



# **stautmann**

**Translation of the  
original instructions for assembly,  
operation and maintenance**

## **Solid material metering system**

**Bio-Mix 750 - 1450  
Bio-Mix 2000 Double - 4000 Double  
Bio-Mix Combi**



---

63300901  
11.11  
Printed in Germany



**Please read and observe these  
instructions before  
commissioning!**





**Declaration of incorporation**  
**according to the EC machinery directive 2006/42/EC, Annex II B**

**Manufacturer:**

B. Strautmann & Söhne GmbH u. Co. KG  
Bielefelder Straße 53  
D-49196 Bad Laer

**Legal person established within the EC and authorized to compile the technical documentation:**

B. Strautmann & Söhne GmbH u. Co. KG  
Bielefelder Straße 53  
D-49196 Bad Laer

**Description and identification of machine:**

Designation:	Solid material metering system
Function:	Chopping, homogeneous mixing and metering of organic solids
Model:	Bio-Mix, Bio-Mix Double, Bio-Mix Combi
Type:	Bio-Mix 750, 900, 1050, 1250, 1450 Bio-Mix 2000 Double, 2400 Double, 2800 Double, 3200 Double, 3400 Double, 4000 Double Bio-Mix Combi
Serial number:	W09633000_0S38001 – W09645000_0S38999
Trade name:	Bio-Mix, Bio-Mix Double, Bio-Mix Combi

**We hereby explicitly declare that the partly completed machine complies with all relevant provisions of the following EC directives:**

2006/42/EC:2006-05-17	EC machinery directive 2006/42/EC
-----------------------	-----------------------------------

**Applied harmonized standards:**

EN ISO 12100-1:2003/A1:2009	Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology
EN ISO 12100-2:2003/A1:2009	Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles
EN ISO 13857:2008	Safety of machinery - Safety distances to prevent hazard areas from being reached by upper and lower limbs
EN ISO 4254-1:2009	Agricultural machinery - Safety - Part 1: General requirements
EN 349:1993+A1:2008	Safety of machinery - Minimum distances to prevent limbs from being crushed
EN 703:2004+A1:2009	Agricultural machinery - Machines for loading, mixing and/or chopping and distributing silage - Safety

**The special technical documentation has been compiled according to Annex VII part B and will be transmitted digitally upon reasoned request.**

**Commissioning of the partly completed machine is not allowed, until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of the directive 2006/42/EC.**

Bad Laer, 05.11.2011

Dipl.-Ing. E. Uhlemann  
Chief Designer  
Feeding Technology

Dr. J. Marquering  
Head of Development

Dr. K.-P. Strautmann  
Managing Director



### Identification data

---

Please enter the machine's identification data here. They are registered on the type plate.

Manufacturer: B. Strautmann & Söhne GmbH u. Co. KG

Machine ID number:  
(17-digit)

Type:

Year of manufacture:

### Manufacturer's address

---

B. Strautmann & Söhne GmbH u. Co. KG

Landmaschinenfabrik

Bielefelder Straße 53

D-49196 Bad Laer

Phone: + 49 (0) 5424 802-0

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E-mail: kontakt@straumann.com

### Spare parts order service

---

B. Strautmann & Söhne GmbH u. Co. KG

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Bielefelder Straße 53

D-49196 Bad Laer

Phone: + 49 (0) 5424 802-31

Fax: + 49 (0) 5424 802-64

E-mail: kontakt@straumann.com

Spare parts catalogue online: [www.straumann-elise.de](http://www.straumann-elise.de)

Please always refer to the machine ID number (17-digit) of your machine when ordering spare parts.

### Formal information about the instructions

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Document number: 63300901

Date of compilation: 11.11

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### Foreword

---

Dear customer,

You have decided in favour of a quality product from the large B. Strautmann & Söhne GmbH u. Co. KG product range. We thank you for the confidence you have shown in us.

Upon receipt of the machine, please check for transport damage or missing parts! Check the delivered machine for its completeness, including the ordered optional extras, by means of the delivery note. Only immediate complaints will give reason to compensation!

Please read and observe these instructions, in particular the safety instructions, before commissioning. After carefully reading the instructions, you will be able to fully benefit from the advantages of your recently acquired machine.

Please make sure that all operators of the machine have read these instructions before starting the machine.

In case of any inquiries or problems, please refer to these instructions or call us.

Regular service and maintenance and timely replacement of worn-out or damaged parts will result in a longer service life of your machine.

### User evaluation

---

Dear reader,

Our instructions are regularly updated. Your suggestions for improvements will be a great help for drawing up more and more user-friendly instructions. Please send your suggestions by fax or e-mail to:

B. Strautmann & Söhne GmbH u. Co. KG

Bielefelder Straße 53

D-49196 Bad Laer

Phone: + 49 (0) 5424 802-0

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E-mail: [kontakt@strautmann.com](mailto:kontakt@strautmann.com)

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## **1 User information**

The chapter "User information" provides information about how to use the instructions.

### **1.1 Purpose of document**

The present instructions

- describe the assembly, operation and maintenance procedures for the machine.
- provide important information about safety-conscious and efficient handling of the machine.

### **1.2 Applied modes of specification**

#### **Instructions and responses**

Activities to be carried out by the operator are specified as numbered instructions. Please keep to the order of the specified instructions. The response to the respective instruction is marked by an arrow if applicable. Example:

1. Instruction 1  
→ response of machine to instruction 1
2. Instruction 2

### **1.3 Applied terms**

<b>The term ...</b>	<b>means ...</b>
third person/party	... all other persons apart from the operator.
risk	... the source of a possible injury or damage to health.
manufacturer	... B. Strautmann & Söhne GmbH u. Co. KG.
machine	... the solid matter metering systems Bio-Mix 750 / 900 / 1050 / 1250 / 1450, Bio-Mix 2000 Double, 2400 Double, 2800 Double, 3200 Double, 3400 Double, 4000 Double and Bio-Mix Combi.
operating element	... the component which is directly actuated by the operator, e.g. by pressing. An operating element may be an adjusting lever, a toggle switch, key button, rotary switch etc.



## 2 Product description

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This chapter includes

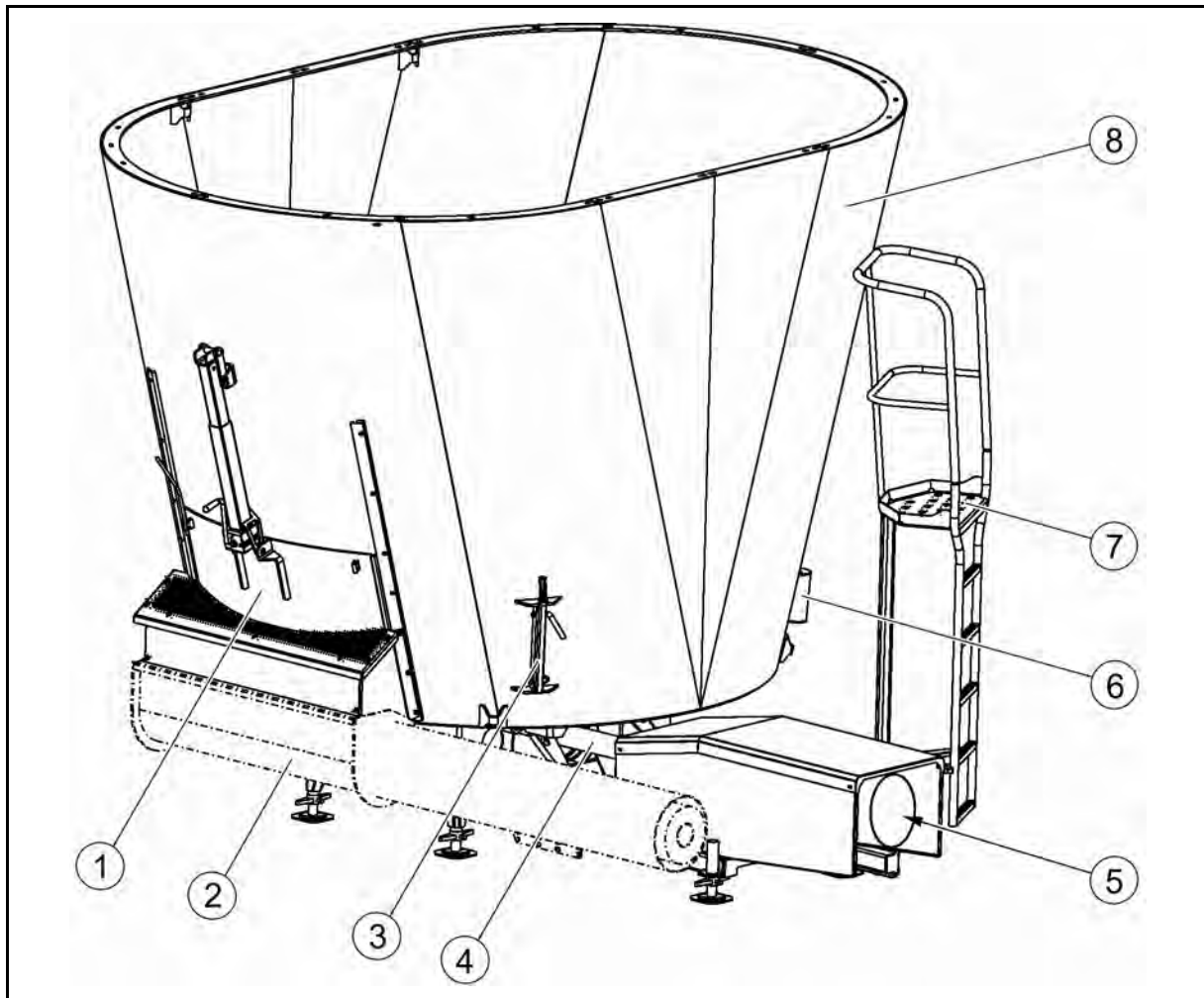
- comprehensive information about the machine design,
- the designations of the individual assemblies and operating elements.

Please read this chapter in the immediate vicinity of the machine if possible, thus acquainting yourself with the machine in the best possible way.

The machines are available with various optional extras. Due to the individual equipment of your machine, not all descriptions included in these instructions apply to your machine. Optional extras are marked in these instructions and are available at extra cost.

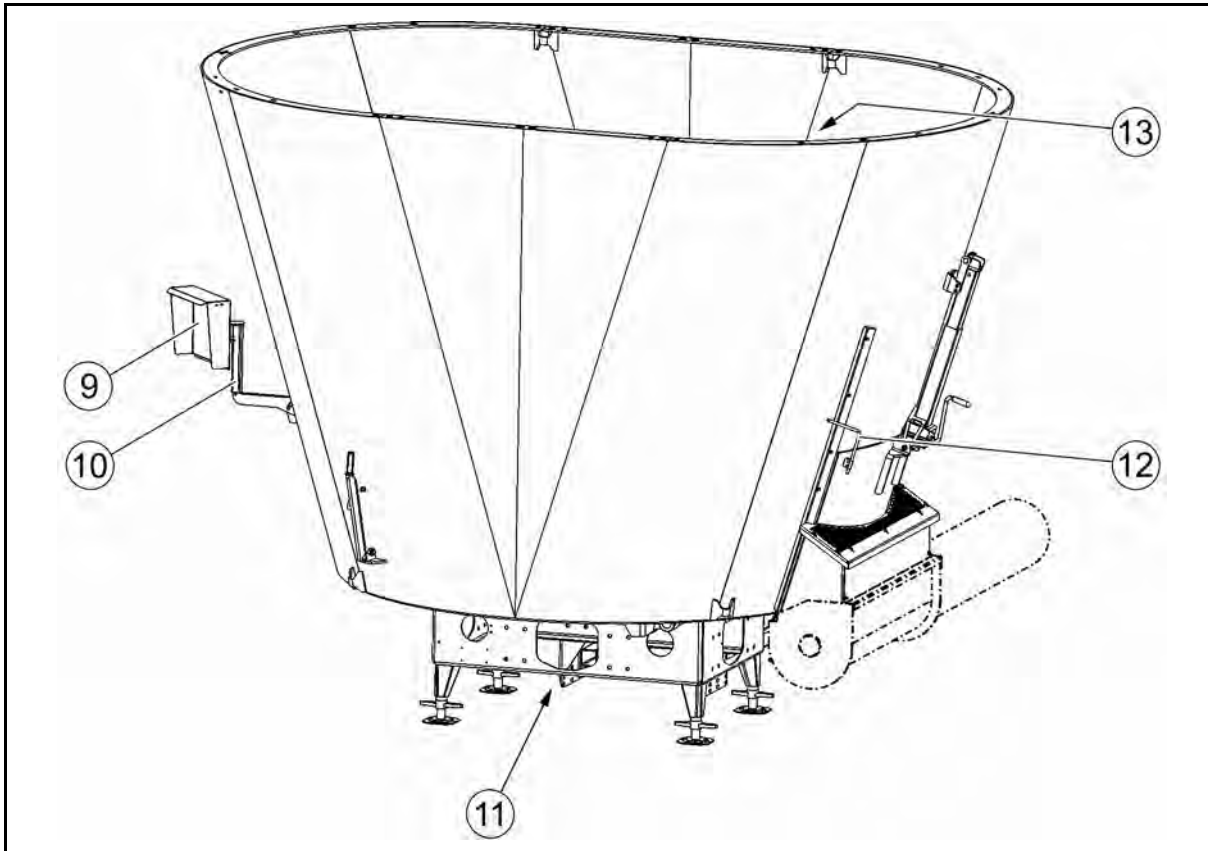
## 2.1 Overview - Assemblies

Illustration of product and identification of essential elements.



**Fig. 1**

- (1) Discharge door
- (2) Trough screw conveyor (not included in the scope of delivery)
- (3) Counter-cutter
- (4) Gear shaft with shear bolt locking mechanism
- (5) Gear motor
- (6) Compensating reservoir for gear lubricant oil of angular gears
- (7) Platform
- (8) Mixing container



**Fig. 2**

- (9) Operating terminal of weighing device (only available with optional extra equipment)
- (10) Swivelling holder for operating terminal of weighing device
- (11) Angular gear for mixing auger drive
- (12) Pointer for opening width of discharge door
- (13) Mixing auger

## 2.2 Safety and protective devices

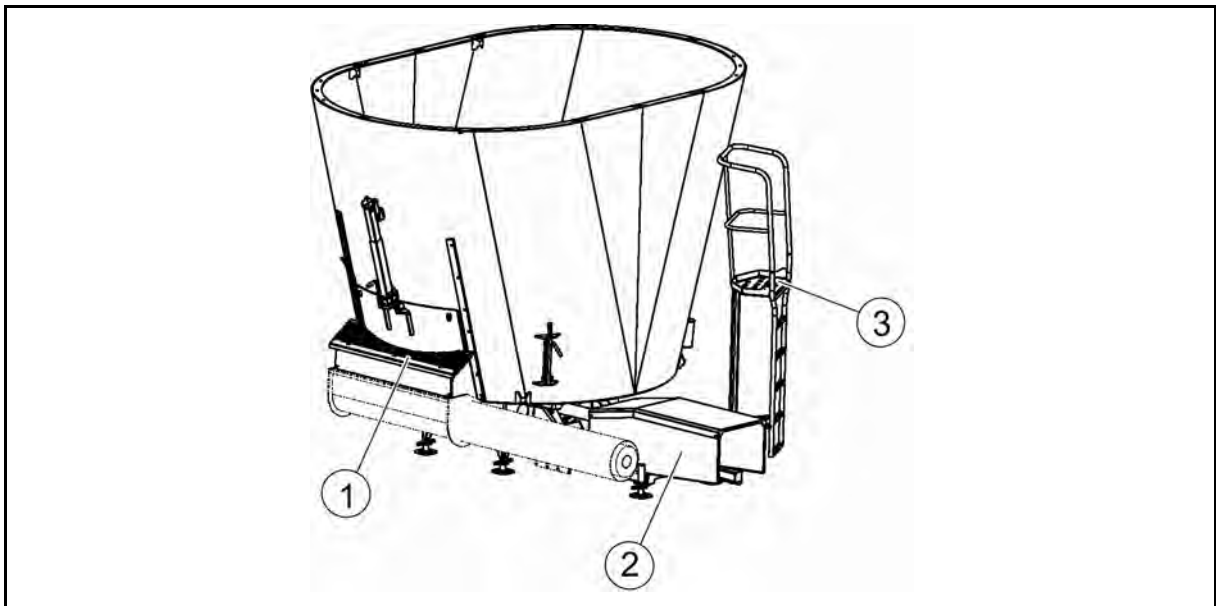
This chapter shows the location of the properly installed protective devices in protective position.

