/C) to the proportioning system above it.
- Put the bolt in the access lock (Fig. 31/B) and remove the key (Fig. 31/A) after locking.



Fig. 32: Example: Code Pa

- Insert the key into the lock (example: Pa) of the key transfer system.

6.21.1 Connecting the overflow safety device

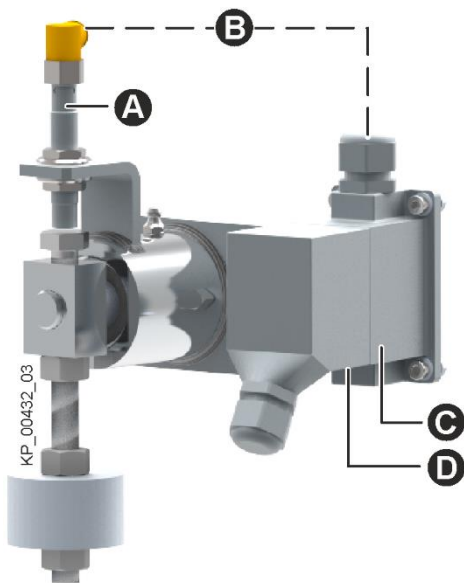


Fig. 33: Overflow safety device

- Lead a cable (Fig. 33/B) from the proximity switch (Fig. 33/A) to the plug device (Fig. 33/C) and connect it.
- Install a cable from the plug (Fig. 33/D) to the terminal box of the machine and connect it according to the wiring diagram.

6.22 Electrical connections



DANGER!

Risk of fatal injury from electrical current!

Contact with live components can be fatal.

- Before starting work, switch off the electrical supply and safeguard the machine against restart!



Read the documentation of the components included in the delivery. It contains more detailed information on assembly and operation.

Requirements on the electrical interlocking of the machine:

- Switching on only possible:
 - if the safety and protective devices are intact
 - if the product discharge unit is switched on
- Switching off:
 - With a controlled product supply, the machine will stop with time delay.
 - In case of failure of the product discharge unit, the plant is shut down in a controlled way.

The following components must be connected by a qualified electrician:

6.22.1 Connecting the drive motor

Terminal diagram

The terminal diagram is included in the operating manual of the motor manufacturer in the annex. Compare the type plate with the type indication in the operating manual.

- Lay the connecting cables from the drive motor to the switch cabinet.
- Connect the drive motor according to the switching proposal or the wiring diagram to the switch cabinet.



Fig. 34: Drive motor

7 Commissioning

7.1 Safety instructions for commissioning

Improper commissioning

**WARNING!****Risk of injury due to improper commissioning!**

Improper commissioning can result in serious injury and significant property damage.

- Have commissioning either be carried out by employees of the manufacturer or by persons authorized by the manufacturer.
- Prior to commissioning, make sure that all installation work has been accomplished correctly.
- Make sure that all protective devices of the upstream and downstream plant parts are available and in working order.
- Prior to commissioning, make sure that there are no persons in the hazardous area of the plant.
- Operate the machine and plant only in a safe and fully functional condition.

Wear the following personal protective equipment:



7.2 Notes on control systems



Observe the operating manual of the plant control system.

The control system of the machine monitors and processes the measuring values of sensors. The operating sequences of the machine will be automatically controlled on the basis of these measuring values.

The parameters, with which the machine and all plant parts are operated to obtain a product of a certain quality, must be preset.

The following points will be recorded and evaluated by the control system of the machine:

- Starting sequence of the drives
- Thermal malfunctions of the drives
- Temperature of the gear oil
- Temperature of the product
- Empty indication of the prebin
- Pile-up upstream and downstream of the machine
- Maximum power consumption of the machine motor
- Stop of all driven shafts
- Hydraulic pressure

7.2.1 Control cabinet

Normally, the control cabinet for the machine has the following display and operating elements:

- Operating elements for the automatic and manual modes
- Ammeter
- Emergency stop button

7.2.2 Setting mode

 The setting mode will only be required in exceptional situations for controlling the individual plant parts, for example for trouble-shooting or during commissioning.

The control system of the machine must be independent of the plant control system and allow the setting mode.

In the setting mode the following points will be monitored:

- Thermal malfunctions of the drives
- Pile-up upstream and downstream of the machine
- Empty indication of the prebin
- Maximum power consumption of the machine motor
- Possibility for adjusting the proportioning system
- Operating elements for the manual mode
- Ammeters for the machines of the plant
- Displays for the product temperature in the machines
- Readiness for operation of the machine

7.2.3 Determining and programming setting values



Observe the operating manual of the plant control system.

During commissioning the setting values for the process are determined, documented, and entered in the control system.

In the automatic mode, the programs for the relevant processes will be recalled.

7.3 Checks prior to commissioning

Distinction between "Initial commissioning" and "Commissioning":

- Initial commissioning will take place after completion of the assembly. Disassembly and reinstallation in another place also requires an initial commissioning. In addition to the checks during commissioning, initial commissioning requires the following work (see below).
- Commissioning – in the general sense: In addition to initial commissioning, commissioning may be necessary for other reasons – for example, after repair or after a temporary shutdown.

Safety devices



DANGER!

Risk of fatal injury due to non-functioning safety devices!

Non-functioning safety devices can cause serious injury and even death.

- Before starting work, check whether all safety devices are in working order and properly installed.
- Never put the safety devices out of function.
- Make sure that all safety devices are accessible.

Carry out the following checks prior to commissioning:

- Check all safety devices for correct function.
- Check correct filling with the necessary lubricants and consumables.
- Check lubrication.
- Check all screwed connections for tight fit and retighten loose connections.

- Check interior of the machine and of upstream and downstream machines for foreign objects and forgotten assembly material. Remove foreign objects and impurities.

Additional checks prior to initial commissioning:

- Check whether the machine has been installed properly in the complete plant. Check all necessary plant parts and plant control system for readiness for operation.
- Check the connections between the machine and the connected plant parts:
 - All safety-relevant regulations must be met.
 - The transition pieces must be designed and mounted in such a way that reaching into the machine will not be possible.

Have the following checks carried out by a skilled electrician.

- Check proper electrical installation in accordance with customer and local regulations.
- Check the safety devices (emergency stop, motor protection relays, ground resistance, main switch).
- Check the electric drives according to the regulations of the motor manufacturer.



Read the documentation of the components included in the delivery. It contains more detailed information on the operation and the possible settings during commissioning.

7.4 Conditions for commissioning

- The checks prior to assembly have been carried out.
- The connections between the machine and the connected parts of the plant meet all safety regulations. The transition pieces must be designed and mounted in such a way that reaching into the machine will not be possible.
- All necessary plant parts and the plant control system are ready for operation.

7.5 Checking the spring assembly with pan grinder head stop



IMPORTANT!

Risk of property damage at the spring assembly!

Build up the hydraulic pressure slowly when you check the spring assembly. Once the stop has been reached (rapid pressure rise), do not continue to increase the hydraulic pressure. Severe damage to the spring assembly can be the consequence of non-compliance.

- Build up the hydraulic pressure slowly.
- Do not further increase the hydraulic pressure if it rises abruptly.

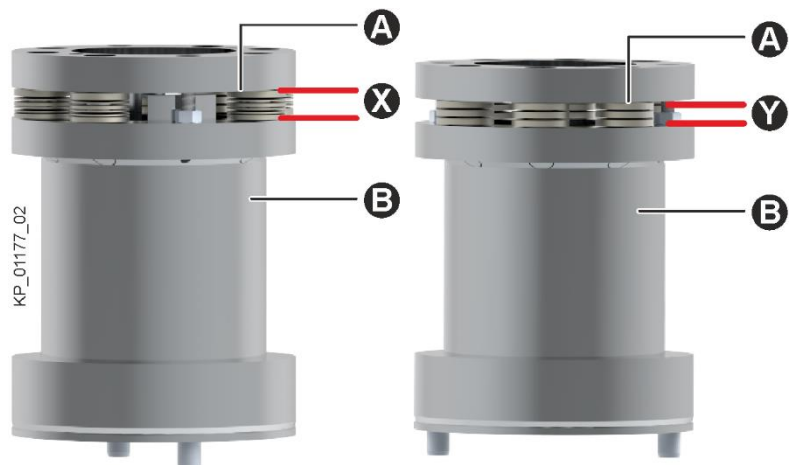


Fig. 35: Spring assembly with pan grinder head stop

General remarks

The spring assembly (Fig. 35/B) comprises 6 disk spring packages, each with 12 disk springs (Fig. 35/A) and 2 locking screws. It is used to lift the pan grinder head about 2 mm with released hydraulic system, so that a gap is produced between the rollers and the die.

Checking the setting of the spring assembly

- Slowly build up pressure with the aid of the hydraulic unit.
 - ⇒ The spring assembly is compressed.
 - ⇒ The hydraulic pressure increases slowly.

As soon as the stroke of the spring assembly (Fig. 35/X) is fully used, the pan grinder head hits the stop (Fig. 35/Y). The hydraulic pressure rises abruptly.

- Do not increase the hydraulic pressure any further.
- Measure the distance of all pan grinder rollers to the die.
 - ⇒ The distance should be 2 mm for all pan grinder rollers.

Coarse adjustment

- Remove spacer rings from or add spacer rings to the spring assembly (see chapter "Assembly").

Fine adjustment

- Remove spacer sheets from or add spacer sheets to the spring assembly (see chapter "Assembly").

Example: If a gap of 0.5 mm is requested, spacer sheets of 1.5 mm must be removed.

7.6 Carrying out a no-load test run (without product)

The no-load test run will be carried out during initial commissioning or during commissioning after having carried out work on the machine. The no-load test run must only be carried out by the following persons:

- Staff of the manufacturer
- Staff of the operating company qualified for commissioning

 The machine is operated via the plant control system or the local control system of the machine.

Check points for the machine

- Function and adjustment of the electrical protective devices, such as motor protection relay or thermistor protection relay.
- Recording of the measured values by the control system
 - Temperature of the product
- Emergency stop function of the main switch.

Carrying out the no-load test run

The no-load test run aims to ensure that the machines and plant parts can be operated without any further supervision for the period of the interlocking tests. The following machines and plant parts will be checked during the no-load test run without product:

- Product discharge system
- Machine
- Product feeding system

The no-load test run is completed when all the necessary adjustment work has been finished.

Product discharge

- Switch on the product discharge system.
- Carry out the checks.
- Switch off the product discharge system.

Machine



IMPORTANT!
Risk of property damage caused by increased wear!

When operating the machine without product, contact between the components will produce increased wear.

- Operate the machine not more than 30 seconds without product.

- Switch on the machine.
- Carry out the checks.
- Switch off the machine.

Product supply

- Switch on the product supply system.
- Carry out the checks.
- Switch off the product supply system.

7.7 Test run with product

After completion of the no-load test run, the machine is fed with the product.

A product layer must form between pan grinder rollers and die during operation. Unnecessary wear of pan grinder rollers and die is avoided this way. Sufficient product must be fed uniformly and continuously into the centre of the machine. Insufficient feeding prevents a sufficient product layer from forming between pan grinder rollers and die.

- Check whether all plant parts upstream and downstream of the machine are ready for operation.
- Set all safety switches in position "ON".
- Unlock the emergency stop switch.
- Switch on the product discharge system.
- Switch on the machine.
- Keep the idle time as short as possible!
- If available: Adjust the hydraulic pressure to 0-10 bar.
- Switch on the proportioning system and slowly increase the product supply to 60 % of the capacity.
- If available: The hydraulic pressure depends on the product; see the information under "Designated use".
- Check the current consumption of the drive motor and note it down.
- Pay attention to lubricant losses and any unusual noises.
- Check the following components after about 12 operating hours for tight fit and retighten them if necessary:
 - Hydraulic nut
 - Grooved nut or tightening nut
 - Lock screws
 - Screws of the hose pipes

After the test run

- Switch off the plant in the following order:
 - Product supply
 - Machine, once emptied
 - Product discharge
- Secure the machine against restarting.

7.8 Interlocking test within the plant

After completion of the no-load test run, the persons responsible for the electrical and mechanical assembly release the interlocking tests.

Purpose of the interlocking tests

- Testing of individual plant groups among each other.
- Testing of the plant groups within the complete plant.
- Ensuring that in case of a failure of one drive the upstream drives in the interlocking chain switch off immediately or after preset times.
- Ensuring that all drives are correctly interlocked.
- Ensuring that the control system functions correctly.



During the interlocking tests, all motors of the plant have to be in operation.

7.9 Inspection list

Plant	Component	Check
Machine	Motor	Check the power consumption at the measuring instrument.
	V-belts	After having terminated commissioning, check the V-belt tension and retighten the V-belts if necessary.
	Hydraulic nut, lock screws, hose pipes	After having terminated commissioning, check them for leakages and tight fit and retighten them if necessary.
	Foundation bolts	After having terminated commissioning, check for tight fit and retighten if necessary.
	Centre part of the case Lower part of the case	Check the main shaft bearing regularly for excessive heating during operation.
	Main bearing of the main shaft	Check the temperature during operation.
Hydraulic unit	Complete plant	Check it for leakages and eliminate them. Check the oil level and refill oil if necessary.

8 Operation

8.1 Safety instructions for operation

Improper operation

**WARNING!****Risk of injury due to improper operation!**

Improper operation can result in serious injury and significant property damage.

- Read the operating manual carefully and pay special attention to the safety instructions.
- Perform all operating steps in accordance with the information and instructions given in this manual.
- Ensure that only qualified staff work on the machine.
- Check and monitor the operational safety of the machine and plant. Before starting work, make sure that
 - all covers, protection devices and limit switches are correctly installed, work correctly and correspond to the local safety regulations.
 - all electrical lines are correctly installed and in a perfect condition.
 - all hoses and pipes are in a good condition and properly fastened.
 - nobody is in the hazardous area.
- Never put safety devices out of function or bypass them during operation.
- Immediately actuate the nearest emergency stop switch in case of danger.

8.2 Switching on (automatic mode)

**IMPORTANT!****Risk of property damage caused by increased wear!**

If the machine is operated without product, components such as pan grinder rollers and die may touch. Increased wear or destruction of components will be the result.

- Operate the machine not more than 30 seconds without product.

**IMPORTANT!****Risk of property damage caused by incorrect product supply or discharge!**

Product supply has to be ensured and monitored at any moment of operation of the machine. Over- and underproportioning are not allowed.

- Provide and install the corresponding monitoring devices.
- Do not start the machine when filled with product. The machine can get stuck. Before switching on, check the interior and empty it.
- Do not stop the machine when filled with product, since it can block on restart.



The machine is part of a plant. The machine is operated via the local control system on the switch cabinet or via a central plant control system.

- Observe the documentation of the control system on the switch cabinet and the central plant control system!

Start conditions

The following conditions must be met before the machine can be switched on:

- Machine (press or pan grinder mill), safety devices and control system are completely assembled.
- The discharge unit and the downstream plant parts are switched on.
- The prebin is filled. The level indicator for the minimum level in the prebin is covered with product.
- The speed monitor is active.

Starting (cold state)

- Check the filling level in the prebin.
- Switch on the plant via the plant control system or with the button "Automatic START" on the local switch cabinet.

The machines of the plant start in the following order:

- Discharge unit and downstream plant parts
- Pelleting press or pan grinder mill
- Upstream machines for product conditioning and supply

- Adjust the setpoint value "throughput".
- Adjust the setpoint value "motor power".

Restarting (warm state)

- Check the filling level in the prebin.
- Switch on the plant via the plant control system or with the button "Automatic START" on the local switch cabinet.

The machines of the plant start in the following order:

- Discharge unit and downstream plant parts
- Pelleting press or pan grinder mill
- Upstream machines for product conditioning and supply
- If necessary, increase the setpoint value "throughput".
- If necessary, increase the setpoint value "motor power".

8.3 Monitoring the process

 We recommend keeping a "Machine journal" and recording the most important operating parameters in dependence on the machine running time. Information on the operating performance of the machine and a scheduled maintenance and repair can be deduced from this journal.

During operation, the following points must be monitored by the plant control system:

- Unusual noises
- Product supply
 - Reduce the product supply in the event of imminent overfilling of the machine.
 - Increase the product supply and check the filling level in the prebin in the event of imminent lack of product.
- Power consumption of the drive motor

If available:

- Hydraulic pressure
 - The max. pressure (see "Designated use") must not be exceeded.

8.4 Switching off (automatic mode)

 In the automatic mode, there are two situations in which the machine will switch off automatically.

- The operator switches off the press or pan grinder mill.
- The minimum level in the prebin has fallen short of.

