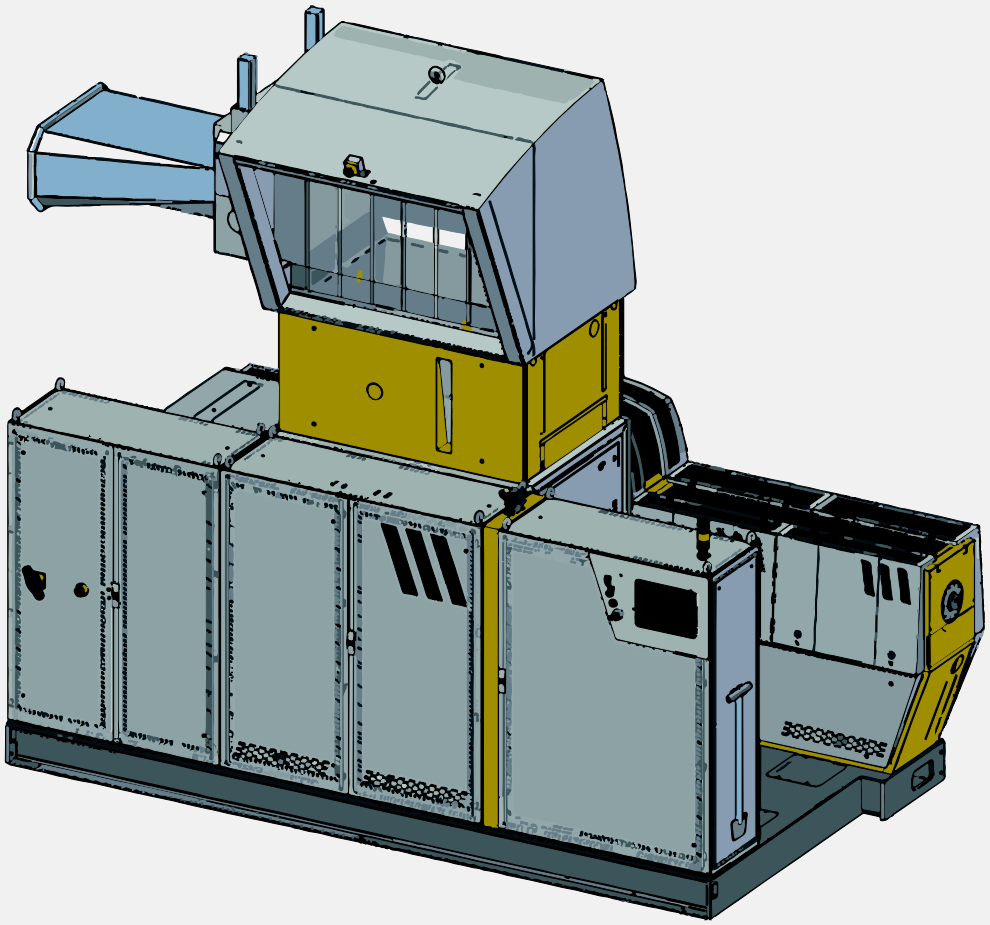

Shredder-Feeder-Extruder-Combination

S:GRAN K

65-50,75-50,65-70,75-70,85-70,95-70,105-100,125-100

Instruction manual

Translation of the original instructions

Version: 18.5.1

Keep for future use at the installation site!

CE

NGR PLASTIC RECYCLING TECHNOLOGIES

Editorial information

Information about the recycling machine

Shredder-Feeder-Extruder-Combination
S:GRAN 65-50,75-50,65-70,75-70,85-70,95-70,105-100,125-100 K
Refer to the model plate for the detailed information identifying the equipment.

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Information about this manual

Version: 18.5.1

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Contents

1 About this manual

This manual contains important information and safety information for operating the machine properly and effectively. Before starting any work activities, personnel must have read and understand these instructions completely.

Any failure to comply with these instructions may result in death, personal injury or property damage.

1.1 Storage and handover of manual

This manual must be kept directly at the workplace and be accessible at any time to all personnel. The operator must notify the staff about the storage location of this manual.

If the manual becomes illegible due to constant use, the operator must obtain a replacement from the manufacturer.

On transfer or sale of the recycling machine to a third party, the following documents must be provided to the new owner.

1.2 Target groups for manual

The manual must be read and observed by all personnel responsible for the following tasks:

- Unloading and transport
- Installation
- Commissioning
- Setup
- Operation and use
- Cleaning
- Maintenance and inspection
- Repair
- Troubleshooting
- Disassembly
- Disposal

Depending on the work activity, different qualifications are required.

➲ see section 2.4 Personnel requirements

1.3 Training and training topics

As part of the equipment acceptance process, training for the operator's personnel is conducted. The training and the equipment acceptance process is conducted at the operator's site.

The training consists of the following topics for working with the equipment:

- Commissioning
- Operation and use
- Setup
- Cleaning
- Maintenance and inspection
- Repair
- Troubleshooting
- Safety

1.4 Applicable documents

In addition to this manual, there are additional documents whose instructions and information therein must be observed and complied with:

- Layout with dimensions
- Spare parts list
- EC Declaration of Conformity
- Circuit diagrams
- Manuals for purchased parts

1.5 Organization of manual

1.5.1 Classification of warning and safety information

Warnings in the manual alert the operator to hazards in working with the equipment and provide information about how to avoid these hazards.

The warnings are classified according to their severity and divided into the following groups:

DANGER

Indicates an imminently hazardous situation.

If this hazard is not avoided, death or serious injury will result.

WARNING

Indicates a potential hazard.

If this potential hazard is not avoided, death or serious injury may result.

CAUTION

Indicates a potential hazard.

If this potential hazard is not avoided, slight or minor injuries may result.

NOTICE

Indicates a potentially harmful situation.

If this potentially harmful situation is not avoided, the equipment can or will result in damage to its environment.

1.5.2 Display of information

	Indicates tips for use and other useful information.
	Indicates the personnel required.
	Indicates the tools required.
	Indicates the spare part required.

1.5.3 Display of texts

For instructions, lists and references, the following indicators are used:

Instructions

1 2	Work steps that must be carried out in the order specified
▸	Work steps without a specified sequence
a b	Sub-steps, which must be performed in the order specified
✔	Result of a work step
=	Result of an instruction

Lists

■	List item
–	Subordinate list item

References

➲	References to sections of this manual or other applicable documents

2 Safety information

2.1 Intended use

2.1.1 Purpose

The machine is designed only for recycling plastics in accordance with contractual terms. It may only be used in combination with a downstream unit (e.g.: hot die-face pelletizer or strand pelletizer). Any other use is considered improper.

2.1.2 Operating conditions of the machine

To ensure safe use of the machine, the following conditions are required:

- The specifications indicated must be complied with.
- The machine may only be used in closed, indoor areas.
- The prescribed operating, service and maintenance conditions must be followed.
- The required minimum distances to the machine must be observed.
- The equipment must be used on a level surface with sufficient standing room and load-carrying capacity.
- The equipment may only be used when it is in a safe and properly functioning condition and only with intact protective devices.
- The machine may only be used in compliance with all instructions in this manual.

2.2 Improper use

Any use not listed under the Intended Use section is regarded as improper. The operator is liable for damages resulting from improper use of the equipment.

The following are not allowed:

- Recycling of material not listed in the contractual terms, which contains metal or mineral impurities or has too high a moisture content.
- Use outdoors.
- Use with insufficient minimum distances.
- Use with broken parts.
- Use without protection devices in place.
- Use by unqualified personnel.
- Use outside the defined specifications.
- Unauthorized conversions and modifications to the equipment.
- Exceeding the maximum allowable limit for material feed.
- Use of incorrect settings.

2.3 Operator duties

The operator owns the recycling machine or has leased it. He is responsible for using the machine properly.

The operator must do the following or note:

- Find out about the applicable health and safety regulations and identify hazards arising from special working conditions at the operating site.
- Inform himself about the dangers resulting from the processed material and prepare appropriate instructions.
- Assign the various tasks on the equipment to qualified, suitable and authorized personnel and define the responsibilities for maintenance, operation, troubleshooting and cleaning.
- Ensure that persons entrusted with the tasks on the machine, have read and understood the operating instructions.
- Prevent unauthorized persons from accessing the machine.
- Ensure that his personnel meets all the necessary physical and mental requirements for the assigned activities.
- Instruct personnel in a verifiable manner regarding the authorizations, tasks and proper conduct in an emergency. Confirm the training of personnel in writing.
- Ensure that the safety measures are not circumvented or rendered ineffective.
- Ensure that safety devices such as emergency stop button, safety switches and covers are inspected monthly and that the prescribed maintenance intervals are adhered to.
- The operator must provide the necessary personal protective equipment and require personnel to wear it.
- The operator has to take preventive measures to prevent a fire in an emergency or to be able to fight until the arrival of the fire brigade.

2.4 Personnel requirements

The operator must ensure that in particular the following persons do not have access to the machine:

- Persons who are under the influence of drugs, alcohol or medications that could affect their reactions.
- Minors.

The operator must ensure that work activities are carried out on the machine only by appropriately qualified specialists. Any work activities on the machine must be performed by specialists.

Depending on the activity, different qualifications are required:

- [A] Design engineers:
  - Utilities, structural engineers for planning the system.
  - The planning and design of the machine requires experts with special qualifications for power supply and structural planning.
- [B] Transport specialist:
  - Transport of the machine requires experts with special qualifications for controlling a crane or forklift.

- [C] Commissioning engineer:
  - Specialists NGR authorized by NGR.
  - Installation, commissioning and disassembly must be performed by qualified specialists authorized by NGR.
  - Specific training in safety engineering, mechanical engineering, electrical engineering, process engineering and programming.
  - Specific training in commissioning the machine.
  - Training for unloading or lifting equipment parts.
- [D] Service engineer:
  - Specialists NGR authorized by NGR.
  - Specific training in performing maintenance activities on the machine.
- [E] Supervisor:
  - Setting the control parameters and all work activities on the machine in every phase of its service life.
  - In-depth technical training in mechanical or electrical engineering and management.
  - Training in safety engineering, mechanical engineering, electrical engineering, process engineering and programming.

  Note: Program changes can be made only by NGR employees.
- [F] User:
  - The user of the machine is personnel that has been trained sufficiently by the operator, in terms of handling and safety equipment, and is responsible for operation within the framework of the intended use.
  - Persons in training may only operate machine under the supervision of an experienced specialist and with the express permission of the operator.
- [G] Mechanical specialist:
  - In-depth technical training on mechanical engineering.
  - Training in terms of maintenance and repair of mechanical components and safety equipment.
  - Authorized to perform activities on mechanical components (maintenance and repair). Repairs that are not described in the operating instructions must not be performed without the instruction of NGR.
- [H] Electrical specialist:
  - In-depth technical training on electrical engineering.
  - Training on electrical and safety engineering.
  - Authorized to perform activities on electrical components. Repairs that are not described in the operating instructions must not be carried out by the manufacturer without guidance.
- [I] Safety specialist:
  - In-depth technical training on safety technology. Authorized and committed to review all safety mechanisms.

2.5 Description of safety signs

2.5.1 Warning signs

	Warning against entanglement hazard		Warning against electric voltage
	Warning against hot surfaces or media		Risk of crush injury to hands
	Warning against cuts		Warning against driven parts
	Warning against plastic melt spraying out		Warning against risk of crush injury by the drive belt
	Warning against arcing		Warning against obstacles in the head area

2.5.2 Mandatory signs

	Refer to the manual		Use face shield
	Use eye protection		Wear ear protection
	Use head protection		Use protective clothing
	Hand protection		Use two people to lift

2.5.3 Prohibition signs

	Climbing on prohibited		Access prohibited

2.6 Safety signs on the equipment

WARNING

Risk due to illegible safety signs!

Due to illegible safety signs, safety hazards cannot be detected, which can result in injury.

- Replace damaged or illegible safety signs immediately.

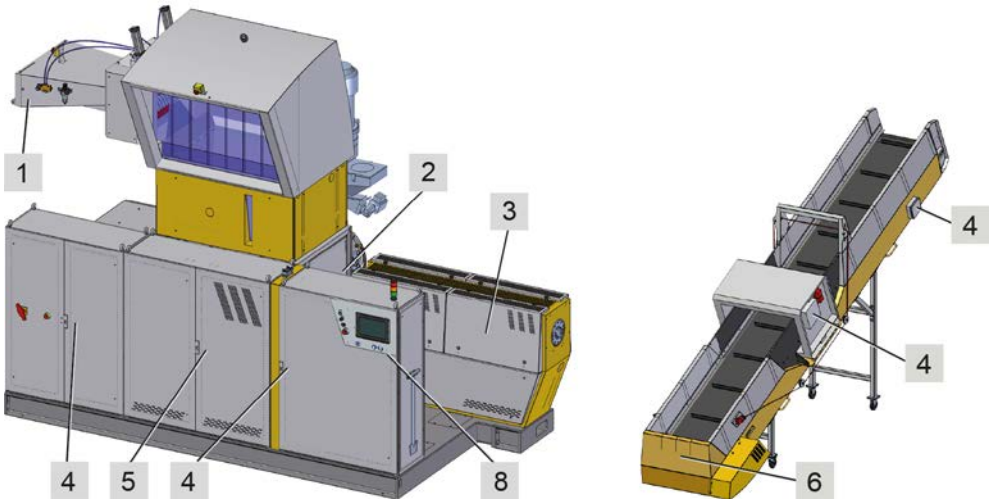


Figure 2-1: Safety signs, recycling machine and conveyor belt

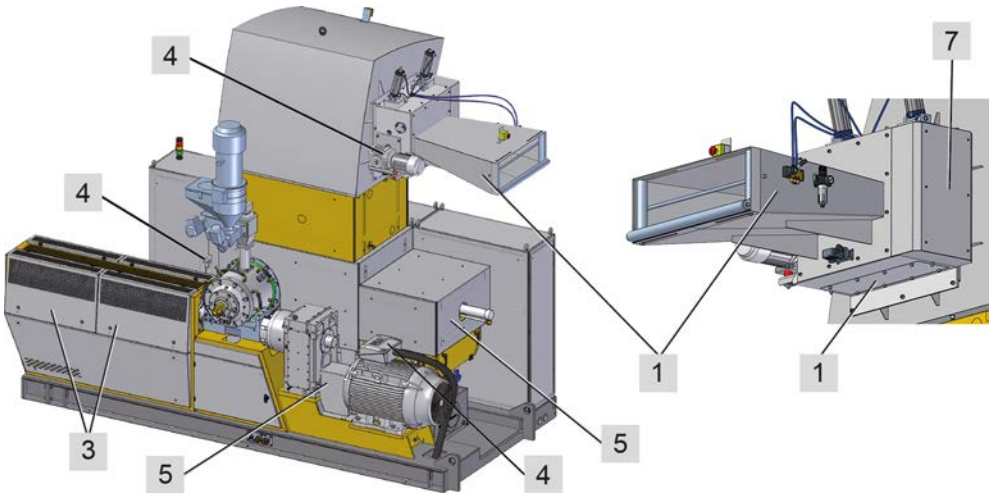
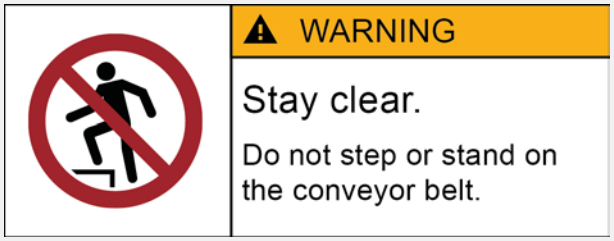


Figure 2-2: Safety signs recycling machine

ANSI safety signs

1	 WARNING Moving parts Keep hands clear. Follow lock-out procedures before servicing.
2	 WARNING Blade hazard Keep hands clear. Do not operate with guard removed.  NOTICE Heavy shredder lid. Single person lift could cause injury. Use assistance when moving or lifting.
3	 CAUTION Hot surface Machine and guard is hot. Wear protective gloves.
4	 DANGER Hazardous voltage Risk of electric shock. Disconnect power before servicing machine.
5	 WARNING Moving parts can crush. Do not operate with guard removed.

6	
7	

2.7 Basic hazards in working with the equipment

2.7.1 Safety information about electrical equipment

DANGER

Avoid direct or indirect contact with live parts to prevent electrocution!

Electrical shock, burns or fatal injuries may result.

- Work on electronics and live components may only be carried out by a qualified electrical specialist.
- Before beginning work activities on the electronics, switch the main switch to 0 and disconnect the equipment from the power supply. Observe all safety regulations.
  - Secure against reconnection
  - Check that no voltage is present
  - Ground and short-circuit the equipment
  - Cover adjacent live parts
- Wait at least 10 minutes after turning off the recycling machine, as the capacitors retain voltage during this time.
- Use only original fuses with the specified current.
- Replace defective electrical components immediately.
- During operation, all electric cabinets must be closed.
- Check the electrical equipment of the machine regularly. Defects such as loose connections or scorched cables must be removed immediately.

2.7.2 Safety information about mechanical equipment

WARNING

Danger of injury from moving parts!

Moving parts can cause serious injury.

- Do not reach into moving parts or handle moving parts during operation.
- Observe follow-up times.
- Do not open safety covers during operation.
- In the hazard area, wear close-fitting clothing with high tear strength.
- Do not step on conveyors.

2.7.3 Safety information about hydraulic equipment

WARNING

The hydraulic system is under high pressure. Risk of injury from released hydraulic energy!

Fluids escaping under high pressure can cause serious injuries and harm the environment.

- Work on the hydraulics must be carried out by a trained mechanical specialist.
- Never exceed the maximum working pressure.
- When searching for leaks, always wear safety glasses and protective gloves.
- If injured by hydraulic oil, see a doctor immediately, as severe infections may occur.
- Prevent contamination of the hydraulic circuit.
- Never open covers during operation.

2.7.4 Safety information about plastics

When recycling plastics, harmful toxic fumes can arise. The chemical composition of the fumes released will depend on the materials being processed or the material composition and can be defined precisely in the specific application only after a thorough chemical analysis.

CAUTION

Risk of harmful fumes!

Any fumes released must not be breathed.

- The operator must ensure adequate ventilation.
- The operator must inform personnel and provide regular training on the use of respiratory protection to combat potentially toxic fumes from plastics processing.

2.7.5 Safety information about combustible materials

For plastics, the combination of mild flammability, high combustion heat and often a special shape can often lead to much faster and more intensive development of fire compared to other materials.

WARNING

Danger from flammable materials!

Areas at risk of fire are those in which flammable substances are manufactured, processed or stored. Plastics are also highly flammable and also highly flammable as films.

- Smoking or handling an open flame is prohibited in the presence of combustible materials.
- Welding, flame cutting and brazing operations may only be carried out only in designated areas.
- Readily combustible or explosive substances must be far enough removed from equipment parts that can develop heat, to ensure that they cannot catch fire.

2.7.6 Safety information about hot surfaces

CAUTION

When working on hot surfaces injury due to high temperatures may result!

Hot surfaces can cause severe burns.

- When working on hot surfaces of the machine, wear safety gloves.
- When reattaching heating plates and heating elements wear safety gloves.
- Before dismantling the heating elements, the heating zones must be switched off. Otherwise, the heating elements will be destroyed.
- When working with oils and fats to be very careful with hot surfaces as these can cause burns.

2.7.7 Safety information about lifting activities

WARNING

Falling load!

The load could fall during transport and unloading and cause serious injury or death.

- Wear helmet and foot protection.
- Never stand under suspended loads.
- Use hoists and slings that are designed for the weight and dimensions of the cargo.
- Attach hoists only at the specified points on the equipment.
- Do not attach a hoist to sharp edges or corners.
- Attach a separate hoist to each fastening point.
- Only use proper lifting equipment.
- Settle load when you leave the workplace.
- Observe center of gravity.

2.8 Cleanliness at the workplace

Order and cleanliness in the workplace facilitate work, minimize risks and reduce the risk of injury.

Observe the following principles for order and cleanliness in the workplace:

- Put away tools no longer required.
- Clean up the workplace at the end of work.
- Avoid tripping hazards (e.g. place waste immediately in the designated containers, cleanly route hoses and cables).
- Keep the floor clear of any dirt or debris.

2.9 Spare parts and accessories

- Only use original spare parts and original accessories. The use of third-party parts and accessories can change the work with the equipment.
- NGR will not be liable for damages due to accessories from third-party suppliers that were installed retroactively.
- If components are replaced, then check to make sure they function properly.

3 Safety equipment

3.1 Basics of safety equipment

The safety equipment protects personnel and property from hazards.

DANGER

Operation without adequate protection!

Operation without adequate safety equipment may result in property damage, serious injury or possibly fatal injuries.

- Do not dismantle, manipulate and override the safety devices.
- Do not replace safety equipment with other devices that do not meet the security requirements.
- Safety equipment such as emergency stop buttons, safety switches and covers must be checked regularly.
- If there are problems with the safety equipment, stop the machine and correct the problems immediately.

3.2 Location and appearance of safety equipment

Emergency stop devices may additionally be defined on site on a project-specific basis. The manual describes the designated standard safety equipment.

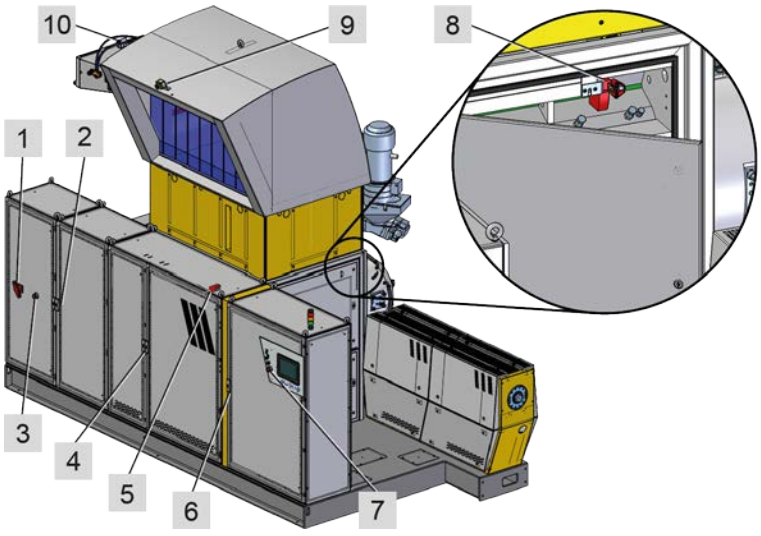


Figure 3-1: Safety equipment, front

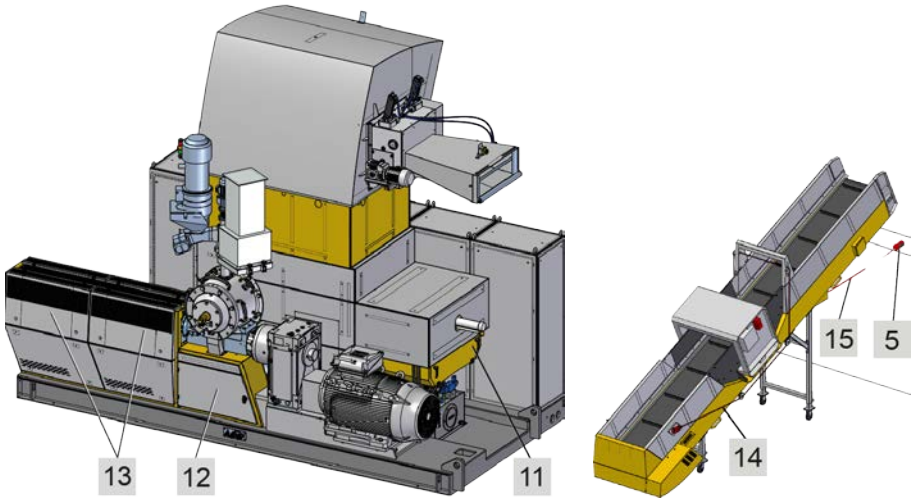


Figure 3-2: Safety equipment, front and conveyor belt

1	Main switch	**9**	Emergency stop button, protective cover
2	Main cabinet door, lockable	**10**	Emergency stop button, roll feeder (optional)
3	Emergency stop button, main cabinet	**11**	Safety switch dust box
4	Gear cabinet door, lockable	**12**	Water distributor door, lockable
5	Safety switch conveyor belt	**13**	Cover extruder cylinder
6	Control cabinet door, lockable	**14**	Emergency stop pull cord conveyor belt
7	Emergency stop button, control panel	**15**	Safety line for conveyor belt
8	Safety switch maintenance door shredder		

4 Product description

4.1 Overview of the recycling machine

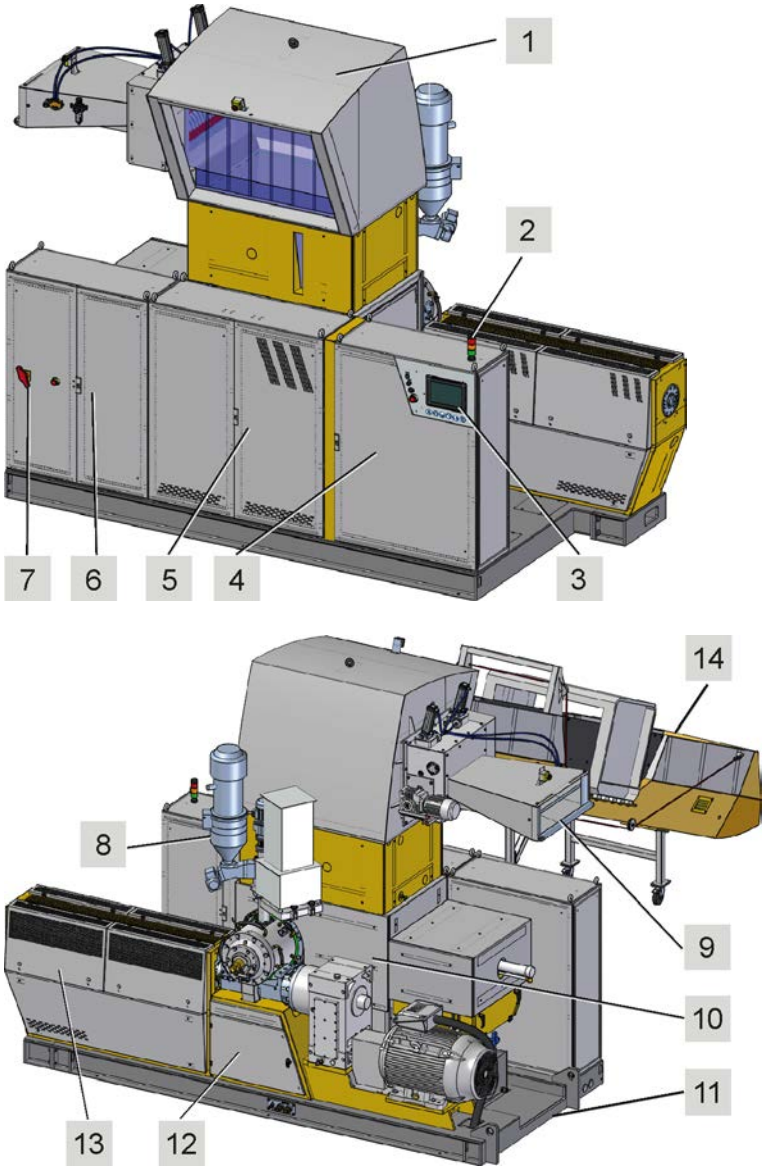


Figure 4-1: Main recycling machine components,

1	Hopper with protective hood	**8**	Dosing unit (optional)
2	Signal lamp	**9**	Roll feeder (optional)
3	Control panel	**10**	Shredder
4	Control cabinet	**11**	Base frame
5	Gear cabinet	**12**	Water distributor
6	Electric cabinet	**13**	Extruder
7	Main switch	**14**	Conveyor belt (optional)

4.1.1 Conveyor belt (optional)

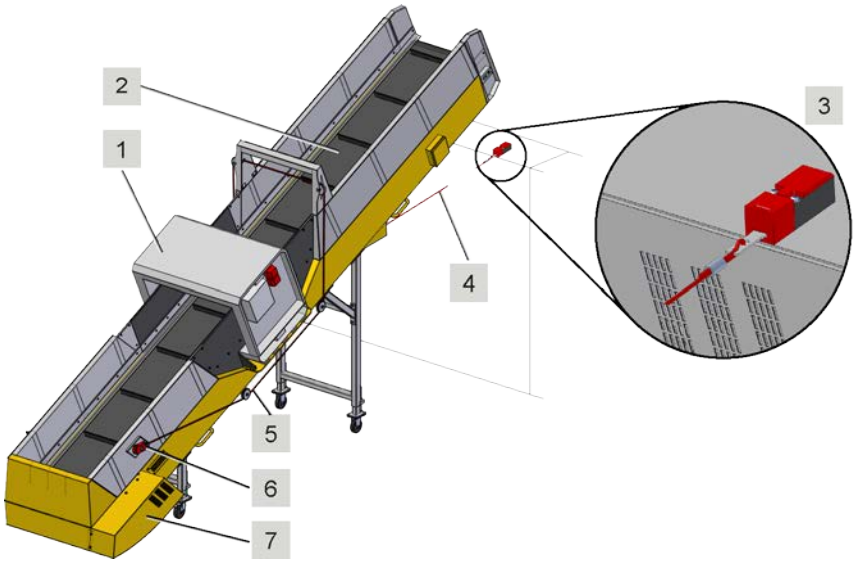


Figure 4-2: Conveyor belt with metal detector

1	Metal detector	**5**	Emergency stop trip wire
2	Conveyor belt	**6**	Release emergency stop trip wire
3	Safety switch	**7**	Geared motor
4	Safety rope		

WARNING

Climbing on the conveyor belt is prohibited.

The conveyor belt is optional and enables operators to feed material into the unit. Continuous feeding is not required. The material is placed by hand on the conveyor belt, which transports the material into the hopper. It passes through a metal detector where it is analyzed for metal parts using an electric field.

Upon detection of metals, the metal detector emits an audible and visible alarm, stopping the conveyor belt. Metallic impurities must be sorted out by hand. After sorting out of the metal, the alarm may and can be reset and normal operation can continue.

The conveyor belt can be operated in automatic or manual mode. In automatic mode, the fill level in the hopper is monitored by sensors and the conveyor belt is controlled accordingly. The automatic mode works only when the machine is ready for operation!

In manual mode, the conveyor belt switched on/off by hand using the control terminal. The fill level sensors are disabled in this mode. The operator must therefore ensure that there is no over-feeding by visually checking the fill level in the hopper and adjusting the amount of material fed accordingly.

For emergencies, the conveyor belt is equipped with an easily accessible emergency stop trip wire. By pulling the emergency stop trip wire, the conveyor belt will be stopped. The emergency stop mode is canceled by pressing the release for the emergency stop trip wire and by acknowledging the alarm.

To ensure that the conveyor belt can only be operated when it is properly installed, it is connected to a safety switch for the equipment via a safety rope. Once the conveyor belt is moved away from the machine, the safety switch is released and interrupts the operation of the machine.

➲ For a detailed description of the metal detector, refer to the instruction manual of the manufacturer under the heading purchased parts.

Max. allowable conveyor belt load:

Model	kg	lb
S:GRAN 65-50	99	218
S:GRAN 75-50		
S:GRAN 65-70	254	560
S:GRAN 75-70		
S:GRAN 85-70		
S:GRAN 95-70		
S:GRAN 105-100		
S:GRAN 125-100		

4.1.2 Roll feeder (optional)

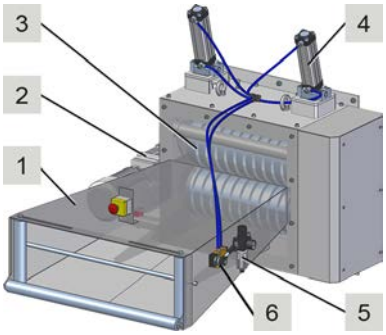


Figure 4-3: Roll feeder

1	Feed hopper	**4**	Pneumatics
2	Geared motor	**5**	Water separator
3	Feed Rollers	**6**	Lever valve

The roll feeder is used to feed the machine with roll scrap. It has a feed hopper and two pneumatically controlled rollers that move the film to be processed and, if necessary, lightly compress it. The rollers are driven by a geared motor. The water separator filters the water from the pneumatic circuit.

The first time you load the material, the upper roller is raised by pressing the rotary valve lever to insert the film by hand. Depending on the material, one or more films may be processed simultaneously. This can be on the floor or be handled by an unwinding device. In any case, the width-to-thickness index specified in the order confirmation must be observed.

In automatic mode, the roll feeder is controlled using the fill level sensors in the hopper. In manual mode, the roll feeder runs continuously; it can be switched off by pressing the function button again on the control terminal.

4.1.3 Air separator (optional)

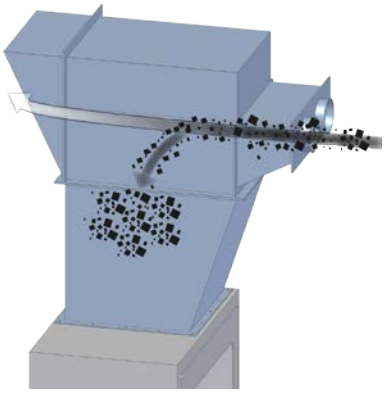


Figure 4-4: Air separator

The material to be recycled is transported by means of air flow, with the air separator separating the transfer air from the material.

4.1.4 Hopper and protective cover

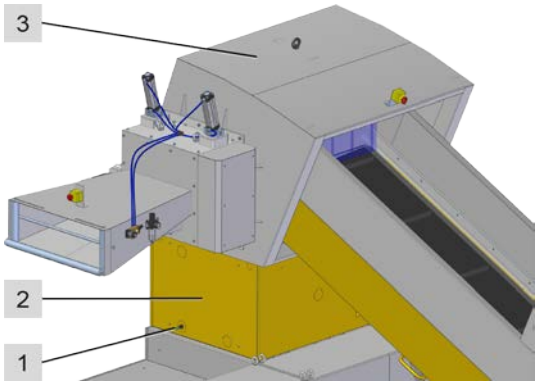


Figure 4-5: Protective cover and hopper

1	Sensor fill level	**3**	Protective cover
2	Hopper		

The protective cover is both a safety cover for the shredder and a receptacle for the material supply equipment such as roll feeder, conveyor belt, conveyor screw or air separator.

The hopper serves as a cache for material, in which smaller irregularities in the material feed are compensated. It is equipped with level sensors, which regulate the material supply via the feeder equipment.

4.1.5 Shredder

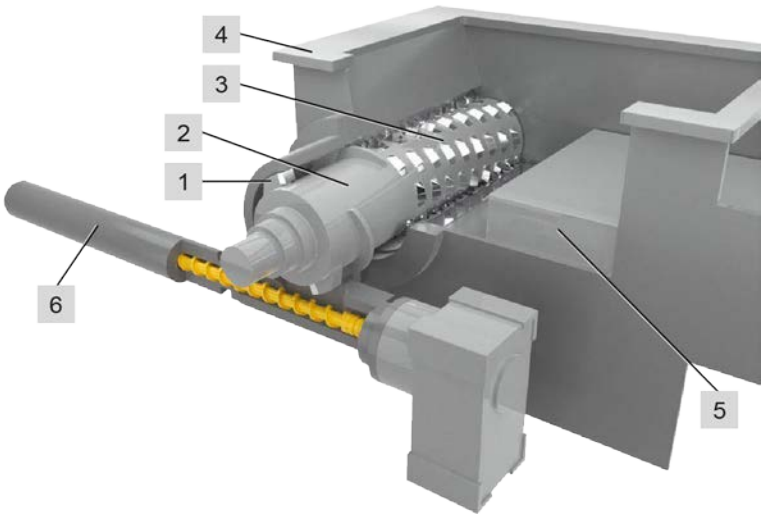


Figure 4-6: Shredder

1	Cutter sleeve	**4**	Hopper
2	Conveyor bushing	**5**	Ram
3	Blade shaft	**6**	Extruder

The material is fed by conveyors into the hopper, which also acts as a cache for material. The blade shaft, which shreds the material, is located at the bottom of the hopper.

The hydraulic ram pushes the material against the blade shaft. It can be controlled automatically or manually. In automatic mode, the ram is controlled by the power supply of the shredder motor, and the current setpoint is set using the control terminal. In manual mode, the ram is manually controlled by two buttons on the control terminal.

Depending on the design, the crushed material is blown via compressed air or fan in the direction of conveyor bushing. The conveyor bushing transports the material to the extruder, while coarser material continues to be shredded by the cutter sleeve. The cutter sleeve forces the material additionally into the extruder.

4.1.6 Dosing unit (optional)

Using dosing, additives can be added to the material stream in a process-controlled manner.

