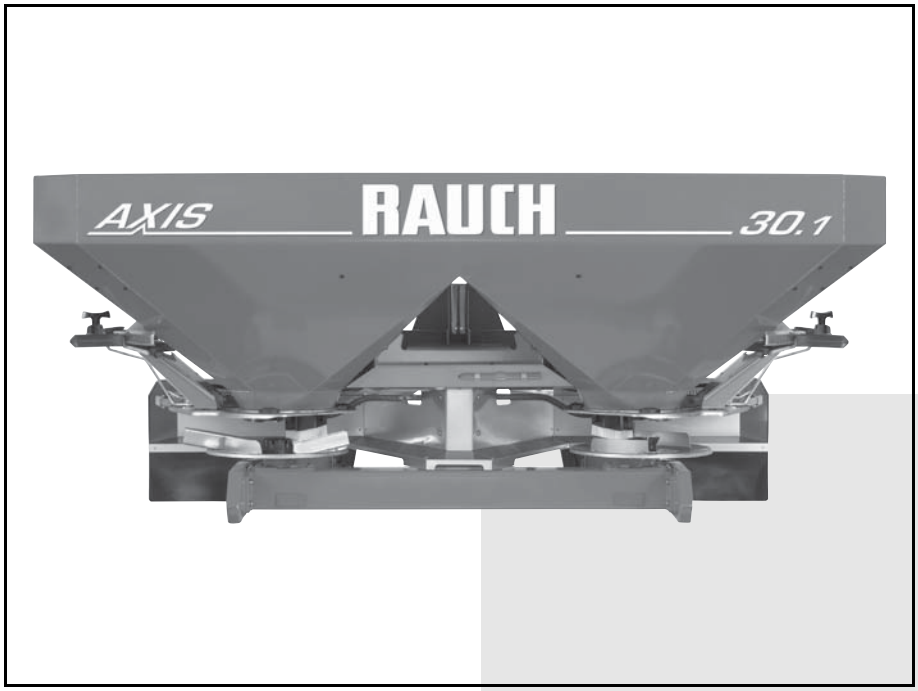
RAUCH
wir nehmen's genau

INSTRUCTION MANUAL



Please read carefully before using the machine.

Keep for future reference.

This instruction manual/assembly instruction is to be considered as part of the machine. Suppliers of new and second-hand machines are required to document in writing that the instruction manual/assembly instruction was delivered with the machine and handed over to the customer.

AXIS 20.1/30.1/40.1/50.1

Original instruction manual

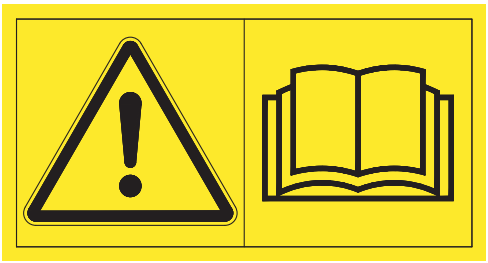
5900656-**d**-en-0413

Preface

Dear customer,

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

Our customer service is always at your disposal Our customer service is always there for you.



Please read this instruction manual carefully before commissioning the mineral fertiliser spreader and follow the advice given.

This instruction manual gives detailed instructions on how to operate the machine, as well as valuable information on assembly, maintenance, and care.

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

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

⚠ CAUTION

We kindly ask you to enter the type and serial number as well as the year of construction of your mineral fertiliser spreader here.

These data are provided on the machine nameplate or on the frame.

Please state this information when ordering spare parts or accessories, and in case of complaints.

Type:	Serial number:	Year of manufacture:

Technical improvements

We are continuously improving our products. Therefore, we reserve the right to make any improvements and changes to our machine that we consider necessary without notice. This constitutes no 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

The chapter **AXIS-General** deals with general instructions regarding the operation of the entire AXIS model range. Please read this chapter carefully and follow the advice given before taking the mineral fertiliser spreader into service.

In particular, the chapter **Safety** contains general safety instructions as well as occupational and traffic safety regulations associated with the handling and operation of the mineral fertiliser spreader AXIS. The consideration of and adherence to the instructions in this chapter is **the basic requirement for the safe handling** and trouble-free operation of the mineral fertiliser spreader.

At the end of the instruction manual, you will find the chapters dealing with disposal of the product and terms/conditions of warranty for all models.

AXIS

The section **AXIS 20.1** contains specific information on the mineral fertiliser spreaders **AXIS 20.1, AXIS-M 20.1 EMC**, **AXIS 20.1 W** and **AXIS-M 20.1 EMC + W**.

AXIS 20.1

The section **AXIS 30.1/AXIS 40.1** contains specific information on the mineral fertiliser spreaders **AXIS 30.1, AXIS 40.1, AXIS-M 30.1 EMC**, **AXIS-M 40.1 EMC**, **AXIS 30.1 W, AXIS 40.1 W**, **AXIS-M 30.1 EMC + W**, **AXIS-M 40.1 EMC + W**

AXIS 30.1, AXIS 40.1

The section **AXIS 50.1** contains specific information on the mineral fertiliser spreaders **AXIS 50.1** and **AXIS 50.1 W**.

AXIS 50.1

The chapter **AXIS-Maintenance** describes the general maintenance and repair work, to be executed for **all** types of the mineral fertiliser spreaders of the AXIS series.

AXIS

Preface

Navigation within the instruction manual

AXIS-General

AXIS 20.1

AXIS 30.1, AXIS 40.1

AXIS 50.1

Navigation within the instruction manual

NOTICE

All useful information on your machine can be obtained from the following tables.

- The chapter **Safety** is to be respected at all times.
- Thoroughly read all subsections for your machine type. By doing so, you can use your machine in a safe manner.
- The functional description is provided under „Description of the machine“ on page 22 and „Versions“ on page 27.

Other symbols are indicated at the margin. These symbols simplify the navigation through the entire documentation. If the letter for your machine version is greyed, the contents on the page are not relevant for your machine.

Example:

The text contents on this page are only relevant **for machines** of the versions **K, D** and **R**

Figure 1: Navigation symbols

NOTICE

Designation of the machine with the M EMC function

The designation EMC and/or EMC + W refers to the machines **AXIS-M 20.1 EMC (+ W)** and/or **AXIS-M 30.1/40.1 EMC (+ W)**.

The component designation **"-M"** (abbreviation for mechanical drive) does **not** appear in the instruction manual. This makes the machine designations, e.g. in headlines, clearer.

AXIS 20.1						
	Chapter 1 to chapter 7	Chapter 8 General commissioning	Chapter AXIS 20.1	Chapter 9 General maintenance	Chapter 10 Disposal	Chapter 11 Warranty
K	●	●	● Sub-chapter A.1 ● Sub-chapter A.2.1 ● Sub-chapter A.3 ● Sub-chapter B.1 to B.3 ● Sub-chapter B.4.2 ● Sub-chapter B.5 to B.9 ● Sub-chapter C.1 ● Sub-chapter C.4 ● Sub-chapter C.5	●	●	●
D	●	●	● Sub-chapter A.1 ● Sub-chapter A.2.1 ● Sub-chapter A.3 ● Sub-chapter B.1 to B.3 ● Sub-chapter B.4.2 ● Sub-chapter B.5 to B.10 ● Sub-chapter C.1 ● Sub-chapter C.4 ● Sub-chapter C.5	●	●	●

AXIS 20.1						
	Chapter 1 to chapter 7	Chapter 8 General commissioning	Chapter AXIS 20.1	Chapter 9 General maintenance	Chapter 10 Disposal	Chapter 11 Warranty
R	●	●	● Sub-chapter A.1 ● Sub-chapter A.2.2 ● Sub-chapter A.3 ● Sub-chapter B.1 to B.3 ● Sub-chapter B.4.2 ● Sub-chapter B.5 to B.10 ● Sub-chapter C.1 ● Sub-chapter C.4 ● Sub-chapter C.5	●	●	●
C	●	●	● Sub-chapter A.1 ● Sub-chapter A.2.3 ● Sub-chapter A.3 ● Sub-chapter B.1 to B.3 ● Sub-chapter B.4.2 ● Sub-chapter B.5 to B.10 ● Sub-chapter C.1 ● Sub-chapter C.4 ● Sub-chapter C.5	●	●	●
Q	●	●	● Sub-chapter A.2.4 ● Sub-chapter A.3 ● Sub-chapter B.1 to B.3 ● Sub-chapter B.4.1 ● Sub-chapter B.5 ● Sub-chapter B.7 to B.10 ● Sub-chapter C.1 ● Sub-chapter C.4 ● Sub-chapter C.5	●	●	●

