User Manual

BD PelletTower
Forsman, Stockholm, MN

Code No. 99-97-0297

Edition: 05/2018 GB

1 Basic instructions

!	**Important:** Please take care of this manual and keep it close to the system **at all times for quick reference**. All persons working with this system, assembling, cleaning and servicing it must be familiar with the contents of this manual. Observe these security instructions whenever any work is carried out on this system! If this manual is damaged or lost, request a new copy from **Big Dutchman**.

The following information is necessary to order a new copy of the manual:

- the 8-digit code number of your language version [99-97-xxxx] as stated on your manual's cover;
- the complete title of the manual including information on the type of manual;
- the edition date.

1.1 Structure of the instructions in this manual

1.1.1 Structure of the safety instructions

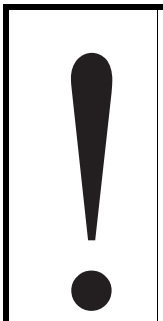
Basic structure:

Pictograph	**Type of danger**
	Possible consequence(s) of non-compliance
Signal word	• Measure(s) against the danger

Meaning of the signal words:

Pictograph	**Signal word**	**Meaning**	**Consequences of non-compliance**
Possible personal injuries:			
Safety symbols: see chapter 2.5	**DANGER**	**directly** dangerous situation	**Will** lead to death or severe injuries.
	WARNING	**possibly** dangerous situation	**May** lead to death or severe injuries.
	CAUTION	**possibly** dangerous situation	**May** lead to minor injuries.
Possible damage to property:			
	**NOTICE**		**May** lead to damage to property.

1.1.2 Structure of the general instructions



IMPORTANT!

This symbol indicates important information. There is no risk of personal injuries or damage to property.

Please note that instructions in the supplier's documentation may differ for external components!

1.2 Qualifications of the persons working with the system

1.2.1 Personnel for assembly and maintenance of mechanical parts

Mechanical parts of the system may only be assembled and maintained by persons who have been trained correspondingly or who have the necessary knowledge or practical experience required for proper assembly and maintenance of the system.

1.2.2 Personnel for assembly and maintenance of electric parts

Only qualified electricians may work on electric parts. A qualified electrician is a person who can evaluate the works assigned to him and recognise possible dangers due to his technical training, knowledge and experience as well as knowledge of the relevant regulations. Relevant regulations specifically include local statutory requirements and provisions of the responsible energy provider.

1.2.3 Operating personnel

The system must only be operated by persons who have received intensive training on how the system works. All operating personnel must know the structure of the system. The operating personnel must also be familiar with the system' control unit.

1.3 Ordering spare parts

 **WARNING**	**Risk of injury and danger to life** **Operational safety is of paramount importance!** Spare parts not approved or recommended by **Big Dutchman** can cause severe injuries as their suitability for **Big Dutchman** systems cannot be verified. • Only use spare parts approved by **Big Dutchman** for you own safety.

Indicate the following when ordering spare parts:

- the code number and description of the spare part;

  or for parts that do not have a code number
- the manual's code and position number including description of the spare part;
- the invoice number of the original delivery;
- the current supply, e.g. 230/400 V – 3 Ph – 50/60 Hz.

	**If a safety symbol or instruction is fixed to a part to be replaced, ensure that it will be fixed to the new part as well.**

1.4 Warranty and liability

Warranty and liability claims regarding personal injury or property damage are excluded if they result from one or several of the following causes:

- inappropriate assembly of the system;
- non-compliance with the instructions in the manuals regarding transport, storage, operation, assembly and spare parts;
- technical modifications to the system without approval from **Big Dutchman;**
- disasters and force majeure.

In the interest of further development, we reserve the right to modify the design and technical data. The actual scope of delivery may therefore deviate from the explanations and descriptions in this manual.

1.5 First aid

In the case of an accident, a first-aid kit must always be available at the place of work, unless otherwise specified. Material taken out and used is to be replaced immediately.

If you need help, describe the accident as follows:

- where it happened
- what happened
- the number of persons injured
- what type of injury
- who is reporting the accident.

1.6 Transport

Due to the high number of possible building units and parts, we can only supply general information in this manual. This information should be sufficient for experienced technicians and transport experts. If you have questions, please contact **Big Dutchman**.

The system is supplied in pre-assembled building units and packaging units. They have to be secured adequately against shifting and tilting during transport. The transport has to be carried out by experts.

The building and packaging units are transported to the construction site with appropriate means of transport. To avoid any possible damage, make sure that the units are loaded and unloaded carefully. If the goods are transported by hand, please keep in mind the reasonable human lifting and carrying abilities.

See that the transport is carried out safely. Avoid bumps and impacts and see to a secure standing at every stage of the transport.

The scope of the delivery is listed in the shipping documents. Please check for completeness upon receipt. Possible transport damage and / or missing parts have to be reported immediately in writing.

Small parts like screws, nuts and washers come in transparent bags packed in cardboard boxes.

1.7 Storage

The storage area for supplied system components should be dry and roofed. If this is not possible, the components should be covered with PE foil and stored with sufficient ground clearance. Make sure that all stored components are protected against dust and moisture. Protect all parts from mechanical damage.

 **NOTICE**	**Storage of electrical parts**
	• Store all electrical parts in a dry and closed space.

Open-air storage of electrical parts is acceptable for a short time only. If stored outside for a short time, electrical parts must be protected against harmful environmental influences.

Thermal expansion caused by temperature changes

- Store all system components where they will be installed, if possible, so they can adjust to the ambient temperature.

1.8 Environmental protection

All works on and with the system must be carried out in compliance with the local statutory provisions for environmental protection.

Water pollutants like lubricating grease and oils as well as solvent-containing cleaning solutions may not pollute the soil or reach the canalisation! These materials must be kept, transported, collected and disposed of in appropriate containers!

1.9 Waste disposal

Dispose of the packaging material and waste that cannot be used further according to statutory provisions. If possible, recycle such material and waste.

Observe the applicable statutory provisions when disassembling and disposing of the system.

1.10 Copyright

For further information please contact:

Big Dutchman International GmbH, P.O. Box 1163, D-49360 Vechta, Germany,
Phone +49 (0)4447/801-0, Fax +49 (0)4447/801-237

E-Mail: big@bigdutchman.de, Internet: www.bigdutchman.de

2 Safety

2.1 General safety instructions

Observe the statutory provisions regarding safety, accident prevention and operational health.
Check the safety and function control devices for correct operation:

- before putting the system into operation;
- in adequate intervals (see the maintenance intervals);
- after modifications or repairs;
- before every restart of the system.

2.2 Designated use

The **Big Dutchman** PelletTower system is designed for making pellets out of animal waste such as manure, carcasses and egg shells.

Any deviating use is considered non-designated use. **Big Dutchman** is not liable for any damage caused by non-designated use.

2.3 Misuse

Any non-compliance with assembly, operating and maintenance instructions is considered misuse. This includes:

- non-compliance with values indicated in the technical data, e.g. regarding the intake material or power supply;
- a mechanical loading of the system that exceeds the load planned for the system;
- use of non-suitable cleaning agents and disinfectants;
- excessive soaking times of cleaning agents and disinfectants.

Big Dutchman excludes any liability in case of misuse of the system.

2.4 Operator's obligations to prevent accidents

The operator is obliged to create a safe working environment. This applies to assembly and disassembly of the system and to operation, maintenance and cleaning of the system.
Involved persons must be informed about

- remaining dangers when performing these tasks;
- the applicable rules and regulations regarding accident prevention. Compliance with these rules and regulations must be monitored.

The basis for these rules and regulations are:

- the system's technical documentation, specifically the included safety instructions;
- the locally applicable safety and health regulations.

2.5 Safety symbols in this manual and on the system

This manual's safety instructions uses the following safety symbols (pictographs).

	Warning: general danger
	Warning: dangerous electric tension
	Warning: hand injuries
	Warning: danger of slipping

The following pictographs indicate specific remaining dangers. They are fixed on the system.

GENERAL DANGER!

System starts working automatically. Before starting any repair, maintenance or cleaning works, put main switch to "OFF"!

DANGER OF CRUSHING due to rotating machine parts!

Always lock and secure the safety devices before starting up the system. Protective devices may only be opened by authorized persons, when the system is idle.

DANGER OF ENTANGLEMENT due to operating auger, chain and/or rope sheaves!

Never reach or climb into the feed hopper, the feed column, the feed pipes or the feed trough while the motor is running!

DANGER for children

Children cannot assess the dangers of the system correctly. Keep children away from the system.

GENERAL DANGER!

Read the manual.

CAUTION

Safety symbols and instructions on the system must always be easily visible and undamaged.

- If they are soiled by dust, manure, feed remains, oil or grease, clean them with a water-detergent mixture.
- Damaged, lost, or unreadable safety symbols have to be replaced immediately.
- If a safety symbol or instruction is fixed to a part to be replaced, ensure that it will be fixed to the new part as well.

2.6 Personal safety instructions

2.6.1 Safety of the operating and maintenance personnel

Only let trained personnel that is familiar with the system perform maintenance tasks.

 **WARNING**	**Risk of injury**
	Lack of knowledge about the structural design of the system can lead to injury. • Make the operating and maintenance personnel familiar with the design and construction of the system under sufficient lighting! • Inform operating and maintenance personnel about remaining dangers. • Inform operating and maintenance personnel about the function and location of protection devices, especially the emergency stop buttons.

2.6.2 Personal protective equipment and measures

 **WARNING**	**Risk of injury**
	The following instructions apply to all works carried out on the system. • Wear **close-fitting protective clothing** and **protective footwear**. • Use **protective gloves** where there is a risk of hand injuries and **safety goggles** where there is a risk of eye injuries. • Do not wear **any rings, necklaces, watches, scarves, ties or other items** which could get caught in parts of the system. • Make sure that **long hair is always tied back**. Hair can get caught in powered or rotating working units or parts of the system, resulting in severe injuries. • Wear a **safety helmet** as well as a **dust mask** upon operating the system!

2.6.3 Safety of external persons

 **WARNING**	**Risk of injury** External persons do not know the danger zones of the system. They are therefore at a special risk. • External persons must not be inside the system on their own. • External persons must wear personal protective clothing while inside the system.

 **WARNING**	**Risk of injury** **Children in the area of the system are at risk of injury as they can often not be supervised sufficiently and are not able to recognize hazards.** • Ensure that children do not use the system as a playground and are not left unsupervised in the vicinity of the system.

2.7 System-specific safety instructions

2.7.1 Safety in the entire system

The individual zones of the **Big Dutchman** system are constructed differently.There are several ejecting, rotating or sliding parts that might be a risk if you are not familiar with their type of construction.

The system has been equipped with all mechanisms that guarantee a safe operation. In places where the danger zone could not be safeguarded totally, in consideration of the operational reliability, safety signs have been placed. They indicate remaining technical dangers when handling the system and give information on how to avoid these dangers.

 **NOTICE**	**Danger of property damage!**
	Excessive loading of system components may lead to damage or destruction. • Observe the information in the respective component's documentation. • Do **not** load the components more than specified by the given parameters.

Only use suitable tools and observe the local accident prevention regulations.

After any maintenance and repair works, check the proper functioning of the system.

 **WARNING**	**Risk of injury** **Parts lying about on the system and in its vicinity can cause persons to stumble and/or fall and thus risk injuring themselves by contact with system components.** **Lack of knowledge about the structural design of the system can lead to injury.** **Party lying about in or on the components can lead to serious damage of the system.** • Never deposit objects (e.g. spare parts, replaced parts, tools, cleaning tools etc.) in the accessible areas of the system or in the surrounding areas have having carried out works on the system! • Make yourself familiar with the design and construction of the system under sufficient lighting! If this is not possible, inform yourself about any remaining dangers in connection with this system! • **Before** restarting the system, assure yourself that all loose or replaced parts have been removed from the system components! • The device may only be put into operation after all protective systems have been put into place again and are functioning.

 **WARNING**	**Risk of injury** **Lack of knowledge regarding the system's type of construction increases the risk of injury.** • Never reach into the running system. First stop the system and secure it against an inadvertent restart. • Assure yourself **before reaching into the system** that the main switch is in the OFF position and cannot be put in the ON position without your knowledge.

2.7.2 Electrical equipment

You as the person responsible for the system or his agent have to ensure that the system with its electrical appliances is operated and maintained according to the local electro-technical regulations.

  **WARNING**	**Risk of injury and danger to life** **Dangerous electric tension may be bare in the case of open control units and may cause severe injuries or lead to death!** • Be aware of the danger and keep workers of other professions away from the danger zone. • Installations and works on electric components/building units may only be carried out by qualified persons according to electro-technical regulations (e.g. EN 60204, DIN VDE 0100/0113/0160).

 **WARNING**	**Danger of electric shock!** **Live parts may be bare when performing different tasks. Touching live parts can lead to injuries caused by electric shock.** • Before performing any repair or maintenance work, turn the main switch to "Off" and display a sign warning that repair or maintenance work is in progress! • Never touch bare electrical components. Equipment with bare electrical components must not be used by the operating personnel.

- Immediately switch off the system in the event of malfunctions of the power supply units. Check that the electrical equipment is not alive.
- Check the electrical wiring and cables for recognisable damage before putting the system into operation again. Replace damaged wiring and cables before taking the system into operation.
- Only use the fuses indicated in the circuit diagram.
- Never cover an electrical motor. This can cause high temperatures resulting in fires and the destruction of the equipment.
- Always keep the control cabinet and all terminal and connection boxes of the system locked.
- Damaged or broken plugs should be immediately replaced by an electrician.
- Do not pull the plug from the socket at the flexible cable.

- For the respective connections please see the enclosed connecting plan of the system parts delivered.

2.8 Safety contrivances

  **WARNING**	**Risk of injury and danger of life** **Defective or disassembled safety contrivances may cause severe injuries or lead to death!** • It is strictly forbidden to remove or put out of operation any safety contrivance. • Should the safety contrivances be damaged, the system has to be put out of operation immediately. The main switch must be locked in neutral position and any damage must be eliminated. • Before putting the system into operation again, make sure that all safety contrivances are assembled correctly and are functioning after works on the system have been carried out.

2.9 Safety symbols on the system

- Observe the instructions fixed to the system, e.g. the arrow on the motor indicating the direction of rotation.
- These safety symbols and instructions must always be visible and may not be damaged. If they are soiled by dust, manure, feed remains, oil or grease, clean them with a water-detergent mixture.

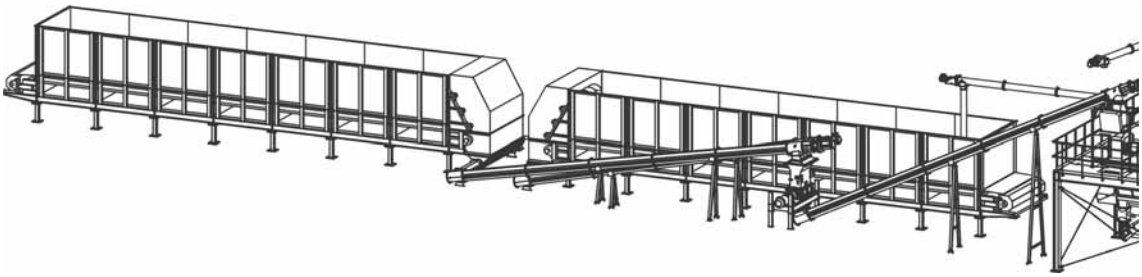
	**If a safety symbol or instruction is fixed to a part to be replaced, ensure that it will be fixed to the new part as well.**

2.9.1 Safety symbols on all system areas with drives

00-00-1519 (100 x 50 mm) **Piktogramm:** Sicherheit für Kinder von 0-15 Jahren **Pictograph:** Safety for children 0-15 years	

Examples for drives

2.9.2 Safety symbols on the dosing hoppers

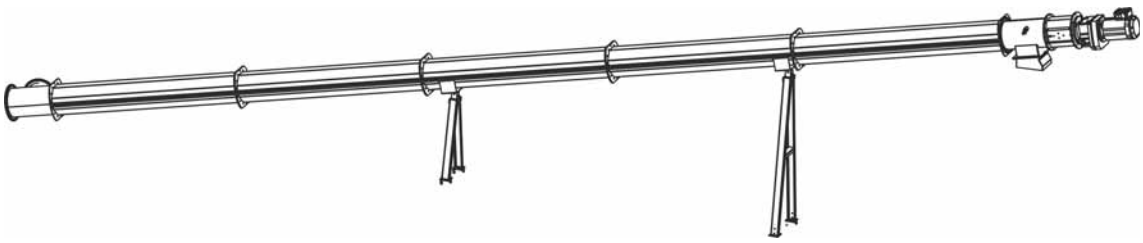


Pos.	Qty.	Code no.	Description
	2	99-99-8563	Sticker EN/IT "Dust free…" 70 x 60 cm

00-00-1320 (100 x 100 mm) **Pictograph:** Pictograph: mandatory / wear goggles **Pictograph:** Mandatory / wear goggles	

00-00-1322 (100 x 100 mm) **Piktogramm:** Gebot / Atemschutzmaske tragen **Pictograph:** Mandatory / wear respirator mask	

2.9.3 Safety symbols on the conveying augers



Auger (dosing hopper)

Auger (dosing hopper)

Auger (hammer mill)

Auger (hygieniser)

Auger (round sieve)

Auger (two-shaft shredder)

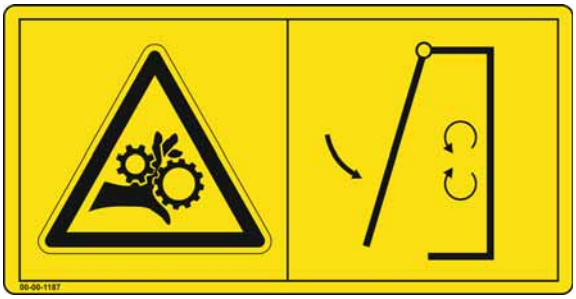
Auger (towards dosing hopper)

Auger (cyclone)

00-00-1187 (100 x 50 mm)

Piktogramm: Quetschgefahr / Schutzvorrichtungen

Pictograph: Crushing danger / protection device



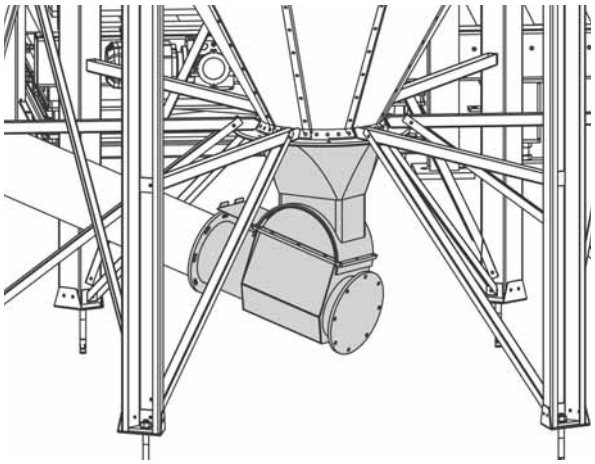
00-00-1188 (100 x 50 mm)

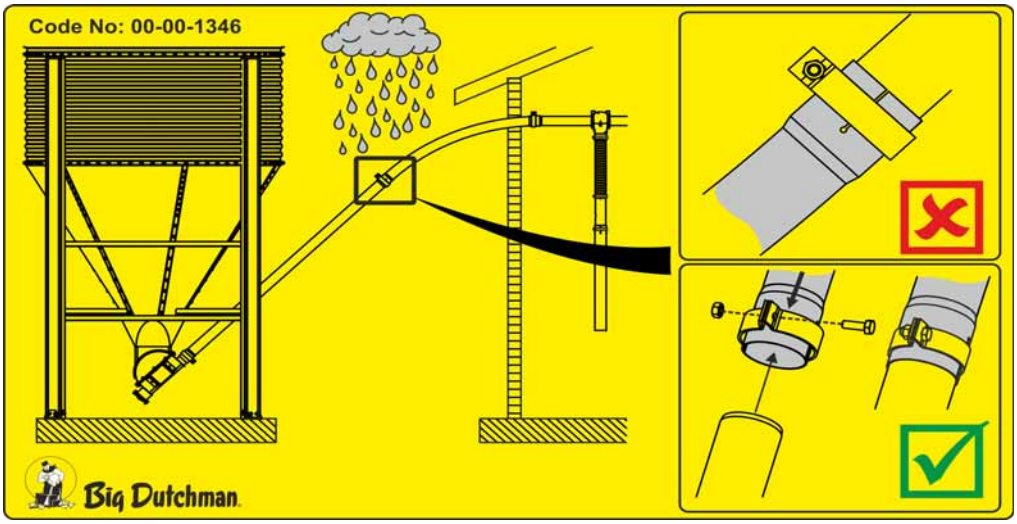
Pictograph: Risk of injury / hopper

Pictograph: Risk of injury / hopper

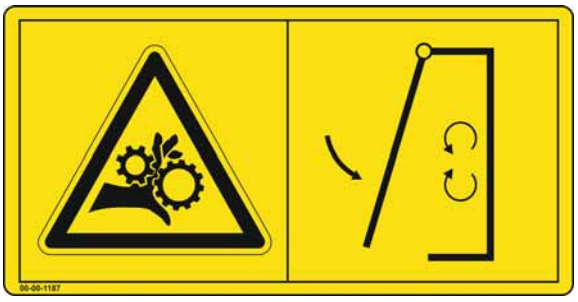
00-00-1186 (100 x 50 mm) **Pictograph:** Before maintenance work main switch "OFF" **Pictograph:** Before maintenance work main switch "OFF"	
00-00-1240 (100 x 50 mm) **Piktogramm:** Allgemeine Gefahr W09 / Anleitung lesen **Pictograph:** General danger W09 / Read the Manual	
00-00-1283 (50x100mm) **Sticker:** ISO 3864-2: Automat. machinery. This unit may ... **Sticker:** ISO 3864-2: Automat. machinery. This unit may ...	

2.9.4 Safety symbols on the silo boot below the silo



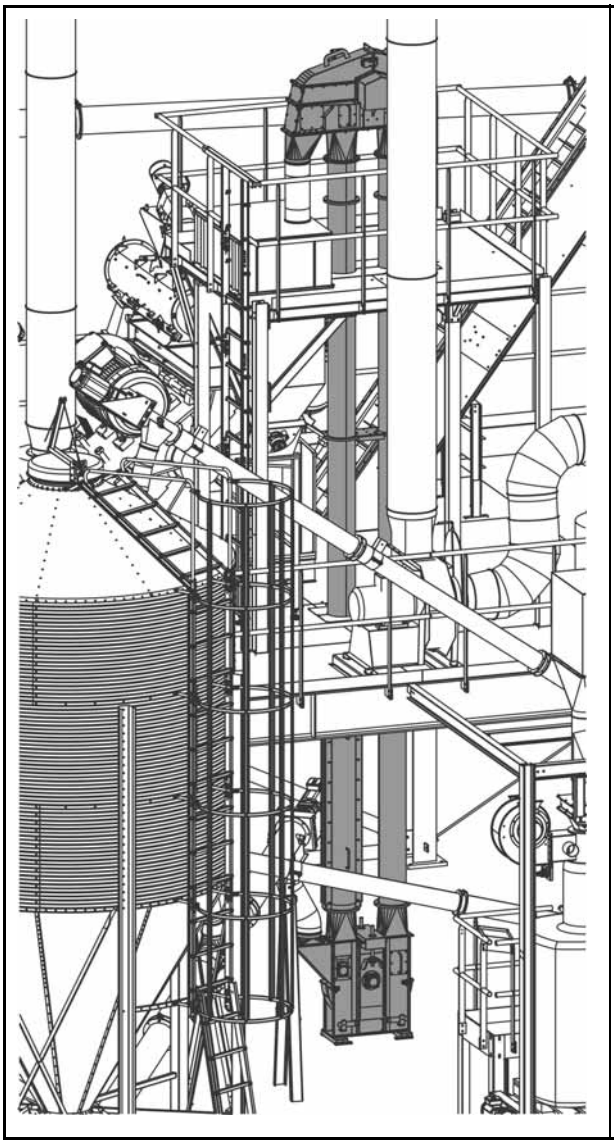


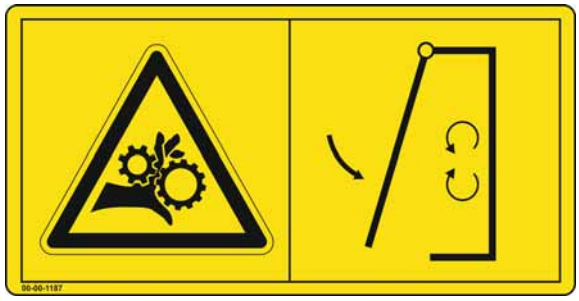
00-00-1225 (100 x 50 mm) **Pictograph:** Danger of injury of hand W23/door resp. flap **Pictograph:** Danger of injury of hand W23 / door resp. flap	

00-00-1186 (100 x 50 mm) **Pictograph:** Before maintenance work main switch "OFF" **Pictograph:** Before maintenance work main switch "OFF"	
00-00-1226 (100 x 50 mm) **Pictograph:** Danger of drawing-in W30 / feed auger **Pictograph:** Danger of drawing-in W30 / feed auger	
00-00-1187 (100 x 50 mm) **Piktogramm:** Quetschgefahr / Schutzvorrichtungen **Pictograph:** Crushing danger / protection device	
00-00-1240 (100 x 50 mm) **Piktogramm:** Allgemeine Gefahr W09 / Anleitung lesen **Pictograph:** General danger W09 / Read the Manual	

00-00-1283 (50x100mm) **Sticker:** ISO 3864-2: Automat. machinery. This unit may ... **Sticker:** ISO 3864-2: Automat. machinery. This unit may ...	