4.1.7 Extruder

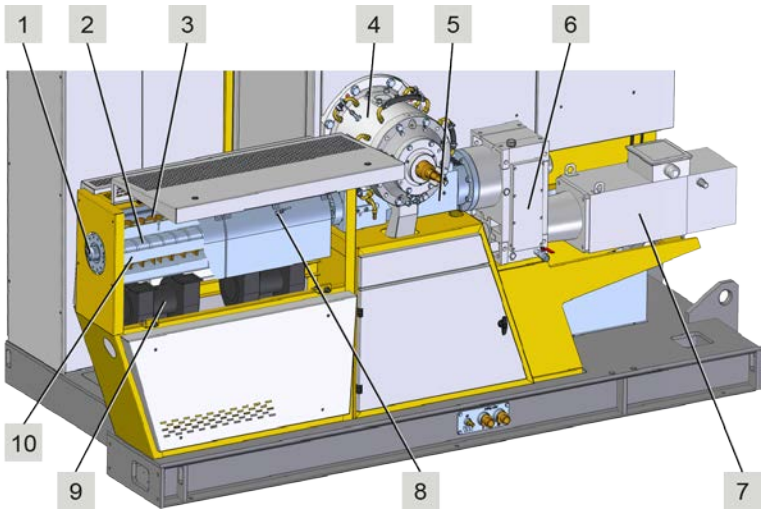


Figure 4-7: Extruder

1	Extruder screw tip	**6**	Extruder gearbox
2	Extruder screw	**7**	Extruder motor
3	Strip heater	**8**	Temperature sensor
4	Outlet pipe	**9**	Cooling fan
5	Extruder intake	**10**	Extruder cylinder

The extruder intake is the interface between the extruder and shredder. The shredder transfers the crushed material through the outlet pipe into the extruder cylinder.

The extruder cylinder is brought to a certain temperature depending on the material. This is monitored by a temperature sensor and is decreased according to demand by means of cooling fan, or increased by means of heating elements. The desired temperature is set on the control terminal.

In the extruder cylinder, the extruder screw runs, which is driven by the extruder motor and extruder gearbox. It compresses the material to a constant melt flow without getting air bubbles. Through friction the material is heated additionally.

At the end of the extrusion screw, the screw head is screwed in and it extends into the adapter. The adapter is the connecting element between the extruder and down-stream equipment.

4.1.8 Base frame

The base frame is a welded steel structure, and is used to hold the individual modules. For safe transport special lifting points are provided on the base frame. Mounting holes are used for optional securing of the recycling machine to the foundation.

4.1.9 Water distributor

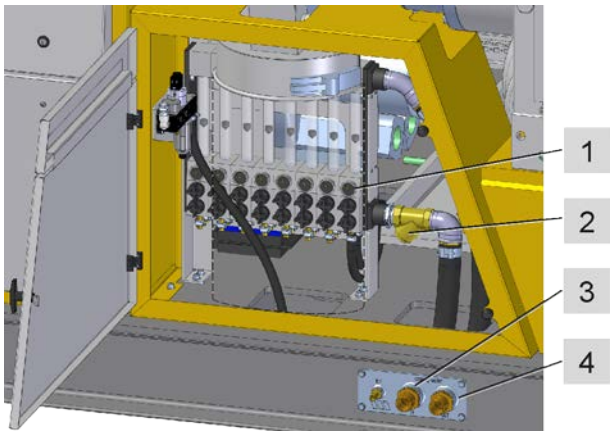


Figure 4-8: water distributor

1	Water flow regulator	**3**	Cooling water supply
2	Water filter	**4**	Cooling water return

The water distributor is composed of several flow controllers and it distributes the cooling water to the individual cooling circuits. The amount of water and the level of cooling per circuit can be finely adjusted using the water flow regulator. This allows the recycling process to be optimized. A water filter protects the circuits from contamination.

The following cooling circuits have been implemented:

S:GRAN 65 – 105:

- Knife shaft
- Extruder gear
- Hydraulic
- Closed water circuit frequency converter and air condition control cabinet
- Intake housing
- Outlet pipe
- Air condition control panel and cooling of shredder gear
- Grooved bush

S:GRAN 125:

- Knife shaft
- Extruder gear
- Hydraulic
- Closed water circuit frequency converter and air condition control cabinet
- Intake housing
- Outlet pipe
- Air conditioner control panel / electric cabinet and cooling of shredder gear
- Grooved bush

4.1.10 Control panel

The key elements for controlling the recycling machine are located on the control panel.

Figure 4-9: Control panel

1	Control terminal	**4**	AUTOMATIC STOP button
2	USB port	**5**	Key switch
3	AUTOMATIC START button	**6**	Emergency stop push-button

4.1.11 Main switch

The main switch is located on the main electric cabinet. Turn this switch to position 0 to interrupt the power supply to the machine and the compressed air supply. The supply of cooling water is not interrupted.

DANGER

Risk of death due to unintentional power-up!

Unintended switching on of the main switch can result in serious to fatal injury and death.

- Before switching on unit make sure that no work is carried out on the machine.
- Observe all safety regulations.

4.1.12 Electric cabinet

The cabinet is mounted on the base frame, it houses the electrical components and protects these from external influences and unauthorized access. On the electric cabinet, the main switch and one of the emergency stop buttons are mounted. Furthermore, the on-site power supply is provided in the electric cabinet.

4.1.13 Control cabinet

It houses the electrical and electronic components for control, protecting these from external influences and unauthorized access. The control panel is also part of the control cabinet.

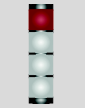
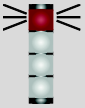
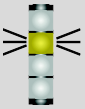
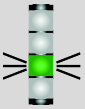
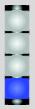
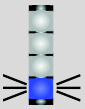
4.1.14 Gear cabinet

It is constructed on the base frame and protects the drive unit of the shredder against unauthorized access. The door is additionally equipped with a safety switch, which is automatically locked in this operation.

4.1.15 Function of signal lamp

The signal lamp displays the general condition of the machine. The user must respond accordingly to process parameters that are not optimal and take the necessary precautions to eliminate the malfunction.

Model with 4 colors

State		Description
	**Solid red light**	**Emergency stop (machine not ready for operation!)** Fault in emergency stop circuit.
	**Flashing red light**	**Error message (machine not ready for operation!)** There is at least one malfunction that requires confirmation.
	**Flashing yellow light**	**Warning message (machine ready for operation on a limited basis)** There is at least one warning message. For example, the machine is warming up.
	**Flashing green light**	**Machine is ready for operation** The machine is warmed up and ready for operation. There are no malfunctions, error or operating messages.
	**Solid green light**	**Machine in operation** There are no malfunctions, error or operating messages.
	**Solid blue light**	**Operational message (optional)** Hopper / Silo is full.
	**Flashing blue light**	**Operational message** Machine is in operation. There is at least one operational message.

4.2 Tools to attach to machine

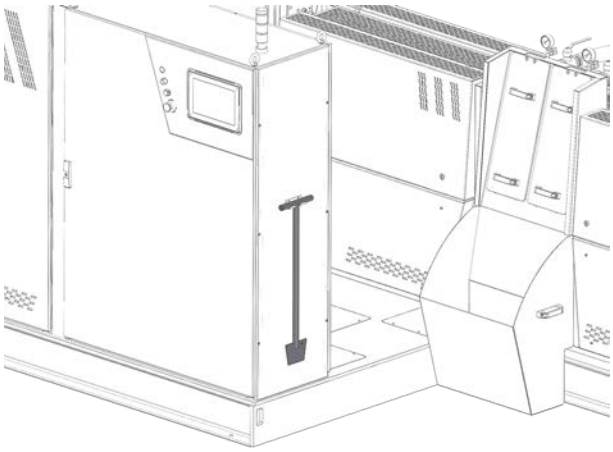


Figure 4-10: Cleaning shovel

WARNING

Risk of injury or threat of serious damage to recycling machine!

Use of improper tools for cleaning the degassing pots can lead to serious injury or seriously damage the recycling machine.

- Use only the cleaning shovel provided to clean the degassing pots!

Details about cleaning the degassing pots:

➲ See section **Fehler! Verweisquelle konnte nicht gefunden werden. Fehler! Verweisquelle konnte nicht gefunden werden.**

4.3 Supplied Accessories

The machine is delivered with accessories such as tool cases, screens, and blade set. Refer to the parts list for the scope of accessories.

4.4 Technical data

4.4.1 General technical data

Specification	Value	Unit
Ambient temperature	5…40 / 41…104	°C / °F
Storage / transport temperature	20…60 / 68…140	°C / °F
Max. altitude above sea level	1000 / 3280	m / ft
Maximum humidity	90	%
Protection class	IP 55	
Acoustic power ($L_{WA\ total}$) *	≤ 112	db (A)
Sound level ($L_{pA\ max}$) *	≤ 85	db (A)

*… The measurement was carried out in accordance with EN ISO 3746 outdoors, without the influence of a hall or other factors. The levels were measured at a distance of 1m at all the user workstations. Due to the wide range of materials and shapes of the feed material, customer readings may deviate from the values listed above.

4.4.2 Layout

➲ See appendix

4.4.3 Electrical data

➲ See electric diagram

4.4.4 Cooling and fresh water

➲ See layout

4.4.5 Compressed air

➲ See layout

4.4.6 Main dimensions

➲ See layout

4.5 Operating materials

Type	Function	Example
VG 320	Gear oil for extruder, conveyor screw, conveyor belt, roll feeder, shredder	OMV HST 320, Renolin CLP 320
HLP 46	Hydraulic oil for pusher, shredder flap	Renolin B15 HLP46
AL-complex	Sealing grease	Sunaplex 781
Grease	Grease	RENOLIT CXI 2
CLP100	Gear oil for vacuum booster	OMEGA FLUID MV
Liquid screw locker	Liquid screw locker moderately tight	Loctite 243
Aluminum paste	For installation of screw and bolt connections exposed to high temperatures and corrosive factors.	Grease 1000
Coolant	Frequency converter, air conditioner	Kühlmittel

4.6 Location and appearance of the type plate

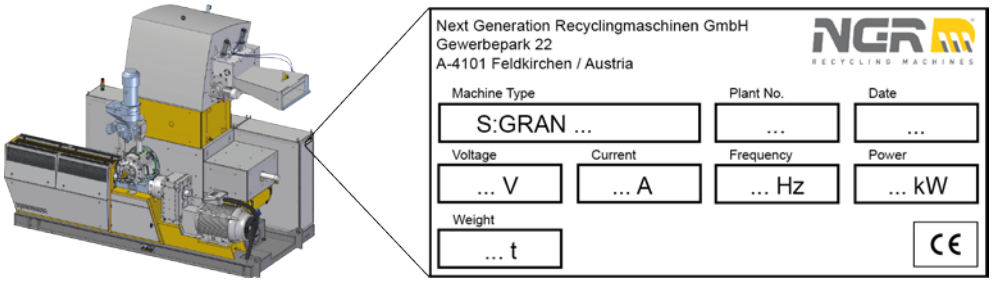


Figure 4-11: Location and appearance of the type plate

5 Transport and storage

5.1 Transport

Transport specialist

5.1.1 Safety instructions for transport

Comply with the following rules for transport and storage:

- Always ensure that the equipment is transported and unloaded in an impact-free, shock-free manner.
- Do not stack the package units.
- Transport packaging units in accordance with the handling instructions on the packaging.
- Do not remove the packaging until immediately before installation.
- The machine may be optionally equipped with transport locks. These safety devices must be removed before commissioning.
- Observe maximum loads of lifting equipment (see the following weight information).
- Only use suitable and properly inspected lifting equipment.

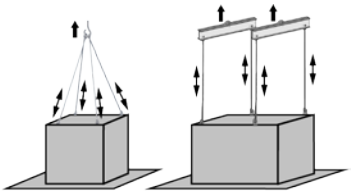
CAUTION

Danger of tipping during lifting activities!

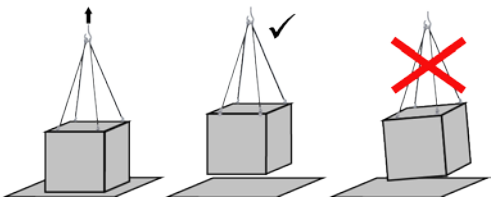
Improper lifting can cause the transport goods to tip and fall over.

- Lift transported goods on a level!
- Carry out test lifts.
- Hoists must all be under tension.

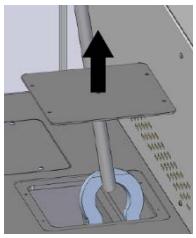
- Lift the transport goods approx. 10cm off the ground and check whether all hoists are under tension.



- Check that the transport goods are hanging level and are not likely to tip.

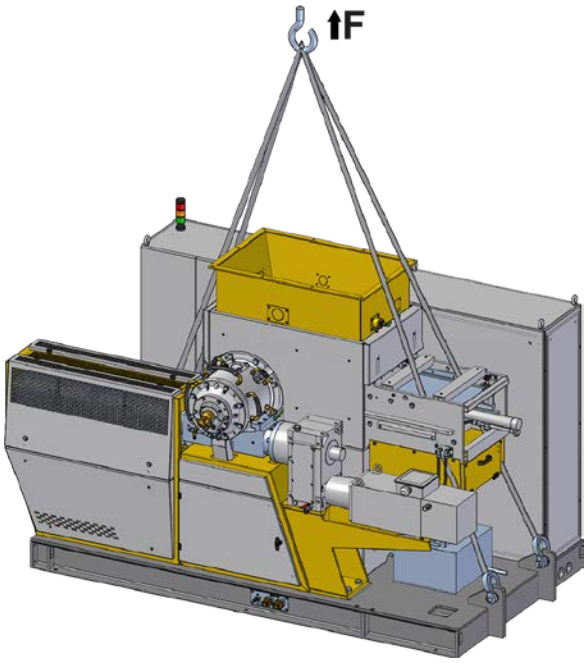


5.1.2 Transport of recycling machine

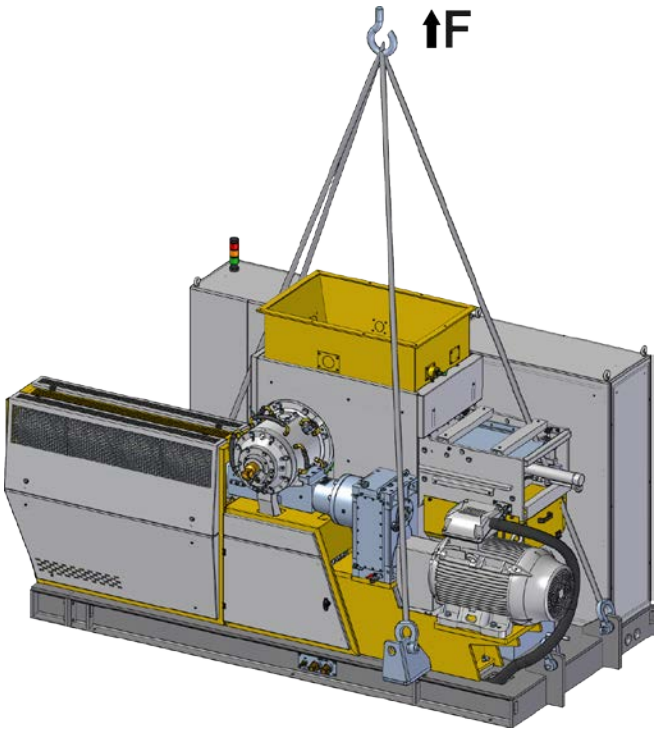


1. Unscrew the base frame cover.
2. Attach shackle as shown in the picture at the intended locations.
3. Fasten a hoist to shackle.
4. Transport machine as shown in the figure.

   The mode of transport varies depending on size. Check the following table for weights.

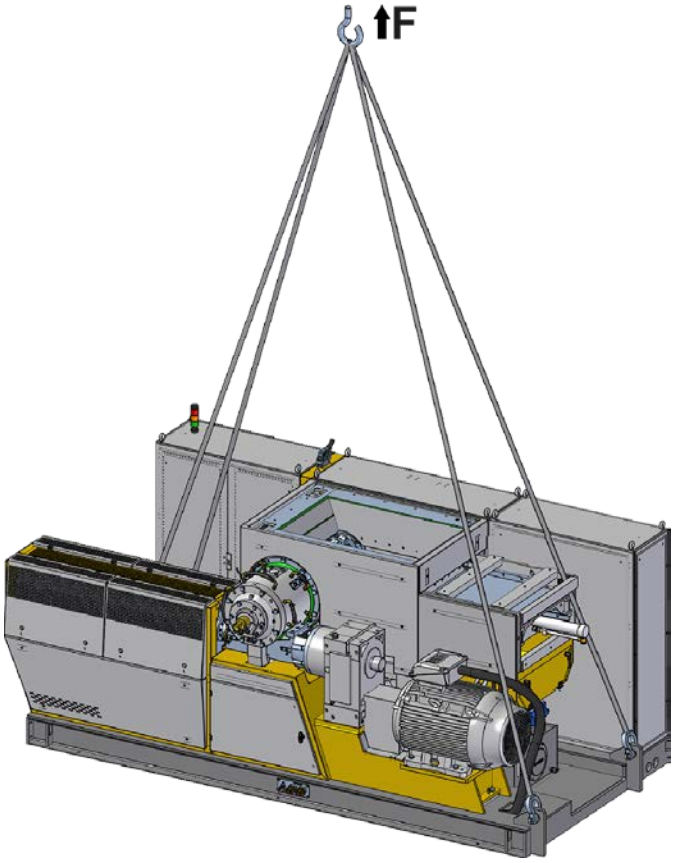


S:GRAN 65-50



S:GRAN 75-50

S:GRAN 65-70
75-70
85-70
95-70
105-100
125-100

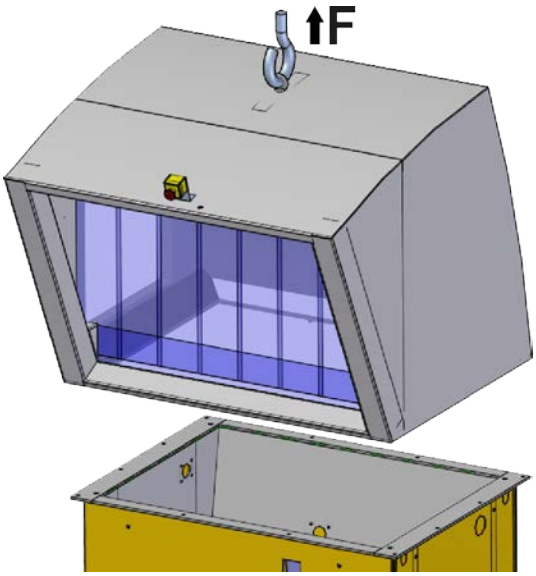


Model	F [kg]	F [lb]
S:GRAN 65-50	5500	12125
S:GRAN 75-50	7500	16535
S:GRAN 65-70	9200	20283
S:GRAN 75-70	10300	22708
S:GRAN 85-70	11000	24251
S:GRAN 95-70	11250	24802
S:GRAN 105-100	14200	31306
S:GRAN 125-100	14200	31306

5.1.3 Transport of protective hood

1. Hand-tighten the eye bolt in the protective cover.
2. Transport the protective cover as shown in the image.

   Check the following table for weights.



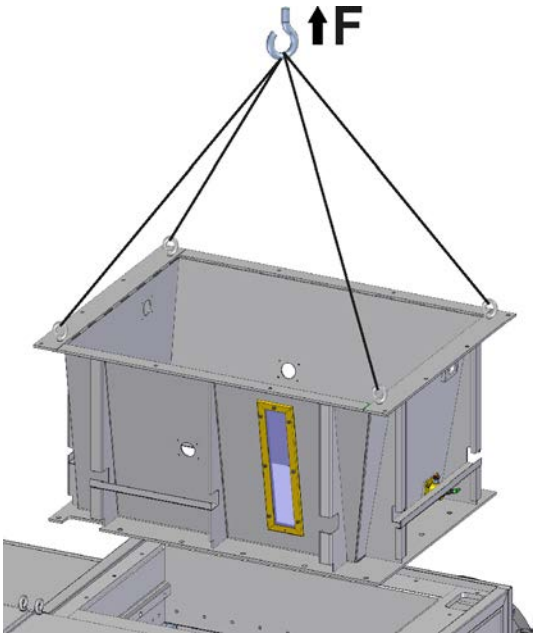
Model	F [kg]	F [lb]
S:GRAN 65-50	150	331
S:GRAN 75-50		
S:GRAN 65-70	250	552
S:GRAN 75-70		
S:GRAN 85-70		
S:GRAN 95-70		
S:GRAN 105-100	370	816
S:GRAN 125-100		

5.1.4 Transport of hopper

1 Attach eye bolt to the hopper.

2 Transport hopper as shown in the figure.

Check the following table for weights.



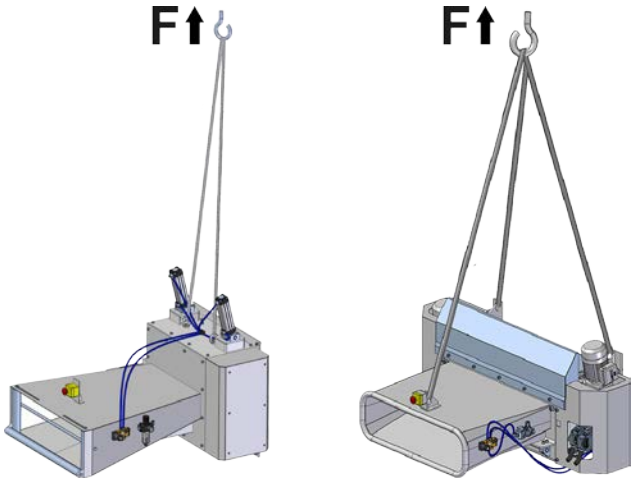
Model	F [kg]	F [lb]
S:GRAN 65-50	120	265
S:GRAN 75-50		
S:GRAN 65-70	280	618
S:GRAN 75-70		
S:GRAN 85-70		
S:GRAN 95-70	400	882
S:GRAN 105-100		
S:GRAN 125-100		

5.1.5 Transport of roll feeder (optional)

1 Hand-tighten the lifting eye in the roll feeder.

2 Transport roll feeder as shown in the figure.

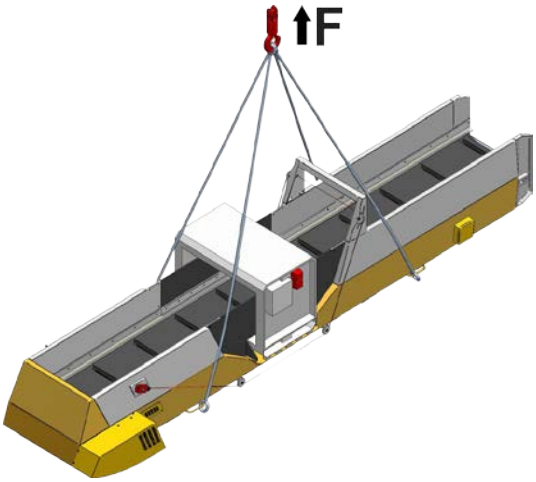
Check the following table for weights.



Model	F [kg]	F [lb]
S:GRAN 65-50	353	779
S:GRAN 75-50		
S:GRAN 65-70	948	2090
S:GRAN 75-70		
S:GRAN 85-70		
S:GRAN 95-70		
S:GRAN 105-100		
S:GRAN 105-100		

5.1.6 Transport of conveyor belt (optional)

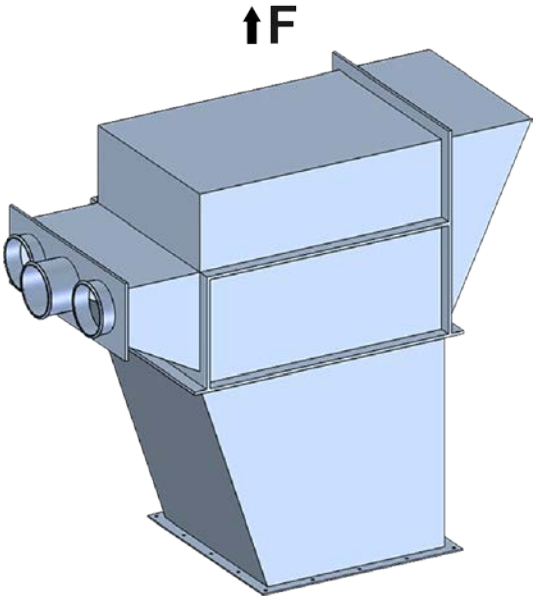
- Transport conveyor belt as shown in the figure.
  Check the following table for weights.



Model	F [kg]	F [lb]
S:GRAN 065-50	800	1764
S:GRAN 075-50		
S:GRAN 065-70	1250	2756
S:GRAN 075-70		
S:GRAN 085-50		
S:GRAN 095-50		
S:GRAN 105-100	1400	3087
S:GRAN 125-100		

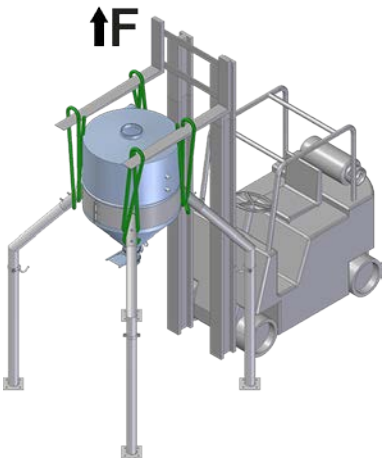
5.1.7 Transporting the air separator (optional)

- Lift with lifting belts.
  F =100 kg / 220 lb



5.1.8 Transport of the silo (optional)

- Transport the silo as shown in the image.
  F = 350 kg [772 lb]



5.2 Storage

Supervisor

Comply with the following storage conditions:

- Store the packaging units in closed, dry rooms.
- Storage temperature -20 °C to 60 °C / -4 °F to 140 °F.
- Relative humidity maximum 90%.
- The cooling water in the frequency converter is equipped with antifreeze and can therefore remain in the cooling circuit when stored. The antifreeze in the coolant must be measured at regular intervals.
- Cooling water must be drained from all other cooling circuits, and the openings must be provided with plugs.
- To prevent point loads and deformations, the bearings of the equipment must be moved on a monthly basis.
- Avoid mechanical vibrations.
- Protect all exposed metal surfaces with a rustproofing.
- Do not expose to aggressive media.
- Avoid direct sunlight.

6 Installation

6.1 Safety information for installation

For the transport of the components during assembly, you must read and observe the section on transport!

➲ see section 5.1 Transport

WARNING

Risk of injury due to improper installation!

Improper installation can result in serious injuries and significant property damage.

- Wear helmet, gloves and foot protection.
- Ensure adequate space for assembly.
- Make sure the space is organized and clean. Tools and parts lying about can cause accidents.
- Sharp-edged parts can cause injuries.

6.2 Unpacking equipment and disposing of packaging

The packaging protects the contents of each package during transport from contamination, corrosion and damage. Do not therefore remove the packaging until immediately before installation. Do not use sharp objects to open the package, otherwise components may be damaged.

The accessories and spare parts package may only be opened in the presence of NGR employees. Otherwise, NGR cannot be held liable for missing or damaged parts.

CAUTION

Risk for the environment!

Incorrect disposal of packaging may result in environmental hazards.

- Dispose of packaging in accordance with local applicable waste disposal and environmental regulations.
- Packaging should, if possible, be introduced to a recycling process.

6.3 Check delivery volume

Check delivery volume immediately after receipt of the order.

6.4 Spare parts package

Attention

Service works cannot be carried out if spare parts are missing!

Service engineers depend on a fully fitted spare parts package.

- The spare parts package is to be opened by service engineers only!

The spare parts package is labelled with the following label:

Figure 6-1: Label for spare parts package

6.5 Requirements for the installation site

Supervisor

Conditions at the installation site:

- Ambient temperature 5 °C to 40 °C / 41 °F to 104 °F.
- Relative humidity maximum 90%.
- Installation altitude max. 1000 m / 3280 ft above sea level.
- Floor and lighting in accordance with industry or commercial standards.
- Only install the system in closed, dry rooms.

6.5.1 Minimum distances

When positioning the machine, note that these minimum distances must be maintained for the maintenance and proper operation of the system. Installation with distances less than the specified minimum clearances is permitted only after consultation with the company NGR. In some countries, a larger minimum distance may be required. The customer is responsible for complying with these regulations.

Minimum clearances for recycling machine

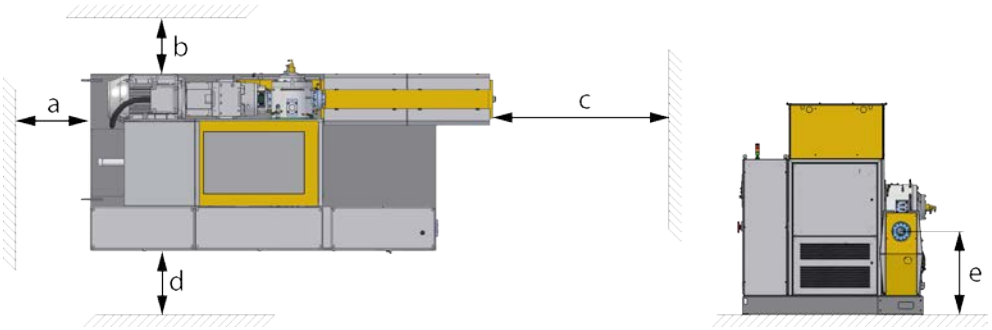


Figure 6-2: Minimum clearances for recycling machine

Model	a [mm]	b [mm]	c [mm]	d [mm]
S:GRAN 65-50	1200	1200	4000	2000
S:GRAN 75-50	1200	1200	4300	2000
S:GRAN 65-70	1500	1500	4000	2000
S:GRAN 75-70	1500	1500	4300	2000
S:GRAN 85-70	1500	1500	4600	2000
S:GRAN 95-70	1500	1500	4900	2000
S:GRAN 105-100	1500	1500	5100	2500
S:GRAN 125-100	1500	1500	5700	2500

Minimum distances for conveyor belt (optional)

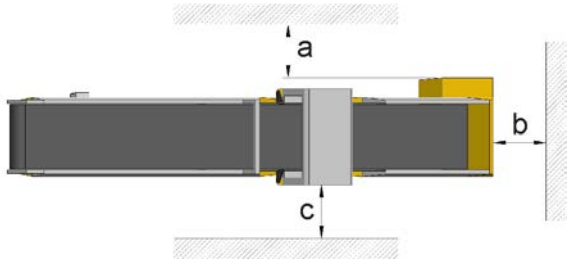


Figure 6-3: Minimum distances for conveyor belt

Model	a [mm]	b [mm]	c [mm]
Conveyor belt	1500	1500	1500

6.5.2 Foundation load

- The foundation must be designed for the weight forces of the recycling machine in accordance with national regulations.
- It must be secured against movement and vibration.

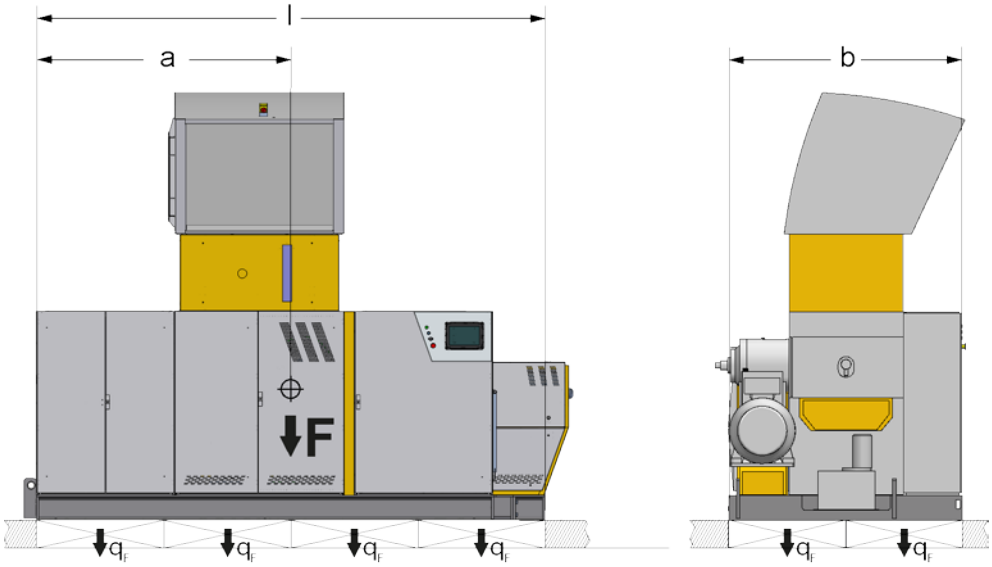


Figure 6-4: Foundation load

Model	F [kg]	qF [kg/m]	a [mm]	b [mm]	l [mm]
S:GRAN 65-50	5770	1890	1510	1650	3050
S:GRAN 75-50	7770	2350	1450	1650	3310
S:GRAN 65-70	9730	2700	1890	2040	3580
S:GRAN 75-70	10830	2790	1900	2040	3875
S:GRAN 85-70	11530	2770	1920	2040	4155
S:GRAN 95-70	11780	2659	1910	2040	4430
S:GRAN 105-100	14970	2867	2400	2400	5220
S:GRAN 125-100	14970	2600	2430	2400	5745

6.5.3 Align the base frame horizontally

Transport specialist, mechanical specialist

Leveling feet

Leveling device

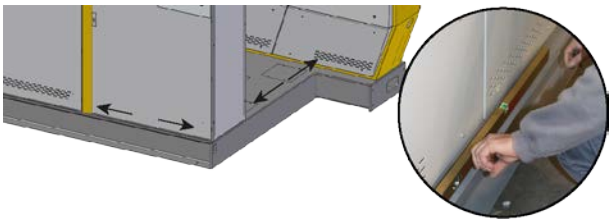
Caution

Risk of damage to machine due to improperly aligned base frame!

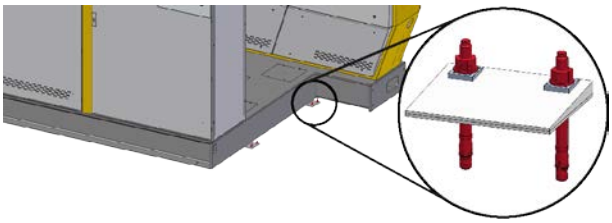
Increased wear and tear and fatigue on the machine.

- Before securing the machine, align the base frame absolutely horizontal and fix in place using the leveling feet.

1 Align the base frame with a leveling device.



2 Install the leveling feet to fix in place the aligned base frame.



= The base frame is now aligned horizontally.

6.5.4 Fastening plan

In general, securing the recycling machine is not necessary. However, fastening points are provided on the base frame.

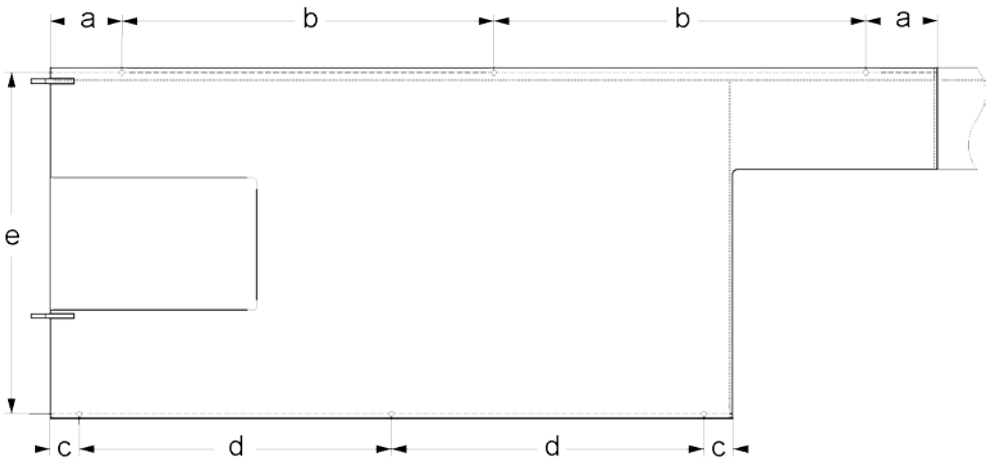


Figure 6-5: Fastening plan

Model	a [mm]	b [mm]	c [mm]	d [mm]	e [mm]
S:GRAN 65-50	170,0	1354,0	170,0	1272,5	1600,0
S:GRAN 75-50	170,0	1354,0	170,0	1272,5	1600,0
S:GRAN 65-70	420,0	1370,0	170,0	1622,5	1980,0
S:GRAN 75-70	420,0	1370,0	170,0	1622,5	1980,0
S:GRAN 85-70	420,0	1657,5	170,0	1822,5	1980,0
S:GRAN 95-70	420,0	1657,5	170,0	1822,5	1980,0
S:GRAN 105-100	420,0	2190,0	170,0	2162,5	2320,0
S:GRAN 125-100	420,0	2190,0	170,0	2162,5	2320,0

6.6 Installing the modules

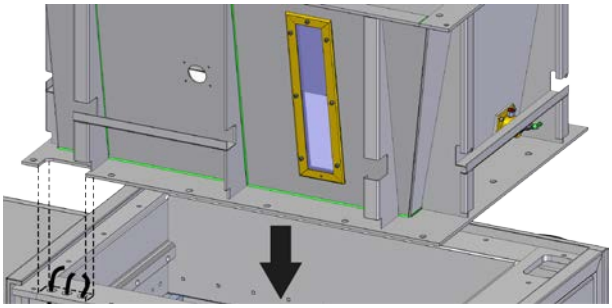
6.6.1 Hopper installation (optional)

Transport, electrical and mechanical specialist

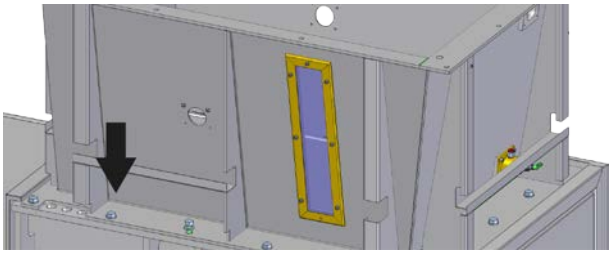
1 Lift the hopper by crane onto the shredder housing.