AXIS 20.1						
	Chapter 1 to chapter 7	Chapter 8 General commissioning	Chapter AXIS 20.1	Chapter 9 General maintenance	Chapter 10 Disposal	Chapter 11 Warranty
W	●	●	● Sub-chapter A.2.4 ● Sub-chapter A.3 ● Sub-chapter B.1 to B.3 ● Sub-chapter B.4.1 ● Sub-chapter B.5 ● Sub-chapter B.7 to B.10 ● Sub-chapter C.1 to C.5 ● page 120	●	●	●
EMC	●	●	● Sub-chapter A.1 ● Sub-chapter A.2.4 ● Sub-chapter A.3 ● Sub-chapter B.1 to B.3 ● Sub-chapter B.4.1 ● Sub-chapter B.5 ● Sub-chapter B.7 to B.10 ● Sub-chapter C.1 ● Sub-chapter C.4 to C.5	●	●	●
EMC + W	●	●	● Sub-chapter A.1 ● Sub-chapter A.2.4 ● Sub-chapter A.3 ● Sub-chapter B.1 to B.3 ● Sub-chapter B.4.1 ● Sub-chapter B.5 ● Sub-chapter B.7 to B.10 ● Sub-chapter C.1 to C.5 ● page 120	●	●	●

AXIS 30.1, AXIS 40.1						
	Chapter 1 to chapter 7	Chapter 8 General commissioning	Chapter AXIS 30.1, AXIS 40.1	Chapter 9 General maintenance	Chapter 10 Disposal	Chapter 11 Warranty
K	●	●	● Sub-chapter A.1.1 ● Sub-chapter A.2 ● Sub-chapter B.1 to B.3 ● Sub-chapter B.4.2 ● Sub-chapter B.5 to B.10 ● Sub-chapter C.1 ● Sub-chapter C.2 ● Sub-chapter C.5 ● Sub-chapter C.6	●	●	●
D	●	●	● Sub-chapter A.1.1 ● Sub-chapter A.2 ● Sub-chapter B.1 to B.3 ● Sub-chapter B.4.2 ● Sub-chapter B.5 to B.10 ● Sub-chapter C.1 ● Sub-chapter C.2 ● Sub-chapter C.5 ● Sub-chapter C.6	●	●	●

AXIS 30.1, AXIS 40.1						
	Chapter 1 to chapter 7	Chapter 8 General commissioning	Chapter AXIS 30.1, AXIS 40.1	Chapter 9 General maintenance	Chapter 10 Disposal	Chapter 11 Warranty
R	●	●	● Sub-chapter A.1.2 ● Sub-chapter A.2 ● Sub-chapter B.1 to B.3 ● Sub-chapter B.4.2 ● Sub-chapter B.5 to B.10 ● Sub-chapter C.1 ● Sub-chapter C.2 ● Sub-chapter C.5 ● Sub-chapter C.6	●	●	●
C	●	●	● Sub-chapter A.1.4 ● Sub-chapter A.2 ● Sub-chapter B.1 to B.3 ● Sub-chapter B.4.2 ● Sub-chapter B.5 to B.10 ● Sub-chapter C.1 ● Sub-chapter C.2 ● Sub-chapter C.5 ● Sub-chapter C.6	●	●	●

AXIS 30.1, AXIS 40.1						
	Chapter 1 to chapter 7	Chapter 8 General commissioning	Chapter AXIS 30.1, AXIS 40.1	Chapter 9 General maintenance	Chapter 10 Disposal	Chapter 11 Warranty
Q	●	●	● Sub-chapter A.1.3 ● Sub-chapter A.2 ● Sub-chapter B.1 to B.3 ● Sub-chapter B.4.1 ● Sub-chapter B.5 ● Sub-chapter B.7 to B.10 ● Sub-chapter C.1 ● Sub-chapter C.2 ● Sub-chapter C.5 ● Sub-chapter C.6	●	●	●
W	●	●	● Sub-chapter A.1.3 ● Sub-chapter A.2 ● Sub-chapter B.1 to B.3 ● Sub-chapter B.4.1 ● Sub-chapter B.5 ● Sub-chapter B.7 to B.10 ● Sub-chapter C.1 to C.6 ● page 154	●	●	●

AXIS 30.1, AXIS 40.1						
	Chapter 1 to chapter 7	Chapter 8 General commissioning	Chapter AXIS 30.1, AXIS 40.1	Chapter 9 General maintenance	Chapter 10 Disposal	Chapter 11 Warranty
EMC	●	●	● Sub-chapter A.1.3 ● Sub-chapter A.2 ● Sub-chapter B.1 to B.3 ● Sub-chapter B.4.1 ● Sub-chapter B.5 ● Sub-chapter B.7 to B.10 ● Sub-chapter C.1 ● Sub-chapter C.2 ● Sub-chapter C.5 ● Sub-chapter C.6	●	●	●
EMC + W	●	●	● Sub-chapter A.1.3 ● Sub-chapter A.2 ● Sub-chapter B.1 to B.3 ● Sub-chapter B.4.1 ● Sub-chapter B.5 ● Sub-chapter B.7 to B.10 ● Sub-chapter C.1 to C.6 ● page 154	●	●	●

AXIS 50.1						
	Chapter 1 to chapter 7	Chapter 8 General commissioning	Chapter AXIS 50.1	Chapter 9 General maintenance	Chapter 10 Disposal	Chapter 11 Warranty
D	●	●	● Sub-chapter A.1.1 ● Sub-chapter A.2 ● Sub-chapter B.1 to B.3 ● Sub-chapter B.4.2 ● Sub-chapter B.5 to B.9 ● Sub-chapter C.1 ● Sub-chapter C.2 ● Sub-chapter C.5, pages 184, 186 ● Sub-chapter C.6.1, C.6.2 ● Sub-chapter C.6.3, C.6.4	●	●	●
C	●	●	● Sub-chapter A.1.3 ● Sub-chapter A.2 ● Sub-chapter B.1 to B.3 ● Sub-chapter B.4.2 ● Sub-chapter B.5 to B.9 ● Sub-chapter C.1 ● Sub-chapter C.2 ● Sub-chapter C.5, pages 184, 186 ● Sub-chapter C.6.1, C.6.2 ● Sub-chapter C.6.3, C.6.4	●	●	●

AXIS 50.1						
	Chapter 1 to chapter 7	Chapter 8 General commissioning	Chapter AXIS 50.1	Chapter 9 General maintenance	Chapter 10 Disposal	Chapter 11 Warranty
W	●	●	● Sub-chapter A.1.2 ● Sub-chapter A.2 ● Sub-chapter B.1 to B.3 ● Sub-chapter B.4.1 ● Sub-chapter B.5 ● Sub-chapter B.7 to B.9 ● Sub-chapter C.1 to C.4 ● Sub-chapter C.5, pages 184, 185 ● Sub-chapter C.6.1, C.6.2 ● Sub-chapter C.6.5, C.6.6 ● Sub-chapter D	●	●	●

1 Intended use and declaration of conformity

1.1 Intended use

The mineral fertiliser spreaders of the AXIS series may only be used in accordance with the stipulations of the present instruction manual.

The mineral fertiliser spreaders of the AXIS series are constructed in accordance with their intended use and may be exclusively used for the points listed below:

- for conventional agricultural use
- for the application of dry, granular and crystalline fertilisers, seeds and slug pellets

Any use beyond these specifications is considered as contrary to the intended use. The manufacturer is not liable for any damage which results from misuse. The operator bears the entire risk.

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

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

The instructions regarding the operation, service and safe handling of the machine as described in this manual and declared by the manufacturer in the form of warning signs and symbols on the machine must be strictly followed during operation.

Moreover, the relevant accident prevention regulations and the other generally recognised safety, occupational health, and road traffic regulations must be strictly observed when using the machine.

Any unauthorized modifications to the mineral fertiliser spreader of the AXIS series are inadmissible. Such modifications will exempt the manufacturer from liability for any damage resulting therefrom.

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

Foreseeable misuse

With the warning notes and pictorial warnings attached to the mineral fertiliser spreader of the AXIS series, the manufacturer points out foreseeable misuse. These warning notes and pictorial warnings are to be respected in any case in order to avoid using the mineral fertiliser spreader of the AXIS series in a way that contradicts the intentions of the instruction manual.

1.2 EC declaration of conformity

In accordance with 2006/42/EC, Appendix II, No. 1.A

Rauch - Landmaschinenfabrik GmbH,
Landstrasse 14, 76547 Sinzheim, Germany

We hereby declare that the product:

Mineral fertiliser spreader AXIS series
Type: AXIS 20.1, AXIS 30.1, AXIS 40.1, AXIS 50.1

complies with all relevant regulations of the EC Machine Directive 2006/42/EC.