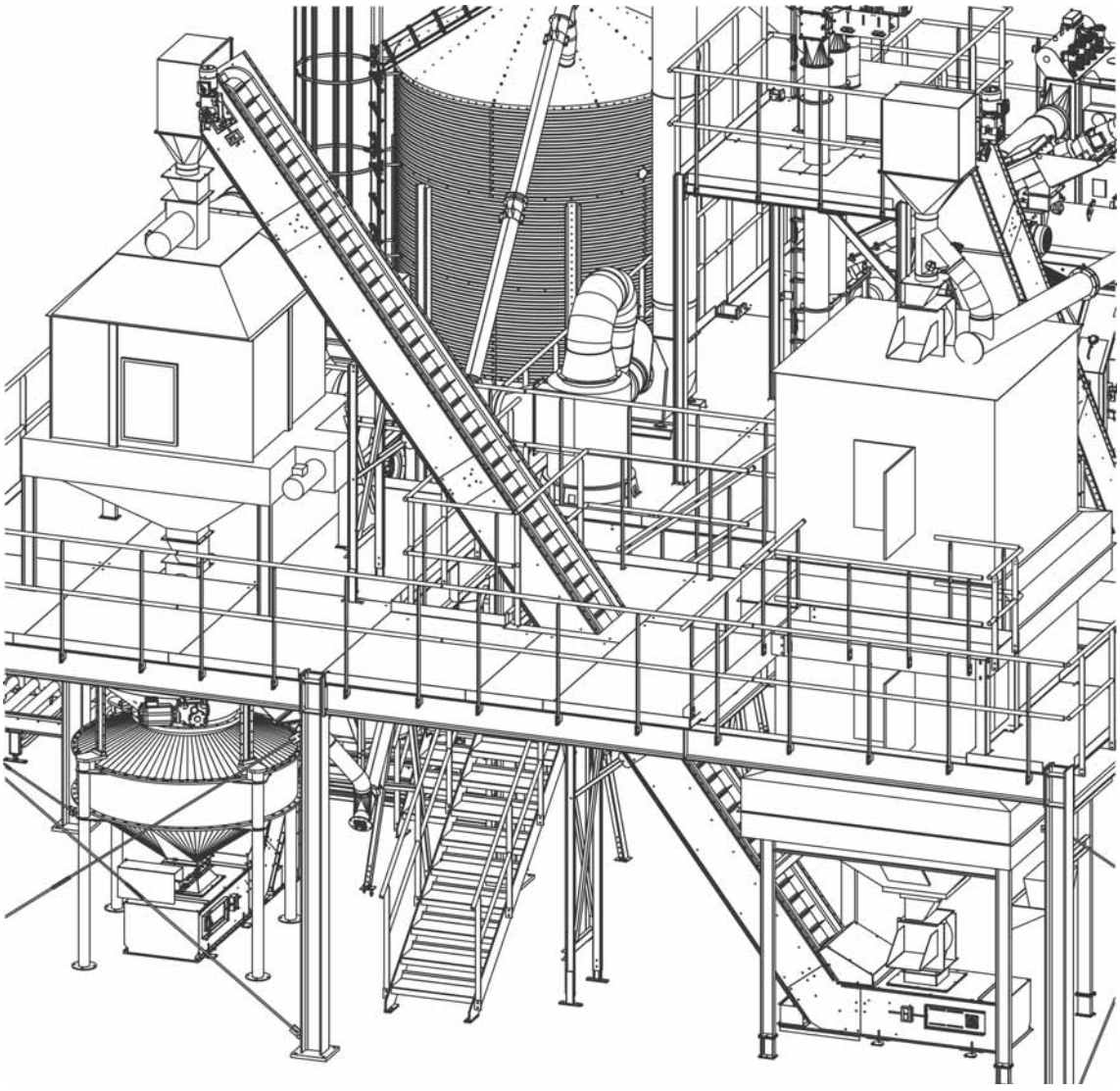
2.9.5 Safety symbols on the bucket elevator

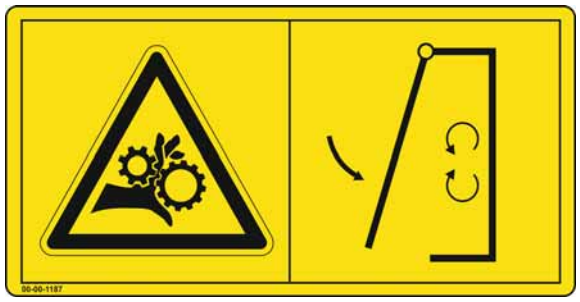


00-00-1187 (100 x 50 mm) **Piktogramm:** Quetschgefahr / Schutzvorrichtungen **Pictograph:** Crushing danger / protection device	
00-00-1226 (100 x 50 mm) **Pictograph:** Danger of drawing-in W30 / feed auger **Pictograph:** Danger of drawing-in W30 / feed auger	
00-00-1186 (100 x 50 mm) **Pictograph:** Before maintenance work main switch "OFF" **Pictograph:** Before maintenance work main switch "OFF"	
00-00-1240 (100 x 50 mm) **Piktogramm:** Allgemeine Gefahr W09 / Anleitung lesen **Pictograph:** General danger W09 / Read the Manual	

00-00-1283 (50x100mm) **Sticker:** ISO 3864-2: Automat. machinery. This unit may ... **Sticker:** ISO 3864-2: Automat. machinery. This unit may ...	

2.9.6 Safety symbols on the sidewall belt conveyor



00-00-1187 (100 x 50 mm) **Piktogramm:** Quetschgefahr / Schutzvorrichtungen **Pictograph:** Crushing danger / protection device	

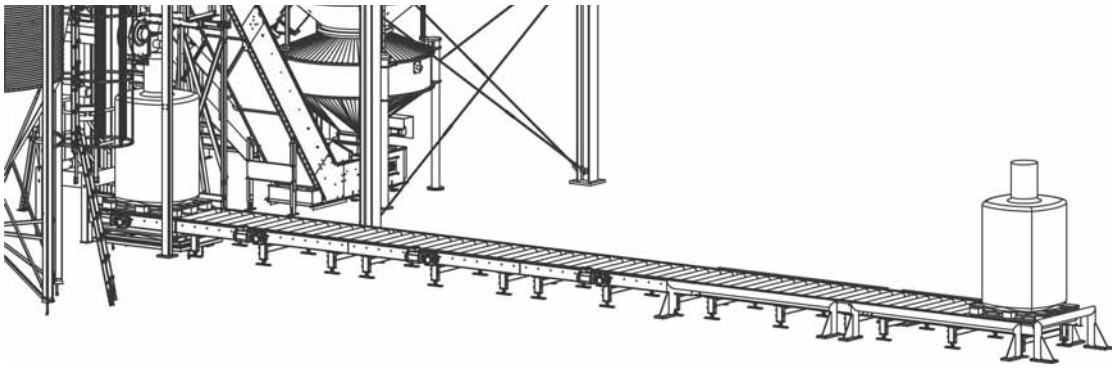
00-00-1188 (100 x 50 mm) **Pictograph:** Risk of injury / hopper **Pictograph:** Risk of injury / hopper	

00-00-1186 (100 x 50 mm) **Pictograph:** Before maintenance work main switch "OFF" **Pictograph:** Before maintenance work main switch "OFF"	

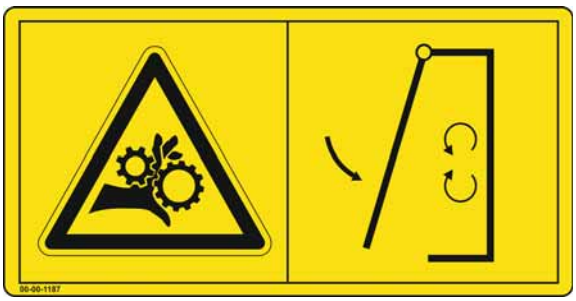
00-00-1240 (100 x 50 mm) **Piktogramm:** Allgemeine Gefahr W09 / Anleitung lesen **Pictograph:** General danger W09 / Read the Manual	

00-00-1283 (50x100mm) **Sticker:** ISO 3864-2: Automat. machinery. This unit may ... **Sticker:** ISO 3864-2: Automat. machinery. This unit may ...	

2.9.7 Safety symbols on the bagging unit



00-00-1320 (100 x 100 mm) **Pictograph:** Pictograph: mandatory / wear goggles **Pictograph:** Mandatory / wear goggles	

00-00-1322 (100 x 100 mm) **Piktogramm:** Gebot / Atemschutzmaske tragen **Pictograph:** Mandatory / wear respirator mask	
00-00-1186 (100 x 50 mm) **Pictograph:** Before maintenance work main switch "OFF" **Pictograph:** Before maintenance work main switch "OFF"	
00-00-1240 (100 x 50 mm) **Piktogramm:** Allgemeine Gefahr W09 / Anleitung lesen **Pictograph:** General danger W09 / Read the Manual	
00-00-1187 (100 x 50 mm) **Piktogramm:** Quetschgefahr / Schutzvorrichtungen **Pictograph:** Crushing danger / protection device	

00-00-1226 (100 x 50 mm) **Pictograph:** Danger of drawing-in W30 / feed auger **Pictograph:** Danger of drawing-in W30 / feed auger	

00-00-1188 (100 x 50 mm) **Pictograph:** Risk of injury / hopper **Pictograph:** Risk of injury / hopper	

2.9.8 Safety symbols on the doors

Entrance door to the BigBag storage

Entrance door to the control room

Entrance door to the manure storehouse

Pos.	Qty.	Code no.	Description
	2	99-99-8563	Sticker EN/IT "Dust free…" 70 x 60 cm

00-00-1320 (100 x 100 mm)

Pictograph: Pictograph: mandatory / wear goggles

Pictograph: Mandatory / wear goggles

00-00-1322 (100 x 100 mm)

Piktogramm: Gebot / Atemschutzmaske tragen

Pictograph: Mandatory / wear respirator mask

2.10 Dangers resulting from non-compliance with the safety instructions

Lack of compliance with these instructions can cause severe danger to personal life and limb and damage the environment or the installation and may lead to the forfeiture of any damage claims. The non-compliance with these instructions can specifically lead to:

- failure of vital functions of the system,
- failure of prescribed maintenance methods,
- risk of injury due to electrical, mechanical and chemical influences.

2.11 Emergency shut-off at the unit

The main switch that is located at the terminal box of the control unit must be switched to the OFF position immediately when a dangerous situation occurs. This interrupts the power supply and the system stops immediately.

The following system components are equipped with an emergency stop button / switch:

Component	Installation position (in conveying direction)
Pellet mills	Operating unit / control cabinet of the pellet mill
Control cabinet	Centrally at the outer door

3 Technical data

3.1 Limit value for the input material

- Dry matter content of the input material (DM in %): > 85 %

3.2 Dimensions of the entire system

The BD PelletTower has the following dimensions:

Length:	66.5 m
Width:	16.3 m
Height:	11.3 m (chimney)
	9 m (highest component)

3.3 Technical data of the components

3.3.1 Dosing hoppers

Length / width / height	18500 / 4170 / 3450	mm
Weight	24.1	t
Capacity	80	m³
Loading capacity (max.)	30	t
Conveying capacity	5 – 20	m³/h
Scraper floor drive	0.37	kW
Milling drum drive	3 x 7.5	kW
Voltage supply	3 AC 400 / 230	V

3.3.2 Discharging augers (octagonal)

Length / width / height	3668 / 970 / 717	mm
Pipe diameter Ø	300	mm
Weight	480	kg
Conveying capacity	35	m³/h
Drive unit	2.2	kW
Speed	50	rpm
Voltage supply	266 / 460 delta / star	V / type of connection

Length / width / height	4360 / 970 / 717	mm
Pipe diameter Ø	300	mm
Weight	520	kg
Conveying capacity	35	m³/h
Drive unit	2.2	kW
Speed	50	rpm
Voltage supply	266 / 460 delta / star	V / type of connection

3.3.3 Conveying augers (octagonal)

Length	11700	mm
Pipe diameter Ø	300	mm
Weight	1420	kg
Conveying capacity	43	m³/h
Drive unit	7.5	kW
Speed	65	rpm
Voltage supply	230 / 460 double star / star	V / type of connection

Length	14000	mm
Pipe diameter Ø	300	mm
Weight	1620	kg
Conveying capacity	43	m³/h
Drive unit	11.0	kW
Speed	65	rpm
Voltage supply	230 / 460 double star / star	V / type of connection

3.3.4 Double-shaft shredder

Length / width / height	2575 / 1010 / 2001	mm
Weight	885	kg
Maximum conveying capacity	60	m³/h
Maximum permissible pressure	2	bar
Maximum ball passage	8 – 32	mm
Maximum permissible working torque	2400	
Drive unit	22	kW
Voltage supply	208 - 230 / 460 double star / star	V / type of connection

3.3.5 Air gravity separator

Length / width / height	660 / 1010 / 1085	mm
Weight	210	kg
Required aspiration air	40 – 45	m³/min

3.3.6 Hammer mill

Length / width / height	1800 / 1200 / 110	mm
Weight	1350	kg
Mill chamber width	400	mm
Screen / grate area	0.62	m²
Screen diameter	6 – 8	mm
Drive unit	22	kW
Voltage supply	460	V

3.3.7 RS200 conveying augers

Length	6000 / 9500 / 12000	mm
Pipe diameter Ø	200	mm
Weight	470	kg
Conveying capacity	35	m³/h
Drive unit	5.5	kW
Speed	200	rpm
Voltage supply	266 / 460 delta / star	V / type of connection

3.3.8 Silo

Diameter Ø	2750	mm
Height (without lid)	6301	mm
Silo class	II	-
Number of rings	3	Quantity
Volume	21.80	m³
Number of legs	6	Unit

3.3.9 Bucket elevator

Length	8350	mm
Pipe diameter Ø	220	mm
Conveying speed	2.5	m/s
Drive unit	1.5	kW
Speed	150	rpm
Voltage supply	460	V

3.3.10 Pellet mill

Length / width / height	2507 / 2407 / 1956	mm
Weight	8000	kg
Drive unit	2 x 110	kW
Speed	1000	rpm
Voltage supply	480	V

3.3.11 Dosing auger

Length / width / height	3060 / 810 / 1970	mm
Pipe diameter Ø	250	mm
Weight	440	kg
Conveying capacity	5	t/h
Drive unit	2.2	kW
Speed	38	rpm
Voltage supply	230 / 460	V

3.3.12 Conditioner

Length / width / height	2025 / 880 / 600	mm
Pipe diameter Ø	400	mm
Weight	540	kg
Conveying capacity	5	t/h
Drive unit	7.5	kW
Speed	1770	rpm
Voltage supply	460	V

3.3.13 Sidewall belt conveyor

Length	10000	mm
Conveying capacity	6	t/h
Conveying speed	0.6	m/s
Drive unit	0.75	kW
Voltage supply	460	V

Length	7300	mm
Conveying capacity	6	t/h
Conveying speed	0.6	m/s
Drive unit	0.75	kW
Voltage supply	460	V

Length	5500	mm
Conveying capacity	10	t/h
Conveying speed	0.6	m/s
Drive unit	0.75	kW
Voltage supply	460	V

3.3.14 Hygieniser

Length / width / height	3146 / 3031 / 7070	mm
Weight	4980	kg
Drive hydraulics	2.2	kW
Voltage supply	415 – 460	V

3.3.15 Pellet cooler

Length / width / height	2130 / 2780 / 3798	mm
Weight	1700	kg
Gear motor drive	0.75	kW
Voltage supply	415 – 460	V

3.3.16 Round sieve

Height	1039	mm
Diameter Ø	1945	mm
Weight	865	kg
Speed	50	m³/h
Drive unit	2.2	kW
Voltage supply	266 / 460 delta / star	V / type of connection

3.3.17 RS 150 conveying augers

Length	4000 / 9390	mm
Pipe diameter Ø	150	mm
Weight	245	kg
Conveying capacity	6	m³/h
Drive unit	3	kW
Speed	200	rpm
Voltage supply	266 / 460 delta / star	V / type of connection

3.3.18 Bagging unit (without inspection platform)

Length	15000	mm
Width	1200	mm
Height	3300	mm
Conveyor speed	0.22	m/s
Pressure inflatable bag clamp	max. 0.25	bar
Fan drive	1.3	kW
Voltage supply	200 - 277	V
Roll conveyor drives	0.55	kW
Voltage supply	230 / 460	V

3.3.19 Lift table with weighing unit

Length	1415	mm
Width	1000	mm
Height	270 – 1130	mm
Hydraulic power unit drive	0.75	kW
Voltage supply	380	V

4 Process description

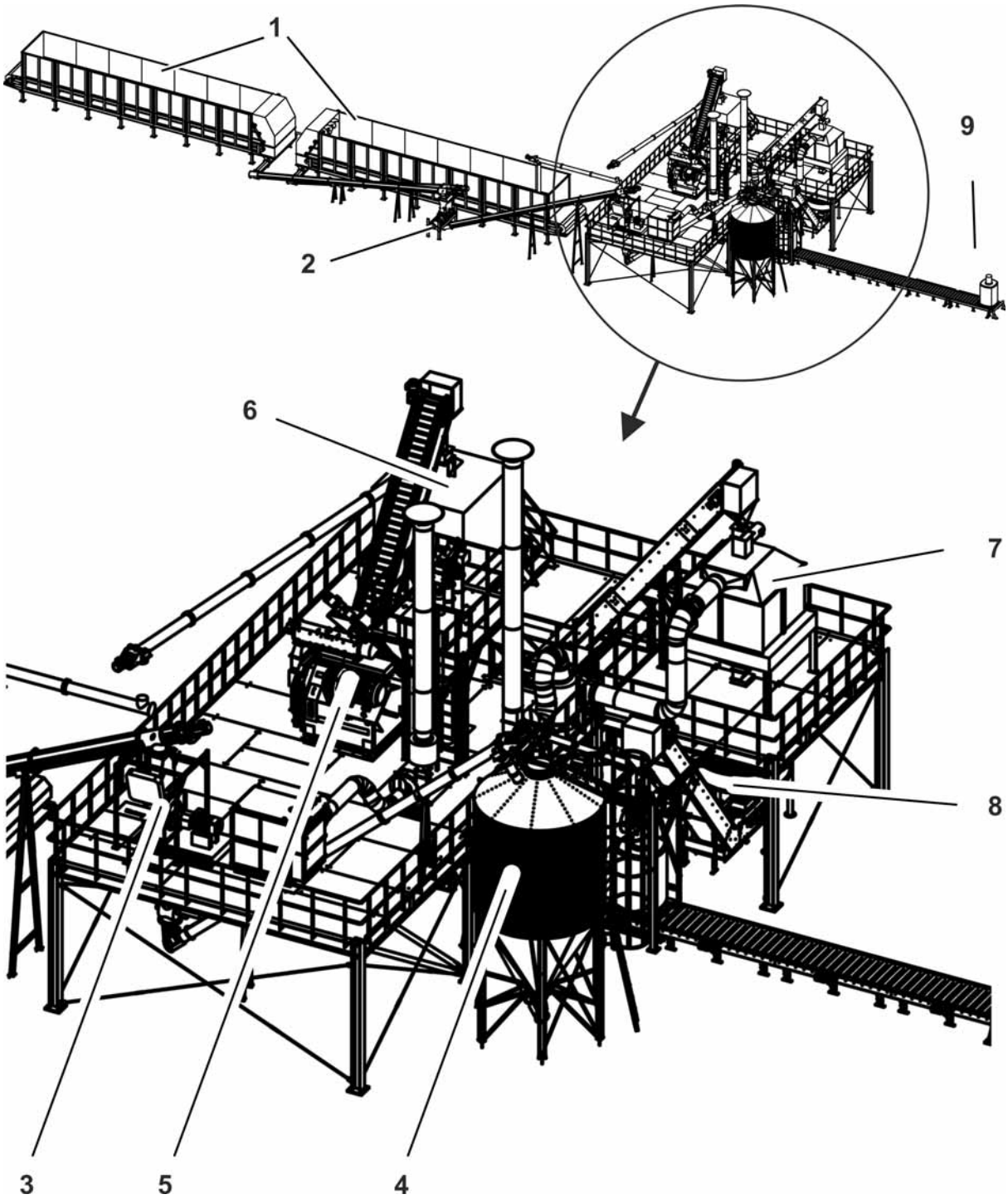


Figure 4-1: Overview of the entire BD PelletTower

Pos.	Description
1	Dosing hoppers (layer manure)
2	Double-shaft shredder
3	Hammer mill
4	Silo
5	Pellet mill
6	Hygieniser
7	Pellet cooler
8	Round sieve
9	Bagging unit

4.1 Process flow

The input material for the pelletizing process is pre-dried poultry manure with parts of carcasses. The input material is stored in a dosing hopper (1). From the hopper, a conveying auger transports the input material to a two-shaft shredder (XRipper, 2). This shredder cuts larger pieces of the input material into smaller ones. A hammer mill (3) then reduces the grain size of the input material further, as necessary for pelletizing. Moreover, a magnetic separator removes metallic objects from the input material in the hammer mill. The chopped input material is transported to a silo (4). This silo is used for temporary storage and ensures that input material is permanently available for pelletizing. A conditioner is situated before the pellet mill (5). The conditioner adjusts the dry matter content of the input material as desired by adding water. From the pellet mill, the produced pellets reach the hygieniser (6) by way of a sidewall belt conveyor. The hygieniser maintains a specific temperature level for a defined time to ensure that harmful germs in the pellets are killed. The following pellet cooler (7) cools down the pellets to a temperature suitable for further transport and storage. Before the pellets are filled into BigBags, a mechanic round sieve separates the produced fine particles. These particles return to the silo and enter the pelletizing process again. After the pellets have been bagged at the bagging unit (9), the bags are transported into the pellet storage room.

4.2 Process diagram

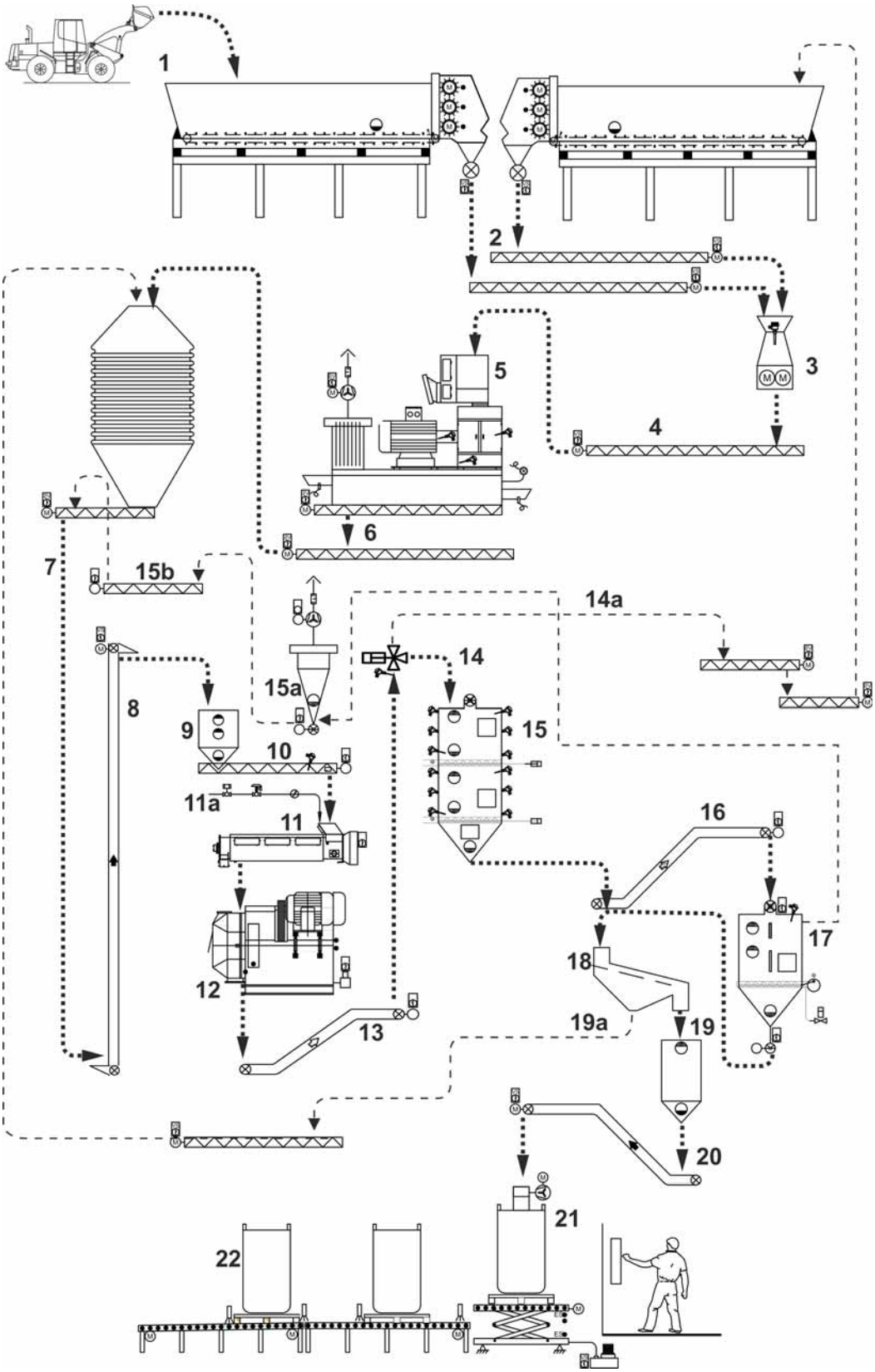


Figure 4-2: Process diagram

Pos.		Description
1		Filling the dosing hoppers with input material
2		Transporting the input material from the dosing hopper to the two-shaft shredder via conveying augers
3		First milling stage: two-shaft shredder
4		Transporting the input material from the two-shaft shredder to the hammer mill via conveying auger
5		Second milling stage: hammer mill Separating foreign objects using an air gravity separator and a magnetic separator. Filtering of produced dust
6		Transporting the input material from the hammer mill to the silo via conveying auger
7		Transporting the input material from the silo to the bucket elevator via conveying auger
8		Transporting the input material from the conveying auger to the mill's storage container via bucket elevator
9		Temporary storage of the input material in the mill's storage container
10		Transporting the input material to the conditioner via dosing auger
11		Adjusting the desired dry matter content in the conditioner
	11a	Water supply
12		Production of pellets in the pellet mill
13		Transporting the pellets to the hygieniser via side wall belt conveyor. Measuring the pellets' temperature
14		Filling the pellets into the hygieniser. Extracting small parts and dust particles by suction
	14a	Returning too-cold pellets to the dosing hopper via conveying augers
15		Temperature treatment of the pellets in the hygieniser to kill germs
	15a	Separating small parts and dust particles in the cyclone
	15b	Returning small parts and dust particles from the cyclone to the conveying auger in front of the bucket elevator via conveying auger
16		Transporting the pellets to the pellet cooler via side wall belt conveyor
17		Cooling the pellets to a suitable temperature in the pellet cooler for further transport and storage
18		Screening pellets to separate small particles
19		Filling the pellets into the buffer container
	19a	Returning small particles into the silo via conveying auger
20		Transporting the pellets to the bagging unit via side wall belt conveyor
21		Filling the pellets into BigBags
22		Removing and storing the BigBags

5 Description of the individual components

	Refer to the included supplier's documentation regarding the individual components.

	The spare parts listed in this user manual are the spare parts recommended for storage by the supplier. Purchase them from **Big Dutchman** by stating the BD code number.

5.1 Dosing hopper

	Refer to the included supplier's documentation (HAVELBERGER) regarding the dosing hopper.

The dosing hoppers store the input material at a minimum dry matter content. The input material is mixed in the hoppers. The input material is transported from the hoppers to the two-shaft shredder by means of integrated discharge augers and other conveying augers.

