

User Manual

Manure drying tunnel OptiPlate

Code No. 99-97-2279

Edition: 05/2015 GB

These instructions are a translation of the original instructions!

EC Declaration of conformity



Big Dutchman

Big Dutchman International GmbH
P.O. Box 1163; D-49360 Vechta, Germany
Tel. +49 (0) 4447 / 801-0
Fax +49 (0) 4447 / 801-237
E-Mail: big@bigdutchman.de

In accordance with EC Directives:

- **Machines 2006/42/EG, Annex II / Part 1 / Chapter A**

Further applicable EC directives:

- Electromagnetic compatibility 2004/108/EC
- Low voltage 2006/95/EC
- Construction Products Regulation N° 305/2011
- Directive Ecodesign 2009/125/EC



The product mentioned below was developed, constructed and produced in accordance with the above mentioned EC Directives and under sole responsibility of Big Dutchman.

Description:	Drying system for poultry manure
Type:	Manure drying tunnel Optiplat
System no. and year of construction:	see customer order no.

The following harmonised standards apply:

- EN ISO 12100:2010 Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)
- EN 60204-1:2006/AC:2010: Safety of machinery - Electrical equipment of machines Part 1: General requirements
- DIN EN ISO 13850 (2008-09): Safety of machinery - Emergency stop - Principles for design
- DIN EN 983 (2009-06): Safety of machinery - Safety requirements for fluid power systems and their components - Pneumatics

Authorised person for technical documents: Productmanager "Drives and Conveyor Technique"
Auf der Lage 2; 49377 Vechta

Vechta

02.04.2013

Managing Director

Place

Date

Signer and information regarding signer

Signature

1	Basic instructions	1
1.1	EC declaration of conformity	1
1.2	Purpose of the BD manuals	1
1.3	Basics	2
1.4	Explanation of the symbols and structure of these instructions	3
1.4.1	Structure of the safety instructions in this manual	3
1.4.2	Structure of the general instructions in the manual	3
1.4.3	Special safety symbols in the manual and on the system	4
1.5	Necessary qualifications of the persons working with the system.	7
1.5.1	Employing external personnel	7
1.5.2	Assembly	7
1.5.3	Installing the gas supply	7
1.5.4	Electrical installation	7
1.6	Obligations	8
1.7	Warranty and liability	8
1.8	First aid	9
1.9	Transport	9
1.10	Storage	9
1.11	Notes for use	10
1.12	Pollution abatement regulations.	11
1.13	Waste disposal	11
1.14	Copyright	11
2	Safety instructions.	12
2.1	Instructions on accident prevention	12
2.2	General safety instructions	12
2.3	Personal safety instructions	13
2.3.1	Personal protective equipment and measures	13
2.4	Use of electrical appliances	14
2.5	Special safety instructions	15
2.5.1	Danger zones	15
2.5.2	Entire system	17
2.5.3	Individual parts	18
2.5.3.1	Manure removal	18
2.5.3.2	Electrical components	18
2.6	Safety contrivances	19
2.7	Dangers resulting from non-compliance with the safety instructions	20
2.8	Safety symbols on the system	21
2.8.1	Overview of the used safety symbols	21
2.8.2	Position of the used safety symbols	22
2.8.2.1	Drive unit	22
2.8.2.2	Idler unit	25
2.9	Emergency stop button at the system	27

2.9.1	Emergency stop button drive unit	27
2.9.2	Emergency stop button idler unit	29
2.10	Safety components of the system	31
2.10.1	Overview of the used safety components	31
3	System description	36
3.1	Overview	36
3.2	Function	37
3.3	Overview of components	38
3.4	Protection device for the process	39
3.5	Transport direction OptiPlate	41
3.6	Technical data	42
3.7	Overview of the air flow in a system of 1 to 6 tiers	43
3.8	Production data	46
3.9	Designated use	47
3.10	Avoidance of foreseeable misuse	48
4	Initial Start-up	49
5	Operation	50
5.1	Main screen AMACS	50
5.2	Manure drying tunnel	51
5.2.1	Manure removal groups	52
5.2.2	Feed belts	53
5.2.3	Plate drying system OptiPlate	54
5.2.3.1	Dosing with slewing unit	55
5.2.3.2	Monitoring of filling level	56
5.2.3.3	Tunnel plates	57
5.2.4	Chopper	59
5.2.5	Dirt belt	60
5.2.6	Discharge belts	61
5.3	Operating buttons	62
5.4	Status messages	64
5.5	Drives	66
5.5.1	Manual operation without the control	66
5.5.2	Operating hours	67
5.5.3	Status	67
5.6	On-site visualization (control cabinet)	68
5.7	Adjustment of manure drying tunnel	69
5.7.1	Start settings	70
5.7.1.1	Manual start	72
5.7.1.2	Automatic start (optional)	74
5.7.2	Dosing	77
5.7.2.1	Sensors	79

5.7.2.2	Control parameters frequency transformer (optional if FT available)	81
5.7.2.3	Starting behaviour.	81
5.7.2.4	Tunnel drives	82
5.7.3	Setting parameters	83
5.7.3.1	Monitoring times	84
5.7.3.2	Delay time / Residual flow time	87
5.7.3.3	Assignment.	89
5.7.4	Manure removal groups.	90
5.7.5	Status of conveyor belts.	92
5.7.5.1	Manure removal group	93
5.7.5.2	Conveyor belt [a1]	93
5.7.5.3	Tunnel drives	94
5.7.5.4	Delivery.	96
5.7.6	Belt controls.	97
5.7.6.1	Limit switch.	98
5.7.6.2	Plate monitoring	99
5.7.6.3	Pulse monitoring.	99
5.7.6.4	Characteristic points of the pulse monitor.	100
5.7.7	Influence by free alarms	101
5.8	Functional principle	103
5.8.1	Automatic tunnel filling.	103
5.8.2	Manual tunnel filling.	104
5.8.3	Bypass operation.	106
5.9	Alarm description.	108
5.10	Adjusting the manure layer height.	112
6	Maintenance	113
6.1	Position lubricating nipple	114
6.1.1	Lubrication nipple drive unit.	114
6.1.2	Lubrication nipple idler unit	116
6.2	Replacing the plate deflector (drive unit).	117
6.3	Replacing the overload safety device (drive unit).	118
6.4	Replacing defective plates in the tunnel block	120
6.5	Adjusting the conveyor belt at the filling station	121
6.6	Adjusting the chain tension (idler unit)	122
7	Fault clearance.	124
8	Checklist key points summary	1

1 Basic instructions

	Important: Please take care of these documents and keep them close to the system at all times for quick reference. All persons mounting the system have to be familiar with the contents of this manual. Observe these security instructions whenever any work is carried out on this system! Manuals can be reordered at any time from Big Dutchman.
---	---

One of the following information is required to reorder a 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 instruction;
- if stated, the 8-digit universal code number [99-94-xxxx] including information on the required language version.

1.1 EC declaration of conformity

We hereby declare that the system described in this manual corresponds to the relevant health and safety requirements according to the EC directive because of its design and construction as introduced to the market by us.

The declaration of conformity can be found at the beginning of the manual.

The declaration of conformity can be found at the beginning of the manual.

1.2 Purpose of the BD manuals

Depending on the intended use, **Big Dutchman** provides the following documentation:

1. Assembly manual
2. User manual
3. Operation manual (assembly and use of the system)
4. Spare parts lists
5. "Local add-on manuals": (for products which differ from those of the original manual in specific countries)

The type of instruction of your manual can be found on the cover above the title.

1.3 Basics

The **Big Dutchman** system has been built with state-of-the-art technology and meets the recognized technical safety requirements. The system is reliable. Upon operation, however, dangers to life and limb of the user or third persons or impairments of the system or other material property are still possible.

The system may only be mounted

- in accordance with its designated use
- in an excellent state from the safety and technical point of view
- by persons who are familiar with the safety regulations.

Should specific problems occur which are not described in detail in these documents, we recommend you contact us for your own safety.

1.4 Explanation of the symbols and structure of these instructions

1.4.1 Structure of the safety instructions in this manual

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:			
possible safety symbols: see chapter 1.4.3	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:			
	CAUTION		May lead to damage to property

1.4.2 Structure of the general instructions in the manual

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

1.4.3 Special safety symbols in the manual and on the system

These safety symbols (pict ographs) illustrate remaining dangers when handling the system. They are used in the safety instructions of this manual (also refer to chapter 1.4.1) and on the system.

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



Warning: general danger



Warning: dangerous electric tension



Warning: danger of explosion



Warning: low temperatures



Warning: danger of slipping



Warning: danger of tripping



Warning: danger of entanglement due to gear wheels



Warning: danger of entanglement due to straps / transport belts



Warning: danger of entanglement due to auger



Warning: suspended load



Warning: stand clear of suspended, unsecured load



Warning: laser beam



Warning: hot surface



Warning against reaching into an automatically starting fan.



Warning: hand injuries



Warning: danger of crushing

1.5 Necessary qualifications of the persons working with the system

1.5.1 Employing external personnel

	IMPORTANT: The supervisor is responsible for the safety of external personnel.
---	---

Mounting works are frequently carried out by external personnel not familiar with the circumstances specific for the system and the inherent dangers.

You as operator are to survey the personnel and to define responsibilities and powers. Inform these people in detail on the dangers of their area of work. Check their method of working and intervene as soon as possible.

1.5.2 Assembly

Assembly of the system can be carried out by the farmer himself or by a person authorized by him. We assume that the operator or the authorized person either have received technical training or have the necessary knowledge or practical experience that are necessary for a proper assembly of the system.

1.5.3 Installing the gas supply

All works relating to the gas supply of a device (e.g. laying gas pipes and connecting the device to the gas supply, etc.) may only be carried out by an expert according to the effective DIN standards, DVGW rules, safety regulations and the provisions of the local gas supplier or the applicable national regulations.

1.5.4 Electrical installation

Work on the electric components may only be carried out by technically skilled personnel and according to German Industry Standards, VDE regulations, safety instructions and electro-technical regulations of the power supply industry (EVU) and the applicable national regulations.

1.6 Obligations

Closely adhere to the instructions in this manual.

A basic condition for safe operation and trouble-free handling of this system is the knowledge of the basic safety instructions and regulations.

This manual, particularly the safety instructions, must be observed by all persons working on this system. Moreover, the regulations and instructions for the prevention of accidents valid at the respective place of use have to be observed.

The manufacturer is not responsible for any damage to the system resulting from changes not authorized by **Big Dutchman**.

1.7 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 assembling of the system;
- non-compliance with the instructions in this manual regarding transport, storage and assembly;
- unauthorized modifications to the system;
- disasters caused by foreign matter or force majeure.

1.8 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.

1.9 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.

1.10 Storage

 CAUTION	Thermal expansion causes by temperature changes • Store the building parts where they will be needed so that their temperature can adjust to the environment.
---	---



The storage area should be dry and roofed. If this is not possible, the parts should be covered with PE-foil and stored with enough ground clearance. Make sure that, when stored, the parts are protected against dust and moisture.

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

Open-air storage is acceptable only for a short time. If stored outside for a longer time, the parts have to be protected against harmful environmental influences. They also have to be protected against mechanical damage.

1.11 Notes for use

In the interest of further development, we reserve the right to modify design and technical data of this installation.

No claims can therefore be derived from any information, illustration or drawing and description contained herein. Errors and omissions excepted!

Inform yourself about adjusting, operating and maintenance requirements before putting the system into operation.

Apart from the safety information in this manual and the obligatory accident prevention regulations applicable in the user's country, please heed the accepted technical rules (safe and expert working in accordance with UVV, VBG, VDE etc.).

1.12 Pollution abatement regulations

All works on and with the installation have to be carried out in compliance with the legal requirements concerning waste prevention and proper recycling / disposal of waste.

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 have to be kept, transported, collected and disposed of in appropriate containers!

1.13 Waste disposal

After completing the assembly, dispose of the packing material and all remains which cannot be used further according to the legal provisions for recycling.

1.14 Copyright

This manual is copyrighted. The information and drawings included in this manual shall not be copied without the manufacturer's consent, nor shall they be misused or be disclosed to third parties.

The contents of this manual can be altered without prior notice.

If you find mistakes or unclear information in this manual, please do not hesitate to let us know.

All trademarks mentioned or shown in the text are trademarks of their respective owners and deemed patented.

© copyright 2015 by **Big Dutchman**

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 instructions

2.1 Instructions on accident prevention

Before operating, cleaning, maintaining or disassembling this system, the operator or person authorized by him is obliged to instruct any person carrying out any of these works on

- the remaining dangers when carrying out these tasks
- the applicable rules and regulations regarding accident prevention and to ensure they are complied with!

The basis for these are:

- the installation's technical documentation, specifically the included safety instructions,
- the applicable safety and health regulations applicable at the place of work.

2.2 General safety instructions

	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.
WARNING	• Ensure that children do not use the system as a playground and are not left unsupervised in the vicinity of the system. Explain remaining dangers fully to the children.

The respective safety precautions and other generally accepted regulations regarding safety and operational health have to be observed.

Please check safety and function control devices to ensure safe and accurate operation

- before putting the system into operation again
- in adequate intervals (confer maintenance intervals)
- after modifications or repairs.

Check the proper functioning of the system after any kind of repair works. You may only put the device into operation when all protective system have been put into place again.

Also observe the regulations of local water distribution and power supply companies.

2.3 Personal safety instructions

These safety instructions are intended to make you familiar with important information on the handling of the system. They are important for your safety and for the safety of the system.

The farm staff has to familiarize itself with the function and arrangement of the safety devices, in particular of the emergency stop button.

The farm staff has to regularly participate in health and safety briefings (according to the provisions e.g. by trade associations).

Maintenance works may only be carried out by specially trained personnel.

	Risk of injury
	Lack of knowledge about the structural design of the system can lead to injury. • Make yourself familiar with the design and construction of the system under sufficient lighting! • Inform yourself as responsible person for the system and your employees about the remaining dangers in connection with this system!

2.3.1 Personal protective equipment and measures

	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 installation, resulting in severe injuries. • When working underneath the installation always wear a hard hat!

2.4 Use of electrical appliances

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.

 	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	

- 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.

	Danger of short circuits
	Never repair or shut defective fuses. Defective fuses should be replaced by new ones immediately.
WARNING	

- 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.

2.5 Special safety instructions

2.5.1 Danger zones

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.

	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.

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.

For your safety, the following safety symbols have been fixed to the system. Please make yourself familiar with the meaning of these systems. The following explanatory notes will provide you with detailed information.

	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!



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.

2.5.2 Entire system

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

Ensure that the system is switched off before performing any service, repair or cleaning work or rectification of functional defects. Disconnect the system from the power supply and secure it against reactivation.

Protect the system by means of a sign fixed to the main switch reading "Do not put into operation!". Refer to maintenance works if necessary.

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

	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.
WARNING	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 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.

2.5.3 Individual parts

2.5.3.1 Manure removal

	Risk of entanglement
	Touching rollers, chains, gear wheels and the manure belt can cause injuries due to entanglement! • Always disconnect the power supply before carrying out any works at the manure removal system, as it can switch on unexpectedly when controlled automatically. • Never touch or reach into rotating or driven parts of the system! • Make sure that all guard caps and protecting coverings are duly closed and secured.

2.5.3.2 Electrical components

	Risk of electric shocks and short circuits
	Live parts may be bare while different kinds of work are carried out. Touching live parts might lead to injuries caused by electric shock and short circuits. • 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 farm staff.

2.6 Safety contrivances

 	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.
WARNING	

2.7 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.

2.8 Safety symbols on the system

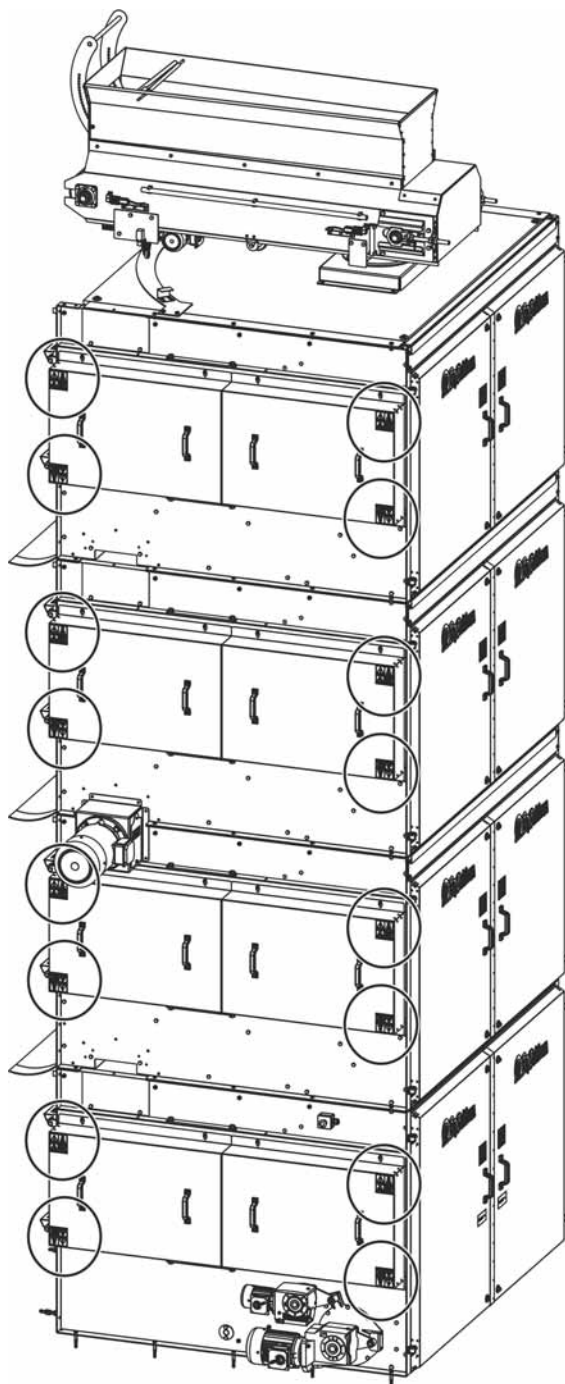
	The system described in this manual may only be operated if the listed safety symbols have been attached correctly! If the component part with the sticker must be replaced, order it immediately as original part from Big Dutchman and re-attach it to the new part!
---	---

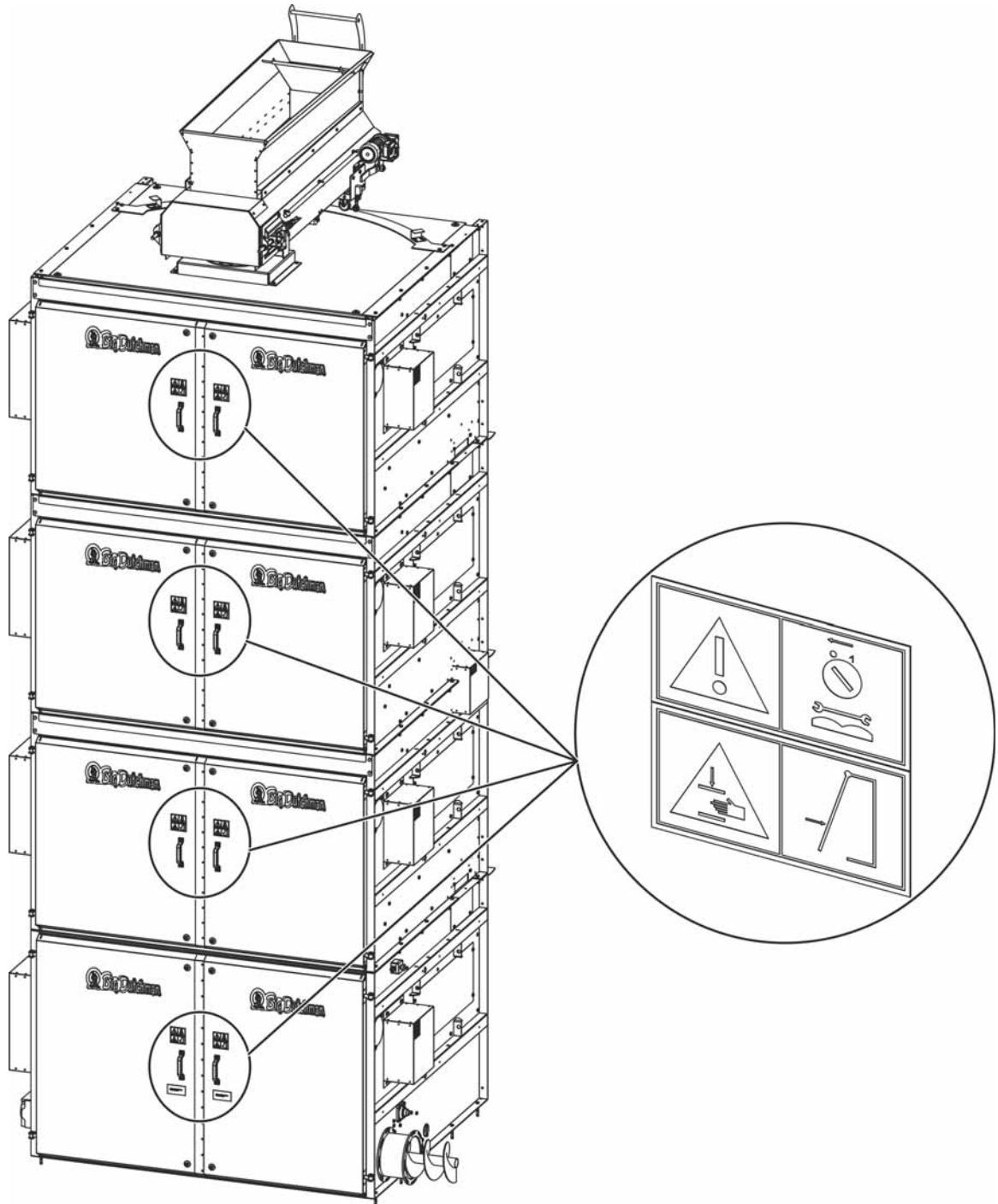
2.8.1 Overview of the used safety symbols

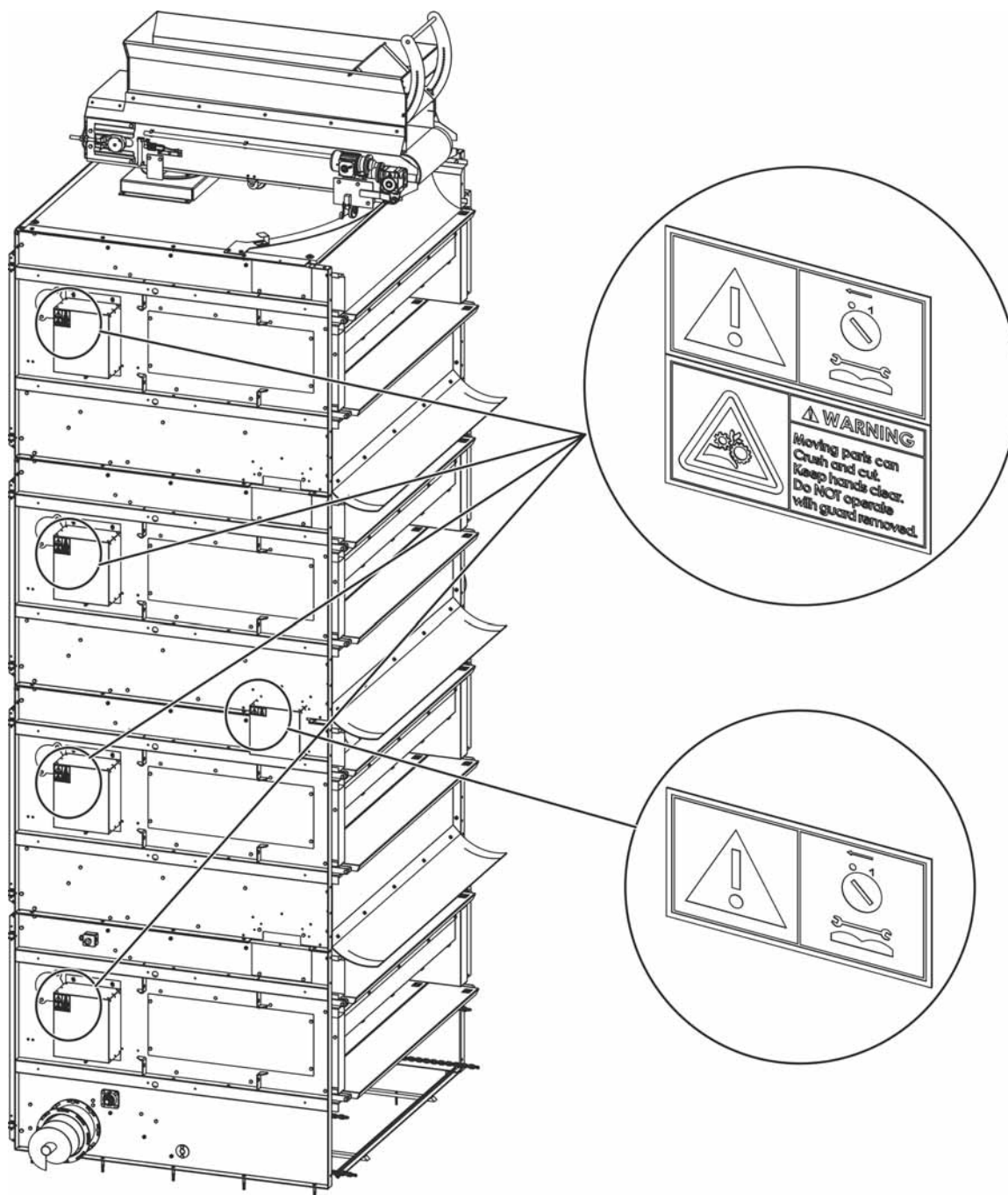
00-00-1186 (100x50 mm) Pictograph: Before maintenance work main switch "OFF"	
00-00-1225 (100 x 50 mm) Pictograph: Danger of injury of hand W23/door resp. flap Pictograph: Danger of injury of hand W23 / door resp. flap	
00-00-1289 (100x50mm) Sticker: ISO 3864-2: Moving parts can crush and cut. Sticker: ISO 3864-2: Moving parts can crush and cut.	

