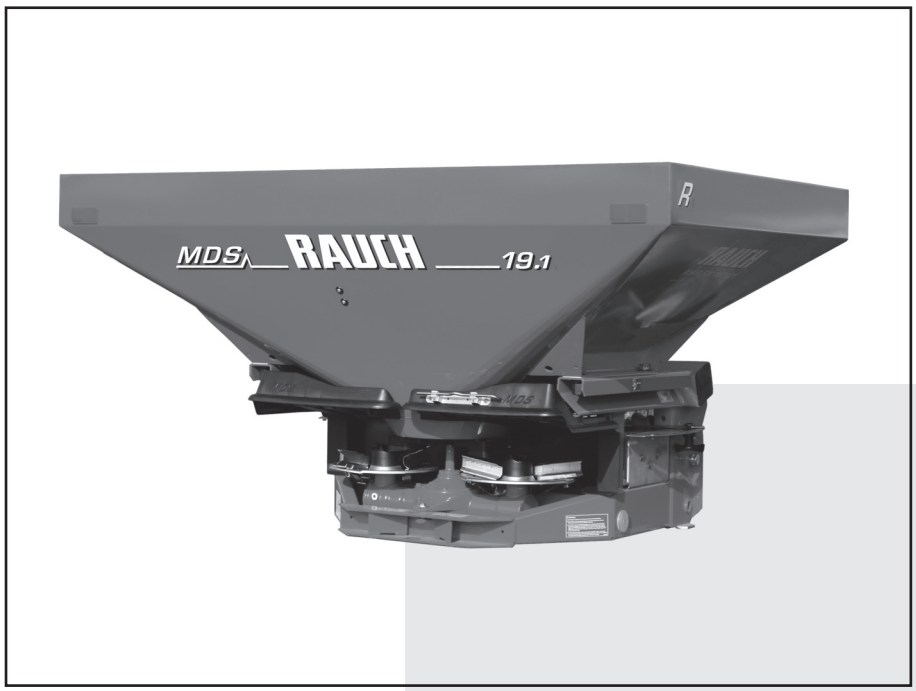
RAUCH

POWER FOR PRECISION

OPERATOR MANUAL



Please read carefully before using the machine!

Store carefully for future use!

This Operator Manual should be considered as part of the machine. Suppliers of new and second-hand machines are obliged to indicate in writing that the Operator Manual has been delivered with the machine.

MDS 10.1/11.1/12.1/17.1/19.1

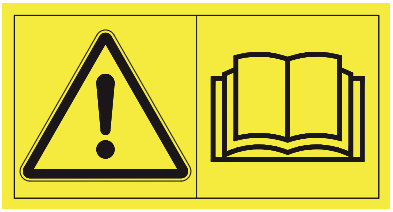
Translation of the original operating manual

5900921-**a**-en-1109

Preface

Dear customer

you have shown your trust in our products by the purchase of a **Series MDS solid fertiliser broadcaster**. Thank you! We want to justify your trust. You have purchased a powerful and reliable **solid fertiliser broadcaster**. However, if any problems occur: Our Customer Service is always ready to help.



Please read this operator's manual carefully before using the solid fertiliser broadcaster and observe the instructions. The operator's manual explains the operation in detail and contains valuable information on handling, care and maintenance.

These instructions could also describe equipment which is not included in your **solid fertiliser broadcasters**.

You should be aware that damage caused by incorrect operation or improper use may not be covered by warranty claims.

Note: Please enter your model type and serial number together with the year of manufacture of your **solid fertiliser broadcaster** here. You can find this information on the identification plate or on the frame. Please provide this information whenever you order spare parts and special accessories or if you have any complaints or comments.

Model:	Serial number:	Year of manufacture:

Technical improvements

We are continuously improving 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

1 Designated use and EC conformity

1.1 Designated use

The Series MDS solid fertiliser broadcasters are constructed in accordance with their designated use and may be used exclusively for the points listed below.

- For normal agricultural use.
- For broadcasting of dry granular and crystalline fertilisers.

Any use outside these specifications is considered as contrary to the intended use. The manufacturer is not liable for any damage resulting from this. The operator bears the entire risk.

Designated use also includes observing the operating, maintenance and service conditions as prescribed by the manufacturer. Only genuine spare parts from the manufacturer may be used as replacements.

The Series MDS solid fertiliser broadcaster may only be used, serviced and repaired by persons who are acquainted with the characteristics of the machine and who have been advised of the dangers involved.

The instructions concerning the operation, service and safe handling of the machine, as described in this operator's manual and stipulated by the manufacturer in the form of warning signs and warning symbols on the machine, must be observed when using the machine.

The relevant accident prevention regulations and the other generally recognised safety-related, occupational medicine and road traffic legal regulations must be observed when using the machine.

Unauthorised modifications to the MDS solid fertiliser broadcaster are not permitted. They will exclude the manufacturer's liability for any resulting damage.

Anticipated faulty use

The manufacturer indicates anticipated faulty use by means of the warning signs and warning symbols on the MDS solid fertiliser broadcaster. These warning signs and warning symbols must be observed under all circumstances in order to avoid using the MDS solid fertiliser broadcaster in a non-intended manner, as stipulated in the operator's manual.

1.2 EC Declaration of Conformity

We
RAUCH - Landmaschinenfabrik GmbH
Landstrasse 14, D-76547 Sinzheim
declare under our sole responsibility that the machine:

Series MDS solid fertiliser broadcaster
Model: MDS 10.1, MDS 11.1, MDS 12.1, MDS 17.1, MDS 19.1

complies with the following provisions in its delivered version:

Machinery Directive 2006/42/EG, Appendix I.

Compilation of the technical documents by:
Rauch - Design Management

Norbert Rauch

(Norbert Rauch – Managing Director)

2 User instructions

2.1 About this operator's manual

This operator's manual is a **constituent part** of the **Series MDS solid fertiliser broadcaster**.

The operator's manual contains important information for **safe**, **proper** and economical **use** and **maintenance** of the solid fertiliser broadcaster. Your attention will help **to prevent dangers**, reduce repair costs and downtime and will increase the reliability and service life of the machine.

The entire documentation, which consists of this operator's manual and all documentation provided by the supplier, must be kept close at hand in the place where the solid fertiliser broadcaster is used (for example in the tractor).

When the machine is sold, the operator's manual must be transferred with it.

The operator's manual is intended for the operator of the MDS solid fertiliser broadcaster 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,
- Repairing faults.

The following are particularly important:

- The chapter on "Safety",
- the warnings in the various chapters.

The operator's manual does not replace your **personal responsibility** as the owner and operator of the MDS solid fertiliser broadcaster.

2.2 Structure of the operator's manual

The operator's manual is divided into 6 key areas in terms of content:

- user instructions,
- safety instructions,
- machine details,
- instructions for operating the solid fertiliser broadcaster,
- instructions for finding and correcting faults and
- maintenance and repair instructions.

2.3 Information regarding the textual presentation

2.3.1 Instructions and procedures

Steps that the operator must carry out are shown as a numbered list.

1. Instruction for action step 1
2. Instruction for action step 2

Instructions that only have one step are not numbered. The same applies for action steps that do not have a specific sequence.

A bullet is placed in front on these instructions:

- Handling instruction

2.3.2 Lists

Lists without a specific sequence are shown as lists with bullet points (level 1) and dashes (level 2):

- Property A
  - Point A
  - Point B
- Property B

2.3.3 References

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

- Please note also chapter 3: Safety, page 5.

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

- Also observe the instructions in the operator's manual for the universal drive shaft.

3 Safety

3.1 General Information

The chapter on safety contains basic safety instructions and safety regulations for working and operating in traffic when using the MDS solid fertiliser broadcaster.

All instructions in this chapter must be observed to ensure safe handling and trouble-free operation of the solid fertiliser broadcaster.

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

Warning instructions with regard to OEM components are contained in the applicable 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 how serious the danger is and the probability of its occurrence.

The danger signs and symbols are provided to advise the user of other unavoidable dangers that may be encountered when operating the solid fertiliser broadcaster. The warning instructions used are structured as follows:

	Warning caption
Symbol	Explanation

Example

⚠ DANGER

Risk to life when warning is not observed

Ignoring this warning will result in very serious injury or death.

▶ Read this operating instruction carefully and follow the warning advice.

Level of danger of the warning signs

The level of danger is indicated by the warning caption. The levels of danger are classified as follows:

⚠ DANGER

Type and source of danger

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

Ignoring this warning will result in very serious injury or death.

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

⚠ WARNING

Type and source of danger

This warning advice warns of a possible dangerous situation for the health of persons.

Non adherence to this warning advice leads to serious injury.

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

⚠ CAUTION

Type and source of danger

This warning advice warns of a potentially dangerous situation for personal health or of material and environmental damage.

Failure to observe this warning will result in damage to the product or the surroundings.

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

NOTICE

General instructions include tips for usage and useful information but not warnings of dangers.

3.3 General information on the safety of the machine

The MDS solid fertiliser broadcaster is designed and manufactured to the state of the art in technology and the generally accepted rules of engineering. However, operation and maintenance of the machine may involve danger to the health of the user or other persons or may adversely affect the machine and other property.

Therefore, operate the MDS solid fertiliser broadcaster:

- when it is in good condition and safe to operate in traffic,
- in awareness of safety and dangers.

This requires that you be familiar with the content of this operating manual, the applicable accident protection regulations and the generally recognised rules of safety, occupational health and highway traffic and apply these rules as required.

3.4 Instructions for the owner

The owner is responsible for the designated use of the MDS solid fertiliser broadcaster.

3.4.1 Qualifications of personnel

Persons who are responsible for the operation, maintenance or repair of the solid fertiliser broadcaster must have read and understood these operating instructions, particularly the chapter on safety and warning notices on the corresponding activities, before starting work.

- The machine may only be operated by trained personnel authorised 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 repair work must be carried out by appropriately qualified persons.

3.4.2 Instruction

Sales representatives, factory representatives or employees of the RAUCH company will instruct the operator in the operation and maintenance of the solid fertiliser broadcaster.

The operator must ensure that new operating and maintenance personnel are instructed with the same care and to the same extent in operating and maintaining the machine, taking these operating instructions into consideration.

3.4.3 Accident prevention

The 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 leave the solid fertiliser broadcaster operating without supervision.
- Do not ride on the solid fertiliser broadcaster while it is working or being transported (no passengers).
- Do not use machine components of the solid fertiliser broadcaster to climb up on the machine.
- Do not wear loose clothing. Do not wear work clothes with belts, loose threads or other items that could snag.
- Follow the manufacturer's directions when working with chemicals. It may be necessary to wear personal protective equipment.

3.5 Information on operating safety

To avoid dangerous situations, the solid fertiliser broadcaster must only be used in an operationally safe condition.

3.5.1 Parking the solid fertiliser broadcaster

- Park the solid fertiliser broadcaster with an empty hopper on level, firm ground.
- If the solid fertiliser broadcaster is parked alone (without a tractor), leave the metering slide completely open (tension released on the return spring - any water that has entered the hopper runs out).

3.5.2 Filling the solid fertiliser broadcaster

- Never fill the solid fertiliser broadcaster with the tractor engine running. Prevent unauthorised starting of the engine by removing the ignition key from the tractor.
- Use suitable equipment for filling (e.g. front-end loader, auger).
- Fill the solid fertiliser broadcaster no higher than the top. Check the fill level, for example through the view window in the hopper (depends on type).
- Fill the solid fertiliser broadcaster only with the protective grid closed. This will prevent problems when broadcasting caused by lumps of fertiliser or foreign bodies.

3.5.3 Checks before putting the machine into operation

Before the first and every subsequent operation, check the solid fertiliser broadcaster to make sure that it is safe to operate.

- Is all safety equipment on the solid fertiliser broadcaster installed and functional?
- Are all fasteners and load-bearing connections tight and in good condition?
- Are the spreading discs and their fasteners in good condition?
- Is the protective grid in the hopper closed and locked?
- Are any persons in the danger zone of the solid fertiliser broadcaster?
- Is the drive shaft guard in good condition?
- Is the test dimension of the protective grid interlock within the proper range? See figure 6.16.
- Is the deflection and protection device securely bolted to the frame and the hopper and in good order? See figure 6.19.

3.5.4 Operation

- If the solid fertiliser broadcaster malfunctions, stop the machine immediately and lock it. Have the fault repaired immediately by qualified technicians.
- Never climb up on to the solid fertiliser broadcaster when it is running.
- Operate the solid fertiliser broadcaster only with the protective grid in the hopper closed. The protective grid must not be opened or removed during operation.
- Rotating machine components can cause serious injury. Make sure that body parts or clothing never come close to rotating components.
- Do not insert any parts (such as screws, nuts) in to the spreader hopper.
- Flying spreader material may cause serious injury (e.g. to the eyes). Make sure that there are no persons within the spreading range of the solid fertiliser broadcaster.
- If the wind speed becomes too high, you must stop spreading because the specified spreading range cannot be guaranteed under such conditions.
- Never climb up on the solid fertiliser broadcaster or the tractor under power lines.

3.6 Using the fertiliser

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

- When selecting the fertiliser inform yourself of its effects on persons, the environment and the machine.
- Follow the directions of the fertiliser manufacturer exactly.

3.7 Hydraulic system

The hydraulic system is under high pressure.

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

- The maximum approved operating pressure must never be exceeded.
- Release the pressure from the hydraulic system **before** all maintenance work. Switch off the engine of the tractor and remove the ignition key to prevent anyone from restarting it.
- When searching for leaks always wear **safety glasses** and **safety gloves**.
- If injuries are caused by hydraulic oil **consult a physician immediately**, because serious infections may result.
- When connecting the hydraulic hoses to the tractor hydraulics, make sure that the hydraulic systems are **unpressurised** on both tractor and spreader.
- Connect the hydraulic hoses of the tractor and spreader hydraulics to the specified couplings.
- Prevent any contamination of the hydraulic circuit. Do not allow the uncoupled hydraulic hoses to hang to the ground (see figure 6.34). Use the dust caps. Clean the connections before joining them.
- Check the hydraulic components and hydraulic lines regularly for mechanic defects, such as cuts and worn positions, crushing, cracking, porous sections etc.
- Even when stored correctly and subjected to permissible loads, hoses and hose connections are subject to a natural ageing process. This limits their storage life and service life.

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

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

- Replace hydraulic hoses when damaged or aged.
- Replacement hydraulic lines must meet the technical requirements of the equipment manufacturer. Make sure the replacement hydraulic lines meet the maximum pressure specifications.

3.8 Maintenance and repair

Maintenance and repair work involves additional hazards that do not occur during operation of the machine.

- Take particular care when carrying out maintenance and repair work. Work very carefully and with awareness of danger.

3.8.1 Qualifications of maintenance personnel

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

3.8.2 Wear-out parts

- Observe the maintenance and repair intervals specified in this operator's manual exactly.
- Also observe the maintenance and repair intervals for the supplied components. See the supplier documentation for the relevant intervals
- We recommend having your dealer check the condition of the solid fertiliser broadcaster, particularly fastening components, safety-relevant plastic components, hydraulic system, metering components and spreader vanes, after every working season.
- Replacement parts must at least comply with the technical standards specified by the manufacturer. This is assured with 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 vanes).

3.8.3 Maintenance and repair work

- Always switch off the tractor engine before all cleaning, maintenance and repair work and when troubleshooting. Wait until all moving parts of the machine have stopped moving.
- Make sure that no unauthorised person can switch on the solid fertiliser broadcaster. Remove the tractor ignition key.
- Check that the tractor is correctly parked with the solid fertiliser broadcaster. Park the fertiliser spreader with an empty hopper on level, solid ground and secure it to prevent it from moving.
- Release the pressure from the hydraulic system before all maintenance and repair work.
- Disconnect the power supply before working on the electrical system.
- If you have to work with the PTO shaft, no one may be near the rotating PTO shaft or universal drive shaft.
- Never clear blockages in the spreader hopper by hand or with the foot but always use a suitable tool. To prevent blockages always use the protective grid when filling the hopper.
- Before cleaning the solid fertiliser broadcaster with water, steam or other cleaning agents cover all components that must be prevented from getting wet (e.g. bearings, electrical connections).
- Regularly check nuts and screws for tight fit and tighten them, if necessary.

3.9 Safety in traffic

When travelling on public roads and tracks, the tractor with the attached solid fertiliser broadcaster must comply with the traffic regulations of the country in which it is operating. The owner and driver are responsible for compliance with these regulations.

3.9.1 Checks before driving

The pre-operational check is an important component of traffic safety. Before every trip check compliance with the operating conditions, traffic safety and the regulations of the country of operation.

- Make sure that the permissible total weight is not exceeded. Note the permissible axle load, the approved braking load and the permissible tyre load capacity, see also chapter 13: Axle load calculation, page 141.
- Is the solid fertiliser broadcaster mounted correctly?
- Could fertiliser be lost while travelling?
  Check the fill level of the fertiliser in the hopper.
  The metering slides must be closed.
  The ball cocks must also be closed on single-action hydraulic cylinders.
- Check the tyre pressures and the function of the tractor brake system.
- Do the lights and identification on the solid fertiliser broadcaster comply with the national regulations for operation on public roads? Make sure that warning signs, reflectors and auxiliary lights are correctly placed.

3.9.2 Road travel with the solid fertiliser broadcaster

The road handling and the tilting, steering and braking performance of the tractor are all altered by the attached solid fertiliser broadcaster. For example, the high permissible load capacity will reduce the weight on the front axle of the tractor and may affect the steering.

- Be aware of the changed driving behaviour.
- Make sure that you have sufficient vision when driving. If vision is restricted (e.g. when reversing), another person is required to direct the driver.
- Do not exceed the permissible maximum speed.
- Avoid sudden turns when driving uphill or downhill or across a slope. The change in the centre of gravity may increase the danger of tipping. Travel over uneven, soft ground (e.g. entering a field, travelling over road edges) with great care.
- Set the lower link on the three-point linkage so it is rigid to prevent the machine from rocking.
- Passengers are prohibited on the solid fertiliser broadcaster during transport and operation.

3.10 Safety equipment on the machine

3.10.1 Position of protection devices

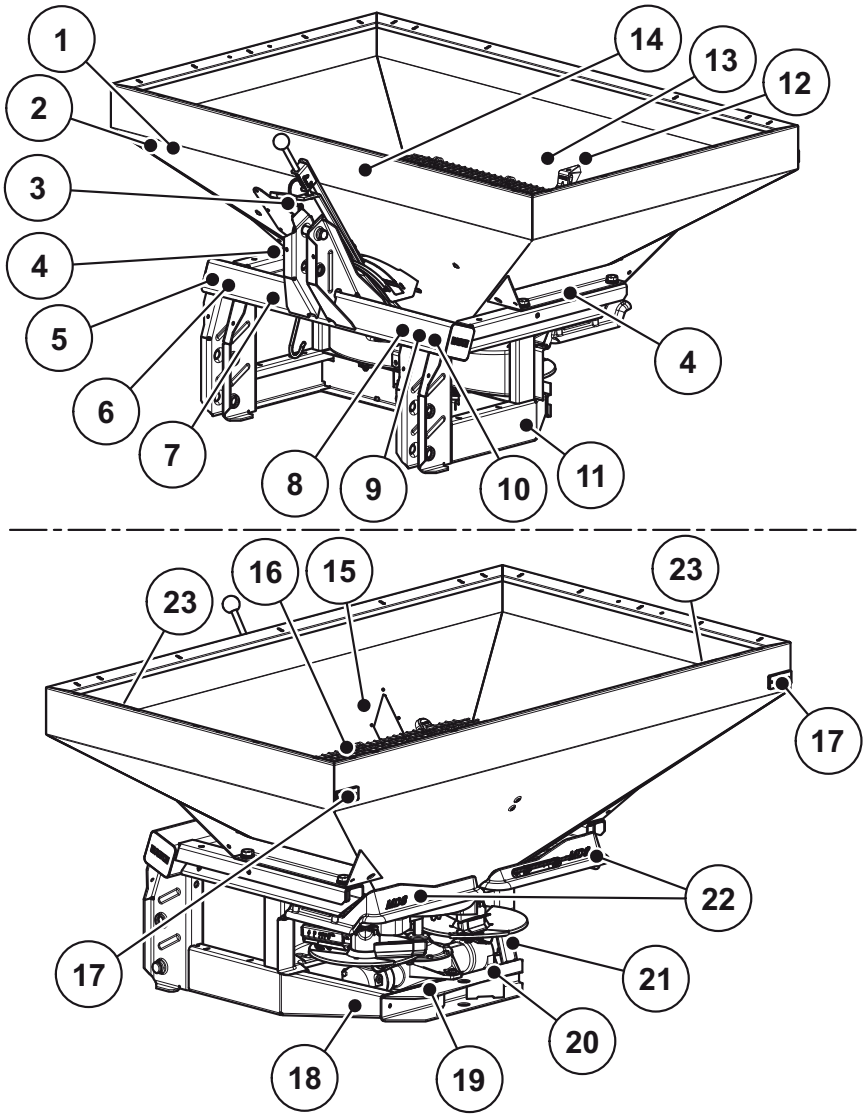
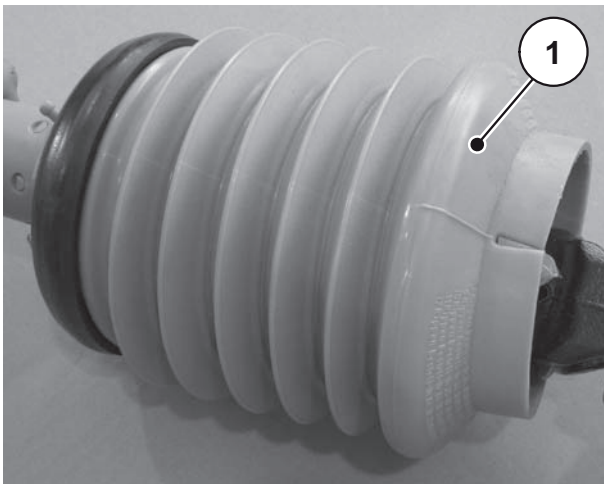


Figure 3.1: Position of protection devices, warning and instruction notices and reflectors

[1] Instruction note concerning serial number on frame and hopper
[2] Serial number on hopper
[3] Warning note - crushing point on adjusting segment
[4] Instructions for tightening torque
[5] Factory plate
[6] Serial number on frame
[7] PTO speed warning
[8] Maximum payload warning
[9] Warning, read operator's manual
[10] Material broadcast warning
[11] Yellow side reflector
[12] Protective grid lock
[13] Instructions for protective grid lock
[14] Instruction note - single sided spreading
[15] Instruction note - use protective grid
[16] Protective grid in hopper
[17] Red reflector
[18] Instruction note - vane adjustment
[19] Moving parts warning
[20] Warning, remove ignition key
[21] Instruction note - pulling a trailer
[22] Deflection and protection device
[23] Crane eyes



[1] Drive shaft shield

Figure 3.2: Universal drive shaft

3.10.2 Function of protection devices

The protection devices are designed to protect your health and life.

- Only operate the solid fertiliser broadcaster with effective protection devices.
- Do not use the deflection and protection device as a climbing aid. It is not designed for this. You may be in danger of falling.

Designation	Function
Protective grid in hopper	Prevents body parts from being dragged along by the rotating agitator. Prevents body parts from being cut off by the metering slides. Prevents faults when spreading caused by lumps in the spreading material, large stones or other large-scale objects (screening effect).
Protective grid lock	Prevents the protective grid in the hopper from being opened unintentionally. Engages mechanically when the protective grid lock is closed properly and can only be unlocked using a tool.
Deflection and protection device	The deflection and protection device prevents spreading fertiliser to the front (towards the tractor/working place). The deflection and protection device prevents being grabbed by rotating spreading discs from behind, from the side and from the front.
Drive shaft shield	Prevents body parts from being pulled into the rotating drive shaft.

3.11 Warning and instruction stickers

There are various warning and instruction notices attached to the MDS series solid fertiliser broadcaster (for attaching to the machine see figure 3.1).

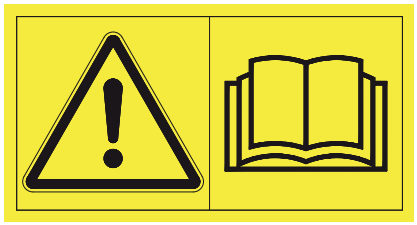
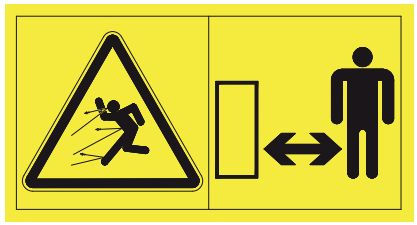
The warning and instruction stickers are components of the machine. They must not be removed or altered. Missing or illegible warning and instruction signs must be replaced immediately.

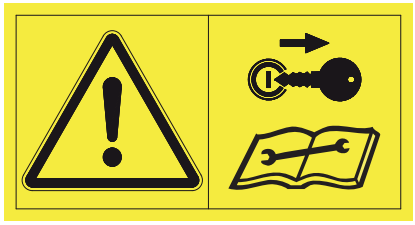
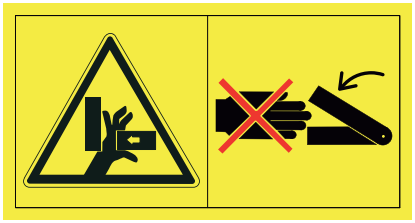
If new components are installed during repairs, the same warning and instruction stickers that were on the original parts must be placed on the new parts.

NOTICE

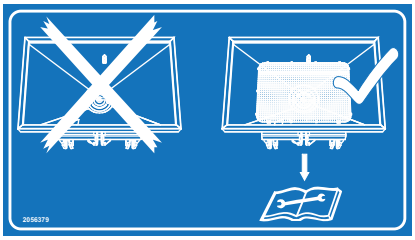
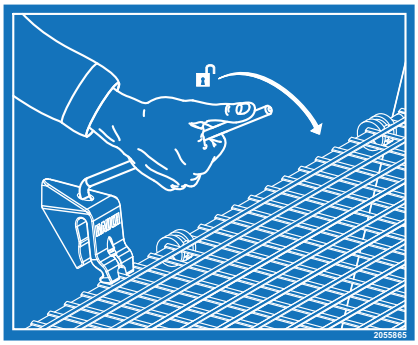
The correct warning and instruction notices can be obtained from the spare parts service.

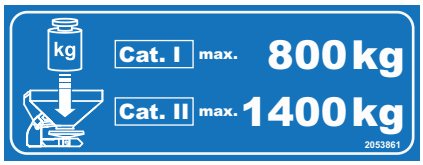
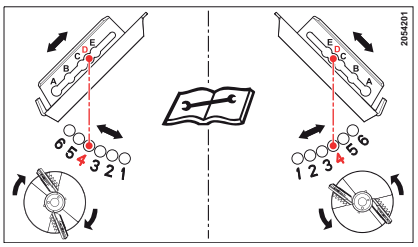
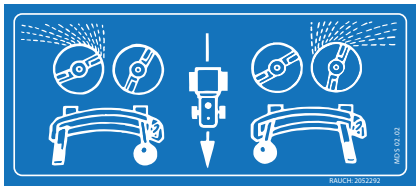
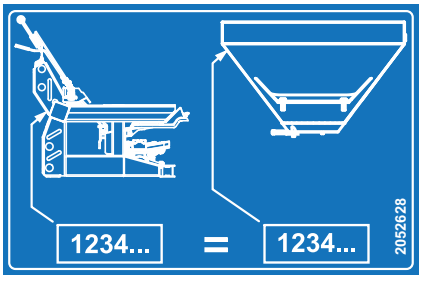
3.11.1 Warning stickers

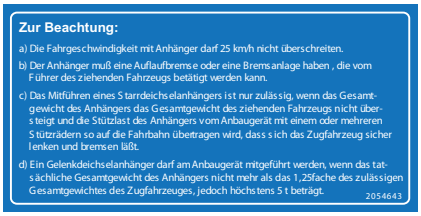
	**Read operator's manual and safety instructions** Before placing the machine in operation, read and observe the operator's manual and warning instructions. The operator's manual explains in detail how to operate the spreader and contains valuable information on operation, care and maintenance.
	**Hazard from broadcast material** Danger of injury to the entire body from spreading material being thrown out. Direct all persons out of the danger zone (spreading area) of the solid fertiliser broadcaster before starting work.
	**Danger from moving parts** Danger of cutting off body parts. Reaching into the danger areas of the rotating spreading discs, the agitator or the drive shaft is prohibited. Before carrying out repair and adjustment work, shut off engine and remove the key.

	**Remove the ignition key** Turn the engine off and remove the ignition key to prevent inadvertent starting of the engine before maintenance, repair and adjustment work.
	**Crushing point in the area of the adjusting lever when the hydraulic slide is actuated (version M)** When actuating the slide control, make sure that there are no persons in the area of the adjusting lever.

3.11.2 Instruction stickers and factory plate

	**Protective grid** Fit and close the protective grid before starting the MDS solid fertiliser broadcaster.
	**Protective grid lock** The protective grid lock is automatically locked when the protective grid in the hopper is closed. It can only be unlocked by using a tool.
	**PTO speed** The rated speed of the PTO shaft is 540 r.p.m.

	**Maximum payload 1800 kg** for MDS 17.1, MDS 19.1
	**Maximum payload** **For category I: 800 kg** **For category II: 1400 kg** for MDS 11.1, MDS 12,1
	**Maximum payload 800 kg** for MDS 10.1
	**Vane adjustment** on the **left** and **right** spreading disc.
	**Spreading to one side**
	**Serial number** on the frame and the hopper must be identical.
	**Tightening torque 90 Nm** for fixing the hopper to the frame.

	**For observance in Germany** Regulations for towing of trailers behind mounted units in accordance with StVZO.
	**Factory plate**

3.12 Towing of trailers (only in Germany)

- The ground speed with a trailer must not exceed **25** km/h.
- The trailer must have an inertia brake or a braking system which can be actuated by the driver of the towing vehicle.
- The towing of a rigid drawbar trailer is only permitted if the overall weight of the trailer does not exceed the total weight of the towing vehicle and the static load of the trailer is transmitted from the mounted unit to the ground using one or more support wheels, so that the tractor vehicle can be safely steered and braked.
- A hinged drawbar trailer can be towed on the mounted unit if the actual total weight of the trailer is no more than 1.25 times the permissible total weight of the tractor vehicle, but no more than **5 t**.

3.13 Reflectors

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

The solid fertiliser broadcaster series MDS is factory-fitted with passive rear and side indicators (for attaching to machine, see figure 3.1).