Technical documents compiled by:
Rauch - Design Management
Landstrasse 14, 76547 Sinzheim, Germany

Norbert Rauch

(Norbert Rauch – Managing Director)

2 User instructions

2.1 About this instruction manual

The present instruction manual is an **integral part** of the machine of the AXIS series.

The instruction manual contains important information for a **safe**, **appropriate** and economic **use** and **maintenance** of the machine. Adherence to this instruction manual helps to **avoid risks**, to reduce repair costs and downtime, and to increase the machine's reliability and service life.

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

If the machine is sold, the instruction manual must also be passed to the new owner.

The manual is intended for the operator of the machine of the AXIS series and anyone involved in operating and maintaining it. It must be read, understood, and applied by all persons entrusted with the following work on the machine:

- Operation,
- Maintenance and cleaning,
- Repairing faults.

The following points are particularly important:

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

The instruction manual **does not substitute** your **own responsibility** as operator and operating staff of the machine of the AXIS series.

2.2 Structure of the manual

The instruction manual is divided into six key areas in terms of content:

- General information
- Safety instructions
- Machine data
- Instructions on the operation of the machine,
- Instructions for detecting and remedying faults, and
- Maintenance and repair instructions.

2.3 Notes on text descriptions

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 involving only 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 Listings

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

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

2.3.3 Cross-references

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

- See also Chapter 3: Safety, page 5.

References to other documents are made without mentioning the exact chapter or page number:

- Please also observe the instructions contained in the manual for the universal drive shaft.

3 Safety

3.1 General Information

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

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

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

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

3.2 Significance of warnings

The warning instructions in this manual have been structured according to the degree of danger and the probability of their occurrence.

Danger signs and symbols inform the user about other construction-related and unavoidable residual risks that may be encountered when operating the machine. The warning notes used are structured as follows:

	Signal word
Symbol	Explanation

Example

⚠ DANGER
Risk to life if warning is not observed Description of the danger and possible consequences. Ignoring these warnings will result in very serious or even fatal injury. ▶ Measures to prevent the danger.

Warning severity level

The degree of danger is indicated by the signal word. and the levels are classified as follows:

⚠ DANGER

Type and source of danger

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

Ignoring these warnings will result in very serious or even fatal injury.

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

⚠ WARNING

Type and source of danger

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

Ignoring these warnings will result in very serious injury.

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

⚠ CAUTION

Type and source of danger

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

Ignoring this warning can result in injuries and damage to the product or the general area.

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

NOTICE

General information containing application tips and particularly useful information, but which constitutes neither warnings nor hazards.

3.3 General information on the safety of the machine

The machine of the AXIS series is designed and manufactured according to the state-of-the-art and the generally accepted rules of engineering. Nevertheless, operation and maintenance of the machine may pose a risk to life and limb of the operator or other persons, as well as causing damage to the machine or other assets in the surrounding area.

For this reason, the machine of the AXIS series may only be operated

- when it is in a proper and roadworthy condition,
- in awareness of safety and dangers.

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

3.4 Instructions for the operator

It is the operator's responsibility that the machine is used as intended.

3.4.1 Personnel qualifications

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

- The machine may only be operated by trained personnel authorised by the owner.
- Members of staff who are still in training or subject to coaching/instructions may only work on the machine when an experienced person is present.
- Maintenance and repair work may only be carried out by qualified staff.

3.4.2 Instruction

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

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

3.4.3 Accident prevention

Safety and accident prevention regulations are governed by law in every country. The machine owner is responsible for ensuring compliance with the legal regulations in force in each country.

The following instructions must also be observed:

- Never let the machine run without supervision.
- Do not ride on the machine while it is working or being transported (**no passengers**).
- Machine parts of the machine must not be used as boarding aid.
- Always wear tight fitting clothes. Do not wear work clothes with belts, loose threads or other items that could snag.
- When handling chemicals, please refer to the warning notes of their respective manufacturer. It may be necessary to wear personal protective equipment.

3.5 Information on operating safety

To avoid dangerous situations only use the machine in a reliable condition.

3.5.1 Parking the machine

- Only park the machine with the hopper empty and on horizontal, solid ground.
- If the machine is parked solely (without tractor), open the metering slides completely. The return springs of the single-acting slide actuation are released.

3.5.2 Filling the machine

- Only fill the machine when the motor of the tractor is stopped. Remove the ignition key in order to ensure that the motor cannot be started.
- Use suitable auxiliary equipment for filling the machine (e.g. front-end loader, feed screw conveyor).
- Fill the machine no higher than the top-edge. Check the fill level, e.g. through the viewing window in the hopper (depending on the model).
- Only fill the machine with the protective grid closed. This way, faults during spreading caused by lumps in the spreading material or other foreign bodies are prevented.

3.5.3 Checks before start-up

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

- Are all safety device at the machine installed and functioning?
- Are all fasteners and load-bearing connections tight and in good condition?
- Are the spreading disks and their fixings in good condition?
- Are the protective grids in the hopper closed and locked?
- Is the test dimension of the protective grid lock within the proper range? See figure 9.3 on page 204.
- Is the hazard zone of the machine **clear** of persons?
- Is the drive shaft cover in good condition?

3.5.4 Operation

- If the machine malfunctions, stop the machine immediately and secure it. Have the fault repaired immediately by qualified technicians.
- Never climb onto the machine while the spreader unit is running.
- Only operate the machine 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. For this reason, ensure that you avoid any contact between body parts or clothes and rotating components.
- Do not deposit any parts (such as screws, nuts) into the spreader hopper.
- Flying spreader material may cause serious injury (e.g. to the eyes). For this reason, ensure that nobody is present in the spreading range of the machine.
- If the wind speed is too high, you must stop spreading because the specified spreading range cannot be guaranteed under such conditions.
- Never climb onto the machine or the tractor when it is situated beneath high-voltage electrical power lines.

3.6 Use of the fertiliser

An inappropriate selection or usage of the fertiliser may lead to severe personal injury or environmental damages.

- When selecting the fertiliser, inform yourself about its effects on persons, the environment, and the machine.
- Please follow the instructions 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:

- Always operate the machine below the permissible maximum operating pressure.
- Depressurise the hydraulic system **before** any **maintenance work**. Stop the motor of the tractor and secure it against being switched on again.
- When looking for leaks, wear **protective glasses** and **protective gloves at all times**.
- In the case of injury in connection with hydraulic oil, **consult a physician immediately** as severe infections may occur otherwise.
- When connecting the hydraulic hoses to the tractor, ensure that the hydraulic system is **depressurised,** both on the tractor and the spreader side.
- Attach the hydraulic hoses of the tractor and the spreader hydraulic systems to the prescribed connections.
- Prevent any contamination of the hydraulic circuit. Only hang the couplings in the brackets provided. Use the dust caps. Clean the connections before joining them.
- Regularly check the hydraulic components and hydraulic hose lines for mechanical defects, e.g. cuts and abrasions, contusions, bends, tears, porosity etc.
- Even when stored correctly and used under approved loads, hoses and hose couplings are subject to a natural ageing process. This limits their storage and service life.

The service life of the hose lines may not exceed 6 years, including a possible storage time of maximally 2 years.

The date of manufacture of the hoses is stamped on the hose coupling in month and year

- Replace hydraulic hoses if damaged or aged.
- Replacement hydraulic hoses must meet the technical requirements of the equipment manufacturer. In particular, note the different maximum pressure ratings of replacement hoses.

3.8 Maintenance and service

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

- Any maintenance and service work is to be conducted with increased alertness at all times. Work particularly thoroughly and cautiously.

3.8.1 Qualifications of maintenance personnel

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

3.8.2 Wear parts

- The maintenance and repair intervals described in the present instruction manual are to be strictly adhered to at all times.
- Furthermore, the maintenance and repair intervals of the supplier components must also be complied with. See the supplier documentation for the relevant intervals.
- We recommend that you have the condition of the machine checked after each season by your specialist dealer, paying particular attention to its fixing components, safety-relevant plastic components, hydraulic system, metering parts and spreader vanes.
- Spare parts must at least comply with the technical standards specified by the manufacturer. The technical standards can be guaranteed by using genuine spare parts, for example.
- Self-locking nuts are designed to be used only once. Always use new self-locking nuts to fasten components (e.g. when replacing spreading vanes).

