Operating manual

Fodder mixing trailer

Verti Mix Double *K*

636 00 903
08.08
Printed in Germany

CE

Read and observe these operating manual before first machine start-up!
Retain for future use!

GB

EC Declaration of Conformity

According to EC Directive for machines 98/37/EC, appendix II A

The manufacturer:

B. Strautmann & Söhne GmbH & Co. KG

Bielefelder Str. 53

D-49196 Bad Laer

hereby declares that the machine described below:

Product:	**Fodder mixing trailer Verti-Mix Double *K***
Model:	**1300, 1500, 1800, 2100**
Machine number:	.....

Conforms to the requirements of the following EC Guidelines:

- Machine Guideline 98/37/EC
- EMC-Guideline 89/336/EEC (Electro-magnetic compatibility)

Applied standards and technical specifications:

- EN ISO 12100-1:2003
- EN ISO 12100-2:2003
- DIN EN 294:1992
- DIN EN 349:1993
- DIN EN 982:1996
- DIN EN 1553:1999
- DIN EN 703:2005

Bad Laer, 15.03.2008

Dr. J. Marquering
Director of development

Dipl.-Ing. E. Uhlemann
Senior manager, construction
Feeding technology

Dr. K.-P. Strautmann
Managing director

Identification data

Enter the identification data of your machine in the space provided below. You will find the identification data on the vehicle identification plate.

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

Vehicle ID No.:
(nine figures)

Model:

Year of manufacture:

Address of manufacturer

B. Strautmann & Söhne GmbH & Co. KG

Landmaschinenfabrik

Bielefelder Straße 53

D-49196 Bad Laer

Tel.: + 49 (0) 5424 802-0

Fax.: + 49 (0) 5424 802-64

E-mail: kontakt@strautmann.com

Spare parts orders

B. Strautmann & Söhne GmbH & Co. KG

Landmaschinenfabrik

Bielefelder Straße 53

D-49196 Bad Laer

Tel.: + 49 (0) 5424 802-31

Fax.: + 49 (0) 5424 802-64

E-mail: kontakt@strautmann.com

Spare parts catalogue online: www.strautmann-elise.de

When ordering spare parts, always quote the machine serial no. (nine figures).

Formal remarks to this operating manual

Document Number: 636 00 903

Date of issue: 08.08

Preface

Dear customer,

You have chosen a quality product from the wide spectrum of products manufactured by B. Strautmann & Söhne GmbH & Co. KG. We thank you for the confidence you have shown in us.

Please check the machine on receipt for transport damage or missing parts! Check the machine and vehicle parts delivered, including any special equipment ordered, against the delivery note. Compensation for damages can only be considered where loss or damage is notified immediately!

Before starting up the machine, read and observe the operating manual, especially the safety instructions. Studying the operating instructions carefully will enable you to make full use of the advantages of your newly acquired machine.

Make sure that every person operating the machine has read this operating manual before they start to operate it.

Should any questions or problems arise, please consult the operating manual or give us a call.

Regular machine maintenance and care combined with timely replacement of worn and/or damaged parts will increase the life expectation of your machine.

Users' comments

Dear reader,

Our operating manuals are regularly updated. Your suggestions for improvement will be of great assistance to us in our production of an increasingly user-friendly operating manual. Please send us your suggestions by fax or E-mail:

Firma B. Strautmann & Söhne GmbH & Co. KG

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1 Information for the user

This section contains information for the user on how to make best use of the operating manual.

1.1 Purpose of the document

These operating manual

- describe the operation and maintenance of the machine.
- give important advice on the safe and efficient running of the machine.
- are an integral part of the machine and must always be kept on the machine or in the tractor.
- are to be retained for future use.
- are to be passed on to the buyer when the machine is sold.

1.2 Direction references in these operating manual

Every direction reference in these operating manual is to be understood as seen from the forward drive position.

1.3 Presentation modes

Operational instructions and consequential reactions

Every action to be taken by the operator is shown in a numbered list of operational instructions. Keep to the given order of operational instructions. The reaction to each respective instruction is in turn marked by an arrow. Example:

1. Operational instruction 1

→ Reaction of the machine to operational instruction 1

2. Operational instruction 2

Enumerations

Enumerations without any particular order are shown as a list of points. Example:

- Point 1
- Point 2

Item numbers in figures

Digits in parenthesis refer to item numbers in figures. The first digit refers to the figure, the second digit to the item number in the figure.

Example (Fig. 3/6)

- Figure 3
- Item 6

1.4 Expressions employed

The term ...	means ...
third person	… all other persons except the operator.
Hazard	… the source of possible injury or damage to health.
Manufacturer	… the company B. Strautmann & Söhne GmbH & Co. KG.
Machine	… the fodder mixing trailers Verti-Mix Double K.
Control device	... the component part that is actuated by the operator e.g. by means of pressure. A control device can be a control lever, toggle switch, button, turn switch, etc.

2 Product description

This section contains:

- comprehensive information on the design of the machine,
- designations of the individual component assemblies and control elements.

If possible, read this section while you are standing right beside the machine. This is the best way to get acquainted with the machine.

The machines can be supplied with a variety of optional equipment. Due to the individual equipping of your machine some of the descriptions of fittings in this operating manual will not apply to your machine. Options are clearly specified in the manual and are available at extra cost.

2.1 Overview – Component Units

Depiction of product and description of the most important elements.

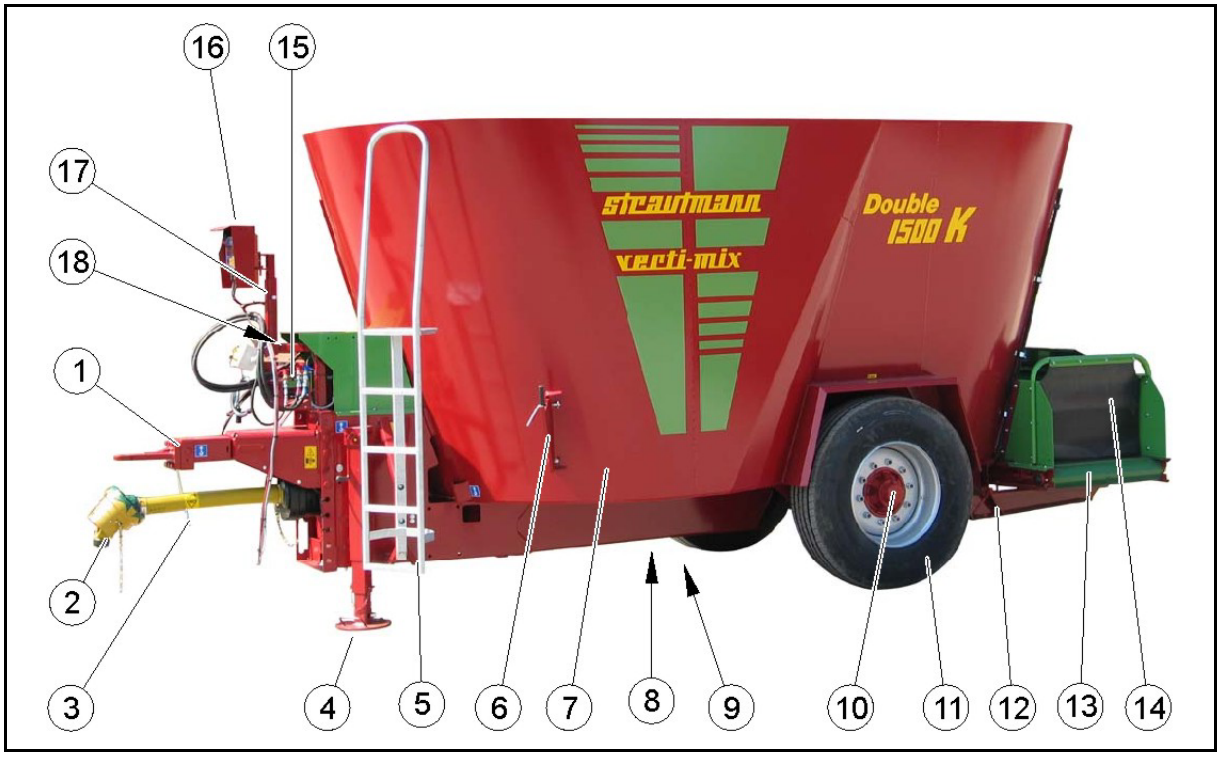


Fig. 1

(1) Drawbar

(2) PTO drive shaft

(3) Storage yoke for PTO drive shaft

(4) Support stand

(5) Ladder, platform

(6) Counter-cutter

(7) Mixing container

(8) Angular gearbox for mixing auger drive

(9) Shear pin safeguard

(10) Brake axle

(11) Wheels

(12) Parking brake

(13) Rear crossover conveyor (only in case of available optional extra)

(14) Left rear protective device for crossover conveyor

(15) Hose cupboard for supply lines

(16) Operating terminal of weighing device (only in case of available optional extra)

(17) Tilting support for the weighing device control terminal

(18) Electrohydraulic control block (only in case of available optional extra)

Fig. 2

(1) Opening scale for discharge door

(2) Indicator for opening width of discharge dosing slide

(3) Wheel chocks

(4) Compensating reservoir for gear lubricant oil of the angular gears

(5) Counter-cutter

(6) Rear crossover conveyor (only in case of available optional extra)

(7) Right rear protective device for crossover conveyor

2.2 Safety devices and safeguards

This section shows the layout of the correctly mounted guards in their protective position.

WARNING

Risk of bodily injury from being crushed, drawn into and caught when moving machine parts are left unguarded during operation!

- Only start up a machine with its entire safeguards correctly mounted.
- Replace defective safeguards immediately.

Fig. 3

(1) Storage yoke for PTO drive shaft

(2) PTO drive shaft guards

(3) Safety cone for drive shaft

(4) Hose cupboard for supply lines

(5) Ladder, platform

(6) Left and right rear protective device for crossover conveyor

(7) Wheel chocks

(8) Protective device front side discharge (tight-fitting, swivelling protective cover) against accidental touching of the powered mixing auger

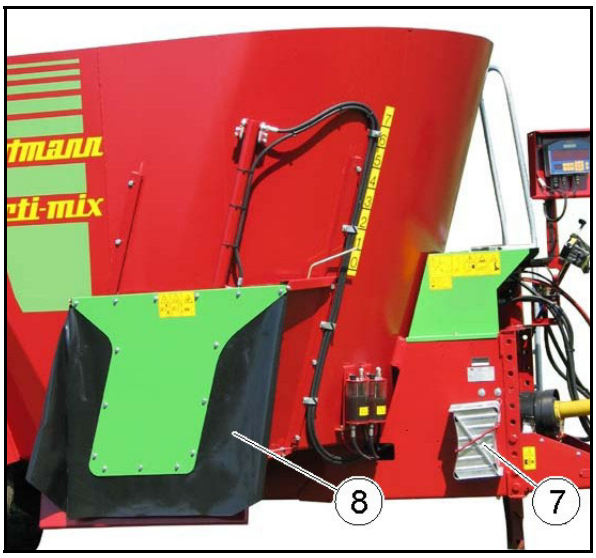


Fig. 4

2.3 Overview - Supply lines between tractor and machine

(1) Hydraulic connection “forward” red

(2) Hydraulic connection “return” blue

(3) Hydraulic connection for hydraulic working brake

(4) Power supply for control unit 3-pin

(5) Lighting connection 7-pin

(6) Compressed air brake supply line red (only in case of available optional extra)

(7) Compressed air brake line yellow (only in case of available optional extra)

(8) Hydraulic connection for hydraulic brake with hydraulic clutch according to ISO 5676 (only in case of available optional extra, not allowed in Germany)

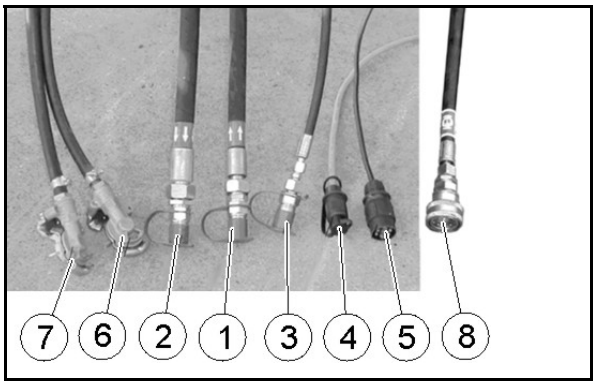


Fig. 5

2.4 Fittings for road drive

Road traffic equipment must be fitted correctly and checked for roadworthiness before transport runs on public roads and ways are carried out.

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

- a lighting and marking system according to the national road traffic regulations,
- a brake system, for further information see chapter "Brake system", page 109.

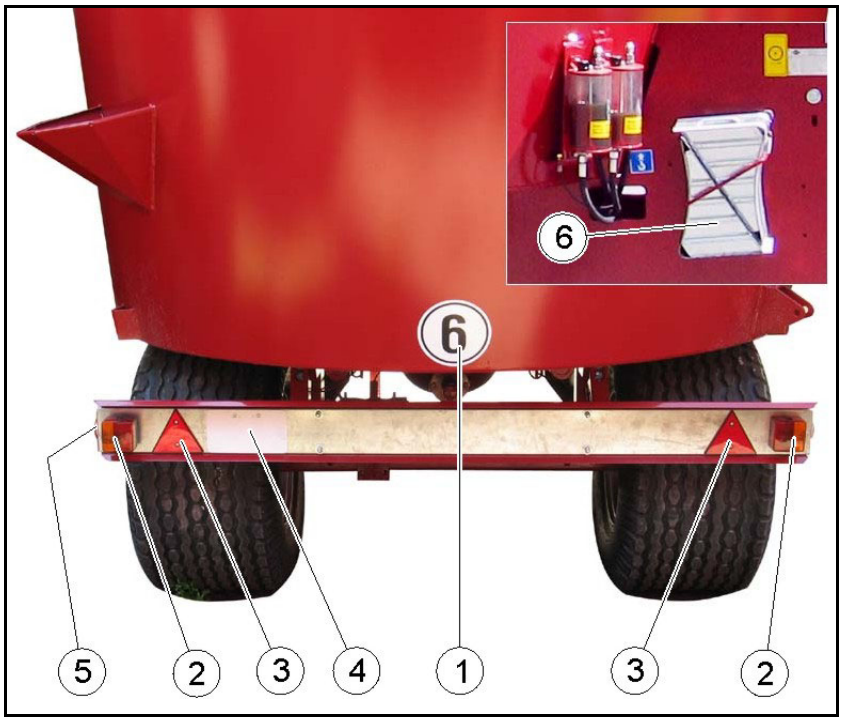


Fig. 6

(1) Speed limit plate

(2) Multi-function lighting fixtures

(3) Triangular reflectors

(4) Number plate

(5) Side reflectors (3 or 4 pieces on each side of the machine)

(6) Wheel chocks

2.5 Intended use

The fodder mixing trailers of the Verti-Mix series:

- are designed for chopping, homogeneous mixing, transporting and discharging all types of silage and normal fodders used in keeping livestock, if the dry substance content of the total mixture is more than 30 %,
- must not be loaded otherwise than by means of:
  - a tractor equipped with a front loader,
  - a yard or wheeled loader,
  - the provided feeding aids such as mineral feed funnel, etc.

The term “intended use” also incorporates:

- compliance with all instructions in this operating manual,
- observance of prescribed maintenance and care work schedules on the machine,
- sole use of genuine parts.

All modes of employment other than those described above are forbidden and will be considered as not intended use.

Where damage is caused by not intended use:

- the operator will be held solely responsible,
- the manufacturer will not accept any liability whatsoever.

2.6 Danger zone and danger points

The danger zone is the area within and / or surrounding a machine where the safety and health of any person can be endangered.

No person may remain in the danger zone:

- if the tractor motor is running with the universal drive shaft / hydraulic- / electronic systems connected.
- if the tractor and machine have not been secured against unintentional starting or rolling.

Only if there is no-one in the danger zone of the machine, may the operator:

- move the machine,
- transfer moving machine parts from transport to working position and from working to transport position,
- actuate work tools.

In the danger zone, the danger comes from hazards that cannot be completely eliminated for reasons of machine performance reliability. These hazards are ever-present and can occur without warning.

Warning signs mark these danger spots on the machine. The danger signs give warning of existing dangers.

In this manual safety information concerning handling draws attention to the ever-present remaining dangers.

Danger can arise:

- by operation movements of the machine and its tools,
- from materials or foreign objects being slung out of the machine,
- through unintentional lowering of the raised machine / raised parts of the machine,
- through unintentional starting and rolling of tractor and machine.

The hazard points are located:

- in the vicinity of the drawbar between tractor and machine,
- in the vicinity of the active PTO drive shaft,
- in the vicinity of the discharge openings,
- within the area of the powered discharge conveyor, crossover conveyor or extension conveyor,
- in the mixing container with the machine powered or not powered,
- around the discharge pipe and in ejection direction in case of machines equipped with a straw blower.

2.7 Type plate and CE-marking

The following diagrams show the lay-out of the type plate, chassis no. (machine no.) and CE-marking.

The entire marking is a valid legal document and may not be altered or rendered unrecognisable.

(1) Vehicle ident. plate with CE-sign
(2) Chassis no. (machine number) (hammered into the frame)

Fig. 7

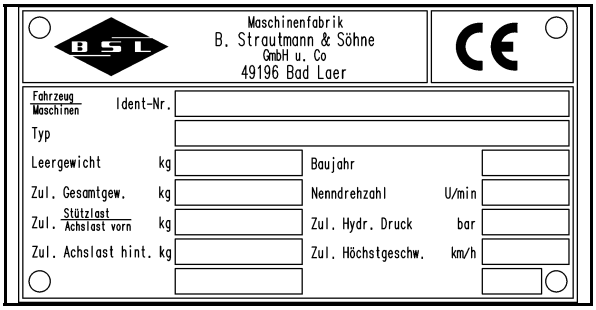


Fig. 8

The type plate displays:

- Hersteller = Manufacturer
- Fahrzeug / Maschinen Ident-Nr. = Vehicle / machine ID No.
- Typ = Model
- Leergewicht kg = Unladen weight in kg
- Zul. Gesamtgew. kg = Permissible total weight kg
- Zul. Stützlast / Achslast vorn kg = Permissible tongue load / Front axle load kg
- Zul. Achslast hinten kg = Permissible Rear axle load kg
- Baujahr = Year of manufacture
- Nenndrehzahl U/min = Nominal speed in revs. per minute
- Zul. Hydr. Druck bar = Permissible hydraulic pressure in bar
- Zul. Höchstgeschw. km/h = Max. perm. speed in km/h

2.8 Technical data

2.8.1 General data

Model	Unit	1300 DK	1500 DK	1800 DK	2100 DK
Permissible laden weight	kg	11800		12000	
Admissible axle load	kg	10000		10000	
Permissible vertical load	kg	1800		2000	
Unladen weight	kg	4860	5330	6150	6610
Usable mixing capacity* (Loading capacity)	m^3	13	15	18	21
Maximum operating pressure	bar	210			
Oil flow rate	l/min	25 - 45			
Minimum power required:					
• without switchgear, 20 min^{-1}	kW (PS)	46 / 63	50 / 68	--	--
• without switchgear, 24 min^{-1}	kW (PS)	53 / 72	57 / 78	64 / 88	71 / 96
• with switchgear, 16 / 13 min^{-1}	kW (PS)	41 / 55	44 / 60	50 / 67	54 / 74
• without switchgear, 29 min^{-1}	kW (PS)	60 / 81	65 / 88	73 / 99	80 / 109
• with switchgear, 19 / 16 min^{-1}	kW (PS)	46 / 63	50 / 68	56 / 76	62 / 84
P.T.O. speed	min^{-1}	540			
Sound pressure level	dB(A)	84			

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

Tab. 1

2.8.2 Dimensions of trailer

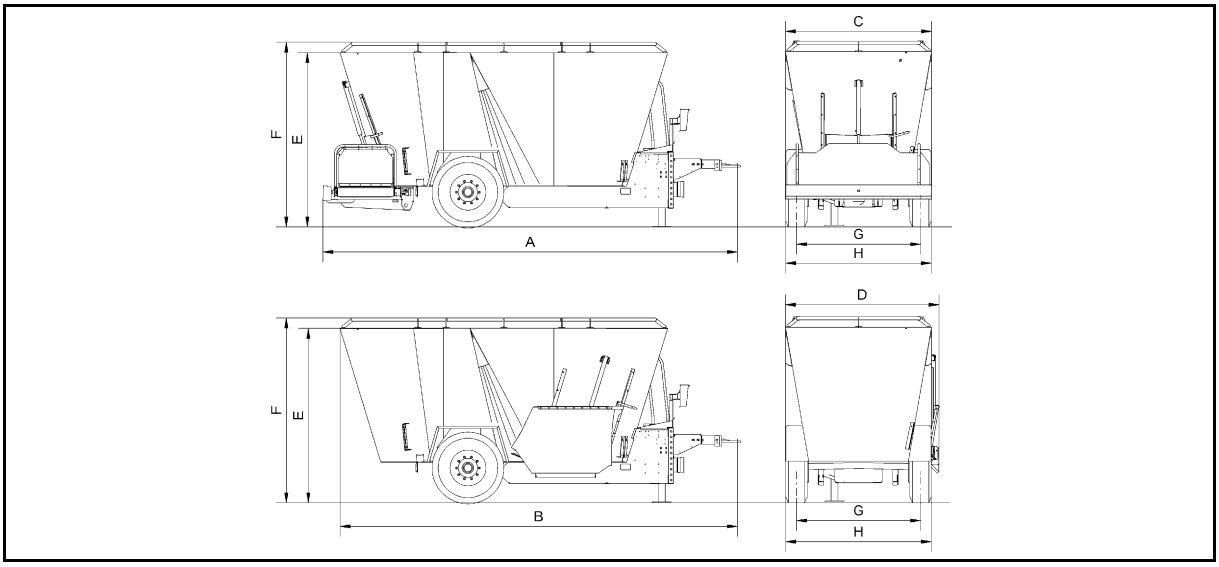


Fig. 9

Model	Unit	1300 DK	1500 DK	1800 DK	2100 DK
Length:					
• A = length with rear crossover conveyor	m	5.97		6.41	
• B = length with side discharge / without crossover conveyor	m	5.80	5.87	6.28	6.38
Width:					
• C = with rear crossover conveyor	m	2.16		2.42	
• D = with right or left side discharge	m	2.26 / 2.28		2.52 / 2.54	
• D = with side discharge on both sides	m	2.38		2.64	
• H = outside wheel width incl. tyres:					
o 315/80 - 22.5	m	2.17			
o 385/65 – 22.5 remoulded	m			2.45	
o 425/65 - 22.5 remoulded	m			2.48	
Height incl. tyres:					
• E = equipped with 315/80 – 22.5	m	2.37	2.59		
• F = equipped with 315/80 – 22.5 + overflow ring	m	2.51	2.73		
• E = equipped with 385/65 – 22.5 remoulded	m			2.61	2.86
• F = equipped with 385/65 – 22.5 remoulded + overflow ring	m			2.76	3.01
• E = equipped with 425/65 – 22.5 remoulded	m			2.63	2.88
• F = equipped with 425/65 – 22.5 remoulded + overflow ring	m			2.78	3.03
• G = track, single axle	m	1.85	1.85	2.06	2.06
• Discharge height	m	0.61	0.61	0.61	0.61

Tab. 2

2.8.3 Tyre pressure

Tyres	Unit	1300 DK	1500 DK	1800 DK	2100 DK
315/80 R22.5	bar / psi	9 / 130	9 / 130	--	--
385/65 R22.5	bar / psi	--	--	9 / 130	9 / 130
425/65 R22.5	bar / psi	--	--	8.5 / 123	8.5 / 123

Tab. 3

2.9 Required tractor equipment

For proper operation of the machine, the tractor employed must fulfil the following requirements:

Tractor engine power

To the power required see chapter "Technical data", page 22.

Electrics

Battery voltage:	• 12 V (Volt)
Socket for lighting:	• 7-pin
Socket for control unit:	• 3-pin (DIN 9680). The supply lead of the 3-pin socket should have a cable cross-section of at least 4 mm².

Hydraulics

- Check the suitability of the hydraulic oil before connecting the machine to the hydraulic system of your tractor. If necessary contact the agricultural machine specialist when you check the suitability of the hydraulic oil.
- Do not mix mineral oil with bio-oil.

Maximum operating pressure:	• 210 bar
Hydraulic pump power ratio	• At least 25 l/min and maximum 45 l/min at 180 bar
Machine hydraulic oil:	• ATF hydraulic oil

For some hydraulic components a choice from a variety of coupling options is possible:

- a double-acting control device,
- to a single-acting control device and a free return line directly into the hydraulic oil tank of the tractor.

We recommend a single-acting control device and a free return line. The hydraulic oil flows back into the hydraulic control tank of the tractor through the free return line with a low pressure. A free return reduces hydraulic oil temperature rise.

The hydraulic hose lines are colour-flagged on the hydraulic plugs:

- Pressure lines (forward P) are marked red,
- Return lines (return T) are marked blue.

Operating via direct tractor connection (standard equipment)

Hydraulic components:	Control units required on the traktor:
• Discharge door:	• 1 double-acting control unit
• Hydraulic support stand:	• 1 double-acting control unit
• Hydraulic counter-cutters:	• 1 double-acting control unit
• Hydraulic motor for crossover conveyor:	Options: • 1 double-acting control unit or • 1 single-acting control unit and 1 pressureless return (tailback pressure in return max. 5 bar)
• Discharge conveyor for right-hand front discharge:	• 1 double-acting control unit (extend and retract)
• Hydraulic motor for discharge conveyor for right-hand front discharge:	Options: • 1 double-acting control unit or • 1 single-acting control unit and 1 pressureless return (tailback pressure in return max. 5 bar)
• Conveyor extension:	• 1 double-acting control unit (extend and retract)

Tab. 4

Operating via hand lever operating gear, bowden cable operation or electro-hydraulic control (optional equipment)

Control units required on the traktor:	Options: • 1 double-acting control unit or • 1 single-acting control unit and 1 pressureless return (tailback pressure in return max. 5 bar)

Tab. 5

Brake system

Hydraulic working brake up to 6 km/h (not registered for driving on public roads):	• 1 single-acting control unit
Two-line service brake system:	Two-line air brake system with: • 1 service line hose coupler (red) for the supply line • 1 service line hose coupler (yellow) for the brake line
Hydraulic service brake system (only for export):	• 1 hydraulic clutch acc. to ISO 5676 (100 bar)

Tab. 6

Mirror

The tractor uses must be fitted with mirrors so that the danger zones on both sides of the machine can be easily seen from the tractor cab.

2.10 Noise emission information

The workplace-related emission value (sound pressure level) is 84 dB(A), measured during operating mode at the driver's ear, the cab being closed.

The sound pressure level mainly depends on the vehicle used.

2.11 Conformity

The machine fulfils the fundamental safety and health requirements of the following guidelines and standards:

- Machine Guideline 98/37/EC
- EMC-Guideline 89/336/EEC
- EN ISO 12100-1
- EN ISO 12100-2
- DIN EN 294
- DIN EN 349
- DIN EN 982
- DIN EN 1553
- DIN EN 703

The manufacturer confirms that the machine fulfils the fundamental safety and health requirements:

- by issuing the declaration of conformity,
- by mounting the CE-marking on the machine.

In the case of unauthorised structural modifications or additions and conversions:

- the declaration of conformity and the CE-marking of the machine lose their validity,
- warranty and liability claims on the manufacturer for bodily injury and material damage are excluded,
- the operator will be held solely responsible.

3 Safety instructions

This chapter contains important information for the operating company and the machine operator on safe and trouble-free operation of the machine.

All safety instructions in this operating manual are to be observed!

The majority of accidents are caused by the simplest of safety rules being ignored.

By observing all the safety information in this operating manual, you can make a contribution to the prevention of accidents.

3.1 Safety awareness at work

The machine is state-of-the-art constructed and complies with the recognised safety regulations. Never-the-less use of the machine can involve danger and injury:

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

For operation corresponding to safety requirements, please observe:

- this operating manual, in particular:
  - the standard safety instructions, the safety instructions concerning handling and the handling instructions,
  - the instructions for correct mode of operation in accordance with the requirements.
- the warnings on the machine,
- the national, general valid regulations for occupational safety, accident prevention and environmental protection,
- the national road traffic safety regulations for transport drives.

Only operate the machine in a safe, faultless condition.

WARNING

Risk of bodily injury from being squashed, cut, caught in, drawn up in or hit, if tractor or machine have insufficient road traffic and operating safety standards!

Before every start-up check tractor and machine for roadworthiness and operational dependability.

3.2 Organisational steps to be taken

The operating manual:

- must always be kept at the point where the machine is in use,
- must always be freely available to the operator and maintenance personnel.

3.2.1 Obligations on the part of the operating company

It is the duty of the operating company:

- to observe the national general regulations concerning the safety-at-work, accident prevention, and environmental protection,
- to only allow persons to work with/on the machine who:
  - are well acquainted with the standard regulations concerning occupational safety and accident prevention,
  - have been trained to work with/on the machine,
  - have read and understood these operating manual.
- to keep all saftey signs on the machine in clearly legible condition,
- to replace damaged saftey signs,
- are equipped with the necessary personal protective shielding, such as e.g.:
  - protective goggles,
  - work gloves to DIN EN 388,
  - safety shoes,
  - protective clothing,
  - skin protection care, etc.

3.2.2 Obligations of the operator

All persons, who have been given a job to do on the machine, are obliged:

- to acquaint themselves with the machine before starting work,
- to acquaint themselves with the following regulations before starting work and to observe them during the operation:
  - the national, general valid regulations concerning safety-at-work, accident prevention and environmental protection,
  - the section in this operating manual on "Basic safety instructions", page 34,
  - to comply with the section in this operating manual on "Warning and instruction notices", page 47 and the warnings and cautions for operation of the machine,
  - to read the sections of this operating manual, which are important for the execution of his/her work tasks.

If the operator detects a device that is not in a perfectly safe condition, the said operator must clear the defect immediately. If this task does not fall within the operator's scope of work or does not have the relevant training, the operator must report the defect to his superior or to the operating company.

3.2.3 Qualifications of Personnel

Only trained and specifically instructed personnel may work with/on the machine. The operating company must clearly define the areas of responsibility of personnel for operation, maintenance and care.

A trainee may only work with/on the machine under the supervision of an experienced operator.

The operating company may only carry our tasks described in this operating manual.

Only specialist workshops may carry out work on the machine that requires specialised technical know-how. Only specialist workshops have qualified personnel and the appropriate equipment (tools, lifting and support devices) for carrying out this work in a correct and safe manner.

This applies to all tasks:

- that are not mentioned in this operating manual,
- that are additionally referred to as "Workshop tasks".

Personnel / Task	A person specially trained for the job [1)]	A specifically instructed person [2)]	A person with specialist training in this field (technical workshop) [3)]
Loading/transport	X	X	X
Starting up the machine	--	X	X
Setting-up/preparation	--	X	X
Operation	--	X	X
Maintenance and care	--	X	X
Fault searching and clearance	--	X	X
Disposal	X	--	--

Legend: X..permitted --..not permitted

1) A person who is able to take on a specific task and may carry it out for suitably qualified company.

2) A person is referred to as "instructed" if he/she has received instruction in the tasks entrusted to him/her and in the possible dangers resulting from improper conduct and has been given the minimum training required as well as the necessary information on safeguards and safeguarding.

3) A person is referred to as a specialist (expert) if he/she has received specialised technical training. On the basis of their specialised training and their knowledge of the appropriate regulations, they are able to assess the relevant work situation and recognize possible dangers.

Note: A qualification of the same status as a specialised technical training qualification can be achieved by working for several years in the same branch.

3.3 Product safety

3.3.1 Operation of the machine in accordance with safety requirements

Only one person may operate the machine from the driver's compartment on the tractor, and there must be no-one in the danger zone of the machine. Please observe here the section "Danger area and danger spots", on page 20.

3.3.2 Safety devices and safeguards

- Only operate the machine, when all the safety and guard devices are correctly installed and fully functional.

  Faulty and dismantled safety devices and safeguards can bring about to dangerous situations.
- Please check all safety and guard devices for outward signs of damage and performance reliability before putting the machine into operation.

3.3.3 Modifications

- Vehicles with an official operating permit or fittings and equipment connected to a vehicle with a valid operating permit or a licence for driving on the road according to road traffic regulations must be in the condition stipulated in the permit or licence.
- Structural modifications, additions or conversions may only be carried out on the machine, when you are in possession of the written permission for these from the manufacturer.
- In the case of unauthorised structural modifications, additions or conversions:
  - the declaration of conformity and the CE-marking of the machine lose their validity,
  - the licence to operate loses all validity under national and international regulations.
- Use only genuine parts or modification parts and accessories allowed by the manufacturer which permit:
  - the declaration of conformity and the CE-marking of the machine retain their validity,
  - the operating licence under national and international rules to retain its validity,
  - the faultless functioning of the machine to be guaranteed.
- The manufacturer will not accept liability for damage caused by:
  - unauthorised machine modifications,
  - unauthorised modification parts and accessories,
  - welding and drilling work on load-bearing parts of the machine.

3.3.4 Spare parts and parts subject to wear and tear as well as auxiliary material

Replace machine parts that are not in perfect condition immediately.

Only use genuine parts from the manufacturer or parts authorised by the manufacturer, enabling the operating permit to retain its validity under national and international rules. If spare parts and replacements for worn parts from third-party manufacturers are used, there can be no guarantee that they are designed and manufactured to stress or safety requirements.

The manufacturer will accept no liability for damage caused by the use of unauthorised spare and wearing parts or auxiliary material.

3.3.5 Guarantee and Liability

Our "General conditions of sale and delivery“ always apply. These must be handed over to the operating company at the latest on conclusion of contract.

Warranty and liability claims for bodily injury and material damage are excluded, if they can be traced back to one of more of the following causes:

- improper use of the machine,
- improper mounting, starting-up, operating and maintaining of the machine,
- operating the machine with faulty safety devices or incorrectly mounted or non-functioning safety and protective devices,
- non-observance of the instructions in the operating manual with regard to start up, operation and maintenance,
- unauthorized modifications to the machine,
- slipshod controlling of machine parts subjected to wear and tear,
- improper repair work,
- catastrophes caused by alien elements and acts of god.

3.4 Basic safety instructions

Basic safety instructions:

- are a fundamental requirement for machine operation in accordance with safety regulations,
- are summarised in the following sub-sections.

3.4.1 General safety and accident prevention instructions

- In addition to the safety information given in this section, please observe the general valid national safety and accident prevention regulations!
- Wear your personal protective clothing when working on the machine!
- Observe the warnings and instructions displayed on the machine. They supply you with important information for the safe and fault-free operation of the machine!
- In addition to the basic safety information in this chapter please observe the safety information concerning handling in the other chapters!
- Order all persons out of the proximity zone of the machine, before you proceed with it or put it into operation! Pay special attention to children!
- Do not transport anyone or anything on the machine! Carrying persons or objects on the machine is prohibited!
- Adjust your driving so that you are always in full control of the tractor with the machine mounted / unhitched!

  taking into consideration your personal ability, the road, traffic, visibility and weather conditions, the road-holding qualities of the tractor as well as the effect of the mounted /hitched machine.

Hitching and unhitching the machine

- Only couple and transport the machine with the appropriate tractors!
- Hitch up the machine as directed to the specified devices!
- Take care when coupling the machine to the front and / or rear fitting of a tractor that the following values are not exceeded:
  - the permissible total weight of the tractor,
  - the permissible axle loads of the tractor,
  - the permissible tongue load at the coupling point of the tractor,
  - the permissible towing capacity of the connecting device,
  - the permissible tyre load capacity of the tractor tyres!
- Secure the tractor and the machine so they cannot roll away accidentally before hitching or unhitching the machine!
- Standing between the tractor and machine while the tractor backs up to the machine is not permitted!

  Those helpers present may only guide in the driver from a position alongside the vehicles but not move over between the vehicles until they are at a standstill.

- Move the support devices into the supporting position (static stability) when hitching up and unhitching the machine!
- Injury resulting from being crushed and cut can occur when support devices are being applied!
- Be particularly careful when hitching and unhitching the machine to or from the tractor! At the coupling points between tractor and machine there is a risk of being crushed or cut!
- Is forbidden to go between the tractor and the machine when the three point linkage is activated!
- Check coupled supply lines. Linked supply lines:
  - must easily follow every movement when cornering without tension, bending or friction,
  - must not rub against external parts!
- Always park the unhitched machine on stable ground!