4 Machine Information

4.1 Manufacturer

RAUCH Landmaschinenfabrik GmbH
Landstrasse 14
D-76547 Sinzheim
Telephone: +49 (0) 7221 / 985-0
Fax: +49 (0) 7221 / 985-200

Service centre, technical service
RAUCH Landmaschinenfabrik GmbH
Postfach 1162
D-76545 Sinzheim
Telephone: +49 (0) 7221 / 985-250
Fax: +49 (0) 7221 / 985-203

4.2 Specifications of base equipment

Dimensions:

Data		MDS 10.1	MDS 11.1	MDS 12.1	MDS 17.1	MDS 19.1
Overall width		108 cm [a]	140 cm	140 cm	190 cm	190 cm
Overall length		108 cm	115 cm	115 cm	120 cm	120 cm
Fill height (basic machine)		92 cm	92 cm	104 cm	93 cm	101 cm
Distance of centre of gravity from lower link coupling point		55 cm	55 cm	55 cm	55 cm	55 cm
Fill width		98 cm	130 cm	130 cm	180 cm	180 cm
Working width [b]		10 - 18 m	10 - 18 m	10 - 18 m	10 - 18 m	10 - 18 m
PTO speed	minimum	450 r.p.m.	450 r.p.m.	450 r.p.m.	450 r.p.m.	450 r.p.m.
	maximum	600 r.p.m.	600 r.p.m.	600 r.p.m.	600 r.p.m.	600 r.p.m.
Nominal speed		540 r.p.m.	540 r.p.m.	540 r.p.m.	540 r.p.m.	540 r.p.m.
Capacity		500 l	600 l	800 l	700 l	900 l
Mass flow [c]	maximum	250 kg/min	250 kg/min	250 kg/min	250 kg/min	250 kg/min
Hydraulic pressure	maximum	200 bar	200 bar	200 bar	200 bar	200 bar
Noise level [d] (in the closed driver's cab of the tractor)		75 dB (A)	75 dB (A)	75 dB (A)	75 dB (A)	75 dB (A)

a. On the versions R, D, K the total width is 120 cm

b. Working width depends on the type of fertiliser and the type of spreading disc (maximum 24 m)

c. Maximum mass flow rate depends on the type of fertiliser.

d. Since the noise level of the solid fertiliser broadcaster can only be determined when the tractor is running, the actual measured value is strongly dependent upon the tractor being used.

Weights and loads:

NOTICE

The unladen weight (mass) of the solid fertiliser broadcaster varies depending on how it is equipped and the combination of attachments. The unladen weight shown on the factory plate refers to the standard version.

Data	MDS 10.1	MDS 11.1	MDS 12.1	MDS 17.1	MDS 19.1
Unladen weight	190 kg	200 kg	210 kg	210 kg	230 kg
Fertiliser load maximum	Category I and II: 800 kg	Category I: 800 kg Category II: 1400 kg		Category II: 1800 kg	

4.3 Specifications of attachments and attachment combinations

Series MDS solid fertiliser broadcasters can be operated with different attachments and combinations of attachments. Depending on the feature package the capacity, dimensions and weights may change.

Attachments for types MDS 11.1/12.1	M 21	M 41
Change in capacity	+ 200 l	+ 400 l
Change in fill height	+ 12 cm	+ 24 cm
Fill width	130 cm	
Maximum attachment size	140 x 115 cm	
Attachment weight	20 kg	30 kg
Notes	4-side	4-side

Attachments for types MDS 17.1/19.1	M 430	M 433	M 630	M 633	M 873
Change in capacity	+ 400 l	+ 400 l	+ 600 l	+ 600 l	+ 800 l
Change in fill height	+ 18 cm	+ 8 cm	+ 30 cm	+ 18 cm	+ 27 cm
Fill width	178 cm			228 cm	
Maximum attachment size	190 x 120 cm			240 x 120 cm	
Attachment weight	30 kg	31 kg	42 kg	49 kg	59 kg
Notes	4-side	3-side	4-side	3-side	3-side

5 Transport without tractor

5.1 General safety instructions

Before transporting the solid fertiliser spreader observe the following instructions:

- The solid fertiliser spreader must only be transported without the tractor if the hopper is empty.
- The operation must only be carried out by suitable, trained and expressly authorised personnel.
- Suitable means of transportation and lifting equipment (e.g. crane, fork lift truck, cable devices...) are to be used for transport purposes.
- Establish the transportation route in good time and remove possible obstacles.
- A check must be made to ascertain that all safety and transport devices are fit for operation.
- Cordon off all danger areas accordingly, even if they are only briefly in existence.
- The person responsible for the transportation is required to make certain, that the transport of the solid fertiliser broadcaster can be carried out routinely.
- Unauthorised persons are to be excluded from the transport route. The areas concerned are to be cordoned off!
- The solid fertiliser broadcaster is to be handled and transported carefully.
- Make sure that allowance is made for the centre of gravity! If necessary, adjust the cables such that the machine is correctly aligned on the means of transport.
- Transport the solid fertiliser broadcaster to the set-up location as close to the ground as possible.

5.2 Loading and unloading, parking

1. Determine the weight of the solid fertiliser broadcaster.

   Check the details on the factory type plate.

   If applicable, note the weight of the special built-on accessories.
2. Hang suitable lifting tackle in both ring eyelets.
3. Lift the machine carefully using suitable lifting equipment.
4. Place the machine carefully on the loading platform of the transport vehicle or on solid ground.

6 Before operation

6.1 Handing over the solid fertiliser broadcaster

When taking delivery of the solid fertiliser broadcaster, check to make certain the scope of delivery is complete.

The standard equipment includes

- 1 operator's manual for Series MDS solid fertiliser broadcaster ,
- 1 calibration chart (paper or CD),
- 1 calibration kit comprising chute and calculator,
- Lower link and upper link pins,
- Agitator head
- Protective grid in hopper
- 1 set of spreader discs (as per order), Multi-Disc with adjusting lever,
- 1 universal drive shaft (including operator's manual).

Also check the special accessories ordered additionally for completeness.

Please check for shipping damage or missing parts. Have shipping damage confirmed by the transport company.

NOTICE

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

The right hand broadcast disc and the left hand broadcast disc must be fitted as looking in the direction of travel.

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

6.2 Requirements for the tractor

To ensure safe, proper use of the MDS Series solid fertiliser broadcaster , the tractor must meet the necessary mechanical, hydraulic and electrical requirements.

- Drive shaft coupling: 1 3/8 inch, 6 spline, 540 r.p.m. (alternatively 8 x 32 x 38, 540 r.p.m.),
- Oil supply: max. 200 bar, single or double acting valve (depending on the equipment) with hydraulic slide control,
- Electrical system: 12 V,
- Three-point linkage Category I or II. (type-dependent)

6.3 Assembling the solid fertiliser broadcaster

NOTICE

The assembly of the frame/hopper must **only** be carried out by your dealer or expert workshop.

⚠ CAUTION

Material damage to the hopper

If the hopper is not placed on the frame properly, the agitator shaft can rest on the base of the hopper and cause material damage.

The plastic drain section or other parts could get damaged.

- ▶ Proceed with care when mounting the hopper on to the frame.
- ▶ Move the lifting equipment closer in small steps in order to locate the hopper in the correct position.

⚠ WARNING

Crushing danger from falling hopper/frame

When lifting the hopper/frame there is a danger of crushing if the hopper/frame is not strapped on properly.

Persons may be injured and the hopper/frame may be damaged.

- ▶ Use suitable lifting tackle for lifting the hopper/frame.
- ▶ Attach the lifting equipment to the points provided.
- ▶ Make sure that no persons are under the raised hopper/frame.

To reduce the transport volume, the hopper and frame are delivered separately.

1. Take the frame off the stack with suitable lifting tackle (e.g. fork-lift truck/front-loader) and suitable straps (see figure 6.1) and place it on level solid ground.

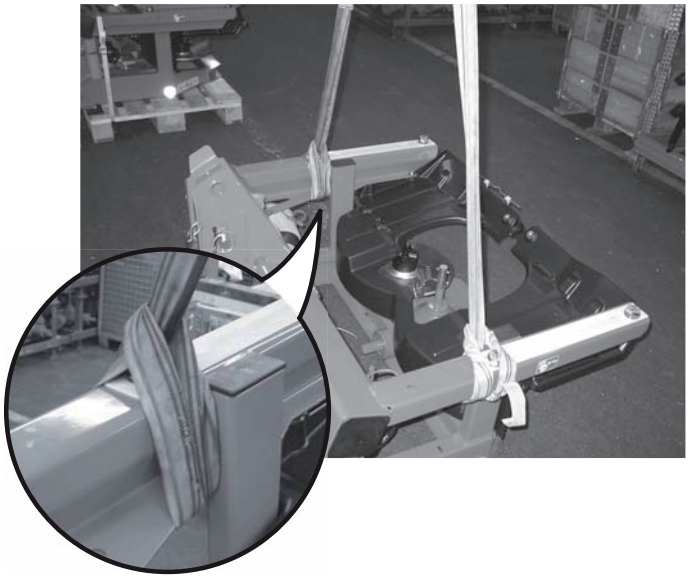


Figure 6.1: Lifting the frame

2. Suspend suitable slinging equipment from the crane eyes on the hopper and remove the hopper from the stack as shown below.

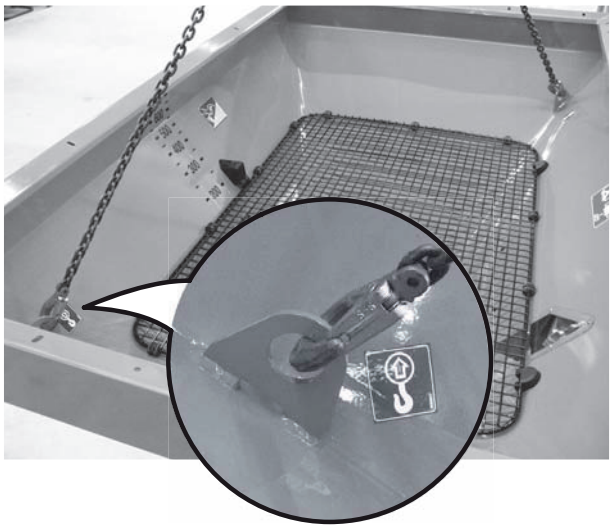


Figure 6.2: Lifting the hopper

NOTICE

Every frame and every hopper has a serial number on the **right hand side** looking in the direction of travel.
These serial numbers on the frame and the hopper must be identical since otherwise the factory setting of frame/hopper will not be effective.

Possible consequences:

- Spreading errors
- Material damage to the machine

6.3.1 Checking the position of the gearbox

NOTICE

After each time the support frame is split from the hopper, the position of the gearbox must be checked when bringing them back together again.

The drive spigot [1] of the agitator must lie exactly in the centre of the base opening. If this is not the case this can be corrected by displacing the gearbox in the appropriate direction. The fixing holes in the gearbox/frame are implemented as slotted holes for this purpose.

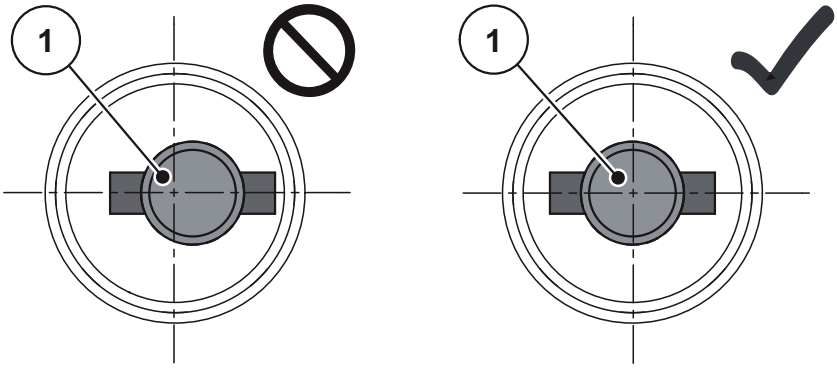


Figure 6.3: Centring the drive spigot

Make sure that the gearbox is straight in the carrier frame.

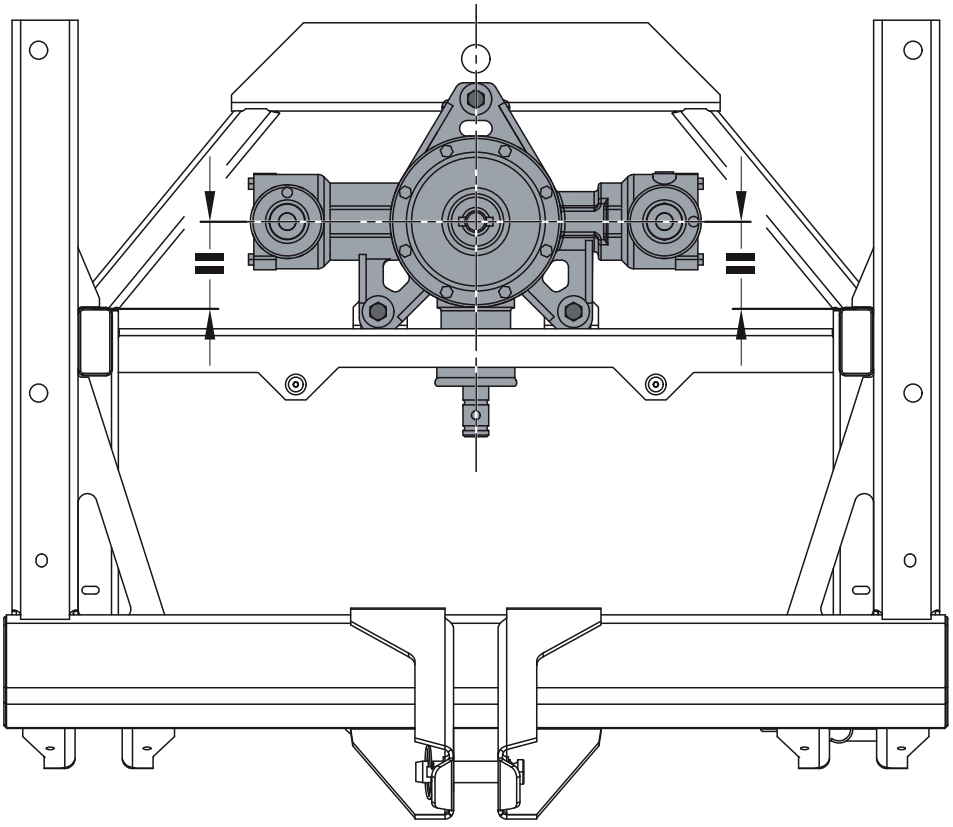


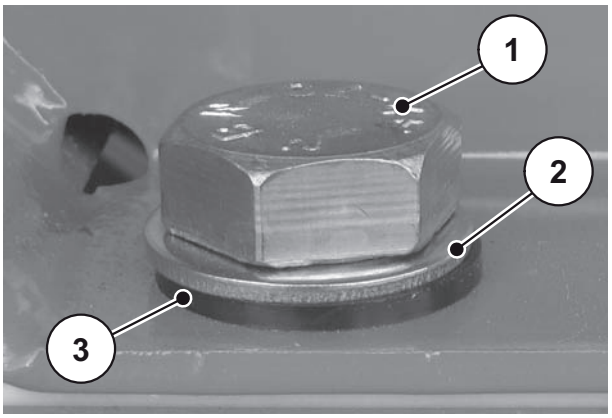
Figure 6.4: Check the location of the gearbox

6.3.2 MDS 10.1/11.1/12.1/17.1/19.1 (M)

1. Close the metering slide.
2. Place the hopper **carefully** onto the frame. In doing so, guide the agitator shaft into the bore on the hopper base.

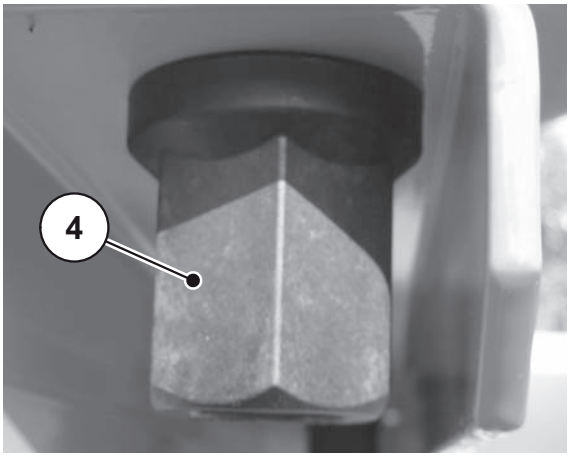
Figure 6.5: Agitator shaft

3. Bolt the frame and the hopper together.



[1] M20 bolt
[2] Metal washer
[3] Plastic washer

Figure 6.6: M20 bolt



[4] Plastic nut

Figure 6.7: Plastic nut

⚠ CAUTION

Tightening torque of the bolted connections

The thread on the plastic nut can be destroyed if the tightening torque is too great.

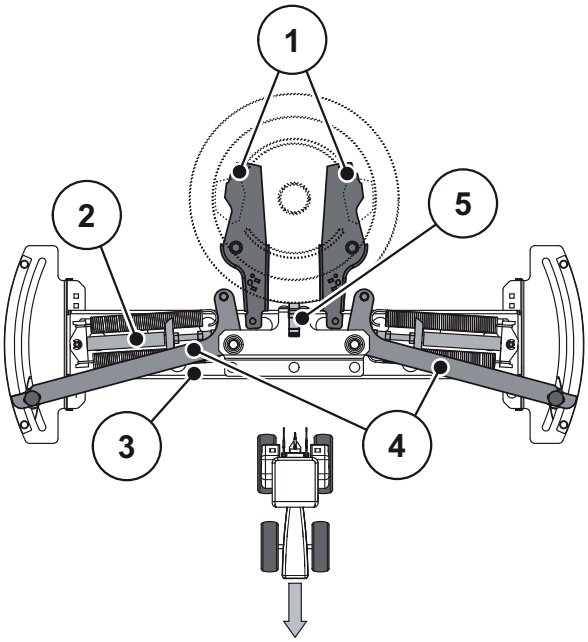
- ▶ The bolted connection between the hopper and the frame must be tightened using a torque wrench.
- ▶ Tightening torque: **90 Nm**

6.3.3 MDS 10.1/11.1/12.1/17.1/19.1 (K/R/D)

NOTICE

Since the MDS solid fertiliser broadcaster (K/R/D) has a metering scale on each side, the following fitting work must be carried out on both the **right hand** and on the **left hand** side.

1. Place the frame on a flat secure surface (e.g. a pallet).



[1] Metering slide
[2] Hydraulic cylinder
[3] Bearing bracket
[4] Stop lever
[5] Bearing journal

Figure 6.8: Setting the metering slide and stop lever

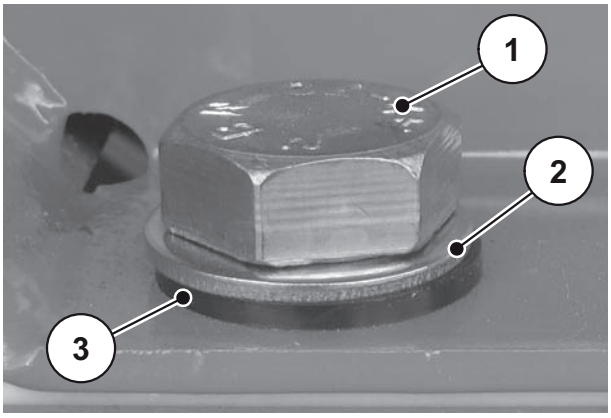
2. Place the right and left stop levers [4] to the highest position (550) and clamp in position.
3. Move the two hydraulic cylinders [2] mounted on the bearing bracket [3] forwards (in the direction of travel).
4. Align the two metering slides [1] on the hopper parallel to the direction of travel by hand.

5. Place the hopper carefully onto the frame.

   Insert the bearing journal [5] into the guide slot on the bearing bracket [3] and insert the agitator shaft into the bore in the base of the hopper (see figure 6.8 und figure 6.9).

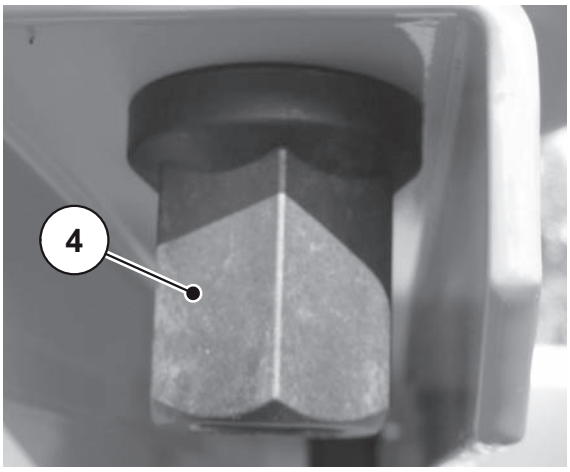
Figure 6.9: Agitator shaft

6. Bolt the frame and the hopper together.



[1] M20 bolt
[2] Metal washer
[3] Plastic washer

Figure 6.10: M20 bolt



[4] Plastic nut

Figure 6.11: Plastic nut

⚠ CAUTION

Tightening torque of the bolted connections

The thread on the plastic nut can be destroyed if the tightening torque is too great.

- ▶ The bolted connection between the hopper and the frame must be tightened using a torque wrench.
- ▶ Tightening torque: **90 Nm**.

Connecting the metering slide

Proceed as follows for both sides (left and right):

1. Remove the universal drive shaft.
2. Close the metering slide by hand as far as possible (up to the stop on the centre bracket).
3. Fix the stop lever in position 0.
4. Remove the plastic part from the fork head on the hydraulic cylinder.
5. Remove the locking pin and the locking washer.
6. Fix the stop lever in position 550.
7. Place the fork head of the hydraulic cylinder on the metering slide [1].

[1] metering slide
[2] Clevis end of the hydraulic cylinder

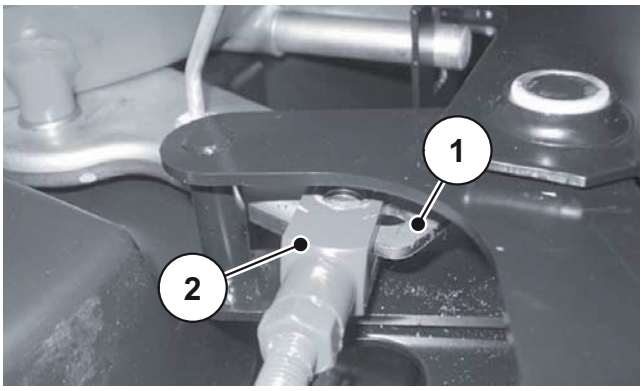


Figure 6.12: Place the cylinder to one side

8. Connect the hydraulic hoses of the hydraulic slide control to the hydraulic power pack or to the tractor.
9. Extend the hydraulic cylinders carefully from the tractor/power pack to the end stop.
10. Close the ball cocks on the hydraulic slide control (only on version K/R).
11. Turn the tractor off or turn the power pack off.
12. Remove the ignition key.

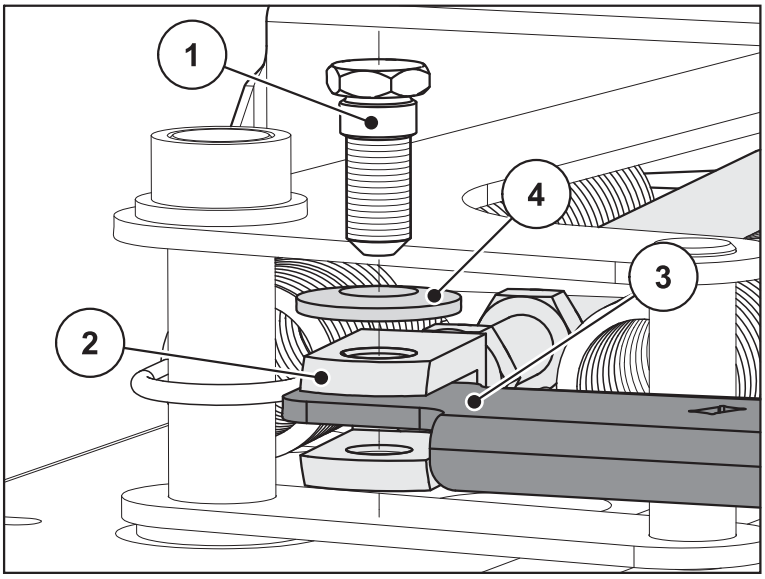


Figure 6.13: Metering slide connection

[1] Locking pin
[2] Clevis end
[3] Metering slide
[4] Locking washer

13. Connect the metering slide [3] to the fork head [2] of the hydraulic cylinder using a locking pin [1] and locking washer [4].

▷ **The assembly of frame/hopper is now complete. If you now disconnect the hydraulic hoses from the tractor/unit, you must first release the tension from the return spring on the single-acting hydraulic cylinders. See 6.11: Switching off and uncoupling the solid fertiliser broadcaster, page 59.**

⚠ WARNING

Crushing danger from machine components

The metering slides are controlled by control valves and ball cocks.

Inadvertent actuation of the control valves or ball cocks can cause the open metering slides to close.

▶ Close the metering slide and possibly the ball cocks before any assembly or setting work.

6.3.4 Agitator assembly

1. Apply graphite grease to the agitator shaft in the area of the cylinder pin.

Figure 6.14: Agitator shaft

2. Also apply graphite grease to the agitator head [1] before mounting.
3. Insert agitator head.
4. Secure the agitator head [1] by turning in an anti-clockwise direction.

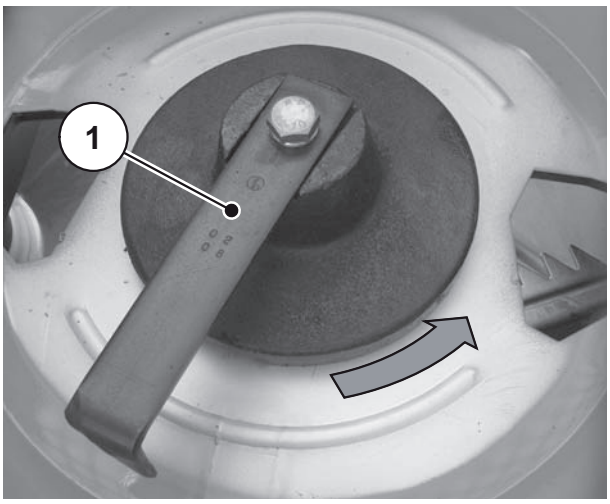


Figure 6.15: Agitator head

6.4 Fitting the protective grid

⚠ WARNING

Danger of injury from moving parts in the hopper

There are moving parts in the hopper.

Injuries to hands and feet can be caused during commissioning and operation of the solid fertiliser broadcaster.

- ▶ Always fit the protective grid before commissioning and operation of the solid fertiliser broadcaster and lock it in position.
- ▶ Switch the PTO shaft off, switch the engine off and remove the ignition key before any setting or other work on the protectice grid.

- Carry out regular functional checks of the protective grid interlock.
- Replace defective protective grid interlocks immediately.

Fitting the protective grid:

1. Place the retainers [1] in the two free sections of the protective grid.

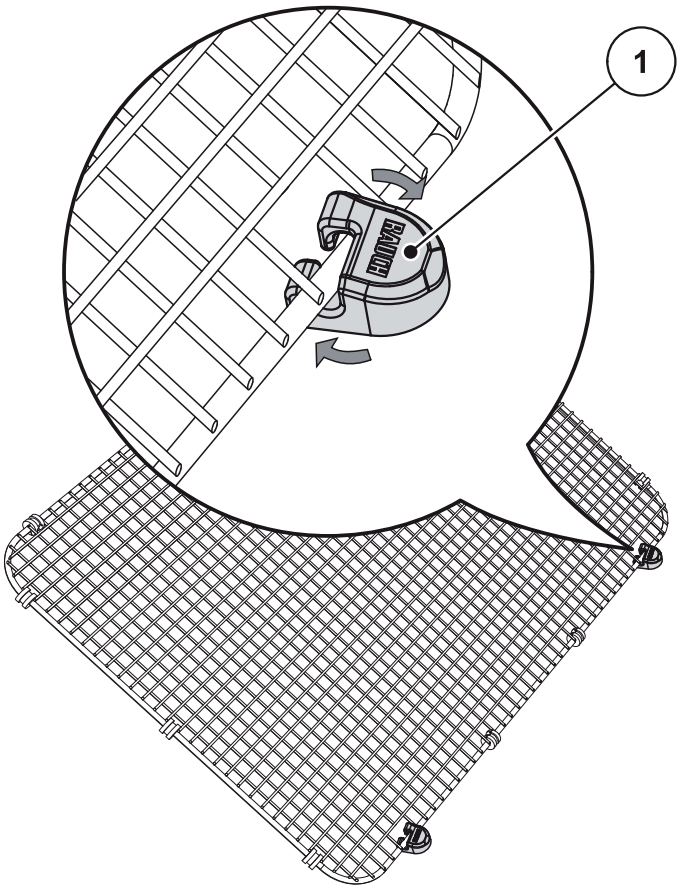


Figure 6.16: Retainers on protective grid

[1] Retainer

2. Place the protective grid in the hopper. Position the retainers over the holes.
3. Fix the retainers from the outer side of the hopper with bolts [2] and washers [3].

NOTICE

When tightening the bolts, make sure that the maximum **tightening torque** of **15 Nm** is not exceeded.

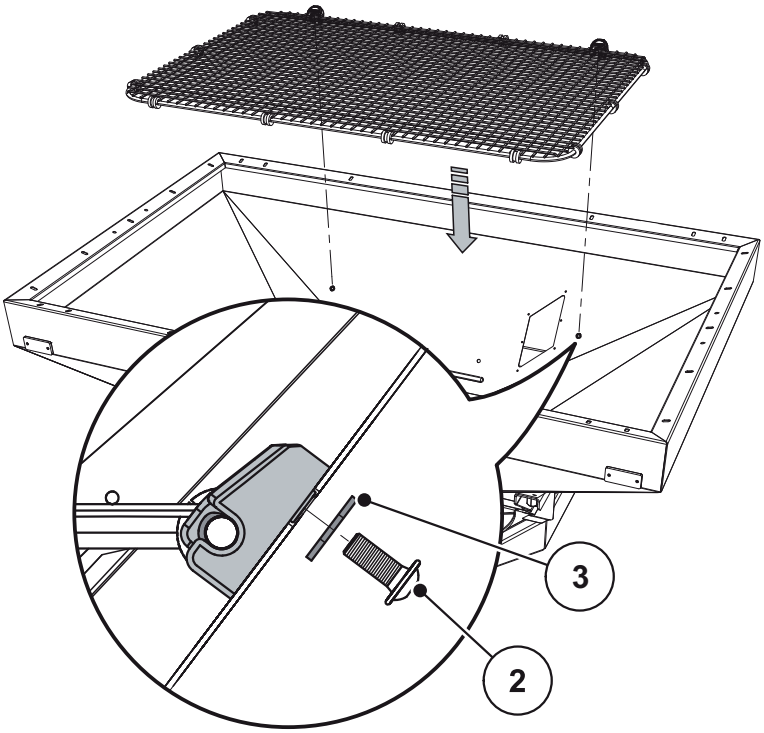


Figure 6.17: Fixing the protective grid

[2] Bolt
[3] Washer

4. Fix the interlock [4] using two bolts [5] and washers [6].

NOTICE

When tightening the bolts, make sure that the maximum **tightening torque** of **5 Nm** is not exceeded.

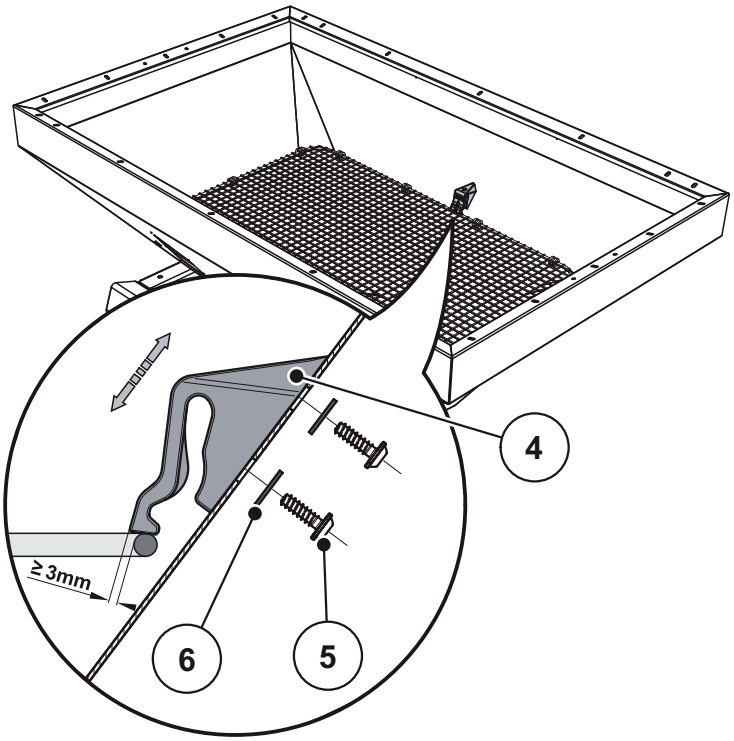


Figure 6.18: Fixing the protective grid

[4] Interlock
[5] Bolt
[6] Washer

5. Make sure that the interlock protrudes **at least 3 mm** over the edge of the protective grid. Correct the adjustment, if necessary, by displacing the interlock downwards/upwards.