3.8.3 Maintenance and repair work

- Always switch off the tractor engine before all cleaning, maintenance and repair work and when troubleshooting. Wait until all rotating parts of the machine have come to a standstill.
- Make sure that **no unauthorised person** can start the universal box spreader. Remove the ignition key of the tractor.
- Before any maintenance and repair work, separate the current supply between tractor and machine.
- Check that the tractor with the machine is correctly parked. Park the spreader with an empty hopper on level, solid ground and secure it to prevent it from moving.
- Before carrying out any maintenance and repair work, depressurise the hydraulic system.
- Disconnect the power supply before working on the electrical system.
- If you must work while the PTO shaft is rotating, make sure that nobody is near the PTO or the universal drive shaft.

- Never remove any clogging in the spreader hopper with your hand or foot, but use suitable tools for this purpose. In order to avoid clogging, only fill the hopper when the protective grid is mounted.
- Before cleaning the machine with water, steam or other cleaning agents, cover all components that must not get wet (e.g. bearings, electrical connections).
- Regularly check nuts and screws for their tight seat. Retighten loose connections.

3.9 Safety in traffic

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

3.9.1 Checks before driving

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

- Is the permissible total weight complied with? Note the permitted axle load, the permitted braking load, and the permitted tyre load capacity; see also „Axle load calculation“ on page 37.
- Is the machine attached appropriately?
- Could fertiliser be lost while travelling?
  - Check the fill level of the fertiliser in the hopper.
  - The metering slides must be closed.
  - The ball valves must also be closed on single-acting hydraulic cylinders.
  - Switch off the electronic control unit.
- Check the tyre pressures and the function of the tractor brake system.
- Does the lighting and marking of the machine comply with the regulations of your country with respect to driving on public roads? Make sure to make the fittings according to the regulations.

3.9.2 Transportation drive with the machine

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

- Be aware of the changed driving behaviour.
- When driving, always ensure that there is sufficient visibility. If vision is restricted (e.g. when reversing), another person is required to direct the driver.
- Observe the permissible maximum speed.
- Avoid sudden turns when driving uphill or downhill or across a slope. Due to the changed centre of gravity, there is a danger of overturning. Special care is to be applied when driving on uneven, soft ground (e.g. when entering fields, kerbs) as well.
- Arrest sideways movement of the lower link of the three-point linkage to prevent the machine from swinging.
- Passengers are prohibited on the machine during the drive and operation.

AXIS

3.10 Protective equipment on the machine

3.10.1 Position of safety equipment

AXIS 20.1/30.1/40.1

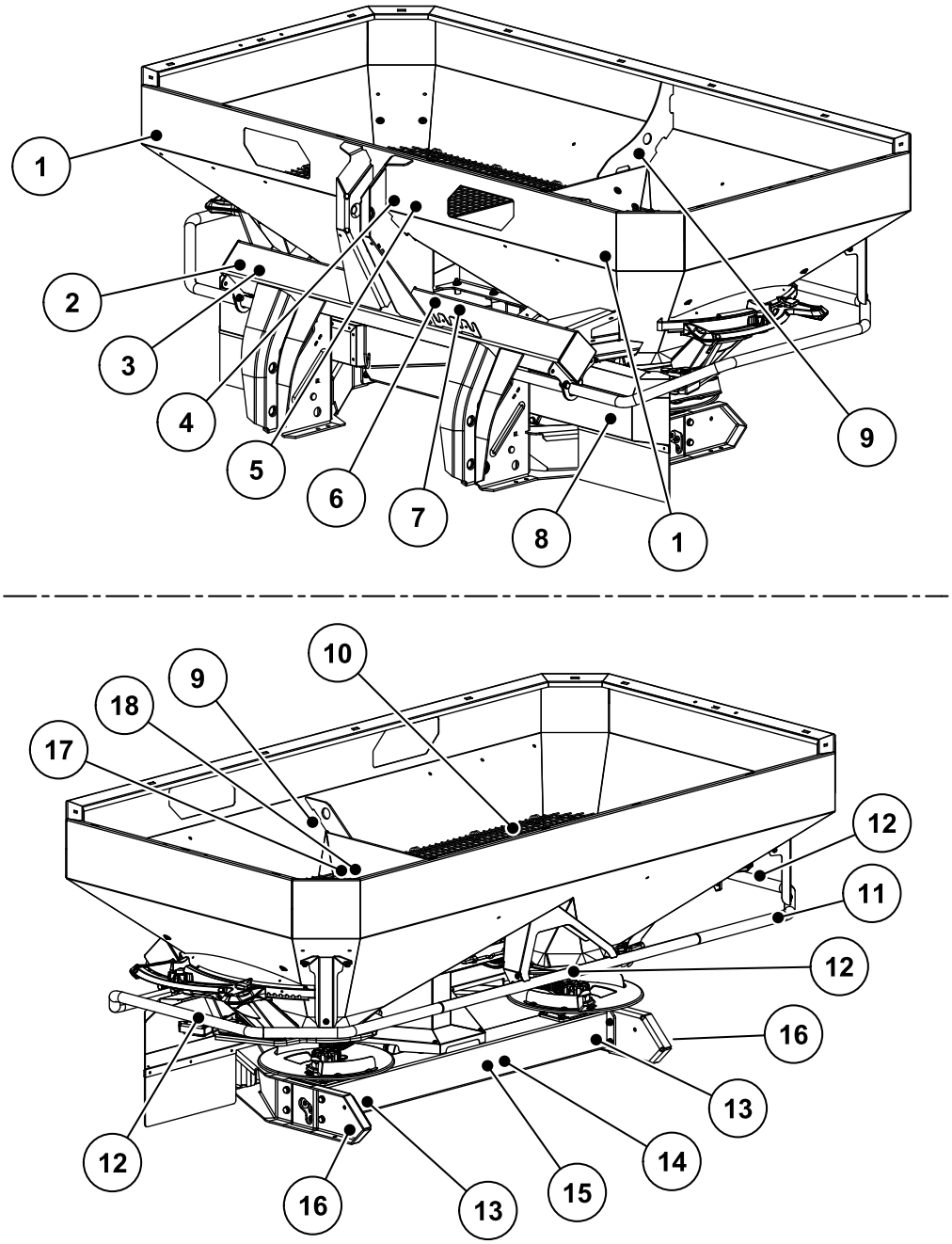


Figure 3.1: Position of protective devices, warning and instruction notices, and reflectors

[1] White reflectors in front
[2] Nameplate
[3] Serial number
[4] Warning: read instruction manual
[5] Material broadcast warning
[6] Instructions: maximum payload
[7] Instructions: PTO speed
[8] Spreading disc cover
[9] Instructions: ring eyelet in hopper
[10] Protective grid in hopper
[11] Deflector bracket
[12] Instructions: no climbing
[13] Red reflector
[14] Warning, remove ignition key
[15] Moving parts warning
[16] Yellow side reflector
[17] Protective grid lock
[18] Instructions: protective grid lock