Using the machine

- Before starting work familiarize yourself with all the fittings and operating elements on the machine as well as their functions! During operation is too late.
- Wear tight-fitting clothes! Loose-fitting clothes increase the risk of getting caught and wound up in drive shafts!
- Only start up the machine when all the guards have been fitted and set in their protecting positions!
- Observe the regulations on maximum payload of the attached / hitched up machine and the permissible axle and tongue loads of the tractor! If necessary drive with the loading area only part-filled.
- It is forbidden to stand:
  - in the work / danger area of the machine,
  - in the ejection range of the machine,
  - in the rotating and swivelling range of the moving parts of the machine,
  - under raised and unsecured moving machine parts!
- On externally-powered (e.g. hydraulic) moving machine parts there is a risk of being crushed and cut at certain points!
- Before activating externally-powered machine parts, ensure that there is no-one in the danger area of the machine!
- Before leaving the tractor, secure it against accidental starting and rolling away!
- Prop up opened covers securely before going under the covers!

Transporting the machine

- Respect the relevant national road traffic regulations during transport runs on public roads!
- Before transport runs check that:
  - the correct connection of the supply lines,
  - othe lighting system for damage, function and cleanliness,
  - the brake and hydraulic system for noticeable defects,
  - whether the parking brake is fully released,
  - the brake system is functioning correctly!
- Make sure that the steering and brakes of the tractor are functioning correctly!

  Machines mounted or hitched up to the tractor and front or tail weights affect the road performance as well as the steering and braking of the tractor!
- Where necessary use front weights!

  The tractor front axle must always be loaded with at least 20% of the tractor unladen weight to ensure sufficient steering control!
- Always secure the front weights properly to the fixing points provided!
- Observe the maximum payload of the mounted / hitched-up machine and the permissible axle and tongue loads of the tractor!
- Check the affectivity of the brakes before driving off! The tractor will provide the specified brake delay for the combination tractor plus mounted / hitched-up machine!
- When driving on windy roads with an mounted or trailed machine, take into consideration the extent of protrusion and gyrating mass of the machine!
- Avoid sudden cornering, in particular on uphill and downhill runs as well as on across-hill runs!
- Put all the moving machine parts in transport position before transport runs!
- Secure all moving machine parts in transport position before transport runs. Use the transport safety brackets provided for this purpose!
- Before transport runs, check that the transport equipment required is correctly mounted on the machine, e.g. lighting, warning and safeguards!
- Adapt your speed of driving to the prevailing conditions!
- Drive downhill in a lower gear!
- The independent braking system must always be switched off before transport runs (lock pedals)!

3.4.2 Hydraulic system

The hydraulic system is highly pressurized!

- Make sure the hydraulic hose lines are correctly connected!
- When connecting the hydraulic hose lines, make sure that the hydraulic system is pressure-less both on the tractor and on the machine!
- Do not block any control elements on the tractor whose function is to directly implement the components' hydraulic or electric movements, e.g. tilting, swivelling and sliding procedures!

  Each movement must stop automatically the relevant control device is released.

  This does not apply to movements of equipment:
  - which are continuous,
  - which are automatically controlled,
  - whose function requires a float or pressure position.
- Before working on the hydraulic system:
  - set down the machine,
  - secure raised moving parts of the machine against accidental lowering,
  - render the hydraulic system pressure-less,
  - switch off the tractor engine,
  - apply the parking brake,
  - remove ignition key!
- Have the hydraulic hose lines checked out for their safe working condition at least once a year by a specialist!
- Replace hydraulic hose lines showing obvious defects, damage and signs of ageing! Always use genuine hydraulic hose lines!
- Hydraulic hose lines should not be used for longer than six years, including a possible storage time of a maximum of two years!

  Even when hose and hose lines have been stored and used correctly, they are still subject to natural ageing processes, which is why their storage time and length of usage is limited. Periods of usage differing from the above may have to be applied to take into account empirical values and in particular accident potential. Other guidelines can apply for hose and hydraulic hose lines made of thermoplastics
- Never try to block leaks in hydraulic hose lines with your hands or fingers!

  Hydraulic oil escaping under high pressure can penetrate the skin and cause severe internal injuries.

  If injuries from hydraulic oil occur, consult a doctor immediately. Danger of infection!
- Because of the high risk of severe infection never use bare hands to feel for leaks. When looking for leaks always use applicable auxiliary products (cleaning spray, special leak detection spray)!

3.4.3 Electrical System

- Always disconnect the negative terminal of the battery before carrying out work on the electrical system!
- Only use the fuses specified. The use of stronger fuses can destroy the electrical system – danger of fire!
- Follow the correct order of procedure carefully when connecting and disconnecting the battery:
  - Connection: Connect the positive terminal first, then the negative terminal.
  - Disconnection: Disconnect the negative terminal first, then the positive terminal!
- Always put the cover provided on the positive terminal of the battery. Earth connection can cause an explosion!
- Prevent sparks and flames developing near the battery! Danger of explosion!
- The machine can be fitted with electronic components and parts, whose functions can be affected by electro-magnetic emissions from other items of equipment. These effects can endanger people, if the safety instructions below are not followed:
  - In the case of a later installation of electrical appliances or components on the machine, with a connection to the on-board network, the operator is responsible for checking out whether the installation is causing interference in the vehicle electronics or other components,
  - Take care that electric and electronic parts installed at a later point in time comply with the EMV-guideline 89/336/EWG in the relevant valid edition and carry the CE-sign!

3.4.4 PTO operation

- Only universal drive shafts specified by the manufacturer and fitted with guard devices according to the regulations are to be used!
- Observe the operating instructions for the universal drive shaft supplied!
- Check the universal drive shaft:
  - protective sleeve and funnel of the universal drive shaft must be undamaged,
  - tractor and machine P.T.O. shaft must each be fitted with a safety shield! The safety shields must be found to be in proper condition!
- Working with damaged protective equipment is forbidden!
- Only mount and demount the drive shafts with:
  - the P.T.O. shaft switched off,
  - the tractor engine switched off,
  - the ignition key removed,
  - the parking brake applied!
- Ensure correct mounting and safeguarding of the PTO drive shaft at all times!
- Secure the PTO drive shaft guard by hanging the chain(s) inside so that it does not travel!
- With drive shafts, ensure the recommended tube overlapping in transport- and work-position!

  Observe the operating manual for the PTO drive shaft.
- When driving on winding roads, keep to the admissible PTO drive shaft offset angle and skid way!
- When using wide angle drive shafts always mount the wide angle joint at the fulcrum between tractor and machine!
- Where universal drive shafts with overload or freewheeling clutch are used, always mount the overload or freewheeling clutch on the machine side!
- Before switching on the P.T.O. shaft, check that the selected speed and direction of rotation of the tractor P.T.O. corresponds to the permissible drive speed and direction of rotation of the machine!
- Order everyone out of the danger zone of the machine before switching on the PTO!
- No-one must be allowed to be within the range of the rotating PTO or PTO drive shaft while they are in operation!
- Never switch on the P.T.O. shaft with the tractor motor switched off!
- Always switch off the PTO if the offset angles become too large or the PTO is not required!
- After switching off the P.T.O. shaft, there is a risk of injury from the coasting-down inertia mass of rotating machine parts!

  During this phase do not go too near the machine! Do not start work on the machine again before all the machine parts have

come to a complete standstill.

- Secure the tractor and machine against accidental starting and rolling before cleaning, lubricating or adjusting is carried out on PTO driven machines or PTO drive shafts!
- Place the uncoupled PTO drive shaft in the holder provided!
- After dismantling the PTO drive shaft, put the protecting hood over the PTO butt end!

3.4.5 Trailed machines

- Take care to observe the admissible combinations of connecting devices on the tractor and traction fittings on the machine!

  Only couple up admissible vehicle combinations (tractor and hitched-up machine).
- With rigid drawbar trailers, the maximum admissible tongue load of the tractor on the coupling device must be complied with!
- Make sure that the steering and brakes of the tractor are functioning correctly!

  Machines attached or hitched up to a tractor have an effect on the drive behaviour as well as on the steering and braking ability of the tractor, in particular in the case of rigid drawbar machines with tongue load on the tractor.
- Only specialised workshops are allowed to adjust the height of the drawbar in the case of drawbars with tongue load!
- Take care when uncoupling and setting down a rigid drawbar machine that there is sufficient tongue load on the support device!

  In particular there is a risk of unevenly loaded machines tipping over (Static stability).

3.4.6 Brake system

- The tractor brake system must correspond to the machine brake system!
- Stop the tractor immediately if any fault occurs in the brake system. Clear all faults without delay!
- Only specialist workshops or recognized brake service centres can carry out adjusting and repair work to the brake system!
- Have the brake system checked regularly!

  To maintain operating reliability the wheel brakes must always be adjusted correctly.
- Before carrying out any work on the brake system:
  - Set the trailer down carefully and secure it against accidental rolling away (wheel chocks),
  - Secure the raised machine against accidental lowering!
- Be particularly careful when carrying out welding, burning or drilling work in the vicinity of brake lines!
- After any adjusting and servicing work has been carried out on the brake system, always carry out a brake test!

Compressed air brake system

- The compressed air systems of tractor and machine must correspond with each other!
- The seals on the service- and brake-line hose couplers must be cleaned to remove any dirt before hitching up the machine!
- The hitched-up machine cannot be started until the manometer on the tractor reaches 5.0 bar!
- Drain the air tank every day!
- Close the hose couplers on the tractor before runs without the machine!
- Hang up the service- and brake-line hose couplers in the dummy couplings provided when the machine is uncoupled!
- Use only the specified brake fluid to top-up or refill. Comply with the relevant regulations when refilling the brake fluid!
- Do not alter the fixed settings on the brake valves!
- Replace the air tank, when:
  - the air tank can be moved around in the tensioned retaining straps,
  - the air tank is damaged,
  - the type ID plate on the air tank is rusty or loose or missing!

Hydraulic brake system for export machines

- Hydraulic brake systems are not permitted in Germany!
- When refilling or renewing always use the specified hydraulic oils. Comply with the relevant regulations when renewing the hydraulic oil!

3.4.7 Axles

Never overload the axles. Overloading the axles reduces the service life of the axle bearings and damages the axles.

For this reason avoid:

- overloading the machine,
- hitting kerbs,
- driving at too high a speed,
- fitting wheels with incorrect wheel offset,
- fitting outsize wheels and tyres.

3.4.8 Tyres

- Only skilled personnel equipped with the appropriate fitting tools may carry out repairs to tyres and wheels!
- Before beginning work on the tyres, set down the machine carefully and secure it against accidental lowering and rolling (parking brake, chocks)!
- Fitting wheels and tyres requires the right know-how and appropriate tools!
- Let the air out of the tyre, before you demount it!
- Check the air pressure regularly!
- Comply with the highest permissible filling pressure in the tyre. There is a danger of explosion if the filling pressure is too high!
- When refilling tyres on the machine, take up a position at the side, in front of or behind the wheel! A filling hose at least 1.5 m in length makes it easier to stand at the side.
- Tighten up all the securing nuts and bolts in accordance with the manufacturer's instructions!

3.4.9 Fodder mixing trailer

- The fodder mixing trailer is only allowed to be operated by one person!
- Before operating the machine, make sure that third persons leave the machine's hazardous area!
- Load the fodder mixing trailer only by means of a tractor equipped with a front loader or by means of a wheeled loader!
- People are not allowed:
  - above the fodder mixing trailer, e.g. to load the mixing container manually from a silo or a hayloft! People who are staying above the fodder mixing trailer 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 as long as the tractor engine is running!
- Meter additional fodder (e.g. mineral feed) or other bulk material into the mixing container through the feed funnel (optional extra) or by means of the loading tool!
- Equip your tractor with mirrors in order to ensure sufficient indirect visibility of the work area to the right and to the left of the fodder mixing trailer!
- Risk of crushing when opening and closing the discharge doors. Before opening or closing the discharge doors, make sure that people and animals leave the hazardous area!
- Never reach into the mixing container through a discharge opening:
  - as long as the tractor engine is running,
  - as long as the discharge door has not been secured against accidental lowering!
- Risk of injuries caused by the sharp-edged cutting knives of the mixing auger. Wear your personal protective equipment (protective gloves, safety footwear), when carrying out maintenance work on the cutting knives of the mixing auger!
- Only enter the mixing container:
  - with the PTO drive shaft uncoupled,
  - through a discharge opening with the discharge door completely open,
  - when wearing your personal protective equipment,
  - with greatest possible care. Beware of the cutting knives' position at the mixing auger!
- When using electrical tools, the connecting cables must not be moved over sharp-edged cutting knives!

3.4.10 Machine maintenance and care

- Carry out the prescribed maintenance and care work on the machine according to schedule!
- Secure the tractor against accidental starting and rolling before carrying out maintenance and care work on the machine!
- Mechanical, hydraulic, pneumatic and electric and electronic residual energy still present can trigger off accidental machine movement!

  Take into consideration the existence of residual energy in the machine when carrying out maintenance work. Danger signs signalise component parts with residual energy. Detailed information can be found in the relevant chapters of this operating manual.
- Secure all operational media, such as compressed air and hydraulic oil, against unintentional start-up!
- Attach and secure large assemblies carefully to hoisting units before replacing them!
- Check nuts and bolts regularly for tight fitting! Retighten loose nuts and bolts!
- Secure the raised machine and/or raised parts of the machine against accidental lowering before servicing the machine or carrying out maintenance!
- Use suitable tools and wear gloves when replacing work tools with cutting edges!
- Check loosened screws and retighten where necessary. Check correct functioning of safety and guard devices after completion of servicing!
- Dispose of oils, greases and filters in the proper manner!
- Handle and dispose of used matter and materials for machine cleaning in a proper and appropriate manner, in particular:
  - when working on lubricating systems and equipment,
  - when cleaning with solvents!
- Disconnect the cable from the generator and battery on the tractor before carrying out electric welding on the tractor and / or mounted / hitched-up machine!
- Replacement parts must comply as a minimum with the technical requirements laid down by the manufacturer! These are fulfilled if genuine parts are used!
- Observe the maintenance intervals for parts subject to wear and tear!

3.5 Safety instructions relevant to operation and important information

Safety instructions relevant to operation and important information are to be found in the operating manual. Signal words and symbols promote recognition of safety and important information at a glance.

3.5.1 Safety instructions relevant to operation

Safety instructions relevant to operation:

- gives warning of hazards which can occur in a certain situation or in connection with a certain type of behaviour,
- is displayed in the individual chapters directly before a dangerous activity,
- is signalised by the triangular safety symbol and a prominent signal word. The signal word describes the gravity of the imminent danger.

DANGER 	**DANGER** **signalises an imminent hazard with high risk level, which will result in severe injury (loss of limb or long-term damage) or death, if not prevented.** **If the "DANGER" sign marking the safety information is ignored, severe injury possibly leading to death is imminent.**

WARNING 	**WARNING** **signalises a possible hazard of average risk level which could result in severe injury or death, if not prevented.** **If the "DANGER" sign marking the safety instructions is ignored, severe injury possible leading to death could perhaps result.**

CAUTION 	**CAUTION** **signalises a possible hazard of low risk level, which could cause light to medium injuries or material damage, if not prevented.** **If the "CAUTION" sign marking the safety instructions is ignored, light to medium injuries or material damage could possibly be caused.**

3.5.2 Important Information

Important Information:

- gives instructions for proper and appropriate handling of the machine,
- gives tips for users on optimising usage of the machine,
- are identified by the following symbols.

IMPORTANT

indicates a duty to adhere to a special code of conduct or particular way of handling the machine.

Non-observance of these instructions can lead to problems on the machine or surrounding area.

NOTE

marks tips on using the equipment and other particularly useful information.

These notes help you to get the most out of your machine.

3.6 Saftey signs and instructional signs

The following information is fixed to the machine:

- Warnings mark danger spots on the machine and give warning of residual hazards which cannot be eliminated completely out of consideration for the reliability of machine functions.
- Instructional signs contain information on proper handling of the machine.

Always keep these notices in a clean and legible condition! Renew illegible hazard notices. Quote the order number when requesting saftey signs and instructional signs:

- from your local dealer,
- directly from the Strautmann spare parts stock (+ 49 (0) 5424 802-31).

3.6.1 Saftey signs

A saftey sign consists of 2 pictograms:

(1) Pictogram depicting the hazard

The pictogram shows a visual impression of the hazard within a triangular safety symbol.

(2) Pictogram for the prevention of the hazard

The pictogram shows visual representation of hazard prevention instructions.

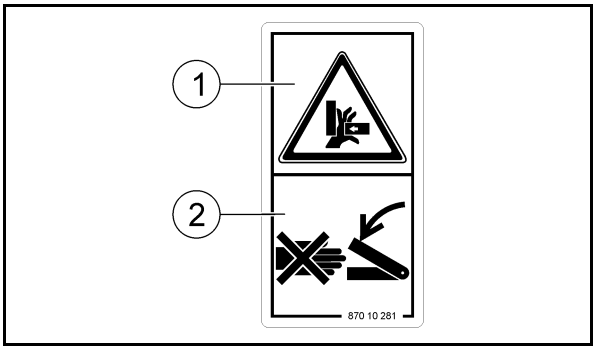


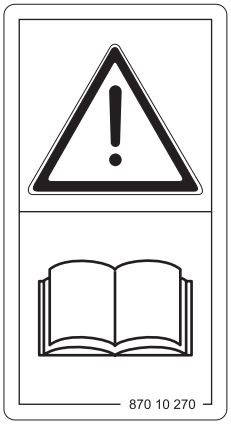
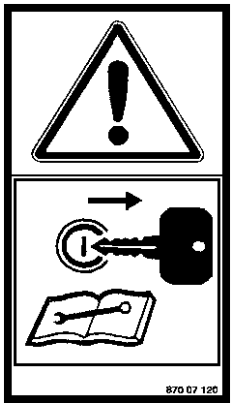
Fig. 10

Explanations to the saftey signs

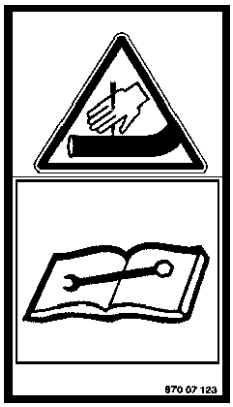
The list below shows:

- in the right-hand column, all the saftey signs displayed on the machine,
- in the left-hand column, the following information on the saftey signs listed on the right:

1. The order number.
2. The description of the hazard, e.g. "Risk of fingers or hand being crushed, due to accessible, moving machine parts!"
3. The consequences of disregarding the instructions for avoiding the hazard e.g. "This hazard can cause severe injuries with loss of limbs."
4. The instruction(s) for avoiding the hazard, e.g. "Never put your hands into the danger area, while the tractor motor is running with the universal drive shaft / hydraulic- / electronic-system connected. Instruct all persons to leave the danger area of the machine before you move any machine parts."

Order number and explanation	Saftey signs
870 10 270 Read and observe the operating manual and safety instructions before starting up the machine!	
870 07 120 **Exposed persons are at risk during work on the machine such as e.g. mounting, adjusting, fault clearance, and maintenance. This hazard is caused by accidental tractor and machine starting and rolling!** These hazards can cause very severe injury resulting in death. • Before any work whatsoever is carried out on the machine, secure the tractor and machine against accidental start and rolling away. • Read and observe all the information relevant to the work to be carried out in the appropriate section of the operating instructions.	
870 07 117 **There is a risk of whole body injury from drawing-in or catching hazards due to driven work tools!** These hazards can cause very severe injury resulting in death. Never climb into the loading area, as long as the tractor engine is running with the universal drive shaft / hydraulic- / electronic-system connected.	

870 07 123



Hydraulic oil escaping under high pressure constitutes a hazard caused by leaking hydraulic hose lines!

This hazard can cause severe injuries leading to death if hydraulic oil escaping under high pressure penetrates the skin into the body.

- Never try to block leaks in hydraulic hose lines with your hands or fingers.
- Read and observe the instructions in the operating manual before beginning maintenance and care work on hydraulic hose lines.
- If injuries from hydraulic oil occur, consult a doctor immediately.

870 07 126

Whole body injury from being rolled over can be caused by the parked, unsecured machine accidentally rolling away!

These hazard can cause very severe injury resulting in death.

Secure the machine so it cannot roll away accidentally before uncoupling it from the tractor or parking. Use the parking brake and/or wheel chocks.

870 07 130

Whole body crushing hazards can result from standing/going into the drawbar swivel area between tractor and hitched machine!

These hazard can cause very severe injury resulting in death.

- It is forbidden to stay in the danger zone between tractor and machine, while the tractor engine is running and the tractor is not secured against accidental rolling away.
- Order everyone out of the danger zone between tractor and machine, while the tractor engine is running and the tractor is not secured against accidental rolling away.

870 10 121

Risk of falling for passengers on treads or platforms!

This risk may cause most serious injuries or even death.

- People are not allowed:
  - passengers on the machine,
  - transport of objects on the machine,
  - climbing onto travelling machines.

  This ban also applies to machines equipped with treads and platforms.
- Ensure that there are no passengers on the machine.

870 10 278

Catching and winding-up hazards caused by the driven shaft!

These hazards can cause very severe injury resulting in death.

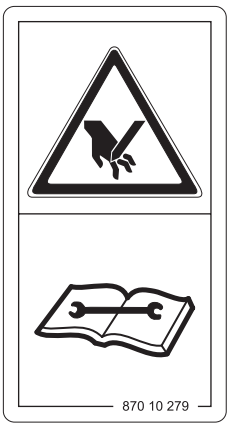
- Stay at a sufficiently safe distance from the PTO drive shaft while the tractor engine is running with the PTO drive shaft / hydraulic system connected.
- Ensure that all persons keep well clear of the active PTO drive shaft.

870 10 279

There is a risk of injury to hands and fingers from being cut during assembly work on sharp / sharp-edged work tools!

These hazards can cause very severe injuries to hands and fingers with loss of limbs.

Consult the information in the operating manual before carrying out assembly work on sharp work tools.



870 10 281

Accessible moving machine parts can cause injuries by crushing hands or fingers!

This hazard can cause severe injuries with loss of limbs.

Never put your hands in danger places while the tractor engine is running with the universal drive shaft / hydraulic- / electronic-system connected.

870 10 283

Standing in or moving into the danger area of the machine can result in injury from materials and foreign bodies being thrown off by or ejected from the machine!

These hazards can cause severe overall body injuries.

- Stay at an adequately safe distance from the danger area of the machine.
- Make sure that all persons stay at a adequately safe distance from the machine danger area as long as the tractor engine is running.

870 10 287

Dangerous situations can arise if load-bearing components break due to mechanical work on frame parts!

These hazards can cause very severe injury resulting in death.

It is absolutely forbidden:

- to carry out mechanical work on the chassis,
- to drill the chassis,
- to bore existing holes in the chassis frame or on frame parts,
- welding onto load-bearing components.

3.6.2 Instructional signs

One instructional sign consists of one pictogram:

(1) Pictogram with Information on correct machine handling.

The pictogram displays information as a pictorial or descriptive representation or in a tabular form.

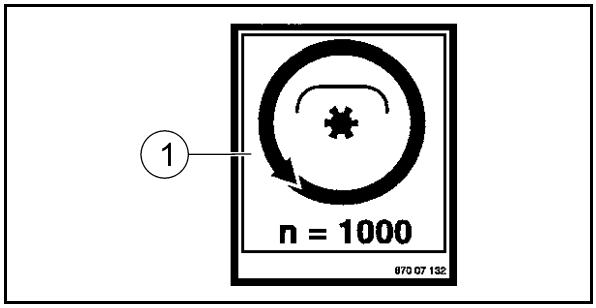
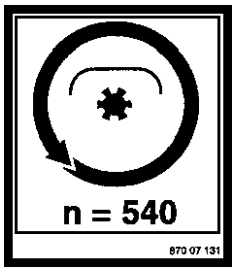
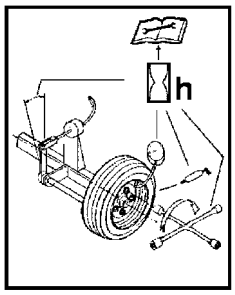
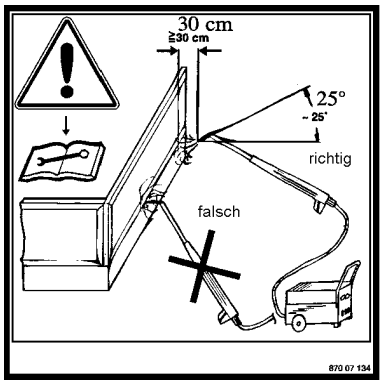
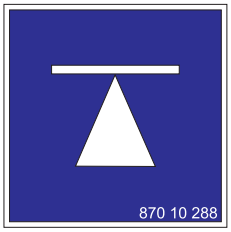


Fig. 11

Order number and explanation	Instructional signs
870 07 131 **The required machine drive speed is 540 min^{-1}.** Before switching on the P.T.O. check that the tractor P.T.O. speed and direction of rotation selected corresponds to the admissible speed and direction of rotation of the machine.	
870 07 133 Consult the information in the operating manual on the maintenance of brake axles.	
870 07 134 **Dangers arising from improper machine cleaning.** It is essential to follow the advisory notes in the chapter "Cleaning with high pressure cleaner or steam jet“ on page 155, if you intend to use a high-pressure cleaner / steam jet for the cleaning of the machine.	
870 10 288 This pictogram marks the positions where the lifting equipment (jack) should be placed.	

870 12 547

The pictograph marks fixing points for fixing slings when loading the machine.

3.6.3 Location of saftey signs and instructional signs

The diagram below show the layout of the saftey signs and instructional signs on the machine.

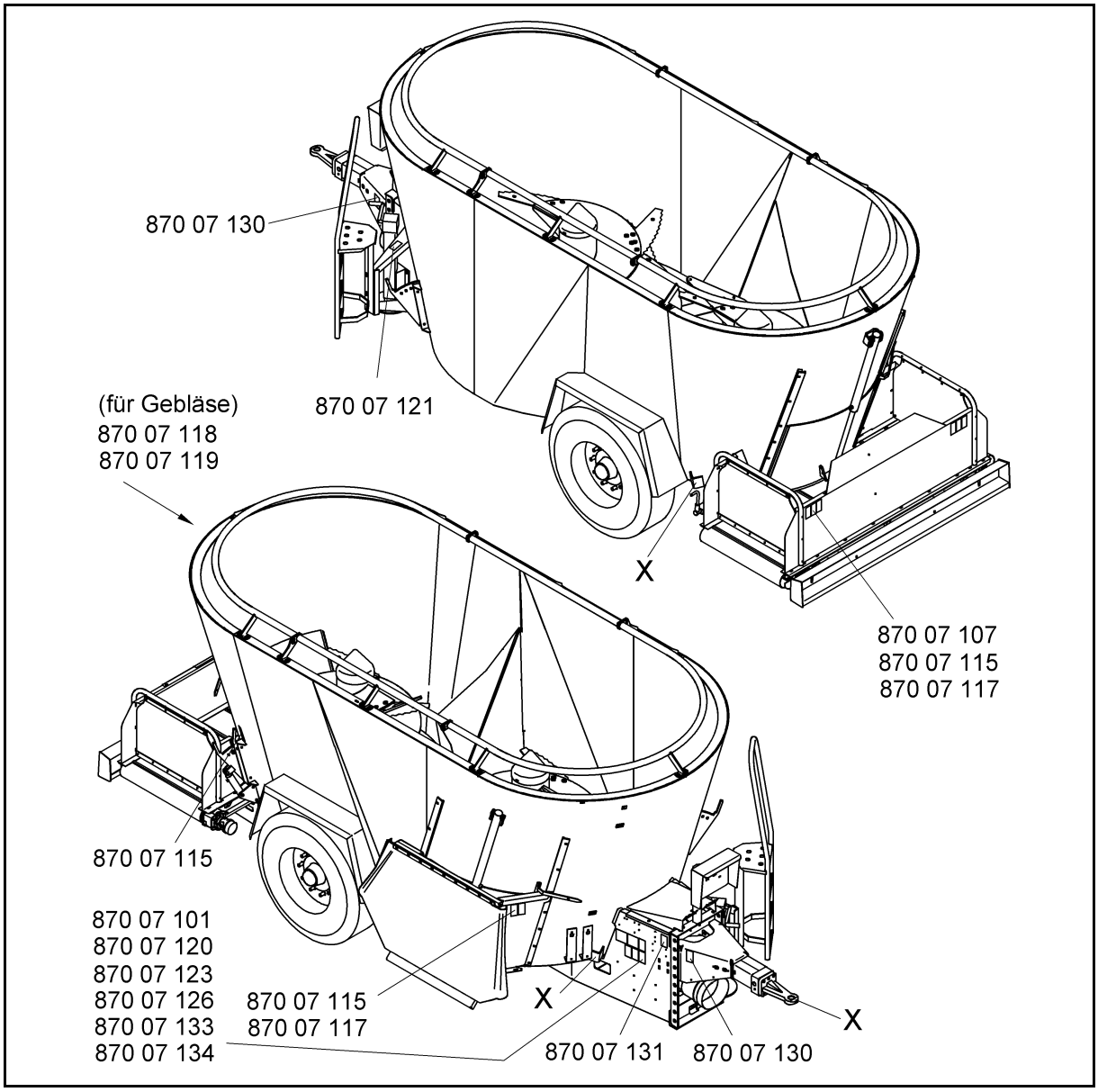


Fig. 12

3.7 Dangers of disregarding safety instructions and saftey signs

Disregard for safety instructions and safety instructions can:

- hazards for persons, environment and machine, e.g.:
  - hazard of persons as a result of unsecured work areas,
  - where important machine functions fail,
  - cause failure of specified methods for usage, maintenance and care of machine,
  - hazard of persons as a result of mechanical and chemical effects,
  - hazard for the environment through leakage of service fluids.
- lead to loss of all claims for damages.

4 Loading and Unloading

Loading and Unloading with tractor

WARNING

Danger of injury to exposed persons from uncontrolled tractor and machine movement can arise, due to insufficient stability or inadequate steering and braking control!

- Couple the machine to the tractor according to the rules and regulations before loading the machine onto a transport vehicle or unloading from a transport vehicle.
- You may only couple the machine to a tractor for unloading and loading if the tractor fulfils the power requirements and can brake the machine safely.

  If the machine is fitted with an air-brake system do not back up until the pressure gauge on the tractor shows 5.0 bar.

Loading and unloading with lifting gear

WARNING

Exposed persons risk injury through being crushed or struck if the raised machine drops down accidentally!

- It is imperative to use the attachment points indicated for securing the lifting tackle for loading and unloading the machine with a hoisting unit.
- Use appropriate lifting tackle able to take the weight of the machine safely.
- Never remain in the lifting zone under the raised machine.

Attachment points on the machine for securing lifting tackle are indicated by the pictogram (Fig. 13).

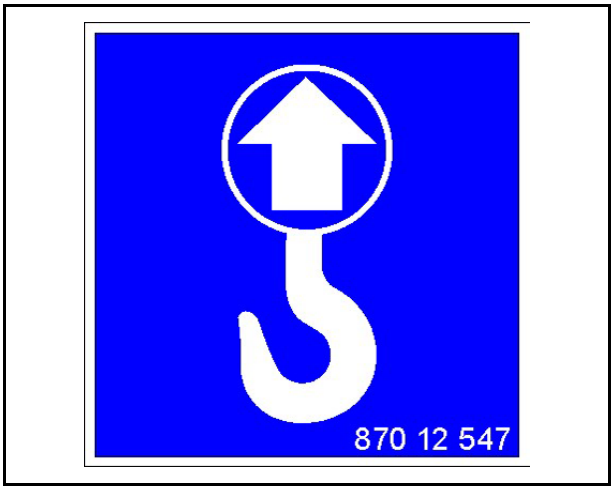


Fig. 13

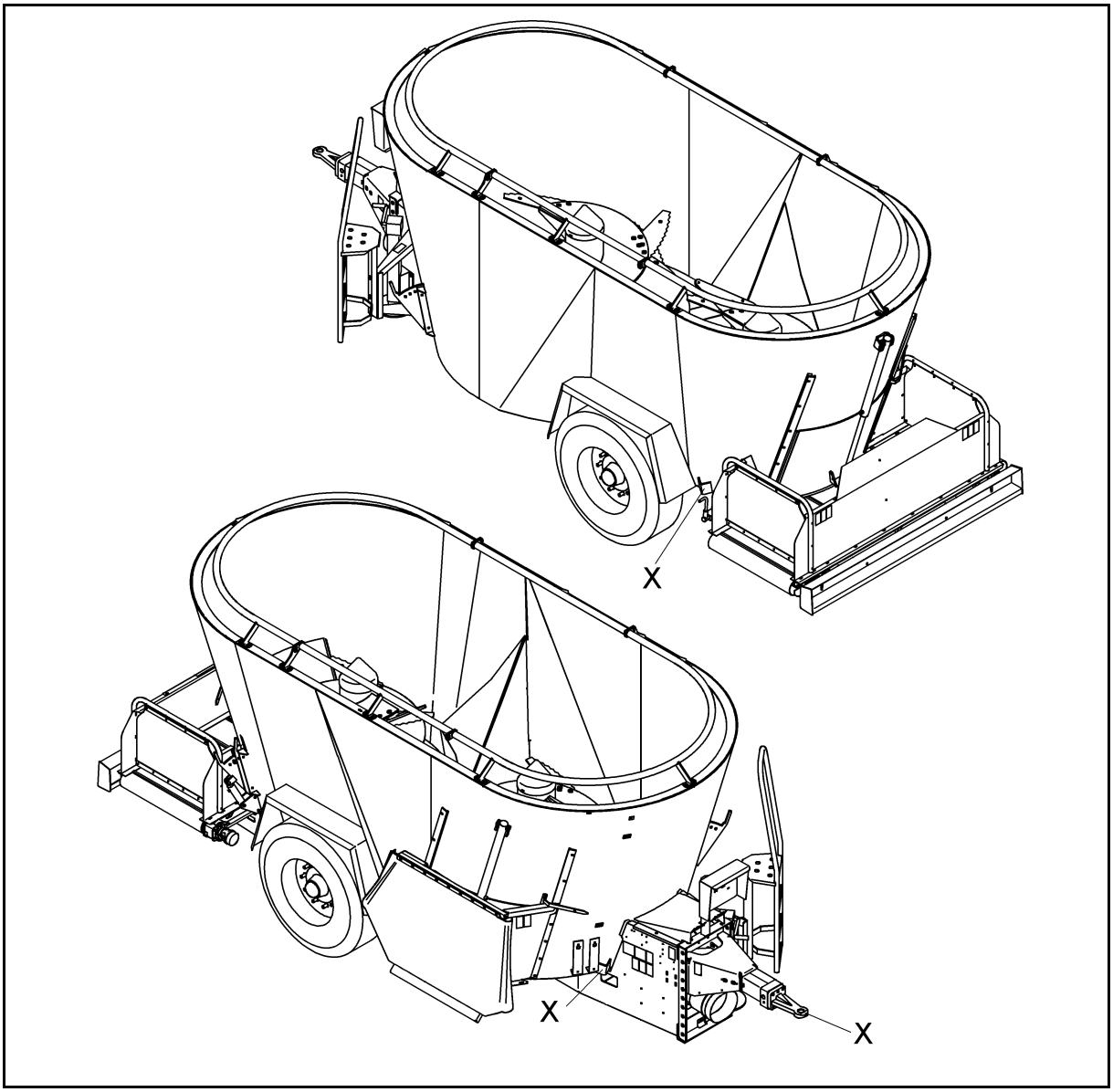


Fig. 14

(X) Lashing points and stops

5 Structure and Functions

The following chapters contain information about the structure of the machine and the functions and handling of the individual component parts.

Some of the machines are shown with special equipment. Options are clearly specified in the manual and are available at extra cost.