▷ **The protective grid has been fitted.**

6.5 Fixing the deflection and protection device

To reduce the transport volume, the hopper and carrier frame are delivered separately.

For this reason, the deflection and protection device must be securely bolted to the hopper before commissioning since, otherwise, proper function is not ensured.

Use the bolts and washers provided and fix the deflection and protection device as shown in the illustration below.

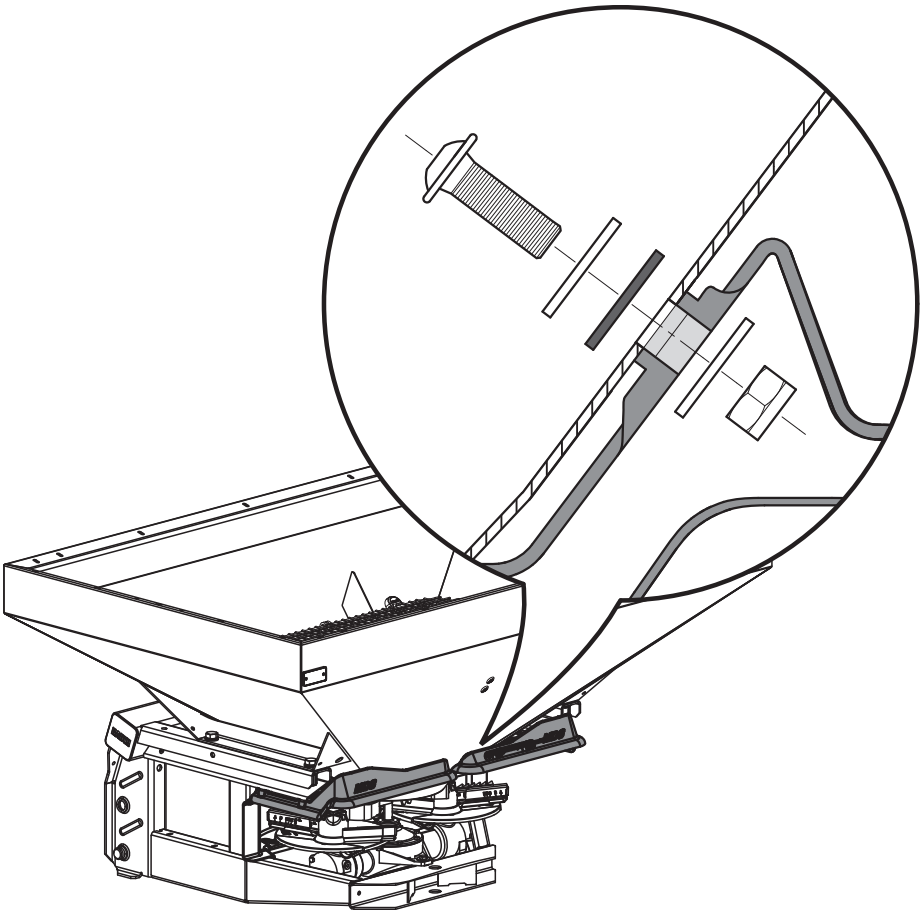


Figure 6.19: Fixing the deflection and protection device

6.6 Fitting the universal shaft to the solid fertiliser broadcaster

⚠ CAUTION

Danger from unsuitable drive shaft

The solid fertiliser broadcaster is equipped with a universal drive shaft which may be arranged differently depending on the device and output.

The use of an incorrectly dimensioned or non-approved universal shaft, for example without a guard or retaining chain, can lead to damage to the tractor and the solid fertiliser broadcaster.

▶ Use only universal drive shafts approved by the manufacturer.

▶ Follow the directions in the shaft manufacturer's manual!

Depending on the design, the solid fertiliser broadcaster may be equipped with different universal drive shafts:

- Standard universal drive shaft,
- Tele-Space universal drive shaft

6.6.1 Check length of universal drive shaft

- Check the length of the universal drive shaft when fitting it to the tractor for the first time.
  ▷ Universal drive shaft tubes that are too long can result in damage to the universal drive shaft and solid fertiliser broadcaster.
- Check the open area between the solid fertiliser broadcaster and the tractor.
  ▷ If there is not enough room between the tractor and the solid fertiliser broadcaster for connecting the drives and control elements, an extending **Tele-Space universal drive shaft** must be used; see also 12.6: Tele-Space universal drive shaft, page 138 in chapter Options.

NOTICE

Observe the attachment instructions and short instructions in the shaft manufacturer's manual when testing and fitting the universal drive shaft. This operator's manual is attached to the universal drive shaft on delivery.

6.6.2 Fitting and removing the PTO shaft

⚠ DANGER

Danger of catching in the rotating drive shaft

Attaching and removing the universal drive shaft with the engine running may cause very serious injury (crushing, catching in the rotating shaft).

▶ Switch off the engine of the tractor and remove the ignition key.

Attachment:

1. Check the mounting position.
   ▷ The end of the shaft with the tractor symbol must be at the tractor end of the shaft.

2. Release the stop screw [1] of the drive shaft shield.
3. Turn the drive shaft shield to the removal position.
4. Remove the universal drive shaft.

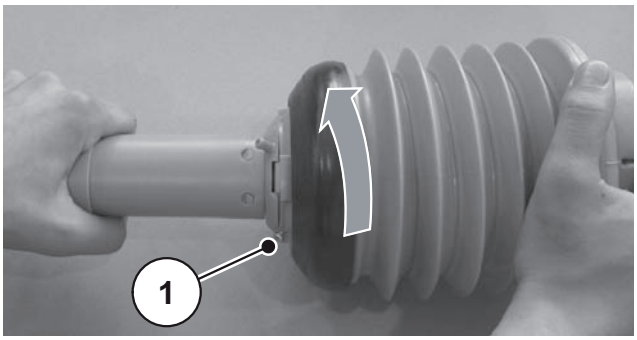


Figure 6.20: Drive shaft

5. Remove the spigot protection and grease the gear spigot.
6. Place the universal drive shaft on the gear spigot.
7. Tighten hexagonal screw and nut with size 17 wrench (max. **35 Nm)**.

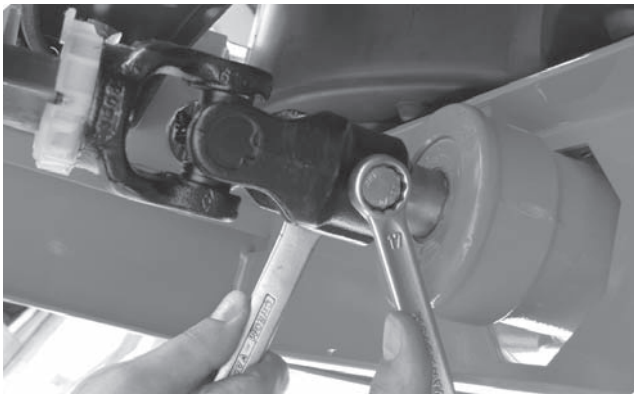


Figure 6.21: Gear spigot

8. Pull drive shaft guard with hose clamp over the universal drive shaft and place on the gearbox neck (do not tighten).
9. Rotate drive shaft guard to lock position.
10. Tighten locking screw.

Figure 6.22: Drive shaft shield

11. Tighten hose clamp.

Figure 6.23: Hose clamp

Instructions for removal:

- Remove the universal drive shaft in reverse order of attachment.
- Do not use safety chain to suspend the universal drive shaft.
- Store uncoupled universal drive shaft on the bracket.

Figure 6.24: Universal drive shaft retainer

6.7 Mounting the solid fertiliser broadcaster to the tractor

6.7.1 Requirements

⚠ DANGER

Danger from unsuitable tractor

Using an unsuitable tractor for the MDS solid fertiliser broadcaster may result in the severest of accidents during operation or road travel.

Only tractors that meet the technical requirements for the solid fertiliser broadcaster may be used.

▶ Based on the vehicle's documentation, check whether your tractor is suitable for use with the MDS solid fertiliser broadcaster.

Check the following specific requirements:

- Are both the tractor and solid fertiliser broadcaster safe to operate?
- Does the tractor comply with the mechanical, hydraulic and electrical requirements (see chapter 6.2: Requirements for the tractor, page 27).
- Do the attachment categories of the tractor and solid fertiliser broadcaster match? If necessary, consult with your dealer.
- Is the solid fertiliser broadcaster standing securely on flat, firm ground?
- Do the axle loadings agree with the stipulated calculations (see chapter 13: Axle load calculation, page 141)?

6.7.2 Attachment

⚠ DANGER

Danger of crushing between the tractor and the solid fertiliser broadcaster

Persons who stand between the tractor and the solid fertiliser broadcaster when the tractor is approaching or when the hydraulics are actuated are risking their lives.

The tractor may brake too late or not at all because of inattention or faulty operation.

▶ Make sure that no one stands between the tractor and the solid fertiliser broadcaster.

The solid fertiliser broadcaster is attached to the three-point linkage (rear power lift) of the tractor.

NOTICE

For normal fertilising and late fertilising **always** use the **top coupling point** of the solid fertiliser broadcaster.

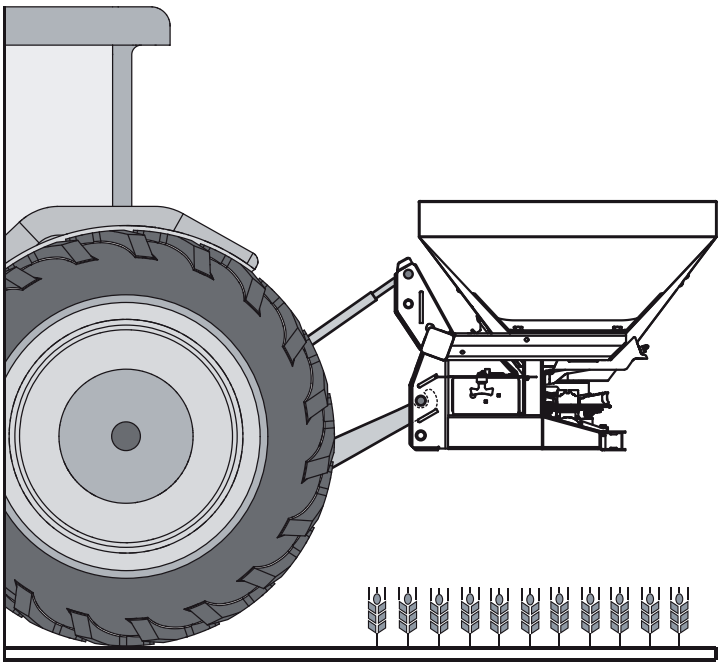


Figure 6.25: Mounting position

Instructions for fitting:

- It can be mounted on a tractor with class III linkage only with the class II clearance and with the use of reducing sleeves.
- The bottom and top linkage pins must be locked with the locking pins or spring clips.
- The solid fertiliser broadcaster must be mounted as specified in the calibration charts for correct cross distribution of the fertiliser.
- In order to prevent oscillating backwards and forwards during broadcasting, make sure that the solid fertiliser broadcaster only has a small clearance at the side:
  - Brace the lower link arms on the tractor with bracing ribs or chains.

1. Start the tractor.
   - the PTO shaft is switched off,
2. Approach the solid fertiliser broadcaster with the tractor.
   - Do not yet hook the lower steering arm catcher hooks in position.
   - Make sure that there is adequate space between the tractor and the solid fertiliser broadcaster for connecting the drives and control elements.
3. Shut off the engine of the tractor. Remove the ignition key.
4. Mount the universal drive shaft on the tractor.
   - If there is inadequate space then an extendable Tele-Space universal drive shaft must be used.
5. Connect the electrical and hydraulic slide controls and the lighting (see Chapter 6.9: Connecting/decoupling the slide control, page 53).
6. From the tractor cab, couple the lower steering arm claw and the upper steering arm to the retainers provided for them, as described in the operator's manual for your tractor.

NOTICE

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

7. Make sure that the solid fertiliser broadcaster is securely fixed in position.
8. Lift the solid fertiliser broadcaster carefully up to the maximum stroke height.

⚠ CAUTION

Material damage caused by universal drive shaft too long

When the solid fertiliser broadcaster is lifted up, the halves of the universal drive shaft can come into contact inside each other. This can cause damage to the universal drive shaft, to the gearbox or the solid fertiliser broadcaster.

- ▶ Check the open area between the solid fertiliser broadcaster and the tractor.
- ▶ Make sure that the outer tube of the universal drive shaft has adequate clearance to the broadcaster side protection hopper (at least 20 to 30 mm).

9. Shorten the universal drive shaft if necessary.

NOTICE

Have the universal drive shaft shortened **only** by your dealer or your expert workshop.

NOTICE

Observe the attachment instructions and short introduction in the shaft manufacturer's manual when testing and fitting the universal drive shaft. This operator's manual is attached to the universal drive shaft on delivery.

10. Pre-set the mounting height in accordance with the fertiliser chart. See chapter 7.2.2: Settings as per spreading charts, page 66.

6.8 Set hopper height

6.8.1 Safety

⚠ DANGER

Danger of crushing by the solid fertiliser broadcaster falling down

If the halves of the upper link are unscrewed completely by mistake, the upper steering arm can no longer take up the tension forces of the full solid fertiliser broadcaster and the solid fertiliser broadcaster can suddenly tip over backwards or can fall off.

Persons could be severely injured and the machine damaged.

- ▶ Always observe the maximum length quoted by the manufacturer of the tractor or the upper steering arm when unscrewing the upper steering arm.
- ▶ Direct all persons away from the danger area of the solid fertiliser broadcaster.

⚠ DANGER

Risk of injury from rotating spreading discs

Contact with the rotating spreading discs and spreader vanes may injure, crush or cut off body parts. Body parts or objects may be caught and pulled in.

- ▶ **Never** exceed the maximum approved hopper heights at the front (V) and rear (H).

General instructions before setting the mounting height

- We recommend the highest coupling point on the tractor for the upper steering arm, particularly with large stroke heights.
- For normal fertilising and late fertilising **always** use the top coupling point of the solid fertiliser broadcaster.
- If the lower steering arm plugs are located in the lower steering arm coupling point, then the upper steering arm coupling point **only** must be used for the upper steering arm, to prevent creating unfavourable force ratios at the upper and lower steering arms.
- The lower coupling points provided on the solid fertiliser broadcaster for the lower steering arm of the tractor are **only for exceptional circumstances** in late fertilising.

6.8.2 Maximum approved hopper height at front (V) and rear (H)

The **maximum** approved hopper height **(V + H)** is **measured from the ground** to the bottom edge of the frame.

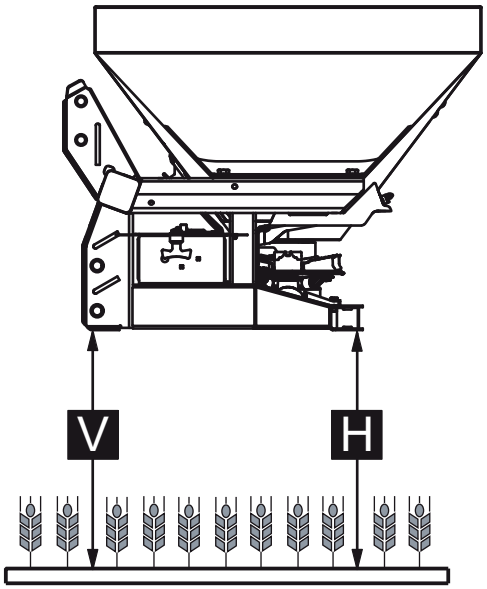


Figure 6.26: Maximum approved hopper height V and H in normal and late fertilising

The maximum approved hopper height depends on the following factors:

- Normal dressing or late top dressing.

Spreader equipment	Maximum approved hopper height			
	in normal dressing		in late fertilising	
	V	H	V	H
MDS	850 mm	850 mm	770 mm	830 mm

6.8.3 Hopper heights A and B as per the fertiliser chart

The hopper heights in the fertiliser chart **(A and B)** are always measured in the field from the top of the **plant stand** to the bottom edge of the frame.

NOTICE

The values of A and B are taken from the **spreading charts**.

Setting the mounting height in normal fertilising

Requirements:

- The upper steering arm is mounted at the highest connecting point of the tractor.
- The solid fertiliser broadcaster is mounted on the **top lower** and **upper steering arm coupling point**.

Proceed as follows when determining the hopper height (in normal dressing):

11. Set the hopper heights **A and B** (above crop) from the calibration charts.

12. Compare the hopper heights A and B plus the plant stand with the maximum approved hopper heights at the front (V) and rear (H).

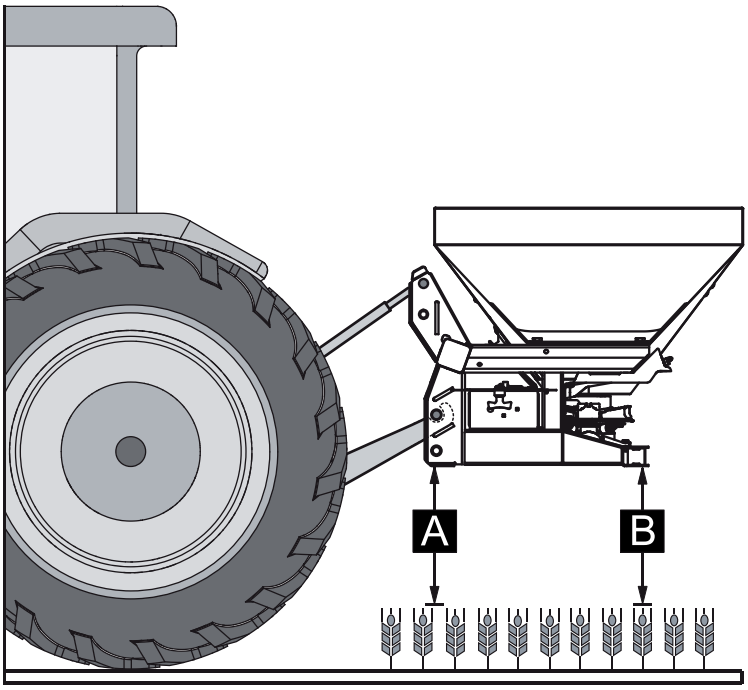


Figure 6.27: Mounting position and height in normal fertilising

The following applies:	A + plant stand ≤ V	Maximum 850 mm
	B + plant stand ≤ H	Maximum 850 mm

13. If the maximum approved hopper height of the solid fertiliser broadcaster for normal dressing is exceeded or hopper height A and B can no longer be reached, the solid fertiliser broadcaster must be set up with the values for **late fertilising**.

Setting the mounting height in late fertilising

Requirements:

- The upper steering arm is mounted at the highest connecting point of the tractor.
- The broadcaster is mounted on the **upper lower steering arm coupling point** and on the **upper upper steering arm coupling point**.

Proceed as follows when determining the hopper height (in late fertilising):

1. Set the hopper heights **A and B** (above crop) from the calibration charts.
2. Compare the hopper heights A and B (plus the plant stand) with the maximum approved hopper heights at the front (V) and rear (H).

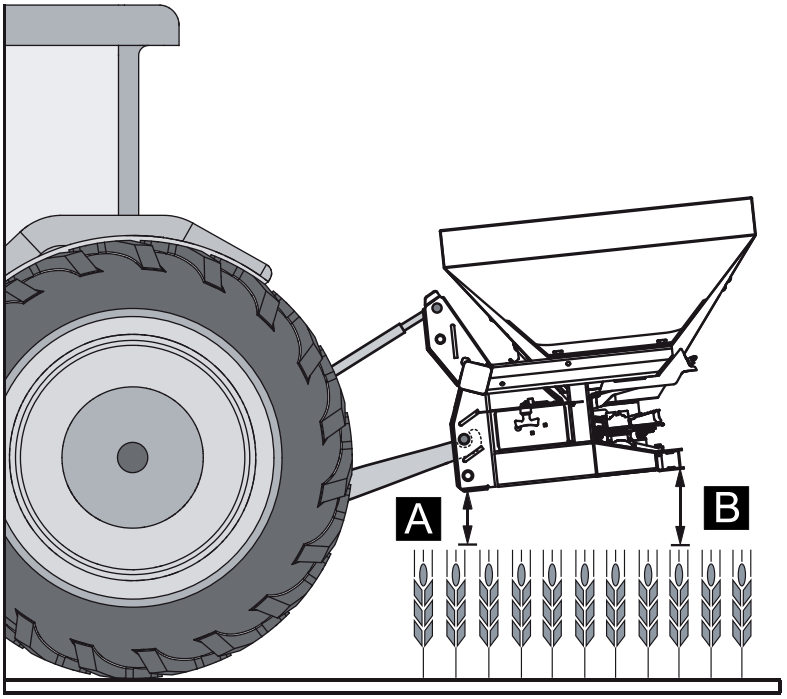


Figure 6.28: Mounting position and height in late fertilising

The following applies:	A + plant stand ≤ V	Maximum 770 mm
	B + plant stand ≤ H	Maximum 830 mm

3. If the lifting height of the tractor is not adequate to set the desired mounting height, you can use the **lower lower** and **upper steering arm coupling point** on the solid fertiliser broadcaster.

NOTICE

Make sure that the **maximum length** of the upper steering arm stipulated by the tractor or upper steering arm manufacturer is not exceeded.

- Observe the details given in the operator's manual of the tractor or upper steering link maufacturer.

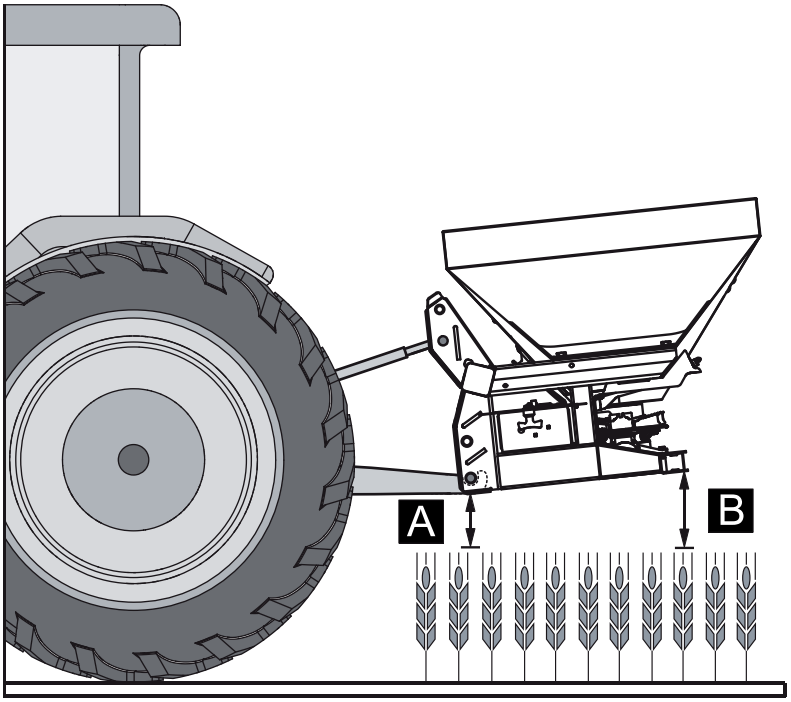


Figure 6.29: Solid fertiliser broadcaster mounted on the lower upper and lower steering arm coupling points

6.9 Connecting/decoupling the slide control

⚠ WARNING

Crushing and shearing danger from tensioned return springs, versions K + R and FHK 4 (single-acting slide control)

There is a danger, when manually actuating the single-acting slide controls, if the metering slide is not closed hydraulically **before quantity setting**.

The pre-tensioned stop lever can move suddenly to the end of the guide slot when the fixing screw is released.

In the event of misuse or non-observance of the procedure for setting the spreading volume, the stop lever can move suddenly to the end of the guide slot.

This can cause crush injuries to the fingers or to injury to the operator.

- ▶ **Never** push against the spring pressure by hand to hold the stop lever in position during volume setting.
- ▶ Before setting work (e.g. setting the spreading volume) the metering slide must **always be closed hydraulically**.

6.9.1 MDS 10.1/11.1/12.1/17.1/19.1 (K/R/D)

The opening slide is actuated separately by two hydraulic cylinder. The hydraulic cylinders are connected to the slide actuator on the tractor by the hydraulic hoses. Different types of hydraulic cylinders can be used on the MDS solid fertiliser broadcaster:

Version	Hydraulic cylinder	Operation	Requirements for the tractor
K	Single-acting hydraulic cylinder	Oil pressure closes spring force opens	Two single-acting control valves or Two double-acting control valves with float position or One single and one double-acting control valve with float position
R	Single-acting hydraulic cylinder with two-way unit	Oil pressure closes spring force opens	One single or one double-acting control valve with float position
D	Double-acting hydraulic cylinder	Oil pressure closes oil pressure opens	Two double-acting control valves

NOTICE

Versions **K** and **R**:

Before extended road travel or **during filling**, close the two ball cocks at the coupling plugs on the hydraulic pipes. This prevents automatic opening of the metering slide caused by leaks in the valves in the tractor hydraulics.

Instructions for connection of a two-way unit (accessories)

The two-way unit

- is standard with version **R**.
- is offered as a special accessory for version **K**.

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

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

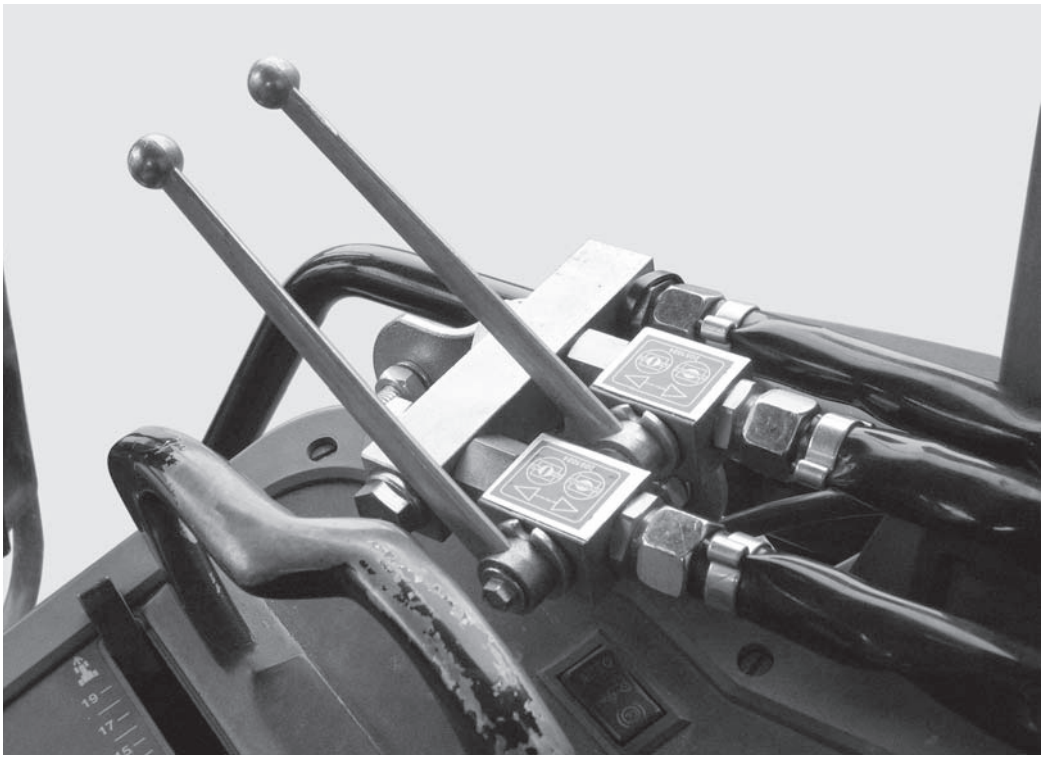


Figure 6.30: Slide actuator of the two-way unit

The metering slides can be actuated individually with the locks of the two-way unit.

Position indicator

This indicator is used to detect the position of the metering slide from the driver's seat, in order to avoid inadvertent loss of fertiliser.

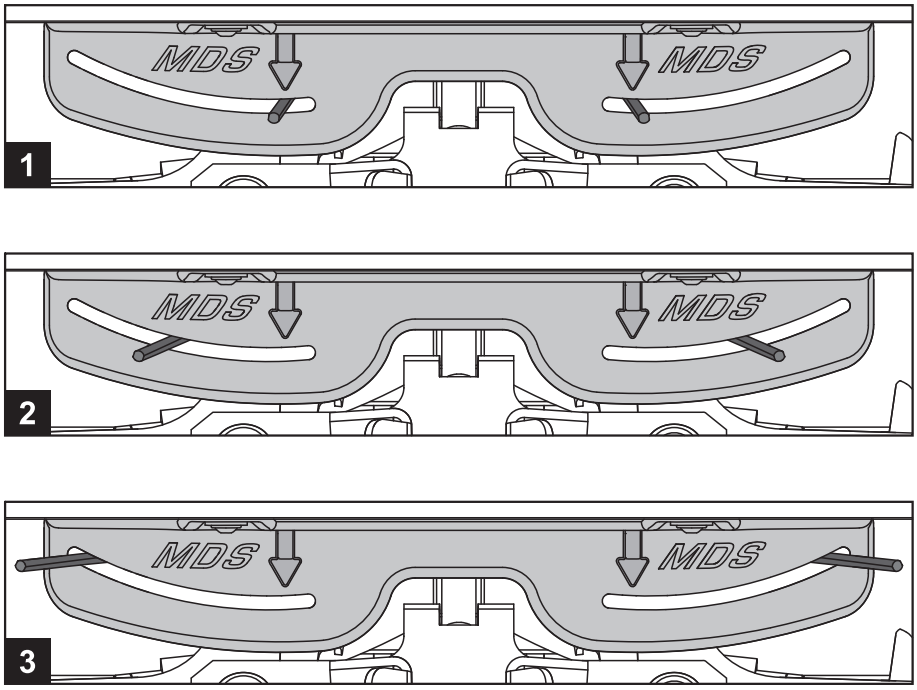


Figure 6.31: Position of the stop slide

[1] Closed
[2] Open
[3] Fully open

6.9.2 MDS 10.1/11.1/12.1/17.1/19.1 (Quantron M Eco)

NOTICE

An electronic slide control is connected to this solid fertiliser broadcaster.

The electronic hydraulic slide actuator is described in a separate operator's manual for the Quantron M operating terminal. This operator's manual is a component of the Quantron M control unit.

6.9.3 MDS 10.1/11.1/12.1/17.1/19.1 (M) with special accessories FHK 4/FHD 4

The opening slide is actuated separately by a hydraulic cylinder. The hydraulic cylinder is connected to the slide actuator on the tractor by one or two hydraulic hoses.

