



Operator's manual



**Please read carefully
before using the
machine!**

Keep for future use

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



MDS 8.2/14.2/18.2/20.2

5902916-d-en-0825

Original instructions

Foreword

Dear customer,

By purchasing the mineral fertilizer spreader of the MDS 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 MDS series may only be used in accordance with the stipulations of the present operator's manual.

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

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

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

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

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

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

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

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

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

■ **Foreseeable misuse**

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

2 User instructions

2.1 About this operator's manual

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

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

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

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

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

- Operation,
- Maintenance and cleaning,
- Troubleshooting.

In particular, the following is to be observed:

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

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

2.2 Structure of the operator's manual

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

- User instructions
- Safety instructions
- Machine data
- Instructions on operating the machine
 - 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

- Only park the machine with an empty hopper on level, firm ground.
- If the machine is parked alone (without tractor), open the metering slides completely. The return springs of the single-acting slide actuation mechanism are released.

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.

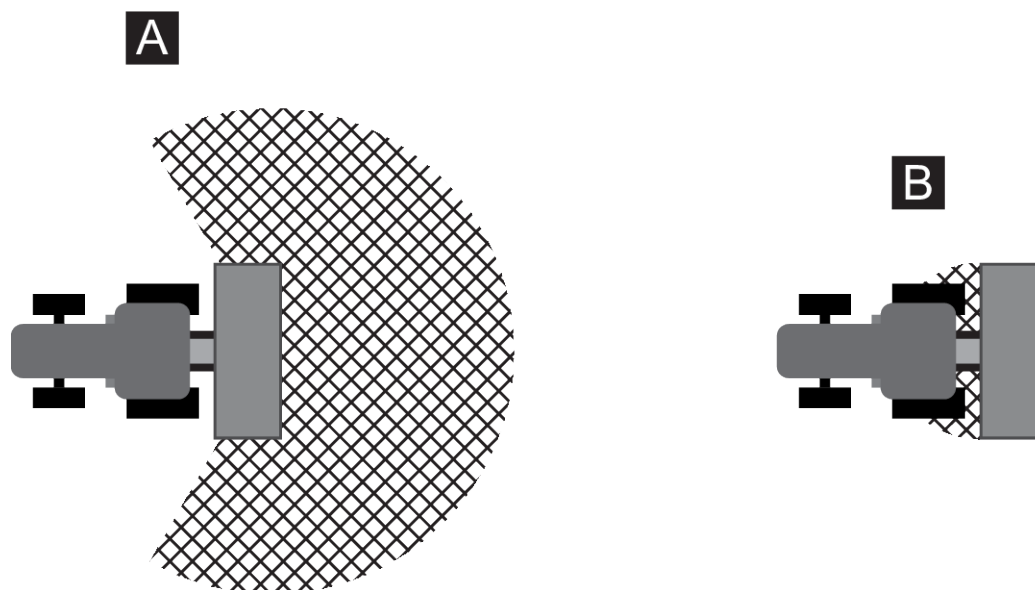


Fig. 1: Hazard zone when devices are attached

[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

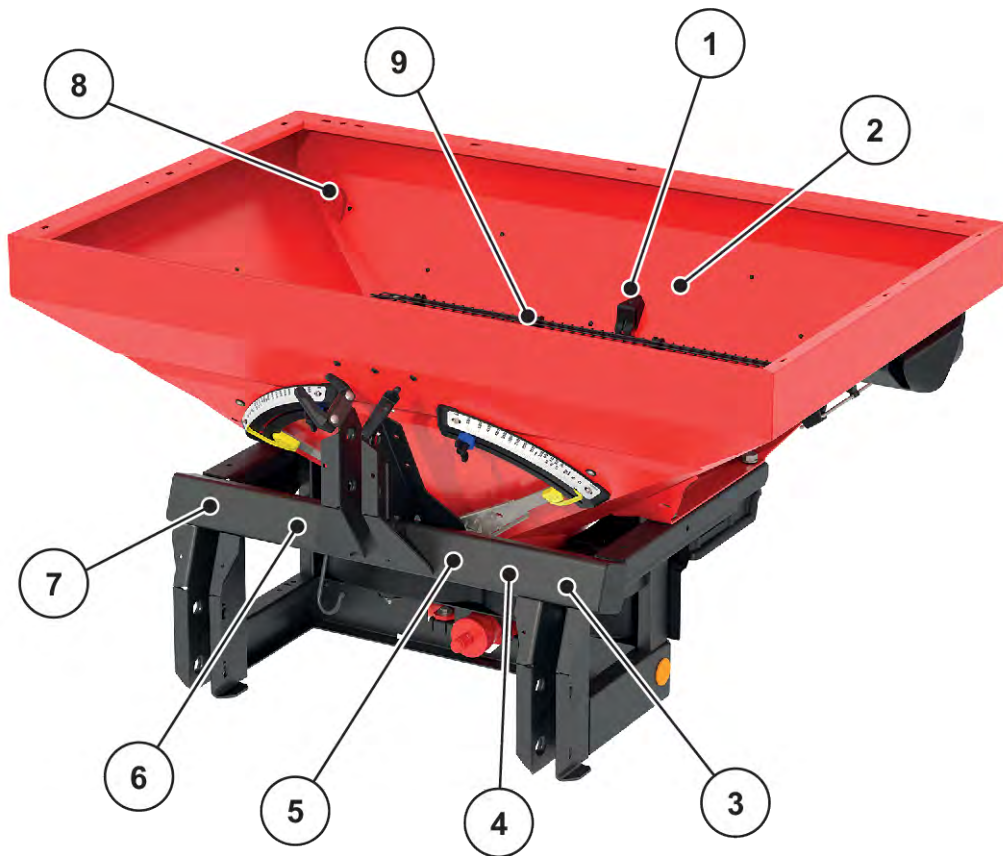


Fig. 2: Position of safety equipment, warning and instruction notices, reflector (front)

- | | |
|--|-----------------------------------|
| [1] Protective grid lock | [5] Instructions: Maximum payload |
| [2] Instructions: protective grid lock | [6] Instructions: PTO speed |
| [3] Warning: crushing hazard between the tractor and the machine | [7] Name plate |
| [4] Warning: Read operator's manual | [8] Crane lugs |
| | [9] Protective grid in hopper |

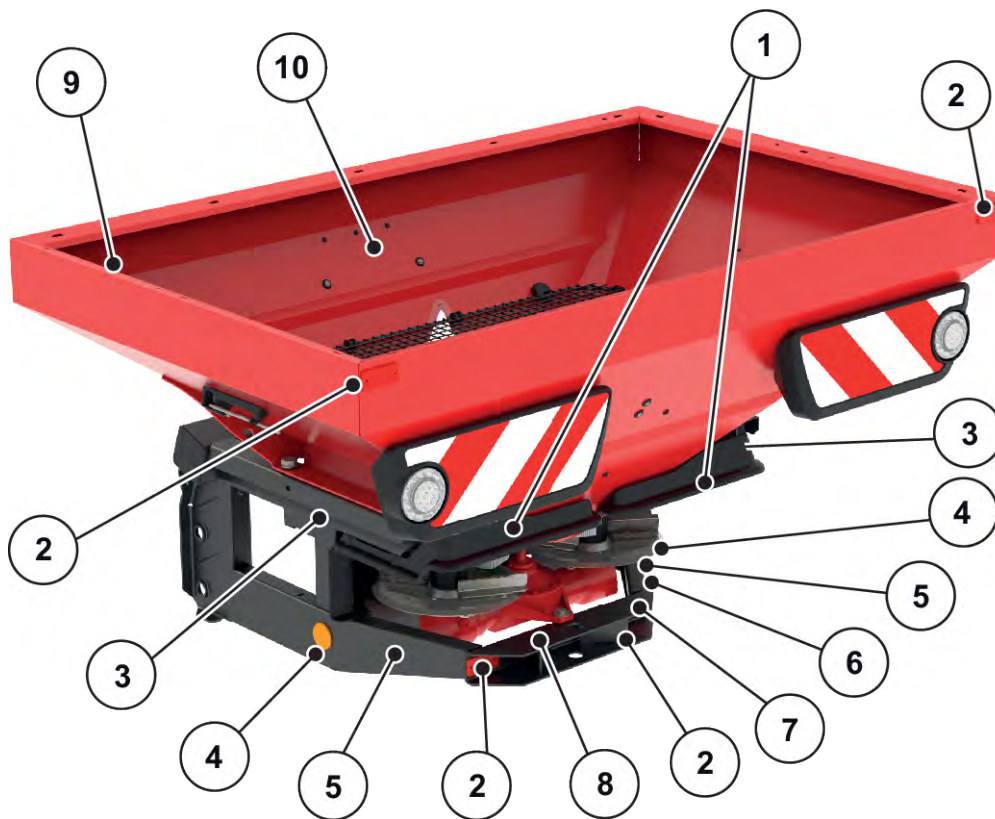
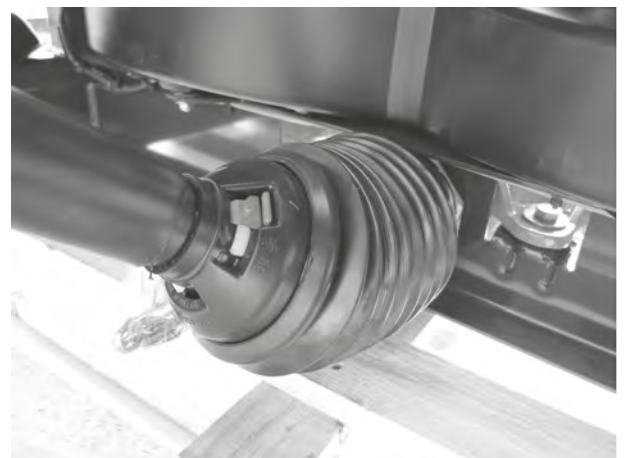


Fig. 3: Position of safety equipment, warning and instruction notices, reflector (rear)

- | | |
|--|--|
| [1] Deflecting device and safety equipment | [6] Instructions: Pulling a trailer |
| [2] Red reflector | [7] Warning: Remove ignition key |
| [3] Instructions: tightening torque | [8] Warning: Ejection of material |
| [4] Yellow side reflector | [9] Crane lugs |
| [5] Warning: Moving parts | [10] Instructions: using the protective grid |

■ Universal drive shaft

- [1] Universal drive shaft cover



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.
Deflecting device and safety equipment	The deflecting device and safety equipment prevents the ejection of fertilizer to the front (direction of tractor/workplace). The deflecting device and safety equipment prevents anything from being grabbed by rotating spreading discs from the front and reduces the risk from the side and the rear.
Universal drive shaft guard	Prevents body parts and clothing from being pulled into the rotating universal drive shaft.

3.11 Warning and instruction stickers

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

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

- Replace missing or illegible warning and instruction stickers immediately.

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



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

3.11.1 Warning stickers

Illustration	Description
	Read the operator's manual and warnings. 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
	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 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.

3.11.2 Instruction stickers

Illustration	Description
	Before commissioning of the machine install and close the protective grid.

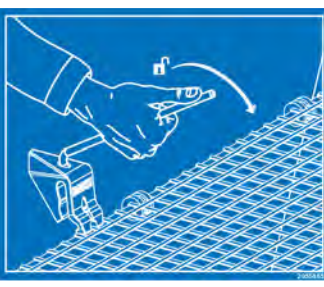
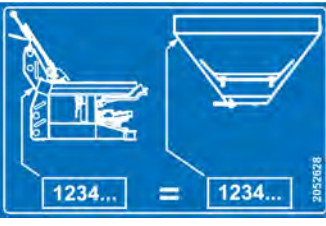
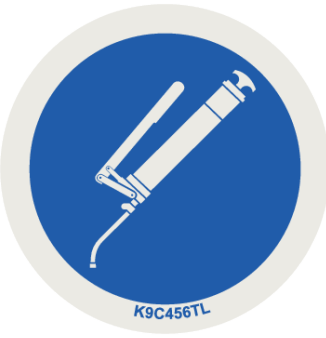
Illustration	Description
	Protective grid lock The grid is automatically locked when the protective grid in the hopper is closed properly. It can only be unlocked by using a tool.
	Rated speed of the PTO shaft The rated speed of the PTO shaft is 540 rpm.
	Maximum load capacity MDS 20.2
	Maximum load capacity MDS 18.2
	Maximum load capacity MDS 14.2
	Maximum load capacity MDS 8.2
	Tightening torque for attachment of the hopper to the frame.

Illustration	Description
	The frame and hopper are delivered separately: ▶ Assemble only frames and hoppers with the same serial number. ▷ Compare the stickers on the frame and the hopper.
	Eyelet in the hopper Labeling of the bracket for fixing the hoisting gear
	Lubrication point
Zur Beachtung: a) Die Fahrgeschwindigkeit mit Anhänger darf 25 km/h nicht überschreiten. b) Der Anhänger muß eine Aufbauförderung oder eine Bremsanlage haben, die vom Fahrer des ziehenden Fahrzeuges bedient werden kann. c) Das Mithilfe eines Stützfußes oder Stützfüßen ist nur zulässig, wenn das Gesamtgewicht des Anhängers das Gesamtgewicht des ziehenden Fahrzeuges nicht übersteigt und die Stützfüße des Anhängers vom Anbaugerät mit einem oder mehreren Stützen auf der Fahrbahn übertragen wird, dass sich die Zugfahrzeug sicher lenken und bremsen läßt. d) Ein Gefährdungsbeurteilung darf am Anbaugerät durchgeführt werden, wenn das tatsächliche Gesamtgewicht des Anhängers nicht mehr als das 1,25fache des zulässigen Gesamtgewichtes des Zugfahrzeuges, jedoch höchstens 5 t beträgt.	Compliance required in Germany Driving with trailers behind mounted equipment is governed by the provisions of the StVZO.
	Spreading material chart on the app. For Android/iOS with DiS function With QR code for quick installation of the app

3.12 Name plate and machine marking



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

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

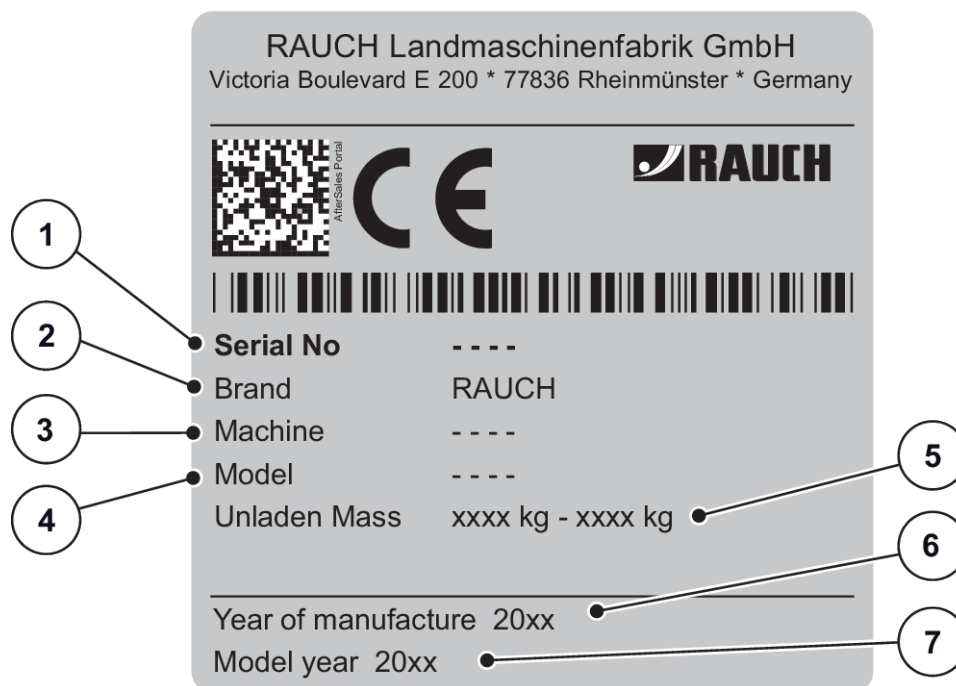


Fig. 4: Nameplate

- [1] Serial number
- [2] Manufacturer
- [3] Machine
- [4] Type

- [5] Empty weight
- [6] Year of construction
- [7] Model year

3.13 Reflector

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

The machine is factory-equipped with a lighting system and front, rear, and side lighting (for 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

Service Center, Technical Customer Service

RAUCH Landmaschinenfabrik GmbH
PO box 1162
Email: service@rauch.de
Fax: +49 (0) 7229 8580-203

4.2 Description of the machine

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

The machine consists of the following assemblies.

- 1-chamber hopper
- 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*



Some models are not available in all countries.

4.2.1 Assembly overview

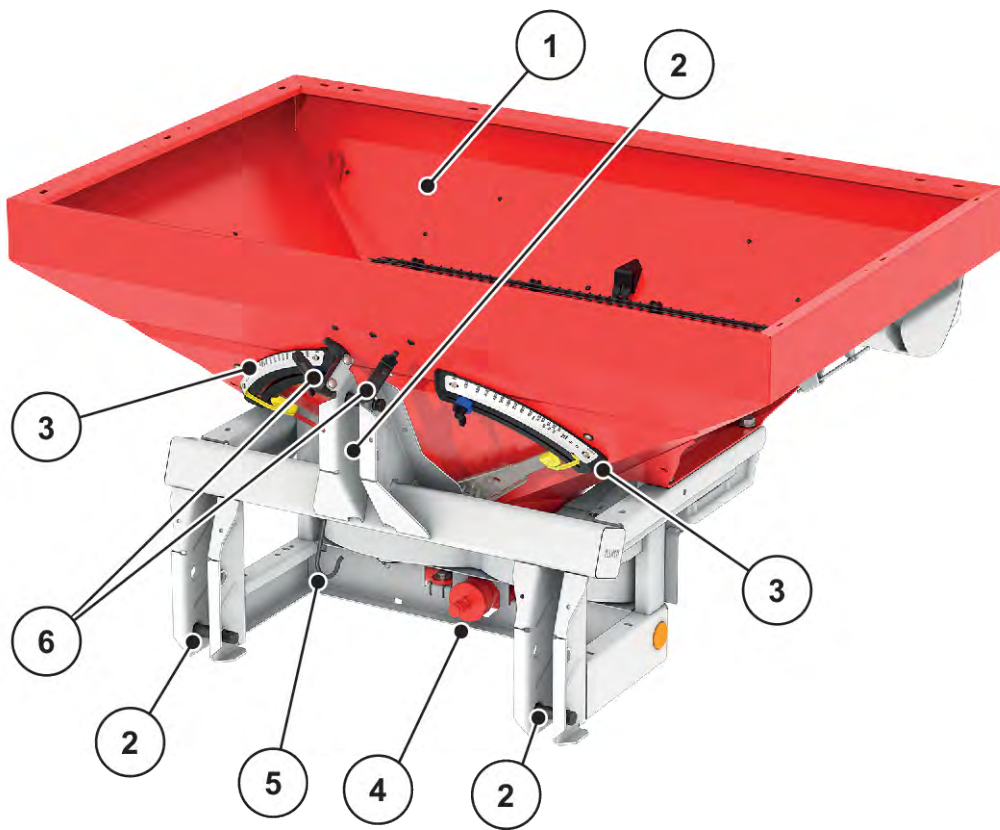


Fig. 5: Assembly overview: Front

- | | |
|---|--|
| [1] Hopper (inspection window, filling level scale) | [4] Transmission spigot |
| [2] Coupling points | [5] Universal drive shaft mounting bracket |
| [3] Scale for the application rate (left/right) | [6] Hose and cable tray |

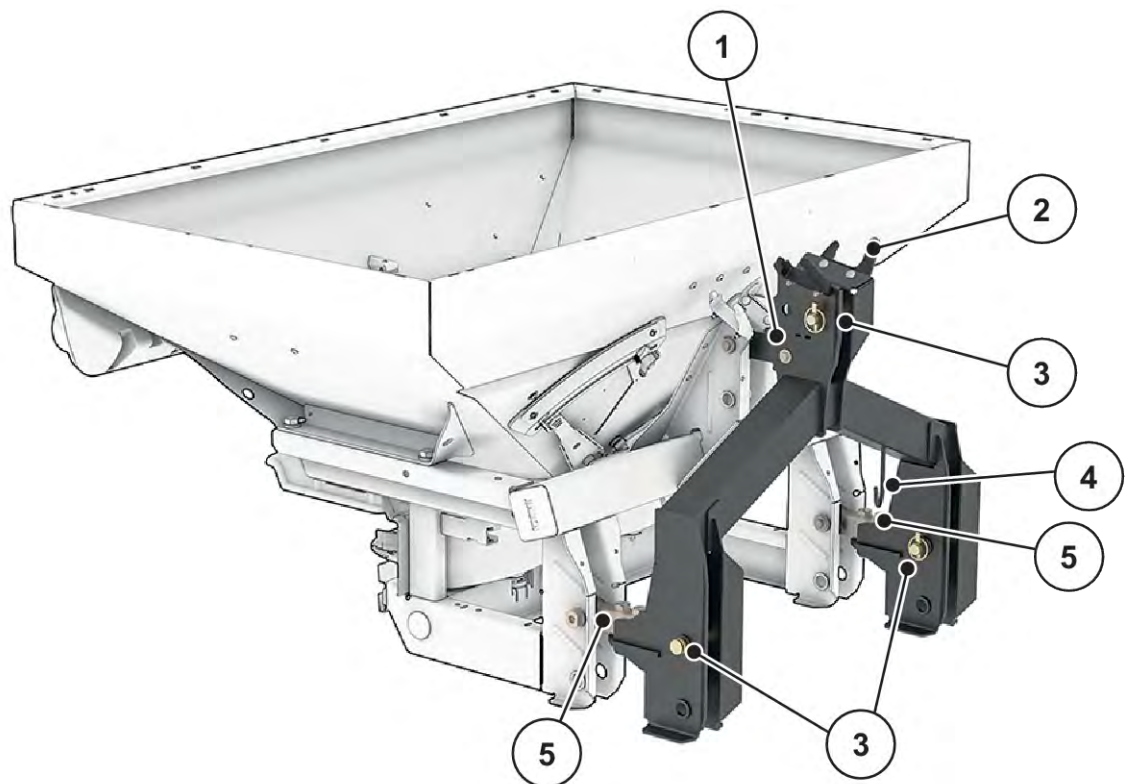


Fig. 6: Assembly overview: front side with weighing frame

- | | |
|-------------------------|--|
| [1] Weighing frame | [4] Universal drive shaft mounting bracket |
| [2] Hose and cable tray | [5] Weigh cells |
| [3] Coupling points | |

