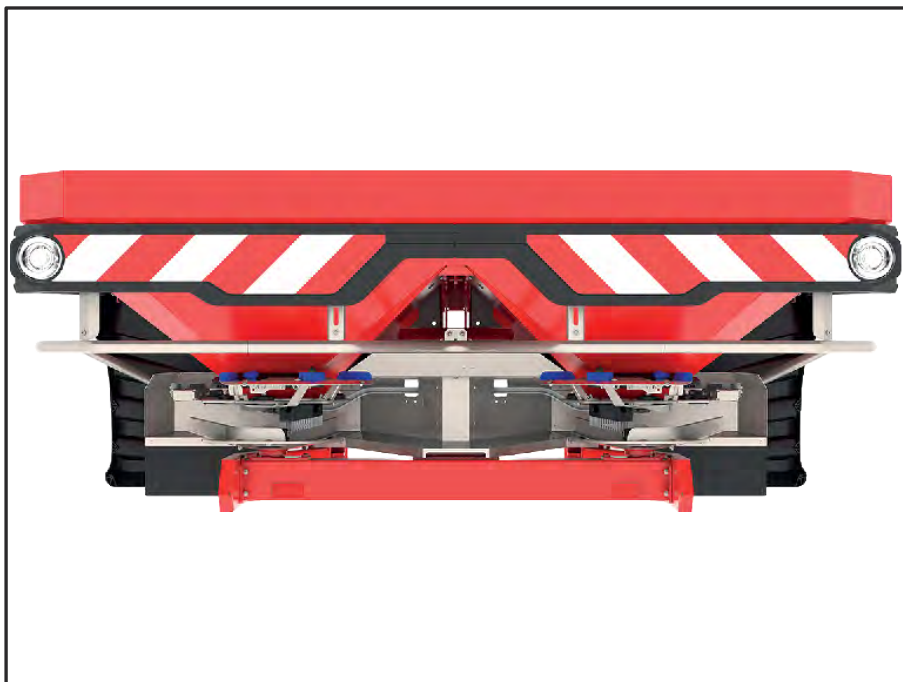


Operator's manual



Please read this manual 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.



AXIS-M 20.2 EMC (+W)

5902281-d-en-0426

Original instructions

Foreword

Dear customer,

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

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



Please read this operator's manual carefully before commissioning the mineral fertilizer spreader and observe the instructions.

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

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

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



Please enter here the type and serial number together with the year of manufacture of your mineral fertilizer spreader.
This information is provided on the machine nameplate or on the frame.
Please state this information when ordering spare parts or optional equipment, and in case of complaints.

Type:

Serial number:

Year of manufacture:

Technical improvements

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

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

Yours sincerely

RAUCH Landmaschinenfabrik GmbH

Table of contents

1	Intended use	7
2	User instructions	8
2.1	About this operator's manual	8
2.2	Structure of the operator's manual	8
2.3	Notes on text descriptions	9
2.3.1	Instructions and procedures	9
2.3.2	Lists	9
2.3.3	References	9
3	Safety	10
3.1	General information	10
3.2	Meaning of warnings	10
3.3	General information on the safety of the machine	11
3.4	Instructions for the operator	11
3.4.1	Qualifications of personnel	11
3.4.2	Instruction	12
3.4.3	Accident prevention	12
3.5	Information on operational safety	12
3.5.1	Parking the machine	12
3.5.2	Filling the machine	13
3.5.3	Checks before commissioning the machine	13
3.5.4	Hazard zone	13
3.5.5	Running operation	14
3.6	Using fertilizer	14
3.7	Hydraulics system	15
3.8	Maintenance and service	15
3.8.1	Qualifications of maintenance personnel	16
3.8.2	Wear parts	16
3.8.3	Maintenance and service tasks	16
3.9	Safety in traffic	16
3.9.1	Checks before driving	17
3.9.2	Road travel with the machine	17
3.10	Safety equipment, warnings and instructions	18
3.10.1	Position of safety equipment as well as warning and instruction stickers	18
3.10.2	Function of safety equipment	19
3.11	Warning and instruction stickers	20
3.11.1	Warning stickers	21
3.11.2	Instruction stickers	22
3.12	Name plate and machine marking	24
3.13	Reflector	24
4	Machine data	25
4.1	Manufacturer	25
4.2	Description of the machine	25

4.2.1	Versions.....	25
4.2.2	Assembly overview	27
4.2.3	Transmission for the M EMC function	28
4.2.4	Agitator.....	29
4.3	Technical specifications.....	29
4.3.1	Technical data for the basic equipment.....	29
4.3.2	Technical data for the extensions.....	31
4.4	Special equipment.....	31
4.4.1	Extensions.....	31
4.4.2	Hopper cover.....	32
4.4.3	Hopper cover extension.....	32
4.4.4	Electric remote control of hopper cover.....	32
4.4.5	Auxiliary lighting.....	32
4.4.6	Operating lights.....	33
4.4.7	Stabilizing rollers.....	33
4.4.8	Limited/full border spreading system.....	33
4.4.9	Spreading width limiter.....	34
4.4.10	Sensor for the border strip spreading device.....	34
4.4.11	Two-way unit.....	34
4.4.12	Three-way unit.....	35
4.4.13	Tele-Space universal drive shaft.....	35
4.4.14	Universal drive shaft with star ratchet.....	35
4.4.15	Spreading vane set.....	35
4.4.16	Practice test kit.....	35
4.4.17	Fertilizer identification system.....	35
4.4.18	Spreading material chart.....	36
5	Axle load calculation	37
6	Transport without tractor	40
6.1	General safety instructions.....	40
6.2	Loading and unloading, parking.....	40
7	Commissioning	41
7.1	Accepting the machine.....	41
7.2	Tractor requirements.....	41
7.3	Mounting the universal drive shaft on the machine.....	42
7.3.1	Universal drive shaft with shearing pin protection.....	42
7.3.2	Mounting the transmission with radial pin clutch.....	45
7.3.3	Mounting the drive shaft guard.....	45
7.3.4	Dismounting the universal drive shaft.....	46
7.4	Installing the machine at the tractor.....	47
7.4.1	Preconditions.....	47
7.4.2	Mounting.....	48
7.5	Connecting the metering slide actuators.....	51
7.5.1	Connecting the hydraulic slide actuator:.....	51
7.6	Pre-setting the mounting height.....	53

7.6.1	Safety.....	53
7.6.2	Maximum admissible mounting height.....	54
7.6.3	Set the mounting height based on the fertilizer chart.....	54
7.7	Filling the machine.....	57
7.8	Using the fertilizer chart.....	58
7.8.1	Information on the fertilizer chart.....	58
7.9	Setting the GSE spreading width limiter.....	64
7.9.1	GSE PRO.....	64
7.10	Adjusting the TELIMAT full and limited border spreading unit.....	66
7.11	Settings for unlisted fertilizer types.....	69
8	Spreading operation.....	70
8.1	Safety.....	70
8.2	Instructions regarding the spreading operation.....	70
8.3	Using the fertilizer chart.....	72
8.4	Setting the application rate.....	72
8.5	Setting the working width.....	73
8.5.1	Selecting the correct spreading disc.....	73
8.5.2	Dismounting and mounting spreading discs.....	74
8.5.3	Adjusting the drop point.....	76
8.6	Checking the mounting height.....	78
8.7	Adjusting the power take-off shaft speed.....	78
8.8	Spreading at the headlands.....	78
8.9	Spreading with section control.....	80
8.10	Calibration test.....	81
8.10.1	Determining the output volume.....	82
8.10.2	Implementing the calibration test.....	85
8.11	Discharging residual material.....	88
8.12	Parking and unhitching the machine.....	89
9	Faults and possible causes.....	91
10	Maintenance and service.....	95
10.1	Safety.....	95
10.2	Wear parts and screw connections.....	97
10.2.1	Checking wear parts.....	97
10.2.2	Checking the bolted connections.....	97
10.2.3	Checking the screw connections of the weigh cells.....	97
10.3	Opening the protective grid in the hopper.....	99
10.4	Cleaning the machine.....	100
10.4.1	Disassemble the dirt deflector.....	101
10.4.2	Dismounting the dirt deflector.....	101
10.5	Checking the position of the spreading disc hub.....	101
10.6	Checking the agitator drive.....	102
10.7	Spreading vane replacement.....	105
10.8	Metering slide adjustment.....	107
10.9	Adjusting the drop point.....	110
10.10	Transmission oil.....	111

10.10.1	Quantities and types.....	111
10.10.2	Checking the oil filling level.....	111
10.10.3	Changing oil	112
10.11	Weigh cell lubrication.....	113
10.12	Drive shaft lubrication	114
10.13	Lubricating the upper and lower links.....	114
10.14	Lubricating the drop point adjustment.....	114
10.15	Lubricating links and bushes.....	114
11	Winterizing and preserving.....	115
11.1	Safety	115
11.2	Winterizing	115
11.3	Washing the machine	115
11.4	Preserving the machine.....	116
12	Disposal.....	118
12.1	Safety	118
12.2	Disposal of the machine.....	118
13	Appendix.....	119
13.1	Table of tightening torque.....	119
14	Guarantee and warranty.....	124

1 Intended use

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

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

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

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

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

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

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

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

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

■ **Foreseeable misuse**

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

2 User instructions

2.1 About this operator's manual

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

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

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

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

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

- Operation,
- Maintenance and cleaning,
- Troubleshooting.

In particular, the following is to be observed:

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

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

2.2 Structure of the operator's manual

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

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

2.3 Notes on text descriptions

2.3.1 Instructions and procedures

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

- ▶ Instructions step 1
- ▶ Instructions step 2

2.3.2 Lists

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

- Property A
- Property B

2.3.3 References

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

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

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

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

3 Safety

3.1 General information

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

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

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

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

3.2 Meaning of warnings

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

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

Symbol + **signal word**

Explanation

Level of danger of warnings

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

DANGER!

Type and source of danger

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

Ignoring these warnings will result in severe injury or death.

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

WARNING!

Type and source of danger

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

Ignoring these warnings leads to severe injury.

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

⚠ CAUTION!**Type and source of danger**

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

Ignoring these warnings leads to injury.

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

NOTICE!**Type and source of danger**

This warning warns of material and environmental damage.

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

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



This is an instruction:

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

3.3 General information on the safety of the machine

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

For this reason, the machine may only be operated:

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

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

3.4 Instructions for the operator

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

3.4.1 Qualifications of personnel

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

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

3.4.2 Instruction

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

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

3.4.3 Accident prevention

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

The following instructions must also be observed:

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

3.5 Information on operational safety

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

3.5.1 Parking the machine

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

3.5.2 Filling the machine

- Only fill the machine when the machine is mounted or attached to the tractor (depending on the machine)
- Only fill the machine when the engine of the tractor is shut off. Remove the ignition key in order to prevent the engine from being started.
- Make sure that there is adequate space on the filling side.
- Use suitable auxiliary equipment for filling the machine (e.g., front-end loader, screw conveyor).
- Observe the maximum permissible payload and the permissible total weight of the machine.
- Fill the machine no higher than the top-edge. Check the filling level.
- Only fill the machine with the protective grid closed. This way, faults during spreading caused by lumps in the spreading material or other foreign bodies are prevented.

3.5.3 Checks before commissioning the machine

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

- Is all safety equipment at the machine installed and functioning?
- Are all fasteners and load-bearing connections tightly installed and in good condition?
- Are the spreading discs and their fasteners in good condition?
- Are the protective grids in the hopper closed and locked?
- Are the test dimensions of the protective grid interlock within the proper range?
- Are there **no** persons in the danger zone of the machine?
- Is the universal drive shaft cover in good condition?

3.5.4 Hazard zone

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

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

The following figure displays the hazard zones of the machine.

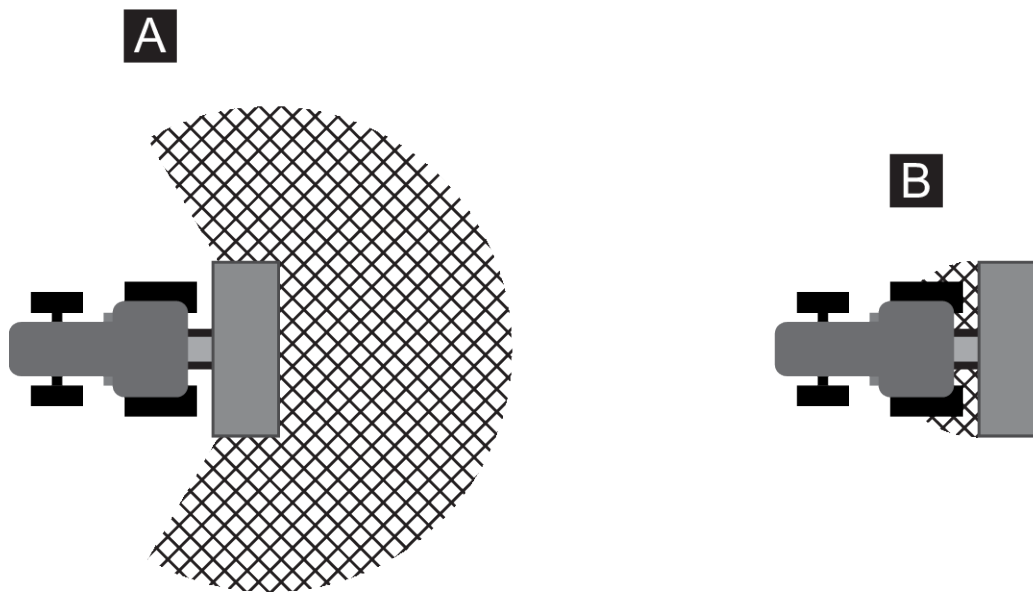


Fig. 1: Hazard zone when devices are attached

[A] Hazard zone in spreading operation

[B] Hazard zone when coupling/decoupling the machine

- Ensure that no persons are present in the spreading range [A] of the machine.
- Immediately stop the machine and the tractor if persons are present in the hazard zone of the machine.
- When coupling/decoupling the machine at the tractor or attaching/detaching the spreading unit, make sure that no one is present in the hazard zones [B].

3.5.5 Running operation

- In the event of malfunctions, the machine is to be shut down and secured immediately. Have the fault repaired immediately by qualified technicians.
- Do not climb on the machine while the spreader unit is running.
- Only operate the machine with the protective grids in the hopper closed. During operation, the protective grid must **neither be opened nor removed**.
- Rotating machine components can cause serious injury. Make sure that body parts or clothing never come close to rotating components.
- Do not deposit any parts (such as screws, nuts) in the hopper.
- Ejected spreading material may cause serious injury (e.g., to the eyes). For this reason, ensure that nobody is present in the spreading range of the machine.
- If the wind speed becomes too high, spreading has to be stopped as the specified spreading range cannot be guaranteed under such conditions.
- Do not climb on the machine or the tractor when it is situated beneath high-voltage electrical power lines.

3.6 Using fertilizer

Use of fertilizers, seeds or crop protection products

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

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

3.7 Hydraulics system

The hydraulic system is under high pressure.

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

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

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

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

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

3.8 Maintenance and service

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

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

3.8.1 Qualifications of maintenance personnel

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

3.8.2 Wear parts

- The maintenance and service intervals described in the present operator's manual are to be strictly adhered to at all times.
- Also observe the maintenance and service intervals for the supplied components. See the supplier documentation for the relevant intervals.
- We recommend having your dealer check the condition of the machine, particularly fastening components, safety-relevant plastic components, the hydraulic system, metering components and spreading vanes, after every working season.
- Spare parts must at least comply with the technical standards specified by the manufacturer. Compliance with technical requirements is ensured using original spare parts.
- Self-locking nuts are designed to be used only once. Always use new self-locking nuts to fasten components (e.g., when replacing spreading vanes).

3.8.3 Maintenance and service tasks

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

3.9 Safety in traffic

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

3.9.1 Checks before driving

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

- Is the vehicle within the permissible overall weight? Note the permitted axle load, the permitted braking load, and the permitted tire load capacity;
 - See 5 *Axle load calculation*
- Is the machine attached correctly?
- Can fertilizer be lost while traveling?
 - Observe the filling level of the fertilizer in the hopper.
 - The metering slides must be closed.
 - Switch off the electronic control unit.
- Check the tire pressures and the function of the tractor brake system.
- Do the lighting and labeling on the machine comply with the national regulations for operation on public roads? Ensure correct attachment.
- Is the boarding step folded away and locked / is the boarding step in the transport position (correct for the machine)?

3.9.2 Road travel with the machine

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

- Adapt your driving to the modified driving characteristics.
- When driving, always ensure that there is sufficient visibility. If vision is restricted (e.g. when reversing), another person is required to direct the driver.
- Observe the admissible maximum speed.
- Avoid sudden turns when driving uphill or downhill or across a slope. The change in the center of gravity may increase the danger of tipping. Special care is to be particularly applied when driving on uneven, soft ground (e.g. when entering fields, curbs).
- Arrest sideways movement of the lower link of the three-point linkage to prevent the machine from swinging.
- Passengers are prohibited on the machine during transport and operation.