### WARNING



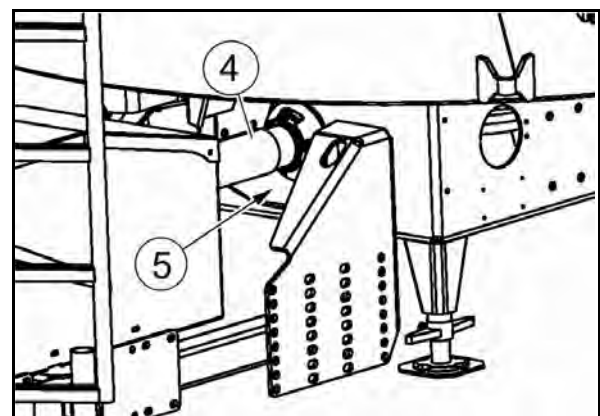
**Risk to people of being crushed, drawn in and becoming entangled during operation of machine due to unprotected moving machine parts!**

- Start the machine only with the protective devices completely mounted.
- Immediately replace defective protective devices.



**Fig. 3**

- (1) Cover of discharge opening
- (2) Protective hood of gear motor
- (3) Platform
- (4) Protective device of gear shaft
- (5) Protective sleeve for drive shaft



**Fig. 4**

### 2.3 Overview - Supply lines between tractor and system

(1) Motor terminal board

(2) PTC resistor



Only qualified staff are allowed to connect the gear motor.

Observe:

- the information in the chapter "Installation and connection", page 47,
- the information in the chapter "Gear motor information", page 78,
- the included operating instructions for the gear motor.

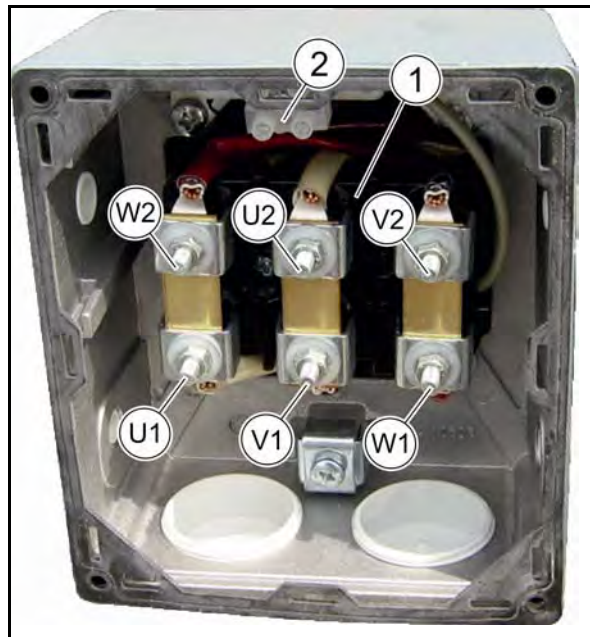


Fig. 5

(3) Analogue output of weighing device

(4) Power supply for weighing device, 2-pole

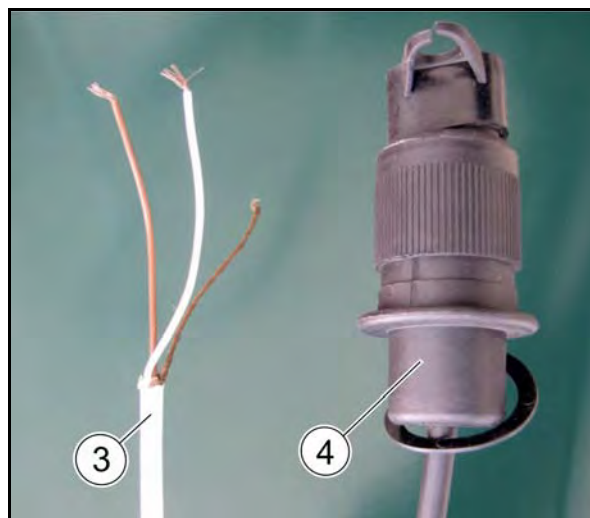


Fig. 6

## **2.4 Correct use**

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The solid matter metering systems of the Bio-Mix series:

- are designed for chopping, homogeneous mixing and metering of organic solids. The dry substance content of the mixed materials should be more than 25%.
- must not be charged otherwise than by means of:
  - a tractor equipped with a front loader,
  - a yard or wheeled loader,
  - a telescopic loader,
  - directly from a conveying device.
- are a component of a biogas plant and must be incorporated in the complete biogas plant.
- must not be installed in Ex zones.
- The observance of all instructions contained herein,
- The observance of the specified service and maintenance work on the machine
- the exclusive use of original spare parts

form also part of the correct use.

Any use beyond this is prohibited and will be regarded as incorrect.

- The user will be solely responsible,
  - The manufacturer will not assume any liability
- for any damage resulting from incorrect use.



### 2.5 Hazardous areas and dangerous spots

---

The hazardous area is the area within and / or in the vicinity of a machine, in which the safety or health of people might be impaired.



People are not allowed in the hazardous area:

- if the gear motor is running with the gear shaft coupled / the electronic system connected,
- if the machine is not secured against accidental starting.

The operator is only allowed to power working tools if no people are within the hazardous area of the machine.

Within the hazardous area, risks occur at dangerous spots which cannot be completely eliminated due to the operational safety of the machine. The risks exist permanently and may occur unexpectedly.

Dangerous spots are marked by warning signs attached to the machine, which warn about existing residual risks.

In these instructions, activity-related safety instructions mark the existing residual risks.

Risks may arise:

- due to work-related movements of the working tools,
- due to substances or foreign objects blown out of the machine,
- due to accidental lowering of lifted machine parts,
- due to accidental starting of the machine.

Dangerous spots exist:

- within the area of the powered gear shaft,
- within the area of the discharge opening,
- in the mixing container with the machine powered or not powered.



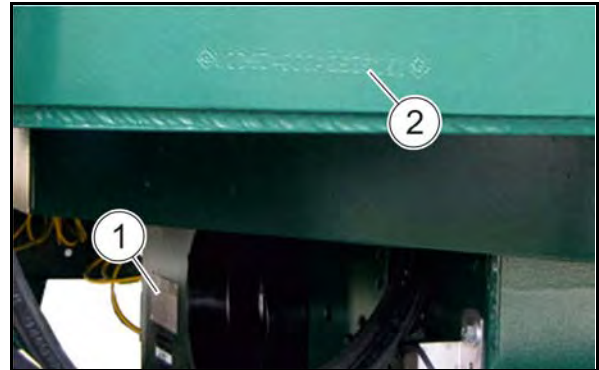
## 2.6 Type plate and marking

The following figures show the position of the type plate and the vehicle identification number (machine ID number).



The complete marking is treated as a document and must not be altered or made unrecognizable.

- (1) Type plate
- (2) Vehicle identification number (machine ID number) (embossed into the mixing container)



**Fig. 7**

The type plate includes:

- Manufacturer
- Fahrzeug / Maschinen Ident-Nr. = Vehicle / Machine ID number
- Typ = Model
- Leergewicht = Empty weight in kg: no entry
- Zul. Gesamtgew. in kg = Gross vehicle weight rating in kg
- Zulässige Stützlast / Achslast vorn in kg = Admissible tongue load / front axle load in kg: no entry
- Zul. Achslast hinten in kg = Admissible rear axle load in kg: no entry
- Baujahr = Year of manufacture
- Nenndrehzahl = Rated speed in  $\text{min}^{-1}$
- Zul. Hydr. Druck in bar = Admissible hydraulic pressure in bar: no entry
- Zul. Höchstgeschw. in km/h = Speed limit in km/h: no entry

		Maschinenfabrik B. Strautmann & Söhne GmbH u. Co. KG D-49196 Bad Laer	
Fahrzeug Maschinen	Ident-Nr.		
Typ			
Leergewicht	kg	Baujahr	
Zul. Gesamtgewicht	kg	Nenndrehzahl	$\text{min}^{-1}$
Zul. Stützlast	kg	Zul. Hydr. Druck	bar
Zul. Achslast vorn	kg	Zul. Höchstgeschw.	km/h
Zul. Achslast hint.	kg		

**Fig. 8**

## 2.7 Technical data

### 2.7.1 Bio-Mix

Model	Unit	Bio-Mix				
		750	900	1050	1250	1450
Gross vehicle weight rating	kg	6730	7590	8850	10200	11690
Empty weight without stainless steel lining *	kg	2825	2935	3378	3709	4201
Empty weight with stainless steel lining * approx.	kg	2980	3090	3600	3950	4440
Usable mixing capacity	m <sup>3</sup>	7.5	9.0	10.5	12.5	14.5 (17)
Admissible loading capacity	kg	3750	4500	5250	6250	7250
Rated power	kW	15	15	18,5	22	22
Power supply, weighing device	V	10 – 30 VDC				
Gear motor 400 V / 50 Hz		see motor rating plate				
Sound pressure level	dB(A)	≤ 70				

\* Weight may vary due to equipment

Figures, technical data and weights may change due to technical development and are not binding for delivery.

Tab. 1

#### 2.7.1.1 Dimensions

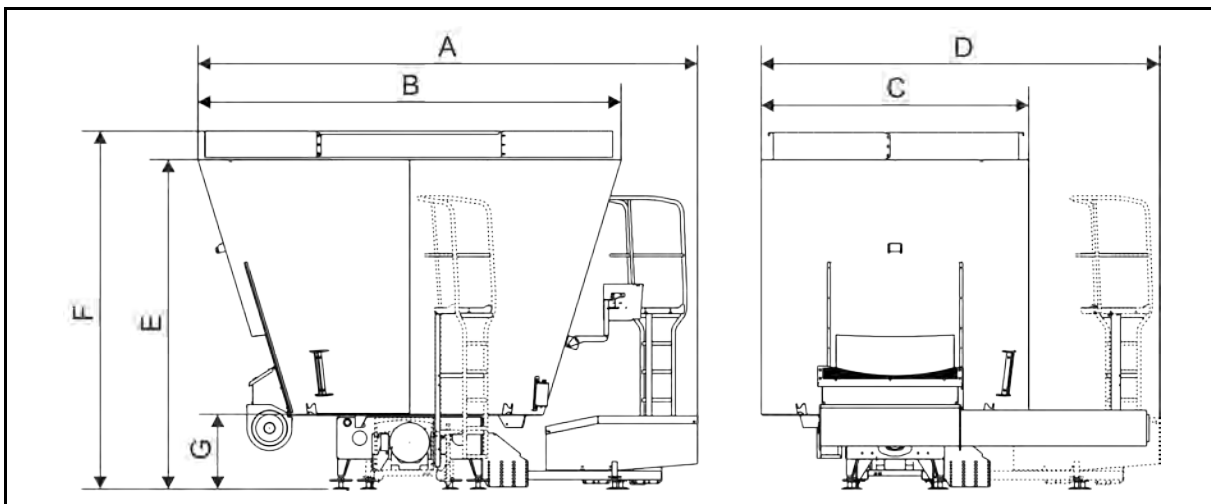


Fig. 9



Model		Bio-Mix				
	Unit	750	900	1050	1250	1450
Length:						
• A = with front gear motor	m	3.64	3.70	4.01	4.11	4.29
• B = with lateral gear motor	m	3.14	3.26	3.47	3.67	3.83
Width:						
• C = with front gear motor	m	2.16	2.16	2.28	2.42	2.42
• D = with lateral gear motor	m	3.05	3.05	3.43	3.49	3.60
Height:						
• E = Height *	m	2.29	2.49	2.61	2.73	2.98
• F = Height with attachment *	m	--	--	--	--	(3.33)
• G = Discharge height						
with PRÄZI auger 300	m	0.67	0.67	0.67	0.67	0.67
with PRÄZI auger 500	m	0.77	0.77	0.77	0.77	0.77

\* Dimension with PRÄZI auger 300

Figures, technical data and weights may change due to technical development and are not binding for delivery.

Tab. 2

## 2.7.2 Bio-Mix Double

Model		Bio-Mix Double					
	Unit	2000 D	2400 D	2800 D	3200 D	3400 D	4000 D
Gross vehicle weight rating	kg	16770	19410	21670	24600	26550	29850
Empty weight without stainless steel lining *	kg	6370	6974	7235	8165	9070	9370
Empty weight with stainless steel lining * approx.	kg	6770	7410	7670	8600	9550	9850
Usable mixing capacity	m <sup>3</sup>	20 (24)	24 (28.5)	28	32	34	40
Admissible loading capacity	kg	10000	12000	14000	16000	17000	20000
Rated power	kW	2x22	2x22	2x22	2x22	2x30	2x30
Power supply, weighing device	V	10 – 30 VDC					
Gear motor 400 V / 50 Hz		see motor rating plate					
Sound pressure level	dB(A)	≤ 70					

\* Weight may vary due to equipment

Figures, technical data and weights may change due to technical development and are not binding for delivery.

Tab. 3

### 2.7.2.1 Dimensions

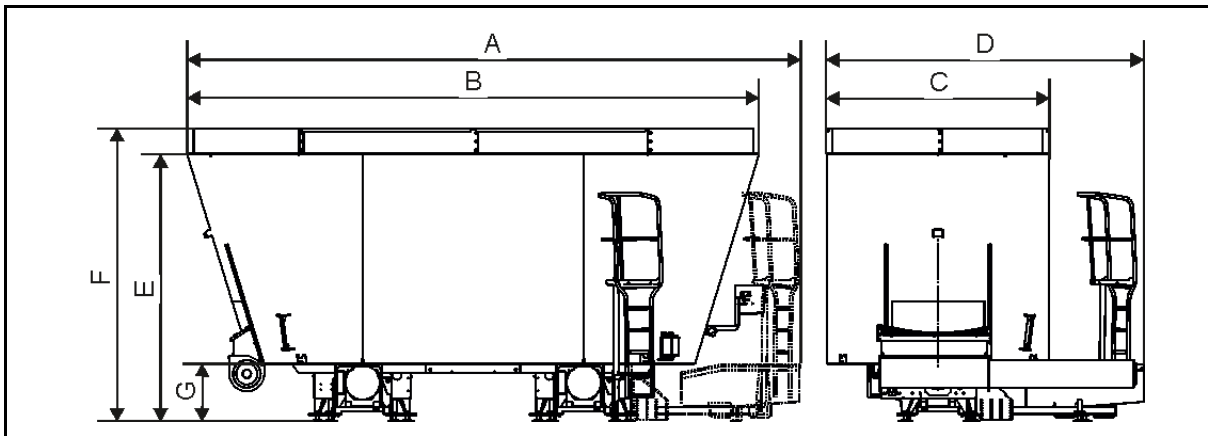


Fig. 10

Model		Bio-Mix Double					
	Unit	2000 D	2400 D	2800 D	3200 D	3400 D	4000 D
Length:							
• A = with front and lateral gear motors	m	6.18	6.42	6.49	6.49	6.99	6.99
• B = with lateral gear motors	m	5.73	6.07	6.23	6.23	6.63	6.63
Width:							
• C = with front gear motors	m	2.28	2.42	2.42	2.42	2.58	2.58
• D = with lateral or front and lateral gear motors *	m	3.32	3.39	3.39	3.39	3.68	3.68
Height:							
• E = Height **	m	2.61	2.73	2.98	--	3.10	--
• F = with attachment **	m	(2.96)	(3.08)	--	3.33	--	3.40
• G = Discharge height							
with PRÄZI auger 300	m	0.67	0.67	0.67	0.67	0.67	0.67
with PRÄZI auger 500	m	0.77	0.77	0.77	0.77	0.77	0.77

\* Dimension may vary depending on the angular position of the motor

\*\* Dimension with PRÄZI auger 300

Figures, technical data and weights may change due to technical development and are not binding for delivery.