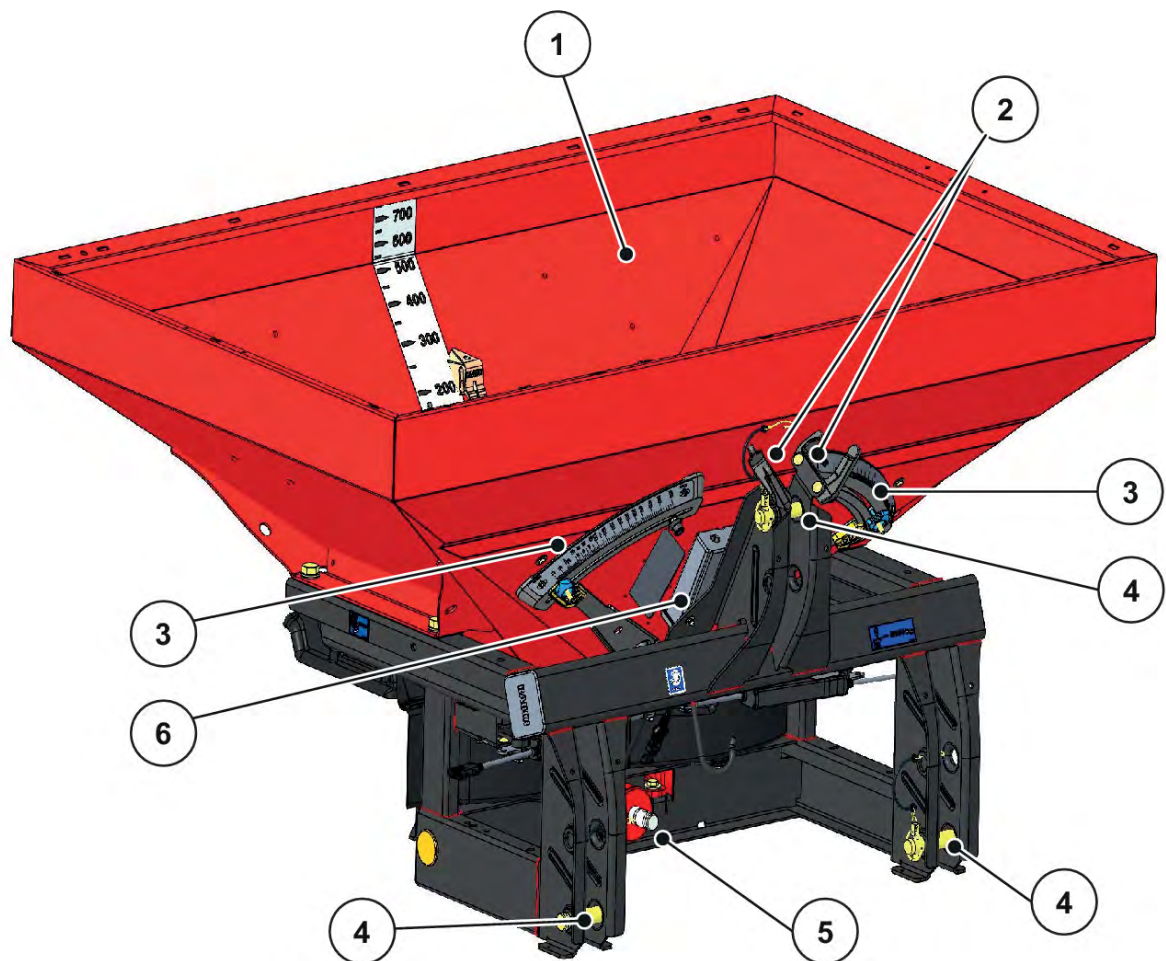


Fig. 7: Assembly overview: Front face of MDS with ISOBUS

- | | |
|---|-----------------------------|
| [1] Hopper (inspection window, filling level scale) | [4] Coupling points |
| [2] Storage facility for hoses and cables | [5] Transmission spigot |
| [3] Scale for the application rate (left/right) | [6] Job computer for ISOBUS |

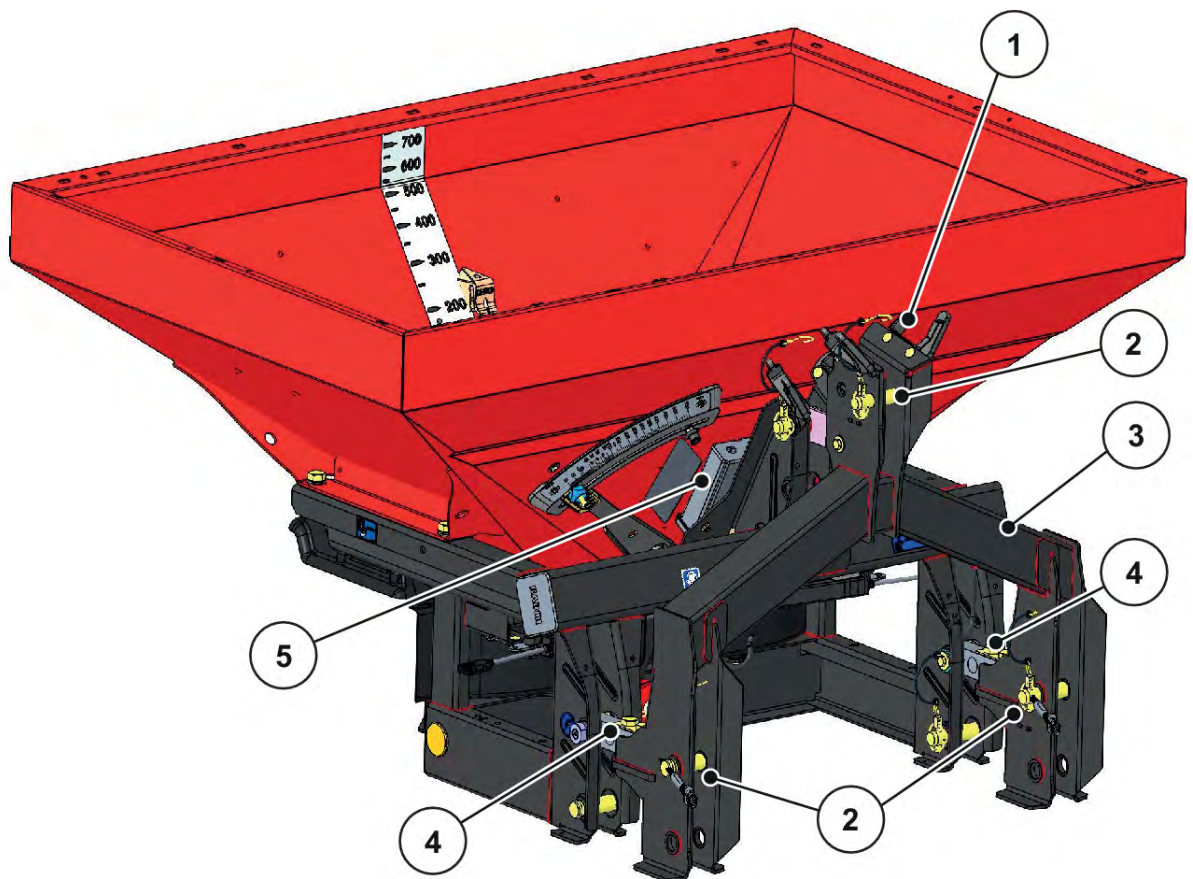


Fig. 8: Assembly overview: Front face of MDS with ISOBUS with weigh frame

- | | |
|---|-----------------------------|
| [1] Storage facility for hoses and cables | [4] Weigh cells |
| [2] Coupling points | [5] Job computer for ISOBUS |
| [3] Weighing frame | |

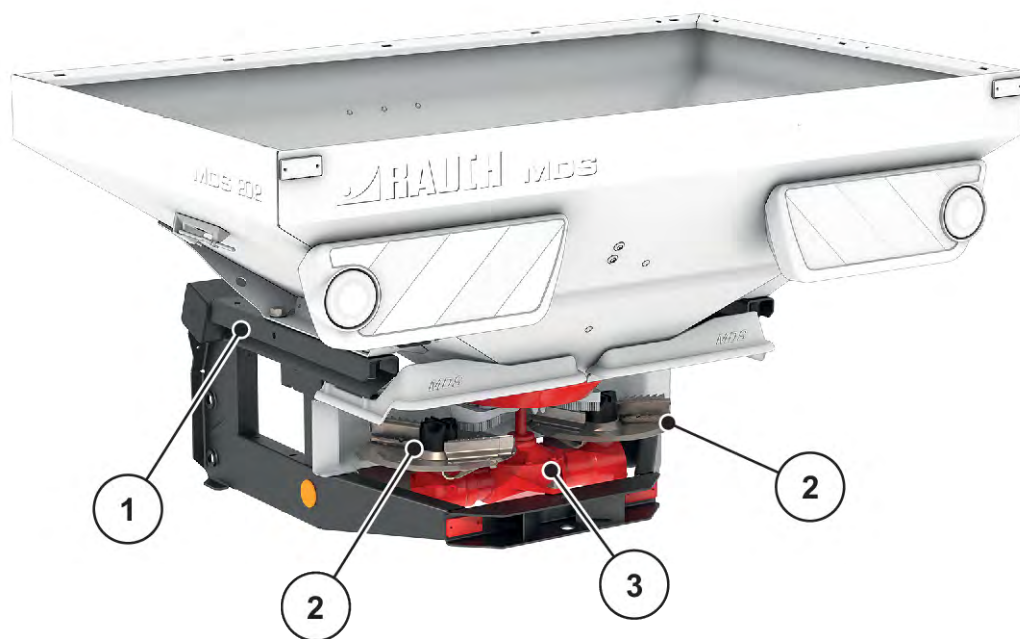


Fig. 9: Assembly overview: Rear

[1] Frame

[2] Spreading disc (left/right)

[3] Transmission

4.2.2 Adjustment lever

The adjustment lever is located on the hopper on the left side (direction of travel)

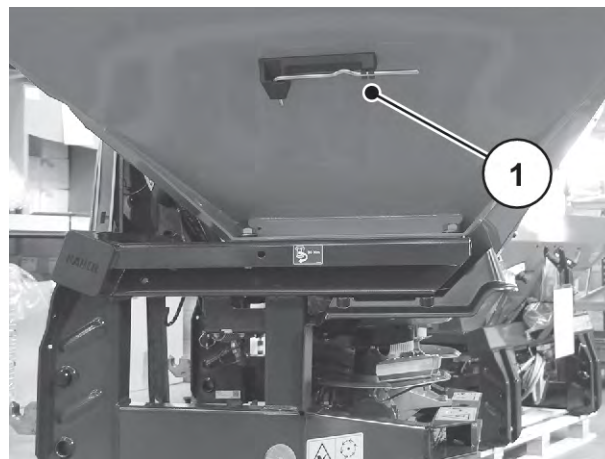


Fig. 10: Adjustment lever position

4.2.3 Agitator

- [1] Agitator
- [2] Metering slide

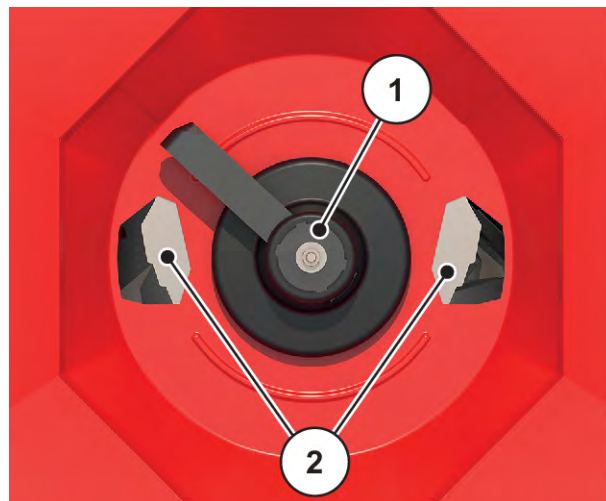


Fig. 11: Agitator

4.3 Technical specifications

4.3.1 Versions



Some models are not available in all countries.

Function	K	D D Mono	R	C	Q	W
Electrically remote-controlled actuators				•	•	•
Single-acting hydraulic cylinders	•					
Single-acting hydraulic cylinder with two-way unit			•			
Double-acting hydraulic cylinders		•				
Spreading depending on forward speed					•	•
Weigh cells						•
VariSpread	VS2	VS2	VS2	VS2	VS8	VS8



The K version can also be equipped with a two-way unit.

- See *Fig. 30 Metering slide actuator of the two-way unit*

4.3.2 Technical data for the basic equipment

■ Dimensions

Data	MDS 8.2	MDS 14.2	MDS 18.2	MDS 20.2
Total width	108 cm	140 cm	190 cm	190 cm
Overall length	124 cm	128 cm	130 cm	130 cm
Distance between center of gravity and lower link point	55 cm	55 cm	55 cm	55 cm

Data	MDS 8.2 W	MDS 14.2 W	MDS 18.2 W	MDS 20.2 W
Total width	108 cm	140 cm	190 cm	190 cm
Overall length	+ 35.6 cm			
Distance between center of gravity and lower link point	+27.4 cm	+27.4 cm	+27.4 cm	+27.4 cm

Data	MDS 8.2 MDS 8.2 W	MDS 14.2 MDS 14.2 W	MDS 18.2 MDS 18.2 W	MDS 20.2 MDS 20.2 W
Filling level (Basic machine)	92 cm	104 cm	93 cm	101 cm
Filling width	98 cm	130 cm	180 cm	180 cm
Working width ¹	10-24 m			
PTO speed min. max.				
	450 rpm			
	600 rpm			
Nominal speed	540 rpm			
Hopper capacity	500 l	800 l	700 l	900 l
Mass flow ² max.	250 kg/min			
Hydraulic pressure max.	200 bar			
Sound pressure level ³ (measured in the closed driver's cab of the tractor)	75 dB(A)			

¹⁾ Working width depending on fertilizer and disc type (max. 24 m)

²⁾ Max. mass flow depending on fertilizer type

■ Weights and loads



The empty weight (mass) of the machine varies depending on the working width, the equipment and extension combination.

Data	MDS 8.2	MDS 14.2	MDS 18.2	MDS 20.2
Empty weight	190 kg	210 kg	210 kg	230 kg
Fertilizer payload	Category I and II: 800 kg	Category I: 800 kg Category II: 1400 kg	Category II: 1800 kg	Category II: 2000 kg

Data	MDS 8.2 W	MDS 14.2 W	MDS 18.2 W	MDS 20.2 W
Empty weight	+ 52 kg			
Fertilizer payload	Category II			
	800 kg	1400 kg	1800 kg	2000 kg

4.3.3 Technical data for the extensions

The machine can be operated with various attachments and attachment combinations. The capacity, dimensions and weights may change depending on the selected feature package.

Extension	M 31 Only MDS 8.2	M 21 Only MDS 14.2	M 41 Only MDS 14.2
Change in capacity	+ 300 l	+ 200 l	+ 400 l
Change in filling height	+ 28 cm	+ 12 cm	+ 24 cm
Filling width	98 cm	130 cm	
Maximum extension size	108 x 108 cm	140 x 115 cm	
Extension weight	25 kg	20 kg	30 kg
Description	4-sided		

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 tractor type being used.

Extension MDS 18.2/20.2	M 430	M 630	M 800	M 1100
Change in capacity	+ 400 l	+ 600 l	+ 800 l	+ 1100 l
Change in filling height	+ 18 cm	+ 30 cm	+ 18 cm	+ 27 cm
Filling width	178 cm		228 cm	
Maximum extension size	190 x 120 cm		240 x 120 cm	
Extension weight	30 kg	42 kg	49 kg	59 kg
Description	4-sided			

4.4 Special equipment



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



Some models are not available in all countries.



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

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

4.4.1 Extensions

The capacity of the standard unit can be increased by fitting a hopper extension.

The extensions are bolted to the standard hopper.



An overview of the extensions can be found in chapter 4.3.3 *Technical data for the extensions*

4.4.2 Hopper cover

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

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

Hopper cover	Application
AP 13	Basic hopper MDS 14.2
AP 19	- Basic hopper MDS 18.2/20.2 - Extensions: M 430, M 630
AP 240	Extensions: M 800, M 1100

4.4.3 Row spreading system

■ RFZ 7

All versions except MDS 8.2

This 7-row spreading system is suitable for depositing dry, granulated fertilizer in rows next to sprouting plants.

A separate operator's manual is supplied with the row spreading system.

■ RV 2M1 for hops and fruit cultivation

The row spreading system is designed such that an approx. 1 m wide strip is spread, depending on the fertilizer, for each row to the right and left of the machine (row spacing: approx. 2-5 m).



Information about spreading with the special equipment can be found in chapter 9.12 *RV 2M1 row spreading system for hops and fruit cultivation*.

4.4.4 Spreading width limiter

■ TELIMAT T1

The TELIMAT limited border spreading unit is used for remote-controlled boundary and border spreading from the track (left).

A double-acting valve is required for use of the TELIMAT T1 limited border spreading unit.



Information about spreading with the special equipment can be found in chapter. 9.10.3 *Adjusting the TELIMAT full and limited border spreading unit*

■ GSE 7

Limits the spreading width (either right or left) to the range between approx. 75 cm and 2 m from the center of the tractor track to the outer field edge. The metering slide that points to the field border is closed.



- ▶ Close the metering slide that points to the border of the field.
- ▶ Fold the limited border spreading unit downwards for limited border spreading.
- ▶ The limited border spreading unit must be folded up again before two-sided spreading.



Information about spreading with the special equipment can be found in chapter. *9.10.2 Setting the GSE spreading width limiter*

4.4.5 Hydraulic remote control unit for spreading width limiter

This remote control is used from the tractor cabin to hydraulically swing the spreading width limiter into position or to swing it from border spreading position into the two-sided spreading position.

4.4.6 Two-way unit

■ ZWE 25

The two-way unit can be used to connect the machine to tractors with only one single-acting control valve.

4.4.7 Tele-Space universal drive shaft

The Tele-Space universal drive shaft is telescopic and provides additional space (approx. 300 mm) for easier coupling of the machine to the tractor.

When delivering the Tele-Space drive shaft, separate assembly instructions are supplied.

4.4.8 Auxiliary lighting

The machine can be fitted with auxiliary lighting.

Lighting	Application
LED lighting	• For MDS 8.2 • Rear lighting • with warning sign
BLW 16	• For MDS 14.2/18.2/20.2 • Rear lighting • with warning sign



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

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



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

- Observe the traffic regulations of your country.

4.4.9 Agitator

■ **RWK 6K**

- For sticky fertilizers



■ **RWK 7K**

- For the use of grass seeds as a spreading material.



■ **RWK 15**

- For mealy fertilizers



4.4.10 Practice test kit

■ PPS 5

For checking the cross-distribution in the field.

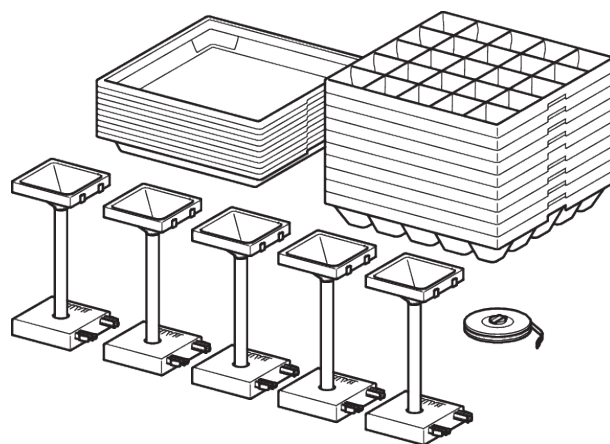


Fig. 12: PPS5 optional equipment

4.4.11 Fertilizer identification system

■ FIS

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

5 Axle load calculation

⚠️ WARNING!

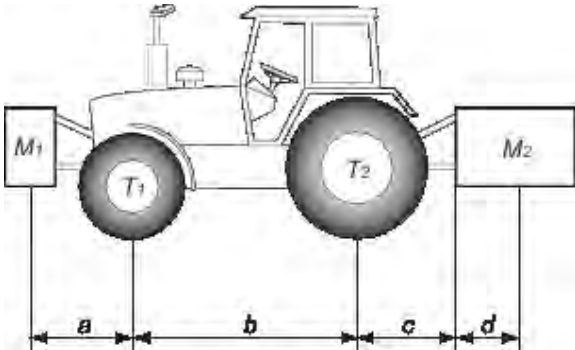
Overload

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.

7 Commissioning

7.1 Accepting the machine

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

The standard equipment includes:

- 1 mineral fertilizer spreader of the MDS series
- 1 MDS operator's manual
- 1 calibration kit comprising chute and calculator
- Lower link and upper link pins
- 1 agitator
- Protective grid in hopper
- Spreading disc set (according to order)
- 1 universal drive shaft (including operator's manual)
- Version Q or W: QUANTRON-A control unit or ISOBUS (including the operator's manual)
- Version C: E-CLICK control unit(including operator's manual)

Please also check any optional equipment that was also ordered.

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



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

The right-hand and left-hand spreading discs must be mounted 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 of the MDS series, the tractor must meet the necessary mechanical, hydraulic, and electrical requirements.

- Universal drive shaft connection: 1 3/8 inches, 6 splines, 540 rpm,
 - Alternatively, 8 x 32 x 38, 540 rpm
- If the distance between the lower link hook and the rear wheel of the tractor is too small, use a hydraulic upper link with a Tele-Space drive shaft.
- Oil supply: max. 200 bar, single or double-acting valve (depending on equipment) with hydraulic metering slide actuator
- Operating voltage: 12 V
- Category I or category II three-point linkage (type-dependent).

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.

Depending on the version, the machine may be equipped with different universal drive shafts:

- Standard drive shaft for standard machine frames.
 - See 7.3.1 *Installing the standard drive shaft*
- Tele-Space drive shaft
- Special drive shaft for machine with weigh frame (version W)
 - See 7.3.2 *Mounting the transmission with radial pin clutch*

7.3.1 Installing the standard drive shaft

- ▶ Check the mounting position.

The drive shaft end that is marked with a tractor symbol must point to the tractor.

- ▶ Draw the lubricating nipple [1] along the universal drive shaft guard.
- ▶ Slide the plastic ring with bayonet lock on the universal drive shaft guard [2] towards the lubricating nipple using a screwdriver.

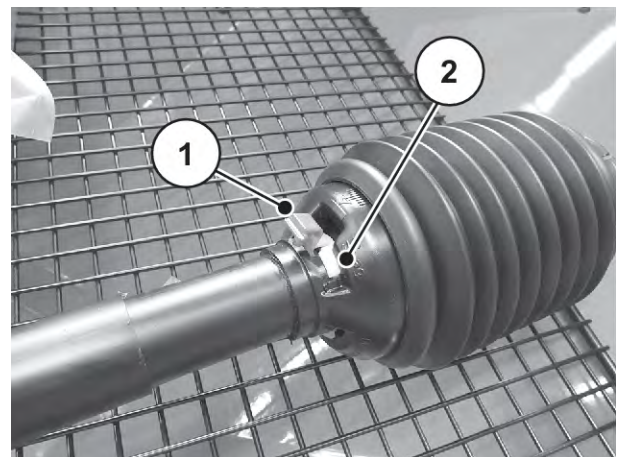


Fig. 13: Opening the universal drive shaft guard

- ▶ Pull the universal drive shaft cover backwards.
- ▶ Hold the universal drive shaft guard and the clamp in an open position with your hand.