5.1 Mixing container and mixing auger

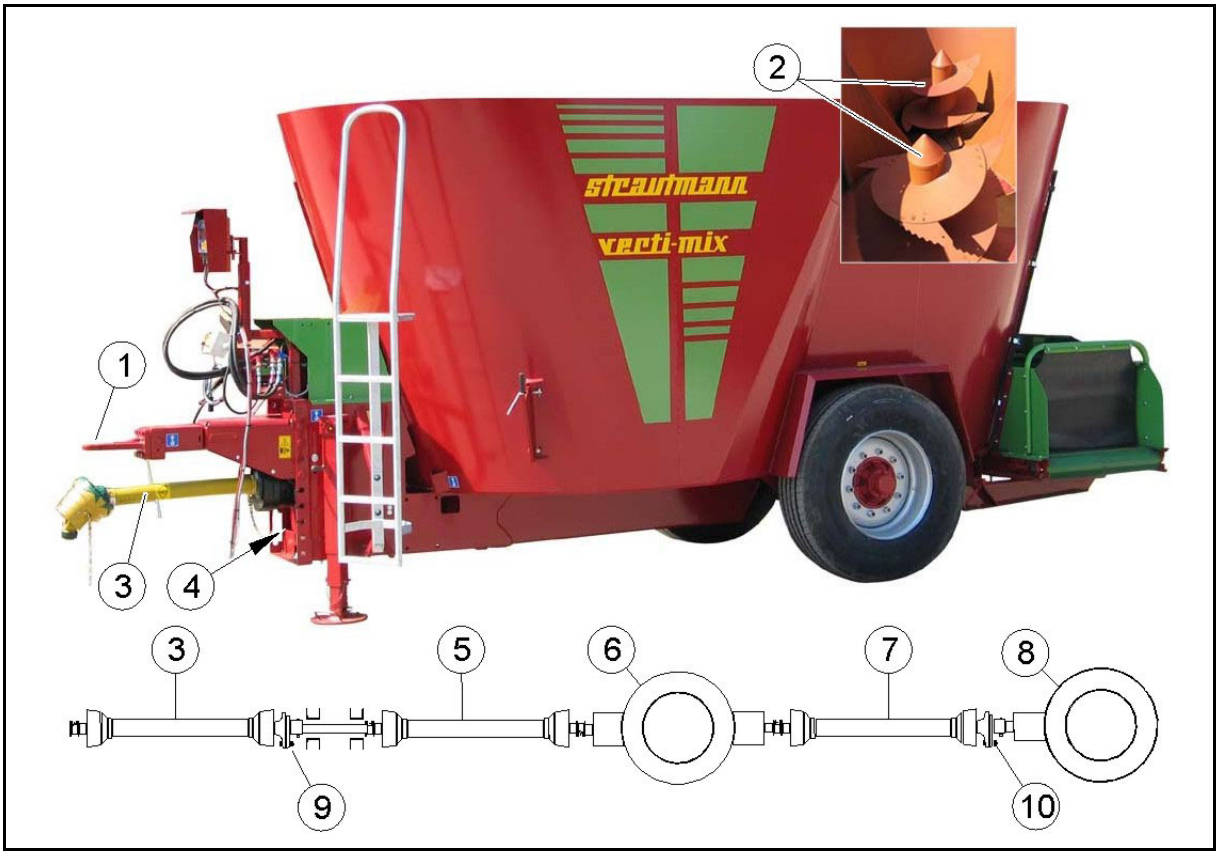


Fig. 15

The fodder mixing trailer is hitched to the tractor by means of the drawbar (1). The p.t.o. shaft of the tractor mechanically drives the mixing augers (2) via the PTO drive shaft (3), the switchgear (4) (optional equipment), the PTO drive shaft (5), the angular gearbox (6), the PTO drive shaft (7) and the angular gearbox (8).

The propeller shafts (3) and (7) are equipped with a shear bolt coupling each (9). In case of overload, the respective shear bolt of the shear bolt coupling shears off thus interrupting the power flux between tractor and mixing auger(s). This protects the power train of the mixing augers from being damaged.

The driving speed (n) of the mixing auger depends on the p.t.o. shaft speed of the tractor. At a p.t.o. shaft speed of 540 rpm, the driving speed of the mixing auger is, depending on the machine model and the type of angular gears:

- n = 20, 24 or 29 min^{-1} for Verti-Mix Double K 1300 and 1500,
- n = 24 or 29 min^{-1} for Verti-Mix Double K 1800 and 2100.

During the mixing process, the mixing augers first transport the fodder components filled in upwards in the centre of the mixing augers. The fodder then falls down the container wall so that a mixing cycle is generated.

The diameter and the height of the mixing auger depend on the size of the mixing container.

5.1.1 Cutting knives of mixing augers

In the mixing container, the fodder components filled in are chopped and mixed by means of the mixing augers (2) equipped with the cutting knives (1). The number of cutting knives mounted on a mixing auger depends on the diameter and the height of the mixing auger.

Additional scrapers (3) mounted opposite the front auger end of the respective mixing augers ensure a uniform discharge of the mixed fodder components.

The cutting knives (1) may be screwed onto the mixing auger in a degressive position (4) (standard) and in an aggressive position (5). Adjustment of the cutting knives permits to individually adapt the mixing system to the operating conditions and the structure of the fodder components to be mixed.

- **Degressive position of cutting knives**

  For fodder components already cut short when being filled into the mixing container.

- **Aggressive position of cutting knives**

  For long-fibre fodder components (e. g. round bale silage, straw). The aggressive position of the cutting knives requires an increased driving power at the p.t.o. shaft of the tractor.

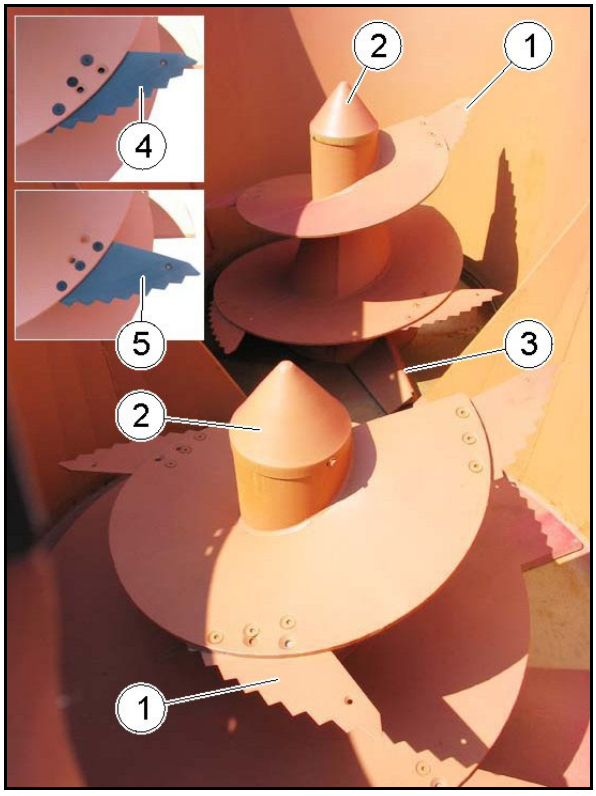


Fig. 16

Various sets of knives for mixing auger

Depending on the operating conditions, various sets of knives for the mixing auger are available.

Standard equipment:

- Standard set of knives:
  - Verti-Mix Double K 1300 and 1500
    10 short cutting knives
  - Verti-Mix Double K 1800 and 2100
    13 short cutting knives

Optional equipment:

- Set of knives, straw:
  - Verti-Mix Double K 1300 and 1500
    6 short cutting knives
    4 long cutting knives
  - Verti-Mix Double K 1800 and 2100
    9 short cutting knives
    4 long cutting knives
- Set of knives, bales:
  - Verti-Mix Double K 1300 and 1500
    2 short cutting knives
    6 long cutting knives
    2 bale knives
  - Verti-Mix Double K 1800 and 2100
    2 short cutting knives
    9 long cutting knives
    2 bale knives

5.1.2 Driving mechanism with switchgear

Optional equipment:

If the power train of the mixing augers is equipped with an additional two-gear switchgear (Fig. 17), the mixing augers can be alternatively powered at gear level I or II providing different speeds.

Two-gear switchgears with the following gear ratios are available:

- 1/1 and 1,5/1 (Verti-Mix Double K 1300 and 1500):
  - at gear level I, the output speed equals the input speed,
  - at gear level II, the output speed is reduced by 50 percent compared to the input speed.
- 1/1,3 and 1,5/1 (Verti-Mix Double K 1300 and 1500):
  - at gear level I, the output speed is increased by 30 percent compared to the input speed,
  - at gear level II, the output speed is reduced by 50 percent compared to the input speed.
- 1/1 and 1,8/1 (Verti-Mix Double K 1800 and 2100):
  - at gear level I, the output speed equals the input speed,
  - at gear level II, the output speed is reduced by 80 percent compared to the input speed.

The increased output speed (gear level I) is used:

- for producing small mixtures,
- for evacuating residual quantities from the mixing container.

The reduced output speed (gear level II) is used:

- for mixing with the mixing container completely filled,
- when using a tractor with low driving power,
- when using a straw blower.

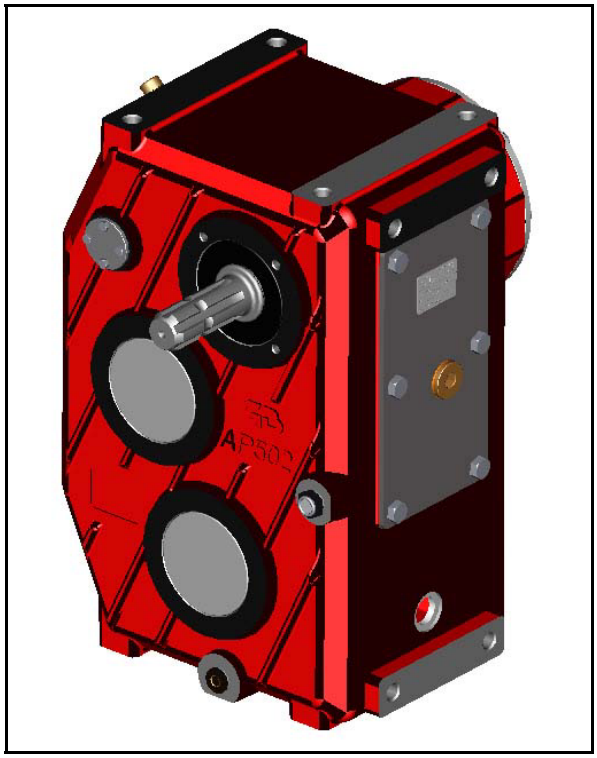


Fig. 17

Depending on the switchgear design, the gear levels can be changed from the tractor via:

- the Bowden cable lever (Fig. 18/1) in case of mechanical remote control via the Bowden cable (Fig. 18/2),

For changing the gear level, swivel the Bowden cable lever (Fig. 18/1) into the required position. Beware of the fact that the Bowden cable lever (Fig. 18/1) engages in the selected position at the notch after changing gear.

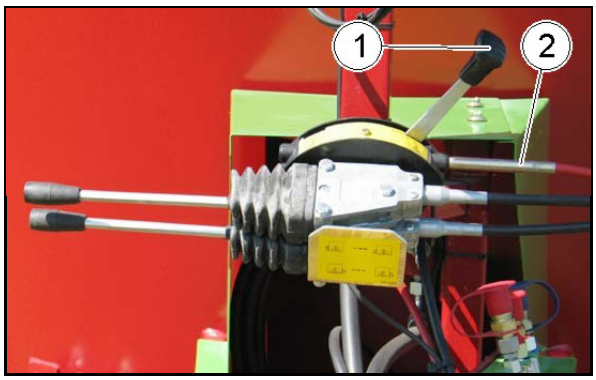


Fig. 18

- the key button (Fig. 19) in case of electrical remote control via the control unit.

For changing the gear level, swivel the key button (Fig. 19) into the required position and keep hold of it there for at least 10 seconds.

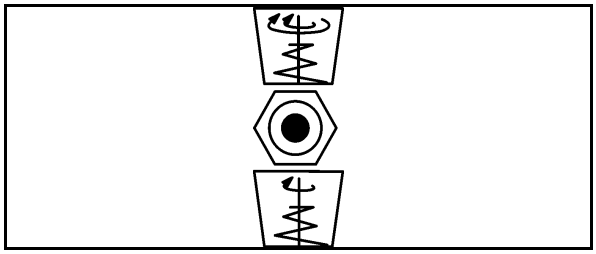


Fig. 19

The position of the indicator pipe (1) of the electrical remote control unit indicates the set gear level:

Position of indicator pipe	Driving speed of mixing auger
top	slow
bottom	fast

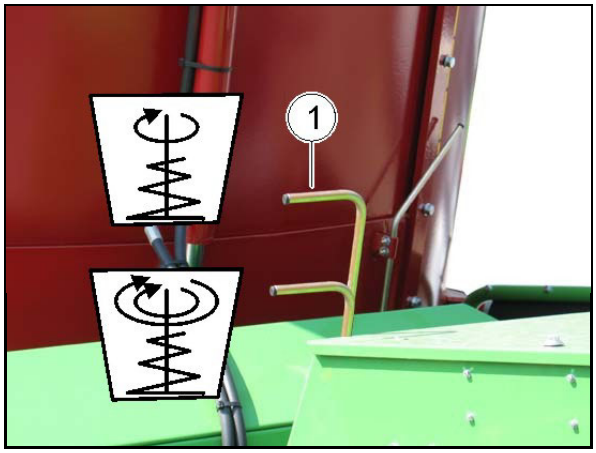


Fig. 20

5.1.2.1 Mount the holder with pocket for mechanical and electrical remote control unit

1. Fix the holder (1) with the pocket (2) for the mechanical remote control unit at an appropriate place in the tractor's cabin.
2. Insert the mechanical remote control unit into the pocket (2).

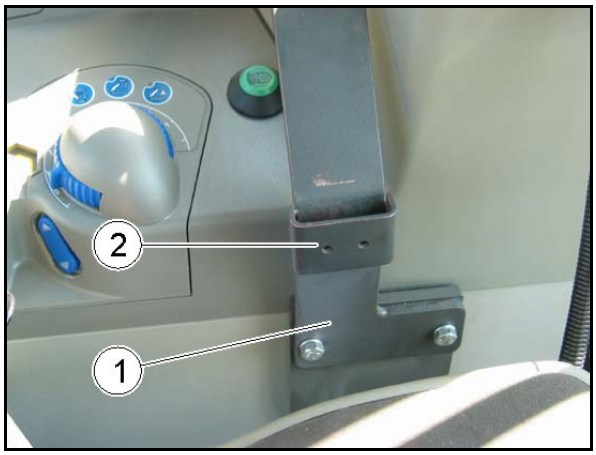


Fig. 21

5.1.2.2 Changing of gear level by means of switchgear

The switchgear is not synchronized. Changing gear level is only possible when the vehicle is stationary or when it is coasting or starting at low speed.

Different steps may therefore be necessary for changing gear level by means of the switchgear. The necessary steps depend on:

- the type of actuation of the tractor's p.t.o. shaft:
  - after the p.t.o. shaft has been switched off, the p.t.o. shaft drive of the tractor is slowed down during coasting and when stationary,
  - the p.t.o shaft coupling engages very fast when the p.t.o. shaft is switched on.
- the type of remote control unit of the switchgear:
  - mecanical remote control unit via Bowden cable,
  - electrical remote control unit via control unit.
- the amount of load of the mixing auger in the mixing container:
  - empty or slightly filled mixing container,
  - fully filled mixing container.

Hereinafter, two different procedures for changing gear level by means of the switchgear are described.

Empty or slightly filled mixing container – low amount of load of mixing auger

1. Switch off the tractor's p.t.o. shaft.
2. Use the switchgear to change the gear level via the mechanical / electrical remote control unit.
3. Switch on the p.t.o. shaft of the tractor again.

→ During restarting, changing gear level is initiated in the switchgear.

Fully filled mixing container – high amount of load of mixing auger

1. Switch off the tractor's p.t.o. shaft.
2. Prepare changing of gear level:
   - Turn off the tractor engine if the p.t.o. shaft drive of your tractor is slowed down while coasting or when stationary after the p.t.o. shaft has been switched off.

   → In this state, the p.t.o. shaft is freely movable.
   - Select the function "Switched-off p.t.o. shaft freely movable with the tractor engine running" at your tractor if your tractor is equipped with this function.
3. Use the switchgear to change the gear level via the mechanical / electrical remote control unit.
4. Switch on the p.t.o. shaft of the tractor again.

→ During restarting, changing gear level is initiated in the switchgear.

5.1.3 Flat-type cylindrical gearing for drive unit with on-board hydraulic system without switchgear

Optional equipment:

If the machine is equipped with an on-board hydraulic system, the gear pump (1) generates the operating pressure required for executing the hydraulic functions.

The gear pump (1) is powered by the flat-type cylindrical gearing (2) with the PTO drive shaft powered.

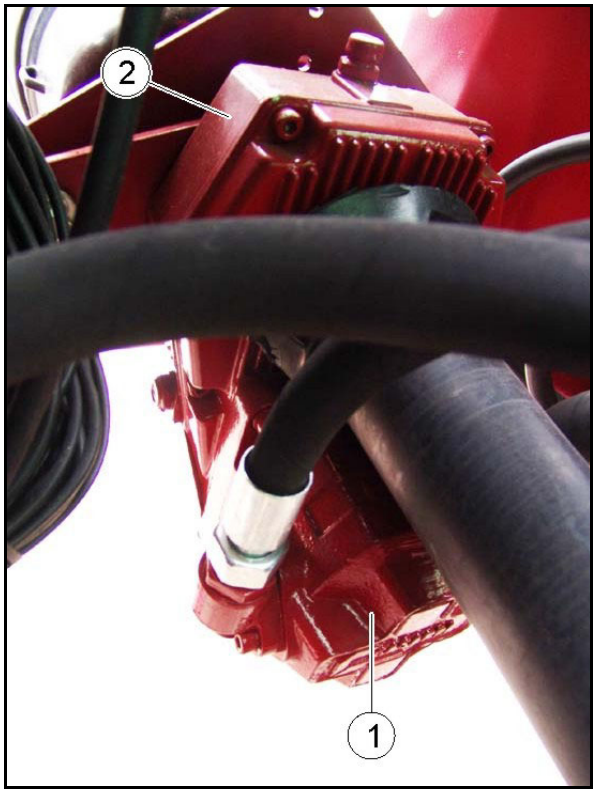


Fig. 22

5.1.4 Overflow ring

Optional equipment:

The overflow ring (1) prevents the fodder from being thrown over the container edge during mixing.

The overflow ring is screwed to the top edge of the container (2) and available in two designs:

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

- an elevated overflow ring (Fig. 23), screwed on the top edge of the container,

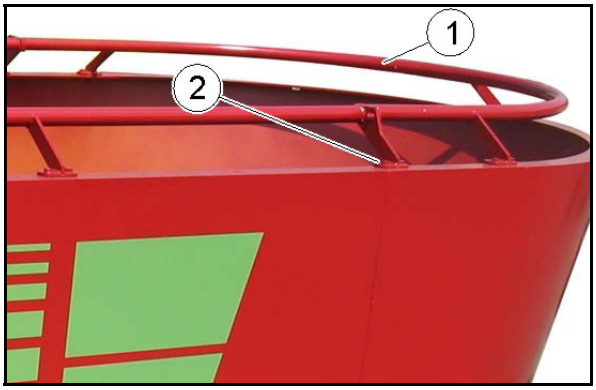


Fig. 23

- an inner overflow ring (Fig. 24) for low overhead clearances, screwed below the top edge of the container.

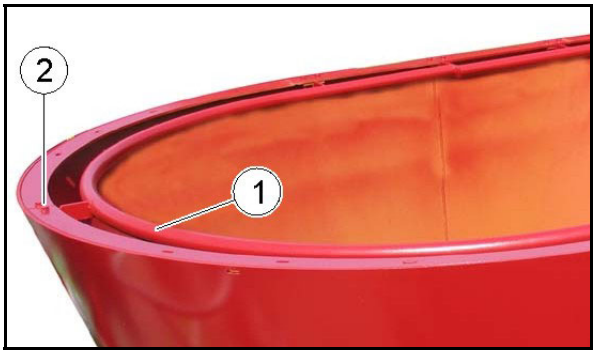


Fig. 24

5.1.5 Counter-cutters

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

The counter-cutters:

- are e.g. used for chopping and mixing round or cuboid bales,
- can be extended into the mixing container by sticking 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.

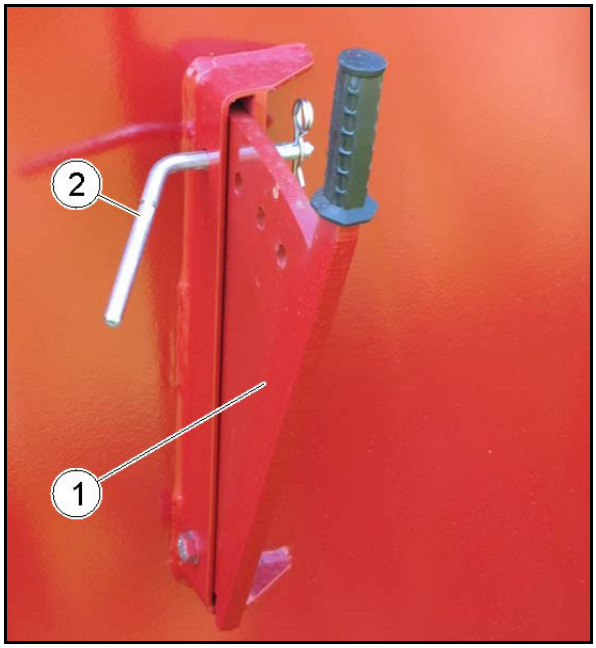


Fig. 25

Optional equipment:

The counter-cutters (1) may be equipped with a hydraulic cylinder (2).

The hydraulic cylinders:

- permit the remotely controlled extension and retraction of the counter-cutters,
- can be extended into the mixing container by sticking bolt (3) in 4 possible positions,
- are operated from the tractor:
  - directly via a double-acting control device of the tractor (standard equipment),
  - via a hand lever (optional extra),
  - via the Bowden cable (optional extra),
  - via electro-hydraulic control (control unit) (optional equipment).

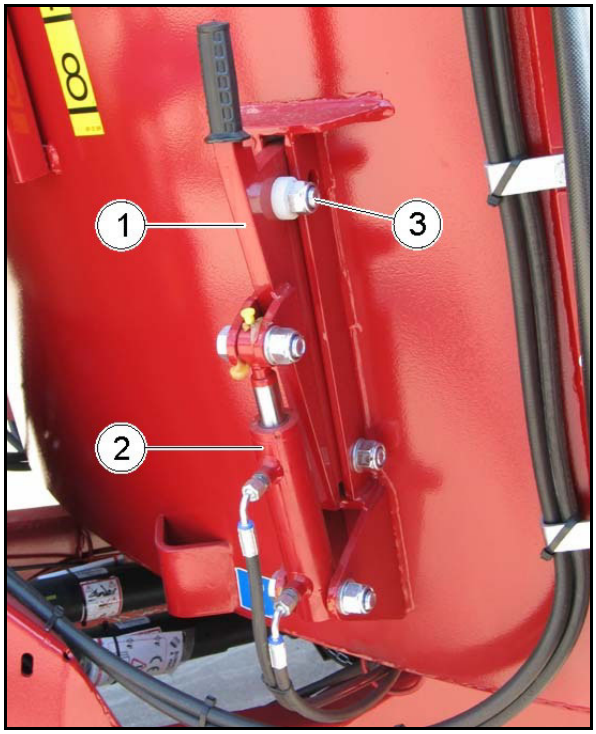


Fig. 26

5.1.6 Feed funnel for mineral feed

Optional equipment:

Mineral feed or other fodder additives can easily be filled into the mixing container from the ground through the feed funnel (Fig. 27).

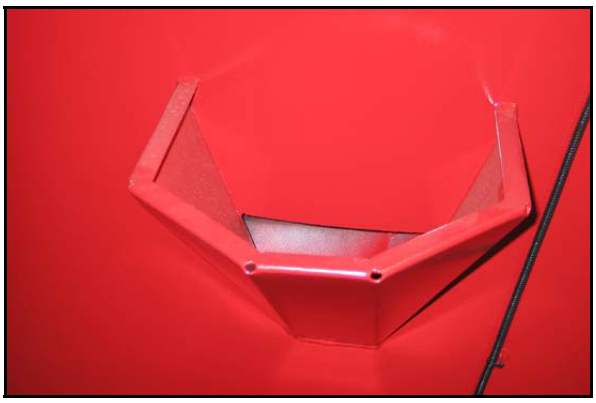


Fig. 27

5.2 Ladder

The standard model is equipped with a ladder (Fig. 28). From the ladder, the mixing process can easily be monitored / supervised.

Fig. 28

5.3 Discharge options

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

- a front left-hand and / or right-hand discharge device,
- a discharge conveyor for right-hand front discharge,
- a discharge device at the rear centre with protective device,
- a rear discharge device for straw blower,
- a rear crossover conveyor,
- a rear crossover conveyor with conveyor extension.

5.3.1 Front side discharge

The front side discharge ensures that the mixed fodder components are directly thrown from the mixing container into the feeding trough.

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

- a right-hand front discharge (Fig. 29),
- a left-hand front discharge,
- a right- and left-hand front discharge.

Fig. 29

5.3.1.1 Discharge conveyor for right-hand front discharge

Optional equipment:

The discharge conveyor for right-hand front discharge (1) helps to transport fodder to elevated feeding troughs which are difficult to access.

The discharge conveyor for right-hand front discharge:

- is directly mounted in front of the right-hand front discharge device,
- is powered by a hydraulic motor (2). The conveyor speed:
  - o is not adjustable in the standard model,
  - o is infinitely adjustable via a current regulation valve (optional equipment). See information in chapter "Setting of conveyor speed for crossover conveyor / discharge conveyor for side discharge", page 73.
- is swivelled from its transport position to its working position and vice versa by means of the double-acting hydraulic cylinder (3). Fig. 30 shows the discharge conveyor for side discharge in working position.

Switching on and off of the driving mechanism and switching from transport position to working position and to reverse run is effected via remote control from the tractor:

- directly via a double-acting control device of the tractor (standard equipment),
- via a hand lever (optional equipment),
- via the Bowden cable (optional equipment),
- via electro-hydraulic control (control unit) (optional equipment).

Beware of the local circumstances when swivelling the discharge conveyor.

The discharge conveyor is in transport position only when the hydraulic cylinder (3) has been completely retracted.

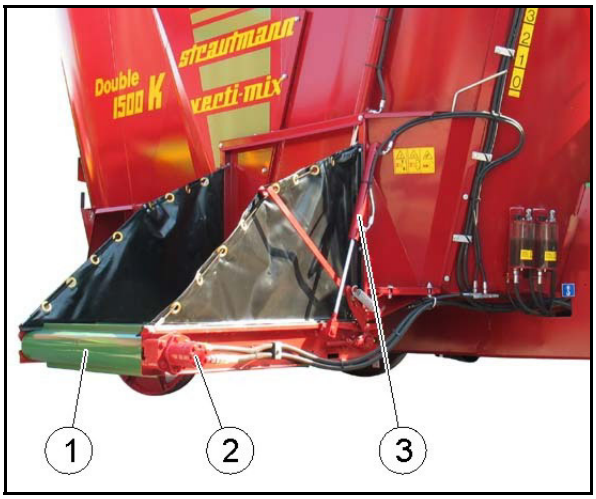


Fig. 30

Fig. 31 shows the discharge conveyor for side discharge in transport position.

Fig. 31

5.3.2 Discharge at the rear centre with protective device

The mixed fodder components are transported from the mixing container to the centre of the feeding table via the rear centre discharge device (Fig. 32).

Fig. 32

5.3.3 Rear crossover conveyor

Optional equipment:

The rear crossover conveyor:

- is powered by a hydraulic motor. The conveyor speed:
  - o is not adjustable in the standard model,
  - o is infinitely adjustable via a current regulation valve (optional equipment). See information in chapter "Setting of conveyor speed for crossover conveyor / discharge conveyor for side discharge", page 73.
- can be powered in two driving directions. Depending on the driving direction, the fodder is discharged on the right- or left-hand side of the fodder mixing trailer.

Fig. 33

Switching on and off of the driving mechanism and switching over from one driving direction to the other is effected via remote control from the tractor:

- directly via a double-acting control device of the tractor (standard equipment),
- via a hand lever (optional equipment),
- via the Bowden cable (optional equipment),
- via electro-hydraulic control (control unit) (optional equipment).

5.3.3.1 Conveyor extension

Optional equipment:

The conveyor extension (1) extends the crossover conveyor (2) such that fodder can be transported to elevated feeding troughs which are difficult to access.

The conveyor extension (1):

- is powered by the hydraulic motor (3),
- is swivelled from transport position to working position and vice versa via the double-acting hydraulic cylinder (4) by remote control from the tractor. Fig. 34 shows the conveyor extension in working position.
- is powered jointly with the crossover conveyor (2).

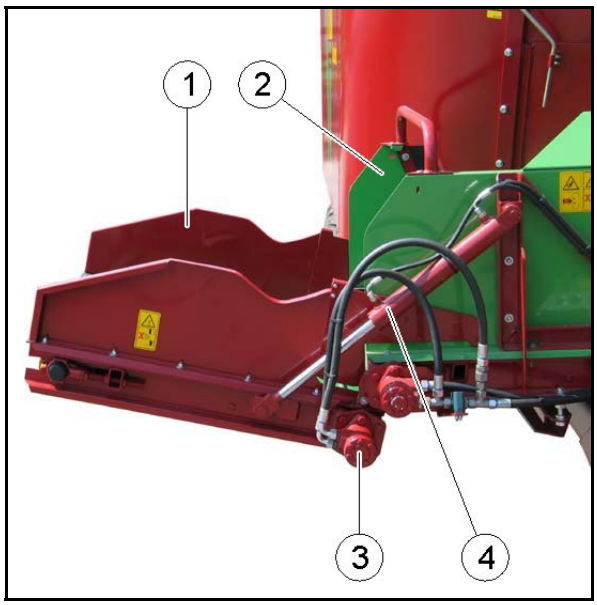


Fig. 34

Beware of the local circumstances when swivelling the conveyor extension.

The conveyor extension is only in transport position when the hydraulic cylinder (4) has been completely retracted.

Fig. 35 shows the conveyor extension in transport position.

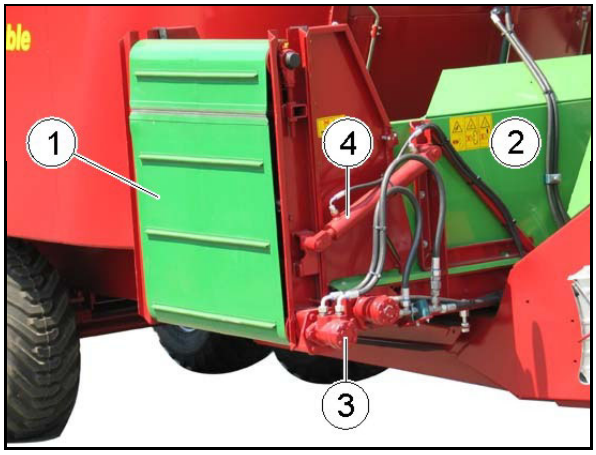


Fig. 35

5.3.4 Opening and closing of discharge door for discharge opening

The discharge door (1) of the discharge opening (2) is opened and closed via the hydraulic cylinder (3).

Depending on the machine's equipment, the hydraulic cylinder is operated via remote control from the tractor:

- directly via a double-acting control device of the tractor (standard equipment),
- via a hand lever (optional equipment),
- via the Bowden cable (optional equipment),
- via electro-hydraulic control (control unit) (optional equipment).

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

The set opening width of the discharge door is indicated by the pointer (4) on the scale (5).

Fig. 36

Scale value	Discharge door
0	closed (no fodder discharged)
8	completely opened (largest quantity of fodder discharged)

5.3.5 Setting of conveyor speed for crossover conveyor / discharge conveyor for side discharge

Optional equipment:

The conveyor speed for the crossover conveyor / discharge conveyor for side discharge is infinitely adjustable.

The set conveyor speed determines the lateral delivery distance (throwing range) of the fodder next to the machine. An increasing conveyor speed results in a larger lateral delivery distance of the fodder.

The conveyor speed is infinitely adjusted at the current regulation valve:

- manually directly on the machine,
- by remote control via the control unit from the tractor.

> The set scale value is not an absolute value for the conveyor speed, but only a reference value. Depending on the tractor model, the set conveyor speed may differ even if the scale value is identical.

5.3.5.1 Manual setting of conveyor speed

Set the conveyor speed directly on the machine via the rotary knob (1) at the current regulation valve (2). Position (3) indicates the scale value for the set conveyor speed.

- Scale value 0 = lowest conveyor speed,
- Scale value 10 = highest conveyor speed.

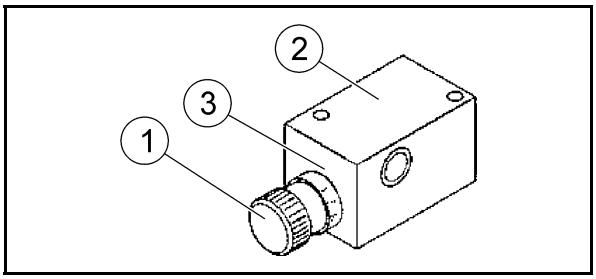


Fig. 37

5.3.5.2 Setting of conveyor speed via control unit

Set the conveyor speed via the control dial (1) on the control unit. Pointer (2) indicates the scale value for the set conveyor speed:

- Scale value 0 = lowest conveyor speed,
- Scale value 10 = highest conveyor speed.

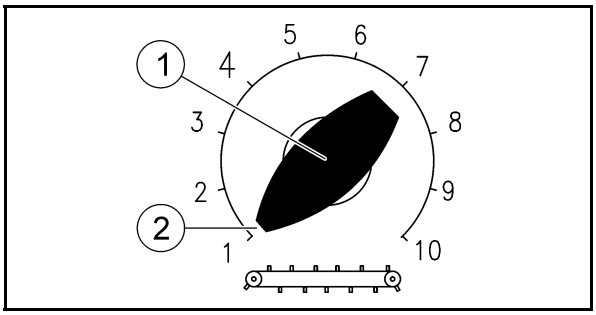


Fig. 38

5.4 Straw blower

Optional equipment:

The straw blower:

- is used for bedding of lie-down areas in freestall barns for cattle,
- is mounted at the rear end of the fodder mixing trailer,
- is equipped with an own on-board hydraulic system,
- is operated electro-hydraulically via remote control unit from the tractor (control unit).

Due to the straw blower, the total height of the Verti-Mix 1300 Double K is increased by at least 123 mm.

Bulk straw or straw bales are filled into the mixing container, chopped and blown into the stable by means of the straw blower.

Fig. 39

5.4.1 Working with the straw blower

WARNING

Risk due to substances or foreign objects blown away from the machine or out of the machine if foreign objects (e.g. stones) get into the mixing container while filling the mixing container!

When filling the mixing container, ensure that:

- there are no foreign objects (e.g. stones) in the straw,
- no foreign objects get into the mixing container.

WARNING

Risk due to substances or foreign objects blown away from or out of the machine if people or animals are staying within the hazardous area of the machine!

Ensure that people and animals keep sufficient safe distance to the hazardous area of the machine as long as the tractor engine is running.

It may be advantageous to extend the counter-cutters a little further into the mixing container for chopping the straw.

Keep strictly to the required operating speed of the straw blower, too low operating speed may cause blockages.

1. Make sure that people and animals leave the hazardous area of the machine / the straw blower.
2. Set the switchgear to gear level II (low driving speed of the mixing auger) if the machine is equipped with a switchgear.
3. Rotate the ejection tower into the desired ejection direction.
4. Switch on the p.t.o. shaft of the tractor.
5. Switch on the straw blower.
6. Speed up the straw blower to operating speed:
   - P.t.o. shaft speed 750±100 min^{-1} for machine without switchgear,
   - P.t.o. shaft speed 1000±100 min^{-1} for machine with switchgear.
7. Open the discharge door completely.

   Ensure to reduce the opening width in case of damp or lumpy spreading material or a lower blower speed (risk of blockage).
8. Set the desired spreading range / throwing range by lifting or lowering the ejection hood.

5.4.2 Elimination of blockages

WARNING

Operator's risk of being drawn in or becoming entangled if the straw blower starts to run during manual elimination of blockages / jams!

Secure the tractor and the machine against accidental starting and rolling before manually eliminating blockages / jams.

WARNING

Risk due to blower wheel continuing to run for a short time!

Wait for the blower wheel to stop completely before unscrewing the screws (Fig. 39/1) at the blow-out pipe (Fig. 39/2) or removing the cover (Fig. 39/3).

1. Switch off the p.t.o. shaft of the tractor.
2. Close the discharge door.
3. Secure tractor and machine against accidental starting and rolling.
4. Wait for the blower wheel to stop completely.
5. Unscrew 3 screws (Fig. 39/1) from the blow-out pipe (Fig. 39/2) such that the blow-out pipe can be easily rotated around one of the front screws.