Tab. 4

### 2.7.3 Bio-Mix Combi

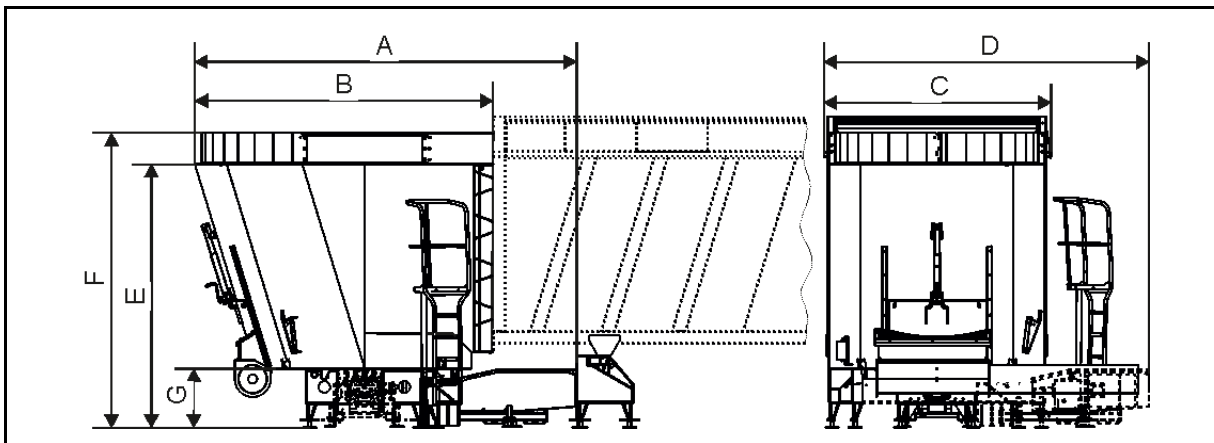
Model		Bio-Mix Combi
	<b>Unit</b>	
Gross vehicle weight rating	kg	11740
Empty weight without stainless steel lining *	kg	4024
Empty weight with stainless steel lining * approx.	kg	4240
Usable mixing capacity	m <sup>3</sup>	15 (17.5)
Admissible loading capacity	kg	7500
Rated power	kW	22
Power supply, weighing device	V	10 - 30 VDC
Gear motor 400 V / 50 Hz		see motor rating plate
Sound pressure level	dB(A)	≤ 70

\* Weight may vary due to equipment

Figures, technical data and weights may change due to technical development and are not binding for delivery.

**Tab. 5**

#### 2.7.3.1 Dimensions



**Fig. 11**



Model		Bio-Mix Combi
	Unit	
Length:		
• A = with gear motor below container	m	4.29
• B = with lateral gear motor	m	3.36
Width:		
• C = with gear motor below container	m	2.44
• D = with lateral gear motor	m	3.61
Height:		
• E = Height *	m	2.98
• F = with attachment *	m	(3.33)
• G = Discharge height		
with PRÄZI auger 300	m	0.67
with PRÄZI auger 500	m	0.77

\* Dimension with PRÄZI auger 300

Figures, technical data and weights may change due to technical development and are not binding for delivery.

**Tab. 6**

### 3 Safety instructions

This chapter contains important information for the user and the operator on how to operate the machine in a safety-conscious and trouble-free way.

**Observe all safety instructions included in these instructions!**

Most accidents are caused by non-observance of simplest safety rules.

By observing all safety instructions included in these instructions, you help to prevent accidents.

#### 3.1 Safety-conscious working

The machine has been designed according to state of the art and the accepted safety-related rules. When using the machine, risks and impairments might yet arise:

- for life and limb of the operator or third parties,
- for the machine itself,
- to other material assets.

For the safety-conscious operation of the machine, please observe:

- these instructions, in particular:
  - the basic safety instructions, the activity-related safety instructions and the instructions what to do,
  - the instructions regarding correct use.
- the warning signs on the machine,
- the general national occupational safety, accident prevention and environmental protection rules,

Only operate the machine in perfect safety-related condition.

**WARNING**

**Risk to people of being crushed, cut, becoming entangled, being drawn in and risk of impact to people if the machine is not in adequate reliable condition!**

Check the machine for its operational safety every day.



### 3.2 Organisational measures

---



The instructions

- must always be kept at the machine's place of operation,
- must always be easily accessible for operating and maintenance staff.

#### 3.2.1 User's obligation

---

The user is obliged:

- to observe the general national occupational safety, accident prevention and environmental protection rules,
- to exclusively have staff operating the machine who:
  - know the basic occupational safety and accident prevention regulations,
  - have been instructed how to operate the machine.
- to keep all warning signs attached to the machine in legible condition,
- to replace any damaged warning signs,
- to provide the necessary personal protective equipment such as: protective goggles, work gloves according to DIN EN 388, safety footwear, protective clothing, skin protectant

#### 3.2.2 Operator's obligation

---

Any members of staff charged to operate the machine are obliged:

- to acquaint themselves with the machine before starting operation,
- to acquaint themselves with the following regulations and to observe them during work:
  - the general national occupational safety, accident prevention and environmental protection rules,
  - the chapter "Basic safety instructions", page 27,
  - the chapter "Warning and instruction signs", page 34, and to observe the warning signs when operating the machine,
  - to read the chapters of these instructions which are important for the tasks assigned to them.

If the operator notices that a device is not in a sound safety-related condition, the operator shall be obliged to immediately eliminate this defect. If this is not part of the operator's scope of tasks or he/she lacks adequate expert knowledge, the operator shall be obliged to report this defect to his/her superior or to the user.



## 3.2.3 Qualification of staff



Only trained and instructed staff are allowed to operate the machine. The user must clearly define the responsibilities of the members of staff for operation, service and maintenance.

A person to be trained must be supervised when operating the machine.

The user is only allowed to carry out the work described in these instructions.

Only authorized workshops are allowed to carry out work on the machine which requires special expert knowledge. Authorized workshops have qualified staff and adequate means (tools, lifting and supporting equipment) at their disposal to carry out this work properly.

This applies to any work:

- which is not mentioned in these instructions,
- which is marked with the annex "Shop work" in these instructions.

Activity \ Staff	Member of staff especially trained for the activity <sup>1)</sup>	Instructed person <sup>2)</sup>	Staff with professional training (Authorized workshop) <sup>3)</sup>
Loading / Transport	X	X	X
Commissioning	--	--	X
Setup	--	--	X
Operation	--	X	X
Service and maintenance	--	X	X
Trouble-shooting	--	X	X
Disposal	X	--	--

Legend:

X..allowed      --..not allowed

<sup>1)</sup> A person who is able to take on a particular task and is allowed to carry it out for an adequately qualified company.

<sup>2)</sup> A person is considered to be instructed if he or she has been informed about the tasks assigned to him or her and possible risks in case of improper behaviour and if he or she has been instructed, if necessary, and if he or she has been advised of the necessary protective devices and measures.

<sup>3)</sup> Persons with professional training are considered to be qualified (expert). Due to their professional training and the knowledge of the relevant provisions, they are able to assess the tasks assigned to them and to identify possible risks.

Please note: A qualification which is equivalent to professional training may also be acquired by several years of practice in the corresponding field of work.



### 3.3 Product safety

---

#### 3.3.1 Safety-conscious operation of machine

---

The machine is only allowed to be operated, provided that no people are within the machine's hazardous area. Observe the information in the chapter "Hazardous area and dangerous spots", page 16.

#### 3.3.2 Safety and protective devices

---

- Only operate the machine when all safety and protective devices are properly fixed and in fully operable condition.  
Defective or removed safety and protective devices might cause dangerous situations.
- Check all safety and protective devices for visible damage and functional ability before starting the machine.

#### 3.3.3 Structural alterations

---

- You are only allowed to carry out structural alterations, extensions or modifications on the machine with the prior written consent of the manufacturer.
- In case of non-authorized structural alterations, extensions or modifications the declaration of incorporation will become invalid.
- Exclusively use original spare parts or modification and accessory parts approved by the manufacturer such that:
  - the declaration of incorporation will remain unaffected,
  - perfect functioning of the machine will be ensured.
- The manufacturer will not assume any liability for damage resulting from:
  - unauthorized alterations of the machine,
  - non-approved modification and accessory parts,
  - welding and drilling work on load-bearing parts of the machine.

#### 3.3.4 Spare and wearing parts, auxiliary materials

---

Immediately replace machine parts which are not in perfect condition.

Exclusively use original spare parts of the manufacturer or parts approved by the manufacturer. If spare and wearing parts produced by third-party manufacturers are used, their stress-related and safety-conscious design and production will not be ensured.

The manufacturer will not assume any liability for damage resulting from the use of non-approved spare and wearing parts or auxiliary materials.

### **3.3.5 Warranty and liability**

---

As a basic principle, our "General Sales Terms and Delivery Conditions" shall apply.

Any warranty and liability claims in case of personal injury and material damage will be excluded if they are due to one or several of the following reasons:

- improper use of the machine,
- improper assembly, commissioning, operation and maintenance of the machine,
- operation of the machine, the safety devices being defective or the safety and protective devices having not been properly installed or being not serviceable,
- non-observance of the information included in the instructions referring to commissioning, operation and maintenance,
- unauthorized structural alterations on the machine,
- insufficient inspection of machine parts which are subject to wear,
- improperly effected repairs,
- disasters due to foreign objects and force majeure.

## **3.4 Basic safety instructions**

---

Basic safety instructions:

- shall, as a basic principle, apply to the safe operation of the machine,
- are summarized in the subsections below.

### **3.4.1 General safety and accident prevention instructions**

---

- Observe the general national safety and accident prevention regulations in addition to the safety instructions included in this chapter!
- Wear your personal protective equipment when carrying out work on the machine!
- Observe the warning and instructions signs attached to the machine. They provide important information for the safe and trouble-free operation of the machine!
- Observe the activity-related safety instructions included in the other chapters in addition to the basic safety instructions included in this chapter!
- Make sure that people leave the hazardous area of the machine before starting the machine! Particularly be aware of children!
- Wait for the machine to stop completely before entering the hazardous area of the machine.
- The following measures are imperative before carrying out any work on the machine such as maintenance work or trouble-shooting:



- o Secure the machine against accidental starting,
- o secure lifted machine parts / the lifted machine against accidental lowering.

### Use of machine

---

- Acquaint yourself with all mechanisms and operating elements of the machine and their functions before starting work! During operation it will be too late.
- Wear close-fitting clothing! Loose-fitting clothing increases the risk of becoming entangled in or wound up at drive shafts or moving parts!
- Start the machine only if all protective devices have been installed and are in protective position!
- People are not allowed:
  - o within the operating / hazardous area of the machine,
  - o beneath lifted and unsecured movable machine parts!
- Powered movable machine parts have crushing and shearing zones!
- You are only allowed to operate powered machine parts if there are no people within the machine's hazardous area!

### 3.4.2 Electrical system

---

The machine can be equipped with electronic components and parts, the functioning of which may be affected by electromagnetic emissions of other devices. Such interferences may be a risk to people if the following safety instructions are not observed:

- In case of a retrofitting of electrical devices or components into the machine and their connection to the mains, the user must check on his own responsibility whether the retrofitted parts interfere with the electronics or other components.
- Ensure that the retrofitted electrical and electronic components comply with the EMC directive 2004/108 as amended from time to time and bear the CE symbol!

### **3.4.3 Gear shaft operation**

---

- Only use the gear shafts specified by the manufacturer and equipped with the proper protective devices!
- Observe the information included in the operating instructions for the supplied gear shaft!
- Check the gear shaft:
  - Protective tube and protective cone of the gear shaft must be undamaged,
  - Protective sleeve at the angular gear and the gear motor cover must be undamaged.
- Mounting and dismounting of the gear shaft is only allowed with the gear motor switched off.
- Always ensure proper mounting and securing of the gear shaft!
- Secure the gear shaft guard against rotation by installing the chain(s)!
- Observe the operating position of the specified tubular covers of the gear shafts!
- Before switching the gear motor on, check whether the sense of rotation of the gear motor complies with the sense of rotation of the machine!
- People are not allowed within the range of the rotating gear shaft when work on the gear shaft is being carried out!
- Risk of injury due to the flywheel mass of machine parts continuing to rotate for a short time after the gear motor has been switched off!  
Do not approach the machine too closely during that time! Do not carry out any work on the machine until all machine parts have completely stopped.



### 3.4.4 Solid material metering system

---

- Charge the solid material metering system by means of a tractor equipped with a front loader, by means of a wheeled loader, a telescopic loader or a conveying device.
- People are not allowed:
  - above the solid material metering system, e.g. to fill the mixing container manually from a silo or a hayloft! People who are standing above the mixing container risk to fall into the mixing container,
  - to climb onto the top edge of the mixing container,
  - to enter or reach into the mixing container!
- Risk of crushing when opening and closing the discharge door. Before opening or closing the discharge door, make sure that people and animals leave the hazardous area!
- Risk of injuries caused by the sharp-edged cutting knives of the mixing auger.
- When using electrical tools, the connecting cables must not be moved over sharp-edged cutting knives!

### **3.4.5 Service and maintenance of machine**

---

- Carry out the required service and maintenance work on the machine in due time!
- Existing mechanical, electrical or electronic residual energies may cause accidental machine movements!  
Beware of existing residual energies in the machine when carrying out maintenance work.
- Secure all operating media against accidental startup!
- Fix larger assemblies carefully to lifting equipment and secure them before replacing larger assemblies!
- Regularly check screws and nuts for tightness! Retighten loosened screws and nuts!
- Use appropriate equipment and gloves when replacing working tools with blades!
- Check unscrewed joints for tightness. After finishing maintenance work, check the safety and protective devices for proper functioning!
- Properly handle and dispose of substances and materials used for cleaning the machine, especially:
  - when working on lubrication systems and devices,
  - when carrying out cleaning work with solvents!
- Spare parts must at least comply with the specified technical standards of the manufacturer! This is guaranteed when using original spare parts!
- Observe the maintenance intervals for wearing parts!

## 3.5 Activity-related safety instructions and important information

Activity-related safety instructions and important information are included in the instructions. Signal words and symbols help to identify activity-related safety instructions and important information at a glance.

### 3.5.1 Activity-related safety instructions

Activity-related safety instructions:

- warn about risks which may occur in a certain situation or in connection with a certain behaviour,
- are directly mentioned in front of a hazardous activity in the individual chapters,
- are marked by the triangular hazard symbol and a preceding signal word. The signal word refers to the seriousness of the risk.

#### DANGER



#### DANGER

marks a direct danger bearing a high risk, which will cause most serious bodily injury (loss of limbs or long-term harm) or even death if it is not prevented.

Non-observance of the safety instructions marked by “DANGER“ directly causes most serious bodily injury or even death.

#### WARNING



#### WARNING

marks a possible danger bearing a moderate risk, which might cause most serious bodily injury or even death if it is not prevented.

Non-observance of the safety instructions marked by “WARNING“ may cause most serious bodily injury or even death.

#### CAUTION



#### CAUTION

marks a possible danger bearing a low risk, which might cause light or moderate bodily injury or material damage if it is not prevented.

Non-observance of the safety instructions marked by "CAUTION" may cause light or moderate bodily injuries or material damage.



### 3.5.2 Important information

---

Important information:

- provides details for proper use of the machine,
- provides user hints for optimum use of the machine,
- is marked by the following symbols.



#### **IMPORTANT**

**marks an obligation to behave in a particular manner or to act in a certain way, in order to use the machine properly.**

**Non-observance of these instructions may cause malfunctions of the machine or in its vicinity.**



#### **INFORMATION**

**marks user hints and particularly useful information.**

**This information will help you to use all functions of your machine in the best possible way.**

### 3.6 Warning and instruction signs



The following warning and instruction signs are attached to the machine:

- Warning signs mark dangerous spots on the machine and warn about residual risks, which cannot completely be eliminated due to the machine's operational safety.
- Instruction signs include information referring to proper use of the machine.

Always keep these signs in clean and clearly legible condition! Replace illegible signs. Order the warning and instruction signs according to their order number:

- from the dealer,
- directly via the Strautmann spare parts warehouse (+ 49 (0) 5424 802-31).

#### 3.6.1 Warning signs

A warning sign consists of 2 pictographs:

**(1) Pictograph for description of risk**

The pictograph shows the pictographic description of the risk, surrounded by a triangular hazard symbol.

**(2) Pictograph for avoidance of risk**

The pictograph shows the pictographic instruction how to avoid the risk.