Version	Hydraulic cylinder	Operation	Requirements for the tractor
FHK4	Single-acting hydraulic cylinder	Oil pressure closes spring force opens	A single acting control valve (tipper connection)
FHD4	Double-acting hydraulic cylinder	Oil pressure closes oil pressure opens	One double-acting control valve

⚠ CAUTION

Material damage caused by incorrect fitting length

If the fitting length of the hydraulic cylinder is incorrect, the adjustment lever or bearing pin can be deformed. (See also separate fitting information).

- ▶ Before the hydraulic cylinder is attached to the adjusting lever, check the fitting length of the cylinder with closed metering slide and extended cylinder.
- ▶ Adjust the fitting length to suit by releasing the locknut and turning the clevis end.

6.9.4 Fitting the FHK 4 single-acting hydraulic cylinder slide control

- Fit the cylinder for the FHK 4 single-acting hydraulic slide control on the right hand side looking in the direction of travel.

6.9.5 Adapting the left-hand angle joint to the FHK 4/FHD 4 slide control

NOTICE

When creating the fertiliser chart for the MDS the adjusting levers were not actuated using the FHK 4/FHD 4 slide controls. The hydraulic cylinder of the FHK 4/FHD 4 slide controls opens the left-hand metering slide a little more because of the increased forces. For this reason the set dimension "x" of the angle joint (on the left-hand side looking in the direction of travel, (figure 6.32) must be reduced by one rotation in the clockwise direction (1 mm) before fitting the hydraulic cylinder.

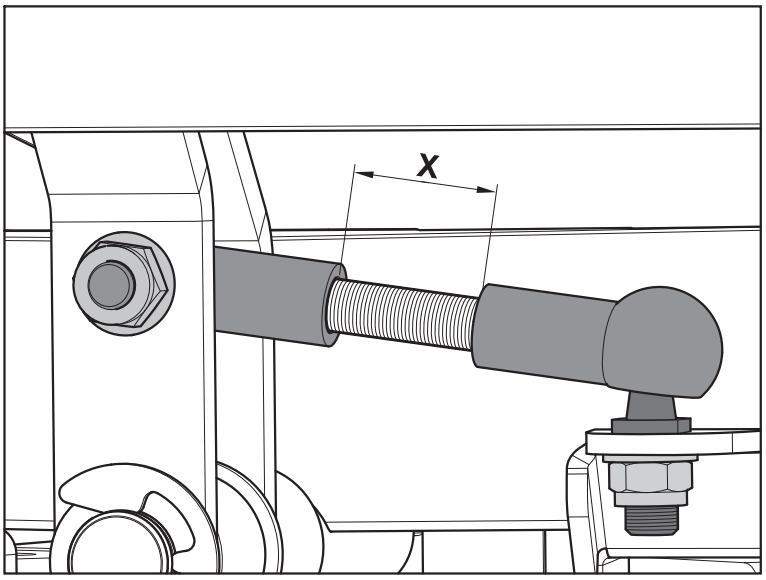


Figure 6.32: Adjusting the angle joint

NOTICE

Version FHK4

Before extended road travel or **during filling**, close the two ball cocks at the plugs on the hydraulic pipes. This prevents automatic opening of the metering slide caused by leaks in the valves in the tractor hydraulics.

6.9.6 Fitting the FHD 4 double-acting hydraulic cylinder slide control

- Fit the cylinder for the FHD 4 double-acting hydraulic slide control on the right hand side looking in the direction of travel.

6.10 Filling the solid fertiliser broadcaster

⚠ DANGER

Danger from running engine

Working on the solid fertiliser broadcaster with the engine running may cause serious injuries from the mechanical components and escaping fertiliser.

Never fill the solid fertiliser broadcaster with the tractor engine running.

▶ Shut off the engine of the tractor. Remove the ignition key.

⚠ CAUTION

Excessive total weight

If the permissible total weight is exceeded, this will affect the operating and road safety of the vehicle (solid fertiliser broadcaster tractor) and may cause serious damage to the machine and environment.

▶ Before filling, know the quantity that you can load.
▶ Do not exceed the permissible maximum total weight.

Notes on filling the solid fertiliser broadcaster:

- Close the metering slide, and the ball cocks if necessary (version K/R or M with FHK 4).
- Fill the solid fertiliser broadcaster **only** when mounted on the tractor. Therefore make sure that the tractor is standing on flat, firm ground.
- Secure the tractor to prevent movement. Set handbrake.
- Switch off the engine of the tractor and remove the ignition key.
- For filling levels above 1.25 m, use special equipment (e.g. front loader, screw conveyor) to fill the solid fertiliser broadcaster.
- Fill the solid fertiliser broadcaster no higher than the top. Check the fill level, for example using the level scale in the hopper.

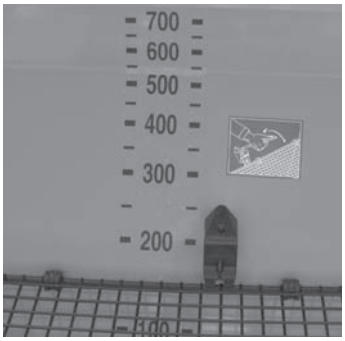


Figure 6.33: Fill level scale

6.11 Switching off and uncoupling the solid fertiliser broadcaster

The solid fertiliser broadcaster can safely be parked on the frame.

⚠ DANGER

Danger of crushing between the tractor and the solid fertiliser broadcaster

Persons standing between the tractor and solid fertiliser broadcaster while they are being parked or disconnected are exposed to lethal hazard.

▶ Make certain when activating the external control for the three-point linkage that there is no one between the tractor and the solid fertiliser broadcaster.

Requirements for parking the solid fertiliser broadcaster:

- The solid fertiliser broadcaster must only be parked on a firm, level surface.
- Park the solid fertiliser broadcaster with an empty hopper only.
- Relieve the load on the coupling points (lower / upper link) before removing the solid fertiliser broadcaster.
- After uncoupling, place the hydraulic hoses and electrical cables on the frame and the universal drive shaft in the retainer provided for the purpose (see figure 6.34).

Figure 6.34: Parking the universal drive shaft and the hydraulic hoses

- If the solid fertiliser broadcaster is uncoupled, the return springs of the single-acting hydraulic cylinders must be de-tensioned. Proceed as follows:

1. Close the metering slide hydraulically.
2. Set the stop to the highest scale value.
3. Open the metering slide.
4. Uncouple the hydraulic hoses.

▷ **The return springs are de-tensioned.**

⚠ WARNING

Crushing and shearing danger with uncoupled solid fertiliser broadcaster

If the fixing screw (K and R slide control) or the stop (FHK 4 slide control) is released when the return spring is tensioned and with air in the hydraulic hose, the stop lever can move suddenly and unexpectedly against the end of the guide slit.

This can cause crush injuries to the fingers or to injury to the operator.

- ▶ If the solid fertiliser broadcaster is parked alone (without the tractor), open the metering slide completely (return spring is de-tensioned).
- ▶ Never stick your fingers in the guide slits of the application rate setting device.

7 Machine settings

⚠ WARNING

Danger from running engine

Adjusting the solid fertiliser broadcaster with the engine running can lead to severe injury from the mechanical parts and from escaping fertiliser.

Before making any adjustments wait until all moving parts have come to a complete stop.

▶ Switch off the tractor engine. Remove the ignition key.

The following points should be noted before carrying out adjustments on the machine:

- Volume setting is always carried out with the slider closed. With slide controls using return springs (versions K/R or M with FHK 4) the ball-cocks must be closed.
- Close the ball-cocks (versions K/R or M with FHK 4) in order to prevent inadvertent escape of fertiliser from the hopper (e.g. during road travel).

⚠ WARNING

Crushing and shearing danger from tensioned return springs, versions K + R and FHK 4 (single-acting slide control)

There is a danger, when manually actuating the single-acting slide controls, if the metering slide is not closed hydraulically **before quantity setting**.

The pre-tensioned stop lever can move suddenly to the end of the guide slot when the fixing screw is released.

In the event of misuse or non-observance of the procedure for setting the spreading volume, the stop lever can move suddenly to the end of the guide slot.

This can cause crush injuries to the fingers or to injury to the operator.

▶ **Never** push against the spring pressure by hand to hold the stop lever in position during volume setting.

▶ Before setting work (e.g. setting the spreading volume) the metering slide must **always be closed hydraulically**.

7.1 Setting the application rate

⚠ DANGER

Risk of injury from rotating spreading discs

Contact with the broadcast equipment (spreading discs, vanes) may injure, crush or cut off body parts. Body parts or objects may be caught and pulled in.

- ▶ Turn off the tractor engine and remove the ignition key.
- ▶ Wait until all rotating parts have come to a standstill before carrying out any work on the machine.

NOTICE

The Quantron M Eco version of the MDS solid fertiliser broadcaster has electronic slide control for setting the spreading volume.

The electronic metering slide actuator is described in a separate operator's manual for the Quantron M operating terminal. This operator's manual is a component of the Quantron M control unit.

7.1.1 MDS 10.1/11.1/12.1/17.1/19.1 (M)

On the MDS 10.1/11.1/12.1/17.1/19.1 (M) solid fertiliser broadcasters the spreading volume is adjusted using a stop on the large scale arc.

With the slide closed, the operator sets the stop [2] to the position (arrowed) which he has previously determined from the fertiliser chart or by a calibration test.

Procedure for setting the spreading volume

1. Close the metering slide.
2. Pull the handle [1] upwards out of the stop holes.

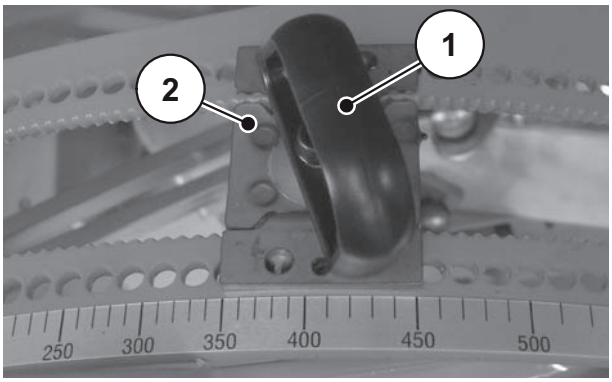


Figure 7.1: Metering slide setting to 350

3. Then set the stop to the determined position.
   ▷ When moving the stop [2] by one hole, the stop moves by two positions. If the adjustment is to be by one position only, the handle [1] must be turned over on the stop and engaged in the offset holes.
   ▷ It is not possible to set all values exactly because of the proportional scale resolution. See also chapter 8.1: Determining the nominal discharge quantity, page 87. Use the next highest or lowest position that can be set. Because of the fine resolution the deviation in distribution volume will only be very small.
4. Engage the handle [1] downwards into the retention holes.

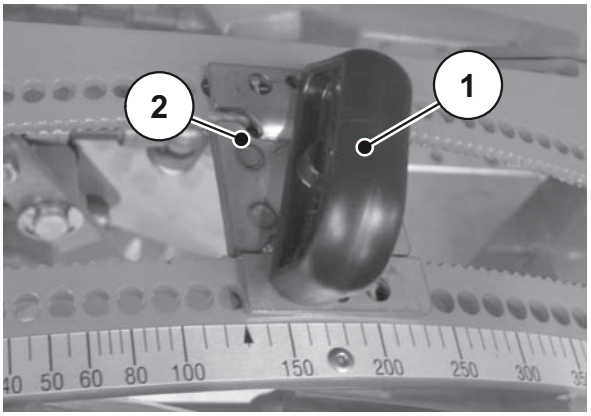


Figure 7.2: Metering slide setting to 130

⚠ WARNING

Danger of injury by incorrect procedure during volume adjustment

The stop lever is held under tension by return springs. In the event of misuse or non-observance of the procedure for setting the spreading volume, the stop lever can move rapidly and unexpectedly to the end of the guide slit.

This can lead to injuries to the fingers or the face.

- ▶ **Never** push against the spring pressure by hand to hold the stop lever in position during volume setting.
- ▶ **The procedure for setting the spreading volume must always be observed.**

7.1.2 MDS 10.1/11.1/12.1/17.1/19.1 (K/R/D)

On the K/R/D versions of the MDS 10.1/11.1/12.1/17.1/19.1 solid fertiliser broadcaster, the spreading volume is adjusted by means of the stop on the adjusting segment. With the slide closed, the operator sets the stop to the position which he has previously determined from the fertiliser chart or by a calibration test.

Procedure for setting the spreading volume

1. Close the metering slide.
2. Release the locking screw [3] on the left hand adjusting segment.
3. Determine the position for the scale setting in the calibration charts or based on the calibration test.
4. Set the left hand stop lever [1] to the appropriate position.
5. Re-tighten the locking screw [3] on the left hand adjusting segment.
6. Carry out the steps 2 to 5 on the right hand side.

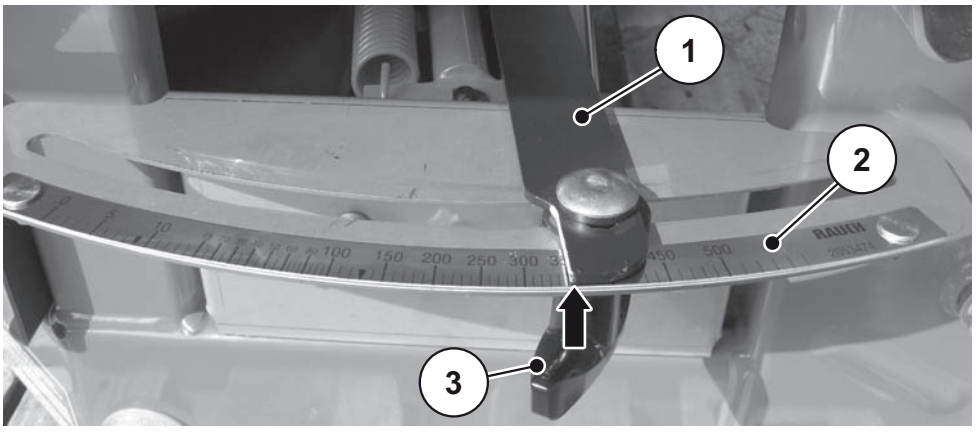


Figure 7.3: Scale for setting the spreading volume (on the left hand side looking in the direction of travel)

[1] Stop lever
[2] Scale
[2] Set screw
Arrow:Marked edge

⚠ WARNING

Danger of injury by incorrect procedure during volume adjustment

The stop lever is held under tension by return springs. In the event of misuse or non-observance of the procedure for setting the spreading volume, the stop lever can move rapidly and unexpectedly to the end of the guide slit.

This can lead to injuries to the fingers or the face.

- ▶ **Never** push against the spring pressure by hand to hold the stop lever in position during volume setting.
- ▶ **The procedure for setting the spreading volume must always be observed.**

7.2 Using the calibration charts

7.2.1 Information on the fertiliser charts

The values in the spreading charts have been determined on the solid fertiliser broadcaster test installation.

The fertilisers used have been sourced from the fertiliser manufacturers or from storage depots. Experience shows that your fertiliser - even with identical specifications - may have different spreader properties because of storage, transport and many other reasons.

This means that the solid fertiliser spreading settings specified in the fertiliser charts may result in a different spreading amount and a poorer fertiliser distribution.

Therefore observe the following instructions:

- Always check the actual spreading amount with a calibration test (see chapter 8: Calibration test and discharging residue, page 87).
- Check the working width of the fertiliser distribution with a practice test kit (special equipment)
- Use only fertilisers listed in the spreading charts.
- Contact us if you do not find a particular fertiliser type in the spreading charts.
- Follow the settings exactly. Even a slightly incorrect setting may adversely affect the spreading pattern.

When using urea note particularly the following:

- Because of fertiliser imports, urea is available in widely varying qualities and particle sizes. This may make different spreader settings necessary.
- Urea is more sensitive to wind and absorbs more moisture than other fertilisers.

NOTICE

The operator is responsible for making the correct settings for the fertiliser in use.

We point out specifically that we do not accept any liability for damage resulting from incorrect spreader settings.

7.2.2 Settings as per spreading charts

The operator determines the hopper height, metering slide adjustment, spreading disc type and PTO speed for optimum spreading from the **calibration charts** depending on the fertiliser type, working width, application rate, ground speed and dressing method.

Example of environmentally optimised boundary spreading in normal dressing

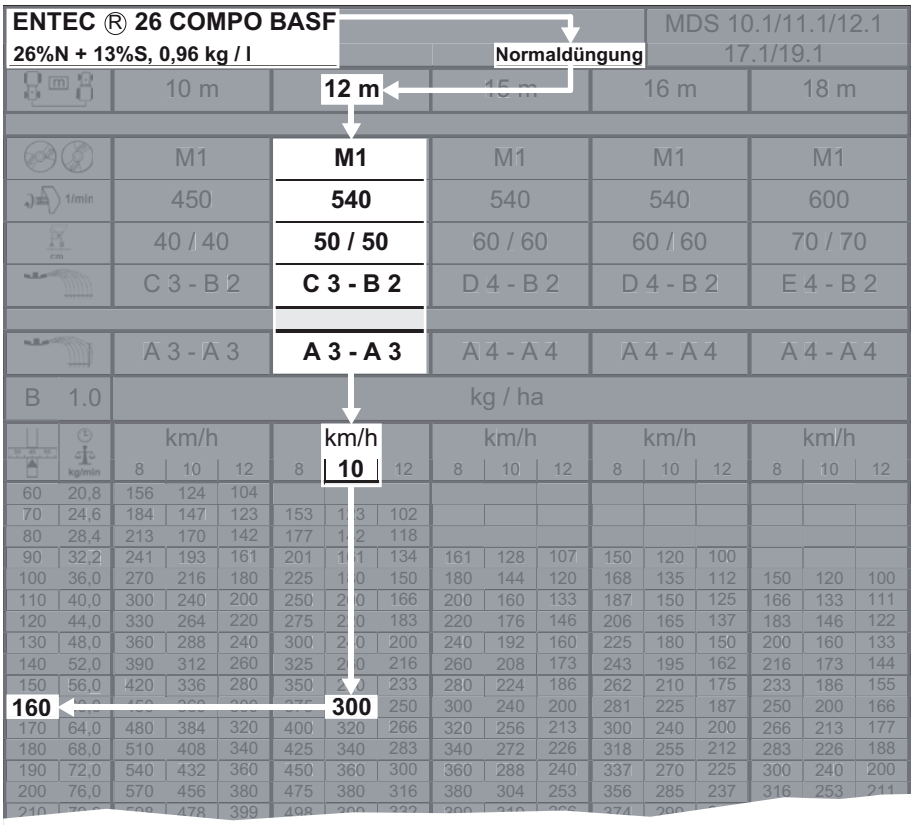


Figure 7.4: Fertiliser chart example normal fertilising

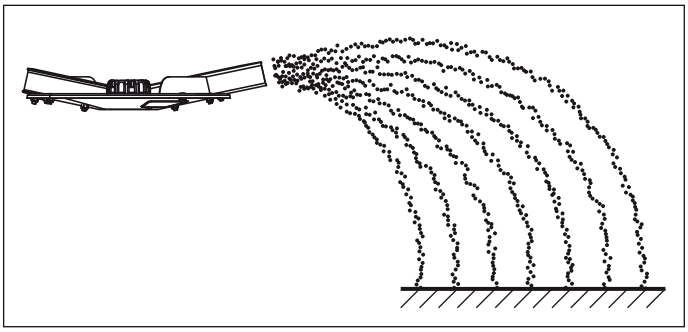


Figure 7.5: Environmentally optimised boundary spreading in normal dressing

Field spreading in normal dressing yields a symmetrical spreading pattern. When the spreader is correctly set (see information in the spreading charts), the fertiliser is spread evenly over the field.

Specified parameters:

Type of fertiliser	ENTEC 26 COMPO BASF
Working width:	12 m
● Spreading disc type:	M1C
Ground speed:	10 km/h
Application rate:	300 kg/ha

The following settings on the solid fertiliser broadcaster are required according to the calibration charts:

● Hopper height:	50/50 (A = 50 cm, B = 50 cm) (see chapter 6.8.3: Hopper heights A and B as per the fertiliser chart, page 50)
● Metering slide adjustment:	160
● PTO speed:	540 r.p.m.
● Vane adjustment	C3-B2

Example of yield-optimised boundary spreading in normal dressing:

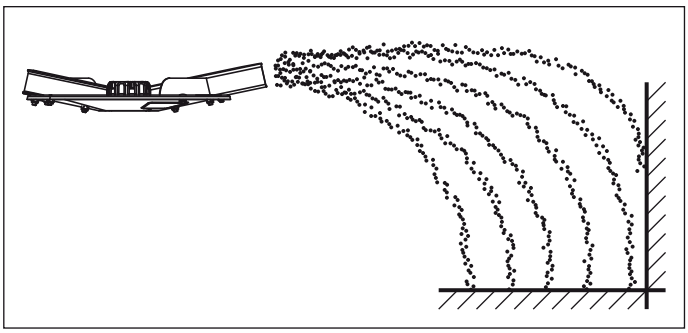


Figure 7.6: Yield-optimised boundary spreading in normal dressing

Yield-optimised boundary spreading in normal dressing refers to a fertiliser spreading technique in which some fertiliser is spread over the boundary of the field. There is a slight underfertilisation at the field boundary.

Specified parameters:

Type of fertiliser	ENTEC 26 COMPO BASF
Working width:	12 m
● Spreading disc type:	M1C
Ground speed:	10 km/h
Application rate:	300 kg/ha

NOTICE

On the edge spreading side both spreader vanes must be set to the value given in the fertiliser chart.

On the other disc the spreader vanes remain in the normal fertilising position.

The following settings on the solid fertiliser broadcaster are required according to the calibration charts:

- Hopper height: 50/50 (A = 50 cm, B = 50 cm) (see chapter 6.8.3: Hopper heights A and B as per the fertiliser chart, page 50)
- Metering slide adjustment: 160
- PTO speed: 540 r.p.m.
- Vane adjustment
  - Edge spreading side: A3-A3
  - other disc (normal fertilisation position): C3-B2

Example of field spreading in late top dressing

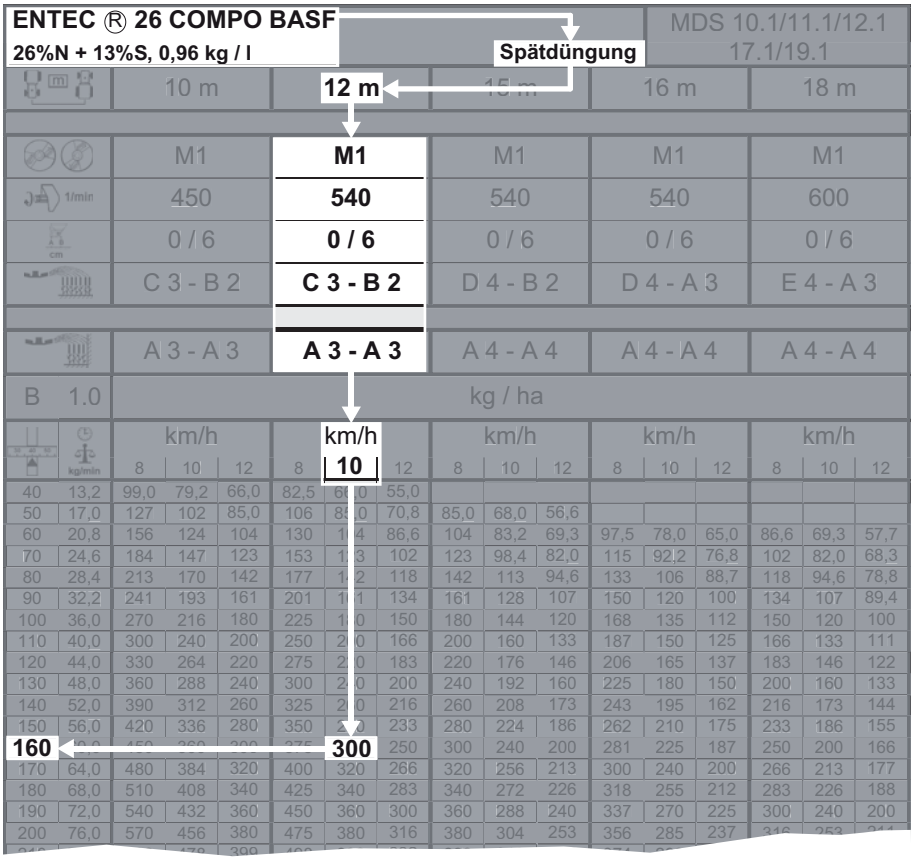


Figure 7.7: Fertiliser chart example late fertilising

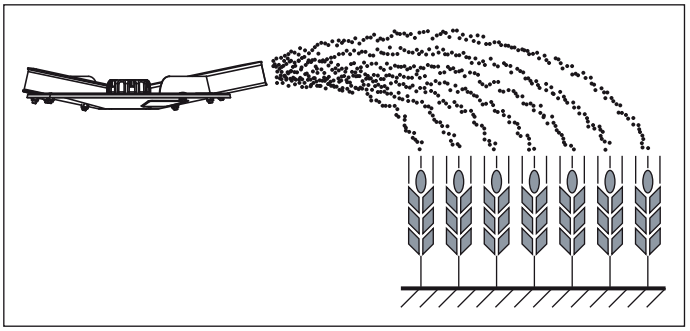


Figure 7.8: Field spreading in late top dressing

Field spreading in late top dressing yields a symmetrical spreading pattern. When the spreader is correctly set (see information in the spreading charts), the fertiliser is spread evenly over the field.

Specified parameters:

Type of fertiliser	ENTEC 26 COMPO BASF
Working width:	12 m
● Spreading disc type:	M1C
Ground speed:	10 km/h
Application rate:	300 kg/ha

The following settings on the solid fertiliser broadcaster are required according to the calibration charts:

● Hopper height:	0/6 (A = 0 cm, B = 6 cm) (see chapter 6.8.3: Hopper heights A and B as per the fertiliser chart, page 50)
● Metering slide adjustment:	160
● PTO speed:	540 r.p.m.
● Spreader disc adjustment:	C3-B2

Example of the yield-optimised boundary spreading in late top dressing:

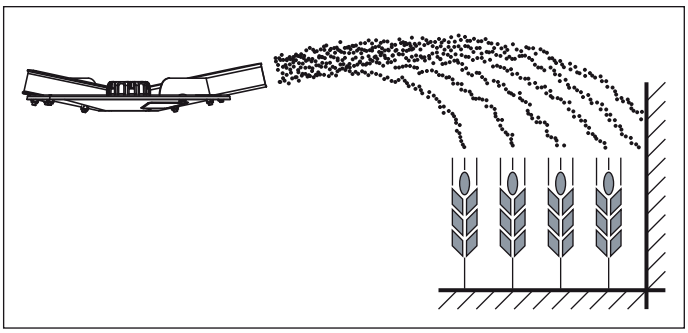


Figure 7.9: Yield-optimised boundary spreading in late top dressing

Yield-optimised boundary spreading in late fertilising refers to a fertiliser spreading technique in which some fertiliser is spread over the boundary of the field. There is a slight underfertilisation at the field boundary.

Specified parameters:

Type of fertiliser	ENTEC 26 COMPO BASF
Working width:	12 m
● Spreading disc type:	M1C
Ground speed:	10 km/h
Application rate:	300 kg/ha

NOTICE

On the edge spreading side both spreader vanes must be set to the value given in the fertiliser chart.

On the other disc the spreader vanes remain in the late fertilising position.

The following settings on the solid fertiliser broadcaster are required according to the calibration charts:

- Hopper height: 0/6 (A = 0 cm, B = 6 cm)
  (see chapter 6.8.3: Hopper heights A and B as per the fertiliser chart, page 50)
- Metering slide adjustment: 160
- PTO speed: 540 r.p.m.
- Vane adjustment
  - Edge spreading side: A3-A3
  - other disc (late fertilisation): C3-B2

7.3 Setting the working width

7.3.1 Spreader vane adjustment

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

Spreading disc type	Working width
M1C	10 - 18 m
M1XC	20 - 24 m

⚠ DANGER

Risk of injury from rotating spreading discs

Contact with the broadcast equipment (spreading discs, vanes) may injure, crush or cut off body parts. Body parts or objects may be caught and pulled in.

- ▶ Switch off the engine of the tractor and remove the ignition key.
- ▶ Wear protective gloves.

Construction of the M1C spreading disc

- There are two identical spreader vanes on each spreading disc.
- A spreader vane consists of a main vane and a vane extension.
- The main vane on the **right hand** spreading disc has the designation **BR** and the corresponding vane extension has the designation **AR**.
- The main vane on the **left hand** spreading disc has the designation **BL** and the corresponding vane extension has the designation **AL**.
- Each spreader vane can be adjusted forwards and backwards in angle, and can be shortened or extended.

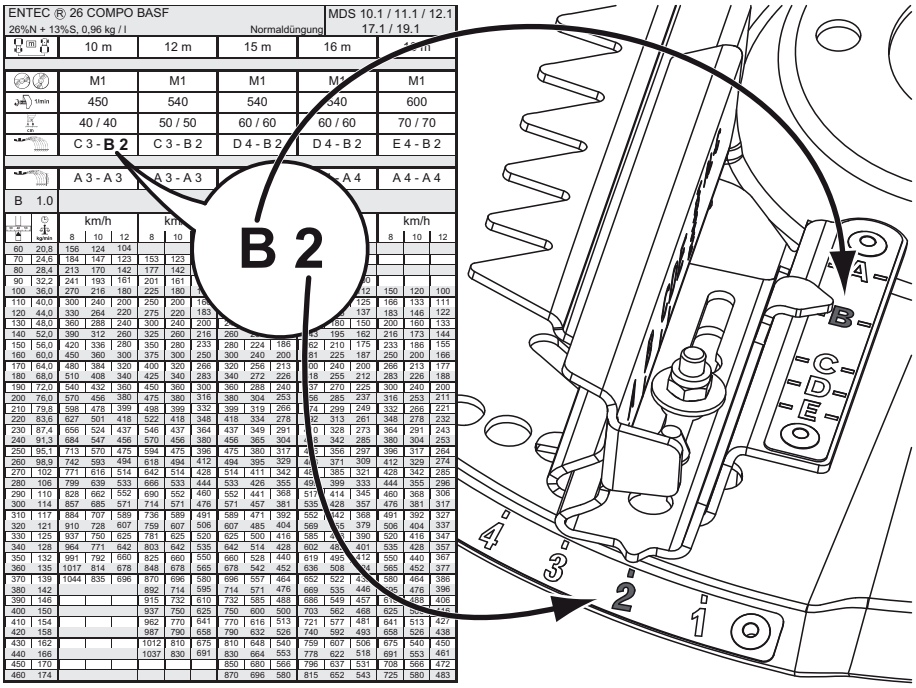


Figure 7.10: Vane adjustment Example spreader vane M1C, position B2

A to E: Length adjustment
1 to 6: Angle adjustment

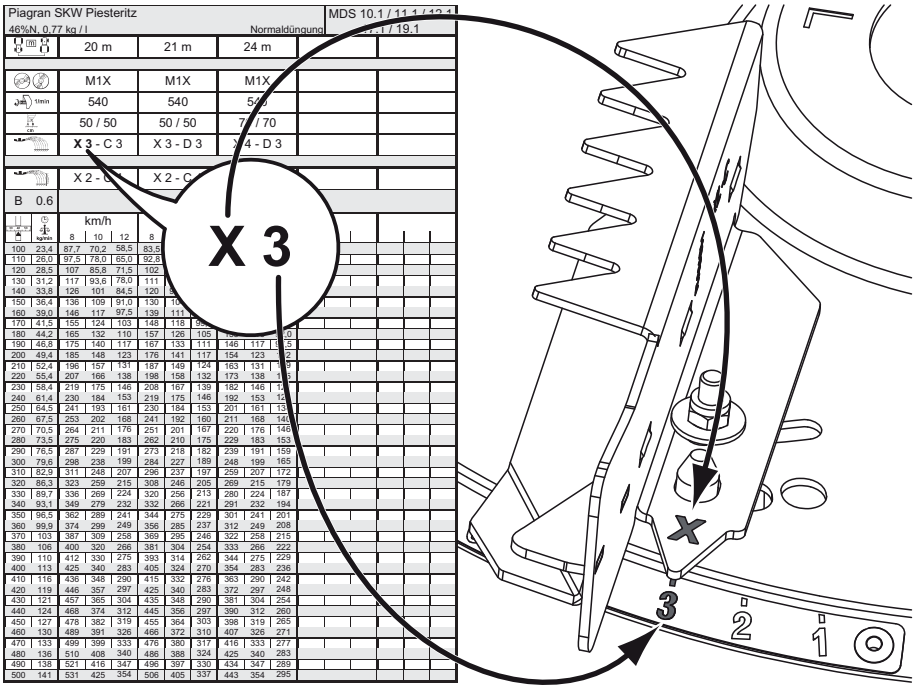


Figure 7.11: Vane adjustment Example spreader disc M1XC, position X3

X: Fixed length setting
1 to 6: Angle adjustment

Structure of the M1XC spreading disc: See chapter 9.12: Replacing an MDS spreader vane with an X spreader vane, page 119.