AXIS

AXIS 50.1

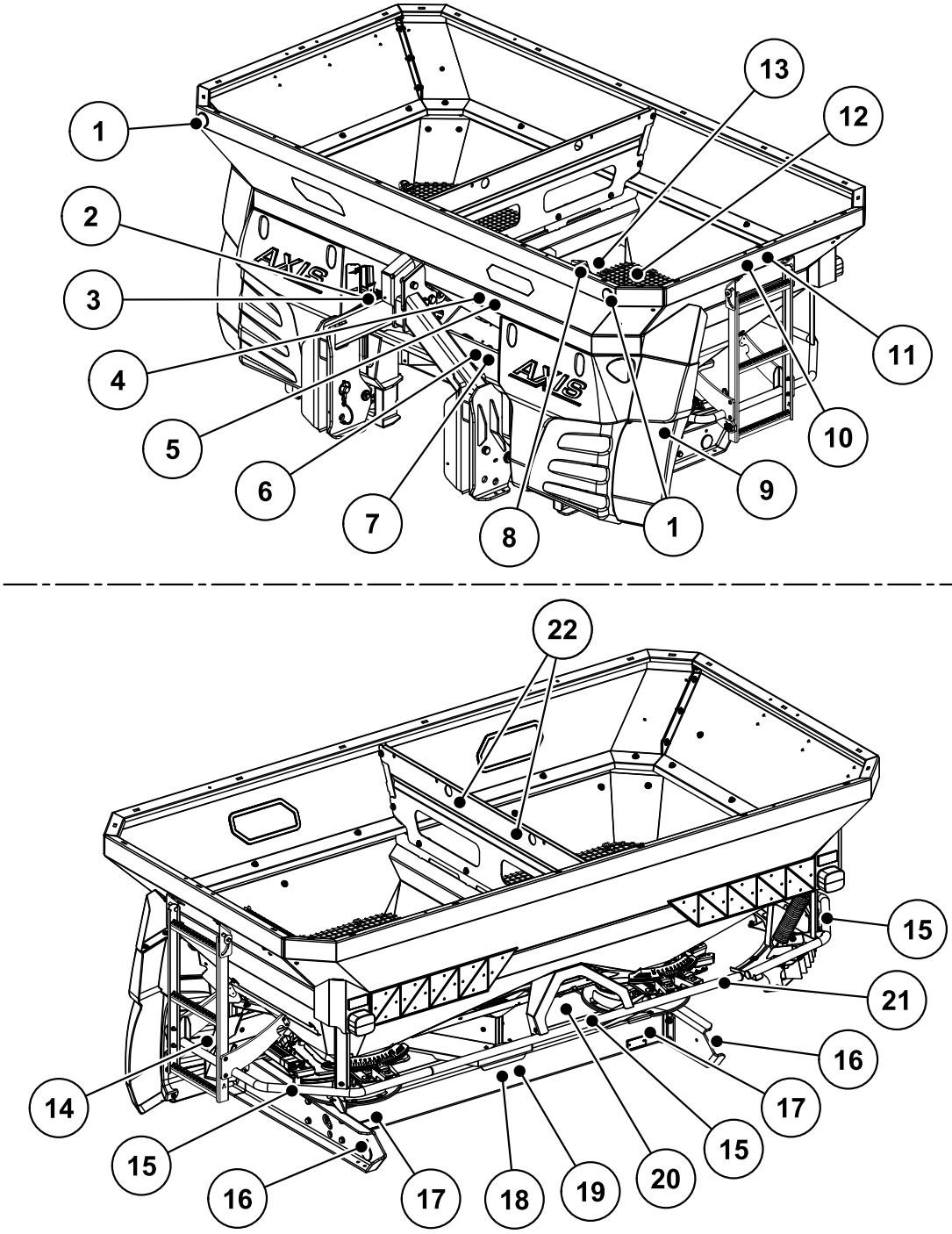
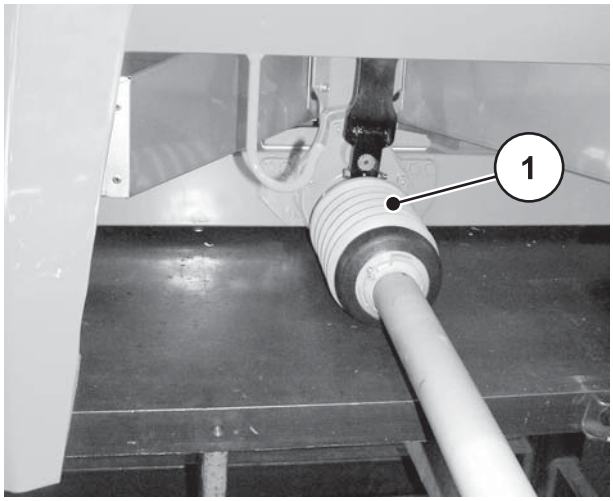


Figure 3.2: Position of protective devices, warning and instruction notices, and reflectors

[1] White reflectors in front
[2] Nameplate
[3] Serial number
[4] Warning: read instruction manual
[5] Material broadcast warning
[6] Instructions: maximum payload
[7] Instructions: PTO speed
[8] Protective grid lock
[9] Spreading disc cover
[10] Instructions: steps
[11] Warning: passenger transport prohibited
[12] Protective grid in hopper
[13] Instructions: protective grid lock
[14] Spreading disc cover
[15] Instructions: no climbing
[16] Yellow side reflector
[17] Red reflector
[18] Moving parts warning
[19] Warning, remove ignition key
[20] Gear protective cover
[21] Deflector bracket
[22] Instructions: ring eyelet in hopper



[1] Universal drive shaft guard

Figure 3.3: Drive shaft

3.10.2 Function of protective devices

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

- Before working with the machine, ensure that the protective equipment is functioning.
- Only operate the machine when the safety equipment is functional.
- Do not use the deflector bracket to climb up on the machine. It is not designed for this. There is a risk of falling.

Description	Function
Protective grid in hopper	Prevents body parts from being caught by the rotating agitator. Prevents body parts from being cut off by the metering slider. Prevents faults during spreading caused by lumps in the spreading material, large stones or other large objects (screening effect).
Protective grid lock	Prevents the inadvertent opening of the protective grid in the hopper. Engages mechanically if protective grid is closed properly. Can only be opened by using a tool.
Deflector bracket	Protection against getting caught by the rotating spreading discs from behind and from the side.
Spreading disc cover	Protection against getting caught by the rotating discs from the front. Prevents the fertiliser from being ejected towards the front (in the direction of the tractor/workstation).

Description	Function
Universal drive shaft guard	Prevents body parts and clothing from being pulled into the rotating drive shaft.
Toothed segment protective cover	**Only with AXIS 50.1:** prevents body parts from getting crushed by moving parts.

3.11 Warning and instruction stickers

Various warning and instruction notes are attached to the machine of the AXIS series (for the position at the machine, please refer to figure 3.1 and figure 3.2).

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

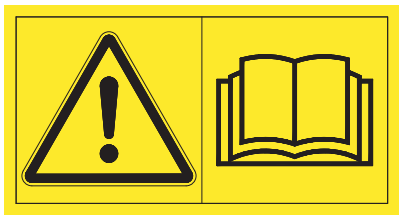
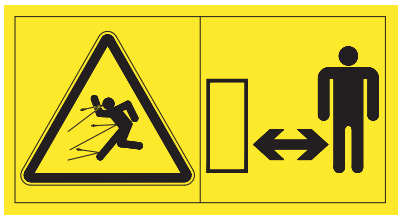
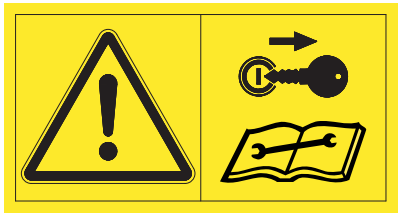
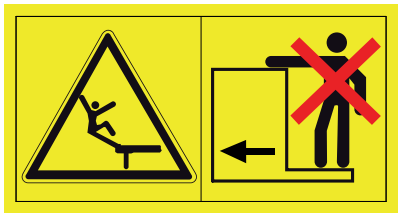
If new components are installed during repairs, the same warning and instruction stickers that were on the original parts must be placed on the new parts.

NOTICE

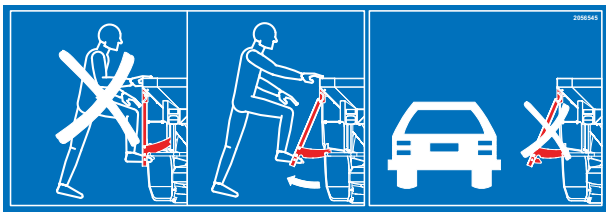
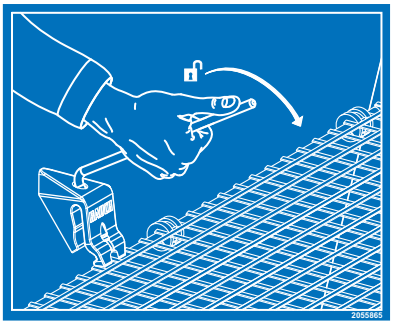
The correct warning and instruction notices can be obtained from the spare parts service.

AXIS

3.11.1 Warning stickers

	Read the instruction manual and warning messages. Read and observe the instruction manual and warning messages before putting the machine into operation. The instruction manual explains in detail how to operate the spreader and contains valuable information on operation, care and maintenance.
	Danger due to ejection of material Risk of injury to the entire body due to rapidly ejected spreading material. Before commissioning, instruct all people to leave the hazard zone (spreading range) of the machine.
	Danger due to moving parts Risk of body parts being cut off It is prohibited to reach into the danger area of the rotating spreading discs, the agitator or the drive shaft. Switch off the tractor's engine and remove the key before carrying out repair and adjustment work.
	Remove the ignition key. Before carrying out any repair and maintenance work, shut off the engine and remove the ignition key. Disconnect the power supply
	Riding prohibited Risk of slipping and injury. Do not climb on the steps of the machine during spreading and transport.

3.11.2 Instruction stickers and nameplate

	**For AXIS 30.1, AXIS 40.1, AXIS 50.1**: steps Climbing on the retracted steps is prohibited. Only climb on the steps when they are extended. Only travel on the road with the steps retracted.
	Ring eyelet on the hopper Bracket for fixing the hoisting gear
	Climbing prohibited Climbing on the deflector bracket is prohibited.
	Protective grid lock The grid is automatically locked when the protective grid in the hopper is closed properly. It can only be unlocked by using a tool.
	Rated speed of the PTO shaft The rated speed of the PTO shaft is 540 rpm.