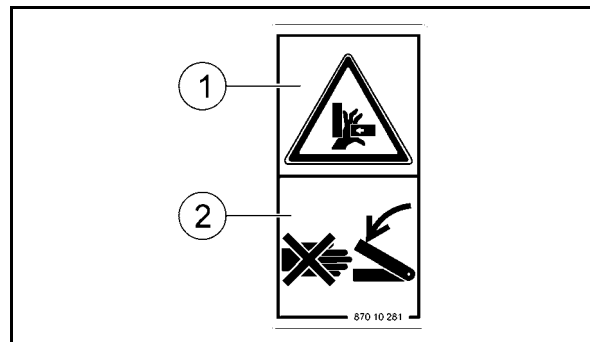


Fig. 12

#### Explanations of warning signs

The following list includes:

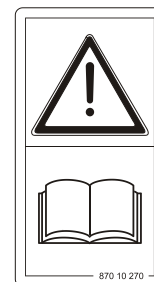
- in the right-hand column all warning signs attached to the machine,
- in the left-hand column the following details referring to the warning sign on the right-hand side:
  1. The order number.
  2. The description of risk, e. g. "Risk of crushing fingers or hand due to accessible movable machine parts!"
  3. The consequences in case of non-observance of the instruction(s) how to avoid the risk, e. g. "This risk may cause most serious injuries involving loss of limbs."
  4. The instruction(s) how to avoid the risk, e. g. "Never reach into the dangerous spot as long as the gear motor is running with the gear shaft coupled / the electronic system connected. Make sure that people leave the hazardous area of the machine before moving machine parts."

## Order number and explanation

## Warning signs

### 870 10 270

Please read and observe the operating and safety instructions before commissioning!



### 870 07 120

**Risks when carrying out work on the machine such as mounting, adjusting, trouble-shooting and maintenance, due to accidental starting of the machine!**

This risk may cause most serious injuries or even death.

- Secure the machine against accidental starting before carrying out any work on the machine.
- Read and observe the instructions in the respective chapters in the instructions depending on the work to be carried out.



### 870 10 280

**Risk to hands or arms of being drawn in or becoming entangled in moving power transmission parts!**

This risk may cause most serious injuries including loss of limbs.

Never open nor remove protective devices, as long as the motor is running with the gear shaft coupled / the electronic system connected.



### 870 10 278

**Risk of becoming entangled and wound up due to the powered gear shaft!**

This risk may cause most serious injuries or even death.

- Keep sufficient safe distance to the gear shaft, as long as the gear motor is running with the gear shaft coupled.
- Ensure that people keep sufficient safe distance to the powered gear shaft.



### 870 10 279

**Risk of cuts for fingers and hands due to mounting work on sharp / sharp-edged working tools!**

This risk may cause most serious injuries including loss of fingers and hands.

Observe the information in the instructions before carrying out mounting work on sharp working tools.



### 870 07 111

#### **Risk of cuts for fingers and hands, of shearing and crushing due to moving components!**

This risk may cause most serious injuries including loss of fingers and hands.

Keep sufficient safe distance to the moving components until the movement has completely stopped.

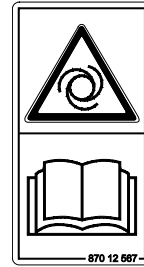


### 870 12 567

#### **Risk of crushing, shearing, cuts, amputation, becoming entangled, wound up and being drawn in due to automatically starting machine!**

This risk may cause most serious injuries or even death.

Secure the machine against accidental starting and read and observe the information included in the instructions before carrying out any work on the machine.



### 870 12 568

#### **Risk of becoming entangled, wound up, being drawn in and risk of slipping, stumbling or falling if people fall from the top edge of the mixing container!**

This risk may cause most serious injuries or even death.

- People are not allowed above the top edge of the mixing container.
- Never bend over the mixing container.



### 870 10 287

#### **Dangerous situations may occur if load-bearing parts break due to mechanical work on frame elements!**

This risk may cause most serious injuries or even death.

As a basic principle,

- mechanical processing of the sub-frame,
- drilling at the sub-frame,
- boring up of existing holes at the sub-frame or at load-bearing parts,
- welding on load-bearing parts

is not allowed.



## 3.6.2 Instruction signs

An instruction sign consists of a pictograph:

**(1) Pictograph including information about proper use of the machine.**

The pictograph includes visual or descriptive information or information summarized in a table.

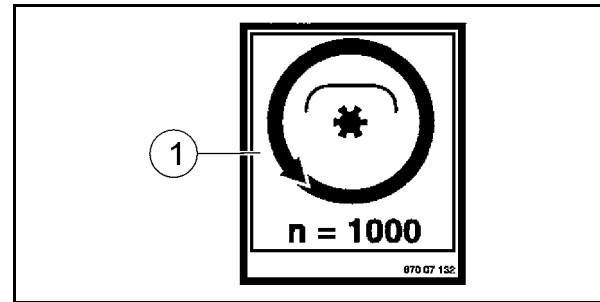


Fig. 13

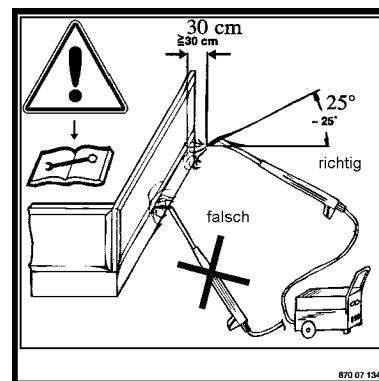
### Order number and explanation

### Instruction signs

**870 07 134**

**Risk due to improper cleaning of the machine.**

Absolutely observe the information in the chapter "Cleaning by means of pressure washer / steam blaster" on page 63 when using a pressure washer / steam blaster for cleaning the machine.



**870 12 547**

The pictograph marks lifting points for fixing lifting equipment when loading the machine.



**877 06 091**

The pictograph marks anchorage points for fixing securing equipment for transport of the machine.



### 3.6.3 Placing of warning and instruction signs

The following figure illustrates the position of the warning and instruction signs on the machine.

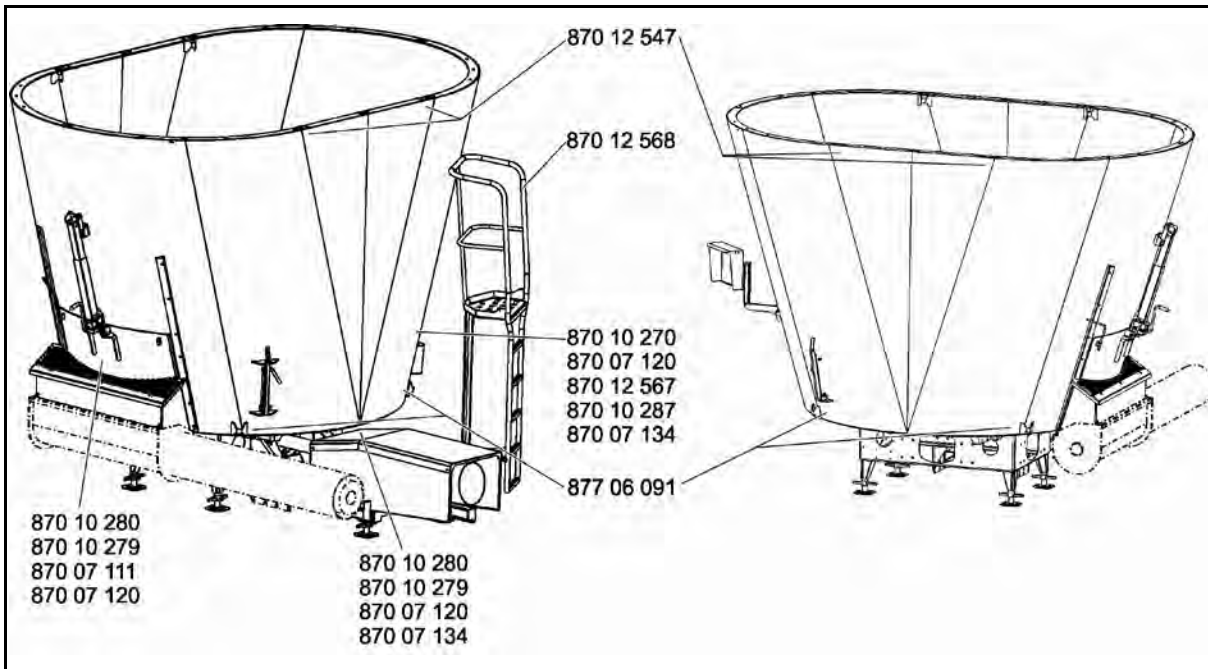


Fig. 14

### 3.7 Risks in case of non-observance of safety instructions and warning signs

Non-observance of the safety instructions and warning signs may:

- cause risk to people, environment and machine such as:
  - risk to people due to non-secured work areas,
  - failure of essential machine functions,
  - failure of specified methods for the use, service and maintenance of the machine,
  - risk to people due to mechanical and chemical effects,
  - threat to the environment due to leaking operating media.
- lead to invalidation of any claims for damages.

## 4 Loading and unloading

### Loading and unloading by means of lifting equipment

#### WARNING



**Risk of crushing and / or impact to people if the lifted machine accidentally comes down!**

- It is imperative to use the marked lifting points / anchorage points when fixing lifting / securing equipment for loading and unloading the machine.
- Use appropriate slings which are able to safely carry the machine's weight.
- Never stand within the lifting zone beneath the lifted machine.

Lifting points for fixing lifting equipment are identified on the machine by pictograph 870 12 547 (Fig. 15).

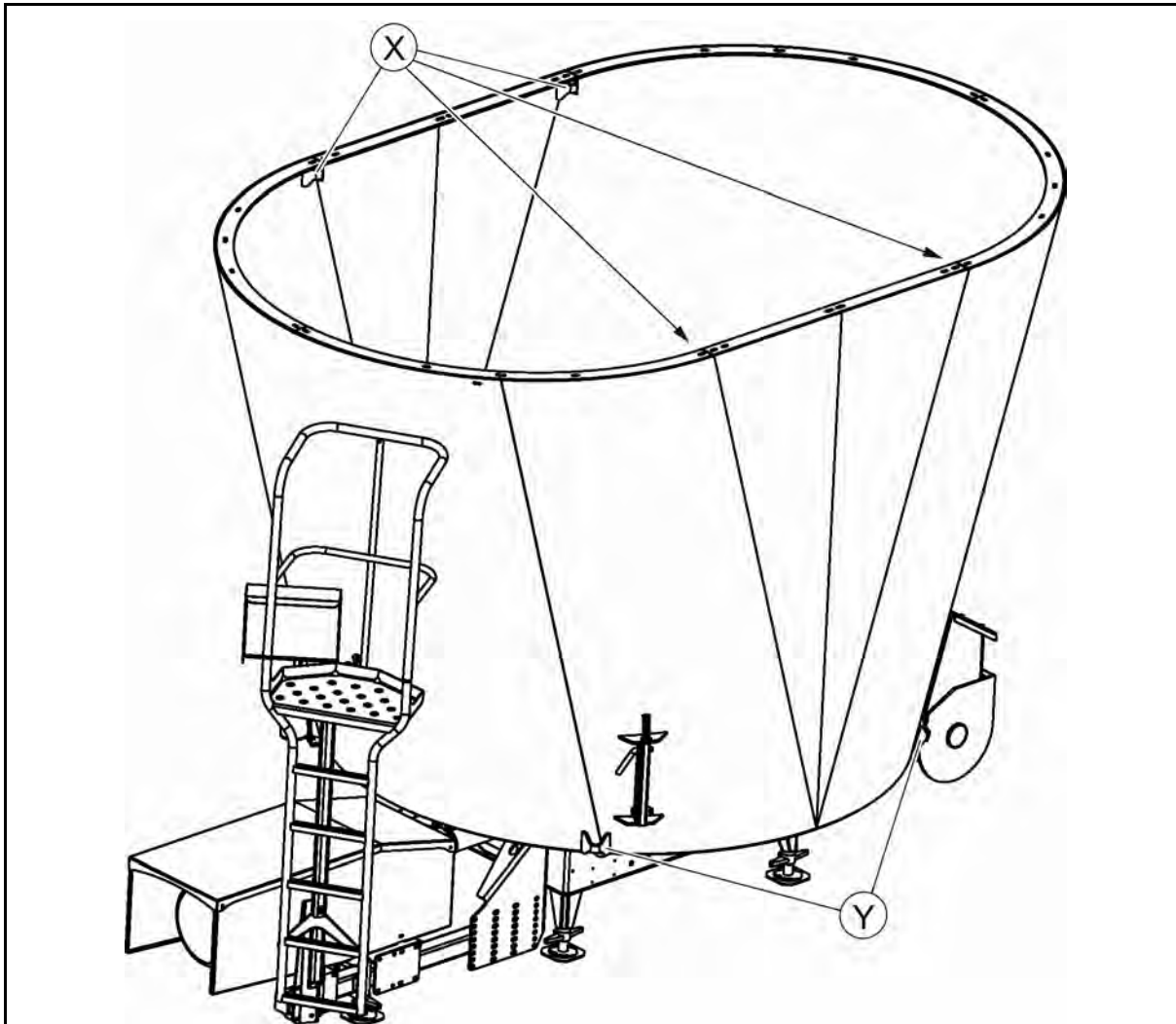


Fig. 15

Anchorage points for fixing securing equipment are identified on the machine by pictograph 877 06 091 (Fig. 16).



Fig. 16



**Fig. 17**

(X) 4x lifting points

(Y) 4x anchorage points



## 5 Design and function

The following chapter provides information about the design of the machine, its function and the handling of the individual components.

Some of the machines are illustrated with optional extras. Optional extras are marked in these instructions and are available at extra cost.

### 5.1 Mixing container and mixing auger

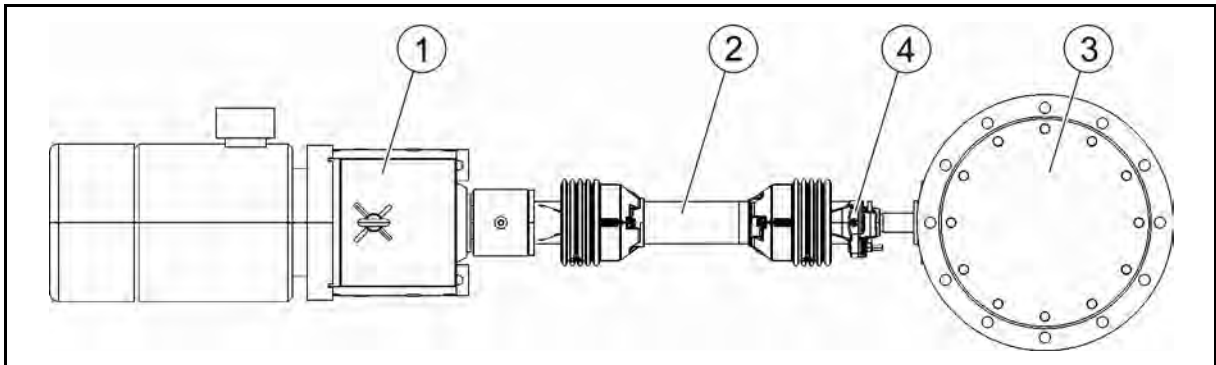


Fig. 18

Each mixing auger is mechanically powered by a gear motor (1) via a gear shaft (2) and an angular gear (3).

The gear shaft (2) is equipped with a shear bolt coupling (4). In case of overload, the shear bolt of the shear bolt coupling shears off thus interrupting the power flux between the gear motor and the mixing auger. This protects the power train of the mixing auger from being damaged.

The output speed of the gear motor and the individual angular gear design determine the drive speed(s) of the mixing auger(s).

During the mixing process, the mixing auger(s) first transport the solid materials filled in upwards in the centre of the mixing auger. The solid materials then fall down the container wall so that a mixing cycle is generated.

### 5.1.1 Cutting knives of mixing augers

In the mixing container, the cutting knives (1) of the mixing auger(s) (2) chop and mix the solid materials filled in. The number of cutting knives mounted on a mixing auger depends on the diameter and the height of the mixing auger.

Additional scrapers mounted opposite the front auger end of the respective mixing augers ensure a uniform discharge of the mixed materials.

The cutting knives (1) may be screwed onto the mixing auger in a retracted position (3) (standard) and in an extended position (4). Adjustment of the cutting knives permits to individually adapt the mixing system to the operating conditions and the structure of the solid materials to be mixed.

