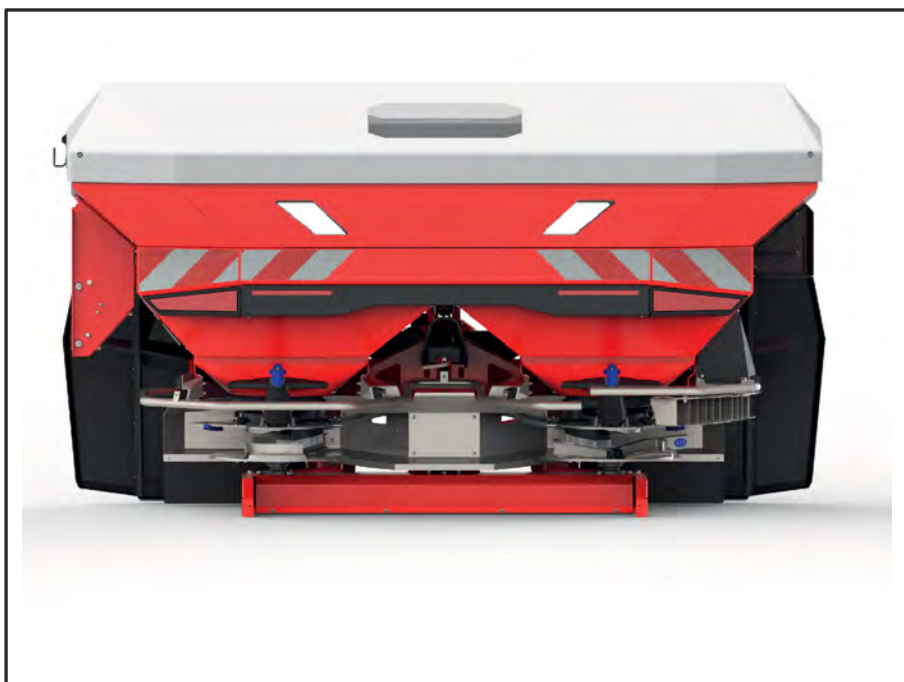




Operator's manual



**Read this manual
carefully before
using the machine!**

Keep for future use

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

AXIS 25 EMC (+W)

5904044-**a**-en-0925

Original instructions

Foreword

Dear customer,

By purchasing the mineral fertilizer spreader of the AXIS series 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 mineral fertilizer spreader and observe the instructions.

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 here the type and serial number together with the year of manufacture of your mineral fertilizer spreader.
This information is 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

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1 Intended use

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

The mineral fertilizer spreaders of the AXIS series are constructed in accordance with their intended use.

They may be used only 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.

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.

2 User instructions

2.1 About this operator's manual

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

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
 - Transport
 - Commissioning
 - Spreading operation
- Instructions for finding and correcting faults
- Maintenance and service instructions

2.3 Notes on text descriptions

2.3.1 Instructions and procedures

Steps that must be performed by operating staff are displayed as follows

- ▶ Instructions step 1
- ▶ Instructions 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 state-of-the-art and is compliant with the applicable technical regulations. However, during its use and maintenance, risks to the health and life of the user or third parties or damage to the machine and other objects can still occur.

For this reason, the machine may only be operated:

- In a flawless and roadworthy condition,
- Taking into account safety and risks.

This requires you to have read and understood the contents of this operator's manual. You must be aware of the relevant accident prevention regulations as well as the generally acknowledged safety, occupational health and traffic regulations and be able to apply them.

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 only with an empty hopper and on level firm ground.
- If the machine is parked alone (without tractor), open the metering slides completely.

3.5.2 Filling the machine

- Only fill the machine when the machine is mounted or attached to the tractor (depending on 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.
- Use suitable auxiliary equipment for filling the machine (e.g., front-end loader, screw conveyor).
- Observe the maximum permissible payload and the permissible total weight of the machine.
- 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 the spreading discs and their fasteners in good condition?
- Are the protective grids in the hopper closed and locked?
- Are the test dimensions of the protective grid interlock within the proper range?
- 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

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 caused by the tractor rolling away or machine movements which may have fatal consequences.

The following figure displays the hazard zones of the machine.

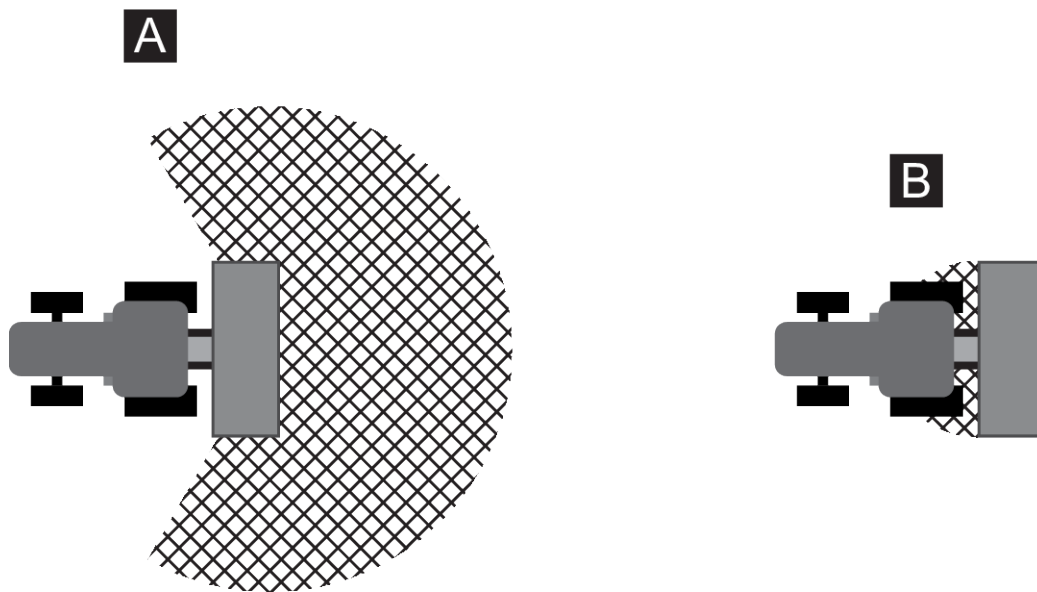


Fig. 1: Hazard zone when devices are attached

[A] Hazard zone in spreading operation

[B] Hazard zone when coupling/decoupling the machine

- 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 attaching/detaching the spreading unit, make sure that no one is present in the hazard zones [B].

3.5.5 Running operation

- In the event of malfunctions, the machine is to be shut down and secured immediately. Have the fault repaired immediately by qualified technicians.
- Do not climb on the machine while the spreader unit is running.
- Only operate the machine with the protective grids in the hopper closed. During operation, the protective grid must **neither be opened nor removed**.
- 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.
- Ejected spreading material may cause serious injury (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.
- Do not climb on the machine or the tractor when it is situated beneath high-voltage electrical power lines.

3.6 Using fertilizer

Use of fertilizers, seeds or crop protection products

Improper selection or use of fertilizers, seeds or crop protection products may cause serious injury or environmental damage.

- When selecting the fertilizers, seeds or crop protection products, inform yourself of its effects on humans, the environment and the machine.
- Refer to the instructions and safety data sheets issued by the manufacturers.

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 having your dealer check the condition of the machine, particularly fastening components, safety-relevant plastic components, the hydraulic system, metering components and spreading vanes, after every working 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 (e.g., when replacing spreading vanes).

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 vehicle within the permissible overall weight? 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.
 - The metering slides must be closed.
 - Switch off the electronic control unit.
- 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.
- Is the boarding step folded away and locked / is the boarding step in the transport position (correct for the machine)?

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.

- 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.
- 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.

3.10 Safety equipment, warnings and instructions

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

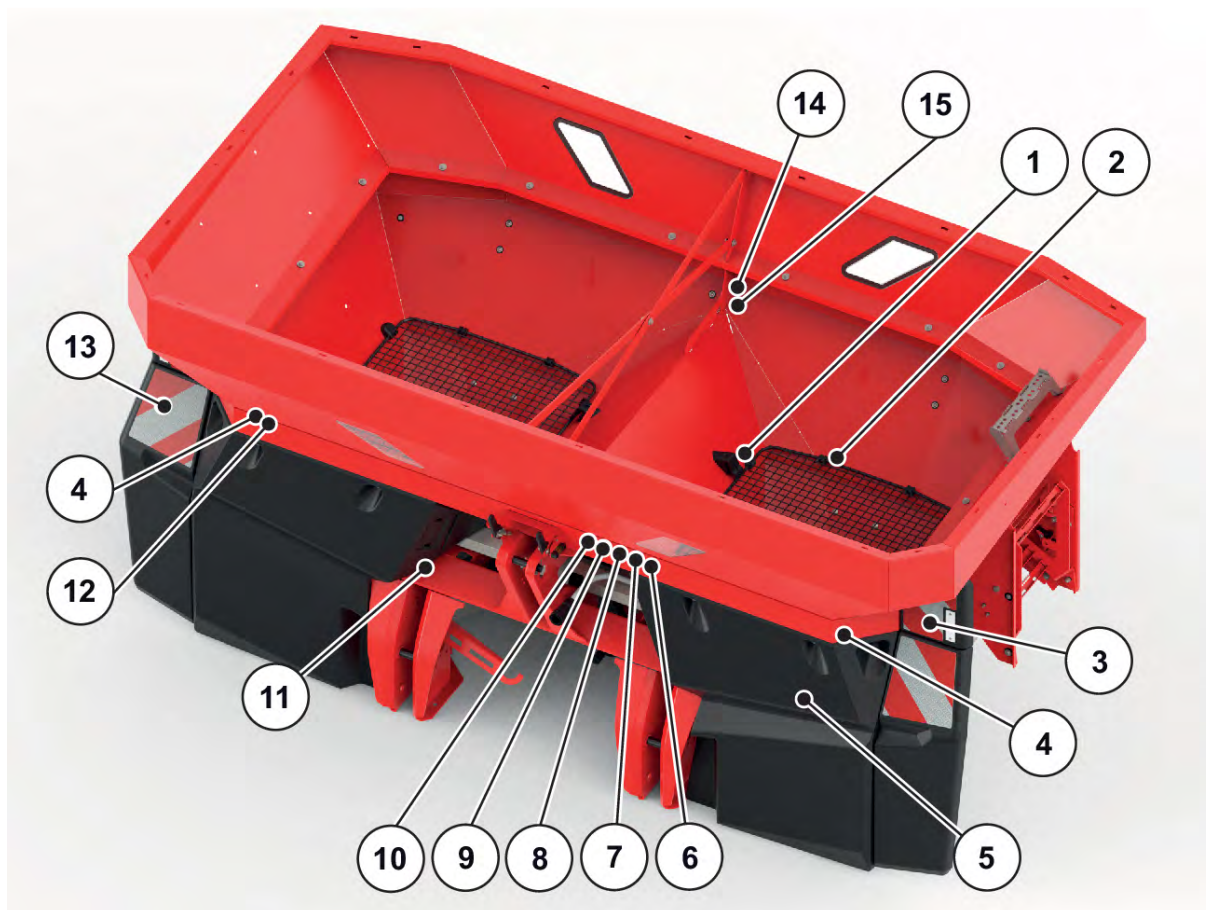


Fig. 2: Safety equipment, warning and instruction stickers, front

- | | |
|--|--|
| [1] Protective grid lock | [9] Warning: Remove ignition key |
| [2] Protective grid in the hopper | [10] Warning: Read the operator's manual |
| [3] Lighting | [11] Nameplate |
| [4] White reflectors | [12] Instructions: Mudguard interlock |
| [5] Splashing water prohibition sign (covered by the mudguard) | [13] Warning foil |
| [6] Instructions: Maximum payload | [14] Eyelet |
| [7] Instructions: PTO speed | [15] Instructions: Eyelet in the hopper |
| [8] Warning: Crush hazard between tractor and machine | |

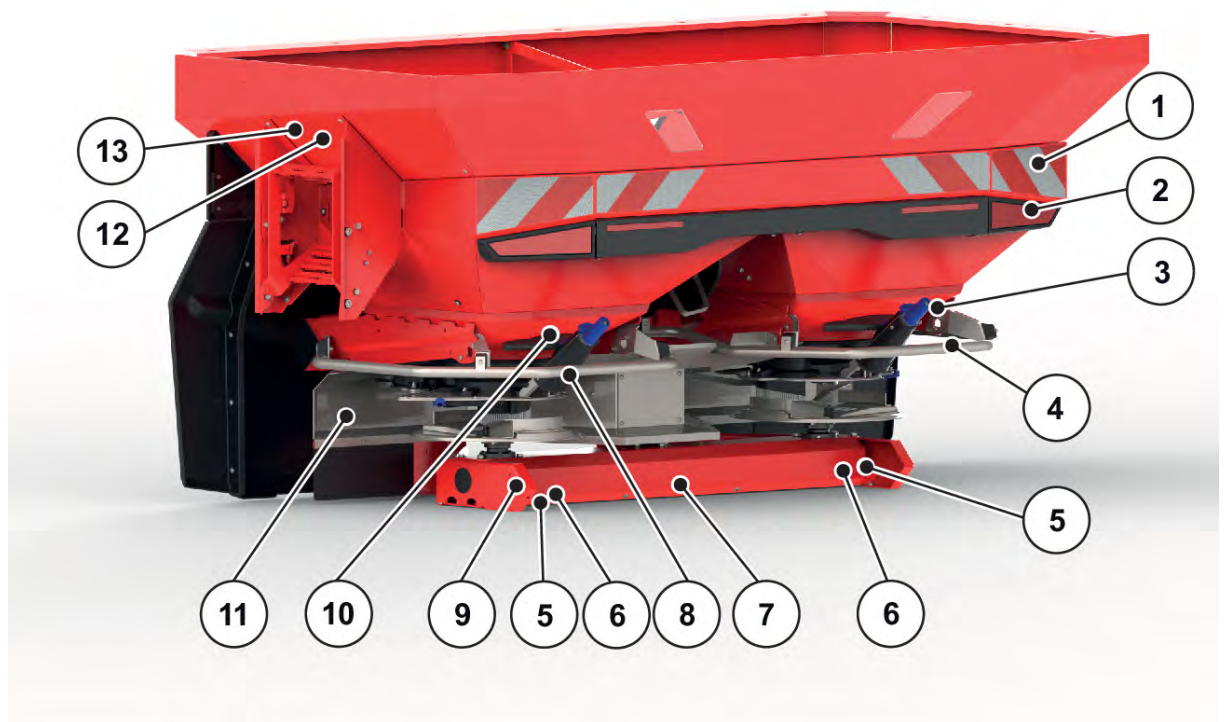


Fig. 3: Safety equipment, warning and instruction stickers, rear

- | | |
|--|--|
| [1] Warning foil | [8] Instructions: Prohibition of climbing |
| [2] Lighting | [9] Yellow side reflectors |
| [3] Instructions: Lashing eyelet (4x around the machine) | [10] Warning: Crush hazard |
| [4] Deflector bracket | [11] Spreading disc guard |
| [5] Red rear reflectors | [12] Warning: Transport of passengers prohibited |
| [6] Warning: Moving parts | [13] Instructions: Fold in the steps before driving away |
| [7] Warning: Ejection of material | |

[1] Universal drive shaft guard

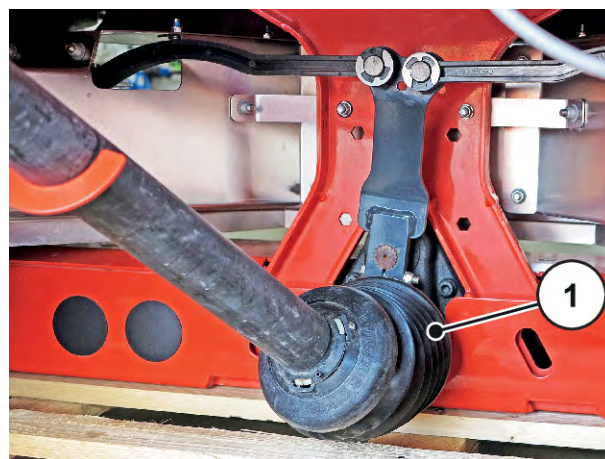


Fig. 4: Universal drive shaft

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 body parts from being caught by the rotating agitator. Prevents body parts from being cut off by the metering slide. Prevents faults during spreading caused by lumps in the spreading material, large stones, or other large objects (screening effect).
Protective grid lock	Prevents the protective grid in the hopper from being opened unintentionally. Engages mechanically if protective grid is closed properly. Can only be opened with a tool.
Spreading disc cover	Prevents the ejection of fertilizer to the front (direction of tractor/workplace).
Universal drive shaft guard	Prevents body parts and clothing from being pulled into the rotating universal drive shaft.
Deflector bracket	Protection against getting caught by the rotating spreading discs from behind and from the side.
Cover of the gearbox bracket	Prevents access to parts of the gearbox.

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. 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. Switch off the engine and remove the key before carrying out maintenance and repair work. Disconnect the power supply
	Passenger transport prohibited Risk of slipping and injury. Do not climb on the machine during spreading and transport.
	Climbing prohibited Climbing on the deflector bracket is prohibited.

Illustration	Description
	Danger between the tractor and the machine 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.
	Danger due to ejection of material Danger of injury to the whole body caused by ejected spreading material Before commissioning, instruct all people to leave the hazard zone (spreading range) of the machine.
	Danger due to moving parts Danger of cutting off body parts It is prohibited to reach into the hazard zone of rotating parts. Switch off the engine and remove the key before carrying out maintenance, repair and adjustment work.
	Danger due to moving parts Danger of cutting off body parts It is prohibited to reach into the hazard zone of the metering slide. Switch off the engine and remove the key before carrying out maintenance, repair and adjustment work.

3.11.2 Instruction stickers

Illustration	Description
	Eyelet in the hopper Labeling of the bracket for fixing the hoisting gear

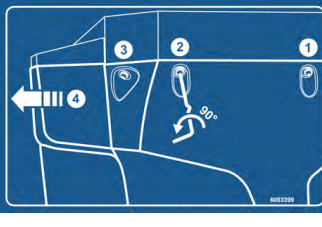
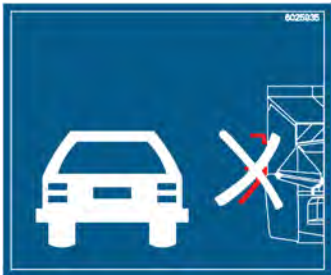
Illustration	Description
	Lashing eyelets on the hopper For identifying the position on the machine, these are used for lashing or securing the machine to prevent movement during transport.
	Lubrication point
	Rated speed of the PTO shaft The rated speed of the PTO shaft is 540 rpm.
	Maximum load capacity
	Dirt deflector lock

Illustration	Description
	Only if the steps are present Fold in the steps before driving away
	Ban on splash water It is prohibited to splash water into the housing of the job computer and other electronic components.
	Spreading material chart on the app. For Android/iOS with DiS function With QR code for quick installation of the app

3.12 Fabrikschild und Maschinenkennzeichnung



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.