CAUTION	Beware of the cable if the blow-out pipe is equipped with an electrical adjusting system for the ejection hood.

6. Swivel the blow-out pipe aside.
7. Empty the blow-out pipe or the blower casing.
8. Open the cover (Fig. 39/3) at the blower casing, in order to remove e.g. stones from the blower casing.
9. Screw the blow-out pipe and the cover to the blower casing according to (Fig. 39) before switching on the blower.

5.5 Weighing device

Optional equipment:

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

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

During loading 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 manual of the weighing device.

Fig. 40

The real load of the fodder components filled into the mixing container is determined via the 3 weighing rods (1). The weighing rods are mounted in the drawbar and at the axle.

Fig. 41

5.6 Operating elements

Depending on the machine's equipment, actuation of the machine's hydraulic and electrical function(s) is effected via remote control from the tractor:

- via direct tractor connection (standard equipment),
- via a hand lever (optional equipment),
- via the Bowden cable (optional equipment),
- via electro-hydraulic control (control unit) (optional equipment).

- The actuating speed of the hydraulic functions (hydraulic components) depends on the tractor's hydraulic system.

  Depending on the tractor model, a correction of the set actuating speed at the tractor's control device / machine's control block may be necessary.
- For information about the required control devices see the chapter "Required tractor equipment" on page 26.

5.6.1 Direct tractor connection

The individual hydraulic components of the machine are directly connected to the hydraulic system of the tractor via appropriate hydraulic hose lines for oil supply.

A double-acting control device is required on the tractor for each function (hydraulic component) of the machine.

Each individual function of the machine is then actuated from the tractor via the control device on the appropriate control device.

Fig. 42

5.6.2 Hand lever operating gear

The individual hydraulic components of the machine are connected to a control block. To ensure the oil supply, the control block is connected to the hydraulic system of the tractor via a double-acting control device or a single-acting control device and a free return pipe.

If the machine is equipped with an on-board hydraulic system, it is not necessary to connect the machine to the hydraulic system of the tractor.

The hydraulic functions of the machine can be actuated from the tractor via hand lever operation if the oil circulation between tractor and machine has been switched on by means of the control device on the tractor.

One control device is required for each function of the machine.

The hand lever operating gear:

- is mounted on an adjustable console on the machine. Adjust the console towards the tractor such that the control device(s) is (are) within easy reach from the tractor.
- is equipped with one or several control device(s).

The control devices are in touch-control or in latch-in design:

- In touch-control design for folding, swivelling or sliding movable machine parts, e.g. discharge doors, hydr. counter-cutters, support stand etc. The function is only carried out when the control device is activated and kept hold of. As soon as the control device is released, it returns to its neutral position and the action is stopped.
- In latch-in design for movements requiring continuous action for constant loads, e.g. hydraulic motor of discharge conveyor.

The control devices can be set to a maximum of 3 positions:

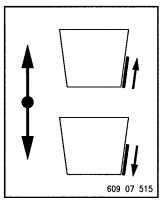
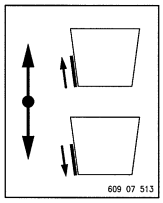
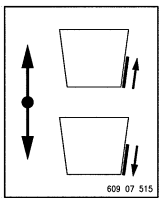
- Function I,
- Neutral position,
- Function II.

Fig. 43

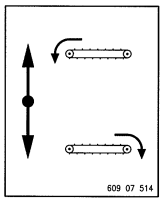
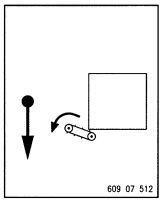
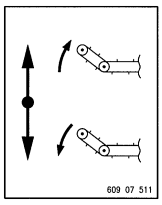
5.6.2.1 Possible symbols and their meaning

The following paragraphs show the possible symbols on the control unit and their meaning.

Open / Close discharge door

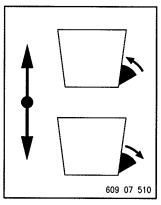
Symbol	Position of hand lever	Discharge door
	top (touch-control)	Right open
	Neutral position	Action stops
	bottom (touch-control)	Right close
	top (touch-control)	Left open
	Neutral position	Action stops
	bottom (touch-control)	Left close
	top (touch-control)	Front / Rear open
	Neutral position	Action stops
	bottom (touch-control)	Front / Rear close

Switching of crossover conveyor / conveyor extension / discharge conveyor

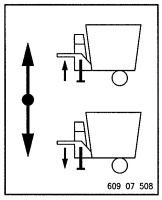
Symbol	Position of hand lever	Crossover conveyor / Conveyor extension / Discharge conveyor
	top (latch-in design)	Crossover conveyor * ON to the left
	Neutral position	Crossover conveyor Off
	bottom (latch-in design)	Crossover conveyor * ON to the right
	top (latch-in design)	Discharge conveyor On
	Neutral position	Discharge conveyor Off
	Position of hand lever	**Conveyor extension / Discharge conveyor**
	top (touch-control)	Swivelling up to transport position
	Neutral position	Action stops
	bottom (touch-control)	Swivelling down to working position

* At the same time, the conveyor extension is powered if a conveyor extension is mounted in the conveying direction of the crossover conveyor. If the material is conveyed away from the conveyor extension, the conveyor extension will stop.

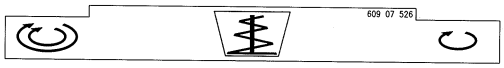
Extending and retracting of counter-cutters

Symbol	Position of hand lever	Counter-cutters
	top (touch-control)	Extending (in)
	Neutral position	Action stops
	bottom (touch-control)	Retracting (out)

Lifting / Lowering of support stand

Symbol	Position of hand lever	Support stand
	top (touch-control)	Lifting to transport position
	Neutral position	Action stops
	bottom (touch-control)	Lowering to support position

Changing of mixing auger speed

Symbol	Position of hand lever	Speed
	front (latch-in design)	Fast Gear level I
	rear (latch-in design)	Slow Gear level II

5.6.3 Bowden cable operation

The individual hydraulic components of the machine are connected to a control block. To ensure the oil supply, the control block is connected to the hydraulic system of the tractor via a double-acting control device or a single-acting control device and a free return pipe.

If the machine is equipped with an on-board hydraulic system, it is not necessary to connect the machine to the hydraulic system of the tractor.

The Bowden cable serves to operate the hydraulic functions of the machine from the tractor if the oil circulation between tractor and machine has been switched on via the control device on the tractor.

One control device is required for each function of the machine.

The Bowden cable operating element:

- is mounted on the tractor within view and easy reach of the operator,
- is equipped with one or several control device(s).

The control devices are in touch-control or in latch-in design:

- In touch-control design for folding, swivelling or sliding movable machine parts, e.g. discharge doors, hydr. counter-cutters, support stand etc. The function is only carried out when the control device is activated and kept hold of. As soon as the control device is released, it returns to its neutral position and the action is stopped.
- In latch-in design for movements requiring continuous action for constant loads, e.g. hydraulic motor of discharge conveyor.

The control devices can be set to a maximum of 3 positions:

- Function I,
- Neutral position,
- Function II.

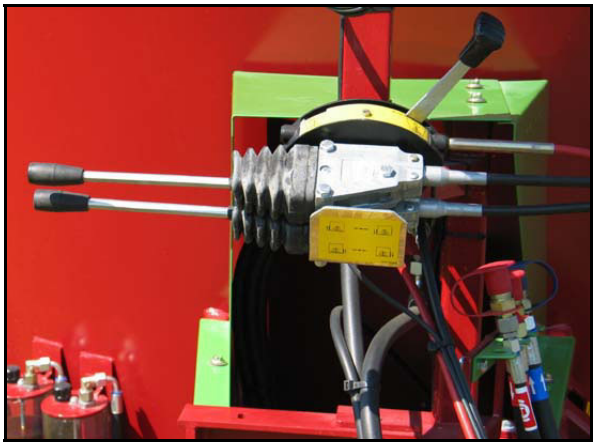
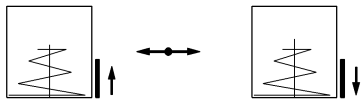
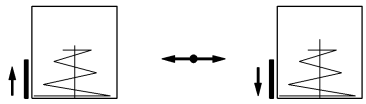
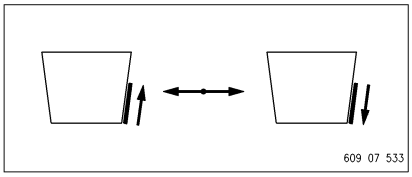


Fig. 44

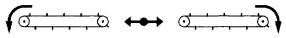
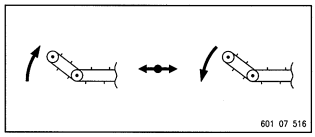
5.6.3.1 Possible symbols and their meaning

The following paragraphs show the possible symbols on the control unit and their meaning.

Open / Close discharge door

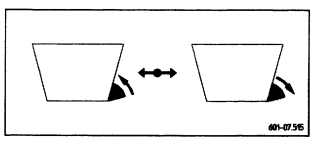
Symbol	Position of hand lever	Discharge door
	front (touch-control)	Right open
	Neutral position	Action stops
	rear (touch-control)	Right close
	front (touch-control)	Left open
	Neutral position	Action stops
	rear (touch-control)	Left close
	front (touch-control)	Front / Rear open
	Neutral position	Action stops
	rear (touch-control)	Front / Rear close

Switching of crossover conveyor / conveyor extension / discharge conveyor

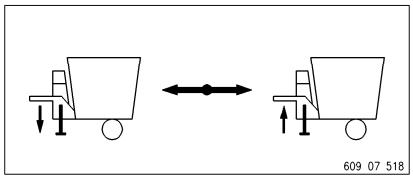
Symbol	Position of hand lever	Crossover conveyor / Conveyor extension / Discharge conveyor
	front (latch-in design)	Cross conveyor * ON to the left
	Neutral position	Cross conveyor Off
	rear (latch-in design)	Cross conveyor * ON to the right
	front (latch-in design)	Discharge conveyor On
	Neutral position	Discharge conveyor Off
	Position of hand lever	**Conveyor extension / Discharge conveyor**
	front (touch-control)	Swivelling up to transport position
	Neutral position	Action stops
	rear (touch-control)	Swivelling down to working position

* At the same time, the conveyor extension is powered if a conveyor extension is mounted in the conveying direction of the crossover conveyor. If the material is conveyed away from the conveyor extension, the conveyor extension will stop.

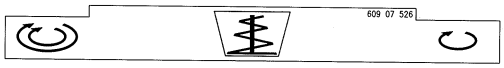
Extending and retracting of counter-cutters

Symbol	Position of hand lever	Counter-cutters
	front (touch-control)	Extending (in)
	Neutral position	Action stops
	rear (touch-control)	Retracting (out)

Lifting / Lowering of support stand

Symbol	Position of hand lever	Support stand
	front (touch-control)	Lifting to transport position
	Neutral position	Action stops
	rear (touch-control)	Lowering to support position

Changing of mixing auger speed

Symbol	Position of hand lever	Speed
	front (latch-in design)	Fast Gear level I
	rear (latch-in design)	Slow Gear level II

5.6.3.2 Mounting of holder with pocket for Bowden cable control unit

1. Fix the holder (1) with the pocket (2) for the Bowden cable control unit within view and easy reach at an appropriate spot in the tractor's cabin.
2. Insert the Bowden cable control unit into the pocket (2).

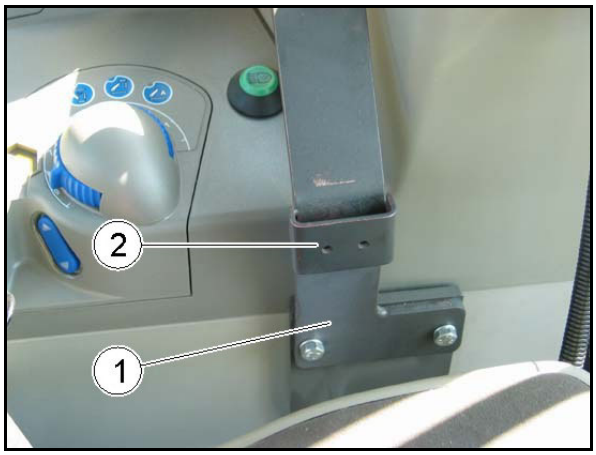


Fig. 45

5.6.4 Electro-hydraulic control (control unit)

The individual hydraulic components of the machine are connected to a control block. To ensure the oil supply, the control block is connected to the hydraulic system of the tractor via a double-acting control device or a single-acting control device and a free return pipe.

If the machine is equipped with an on-board hydraulic system, it is not necessary to connect the machine to the hydraulic system of the tractor.

The electro-hydraulic control (control unit) serves to actuate the hydraulic functions of the machine from the tractor if the oil circulation between tractor and machine has been switched on via the control device on the tractor.

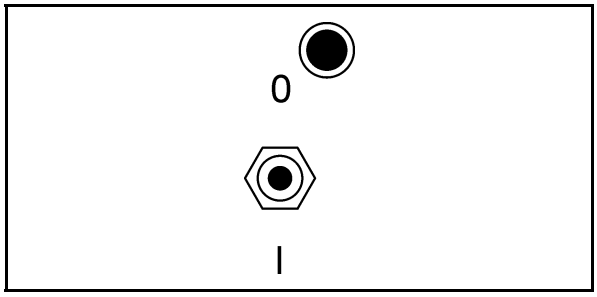


Fig. 46

One control device is required for each function of the machine.

The control unit:

- is differently designed according to the machine's equipment,
- is mounted on the tractor within view and easy reach such that the operating elements are easily accessible,
- must be connected to the tractor's power supply (12 V) via the three-pole plug (DIN 9680),
- is equipped with several control devices such as key buttons, toggle switches and a control dial.

The control devices are in touch-control design (key buttons), in latch-in design (toggle switches) or in control-dial design:

- In touch-control design for folding, swivelling or sliding movable machine parts, e.g. discharge doors, hydr. counter-cutters, support stand etc. The function is only carried out when the control device is activated and kept hold of. As soon as the control device is released, it returns to its neutral position and the action is stopped.
- In latch-in design for movements requiring continuous action for constant loads, e.g. hydraulic motors.
- Control dials for setting the actuating speed of the hydraulic functions in 10 steps (e.g. conveyor speed for crossover conveyor / discharge conveyor).

The control devices in touch-control or in latch-in design can be set to a maximum of 3 positions:

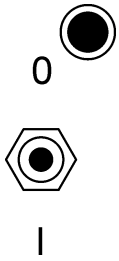
- function I,
- Neutral position,
- function II.

In case of longer downtimes of the machine, switch off the control unit in order to avoid a discharging of the tractor's battery due to switched-on loads.

5.6.4.1 Possible symbols and their meaning

The following paragraphs show the possible symbols on the control unit and their meaning.

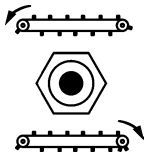
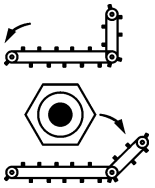
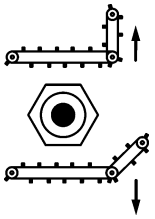
Switching on / off of control unit

Symbol	Position of toggle switch	Control unit
	0 (OFF) top (latch-in design)	Off (green control lamp does not light up)
	I (ON) bottom (latch-in design)	On (green control lamp lights up)

Open / Close discharge door

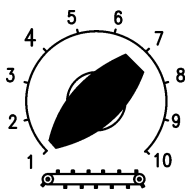
Symbol	Position of key button	Front discharge door
	top (touch-control)	open
	Neutral position	Action stops
	bottom (touch-control)	close
	top (touch-control)	Front / Rear open
	Neutral position	Action stops
	bottom (touch-control)	Front / Rear close

Switching of crossover conveyor / conveyor extension / discharge conveyor

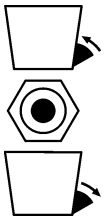
Symbol	Position of toggle switch	Crossover conveyor / Conveyor extension / Discharge conveyor
	top (latch-in design)	Crossover conveyor * ON to the left
	Neutral position	Crossover conveyor Off
	bottom (latch-in design)	Crossover conveyor * ON to the right
	top (latch-in design)	Discharge conveyor On
	Neutral position	Discharge conveyor Off
	Position of key button	**Conveyor extension / Discharge conveyor**
	top (touch-control)	Swivelling up to transport position
	Neutral position	Action stops
	bottom (touch-control)	Swivelling down to working position

* At the same time, the conveyor extension is powered if a conveyor extension is mounted in the conveying direction of the crossover conveyor. If the material is conveyed away from the conveyor extension, the conveyor extension will stop.

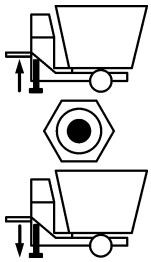
Setting of conveyor speed for crossover conveyor / discharge conveyor

Symbol	Position of control dial	Conveyor speed and other hydraulic functions
	1	Low
	10	High

Extending and retracting of counter-cutters

Symbol	Position of key button	Counter-cutters
	top (touch-control)	Extending (in)
	Neutral position	Action stops
	bottom (touch-control)	Retracting (out)

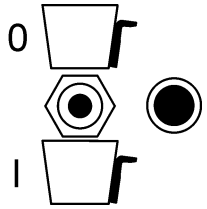
Lifting / Lowering of support stand

Symbol	Position of key button	Support stand
	top (touch-control)	Lifting to transport position
	Neutral position	Action stops
	bottom (touch-control)	Lowering to support position

Changing of mixing auger speed

Symbol	Position of key button	Speed
	top (touch-control) keep hold of for at least 10 s	Fast Gear level I
	Neutral position	remains constant
	bottom (touch-control) keep hold of for at least 10 s	Slow Gear level II

Switching on / off of straw blower

Symbol	Position of toggle switch	Straw blower
	0 (OFF) top (latch-in design)	Off (green control lamp does not light up)
	I (ON) bottom (latch-in design)	On (green control lamp lights up)

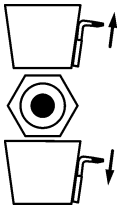
Straw blower - Open / Close discharge door

Symbol	Position of key button	Discharge door
	top (touch-control)	Open
	Neutral position	Action stops
	bottom (touch-control)	Close

Straw blower – Rotate tower

Symbol	Position of key button	Tower
	top (touch-control)	Turn to the left
	Neutral position	Action stops
	bottom (touch-control)	Turn to the right

Straw blower – Lift / Lower ejection hood

Symbol	Position of key button	Ejection hood
	top (touch-control)	Lift (Increase throwing range)
	Neutral position	Action stops
	bottom (touch-control)	Lower (Reduce throwing range)

5.6.4.2 Mounting of control unit on the tractor

1. Mount the holder (1) with the pocket (2) for the control unit on the tractor within view and reach to the driver's right.
2. Insert the pocket for the control unit into the holder.
3. Plug the 3-pole plug (DIN 9680) of the power cable (2) into the 3-pole socket of the tractor.
   (Pole 15/30 = Plus; Pole 31 = Minus)

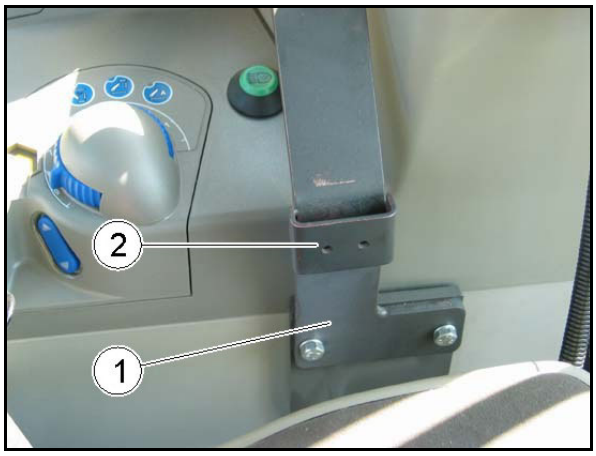


Fig. 47

- Do not take the electric current from the light socket.
- Retrofit the 3-pin socket if your tractor does not have a 3-pin socket. Strautmann offers an appropriate retrofit kit.
- You require a constant electric current supply of 12 V. The 3-pin socket must be safeguarded by a fuse of at least 25 A.
- The supply lead of the 3-pin socket should have a cable cross-section of at least 4 mm².

5.6.4.3 Electro-hydraulic control block

(1) Electro-hydraulic control block

(2) Input plate

(3) Connection pressure line P

(4) Control unit with directional control valve for e.g. hydraulic cylinder of discharge door, crossover conveyor drive, hydraulic cylinder of discharge conveyor, hydraulic cylinder of counter-cutters etc.

(5) End plate

(6) Connection return line T

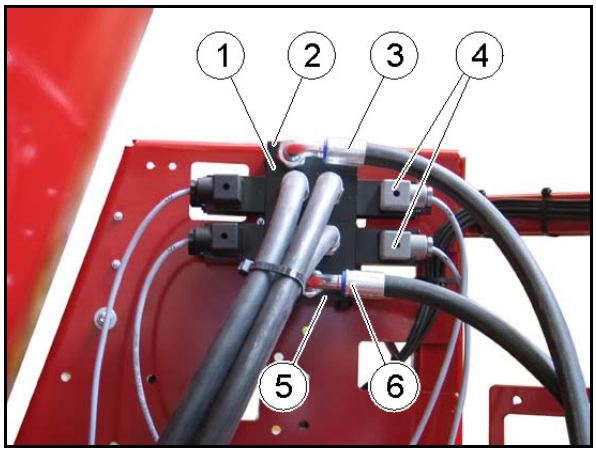


Fig. 48

5.6.4.4 Emergency manual actuation in case of electric power system failure

In case of failure of the electrical system, the solenoids for switching the directional control valves and directional seat valves can be actuated directly at the electro-hydraulic control block via the emergency manual operation function.

Use a pointed object (1) to push the armature of the solenoid at the respective switch-over valve in to actuate the required hydraulic function.

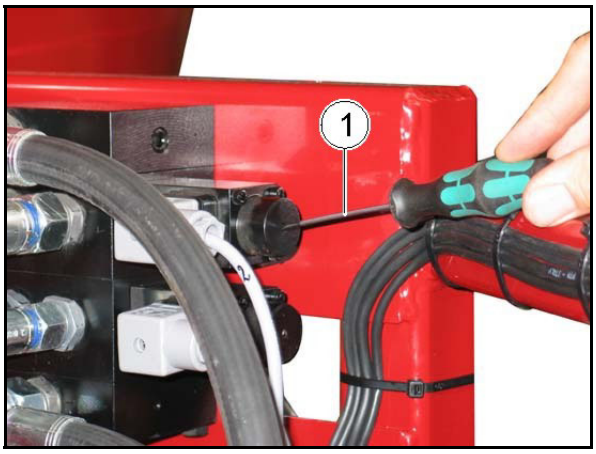


Fig. 49

5.7 Drawbar

The machine is equipped with a vertically adjustable drawbar for:

- Top hitching with flanged hitch ring 40 mm (6 km/h),
- Top linkage with flanged hitch ring 40 mm according to DIN 74054-1/2 / ISO 8755,
- Bottom linkage with flanged hitch ring 50 mm (6 km/h),
- Bottom linkage with flanged hitch ring 50 mm according to DIN 74053-1 / ISO 1102.

Within the adjustable range of the positioning holes (2), the drawbar (1) can be screwed on at different levels compared to the chassis (3) (Fig. 50).

This allows optimum adjustment of the hitch ring to the respective height of the coupling device of the different tractors.

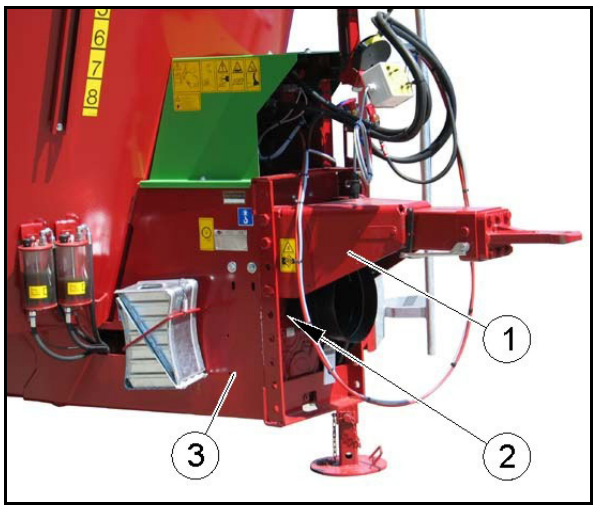


Fig. 50

5.7.1 Top hitching

The hitch ring (Fig. 51/1) is coupled by means of an appropriate bolt-type coupling.

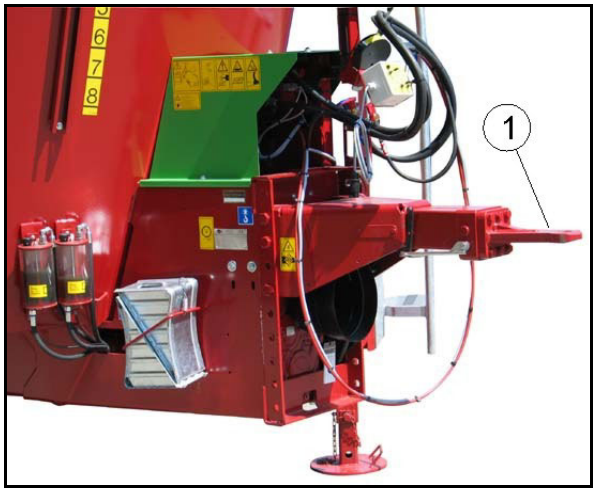


Fig. 51

5.7.2 Bottom hitching

The hitch ring (Fig. 52/1) is coupled by means of a tow-hook (hitch hook) or a hitch pin (Piton-Fix).

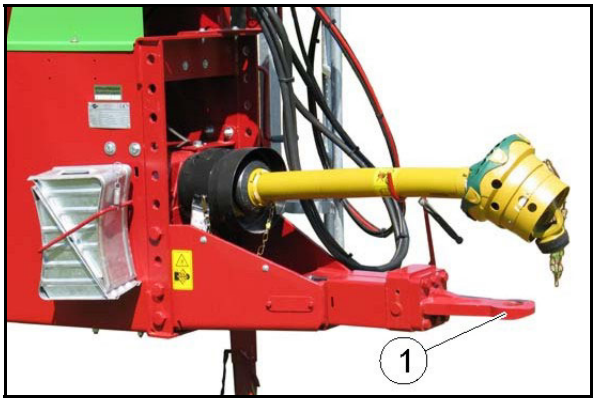


Fig. 52

5.7.3 Hitching up the drawbar hitch

WARNING

There is a risk of injury to exposed persons from crushing, entanglement and impact if the machine accidentally detaches from the tractor!

- Check that the link device on your tractor is approved for coupling with the machine towing device.

  Observe the chapter on "Requirements for the operation of tractors with rigid drawbar trailers", page 122.
- Couple and secure the machine to the tractor according to regulations.
- Use hitching systems that have never been damaged or bent.

WARNING

There is a risk of exposed persons being crushed and struck, if they go between the tractor and the machine as the tractor approaches it!

Order everyone out of the danger area between the tractor and machine before backing up to the machine.

Those helpers present may only guide in the driver from a position alongside the vehicles but not move over between the vehicles until they are at a standstill.

5.7.3.1 Bolt coupling

1. Secure the machine against rolling away.
2. Prepare to couple up:
   - Remove the coupling bolt (non-automatic bolt coupling).
   - Open the hitch coupling, i.e. it must be ready for coupling (automatic bolt coupling).
3. Order everyone out of the danger area between the tractor and machine before backing up to the machine.
4. Reversing the tractor:
   - so that tractor and machine can hitch up via the coupling bolt (non-automatic bolt coupling).
   - until the bolt coupling locks into the hitch ring of the drawbar (automatic bolt coupling).
5. Secure the tractor against accidental starting and rolling.
6. After coupling up, check that the connection is secure:
   - Secure the inserted coupling bolt by positive locking (non-automatic bolt coupling).
   - Ensure that the automatic bolt coupling is locked (control pin, end position of operating lever etc.).
7. Connect the supply lines.
8. Raise the support stand into transport position.
9. Release the parking brake of the machine.

5.7.3.2 Tow-hook (hitch hook) and hitch ring

1. Secure the machine against rolling away.
2. Order everyone out of the danger area between the tractor and machine before backing up to the machine.
3. Lower the tow-hook.
4. Drive as closely as possible to the machine such that the lowered tow-hook can take up the hitch ring.
5. Lift the tow-hook to catch the hitch ring.

→ After automatic engaging, the drawbar eye is fixed between the tow-hook and the lock (holding-down device).

6. Secure the tractor against accidental starting and rolling.
7. Ensure that the tow-hook is properly locked.
8. Connect the supply lines.
9. Release the parking brake of the machine.
10. Raise the support stand into transport position.

5.7.3.3 Hitch pin (piton-fix) and hitch ring

1. Secure the machine against rolling away.
2. Order everyone out of the danger area between the tractor and machine before backing up to the machine.
3. Set back tractor and back up to machine.
4. Secure the tractor against accidental starting and rolling.
5. Remove the holding-down device (cross bolt) above the draw pin.
6. Connect the supply lines.
7. Drive as closely as possible to the machine such that the draw pin can take up the drawbar eye.
8. Lower the drawbar by means of the support stand, until the hitch pin catches the hitch ring.
9. Secure the tractor against accidental starting and rolling.
10. Fix and secure the cross bolt above the draw pin.
11. Release the parking brake of the machine.
12. Raise the support stand into transport position.

5.7.4 Unhitching the drawbar

WARNING

There is a risk of exposed persons being crushed while the machine is being unhitched, if the uncoupled machine accidentally rolls away!

Secure the machine so it cannot roll away before uncoupling it from the tractor. Take note of the information in the chapter "Securing tractor and machine against accidental starting and rolling", page 126.

5.7.4.1 Bolt coupling

1. Secure the tractor against accidental starting and rolling.
2. Secure the machine against rolling away. Take note of the information in the chapter "Securing tractor and machine against accidental starting and rolling", page 126.
3. Lower the support stand to support position such that the drawbar no longer transmits any tongue load onto the tractor.
4. Disconnect the supply lines.
5. Place the hydraulic hose lines in the hose cupboard.
6. Prepare unhitching:
   - Remove the coupling bolt (non-automatic bolt coupling).
   - Open the hitch (automatic bolt coupling).
7. Move the tractor forward.

5.7.4.2 Tow-hook (hitch hook) and hitch ring

1. Secure the tractor against accidental starting and rolling.
2. Secure the machine against rolling away. Take note of the information in the chapter "Securing tractor and machine against accidental starting and rolling", page 126.
3. Lower the support stand to its support position.
4. Lower the tow-hook.
5. Move the tractor forward (approx. 25 cm).
6. Lift the tow-hook.
7. Secure the tractor against accidental starting and rolling.
8. Disconnect the supply lines.
9. Place the hydraulic hose lines in the hose cupboard.
10. Move the tractor forward.

5.7.4.3 Hitch pin (piton-fix) and hitch ring

1. Secure the tractor against accidental starting and rolling.
2. Secure the machine against rolling away. Take note of the information in the chapter "Securing tractor and machine against accidental starting and rolling", page 126.
3. Remove the holding-down device (cross bolt) above the draw pin.
4. Lower the support stand to support position such that the hitch ring disengages from the hitch pin.
5. Move the tractor forward (approx. 25 cm).
6. Secure the tractor against accidental starting and rolling.
7. Fix and secure the holding-down device (cross bolt) above the hitch pin.
8. Disconnect the supply lines.
9. Place the hydraulic hose lines in the hose cupboard.
10. Move the tractor forward.

5.8 Support stand

The uncoupled machine rests on the support stand. Depending on the machine's equipment, it is fitted with:

- a mechanical support stand (standard equipment),
- a hydraulic support stand (optional equipment).

5.8.1 Mechanical support stand

Standard equipment:

The mechanical support stand (Fig. 53/1) with spindle adjustment and telescopic quick adjustment (2) is rotated via the crank handle (3).

Winding direction of the hand crank	Support stand
clockwise	raise (transport position)
anti-clockwise	lower (support position)

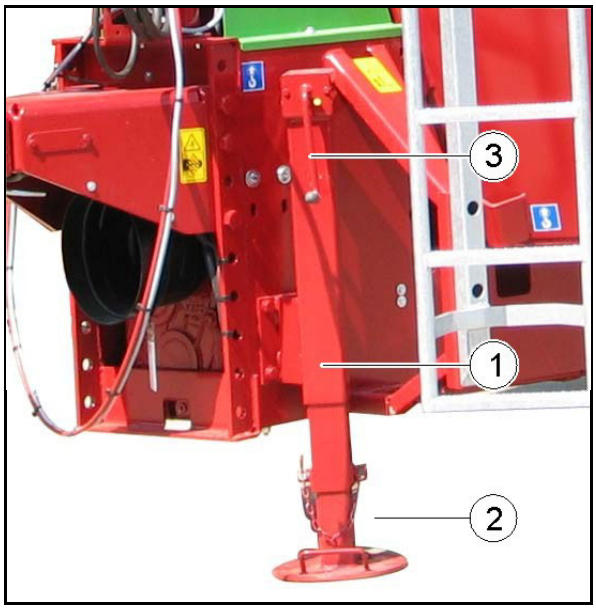


Fig. 53

5.8.1.1 Lifting of mechanical support stand to transport position

1. Relieve the support stand via the crank handle (3).
2. Grip the handle (4) of the telescopic quick adjustment (2).
3. Release and remove locking pins (5).
4. Raise the support stand.
5. Secure the support stand in the lifted transport position by means of the locking bolt.
6. Secure the locking bolt against accidental losing by means of the spring cotter (6).

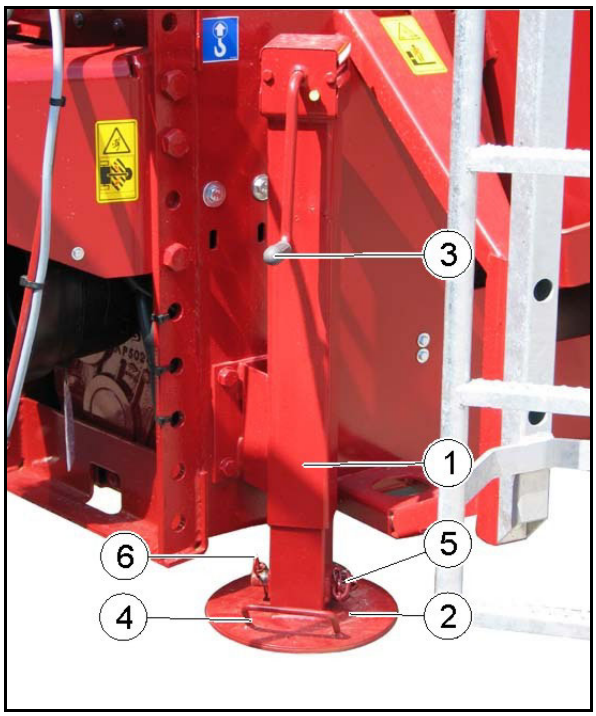


Fig. 54

5.8.1.2 Lower mechanical support stand to support position

1. Grip the handle (4) of the telescopic quick adjustment (2).
2. Release and remove locking pins (5).
3. Lower the support stand.
4. Secure the support stand in the lowered support position by means of the locking bolt.
5. Secure the locking bolt against accidental losing by means of the spring cotter (6).
6. Use the crank handle (3) to further lower the support stand.

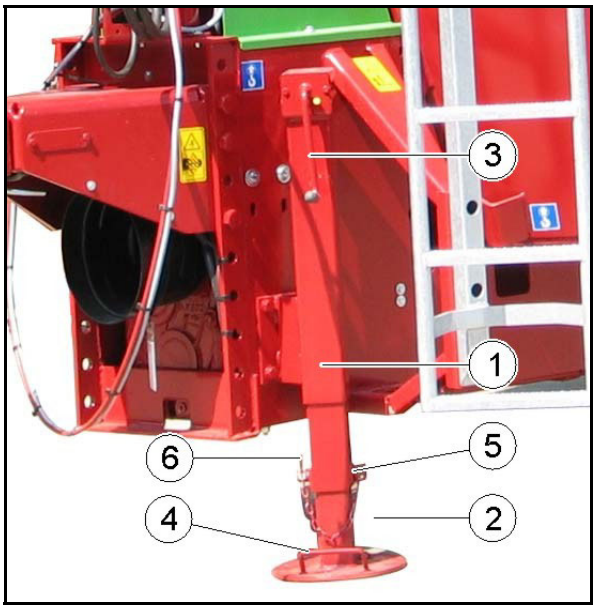


Fig. 55

5.8.2 Hydraulic support stand

Optional equipment:

Depending on the machine's equipment, the support stand (Fig. 56) is operated via remote control from the tractor:

- directly via a double-acting control device of the tractor (standard equipment),
- via a hand lever (optional equipment),
- via the Bowden cable (optional equipment),
- via electro-hydraulic control (control unit) (optional equipment).