Switching off

- Switch off the plant via the plant control system or with the button "Automatic STOP" on the local switch cabinet.

The machines of the plant will be switched off in a controlled way in the following order:

- Upstream machines for product conditioning and supply
- The press or pan grinder mill runs empty within 30 seconds.
 - The power consumption of the drive motor returns to no-load current.
- Discharge unit and downstream plant parts

8.5 Influencing the product quality

Deviation in quality	Possible cause	Remedy	Staff
Broken pellets	Product too moist	Check the moisture content. Product too moist Add less water.	Operator
Process temperature is too high Pellet with the following undesirable characteristics: • short • very hard • dark • shiny	Product too dry	Check the moisture content of the product. Product too dry: Add more water.	Operator
	Roller gap too large	Reduce the roller gap.	Qualified staff
	Effective bore length too long	Use a die with a shorter effective bore after consultation with the manufacturer.	Qualified staff
Different pellet lengths	Throughput too low	Increase the throughput.	Operator
	Non-uniform moisture distribution in the product	Adjust the steam and water addition. Adjust the upstream process in such a way that the steam and water absorption of the product is improved.	Qualified staff
	Irregular product supply	Check the product supply.	Operator
Too many fines	Pan grinder rollers and die worn	Replace the pan grinder rollers and die.	Qualified staff
	Effective bore length too short	Use a die with a longer effective bore after consultation with the manufacturer.	Qualified staff

Deviation in quality	Possible cause	Remedy	Staff
	Roller gap too large	Reduce the roller gap.	Qualified staff
	If available: Distance of the knives to the die too large	Reduce the distance of the knives to the die.	Qualified staff
	Product too moist	Check the moisture content of the product. If the product is too moist, add less water to the process.	Operator
	Stress on the pellets in the downstream machines too high	Adjust the parameters for the discharge system. Check the machines downstream of the pelleting press for damage and wear.	Qualified staff
	If available: Air speed in the cooler too high	Reduce the air speed in the cooler. Adjust the parameters for the cooling process.	Qualified staff

9 Malfunctions

In this chapter the possible causes for malfunctions and the measures for trouble shooting are described.

In case of repeated malfunctions, the maintenance intervals must be adapted to the actual load.

Contact the manufacturer in case of malfunctions which are not described in the following table or in the supplied documentations of the components.

9.1 Safety instructions for trouble shooting

Improper trouble shooting

**WARNING!****Risk of injury due to improper trouble shooting!**

Improperly performed work may result in serious injury and significant property damage.

- Work for trouble shooting may only be performed by qualified staff.
- Ensure sufficient space before starting work.
- Only use screws and assembly material of the manufacturer.
- Before commissioning, make sure that
 - all work for trouble shooting has been carried out and completed properly.
 - nobody is in the hazardous area.

Electrical current

**DANGER!****Risk of fatal injury from electrical current!**

Contact with live components can be fatal.

- Before starting work, switch off the electrical supply and safeguard the machine against restart!

Safeguarding against unauthorized re-start

**DANGER!****Risk of fatal injury due to unauthorized re-start!**

Unauthorized re-start of the machine can cause serious injury including death.

- Before starting work, switch off the machine and safeguard it against re-start!

Wear the following personal protective equipment:



9.2 Procedure in case of malfunctions

- In case of malfunctions representing an immediate danger to persons or property, emergency stop has to be initiated immediately.
- Determine the cause of the malfunction.
- If trouble shooting requires work in the hazardous area, switch off the affected part of the plant and prevent it from restarting.
- Inform the person in charge on site of the malfunction.
- Depending on the nature of the malfunction, have it eliminated by authorized qualified personnel or eliminate it yourself.

9.3 Troubleshooting table for the process technology

Malfunction	Possible cause	Remedy	Staff
The machine does not start.	Upstream machines are switched off.	Switch on the upstream machines.	Operator
	No product in the prebin	Fill product into the prebin.	Operator
	Machine overfilled	Empty the machine interior.	Qualified staff
	Drive motor failed	Check the electrical connections. Check the motor protection fuse. Replace defective motor.	Skilled electrician
Machine blocks during plant start.	Machine was not empty when it was switched off.	Switch off the machine and remove product from the pan grinder rollers.	Qualified staff
	Product has accumulated in front of the pan grinder rollers.		
Vibrations during operation	Roller gap too large	Reduce the roller gap.	Qualified staff
	Product layer between pan grinder rollers and die too large	Reduce the product supply.	Operator
	Product too dry	Check the moisture content of the product. If the product is too dry, add more water to the process.	Operator
Highly fluctuating machine capacity	Different-sized particles in the product	Use product with particles of the same size.	

	Non-uniform moisture distribution in the product	Adjust the steam and water addition. Adjust the upstream process in such a way that the steam and water absorption of the product is improved.	Operator
	Irregular product supply	Check the product supply.	Operator
	Pan grinder rollers and die or perforated plate worn	Replace the pan grinder rollers and die or perforated plate.	Qualified staff
	Roller gap too large	Reduce the roller gap.	Qualified staff
Slipping pan grinder rollers	Product too moist	Check the moisture content of the product. If the product is too moist, add less water to the process.	Operator
	Pan grinder rollers worn	Replace the pan grinder rollers and die.	Qualified staff
	Bores in the die closed	Rework the die; countersink clogged bores.	Qualified staff
	Roller profile worn	Replace the pan grinder rollers; check the die.	Qualified staff
	Roller bearings defective	Replace the bearings.	Qualified staff
	Roller bearings tightened too much	Check and readjust the bearings.	Qualified staff
Roller gap too large	Hydraulic pressure too low	Increase the hydraulic pressure.	Qualified staff
	Leakage in the hydraulic system	Remove the leakage.	Qualified staff

	Product too dry	Check the moisture content of the product.	Operator
Roller gap too large	Grooved nut wrongly adjusted	Retighten the grooved nut.	Qualified staff
	Product too dry	Check the moisture content of the product.	Operator
Uneven wear	Roller gap too small	Adjust the roller gap.	Qualified staff
	Irregular product supply	Check the product supply.	Operator
	Capacity too low	Increase the capacity.	Operator
Steel-to-steel contact between pan grinder rollers and die or perforated plate	Roller gap too small	Adjust the roller gap.	Qualified staff
	Machine operated for too long without product	Check / replace the pan grinder rollers and die or perforated plate. Operate the machine only shortly without product.	Qualified staff
	Capacity too low	Increase the product supply.	

9.4 Troubleshooting table for the mechanical system

Malfunction	Possible cause	Remedy	Staff
The pan grinder rollers do not touch the die	Inner diameter of the die is too small	Check the die and roller dimensions.	Operator
	Pan grinder head is stuck on the main shaft	Pull off the pan grinder head and clean it; use antiseize agent.	Qualified staff
No pressure build-up in the hydraulic system	Coupling pieces not properly connected	See "Hydraulic system".	
	Pump / hydraulic unit defective	See "Hydraulic system".	
Scraping, scratching noises	Scrapers not installed properly	Check fastening of the scrapers.	Qualified staff
	Pan grinder rollers not properly installed, bearings defective	Check the pan grinder rollers / bearings.	Qualified staff
	Foreign objects adhere to the scrapers	Remove the foreign objects.	Qualified staff
	Main shaft does not run true	Check / replace the main shaft.	Qualified staff
	Knives too close to the die	Set the knives deeper.	Qualified staff
	Foreign objects under the discharge device	Remove the foreign objects.	Qualified staff

9.5 Troubleshooting table for the electrical system

Malfunction	Possible cause	Remedy	Staff
Drive motor does not start	Fuses	Check the fuses.	Qualified staff
	No release (interlocking)	Check the key transfer system.	Operator
No pressure build-up	Hydraulic pump does not run	Check the hydraulic pump. Electrical connection, fuses, interlocking by the plant control system	Qualified staff
	Quick-action relief valve open	Check the switching.	Qualified staff
	Sensitive relief valve open	Check the switching.	Qualified staff
	Direction of rotation of the pump	Check the direction of rotation.	Operator
	Oil level	Check the oil level / oil level indicator.	Operator
	Oil temperature < 12 °C, oil too viscous	Heat the oil / ambience.	Operator
Pressure drop	Hydraulic lines leaky	See the troubleshooting table of the hydraulic system.	Qualified staff
	Sensitive relief valve open	Check the switching.	Qualified staff
Function of the hydraulic unit	Control voltage	Check the switching/voltage.	Qualified staff
	Direction of rotation of the pump	Check the direction of rotation.	Qualified staff
	Filter clogged	Clean/replace the filter.	Qualified staff

Pump motor does not start	Oil level too low	Check the oil level, refill oil.	Operator
	Interlocking system	Check the key transfer system / switching.	Qualified staff

9.6 Troubleshooting table for the hydraulic system

Malfunction	Possible cause	Remedy	Staff
No pressure build-up, pump	Hydraulic pump does not run	Check the hydraulic pump. Electrical connection, fuses, interlocking by the plant control system	Qualified staff
	Insufficient hydraulic oil in the hydraulic system	Fill up hydraulic oil according to the specification.	Operator
Pressure drop	Pneumatic ball valve open/leaking	See "Troubleshooting table for the electrical system" / "Check/replace the valve".	Qualified staff
	Pressure limiting valve defective	Check/replace the valve.	Qualified staff
	Non-return valve defective	Check/replace the valve.	Qualified staff
	Oil leakage at the revolute joint	Replace the revolute joint/seals.	Qualified staff
	Oil leakage at the hose pipes	Retighten/replace the screws.	Qualified staff
	Oil leakage at the pipes	Retighten/replace the screws.	Qualified staff
	Oil leakage at the hydraulic nut, seals defective	Replace the seals.	Qualified staff

	Oil temperature < 12 °C, oil too viscous	Pre-heat the oil.	Operator
Too high pressure during start	Hoses pipes not properly coupled	Check the coupling.	Operator
Rapid pressure build-up	No stroke for the hydraulic nut available	Adjust correct stroke.	Operator
Too high pressure during operation	Wear of pan grinder rollers, die or perforated plate	Reduce the number of spacer rings, replace the pan grinder rollers, die or perforated plate.	Qualified staff
	Change of the product	Check the product (moisture).	Operator
	Hydraulic system leaky, product layer too thick	Check the hydraulic system.	Operator
Pressure build-up during repumping	Wrong or missing spacer rings	Check the spacer ring dimensions.	Qualified staff
	Pan grinder rollers and/or die/perforated plate worn	Check and replace them if necessary. Readjust the hydraulic nut/spacer rings.	Qualified staff
	Hydraulic nut loose	Tighten the hydraulic nut and lock it.	Qualified staff
Pressure drop, the hydraulic nut does not move out	Air in the hydraulic system	Vent the hydraulic system at the revolute joint via the screw plug.	Operator

9.7 Commissioning after trouble-shooting

Before re-start

**DANGER!**

Risk of fatal injury due to unauthorized re-start!

Unauthorized re-start of the machine can cause serious injury including death.

- Mount all safety devices and make them ready for use.
- Make sure that nobody is in the hazardous area.
- Start the machine in accordance with the instructions in chapter "Operation".



The machine is operated via the plant control system. Read the operating manual of the control system before switching on the machine.

10 Maintenance

This chapter describes the maintenance work required for trouble-free operation.

In case of increased wear, the maintenance intervals must be adapted to the actual load.

10.1 Safety instructions for the maintenance work

Improperly performed maintenance work

**WARNING!****Risk of injury due to improper maintenance!**

Improperly performed work may result in serious injury and significant property damage.

- Maintenance work may only be performed by qualified staff.
- Ensure sufficient space before starting work.
- Only use screws and assembly material of the manufacturer.
- Before commissioning, make sure that
 - all maintenance work has been carried out and completed properly.
 - nobody is in the hazardous area.

Electrical current

**DANGER!****Risk of fatal injury from electrical current!**

Contact with live components can be fatal.

- Before starting work, switch off the electrical supply and safeguard the machine against restart!

Hot surfaces



WARNING!

Risk of burn injuries from hot components!

Parts of the plant heat up during operation.

Skin contact with hot components causes severe burns.

When working near hot components:

- Wear clothing and gloves protecting against heat.
- Do not touch hot components.

When working on hot components:

- Cool the component to ambient temperature.
- Wear gloves protecting against heat.

Hydraulic unit



WARNING!

Risk of injury due to hydraulic energy!

Hydraulically moved components can cause severe injuries.

- Work on hydraulic components must be performed by qualified staff specialised in hydraulics.
- Do not reach into moving components.
- Operate the machine only with mounted safety devices.
- Do not open access points, such as maintenance flaps, while the machine is in operation.

Prior to any work on the machine:

- Depressurize the hydraulic system completely. Release the pressure accumulator completely.

Safeguarding against unauthorized re-start



DANGER!

Risk of fatal injury due to unauthorized re-start!

Unauthorized re-start of the machine can cause serious injury including death.

- Before starting work, switch off the machine and safeguard it against re-start!

Wear the following personal protective equipment:



10.2 Maintenance and inspection list

Plant	Operating hours	Check point	Maintenance instructions
	Every 200 hours	Overflow safety device	Relubricate it.
	Every 200 hours	Bearing arrangement of the main shaft	Relubricate it.
	Every 100 hours or weekly	Pan grinder rollers with axial face seal	Replace the grease.
	After the first 200 hours, then every 1,000 hours	Hydraulic nut	Check it for leakages.
	Whenever the die or pan grinder rollers are replaced, at least every 500 hours	Roller gap	Check the distance between die and pan grinder rollers. Readjust the grooved nut if necessary.
		Pan grinder head bore, main shaft	Treat the pan grinder head and the main shaft with corrosion-proof antiseize agent.
		Spacer rings	Check the height of the spacer rings. Add or remove spacer rings.
	500 hours	Pan grinder head	Check all fastening screws for tight fit and replace them if necessary.
	Every 500 hours and whenever the die is changed	Breaking-off device	Check the cutting tool; replace it if necessary (see "Repair").
	Every 1,000 hours	Simple revolute joint	Check it for leakages. Check grooved rings, wear rings and O-rings. Replace them if necessary.

	Every 1,000 hours	V-belts	Check tensions and retighten them if necessary.
	Every 2,000 hours or once a year	Hydraulic system / pipes	Check them for leakages and damages.
	2,000 hours or once a year	Die support	Check it for flatness.
	As and when required	Discharge device	Clean and preserve the space under the discharge device.
		Die	Clean the bores and countersink them if necessary.
	8,000 hours	Slip-on gear	Fill in oil acc. to the documentation of the gear (see annex).



Both the main shaft – above the bearing – and the components which are fastened to the main shaft (except for the grooved nut or hydraulic nut) must be treated with corrosion-proof lubricant before assembly.

Plant	Operating hours	Check point	Maintenance instructions
Hydraulic unit	Once a week	Hydraulic system	Check it for leakages and damages.
	2,000 hours or once a year	Oil reservoir	Change the oil, dispose of the used oil properly.
	Clogging indicator in the red area during operation	Return filter	Replace the filter element.



After the oil or filter change the hydraulic system must be vented. See "Venting the hydraulic system".