- ▶ Grease the transmission spigot. Place the universal drive shaft on the transmission spigot.

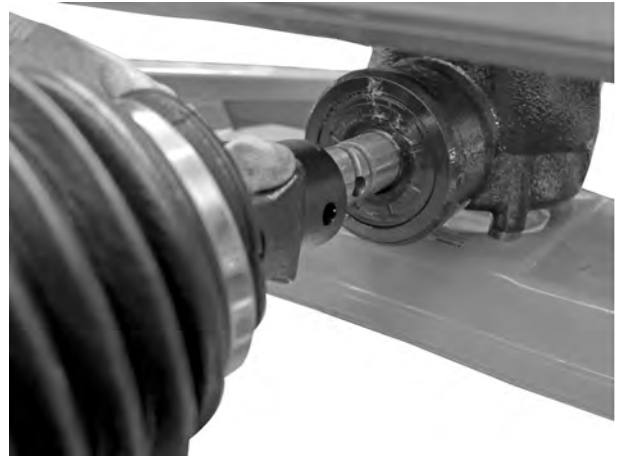


Fig. 14: Pushing the universal drive shaft onto the transmission spigot

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



Fig. 15: Connecting the universal drive shaft

- ▶ Push the universal drive shaft guard with hose clamp over the universal drive shaft and attach it to the transmission neck.
- ▶ Tighten the hose clamp.



Fig. 16: Mounting the universal drive shaft guard

- ▶ Rotate the plastic ring until it reaches its locking position.
- ▶ Press the lubricating nipple into a closed position on the universal drive shaft guard.



Fig. 17: Securing the universal drive shaft cover

Notes for removal:

- Dismount the universal drive shaft in reverse order of mounting.
 - Never use the suspension chain for suspending the universal drive shaft.
-
- ▶ Always place universal drive shafts which have been removed on the bracket provided.

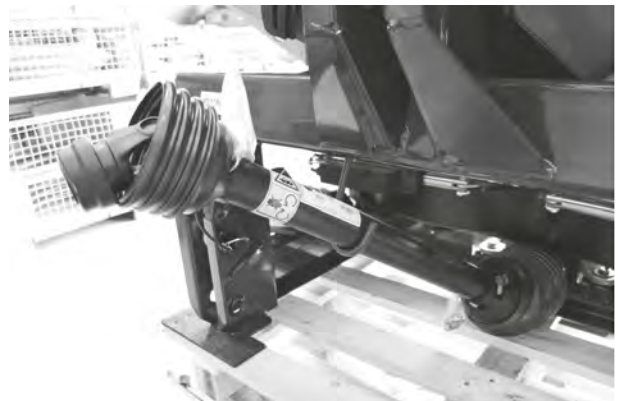


Fig. 18: Universal drive shaft bracket

7.3.2 Mounting the transmission with radial pin clutch

- ✓ 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.

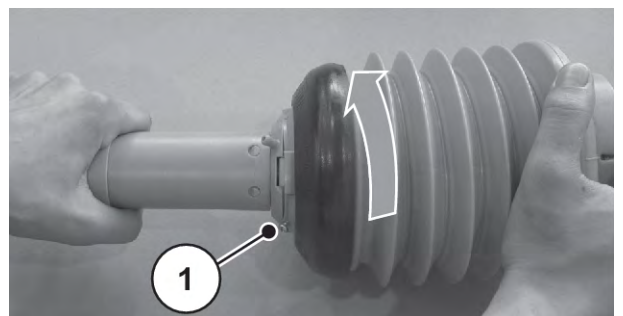


Fig. 19: Loosening the universal drive shaft guard

■ **Mounting the transmission with radial pin clutch**

- ▶ Remove the spigot protection and grease the transmission spigot.

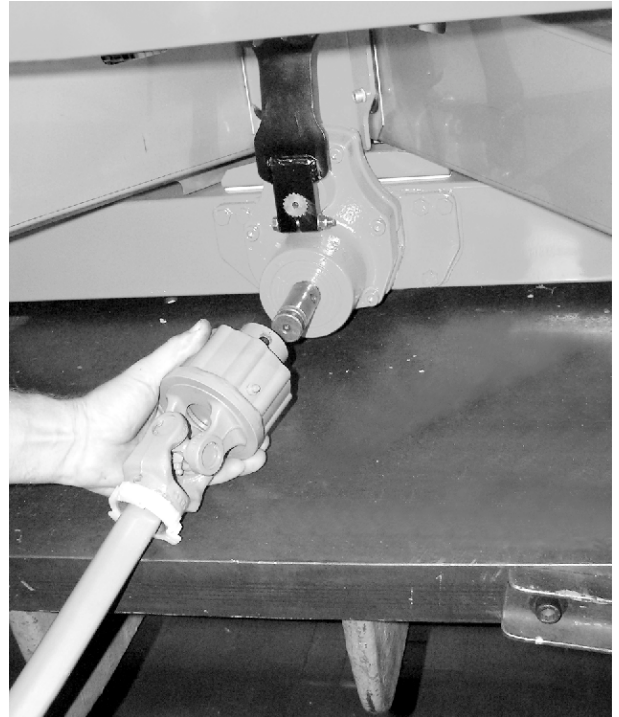


Fig. 20: Pushing the universal drive shaft on to the transmission spigot

- ▶ Place the universal drive shaft on the transmission spigot.
- ▶ Tighten the hexagon head screw and nut using a size 17 wrench (max. 35 Nm).

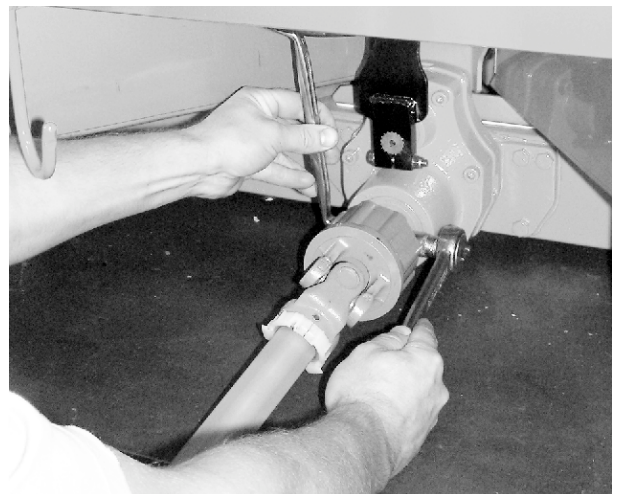


Fig. 21: Fastening the universal drive shaft

■ **Mounting the drive shaft guard**

- ▶ Push the drive shaft guard with hose clamp over the drive shaft and loosely attach it to the extension housing of the transmission (do not tighten).

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



Fig. 22: Attaching the universal drive shaft guard

- ▶ Tighten the hose clamp.

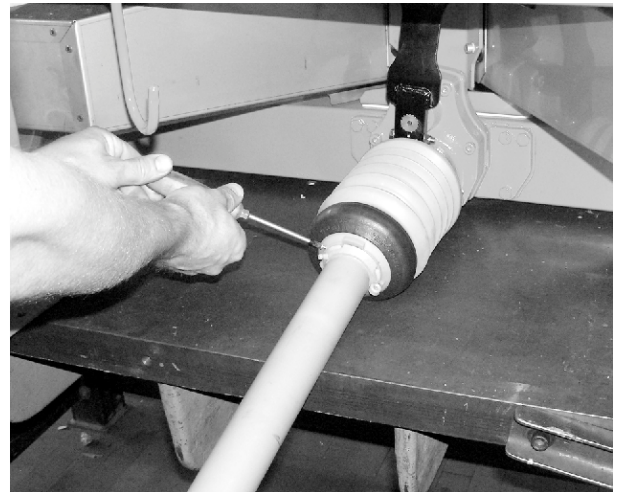


Fig. 23: Securing the universal drive shaft cover

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.

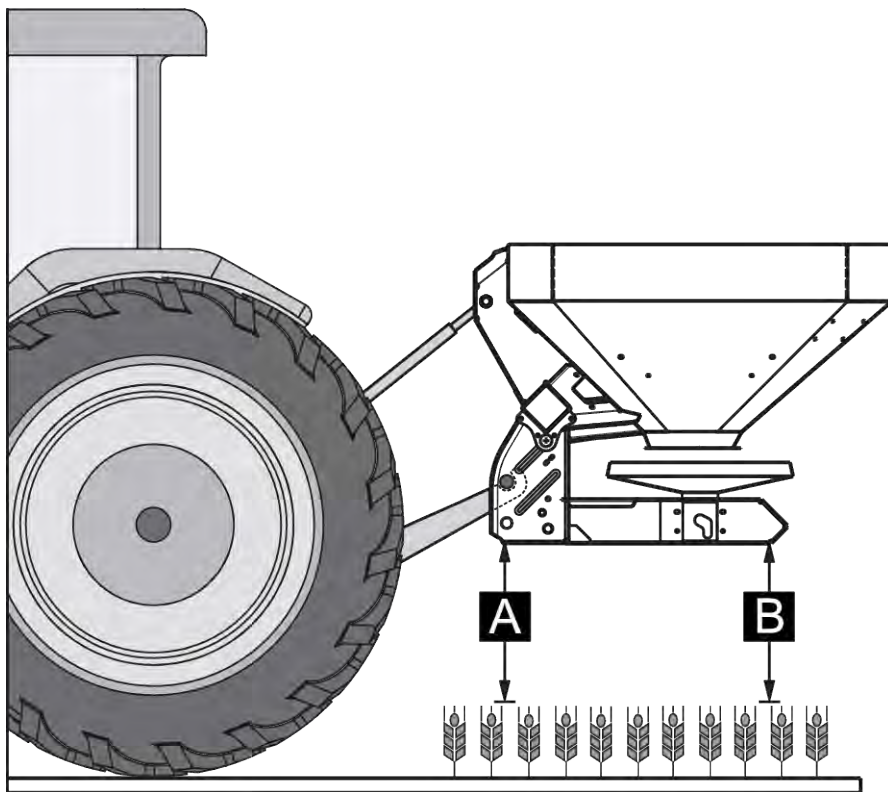


Fig. 24: Mounting position

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 linch pins or spring clips.
- Attach the machine according to the values in the fertilizer chart. This guarantees correct cross-distribution of the fertilizer.
- 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.
 - 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, an extendable Tele-Space universal drive shaft must be used.
- ▶ Lay the hydraulic hoses below the cross pipe. If the hoses are too short, replace with longer ones (0.5 mm plate required).



Only a specialist workshop may replace the hydraulic hoses.

- [1] Guide hook
- [2] Hydraulic hoses

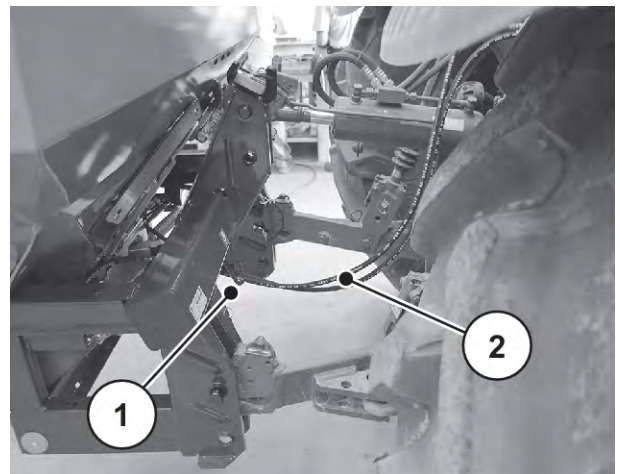


Fig. 25: Hydraulic hose guide

- ▶ Connect the electric and hydraulic metering slide actuators and the lighting (refer to 7.6 *Connecting the metering slide actuators*).
- ▶ From the tractor cab, connect the lower link hooks and the upper link to the designated coupling points; please refer to the operator's manual of the tractor.



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

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

NOTICE!

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

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

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

- ▶ Shorten the universal drive shaft, if required.



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



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

- ▶ Pre-set the mounting height according to the fertilizer chart. See 7.5 *Pre-setting the mounting height*

The machine is attached to the tractor.

7.5 Pre-setting the mounting height

7.5.1 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.

General instructions before setting the mounting height

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



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

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

7.5.2 Maximum admissible mounting height

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

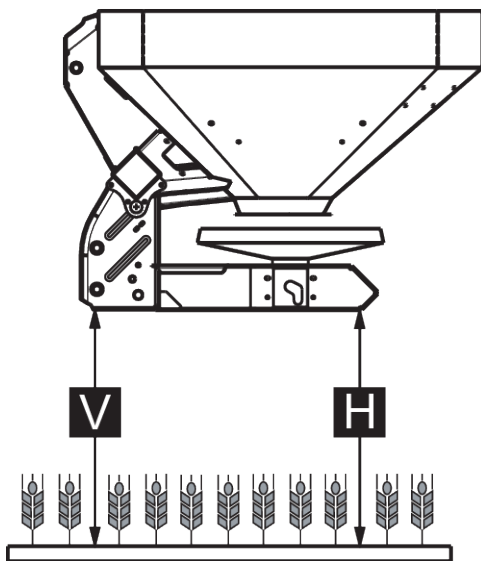


Fig. 26: Maximum admissible mounting height during normal and late fertilizing

The maximum admissible mounting height depends on the following factors:

Fertilization method	Maximum admissible mounting height	
	V [mm]	H [mm]
Normal fertilizing	850	850
Late fertilization	730	830

7.5.3 Set the mounting height based on the fertilizer chart

The mounting heights in the fertilizer chart (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) from the fertilizer chart.
- ▶ Compare the mounting heights **A** and **B** plus the crop height with the maximum admissible mounting heights at the front (V) and rear (H).

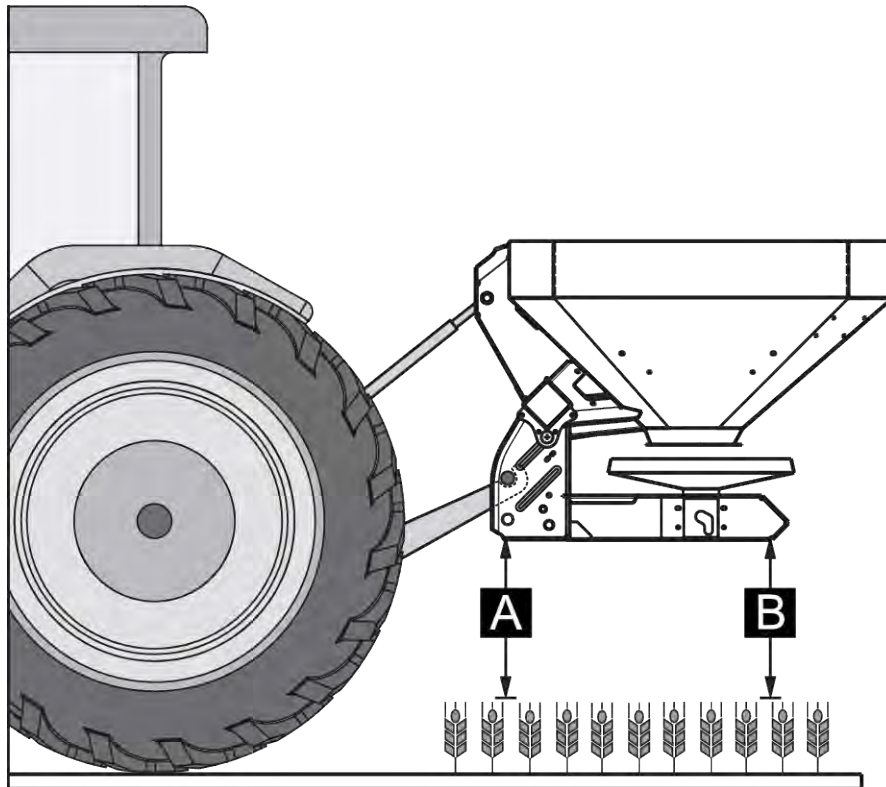


Fig. 27: Mounting position and height during normal fertilizing

- ▶ 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. 850
- $B + \text{crop height} \leq H$: max. 850

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) from the fertilizer chart.
- ▶ Compare the mounting heights **A** and **B** plus the crop height with the maximum admissible mounting heights at the front (V) and rear (H).

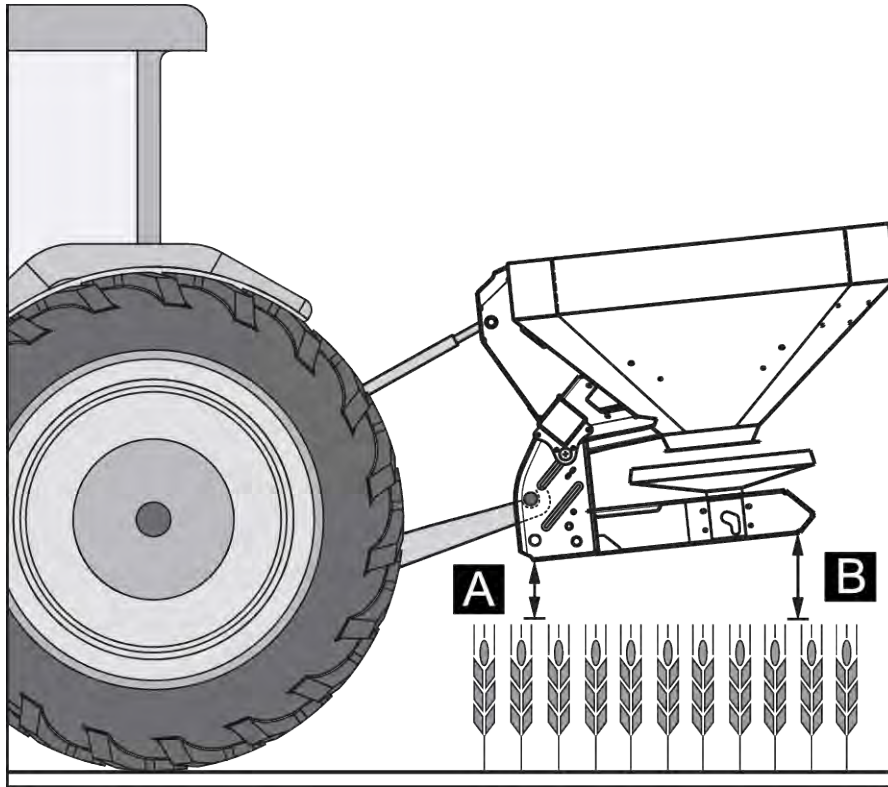


Fig. 28: Mounting position and height during late fertilizing

- ▶ 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. 730
- $B + \text{crop height} \leq H$: max. 830



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.

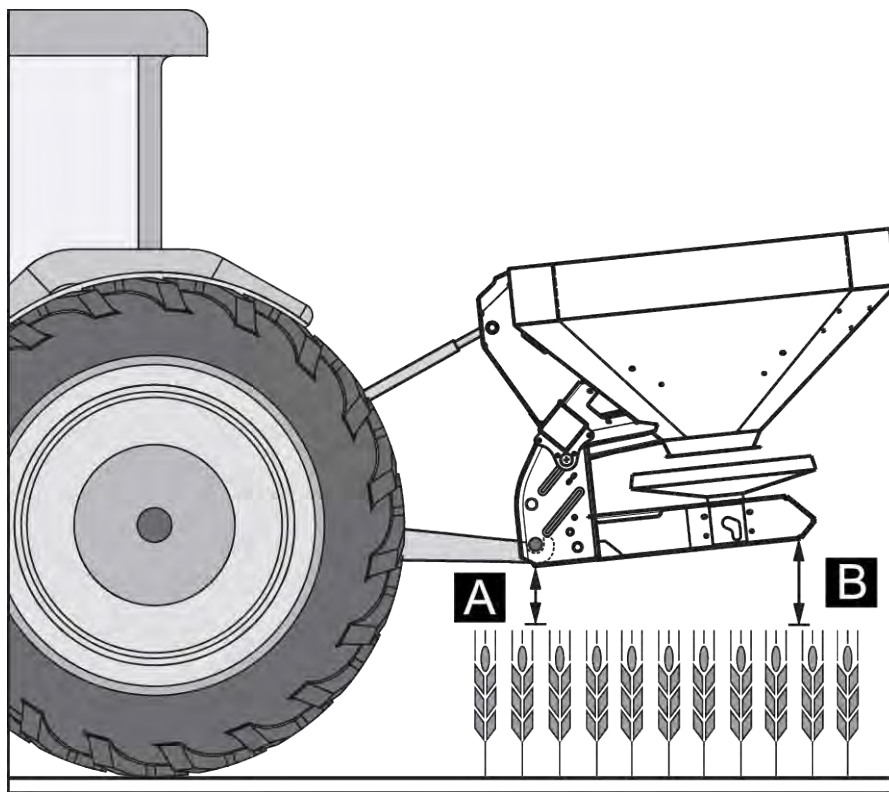


Fig. 29: Attachment of the machine on the lower coupling point of the lower link

The following applies:

- $A + \text{crop height} \leq V$: max. 730
- $B + \text{crop height} \leq H$: max. 830

7.6 Connecting the metering slide actuators

7.6.1 Connecting the hydraulic slide actuator:

■ Version K/D/D Mono

Tractor requirements

- Version K: two **single-acting** control valves
- Version D: two **double-acting** control valves
- Version D Mono: one **double-acting** control valve

Function

The metering slides are controlled separately by two hydraulic cylinders. The hydraulic cylinders are connected to the slide actuator on the tractor via hydraulic hoses.

Version	Hydraulic cylinders	Function
K	Single-acting hydraulic cylinder	- The oil pressure closes. - The spring force opens.
D D Mono	Double-acting hydraulic cylinder	- The oil pressure closes. - The oil pressure opens.

Connecting the metering slide actuators

- ▶ Depressurize the hydraulic system.
- ▶ Remove the hoses from the retainers at the frame of the machine.
- ▶ Lay the hydraulic hoses below the cross pipe. See *Fig. 25 Hydraulic hose guide*
 - ▷ If the hoses are too short, replace with longer ones (0.5 mm plate required).
- ▶ Insert the hoses into the corresponding couplings on the tractor.



Version K

Before extended road travel or during filling, close the two ball valves at the coupling plugs on the hydraulic lines.

This prevents automatic opening of the metering slide caused by leaks in the valves in the tractor hydraulics.

The slide actuator is connected.

■ Instructions for connecting a two-way unit

The two-way unit is available as an optional equipment for version **K**.