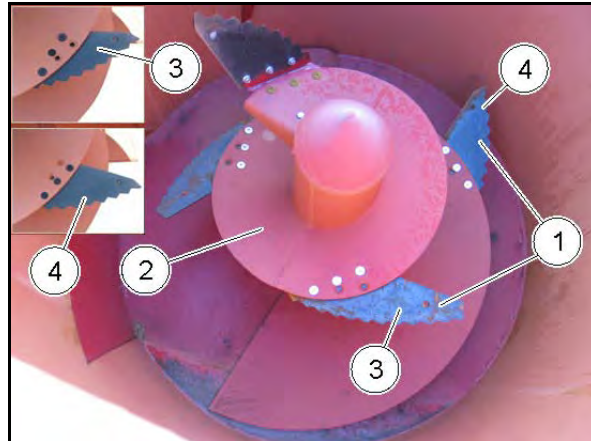


Fig. 19

- **Retracted position of cutting knives:**
  - easier cutting,
  - better undoing of bales,
  - less driving power required.
- **Extended position of cutting knives:**
  - cutting with more effort,
  - support of discharge of highly-structured mixtures at the discharge opening,
  - all cutting knives extended leads to worse undoing of bales,
  - better picking-up and new inclusion in the intensive mixing process of bale components by one extended cutting knife at the top of the mixing auger,
  - requires high driving power.

### 5.1.2 Attachment

#### DANGER



**Risk of damage to the machine due to overload caused by filling too much mass into the mixing container due to a non-approved attachment!**

Exclusively use approved attachments.

#### Optional extra:

The attachment (1) increases the capacity and prevents the solid materials from being thrown over the container edge during mixing.

The attachment is screwed to the top edge of the container.

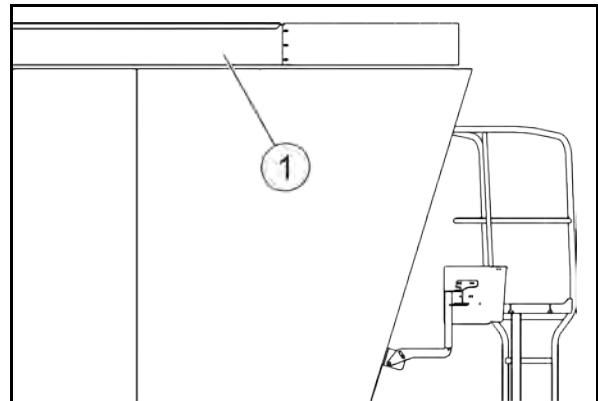


Fig. 20

### 5.1.3 Counter-cutters

The use of the counter-cutters (1) allows finer chopping and faster mixing of highly-structured solid materials.

The counter-cutters:

- are e.g. used for chopping and mixing round or cuboid bales,
- can be extended into the mixing container by sticking the bolt (2) in 4 possible positions,
- are working the more effectively, the further the counter-cutters are extended into the mixing container,
- are, as a standard feature, manually extended into the mixing container or retracted.

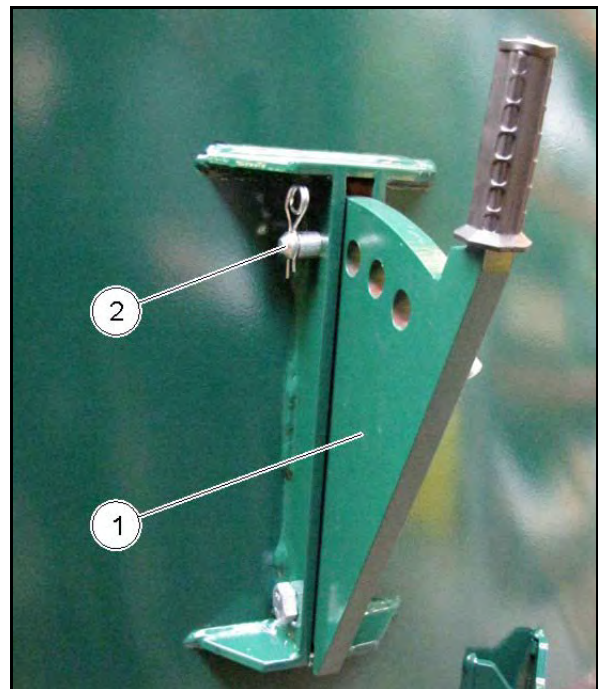


Fig. 21

### 5.2 Platform



Use the platform for supervision of the mixing process.

From the platform the mixing process can easily be monitored / supervised.



Fig. 22

### 5.3 Discharge

Through the discharge, the mixed materials are directly transported from the mixing container into a conveying device, e.g. a trough screw conveyor.



Fig. 23

## 5.3.1 Open and close discharge door for discharge opening

The discharge door (1) of the discharge opening is opened and closed manually.

The discharge door (1) is actuated via the crank handle (2).

The opening width of the discharge door (1) and the structure of the mixed materials determine the quantity of material discharged.

The set opening width of the discharge door is indicated by the pointer (3) on the scale (4).

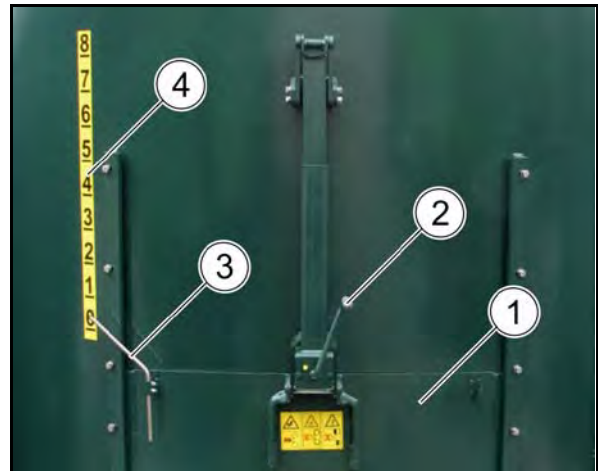


Fig. 24

## 5.4 Weighing device

### Optional extra:

Depending on the machine's equipment, it is fitted with:

- an adding weighing device to determine the quantities of solid material filled in,
- a programmable weighing device offering the possibility to save several recipes and to transfer data to the PC.

During charging and distributing, the weight display of the weighing device can be swivelled into the desired direction for better visibility via the swivelling holder.

Observe the included operating instructions for the weighing device.



Fig. 25

The actual weight of the solid materials filled into the mixing container is calculated by means of the weighing rods (1). The weighing rods are mounted between the container and the sub-frame.



Fig. 26

### 5.5 Operating elements

The electrical function(s) of the machine are operated via a central control system (not included in the scope of delivery).

### 5.6 Gear shaft

The power transmission between the gear motor and the machine is effected by means of the gear shaft.

#### WARNING



#### **Risk to people of becoming entangled and wound up due to an unsecured gear shaft or damaged protective devices!**

- Never use the gear shaft without protective device or with a damaged protective device or without proper handling of the clip chain.
- Regularly check all protective devices of the gear shaft for proper mounting and functioning.
- Immediately have damaged or missing parts of the gear shaft replaced by original spare parts from the gear shaft manufacturer.

Observe the fact that only an authorized workshop is allowed to repair a gear shaft.

#### WARNING



#### **Risk to people of becoming entangled and wound up due to unprotected gear shaft parts within the power transmission area between the gear motor and the powered machine!**

Ensure that the power train between the gear motor and the powered machine is completely protected:

- The unprotected parts of the gear shaft must always be protected by means of a protective hood mounted on the gear motor and a protective sleeve mounted on the angular gear.

## 5.7 Installation and connection



- Installation of the machine in Ex zones is not allowed!
- Observe the safe distance to movable and immovable components required by law.
- Only qualified staff are allowed to connect the gear motor. Observe the information in the chapter "Overview - Supply lines between tractor and system", page 14 and the included operating instructions for the gear motor.  
Danger to life in case of improper connection!
- Exclusively connect the included gear motor(s) with an appropriate gear shaft.
- Observe the regulations for connections of the power supply companies.
- In order to ensure trouble-free weighing, the machine must not come into contact with feeding or discharging conveyor systems.

### 5.7.1 Installation



Build an amply dimensioned, solid, even and horizontal foundation which meets the machine requirements and complies with state-of-the-art technology.



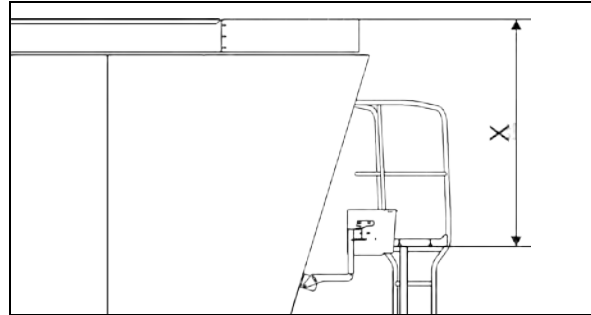
Make sure that a lockable emergency stop switch is connected at an appropriate position, in order to establish the machine's readiness for operation.



Observe the fact that a suitable container must be mounted to the Bio-Mix Combi!



1. Set down the machine on appropriate ground.
2. Align the machine to the trough screw conveyor.
3. Align the machine in horizontal position by adjusting the adjustable legs.
4. Screw a container to your Bio-Mix Combi if necessary. Use the included sealant for that purpose.
5. Mount the platform.



**Fig. 27**

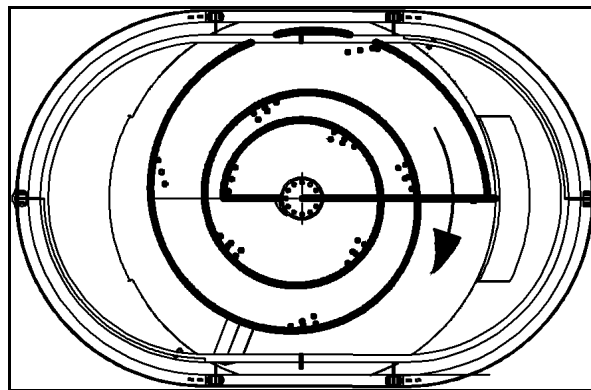


Check the distance X between the top edge of the mixing container and the standing surface of the platform. The distance X shall

- be not less than 1.20 m
- be not more than 1.60 m

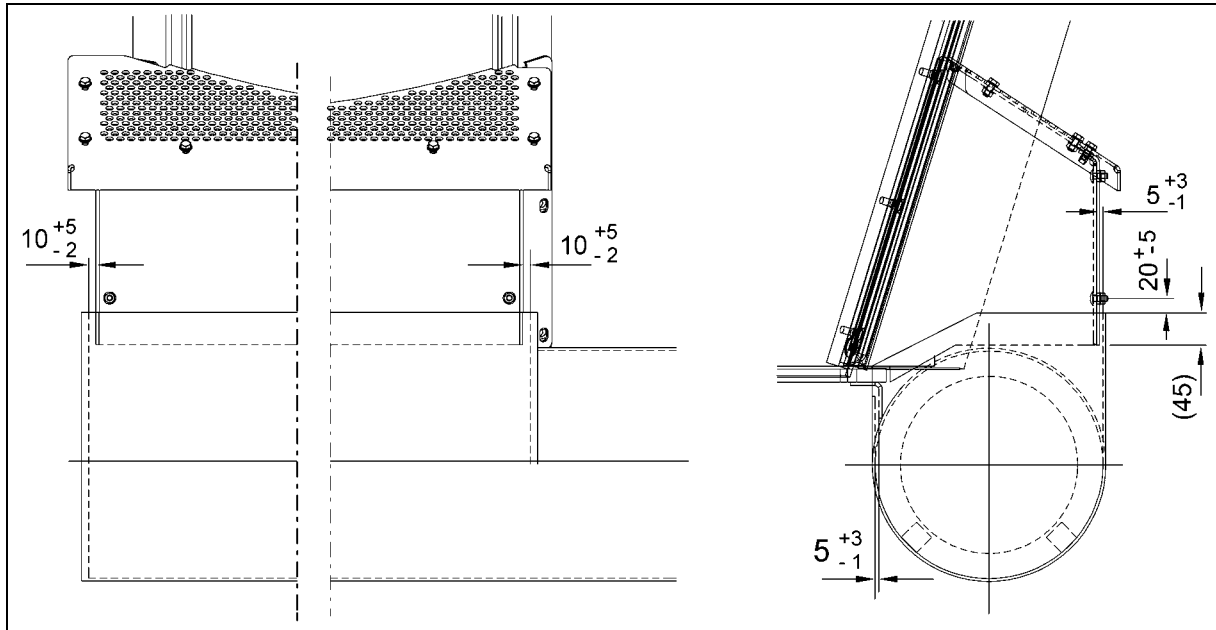
Correct this distance if necessary.

6. Have the gear motor installed and connected by qualified staff.
  - o Cable cross sections and gear motor fuse must be selected according to the motor rating and the operating conditions.
7. Check the gear motor connection by comparing the sense of rotation of the mixing auger(s) with that illustrated in Fig. 28.
  - 6.1 If the sense of rotation of the mixing auger(s) is not identical to that illustrated in Fig. 28, the sense of rotation must be corrected by interchanging two phases.
8. Mount a lockable emergency stop switch (not included in the scope of delivery) on the machine within easy reach.
9. Check the clearances and tolerances specified in Fig. 29.
  - 9.1 If the attachment dimensions do not comply with the clearance and tolerance values specified in Fig. 29, the attachment must be corrected.



**Fig. 28**





**Fig. 29**

10. Connect the weighing device. Observe the included operating instructions for the weighing device.

## 5.7.2 Establish potential equalization



Check the correct potential equalization establishment by measuring the resistance by means of appropriate testing equipment.

1. Establish a potential equalization (connection to ground) between:
  - o the container, the sub-frame and the gear motor support and the ground conductor of the complete biogas plant.
  - o between the control system of the weighing device and the ground conductor of the complete biogas plant.
- 1.1 Screw the connecting cable (1) to an M8 screw (2) on the machine. For Bio-Mix and Bio-Mix Combi please refer to Fig. 30 and for Bio-Mix Double to Fig. 31.
- 1.2 For establishing a potential equalization between the control system of the weighing device and the ground conductor of the complete biogas plant, observe the included operating instructions for the weighing device.