3.10 Safety equipment, warnings and instructions

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

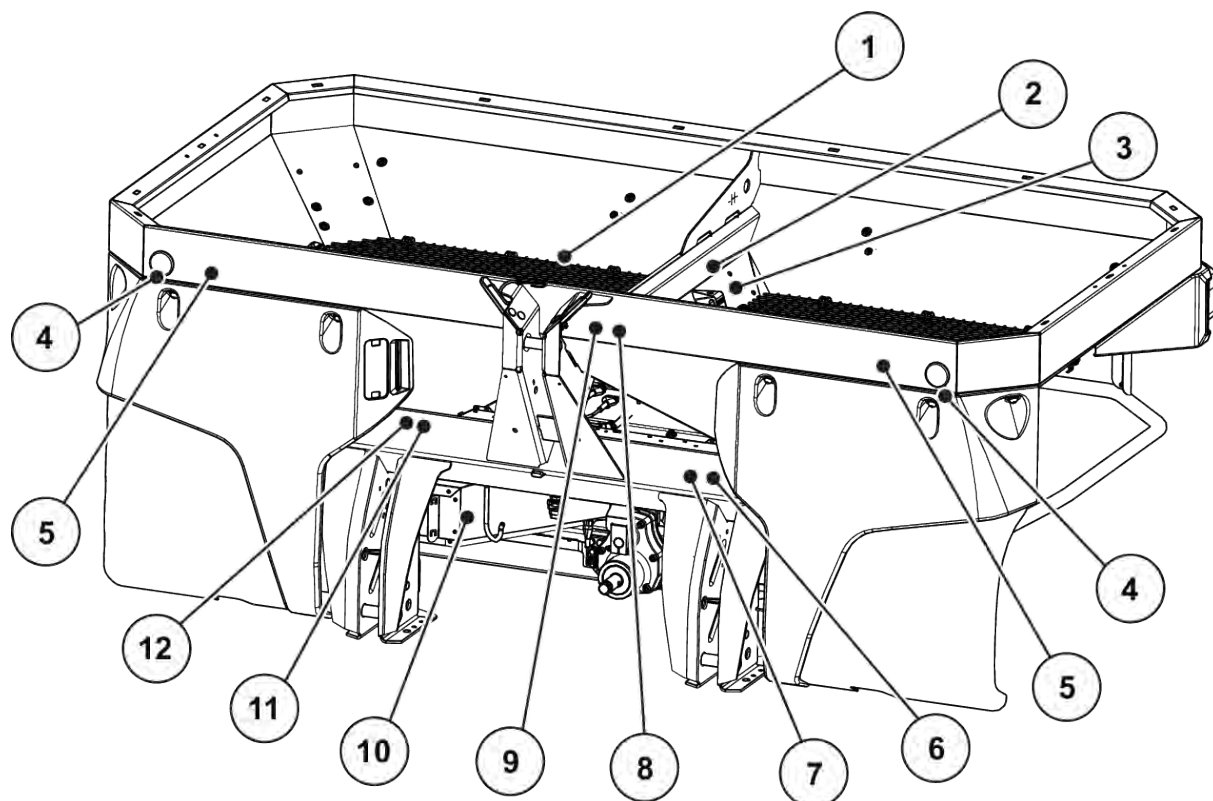


Fig. 2: Safety equipment, warning and instruction stickers, front

- | | |
|--|---|
| [1] Protective grid in hopper | [7] Instructions: Maximum payload |
| [2] Instructions: Protective grid lock | [8] Warning: Ejection of material |
| [3] Protective grid lock | [9] Warning: Read the operator's manual |
| [4] White reflectors | [10] Spreading disc cover |
| [5] Instructions: Mudguard interlock | [11] Homologation sign |
| [6] Instructions: PTO speed | [12] Nameplate |

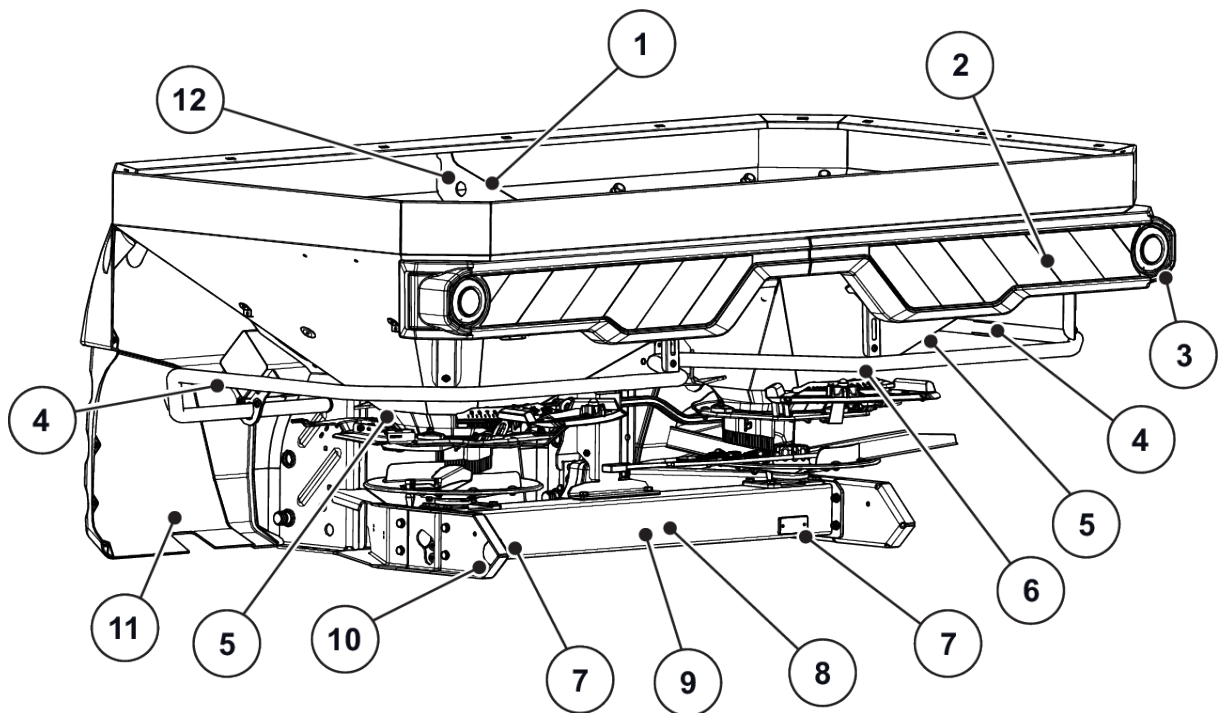


Fig. 3: Safety equipment, warning and instruction stickers, rear

- | | |
|---|--|
| [1] Instructions: Eyelet in the hopper | [7] Red rear reflectors |
| [2] Warning sign | [8] Warning: Withdraw the ignition key |
| [3] Lighting | [9] Warning: Moving parts |
| [4] Instructions: Prohibition of climbing | [10] Yellow side reflectors |
| [5] Warning: Crush hazard | [11] Spreading disc cover |
| [6] Deflector bracket | [12] Eyelet in the hopper |

- [1] Universal drive shaft guard

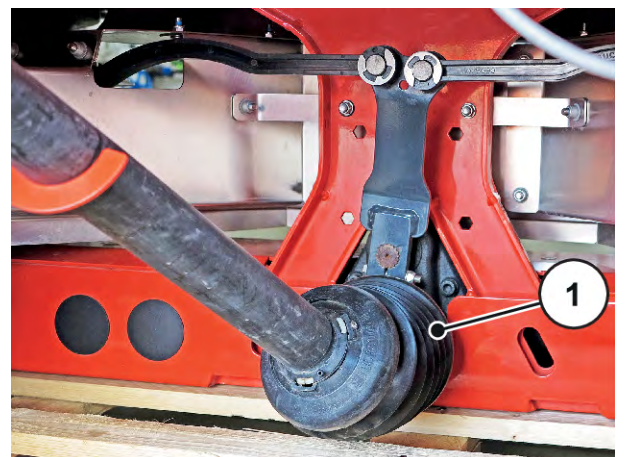


Fig. 4: Universal drive shaft

3.10.2 Function of safety equipment

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

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

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

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
	<p>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.</p>
	<p>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.</p>
	<p>Passenger transport prohibited Risk of slipping and injury. Do not climb on the machine during spreading and transport.</p>
	<p>Climbing prohibited Climbing on the deflector bracket is prohibited.</p>
	<p>Danger due to moving parts Danger of cutting off body parts It is prohibited to reach into the hazard zone of the metering slide. Switch off the engine and remove the key before carrying out maintenance, repair and adjustment work.</p>
	<p>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.</p>
	<p>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.</p>

Illustration	Description
	<p>Remove the ignition key. Switch off the engine and remove the key before carrying out maintenance and repair work. Disconnect the power supply</p>

3.11.2 Instruction stickers





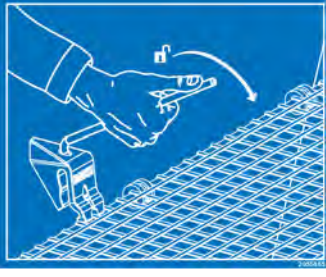
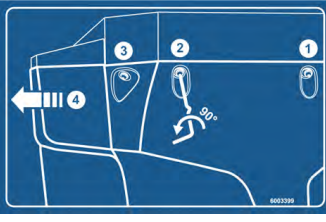


Illustration	Description
	<p>Eyelet in the hopper Labeling of the bracket for fixing the hoisting gear</p>
	<p>Lubrication point</p>
	<p>Rated speed of the PTO shaft The rated speed of the PTO shaft is 540 rpm.</p>
	<p>Maximum load capacity</p>

Illustration	Description
	<p>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.</p>
	<p>Dirt deflector lock</p>
	<p>Ban on splash water It is prohibited to splash water into the housing of the job computer and other electronic components.</p>
	<p>Spreading material chart on the app. For Android/iOS with DiS function With QR code for quick installation of the app</p>

3.12 Name plate and machine marking



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

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

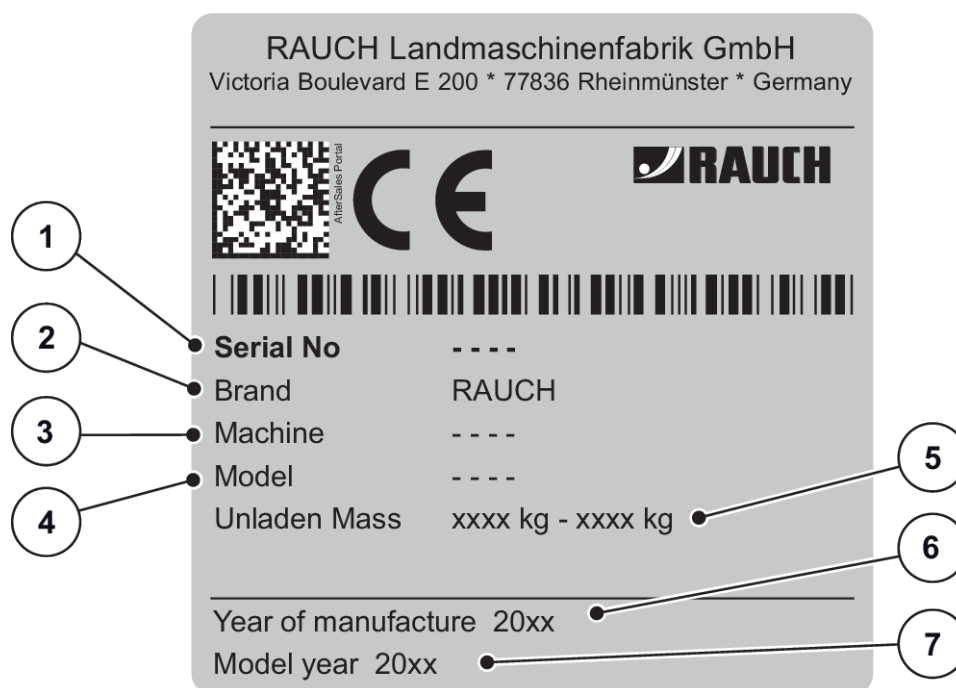


Fig. 5: Nameplate

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

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

3.13 Reflector

The machine is factory-equipped with a lighting system and front, rear, and side lighting (for attachment to the machine, please refer to *Fig. 2 Safety equipment, warning and instruction stickers, front*).

4 Machine data

4.1 Manufacturer

RAUCH Landmaschinenfabrik GmbH
Victoria Boulevard E 200
77836 Rheinmünster
Germany

Phone: +49 (0) 7229 8580-0

Fax: +49 (0) 7229 8580-200

4.2 Description of the machine

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

The machine consists of the following assemblies.

- 2-chamber hopper with agitator and outlets
- Frame and coupling points
- Drive elements (drive shaft and transmission)
- Metering elements (agitator, metering slide, application rate scale)
- Elements for adjusting the working width
- Safety equipment - See *Fig. 2 Safety equipment, warning and instruction stickers, front*

4.2.1 Versions



Some models are not available in all countries.



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

- If you require specific special equipment, ask your dealer or importer.

Machine variant	Drive			Metering slide actuation						VariSpread	
	Mechanical Transmission	Universal drive shaft with shear pin coupling	Universal drive shaft with star ratchet coupling	Remote-controlled electric actuator	Electronic Mass Flow Control (EMC)	Single-acting hydraulic cylinder	Dual-acting hydraulic cylinder	Speed Servos	VariSpread V2	VariSpread V8	
					QUANTRON-A	ISOBUS					
Q	•	•		•					•	•	
K	•	•					•			•	
D	•	•						•		•	
C	•	•		•						•	
W	•	•		•							
EMC			•		•					•	
EMC + W			•		•				•	•	
EMC ISOBUS			•			•			•	•	
EMC+W ISOBUS			•			•			•	•	

4.2.2 Assembly overview

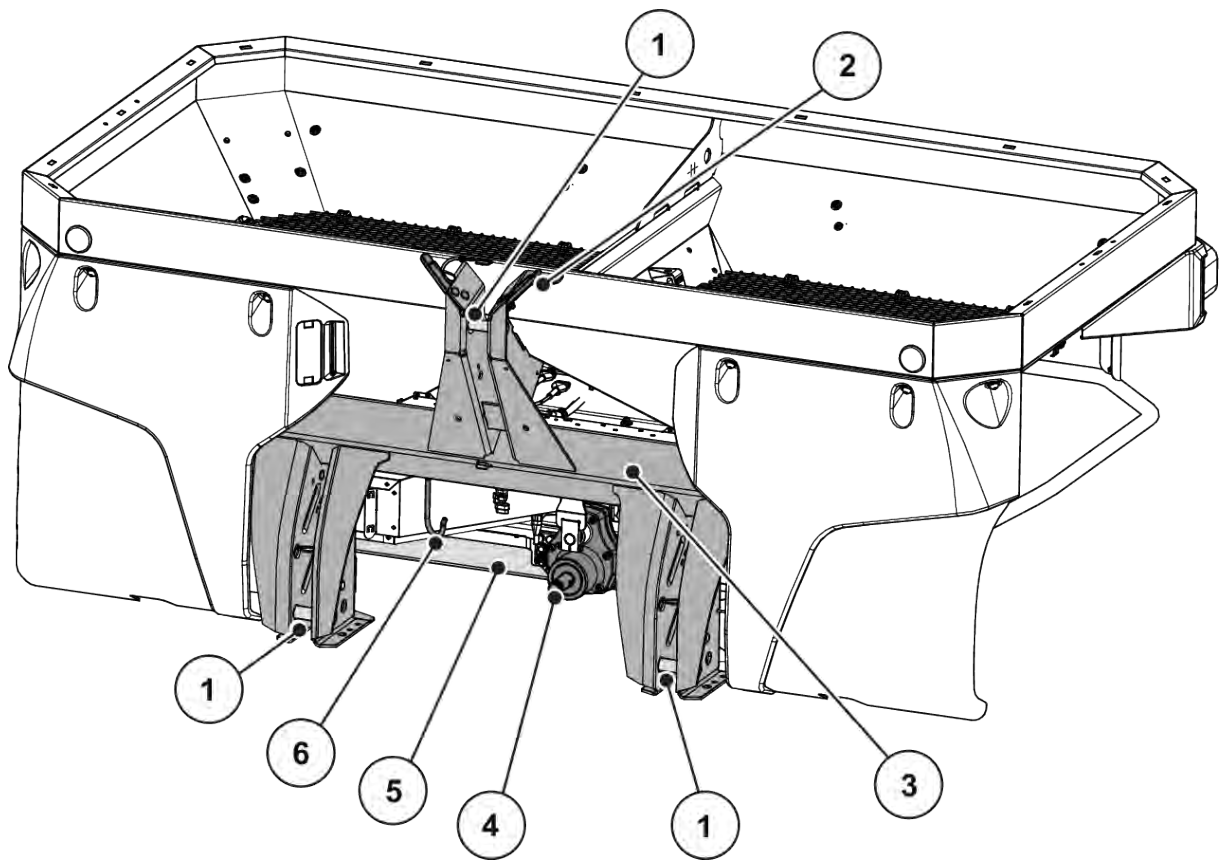


Fig. 6: Assembly overview: Front

- | | |
|---|--|
| [1] Storage facility for hoses and cables | [4] Drive spigot |
| [2] Coupling points | [5] Transmission |
| [3] Frame | [6] Universal drive shaft mounting bracket |

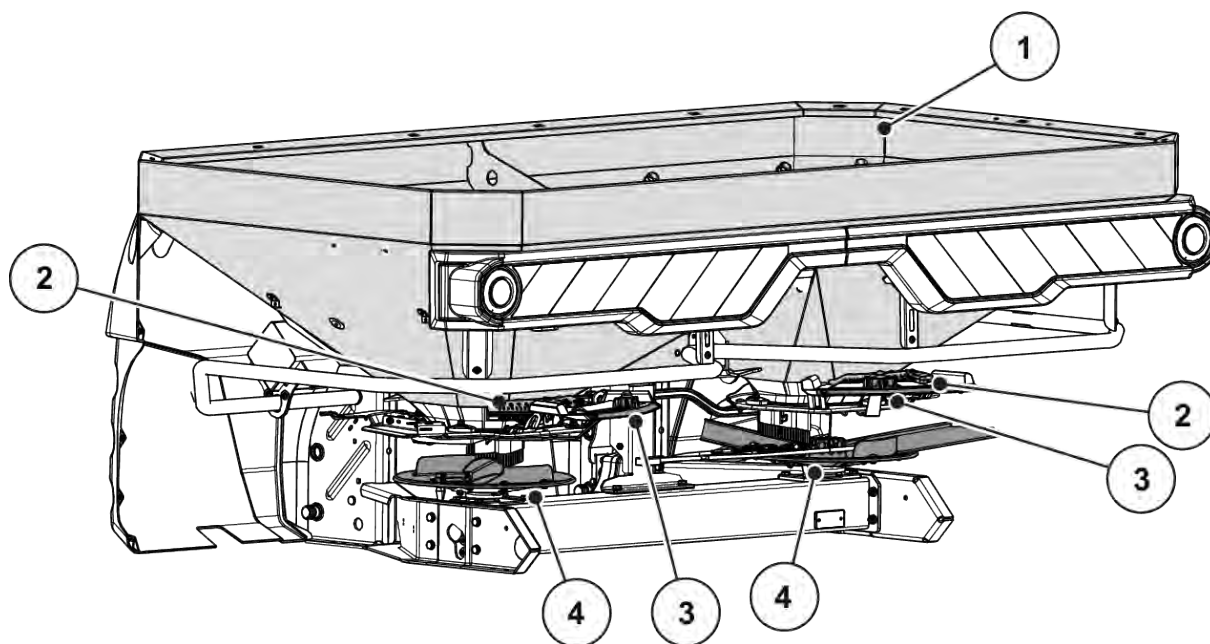


Fig. 7: Assembly overview: Rear

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

4.2.3 Transmission for the M EMC function

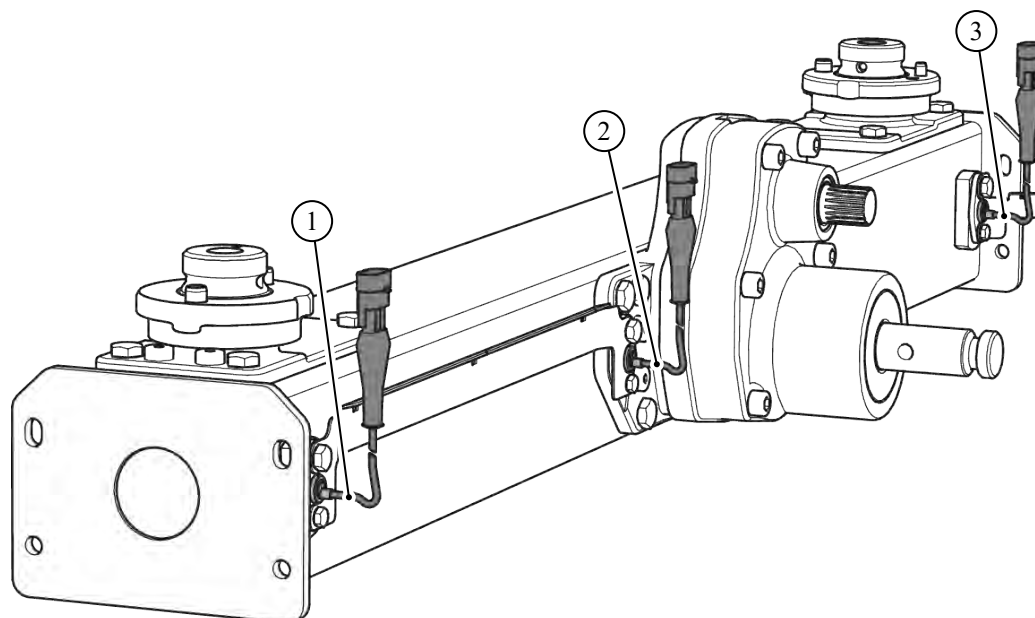


Fig. 8: Mass flow control by measuring the torque of the spreading discs

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

4.2.4 Agitator

- [1] Metering slide
- [2] Agitator

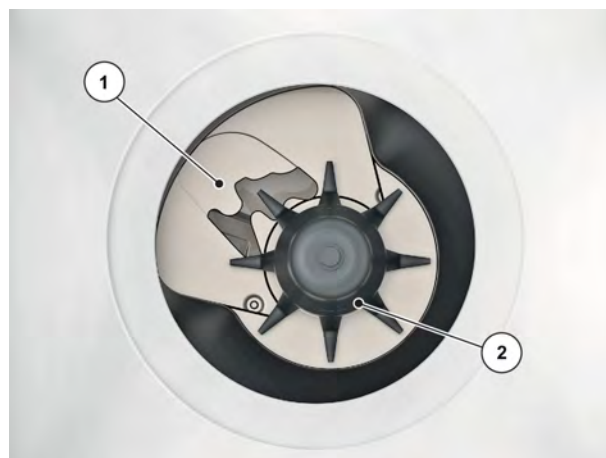


Fig. 9: Agitator

4.3 Technical specifications

4.3.1 Technical data for the basic equipment

■ Dimensions

Data	AXIS-M 20.2 AXIS-M 20.2 EMC
Overall width	240 cm
Overall length	141,5 cm
Filling level (Basic machine)	95 cm
Distance between center of gravity and the lower link point	65,5 cm
Filling width	230
Working width ¹	12-36 m
PTO speed	min. 450 rpm
	max. 650 rpm
Hopper capacity	1400 l
Mass flow ² max.	500 kg/min
Hydraulic pressure max.	200 bar

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

²) Max. mass flow depending on fertilizer type

Data	AXIS-M 20.2 AXIS-M 20.2 EMC
Sound pressure level ³ (measured in the closed driver's cab of the tractor)	75dB(A)

Data	AXIS-M 20.2 EMC + W
Overall width	240 cm
Overall length	145 cm
Filling level (Basic machine)	95 cm
Distance between center of gravity and the lower link point	72,5 cm
Filling width	230 cm
Working width ⁴	12-36 m
PTO speed	
	min. 450 rpm
	max. 650 rpm
Hopper capacity	1400l
Mass flow ⁵ max.	500 kg/min
Hydraulic pressure max.	200 bar
Sound pressure level ⁶ (measured in the closed driver's cab of the tractor)	75 dB(A)

³) Since the sound pressure level of the machine can only be determined when the tractor is running, the actual measured value is greatly dependent on the type of tractor being used.