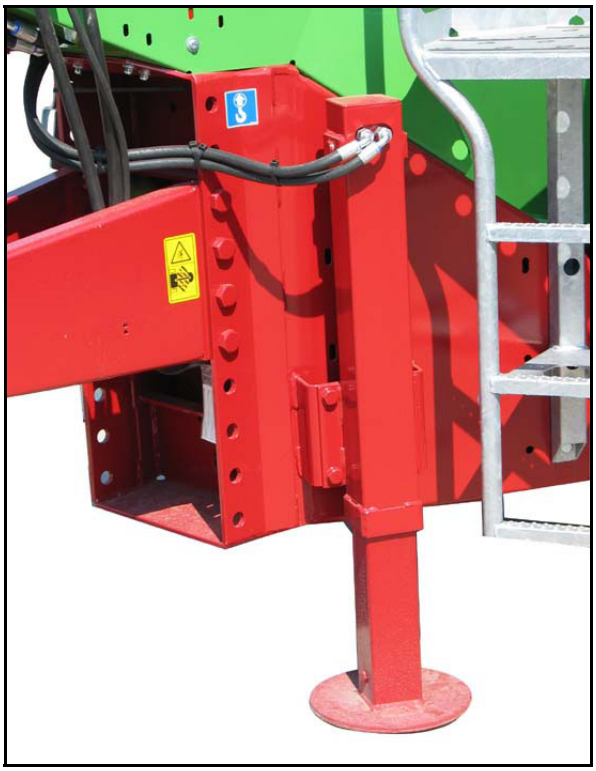


Fig. 56

5.8.2.1 Raise hydraulic support stand to transport position

WARNING

Risk of crushing fingers and hands of people when lifting the support stand to its transport position!

- When lifting the support stand, keep sufficient safe distance to the support stand as long as parts are moving.
- Make sure that people leave the hazardous area between the tractor and the machine before lifting the hydraulic support stand.

1. Make sure that people leave the hazardous area between the tractor and the machine before lifting the hydraulic support stand.
2. Keep hold of the respective control device in “Lifting“ position until the support stand has been lifted from its support position to its transport position.

5.8.2.2 Lower hydraulic support stand to support position

WARNING

Risk of crushing feet of people when lowering the support stand to its support position!

- When lowering the support stand, keep sufficient safe distance to the support stand as long as parts are moving.
- Make sure that people leave the hazardous area between the tractor and the machine before lowering the hydraulic support stand.

1. Make sure that people leave the hazardous area between the tractor and the machine before lowering the hydraulic support stand.
2. Keep hold of the respective control device in “Lowering" position until the support stand has been lowered from its transport position to its support position.

→ The drawbar no long transfers tongue load to the tractor.

5.9 PTO drive shaft

The PTO drive shaft is responsible for the power transmission between tractor and machine.

WARNING

There is a risk of exposed persons being crushed if tractor and machine are accidentally started or roll away!

Only couple up or uncouple the PTO drive shaft to or from the tractor when both the tractor and machine have been secured against accidental startup and rolling away.

WARNING

There is a risk of exposed persons being caught and wound-up when the universal drive shaft is unsecured or the guards are damaged!

- Never use the PTO drive shaft without a guard or with a damaged guard or without using the retaining chain properly.
- Before every usage, check that:
  - all the PTO drive shaft guards are fitted and in good working condition,
  - there is sufficient clearance around the PTO drive shaft in all operating conditions. Lack of clearance causes damage to the PTO drive shaft.
- Hang the retaining chains in such a way that adequate swivelling area for the universal drive shaft is guaranteed in all operating situations. Do not allow the chains to get caught up in tractor or machine component parts.
- Have damaged or missing parts of the PTO drive shaft replaced immediately by genuine spare parts from the PTO drive shaft manufacturer.

  Note that a universal drive shaft can only be repaired by a specialist workshop.
- Place the uncoupled PTO drive shaft in the holder provided. This will protect the PTO drive shaft against damage and soiling.

  Never use the PTO drive shaft chain to hang up the uncoupled PTO drive shaft.

WARNING

There is a risk of exposed persons being caught and wound up, when parts of the universal drive shaft in the region of the power transmission between tractor and driven machine are unprotected!

Only work with a fully protected drive unit between tractor and driven machine:

- The unprotected parts of the universal drive shaft must always be guarded by a safety screen on the tractor and a universal drive shaft guard on the machine.
- Check that the safety screen on the tractor and/or the drive shaft guard on the machine and the safety devices and safeguards of the elongated universal drive shaft overlap by more than 50 mm. If not, the machine may not be driven via the PTO drive shaft.

- Only use the PTO drive shaft supplied, or the type of PTO drive shaft supplied.
- Observe the operating manual supplied for the universal drive shaft. Proper usage and maintenance of the PTO drive shaft is a good protection against serious accidents.
- When coupling the PTO drive shaft, follow:
  - the operating manual supplied for the universal drive shaft,
  - the admissible drive speed of the machine,
  - the correct fitting length of the PTO drive shaft. Observe the information in chapter “Adjusting the PTO drive shaft length to the tractor”, page 132,
  - The correct fitting length of the PTO drive shaft. The tractor symbol on the PTO drive shaft protective tube marks the tractor-side connection of the PTO drive shaft.
- Always mount the overload or freewheel clutch on the machine side, if the PTO drive shaft has an overload or freewheel clutch.
- Before switching on the PTO observe the advice on safety for PTO operation in the chapter "Basic safety instructions", page 39.

5.9.1 Coupling the PTO drive shaft

1. Clean and grease the PTO on the tractor.
2. Hitching the tractor to the machine.
3. Secure the tractor against accidental starting and rolling.
4. Check that the PTO is switched off.
5. Push the PTO drive shaft locking mechanism onto the tractor PTO shaft until the lock is heard to snap into place. Observe the operating manual supplied for the universal drive shaft when coupling the latter.
6. Secure the universal drive shaft guard on the tractor and on the machine with the retaining chains (1) against rotating:
   - 6.1 Fix the chains as far as possible at right angles to the PTO drive shaft.
   - 6.2 Fix the chains in such a way that adequate swivelling area for the PTO drive shaft is guaranteed in all operating situations. Do not allow the chains to get caught up in tractor or machine component parts.
7. Check whether there is sufficient clearance around the PTO drive shaft in all operating situations. Lack of clearance causes damage to the PTO drive shaft.

Fig. 57

5.9.2 Uncouple the PTO drive shaft

CAUTION

There is a danger of being burnt if you touch hot component parts on the universal drive shaft!

Do not touch any very hot universal drive shaft component parts (in particular the clutches).

Clean and lubricate the PTO drive shaft before a longer period of stoppage.

1. Secure the machine against accidental starting and rolling.
2. Pull off the PTO drive shaft locking mechanism from the tractor PTO.
3. Place the PTO drive shaft in the holder (1) provided.

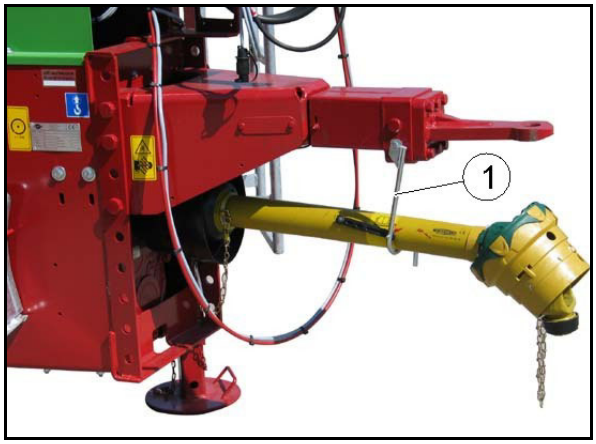


Fig. 58

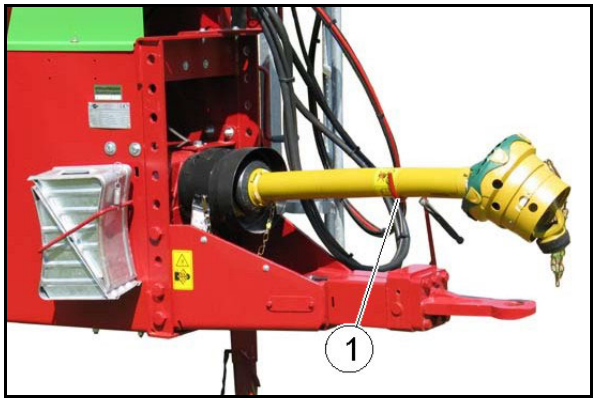


Fig. 59

5.10 Hydraulic hose lines

WARNING

A risk of infection in persons can occur if hydraulic oil escapes under high pressure and penetrates the body!

When connecting and unconnecting the hydraulic hose lines, make sure that the hydraulic system is pressure less both on the tractor- as well as the machine-side. Always swivel the control device on the control unit on the tractor in floating position.

If injuries occur from hydraulic oil, consult a doctor immediately.

5.10.1 Coupling the hydraulic hose lines

WARNING

There is a risk of injury to persons of being crushed, cut, entangled, pulled in or struck by equipment, when incorrectly connected hydraulic hose lines cause malfunctioning!

- Observe with due care the colour markings on the hydraulic plugs when coupling up the hydraulic hose lines.
- Check the allocation of the hydraulic hose lines on the machine control block if the colour markings (dust covers) are missing:
  - P = pressure line,
  - T = return line.

- Check the suitability of the hydraulic oil before connecting the machine to the hydraulic system of your tractor.
- Never mix mineral oil with bio-oil!
- Comply with the maximum admissible hydraulic oil operating pressure of 210 bar.
- Only connect clean hydraulic plugs and hydraulic sleeves.
- Make sure no oil escapes into the surrounding area when the hydraulic hose lines are being hitched or unhitched.
- Push the hydraulic plug into the hydraulic sleeve until you can fee the hydraulic pin locking.
- Check the hydraulic hose line connecting points for correct tight fit.
- Hitched-up hydraulic hose lines:
  - must easily follow every movement when cornering without tension, bending or friction,
  - must not chafe against external parts.

1. Swivel the relevant control device on the tractor control unit in floating position (neutral position).
2. Clean the hydraulic plugs and hydraulic sleeves before you connect hydraulic plugs to the hydraulic sleeves.
3. Hitch up the hydraulic hose lines with the tractor control units:
   3.1 Pressure line (red dust cover) to a single- or double- acting control unit.
   3.2 Return line (blue dust cover) to a pressure-less line, if possible.

5.10.2 Unconnect hydraulic hose lines

CAUTION	**There is a danger of being burnt if you touch hot component parts of the hydraulic hose lines!**
	Do not touch any very hot component parts of the hydraulic hose lines (in particular the hydraulic plugs and hydraulic sleeves).

1. Swivel the relevant control device on the tractor control unit in floating position (neutral position).
2. Release the hydraulic plugs from the hydraulic sleeves.
3. Keep the hydraulic plugs and sleeves free of dirt by using the dust covers.
4. Place the hydraulic hose lines in the hose cupboard (1).

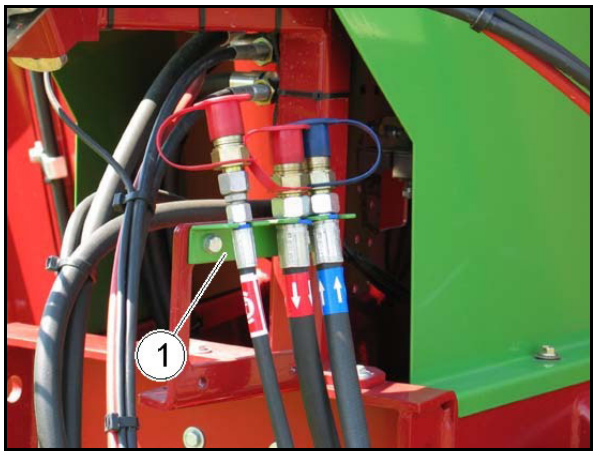


Fig. 60

5.11 Ground drive

Depending on the machine's equipment, the braking axle of the machine is equipped:

- with hydraulic service brake and parking brake for an admissible maximum speed of 6 km/h (standard equipment),
- with two-line service brake system (compressed-air brake system) with manually operated brake force regulator and parking brake for an admissible maximum speed of 25 km/h (optional equipment),
- with controlled hydraulic service brake system and parking brake for an admissible maximum speed of 25 km/h (optional equipment for export).

- Follow the national road traffic regulations.
- Take into account that the brake axle runs in during the first hours of operation – the brake pad adapts to the brake drum. Full braking power is not reached until after this run-in phase.
- Test for correct functioning of the brake system before you carry out transport drives.

5.11.1 Hydraulic working brake

The hydraulic service brake is connected to a single-acting control device or to a double-acting control device with open-centre position of the tractor. The operator must actuate the respective control device on the tractor in order to slow the machine down.

The machine equipped with a hydraulic service brake is a pure farmyard vehicle and not licensed for use on public roads. The admissible max. speed is 6 km/h.

We explicitly point out to you the risk to lose insurance coverage if you cause an accident by exceeding the admissible maximum speed of 6 km/h.

When connecting the hydraulic service brake to the tractor, ensure that the full system pressure must always act on the brake connection, even when switching on other hydraulic functions.

(1) Hydraulic plug ISO 7241-A DIN 2353

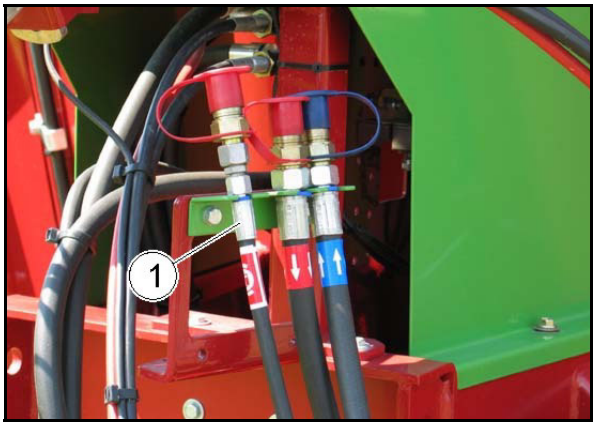


Fig. 61

(2) Brake axle hydraulic cylinder

Fig. 62

5.11.1.1 Coupling

- Only couple clean hydraulic couplings.
- If necessary clean the hydraulic plug and hydraulic sleeve.
- Push the hydraulic plugs into the hydraulic sleeve until the hydraulic plug is heard to lock in.
- Check the coupling spot of the hydraulic brake line for correct and tight seat.
- The coupled hydraulic brake line:
  - must easily follow every movement when cornering without tension, bending or friction,
  - must not chafe against external parts.
- Check the hydraulic service brake for proper functioning before carrying out transport drives.

1. Swivel the control device at the control device on the tractor to open-centre position (neutral position).
2. Remove the dust cap from the hydraulic plug (1).
3. Couple the hydraulic plug with the hydraulic sleeve to a single-acting control device or a double-acting control device with open-centre position of the tractor.
4. Release the parking brake.

Fig. 63

5.11.1.2 Uncoupling

1. Apply the parking brake.
2. Relieve brake hydraulics. Swivel control device on the tractor to “Lowering“ position such that the hydraulic oil flows back to the tractor.
3. Uncouple the hydraulic plug.
4. Safeguard the hydraulic plug against dirt with the dust cap.
5. Store the hydraulic brake line in the hose cupboard.

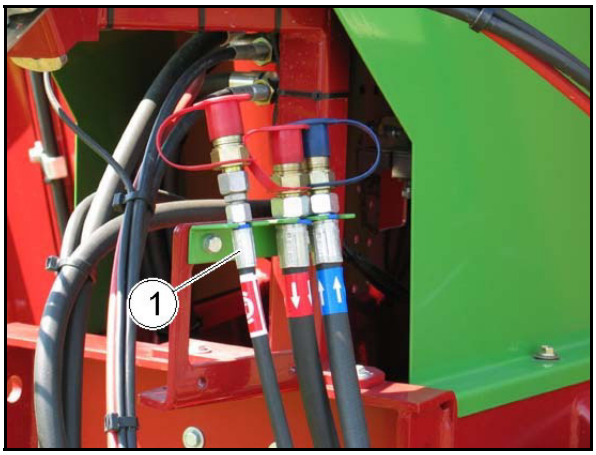


Fig. 64

5.11.2 Hydraulic service brake system

The controlled hydraulic service brake system is connected to the special brake valve of the tractor. When the operator applies the brake on the tractor, the machine brakes.

The hydraulic service brake system has not been licensed for Germany.

(1) Hydraulic sleeve ISO 5676

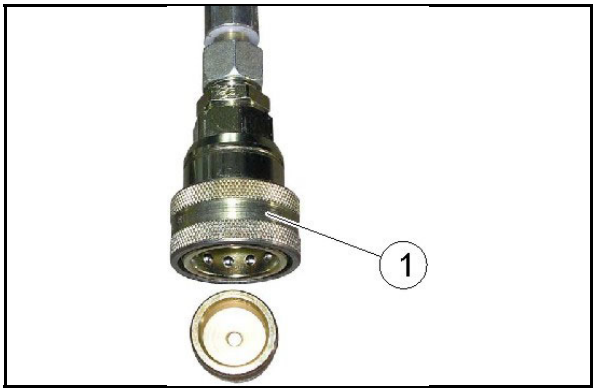


Fig. 65

(2) Brake axle hydraulic cylinder

Fig. 66

5.11.2.1 Coupling

- Only couple clean hydraulic couplings.
- If necessary clean the hydraulic sleeve and the hydraulic plug.
- Slip the hydraulic sleeve on the hydraulic plug until the hydraulic sleeve noticeably locks.
- Check the coupling spot of the hydraulic brake line for correct and tight seat.
- The coupled hydraulic brake line:
  - must easily follow every movement when cornering without tension, bending or friction,
  - must not chafe against external parts.
- Check the hydraulic service brake system for proper functioning before carrying out transport drives.

1. Remove hydraulic sleeve (1) from the machine's blanked-off connecting piece (2).
2. Connect the machine's hydraulic sleeve with the tractor's hydraulic plug of the hydraulic brake system.
3. Release on the machine parking brake.

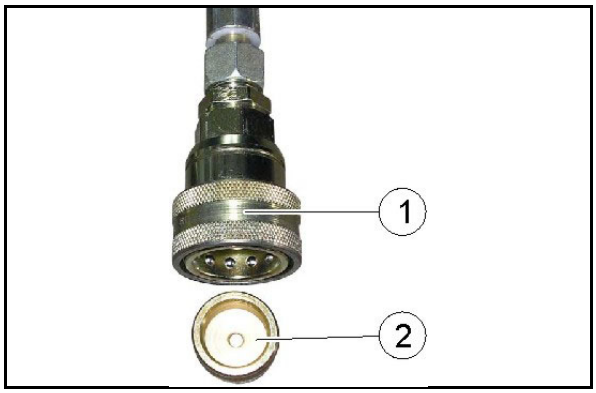


Fig. 67

5.11.2.2 Uncoupling

1. Pull on the machine parking brake.
2. Uncouple the hydraulic sleeve (1).
3. Slip the hydraulic sleeve on the machine's blanked-off connecting piece (2).

5.11.3 Two-line service brake system

Observance of the maintenance intervals is indispensable for proper functioning of the two-line service brake system.

(1) Supply line with coupling head (red)
(2) Brake line with coupling head (yellow)
(3) Line filter of supply line
(4) Line filter of brake line
(5) Trailer brake valve with brake force regulator
(6) Piston-type brake cylinder
(7) Test connection, piston-type brake cylinder
(8) Compressed air tank
(9) Drain valve
(10) Test connection compressed air tank

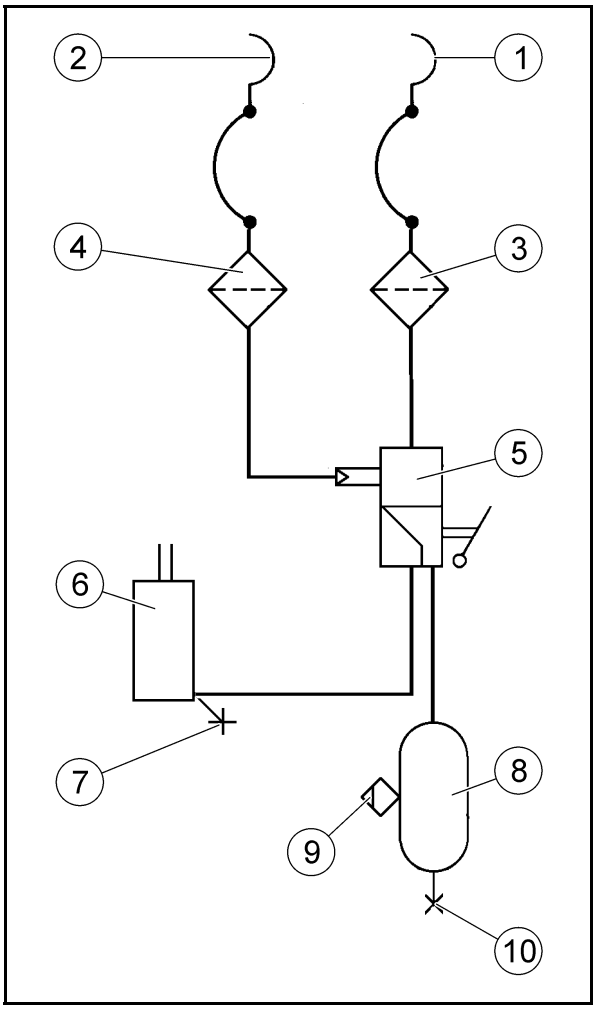


Fig. 68

Brake force regulator

The brake force regulator can be used to manually adapt the braking effect (braking force) of the two-line service brake system to the current loading condition of the machine. Possible braking effects are:

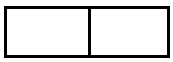
- Full load = Machine full filled
- Half load = Machine partly filled
- Empty = Machine empty
- Release = Release service brake system

The "Release" position allows to manoeuvre the machine with the brake hoses not coupled to the manoeuvring vehicle.

(1) Trailer brake valve
(2) Brake force regulator
(3) Supply line with coupling head (red)
(4) Brake line with coupling head (yellow)
(5) Line filter of supply line
(6) Line filter of brake line
(7) Hand lever for adjusting braking effect
(8) Reading point for set braking effect


"Full load"


"Half load"


"Empty"


"Release"

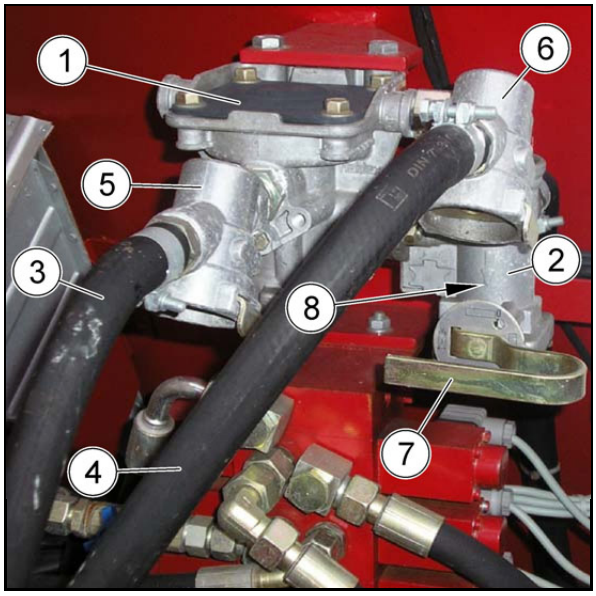


Fig. 69

Example:
Machine partly filled = turn hand lever (7) so that the symbol "Half-load" is below the reading point (8).

Absolutely adapt the braking effect of the two-line service brake system via the brake force regulator to the current loading condition of the machine before carrying out transport drives.

Only with matched braking effect:

- will the pressure released by the trailer brake valve be limited,
- will there be no overrun pushes,
- can you brake the tractor / machine combination sensitively and stepped,
- does the tractor / machine combination stay stretched through rapid advance braking.

5.11.3.1 Couple the brake and supply line

WARNING

There is risk of injury to exposed persons from being crushed, cut, caught, entangled and struck when the brake system is not functioning properly!

- When coupling the brake and supply line, take steps to ensure that:
  - o the seals on the coupling heads are clean,
  - o the sealing rings of the hose couplings seal tightly.
- Replace damaged sealing rings immediately.
- Drain the air tank before the first daily run.
- Do not start to drive with the hitched machine until the manometer for the compressed air brake system on the tractor registers 5.0 bar.
- Check the routing of the coupled brake lines! Brake lines must not be allowed to rub against foreign objects.

WARNING

There is risk of injury to exposed persons from being crushed, cut, caught, entangled and struck if the machine starts to roll while the service brake system is disengaged!

Always couple the brake line hose coupler (yellow) first and then the supply line hose coupler (red).

This is the only way to secure the hitched-up machine against rolling.

1. Open the covers of the coupling heads on the tractor.
2. Remove the brake line coupling head (yellow) out of the vacant pocket.
3. Clean the soiled seals or replace the damaged seals.
4. Secure the brake line coupling head (yellow) as directed in the yellow marked coupling on the tractor.
5. Remove the supply line coupling head (red) out of the vacant pocket.
6. Clean the soiled seals or replace the damaged seals.
7. Secure the supply line coupling head (red) as directed in the red marked coupling on the tractor.
8. Use the brake force regulator to adapt the braking effect of the service brake system to the current loading condition of the machine.
9. Release the machine parking brake and / or remove the wheel chocks.

5.11.3.2 Uncouple the brake and supply line

WARNING

There is risk of injury to exposed persons from being crushed, cut, caught, entangled and struck if the machine starts to roll while the service brake system is disengaged!

Always uncouple the supply line hose coupler (red) first and then the brake line hose coupler (yellow).

This is the only way to secure the hitched-up machine against rolling.

It is imperative to observe this order, as otherwise the service brake system will be released and the non-braked machine may start to move.

With uncoupling or machine break-away the supply line bleeds to the trailer rake valve. The trailer brake valve automatically switches over thus actuating the service brake according to the set braking effect.

1. Secure the machine against rolling away. Take note of the information in the chapter "Securing tractor and machine against accidental starting and rolling", page 126.
2. Release the supply line coupling head (red).
3. Release the brake line coupling head (yellow).
4. Secure the coupling heads in the idle couplings.
5. Close the covers on the coupling heads on the tractor.

5.11.3.3 Manoeuvre unhitched machine by means of a manoeuvring vehicle

WARNING 	**Risk of crushing, entanglement and impact for people if the machine accidentally rolls during manoeuvring work with the service brake released!** Tightly connect the machine with the braked manoeuvring vehicle before releasing the service brake by means of the hand lever at the brake force regulator. Now the machine must be exclusively slowed down by the manoeuvring vehicle.

1. Hitch the machine to the braked manoeuvring vehicle.
2. Release the parking brake of the machine.
3. Swing round the hand lever on the brake force regulator to the "release" position.

→ The service brake is released and the machine can be manoeuvred.

4. Manoeuvre the machine by means of the manoeuvring vehicle.
5. Apply the parking brake of the manoeuvring vehicle after manoeuvring.
6. Swing round the hand lever on the brake force regulator after parking back to the initial position.

→ The reserve pressure from the air tank decelerates the machine.

7. Pull on the machine parking brake.
8. Uncouple the machine and the manoeuvring vehicle.

5.11.4 Parking brake

The applied parking brake secures the uncoupled machine against rolling away. The parking brake is activated by turning the crank by means of spindle and cable.

(1) Crank; in variable position (2)

(2) Adjusting position

(3) Home position, swivelled round at 180° to variable position

(4) Spindle

(5) Cable

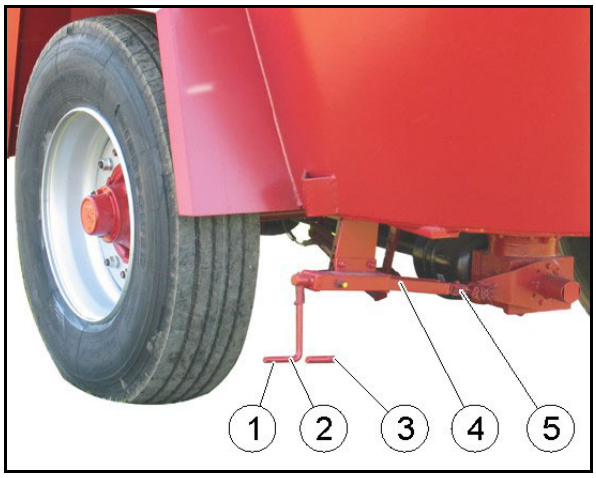


Fig. 70

Release parking brake

Make sure that the cable does not bear on or chafe against other vehicle parts.

With the parking brake released, the cable must sag a little.

1. Swing round the crank (1) from neutral position (3) by 180° to the adjusting position (2).
2. Swivel round the crank (1) in anti-clockwise direction until the cable (5) is slack.

→ The parking brake is released.

3. Swing back the crank (1) into neutral position (3).

Apply parking brake

Correct the setting of the parking brake if the spindle (4) tension way is no longer sufficient.

1. Swing round the crank (1) from neutral position (3) by 180° to the adjusting position (2).
2. Turn the crank (1) clockwise and apply the parking brake by means of the cable (5) (the pulling force of the parking brake is approx. 40 kg hand power).

6 Starting up the machine

In this chapter you will find information:

- how to put your machine into operation,
- and how to check out whether or not the machine may be mounted / hitched to your tractor.

- Before starting up the machine, the operator must have read and understood the operating manual.
- When starting up the machine into operation, please also observe the information in the chapter:
  - "Obligations of the operator", page 30,
  - "Qualification of personnel", page 31,
  - "Basic safety instructions", page 34,
  - "Saftey signs and instructional signs", page 47.
  - "Machine maintenance and care", page 153.

  Observance of these chapters is in the interest of your safety.
- Before every new machine start, the operator must check the tractor and machine for road traffic and work safety.
- Only couple and transport the machine with an appropriate tractor.
- Tractor and machine must comply with the national road traffic regulations.

  The registered vehicle keeper (operator) and the vehicle driver (user) are responsible for adherence to national road traffic regulations.

WARNING

Crushing, shearing, cutting, entanglement and trapping hazards with risk of personal injury can arise when controls for the actuation of hydraulic or electric components are blocked!

Do not block any controls on the tractor which serve the purpose of direct activation of hydraulic and electric movements of components, e.g. folding, swivelling and pushing procedures.

Each movement must stop automatically when you leave go of the relevant control device.

This does not apply to movements of equipment:

- in continuous operation for constant consumers,
- which are automatically controlled,
- whose function requires a float or pressure position.

WARNING

Dangerous situations can arise for exposed persons if the hazard areas of the machine are not easily visible from the tractor!

Fit the tractor with mirrors so that the hazard areas on both sides of the machine can be easily seen.

6.1 Road traffic regulations

Follow the national road traffic regulations.

The registered vehicle keeper (operator) and the vehicle driver (user) are responsible for adherence to national road traffic regulations.

6.1.1 Road traffic regulations for Germany

The standard machine:

- is purely a farmyard vehicle,
- has no MOT Certificate,
- is not licensed for public road traffic.

The admissible max. speed is 6 km/h!

- In terms of the StVZO (note of transl.: German Road Traffic Licensing Code) the fodder mixing trailer is a hitched-up farming or forestry machine.
- Farming or forestry equipment:
  - with a gross vehicle weight rating of more than 3 t require an operating licence for travelling on public roads,
  - with a gross vehicle weight rating of more than 3 t do not require an operating licence for travelling on public roads if the admissible maximum speed is 6 km/h,
  - are not subject to license (no license plate, no technical supervision) if:
    - exclusive use in land and forestry businesses,
    - Use only for land and forestry purposes.
  - must be equipped with the second license plate of one of the farm's tractors if they are not subject to license,
  - are subject to license for commercial use, e.g. by subcontractors (license plate, technical supervision),
  - must be equipped with proper lighting and marking when travelling on public roads.

Application for operating permit or registration

A current technical inspection document supplied (TÜV-German Certificate) does not, on its own, authorize driving on public roads. The only recognised document is the official operating permit or registration.

Apply for the operating permit or registration with the TÜV document supplied at your local registration office.

6.2 Check the suitability of the tractor

WARNING

Hazard situations can arise when the tractor is not properly employed leading to failure of components inadequate tractor stability and insufficient steering and braking ability occur!

- Check the suitability of your tractor, before attaching / hitching the machine to it.

  Only attachment / hitching of machines to suitable tractors is permitted.

- Carry out a braking test to check whether the tractor achieves the required braking deceleration with the machine attached / hitched on.

The requirements for the suitability of the tractor are in particular:

- the permissible total weight of the tractor,
- the permissible axle loads of the tractor,
- the permissible tongue load / trailer load on the connecting device of the tractor.

  You can find this data on the vehicle type plate, in the vehicle registration document and in the tractor operating manual.

- the tyre load capacity of the mounted tyres.

The front axle of the tractor must always be loaded with at least 20 % of the kerb weight of the tractor.

The tractor must achieve the brake deceleration prescribed by the tractor manufacturer with mounted as well as trailed machine.

6.2.1 Requirements for the operation of tractors with rigid drawbar trailers

WARNING

Hazards can arise from the failure of components if you do not use the tractor in the proper manner!

Please ensure:

- that the connecting device on the tractor has an adequate permissible tongue load for the actual tongue load,
- that the connecting device on the tractor and the towing device on the rigid drawbar trailer can take the trailer load of the rigid drawbar trailer (trailer load = axle load). You will have to calculate the tractor's admissible trailer load, if necessary.
- that the axle loads and lead weights of the tractor, which have changed due to the tongue load, lie within the permissible limits. If there is any doubt, reweigh.
- that the static, actual rear axle load of the tractor does not exceed the permissible rear axle load,
- that the permissible weight of the tractor is kept to,
- that the permissible tyre load carrying capacities of the tyres mounted on the tractor are not exceeded.

6.2.1.1 Possible combination variations for connecting and towing devices

Tab. 7 shows permissible combination variations for the connecting device on the tractor and the towing device on the machine depending on the maximum permissible tongue load.

The maximum permissible tongue load for your tractor can be found on the type plate of the connecting device / in the operating manual / in the vehicle registration document of your tractor.

Maximum admissible Tongue load	Connecting device on the tractor	Towing device on the machine
2500 kg - ≤ 25 km/h 2000 kg - ≤ 40 km/h	Bolt coupling DIN 11028 / ISO 6489-2	• Hitch ring 40 reinforced DIN 11026 / ISO 5692-2 • Hitch ring 40 for articulated drawbar DIN 11043 • Hitch ring 40 DIN 74054-1/2 / ISO 8755
	Non-automatic bolt coupling DIN 11025	• Hitch ring 40 for articulated drawbar DIN 11043 • Hitch ring 40 DIN 74054-1/2 / ISO 8755
	Automatic bolt coupling 40 DIN 74051-1 / ISO 3584	• Hitch ring 40 DIN 74054-1/2 / ISO 8755
	Automatic bolt coupling 50 DIN 74052-1 / ISO 3584	• Hitch ring 50 DIN 74053-1 / ISO 1102

Maximum admissible Tongue load	Connecting device on the tractor	Towing device on the machine
4000 kg - ≤ 40 km/h 2000 kg - > 40 km/h	Towing hook (hitch hook) ISO 6489-1	• Drawbar eye (hitch ring) ISO 20019 • Drawbar eye (hitch ring) ISO 5692-1
	Hitch pin (Piton-Fix) ISO 6489-4	• Drawbar eye (hitch ring) ISO 5692-1
4000 kg - ≤ 40 km/h 2000 kg - > 40 km/h	Ball head coupling 80	• Hitch pan 80

Tab. 7

6.2.1.2 Calculate real D_C-value for the combination to be coupled

WARNING

Exposed persons are at risk if connecting devices between tractor and machine break as a result of improper use of the tractor causing components to malfunction!