➲ see also section 5.1.4 Transport of hopper

Carefully place the hopper with the recess for the cables in the correct corner. This prevents pinching of the cables and air hoses.



2 Screw on the hopper.



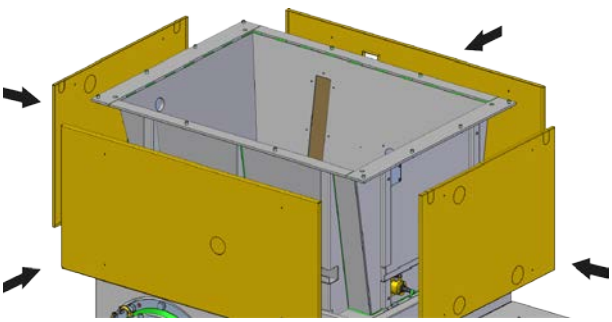
3 Connect the cables and air hoses.

Observe the following:

– Connect the wires for each sensor according to electric diagram.
– Do not shorten air hoses and cables. The lengths have already been cut to optimal length at the factory.

4 Screw on the covering panels of the hopper.

This step is omitted with S:GRAN 65-50 and S:GRAN 75-50.



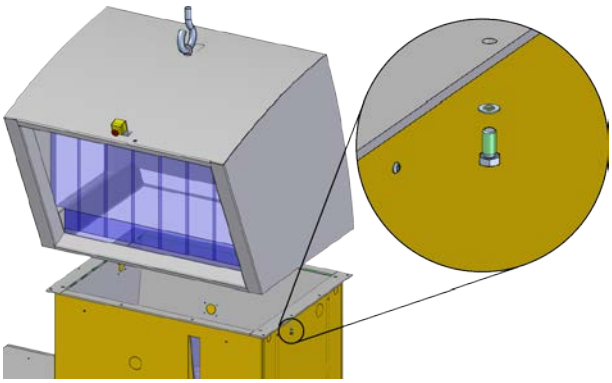
= Hopper has been installed.

6.6.2 Installing the protective hood

1 Position the protective hood by crane on the feed hopper.

➲ see also section 5.1.3 Transport of protective hood

2 Attach the protective cover using screws and washers (12 each).

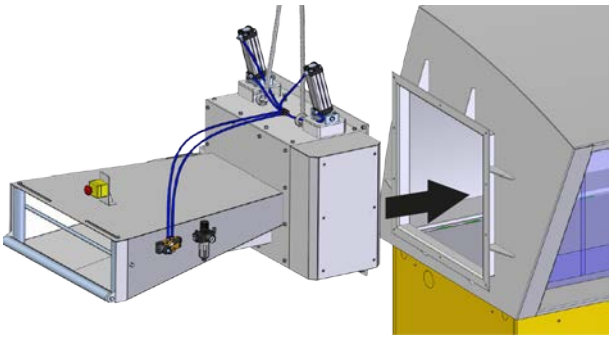


6.6.3 Roll feeder installation (optional)

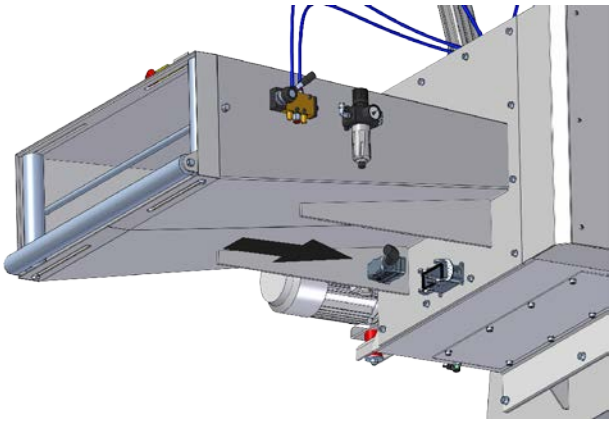
1 Position the roll feeder, as shown in the image, using a crane on the protective cover.

➲ see also section

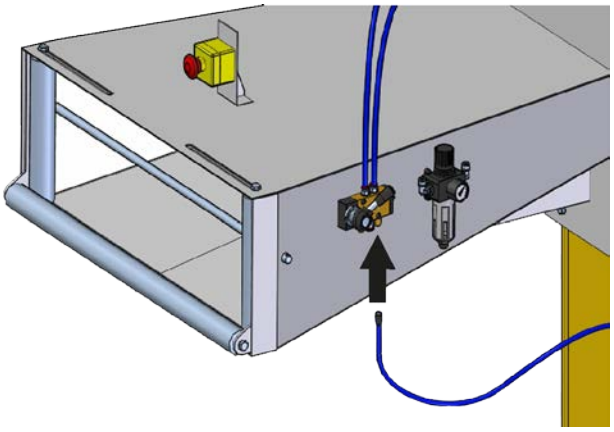
2 Attach the roll feeder using the screws and washers provided (10 each).



3 Connect the plug on the underside of the roll feeder.



4 Connect the compressed air hose.



= Roll feeder has been installed.

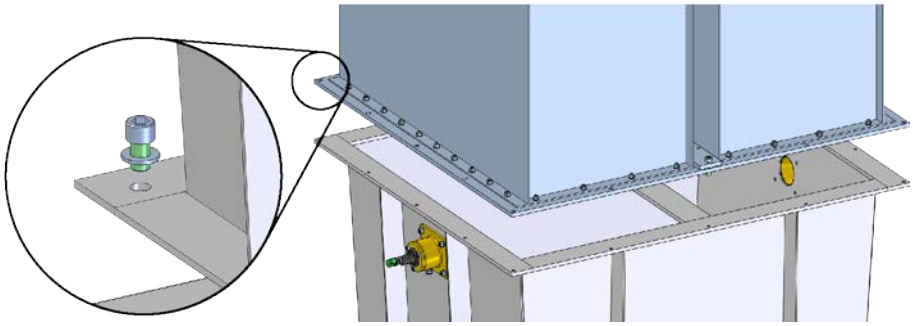
6.6.4 Installing the air separator (optional)

Transport and mechanical specialists

1 Position the air separator by crane above the collecting hopper.

➲ see also section

2 Attach the air separator using screws and washers.

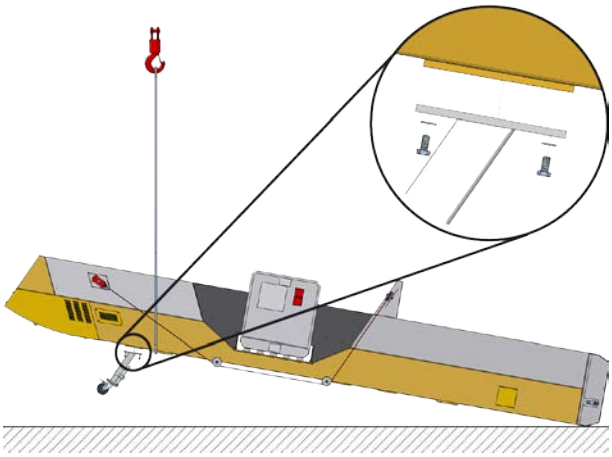


6.6.5 Conveyor belt installation (optional)

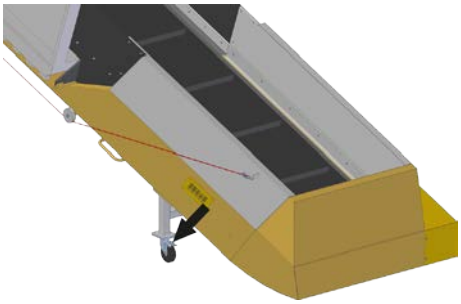
Transport and mechanical specialist

1 Lift conveyor belt using a crane at the front and screw on the two feet

(4 screws and washers for each foot).

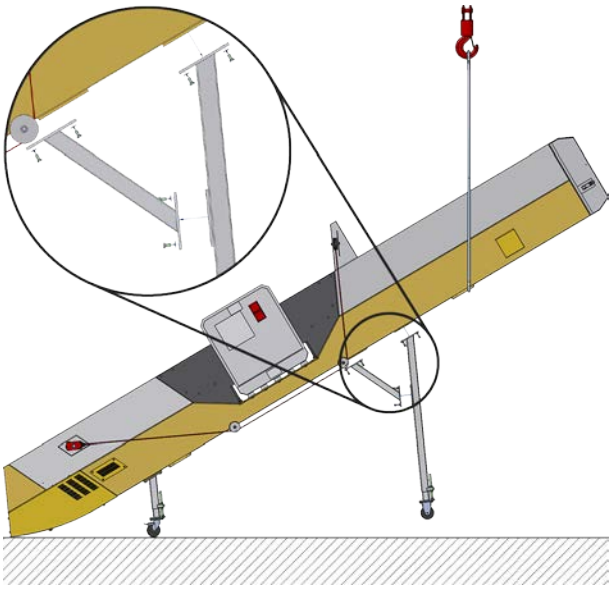


2 Activate brakes for the front wheels.



3 Lift conveyor belt using a crane at the back and screw on the two feet and braces

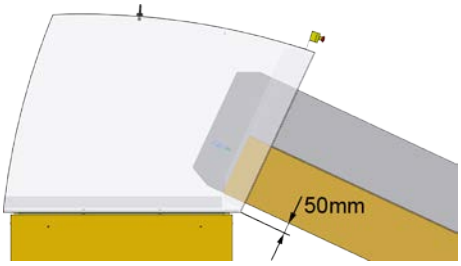
(4 screws and washers for each foot, 8 screws and washers for each brace).



4 Release the brakes on all rollers.

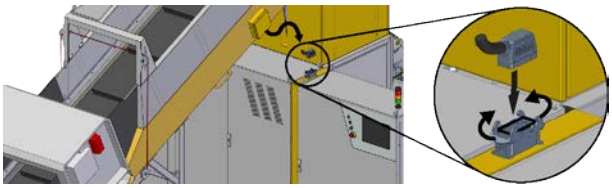
5 Slide conveyor belt into the opening of the protective hood of the machine.

Check the vertical safety clearance between the conveyor belt and the opening of the protective hood as shown in the picture.

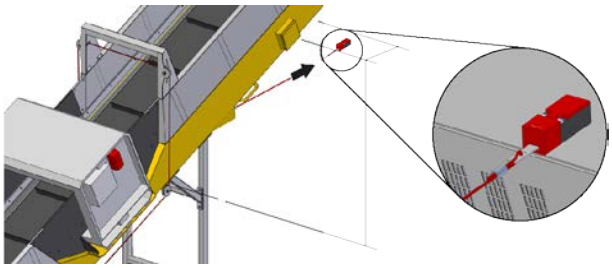


6 Set the brakes on all rollers.

7 Plug in and secure power supply.



8 Plug in safety line.



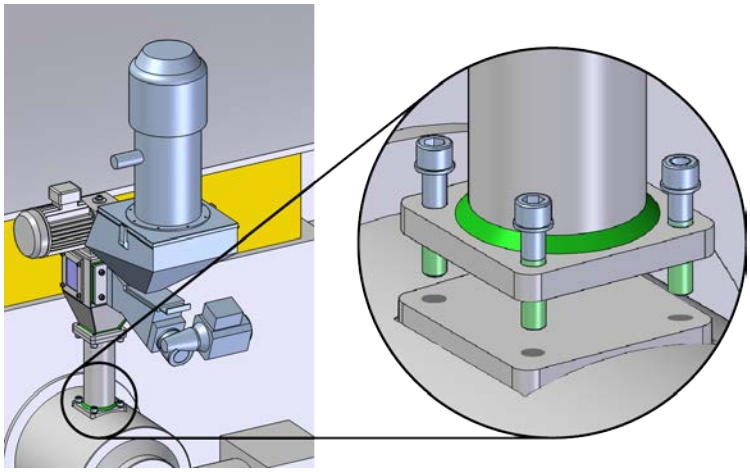
= Conveyor belt has been set up.

6.6.6 Installing the dosage (optional)

Transport and mechanical specialist

1 Lift Dosage using a crane.

2 Place adapter plate onto discharge pipe of the cutter. If adapter plate is already fixed onto discharge pipe the screws must be removed.



3 Position dosage onto adapter plate as shown in the picture above.

4 Fix adapter plate and dosage onto the machine using 4 screws.

= Dosage has been installed.

6.6.7 Signal lamp installation

Electrical specialist

Attention

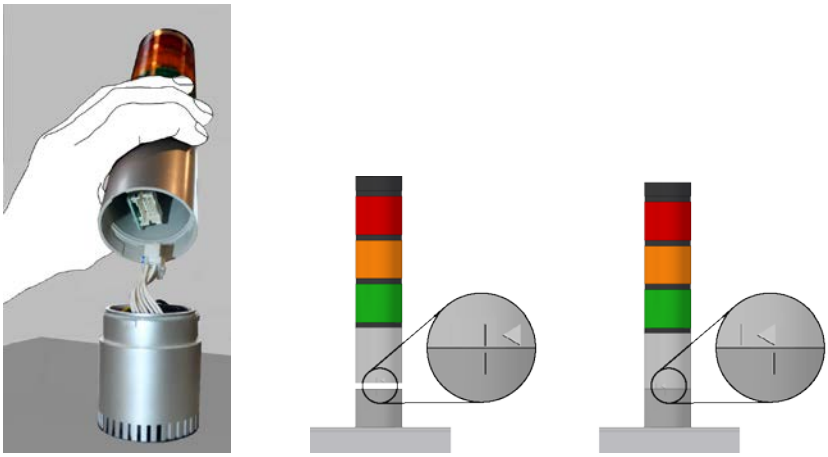
Signal lamp does not light up with incorrect installation!

An incorrect installed signal lamp cannot display an alarm and cannot alert operators to possible damage to the machine.

- Install the signal lamp correctly.

1 Remove the signal lamp from its packaging.

2 Establish the connection.



3 Place the signal lamp on the base.

a The line markings indicate the correct position for attaching the lamp.

b After attaching the lamp, rotate it to the correct position.

= Signal lamp is installed.

6.6.8 Pre-installing the downstream units

Mechanical specialist

Attention

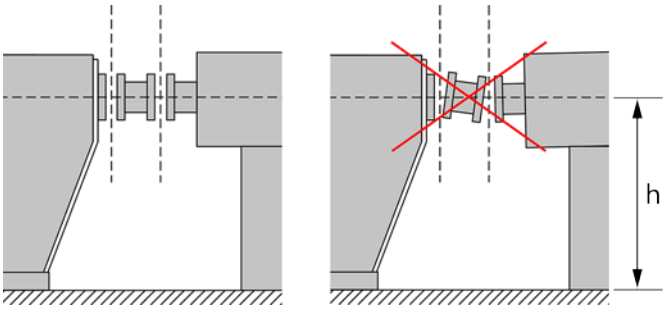
Risk of damage due to improperly aligned downstream units!

Failure to properly align the downstream units will cause damage to the machine.

- Position the downstream units in line and horizontally.
- The extruder cylinder is preconfigured at the factory. Differences in height between the downstream unit and the extruder must be corrected on the downstream unit.

1 Check that the base frame is installed level.

2 Align the downstream unit at extrusion height (h) (see table).



Model	Extrusion level h [mm]
A:GRAN	1010
C:GRAN	1100
E:GRAN	1100
F:GRAN	1100
X:GRAN	1100

3 Align the connecting surfaces in parallel.

4 Hand-tighten the screws for the connection. The entire assembly will be integrated for operation during commissioning by NGR.

= The downstream unit has been pre-installed.

6.7 Removing transport protection

6.7.1 Opening the ball cock for the cooling circuit of the frequency converter

- Open the ball cock.

Attention

High water pressure can damage the frequency converter.

The pressure can only be balanced with open ball cock.

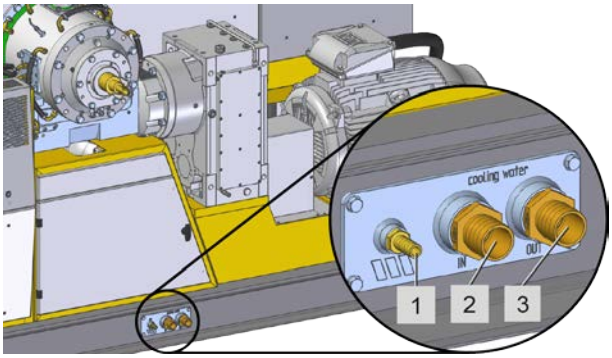
- Always leave the ball cock open.

6.8 Connections

6.8.1 Water and air connections

Mechanical specialist

- Follow the illustrations and tables below in making the connections.
  Water temperature max. 15 °C / 59 °F
  Water pressure 3–4 bar / 44–58 psi
  Air pressure 6–7 bar / 87–102 psi



1	Compressed air	**3**	Cooling water return
2	Cooling water supply		

Model	1	2	3
S:GRAN 65-50	½", 750 l/min / 165 gal/min	1 ½", 133 l/min / 29 gal/min	1 ½", 133 l/min / 29 gal/min]
S:GRAN 75-50			
S:GRAN 65-70		1 ½", 163 l/min / 36 gal/min	1 ½", 163 l/min / 36 gal/min
S:GRAN 75-70			
S:GRAN 85-50	½", 1000 l/min / 220 gal/min	1 ½", 168 l/min / 37 gal/min	1 ½", 168 l/min / 37 gal/min
S:GRAN 95-50			
S:GRAN 105-100		1 ½", 178 l/min / 39 gal/min	1 ½", 178 l/min / 39 gal/min
S:GRAN 125-100			

6.8.2 Electrical mains connection

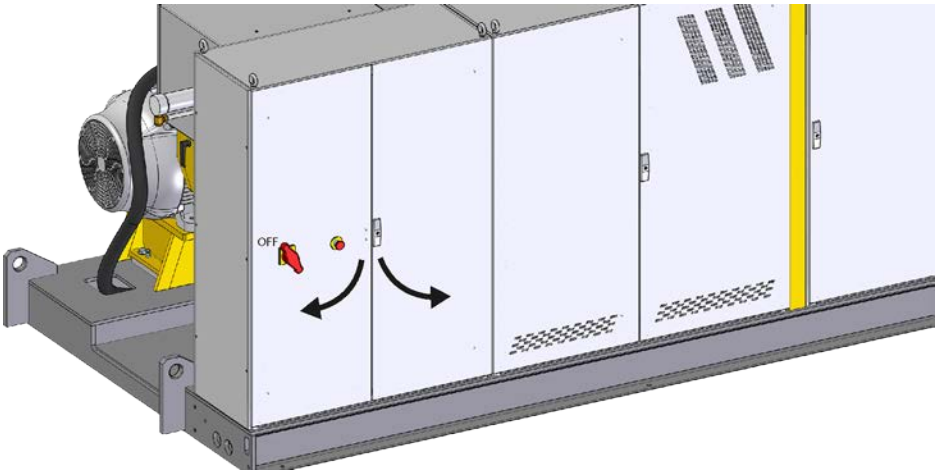
Electrical specialist

Electric cabinet key

All electrical data is found on the type plate. The voltage must not deviate more than ±5% from the rated voltage. A clockwise rotation must be ensured. Make sure that the cable is disconnected (voltage-free) and secured against being switched on again. To this end, observe the safety instructions regarding electrical equipment!

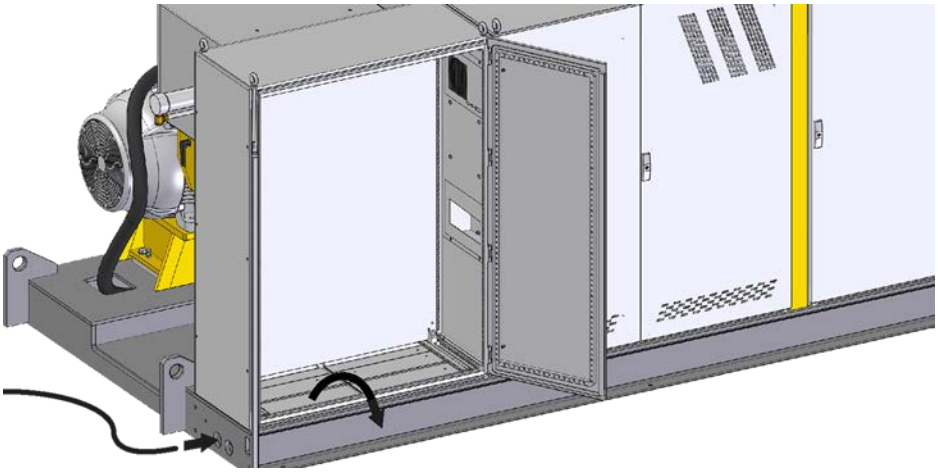
➲ See section 2.7.1 Safety information about electrical equipment

1 Place the main switch in OFF position and open the electric cabinet door.



If the main switch is on, you will not be able to open the electric cabinet door!

2 Remove the bottom cover and thread the main connection cable through the opening in the base frame.



3 Connect the main power cable.

4 Install covers again and close the electric cabinet doors.

= Electrical main connection cable is connected.

7 Commissioning

Specialist personnel authorized by NGR

Installation and commissioning may only be performed by commissioning specialists of NGR or persons authorized by NGR. Any unauthorized installation or initial start-up will void the warranty. Improper settings may also result in low output values.

WARNING

Risk of injury or danger of serious damage to recycling machine!

Improper installation or initial commissioning may result in damage to machinery and serious injury or possibly fatal injury.

- Installation and commissioning may only be performed by authorized specialist personnel.

8 Operation and use

8.1 Safety information for operation and use

WARNING

Risk of injury due to improper use!

Improper use can result in serious injuries and significant property damage.

- The machine can reach harmful noise levels during operation, it is therefore absolutely essential to wear hearing protection.
- In addition, hand protection, protective clothing, as well as foot and eye protection, should be worn.
- Operate the machine only as intended.
- All safety equipment must be present and secured correctly.
- Smoking and handling an open flame is prohibited.
- Make sure that there are no persons in the danger zone.

8.2 Duties of the user

Users must ensure the machine is working properly. In particular, the user must:

- Feed the machine with material, in accordance with the terms and conditions.
- Check the parameters relevant to the process such as temperature, current and melt pressure.
- If necessary, respond to non-optimal process parameters by changing the setpoints on the control terminal, or making mechanical or process engineering modifications to the process.
- Respond to alarm signals.

8.3 Overview of the user workstation

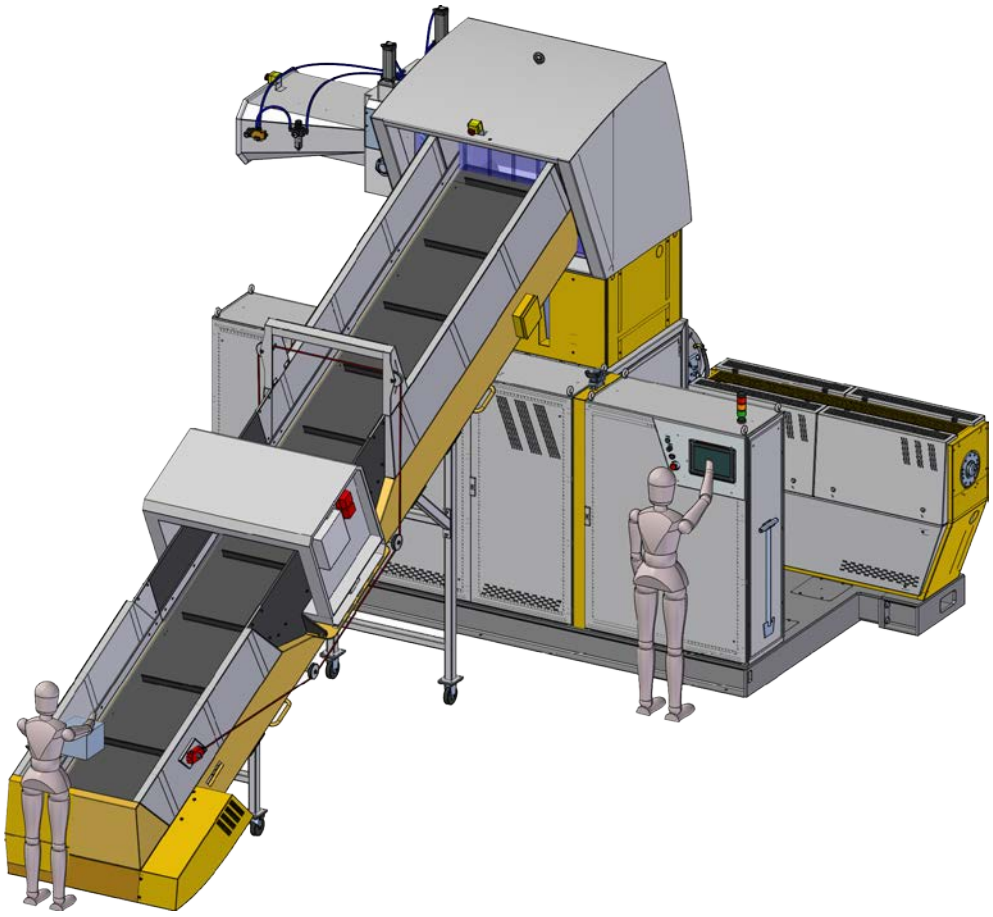


Figure 8-1: Operator workstation

8.4 Check machine before starting work

- Perform the following visual inspections:
  - Check for damage and defects
  - Check the cooling water and compressed air connections for leaks
  - Review the work area for slip and trip hazards
  - Check the compressed air gauge for operating pressure

8.5 Switching on the machine

1 Turn on **main switch**.

- ✔ Mains voltage is on.
- ✔ Machine in emergency-stop mode.
- ✔ Signal lamp lights up red.

2 Turn the **Key switch** to the middle position **ON**.

- ✔ Control voltage is on.
- ✔ The machine control system starts up.
- ✔ The **Overview** window is displayed on the control terminal.
- ✔ The signal lamp lights up red.

3 Turn the **Key switch** briefly to **START**.

After turning the key, the **Key switch** clicks back into place in the middle position and remains on **ON**.

- ✔ The machine heats up.
- ✔ Signal lamp flashes green. If there are problems, the signal lamp flashes red.

Heating up takes a longer time. For this reason, plan this time into the production process.

= The machine switches on.

8.6 Starting the machine

You can start the machine in automatic or manual mode.

A) Starting the machine in automatic mode

- On the control panel, press the **Auto Start** button.
  - ✔ The main components of the machine are automatically turned on in the right process order.

B) Starting the machine in manual mode

Switch on the main components in the correct process-engineering order at the control terminal. The button changes from black to green when turning on the machine.

1. Manually switch on the pelletization unit via the control terminal.
   - ✔ The pelletization unit is turned on.
2. Manually switch on the extruder via the control terminal.
   - ✔ The extruder is switched on.
3. Manually switch on the shredder via the control terminal.
   - ✔ The shredder is switched on.
4. Manually switch on the feeding process via the control terminal.
   - ✔ Feeding is switched on.

Attention

Damage to recycling machine due to incorrect process of switching on the main components!

Material jam and incorrect parameters may result.

- Make sure you turn on the machine in manual mode in the correct process order.
- The material feed via the feeding unit can first start once the operating temperature has been reached fully.

8.7 Starting automatic mode

To start the automatic mode, the following conditions must be met:

- Power supply of the machine is switched on.
- Pelletizer housing is open.
- Signal lamp flashes green.

Preparing the machine for automatic mode

1. Press AUTOMATIC - START.
2. Remove material from the die plate.

   Check the material exiting the die plate for air pockets. Wait until material is free from air pockets.
3. Press AUTOMATIC - STOP.
4. Remove material residue with a scraper from the die plate and clean pelletizer blades.
5. Close pelletizer housing.

   ✔ The pelletizer housing is closed.

Starting automatic mode

▶ Press AUTOMATIC - START.

✔ The AUTOMATIC - START push-button flashes.

✔ Components such as conveyor belt and cutter are switched on.

= Push-button lights up green: Automatic mode has started.

8.8 Restarting the conveyor belt after an alarm on the metal detector

Caution

Machine damage due to incorrect configuration of the metal detector!

Machine damage due to unidentified metal parts.

- The metal detector must, as a rule, be configured by NGR.
- The sensitivity and the product compensation may not be adjusted by untrained personnel.

If the metal detector detects metal in the material, a visual and acoustic alarm is triggered and the conveyor belt stops.

1. Check material and remove metal parts.
2. Reset the alarm by pressing the **Enter** button on the metal detector.
   - ✔ The alarm is reset.
   - ✔ The conveyor belt is ready for use again.
3. Acknowledge the alarm.
4. Start conveyor belt.

The metal detector is a purchased part. Refer to the documentation for the metal detector for further information.

➲ see the documentation for the metal detector

8.9 Run the recycling machine until empty and turn it off

A) Run the machine automatically until it is empty

- Press the **AUTOMATIC - STOP** button.
  - ✔ The main components of the machine are turned off in the right process order.

B) Run the machine manually until it is empty

Switch off the main components in the correct process-engineering order on the function bar at the control terminal. The button changes from green to black when shutting down the machine.

1. Manually shut off the feeding process via the control terminal.
   - ✔ The material feed is now stopped.
   - ✔ Existing material in the process is further processed.
2. Manually shut off the shredder via the control terminal.
3. Wait until no more pellets emerge from the pelletizer.
4. Manually shut off the extruder via the control terminal.
   - ✔ The extruder no longer conveys material.
5. Manually shut off the pelletization unit via the control terminal.
6. Open pelletizer housing.
7. Clean die plate with a scraper.
8. Clean pelletization unit.

= The machine is run empty and the main components are turned off.

Switching off the machine

1. Switch the key switch to **OFF**.
2. Turn off the client-side water supply.

Attention

Water and rust damage due to not-turned-off water supply!

If the water supply is not turned off, condensation can build up and result in rust damage.

In addition, water may leak out due to defective components.

- Turn off the client-side water supply after turning off the machine.
- Do not leave the machine unmonitored when the water supply is on.

3. Switch off the main switch.

= The machine is switched off.

8.10 Secure the machine against reconnection

Electrical specialist

When working on moving parts or live lines, the machine must be secured against being switched on again - after being first switched off.

- Switch off the main switch.
- Place the lock on the main switch.
- Place sign "Do Not Turn On" on the main switch.

8.11 Stop the machine in an emergency

An emergency stop may only be made in an emergency, to prevent injury or to prevent damage to the machine. In an emergency stop, damage to the machine can occur.

Stop the machine

1 Trigger one of the emergency-stop devices.

- ✔ All moving machine parts are stopped.
- ✔ Strip heaters are switched off.
- ✔ Signal lamp lights up red.

2 Switch off the main switch.

NOTICE

Machine damage from melt in pelletizer housing!

The melt flows after an emergency stop further into the pelletizer housing. This may damage the machine.

- ▸ After an emergency stop immediately open the pelletizer housing.
- ▸ Catch escaping melt in a container.

3 Open pelletizer housing.

= Machine has stopped.

If the machine remains idle for longer than 6 hours after an emergency stop, the alarm must be suspended and an orderly shutdown of the machine must be carried out.

8.12 After an emergency stop, run the machine till it is empty and turn it off

1 Unlock activated emergency stop devices.

2 Briefly turn the key switch on the control panel to START.

- ✔ EMERGENCY STOP status is canceled.
- ✔ The machine heats up.

3 Let the machine heat up to operating temperature.

4 Switch on the extruder at the control terminal.

5 Let the extruder screw empty itself out entirely.

- ✔ Extruder screw is empty.

6 Switch off the extruder at the control terminal.

7 Turn key switch to OFF position.

- ✔ The strip heaters are switched off and the machine cools down.

8 Turn off the water supply.

Attention

Cooling water will cause condensation!

If the water supply is not shut off, it can lead to condensation. The condensation can cause rust damage to machine components.

- ▶ Turn off the water supply after disconnecting.

9 Switch off the main switch.

= Machine has been emptied out and turned off after emergency stop.

9 Machine control

This chapter provides information about a maximum specification for the machine control. Depending on the equipment, individual components can be dispensed with.

9.1 Safety instructions for machine control

User, supervisor

Attention

Damage to recycling machine and impact on production results!

Improper operation of the machine controls can impact production results and damage the recycling equipment.

- The operator must have received training from NGR.

9.2 Basic principles of operation

9.2.1 Switch on the machine controls

Figure 9-1: Control panel

1	Key switch
2	Control terminal

1 Briefly turn the key switch on the control panel to the right to **ON**.

2 Wait until the control terminal starts up.

✔ The control terminal window **Overview** is displayed.

= Machine control is switched on.

9.2.2 Layout of control terminal

The terminal is designed as a touchscreen, that is, the user taps the elements on the screen to control the machine. The layout is as follows:

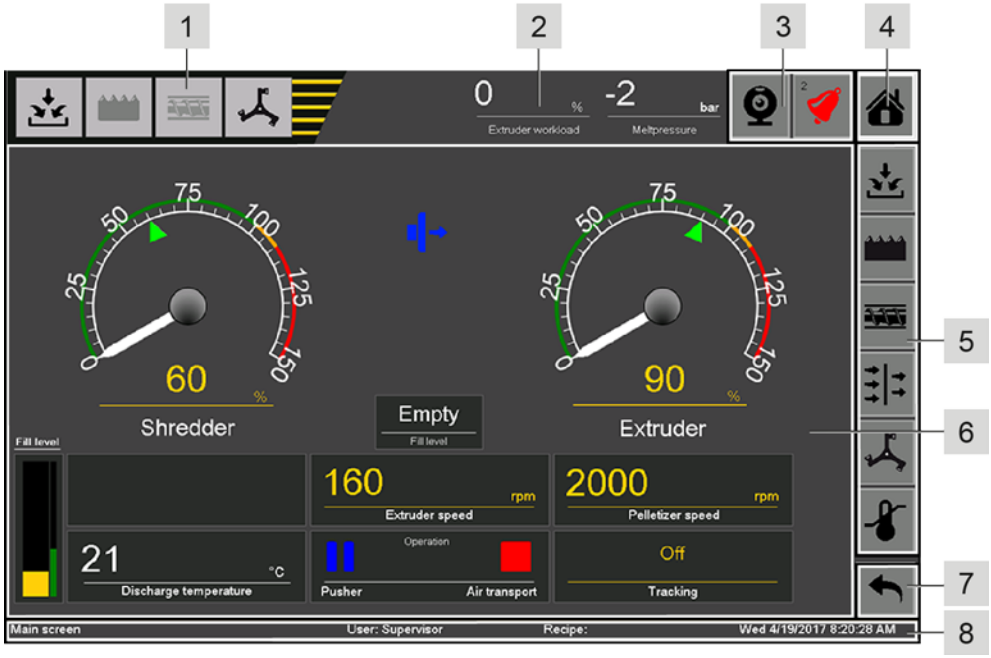


Figure 9-2: Layout of control terminal

Pos.	Description		Description
1	Toolbar		Here the main components can be manually switched on or off.
2	Info area		The most important parameters are shown here.
3		Webcam (optional)	Opens a window in which the camera image from the shredder camera is displayed.
		Screenshot	Keep pressed for 0,5 seconds to generate a screenshot. The screenshot is saved onto the USB memory stick if there is a USB port and a USB memory stick properly plugged in.
		Alarm	Opens the Alarm window. If no alarm, the button is black. For current alarms, the button appears red and the number of current alarms is displayed.
4		Home	Toggle between the main screen and cockpit.
5	Menu bar		Use this toolbar to switch between individual menu windows.
6	Menu window		Details of the individual windows are described below.

7	Back	Moves to the previously visited screen.
8	Footer bar	Date, time, registered users, selected recipe and heading of the current menu window.
9	Fill level (optional)	The current fill level in the hopper is displayed here. This diagram is only visible with laser sensor.

9.2.3 Explanation of symbols

Icon	Description	Icon	Description
	Feeding		Air transport
	Conveyor belt		Charging screw
	Roll feeder		cutter compactor
	Silo		Shredder
	Pusher		Dosing unit
	Conveyor screw		Extruder
	Venting unit		Filtration
	Pelletization unit		Strand pelletization unit
	Gas control		Mix part
	Entry pump		Discharge pump
	PET reactor		Temperatures
	Camera		Alarm
	Home		Scroll back

9.2.4 User levels

The machine control is protected by the different user levels. The following users are added by default:

User	Function
Operator	Access to all operating elements
Supervisor	Access to all operating elements Changing of setpoints Change the general settings such as regional or language settings
NGR	All authorizations

Certain changes can only be made after logging in as the corresponding user.