⁴) Working width depending on fertilizer type and spreading disc type

⁵) Max. mass flow depending on fertilizer type

⁶) 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.

■ Weights and loads



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

Data	AXIS-M 20.2	AXIS-M 20.2 + W
Empty weight	300 kg	365 kg
Fertilizer payload	2300 kg	

4.3.2 Technical data for the extensions

	L603	L800	XL1103	XL1300
Change in capacity	+ 600 l	+ 800 l	+ 1100 l	+ 1300 l
Change in filling height	0	+ 26 cm	+ 24 cm	+ 38 cm
Max. extension size	240 x 130 cm		280 x 130 cm	
Extension weight	30 kg	45 kg	60 kg	65 kg
Comment	3-sided	4-sided	3-sided	4-sided

4.4 Special equipment



We recommend that the extra equipment should be fitted and mounted on the basic machine by the supplier or a specialist workshop.



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.

- If you require specific special equipment, ask your dealer or importer.

4.4.1 Extensions

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

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



For an overview of attachments: see chapter 4.3.2 *Technical data for the extensions*

4.4.2 Hopper cover

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

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

Hopper tarpaulin	Application
AP-L-25.2, fold-away	<ul style="list-style-type: none"> Basic machine Attachment: L603⁷, L800, L1500
AP-XL-25.2, fold-away	<ul style="list-style-type: none"> Attachment: XL1103⁷, XL1300, XL 1800

4.4.3 Hopper cover extension

For the attachments L603 and XL1103, hopper cover extensions are required in addition to the hopper covers.

Hopper cover extension	Application
APE-L-25	<ul style="list-style-type: none"> Attachment: L603
APE-XL-25	<ul style="list-style-type: none"> Attachment: XL1103

4.4.4 Electric remote control of hopper cover

■ AP-Drive

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

4.4.5 Auxiliary lighting

The machine can be fitted with auxiliary lighting.

⁷⁾ An additional hopper tarpaulin is necessary for this attachment

Lighting	Application
BLF 25.2	<ul style="list-style-type: none"> • Front lighting • with warning sign • for wide attachments



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

- If you require specific rear lighting, ask your dealer or importer.



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

- Observe the traffic regulations for your country.

4.4.6 Operating lights

■ *SpreadLight*

Only for machines with electronic control unit

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

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

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

4.4.7 Stabilizing rollers

■ *ASR 25*

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

The stabilizing rollers consist of two castors at the front and two fixed rollers without brakes at the rear.

4.4.8 Limited/full border spreading system

■ *TELIMAT T25*

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

The TELIMAT system is activated from the terminal and is controlled by an electrical positioning cylinder.

4.4.9 Spreading width limiter

■ GSE PRO

Basic settings for limiting the width of spread within the range between approx. 1 m and 2 m from the center line of the tractor to the outer edge of the field (driving track widths 2-4 m).



The GSE spreader setting can be increased so as to limit the width of spread more closely. It is not recommended to reduce the GSE spreader setting by more than one point.

Type of fertilizer	Disc	GSE disc setting
Fertilizer in the form of round pellets with good flow characteristics, such as KAS, NPK, PK, SSA coarse	S1, S2	0
	S4	0
	S6	0
	S8	3
	S12	2
Type of fertilizer with angular grains with poor flow characteristics, such as potassium, SSA fine grain	S1, S2	0
	S4	0
	S6	0
	S8	1
	S12	0
Lightweight fertilizers with a bulk density less than 0.9 kg/l, such as urea, organic fertilizers	S1, S2	0
	S4	0
	S6	0
	S8	0
	S12	0

4.4.10 Sensor for the border strip spreading device

■ GSE sensor

Position indicator for the border strip spreading device in the QUANTRON A control unit or the ISOBUS terminal

4.4.11 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.

4.4.12 Three-way unit

■ DWE 25

This allows variant K machines with the border spreading device TELIMAT to be connected to tractors with only a single-acting control valve.

4.4.13 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.

4.4.14 Universal drive shaft with star ratchet

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

4.4.15 Spreading vane set

The purpose of the spreading vane set is to spread the grains of fertilizer. The spreading vane for the grains of fertilizer supersedes the short spreading vane on the left and right spreading disc.

Set	Application
Z14	Spreading disc S4
Z16	Spreading disc S6
Z18	Spreading disc S8

4.4.16 Practice test kit

■ XCheck

For checking the cross-distribution in the field.



Fig. 10: XCheck optional equipment

4.4.17 Fertilizer identification system

■ FIS

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

4.4.18 Spreading material chart

The latest spreading material charts can now be accessed at any time online or via the Fertilizer Chart app.

5 Axle load calculation

! WARNING!

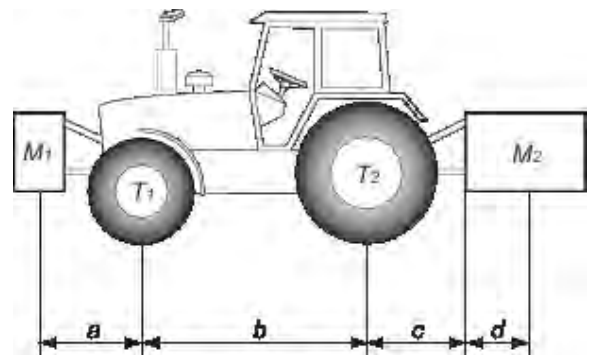
Overload

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.
- When lifting the machine, do so via the crane attachment eyes in the hopper (if present).
- The person responsible for transportation must ensure 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 AXIS series
- 1 AXIS-M 20.2 operator's manual
- 1 calibration kit comprising chute and calculator
- Lower link and upper link pins
- Spreading disc set (according to order)
- 1 universal drive shaft (including operator's manual)
- 1 agitator
- Protective grid in hopper
- Variant Q or W: QUANTRON-A control unit(including operator's manual)
- Variant C: E-CLICK control unit(including operator's manual)
- Control unit QUANTRON-A M EMC or ISOBUS terminal with AXIS EMC ISOBUS machine controls (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 AXIS series, the tractor must meet the necessary mechanical, hydraulic, and electrical requirements.

- Universal drive shaft connection: 1 3/8 inches, 6-part, 540 rpm or 1000 rpm
- Three-point linkage category I or category II. (depending on the type)
- Three-point linkage category I N is also available as special equipment.
- Operating voltage: 12 V
- **Oil supply** (hydraulic drive):
 - 1 single-acting control valve
 - 1 free return
 - Oil supply: Max. 200 bar

7.3 Mounting the universal drive shaft on the machine

⚠ WARNING!

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

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

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

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

- ✓ Check the mounting position. The drive shaft end that is marked with a tractor symbol must point to the tractor.

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

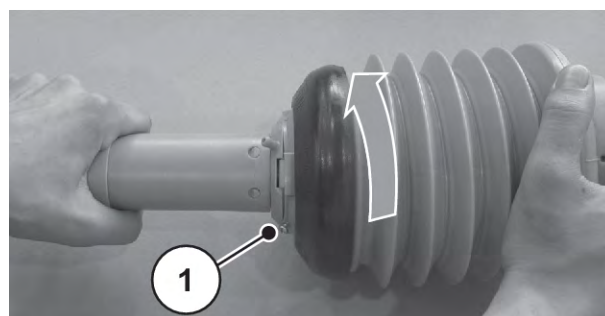


Fig. 11: Loosening the universal drive shaft guard

7.3.1 Universal drive shaft with shearing pin protection

- ▶ Slacken the grease nipple.



Fig. 12: Slacken the grease nipple

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

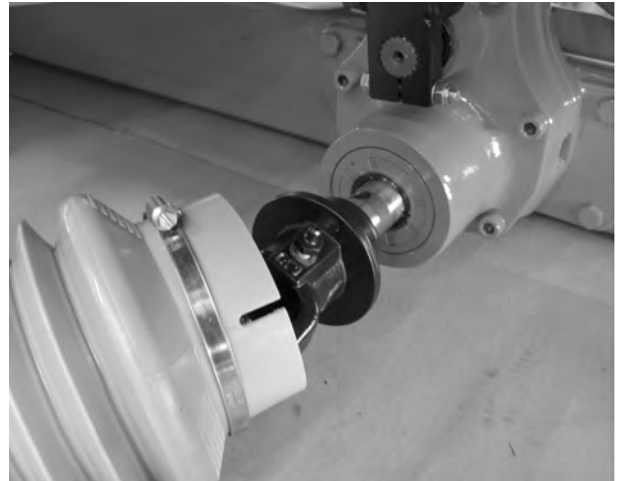


Fig. 13: Pushing the universal drive shaft on to the transmission spigot

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



Fig. 14: Fastening the universal drive shaft

- ▶ Retighten the grease nipple.

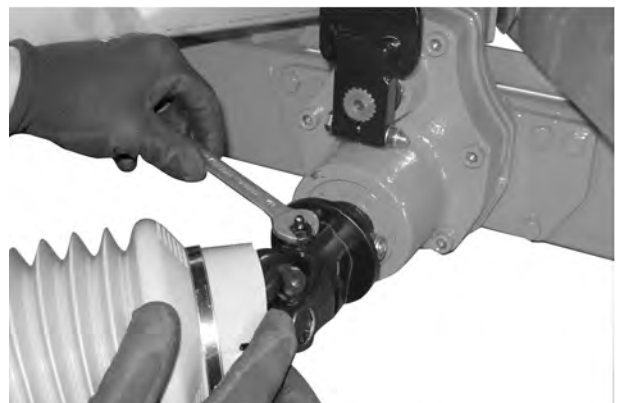


Fig. 15: Tighten the grease nipple

- ▶ 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.

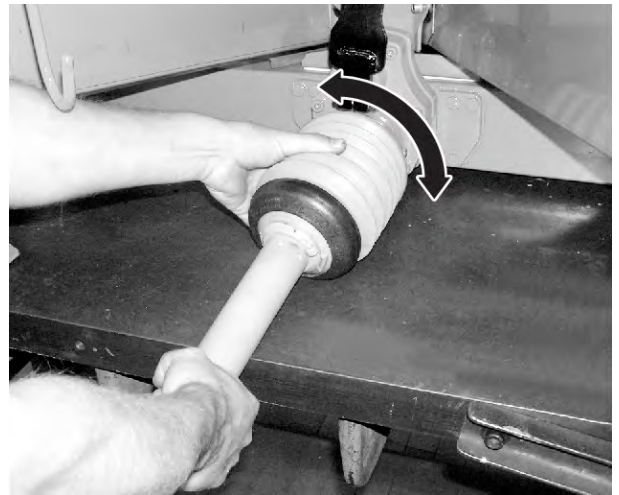


Fig. 16: Attaching the universal drive shaft guard

- ▶ Tighten the locking screw.
- ▶ Tighten the hose clamp.

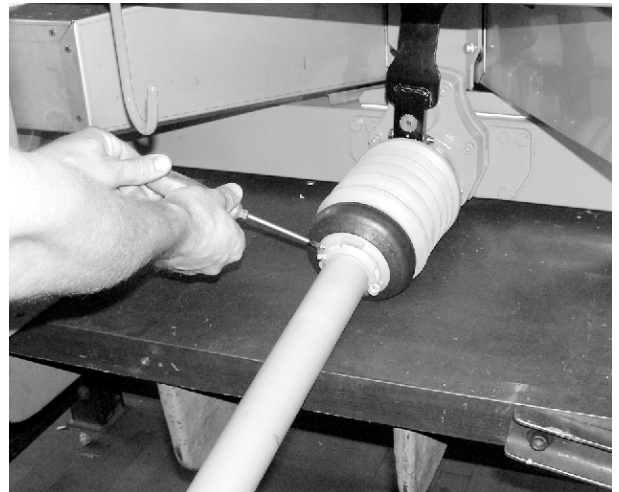


Fig. 17: Securing the universal drive shaft cover

7.3.2 Mounting the transmission with radial pin clutch

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

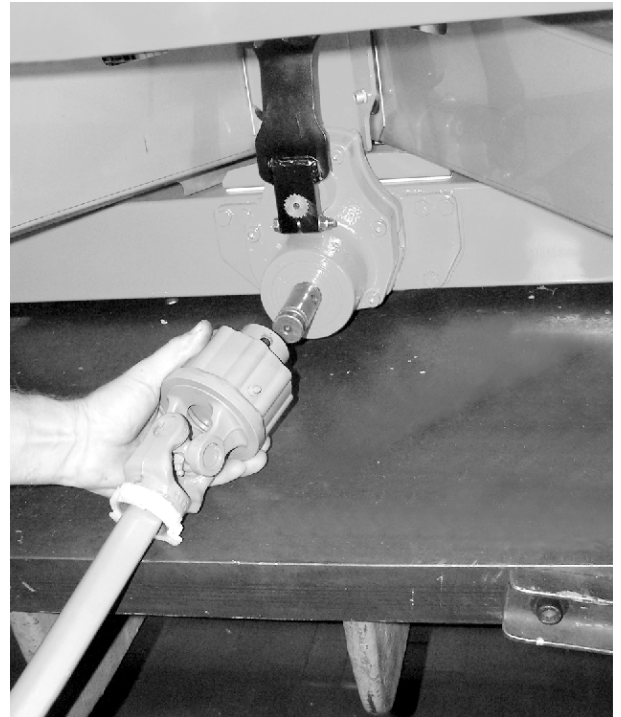


Fig. 18: Pushing the universal drive shaft on to the transmission spigot

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

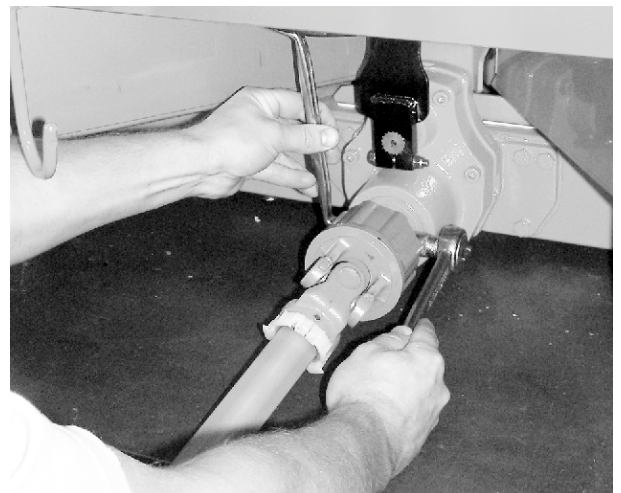


Fig. 19: Fastening the universal drive shaft

7.3.3 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.

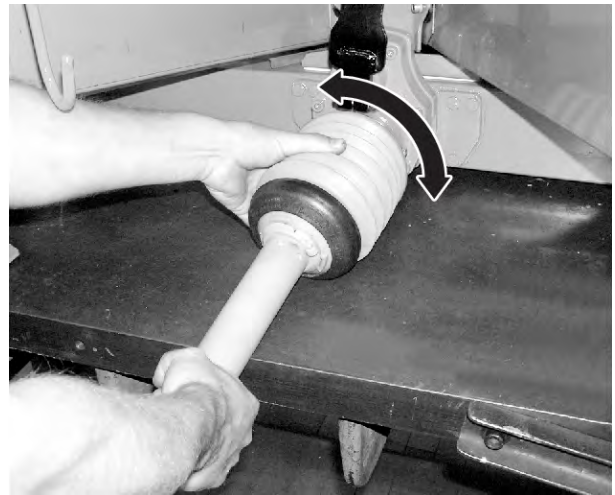


Fig. 20: Attaching the universal drive shaft guard

- ▶ Tighten the hose clamp.