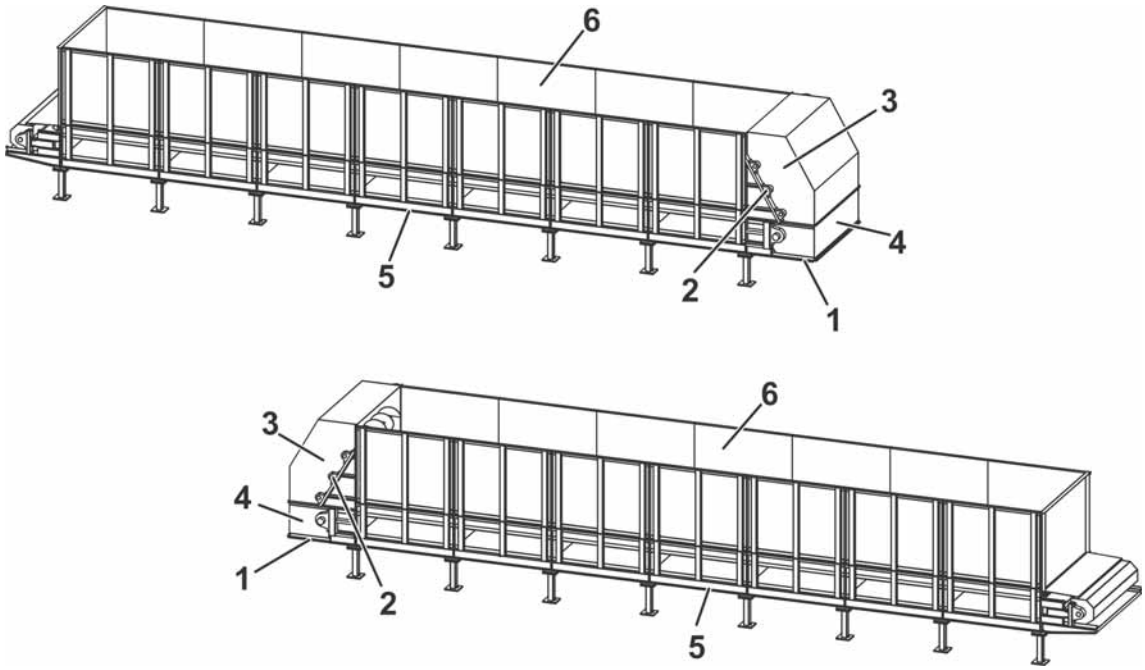


Figure 5-1: Dosing hopper

Pos.	Description
1	Transfer
2	Agitator with gear motor
3	Protective cover of the agitator's drive
4	Drive system of the conveying system
5	Steel profile substructure
6	Container of the dosing hopper

5.1.1 Scraper floor chain and idler unit

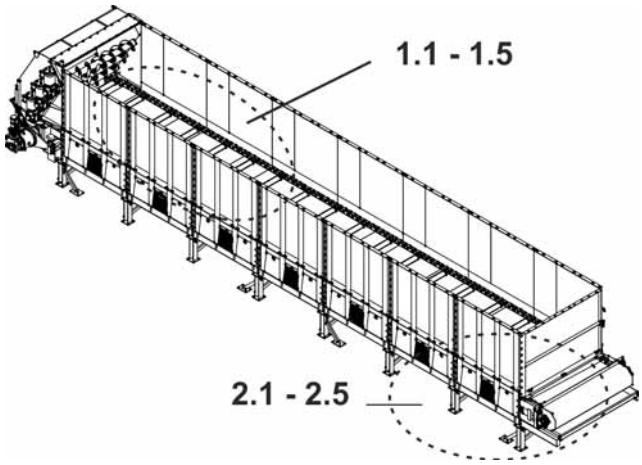


Figure 5-2: Driving parts hopper

Pos.	Qty.	Code no.	Description
1			**Scraper floor chain**
1.1	2	60-63-0472	Conveyor chain HVB620 232 links
1.2	2	60-63-0473	Chain joint VG 620
1.3	39	60-63-0474	Scraper 2700 cpl. HVB
1.4	156	99-10-4092	Hexagon head screw M 16 x 40 hot-dip galv. DIN 933 8.8
1.5	156	99-20-1198	Self-locking counter nut M 16 galv. DIN 985-6
1.6	1	60-63-0477	Chain lubrication TÖS

Pos.	Qty.	Code no.	Description
2			**Idler module**
2.1	1	60-63-0478	Shaft with idler rollers 2700
2.2	2	60-63-0479	Housing for pedestal bearing SN 528
2.3	2	60-63-0480	Self-aligning roller bearing 22218K
2.4	2	60-63-0481	Clamping sleeve H3128
2.5	2	60-63-0482	Clamp ring FRB 260/10

5.1.2 Cutting head

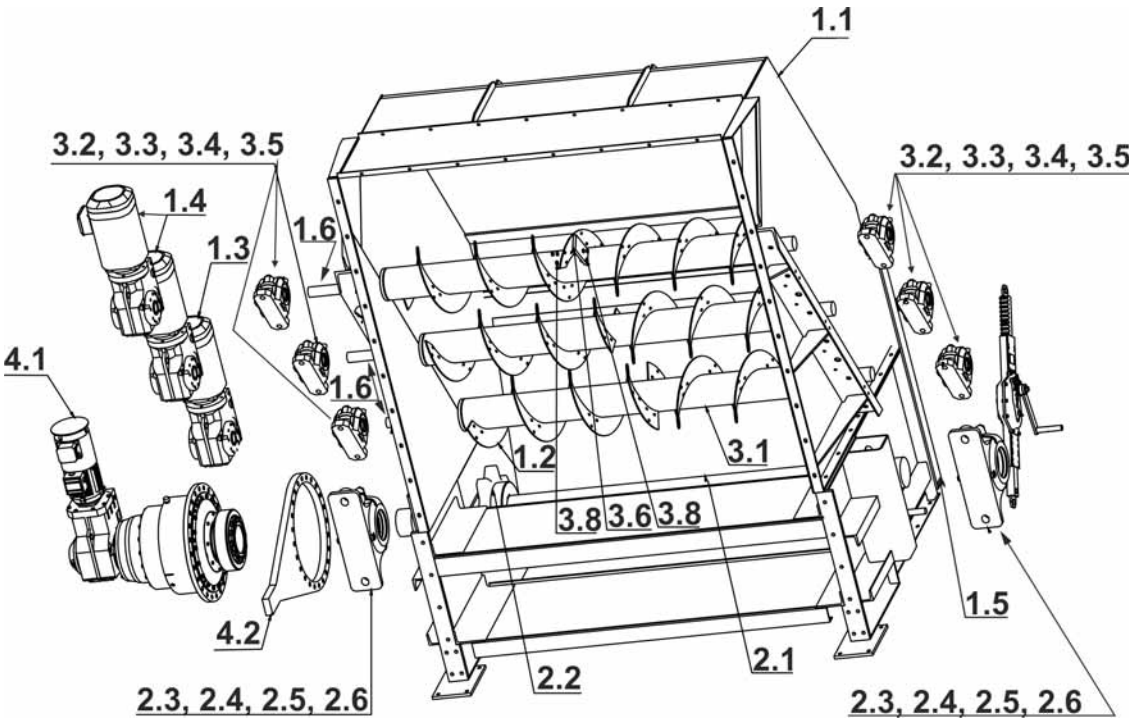


Figure 5-3: Cutting head

Pos.	Qty.	Code no.	Description
1			**Cutting head**
1.1	1	60-63-0450	Cover for cutting head HVB
1.2	3	60-63-0451	Screw cutting roller 2700 cpl. HVB
1.3	3	60-63-0452	Gear motor 7.5kW 112 r 60 Hz lh KH/T DRN 132M4/TH/C/ DH
1.4	3	60-63-0453	Rotation monitoring system BES 516-360 E4-c
1.5	2	60-63-0454	Safety switch AZ-16 zvk- M16

Pos.	Qty.	Code no.	Description
2			**Drive shaft complete**
2.1	1	60-63-0455	Drive shaft 2700 HVB
2.2	2	60-63-0456	Chain wheel 8t 160 mm partition 50 mm C45
2.3	2	60-63-0457	Housing for pedestal bearing S 3034K
2.4	2	60-63-0458	Self-aligning roller bearing 23034K
2.5	2	60-63-0459	Clamping sleeve H3034
2.6	2	60-63-0460	Clamp ring FR 260/10

Pos.	Qty.	Code no.	Description
3			**Screw cutting roller complete (1.2)**
3.1	1	60-63-0461	Screw cutting roller 2700 HVB
3.2	2	60-63-0462	Housing for pedestal bearing SNL 516
3.3	2	60-63-0463	Self-aligning roller bearing 22216K
3.4	2	60-63-0464	Clamping sleeve H316
3.5	2	60-63-0465	Clamp ring FR 12.5 x 140
3.6	28	60-63-0466	Cutting tool Hardox
3.7	84		Hexagon head screw M 10 x 30 DIN 933 10.9
3.8	84	83-02-1000	Self-locking counter nut M 10 galv. DIN 985-6
3.9	2	60-63-0469	Scraper lateral HVB

Pos.	Qty.	Code no.	Description
4			**Scraper floor drive**
4.1	1	60-63-0470	Gear motor 0.37 kW 0.04 rpm rh PHF022 KF87 DR57 1M6/ TF/V/C/DH
4.2	1	60-63-0471	Torque support PHF022

5.1.3 Discharging auger of the hopper

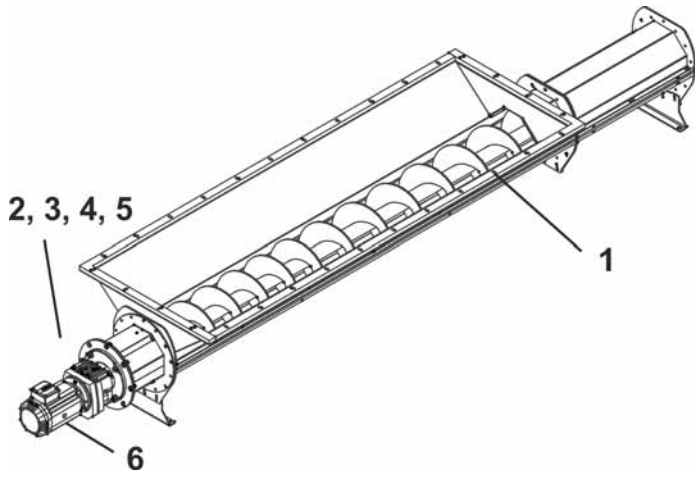


Figure 5-4: Discharging auger of the hopper

Pos.	Code no.	Description
1	60-63-0550	Sliding rail 120 x 12 mm PE1000 per running meter
2	60-63-0553	Flange bearing UCF311 55 x 185 x 71 mm
3	60-63-0554	Coupling spacer HRC 180B
4	60-63-0556	Coupling half elastic 180 dia 40 mm
5	60-63-0557	Coupling half elastic 180 dia 50mm
6	60-63-0565	Gear motor RF77DRE100L4 2.2 kW n=52/min 266/460 V 60 Hz

5.2 Conveying augers

	Refer to the included supplier's documentation (THIEL) regarding the conveying augers.

Conveying augers transport the input material and the small parts and dust particles created during the milling process.
All conveying augers are equipped with a safety sensor. This sensor switches off the auger in case its capacity is exceeded.

5.2.1 Tube auger diameter 300 octagonal

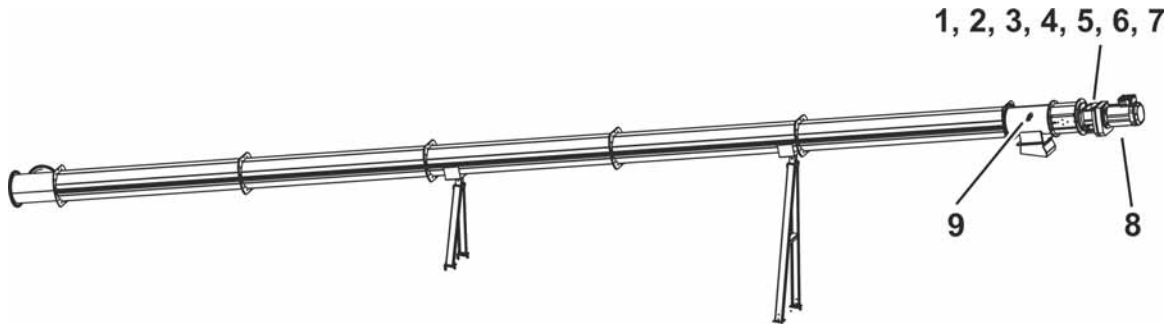


Figure 5-5: Tube auger diameter 300 octagonal

Usage

Type	from	to
L= 14000 mm, 11 kW	Dosing hopper	Double-shaft shredder
L= 14000 mm, 11 kW	Double-shaft shredder	Hammer mill
L= 11700 mm, 7.5 kW	Dosing hopper	Double-shaft shredder

Pos.	Code no.	Description
1	60-63-0551	Deep-groove ball bearing 6312 2RS 60 x 130 x 31 mm
2	60-63-0552	Cylindrical roller bearing axial 81113
3	60-63-0555	Coupling spacer HRC 230B
4	60-63-0558	Housing for flange bearing for bearing block FS15-B-L
5	60-63-0559	Bush for cylindrical roller bearing axial 81113
6	60-63-0560	Coupling half elastic 230 dia 60 mm
7	60-63-0561	Coupling half elastic 230 dia 55 mm
8		L = 14050 mm / L = 14000 mm
	60-63-0563	Gear motor RF97DRE160MC4 11.0 kW n=52/min 266/460 V 60 Hz
		L = 11700 mm
	60-63-0564	Gear motor RF97DRE132MC4 7.5 kW n=65/min 266/460 V 60 Hz
9	60-63-0562	Sensor inductive IFM IFC258 M12x1.0

5.2.2 RS200 tube augers

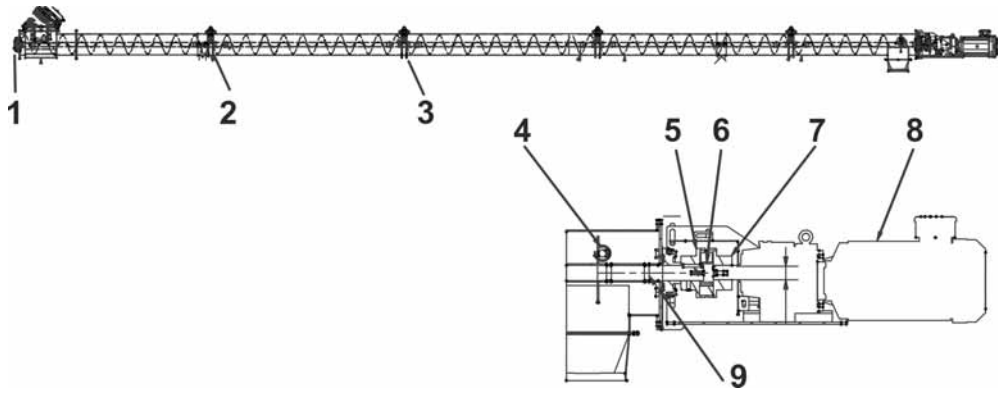


Figure 5-6: RS 200 conveying auger

Usage

Type	from	to
L = 12000 mm	Hygieniser	Dosing hopper
L = 9500 mm	Hammer mill	Silo
L = 6000 mm	Silo	Bucket elevator

Pos.	Code no.	Description
1	60-63-0567	Flange bearing UCF208D1 40 x 130 x 49.2 mm
2	60-63-0570	Intermediate bearing S200
3	83-12-7687	Plain bearing 40 x 45 x 4.5
4	60-63-0566	Plastic bush for intermediate bearing RS/TS200
5	83-16-5970	Coupling half elastic 130 dia 40 mm
6	83-16-5969	Coupling spacer HRC 130
7	83-16-6185	Coupling half elastic 130 dia 35 mm
8		L = 12000 mm
	60-63-0572	Gear motor RF57DRE100L4 2.2 kW n=104/min 266/400 V 60 Hz
		L = 9500 mm
	90-00-4103	Gear motor SK22-90LP/4 CUS TF 1.5 kW 230/460 V 60 Hz n=70 1/min
		L = 6000 mm
	60-63-0569	Gear motor RF47DRE100LC4 3.7kW n=218/min 266/400 V 60 Hz
9	83-15-7583	Drive shaft galv. dia 40 l = 280 mm S200

5.2.3 RS 150 tube augers

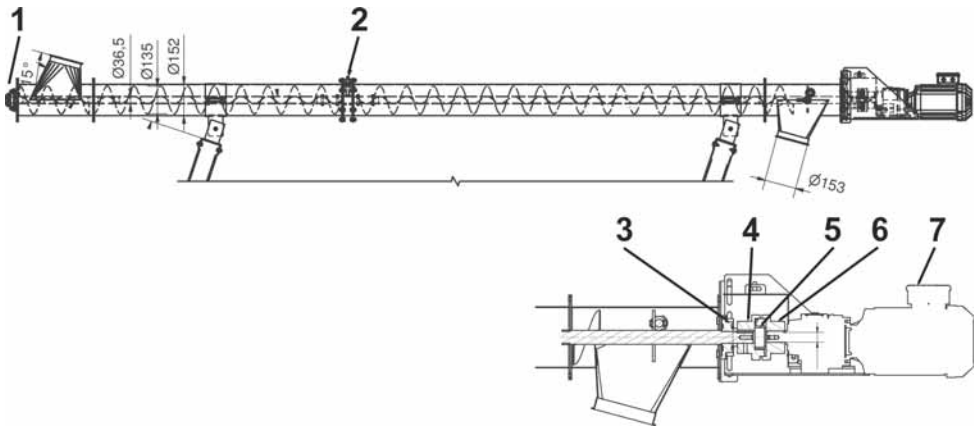


Figure 5-7: RS 150 conveying auger

Usage

Type	from	to
L = 9390 mm	Round sieve	Silo
L = 4000 mm	Cyclone	RS 200 L = 6000 mm

Pos.	Code no.	Description
1	25-16-3135	End bearing S150 cpl.
2	25-16-3480	Intermediate bearing S150 cpl.
3	25-16-3101	Flange bearing cast iron dia 30 4 holes UCF 206 D1
4	83-15-7249	Coupling half for BICO110S KS11 dia 30
5	83-15-7250	Coupling spacer HRC 110
6	60-63-0571	Coupling half elastic 110 dia 25 mm
7		L = 9390 mm
	60-63-0569	Gear motor RF47DRE100LC4 3.7kW n=218/min 266/400 V 60 Hz
		L = 4000 mm
	60-63-0573	Gear motor RF37DRE90L4 1.5 kW n=218/min 266/460 V 60 Hz

5.3 Two-shaft shredder

	Refer to the included supplier's documentation (VOGELSANG) regarding the two-shaft shredder.

The two-shaft shredder of the type "XRipper" reduces the grain size of the input material evenly.

5.3.1 Drive unit of the two-shaft shredder

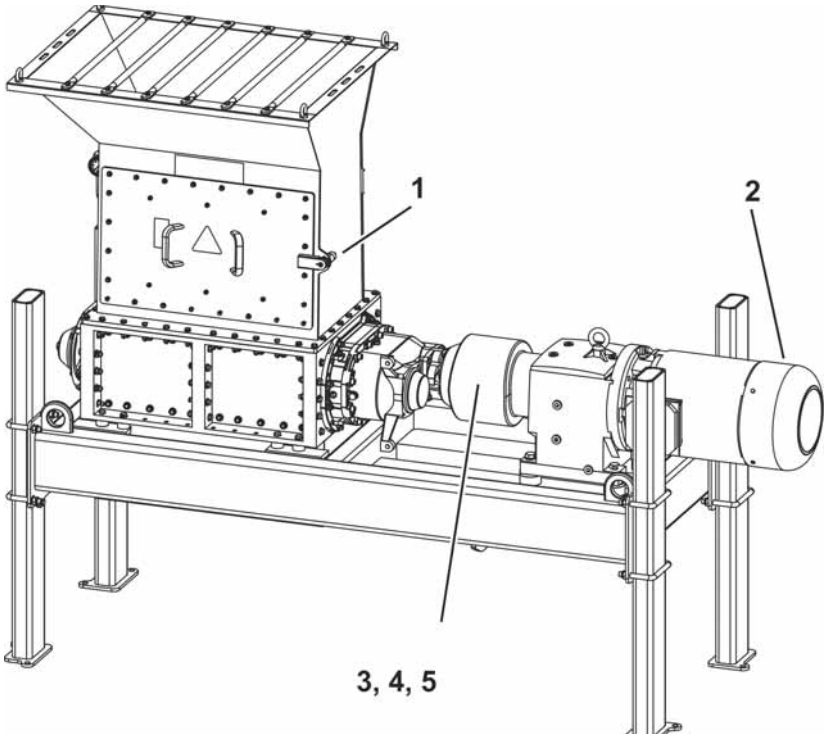


Figure 5-8: Double-shaft shredder

Pos.	Code no.	Description
1	60-63-0418	Safety switch ELO PL d 24V M30 IP67
2	60-63-0413	Gear motor 22 kW 235 rpm 230/460 V 60 Hz SK62 180LP 4 TF
3	60-63-0414	Coupling hub KTR- Rotex size 75 hub1 hole 65 mm
4	60-63-0415	Coupling hub KTR- Rotex size 75 hub1 hole 60 mm BKN
5	60-63-0416	Shear pin L = 49 mm M4

5.3.2 Rotors of the two-shaft shredder

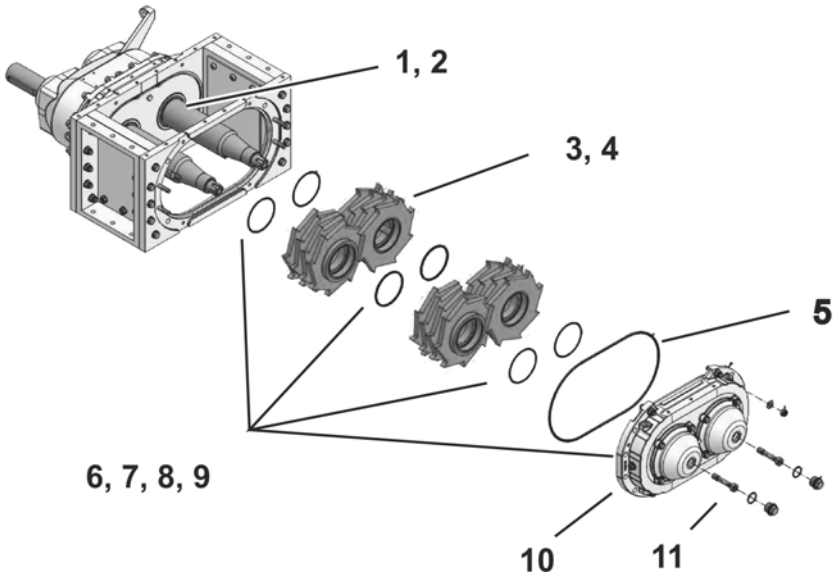


Figure 5-9: Rotor parts

Pos.	Code no.	Description
1		Feather key 22 x 14 x 100 DIN 6885
2		Feather key 22 x 14 x 140 DIN 6885
3	60-63-0407	Rotor XR186-130 rh cutting width 16 mm for XRipper
4	60-63-0408	Rotor XR186-130 lh cutting width 16 mm for XRipper
5	60-63-0403	O-ring 368 x 6 NBR 70
6	60-63-0404	O-ring 92 x 4 NBR 70
7	60-63-0405	O-ring 104 x 3 NBR 70
8	60-63-0406	O-ring 103 x 5 NBR 70
9	60-63-0409	O-ring 85 x 2.5 NBR 70
10	60-63-0410	Sealing cartridge mech. single VX186/215
11	99-10-4xxx	Hexagon socket head cap screw M 16 x 80 DIN 6912 10.9 galv.
Non-illustrated tools		
	60-63-0411	Disassembly tool for sealing cartridge VX186
	60-63-0412	Lobe puller 186 780QD

WARNING

Risk of injury due to sharp-edged and rotating rotors of the two-shaft shredder!

Touching the rotating rotors of the two-shaft shredder can lead to injuries such as cuts, severing and entanglement.

- Facilities for supply and discharge:

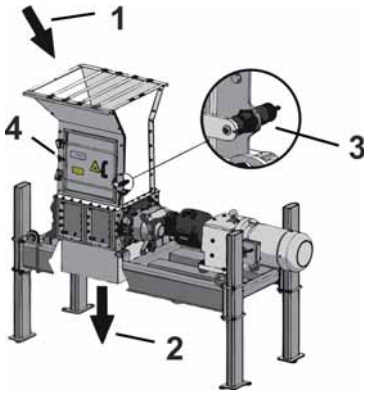
  The machine must only be put into operation after the facilities for supply and discharge (1 and 2) have been installed in a way that prevents access to danger zones in the infeed and outlet areas under any condition.

- Safety distances:

  Observe the safety distances in DIN EN ISO 13857 (Safety of machinery – Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2008)).

- Maintenance flap of the safety switch:

  It must be possible to reach and eliminate any blocking or obstruction using a maintenance flap (4) in the filling chute. The maintenance flap must be equipped with a safety switch (3, minimum performance level c according to EN ISO 13849) that always disconnects the drive motor from the power supply when the flap is open.



5.3.3 Scraper

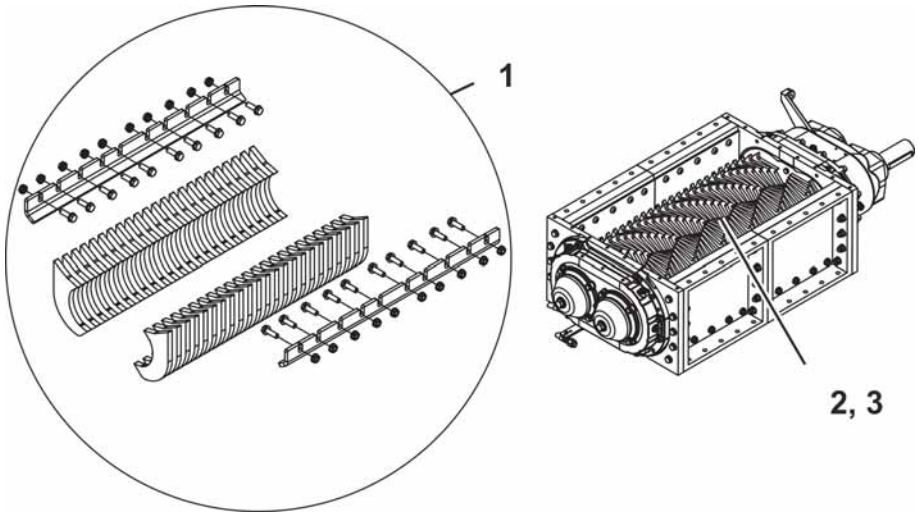


Figure 5-10: Scraper

Pos.	Code no.	Description
1	60-63-0417	Scraper set XR186-780 b = 16 mm
2	60-63-0407	Rotor XR186-130 rh cutting width 16 mm for XRipper
3	60-63-0408	Rotor XR186-130 lh cutting width 16 mm for XRipper

5.4 Hammer mill

	Refer to the included supplier's documentation (TIETJEN) regarding the hammer mill and the corresponding components.

The hammer mill grinds the material into a pourable size adequate for pelletizing.