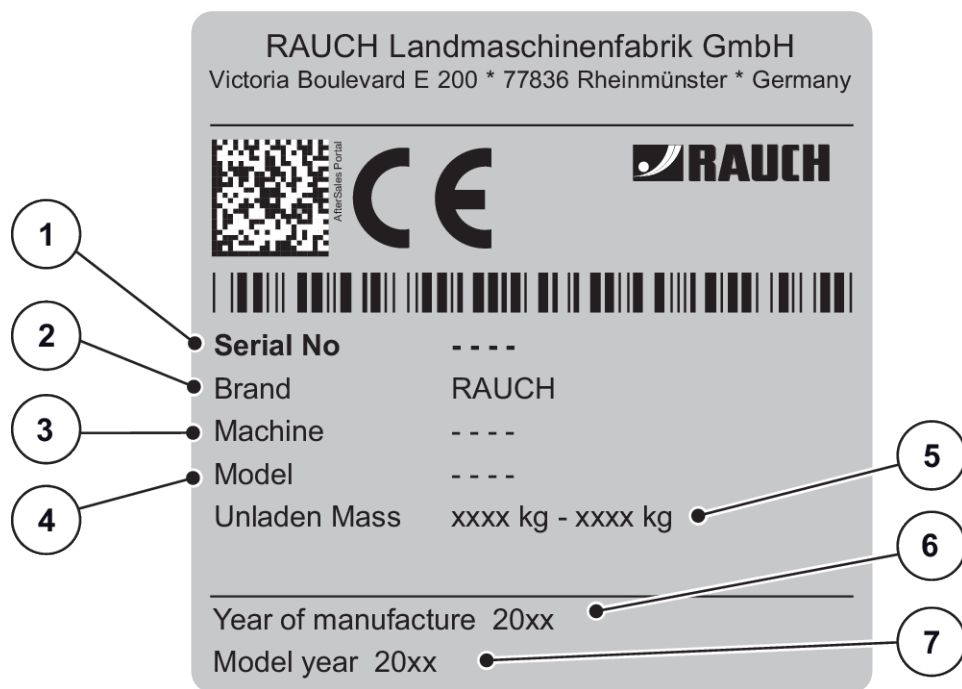


Fig. 5: Nameplate

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

3.13 Lighting / identification

The machine is factory-equipped with a lighting system and front, rear, and side lighting (for attachment to the machine, please refer to 3.10.1 *Position of safety equipment as well as warning and instruction stickers*).

4 Machine data

4.1 Manufacturer

RAUCH Landmaschinenfabrik GmbH
Victoria Boulevard E 200
77836 Rheinmünster
Germany

Phone: +49 (0) 7229 8580-0

Fax: +49 (0) 7229 8580-200

4.2 Description of the machine

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

The machine consists of the following assemblies.

- 2-chamber hopper with agitator and outlets
- Frame and coupling points
- Drive elements (drive shaft and transmission)
- Metering elements (agitator, metering slide, application rate scale)
- Elements for adjusting the working width
- Safety equipment - See 3.10 *Safety equipment, warnings and instructions*

4.2.1 Versions



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.

4.2.2 Assembly overview

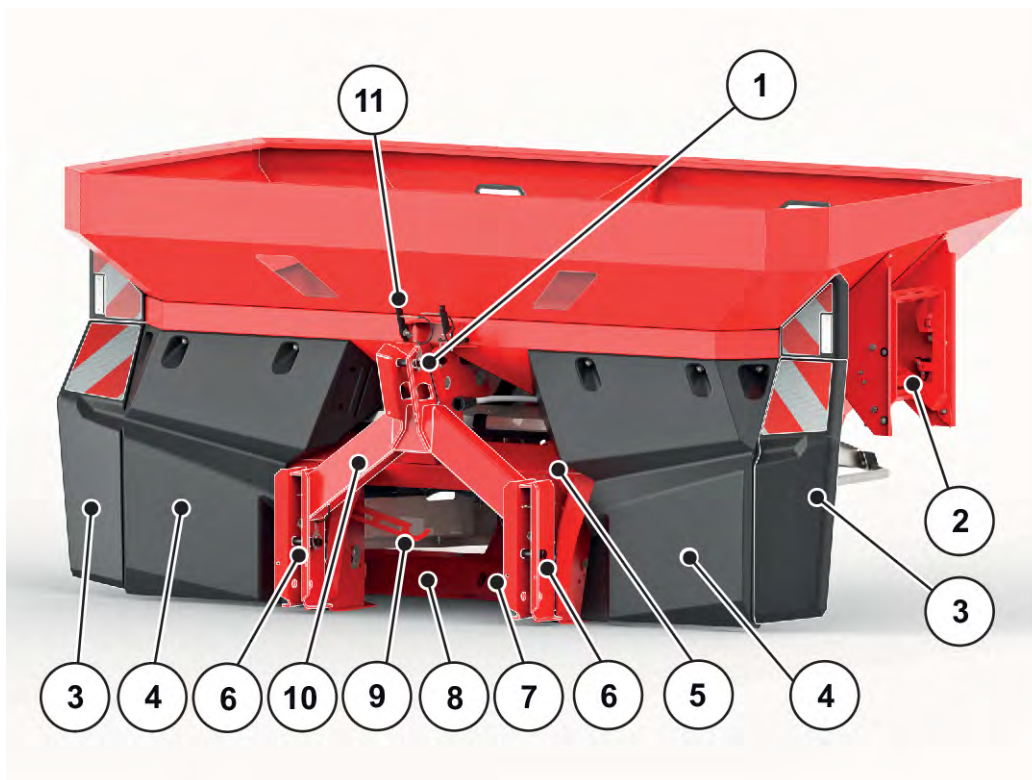


Fig. 6: Assembly overview: Front

- | | |
|---|--|
| [1] Coupling point for the upper links | [7] PTO spigot |
| [2] Steps | [8] Gearbox |
| [3] Width extension of the dirt deflector | [9] Universal drive shaft mounting bracket |
| [4] Dirt deflector | [10] Weighing frame |
| [5] Frame | [11] Hose storage point |
| [6] Coupling point for the lower links | |

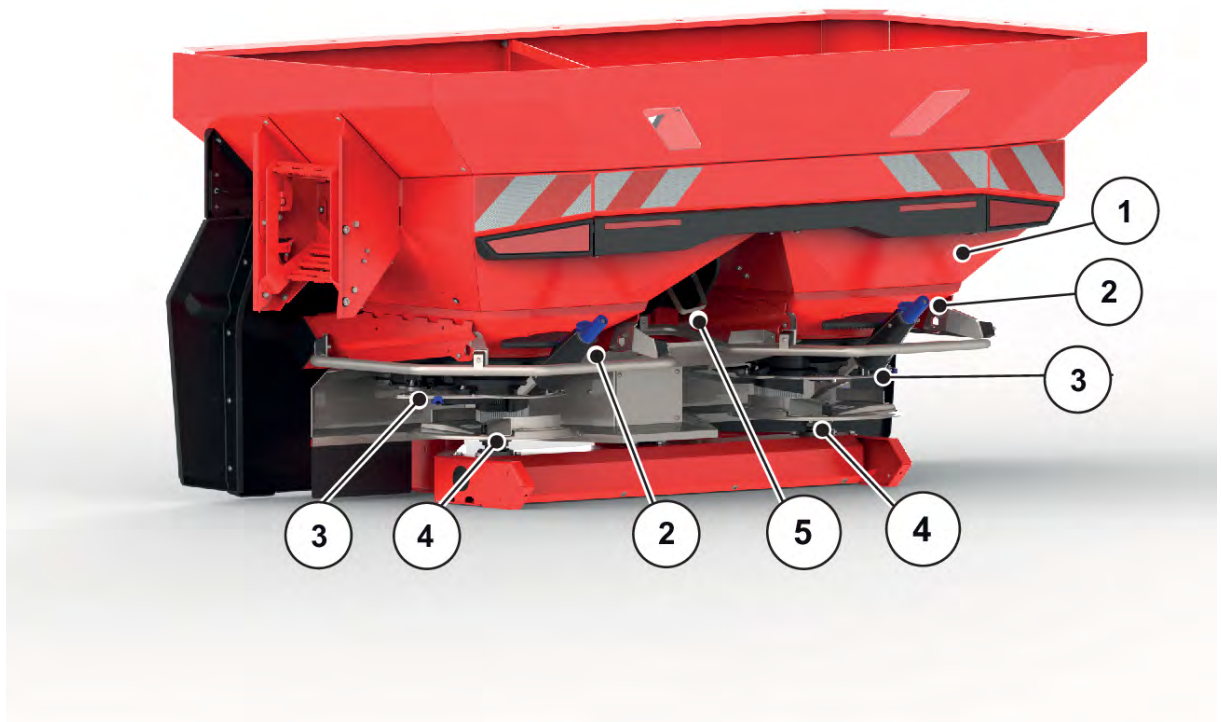


Fig. 7: Assembly overview: Rear

- | | |
|--|---|
| [1] Hopper (fill level scale) | [3] Scale for the application rate (left/right) |
| [2] Adjustment center for the discharge point (left / right) | [4] Spreading disc (left/right) |
| | [5] Calibration test chute |

4.2.3 Transmission for the M EMC function

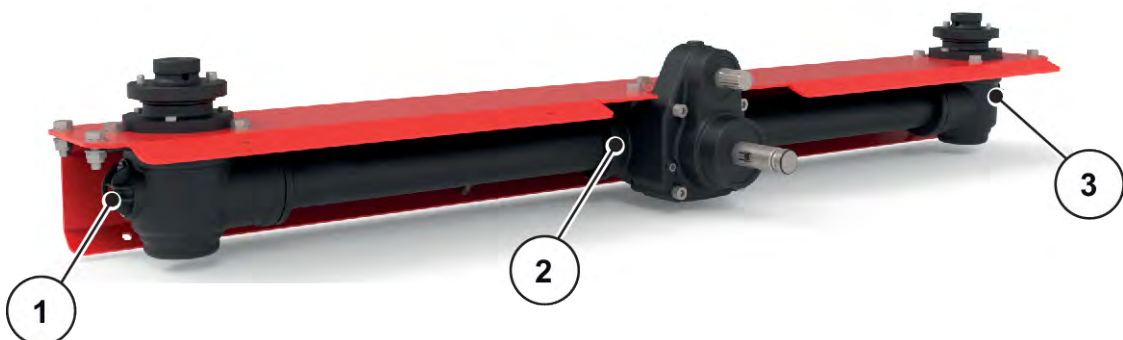


Fig. 8: Mass flow control by measuring the torque of the spreading discs

- | | |
|--|---|
| [1] Right speed sensor (direction of travel) | [3] Left speed sensor (direction of travel) |
| [2] Reference speed sensor | |

4.2.4 Agitator

- [1] Metering slide
- [2] Agitator

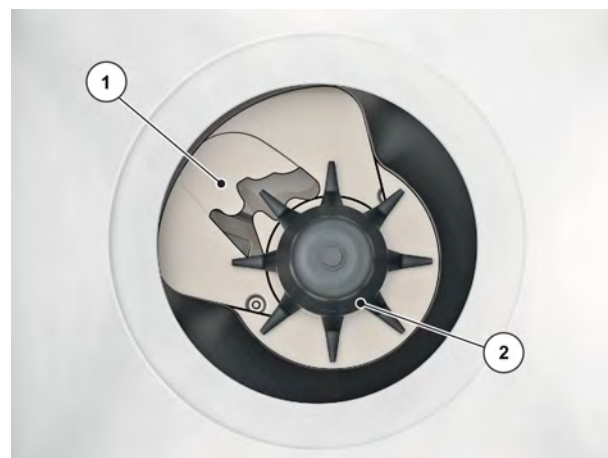


Fig. 9: Agitator

4.2.5 Steps



The steps must be folded up before the machine is transported.



Fig. 10: Folding up the steps into the transport position

[1] Steps with L attachment.

[2] Steps with XL attachment.

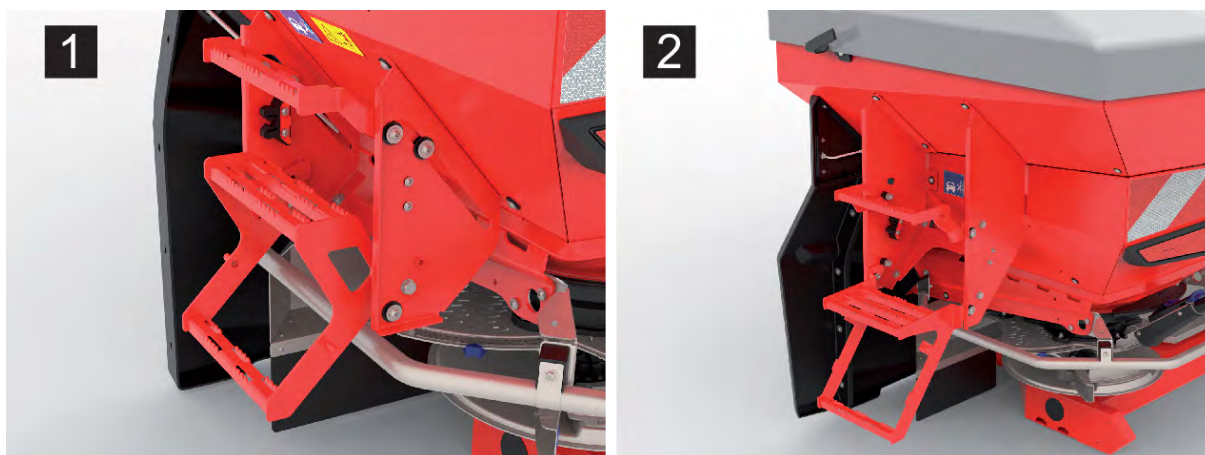


Fig. 11: Steps in the working position

[1] Steps with L attachment.

[2] Steps with XL attachment.

4.3 Technical specifications

4.3.1 Machine dimensions

Data	AXIS 25 EMC	AXIS 25 EMC + W
Overall width		
with L attachment	240 cm	
with XL attachment	295	
Overall length	143 cm	160 cm
Filling level (basic machine)	108 cm	
Distance between center of gravity and the lower link point	65.5 cm	79.5 cm
Filling width		
with L attachment	195 cm	
with XL attachment	250 cm	
Working width ¹	12 - 42 m	

4.3.2 Technical data for the basic equipment

Data	AXIS 25 EMC	AXIS 25 EMC + W
PTO speed		

¹) Working width depending on type of fertilizer and type of spreading disc

Data	AXIS 25 EMC	AXIS 25 EMC + W
min.	450 rpm	
max.	650 rpm	
Hopper capacity	1500-2500 l	
Mass flow ² max.	675 kg/min	
Hydraulic pressure max.	200 bar	
Sound pressure level ³ (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 attachments combination.

Data	AXIS 25 EMC	AXIS 25 EMC + W
Tare weight min. - max.	435 - 675 kg	
Fertilizer payload	2500 kg	

4.3.3 Technical data for the extensions

	L500	LA500	L1500	XL1500
Change in capacity	+ 500 l	+ 500 l	+ 1500 l	+ 1500 l
Changing the filling level in mm	+ 145	+ 175	+ 445	+ 325
Max. attachment size in mm	2400x1300x245	2400x1300x175	2400x1300x550	2900x1500x450
Attachment weight	33 kg	33 kg	72 kg	87 kg



The attachment LA500 can be used only in combination with attachment L500.

²⁾ Max. mass flow depending on fertilizer type

³⁾ 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 type of tractor being used.

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 Extensions

An L attachment or XL attachment is factory-fitted to the machine.

The LA extension attachment further extends the facility to grasp the machine.



For an overview of attachments: see chapter 4.3.3 *Technical data for the extensions*

4.4.2 Steps

The steps assist the operator in climbing into the hopper.

Steps	Application
AS-L	• Attachment: L500, LA500, L1500
AS-XL	• Attachment: XL1500



Under no circumstances use the steps whilst spreading is being performed!

Whilst spreading is being performed, ensure that the steps are folded away. *Chapter 4.2.5 - Steps - Page 29*

4.4.3 Hopper cover

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

The hopper tarpaulin is bolted to the hopper attachment which is fitted.

Hopper tarpaulin	Application
AP-L, fold-away	Attachment: L500, LA500, L1500
AP- XL, fold-away	Attachment: XL1500

4.4.4 Stabilizing rollers

■ ASR

For use when parking and when manually moving the empty machine around.

The stabilizing rollers consist of two fold-away castors at the front and two fixed rollers with brakes at the rear.

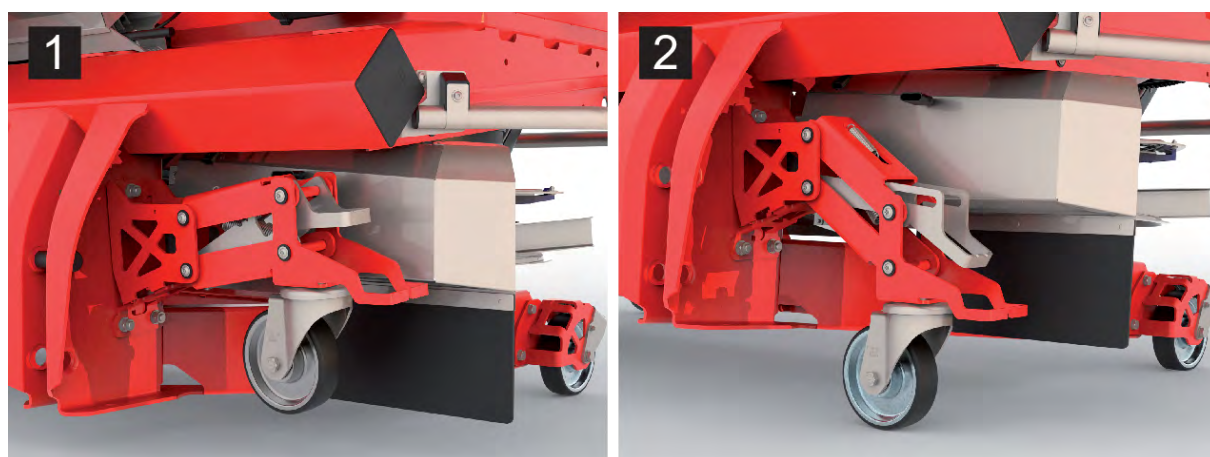


Fig. 12: Front castor

[1] Top castor

[2] Bottom castor

4.4.5 Limited/full border spreading system

■ TELIMAT X

The TELIMAT X system is used for remote-controlled boundary and border spreading from the track (right).