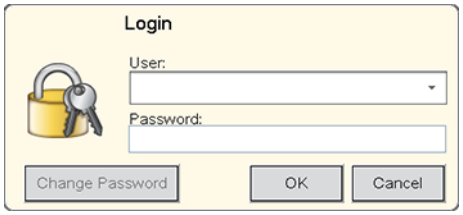


Figure 9-3: Login window

9.2.5 Changing values

Changing numerical values

The numeric pad is used to enter setpoints. It appears when a field in which you can enter setpoints is touched. Setpoints are labeled white and actual values are yellow. Press **Esc** to close the number pad without making any changes.

In the controls, upper and lower limits are defined for the target values. If a value is entered that is outside of these default values, the old value is retained after pressing the **Enter** key.

1 Tap the field.

✔ The numeric keypad is displayed.

2 Write numbers using the numeric keypad.

3 Confirm number entered by pressing the ↵ key.

= The new value is accepted.

Changing alphanumeric values

The alphanumeric pad is used to enter texts. It appears when a field in which you can enter text is touched. Press **Esc** to close the number pad without making any changes.

1 Tap the field.

✔ The alphanumeric block is displayed.

2 Write text using the keyboard on the alphanumeric block.

3 Confirm text entered by pressing the ↵ key.

= The new text is accepted.

9.3 Menu window

9.3.1 Homepage window

When starting up the machine controls, this window is automatically displayed. Here is an overview of the most important parameters presented. Any alarms (red) or messages (blue) are visualized centrally by colored icons.

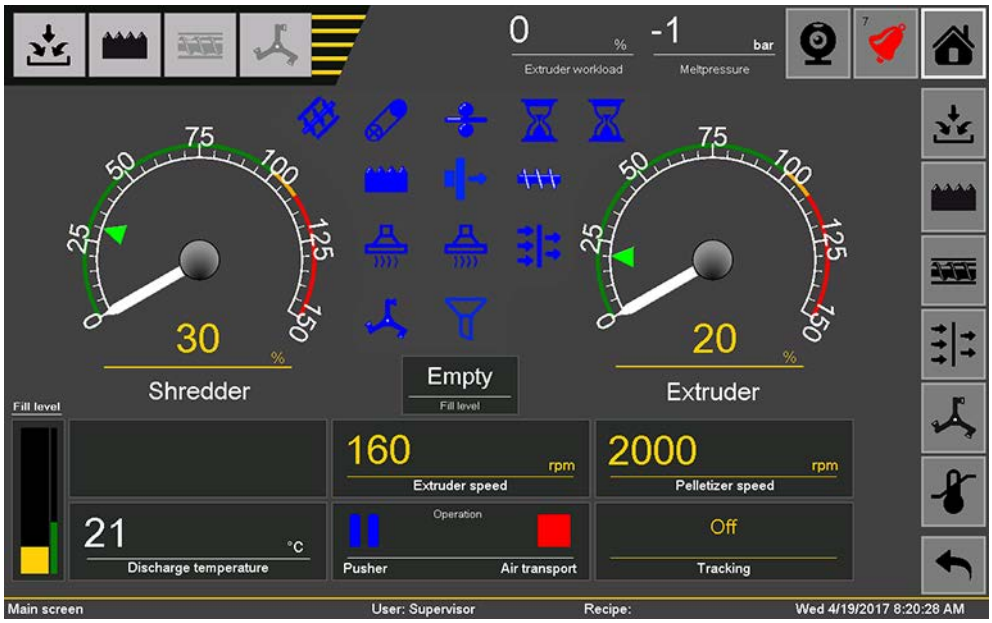


Figure 9-4: Window overview

Parameters	Description
Shredder	Current and setpoint values for shredder capacity. The arrow ◀ indicates the setpoint selected.
Fill level	Current fill level in the hopper.
Extruder	Current and setpoint values for extruder capacity. This arrow ◀ indicates the setpoint selected.
shredder speed	Setpoint for the shredder speed.
Discharge temperature	Current discharge temperature.
Extruder speed	Setpoint for the extruder speed.
Business	The operating states of the pusher and air transport are displayed here. ■ Stopped, ▶ started, ❚❚ paused
Pelletizer speed	Setpoint for the pelletizer speed.
speed adjustment	**On:** Pelletizer speed is automatically adjusted to the melt pressure. **Off:** Constant pelletizer speed.

9.3.2 Feeding window

Figure 9-5: Feeding window

	Hopper		Charging screw
	Conveyor belt		Dosing unit
	Roll feeder		

Tapping the icons opens a parameter window where additional settings can be configured. All parameters are then described below.

9.3.2.1 Feeding/hopper window

Figure 9-6: Feeder/hopper window

Parameters	Description
Status	The current fill level (empty/full) is displayed here.
Fill level	Current fill level in the hopper. This parameter is only available with ultrasound or laser sensors.
Fill level sensor	Depending on the material, sensors are more or less for determining the level. The desired fill level sensor can be set here. The type and number of sensors is order-specific.
	Fill level sensor minimum: The fill level sensor is located below the hopper. **Fill level sensor maximum:** The fill level sensor is located above the hopper. **Ultrasound sensor** **Laser sensor**

The following parameters are only available with ultrasound or laser sensors.

Parameters	Description
Fill level	Setpoint for fill level **full**.
Hopper level	Offset for sensor level.

9.3.2.2 Feeding / conveyor belt window

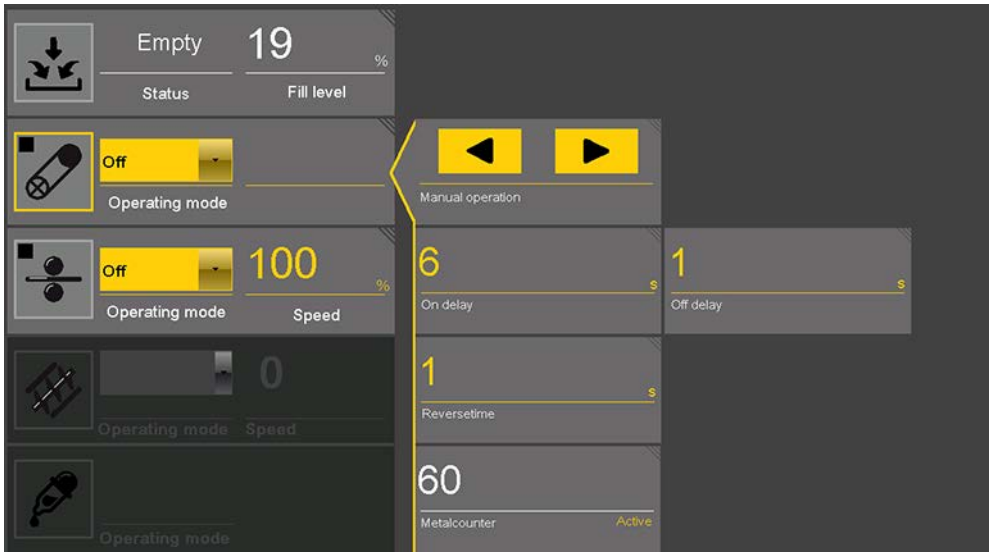


Figure 9-7: Feeding / conveyor belt window

Parameters	Description
Operating mode	**On:** Conveyor belt runs continuously. **Off:** Conveyor belt is switched off. **Auto:** Conveyor belt is controlled based on the fill level sensor
Manual operation	Manually move the conveyor belt regardless of the mode. ◀ Reverse ▶ Forward
On delay	Delay time for starting the conveyor belt, when the hopper has reached the empty level.
Off delay	Delay time for stopping the conveyor belt, when the hopper has reached the full level.
Reversetime	Time, in which the conveyor belt reverses after a metal alarm.
Metal counter reset	Reset metal counter to 0.
Metal counter	Number of metal alarms reported by the metal detector.

9.3.2.3 Feeding / roll feeder window

Figure 9-8: Feeding / roll feeder window

Parameters	Description
Mode of operation	**On:** Roll feeder runs continuously. **Off:** Roll feeder is switched off. **Auto:** Roll feeder is controlled based on the fill level sensor
Speed	Setpoint for the motor speed of the roll feeder.
Manual mode	Manually move the roll feeder regardless of the mode. ◀ Reverse ▶ Forward
Power-on delay	Delay time for starting the roll feeder, when the hopper has reached the empty fill level.
Power-off delay	Delay time for stopping the roll feeder, when the hopper has reached the full level.

9.3.2.4 Feeding / charging screw window

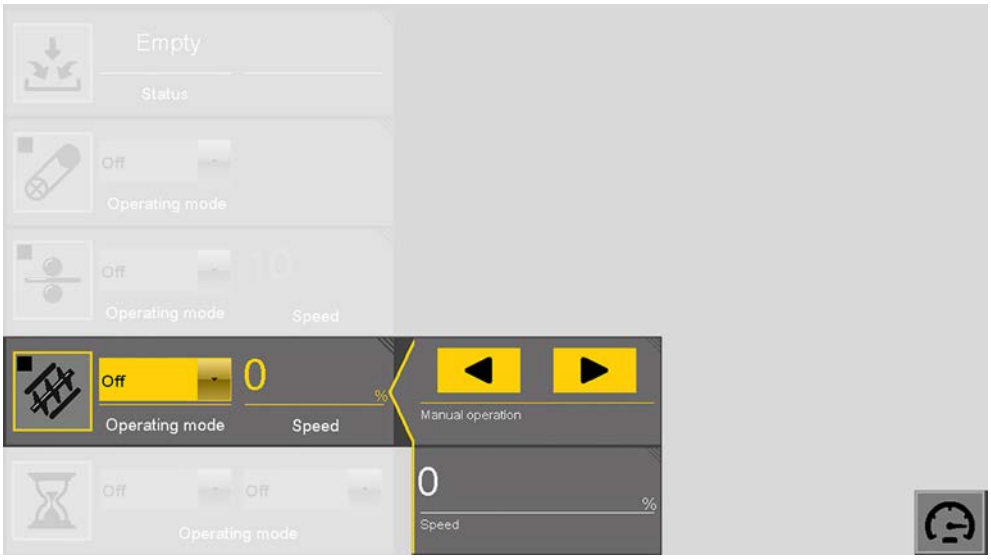


Figure 9-9: Feeding / conveyor screw window

Parameters	Description
Operating mode	**On:** Charging screw runs continuously. **Off:** Charging screw is switched off. **Auto:** Charging screw is controlled based on the fill level sensor.
Speed	Speed setpoint for the charging screw.
Manual operation	Manually move the charging screw regardless of the operating mode. ◀ Reverse ▶ Forward

9.3.2.5 Feeding – dosing window (optional)

Figure 9-10: Feeding / dosage window

Parameters	Description
Operating mode	**Off:** Dosage is switched off. **%:** Dosage in percent to the maximum possible dosage. **kg/h:** Dosage in kg/h. **Calibration:** Dosage in calibration mode.
Dosage 1 operating mode	**Off:** Dosage is switched off. **%:** Dosage in percent to the maximum possible dosage. **kg/h:** Dosage in kg/h. **Calibration:** Dosage in calibration mode.
Max. output	Display of the max. possible dosage.
Calibration	Starts the calibration process.

Calibration

Figure 9-11: Calibrate dosage window

Parameters		Description
Operating mode		**Off:** Dosage is switched off. **%:** Dosage in percent to the maximum possible dosage. **kg/h:** Dosage in kg/h. **Calibration:** Dosage in calibration mode.
Max. output		Display of the max. possible dosage.
Scan time		Desired measurement time.
Measurement 1,2,3		At least 3 measured results are entered here.
	OK	Confirm the test result.
	Cancel	Cancel calibration.
	Back	Close the window.

9.3.3 Shredder window

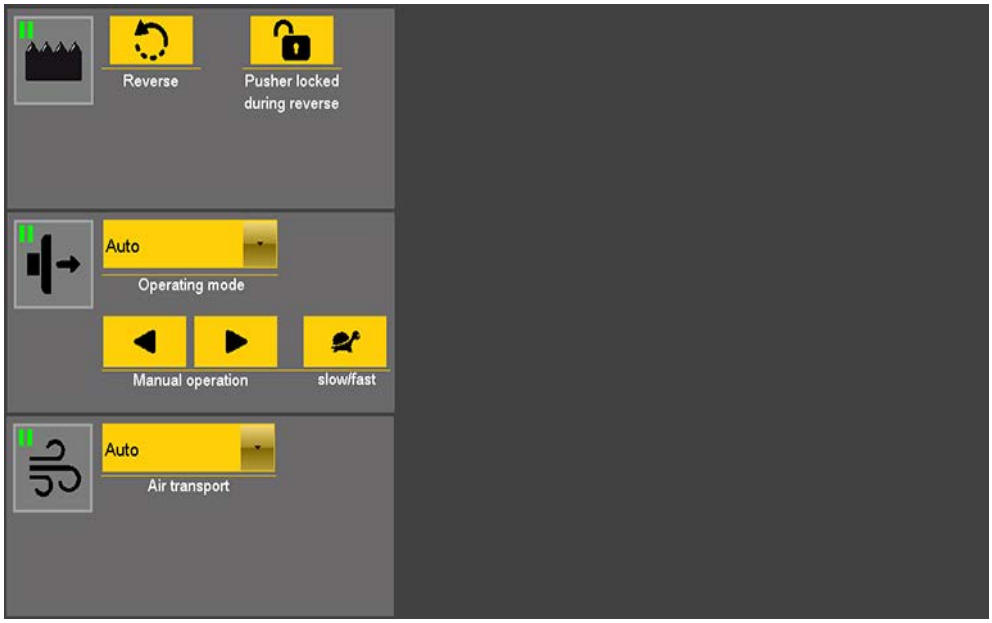


Figure 9-12: Window shredder

	Blade shaft		Air transport
	Pusher		

Tapping the icons opens a parameter window where additional settings can be configured. All parameters are then described below.

9.3.3.1 Shredder / blade shaft window

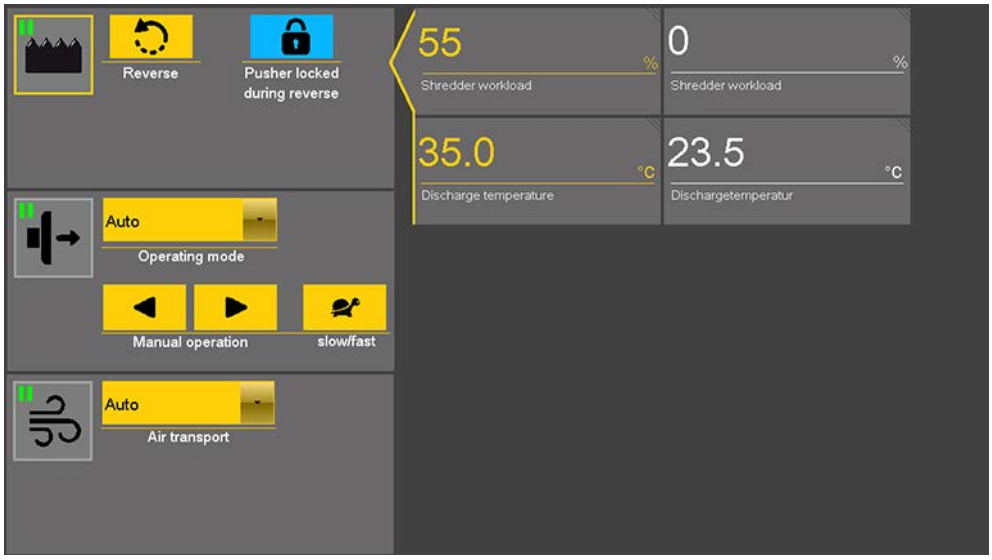


Figure 9-13: Shredder / blade shaft window

Parameters	Description	
Direction of rotation	Manually reversing of the blade shaft.	
Pusher blocked during reverse	Tap the button to keep the pusher in motion during the manual reverse, or stop it.	
		The pusher is in motion during manual reverse.
		The pusher is blocked during manual reverse.
Shredder speed (optional)	Setpoint for the shredder speed.	
shredder capacity	Setpoint for the shredder capacity.	
shredder capacity	Actual value of shredder capacity. When the setpoint is reached, the pusher is stopped.	
Discharge temperature	Upper limit for temperature in the shredder-extruder.	
Discharge temperature	Actual value for temperature in the shredder-extruder.	

9.3.3.2 Shredder / pusher window

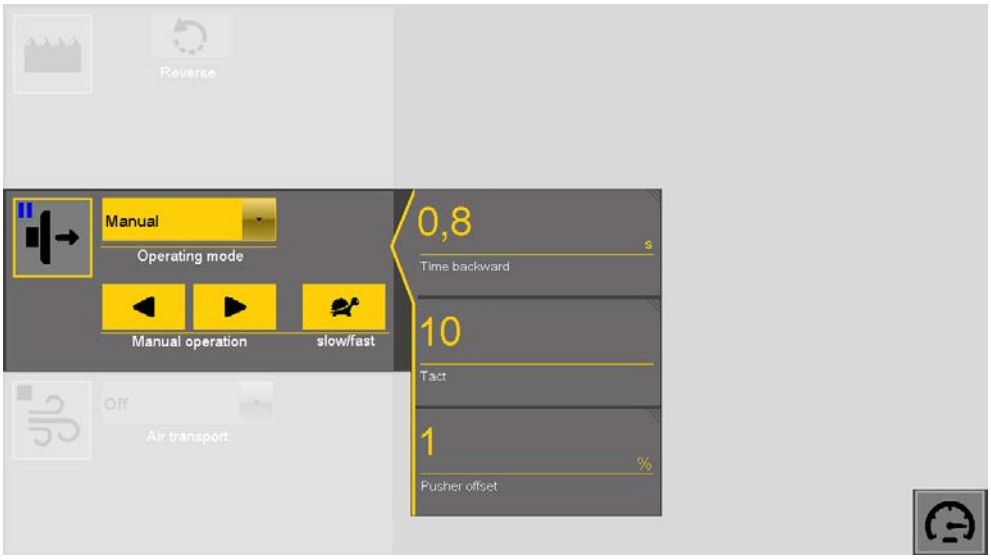


Figure 9-14: Shredder / pusher window

Parameters	Description
Operating mode	**Manual:** The pusher must be controlled manually via push-button. **Auto:** Automatic mode for harder materials that reach a certain shredder capacity. ■ The pusher moves forward until the setpoint for the shredder capacity is reached and then stops. ■ If the shredding capacity increases further to the offset value, the pusher returns at the set reversing time. ■ If the offset value is not reached, the pusher moves back only after falling below the setpoint of the shredder capacity. ■ This press cycle is repeated in accordance with the timing. ■ The pusher then moves back again to the rear limit switch and the entire cycle starts all over again. **Soft material**: Automatic mode for softer materials that do not reach a certain shredder capacity. ■ The pusher moves to the front limit switch. ■ The the pusher moves back at the set reversing time. ■ This press cycle is repeated in accordance with the timing. ■ The pusher then moves back again to the rear limit switch and the entire cycle starts all over again.

Parameters	Description
Manual operation	Manually move the pusher in Manual operating mode. ◀ Reverse, ▶ Forwards, Slow, Fast
Reversing time	Time for maximal reversing capacity. If the maximum reversing time is reached, the pusher reverses.
Timing	Maximum press cycles until pusher moves all the way back.
Pusher offset	If the setpoint for shredder capacity + pusher offset is achieved, the pusher moves back in Auto operating mode.

9.3.3.3 Shredder / air transport window

Figure 9-15: Shredder / air transport window

Parameters	Description
Air transport	**Off**: Compressed air is switched off. **On**: Compressed air is switched on. **Auto**: Compressed air is switched automatically on and off depending on extruder capacity. **Timing:** Compressed air is switched on and off by timer.
Transport fan (optional)	**Off**: Transport fan is switched off. **On**: Transport fan is switched on. **Auto**: Transport fan is switched on and off automatically depending on extruder capacity.
Switch-on time	Time that compressed air is switched on during Time mode of operation.
Switch-off time	Time that compressed air is switched off during Time mode of operation.

9.3.4 Extruder window

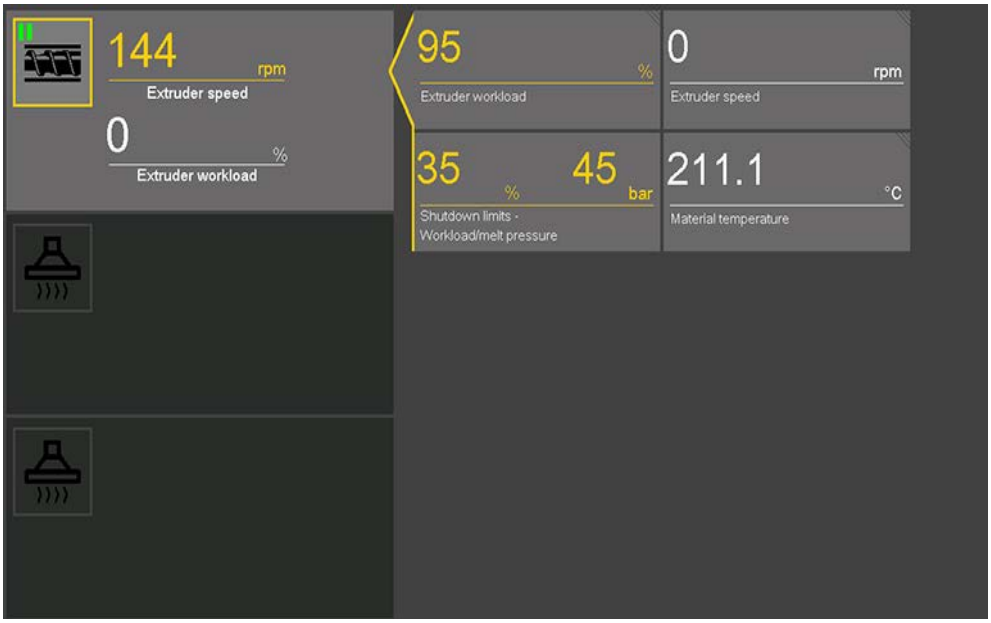


Figure 9-16: Extruder window

	Extruder		Venting unit

9.3.4.1 Extruder / settings window

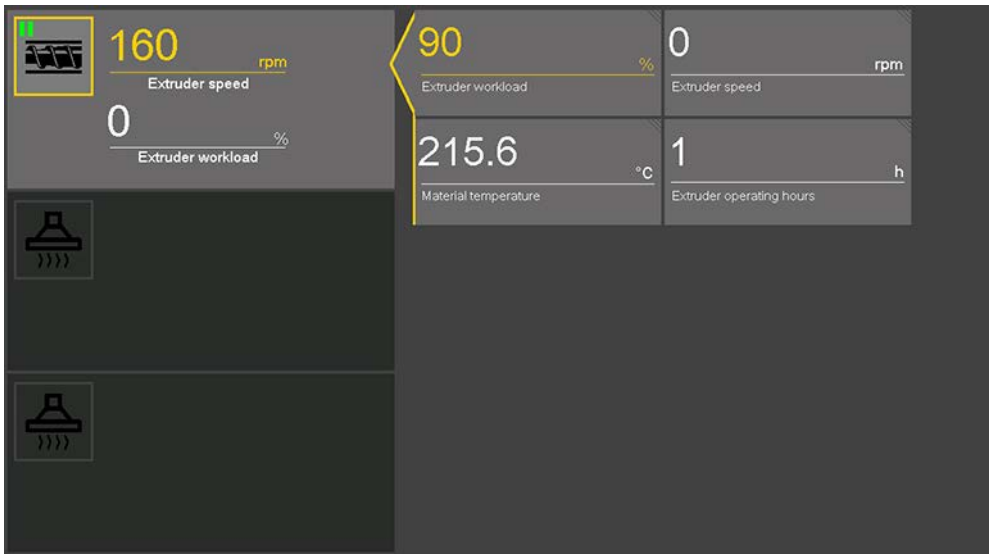


Figure 9-17: Extruder / settings window

Parameters	Description
Extruder speed	Current and setpoint values for extruder speed.
extruder capacity	Current and setpoint values for extruder capacity.
Material temperature	Current melt temperature in the adapter/extruder.
Extruder runtime	Extruder operating hours.
Max. melt pressure	Setpoint for maximum melt pressure.

9.3.5 Screen changer window

9.3.5.1 Double piston screen changer without backflush

Figure 9-18: Filtration / double piston screen changer without backflush

Parameters	Description
Operating mode	**Auto:** Piston moves to the end position when you press the corresponding arrow keys. **Manual:** Piston must be moved manually using the corresponding arrow keys. One piston must be in production position so that the other pistons can be moved.
Melt pressure	Current melt pressure upstream of the screen changer.
Manual operation cylinder, down	Buttons for manually moving the lower screen changer piston.
Manual operation cylinder, up	Buttons for manually moving the upper screen changer piston.
Screen change pressure	Setpoint for the screen changer alarm. When a screen change needs to be carried out, an alarm message is output.

9.3.5.2 Double piston screen changer with backflush

Figure 9-19: Filtration / double piston screen changer with backflush

Parameters	Description
Operating mode	**Auto:** Piston moves to the end position when you press the corresponding arrow keys. **Manual:** Piston must be moved manually using the corresponding arrow keys. One piston must be in production position so that the other pistons can be moved.
Melt pressure	Current melt pressure upstream of the screen changer.
Manual operation cylinder, down	Buttons for manually moving the lower screen changer piston.
Manual operation cylinder, up	Buttons for manually moving the upper screen changer piston.
Backflush pressure	Pressure setpoint for the start of an automatic backflushing process.
backflush	Key for one-time manual backflush.
Position	Current position of the pistons.
Position status	The current operating status for filtration is displayed here.
Number of backflushes	Current and setpoint values back-flush cycles before a screen changer alarm is displayed.
 Settings	The break time, venting time and backflushing time can be set here.

9.3.6 Downstream equipment window

Figure 9-20: Downstream equipment window

	Pelletization unit		Gas control
	Weighing function		

Tapping the icons opens a parameter window where additional settings can be configured. All parameters are then described below.

9.3.6.1 Downstream equipment / pelletization window

Figure 9-21: Downstream equipment / pelletization window

Parameters	Description
Pelletizer speed	Setpoint for the pelletizer speed.
Melt pressure	Current melt pressure before pelletization.
Tracking	**On:** Pelletizer speed is automatically adjusted to the melt pressure. **Off:** Constant pelletizer speed.
Reset tracking after machine shut down	**disabled:** The speed adjustment will not be reset. **enabled:** The speed adjustment will be reset.
Water tank operating mode	The filling of the water bath is set here. **On:** Water is continuously replenished. **Off:** Filling is switched off. **Auto:** Water level will be controlled automatically by fill level sensors.
Speeddifference per bar (psi)	Value at which the pelletizer speed will be adjusted for a change in pressure.
Water temperature	Current and set temperature in the water bath.

9.3.6.2 Downstream equipment / weighing window

Figure 9-22: Weighing window

Parameters	Description
Operating mode	**Pounds:** Weight measured in pounds. **kg:** Weight measured in kg.
Calculated output	Calculated output per hour.
Reset total weight	Total weight is reset to zero (zero=0).
Total weight	Total weight of the measured output since the total weight was reset to zero.

9.3.6.3 Downstream equipment / gas control window

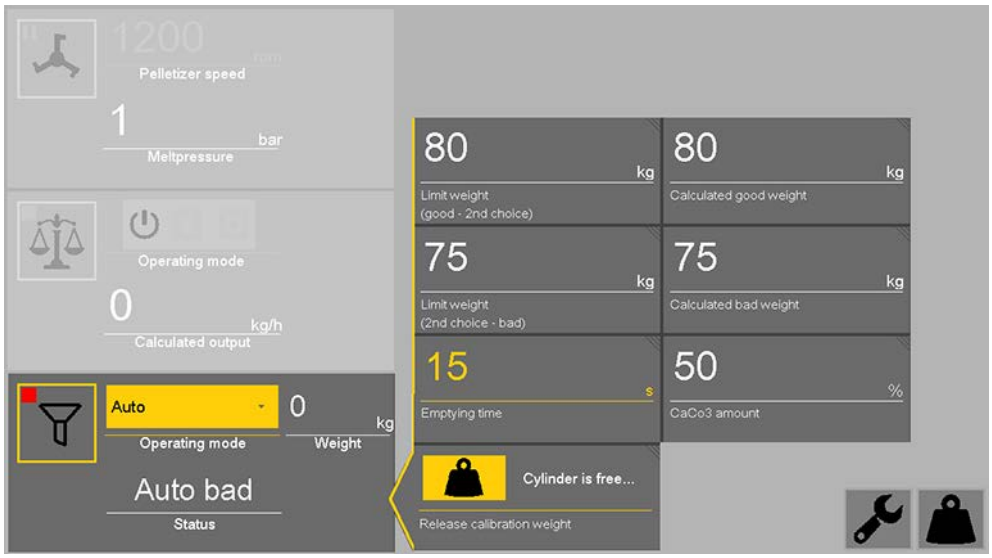


Figure 9-23: Downstream equipment / gas control window

Parameters	Description
Operating mode	**Off:** Switch off fan, open both pneumatic pushers. **Auto:** The gasometer switches the bypasses automatically depending on the weight evaluation. **Perm. Good:** Bypass is set permanently to good material. **Perm. Bad:** Bypass is set permanently to bad material. **Perm. 2 choice:** Bypass is set permanently to 2nd choice.
Status	The current operating mode is displayed here.
Weight limit (good - 2nd choice)	Weight limit for 2nd choice. Greater than or equal to this value, the pellets are declared good.
Calculated weight limit for good material	Weight limit for 2nd choice, estimated upward to incl. calcium carbonate.
Weight limit (2nd choice - bad)	Weight limit for 2nd choice - bad. Greater than or equal to this value and less than value good – 2nd choice, the pellets are declared 2nd Choice – declared bad.
Calculated weight limit for bad material	Weight limit for 2nd choice – bad, estimated upward to incl. calcium carbonate.
Emptying time	Time for emptying cycle.
CaCo3 quantity	Displays the currently supplied amount of calcium carbonate. Signal comes from the dosing unit.
Release calibration weight	Calibration is applied automatically to the load cell.

Parameters		Description
	Settings	The weight requirements can be set here.
	Calibration	Opens the calibration window. ➲ see section 9.3.6.4 Calibrate weighing window

9.3.6.4 Calibrate weighing window

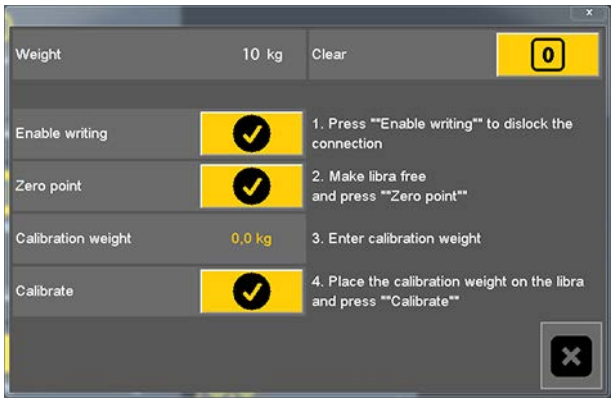


Figure 9-24: Calibrate weighing window

1 Press the **Release communication** button.

✔ This starts the calibration process.

2 Check whether the weighing container is empty and suspended freely.

3 Press the **Point of origin** button.

4 Shows the weight info does not equal 0, press the zeros button.

✔ The point of origin is corrected.

5 Enter calibration in weighing container and wait until the weight display stabilizes.

6 Enter calibration weight.

7 Enter calibration weight in the field.

8 Press calibrate button.

= Scale is successfully calibrated.

9.3.7 Temperatures window

In these menus all process-relevant temperatures for the separate parts are displayed and configured.

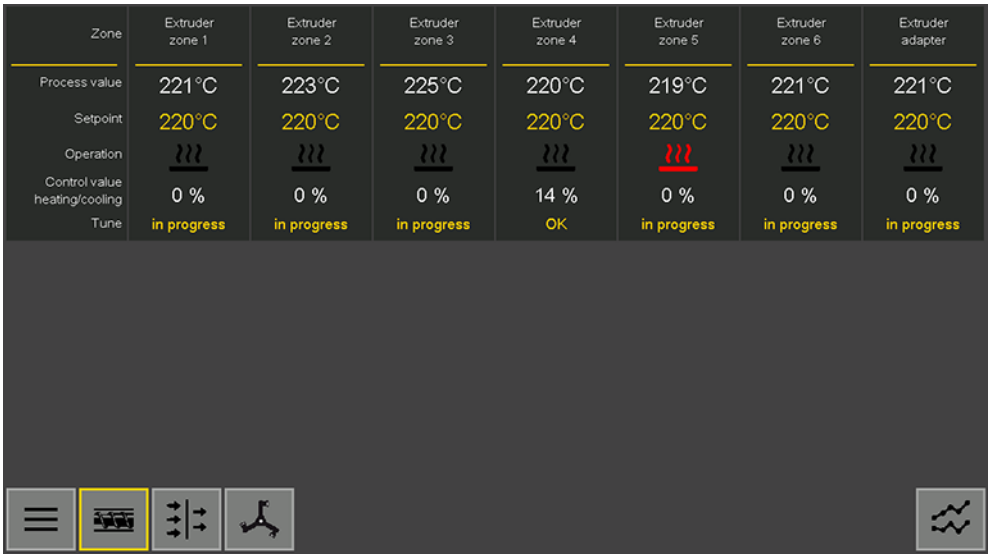


Figure 9-25: Temperatures window

Key		Description
	Cooling process	If the icon is illuminated, this zone is cooling down.
	Warm-up process	If the icon is illuminated, this zone is warming up.
	Conveyor screw	Tap the button to open the window with the temperature table for the conveyor screw. (optional), extruder, filtration or pelletization.
	Extruder	
	Filtration	
	Pelletization unit	
	Automatic warm-up (optional)	Tap the button to open the window to set the times for the machine to warm up automatically.
	Trend	Opens the Trend window.

9.3.8 Alarm window

Alarms are displayed in the info bar with a red icon, and the number shows the amount of active alarms. Press this button to open a window containing the active alarms.

The alarms are differentiated on the basis of color, with confirmed alarms displayed lighter.

Red ..... Alarm requires confirmation
Yellow . Alarm does not require confirmation
Blue..... Operational message
White... Historical alarm

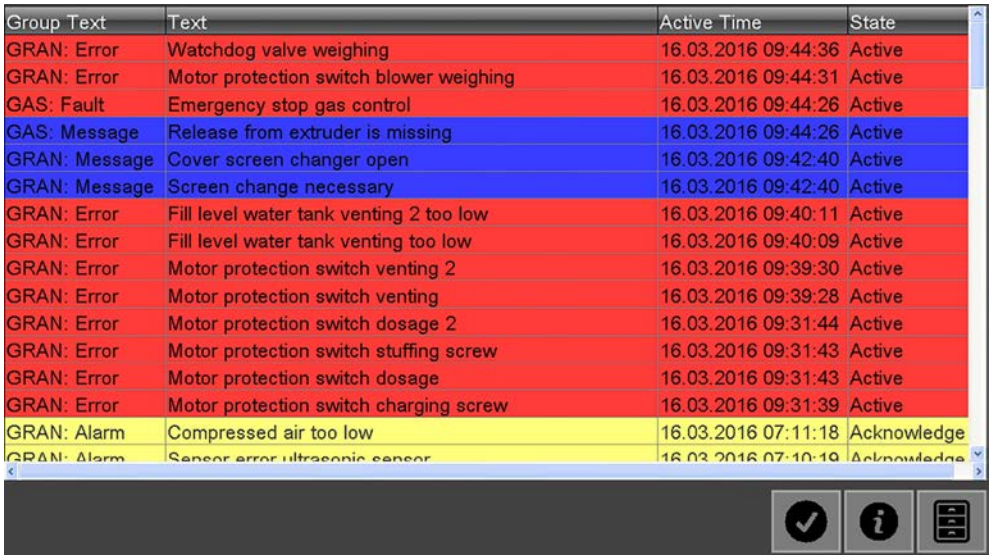
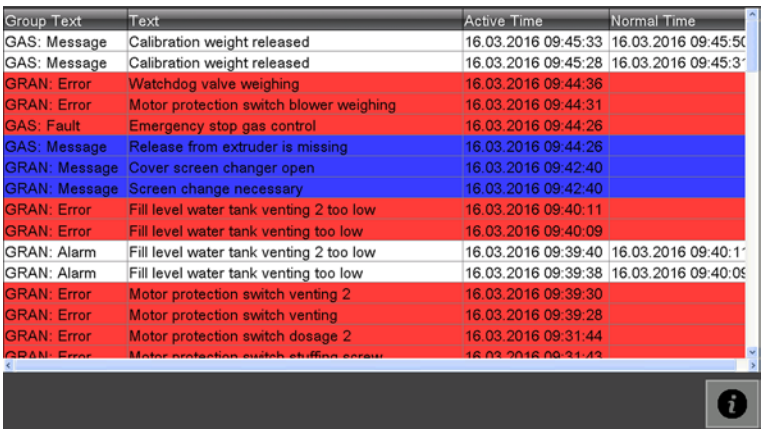


Figure 9-26: Alarms window

Key		Description
	Acknowledge	Use this key to confirm the alarm. Some alarms such as emergency-off messages must be confirmed. If the cause for the alarm is eliminated and it has been confirmed, it is moved to historical alarms.
	Info	Additional information on the selected alarm is displayed.
	Alarm archive	Opens the alarm archive.