2.8.2 Position of the used safety symbols

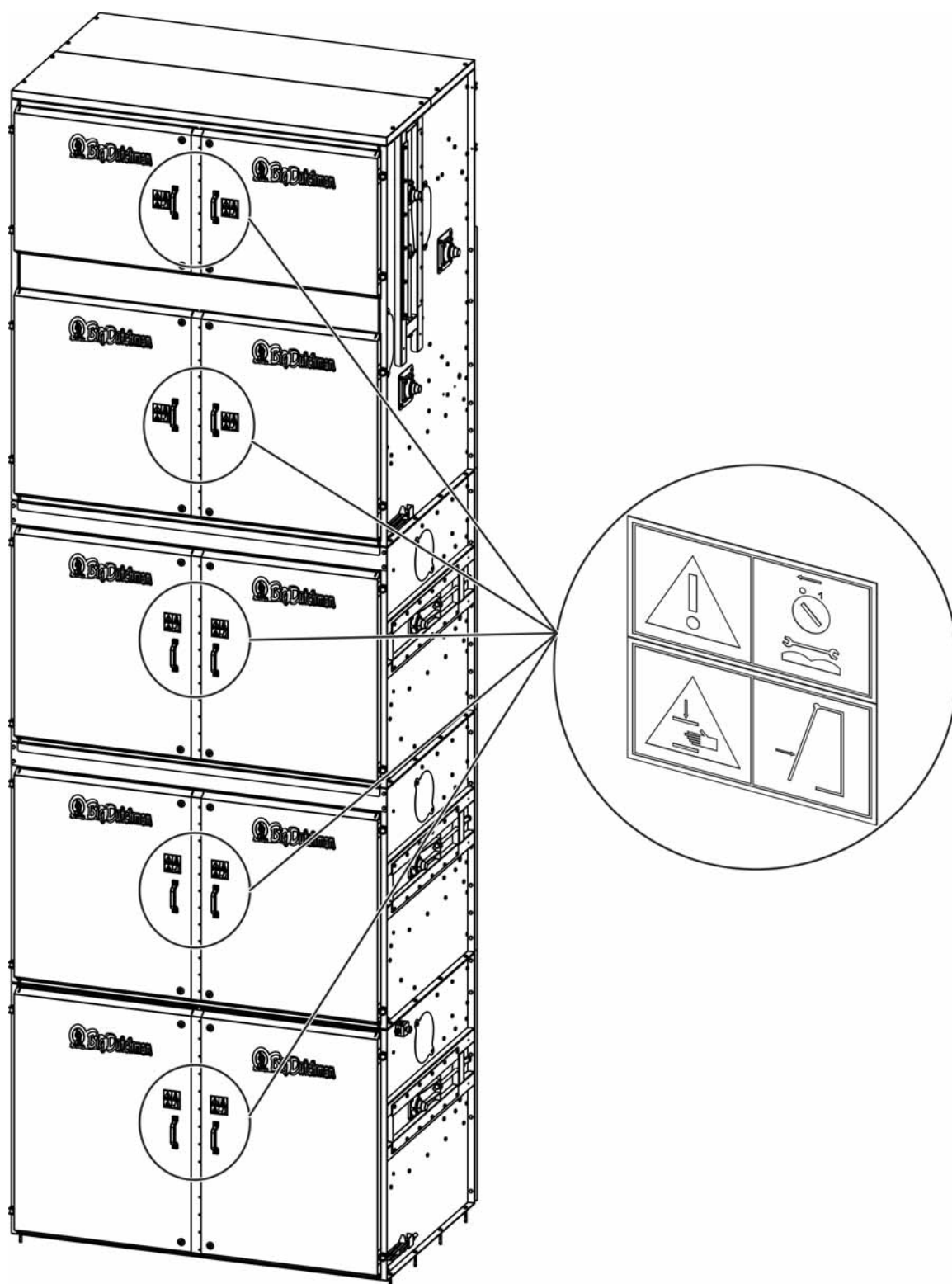
2.8.2.1 Drive unit

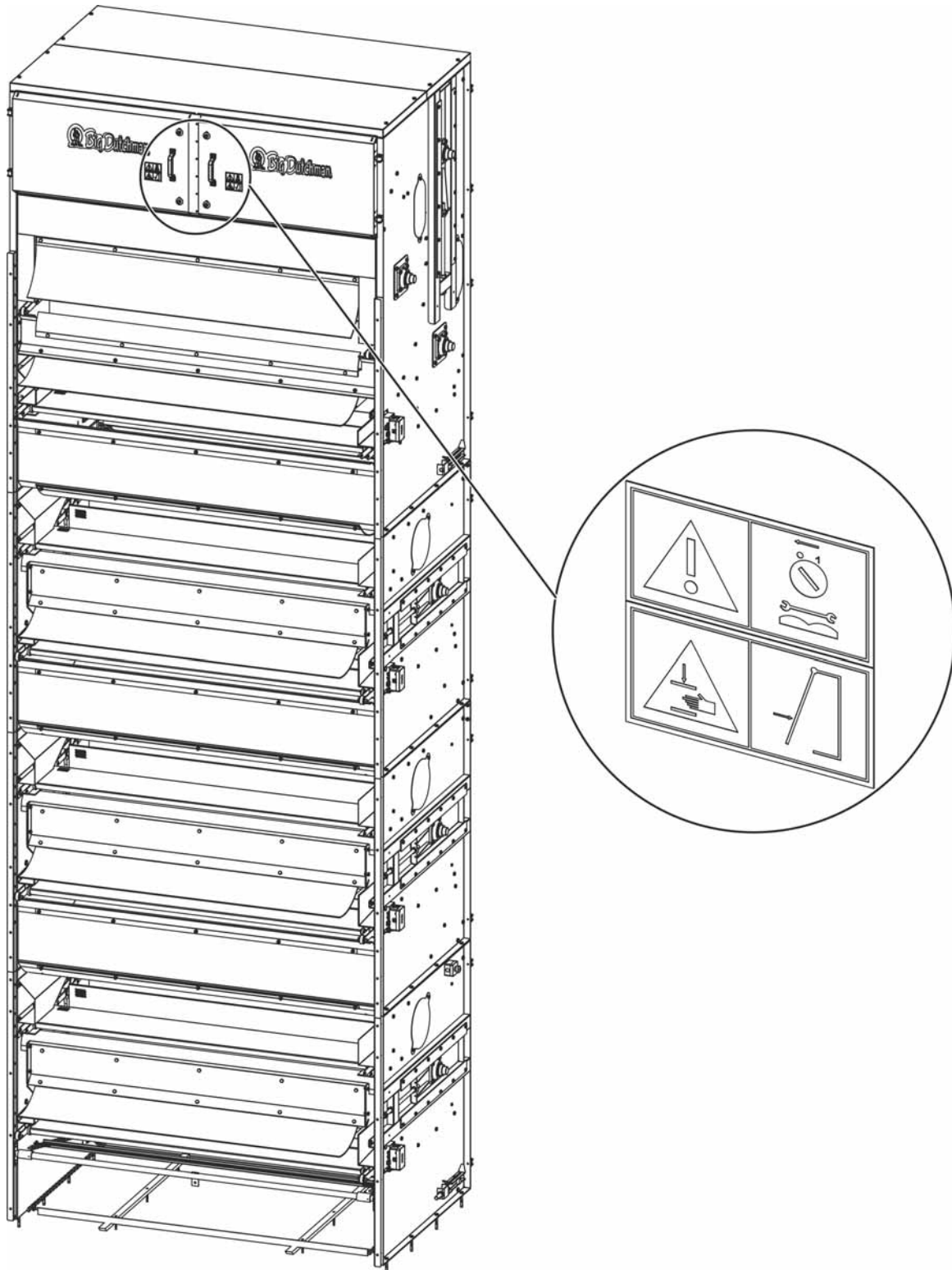






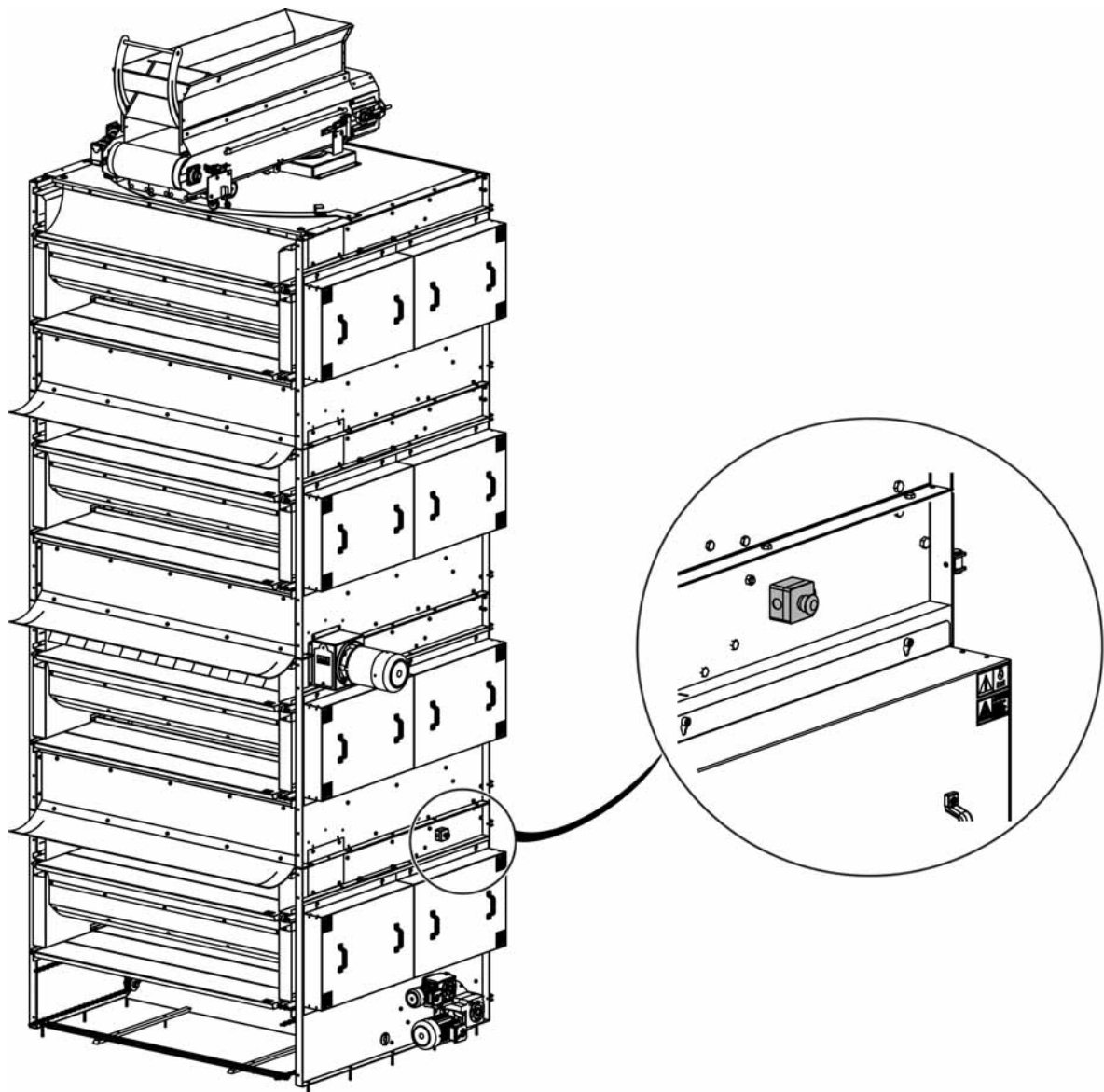
2.8.2.2 Idler unit

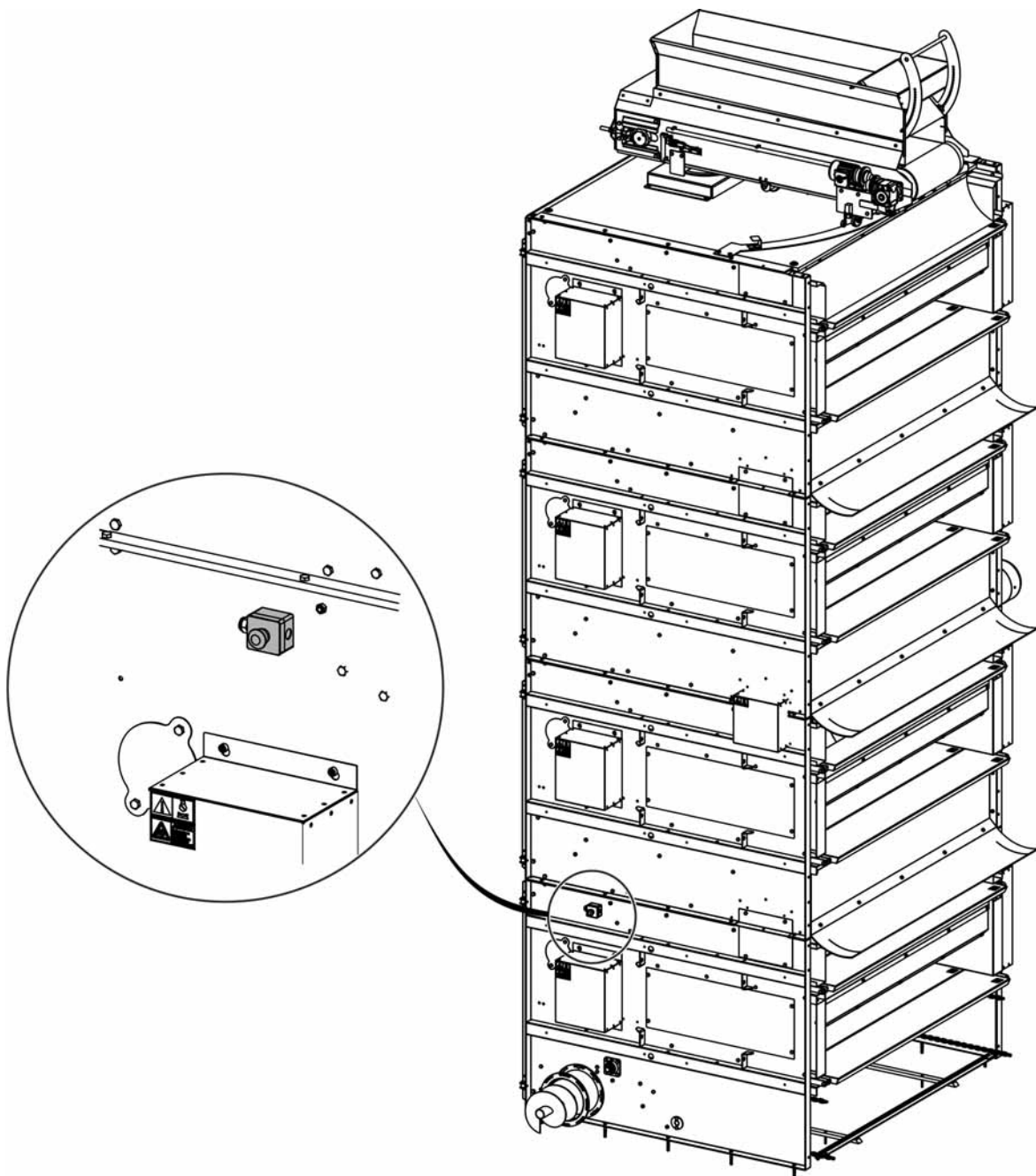




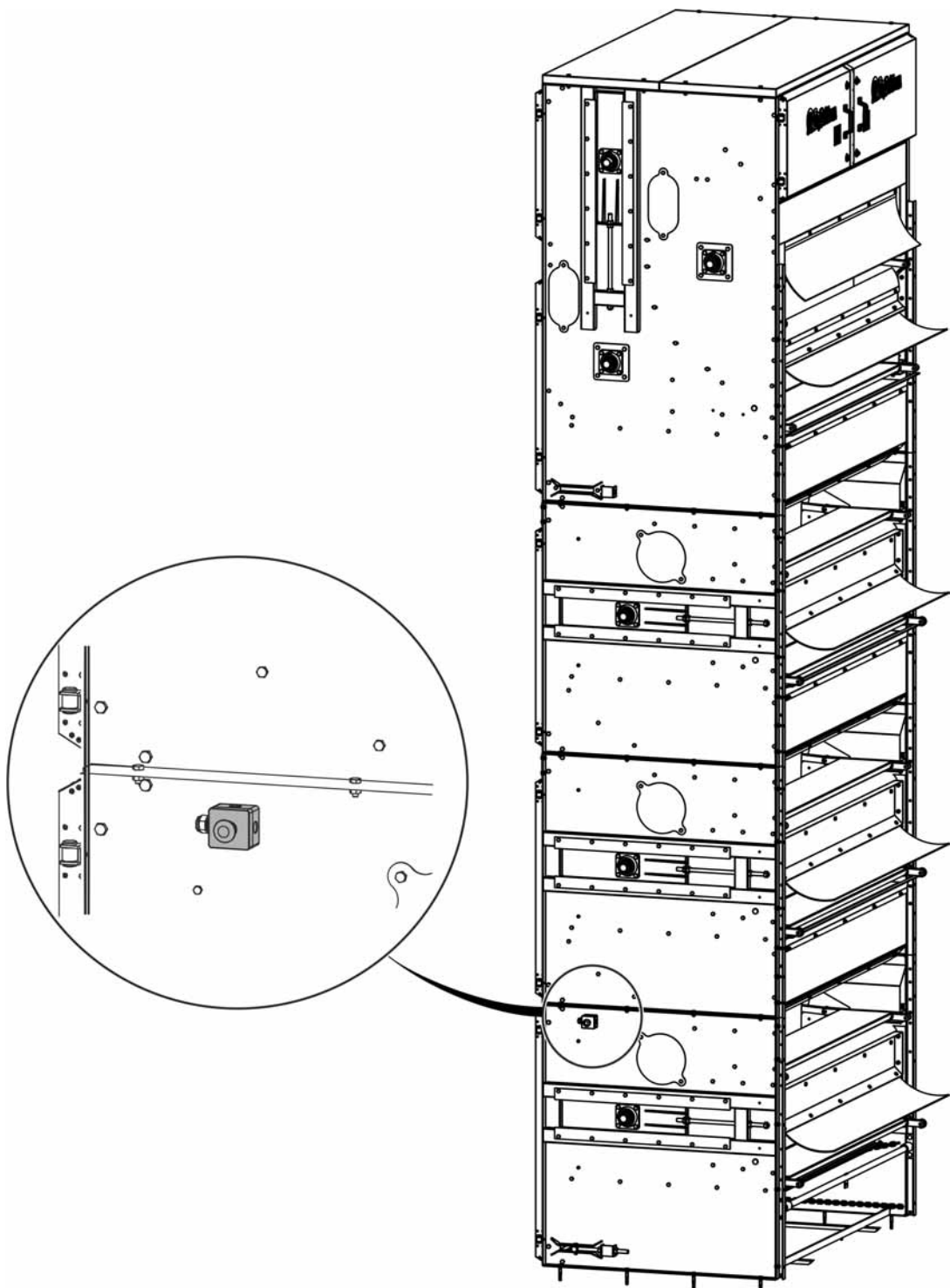
2.9 Emergency stop button at the system

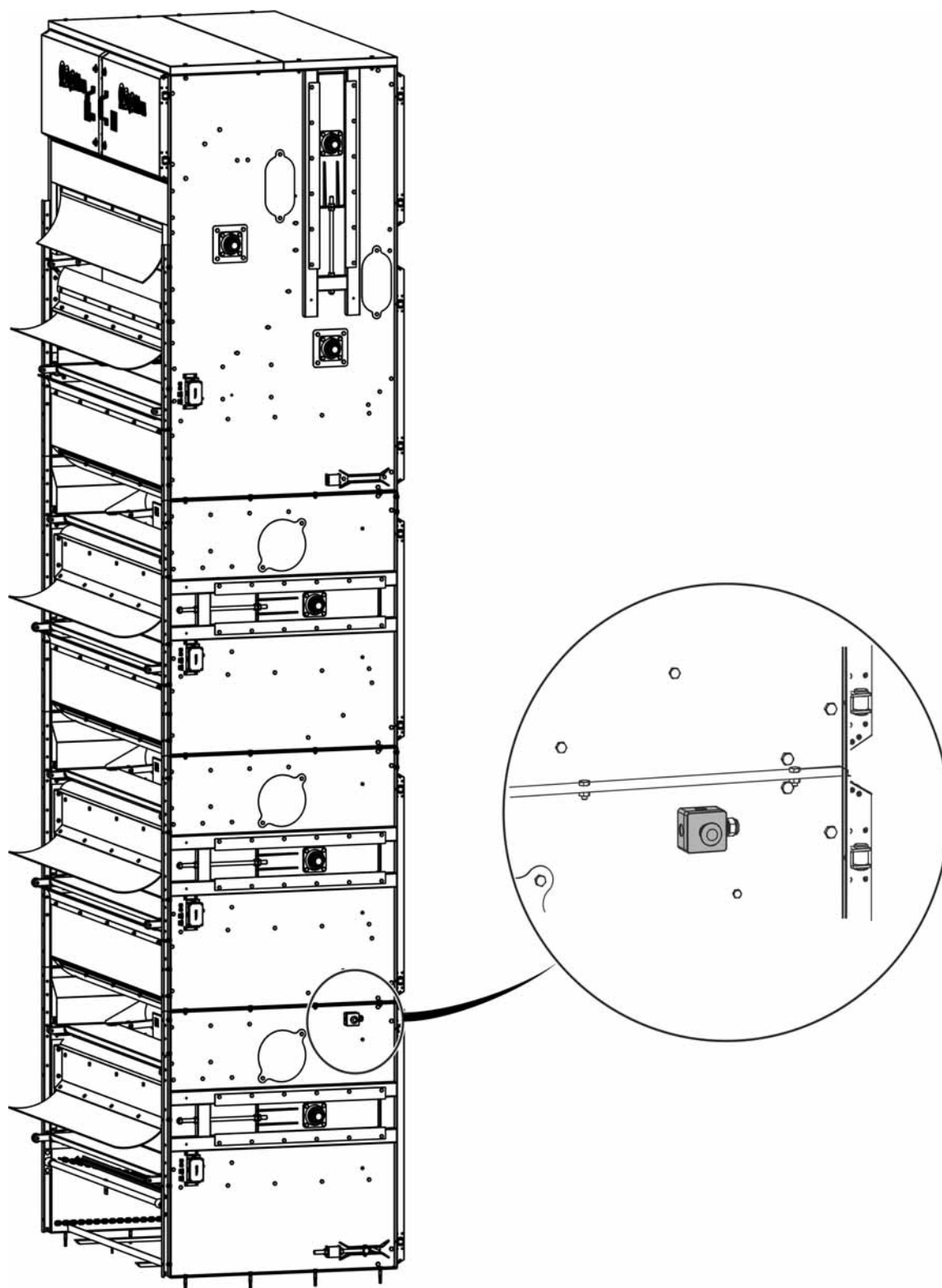
2.9.1 Emergency stop button drive unit





2.9.2 Emergency stop button idler unit





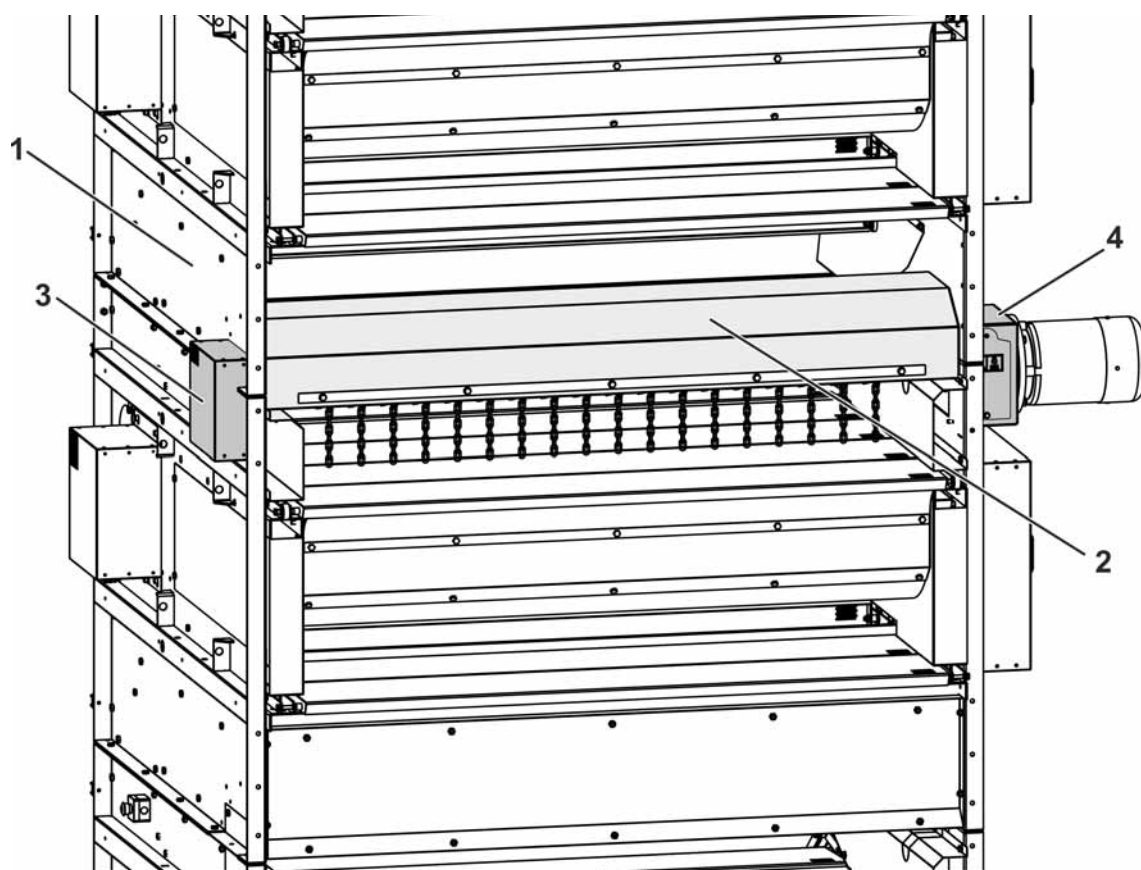
2.10 Safety components of the system



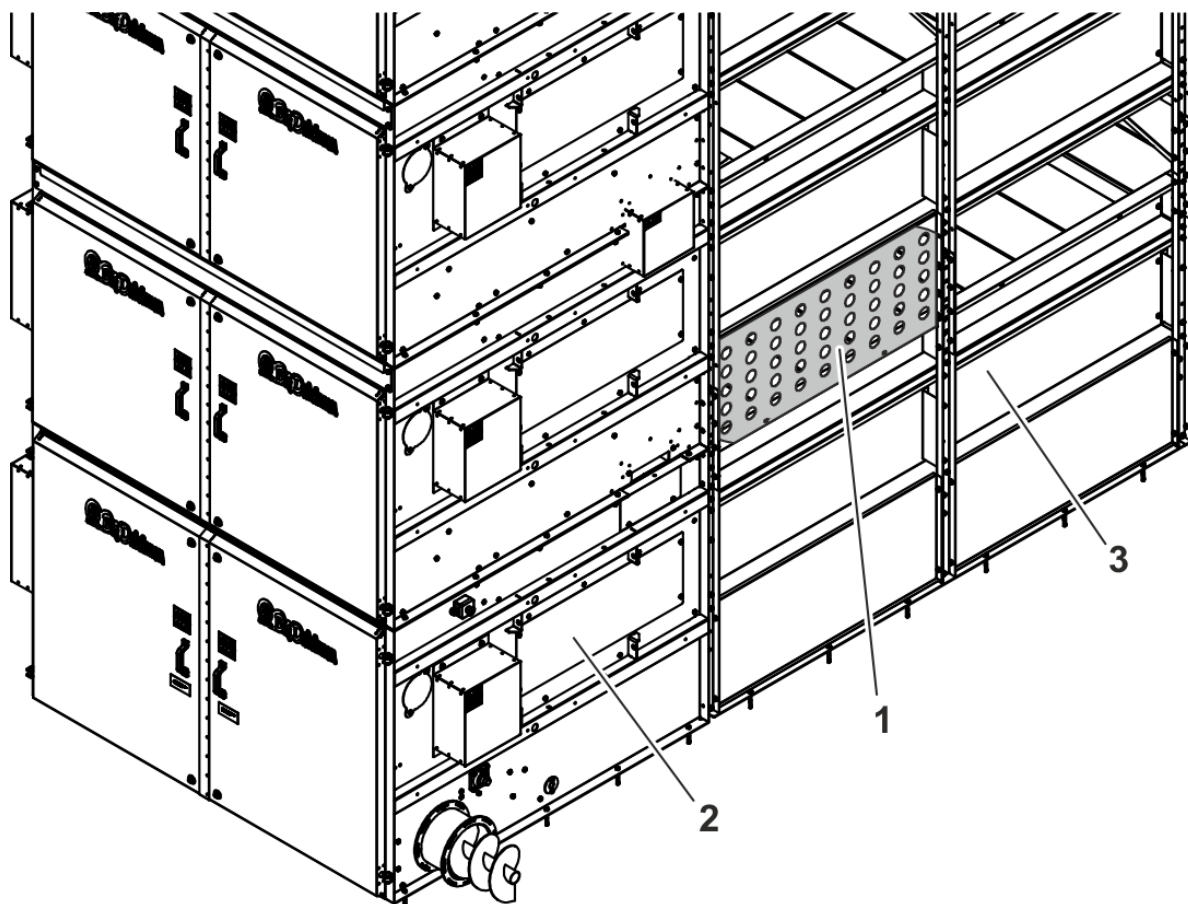
The system described in this manual may only be operated if the listed safety component parts have been mounted and installed correctly and have been checked for correct functioning!

If safety component parts are missing or defective, the original part must be ordered from **Big Dutchman** and replaced immediately!

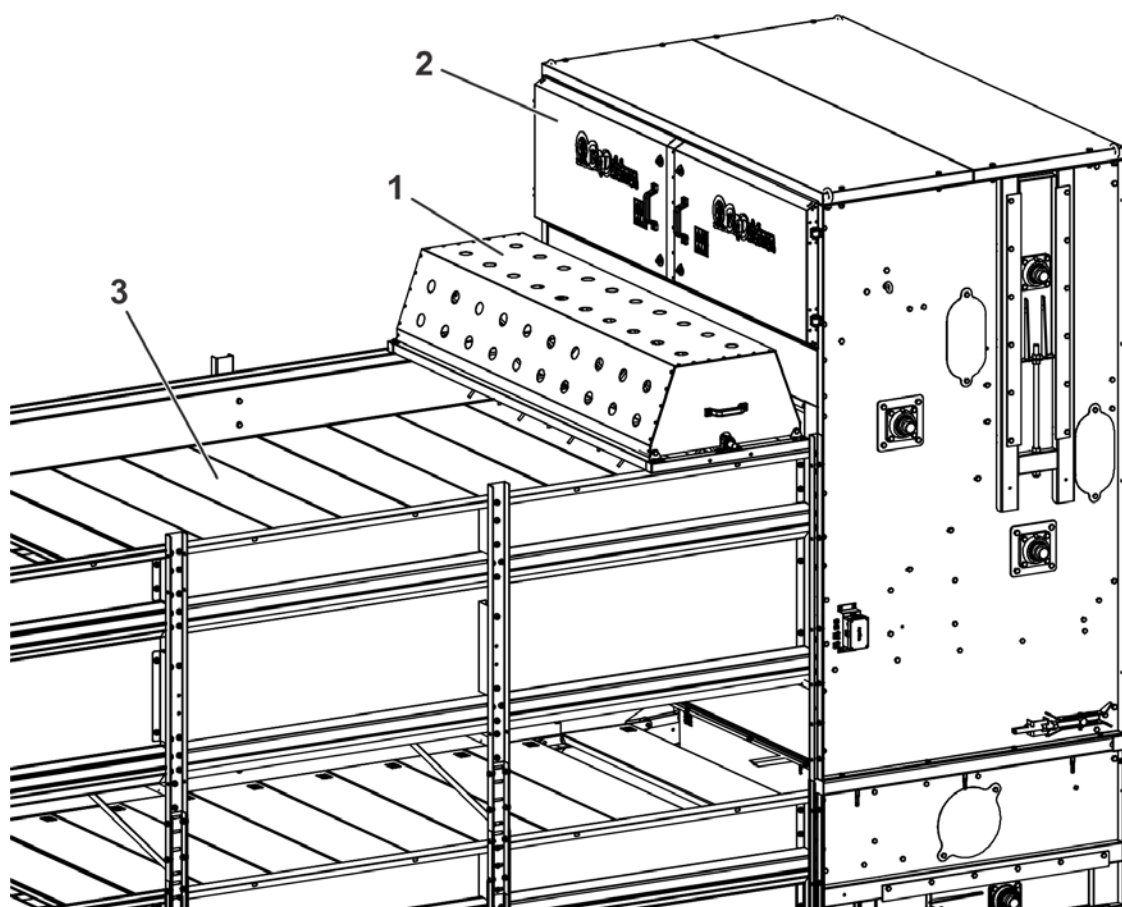
2.10.1 Overview of the used safety components



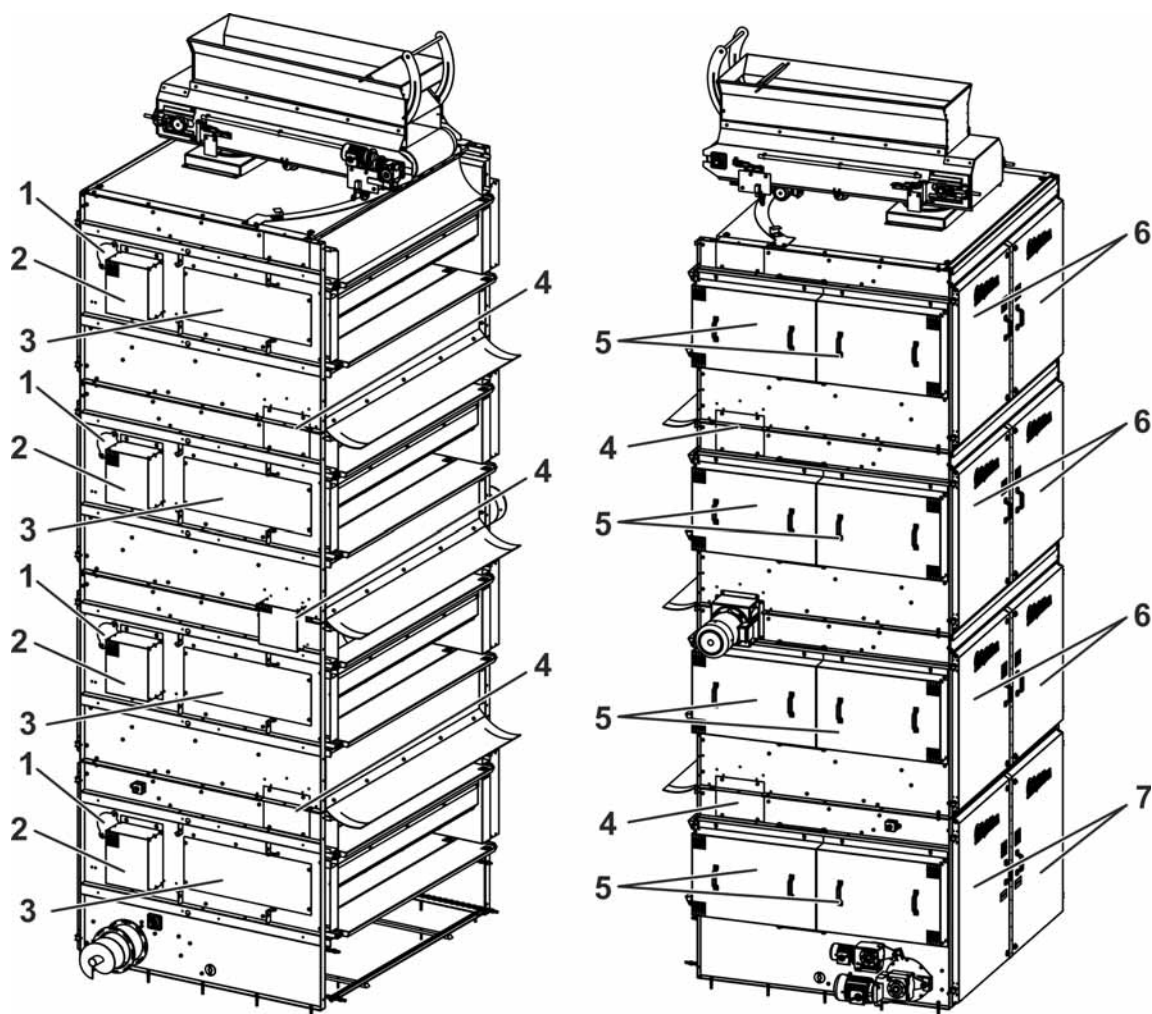
Pos.	Keytech No.	Code no.	Description
1			Drive unit
2	83-12-6528		Cover for chopper OptiPlate
3	83-12-6532		Cover with pictograph 00-00-1186 and 00-00-1289
4	83-12-6542		Cover with pictograph 00-00-1186 and 00-00-1289



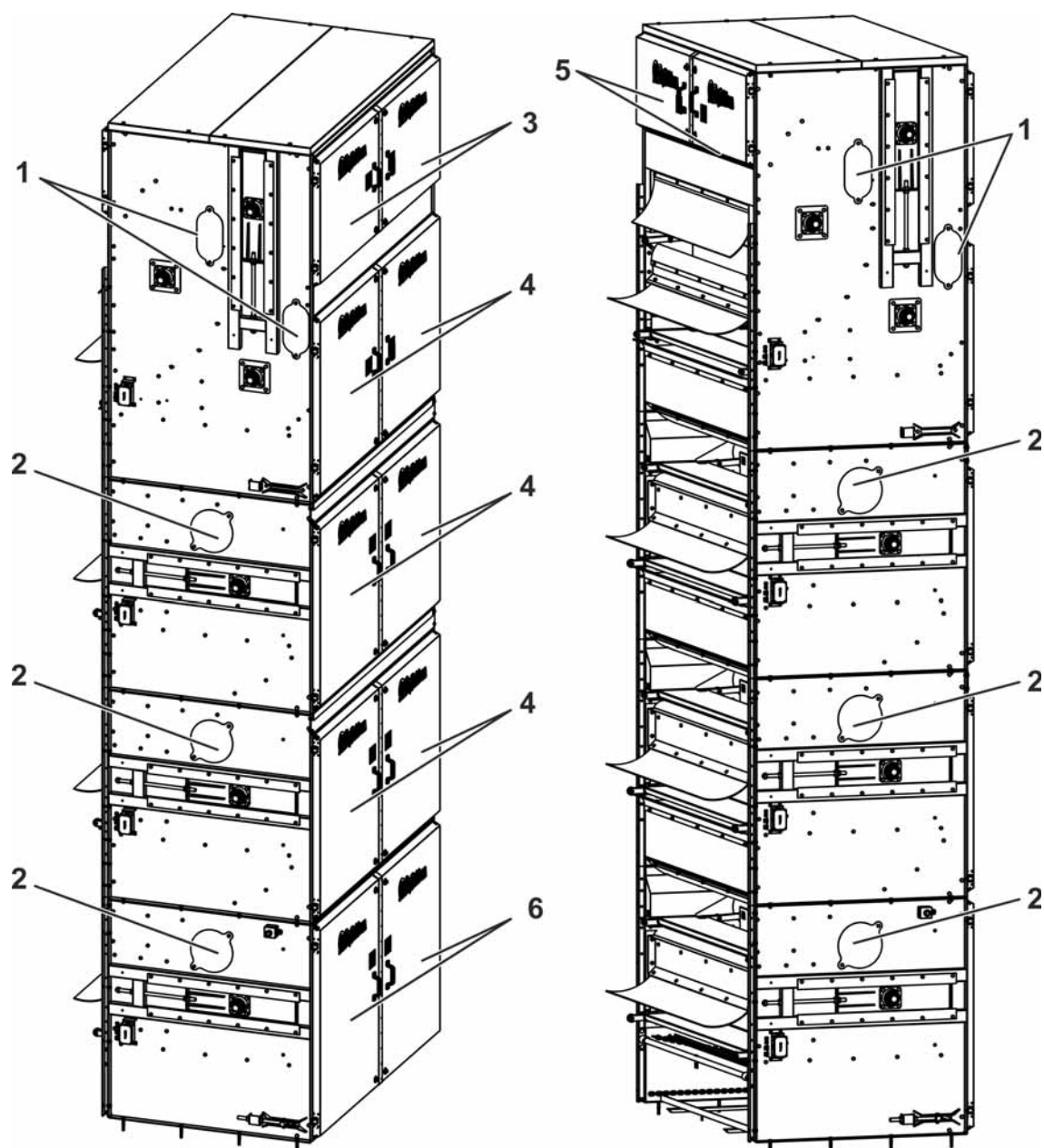
Pos.	Keytech No.	Code no.	Description
1		83-12-1091	Guard plate perforated SST for chopper Optiplate V14
2			Drive unit
3			Tunnel block



Pos.	Keytech No.	Code no.	Description
1	83-12-1091	83-12-1091	Cover cpl for manure rake OptiPlate
2			Drive unit
3			Tunnel block



Pos.	Keytech No.	Code no.	Description
1	83-11-2144	83-11-2144	Cover for maintenance opening drive unit
2	83-12-6463	83-12-6463	Cover for pulser OptiPlate
3	83-10-7523	83-10-7523	Sealing plate for motor opening OptiPlate
4	83-11-2152	83-11-2152	Cover for opening chopper/filling station OptiPlate
	83-11-2245	83-11-2245	Cover for opening chopper OptiPlate
5	83-11-2150	83-11-2150	Cover cpl for motor OptiPlate
6	83-11-1817	83-11-1817	Safety door for idler central OptiPlate
7	83-11-1940	83-11-1940	Safety door for idler lower OptiPlate



Pos.	Keytech No.	Code no.	Description
1	83-12-4224	83-12-4224	Cover for maintenance opening idler unit upper OptiPlate
2	83-11-1768	83-11-1768	Cover for maintenance opening idler unit lower OptiPlate
3	83-20-0202	83-20-0202	Safety door for idler unit upper OptiPlate
4	83-20-0249	83-20-0249	Safety door for idler unit
5	83-11-1700	83-11-1700	Safety door for idler scraper OptiPlate
6	83-11-1940	83-11-1940	Safety door for idler lower OptiPlate

3 System description

3.1 Overview

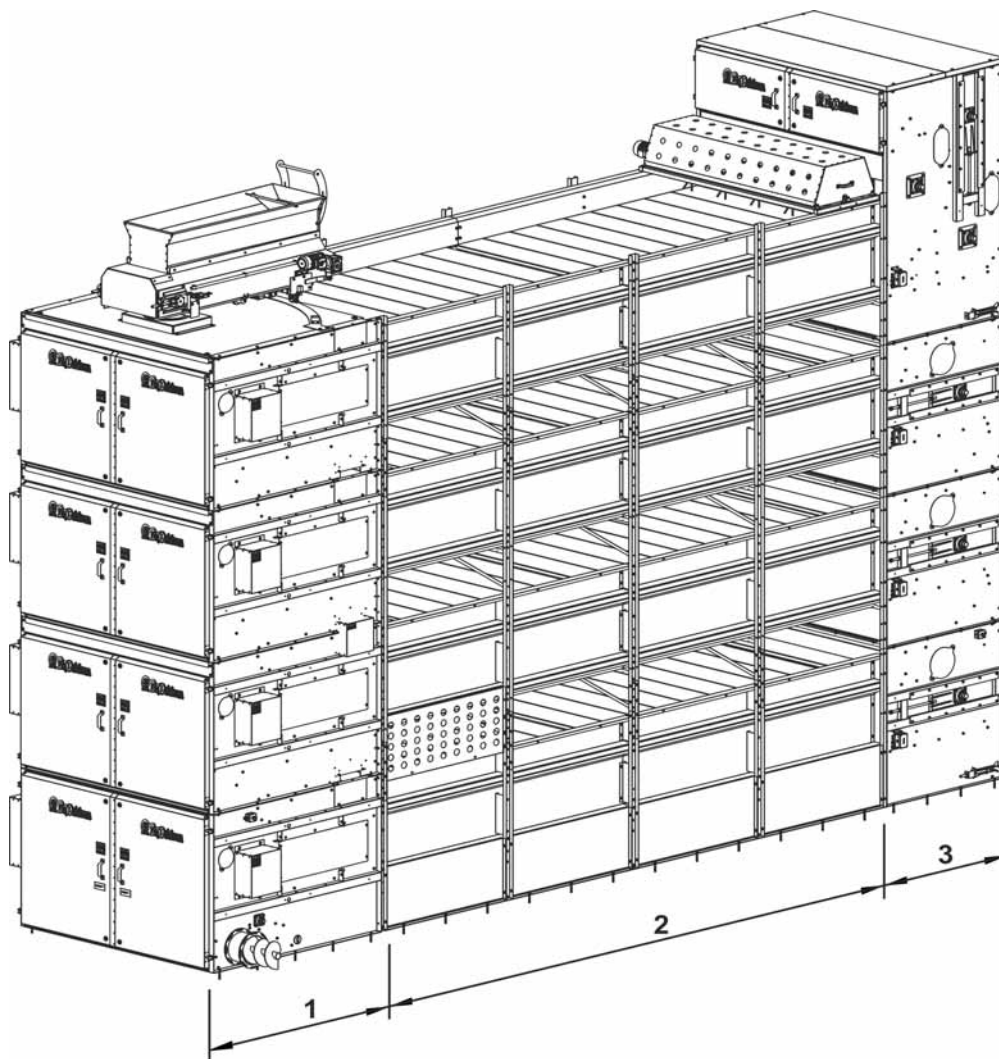
The Big Dutchman steel plate drying system OptiPlate is used to dry poultry manure originating from aviaries and cage systems.