5.4.1 Air gravity separator type AGS 300

The air gravity separator is connected to the hammer mill. It separates magnetic parts using a magnetic grate. The gravity separator separates all other, non-magnetic heavy parts. A fan draws the material to be pelletized into the hammer mill. The separated material drops into a container.

5.4.2 Rotary feeder

The rotary feeder dispenses, feeds in and discharges the fine material.

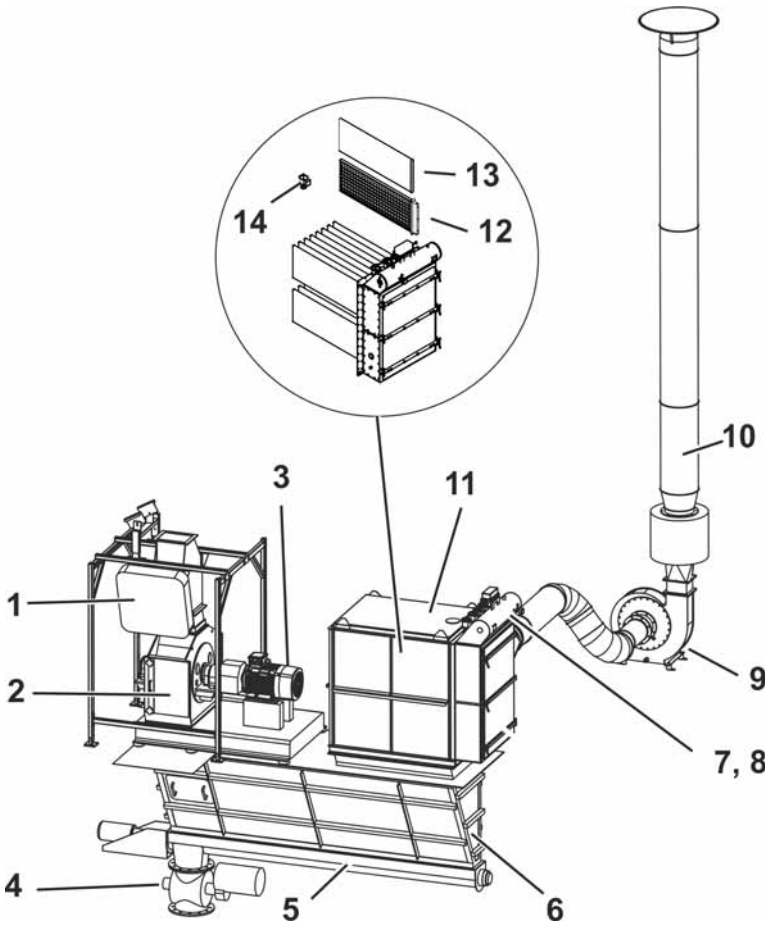


Figure 5-11: Hammer mill with auxiliary equipment

Pos.	Code no.	Description
1		**Air gravity separator type AGS 300**
2		**Hammer mill type VDK 4.1**
3	60-63-0312	Electric motor 22.0 kW n=1800/min 440/760 V 60 Hz IP55
4		**Rotary feeder**
	60-63-0332	Electric motor for rotary feeder 15284098
	60-63-0333	Spare parts package for rotary feeder TZRD320 – USA
5		**Discharging auger TTS 220**
	60-63-0323	Flange bearing ZUCF210 incl. housing and covering disk
	60-63-0324	Flange bearing UCF210 incl. housing and 3-lip sealing
	60-63-0325	Coupling ROTEX 55 cpl. with hub dia 40 mm / 50 mm coupling ring
	60-63-0326	Gear motor NEMA 2.2 kW n=46/min 230/460 V 60 Hz UL-certified
6		**Mill storage container type TB 4**
	60-63-0313	Relief valve E-VENT TEVN 320- 2.0
	60-63-0314	Safety switch EEx13 for relief valve
7	60-63-0320	Pilot valve GOYEN Rp 1/8 230 VAC
8	60-63-0317	Negative pressure guard VC52 – USA
9		**High-performance radial fan, type TXE 5071 USA**
	60-63-0327	Electric motor with cage rotor 8.6 kW n=3600/min 440 V 60 Hz IE3 UL
	60-63-0328	Shaft seal ring d60 mm 1.4571 with flat gasket
	60-63-0329	Anti-vibration buffer with mounting plate NR55 Shore A galv.
	60-63-0330	Compensator round DN250 L = 150 mm polyester inlet
	60-63-0331	Compensator angular L = 150 mm polyester inlet
10		**Exhaust silencer**
11		**Hopper extension pocket filter type FTA1-2-9/12 USA**
12	60-63-0311	Bag frame galv. 475 x 1250 sheet metal / wire mesh
13	60-63-0310	Filter bag 1.25m² polyester NF550AS 475 x 1250
14	60-63-0318	Diaphragm valve VEM 608 without pilot valve 2"/1" connection 1"
	60-63-0319	Diaphragm DB18 1" 4-hole neoprene
	60-63-0320	Pilot valve GOYEN Rp 1/8 230 VAC
	60-63-0321	Cartridge for prefilter FP-V dia 55 x 50 mm
	60-63-0322	Gasket for prefilter dia 145 / 88 mm 3.0 mm NBR-bright

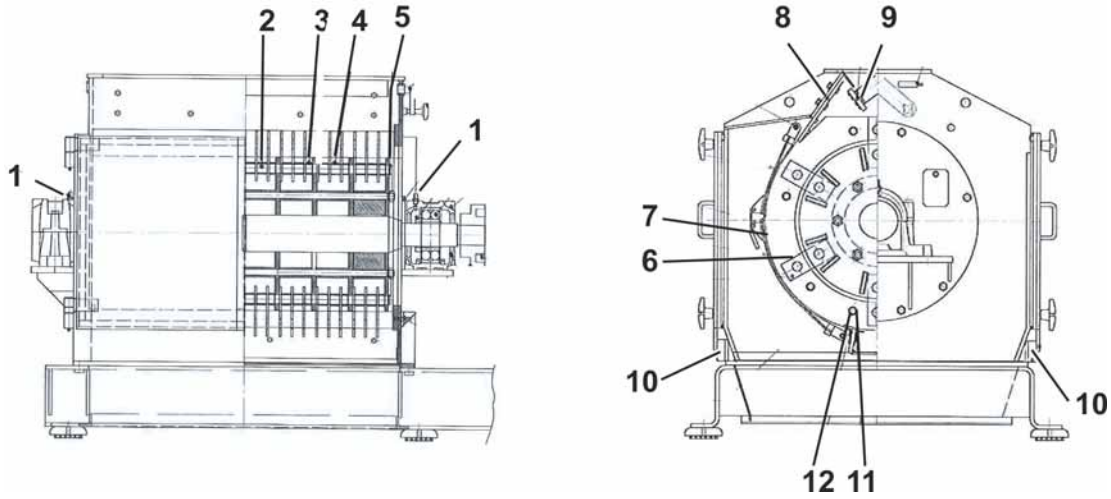


Figure 5-12: Sectional view of the hammer mill

Pos.	Code no.	Description
1	60-63-0315	Temperature sensor PT100 90.2040 (90.294-F90) M14x1.5
2	60-63-0308	Hammer bolt for VDK 4
3	60-63-0302	Spacer d38 x 2.9 mm 20 mm long
4	60-63-0301	Spacer d38 x 2.9 mm 32 mm long
5	20-50-3539	Retaining ring DIN 471 - 30 x 1.5
6	60-63-0300	Hammer 164 x 60 x 6 2 holes 31 distance 155 mm T=66 mm
7	60-63-0303	Screen holes 6 mm sheet = 3 mm T = 8 mm 51% open 400 x 745 for VDK 4 II
7	60-63-0334	Screen holes 7mm sheet = 3 mm T = 9 mm 55% open 400 x 745 for VDK 4 II
7	60-63-0335	Screen holes 8mm sheet = 3 mm T = 12 mm 40% open 400 x 745 for VDK 4 II
8	60-63-0304	Impact plate for VDK 4
9	60-63-0305	Inlet flap for VDK 4
10	60-63-0316	Safety switch with guard control TLS-1 GD2 240 VAC
11	60-63-0307	Impact angle inside for VDK 4
12	60-63-0306	Impact angle outside for VDK 4

Figure 5-13: Sensor at the hammer mill

Pos.	Description
1	Temperature sensor of the bearing
2	Temperature sensor of the mill chamber

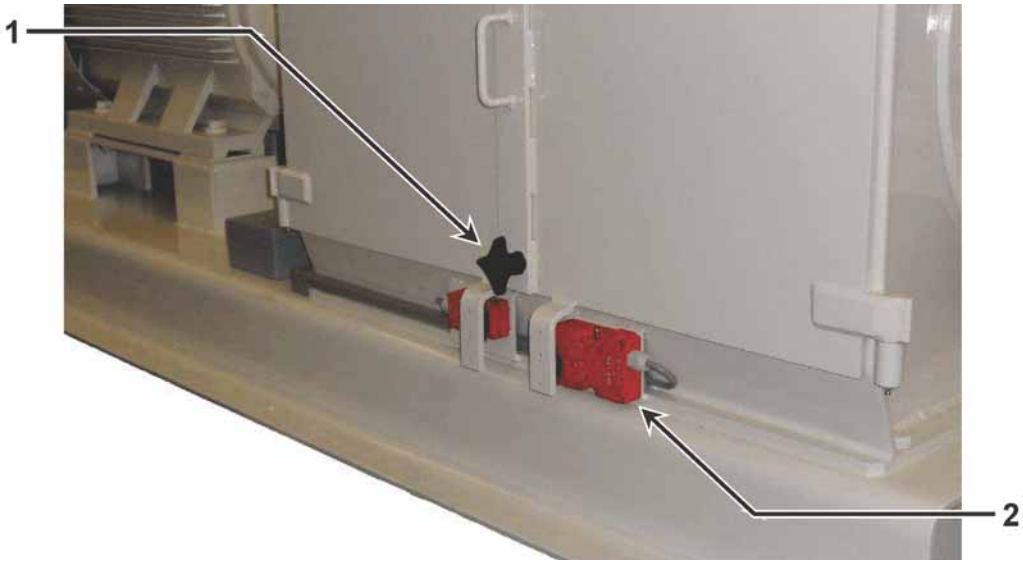


Figure 5-14: Door switch and locking

Pos.	Description
1	Door locking
2	Safety door locking

5.5 Silo BD-EU

	Refer to the **operation manual "Silo BD-EU WL2"** for the silo BD-EU. If necessary, order a new copy of the manual by stating the following code number: 99-94-0474 (Silo BD-EU WL2) Also refer to the information in chapter 1 ”Basic instructions”.

The silo BD-EU WL2 stores (buffers) the material that was ground in the hammer mill and thus ensures permanent material supply for the following pellet mill.

5.6 Bucket elevator

	Refer to the included supplier's documentation (THIEL) regarding the bucket elevator.

The bucket elevator is exclusively intended for the transport of appropriate dry, transportable, pourable material.

Usage

Type	from	to
BE 220 L = 8350 mm	RS 200 L = 6000 mm	Pellet mill

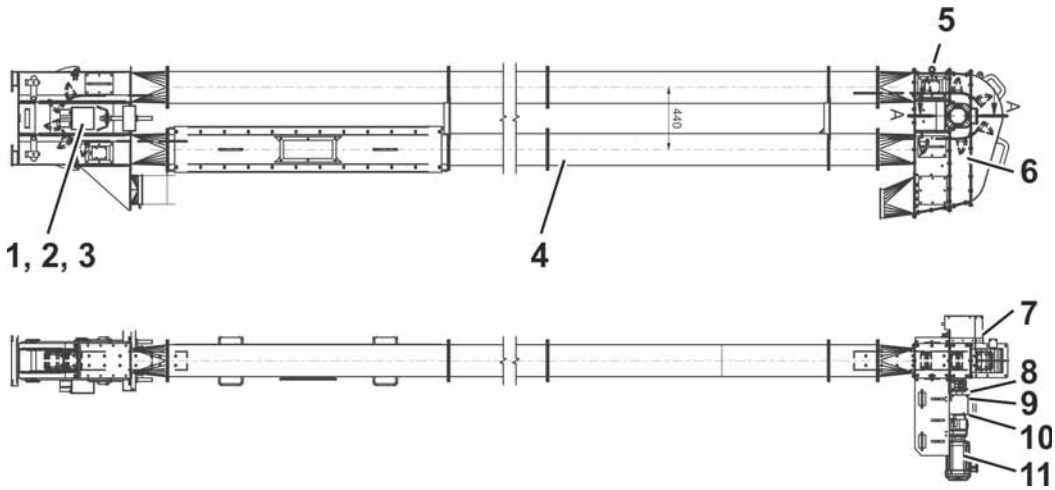


Figure 5-15: Bucket elevator

Pos.	Code no.	Description
1	60-63-0575	Grid pulley BE200 d315 B=125 mm hole 35G6
2	60-63-0579	Flange bearing UCF 207 E dia 35
3	60-63-0581	2-lip sealing dia 40 SNH 509 TSNA
4	60-63-0576	Belt for elevator EP630/4 B=130 mm 10B
5	60-63-0578	Off-track detector belt guard
6	60-63-0574	Belt pulley BE 220 d315 B = 125 mm hole 40G6
7	60-63-0580	Self-aligning roller bearing 22209EK 40 x 85 x 23 mm
8	60-63-0577	Coupling half elastic 110 dia 45mm
9	83-15-7250	Coupling spacer HRC 110
10	60-63-0571	Coupling half elastic 110 dia 25mm
11	81-39-3817	Gear motor 1.50 230/460 60 Hz 3 Ph 184 rpm shaft 25 x 50 CUS

5.7 Pellet mill

Refer to the included supplier's documentation (SALMATEC) regarding the pellet mill.

The pellet mill produces pellets from the fine input material.

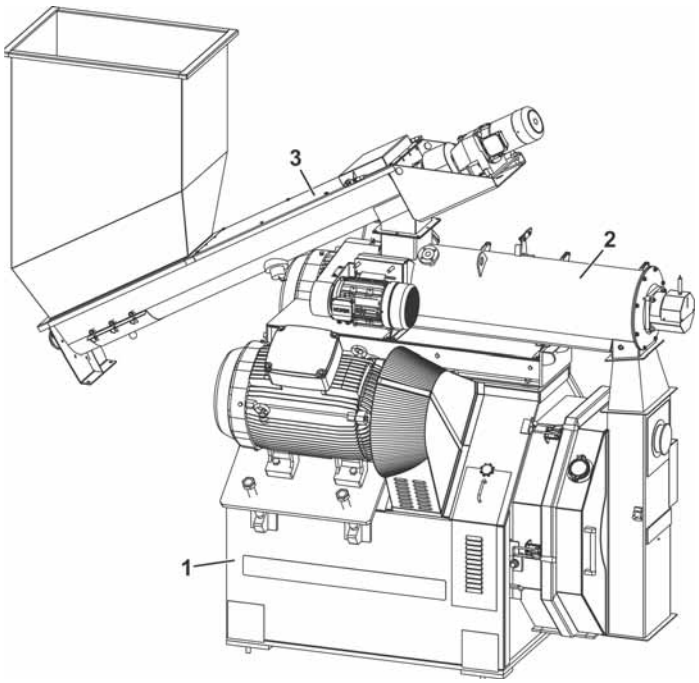


Figure 5-16: Pellet mill with dosing auger and conditioner

Pos.	Description
1	Pellet mill
2	Conditioner
3	Dosing auger

5.7.1 Mill storage container

The mill's storage container receives and stores the fine input material.

5.7.2 Dosing auger

The dosing auger transports the input material from the mill's storage container to the conditioner at a defined speed. A sensor inside the dosing auger moreover measures the input material's dry matter content.

5.7.3 Conditioner

The conditioner automatically adds water to the input material, if necessary. The amount of added water depends on the dry matter content measured beforehand. The input material is mixed and conveyed to the pellet mill.

Pellet mill – roller

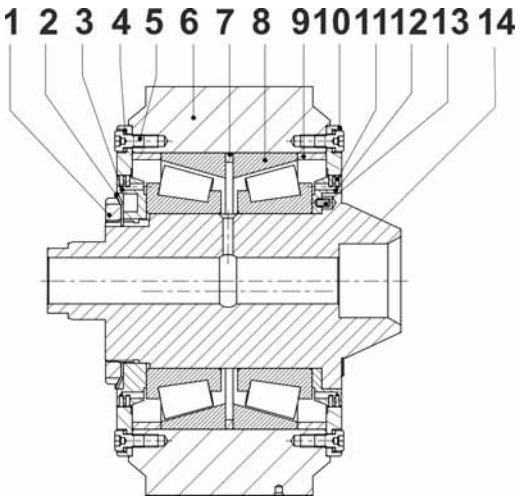


Figure 5-17: Roller

Pos.	Code no.	Description
1	60-63-0210	Slotted nut KM22 M 110 x 2 DIN 981, turned down to 11 mm
2	60-63-0209	Lock washer MB22 110 x 154 DIN 5406 for Maxima 700-130
3	60-63-0214	Dust cap reinforced front side for Maxima 700-130
4	60-63-0213	Safety washer Nordlock dia 10.7
5	99-10-4xxx	Hexagon socket head cap screw M 10 x 16 DIN 912 galv.
6	60-63-0202	Roller bushing 3-K reinforced perforated for Maxima 700-130
7	60-63-0207	Distance ring reinforced middle for Maxima 700-130
8	60-63-0204	Taper roller bearing 32224 for Maxima 700-130
9	60-63-0203	Distance ring reinforced outside for Maxima 700-130
10	60-63-0205	Dust cap piston ring seal for Maxima 700-130
11	60-63-0208	Piston ring 180 x 463 x 3 for Maxima 700-130
12	60-63-0206	Dust cap reinforced rear for Maxima 700-130
13	99-50-3xxx	Spring type straight pin DIN 1481 - 6 x 10
14	60-63-0215	Eccentric axle taper roller bearing for Maxima 700-130
	60-63-0201	Roller cpl. 3-K perforated for Maxima 700-130

Pellet mill – rotor add-on parts

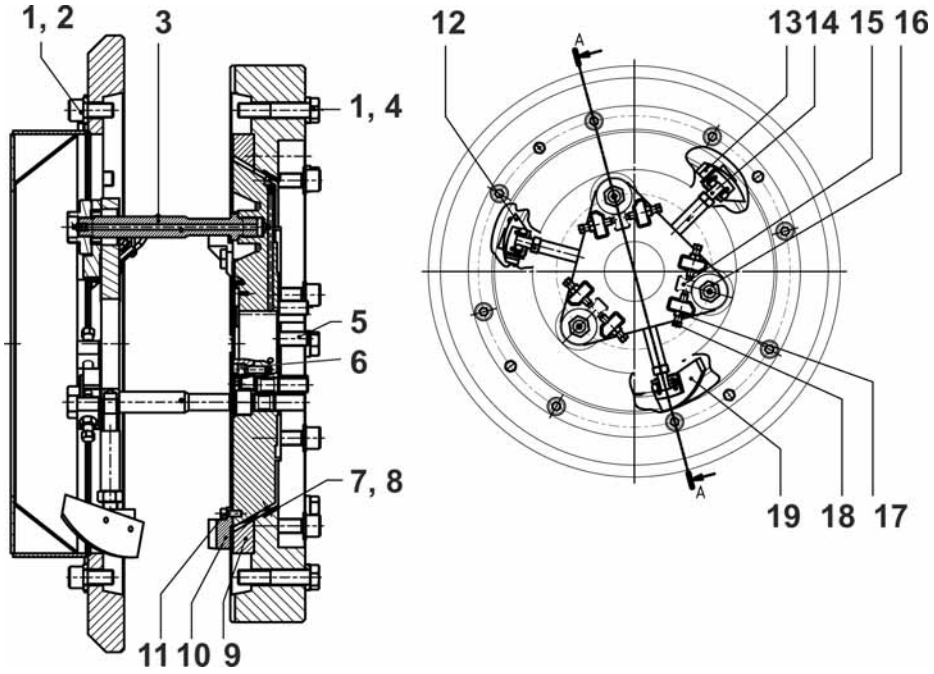


Figure 5-18: Rotor add-on parts

Pos.	Code no.	Description
1	60-63-0224	Washer hardened HRC36 dia 43/25 x 8
2	99-10-4xxx	Hexagon socket head cap screw M 24 x 50 DIN 912 galv. 8.8
3	60-63-0217	Stud bolt for Maxima 700-130
4	99-10-4xxx	Hexagon head screw M 24 x 120 galv. DIN 931 8.8
5	60-63-0216	Screw with ductile shaft M 24 x 2 x 90 for Maxima 700-130
6	60-63-0219	Scraper back plate for Maxima 700-130
7	99-10-4xxx	Hexagon socket head cap screw M 10 x 35 DIN 912 galv. 12.9
8	99-10-4xxx	Hexagon socket countersunk head screw M 6 x 12 DIN 7991 stainless steel
9	60-63-0226	Wear ring for Maxima 700-130
10	60-63-0221	Rear slider for Maxima 700-130
11	45-00-0205	Cylinder head screw M 10 x 25 DIN 912 ISO 4762 galv.
12	60-63-0234	Front slider blade 3-K lh for Maxima 700-130
13	60-63-0231	Front slider blade 3-K rh for Maxima 700-130
14a	60-63-0232	Front slider bracket 3-K for Maxima 700-130
14b	60-63-0235	Hexagon head screw M 30 x 160 galv. DIN 561 8.8 with pin
15	60-63-0228	Roller adjuster for Maxima 700-130
16	60-63-0218	Stud bolt nut for Maxima 700-130
17	99-20-1072	Hexagon nut M 16 galv. DIN 934-8
18	60-63-0229	Hexagon head screw M 16 x 80 galv. DIN 561 8.8 with pin
19	60-63-0233	Front slider blade 3-K bottom for Maxima 700-130

Pellet mill – not illustrated

	Code no.	Description
Drive unit		
	60-63-0245	Electric motor 110 kW 1000 rpm 315 S/M6 B3 IE3 ATEX22
	60-63-0237	V-belt SPB 4750 red power 3
	60-63-0240	Safety switch EEX AZM 415 11/11zpk 3D 24 VAC
Front wall		
	60-63-0238	Rubber gasket ATPK 929 x 1255 x 5 for Maxima 700-130
Pellet mill door		
	60-63-0241	Rubber gasket mill door S.162.502 for Maxima
Rotor main shaft		
	60-63-0242	Shaft seal ring 250/290 x 16 high compound without spring
	60-63-0246	Main shaft rotor reinforced BD Maxima 700
Dies		
	60-63-0200	Die dia 700 x 130 hole 5 mm chrome steel for Maxima 700-130
Temperature monitoring		
	60-63-0236	Resistance thermometer PT100 0-150°C Teflon cable 3 m
Pellet cutter		
	60-63-0239	Pellet cutter for Maxima 700-130

Conditioner – drive

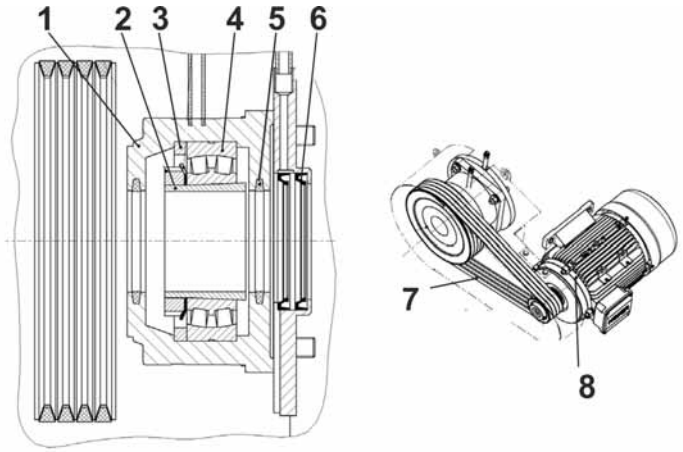


Figure 5-19: Conditioner – drive

Pos.	Code no.	Description
1	60-63-0262	Housing for flange bearing F518B 1000-2030
2	60-63-0261	Clamping sleeve H318S 1000-2030
3	60-63-0263	Fixed ring FRB-100-160
4	60-63-0260	Self-aligning roller bearing 22218 EK
5	60-63-0264	Felt gasket FS-0330-080
6	60-63-0265	Shaft seal ring 90/110x10 BA
7	60-63-0259	V-belt SPA 1500
8	60-63-0258	Electric motor 7.5 kW UL-certified

Conditioner – end station

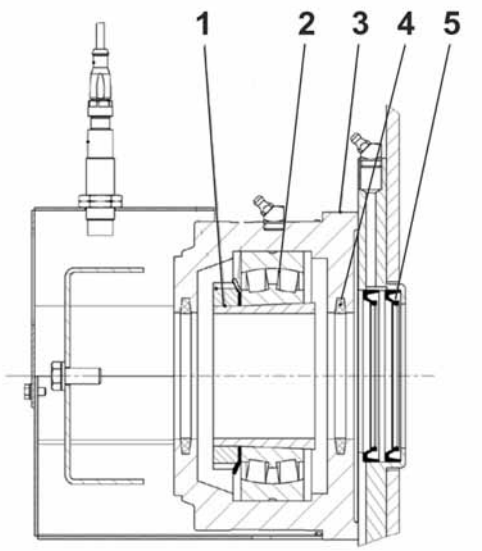


Figure 5-20: Conditioner – end station

Pos.	Code no.	Description
1	60-63-0261	Clamping sleeve H318S 1000-2030
2	60-63-0260	Self-aligning roller bearing 22218 EK
3	60-63-0257	Housing for flange bearing SKF 722509-DB-P
4	60-63-0264	Felt gasket FS-0330-080
5	60-63-0256	Shaft seal ring 50/68 x 8 DIN 3760

Dosing auger

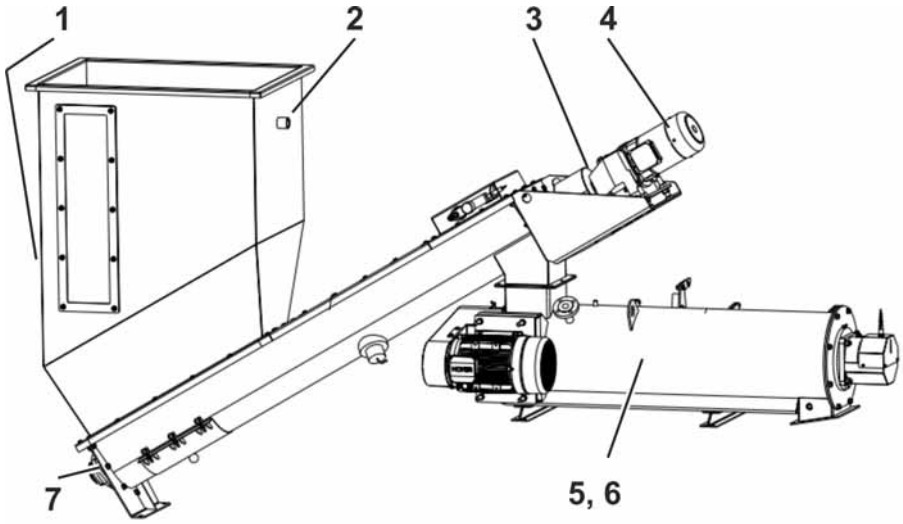


Figure 5-21: Dosing auger

Pos.	Code no.	Description
1	60-63-0247	Sensor with rotary paddle max UWT RN6001CM11EB1A3D UL-certified
2	60-63-0248	Sensor with rotary paddle min UWT RN6001AM11EB1A3D UL-certified
3	60-63-0249	Gear motor SK32-100LH/4 CUS IID2TF 38 rpm 551 Nm UL
4	60-63-0250	Coupling KTR PN065 AR incl. drill holes and feather key groove
5	60-63-0243	Mixing paddle 50 x 125/M20 stainless steel
6	60-63-0244	Mixing paddle 50 x 145/M20 stainless steel
7	**Dosing auger end station**	
	60-63-0251	Self-aligning ball bearing 1209K
	60-63-0252	Clamping sleeve H209
	60-63-0253	Housing for flange bearing SKF 722509-DB-Z
	60-63-0254	Fixed ring FRB-060-085
	60-63-0255	Felt gasket FS-190-040

5.8 Sidewall belt conveyor

	Refer to the included supplier's documentation (AH MEYER) regarding the sidewall belt conveyor.