The TELIMAT X system is activated from the terminal and is controlled by a positioning cylinder.

4.4.6 Universal drive shaft with star ratchet

The star ratchet clutch limits the torque in case of overload.

4.4.7 Practice test kit

■ *XCheck*

For checking the distribution across the field.



Fig. 13: Practical Xcheck test kit

4.4.8 Fertilizer identification system

■ *FIS*

Fast and uncomplicated determination of spreader settings when working with unfamiliar fertilizers.

5 Axle load calculation

! WARNING!

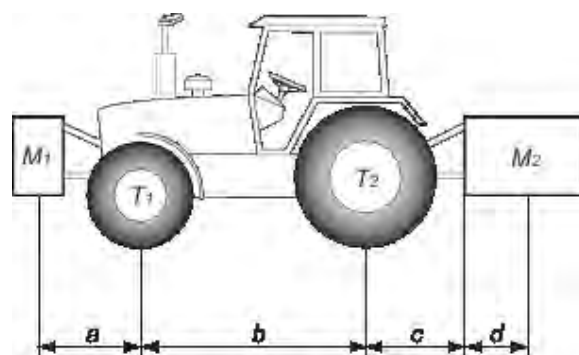
Overload

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 Measure on scale
T1	kg	Unladen load on tractor front axle	Refer to the tractor operator's manual Measure on scale
T2	kg	Empty load on tractor rear axle	Refer to the tractor operator's manual 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 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 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 Dimensions
b	m	Distance between the tractor axles	Refer to the tractor operator's manual 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 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
$M1 \text{ minimum} = [M2 \times (c+d) - T1 \times b + 0.2 \times T \times b] / [a+b]$
Write the minimum additional weight in the chart.

Front tool:

2) Calculation of the minimum rear ballast weight M2: minimum
$M2 \text{ minimum} = [M1 \times a - T2 \times b + 0.45 \times T \times b] / [b + c + d]$
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
$T1 \text{ real} = [M1 \times (a+b) + T1 \times b - M2 \times (c+d)] / [b]$
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
$M \text{ real} = M1 + T + M2$
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
$T2 \text{ real} = M \text{ real} - T1 \text{ real}$
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. 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 expressly 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.

6.2.1 Transport with the HGV

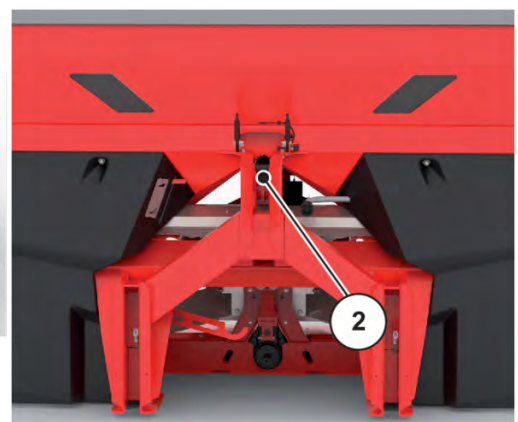
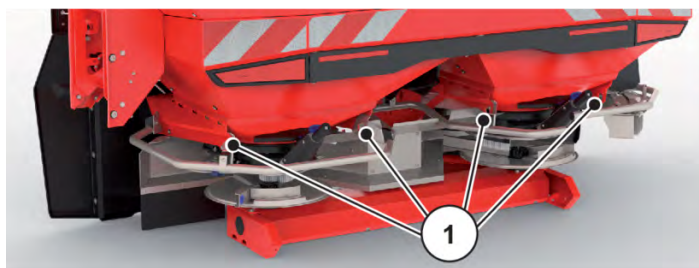


Fig. 14: Lashing point

[1] 4 x lashing eyes at the rear

[2] Lashing point on the front upper link

Transport with the HGV

- ▶ Use the lashing eyes [1] and the upper link [2] to lash the machine to the loading platform of the transport wagon.

7 Commissioning

7.1 Accepting the machine

When accepting the machine, check the delivery for completeness.

The standard equipment includes:

- 1 mineral fertilizer spreader of the AXIS series
- 1 AXIS 25 operator's manual
- 1 calibration kit comprising chute and calculator
- Lower link and upper link pins
- Spreading disc set (according to order)
- 1 universal drive shaft (including operator's manual)
- 1 agitator
- Protective grid in the hopper
- ISOBUS terminal with AXIS-M EMC ISOBUS machine control unit (including operator's manual)

Also check any special equipment that was ordered.

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



When receiving the machine, check that attached components are securely and correctly positioned.

The sense of mounting the right-hand and left-hand spreading discs is facing the direction of travel.

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

7.2 Tractor requirements

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

- Universal drive shaft connection: 1 3/8 inches, 6 splines, 540 rpm,
- Three-point linkage, category II
- Operating voltage: 12 V
- 7-pin plug connector
- **Oil supply** (hydraulic drive):
 - 1 double-acting control valve without free return (required only when machine is fitted with Telimat)
 - Oil supply: Max. 200 bar

7.3 Mounting the universal drive shaft on the machine

⚠ WARNING!

Risk of injury and damage to property if an unsuitable universal drive shaft is used

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.

- ▶ Remove the protective cap.
- ▶ Loosen the locking screw [1] of the drive shaft guard.
- ▶ Turn the universal drive shaft guard to the demounting position.
- ▶ Pull the universal drive shaft out.

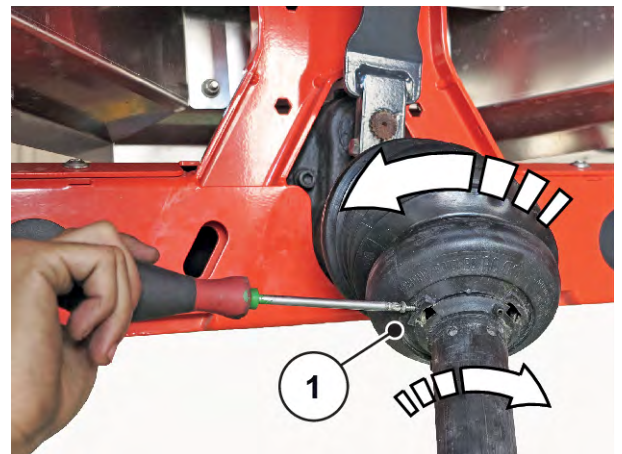


Fig. 15: Loosening the universal drive shaft guard

7.3.1 Mounting the transmission with radial pin clutch

- ▶ Remove the PTO spigot protection and grease the PTO spigot.
- ▶ Place the universal drive shaft on the PTO spigot.



Fig. 16: Pushing the universal drive shaft on to the PTO spigot

- ▶ Tighten the hexagon head screw and nut using a size 17 wrench (max. 35 Nm).



Fig. 17: Fastening the universal drive shaft

- ▶ Insert the hose clamp over the PTO spigot guard.



- ▶ Push the PTO spigot guard with hose clamp over the PTO shaft and loosely attach it to the neck of the gearbox (do not tighten it).



- ▶ Turn the universal drive shaft guard to the locking position.

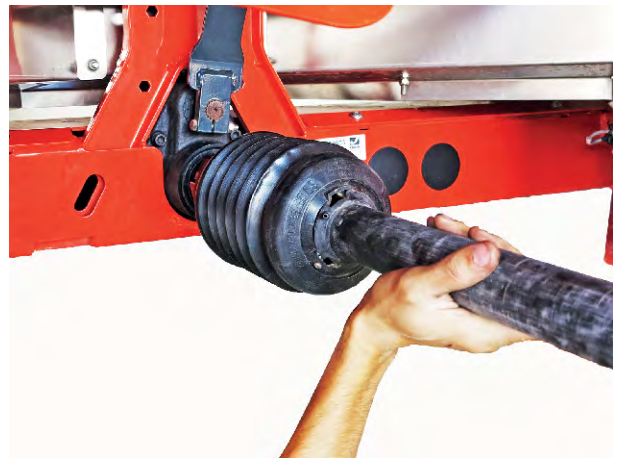


Fig. 18: Attaching the universal drive shaft guard

- ▶ Tighten the locking screw.



Fig. 19: Securing the universal drive shaft cover

- ▶ Tighten the hose clamp.



Fig. 20: Tighten the hose clamp

7.3.2 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].

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?
 - See 7.2 *Tractor 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?
 - See 5 *Axle load calculation*

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** of the machine.

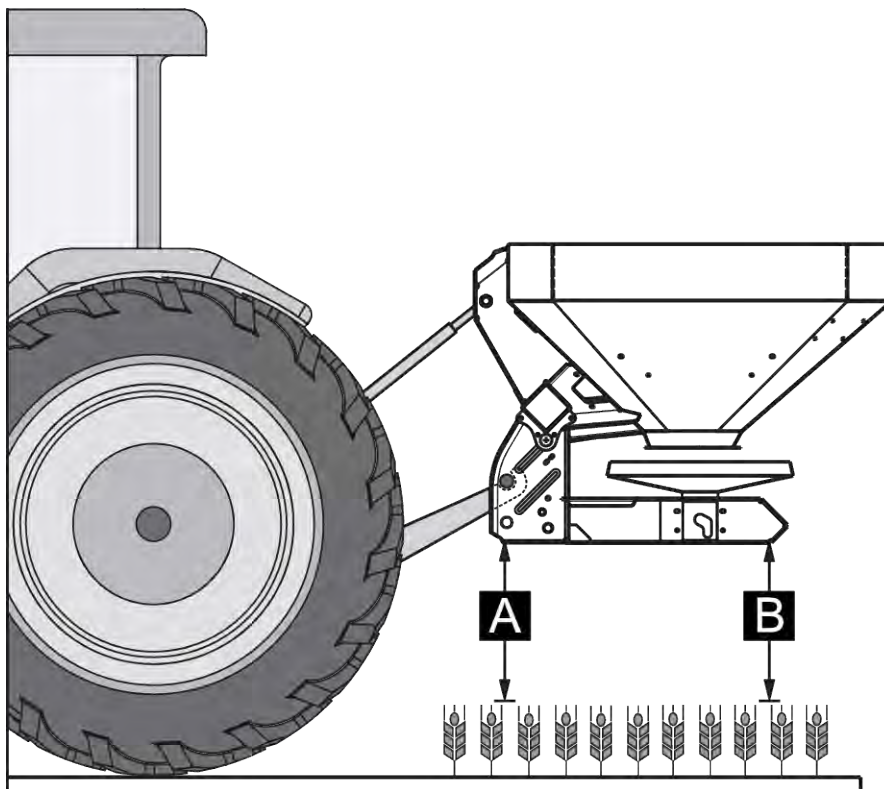


Fig. 21: Mounting position

Mounting instructions

- The machine can be connected to a tractor with category III linkage only with category II clearance. Use reducing sleeves.
- The bottom and upper link pins must be secured with lynch 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.
 - The lower link arms of the tractor are to be braced by means of stabilizing struts or chains.

■ 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, use an extendable Tele-Space universal PTO shaft.
- ▶ Connect the electrical actuation of the metering slides.
- ▶ 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.

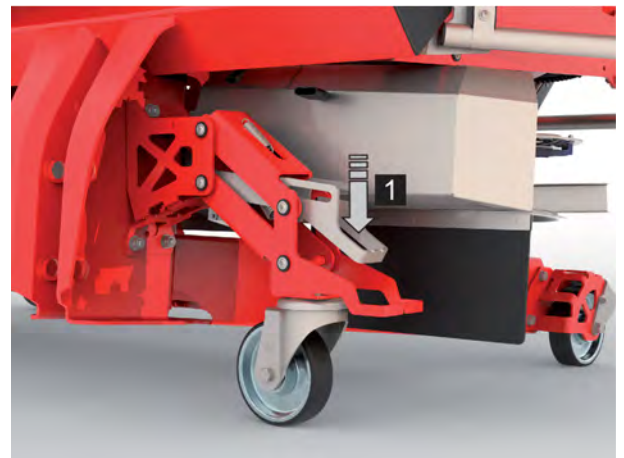


Only your dealer or your specialist workshop may shorten the universal drive shaft.



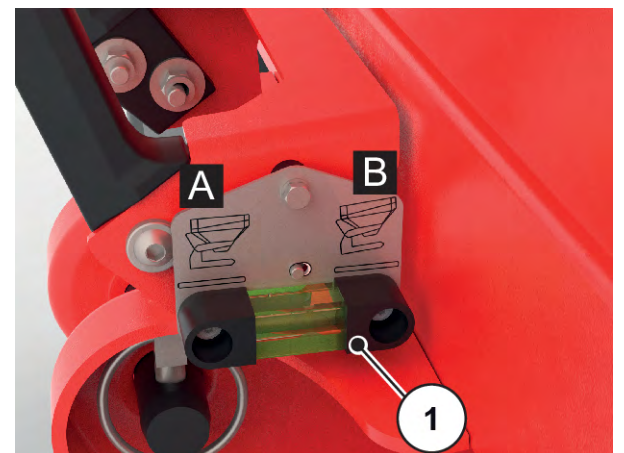
When checking and adjusting the universal PTO shaft, observe the installation and shortening instructions provided in the operator's manual supplied by the manufacturer of the universal PTO shaft. The operator's manual is attached to the drive shaft on delivery.

- ▶ Bring the front parking rollers into the transport position [1].



- ▶ Refer to the integral spirit level [1] to check the horizontal alignment of the machine.
 - ▷ Normal fertilizer application [A]. The retraining plate must lie at the front edge of the elongated hole.
 - ▷ Late fertilizer application [B]. The retraining plate must lie at the rear edge of the elongated hole.

The machine is attached to the tractor.



7.5 Connecting the metering slide actuators

■ EMC version



Machines of the EMC variant are equipped with an electronic metering slide actuator.

Description of the electrical actuation of the metering slides: see the operator's manual for the control unit. This operator's manual is an integral part of the control unit.

7.6 Pre-setting the mounting height

7.6.1 Safety

DANGER!

Danger of crushing by the machine falling

If the upper link halves are accidentally rotated totally apart from each other, it may happen that the upper link cannot compensate for the traction forces of the machine. This may result in the machine abruptly tilting over backwards or falling down.

This can lead to severe personal injury. Machines can be damaged.

- ▶ When extending the upper link, always observe the maximum admissible length specified by the tractor or upper link manufacturer.
- ▶ Ensure that nobody is present in the hazard zone of the machine.

WARNING!

Risk of injury from rotating spreading discs

The distribution unit (spreading discs, spreading vanes) may catch and pull in body parts or objects. Contact with the distribution unit may injure, crush or cut off body parts.

- ▶ Maximum admissible mounting heights at front (V) and rear (H) are to be complied with at all times.
- ▶ Ensure that nobody is present in the hazard zone of the machine.
- ▶ Do not remove deflectors mounted on the hopper.

WARNING!

Risk of injury from rotating spreading discs

The distribution unit (spreading discs, spreading vanes) may catch and pull in body parts or objects. Contact with the distribution unit may injure, crush or cut off body parts.

- ▶ Maximum admissible mounting heights at front (V) and rear (H) are to be complied with at all times.
- ▶ Ensure that nobody is present in the hazard zone of the machine.
- ▶ Do not remove deflectors mounted on the hopper.

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.

NOTICE!**Incorrect machine settings**

When fertilizer is to be spread by weight the machine may lower itself during the filling process so that the frame rests on the ground, causing an incorrect sensing of the weight. Acknowledgment of the weight then leads to errors in controlling the distribution.

- It is essential that the specified ground clearance is maintained.

7.6.2 Maximum admissible mounting height

The maximum admissible mounting height ($V + H$) is measured from the ground to the lower edge of the frame.

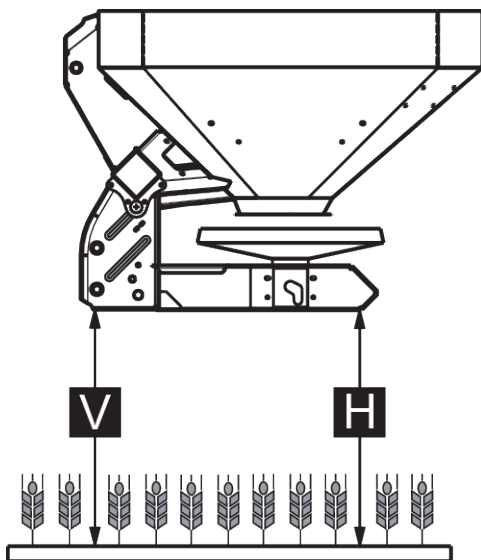


Fig. 22: Maximum admissible mounting height during normal and late fertilizing

The maximum admissible mounting height depends on the following factors:

Fertilization method	Maximum admissible mounting height	
	V [mm]	H [mm]
Normal fertilizing	1040	1040
Late fertilization	950	1010

7.6.3 Pre-setting the mounting height

The mounting heights (A and B) are always measured in the field from the top of the crop height to the bottom edge of the frame.



The values of A and B can be taken from the fertilizer chart.

The maximum admissible mounting height depends on the type of fertilizer:

Setting the mounting height for normal fertilizing

- ✓ The machine is installed at the highest connecting point of the upper link at the tractor.
- ✓ The lower link of the tractor is installed at the upper coupling point of the lower link of the machine.
- ▶ Determine the mounting heights **A** and **B** (above crop height).
- ▶ Compare the mounting heights **A** and **B** plus the crop height with the maximum admissible mounting heights at the front (V) and rear (H).