Function:

The spreader vanes of the Multi-Disc spreading disc can be adjusted to suit different types of fertiliser, working widths and fertiliser types.

- Normal fertilising.
- Edge spreading in normal fertilising (either right or left, depending on choice).
- Late fertilising.
- Edge spreading in late fertilising (either right or left, depending on choice).

Angle setting of the spreader vane:

- Adjustment towards smaller numbers: The spreader vane is set back in angle.
- Adjustment towards larger numbers: The spreader vane is set forward in angle.

Spreader vane length adjustment:

- Shortening the spreader vane: The movable vane extension is moved towards the spreader vane centre and then locked in position.
- Extending the spreader vane: The movable vane extension is pulled outwards and then locked in position.

Vane adjustment

The operator moves the spreader vanes to the position previously determined from the spreading charts.

NOTICE

The setting of the spreader vane on the right hand spreader disc **is always the same as** the setting of the spreader vane on the left hand spreading disc (exception - edge spreading).

Example: **C3-B2**

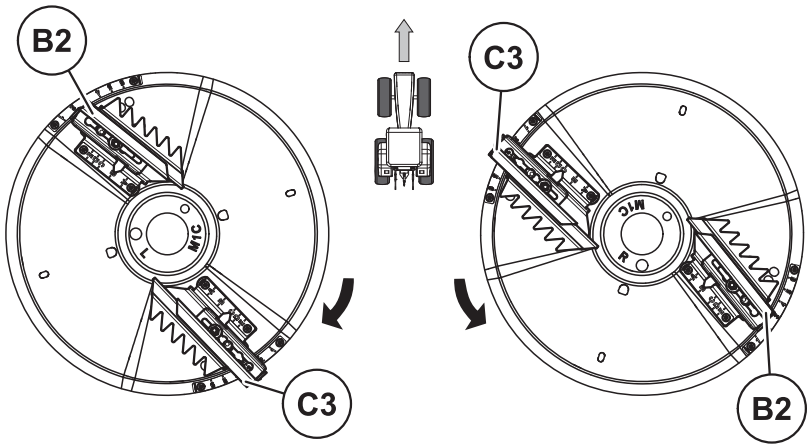


Figure 7.12: Vane adjustment, example C3-B2

⚠ WARNING

Danger of injury from sharp edges

The spreader vanes have sharp edges.

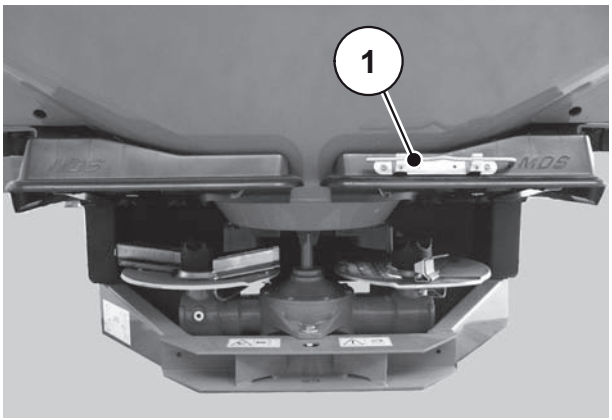
There is a danger to the hands when changing or setting the spreader vanes.

▶ Wear protective gloves.

1. Determine the position for the spreader vanes in the spreading charts or by a test with the practice test kit (option).
2. Use the setting lever for setting the spreader vanes and for changing the spreading discs.

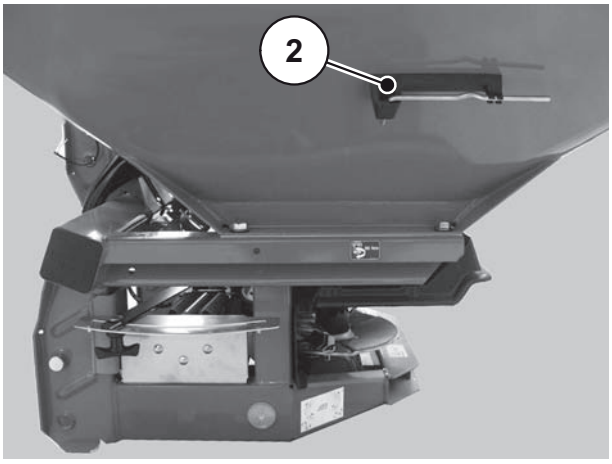
NOTICE

The setting lever can be found at one of the two positions shown below, **depending on the version** of the solid fertiliser broadcaster:



[1] Position of setting lever (spreading disc protector)

Figure 7.13: Setting lever



[2] Position of setting lever (hopper direction of travel on the left)

Figure 7.14: Setting lever

[3] Locking bolts
[4] Locking bolt aperture

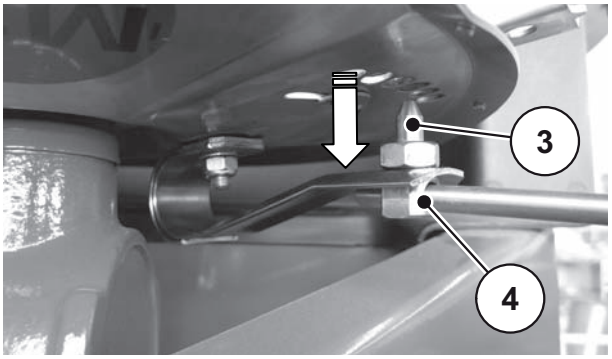


Figure 7.15: Vane adjustment

3. Insert the setting lever in the locking pin aperture [4] under the spreading disc and push downwards.
   ▷ The locking bolt [3] disengages.
4. Adjust the angle and length of the spreader vanes and push the locking pin upwards with the setting lever until it engages.

⚠ WARNING

Danger of injury Damage to solid fertiliser broadcaster by improperly fitted parts

There is a danger if the setting lever is not fixed properly again after use or if the locking bolt does not engage properly in the spreading disc.

Loose components can cause injury or damage during operation.

- ▶ Engage the locking pin again fully after setting.
- ▶ Fasten the setting lever properly on the spreading disc protector again before engaging the PTO shaft.

⚠ CAUTION

Do not over-bend the flat spring

The flat spring tension must securely retain the main and extension vanes on the spreading disc. If the flat spring is over-bent it loses its necessary tension for securing the spreader vanes.

If the spring tension is too low the locking pin disengages and can cause severe material damage.

- ▶ When adjusting the spreader vane position, push the locking pin **carefully** into one of the position holes.
- ▶ Check the spring tension at regular intervals. See chapter 9.2.3: Check the flat areas of the spreader discs, page 98.
- ▶ If the spring tension is too low replace the flat spring immediately.

7.4 Adjustments for unlisted fertiliser types

2 different types of special equipment are available for setting a type of fertiliser not listed.

- **Fertiliser Identification System (DiS)**
  - The RAUCH Fertiliser Identification System (special equipment) permits rapid simple determination of the spreader settings when using unknown fertilisers.
  - The fertiliser identification can be carried out without problems and using only a few ancillary items, even when in the field.
  - The fertiliser to be investigated is first categorised according to its content materials (nitrogen, potassium fertiliser etc.). Reference illustrations are then used to identify more closely the properties of the fertiliser. The spreader setting can be determined from the enclosed table.
- **Practice Test**
  - The settings for fertiliser types not listed in the spreading charts can be calculated with this option.

NOTICE

See also the supplementary manual for the practice test kit to calculate settings for unlisted fertiliser types.

To check the spreader settings **quickly** we recommend layout for **one pass**.

For **more precise** calculation of the spreader settings we recommend the layout for **three passes**.

7.4.1 Practice Test: Requirements and conditions

NOTICE

The requirements and conditions apply for both one pass and three passes.

Observe these conditions to ensure that the results are as accurate as possible.

- Conduct the test on a **dry day with no wind so the weather will not influence the result.**
- We recommend an area that is horizontal in both directions as the test area. The tracks must **not** have any significant **dips** or **peaks**, as this may distort the scatter pattern.
- Run the test either on a freshly cut field or on low growth (max.10 cm).

7.4.2 Carrying out a test run (Practice Test)

Layout:

- Test area length: 60 - 70 m

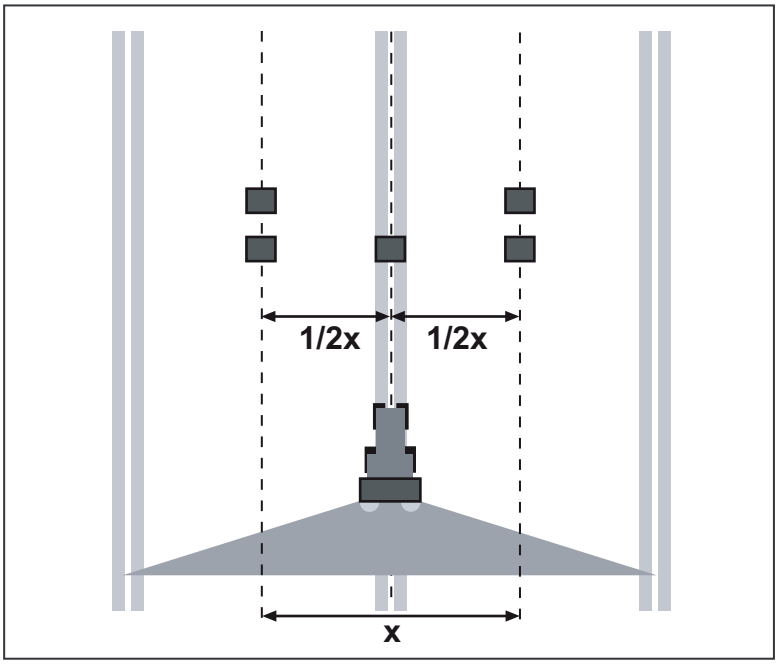


Figure 7.16: Layout for one pass

Preparing one pass:

- Select a similar fertiliser from the spreading charts and set the spreader accordingly.
- Set the hopper height of the solid fertiliser broadcaster as specified by the information in the calibration charts. **Make sure that the mounting height includes the top edge of the trays.**
- Check the completeness and status of the spreading components (spreading discs, spreader vanes, discharge).
- Place two trays in line as shown in the diagram (distance **1** m) in the overlap zones (between the tracks) and one tray in the track (corresponding to figure 7.16).

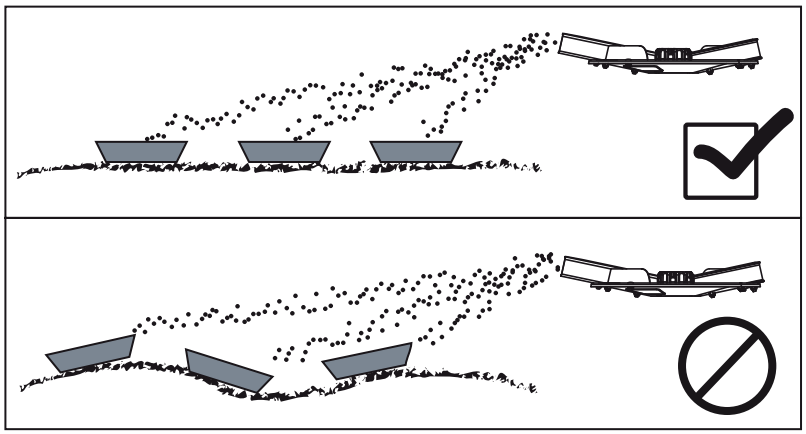


Figure 7.17: Layout of the catch trays

- Set the trays horizontally. Slanted trays may cause measurement errors (figure 7.17).
- Carry out a calibration test (see chapter 8: Calibration test and discharging residue, page 87).
- Set the metering slide left and right and fix in position (see Chapter 7.1: Setting the application rate, page 62).

Run broadcast test with the openings set as calculated for the job.

- Ground speed: select **3 - 4 km/h**.
- Open metering slide **10 m before** the catch trays.
- Close metering slides approx. **30 m after** the catch trays.

NOTICE

If the quantity in the trays is too low, repeat the run.

Do not change the adjustment of the metering slide.

Evaluate the results and correct if necessary:

- Collect the contents of the trays and pour them into the measuring pipe from the left.
- The quality of the cross-distribution can be easily read from the fill level of the three sight glasses.

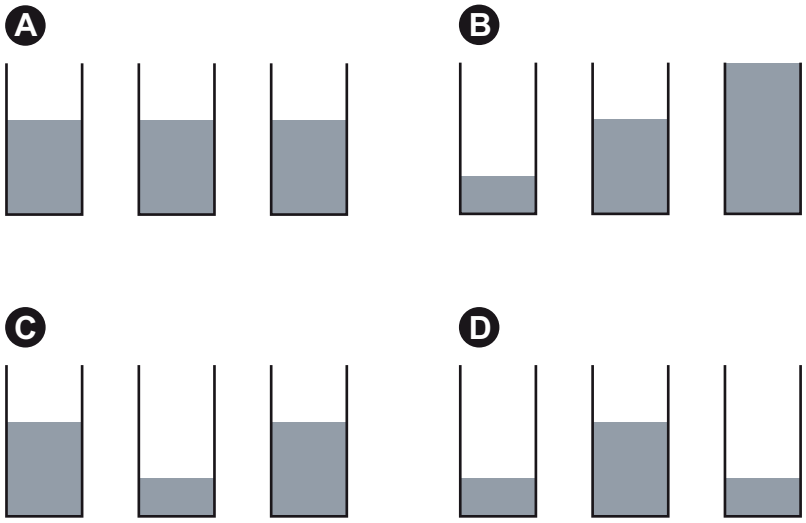


Figure 7.18: Possible results of pass

[A] The same quantity is in all tubes (approved deviation ±1 graduation):
[B] Fertiliser distribution not symmetrical.
[C] Too much fertiliser in the overlap zone
[D] Too little fertiliser in the overlap zone.

7.4.3 Carrying out three test runs (Practice Test)

Layout:

- Test area width: 3 x track width
- Test area length: 60 - 70 m
- The three tracks must be parallel. If you are running the test without drilled tracks the paths must be measured and marked with rods, for example.

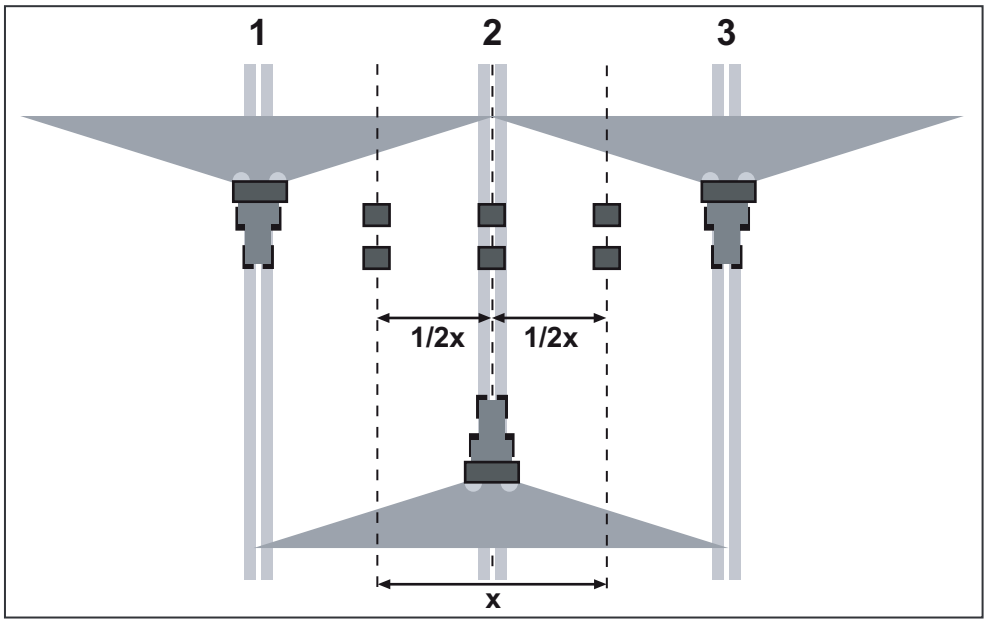


Figure 7.19: Layout for three passes

Preparing for three passes:

- Select a similar fertiliser from the spreading charts and set the spreader accordingly.
- Set the hopper height of the solid fertiliser broadcaster as specified by the information in the calibration charts. Make sure that the mounting height includes the top edge of the trays.
- Check the completeness and status of the spreading components (spreading discs, spreader vanes, discharge).
- Place two catch trays at a distance of **1 m** behind each other in the overlap zones and in the centre track (corresponding to figure 7.19).

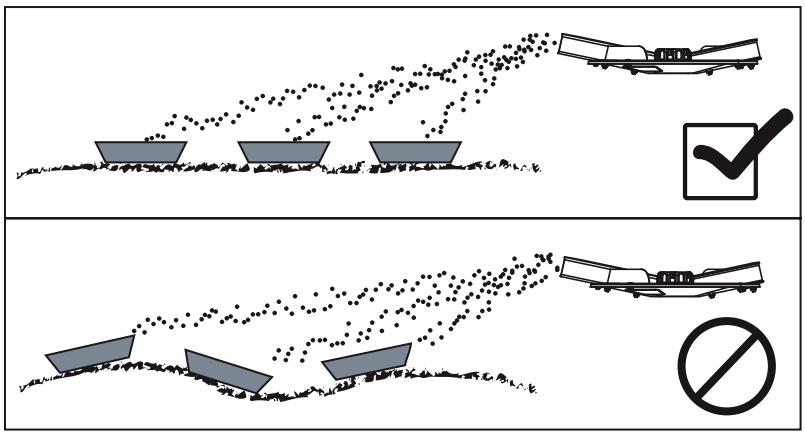


Figure 7.20: Layout of the catch trays

- Set the trays horizontally. Slanted trays may cause measurement errors (figure 7.20).
- Carry out a calibration test (see chapter 8: Calibration test and discharging residue, page 87).
- Set the metering slide left and right and fix in position (see chapter 7.1: Setting the application rate, page 62).

Run broadcast test with the openings set as calculated for the job.

- Ground speed: select **3 - 4 km/h**.
- Run over tracks 1 to 3 in succession.
- Open metering slide **10 m before** the catch trays.
- Close metering slides approx. **30 m after** the catch trays.

NOTICE

If the quantity in the trays is too low, repeat the run.

Do not change the adjustment of the metering slide.

Evaluate the results and correct if necessary:

- Collect the contents of the trays and pour them into the measuring pipe from the left.
- The quality of the cross-distribution can be easily read from the fill level of the three sight glasses.

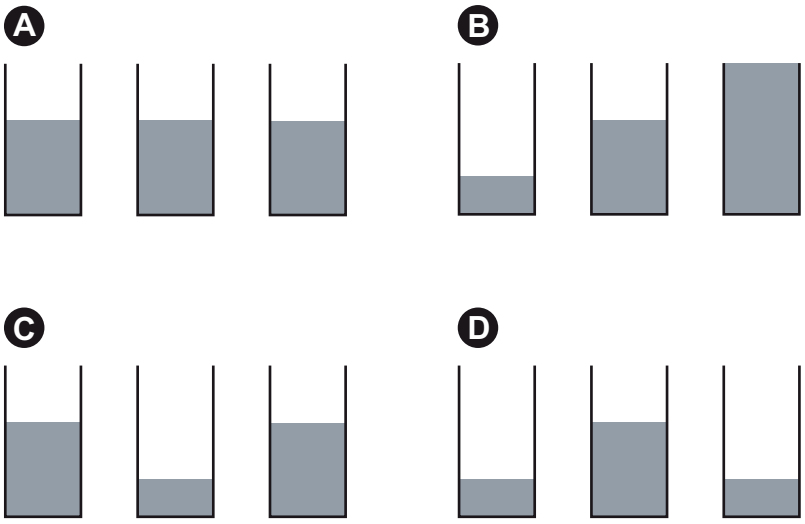


Figure 7.21: Possible results of pass

[A] The same quantity is in all tubes (approved deviation ±1 graduation):
[B] Fertiliser distribution not symmetrical.
[C] Too much fertiliser in the overlap zone
[D] Too little fertiliser in the overlap zone.

7.4.4 Examples for correction of the spreader setting:

The following examples are applicable to both test run variants.

Test result	Fertiliser distribution	Action, test
Case A	Even distribution (permissible deviation ± 1 graduation)	Adjustments are correct.
Case B	Fertiliser quantity decreases from right to left (or vice versa).	Are the spreader vanes set equal on the right and left?
		Is the metering slide setting on the left and right the same?
		Track distances the same?
		Tracks parallel?
		Was there a strong side wind during the test?
Case C	Too little fertiliser in the track of the tractor.	Reduce the fertiliser volume in the overlap zone: Retract the spreader vane mentioned second in the fertiliser chart (to smaller figures). e.g. C3-B2 to setting value C3-B1. If the angle correction of the spreader vane mentioned second is not adequate, shorten the length of the spreader vane. e.g. C3-B1 to setting value C3-A1.
Case D	Too little fertiliser in the overlap zones.	Reduce the fertiliser amount in the track of the tractor: Extend the spreader vane mentioned second in the fertiliser chart (to greater figures). e.g. E4-C1 to setting value E4-C2. If the angle correction of the spreader vane mentioned second is not adequate, extend the length of the spreader vane. e.g. E4-C2 to setting value E4-D2.

If the result is not achieved, despite adjusting the spreader vane mentioned second, the first-named spreader vane can also be adjusted.

Spreading width too wide

1. Set the position of the first-named spreader vane to the next smallest working width according to the fertiliser chart. e.g. E4-C1 (18 m) to setting value D4-C1 (15 m).

Spreading width too narrow

2. Set the position of the first-named spreader vane to the next biggest working width according to the fertiliser chart. e.g. D4-C1 (15 m) to setting value E4-C1 (18 m).

7.5 Spreading to one side

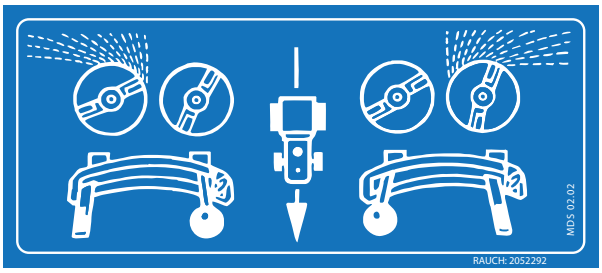


Figure 7.22: Spreading to one side

7.5.1 MDS 10.1/11.1/12.1/17.1/19.1 (M)

- When spreading to the right and to the left, de-couple both stop levers by pulling the round operating lever and push the operating lever for the relevant side up to the stop.

Actuate the round operating lever: **right hand side** is spread.

Actuate the rectangular operating lever: **left hand side** is spread.

7.5.2 MDS 10.1/11.1/12.1/17.1/19.1 (K/R/D)

Version	Setting for single-sided spreading	Result
K	● To spread to the left or right, release the relevant control valve.	The springs pull the relevant metering slide against the stop.
D	● To spread to the left or right actuate the relevant control valve.	The hydraulic cylinder pulls the relevant metering slide against the stop.
R	● To spread to the left or right close or open the relevant ball-cock on the two-way unit. ● Release the control valve.	The springs pull the relevant metering slide against the stop.

7.6 Edge spreading or border spreading

Edge spreading refers to fertiliser distribution at the border where fertiliser is spread over the border but where only slight under-fertilising of the field boundary is produced.

During border spreading virtually no fertiliser is spread over the boundary of the field, but underfertilisation at the boundary must be accepted.

Only edge spreading is possible with the basic version of the solid fertiliser broadcaster. The special version GSE 7 or
TELIMAT T1 is required for border spreading.

7.6.1 Edge spreading from the first tramline

- Set the spreader vanes on the boundary side in accordance with the details given in the fertiliser chart.

The metering slide setting is the same as the metering slide setting on the field side.

7.6.2 Border or edge spreading with the GSE 7 border spreading unit (special accessory)

The GSE 7 is used to limit the spreading width (either right or left) to the range between approx. 75 cm and 2 m from the centre of the tractor track to the outer field edge. See also chapter 12.9: Border spreading device GSE 7, page 139.

- Close the metering slide that points to the edge of the field.
- Fold the border spreading device downwards.
- Hinge the border spreading device back up again before spreading to both sides.

7.6.3 Border or edge spreading with the TELIMAT T1 border spreading unit (special accessory)

The **Telimat T1** border spreading unit is used to limit the spreading width out from the first tramline (1/2 working width from edge of the field). See also chapter 10.5: TELIMAT T1 (special version), page 128.

7.7 Spreading of narrow field strips

- Set the spreader vanes of the two spreading discs to the edge spreading position quoted in the fertiliser chart.

8 Calibration test and discharging residue

For precise control of the discharge amount we recommend running a new calibration test every time you change fertiliser types.

Run the calibration test:

- Before spreading for the first time.
- If the fertiliser quality has changed greatly (moisture, high dust content, cracked grain).
- If new fertiliser types are used.

The calibration test must be conducted (with engaged PTO shaft) at a standstill or during travel over a test section.

NOTICE

With the solid fertiliser broadcasters MDS **Quantron M Eco** the calibration is carried out on the Quantron M control unit.

The calibration test is described in a separate operator's manual for the Quantron M operating terminal. This operator's manual is a component of the Quantron M control unit.

8.1 Determining the nominal discharge quantity

Calculate the nominal discharge quantity before starting the calibration test.

8.1.1 Calculate exact ground speed

The exact ground speed must be known to calculate the nominal discharge amount.

1. Drive the **half full** solid fertiliser broadcaster over a **100 m** distance **in the field**. Note the time required.
2. Read the exact ground speed on the scale of calibration test calculator.

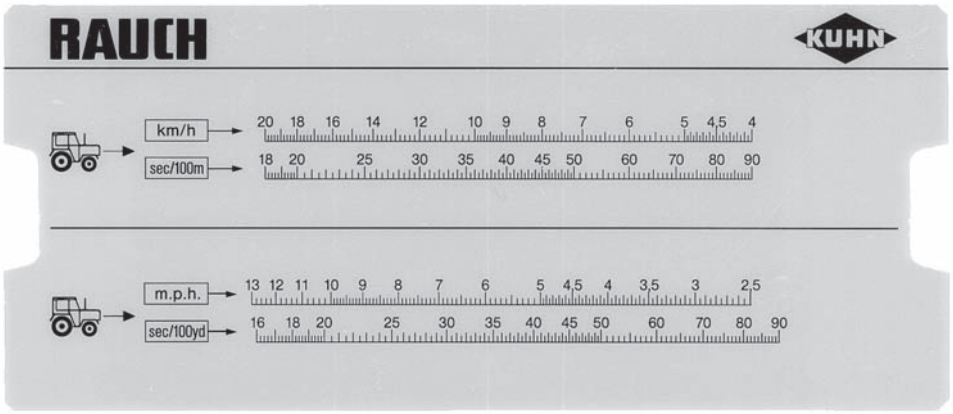


Figure 8.1: Scale for calculating the exact ground speed

The exact ground speed can also be calculated by the following formula:

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

Example: You require 45 seconds to travel 100 m:

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

8.1.2 Determining the nominal discharge quantity per minute

To calculate the nominal discharge amount per minute you will require:

- the exact ground speed,
- the working width,
- the desired application rate.

Example: You wish to calculate the nominal discharge amount at one discharge. The ground speed is **8 km/h**, the working width is set at **18 m** and the application rate should be **300 kg/ha**.

NOTICE

For some application rates and ground speeds the discharge amounts are already shown in the calibration charts.

If you do not find your values in the calibration charts, they can be found with the broadcast test calculator or from a formula.

Calculation with the broadcast test calculator:

1. Move the tab until it is at **300 kg/ha** under **18 m**.
2. The value of the nominal discharge amount for both discharges can now be read above the value of the ground speed of **8 km /h**.

▷ **The nominal discharge amount per minute is 72 kg/min.**

If the calibration test is conducted at one discharge only, the total value of the nominal discharge amount must be halved to calculate the value for one discharge.

3. Divide the read value by two (= number of discharges).

▷ **The nominal discharge amount per minute is 36 kg/min.**

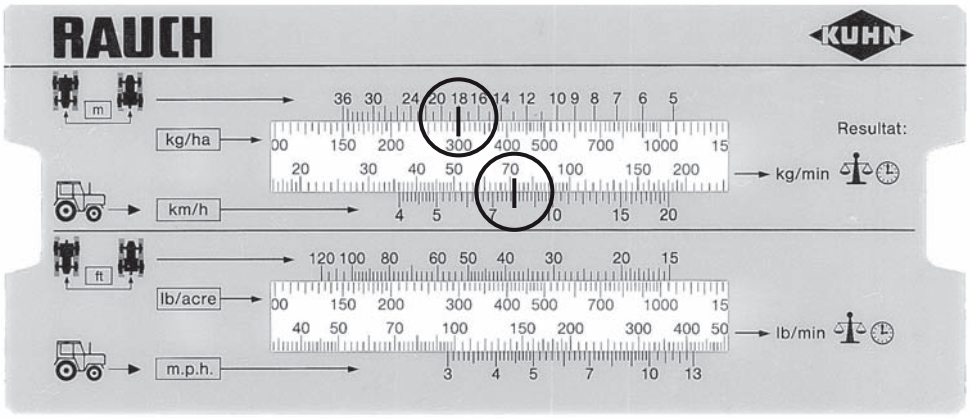


Figure 8.2: Scale for determining the nominal discharge quantity per minute

Calculation with formula

The nominal discharge amount per minute can also be calculated with the following formula:

$$\text{Nominal discharge quantity (kg/min)} = \frac{\text{Ground speed (km/h)} \times \text{Working width (m)} \times \text{Application rate (kg/ha)}}{600}$$

Calculation for example:

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

NOTICE

Constant fertiliser application is only possible at an even ground speed.

Example: 10% higher ground speed results in 10% underfertilisation.

8.2 Running the calibration test

⚠ WARNING

Risk of injury due to chemicals

Discharged fertiliser may cause injuries to eyes and nasal mucous membrane.

- ▶ Wear safety goggles during the calibration test.
- ▶ Direct all persons out of the danger zone of the solid fertiliser broadcaster before the calibration test.

Requirements:

- The metering slides are closed.
- PTO shaft and engine of the tractor are switched off and locked to prevent accidental starting.
- Have a sufficiently large hopper ready for holding the fertiliser (holding capacity at least **25 kg**). Determine the unladen weight of the bin.
- Have the calibration test chute ready. The calibration test chute is located on the frame at the front right hand side (looking in the direction of travel).
- A sufficient quantity of fertiliser is placed 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 spreading charts.