	Rated speed of the PTO shaft (optional equipment, transmission with 750 rpm) The rated speed of the PTO shaft is 750 rpm.
	Maximum payload (depending on model)
	
	
	Nameplate
	Serial number

3.12 Reflector

The machine of the AXIS series is factory-fitted with passive front, back and side lighting (for an illustration of the positioning on the machine, see chapter figure 3.1 and figure 3.2).

AXIS

4 Technical data

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 Customer Service
RAUCH Landmaschinenfabrik GmbH
P.O. Box 1162
D-76545 Sinzheim
Telephone: +49 (0) 7221 / 985-250
Fax: +49 (0) 7221 / 985-203

4.2 Description of the machine

Use the machines of the AXIS series in accordance with the chapter „Intended use“ on page 1.

The machine consists of the following assemblies.

- 2-chamber hopper with agitators and discharges
- Frame and coupling points
- Drive elements (drive shaft and transmission)
- Metering elements (agitator, metering slide, scale for the spreading volume)
- Elements for adjusting the working width
- Protective equipment; see „Protective equipment on the machine“ on page 14.

4.2.1 Assembly overview AXIS 20.1, AXIS 30.1, AXIS 40.1

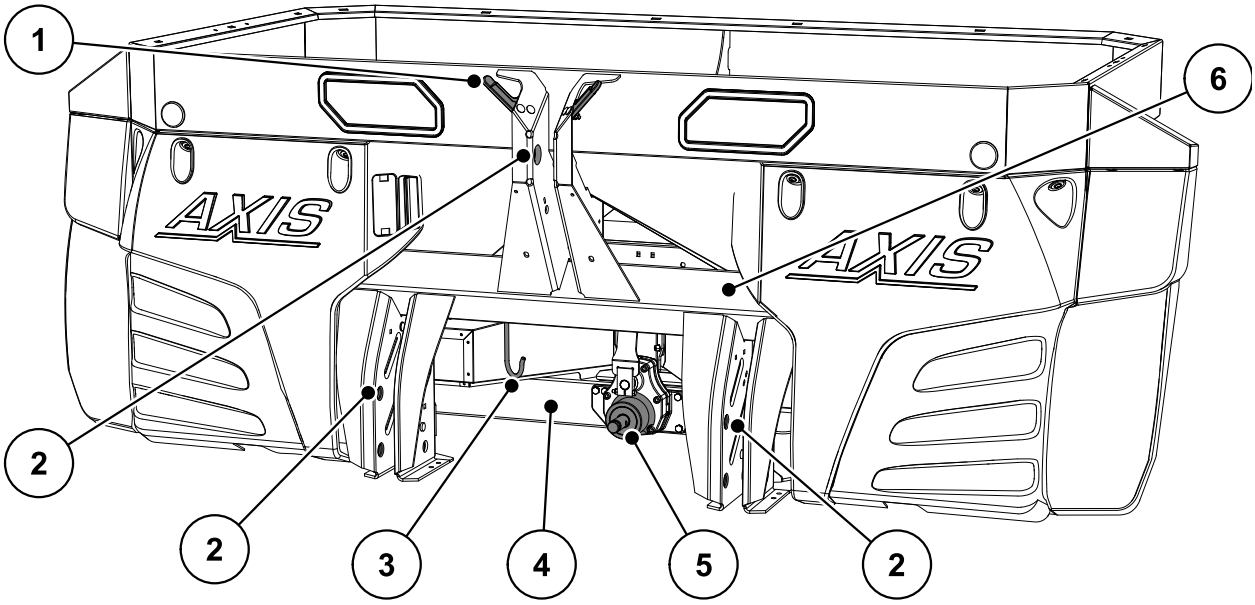


Figure 4.1: Assembly overview: Example AXIS 30.1, - Front

[1] Hose and cable tray
[2] Coupling points
[3] Drive shaft mounting bracket
[4] Transmission
[5] Transmission spigot
[6] Frame

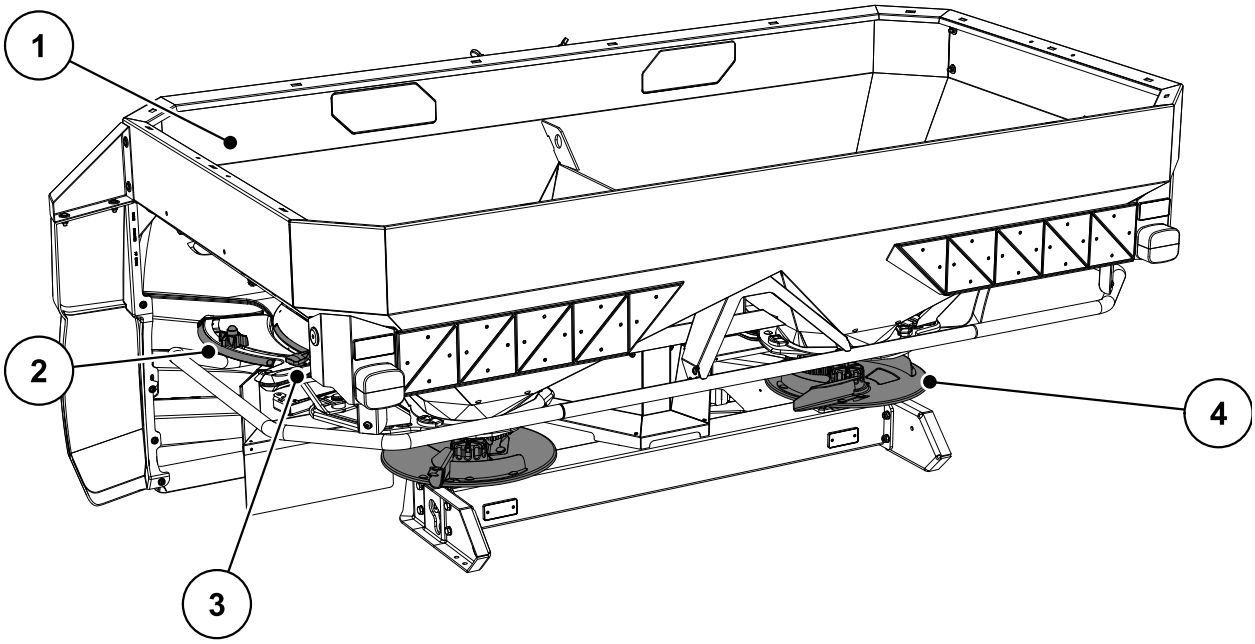


Figure 4.2: Assembly overview: Example AXIS 30.1 - Rear

[1] Hopper (inspection window, filling level scale)
[2] Scale for the spreading volume (left/right)
[3] Drop point adjustment centre (left/right)
[4] Spreading disc (left/right)

4.2.2 Assembly overview AXIS 50.1

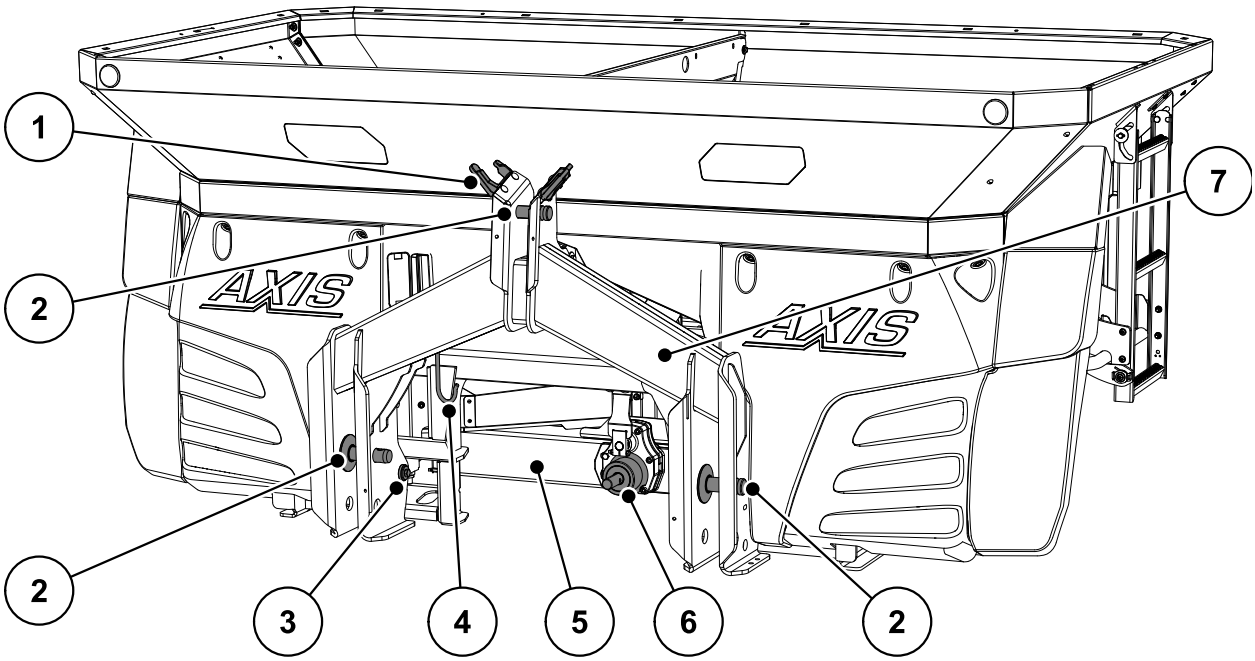


Figure 4.3: Assembly overview AXIS 50.1 - Front

[1] Hose and cable bracket
[2] Coupling points
[3] Weigh cells
[4] Drive shaft bracket
[5] Transmission
[6] Transmission spigot
[7] Weighing frame