OptiPlate is a modular system consisting of three main components: Drive unit (1), idler unit (2) and tunnel section (3).

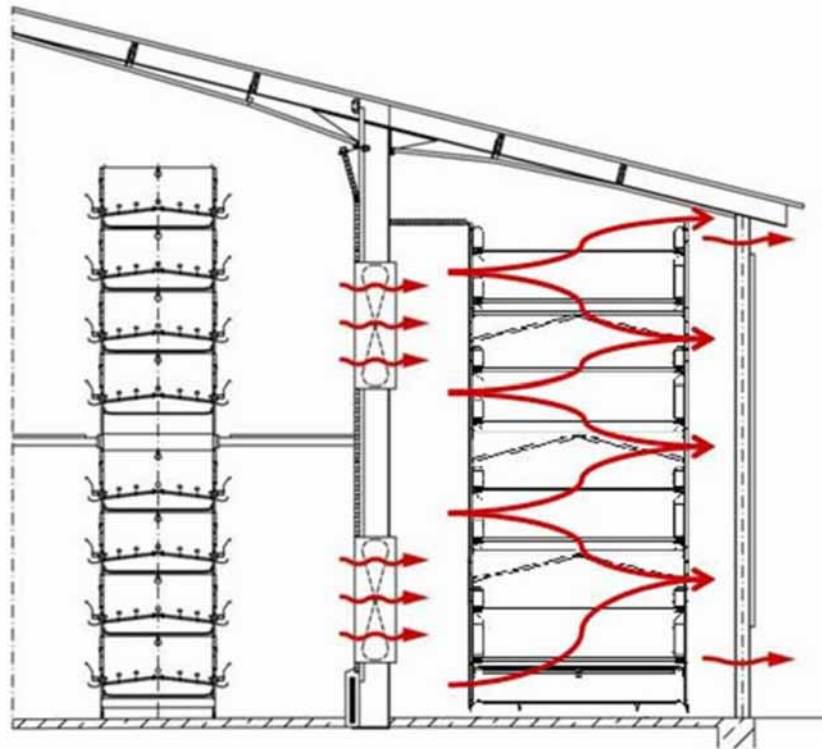
The OptiPlate tunnel can be mounted with one to six tiers as well as eight sections maximally.

Each tier may be loaded up to a layer height of up to 20 cm and a dry substrate content of 45 %. The maximum load of a tier is 10 t and the minimal dry substrate content of the incoming manure must be 30 %.

One system can dry the manure of up to 200,000 laying hens.



3.2 Function



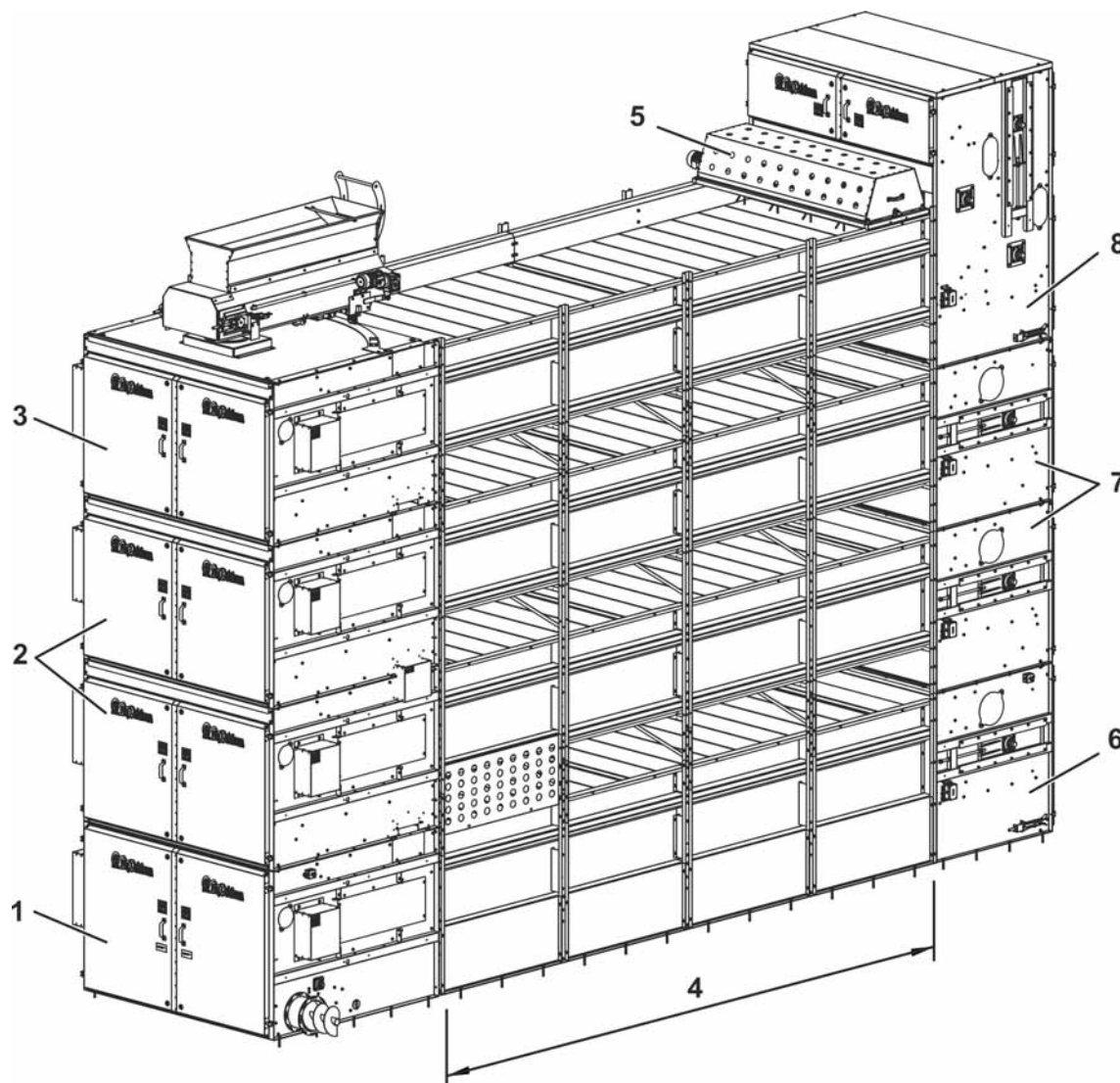
The exhaust air is sucked out of the house via fans and then pressed in the pressure corridor. The exhaust air flows into the tunnel via the lateral openings of the OptiPlate and aerates the perforated plates. The poultry manure is dried with the warm and dry air of the layer house.

3.3 Overview of components

The drive unit consists of three different modules. It comprises the lower (1), central (2) and upper drive unit (3). Optionally, a chain chopper can be integrated to increase the manure drying effect.

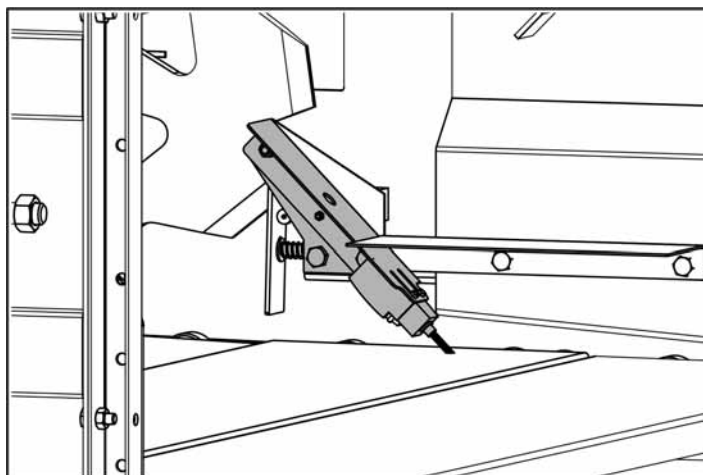
The tunnel section consists of the section modules (4) and the manure rake (5).

The idler unit is also composed of three modules like the drive unit. It comprises the lower (6), central (7) and upper idler unit (8).



3.4 Protection device for the process

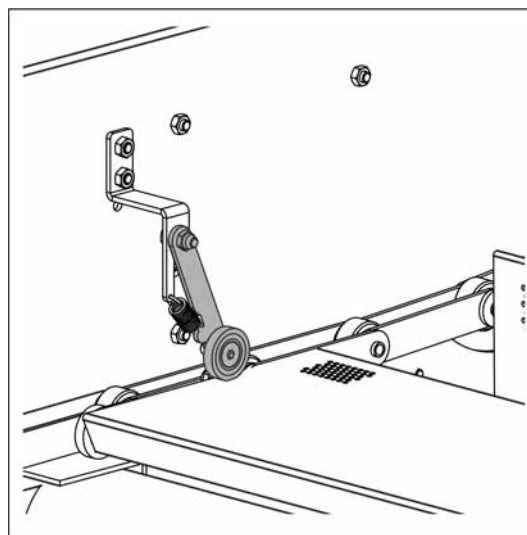
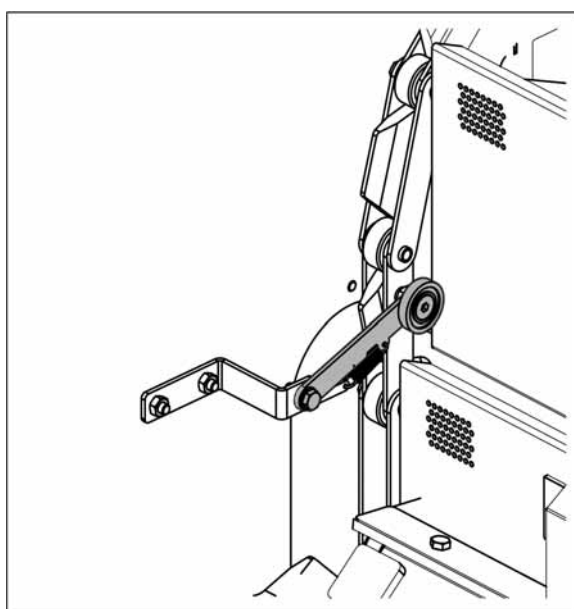
Each module of the idler unit is provided with a combination of two limit switches. In case of a false position of a dryer plate, these will prevent damage to the system.



Moreover, plate deflectors are installed in the idler unit. They bring the plates into the correct position.

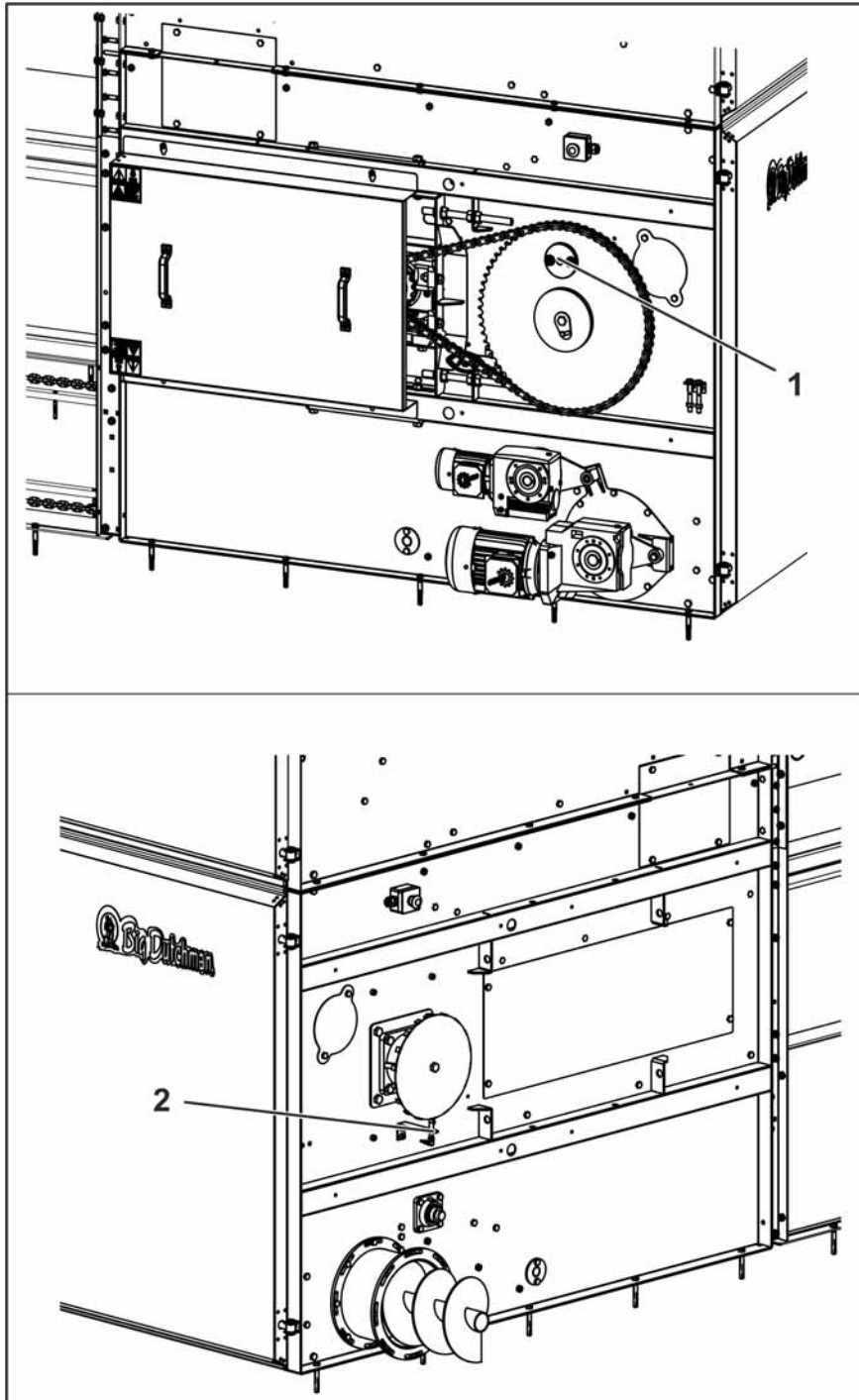
upper idler unit

lower and central idler unit

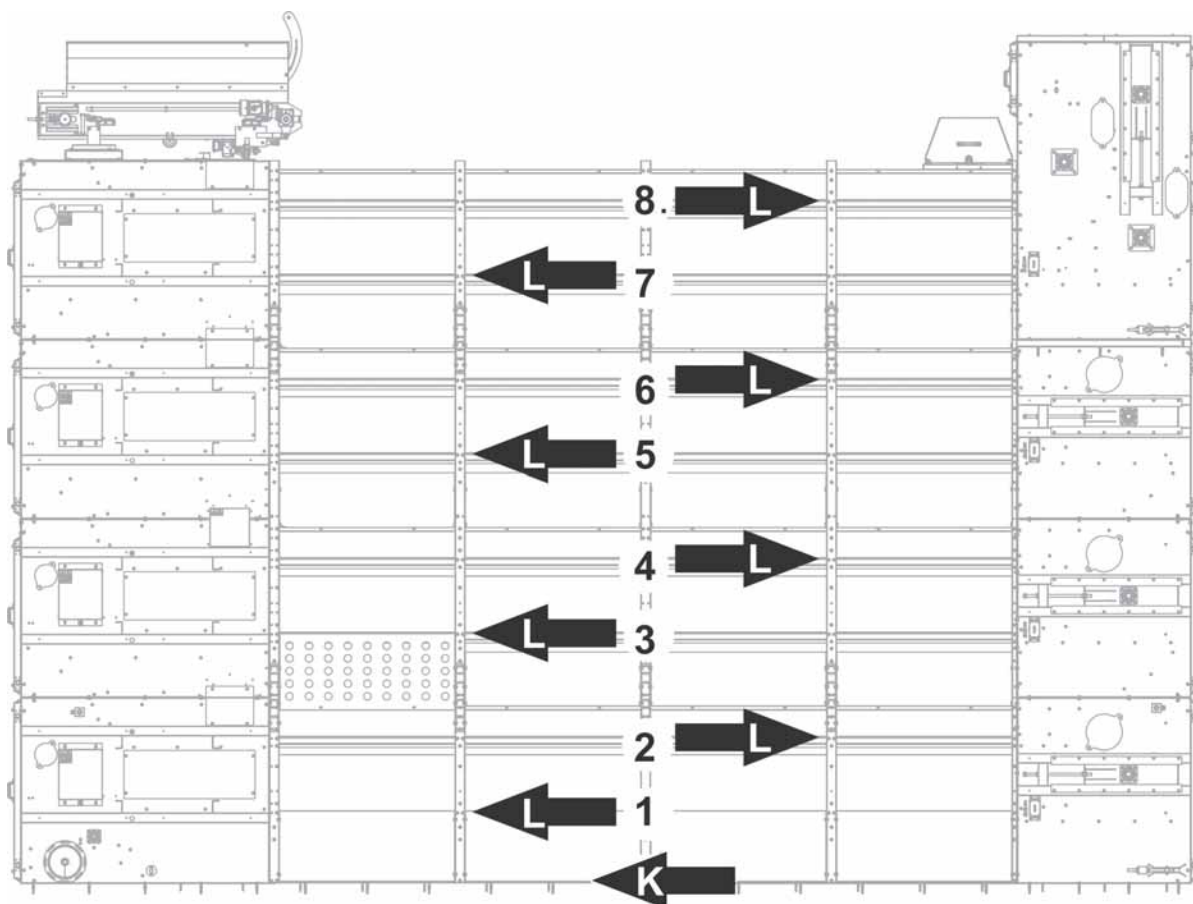


Each module of the drive unit is equipped with an overload safety device (1) and a pulse monitoring (2).

The pulse monitoring determines a standstill of the chain. Thus the system is not overloaded when the overload safety device is released.



3.5 Transport direction OptiPlate

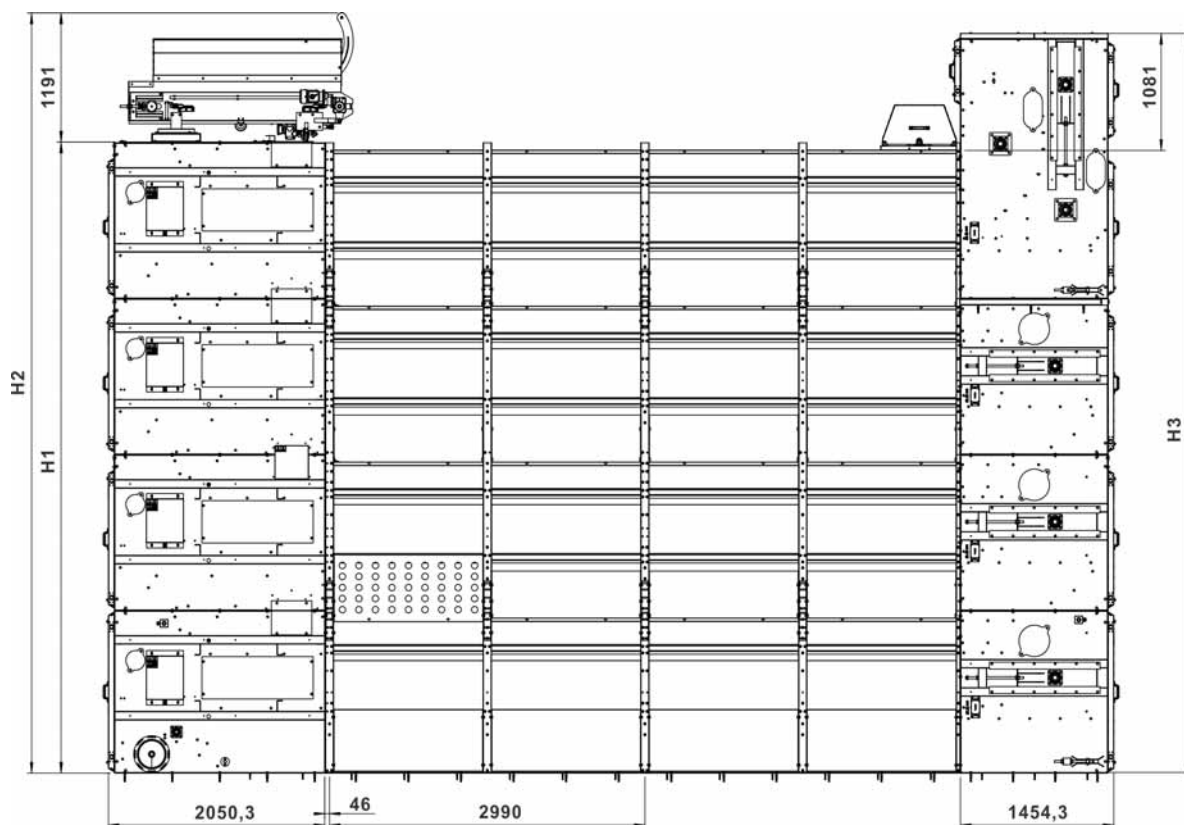


L = moving direction of the manure belt

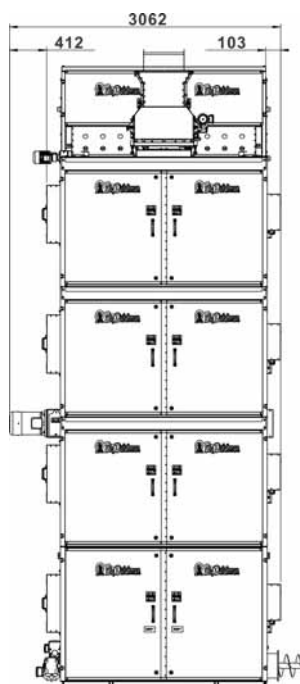
K = moving direction of the scraper floor

1, 2, 3, ... = assembly order of the tunnel blocks

3.6 Technical data



Tiers	1	2	3	4	5	6
Section height (H1)	1488	2928	4368	5808	7248	8648
Total height drive (H2)	2679	4119	5559	6999	8439	9839
Total height idler (H3)	2510	3950	5390	6830	8270	9710

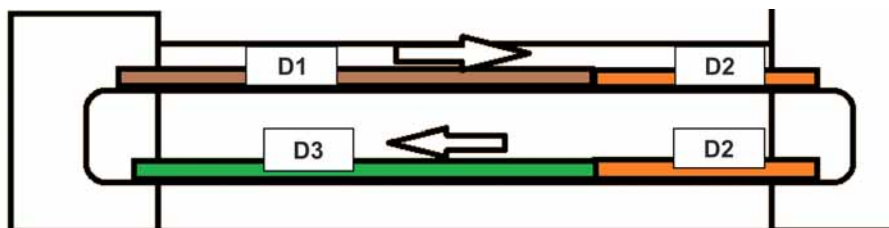


3.7 Overview of the air flow in a system of 1 to 6 tiers

The data and figures in the following tables show the air flow and the time which is necessary for the manure drying.

Each tier has two levels. In the figures, these are specified with **L1**, **L2**, **L3**, etc.

The manure is slowly transported through the levels respectively tiers. The days necessary for the transport are abbreviated with **D1**, **D2**, **D3**, etc. The following figure shows the side view of an installation.

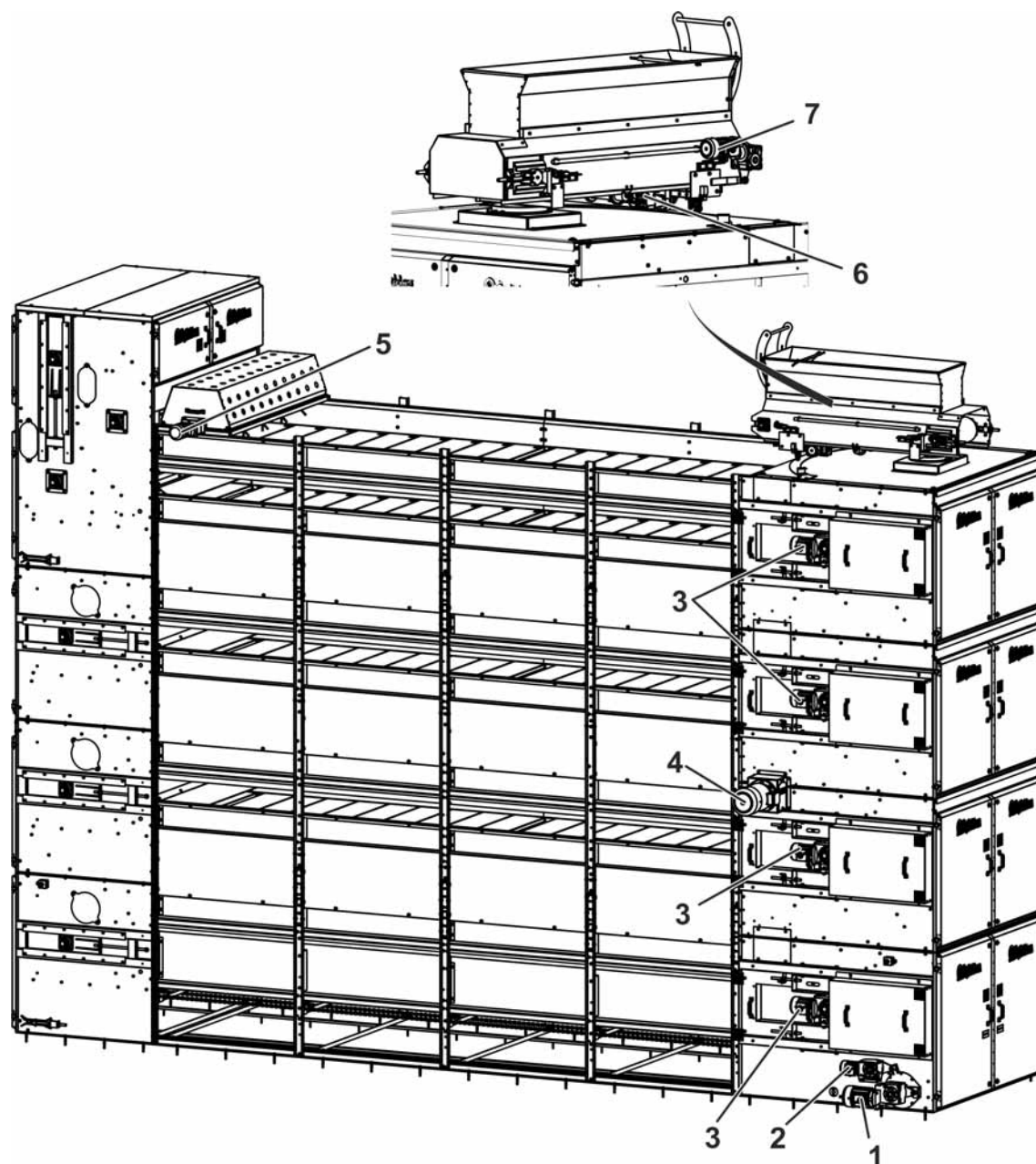


Cross section	Tiers	Level	Day
	1	1	
		2	
	2	1	1
		2	1
		3	2
		4	2

Cross section	Tiers	Level	Day
	3	1	1
		2	1
		3	2
		4	2
		5	3
		6	3
	4	1	1
		2	1
		3	1
		4	2
		5	2
		6	2
		7	3
		8	3

Cross section	Tiers	Level	Day
	5	1	1
		2	1
		3	1
		4	1
		5	2
		6	2
		7	2
		8	3
		9	3
		10	3
	6	1	1
		2	1
		3	1
		4	1
		5	2
		6	2
		7	2
		8	2
		9	3
		10	3
		11	3
		12	3

3.8 Production data



Pos.	Motor for:	Description
1	Discharging auger	P = 3.0 kW, U = 230/400V, f = 50Hz, I1= 11,4A, I2= 6.6A
2	Scraper floor	P = 0.18 kW, U = 230/400V, f = 50Hz, I1= 1,18 A, I2= 0.68 A
3	Dryer plate	P = 0.75 kW, U = 230/400V, f = 50Hz, I1= 3,64 A, I2= 2.1 A
4	Chopper	P = 5.5 kW, U = 230/400V, f = 50Hz, I1= 12,4 A, I2= 7.16 A
5	Manure rake	P = 0.37 kW, U = 230/400V, f = 50Hz, I400V= 1.07A
6	Slewing belt	P = 0.18 kW, U = 230/400V, f = 50Hz, I1= 1,18 A, I2= 0.68 A
7	Conveyor belt	P = 0.18 kW, U = 230/400V, f = 50Hz, I1= 1,18A, I2=0.68A

3.9 Designated use

- The system dries organic material as e.g. poultry manure with a dry matter content (DM) of at least 30 %.
- The system may be loaded with a weight of 5t maximally per level.
- The maximum material height per tier is about 20 cm with an initial dry matter content of 45 %.
- For the drying it must be considered that the final dry matter value is strongly dependent on exterior influences as e.g. air humidity and can thus vary.
- Material in dried condition leads to an increased risk of fire. Therefore, safety devices for fire protection have to be cleared with the responsible expert according to the respective fire protection regulations.
- Warm exhaust air from the house is necessary for the drying process. Optionally, a heat exchanger can be used to warm up the air. The heat exchanger may only be ventilated with warm air of 65°C max.
- Protect the system from weather conditions and direct sunlight. The air temperature in the dryer must not fall below 4°C.