10.3 Lubrication points of the machine

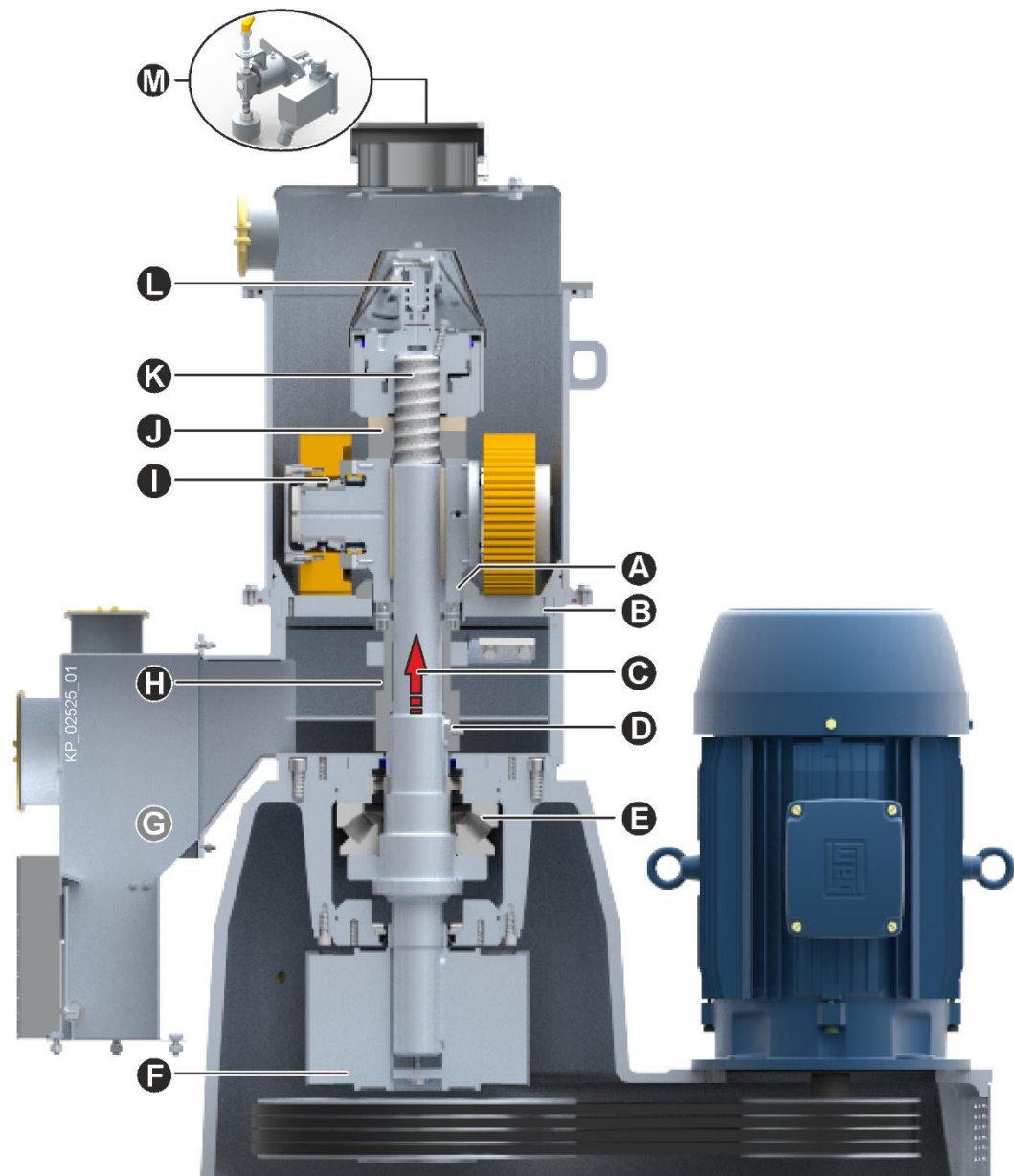


Fig. 36: Overview of the lubrication points

Diagram legend

- | | | | |
|---|---|---|------------------------------------|
| A | Pan grinder head collar and pan grinder head seal | B | Surface of the die guide |
| C | Main shaft from the discharge device upwards | D | Main shaft and discharge device |
| E | Main bearing of the main shaft | F | Gear |
| G | Outlet box | H | Main shaft and breaking-off device |

- | | | | |
|---|--------------------------------------|---|--------------------------------------|
| I | Roller bearings with axial face seal | J | Spacer rings on the pan grinder head |
| K | Thread of the main shaft | L | Simple revolute joint |
| M | Overflow safety device | | |

Lubrication points of the machine

Lubrication points	Type of lubrication	Interval / quantity
Overflow safety device	Grease according to specification	Every 200 hours
Thread of the main shaft	Corrosion-proof antiseize agent	At each assembly / disassembly
Simple revolute joint	Grease according to specification	Every 200 hours, at the lubricating nipple
Main shaft and breaking-off device	Corrosion-proof antiseize agent	At each assembly / disassembly
Spring assembly	Corrosion-proof antiseize agent	At each assembly / disassembly
Roller bearings (axial face seal)	Grease according to specification	See "Checking the lubricant filling of the pan grinder rollers"
Surface of the die guide	Corrosion-proof antiseize agent	At each assembly / disassembly
Main shaft and discharge device	Corrosion-proof antiseize agent	At each assembly / disassembly
Gear	Oil acc. to the documentation of the gear	Oil quantity: See documentation in the annex.
Main bearing of the main shaft	Grease according to specification	Every 200 hours / 20 g
Pan grinder head collar and pan grinder head seal	Corrosion-proof antiseize agent	At each assembly / disassembly
Spacer rings under the pan grinder head	Corrosion-proof antiseize agent	At each assembly / disassembly

Spacer rings on the pan grinder head	Corrosion-proof antiseize agent	At each assembly / disassembly
Outlet box	Grease according to specification	Monthly / 20 g per lubricating nipple

Lubrication points of the drive motor



For safe operation of the motor, the lubricants and lubrication intervals have to be observed. See the documentation of the motor in the annex.

Lubrication points of the additional equipment

Lubrication points	Type of lubrication	Interval / quantity
Oil reservoir of the hydraulic unit	Replace the oil. Dispose of the waste oil properly. Lubricating oil acc. to specification, hydraulic unit	2,000 hours or once a year



After changing the oil, vent the hydraulic system in accordance with the documentation of the hydraulic unit.

10.4 Screwed connections at the pan grinder head



IMPORTANT!

Risk of property damage caused by loose screwed connections!

Screws can come loose. Loose screws, which get into the machine, are a potential ignition source. Property damage to the pan grinder rollers and die can be the result.

- Loosen the screws after each disassembly process, clean them and lock them again with Loctite.
- Check the screws for tight fit and retighten them if necessary.

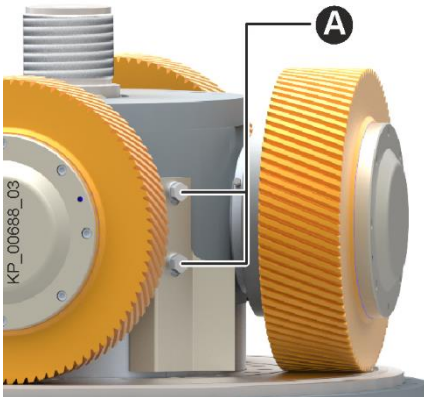


Fig. 37: Example: Screws at the pan grinder head

After assembly work

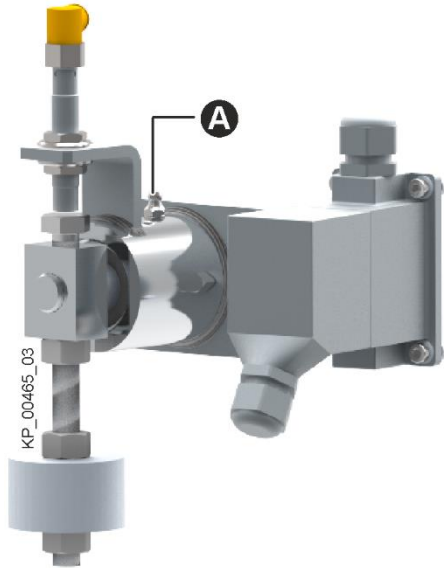
- All screws which are loosened during the disassembly work must be glued in place again with Loctite 243.
- Clean all threads before gluing. For cleaning, acetone, Loctite No. 706 36 AC or Loctite 80646 can be used.
- Observe the tightening torques in the table below.

Reference values for tightening torques

Set screws with standard metric thread, property class 8.8 (VDI 2230)

Thread	Tightening torque [Nm]	Thread	Tightening torque [Nm]
M 5	5.9	M 12	84
M 6	10.1	M 16	206
M 8	24.6	M 20	415
M 10	48	M 24	714

10.5 Greasing the overflow safety device



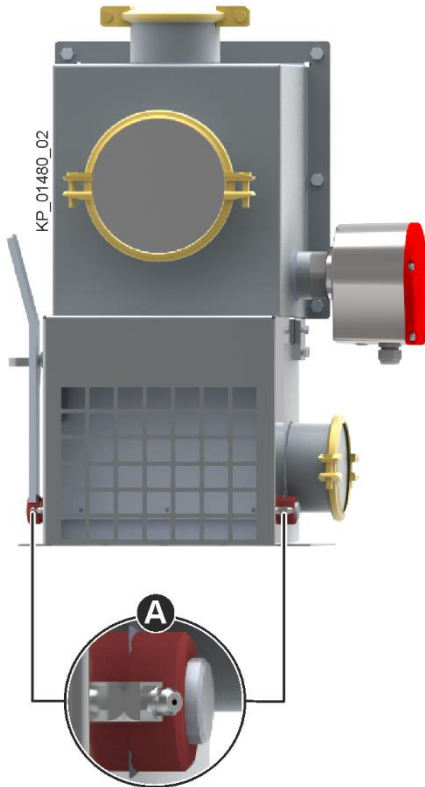
- Grease the bearing of the overflow safety device regularly at the lubricating nipple (Fig. 38/A). The lubricating nipple is located on the top side of the overflow safety device on the outside of the machine.

Recommended interval

- Every 200 operating hours
- Lubricant: see specification

Fig. 38: Overflow safety device

10.6 Lubricating the outlet box



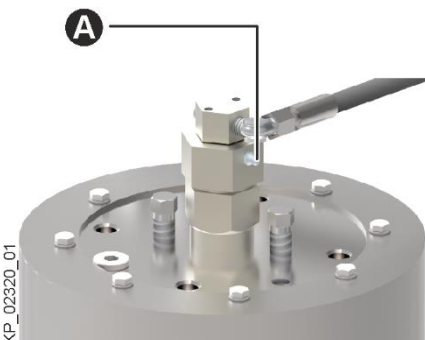
- Relubricate the bearings of the flap of the outlet box every month at the lubricating nipple (Fig. 39/A).

Recommended interval

- Monthly / 20 g per lubricating nipple
- Lubricant: see specification

Fig. 39: Outlet box

10.7 Greasing the simple revolute joint



- Every 200 operating hours
- Lubricant: see specification.

Relubrication

- Clean the lubricating nipple (Fig. 40/A).
- Put on the mouth piece and lubricate.
- Wipe off any excess grease.

Fig. 40: Lubricating nipple

10.8 Checking the lubricant filling of the pan grinder rollers



IMPORTANT!

Risk of property damage caused by different lubricants!

Do not mix lubricating greases and oils, as they will lose their efficiency. Damage to the machine may result.

- Always use the same type of lubricant.

Replacing the lubricant

- Replace the lubricant every 100 operating hours or weekly:
 - ⇒ Check whether grease emerges at the bore of the screw plug (Fig. 41/A).
 - ⇒ If not, replace the axial face seal.
- Remove the screw plug (Fig. 41/B) from the pan grinder head.
- Clean the area around the lubricating nipple (Fig. 41/B) and the mouth piece of the grease gun.
- Slowly and gently press in grease until fresh grease emerges at the screw plug (Fig. 41/A).
- Let excess lubricant escape.
- Clean the screw plug carefully with an appropriate cleaning agent.
- Mount the screw plug (Fig. 41/A) and lock it with Loctite.

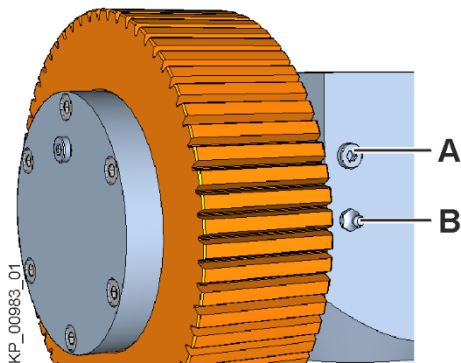


Fig. 41: Pan grinder head with lubricating nipples

10.9 Replacing the lubricant of the slip-on gear

The slip-on gear is provided with a long-term lubrication.

To ensure a long service life:

- Check the lubricant level after 3,000 operating hours.
- Remove the lubricant after 8,000 operating hours.
- Clean the gear thoroughly.
- Fill in the new lubricant (see the documentation of the gear in the annex).

10.10 Lubricating the main bearing of the main shaft

The bearing of the main shaft is provided with grease via a lubricating nipple.

- Every 200 operating hours 20g of lubricant
- Lubricant: see specification.
- Clean the area around the lubricating nipple (Fig. 42/B) and the mouth piece of the grease gun.
- Slowly and gently press in grease until the old grease becomes visible in the collecting bin (Fig. 42/A).
- Empty the full collecting bin in time and dispose of the lubricant properly.

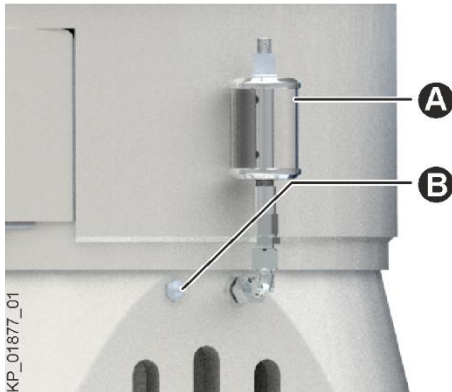


Fig. 42: Lubricating nipple and collecting bin

10.11 Lubricants



IMPORTANT! **Risk of property damage caused by incorrect lubricants!**

When using non-approved lubricants, the lubricating effect may be impaired. Severe machine damage can be the result.

- Only use lubricants for this machine which are listed in the following table.
- For third-party components, see the operating instructions in the annex. Use only lubricants of the specifications mentioned therein.

**IMPORTANT!****Risk of property damage caused by mixed lubricants!**

If different lubricating greases are mixed, they lose their effectiveness. Severe machine damage can be the result.

- Do not mix lubricants of different type and origin.
- Replace the complete filling quantity at each lubricant change.

10.12 Lubricating greases

Application

- Pan grinder rollers with rotary shaft seal
- Revolute joint
- Discharge device
- Overflow safety device
- Outlet box

Use the following lubricating greases according to DIN 51825 and 51502:

10.12.1 Lubricating greases - upper application temperature + 140 °C

Lubricants with an admissible application temperature of up to 140 °C must be used for lubrication.

Specification

Base oil: Mineral oil or synthetic oil

Thickener: Lithium or calcium sulphonate complex soaps or the like

Appropriate for:

- sealing materials made from NBR and FPM
- use in central lubricating systems

Recommended: Intrinsic viscosity at 40 °C of 460 mm²/s

Manufacturer	Designation
KLÜBER (*)	Stabutherm GH 461
SETRAL	MI-setral-PU 460
TOTAL	CERAN XM 460 AXA CO 1
Fuchs Schmierstoffe GmbH	RENOLIT CSX 15
FUCHS LUBRITECH	Lagermeister PP2
BECHEM	Berutemp 490 RS

(*) Used at the factory.

Alternative products

The use of products from other manufacturers is possible provided the product properties are comparable. The use of these products has not been tested by Amandus Kahl and is the responsibility of the customer.

10.12.2 Food grade (NSF H1)

For the lubrication of components which are used in a feed or food environment, lubricants must be used that may have unintentional contact with the product.

Manufacturer	Designation
SETRAL (*)	SYN-setral-CA/C2-400 FD
TOTAL	Nevastane XS 320 Nevastane MP 1.5
BECHEM	Berulub FB 34
KLÜBER	Klüberfood NH 1 11-572 Klüberfood NH 1 94-402
BREMER & LEGUIL FUCHS LUBRITECH	Cassida Grease FM HD 2

(*) Used at the factory.

Alternative products

The use of products from other manufacturers is possible provided the product properties are comparable. The use of these products has not been tested by Amandus Kahl and is the responsibility of the customer.

10.13 Hydraulic oils**Application**

- Hydraulic unit

10.13.1 Hydraulic oil HLP according to DIN 51524-2

Manufacturer	Designation
SHELL (*)	Tellus S3 M 68
SETRAL	HYD-setral-SYN 68 FD
TOTAL	Azolla AF 68
Fuchs Schmierstoffe GmbH	RENOLIN ZAF B68 HT
KLÜBER	Lamora HLP 32/68
BECHEM	Staroil Nr 68

(*) Used at the factory.

Alternative products

The use of products from other manufacturers is possible provided the product properties are comparable. The use of these products has not been tested by Amandus Kahl and is the responsibility of the customer.

10.13.2 Food grade (NSF H1)

For the lubrication of components which are used in a feed or food environment, lubricants must be used that may have unintentional contact with the product.

Manufacturer	Designation
SETRAL (*)	HYD-setral-SYN 68 FD
BREMER & LEGUIL FUCHS LUBRITECH	Cassida HF 68
TOTAL	Nevastane SH 68
BREMER & LEGUIL	Rivolta F.L. 100
BECHEM	Berusynth 68 H1
KLÜBER	Klüberfood 4 NH 1-32/68

(*) Used at the factory.

Alternative products

The use of products from other manufacturers is possible provided the product properties are comparable. The use of these products has not been tested by Amandus Kahl and is the responsibility of the customer.