The sidewall belt conveyors transport the pellets.

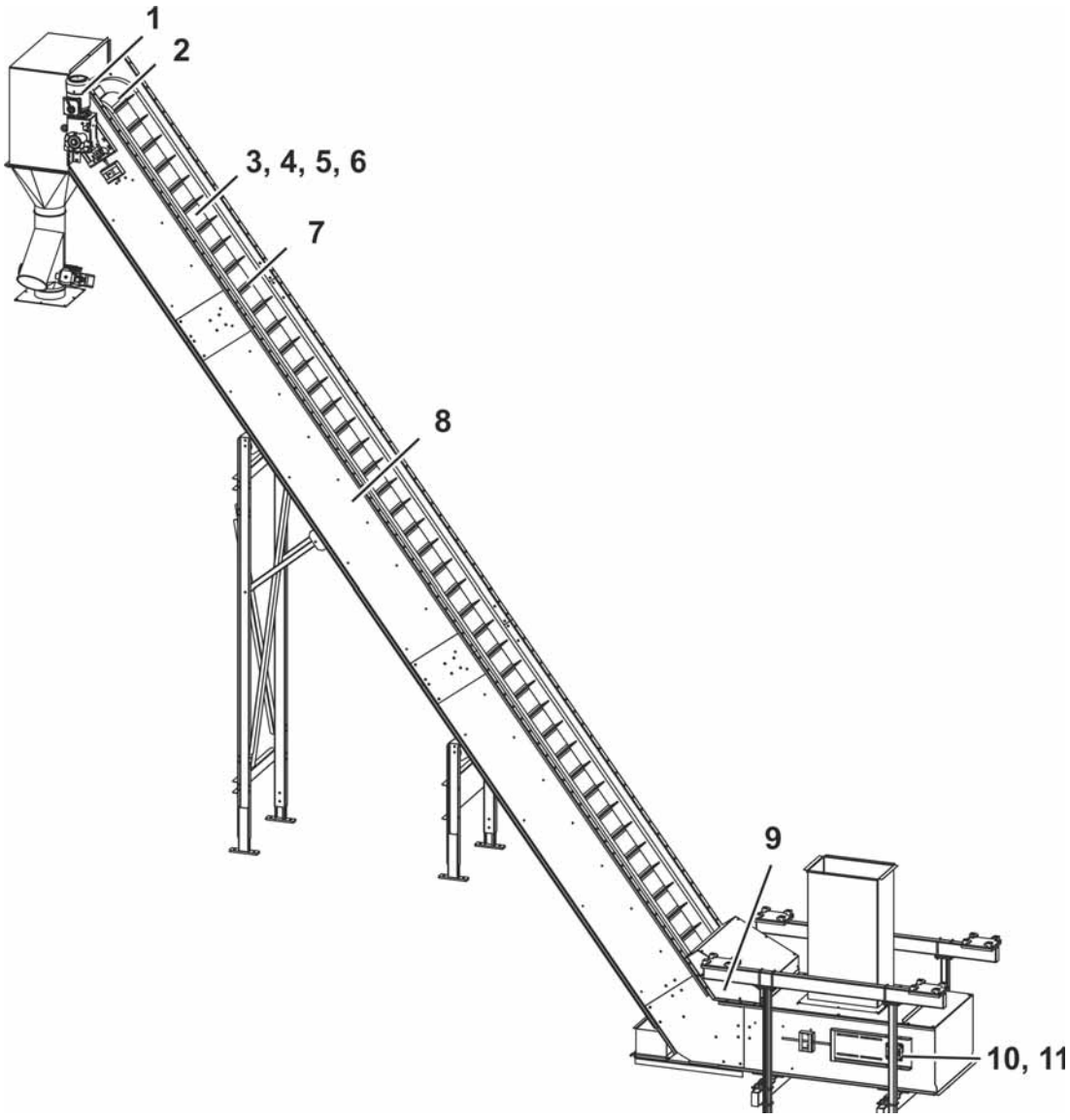


Figure 5-22: Sidewall belt conveyor

Pos.	Code no.	Description
1	60-63-0608	Gear motor 0.75 kW 230/460 V 60 Hz CUS hollow shaft d=35 brake
2	60-63-0603	Driving drum dia 200x624 d=35 rubberized
3	60-63-0617	Conveyor belt 620 with corrugated edge 23100 mm cross slat
4	60-63-0616	Conveyor belt 620 with corrugated edge 17985 mm cross slat
5	60-63-0615	Conveyor belt 620 with corrugated edge 13805 mm cross slat
6	60-63-0618	Conveyor belt 620 with corrugated edge per running meter cross slat

Pos.	Code no.	Description
7	60-63-0605	Coupling Alligator b=620 mm
8	60-63-0612	Supporting roller D=50 EL/AL = 634 mm IGM M 8 galv.
9	60-63-0613	Supporting roller D=80 EL/AL = 640 mm IGM M 12 galv.
10	60-63-0600	Flange bearing UCF207 d35 4 holes
11	60-63-0619	Idler drum dia 200 x 624 mm d=35

5.9 Hygieniser

Refer to the included supplier's documentation (GEELEN) regarding the hygieniser.

The pellets that were heated during the milling process remain in the hygieniser for no less than one hour to ensure that all germs are killed. The hygieniser is equipped with a heating wire that maintains the set temperature.

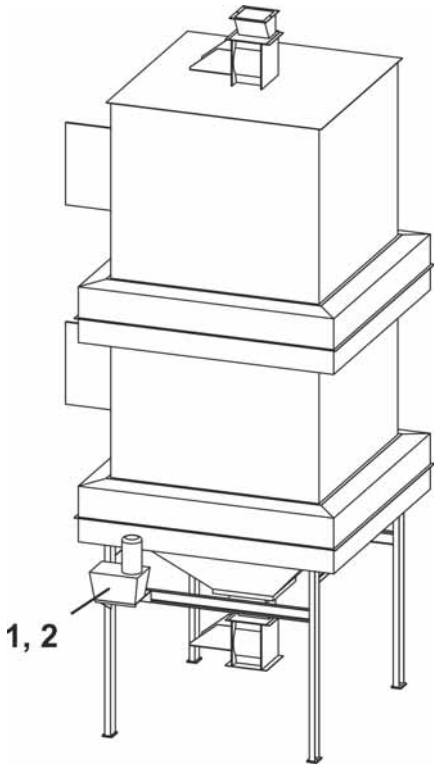


Figure 5-23: Hygieniser

Pos.	Code no.	Description
1	60-63-0517	Oil filter hydraulic unit T918113t/mT918118
2	60-63-0524	Electric motor 2.2 kW 1500 V1 CSA/UL

5.10 Pellet cooler

	Refer to the included supplier's documentation (GEELEN) regarding the pellet cooler.

The air flow cools the pellets in the pellet cooler to a temperature that is suitable for further transport and storage. This air flow is produced by a fan.

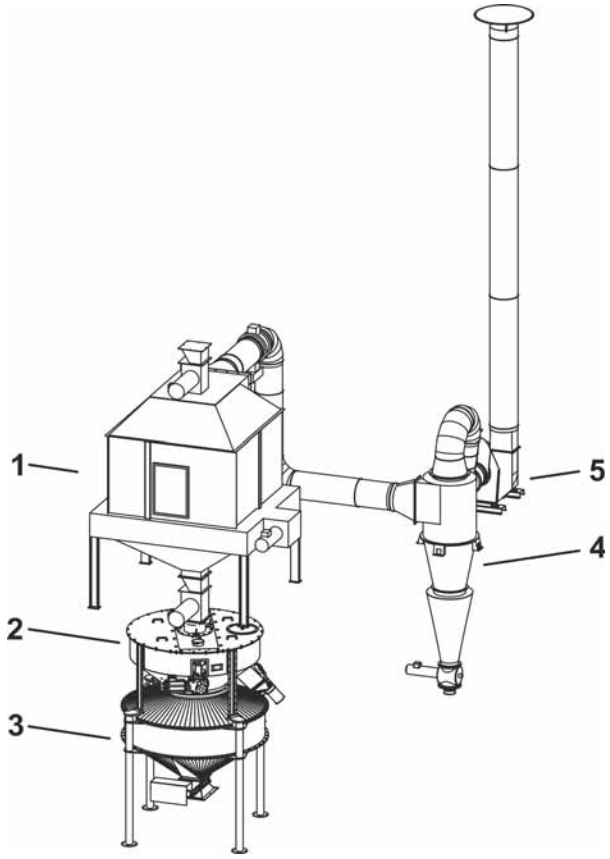


Figure 5-24: Pellet cooler

Pos.	Description
1	Pellet cooler
2	Round sieve
3	Sieve storage container
4	Cyclone
5	Fan

5.10.1 Cyclone

The cyclone separates dust particles that were carried along by the air flow.

5.10.2 Round sieve

Loose particles that are not integrated well enough after the pelletizing process are removed from the pellets in the round sieve. This reduces the share of loose material for the remaining production process. A conveying auger transports the sieved parts back to the silo to start the pelletizing process again.

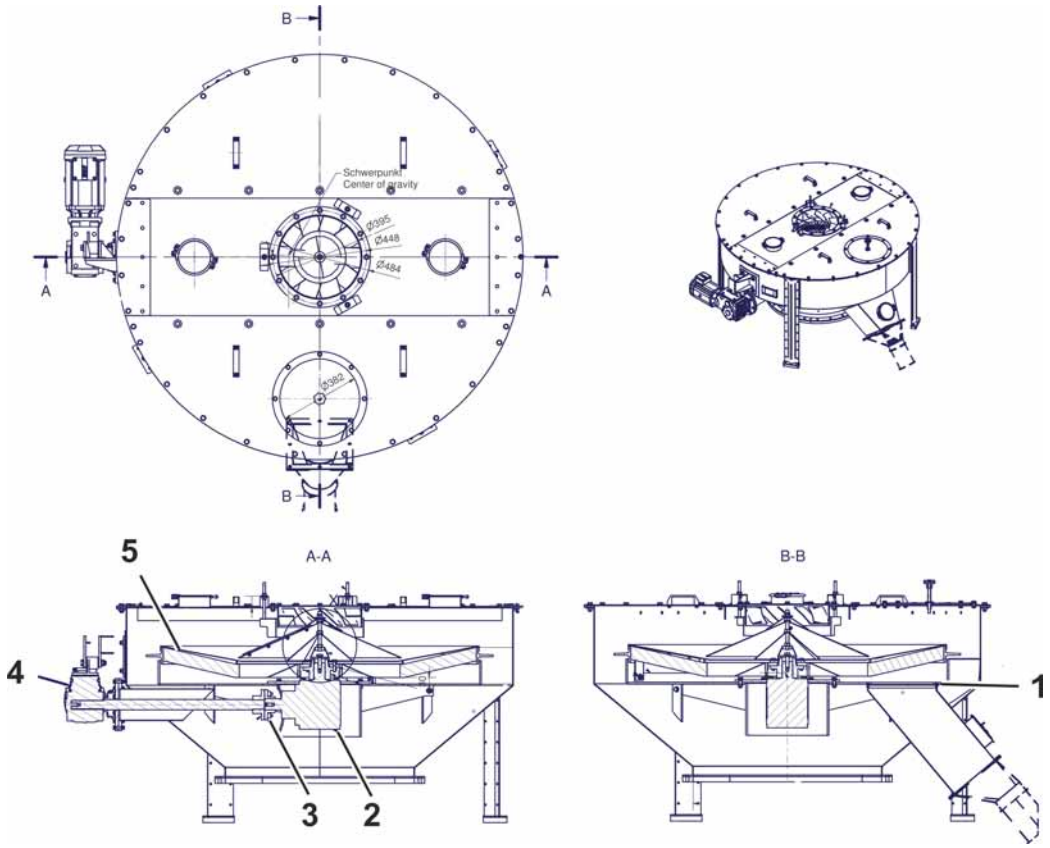


Figure 5-25: Round sieve

Pos.	Code no.	Description
1	60-63-0591	Seal self-locking NBR60° Shore A black L=180 mm
2	60-63-0582	Bevel gear W199-0001/56-OVO-1
3	60-63-0585	Coupling Orpex WS144 bolt part (part 2)
4	60-63-0583	Gear motor 2.2 kW 49 rpm SK9022.1AZD/3D-100LH/4 3DTF
5	60-63-0592	Sieve for round sieve machine 6.0-8.0 d1500 mm
	60-63-0584	Sieve for round sieve machine 3.5-5.5 d1500 mm

5.10.3 Sieve storage container

The sieve's storage container stores the pellets before they are filled into BigBags.

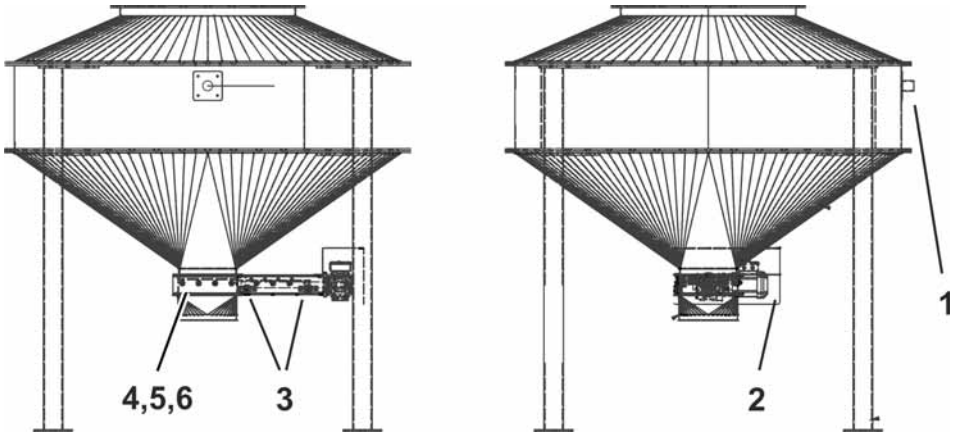
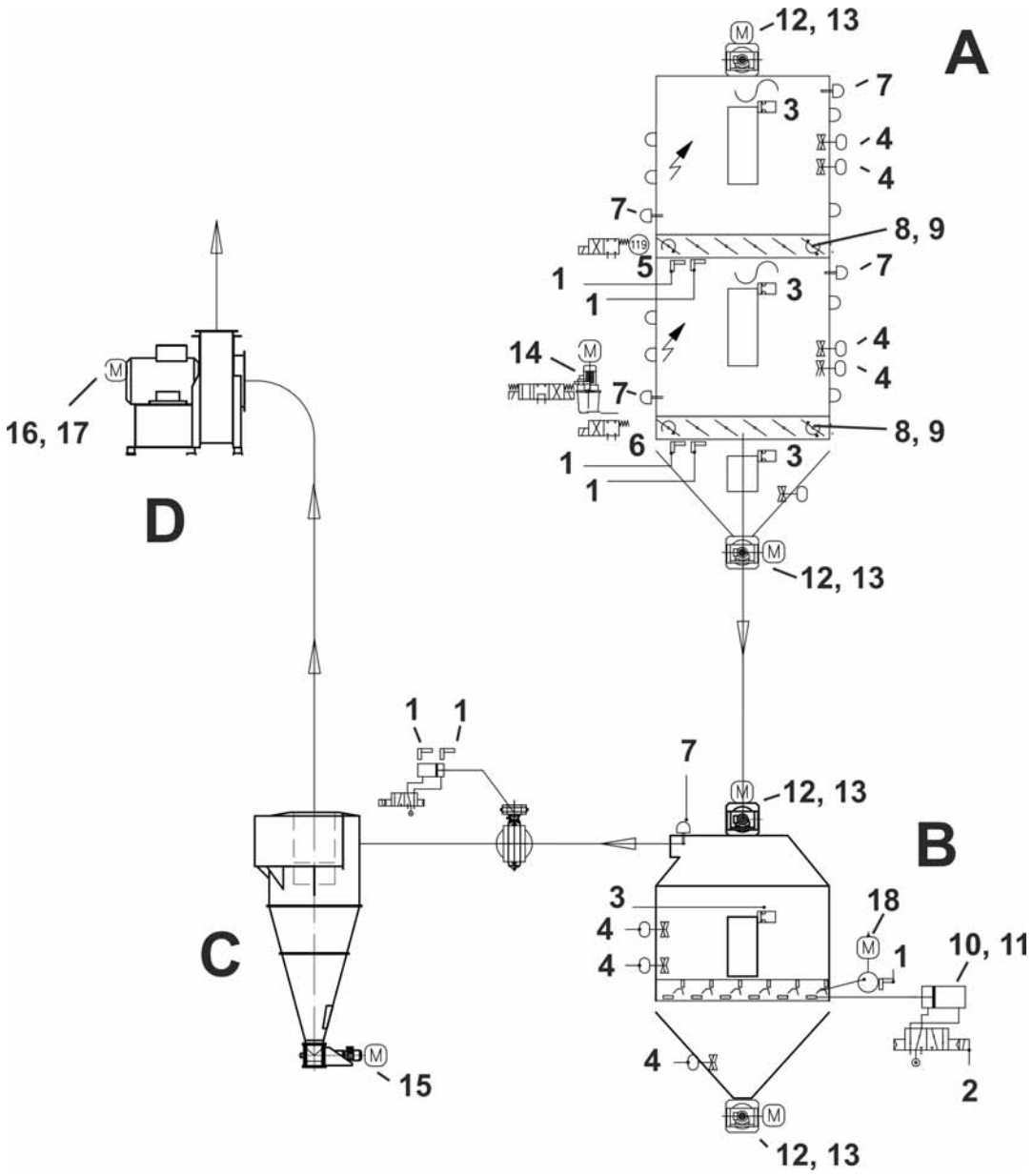


Figure 5-26: Sieve storage container

Pos.	Code no.	Description
1	60-63-0590	Sensor with rotary paddle RN4001 2.5 W 24 V
2	60-63-0593	Gear motor DRS71M4 0.37 kW 156 rpm 60 Hz hollow shaft dia 20 mm
3	60-63-0562	Sensor inductive IFM IFC258 M12x1.0
4	60-63-0586	Deep-groove ball bearing 6000 2RS 10 x 26 x 8.0 mm
5	60-63-0588	Trapezoid thread nut TR 24 x 5 dia 50 x 23
6	60-63-0589	Shaft dia 20 TR24x5 L = 554 mm

5.10.4 Electronic parts of the pellet cooler, round sieve and cyclone



Pos.	Code no.	Description
A		**Hygieniser**
B		**Pellet cooler**
C		**Cyclone**
D		**Fan**
1	60-63-0510	Proximity switch IGA2008 CSA 20-250 V AC / V DC
2	60-63-0511	Valve pneumatic 5/2 1/8" M05 510-HN 48 V 50/60 Hz 24 V DC CSA/UL
3	60-63-0512	Door safety switch Allen Bradley 440K-T11090 IP67
4	60-63-0513	Sensor with rotary paddle UWT RN6001AN11MQ1B3Z+38G 115/230 V AC / 24 V DC
5	60-63-0514	Valve hydraulic Rexroth 24 V DC level selection
6	60-63-0515	Valve hydraulic Rexroth 24 V DC

Pos.	Code no.	Description
7	60-63-0516	Temperature sensor PT100 l=150
8	60-63-0518	Cylinder hydraulic D60/35-320 SGL-CGL
9	60-63-0519	Repair set for hydraulic cylinder D60/35
10	60-63-0520	Cylinder pneumatic d125x50
11	60-63-0521	Repair set for pneumatic cylinder d125 SPEC
12	60-63-0522	Gear motor R47DRN80M4 0.75 kW
13	60-63-0523	Rotor 350 sluice SLUIS 350 RVS 316L
14	60-63-0524	Electric motor 2.2 kW 1500 V1 CSA/UL
15	60-63-0526	Powder sluice GS250 motor 0.37 kW 415-460 V 60 Hz IP54
16	60-63-0527	Electric motor 11 kW 3000 rpm B3 GMB14
17	60-63-0528	Fan wheel GMB14 RB
18	60-63-0525	Gear motor R67DRN90S4-BE2

5.11 Bagging unit

Refer to the included supplier's documentation (AH-MEYER) regarding the bagging unit.

The bagging unit fills the pellets into BigBags.

5.11.1 Bagging system

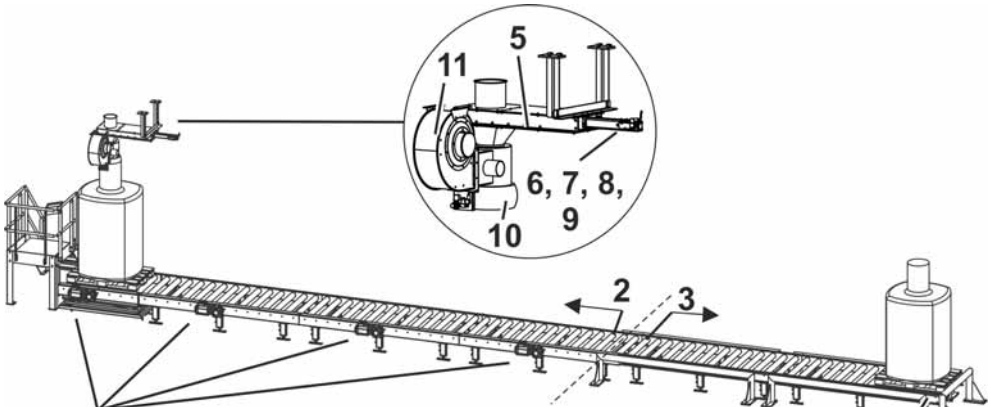
The bagging system fills the pellets into BigBags. Place the BigBags under one of the filler necks by hand. An inflatable bag clamp stops the BigBags from slipping. The clamp seals the BigBags closed, thus reducing the dust load. A fan inflates the BigBags to guarantee even filling. The BigBags are filled automatically until they reach a pre-set weight.

5.11.2 Lift table

The height of the roll conveyor can be adjusted to the height of the BigBag that is being filled by using the lift table. This prevents tearing of the BigBag's upper part.

5.11.3 Roll conveyor

The roll conveyor transports the BigBags to the discharge point.



Pos.	Code no.	Description
1	60-63-0610	Gear motor 0.55 kW n=48/min 230/460 V 60 Hz CUS d=25
2	60-63-0611	Supporting roller D=89 EL/AL=1042 2 x chain wheel 5/8" 15t galv.
3	60-63-0614	Supporting roller D=89 EL/AL = 950mm IGM M 12 galv.
4	60-63-0607	Reflection light barrier Idec with angle support
5	60-63-0604	Guide rail set for slider
6	60-63-0601	5/2-way valve solenoid and socket for slider cylinder
7	60-63-0602	5/2-way valve solenoid and socket for slider cylinder control
8	60-63-0609	Pressure regulator 0.05-0.7 bar
9	60-63-0606	Bracket for pneumatic system
10	60-63-0500	Inflatable sleeve IW = 273 mm OW = 315 mm H = 150 mm 1/8" male cpl.
11	60-63-0680	Fan ECblue 1.3 kW 200/277 V 50/60 Hz 6.4/4.6 A 1390/min
Lift table, not illustrated		
	60-63-0650	Control for lift table IL 1000 XB SAX 69
	60-63-0651	Sealing kit lifting cylinder for lift table
	60-63-0652	Lowering valve for lift table IL 1000 XB
	60-63-0653	Profile aluminum for safety frame cpl.
	60-63-0654	Corner connection for safety frame lift table IL 1000 XB
	60-63-0655	Contact for safety frame lift table IL 1000 XB
	83-06-2773	Weigh bar SQB-A 500 kg

5.12 Functional single parts

5.12.1 Door switch

For example: Allen Bradley 440k-T11090, …

Function: The sensors monitor the state of doors and covers within the system. When opening a component, this component's drive is switched off and cannot be switched on again, i.e. the danger of moving parts is eliminated.

Places of installation

- Hammer mill
- Double-shaft shredder
- Elevator
- Pellet mill
- Hygieniser
- Pellet cooler

5.12.2 Valves

For example: Bürkert - 3280, …

Function: The valves control the air supply for specific system parts and therefore move the cylinders, for example.

Places of installation

- Cyclones
- Pellet mill
- Hygieniser
- Pellet cooler
- Water dosing

5.12.3 Flow meter

Kobold – DTK 24 VDC

Function: The flow meter measures the water flow at the conditioner to adjust the moisture content of the input material as precisely as possible.

Places of installation

- Conditioner of the pellet mill

5.12.4 Heater cable

Heater cable 320 ohm/km

Function: The heater cable creates the temperatures required to ensure that all germs are killed in the hygieniser and maintains this temperature over the entire production period.

Places of installation

- Conditioner

5.12.5 Inductive sensor

For example: IFM – IGC225, …

Function: The inductive sensor monitors the position of scrapers, overflow flaps and covers. It is also used to monitor the speed of some components.

Places of installation

- Dosing hopper
- Double-shaft shredder
- Dosing augers
- Hammer mill
- Fire shutter
- Elevator
- Pellet mill
- Hygieniser
- Pellet cooler
- Conditioner

5.12.6 Fill level sensor

For example: Rotonivo – RN 3000

Function: The sensor monitors the fill level of different system components. It is sometimes used as full or empty sensor. Depending on its function, the sensor switches off previous components to prevent clogging or overflowing and thus damage to the system. When used as an empty sensor, it switches off the following component if it is in danger of running empty until sufficient material is available again. The sensors also monitor the fill level and in this case do not switch off previous or following components, but only show a corresponding message in the visualization.

Places of installation

- Dosing hopper
- Silo
- Pellet mill (storage tank)
- Round sieve (storage tank)
- Hygieniser
- Pellet cooler

5.12.7 Light barriers

SAIU-P07M

Function: The light barriers monitor the position of the BigBags on the roll conveyor. When a BigBag is located in front of the light barriers, the barrier sends a signal to the control unit and stops the conveyor belt for the next BigBag until the roll conveyor is empty again. The visualization also shows the position of the BigBags.