When using the two-way unit, the hydraulic pipes between the hydraulic cylinders and the slide controls are additionally sheathed with a protective hose in order to avoid injury to the operator caused by hydraulic oil.

⚠ CAUTION!

Risk of injury due to hydraulic oil

Leaking hydraulic oil which is under pressure may damage the skin and cause poisoning.

- ▶ Always use an undamaged hose sheath for the hydraulic lines.

The metering slides can be actuated individually by means of the two-way unit's ball valves.



Fig. 30: Metering slide actuator of the two-way unit

■ Position display

This display makes it possible to see the position of the metering slides from the driver's seat in order to prevent accidental dropping of fertilizer.



Fig. 31: Metering slide position

- | | |
|---------------------|------------|
| [1] Completely open | [3] Closed |
| [2] Open | |

7.6.2 Connecting the electric slide actuators

■ Version C



The machines of the version C are equipped with electronic slide actuators.

The electronic slide actuator is described in a separate operator's manual for the E-CLICK operating unit. This operator's manual is included in the scope of delivery.

7.6.3 Connecting the electronic slide actuators:



The version Q machines are equipped with an electronic metering slide actuator.

The electronic slide actuator is described in a separate operator's manual for the operating unit. This operator's manual is supplied with the control unit.

7.7 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 *Technical specifications*.
- ▶ Prior to filling, determine the maximum quantity to be loaded.
- ▶ Observe the admissible overall weight.

- ▶ Close the metering slide and, if applicable, the ball valves (versions K).
- ▶ **Only** fill the machine when it is attached to the tractor. 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 heights of more than 1.25 m, fill the machine by means of suitable auxiliary equipment (e.g., front loader or screw conveyor).
- ▶ Maximally fill the machine up to the edge.
- ▶ Check the filling level e.g. with the steps being folded out or by means of the inspection window in the hopper (depending on type).

The machine is filled.

■ **Filling level scale**

A filling level scale is installed in the hopper to monitor the filling level. This scale can be used to estimate how long spreading can continue until the hopper has to be refilled.

The fill level can be checked through the inspection window in the side of the hopper (type-dependent).

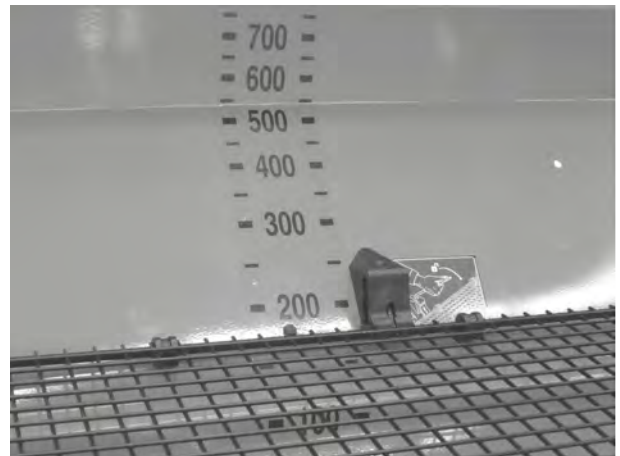


Fig. 32: Filling level scale (graduated in liters)

8 Calibration test

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

Execute the calibration:

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

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



You execute the calibration test for machine version **Q** on the control unit.

The calibration test is described in a separate operator's manual for the control unit. This operator's manual is an integral part of the control unit.

8.1 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.

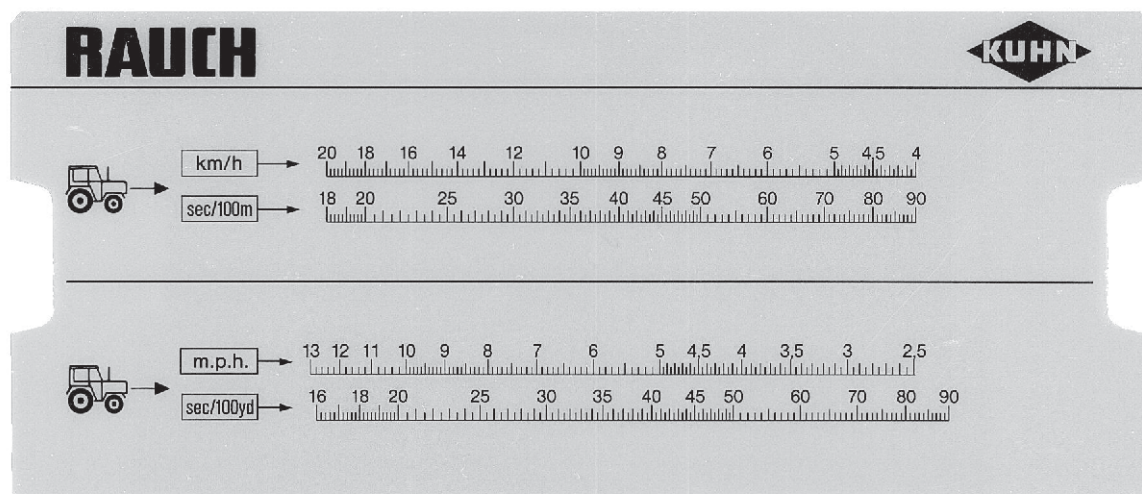


Fig. 33: Scale for calculating the exact forward speed

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 need 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 you do not find your values in the fertilizer charts, they can be determined using the calibration test calculator or from a formula.

Calculation with 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 only to be carried out at one outlet, the total value of the nominal output volume is to be halved.

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

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

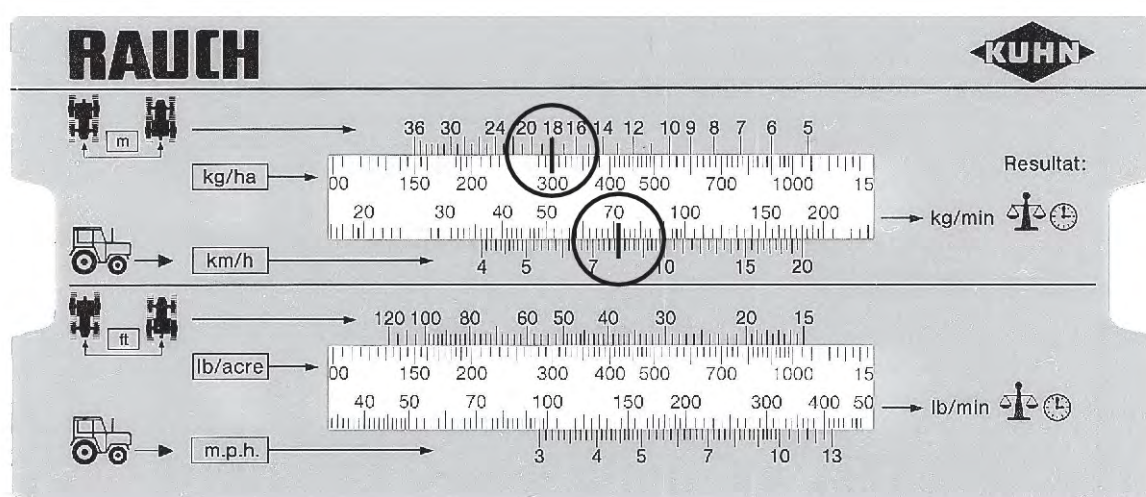


Fig. 34: Scale for calculation of the nominal output volume per minute

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

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



Consistent fertilization is only achieved at a uniform forward speed.

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

8.2 Implementing the calibration test

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 PTO and tractor engine are switched off and locked to prevent unauthorized starting.
- An adequately sized collection vessel is ready for collecting the fertilizer (minimum capacity **25 kg**).
 - Determine the empty weight of the collecting vessel.
- Prepare the calibration test chute. See *Fig. 35 Position of 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 maximum possible fertilizer quantities. The higher the quantity, the higher the precision of the measurement.

[1] Calibration test chute

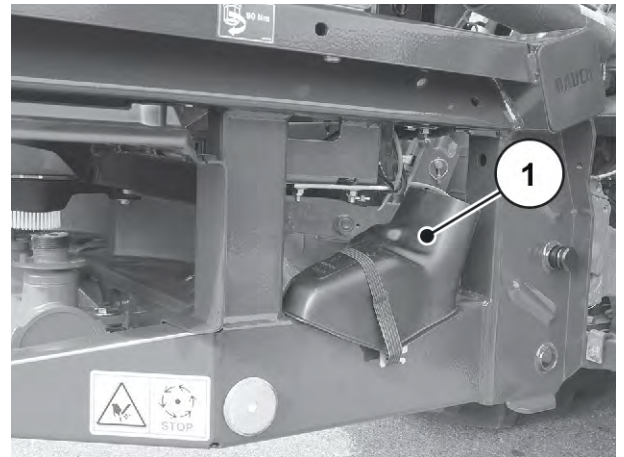


Fig. 35: Position of the calibration test chute



The calibration has to be carried out on **one** side of the machine only. For safety reasons, however, **both** spreading discs must be removed.

- ▶ Remove the adjustment lever [1] from the bracket.

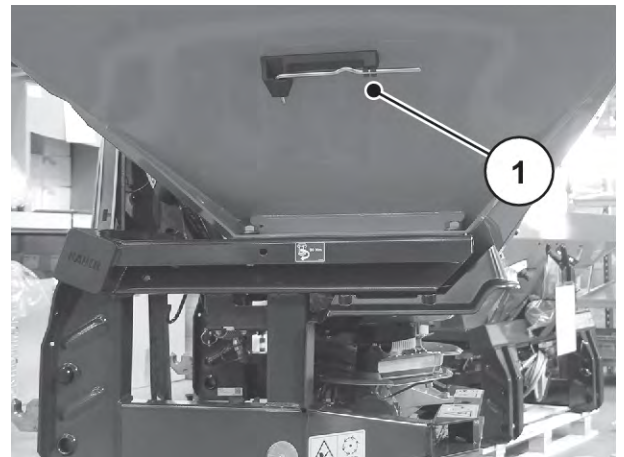


Fig. 36: Adjustment lever position

- ▶ Use the adjustment lever to loosen the cap nut of the spreading disc.
- ▶ Remove the spreading disc from the hub.



Fig. 37: Loosening the cap nut

- ▶ Suspend the calibration test chute under the left outlet (in the direction of travel).

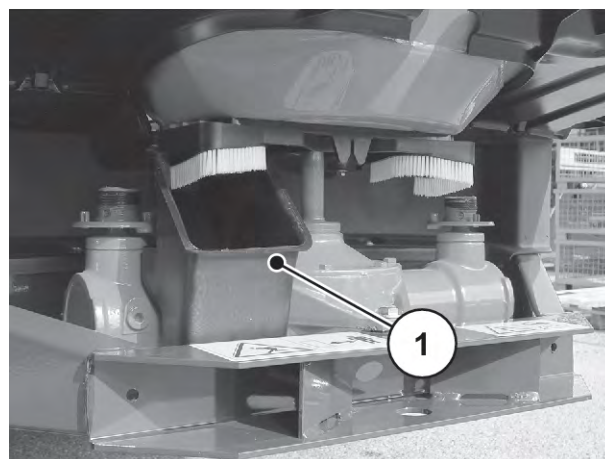


Fig. 38: Attaching the calibration test chute

- ▶ Set the metering slide stop to the scale value from the fertilizer chart.



The **version Q** machine is equipped with **electronic adjustment** of the metering slide opening.

When the calibration test function is selected, the electronic control unit automatically moves the metering slide to the open position.

Please observe the operator's manual for the control unit.

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.

- Position a collection vessel under the left outlet.



Fig. 39: Implementing the calibration test

- Start the tractor.
- Set the PTO speed in accordance with the information in the fertilizer 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.
- Switch off the PTO and the tractor engine and lock them to prevent unauthorized starting.
- 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 %, the application rate stop is set to a 10 % higher position (e.g. from 150 to 165).

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

- 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. The correct spreading disc is the one that fits precisely into the spreading disc holder.

- ▶ Carefully position the cap nut (do not tilt).
- ▶ Tighten the cap nut to approx. 25 Nm. Do not use the adjustment lever.



Fig. 40: 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.

The calibration is completed.

Calculation with formula

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

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

9 Spreading operation

9.1 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.
- For metering slide actuators with return springs, close the ball valves in order to prevent undesired discharge of fertilizer from the hopper.

WARNING!

Risk of crushing or shearing by tensioned return springs

If the return spring is tensioned when the setscrew is loosened, the stop lever may hit the end of the guide slot.

This may cause crushing injuries to fingers and/or result in injury to the operating personnel.

- ▶ **Closely** observe the procedure for adjusting the application rate.
- ▶ **Never** put your fingers in the guide slots of the application rate adjustment unit.
- ▶ Before carrying out any adjustment work (e.g. application rate adjustment), **always close the metering slide hydraulically**.

9.2 Instructions regarding the spreading operation

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

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

Reasons for this may be:

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

- ▶ 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.



Please note that the service life of the machine mainly depends on your driving behavior.

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

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

Preparation

- ▶ Install the machine at the tractor: 49
- ▶ Close the metering slide.
- ▶ Pre-set the mounting height: 54
- ▶ Pour in fertilizer: 61
- ▶ Carry out the calibration test: 63
- ▶ Set the spreading vane: 75
- ▶ Set the application rate: 73

Spreading

- ▶ Travel to the spreading location
- ▶ Check the mounting height: 54
- ▶ Activate the PTO.
- ▶ Open the metering slide and starting spreading.
- ▶ Finish spreading operations and close the metering slide
- ▶ Disengage the PTO shaft.
- ▶ Empty residual quantity in hopper: 97

Cleaning/maintenance

- ▶ The metering slides open.
- ▶ Remove the machine from the tractor: 98
- ▶ Clean and maintain the machine: 104

9.3 Setting the application rate

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.

■ **Versions K/D (Mono)/C**

For the versions K/R/D/C, the application rate is set using stop in the adjustment segment. To this end, the operator sets the stop, with the metering slide closed, to the position which they have previously determined from the fertilizer chart or by a calibration test.

! WARNING!

Risk of injury due to incorrect procedure for setting the application rate

The stop lever is tensioned by a return spring. In the event of incorrect operation or failure to observe the procedure for setting the application rate, the stop lever may unexpectedly move back to the end of the guide slot.

This may result in injuries to the fingers or the face.

- ▶ Never push against the spring pressure by hand to hold the stop lever in position during volume setting.
- ▶ Always observe the procedure for setting the application rate.

Setting the application rate

- ▶ Close the metering slide.
- ▶ Release the locking screw [2] at the stop [4].
- ▶ Determine the position for the scale setting in the spreading material chart or based on the calibration test.
- ▶ Set the stop [4] to the appropriate position.
- ▶ Retighten the adjustment screw [2] at the stop.

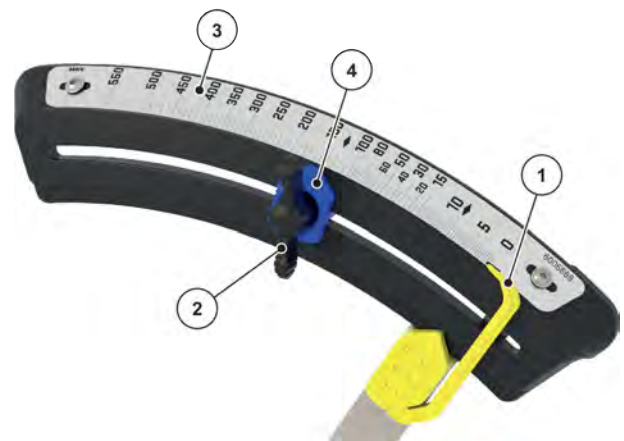


Fig. 41: Scale for setting the application rate (driving direction right, versions K/D/C)

- | | |
|------------------------|-----------|
| [1] Position indicator | [3] Scale |
| [2] Locking screw | [4] Stop |

■ Version Q



The **version Q** machines are equipped with electronic slide actuators for application rate adjustment.

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.

NOTICE!**Property damages caused by incorrect positioning of the metering slide**

If the stop levers are positioned incorrectly, the operation of the actuators by the electronic control unit may cause damage to the metering slides.

- **Always clamp the stop levers at the maximum scale position.**

For version Q, the stop is firmly fixed **in a position outside the scale** with a fillister head screw [1].

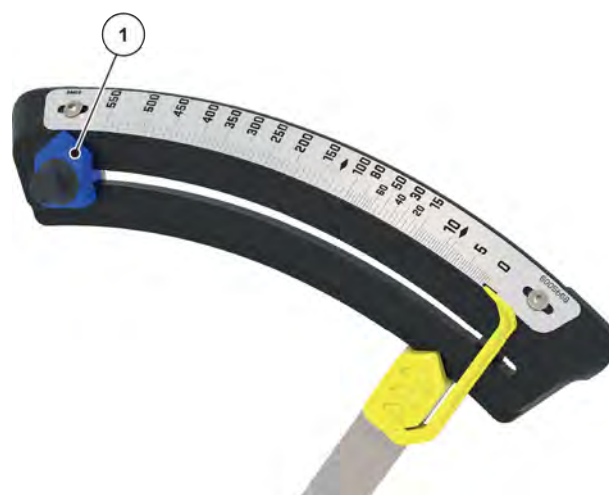


Fig. 42: Scale for setting the application rate (on the right in the direction of travel, version Q)

9.4 Setting the working width

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

Disc type	Working width
M1	10 - 18 m
M2	18 - 24 m

! 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.

■ Structure of spreading disc M1

There are two identical spreading vanes on every spreading disc.

- A spreading vane comprises a main vane and an extension vane.
- The main vane of the right-hand spreading disc has the designation **BR** and the corresponding extension vane has the designation **AR**.
- The main vane of the left-hand spreading disc has the designation **BL** and the corresponding extension vane has the designation **AL**.
- The **angle** of each spreading vane can be adjusted forward and back, and the **length** can be shortened or lengthened.

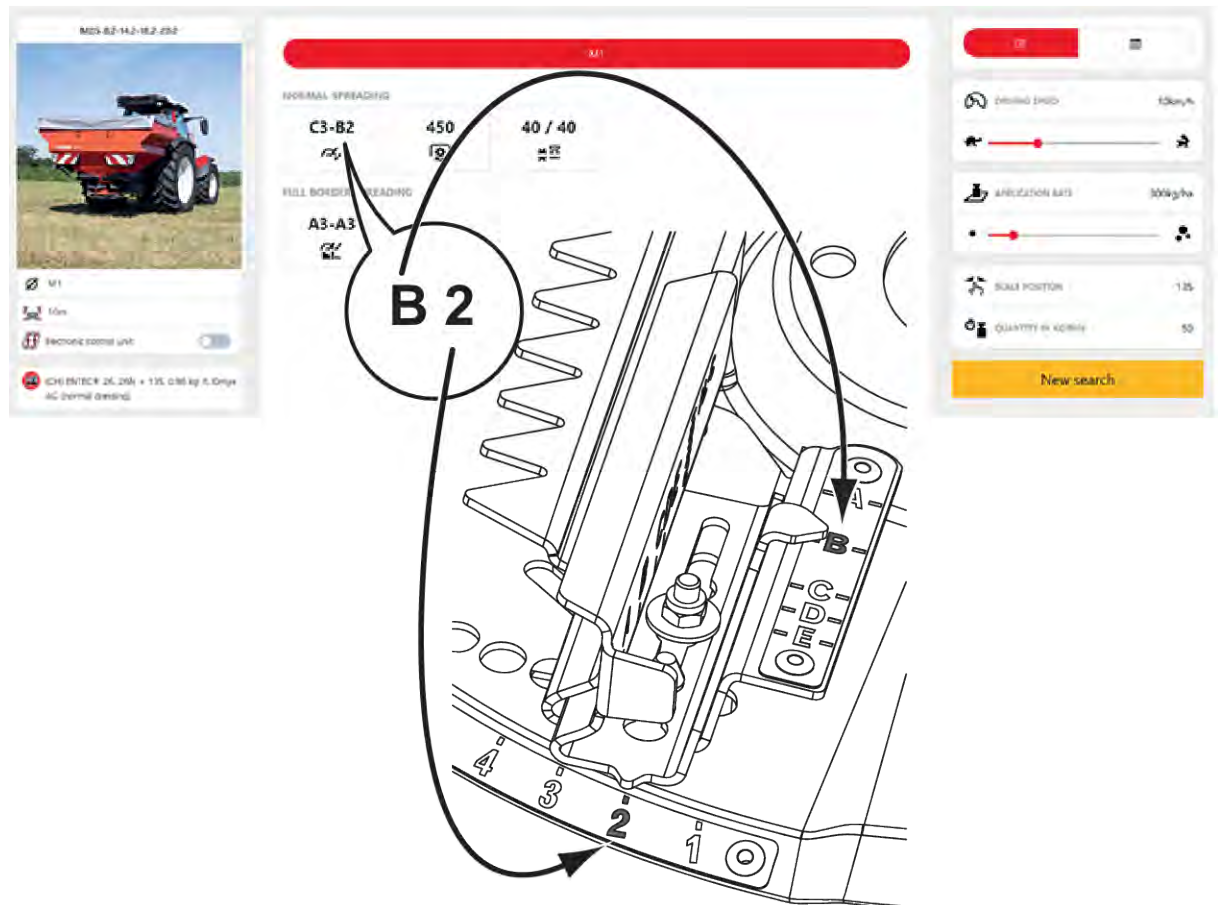


Fig. 43: Spreading vane adjustment; position B2; A to E: Length adjustment 1 to 6: Angle settings

■ Structure of spreading disc M2

NOTICE!

Environmental damage due to incorrectly installed spreading vanes

An incorrect vane combination can significantly impair the spreading pattern and harm the environment.

- ▶ Pay attention to the specified vane combination.
- ▶ For each M2 spreading disc (left/right), install only one W spreading vane.

There are two spreading vanes on every spreading disc.

- A spreading vane comprises a main vane with an extension vane.
 - The main vane of the right-hand spreading disc has the designation **BR** and the corresponding extension vane has the designation **AR**.
 - The main vane of the left-hand spreading disc has the designation **BL** and the corresponding extension vane has the designation **AL**.
 - The **angle** of each spreading vane can be adjusted forward and back, and the **length** can be shortened or lengthened.
- With the other spreading vane (W spreader) **only the angle** can be adjusted; the length is fixed.