NOTICE

Select the values or the time for the calibration test so that the maximum possible quantity of fertiliser is broadcast. The greater the application rate the greater the precision of the measurement.

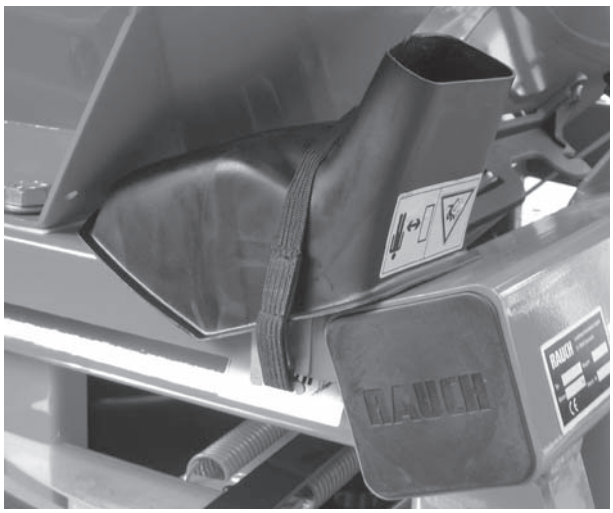


Figure 8.3: Calibration test chute

Implementation:

NOTICE

The calibration test is carried out on the left hand side of the solid fertiliser broadcaster. For safety reasons however **both** spreading discs must be removed.

1. Remove the setting lever from the retainer.

NOTICE

The setting lever can be found at one of the two positions shown below, depending on the version of the solid fertiliser broadcaster.

[1] Position of setting lever (Deflection and protection device)

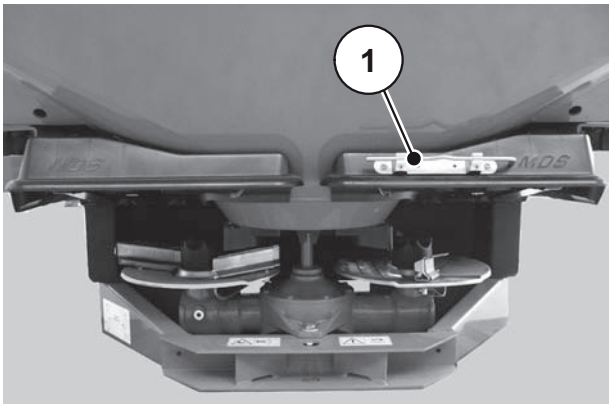


Figure 8.4: Setting lever

[2] Position of setting lever (hopper direction of travel on the left)

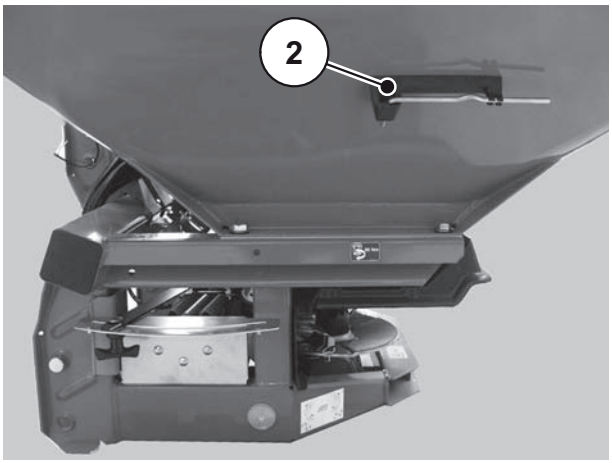


Figure 8.5: Setting lever

2. Release the cap nut [3] on the spreading disc with the setting lever.
3. Remove the spreading disc from the hub.

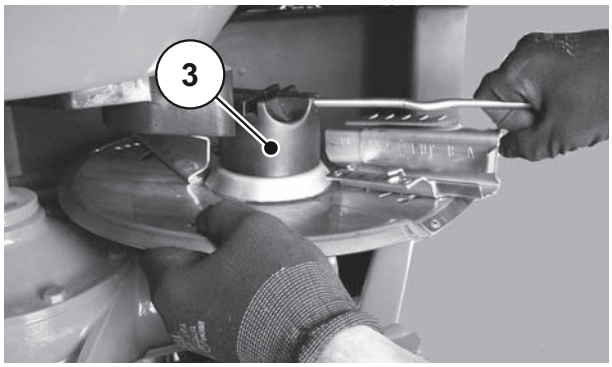


Figure 8.6: Slackening cap nuts

4. Attach the calibration test chute under the left discharge (viewed in the direction of travel).

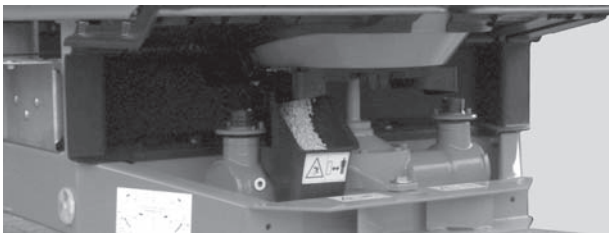


Figure 8.7: Calibration test chute under the outlet

NOTICE

The Quantron M Eco version of the MDS solid fertiliser broadcaster has electronic setting of the metering slide opening.

The metering slide is driven automatically to the opening position by the Quantron M control unit if the function calibration test is selected.

Observe the operator's manual for the control unit.

5. Set the metering slide stop to the scale value specified in the spreading charts. See chapter 7.1: Setting the application rate, page 62.

⚠ DANGER

Risk of injury from rotating machine components

Contact with rotating machine components (universal drive shaft, hubs) may cause bruises, abrasions and crushing injuries. Body parts or objects may be caught and pulled in.

- ▶ When the machine is running keep clear of the rotating hubs.
- ▶ Actuate the metering slide **only** ever from the tractor seat when the universal drive shaft is rotating.
- ▶ Direct all persons out of the danger zone of the solid fertiliser broadcaster before the calibration test.

6. Place the collecting container under the left outlet.

Figure 8.8: Running the calibration test

7. Start the tractor. Set the PTO speed as specified in the spreading charts.
8. Open (from the tractor seat) the left metering slide for the previously specified calibration test time. It is generally around **1 min**. Close the metering slide again after this time.
9. Switch off the PTO shaft. Turn the tractor off, remove the ignition key.
10. Calculate the weight of the fertiliser (include the unladen weight of the catch tray).
11. Compare spread appl. rate with nominal appl. rate.

▷ **Actual discharge quantity = nominal discharge quantity: appl. rate stop correctly set. Finish calibration test.**

▷ **Actual discharge quantity < nominal discharge quantity: set appl. rate stop to a higher position and repeat calibration test.**

▷ **Actual discharge quantity > nominal discharge quantity: set appl. rate stop to a lower position and repeat calibration test.**

NOTICE

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

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

$$\text{New position of the broadcast quantity stop} = \frac{\text{Position of the broadcast quantity stop of current calibration test} \times \text{Nominal quantity}}{\text{Actual discharge quantity of the current calibration test}}$$

12. Finish calibration test. Disengage PTO shaft and switch off tractor engine and lock to prevent unauthorised starting.

13. Mount the spreading discs. Make sure that the left and right spreading discs are not reversed.

NOTICE

Note the mark in the centre of the disc (L = left hand disc; R= right hand disc).

14. Place the cap nut carefully in position (do not tilt).

15. Tighten the cap nut to **25 Nm** (well hand tight). Do **not** do this with the setting lever.

Figure 8.9: Screw on cap nuts

NOTICE

The plastic nuts have an internal stop that prevents them from coming loose. The stop must be felt when tightening the nut. Otherwise the cap nut is worn and must be replaced.

16. Check that there is a clearance between the vanes and the plastic fertiliser guides by turning the discs by hand.

17. Fasten the calibration test chute and adjustment lever to their normal positions in the solid fertiliser spreader.

8.3 Discharging residue

⚠ DANGER

Risk of injury from rotating machine components

Contact with rotating machine components (universal drive shaft, hubs) may cause bruises, abrasions and crushing injuries. Body parts or objects may be caught and pulled in.

- ▶ When the machine is running keep clear of the rotating hubs.
- ▶ Actuate the metering slide **only** ever from the tractor seat when the universal drive shaft is rotating.
- ▶ Direct all persons out of the danger zone of the machine before discharging the residue.

We recommend emptying the solid fertiliser broadcaster immediately after every use to maintain its value. Proceed as with the broadcast test to discharge the residue.

Instructions for completely discharging the residue:

Small amounts of fertiliser may remain in the solid fertiliser broadcaster when discharging residue normally. If you wish to discharge the residue completely (e.g. at the end of the season, when changing broadcast material), proceed as follows:

1. Set the metering slide to the maximum opening position.
2. Empty hopper until no more material comes out (normal residue discharge)
3. Disengage PTO shaft and switch off tractor engine and lock to prevent unauthorised starting. Remove the tractor ignition key.
4. Remove remaining fertiliser with a soft water jet in the course of cleaning the machine.

⚠ WARNING

Danger of injury from moving parts in the hopper

There are moving parts in the hopper.

During commissioning and operation of the solid fertiliser broadcaster, hands and feet can be injured.

- ▶ Always fit the protective grid before commissioning and operation of the solid fertiliser broadcaster and lock it in position.

Before opening the protective grid:

- Switch off the PTO shaft.
- Switch off the tractor engine.
- Lower the solid fertiliser broadcaster.

9 Service and maintenance

9.1 Safety

Service and maintenance work involves additional hazards that do not occur during operation of the machine.

Take particular care when carrying out servicing and maintenance work. Work very carefully and with awareness of the dangers.

Observe the following instructions in particular:

- Welding and work on the electrical and hydraulic systems must be carried out by qualified technicians only.
- When working on the raised solid fertiliser broadcaster it may be in **danger of tipping**. Always secure the solid fertiliser broadcaster with suitable supports.
- Always use an **appropriate strap** for lifting the solid fertiliser broadcaster with lifting tackle.
- Power-operated components (adjusting lever, metering slide) may **crush and shear.** Make sure that there is no one in close proximity to the rotating parts during maintenance.
- Replacement parts must at least comply with the technical standards specified by the manufacturer. This is assured with original spare parts.
- Before all cleaning, maintenance and repair jobs, and when repairing faults, turn off the tractor engine and wait until all rotating parts of the machine have come to a stop.
- Repair work should only be carried out by the **trained** and **authorised expert workshop**.

NOTICE

Note the warning in chapter 3: Safety, page 5. Take particular note of the instructions in section 3.8: Maintenance and repair, page 11.

9.2 Wearing parts and bolted connections

9.2.1 Checking wear parts

Wear parts are: **spreader vanes**, **agitator shaft, agitator finger** , **outlet**, **hydraulic hoses, deflection and protection device**.

- Check the wear parts.

If these parts show visible signs of wear, deformation or holes, they must be replaced, otherwise the scatter pattern will not be correct.

The durability of the wear parts depends in part on the material spread.

9.2.2 Checking bolted connections

The threaded fasteners are tightened to the specified torque and locked at the factory. Vibrations and jerks, in particular during the initial operating hours, can loosen screwed connections.

- Check the solid fertiliser broadcaster when it is new about every 30 operating hours to make certain it is structurally sound.
- Check all the bolted connections regularly for tightness, and at least before the start of the spreading season.

Some components (e.g. spreader vanes) are mounted with self-locking nuts. **Always use new self-locking nuts** when mounting these components.

9.2.3 Check the flat areas of the spreader discs

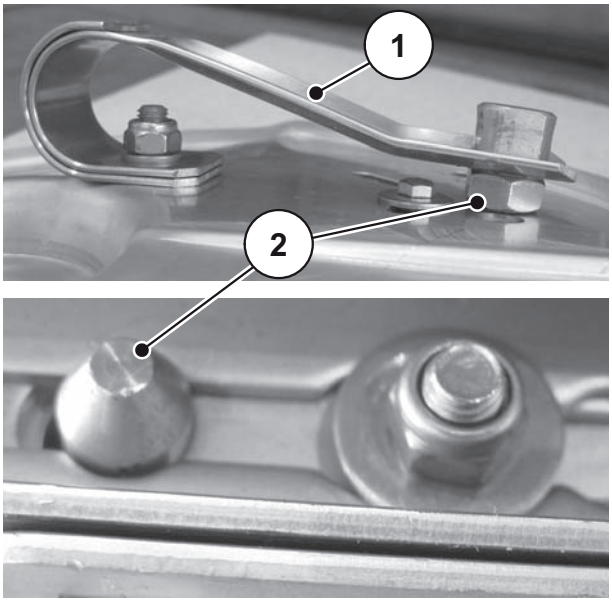
⚠ CAUTION

Do not over-bend the flat spring

The flat spring tension must securely retain the main and extension vanes on the spreading disc. If the flat spring is over-bent it loses its necessary tension for securing the spreader vanes.

If the spring tension is too low the locking pin disengages and can cause severe material damage.

- ▶ When adjusting the spreader vane position, push the locking pin **carefully** into one of the position holes.
- ▶ If the **spring tension is too low** replace the flat spring immediately.



[1] Flat spring
[2] Locking pin

Figure 9.1: Locking pin correctly engaged

9.3 Cleaning

We recommend cleaning the solid fertiliser broadcaster immediately after every use with a soft water spray to maintain its value.

To facilitate cleaning, the protective grid in the hopper can be folded up (see chapter 9.4: Opening the protective grid in the hopper, page 100).

The following instructions must be observed for cleaning:

- Clean the discharge ducts and the area of the slide guides from below only.
- Clean oiled machines only at washing points with an oil separator.
- When cleaning with high pressure never direct the water jet directly at warning signs, electrical equipment, hydraulic components and sliding bearings.

After cleaning, we recommend treating the **dry** solid fertiliser broadcaster, **especially the coated spreader vanes and stainless steel parts**, with an environmentally compatible corrosion protection agent.

A suitable polishing kit can be ordered from authorised dealers for use in treating rust spots.

9.4 Opening the protective grid in the hopper

⚠ WARNING

Danger of injury from moving parts in the hopper

There are moving parts in the hopper.

Injuries to hands and feet can be caused during commissioning and operation of the solid fertiliser broadcaster.

- ▶ Always fit the protective grid before commissioning and operation of the solid fertiliser broadcaster and lock it in position.
- ▶ Only open the protective grid for maintenance and in the event of a fault.

The protective grid in the hopper is locked automatically by a protective grid interlock.

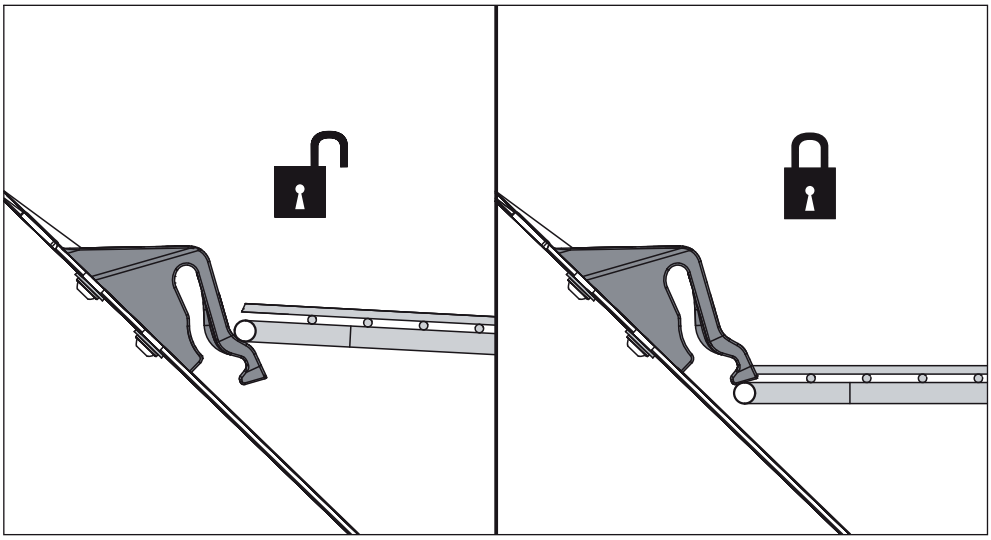


Figure 9.2: Protective grid interlock open/closed

To prevent the protective grid from being opened unintentionally, the protective grid interlock can only be opened with a tool (setting lever - see figure 7.14).

Before opening the protective grid:

- Disengage PTO shaft
- Lower solid fertiliser broadcaster.
- Turn off the engine of the tractor.

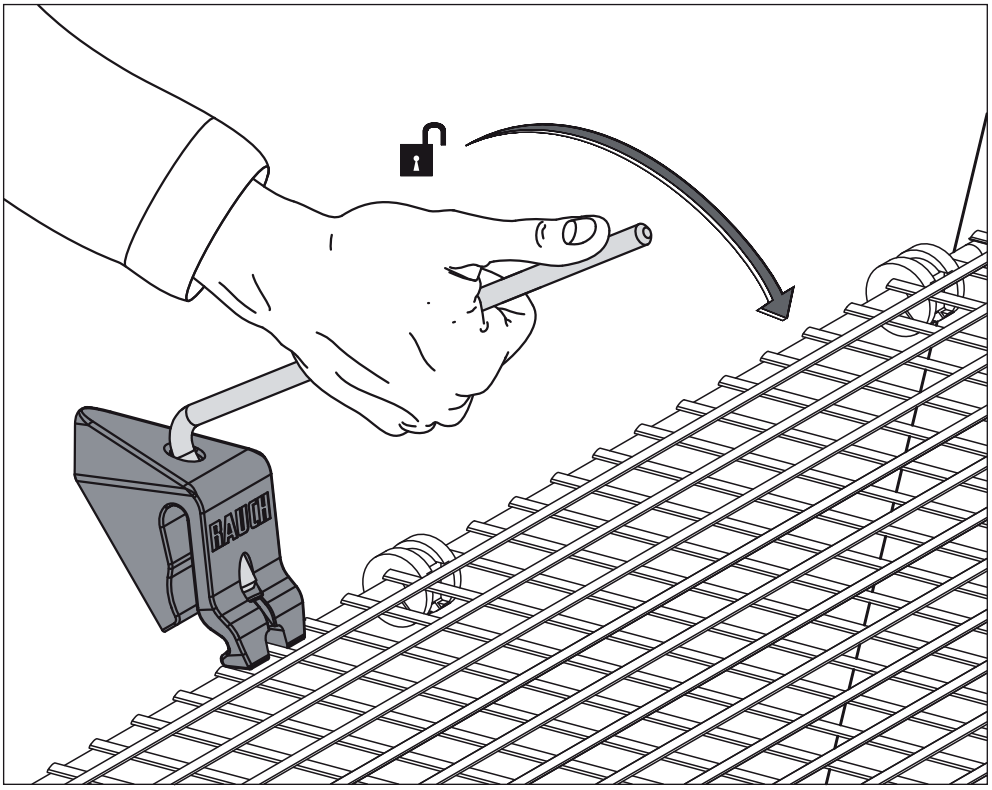


Figure 9.3: Open the protective grid interlock

- Carry out regular functional checks of the protective grid interlock. See illustration below.
- Replace defective protective grid interlocks immediately.
- Correct if necessary by displacing the protective grid interlock [1] the setting downwards/upwards (see figure 9.4).

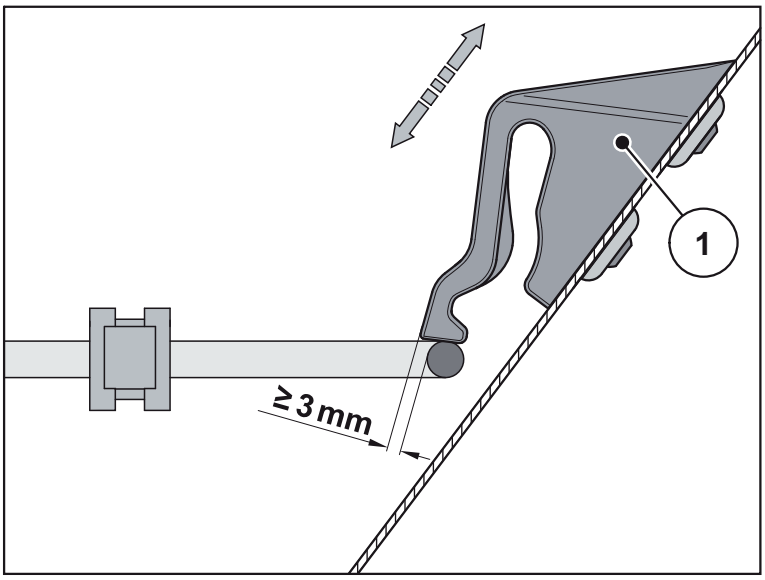


Figure 9.4: Test dimension for functional check of the protective grid interlock

9.5 Checking and setting the metering slide

Before each spreading season and also during the season, if necessary, have the setting of the metering slide checked for even opening **by your expert workshop** .

When spreading **seeds or slug and snail pellets** we recommend a separate check of the metering slide for even opening.

⚠ DANGER

Danger of crushing and shearing

Power-operated components (adjusting lever, metering slide) may crush and shear when working on them.

Pay attention to the shear points of the metering outlet and slides during all adjustment work.

- ▶ Shut off the engine of the tractor. Remove the ignition key.
- ▶ Do not operate hydraulic slide actuators during adjustment work.

9.5.1 MDS 10.1/11.1/12.1/17.1/19.1 (K/R/D)

Checking and adjusting the K/R/D metering slide

NOTICE

Since the MDS solid fertiliser broadcaster (K/R/D) has a metering scale on each side, the setting work must be carried out on both the **right hand** and on the **left hand** side.

The mechanics must be freely movable to check the metering slide setting.

1. Place the solid fertiliser broadcaster securely on the ground or on a pallet. Make sure the ground is flat and firm!
2. Remove both the two spreading discs.
3. Connect the hydraulic hoses of the hydraulic slide control to the hydraulic power pack or to the tractor.
4. Close the metering slide.
5. Set the stop lever on the spreader volume scale to position 130 (to position 9 for seeds or slug and snail pellets)
6. Open the metering slide to the previously set stop.
7. Turn the tractor off and remove the ignition key or switch the unit off.

8. Take a lower link pin ∅ = 28 mm (with seeds or snail and slug pellets the setting lever ∅ = 8 mm) and insert it in the right hand or left hand metering opening

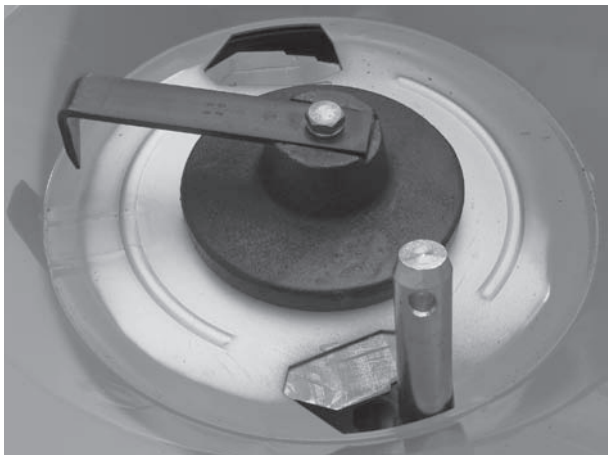


Figure 9.5: Lower steering arm bolt into metering opening

Case 1: Pin can be inserted in the metering opening and has less than 1 mm clearance.

- The adjustment is OK.
- Remove the bolt from the metering opening.
- Continue with point [26].

Case 2: Pin can be inserted in the metering opening and has more than 1 mm clearance.

- A new setting is required.
- Continue with point [9].

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

- A new setting is required.
- Continue with point [10].

9. Remove the bolt from the metering opening.
10. Start the tractor/unit.
11. Close the metering slide.
12. Close the ball cocks on the hydraulic slide control (only on version K/R)
13. Turn the tractor off and remove the ignition key or switch the unit off.
14. Separate the metering slide from the hydraulic cylinder.
15. Remove screw and locking washer.
16. Pull the hydraulic cylinder forwards in the direction of travel and place under the metering slide with the fork head.
17. Set the stop lever to position **550**.

18. Pull the metering slide [1] by hand to the stop [2] (see figure 9.6).

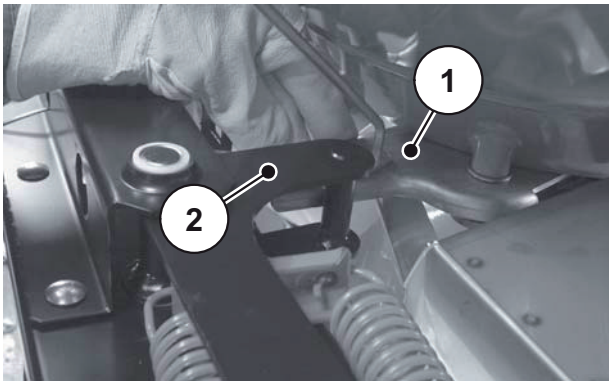


Figure 9.6: Pull the metering slide to the stop

19. Insert the pin in the opening and pull the stop lever to smaller values until the slide is in contact with the pin.
20. Securely clamp the stop lever.
21. Remove the bolt from the metering opening.
22. Release the bolts [3] on the broadcasting scale [4].

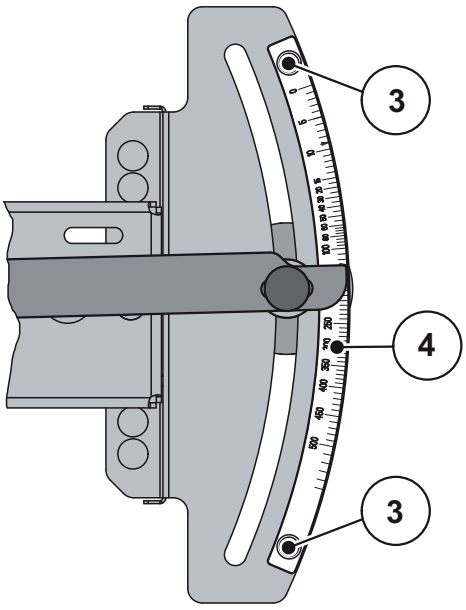


Figure 9.7: Metering slide adjustment scale

23. Displace the entire scale so that the **stop** is exactly at position **130** (with seeds or snail and slug pellets to position **9**) on the scale arc. Tighten the scale again.
24. Place the fork head of the hydraulic cylinder on the slide (if necessary, place the stop lever in a higher position).
25. Fit the bolt and the locking washer.
26. Re-fit both spreading discs.

▷ **The adjustment is now complete. If you now disconnect the hydraulic hoses from the tractor/unit, you must first release the force from the return spring on the single-acting hydraulic cylinders.See chapter** **6.11: Switching off and uncoupling the solid fertiliser broadcaster, page 59****.**

NOTICE

Both metering slides must open **by the same amount**. Always test both metering slides.

9.5.2 MDS 10.1/11.1/12.1/17.1/19.1 (M)

Checking and adjusting the metering slide (M)

1. Place the solid fertiliser broadcaster securely on the ground or on a pallet. Make sure the ground is flat and firm!
2. Remove both spreading discs
3. Close the metering slide.
4. Set the stop lever on the spreader volume scale to position **130** (with seeds or slug and snail pellets to position **9**)
5. Open the metering slide to the previously set stop.
6. Take a lower link pin ∅ = 28 mm (with seeds or snail and slug pellets the setting lever ∅ = 8 mm) and insert it in the right hand or left hand metering opening.

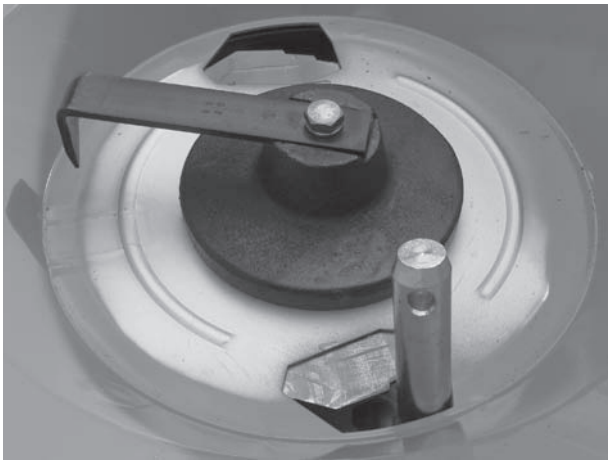


Figure 9.8: Lower link pin in outlet

Case 1: Pin can be inserted in the metering opening and has less than 1 mm clearance.

- The adjustment is OK.
- Remove the bolt from the metering opening.
- Continue with point [8].

Case 2: Pin can be inserted in the metering opening and has more than 1 mm clearance.

- A new setting is required.
- Remove the bolt from the metering opening.
- Continue with point [7].

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

- A new setting is required.
- Continue with point 7.

7. To permit adjustment the angle joints [1] can be released on one side and the setting of the metering slide can be increased or reduced by a complete revolution.

NOTICE

It is fundamentally important to make sure that the metering slides are opened to **equal** width, as far as possible.

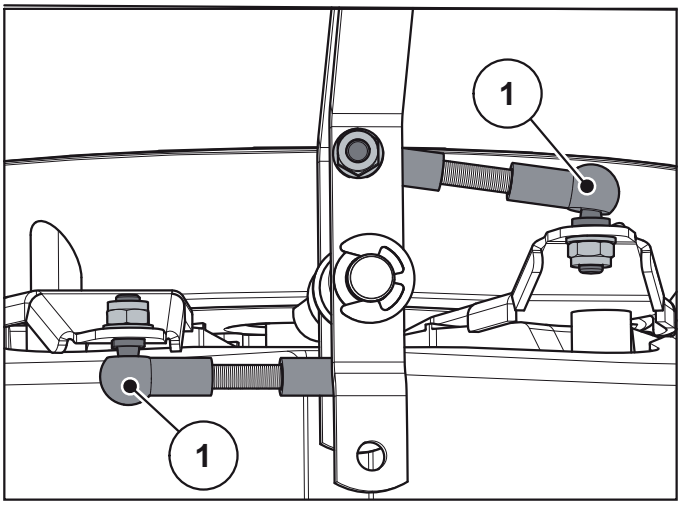


Figure 9.9: Angle joint

8. Re-fit both spreading discs.

▷ **The adjustment is now complete. If you now disconnect the hydraulic hoses from the tractor/unit, you must first release the force from the return spring on the single-acting hydraulic cylinders.See chapter** **6.11: Switching off and uncoupling the solid fertiliser broadcaster, page 59**

9.6 Checking the agitator for wear

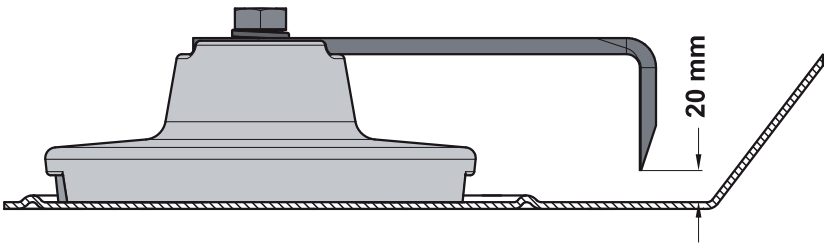


Figure 9.10: Wear region on the agitator finger

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

9.7 Checking spreading disc hub

In order to maintain the ease of movement of the cap nut on the spreading disc hub we recommend that the spreading disc hub be greased (graphite grease). Check the cap nut for cracks and damage. Defective cap nuts should be replaced immediately.

9.8 Checking safety relevant plastic parts for wear

⚠ CAUTION

Danger of injury from worn plastic components

The service life of the safety relevant plastic components is limited.