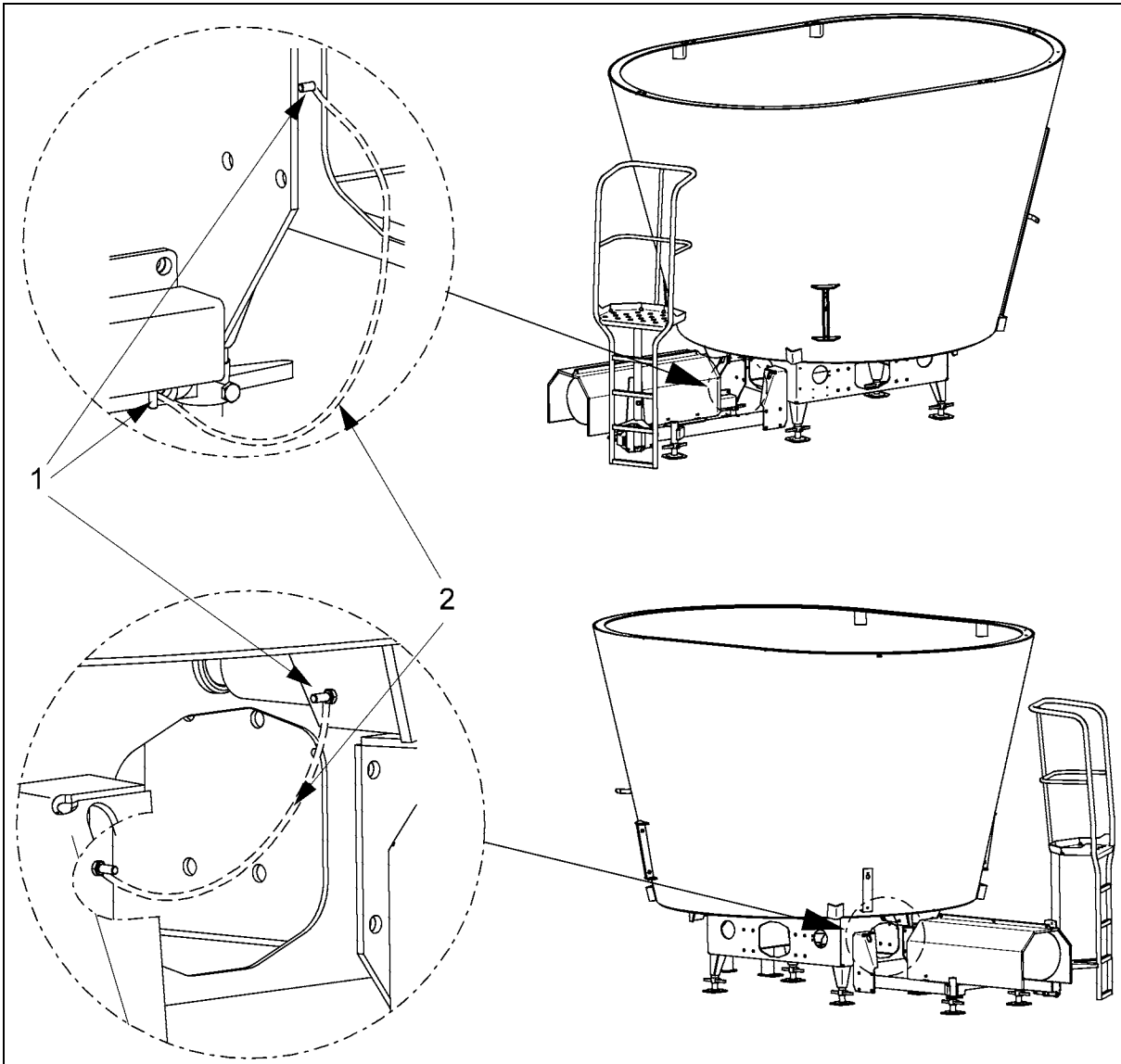


Fig. 30 Bio-Mix, Bio Mix Combi

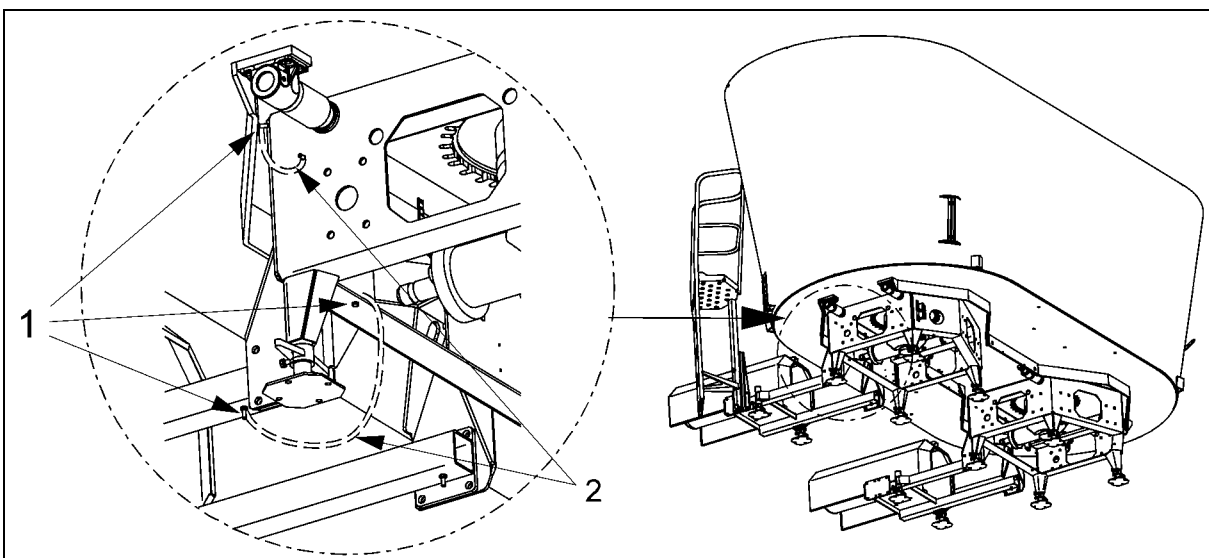


Fig. 31 Bio-Mix Double

## **6 Commissioning**

This chapter will provide information:

- on how to proceed when commissioning your machine,



- Before commissioning, the operator must have read and understood the instructions.
- When commissioning the machine, additionally observe the information included in the chapters:
  - "Operator's obligation", page 24,
  - "Qualification of staff", page 25,
  - "Basic safety instructions", page 27,
  - "Warning and instruction signs", page 34,
  - "Service and maintenance of machine", page 61.Observance of these chapters serves your safety.
- Before each startup, the machine must be checked for its operational safety.

### **6.1 Check machine for proper functioning**

Check the machine for proper functioning before the first startup:

1. Check the oil level of the angular gear in the compensating reservoir for the gear lubricant oil. Observe the information in the chapter "Check oil level", page 68.
2. Check all functions of the machine before charging the mixing container for the first time:
  - 2.1 Open and close discharge door.
  - 2.2 Extend and retract counter-cutters into and from the mixing container.
  - 2.3 Check the weighing device (if available) for proper functioning.

## 6.2 Secure machine against accidental starting

### WARNING



**Risk of crushing, shearing, cuts, amputation, becoming entangled, wound up, being drawn in and risk of impact to people during work on the machine:**

- if powered working tools are not switched off,
- if working tools or machine parts are unintentionally powered with the machine connected to the gear motor and the gear motor running,
- if the gear motor is accidentally started,
- if lifted machine parts accidentally come down.

Risk due to accidental contact with powered, unsecured working tools and lifted, unsecured machine parts when carrying out work on the machine.

Therefore, the following measures are imperative before carrying out any work on the machine such as adjusting work or trouble-shooting:

- de-energize the gear motor and the machine via the central control system,
- actuate the lockable emergency stop switch,
- secure lifted machine parts against accidental lowering.

### Secure machine against accidental starting

1. Lower lifted, unsecured machine parts to a secure stop position.  
→ This will prevent accidental lowering.
2. De-energize the gear motor and the machine via the central control system.
3. Actuate the lockable emergency stop switch.

## 7 Settings



When carrying out adjusting work, additionally observe the information included in the chapters:

- "Basic safety instructions", page 27,
- "Warning and instruction signs", page 34.
- "Secure machine against accidental starting", page 52.

Observance of these instructions serves your safety.

### WARNING



**Risk of crushing, shearing, cuts, amputation, becoming entangled, wound up, being drawn in and risk of impact to people during adjusting work on the machine:**

- if powered working tools are not switched off,
- if working tools or machine parts are unintentionally powered with the machine connected to the gear motor and the gear motor running,
- if the gear motor is accidentally started,
- if lifted machine parts accidentally come down!
- Secure the machine against accidental starting before carrying out adjusting work on the machine.
- Wait for the machine to stop completely before entering the hazardous area of the machine.

### 7.1 Adjust discharge door

1. Turn the crank handle (2) to open the discharge door (1) to the desired opening width.



Fig. 32



### 7.2 Adjust cutting knives

For details refer to the chapter "Swivel / Replace cutting knives", page 72.

### 7.3 Adjust counter-cutters

For details refer to the chapter "Counter-cutters", page 43.

## 8 Use of machine



When using the machine, additionally observe the information included in the following chapters:

- "Operator's obligation", page 24,
- "Qualification of staff", page 25,
- "Basic safety instructions", page 27,
- "Warning and instruction signs", page 34.
- "Secure machine against accidental starting", page 52.

Observance of these chapters serves your safety.

#### WARNING



**Risk of becoming entangled, wound up and risk due to blown-away foreign objects to people within the hazardous area of the powered gear shaft!**

- Regularly check the safety and protective devices of the gear shaft for proper functioning and completeness.  
Have damaged safety and protective devices of the gear shaft immediately replaced by an authorized workshop.
- Ensure that the gear shaft guard is secured against twisting by means of the clip chain.
- Keep sufficient safe distance to the powered gear shaft.
- Make sure that people leave the hazardous area of the powered gear shaft.
- Immediately turn the gear motor off in case of emergency.

### WARNING



**Risk to people of being crushed, drawn in and becoming entangled due to unprotected powered driving elements during machine operation!**

- Start the machine only with the protective devices completely mounted.
- It is not allowed to open protective devices:
  - when the machine is powered,
  - as long as the gear motor is running with the gear shaft coupled,
  - if the gear motor can be accidentally started with the gear shaft coupled.

Close open protective devices before switching the machine on.
- It is not allowed to operate the machine without discharge opening cover!

### CAUTION



**Risk due to failure of components in case of actuation of the overload clutch!**

Immediately switch the gear motor off in case of actuation of the overload clutch.

This will prevent damage of the overload clutch.

### WARNING



**Risk of crushing, cuts, becoming entangled and being drawn in if people get into accidental touch with the powered mixing auger!**

- Never reach into the mixing container through the open discharge opening with the mixing auger powered.
- Never bend over the top edge of the mixing container with the mixing auger powered.
- Never enter the mixing container.

## 8.1 Charge mixing container

### CAUTION



#### **Risk of breakdown of components due to overloading of the machine!**

Observe the maximum load of the machine and the charging order of the individual solid materials.

The solid materials should freely move in the mixing container when the mixing auger is powered. Overloading may occur if solid materials become entangled by the counter-cutters and blockages pile up.

Overloading affects the machine's performance and service life. Damages due to overloading are excluded from warranty.

### WARNING



#### **Risk of crushing, cuts, becoming entangled or being drawn in if people get into accidental contact with the powered mixing auger due to improper charging of the mixing container!**

- Only use appropriate equipment to charge the mixing container. Appropriate equipment is:
  - o tractor equipped with front loader,
  - o telescopic loader,
  - o wheeled / yard loader.
  - o conveying device.
- People are not allowed above the mixing container.



Remove baler twines and nets on the ground before filling round or cuboid bales into the mixing container by means of the charging device.





- The total quantity that can be mixed and chopped in one mixing container charging cycle depends on the following factors:
  - mixing container capacity,
  - total dry mass of the solid material components to be mixed,
  - structure (stalk length and quality) of the individual solid materials,
  - way and order of charging,
  - gear motor power.
- Due to the different solid materials to be mixed, the charging quantity for one mixing container charging cycle may vary. Avoid overloading of the solid material metering system when charging the mixing container. In case of overload:
  - the individual solid materials cannot be mixed homogeneously,
  - mechanical damage on the power train may occur,
  - cutting knives of the mixing auger may be bent.
- The mixing process will be accelerated if the mixing auger(s) is (are) powered during charging.  
 If the mixing auger(s) is (are) switched on only after charging, more power will be required to set the solid materials to be mixed in motion.

1. Check the mixing container for foreign objects every day. Have the foreign object(s) removed from the mixing container if necessary.



Only an authorized workshop is allowed to carry out work in the mixing container!

2. Close possibly open discharge door.
  3. Swivel the weighing device (if available) into charging direction.
  4. Switch the weighing device on and start the programme (if available).
  5. Switch the gear motor on.
- The mixing auger(s) start(s).
6. Charge the mixing container by means of a tractor equipped with a front loader, by means of a wheeled / yard loader or from a conveying device.

### 8.1.1 Recommended charging order



Recommended procedure for processing round or cuboid bales:

1. Extend the counter-cutters into the mixing container.
2. Fill round or cuboid bales in.
3. Retract the counter-cutters from the mixing container after the bales have been undone.

1. Fill highly-structured components (hay, straw etc.) in with the mixing auger powered.

Have them possibly mixed for a short time before filling in the next component. A longer mixing ensures better chopping of the long stalks.

2. Fill in grain components etc.
3. Fill in mineral components.
4. Fill in grass silage.
5. Fill in maize silage, grain silage.
6. Fill in components with a high proportion of water, e.g. litter manure or beet chips.

### 8.2 Mix solid materials



- The type and the structure of the used solid materials and the desired cutting length of the materials to be mixed determine the duration of the last mixing cycle.

The mixing process will be extended for highly-structured solid materials which must be cut.

- Monitor the mixing process from the ladder.
- Depending on the structure of the solid materials, the counter-cutters can be extended into the mixing container at different positions.

The counter-cutters slow down the horizontal revolving of the solid materials in the mixing container, e. g. during chopping and mixing of round or cuboid bales. The further the counter-cutters project into the mixing container, the larger the slowing-down effect.

Extend the counter-cutters into the mixing container only as far as to ensure that the solid materials will not get entangled by / pile up on the counter-cutters.

Swivel the counter-cutters only with the mixing auger stopped.

- Sharp cutting knives reduce the required mixing auger power. Sharpen the cutting knives if necessary. Observe the information in the chapter "Grind cutting knives", page 71.

### 8.3 Meter solid materials



It is not allowed to operate the machine without discharge opening cover!

The discharge of the mixed materials can be started after the mixing process has been finished.

The mixed materials quantity to be discharged is adjusted by means of the opening width of the discharge door.



- The discharge door must be completely opened when discharging very dry, long and highly-structured solid materials.
- The discharge door must be opened according to the desired discharge quantity when discharging easily pourable solid materials.

1. Switch the mixing auger(s) on.
  - The mixed materials are homogeneously transported to the conveying device through the open discharge door (1).
2. Switch the conveying device on if applicable.
  - The mixed materials are conveyed to the fermenter.
3. Switch the mixing auger(s) drive off to stop the discharge.
4. Switch the conveying device off if applicable.

### 8.3.1 Eliminate blockages

**WARNING**



**Risk of crushing, shearing, cuts, amputation, becoming entangled, wound up, being drawn in and risk of impact to people if:**

- **lifted, unsecured machine parts accidentally come down or are unintentionally lowered , e.g. an open discharge door,**
- **the machine accidentally starts,**
- Secure lifted machine parts against accidental lowering before working beneath lifted parts.
- Secure the machine against accidental starting,
- Wait for the machine to stop completely before entering the hazardous area of the machine.

**WARNING**



**Risk of cuts if people reach into sharp-edged cutting knives of the mixing auger when eliminating blockages!**

When eliminating blockages, beware that sharp-edged cutting knives of the mixing auger may be within the discharge opening area.

**WARNING**



**Risk of crushing, shearing, cuts, amputation, becoming entangled, wound up, being drawn in and risk of impact if people fall into or enter the container while eliminating blockages!**

Climbing onto the top edge of the container is not allowed.

**CAUTION**



**Risk of damage to the machine if you change the sense of rotation of the gear motor for eliminating blockages!**

Never change the sense of rotation of the gear motor.

1. Secure the machine against accidental starting,
2. Remove the cover of the discharge opening by unscrewing the screwed connections.
3. Open the discharge door completely if necessary.
4. Eliminate the blockage such that the discharge opening gets free and the mixed materials can be easily discharged again.
5. Lower the discharge door until the desired opening degree is reached.
6. Screw the cover of the discharge opening back into its protective position at the machine.
7. Release the securing mechanism of the machine against accidental starting.
8. Switch the mixing auger(s) on and continue the discharge of the mixed materials.

## 9 Service and maintenance of machine

Regular and proper service and maintenance:

- will keep your machine ready for use for a long time and avoid early wear,
- will reduce downtimes and repairs,
- is a precondition for our warranty provisions.



- When carrying out service and maintenance work on the machine, additionally observe the information included in the following chapters:
  - "Operator's obligation", page 24,
  - "Qualification of staff", page 25,
  - "Basic safety instructions", page 27,
  - "Warning and instruction signs", page 34,
  - "Secure machine against accidental starting", page 52.Observance of these chapters serves your safety.
- Observe environmental measures when carrying out service and maintenance work on the machine.
- Observe legal provisions when disposing of operating materials such as oils and greases. These legal provisions also apply to parts having come into contact with those operating materials.
- As a basic principle, secure the machine against accidental starting before carrying out any service and maintenance work on the machine.
- As a basic principle, disconnect all electrical / electronic connections to the gear motor before carrying out welding work.
- It is necessary to take protective measures such as covering power supply and feed lines or removal of such lines at particularly critical spots:
  - when carrying out welding, drilling and grinding work,
  - when carrying out work by means of cutoff wheels in the vicinity of these lines.
- Only an authorized workshop is allowed to carry out work in the mixing container.



- Special know-how is required for carrying out testing and maintenance work. This know-how is not imparted by these instructions.
- The maintenance intervals depend on the frequency of use of your machine.