9.3.9 Alarm archive window

Displays a list of historical alarms.



Group Text	Text	Active Time	Normal Time
GAS: Message	Calibration weight released	16.03.2016 09:45:33	16.03.2016 09:45:5(
GAS: Message	Calibration weight released	16.03.2016 09:45:28	16.03.2016 09:45:3'
GRAN: Error	Watchdog valve weighing	16.03.2016 09:44:36	
GRAN: Error	Motor protection switch blower weighing	16.03.2016 09:44:31	
GAS: Fault	Emergency stop gas control	16.03.2016 09:44:26	
GAS: Message	Release from extruder is missing	16.03.2016 09:44:26	
GRAN: Message	Cover screen changer open	16.03.2016 09:42:40	
GRAN: Message	Screen change necessary	16.03.2016 09:42:40	
GRAN: Error	Fill level water tank venting 2 too low	16.03.2016 09:40:11	
GRAN: Error	Fill level water tank venting too low	16.03.2016 09:40:09	
GRAN: Alarm	Fill level water tank venting 2 too low	16.03.2016 09:39:40	16.03.2016 09:40:1'
GRAN: Alarm	Fill level water tank venting too low	16.03.2016 09:39:38	16.03.2016 09:40:0(
GRAN: Error	Motor protection switch venting 2	16.03.2016 09:39:30	
GRAN: Error	Motor protection switch venting	16.03.2016 09:39:28	
GRAN: Error	Motor protection switch dosage 2	16.03.2016 09:31:44	

Figure 9-27: Alarm archive window

9.3.10 Cockpit window

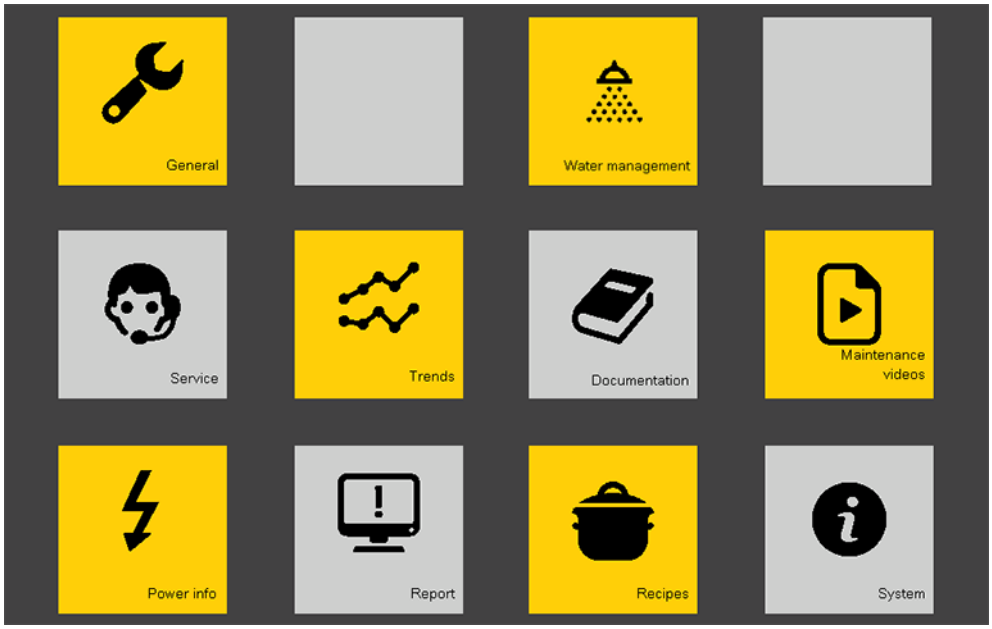


Figure 9-28: Cockpit window

Key		Description
	Settings	➲ see section 9.3.11 Settings window
	Water management (optional)	Displays the temperature of the cooling water shredder and inverter. Additional parameters are the flow of the cooling water and the set point for the temperature limit.
	Maintenance schedule (optional)	This is where the maintenance schedule for the machine is stored. Any maintenance activities are then output as a message.
	Trend	➲ see section 9.3.14 Trend window
	Service	Important service information.
	Maintenance videos (optional)	Videos of the most important maintenance activities can be viewed here.
	Power info (optional)	Displays the current power rating of the machine.
	Data recording (optional)	Operating data recording as CSV file.
	recipe	➲ see section 9.3.13 Recipe window
	System info	Panel system information

9.3.11 Settings window

Figure 9-29: Settings window

Parameters	Description
Language	The display language can be changed here.
Unit of pressure	bar or psi.
Unit of temperature	°C or °F.
Signal horn	Switch on/off signal horn for alarm messages.
Time zone	Set the time zone.
Date/time	Set date / time.
Backlighting	Adjust the screen's backlighting.

Parameters	Description
Limit for extruder cut-out pressure	The machine is switched off as soon as the current melt pressure is less than the limit set for the extruder cut-out pressure.
Limit for extruder cut-out load	The machine is switched off as soon as the current utilization or load of the extruder is less than the limit set for the extruder cut-out load.

Key		Description
	Configuration	Accessible only for NGR employees.

9.3.12 Data recording window

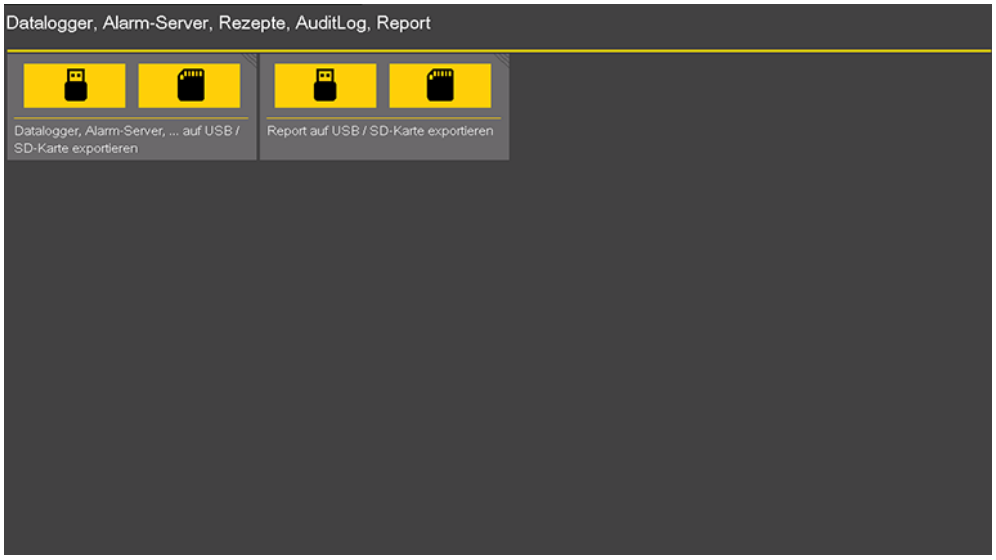


Figure 9-30: Data recording window

Key		Description
	Data logger, alarm server, … export to USB / SD card	By tapping the icon, the data logger and alarm server are saved to USB stick. To do so, a USB stick must be plugged into the USB port.
		Saving of data logger and alarm server information to SD card. The SD card must be plugged in at the back of the control terminal.
	Export report to USB / SD card	By tapping the icon, the audit log and report are saved to USB stick. To do so, a USB stick must be plugged into the USB port.
		Saving of AuditLog and report to SD card. The SD card must be plugged in at the back of the control terminal.

9.3.13 Recipe window

This window allows you to manage a wide range of recipes. A recipe includes the settings for the control terminal, where a machine recipe includes all the settings while a material recipe only includes the material-specific settings.

Figure 9-31: Recipe window

Key		Description
	Save	Saves the current material or machine recipe to the memory card of the control terminal.
	Load	Loads the already saved material or machine recipe from the memory card of the control terminal to the control unit.
	Export	Exports the current material or machine recipe to an external memory device.
	Import	Imports the current material or machine recipe from an external memory device.
	Delete	Deletes a material or machine recipe.

9.3.14 Trend window

The most important process data is presented here in chart form.

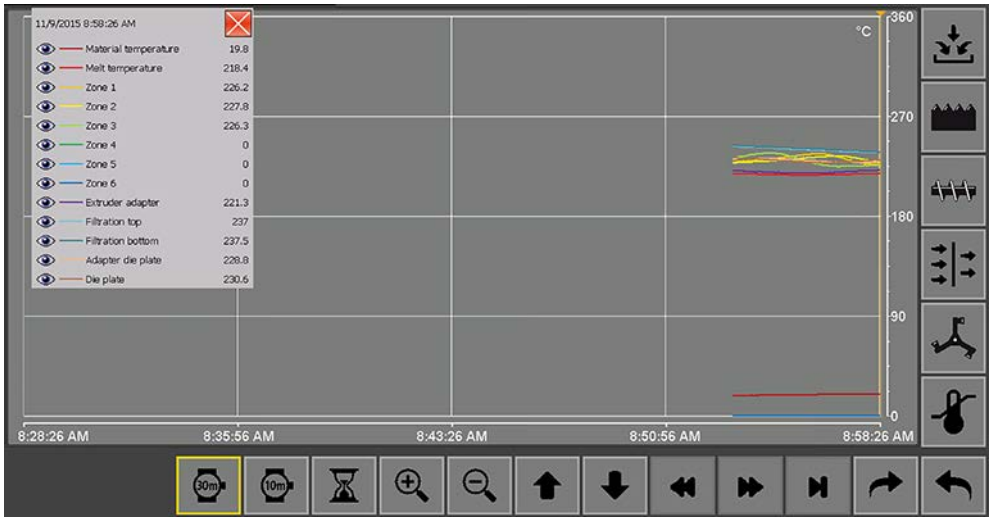


Figure 9-32: Trend window

Key	Description	Key	Description
	Displays the last 30 minutes		Displays the last 10 minutes
	Enlarge		Reduce
	Scroll up		Scroll down
	Historical data		Continue scrolling

9.3.15 Automatic Heating

In this window time can be set for the machine to start heating up automatically.

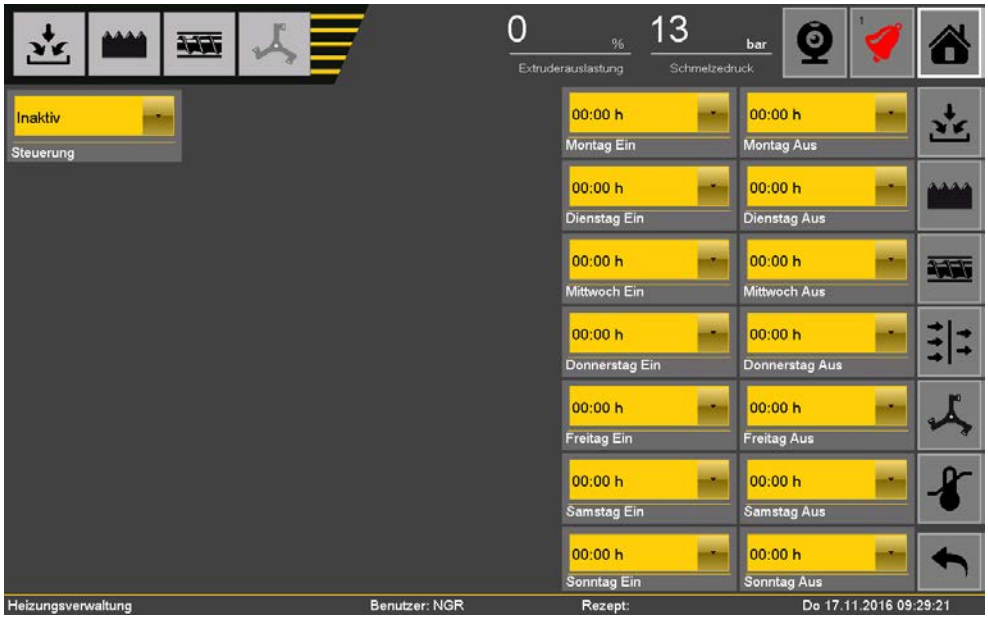


Bild 9-33: Window automatic heating

Parameters	Description
Activ / Inactiv	Automatic heating can be set to activ or inactiv.
Max. Temp.	The maximum temperature for the automatic heating up is fixed.
Monday on / off	Each day a time can be set when the machine heats up automatically.

10 Cleaning

User

10.1 Safety instructions regarding cleaning

Warning

Risk of injury when cleaning!

- Move the main switch to OFF and let the machine cool down.
- Wear close-fitting clothing, protective helmet, protective footwear and protective gloves.
- Tie long hair.
- Make sure the space is organized and clean. Tools and parts lying about can cause accidents.
- Make sure that no fluids enter the electrical components or inside the machinery when cleaning.

Attention

Improper disposal may result in damage to the environment!

Serious environmental harm.

- Dispose of all cleaning waste according to local regulations.

10.2 Cleaning agents

Use the following cleaning agents:

- Water and soap
- Compressed air

Do not clean the machine with the following cleaning agents:

- Alkali or acid
- Abrasive agents
- Polishing wool
- Scrapers, razor blades or spatulas
- Highly volatile solvents such as benzine, trichlorethylene, etc.

10.3 Cleaning activities

1. Switch off the machine and secure against being switched on again.
2. Let equipment cool off.
3. Wipe off all component surfaces with a damp cloth.

= The machine has been cleaned.

11 Maintenance

11.1 Safety instructions regarding maintenance

Information about oils. Required for maintenance are listed in the section on Operating Materials.

If during regular inspections increased wear is detected, the required maintenance intervals should be shortened according to the actual wear and tear.

For questions about maintenance work and intervals, contact the manufacturer.

➲ see section 2.7.6 Safety information about hot surfaces

Purchased components should be serviced according to the operating instructions of the respective manufacturer.

➲ See technical documentation provided with order, in particular, the section on supplier documentation

DANGER

Risk of injury from switching the machine back on during maintenance or repair work!

Electrical shock and injuries from moving parts may result.

- Work on electronics and live components may only be carried out by a qualified electrical specialist.
- Before beginning work activities on the electronics, switch the main switch to 0 and disconnect the equipment from the power supply. Observe all safety regulations.
  - Disconnect from power supply
  - Secure against reconnection
  - Check that no voltage is present
  - Ground and short-circuit the equipment
  - Cover adjacent live parts
- Wait at least 10 minutes after turning off the recycling machine, as the capacitors retain voltage during this time.

WARNING

Risk of injury during maintenance work!

- Wear close-fitting clothing, protective helmet, protective footwear and protective gloves.
- Tie long hair.
- Make sure the space is organized and clean. Tools and parts lying about can cause accidents.
- The machine heats up during operation. Observe safety information for hot surfaces.
- The machine is electrically energized when in operation. Observe the safety information regarding electrical equipment.

11.2 Maintenance schedule

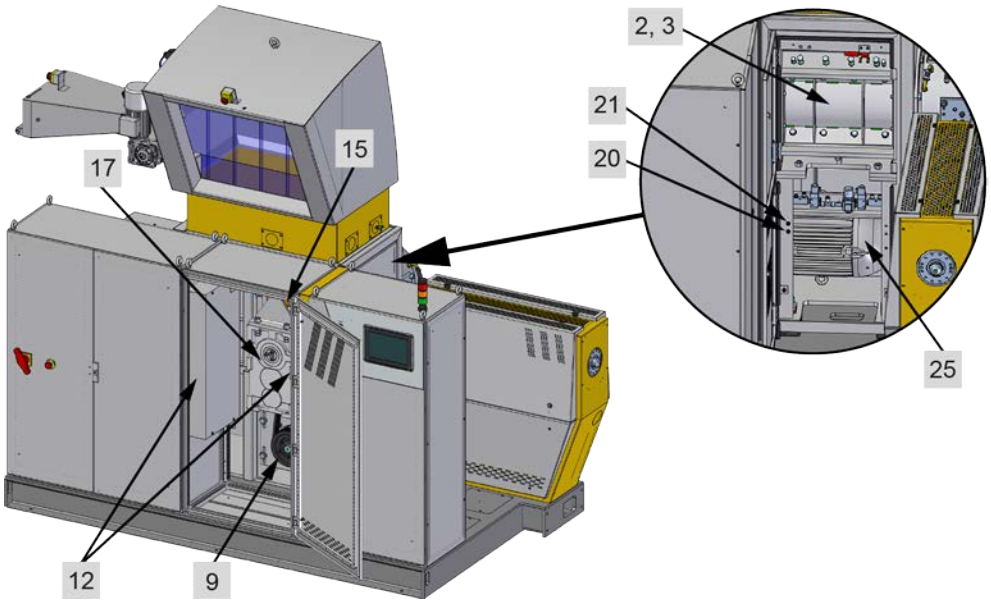


Figure 11-1: Lubrication points S:GRAN 65-50,75-50 Front

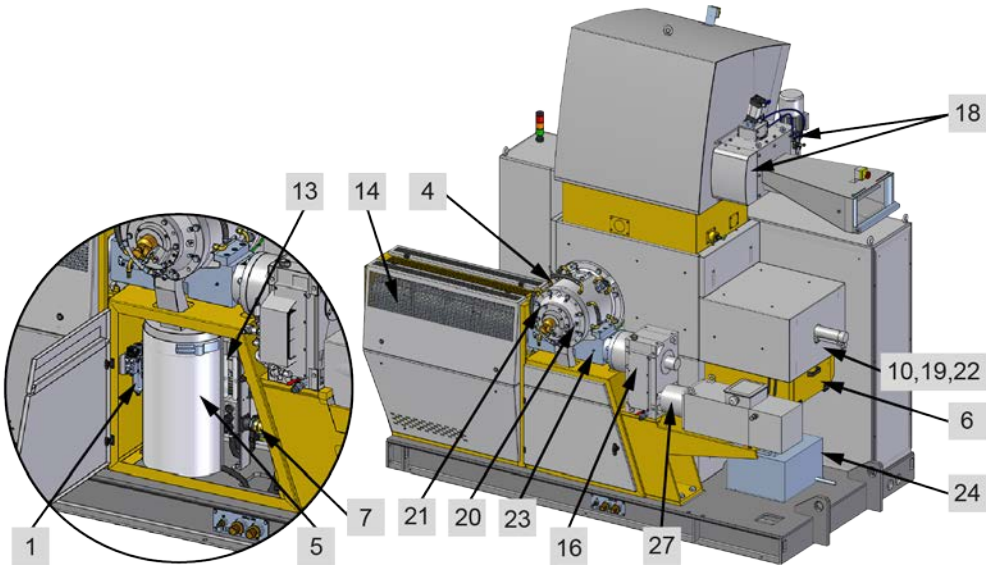


Figure 11-2: Lubrication points S:GRAN 65-50 Back

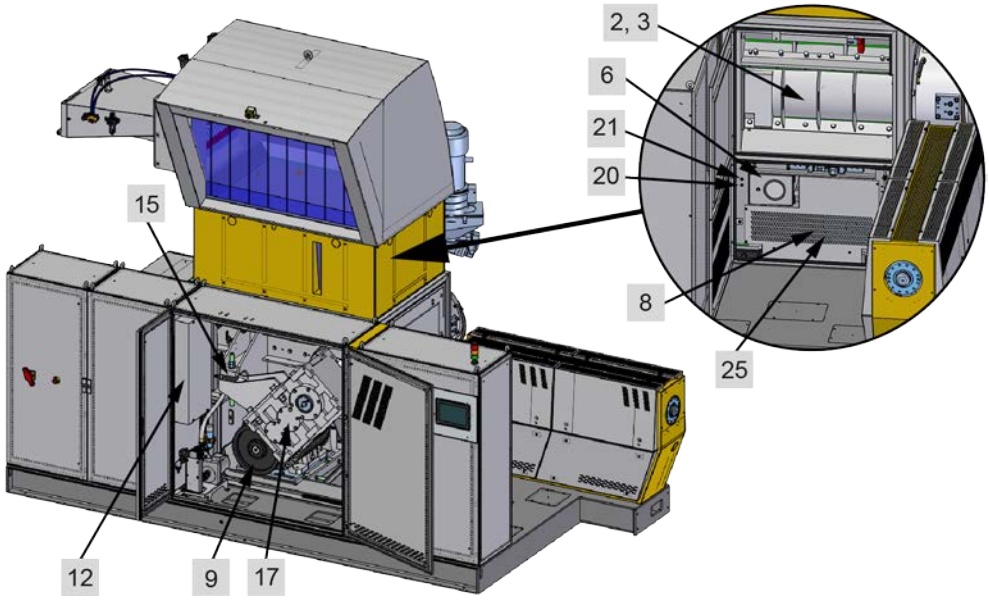


Figure 11-3: Lubrication points S:GRAN 75-70,85-70,95-70,105-100,125-100 Front

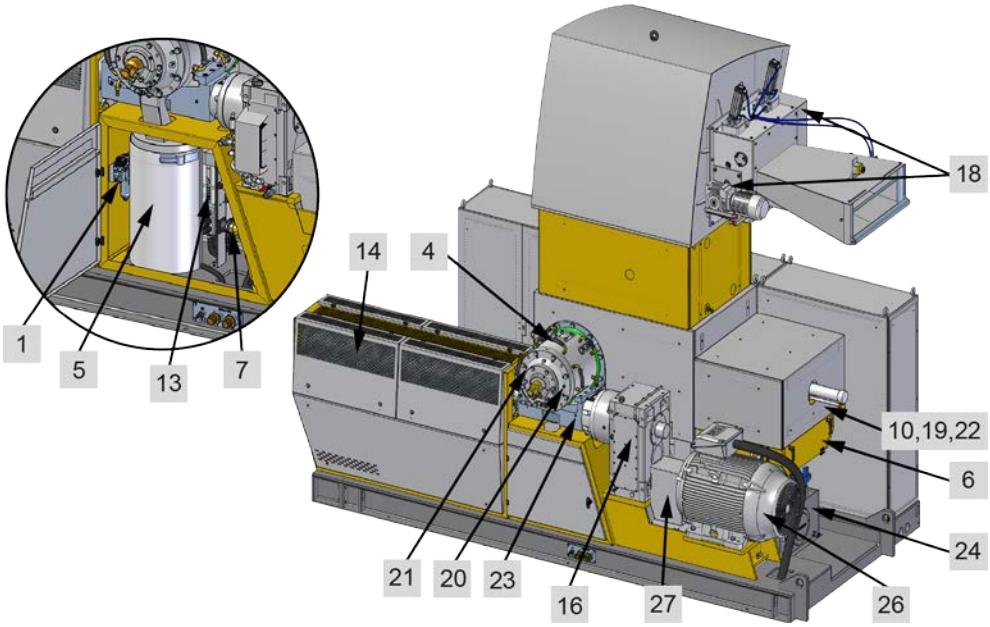


Figure 11-4: Lubrication points S:GRAN 75-70,85-70,95-70,105-100,125-100 Back

Intervals	Maintenance work		No.	Lubricants	
				Amount	Operating material
Daily	Clean the machine and work area	F	—	—	—
	Check the machine visually	F	—	—	—
	Check the noise level of the machine	F	—	—	—
Weekly	Empty the water separator	F	1	—	—
	Check the air and water supply	E	—	—	—
	Check the lower stationary blade	G	2		Aluminum paste
	Check the upper stationary blade, shredder blade and blade holder	G	3		Aluminum paste
	Check the cutter sleeve for the blade and replace, if necessary	G	4		Aluminum paste
	Check fill level of dust bag and empty, if necessary	F	5	—	—
	Check fill level of dust boxes and empty, if necessary	F	6	—	—
	Check fill level of dust extractors and if necessary empty (optional). ➲ see the user manual of the product manufacturer	F	—	—	—
Monthly	Check the mechanical connections	G	—	—	—
	Clean the filter for the cooling water supply	G	7	—	—
	Clean the filter for the shredder fan (optional)	G	8	—	—
	Check, tighten and clean the V-belt shredder drive and replace, if necessary	G	9	—	—
	Check the sliding bars for the pusher	G	10	—	—
Quarterly per year	Tighten electrical terminal points	H	—	—	—
Annually	Check the protective devices	E	—	—	—
	Check the coolant for the frequency converter (S:GRAN 105-100 or higher)	F	—	—	Coolant
	Check the air conditioner electric cabinet and clean, if necessary	H	12	—	—

Intervals	Maintenance work		No.	Lubricants	
				Amount	Operating material
	Check the sight glass for the water distributor and clean, if necessary	G	13	—	—
	Clean the heating and cooling fan	G	14	—	—
	Service the dust extractor (optional) ➲ see the user manual of the product manufacturer	E	—	—	—
Semi-annually	Replace rubber buffer for gear suspension	G	15	—	—
300 h (once after initial startup)	Change the oil for the extruder gearbox	G	16		
	S:GRAN 65-50			8 l	Gear oil Amounts listed are recommended values. Observe the oil level indicator!
	S:GRAN 75-50			11 l	
	S:GRAN 65-70			8 l	
	S:GRAN 75-70			11 l	
	S:GRAN 85-70			15 l	
	S:GRAN 95-70			20 l	
	S:GRAN 105-100			26 l	
	S:GRAN 125-100			37 l	
300 h (once after initial startup)	Change oil for the shredder gear	G	17		
	S:GRAN 65-50			6 l	Gear oil Amounts listed are recommended values. Observe the oil level indicator!
	S:GRAN 75-50			8 l	
	S:GRAN 65-70			6 l	
	S:GRAN 75-70			8 l	
	S:GRAN 85-70			15 l	
	S:GRAN 95-70			15 l	
	S:GRAN 105-100			20 l	
	S:GRAN 125-100			37 l	
500 h	Check oil levels and refill, if necessary	G	—		Gear oil
1000 hours	Regrease the flanged bearings for the roll feeder (optional accessory)	G	18	10 g	Grease

Intervals	Maintenance work		No.	Lubricants	
				Amount	Operating material
	Regrease joint eye for hydraulic cylinder	G	19	10 g	Grease
	Regrease spherical roller bearings for shredder shaft	G	20	10 g	Grease
	Regrease radial shaft seal ring for the shredder	G	21	30 g	Grease
3500 h	Replace the pusher seals	G	22	—	—
	Regrease sealing bush on intake housing	G	23	5 g	Sealing grease
	Change oil for hydraulic unit	G	24	60 l	Hydraulic oil Amount listed is a recommended value. Observe the oil level indicator!
	Regrease shredder motor	G	25		Refer to type plate for gear
	Regrease extruder motor (not applicable for S:GRAN 65-50)	G	26		Refer to type plate for gear
3500 operating hours or every 18 months at the latest	Change the oil for the extruder gearbox	G	16		
	S:GRAN 65-50			8 l	Gear oil Amounts listed are recommended values. Observe the oil level indicator!
	S:GRAN 75-50			11 l	
	S:GRAN 65-70			8 l	
	S:GRAN 75-70			11 l	
	S:GRAN 85-70			15 l	
	S:GRAN 95-70			20 l	
	S:GRAN 105-100			26 l	
	S:GRAN 125-100			37 l	
3500 operating hours or every 18 months at the latest	Change oil for the shredder gear	G	17		
	S:GRAN 65-50			6 l	Gear oil
	S:GRAN 75-50			8 l	
	S:GRAN 65-70			6 l	

Intervals	Maintenance work		No.	Lubricants	
				Amount	Operating material
	S:GRAN 75-70			8 l	Amounts listed are recommended values. Observe the oil level indicator!
	S:GRAN 85-70			15 l	
	S:GRAN 95-70			15 l	
	S:GRAN 105-100			20 l	
	S:GRAN 125-100			37 l	
If necessary,	Replace lower stationary blade	G	2	—	Aluminum paste
	Replace upper stationary blade	G	3	—	Aluminum paste
	Replace shredder blades	G	3	—	Aluminum paste
	Replace shredder blade and blade holder	G	3	—	Aluminum paste
	Replace elastomeric spider for shaft coupling	G	27	—	—
	Remove/replace extruder screw	G	—	—	—
	Disassemble and rebuild extruder screw	G	—	—	—
	Replace sliding bars for pusher	G	10	—	—
	Replace coolant for frequency converter	F	11	—	Coolant

11.2.1 Clean the machine and work area

User

- Clean the machine and work area, taking into account the safety instructions.
  - ➲ See section 10 Cleaning

= Machine and work area have been cleaned.

11.2.2 Check the machine visually

User

- Check the machine for visible damage and fix any damage without delay. Consult the proper personnel in doing so.

  Visually inspect the following:
  - Tightness
  - Electrical components and contacts
  - Safety signs and signage
  - Damage to protective covers, holders, etc.
  - Corrosion spots
  - Cracks and/or damage to paintwork

= Inspect the machine visually.

11.2.3 Check the noise level

User

- Check the machine for unusual noises. Consult with the proper personnel in case of any irregularities.

= The noise level of the machine has been checked.

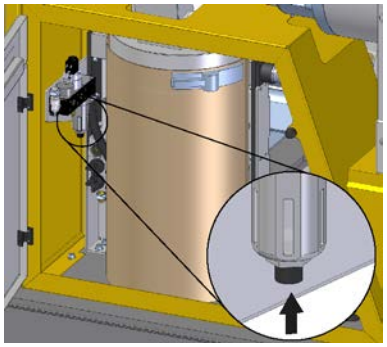
11.2.4 Empty the water separator

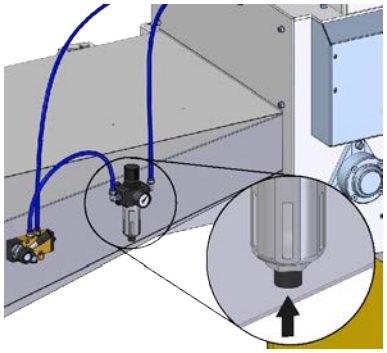
User

1 Check the water separator for excess fluid.

2 Wipe off excess liquid.

Use a dry, absorbent cloth at the bottom of the fitting of the water separator as shown in the picture.





= Water separator is emptied.

11.2.5 Check the air and water supply

Supervisor

- The cooling and fresh water supply must be provided by the customer.
- Compliance with the specified values must be checked according to contract.

= Air and water supply have been checked.

11.2.6 Check the lower stationary blade

Mechanical specialist - 2nd person required for unskilled work

Feeler gauge

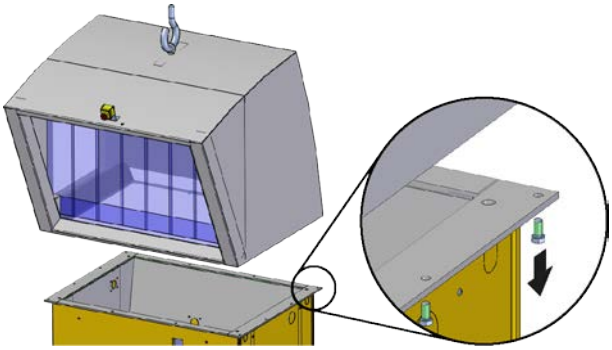
CAUTION

Risk of injury from cuts!

When carrying out maintenance activities on the shredder shaft there is a risk of injury from the sharp edges of the blades.

- Always wear hand protection and protective clothing when performing maintenance activities.

1. Switch off the machine and secure against being switched on again.
2. Loosen the screws for the protective hood.



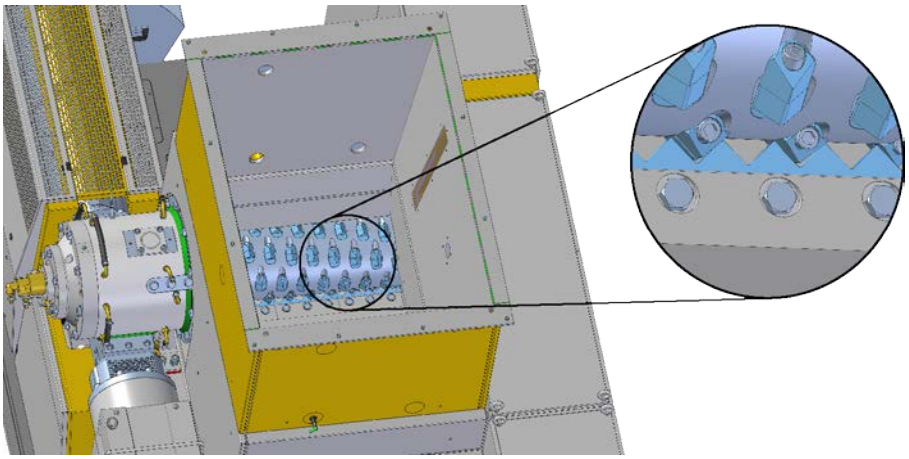
3. Lift the protective cover with a crane.

   ➲ see section 5.1.3 Transport of protective hood

4. Climb on hopper to visually inspect the shredder shaft and the lower stationary blade. There are two types of shredder shafts:

   – Shredder shaft without blade holder
   – Shredder shaft with blade holders

   The inspection of the shredder shaft is carried out the same for both.



Blade with the blade holder

5 Perform visual inspection.

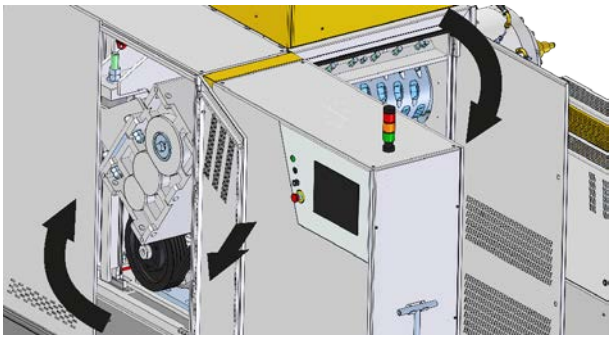
Move the shredder shaft by hand to carry out the check. One specialist performs the visual inspection, while the second specialist rotates the shredder shaft by pulling the v-belt.

CAUTION

Risk of crush injury!

When manually turning the shredder shaft, the fingers can be pinched by the pulley.

- Pull down the belt using caution.



During the inspection, note the following:

- Check shredder blades and stationary blades for wear.
- Damaged blades with cracks or chipped edges must be replaced immediately. Blades with worn cutting edges can be reused by rotating 180°. If all the cutting edges are worn, the blade must be replaced.
- Shredder blades must not collide with stationary blades!

  There must be a cutting gap of 0.4 to 0.5 mm between the stationary blade and rotating shredder blades.

= Lower stationary blades have been checked.

11.2.7 Check the upper stationary blade, shredder blade and blade holder

Mechanical specialist - 2nd person required for unskilled work

Feeler gauge

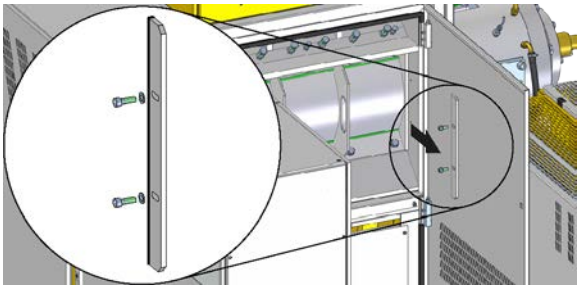
CAUTION

Risk of injury from cuts!

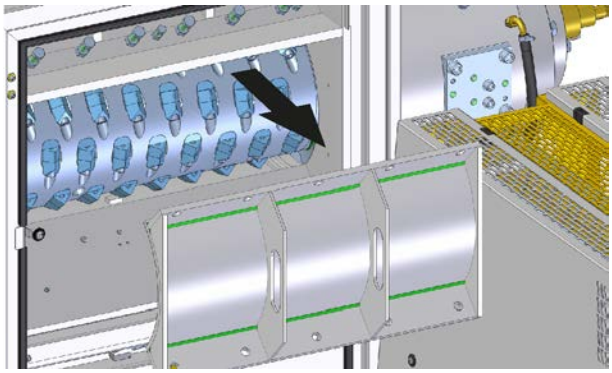
When carrying out maintenance activities on the shredder shaft there is a risk of injury from the sharp edges of the blades.

- Always wear hand protection when performing maintenance activities.

1. Switch off the machine and secure against being switched on again.
2. Open maintenance door for the shredder.
3. Unscrew shredder lid edge strips on both sides.



4. Remove shredder lid by loosening the hex-head screws.



Attention

Shredder lid is very heavy!

- Two persons are needed to remove the shredder lid!