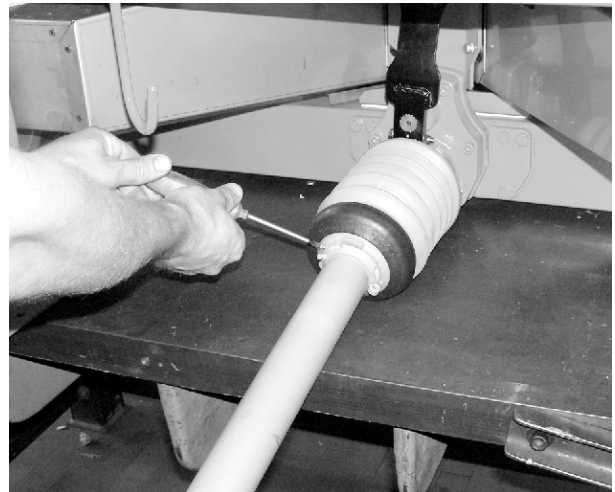


Fig. 21: Securing the universal drive shaft cover

7.3.4 Dismounting the universal drive shaft

■ *Instructions for dismounting*

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

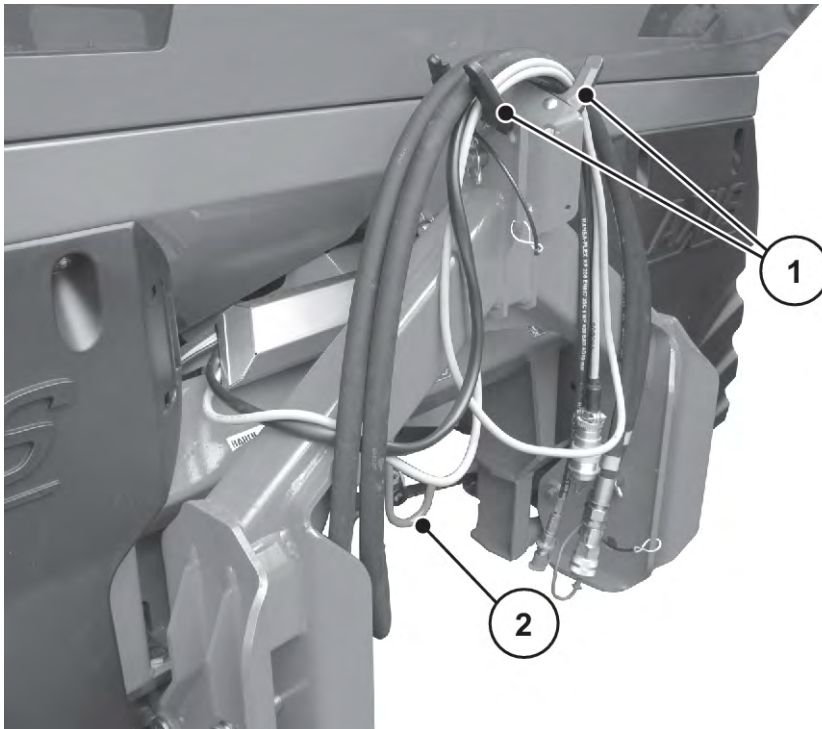


Fig. 22: Storage of the cables and hydraulic hoses

[1] Bracket for hoses and cables

[2] Drive shaft bracket

7.4 Installing the machine at the tractor

7.4.1 Preconditions

⚠ DANGER!

Danger to life due to unsuitable tractor

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

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

In particular check the following 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.

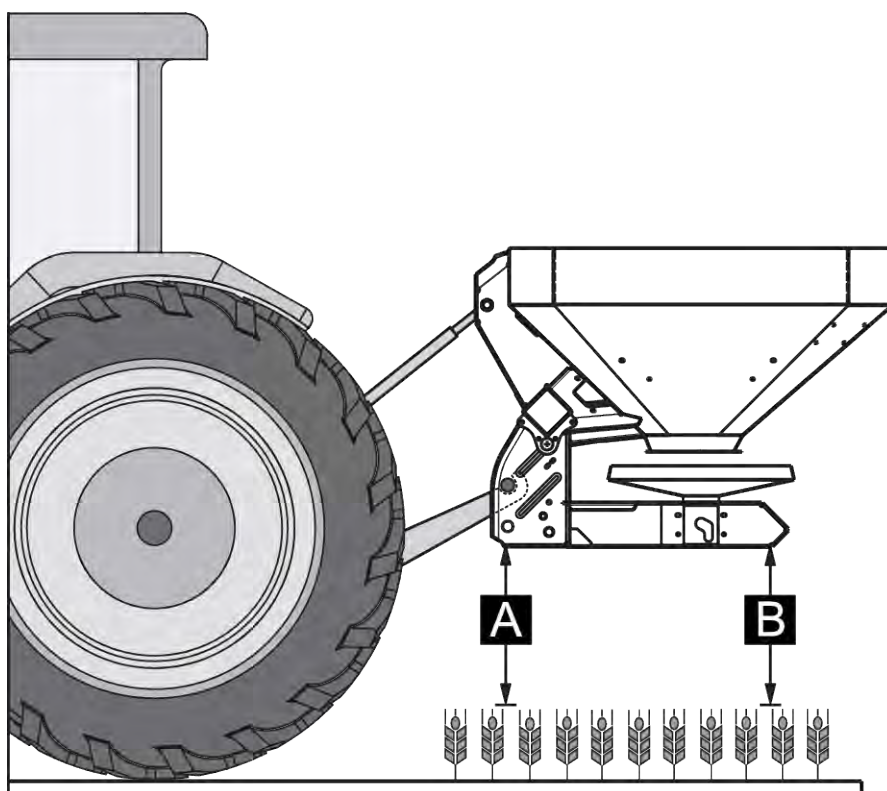


Fig. 23: Mounting position

Mounting instructions

- The machine can be connected to a tractor with category III linkage only with category II clearance. Use reducing sleeves.
- The bottom and upper link pins must be secured with lynch pins or spring clips.
- Attach the machine according to the values in the spreading material chart. This guarantees the correct lateral 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.

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.
- ▶ Connect the electric and hydraulic metering slide actuators and the lighting (refer to 7.5 *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 7.8 *Using the fertilizer chart*

The machine is attached to the tractor.

7.5 Connecting the metering slide actuators

7.5.1 Connecting the hydraulic slide actuator:

■ Variant K/D

Tractor requirements

- Variant K: two **single-acting** control valves
- Variant D: two **double-acting** control valves

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.

Variant	Hydraulic cylinders	Function
K	Single-acting hydraulic cylinder	<ul style="list-style-type: none"> • The oil pressure closes. • The spring force opens.
D	Double-acting hydraulic cylinder	<ul style="list-style-type: none"> • 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.
 - ▷ If the hoses are too short, replace them with longer ones (0.5 mm orifice required).
- ▶ Insert the hoses into the corresponding couplings on the tractor.



Variant 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.

■ **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.

■ **Variant Q/W/EMC**



The variant Q machines are equipped with an electronic metering slider actuator.

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

7.6 Pre-setting the mounting height

7.6.1 Safety

DANGER!

Danger of crushing by the machine falling

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

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

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

WARNING!

Risk of injury from rotating spreading discs

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

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

General instructions before setting the mounting height

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



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

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

NOTICE!

Incorrect machine settings

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

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

7.6.2 Maximum admissible mounting height

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

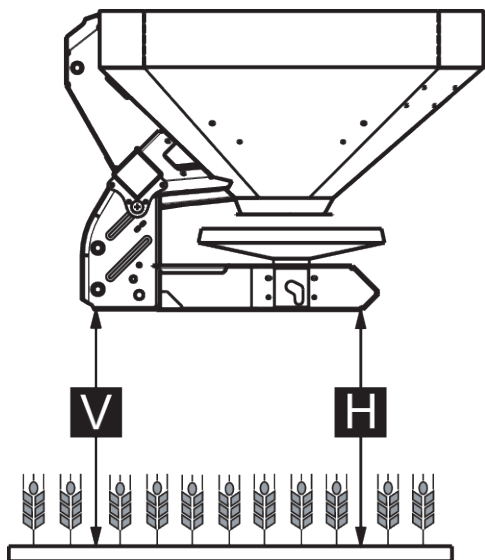


Fig. 24: Maximum admissible mounting height during normal and late fertilizing

The maximum admissible mounting height depends on the following factors:

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

7.6.3 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).

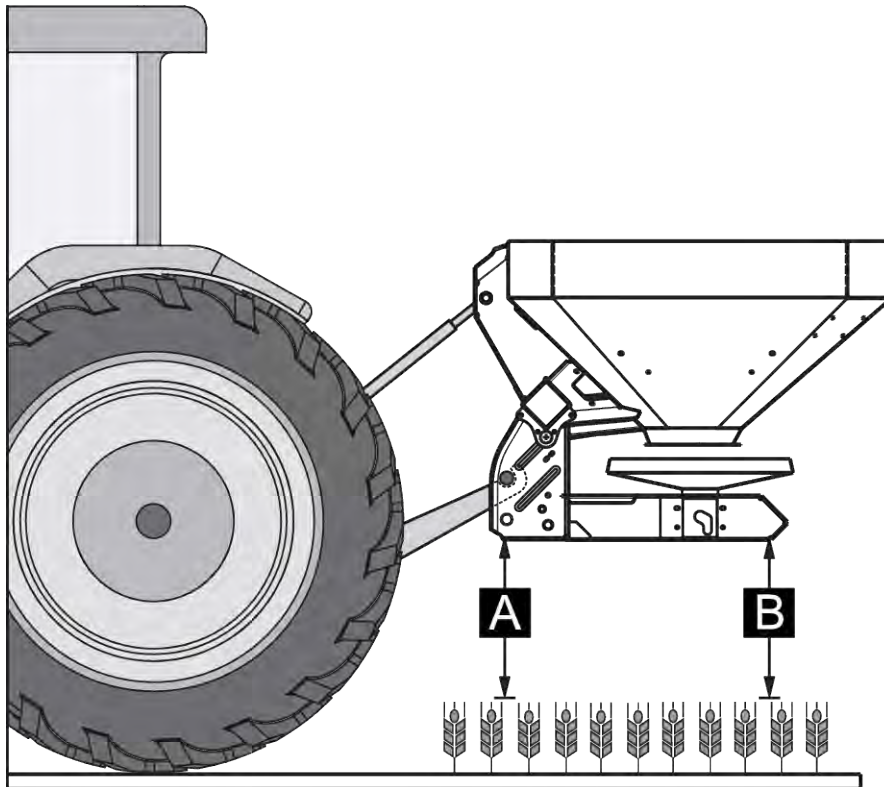


Fig. 25: Mounting position and height during normal fertilizing

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

The following applies:

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

Setting the mounting height during late fertilizing

- ✓ The machine is installed at the highest connecting point of the upper link at the tractor.
- ✓ The lower link of the tractor is installed at the **upper coupling point of the lower link** of the machine.
- ▶ Determine the mounting heights **A** and **B** (above crop height) 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).

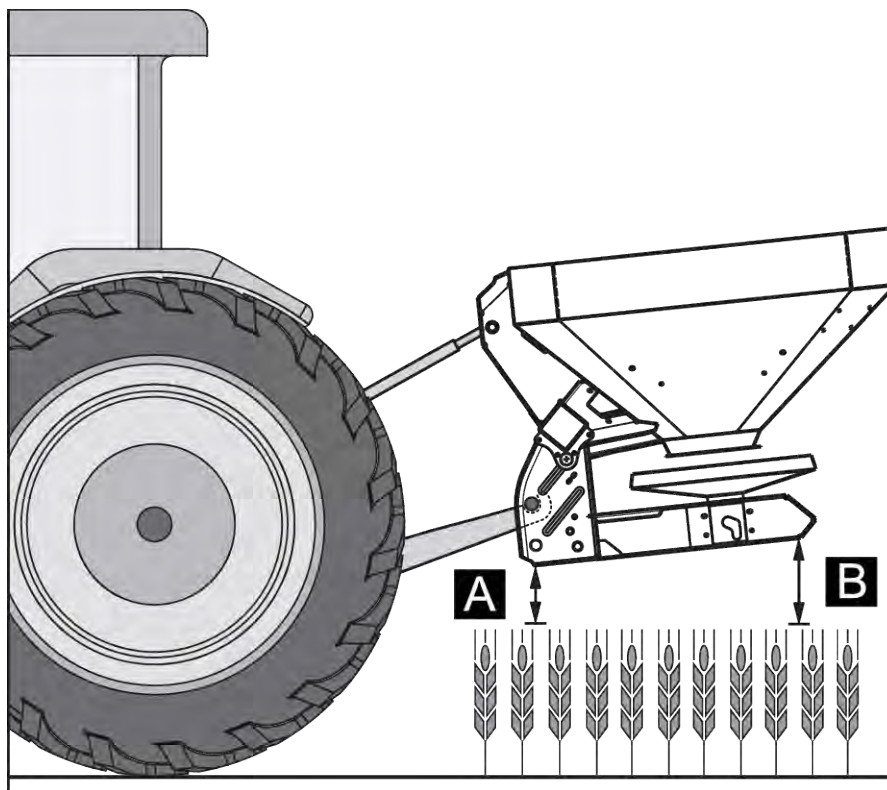


Fig. 26: Mounting position and height during late fertilizing

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

The following applies:

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



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

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

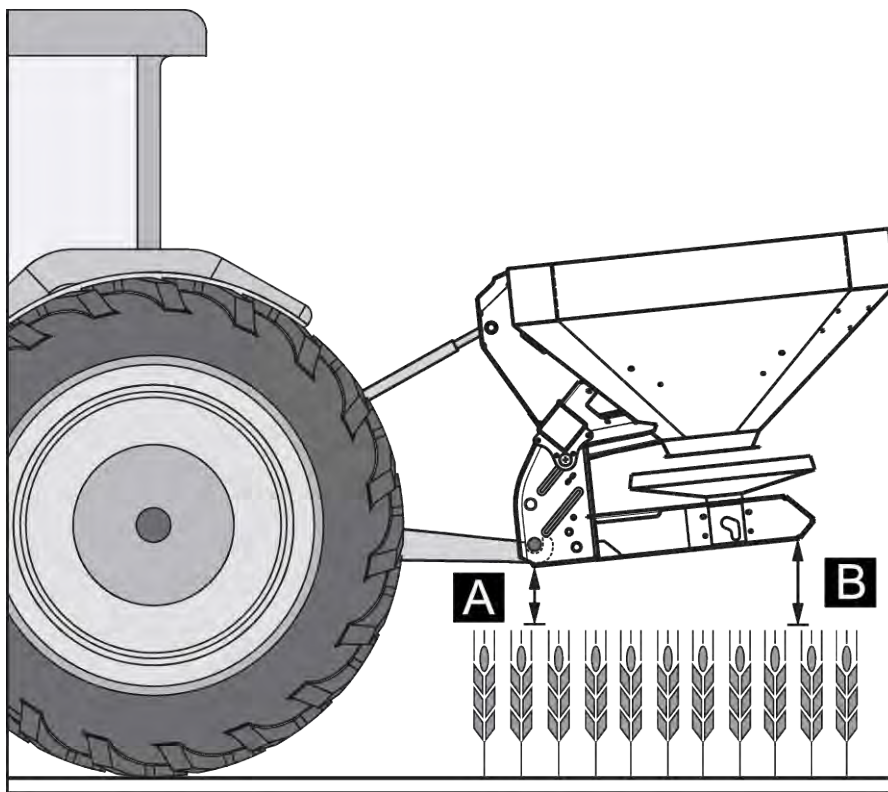


Fig. 27: Attachment of the machine on the lower coupling point of the lower link

The following applies:

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

7.7 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 4.3.1.2 *Weights and loads*.
- ▶ 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.

7.8 Using the fertilizer chart

7.8.1 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 (4.4.16 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 for 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 spreading of fertilizer:**

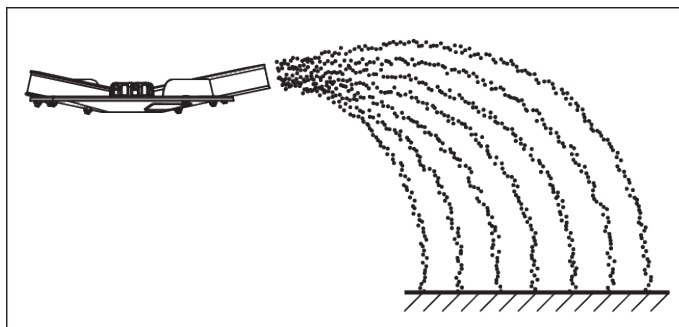


Fig. 28: Field spreading during normal fertilizing

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	KAS BASF
Application rate	300 kg/ha

Specified parameters

Working width	24 m
Forward speed	12 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)
Discharge point	6
Metering slide adjustment	180
Type of spreading disc	S4
PTO speed	540 rpm

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

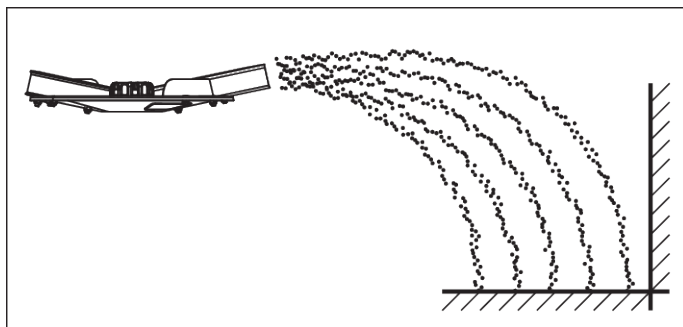


Fig. 29: Limited border spreading during normal fertilizing

During limited border spreading in normal fertilizing mode, almost no fertilizer crosses the field border. Underfertilization at the field boundary must be accepted in this case.

Specified parameters

Type of fertilizer	KAS BASF
Application rate	300 kg/ha
Working width	24 m
Forward speed	12 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)
Discharge point	6

Metering slide adjustment	180 left, 150 right ⁸
Type of spreading disc	S4
PTO speed	540 rpm
Setting the border spreading unit TELIMAT	K12.5

■ **Example of border spreading during normal spreading of fertilizer**

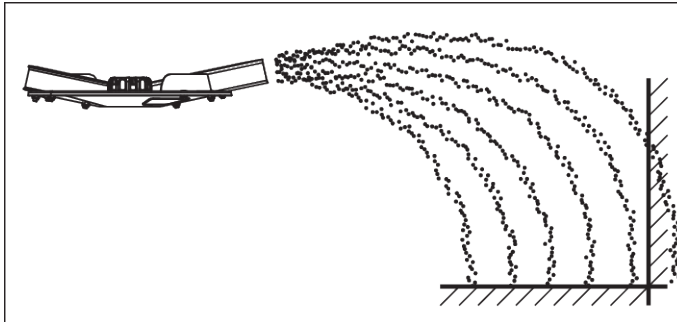


Fig. 30: Border spreading during normal fertilizing

Border spreading in normal fertilizing mode refers to a spreading technique in which a little fertilizer lands beyond the border of the field. Therefore there is just a slight under-fertilization at the field boundary.

Specified parameters

Type of fertilizer	KAS BASF
Application rate	300 kg/ha
Working width	24 m
Forward speed	12 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)
Discharge point	6
Metering slide adjustment	180
Type of spreading disc	S4
PTO speed	540 rpm
Setting the border spreading unit TELIMAT	S13

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

⁸⁾ Recommendation for reducing the quantity by 20 % of the value listed on the distribution limits page.