10.14 Corrosion-proof lubricating and anti-seize agents

Application

- Main shaft / pan grinder head as assembly paste

The applied anticorrosive agents must have a good adhesion at high operating temperatures of the machine.

10.14.1 Standard application

Manufacturer	Designation
SETRAL (*)	SYN-setral-WKT
KLÜBER	Klüberpaste HEL 46-450
FUCHS	Gleitmo WSP 5040
BREMER & LEGUIL	Rivolta W. A. P. paste
TOTAL	SPECIS CU
BECHEM	Berulub Paste PT 2

(*) Used at the factory.

Alternative products

The use of products from other manufacturers is possible provided the product properties are comparable. The use of these products has not been tested by Amandus Kahl and is the responsibility of the customer.

10.14.2 Food grade (NSF H1)

For the lubrication of components which are used in a feed or food environment, lubricants must be used that may have unintentional contact with the product.

Manufacturer	Designation
SETRAL (*)	SYN-setral-FGP
KLÜBER	Klüberpaste UH 1 96-402
BREMER & LEGUIL	Rivolta F. L. A. paste
BECHEM	Berulub Antiseize 932 Paste

(*) Used at the factory.

Alternative products

The use of products from other manufacturers is possible provided the product properties are comparable. The use of these products has not been tested by Amandus Kahl and is the responsibility of the customer.

Storage of lubricants

Keep lubricants such as oils and greases in clean, closed containers (tins, cans, barrels) to avoid the ingress of dust and moisture and minimise the oxidation effect of the air. The storage place should be dry and cool.

10.15 Preserving the machine



IMPORTANT!

Risk of property damage caused by improper shutdown!

After shutdown, take the following measures. Otherwise, corrosion and property damage can occur at the machine.

- Take measures to preserve the machine immediately.

Aggressive product mixtures

- Some product mixtures can include aggressive components. Pay special attention to wear and corrosion.
- Check the area under the die / the perforated plate carefully and treat it accordingly.
- Wear safety clothing.
- Remove the aspiration system.
- Remove the proportioning system and the dust hood using suitable lifting gears (see "Repair").
- Remove the tightening nut, grooved nut or hydraulic nut.
- Remove the pan grinder head.
- Clean the bore and preserve it.
- Clean the main shaft and preserve it.
- Check whether the pan grinder rollers have evenly worn out.
- Check the bearing clearance of the pan grinder rollers.

It must be easily possible to turn the pan grinder rollers by hand. If necessary, the pan grinder rollers and roller bearings must be replaced in a workshop.
- Lubricate the pan grinder rollers according to specification.
- Check the screws of the roller covers and the scrapers (optional).
- Lift the discharge device.

- Clean and preserve the area under the discharge device carefully.
- Check the support and the fastening device of the die / perforated plate for wear and damage.
- Replace the die or the perforated plate if necessary.
- Check the die / perforated plate.
- Clean the upper side of the die or perforated plate from product residues and preserve it if necessary.
- Check the V-belts for wear and release them.
- Replace the V-belts if necessary.
- Check the spacer rings. Replace the spacer rings if necessary.

Preserving



The machine is preserved by these measures. When restarting the machine, the chapter "Commissioning" must be considered.

11 Repair

11.1 Safety instructions for the repair work

Improper repair work

**WARNING!****Risk of injury due to improper repair work!**

Improperly performed work may result in serious injury and significant property damage.

- Repair work may only be performed by qualified staff.
- Ensure sufficient space before starting work.
- Only use screws and assembly material of the manufacturer.
- Before commissioning, make sure that
 - all repair work has been carried out and completed properly.
 - nobody is in the hazardous area.

Electrical current

**DANGER!****Risk of fatal injury from electrical current!**

Contact with live components can be fatal.

- Before starting work, switch off the electrical supply and safeguard the machine against restart!

Hot surfaces

**WARNING!****Risk of burn injuries from hot components!**

Parts of the plant heat up during operation.

Skin contact with hot components causes severe burns.

When working near hot components:

- Wear clothing and gloves protecting against heat.
- Do not touch hot components.

When working on hot components:

- Cool the component to ambient temperature.
- Wear gloves protecting against heat.

Safeguarding against unauthorized re-start

DANGER!
Risk of fatal injury due to unauthorized re-start!

Unauthorized re-start of the machine can cause serious injury including death.

- Before starting work, switch off the machine and safeguard it against re-start!

Wear the following personal protective equipment:

11.2 Repair instructions

- Read the documentation of the components included in the delivery. It contains more detailed information on assembly and operation.
- Observe the operating manual of the machine.
- Observe the indications on the dimension sheet.

Reference values for tightening torques

Set screws with standard metric thread, property class 8.8 (VDI 2230)

Thread	Tightening torque [Nm]	Thread	Tightening torque [Nm]
M 5	5.9	M 12	84
M 6	10.1	M 16	206
M 8	24.6	M 20	415
M 10	48	M 24	714

11.3 Securing screwed connections with Loctite

Adhesive

Loctite No.	Temperature range	Handling strength / full strength after
RC 243	max. + 150 °C	10 - 30 min. / 3 hours

Cleaner

 Do not use moisturizing cleaners, such as diluent for cellulose lacquers.

Recommended cleaning agents:

- Acetone
- Fast cleaner spray Loctite
 - fast evaporation = No. 706 36 AC
 - slow evaporation = No. 706 36 IP
- Glue remover spray Loctite No. 806 46

 Pay attention to the processing and security information on the package or package insert of the recommended cleaning agent.

Activator

The activator N Loctite can be used to shorten the curing time until handling strength is reached.

The activator shortens the curing time until reaching handling strength to 5 to 15 minutes.

 The activator does not reduce the curing time until reaching full strength.

11.3.1 Gluing screws

- Clean the gluing surfaces mechanically (brushing, grinding) and degrease them.

The more thorough the gluing surfaces are cleaned, the better the glued joints.

i Pay attention to the processing and security information on the package or package insert of the adhesive and activator.

- Treat the gluing surfaces with adhesive and activator according to the manufacturer's instructions.

Wait for the end of the prescribed curing time (handling strength / full strength).

Do not move the glued parts before handling strength of the glued joint has been reached.

11.3.2 Loosening the glued joint

- Loosen the glued screwed connection.

11.4 Removing the dust hood

Preparatory work

- Switch off the machine and process-related parts of the plant and safeguard them against restart.
- Let the machine cool down.
- If available: Remove or swivel aside the proportioning system using suitable lifting gears.
- If available: Depressurize the hydraulic unit.

Opening the access lock

- Remove the key of the machine from the local switch cabinet.
- Open the lock (Fig. 43/A) on the machine with the key and remove the bolt (Fig. 43/B).

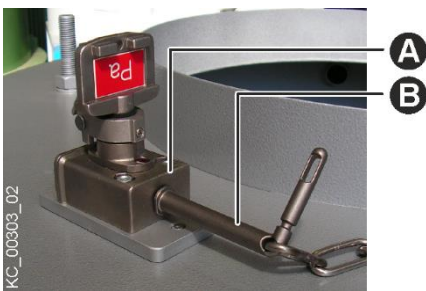


Fig. 43: Lock on the dust hood

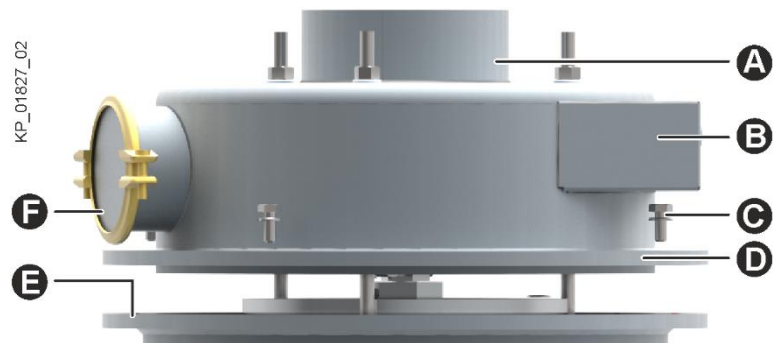


Fig. 44: Overview of the dust hood

Removing the dust hood

- Loosen the bent-lever closure (Fig. 44/A).
- Swivel the proportioning system to the side.
- If available: Remove the aspiration system (Fig. 44/F).
- Work on the hydraulic unit and the central lubrication system if available:
 - Uncouple the connection of the hydraulic unit and the central lubrication system (Fig. 44/B).
 - Remove the spring plugs of the hose pipes.
 - Reach through the product inlet (Fig. 44/A) and pull the hoses in the machine interior.
- Loosen the screws (Fig. 44/C).
- Lift off the dust hood (Fig. 44/D).

11.5 Dismounting the cover cone



- Loosen the screws of the cover cone (Fig. 45/A) on the revolute joint (Fig. 45/C).
- Remove the cover cone (Fig. 45/A) from the hydraulic nut.

Fig. 45: Cover cone

11.6 Repairing the simple revolute joint

Preparatory work

- Switch off the machine and process-related parts of the plant and safeguard them against restart.
- Let the machine cool down.
- Remove the proportioning system and the dust hood using suitable lifting gears.
- Use an oil trough for the following work.

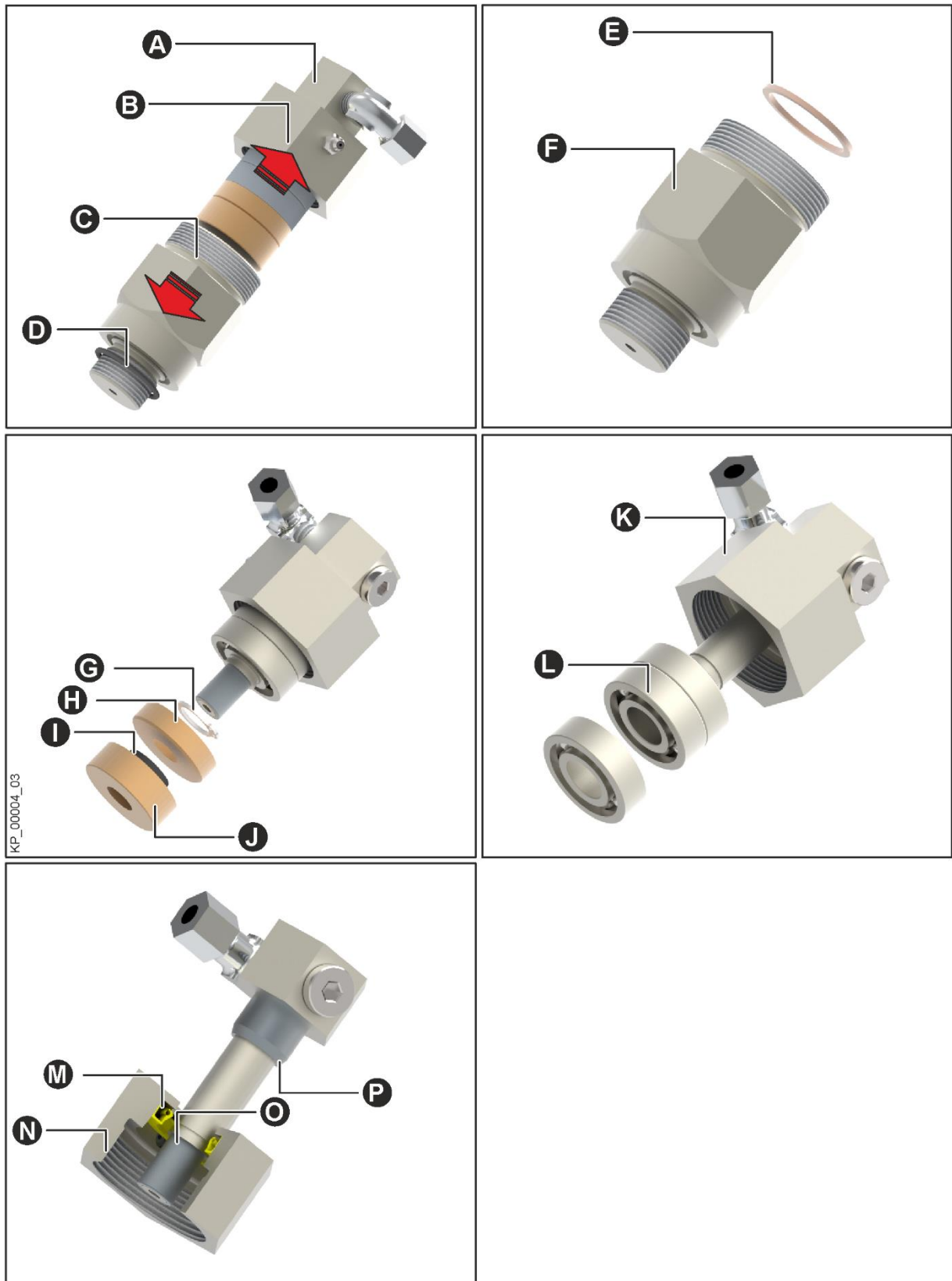


Fig. 46: Overview of the simple revolute joint

Removing the simple revolute joint

- Screw off the supply piping.
- Unscrew the simple revolute joint from the hydraulic nut using a suitable open-end spanner.
- Clamp the simple revolute joint at the two flat surfaces of the rotor (Fig. 46/C) in a vice.
- Loosen the cover (Fig. 46/B) and screw it off.
- Pull the stator (Fig. 46/A) out of the rotor.
- Remove the O-ring (Fig. 46/D) of the rotor and replace it by a new one.
- Remove the copper ring (Fig. 46/E) of the rotor (Fig. 46/F) and replace it by a new one.
- Remove the seal carrier (Fig. 46/J) with sealing ring (Fig. 46/I) from the stator.
- Replace the sealing ring (Fig. 46/I) by a new one.
- Pull off the bearing cover (Fig. 46/H) from the stator.
- Remove the locking ring (Fig. 46/G).
- Remove the bearing (Fig. 46/L) from the stator (Fig. 46/K).
- Remove the cover (Fig. 46/N) with grooved ring (Fig. 46/M).
- Replace the grooved ring (Fig. 46/M) by a new one.
- Clean all components thoroughly.

Mounting the simple revolute joint

- Carefully grind notches in the old wear rings (Fig. 46/P, O) until there is a fine crack.
- Slightly clamp the rotor in the field of the ground-in wear rings in a vice.
- Twist the rotor carefully and tighten the wear rings.
- Coat the new wear rings (Fig. 46/P, O) at the front side with Loctite and insert them.
- Place the cover (Fig. 46/M) on the wear ring (Fig. 46/P) again.

- Place the bearings (Fig. 46/L) on the stator (Fig. 46/K).
- Place the locking ring (Fig. 46/G) on the bearings (Fig. 46/L).
- Place the bearing cover (Fig. 46/H) on the stator.
- Place the seal carrier (Fig. 46/J) with new sealing ring (Fig. 46/I) on the stator.
- Push the rotor (Fig. 46/F) with new copper ring (Fig. 46/E) on the stator.
- Screw the rotor (Fig. 46/F) to the cover (Fig. 46/B).
- Screw the simple revolute joint onto the hydraulic nut.

11.7 Dismounting the hydraulic nut

Preparatory work

- Switch off the machine and process-related parts of the plant and safeguard them against restart.
- Relieve the hydraulic plant from pressure.
- Let the machine cool down.
- Remove the proportioning system and the dust hood using suitable lifting gears.

Dismounting the hydraulic nut

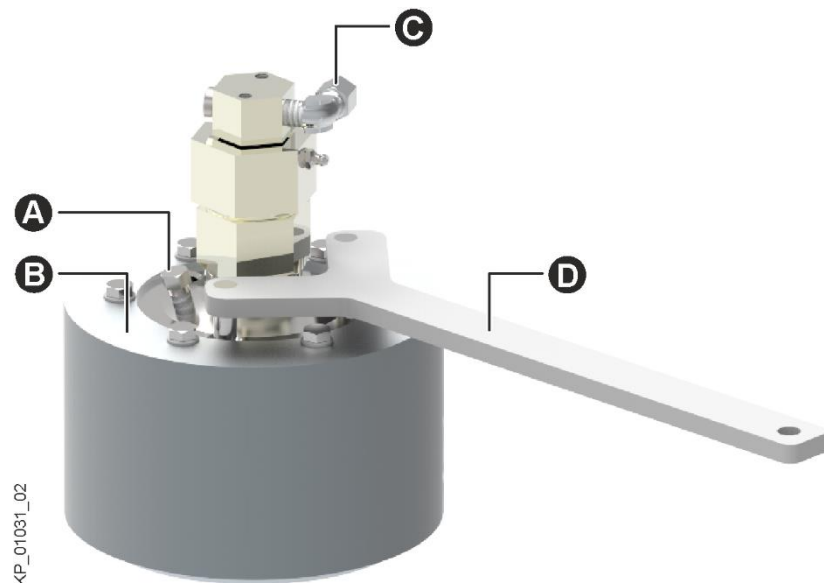


Fig. 47: Dismounting the hydraulic nut

- Clean the hydraulic nut (Fig. 47/B).
- Uncouple the plug-in coupling (Fig. 47/C).
- Loosen the securing screws (Fig. 47/A).
- Clean the threaded bores (Fig. 47/A).
- Loosen the hydraulic nut with the provided open-end spanner (Fig. 47/D) and turn it up to the end of the main shaft thread.
- Lift the hydraulic nut from the main shaft and place it in an oil trough.