3.10 Avoidance of foreseeable misuse

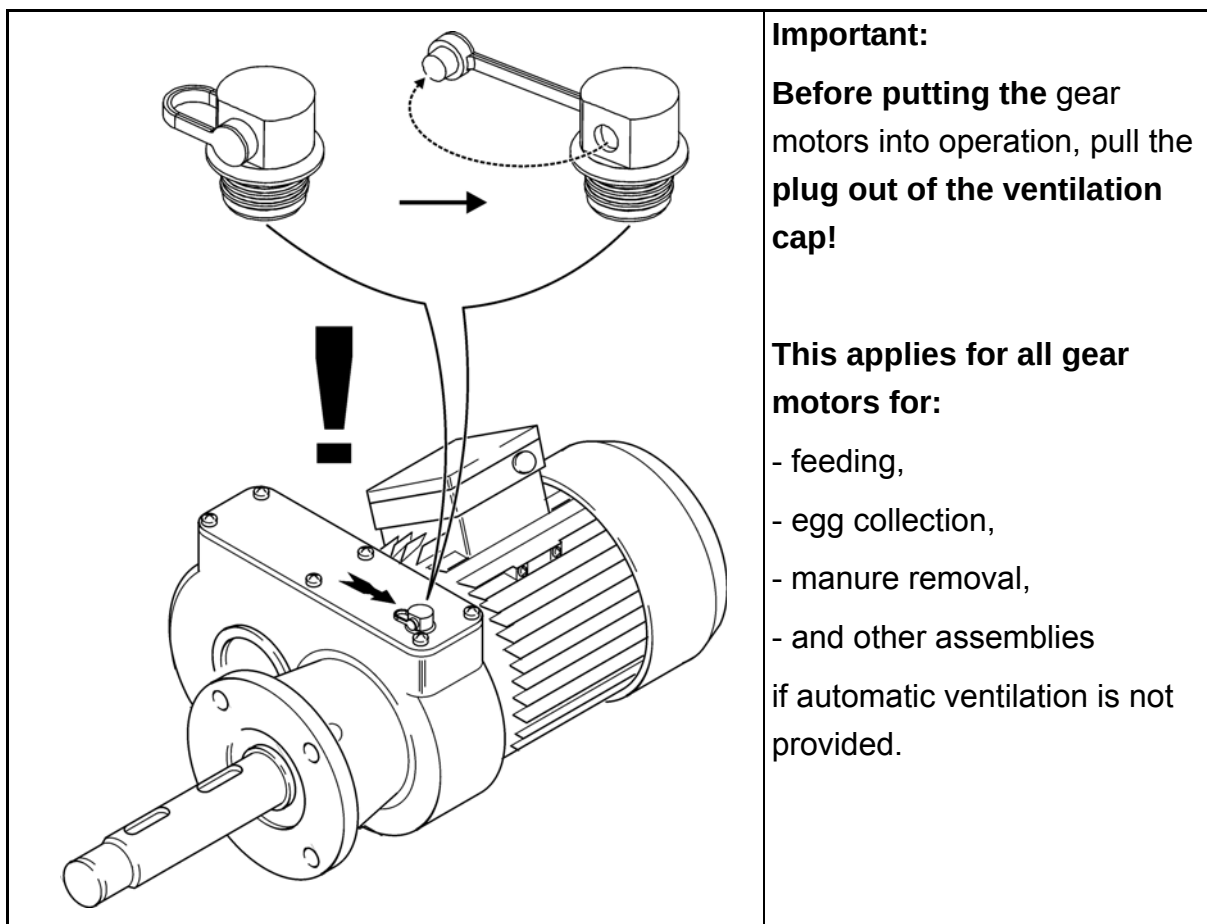
The following uses of the **Big Dutchman** manure drying tunnel OptiPlate are not permitted and are considered as improper use:

- Using the system with organic and inorganic materials not released by Big Dutchman.
- Using the system at air temperatures above 65°C and below 0°C.
- Drying of organic materials below 30% DM.
- Mechanical loads which exceed 10t per tier.
- Using the system outdoors.
- Using the system with layer heights above 20 cm.
- Treating the system with aggressive and / or corrosive substances.
- Using spare parts which are not Big Dutchman-compliant.

A non-designated use will lead to a liability exclusion by **Big Dutchman**.

The operator of the system exclusively bears the risk resulting from misuse!

4 Initial Start-up



The following points **must** be checked before the initial operation:

- Motors run in the right rotating direction.
- The dryer plates are mounted fully functional.
- Function of the emergency stop button is checked.
- All chains are checked for their tension and the chain tensioners are adjusted.
- All protective covers are mounted.
- The system is free of assembly parts and tools.

Before putting the system into operation it must be ensured that there is sufficient manure to adjust the system optimally.

5 Operation

5.1 Main screen AMACS



To access the manure drying overview screen, open the area selection by clicking on the shaded lower right corner in each house view. Click on the manure drying tunnel symbol. The manure drying tunnel overview screen only opens if you have the required rights.

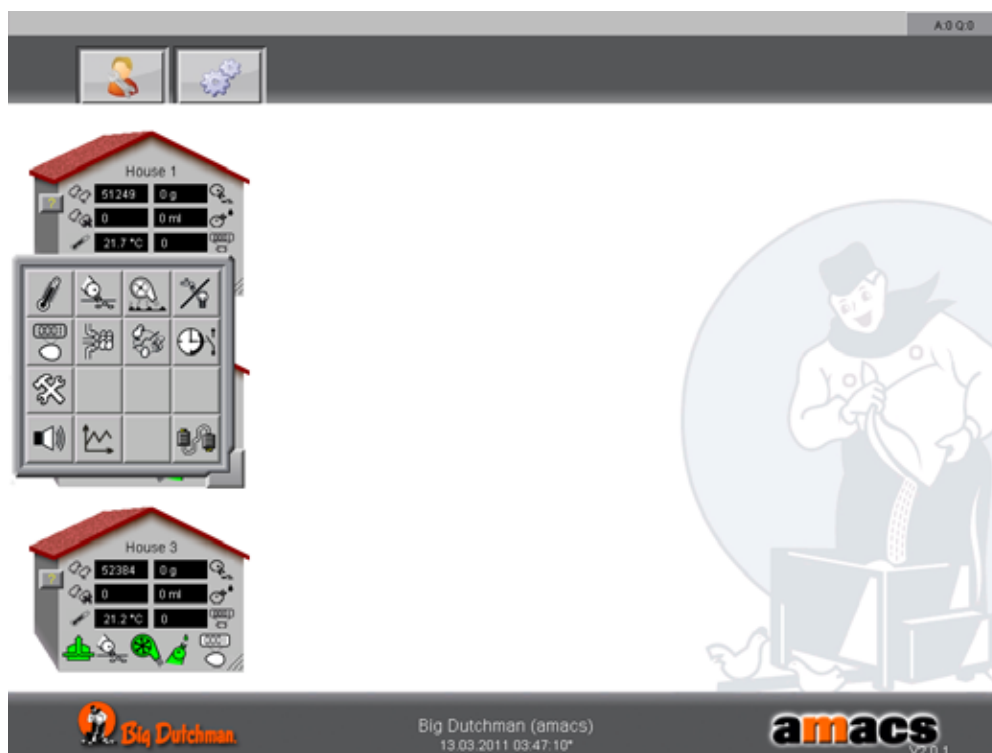


Figure 5-1: Opening the manure drying tunnel

5.2 Manure drying tunnel

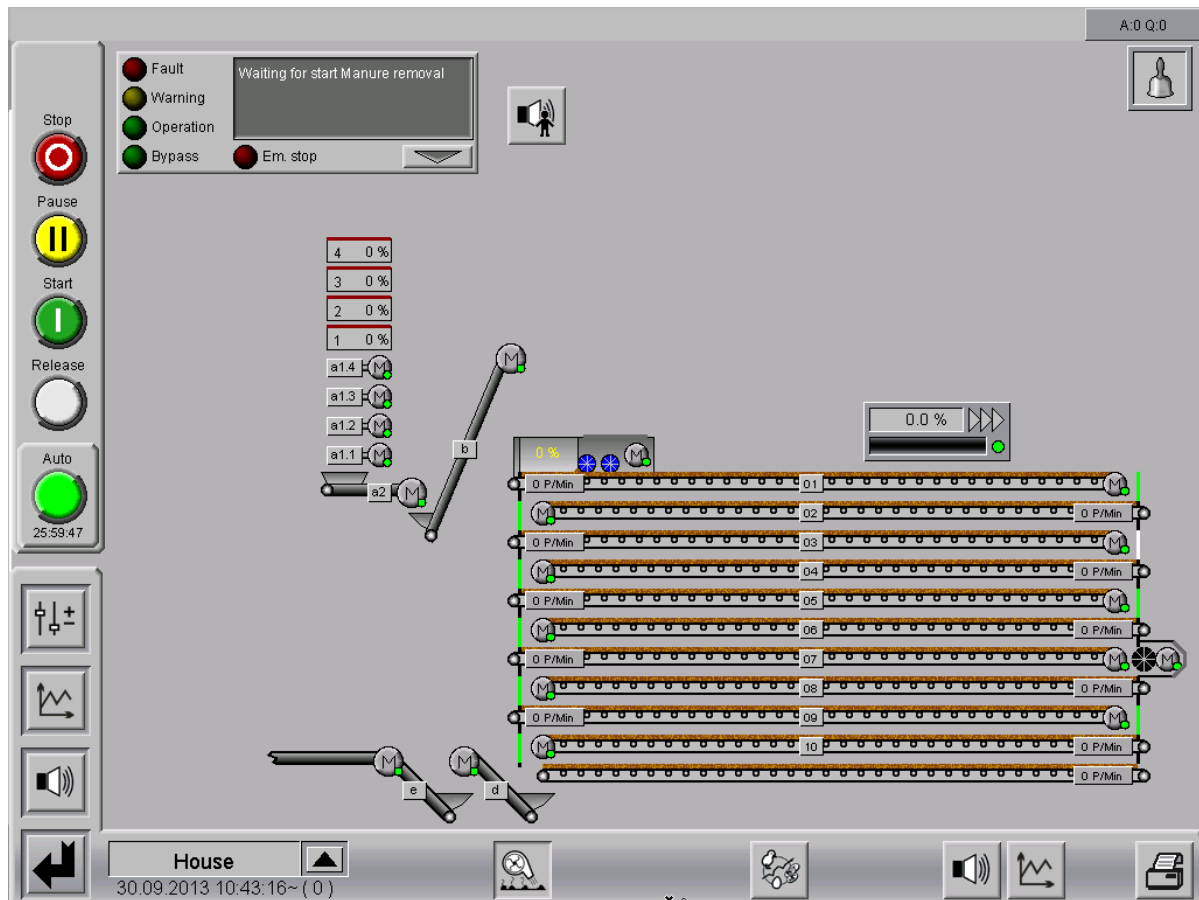
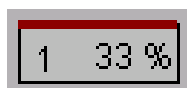


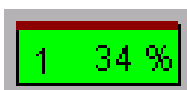
Figure 5-2: Manure drying tunnel in Amacs

5.2.1 Manure removal groups

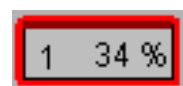
The up to 20 manure removal groups are displayed in a simplified manner by showing their number and current progress. They are assigned to the manure cross belts (a1) in a table in the settings (chapter 5.7.3.3 "Assignment").



The manure removal group is not active.



The manure removal group is active.



The emergency stop of the manure removal group has been triggered.

Clicking on the manure removal group opens a menu with further information. The description entered in the settings is displayed. Additionally, a possible release for this manure removal and a possible actuation of the emergency stop are indicated. The current belt progress is visualised in percent and as a bar graph. Clicking on the area with the rhombuses displays which manure cross belts are required for the manure removal in this group. Manure cross belts which are not required are disabled.

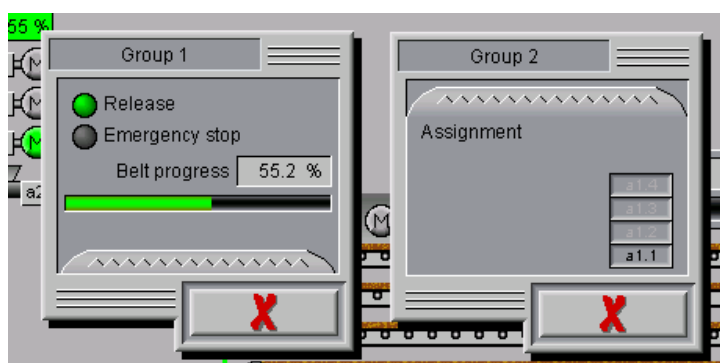


Figure 5-3: Manure removal groups

5.2.2 Feed belts



The status messages of the motors are described in
Section 5.5 "Drives"

- **Manure cross belts [a1.1 - a1.20] see figure 5-4**

The manure drying tunnel is charged by the manure cross belts. The manure cross belts may be situated in one house (in several groups) or in different houses (clients). These may also be simple transfer stations (e.g. supply by trailer).

The manure cross belts are assigned to the manure removal groups in the settings (chapter 5.7.3.3 "Assignment").

- **Transfer belt [a2] see figure 5-4**

A transfer belt may optionally exist. This belt collects the manure from the manure cross belts and conveys it to the vertical conveyor belt.

- **Vertical conveyor belt [b] see figure 5-4**

The vertical conveyor belt supplies the manure drying tunnel with the manure.



5.2.3 Plate drying system OptiPlate

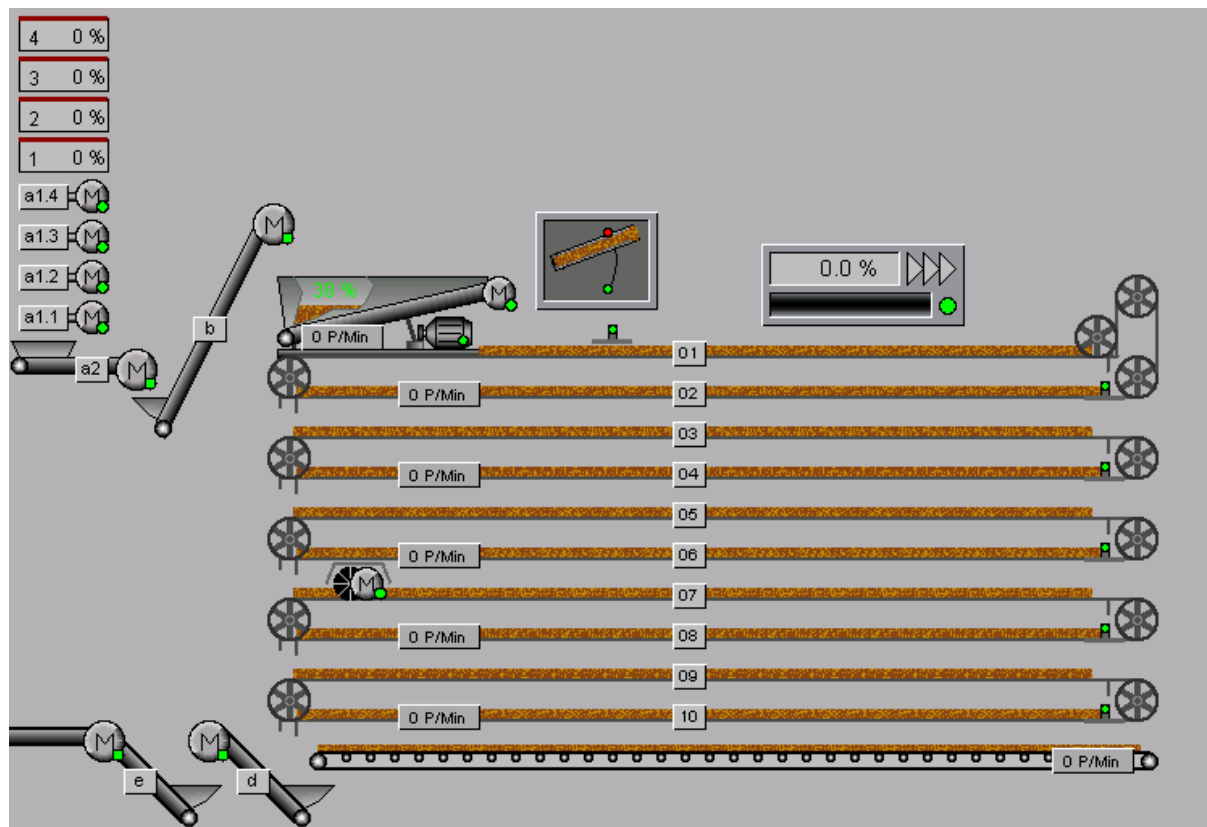
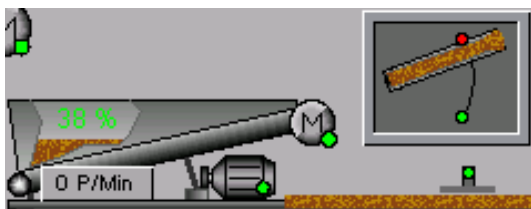


Figure 5-4: Main screen plate drying system

5.2.3.1 Dosing with slewing unit

The dosing unit is integrated into the top level of the manure drying tunnel. Up to four load cells measure the incoming amount of manure. The slewing unit moves one conveyor belt evenly along the entire width of the plates and thus distributes the manure. The speed of the belts and the slewing unit are synchronised.



The movement of the slewing unit is indicated by means of the limit switch's state. The final movement of the previous dosing is completed whenever the slewing unit starts. If the slewing unit is switched on automatically, the slewing

moves are also carried out. The pause times in reverse position are also adhered to.

There are additional options for the slewing unit. These include the possibility for pulse monitoring of the conveyor belt in the slewing unit (see chapter 5.2.3.3 "Tunnel plates").

An additional output for the piloting of a separate frequency converter can also be configured for the speed of the conveyor belt. The set value of the slewing belt can then be adjusted depending on the set value of the tunnel belts.

5.2.3.2 Monitoring of filling level

The filling level monitoring is displayed above the top level. This measures the filling level of the top level and issues an alarm in case of overfilling.

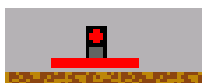
A delay time may be set for the filling level monitoring. The monitoring first warns when the sensor has been triggered. After the delay time has expired, an alarm message is issued and the manure drying tunnel is stopped.



Filling level OK



Filling level exceeded



Filling level exceeded, delay time expired



Filling level OK after exceeding



Monitoring deactivated, filling level OK



Monitoring deactivated, filling level exceeded



This delay time considers the piloting of the level drives, i.e. the delay time does not elapse while the drives are not piloted.

5.2.3.3 Tunnel plates

The tunnel plates on which the manure is dried can optionally be piloted by a frequency transformer. With this control, the tunnel plates are controlled steplessly depending on the filling level of the dosing unit (if the filling level in the dosing unit increases, the tunnel plates' speed increases; if the filling level decreases, the speed does so as well). Load cells measure the filling level of the dosing unit. Above the tunnel plates, the set value of the frequency transformer is displayed in percent depending on the maximum speed.

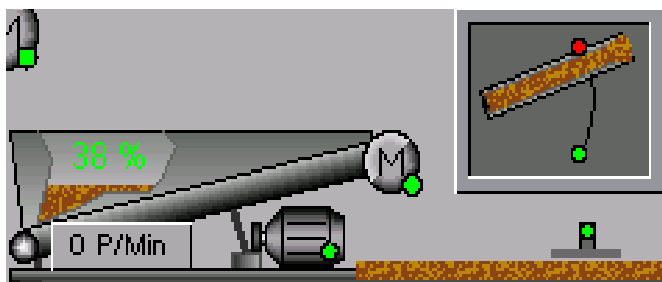


Figure 5-5: Tunnel plates



The status messages of the motors are described in **Section 5.5 "Drives"**

- **Speed monitor**

A pulse monitoring of the plate drying system depending on the system's speed can be configured per double level. The rotations are registered in pulses per minute. In the case of a slip between the drive roller and the tunnel plate, the number of rotations is not passed on, or only passed on partially, to the idler unit. The same applies if the plates jam. Recognition of too low a number of rotations of the idler roller leads to the tunnel being switched off.



Drive switched off



Drive switched on



Drive switched on, maintenance

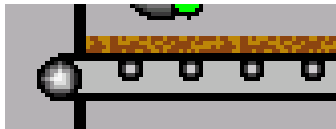




Drive switched off, alarm



Speed monitor deactivated



Speed monitor not existing



The messages generated for the speed monitor of the dirt belt are identical to the messages of the tunnel belt speed monitor (see above).

- **Plate monitoring**

A plate monitoring is also planned for each double level. This monitoring system checks whether the plates are positioned correctly behind the idler unit. If the plate monitoring is triggered, the tunnel immediately stops if it is operated automatically. The manure removal is not interrupted during bypass operation. A manual piloting is still possible as long as no electromechanical lock is installed.



Plate position OK



Plate position triggered



Plate position OK again after having been triggered



Monitoring deactivated, plate position OK



Monitoring deactivated, plate position triggered

5.2.4 Chopper

The chopper consists of a quickly rotating shaft, at which several chain sections and beaters are fastened. They chop up the manure chunks before they are fully dried. The chopper can be installed on any level; however, it should only be used on a level where a good drying degree of the manure has already been reached.

The chopper is equipped with overcurrent monitoring so the tunnel drives are stopped in case of an overload and an alarm message is generated if the overload is not eliminated even though the tunnel drives have been stopped.

Optionally, a digital input can be utilised as an analogue value to register and evaluate the chopper's limit values. Clicking on the chopper opens a menu for manual operation. Clicking on the area with the rhombuses displays the state of the current monitoring as well as the operating hours. Where an analogue current monitoring has been installed, the current load is indicated by a percentage and a bar.

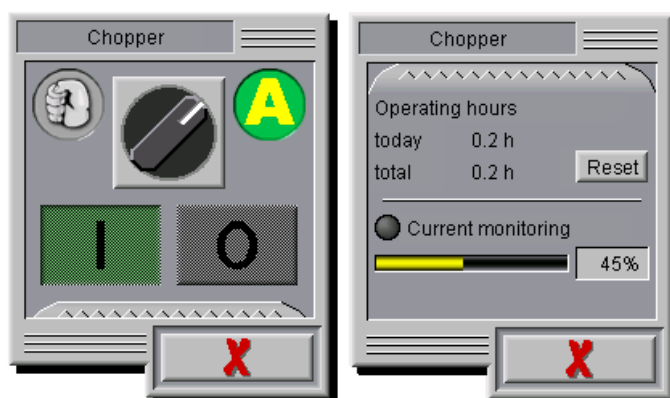
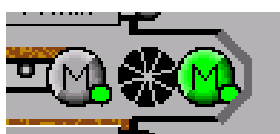


Figure 5-6: Chopper



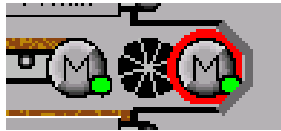
Chopper switched off



Chopper switched on



Service openings open



Protective motor protection switch triggered



Overcurrent warning



Overcurrent fault



The status messages of the motors are described in **Section 5.5 "Drives"**

5.2.5 Dirt belt

- Dirt belt**

Beneath the bottom level, an additional manure belt without perforations is installed, collecting small particles and dust from all levels. When the dry manure is removed, this solid belt is also cleaned, so that the floor beneath the tunnel remains clean.

If the lowest level (dirt belt) has its own drive, it can also be equipped with a speed monitor.



The messages generated for the speed monitor of the dirt belt are identical to the messages of the tunnel belt speed monitor (see above).

5.2.6 Discharge belts

The discharge belts are switched on first for every start of the manure drying tunnel to ensure a secure removal of the dried manure.



The status messages of the motors are described in
Section 5.5 "Drives"

- **Conveyor belt [d] see figure 5-2**

The conveyor belt [d] is a discharge belt which transfers the manure from the tunnel onto the conveyor belt [e].

- **Conveyor belt [e] see figure 5-2**

The conveyor belt [e] is an externally controlled belt. A release contact is required by belt [e] (operating message) for the operation of the tunnel so that the manure drying tunnel can start.



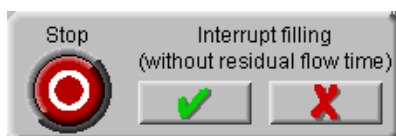
5.3 Operating buttons

The following shown keys correspond to those which also exist at the control cabinet. Thus they have also the same function.



- **Stop**

Stop the filling of manure drying tunnel (observing the set residual flow times of the single conveyor belts, see **chapter 5.7.3.2 "Delay time / Residual flow time"**)



The button for direct stop without residual flow time only exists on the user interface (farm computer and operation on-site).

It appears if a filling is not finished and the stop button was pressed for more than 5 seconds. If the button is not activated within another 10 seconds, it is hidden again.

This may be necessary if e.g. the filling must be stopped due to a defect or fault without having to restart the belts and augers in order to observe the residual flow times.

- **Pause**

Interruption of filling

(Pause is lifted again by pressing the start button)

- **Start**

Start the filling of the manure drying tunnel

- **Enable**

Acknowledgment of alarms for the manure drying tunnel. After a fault (limit position switch, pulse monitoring, emergency stop, etc.) the tunnel filling will only recommence after actuation of the release button.

- **Auto (optional)**

In order to release an automatic start of the manure removal, the system must be checked at least once a day. This check can be acknowledged by means of a push button. The check is always valid for 26 hours; the remaining time is shown below the button.

For the first 24 hours after actuation, the button is lit continually, for the last two hours in a slow rhythm and after the time has expired, the light is turned off.

After the time has expired, no more manure removals are entered into the to-do list. Started removals and the list are completed. A manual start is possible irrespective of an autostart release.



Since Big Dutchman cannot assume liability for such an operation, this optional function is only released after written risk assumption by the operator! A safety briefing must have taken place before.

Please also observe the notes in the manual "Safety instructions for the operation of AMACS"!



5.4 Status messages

In the field "Status messages", information about the current status of the manure drying tunnel is displayed during manure removal.

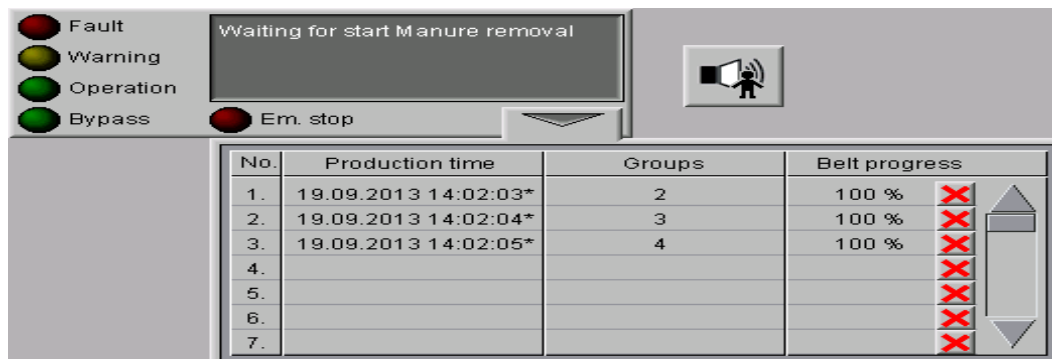


Figure 5-7: Status messages

- Fault**
 A fault is present that has led to the drives being stopped (e.g. emergency stop, limit switch, motor protection).
- Warning**
 A warning has been issued that has not (yet) led to the drives being stopped (e.g. weight in the dosing unit undercut or exceeded, limit switch, pulse monitoring, chopper overcurrent).
- Operation**
 Filling of the manure drying tunnel has started or is active. Some messages only lead to an alarm message (e.g. safety switch on the service openings of the chopper and the dosing unit) when the manure drying tunnel is active.
- Bypass**
 Visualisation of the input status bypass.
- Emergency stop**
 Visualisation of the emergency stop input.
- Information window**
 The information window displays the currently requested manure removal groups and the desired belt progress.

- **Manure removal list**

Pending manure removals triggered by the automatic start are be saved in a list by means of the manure removal groups. Up to 40 pending manure removals may be displayed. If the automatic start triggers further manure removals, the oldest entries on the list are deleted and the new ones added.

The list displays the time of the entry, the group number and the desired belt progress. It is also possible to delete individual entries from the list.

- **Start warning signal**



The warning signal for the start can be triggered manually at any time by clicking on the button in the upper centre of the screen.

**Caution!**

A warning signal is generated before each start of the manure drying tunnel, whether in manual, automatic or bypass mode. This signal is activated three times for one second, with one second pause in-between. Afterwards, there is a pause of five seconds before the request for the belt is released.

5.5 Drives

5.5.1 Manual operation without the control

A control panel opens up by clicking on a drive. Depending on whether the element is set digitally (ON/OFF) or is an analogue element, either a switch or a slide bar appears. The drive can be switched on or off via this element, and/or the operating mode can be switched over from manual to automatic.

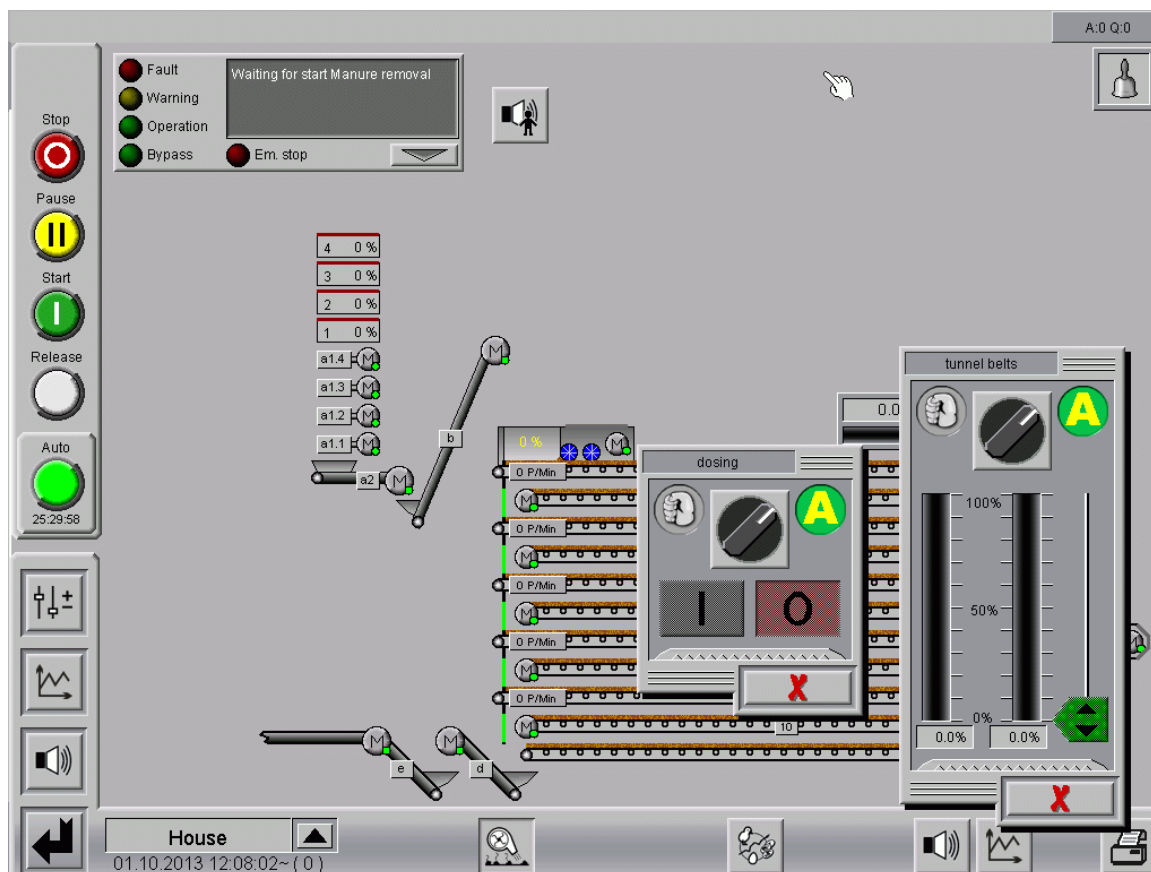


Figure 5-8: Hand-automatic switch



Warning

Work on drives or fans may only be carried out when the protection switch is switched off. The drives are enabled without warning, e.g., by the timers. Observe local safety instructions and regulations!

5.5.2 Operating hours

It is helpful to be able to read off the motors' running times, in order to be able to determine service intervals. With a click on the serrated area, the respective operating hours counter of a component opens.

Here the completed hours are displayed under "today" and "total". The reset button resets the values to 0.

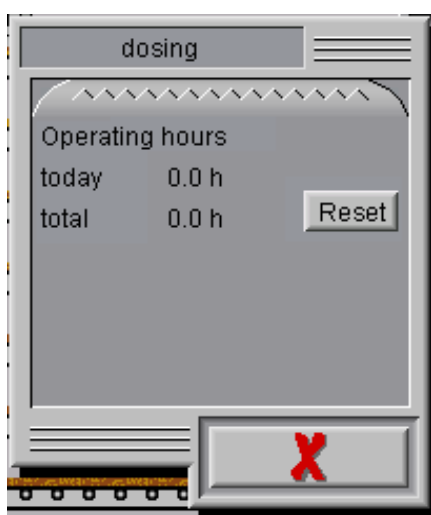


Figure 5-9: Operating hours

5.5.3 Status

You can recognise the status of the respective drive by means of the display:



Drive Off
(Auto)



Drive Off
(Manual)



Drive active



Drive fault
(Protective motor switch)



Drive requested
(only external belt [e], see figure figure 5-2)



Drive active

(with feedback, only external belt [e], see figure 5-2)

5.6 On-site visualization (control cabinet)



The presentation of the on-site visualization is mainly the same as that of the FarmController. The symbols are, however, slightly closer together, in order to be able to present all information on the display.

The functions of the individual elements are explained in this section.