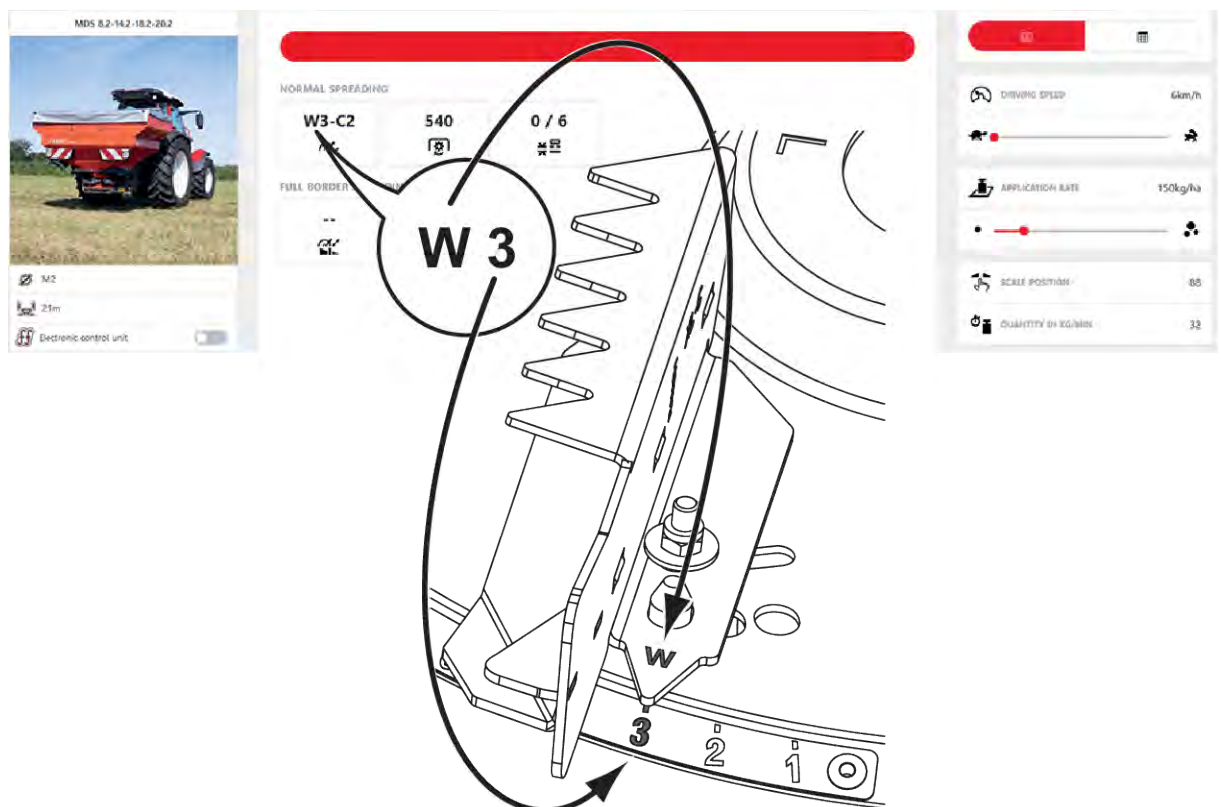


Fig. 44: Spreading vane setting spreading disc M2, position W3; W: fixed length adjustment 1 to 6: Angle settings

■ Functional principle

The spreading vanes on the spreading discs can be set to suit the various fertilization methods, working widths and fertilizer types.

- Normal fertilizing
- Full border spreading during normal fertilizing (optionally right or left)
- Late fertilization
- Full border spreading during late fertilizing (optionally right or left)

■ Spreading vane angle settings

- Adjustment towards smaller numbers: The angle of the spreading vane is moved back.
- Adjustment towards larger numbers: The angle of the spreading vane is moved forward.

■ **Length adjustment of the spreading vane (only M1 spreading disc)**

- Shortening the spreading vane: The movable extension vane is moved towards the center of the spreading disc and then locked.
- Extending the spreading vane: The movable extension vane is moved outward and then locked.

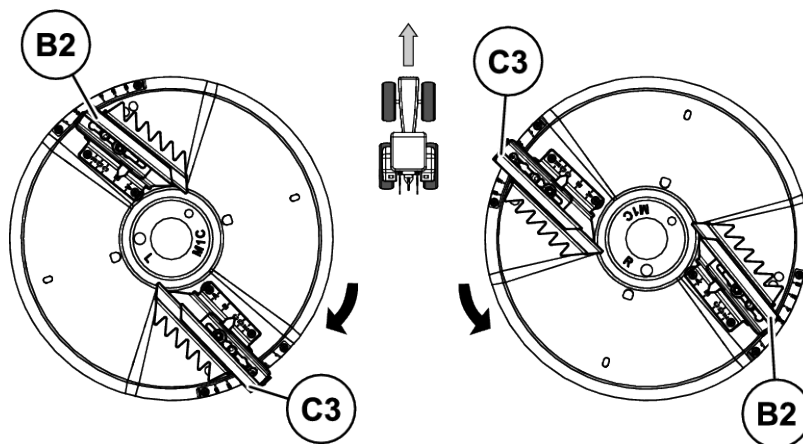
■ **Spreading vane settings**

You set the spreading vane to the position which you have determined in advance in the fertilizer chart.



The spreading vane settings on the right-hand spreading disc are **always the same** as the spreading vane settings on the left-hand spreading disc (with the exception of full border spreading).

Example: **C3-B2**



⚠ WARNING!

Risk of injury due to sharp edges.

The spreading vanes have sharp edges.

There is a danger to the hands when changing or setting the spreading vanes.

- ▶ Wear protective gloves.

- ▶ Determine the position of the spreading vane in the fertilizer chart or by means of a test with the practice test kit (optional equipment).
- ▶ Remove the adjustment lever from the bracket.
 - ▷ See Fig. 10 Adjustment lever position

- ▶ Insert the adjustment lever into the locking bolt opening [3] under the spreading disc.
- ▶ Press down.

The locking bolt [2] is released.

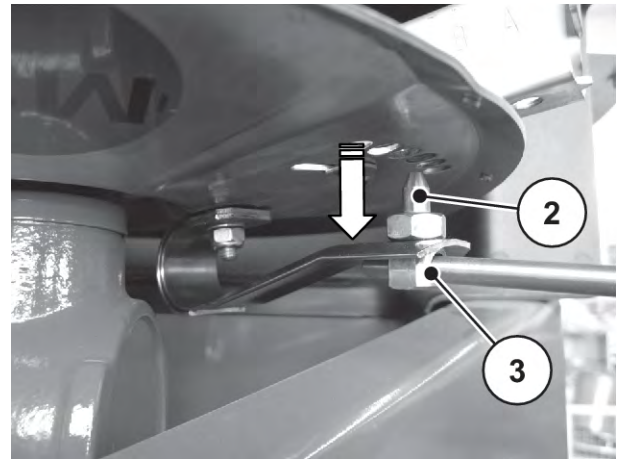


Fig. 45: Spreading vane settings

- ▶ Set the angle and length of the spreading vane.
- ▶ Press the locking bolt up with the adjustment lever until it engages.

! WARNING!

Risk of injury due to improperly installed parts

A risk hazard is posed if the locking bolt does not properly latch into the spreading disc.

Loose components can cause injuries or material damage during operation.

- ▶ After setting, fully engage the locking bolts again.

NOTICE!

Danger of material damage: Do not over-bend the flat spring

The flat spring tension must reliably lock the main and extension vanes onto the spreading disc. If the flat spring is over-bent, then it loses the tension required to secure the spreading vane.

If the spring tension is too low, the locking bolt disengages and can cause significant material damage.

- ▶ When setting the spreading vane position, carefully press the locking bolt into any positioning hole.
- ▶ If the spring tension is too low, replace the flat spring immediately.

9.5 Using the fertilizer chart

9.5.1 Information on the fertilizer chart

The values in the fertilizer chart have been determined using the manufacturer's test system.

The fertilizer used has been obtained from fertilizer manufacturers or dealers. Experience shows that your fertilizer - even with identical specifications - may have different spreading properties due to storage, transport, and many other reasons.

Together with the machine settings indicated in the fertilizer charts, this may lead to a different application rate and a less optimal fertilizer distribution.

The following instructions should therefore be observed:

- Always check the actual application rate discharged by performing a calibration test.
- Check the working width of the fertilizer distribution with a practice test kit (4.4.10 Practice test kit optional equipment).
- Use only fertilizers listed in the fertilizer chart.
- Contact us if you do not find a particular fertilizer type in the fertilizer chart.
- Observe the adjustment values exactly. Even a slightly incorrect setting may adversely affect the spreading pattern.

When using urea, particular attention is to be paid to the following:

- Because of fertilizer imports, urea is available in widely varying qualities and particle sizes. It may therefore be required to adjust the spreader.
- Urea is more sensitive to wind and absorbs more moisture than other fertilizers.



The operator is responsible the correct adjustments for the fertilizer in use.

The machine manufacturer shall not assume any liability for any damage due to incorrect spreader settings.

You can determine the mounting height, fertilizer drop point, metering slide adjustment, spreading disc type and PTO speed for an optimum spreading from the **fertilizer chart** depending on the fertilizer type, working width, application rate, forward speed and fertilization method.

■ **Example of field spreading during normal fertilizing:**

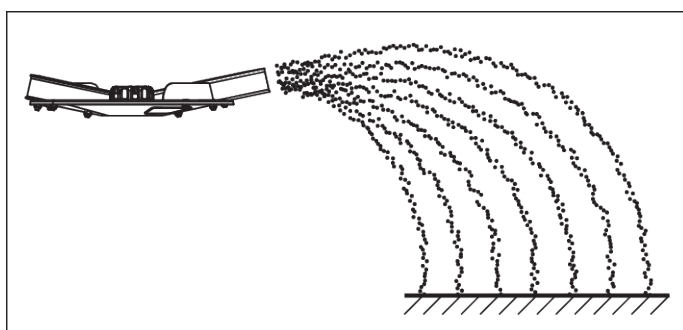


Fig. 46: Field spreading during normal fertilizing

During field spreading in normal fertilizing mode, a symmetrical spreading pattern is produced. If the spreader is correctly set (see information in the fertilizer chart), the fertilizer is evenly spread over the field.

Specified parameters

Type of fertilizer

ENTEC 26 COMPO BASF

Specified parameters

Application rate	300 kg/ha
Working width	12 m
Spreading disc type	M1
Forward speed	10 km/h

► The following settings are to be applied to the machine according to the fertilizer chart:

Mounting height	50/50 (A = 50 cm, B = 50 cm)
Metering slide adjustment	160
PTO speed	540 rpm
Spreading vane settings	C3-B2

■ **Example of full border spreading during normal fertilizing**

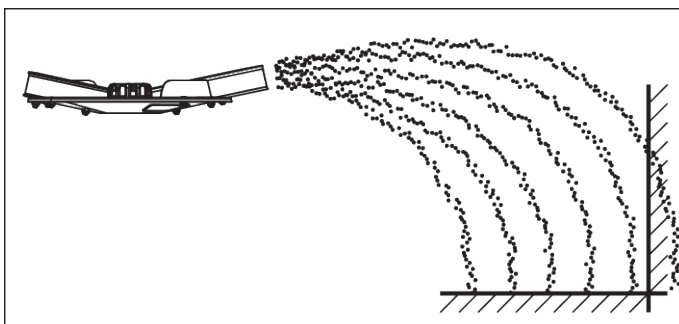


Fig. 47: Full border spreading during normal fertilizing

Full border spreading in normal fertilizing mode refers to a spreading technique in which a bit more fertilizer lands beyond the border of the field. Therefore, there is just a slight underfertilization at the field boundary.

Specified parameters

Type of fertilizer	ENTEC 26 COMPO BASF
Application rate	300 kg/ha
Working width	12 m
Spreading disc type	M1
Forward speed	10 km/h



On the full border spreading side, both spreading vanes should be set to the value specified in the fertilizer chart.

On the field-interior spreading side, the spreading vanes of the other spreading disc remain in their position.

► The following settings are to be applied to the machine according to the fertilizer chart:

Mounting height	50/50 (A = 50 cm, B = 50 cm)
Metering slide adjustment	160
PTO speed	540 rpm
Spreading vane settings	
Full border spreading side	A3-A3
Other spreading disc (Normal fertilizing position):	C3-B2

■ **Example of field spreading during late fertilizing:**

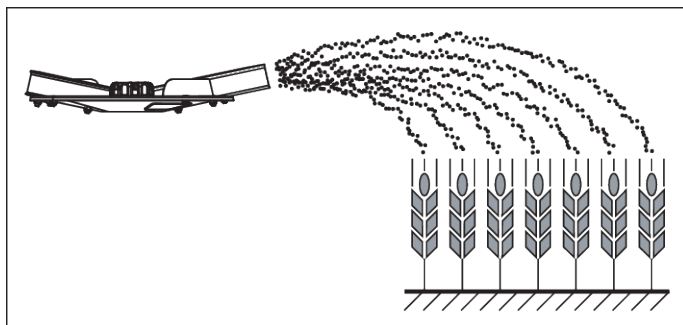


Fig. 48: Field spreading during late fertilizing

During field spreading in late fertilizing mode, a symmetrical spreading pattern is produced. When the spreader is correctly set (see information in the fertilizer charts), the fertilizer is spread evenly over the field.

Specified parameters

Type of fertilizer	ENTEC 26 COMPO BASF
Working width	12 m
Spreading disc type	M1
Forward speed	10 km/h
Application rate	300 kg/ha

The following settings are to be applied to the machine according to the fertilizer chart:

Mounting height	0/6 (A = 0 cm, B = 6 cm)
Metering slide adjustment	160
PTO speed	540 rpm
Spreading vane settings	C3-B2

■ **Example of full border spreading during late fertilizing**

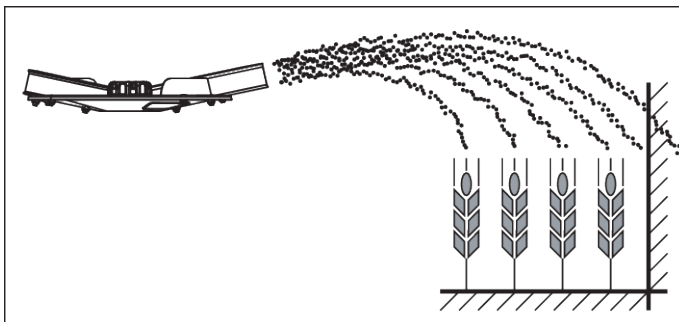


Fig. 49: Full border spreading during late fertilizing

The yield-optimized boundary spreading in late fertilizing is a fertilizer spreading mode in which some fertilizer crosses the field border. Therefore, there is slight underfertilization at the field boundary.

Specified parameters

Type of fertilizer	ENTEC 26 COMPO BASF
Working width	12 m
Spreading disc type	M1
Forward speed	10 km/h
Application rate	300 kg/ha



On the full border spreading side, both spreading vanes should be set to the value specified in the fertilizer chart.

On the field-interior spreading side, the spreading vanes of the other spreading disc remain in their position.

The following settings are to be applied to the machine according to the fertilizer chart:

Mounting height	0/6 (A = 0 cm, B = 6 cm)
Metering slide adjustment	160
PTO speed	540 rpm

Spreading vane settings

Full border spreading side:	A3-A3
Other spreading disc (late fertilizing position)	C3-B2

9.6 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 V2	VariSpread V8
	Electronic control unit
1 section per side	4 sections per side
K, D, C	Q, W

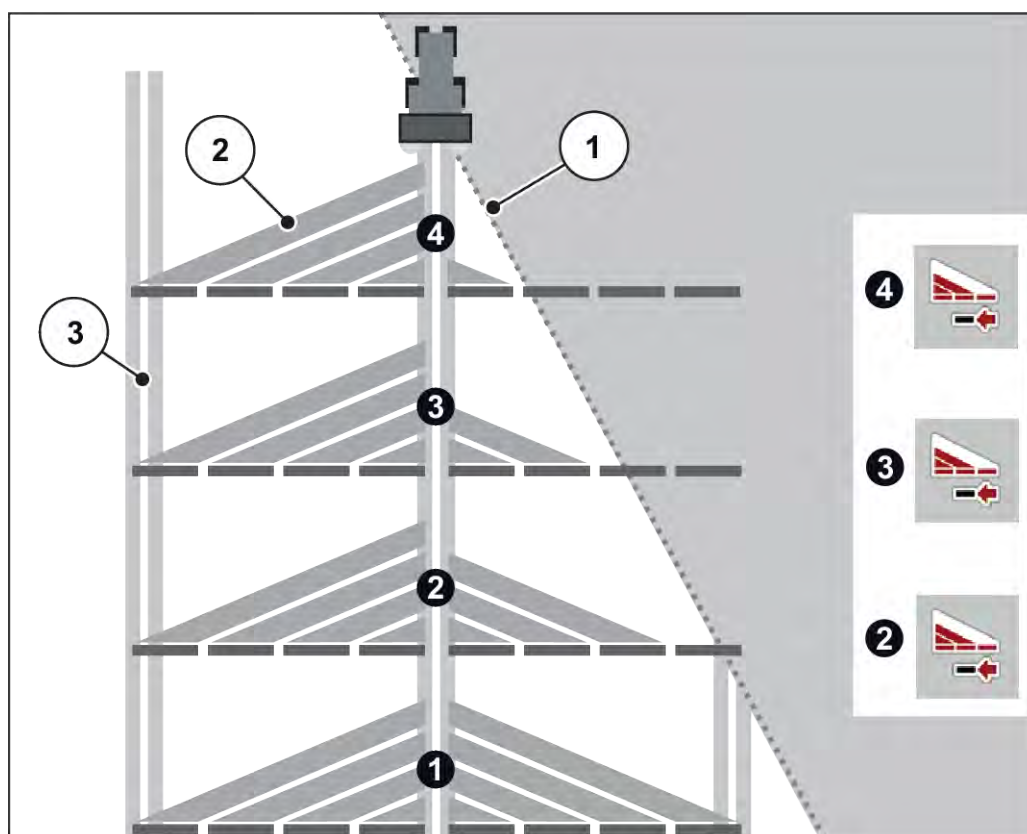


Fig. 50: Section control example

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



The VariSpread-compatible machine is equipped with electric metering slide actuators. You can use your electronic control unit 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 operator's manual of your control unit.

9.7 Spreading of narrow field strips

- Set the spreading vanes on **both spreading discs** to the **boundary spreading position** specified in the fertilizer chart.

9.8 Spreading to one side

Version	Settings for spreading to one side	Result
K	▶ To spread to the left or to the right, release the corresponding control valve.	The springs pull the respective metering slide against the stop.
K with two-way unit special equipment	▶ To spread to the left or to the right, open or close the corresponding ball valve on the two-way unit. ▶ Release the control valve.	The springs pull the respective metering slide against the stop.
D	▶ To spread to the left or to the right, actuate the corresponding control valve.	The hydraulic cylinder pulls the respective metering slide against the stop.
D Mono	▶ For spreading to the left-hand side	The hydraulic cylinder pulls the left metering slide against the stop.
C	▶ To spread to the left or right, actuate the corresponding rocker switch on E-CLICK.	The actuator pulls the respective metering slide against the stop.
Q	▶ To spread to the left or to the right, actuate the corresponding start/stop button on the control unit.	The actuator opens the respective metering slide according to the electronic control unit.

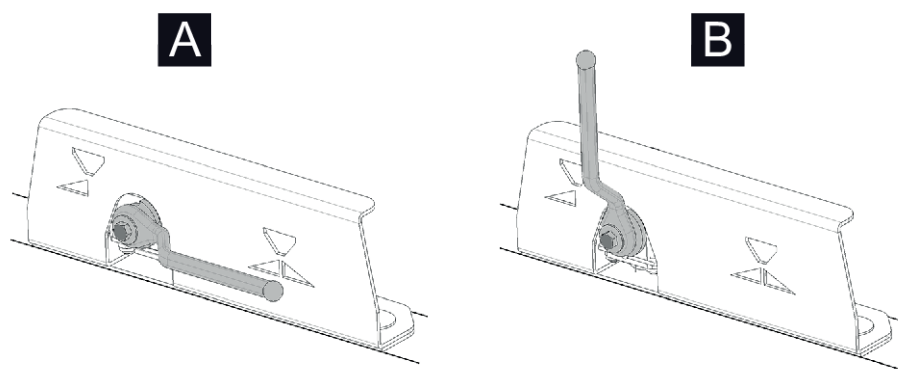


Fig. 51: Version D Mono: Position of the ball valve

[A] Spread on both sides

[B] Spread on left only

9.9 Settings for unlisted fertilizer types

The settings for fertilizer types 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.

9.10 Full or limited border spreading

Full border spreading is fertilizer spreading at the boundary in which fertilizer goes beyond the boundary, but there is only slight underfertilization at the field boundary.

With limited border spreading, virtually no fertilizer goes beyond the boundary, so underfertilization at the field boundary must be accepted in this case.

Only full border spreading is possible with the basic machine equipment. For limited border spreading, you need the GSE 7 or TELIMAT T1 special equipment.

9.10.1 Full border spreading from the first track

- Set spreading vanes on the boundary side as specified in the fertilizer chart.
- ▷ See 9.4 *Setting the working width*

The metering slide adjustment matches the metering slide adjustment on the field side. See 9.3 *Setting the application rate*

9.10.2 Setting the GSE spreading width limiter

The spreading width limiter limits the spreading width (either towards the left or right) to a range between approx. 75 cm and 2 m from the center of the tractor track to the outer edge of the field.

- ▶ Close the metering slide that points to the border of the field.
 - ▷ See GSE 7
- ▶ Fold the spreading width limiter downwards for limited border spreading.
- ▶ The spreading width limiter must be folded up again before two-sided spreading.



The settings for the spreading width limiter refer to the **spreading disc working towards the inside of the field**.

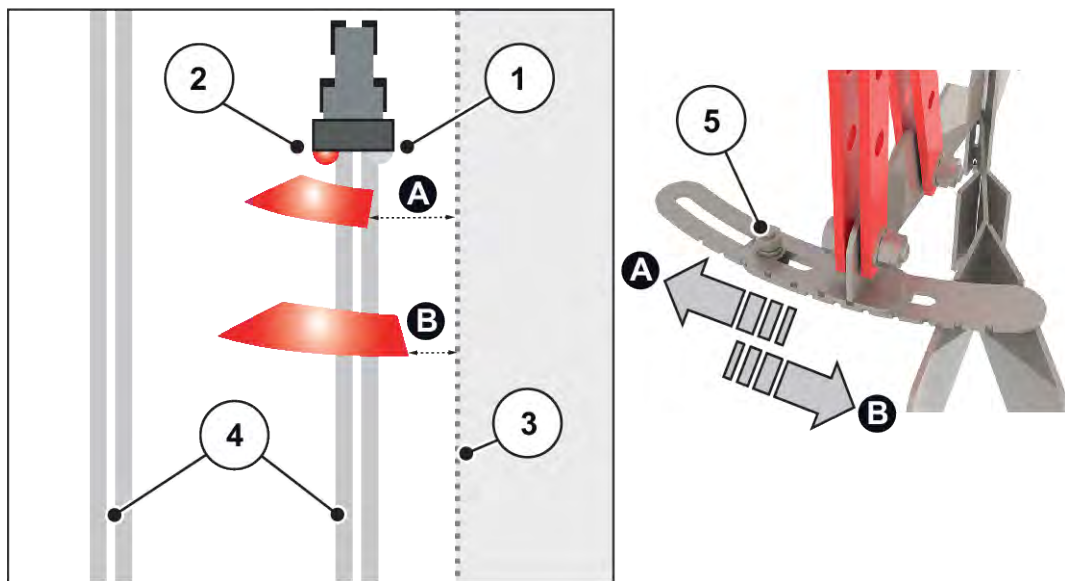


Fig. 52: Setting the spreading width limiter

- | | |
|---|---|
| [[1]] Right closed metering slide | [[5]] Adjustment nut |
| [[2]] Field-interior spreading disc (left here) | [[A]] Decrease the spreading width, left side |
| [[3]] Field border | [[B]] Increase the spreading width, left side |
| [[4]] Track | |

- ▶ Loosen the locking nut [5] on the adjustment piece.
- ▶ For the position of the adjustment piece [3], refer to the table below.
- ▶ Slide the adjustment piece to the determined value.
- ▶ Tighten the locking nut [5].