11.8 Replacing the seals of the hydraulic nut

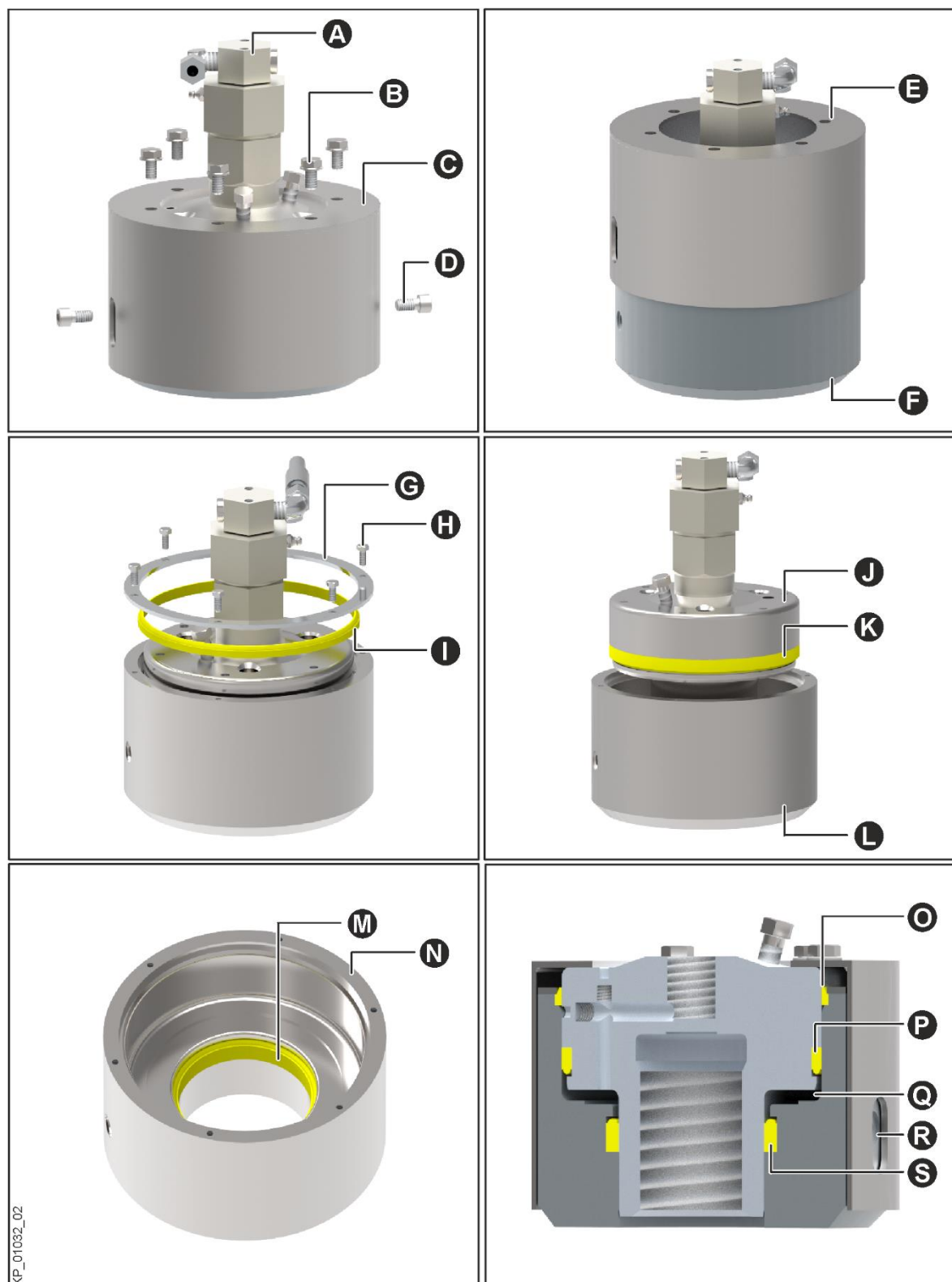


Fig. 48: Overview of the hydraulic nut

**IMPORTANT!****Risk of property damage caused by improperly mounted seals!**

When installing the seals, make sure that the sealing lips show in the direction of the oil chamber (Fig. 48/Q). Incorrect assembly can cause serious damage to the hydraulic nut.

- Observe the position of the seals (Fig. 48/P, S)!
- Coat the seals with an antiseize agent.

- Make sure that the simple revolute joint (Fig. 48/A) is still mounted.
- Remove the screws (Fig. 48/B) from the cover (Fig. 48/C).
- Remove the securing screws (Fig. 48/D).
- Remove the cover (Fig. 48/C) from the annular cylinder (Fig. 48/F).
- Remove the screws (Fig. 48/H) of the holding plate (Fig. 48/G).
- Remove the scraper (Fig. 48/I).
- Hold the annular cylinder (Fig. 48/L) firmly and carefully pull out the annular piston (Fig. 48/J) at the simple revolute joint until the seals (Fig. 48/K, M) are exposed.
- Remove the old seals (Fig. 48/K, M).
- Clean all components and sealing surfaces carefully.
- Insert new seals (Fig. 48/K, M).
 - Observe the position of the seals (Fig. 48/P, S).
- Push the annular piston (Fig. 48/J) and the annular cylinder (Fig. 48/L) into each other again and press them together manually.
- Insert new scraper (Fig. 48/I).
 - Observe the position of the scraper (Fig. 48/P).
- Mount and screw the holding plate (Fig. 48/G) (Fig. 48/H).
- Place the cover (Fig. 48/E) on the annular cylinder (Fig. 48/F) again.

- Align the recess of the cover with the bore in the annular cylinder (Fig. 48/S).
- Screw the cover (Fig. 48/C) to the annular cylinder (Fig. 48/F) (Fig. 48/B).

11.9 Dismounting the pan grinder head



DANGER!

Risk of fatal injury due to insufficient lifting gear!

Pay attention to the weight of the complete pan grinder head (see transport weights). Death or serious injury can result from the use of an insufficient lifting gear.

- Use a lifting gear with sufficient carrying capacity.

Preparatory work

- Switch off the machine and process-related parts of the plant and safeguard them against restart.
- Let the machine cool down.
- Remove the proportioning system, the dust hood, the upper part and the grooved nut / tightening nut or hydraulic nut using suitable lifting gears.

Dismounting the pan grinder head

- Remove the spacer rings.
- Screw eye bolts (Fig. 49/A) into the pan grinder head.
- Fasten the lifting gear to the eye bolts.
- Lift the pan grinder head (Fig. 49) a little.

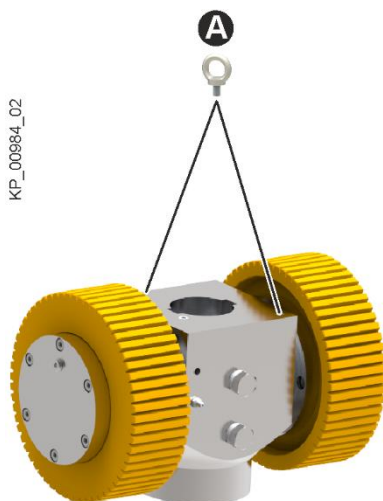
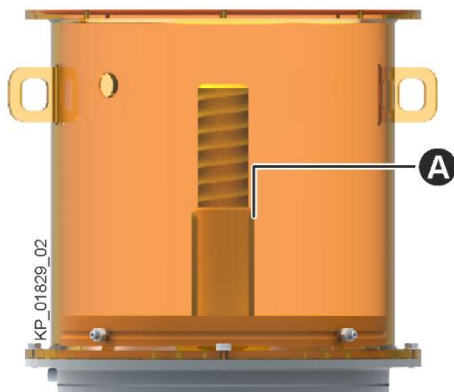


Fig. 49: Lifting the pan grinder head



- Safeguard the feather keys (Fig. 50/A) to prevent them from falling down.
- Lift down the pan grinder head completely.
- Put the pan grinder head on a wooden pallet or other suitable flat surface.

Fig. 50: Basic machine

11.10 Dismounting the upper part



Fig. 51: Overview of the upper part

- If available: Remove the plug of the overflow safety device (Fig. 51/B).
- Loosen all fastening screws (Fig. 51/E).
- Suspend the lifting gear into the bows of the upper part (Fig. 51/A).
- Lift off the upper part (Fig. 51/B).

11.11 Dismounting pan grinder rollers with axial face seal

Preparatory work

When disassembling the pan grinder rollers, lubricant escapes.

- Hold ready an oil trough and cleaning agent.

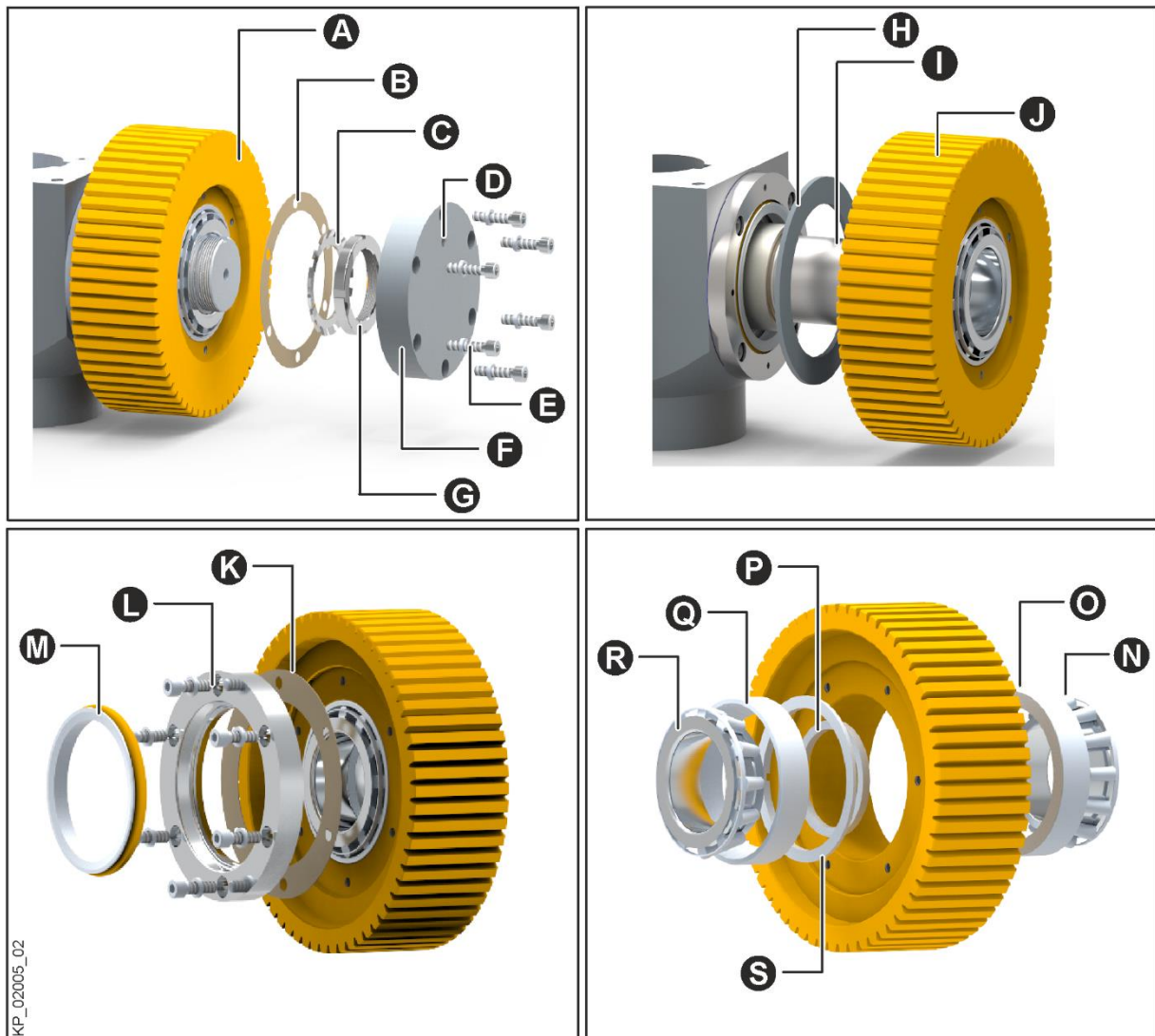


Fig. 52: Pan grinder rollers with axial face seal

- Place the pan grinder head in an oil trough.
- Turn the pan grinder roller until the screw plug (Fig. 52/D) is in the lower position.

- Remove the cheese head screws (Fig. 52/E) from the roller cover (Fig. 52/F) using a hexagon socket screw key.
- Remove the roller cover.
- Unlock and remove the grooved nut (Fig. 52/G).
- Remove the locking plate (Fig. 52/C).
- Screw in 2 eye bolts instead of the cheese head screws (Fig. 52/E).
- Pull the pan grinder roller (Fig. 52/J) including taper roller bearings from the roller axle (Fig. 52/I) and lay it down in a trough.
- Turn the pan grinder roller and unscrew the inner cover (Fig. 52/L).
- Lift off the inner ring with cage of the inner bearing (Fig. 52/R).
- Lift off the inner ring with cage of the outer bearing (Fig. 52/N).
- Press the outer rings of the taper roller bearings (Fig. 52/Q, O) and the spacer ring (Fig. 52/S) out of pan grinder roller.
- Remove the inner spacer ring (Fig. 52/P).

11.12 Replacing the axial face seal



IMPORTANT!

Risk of property damage caused by defective axial face seals!

Axial face seals are precision parts made of chilled cast iron. Knocks and bumps can severely damage the axial face seals.

- The seal receiving parts must be free of dirt.
- Remove original packing only immediately before mounting the seal. Protect the sliding surfaces against damages and impurities.

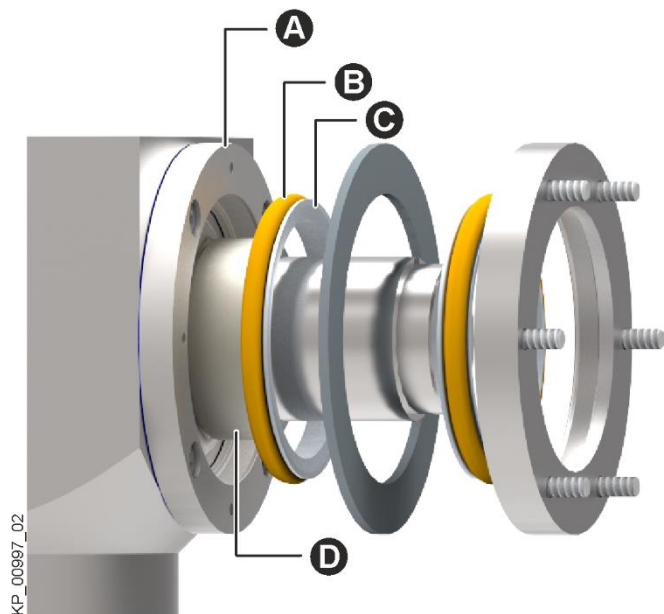


Fig. 53: O-ring and sliding ring

The roller bearing set is free of adjustment. The parts of the bearing sets must not be interchanged. After disassembly from the pan grinder roller, the bearing set must be placed aside as a complete unit (e.g. in a box).

- Remove the O-ring (Fig. 53/B) and the sliding ring (Fig. 53/C) from the seal carrier (Fig. 53/A).
- Check the spacer ring (Fig. 53/E) for damage and replace it if necessary.
- Clean the parts and check them for damages.

- Make sure that the contact area of the O-rings has a perfect surface for sealing.
- Apply a thin layer of lubricant to the bore and seal.

Before putting one sealing ring on top of the other:

- Apply lubricant to the sliding surfaces.



IMPORTANT!