Places of installation

- Conditioner (pellet mill)

5.12.8 Pressure monitoring

SUCO – 034045703

Function: The sensor monitors the availability of air pressure at the pellet mill and sends an error message via the visualization in case there is none. The mill cannot be switched on without compressed air.

Places of installation

- Mill

5.12.9 Reed switch

Camozzi

Function: The reed switch indicates the cylinder's retraction and extension positions at the BigBag bagging unit.

Places of installation

- Bagging unit

5.12.10 Roller lever

For example: Schmersal – EEX 335 T4VH

Function: At the pellet mill, the roller levers provide information about the release of the overload clutch by sending a signal to the control unit that stops the mill and all previous components.

At the lift table, the roller levers send a signal to the control unit when the safety frame is lifted. The lift table then stops and does not lower further until the safety frame is back in its starting position and the procedure starts again. Two more levers indicate the upper and lower end position of the lift table.

Places of installation

- Pellet mill
- Lift table

5.12.11 Temperature sensors

For example: Jumo – PT100/t90.2040

Function: The temperature sensors measure the temperature and send it to the visualization. The sensors monitor several components for overheating and prevent this issue by switching the corresponding component off. The material is automatically sent to the hygieniser when the sensors determine the required temperature. The temperature sensors also check for the required temperature in the hygieniser to ensure that all germs are killed.

Places of installation

- Hammer mill
- Pellet mill
- Funnel (in front of hygieniser)
- Hygieniser
- Pellet cooler

5.12.12 Load cells

Function: The load cells weigh the BigBags at the bagging unit and thus ensure that each BigBag weighs nearly exactly 1 metric ton (1,000 kg). When a BigBag reaches the target weight, all previous components are switched off until a new BigBag is in the correct position.

Places of installation

- Lift table (BigBag bagging unit)

6 Initial operation

DANGER

Observe the safety instructions in chapter 2 ”Safety” and the applicable safety and accident prevention regulations valid on site!

- Personnel carrying out initial operation must be qualified, authorized and trained!
- Cut off the power supply before you carry out any mechanical or electrical work (switch off the main switches and secure them by installing a padlock or U-lock)!
- Check for residual voltage after having switched off the machine or system!
- If necessary, attach temporary barriers at the machine or system before starting any work (e.g. a red and white safety chain) and define access restrictions!
- Do not climb on or through the machine or system!
- Do not disassemble or modify protective equipment!

The machine or system is a technical unit that may be damaged when initial operation is not completed correctly.

6.1 Preparation for initial operation

The following tasks must have been completed before initial operation begins:

- building site cleared and clean;
- protective equipment installed and warning signs attached;
- transport locks removed.

Check the following points at the machine or system before putting it into operation:

- aggregates correctly fixed to electrical and pneumatic components;
- tight screw unions (tighten loose unions with the correct torque);
- on-site supply with power, compressed air and water, e.g. to meet the requirements for operating fluids;
- energy connections;
- terminals and protective fastening;

- electrical system and programmable logic controller (PLC), e.g. execution and functional test;
- pneumatic system, lubrication, e.g. execution and functional test;
- control elements, e.g. execution and functional test;
- correct tension of the chain drives and conveyor belts;
- no loose connections, correct tensions.

6.2 Initial operation without material

Carry out the following steps after all preparations have been completed:

1. Actuate the main switch to turn on the PelletTower.
2. Log into the control using the touch panel.
3. Start the system in automatic mode.
4. Use the touchscreen to check whether all components and sensors function correctly.
   – Scrapers and drives work if all sensors are indicated as active.
5. Check whether the automatic water supply at the dosing container works (automatic filling of the tank).
6. Check all emergency stop buttons.
7. Eliminate possible faults.

6.3 Test run with material

After the initial operation without material, proceed as follows:

1. Fill the dosing system with material.
   – The material's dry matter content should be higher for the test run than it will be in reality to test whether the automatic humidification works.
2. Fill the rinsing units with flushing fluid.
3. Start the PelletTower in automatic mode.
4. Carry out a rinsing with automatic stop.
5. Carry out an emptying process with rinsing and automatic stop.
6. Check the system components for any abnormal behavior during production.
7. Correct this abnormal behavior.

7 Operation

DANGER

Observe the safety instructions in chapter 2 ”Safety” and the applicable safety and accident prevention regulations valid on site!

- Personnel operating the system must be qualified, authorized and trained!
- Wear adequate protective clothing when operating the system!
- Mind hot and rotating parts!
- Stay at the control unit with the control elements while operating the system, as this area is considered the work station of the system!
- Do not disassemble or modify protective equipment!

Important colors in the control unit visualization:

- System components depicted in ***green*** are active and switched in the correct order.
- System components depicted in ***blue*** are inactive and currently not controlled.
- System components depicted in ***red*** are in error mode. This error must be eliminated before the system can start.
- System components depicted in ***white*** are ready to operate. However, these components cannot be started because of an error, because a component is set to "Manual" or because a message regarding the material's filling level is missing.

User interface and general functions:

The Högemann control unit controls and monitors the system processes.

The following chapter describes the structure and functions of the Högemann control unit.

7.1 Högemann main screen

Open the software and log in. The next screen is the start screen and shows the standard selection mask:

Figure 7-1: Högemann main screen

7.2 Högemann menus

7.2.1 Mill menu

Tap on Mill to reach the Mill menu. The menu shows the following components:

- the dosing hoppers;
- the two-shaft shredder;
- the hammer mill;
- the BD-EU silo.

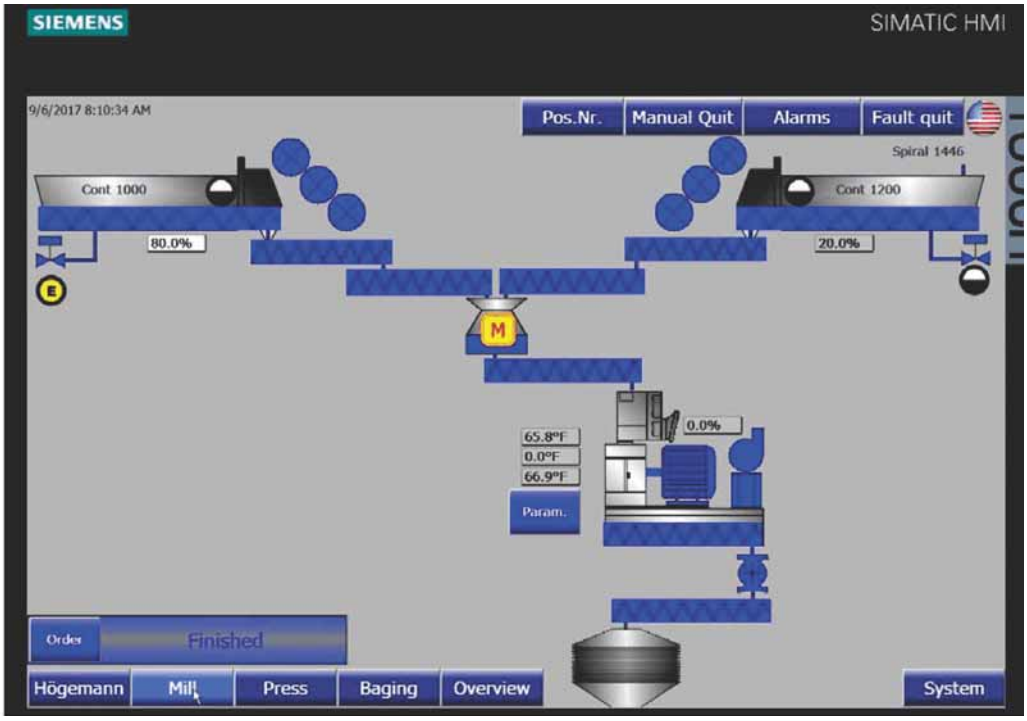


Figure 7-2: Mill menu

7.2.2 Press menu

Tap on Press to reach the Press menu. The menu shows the following components:

- the dosing hopper;
- the mill's storage container;
- the pellet mill;
- the hygieniser;
- the pellet cooler;
- the screen;
- the bagging unit container.

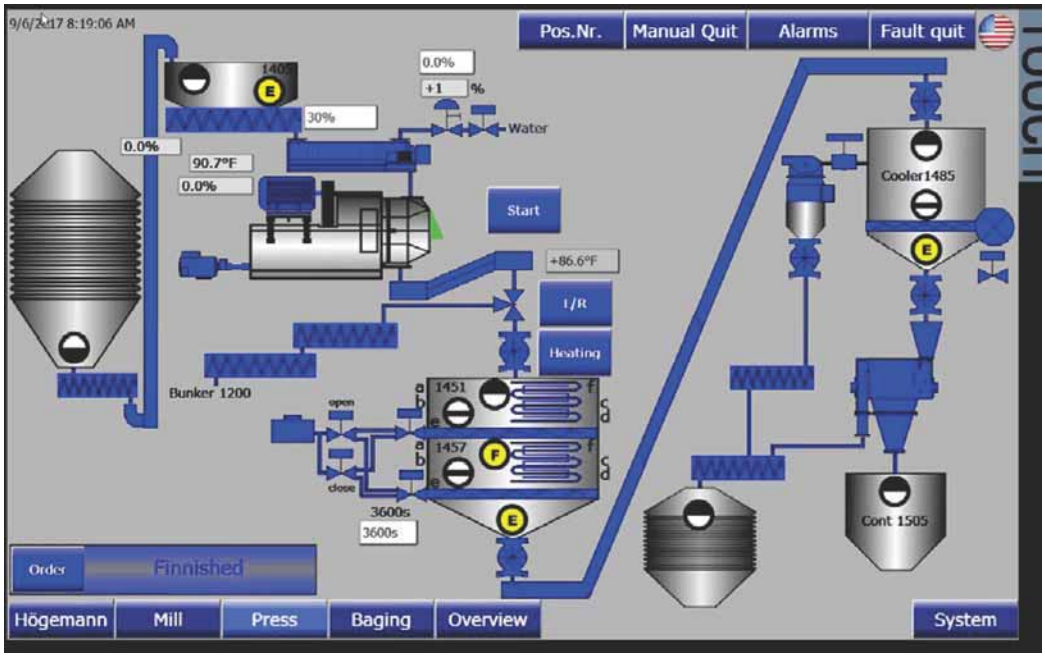


Figure 7-3: Press menu

7.2.2.1 Starting the mill system

Tap on "Order" to start the mill system (from the dosing hoppers to the mill's storage container).

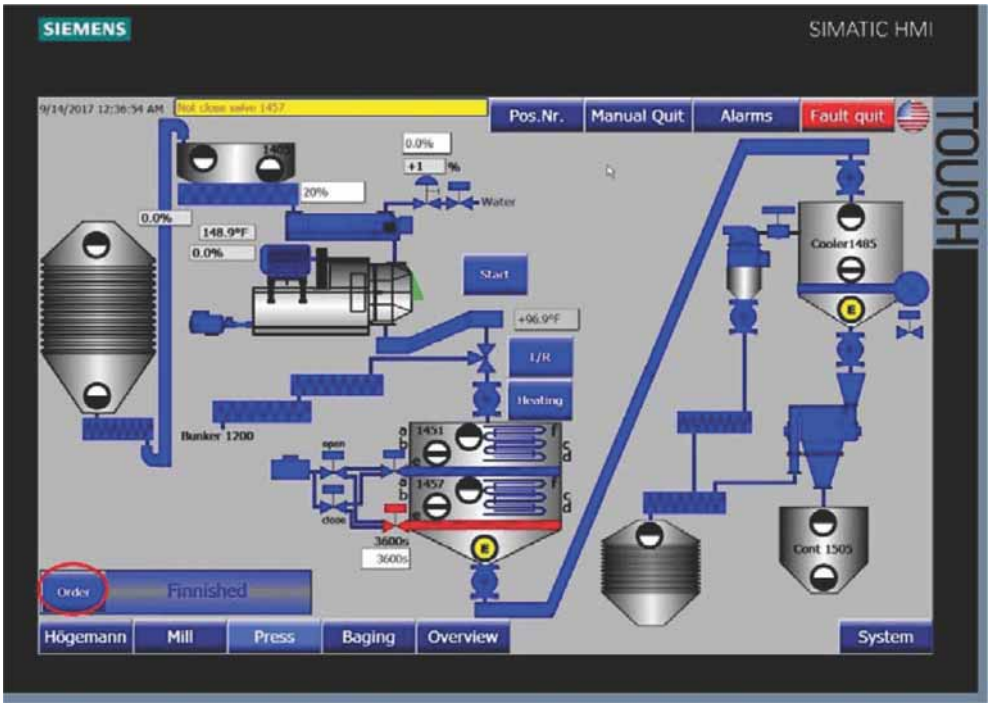


Figure 7-4: Starting the mill system

Figure 7-5: Tapping on "Start"

Tap on "Start" to start the further system components (the following components are started separately: pellet mill, conditioner, dosing auger, see the next chapter).

7.2.2.2 Starting the pellet mill, conditioner and dosing auger

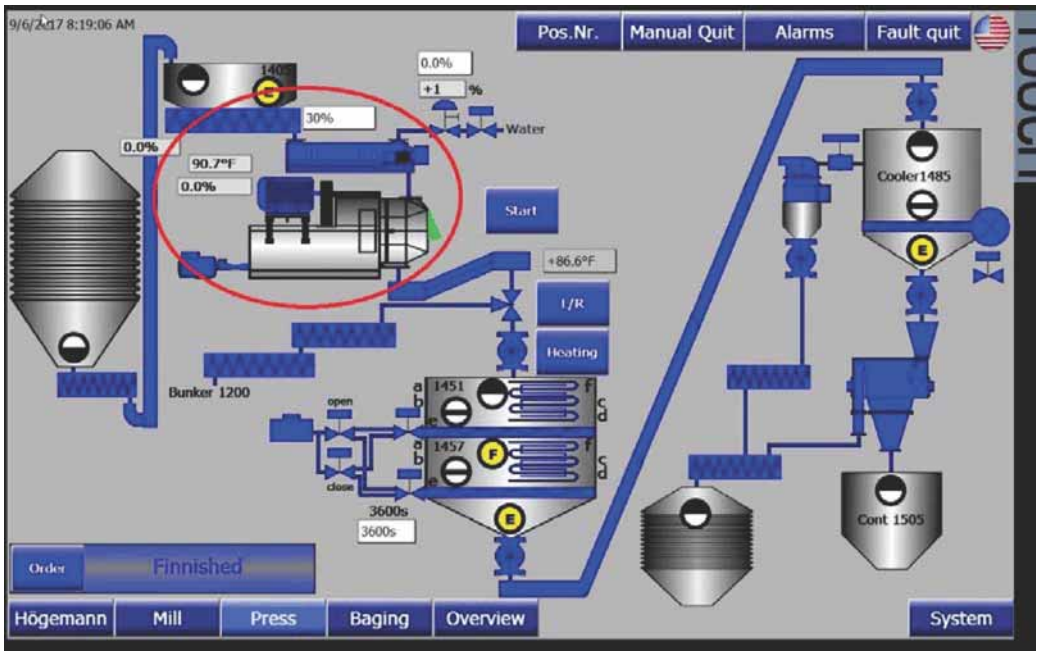


Figure 7-6: Starting the pellet mill, conditioner and dosing auger

Tap on "Start" to start this system component.

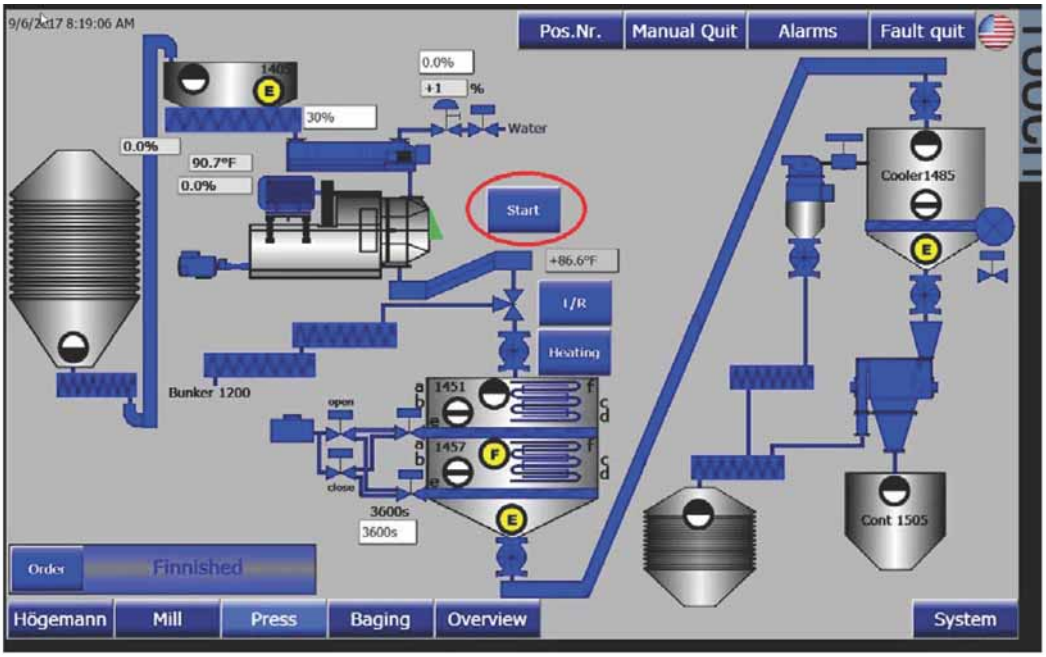


Figure 7-7: Start button for pellet mill, conditioner and dosing auger

7.2.2.3 Adjusting the set pellet temperature before hygienisation

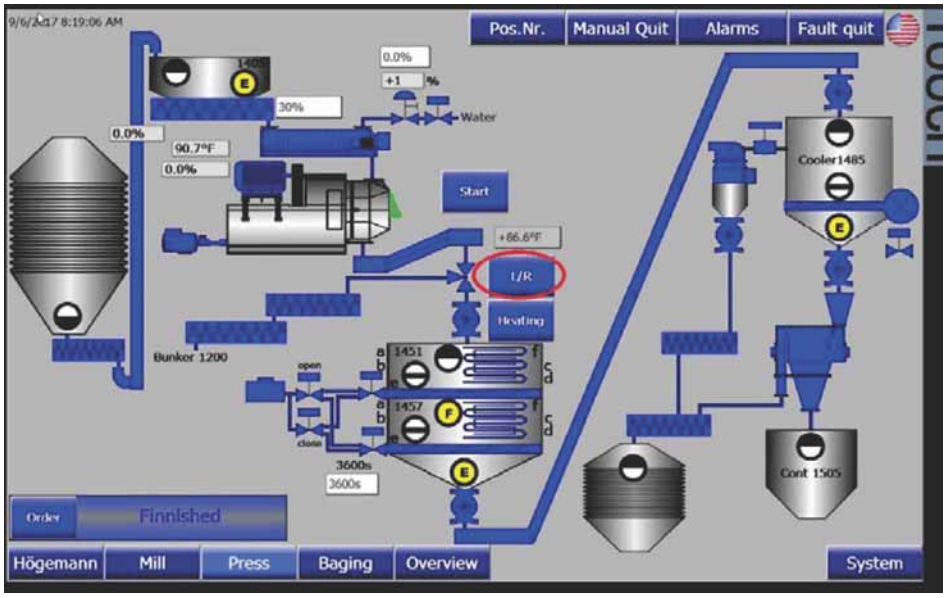


Figure 7-8: Adjusting the set pellet temperature before hygienisation

Tap on "L/R" to view the input field for entering the required heating value setpoint.

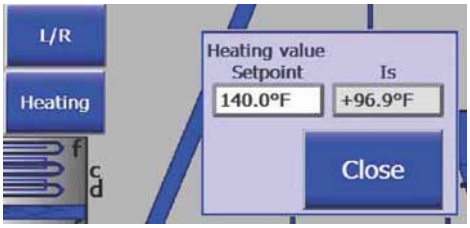


Figure 7-9: Input field for entering the heating value setpoint

7.2.2.4 Adjusting heating phases and temperatures for the hygieniser

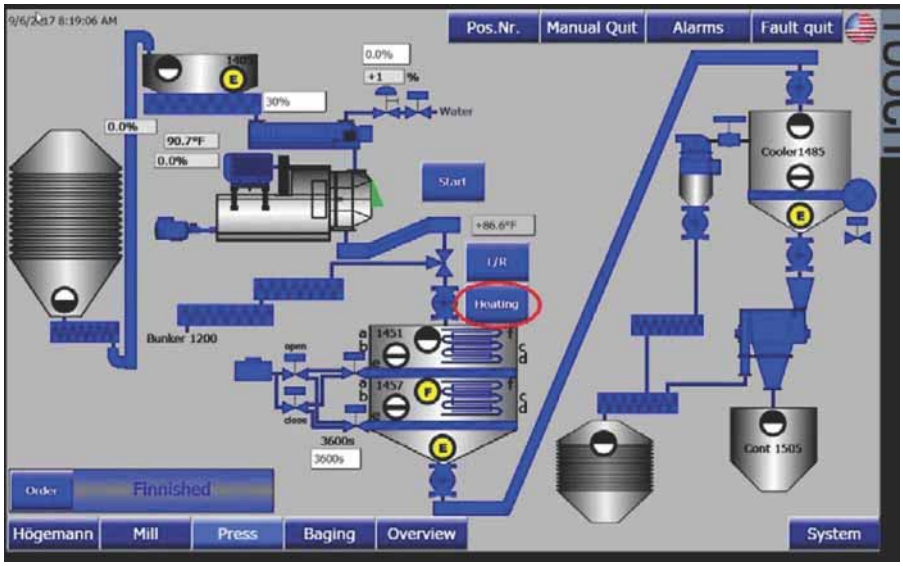


Figure 7-10: Adjusting heating phases and temperatures for the hygieniser

Tap on "Heating". The following control window appears:

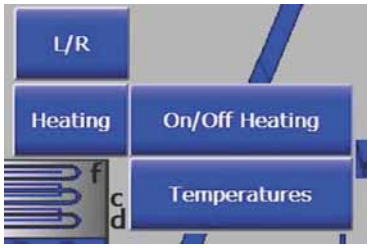


Figure 7-11: Control window for heating phases and temperatures of the hygieniser

Tap on "On/Off Heating". The following input field appears:

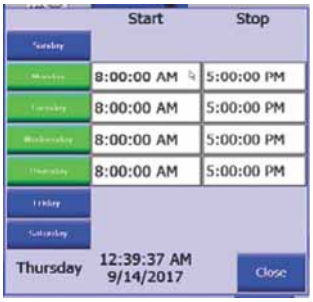


Figure 7-12: Input field for determining heating phases

Adjust here when the hygieniser should heat (dates and times).

Tap on "Temperatures". The following input field appears:

Figure 7-13: Input field for the necessary temperature

Define the temperature that must be reached in the hygieniser here.

7.2.3 Bagging

Tap on Baging to reach the Bagging menu. The menu shows the following components:

- the bagging unit container;
- the bagging system;
- the roll conveyor.

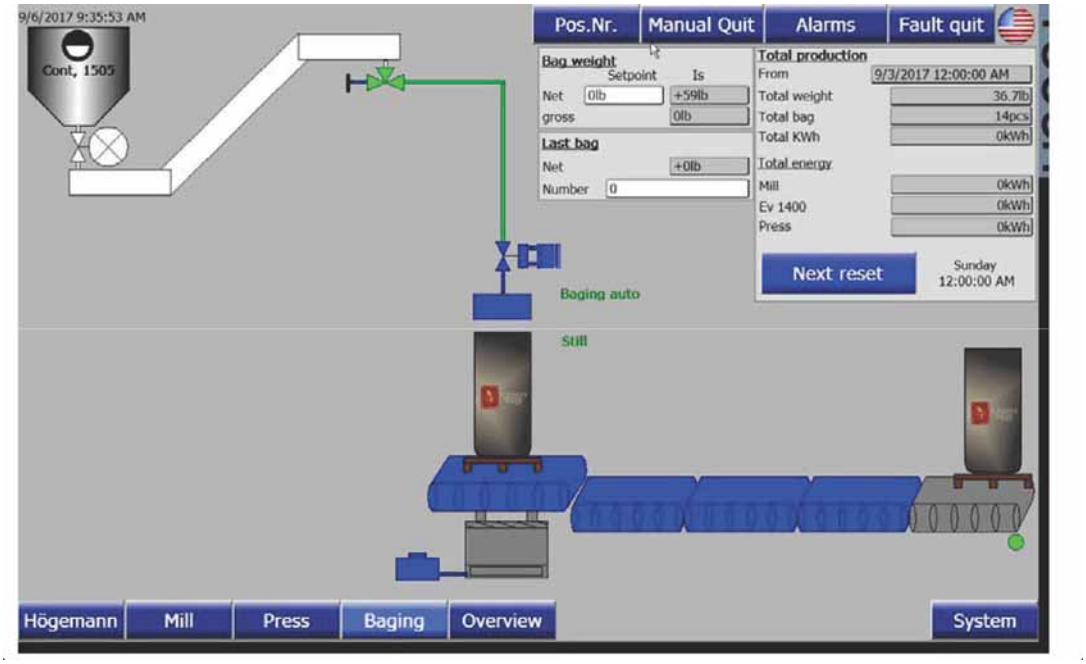


Figure 7-14: Bagging menu

7.2.4 Overview

Tap on Overview to reach the Overview menu. The menu shows the following components:

- the entire system;
- the dosing hoppers;
- the two-shaft shredder and hammer mill;
- the pellet mill;
- the hygieniser;
- the pellet cooler;
- the bagging unit.

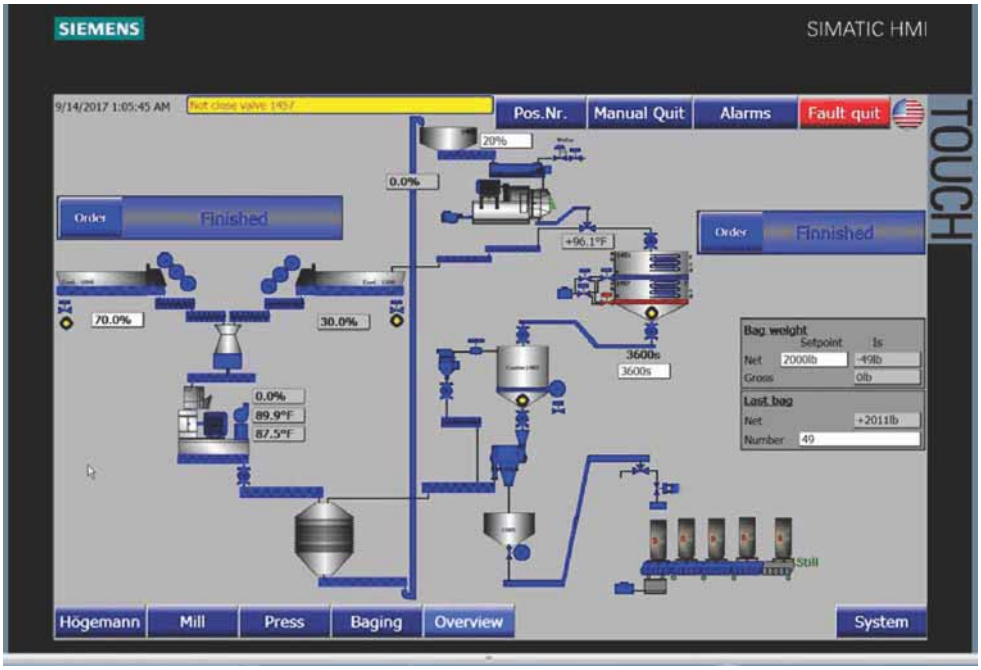


Figure 7-15: Overview menu

7.2.5 System

Tap on System to reach the System menu. You can configure the following settings here:

- calibrating the touchscreen;
- cleaning the touchscreen;
- changing the touchscreen's brightness;
- changing the date and time;
- exiting the current program.