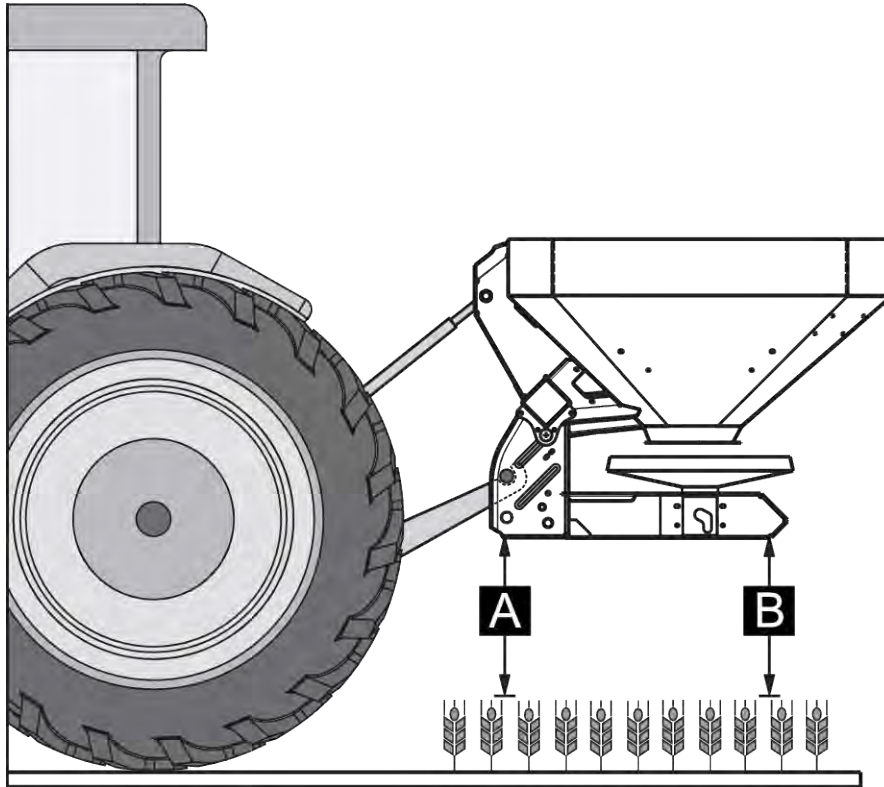


Fig. 23: Mounting position and height during normal fertilizing

- ▶ If the maximum admissible mounting height of the machine is exceeded during normal fertilizing or if the mounting heights A and B cannot be reached: The machine is to be mounted according to the **late fertilizing** values.

The following applies:

- $A + \text{crop height} \leq V$: max. 1040
- $B + \text{crop height} \leq H$: max. 1040

Setting the mounting height during late fertilizing

- ✓ The machine is installed at the highest connecting point of the upper link at the tractor.
- ✓ The lower link of the tractor is installed at the **upper coupling point of the lower link** of the machine.
- ▶ Determine the mounting heights **A** and **B** (above crop height).
- ▶ Compare the mounting heights **A** and **B** plus the crop height with the maximum admissible mounting heights at the front (V) and rear (H).

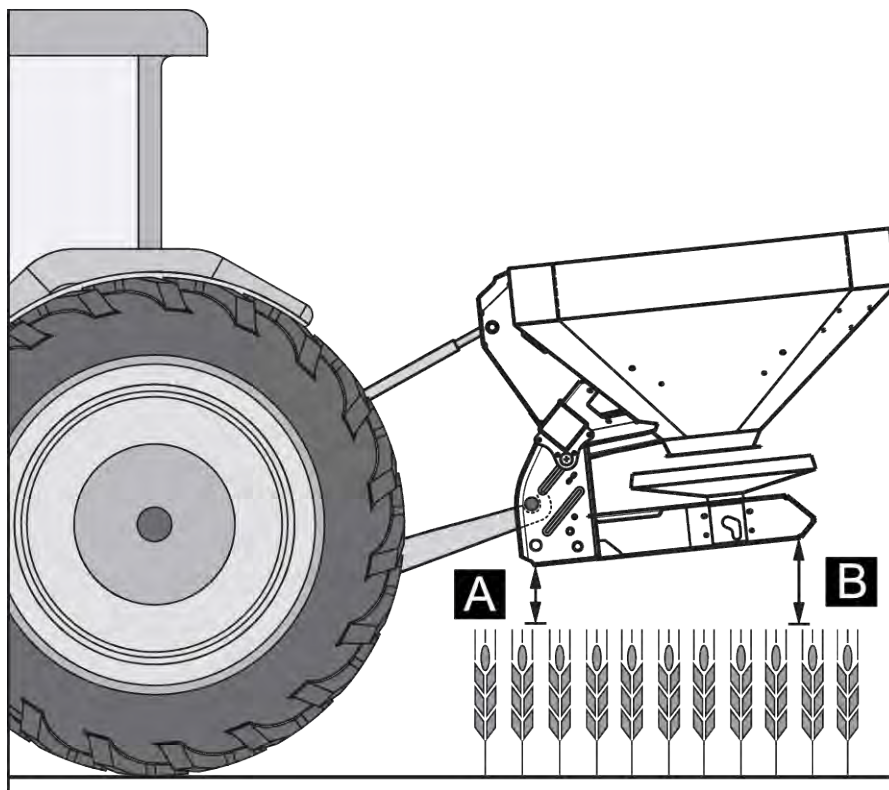


Fig. 24: Mounting position and height during late fertilizing

- ▶ If the lifting height of the tractor is insufficient for setting the required mounting height: use the lower coupling point on the lower link of the machine.

The following applies:

- $A + \text{crop height} \leq V$: max. 950
- $B + \text{crop height} \leq H$: max. 1010



Make sure that the maximum length of the upper link specified by the tractor manufacturer or upper link manufacturer is not exceeded.

- Comply with the data listed in the operator's manual issued by the tractor manufacturer or upper link manufacturer.

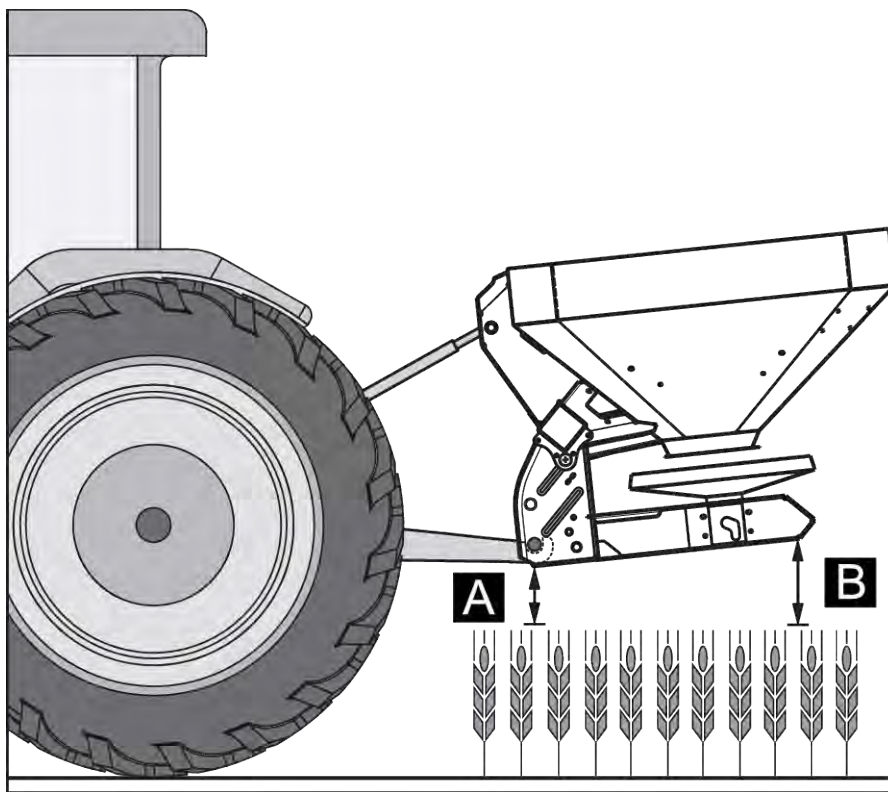


Fig. 25: Attachment of the machine on the lower coupling point of the lower link

The following applies:

- $A + \text{crop height} \leq V$: max. 950
- $B + \text{crop height} \leq H$: max. 1010

7.7 Steps

7.7.1 Fold out the steps

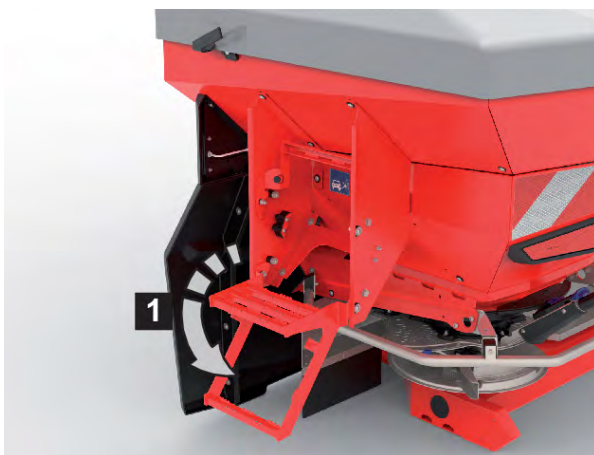
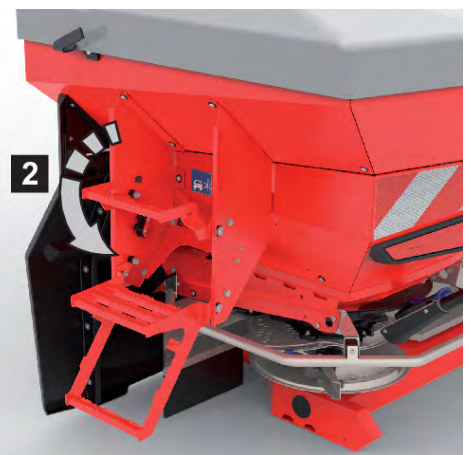


Fig. 26: Steps with XL attachment

[1] Swing out the lower step.

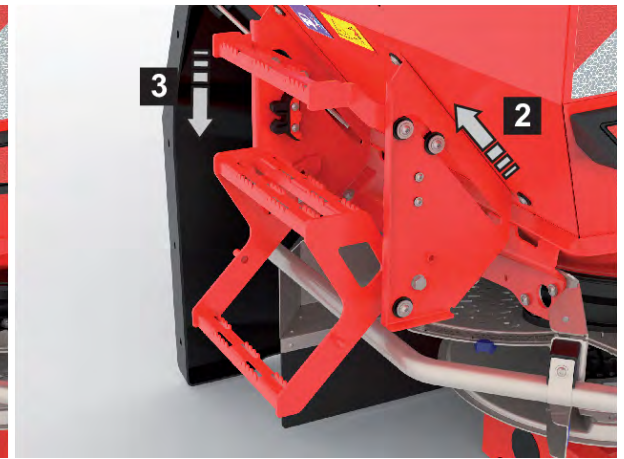


[2] Swing out the upper step.



Fig. 27: Steps with L attachment

[1] Swing out the lower step.



[2] Swing out the upper step to the stop.

7.7.2 Folding in the steps

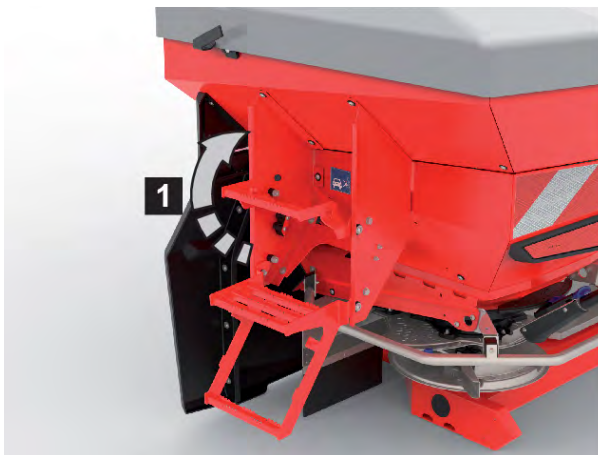
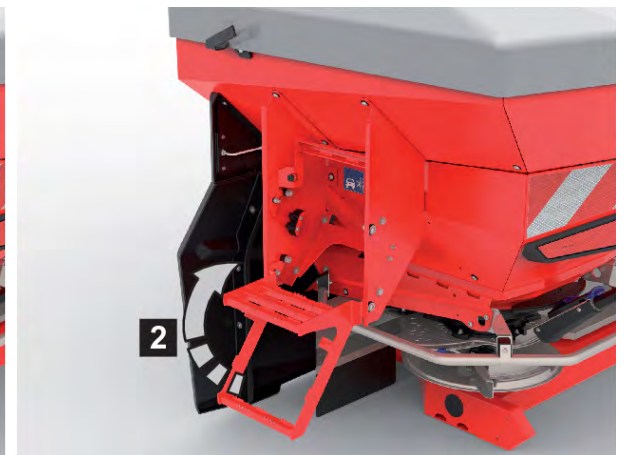


Fig. 28: Steps with XL attachment

[1] Swing in the upper step.



[2] Swing in the lower step.

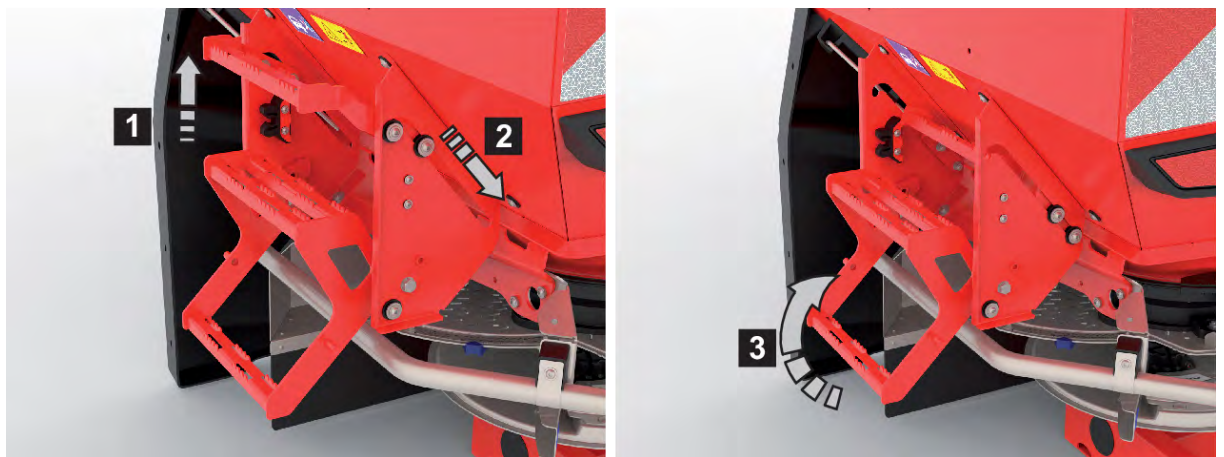


Fig. 29: Steps with L attachment

- [1] Raise the upper step and slide it to the rear. [2] Swing in the lower step.

7.8 Hopper cover

7.8.1 Opening the hopper cover

Opening the hopper tarpaulin

- ▶ Pull the lever towards you. [1]
- ▶ Move the lever anti-clockwise. [2]

Hopper tarpaulin open

Closing the hopper tarpaulin

- ▶ Perform the operations in the reverse order to close the hopper tarpaulin. The lever must latch into position.

Hopper tarpaulin closed



7.9 Filling the machine

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**.

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 4.3.2.1 *Weights and loads*.
 - ▶ Prior to filling, determine the maximum quantity to be loaded.
 - ▶ Observe the admissible overall weight.
- ▶ Fill the machine **only** when it is attached to the tractor. When doing so, make sure that the tractor is standing on level and solid ground.
 - ▶ Secure the tractor against moving. Apply the handbrake.
 - ▶ Switch off the tractor engine and remove the ignition key.
 - ▶ For filling levels greater 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, either by using the folded out steps or by means of the inspection window in the hopper (depending on the type).

The machine is filled.

7.10 Setting limited/full border spreading equipment Telimat X

The TELIMAT X system is a remotely-controlled system for boundary and border spreading using working widths of 12 - 42 m (for some types of fertilizer it is used only for border spreading). The TELIMAT X system is mounted on the **right** side of the machine in the direction of travel. The equipment is actuated from the tractor, using the terminal. The TELIMAT X sensors must previously have been activated in the machine options.



Installation of the TELIMAT X on to the machine: see the separate installation instructions included in the scope of supply of the equipment.

■ **Adjusting the TELIMAT X**

Prepare the TELIMAT X unit for spreading in accordance with the **type of fertilizer**, the **working width** and the desired **type of border spreading** (border spreading or edge spreading).

- [1] Mechanical display (standard equipment)
- [2] Upper limit sensor (optional)
- [3] Lower limit sensor (optional)
- [4] Numerical scale for fine adjustment
- [5] Alphabetic scale for coarse adjustment
- [6] Adjustment nut for alphabetic scale



Fig. 30: Adjusting the TELIMAT X

- The complete TELIMAT X housing can be rotated in guides around the spreading disc hub (alphabetic scale E to T). The alphabetic scale is used to adjust the housing according to the respective type of fertilizer, working width and type of border spreading (border or boundary spreading).
- One-piece guiding plates are available inside the limited border spreading unit and can be moved along a numeric scale (scale 12 to 18). The numeric scale is mainly used for fine adjustment.

Adjustment (alphabetic scale)

- ▶ Loosen the adjustment nut for the alphabetic scale using the adjustment lever of the machine.
- ▶ Slide the TELIMAT X housing (sliding section) on to the letter prescribed by the adjustment chart.
The arrow is exactly above the specified letter.
- ▶ Tighten the adjustment nut for the alphabetic scale using the adjustment lever of the machine.

Adjustment (numeric scale)

- ▶ Loosen the adjustment nut for the numeric scale using the adjustment lever of the machine.
- ▶ Move the guiding plate to the number value specified in the calibration chart.
The specified number value is precisely aligned with the first guiding plate.
- ▶ Tighten the adjustment nut for the numeric scale using the adjustment lever of the machine.

The unit is now set.

■ **Correcting the spreading width**

The values in the calibration chart are standard values. If there are differences in the fertilizer quality, it may be necessary to correct the setting.

If only minor deviations occur, it is generally sufficient to modify the guiding plate setting.

- To **decrease** the spreading distance relative to the calibration chart setting: Perform a **single point reduction** in the guide plate setting (such as from 14 to 13).
- To **increase** the spreading distance relative to the calibration chart setting: Perform a **single point increase** in the guide plate setting (such as from 14 to 15).

For larger deviations:

- To **decrease** the spreading distance relative to the calibration chart setting: Adjusting the power take-off shaft speed to suit the limited border spreading and headland driving channel.
- To **increase** the spreading distance relative to the calibration chart setting: Reduce the power take-off shaft speed by 25 rpm.



Limited border spreading for working widths of 12 - 42 m

For an optimal spreading pattern, it is recommended that the material output quantity is reduced by **20 %** on the border spreading side.

■ Instructions for spreading with the TELIMAT X unit

You set the intended TELIMAT X position from the tractor via a single-acting control valve.

- Limited border spreading: lower position
- Normal spreading: upper position

NOTICE!

Spreading errors caused by the TELIMAT X unit not reaching its end position

If the TELIMAT X unit is not completely at its end position, spreading errors may occur.