Risk of property damage caused by strong pressure during installation!

Do not apply excessive pressure on the O-ring via the sliding ring. Do not use sharp-edged tools. Damage to the O-ring and the sliding ring can be the result.

- Insert the O-ring and the sliding ring by hand.

- Insert one O-ring and one sliding ring each carefully into the seal carrier and the inner cover.
- Use the assembly aids of the manufacturer.

11.13 Replacing the bearing set

Preparatory work

When replacing the bearing unit, the seal must necessarily be opened. The assembly of a new seal set is always needed, even when the wear limit has not been reached. After a relatively short operation time, the surfaces sliding over each other already have adapted to each other.

When remounting the used seal, the same mounting position is no longer ensured. The bearing set is preset. Replace only the complete unit (taper roller bearing and spacer rings).

A Teflon washer is installed to protect the axial face seal. The thickness of the washer is about 5 mm when new. If this value is clearly lower, the Teflon washer needs to be replaced.

When disassembling the pan grinder rollers, lubricant escapes.

- Hold ready an oil trough and cleaning agent.

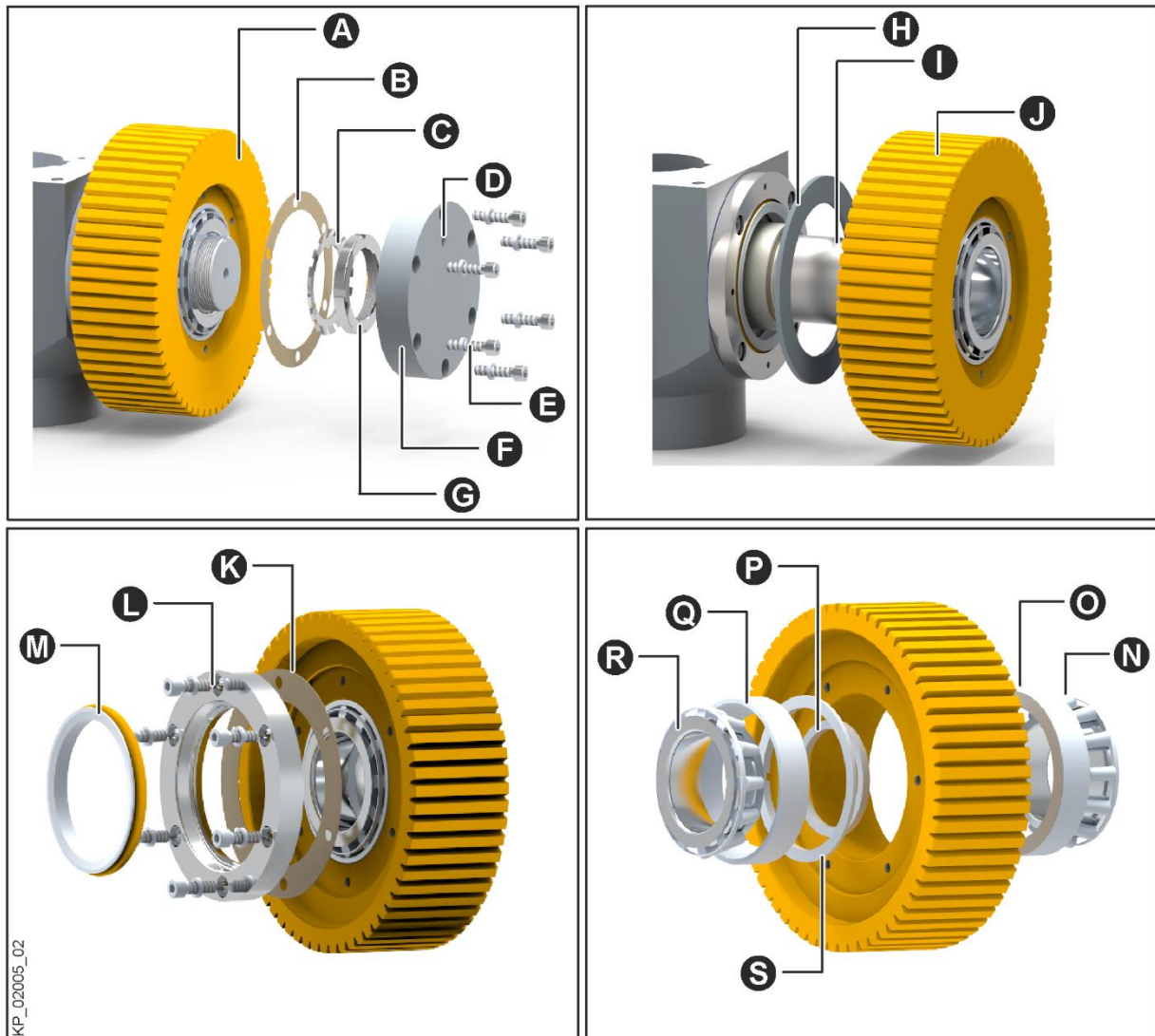


Fig. 54: Pan grinder rollers with axial face seal

- Insert a new flat seal (Fig. 54/K).
- Put the inner cover (Fig. 54/L) on the pan grinder roller and screw it tightly to the pan grinder roller.
- Rotate the pan grinder roller so that the roller axle is vertical.
- Press in the first outer ring (Fig. 54/Q) of the taper roller bearing with suitable tools.
- Insert the spacer ring (Fig. 54/S).
- Press in the second outer ring (Fig. 54/O) of the taper roller bearing with suitable tools.

- Slip the inner ring (Fig. 54/R) of the taper roller bearing with roller cage on the vertical roller axle.
- Insert the spacer ring (Fig. 54/P).
- Insert the Teflon washer (Fig. 54/H).
- Slip the pan grinder roller with pre-assembled bearing set, inner cover (Fig. 54/L) and axial face seal (Fig. 54/M) on the roller axle.
- Slip on the second inner ring (Fig. 54/N) with roller cage.
- Insert the locking plate (Fig. 54/C).
- Screw on the grooved nut (Fig. 54/G) by hand.
- While continuously rotating the pan grinder roller (at least 10 turns), tighten the grooved nut with a hook spanner.

A tight fit of the bearings must be ensured.

- Lock the grooved nut (Fig. 54/G).
- Insert a new flat seal (Fig. 54/B) and fasten the outer cover.
- Fill in lubricant again (see "Maintenance").

11.14 Repairing the spring assembly

Preparatory work

- Switch off the machine and process-related parts of the plant and safeguard them against restart.
- Let the machine cool down.
- Remove the proportioning system, the dust hood, the upper part, the grooved nut or hydraulic nut, the pan grinder head, the die, if available: the pan grinder head stop or spring assembly, and the breaking-off device using suitable lifting gears.



IMPORTANT!

Risk of property damage at the spring assembly!

Build up the hydraulic pressure slowly when you check the spring assembly. Once the stop has been reached (rapid pressure rise), do not continue to increase the hydraulic pressure. Severe damage to the spring assembly can be the consequence of non-compliance.

- Build up the hydraulic pressure slowly.
- Do not further increase the hydraulic pressure if it rises abruptly.

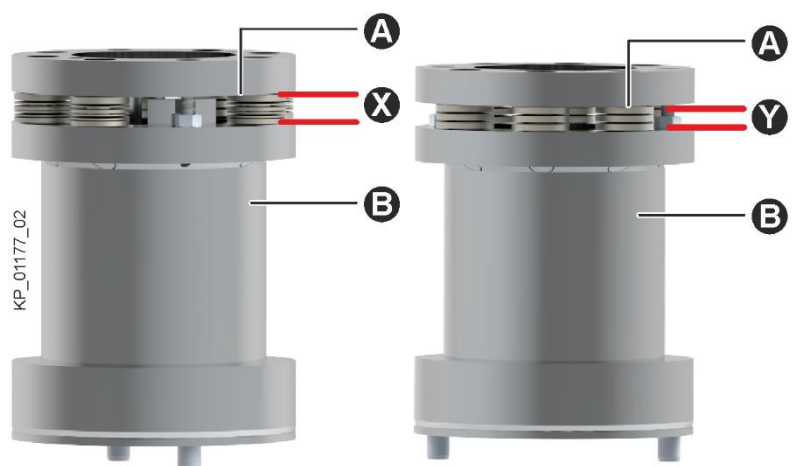


Fig. 55: Spring assembly with pan grinder head stop

General information

The spring assembly comprises 6 disk spring packages, each with 12 disk springs (Fig. 55/A) and 2 locking screws. It

is used to lift the pan grinder head about 2 mm with released hydraulic system, so that a gap is produced between the rollers and the die.

- The spring assembly is preloaded at the factory.
- The total height of the spring assembly is 43 mm in the preloaded state. The spring assembly can be compressed by 2 mm.
- The spring assembly is mounted as a complete unit. Clean the disk springs at regular intervals (e.g. by blowing them out) and preserve them.

Checking the setting of the spring assembly

- Slowly build up pressure with the aid of the hydraulic unit.
 - ⇒ The spring assembly is compressed.
 - ⇒ The hydraulic pressure increases slowly.
- Do not increase the hydraulic pressure any further.
- Measure the distance of all pan grinder rollers to the die.
 - ⇒ There must be a small gap under all pan grinder rollers.

Setting the spring assembly

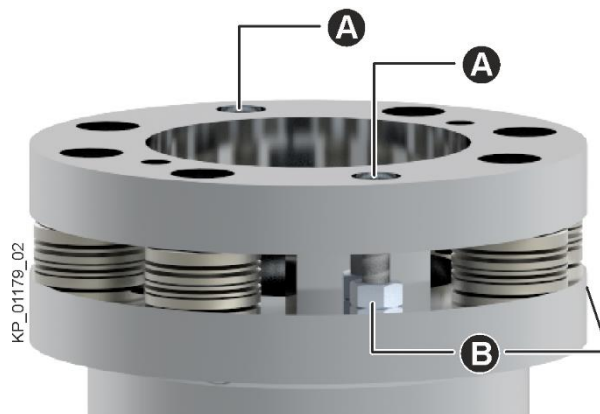


Fig. 56: Setting the spring travel

- Loosen the lock nuts (Fig. 56/B) of the socket head cap screws (Fig. 56/A).
- Set the socket head cap screws (Fig. 56/A) to uniform height and secure them with lock nuts (Fig. 56/B).
- Mount the pan grinder head and check setting.

11.15 Replacing the die

Preparatory work

- Switch off the machine and process-related parts of the plant and safeguard them against restart.
- Let the machine cool down.
- Remove the proportioning system, the dust hood, the upper part, the grooved nut or hydraulic nut and the pan grinder head using suitable lifting gears.

Replacing the die

- Lift down the die (Fig. 57/B).
- Clean the die support and the lateral die guide (Fig. 57/D) thoroughly.
- Insert the new die.
- If available: Insert the lateral screw (anti-twist device) into the groove (Fig. 57/C).

 If a die with a different die thickness is used, the spacer ring height must be adjusted.

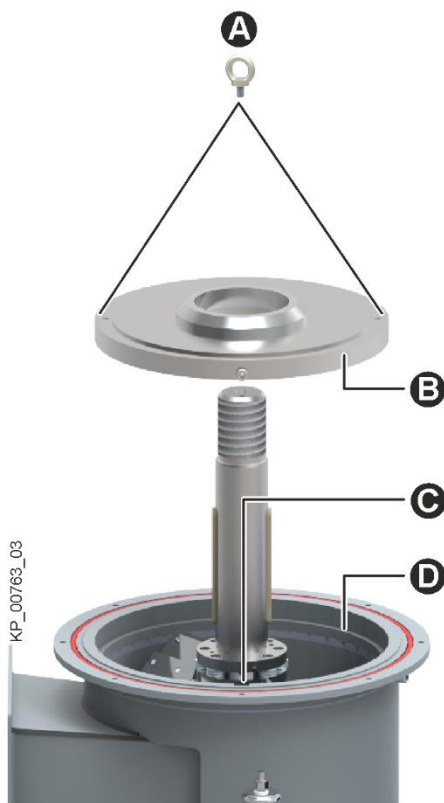


Fig. 57: Replacing the die

11.15.1 Repairing the die

Preparatory work

- Switch off the machine and process-related parts of the plant and safeguard them against restart.
- Let the machine cool down.
- Remove the proportioning system, the dust hood, the upper part, the grooved nut / tightening nut or hydraulic nut and the pan grinder head using suitable lifting gears.

Reworking

The die wears in dependence on the product composition. A high dust content provides information on the wear of a die. The die needs to be reworked in this case.

Countersinking



Fig. 58: Countersinking a die

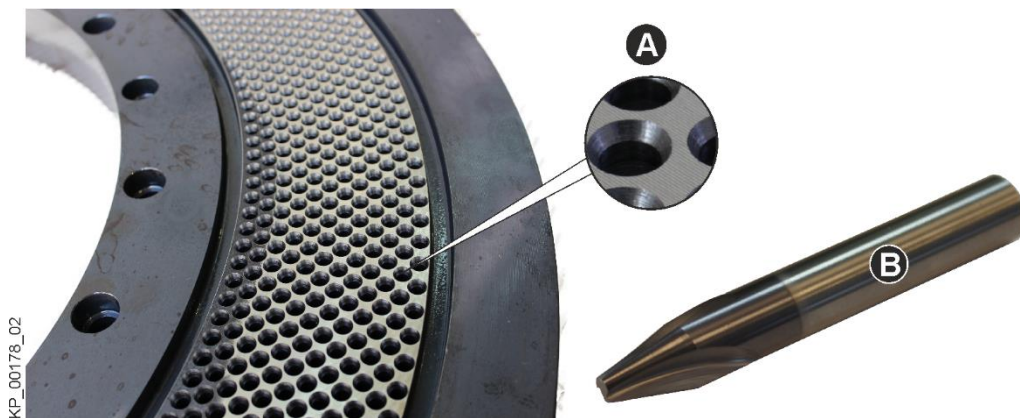


Fig. 59: Countersink and hard metal drill

Use a special hard metal drill for countersinking (Fig. 59/B).

- See the order sheet for dies for the necessary countersink.
- The necessary hard metal drill can be obtained on request.

Reboring

If the product is too dry, it can get stuck in the effective bores (Fig. 59/A). In this case, the bores of the die must be rebored.

- Afterwards, run in the die again.

11.15.2 Running in the die

Running-in

A rebored or reworked die is run in with product and low throughput (approx. 60 % of the nominal capacity). Run-in dies are available on request.

- Only feed as much product into the machine as pellets will leave the machine. If too much product is fed, it will be rolled over several times and dried. The effective bores of the die will block and the machine will clog.
- Make sure that neither too little nor too much product is fed into the interior.

11.16 Repairing the breaking-off device

Preparatory work

- Switch off the machine and process-related parts of the plant and safeguard them against restart.
- Let the machine cool down.
- Remove the proportioning system, the dust hood, the upper part and the grooved nut / tightening nut or hydraulic nut, the pan grinder head and the die using suitable lifting gears.

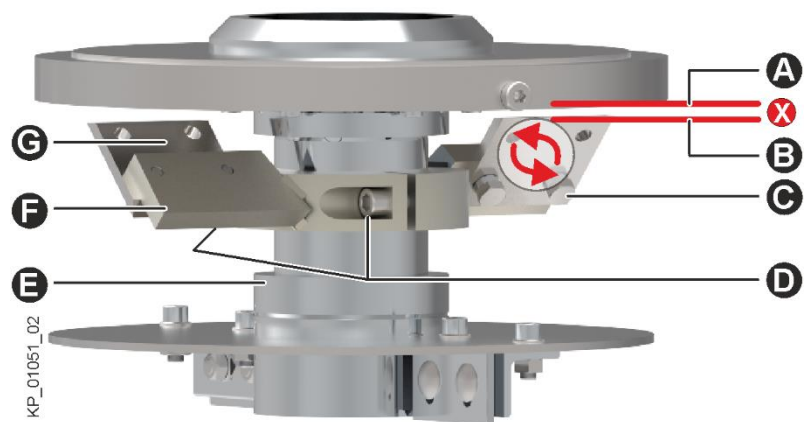


Fig. 60: Breaking-off device



IMPORTANT!

Risk of property damage caused by an improperly adjusted distance!

The minimum distance (Fig. 60/X) between the upper edge of the knives (Fig. 60/B) and the lower edge of the die (Fig. 60/A) must be 2 mm. Severe property damage may be the result of a wrong distance.

- Check the distance and adjust it if necessary.

Turning round/replacing the knives

- Loosen the screws (Fig. 60/C).
- Turn round the knife (Fig. 60/G) and tighten the screws (Fig. 60/C) again.
- If necessary, replace the knife.
- Loosen the screws (Fig. 60/D).