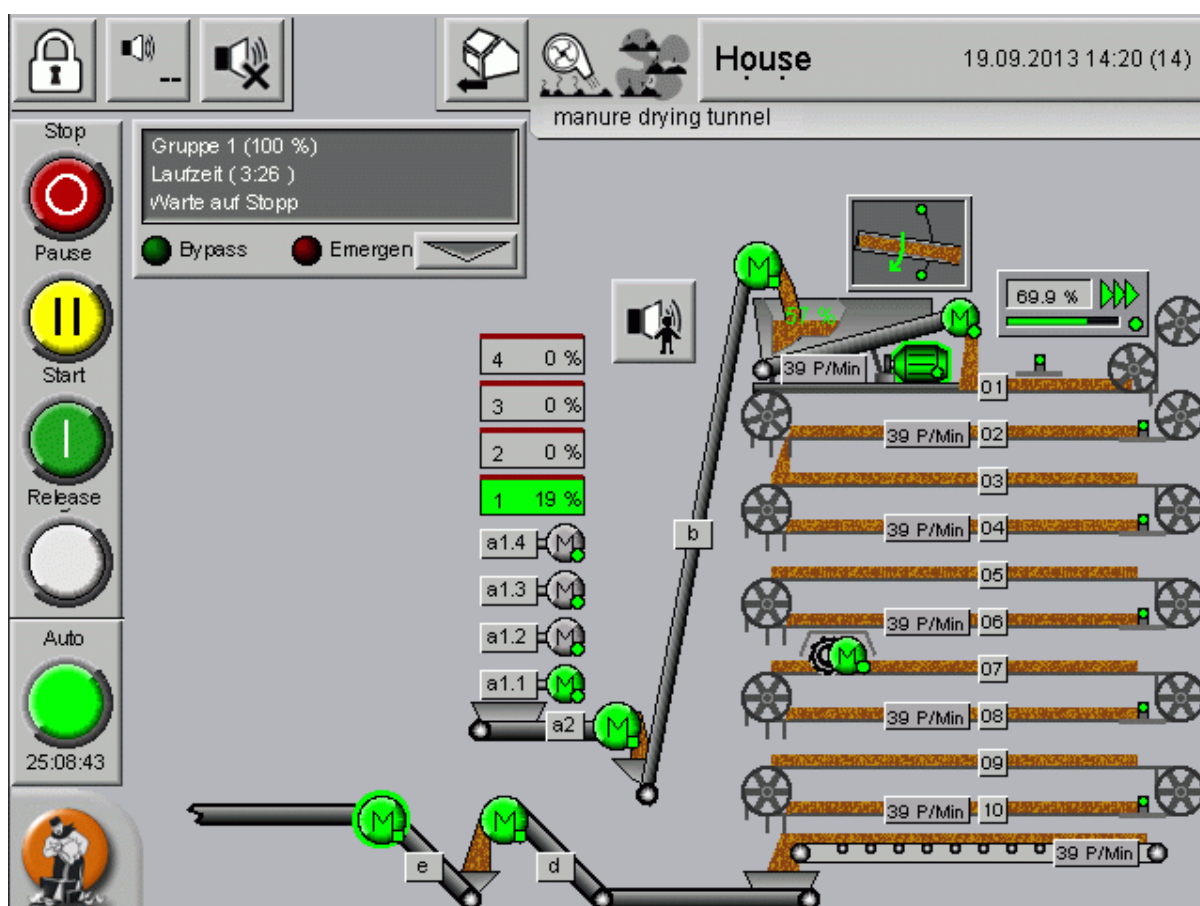
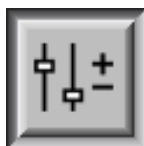


Figure 5-10: Local visualization - OptiPlate

5.7 Adjustment of manure drying tunnel



Clicking on the settings icon opens the overview of the "Manure drying tunnel" parameter input.

Not only the status messages of the drives are displayed, but the dosing, parameters and belt controls can be adjusted as well.

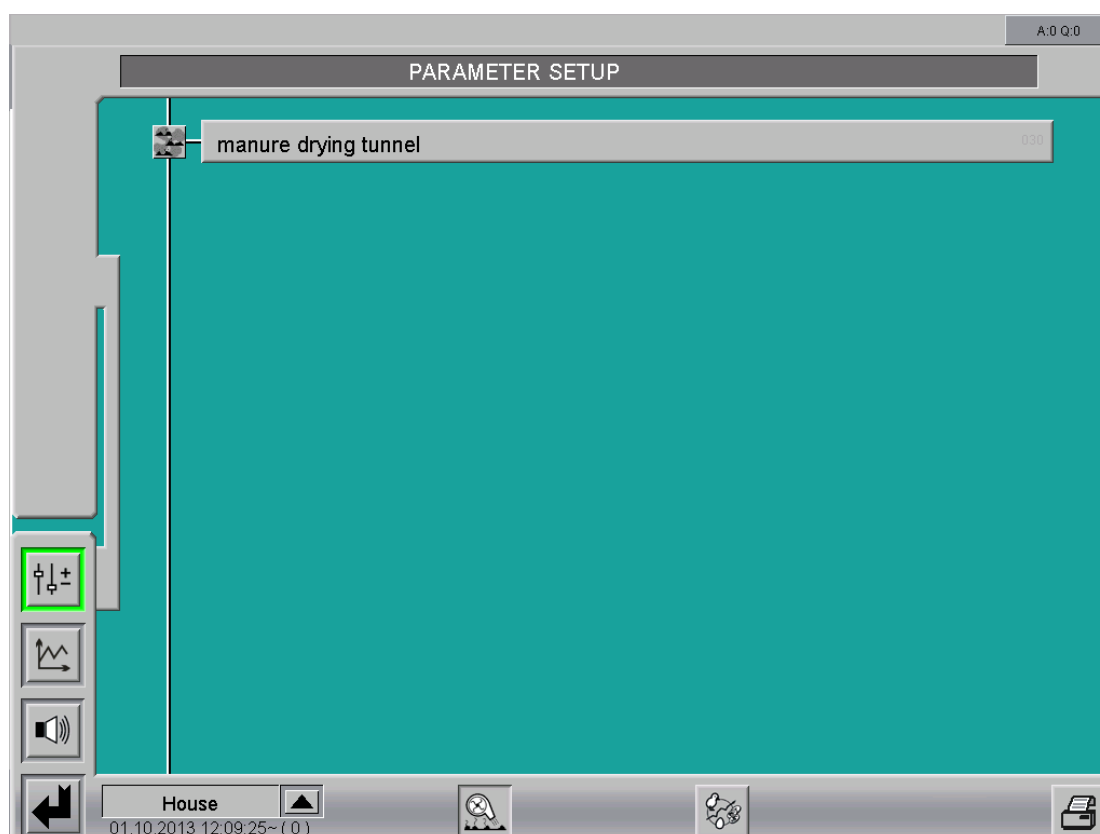


Figure 5-11: Setup

5.7.1 Start settings

On the first page you will find the settings for the start of the manure drying tunnel.

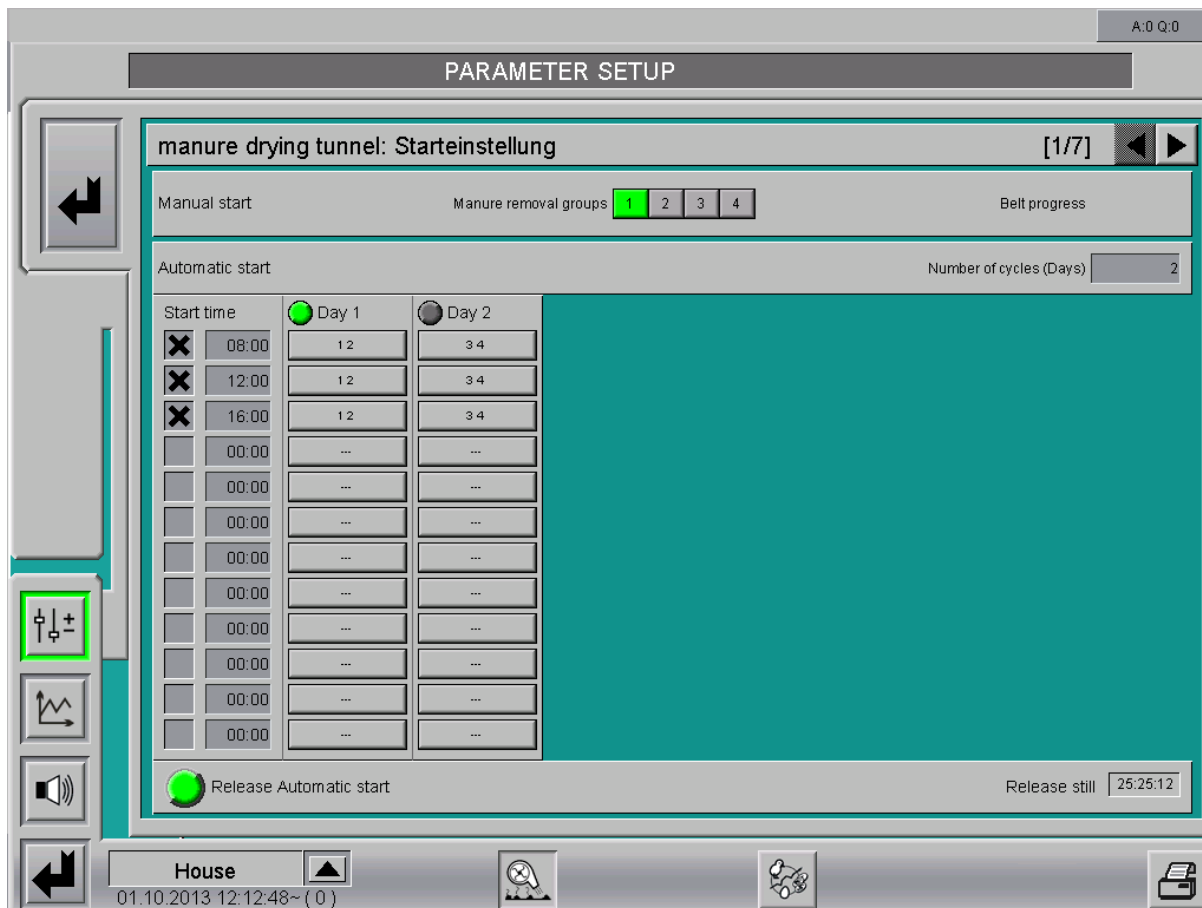


Figure 5-12: Start settings



If only one manure removal group is available, there are no further selection options. This one group is always started. Only the settings for the belt progress appear.



If the selection or the desired progress are changed during an active manure removal, this does not influence the currently active removal. The changes are only considered for the next start.

If there is still a manure removal active, no additional removal can be started manually. The start button is instead used for a restart after a pause or fault.



If no manure removal has been selected or the belt progress has been set to 0 percent, the filling of the manure drying tunnel does not start with the start button.



5.7.1.1 Manual start

Selecting the manure removal groups at the user interface

- If more than one feed belt (manure removal) exists and **"Select delivery at user interface"** was selected in the settings (see 5.7.5.4 "Delivery"), it is possible to choose here the manure removal to be activated in case of a manual start.



Figure 5-13: Manual start

The overview screen indicates the selected groups whose belt progress has been set to a figure higher than zero in green. The settings for the manual start of individual groups can be adjusted in a submenu. The menu can be accessed by clicking on the respective manure removal group.

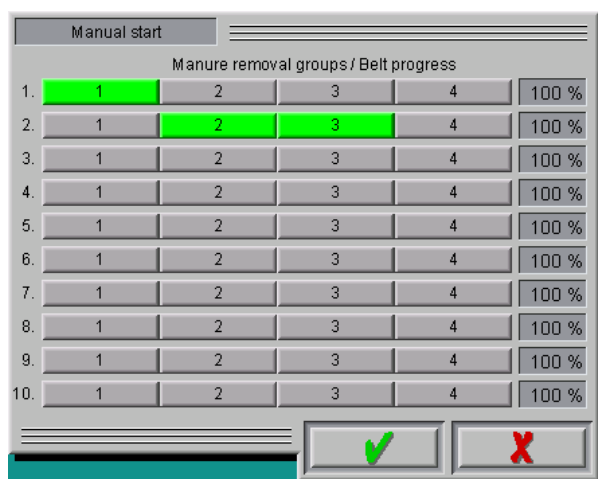


Figure 5-14: Selection manual start

Up to ten manure removal groups can be entered for the start by using the menu. These starts are then automatically carried out successively. For each of these ten manure removal groups, the desired belt progress can be set. It is also possible to activate several groups for one manure removal. The removal for these groups is then carried out simultaneously. The set belt progress applies to all groups in which the manure is removed simultaneously.



All changes are only accepted upon clicking on the button with the green checkmark. Clicking on the button with the red cross abandons all changes.

Selecting the manure removal groups via digital inputs

- If the setting " **Select delivery via digital inputs**" was chosen (see 5.7.5.4 "Delivery"), there is no selection possible here. Only the manure removal group selected with the switch starts. The status of the inputs is displayed as information. For the manure removal in the group, the setting for the desired belt progress is displayed as well. The group is released until it has made the set progress.

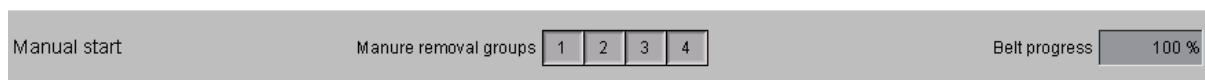


Figure 5-15: Manual start



The presentation of the on-site visualization is mainly the same as that of the FarmController. The symbols are, however, slightly closer together, in order to be able to present all information on the display.

The functions of the individual elements are explained in this section.

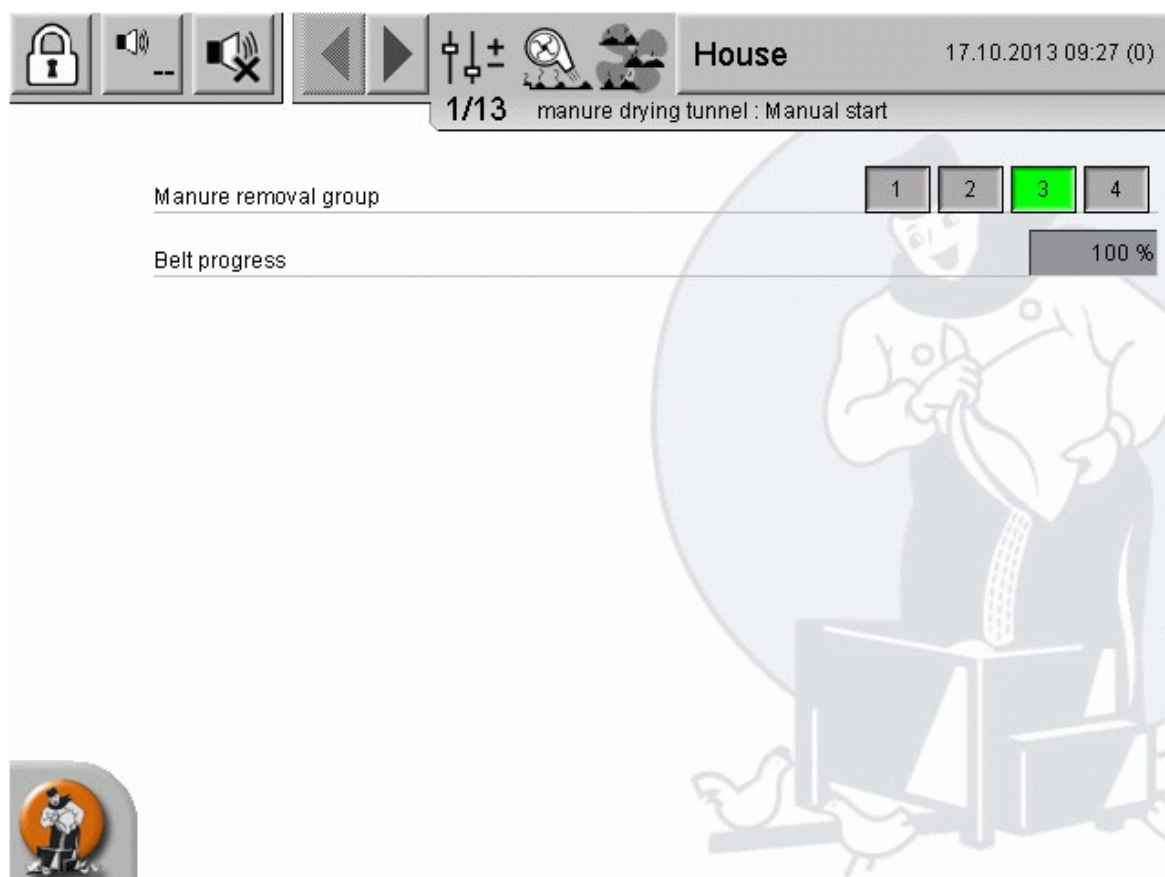


Figure 5-16: Manual start

5.7.1.2 Automatic start (optional)



Since Big Dutchman cannot assume liability for such an operation, this optional function is only released after written risk assumption by the operator! A safety briefing must have taken place before.

Please also observe the notes in the manual "Safety instructions for the operation of AMACS"!

In order to achieve a high flexibility, an interval of several days can be set via the setting **"Number of cycles (days)"**. A setting of up to seven days is possible.

The interval does not depend on weekdays. The current **day** is displayed by the green round button in the day settings. Clicking the button switches to the setting for the respective day.

If a 1-day interval was selected, the display of the current day does not appear.



Caution!

A warning signal is generated before each start of the manure drying tunnel, whether in manual, automatic or bypass mode. This signal is activated three times for one second, with one second pause in-between. Afterwards, there is a pause of five seconds before the request for the belt is released.

Automatic start		Number of cycles (Days) 2	
Start time	☒ Day 1	☐ Day 2	
☒ 08:00	1 2	3 4	
☒ 12:00	1 2	3 4	
☒ 16:00	1 2	3 4	
☐ 00:00	...	...	
☐ 00:00	...	...	
☐ 00:00	...	...	
☐ 00:00	...	...	
☐ 00:00	...	...	
☐ 00:00	...	...	
☐ 00:00	...	...	
☐ 00:00	...	...	
☐ 00:00	...	...	
☐ 00:00	...	...	

☒ Release Automatic start Release still

Figure 5-17: Automatic start

Twelve **start times** can be set and activated. The groups for which the manure is to be removed are displayed on the **groups** button on the respective day and time. The group sequence on the button is not the actual starting sequence. The corresponding menu is accessed by clicking on the respective buttons.

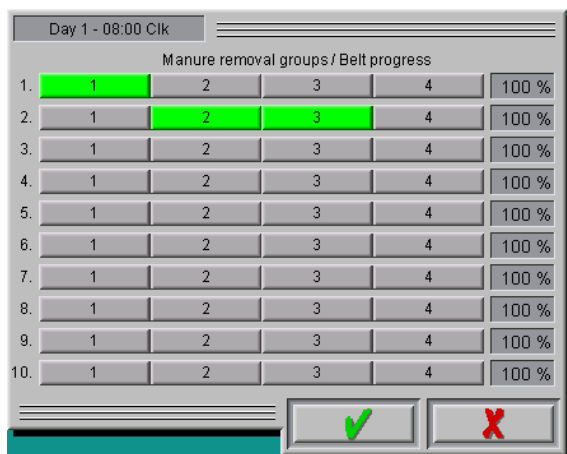


Figure 5-18: Selection automatic start

Up to ten **manure removals** can be defined for the start by using the menu. These starts are then automatically carried out successively. For each of these ten manure removals, the desired **belt progress** and the **manure removal group** can be set. It is also possible to activate several groups for one manure removal. The removal for these groups is then carried out simultaneously. The set belt progress applies to all groups in which the manure is removed simultaneously.



If on one day no delivery is selected for the starting time or the belt progress has been set to 0 %, the manure drying tunnel does not start automatically at this time. If a filling is still active at the starting time, it is listed for manure removal.

Moreover, the button **Release automatic start** is displayed. It has the same meaning and function as in the main screen.



The presentation of the on-site visualization is mainly the same as that of the FarmController. The symbols are, however, slightly closer together, in order to be able to present all information on the display.

The functions of the individual elements are explained in this section.

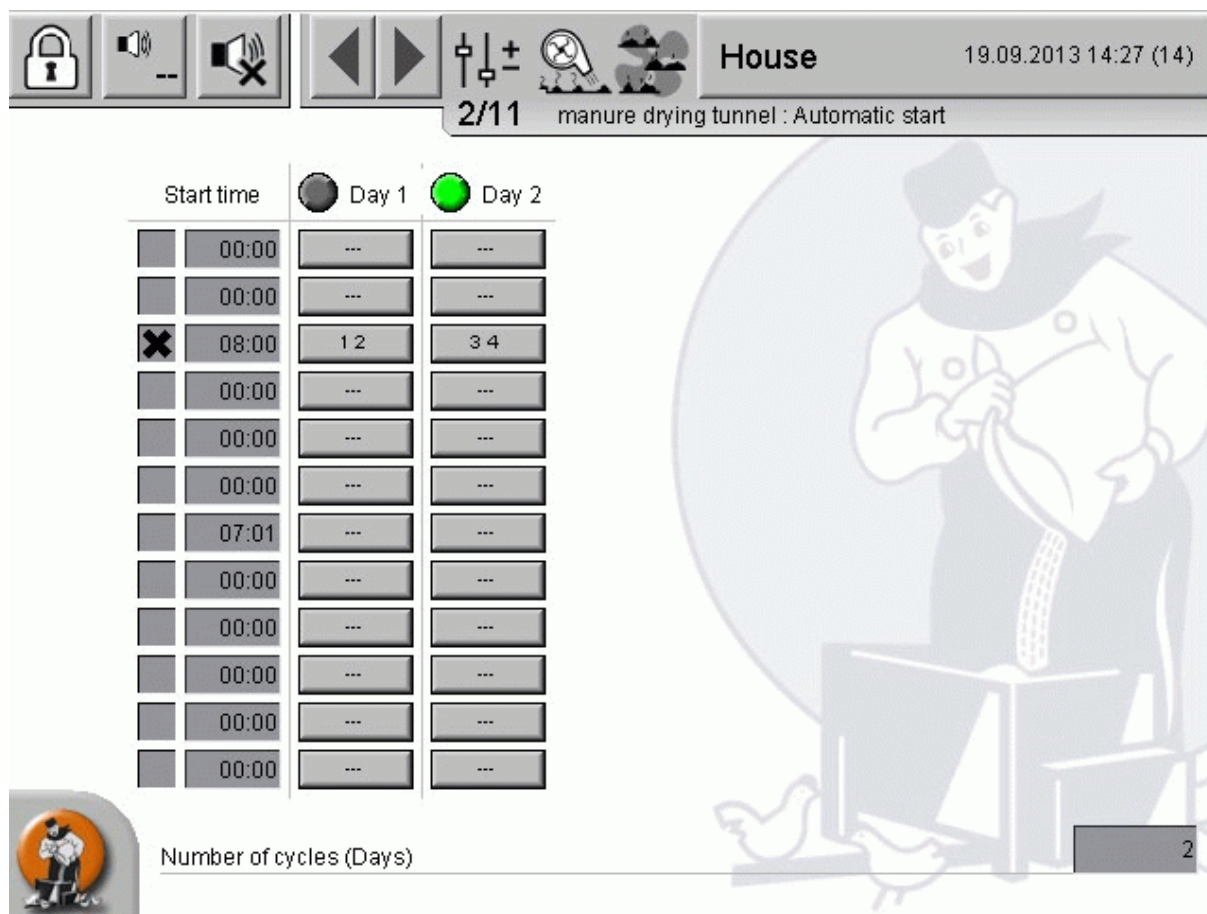


Figure 5-19: Start

5.7.2 Dosing

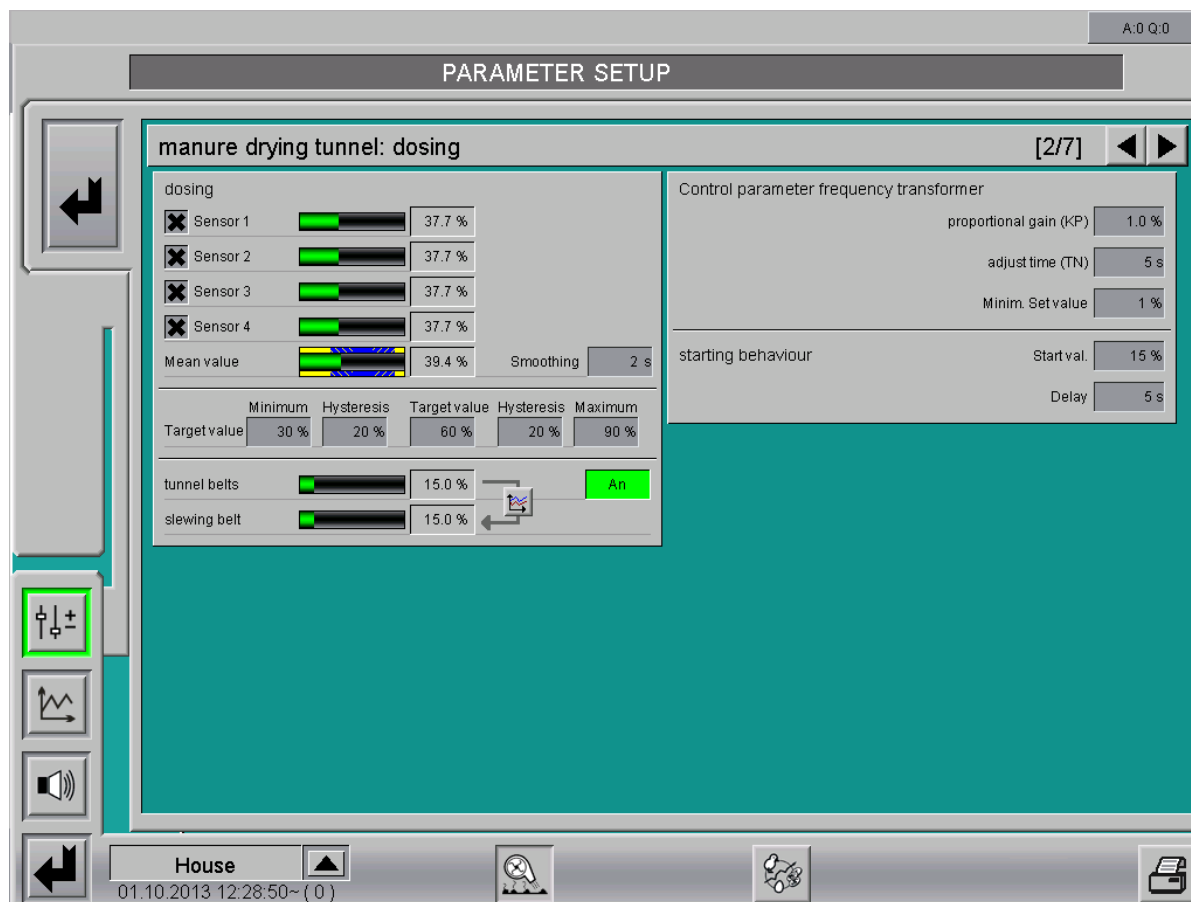


Figure 5-20: Overview

The weight of the material filled in to the dosing unit is determined by up to four electronic load cells (sensors 1 to 4) and required to calculate the speed of the manure drying tunnel.



Tunnel belts and manure feed belts from the house to the tunnel are started and stopped according to the values determined by the load cells!



The presentation of the on-site visualization is mainly the same as that of the FarmController. The symbols are, however, slightly closer together, in order to be able to present all information on the display.

The functions of the individual elements are explained in this section.

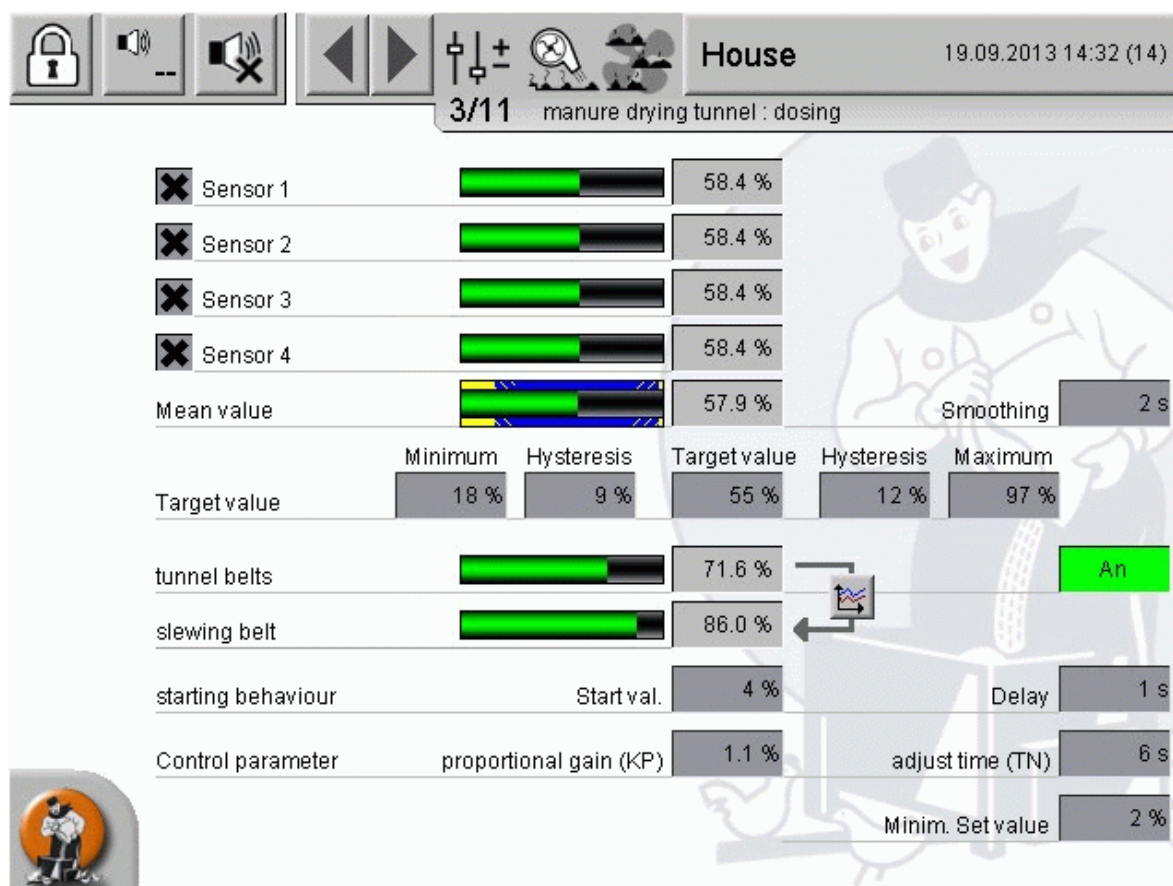


Figure 5-21: Dosing

5.7.2.1 Sensors

The currently measured values of the **sensors** and the smoothed **mean value** for the control are shown numerically and as bar graphs. For a better overview, the settings regarding the minimum and maximum values are shown together with the corresponding hysteresis at the bar graph displaying the mean value. The minimum and maximum areas are displayed in yellow, the respective hysteresis is shaded in blue/yellow.

The minimum and maximum values of the measuring range are defined when putting the system into operation (e.g. minimum = 30 %, maximum = 90 %).

As long as the load cells determine a weight between these values, the tunnel drives as well as the manure conveyor belts will continue to run from the house to the tunnel.

Defective sensors can be deactivated temporarily by removing the "X" in front of the sensor. A maximum number of one sensor has to remain active.

!

Important!

To ensure smooth operation, defective sensors should be replaced immediately.

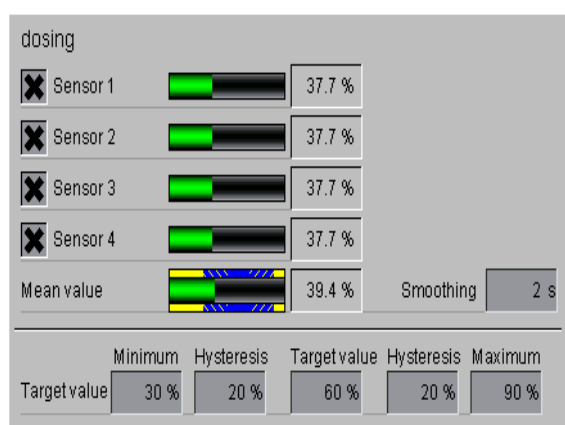


Figure 5-22: Dosing

- **Smoothing**

To ensure that the tunnel drives do not react too sensitively, it is possible to define a time for the smoothing of the sensor value.

- **Target value**

The desired target value for the filling level of the dosing unit is set here.

- **Maximum and hysteresis**

Settings regarding the maximum filling level of the dosing unit can be carried out here. If the maximum value is exceeded, the manure feed stops (belt [b], [a2], [a1]), see figure 5-2). The tunnel drives continue to run so that manure continues to be transported away from the load cells. The value to be measured by the load cells decreases and the manure feed is resumed as soon as it falls below the set hysteresis (maximum minus (-) hysteresis).

- **Minimum and hysteresis**

Settings regarding the minimum filling level of the dosing unit can be carried out here. If the filling level falls below the minimum value, the tunnel drives stop. The manure feed (belt [b], [a2], [a1], see figure 5-2) continues to run from the house to the tunnel so that manure continues to be conveyed to the tunnel. The value to be measured by the load cells increases and the tunnel belts begin to run again as soon as the set hysteresis value (minimum plus (+) hysteresis) is exceeded.

5.7.2.2 Control parameters frequency transformer (optional if FT available)

A PI controller (proportional-integral controller) is used for the frequency-controlled tunnel drives. The corresponding parameters can be set here.