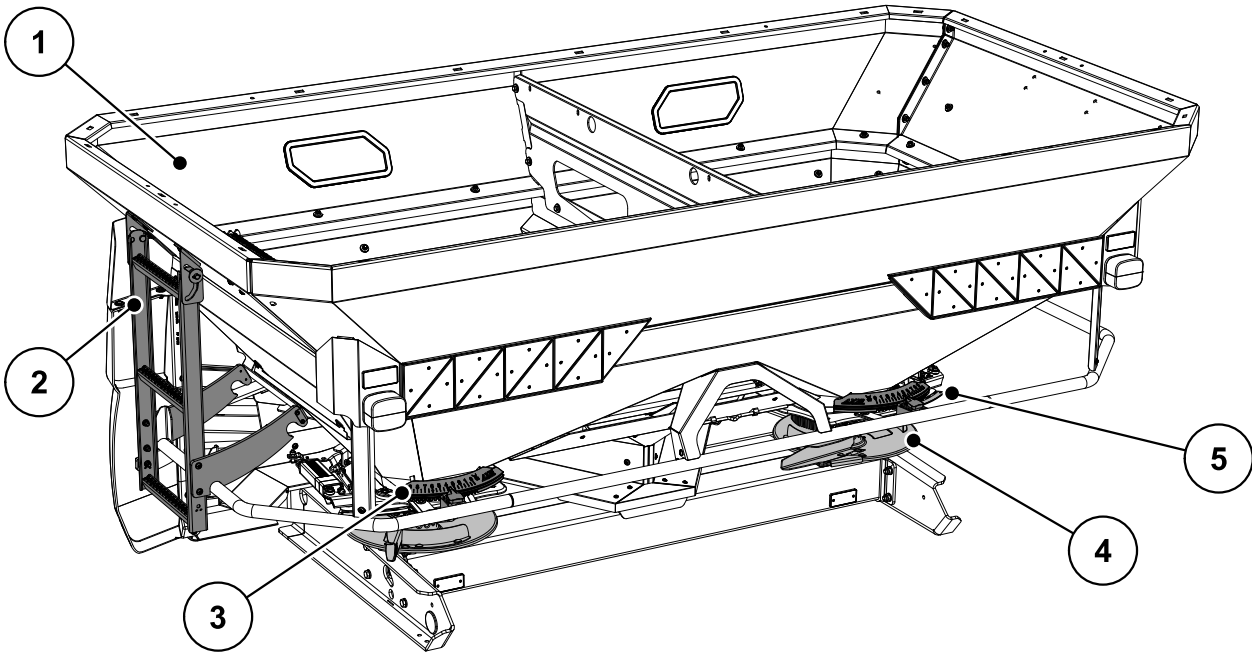


Figure 4.4: Assembly overview AXIS 50.1 - Rear

[1] Hopper (inspection window, filling level scale)
[2] Steps

[1] Drop point adjustment centre (left/right)
[2] Spreading disc (left/right)
[3] Scale for the spreading volume (left/right)

4.2.3 Transmission for the M EMC function

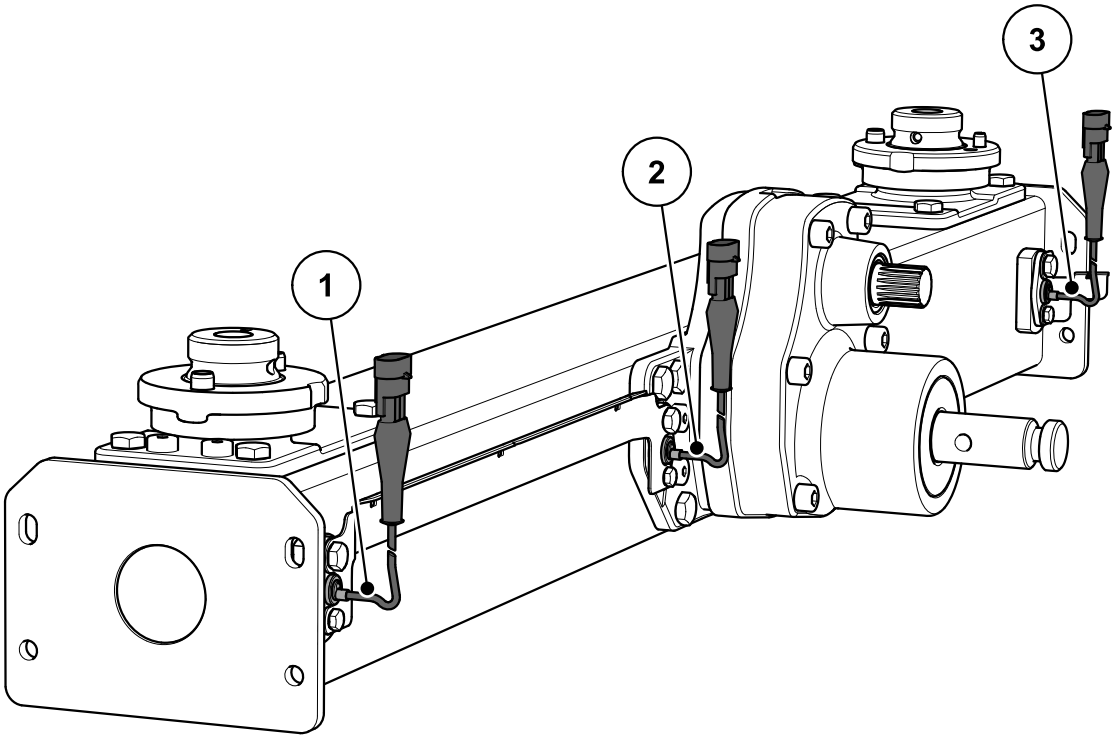


Figure 4.5: Mass flow control by measuring the torque of the spreading discs: AXIS-M 20.1/30.1/40.1 EMC

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

AXIS

4.2.4 Agitator

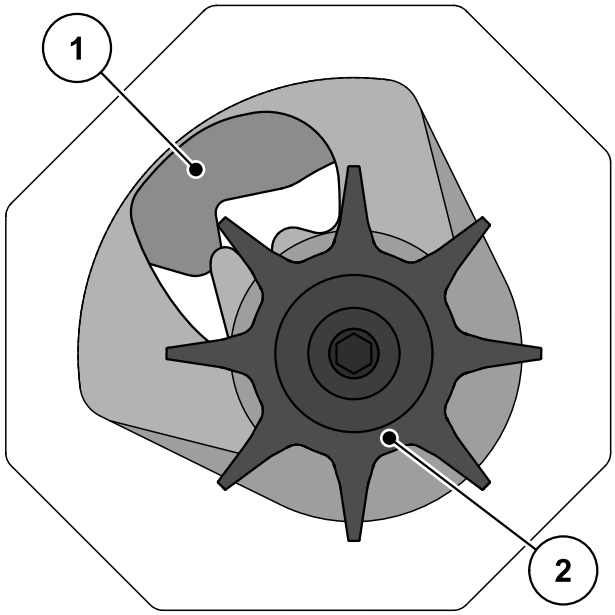


Figure 4.6: Agitator

[1] Metering slide
[2] Agitator

4.3 Machine data

4.3.1 Versions

Type	AXIS 20.1		AXIS 30.1 AXIS 40.1		AXIS 50.1
Function	Q	W	Q	W	W
Spreading depending on forward speed	●	●	●	●	●
Mass flow control by Weigh cells		●		●	●
Electrical drop point setting					●