- Adjust the height of the breaking-off device (Fig. 60/F).
- Retighten the screws (Fig. 60/D).

11.17 Repairing the discharge device

Preparatory work

- Switch off the machine and process-related parts of the plant and safeguard them against restart.
- Let the machine cool down.
- Remove the proportioning system, the dust hood, the upper part, the grooved nut / tightening nut or hydraulic nut, the pan grinder head and the die using suitable lifting gears.

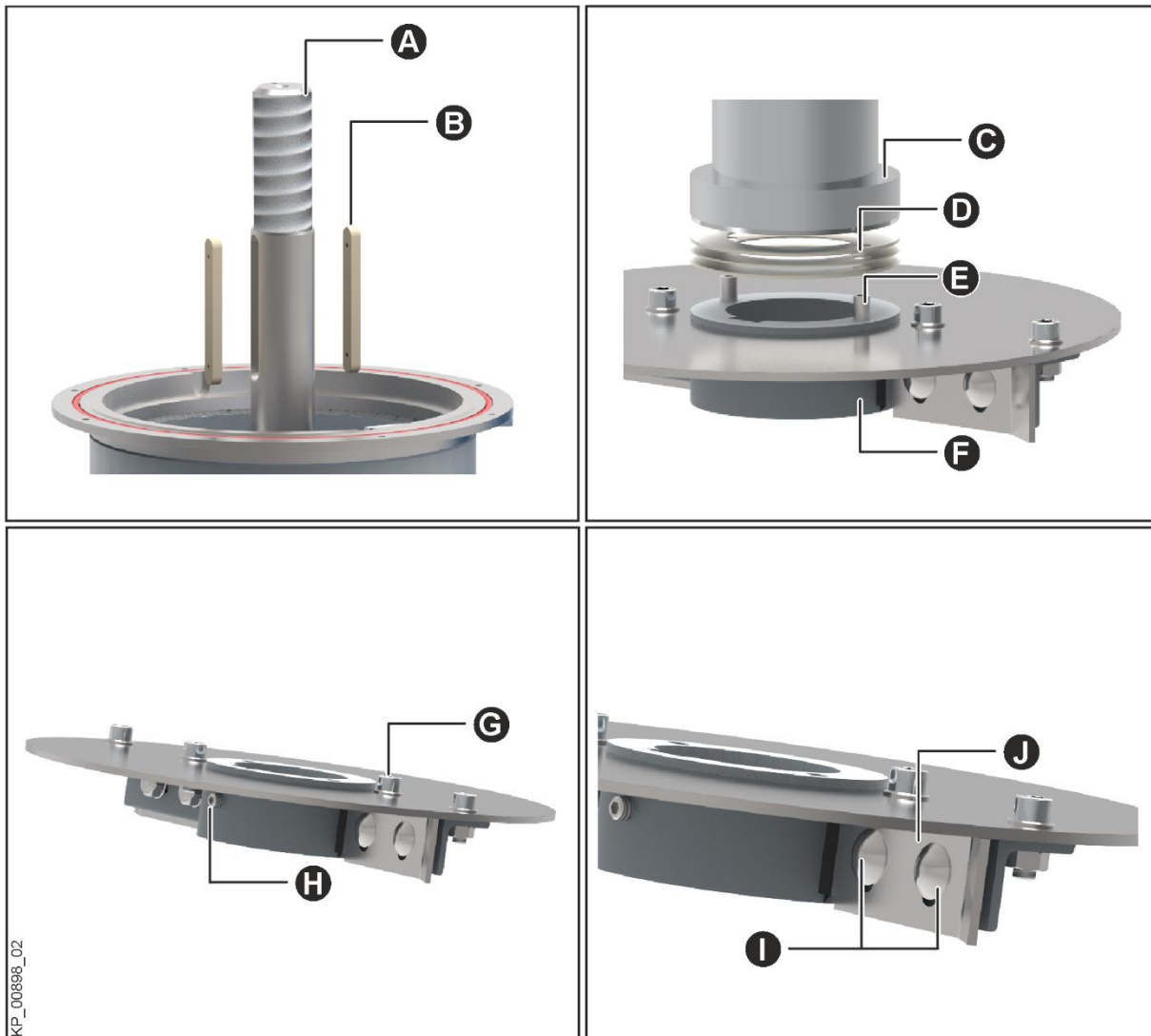


Fig. 61: Overview of the discharge device

Dismounting the discharge device

- Remove the feather keys (Fig. 61/B) from the main shaft (Fig. 61/A).
- If available: Pull the spring assembly or the pan grinder head stop (Fig. 61/C) and spacer rings (Fig. 61/D) off the discharge device (Fig. 61/F).
- Remove the headless screw (Fig. 61/H) from the discharge device.
- Remove the cheese head screws (Fig. 61/G) from the discharge device.
- Screw in eye bolts.

- Lift the discharge device from the main shaft using an appropriate lifting gear.

Mounting the discharge device

- Place the discharge device (Fig. 61/F) on the main shaft using an appropriate lifting gear.
- The discharge device must not rest on the bottom plate!
- Align the discharge device at a distance of abt. 1 mm to the bottom plate and fasten it.
- Screw the headless screw (Fig. 61/H) in the discharge device again.
- Screw the cheese head screws (Fig. 61/G) in the discharge device again.

Checking the distance of the discharging plates

The discharging plates (Fig. 61/J) must have a distance of 1 to 3 mm to the bottom plate.

- Adjust the distance:
 - Loosen the screws of the discharging plate (Fig. 61/I).
 - Adjust the distance and tighten the screws of the discharging plate (Fig. 61/J) again.
 - Adjust the same distance at all discharging plates.
- Insert the spacer rings (Fig. 61/D) and spring assembly or pan grinder head stop (Fig. 61/C) back into the dowel pins of the discharge device (Fig. 61/D).
- Fasten the feather keys (Fig. 61/B) to the main shaft (Fig. 61/A).

11.18 Replacing the wear parts of the main shaft

Preparatory work

- Switch off the machine and process-related parts of the plant and safeguard them against restart.
- Let the machine cool down.
- Remove the proportioning system, the dust hood, the upper part, the grooved nut or hydraulic nut, the pan grinder head, the die, if available: the pan grinder head stop or spring assembly, the breaking-off device and the discharge device using suitable lifting gears.

**IMPORTANT!****Risk of property damage caused by foreign objects in the main shaft bearing!**

During disassembly of the main shaft bearing, penetrating foreign objects can cause serious damage to the bearing.

- Clean the working environment carefully.
- Check the bearing parts for foreign objects.

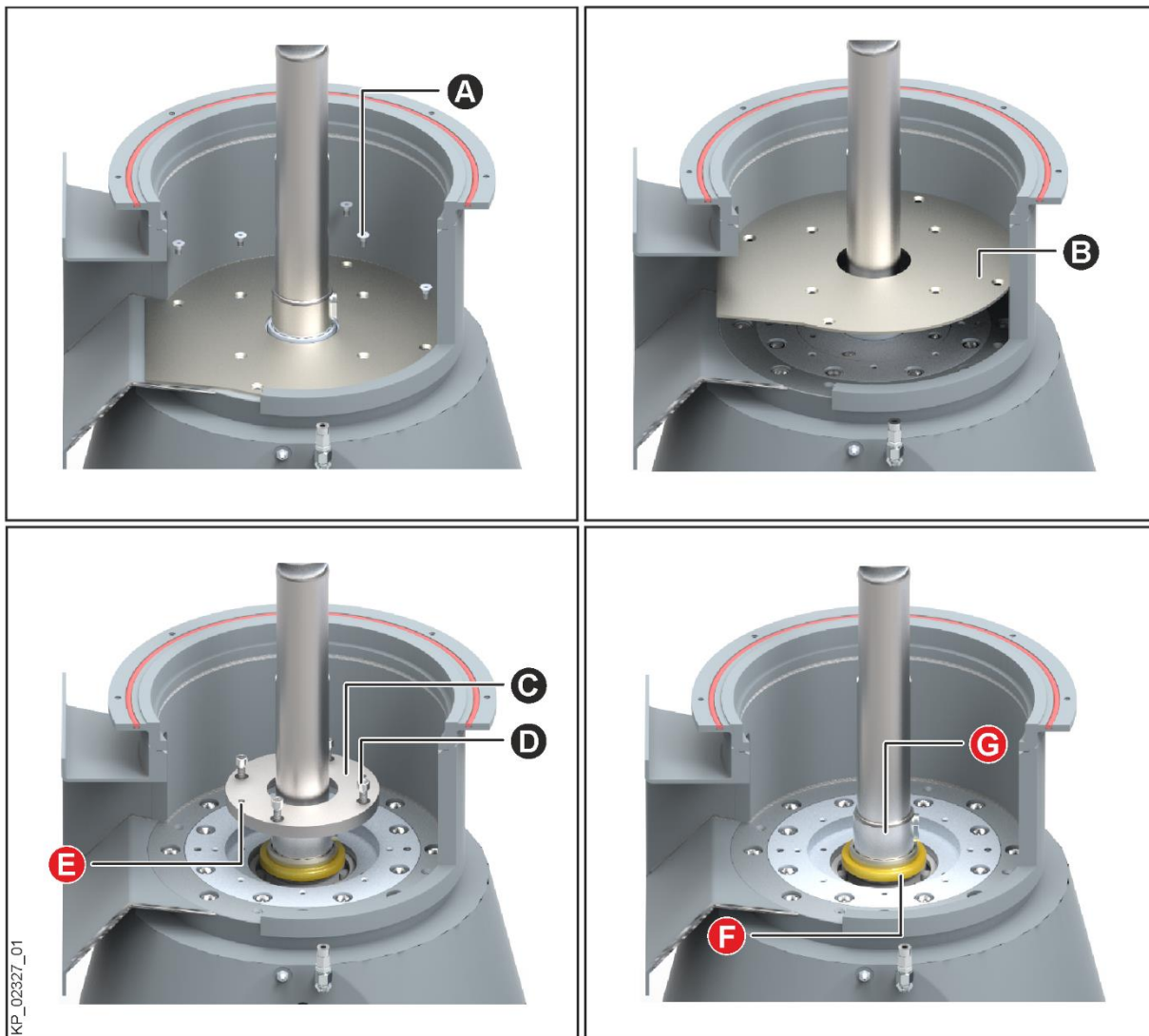


Fig. 62: Overview of the centre part with bottom plate and bearing cover

Replacing the upper seal

- Remove the countersunk screws (Fig. 62/A) in the bottom plate (Fig. 62/B).
- Lift out the bottom plate (Fig. 62/B).

- Remove the cheese head screws (Fig. 62/D).
- Insert suitable screws into the bores (Fig. 62/E) of the bearing cover (Fig. 62/C).
- Separate the bearing cover (Fig. 62/C) by force and remove it.
- Check the seal (Fig. 62/F) and the wear ring (Fig. 62/G). If necessary, replace them:
 - Grease the wear ring with a corrosion-proof lubricant.
 - Insert the new seal in correct position in the bearing cover.
- Mount the bearing cover (Fig. 62/C) and the bottom plate (Fig. 62/B) again and tighten the screws.

Replacing the lower seal



WARNING! **Risk due to tipping the machine!**

To replace the lower seal the machine must be turned on its side. There is a risk of injury.

- Only use suitable lifting gears and protection devices.
- Pay attention to the weight of the complete machine (see "Technical Data").

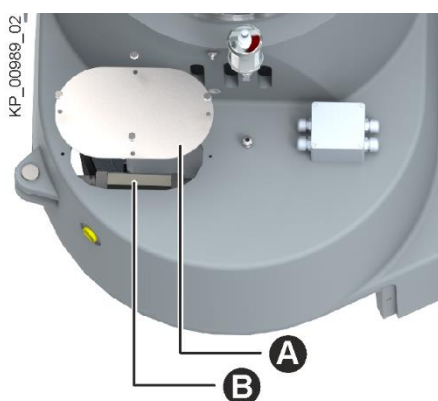


Fig. 63: Releasing the V-belts

Disassembly

- Remove the cover plate of the opening (Fig. 63/A) of the belt tensioner.
- Release the belt tensioner (Fig. 63/B) so that the V-belts are no longer tensioned.

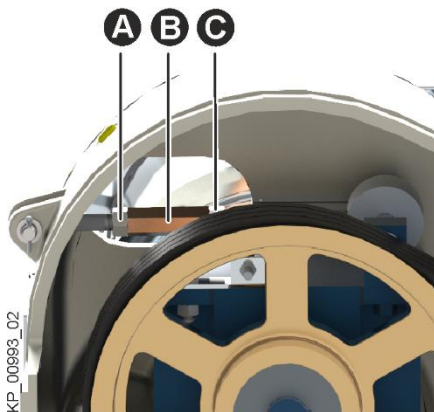


Fig. 64: Separating the belt tensioner

- Lay the machine on its side using suitable lifting gears.
- Loosen the lock nuts (Fig. 64/A) of the belt tensioner.
- Loosen the turnbuckle sleeve (Fig. 64/B) until the belt tensioner is separated.

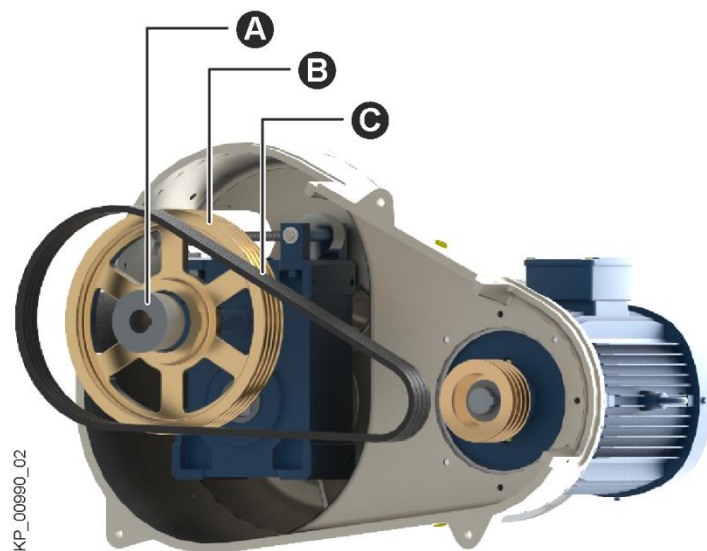


Fig. 65: Removing the belt pulley and V-belt

- Remove the V-belt (Fig. 65/C).
- Remove the V-belt pulley (Fig. 65/B).

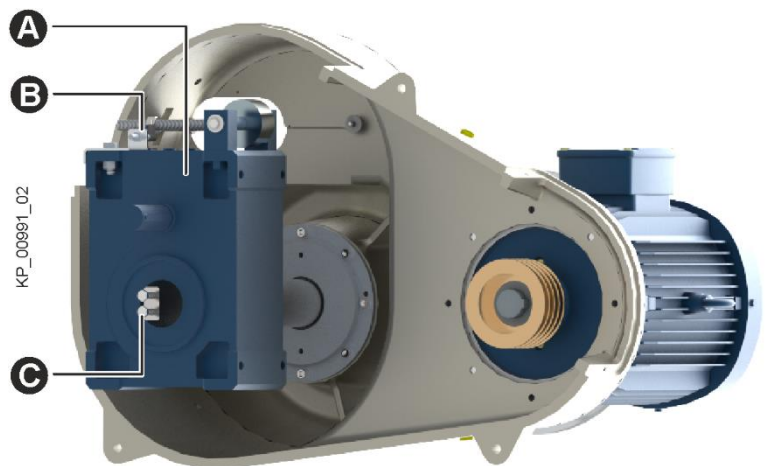


Fig. 66: Removing the slip-on gear

- Disconnect the speed monitor (Fig. 66/B).
- Remove the locking plate (Fig. 66/C) of the gear.
- Carefully remove the slip-on gear (Fig. 66/A) from the main shaft.