5. Visually inspect the blades.

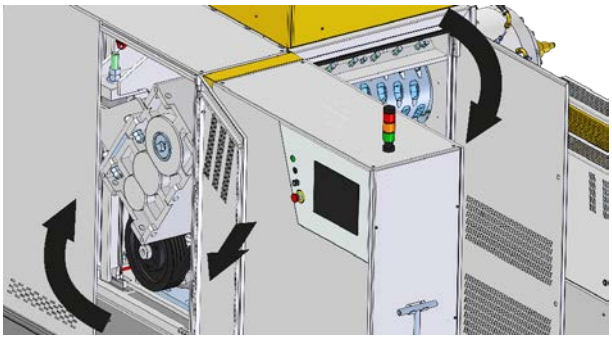
Move the shredder shaft by hand to carry out the check. One specialist performs the visual inspection, while the second person rotates the shredder shaft by pulling on the V-belt.

CAUTION

Risk of crush injury!

When manually turning the shredder shaft, the fingers can be pinched by the pulley.

- Pull down the belt using caution.

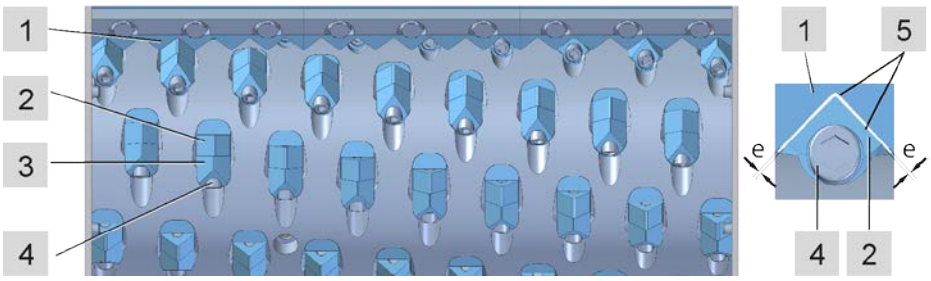


During the inspection, note the following:

- Check shredder blades and stationary blades for wear.
- Damaged blades with cracks or chipped edges must be replaced immediately. Blades with worn cutting edges can be reused by rotating 180°. If all the cutting edges are worn, the blade must be replaced.
- Shredder blades must not collide with stationary blades!

  There must be a cutting gap of 0.7 to 0.8 mm between the stationary blade and rotating shredder blades.

Shredder shaft **with** blade holders



1	Upper stationary blades	**4**	Cylinder bolt
2	Shredder blade	**5**	Cutting edge
3	Blade holder	**e**	Average gap 0.7-0.8 mm

= The upper stationary blade, shredder blade and blade holder have been checked.

11.2.8 Check the cutter sleeve for the blade and replace, if necessary

Mechanical specialist

Blade of cutter sleeve

CAUTION

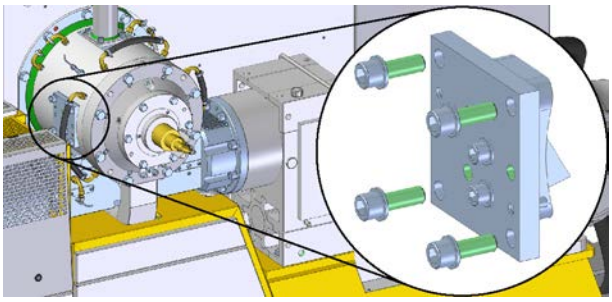
Risk of injury from cuts!

When carrying out maintenance activities on the shredder shaft there is a risk of injury from the sharp edges of the blades.

- Always wear hand protection when performing maintenance activities.

1 Switch off the machine and secure against being switched on again.

2 Remove cover plate housing by removing the 4 cylinder bolts.

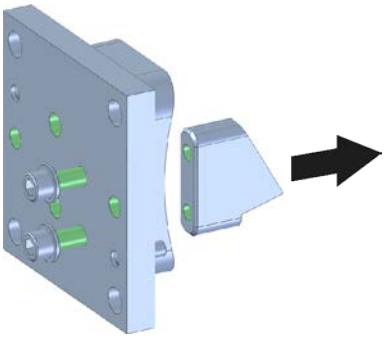


3 Visually inspect the blade and replace, if necessary.

- Check blades for wear.
- Damaged blades with cracks or chipped edges must be replaced immediately.

4 Replace the blade.

a Uninstall blade by loosening the 2 cylinder bolts from the cover plate.



b Clean cutout of the cover plate and spray with a suitable corrosion protection.

c Insert new blade and tighten cylinder bolts according to torque chart.

➲ see section 14.2 Torque chart

Attention

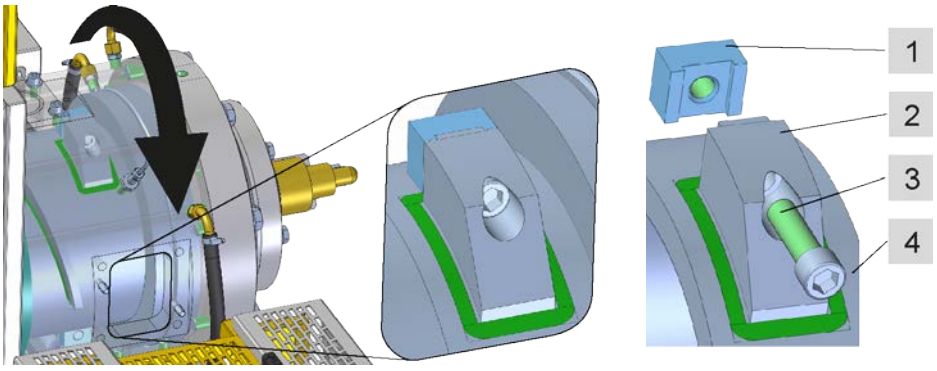
Risk of damage to machine due to improper configuration of the blades!

The blades used must not collide with the stationary blades.

- There must be a cutting gap of 0.8 to 1.0 mm between the stationary blade and rotating knife.

5 Visually inspect the blades on the cutter sleeve.

Move the rotor by hand down and check both blades in the window.



1	Blade of cutter sleeve	**3**	Cylinder bolt
2	Blade holder of cutter sleeve	**4**	Cutter sleeve

6 Replace the blades with worn edges.

a Loosen cylinder bolt and remove blade.

b Clean the contact of the welded blade holder of the cutter sleeve and spray with a suitable corrosion protection.

c Insert blade.

d Tighten the cylinder bolt according to torque chart.

➲ see section 14.2 Torque chart

e Insert cover into the housing opening. Use the dowel pins to facilitate installation.

f Install cover plate by tightening the 4 cylinder bolts according to the torque chart.

g Visually inspect the blades.

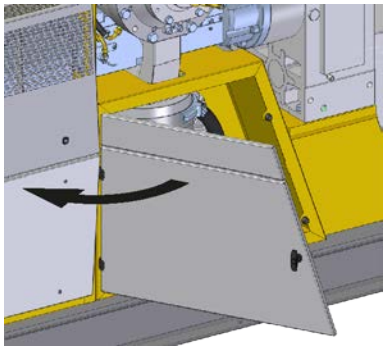
= Blade for cutter sleeve has been replaced.

11.2.9 Check fill level of dust bag and empty, if necessary

User

1 Switch off the machine and secure against being switched on again.

2 Open the maintenance door and unlock the quick release for the dust bag.



3 Remove dust bag and check fill level. Dispose of contents when necessary.

4 Clamp dust bag back into the holder and lock the quick release.

= Dust bag is checked and emptied.

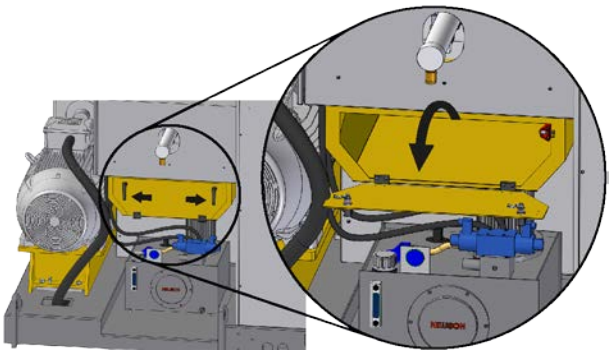
11.2.10 Check fill level of dust boxes and empty, if necessary

User

Dust box for pusher

1 Switch off the machine and secure against being switched on again.

2 Open the dust box.



3 Check level of dust box and empty, if necessary.

4 Close the pusher's dust box door.

= Dust box for pusher has been emptied.

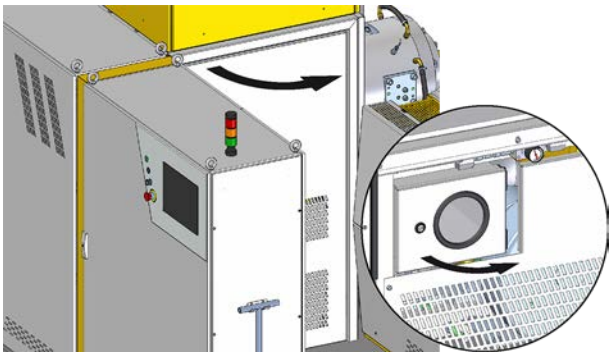
Dust box for shredder

1 Switch off the machine and secure against being switched on again.

2 Open maintenance door for the shredder.

3 Check the fill level of the dust box using the window.

If the dust box is full, open the dust box and empty it using an electric cabinet key.



4 Close the dust box and maintenance door for shredder.

= Dust box for shredder has been emptied.

11.2.11 Check the mechanical connections

Mechanical specialist

1 Switch off the machine and secure against being switched on again.

2 Check all mechanical connections.

= The mechanical connections have been checked.

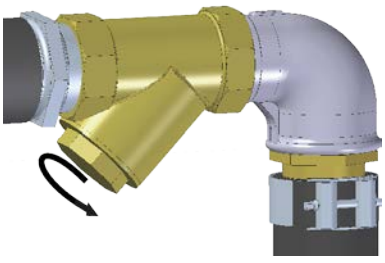
11.2.12 Clean the filter for the cooling water supply

Mechanical specialist

1 Run the machine till it is empty and turn it off.

2 Turn off water supply.

3 Remove filter screen as shown in the image.



4 Flush and clean the filter screen.

5 Insert the filter screen and close the filter cap.

= Water filter has been cleaned.

11.2.13 Clean the filter for the shredder fan (optional accessory)

Mechanical specialist

1 Switch off the machine and secure against being switched on again.

2 Remove the filter cover.

3 Blow out an clean filter using compressed air and replace, if necessary.

= Filter for shredder fan has been cleaned.

11.2.14 Check, tighten and clean the V-belt for the shredder drive and replace, if necessary

Mechanical specialist

V-belt

Tension meter, glycerin-alcohol mixture 1:10

CAUTION

Risk of injury during operation!

The recycling machine must be shut down before the start of the maintenance work.

- Completely turn off the machine.
- Move the main power switch to the 0 position; secure the switch against being switched on again and attach warning sign.

Check the V-belt

1 Switch off the machine and secure against being switched on again.

2 Open gear cabinet.

3 Check the V-belt for dirt and clean, if necessary.

4 Check the belt tension and adjust, if necessary.

5 Check the V-belt for wear and replace, if necessary.

= V-belt has been checked.

Clean V-belts

- Clean dirty V-belt with a glycerin-alcohol mixture at a ratio of 1:10.

Attention

Damage due to improper cleaning of the V-belt!

Mechanical damage to the V-belt.

- Benzine, benzene, turpentine, and similar agents are not suitable as cleaning agents.
- Wire brushes, sandpaper, etc. should never be used.

Check the belt tension and adjust, if necessary

- Measure the belt tension using a tension meter.
- The meter must be placed in the center of the strand.
- The drive must be tightened until the pre-tension according to the following table is reached.

Model	Static strand force pre-tension (N)			
	Initial assembly		Operating tension	
	50 Hz	60 Hz	50 Hz	60 Hz
S:GRAN 65-50 (22kW Cutter)	337	381	259	293
S:GRAN 65-50 (30kW Cutter)	380	342	292	263
S:GRAN 75-50 (22kW Cutter)	304	357	234	275
S:GRAN 75-50 (30kW Cutter)	380	342	292	263
S:GRAN 65-70	671	626	516	482
S:GRAN 75-70	679	645	552	496
S:GRAN 85-70	663	672	510	517
S:GRAN 95-70	642	725	494	558
S:GRAN 105-100	766	768	589	591
S:GRAN 125-100	766	768	589	591

= V-belts are tensioned.

Replace the V-belt

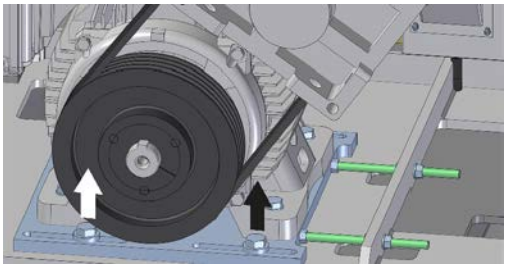
Attention

Improper drive due to replacing only individual V-belts!

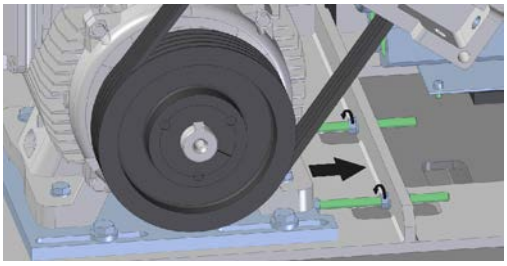
Rapid V-belt wear or slipping belt.

- Always replace the complete set of belts.

1 Loosen the Allen screws for the motor plate.



2 Screw the nuts on the threaded rod and push motor with motor plate towards the gear.



3 Remove old belt and install new belt.

4 Move back motor plate and adjust belt tension using the adjustment screws. While doing so, check the belt tension and correct.

5 Tighten the hex screws for the motor plate.

6 Close gear cabinet.

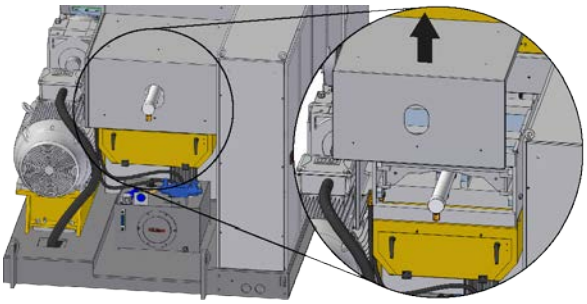
= V-belts have been exchanged.

11.2.15 Check the sliding bars of the pusher

User

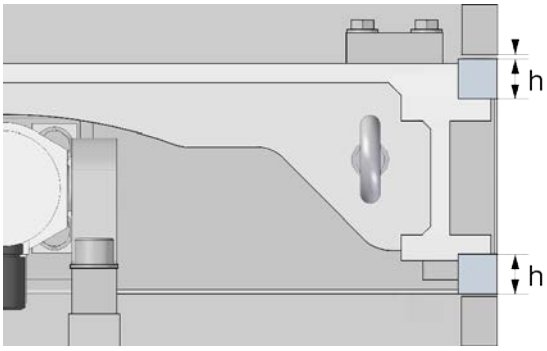
1 Switch off the machine and secure against being switched on again. Pusher is in the rearmost end position.

2 Remove the cover by loosening the 9 screws.



3 Check the sliding bars.

Minimum height of the sliding bars h = 30 mm.



4 Continue with replacing the sliding bars in case of heavy wear or damage to the sliding bars. Otherwise, reinstall the cover.

➲ See section 11.2.44 Replace sliding bars for pusher

= Sliding bars of the pusher have been checked.

11.2.16 Tighten electrical terminal points

Electrical specialist

DANGER

Avoid direct or indirect contact with live parts to prevent electrocution!

Electrical shock, burns or fatal injuries may result.

- Work on electronics and live components may only be carried out by a qualified electrical specialist.
- Before beginning work activities on the electronics, switch the main switch to 0 and disconnect the equipment from the power supply. Observe all safety regulations.
- Wait at least 10 minutes after turning off the recycling machine, as the capacitors retain voltage during this time.
- Use only original fuses with the specified current.

1 Switch off the machine and secure against being switched on again.

2 Open the electric cabinet.

3 Check the terminal connections and retighten, if necessary.

= Electrical terminal connections have been retightened.

11.2.17 Check the protective devices

Safety specialist

- Check that all protective devices are present and working correctly.
- Location and appearance of protective devices:

  ➲ See section 3 Safety equipment

= Protective devices have been checked.

11.2.18 Check coolant of frequency converter

User

Check the fluid level

1 Switch off the machine and secure against being switched on again.

2 Check the coolant display for sufficient coolant and refill, if necessary.

3 Check the glycol content of the coolant.

Mixing ratio: 50% water - 50% glycol

4 Check the coolant for discoloration and replace, if necessary.

= Coolant of frequency converter is checked.

11.2.19 Check the air conditioner of the electric cabinet and clean, if necessary

Electrical specialist

1 Switch off the machine and secure against being switched on again.

2 Open the electric cabinet.

3 Check air conditioner for pollution and noise.

4 If necessary, uninstall the fan by loosening the 4 screws.

5 Clean the fan.

6 Reinstall the fan and screw on the cover.

= Air conditioner for electric cabinet has been cleaned.

11.2.20 Checking the air conditioner for frequency converter and clean, if necessary

Electrical specialist

1 Switch off the machine and secure against being switched on again.

2 Open the electric cabinet.

3 Check air conditioner for pollution and noise.

4 Clean the air conditioner according to manufacturer's instructions.

➲ For a detailed description of the air conditioner, refer to the instruction manual of the manufacturer under the heading purchased parts.

= Air conditioner for frequency converter has been cleaned.

11.2.21 Check the sight glass for the water distributor and clean, if necessary

Mechanical specialist

O-rings for water distributor

Pipe brushes, mounting wrench for water distributor

1 Run the machine till it is empty and turn it off.

2 Shut off water supply.

Attention

Water distributor is under pressure!

The pressure in the water distributor is 3-4 bar / 44-58 psi.

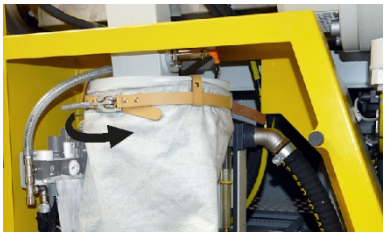
- Perform maintenance on water distributor only when the water supply is shut off.

3 Open maintenance door for the water distributor.

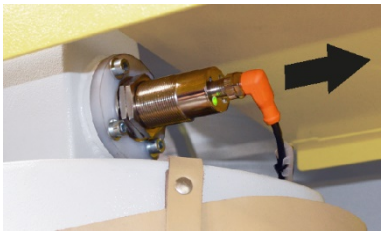
4 Remove the dust bag.

a Open the quick release on the bag clamp.

b Remove the dust bag.



5 Unscrew the sensor connection and remove.



6 Remove the dust bag connector by removing the 4 screws.

7 Open the screw plug for the separate sight glasses using the mounting wrench provided.

8 Clean the sight glass with a pipe brush.

9 Check the O-ring on the screw plug; clean and replace, if necessary.

10 Close screw plug.

11 Tighten the dust bag connector.

12 Plug in sensor connection again and screw on.

13 Attach the dust bag.

14 Close the maintenance door for the water distributor.

= Water distributor has been cleaned.

11.2.22 Cleaning the heating and cooling fan

Mechanical specialist

1 Switch off the machine and secure against being switched on again.

2 Let equipment cool off.

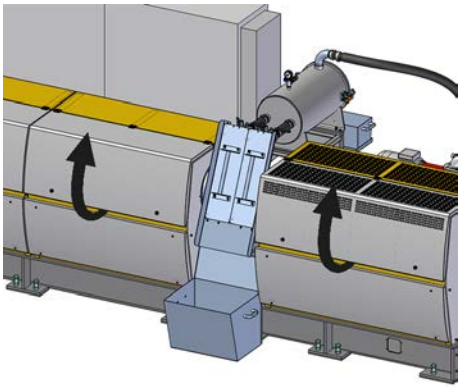
CAUTION

Danger of injuries due to hot surfaces!

Strip heaters and their surrounding surfaces can cause severe burns.

- When working on hot surfaces of the machine, wear safety gloves.

3 Open the protective covers of the heating and cooling fan.



4 Thoroughly clean the spaces in between and remove dust.

5 Close the protective covers.

= The spaces in between the heating and cooling fan have been cleaned.

11.2.23 Replace rubber buffer for gear suspension

Mechanical specialist - 2nd Person required for securing activities

Threaded rod, rubber buffer, threadlocking moderately tight (Loctite 243 or the same)

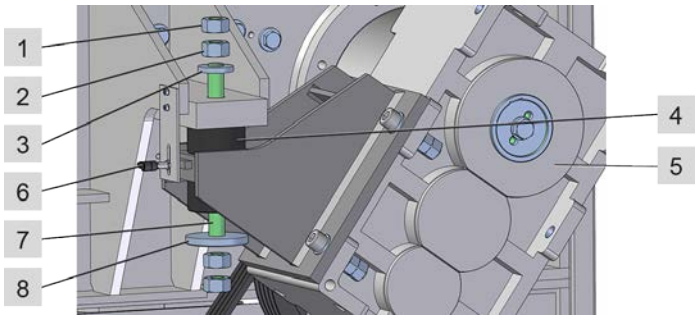


Figure 11-5: Overview of gear suspension

1	Lock nut	**5**	Shredder gear
2	Hex-head nut	**6**	Shock sensor
3	Spacer	**7**	Threaded rod
4	Rubber buffer (PU connector)	**8**	Support washer

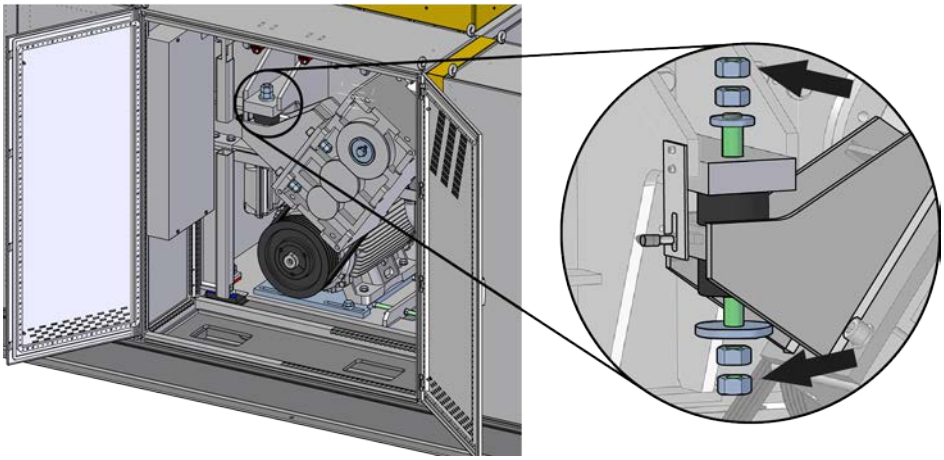
1 Switch off the machine and secure against being switched on again.

2 Open gear cabinet.

3 Secure gear.

The gear is movable and must be secured, in order to prevent uncontrolled tipping. For securing activities, a second person is required.

4 Unscrew the lock nuts and hex-head nuts on both sides.



5 Remove threaded rod, spacer, support washer and rubber buffer.

6 Insert new rubber buffer.

7 Insert spacer, support washer and new threaded rod and hand-tighten the hex-head nut.

8 Pre-tension the rubber buffer 5% by using upper and lower hex-head nut.

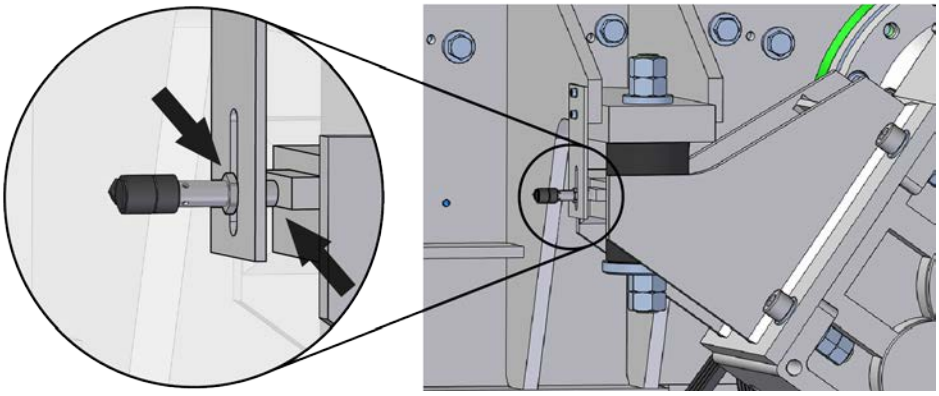
9 Apply threadlocking fluid to the lock nuts and secure.

10 Check the position of the shock sensor and adjust the height, if necessary.

a Release the shock sensor by rotating the nuts.

b Align the shock sensor on the division bar as shown in the figure.

c Re-tighten the shock sensor by tightening the nuts.



11 Close gear cabinet.

= The rubber buffers have been replaced.

11.2.24 Change the oil for the extruder gearbox

Mechanical specialist

Hopper

Attention

Damage to gears!

- To completely empty the oil, drain in warm state.
- The used oil must be the same oil grade and have the same specifications as the new oil.

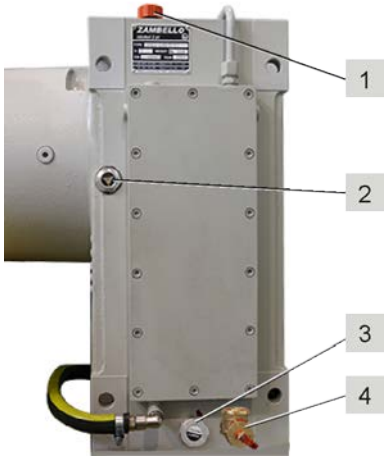


Figure 11-6: Extruder gearbox

1	Filler plug	**3**	Magnetic screw
2	Oil sight glass	**4**	Drain plug

1 Switch off the machine and secure against being switched on again.

2 Open the filler plug.

3 Place heat-resistant container with sufficient volume under the oil drain plug.

CAUTION

Risk of burns!

Gear oil reaches temperatures up to 80°C.

- Wear protective equipment.

4 Open the release on the drain plug.

5 Unscrew the drain plug and drain the oil completely.

6 Unscrew the magnetic screw and clean off the metal shavings.

7 Re-tighten the magnetic screw.

8 Screw closed the drain plug.

9 Screw tight the release for the drain plug.

10 Fill up fresh oil to the middle of the oil sight glass.

11 Screw closed the filler plug.

12 Dispose of used oil properly.

= The oil for the extruder gearbox has been changed.

11.2.25 Change oil for the shredder gear

Mechanical specialist

Attention

Damage to gears!

- To completely empty the oil, drain in warm state.
- The used oil must be the same oil grade and have the same specifications as the new oil.

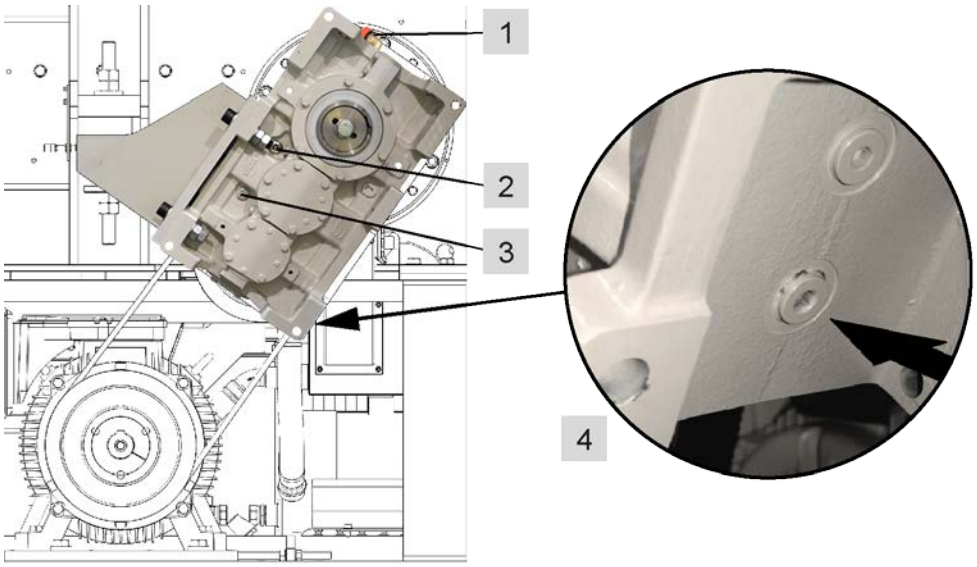


Figure 11-7: Shredder gear

1	Filler plug	**3**	Lower oil sight glass
2	Upper oil sight glass	**4**	Oil drain plug

1 Switch off the machine and secure against being switched on again.

2 Open the filler plug.

3 Place heat-resistant container under the oil drain plug.

CAUTION

Risk of burns!

Gear oil reaches temperatures up to 80°C.

- Wear protective equipment.

4 Open the oil drain plug.

5 Drain the oil into the heat-resistant container.

6 Screw closed the oil drain plug.

7 Fill up fresh oil to the middle of the upper oil sight glass.

8 Screw closed the filler plug.

9 Dispose of used oil properly.

= The oil in the shredder gear has been changed.

11.2.26 Check level of oil and refill, if necessary

User, mechanical specialist

Check oil level in cooled state.

For a correct reading of the oil level, shut off the machine and allow it to cool at least one hour.

Caution

Machine damage due to improper oil!

Use of incorrect oil types will result in considerable damage to the machine.

- The oil refilled must be the same type of oil and have the same specifications as the drained oil.
- Do not mix different types of oil.

Use the sight glass to check the oil level. The oil must be refilled by a mechanical specialist once the oil level in the lower third of the sight glass can be seen.

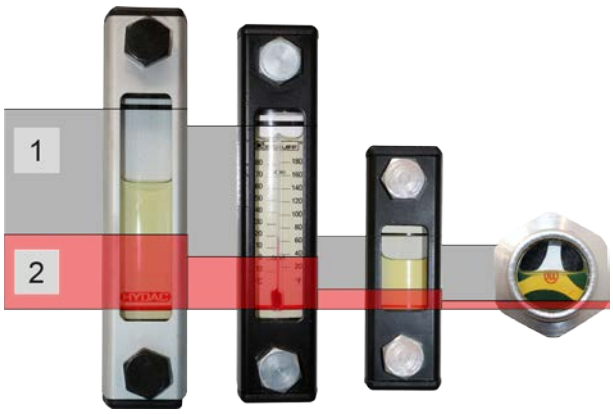


Figure 11-8: Oil level indicators

1	Maximum level	Fill with oil up to the maximum upper mark
2	Minimum level	Oil level too low - add oil

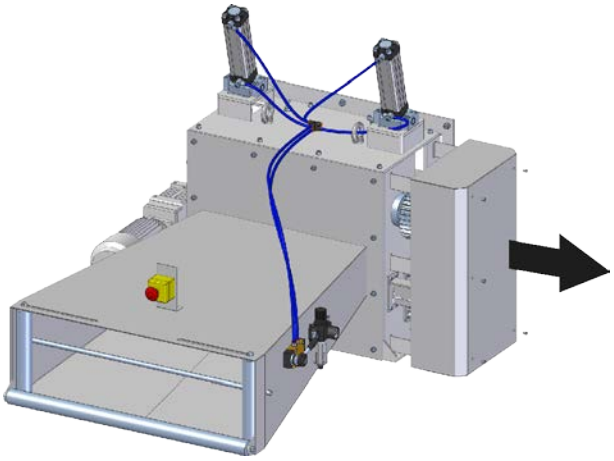
11.2.27 Regrease the flanged bearings for the roll feeder (optional)

Mechanical specialist

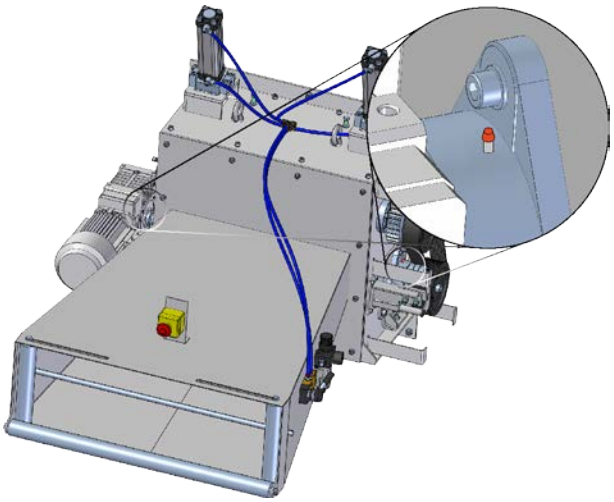
Grease gun

1 Switch off the machine and secure against being switched on again.

2 Remove the lateral protective covers by removing the 6 screws.



3 Grease the flanged bearings according to the lubrication plan.



4 Screw on protective covers.

= The flanged bearings have been lubricated.

11.2.28 Regrease joint eye for hydraulic cylinder

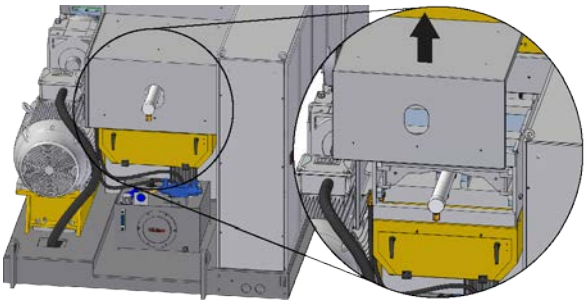
Mechanical specialist

Grease gun

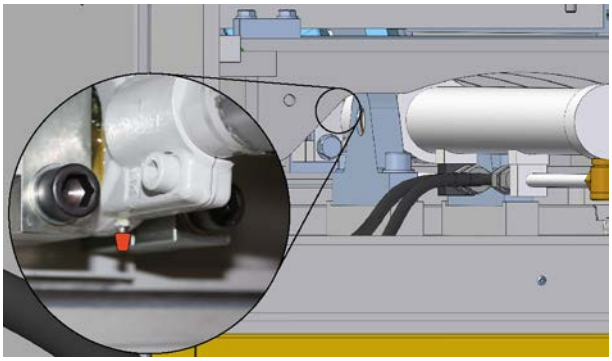
1 Switch off the machine and secure against being switched on again. Pusher is in the rearmost end position.

2 Clean the lubrication nipples and grease gun thoroughly before greasing.

3 Removing the cover for the pusher.



4 Remove the cap for the lubrication nipple.



5 Open box dust and grease lubrication nipple from below.

6 Regrease according to lubrication plan.

7 Install cap.

8 Install cover.

= Joint eye for hydraulic cylinders has been lubricated.

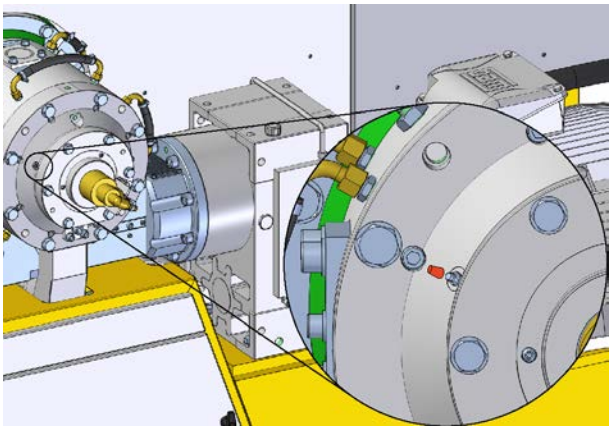
11.2.29 Regrease spherical roller bearings for shredder shaft

Mechanical specialist

Grease gun

1 Clean the lubrication nipples and grease gun thoroughly before greasing.

2 Regrease lubrication point according to lubrication plan.



3 Open maintenance door for the shredder.

4 Regrease lubrication point according to lubrication plan.

= Spherical roller bearings for shredder shaft successfully regreased.