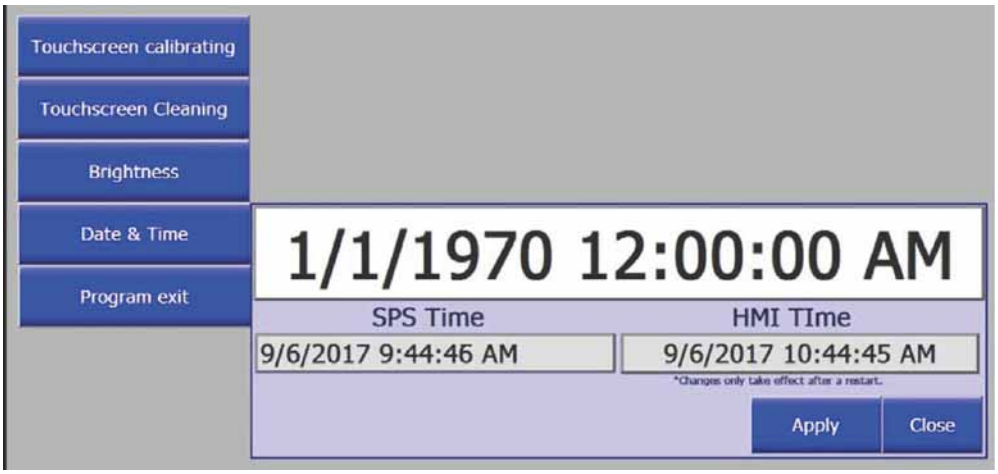


Figure 7-16: System menu

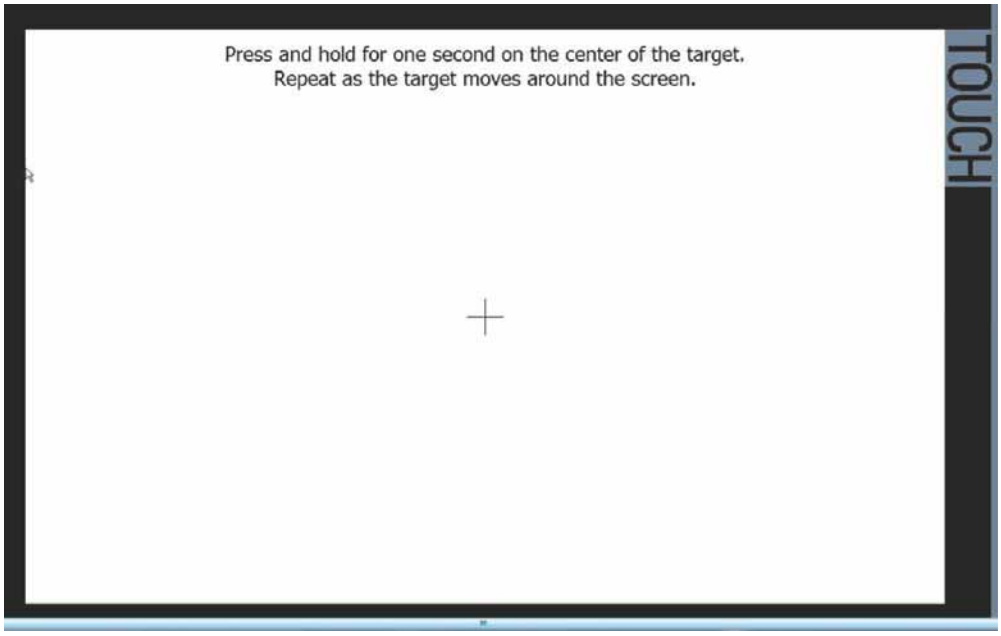


Figure 7-17: Calibrating the touchscreen

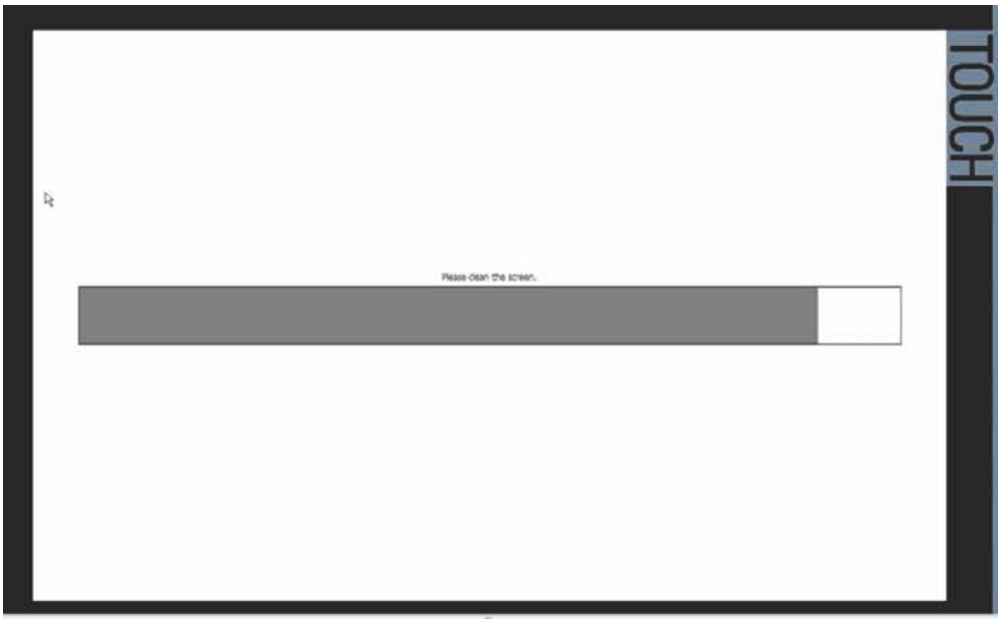


Figure 7-18: Calibrating the touchscreen

Figure 7-19: Options for touchscreen calibration

7.2.6 Functions in the Overview menu

Tap on Pos.Nr. to see the position numbers of the corresponding machine part.

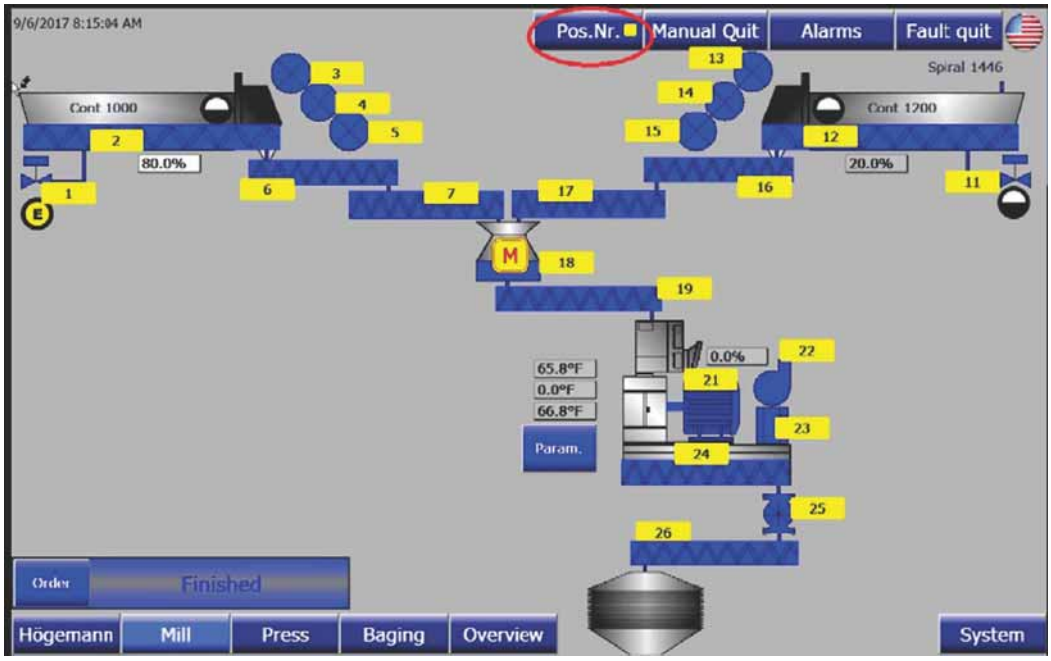


Figure 7-20: Position numbers

Tap on Manual Quit to reset the system's manual operating options.

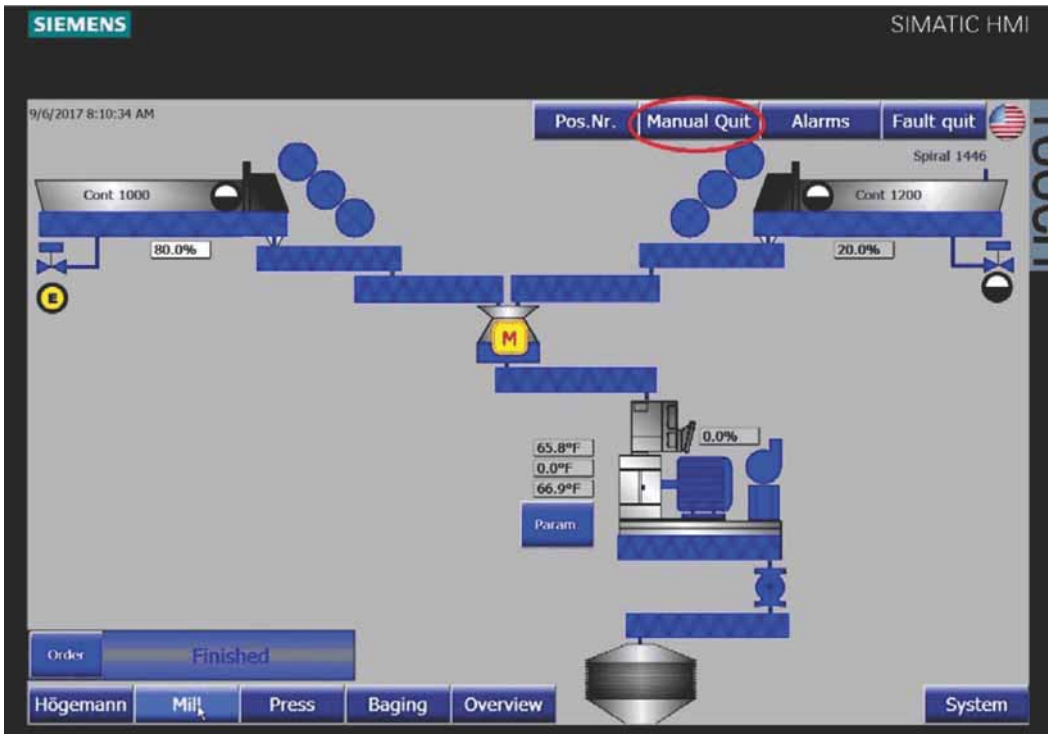


Figure 7-21: Manual quit

Tap on **Alarms** to view the currently active alarms.

Figure 7-22: Alarm menu

Use the button with the country flags to select the menu language.

Figure 7-23: Selecting the menu language

7.2.7 Starting the pelletizing process

Tap on Order to start the pelletizing process.

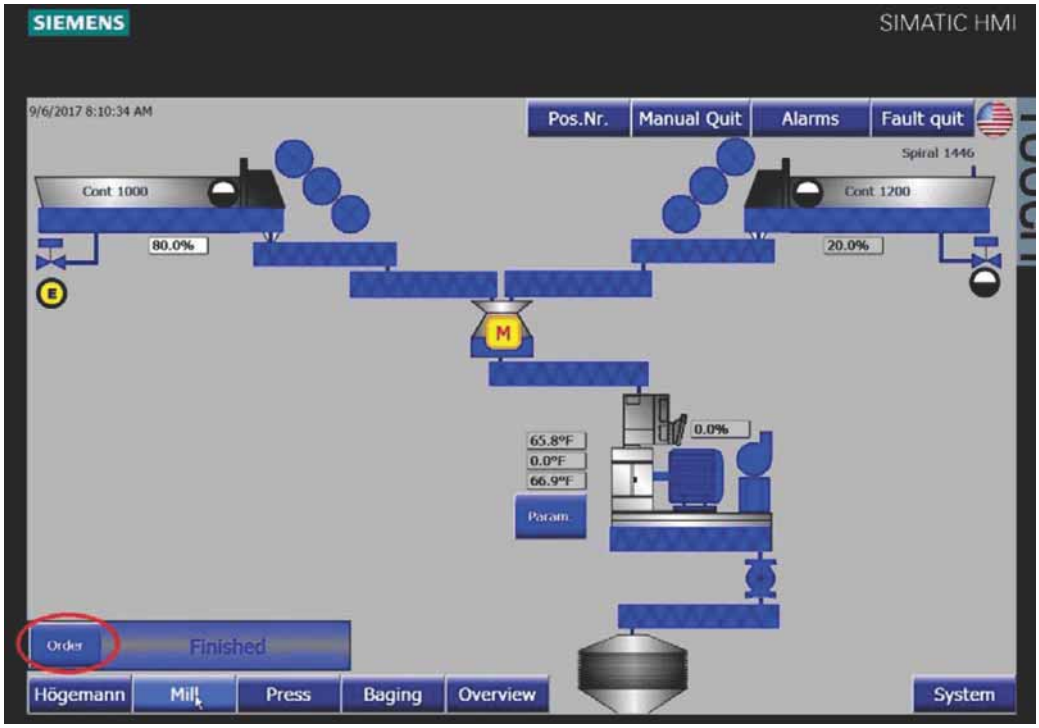
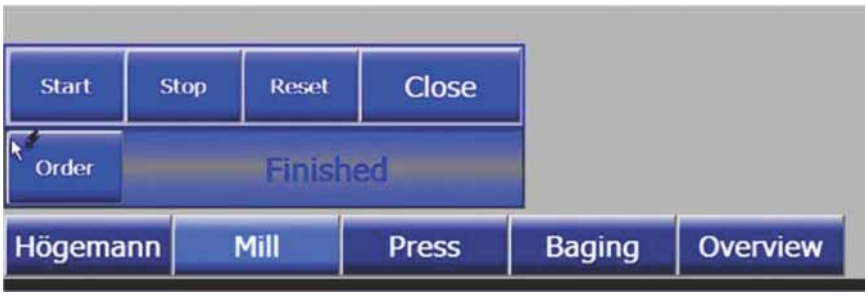


Figure 7-24: Starting the pelletizing process

After tapping the button, another bar with buttons and the following options appears:



Start Tap on "Start" to start the system.	Stop Tap on "Stop" to stop the system.	Reset Tap on "Reset" to reset the system immediately.	Close Tap on "Close" to close the window.

7.2.8 Adjusting the mixing ratios

Use the following menu to adjust the mixing ratio for the input material from the dosing hoppers:

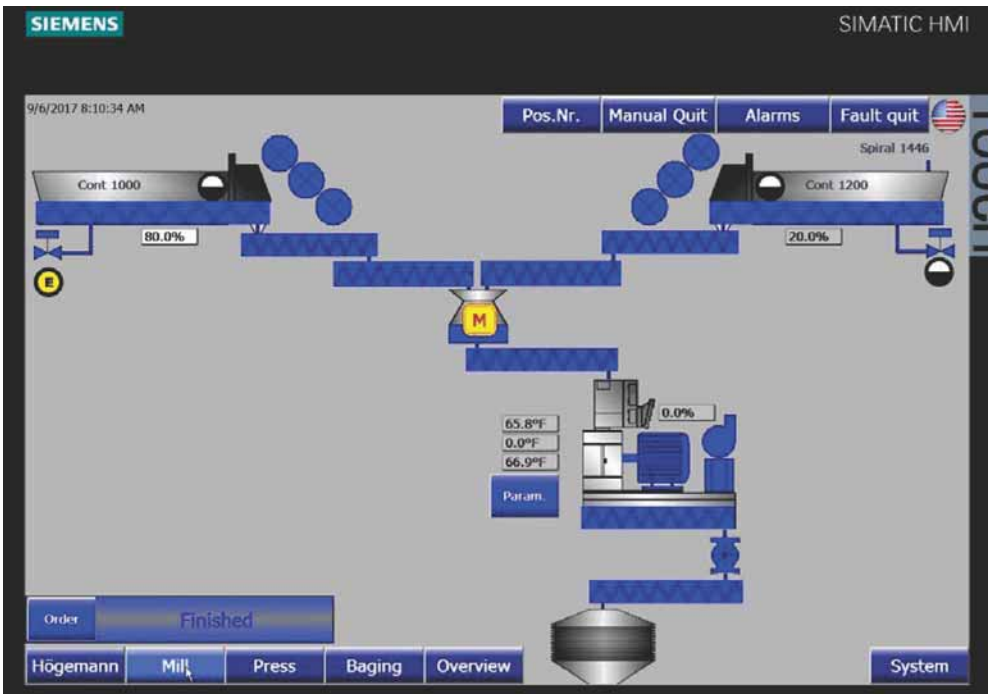
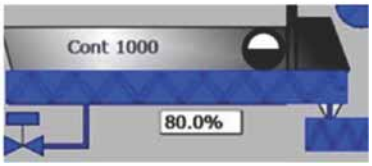


Figure 7-25: Adjusting the mixing ratio

Adjust the mixing ratio for the material from this dosing hopper in percent under the dosing hopper icon "Container 1000". The difference to 100 % is automatically added from the dosing hopper "Container 1200".



7.2.9 Adjusting the hammer mill

Use the following menu to configure settings for the hammer mill:

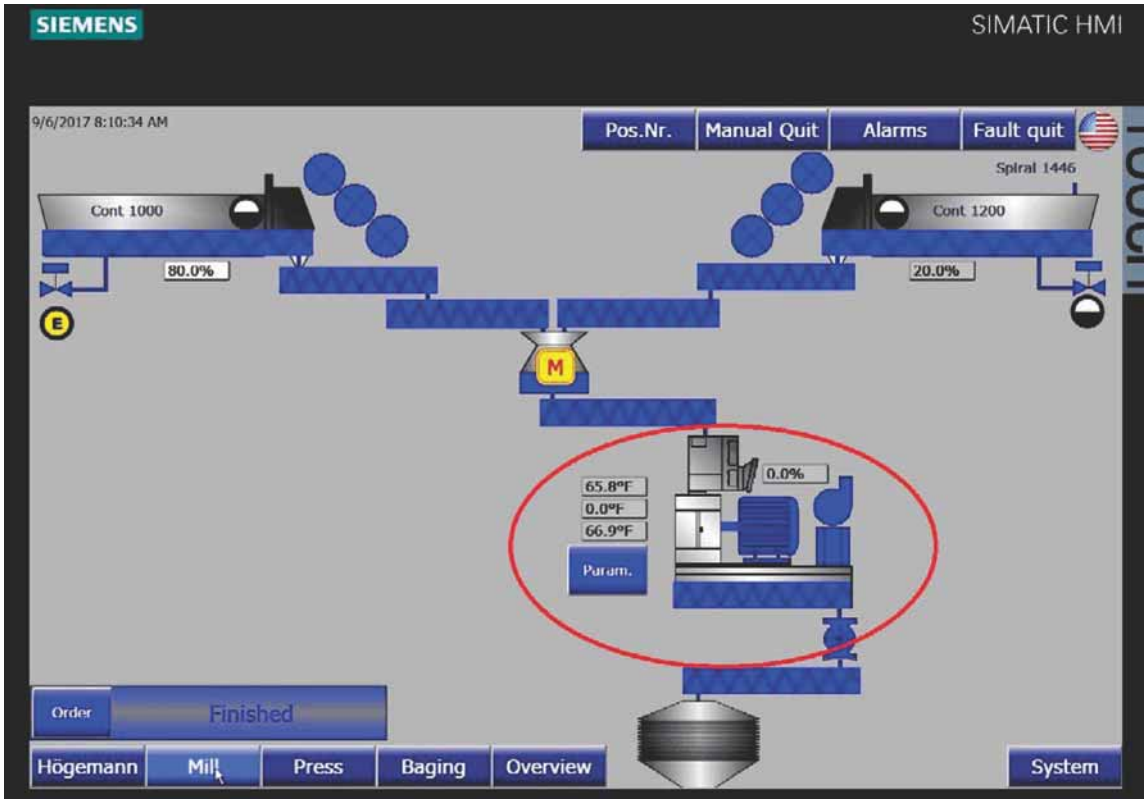


Figure 7-26: Adjusting the hammer mill

Tap on "Param." to view the hammer mill parameters.

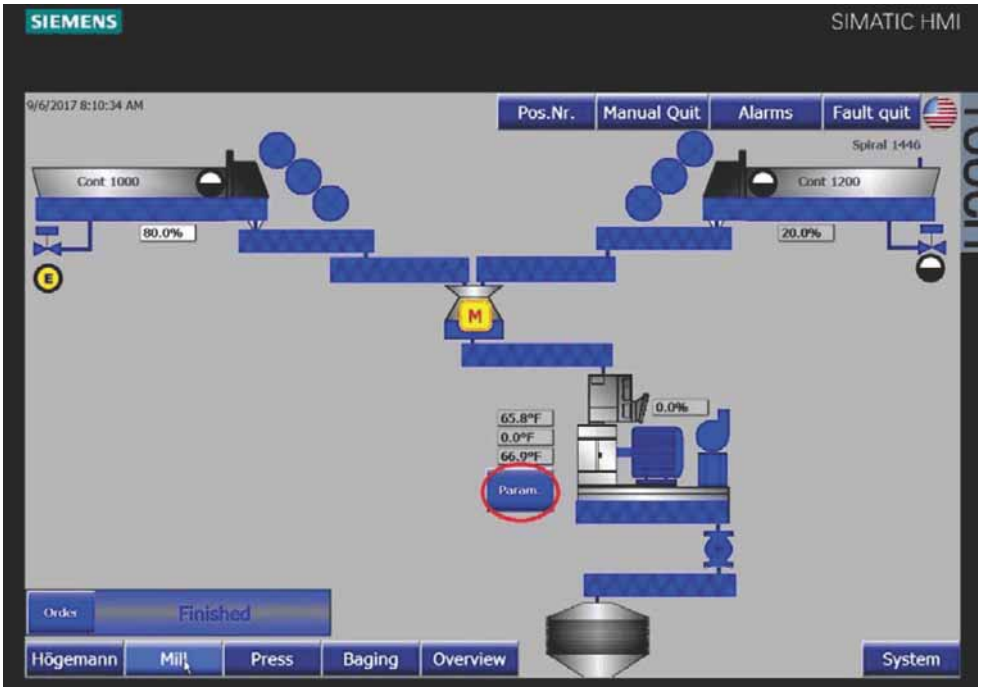


Figure 7-27: Hammer mill parameters

Parameter control window:

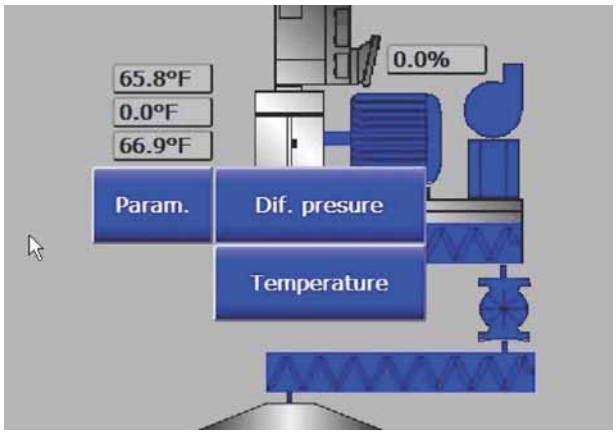
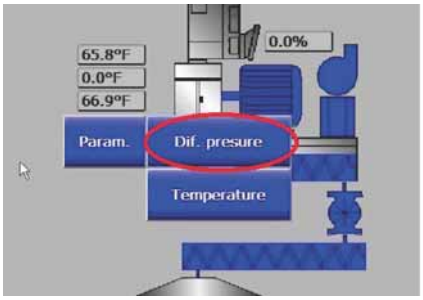
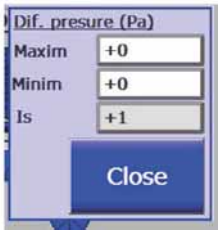


Figure 7-28: Detailed view hammer mill parameters

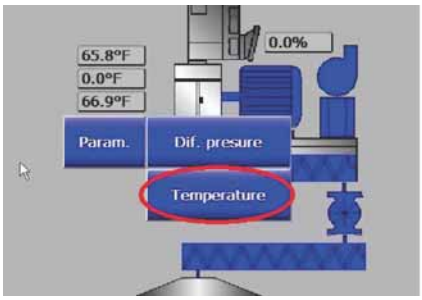
Differential pressure window:





- The differential pressure window shows the maximum and minimum permissible pressure as well as the actual pressure.
- Tap on "Close" to close the window showing the differential pressure.

Temperature window:



- Tap on "Close" to close the temperature window.