- ▶ Make sure that the unit is always in the specified end position.
- ▶ When switching from boundary spreading to normal spreading, operate the control valve until the unit is **completely** located in the top end position.
- ▶ For longer boundary spreading (depending on the condition of your spreading unit), operate the control valve in regular intervals and return the unit to the end position.

7.11 Settings for unlisted fertilizer types

The settings for types of fertilizer not listed in the fertilizer chart can be calculated using the practice test kit (optional equipment).



See also the additional user manual for the practical test kit.

8 Spreading operation

8.1 Safety

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**.

- Always set the output quantity while the metering slide is closed.



IN order to obtain good spreading results when spreading EMC fertilizer or W fertilizer, the application rate must be **at least** 30 kg/min.

8.2 Instructions regarding the spreading operation

The intended use of the machine includes compliance with the operating, maintenance conditions and service conditions in accordance with the manufacturer's 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: 44
- ▶ Close the metering slide.
- ▶ Pre-setting the mounting height: 48
- ▶ Pour in fertilizer: 56
- ▶ Setting the application rate: 62
- ▶ Set the working width.
 - ▷ Selecting the correct spreading disc: 62
 - ▷ Adjusting the discharge point: 65

Spreading

- ▶ Travel to the spreading location.
- ▶ Check the mounting height.
- ▶ Activate the PTO.
- ▶ Open the metering slide and start the spreading run (Spreading START).
- ▶ Stop the spreading run (Spreading STOP) and close the metering slide.
- ▶ Disengage the PTO shaft.

Cleaning/maintenance

- ▶ Discharge residual material: 76
 - ▶ The metering slides open.
 - ▶ Remove the machine from the tractor.
 - ▶ Cleaning and maintenance: 83
-
- ▶ 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 spreading vanes.

The spreading distance to the rear is approx. half a working width. The total spreading distance is approx. 2 working widths with a triangular spreading pattern.

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

Claims for damage other than to the machine will not be accepted.

This also means that no liability will be accepted for damage resulting from spreading errors.

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

8.3 Setting the application rate



The EMC machine variants are equipped with electronic actuation of the metering slide for adjusting the spreading quantity.

The electronic metering slide actuator is described in a separate operator's manual for the control unit. This operator's manual is an integral part of the control unit

8.4 Setting the working width

8.4.1 Selecting the correct spreading disc

Various spreading discs are available for implementation of the working width depending on the fertilizer type.

Type of spreading disc	Working width
AX1	12 m - 25 m • For 24 m working width, the AX1 should be the preferred spreading disc • For 27 and 28 m the fertilizers specified for AX1 in the fertilizer chart should be provided
AX2	24 m - 36 m
AX3	• 36 m special spreading disc for urea > 2.9 mm • 39 - 42 m coarse grained fertilizers

There are two different, permanently installed spreader vanes on every spreading disc. The spreader vanes are labeled in accordance with their type.

! WARNING!**Risk of injury from rotating spreading discs**

The distribution unit (spreading discs, spreading vanes) may catch and pull in body parts or objects. Contact with the distribution unit may injure, crush or cut off body parts.

- ▶ Maximum admissible mounting heights at front (V) and rear (H) are to be complied with at all times.
- ▶ Ensure that nobody is present in the hazard zone of the machine.
- ▶ Do not remove deflectors mounted on the hopper.

8.4.2 Dismounting and mounting spreading discs

For disassembly and assembly of specific components at the machine, the adjustment lever is required as a tool. It is located on the side of the machine.

- [1] Adjustment lever (hopper direction of travel on the left)

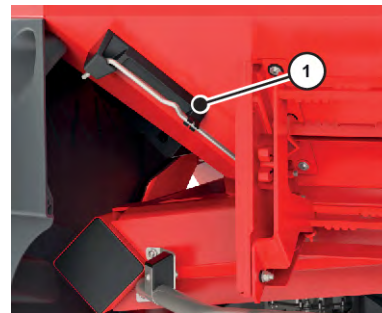


Fig. 31: Position of the AXIS 25 adjustment lever

! 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.

- ▶ **Never** mount or dismount spreading discs while the engine is running or the PTO shaft of the tractor is rotating.
- ▶ Switch off the tractor engine.
- ▶ Remove the ignition key.

Dismounting the spreading discs

- ▶ Use the adjustment lever to loosen the cap nut [1] of the spreading disc.

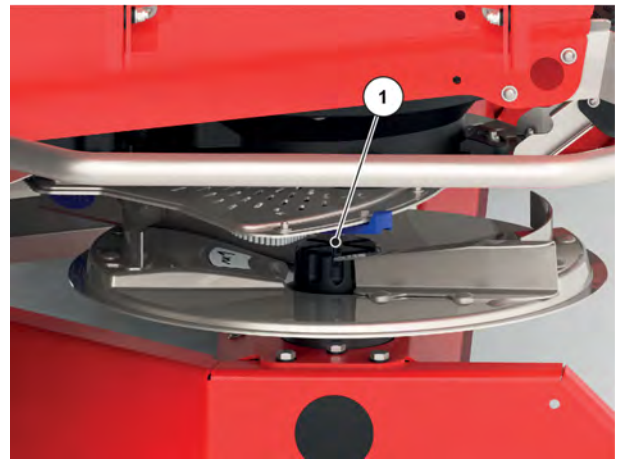


Fig. 32: Loosening the cap nut

- ▶ Unscrew the cap nut [1].
- ▶ Remove the spreading disc from the hub.
- ▶ Put the adjustment lever back into the designated bracket. See *Fig. 31 Position of the AXIS 25 adjustment lever*

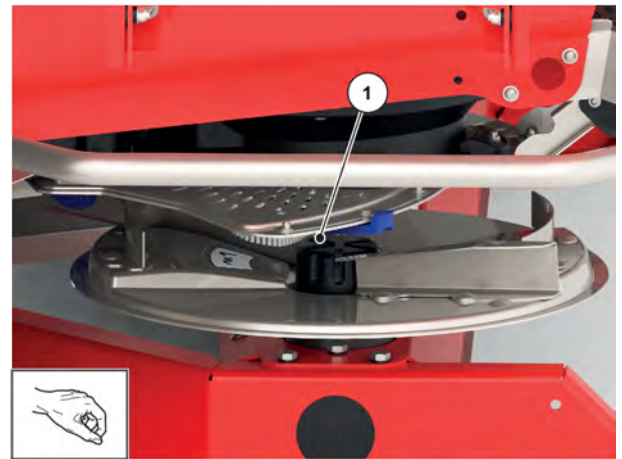


Fig. 33: Unscrew the cap nut

Mounting the spreading discs

- ✓ PTO and tractor engine are switched off and locked to prevent unauthorized starting.
- ✓ Mount the left spreading disc on the left side in the direction of travel and the right spreading disc on the right side in the direction of travel.
 - Make sure that the left and right spreading discs are not confused.
 - The following procedure is for mounting the left-hand spreading disc.
 - Mount the right-hand spreading disc according to these instructions as well.
- ▶ Put the left spreading disc on the left spreading disc hub.
The spreading disc must be placed level on the hub (if required, remove dirt).



The pins on the spreading disc holders have different positions on the left and right side. Install the correct spreading disc only if it is exactly suitable for the spreading disc mounting.

- ▶ Carefully position the cap nut (do not tilt it).
- ▶ Tighten the cap nut to approx. 38 Nm.



The cap nuts have an internal locking mechanism that prevents them working loose. Activation of the locking mechanism must be perceptible whilst tightening, otherwise, the cap nut is worn and must be replaced.

- ▶ Check that there is clearance between the spreading vanes and the outlet by turning the spreading discs by hand.

8.4.3 Adjusting the drop point

With the selection of the spreading disc type, a particular range for the working width is defined. By altering the drop point, the working width can be accurately set and adjustments to different types of fertilizer can be made.

The drop point is set using the top scale arc.

- **Adjustment towards smaller numbers:** The fertilizer is dropped earlier. This results in spreading patterns for smaller working widths.
- **Adjustment towards larger numbers:** The fertilizer is dropped later and is spread more towards the outside in the overlap zones. This results in spreading patterns for larger working widths.

- ▶ Determine the position for the drop point in the fertilizer chart or by means of a test with the practice test kit (optional equipment).
- ▶ Grasp the grip [1].
- ▶ Press the unlocking button [2].
The lock is released. The adjustment center can be moved.
- ▶ Slide the adjustment center with the pointer unit to the determined position.
- ▶ Release the unlocking button.
The adjustment center is locked once again.
- ▶ Thoroughly check that the adjustment center is locked.

The drop point is set.

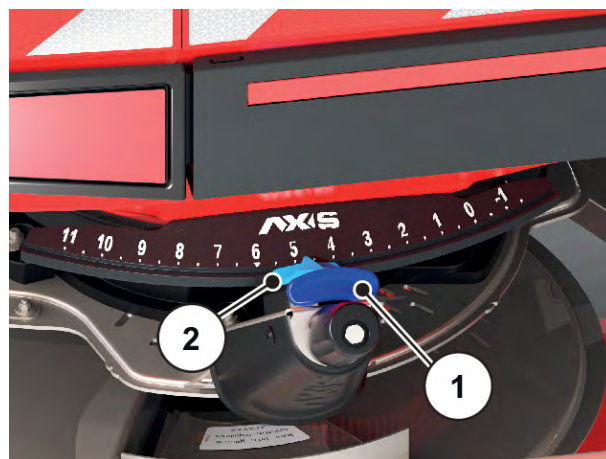


Fig. 34: Drop point adjustment center

8.5 Checking the mounting height



After filling the hopper, check whether the resulting mounting height is correct.

- The values for adjusting the mounting height can be found in the spreading material chart.
- Ensure the machine complies with the maximum permissible mounting height. Please also refer to 7.6.1 Safety

8.6 Adjusting the power take-off shaft speed



For the correct speed of the PTO spigot: see the fertilizer chart.

8.7 Spreading at the headlands

In order to achieve good fertilizer distribution in headlands, a precise arrangement of the tracks is essential.

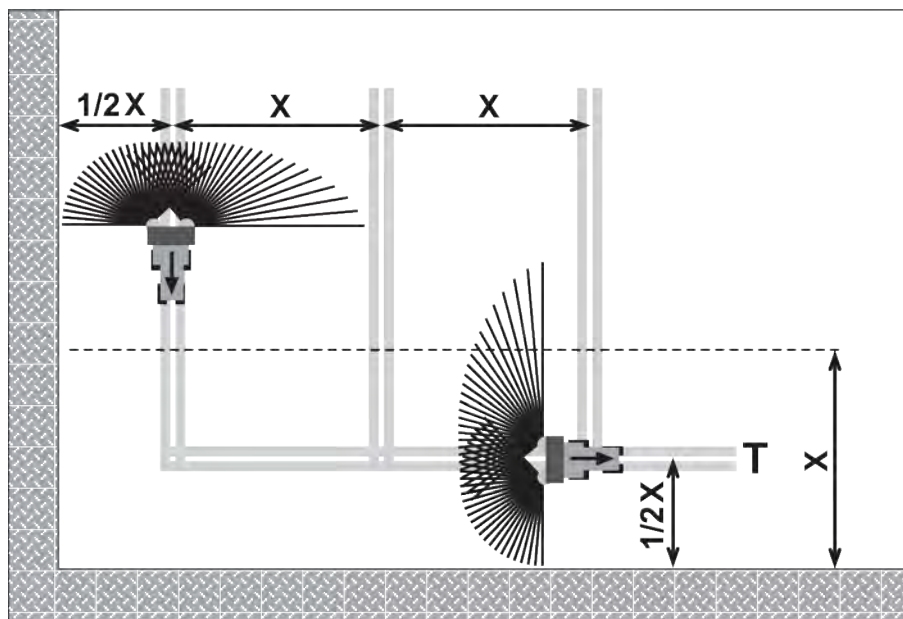


Fig. 35: Boundary spreading

[T] Headland track

[X] Working width

- Place the headland track [T] half the working width [X] away from the border of the field.

When continuing spreading in the field after headland track spreading note the following:

- Swing the TELIMAT X border spreading unit out of the spreading area (upper position).

The TELIMAT X limited border spreading unit is inactive.

Spreading is performed across the entire working width.

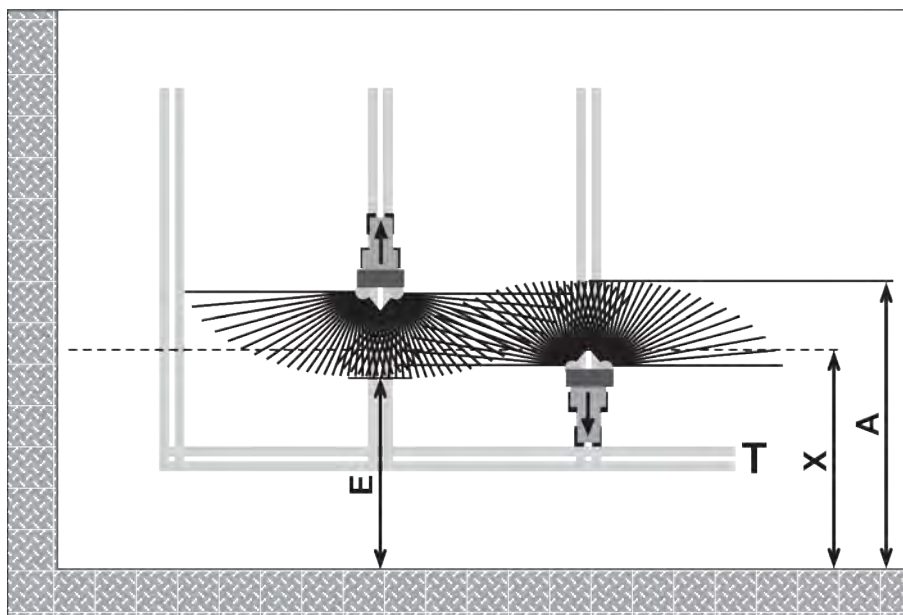


Fig. 36: Normal spreading

- | | |
|---|--------------------|
| [A] End of spreading fan when spreading in the headland track | [T] Headland track |
| [E] End of spreading fan when spreading in the field | [X] Working width |

- The metering slides open or close at different distances to the field border of the headlands when traveling backwards and forwards.

Driving out of the headland track

- **Open** the metering slides if the following condition is met:
 - ▷ The end of the spreading fan on the field [E] is at approx. half of the working width + 4 to 8 m from the field boundary of the headland.

The tractor is then located at different distances in the field, depending on the spreading width of the fertilizer.

Driving into the headland track

- Close the metering slides **as late as possible**.
 - ▷ The end of the spreading fan should ideally lie on the field [A] at a distance of approx. 4 to 8 m wider than the working width [X] of the headlands.
 - ▷ This cannot always be achieved depending on the spreading distance of the fertilizer and the working width.
- Alternatively, you can drive out beyond the headland track or you can create a 2nd headland track.

Follow these instructions in order to ensure an environmentally friendly and economical working method.

8.8 Spreading with section control

With the spreading width wizard VariSpread, you can reduce the spreading width and the application rate on each side. Wedge-shaped fields can thus be spread at high precision.



Some models are not available in all countries.

VariSpread Dynamic
ISOBUS EMC NG
stepless section control
EMC (+W)

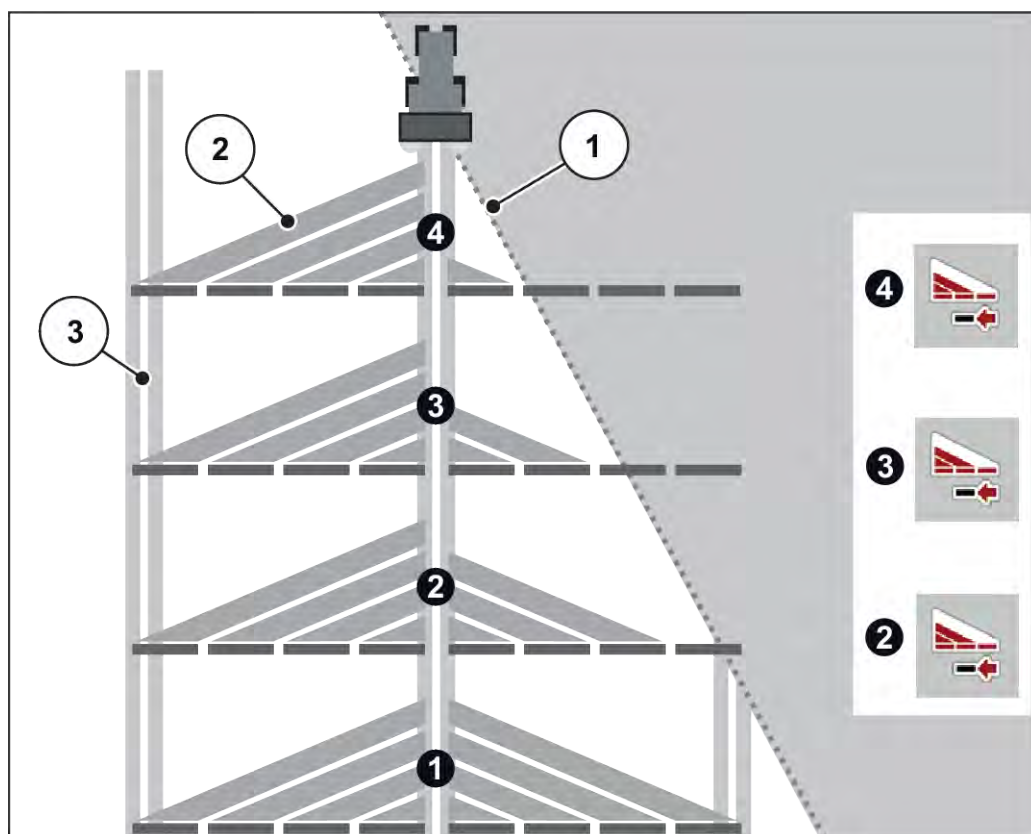


Fig. 37: Section control example

- [1] Field edge
- [2] Sections 1 to 4: successive section width reduction on the right
- [3] Tractor track



The VariSpread-compatible machine is equipped with two electric discharge point actuators. You can use either the control unit or the ISOBUS EMC NG machine controls to define the settings for the sections to achieve accurate spreading results in wedge-shaped fields.

More detailed information about possible settings of the sections is provided in the control unit manual for your electronic controls.

8.9 Calibration test



The **M EMC** machine variants control the application rate on each side automatically. Therefore there is **no need** to perform a calibration test.

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

Perform a calibration test:

- 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

Perform the calibration test at a standstill with the engine running.