Worn plastic components can fracture and no longer be used as protection devices. This can lead to injury and material damage when operating the solid fertiliser broadcaster.

- ▶ Carry out regular functional checks of the plastic components.
- ▶ The defective plastic components must be replaced immediately.

The following components of the solid fertiliser broadcaster have safety relevant functions:

- Outlet
- Deflection and protection device
- Plastic nut on the hopper (see chapter 6.3: Assembling the solid fertiliser broadcaster, page 28)
- Cap nut on the spreading discs
- Protective grid lock

9.9 Removing and mounting spreading discs

⚠ DANGER

Danger from running engine

Working on the solid fertiliser broadcaster with the engine running may cause serious injuries from the mechanical components and escaping fertiliser.

Never remove or mount the spreading discs with the tractor engine running or the PTO shaft rotating.

▶ Shut off the tractor engine and disengage the PTO shaft. Remove the ignition key.

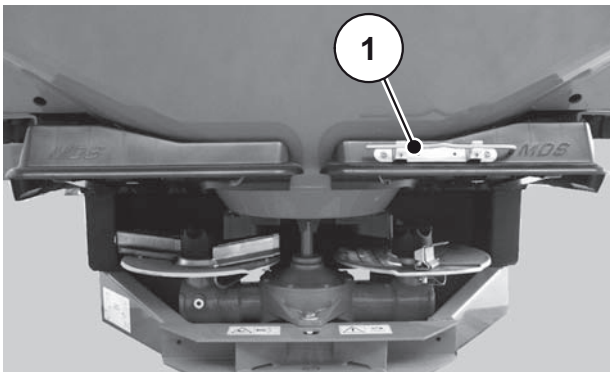
9.9.1 Removing spreading discs

Continue on both sides (left and right) as follows:

1. Remove the setting lever from the retainer.

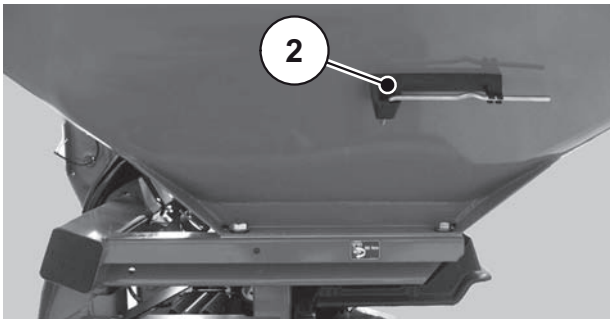
NOTICE

The setting lever can be found at one of the two positions shown below, depending on the versionof the solid fertiliser broadcaster.



[1] Position of setting lever (Deflection and protection device)

Figure 9.11: Setting lever



[2] Position of setting lever (hopper direction of travel on the left)

Figure 9.12: Setting lever

2. Release the cap nut [3] on the spreading disc with the setting lever. Remove the spreading disc from the hub.
3. Put the setting lever back into the retainer provided for the purpose.

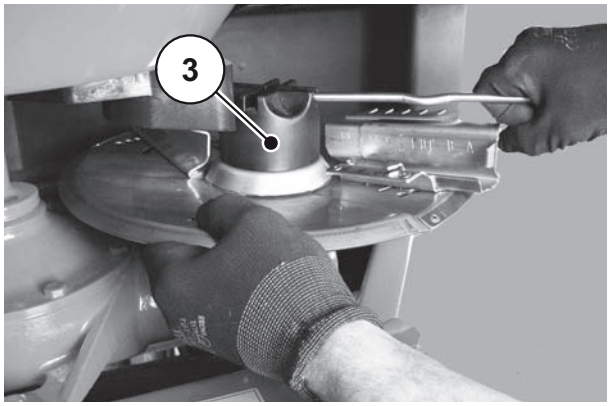


Figure 9.13: Slackening cap nuts

9.9.2 Fitting the spreading discs

Requirements:

- PTO shaft and engine of the tractor must be switched off and locked to prevent accidental starting.

Assembly:

Mount the broadcast disc in the left direction of travel and the right broadcast disc in the left direction of travel. Make sure that the left and right spreading discs are not reversed.

The following procedure is for fitting the left hand spinning disc. The right hand disc is fitted in the same way.

1. Place the left hand disc on the left hand hub. Make sure that the disc is correctly placed on the hub (clean any dirt away).

NOTICE

The pins on the spreading disc holders have different positions on the left and right. The correct broadcast disc is the one that fits precisely into the broadcast disc holder.

2. Place the cap nut carefully in position (do not tilt).
3. Tighten the cap nut to **25 Nm** well hand tight. Do **not** do this with the setting lever, however.

NOTICE

The plastic nuts have an internal stop that prevents them from coming loose. It must be possible to hear these when tightening. If not the cap nut is worn or and must be replaced.

4. Check that there is a clearance between the vanes and the plastic fertiliser guides/agitator parts by turning the discs by hand.

9.10 Checking the setting of the agitator

1. Place the agitator in the agitator shaft and engage the bayonet lock.
2. Lift the engaged agitator out upwards.

   The distance between the bottom of the agitator and the base of the hopper must now be **1** mm.
3. Use a **1 mm** thick packing washer or a sheet metal strip to check.

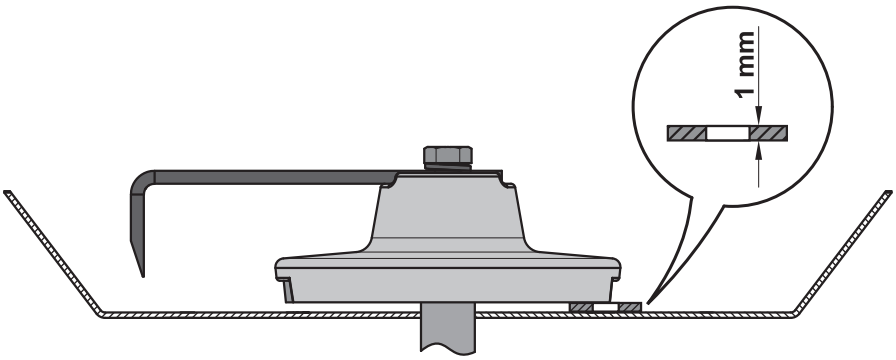


Figure 9.14: Setting the agitator

Case 1: The agitator has too much clearance to the hopper base

- Lower the gearbox by removing spacing washers from the 3 fixing bolts. If necessary place a continuous strip of sheet metal evenly under the four bolts on the hopper.

Case 2: The clearance is less than 1 mm.

- Place equal spacing washers of appropriate thickness at the 3 fixing bolts on the gearbox.

Case 3: The agitator cannot be engaged.

- The cross pin is too low.
- Place equal spacing washers of appropriate thickness at the 3 fixing bolts on the gearbox.

NOTICE

Take particular care when fitting the spreading discs that there is a space between the spreader vanes and the outlet. See 9.9.2: Fitting the spreading discs, page 109.

9.11 Changing spreader vanes

Worn vanes can be replaced.

NOTICE

Worn spreader vanes must **only** be replaced by your dealer or expert workshop.

Requirement:

- The spreading discs are removed (see Section 9.9.1: Removing spreading discs, page 108).
- A spreader vane consists of a **main vane** and a **vane extension**.
- The main vane on the **right hand** spreading disc has the designation **BR-C** and the corresponding vane extension has the designation **AR-C**.
- The main vane on the **left hand** spreading disc has the designation **BL-C** and the corresponding vane extension has the designation **AL-C**.

Example - left hand spreading disc

BL-C: Main vane

AL-C: Vane extension

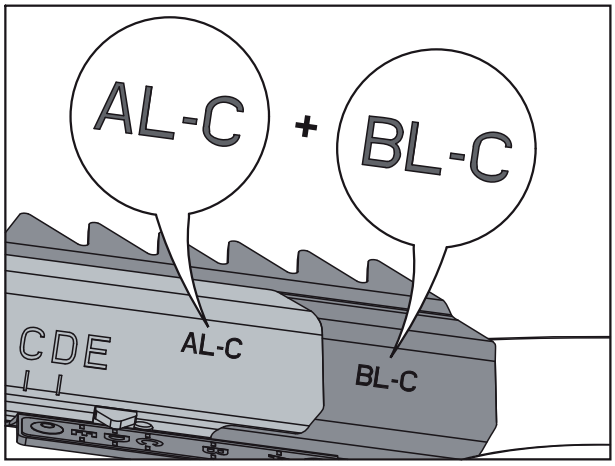


Figure 9.15: Spreader vane combination

9.11.1 Replacing the vane extension

Removing the extension vane:

1. Remove the screw [1] with the associated nut and washers.

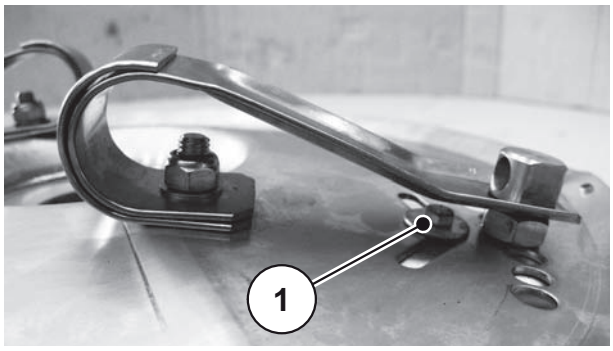


Figure 9.16: Flat spring on the spreading disc

2. Disengage the flat spring [2] using the setting lever [3].

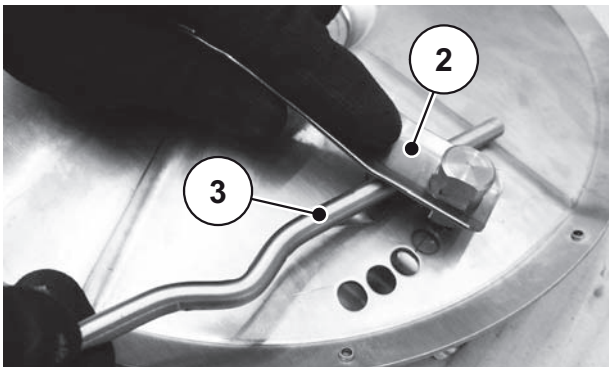


Figure 9.17: Disengage the flat spring

3. Slide the old vane extension [4] out of the main vane [5].

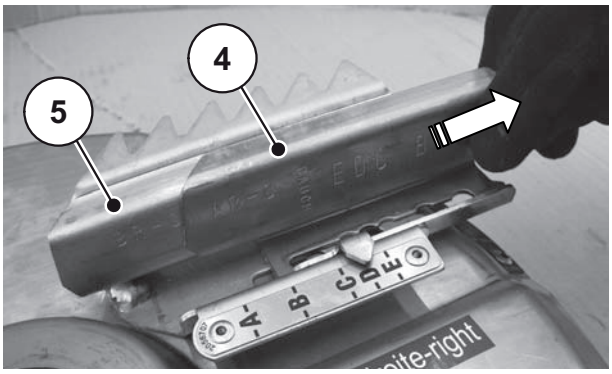


Figure 9.18: Vane extension and main vane

Fitting the new vane extension:

⚠ DANGER

Risk of injury from rotating machine components

If the vane extensions are fitted using the old bolts and nuts the spreader vane can become loose and cause severe injuries.

▶ For fitting new components use **only** the supplied **new** bolts, nuts and washers.

1. Slide the new vane extension [4] into the main vane [5].

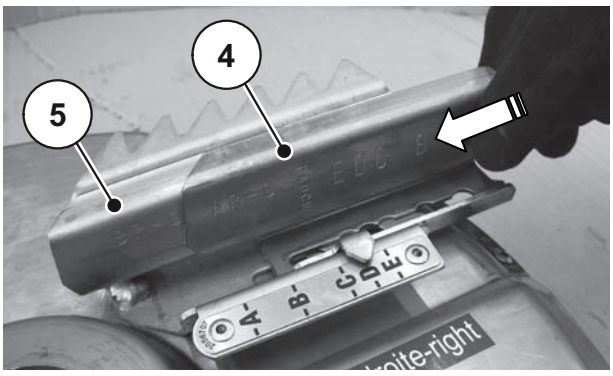


Figure 9.19: New vane extension

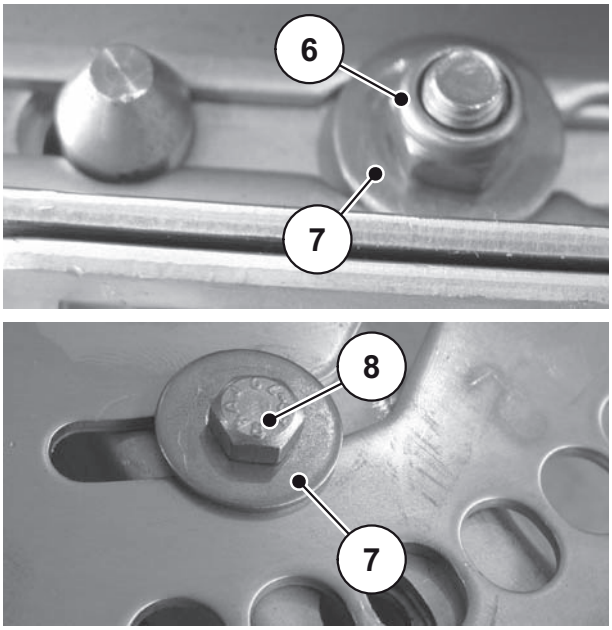


Figure 9.20: Spreading vane fixing points

2. Bolt the spreader vane to the spreading disc with the new bolt [8], the new lock-nuts [6] and the new wash-ers [7].

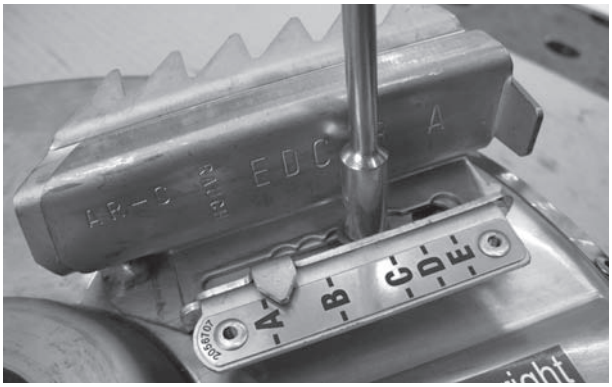


Figure 9.21: Spreading vane fixing points

3. Tighten the bolt so that it is flat and tight (tightening torque: approx. **8** Nm).

4. In order to make adjustment of the position of the vane extension more easy, release the bolt [8] again by approx. half a turn.

▷ **The bolt may only be released so far as to permit adjustment of the po-sition of the vane extension and the vane extension still remains in good contact with the main vane.**

5. Re-engage the flat spring using the setting lever.

6. If necessary, repeat the working steps on the other vane extensions that need to be replaced.

▷ **Re-fit both spreading discs. See chapter** **9.9.2: Fitting the spreading discs, page 109****.**

9.11.2 Replacing the main vane or the complete spreader vane

Removing the spreader vane

⚠ WARNING

Danger of injury by tensioned flat spring

The flat spring is under tension and can jump out in an uncontrolled manner.

- ▶ Maintain an adequate distance when removing.
- ▶ Do not remove the spring towards the body.
- ▶ Do not bend directly over the spring.

1. Unscrew the self-locking spring retaining nut of the spreader vane using a 13 mm AF open-ended spanner.

Figure 9.22: Remove bolts

2. Remove the flat spring [1] using a suitable screwdriver or the setting lever [2].

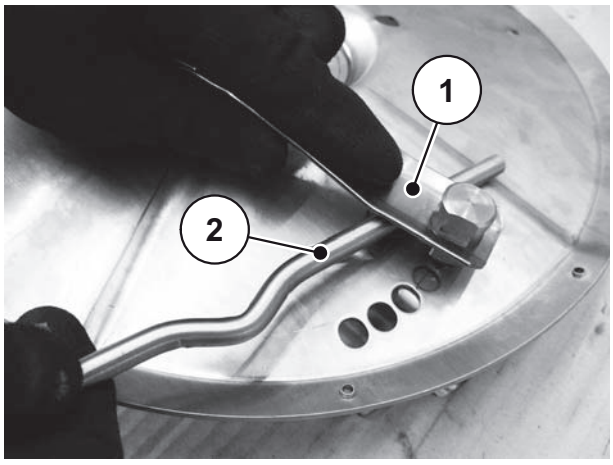


Figure 9.23: Removing the flat spring

3. Remove the screw [3] with the associated nut and washers.

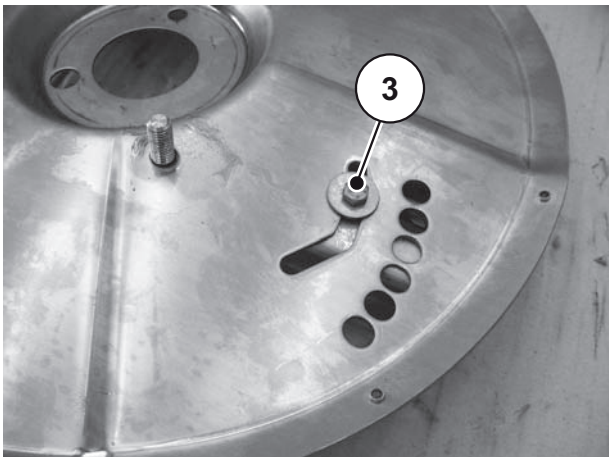


Figure 9.24: Bolt on the bottom of the spreader vane

4. Remove the old spreader vane [4] with the associated nut and washers.

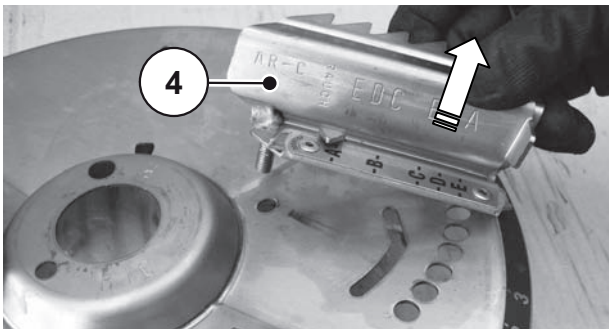


Figure 9.25: Remove spreader vane

Fitting the new main vane or complete spreader vane

1. Place the new main vane on the spreading disc.

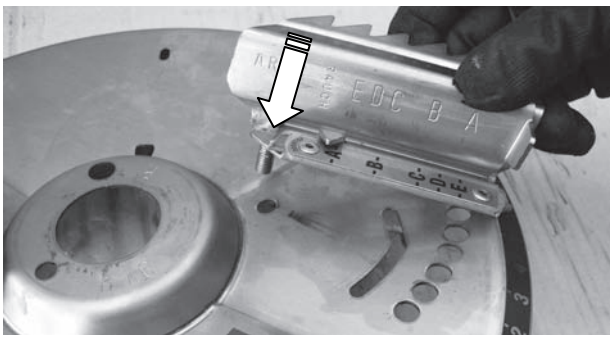


Figure 9.26: Main vane fitting

NOTICE

When fitting, make sure that the combination of main vane and vane extension is correct. See figure 9.15.

⚠ DANGER

Risk of injury from rotating machine components

If the spreader vanes are fitted using the old bolts the spreader vane can become loose and cause severe injuries.

▶ For fitting new spreader vanes use **only** the supplied **new** bolts, nuts and washers.

2. Bolt the new vane extension and the new main vane to the spreading disc.

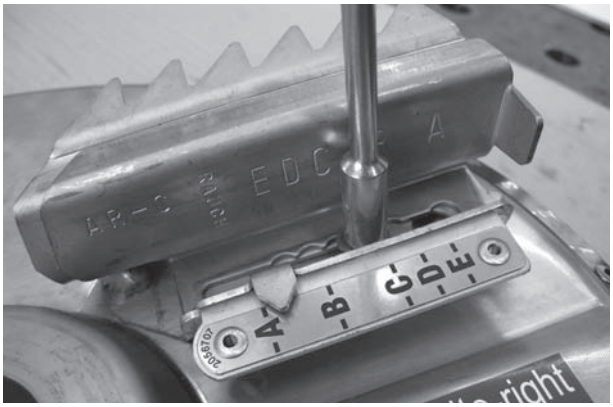


Figure 9.27: Spreader van on the spreading disc

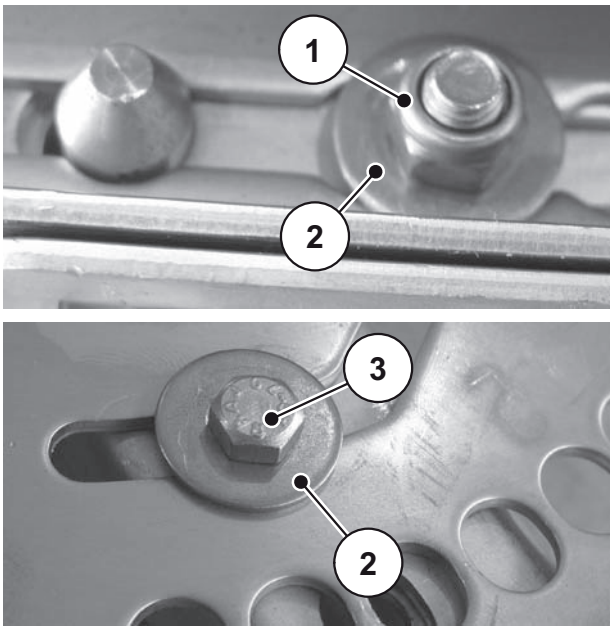


Figure 9.28: Spreading vane fixing points

3. Bolt the complete spreader vane to the spreading disc with the new bolt [3], the new lock-nut [1] and the new washers [2].
4. Tighten the bolt so that it is flat and tight (tightening torque: approx. **8** Nm).
5. In order to make adjustment of the position of the vane extension more easy, release the bolt [3] again by approx. half a turn.

   ▷ The bolt may only be released so far as to permit adjustment of the position of the vane extension and the vane extension still remains in good contact with the main vane.

⚠ WARNING

Danger of injury by tensioned flat spring

The flat spring is under tension and can jump out in an uncontrolled manner.

- ▶ Maintain an adequate distance when removing.
- ▶ Do not remove the spring towards the body.
- ▶ Do not bend directly over the spring.

6. Place the flat spring [4] on the stud [5] on the main vane.
7. Carefully push the locking pin [6] into one of the positioning holes

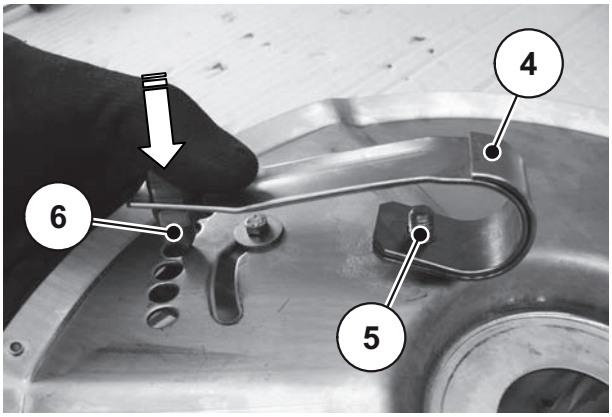


Figure 9.29: Flat spring on the spreading disc

8. Fix the flat spring with a new washer and a new self-locking spring fixing nut.

Figure 9.30: Fixing the flat spring

9. Tighten the spring fixing nut so that the flat spring is flat and tight against the spreading disc.
10. In order to make adjustment of the position of the spreader vane more easy, release the spring fixing nut again by approx. half a turn.

⚠ DANGER

Risk of injury from rotating machine components

If the spring fixing nut is too loose the spreader vane can separate from the spreading disc.

This can lead to damage to the machines and to severe injuries.

▶ Only release the spring fixing nut so that the spreader vane can be adjusted and that the flat spring still lies securely on the spreading disc.

11. If necessary, repeat the working steps on the other spreader vanes that need to be replaced.

▷ **Re-fit both spreading discs. See chapter** **9.9.2: Fitting the spreading discs, page 109****.**

9.12 Replacing an MDS spreader vane with an X spreader vane

NOTICE

The standard spreader vanes should **only** be replaced by X spreader vanes by your dealer or expert workshop.

Vane combination

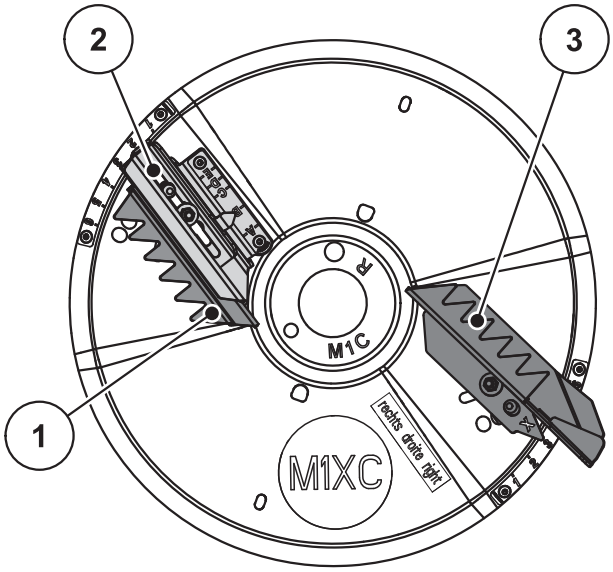
⚠ CAUTION

Environmental damage caused by incorrectly fitted spreader vanes

Always observe the prescribed vane combinations. Other combinations can have a significant adverse effect on the spreading pattern.

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

		Spreading disc type M1XC	
		Main vane and vane extension	**X spreader vane**
Spreading disc	left	BL-C and AL-C	XL-C
	right	BR-C and AR-C	XR-C



[1] Main vane
[2] Vane extension
[3] X spreader vane

Figure 9.31: Example spreading disc with X spreader vanes

Fitting the X vane:

NOTICE

Make sure that the X vane spreading disc combination is correct; see table.

1. Remove a main vane and auxiliary vane from each spreading disc.

   See: Removing the spreader vane, page 114

2. Bolt the X spreader vane to the spreading disc as described in: Fitting the new main vane or complete spreader vane, page 115.
3. Bolt the flat spring with the spreading disc and the X spreader vane.
4. Observe the instructions for fitting the spreading disc.see chapter 9.9.2: Fitting the spreading discs, page 109.

9.13 Gear oil

9.13.1 Quantity and types

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

NOTICE

Use one type of oil, never mix different types.

9.13.2 Checking oil level, changing oil

The gearbox is lubricated for life under normal operating conditions. However, we recommend changing the oil after **10** years.

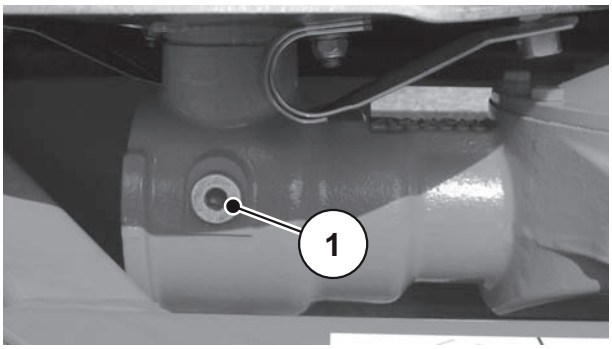
A shorter oil change interval is recommended if fertilisers with a high dust content are used and the spreader is frequently cleaned.

⚠ CAUTION

Environmentally correct used oil disposal

Used oil that enters the ground water is a hazard for people and the environment.

▶ Dispose of used oil according to the local regulations.



[1] Oil level checking screw

Figure 9.32: Fill and drain points for gear oil

Check oil level

- Open the oil level check plug.
  ▷ The oil level is satisfactory when the oil is at the bottom edge of the hole.

9.14 Lubrication chart

Lubrication points	Lubricant	Notes
Drive shaft	Grease	See manufacturer's manual.
Metering slide, stop lever	Grease, oil	Keep moving smoothly and grease regularly.
Spreading disc hub	Graphite grease	Keep the thread and mounting surface clean and grease regularly.
Agitator shaft, agitator finger	Graphite grease	Grease before and after each spreading season.
Upper and lower link balls	Grease	Grease regularly.
Joints, bushes	Grease, oil	Designed for dry operation but can be lightly greased.

10 Useful information for spreading

10.1 General Information

The modern technology and design of our solid fertiliser broadcasters and comprehensive, continuous testing at our factory fertiliser spreader test area ensures that you will have a perfect scatter pattern.

In spite of the care taken during manufacture of the machines deviations in fertiliser application or some type of fault is always possible even when used as designated.

The reasons for this may be:

- Changes in the physical properties of the seeds or the fertiliser (such as variable grain size distribution, variable density, grain size and surface, treatment, coating, moisture).
- Clumping and damp fertiliser.
- Wind drift (stop spreading at high wind speeds).
- Blockages or bridge formation (e.g. because of foreign objects, bag residue, wet fertiliser....).
- Uneven ground.
- Wear of wear-out parts (e.g. agitator fingers, vanes, discharge).
- Damage from external causes.
- Poor cleaning and care to prevent corrosion.
- Incorrect drive speeds and ground speeds.
- Not conducting broadcast test.
- Incorrect machine settings.

Pay close attention to the machine settings. Even a slightly incorrect setting may adversely affect the scatter pattern. Therefore, before every use of the spreader and during work check that your machine operates properly and that the application is sufficiently precise (run a calibration test).

Particularly hard fertiliser types, such as Thomas fertiliser and kieserite, increase the wear on the spreader vanes.

The spreading width to the rear is approx. ½ working width. The total broadcast width is approx. 2 working widths with the triangular spreading pattern (M1C disc: 10-18 m depending on the type of fertiliser).

Always use the supplied sieve to prevent blockages caused by foreign objects or fertiliser clumping.

No claims for compensation for damages that are not part of the solid fertiliser broadcaster itself will be accepted.

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

10.2 Sequence of fertiliser spreading

Designated use of the solid fertiliser broadcaster also includes observing the service, maintenance and repair conditions as prescribed by the manufacturer. **Spreading** therefore always includes the work of **preparation** and **cleaning/maintenance**.

- Conduct spreading as described below.

Preparation	● Attach the spreader to the tractor ● Close metering slide ● Filling fertiliser ● Run calibration test ● Set hopper height ● Set spreader vane
Spreading	● Engage PTO shaft ● Finish spreading run and close the outlets ● Disengage PTO shaft
Cleaning/maintenance	● Open metering slide ● Unhitch the solid fertiliser broadcaster from the tractor ● Maintenance and lubrication

10.3 Fill level scale

There is a filling level scale in the hopper for checking the filling level (tolerance range of individual scale marks max. +/- 10 %).

The scale can be used to estimate how long spreading can continue until the hopper must be refilled.

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

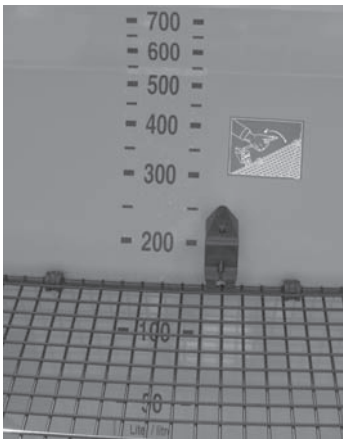


Figure 10.1: Fill level scale (graduated in litres)

10.4 Spreading in the headland

In order to achieve good spreading in the headland, precise arrangement of the tramlines is essential.