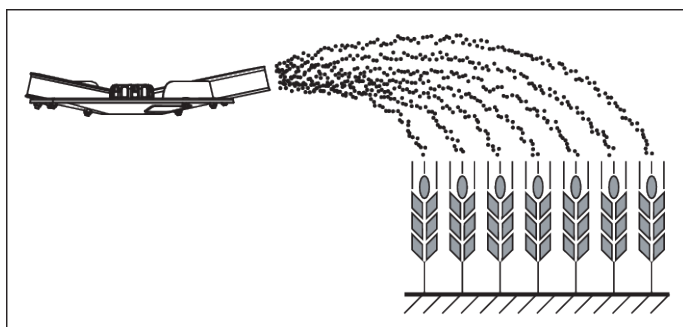


Fig. 31: Field spreading during late fertilizing

During field spreading in late 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	KAS BASF
Application rate	150 kg/ha
Working width	24 m
Forward speed	12 km/h

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)
Discharge point	6.5
Metering slide adjustment	90
Type of spreading disc	S4
PTO speed	540 rpm

■ Example of spreading on the border strip during late fertilizing:

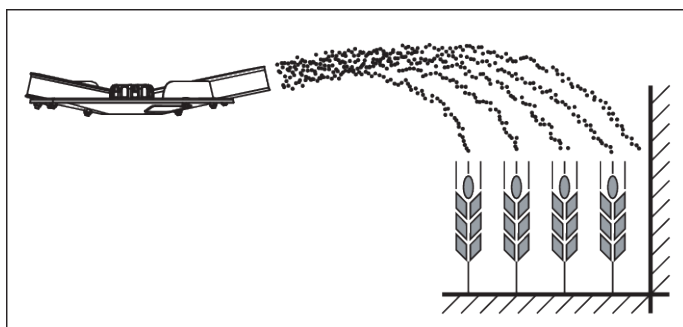


Fig. 32: Border spreading during late fertilizing

During border spreading in normal fertilizing mode, almost no fertilizer crosses the field border. Underfertilization at the field boundary must be accepted in this case.

Specified parameters

Type of fertilizer	KAS BASF
Application rate	150 kg/ha
Working width	24 m
Forward speed	12 km/h

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)
Discharge point	6.5
Metering slide adjustment	90 left, 72 right ⁹
Type of spreading disc	S4
PTO speed	540 rpm
Setting the border spreading unit TELIMAT	K12.5

■ Example of border spreading during late fertilizing

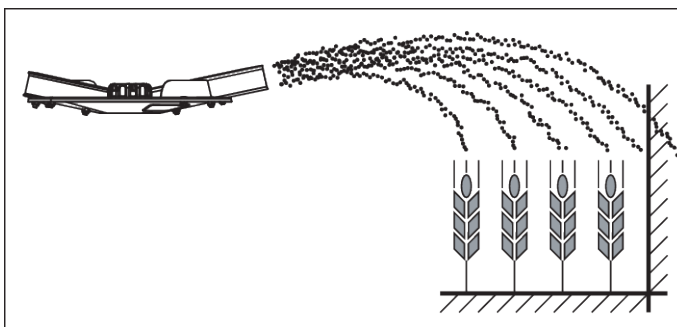


Fig. 33: Border spreading during late fertilizing

Border spreading in normal fertilizing mode refers to a spreading technique in which a little fertilizer lands beyond the border of the field. Therefore there is just a slight under-fertilization at the field boundary.

Specified parameters

Type of fertilizer	KAS BASF
Application rate	300 kg/ha

⁹⁾ Recommendation for reducing the quantity by 20 % of the value listed on the distribution limits page.

Specified parameters

Working width	24 m
Forward speed	12 km/h

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)
Discharge point	6.5
Metering slide adjustment	90 left hand
Type of spreading disc	S4
PTO speed	540 rpm
Setting the border spreading unit TELIMAT	S13

7.9 Setting the GSE spreading width limiter

7.9.1 GSE PRO

The border spreading unit is a device for limiting the width of spreading (on either the left or the right) to a range between approx. 1 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.
- ▶ 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.



The settings for the border spreading unit refer to the **spreading disc delivering towards the inner area of the field.**

The GSE spreader setting can be increased so as to limit the width of spread more closely. It is not recommended to reduce the GSE spreader setting by more than one point.

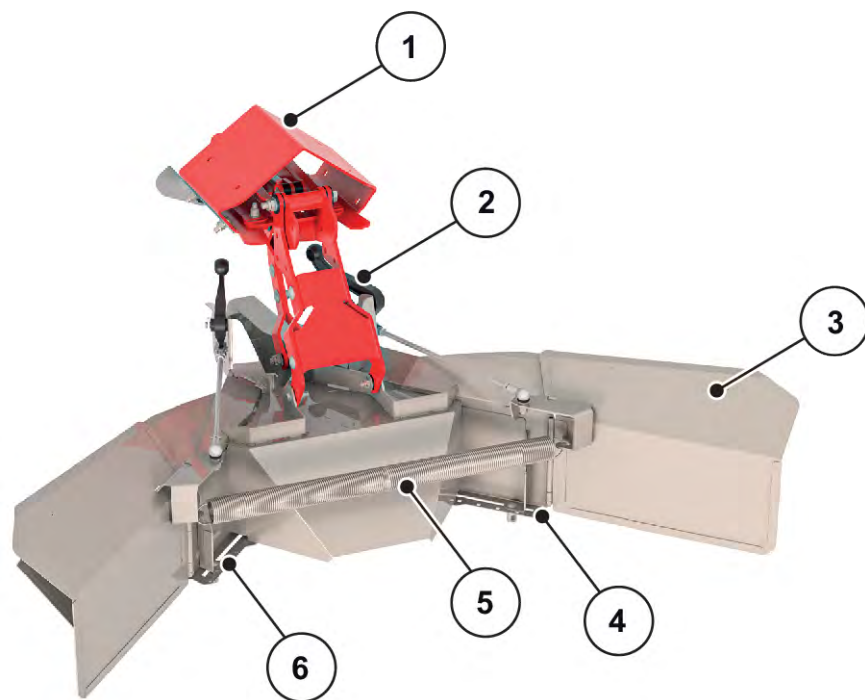


Fig. 34: Setting the border spreading unit

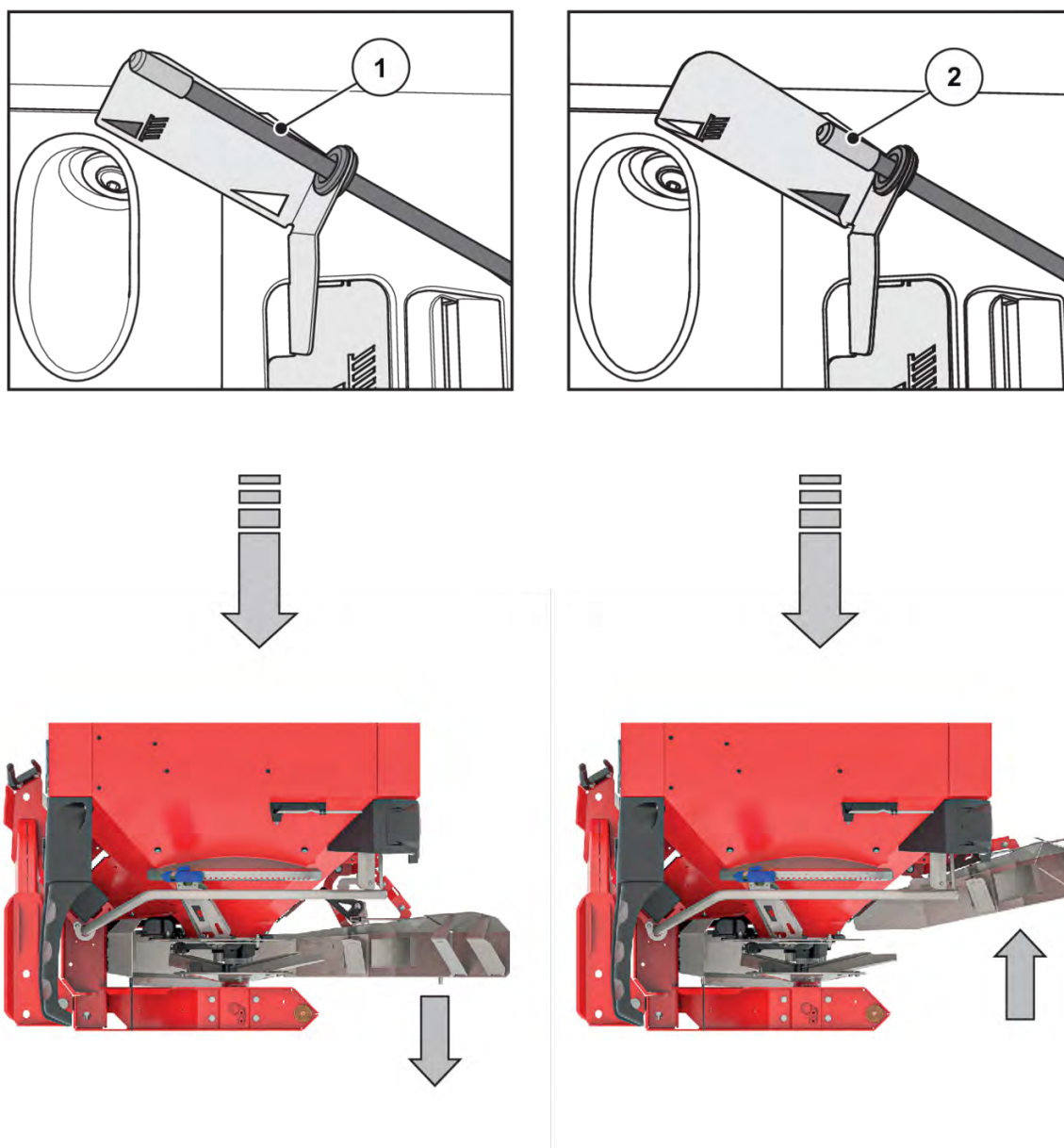
- | | |
|--|---------------------------------------|
| [1] Adapter plate | [4] Numeric scale with locknut, right |
| [2] Changeover lever (automatic) for the spreading width limiter | [5] Tensioning spring |
| [3] Spreading width limiter | [6] Numeric scale with locknut, left |

- ▶ Release the lock nuts [4 or 6] for the slide on the numeric scale with the adjustment lever for the machine.
- ▶ Move the slide on the numeric scale so that the pointer points to the value that was determined.
- ▶ Tighten the lock nuts [2] for the slide on the numeric scale with the adjustment lever for the machine.



The optimum value settings for spreading your special materials can be found in the spreading material charts or via the Fertilizer Chart app.

The GSE PRO has a mechanical indicator which displays whether the GSE PRO is folded in or folded out.



[1] GSE PRO is folded out.

[2] GSE PRO is folded in.

7.10 Adjusting the TELIMAT full and limited border spreading unit

The TELIMAT system is a remotely-controlled system for boundary and border spreading using working widths of 12 - 42 m (for some types of fertilizer it is used only for border spreading). The TELIMAT system is mounted on the **right** side of the machine in the direction of travel. You can control the equipment 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 system.

■ Adjusting the TELIMAT

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



The setting values are provided in the fertilizer chart.

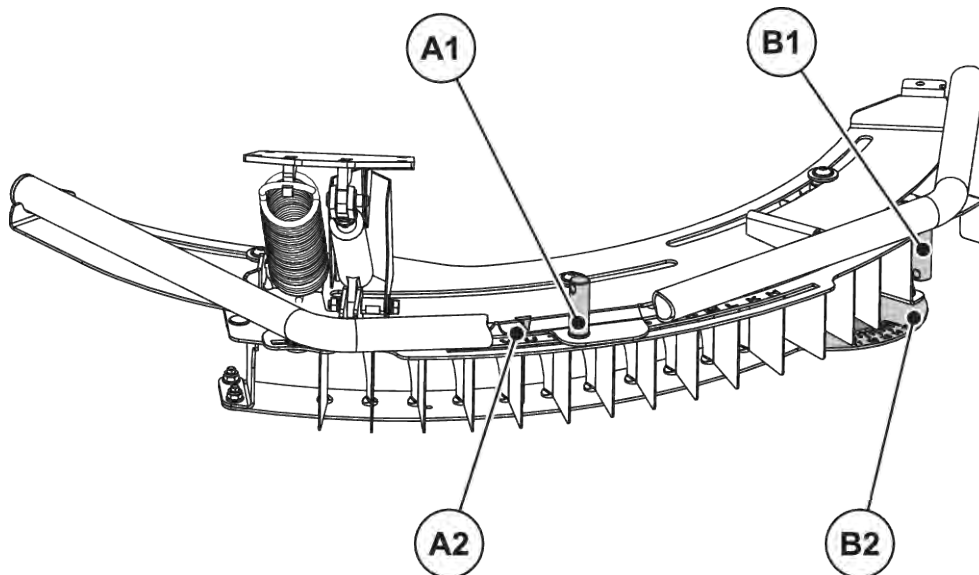


Fig. 35: Adjusting the TELIMAT

[A1] Adjustment nut for alphabetic scale

[B1] Adjustment nut for numeric scale

[A2] Alphabetic scale for coarse adjustment

[B2] Numeric scale for fine 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 type of fertilizer, working width and type of border spreading (border or boundary spreading).
- One-piece guiding plates are available inside the limited border spreading unit and can be moved along a numeric scale (scale 11 to 15). The numeric scale is mainly used for fine adjustment.

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) on to the letter prescribed by the adjustment chart.
The arrow is exactly above the specified letter.
- ▶ Tighten the adjustment nut for the alphabetic scale using the adjustment lever of the machine.

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.

■ 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).



Limited border spreading for working widths of 12 - 50 m

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

■ Instructions for spreading with the TELIMAT unit

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

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

NOTICE!**Spreading errors caused by the TELIMAT 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 limited border 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.

The mechanical display of the spreading position is located on the right-hand side in the direction of travel directly alongside the TELIMAT unit. The display is visible from the cab of the tractor.

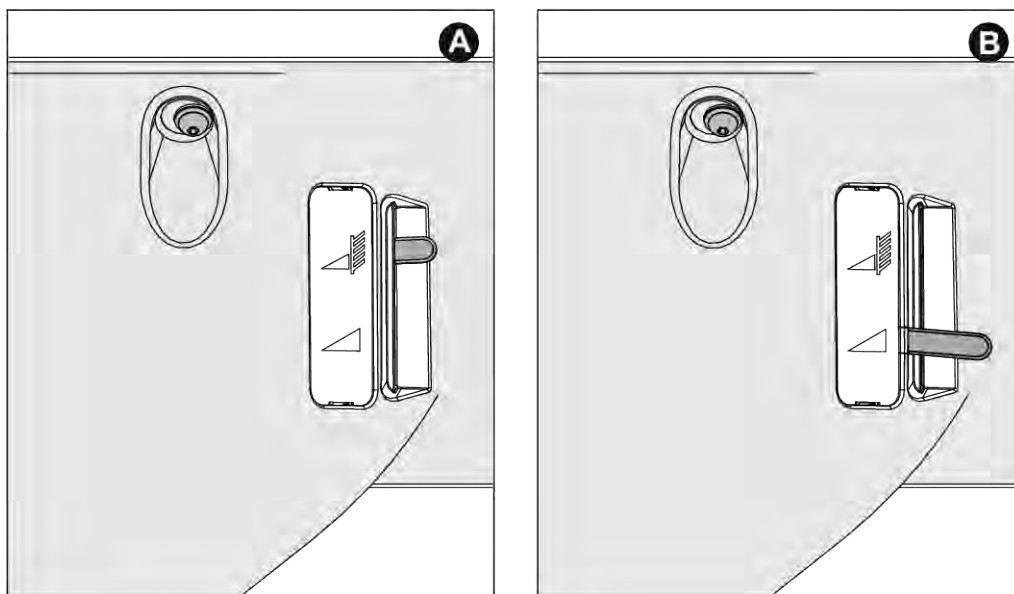


Fig. 36: TELIMAT Mechanical display

[A] Position for border spreading

[B] Position for normal spreading

7.11 Settings for unlisted fertilizer types

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



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

8 Spreading operation

8.1 Safety

DANGER!

Danger of injury due to running engine

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

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

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

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



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

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**.

8.2 Instructions regarding the spreading operation

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

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

Preparation

- ▶ Install the machine at the tractor: 47
- ▶ Close the metering slide.
- ▶ Pre-setting the mounting height: 53
- ▶ Pour in fertilizer: 57
- ▶ Setting the application rate: 72
- ▶ Set the working width.
 - ▷ Selecting the correct spreading disc: 73
 - ▷ Adjusting the discharge point: 76

Spreading

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

Cleaning/maintenance

- ▶ Discharge residual material: 88
- ▶ The metering slides open.
- ▶ Remove the machine from the tractor.
- ▶ Cleaning and maintenance: 95

- ▶ Pay close attention to the machine settings. Even a slightly incorrect setting may adversely affect the spreading pattern.
- ▶ Check that your machine is working properly and that the application is sufficiently precise before every use of the spreader and during work (carry out a calibration test).

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

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

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

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

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

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

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

Reasons for this may be:

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

8.3 Using the fertilizer chart



Refer to the relevant section *7.8.1 Information on the fertilizer chart*

8.4 Setting the application rate



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

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

NOTICE!

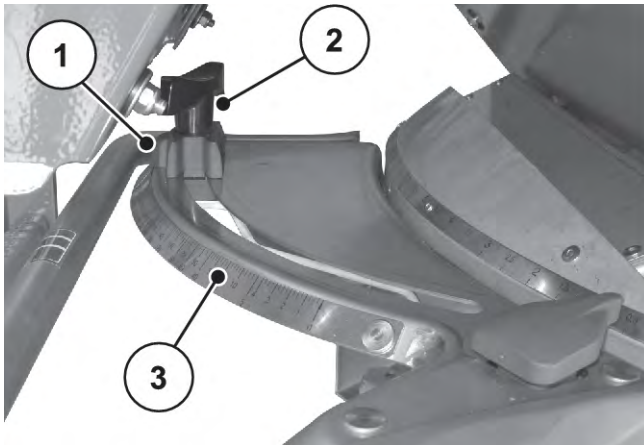
Property damages caused by incorrect positioning of the metering slide

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 variant K/D/C machines, you set the application rate using the lower scale arc for both openings.

- The position of the pointer on the scale arc is dependent on the **application rate** and on the **speed of travel**.
- ▶ Close the metering slide.
- ▶ Determine the position for the scale setting from the spreading material chart or based on the calibration test.



[1] Pointer stop
[2] Locking screw

[3] Lower scale arc

- ▶ Release the locking screw [2] on the lower scale arc [3].
- ▶ Slide the pointer of the stop [1] to the determined position.
- ▶ Tighten the locking screw again.

8.5 Setting the working width

8.5.1 Selecting the correct spreading disc

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

Type of spreading disc	Working width
S2	15 m-18 m
S4	20 m - 28 m
S6	27 m - 33 m

There are two different, permanently installed spreading vanes on every spreading disc. The spreading vanes are marked to show their type.

Type of spreading disc	Left-hand spreading disc	Right-hand spreading disc
S2	S2-L-170 S2-L-240	S2-R-170 S2-R-170
S2 VxR	S2-L-170 VxR S2-L-240 VxR	S2-R-170 VxR S2-R-170VxR
S4	S4-L-200 S4-L-270	S4-R-200 S4-R-270
S4 VxR	S4-L-200 VxR S4-L-270 VxR	S4-R-200 VxR S4-R-270 VxR
S6 VxR plus (coated)	S6-L-255 VxR S6-L-360 VxR	S6-R-255 VxR S6-R-360 VxR

8.5.2 Dismounting and mounting spreading discs

For disassembly and assembly of specific components at the machine, the adjustment lever is required as a tool. It is located on the side of the machine. (AXIS xx.1 at the rear of the hopper)

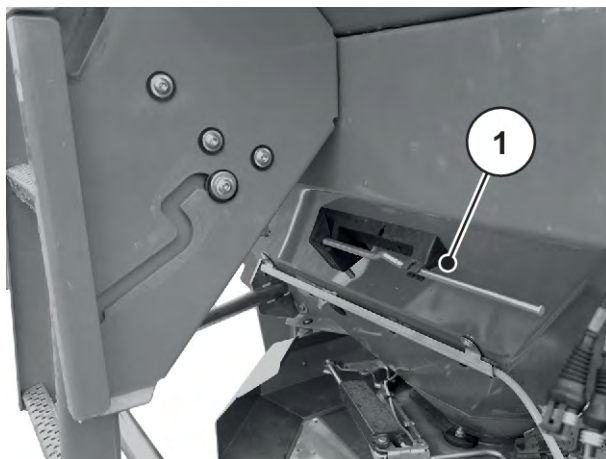


Fig. 37: Position of the adjustment lever AXIS xx.2

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

⚠ 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. 38: Loosen the cap nut

- ▶ Unscrew the cap nut.
- ▶ Remove the spreading disc from the hub.
- ▶ Put the adjustment lever back into the designated bracket. See *Fig. 37 Position of the adjustment lever AXIS xx.2*



Fig. 39: Unscrew the cap nut

Mounting the spreading discs

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



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

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



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

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

8.5.3 Adjusting the drop point

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

The drop point is set using the upper scale arc.