### WARNING



**Risk of crushing, shearing, cuts, amputation, becoming entangled, wound up, being drawn in and risk of impact to people if:**

- **lifted, unsecured machine parts accidentally come down or are unintentionally lowered,**
- **the machine accidentally starts!**
- Secure lifted machine parts against accidental lowering before working beneath lifted parts.
- Secure the machine against accidental starting before carrying out any service or maintenance work on the machine.
- Wait for the machine to stop completely before entering the hazardous area of the machine.

### WARNING



**Risk of crushing, shearing, cuts, amputation, becoming entangled, wound up and being drawn in to people due to unprotected, powered driving elements!**

- It is not allowed to open or remove protective devices with the gear motor running. Wait for the machine to stop completely.
- Secure the machine against accidental starting before opening protective devices.
- Close or mount protective devices which have been opened or removed for carrying out service and maintenance work on the machine before powering the machine.
- Immediately replace defective protective devices.

### WARNING



**Dangerous situations may occur if load-bearing parts break due to mechanical work on frame elements!**

As a basic principle,

- drilling at the frame or chassis,
- boring up of existing holes at the frame or chassis,
- welding on load-bearing parts

is not allowed.

## 9.1 Service and maintenance plan – Overview



- Carry out the maintenance intervals according to the time limit reached first.
- The time intervals, service hours and maintenance intervals specified in the included sub-supplier documentation shall prevail.

## 9.2 Cleaning of machine



- Regularly and thoroughly clean the machine! Dirt may attract humidity thus facilitating the formation of rust.  
Regular cleaning of the machine is the precondition for proper maintenance and makes operation of the machine easier.
- Lubricate the machine after cleaning, especially after cleaning by means of a pressure washer / steam blaster or fat dissolving agents.
- Observe the legal provisions for handling and disposal of cleaning agents.
- Continuously inspect the machine for corrosion damage! Remedy corrosion damage by touching up paintwork.

### Cleaning by means of pressure washer / steam blaster



Absolutely observe the following when using a pressure washer / steam blaster for cleaning:

- The maximum admissible injection pressure is 80 bar.
- The maximum admissible water temperature is 60°C.
- Do not clean electrical components such as weighing rods, distributor boxes, weighing computer etc.
- Do not clean chromium-plated components.
- Never aim the cleaning nozzle jet of the pressure washer / steam blaster directly at lubrication points and bearings.
- Always keep a minimum nozzle distance of 300 mm between the cleaning nozzle and the machine.
- Never aim the cleaning nozzle jet at the machine parts at right angles. The nozzle spray angle must at least be 25°.
- Do not use any chemical additives.
- Observe the safety instructions when handling pressure washers.



### 9.3 Lubrication of machine

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- Lubricate all bearings and lubrication points according to the lubrication plan.
- Remove dirt from the lubricating nipples.
- Use environmentally friendly oils and greases where lubricants may penetrate the ground. For further information, contact your specialist for agricultural machinery.
- Beware not to exceed a lubricating pressure of 250 bar, when using high-pressure grease guns for lubricating. Damage to bearings, seals etc. may occur if the grease gun used is not equipped with a protective device.



## 9.3.1 Lubrication plan



Observe the included operating instructions of the gear shaft manufacturer(s) when lubricating the gear shaft(s).

Item	Component / Location	Number	Activity	Time / Interval
1	Lubricating nipple, crank handle, discharge door	1	Lubricate	100 h
2	Lubricating nipple, top bearing, angular gear	1 (2)	Lubricate	500 h
3	Angular gear	1 (2)	Change oil	1000 h, then every 2000 h
4	Lubricating nipple, gear shaft	5	Lubricate	50 h
5	Gear motor	1 (2)	Change oil	10000 h, after 2 years at the latest

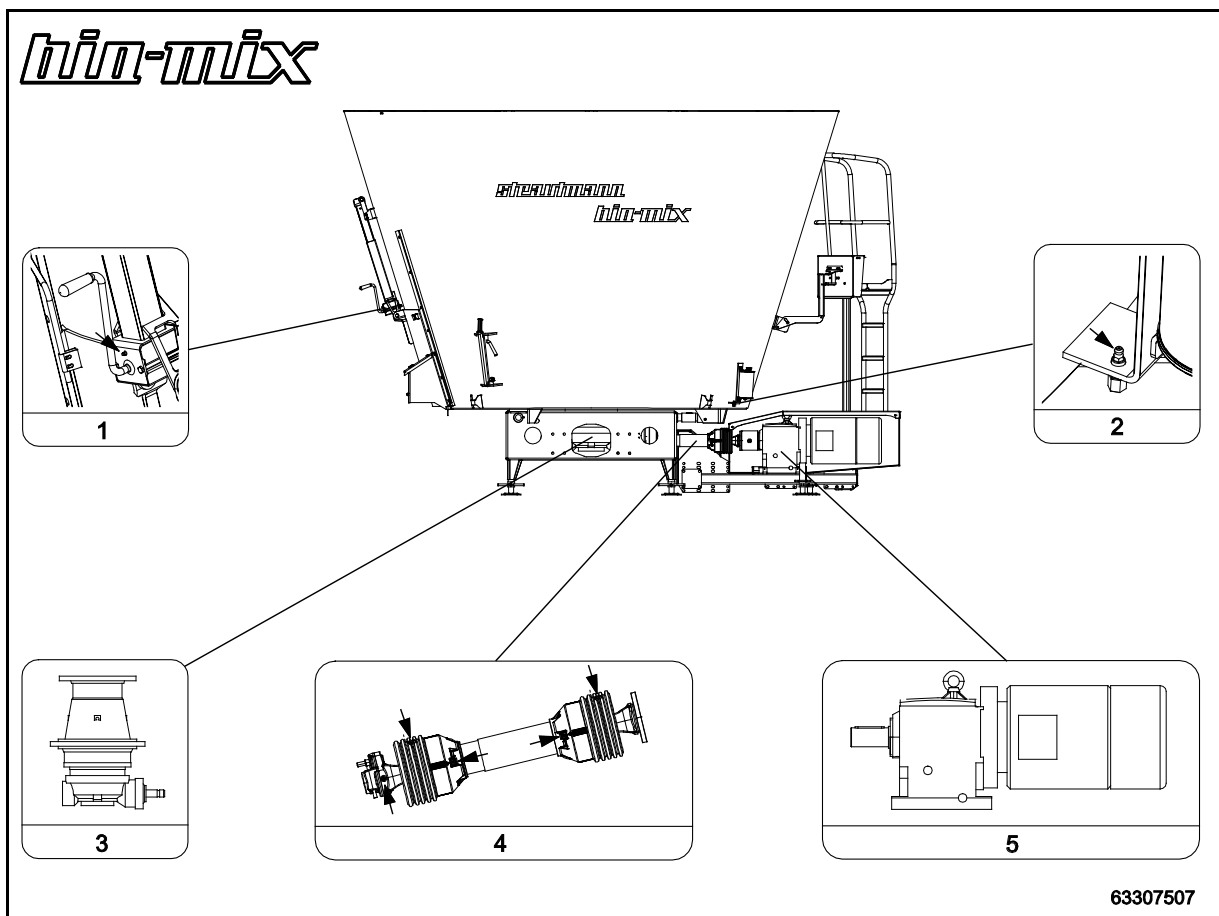


Fig. 33



### 9.4 Preservation / Longer downtimes



Preparing the machine for longer downtimes shall include:

- thorough cleaning of machine,
- lubrication and greasing of machine,
- touching up of paintwork.

### 9.5 Check / top up / change gear lubricant oil

The angular gears and the gear motor require:

- regular check / topping-up of oil level,
- change of gear lubricant oil.

#### CAUTION



**Risk of damage to machine components when powering gearboxes without gear lubricant oil!**

Always ensure a sufficient oil level in the gearboxes.

#### WARNING



**Risk of slipping to people due to leaking gear lubricant oil during topping-up of oil / oil change!**

Immediately remove fresh oil stains by means of binding agents.



- Change the oil when the gear lubricant oil has reached its operating temperature (30 – 40°C) if possible. At operating temperature, the flow capability of the gear lubricant oil is at its optimum.
- Optimum check of oil level is carried out at an oil temperature between 0 - 20°C.

## 9.5.1 Quantities when filled and change intervals



Dispose of used oil according to regulations. Contact your oil supplier in case of disposal problems!

Gearbox	Gear lubricant oil	Quantity when filled [litre]	Interval
Angular gear	EP 80W-90 / EP VG 220	18	1000 h, then 2000 h
Angular gear in Bio-Mix 1450, Bio-Mix 3400 D, Bio-Mix 4000 D	EP 80W-90 / EP VG 220	23	1000 h, then 2000 h
Gear motor	See included operating instructions for gear motor		10000 h, every 2 years at the latest

Tab. 7

## 9.5.2 Angular gear

In case of the angular gears:

- check the oil level and top up if necessary,
- change the gear lubricant oil.

### 9.5.2.1 Check oil level



Check the oil level before starting the mixing process, as the oil heats up during the mixing process thus rising in the compensating reservoir.

1. Check the oil level in the angular gears via the lateral compensating reservoirs (1).  
The oil level must be visible between the two markings (2, 3) of the sticker (4).
2. Top up oil through the filler neck (5) into the compensating reservoir if necessary.

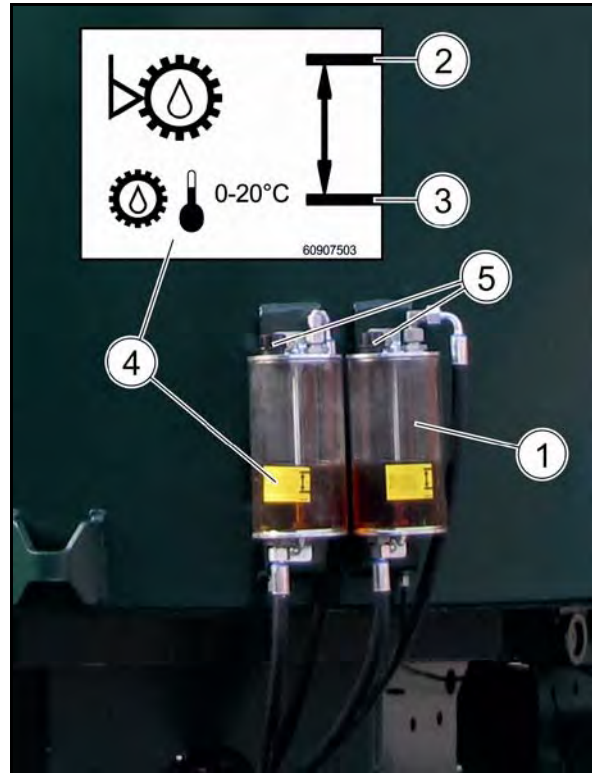


Fig. 34

### 9.5.2.2 Change gear lubricant oil

1. Place a drip tray beneath the drain valve of the mixer gearbox (capacity approx. 25 litres).
  2. Hang one end of the oil drain hose (M 26 x 1.5) (not included in the scope of delivery) into the drip tray.
  3. Remove the cap from the drain valve (1).
  4. Screw the other end of the oil drain hose onto the drain valve (1).
- The drain valve automatically opens.
- The gear lubricant oil drains off into the drip tray.
5. Wait for the oil to stop draining off through the oil drain hose.
  6. Connect a filling pump to the oil drain hose.
  7. Fill gear lubricant oil through the filling pump into the mixer gearbox until the gear lubricant oil pours into the compensating reservoir through the connector and the oil level is visible between the two markings of the sticker (4) (18 / 23 litres).



Fill the gear lubricant oil slowly into the mixer gearbox, in order to avoid formation of bubbles. In case of bubbles forming, the mixer gearbox cannot be filled with the required quantity of gear lubricant oil.

8. Disconnect the filling pump from the oil drain hose.
9. Unscrew the oil drain hose from the drain valve (1).
10. Screw the cap onto the drain valve (1).
11. Carry out a test run for several minutes.
12. Check the oil level in the compensating reservoir afterwards.
13. Top up oil through the filler neck (2) into the compensating reservoir if necessary.
14. Check the oil level in the mixer gearbox several times a day during the first 10 service hours after changing the gear lubricant oil.

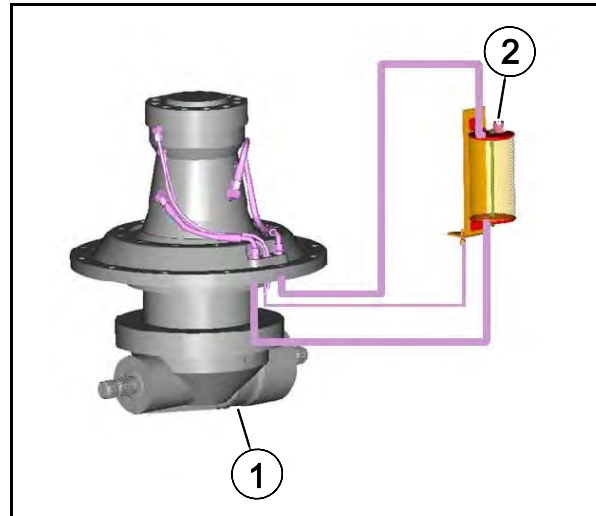


Fig. 35

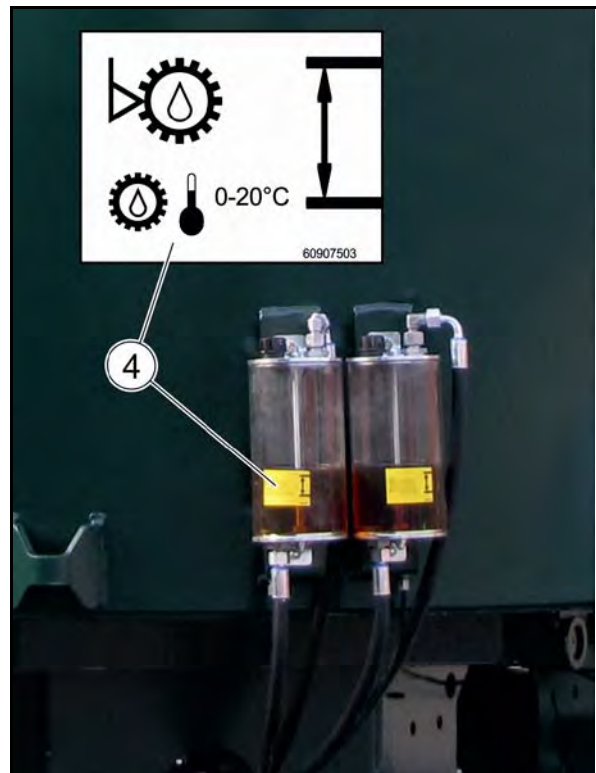


Fig. 36

## 9.6 Replace shear bolts of shear bolt coupling

1. Eliminate the cause for the overloading, see information on page 60.
2. Open the fitting apertures on the protective device. Observe the included operating instructions for the gear shaft.
3. Remove the residues of the shear bolt (2).
4. Rotate the power train such that the boreholes of the coupling halves (3) and (4) face each other.
5. Replace the shear bolts (2) by a bolt of equal grade (8.8).
6. Close the fitting aperture.



Fig. 37

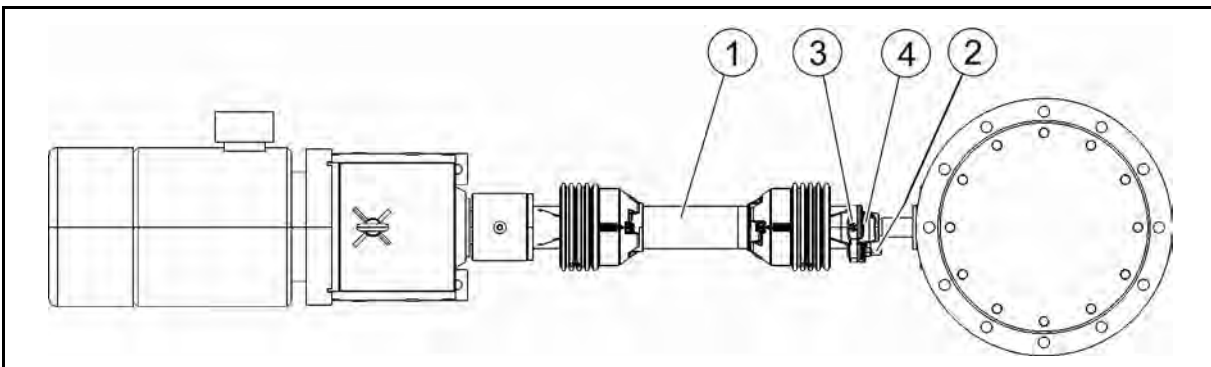


Fig. 38

## 9.7 Discharge door

1. Check the gap X between the discharge door and the mixing container. The gap X should be approx. 5 mm.  
The gap X can be altered by unscrewing the screws (1) and displacing the L straps (2) in the oblong holes.
2. Align the L straps (2) such that the gap X is again approx. 5 mm.
3. Retighten the screwed connections (1).