[1] Calibration test chute

Detaching the calibration test chute

- ▶ Release the rubber band at the hook provided for the purpose.
- ▶ Take off the calibration test chute.

Attaching the calibration test chute

- ▶ Perform installation by executing the operations in the reverse order.

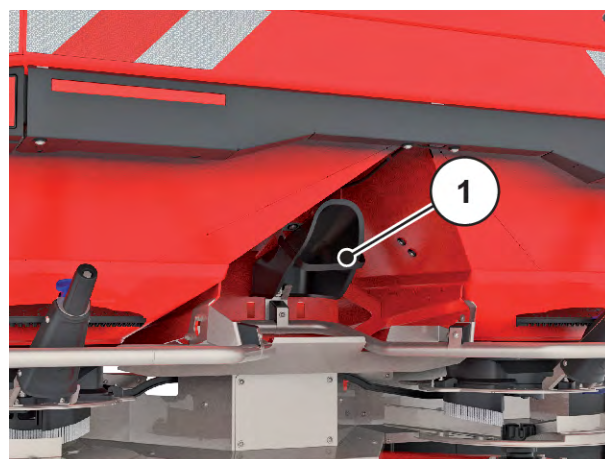


Fig. 38: Position of the calibration test chute

8.9.1 Determining the output volume

- Calculate the nominal output volume before starting the calibration test.

The exact forward speed must be known to calculate the nominal output volume.

Calculating the exact forward speed

- ▶ With a **semi-filled** machine, drive a distance of **100 m on the field**.
- ▶ Stop the time required for this.
- ▶ The exact forward speed is indicated at the scale of the calibration test calculator.

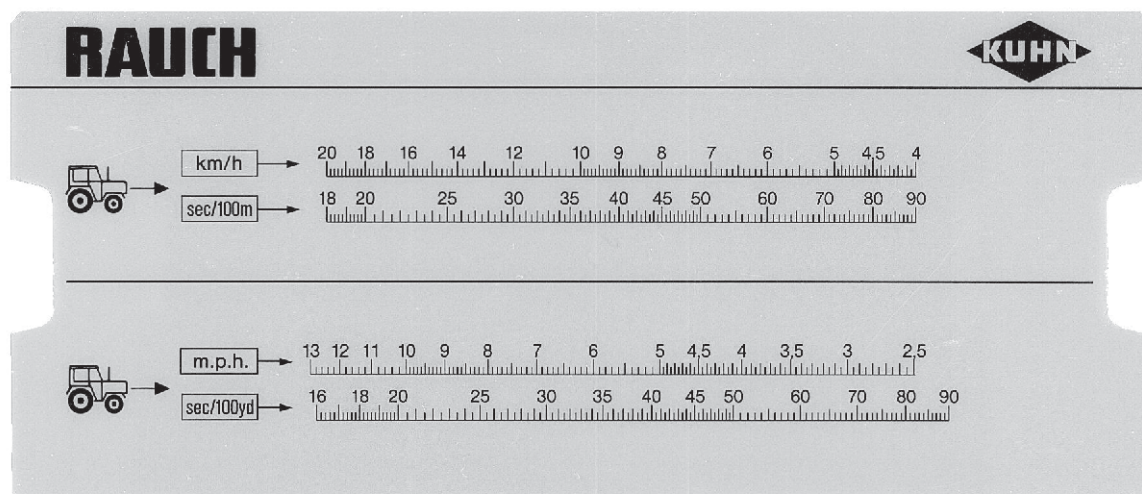


Fig. 39: Scale for calculating the exact forward speed

The exact forward speed can also be calculated using the following formula:

$$\text{Forward speed (km/h)} = \frac{360}{\text{Time over 100 m}}$$

Example: You require 45 seconds for 100 m

$$\frac{360}{45 \text{ s}} = 8 \text{ km/h}$$

Determining the nominal output volume per minute

To calculate the nominal output volume per minute, you will require the following:

- The exact forward speed
- The working width
- The desired application rate

Example: The nominal output volume at a particular outlet is to be determined. Your forward speed is 8 km/h, the working width is specified to be 18 m and the application rate shall amount to 300 kg/ha.



For some application rates and forward speeds, the output volume is already shown in the fertilizer chart.

If the required values are not available in the fertilizer chart, they can be determined using the calibration test calculator or by means of a formula.

Calculation using the calibration test calculator

- Move the tab to set 300 kg/ha under 18 m.
- The value of the nominal output volume for both outlets can now be read off above the value of the forward speed of 8 km/h.

The nominal output volume per minute amounts to 72 kg/min.

If calibration is to be at only a single outlet, the total value of the nominal output volume should be halved.

- Divide the read off value by 2 (= number of outlets).

The nominal output volume per output amounts to 36 kg/min.

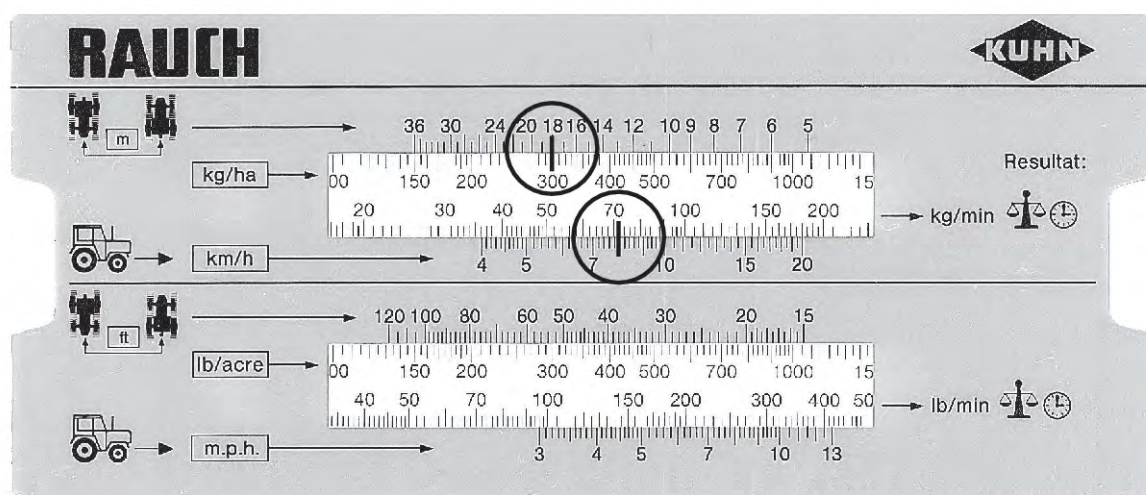


Fig. 40: Scale for calculation of the nominal output volume per minute

Calculation with formula

$$\text{Nominal output volume (kg/min)} = \frac{\text{Forward speed (km/h)} \times \text{Working width (m)} \times \text{Application rate (kg/ha)}}{\text{Time over 100 m}}$$

Calculation for example

$$\frac{8 \text{ km/h} \times 18 \text{ m} \times 300 \text{ kg/ha}}{600} = 72 \text{ kg/min}$$



A constant forward speed must be maintained to achieve uniform spreading of the spreading material.

For example: 10 % increased speed results in 10 % underfertilization.

8.9.2 Implementing the calibration test

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.

- ▶ **Never** mount or dismount spreading discs while the engine is running or the PTO shaft of the tractor is rotating.
- ▶ Switch off the tractor engine.
- ▶ Remove the ignition key.

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.

Requirements

- The metering slides are closed.
- The tractor engine is switched off and locked to prevent unauthorized starting.
- An adequately sized vessel is ready for collecting the fertilizer (minimum capacity **25 kg**).
 - Determine the empty weight of the collecting vessel.
- Prepare the calibration test chute.
- There is sufficient fertilizer in the hopper.
- The preliminary settings for the metering slide stop, the PTO speed and the calibration test time are specified and known from the fertilizer chart.



Select the values for the calibration test for the greatest fertilizer quantities that are anticipated. The higher the quantity, the higher the precision of the measurement.



Perform the calibration on only **one** side of the machine. For reasons of safety, however, **both** spreading discs should be removed.

Perform a calibration test (the example is for spreading on the left hand side)

- ▶ Use the adjustment lever to loosen the cap nut [1] of the spreading disc.
- ▶ Remove the spreading disc from the hub.
- ▶ Setting the discharge point to position **11**.
- ▶ Attaching the calibration test chute.
- ▶ Adjusting the metering slide stop.
- ▶ Position a collection vessel under the outlet.

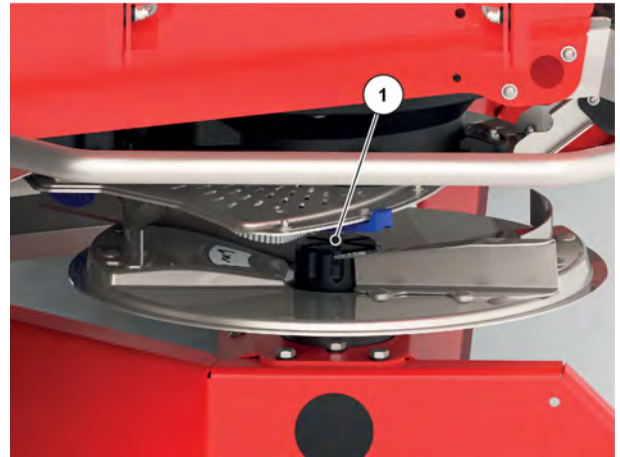


Fig. 41: Loosening the cap nut

⚠ WARNING!

Risk of injury due to rotating machine parts

Rotating machine components (universal drive shaft, hubs) 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 hubs while the machine is running.
- ▶ When the drive shaft is rotating, the metering slides are to be operated from the tractor seat at all times.
- ▶ Ensure that nobody is present in the hazard zone of the machine.

- ▶ Start the tractor.
- ▶ Set the speed in accordance with the information in the spreading material chart.
- ▶ Open the left metering slide for the calibration test time stipulated before remotely from the tractor seat.
- ▶ Close the metering slide when this time has elapsed.
- ▶ Determine the fertilizer weight (taking into consideration the empty weight of the collection vessel).
- ▶ Compare the actual quantity with the target quantity.

Actual output volume = target output volume: Application rate stop is set correctly. End calibration test.

Actual output volume < target output volume: Set the application rate stop to a higher position and repeat the calibration test.

Actual output volume > target output volume: Set the application rate stop to a lower position and repeat the calibration test.



You can use the percentage scale to reset the position of the application rate stop. For example, if the calibration test weight is down by 10 %, set the application rate stop to a position 10 % higher (change for instance from 150 to 165).

- ▶ End calibration test. Switch off the tractor engine and secure it against unauthorized starting.
- ▶ Mount the spreading discs. Make sure that the left and right spreading discs are not confused.



The pins on the spreading disc holders have different positions on the left and right side. Install the correct spreading disc only if it is exactly suitable for the spreading disc mounting.

- ▶ Carefully position the cap nut [1] (do not tilt it).
- ▶ Tighten the cap nut to approx. 38 Nm. Do not use the adjustment lever.

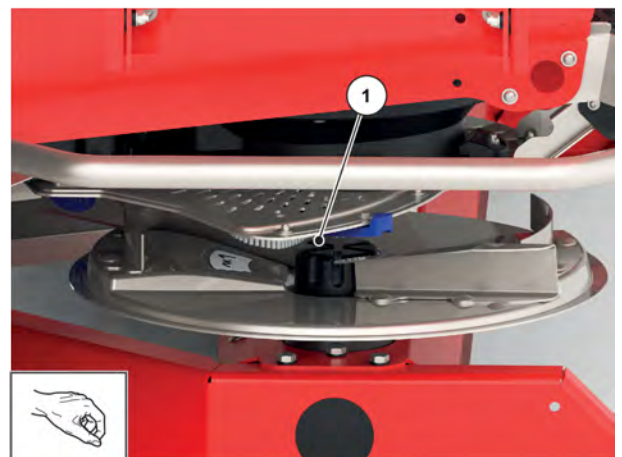


Fig. 42: Screw the cap nut on



The cap nuts have an internal locking mechanism that prevents them working loose. The locking mechanism must be noticeable while tightening the nut. Otherwise, the cap nut is worn and must be replaced.

- ▶ Check that there is clearance between the spreading vanes and the outlet by turning the spreading discs by hand.
- ▶ Re-mount the calibration test chute and the adjustment lever in their specified locations on the machine.
- ▶ **Important:** Return the discharge point to the position that was determined.

The calibration is completed.

Calculation using the formula

The position of the quantity stop can also be calculated using the following formula:

$$\text{New position of the quantity stop} = \frac{\text{Position of the quantity stop during current calibration test} \times \text{Target output volume}}{\text{Actual output volume during the current calibration test}}$$

8.10 Discharging residual material

! WARNING!

Risk of injury due to rotating machine parts

Rotating machine components (universal drive shaft, hubs) 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 hubs while the machine is running.
- ▶ When the drive shaft is rotating, the metering slides are to be operated from the tractor seat at all times.
- ▶ Ensure that nobody is present in the hazard zone of the machine.

To maintain the value of your machine, discharge the hopper immediately after every use.

Instructions for completely discharging the residual material:

Small amounts of fertilizer may remain in the machine when discharging residual material normally. To completely discharge the residual material (e.g. at the end of the spreading season, or when changing spreading material), proceed as follows:

- ▶ Empty the hopper until all material has been discharged (normal residue discharge).
- ▶ Switch off the tractor engine and lock it to prevent unauthorized starting. Remove the ignition key of the tractor.
- ▶ Set the drop point to position **11**.
- ▶ Any remaining fertilizer can be removed with a gentle water jet when cleaning the machine;. See also *10.4 Cleaning and maintaining the machine*.

8.11 Parking and unhitching the machine

⚠ DANGER!

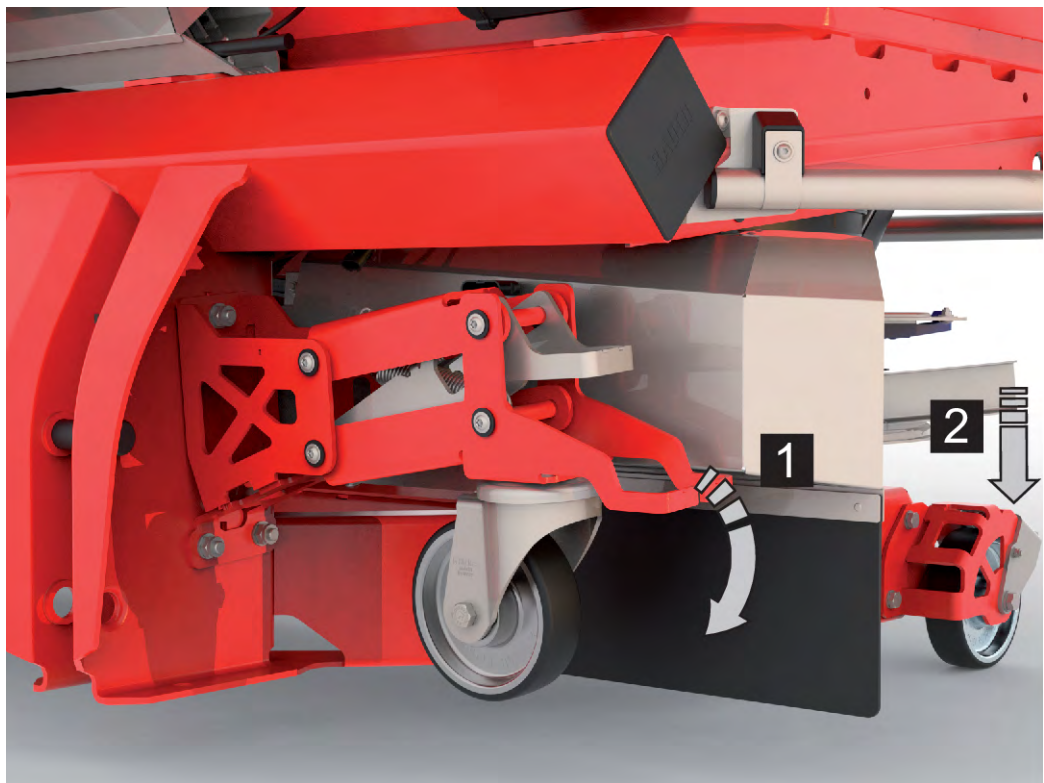
Crushing hazard between the tractor and the machine

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.

Requirements for parking the machine:

- Only park the machine on level, solid ground. Park it on the parking rollers (optional) if these are fitted.
- Only park the machine when the hopper is empty.
- Relieve the load on the coupling points (lower / upper link) before removing the machine.



Park the machine on parking rollers

- ▶ Actuate the parking rollers [1] until they latch.
- ▶ Lower the machine.
- ▶ Actuate the fixed rollers with parking brakes (rear) [2].

Machine in the parked position

Parking the machine

- ▶ Put dust caps on to the electrical and hydraulic sockets.
- ▶ After unhitching, place the universal drive shaft, hydraulic hoses, and electric cables in the retainers provided for the purpose. *Hose storage point 27*

9 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.
- Park the machine.



Please take particular note of the warnings in chapter 3 *Safety* and 10 *Maintenance and service*.

Fault	Possible cause	Measure
Uneven fertilizer distribution	Clumps of fertilizer on spreading discs, spreading vanes and outlet ducts.	Remove the clumps of fertilizer.
	The metering slides do not open fully.	Check the function of the metering slides.
	Discharge point set incorrectly	Correct the setting of the discharge point
Too much fertilizer in the tractor track.	Defective spreading vanes, outlets.	Replace defective parts immediately.
	The fertilizer has a smoother surface than the fertilizer that was tested for the fertilizer chart.	Select a later setting of the discharge point (e.g. change the discharge point from 4 to 5).
	Power take-off speed too low	Correct the speed
Too much fertilizer in the overlap area	The fertilizer has a rougher surface than the fertilizer tested for the fertilizer chart.	Select an earlier setting of the discharge point (e.g. change the feed point from 5 to 4).
	Power take-off speed too high	Correct the speed

Fault	Possible cause	Measure
Higher spreading quantity on one side of the spreader than the other. During normal spreading the hopper empties asymmetrically.	Bridging above the agitator	- Remove fertilizer from the side that is affected down to the height of the protective grid. - Use a suitable wooden stick to poke the bridged material through the mesh of the protective grid.
	Outlet blocked	See Metering openings clogged
	Metering slide set incorrectly	- Empty the hopper of remaining fertilizer. - Check the setting of the metering slide. See <i>10.8 Metering slide adjustment</i>
	Defective agitator	- Remove fertilizer from the side that is affected down to the height of the protective grid. - With the metering slide open, use a suitable wooden stick to poke the remaining fertilizer material through the mesh of the protective grid so that it runs out through the discharge opening. - Check that the agitator drive is performing correctly. See <i>10.6 Checking the agitator drive</i>

Fault	Possible cause	Measure
Irregular fertilizer feed to spreading disc	Bridging above the agitator	- Remove fertilizer from the side that is affected down to the height of the protective grid. - Use a suitable wooden stick to poke the bridged material through the mesh of the protective grid.
	Outlet blocked	See Metering openings clogged:
	Defective agitator	- Remove fertilizer from the side that is affected down to the height of the protective grid. - With the metering slide open, use a suitable wooden stick to poke the remaining fertilizer material through the mesh of the protective grid so that it runs out through the discharge opening. - Check that the agitator drive is performing correctly. See 10.6 <i>Checking the agitator drive</i>
The spreading discs are fluttering.		► Check cap nuts for tight fit and check threads.
The metering slide does not open.	The metering slide is sluggish.	► Check the slide, the lever and the joints for smooth movement and improve if necessary. ► Check tension spring.
	The reducing plate at the hose connection of the plug-in connector is contaminated.	► Clean the reducing plate at the hose connection of the plug-in connector.