7.2.10 Operating the bagging unit

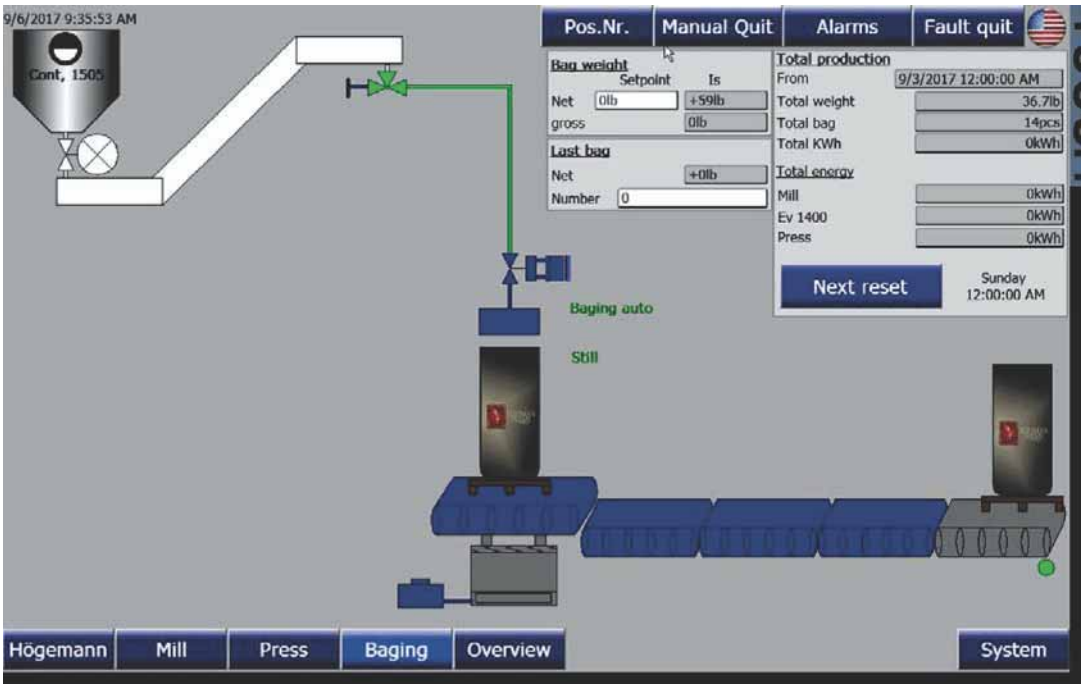


Figure 7-29: Operating the bagging unit

Figure 7-30: Control elements of the bagging unit

- Bagging Start = starting the bagging unit
- Rollingtable Start = starting the roll conveyor
- Rollingtapes = starting the remaini conveyors
- Slide valve = operating the inflatable bag clamp (start / stop)
- Blower = button for inflating the inflatable bag clamp

7.2.11 Explanations for the used message icons

Empty sensor (E)	Full sensor (F)	Level indication (L)
		

8 Maintenance

 CAUTION	**Risk of injury** **Special dangerous situations may occur during maintenance and repair tasks.** • Make sure that the system component that is being maintained is disconnected from the power supply. Make sure that nobody reconnects the power supply without your knowledge. • Mind pointed and sharp system parts to prevent cuts. • Observe the instructions in the chapter "Safety".

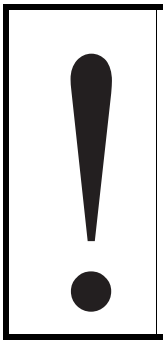
 **WARNING**	Risk of injury caused by electric shock **Live electric components may be bare during maintenance and repairs.** • Only persons with the necessary qualifications may work with electric components.

REMOVE DUST IN THE SYSTEM AT LEAST ONCE PER WEEK!

8.1 Daily maintenance

General
• Remove all dust from the PelletTower and sweep the entire PelletTower area after the end of production.
• Check whether all sensors are ready to operate before starting production.

Hammer mill
• Clean the magnetic separator and check its fastening.
• Clean the foreign object collector and check its fastening.
• Clean the fresh air shutter, check it for correct positioning and the fastening.
• Check the screens for wear and damage.
• Check the hammers for wear and damage.
• Empty the foreign object box.



The hole edges of the hammer mill's screens wear on one side only. This changes the structure of the milled material and reduces the milling output. Turn the screens around regularly or change the rotating direction of the drive motor for this reason.

Silo
• Check the ladder and remove slippery material before each use.

Lift table
• Check the safety frame.
• Check for leaks in the hydraulic system.
• Check for loose cables.
• Check the system for damage.
• Check for unusual noise during operation.
• Check whether all safety signs are attached and visible.
• Check whether the safety supports are installed and function correctly.

Pellet mill
• Check the bearings at the dosing auger for smooth running. They must run smoothly. • Check the dosing auger for exterior leaks, damage and soiling. • Check the dosing auger for unusual noise during operation. • Check the measuring devices of the dosing auger (if applicable) for correct functioning. • Check the chains and belts of the dosing auger (if appliable) for tight seat and wear.

8.2 Weekly maintenance

General
• Check the emergency stop switch. • Bring along the maintenance plan (monitoring).

Dosing hopper
• Clean and lubricate the bearings. • Inspect the dosing hopper's scraper floors. • Check the oil level of the chain lubrication.

Elevator
• Clean and lubricate the bearings. • Check the coupling for damage and/or correct distances.

Conveying auger
• Clean and lubricate the bearings. • Check the motor's clutch ring for wear. • Check the auger helix for wear. • Check the plastic wear rail (of octagonal conveying augers). • Check the inlet and outlet for deposits.

Pellet mill
• Lubricate the bearings' main shaft bush.
• Fill the central lubrication.
• Clean the magnetic separator.
• Lubricate the auger's bearings.

Round sieve
• Clean and lubricate the bearings.
• Check the motor's clutch ring for wear.
• Check the round sieve for wear.
• Eliminate remaining material.

Control cabinet
• Clean the control cabinet with compressed air.
• Read the meters.

Water lines
• Inspect the lines to find leaks.

Sidewall belt conveyor
• Check the sidewall belt conveyor for damage and cracks.
• Eliminate remaining material.
• Carry out a test run.
• Check the sidewall belt conveyor for free-wheel rollers and bearings.
• Check the belt for correct tension and direction.
• Remove deposits at the belt.

8.3 Monthly maintenance

Hammer mill
• Check the impact plate for wear, damage and correct fastening.
• Check the protecting strip for wear and damage.
• Check the impact angle for wear, damage and correct fastening.
• Check the infeed flap(s) for wear, functioning and correct fastening.
• Inspect the shaft sealing.
• Inspect the door sealing.
• Check the explosion relief valve for emerging material and replace defective O-rings, if necessary.
• Check the air amount at the pocket filter.
• Check the drain plug, pilot and diaphragm valves of the pocket filter and clean them, if necessary.
• Check whether the pilot and diaphragm valves of the pocket filter work.
• Check the filter resistance of the pocket filter.
• Check the fresh air inlet / sound protection.

General
• Check whether the electrical switches work.

Double-shaft shredder
• Check the sealing and quench liquid.
• Check the oil level.

Conveying auger
• Check the screw connections.

Hygieniser
• Clean and lubricate the bearings.

Pellet cooler
• Clean and lubricate the bearings.

Fan
• Clean and lubricate the motor's bearings.

Motor shutter
• Check the screw connections.

Round sieve
• Check the screw connections.

Pellet mill
• Check the screw connections of the die.
• Check the die, the front and rear sliders and the die's scraper for wear.
• Check the oil level at the Salmacon dosing auger.
• Check for low resistance of the anti-static brush (if applicable) of the Salmacon dosing auger.
• Check the Salmacon dosing auger's wear metal sheets or rails (if applicable) for wear.

Elevator
• Check the screw connections.
• Check the buckets and the belt.
• Check the inlets and outlets for deposits.
• Check the pulleys for deposits.
• Check the oil level of the motor.

Dosing hopper
• Inspect the metering rollers.
• Check the oil level of the planetary gear.
• Check the oil level of the metering rollers.

Sidewall belt conveyor
• Lubricate the chains and chain wheels.
• Check the covers for leaks.
• Check the screw connections.
• Lubricate the ball bearings.
• Inspect the motor, check the temperature and for possible oil loss.
• Carry out a test run with visual inspection and check for unusual noise.

Lift table
• Lubricate the lubricating nipple.
• Clean the lift table.
• Check the oil level of the hydraulic pump.

Silo
• Check the ladder for damage and wear.

BigBag bagging unit
• Check the inflatable bag clamp for bulging.
• Check the slider for deposits.
• Check the oil level of the motor.

8.4 Quarterly maintenance

Pellet mill
• Check the tightening torques of the Salmacon dosing auger's fastening screws.
• Clean the entire Salmacon dosing auger.
• Check the Salmacon dosing auger's bearings for damage and tight seat as well as play.
• Check the electrical connection of the Salmacon dosing auger's motors (strain relief, tight seat and damage).
• Check the mechanic fastening of Salmacon dosing auger's motors.
• Clean the fan hoods of the Salmacon dosing auger's motors.
• Check the bending of the Salmacon dosing auger's shaft.

General
• Check the electrical components for damage.

Dosing hopper
• Check the covers, protective housings and chain protection.

Hygieniser
• Check the oil level of the hydraulic pump.

Fan
• Check the anti-vibration buffer for damage.
• Check the tension of the motor's V-belt.

Hammer mill
• Check the wear rings for wear.
• Check whether the coupling is aligned correctly.
• Check the motor's clutch ring for wear.
• Check the fastening of the coupling protection.
• Check the bearing housing and the sealing for wear and lubricate them.
• Check the self-aligning roller bearing for wear and align it.
• Check the pocket filter's safety valve.
• Check the pocket filter's filter pockets and for leaks.
• Drain the condensate from the pocket filter's pressure tank.
• Check the current consumption of the pocket filter's motor.
• Check the differential pressure measuring device of the pocket filter.
• Check the pocket filter's grounding.

BigBag bagging unit
• Check the rollers for wear and replace them, if necessary.

8.5 Annual maintenance

Dosing hopper
• Check the screw connections.
• Inspect the scraper floor and change the oil.
• Change the oil of the planetary gear.
• Change the oil of the metering rollers.
• Check the lines for loose cables.
Elevator
• Check the welding seams.
• Change the oil of the motor.
Hygieniser
• Check the hoses, pistons and the ball joint.
• Change the oil of the hydraulic pump and replace the filter.
Silo
• Check the silo for leaks and rust.
Conveying auger
• Check the welding seams.
• Check the motor's rubber cushion and replace it, if necessary.
• Check the oil level of the motor.
• Check the motor for escaping oil.
• Change the motor sealing.
• Replace the bearing grease of the motor.
• Change the oil of the motor.
• Check the motor bearings for unusual noise.
Pellet cooler
• Check the oil level.
• Change the oil of the motor.
Motor shutter
• Inspect the welding seams and the surface.
• Check the inlet and outlet for deposits.
Pellet mill

• Check the shaft seal rings.
• Replace the fastening screws of the back plate and check the cylinder pin.
• Have qualified personnel inspect the pellet mill.
• Check the motor bearings for wear.
• Check the oil level of the motors.
• Inspect the motors.
• Check the Salmacon dosing auger's shaft for wear.
• Check the oil level and oil quality of the Salmacon dosing auger's gear motor.
• Check the fastening of the Salmacon dosing auger's gear.
• Replace the radial shaft seals of the Salmacon dosing auger.
• Replace the bearings at the Salmacon dosing auger.
• Replace the motor's shaft seal rings, if necessary.
• Re-grease the bearings in the gear.
• Overhaul the motors.
• Clean or replace the motor vent screw.
• Change the oil of the motor.
• Change the oil of the Salmacon dosing auger.
Round sieve
• Check the round sieve for leaks and rust.
• Check the bearings for wear.
• Inspect the welding seams and the surface.
• Change the oil of the motor.
Double-shaft shredder
• Change the sealing and quench liquid.
• Change the oil.
Rotary feeder
• Check the motor's clutch ring for wear.
• Check the motor's oil level.
• Change the oil of the motor.
General
• Check the grounding.
Lift table

- Check the lift table for damage and cracks.
- Have qualified personnel inspect the lift table.
- Change the oil of the hydraulic pump.
- Check the bearings and bolts for wear.

Sidewall belt conveyor

- Check the bearing's rubber cushion (if applicable).
- Check the gear's bearings for wear.
- Check the oil level of the gear.
- Inspect the gear. Check for leaks.
- Replace the oil of the gear.
- Exchange the gear's roller bearing grease.
- Replace the shaft seal ring of the gear.
- Clean the cooling air routes of the motor.
- Clean the air filter of the motor.
- Clean closed drill holes.
- Check the roller bearing of the motor.
- Replace the shaft seal ring of the motor.
- Remove brake dust by suction.
- Check the anchor plate of the motor brake.
- Measure and adjust the air gap of the motor brake.
- Check the brake shoes and pads of the motor brake.
- Measure the brake pad thickness of the motor brake.
- Check the pressure rings of the motor brake.
- Check the pushers and interlocking of the motor brake.
- Inspect the motor brake's switch contacts and replace them, if necessary.

Motor shutter

- Change the oil of the motor.

BigBag bagging unit

- Change the oil of the motor.

Fan

- Replace the bearing of the motor.

Annually [at the latest upon die exchange]

Pellet mill
• Clean the connecting points, drill holes and threads of the dies and apply graphite oil.

Annually [at the latest upon screen exchange]

Hammer mill
• Check the fastening of the hook spanners.
• Check the fastening of the bag frame.

Annually [at the latest upon hammer exchange]

Hammer mill
• Check the hammer bolt/fuse for wear and damage.

9 Troubleshooting

 CAUTION	**Risk of injury**
	Special dangerous situations may occur during maintenance and repair tasks. • Make sure that the system component that is being maintained is disconnected from the power supply. Make sure that nobody reconnects the power supply without your knowledge. • Mind pointed and sharp system parts to prevent cuts. • Observe the instructions in the chapter "Safety".

 **WARNING**	Risk of injury caused by electric shock
	Live electric components may be bare during maintenance and repairs. • Only persons with the necessary qualifications may work with electric components.

- Secure the workplace.
- Make yourself familiar with the component that requires maintenance. Read the documentation.
- Use adequate tools.
- Only use spare parts approved by **Big Dutchman**.

9.1 PelletTower or system components do not start

If the entire PelletTower or individual system components do not start, proceed as follows:

- Check the error log of the system's control unit. If there is a specific error message, implement the corresponding measures.
- If there is no specific error message, check the power supply:
  - Check whether all main switches are set to "On".
  - Check whether any emergency stop buttons were actuated and are still active.
  - Check whether any protective motor switches were triggered. If yes, find the cause.
  - Check whether the main power supply works correctly (voltage / fuses).

The following chapters list possible faults of PelletTower components as well as causes for these faults. This list of faults and causes cannot be exhaustive. Refer to the additional documentation from the suppliers.

9.2 Faults in PelletTower system components

9.2.1 Dosing hopper with discharging auger (octagonal)

Fault	Cause	Remedy
No material is discharged.	The screw cutting roller is blocked.	Remove foreign objects.
	The auger is clogged, foreign object in the auger.	Remove the cause for clogging / the foreign object.

9.2.2 Discharging auger

Fault	Cause	Remedy
The discharging auger does not rotate.	Material is clogging the discharge.	Remove the cause for clogging and reset the overflow flap.

9.2.3 Double-shaft shredder

Fault	Cause	Remedy
No material is discharged.	Clogging due to foreign object or broken shear pin.	Remove the foreign object, replace the shear pin, if necessary.

9.2.4 Air gravity separator

Fault	Cause	Remedy
Negative-pressure monitoring	The mill or screens are clogged.	Remove the cause for clogging.
	The setting flaps of the heavy parts separator have changed position.	Check for the correct position.

9.2.5 Hammer mill

Fault	Cause	Remedy
The mill does not start.	The maintenance flaps are open.	Check and close the flaps.
	The lever for rotating direction is in central position.	Set the lever to clockwise or counter-clockwise rotation and fix the position.

9.2.6 RS200 conveying augers

Fault	Cause	Remedy
The V-belt slips or the coupling is defective.	Foreign object in the pipe outlet.	Tap the pipe until you find the place where it is empty. Look for the foreign object. Remove foreign objects.
	Congestion in the auger. Congestion. Clogging.	Localize the place where the pipe is empty or warm. Disassemble the pipe at this place and remove the cause for congestion.
	The auger has broken.	Disassemble and repair the auger.
The chain links lift up or skip.	The chain has lengthened.	Adjust the chain tensioner and remove a chain link, if necessary.

Fault	Cause	Remedy
The motor starts, then stands still and the auger rotates in the opposite direction.	Foreign object in the auger.	Check the conveying system for foreign objects. Remove foreign objects.
The motor starts and then stops.	Incorrect direction of rotation of the auger.	Change the motor connections.
	The auger is clogged.	Localize the place where the auger is clogged and remove the cause.
	The throughput is too high.	Check the throughput and current consumption.
	The motor has burned out.	Find the cause and have qualified personnel repair it.
	The end bearing or gear unit are defective.	Find the cause and replace the defective parts.
	The outlet is clogged.	Clean the outlet.
	The gear pinion or output shaft is defective.	Find the cause and replace the defective parts.
	The direction of rotation is incorrect.	Change the motor connections.
The auger operates irregularly.	The bearing is stalled or defective.	Replace the bearing.
	Foreign object in the auger.	Remove foreign objects.
The bearing is stalled.	Cleaning water in the auger pipe or silo boot.	Remove water.
	The auger has broken.	Repair the auger.

9.2.7 Silo

Fault	Cause	Remedy
The vibrating plate does not work.	The motor is defective.	Replace the motor.
	The sensor (empty sensor) is dirty.	Clean the sensor thoroughly.
	The sensor (empty sensor) is defective.	Replace the sensor.

9.2.8 Bucket elevator

Fault	Cause	Remedy
The elevator does not work.	Foreign object in the elevator.	Clean the elevator.
The motor is running, but the elevator is not.	The coupling has broken.	Replace the coupling.
	The elevator belt is not sufficiently tensioned. Fire hazard!	Re-tension the elevator belt.
The throughput is not ideal.	The supply conveyor does not supply sufficient material.	Check the supply conveyor's throughput and adjust it, if necessary.
	Material accumulates in the inlet.	Adjust the supply conveyor's throughput for ideal supply.
	The drive does not reach the planned speed.	Check the drive.
	The motor has a low line voltage.	Have qualified personnel check the voltage.
	Material is sticking to the buckets.	Clean the buckets.
The bucket belt does not run centrally on the drum.	The belt pulley in the boot is not tensioned correctly.	Adjust the belt pulley so that the belt runs centrally on the pulley.
	The pipes are not aligned vertically or bent.	Check the housing and pipes for vertical assembly and align them correctly.
	The belt pulley in the head is not aligned correctly.	Use the adjusting screws of the bearing plate to center the belt on the pulley.
The bucket belt chafes in the head or boot housing or in the extension pipes.	The pipes are not aligned vertically or bent.	Check the housing and pipes for vertical assembly and align them correctly.
	The belt pulley in the head is not aligned correctly.	Use the adjusting screws of the bearing plate to center the belt on the pulley.
	Material is sticking to the belt pulley.	Clean the belt pulley.

Fault	Cause	Remedy
Part of the material drops into the upward or downward line.	The elevator head is clogged.	Check for foreign objects and remove any, if applicable.
	The belt pulley rotates too fast or too slowly.	Check and correct the drive conditions.
	The buckets are loose.	Tighten the buckets.
The bucket belt jerks and stops or slips.	The bucket belt is not tensioned sufficiently.	Tension the belt. If further tensioning is not possible, shorten the belt and create a new connection.
	The belt pulley slips at the drive unit in the elevator head.	Tension the belt.
	The belt pulley is worn.	Replace the belt pulley.
Noise or vibrations during operation.	The belt is not tensioned or not correctly centered.	Tension or center the belt or use the adjusting screws of the bearing plate at the elevator head so that the belt is centered on the pulley.
	The elevator belt is tensioned too tightly.	Correct the belt tension.
	Buckets are loose or damaged.	Replace the buckets or tighten the bucket screws.
	Foreign objects inside the elevator.	Remove foreign objects.
	Material is sticking to the belt pulley.	Clean the belt pulley.
	The elevator was not anchored correctly.	Tightly anchor the elevator to the base and to the steel structure.
A belt pulley produces noise or does not rotate.	The bearing is blocked or defective.	Lubricate or replace the bearing.

9.2.9 Conditioner

Fault	Cause	Remedy
The auger shaft does not rotate.	The shaft has broken.	Replace the auger shaft.
	The chain or drive belt have torn.	Replace the chain or drive belt.
	Coupling	Replace the coupling.
	The gear is damaged.	Replace the gear or gear motor.
	The cleaning flap is open.	Close the cleaning flap.
	Clogging	Remove the cause for clogging.
		Reduce the filling level of the conveying auger.
	Foreign objects in the auger	Check the auger for foreign objects and remove any, if necessary.

9.2.10 Pellet mill

Fault	Cause	Remedy
Low pellet quality.	The rollers have worn.	Install new rollers.
	The die has worn.	Install a new die.
	The die is not suitable due to changed material composition.	Install a die with a different hole size or wall thickness.
	The distance between rollers and die is too large.	Re-adjust the rollers. Roller gap. Set-actual comparison.
The mill is blocked.	The V-belts are too loose.	Tension the V-belts.
	The V-belts are worn or have broken.	Replace the entire V-belt set.
	The speed monitor is triggered.	Check functioning and setting.
	Overload release due to foreign objects.	Remove foreign objects and reset the overload clutch.

Fault	Cause	Remedy
	Too much or irregular material input.	Reset the rollers and clean the die's contact surface, adjust the rollers according to the instructions. Remove all input material from the mill.
	The input material is not prepared correctly (e.g. too moist).	
The mill stalls often.	Irregular material input.	Replace or adjust the front sliders.
	The roller gap is too large.	Adjust the rollers.
	The V-belt is not tensioned correctly.	
	The die is blocked.	
	The rollers are blocked.	

9.2.11 Sidewall belt conveyor

Fault	Cause	Remedy
The sidewall belt conveyor does not start.	The conveyor belt is overloaded.	Change the load.
The conveyor belt is not running straight.	The tensioning device is not adjusted correctly.	Re-adjust the tensioning device.
The conveyor belt slips on the idler rollers.	The conveyor belt has stretched.	Re-tension the conveyor belt.
Bulk material drops onto the floor.	The conveyor belt is damaged.	Replace the conveyor belt.
	The angle is too steep.	Change the load.

9.2.12 Hygieniser

Fault	Cause	Remedy
The protective motor switch is triggered.	Foreign objects are blocking the rotary feeder.	Remove the foreign objects.
	Input material is blocking the rotary feeder.	Eliminate the blocking.

Fault	Cause	Remedy
Material falls through the sliding floor.	The sensor is positioned incorrectly.	Position the sensor correctly.
The sliding floor leaks.	The valve lever is not tight.	Use Loctite 638 to bond any leaks.
	The valve is damaged / adjusted incorrectly.	Replace / adjust the valve.
The hydraulic oil has overheated.	The pump is running, but the release valve is closed. Check the release valve piloting. Check the release valve.	Check the valves.

9.2.13 Pellet cooler

Fault	Cause	Remedy
The protective motor switch is triggered.	Foreign objects are blocking the rotary feeder.	Remove the foreign objects.
	Input material is blocking the rotary feeder.	Eliminate the blocking.
Material falls through the sliding floor.	The sensor is positioned incorrectly.	Position the sensor correctly.

9.2.14 Round sieve

Fault	Cause	Remedy
The conveying capacity is not reached.	The layer thickness is not adjusted correctly.	Re-adjust the layer thickness.

Fault	Cause	Remedy
The motor starts and then stops.	The sieve rotates in the wrong direction.	Change the motor connections.
	The sieve is clogged.	Localize the place where the sieve is clogged and remove the cause.
	The throughput is too high.	Check the throughput and current consumption.
	The motor has burned out.	Find the cause and have qualified personnel repair it.
	The gear unit is defective.	Find the cause and replace the defective parts.
	The outlet is clogged.	Clean the outlet.
	The gear pinion or drive shaft is defective.	Find the cause and replace the defective parts.
The round sieve operates irregularly.	Bearing is stalled or damaged.	Replace the bearing.
	Foreign objects in the round sieve.	Remove foreign objects.
	The coupling buffer has worn.	Replace the coupling buffer.
The round sieve does not rotate.	The drive shaft has broken.	Replace the drive shaft.
	The gear unit is defective.	Find the cause and replace the defective parts.
All incoming material is flowing out of the outlet for pellets.	The sieve rotates in the wrong direction.	Change the motor connections.
	The round sieve's inlet is defective.	Replace the round sieve's inlet.
The sieved material does not drain off.	The outlets are clogged.	Clean the outlets and check the outlet line. Empty the outlet container, if necessary.
The housing vibrates.	The vibration absorption mat is defective.	Replace the vibration absorption mat.
	Vibrations can indicate different types of damage.	Search for damage and rectify.

9.2.15 Sieve storage container

Fault	Cause	Remedy
The level sensor sends a signal but no material is discharged.	The storage container is clogged.	Remove the cause for clogging.
	The sensor sends an error message.	Check the sensor.

9.2.16 Shutter below the sieve's storage container

Fault	Cause	Remedy
The shutter plate cannot be moved or does not reach its final position.	The shutter plate is blocked on the inside.	Disassemble, clean and re-install the shutter in the sieve's storage container.
	The material's weight is too high.	Reduce the amount of material on the shutter plate.
	The shutter is not installed correctly in conveying direction.	Check the conveying direction and change the shutter's installation position.
	The motor is too weak.	Check the main line and the drive.
	The sensor is not positioned correctly.	Adjust the sensor in its end position.
	Cam switch and sensor are stuck together.	Adjust the switch interval.
	The trapezoid thread nut is defective.	Replace the trapezoid thread nut.
	Some roller bearings are damaged.	Replace the roller bearings.

9.2.17 Bagging unit

Fault	Cause	Remedy
The shutter does not open.	No control voltage.	Check the circuit / fuses.
	The end position sensors are damaged / defective.	Check and replace the sensors, if necessary.
	The pressure is too low.	Increase the pressure.
The inflatable bag clamp does not inflate.	The pressure is too low.	Increase the pressure.

9.2.18 Lift table

Fault	Cause	Remedy
The lift table does not lift, the hydraulic pump does not start when actuating the lift button.	The fuse has blown.	Replace the defective fuse.
	The safety frame's contacts are defective.	Replace the contacts.
The lift table does not lift, but the hydraulic pump's motor is running.	Too little oil in the oil tank.	Fill hydraulic oil HLP 22 up to the tank's fill level.
The lift table does not lower.	The end stop contacts below the safety frame are locked.	Ensure that the end stop contacts are not activated or crushed.
The lift table lowers by itself.	Leaks in the solenoid valve.	Replace the solenoid valve.
	Leaks in the cylinder's sealing.	Replace the sealing.
	The oil level in the tank is too low. Air in the system.	Add hydraulic oil type HLP 22 slowly.
The hydraulic motor operates with audible effort and gets hot.	Lack of oil.	Add oil.
	The motor is connected incorrectly.	Change the motor connections.
Irregular movements of the lift table.	Too little oil in the tank.	Add hydraulic oil type HLP 22 slowly.
	Air in the hydraulic system.	Bleed the hydraulic system.

9.2.19 Roll conveyor

Fault	Cause	Remedy
The motor starts in automatic mode without BigBags.	The light beam of the light barrier is interrupted.	Remove the foreign objects.
	The sensor not aligned correctly for the reflector.	Position the sensor correctly.

10 Supplier's documentation

The documentation from suppliers listed below was provided electronically.
[x – component (manufacturer)]

1- Dosing Machine (Havelberger)

2- Double Shaft Shredder (Vogelsang)

3- Hammermill (Tietjen)

4- Bucket Elevator (Thiel)

5- Pelletizer (Salmatec)

6- Conveyor with Hoppers (AH MEYER)

7- Post Conditioner (Geelen)

8- Cooler and Sleeve (Geelen, Thiel)

9- Filling Station (AH Meyer)

10- Augers (Thiel)

11- Automation (Högemann)