Control parameter frequency transformer	
proportional gain (KP)	1.0 %
adjust time (TN)	5 s
Minim. Set value	1 %

Figure 5-23: Control parameter

- **Proportional gain (KP)**

P part of the PI controller. The more the mean value deviates from the target value, the larger the change to the set value. The closer the mean value approximates the target value, the smaller the change to the set value of the tunnel drives.

- **Adjust time (TN)**

Time factor for the I part of the PI controller. The longer the time period is, the slower the control signal is changed at identical deviation.

- **Minimum set value**

The minimum set value for the frequency transformer ensures that the tunnel drives do not stop if the filling level of the dosing unit is below the target value but above the minimum for an extended period of time.

5.7.2.3 Starting behaviour

The starting behaviour settings ensure that the tunnel drives are piloted with the desired start value for the set delay time at every start. After the delay time has elapsed, the speed control of the drives is released via the sensor values.

starting behaviour	
Start val.	15 %
Delay	5 s

Figure 5-24: Starting behaviour

5.7.2.4 Tunnel drives

The tunnel speed is calculated based on the control parameters and the starting behaviour and is displayed here numerically and as a bar graph. In addition, the piloting of the slewing belt depending on the tunnel drives can be entered here by means of a curve.



Figure 5-25: Tunnel belts

- **Status**

The status display indicates whether the tunnel drives are piloted (An = on / Aus = off).

- **Tunnel belts**

The current set value of the frequency transformer for the speed of the tunnel drives is displayed numerically and graphically here.

- **Slewing belt**

The set value can be influenced in case an individual set value output is available for the piloting of the slewing belt, depending on the piloting of the tunnel drives.



Clicking on the button with the curve symbol opens a menu in which the ratio can be entered into a curve.



The values in this curve are changed and stored as described in the **AMACS Operation User manual chapter Set curves**.



Even if a slewing belt speed is already set for the tunnel belt control of 0 % in the curve settings, the slewing belt is not piloted.

5.7.3 Setting parameters

A:0 Q:0

PARAMETER SETUP

manure drying tunnel: Setting parameter [3/7] ◀ ▶

Manure removal:	Runtime control	60 min
tunnel belts:	Delay pulse monitoring	15 s
☒ Monitoring of filling level	Delay	5 s
Chopper:	Delay Current monitoring	10 s
Minimum	10 %	Maximum 100 %
slewing unit:	Runtime control	20 s
	Waiting time in reverse position	2 s
Stand-by position:	☐ Left ☐ Middle ☐ Right	
dosing:	monitoring time for congestion	30 s

	Delay time	Residual flow time	
conveyor belt a1	5 s	120 s	
conveyor belt a2	5 s	120 s	☒ Bypass
conveyor belt b	5 s	120 s	☐ Bypass
conveyor belt d	5 s	120 s	☒ Bypass
Chopper	5 s	0 s	
tunnel belts		0 s	

Assignment	1	conveyor belt a1.	2	3	4
Group 1	☒	☐	☐	☐	☐
Group 2	☒	☒	☐	☐	☐
Group 3	☐	☒	☒	☐	☐
Group 4	☐	☐	☐	☐	☒

House 01.10.2013 12:47:27~ (0)

Figure 5-26: Setting parameters

5.7.3.1 Monitoring times

During the monitoring times, the system is checked for problems between the drives and the sensors. If the monitoring times are not observed, the manure drying tunnel switches off and an alarm is generated.

Manure removal:	Runtime control	60 min
tunnel belts:	Delay pulse monitoring	15 s
	Delay limit switch	5 s
Chopper:	Delay Current monitoring	10 s
	Minimum	0 %
	Maximum	100 %
dosing:	monitoring time for congestion	30 s

Figure 5-27: Monitoring times - Belt drying system



The presentation of the on-site visualization is mainly the same as that of the FarmController. The symbols are, however, slightly closer together, in order to be able to present all information on the display.

The functions of the individual elements are explained in this section.

Component	Setting	Value
Manure removal	Runtime control	60 min
tunnel belts	Delay pulse monitoring	10 s
	☒ Monitoring of filling level	
	Delay	10 s
Chopper	Delay Current monitoring	10 s
	Minimum	10 %
	Maximum	75 %
slewing unit	Runtime control	20 s
	Waiting time in reverse position	2 s
	Stand-by position:	☐ Left ☐ Middle ☐ Right
dosing	monitoring time for congestion	30 s

Figure 5-28: General settings

- **Runtime control manure removal**

The runtime of the current manure removal is controlled by means of these settings. The manure removal runtime control always applies per manure removal. If the manure removal group is changed without emptying the manure drying tunnel, the runtime is evaluated again. If the manure removal takes longer than the monitoring time, an alarm message "runtime error" is generated. The conveyor belts stop.

This setting is especially useful for the measuring of the belt progress via pulse.



Clicking on the Stop button stops the manure removal even before the desired progress has been reached. The delay times of the drives are considered.

- **Delay pulse monitoring (tunnel drives)**

The pulse monitoring controls the actual speed of the tunnel drives. It is triggered when the expected "pulses per minute" are not met.

If the number of expected pulses is below the set value for a longer time than set as monitoring time here (e.g. due to belt slippage), the warning becomes a fault and the manure removal is interrupted.

- **Delay overcurrent monitoring (chopper)**

The overcurrent monitoring checks the load on the chopper. If an overcurrent is detected, a warning is displayed. If the duration of the overcurrent exceeds the monitoring time set here, the tunnel drives and the feed belts are stopped in order to reduce the load on the chopper.

If an analogue signal can be analysed for the current monitoring of the chopper, it is possible to set a minimum and maximum value for the generation of an alarm in addition to the delay time.

- **Monitoring time for congestion (dosing)**

This monitoring time serves for recognizing a bridging problem in the dosing unit. If the weight in the dosing unit is so large that the supply stops (congestion) and the weight is not reduced within the pre-set time despite switched-on tunnel belts so that the supply can be started again, the manure drying tunnel is stopped and an alarm is generated (see chapter 5.9 "Alarm description").

This shall prevent that the tunnel belts run dry in case the material cannot be transported out of the dosing unit.



- **Monitoring of filling level (tunnel drives)**

The monitoring of the filling level is optional. It monitors the filling level of the manure on the top level and can be activated or deactivated. In addition, a delay time can be set. This delay time considers the piloting of the level drives.

- **Runtime control (slewing unit)**

A runtime control for the OptiPlate slewing unit is possible as well. If the slewing unit does not reach its final position within this time, an alarm is generated to stop the manure drying tunnel.

- **Waiting time in reverse position (slewing unit)**

A waiting time can be set for the direction change of the slewing unit. When the slewing unit reaches a final position, it waits in the reverse position for the set waiting time before moving into the reverse direction.

- **Stand-by position (slewing unit)**

It is possible to set a stand-by position for the slewing unit. If the filling level of the dosing unit is not sufficient to start the tunnel belts, the unit moves into this position. The slewing unit also moves into this position at the end of the manure removal. Several positions can be activated. The slewing unit then stops at the next set position.

5.7.3.2 Delay time / Residual flow time

Here a delay time and a run-on time can be set for each of the conveyor belts shown. The delay time is also observed after an interruption (fault, pause, overfilling of dosing unit, chopper overcurrent). The run-on times are intended to ensure that the conveyor belts are completely emptied after completion of the manure removal process.

	Delay time	Residual flow time	
conveyor belt a1	5 s	120 s	
conveyor belt a2	5 s	120 s	☒ Bypass
conveyor belt b	5 s	120 s	☐ Bypass
conveyor belt d	5 s	120 s	☒ Bypass
Chopper	5 s	0 s	
tunnel belts		0 s	

Figure 5-29: Conveyor belts

- **Conveyor belt**

The set delay and residual flow times of the conveyor belts (belt [a1], [a2], [b] and [d]) serve for the ideal starting and stopping of the system. The times set for the conveyor belt [a1] apply to all manure cross belts a1 [1 to 20].

- **Bypass**

For conveyor belts [a2], [b] and [d] (see figure 5-29) an activation field for "bypass" is displayed. When you click on this field, an "X" appears and the control is informed that this belt is necessary for the bypass mode of the manure removal.

- **Chopper**

The delay time for the chopper is used if the chopper requires a delay time to achieve the operating speed. The tunnel drives will only be switched on after the delay time.

The residual flow time for the chopper ensures that the manure can be removed from it without new manure being fed in. This guarantees that no manure remains in the chopper.

- **Tunnel drives**

The tunnel drives move towards their minimum weighing value at the end of the manure removal and are then piloted independent of the weight value for the set residual flow time. This is to ensure that the dosing unit / the slewing belt are completely empty so that no manure remains in the tunnel.



The presentation of the on-site visualization is mainly the same as that of the FarmController. The symbols are, however, slightly closer together, in order to be able to present all information on the display.

The functions of the individual elements are explained in this section.

	Delay time	Residual flow time	
conveyor belt a1	5 s	120 s	
conveyor belt a2	5 s	120 s	Bypass (Used)
conveyor belt b	5 s	120 s	Bypass (Used)
conveyor belt d	5 s	120 s	Bypass (Used)
Chopper	5 s	0 s	
tunnel belts		0 s	

Figure 5-30: Conveyor belts

5.7.3.3 Assignment

With this assignment table, it is possible to freely select the a1 conveyor belts [1 to 20] required for the manure removal in one group. The a1 belts can thus be used individually by several groups. It may also be the case that some groups do not need a1 belts. Changes to these assignments influence active manure removals, as well. If several manure removal groups are active simultaneously, all required a1 belts are piloted for this group.

Assignment	conveyor belt a1.			
	1	2	3	4
Group 1	☒	☐	☐	☐
Group 2	☒	☒	☐	☐
Group 3	☐	☒	☒	☐
Group 4	☐	☐	☐	☒

Figure 5-31: Assignment



The presentation of the on-site visualization is mainly the same as that of the FarmController. The symbols are, however, slightly closer together, in order to be able to present all information on the display.

The functions of the individual elements are explained in this section.

House
19.09.2013 14:43 (14)

6/11
manure drying tunnel : Assignment

Assignment	conveyor belt a1			
	1	2	3	4
Group 1	☒	☐	☐	☐
Group 2	☒	☒	☐	☐
Group 3	☐	☒	☒	☐
Group 4	☐	☐	☐	☒

Figure 5-32: Assignment

5.7.4 Manure removal groups

The manure removal groups (groups 1 to 20) are assigned manure cross belts for an automatic manure removal. The name of the manure removal group can be entered in this display. Additionally, the current progress is displayed numerically and graphically. The manure removal groups must be calibrated beforehand so their progress can be registered. By default, the belt progress of the feed belts is measured on a time basis. If a pulse sensor has been installed for progress determination, a selection between "**time-controlled**" and "**pulse-controlled**" determination is possible.

- In case of a time-controlled procedure, the **Time for 100% progress** is to be set for the respective feed belt.
- In case of a pulse-controlled procedure, the **Pulses for 100% progress** are to be set.



Figure 5-33: Belt progress



The progress is reset every day at midnight(00:00). If a filling is still active at that point, the progress is reset after the filling has been completed.

The procedure can be changed and the values can be modified at any time. The progress will then be measured from the current position.

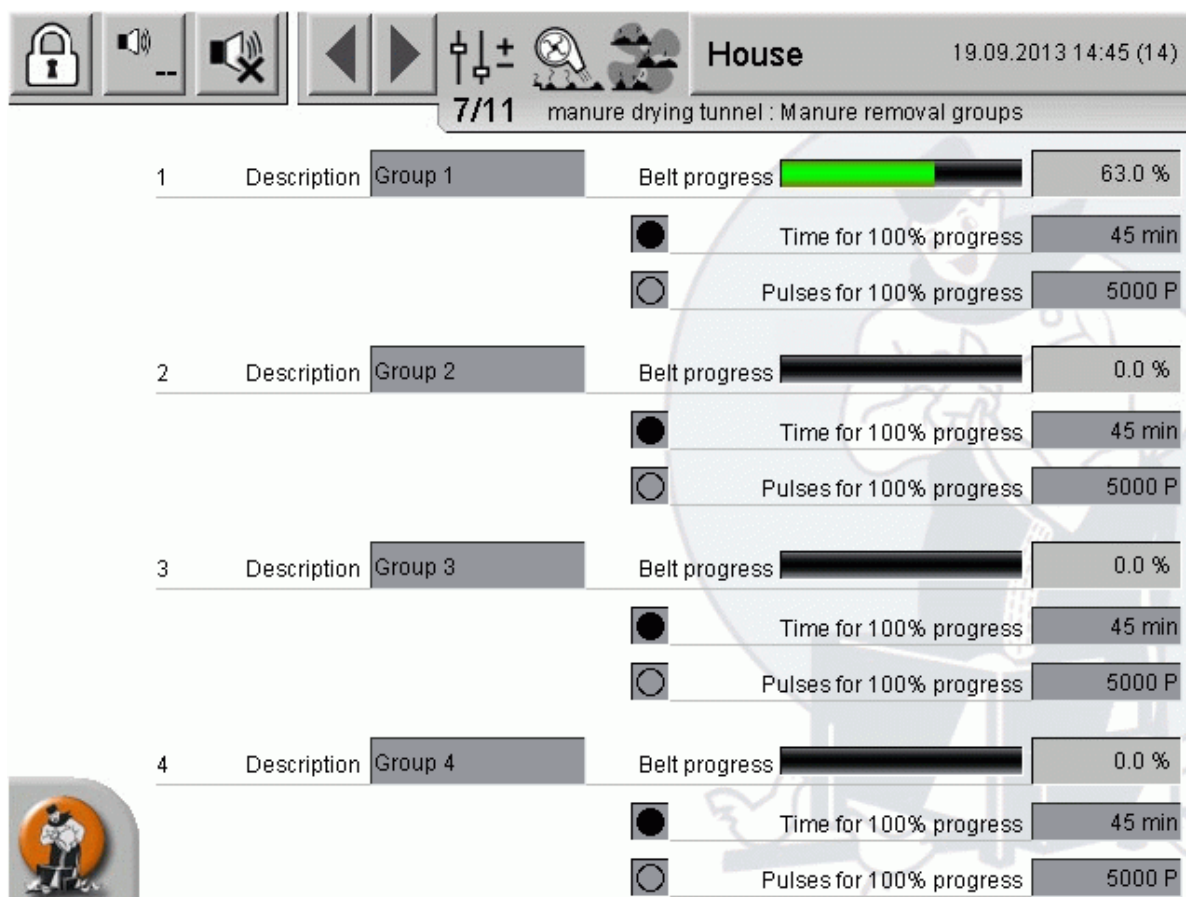


Figure 5-34: Belt progress



The presentation of the on-site visualization is mainly the same as that of the FarmController. The symbols are, however, slightly closer together, in order to be able to present all information on the display.

The functions of the individual elements are explained in this section.

5.7.5 Status of conveyor belts

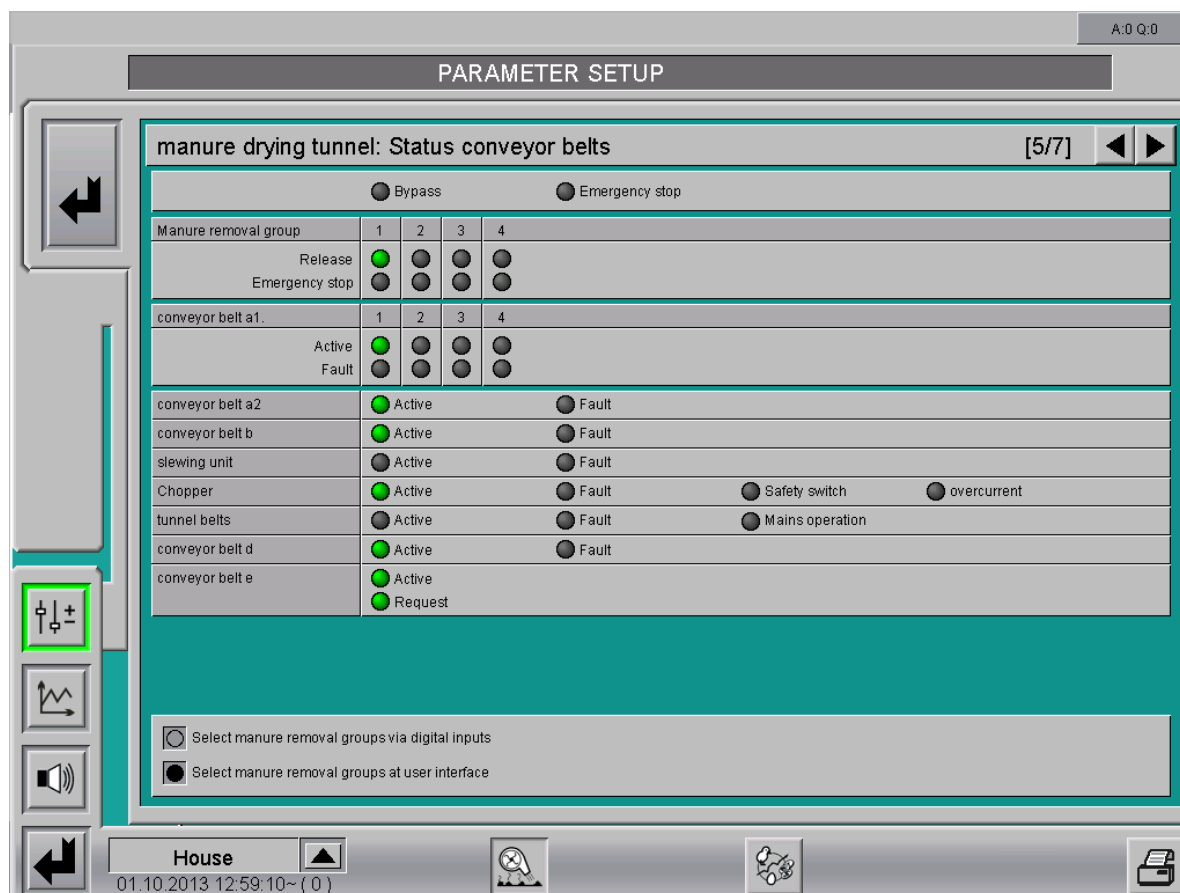


Figure 5-35: Status conveyor belts

- Bypass**

Here it is indicated whether a tunnel- or bypass operation is activated (selection key at the control cabinet).



Caution

If the operation mode is set to bypass while a manure removal is active, the manure drying tunnel pauses.

- Emergency stop**

The current status of the emergency stop circuit is displayed (grey = OK; red = triggered)

5.7.5.1 Manure removal group

Manure removal group	1	2	3	4
Release				
Emergency stop				

Figure 5-36: Manure removal group

	Description	Status
Release	Release manure removal group	grey = off green = on
Emergency stop	Status emergency stop circuit manure removal	grey = OK red = triggered

Table 5-1: Conveyor belt

5.7.5.2 Conveyor belt [a1]

conveyor belt a1.	1	2	3	4
Active				
Fault				

Figure 5-37: Supply

	Description	Status
Active	Status output / drive	grey = off green = on
Fault	Status protective motor switch	grey = OK red = fault

Table 5-2: Conveyor belt [a1]

5.7.5.3 Tunnel drives

conveyor belt a2	 Active	 Fault		
conveyor belt b	 Active	 Fault		
slewing unit	 Active	 Fault		
Chopper	 Active	 Fault	 Safety switch	 overcurrent
tunnel belts	 Active	 Fault	 Mains operation	
conveyor belt d	 Active	 Fault		
conveyor belt e	 Active  Request			

Figure 5-38: Tunnel drives

- Conveyor belt [a2] (optional)**

	Description	Status
Active	Status output / drive	grey = off green = on
Fault	Status protective motor switch	grey = OK red = fault

Table 5-3: Conveyor belt [a2]

- Conveyor belt [b]**

	Description	Status
Active	Status output / drive	grey = off green = on
Fault	Status protective motor switch	grey = OK red = fault

Table 5-4: Conveyor belt [b]

- Dosing / slewing unit**

	Description	Status
Active	Status output / drive	grey = off green = on
Fault	Status protective motor switch	grey = OK red = fault
Safety switch	Status safety switch Dosing unit	grey = OK red = triggered

Table 5-5: Dosing

- **Chopper**

	Description	Status
Active	Status output / drive	grey = off green = on
Fault	Status protective motor switch	grey = OK red = fault
Overcurrent	Status overcurrent monitoring	grey = OK red = fault
Safety switch	Status safety switch	grey = OK red = triggered

Table 5-6: Chopper

- **Tunnel drives**

	Description	Status
Active	Status output / drive	grey = off green = on
Fault	Status protective motor switch	grey = OK red = fault

Table 5-7: Tunnel drives

- **Conveyor belt [d]**

	Description	Status
Active	Status output / drive	grey = off green = on
Fault	Status protective motor switch	grey = OK red = fault

Table 5-8: Conveyor belt [d]

- **Conveyor belt [e]**

	Description	Status
Demand	Status demand ext. belt	grey = off green = on
Active	Status switched on	grey = off green = active

Table 5-9: Conveyor belt [e]

5.7.5.4 Delivery

Here it can be selected whether the selection of the deliveries to be activated shall be effected at the user interface (**Select delivery at user interface**) or via digital inputs (**Select delivery via digital inputs**).

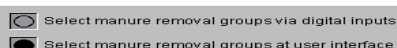


Figure 5-39: Delivery



The settings for the selection are only available if more than one delivery is possible. They are usually carried out by the service technician during initial operation.



The presentation of the on-site visualization is mainly the same as that of the FarmController. The symbols are, however, slightly closer together, in order to be able to present all information on the display.

The functions of the individual elements are explained in this section.

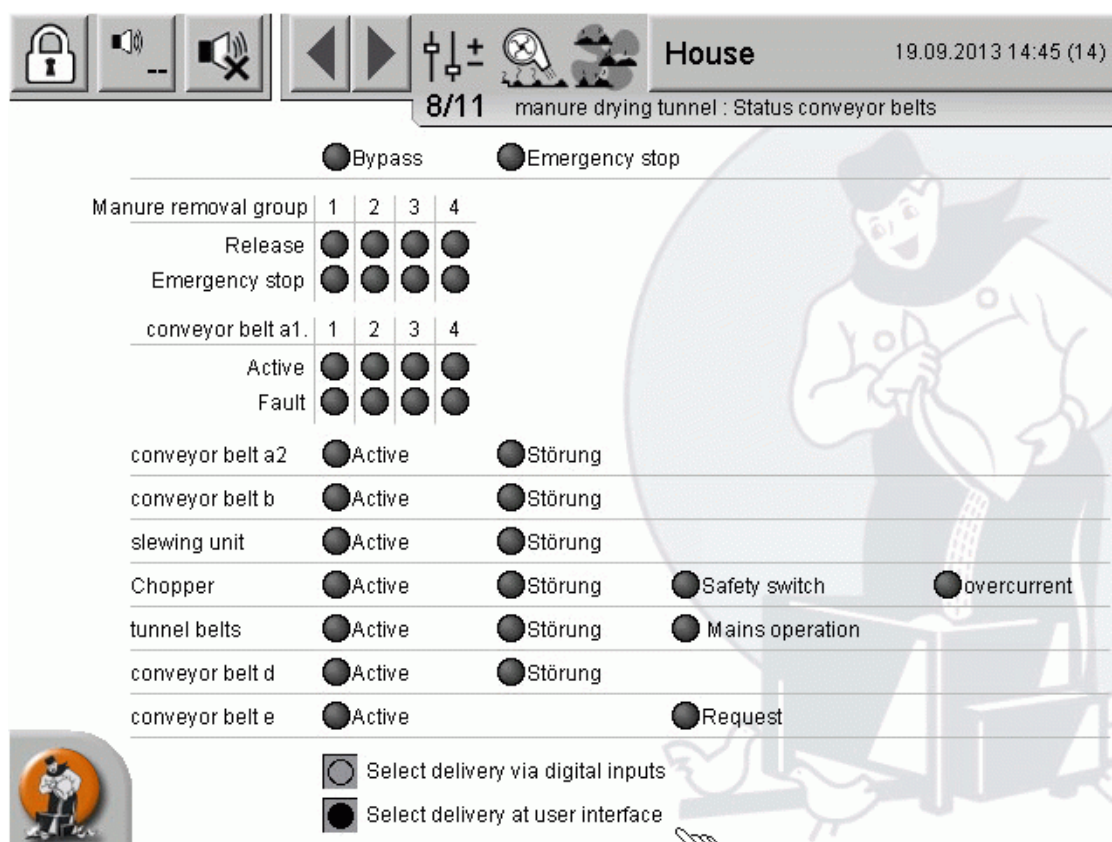


Figure 5-40: Conveyor belts

5.7.6 Belt controls

The belt controls of the slewing belt, level and dirt belt can be set and calibrated individually here. In addition, the current sensor values (limit switch / plate monitoring) and the resulting states are displayed.

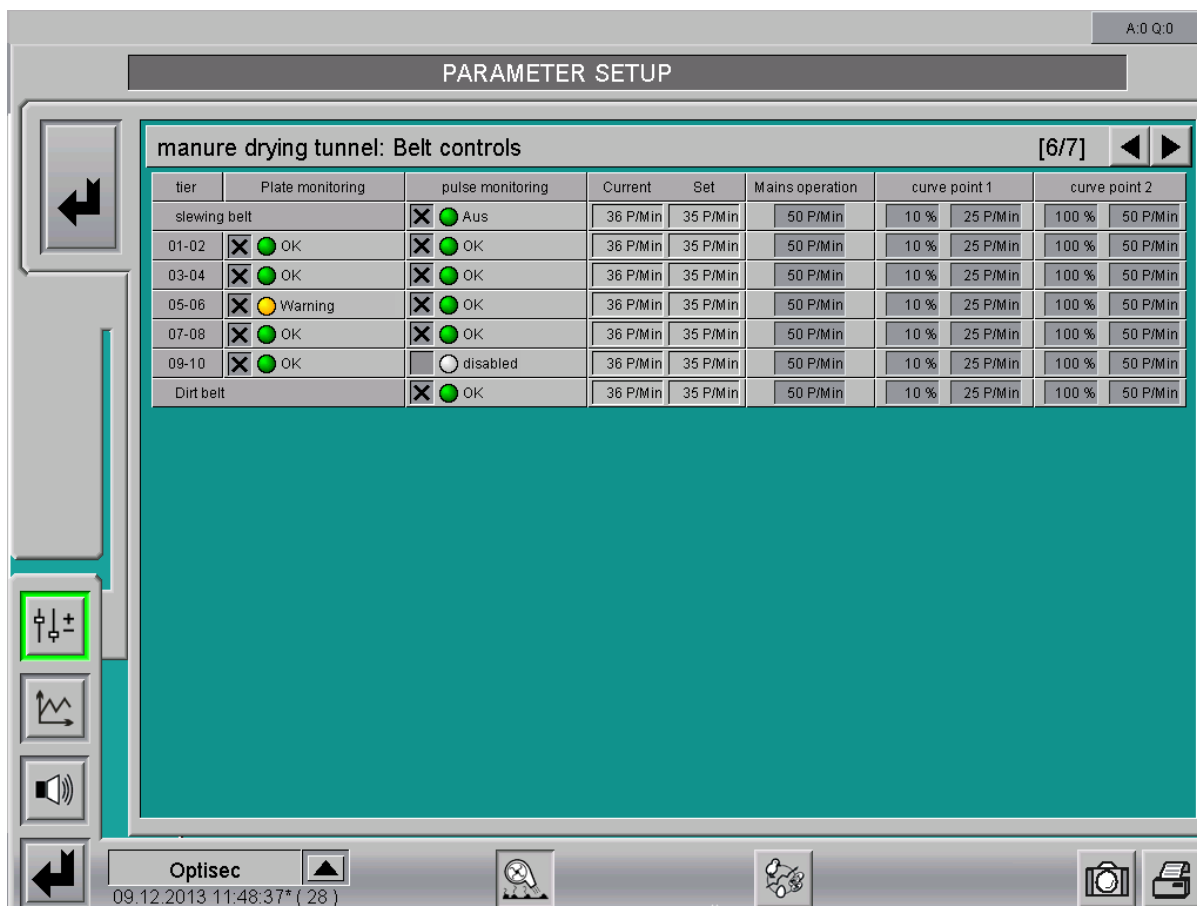


Figure 5-41: Belt controls

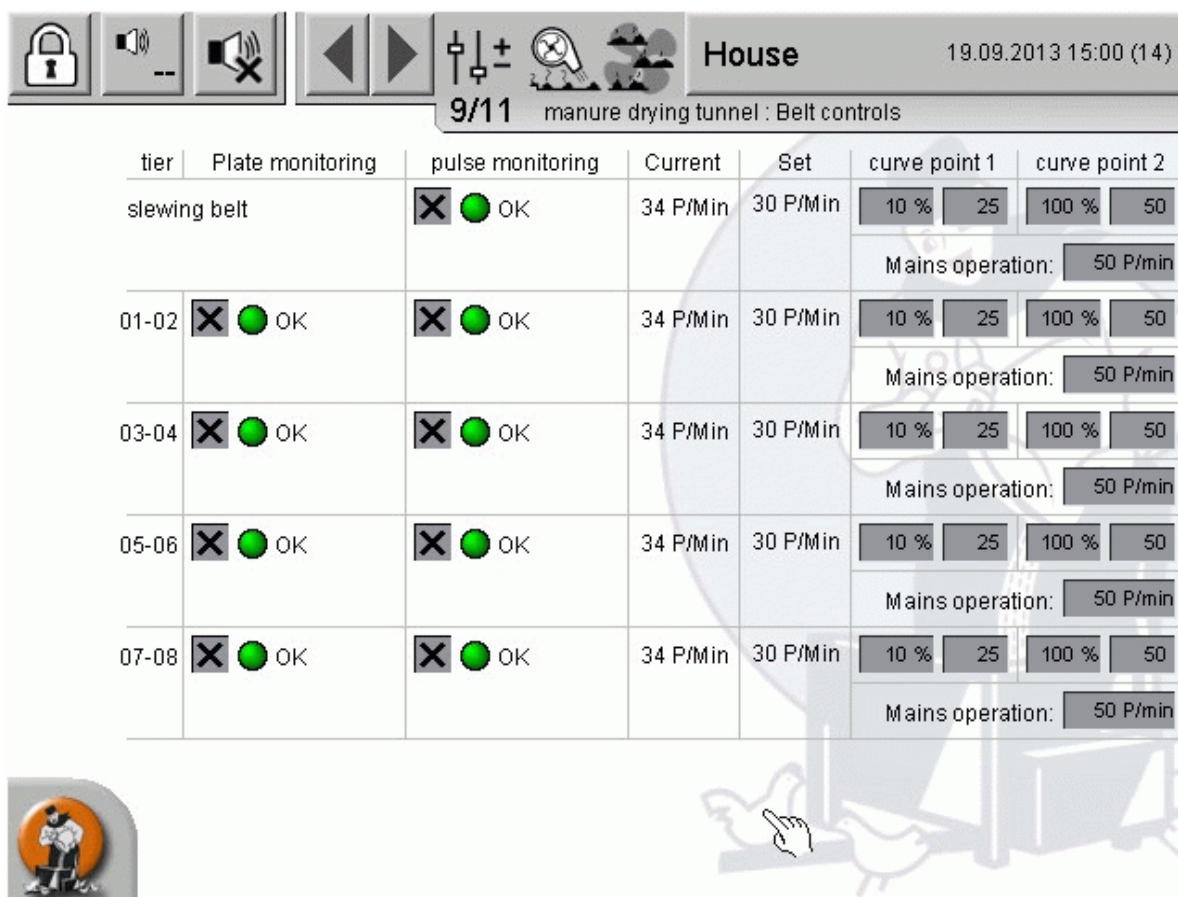
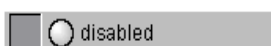


Figure 5-42: Belt controls at the on-site visualisation

5.7.6.1 Limit switch

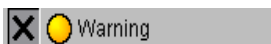


Limit switch deactivated



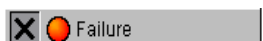
Limit switch in position

Warning limit switch



The limit switch has triggered, the delay time has not yet been exceeded.

Alarm limit switch



The limit switch has triggered and the delay time has been exceeded.

5.7.6.2 Plate monitoring



Plate monitoring deactivated



Plate monitoring activated



Alarm plate monitoring

The plate monitoring has been triggered.

5.7.6.3 Pulse monitoring



Speed monitor deactivated



Drive switched off



Drive switched on

Warning pulse monitor



The speed is below the target value but the delay time has not yet been exceeded.

Alarm pulse monitor



The speed is below the target value and the delay time has been exceeded.

5.7.6.4 Characteristic points of the pulse monitor

In order to be able to monitor the speed of the tunnel belts, the expected pulses per minute (target) are calculated and compared with the current pulses per minute (actual).

The expected pulses per minute result from the current speed, which interpolates with the two characteristic points and summed with the time.

In the settings for the pulse monitoring, a value for the **mains operation** can now be set for single and double levels. This setting also appears if the tunnel drives are not equipped with a frequency transformer. In case of only one speed, the frequency transformer is used to simplify the settings for pulse monitoring.

Current	Set	Mains operation	curve point 1		curve point 2	
36 P/Min	35 P/Min	50 P/Min	10 %	25 P/Min	100 %	50 P/Min
36 P/Min	35 P/Min	50 P/Min	10 %	25 P/Min	100 %	50 P/Min
36 P/Min	35 P/Min	50 P/Min	10 %	25 P/Min	100 %	50 P/Min

Figure 5-43: Characteristic points of the pulse monitor



Perform the following cycle for characteristic points 1 and 2 as well as for each tier with a pulse monitor.

1. When calibrating the characteristic points you must manually specify a fixed set value for the tunnel belts (e.g. 10% for characteristic point 1 and 100% for characteristic point 2).
2. The set value must be entered in the field % for the respective characteristic point/tier.
3. When the pulses per minute have stabilised, you can read them off here or on the main screen and enter them in the field P/min.