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

- ▶ Determine the position for the drop point in the fertilizer chart or by means of a test with the practice test kit (optional equipment).
- ▶ Grip the left and right handle.
- ▶ Press the pointer unit.
The lock is released. The adjustment center can be moved.
- ▶ Slide the adjustment center with the pointer unit to the determined position.
- ▶ Release the pointer unit.
The adjustment center is locked.
- ▶ Thoroughly check that the adjustment center is locked.

The drop point is set.



Fig. 40: Drop point adjustment center

■ Electronic adjustment of the drop point



The machine has an electronic drop point adjustment. The electronic drop point adjustment is described in a separate operator's manual for the machine control unit. This separate operator's manual is supplied with the machine control unit.

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

The drop point adjustment can be seen on the scale plate on the side.

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



Fig. 41: Drop point display (example)

8.6 Checking the mounting height



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

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

8.7 Adjusting the power take-off shaft speed



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

8.8 Spreading at the headlands

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

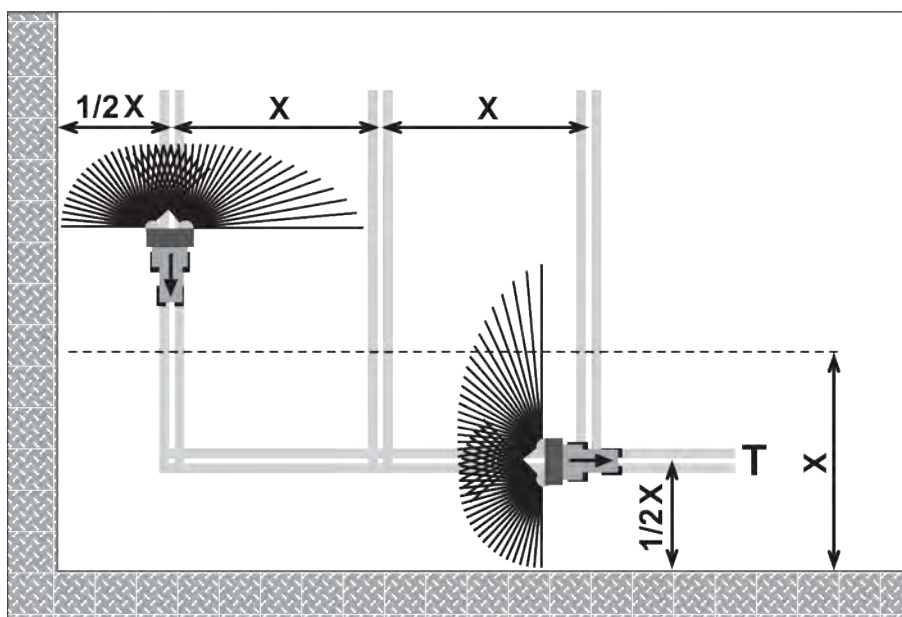


Fig. 42: Boundary spreading

[T] Headland track

[X] Working width

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

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

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

The TELIMAT limited border spreading unit is inactive.

Spreading is performed across the entire working width.

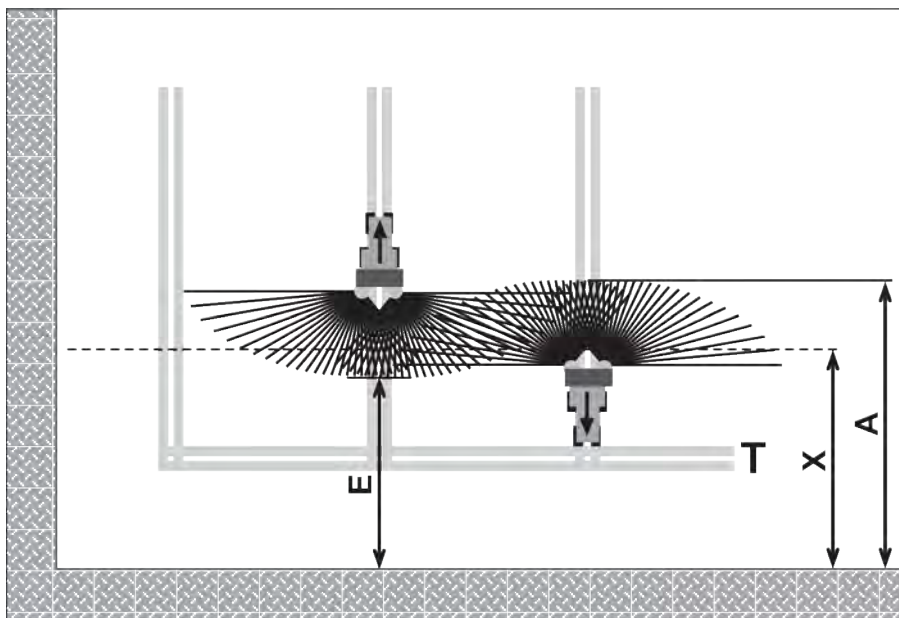


Fig. 43: Normal spreading

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

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

Driving out of the headland track

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

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

Driving into the headland track

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

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

8.9 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	VariSpread Dynamic
	QUANTRON A	QUANTRON A or ISOBUS EMC NG
1 section per side	2 sections per side	stepless section control
K, D, C	Q, W, EMC (+W)	EMC (+W)

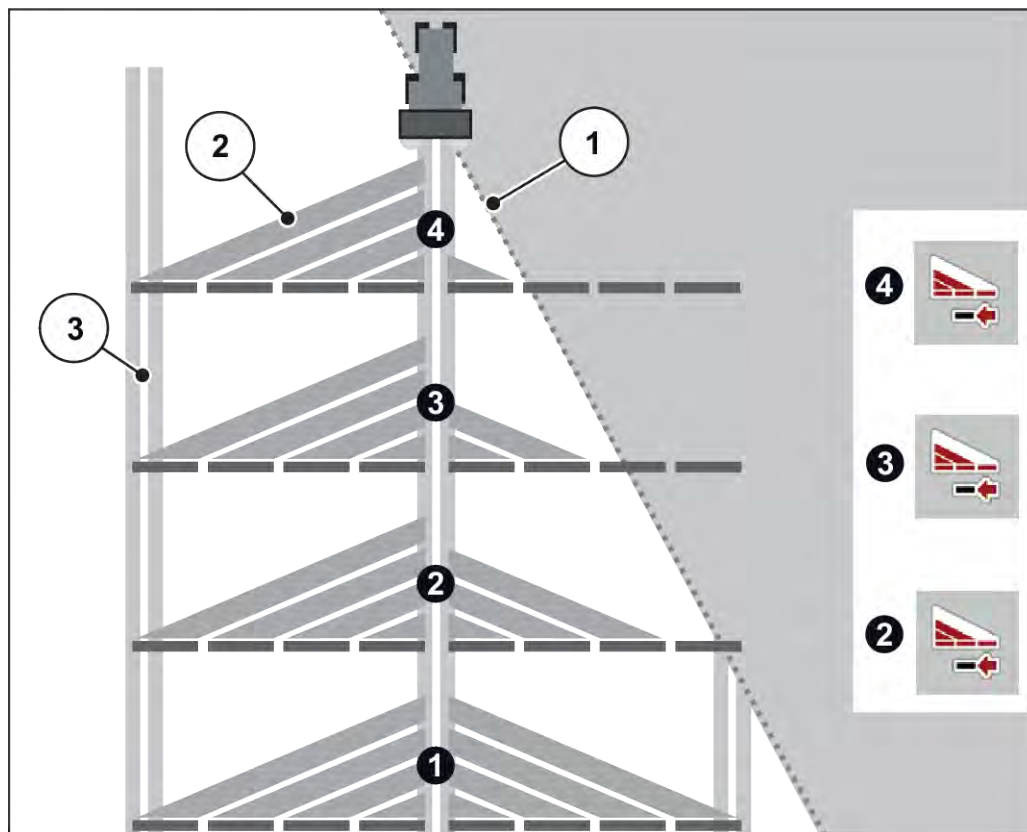


Fig. 44: Section control example

- [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 two electric discharge point actuators. You can use either the control unit QUANTRON A or the ISOBUS EMC NG machine controls to define the settings for the sections to achieve accurate spreading results in wedge-shaped fields.

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

8.10 Calibration test



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



For the **Q/W** machine variants you perform the calibration test 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.

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

Perform a calibration test:

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

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

8.10.1 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.

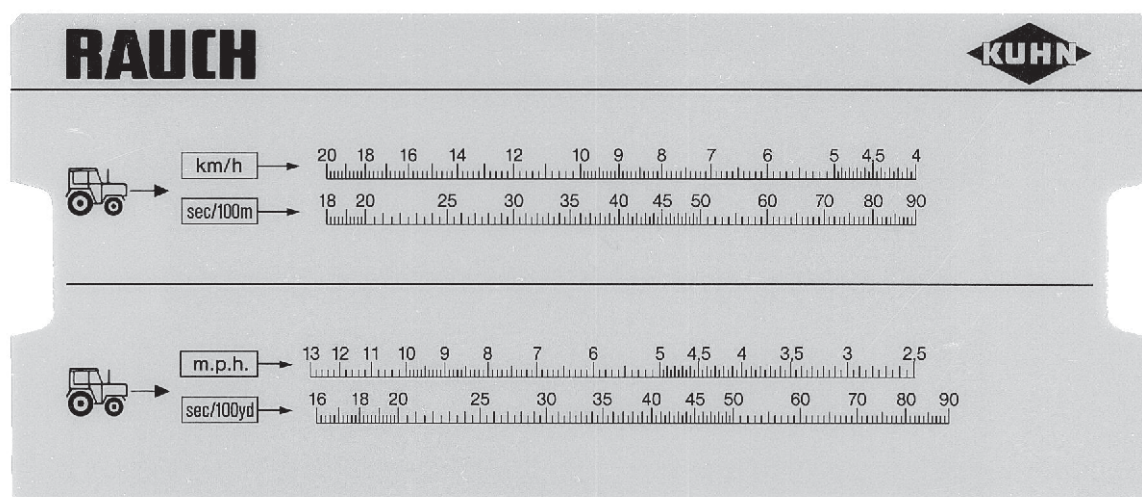


Fig. 45: Scale for calculating the exact forward speed

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

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

Example: You require 45 seconds for 100 m

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

Determining the nominal output volume per minute

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

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

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



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

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

Calculation using the calibration test calculator

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

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

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

- ▶ Divide the read off value by 2 (= number of outlets).
The nominal output volume per output amounts to 36 kg/min.

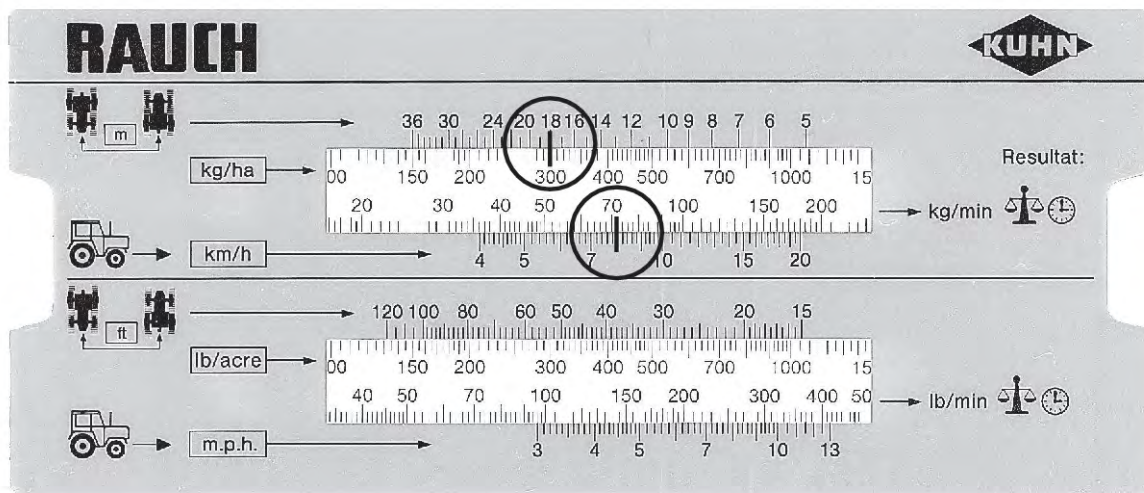


Fig. 46: Scale for calculation of the nominal output volume per minute

Calculation with formula

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

Calculation for example

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



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

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

8.10.2 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 tractor engine is switched off and locked to prevent unauthorized starting.
- An adequately sized vessel is ready for collecting the fertilizer (minimum capacity **25 kg**).
 - Determine the empty weight of the collecting vessel.
- Prepare the calibration test chute. The calibration test chute is located in the center behind the spreading disc guard.
- 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.

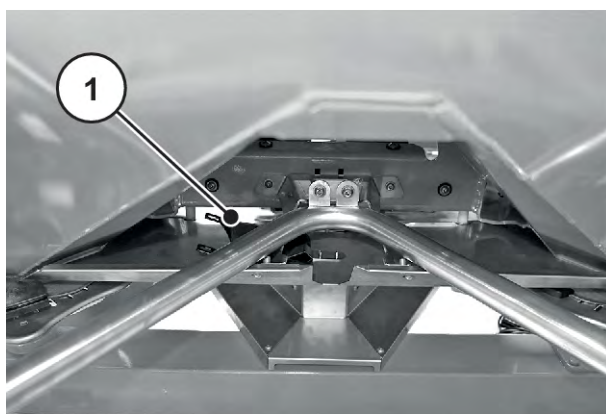


Fig. 47: Calibration test chute

[1] 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.

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

- ▶ Use the adjustment lever to loosen the cap nut of the spreading disc.
- ▶ Remove the spreading disc from the hub.
- ▶ Setting the discharge point to position **0**.



Fig. 48: Loosening the cap nut

- ▶ Suspend the calibration test chute under the left outlet (in the direction of travel).
- ▶ Set the metering slide stop to the scale value taken from the spreading material chart.



Fig. 49: Attaching the calibration test chute

⚠ 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.

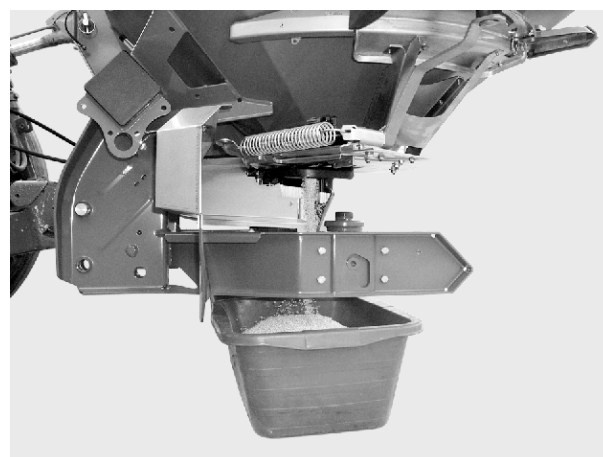


Fig. 50: Perform a calibration test

Perform a calibration test

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

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

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

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



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

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



The pins on the spreading disc holders have different positions on the left and right side. 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. 38 Nm. Do not use the adjustment lever.



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



Fig. 51: Tighten the cap nut

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

The calibration is completed.

Calculation with formula

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

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

8.11 Discharging residual material

⚠ WARNING!

Risk of injury due to rotating machine parts

Rotating machine components (universal drive shaft, hubs) may catch and pull-in body parts or objects. Contact with rotating machine components may cause bruises, abrasions and crushing injuries.

- ▶ Always stay outside the area of rotating hubs while the machine is running.
- ▶ When the drive shaft is rotating, the metering slides are to be operated from the tractor seat at all times.
- ▶ Ensure that nobody is present in the hazard zone of the machine.

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

Instructions for completely discharging the residual material:

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

- ▶ Empty the hopper until all material has been discharged (normal residue discharge).
- ▶ Switch off the tractor engine and lock it to prevent unauthorized starting. Remove the ignition key of the tractor.
- ▶ With the metering slide open, move the discharge point back and forth (setting **0** to **9** and back again).
- ▶ Any remaining fertilizer can be removed with a gentle water jet when cleaning the machine;. See also *10.4 Cleaning the machine*.

8.12 Parking and unhitching the machine

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

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

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

Requirements for parking the machine:

- Only park the machine on level, solid ground.
- Only park the machine when the hopper is empty.
- 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.

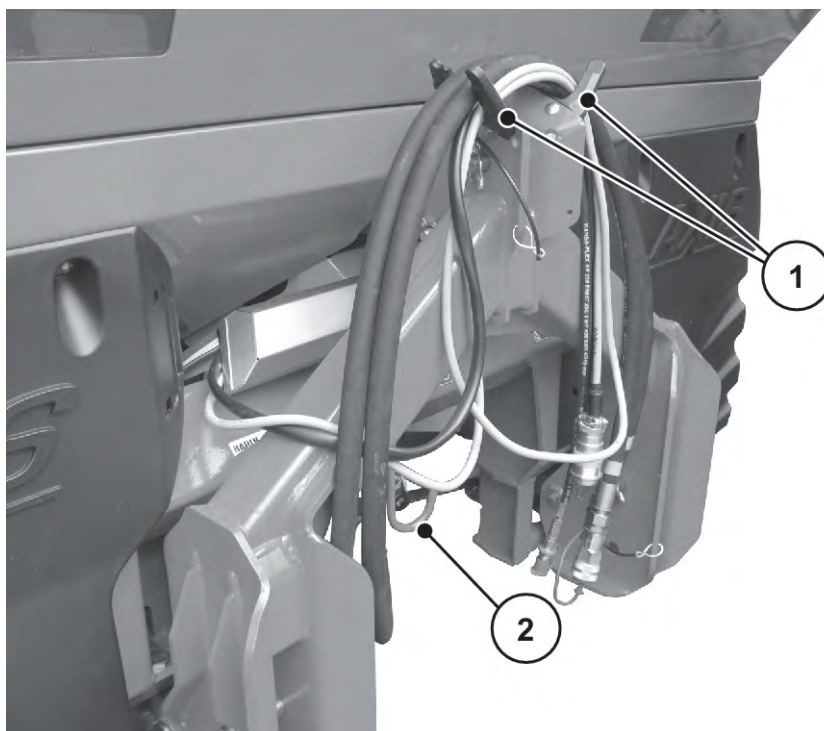


Fig. 52: Storage of the cables and hydraulic hoses

[1] Bracket for hoses and cables

[2] Drive shaft bracket

! 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.
- ▶ Uncouple the hydraulic hoses.