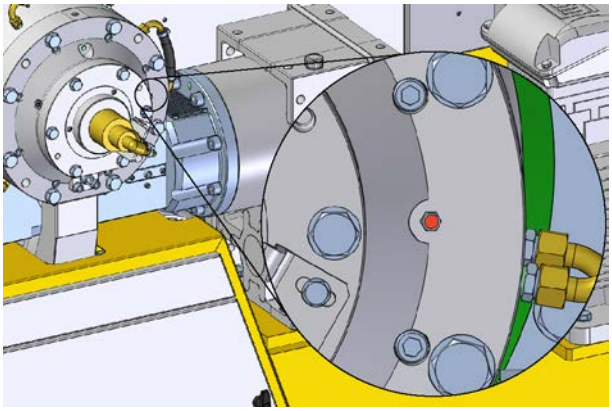
11.2.30 Regrease radial shaft seal ring for the shredder

Mechanical specialist

Grease gun

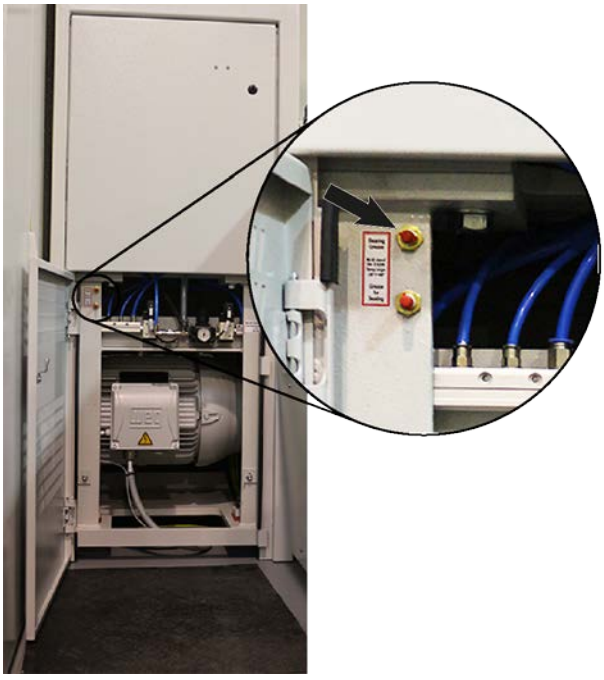
1 Clean the lubrication nipples and grease gun thoroughly before greasing.

2 Regrease lubrication point according to lubrication plan.



3 Open maintenance door for the shredder.

4 Regrease lubrication point according to lubrication plan.



= Radial shaft seal for shredder has been regreased.

11.2.31 Replacing the pusher seals

Mechanical specialist

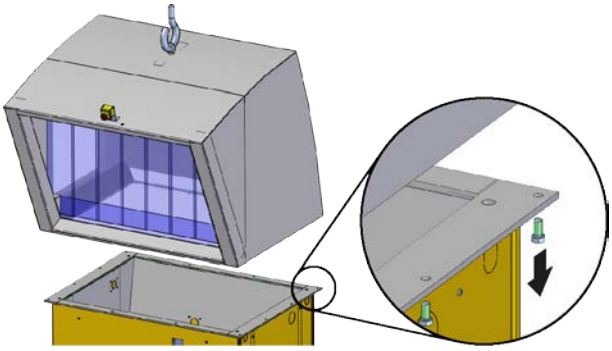
Screw adhesive (e.g. Loctite)

Pusher sealing bars, vulkocell sealing, Schnorr washers

1 Switch off the machine and secure against being switched on again.

✔ Pusher is in the rearmost end position.

2 Loosen the screws for the protective hood.



3 Lift the protective cover with a crane and remove.

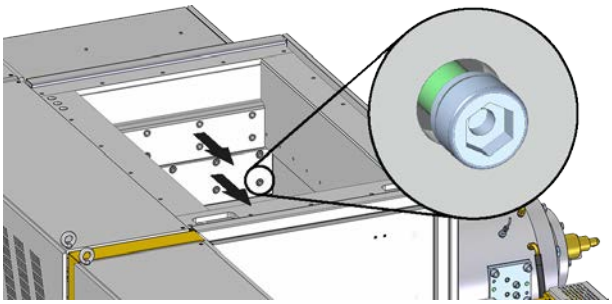
➲ see section 5.1.3 Transport of protective hood

4 Remove hopper, if necessary.

In low light, the hopper needs to be removed. If the hopper is sufficiently well lit, the maintenance work can be carried out in the hopper.

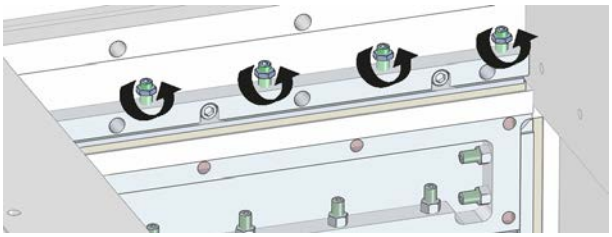
5 Remove cover plate sealing and cover plate for pusher as shown in the picture.

Loosen the hexagon socket screws for the two cover plates.

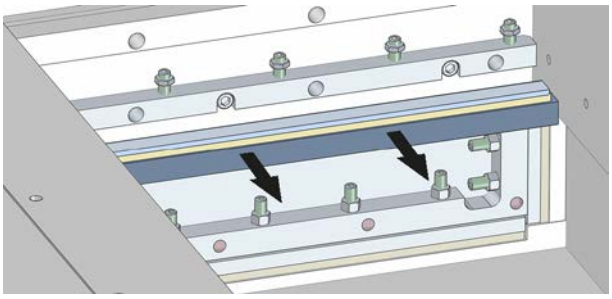


6 Replace upper pusher seal.

a Loosen adjustment screws and lock nuts.



b Loosen and remove the sealing bar, vulkocell strip and pressure bar.



c Remove the vulkocell strips. The vulkocell strips are disposed of.

d Adjust new sealing bar.

Attention

Evidence of wear and tear on pusher!

Due to sticking sliding bars, abrasion marks can appear on the pusher.

- The sealing bar must have approx. 1 mm of play.

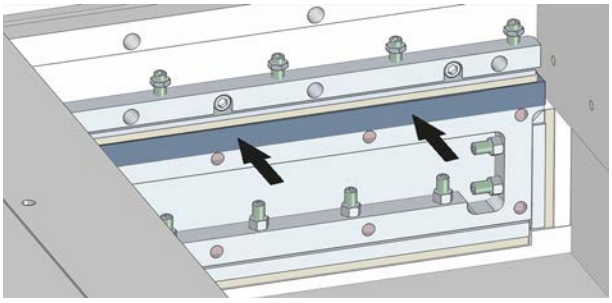
e Hone upper sealing bar with file on the side accordingly.

f Insert the vulkocell strips.

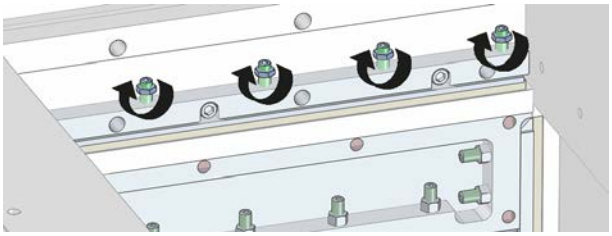
g Insert pressure bar.

h Place sealing bar, vulkocell strips and pressure bar on the pusher and press against the rear wall.

i With the straight edge, check that the sealing bar is not protruding.



j Tighten adjustment screws by hand.



k Hand-tighten the grub screws.

l Secure the lock nut for the adjustment screws. The lock nuts only tighten when the pressure on the metal strip is evenly distributed.

7 Install the cover plate for the sealing.

Attention

When installing the cover plate, make sure that it does not lie on the pusher.

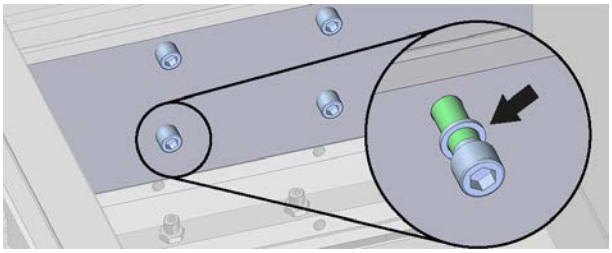
Friction marks on the pusher surface are the result, and the function of the sealing bar is no longer ensured.

▶ Lift the cover plate slightly during installation.

a Secure screws for the cover plate with screw adhesive.

b Lift the cover during installation with a screwdriver.

c Replace Schnorr washers.



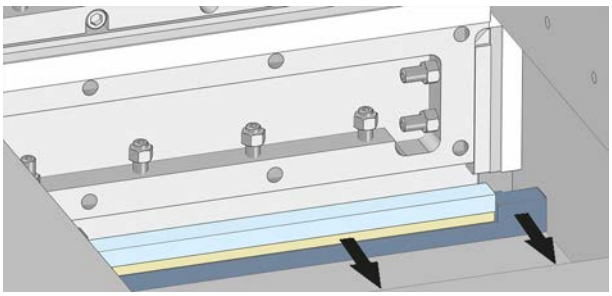
d Tighten the screws.

➲ see section 14.2 Torque chart

8 Replace lower pusher seal.

a Loosen grub screws and lock nuts.

b Remove the sealing bar, vulkocell strips and pressure bar from the recess for the pusher. The vulkocell strips are disposed of.



c Insert the new sealing bar, vulkocell strips and pressure bar.

d Check that the sealing bar does not protrude at the front of the pusher.

This can be done best using a straight edge or similar tool. If the sealing bar protrudes, it will stick after attaching the front panel.

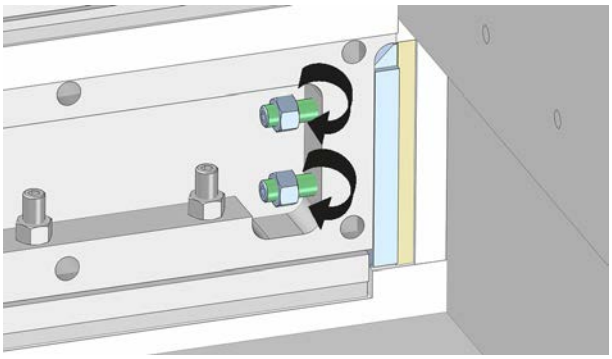
e Tighten grub screws by hand. The grub screws only tighten if the pressure on the metal strip is evenly distributed.

f Hand-tighten the grub screws.

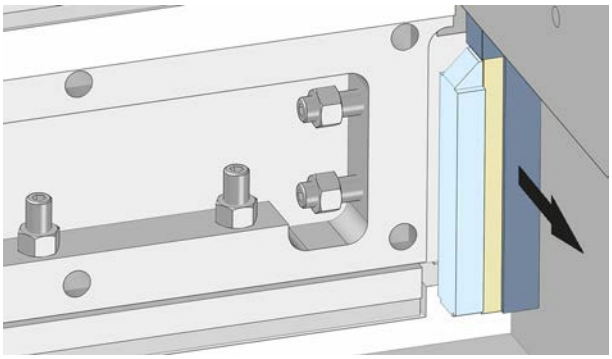
g Secure the lock nut for the grub screws. The lock nuts only tighten when the pressure on the pressure strip is evenly distributed.

9 Replace the lateral pusher seal.

a Loosen grub screws and lock nuts.



b Remove the lateral sealing bar, metal strip and vulkocell sealing from the recess for the pusher. The vulkocell sealing must be disposed of.



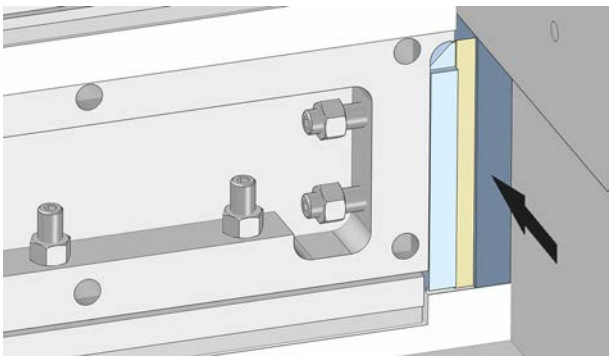
c Adjust new sealing bar.

d The lateral sealing bars are also adjusted with a file to fit between the lower sealing bar and the upper guide rail.

The sealing bar fits best when it can be inserted straight with 3 fingers, and there is a gap on the side of 1 mm to the sidewall.

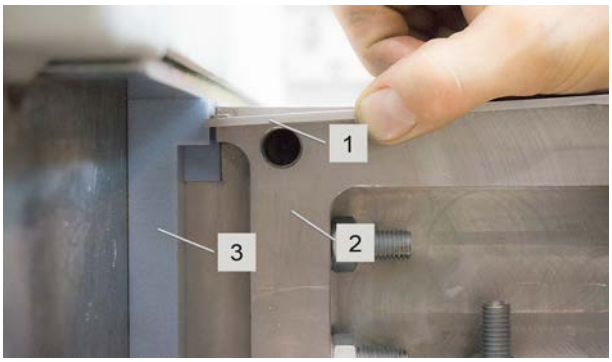
1	Sealing bar, lateral

e Fit the sealing bar, vulkocell strips and pressure bar into the recess. Arranged as shown in the illustration.



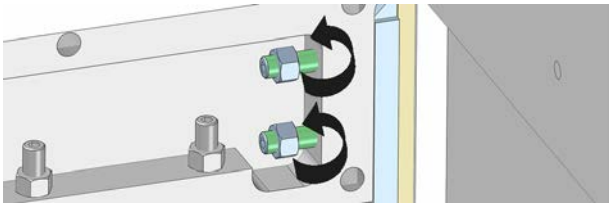
f Check that the sealing bar does not protrude at the front of the pusher.

This can be done best using a straight edge or similar tool. If the sealing bar protrudes, it will stick after attaching the front panel.



1	Straight edge
2	Pusher front
3	Sealing bar

g Tighten adjustment screws by hand. The adjustment screws only tighten if the pressure on the metal strip is evenly distributed.



h Hand-tighten the grub screws.

i Secure the lock nut for the adjustment screws.

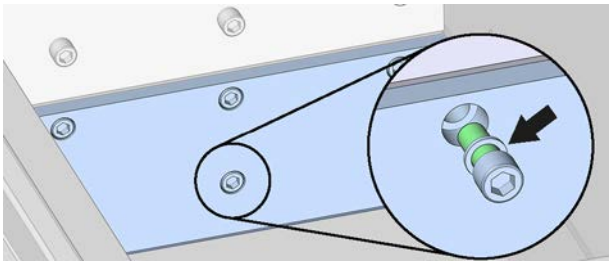
10 Also replace the pusher seal on the other side.

Follow the instructions in point 9.

11 Install the cover plate for the pusher.

a Secure screws for the cover plate with screw adhesive.

b Replace Schnorr washers.



c Tighten the screws.

➲ see section 14.2 Torque chart

= The pusher seals have been replaced.

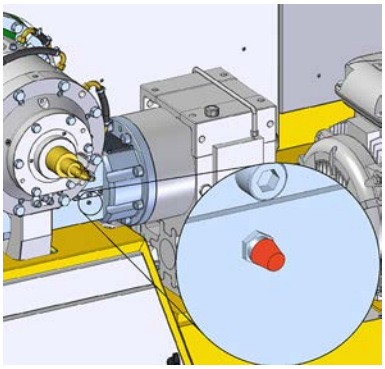
11.2.32 Regrease sealing bush on intake housing

Mechanical specialist

Grease gun

1 Clean the lubrication nipples and grease gun thoroughly before greasing.

2 Regrease according to lubrication plan.



= Sealing bush for intake housing has been regreased.

11.2.33 Change oil for hydraulics unit

Mechanical specialist

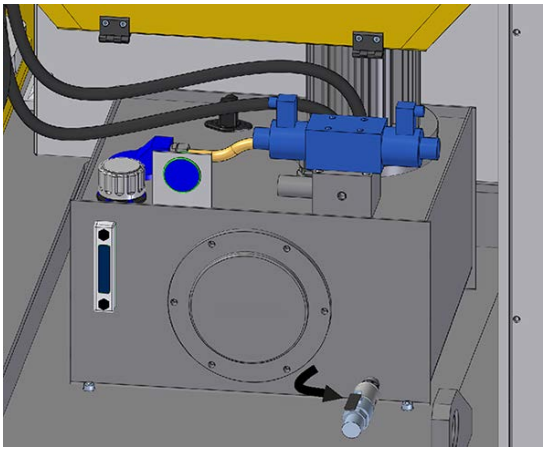
Circulating pump with fine filter

1 Switch off the machine and secure against being switched on again.

2 Place container under the outlet valve or attach hose.

3 Screw on the sealing screw the outlet valve.

4 Drain the hydraulic oil by opening the outlet valve. Depending on the make, the outlet valve may be located centrally or on the side in front and at the bottom (see figure).



5 Thoroughly clean the hydraulic tank by flushing the system thoroughly. To flush the tank, use the same liquid used to run the system. If a cleaning fluid is used, then this must be compatible with the hydraulic fluid.

6 Replace filter elements.

7 Tighten sealing screw.

8 Open the filler plug.

Attention

Damage to the machine!

Dirty oil can damage the hydraulics unit.

- The hydraulic oil must be absolutely free of impurities such as rust or condensed water.
- To ensure clean refilling of hydraulic oil from the barrel, use a circulating pump with fine filter.

9 Fill fresh hydraulic oil to the middle of the oil sight glass and dispose of used oil properly.

10 Screw closed the filler plug.

= The hydraulic oil has been changed.

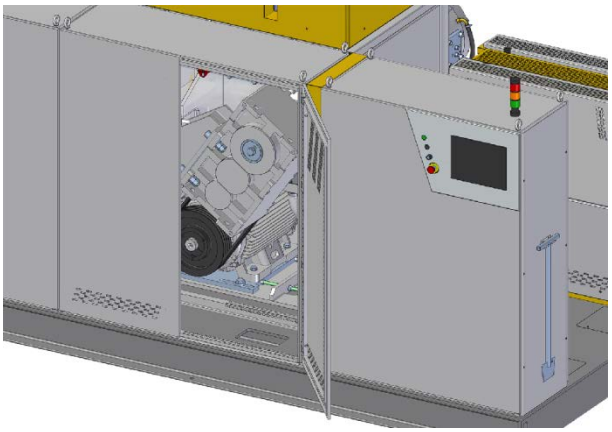
11.2.34 Regrease shredder motor

Mechanical specialist

Grease gun

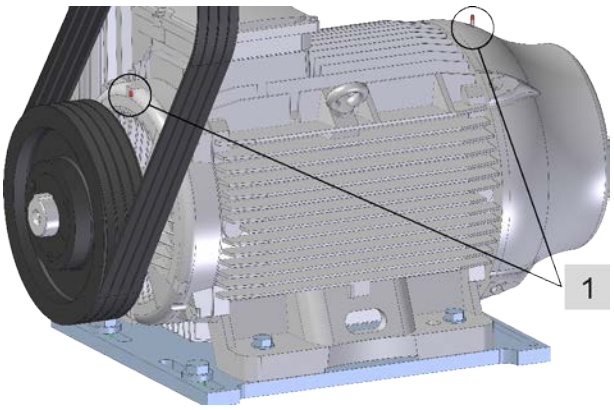
1 Switch off the machine and secure against being switched on again.

2 Open gear cabinet.



3 Clean the lubrication nipples and grease gun thoroughly before greasing.

4 Remove the caps for the lubrication nipple.



1	Lubrication nipple for shredder motor

5 Regrease according to lubrication plan.

6 Reinstall caps.

7 Close gear cabinet.

= The shredder motor has been regreased.

11.2.35 Regrease extruder motor

Mechanical specialist

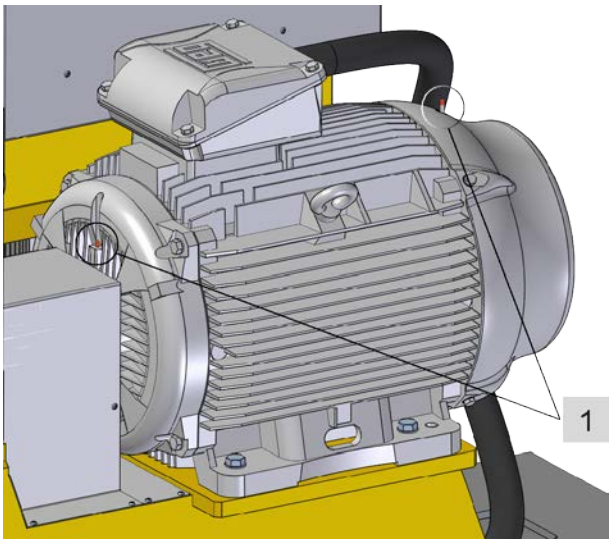
Grease gun

1 Run the machine till it is empty, switch it off, and secure it against being switched on again.

2 Clean the lubrication nipples and grease gun thoroughly before greasing.

3 Remove the cap for the lubrication nipple.

4 Regrease according to lubrication plan.



1	Lubrication nipple for extruder motor

5 Install cap.

= The extruder motor has been regreased.

11.2.36 Replace lower stationary blade

Mechanical specialist

Stationary blade

Caution

Risk of injury from cuts!

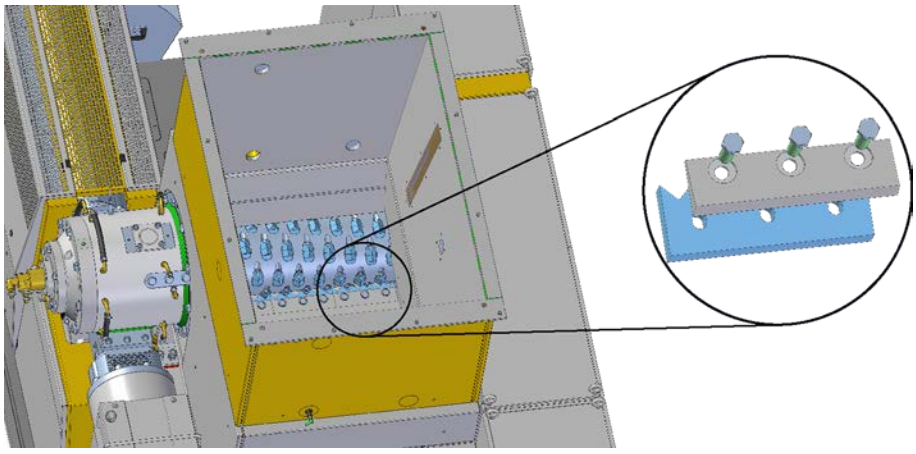
When carrying out maintenance activities on the shredder shaft there is a risk of injury from the sharp edges of the blades.

- Always wear hand protection when performing maintenance activities.

1. Switch off the machine and secure against being switched on again.
2. Check the lower stationary blades.

   Refer to the instructions for removing the covers in the following section.

   ➲ See section 11.2.6 Check the lower stationary blade
3. Remove the lower stationary blade.



Shredder shaft **with** blade holders

4. Remove the stationary blade and cover plate.
5. Check the sharpness of the stationary blade.
6. Rotate a stationary blade worn on one side by 180° and reinsert it. Replace stationary blades worn on both sides.

Attention

Machine damage due to inferior cylinder screws!

Improper screws could result in damage to the machine.

- The cylinder screws must have the strength class 10.9.

7. Center and fasten the stationary blade.

8 Check clearance between shredder blade and stationary blade with feeler gauge.

➲ See section 14.2 Torque chart.

9 Attach cover plate and stationary blades with countersunk screws. Tighten the screws according to torque chart.

➲ See section 11.2.6 Check the lower stationary blade

10 Position the protective cover with a crane.

11 Mount the protective cover.

= Lower stationary blades have been replaced.

11.2.37 Replace upper stationary blade

Mechanical specialist - 2nd person required for unskilled work

Shredder blade

Caution

Risk of injury from cuts!

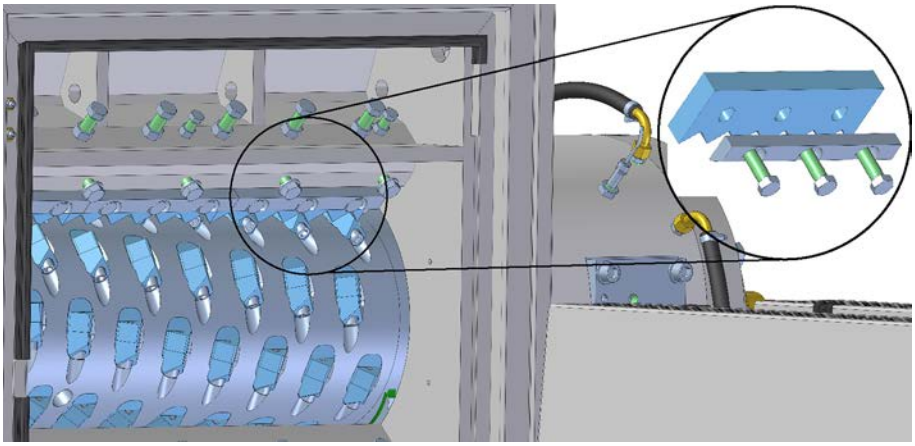
Risk of injury from sharp blades.

- Always wear hand protection when performing maintenance activities.

1. Switch off the machine and secure against being switched on again.
2. Check the shredder blade and blade holder.

   Refer to the instructions for removing the covers in the following section.

   ➲ See section 11.2.7 Check the upper stationary blade, shredder blade and blade holder
3. The stationary blades are mounted with 3 countersunk screws. Loosen countersunk screws of the stationary blade to be replaced.
4. Remove the stationary blade and cover plate.



5. Check the sharpness of the stationary blade.
6. Rotate a stationary blade worn on one side by 180° and reinsert it. Replace stationary blades worn on both sides.
7. Attach cover plate and stationary blades with countersunk screws. Tighten the screws according to torque chart.

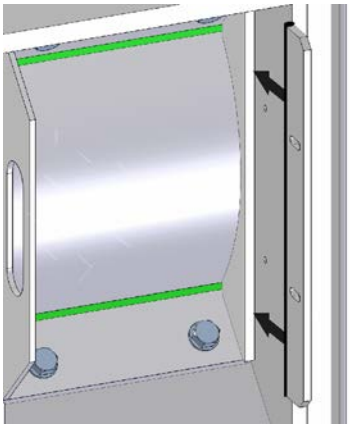
   ➲ See section 14.2 Torque chart
8. Center and fasten the stationary blade.
9. Check clearance between shredder blade and stationary blade with feeler gauge.

   ➲ See section 11.2.7 Check the upper stationary blade, shredder blade and blade holder.

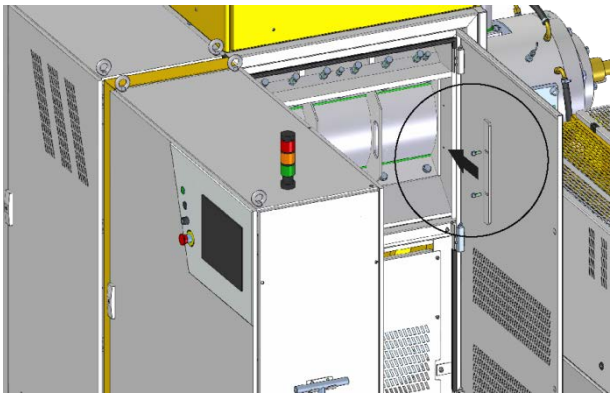
10 After inspection, reinstall the shredder lid. Tighten the screws according to torque chart.

Depending on the size of machine, shredder lid is secured with 8 or 10 screws.

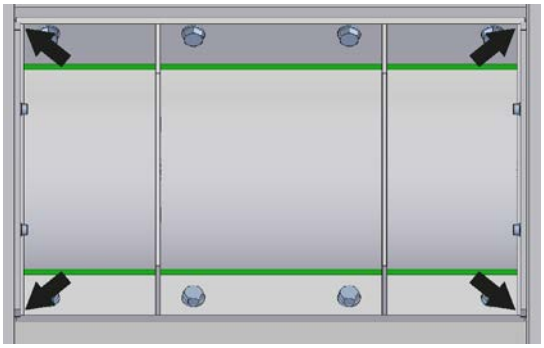
11 Check the sealing for the side bars and replace, if necessary.



12 Press and screw on the side bars against the shredder lid.



13 Replace silicone seal in the corners of shredder lid.



14 Close the maintenance door for the shredder.

= Upper stationary blades have been replaced.

11.2.38 Replace the shredder blade

Mechanical specialist - 2nd person required for unskilled work

Shredder blade

Caution

Risk of injury from cuts!

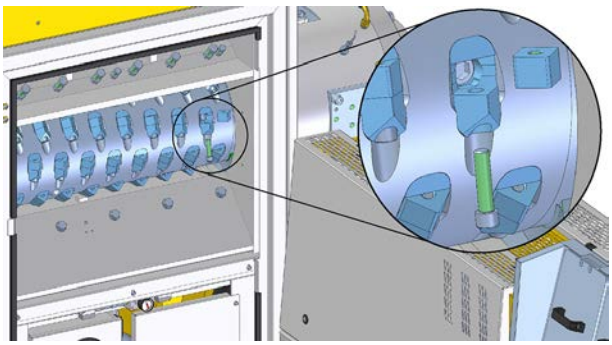
Risk of injury from sharp blades.

- Always wear hand protection when performing maintenance activities.

1. Switch off the machine and secure against being switched on again.
2. Check the shredder blade and blade holder.

   Refer to the instructions for removing the covers in the following section.

   ➲ See section 11.2.7 Check the upper stationary blade, shredder blade and blade holder
3. Loosen cylinder head screw and remove shredder blade.



4. Clean the V-profile of the blade holder and spray with suitable corrosion protection.
5. Insert blade with sharp edges in the V-profile of the blade holder. Each blade can be re-used four times.
6. Tighten the cylinder head screws according to torque chart.

   ➲ See section 14.2 Torque chart
7. Tap the blade into the mount using a copper hammer.

Attention

Machine damage due to improper cylinder screws!

- The cylinder screws must have the strength class 10.9. Screws with a lower strength class could result in damage to the machine.

8. Visually inspect the shredder shaft.

Attention

Machine damage due to improper configuration of the blades!

The blades used must not collide with the stationary blades.

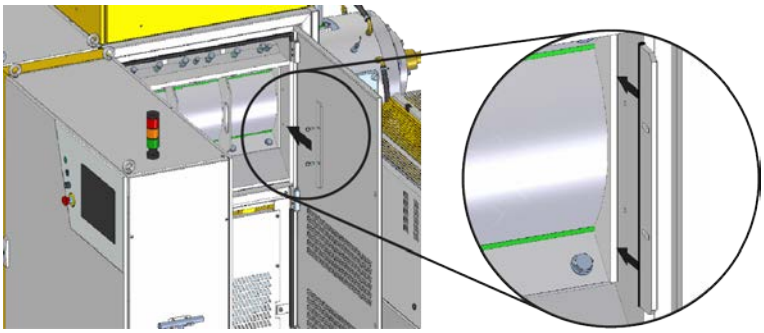
- There must be an average gap from 0.4 to 0.5 mm (Lower stationary blade) and 0.7 to 0.8 mm (Upper stationary blade) between stationary blades and rotating knife.

9 After inspection, reinstall shredder lid. Tighten the screws according to torque chart.

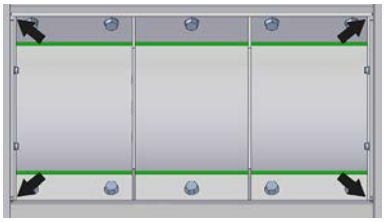
Depending on the size of machine, shredder lid is secured with 8 or 10 screws.

10 Check the sealing for the side bars and replace, if necessary.

11 Press and screw on the side bars against the shredder lid.



12 Replace silicone seal in the corners of shredder lid.



13 Close the maintenance door for the shredder.

= Shredder blades have been replaced.

11.2.39 Replacing shredder blade and blade holder

Mechanical specialist - 2nd person required for unskilled work

Shredder blades, blade holders

CAUTION

Risk of injury from cuts!

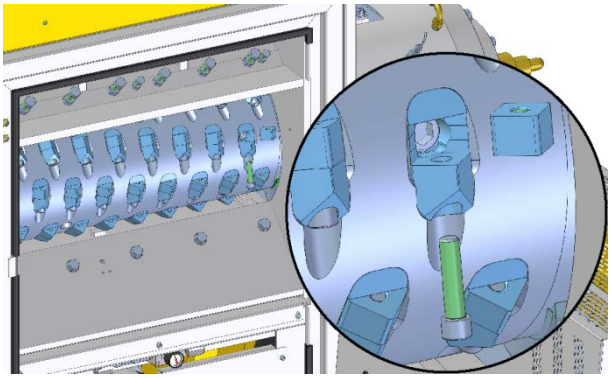
Risk of injury from sharp blades.

- Always wear hand protection when performing maintenance activities.

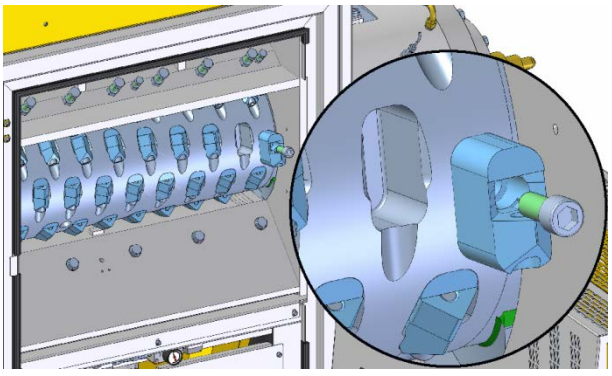
1. Switch off the machine and secure against being switched on again.
2. Check the shredder blade and blade holder.

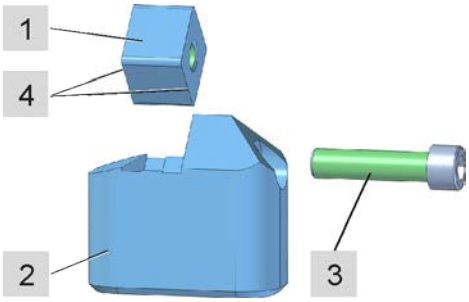
   Refer to the instructions for removing the covers in the following section.

   ➲ see section 11.2.7 Check the upper stationary blade, shredder blade and blade holder
3. Loosen cylinder bolt in the lower part of the blade holder and remove the shredder blade.



4. Loosen cylinder bolt of the countersunk blade holder and remove the blade holder.





1	Shredder blade	**3**	Cylinder bolt
2	Blade holder	**4**	Cutting edges

5 Clean the V-profile of the blade holder and spray with suitable corrosion protection.

6 Insert the blade holder into the shredder shaft and tighten.

7 Insert the blade into the V-profile of the blade holder and tighten according to torque table.

➲ see section 14.2 Torque chart8 Tap the blade into the mount using a copper hammer.

Attention

Machine damage due to improper cylinder bolts!

- The cylinder bolts must have the strength class 10.9. Screws with a lower strength class could result in damage to the machine.

9 Visually inspect the shredder shaft.

Attention

Risk of damage to machine due to improper configuration of the blades!

The blades used must not collide with the stationary blades.

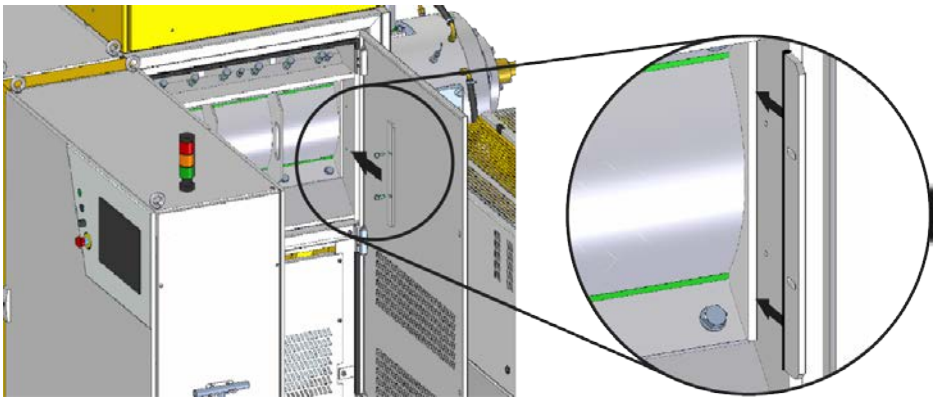
- There must be an average gap from 0.4 to 0.5 mm (Lower stationary blade) and 0.7 to 0.8 mm (Upper stationary blade) between stationary blade and rotating knife.

10 After inspection, reinstall shredder lid. Tighten the screws according to torque chart.

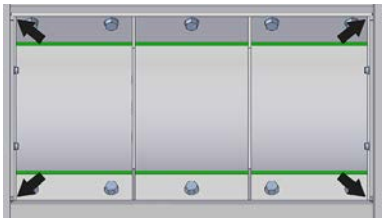
Depending on the size of machine, shredder lid is secured with 8 or 10 screws.

11 Check the sealing for the side bars and replace, if necessary.

12 Press and screw on the side bars against the shredder lid.



13 Replace silicone seal in the corners of shredder lid.



14 Close the maintenance door for the shredder.

= Shredder blade and blade holder have been replaced.