5.7.7 Influence by free alarms

Free manure drying alarms can now optionally stop manure drying tunnels in automatic mode. A manual operation is also possible. For each free alarm, it is possible to select whether the manure removal in tunnel mode or bypass mode is stopped in case of an alarm. The current state of the free alarm is also displayed as information. Up to ten free alarms are possible to include additional alarms and to allow for a flexible alarm configuration.

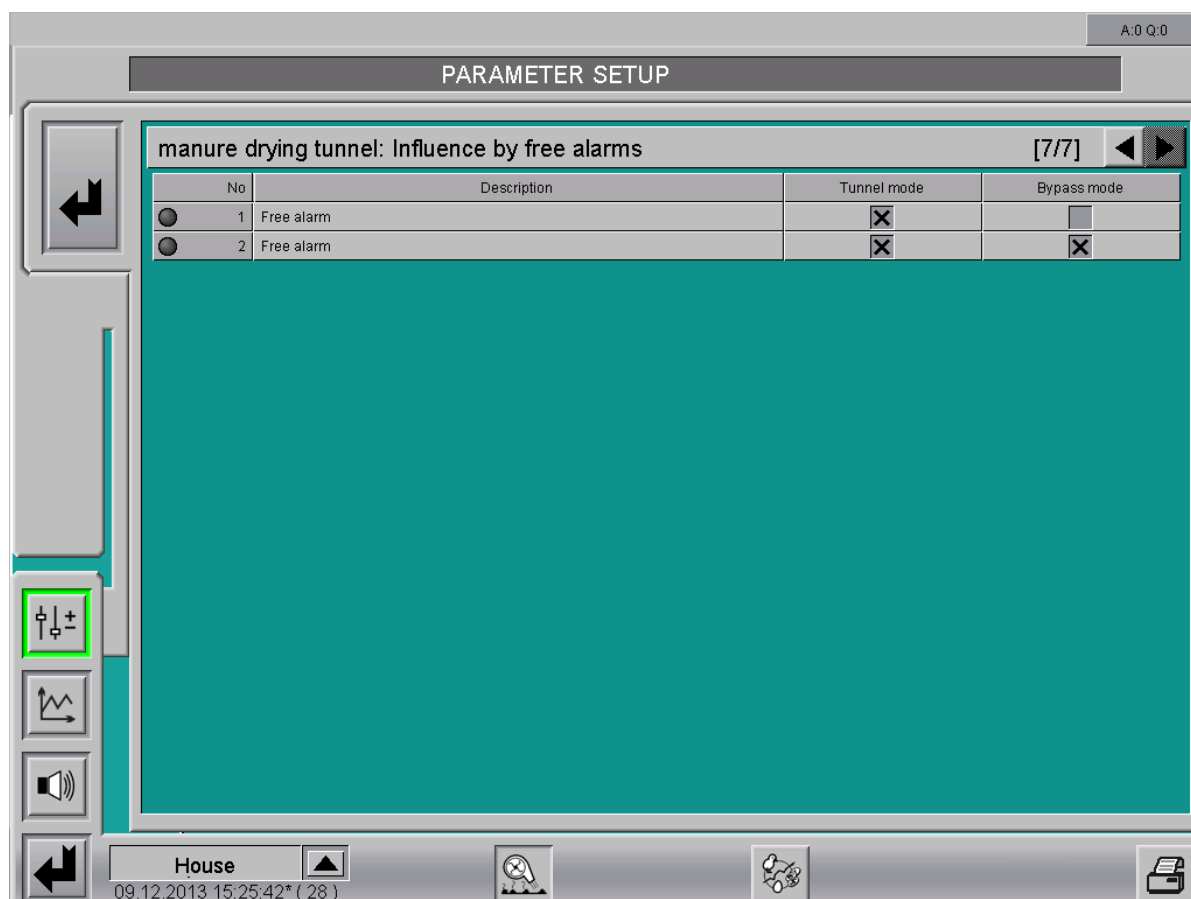


Figure 5-44: Influence by free alarms



The presentation of the on-site visualization is mainly the same as that of the FarmController. The symbols are, however, slightly closer together, in order to be able to present all information on the display.

The functions of the individual elements are explained in this section.

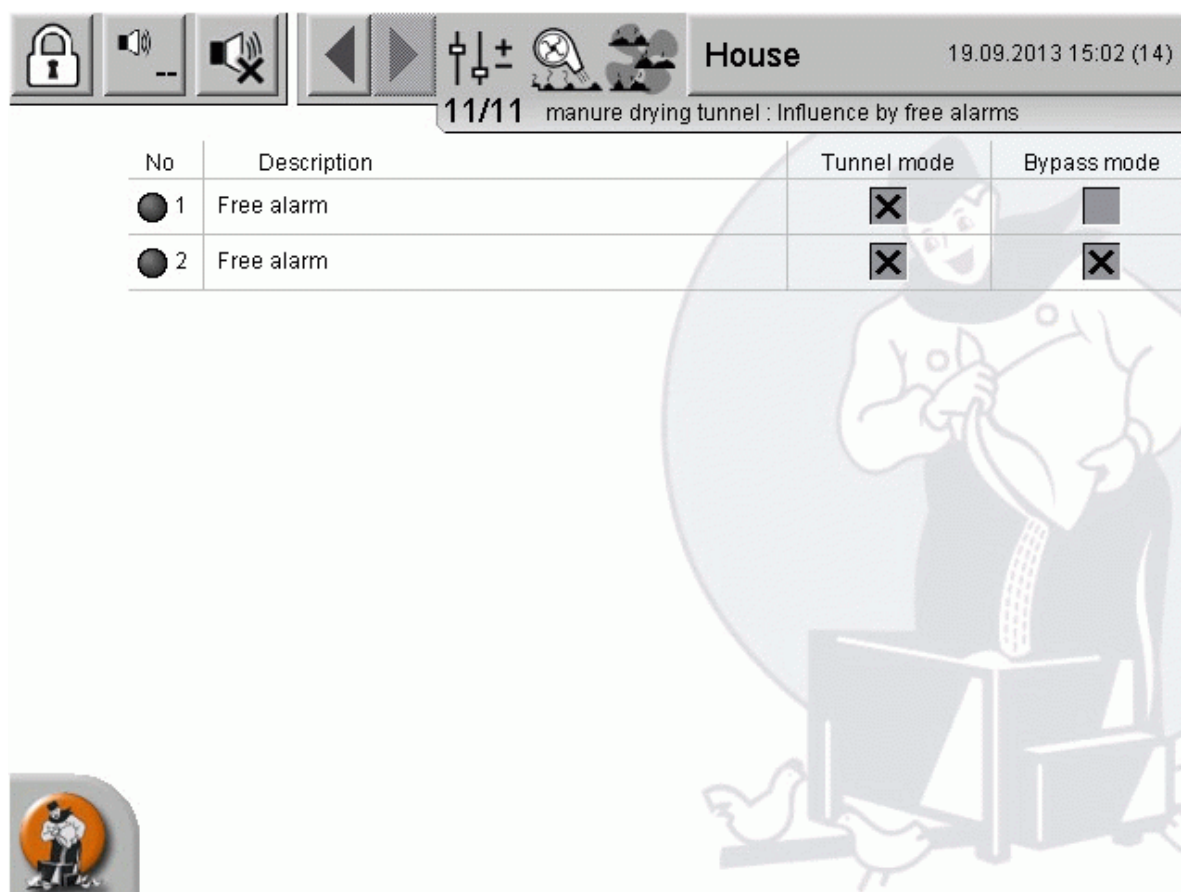


Figure 5-45: Influence by free alarms

5.8 Functional principle

The cycle of a regular manure removal process is presented below.

The times in the cycle during which you as the person executing the manure removal process need to act are marked "Employee".

The items regulated by the control unit are marked "Control unit".

If faults occur, the manure drying tunnel is switched off. In this case, the alarm has to be investigated and acknowledged via the Release control button (see **5.8.2 "Manual tunnel filling"**).



Caution!

A warning signal is generated before each start of the manure drying tunnel, whether in manual, automatic or bypass mode. This signal is activated three times for one second, with one second pause in-between. Afterwards, there is a pause of five seconds before the request for the belt is released.

5.8.1 Automatic tunnel filling



Before the automatic start is released every 24 hours, the maintenance instructions section 6 "Maintenance" must be observed.



Since Big Dutchman cannot assume liability for such an operation, this optional function is only released after written risk assumption by the operator! A safety briefing must have taken place before.

Please also observe the notes in the manual "Safety instructions for the operation of AMACS"!



5.8.2 Manual tunnel filling

1. Employee: performs a visual inspection of the system

2. Employee: chooses which manure removal is to be used (if more than one are available)

3. Employee: sets the selector switch tunnel/bypass to tunnel

4. Employee: presses the start button

Control unit: generates three warning signals of one second to indicate that belt [e] is running

Control unit: sets request for ext. belt [e] and waits until belt [e] is running

5. Employee: switches on the external belt

Control unit: waits until the delay time has expired and starts belt [d]

Control unit: starts the chopper, dosing unit and tunnel drives if the dosing unit does not indicate an error

Control unit: waits until the delay time has expired and starts belt [b]

Control unit: waits until the delay time has expired and starts belt [a2]

Control unit: waits until the delay time has expired and starts belt (e.g. [a1.1])

Control unit: sets release for manure belts in the house

6. Employee: monitors the tunnel filling

Control unit: resets release for house

Control unit: waits until the residual flow time has expired and switches off belt (e.g. [a1.1])

Control unit: waits until the residual flow time has expired and switches off belt [a2]

Control unit: waits until the residual flow time has expired and switches off belt [b]

Control unit: switches off tunnel belts, dosing screw and chopper

Control unit: waits until the run-on time has expired and switches off belt [d]

Control unit: resets request for ext. belt [e]

7. Employee: switches off the external belt [e]



An overview of all belt names can be found in figure .



5.8.3 Bypass operation

In the control, you can select for the manure belts [a2], [b], [d] (see figure 5-1) whether they are required for the bypass function. A possible directional reversal of individual belts owing to the system is realised electro-mechanically.

1 Employee: performs a visual inspection of the system

2. Employee: chooses which manure removal is to be used (if more than one are available)

3. Employee: sets the selector switch tunnel/bypass to bypass

4. Employee: presses the start button

Control unit: generates three warning signals of one second to indicate that belt [e] is running

Control unit: sets request for ext. belt [e] and waits until belt [e] is running

5. Employee: switches on the external belt [e]

Control unit: waits until the time delay has expired and starts belt [d] (if active for bypass)

Control unit: waits until the time delay has expired and starts belt [b] (if active for bypass)

Control unit: waits until the time delay has expired and starts belt [a2] (if active for bypass)

Control unit: waits until the delay time has expired and starts belt (e.g. [a1.1])

Control unit: sets release for manure belts in the house

6. Employee: starts the release belts in the house

7. Employee: supervises manure removal

8. Employee: presses the stop button when the manure removal process has ended

Control unit: resets release for house

Control unit: waits until the delay time has expired and switches the manure removal off

Control unit: waits until the residual flow time has expired and switches off belt (e.g. [a1.1])

Control unit: waits until the residual flow time has expired and switches off belt [a2] (if active for bypass)

Control unit: waits until the residual flow time has expired and switches off belt [b] (if active for bypass)

Control unit: waits until the residual flow time has expired and switches off belt [d] (if active for bypass)

Control unit: resets request for ext. belt [e]

9. Employee: switches off the external belt [e]



An overview of all belt names can be found in figure 5-2.



5.9 Alarm description



In the alarm settings you can choose which alarms you require and when they should appear. In addition you can state whether the alarm is to be issued by the alarm device or sent to the users by e-mail.



Attention

All alarms are activated as standard!

Before deactivating an alarm you should make sure to check whether it is really not required. Alarms help to prematurely recognise problems they may potentially endanger the animals' health. Alarms should not be viewed as disturbing but as a chance to be able to keep the productivity of the house at a consistently high level.



How to operate the **Alarm settings** can be found in the "Amacs Operation" manual.

2012/11/27 13:04:49.571* House01 manure drying tunnel: (A208) Fault pulse monitoring tier 8 A:9 Q:1

ALARM SETTINGS

No.	Description	Hardware	Software	Start Day	Delay	Message
No. 1	drying tunnel (A05) Emergency stop	☒	☒	-2	0 s	MESSAGE NOTHIN
No. 2	drying tunnel (A19) Runtime control Manure removal	☒	☒	-2	0 s	MESSAGE NOTHIN
No. 3	drying tunnel : tunnel belts (A10) Fault frequency transformer tunnel belts	☒	☒	-2	0 s	MESSAGE NOTHIN
No. 4	drying tunnel : tunnel belts (A101) - (A120) Fault limit switch tier 1-20	☒	☒	-2	0 s	INVERT MESSAGE NOTHIN
No. 5	drying tunnel : tunnel belts (A07) Fault tunnel belts	☒	☒	-2	0 s	MESSAGE NOTHIN
No. 6	drying tunnel : tunnel belts (A200) - (A220) Fault pulse monitoring tier 1-20	☒	☒	-2	0 s	MESSAGE NOTHIN
No. 7	drying tunnel : Chopper (A08) Fault Chopper	☒	☒	-2	0 s	MESSAGE NOTHIN
No. 8	drying tunnel : Chopper (A09) overcurrent monitoring Chopper	☒	☒	-2	20 s	INVERT MESSAGE NOTHIN
No. 9	drying tunnel : Chopper (A12) Safety switch Chopper	☒	☒	-2	0 s	INVERT MESSAGE NOTHIN
No. 10	drying tunnel : conveyor belt (a1) (A91) Emergency stop conveyor belt a1.1	☒	☒	-2	0 s	INVERT MESSAGE NOTHIN
No. 11	drying tunnel : conveyor belt (a1) (A81) Fault conveyor belt a1.1	☒	☒	-2	0 s	MESSAGE NOTHIN

House 2012/11/27 13:40:08* (0)

Figure 5-46: Alarm setting

This section describes the various alarms shown in the message line and their cause. You will find information regarding how to operate the message line in the manual **Amacs Operation**.

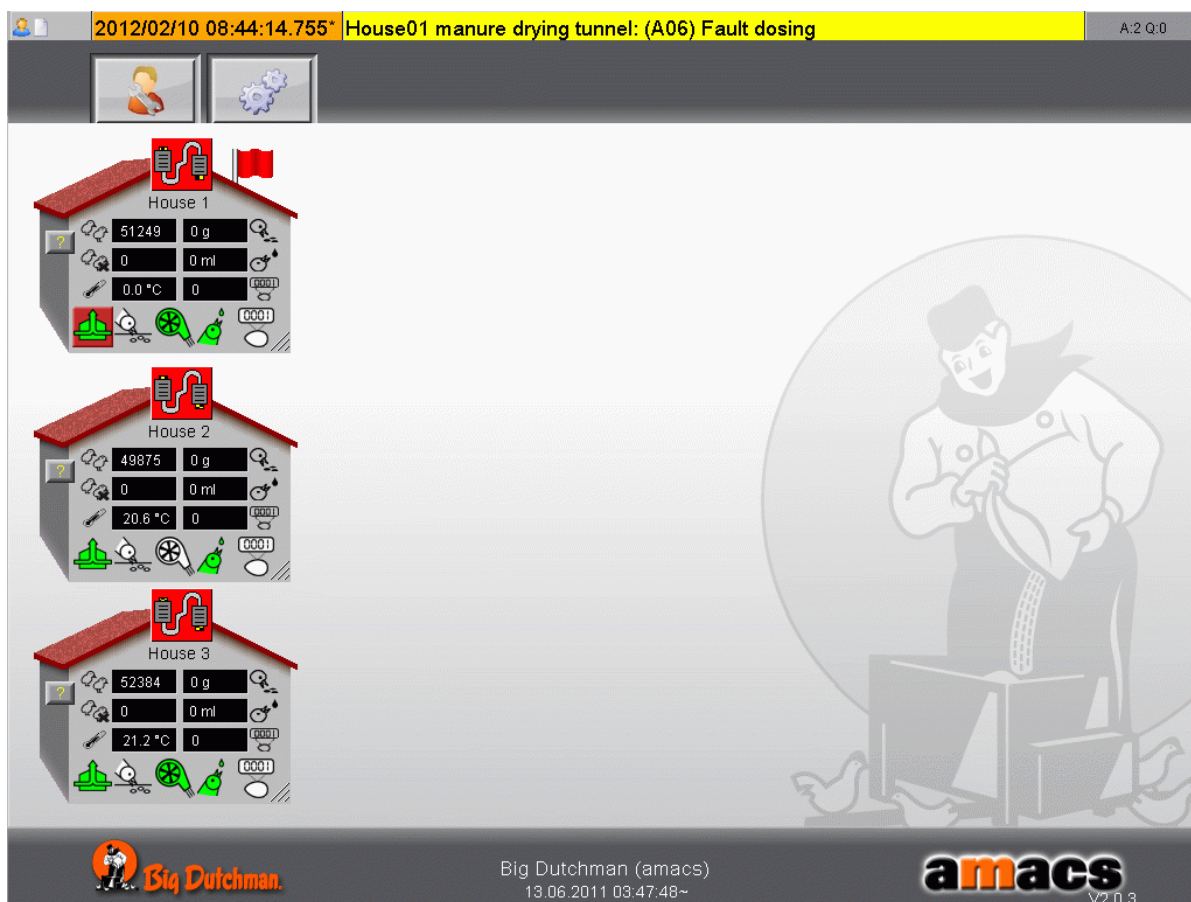


Figure 5-47: Alarm line



An overview of all belt names can be found in figure 5-2.

Fault no.	Description
A05	Manure drying tunnel: (A05) Emergency stop => An Emergency stop switch at the manure drying tunnel has been triggered.
A19	Manure drying tunnel: (A19) Runtime monitor manure removal => Time limit for manure removal exceeded. Duration of manure removal too long, important in case of progress measuring via pulse counter.

Table 5-10: General alarms

Fault no.	Description
A8 [1-20]	Manure drying tunnel: (A8 [1-20]) Fault conveyor belt (e.g. [a1.01-20]) => The protective motor switch of the conveyor belt [a1.01-20] was triggered (control cabinet).
A9 [1-20]	Manure drying tunnel: (A9 [1-20]) Emergency stop conveyor belt [a1.01-20] => Emergency stop at the manure removal [a1.01-20] was triggered.
A02	Manure drying tunnel: (A02) Fault conveyor belt [a2] => The protective motor switch of the conveyor belt [a2] was triggered (control cabinet).
A03	Manure drying tunnel: (A03) Fault conveyor belt [b] => The protective motor switch of the conveyor belt [b] was triggered (control cabinet).

Table 5-11: Feed belt alarms

Fault no.	Description
A14	Manure drying tunnel: (A14) Fault emptying dosing unit => Bridging in the dosing unit. Weight is not decreasing despite piloted tunnel belts and interruption of delivery.
A15	Manure drying tunnel: (A15) Monitoring of filling level The maximum filling level of the Optiplate was exceeded. The manure drying tunnel is switching off.
A17	(A17) Underfilling dosing unit Warning message: Dosing unit is underfilled. The tunnel drives stop, the manure feed (belts [b], [a2], [a1]) continue running (status message).
A18	A18 Congestion dosing unit Warning message: Dosing unit is congested. The manure feed (belts [b], [a2], [a1]) stops, the tunnel drives continue running (status message).
A23	(A23) Fault slewing unit The protective motor switch of the slewing unit was triggered (control cabinet).
A24	(A24) Runtime control slewing unit Time limit slewing unit was exceeded. The position sensor of the slewing unit does not indicate that the position was reached.
A221	(A221) Fault pulse monitoring of slewing unit The speed of the dosing unit's slewing belt is too slow. The manure drying tunnel is switched off.

Table 5-12: Dosing unit alarms

Fault no.	Description
A08	Manure drying tunnel: (A08) Fault chopper => The protective motor switch of the chopper was triggered (control cabinet).
A09	Manure drying tunnel: (A09) Overcurrent monitoring of chopper => The overcurrent monitoring of the chopper was triggered because the load is too high. The tunnel drives are being stopped.
A12	Manure drying tunnel: (A12) Safety switch chopper => The service opening of the chopper is open.
A20	Manure drying tunnel: (A20) Overcurrent chopper Warning message => The analogue current monitor of the chopper indicates excessive power consumption (status message).
A21	Manure drying tunnel: (A21) Current monitoring of chopper (maximum) => The analogue current monitor of the chopper indicates excessive power consumption (status message).
A22	Manure drying tunnel: (A22) Current monitoring of chopper => The analogue current monitor of the chopper indicates a power consumption which is too low (status message).

Table 5-13: Chopper alarms

Fault no.	Description
A04	Manure drying tunnel: (A04) Fault conveyor belt [d] => The protective motor switch of conveyor belt [d] has triggered (control cabinet).
A70	Manure drying tunnel: (A70) No feedback conveyor belt [e] => The discharge belt [e] is not switched on. The manure drying belt has no release signal.

Table 5-14: Alarms discharge belts

5.10 Adjusting the manure layer height

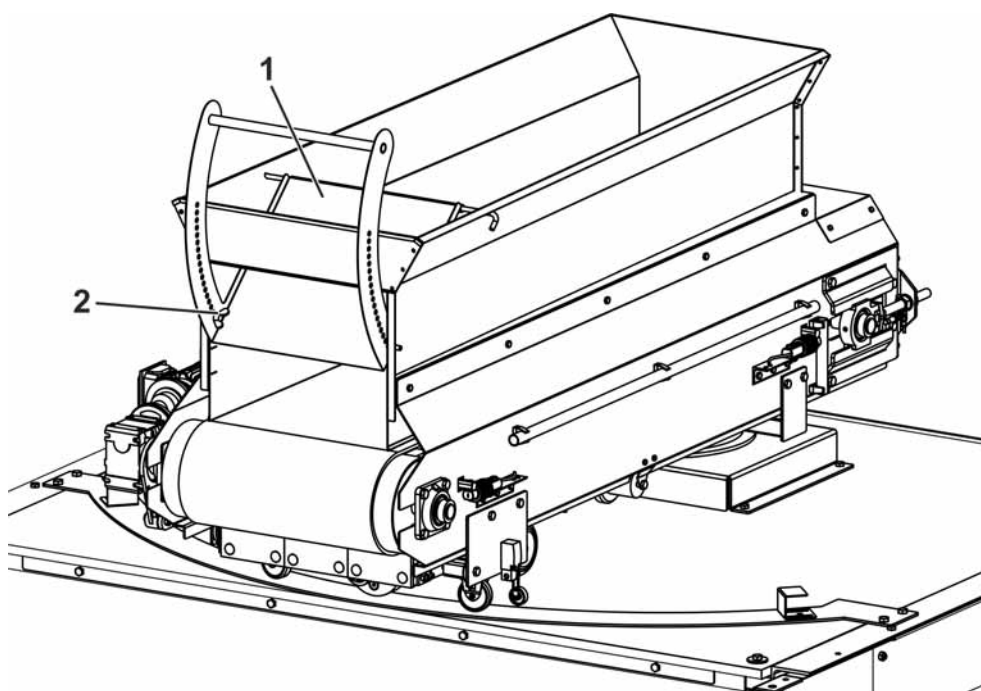


Important!

Before each handling at or in the OptiPlate, the main switch must be switched off since the system is provided with an automatic start.

The hopper of the slewing belt is equipped with a pendulum flap (1) to adjust the height of manure layer.

The position of the pendulum flap can be changed by loosening the wing screw (2). The opening of the pendulum flap varies between 4 cm and 19 cm. Observe the manure removal concept when adjusting the layer height. Here, the layer height is indicated for the system. The fine adjustment of the layer height is carried out by means of AMACS.



6 Maintenance



Important!

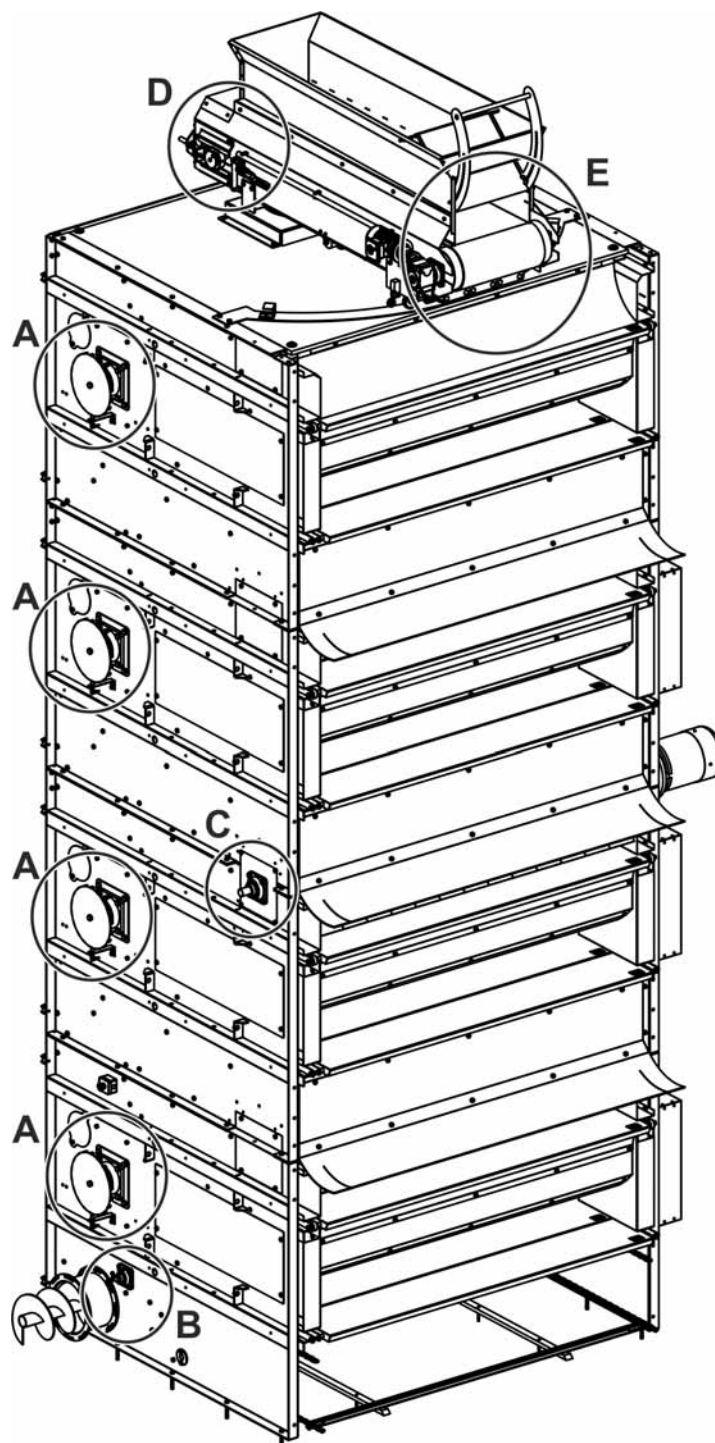
Before each maintenance or repair of the OptiPlate tunnel, the main switch must be switched off since the system has an automatic start-up.

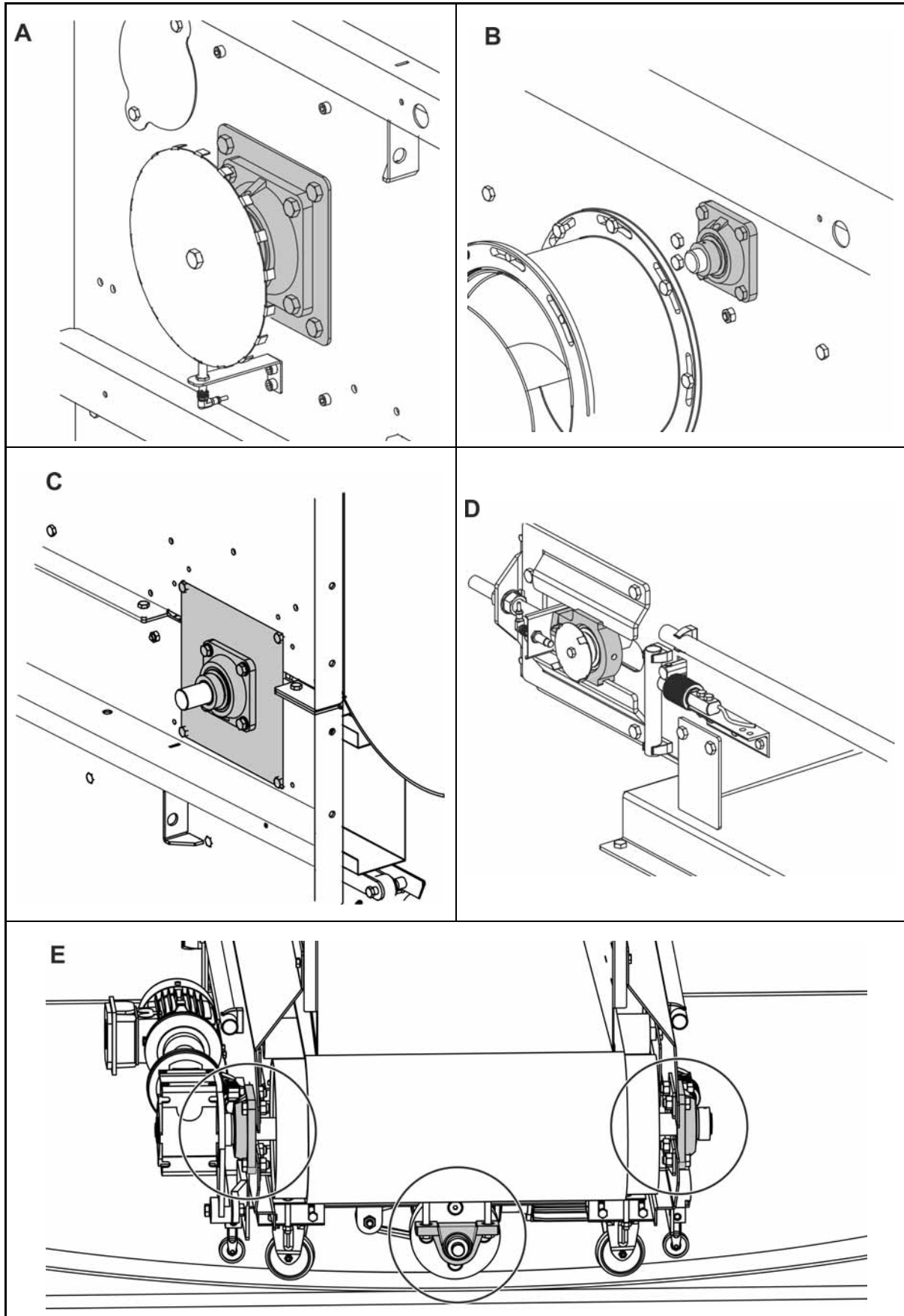
Maintenance interval	Assembly group / components to be checked
Daily	• Check functioning of all parts and replace defective parts immediately, if necessary • Check safety contrivances / emergency switch-off devices see chapter 2.10 "Safety components of the system" and 2.9 "Emergency stop button at the system"
Weekly	• Check manure rack for manure adhesions at the bars and clean it, if necessary • Check manure scraper in the idler unit on top for manure adhesions and clean it, if necessary • Check the funnel of the filling station for adhesions and clean it, if necessary • Check the filling station for soiling and clean it, if necessary • Check the motors for dust deposits and clean them, if necessary. This must be done since otherwise the motors can overheat.
Monthly	• Greasing all running and rotating components • Check chain tension of the plates and readjust, if necessary • Check chain tension of the drive chains and readjust, if necessary • Check chain tension of the scraper floor and readjust, if necessary
after each cleaning	• Greasing all chains and bearings



6.1 Position lubricating nipple

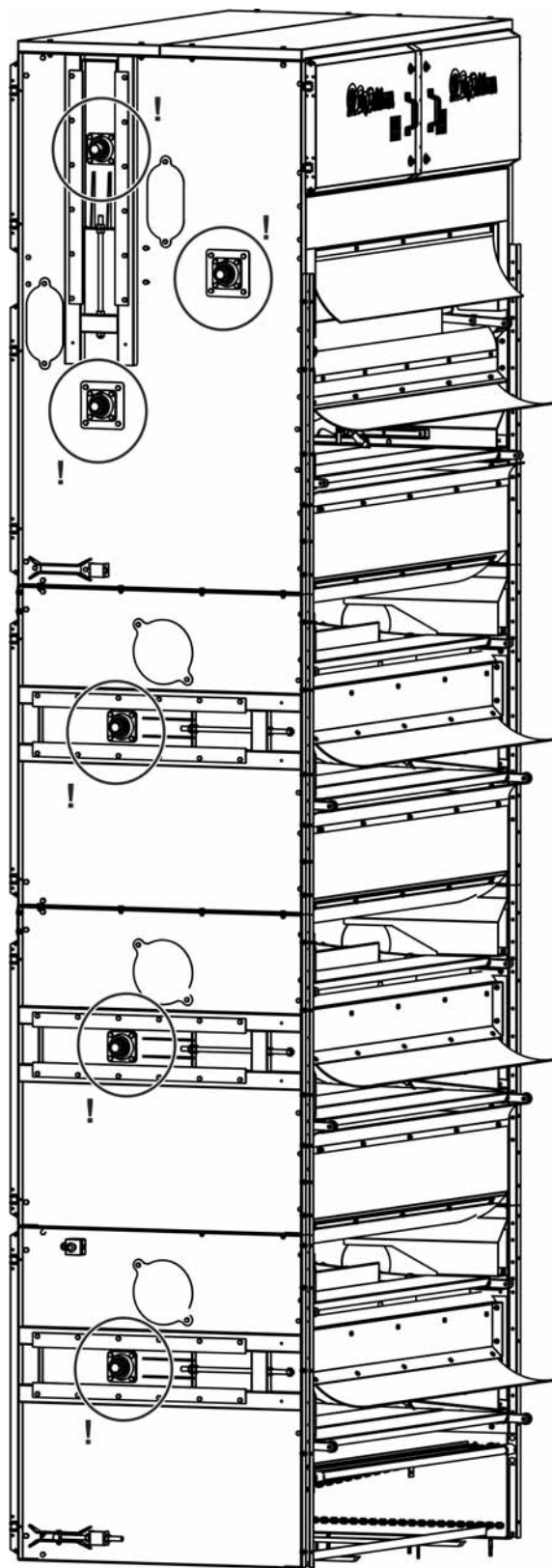
6.1.1 Lubrication nipple drive unit





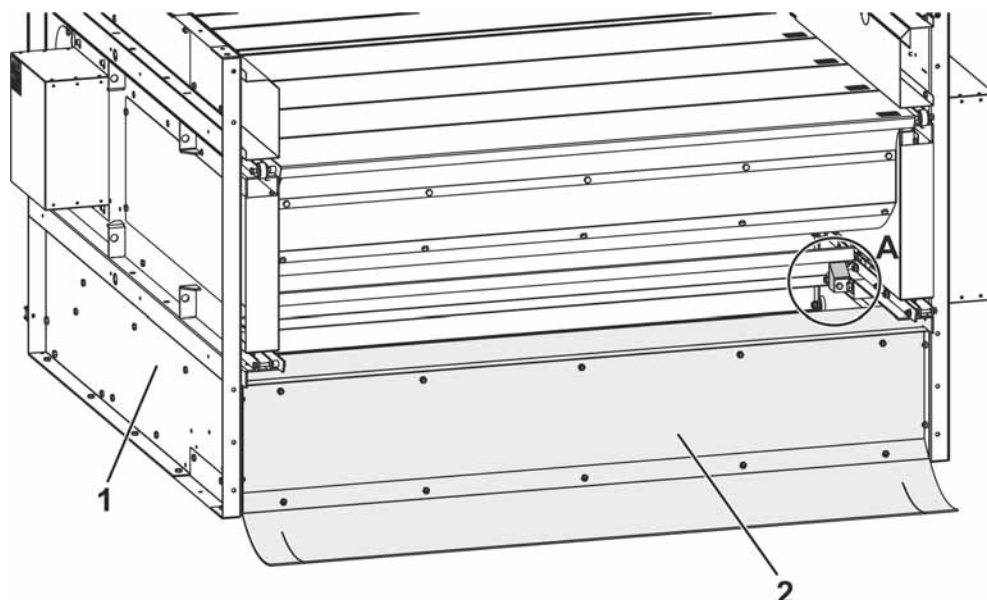
6.1.2 Lubrication nipple idler unit

The lubricating nipple of the idler unit is identical on the right and left side. Therefore, the following illustration only shows one side.