Environmentally optimised boundary spreading

Spreading at the headland with the remote-controlled TELIMAT boundary spreading system:

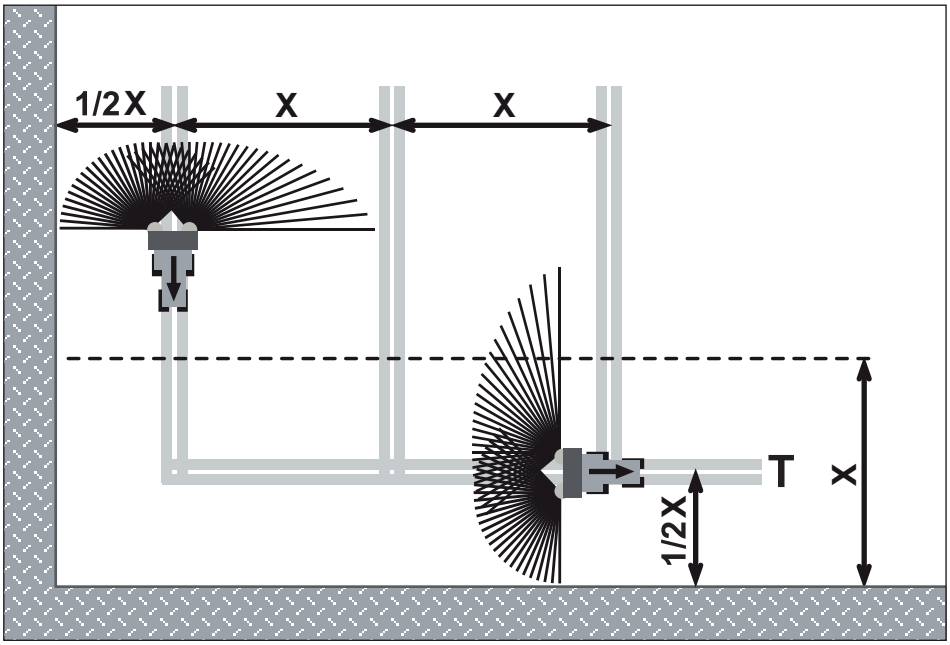


Figure 10.2: Environmentally optimised boundary spreading

[T] Headland tramline
[X] Working width

- Place the headland tramline [T] at a distance of half the working width [X] from the edge of the field.

Normal spreading in or out of the headland tramline

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

- Swing the border spreading unit TELIMAT out of the spreading area.

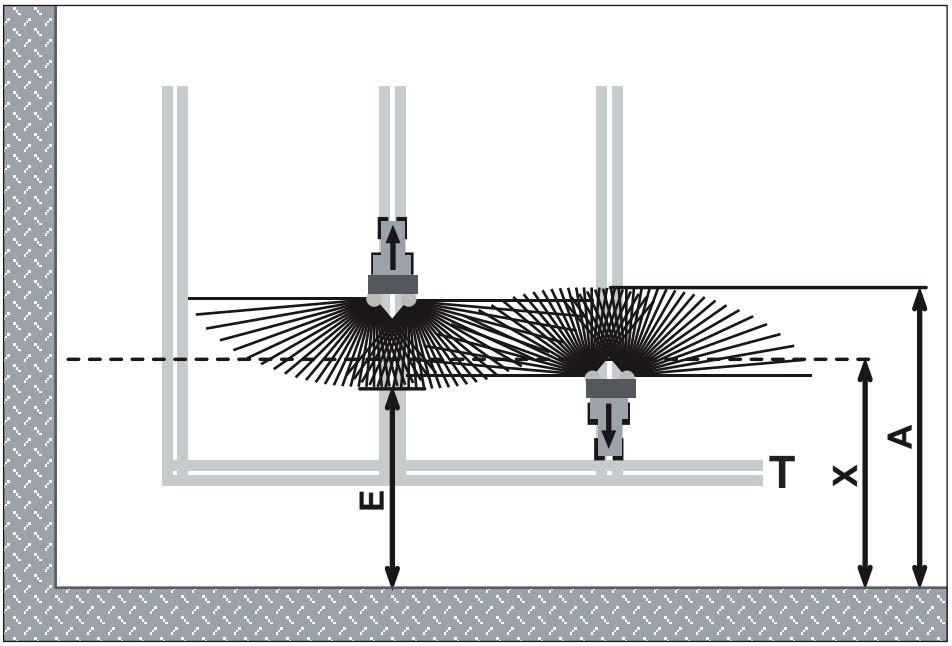


Figure 10.3: Normal spreading

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

The metering slides must be opened or closed at different distance to the field border of the headland when travelling backwards and forwards.

Outbound from the headland tramline

- **Open** the metering slide when the following condition is fulfilled:
  - 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 fertiliser.

Inbound in the headland tramline

- Close the metering slide **as late as possible**.
  - Ideally, the end of the spreading fan on the field [A] should come to rest approx. 4 to 8 m further than the working width [X] of the headland.
  - This cannot always be achieved, depending on the spreading width of the fertiliser and the working width.
- Alternatively, you can drive out beyond the headland tramline or you can create a second headland tramline.

Follow these directions for an environmentally friendly and economical method of working.

10.5 TELIMAT T1 (special version)

The Telimat T1 is a remote controlled border and edge spreading unit for working widths of **10 - 24 m** (20 - 24m just border spreading).

The Telimat T1 is mounted on the **left** of the solid fertiliser broadcaster, looking in the direction of travel. It is actuated by a double-acting control valve from the tractor.

NOTICE

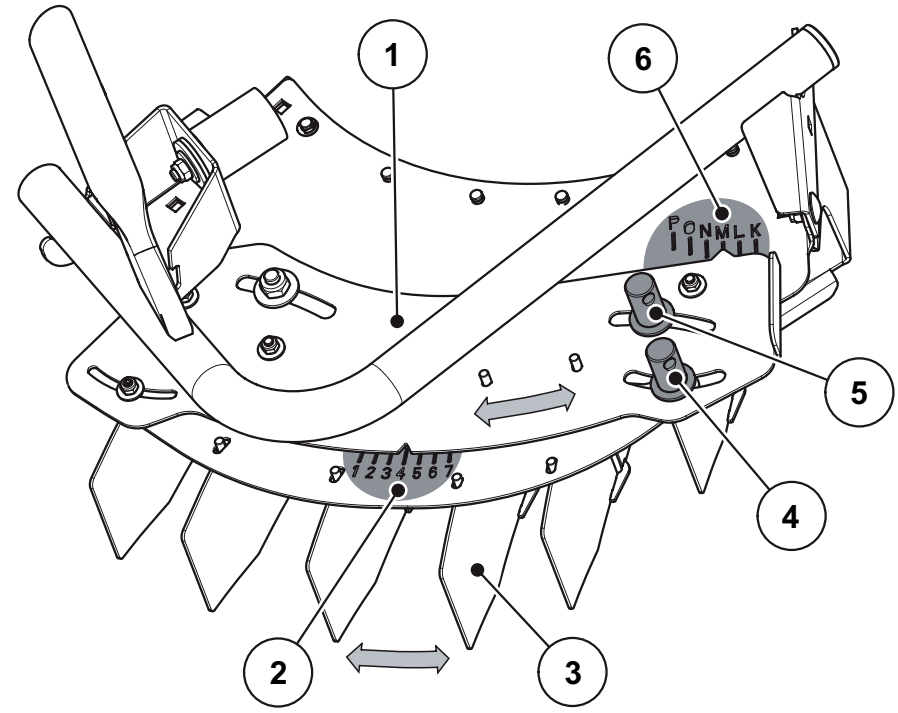
Attaching the Telimat to the solid fertiliser broadcaster is described in a separate assembly manual. This assembly manual is a constituent part of the TELIMAT.

10.5.1 Setting the TELIMAT

The Telimat T1 is prepared for the spreading work depending on the **type of fertiliser**, **working width** and the desired **border spreading type** on the basis of the setting table (see sticker). You can choose between border spreading setting (considerable under-fertilisation next to the edge of the field) and edge spreading setting (virtually constant spreading volume up to the edge of the field).

NOTICE

The settings for the TELIMAT can be found on the sticker.



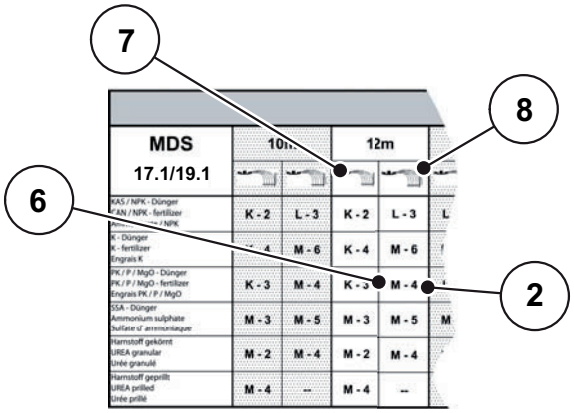


Figure 10.4: Setting the TELIMAT

[1] Sliding section
[2] Number scale
[3] Guide plates
[4] Adjustment nut for number scale
[5] Adjustment nut for letter scale
[6] Letter scale
[7] Border spreading setting
[8] Edge spreading setting

Setting the guide plates (letter scale):

The guide plates [3] are set to the individual type of fertiliser and edge spreading type (border or edge spreading) on the letter scale (K to P, [6]).

1. Release the two adjustment nuts [4], [5] with the setting lever of the solid fertiliser broadcaster.
2. Adjust sliding section [1] indicator arrow to the letter specified in the setting chart.

   ▷ The arrow is exactly above the specified letter.
3. Tighten the adjustment nut close to the letter scale [5] with the setting lever of the solid fertiliser broadcaster.

Setting the guide plates (number scale):

The number scale [2] is used generally for setting the working width.

1. Set the relevant number value at the notch of the sliding section [1] by moving the guide plates [3] at the outer end.
2. Fix the complete adjusting unit with the outer adjustment nut [4].

   ▷ The setting example in figure 10.4 corresponds to edge spreading adjustment [8] for urea granulate at a working width of 12 m = **M–4** [6], [2].

NOTICE

Environmentally optimised boundary spreading at working widths of 20 - 24 m:

To optimise the scatter pattern we recommend reducing the output **on the boundary side** by 30 %.

Version **M** with hydraulic slide control (FHK 4, FHD 4): single sided volume reduction not possible. The volume must be reduced by 30 % **on both sides**.

If the symbol **- -** is entered in a column in the setting table (sticker) of the Telimat T1, then the following applies:

- Edge spreading with Telimat is not possible since the spreading pattern for field spreading is already similar to a spreading pattern for edge spreading. This also applies to edge spreading of 20 to 24 m.

10.5.2 Correcting the spreading width

The values in the setting chart are standard values. If there are deviations in fertiliser quality it may be necessary to correct the setting.

In order to correct the given setting of the TELIMAT it is only necessary, in most cases, to change the number scale to optimise the spreading width up to the field edge.

- To **reduce** the spreading width from the standard setting in the setting chart: move the deflector plate position on the number scale towards the **lower number value**.
- To **increase** the broadcast range from the standard setting in the setting chart: move the deflector plate position on the number scale towards the **higher number value**.

If there are greater deviations it may be necessary to move the TELIMAT housing along the letter scale.

- To **reduce** the spreading width from the standard setting in the setting chart: move the Telimat along the letter scale towards the **lower letters** (in alphabetical order).
- To **increase** the broadcast range from the standard setting in the setting chart: move the Telimat along the letter scale towards the **higher letters** (in alphabetical order).

NOTICE

Guide plate setting

- In order to be able to move the guide plates along the number scale you only need to release the outer fixing nut [4]
- If the guide plates are also to be moved along the letter scale, both fixing nuts [4], [5] need to be released.

10.5.3 Instructions for spreading with the TELIMAT

The TELIMAT is set to the position required for the selected spreading method from the tractor with a double-acting control valve.

- Boundary spreading: bottom position,
- Normal spreading: top position.

⚠ CAUTION

Spreading errors caused by not reaching the end position of the TELIMAT

If the TELIMAT is not completely at the end position, you may encounter spreading errors.

▶ Make sure that the TELIMAT is always in the specified end position.

▶ When switching from boundary spreading to normal spreading, actuate the control valve until the TELIMAT is completely in the top end position.

10.6 Line spreading device RV 2M1 (special version)

The RV 2M1 line spreading device is inserted in the top link of the clevis hitch. The line spreading device is arranged in such a way that a row [X] (row pitch: approx. 2-5 m) to the left and to the right of the solid fertiliser broadcaster is spread with a planting strip approx. 1 m wide, depending on the type of fertiliser.

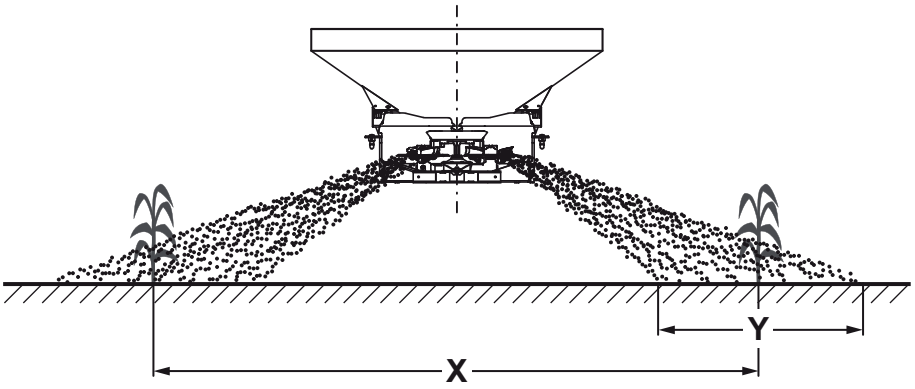


Figure 10.5: Spreading with the line spreading device

[X] Line separation distance
[Y] Width of the planting line

10.6.1 Pre-settings on the solid fertiliser broadcaster

Before fitting the RV 2M1, the spreader vanes on both spreading discs must be set to positions A2-A2.

⚠ CAUTION

Material damage to spreader vanes and line spreader device RV 2M1

If the spreader vanes are set to **higher** values than **A2-A2**, the spreader vanes can collide with the guide plates on the line spreading device RV 2M1.

- ▶ Never set the spreader vanes to higher values than A2-A2.
- ▶ Check that the spreader discs have feed transition after installing the line spreader device RV 2M1 with the tractor stopped (turn the spreading discs by hand).

10.6.2 Setting the line spreading and the spreading width

The line separation can be adjusted by displacing the plates [1].

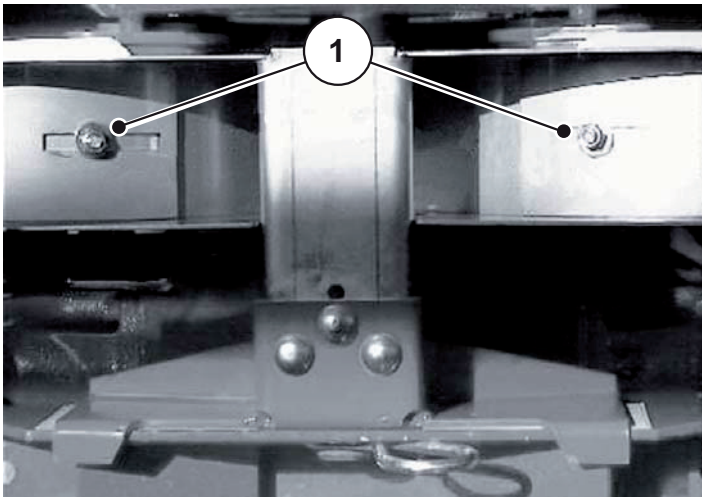


Figure 10.6: Plates on the line spreading device

[1] Plates

The strip width to be spread can be adjusted by displacing the side plates [2].

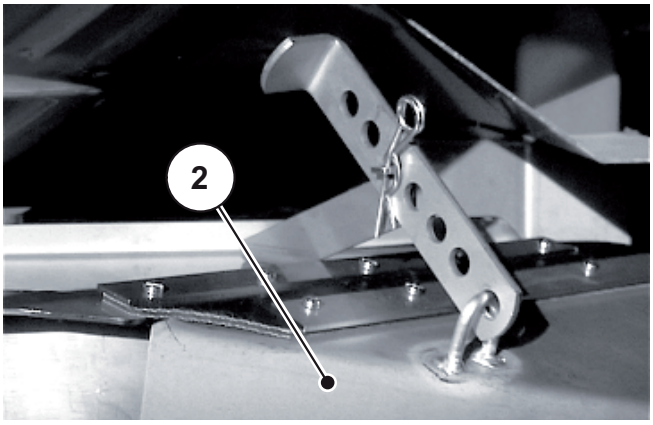


Figure 10.7: Adjustment on the line spreading device

[2] Side plates

Small corrections can be made between the steps in the adjustment by mounting the solid fertiliser broadcaster higher or lower.

10.6.3 Settings of the spreading volume

Example for calculation of the spreading volume:

- Two rows are to be spread.
- The distance between the two rows to be spread is 3 m

  ▷ The effective working width thus is 6 m (transition every second tramline).

However, since there are no details for solid fertiliser broadcaster setting in the fertiliser chart for a working width of 6 m, it is recommended to take the setting values for 12 m working width from the fertiliser chart.

If you want to spread 200 kg/ha at a working width of 6 m you need to take the setting values for 12 m working width from the fertiliser chart and set the metering slide for 100 kg/ha.

11 Fault finding chart

⚠ WARNING

Risk of injury and accident from forgotten or inadequate troubleshooting

If faults are incorrectly repaired by unqualified persons or only after a delay this may result in incalculable risks with negative consequences for persons, machine and the environment.

- ▶ Have any faults corrected **immediately**.
- ▶ Correct faults yourself only if you have the appropriate qualifications.

Fault	Possible cause/action
Uneven fertiliser distribution	● Remove clumps of fertiliser on spreading discs, spreader vanes and discharge ducts. ● Opening slides do not open completely. Check slides opening position. ● Spreader vane set incorrectly. Correct the setting in accordance with the details in the fertiliser chart.
Too little fertiliser in the overlap area	● Check spreader vanes and discharges and replace faulty parts immediately. ● The fertiliser has a smoother surface than the fertiliser tested for the fertiliser chart. ● Extend the spreader vane mentioned second in the fertiliser chart (to greater figures). - e.g. E4-C1 to setting value E4-C2 ● If the angle correction of the spreader vane mentioned second is not adequate, extend the length of the spreader vane. - e.g. E4-C2 to setting value E4-D2 ● Spreader vane set incorrectly. Correct the setting in accordance with the details in the fertiliser chart.

Fault	Possible cause/action
Too little fertiliser in the track of the tractor.	● The fertiliser has a rougher surface than the fertiliser tested for the fertiliser chart. ● The PTO speed is higher than that shown on the tractor meter. Check the speed and correct it if necessary. ● Retract the spreader vane mentioned second in the fertiliser chart (to smaller figures). - e.g. C3-B2 to setting value C3-B1 ● If the angle correction of the spreader vane mentioned second is not adequate, shorten the length of the spreader vane. - e.g. C3-B1 to setting value C3-A1 ● Spreader vane set incorrectly. Correct the setting in accordance with the details in the fertiliser chart.
Spreader feeds more on one side	● Check adjustment of metering slides. ● Check function of agitator. ● Check discharge.
Irregular/blocked fertiliser feed to spreading disc	● Check agitator and replace if necessary. ● Clear blockages.
Spreading discs flutter	● Check that plastic cap nuts are tight and the thread is good.
When the metering slide is closed fertiliser trickles out of the hopper	● Check the distance between the agitator and the hopper base. ● If the distance is greater than 2 mm observe chapter 9.10: Checking the setting of the agitator, page 110.
Metering slide does not open	● Metering slides do not move easily. Regularly check nuts and screws for tight fit and tighten them, if necessary. ● Check tension spring. ● The reducing plate on the hose connection of the female coupler is dirty.
Metering slide opens too slowly	● Clean orifice plate. ● Replace 0.7 mm orifice plate with a 1.0 mm plate. The plate is at the hose connection of the female coupler.
Blockages at outlets because of: lumps in the fertiliser, wet fertiliser, other contaminants (leaves, straw, bag residues)	● Clear blockages. Proceed as follows: **1.** Park tractor, remove ignition key **2.** Open metering slides **3.** Place catch basin underneath **4.** Remove spreading discs **5.** Clean the outlet from below with a wooden pole or clean the setting lever and push through the metering opening **6.** Remove foreign bodies from the hopper, see chapter 9.3: Cleaning, page 99.

12 Options

12.1 Extensions

You can increase the capacity of the solid fertiliser broadcaster by fitting a hopper extension.

You can obtain three and four sided extensions with different capacities for the MDS 17.1 and MDS 19.1 solid fertiliser broadcasters.

The extensions are bolted to the standard unit.

NOTICE

For an overview of extensions and extension combinations see chapter 4.3: Specifications of attachments and attachment combinations, page 23.

12.2 Hopper cover

A hopper cover can be installed to protect the spreader material from rain and moisture.

The covers can also be attached to the extensions.

Cover	Application
AP 13	• Standard unit MDS 11.1/12.1
AP 19	• Standard unit MDS 17.1/19.1 • Extensions: M 423
AP 240	• Extensions: M 623, M 863

12.3 RFZ 7 (all versions except MDS 10.1)

This 7 row line spreading device is suitable for spreading dry, granulated fertiliser in the line next to growing plants.

A separate operating or assembly manual is supplied with the line spreading device.

12.4 TELIMAT T1

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

A double-acting valve is required to use the TELIMAT T1.

NOTICE

Notes concerning the spreading work with this special version can be taken from chapter 10.5: TELIMAT T1 (special version), page 128.

12.5 Two way unit

Using the two way unit, the MDS 17.1 K and MDS 19.1 K solid fertiliser broadcasters can also be mounted on a tractor with just a single-acting control valve.

12.6 Tele-Space universal drive shaft

The Tele-Space universal drive shaft is extendable and provides additional space (approx. 300 mm) for ease of coupling the solid fertiliser broadcaster to the tractor.

A separate assembly manual is supplied with the Tele-Space universal drive shaft.

12.7 Auxiliary lighting

The solid fertiliser broadcaster can be fitted with additional lighting.

Lighting	Application
BLW 1	● For MDS 10.1/11.1/12.1 ● Lighting for rear ● with warning sign
BLW 8	● For MDS 17.1/19.1 ● Lighting for rear ● with warning sign
BLO 1	● For MDS 11.1/12.1 ● Lighting for rear ● Without warning sign
BLO 2	● Lighting for rear ● Without warning sign (for MDS 17.1/19.1)

NOTICE

Mounted units are subject to the lighting regulations of road traffic laws. Observe your national traffic regulations.

12.8 Line spreader device RV 2M1 for growing hops and fruit

The line spreading device is arranged in such a way that a row (row pitch: approx. 2-5 m) to the left and to the right of the solid fertiliser broadcaster is spread with a strip approx. 1 m wide, depending on the type of fertiliser.

NOTICE

Notes concerning the spreading work with this special version can be taken from chapter 10.6: Line spreading device RV 2M1 (special version), page 132.

12.9 Border spreading device GSE 7

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

- Fold the border spreading device downwards for border spreading.
- The border spreading device must be hinged up again before two-sided spreading.

12.10 Hydraulic remote control FHZ 10

This remote control unit is used to hydraulically swing the GSE 7 edge spreading unit into the edge spreading position or to swing it out of the edge spreading position for spreading to both sides, from the tractor cab.

12.11 Hydraulic slide control FHK 4

Single-acting cylinder for MDS 10.1/11.1/12.1/17.1/19.1 (M).

12.12 Hydraulic slide control FHD 4

Double-acting cylinder for MDS 10.1/11.1/12.1/17.1/19.1 (M).

12.13 Grass seed agitator finger RWK 7

For the use of grass seed as the spreading material.

12.14 Agitator RWK 15

For floury fertilisers.

12.15 Practice test kit PPS1/PPS5

For checking cross-distribution in the field.

12.16 Fertiliser Identification System (DiS)

Rapid, uncomplicated determination of spreader settings with unfamiliar fertilisers.

13 Axle load calculation

13.1 Calculation of the total weight

⚠ CAUTION

Overload danger

Mounted units on the front or rear three-point linkage must not cause the approved total weight to be exceeded. The front axle of the tractor must always be loaded with at least 20 % of the unladen weight of the tractor.

▶ Before using the unit make sure that it meets these requirements by performing the following calculations or weighing the tractor-unit combination.

Calculation of the total weight, the axle loads and the tyre capacity and the required ballast weights.

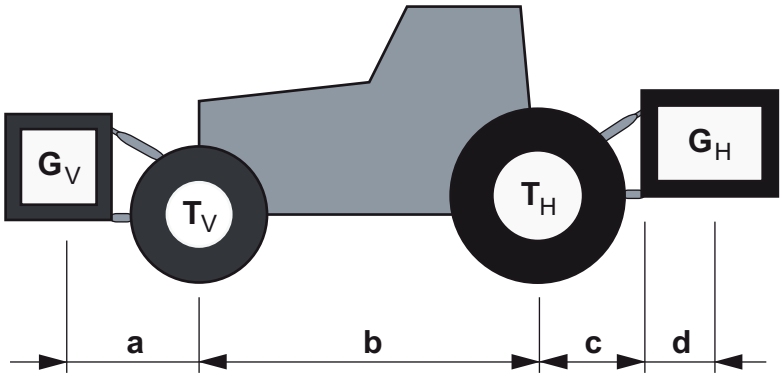


Bild 13.1: Loads and weights

You will need the following data for the calculation:

Character [unit]	Meaning	Calculation by
T_L [kg]	Unladen weight of tractor.	[1]
T_V [kg]	Front-axle load of the unladen tractor.	[1]
T_H [kg]	Rear-axle load of the unladen tractor.	[1]
G_V [kg]	Total weight of front-mounted unit or front ballast.	[2]
G_H [kg]	Total weight of rear-mounted unit or rear ballast.	[2]
a [m]	Distance between centre of gravity of front-mounted unit or front ballast and centre of front axle.	[2], [3]
b [m]	Wheel base of tractor.	[1], [3]
c [m]	Distance between centre of rear axle and centre of lower link ball.	[1], [3]
d [m]	Distance between centre of lower link ball and centre of gravity of rear-mounted unit or rear ballast.	[2]

[1] See tractor operator's manual

[2] See equipment price list and/or operator's manual

[3] Measuring

Rear-mounted unit or front-rear combinations

Calculation of minimum ballast at front $G_{V\ min}$

$$G_{Vmin} = \frac{(G_H \bullet (c + d) - T_V \bullet b + 0,2 \bullet T_L \bullet b)}{a + b}$$

Enter the calculated minimum ballast requirement in the table.

Front-mounted unit

Calculation of the minimum ballast at rear $G_{H\ min}$

$$G_{H\ min} = \frac{(G_V \bullet a - T_H \bullet b + 0,45 \bullet T_L \bullet b)}{b + c + d}$$

Enter the calculated minimum ballast requirement in the table.

If the front-mounted unit (G_V) is lighter than the minimum ballast at the front ($G_{V\ min}$), the weight of the front-mounted unit must be increased to at least the weight of the minimum front ballast.

Calculation of the actual front-axle load $T_{V\ tat}$

$$T_{Vtat} = \frac{(G_V \bullet (a + b) + T_V \bullet b - G_H \bullet (c + d))}{b}$$

Enter the calculated actual and approved front-axle load as specified in the tractor operator's manual in the table.

If the rear-mounted unit (G_H) is lighter than the minimum ballast at the rear ($G_{H\ min}$), the weight of the rear-mounted unit must be increased to at least the weight of the minimum rear ballast.

Calculation of the actual total weight G_{tat}

$$G_{tat} = (G_V + T_L + G_H)$$

Enter the calculated actual and approved total weight as specified in the tractor operator's manual in the table.

Calculation of the actual rear-axle load $T_{H\ tat}$

$$T_{H_{tat}} = (G_{tat} - G_{Vtat})$$

Enter the calculated actual and approved rear-axle load as specified in the tractor operator's manual in the table.

Tyre load capacity

Enter double the value (two tyres) of the approved tyre load capacity (for example, see tyre manufacturer's documentation) in the table.

13.2 Axle loads table

	Actual value from calculation		Approved value from operator's manual		Twice approved tyre load capacity (two tyres)
Minimum ballast front/rear	kg		—		—
Total weight	kg	≤	kg		—
Front-axle load	kg	≤	kg	≤	kg
Rear-axle load	kg	≤	kg	≤	kg

The minimum ballast weight must be mounted on the tractor as an attachment or as ballast.

The calculated values must be less than or equal to the permitted values.

14 Disposal

14.1 Safety

⚠ WARNING

Pollution of the environment due to unsuitable disposal of hydraulic and gear oil

Hydraulic oil and gear oil are not fully biodegradable. Therefore oil must not be disposed off in the environment in an uncontrolled manner.

- ▶ The proper disposal of used oil must only be undertaken by the authorised maintenance personnel.
- ▶ Soak up or dam up oil that has run out of equipment with sand, soil or absorbent material.
- ▶ Collect hydraulic and gear 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 swerage system. Penetration of oil into the water drain by setting up barriers of sand or earth or other appropriate barrier methods.

⚠ WARNING

Environmental pollution due to the unsuitable disposal of packaging material

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

- ▶ The specialised disposal of packaging material takes place via an appropriately authorised disposal company with adherence to the national regulations.
- ▶ Do not burn packaging material or dispose of it as household refuse.

⚠ WARNING

Environmental pollution due to the unsuitable disposal of packaging material

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

- ▶ Disposal only by authorised companies.

14.2 Disposal

The following points apply without restriction. The precautions laid down as a result of national regulations are to be carried out implicitly.

1. All parts, auxiliary and operating substances are to be removed from the solid fertiliser broadcaster by specialist personnel. In so doing these parts are to be sorted into specific categories.
2. All waste products are then to be disposed of in accordance with local regulations and directives for recycling or special refuse categories by authorised companies.

15 Guarantee and warranty

Rauch units are manufactured with modern production methods and with the greatest care and are subject to numerous inspections.

Therefore RAUCH offers a 12-month warranty subject to the following conditions:

- The warranty begins on the date of purchase.
- The warranty covers material and manufacturing faults. Our liability for third-party products (hydraulic system, electronics) is limited to the warranty of the manufacturer of the equipment. During the warranty period, manufacturing and material faults are corrected free of charge by replacement or repair of the affected parts. Other rights extending beyond the above, such as claims for conversion, reduction or replacement for damages that did not occur in the object of supply are explicitly excluded. Warranty services are provided by authorised workshops, by RAUCH factory representatives or the factory.
- The following are excluded from coverage by the warranty: natural wear, dirt, corrosion and all faults caused by improper handing and external causes. The warranty is rendered void if the owner carries out repairs or modifications to the original state of the object of supply. Warranty claims are rendered void if RAUCH original spare parts were not used. Please follow the directions in the operator's manual. In all cases of doubt contact our factory representatives or the factory directly. Warranty claims must be submitted to the factory by 30 days at the latest after occurrence of the problem. The date of purchase and the serial number are required. If repairs under the warranty are required, they must be carried out by the authorised workshop only after consultation with RAUCH or the company's appointed representatives. The warranty period is not extended by work carried out under warranty. Shipping faults are not factory faults and therefore are not part of the warranty obligation of the manufacturer.
- No claims for compensation for damages that are not part of the solid fertiliser broadcaster itself will be accepted. This also means that no liability will be accepted for damages resulting from spreading errors. Unauthorised modifications to the overload trailer or solid fertiliser broadcaster can lead to consequential damage for which the supplier accepts no liability. In the event of 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 faults in the object of supply, the supplier's liability exclusion will not apply. It will also not apply in the case of faults in properties that are explicitly assured, if the assurance had the purpose of protecting the purchaser against damage that does not arise from the object of supply itself.