Fault	Possible cause	Measure
The metering slide opens too slowly.	The metering slide is sluggish.	▶ Clean orifice plate. ▶ Replace 0.7 mm orifice plate with a 1.0 mm plate. ▷ The plate is at the hose connection of the plug-in connector.
Agitator not working.	Agitator drive is defective	Check the agitator drive <i>10.6 Checking the agitator drive</i>
Metering openings clogged by: • Fertilizer clumps • Moist fertilizer • Other impurities (leaves, straw, bag residues)	Blockages	▶ Park tractor, remove ignition key, disconnect the power supply, ▶ Open metering slides. ▶ Place the collecting vessel underneath. ▶ Remove spreading discs. ▶ Clean the outlet from below with a wooden pole or the adjustment lever and push through the metering opening. ▶ Remove foreign bodies from the hopper. ▶ Install spreading discs, close metering slides.
The spreading discs do not turn or stop suddenly after being turned on.	When using a universal drive shaft with shear pin protection: • The shear pin is defective	• Check the shear pin protection, and replace if necessary (see the universal drive shaft manufacturer's manual).

10 Maintenance and service

10.1 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**.

■ **Wartungstabelle**

Task	Before operation	After operation	After the first X hours	After the first X hours	Every X hours	Every X hours	Every X hours	Every X years	At the beginning of the season
Value (X)			10	100	50	100	150	6	
Cleaning									
<i>Cleaning and maintaining</i>		X							
Lubrication									
<i>Spreading disc hub</i>						X			X
<i>Weighing spreader</i>					X				X
<i>Universal drive shaft</i>									X
<i>Upper and lower link balls</i>					X				X
<i>Drop point adjustment</i>					X				X
<i>Joints, bushes</i>					X				X
Check									
<i>Wearing parts</i>						X			X
<i>Screw connections</i>	X		X						X
<i>Checking the screw connection of the weigh cells</i>							X		X
<i>Protective grid lock</i>	X				X				
<i>Agitator drive</i>	X								
<i>Spreading vane</i>	X				X				
<i>Metering slide setting</i>				X					X
<i>Drop point setting</i>					X				X
<i>Hydraulic hoses</i>	X				X				X
Replacement									
<i>Hydraulic hoses</i>								X	

10.2 Wear parts and screw connections

10.2.1 Checking wear parts

■ *Wearing parts*

Wear parts are: **Spreading vanes, agitator head, outlet, hydraulic hoses** and all plastic parts.

Plastic parts are subject to a certain aging process even under normal spreading conditions. Plastic parts are for instance: **protective grid locks, connecting rod**.

- Inspect wearing 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 wearing parts depends, among other things, on the material being spread.

10.2.2 Checking the bolted connections

■ *Screw connections*

The screw connections are tightened with the necessary torque and secured at the factory. Oscillations and vibrations, particularly during the initial hours of operation, can cause screw connections to become loose.

- Check that all screw connections are tight.



Some of the components have self-locking nuts.

Always use new self-locking nuts when assembling these components.



Observe the tightening torques for the standard screw connections.

- See 13.1 *Table of tightening torque*

10.2.3 Checking the screw connections of the weigh cells

■ *Checking the 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.

- Using a torque wrench (torque = **300 Nm**) tighten 2x screw fastenings [1] on the right and left of each weigh cell.

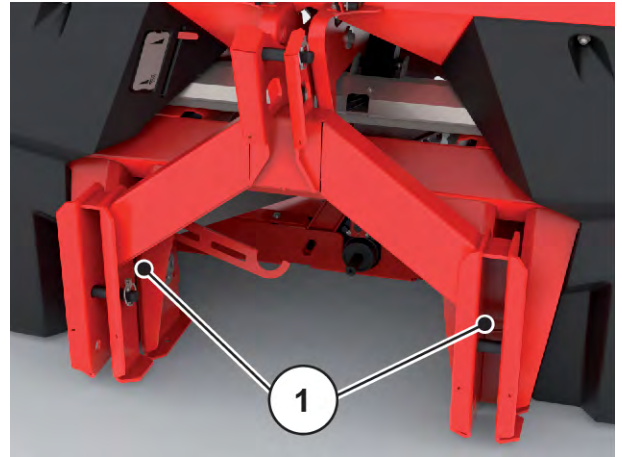


Fig. 43: Fastening the weigh cells (on the left side of the direction of travel)

- Using a torque wrench (torque = **65 Nm**), tighten the screw fastening [1].

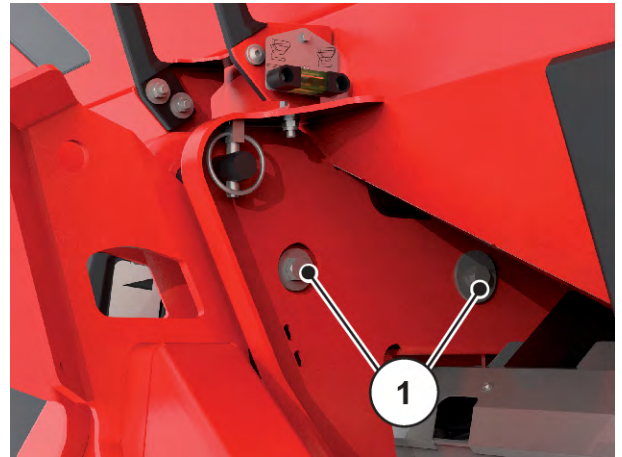


Fig. 44: Fastening the tie rod at the weigh frame



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.

10.3 Opening the protective grid in the hopper

- **Protective grid lock**

! WARNING!**Risk of injury from moving parts in the hopper**

There are moving parts in the hopper.

Injuries to hands and feet may occur during commissioning and operation of the machine.

- ▶ Always install and lock the safety grid before commissioning and operating the machine.
- ▶ **Only** open the protective grid for maintenance work or in the event of malfunctions. Switch off the tractor before opening the safety grid.

The protective grid locks mechanically without tools.

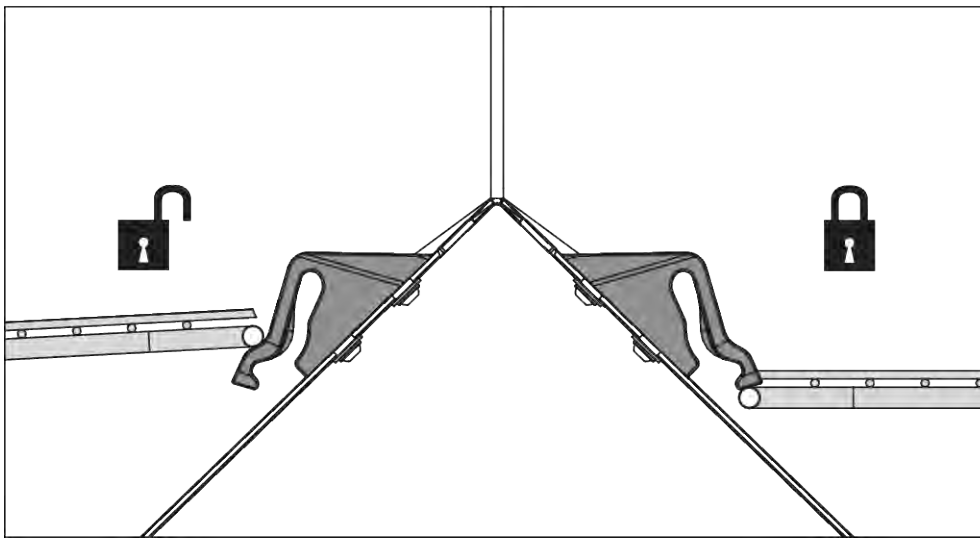


Fig. 45: Protective grid lock open/closed

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.

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.

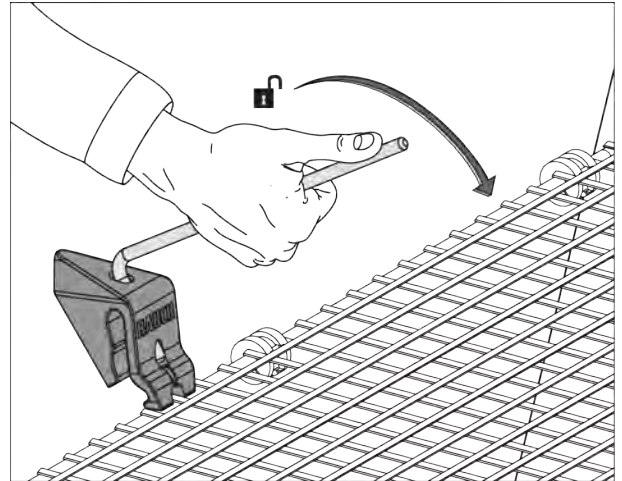


Fig. 46: Opening the protective grid lock

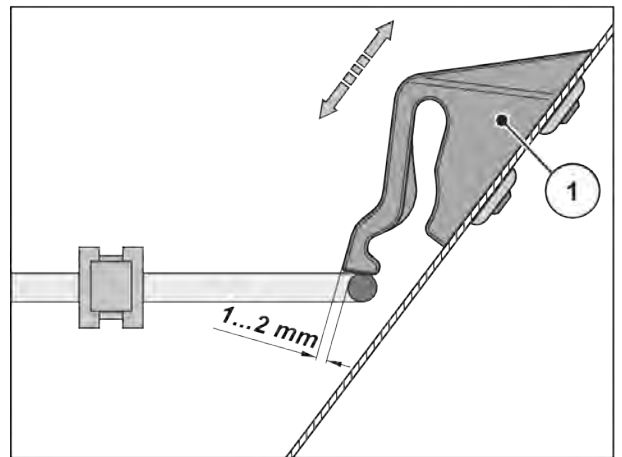


Fig. 47: Test dimensions for functional check of the protective grid interlock

10.4 Cleaning and maintaining the machine

■ *Cleaning and maintaining*

To ensure your machine holds its value, we recommend that it is cleaned using a gentle jet of water immediately it has been used.

- ▶ Fold up the protective grid in the hopper (refer to chapter *Protective grid lock*).
- ▶ Clean the outlet ducts and the slide guide area from below only.
- ▶ Clean oiled machines only at washing points fitted with an oil separator.
- ▶ When cleaning with high-pressure water, never aim the water jet directly at warning signs, electrical equipment, hydraulic components, and plain bearings.
- ▶ Cleaning the gearbox/ gearbox bracket. There are lateral openings on the gearbox bracket.
Chapter 10.4.2 - Cleaning the gearbox bracket - Page 90
- ▶ After cleaning, treat the **dry** machine, **especially the coated spreading vanes and stainless steel parts**, with an environmentally friendly anti-corrosion agent.
 - ▷ A suitable polishing kit can be ordered from authorized dealers for treating rust spots.

10.4.1 Dirt in places to which access is difficult



When performing cleaning, look out for places to which access is difficult.

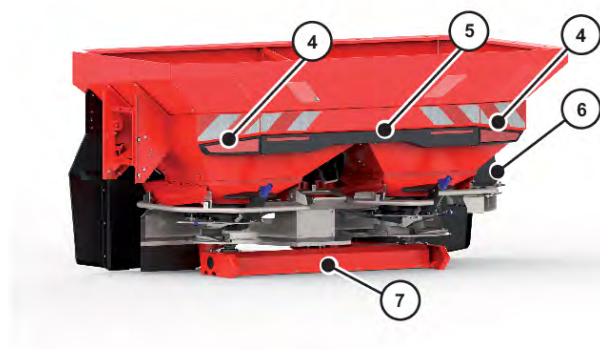
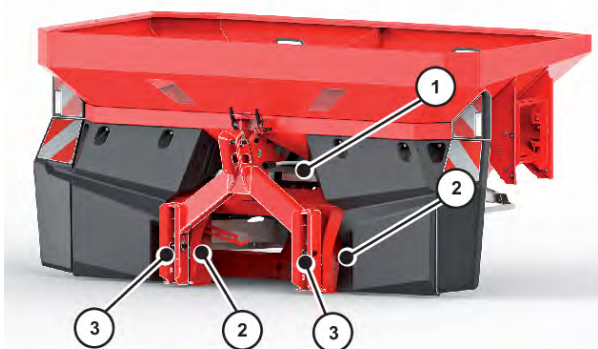


Fig. 48: Places at the front and rear

- | | |
|--|---|
| [1] Around the cable duct. | [4] At the back of each light. |
| [2] On the weigh cells. | [5] At the back of the center lighting support. |
| [3] Around the lower link and at the coupling points to the frame. | [6] At the back of the TELIMAT cover. |
| | [7] On the inside of the gearbox bracket. |

10.4.2 Cleaning the gearbox bracket

[1] Cleaning openings (left, right)

Cleaning the gearbox bracket

- ▶ Insert the high-pressure cleaning lance into the opening provided.
 - ▷ The dirty water runs away downwards.

Allow the machine to dry

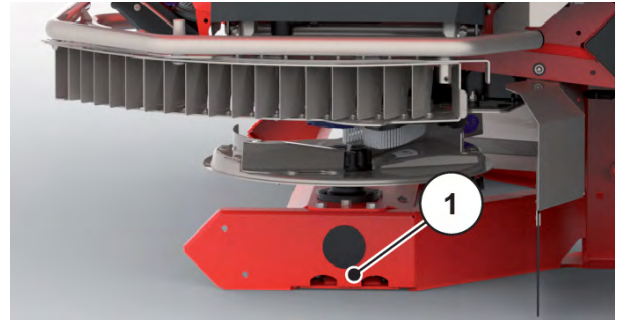


Fig. 49: Positions of the cleaning openings

10.4.3 Drying position of the hopper tarpaulin



Fig. 50: Hopper tarpaulin latched open in the drying position

[1] Latched in the drying position

After the machine has been cleaned, move the hopper tarpaulin into the drying position. When doing so, do not fully close the tarpaulin, thereby allowing moisture to escape from the hopper.

10.4.4 Disassemble the dirt deflector

- ▶ Use the adjustment lever on the machine.
 - ▷ See Fig. 31 Position of the AXIS 25 adjustment lever
- ▶ Open the 3 quick-release closures (1, 2 and 3) on the left and right dirt deflectors.
- ▶ Move the dirt deflector (4) to the outside.
- ▶ Put the dirt deflector aside and store it in a safe place.

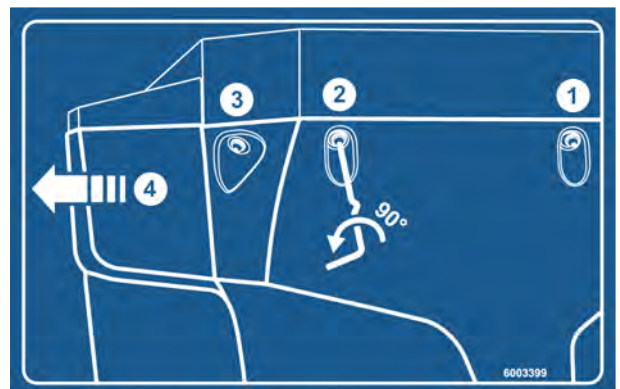


Fig. 51: Dirt deflector instruction sticker

10.4.5 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.

10.5 Greasing the spreading disc hub

■ *Spreading disc hub*

- Lubricant: Graphite grease

10.6 Checking the agitator drive

■ *Agitator drive*

- Lubricant: Grease/oil



There is a **left-hand** agitator and a **right-hand** agitator. Both agitators rotate in the same direction as the spreading discs.

In order to guarantee an even fertilizer flow, the agitator must work at a constant speed.

- Speed of the agitator: 15 - 20 rpm

In order to reach the correct agitator speed, the agitator requires the resistance of the spreading material inside it. This is the reason why it is entirely possible that even with a fully functional agitator, the correct speed cannot be reached or that the hopper swings back and forth when the hopper is empty.

If the speed is outside of this range **when the hopper is full**, the agitator must be checked for damage and wear.

Checking the function of the agitator

Requirements:

- ✓ The tractor is parked
- ✓ The ignition key has been removed
- ✓ The machine is placed on the ground

► Checking the connecting rods

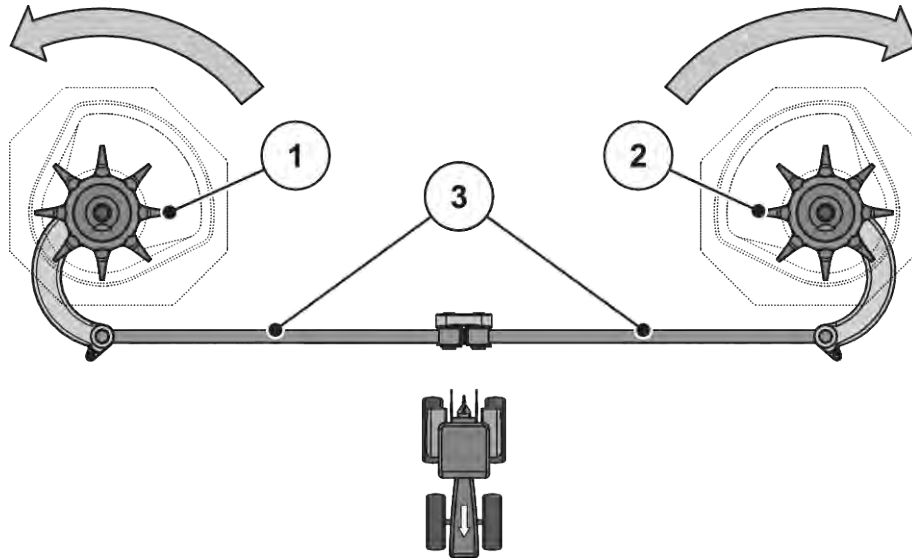


Fig. 52: Checking the agitator drive

- | | |
|---|---|
| [[1]] Right-hand agitator head (in the direction of travel) | [[3]] Connecting rods |
| [[2]] Left-hand agitator head (in the direction of travel) | Arrows: Rotational direction of spreading discs |

- ▷ Connecting rods must not show any cracks or other signs of damage.
- ▷ Checking the joint bearing for wear
- ▷ Checking safety element functions at all joints
- Manually turn the agitator head **into the rotational direction of the spreading disc**. See Fig. 52 Checking the agitator drive.
 - ▷ It must be possible to turn the agitator head

If it does not turn, replace the agitator head.
- Turn the agitator head manually or with the help of an oil filter belt forcefully **against the rotational direction of the spreading disc**. See Fig. 52 Checking the agitator drive
 - ▷ The agitator head must lock

If the agitator head can be turned, replace it.