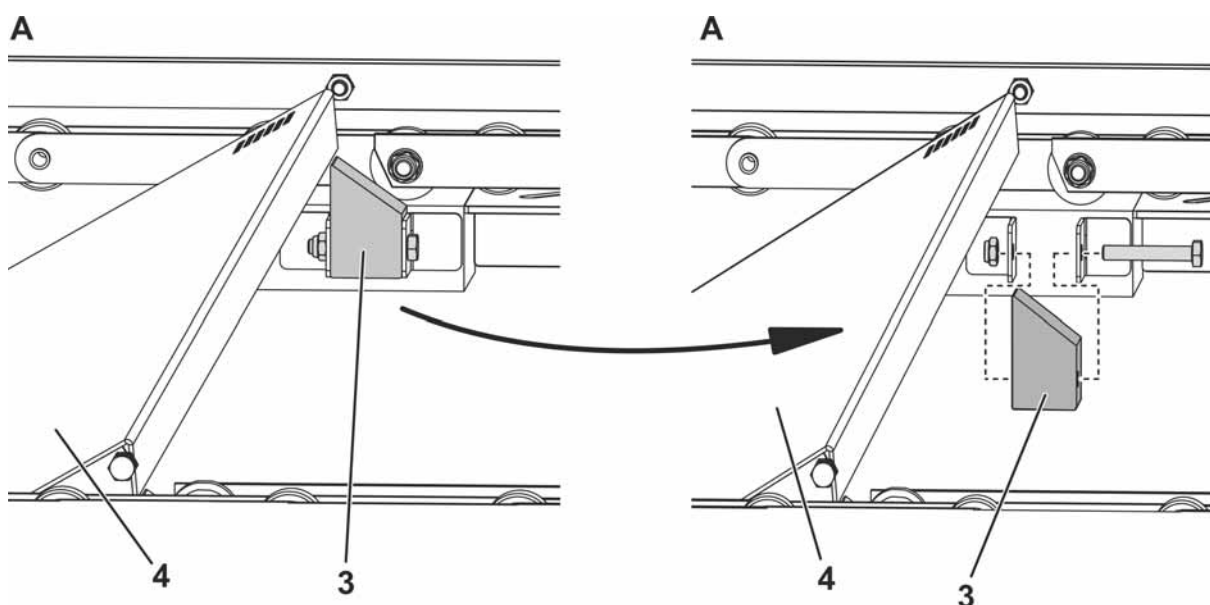


6.2 Replacing the plate deflector (drive unit)

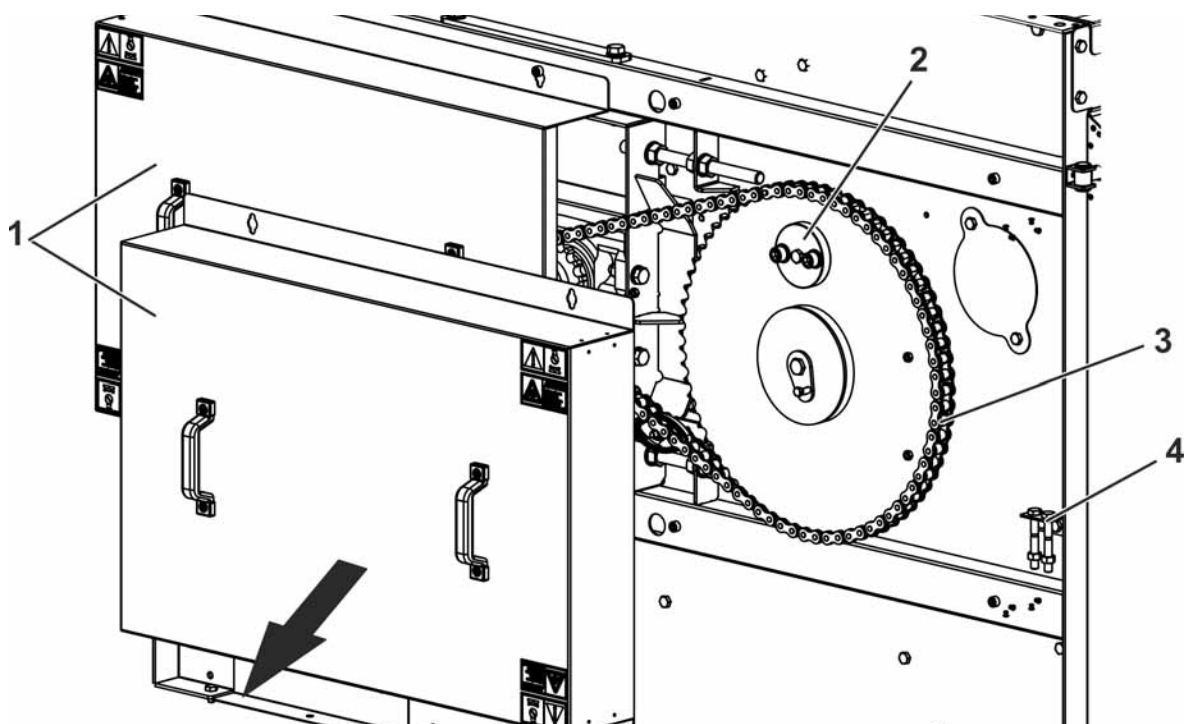
The plate deflector is installed on each tier on the left and right hand side in the drive unit. The figure shows one tier respectively one side.



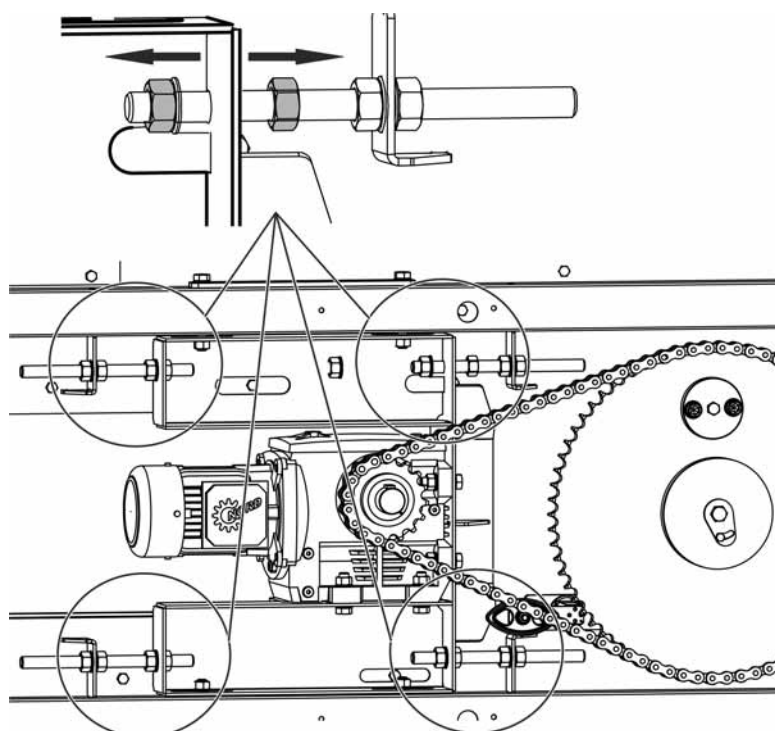
Pos.	Keytech No.	Code no.	Description
1			Drive unit
2	83-11-2239	83-11-2239	Sealing cpl drive upper OptiPlate
3	83-14-3255	83-14-3255	Plate deflector pair for drive side OptiPlate (comprises on the left and right hand side)
4		83-10-6586	Drying plate cpl OptiPlate

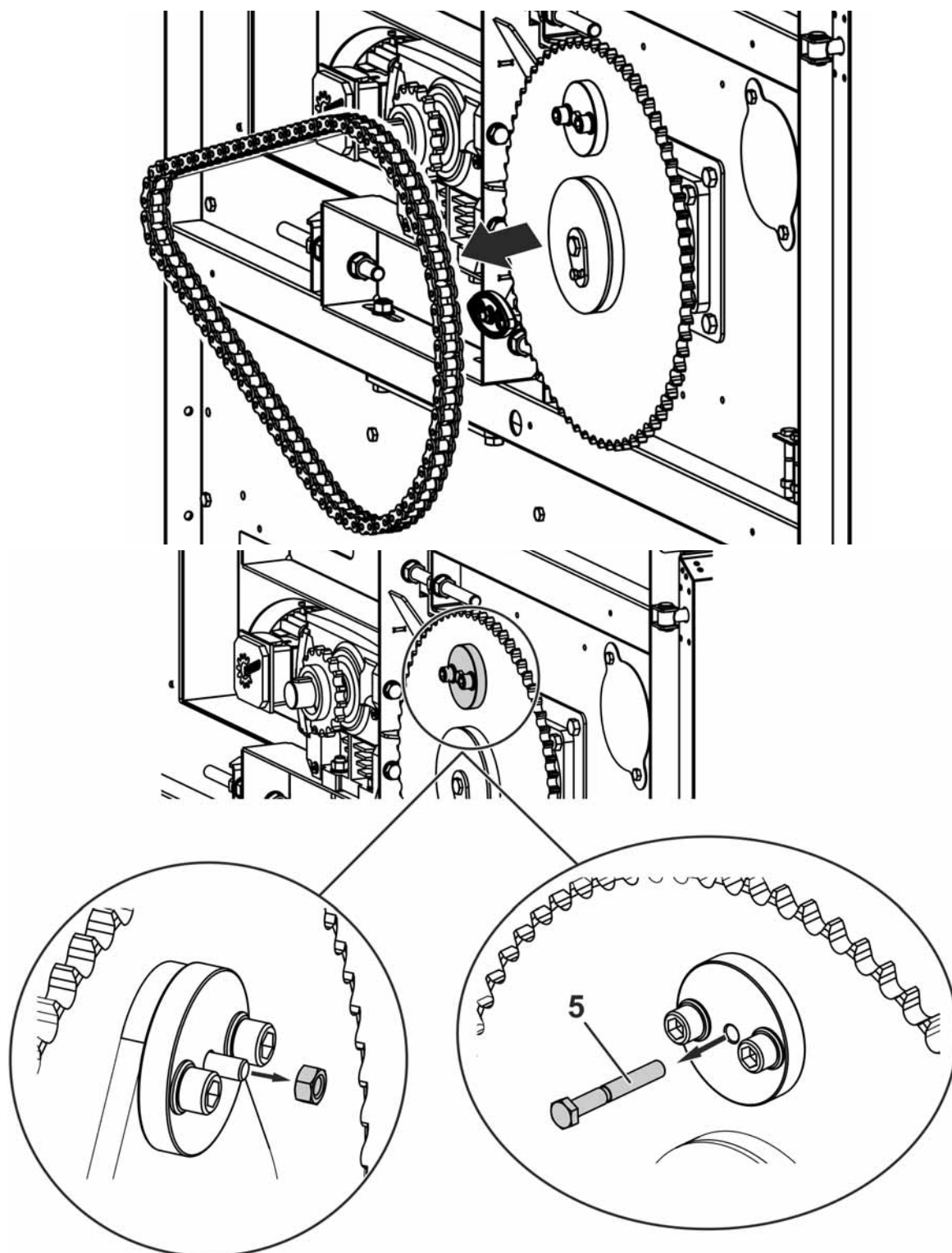


6.3 Replacing the overload safety device (drive unit)



Pos.	Keytech No.	Code no.	Description
1	83-11-2150	83-11-2150	Cover cpl for motor OptiPlate
2	83-10-7573	83-10-7573	Chain wheel 1" t70 d160 cpl with overload safety OptiPlate
3	83-10-7592	83-10-7592	Drive chain 1" OptiPlate
4	83-13-2575	83-13-2575	Replacement shear pin OptiPlate
5	83-11-2091	83-11-2091	Shear pin for overload safety OptiPlate

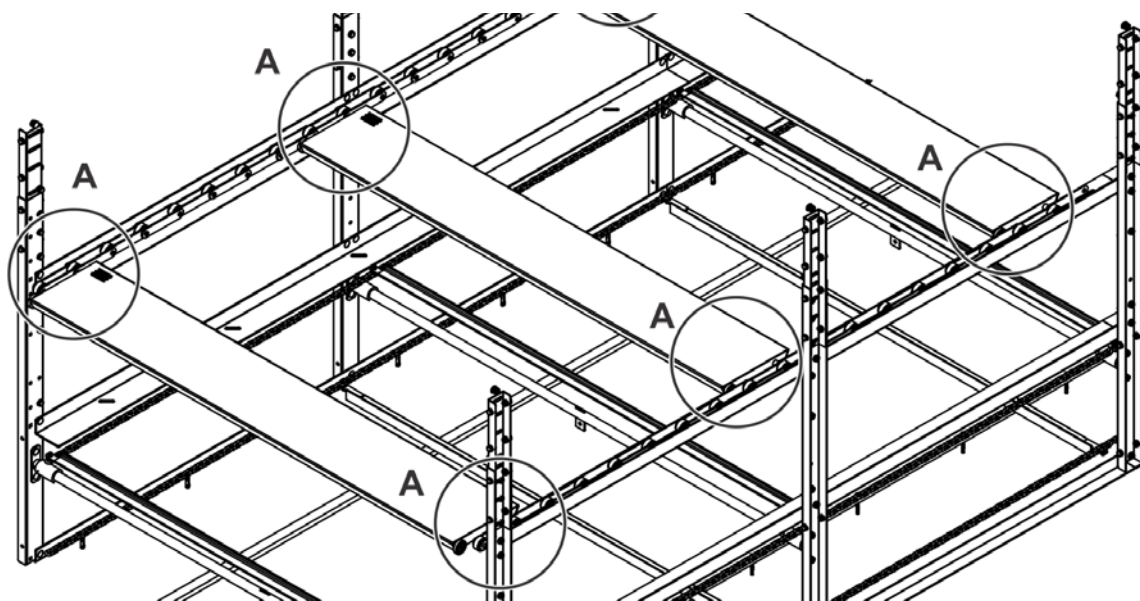




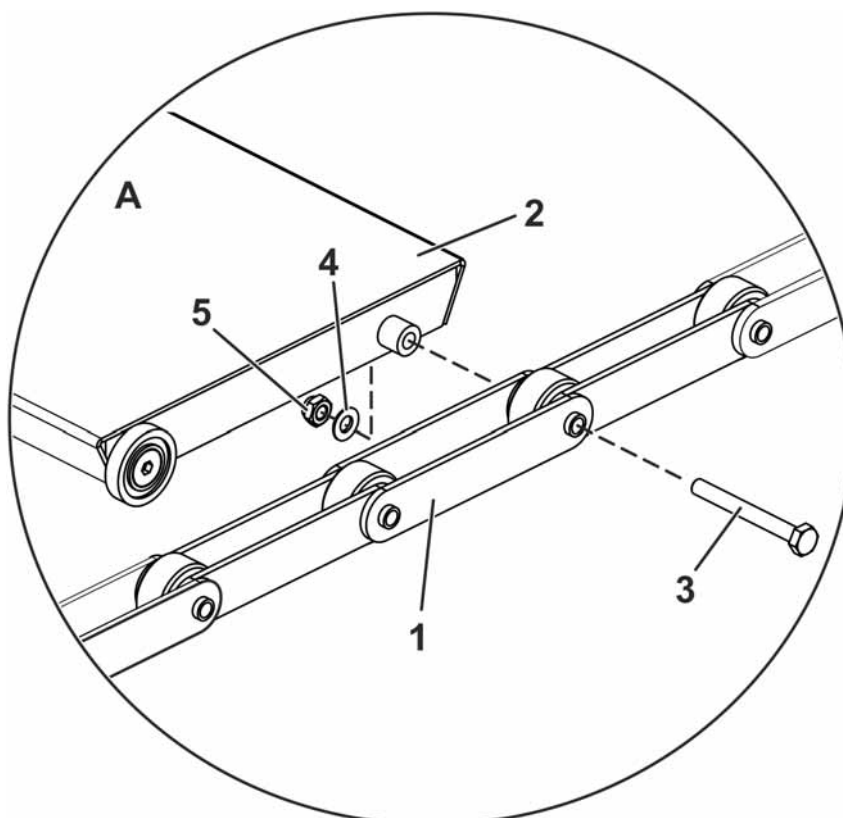
- Take a new shear pin out of the magazine.
- Turn the chain wheel so far that the shear pin can be inserted.
- Tighten the nut at the shear pin.
- Insert the chain again.
- Tension the motor seat by tightening the screws.
- Re-attach the motor cover.



6.4 Replacing defective plates in the tunnel block

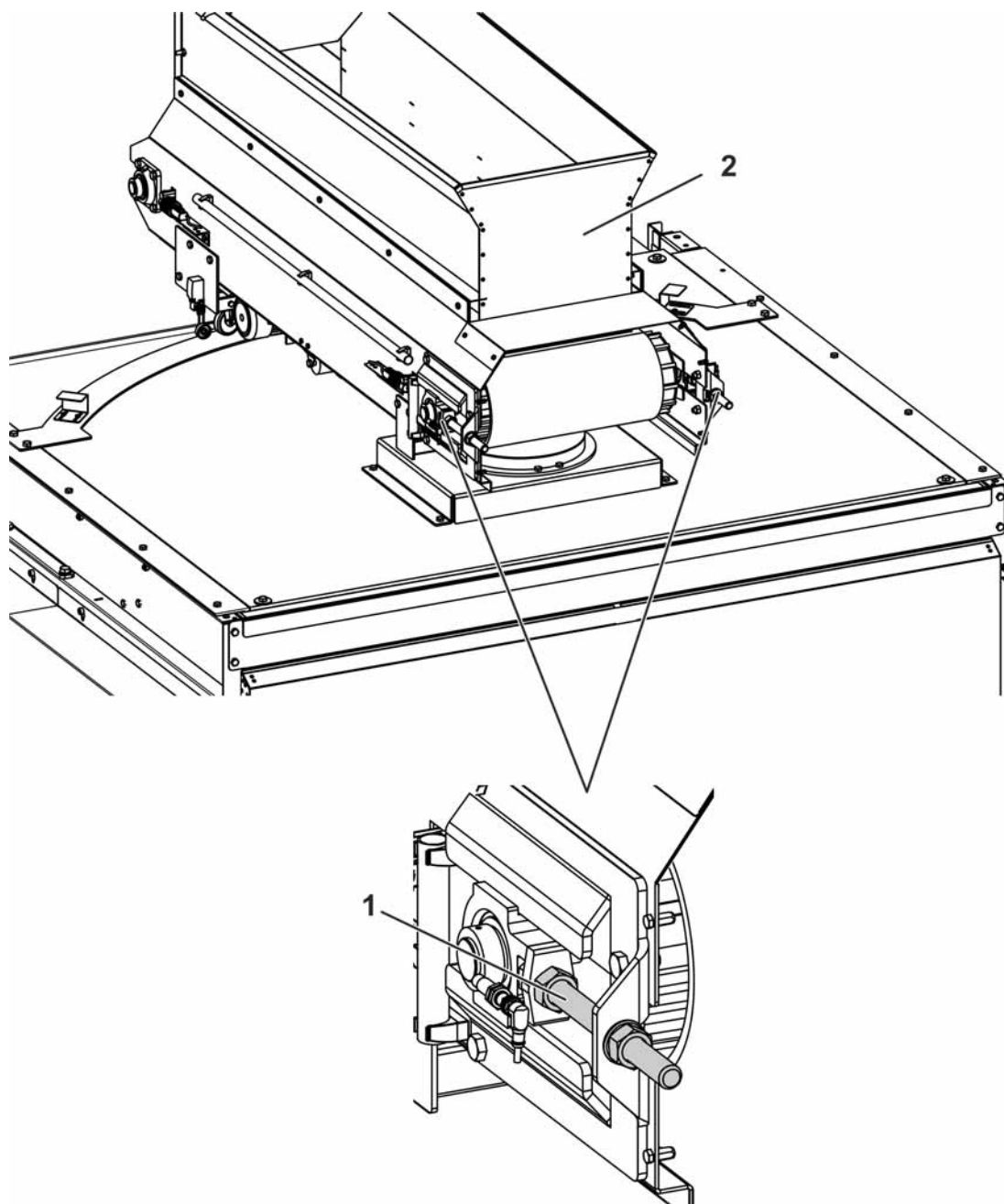


Pos.	Qty.	Code no.	Description
1		83-10-7740	Conveyor chain P-FVC 90 x 160 5 m per side
2		83-10-6587	Dryer plate OptiPlate
3		99-10-1450	Hexagon head screw M 10 x 90 galv. DIN 931 8.8
4		99-50-1090	Washer B 10.5 DIN 125 galv.
5		83-02-1000	Self-locking counter nut M10 galvanized DIN 985-6



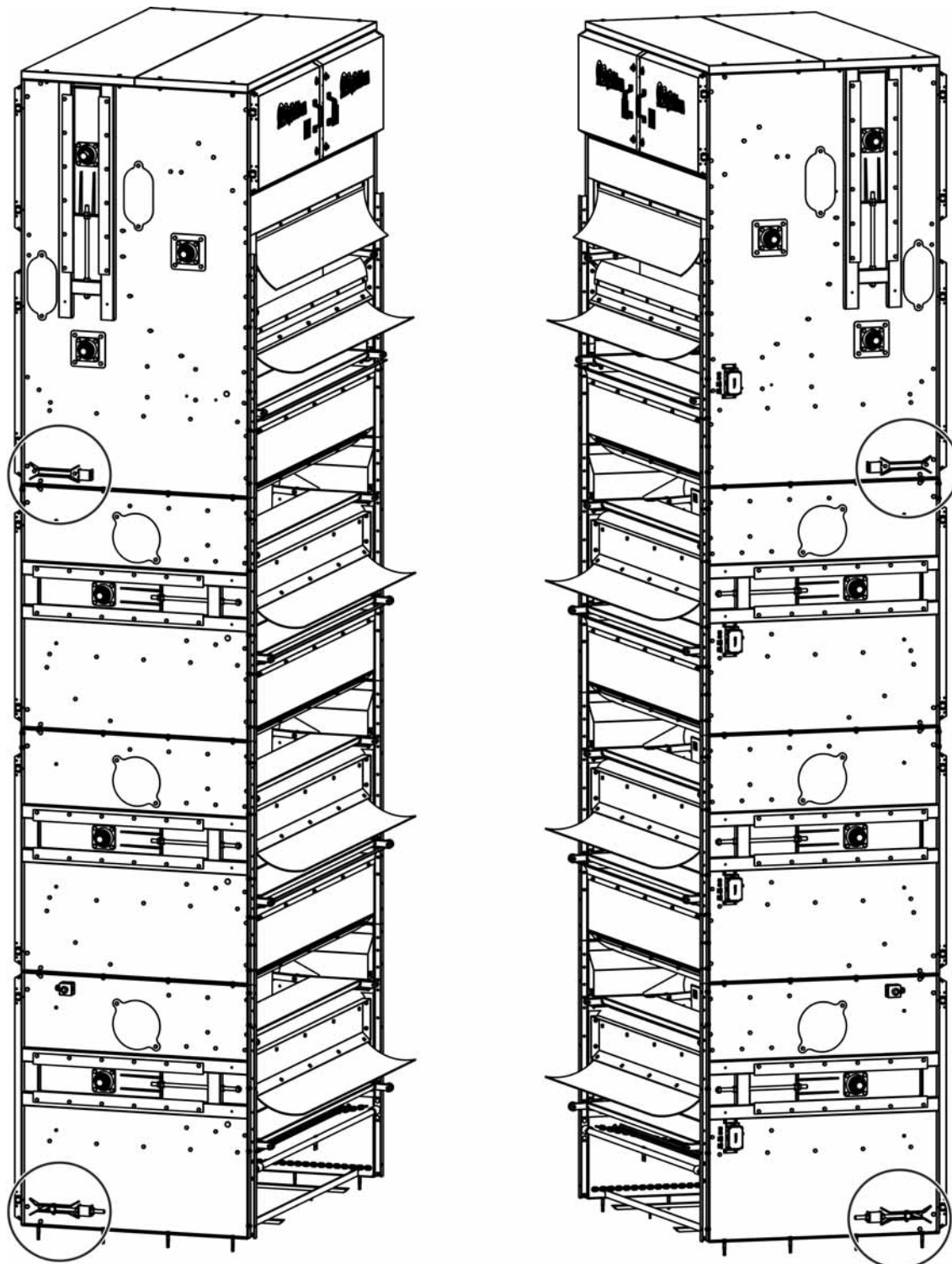
Do not yet tighten the screw connection! The plates must remain movable!

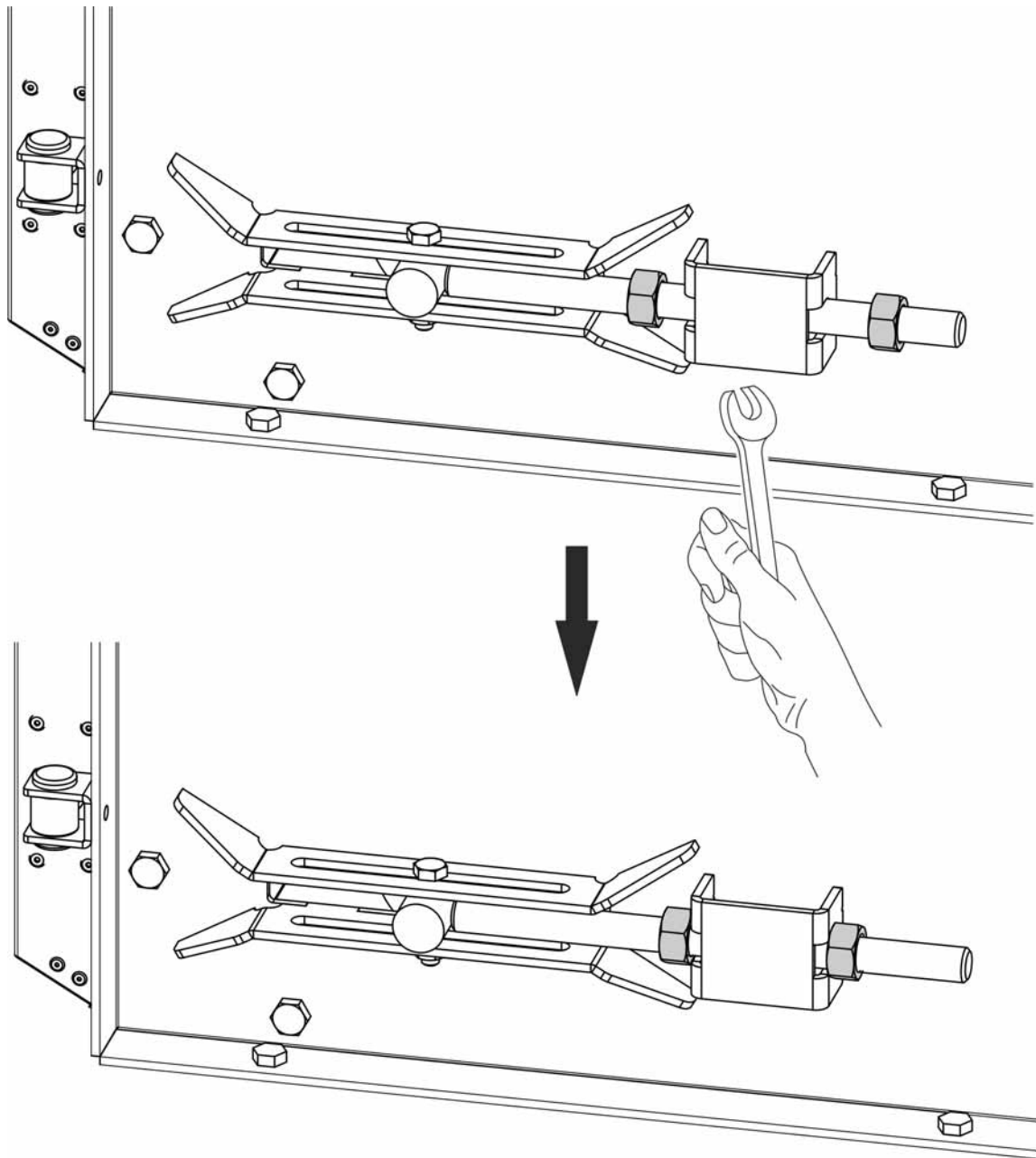
6.5 Adjusting the conveyor belt at the filling station



Pos.	Keytech No.	Code no.	Description
1	83-12-4400	83-12-4400	Belt tensioner cpl for slewing belt OptiPlate
2		83-12-4426	Slewing belt cpl for filling OptiPlate

6.6 Adjusting the chain tension (idler unit)





7 Fault clearance

Fault	Possible cause	Remedy
Creaking noises at the drive side	Drive chain is not sufficiently tensioned and jumps off	Tension the chain
Tunnel does not start up	Too much manure on the belts	Reduce the manure weight on the dryer plates
	The plate position monitoring has been triggered	Check the plate switch and bring the plate into the correct position, if necessary
One level stops respectively does not run	Overload bolt is broken	Replace overload bolt
Frequent starts and stops of the system	Filling station clogged	Open the pivoting flap further, the maximum layer height of 20 cm may not be exceeded
	Manure too moist	Check the cage system for leakages
Manure is badly dried on the upper level	Perforation on the dryer plate is clogged	Clean dryer plates
The protective motor switch of the manure rake triggers permanently	Manure rake is badly soiled	Clean manure rake
Vacancies on the manure drying tunnel	Conveyor belt badly soiled respectively adhesions in the funnel	Clean filling station
	Empty weight and target weight in the control unit have the same value	Reduce the empty weight in the control unit
Overflowing of the filling station	Too small manure output of the filling station	Reduce maximum weight in the control unit
	Wrong weighing values	Check load cell for blockage or defect

If there is an error code in AMACS, please refer to the manual 99-97-6070 "AMACS manure drying tunnel" for cause and remedy.



8 Checklist key points summary



Important! Please remember to cut this page and the following pages along the line from this manual and keep them save as *blank* master copies!

Date _____

Name _____

Key points DAILY		Result	Comments
☐	Check the function of all components and replace defective parts immediately.		
☐	Check the emergency stop device.		

For a detailed description of all steps of the procedure, please refer to chapter

Key points WEEKLY		Result	Comments
☐	Check for manure accumulation at the scraper of the idler unit.		
☐	Check for manure accumulation at the ridge of the rake.		
☐	Check for bridging in the funnel of the filling station.		
☐	Check the cleaning of the weighing table at the filling station and clean, if necessary.		
☐	Check the motors for dust deposits and clean the motors, if necessary.		

For a detailed description of all steps of the procedure, please refer to chapter



Key points MONTHLY		Result	Comments
☐	Grease all bearings at the idler unit.		
☐	Grease all bearings at the drive unit and drive chains.		
☐	Grease all bearings at the filling station.		
☐	Grease all bearings at the chopper.		
☐	Check the chain tension of the dryer plates. Re-tension the chain, if necessary.		
☐	Check the chain tension of the motors at the drive unit. Re-tension the chain, if necessary.		
☐	Grease all bearings at the chopper.		

For a detailed description of all steps of the procedure, please refer to chapter 6 "Maintenance"