For the zero position, place the two adjustment pieces on top of each other (congruent).

Adjustment

Limited spreading width from the center of the track to the boundary (in meters)	Adjustment position
0.75	2 notches toward the spreading disc
1	1 notch toward the spreading disc
1.25	Zero position
1.5	1 notch away from the spreading disc
1.75	1.5 notches away from the spreading disc
2	2 notches away from the spreading disc

Spreading width correction

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

- In order to **reduce** the spreading width, swing closer to the spreading disc.
- In order to **increase** the spreading width, swing away from the spreading disc.

9.10.3 Adjusting the TELIMAT full and limited border spreading unit

The TELIMAT T1 is a remote-controlled full and limited border spreading unit for working widths of **10 - 24 m** (20 - 24 m for limited border spreading only).

The TELIMAT T1 is mounted on the **left** side of the machine in the direction of travel. You can control the TELIMAT unit from the tractor via a single-acting control valve.



Mounting of the TELIMAT on the machine is described in detail in a separate assembly manual. This assembly manual is included in the scope of delivery of the TELIMAT unit.

■ Adjusting the TELIMAT unit

You prepare the TELIMAT unit for spreading in accordance with the **fertilizer type**, the **working width** and the desired **type of boundary spreading** (limited or full border spreading).



The setting values are provided in the fertilizer chart.

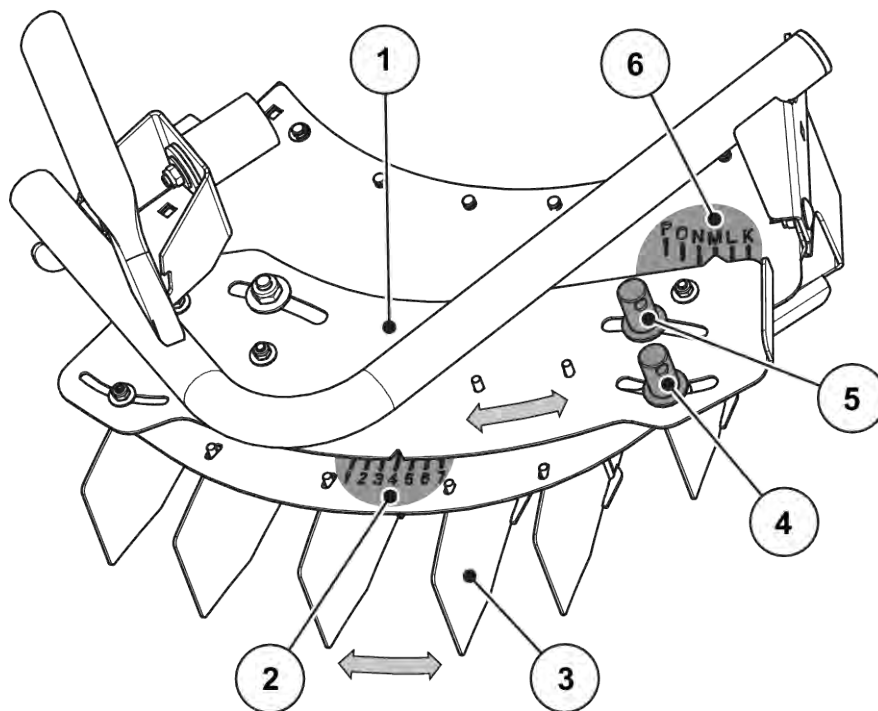


Fig. 53: Adjusting the TELIMAT unit

- | | |
|---------------------------------------|--|
| [1] Sliding section | [4] Adjustment nut for alphabetic scale |
| [2] Numeric scale for fine adjustment | [5] Adjustment nut for numeric scale |
| [3] Guiding plate | [6] Alphabetic scale for coarse adjustment |

- The complete TELIMAT housing can be rotated in guides around the spreading disc hub (alphabetic scale H to Z). The alphabetic scale is used to adjust the housing according to the respective fertilizer type and spreading type (limited or full border spreading).
- One-piece guiding plates are available inside the boundary spreading unit and can be moved along a numeric scale (scale 1 to 7). The numeric scale is mainly used for setting the working width.

Coarse adjustment (alphabetic scale)

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

The coarse adjustment is finished and is refined with the fine adjustment.

Fine 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.

TELIMAT T1													
MDS	10m		12m		15m		16m		18m		20m	21m	24m
											 -30%	 -30%	 -30%
KAS / NPK - Dünger CAN / NPK - fertilizer Ammonitrate / NPK	K - 2	L - 3	K - 2	L - 3	L - 2	L - 4	L - 2	L - 5	M - 3	M - 6	M - 6	M 6	M - 6
K - Dünger K - fertilizer Engrais K	K - 4	M - 6	K - 4	M - 6	M - 6	O - 6	M - 6	O - 7	N - 7	P - 7	M - 6	M 6	P - 7
PK / P / MgO - Dünger PK / P / MgO - fertilizer Engrais PK / P / MgO	K - 3	M - 4	K - 3	M - 4	L - 4	M - 5	M - 4	M - 6	N - 4	N - 6	N - 6	N - 6	N - 6
SSA - Dünger Ammonium sulphate Sulfate d'ammoniaque	M - 3	M - 5	M - 3	M - 5	M - 4	O - 7	M - 5	O - 7	M - 6	O - 7	P - 7	P - 7	--
Harnstoff gekörnt UREA granular Urée granulé	M - 2	M - 4	M - 2	M - 4	M - 3	M - 5	M - 3	M - 6	M - 4	M - 6	M - 6	M - 6	M - 6
Harnstoff gepulvert UREA prilled Urée prillé	M - 4	--	M - 4	--	M - 4	--	--	--	--	--	--	--	--

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Fig. 54: Configuration table for the boundary spreading unit

[[-]] Full border spreading is not possible

This working width cannot be reached

■ 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: Change the position of the guiding plate on the numeric scale in the direction of **the lower value**.
- To **increase** the spreading distance relative to the calibration chart setting: Change the position of the guiding plate on the numeric scale in the direction of **the higher value**.

If there are greater deviations, move the TELIMAT housing along the alphabetic scale.

- To **decrease** the spreading distance relative to the calibration chart setting: Change the position of the housing on the alphabetic scale in the direction of **the lower character** (in alphabetical order).
- To **increase** the spreading distance relative to the calibration chart setting: Change the position of the housing on the alphabetic scale in the direction of **the higher character** (in alphabetical order).



Boundary spreading for working widths of 20 - 24 m

For an optimal spreading pattern, it is recommended that the material output quantity be reduced by **30 %** on the boundary spreading side.

In the case of spreaders with an “M” slide actuator in conjunction with an external remote control, no one-sided volume reduction is possible.

- Reduce the volume on both sides by 30%

■ *Instructions for spreading with the TELIMAT unit*

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

- Boundary spreading: lower position
- Normal spreading: upper position

NOTICE!

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

If the TELIMAT 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.



When older control equipment is used, leaks are possible during boundary spreading. The TELIMAT unit can leave the reached end position (lower position) again. In order to avoid spreading errors, return the unit to its end position at regular intervals.

9.11 Spreading on the headland with TELIMAT T1 special equipment

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

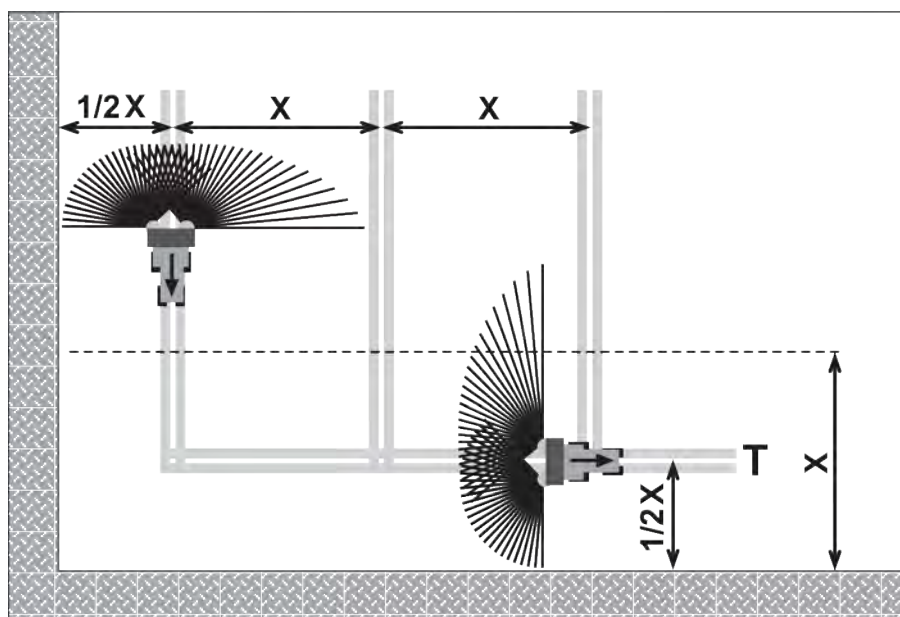


Fig. 55: Boundary spreading

[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:

- Swivel the TELIMAT boundary spreading unit out of the spreading area (upper position).

The TELIMAT boundary spreading unit is inactive.

You are spreading over the entire working width.

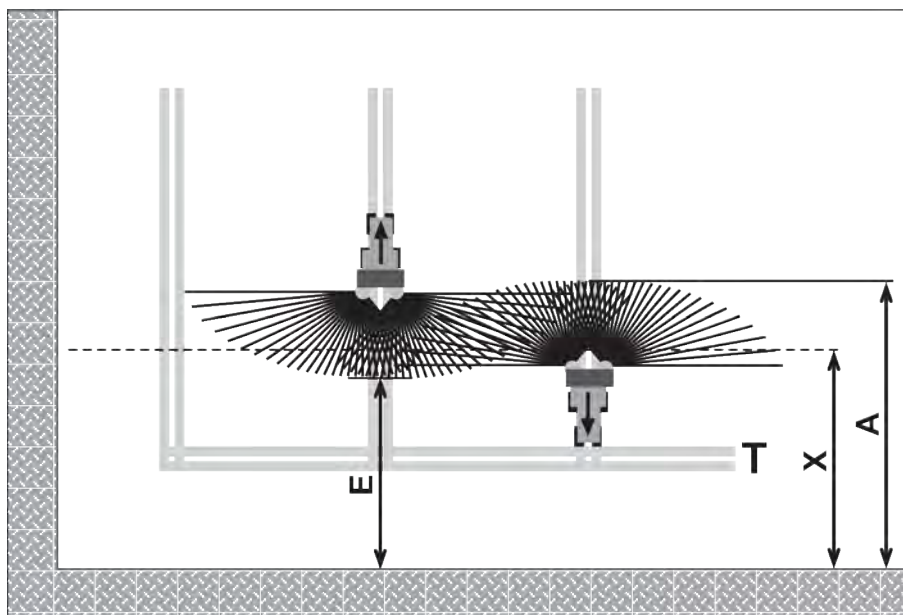


Fig. 56: Normal spreading

- | | |
|---|--------------------|
| [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 second headland track.

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

9.12 RV 2M1 row spreading system for hops and fruit cultivation

The RV 2M1 row spreading system is parked in the upper link of the drawbar. The row spreading system is designed such that an approx. 1 m wide plant row [Y] is spread, depending on the fertilizer, for each row [X] to the right and left of the machine (row spacing: approx. 2 to 5 m).

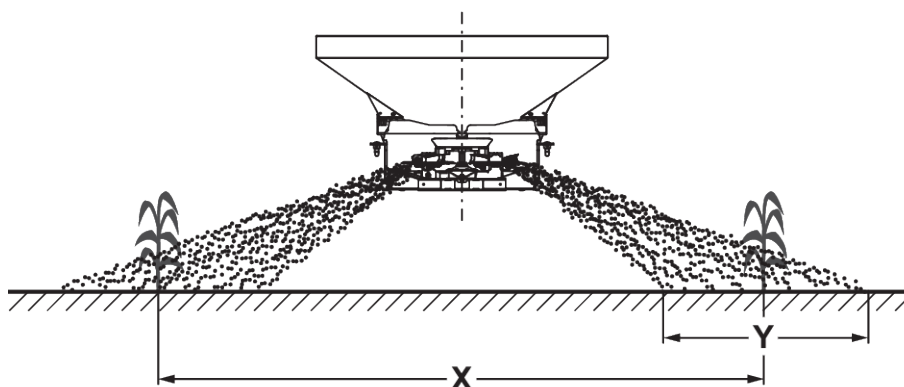


Fig. 57: Spreading with the row spreading system

[[X]] Row spacing

[[Y]] Width of the plant row

9.12.1 Pre-configuration of the machine

- Before mounting the RV 2M1, the spreading vanes on both spreading discs must be set to the A2-A2 setting.

NOTICE!

Material damage to the spreading vanes and RV 2M1 row spreading system

If the spreading vanes are set to higher values than A2-A2, the spreading vanes may impact the guiding plates of the RV 2M1 row spreading system.

- Never set the spreading vanes to higher values than A2-A2.
- After mounting the RV 2M1 row spreading system, check the free passage of the spreading discs (turn the spreading discs by hand) with the tractor switched off.

9.12.2 Adjustment of the row spacing and spreading width

Row spacing adjustment

- ▶ Release the bolts [1].
- ▶ Set the plates [2] according to the desired row spacing.

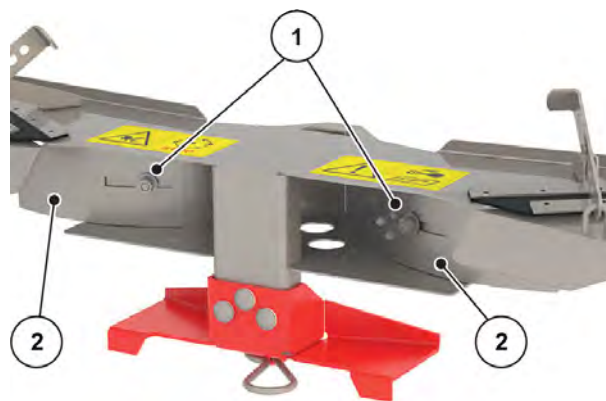


Fig. 58: Plates on the row spreading system

Setting the width of the fertilizer rows

- ▶ Remove the cotter pin [3].
- ▶ Determine the position of the side plate [1] via the adjusting plate [2].
- ▶ Insert the link into the corresponding hole.
- ▶ Secure the link with the cotter pin [3].
The position of the side plate is secured.
- ▶ Repeat the procedure on the other side.
 - ▷ The position must be the same on both sides.

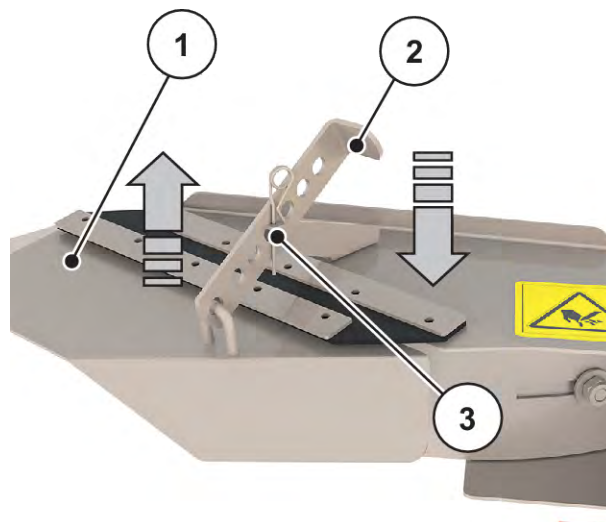


Fig. 59: Adjustment on the row spreading system



Small corrections between the configuration steps can be achieved through higher or lower mounting on the machine.

9.12.3 Setting the application rate

Example of calculation of the application rate:

- Two rows should be spread.
- The distance between the two rows to be spread is 3 m.
 - The effective working width is therefore 6 m (driving along every second track).



You will not find any information for machine configuration for a working width of 6 m in the fertilizer chart.

- It is therefore advisable to refer to the fertilizer chart for the setting values at the working width of 12 m.

Example: Application rate of 200 kg/ha at a working width of 6 m.

- ▶ Take the setting values for a 12 m working width from the spread chart.
- ▶ Set the metering slide setting for 100 kg/ha.

9.13 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.

We recommend emptying the machine immediately after every use to maintain its value. Proceed as similarly to the calibration test to discharge the residual material. See *8 Calibration test*

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, when changing spreading material), please proceed as follows:

- ▶ Set the metering slide to the maximum opening position.
- ▶ Empty the hopper until all material has been discharged (normal residue discharge).
- ▶ Switch off the PTO and the tractor engine and lock them to prevent unauthorized starting. Remove the ignition key of the tractor.
- ▶ Any remaining fertilizer can be removed with a gentle water jet when cleaning the machine;. See also *11.4 Cleaning the machine*.

9.14 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.

WARNING!

Risk of crushing and shearing when the machine is uncoupled

If the return spring is tensioned when the setscrew is loosened, the stop lever may hit the end of the guide slot.

This may cause crushing injuries to fingers and/or result in injury to the operating personnel.

- ▶ If the machine is parked on its own (without tractor), fully open the metering slide (return spring is released).
- ▶ Never put your fingers in the guide slots of the application rate adjustment unit.

Release the return spring of the single-acting hydraulic cylinder

- ▶ Close the metering slide hydraulically.
- ▶ Set the stopper to the highest scale value.
- ▶ Open metering slides.

The return springs are de-tensioned.

Requirements for parking the machine:

- Only park the machine on level, solid ground.
- Only park the machine when the hopper is empty.
- The hydraulic system is de-pressurized and has cooled down.

Parking the machine

- ▶ Relieve the load on the coupling points (lower/upper link) before removing the machine.
- ▶ After unhitching, place the universal drive shaft, hydraulic hoses, and electric cables in the retainers provided for the purpose.
- ▶ Put the protective cap on the connectors of the hoses.

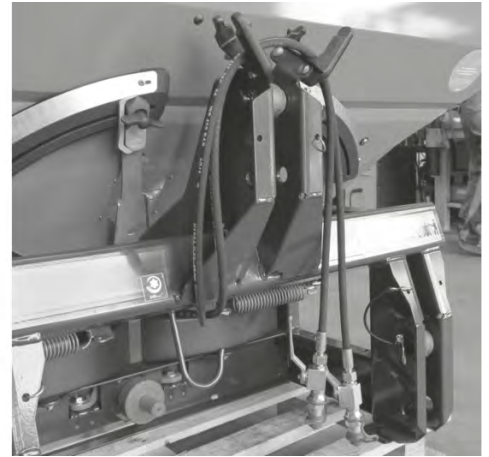
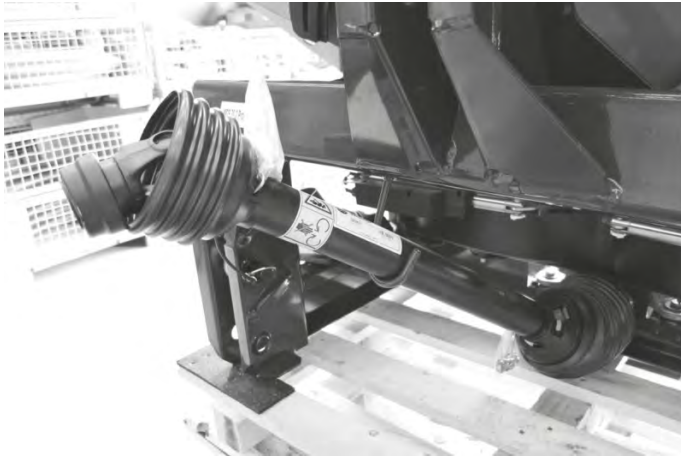


Fig. 60: Storage of the drive shaft, storage of the cables and hydraulic hoses

The machine is parked.

10 Faults and possible causes

! WARNING!

Risk of injury due to incorrect troubleshooting

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

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

Troubleshooting requirements:

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



Please take particular note of the warnings in chapter 3 *Safety* and 11 *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 completely.	▶ Check the function of the metering slides.
	Spreading vanes incorrectly adjusted.	▶ Correct the settings in accordance with the fertilizer chart information.

Fault	Possible cause	Measure
Too little fertilizer in the overlap area	Defective spreading vanes, outlets.	▶ Replace defective parts immediately. ▶
	The fertilizer has a smoother surface than the fertilizer that was tested for the fertilizer chart.	▶ Set the second spreading vane indicated in the fertilizer table forward (to higher numbers). ▷ e.g. E4-C1 to setting E4-C2 ▶ If correction of the angle of the second spreading vane indicated is not sufficient, increase the spreading vane length. ▷ e.g. E4-C2 to setting E4-D2
	Spreading vanes incorrectly adjusted.	▶ Correct the settings in accordance with the fertilizer chart information.
Too little fertilizer in the tractor track.	The fertilizer has a rougher surface than the fertilizer tested for the fertilizer chart.	▶ Set the second spreading vane indicated in the fertilizer table back (to lower numbers). ▷ e.g. C3-B2 to setting C3-B1. ▶ If correction of the angle of the second spreading vane indicated is not sufficient, shorten the spreading vane length. ▷ e.g. C3-B1 to setting C3-A1.
	PTO speed is higher than indicated on the tractor meter.	▶ Check the speed and have it corrected if necessary.
	Spreading vanes incorrectly adjusted.	▶ Correct the settings in accordance with the fertilizer chart information.

Fault	Possible cause	Measure
Higher application rate on one side of the spreader than the other.		▶ Check the setting of the metering slides. ▶ Check the functionality of the agitator. ▶ Checking the outlet.
Irregular fertilizer feed to spreading disc	Outlet blocked	▶ Clear clogging.
	Defective agitator	▶ Checking the agitator ▶ Replace agitator if necessary.
The spreading discs are fluttering.		▶ Check cap nuts for tight fit and check threads.
Fertilizer trickles out of the hopper when the metering slide is closed.	• Distance between agitator and hopper base is too great.	▶ Check distance between agitator and hopper base. ▶ If the distance is greater than 2 mm, consult chapter <i>11.10 Checking the agitator</i>.
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.
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.