The return springs are de-tensioned.

9 Faults and possible causes

! WARNING!

Risk of injury due to incorrect troubleshooting

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

- ▶ Any faults occurring must be repaired **immediately**.
- ▶ Troubleshooting may be performed by personnel who are appropriately **qualified**.

Troubleshooting requirements:

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



Before starting troubleshooting, take particular note of the warning instructions in chapters 3 *Safety* and 10 *Maintenance and service*.

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

Fault	Possible cause	Measure
<p>Higher spreading quantity on one side of the spreader than the other.</p> <p>During normal spreading the hopper empties asymmetrically.</p>	Bridging above the agitator	<ul style="list-style-type: none"> • Remove fertilizer from the side that is affected down to the height of the protective grid. • Use a suitable wooden stick to poke the bridged material through the mesh of the protective grid.
	Outlet blocked	<ul style="list-style-type: none"> • See Metering openings clogged
	Metering slide set incorrectly	<ul style="list-style-type: none"> • Empty the hopper of remaining fertilizer. • Check the setting of the metering slide. See <i>10.8 Metering slide adjustment</i>
	Defective agitator	<ul style="list-style-type: none"> • Remove fertilizer from the side that is affected down to the height of the protective grid. • With the metering slide open, use a suitable wooden stick to poke the remaining fertilizer material through the mesh of the protective grid so that it runs out through the discharge opening. • Check that the agitator drive is performing correctly. See <i>10.6 Checking the agitator drive</i>

Fault	Possible cause	Measure
Irregular fertilizer feed to spreading disc	Bridging above the agitator	<ul style="list-style-type: none"> • Remove fertilizer from the side that is affected down to the height of the protective grid. • Use a suitable wooden stick to poke the bridged material through the mesh of the protective grid.
	Outlet blocked	<ul style="list-style-type: none"> • See Metering openings clogged:
	Defective agitator	<ul style="list-style-type: none"> • Remove fertilizer from the side that is affected down to the height of the protective grid. • With the metering slide open, use a suitable wooden stick to poke the remaining fertilizer material through the mesh of the protective grid so that it runs out through the discharge opening. • Check that the agitator drive is performing correctly. See 10.6 <i>Checking the agitator drive</i>
The spreading discs are fluttering.		<ul style="list-style-type: none"> ▶ Check cap nuts for tight fit and check threads.
The metering slide does not open.	The metering slide is sluggish.	<ul style="list-style-type: none"> ▶ 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.	<ul style="list-style-type: none"> ▶ Clean the reducing plate at the hose connection of the plug-in connector.

Fault	Possible cause	Measure
The metering slide opens too slowly.	The metering slide is sluggish.	<ul style="list-style-type: none"> ▶ Clean orifice plate. ▶ Replace 0.7 mm orifice plate with a 1.0 mm plate. <ul style="list-style-type: none"> ▷ The plate is at the hose connection of the plug-in connector.
Agitator not working.	Agitator drive is defective	Check the agitator drive <i>10.6 Checking the agitator drive</i>
Metering openings clogged by: <ul style="list-style-type: none"> • Fertilizer clumps • Moist fertilizer • Other impurities (leaves, straw, bag residues) 	Blockages	<ul style="list-style-type: none"> ▶ Park tractor, remove ignition key, disconnect the power supply, ▶ Open metering slides. ▶ Place the collecting vessel underneath. ▶ Remove spreading discs. ▶ Clean the outlet from below with a wooden pole or the adjustment lever and push through the metering opening. ▶ Remove foreign bodies from the hopper. ▶ Install spreading discs, close metering slides.
The spreading discs do not turn or stop suddenly after being turned on.	When using a universal drive shaft with shear pin protection: <ul style="list-style-type: none"> • The shear pin is defective 	<ul style="list-style-type: none"> • Check the shear pin protection, and replace if necessary (see the universal drive shaft manufacturer's manual).

10 Maintenance and service

10.1 Safety



Take particular note of the warning instructions in chapter 3 *Safety*.

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

Take note of the following instructions:

- 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 hours	After the first X years	At the beginning of the season	At the end of the season
Value (X)			10	50	100	50	50	100	150	10		
Cleaning												
<i>Cleaning</i>		X										
Lubrication												
<i>Spreading disc hub</i>								X			X	
<i>Weighing spreader</i>						X					X	
<i>Universal drive shaft</i>											X	
<i>Upper and lower link balls</i>						X					X	
<i>Drop point adjustment</i>						X					X	
<i>Joints, bushes</i>						X					X	
Check												
<i>Wearing parts</i>								X			X	
<i>Screw connections</i>	X		X								X	
<i>Checking the screw connection of the weigh cells</i>									X		X	
<i>Protective grid lock</i>	X					X						
<i>Checking the position of the spreading disc hub</i>					X							X
<i>Agitator drive</i>	X											
<i>Spacer</i>	X					X						
<i>Metering slide setting</i>					X						X	
<i>Drop point settings</i>							X				X	
<i>Checking the oil filling level</i>				X	X					X	X	

10.2 Wear parts and screw connections

10.2.1 Checking wear parts

■ *Wearing parts*

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

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

- Inspect wearing parts on a regular basis.

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

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

10.2.2 Checking the bolted connections

■ *Screw connections*

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

- ▶ Check that all screw connections are tight.



Some of the components have self-locking nuts.

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



Observe the tightening torques for the standard screw connections.

- See 13.1 *Table of tightening torque*

10.2.3 Checking the screw connections of the weigh cells

■ *Checking the screw connection of the weigh cells*

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

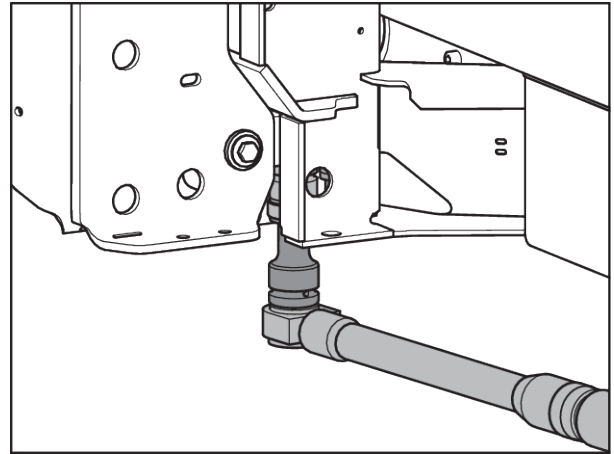


Fig. 53: Fastening the weigh cells (on the left side of the direction of travel)

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

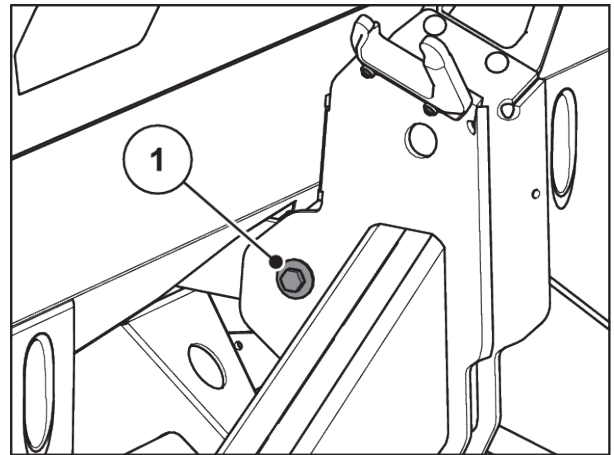


Fig. 54: Fastening the tie rod at the weigh frame

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

The screw connections are firmly tightened.

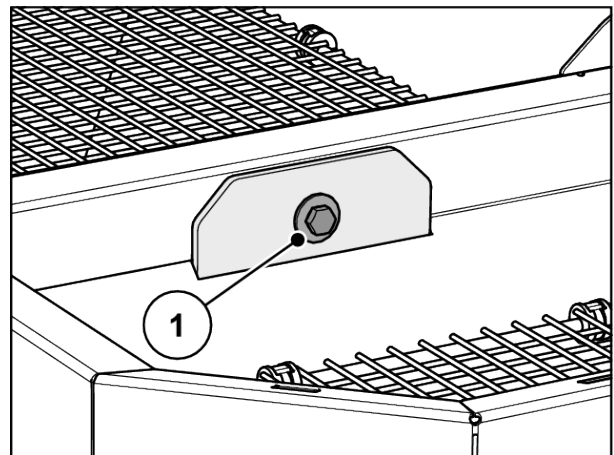


Fig. 55: Fastening the tie rod at the hopper



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

10.3 Opening the protective grid in the hopper

■ Protective grid lock

! WARNING!

Risk of injury from moving parts in the hopper

There are moving parts in the hopper.

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

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

The protective grid locks mechanically without tools.

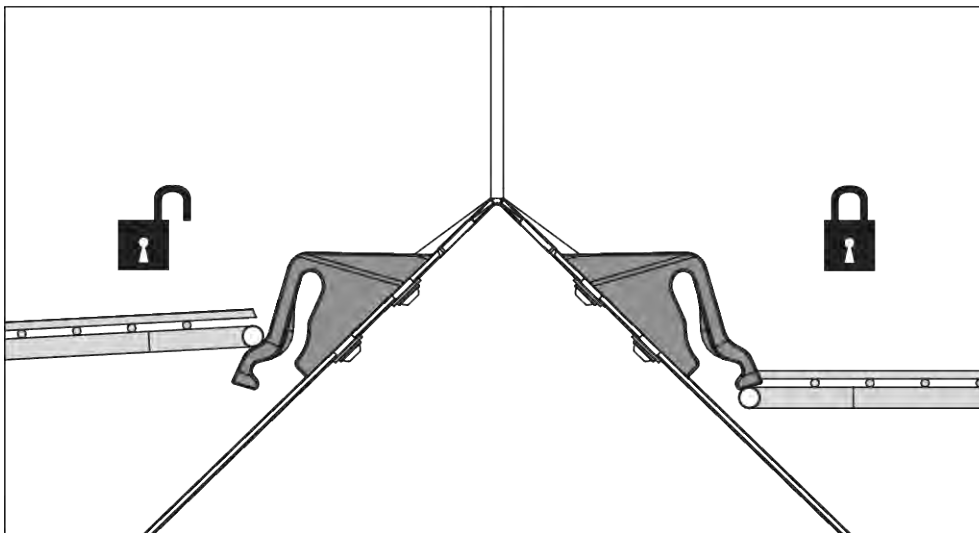


Fig. 56: Protective grid lock open/closed

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

Requirements:

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

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.

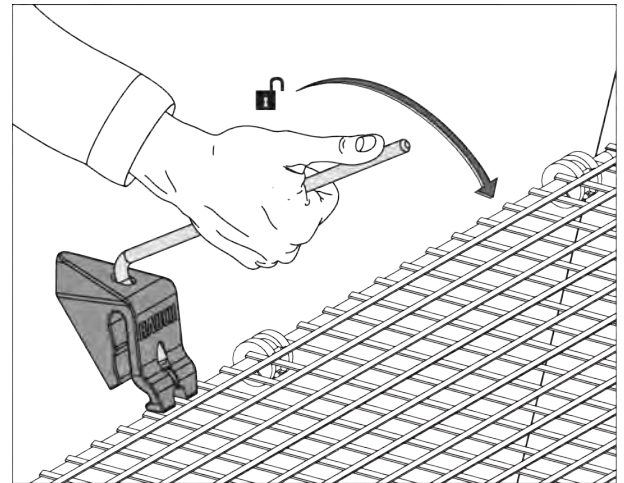


Fig. 57: Opening the protective grid lock

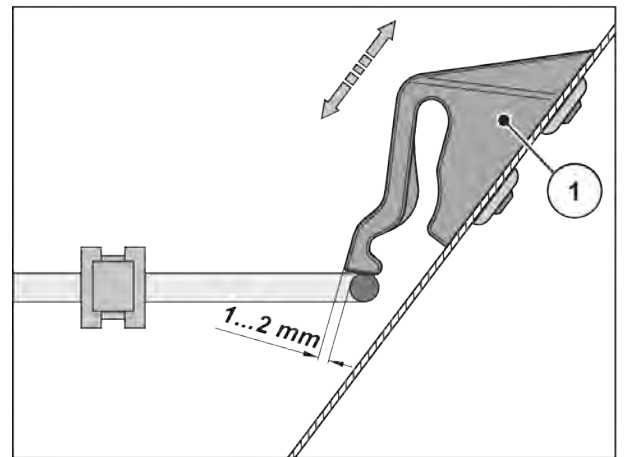


Fig. 58: Test dimensions for functional check of the protective grid interlock

10.4 Cleaning the machine

■ Cleaning

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

- ▶ Fold up the protective grid in the hopper (see chapter 10.3 *Opening the protective grid in the hopper*).
- ▶ Clean the outlet ducts and the slide guide area from below only.
- ▶ Clean oiled machines only at washing points fitted with an oil separator.
- ▶ When cleaning with high-pressure water, never aim the water jet directly at warning signs, electrical equipment, hydraulic components, and plain bearings.
- ▶ Cleaning the gearbox.
- ▶ After cleaning, treat the **dry** machine, **especially the coated spreading vanes and stainless steel parts**, with an environmentally friendly anti-corrosion agent.
 - ▷ A suitable polishing kit for treating rust spots can be ordered from authorized dealers.

10.4.1 Disassemble the dirt deflector

- ▶ Use the adjustment lever on the machine.
 - ▷ See Fig. 37 *Position of the adjustment lever AXIS xx.2*
- ▶ Open the 3 quick-release closures (1, 2 and 3) on the left and right dirt deflectors.
- ▶ Move the dirt deflector (4) to the outside.
- ▶ Put the dirt deflector aside and store it in a safe place.

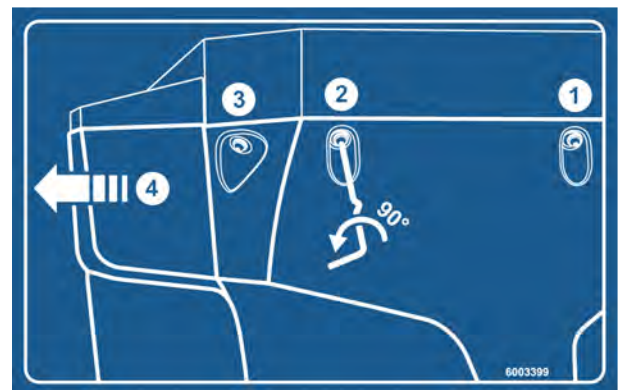


Fig. 59: Dirt deflector instruction sticker

10.4.2 Dismounting the dirt deflector

- ▶ Move the dirt deflector laterally to the inside until it latches in the bracket.
- ▶ Screw the 3 quick release closures on the left and right dirt deflector together with the adjustment lever of the machine.
- ▶ Put the adjustment lever back into the specified bracket.

10.5 Checking the position of the spreading disc hub

■ *Checking the position of the spreading disc hub*

The spreading disc hub must be centered under the agitator.

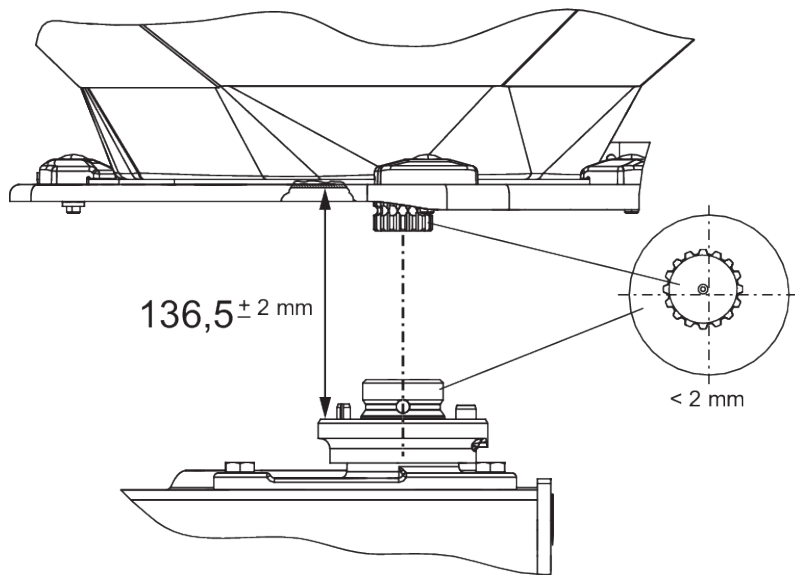


Fig. 60: Checking the position of the spreading disc hub

Requirements:

- The spreading discs are removed (see *Checking the position of the spreading disc hub*).

Checking the centering:

- ▶ Check the centering of the spreading disc hub and the agitator by means of suitable aids (e.g., straightedge, angled blade)

The axes of the spreading disc hub and of the agitator must be aligned. They may differ from each other by a maximum of 2 mm.

Checking the clearance:

- ▶ Measure the clearance between the upper edge of the spreader disc hub and the lower edge of the agitator.
 - ▷ The clearance must be **136.5 mm** (permissible tolerance ± 2 mm).



If these tolerances are exceeded, please refer to your dealer and/or your specialist workshop.

■ **Spreading disc hub**

- Lubricant: Graphite grease

10.6 Checking the agitator drive

■ **Agitator drive**

- Lubricant: Grease/oil



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

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

- Speed of the agitator: 15 - 20 rpm

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

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

Checking the function of the agitator

Requirements:

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

► Checking the connecting rods

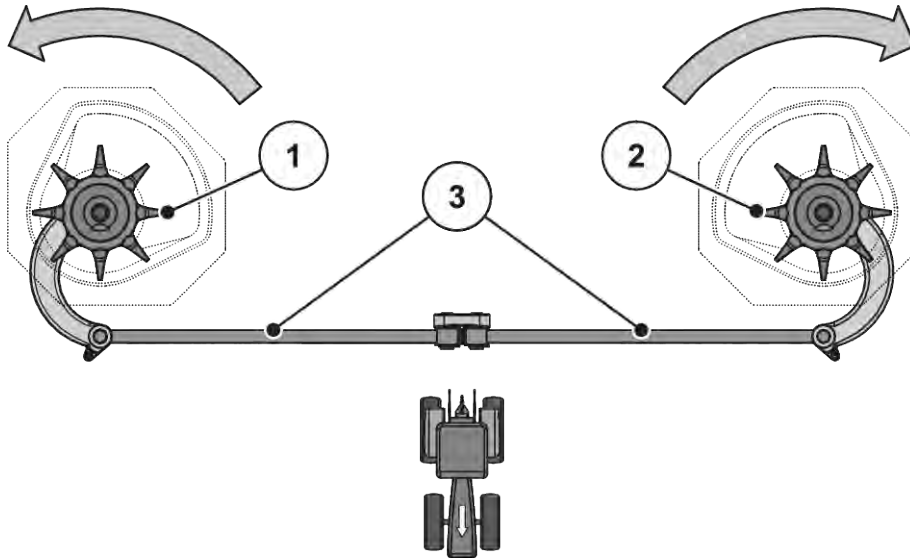


Fig. 61: Checking the agitator drive

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

- ▷ Connecting rods must not show any cracks or other signs of damage.
- ▷ Checking the joint bearing for wear
- ▷ Checking safety element functions at all joints

► Manually turn the agitator head **into the rotational direction of the spreading disc**. See Fig. 61 Checking the agitator drive.