If the checkup does not identify any cause, please contact your authorized specialist workshop for further inspections.

Checking the agitator head for wear or damage

- ▶ Checking the fingers of the agitator head for wear

The length of the fingers must not be less than the wear range (Z = 9).

The fingers must not be bent.

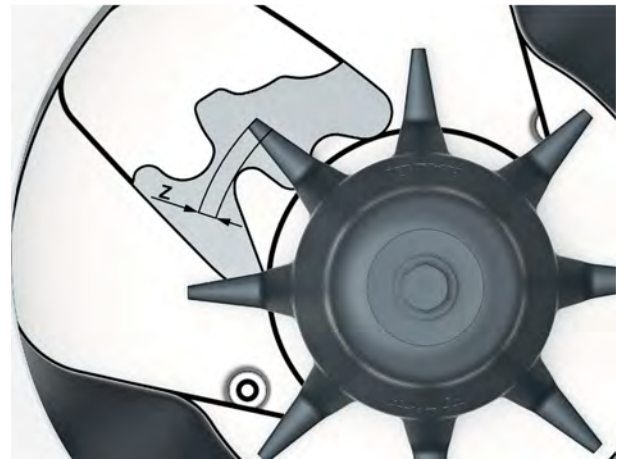


Fig. 53: Agitator head wear range

10.7 Spreading vane replacement

■ Spreading vane



Have worn spreading vanes replaced by **only** your dealer or your expert workshop.

Requirement:

- The spreading discs are removed (see *Chapter 8.4.2 - Dismounting and mounting spreading discs - Page 63*).

NOTICE!

Conformity of the spreading vane types

The type and size of the spreading vanes are adapted to the spreading disc. Incorrect spreading vanes can cause damage to the machine and the environment.

- ▶ ONLY use spreading vanes which are approved for the relevant disc.
- ▶ Compare the labeling on the spreading vane. The model and size of the new and old spreading vanes must be identical.

- [1] Type of spreading disc
- [2] Spreader side
- [3] Length of the spreading vane
- [4] Coating

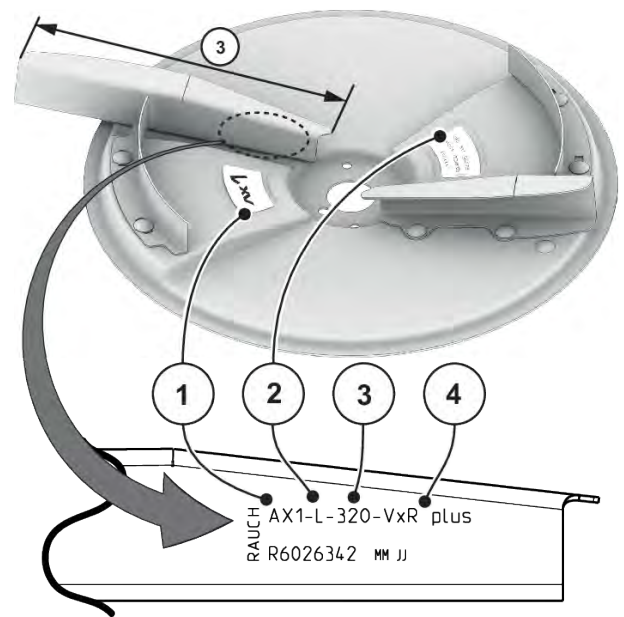


Fig. 54: Spreading disc label

Spreading vane replacement

- Loosen the self-locking nuts at the spreading vane and remove the spreading vane.
- Attach the new spreading vane to the spreading disc. Make sure that you have the correct spreading vane type.
- Screw on the spreading vane (tightening torque: **20 Nm**). For this purpose, **always use new self-locking** nuts.

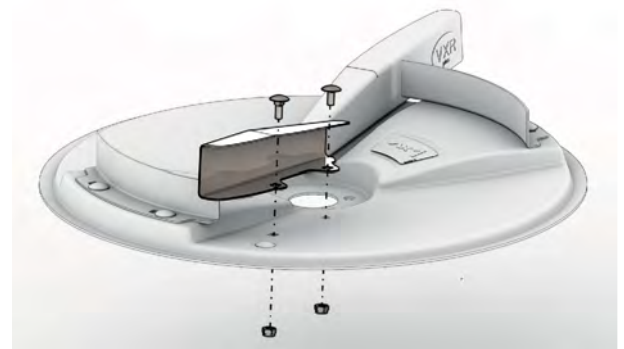


Fig. 55: Loosening the screws of the spreading vane

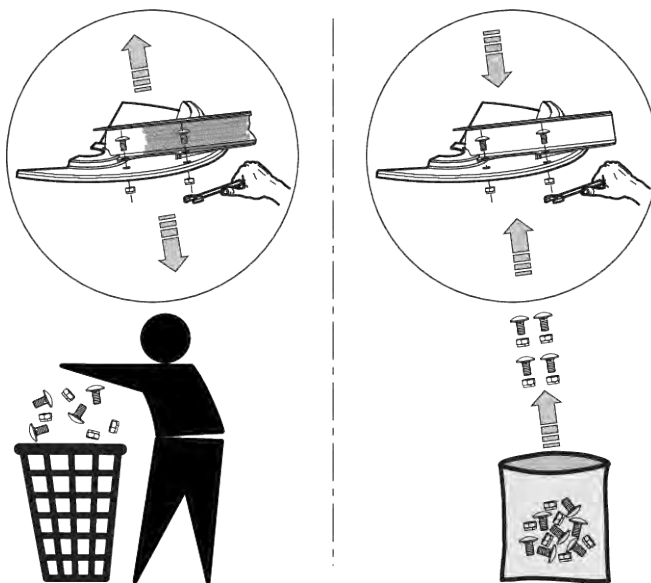


Fig. 56: Using new self-locking nuts

10.8 Metering slide adjustment

■ Metering slide setting

When setting the two metering slides before every spreading season, check that they both open to the same extent; check this as necessary also during the spreading season.

! WARNING!

Danger of crushing and shearing due to externally-actuated components

When working on power-operated components (adjusting lever, metering slides), there is a crushing and shearing risk.

Pay attention to the shear point of the metering slide opening and the metering slide during adjustment.

- ▶ Switching off the tractor engine
- ▶ Removing the ignition key
- ▶ Disconnecting the power supply between the tractor and the machine
- ▶ Never operating the hydraulic metering slide during adjustment

Requirements:

- ✓ The mechanical system must move freely

Checking (e.g., left side of machine)

- ▶ Insert a lower link pin with a diameter of **28 mm** centrally into the metering opening.
- ▶ Push the metering slide against the pin and lock it in this position by tightening the setscrew.

The stop at the lower scale arc (metering scale) is at scale value 89.

- ▶ If the position is not correct, readjust the scale.

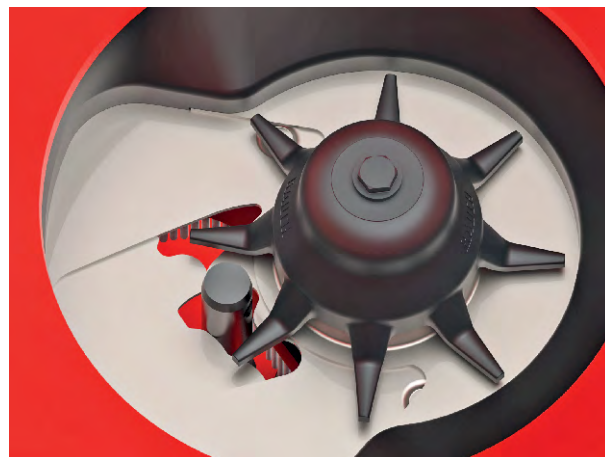


Fig. 57: Lower link pin in metering opening

Adjustment

- ✓ The metering slide is pushed lightly against the pin. See *Fig. 57 Lower link pin in metering opening*.
- Loosen the mounting screws on the scale of the lower scale arc.



Fig. 58: Scale mounting screws

- Adjust the scale in such a way that **scale value 89** lies exactly under the pointer element.

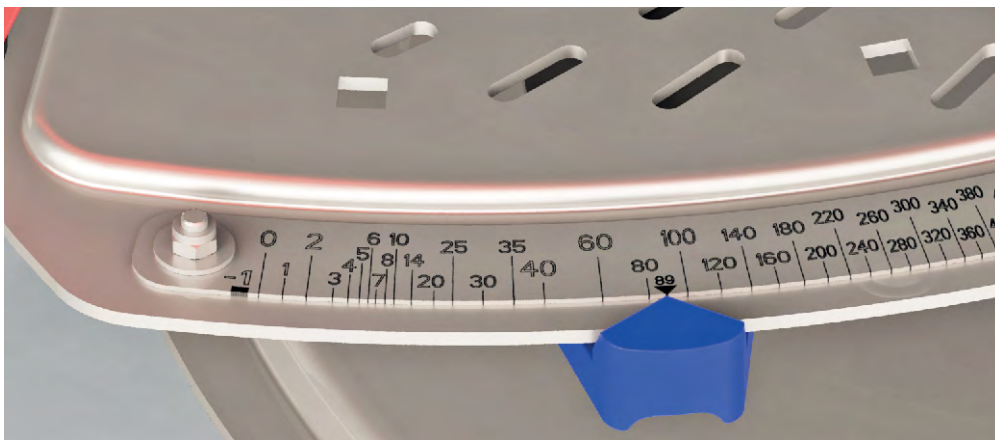


Fig. 59: Metering slide pointer on scale value 89

- Tighten the scale again.
Repeat the steps for the right-hand metering slide.



Both metering slides must open **evenly** and to the same extent. Therefore check the setting of the metering slides on both sides.



After scale correction with electronic metering slide actuators, correcting the slide testing points in the ISOBUS machine control unit is also necessary.

- Please refer to the operator's manual for the machine control unit.
- In the event of deviations, consult the dealer or the specialist workshop for recalibration.

10.9 Adjusting the drop point

■ *Drop point setting*

By altering the drop point, the working width can be accurately set and adjustments to different types of fertilizer can be made.

Check the setting of the drop point at the start of each working season, and during the season if necessary (if uneven spreading is noticed).

The drop point is set using the top scale arc.



The drop point must be set to the **same** position on both sides. Therefore check the setting on both sides.

Check

- ▶ Setting the drop point to **position 11**
- ▶ Dismounting the outlet with brushes on both openings
- ▶ Release both plastic levers (agitator drive) and slide them downwards until the splines of the agitator are showing
- ▶ Attach a suitably thin string **at the rear** in the direction of travel to the splines of the agitator shafts and tension it.

The triangular mark at the ground plate must be aligned with the tensioned string.

- ▶ If the mark is not aligned to the string, the drop point must be readjusted.

10.10 Transmission oil



On machines with the M EMC function, the gearbox is maintenance-free. However, we recommend changing the oil after 10 years. A shorter oil change interval is recommended if fertilizers with high dust content are used and the spreader is frequently cleaned.

10.11 Weigh cell lubrication

■ *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:

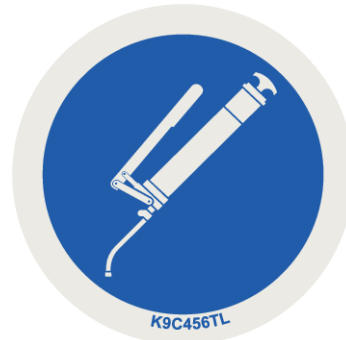


Fig. 60: Lubrication points notice plate



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

[1] Lubrication point

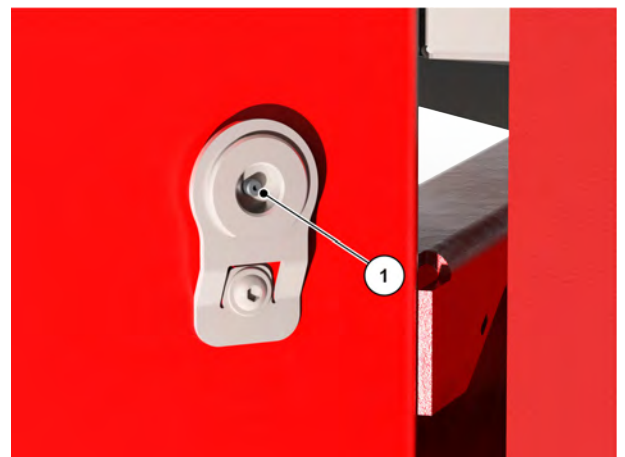


Fig. 61: Lubrication point of weighing spreaders

10.12 Drive shaft lubrication

■ Universal drive shaft

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

10.13 Lubricating the upper and lower links

■ Upper and lower link balls

- Lubricant: Grease

10.14 Lubricating the drop point adjustment

■ *Drop point adjustment*

- Lubricant: Oil
- Keep moving smoothly and grease regularly, from the edge inwards and from the ground outwards

10.15 Lubricants

■ *Joints, bushes*

- Lubricant: Grease, oil

10.16 Hydraulic system maintenance

WARNING!

Danger due to high pressure and high temperature in the hydraulic system

Hot fluid escaping under high pressure may cause serious injury.

- ▶ Depressurize the hydraulic system before carrying out any work.
- ▶ Switch off the tractor engine and secure it against restarting.
- ▶ Let the hydraulic system cool down.
- ▶ When checking for leakage, wear protective goggles and protective gloves at all times.

WARNING!

Danger of infection due to hydraulic oil

Hot fluid escaping under high pressure can cause serious injury.

- ▶ Depressurize the hydraulic system before carrying out any work.
- ▶ Switch off the tractor engine and secure it against restarting.
- ▶ Allow the hydraulic system to cool down.
- ▶ When checking for leakage, wear protective goggles and gloves at all times.

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

The hydraulic and transmission oils are not entirely biodegradable. Therefore the entry of oil into the environment in an uncontrolled manner must be prevented.

- ▶ 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 must 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.

10.16.1 Checking 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

10.16.2 Replacing hydraulic hoses

■ *Hydraulic hoses*

Hydraulic hoses are subject to aging. They may only be used for a maximum of 6 years, including a storage period of a maximum of 2 years.



The manufacturing date of a hose line is indicated in one of the hose fittings as year/month (e.g., 2012/04).

Preparation

- ▶ Ensure that the hydraulic system is depressurized and has cooled down.
- ▶ Provide collection trays for leaking hydraulic oil below the separation points.
- ▶ Have suitable plugs ready in order to prevent a leaking of the hydraulic oil out of the lines which cannot be replaced.
- ▶ Provide suitable tools.
- ▶ Put on your protective gloves and glasses.
- ▶ Ensure that the new hydraulic hose corresponds to the type of hydraulic hose to be replaced. In particular, observe the correct pressure range and hose length.

There are two nitrogen tanks in the hydraulic circuit. These also remain under pressure after system shutdown.

- ▶ Slowly and carefully open the screw connections of the hydraulic circuit.



Observe the different maximum pressure specifications on the hydraulic lines to be replaced.

Implementation:

- ▶ Loosen the hose fitting at the end of the hydraulic hose to be replaced.
- ▶ Discharge the oil from the hydraulic hose.
- ▶ Loosen the other end of the hydraulic hose.
- ▶ Put the loose hose end into the oil collection tray immediately and plug the connection.
- ▶ Loosen the hose fixtures and remove the hydraulic hose.
- ▶ Connect the new hydraulic hose. Tighten the hose fittings.
- ▶ Fix the hydraulic hose by means of the hose fixtures.
- ▶ Check the position of the new hydraulic hose.
 - ▷ The hose routing must correspond to the one of the old hydraulic hose.
 - ▷ Friction points are to be excluded.
 - ▷ The hose may not be twisted or tensioned.

The hydraulic hoses have been replaced successfully.

11 Winterizing and preserving

11.1 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.

11.2 Winterizing



Thoroughly clean the machine before winterizing (refer to chapter 10.4 *Cleaning and maintaining the machine*)

- ▶ Open metering slides.
- ▶ Hang up hoses and cables with the connector facing downwards to ensure that water can drain well.
- ▶ Switch off the spreader.
- ▶ Bring the hopper tarpaulin into the drying position, in order to avoid moisture entering the hopper. *Chapter 10.4.3 - Drying position of the hopper tarpaulin - Page 90*
- ▶ Preservation of hydraulic components and parts susceptible to rust. To do this, use suitable anti-corrosion agent. Protective wax, for instance.
- ▶ Place dust caps on hoses and cable.



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



Prior to winterization, grease and lubricate the machine (refer to chapter 10 *Maintenance and service*)

11.3 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*".

12 Disposal

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.

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.

12.2 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.

13 Appendix

13.1 Table of tightening torque

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: $0,12 \leq \mu \leq 0,18$

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

Permissible torques for A2-70 and A4-70 screws for lengths up to 8 x thread diameter,		
Thread	Friction coefficient μ	Permissible torques Nm
M5	0.14	4.2
	0.16	4.7
M6	0.14	7.3
	0.16	8.2
M8	0.14	17.5
	0.16	19.6

Permissible torques for A2-70 and A4-70 screws for lengths up to 8 x thread diameter,		
Thread	Friction coefficient μ	Permissible torques Nm
M10	0.14	35
	0.16	39
M12	0.14	60
	0.16	67
M14	0.14	94
	0.16	106
M16	0.14	144
	0.16	162
M18	0.14	199
	0.16	225
M20	0.14	281
	0.16	316
M22	0.14	376
	0.16	423
M24	0.14	485
	0.16	546
M27	0.14	708
	0.16	797
M30	0.14	969
	0.16	1092

14 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
RAUCH Spridningstabellen
RAUCH Tablas de abonado



<https://streutabellen.rauch.de/>



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