Fault	Possible cause	Measure
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.

11 Maintenance and service

11.1 Safety

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.



Please note the warnings in the chapter *3 Safety*

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

Observe the following instructions in particular:

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

DANGER!

Danger of injury due to running engine

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

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

■ **Maintenance plan**

Task	Before operation	After operation	After the first X hours	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	At the end of the season
Value (X)			10	50	100	50	100	150	6		
Cleaning											
<i>Cleaning</i>	X	X									
Lubrication											
<i>Universal drive shaft</i>										X	
<i>Other components</i>						X				X	X
Check											
<i>Wearing parts</i>							X			X	
<i>Screw connections</i>	X		X							X	
<i>Screw connection of the weigh cells</i>								X		X	
<i>Protective grid lock</i>	X					X					
<i>Metering slide setting</i>	X									X	
<i>Agitator</i>							X			X	
<i>Spreading disc hub</i>							X			X	
<i>Spreading vane flat spring</i>	X					X					
<i>Setting the agitator</i>	X									X	
<i>Hydraulic hoses</i>	X					X				X	
<i>Oil level</i>				X	X					X	
Replacement											
<i>Hydraulic hoses</i>									X		

11.2 Wear parts and screw connections

11.2.1 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.

11.2.2 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 14.1 *Tightening torque*

11.2.3 Checking the screw connections of the weigh cells

■ *Screw connection of the weigh cells*

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

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

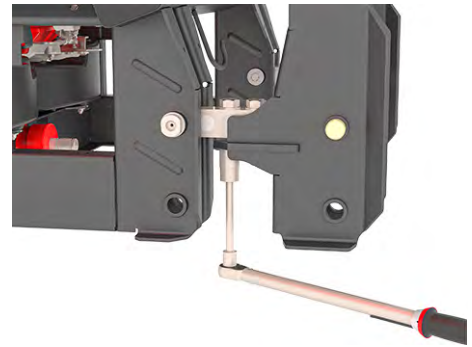


Fig. 61: Fastening the weigh cells (right side in direction of travel)

- Tighten the screw connection [1] with a torque wrench (torque = **65 Nm**).

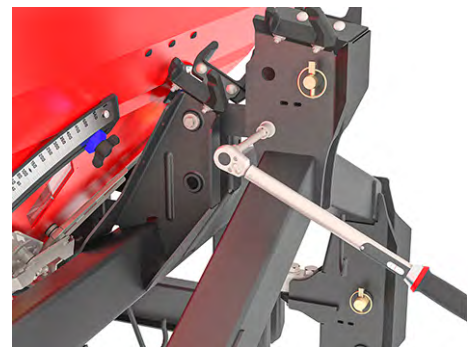


Fig. 62: Fastening the tie rod at the weigh frame



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

11.3 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.

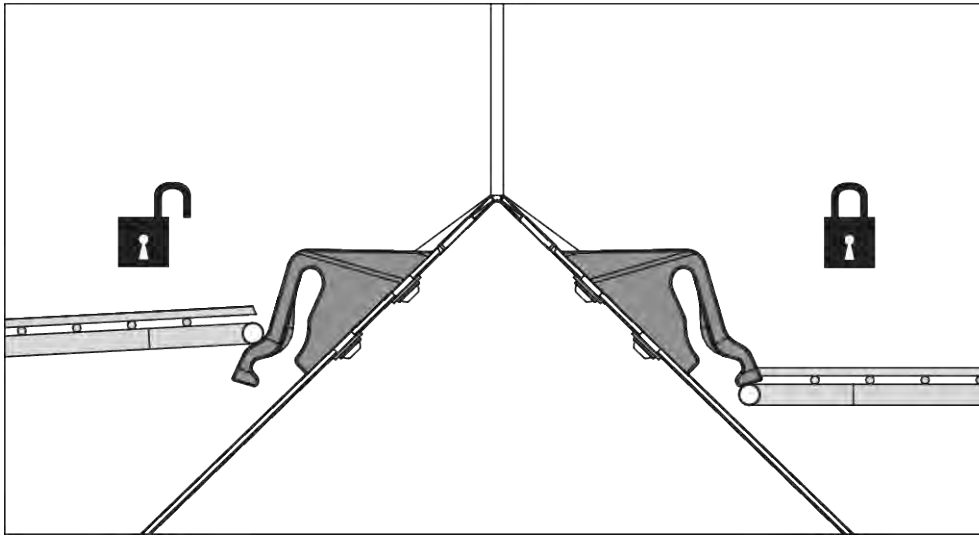


Fig. 63: Protective grid lock open/closed

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.

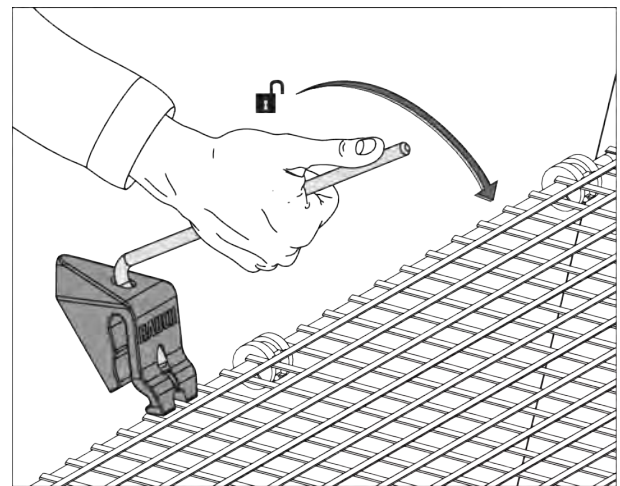


Fig. 64: Opening the protective grid lock

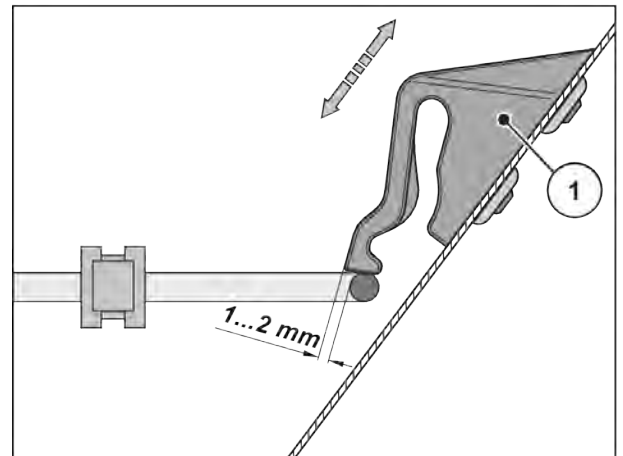


Fig. 65: Test dimensions for functional check of the protective grid interlock

11.4 Cleaning the machine

■ Cleaning



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

- ▶ If available, fold up the protective grids in the hopper (depending on the machine).
- ▶ 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.
- ▶ Preferably clean the machine using a gentle water jet.
- ▶ Especially clean the air ducts, injectors, and bends.
- ▶ After cleaning, treat the **dry** machine, **especially the stainless steel parts**, with an environmentally friendly anti-corrosion agent.
 - ▷ A suitable polishing kit can be ordered from authorized dealers for treating rust spots.
- ▶ After cleaning, spray the **dry** hydraulic fittings with cavity protection wax and allow to dry.
 - ▷ Order cavity protection wax from your authorized dealer.

11.5 Metering slide adjustment

■ Metering slide setting

When spreading seeds or slug pellets, separate checking of the metering slide for even opening is recommended.

⚠ 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.
- ▶ Switch off the tractor engine.
- ▶ Remove the ignition key.
- ▶ Disconnect the power supply between the tractor and the machine.
- ▶ Do not operate hydraulic metering slide during adjustment.



Since the machine has a metering scale on each side, the adjustments must always be made on the right-hand and left-hand side.

The mechanics must be able to move freely in order to check the metering slide setting.

- ▶ Position the machine safely on the ground on a pallet.
Make sure the surface is even and safe!
- ▶ Remove both spreading discs. See *11.8.1 Dismounting the spreading discs*
- ▶ **Versions K/D/D Mono**
Connect the hydraulic hoses for the hydraulic metering slide actuator to a hydraulic unit or tractor.
- ▶ **Versions C/Q/W**
Insert the plug of the electronic control unit into the tractor.
- ▶ Start the tractor/unit/transformer.
- ▶ Close the metering slide.
- ▶ Switch the tractor off and remove the ignition key or switch the unit/transformer off.
- ▶ **Versions K/D/D Mono/C**
Set the stop on the application rate scale to position 130 (position 9 for seeds or slug pellets).
Start the tractor/unit/transformer.
Open the metering slide to the preset stop.
- ▶ **Versions Q/W**
Open metering slides (position 130).
Stop at the test points (see operator's manual for the control unit).
- ▶ Switch the tractor off and remove the ignition key or switch the unit/transformer off.

- ▶ Insert the lower link pin diameter = 28 mm (adjustment lever diameter = 8 mm for seeds or slug pellets) into the right-hand or left-hand metering opening.



Fig. 66: Lower link pin in metering opening

Case 1: Pin can be inserted into the metering opening and has less than 1 mm of play.

- The setting is OK.
- Remove pin from the metering opening.
- Reinstall the spreading discs.

Case 2: Pin can be inserted into the metering opening and has more than 1 mm of play.

- A new setting is required.
- Remove pin from the metering opening.
- Continue with chapter *11.5.1 Adjustment*.

Case 3: Pin cannot be inserted into the metering opening.

- A new setting is required.
- Remove pin from the metering opening.
- Continue with *11.5.1 Adjustment*.

11.5.1 Adjustment

- ▶ Start the tractor/unit/transformer.

▶ Versions K/D/C

Close the metering slide.

Set the stop to the maximally open position (end of the slotted hole).

- ▶ Open the metering slide to the stop.

Version K: *The spring is now released.*

- ▶ Switch the tractor off and remove the ignition key or switch the unit / transformer off.

- **Only version K:** Remove the spring using the adjustment lever.



Fig. 67: Remove the spring

- ▶ Disconnect the metering slide and hydraulic/electronic cylinder.
- ▶ Remove the lock washer.

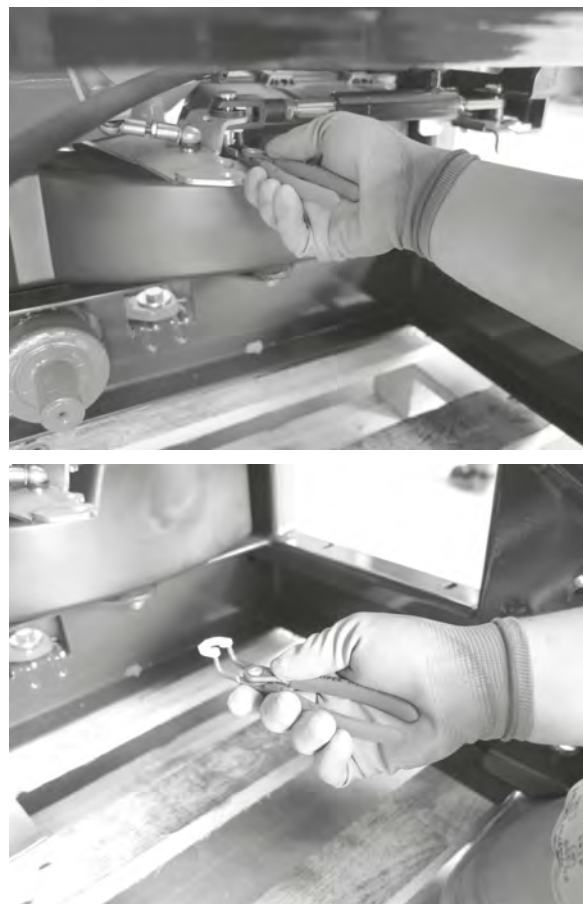


Fig. 68: Remove the cylinder

- ▶ Remove the bolt.
- ▶ Pull out the hydraulic cylinder.

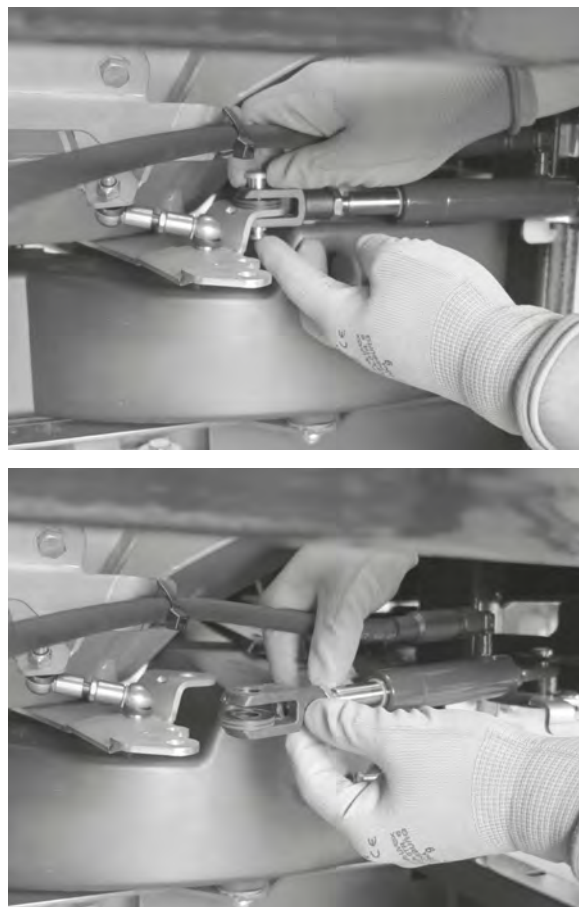


Fig. 69: Pull out the hydraulic cylinder

- ▶ **A second person is required for this step.**

Person 1: Insert the lower link pin into the metering opening (see Fig. 66 Lower link pin in metering opening).

Person 2: Move the position indicator towards smaller values until the metering slide lines up with the pin [1].

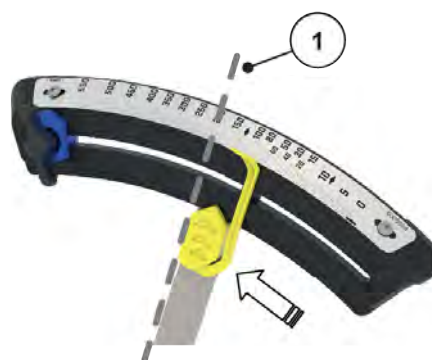


Fig. 70: Move the position indicator

- ▶ Move the stop to the position indicator and clamp the stop there.



Fig. 71: Move the stop

- ▶ Remove the pin from the metering opening.
- ▶ Loosen the screws [1] of the application rate scale.
- ▶ Move the entire scale such that the stop is in precisely position **130** (position **9** for seeds or slug pellets) on the scale curve.
 - ▷ If the slot range for the scale is insufficient, change the distance at the angle joint.

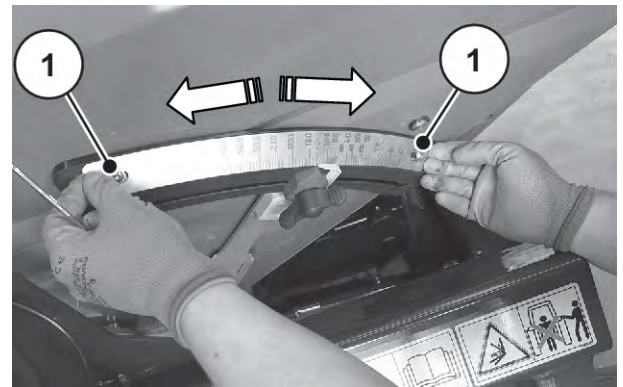


Fig. 72: Move the scale

- ▶ Screw the application rate scale tight again.
- ▶ **Version Q/W**
Set the stop to the maximally open position (end of the slotted hole).
Tighten the adjustment screw and additionally fix the stop with the fillister head screw.
- ▶ Connect the metering slide and hydraulic/electronic cylinder.
Install the bolt and lock washer.
- ▶ **Version K/R:**
Install the spring by hand (see Fig. 67 Remove the spring).
- ▶ Reinstall both spreading discs.
- ▶ **Version Q/W**
Readjusting the test points (see operator's manual).

Adjustment is now complete. If you now disconnect the hydraulic hose from the tractor/unit, the return spring of the single-acting hydraulic cylinder must first be released. See 9.14 Parking and unhitching the machine



Both metering slides must open evenly and to the same extent. Therefore, always check both metering slides.

11.6 Checking the agitator for wear

■ Agitator

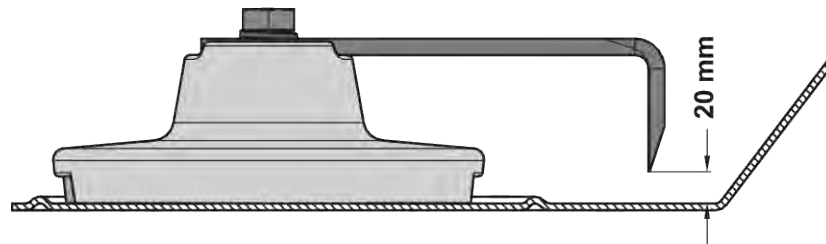


Fig. 73: Agitator finger wear range

- ▶ Measure the distance between the agitator finger and the hopper base.
 - ▷ If the distance measured exceeds 20 mm, the agitator finger must be replaced.

11.7 Checking the spreading disc hub

■ Spreading disc hub

In order to maintain ease of movement of the cap nut on the spreading disc hub, lubrication of the spreading disc hub is recommended (graphite grease).

- ▶ Check the cap nut for cracks and damage.
- ▶ Replace damaged cap nuts immediately.

11.8 Dismounting and mounting spreading discs

11.8.1 Dismounting the spreading discs

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 of the spreading disc.

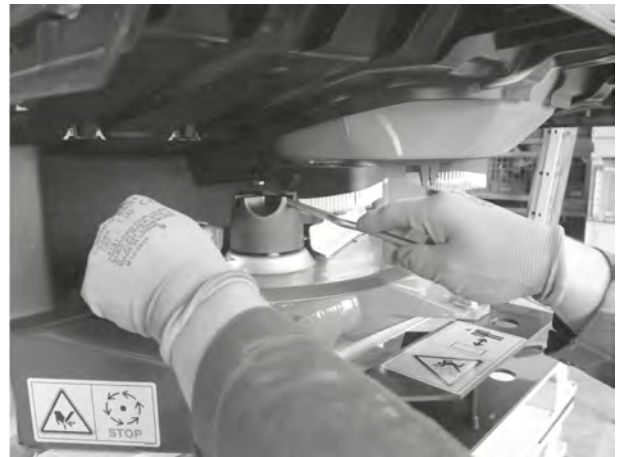


Fig. 74: Loosening the cap nut

- ▶ Unscrew the cap nut.
- ▶ Remove the spreading disc from the hub.
- ▶ Fasten the adjusting lever to the bracket for it. See *Fig. 10 Adjustment lever position*

11.8.2 Mounting the spreading discs

Mounting the spreading discs

- ✓ The tractor engine is 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. The correct spreading disc is the one that fits precisely into the spreading disc holder.

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



The cap nuts have an internal locking mechanism that prevents them from coming loose. The locking mechanism must be noticeable while 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.

11.9 Checking the spreading disc flat spring

NOTICE!

Danger of material damage: Do not over-bend the flat spring

The flat spring tension must reliably lock the main and extension vanes onto the spreading disc. If the flat spring is over-bent, then it loses the tension required to secure the spreading vane.

If the spring tension is too low, the locking bolt disengages and can cause significant material damage.

- ▶ When setting the spreading vane position, carefully press the locking bolt into any positioning hole.
- ▶ If the spring tension is too low, replace the flat spring immediately.

■ *Spreading vane flat spring*

- [1] Flat spring
- [2] Locking bolt

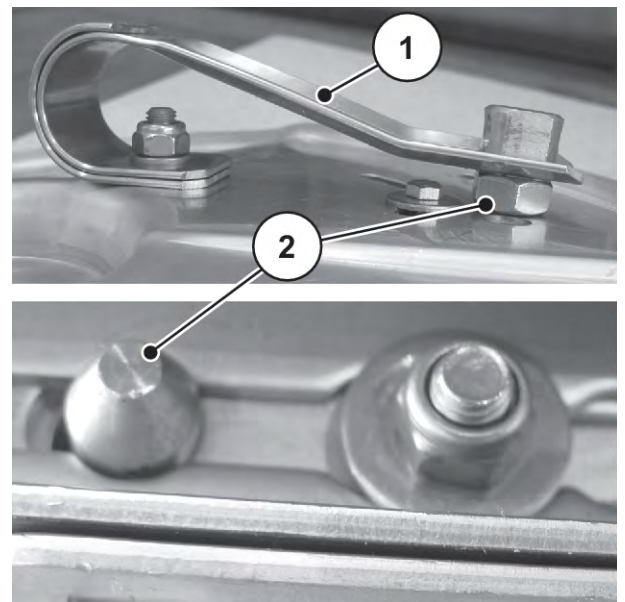


Fig. 75: Locking bolt properly engaged

11.10 Checking the agitator

■ Setting the agitator

- ▶ Insert the agitator into the agitator shaft and engage the bayonet lock.
- ▶ Pull the engaged agitator up with one hand.

Use a 1 mm thick washer or a metal strip to check.

The distance between the bottom edge of the agitator and the hopper base must now be **1 mm**.

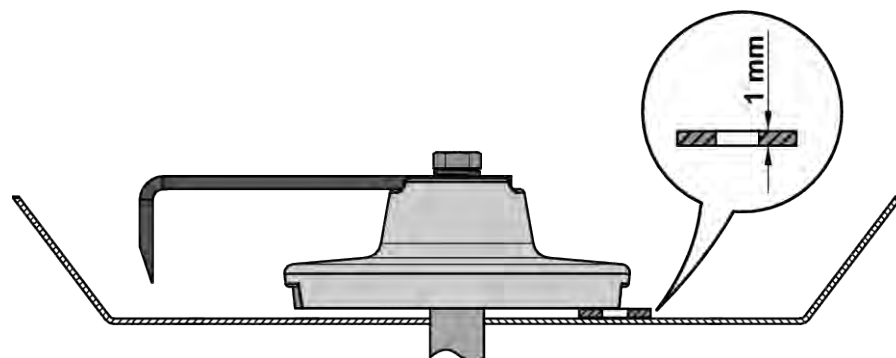


Fig. 76: Setting the agitator

Case 1: There is too much space between the agitator and the hopper base.

- ▶ Remove washers from the 3 mounting screws of the transmission.

The transmission sits lower.

Case 2: The distance is less than 1 mm.