- ▷ It must be possible to turn the agitator head
- If it does not turn, replace the agitator head.*

► Turn the agitator head manually or with the help of an oil filter belt forcefully **against the rotational direction of the spreading disc**. See Fig. 61 Checking the agitator drive

- ▷ The agitator head must lock
- If the agitator head can be turned, replace it.*

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

Checking the agitator head for wear or damage

- ▶ Checking the fingers of the agitator head for wear

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

The fingers must not be bent.

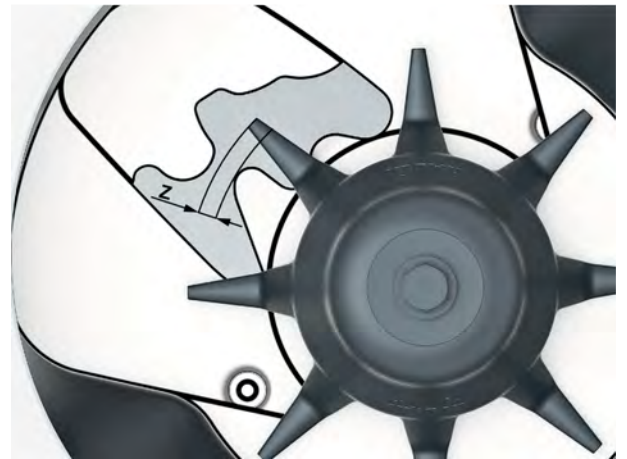


Fig. 62: Agitator head wear range

10.7 Spreading vane replacement

■ Spacer



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

Requirement:

- The spreading discs have been removed (see chapter "Dismounting and mounting spreading discs").

NOTICE!

Conformity of the spreading vane types

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

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

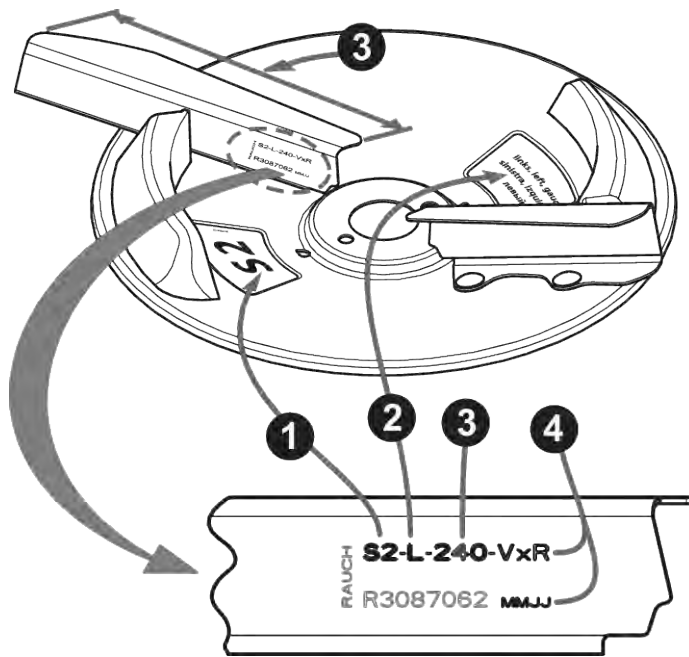


Fig. 63: Spreading disc label

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

Spreading vane replacement

- ▶ Loosen the self-locking nuts at the spreading vane and remove the spreading vane.
- ▶ Attach the new spreading vane to the spreading disc. Make sure that you have the correct spreading vane type.

- ▶ Screw-on the spreader vane (tightening torque: **20 Nm**). For this purpose, **always use new self-locking nuts**.

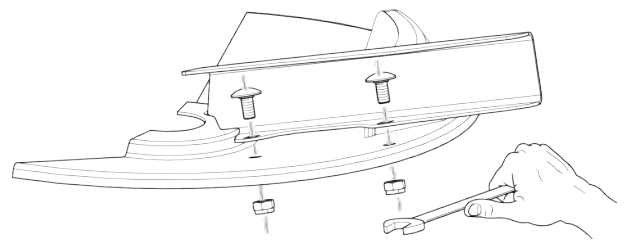


Fig. 64: Loosening the screws of the spreading vane

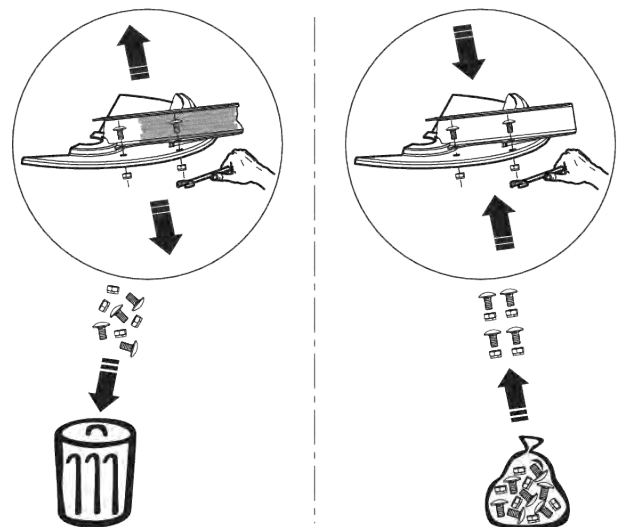


Fig. 65: Using new self-locking nuts

10.8 Metering slide adjustment

■ *Metering slide setting*

Check the setting of the two metering slides for even opening before each spreading season and also during the season, if necessary.

! WARNING!

Danger of crushing and shearing due to externally-actuated components

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

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

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

Requirements:

- The mechanical system must move freely
- Variant K: The return spring is unhooked
- The hydraulic cylinder is unhooked

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

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

The stop at the lower scale arc (metering scale) is at scale value 85.

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



Fig. 66: Lower link pin in metering opening

Adjustment

- ✓ The metering slide is in the position of step 2 (lightly pressed against the pin).
- ▶ Loosen the mounting screws on the scale of the lower scale arc.



Fig. 67: Metering slide adjustment scale

- ▶ Adjust the scale in such a way that **scale value 85** lies exactly under the pointer element.
- ▶ Tighten the scale again.

Repeat steps {1 - 4} for the right-hand metering slide.



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

- ▶ Versions K: Reattach the return spring and the hydraulic cylinders.



After scale correction with electronic slide actuators, a correction of the slide testing points in the operating unit is also necessary.

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

Adjustment

- ✓ The metering slide is pushed lightly against the pin. See *Fig. 66 Lower link pin in metering opening*.
- ▶ Loosen the mounting screws on the scale of the lower scale arc.

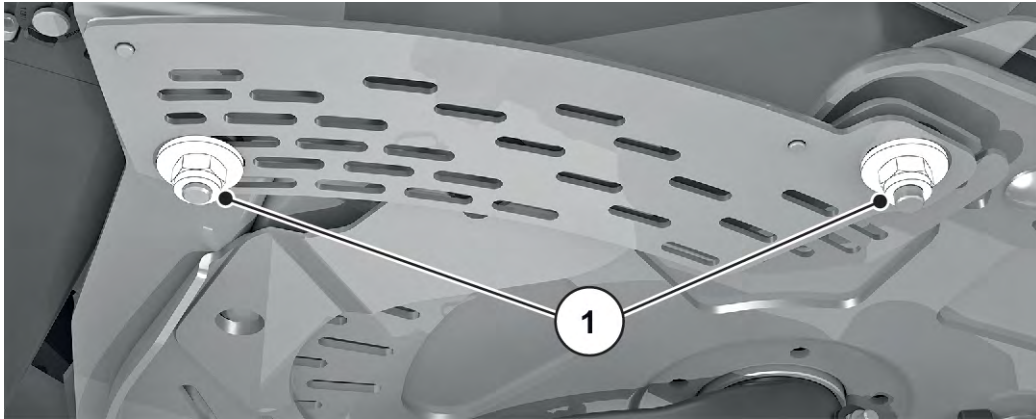


Fig. 68: Scale mounting screws

- ▶ Adjust the scale in such a way that **scale value 85** lies exactly under the pointer element.

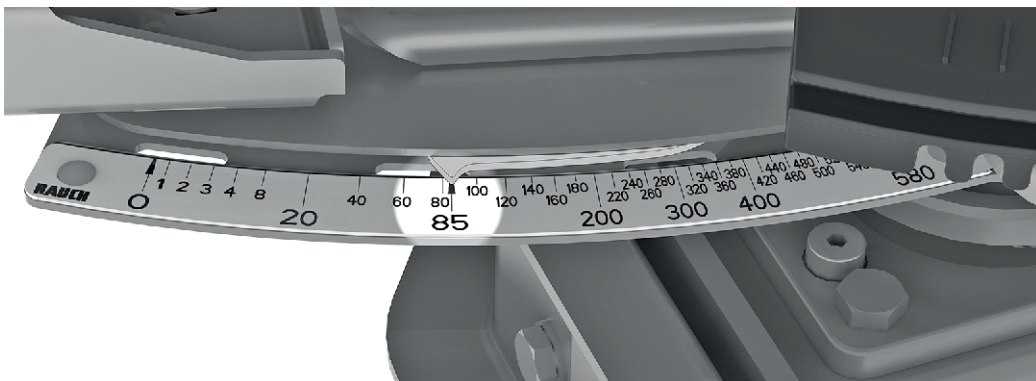


Fig. 69: Metering slide pointer on scale value 85

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



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



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

- Please observe the operator's manual for the machine control unit.
- In the event of discrepancies, please contact your dealer or an authorized specialist workshop for recalibration.

10.9 Adjusting the drop point

■ Drop point settings

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

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

The drop point is set using the top scale arc.

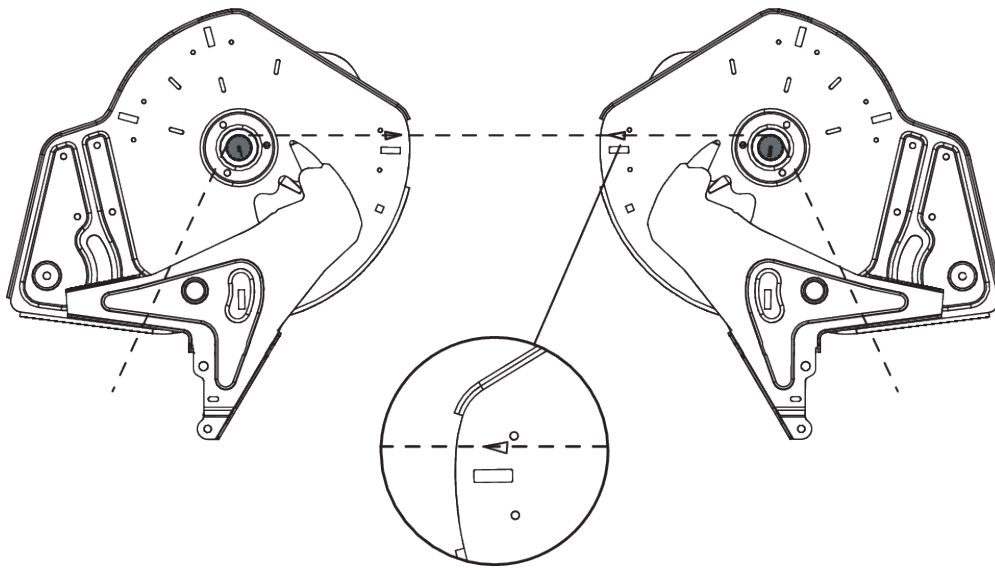


Fig. 70: Checking the drop point



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

Check

- ▶ Setting the drop point to **position 6**
- ▶ Dismounting the outlet with brushes on both openings
- ▶ Release both plastic levers (agitator drive) and slide them downwards until the splines of the agitator are showing
- ▶ Attach a suitably thin string **at the rear** in the direction of travel to the splines of the agitator shafts and tension it.

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

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

Adjustment

- ▶ Release the adjustment plate under the "drop point pointer" button (2 self-locking nuts).
- ▶ Rotate the adjustment center until the triangular mark is aligned with the tensioned string
- ▶ Fastening the adjustment plate
- ▶ Push both plastic levers (agitator drive) upwards, and secure them
- ▶ Mount the brushes at the discharge
- ▶ Only for machines with **VariSpread**: Use the control unit to recalibrate the positions of the discharge point



Fig. 71: Release the adjustment sheet from the discharge point



Please follow the instructions in the chapter "Test/diagnosis" of the operator's manual for the control unit.

10.10 Transmission oil



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

10.10.1 Quantities and types

The machine transmission is filled with approx. **5.5 l** of transmission oil. Any oil with specification CLP 460 DIN 51517 (SAE 140 GL-4) is suitable for filling the transmission.



Use only one type of oil.

- **Never** mix different types of oil.

10.10.2 Checking the oil filling level

- **Checking the oil filling level**

Under normal operating conditions, the gearbox does not need lubrication. 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.

Requirements

- In order to check the filling level and for filling, the machine is in a horizontal position. To drain the oil, the machine must be in a slightly tilted position (approx. 200 mm).
- PTO drive and tractor engine are stopped, the ignition key of the tractor is removed.
- If oil is to be drained, a suitably large collection vessel (approx. 11 l) is to be provided.

Checking the oil filling level

- ▶ Open the oil level checking screw.

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

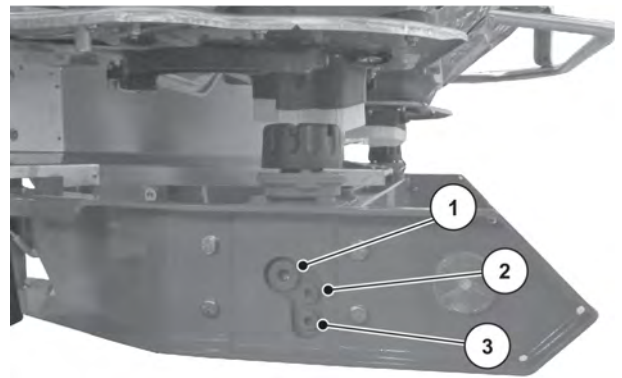


Fig. 72: Filling and draining points for the transmission oil

- | | |
|------------------------------|---------------------|
| [1] Oil filling screw | [3] Oil drain screw |
| [2] Oil level checking screw | |

10.10.3 Changing oil

Drain the oil

- ▶ Tilt the machine to one side (approx. 200 mm higher on one side).
- ▶ Place a collection vessel under the oil drain plug.
- ▶ Open the oil drain plug and allow the oil drain to drain completely.
- ▶ Close the oil drain plug.

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.

Fill with oil

- ✓ Use only LS 75W-90 gear oil.
- ▶ Open the filling opening and the checking screw.
- ▶ Pour gear oil into the filling opening until the oil level at the checking screw reaches the lower edge of the hole.
- ▶ Close the filler hole and screw in the checking screw again.

10.11 Weigh cell lubrication

■ *Weighing spreader*

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

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

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

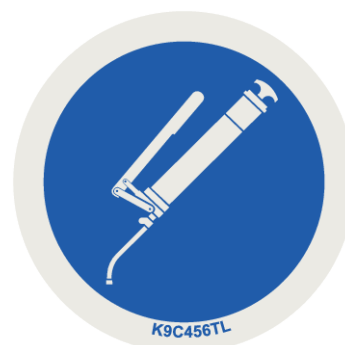


Fig. 73: Lubrication points notice plate

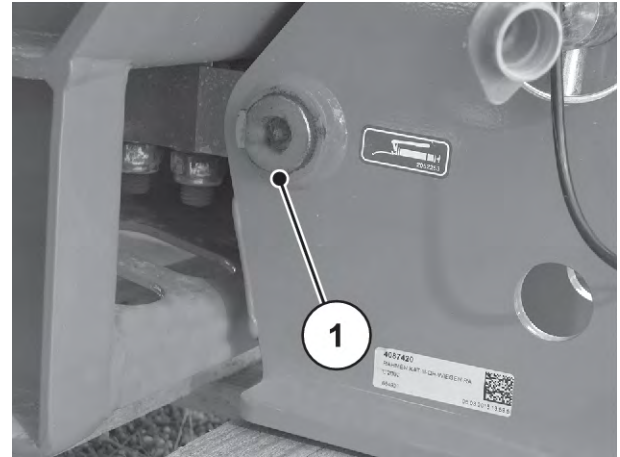


Fig. 74: Lubrication point of weighing spreaders

[1] Lubrication point

10.12 Drive shaft lubrication

■ *Universal drive shaft*

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

10.13 Lubricating the upper and lower links

■ *Upper and lower link balls*

- Lubricant: Grease

10.14 Lubricating the drop point adjustment

■ *Drop point adjustment*

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

10.15 Lubricating links and bushes

■ *Joints, bushes*

- Lubricant: Grease, oil

11 Winterizing and preserving

11.1 Safety

NOTICE!

Environmental pollution due to unsuitable disposal of hydraulic and transmission oil

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

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

11.2 Winterizing



Thoroughly clean the machine before winterizing (refer to chapter 11.3 *Washing the machine*)

- ▶ Opening metering slide, pre-metering slide
- ▶ Hang up hoses and cables with the connector facing downwards to ensure that water can drain well. (see Chapter Fig. 52 *Storage of the cables and hydraulic hoses*)
- ▶ Park the spreader, placing it on parking rollers if necessary (see chapter 4.4.7 *Stabilizing rollers*)
- ▶ Close the cover tarpaulin. Leave a gap open to prevent moisture condensing in the hopper.
- ▶ Preservation of hydraulic components and parts susceptible to rust. To do this, use suitable anti-corrosion agent. E.g., protective wax
- ▶ Place dust caps on hoses and cable.



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

11.3 Washing the machine

A fertilizer spreader **must** be cleaned after each use **and** prior to winterization.

- ▶ Removing the dirt deflector (refer to chapter *10.4.1 Disassemble the dirt deflector*).
- ▶ Fold up the protective grid in the hopper (refer to chapter *10.3 Opening the protective grid in the hopper*).
- ▶ Dismounting the spreading discs.
- ▶ Place the cap nut back onto the hub prior to washing.
- ▶ Open the metering slide completely.
- ▶ When cleaning with high-pressure, never aim the water jet directly at warning signs, electrical equipment, hydraulic components, and sliding bearings.
- ▶ Clean the outlet ducts and the slide guide area thoroughly. Pay special attention to accumulated dirt in inaccessible areas.
- ▶ Let the machine dry after cleaning.



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

11.4 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.



The video "Getting ready - winterization essentials" gives further useful information on washing and protection.

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

12 Disposal

12.1 Safety

NOTICE!

Environmental pollution due to unsuitable disposal of hydraulic and transmission oil

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

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

NOTICE!

Environmental pollution caused by inappropriate disposal of packaging materials

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

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

NOTICE!

Environmental pollution caused by inappropriate disposal of components

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

- ▶ Only authorized companies may be commissioned with disposal.

12.2 Disposal of the machine

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

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

13 Appendix

13.1 Table of tightening torque

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



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

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

Steel class quality fasteners according to ISO 898-1

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

Head dimensions of cylindrical bolts according to ISO 4762

Hole "medium" according to EN 20273

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

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

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

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

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

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

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

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

14 Guarantee and warranty

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

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

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

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



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



RAUCH Landmaschinenfabrik GmbH

Victoria Boulevard E 200
77836 Rheinmünster · Germany



info@rauch.de · www.rauch.de

Phone +49 (0) 7229/8580-0