- Only make admissible combinations of connecting and towing devices.
- Calculate the actual D_C-value of your combination, consisting of tractor and rigid drawbar trailer, in order to check whether the connecting device on your tractor meets the required D_C-value. The actual calculated D_C-value for the combination must be lower or the same as (≤) the given D_C-value of the connecting device of your tractor and the towing device of the rigid drawbar trailer. If this is not the case, you will have to calculate the admissible trailer load for your tractor. In each case, the lowest D_C-value shall be relevant.
- Calculate the permissible trailer load of your tractor, if the calculated D_C-value for the combination is greater than the given D_C-value of the connecting device of your tractor or the towing device of the rigid drawbar trailer. Do not exceed this calculated trailer load when filling your rigid drawbar trailer.

The actual D_C-value of a combination for coupling is to be calculated as follows:

$$D_C = g \times \frac{T \times C}{T + C}$$

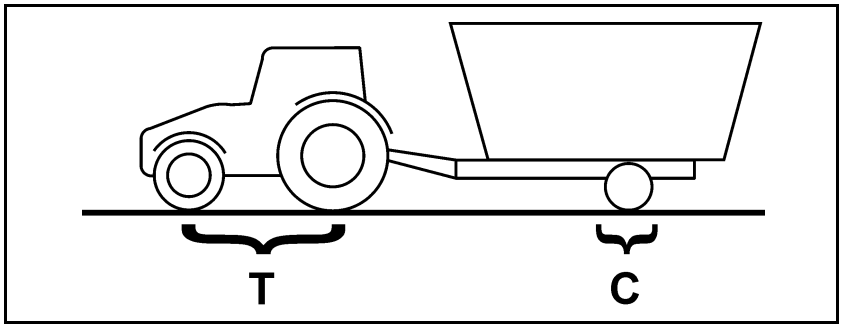


Fig. 71 D_C-value for the combination

T: Permissible total weight of the tractor in [t]
(see operating manual or vehicle registration document of the tractor)

C: Axle load of the machine loaded with the permissible mass (payload) in [t] without tongue load

g: Gravity acceleration (9,81 m/s²)

real, calculated D_C-value for the combination		**given D_C-value of the connecting device on the tractor**
KN	≤	KN

You will find the D_C-value:

- for the connecting device on the ID plate of the connecting device / in the operating manual of your tractor.

  Where there are differing values on the ID plates of hitch bracket and coupling, the lower value is to be taken.

- for the towing device on the ID plate of the towing device.

Example:

Permissible total weight of the tractor: 4.5 [t]

Permissible axle load(s) for the rigid drawbar trailer: 10 [t]

$$D_C = 9{,}81\ m/s^2 \times \frac{4{,}5\ [t] \times 10\ [t]}{4{,}5\ [t] + 10\ [t]} = 30{,}4\ [kN]$$

6.2.1.3 Calculate permissible trailer load of the tractor

The parameters of your tractor's connecting device determine the permissible trailer load C of your tractor. With rigid drawbar trailers, the trailer load on the tractor corresponds exactly to the axle load(s) of the rigid drawbar trailer.

The permissible trailer load of your tractor determines the permissible payload of your rigid drawbar trailer. Do not exceed this calculated trailer load / axle load when filling your rigid drawbar trailer.

$$C = \frac{T \times D_C}{g \times T - D_C}$$

T: Permissible total weight of your tractor in [t] (see operating manual or vehicle registration document of the tractor)

D_C: D_C-value of the connecting device of your tractor (see ID plate of the connecting device)

g: Gravity acceleration (9,81 m/s²)

Example:

Permissible total weight of the tractor: 4.5 [t]

D_C-value of the connecting device on the tractor: 31,3 [kN]

D_C-value of the towing device: 30,4 [kN]

D_C-value for the combination: 30,4 [kN]

$$C = \frac{4{,}5\ [t] \times 30{,}4\ [kN]}{9{,}81\ m/s^2 \times 4{,}5\ [t] - 30{,}4\ [kN]} = 10\ [t]$$

On the basis of D_C-value of the connecting device of the tractor, the permissible axle load amounts to 10 [t]. Do not exceed this calculated axle load when filling your rigid drawbar trailer.

6.3 Securing tractor and machine against accidental starting and rolling

WARNING

There is a risk to exposed persons of being crushed, grazed, cut, severing, caught, entangled, drawn in, trapped and struck during intervention in the machine:

- **when the machine, unhitched from the tractor and unsecured, accidentally rolls away,**
- **when driven work tools are not switched off,**
- **when hydraulic functions are accidentally activated, work tools and machine part are driven while the machine is hitched to the tractor and the tractor motor is running,**
- **when the tractor motor is started accidentally,**
- **when tractor and machine roll away accidentally,**
- **when raised parts of the machine are lowered accidentally.**

Every intervention in the machine represents a hazard as a result of accidental contact with driven, unsecured work tools and raised, unsecured machine parts.

It is therefore essential before any intervention in the machine, such as e.g. work to stop or clear faults:

- to secure the machine against rolling, if the machine is not hitched to the tractor,
- to put the tractor motor off and secure machine and tractor against accidental starting and rolling, if the machine is hitched up to the tractor,
- to order third persons (children) off the tractor,
- to secure raised machine parts against accidental lowering.

Securing machine against rolling

Secure the machine against rolling away:

- on level ground, by means of parking brake and wheel chocks,
- on very uneven ground or on slopes, by means of parking brake and wheel chocks.

Securing tractor and machine against accidental starting and rolling away

1. Lower raised, unsecured machine parts to a final end position.

→ In this way you can prevent parts from lowering accidentally.

2. Pull on the tractor parking brake.
3. Switch off the tractor engine.
4. Remove the ignition key.
5. Order third persons (children) from the tractor.
6. Close the driver's cab if necessary.
7. Secure the machine against rolling away:
   - on level ground, by means of parking brake and wheel chocks,
   - on very uneven ground or on slopes, by means of parking brake and wheel chocks.

6.4 Entering the mixing container

You will have to enter the mixing container, e.g. to carry out maintenance work on the cutting knives of the mixing auger.

WARNING

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

- **lifted, unsecured machine parts accidentally come down or are lowered unintentionally, e.g. an open discharge door,**
- **Tractor and machine accidentally start and roll away,**
- **the mixing auger is accidentally powered!**
- Secure raised machine parts against accidental lowering before you start work in the vicinity of raised parts.
- Secure the tractor and the machine against accidental starting and rolling before entering the mixing container.

  Take note of the information in the chapter "Securing tractor and machine against accidental starting and rolling", page 126.

WARNING

Risk of falling off the machine if people enter the mixing container by climbing over the top edge of the mixing container!

As a basic principle, enter the mixing container through a discharge opening.

WARNING

Risk of cuts when entering the mixing container if the cutting knives of the mixing auger are directed towards the discharge opening!

Rotate the mixing auger such that the cutting knives are directed away from the discharge opening before entering the mixing container.

WARNING

Risk of slipping, stumbling or falling when moving in the mixing container if people slip due to insufficient stability!

- Wear appropriate protective clothing when entering the mixing container.
- Always ensure a firm standing position. Beware that the standing surface on the mixing auger is inclined.
- Cover the sharp-edged cutting knives before moving in the mixing container.
- Remove any fodder residues and dampness before moving in the mixing container.

1. Completely open the discharge door through which you want to enter the mixing container.
2. Secure the tractor and machine against accidental starting and rolling, see page 126.
3. Strip the PTO drive shaft off the tractor's p.t.o. shaft allowing you to manually rotate the mixing auger via the PTO drive shaft, if necessary.
4. Rotate the mixing auger such that the cutting knives are directed away from the discharge opening.
5. Unscrew the screwed connections (1) between protective cover (2) and mixing container (3).
6. Remove the screwed connection (4) of the swivel pin and take off the protective cover (2).
7. Enter and leave the mixing container carefully through the discharge opening or the crossover conveyor and the discharge opening.
8. Clean the mixing container carefully before leaving the mixing container.
9. Ensure that all components, tools etc. are removed from the mixing container.
10. Fix the protective cover (2) again on the mixing container according to the specifications after finishing all necessary work in the mixing container:
    - 10.1 Swivel the protective cover back.
    - 10.2 Screw the protective cover to the mixing container.

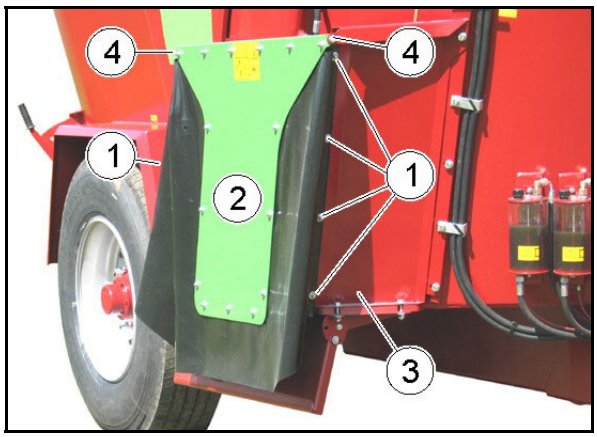


Fig. 72

6.5 Adjust mounting height of drawbar (workshop job)

You must have the mounting height of the drawbar adjusted to the respective tractor model if the fodder mixing trailer hitched to the tractor is not horizontally aligned on even ground.

The mixing auger only works at its optimum in horizontally aligned position. When horizontally aligning the fodder mixing trailer, use the top edge of the mixing container for guidance.

WARNING

Risk of crushing, entanglement, being drawn in and of impact for people if the hitched-up machine accidentally loosens from the tractor!

Only an authorized workshop is allowed to adjust the drawbar to the chassis within the adjusting range of the positioning holes for adapting the mounting height.

WARNING

Risk of crushing, entanglement, being drawn in and of impact for people if the machine starts rolling when adjusting the mounting height of the drawbar!

Secure the machine against rolling before adjusting the mounting height of the drawbar.

WARNING

Risk of crushing and impact for people if the chassis accidentally lowers during screwing work on the drawbar!

Ensure sufficient ground stability when lifting the chassis by means of the support stand. Use additional solid, load-distributing supports, if necessary.

Assembly instructions for authorized workshop:

1. Park the fodder mixing trailer on even, solid ground:
   1.1 Secure the fodder mixing trailer against rolling by means of the parking brake and / or wheel chocks.
   1.2 Unhitch the machine from the tractor.
   1.3 Pull the tractor ahead until the connecting device of the tractor uncovers the towing device of the drawbar.
2. Align the fodder mixing trailer horizontally by means of the support stand (1) such that the top edge of the mixing container runs parallel to the ground.
3. Align the connecting device on the tractor such that the connecting device can take up the towing device (2) of the drawbar.
4. Have the drawbar screwed by an authorized workshop if the adjusting range for the connecting device on the tractor is not sufficient to hitch the fodder mixing trailer in horizontal position.
5. Ensure that there is sufficient free space around the PTO drive shaft in any operating state. Insufficient free space will lead to damage on the PTO drive shaft.

Fig. 73

6.6 Adjusting the length of the PTO drive shaft to the tractor (workshop job)

WARNING

There is a risk of exposed persons being drawn in and trapped if faulty mounting on the PTO drive shaft or inadmissible structural modifications have been carried out!

Only specialist workshops may carry out structural alterations on the PTO drive shaft. Observe here the operating manual supplied by the PTO drive shaft manufacturer.

Adjusting the length of the PTO drive shaft, taking into account the required minimum section overlap is permitted.

Structural alterations to the PTO drive shaft are not permitted, if these are not described in the operating manual supplied for the PTO drive shaft.

WARNING

There is a risk of exposed persons being injured by ejected objects if the PTO drive shaft length was not correctly adjusted and buckles as a result on cornering!

Have the length of the PTO drive shaft checked in every operating situation and, if necessary, adjusted by a specialist workshop before connecting the PTO drive shaft to your tractor for the first time.

PTO drive shaft compression or insufficient section overlapping can thus be avoided.

WARNING

There is a risk of exposed persons being crushed when the tractor and hitched-up machine roll away accidentally!

Secure the tractor and machine against accidental starting and rolling away, before moving into the danger zone between tractor and hitched-up machine to adjust the PTO drive shaft.

- The shortest operative position of the PTO drive shaft is reached when driving in very sharp bends. The PTO drive shaft reaches its longest operating position on straight-ahead drives.
- Also ensure:
  - possible changes in inclination between tractor and machine, e.g. in case of ramp travels,
  - the specific differences between top and bottom hitching.
- The adjustment of the PTO drive shaft applies only to the current tractor model. The adjustment of the PTO drive shaft may have to be repeated when the machine is coupled to another tractor.

Assembly instructions for authorized workshop:

1. Hitching the tractor to the machine (do not connect the PTO drive shaft).
2. Take up the shortest PTO drive shaft operational position.
3. Secure the tractor against accidental starting and rolling away before moving into the danger zone between tractor and machine.
4. Pull the PTO drive shaft apart.
5. Push the locking mechanism of the PTO drive shaft half with the tractor symbol on the guard tube onto the PTO shaft of the tractor until the locking mechanism noticeably locks in.
6. Push the locking mechanism of the other PTO drive shaft half onto the PTO shaft of the machine until the locking mechanism noticeably snaps into place.
7. Consult the PTO drive shaft operating instructions for information on determining the length and shortening the PTO drive shaft.
8. Push the shortened halves of the PTO drive shaft into each other again.
9. Grease the tractor PTO and machine PTO before connecting the PTO drive shaft.

6.7 Check machine functions

Before initial start-up and each work start, check machine functioning:

1. Hitch the fodder mixing trailer to the tractor.
2. Completely lubricate the fodder mixing trailer and the PTO drive shaft. For further details consult the chapter "Lubricating machine", page 156.
3. Check the oil level of the angular gearbox in the compensating reservoir for the gear lubricant oil. For further details consult the chapter "Check oil level", page 158.
4. Check all functions of the machine before loading the mixing container for the first time:
   - 4.1 Open and close discharge door.
   - 4.2 Lift hydraulic support stand (if available) to transport position and lower it to support position.
   - 4.3 Extend and retract hydraulic counter-cutters (if available) into the mixing container.
   - 4.4 Let crossover conveyor (if available) run in both driving directions.
   - 4.5 Let crossover conveyor (if available) run at different conveyor speeds.
   - 4.6 Lower conveyor extension (if available) to working position and lift it to transport position.
   - 4.7 Lower discharge conveyor for side discharge (if available) to working position and lift it to transport position.
   - 4.8 Let discharge conveyor for side discharge (if available) run in driving direction.
   - 4.9 Let discharge conveyor for side discharge (if available) run at different conveyor speeds.
   - 4.10 Check the weighing device (if available) for proper functioning.
   - 4.11 Check the lighting system for proper functioning.
   - 4.12 Check the brake system for proper functioning.

Ensure that the stop valve (5) is open before each start-up. Fig. 74 shows the open stop valve (5).

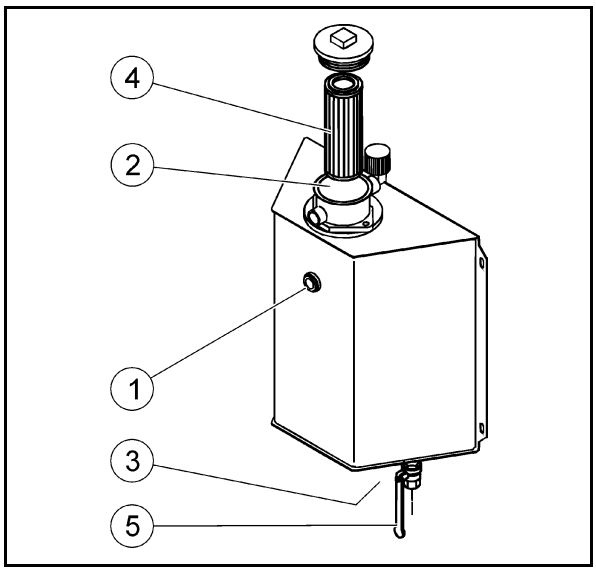


Fig. 74

7 Hitching and unhitching the machine

- Also consult the chapter "Basic safety instructions", page 34 when hitching and unhitching the machine.
- Each time you hitch and unhitch the machine check it for obvious defects. Take note of the information in the chapter "Obligations of the operator", page 30.

WARNING

There is a risk of exposed persons being crushed if the tractor and machine accidentally start up and roll away during hitching and unhitching!

Secure the tractor and machine against accidental starting and rolling before going between the tractor and machine to hitch and unhitch.

Take note of the information in the chapter "Securing tractor and machine against accidental starting and rolling away", page 126.

7.1 Hitch up the machine

WARNING

Hazards can be incurred where the tractor is not used in accordance with requirements if a lack of stability or tractor steering and braking ability develops through the mounted / hitched machine!

You may only attach / hitch the machine to tractors which are suited to this purpose. Take note of the information in the chapter "Check the suitability of the tractor", page 121.

WARNING

There can be a risk of exposed persons being crushed and struck, if they go between tractor and machine during machine hitching!

Order everyone out of the danger area between the tractor and machine before backing up to the machine.

Any assisting persons present may only stand beside the tractor and machine to give directions to the operator and are only allowed to go between the vehicles when they have come to a halt.

WARNING

Danger of injury by crushing, cutting, entanglement, drawing-in and impact arises for exposed persons, if the hitched-up machine accidentally detaches itself from the tractor!

- Observe the maximum permissible tongue-, trailer- and axle loads of the tractor.
- Apply and secure the devices supplied for connecting tractor and machine in accordance with the terms.

WARNING

Danger of injury to exposed persons arises when the power supply between tractor and machine is disrupted by damaged supply lines!

Consider the routing of supply lines when coupling the supply lines. The supply lines:

- must easily follow every movement when cornering without tension, bending or friction,
- must not chafe against external parts.

1. Secure the machine against rolling away. Take note of the information in the chapter "Securing tractor and machine against accidental starting and rolling", page 126.
2. Always check the machine when hitching for obvious defects. Take note of the information in the chapter "Obligations of the operator", page 30.
3. Couple up the drawbar. Take note of the information in the chapter "Coupling up the drawbar", from page 98.
4. Couple the hydraulic hose lines. Take note of the information in the chapter "Coupling the hydraulic hose lines", page 107.
5. Coupling the brake system. For further information consult the chapter:
   - Hydraulic working brake, from page 109,
   - Hydraulic service brake system, from page 111,
   - Two-line service brake system, from page 113.
6. Couple the PTO drive shaft. Take note of the information in the chapter "Coupling the PTO drive shaft", from page 105.
7. Insert the Bowden cable control set / the control unit into the holder of the tractor.
8. Couple the electric supply lines / lighting system.
9. Raise the support stand into transport position. For further information consult the chapter:
   - Lifting of mechanical support stand to transport position, page 101,
   - Lifting of hydraulic support stand to transport position, page 102.
10. Release on the machine parking brake. Take note of the information in the chapter "Parking brake", page 118.

7.2 Unhitching the machine

WARNING

There is a risk of injury to exposed persons from being crushed, cut, entangled, drawn- in and impact if the unhitched machine is not sufficiently stable!

- Park the empty machine on level, firm ground used for parking.
- Secure the machine against rolling away.

Take care when uncoupling the machine to leave enough free space in front of the machine, for the tractor to be backed up in line to the machine again for re-coupling.

1. Lower the support stand to its support position. For further information consult the chapter:
   - Lower mechanical support stand to support position, page 100,
   - Lower hydraulic support stand to support position, page 102.
2. Secure the machine against rolling away. Take note of the information in the chapter "Securing tractor and machine against accidental starting and rolling", page 126.
3. Always check the machine during uncoupling for conspicuous defects. Take note of the information in the chapter "Obligations of the operator", page 30.
4. Uncouple the electrical supply lines / lighting system.
5. Uncouple the hydraulic hose lines. Take note of the information in the chapter "Uncoupling hydraulic hose lines", page 108.
6. Uncouple the brake system. For further information consult the chapter:
   - Hydraulic working brake, page 109,
   - Hydraulic service brake system, from page 111,
   - Two-line service brake system, page 113.
7. Disengage the PTO drive shaft. Take note of the information in the chapter "Uncoupling the PTO drive shaft", page 106.
8. Insert the Bowden cable control set / the control unit into the holder on the machine.
   - 8.1 Disconnect the control unit from the power supply.
   - 8.2 Take the control unit out of the holder.
   - 8.3 Fix the control unit to the holder on the machine.
9. Unhitch the drawbar. Observe the information in the chapter "Unhitching of drawbar", from page 98.

8 Settings

When adjusting any settings, take heed of the notes in the chapter:

- "Basic safety instructions", page 34,
- "Saftey signs and instructional signs", page 47.

Observe this advice for your own safety.

WARNING

There is a risk of injury to exposed persons from being crushed, grazed, cut, entangled, wound up, drawn-in, trapped and impact during adjustment work on the machine:

- **when the machine, unhitched from the tractor and unsecured, accidentally rolls away,**
- **when driven work tools are not switched off,**
- **when hydraulic functions are accidentally activated, work tools and machine part are driven while the machine is hitched to the tractor and the tractor motor is running,**
- **when the tractor motor is started accidentally,**
- **when tractor and machine roll away accidentally,**
- **if raised machine parts are lowered accidentally!**

- Secure the tractor and machine against accidental start and rolling away, before you adjust the machine hitched to the tractor.

  Take note of the information in the chapter "Securing tractor and machine against accidental starting and rolling away", page 126.
- Wait until the machine stands still before entering the danger area of the machine.

9 Start machine

For further information on the use of the machine please consult the chapter:

- "Obligations of the operator", page 30,
- "Qualification of personnel", page 31,
- "Basic safety instructions", page 34,
- "Saftey signs and instructional signs", page 47.

Attention to these chapters is in the interests of your own safety.

WARNING

There is a risk of injury to exposed persons in the hazard area of the driven universal drive shaft as a result of being caught, entangled and struck by ejected foreign objects!

- Every time the machine is to be used, check that the PTO drive shaft safety devices and safeguards are complete and functioning correctly.

  Arrange for damaged safety devices and safeguards on the PTO drive shaft to be replaced by a specialist workshop immediately.
- Check that the PTO drive shaft guard is secured by the chain against twisting.
- Stay at a safe distance from the actuated PTO drive shaft.
- Order everyone out of the danger zone of the actuated PTO drive shaft.
- In the event of danger switch off the tractor engine immediately.

WARNING

There is a risk of injury to exposed persons from being crushed, drawn-in and trapped when drive elements are unguarded during machine operation!

- Only start up a machine with its entire safeguards correctly mounted.
- Do not open any safeguards:
  - o while the machine is running,
  - o as long as the tractor engine is running with universal drive shaft /hydraulic system connected,
  - o if the ignition key has been left in the lock on the tractor and the tractor engine with the connected PTO drive shaft / hydraulic unit could be started accidentally,
  - o if the tractor and machine have not been secured by their respective parking brakes and/or wheel chocks against accidental rolling away.

  Close the open safeguards before starting the machine.

WARNING

There is a risk of injury to exposed persons due to component part failure when the machine is driven at a drive speed higher than permitted!

Check the permissible machine drive speed before switching on the tractor P.T.O.

CAUTION

Risk of injury due to component part failure can occur when the overload clutch responds!

Switch off the tractor PTO immediately when the overload clutch reacts.

Avoid damage to the overload clutch.

WARNING

There is a risk of injury to exposed persons from being crushed, drawn-in, trapped or by impact, if tractor and machine tip over as a result of insufficient stability!

Always drive in such a way that you always have complete control over tractor and mounted / hitched machine:

- Take into consideration your own ability, the roadway, curve, traffic, view and weather conditions, the handling features of the tractor and the influence of the mounted / hitched machine.
- Never drive round narrow bends at too high a speed.
- Avoid sudden turns when driving on slopes as well as on drop line and parallel horizontal lines across hill (danger of buckling sideways!).

WARNING

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

- Never reach into the mixing container through an 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 with the mixing auger powered or the tractor engine running.

9.1 Loading of fodder mixing trailer

WARNING

Hazard situations can arise when the tractor is not properly employed leading to failure of components inadequate tractor stability and insufficient steering and braking ability occur!

Observe the regulations on maximum payload of the mounted / hitched machine and the permissible axle and tongue loads of the tractor. Run the machine only with partly-filled mixing container, if necessary.

CAUTION

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

Observe the maximum load of the machine and the filling order of the individual fodder components.

The fodder components should freely move in the mixing container when the mixing auger is powered. Overloading may occur if fodder components 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, entanglement or being drawn in if people get into accidental touch with the powered mixing auger due to improper loading of the mixing container!

- Only use appropriate equipment to load the mixing container.

  Appropriate equipment may be:

  - tractor with front loader,
  - wheeled / yard loader.

- People are only allowed to load the mixing container manually if they cannot accidentally fall into the mixing container.

  People are not allowed on a level with or above the feed opening of the mixing container.

- As a basic principle, meter additional fodder (e.g. mineral feed) via the loading tool (shovel) or via the feed funnel (optional extra) into the mixing container.

- Remove baler twines and nets before filling round or cuboid bales into the mixing container.
- When loading the mixing container, ensure that the tractor engine runs as equally as possible when powering the mixing auger, i.e. without variations in the tractor engine speed. Variations in the tractor engine speed indicate insufficient engine power of your tractor and cause additional load to all other powered components.

  The required tractor power can be reduced by means of a two-gear switchgear (optional equipment) in the powertrain of the mixing auger.

- The total fodder quantity that can be mixed and chopped in one mixing container filling cycle depends on the following factors:
  - mixing container capacity,
  - total dry mass of the fodder components to be mixed,
  - structure (stalk length and quality) of the individual fodder components,
  - way and order of loading,
  - tractor power.
- Due to the different fodder components to be mixed, the loading quantity for one mixing container filling cycle may vary. Avoid overloading of the fodder mixing trailer when loading the mixing container. In case of overload:
  - the individual fodder components cannot be mixed homogeneously,
  - mechanical damage on the powertrain may occur,
  - cutting knives of the mixing auger may bend.
- If only one tractor is available, the mixing container can also be loaded when unhitched. The mixing process will, however, be accelerated if the mixing auger is powered during loading.

  If the mixing auger is switched on only after loading or transport journeys, more power will be required to set the fodder components to be mixed in motion.

1. Check the mixing container for foreign objects before starting the tractor engine. Remove foreign objects from the mixing container, if necessary.
2. Start the tractor engine.
3. Park the tractor together with the hitched-up fodder mixing trailer on even ground.
4. Secure the tractor and the fodder mixing trailer against rolling.
5. Close possibly open discharge doors.
6. Swivel the weighing device (if available) from the tractor into loading direction.
7. Switch the weighing device on and start the programme (if available).
8. Make sure that people leave the loading area of the fodder mixing trailer.
9. Switch on the p.t.o. shaft of the tractor.

→ The mixing auger starts.

10. Let the tractor engine run at appropriate speed to ensure that the tractor engine runs equally and does not stall when the mixing container is being loaded.
11. Load the mixing container by means of a tractor equipped with a front loader or by means of a wheeled / yard loader.

Fig. 75

9.1.1 Recommended loading order

- For undoing round or cuboid bales, a higher power is required. The required power can be reduced by means of a two-gear switchear (gear level II).
- Recommended procedure for processing round or cuboid bales:
  1. Extend the counter-cutters into the mixing container.
  2. Fill in round or cuboid bales at slow mixing auger driving speed.
  3. Increase the driving speed of the mixing auger after the bale has been "undone".
  4. Now retract the counter-cutters from the mixing container.

1. Highly-structured fodder components (hay, straw etc.) fill 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 concentrated feed, grain feed etc.
3. Fill in mineral feed via the loading tool (shovel) or via the feed funnel (optional equipment).
4. Fill in grass silage.
5. Fill in maize silage, grain silage.
6. Fill in fodder components with a high proportion of water, e.g. draff, potato pulp or beet chips.
7. Fill liquid components such as liquid yeast, molasses into the mixing container by means of the loading tool together with the last portion of maize silage.

9.2 Mixing of fodder components

- The type and the structure of the used fodder components and the desired cutting length of the fodder mixture determine the duration of the last mixing cycle.

  The mixing process will be extended for highly-structured fodder components which must be cut.

- Monitor the mixing process from the ladder.
- Stop the mixing process when the fodder components have been homogeneously mixed. In case of a too long mixing process, the mixture risks to lose its structure.
- Depending on the structure of the fodder components, the counter-cutters can be extended into the mixing container at different positions.

  The counter-cutters slow down the horizontal revolving of the fodder 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 fodder will not get entangled by / pile up on the counter-cutters.

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

- Reduce the driving speed of the mixing auger if light fodder components are thrown over the edge of the mixing container during mixing.

  If, however, the mixing container happens to overflow, an overflow ring (optional equipment) may help. Observe the information in the chapter "Overflow ring", page 65.

- Sharp cutting knives reduce the required mixing auger power. Regularly sharpen cutting knives. Observe the information in the chapter "Sharpening of cutting knives“, page 165.

9.3 Fodder discharge

WARNING

Risk of impact for people and animals if objects are thrown out of the discharge opening or the crossover conveyor with the mixing auger powered!

Make sure that people leave the hazardous area of the discharge opening and / or the crossover conveyor before switching on the p.t.o. shaft of the tractor.

Keep animals away from the hazardous area.

The fodder discharge can be started after the mixing process has been finished.

The fodder quantity discharged onto the feeding table is set via:

- the driving speed of the mixing auger,
- the opening width of the discharge door,
- the travelling speed of the tractor on the feeding table.

The higher the driving speed of the mixing auger, the wider the opening width of the discharge door and the slower the travelling speed of the tractor, the larger the fodder quantity discharged onto the feeding table.

- The discharge door must be completely opened when discharging very dry, long and highly-structured fodder.
- The discharge door must be opened according to the desired discharge quantity when discharging strongly pourable fodder.
- When discharging the fodder, the 750 p.t.o. shaft (if available) can be used and the tractor engine can be run at reduced speed.
- Increase the driving speed of the mixing auger for a short time towards the end of the discharging procedure (gear level I or p.t.o. shaft speed 1000 min^{-1}) to throw off any fodder residues from the mixing auger and to completely empty the mixing container.

9.3.1 Fodder discharge through discharge openings

1. Make sure that people leave the hazardous area of the machine.
2. Keep animals away from the hazardous area.
3. Switch on the p.t.o. shaft.
4. Power the mixing auger at the desired driving speed.
5. Slowly open the discharge door (1) via the hydraulic cylinder (2), until the fodder is homogeneously coming out of the discharge opening. The set opening width of the discharge door is indicated by the pointer (3) on the scale (4).
6. Travel over the feeding table at the desired travelling speed.
7. Finish fodder discharge:
   - 7.1 Close the discharge door.
   - 7.2 Switch off the p.t.o. shaft.

Fig. 76

9.3.2 Fodder discharge via discharge conveyor for side discharge

1. Make sure that people leave the hazardous area of the machine.
2. Keep animals away from the hazardous area.
3. Swivel the discharge conveyor (1) to working position.
4. Switch on the p.t.o. shaft.
5. Switch on the discharge conveyor drive. Observe the information in the chapter "Discharge conveyor for side discharge" page 69.
6. Power the mixing auger at the desired driving speed.
7. Open the discharge door (2) at the desired opening width. The set opening width of the discharge door is indicated by the pointer (3) on the scale (4).
8. Travel over the feeding table at the desired travelling speed.

Fig. 77

> The discharge conveyor speed is infinitely adjustable in order to vary the lateral delivery distance (throwing range) of the fodder next to the fodder mixing trailer. Observe the information in the chapter "Setting of conveyor speed for crossover conveyor / discharge conveyor for side discharge", page 73.

9. Finish fodder discharge:
   - 9.1 Close the discharge door.
   - 9.2 Switch off the p.t.o. shaft.
   - 9.3 Switch off the discharge conveyor only when the fodder discharge has been finished.
10. Swivel the discharge conveyor to transport position.

9.3.3 Fodder discharge via crossover conveyor

1. Make sure that people leave the hazardous area of the machine.
2. Keep animals away from the hazardous area.
3. Switch on the p.t.o. shaft.
4. Switch on the crossover conveyor drive in the desired driving direction.
5. Power the mixing auger at the desired driving speed.
6. Slowly open the discharge door (1) via the hydraulic cylinder (2), until the fodder is homogeneously coming out of the discharge opening. The set opening width of the discharge door is indicated by the pointer (3) on the scale (4).
7. Travel over the feeding table at the desired travelling speed.

Fig. 78

> The crossover conveyor speed is infinitely adjustable in order to vary the lateral delivery distance (throwing range) of the fodder next to the fodder mixing trailer. Observe the information in the chapter "Setting of conveyor speed for crossover conveyor / discharge conveyor for side discharge", page 73.

8. Finish fodder discharge:
   - 8.1 Close the discharge door.
   - 8.2 Switch off the p.t.o. shaft.
   - 8.3 Switch off the crossover conveyor only when the fodder discharge has been finished.

9.3.4 Fodder discharge via conveyor extension

1. Make sure that people leave the hazardous area of the machine.
2. Keep animals away from the hazardous area.
3. Swivel the conveyor extension (1) to working position.
4. Switch on the p.t.o. shaft.
5. Switch on the crossover conveyor drive in the desired driving direction.
6. Power the mixing auger at the desired driving speed.

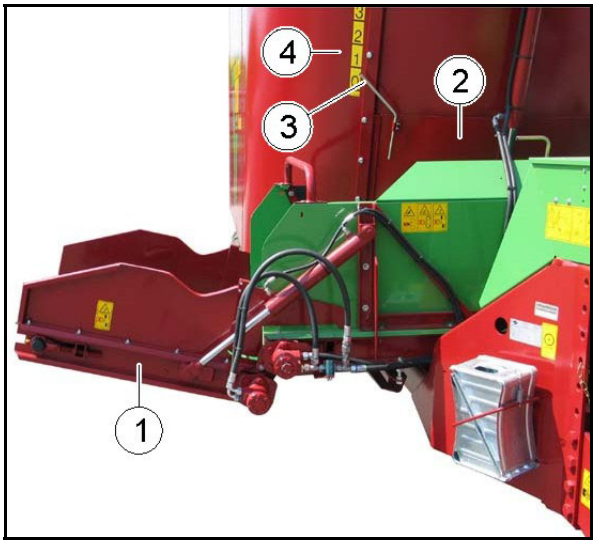


Fig. 79

> The conveyor extension drive is hydraulically coupled with the crossover conveyor drive. If the crossover conveyor is not driven in the conveyor extension's direction, the conveyor extension will stop.

7. Open the discharge door (2) at the desired opening width. The set opening width of the discharge door is indicated by the pointer (3) on the scale (4).
8. Travel over the feeding table at the desired travelling speed.

> The crossover conveyor / conveyor extension speed is infinitely adjustable in order to vary the lateral delivery distance (throwing range) of the fodder next to the fodder mixing trailer. Observe the information in the chapter "Setting of conveyor speed for crossover conveyor / discharge conveyor for side discharge", page 73.

9. Finish fodder discharge:
   - 9.1 Close the discharge door.
   - 9.2 Switch off the p.t.o. shaft.
   - 9.3 Switch off the crossover conveyor only when the fodder discharge has been finished.
10. Swivel the conveyor extension to transport position.

9.3.5 Elimination of blockages

WARNING

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

- **lifted, unsecured machine parts accidentally come down or are lowered unintentionally, e.g. an open discharge door,**
- **tractor and machine accidentally start and roll away.**

- Secure raised machine parts against accidental lowering before you start work in the vicinity of raised parts.
- Secure the tractor and the machine against accidental starting and rolling before eliminating any blockages on the machine.
- Wait until the machine stands still before entering the danger 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.

CAUTION

Risk of damage to the machine if you change the sense of rotation of the tractor's p.t.o. shaft for eliminating blockages!

Never change the sense of rotation of the tractor's p.t.o. shaft.

1. Switch off the p.t.o. shaft.
2. Completely open the discharge door of the blocked discharge opening, if necessary.
3. Secure the tractor and machine against accidental starting and rolling, for further details see page 126.
4. Eliminate the blockage such that the discharge opening gets free and the mixed materials can be easily discharged again.
5. Start the tractor engine.
6. Close the discharge door.
7. Switch on the p.t.o. shaft.
8. Power the mixing auger at the desired driving speed.
9. Open the discharge door at the desired opening width and continue the fodder discharge.

10 Transport runs

A transport run is a journey from or to the machine application location in loaded or unloaded condition.

- For transport runs please also take heed of the information in the chapter "Basic safety instructions", page 34.
- Before transport runs check that:
  - the correct connection of the supply lines,
  - the lighting system for damage, functions and cleanliness,
  - the brake and hydraulic system for noticeable defects,
  - whether the parking brake is fully released,
  - the brake system is functioning correctly.

WARNING

There is a risk of injury to exposed persons from being crushed, drawn-in, trapped or by impact, if tractor and machine tip over as a result of insufficient stability!

Always drive in such a way that you always have complete control over tractor and mounted / hitched machine:

- Take into consideration your own ability, the roadway, curve, traffic, view and weather conditions, the handling features of the tractor and the influence of the mounted / hitched machine.
- Never drive round narrow bends at too high a speed.
- Avoid sudden turns when driving on slopes as well as on drop line and parallel horizontal lines across hill (danger of buckling sideways!).

WARNING

Improper use of the tractor can give rise to hazards where the former causes failure of components, inadequate stability and insufficient tractor steering and braking ability!

Observe the regulations on maximum payload of the mounted / hitched machine and the permissible axle and tongue loads of the tractor. If necessary, drive with the machine only half-filled.

WARNING

There is a high risk of injury to exposed persons if hydraulic functions are accidentally actuated during transport drives!

Before carrying out transport drives:

- switch off the control unit,
- switch off the oil circulation between tractor and machine,
- always switch off the PTO drive shaft if an on-board hydraulic system is available.

WARNING

Risk of being drawn in, getting entangled or risk of impact for people if machine parts swivelled to transport position accidentally move off their transport position during transport drives!

Before carrying out transport drives:

- lock the swivelling machine parts in transport position,
- ensure that the swivelling machine parts are locked in transport position.

WARNING

Risk of falling off the machine for unauthorized passengers!

Passengers are not allowed on the machine.

11 Machine maintenance and care

Correct maintenance and care according to regulations:

- keeps your machine ready for use for a long time and prevents early wear and tear,
- reduces downtimes and repairs,
- is a pre-condition for our guarantee provisions.

- For maintenance and care of the machine please also consult the information in chapter:
  - o "Obligations of the operator", page 30,
  - o "Qualification of personnel", page 31,
  - o "Basic safety instructions", page 34,
  - o "Saftey signs and instructional signs", page 47.

  Observance of these chapters is in the interest of your safety.
- Only use genuine spare parts.
- When cleaning and servicing the machine take all necessary steps to protect the environment.
- Comply with the legal requirements concerning the disposal of fuels and lubricants, such as oil and grease. These legal provisions also apply to parts coming into contact with those working materials.
- Before commencing machine maintenance and care, always disconnect all electric / electronic plug and socket connections to the tractor. As a basic principle, unhitch the machine from the tractor during welding work.
- It is essential to take safeguarding, such as shielding electric power-hydraulic hose-, brake- and supply lines or removing these lines at particularly critical points:
  - o during welding, drilling and grinding,
  - o when carrying out any work by means of cutoff wheels in the vicinity of these pipes and lines.
- Monitor the brake, air and hydraulic hose lines very closely for noticeable defects.

- Special know-how is required for carrying out testing and maintenance work. This know-how is not imparted by these operating manual.
- 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 for people if:

- **raised, unsecured machine parts accidentally drop or are lowered,**
- **tractor and machine accidentally start and roll away!**
- Secure raised machine parts against accidental lowering before you start work in the vicinity of raised parts.
- Secure the tractor and machine against accidental starting and rolling, before you commence with maintenance and care of the machine.

  Take note of the information in the chapter "Securing tractor and machine against accidental starting and rolling away", page 126.
- Wait until the machine stands still before entering the danger area of the machine.

WARNING

Risk of injury to exposed persons from crushing, grazing, cutting, severing, entangling, winding-up, drawing-in and trapping if actuated drive elements are unguarded!

- Secure the tractor and machine against accidental start and rolling away before opening safeguards.
- Close or mount the safeguards which you have opened for maintenance and care purposes or removed before you actuate the machine.
- Replace defective safeguards immediately.

WARNING

Dangerous situations can arise if load-bearing components break due to mechanical work on frame parts!

It is absolutely forbidden:

- to drill holes in the frame or chassis,
- to drill into existing holes in the frame or chassis,
- welding onto load-bearing components.

11.1 Maintenance and care schedule – overview

- Carry out maintenance at the prescribed intervals from the first inspection date reached.
- The time intervals, mileage and maintenance intervals of any external documentation supplied have priority.

11.2 Cleaning the machine

- Clean the machine regularly and thoroughly! Dirt attracts moisture and leads to the formation of rust.
  Regular cleaning is an essential pre-requisite to proper servicing and facilitates operation of the machine.
- After cleaning, grease the machine, especially after cleaning with a high pressure cleaner / steam jet or grease solvents.
- Comply with the legal requirements for dealing with and disposing of cleaning agents.
- Check the machine continually for corrosion damage! Eliminate corrosion by touching up damage to the finish.
- Monitor the brake, air and hydraulic hose lines very closely for noticeable defects.
- Never treat brake, air and hydraulic hose lines with petrol, benzene, kerosene or mineral oils.

Cleaning with high pressure cleaner or steam jet

It is essential that you adhere to the rules listed below when cleaning with a high pressure cleaner / steam jet.

- The maximum permissible spray pressure is 80 bar.
- The water temperature must be at least 60°C.
- Do not clean any electric component parts such as e.g. operator control panel, weighing rods, distribution boxes, weighing computer, etc.
- Do not clean any chrome-plated parts.
- Never aim the cleaner nozzle jet of the high pressure cleaner / steam jet:
  - directly at greasing and bearing points,
  - nor directly at hydraulic parts.
- Always make sure you do not exceed the minimum nozzle distance of 300 mm between cleaner nozzle and machine.
- Never direct the cleaning jet at right angles onto machine parts. The nozzle spraying angle must be at least 25°.
- Do not use any chemical additives.
- Observe the safety regulations when handling high pressure cleaners.

11.3 Lubricate machine

- Lubricate all bearing and lubrication points according to lubrication chart.
- Remove dirt from the grease nipples.
- Use environmentally friendly biodegradable oil and grease, wherever lubricants could get into fodder or into the ground. Ask your agricultural machine specialist supplier for further information.
- Take care not to exceed a lubricating pressure of 250 bar when lubricating with high pressure grease guns. Damage to bearing points, seals etc. can occur if the grease gun used does not have a safety device.

11.3.1 Lubrication chart

For lubrication of the universal drive shaft(s) consult the operating instructions supplied by the drive shaft manufacturer.

Component / Location	Number	Activity	Time / Interval
Lubricating nipple, universal joint in front of gearbox	2	Lubricating	250 h
Lubricating nipple, top bearing, angular gearbox	1	Lubricating	250 h
Lubricating nipple, drive shaft, bearing block	1	Lubricating	50 h
Lubricating nipple, support stand	1	Lubricating	100 h
Lubricating nipple, crossover conveyor	4	Lubricating	25 h
Guide rail, discharge door	2	Greasing	50 h

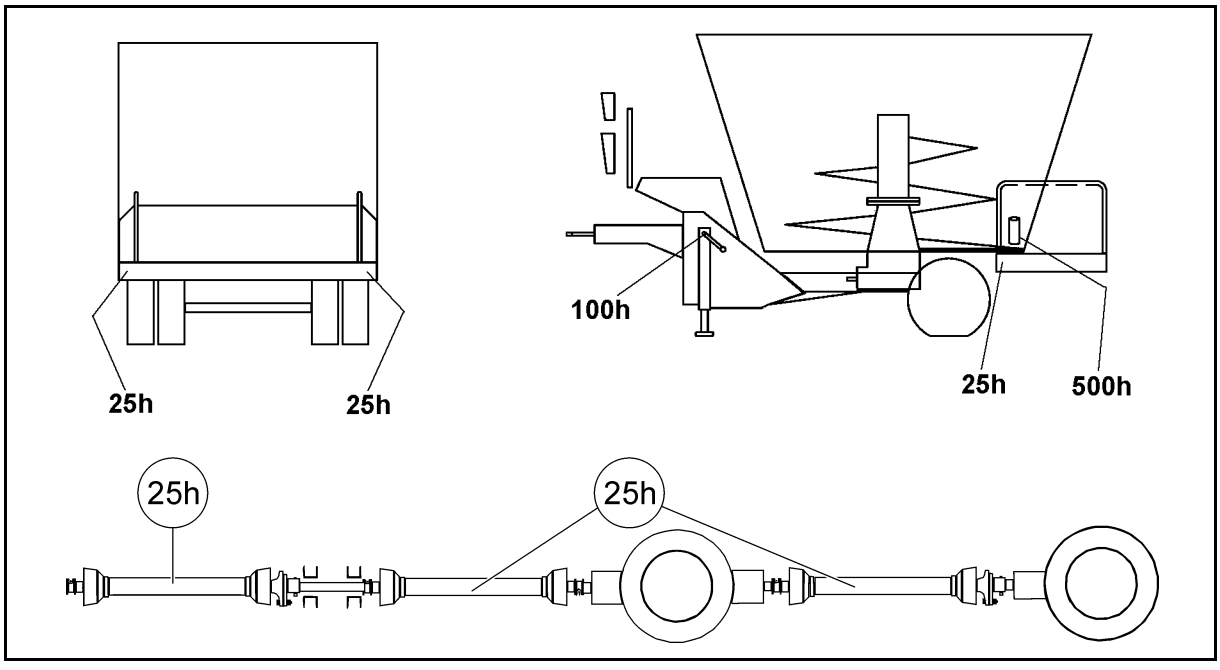


Fig. 80

11.4 Preserving / long downtimes

Prepare the machine for long downtimes as follows:

- Clean machine thoroughly,
- Lubricate, oil and grease machine,
- Correct paint damage.

11.5 Check gear oil / top up / change

On each gearbox you must:

- check the oil level regularly / top up,
- change the gear oil,
- carry out the first oil change after 50 hours of operation.

CAUTION

Hazards from damage to machine component parts arise when gearboxes are actuated without gear oil!

Make sure the oil level in the gears is always sufficient.

WARNING

There is a danger of exposed persons slipping down if gear oil leaks during oil topping-up / oil change!

Remove fresh oil blotches immediately with binding agents.

- If possible you should carry out the oil change when the gear oil has heated up to operating temperature (30 – 40°C). At operating temperature, the viscosity of the gear oil is at its best.
- The optimum oil level is reached at an oil temperature of 0 - 20°C.

11.5.1 Filling quantities and oil change time intervals

- Change gear oil:
  - for the first time after 50 service hours,
  - then every 1000 service hours,
  - but at least once a year (depending on which change interval occurs first).
- Dispose of used oil according to regulations. Should you have any problems with disposal, consult your oil supplier!

Gearbox	Gear oil	Filling quantitie [litre]	Interval
Angular gearbox	EP80W-90 SAE / VG 150 - 220 (ISO 3448)	20	1000 h or once a year
Switchgear	EP80W-90 SAE / VG 150 - 220 (ISO 3448)	13	
Gearbox, on-board hydraulic system without switchgear	EP80W-90 SAE / VG 150 - 220 (ISO 3448)	0.75	

Tab. 8

11.5.2 Angular gearbox

In case of the angular gears:

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

11.5.2.1 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 range between the two markings (2, 3) of the sticker (4).
2. Top up oil through the filler opening (5) into the compensating reservoir.

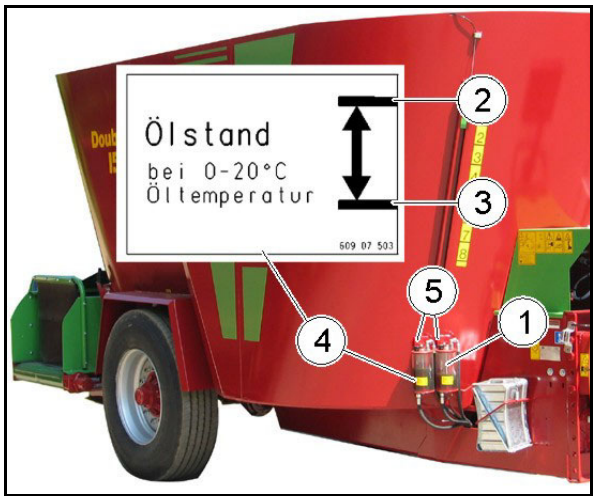


Fig. 81

11.5.2.2 Change gear oil

1. Secure the machine against rolling away.
2. Align the machine in horizontal position.
3. Place a drip tray beneath the gearbox (capacity approx. 25 litres).
4. Open the filler opening (1) at the compensating reservoir.
5. Unscrew oil drain plug (2) from the bottom gearbox.
6. Wait until the oil has stopped draining off the oil drain opening.
7. Screw in again and tighten oil drain plug (2) (use sealant).
8. Fill gear oil into the compensating reservoir through the filler opening (3) until the oil level ranges between the two markings of the sticker (4). (approx. 20 litres).
9. Close the cover (1) at the compensating reservoir.
10. Check the oil level after 5 service hours.

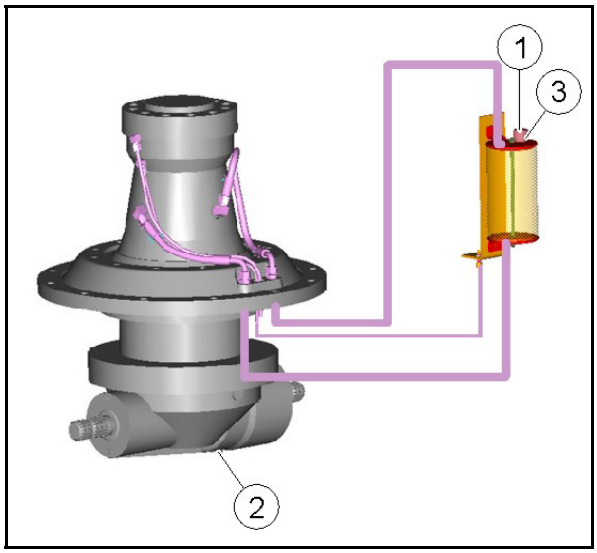


Fig. 82

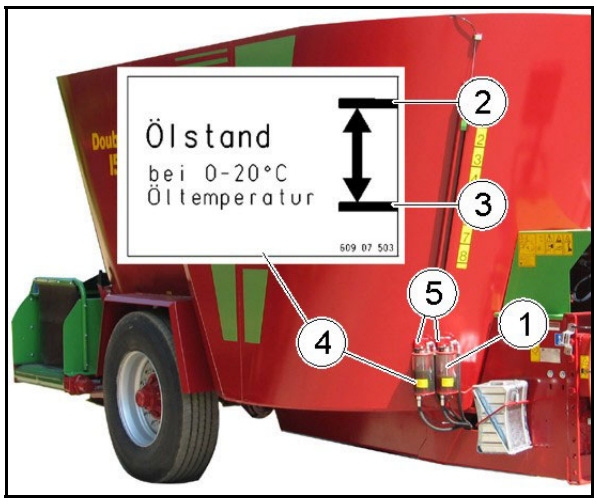


Fig. 83

11.5.3 Switchgear

In case of the switchgear:

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

11.5.3.1 Check oil level

1. Remove the inspection plug (1) to check the oil level.

   The oil level must reach the tap hole.
2. Top up oil through the filler opening (2), if necessary.
3. Screw the inspection plug in again.

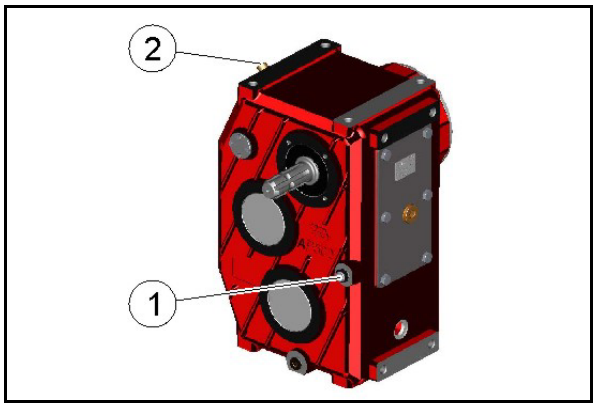


Fig. 84

11.5.3.2 Change gear oil

1. Secure the machine against rolling away.
2. Align the machine in horizontal position.
3. Place a drip tray beneath the gearbox (capacity approx. 15 litres).
4. Unscrew oil drain plug (1) and ventilation screw (2).
5. Wait until the oil has stopped draining off the oil drain opening.
6. Screw in again and tighten oil drain plug (1) (use sealant).
7. Remove the inspection plug (3).
8. Top up 13 litres of oil through the filler neck (4), until the oil level becomes visible at the tap hole.
9. Screw the inspection plug in again.
10. Clean and screw in ventilation screw (2).
11. Check the oil level after 5 service hours.

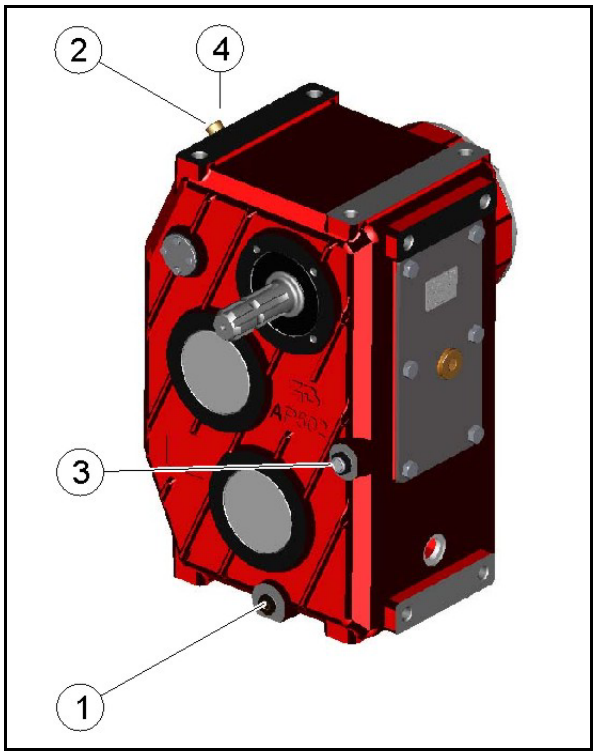


Fig. 85

11.5.4 Flat-type cylindrical gearing for drive unit with on-board hydraulic system without switchgear

In case of the flat-type cylindrical gearing:

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

11.5.4.1 Check oil level

1. The oil level must be visible at the inspection glass (1) of the flat-type cylindrical gearing (2).
2. Top up oil through the filler opening (3), if necessary.

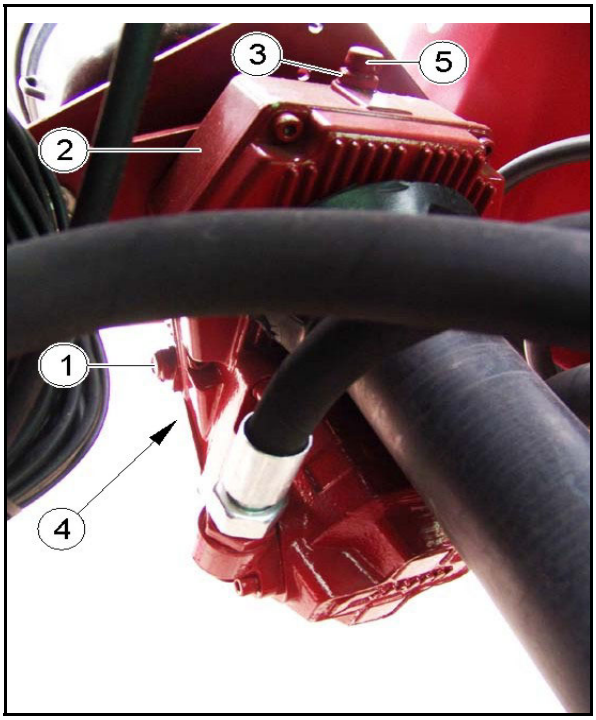


Fig. 86

11.5.4.2 Change gear oil

1. Secure the machine against rolling away.
2. Align the machine in horizontal position.
3. Place a drip tray beneath the gearbox (capacity approx. 2 litres).
4. Unscrew oil drain plug (4) and ventilation screw (5).
5. Wait until the oil has stopped draining off the oil drain opening.
6. Screw in again and tighten oil drain plug (4) (use sealant).
7. Top up 0.75 litres of oil through the filler opening (3), until the oil level becomes visible at the inspection glass (1).
8. Clean and screw in ventilation screw (5).
9. Check the oil level after 5 service hours.

11.5.5 On-board hydraulic system for hydraulic functions or for blower drive

In case of the on-board hydraulic system:

- check the oil level and top up hydraulic oil, if necessary,
- change the hydraulic oil / replace the filter element.

- Change the hydraulic oil:
  - for the first time after 500 service hours,
  - then every 3000 service hours,
  - but at least every 2 years (depending on which change interval occurs first).
- Required hydraulic oil, on-board hydraulic system for hydraulic functions:
  - Hydraulic oil ATX 40 (similar to ATF oil),
  - Filling capacity approx. 21 litres.
- Required hydraulic oil, on-board hydraulic system for blower drive:
  - Hydraulic oil ATX 40 (similar to ATF oil),
  - Filling capacity approx. 52 litres.
- Never mix different types of hydraulic oil
- Dispose of used oil according to regulations. Should you have any problems with disposal, consult your oil supplier!
- Replace the filter element:
  - for the first time after 250 service hours,
  - then every 2000 service hours,
  - but at least every 2 years (depending on which change interval occurs first).

11.5.5.1 Check oil level

1. Check the oil level at the inspection glass (1).

   The oil level must be visible at the inspection glass.

2. Fill hydraulic oil through the filler neck (2) into the hydraulic oil tank, if necessary.

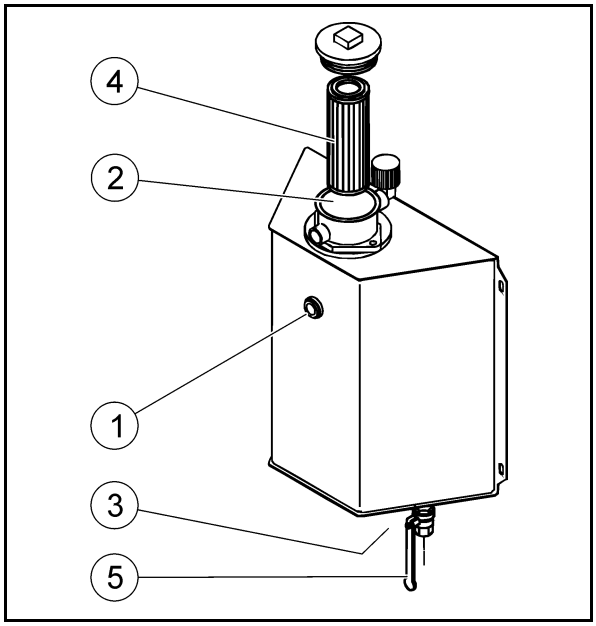


Fig. 87

11.5.5.2 Change hydraulic oil

1. Secure the machine against rolling away.
2. Align the machine in horizontal position.
3. Place a drip tray beneath the hydraulic oil tank:
   - Capacity approx. 25 litres in case of on-board hydraulic system for hydraulic functions,
   - Capacity approx. 60 litres in case of on-board hydraulic system for blower drive.
4. Unscrew oil drain plug (3) from the bottom of the hydraulic oil tank.
5. Wait until the oil has stopped draining off the oil drain opening.
6. Screw in again and tighten oil drain plug (3) (use sealant).
7. Replace the filter element (4), if necessary (order no. 870 01 788).
8. Fill the required hydraulic oil and the required oil quantity through the filler neck (2) into the hydraulic oil tank.

   The oil level must be visible at the inspection glass (1).

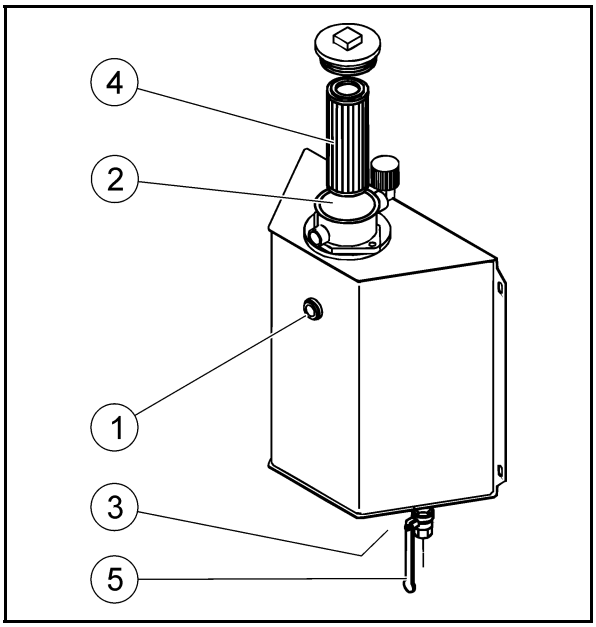


Fig. 88

11.6 Replacing of shear bolts of the shear bolt coupling

1. Secure the tractor and the machine against accidental starting and rolling, see information on page **126**.
2. Eliminate the cause for the overloading (e.g. foreign object in the mixing container), see information on page 150.
3. Strip the PTO drive shaft (1) off the p.t.o. shaft of the tractor.
4. Open the fitting apertures on the protective device. Observe the included operating instructions for the PTO drive shaft.
5. Remove the residues of the shear bolt (2).
6. Rotate the power train such that the boreholes of the coupling halves (3) and (4) face each other.
7. Replace the shear bolts (2) by a bolt of equal grade (8.8)

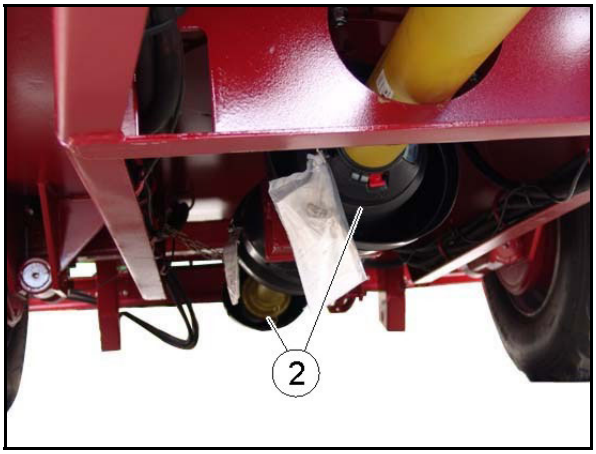


Fig. 89

Driving speed of mixing auger	20 min^{-1}	24 / 29 min^{-1}
Shear bolt	M8 x 50 8.8	M10 x 50 8:8

8. Close the fitting aperture.
9. Couple the PTO drive shaft.

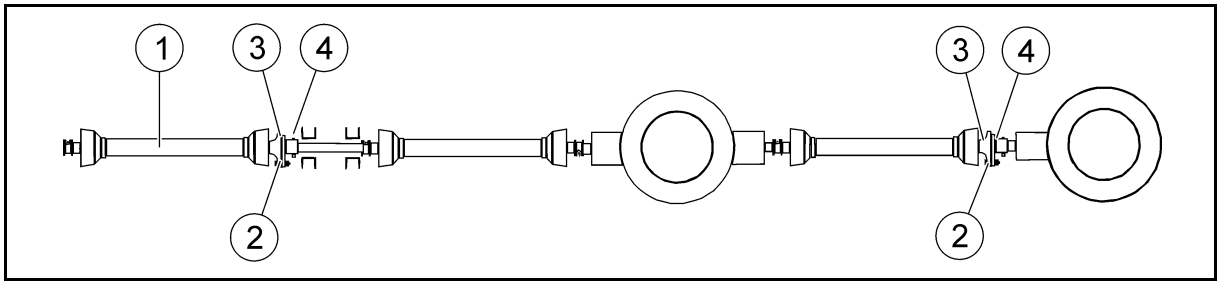


Fig. 90

11.7 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).

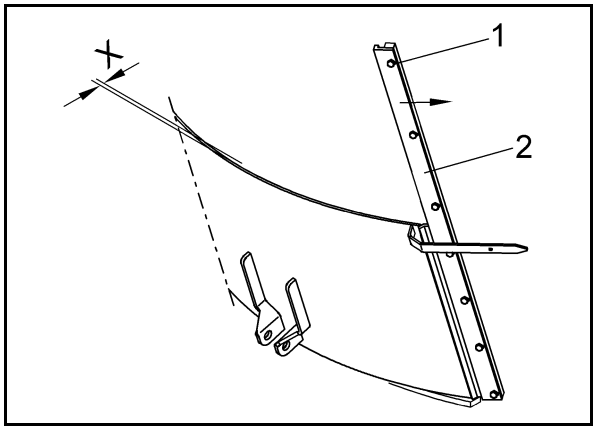


Fig. 91

11.8 Cutting knives of mixing auger

- Grind the cutting knives of the mixing auger, if necessary.

  Blunt cutting knives require a higher power of the mixing auger thus also increasing the tractor's fuel consumption.

- Daily check the cutting knives from the service platform / the ladder for visible defects. Timely replace damaged or worn cutting knives.

11.8.1 Sharpening of cutting knives

WARNING

There is a risk of injury to eyes from ground particles being ejected during sharpening of knives!

Always wear protective goggles when sharpening the cutting knives.

- Use angle drivers with a serrated lock grinding disc for grinding knives (Fig. 92).
- Only grind knives on the smooth side, never on the dished side.
- Sharpen the cutting knives carefully so that they do not heat up too much. If the cutting knives discolour during sharpening:
  - o they have overheated,
  - o the service life of the cutting knives will be reduced.

1. For grinding the cutting knives, enter the empty mixing container through a discharge opening. Absolutely observe the chapter "Entering the mixing container", from page 128.
2. Wear protective goggles and protective gloves.
3. Carefully grind the cutting knives on their smooth side.
4. Remove any foreign objects (tools etc.) from the mixing container. Clean the mixing container, if necessary.
5. After completing work, leave the mixing container through the discharge opening.

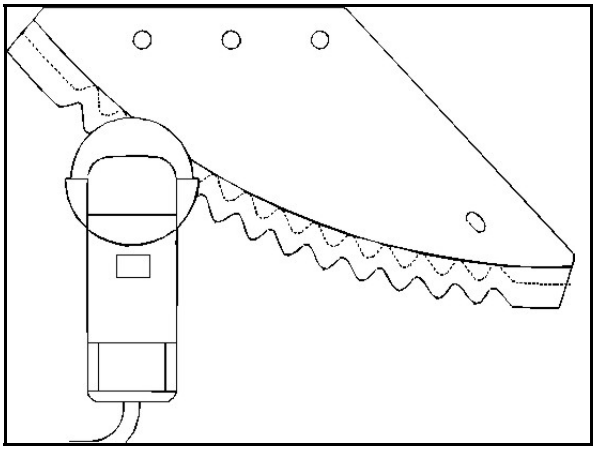


Fig. 92

11.8.2 Swivelling / Replacing of cutting knives

WARNING

There is a risk of injury from being cut during assembly work on sharp cutting knives!

Always wear cut-resistant protective gloves when carrying out work on the cutting knives.

For swivelling / replacing the cutting knives you require:

- different wrenches:
  - 1 x open end or ring wrench, wrench size 24,
  - 1 x hexagon wrench, size 10,
  - 1 x hexagon wrench, size 6, for the top cutting knife with knife supporting plate,
- a scraper or screw driver,
- a hard brush,
- cut-proof protective gloves,
- edge protector to cover the knife edges when carrying out assembly work on the cutting knives.

1. For replacing the cutting knives, enter the empty mixing container through a discharge opening. Absolutely observe the chapter "Entering the mixing container", from page 128.
2. Put on protective gloves.
3. Use the edge protector to cover the knife edge (1) of the respective cutting knife to be mounted.
4. Unscrew and remove the screws (2) (M16 x 45 or M10 x 20 - grade 8.8).
5. Replace the cutting knives or swivel the cutting knives into the desired position (aggressive or degressive), see information on page 60.
6. Tighten all screws (2) of the cutting knives screwed connections.
7. Remove any foreign objects (tools etc.) from the mixing container. Clean the mixing container, if necessary.
8. After completing work, leave the mixing container through the discharge opening.

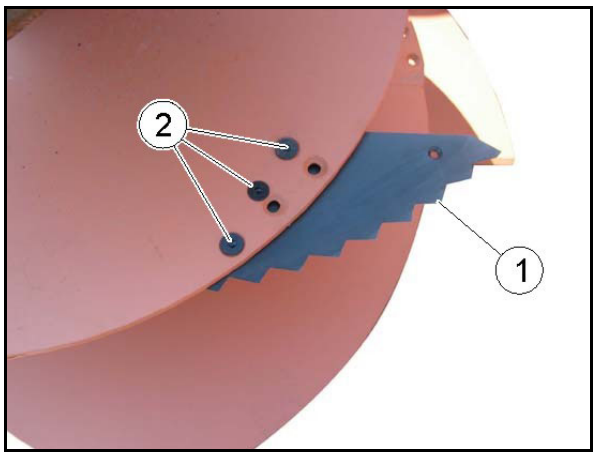


Fig. 93

11.9 Crossover conveyor, discharge conveyor or conveyor extension

- Check the tension of the respective conveyor before each start-up.

  A wrong tension may cause damage to the conveyor.

  A properly tightened conveyor sags by approx. 10 to 15 mm in the centre. Consider the ambient temperature. Low temperatures shorten the conveyor, high temperatures lengthen it.
- Straighten the conveyor by means of the clamping screws (Fig. 95/2) if the conveyor is not running straight or is rubbing along the frame.
- Clean the driving, supporting and guide rollers if fodder residues have piled up on the rollers.
- Lubricate the 4 flanged bearings of the conveyor at least every 25 service hours.

11.9.1 Check the conveyor for visible defects

Check the conveyor (1) and the belt fastener (2) of the respective conveyor weekly for visible defects. Replace the conveyor in case of damage (fissures, raised corners).

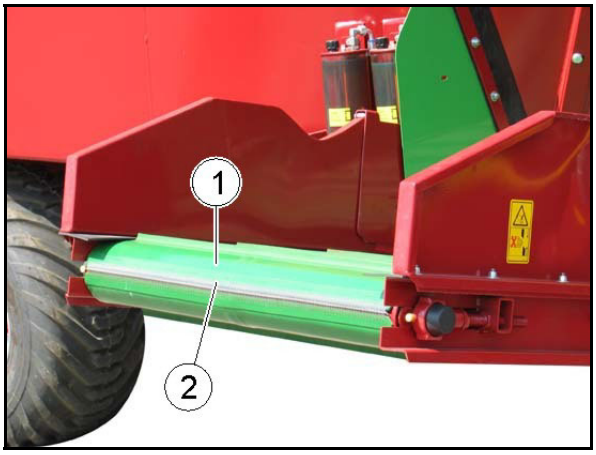


Fig. 94

11.9.2 Adjusting / Tightening of conveyor

1. Secure the tractor and the machine against accidental starting and rolling, see information on page 126.
2. Unscrew the counternuts (1) of the right and left clamping screw (2).
3. Turn the two clamping screws (2) equally:
   - such that the conveyor sags by approx. 10 to 15 mm in its centre,
   - the distance A between the square profiles (3) and the clamping housing (4) is equal on both sides of the conveyor.

     Only if the distance A is equal on both sides of the conveyor, the conveyor runs straight.
4. Carry out a test run to check whether the conveyor has an equal distance to the frame at the return rollers on both sides. If not, correct accordingly by turning the clamping screws (2).
5. Tighten up all counternuts (1) firmly again.

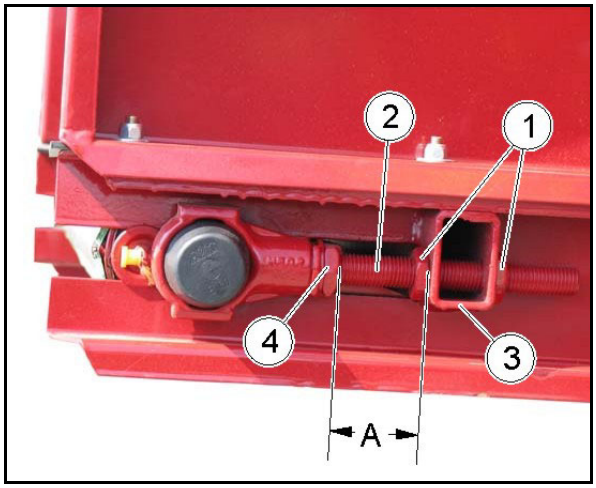


Fig. 95

11.9.3 Cleaning of driving, supporting and guide rollers

1. Secure the tractor and the machine against accidental starting and rolling, see information on page 126.
2. Release the conveyor (1).
3. Rotate the released conveyor until the side of the belt fastener (2) is positioned on the guide roller.
4. Draw the connecting wire out of the belt fastener.
5. Remove the conveyor.
6. Clean:
   - the driving, supporting and guide rollers,
   - the frame,
   - the rubber seal strips.
7. Reinstall the conveyor.

   Ensure that the rubber seal strips rest on top of the conveyor.
8. Mount the connecting wire.
9. Tighten the conveyor.

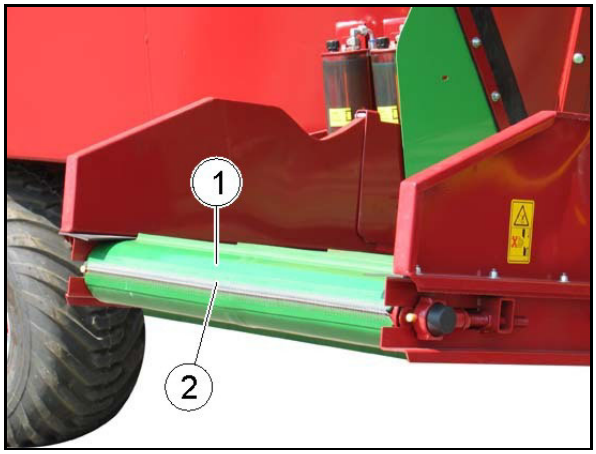


Fig. 96

11.10 Replacing of remote control cable of mechanical remote control unit

Disassembly

Connection to control valve of control block:

1. Unscrew counternut (H).
2. Remove the two screws (P) at the adapter (G).
3. Remove pin (M).
4. Strip the connecting sleeve (F) off the sliding pin (K).

Connection to operating element:

5. Remove the locking screw (A).
6. Operate control device (B) until the connecting pin (C) is visible.
7. Unscrew the threaded sleeve (D) of the remote control cable from connecting pin (C) with operating control device (B) actuated.
8. Release operating control device (B) and draw sleeve (E) completely out of the housing.

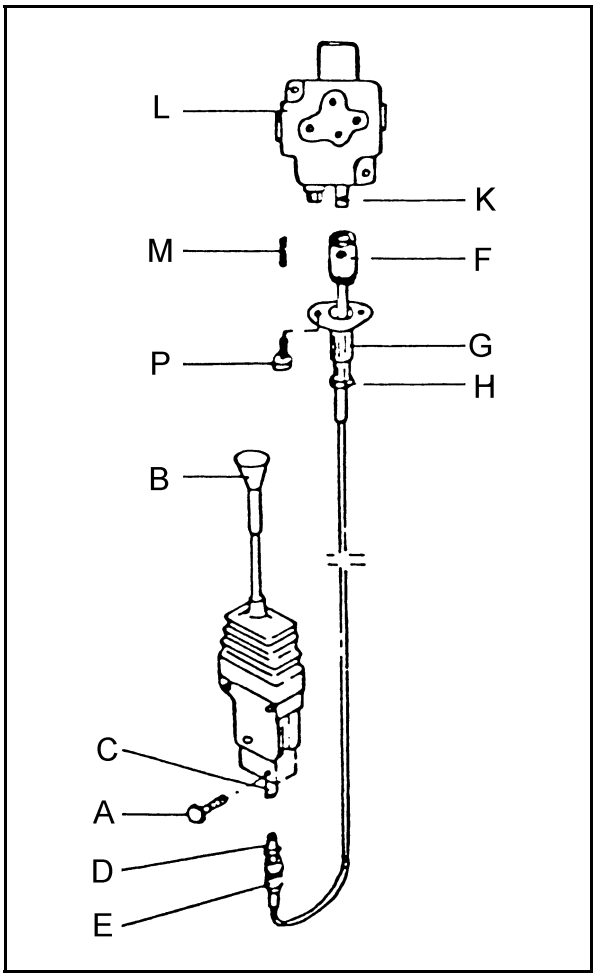


Fig. 97

Assembly

Connection to control device:

1. Remove the locking screw (A).
2. Operate control device (B) until the connecting pin (C) is visible.
3. Screw threaded sleeve (D) of the remote control cable into the connecting pin (C) with operating control device (B) actuated.
4. Release operating control device (B).
5. Insert sleeve (E) completely into the housing.
6. Mount locking screw (A).

Connection to control valve of control block:

7. Operate control device (B) until the connecting sleeve (F) is jutting out of the adapter (G).
   Possibly loosen counternut (H) and turn back adapter (G).
8. Slip the connecting sleeve (F) onto the sliding pin (K).
9. Connect connecting sleeve (F) and the sliding pin (K) by means of pin (M).
10. Turn the adapter (G) until it fits closely to the valve box (L).
11. Fasten the adapter (G) to the valve box (L) by means of the two screws (P) M 6 x 16.
12. Tighten the counternut (H).

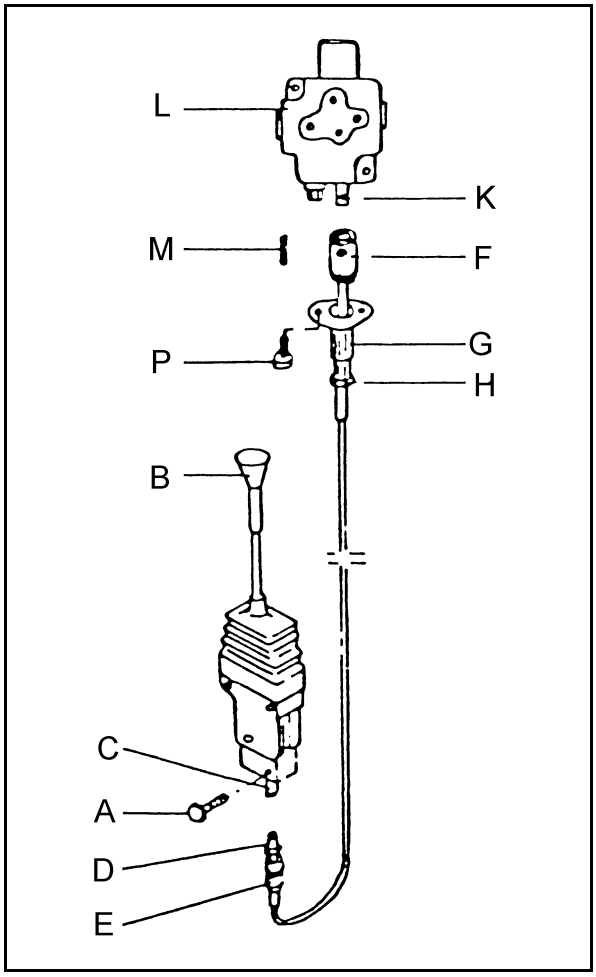


Fig. 98

11.10.1 Replacing of remote control cable adapter (G)

1. Remove the connector at the control valve of the control block.
2. Unscrew the counternut of connecting sleeve (F).
3. Unscrew the connecting sleeve (F).
4. Replace the adapter (G).
5. Screw on the connecting sleeve (F).
6. Tighten the counternut of connecting sleeve (F).
7. Install the connector at the control valve of the control block.

11.11 Hydraulic system

WARNING

A risk of infection in persons can occur if hydraulic oil escapes under high pressure and penetrates the body!

- Only specialist workshops are permitted to carry out work on the hydraulic system.
- Make the hydraulic system pressure less before beginning work on the hydraulic system.
- Only use suitable auxiliary agents when looking for leaks.
- Never try to block leaks in hydraulic hose lines with your hands or fingers.

  Hydraulic oil escaping under high pressure can penetrate the skin and cause severe injuries.

  If injuries occur from hydraulic oil, consult a doctor immediately! Risk of infection.
- Risk of explosion in the case of improper work on hydraulic reservoirs!

  Welding, soldering, drilling and other work on hydraulic reservoirs which can alter the mechanical properties are forbidden.
- For maintenance of the hydraulic system consult the chapter "Basic safety instructions", page 37.

WARNING

There is a danger of exposed persons slipping down if hydraulic oil leaks during work on the hydraulic system!

Remove fresh oil blotches immediately with binding agents.

- Take care when connecting the hydraulic hose lines to the hydraulic system of the tractor, that the hydraulic system on the tractor and on the machine is pressure-less.
- Make sure the hydraulic hose lines are correctly connected.
- Check all hydraulic hose lines and hydraulic plugs regularly for damage and soiling.
- Have the hydraulic hose lines checked out for their safe working condition at least once a year by a specialist.
- Replace hydraulic hose lines when damaged or worn. Always use genuine hydraulic hose lines from the manufacturer.
- Hydraulic hose lines should not be used for longer than six years, including a possible storage time of a maximum of two years.

  Even when hose and hose lines have been stored and used correctly, they are still subject to natural ageing processes, which is why their storage time and length of usage is limited. Periods of usage differing from the above may have to be applied to take into account empirical values and in particular accident potential. Other guidelines can apply for hose and hydraulic hose lines made of thermoplastics
- Dispose of waste oil according to the regulations. Should you

have any problems with disposal, consult your oil supplier.

- Keep hydraulic oil well secured out of reach of children.
- Ensure that no hydraulic oil gets into ground or water.

11.11.1 Make the hydraulic system pressure-less

WARNING

Danger from accidental contact with hydraulic oil occur when hydraulic oil escaping under high pressure penetrates the body; in particular in the case of hydraulic systems with diaphragm pressure tanks!

- All work on the hydraulic system is prohibited, when the hydraulic system is under working pressure.
- Make the hydraulic system pressure less before carrying out work on the hydraulic system.
- If injuries occur from hydraulic oil, consult a doctor immediately.

1. Relieve the relevant hydraulic cylinder via the corresponding controller.

11.11.2 Hydraulic hose lines

11.11.2.1 Flagging and length of usage of hydraulic hose lines

The flagging on the fitting (Fig. 99) provides the following information:

(1) Identification of the manufacturer of the hydraulic hose line (A1HF)

(2) Date of manufacture of the hydraulic hose line
(07 / 10 = year / month = october 2007)

(3) Maximum permissible operating pressure (210 BAR)

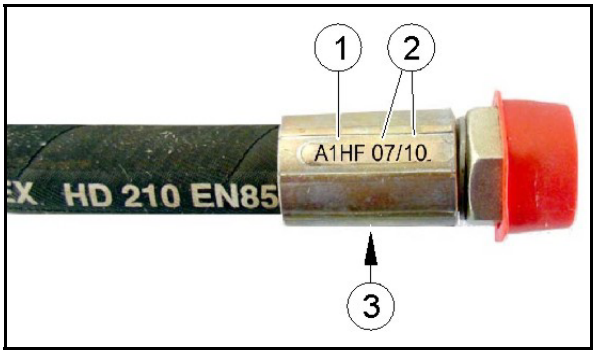


Fig. 99

The period of use of a hydraulic hose line ends when the date of manufacture of the hydraulic hose line (2) has been exceeded by more than 6 years.

Example:

Date of manufacture (2) = 07 / 10	October 2007
End of period of use	October 2013

Do not use the hydraulic hose line after the date for end of usage has been reached.

11.11.2.2 Service Intervals

After the first 10 hours of operation and after that every 50 hours of operation:

1. Check seal tightness on all components of the hydraulic system.
2. Tighten up screw connections as required.

Before every initial start-up:

Check the hydraulic hose lines for obvious defects. Stop the following defects immediately:

1. Repair rubbed points on hydraulic hose lines and tubes.
2. Replace worn, damaged or over aged hydraulic hose lines immediately (Workshop tasks).

11.11.2.3 Inspection criteria for hydraulic hose lines

In the interests of your own safety:

Replace hydraulic hose lines immediately as soon as you discover the following defects:

- Damage to the outer layer through to the middle layer (e.g. worn spots, cuts, tearing).
- Increasing brittleness of outer layer (crack formation on hose material).
- Unnatural deformation of the hydraulic hose line, both in pressure-less as well as pressurised condition or with bending (e.g. layer separation, blistering, pinch or kink sites).
- Leaks.
- Hose fitting damage, deformation or leakage. Minor surface damage does not necessitate replacement.
- Hose slipping out of the fitting.
- Corrosion of fitting, which can impair functions and resistance.
- Incorrectly laid hydraulic hose lines e.g. disregarded bending radii, routing over sharp edges.
- Exceeding limit of 6 years of use. For further information please consult the chapter "Flagging and length of usage of hydraulic hose lines", page 173.

11.11.2.4 Installation and removal of hydraulic hose lines (Workshop tasks)

When installing and removing hydraulic hose lines, compliance with the following statements is essential:

- Always use the genuine hydraulic hose lines of the manufacturer.
- Ensure cleanliness.
- Install the hydraulic hose lines in such a way that in every operating condition:
  - no tensile strength occurs except from net weight,
  - no compressive stress arises with short lengths,
  - external mechanical effects on the hydraulic hose lines are avoided.

    Prevent hydraulic hose lines from rubbing against component parts or against each other by purpose-orientated layout and securing. If necessary protect hydraulic hose lines with a protective coating. Cover up sharp-edged parts.
  - the admissible bending radii must not be exceeded.
- Calculate the hose length of a hydraulic hose line for connection to rotating parts, so that:
  - over the entire area of movement, the smallest permissible bending radius is not exceeded,
  - the hydraulic hose line is not subjected to tensile strength.
- Secure the hydraulic hose lines to the designated attaching points. Avoid additional hose fixtures which restrict natural movement and length altering of the hydraulic hose lines.
- Painting over hydraulic hose lines is not permitted.

11.12 Tyres

Good tyre economy is a question of regular checks and driving with the correct tyre pressure.

11.12.1 Check tyres

- Check the tyre pressures at least every 14 days. If the machine is not used for a longer period of time, check the tyre pressure before starting up machine operation again.

  Always ensure that the tyre pressure is always correctly adjusted to the type of work which is normally carried out by the machine in question.
- Never overload tyres.
- Ensure that the caps fit correctly on the valves and well tightened.
- It is advisable to check the tyres during operation for "folds" or other abnormal deformations.

  Remove any stones, gravel, nails and other foreign objects which have got stuck in the tyres before they have a chance to work themselves into the tyres.

  Have deep cuts repaired as quickly as possible.
- Relieve tyres if you will not be using the vehicle for a longer period of time. This prevents tyre deformation.
- Store the "unmounted" wheels in a dark place, free of oil and other chemicals.
- Do not put the tyres near electric motors. The ozone produced by the electric motors dries out the rubber.

11.12.2 Changing tyres

When repairing tyres and wheels please consult the chapter "Basic safety instructions", page 42.

WARNING

Exposed persons are in danger of being injured by crushing or impact when the machine is lowered to change the tyres!

- Use hoisting equipment with sufficient lifting power, which is suitable and admissible for the weight of the machine.
- Only apply the hoisting equipment at the designated fitting points.
- Take care that the ground is sufficiently firm before lifting the machine with hoisting equipment and securing it against accidental lowering with safety stands. If necessary use also robust, load-distributing back-up bases.
- Never stand or walk under a raised, unsecured machine.

WARNING

Situations dangerous to exposed persons can arise when repair work on tyres and wheels is not carried out according to good professional practice!

- Only skilled personnel equipped with the appropriate fitting tools may carry out repairs to tyres and wheels.
- Never use or repair damaged wheel rims.

1. Secure the tractor and machine against accidental starting and rolling away, see page 126.
2. Apply the hoisting equipment at the designated fitting points.

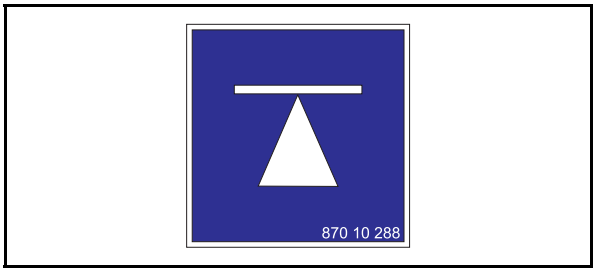


Fig. 100

3. Keep to the order shown when loosening and tightening wheel nuts. Fig. 101
4. Tighten the wheel nuts to the required torque:
   - o M 18x1.5 – 270^{+20+0} Nm
   - o M 22x1.5 – 450^{+60+0} Nm
5. Check wheel nuts for tight fit after 10 hours in operation. Re-torque the wheel nuts as required.

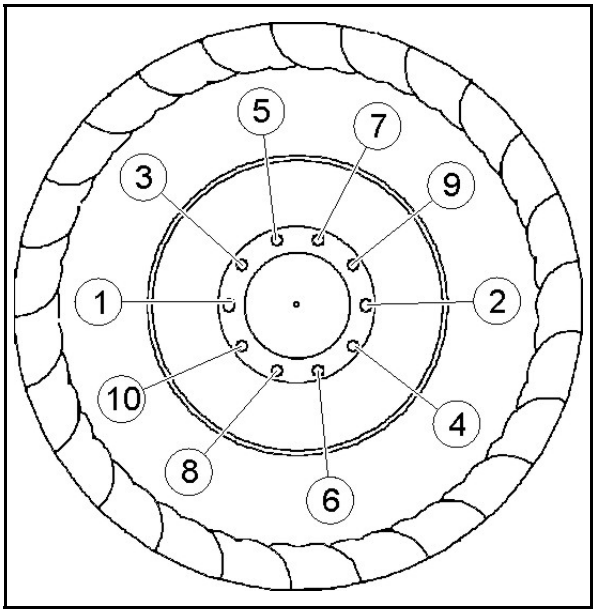


Fig. 101

11.13 Brake system

11.13.1 Check / Clean in-line filters of compressed-air brake system

The in-line filters of the brake and supply line protect the compressed-air brake system from being soiled by solid particles.

The air supply to the brake system takes precedence over the protection of the brake system against soiling and must be guaranteed at all times. In case of the filter element being blocked, an internal bridging-over element opens and unfiltered air passes through the in-line filter. The brake system remains in full working order for both directions of flow.

- Clean the two in-line filters approx. every 3 – 4 months, depending on the operating conditions.
- Replace damaged filter elements.

1. Secure tractor and machine against accidental starting and rolling.
2. Uncouple supply and brake line from the tractor.
3. Push in base plate (1).
4. Release slide valve (2).
5. Remove base plate (1) with O-ring (3), pressure spring (4) and filter element (5) from the casing.
6. Clean (rinse) the filter element with benzine or a dilution and blow dry by means of compressed air.
7. Reinsert filter element, pressure spring and cap with O-ring into the casing.

Ensure that the O-ring will not get jammed in the guiding slot during insertion.

8. Reclose slide valve.
9. Hitch the brake and supply line to the tractor.
10. Check in-line filters for tightness.

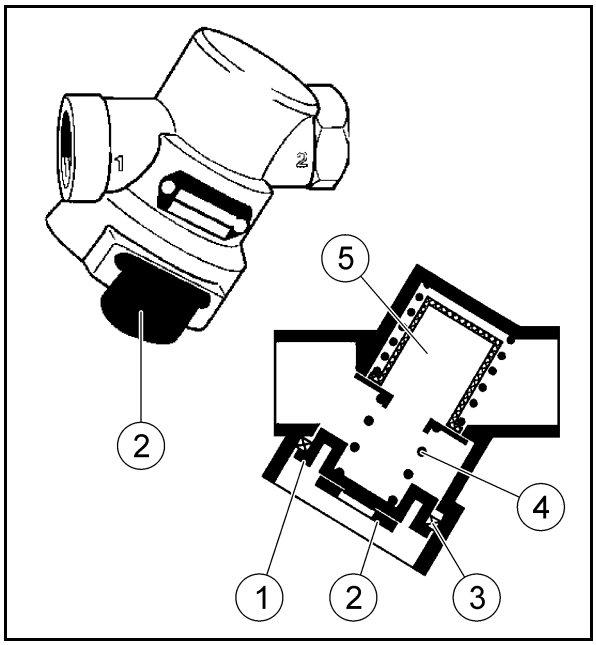
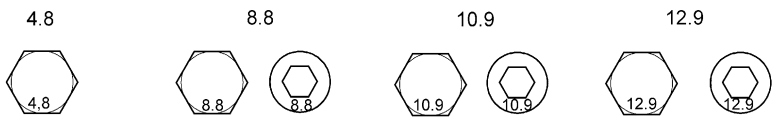


Fig. 102

11.13.2 Check brake system for proper functioning.

- Check brake system for proper functioning before start-up of the machine. Have any irregularities or malfunctions of the brake system promptly remedied by an authorised workshop.
- Have the brake system checked by an authorised workshop for proper functioning every 200 service hours.

11.14 Torque settings for metric screw connections

Class and marking of bolt heads	
Class and marking of nuts	

Size	Class 4.8				Class 8.8				Class 10.9				Class 12.9			
	oiled*		dry°		oiled*		dry°		oiled*		dry°		oiled*		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

* *"Oiled" means, that the screws are lubricated with, for example, engine oil, or that phosphated or oiled screws are used.*

° *"Dry" means, that normal or zinc-plated screws without any lubrication are used.*

Tab. 9

The torque settings shown in the chart are recommended values. They only apply if no other torque settings for certain screws or nuts are prescribed in this operating manual.

- Check regularly that the screws and nuts are firmly screwed in.
- Shear bolts are so designed that they shear off at a certain load level. Only use bolts of the same class when replacing shear bolts.
- When replacing nuts and bolts take care to replace them with corresponding parts of the same or higher class.
- Tension nuts and bolts of a higher class with the same torque as the parts originally used.
- Make sure the thread is clean and the screws correctly inserted before tightening up the screw connections. This prevents damage occurring during tightening up.
- Torque the lock nuts (not the screws) with plastic inserts and flanged steel lock nuts with approx. 50% of the “dry” value shown in the chart.
- Torque the toothed or castellated nuts with the full torque.

12 Eliminating malfunctions

WARNING

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

- **lifted, unsecured machine parts accidentally come down or are lowered unintentionally, e.g. an open discharge door,**
- **tractor and machine accidentally start and roll away.**
- Secure raised machine parts against accidental lowering before you start work in the vicinity of raised parts.
- Secure the tractor and the machine against accidental starting and rolling before eliminating any malfunctions on the machine.
  Take note of the information in the chapter "Securing tractor and machine against accidental starting and rolling", page 126.
- Wait until the machine stands still before entering the danger area of the machine.

12.1 Malfunctions and remedy – machine

Malfunction	Cause	Remedy
The power requirement is too high, shear bolt of the shear bolt coupling in front of the angular gearbox shears	Cutting knives blunt	Sharpen cutting knives.
	Long stalks have wrapped around the front end of the auger 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.
Mixing auger does not rotate with the p.t.o. shaft powered	Gear levels at the switchgear not selected clearly	Clearly select gear level I or II.
	Shear bolt of the shear bolt coupling in front of the angular gearbox sheared off.	Replace shear bolt.
Machine does not mix well	Fodder is piling up in front of counter-cutter	Extend and retract counter-cutter.
Non-uniform discharge	All cutting knives retracted (out)	Extend lower cutting knives (in).
Crossover conveyor does not start	Operating error	First switch on crossover conveyor, open discharge door only then.
	Crossover conveyor too loose	Tighten crossover conveyor.

Tab. 10

12.2 Malfunctions and remedy – electrics

Electro-hydraulic control does not work (all functions)	No voltage (12 V) at the control unit	Plug 3-pole plug (DIN 9680) into the socket for the tractor's power supply.
	Polarity of plug and socket are not compatible	Check polarity of plug and socket and reconnect, if necessary.
	Fuse for socket defective	Replace fuse.
	Fuse for control unit defective	Replace fuse.
	Insufficient power supply and amperage	Power requirement approx. 20 A (12 V). Check socket and cabling.
		Check power supply, sockets and cables.
One of the electrically operated functions does not work	Insufficient power supply	Check switches etc. (measurement at the valve plug).
	Control valve blocked	Check via emergency operation.
Functions work irregularly	Cable cross-sections of supply line too small	Select larger cable cross-section - at least 4 mm²
No hydraulic function available	Hydraulic hose lines not correctly coupled (return pipe to pressure connection)	Couple hydraulic hose lines correctly.
	Hydraulic plugs not correctly locked in hydraulic sleeves	Insert hydraulic plugs into hydraulic sleeves until the hydraulic plugs noticeably lock.

Tab. 11

12.3 Malfunctions and remedy – Weighing device

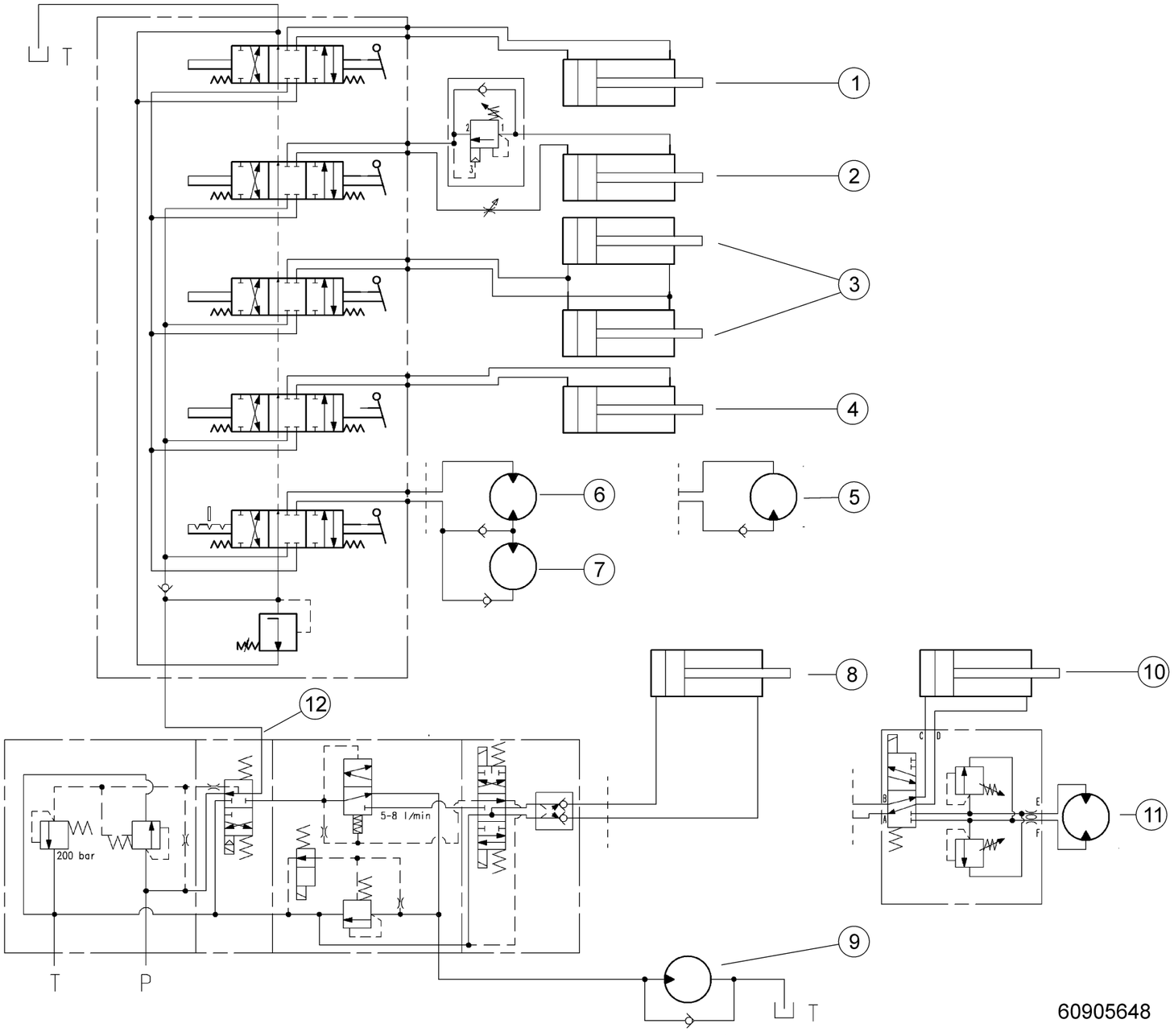
Absolutely observe the included operating manual for the weighing device.

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 polarity connecting cable. (The devices are equipped with an automatic fuse).
Device displays bars (top or bottom)	Device	Pull the connecting box plug out of the weighing computer and watch display. If the bars disappear, the weighing computer functions properly.
	Connecting box	Pull out the plugs of all weighing rods, the connecting 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 into the connecting 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".
	Connecting 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 into the connecting 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 manual "Recalibration".
Device displays ERROR	Internal error	Send device in for repair.

Tab. 12

13 Circuit diagrams

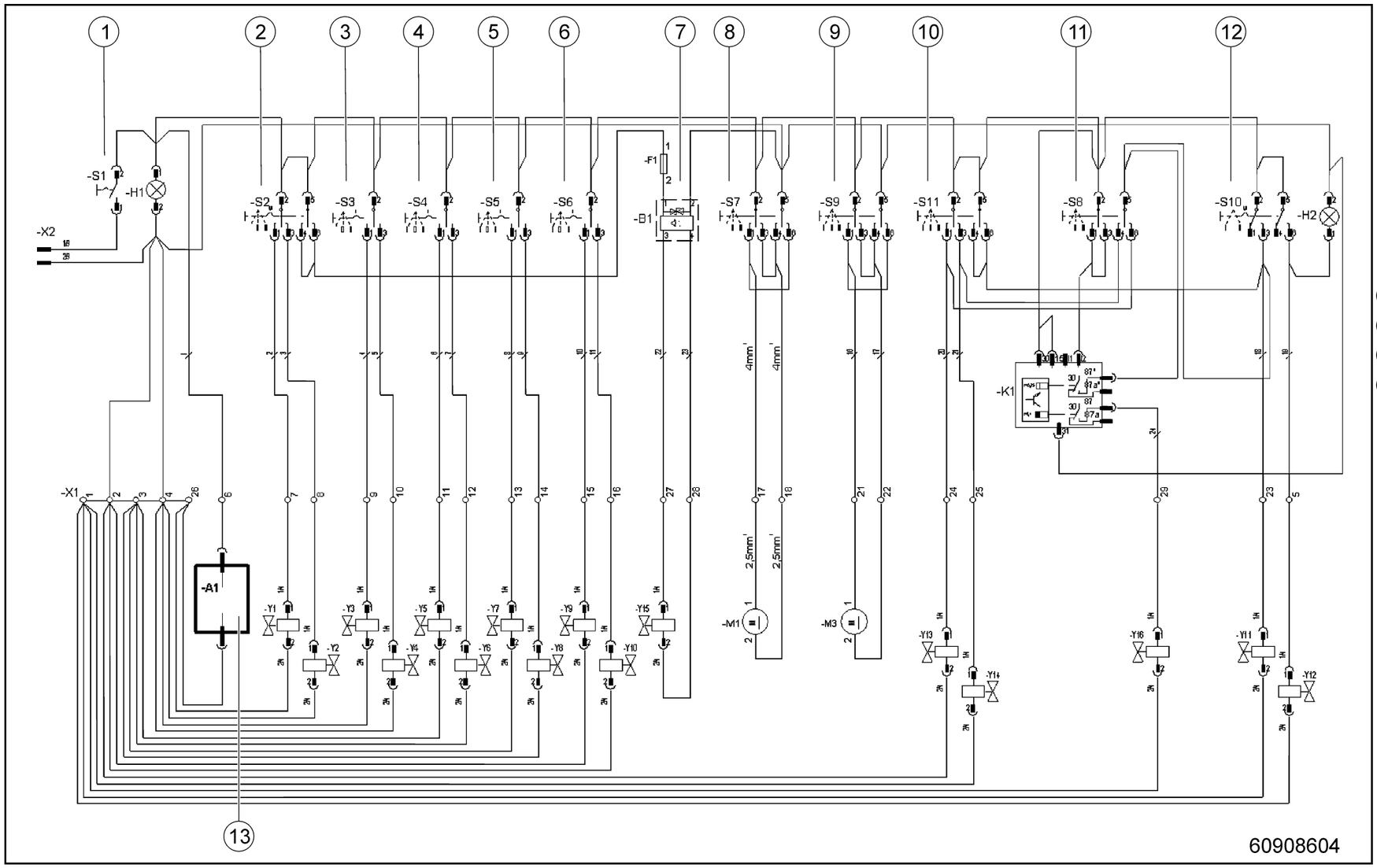
13.1 Hydraulic circuit diagram



(1) Discharge door
(2) Height adjustment for conveyor extension
(3) Hydraulic counter-cutters
(4) Hydraulic support stand
(5) Hydraulic motor of discharge conveyor for side discharge
(6) Hydraulic motor for crossover conveyor
(7) Hydraulic motor for conveyor extension
(8) Discharge door for straw blower with manual rotary adjustment of tower
(9) Hydraulic motor for straw blower
(10) Discharge door for straw blower with hydraulic rotary adjustment of tower
(11) Hydraulic motor for hydraulic rotary adjustment of tower

Fig. 103

13.2 Electrical circuit diagram



(1) Control ON
(2) Crossover conveyor cw rotation / ccw rotation
(3) Discharge door
(4) Hydraulic support stand
(5) Hydraulic counter-cutters
(6) Conveyor extension
(7) Conveyor speed
(8) Switchgear
(9) Ejection hood for straw blower
(10) Discharge door for straw blower
(11) Hydraulic rotating mechanism for ejection tower
(12) Straw blower ON
(13) Weighing device

Fig. 104

13.3 Weighing device

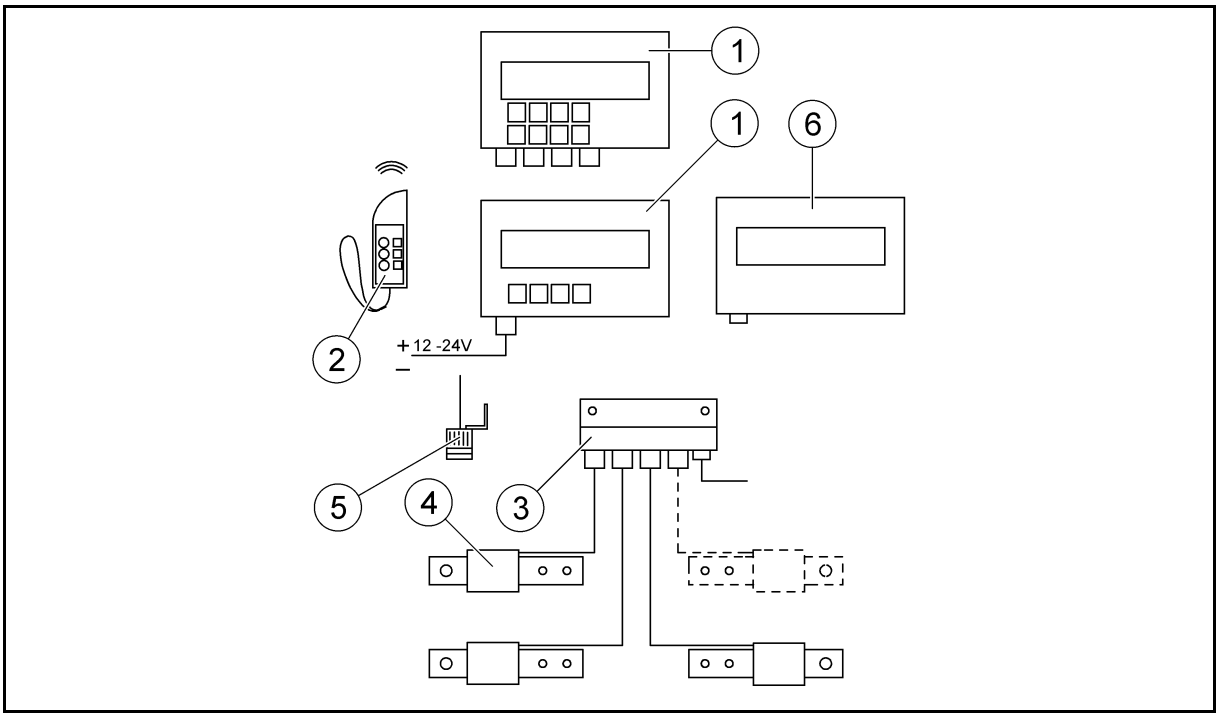


Fig. 105

(1) Weighing computer

(2) Radio remote control

(3) Collecting box

(4) Weighing rod

(5) Signal hooter

(6) Additional large-scale display