- ▶ Place washers of an appropriate thickness evenly underneath the 3 mounting screws.

Case 3: The agitator cannot be snapped into place.

- The cross pin is too low.
- Place washers of an appropriate thickness evenly underneath the 3 mounting screws.

11.11 Spreading vane replacement



Only your dealer or your specialist workshop may replace worn spreading vanes.

Requirement

- The spreading discs are removed (see 11.8.1 *Dismounting the spreading discs*).
- A spreading vane comprises a main vane and an extension vane.
- The main vane of the **right-hand** spreading disc has the designation **BR** and the corresponding extension vane has the designation **AR**.
- The main vane of the **left-hand** spreading disc has the designation **BL** and the corresponding extension vane has the designation **AL**.

Example: left-hand spreading disc

[BL] Main vane

[AL] Extension vane

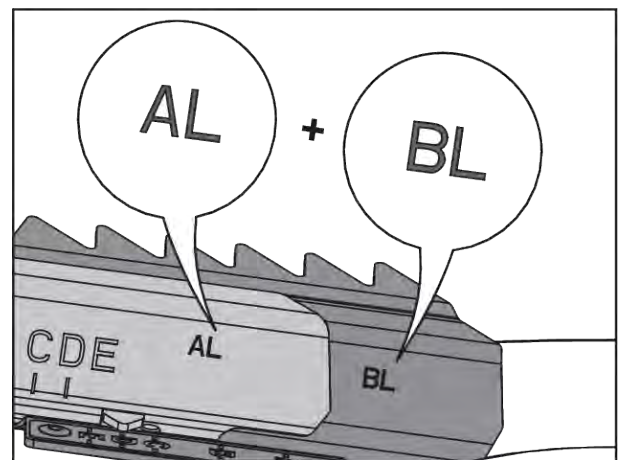


Fig. 77: Spreading vane combination

11.11.1 Replacing the extension vane

■ **Removing the extension vane**

- Remove the screw [1] along with the respective nut and washer.

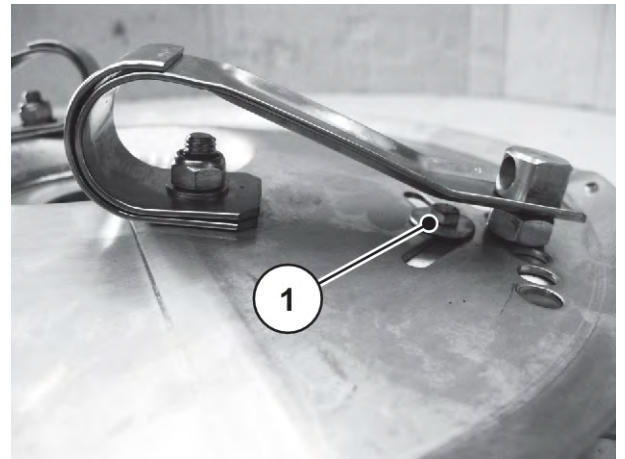


Fig. 78: Flat spring on the spreading disc

- Release the flat spring [2] with the adjustment lever [3].

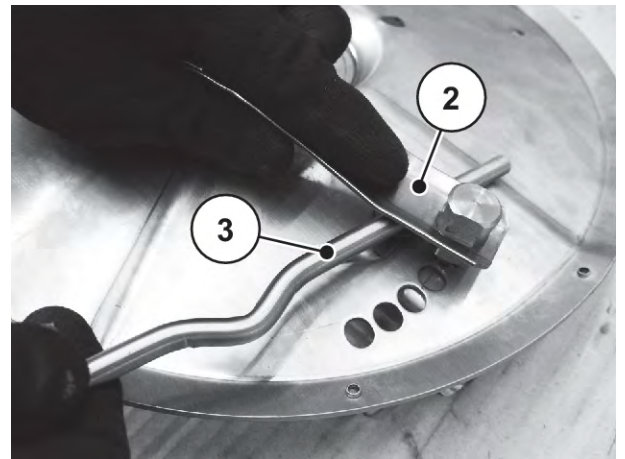


Fig. 79: Release the flat spring

- Push the old extension vane [4] out of the main vane [5].

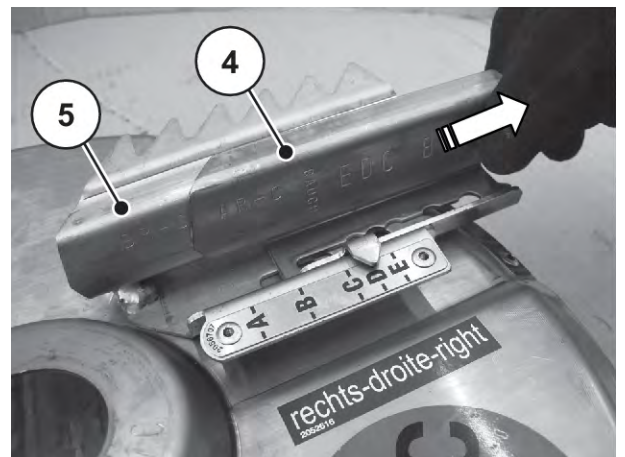


Fig. 80: Extension vane and main vane

■ **Installing the new extension vane**

⚠ WARNING!

Risk of injury due to rotating machine parts

If the extension vanes are installed with the old screws and nuts, then the spreading vanes may come loose and can cause serious injuries.

- ▶ **Only** use the **new** screws, nuts and washers supplied to install new components.

- ▶ Push the new extension vane [4] into the main vane [5].

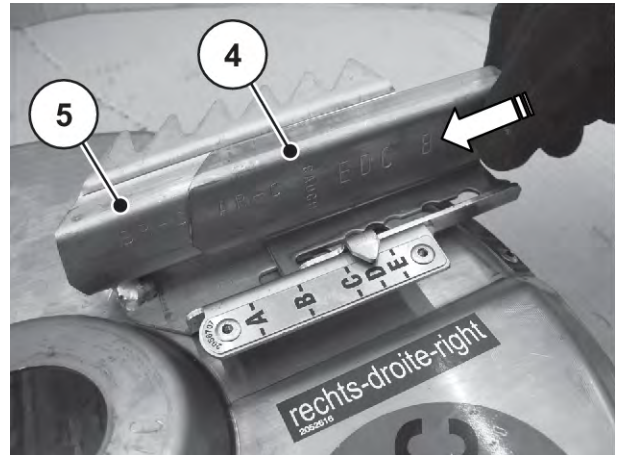


Fig. 81: New extension vane

- ▶ Screw the spreading vane onto the spreading disc using the new screw [8], the new lock nut [6] and the new washer [7].

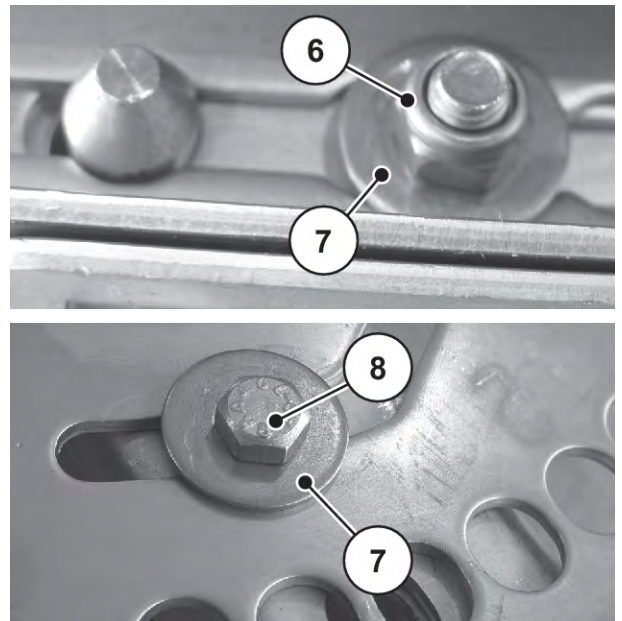


Fig. 82: Spreading vane attachment points

- ▶ Tighten the screw such that it lies flat and tight (tightening torque: approx. 8 Nm).

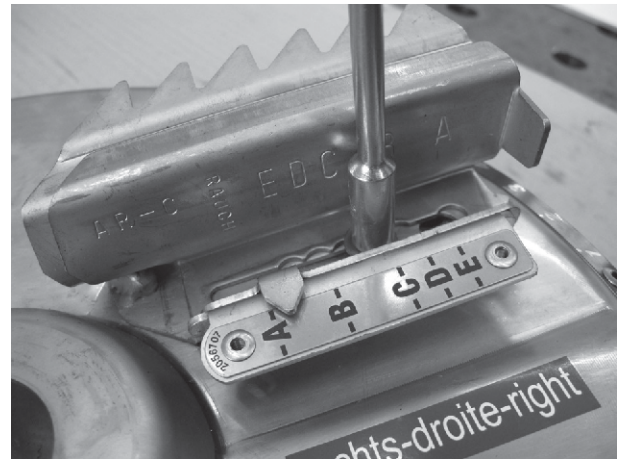


Fig. 83: Spreading vane attachment points

- ▶ Loosen the screws [8] again by approx. half a rotation in order to ensure easy adjustment of the extension vane position.
The screw may only be loosened enough that the extension vane position can be adjusted and the extension vane is still seated firmly on the main vane.
- ▶ Engage the flat spring again using the adjustment lever.
- ▶ Repeat the work steps, where necessary, for other extension vanes which need to be replaced.

Reinstall both spreading discs. See 11.8.2 Mounting the spreading discs

11.11.2 Replacing the main vane or the complete spreading vane

■ Removing spreading vanes

! WARNING!

Risk of injury due to tensioned flat spring

The flat spring is under tension and can spring free erratically.

- ▶ Maintain a sufficiently safe distance when installing/removing it.
- ▶ Do not remove the spring towards the body.
- ▶ Do not bend directly over the spring.

- Unscrew the self-locking spring fastening nut of the spreading vane with a size 13 wrench.



Fig. 84: Removing the screws

- Remove the flat spring [1] using the adjustment lever [2].

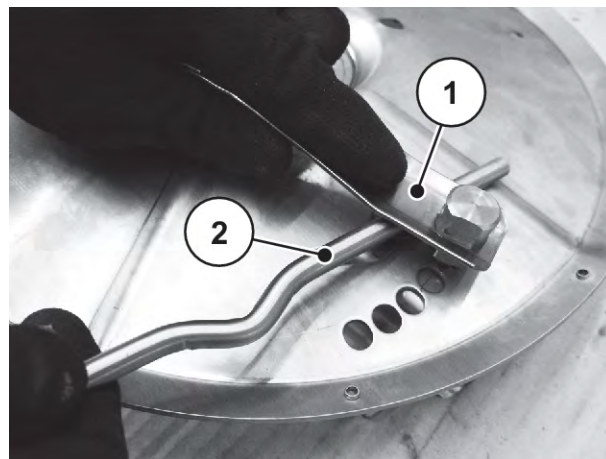


Fig. 85: Removing the flat spring

- Remove the screw [3] along with the respective nut and washer.

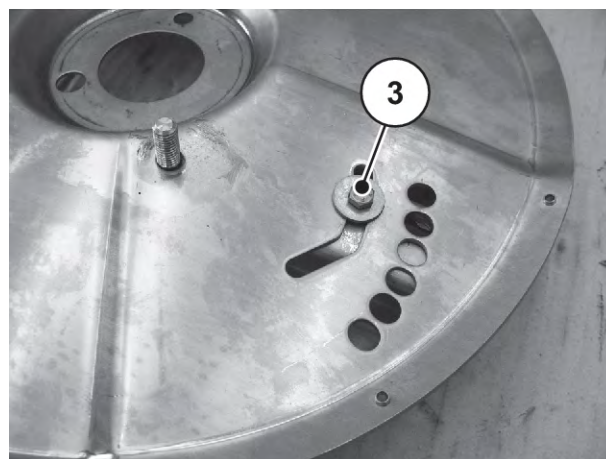


Fig. 86: Screw on the underside of the spreading discs

- Remove the old spreading vane [4] along with the respective nut and washer.



Fig. 87: Removing the spreading vanes

■ **Installing a new main vane or complete spreading vane**

- Place the new main vane on the spreading disc.



Fig. 88: Main vane installation



During installation, make sure that the combination of main vane and extension vane is correct.

- See Fig. 77 Spreading vane combination

- Screw the new extension vane and the new main vane onto the spreading disc.

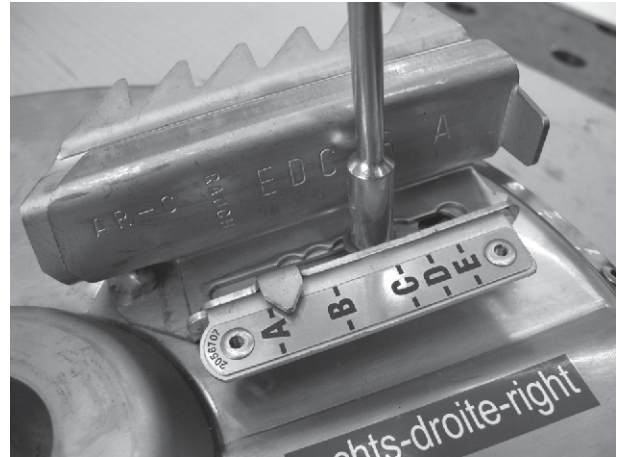


Fig. 89: Spreading vane on the spreading disc

- Screw the complete spreading vane onto the spreading disc using the new screw [3], the new lock nut [1] and the new washer [2].
- Tighten the screw such that it lies flat and tight (tightening torque: approx. 8 Nm).

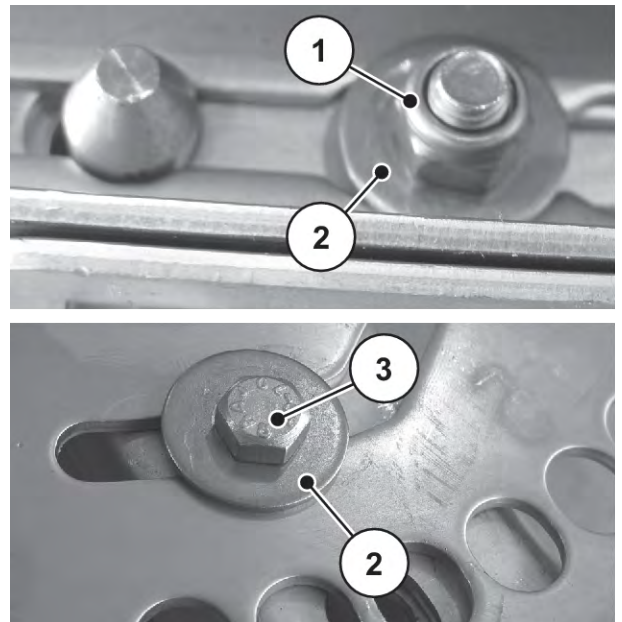


Fig. 90: Spreading vane attachment points

- Loosen the screw [3] again by approx. half a rotation in order to ensure easy adjustment of the extension vane position.

The screw may only be loosened enough that the extension vane position can be adjusted and the extension vane is still seated firmly on the main vane.

⚠ WARNING!

Risk of injury due to tensioned flat spring

The flat spring is under tension and can spring free erratically.

- Maintain a sufficiently safe distance when installing/removing it.
- Do not remove the spring towards the body.
- Do not bend directly over the spring.

- ▶ Insert the flat spring [4] into the threaded bolt [5] for the main vane.
- ▶ Carefully press the locking bolt [6] into any positioning hole.

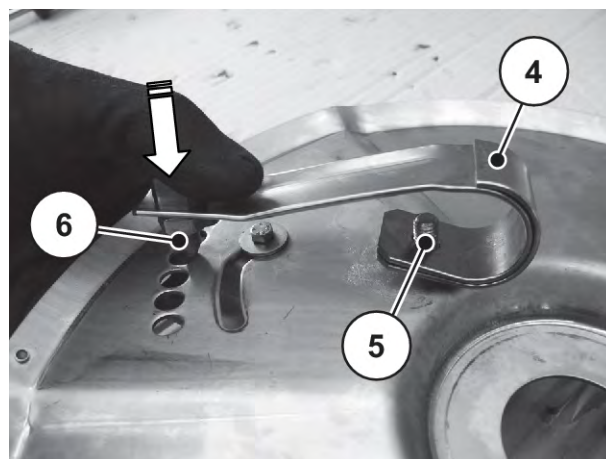


Fig. 91: Flat spring on the spreading disc

- ▶ Attach the flat spring with a new washer and a new self-locking spring securing nut.



Fig. 92: Attachment of the flat spring

- ▶ Tighten the spring attachment nut such that the flat spring lies flat and tight on the spreading disc.
- ▶ Loosen the spring securing nut again by roughly half a rotation in order to ensure easy adjustment of the spreading vane position.

11.11.3 Replacement of the W spreading vane

■ Spreading vane combination

NOTICE!

Environmental damage due to incorrectly installed spreading vanes

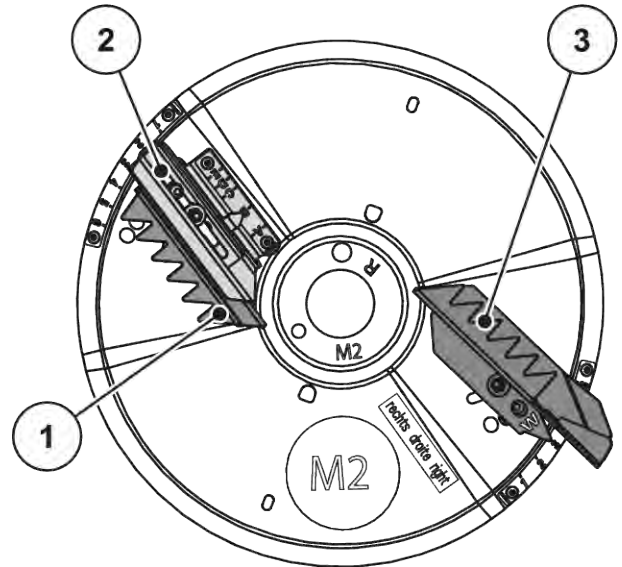
Closely observe the specified vane combination. Other combinations may have a significant adverse effect on the spreading pattern.

- ▶ **Only one X spreading vane** may be installed per spreading disc (left/right).

	Spreading disc type M2	
	Main vane and extension vane	W spreading vane

Left spreading disc	BL and AL	WL
Right spreading disc	BR and AR	WR

- [1] Main vane
- [2] Extension vane
- [3] W spreading vane



■ **Replacement of the W vane**

- ▶ Remove the worn W spreading vane.
 - ▷ Refer to chapter 11.11 *Spreading vane replacement*
- ▶ Screw the W spreading vane to the spreading disc.
 - ▷ Refer to chapter *Installing a new main vane or complete spreading vane*
- ▶ Screw the flat spring to the spreading disc and the W spreading vane.
- ▶ Observe the instructions for installation of the spreading disc.
 - ▷ Refer to chapter 11.8.2 *Mounting the spreading discs*

11.12 Hydraulics system

The hydraulic system of the machine consists of the following hydraulic assemblies.

- Connecting hoses

! 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**

Hydraulic oil escaping under high pressure may penetrate the skin and cause infection.

- ▶ In the event of injury caused by hydraulic oil, seek medical attention immediately!

! WARNING!**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.

11.12.1 Checking the hydraulic hoses

■ *Hydraulic hoses*

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

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

11.12.2 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.

11.13 Transmission oil

11.13.1 Quantities and types

The transmission is filled with approx. **2.2 l** of SAE 90 API-GL-4 transmission oil.



Do not mix different types of oil.

- **Never** mix different oil types.

11.13.2 Checking the oil filling level

■ Oil level



For oil changes and dismantling the transmission, please contact your dealer or an authorized specialist workshop.

The transmission does not need to be lubricated under normal operating conditions. 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.

[1] Oil level checking screw

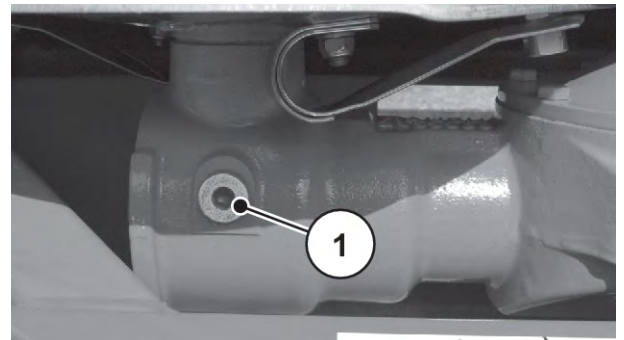


Fig. 93: Transmission oil filling and draining points

Checking the oil filling level

- Open the checking screw.

The oil level is satisfactory when the oil reaches the lower edge of the hole.

11.14 Lubrication

11.14.1 Drive shaft lubrication

■ Universal drive shaft

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

11.14.2 Lubricating other components

■ *Other components*

- Lubricant: Grease, oil

Lubrication points

- Upper and lower link balls
- Joints, bushes
- Metering slide, position indicator

- Lubricant: Graphite grease

Lubrication points

- Spreading disc hub
- Agitator shaft
- Agitator finger
- Weigh cells

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 Winterization and preservation

13.1 Safety

NOTICE!

Environmental pollution due to unsuitable disposal of hydraulic and transmission oil

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

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

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



Prior to winterizing, thoroughly **wash** the machine (refer to *13.2 Washing the machine*) and let it dry well.

Next, **preserve** the machine (refer to *13.3 Preserving the machine*).

- ▶ Hang up hoses and cables (refer to *Fig. 60 Storage of the drive shaft, storage of the cables and hydraulic hoses*).
- ▶ Park the machine (refer to *9.14 Parking and unhitching the machine*).
- ▶ Close the hopper cover. Leave a gap open to prevent moisture in the hopper.
- ▶ If present, disconnect the control unit or the ISOBUS terminal from power and dust off.



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

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

13.2 Washing the machine

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

- ▶ Remove the dirt deflector (refer to *3.10.1 Position of safety equipment as well as warning and instruction stickers*).
- ▶ Fold up the protective grid in the hopper (refer to *11.3 Opening the protective grid in the hopper*).
- ▶ When cleaning with high-pressure, never aim the water jet directly at warning signs, electrical equipment, hydraulic components, and sliding bearings.
- ▶ Let the machine dry after cleaning.



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



Lubricating the machine before winterization (refer to *13.3 Preserving the machine*)

13.3 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*".

14 Appendix

14.1 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

15 Guarantee and warranty

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

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

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

RAUCH Streutabellen
RAUCH Fertilizer Chart
Tableaux d'épandage RAUCH
Tabele wysiewu RAUCH
RAUCH Strooitabellen
RAUCH Tabella di spargimento
RAUCH Spredetabellen
RAUCH Levitystaulukot
RAUCH Spridningstabellen
RAUCH Tablas de abonado



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



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