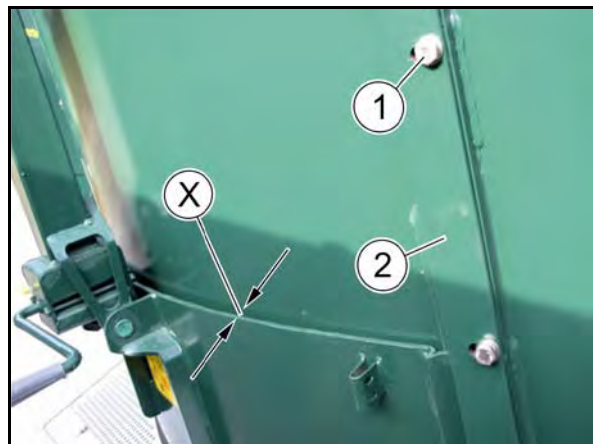


Fig. 39

## 9.8 Cutting knives of mixing auger



- Only an authorized workshop is allowed to carry out work in the mixing container.
- Have the cutting knives of the mixing auger ground if necessary. Blunt cutting knives require a higher mixing auger power.
- Daily check the cutting knives from the service platform / the ladder for visible defects. Have damaged or worn cutting knives replaced in good time. Have broken-off cutting knife particles removed from the mixing container to avoid any damage resulting from conveyed cutting knife particles.

### WARNING



#### Risk of cuts when carrying out assembly work on sharp cutting knives!

Wear cut-proof protective gloves when carrying out work on the cutting knives.

### 9.8.1 Grind cutting knives

### WARNING



#### Risk to eyes due to blown-away particles when grinding the cutting knives!

Always wear protective goggles when grinding cutting knives.



- Use a flap grinding wheel (Fig. 40) when grinding cutting knives.
- Only grind the cutting knives on their smooth side, never on their corrugated side.
- Carefully regrind the cutting knives such that they do not heat up much. If the cutting knives change colour during grinding:
  - they have heated up excessively,
  - this will reduce the service life of the cutting knives.

1. Carefully grind the cutting knives on their smooth side.
2. Remove any foreign objects (tools etc.) from the mixing container. Clean the mixing container from grinding residues if necessary.

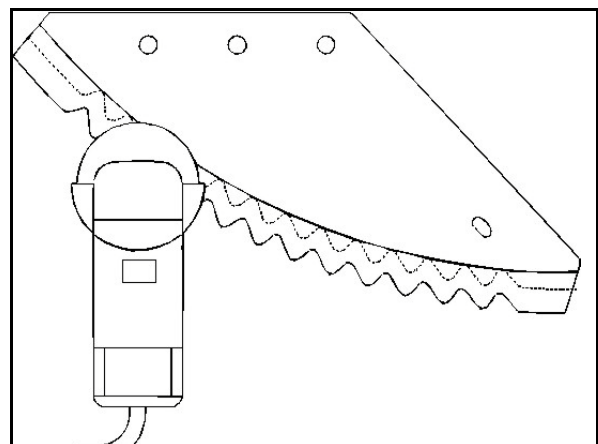


Fig. 40

### 9.8.2 Swivel / Replace cutting knives



For swivelling / replacing the cutting knives you require:

- various wrenches:
  - o 1 x socket wrench / ring wrench, wrench size 24,
  - o 1 x hexagon wrench, size 10,
  - o 1 x hexagon wrench, size 6,
- a scraper or screw driver,
- a hard brush,
- cut-proof protective gloves,
- edge protectors to cover the blades when carrying out assembly work on the cutting knives.

1. Unscrew and remove flat-headed screws (2) (M16 x 45 or M10 x 20 - grade 8.8).
2. Replace the cutting knives or swivel them into the desired position (extended or retracted), for further information refer to page 42.
3. Tighten all flat-headed screws (2) of the screwed connections of the cutting knives.
4. Remove any foreign objects (tools etc.) from the mixing container. Clean the mixing container if necessary.

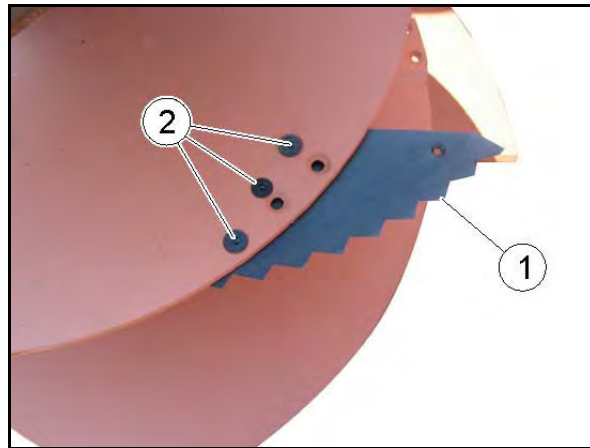













Fig. 41



## 9.9 Tightening torques for metric screws

Grade and marking of screw heads					4.8		8.8		10.9		12.9					
Grade and marking of nuts							 		 		 					
																
Size	Grade 4.8				Grade 8.8				Grade 10.9				Grade 12.9			
	lubricated *		dry °		lubricated *		dry °		lubricated *		dry °		lubricated *		dry °	
	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft
M 6	4.8	3.5	6	4.5	9	6.5	11	8.5	13	9.5	17	12	15	11.5	19	14.5
M 8	12	8.5	15	11	22	16	28	20	32	24	40	30	37	28	47	35
M10	23	17	29	21	43	32	55	40	63	47	80	60	75	55	95	70
M12	40	29	50	37	75	55	95	70	110	80	140	105	130	95	165	120
M14	63	47	80	60	120	88	150	110	175	130	225	165	205	150	260	190
M16	100	73	125	92	190	140	240	175	275	200	350	255	320	240	400	300
M18	135	100	175	125	260	195	330	250	375	275	475	350	440	325	560	410
M20	190	140	240	180	375	275	475	350	530	400	675	500	625	460	800	580
M22	260	190	330	250	510	375	650	475	725	540	925	675	850	625	1075	800
M24	330	250	425	310	650	475	825	600	925	675	1150	850	1075	800	1350	1000
M27	490	360	625	450	950	700	1200	875	1350	1000	1700	1250	1600	1150	2000	1500
M30	675	490	850	625	1300	950	1650	1200	1850	1350	2300	1700	2150	1600	2700	2000
M33	900	675	1150	850	1750	1300	2200	1650	2500	1850	3150	2350	2900	2150	3700	2750
M36	1150	850	1450	1075	2250	1650	2850	2100	3200	2350	4050	3000	3750	2750	4750	3500

\* "Lubricated" means that the screws are treated with a lubricant such as e.g. engine oil, or that phosphated or oiled screws are used.

° "Dry" means that normal or galvanized screws without any lubrication are used.

Tab. 8




The tightening torques listed in the above table are reference values. They apply provided that these instructions do not specify other tightening torques for certain screws or nuts.



- Regularly check screws and nuts for tightness.
- Shear bolts are designed such that they shear off at a certain stress. Only use bolts of equal grade when replacing shear bolts.
- When replacing screws and nuts, ensure to use respective parts of equal or higher grade.
- Tighten screws and nuts of higher grade at the same torque as those originally used.
- Ensure that the threads are clean and the screws have been properly fitted before tightening the screwed connections, thus preventing damage during tightening.
- Tighten counter nuts (not the screws) with plastic insert and bordered steel counter nuts at approx. 50% of the “dry” value specified in the table.
- Tighten gear or crown nuts at full torque.

## 10 Trouble-shooting

<p><b>WARNING</b></p> 	<p>Risk of crushing, shearing, cuts, amputation, becoming entangled, wound up, being drawn in and risk of impact to people if:</p> <ul style="list-style-type: none"> <li>• <b>lifted, unsecured machine parts accidentally come down or are unintentionally lowered , e.g. an open discharge door,</b></li> <li>• <b>the machine accidentally starts.</b></li> <li>• Secure lifted machine parts against accidental lowering before working beneath lifted parts.</li> <li>• Secure the machine against accidental starting before eliminating any malfunctions on the machine.</li> <li>• Wait for the machine to stop completely before entering the hazardous area of the machine.</li> </ul>
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### 10.1 Malfunctions and remedy – Machine

Malfunction	Cause	Remedy
<b>The power requirement is too high, shear bolt of the shear bolt coupling in front of the angular gear shears</b>	Cutting knives blunt	Sharpen knives.
	Long stalks have wrapped around the auger front end or the scraper	Clean mixing auger.
	Foreign objects are jamming the mixing auger	Eliminate foreign objects.
	Screwed connection of the mixing auger has loosened	Retighten screwed connection.
<b>Mixing auger does not rotate with the p.t.o. shaft powered</b>	Shear bolt of the shear bolt coupling in front of the angular gear sheared off	Replace shear bolt.
<b>Machine does not mix well</b>	Material to be mixed is piling up in front of counter-cutter	Extend and retract counter-cutter.
<b>Non-uniform discharge</b>	All cutting knives retracted (out)	Extend lower cutting knives (in).

Tab. 9

## 10.2 Malfunctions and remedy – Weighing device



Absolutely observe the included operating instructions for the weighing device.

Malfunction	Cause	Remedy
Device cannot be switched on	No power supply	Check connecting cable. Switch on power supply, check power supply battery.
	Wrong polarity	Check connecting cable for correct polarity. (The devices are equipped with an automatic fuse).
Device displays bars (top or bottom)	Device	Pull the terminal box plug out of the weighing computer and watch display. If the bars disappear, the weighing computer functions properly.
	Terminal box	Pull out the plugs of all weighing rods, the terminal box being plugged into the weighing computer. Watch display. If the bars disappear, the display functions properly.
	Weighing rods	Always plug only one weighing rod at a time into the terminal box or directly into the weighing computer. If the bars disappear, the respective weighing rod functions properly.
Weighed value varies	Device	See malfunction description: "Device displays bars".
	Terminal box	See malfunction description: "Device displays bars".
	Weighing rods	See malfunction description: "Device displays bars".
Scales display wrong weighed value	Weighing rods not properly installed	Always plug only one weighing rod at a time into the terminal box or directly into the weighing computer.  The displayed value must increase when load is applied. Always test all rods!
	Weighing system misadjusted	Readjust scales, see included operating instructions "Recalibration".
Device displays ERROR	Internal error	Send device in for repair.

Tab. 10

## 11 Circuit diagram

### 11.1 Circuit diagram of weighing device

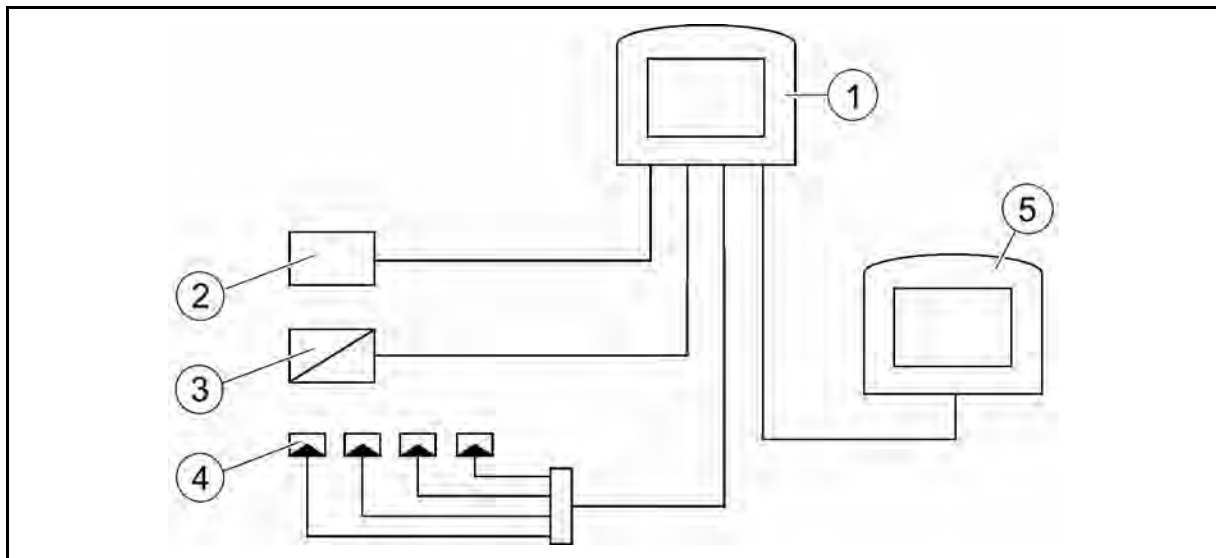


Fig. 42

**Optional extra:**

- (1) Weighing computer
- (2) Power supply 10 - 30 VDC
- (3) Analogue output 4 – 20 mA
- (4) Weighing rod
- (5) Additional display

## 12 Gear motor information

### 12.1 Technical data - Gear motor



Observe also the included operating instructions for the gear motor.

Model	Output [kW]	Speed [1/min]	Power supply [V]	Frequency [Hz]	Weight approx. [kg]
SK42-160L/4	15	172	400 / 460	50 / 60	135
SK52-180M/4	18.5	165			199
SK52-180L/4	22	138			213
SK62-180L/4	22	105			270
SK72-200L/4	30	87			385

400 V / 50 Hz											
Model	P <sub>N</sub> [kW]	n <sub>N</sub> [1/min]	I <sub>N</sub> [A]	cos ω	η (4/4xP <sub>N</sub> ) [%]	η (3/4xP <sub>N</sub> ) [%]	EFF* rating	M <sub>N</sub> [Nm]	M <sub>A</sub> /M <sub>N</sub>	M <sub>K</sub> /M <sub>N</sub>	I <sub>A</sub> /I <sub>N</sub>
SK42-160L/4	15.0	1460	28.5	0.84	90.0	90.2	EFF2	98	2.6	3.0	6.5
SK52-180M/4	18.5	1460	35	0.83	90.5	90.5		121	2.3	3.0	7.5
SK52-180L/4	22.0	1460	41	0.84	91.2	91.2		144	2.3	3.0	7.5
SK62-180L/4	22.0	1460	41	0.84	91.2	91.2		144	2.3	3.0	7.5
SK72-200L/4	30.0	1465	55	0.86	91.8	91.8		196	2.6	3.2	7.0

\*Energy Efficiency

460 V / 60 Hz					
Model	P <sub>N</sub> [kW]	n <sub>N</sub> [1/min]	I <sub>N</sub> [A]	M <sub>N</sub> [Nm]	J [kgm <sup>2</sup> ]
SK42-160L/4	17.3	1760	28	94	0.05
SK52-180M/4	21.3	1755	35	116	0.16
SK52-180L/4	25.3	1755	41	138	0.15
SK62-180L/4	21.3	1755	35	116	0.13
SK72-200L/4	34.5	1760	55	188	0.24

## 12.2 Circuit diagram - Three-phase gear motor with short-circuit armature

(I) Terminal board

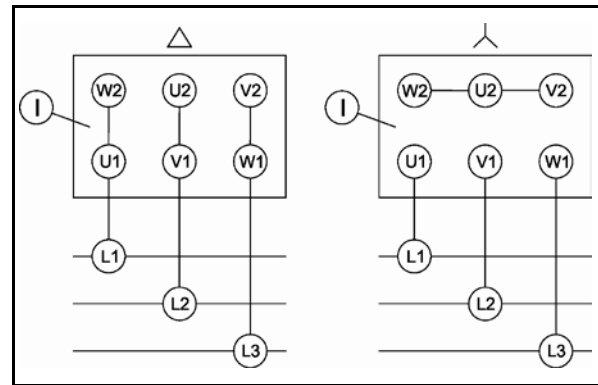


Fig. 43