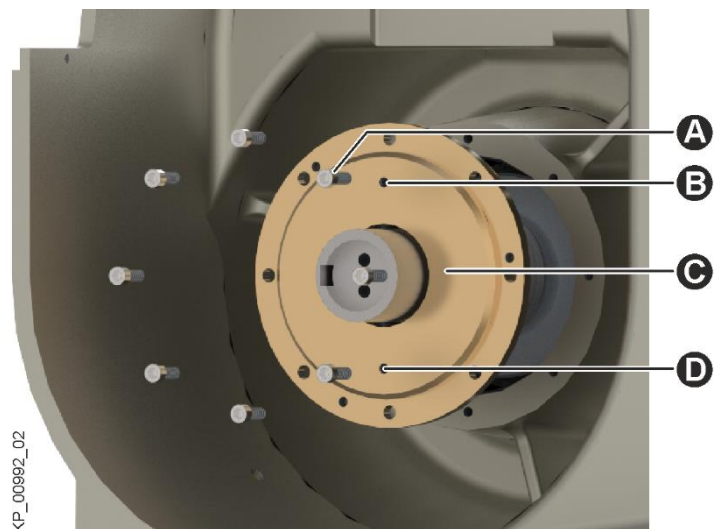


Fig. 67: Removing the bearing flange cover

- Remove the cheese head screws (Fig. 67/A) from the bearing flange cover (Fig. 67/C).
- Remove the bearing flange cover using the lifting thread (Fig. 67/B).

The self-aligning roller bearings beneath remain on the main shaft.

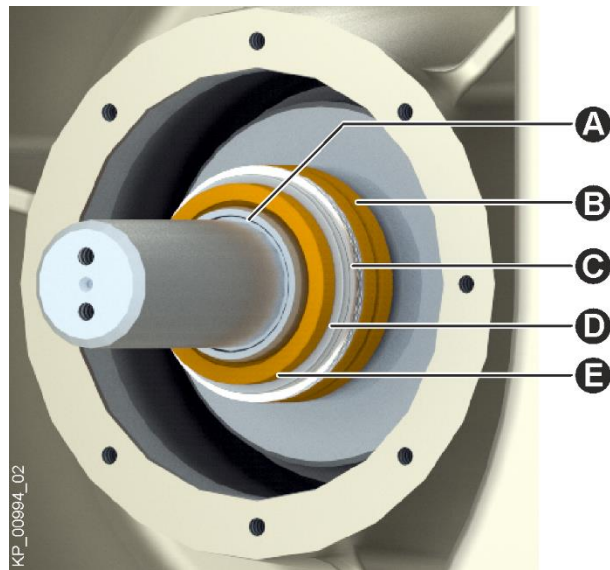


Fig. 68: Bearing of the main shaft

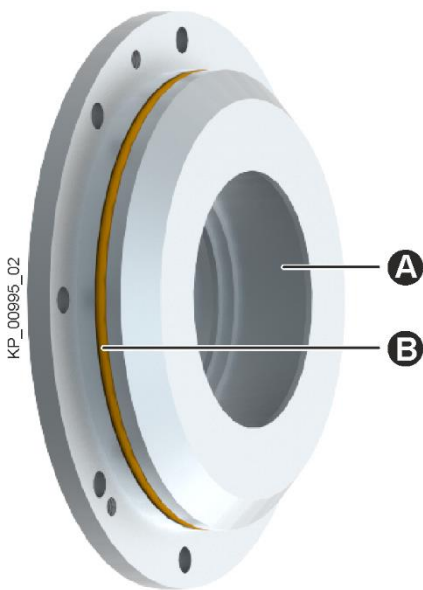


Fig. 69: Bearing flange cover with seal

- Check the wear ring (Fig. 68/A) and replace it if necessary.
- Replace the rotary shaft seal (Fig. 68/E).
- Check the seal (Fig. 69/B) of the bearing flange cover (Fig. 69/A) and replace it if necessary.

Assembly

- Put the shaft washer (Fig. 68/D) and 6 disk springs (Fig. 68/C) in the proper position in the bearing flange cover.
- Mount the bearing flange cover (Fig. 69/A) together with the inserted rotary shaft seal (Fig. 68/E), the shaft washer and the disk springs.
- Put on the slip-on gear (Fig. 66/A) and secure it with the locking plate (Fig. 66/B).
- Mount the V-belt pulley (Fig. 65/A).
- Put on the V-belts (Fig. 65/B).
- Mount the belt tensioner (Fig. 64) and tension the V-belts.

The V-belts must be sufficiently tensioned (see assembly of the V-belt drive).

11.19 Mounting the V-belt drive

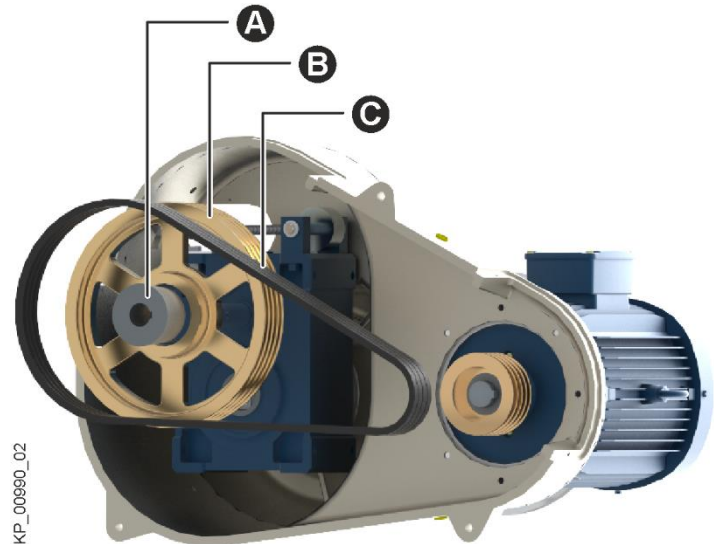


Fig. 70: V-belt drive

When mounting the taper-lock clamping bush (Fig. 70/A), observe the following steps:

- Clean and degrease bright surfaces.
- Fit the V-belt pulley and the taper-lock clamping bush into each other.
- Align the holes and lightly screw in greased clamping screws.
- Screw in the clamping screws uniformly.
- Tighten the clamping screws with 90 Nm.

11.20 Fitting and tensioning the V-belts



IMPORTANT!

Risk of property damage caused by slipping V-belts!

Pay attention to the tension of the V-belts (Fig. 71/A). The V-belts must not slip during operation. Property damage may be the result.

- Check the tension regularly.

The V-belt pulley of the machine has four grooves. The machine is supplied with 3 to 4 mounted V-belts.

When the machine is equipped with 3 V-belts, the lower groove of the V-belt pulley (Fig. 71/A) remains free.

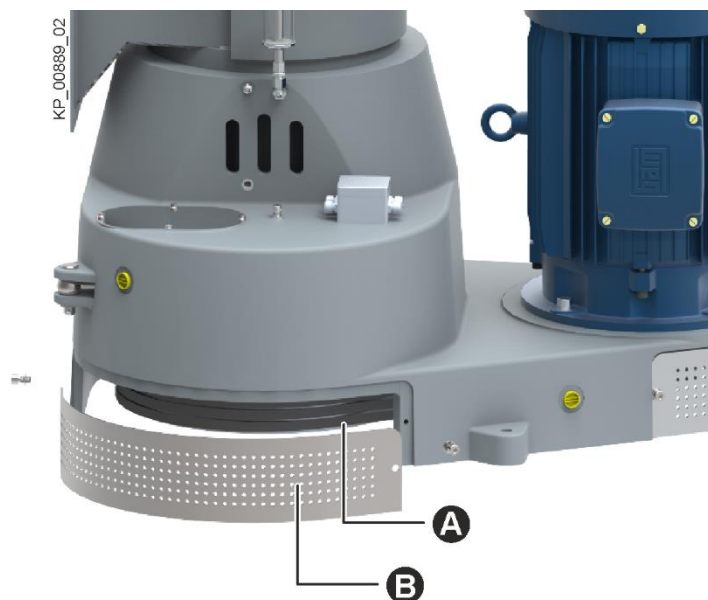


Fig. 71: V-belt guard

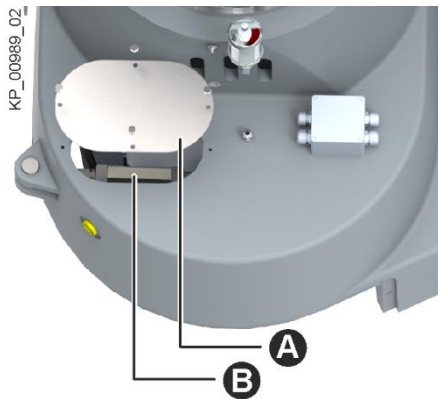


Fig. 72: Cover plate

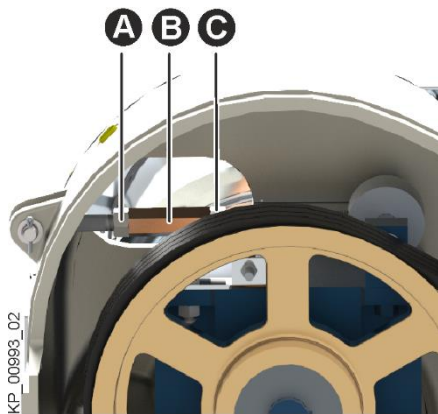


Fig. 73: Loosening the belt tensioner

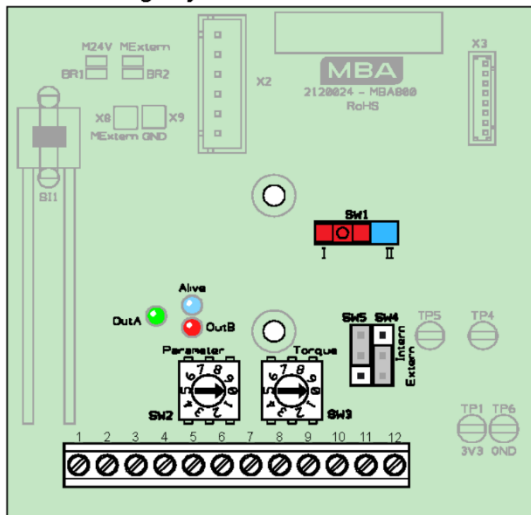
- Remove the V-belt guard (Fig. 71/B) and the cover plate (Fig. 72/A) of the belt tensioner.
- Loosen the lock nuts (Fig. 73/A) of the turnbuckle sleeve (Fig. 72/B).
- Loosen the turnbuckle sleeve by turning it anti-clockwise.
- Replace the V-belts.
- Turn the turnbuckle sleeve (Fig. 73/B) clockwise to tension the V-belts, until the V-belts can be pressed down as follows when applying a test pressure of 7.5 kg (strong thumb pressure) at half distance between centres:
 - 13 to 18 mm (new V-belts)
 - 17 to 22 mm (V-belts which have already run)
- Secure the lock nuts (Fig. 73/A).
- Mount the cover plate (Fig. 72/A) and the V-belt guard (Fig. 71/B).

12 Setting/Adjusting the Level Indicator

12.1 Setting the switching logic and function mode

Level indicator series MBA800

3.6 Setting/Adjustment



3.6.1 Select switch logic

SW1	Level status (OutA) "activated" means:
I	Signal comes when paddle blocked (empty)
II	Signal comes when paddle rotates (full/pile-up)

3.6.2 Select function mode

At the shaft type "halfpipe" (code: R, P, V, W) it is only allowed to use SW2 at position 0.

SW2	Recommended application
0	Silo full sensor [with reversal of direction] ^{1 2}
1	Silo full sensor
2	Buffer storage / buffer silo: full
3	Back-up sensor [with reversal of direction] ¹
4	Loading apparatus (full/pile-up/empty)
5	Silo empty sensor
6	Buffer storage / buffer silo: empty
7	Bulk material high flowing ability/low cohesion
8	Special application ³
9	Functional test ⁴



The operating behaviour is also affected by

- the properties of the bulk material
- torsion effects (e.g. cable shaft, rubber paddle).

3.6.3 Adjust sensitivity

SW3	Switching torque	
	Relative	Absolute
0	< 5 %	Very low switching torque, only for special application
1	< 10 %	
2	15 %	35 mNm
3	20 %	46 mNm
4	25 %	58 mNm
5	30 %	69 mNm
6	40 %	92 mNm
7	50 %	115 mNm
8	60 %	138 mNm
9	80 %	184 mNm



- For light, smooth bulk material, select a low switching torque. For heavy, coarse bulk material, select a high switching torque.
- If there is no empirical value: Determine the right setting during the initial start-up.

3.6.4 Select signal voltage

SW4	Output of OutA (if activated)
Internal	Supply voltage
External	Signal voltage of InA

SW5	Output of OutB (if activated)
Internal	Supply voltage
External	Signal voltage of InB



If "external" is selected, then outputs "OutA"/"OutB" are potential-free (→ page 10 §3.5.3).



For the MBA810, SW4 must be set to "internal" so that the function of the relay is given.

3.7 Closing the housing

3.7.1 Sealing the cable glands

- After installation of the cables, seal the cable glands so that they are dust-tight and water-tight.
- Unused cable glands must only be sealed with original sealing plugs in accordance with the manufacturer's specifications.

3.7.2 Close housing

- Before closing cover of the unit, check whether there are any foreign bodies inside the unit head (such as cable residue).
- Visually check the sealing of the cover of the unit. Clean or replace if necessary.
- Put on the cover of the unit and tighten the screws using 4.7 Nm.
- The cap nuts must be tightened with the following torque:
 - Plastic threaded cable gland: 4.5 Nm ± 10%
 - Metal threaded cable gland: 8 Nm ± 10%

1 Explanation → page 5, § 2
 2 Factory setting
 3 Configured according to customer request
 4 If the paddle is rotating: Status of "OutA" changes every second. If the paddle is blocked: "OutA" is activated permanently.

Fig. 74: MBA820

- Set the level indicator according to the following specifications:

Function as:	Empty indicator	Full indicator	Pile-up indicator
SW 1	Position I	Position II	Position II
SW 2	Position 4	Position 4	Position 4
SW 3	Position 4	Position 4	Position 4
SW 4	Position Internal	Position Internal	Position Internal
SW 5	Position Internal	Position Internal	Position Internal

Select switching logic SW 1

SW 1 decides which switching logic the indicator carries out (full / pile-up / empty indicator). This switching logic ensures that no malfunction occurs even in the event of a cable break.

Position I Signal comes when paddle blocked (empty indicator)

Position II Signal comes when paddle rotates (full indicator/pile-up indicator)

Select function mode SW 2

SW 2 determines:

- the speed of the shaft
- the response behaviour at the transition from the rotating to the blocked shaft.
- the release of a blockage and message of a rotating shaft

We recommend:

Position 4 Loading device (full indicator/pile-up indicator/empty indicator)

Position 4, because the short reaction time is particularly important when used as a full or pile-up indicator.

If there are problems during commissioning, you can try out other positions with this switch.

Note that the positions 0 and 3 (with reversal of direction of rotation) result in very long reaction times, and this is not permitted with the pile-up indicator.

Adjust sensitivity SW 3

The torque setting of the indicator.

Position **4** To be maintained.
(factory setting MBA)

- < 4 Reduce torque
for light/smooth bulk materials which do not block when the
indicator is fully covered
- > 4 Increase torque
for heavy, coarse or sticky bulk materials which tend to stick
around the indicator



If there are no empirical values, the appropriate setting may have to be determined during commissioning using the bulk density.

Select signal voltages SW 4 and SW 5

Position **Internal** Select "Supply voltage".

13 Disposal

At the end of the service life, the machine must be dismantled and disposed of in an environmental sound manner.

13.1 Safety instructions for the disassembly

Electrical system

**DANGER!****Risk of fatal injury from electrical current!**

Contact with live components can be fatal.

Switched-on electrical components can cause uncontrolled actions of the plant or machine as well as serious injury including death.

- Before starting work, switch off the electrical supply and safeguard the machine against restart!

Improper disassembly

**WARNING!****Danger of injury in case of improper disassembly!**

Stored residual energies and sharp-edged components at or in the machine can cause injury.

- Ensure sufficient space before starting work.
- Be careful with sharp-edged components.
- Remove the components properly. Observe the high own weight of some components. If necessary, use lifting gears.
- Secure the components so that they cannot fall down or tip over.

13.2 Disassembly

Before starting disassembly (see also section "Shutdown"):

- Switch off the machine and safeguard it against restart.
- Separate the complete power supply from the machine and discharge the stored residual energies.
- Remove the remaining process materials and dispose of them in an environmentally sound manner.

Then clean the assembly groups and components correctly and dismantle them in compliance with the applicable local occupational health and accident prevention as well as environmental protection regulations.

13.3 Disposal

If there is no other return or disposal agreement, recycle the dismantled components.

14 Annex

- Machine journal
- Dimension sheet
- Manufacturer's documentation of machine components
- Spare parts list

i We recommend that you keep a "Machine journal" and make notes of the most important operating parameters in dependence on the operating time of the machine in order to deduce information on the operating performance of the machine and for a systematic maintenance and repair.

Machine No.: