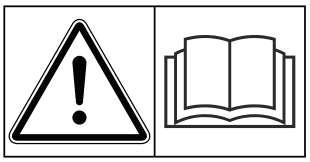
RAUCH

# Operator's manual

## Please read carefully before using the machine!

### Keep for future use

This operator's and assembly manual is an integral part of the machine. Suppliers of new and second-hand machines are required to document in writing that the operator's and assembly manual was delivered with the machine and handed over to the customer.

AERO 32.1

5903181-b-en-0423

Original instructions

**Foreword**

Dear customer,

By purchasing the boom-type mineral fertilizer spreader, you have shown confidence in our product. Thank you very much! We want to justify this confidence. You have purchased a powerful and reliable machine.

However, in case unexpected problems arise, our customer service department is always there for you.

**Please read this operator's manual carefully before commissioning the machine and follow the advice given.**

This operator's manual gives detailed instructions on the operation of the machine, as well as valuable information on assembly, maintenance, and care.

This manual may also describe equipment that is not included in your machine.

Please note that damage caused by incorrect operation or improper use cannot be covered by warranty claims.

Please enter your model type and serial number, together with the year of manufacture of your machine here.
These data are provided on the machine nameplate or on the frame.
Please state this information when ordering spare parts or optional equipment, and in case of complaints.

Type: Serial number: Year of manufacture:

**Technical improvements**

We continuously strive to improve our products. For this reason, we reserve the right to make any improvements and changes to our machine that we consider necessary without notice. We do not accept any obligation to make such improvements or changes on machines that have already been sold.

We will be pleased to answer any other questions that you might have.

Yours sincerely

RAUCH Landmaschinenfabrik GmbH

# Table of contents

# 1 Intended use

The mineral fertilizer spreaders of the series AERO 32.1 may only be used in accordance with the stipulations of the present operator’s manual.

**They may only be used for the application of dry, granular and crystalline fertilizers, seeds and slug pellets.**

The machine is intended as a three-point linkage on the rear of a tractor and for operation by a person.

In the following chapters, the mineral fertilizer spreader is referred to as the "machine".

Any use beyond these specifications is considered as contrary to the intended use. The manufacturer shall not assume any liability for any damages resulting from this. The risk is solely carried by the operator.

The intended use also comprises the compliance with the operating, maintenance, and repair conditions prescribed by the manufacturer. Only genuine spare parts from RAUCH may be used as replacements.

The machine may only be used, maintained and repaired by people who are familiar with the characteristics of the machine and who are aware of the risks.

The instructions regarding the operation, service, and safe handling of the machine as described in this operator's manual and declared by the manufacturer in the form of warning signs and symbols on the machine must be strictly followed during operation. The relevant accident prevention regulations and other generally recognized safety-related, occupational health and road traffic regulations must be observed when using the machine.

Unauthorized modifications to the machine are not permitted. Such modifications exclude any liability of the manufacturer for any resulting damages.

■ ***Foreseeable misuse***

The manufacturer provides warning notes and signs on the mineral fertilizer spreader relating to foreseeable misuse. These warnings and warning symbols must always be observed. This way, application of the machine against the intentions of the operator’s manual is prevented.

## 1.1 Specimen of the "EC Declaration of conformity"

# Original EC-/EU-Declaration of Conformity

RAUCH



The manufacturer

RAUCH Landmaschinenfabrik GmbH
Landstr. 14 * 76547 Sinzheim * Germany

hereby declares that the product below:

**Fertilizer Spreader: AERO 32.1**

**Serial No:**

complies with all relevant provisions in the directives listed below
-including any amendments applicable at the time of the declaration

**Machine Directive 2006/42/EC, Appendix II, No. 1A**

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The following harmonised standards have been applied:

Compilation of the technical documentation:
RAUCH Landmaschinenfabrik GmbH
Design management
Landstr. 14 * 76547 Sinzheim * Germany

M.Sc. Volker Stöcklin
Director Research and Development

# 2 User instructions

## 2.1 About this operator’s manual

This operator’s manual is an **integral part** of the machine.

The operator’s manual contains important instructions for **safe, proper,** and economic **use** and **maintenance** of the machine. Compliance with its stipulations helps to **avoid risks**, reduce repair costs and downtime, and to increase the reliability and service life of the machine controlled with it.

The complete documentation, comprising this operator’s manual and any other documents provided, must be kept in an easily accessible location close to where the machine is used (e.g., in the tractor).

If the machine is sold, the operator’s manual must also be passed to the new owner.

The operator’s manual is intended for the operator of the machine and anyone involved in operating and maintaining it. It must be read, understood, and applied by every person who is entrusted with the following work on the machine:

- Operation,
- Maintenance and cleaning,
- Troubleshooting.

In particular, the following is to be observed:

- The chapter on safety,
- The warnings in the text of the individual chapters.

The operator's manual does not replace your **own responsibility** as operator and operational staff of the machine control unit.

## 2.2 Structure of the operator’s manual

The operator’s manual is divided into six key areas in terms of content

- User instructions
- Safety instructions
- Machine data
- Instructions on operating the machine
- Instructions for finding and correcting faults
- Maintenance and service instructions

## 2.3 Notes on text descriptions

### 2.3.1 Instructions and procedures

Steps that the operator must carry out are shown as follows.

▶ Instruction for action step 1

▶ Instruction for action step 2

### 2.3.2 Lists

Lists without a specific sequence are shown as lists with bullet points:

- Property A
- Property B

### 2.3.3 References

References to other sections in the document are shown with paragraph number, header text and/or page number:

- **Example:** Please also note *3 Safety*

References to other documents are shown as information or instructions without the exact chapter or page number:

- **Example:** Follow the instructions in the operator’s manual of the universal drive shaft manufacturer.

# 3 Safety

## 3.1 General information

The chapter **Safety** contains basic warning notes as well as working and traffic safety instructions for the usage of the installed machine.

The adherence to the instructions in this chapter is a prerequisite for the safe handling and trouble-free operation of the machine.

There are additional warnings in the other chapters of this operator's manual, which must also be observed. The warning instructions are given before the text for the relevant actions.

Warning notes on the supplier components can be found in the respective supplier documentation. These warning instructions must also be observed.

## 3.2 Meaning of warnings

The warnings in the operator's manual are classified according to the severity of the risk and the probability of its occurrence.

The warning symbols draw attention to the residual risks to which users of the machine are exposed. The warnings used are structured as follows:

| |
|---|
| Symbol + **signal word** |
| Explanation |

**Level of danger of warnings**
The level of danger is indicated in the signal word. The levels of danger are classified as follows:

**⚠ DANGER!**

**Type and source of danger**

This warning warns of a danger posing an immediate threat to the health and life of people.

Ignoring these warnings will result in severe injury or death.

- ▶ Always observe the measures described to prevent this danger.

**⚠ WARNING!**

**Type and source of danger**

This warning warns of a potentially dangerous situation for personal health.

Ignoring these warnings leads to severe injury.

- ▶ Always observe the measures described to prevent this danger.

**⚠CAUTION!**

**Type and source of danger**

This warning warns of a potentially dangerous situation for personal health.

Ignoring these warnings leads to injury.

▶ Always observe the measures described to prevent this danger.

***NOTICE!***

**Type and source of danger**

This warning warns of material and environmental damage.

Ignoring these warnings will result in damage to the machine and to the environment.

▶ Always observe the measures described to prevent this danger.

This is an instruction:
General instructions contain tips for the operation and information that is particularly useful, but no warnings about hazards.

## 3.3 General information on the safety of the machine

The machine is constructed in accordance with the state of the art and the recognized technical regulations. However, its usage and maintenance may cause danger to the health and life of the operator or third parties and/or the impairment of the machine and other material assets.

For this reason, the machine may only be operated
- when it is in a proper and roadworthy condition,
- in awareness of safety and dangers.

Therefore, it is imperative that you have read and understood the contents of the operator's manual. You must be familiar with the applicable accident protection regulations and the generally accepted regulations for safety, occupational health, and road traffic, and apply these rules as required.

## 3.4 Instructions for the operator

The owner is responsible for the intended use of the machine.

### 3.4.1 Qualifications of personnel

Before starting any work on or with the machine, all persons who are involved in operation, maintenance or service must have read and understood this operator's manual.

- The machine may only be operated by instructed personnel authorized by the owner.
- Persons who are apprentices, in training or under instruction may only work on the machine under the supervision of an experienced person.
- Maintenance and service may only be carried out by qualified maintenance personnel.

### 3.4.2 Instruction

Distribution partners, works representatives or employees of the manufacturer will instruct the operator regarding the operation and maintenance of the machine.

The owner must ensure that newly recruited operating and maintenance personnel are instructed to the same extent and with the same care with regard to the operation and repair of the machine in compliance with this operator’s manual.

### 3.4.3 Accident prevention

Safety and accident prevention regulations are legally specified in every country. The owner of the machine is responsible for observing the regulations applicable in the country of operation.

The following instructions must also be observed:

- Never let the machine run without supervision.
- Do not ride on the machine while it is working or being transported (**no passengers**).
- **Do not use** machine parts as steps.
- Always wear tight fitting clothes. Do not wear work clothes with belts, loose threads or other items that could get caught.
- Follow the manufacturer's warnings when handling chemicals. You may have to wear personal protective equipment (PPE).

## 3.5 Information on operational safety

Only use the machine in safe operating condition. Avoid hazardous situations.

### 3.5.1 Parking the machine

- Park the machine with the swivel frame in the operating position.
- Park the machine with an empty hopper on a pallet.

For more information, refer to chapter *9.12 Parking and unhitching the machine*

### 3.5.2 Filling the machine

- Only fill the machine when the engine of the tractor is shut off. Remove the ignition key in order to prevent the engine from being started.
- Make sure that there is adequate space on the filling side. Make sure to pay attention to a potential collision with the swivel frame cylinders.
- Use suitable auxiliary equipment for filling the machine (e.g. front-end loader, feed screw conveyor).
- Fill the machine no higher than the top-edge. Check the filling level.
- Only fill the machine with the protective grid closed. This way, faults during spreading caused by lumps in the spreading material or other foreign bodies are prevented.

### 3.5.3 Checks before commissioning the machine

Check the operating safety of the machine before the first and every subsequent commissioning.

- Is all safety equipment at the machine installed and functioning?
- Are all fasteners and load-bearing connections tightly installed and in good condition?
- Are all locking mechanisms securely engaged?
- Are there cracks in the wire rope or on the rope/rope pulley interface?
- Are the protective grids in the hopper closed and locked?
- Are there **no** persons in the danger zone of the machine?
- Is the universal drive shaft cover in good condition?

### 3.5.4 Hazard zone

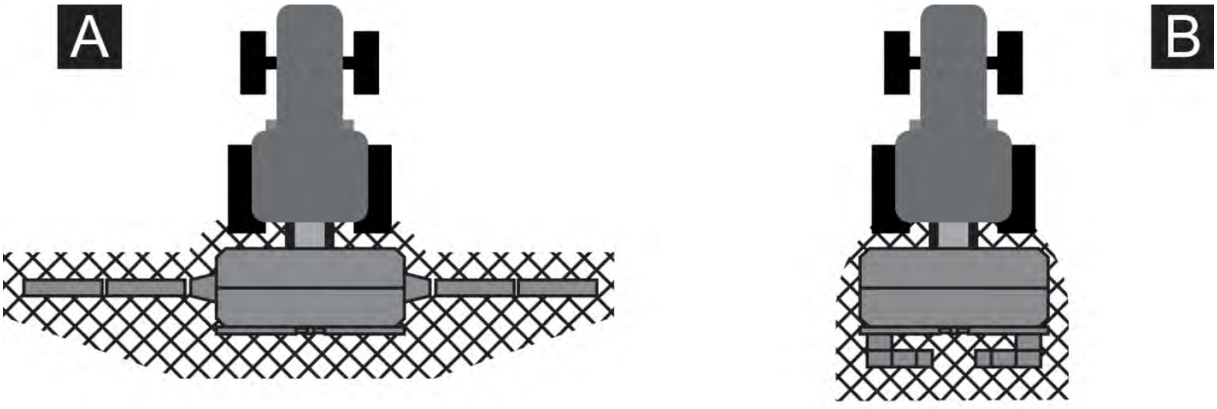



*Fig. 1: Hazard zone when devices are attached*

A Hazard zone in spreading operation

B Hazard zone when coupling/decoupling the machine

Ejected spreading material may cause serious injury (e.g., to the eyes).

When persons are present between the tractor and the machine, there is a great hazard by the tractor rolling away of machine movements When persons are present between the tractor and the machine which may have fatal consequences.

- During spreading operation or when swinging the boom in/out, ensure that no persons are present in the spreading range [A] of the machine.
- Immediately stop the machine and the tractor if persons are present in the hazard zone of the machine.
- When coupling/decoupling the machine at the tractor or swiveling the swivel frame, make sure that no one is in the hazard zone [B].

### 3.5.5 Running operation

- In the event of malfunctions, the machine is to be shut down and secured immediately against reactivation. Have the fault repaired immediately by qualified technicians.
- Never climb on the machine.
- Only operate the machine with the protective grid in the hopper closed. During operation, the protective grid must **neither be opened nor removed**.
- Only operate the machine when the protective covers are installed.
- Rotating machine components can cause serious injury. Make sure that body parts or clothing never come close to rotating components.
- Do not deposit any parts (such as screws, nuts) in the hopper.
- Leaked fertilizer may cause serious injuries (e.g., to the eyes). For this reason, ensure that nobody is present in the spreading range of the machine.
- If the wind speed becomes too high, spreading has to be stopped as the specified spreading range cannot be guaranteed under such conditions.
- Before operating the boom, make sure that there is sufficient space available, that there are no persons in the hazard zone, and that there are no other obstacles in the way.
- If the terrain is uneven, the boom can come into contact with the ground or with obstacles. Avoid dangerous situations such as touching live overhead lines.
- Only swing the boom in and out on level surfaces.
- Only swing the boom in and when the tractor is stationary.
- Do not swing the boom in and out in close proximity to overhead lines. Make sure to maintain a sufficiently safe distance.
- Ensure that the swivel frame is in the operating position and locked on the left and right before starting the swinging process.
- Do not climb on the machine or the tractor when it is situated beneath high-voltage electrical power lines.

■ ***Measures in case of contact with overhead lines***

Operations such as folding in, folding out, leveling the boom, etc., can change the dimensions of the machine. Check the area to make sure that the machine can be operated safely.

- Do not leave the vehicle if it is standing under hazardous voltage (discharge voltage pattern).
- In case of contact with power lines, remain in the vehicle if possible.
- Keep all persons away from the machine (at least 10 m) and contact emergency services to ask them to switch off power.
- Drive away from the power line if the machine is operational.
  If you have to leave the cabin, park the machine, turn off the engine, and jump away from the machine as far as possible. Do not touch the ground and the machine at the same time as this may result in electric shock.
- Maintain a safe distance from the machine as the ground near the machine can be live.
- Do not return to the machine until the operator of the power line has confirmed that it is safe to do so.

## 3.6 Using fertilizer

Improper selection or use of fertilizer may cause serious injury or environmental damage.

- When selecting the fertilizer, inform yourself of its effects on humans, the environment and the machine.
- Always follow the instructions of the fertilizer manufacturer.

## 3.7 Hydraulics system

The hydraulic system is under high pressure.

Fluid escaping under high pressure may cause serious injury and environmental damage. The following instructions must be observed to prevent danger:

- Always operate the machine below the permissible maximum operating pressure.
- **Release the pressure** from the hydraulic system **before** carrying out any maintenance. Switch off the engine of the tractor. Secure it against reactivation.
- When searching for leaks, always wear safety **glasses** and safety **gloves**.
- In case of injury in connection with hydraulic oil, consult **a physician immediately** as severe infections may occur.
- When connecting the hydraulic hoses to the tractor, ensure that the hydraulic system is **depressurized**, both on the tractor and the machine side.
- Attach the hydraulic hoses of the tractor and the spreader hydraulic systems only with the prescribed connections.
- Prevent any contamination of the hydraulic circuit. Always suspend the couplings in the brackets provided. Use the dust caps. Clean the connections before coupling them.
- Regularly check the hydraulic components and hydraulic hose lines for mechanical defects, e.g., cuts and abrasions, contusions, bends, tears, porosity, etc.
- Even when stored correctly and used within approved load limits, hoses and hose couplings are subject to a natural aging process. This limits their storage and service life.

The hydraulic hoses are designed for a maximum service life of 6 years, including storage for a maximum of 2 years.

The month and year of manufacture of the hydraulic hoses is stamped on the hose fitting.

- Have the hydraulic hoses replaced if they are damaged and after the specified service life has been reached.
- Replacement hydraulic hoses must meet the technical requirements of the equipment manufacturer. Make sure the replacement hydraulic hoses meet the maximum pressure specifications.

## 3.8 Maintenance and service

Maintenance and service involve additional hazards that do not occur during operation of the machine.

For this reason, take particular care when carrying out maintenance and service work. Work particularly thoroughly and cautiously.

### 3.8.1 Qualifications of maintenance personnel

- Welding and work on the electrical and hydraulic systems is to be carried out by qualified technicians only.

### 3.8.2 Wear parts

- The maintenance and service intervals described in the present operator’s manual are to be strictly adhered to at all times.
- Also observe the maintenance and service intervals for the supplied components. See the supplier documentation for the relevant intervals.
- We recommend that you have the condition of the machine and particularly of attached components, safety-relevant plastic components, the hydraulic system, and metering elements checked by your specialist dealer after each season.
- Spare parts must at least comply with the technical standards specified by the manufacturer. Compliance with technical requirements is ensured using original spare parts.
- Self-locking nuts are designed to be used only once. Always use new self-locking nuts to fasten components.

### 3.8.3 Maintenance and service tasks

- **Always switch off the tractor engine** before any cleaning, maintenance, service, and troubleshooting. **Wait until all rotating parts of the machine have come to a standstill.**
- Make sure that unauthorized persons **cannot** start the machine. Remove the ignition key of the tractor.
- Disconnect the power supply between the tractor and the machine before performing any maintenance and service tasks or before working on the electrical system.
- Check that the tractor with the machine is correctly parked. Park the spreader with an empty hopper on level, solid ground and secure it to prevent it from moving.
- Secure the lifted machine additionally against falling (e.g., by means of a safety stand) when carrying out maintenance and repair work or inspections under the lifted machine.
- Release the pressure from the hydraulic system before any maintenance and repair work.
- Only open the protective grid in the hopper if the machine has been decommissioned.
- If work is to be carried out while the PTO shaft is rotating, make sure that nobody is near the PTO or the universal drive shaft.
- Never clear blockages in the spreader hopper by hand or with the foot: always use a suitable tool.
- When cleaning with high-pressure, never aim the water jet directly at warning signs, electrical equipment, hydraulic components, and sliding bearings.
- Regularly check nuts and screws for tightness. Retighten loose connections.

## 3.9 Safety in traffic

When driving on public streets and roads, the tractor with the attached machine must comply with the road traffic regulations of the respective country. The owner and driver are responsible for compliance with these regulations.

### 3.9.1 Checks before driving

The check before departure is an important contribution to road safety. Before every trip, check compliance with the operating conditions, traffic safety, and the regulations of the country of operation.

- Is the admissible total weight complied with? Note the permitted axle load, the permitted braking load, and the permitted tire load capacity;
  - See *5 Axle load calculation*
- Is the machine attached correctly?
- Can fertilizer be lost while traveling?
  - Observe the filling level of the fertilizer in the hopper.
  - Switch off the electronic control unit.
- Are all boom parts fully folded in, swiveled into the transport position, and locked? See *Locking the swivel frame*.
- Check the tire pressures and the function of the tractor brake system.
- Do the lighting and labeling on the machine comply with the national regulations for operation on public roads? Ensure correct attachment.
- Passengers are prohibited on the machine during transport and operation.

### 3.9.2 Road travel with the machine

Handling, steering, and braking performance of the tractor are affected by the attached machine. For example, an excessive weight of the machine will reduce the weight on the front axle of the tractor and affect the steering.

- **Never** drive on roads with a fully loaded hopper.
- **Never** drive on roads with the swivel frame open.
- Adapt your driving to the modified driving characteristics.
- When driving, always ensure that there is sufficient visibility. If vision is restricted (e.g. when reversing), another person is required to direct the driver.
- Adjust the tractor rear mirrors so that the visible area behind the machine is as large as possible.
- Observe the admissible maximum speed.
- Avoid sudden turns when driving uphill or downhill or across a slope. The change in the center of gravity may increase the danger of tipping. Special care is to be particularly applied when driving on uneven, soft ground (e.g., when entering fields, curbs).
- Arrest sideways movement of the lower link of the three-point linkage to prevent the machine from swinging.
- Passengers are prohibited on the machine during transport and operation.
- Observe the total height of the attached machine (refer to *4.3.1.1 Dimensions*)

## 3.10 Safety equipment, warnings and instructions

### 3.10.1 Position of safety equipment as well as warning and instruction stickers

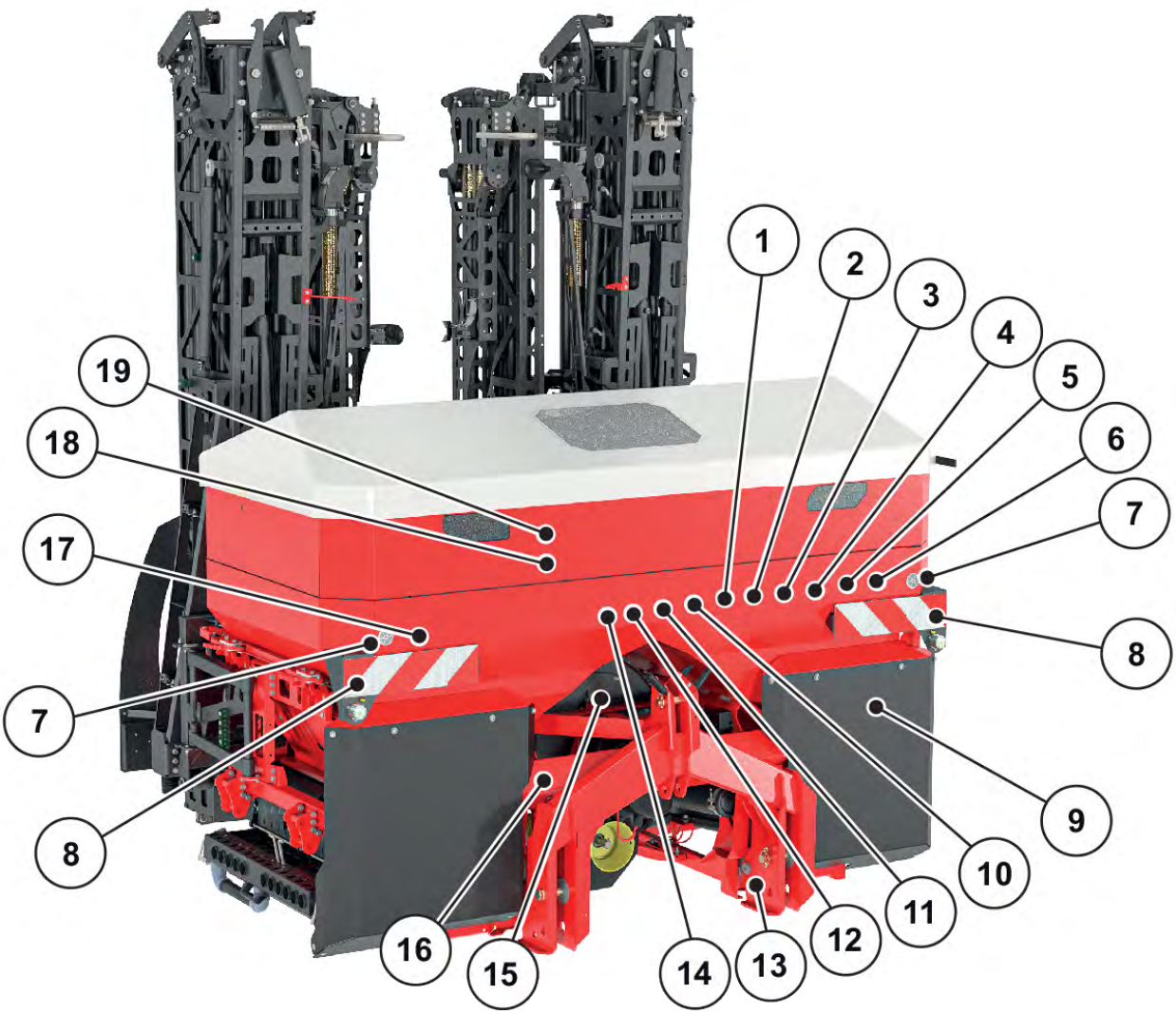



*Fig. 2: Safety equipment, warning and instruction stickers, front*

[1] Warning: Danger from hydraulic system
[2] Warning: Danger from high-voltage electrical power lines
[3] Warning: Remove ignition key
[4] Warning: Read operator's manual
[5] Warning: Crushing hazard between the tractor and the machine
[6] Warning: Turn the machine off
[7] White reflectors
[8] Warning sign with limit lamp and display of locking status
[9] Prohibition sign: Splash water
[10] Instructions: Maximum payload
[11] Instructions: PTO speed
[12] Instructions: Swivel frame and boom locking mechanism
[13] Instructions: Lubrication point
[14] Instructions: Switching between CC/LS
[15] Cover of blower drive
[16] Name plate
[17] Instructions: Dirt deflector interlock
[18] Protective grid in hopper
[19] Instructions: Eyelet in hopper

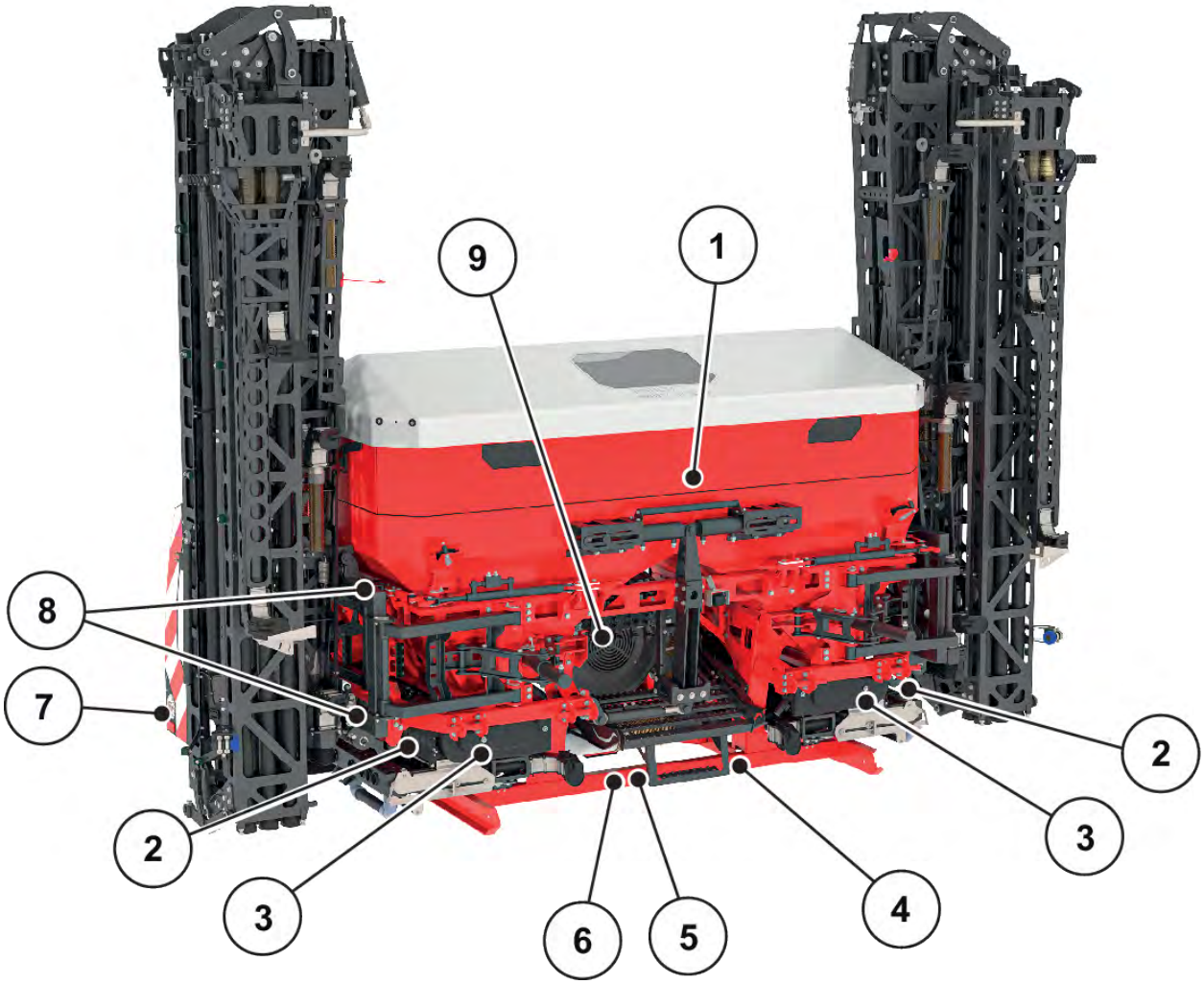



*Fig. 3: Safety equipment, warning and instruction stickers, rear*

[1] Warning: Passenger transport prohibited
[2] Warning: Moving parts and cover of metering roller cam wheel
[3] Belt cover
[4] Warning: Swinging and swiveling zone
[5] Warning: Ejection of material
[6] Warning: Sinking parts
[7] Warning sign, lighting, red reflectors
[8] Locking mechanisms of swivel frame (left and right)
[9] Intake grille of blower

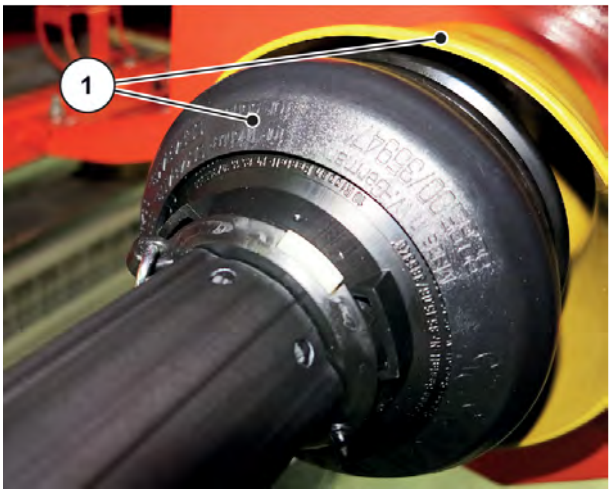



*Fig. 4: Universal drive shaft guard*

[1] Universal drive shaft guard

### 3.10.2 Function of safety equipment

The safety equipment is designed to protect your health and life.

- Before working with the machine, ensure that the safety equipment is functioning and not damaged.
- Only operate the machine when the safety equipment is functional.

| Designation | Function |
|---|---|
| Protective grid in hopper | Prevents access to the metering rollers from the hopper.<br>Prevents faults during spreading caused by lumps in the spreading material, large stones or other large objects (screening effect). |
| Cover of blower drive | Prevents body parts from being pulled into the blower mounting. |
| Intake grille of blower | Prevents larger objects from being pulled in and reaching into the intake area of the blower. |
| Cover of metering roller cam wheel | Prevents body parts from being pulled into the metering elements.<br>Cover on each metering unit. |
| Belt cover | Prevents body parts from being pulled through the rotating belt. |
| Universal drive shaft guard | Prevents body parts and clothing from being pulled into the rotating universal drive shaft. |

## 3.11 Warning and instruction stickers

Various warning and instruction stickers are attached to the machine (for the position at the machine, please refer to *3.10.1 Position of safety equipment as well as warning and instruction stickers*).

The warning and instruction stickers are components of the machine. They must not be removed or modified.

▶ Replace missing or illegible warning and instruction stickers immediately.

If new components are installed during repairs, the same warning and instruction stickers that were on the original parts must be placed on the new parts.

The correct warning and instruction stickers can be obtained from the spare parts service.

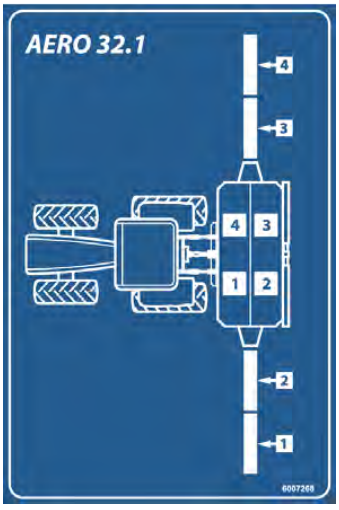
### 3.11.1 Warning stickers

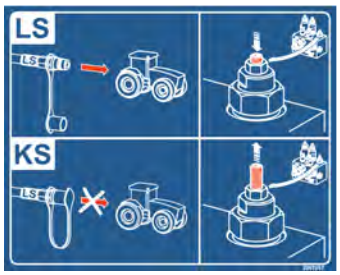
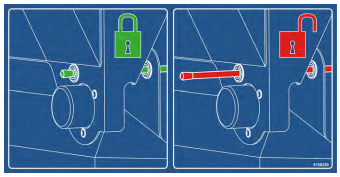
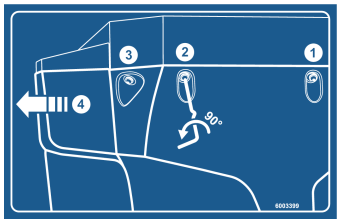
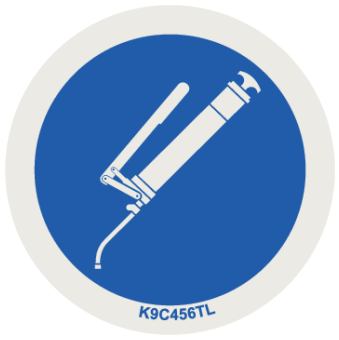
| Illustration | Description |
|---|---|
|  | Read the operator's manual and warnings.<br>Read and observe the operator’s manual and warnings before commissioning the machine. The operator’s manual explains in detail how to operate the spreader and contains valuable information on operation, care and maintenance. |
|  | Remove the ignition key.<br>Switch off the engine and remove the key before carrying out maintenance and repair work. Disconnect the power supply |
|  | Danger due to moving parts<br>Danger of cutting off body parts<br>It is prohibited to reach into the hazard zone of rotating parts.<br>Switch off the engine and remove the key before carrying out maintenance, repair and adjustment work. |
|  | Danger from hydraulic system<br>Hot fluid escaping under high pressure may cause serious injury.<br>It may also penetrate the skin and cause infection.<br>De-pressurize the hydraulic system before maintenance work.<br>When checking for leakage, wear protective goggles and protective gloves at all times.<br>In the event of injury caused by hydraulic oil, seek medical attention immediately!<br>Observe the manufacturer documentation. |

| Illustration | Description |
|---|---|
|  | Risk of death due to live overhead lines<br>Never park the machine under live overhead lines. Keep safety distance. Only switch the boom from the transport to the spreader position and vice versa and fold the boom in and out in locations without overhead lines. |
|  | Danger between the tractor and the machine<br>There is a crushing hazard that may result in fatal injury for persons standing between the tractor and the machine when the tractor approaches or the hydraulic system is actuated.<br>The tractor may brake too late or not at all because of carelessness or incorrect operation.<br>Ensure that nobody is present in the hazard zone between the tractor and the machine. |
|  | Crushing hazard in the folding and swivel range of the boom.<br>It is prohibited to stand in the folding and swivel range of the boom while it is operated by the hydraulic system.<br>Switch off the engine and remove the key before carrying out maintenance, repair and adjustment work. |
|  | Danger due to sinking parts<br>Do not stand under unsecured loads.<br>Before going under the machine or the boom, use support devices to prevent the boom from lowering inadvertently.<br>When operating any moving parts of the boom, make sure that there are no people or objects in this area. |
|  | Danger due to ejection of material<br>Danger of injury to the whole body caused by ejected spreading material<br>Before commissioning, instruct all people to leave the hazard zone (spreading range) of the machine. |
|  | Passenger transport prohibited<br>Risk of slipping and injury. Do not climb on the machine during spreading and transport. |
|  | Danger of machine tipping over<br>Park the machine with the swivel frame in the operating position.<br>Position the machine on a pallet. |

| Illustration | Description |
|---|---|
|  | Ban on splash water<br>It is prohibited to splash water into the housing of the job computer and other electronic components. |

## 3.11.2 Instruction stickers

| Illustration | Description |
|---|---|
|  | Rated speed of the PTO shaft<br>The rated speed of the PTO shaft is 1000 rpm. |
|  | Maximum load capacity |
|  | Breakdown of the boom part widths and the metering rollers |

| Illustration | Description |
|---|---|
|  | Switching between CC/LS<br>Screw the adjustment screw in to the stop: LS mode (load sensing)<br>Screw the adjustment screw out to the stop: CC mode (constant current) |
|  | Illustration of swivel frame lock and boom lock for driving on roads<br>Green (display pin pushed in) = locked (transport position)<br>Red (display pin pulled out) = unlocked |
|  | Dirt deflector lock |
|  | Eyelet in the hopper<br>Labeling of the bracket for fixing the hoisting gear |
|  | Lubrication point |

## 3.12 Name plate and machine marking

When delivering your machine, ensure that all necessary signs are present.

Depending on the country of destination, additional signs can be attached to the machine.

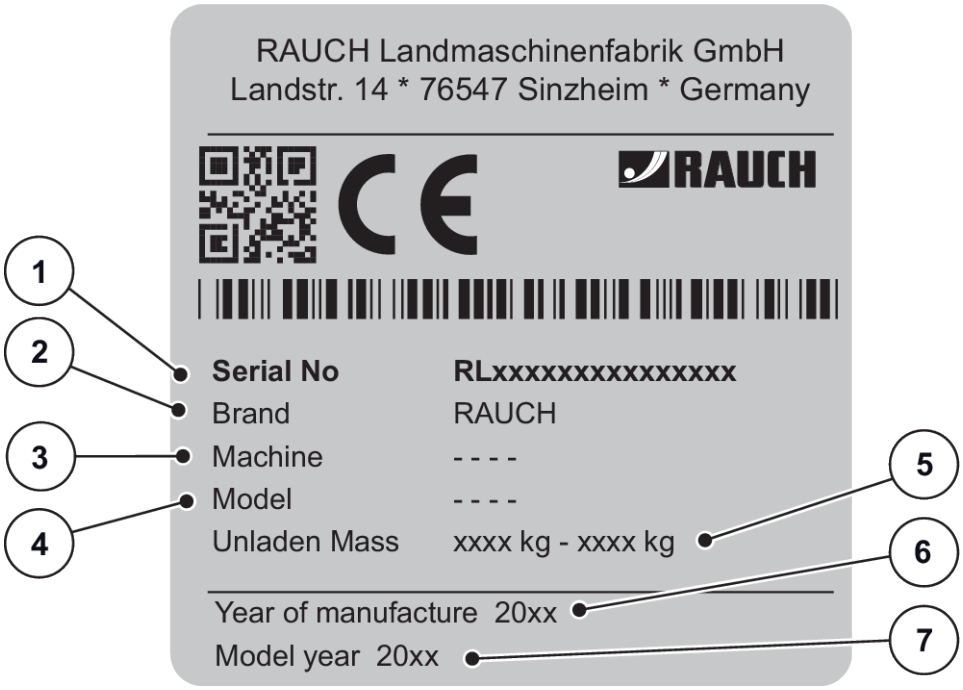



*Fig. 5: Name plate*

[1] Manufacturer
[2] Serial number
[3] Machine
[4] Type
[5] Empty weight
[6] Year of construction
[7] Model year

## 3.13 Illumination and identification

The lighting equipment must be attached as specified and must always be in operating condition. Lights must not be covered or obscured by dirt.

The machine is factory-equipped with a lighting system and front, rear, and side lighting (for the attachment to the machine, please refer to *3.10 Safety equipment, warnings and instructions*).

# 4 Machine data

## 4.1 Manufacturer

RAUCH Landmaschinenfabrik GmbH
Landstrasse 14
76547 Sinzheim
Germany

Phone: +49 (0) 7221 985-0
Fax: +49 (0) 7221 985-206

**Service Center, Technical Customer Service**

RAUCH Landmaschinenfabrik GmbH
PO box 1162
email: service@rauch.de
Fax: +49 (0) 7221 985-203

## 4.2 Description of the machine

Use the machines in accordance with chapter *1 Intended use*.

The machine consists of the following assemblies.

- 2-chamber hopper with outlets
- Frame with weigh cells and coupling points
- Drive components (drive shaft, motor shaft, gears)
- Metering elements (blower, metering shaft, air duct)
- Boom consisting of 2 boom sides with 4 segments each. The overall boom has 4 sections See *4.2.4 Boom*
- Swivel frame
- 14 bends: 22 on the frame and 2 on the machine frame
- Safety equipment - See *3.10.1 Position of safety equipment as well as warning and instruction stickers*

Some models are not available in all countries.

## 4.2.1 Assembly overview

### ■ Basic machine

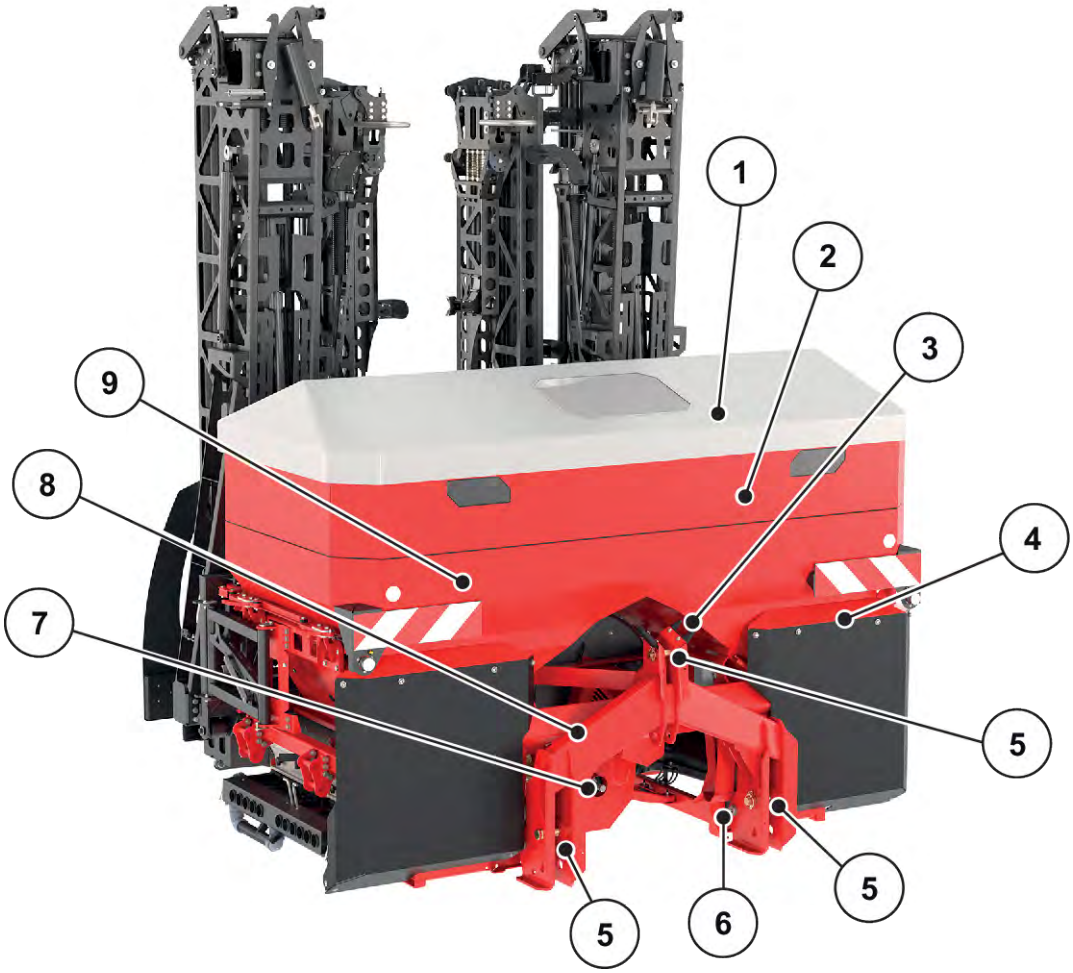



*Fig. 6: Assembly overview: Front*

[1] Hopper cover
[2] Extension
[3] Hose and cable tray
[4] Job computer (behind dirt deflector)
[5] Coupling points
[6] Weigh cells
[7] Transmission spigot
[8] Weighing frame
[9] Hopper

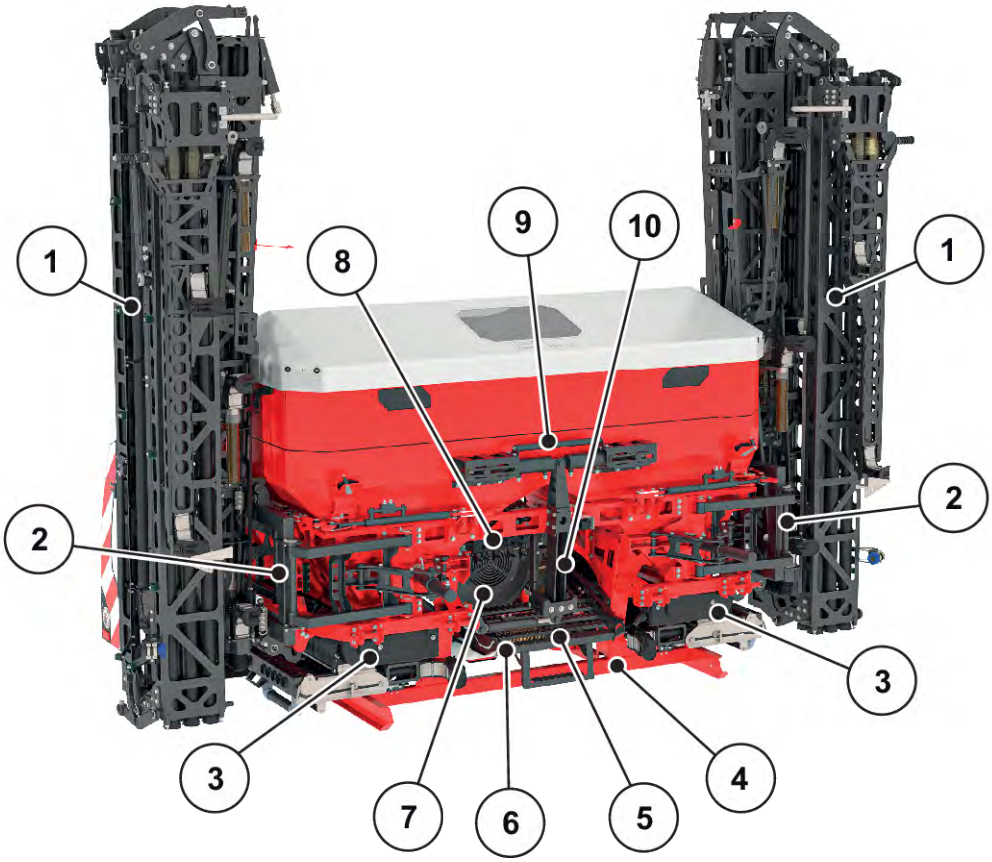



*Fig. 7: Assembly overview: Rear*

[1] Boom with 4 segments each
[2] Swivel frame
[3] Metering unit
[4] Frame
[5] Platform
[6] Air duct
[7] Blower
[8] Hydraulic block: Control unit of boom
[9] Pendulum frame with wire rope (not visible here) and hydraulic cylinder in V-position
[10] Leaf spring, pendulum frame, and inclination cylinder

The adjustment lever is located on the hopper on the left side in the direction of travel.

*Fig. 8: Adjustment lever position*

### 4.2.2 Blower

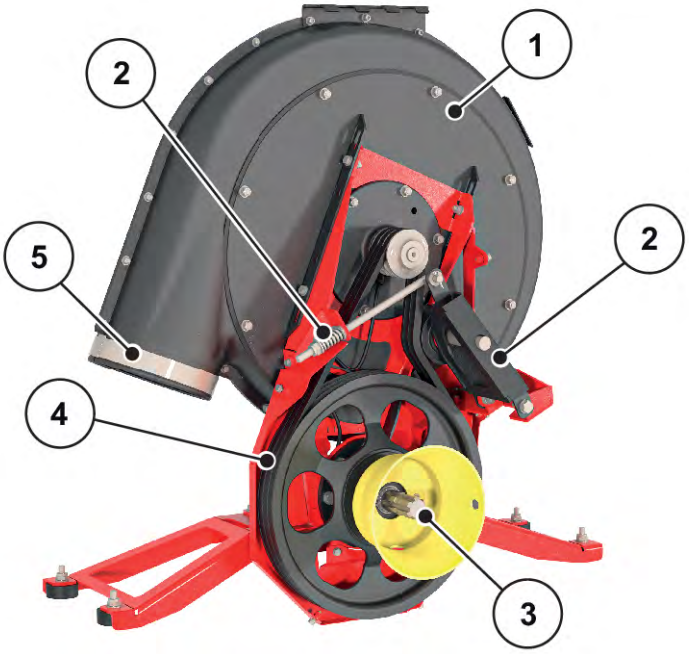



*Fig. 9: Assemblies and functions of the machine, blower*

[1] Housing with blower
[2] Belt tensioning mechanism
[3] Transmission spigot: Drive of the blower
[4] Drive belt
[5] Air outlet to air duct

### 4.2.3 Metering unit and air duct

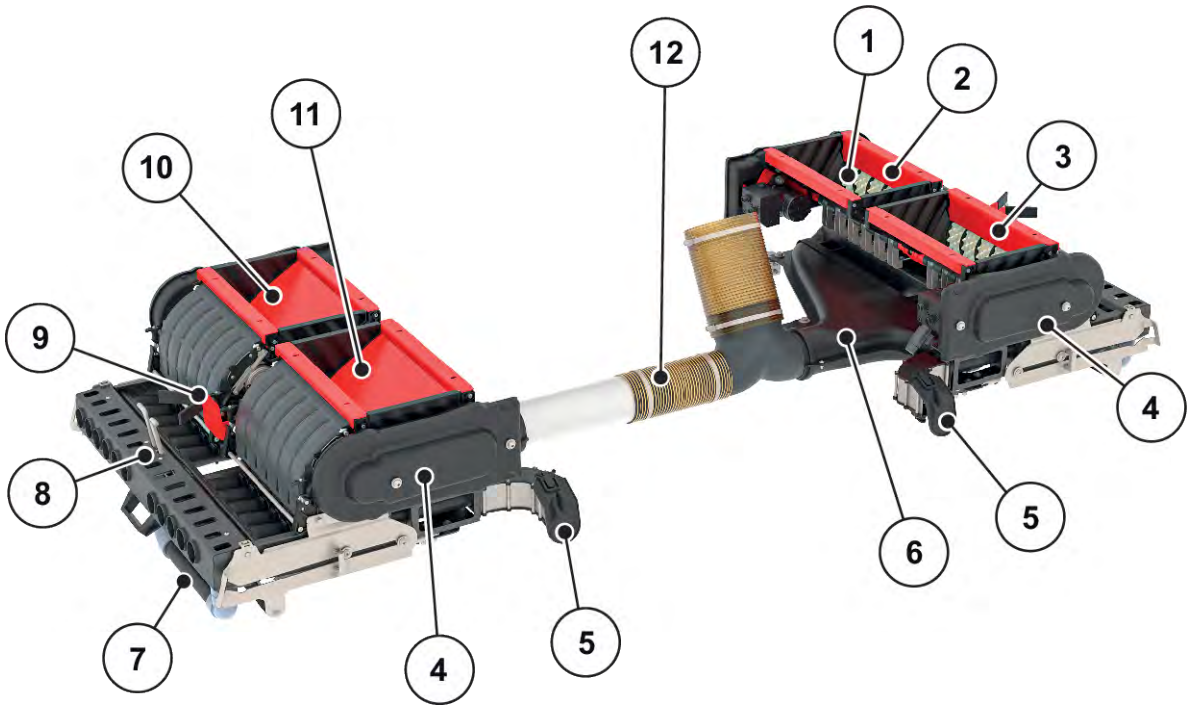



*Fig. 10: Assemblies and function of the machine, detail of rear*

[1] Metering roller
[2] Metering unit, section 4
[3] Metering unit, section 3
[4] Belt drive of metering rollers (4 x)
[5] Bend on machine frame with baffles
[6] Pressure chamber (2 x)
[7] Air duct bypass pipe for bends on machine frame
[8] Locking mechanism for injector cartridge (2 x)
[9] Lever for pulling back the pressure chamber (2 x)
[10] Metering unit, section 1
[11] Metering unit, section 2
[12] Air duct

### 4.2.4 Boom

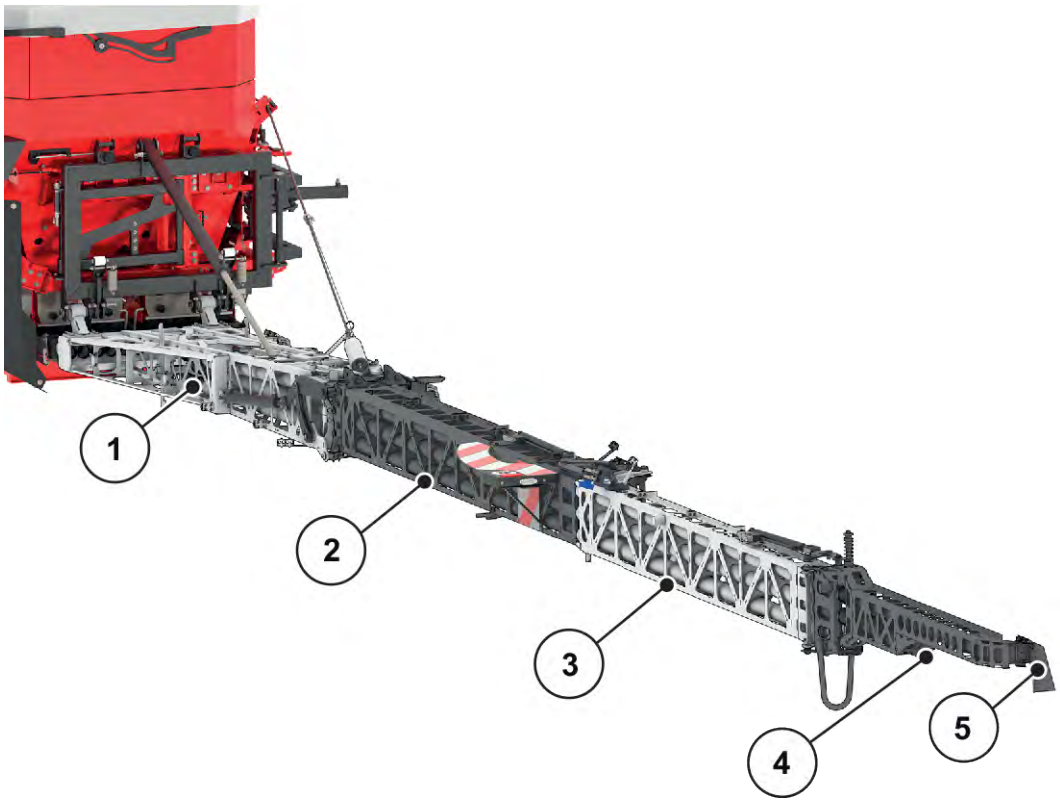



*Fig. 11: Assemblies and function of the machine, boom*

[1] Start section
[2] Central section 1
[3] Central section 2
[4] End section and collision protection
[5] Spreading limit panel (manual setting)

### 4.2.5 Hydraulics system

The machine is equipped with an on-board hydraulic system.

Observe chapter *(→ 9 Spreading operation)* as well as the operator's manual for the electronic control units.

**⚠ WARNING!**

**Risk of injury due to hot surfaces**

The accumulator body may heat up. There is a risk of burning.

▶ Only qualified personnel may perform work on the hydraulic parts and plug connectors.

■ ***Connection diagram of the control block***

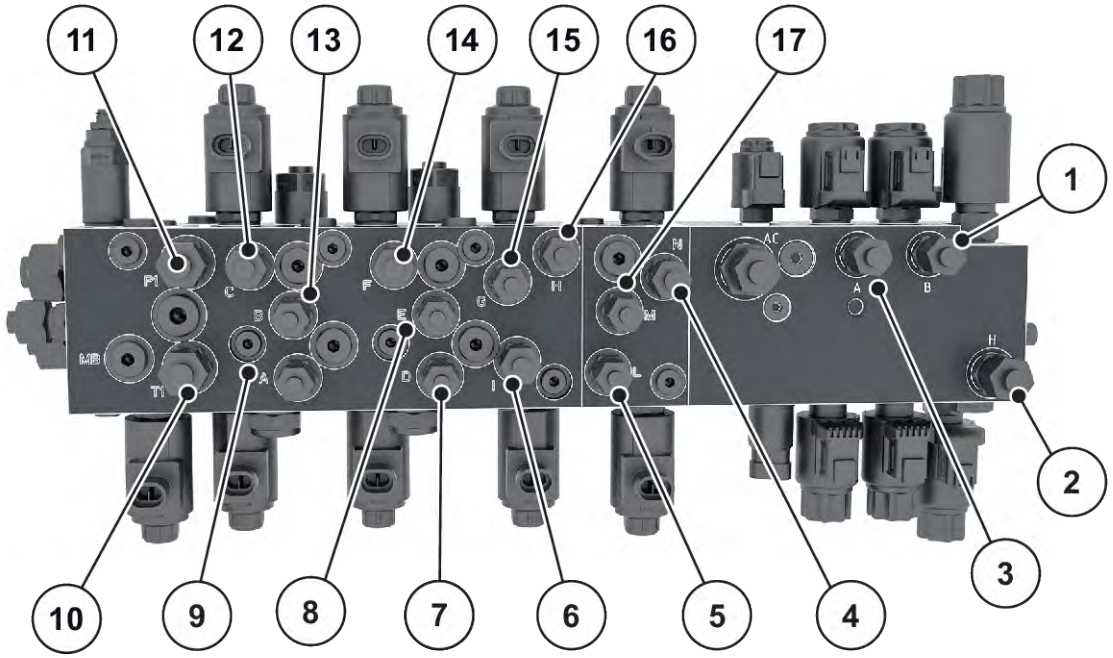



*Fig. 12: Connection diagram of the control block*

[1] Slope - raise on right side
[2] V-position (headlands)
[3] Folding the right end section
[4] Folding out central sections 2
[5] Folding in left central section 2
[6] Folding out the end sections
[7] Folding in left central section 1
[8] Folding in right central section 1
[9] Folding out the left start section
[10] Metering return
[11] Metering supply
[12] Folding in the start sections
[13] Folding out the right start section
[14] Folding out central sections 1
[15] Folding in the left end section
[16] Folding in the right end section
[17] Folding in right central section 2

■ ***LS/CC valve on the control block***

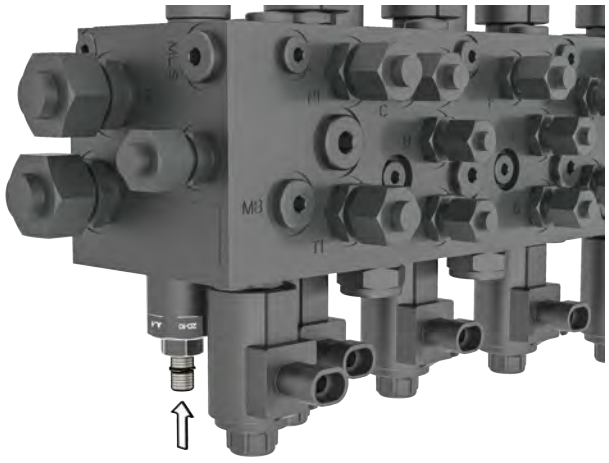


*Fig. 13: Position of the LS/CC valve*

# 4.3 Technical data

## 4.3.1 Technical data for the basic equipment

### ■ Dimensions

| Data | AERO 32.1 |
|---|---|
| Total width in transport position | 2,95 m |
| Total length in transport position | 2,50 m |
| Working width | 24 m, 27 m, 28 m, 30 m |
| Total height | 3,55 m |
| Filling level (basic machine) | 1,40 m |
| Filling opening | 2,80 x 1,30 m |
| Distance between center of gravity and lower link point | 1,25 m |
| PTO speed | 1000 RPM |
| Hopper capacity | 3200 l |
| Mass flow[1] max. | 360 kg/min |
| Hydraulic pressure max. | 200 bar |
| Sound pressure level[2] (measured in the closed driver's cab of the tractor) | 75 dB(A) |

### ■ Weights and loads

The empty weight (mass) of the machine varies depending on the feature package and extension combination.

| Data | AERO 32.1 |
|---|---|
| Empty weight | 2200 kg |
| Fertilizer payload | 3200 kg |

[1)] Max. mass flow depending on fertilizer type

[2)] Since the sound pressure level of the machine can only be determined when the tractor is running, the actual measured value is greatly dependent on the tractor type being used.

### 4.3.2 Technical data for the extensions

| | XL1300 |
|---|---|
| Change in capacity | + 1300 l |
| Change in filling height | + 38 cm |
| Max. extension size | 280 x 130 cm |
| Extension weight | 65 kg |
| Description | 4-sided |

## 4.4 Special equipment

We recommend that you have the extra equipment fitted and mounted on the basic machine by your supplier or an authorized service center.

Some models are not available in all countries.

The available special equipment depends on the country of use of the machine and is not listed fully here.

- Contact your dealer/importer if you need specific special equipment.

### 4.4.1 Hopper cover

A hopper cover can be fitted to protect the spreading material from humidity.

The hopper cover is screwed both to the main hopper as well as to the additionally mounted hopper extensions.

### 4.4.2 Electric remote control of hopper cover

■ ***AP-Drive***

With the remote control, you can electrically fold the hopper cover in and out from the cabin of the tractor.

### 4.4.3 Auxiliary lighting

The machine can be fitted with auxiliary lighting.

The lighting mounted ex works depends on the country of use of the attachment.

- Contact your dealer/importer if you need rear lighting.

Attachments are subject to the lighting regulations specified in the traffic regulations.

- Observe the traffic regulations of your country.

### 4.4.4 Operating lights

■ ***SpreadLight***

**Only for machines with electronic control unit**

The SpreadLight special equipment supports the user in visually checking the individual spreading functions during the spreading operation in the dark.

The SpreadLight special equipment consists of an intensive LED light and is targeted onto the spreading fans. Potential incorrect settings or blocks in the metering slides are immediately recognized.

Additionally, they allow the user to more quickly react to objects or danger zones in the external spreading area which are hard to detect, especially in the event of large working widths, when it is dark.

### 4.4.5 CCI A3 joystick

| Illustration | Designation |
|---|---|
|  | CCI A3 joystick (the key assignment can differ depending on the machine) |

### 4.4.6 Camera for rear view monitoring

The rear view camera offers a view of the area behind the machine.

Check the setting of the camera at the ISOBUS terminal.

Please note that the boom limits the width and angle of the field of vision when the machine is in transport position.

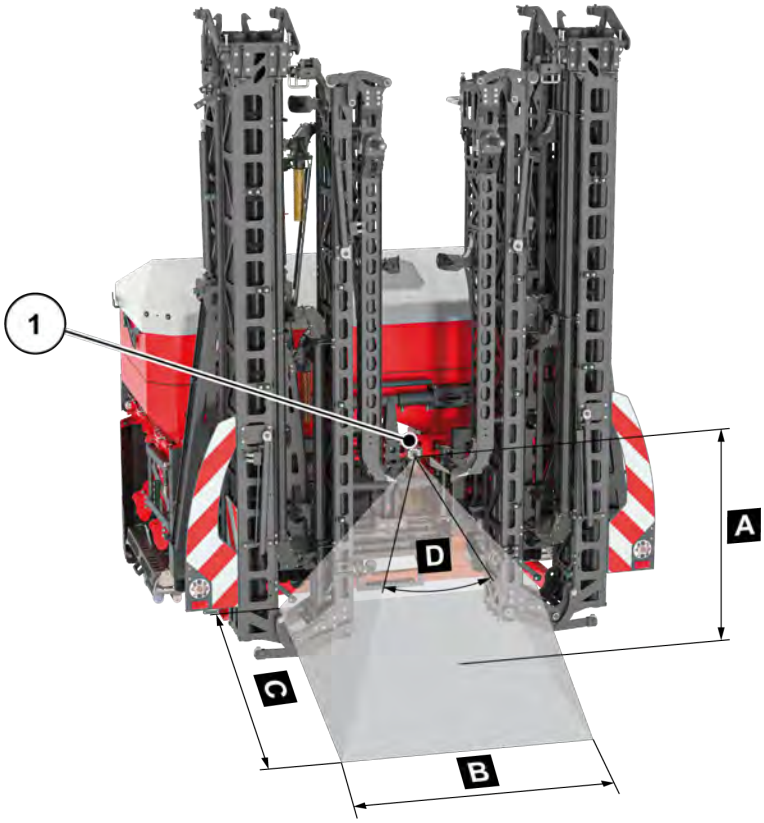



*Fig. 14: Rear view camera field of vision when in transport position*

| | | | |
|---|---|---|---|
| A | Installation height of the rear view camera | D | Viewing angle |
| B | Width of field of vision | 1 | Rear view camera |
| C | Depth of field of vision | | |

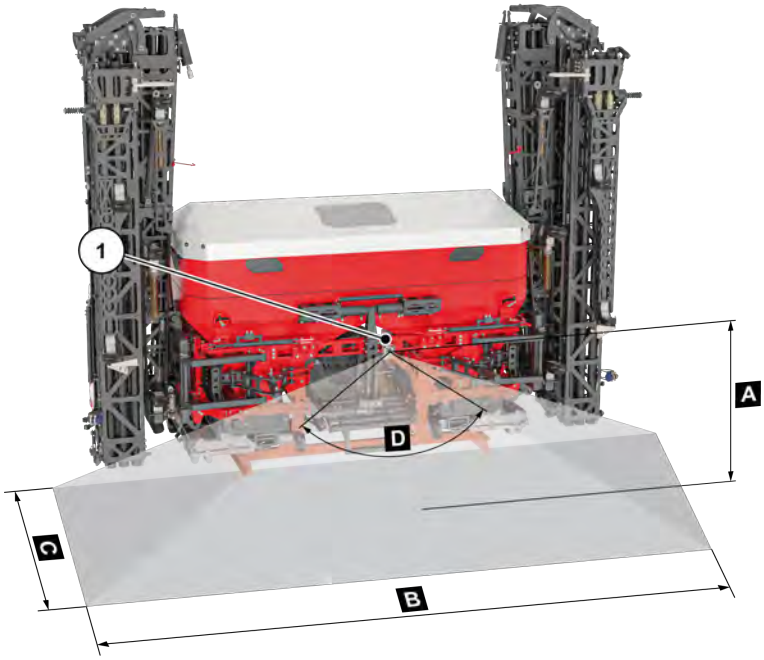



*Fig. 15: Rear view camera field of vision when in operating position*

*Fig. 16: Rear view camera screenshot*

### 4.4.7 Metering roller for fine seeds

The metering roller with cam wheels can be replaced by the metering roller for fine seeds.

*Fig. 17: Metering roller for fine seeds*

### 4.4.8 Remote-controlled boundary spreading equipment

The remote-controlled boundary spreading equipment can be activated or deactivated using the machine control unit (choice of right or left). Modules at the end of the boom will be automatically positioned correctly.

*Fig. 18: Boundary spreading is disabled*

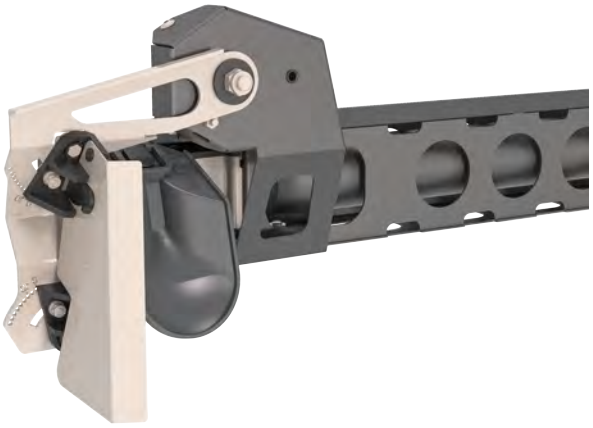


*Fig. 19: Boundary spreading is enabled*

### 4.4.9 DistanceControl

Ultrasonic sensors are used to move the boom to the optimum height and the correct inclination for the existing plants.

The DistanceControl function is activated via the ISOBUS machine control unit.

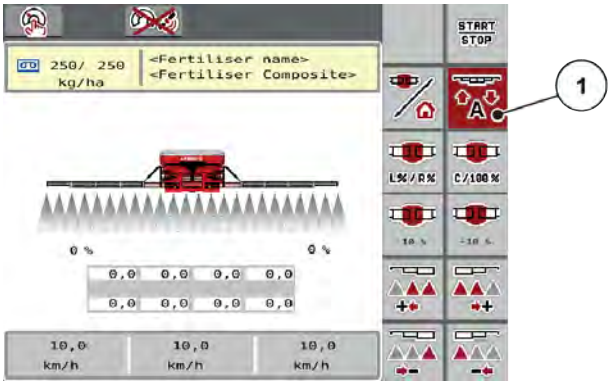



*Fig. 20: DistanceControl button enabled*

[1] DistanceControl button

If the machine has the DistanceControl function, the DistanceControl button will appear on the right of the screen with the function buttons. The button is highlighted in red if DistanceControl is enabled and in gray if it is disabled.

# 5 Axle load calculation

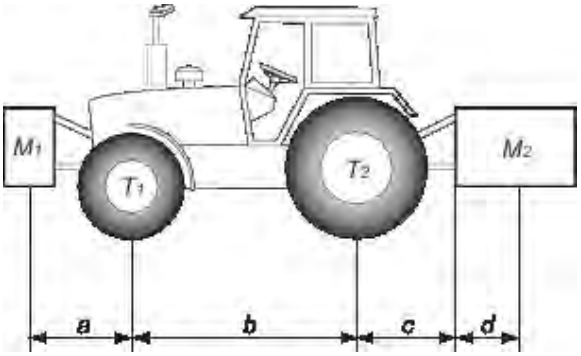
**⚠ WARNING!**

**Overload**

Mounted units on the front or rear three-point linkage must not cause the approved total weight to be exceeded.

- ▶ Before using the machine, ensure that these conditions are met.
- ▶ Implement the following calculations or weigh the tractor machine combination.

Define the total weight, axle loads, tire capacity and minimum additional mass:
The following values are required for the calculation:




| Description | Units | Description | Obtained by |
|---|---|---|---|
| T | kg | Tractor unladen weight | Refer to the tractor operator's manual<br>Measure on scale |
| T1 | kg | Unladen load on tractor front axle | Refer to the tractor operator's manual<br>Measure on scale |
| T2 | kg | Empty load on tractor rear axle | Refer to the tractor operator's manual<br>Measure on scale |
| t | kg | Axle loads (Tractor + machine) | Measure on scale |
| t1 | kg | Load on front axle (Tractor + machine) | Measure on scale |
| t2 | kg | Load on rear axle (Tractor + machine) | Measure on scale |
| M1 | kg | Total weight of front tool or front ballast | Refer to the machine price-list or operator's manual<br>Measure on scale |

| Description | Units | Description | Obtained by |
|---|---|---|---|
| M2 | kg | Total weight of rear tool or rear ballast | Refer to the machine price-list or operator's manual<br>Measure on scale |
| a | m | Distance between the tools' center of gravity or the front ballast and the front axle center | Refer to the machine price-list or operator's manual<br>Dimensions |
| b | m | Distance between the tractor axles | Refer to the tractor operator's manual<br>Dimensions |
| c | m | Distance between the rear axle center and the center of the lower link ball joints | Refer to the tractor operator's manual<br>Dimensions |
| d | m | Distance between the center of the lower link ball joints and the center of gravity of the rear tool or rear ballast | Refer to the machine price-list or operator's manual |

**Rear tool or front-rear combination:**

| **1) Calculation of the minimum front ballast weight: M1 minimum** |
|---|
| M1 minimum = [ M2 x (c+d) - T1 x b + 0.2 x T x b ] / [a+b] |
| Write the minimum additional weight in the chart. |

**Front tool:**

| **2) Calculation of the minimum rear ballast weight M2: minimum** |
|---|
| M2 minimum = [ M1 x a - T2 x b + 0.45 x T x b] / [ b + c + d ] |
| Write the minimum additional weight in the chart. |

| **3) Calculation of the actual load on the front axle: T1 real** |
|---|
| If the front tool (M1) is lighter than the minimum load required at the front (minimum), increase tool weight until the required minimum front load is reached |
| T1 real = [ M1 x (a+b) + T1 x b - M2 x (c+d) ] / [ b ] |
| Indicate front axle calculated load value and the one indicated in the tractor operator's manual. |

| **4) Calculation of the total weight: M real** |
|---|
| If the rear tool (M2) is lighter than the minimum load required at the rear(minimum), increase tool weight until the required minimum rear load is reached |

| **4) Calculation of the total weight: M real** |
|---|
| M real = M1 + T + M2 |
| Indicate calculated total load value and the one authorized as indicated in the tractor operator's manual. |

| **5) Calculation of the actual rear axle load: T2 real** |
|---|
| T2 real = M real - T1 real |
| Indicate rear axle calculated load value and the one indicated in the tractor operator's manual. |

| **6) Tire carrying capacity** |
|---|
| Indicate double (2 tires) the authorized load value (see tire manufacturer indications). |

**Table:**

| | **Actual value obtained by calculation** | **Value authorized according to operator's manual** | **Double value of the authorized capacity per tire (2 tires)** |
|---|---|---|---|
| Minimum front/rear ballasting | kg | | |
| Total weight | kg | kg | |
| Load on front axle | kg | kg | kg |
| Load on rear axle | kg | kg | kg |
| | The minimum ballasting must be made by fitting a tool or an additional mass to the tractor.<br>The values obtained must be below or equal the authorized values. | | |

# 6 Transport without tractor

## 6.1 General safety instructions

Read the following instructions before transporting the machine:

- Without tractor, the machine may only be transported with an empty hopper.
- Only suitable, instructed and expressively authorized persons may execute the work.
- Suitable means of transportation and lifting equipment (e.g., crane, forklift truck, lifting tackle ...) are to be used.
- Establish the transportation route in good time and remove possible obstacles.
- Check that all safety and transportation devices are fully operational.
- Secure all danger areas appropriately, even if they only exist briefly.
- The person responsible for transportation ensures that the machine is transported appropriately.
- Unauthorized persons are to be kept away from the transport route. Cordon off the affected areas!
- Transport the machine cautiously and handle it with care.
- Ensure that allowances are made for the center of gravity. If necessary, adjust the cables to ensure that the machine is correctly aligned on the means of transport.
- Transport the machine to the set-up location as close to the ground as possible.

## 6.2 Loading and unloading, parking

▶ Determine the weight of the machine.

  ▷ Check the details on the name plate.

  ▷ Take the weight of mounted optional equipment into account.

▶ Carefully lift the machine with suitable lifting equipment.

▶ Carefully place the machine on the loading platform of the transportation vehicle or on solid ground.

# 7 Commissioning

## 7.1 Accepting the machine

When accepting the machine, please check the completeness of the delivery.

The standard equipment includes:
- 1 mineral fertilizer spreader AERO 32.1
- 1 operator’s manual AERO 32.1
- 1 calibration test tank
- Lower link and upper link pins
- 1 universal drive shaft (including operator’s manual)
- Protective grid in hopper
- AERO ISOBUS machine control unit (including operator's manual) for ISOBUS terminal

Please also check any additionally ordered special equipment.

Check for any transport damage or missing parts. Have any shipping damage confirmed by the forwarding agent.

When receiving the machine, check that attached components are correctly and tightly positioned (e.g., baffles).

In case of doubt, please contact your dealer or the factory directly.

## 7.2 Tractor requirements

To ensure a safe and correct use of the machine, the tractor must meet the necessary mechanical, hydraulic, and electrical requirements.

- Tractor engine power: At least 180 HP
- Oil supply: Max. 200 bar
- 1 single-acting control unit for supplying the hydro block
- 1 free return: **Min. NW 18 mm** for the metering drive
- 1 dual-acting control unit for swiveling the boom
- 1 dual-acting control unit for locking the boom
- Hydraulic performance: 65 l/min, constant current or load-sensing system,
- Universal drive shaft connection:
  - 1 3/8 inches, 6-part, 1000 rpm or
  - 1 3/4 inches, 20-part, 1000 rpm
- Operating voltage: 12 V
- Three-point linkage category III
- 7-pin socket according to ISO 1727 for the lighting system

## 7.3 Mounting the universal drive shaft on the machine

**⚠ DANGER!**

**Danger of pulling in on the rotating universal drive shaft**

Installing and removing the universal drive shaft while the motor is running may cause serious injuries (crushing, pulling into the rotating shaft).

- ▶ Turn the tractor engine off and remove the ignition key.
- ▶ Make sure that the universal drive shaft cover is in good condition.

***NOTICE!***

**Material damage due to an unsuitable universal drive shaft**

The machine is equipped with a universal drive shaft that is designed according to the device and performance.

The use of incorrectly dimensioned or inadmissible drive shafts, for instance without guard or suspension chain, may cause personal injury or lead to damage to the tractor and/or the machine.

- ▶ Use only universal drive shafts approved by the manufacturer.
- ▶ Follow the directions in the operator's manual of the universal drive shaft manufacturer.

- ▶ Check the mounting position.

  The drive shaft end that is marked with a tractor symbol must point to the tractor.
- ▶ Grease the transmission spigot.
- ▶ Pull the pulling sleeve [1] backward with one hand.

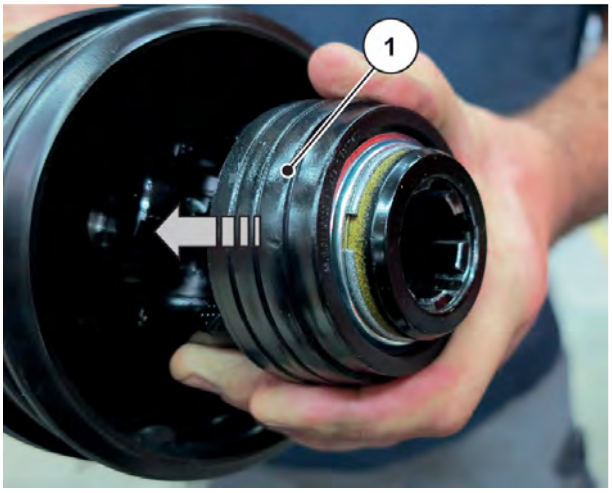



*Fig. 21: Pulling back the pulling sleeve*

- ▶ Place the universal drive shaft on the transmission spigot [1].
- ▶ Push the pulling sleeve [3] until the closure automatically engages in the ring groove.
- ▶ Push the universal drive shaft cover over the universal drive shaft.
- ▶ Rotate the plastic ring until it reaches its locking position.
- ▶ Fasten the safety chain on the universal drive shaft guard [4] of the machine, e.g., onto the bore hole on the protective cap [2].

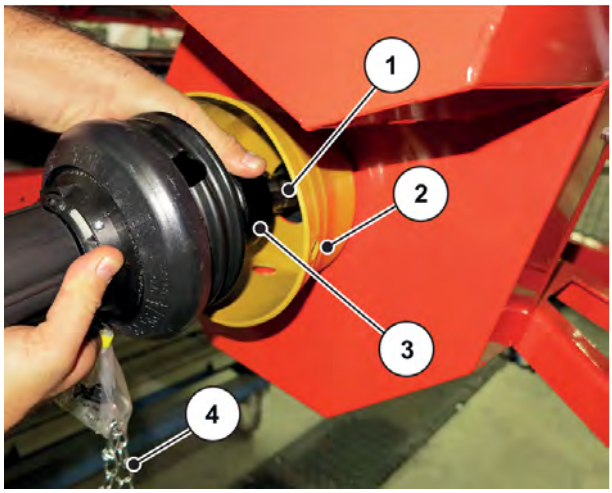



*Fig. 22: Securing the universal drive shaft*

## 7.3.1 Dismounting the universal drive shaft

■ ***Instructions for dismounting***

- Dismount the universal drive shaft in reverse order of mounting.
- Never use the suspension chain for suspending the universal drive shaft.
- Put the dismounted universal drive shaft always in the provided bracket [2].

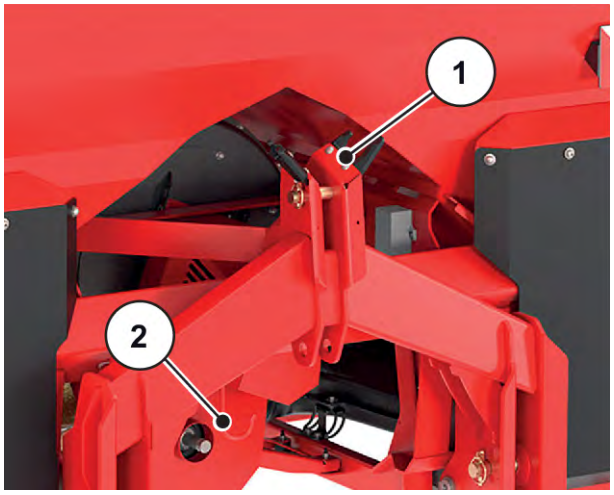



*Fig. 23: Storage of the cables and hydraulic hoses*

[1] Bracket for hoses and cables

[2] Drive shaft bracket

## 7.4 Installing the machine at the tractor

### 7.4.1 Preconditions

**⚠ DANGER!**

**Danger to life due to unsuitable tractor**

Using an unsuitable tractor for the machine may result in severe accidents during operation or road travel.

- ▶ Only use tractors that comply with the technical requirements of the machine.
- ▶ Refer to the vehicle documents in order to check whether the tractor is suitable for the machine.

**Check the following specific preconditions:**

- Are both the tractor and the machine safe to operate?
- Does the tractor comply with the mechanical, hydraulic, and electrical requirements?
- Do the mounting categories of the tractor and the machine match (if necessary, consult your dealer)?
- Is the machine securely positioned on level and solid ground?
- Do the axle loads conform to the stipulated calculations?

### 7.4.2 Mounting

**⚠ DANGER!**

**Danger to life due to carelessness or incorrect operation**

There is a crushing hazard that may result in fatal injury for persons standing between the tractor and the machine when the tractor approaches or the hydraulic system is actuated.

The tractor may brake too late or not at all because of carelessness or incorrect operation.

- ▶ Ensure that nobody is present in the hazard zone between the tractor and the machine.

- The machine is installed at the three-point linkage (rear power lift) of the tractor.

For normal fertilizing and late fertilizing, **always** use the **upper coupling points** on the machine. See *Fig. 24 Mounting position*

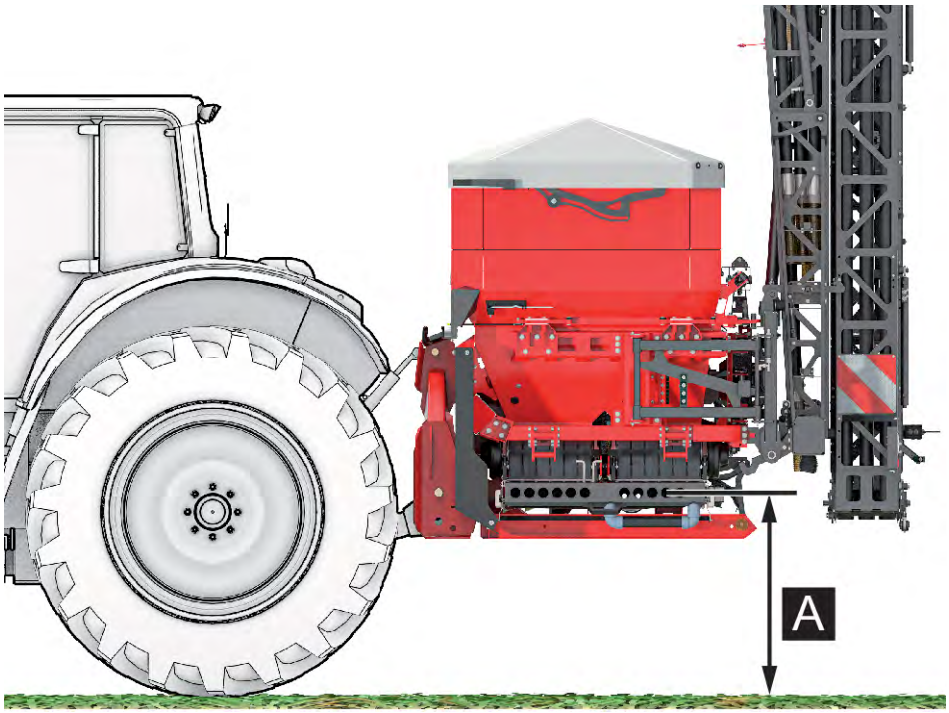



*Fig. 24: Mounting position*

**Mounting instructions**

- The bottom and upper link pins must be secured with linch pins or spring clips.
- Any oscillating movements during spreading are to be avoided. Make sure that the machine does not have too much play to the sides.

**Attaching the machine**

- ▶ Start the tractor.
  - ▷ Check: The PTO shaft is switched off.
- ▶ Move the tractor to the machine.
  - ▷ Do not latch the lower link hooks into place yet.
  - ▷ Make sure there is enough space between the tractor and the machine in order to be able to connect the drives and control elements.
- ▶ Switch off the tractor engine. Remove the ignition key.
- ▶ Mount the universal drive shaft on the tractor.
  - ▷ If there is not enough space available, an extendable Tele-Space universal drive shaft must be used.
- ▶ Fasten the safety chain of the universal drive shaft guard to the tractor.
- ▶ Connect the electric and hydraulic lines (refer to *7.4.3 Connecting the electric lines and hydraulic hoses*).
- ▶ From the tractor cab, connect the lower link hooks and the upper link to the designated coupling points; please refer to the operator's manual of the tractor.

We recommend using lower link hooks with a hydraulic upper link for safety and comfort.

- ▶ Check that the machine is securely positioned.
- ▶ Carefully lift the machine to the desired lifting height.

***NOTICE!***

**Material damage caused by a universal drive shaft that is too long**

When the machine is lifted up, the halves of the universal drive shaft can come into contact with each other. This may cause damage to the universal drive shaft, to the gearbox or the machine.

- ▶ Check the clearance between the machine and the tractor.
- ▶ Make sure that there is enough space (at least 20 to 30 mm) between the outer pipe of the universal drive shaft and the protective cone on the spreading side.

- ▶ Shorten the universal drive shaft, if required.

**Only** your dealer or your specialist workshop may shorten the universal drive shaft.

Observe the installation and shortening instructions provided in the operator's manual of the universal drive shaft manufacturer when checking and adjusting the universal drive shaft. The operator’s manual is attached to the drive shaft on delivery.

*The machine is attached to the tractor.*

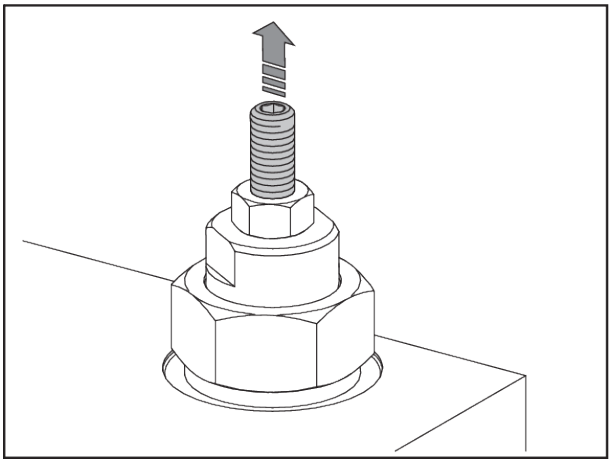
### 7.4.3 Connecting the electric lines and hydraulic hoses

- ▶ Depressurize the hydraulic system.
- ▶ Remove the hoses from the retainers at the frame of the machine.
- ▶ Insert the hoses into the corresponding couplings on the tractor.
- ▶ Observe the following sequence for connecting the hoses.
  - ▷ Connect the hydraulic hoses to the swivel frame locking mechanism on the hydraulic control unit of the tractor.
  - ▷ Connect the hydraulic hoses of the swivel frame to the hydraulic control unit of the tractor.
  - ▷ Connect the hydraulic hose for the block supply.
  - ▷ Connect the free return line.
- ▶ Connect the ISOBUS connector plug to the ISOBUS connector socket at the rear of the tractor.
- ▶ Connect the lighting cable.
- ▶ Select hydraulic operation.

The LS/CC valve is under the hydraulic block. See *LS/CC valve on the control block*

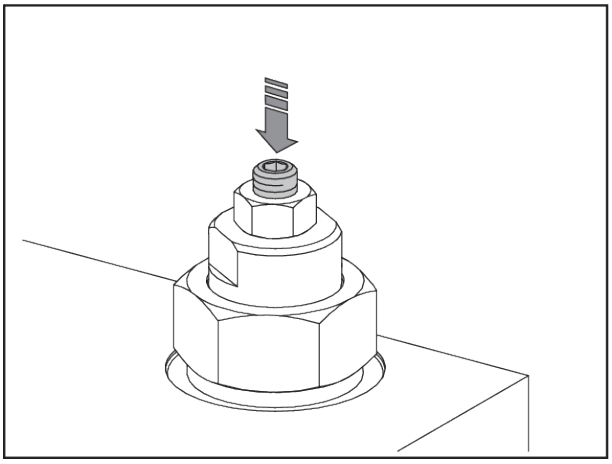
■ ***Constant current mode (default factory setting)***

- ▶ Connect the free return line and the pressure line to the couplings on the tractor.
- ▶ The adjusting screw is screwed out to the stop on the hydraulic block.
- ▶ The adjusting screw is secured with the lock nut.
- ▶ The load sensing line is not used. Safely store the hose in the cable deposit on the machine.



■ ***Load sensing mode (power beyond)***

- ▶ Release the lock nut of the adjusting screw on the hydraulic block.
- ▶ Screw the adjusting screw in the whole way on the hydraulic block.
- ▶ Tighten the lock nut.
- ▶ Connect the free return line, the pressure line and the load sensing line to the correct couplings on the tractor.



## 7.5 Pre-setting the mounting height

### 7.5.1 Safety

**General instructions before setting the mounting height**

- We recommend that you choose the highest coupling point on the tractor to connect the upper link, particularly for high lifting heights.

For normal fertilizing and late fertilizing, **always** use the **upper coupling points** of the machine.

- The lower coupling points for the lower links of the tractor present at the machine are only provided **for exceptional cases** in late fertilization.

### 7.5.2 Ideal mounting height

The ideal mounting height (A) is measured from the ground to the middle of the bend.

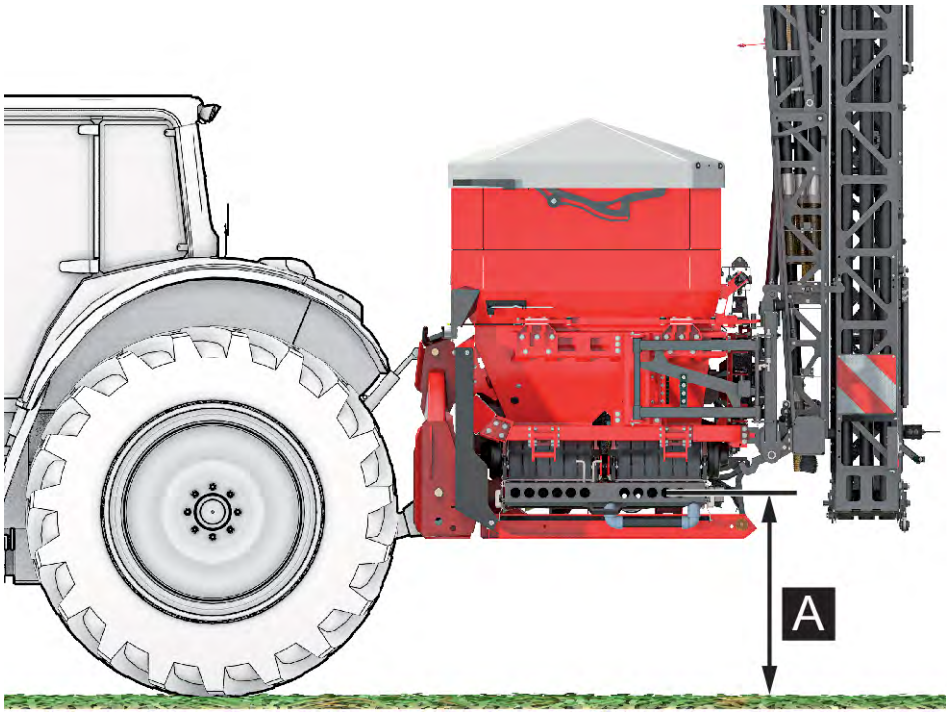



*Fig. 25: Ideal mounting height for normal and late fertilizing*

We recommend selecting the highest possible installation height, 1 m at the very least. If a minimum distance of 70 cm from growing crops cannot be kept, the baffles must be changed for late fertilizing. See *9.8.1 Spreading operation*

## 7.6 Filling the machine

**⚠DANGER!**

**Danger due to inadmissible overall weight**

Exceeding the overall weight can lead to breakage during operation and negatively affects the operational and road safety of the vehicle (machine and tractor).

Serious personal injury is possible as well as material and environmental damage.

- ▶ Always observe the information in chapter *4.3 Technical data*.
- ▶ Prior to filling, determine the maximum quantity to be loaded.
- ▶ Observe the admissible overall weight.

- **Only** fill the machine when it is attached to the tractor. Make sure that the tractor is standing on level and solid ground.
- Swing the boom out to the side.
- Secure the tractor against moving. Apply the handbrake.
- Switch off the tractor engine and remove the ignition key.
- Open the hopper cover with the adjustment lever.
- Fill the machine from behind.
- For filling heights of more than 1.25 m, fill the machine using suitable auxiliary equipment (e.g., front loader or screw conveyor).
- Maximally fill the machine up to the edge.
- Check the filling level through the inspection window on the hopper.

*The machine is filled.*

### ■ *Using the step on the machine*

The step on the back of the machine can be used to fill it (if present).

- Firmly pull the step tread until the step swings out completely.

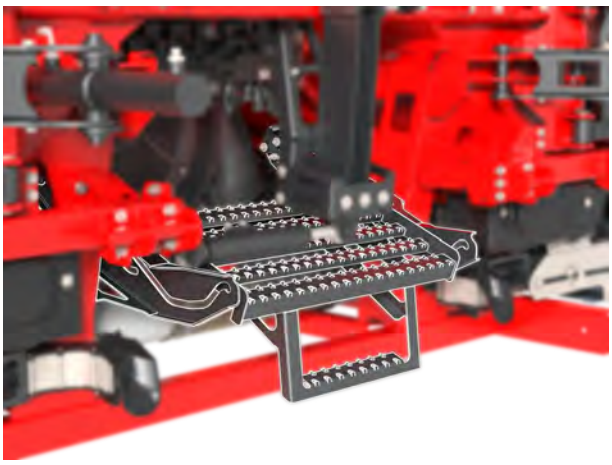


*Fig. 26: Step retracted*

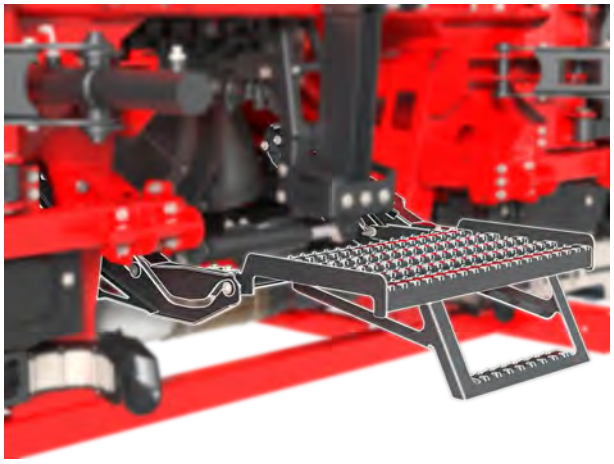


*Fig. 27: Step extended*

## 7.7 Switching on the machine control unit

**Requirements:**

- The machine control unit is correctly connected to the machine and the tractor.
  - For an example, see Chapter *7.4 Installing the machine at the tractor*.
- The minimum voltage of **11 V** is guaranteed.

Due to the great variety of different ISOBUS-compatible terminals, this chapter is limited to the functions of the electronic machine control system without indicating a specific ISOBUS terminal.

- Please observe the instructions for the operation of your ISOBUS terminal in the corresponding operator's manual.

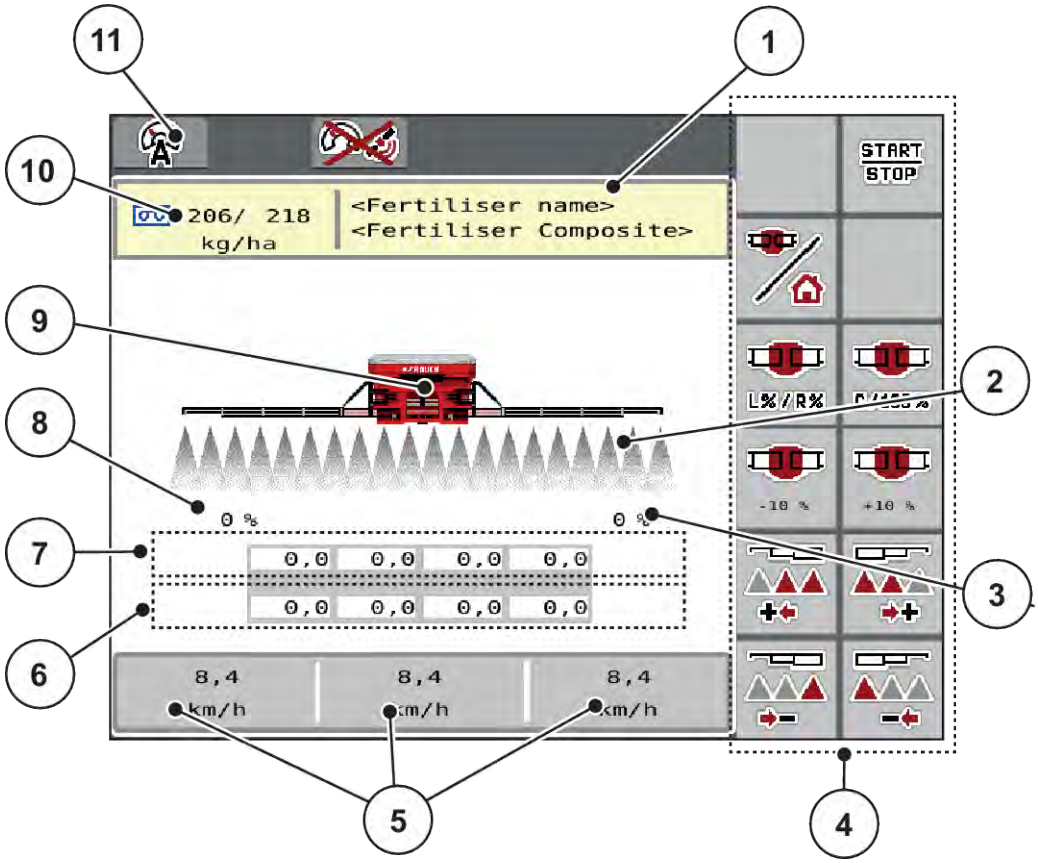



*Fig. 28: Machine control unit display*

[1] Display of fertilizer information (fertilizer designation and composition)
Button: Adjustment in the fertilizer chart
[2] Display of sections and individual fertilizer output
[3] Rate change for the right boom side
[4] Function keys
[5] Freely definable display fields
[6] Actual speed of metering units
[7] Target speed of metering units
[8] Rate change for the left boom side
[9] Display of boom-type mineral fertilizer spreader
[10] Current application rates (left, right) from the fertilizer settings or the task controller
Button: direct entry of the application rate
[11] Selected operating mode

▶ Start the machine control unit.

*After a few seconds, the* **start-up screen** *of the machine control unit is displayed.*

*Subsequently, the machine control unit displays the* **activation menu** *for a few seconds.*

▶ Press the enter key.

*The working screen then appears.*

You can find detailed information on how to use the machine in the operator’s manual of the electronic machine control. unit

The operator’s manual of the electronic machine control unit AERO ISOBUS is included in the scope of supply.

- If it is no longer present, please contact your dealer or your specialist workshop.

# 8 Calibration

For precise control of the discharge amount, we recommend running a new calibration test every time the fertilizer material type is changed.

Execute the calibration:

- Before spreading for the first time
- If the fertilizer quality has changed significantly (moisture, high dust content, granulate damage)
- If a new fertilizer type is used

The calibration must be conducted while the motor is running at a standstill or during travel over a test track.

If the section is reduced, the calibration test should not be used to calibrate the machine. The application rate check can be performed even if the section is reduced.

**Requirements:**

- The machine is attached to the tractor.
- The hydraulic, electric, and pneumatic lines are connected.
- The boom is swiveled to the rear.

As described below, always perform the calibration test on the first metering on the right front in the direction of travel. In the control unit, this corresponds to section no. 4. This section is the default factory setting and can be changed manually if necessary.

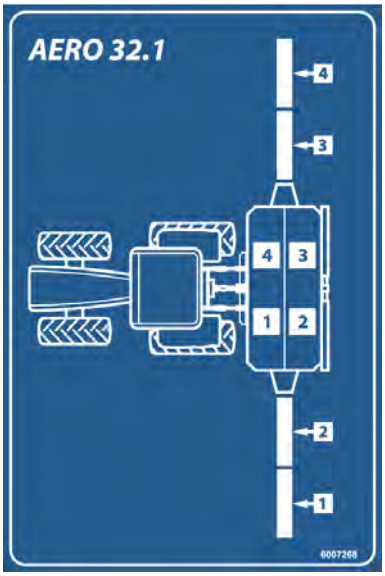



*Fig. 29: Illustration of the sections on the boom-type mineral fertilizer spreader*

## 8.1 Disconnecting the metering unit

- ▶ Hold the injector cartridge [3] with one hand on the lower handle [2].
- ▶ Press together the locking mechanism [1].
- ▶ Pull the injector cartridge towards you on the handle.

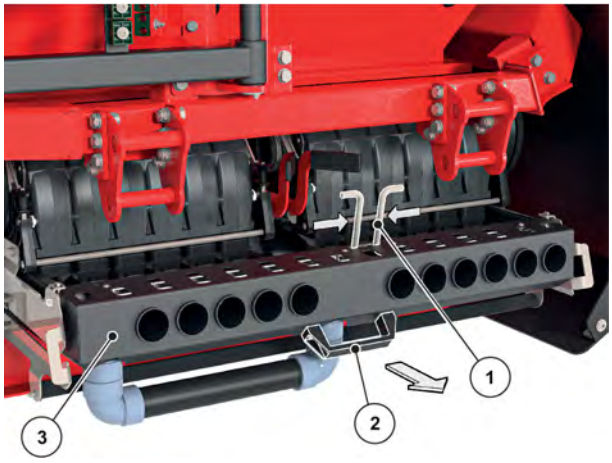



*Fig. 30: Unlocking the injector cartridge*

[1] Injector cartridge locking mechanism
[2] Handle
[3] Injector cartridge

- ▶ Carefully lower the injector cartridge.

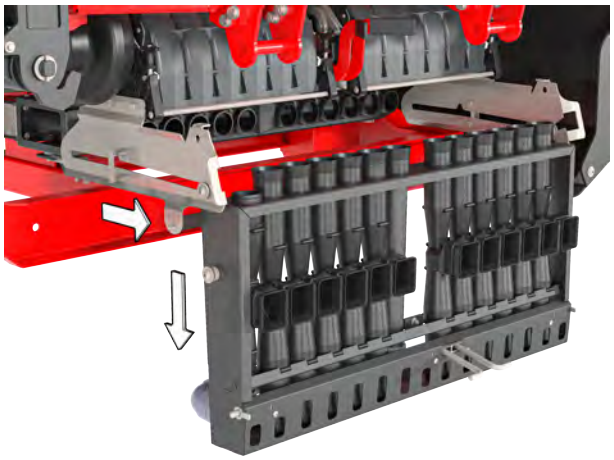


*Fig. 31: Lowering the injector cartridge*

- ▶ Place the collection tray provided under the metering unit selected for the calibration test.

*The machine is ready for the calibration test.*

## 8.2 Implementing the calibration test

**⚠ WARNING!**

**Risk of injury during calibration**

Rotating machine parts and discharged fertilizer could cause injury.

- ▶ Before starting the calibration, ensure that all requirements have been met.
- ▶ Do not reach into the metering unit.

**⚠ WARNING!**

**Risk of injury due to chemicals**

Escaping fertilizer may lead to injury to eyes and nasal mucous membranes.

- ▶ Wear safety goggles during calibration.
- ▶ Follow the manufacturer's warnings when handling chemicals. Wear the recommended personal protective equipment (PPE).
- ▶ Before running the calibration test, ensure that all people leave the hazard zone of the machine.

The calibration test is used to calibrate the exact amount of fertilizer. Fertilizer must be filled into the hopper. Up to 4 calibration tests can be stored on the terminal/job computer.

**Requirements:**

- The metering unit is disconnected. (See *8.1 Disconnecting the metering unit*)
- The machine control (ISOBUS terminal) is ready for operation.
- An adequately sized tray for collecting the fertilizer is located under the metering unit (minimum capacity 25 kg).
- The hydraulic system of the tractor is switched on (minimum oil flow rate 60 l/min).

▶ Access the menu Fertiliser settings > Start calibration.

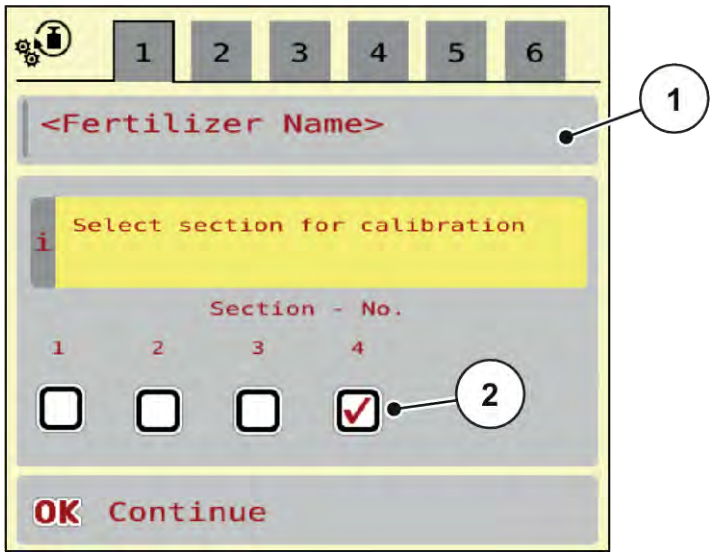



*Fig. 32: Calibration test menu, page 1*

[1] Fertilizer designation

[2] Selecting the section on which the calibration test is performed

▶ Enter the new designation in the input field Fertiliser name.

▶ Select the desired section for the calibration test.

▷ To do so, check the box under the section number.

The default procedure is to select the 4th section.

▶ Press the OK button.

*Page 2 appears.*

▶ Enter the average working speed.

▶ Press the OK button.

*The new value is saved in the machine control unit.*

*The display switches to page 3.*

*The metering roller now fills the spreader tank and automatically stops after 15 s.*

*The display switches to page 4.*

▶ Empty the fertilizer collection tray and then place it back under the metering unit.

▶ Press the OK button.

*Page 5 appears.*

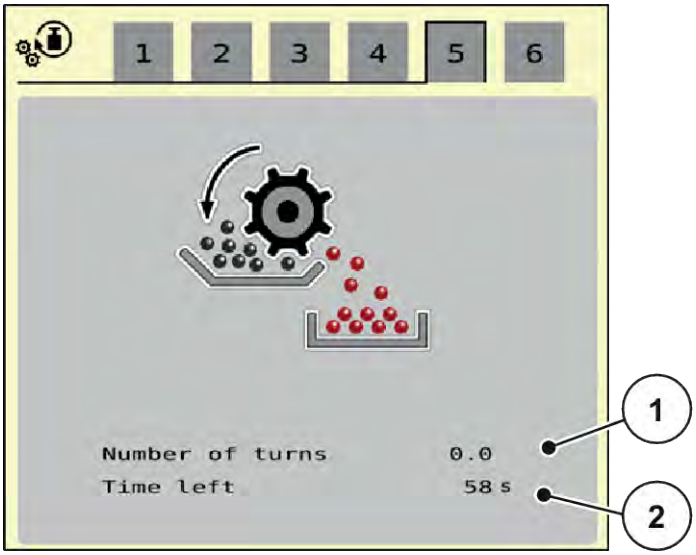



*Fig. 33: Calibration test menu, page 5*


▶ Press the start/stop function key.

▶ The calibration procedure now runs automatically until metering switches off independently after 80 s.

▶ The display switches to page 6.

▶ Weigh the collected fertilizer quantity again.

▶ Enter the collected fertilizer quantity.

*The machine control uses the data to calculate the turns/kg.*

▶ Press the OK button.

*The newly calculated revolutions/kg have been adopted.*

*You will return to the fertilizer settings menu.*

*The calibration test has been performed and is therefore complete.*

If you want to keep the previously stored turns/kg, press the back button.

## 8.3 Assembling the metering unit

- ▶ Lift the injector cartridge on the handle.
- ▶ Slide the injector cartridge through the rail until the locking mechanism engages.

  *Check to make sure that the injector cartridge is firmly locked in the operating condition.*

*The machine is ready for spreading operation.*

# 9 Spreading operation

## 9.1 Instructions regarding the spreading operation

The modern technology and design of our machines and exhaustive, continuous testing in the factory's fertilizer spreader test system ensure that you will have a perfect spreading pattern.

In spite of the care taken during machine manufacture, deviations in fertilizer application or other faults are possible even with designated usage.

Reasons for this may be:

- Changes in the physical properties of the seeds or fertilizer (such as variable grain size distribution, variable density, grain size and surface, treatment, coating, moisture).
- Clumping and damp fertilizer
- Wind drift: stop spreading at high wind speeds.
- Blockages or bridge formation (e.g., due to foreign objects, bag residue, wet fertilizer, etc.).
- Uneven ground
- Deterioration of wear parts
- Damage from external causes
- Poor cleaning and care for preventing corrosion
- Incorrect drive speeds and forward speeds
- Neglecting to carry out the calibration test.
- Incorrect machine settings

▶ Pay close attention to the machine settings. Even a slightly incorrect setting may adversely affect the spreading pattern.

▶ Check that your machine is working properly and that the application is sufficiently precise before every use of the spreader and during work (carry out a calibration test).

Particularly hard fertilizer types (such as Thomas fertilizer and kieserite) increase the wear on the spreader vanes.

▶ **Always** use the protective grid supplied to prevent blockages, e.g., caused by foreign objects or fertilizer clumping.

- Reduce speed on uneven ground, drive with care through the headlands, and prevent the boom from hitting the ground. Avoid sudden turns when driving uphill or downhill or across a slope. The change in the center of gravity may increase the danger of tipping. Special care is to be particularly applied when driving on uneven, soft ground (e.g., when entering fields, curbs).
- The machine's operation depends on the driving speed. When the driving speed changes, the metering shaft speed is adjusted automatically.
- For optimum performance of the blower, maintain a constant drive shaft speed of approximately 1000 rpm.

The intended use of the machine includes compliance with the operating, maintenance, and service conditions in accordance with the manufacturer specifications. **Spreading** therefore always includes **preparation** and **cleaning/maintenance**.

- Carry out spreading operations in accordance with the sequence described below.

**Preparation**

- ▶ Install the machine at the tractor: *50*
- ▶ Adjust the machine control settings
- ▶ Pre-set the mounting height: *54*
- ▶ Pour in fertilizer: *55*
- ▶ Enter the application rate: Observing the operator's manual of the machine control

**Spreading**

- ▶ Unlock the swivel frame and swiveling it into the operating position: *71*
- ▶ Fold out the boom in the field: *72*
- ▶ Check the mounting height: *54*
- ▶ Engage the PTO shaft
- ▶ Start spreading (spreading START)
- ▶ Stop spreading (spreading STOP)
- ▶ Disengage the PTO shaft
- ▶ Fold in the boom: *79*
- ▶ Swivel the boom into the transport position and locking it: *Fig. Machine in transport position 82*

**Cleaning/maintenance**

- ▶ Discharge residual material: *81*
- ▶ Remove the machine from the tractor: *84*
- ▶ Cleaning and maintenance: *90*

## 9.2 Replacing the metering roller

The metering roller with cam wheels can be replaced by the metering roller for fine seeds.

**Requirements:**

- The machine is in transport position.
- The tractor engine is off and the ignition key has been removed.

It is recommended to empty out any residual volume before changing the metering roller to prevent material from flowing out when opening the metering tank. See *9.11 Discharging residual material*

- Lowering the injector cartridge.

- Unlocking the metering tank.

*Fig. 34: Unlocking the metering tank*

- Remove the two screw caps on the right and the left of the metering roller cover and remove the cover.

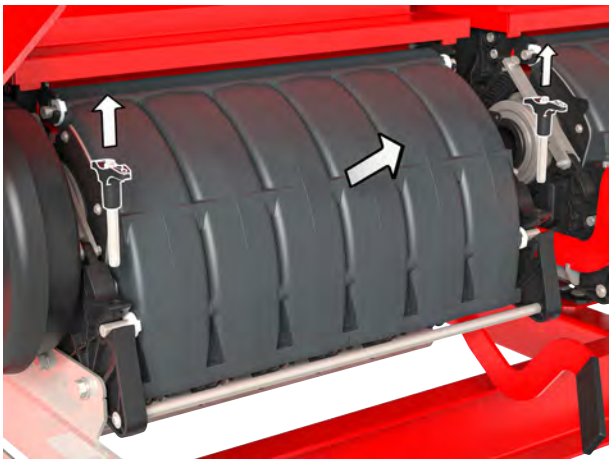


*Fig. 35: Removing the metering roller cover*

To change the metering roller on section 1 or 4, remove the splash guard on the front of the machine. See *11.4.1 Disassemble the dirt deflector*

- Release two quick release closures on the belt cover using the adjustment lever and remove the belt cover.

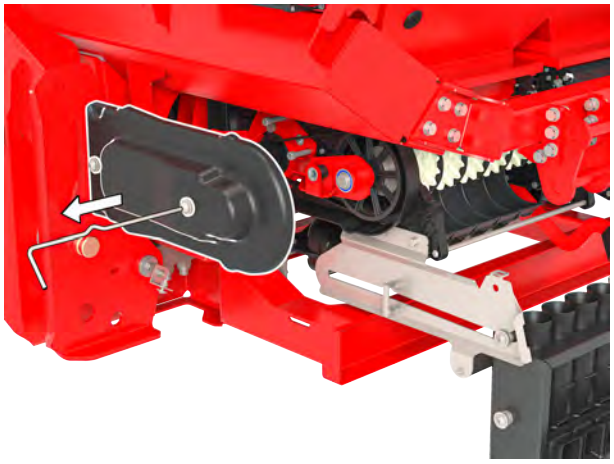


*Fig. 36: Removing the belt cover*

- Release two screws on the motor.

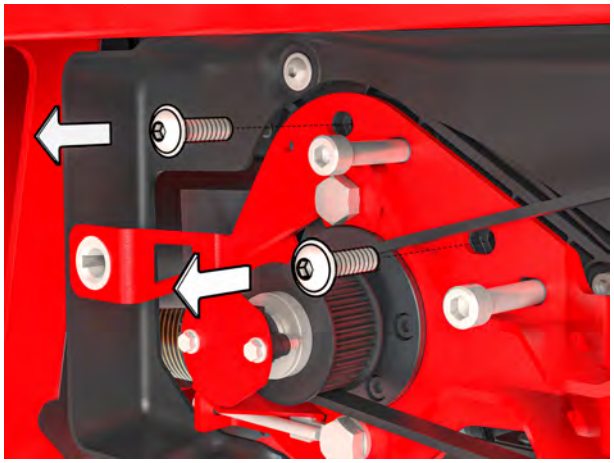


*Fig. 37: Releasing screws on the motor*

- Release the screw on the metering roller bracket and open the bracket.

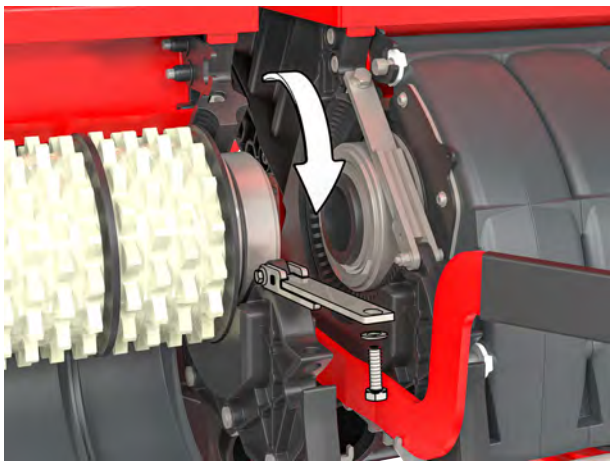
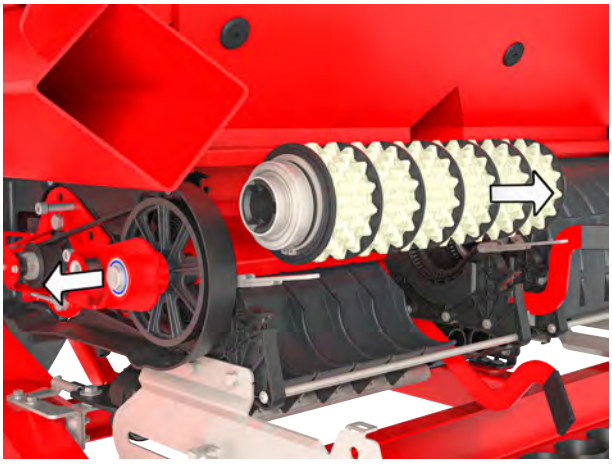


*Fig. 38: Opening the metering roller bracket*

▶ Push the motor forward slightly and release the metering roller from the form lock with the motor. Remove the metering roller.

*The metering roller has been removed.*



The metering roller can be installed by following the same steps for removal in the reverse order.

## 9.3 Preparing the machine for driving

**⚠DANGER!**

**Risk of injury due to ineffective locking mechanisms resulting from excessive mechanical stress from the swivel frame and boom sections**

Excessive stress could damage the locking mechanism if the boom or the swivel frame are not completely extended or retracted and locked during travel or swiveled and locked in transport position. This in turn could result in injury due to an unsecured boom or swivel frame. The boom must be completely extended or completely retracted and locked during travel.

▶ Before traveling, even for the shortest distances, swing the boom to the end position (either extended or retracted and locked).

▶ Before traveling with the boom retracted, even for the shortest distances, swivel the swivel frame into the transport position until it locks into place.

**Requirements:**

• The machine is firmly attached to the tractor. See *7.4 Installing the machine at the tractor*

■ ***Switching on the hydraulic system***

▶ Switch on the hydraulic valve on the tractor for the boom-type mineral fertilizer spreader.

The hydraulic valve for the boom-type mineral fertilizer spreader must also be switched when driving on roads.

■ ***Locking the swivel frame***

▶ Operate the hydraulic control unit of the tractor to lock the swivel frame.

▶ Check to make sure that the swivel frame is correctly locked in the transport position.

▷ To do so, pay attention to the position of **both** locking mechanism displays.

The locking mechanism displays are located on the warning signs on the left and right of the machine's front side. See *12 Instructions: Swivel frame and boom locking mechanism*

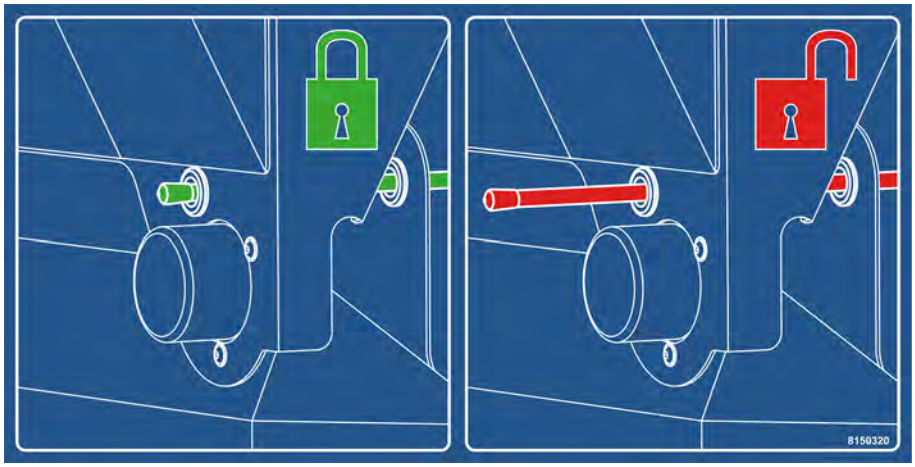



*Fig. 39: Locking mechanism display*

[a] Locked green padlock: The swivel frame is locked.

[b] Unlocked red padlock: The swivel frame is not locked.

## 9.4 Moving the swivel frame into the operating position

**⚠ WARNING!**

**Risk of injury from swivel frame movements**

When the swivel frame is moved, people can be injured or property damaged. In particular, note that the swivel frame needs space behind and on the side of the machine.

▶ Only operate the swivel frame if there is enough free space around the spreader.

▶ Only operate the swivel frame when the attached spreader is at a standstill.

▶ Ensure that nobody is present in the hazard zone.

Requirement:

• Start the hydraulic control unit of the tractor.

- ▶ Activate the tractor control unit for the swivel frame locking mechanism to unlock the swivel frame.
- ▶ Activate the tractor control unit for the swivel frame locking mechanism to swivel the swivel frame into the operating position [B].

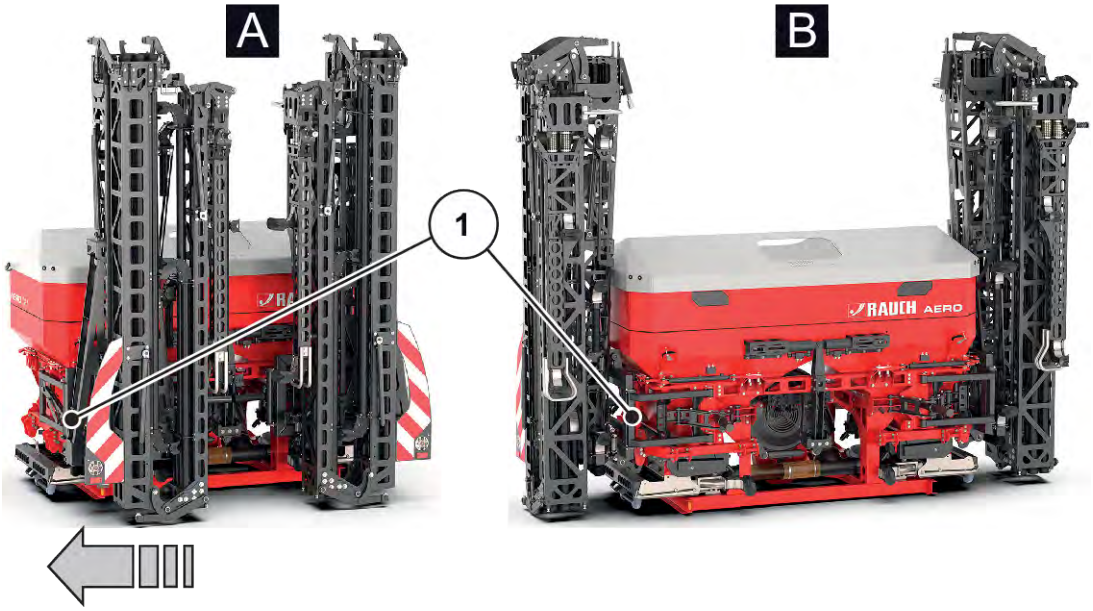



*Fig. 40: Swiveling the swivel frame into the operating position*

A Swivel frame [1] in transport position B Swivel frame [1] in operating position

- ▶ Activate the tractor control unit for the swivel frame locking mechanism to lock the swivel frame.

*The swivel frame is locked in the operating position.*

## 9.5 Folding out the boom

**⚠CAUTION!**

**Risk of collision while the boom packages are swinging in and out**

The boom packages can injure people while they are swinging in and out.

- ▶ Ensure that nobody is present in the hazard zone.

***NOTICE!***

**Risk of property damage when the boom packages are swinging in and out**

If the boom packages are extended while the swivel frame is in the transport position or is not locked, the machine could be damaged.

- ▶ Do not start the swinging procedure until the swivel frame is in the operating position and locked on the left and right.
- ▶ Only swing the boom in or out when the attached spreader is at a standstill.
- ▶ Only operate the boom if there is enough free space around the spreader.

Whilst swinging the boom in or out, always watch it closely.

The machine is equipped with hydraulically swinging boom sections.

You can continuously adjust the boom electronically in the inclination to the ground by hand.

**Requirements:**

- The machine must be standing as horizontal as possible.
- The tractor hydraulic control unit must be started.
- The swivel frame is locked in the transport position.

▶ Access the menu Main menu > Boom folding.

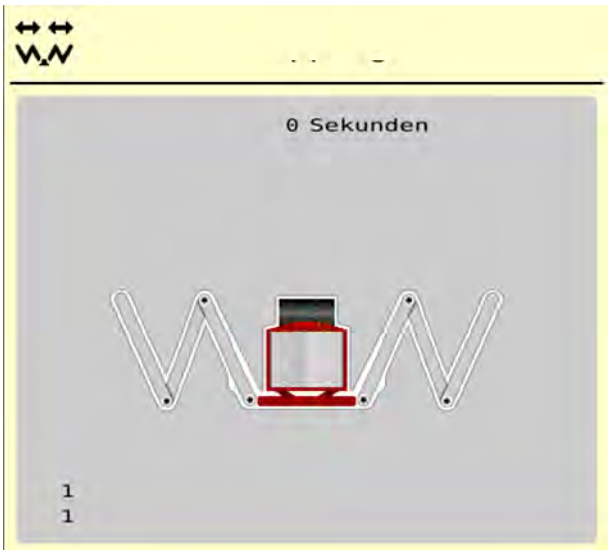



*Fig. 41: Menu Boom folding*

▶ Press the **Swing out first sections and central sections 1** function key until the boom first sections and central sections are fully swung out **and** the timer on the screen has expired.

*The first sections and central sections 1 are fully swung out on both sides.*

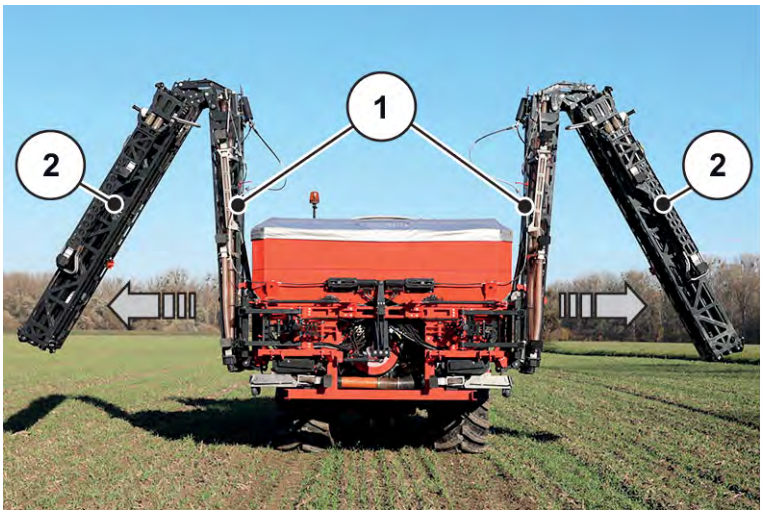



*Fig. 42: Swinging out the start sections and central sections 1*

Look at the boom to check whether the first sections and central sections 1 are fully swung out and are relatively level.

- The cylinders of the start side must extend completely.
- The cylinders are extended, the wire rope is under tension.

▶ Press the **Central sections 2** function key until the boom central sections are fully swung out **and** the timer on the screen has expired.

*The central sections 2 are fully swung out on both sides.*

*The timer on the screen counts down to 0.*

▶ Press the **Swing out end sections** function key until the boom end sections are fully swung out **and** the timer on the screen has expired.

*The machine is ready for spreading.*

*The timer on the screen counts down to 0.*

## 9.6 Automatic re-tensioning of the boom

During spreading, the tension of the boom cylinders decreases due to the vibrations. This is why regular re-tensioning is required. This is done automatically via the **AUTO re-tensioning** function.

Requirement:

- The boom is folded out. See *Chapter 9.5 - Folding out the boom - Page 72*

▶ Press the AUTO re-tensioning function key in the main menu.

*Re-tensioning is active.*

*All boom cylinders are re-tensioned every 120 seconds for 5 seconds.*

## 9.7 Adjusting the inclination of the boom

You can use the machine control or the joystick to manually adjust the inclination of the boom packages.

**NOTICE!**

**Risk of damage to property due to insufficient operating height and inclination of the boom**

When one side of the boom is inclined, the other side inclines in the opposite direction. Collision of the boom with the ground, e.g., on slopes, can lead to severe damage to the machine.

- ▶ Do not set the operating height on the baffles of the innermost bend to less than 1 m above the ground, even during late fertilizing.
- ▶ If the terrain is very uneven, select a higher operating height to prevent the boom from making contact with the ground.

▶ Switch from the working screen to the main menu.

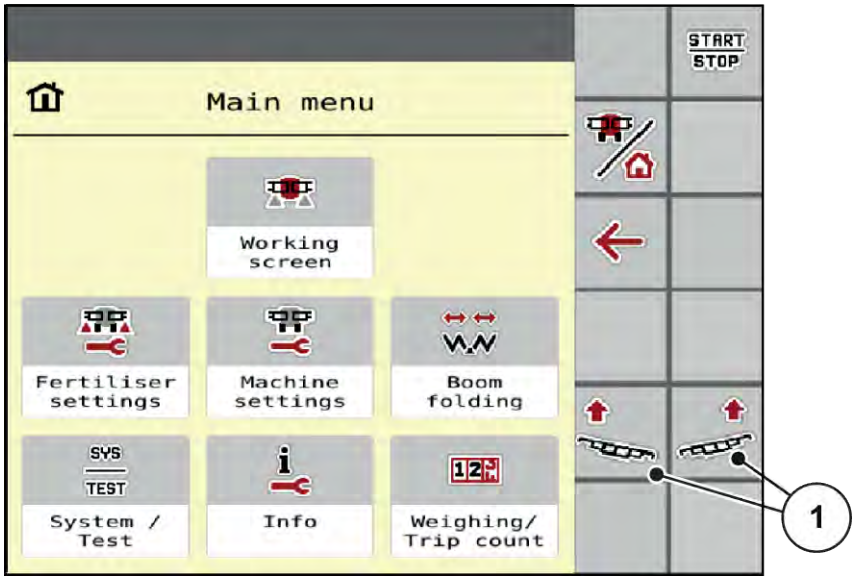



*Fig. 43: Function keys for adjusting the boom inclination*

▶ Use the function keys [1] on the left or right side to increase the inclination of the boom for the slope.

## 9.8 Fertilizer spreading

Before starting the work, check to ensure that all requirements for a secure and economic spreading operation are met.

In particular, the following points are to be considered:

- Is the tractor/machine combination fail-safe?
- Are there any people left in the spreading range? Instruct these people to leave the hazard zone.
- Will the environmental conditions allow for a risk-free spreading operation? In particular, high wind speeds are to be considered.
- Do you know the area and are you aware of any possible hazard spots?
- Do you use the correct fertilizer?
- Have you set the correct application rate at the operating unit in the Fertiliser settings menu?
- Did you perform a calibration test that is required before using the machine?
- Is the drive shaft switched on (to ensure that blower is operating)?
- Is the hydraulic system of the tractor activated?
- Was the boom folded out and positioned with an incline?
- Was the automatic section control activated?
- Was the automatic control unit of the boom activated?

### 9.8.1 Spreading operation

▶ Switch on the universal drive shaft.

▶ If required, switch on the sections manually or automatically in the electronic control unit.

▶ Check the inclination of the boom.

▷ See *9.7 Adjusting the inclination of the boom*

▶ Switch to the working screen.


▶ Press the **Spreading ON/OFF** function key.

*The spreading starts.*


Exclusively spread the fertilizer on the field in according with your track system until the end.

Switch your sections to prevent overfertilizing the border zones.


▶ Press the **Spreading ON/OFF** function key.

▶ Switch off the universal drive shaft at the tractor.

*The blower stops.*

▶ Stop the tractor in the track in a place that is as level as possible.

When the boom is folded out and in the operating position, the baffles must be inserted into the upper brackets on all bends.

**Normal fertilizing**

- ▶ Insert the baffle into the upper bracket facing downward.

*Fig. 44: Baffle in normal fertilizing mode*

**Switching baffles for late fertilizing**

- ▶ Pull the clamp of the baffle to the side with the fingers.
- ▶ Pull out the baffle.

*Fig. 45: Pulling out the baffle*

- ▶ Flip the baffle.

  *The baffle is flipped facing downward.*

*Fig. 46: Switching the baffle*

- ▶ Insert the baffle into the lower bracket until it engages.
  - ▷ Check to make sure that the baffle is firmly inserted.

*Fig. 47: Baffle in late fertilizing mode*

## 9.8.2 Driving into the headlands

When you are driving into the headlands at the end of the field, you can move the boom to the turning position. This helps you to prevent damage due to potential obstacles at the field boundary or due to uneven terrain.

- ▶ Driving into the headland track.


- ▶ Stop spreading using the machine control. When the Task control/Section control function is selected, the machine stops automatically in the headland.

- ▶ Press the **Lift boom** button on the machine control.

  *The boom moves to the V-position.*
- ▶ Drive along the headland to reach the next track.

- ▶ Press the **Lower boom** button on the machine control.

  *The boom is in the operating position.*


- ▶ Restart spreading.

## 9.8.3 Spreading with section control

You can adjust the working width when activating or deactivating the sections. These settings can be configured directly in the working screen. You can use these to optimally adapt them to the field requirements during spreading operation.

| Button | Spreading type |
|---|---|
|  | Switching off the section from the left to the center |
|  | Activating the section from the center to the left |
|  | Switching off the section from the right to the center |
|  | Activating the section from the center to the right |

▶ Press the function key several times until the desired working width is displayed.

## 9.9 Folding in the boom

**⚠DANGER!**

**Risk of injury if boom sections are not completely retracted or not locked properly**

If boom sections are not completely retracted or not locked, there is a risk of injury from boom sections swinging out suddenly and unexpectedly. If the machine is sloping to the side or if the power of the PTO shaft is too low, it is possible that the boom cannot be completely retracted or locked correctly.

- ▶ Before retracting the boom, position the machine as level as possible.
- ▶ If the boom cannot be locked correctly, shut down the machine.

**⚠CAUTION!**

**Risk of collision while the boom packages are swinging in and out**

The boom packages can injure people while they are swinging in and out.

- ▶ Ensure that nobody is present in the hazard zone.

**NOTICE!**

**Risk of property damage when the boom packages are swinging in and out**

If the boom packages are extended while the swivel frame is in the transport position or is not locked, the machine could be damaged.

- ▶ Do not start the swinging procedure until the swivel frame is in the operating position and locked on the left and right.
- ▶ Only swing the boom in or out when the attached spreader is at a standstill.
- ▶ Only operate the boom if there is enough free space around the spreader.

Whilst swinging the boom in or out, always watch it closely.

- ▶ Press the **Swinging in the end sections** function key until the boom end sections are fully swung in on both sides **and** the timer on the screen has expired.

- ▶ Press the **Swing in central sections 2** function key until the boom central sections 2 are fully swung in **and** the timer on the screen has expired.

- ▶ Press the **Swing in first sections and central sections 1** function key until the boom first sections and central sections 2 are fully swung in **and** the timer on the screen has expired.

## 9.10 Moving the swivel frame into the transport position

**⚠DANGER!**

**Risk of injury due to swivel frame not being completely swiveled or correctly locked**

There is a risk of injury from the swivel frame swiveling suddenly and unexpectedly while travelling if the swivel frame is not completely swiveled or not locked. If the machine is sloping to the side, it is possible that the swivel frame cannot be swiveled into the end position completely and locked.

- ▶ Before swiveling the swivel frame, position the machine as level as possible.
- ▶ Before travel, use the locking mechanism displays to verify that the swivel frame is locked.

**⚠ WARNING!**

**Risk of injury from swivel frame movements**

When the swivel frame is moved, people can be injured or property damaged. In particular, note that the swivel frame needs space behind and on the side of the machine.

- ▶ Only operate the swivel frame if there is enough free space around the spreader.
- ▶ Only operate the swivel frame when the attached spreader is at a standstill.
- ▶ Ensure that nobody is present in the hazard zone.

Requirement:

- The tractor hydraulic control unit must be started.

▶ Activate the tractor control unit for the swivel frame locking mechanism to unlock the swivel frame.

▶ Activate the tractor control unit for the swivel frame locking mechanism to swivel the swivel frame into the transport position.

▶ Activate the tractor control unit for the swivel frame locking mechanism to lock the swivel frame.

*The swivel frame is locked in the transport position.*

## 9.11 Discharging residual material

To protect against corrosion and blockages as well as to maintain the properties of the fertilizer, we recommend that you discharge the residual material on a daily basis after use. You can reuse the fertilizer afterwards.

**Requirements:**

- During discharge of residual material, the machine is coupled to the tractor.
- The swivel frame is in the transport position and locked.
- The boom is locked.

*Fig. 48: Machine in transport position*

**⚠ WARNING!**

**Risk of injury due to rotating machine parts**

Rotating metering rollers may catch and pull in body parts or objects. Contact with rotating machine components may cause bruises, abrasions and crushing injuries.

- ▶ Always stay outside the area of rotating metering rollers while the machine is running.
- ▶ Ensure that nobody is present in the hazard zone of the machine.

**Disconnect all metering units on the left and right**

- ▶ Hold the injector cartridge [3] with one hand on the lower handle [2].
- ▶ Press together the locking mechanism [1].
- ▶ Pull the injector cartridge towards you on the handle.

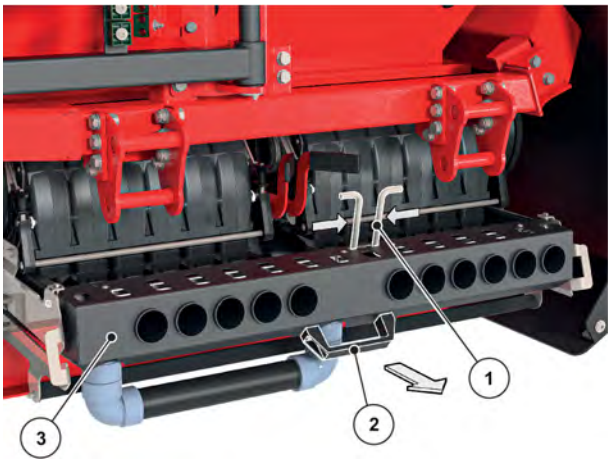



*Fig. 49: Unlocking the injector cartridge*

[1] Injector cartridge locking mechanism
[2] Handle
[3] Injector cartridge

▶ Carefully lower the injector cartridge.

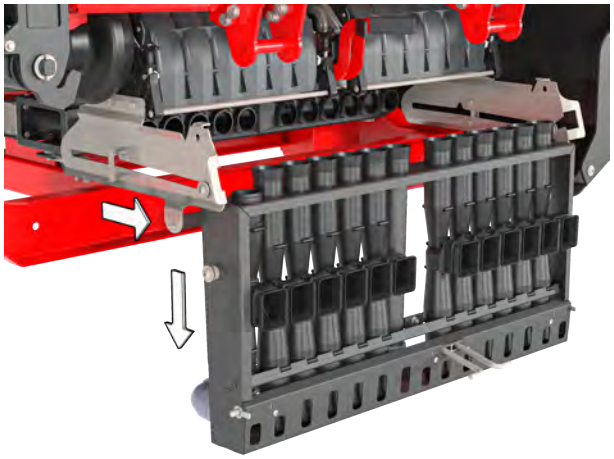


*Fig. 50: Lowering the injector cartridge*

**Draining procedure**

▶ Place a collection tray under each metering roller.

▶ Adjust the metering speed using the electronic machine control unit.

▷ Please refer to the operator's manual for the electronic machine control unit AERO ISOBUS


▶ Press Start/Stop.

*Turn the metering rollers.*

*Fertilizer flow runs into the collection tray.*

You can interrupt the emptying procedure at any time, e.g., to empty the collection tray.

- Press Start/Stop.

▶ After completely emptying of the spreading material hopper, clean the machine.

▷ See *11.4 Cleaning the machine*

▶ Reassemble the metering units.

Even though the spreader tanks have been emptied, they may still contain some fertilizer.

- We recommend to completely empty the machine at the end of the season or after spreading.

**Emptying the machine completely**

▶ Release the locking mechanisms of the metering tanks on the left and right.

*The metering rollers and the spreader tanks are separated. Fertilizer runs out directly from the spreader tanks.*

*Fig. 51: Opening the locking mechanism of the metering tank*

▶ Remove the remaining fertilizer with a hand brush.

▶ Re-secure the locking mechanisms of the metering tanks on the left and right.

## 9.12 Parking and unhitching the machine

**⚠DANGER!**

**Crushing hazard between the tractor and the machine**

Persons standing between the tractor and the machine while they are being parked or decoupled are in lethal danger.

▶ Ensure that nobody is present in the hazard zone between the tractor and the machine.

**⚠DANGER!**

**Risk of crushing due to loss of stability of the machine**

If the machine is not positioned in accordance with the requirements, it could tip over and injure persons in the hazard zone.

▶ Only park the machine with the swivel frame in the operating position.

**Requirements for parking the machine:**

- Position the machine on a pallet.
- Only park the machine when the hopper is empty.
- Relieve the load on the coupling points (lower / upper link) before removing the machine.

- ▶ Move the swivel frame into the operating position and lock it. See *9.4 Moving the swivel frame into the operating position*.
- ▶ Carefully lower the machine via the tractor's hydraulic system and place it on a pallet.
- ▶ Remove the coupling pin and unhitch the machine.
- ▶ After unhitching, place the universal drive shaft, hydraulic hoses, and electric cables in the retainers provided for the purpose.

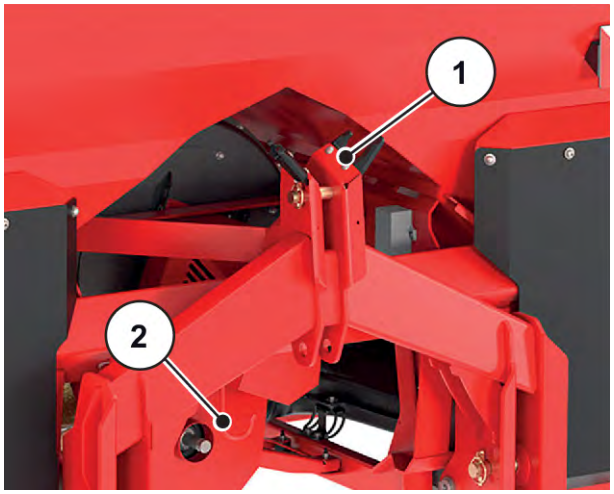



*Fig. 52: Storage of the cables and hydraulic hoses*

[1] Bracket for hoses and cables

[2] Drive shaft bracket

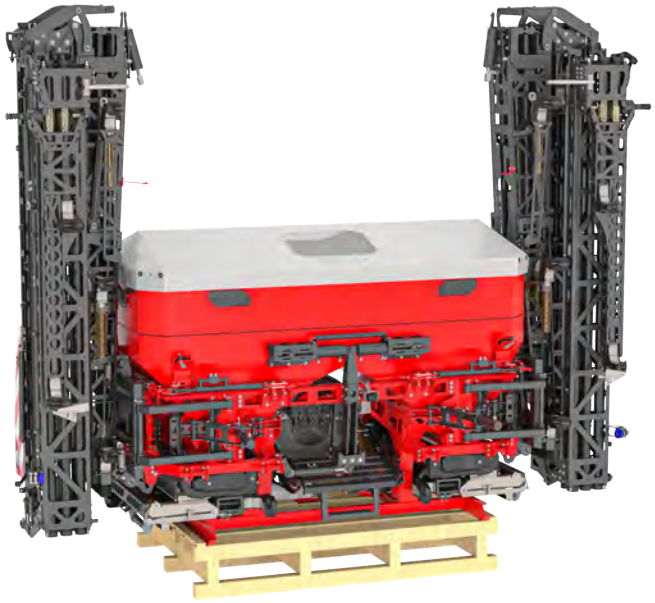


*Fig. 53: Placing the machine on a pallet*

# 10 Faults and possible causes

**⚠ WARNING!**

**Risk of injury due to incorrect troubleshooting**

Delayed or incorrect repairs by unqualified personnel may result in severe personal injury as well as in damages to the machine and the environment.

- ▶ Any faults occurring must be repaired **immediately**.
- ▶ Repairs may only be carried out by **qualified** personnel.

**Troubleshooting requirements**

- Switch off the tractor engine and lock it to prevent unauthorized starting.

Please take particular note of the warnings in chapter *3 Safety* and *11 Maintenance and service*.

| Fault | Possible cause | Measure |
|---|---|---|
| The displayed speed for the metering shaft on the operating screen is "0". | The encoder on the front LEFT or RIGHT metering drive is defective. | ▶ Replace the encoder. |
| | The hydraulic line to the drive motor is defective. | ▶ Replace the hydraulic line. |
| | Broken cable on the wiring harness to the encoder. | ▶ Visit an authorized workshop. |

| Fault | Possible cause | Measure |
|---|---|---|
| The typical working speed is not longer reached. | The moisture content in the fertilizer has increased. This caused the flow characteristics to deteriorate. | ▶ Close the hopper cover.<br>▶ Empty the hopper of remaining fertilizer.<br>▶ Fill in new fertilizer. |
| | The output and flow rate on elements conveying air and fertilizer is reduced. | ▶ Make sure that the pressure chambers are firmly connected to the air ducts.<br>▶ Check the fertilizer conveying hoses and ducts for leaks and replace them, if necessary.<br>▶ Check the sealing funnel between the air ducts and the boom segments and replace them, if necessary.<br>▶ If necessary, remove sticky and/or clogged moist fertilizer in the injector and bend. |
| The target application rate does not match the actual application rate. | Wear or damage on the metering shafts affect the metering accuracy. | ▶ Make sure that the distance between the cam wheel and the spreader tank is 3 mm.<br>See *11.6 Check metering unit and application*<br>▶ Cam wheels that are broken due to foreign objects at the metering shafts must be replaced.<br>▶ Check the hopper filling input under "Settings/ information" and correct them, if necessary. |
| The metering shaft of a section does not stop after it has been switched off. | The hydraulic valve on the metering drive is without function. | ▶ Check the valve and replace it, if necessary. |
| | Power supply, plug connectors, and/or wiring harness to the switching solenoid on the drive motor defective. | ▶ Visit an authorized workshop. |

| Fault | Possible cause | Measure |
|---|---|---|
| The metering shaft cannot be switched back on. | The hydraulic valve on the metering drive is without function. | ▶ Check the valve and replace it, if necessary. |
| | Power supply, plug connectors, and/or wiring harness to the switching solenoid on the drive motor defective. | ▶ Visit an authorized workshop. |
| The pendulum frame locking mechanism does not secure the boom correctly. | Slope cylinder is retracted or extended all the way. | ▶ Adjust the boom to the horizontal position before locking the pendulum frame. |
| | Installation length on the hydraulic cylinders of the locking mechanism not correct | ▶ Check the adjustment of the joint eyes on the hydraulic cylinders and correct it, if necessary. |
| | Hydraulic lines to the hydraulic cylinders defective | ▶ Replace the hydraulic line. |
| | Leakage in the hydraulic cylinder | ▶ Replace the sealing package of the hydraulic cylinder. |
| | Switching valve for locking mechanism in control block defective | ▶ Visit an authorized workshop. |
| | Power supply, plug connectors, and/or wiring harness to the switching solenoid defective | ▶ Visit an authorized workshop. |

| Fault | Possible cause | Measure |
|---|---|---|
| Transport lock does not secure the boom correctly | Installation length on the hydraulic cylinder of the locking mechanism not correct | ▶ Check the adjustment of the joint eyes on the hydraulic cylinder and correct it, if necessary. |
| | Check the hydraulic lines to the hydraulic cylinder. | ▶ Replace the hydraulic line. |
| | Leakage in the hydraulic cylinder | ▶ Replace the sealing package of the hydraulic cylinder. |
| | Switching valve for locking mechanism in control block defective | ▶ Visit an authorized workshop. |
| | Power supply, plug connectors, and/or wiring harness to the switching solenoid defective | ▶ Visit an authorized workshop. |
| The lighting system does not work. | Power supply, plug connectors, and/or wiring harness defective | ▶ Visit an authorized workshop. |

# 11 Maintenance and service

## 11.1 Safety

Please note the warnings in the chapter *3 Safety*

Take **particular note of the instructions** in the section. *3.8 Maintenance and service*

Observe the following instructions in particular:

- Welding and work on the electrical and hydraulic systems is to be carried out by qualified technicians only.
- There is a **risk of tipping** when working at the lifted machine. Always secure the machine using suitable supports.
- Always use **both** eyelets in the hopper for lifting the machine by means of hoisting gear.
- There is a risk of **crushing and shearing** at power-operated components. Make sure that there is no one in close proximity to the moving parts during maintenance.
- Spare parts must at least comply with the technical standards specified by the manufacturer. This is assured with original spare parts.
- Before starting any cleaning, maintenance, or repair work, and when troubleshooting, switch off the tractor's engine, remove the ignition key, and wait until all moving parts of the machine have come to a stop.
- By controlling the machine with an operating unit, additional risks and hazards due to externally operated components may arise.
  - Disconnect the power supply between the tractor and the machine.
  - Disconnect the power supply cable from the battery.
- Repairs may **ONLY be carried out by instructed and authorized workshops**.

**⚠DANGER!**

**Danger of injury due to running engine**

Working on the machine with the engine running may result in serious injury caused by mechanical components and escaping fertilizer.

- ▶ Wait until all moving parts have come to a complete stop before making any adjustments or performing maintenance work.
- ▶ Switch off the tractor engine.
- ▶ Remove the ignition key.
- ▶ Ensure that nobody is present **in the hazard zone**.

■ ***Maintenance plan***

| Task | Before operation | After operation | After the first X hours | Every X hours | Every X hours | Every X hours | Every X hours | At the beginning of the season |
|---|---|---|---|---|---|---|---|---|
| **Value (X)** | | | 10 | 30 | 50 | 100 | 150 | |
| **Cleaning** | | | | | | | | |
| *Cleaning* | | X | | | | | | |
| **Lubrication** | | | | | | | | |
| *Universal drive shaft* | | | | | | | | X |
| *Weighing spreader* | | | | | X | | | X |
| *Upper and lower link balls* | | | | | X | | | X |
| *Joints, bushes* | | | | | X | | | X |
| *Blower* | | | | | | | | X |
| **Check** | | | | | | | | |
| *Wear parts* | | | | | | X | | X |
| *Screw connections* | X | | X | X | | | | X |
| *Screw connection of the weigh cells* | | | | | | | X | X |
| *Protective grid lock* | X | | | | X | | | |
| *Hydraulic hoses* | X | | | | X | | | X |
| *Distance between cam wheel and spreader tank* | | | | | X | | | X |
| *Belt tension on the blower* | X | | X | | | | | X |

## 11.2 Wear parts and screw connections

### 11.2.1 Checking wear parts

■ ***Wear parts***

Wear parts are: **Hoses, metering rollers, drive belts, hydraulic hoses**, and all plastic parts.

Plastic parts are subject to a certain aging process even under normal spreading conditions. Plastic parts are, e.g., **protective grid locks.**

- Inspect wear parts on a regular basis.

▶ Replace these parts if they show signs of wear, deformation, holes, or aging. Otherwise, the spreading pattern will not be correct.

▷ The durability of wear parts depends, among other things, on the material being spread.

▶ Have the condition of the machine and particularly the attached components, hydraulic system, metering elements, bends, hoses, and baffles checked by your specialist dealer after each season.

▶ Replace worn parts in time to prevent consequences resulting from damage.

### 11.2.2 Checking the screw connections

■ ***Screw connections***

Screw connections have been tightened to the specified torque and locked at the factory. Vibrations and shocks, in particular during the initial operating hours, can loosen screw connections.

▶ Check all screw connections for tightness.

Some components are mounted with self-locking nuts.

▶ When mounting these components, always use new self-locking nuts.

Observe the tightening torques of the standard screw connections.

- See *14.1 Torque value*

### 11.2.3 Checking the screw connections of the weigh cells

■ ***Screw connection of the weigh cells***

The machine is equipped with 2 weigh cells and a tie rod. These elements are fixed by means of screw connections.

▶ Tighten the screw connection with a torque wrench (torque = **300 Nm**).

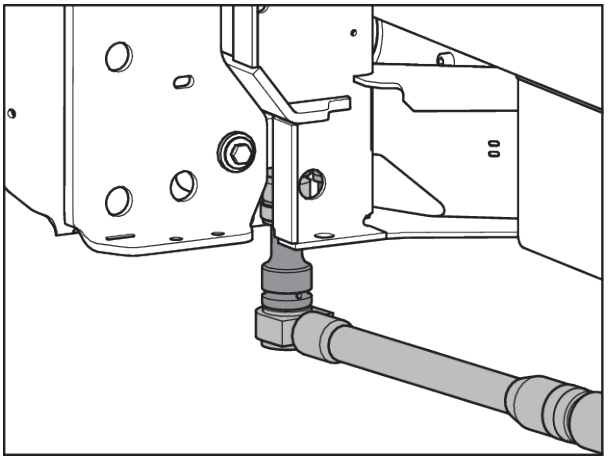


*Fig. 54: Fastening the weigh cells (on the left side of the direction of travel)*

▶ Tighten the screw connections of the tie rod with a torque wrench (torque = **65 Nm**).

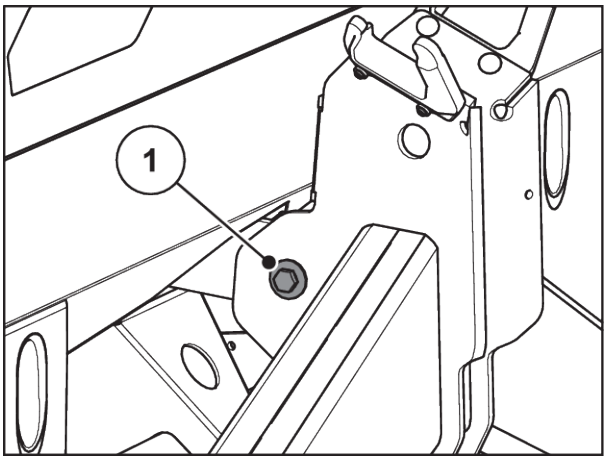



*Fig. 55: Fastening the tie rod at the weigh frame*

After tightening the screw connections with the torque wrench, the weighing system is to be tared again. Please follow the instructions in the chapter **Machine tare** of the operator's manual of the control unit.

## 11.3 Checking the protective grid lock

■ ***Protective grid lock***

**⚠ WARNING!**

**Risk of injury due to moving parts in the hopper**

There are moving parts in the hopper.

There is a risk of injury to hands and feet during commissioning and operation of the machine.

- ▶ Install and the lock the protective grid before commissioning and operating the machine at all times.
- ▶ The protective grid may **only** be opened for maintenance purposes or in the event of a fault.

The protective grid locks mechanically without tools.

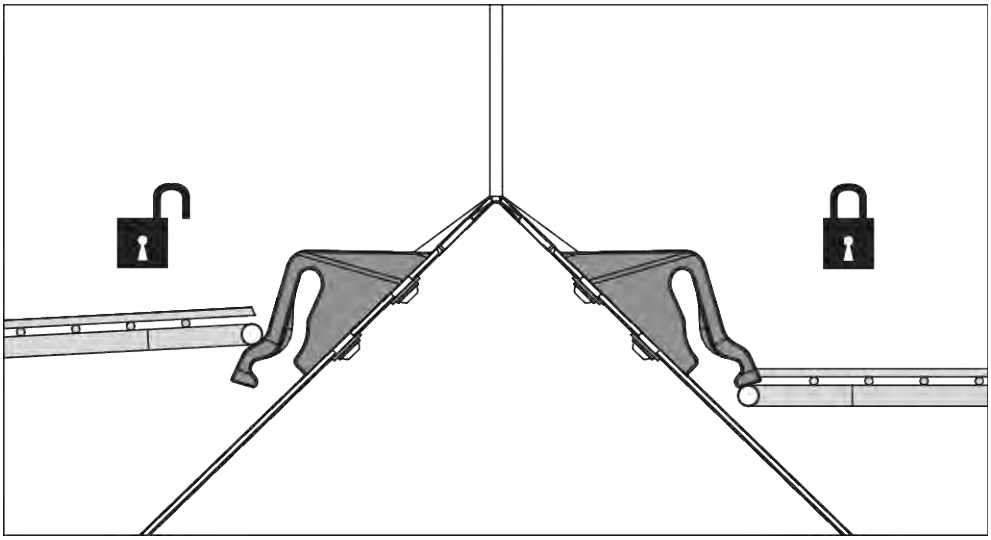


*Fig. 56: Protective grid lock open/closed*

To prevent the protective grid from being opened unintentionally, the protective grid lock can only be opened with a tool (e.g. with the adjustment lever).

**Requirements:**

- Lower the machine.
- Switch off the engine of the tractor. Remove the ignition key.

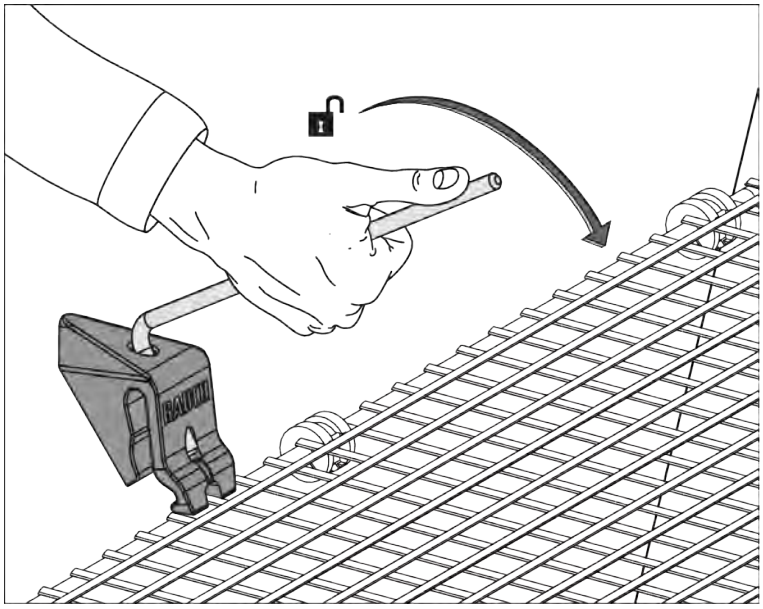


*Fig. 57: Opening the protective grid lock*

**Checking the protective grid lock**

- ▶ Perform a regular function check of the protective grid lock.
- ▶ Replace defective protective grid locks immediately.
- ▶ If required, correct the setting by moving the protective grid lock [1] up/down.

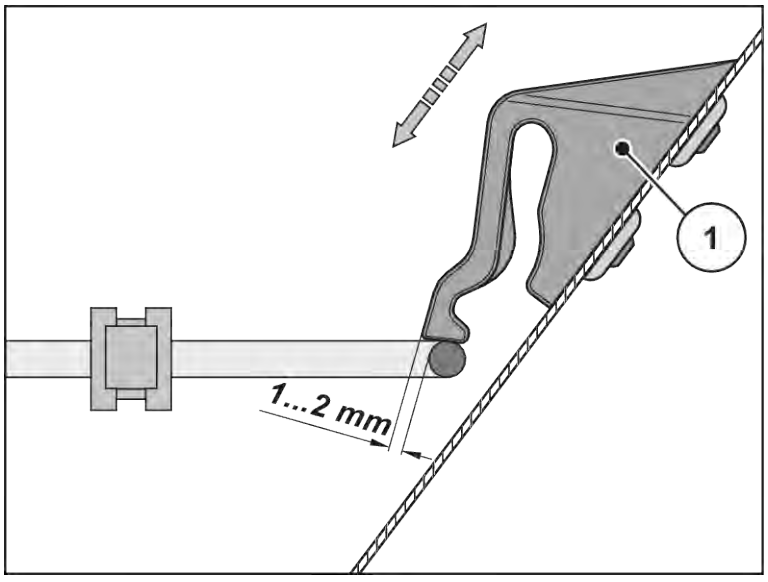



*Fig. 58: Test dimensions for functional check of the protective grid interlock*

## 11.4 Cleaning the machine

■ ***Cleaning***

Spreading material and dirt promote corrosion. Although the machine components are made from corrosion-free material, we recommend that you clean the machine immediately after each use to maintain its value.

- ▶ If available, fold up the protective grids in the hopper (depending on the machine).
- ▶ Only clean oiled machines at washing points fitted with an oil separator.
- ▶ When cleaning with high-pressure, never aim the water jet directly at warning signs, electrical equipment, hydraulic components, and sliding bearings.
- ▶ Preferably clean the machine using a gentle water jet.
- ▶ Especially clean the air ducts, injectors, and bends.
- ▶ After cleaning, treat the **dry** machine, **especially the stainless steel parts**, with an environmentally friendly anti-corrosion agent.
  - ▷ A suitable polishing kit can be ordered from authorized dealers for treating rust spots.

### 11.4.1 Disassemble the dirt deflector

▶ Use the adjustment lever on the machine.

▷ See *Fig. 8 Adjustment lever position*

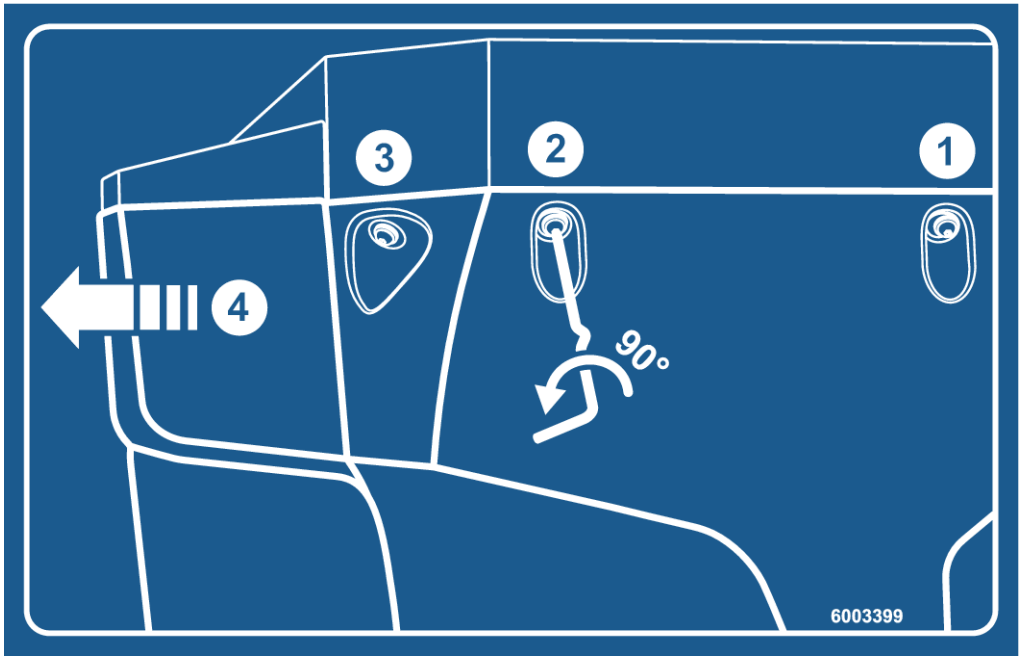



*Fig. 59: Dirt deflector instruction sticker*

▶ Open the 3 quick release closures on the left and right dirt deflector.

▶ Move the dirt deflector to the outside.

▶ Put the dirt deflector down and store it in a safe place.

### 11.4.2 Dismounting the dirt deflector

▶ Move the dirt deflector laterally to the inside until it latches in the bracket.

▶ Screw the 3 quick release closures on the left and right dirt deflector together with the adjustment lever of the machine.

▶ Put the adjustment lever back into the specified bracket.

## 11.5 Checking the hydraulic hoses

■ ***Hydraulic hoses***

Hydraulic hoses are subject to high loads. They have to be checked regularly and are to be replaced immediately when damaged.

- ▶ Check the hydraulic hoses for damage on a regular basis or at least before the start of the spreading season, by means of a visual inspection.
- ▶ Before the start of the spreading season, check the age of the hydraulic hoses. Replace the hydraulic hoses when the prescribed period for storage and usage has been exceeded.
- ▶ Replace the hydraulic hoses if they show one or several of the following types of damage:
  - ▷ Damages to the external layer up to the insert
  - ▷ Embrittlement of the external layer (crack formation)
  - ▷ Deformation of the hose
  - ▷ Hose moving out of the hose fitting
  - ▷ Damages to the hose fitting
  - ▷ Resistance and function of the hose fitting reduced due to corrosion

## 11.6 Check metering unit and application

■ ***Distance between cam wheel and spreader tank***

For exact metering and discharge, the metering elements must be properly adjusted and free from fertilizer residues.

The distance between the cam wheels and the uppermost edge of the spreader tank must be **a uniform distance of approx. 3 mm** across the entire width.

**Checking the distance between the cam wheels and the spreader tank**

- ▶ Insert a 3 mm thick metal strip into the space between the cam wheels [1] and the sheet edge of the spreader tank [2].

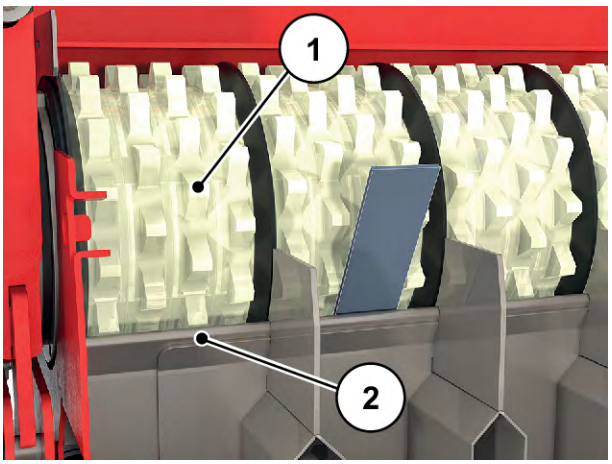



*Fig. 60: Checking the distance between the cam wheels and the spreader tank*

The distance is set correctly if:

- The **3 mm** thick metal strip can be inserted over the entire measured width without any play,
- The distance is set **uniformly** across the entire width.

In machines with a reduced working width, the uniform distance of 3 mm only has to be checked at the level of the conveying cam wheels. The distance can vary in the area of the solid discs (no fertilizer is conveyed).

**Setting the distance between the cam wheels and the spreader tank**

▶ Set the distance on the adjustment screws [3] of the spreader tank bearing.

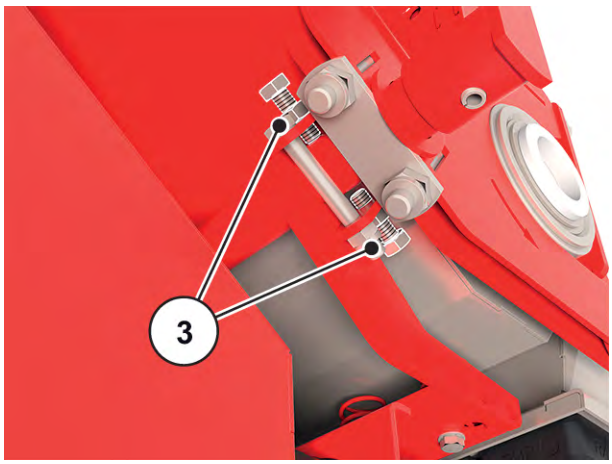



*Fig. 61: Setting the distance between the cam wheels and the spreader tank*

If it is no longer possible to adjust the distance to 3 mm, the cam wheels of the metering roller must be replaced.

**Check further metering elements for wear:**

- Check air ducts, sealing funnel, bends, fertilizer hoses, and baffles for wear.
- These parts must be replaced if worn due to wear.

Perform a calibration test to check the proper metering quantity. See *8.2 Implementing the calibration test*

## 11.7 Check the belt tensions

■ ***Belt tension on the blower***

The belt tensioning mechanism is located on the left above the PTO shaft connection.

▶ Check that the top of the washer [1] is the same height as the spacer plate [3].

  ▷ Top of the washer is the same height as the spacer plate: The belt tension is set correctly.

  ▷ Top of the washer is not the same height as the spacer plate: Tighten the nut [2] until the top of the washer is at the same height as the spacer plate.

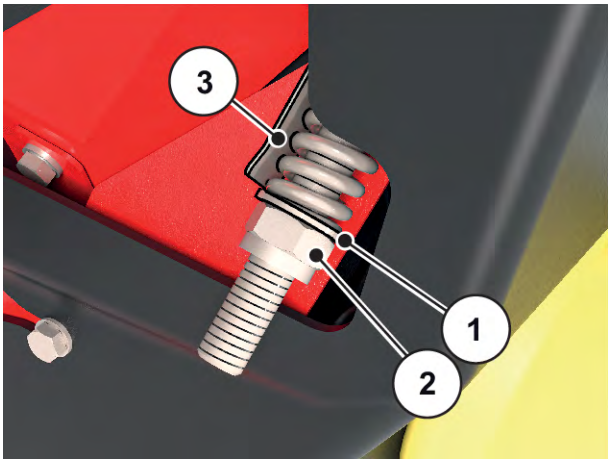



*Fig. 62: Blower belt tensioning mechanism*

[1] Washer
[2] Nut
[3] Spacer plate

# 11.8 Lubrication

## 11.8.1 Drive shaft lubrication

■ ***Universal drive shaft***

- Lubricant: Grease
- See operator’s manual of the manufacturer.

## 11.8.2 Lubricating weigh cells

■ ***Weighing spreader***

The lubrication points are distributed over the entire machine and marked correspondingly.

You can identify the lubrication points by means of the following notice plate:

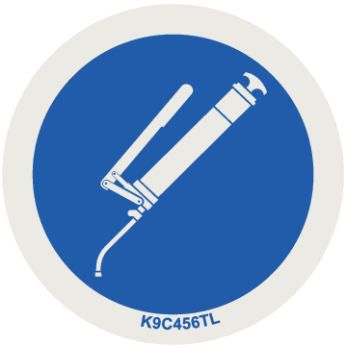



*Fig. 63: Lubrication points notice plate*

- Always keep the notice plates **clean** and **in a legible state**.

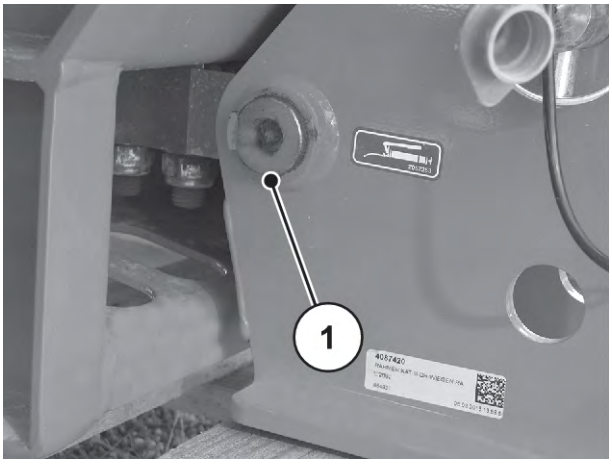



*Fig. 64: Lubrication point of weighing spreaders*

[1] Lubrication point

## 11.8.3 Lubrication of upper and lower links

■ ***Upper and lower link balls***

• Lubricant: Grease

## 11.8.4 Lubrication of links, bushes

■ ***Joints, bushes***

• Lubricant: Grease, oil

## 11.8.5 Lubricating the blower

■ ***Blower***

The lubrication point is on the back of the blower.

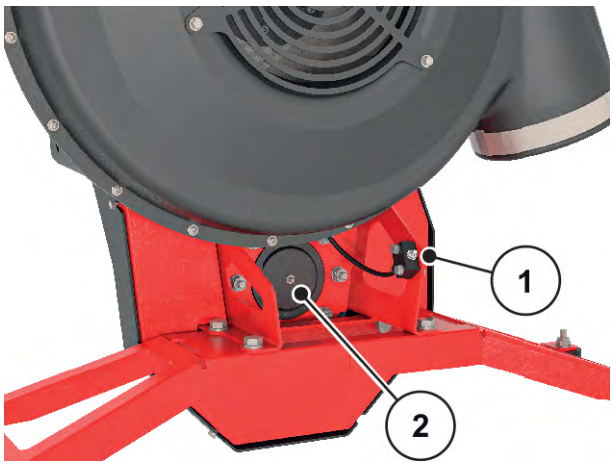



*Fig. 65: Blower lubrication point*

- Lubricant: Grease

# 12 Winterization and preservation

## 12.1 Safety

**NOTICE!**

**Environmental pollution due to unsuitable disposal of hydraulic and transmission oil**

The hydraulic and transmission oils are not entirely biodegradable. Therefore, oil must be prevented from entering the environment in an uncontrolled manner.

- ▶ Collect/dam escaped oil with sand, soil, or other absorptive material.
- ▶ Collect hydraulic and transmission oil in a suitable container provided for the purpose, and dispose of it in accordance with the local statutory requirements.
- ▶ Draining and penetration of oil into the sewerage system is to be prevented.
- ▶ Prevent the penetration of oil into the water drain by setting up sand or earth barriers, or by using other appropriate barrier methods.

In combination with moisture, fertilizer can form aggressive acids that attack paints, plastics, and especially metal parts. This is why **regular washing and caring after use** is very important.

Prior to winterizing, thoroughly **wash** the machine (refer to *11.4 Cleaning the machine*) and let it dry well.

Next, **preserve** the machine (refer to *12.3 Preserving the machine*).

- ▶ Hang up hoses and cables (refer to *Fig. 52 Storage of the cables and hydraulic hoses*).
- ▶ Park the machine (refer to *9.12 Parking and unhitching the machine*).
- ▶ Close the hopper cover. Leave a gap open to prevent moisture in the hopper.
- ▶ If present, disconnect the control unit or the ISOBUS terminal from power and dust off.

Do not store the control unit or the ISOBUS terminal outdoors. Store in a suitable warm location.

- ▶ Place dust caps on hoses and cable.
- ▶ Open the fertilizer outlets:
  - ▷ Metering slide, pre-metering slide, drain door, etc (depends on the machine)

## 12.2 Washing the machine

A fertilizer spreader that is placed into storage **must** first be cleaned.

- ▶ Remove the dirt deflector (refer to *11.4.1 Disassemble the dirt deflector*).
- ▶ Fold up the protective grid in the hopper (refer to *11.3 Checking the protective grid lock*).
- ▶ When cleaning with high-pressure, never aim the water jet directly at warning signs, electrical equipment, hydraulic components, and sliding bearings.
- ▶ Let the machine dry after cleaning.

Do not store the terminal outdoors. Store in a suitable warm location.

Lubricating the machine before winterization (refer to *11.8 Lubrication*)

## 12.3 Preserving the machine

- Only spray on **approved and environmentally friendly** preserving agents.
- Prevent mineral oil-based agents (diesel, etc.). They are rinsed off when the machine is first washed and can get into the sewage system.
- Only use preservation agents that will not attack the paint, plastics, and rubber seals.

- ▶ Only spray the machine once certain that it is completely **clean** and **dry**.
- ▶ Treat the machine with environmentally friendly anti-corrosion agents.
  - ▷ We recommend using protective wax or preservation wax.

Please contact your specialist dealer or your specialist workshop if you want to obtain preservation agents.

Preserve the following assemblies or parts:

- All hydraulic components that are susceptible to rust, e.g., hydraulic couplers, pipes, press-fit rings, and valves
- Galvanized bolts
- If present on your machine:
  - Parts of the braking system
  - Pneumatic lines
  - Spray galvanized **bolts on the axles and the drawbar** with a special protective wax after washing.

You can find further useful information on washing and preserving in the video "Getting ready - winterization essentials".

- Please visit the RAUCH YouTube channel.
- Here is the link to the video: *"Winterization video"*.

# 13 Disposal

## 13.1 Safety

**NOTICE!**

**Environmental pollution due to unsuitable disposal of hydraulic and transmission oil**

The hydraulic and transmission oils are not entirely biodegradable. Therefore, oil must be prevented from entering the environment in an uncontrolled manner.

- Collect/dam escaped oil with sand, soil, or other absorptive material.
- Collect hydraulic and transmission oil in a suitable container provided for the purpose, and dispose of it in accordance with the local statutory requirements.
- Draining and penetration of oil into the sewerage system is to be prevented.
- Prevent the penetration of oil into the water drain by setting up sand or earth barriers, or by using other appropriate barrier methods.

**NOTICE!**

**Environmental pollution caused by inappropriate disposal of packaging materials**

Packaging material contains chemical compounds, which must be dealt with appropriately.

- Packaging material is to be disposed of at an authorized waste management company.
- Observe the national regulations.
- Packaging material may not be burned nor disposed of with the domestic waste processing.

**NOTICE!**

**Environmental pollution caused by inappropriate disposal of components**

The inappropriate disposal of materials is a threat to the environment.

- Only authorized companies may be commissioned with disposal.

## 13.2 Disposal of the machine

The following points apply without restriction. Stipulate suitable precautionary measures based on the national legislation and implement them.

- All components, auxiliary and operating materials from the machine must be removed by specialist staff.
  - ▷ In so doing, these parts are to be sorted into specific categories.
- All waste products are then to be disposed of in accordance with local regulations and directives for recycling or special refuse categories by authorized companies.

# 14 Appendix

## 14.1 Torque value

Tightening torque and assembly pre-load for bolts with metric thread and standard or fine pitch

The values listed apply to dry or slightly lubricated connections.
Do not use galvanized (plated) bolts and nuts without grease.
When using a stiff grease, reduce the value in the table with 10%.
When using (self-)locking bolts and nuts increase the value in the table with 10%.

Tightening torque and assembly pre-load with v=0,9 for shank bolts with metric thread and standard or fine pitch according to ISO 262 and ISO 965-2

Steel class quality fasteners according to ISO 898-1

Head dimensions of hexagonal bolts according to ISO 4014 to ISO 4018

Head dimensions of cylindrical bolts according to ISO 4762

Hole "medium" according to EN 20273

Friction coefficient: 0,12≤ μ ≤0,18

| **Metric thread with standard pitch** | | | | |
|---|---|---|---|---|
| **Thread** | **Class** | **Tightening torque** | | **Max. assembly pre-load ($\mu_{min}$=0.12) N** |
| | | **N.m** | **(lbf.in) lbf.ft** | |
| M4 (X0.7) | 8.8 | 3 | (26.5) | 4400 |
| | 10.9 | 4.9 | (40.7) | 6500 |
| | 12.9 | 5.1 | (45.1) | 7600 |
| M5 (X0.8) | 8.8 | 5.9 | (52.2) | 7200 |
| | 10.9 | 8.6 | (76.1) | 10600 |
| | 12.9 | 10 | (88.5) | 12400 |
| M6 (X1) | 8.8 | 10.1 | 7.4 | 10200 |
| | 10.9 | 14.9 | 11 | 14900 |
| | 12.9 | 17.4 | 12.8 | 17500 |

| Metric thread with standard pitch | | | | |
|---|---|---|---|---|
| **Thread** | **Class** | **Tightening torque** | | **Max. assembly pre-load ($\mu_{min}$=0.12) N** |
| | | **N.m** | **(lbf.in) lbf.ft** | |
| M8 (X1.25) | 8.8 | 24.6 | 18.1 | 18600 |
| | 10.9 | 36.1 | 26.6 | 27300 |
| | 12.9 | 42.2 | 31.1 | 32000 |
| M10 (X1.5) | 8.8 | 48 | 35.4 | 29600 |
| | 10.9 | 71 | 52.4 | 43400 |
| | 12.9 | 83 | 61.2 | 50800 |
| M12 (X1.75) | 8.8 | 84 | 62 | 43000 |
| | 10.9 | 123 | 90.7 | 63200 |
| | 12.9 | 144 | 106.2 | 74000 |
| M14 (X2) | 8.8 | 133 | 98 | 59100 |
| | 10.9 | 195 | 143.8 | 86700 |
| | 12.9 | 229 | 168.9 | 101500 |
| M16 (X2) | 8.8 | 206 | 151.9 | 80900 |
| | 10.9 | 302 | 222.7 | 118800 |
| | 12.9 | 354 | 261 | 139000 |
| M18 (X2.5) | 8.8 | 295 | 217.6 | 102000 |
| | 10.9 | 421 | 310.5 | 145000 |
| | 12.9 | 492 | 363 | 170000 |
| M20 (X2.5) | 8.8 | 415 | 306 | 130000 |
| | 10.9 | 592 | 436.6 | 186000 |
| | 12.9 | 692 | 510.4 | 217000 |
| M22 (X2.5) | 8.8 | 567 | 418.2 | 162000 |
| | 10.9 | 807 | 595 | 231000 |
| | 12.9 | 945 | 697 | 271000 |
| M24 (X3) | 8.8 | 714 | 526.6 | 188000 |
| | 10.9 | 1017 | 750.1 | 267000 |
| | 12.9 | 1190 | 877.1 | 313000 |

| Metric thread with standard pitch | | | | |
|---|---|---|---|---|
| **Thread** | **Class** | **Tightening torque** | | **Max. assembly pre-load ($\mu_{min}$=0.12) N** |
| | | **N.m** | **(lbf.in) lbf.ft** | |
| M27 (X3) | 8.8 | 1050 | 774.4 | 246000 |
| | 10.9 | 1496 | 1013.3 | 351000 |
| | 12.9 | 1750 | 1290.7 | 410000 |
| M30 (X3.5) | 8.8 | 1428 | 1053.2 | 300000 |
| | 10.9 | 2033 | 1499.4 | 427000 |
| | 12.9 | 2380 | 1755.4 | 499000 |
| M36 (X4) | 8.8 | 2482 | 1830.6 | 438000 |
| | 10.9 | 3535 | 2607.3 | 623000 |
| | 12.9 | 4136 | 3050.5 | 729000 |

| Metric thread with fine pitch | | | | |
|---|---|---|---|---|
| **Thread** | **Class** | **Tightening torque** | | **Max. assembly pre-load ($\mu_{min}$=0.12) N** |
| | | **N.m** | **lbf.ft** | |
| M8X1 | 8.8 | 26.1 | 19.2 | 20200 |
| | 10.9 | 38.3 | 28.2 | 29700 |
| | 12.9 | 44.9 | 33.1 | 34700 |
| M10X1.25 | 8.8 | 51 | 37.6 | 31600 |
| | 10.9 | 75 | 55.3 | 46400 |
| | 12.9 | 87 | 64.2 | 54300 |
| M12X1.25 | 8.8 | 90 | 66.4 | 48000 |
| | 10.9 | 133 | 98 | 70500 |
| | 12.9 | 155 | 114.3 | 82500 |
| M12X1.5 | 8.8 | 87 | 64.2 | 45500 |
| | 10.9 | 128 | 94.4 | 66800 |
| | 12.9 | 150 | 110.6 | 78200 |

| Metric thread with fine pitch | | | | |
|---|---|---|---|---|
| **Thread** | **Class** | **Tightening torque** | | **Max. assembly pre-load ($\mu_{min}$=0.12) N** |
| | | **N.m** | **lbf.ft** | |
| M14X1.5 | 8.8 | 142 | 104.7 | 64800 |
| | 10.9 | 209 | 154.1 | 95200 |
| | 12.9 | 244 | 180 | 111400 |
| M16X1.5 | 8.8 | 218 | 160.8 | 87600 |
| | 10.9 | 320 | 236 | 128700 |
| | 12.9 | 374 | 275.8 | 150600 |
| M18X1.5 | 8.8 | 327 | 241.2 | 117000 |
| | 10.9 | 465 | 343 | 167000 |
| | 12.9 | 544 | 401 | 196000 |
| M20X1.5 | 8.8 | 454 | 335 | 148000 |
| | 10.9 | 646 | 476.5 | 211000 |
| | 12.9 | 756 | 557.6 | 246000 |
| M22X1.5 | 8.8 | 613 | 452 | 182000 |
| | 10.9 | 873 | 644 | 259000 |
| | 12.9 | 1022 | 754 | 303000 |
| M24X2 | 8.8 | 769 | 567 | 209000 |
| | 10.9 | 1095 | 807.6 | 297000 |
| | 12.9 | 1282 | 945.5 | 348000 |

# 15 Guarantee and warranty

RAUCH devices are manufactured using modern production methods and with the greatest of professional care, and are subjected to numerous inspections.

This is why RAUCH is offering a 12 month warranty if the following conditions are met:

- The warranty starts on the date of purchase.
- The warranty covers material or manufacturing defects. We are liable for third-party products (hydraulics, electronics) only to the extent of the relevant manufacturer During the warranty period, manufacturing and material defects will be rectified free of charge with the replacement or repair of the affected parts. Other rights extending beyond the above, such as claims for conversion, reduction, or replacement for reasons of damage not suffered by the supplied product are explicitly excluded. Warranty services are provided by authorized workshops, by RAUCH factory representatives or the factory itself.
- Consequences of natural wear, dirt, corrosion, and all defects caused by improper use as well as external influences shall be excluded from the warranty. Any unauthorized repairs or changes to the original condition will void the warranty. The warranty is voided if any spare parts other than genuine RAUCH spare parts were used. Therefore, the directions in the operating manual must be observed. Please contact our company representatives of the parent company if you have any questions or doubts. Warranty claims must be submitted to the company within 30 days at the latest after the damage has occurred. The date of purchase and the machine number must be indicated. If repairs under the warranty are required, they must be carried out by the authorized workshop only after consultation with RAUCH or the company's appointed representatives. The warranty period will not be extended by warranty work. Transport damage is not a factory defect and is therefore not covered by the manufacturer's warranty manufacturer.
- Claims for damage other than to the RAUCH devices will not be accepted. This also means that no liability will be accepted for damage resulting from spreading errors. Unauthorized modifications of the RAUCH devices may result in consequential damage, for which the manufacturer will not accept any liability. The manufacturer's exclusion from liability will not apply in the case of willful intent or gross negligence by the owner or a senior employee, and in cases where – according to the product liability law – there is liability for personal injury or material damage to privately used objects in the event of defects in the supplied product. The exclusion from liability will also not apply if characteristics are missing that are explicitly guaranteed, if the purpose of their guarantee was to protect the purchaser against damage not suffered by the supplied product itself.

**RAUCH Streutabellen**
**RAUCH Fertilizer Chart**
**Tableaux d'épandage RAUCH**
**Tabele wysiewu RAUCH**
**RAUCH Strooitabellen**
**RAUCH Tabella di spargimento**
**RAUCH Spredetabellen**
**RAUCH Levitystaulukot**
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