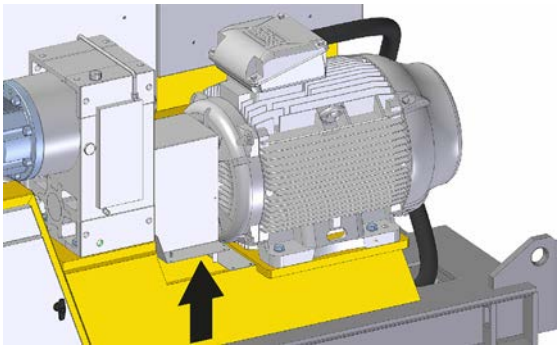
11.2.40 Replace elastomeric spider for shaft coupling

Transport and mechanical specialist

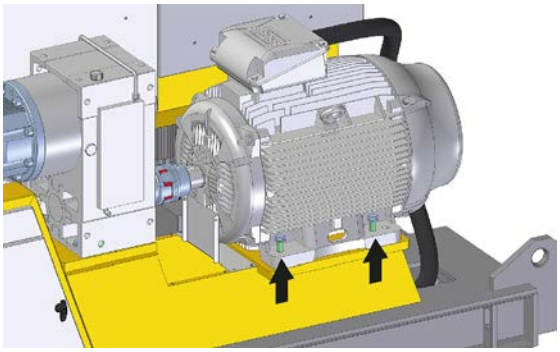
Elastomeric spider

1 Switch off the machine and secure against being switched on again.

2 Remove protective cover for the shaft coupling as shown in the picture.



3 Loosen the 4 screws for the extruder motor.



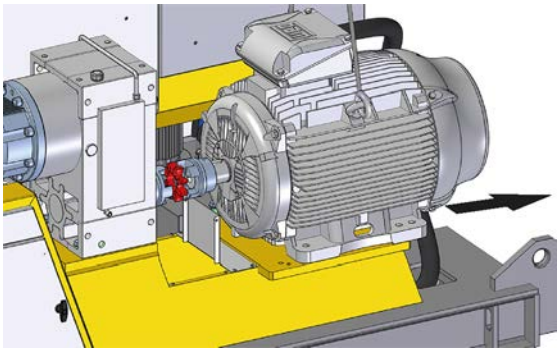
4 Remove extruder motor with caution using a crane.

Attention

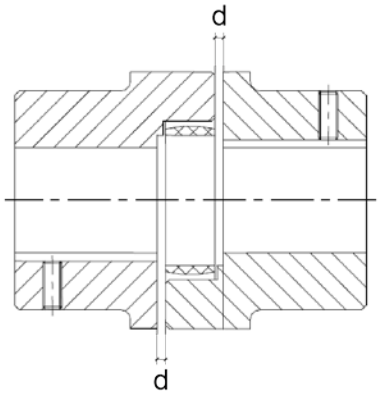
Damage to the power cable!

Uncontrolled lifting of extruder motor with a jerking motion may damage the connection cable.

- Use care when lifting and make sure the connection cable is not damaged.



5 Remove spider from the teeth and replace with a new spider. When doing so, observe the required distance (d = 2 mm) as shown in the following figure.



6 Reassemble all machine parts in reverse order.

= Elastomeric spider has been replaced.

11.2.41 Check the extruder screw for wear

Mechanical specialist - 2nd person required for unskilled work

2 rulers, caliper

Extruder screws are divided in 3 zones which are passed by the material accordingly.

1.) Intake zone

2.) B-Zone

3.) Metering zone

Especially in the intake zone the extruder screw is under extreme strain. This results in high wear rates that quickly change the overall performance.

To find out to what extend mechanical wear has progressed the extruder screw must be measured.

1 Remove the extruder screw and clean it.

For a better orientation during measurement number the threads

2 Number the treads.

3 Measure the diameter of the extruder screw.

Attention

- Use 2 rulers to allow measurement as illustrated
- Ask a 2nd person for assistance.

4 Measure each thread successively and enter the value in a measurement report.

If wear is greater than 2 % of the nominal diameter the extruder screw is worn.
e.g.: original diameter of the screw is 75mm - 1,5mm max. wear

Example for a measurement report:

Date: _____

Machine: _____

Nominal diameter: _____

thread #	diameter (measured)	comment
1		
2		
3		
4		

11.2.42 Remove/replace extruder screw

Transport and mechanical specialist

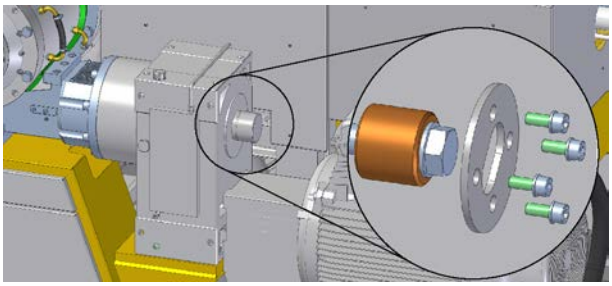
Remove the extruder screw

1 Run the machine till it is empty.

2 Switch the machine off and secure against being switched on again.

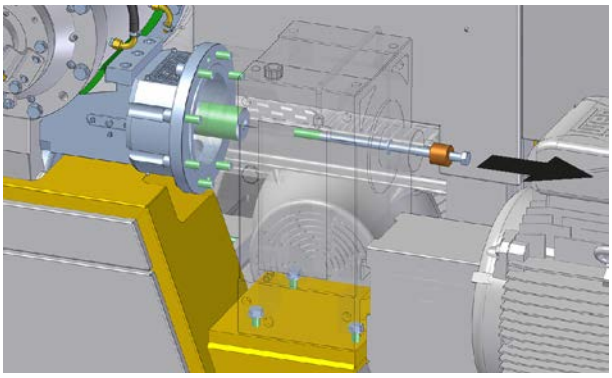
3 Disassemble and remove downstream units (e.g. pelletizer).

4 Unscrew the protective cover on the extruder gearbox.



5 Remove the snap ring by unscrewing the 4 screws.

6 Unscrew the extruder bolts from the extruder screw.

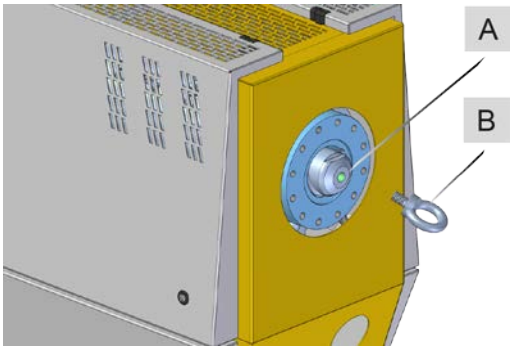


7 Switch on the machine and wait until the operating temperature is reached.

8 Switch off the machine in heated state and secure against being switched on again.

Only remove the extruder screw at operating temperature!

9 Clean threads at the screw tip (A).



10 Install eye bolt (B) on the screw tip (A) and pull the screw.

Attention

Remove screw horizontally!

- Extruder and venting screw must be removed horizontally from the cylinder.

11 Clean the extruder screw with a scraper.

Install the extruder screw

1 Clean the gear teeth.

2 Switch on the machine and wait until the operating temperature is reached.

3 Grease serration of the extruder screw.

4 Completely grease the thread of the extruder screw.

5 Switch the machine off and secure against being switched on again.

6 Insert extruder screw halfway into the cylinder.

Attention

Insert screws horizontally!

- Extruder and venting screw must be inserted horizontally into the cylinder.

7 Insert the spacer and extruder bolt.

8 Secure locking plate with 4 screws.

9 Move extruder by hand on the gear input shaft to verify proper installation.

10 Tighten safety cover with 2 screws.

✔ The extruder screw has been installed.

= Extruder screw has been exchanged.

11.2.43 Remove extruder screw and reassemble

Transport and mechanical specialist

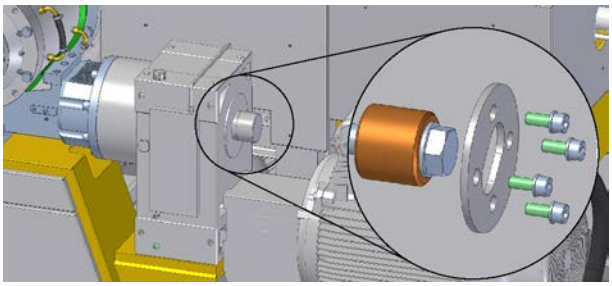
Remove the extruder screw

1 Run the machine till it is empty.

2 Switch the machine off and secure against being switched on again.

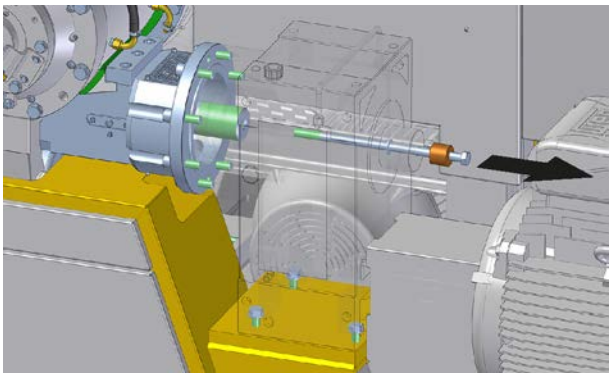
3 Disassemble and remove downstream units (e.g. pelletizer).

4 Unscrew the protective cover on the extruder gearbox.



5 Remove the snap ring by unscrewing the 4 screws.

6 Unscrew the extruder bolts from the extruder screw.

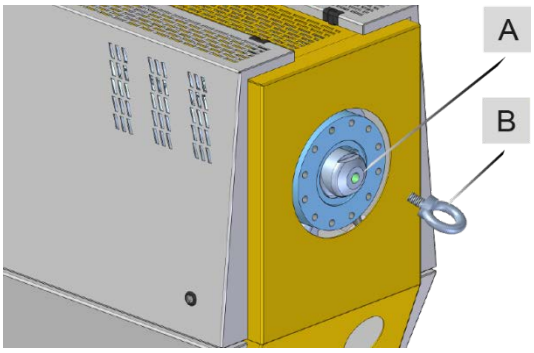


7 Switch on the machine and wait until the operating temperature is reached.

8 Switch off the machine in heated state and secure against being switched on again.

Only remove the extruder screw at operating temperature!

9 Clean threads at the screw tip (A).



10 Install eye bolt (B) on the screw tip (A) and pull the screw.

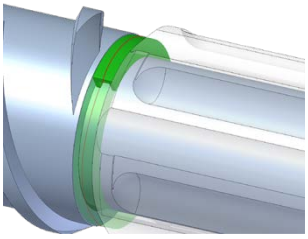
Attention

Remove screw horizontally!

- Extruder and venting screw must be removed horizontally from the cylinder.

11 Clean the extruder screw with a scraper.

12 Notch cutting ring with angle grinder.



Attention

Do not cut through the screw!

- Notch the cutting ring without cutting the extruder screw.

13 Unscrew extruder screw from venting screw.

✔ Extruder screw has been removed.

Install the extruder screw

1 Clean the gear teeth.

2 Switch on the machine and wait until the operating temperature is reached.

3 Grease serration of the extruder screw.

4 Completely grease the thread of the extruder screw.

5 Introduce extruder screw halfway into the cylinder.

6 Grease the end of the venting screw and mount shear ring.

7 Install cutting ring.

8 Screw home the venting screw with extruder screw and fully insert the screws into the cylinder until the serration of the extruder screw snaps into the gearbox mount.

Attention

Insert screws horizontally!

- Extruder and venting screw must be inserted horizontally into the cylinder.

9 Insert the spacer and extruder bolt.

10 Secure locking plate with 4 screws.

11 Move extruder by hand on the gear input shaft to verify proper installation.

12 Tighten safety cover with 2 screws.

✔ The extruder screw has been installed.

= Extruder screw has been exchanged.

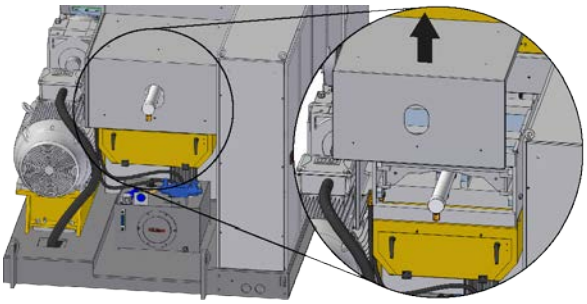
11.2.44 Replace sliding bars for pusher

Mechanical specialist, 2nd person required for unskilled work

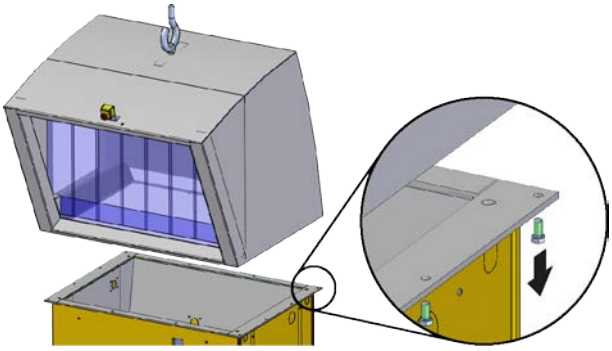
Sliding bar for pusher

1 Switch off the machine and secure against being switched on again. Pusher is in the rearmost end position.

2 Remove the cover by loosening the 9 screws.



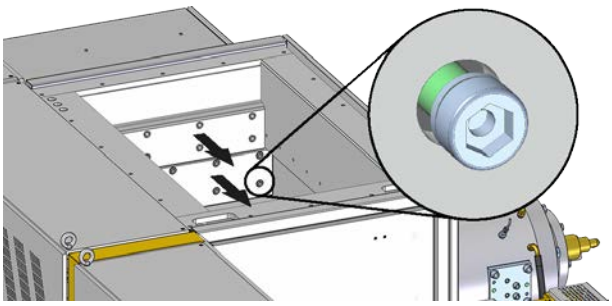
3 Loosen the screws for the protective hood.



4 Lift the protective cover with a crane.

➲ See section 5.1.3 Transport of protective hood

5 Remove the cover for the pusher and cover plate sealing in the hopper as shown in the image.

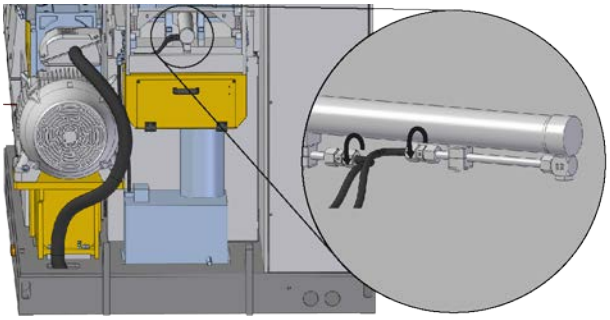


6 Remove all sealing bars.

➲ See section 11.2.31 Replacing the pusher seals.

7 Disconnect the hydraulic hoses from the pusher cylinder.

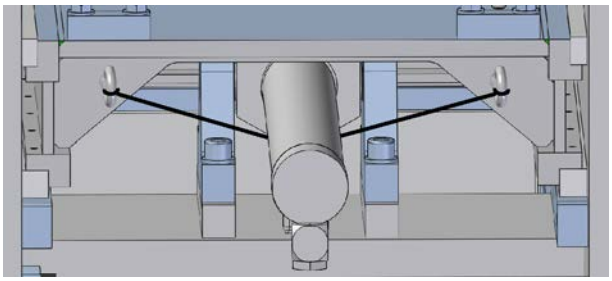
Label hydraulics hoses to keep from confusing them during assembly.



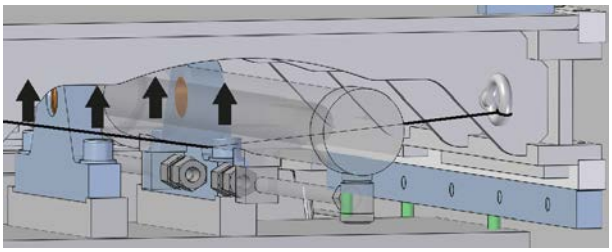
8 Secure the cylinder of the pusher with a rope.

a Install eye bolt as shown in the figure.

b Stretch a load-bearing rope between the eye bolts below the cylinder.



9 Detach the pusher by loosening the 4 mounting screws for the holder.

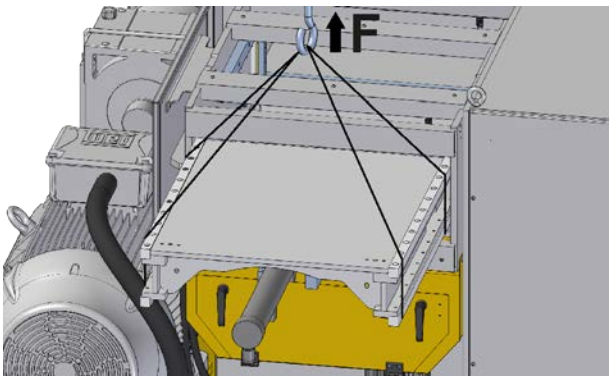


Attention

Pusher is very heavy!

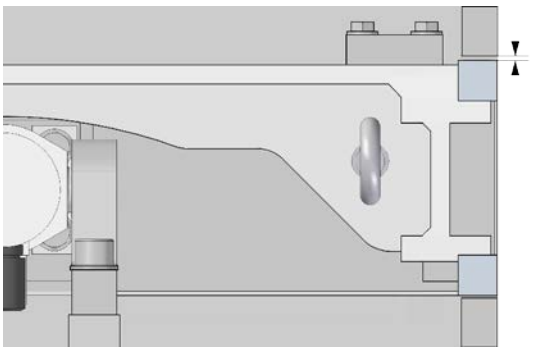
- When pulling the pusher two people are required!

10 Remove pusher with crane.



11 Unscrew the sliding bars.

12 Screw on new sliding bar. Leave a gap of 0,2 to 0,4 mm between the upper sliding bar and the upper metal rail.



13 Reassemble the equipment in reverse order.

= Sliding bars for pusher have been replaced.

11.2.45 Check coolant for frequency converter

Mechanical specialist

1 Open the ball cock valve.

2 Fill the fluid to the mark.

3 Close the ball cock valve.

= The fluid has been refilled.

12 Troubleshooting

12.1 Potential malfunctions

12.1.1 General information

Malfunction	Possible cause	Solution
System cannot be put into operation using the key switch	Main switch is off	Turn on main switch
	The safety equipment was triggered	Disable the emergency stop push-button. Use the safety switch to close the secured doors and covers properly ➲ see section 2.6 Safety signs on the equipment
	Circuit breaker for transformer voltage control, PLC voltage or 24V control voltage is switched off or was tripped	Notify personnel with qualification of electrical specialist and turn on the safety switch

12.1.2 Air separator (optional)

Problem	Possible cause	Solution
Film sticks to the housing.	Material is electrostatically charged	Install anti-static unit
	Anti-static unit not connected or not connected properly	Check the installation of the anti-static unit
Material jam in the air separator	Material is blocking intake for extruder screw	Remove material jammed against service door of the air separator
	The system cannot handle the quantity of material supplied	Remove material jammed against service door of the air separator and reduce material supply

12.1.3 Roll feeder (optional)

Malfunction	Possible cause	Solution
Roll feeder stops.	Film wrapped around one of the feed rollers.	Stop roll feeder, cut film and remove it from the feed roller.

12.1.4 Conveyor belt (optional)

Malfunction	Possible cause	Solution
Audio and visual alarms from metal detector at start-up	The metal detector is activated and signals readiness for operation For approx. 10 seconds the alarm for the metal detector sounds	No action necessary
Conveyor belt moves in the wrong direction	Motor rotation direction of the drive motor is set incorrectly	Notify personnel with qualification of electrical specialist and have the motor's rotation direction changed
Conveyor belt stops or does not start	The machine is switched off	Switch on the machine
	Machine is in manual mode and conveyor belt is switched off.	Switch on the conveyor belt at the control terminal
	Power supply for drive motor has failed	Check power supply
	Conveyor belt is not connected	Check connection for conveyor belt
	Main switch for auxiliary equipment is turned off or was tripped	Check all fuses of the supply lines to the auxiliary units
	Metal detector has located metal in the detector area	Remove metal from the conveyor belt and reset the alarm ➲ See supplier documentation on metal detector
	Alarm on metal detector	➲ See supplier documentation on metal detector
	Very wet material	Check material quality

Malfunction	Possible cause	Solution
Conveyor belt stops or does not start smoothly	Too much material	Reduce amount of material
	A very small metal part is on the conveyor belt e.g. an aluminum-coated paper	Remove metal from the conveyor belt and reset the alarm ➲ See supplier documentation on metal detector
	The sensitivity or product compensation of the metal detector is set incorrectly	Notify personnel with qualification of electrical specialist and have the sensitivity and product compensation checked ➲ See supplier documentation on metal detector
Conveyor belt stops or does not start Fault message - hopper overfilled	Light barrier at the hopper indicates full because light barrier is dirty	Clean the light barrier
	Light barrier on the hopper indicates full, because the light barrier is broken	Notify personnel with qualification of electrical specialist and have the light barriers checked
Drive motor does not run when switched on	Belt is blocked on the guides	Check the belt
	Material located between the belt and the drive pulley	Clean belt and drive pulley
	Belt tension too low	Check belt tension
Conveyor belt stops Fault message - motor circuit for conveyor belt	Motor circuit-breaker is turned off or was tripped	Notify personnel with qualification electrical specialist and turn on the motor circuit-breaker
	The belt is blocked	Check belt
	Too many start and stop operations	Clean light barrier at the feed hopper
Other problems with the metal detector		➲ See supplier documentation on metal detector

12.1.5 Shredder

Malfunction	Possible cause	Solution
Shredder does not start or stops during operation Fault message Error limit switch for shredder-feeder	One of the safety switches on the shredder is open	Close all covers properly
Shredder-feeder motor stops during operation Fault message Error limit switch for shredder-feeder	Main contactors are OFF or blown	Check start of startup unit and cabling of shredder-feeder
Shredder-feeder motor stops during operation Fault message Error start of startup unit	Shredder-feeder drive motor is overheated	Check settings of the shredder-feeder and reset, if necessary
Shredder-feeder motor stops during operation Fault message Error start of startup unit	Settings on the ram are too high	Check settings on ram and reset, if necessary
	Shredder shaft covers more material than processing by blades can handle	Check the intake zone of the shredder and find and eliminate the cause of increased material feed
		Check condition of materials
	Shredder shaft is blocked by foreign objects	Reverse shredder shaft and try again If shredder shaft cannot run freely, remove material parts
		Release the shredder shaft from foreign parts
V-belt slips on shredder drive	Belt tension too low	Increase the belt tension
Temperature rise in the shredder-feeder is too fast too high	Amperes for shredder motor is too high	Lower the setpoints for the shredder motor
		Lower the motor hysteresis
	Settings on the ram are too high	Lower the setpoints for the ram

Malfunction	Possible cause	Solution
	Shredder shaft captures material without pressure from the ram	Check the intake zone of the shredder and find and eliminate the cause of material feed
High peak loads of the shredder-feeder motor	Reversing point of the ram is set too high	Check settings for the reversal point of the ram and adjust
	Rotating and/or stationary blades in the shredder-feeder are worn out	Replace and/or rotate the blade
		Replace and/or rotate the cutting plates
Fault message for hydraulics of ram	Motor circuit-breaker of the hydraulic motor is switched off or was tripped	Notify personnel with qualification electrical specialist and turn on the motor circuit-breaker
	Pusher is blocked	Check ram
	Pusher moves too much	Check settings on ram and reset, if necessary
Fault message for overheating of the hydraulic oil in the hydraulic ram	Hydraulic oil is too hot	Check the cooling lines for the hydraulic units
Hydraulics of ram stops with running hydraulic motor	Limit switch does not send signal to the PLC	Reset the limit switch
	Limit switch at end position set incorrectly	Reset limit switch
	Limit switch is damaged at end position	Replace damaged limit switch
Hydraulic ram moves at low amperage	Supply of the material in the feed hopper is blocked	Remove blockage
	Material is very light (e.g. XPS)	Upgrade feed hopper with an additional press

12.1.6 Extruder

Malfunction	Possible cause	Solution
Extruder motor stops Fault message main power to the extruder motor	Fuse monitoring for main fuses of the extruder motor is OFF	Turn on fuse monitoring
	Extruder screw is blocked by foreign objects	Remove foreign objects from the extruder screw by reversing unit
		Pull out extruder screw and remove foreign parts
	Extruder screw moves when switching from star to delta connection	Increase setpoint temperatures in the extruder housing and let the extruder screw run freely Then return the setpoint temperatures back to normal
Extruder motor stops Fault message overload extruder motor	Temperature sensor in the extruder motor signals overheating	Check set temperature of the extruder for the material to be processed For some plastics (HDPE), it is necessary to open the inlet valve of the extruder
	Extruder motor is overloaded	Reduce extruder speed by replacing the pulleys
Extruder motor stops Fault message over pressure	Pressure sensor before screen changer indicates a pressure above 350 bar	Change screens
	No signal from the pressure sensor	Check the pressure sensor
	Screens are dirty	Change screens
	Material in front of the screen changer is not melted	Increase the setpoint temperatures on the housing taking into account the limit values for the material Check wiring and melt pressure sensors

Malfunction	Possible cause	Solution
High output fluctuations	Extruder is not sufficiently filled	Increase setpoints of the shredder-feeder and monitor material temperature in the shredder-feeder for an hour to ensure it does not exceed the limits of the material to be processed
		Check the cooling lines
Melt pressure pulsates up and down for a few seconds	Extruder is not sufficiently filled	Increase setpoints of the shredder-feeder and monitor material temperature in the shredder-feeder for an hour to ensure it does not exceed the limits of the material to be processed
		Check the cooling lines
Extruder output too low Extruder power consumption low	Shredder-feeder does not transport enough material to the extruder	Increase setpoints of the shredder-feeder and monitor material temperature in the shredder-feeder for an hour to ensure it does not exceed the limits of the material to be processed
	Supply of the material in the feed hopper is blocked	Upgrade feed hopper with an additional press
	Further transport of material from the shredder-feeder to the extruder via screw sleeve is blocked	Clean the feed screw sleeve
	Screw sleeve has not taken up sufficient material	Check the compressed air to the nozzles
	Self-feed of extruder screw is low	Check setting of the intake pusher – the largest flow occurs when the gap between the extruder screw and ram is "0"

Malfunction	Possible cause	Solution
Extruder output too low Low extruder power consumption, extruder power consumption decreases steadily over a longer period	Signs of wear after long periods of operation of the extruder screw, cylinder, grooved bushing, intake bush, etc.	Check geometry of extruder screw, cylinder, grooved bushing, intake bush, etc.
Extruder output too low High extruder power consumption and high melt pressure	Downstream equipment such as adapters, screen changers or pelletization unit are clogged	Change screens
	Material is not completely melted	Check setpoint temperatures
	Speed is too high	Change gear ratio on the belt drive

13 Disassembly and disposal

13.1 Disassembly

Transport, mechanical, electrical specialists and user

Warning

Risk of injury during disassembly!

Stored residual energy, corners, sharp and angular parts can cause injury.

- Wear helmet, foot protection, hand protection and protective suit, as well as tight-fitting clothing.
- Do not wear long hair loose.
- Provide sufficient space.
- Make sure the space is organized and clean. Tools and parts lying about can cause accidents.
- Dismantle components professionally.
- If needed, use lifting equipment.
- Handle open sharp-edged components with caution.
- Let equipment cool off.

DANGER

Avoid direct or indirect contact with live parts to prevent electrocution!

Electrical shock, burns or fatal injuries may result.

- Wait at least 10 minutes after turning off the recycling machine, as the capacitors retain voltage during this time.
- Disconnecting the machine from the mains, as well as all work on the electronics and live components, may only be performed by a qualified electrical technician.

Prior to disassembly, perform the following steps:

1. Run the recycling machine till it is empty and turn it off.
2. Let equipment cool off.
3. Have electrical specialist switch off electrical supply and close.
4. Switch off all other supplies and close.

13.2 Disposal

When the recycling machine reaches the end of its service life, it must be dismantled and disposed of in an environmentally responsible manner.

Attention

Incorrect disposal of machine or equipment components!

Environmental damage can be the result.

- Dispose of all machine components according to local regulations.
- Also during operation residues must be removed from the vacuum system, waste water, and operating material according to local regulations.

The following components of the dismantled system must be recycled, provided no redemption or disposal agreement was concluded:

Metals	Scrap the metals and have them disposed of by an authorized specialist.
Plastics	Sort the plastics and have them disposed of by an authorized specialist.
Contaminated equipment parts	Equipment parts contaminated by environmentally hazardous additives must be removed as specified in the safety data sheet and be disposed of by a licensed contractor.
Electrical scrap	Electronic components, cables and controls are to be removed disposed of by a licensed contractor.
Auxiliary and operating materials	The following auxiliary and operating materials are considered hazardous waste and must be disposed of accordingly: ■ Hydraulic oil ■ Gear oil ■ Grease and sealing grease ■ Coolant ■ Antifreeze
Batteries	Batteries contain toxic heavy metals and must be delivered to a recycling center.

14 Appendix

14.1 Contact details for customer service

If it is not possible to resolve the problem, please contact our customer service department.

Central Austria

Next Generation Recyclingmaschinen GmbH
Gewerbepark 22
4101 Feldkirchen

✉ service@ngr.at
✆ +43 7233 70107 - 0

Emergency call service for urgent cases outside office hours:
Friday: 12:00 - 18:00 (CET)
Saturday: 08:00 - 15:00 (CET)

✆ +43 664 8329054

US Branch Office

Next Generation Recycling Machines Inc.
3000 Center Place, Suite 100, Norcross, GA 30093

✉ service@ngr-usa.com
✆ +1 678 720 9861

Emergency call service for urgent cases outside office hours:
Saturday: 08:00 - 15:00 (EST)

14.2 Torque chart

Installation pre-tensioning forces and tightening torques (with m = 0.12 as the mean coefficient of friction in the thread) for set screws with metric thread according to DIN 13 part 13, and head dimensions of hex screws DIN 931 or DIN 912 cylinder bolts.

Dim	Class	Installation pre-tensioning forces FM in N for μ =							Tightening torque MA in Nm for μ =						
		0.08	0.10	0.12	0.14	0.16	0.2	0.24	0.08	0.10	0.12	0.14	0.16	0.2	0.24
M 4	8.8	4400	4200	4050	3900	3700	3400	3150	2.2	2.5	2.8	3.1	3.3	3.7	4.0
	10.9	6400	6200	6000	5700	5500	5000	4600	3.2	3.7	4.1	4.5	4.9	5.4	5.9
	12.9	7500	7300	7000	6700	6400	5900	5400	3.8	4.3	4.8	5.3	5.7	6.4	6.9
M 5	8.8	7200	6900	6600	6400	6100	5600	5100	4.3	4.9	5.5	6.1	6.5	7.3	7.9
	10.9	10500	10100	9700	9300	9000	8200	7500	6.3	7.3	8.1	8.9	9.6	10.7	11.6
	12.9	12300	11900	11400	10900	10500	9600	8800	7.4	8.5	9.5	10.4	11.2	12.5	13.5
M 6	8.8	10100	9700	9400	9000	8600	7900	7200	7.4	8.5	9.5	10.4	11.2	12.5	13.5
	10.9	14900	14300	13700	13200	12600	11600	10600	10.9	12.5	14.0	15.5	16.5	18.5	20.0
	12.9	17400	16700	16100	15400	14800	13500	12400	12.5	14.5	16.5	18.0	19.5	21.5	23.5
M 7	8.8	14800	14200	13700	13100	12600	11600	10600	12.0	14.0	15.5	17.0	18.5	21.0	22.5
	10.9	21700	20900	20100	19300	18500	17000	15600	17.5	20.5	23.0	25.0	27.0	31.0	33.0
	12.9	25500	24500	23500	22600	21700	19900	18300	20.5	24.0	27	30	32.0	36.0	39.0
M 8	8.8	18500	17900	17200	16500	15800	14500	13300	18.0	20.5	23.0	25.0	27.0	31.0	33.0
	10.9	27000	26000	25000	24200	23200	21300	19500	26.0	30.0	34.0	37.0	40.0	45.0	49.0
	12.9	32000	30500	29500	28500	27000	24900	22800	31.0	35.0	40.0	43.0	47.0	53.0	57.0
M 10	8.8	29500	28500	27500	26000	25000	43100	21200	36.0	41.0	46.0	51.0	55.0	62.0	67.0
	10.9	43500	42000	40000	38500	37000	34000	31000	51.0	60.0	68.0	75.0	80.0	90.0	98.0
	12.9	50000	49000	47000	45000	43000	40000	36500	61.0	71.0	79.0	87.0	94.0	106.0	115.0
M 12	8.8	43000	41500	40000	38500	36500	33500	31000	61.0	71.0	79.0	87.0	94.0	106.0	115.0
	10.9	63000	61000	59000	56000	54000	49500	45500	90.0	104.0	117.0	130.0	140.0	155.0	170.0
	12.9	74000	71000	69000	66000	63000	58000	53000	105.0	121.0	135.0	150.0	160.0	180.0	195.0
M 14	8.8	59000	57000	55000	53000	50000	46500	42500	97.0	113.0	125.0	140.0	150.0	170.0	185.0
	10.9	87000	84000	80000	77000	74000	68000	62000	145.0	165.0	185.0	205.0	220.0	250.0	170.0
	12.9	101000	98000	94000	90000	87000	8000	73000	165.0	195.0	215.0	240.0	260.0	290.0	320.0
M 16	8.8	81000	78000	75000	72000	70000	64000	59000	145.0	170.0	195.0	215.0	230.0	260.0	280.0
	10.9	119000	115000	111000	106000	102000	94000	86000	215.0	250.0	280.0	310.0	340.0	380.0	420.0
	12.9	139000	134000	140000	124000	119000	110000	101000	250.0	300.0	330.0	370.0	400.0	450.0	490.0
M 18	8.8	102000	98000	94000	91000	87000	80000	73000	210.0	245.0	280.0	300.0	330.0	370.0	400.0
	10.9	145000	140000	135000	129000	124000	114000	104000	300.0	350.0	390.0	430.0	470.0	530.0	570.0
	12.9	170000	164000	157000	151000	145000	133000	122000	350.0	410.0	460.0	510.0	550.0	620.0	670.0
M 20	8.8	141000	126000	121000	117000	112000	103000	95000	300.0	350.0	390.0	430.0	470.0	530.0	570.0
	10.9	186000	180000	173000	166000	159000	147000	135000	420.0	490.0	560.0	620.0	670.0	750.0	820.0
	12.9	218000	210000	202000	194000	187000	171000	158000	500.0	580.0	650.0	720.0	780.0	880.0	960.0
M 22	8.8	163000	157000	152000	146000	140000	129000	118000	400.0	470.0	530.0	580.0	630.0	710.0	780.0
	10.9	232000	224000	216000	208000	200000	183000	169000	570.0	670.0	750.0	830.0	900.0	1020.0	1110.0
	12.9	270000	260000	250000	243000	240000	215000	198000	670.0	780.0	880.0	970.0	1050.0	1190.0	1300.0
M 24	8.8	188000	182000	175000	168000	161000	148000	136000	510.0	600.0	670.0	740.0	800.0	910.0	990.0
	10.9	270000	260000	249000	239000	230000	211000	194000	730.0	850.0	960.0	1060.0	1140.0	1300.0	1400.0
	12.9	315000	305000	290000	280000	270000	247000	227000	850.0	1000.0	1120.0	1240.0	1350.0	1500.0	1650.0
M 27	8.8	247000	239000	230000	221000	213000	196000	180000	750.0	880.0	1000.0	1100.0	1200.0	1350.0	1450.0
	10.9	350000	340000	330000	315000	305000	280000	255000	1070.0	1250.0	1400.0	1550.0	1700.0	1900.0	2100.0
	12.9	410000	400000	385000	370000	355000	325000	300000	1250.0	1450.0	1650.0	1850.0	2000.0	2250.0	2450.0
M 30	8.8	300000	290000	280000	270000	260000	237000	218000	1000.0	1190.0	1350.0	1500.0	1600.0	1800.0	2000.0
	10.9	430000	415000	400000	385000	370000	340000	310000	1450.0	1700.0	1900.0	2100.0	2300.0	2600.0	2800.0
	12.9	500000	485000	405000	450000	430000	395000	365000	17000.0	2000.0	2250.0	2500.0	2700.0	3000.0	3300.0
M 33	8.8	375000	360000	350000	353000	320000	295000	275000	1400.0	1600.0	1850.0	2000.0	2200.0	2500.0	2700.0
	10.9	530000	520000	495000	480000	460000	420000	390000	1950.0	2300.0	2600.0	2800.0	3100.0	3500.0	3900.0
	12.9	620000	600000	580000	560000	450000	395000	455000	2300.0	2700.0	3000.0	3400.0	3700.0	4100.0	4500.0
M 36	8.8	440000	425000	410000	395000	380000	350000	320000	1750.0	2100.0	2350.0	2600.0	2800.0	3200.0	3500.0
	10.9	630000	600000	580000	560000	540000	495000	455000	2500.0	3000.0	3300.0	3700.0	4000.0	4500.0	4900.0
	12.9	730000	710000	680000	660000	630000	580000	530000	3000.0	3500.0	3900.0	4300.0	4700.0	5300.0	5800.0
M 39	8.8	530000	510000	490000	475000	455000	420000	385000	2300.0	2700.0	3000.0	3400.0	3700.0	4100.0	4500.0
	10.9	750000	730000	700000	670000	650000	600000	550000	3300.0	3800.0	4300.0	4800.0	5200.0	5900.0	6400.0
	12.9	880000	850000	820000	790000	760000	700000	640000	3800.0	4500.0	5100.0	5600.0	6100.0	6900.0	7500.0