Type	AXIS 20.1				AXIS 30.1 AXIS 40.1				AXIS 50.1	
Function	C	K	R	D	C	K	R	D	C	D
Electrically remote-controlled actuator	●				●				●	
Single-acting hydraulic cylinder		●				●				
Single-acting hydraulic cylinder with two-way unit			●				●			
Double-acting hydraulic cylinder				●				●		●

Type	AXIS 20.1 EMC AXIS 30.1 EMC AXIS 40.1 EMC	AXIS 20.1 EMC + W AXIS 30.1 EMC + W AXIS 40.1 EMC + W
Mass flow control (EMC) by measuring the torque of the spreading discs	●	●
Spreading depending on forward speed	●	●
Speed display	●	●
Weigh cells		●

4.3.2 Technical data of basic equipment

Dimensions:

Data		AXIS 20.1 AXIS 20.1 EMC	AXIS 30.1 AXIS 40.1 AXIS 30.1 EMC AXIS 40.1 EMC	AXIS 50.1
Overall width		240 cm	240 cm	290 cm
Overall length		141.5 cm	141.5 cm	161.0 cm
Filling height (basic machine)		95 cm	101 cm	125 cm
Distance between centre of gravity and lower link point		65.5cm	65.5 cm	74.5 cm
Filling width		230 cm	230 cm	270 cm
Working width[1]		12 - 28 m	12 - 42 m	18 - 50 m
PTO speed[2]	min.	450	450	450
	max.	650	650	650
Hopper capacity		1,000 l	1,200 l	2,000 l
Mass flow[3]	max.	400 kg/min	500 kg/min	500 kg/min
Hydraulic pressure	max.	200 bar	200 bar	200 bar
Sound pressure level[4] (measured in the closed driver's cabin of the tractor)		75 dB(A)	75 dB(A)	75 dB(A)

1. Working width depending on fertiliser and disc type
2. Optional equipment: transmission with 750 rpm, max. 900 rpm
3. Max. mass flow depending on fertiliser type
4. Since the sound pressure level of the machine can only be determined when the tractor is running, the actual measured value is greatly dependent on the tractor type being used.

Data		AXIS 20.1 W AXIS 20.1 EMC + W	AXIS 30.1 W AXIS 40.1 W AXIS 30.1 EMC + W AXIS 40.1 EMC + W	AXIS 50.1 W
Overall width		240 cm	240 cm	290 cm
Overall length		145 cm	145.0 cm	161.0 cm
Filling height (basic machine)		95 cm	101 cm	125 cm
Distance between centre of gravity and lower link point		72.5 cm	72.5 cm	74.5 cm
Filling width		230 cm	230 cm	270 cm
Working width[1]		12 - 28 m	12 - 42 m	18 - 50 m
PTO speed[2]	min.	450	450	450
	max.	650	650	650
Hopper capacity		1,000 l	1,200 l	2,000 l
Mass flow[3]	max.	400 kg/min	500 kg/min	500 kg/min
Hydraulic pressure	max.	200 bar	200 bar	200 bar
Sound pressure level[4] (measured in the closed driver's cabin of the tractor)		75 dB(A)	75 dB(A)	75 dB(A)

1. Working width depending on fertiliser and disc type
2. Optional equipment: transmission with 750 rpm, max. 900 rpm
3. Max. mass flow depending on fertiliser type
4. Since the sound pressure level of the machine can only be determined when the tractor is running, the actual measured value is greatly dependent on the tractor type being used.

Weights and loads:

NOTICE

The empty weight (mass) of the machine varies depending on the feature package and attachment combination. The empty weight (mass) shown on the nameplate refers to the standard version.

Data	AXIS 20.1	AXIS 20.1 W	AXIS 30.1 AXIS 40.1	AXIS 30.1 W AXIS 40.1 W	AXIS 50.1
Empty weight	295 kg	350 kg	320 kg	375 kg	680 kg
Fertiliser payload max.	2,100 kg	2,100 kg	3,000 kg		4,000 kg

4.3.3 Technical data of the extensions

For machines of the AXIS series, various extensions are available. The capacity, dimensions and weights may change depending on the selected feature package.

	AXIS 20.1		
Extension	L603	L800	XL1103
Change in capacity	+ 600 l	+ 800 l	+ 1,100 l
Change in filling height	0	+ 26 cm	+ 24 cm
Extension size max.	240 x 130 cm		280 x 130 cm
Extension weight	30 kg	45 kg	60 kg
Notes	3-sided	4-sided	3-sided

	AXIS 30.1, AXIS 40.1					
Extension	L603	L800	L1500	XL1103	XL1300	XL1800
Change in capacity	+ 600 l	+ 800 l	+ 1,500 l	+ 1,100 l	+ 1,300 l	+ 1,800 l
Change in filling height	0	+ 26 cm	+ 50 cm	+ 24 cm	+ 38 cm	+ 52 cm
Extension size max.	240 x 130 cm			280 x 130 cm		
Extension weight	30 kg	45 kg	75 kg	60 kg	65 kg	85 kg
Notes	3-sided	4-sided	4-sided	3-sided	4-sided	4-sided

Extension	AXIS 50.1 GLW1000	GLW2000
Change in capacity	+ 1000 l	+ 2,000 l
Change in filling height	+ 22 cm	+ 44 cm
Extension size max.	290 x 150 cm	
Extension weight	52 kg	86 kg
Notes	4-sided	4-sided

4.4 List of available accessories

NOTICE

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

4.4.1 Hopper extensions

You can increase the capacity of the basic equipment by fitting a hopper extension.

The extensions are bolted to the standard hopper.

NOTICE

An overview of the extensions can be found in chapter 4.3.3: Technical data of the extensions, page 30.

4.4.2 Hopper cover

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

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

Hopper cover	Application
AP-L 25, foldable	● Standard unit ● Extensions: L603[1], L800, L1500
AP-XL 25, foldable	● Extensions: XL1103[1], XL1300, XL1800
AP-L 50, foldable	● Extensions: GLW1000, GLW2000

1. A supplementary hopper cover is necessary for this extension.

4.4.3 Hopper cover supplement

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

Hopper cover supplement	Application
APE-L 25, foldable	● Extension: L603
APE-XL 25, foldable	● Extension: XL1103

4.4.4 TELIMAT T 25, T 50

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

A single-acting valve is required for the operation of the TELIMAT T25 or T50.

4.4.5 Two-way unit (only for AXIS 20.1/30.1/40.1)

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

4.4.6 Tele-Space universal drive shaft

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

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

4.4.7 Universal drive shaft with ratchet clutch (only AXIS 20.1)

The ratchet safety clutch limits the torque in case of overloads.

4.4.8 Auxiliary lighting

The machine can be fitted with auxiliary lighting.

Lighting	Application
BLO 25/50	● Rear lighting ● without warning sign
BLW 20/25/50	● Rear lighting ● with warning sign
BLF 25/50	● Lighting for front ● with warning sign ● for wide extensions
BLF	● Lighting for front ● without warning sign ● for wide extensions

NOTICE

Attachments are subject to the lighting regulations specified in the traffic regulations. Observe the traffic regulations of your country.

4.4.9 Stabilising rollers with bracket ASR 125

For parking and manually moving the empty machine.

The stabilising rollers consist of two turning wheels in front and two non-turning wheels at the rear without wheel lock.

4.4.10 Border spreading unit GSE25 (only AXIS for 20.1/30.1/40.1)

Limits the spreading width (either towards the left or right) to a range between approx. 0.5 m and 2 m from, the centre of the tractor to the outer edge of the field. The metering slide that points to the field edge is closed.

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

4.4.11 Hydraulic remote control FHZ25 for GSE 25 (only for AXIS 20.1/30.1/40.1)

This remote control is used from the tractor cabin to hydraulically swing the GSE 25 border spreading unit into position or to swing it from border spreading position into the two-sided spreading position.

For operating the hydraulic remote control FHZ 25, a single-acting control valve is required.

4.4.12 Hydraulic remote control FHZ 26 for GSE 25 (only for AXIS 20.1/30.1/40.1)

This remote control is used from the tractor cabin to hydraulically swing the GSE 25 border spreading unit into position or to swing it from border spreading position into the two-sided spreading position.

For operating the hydraulic remote control FHZ 26, a double-acting control valve is required.

4.4.13 Dirt deflector SFG 30 (only for AXIS 20.1)

The dirt deflector prevents the machine and the extra equipment from getting dirty by dirt thrown upwards by the wheels of the tractor.

Apart from that, the dirt deflector also prevents dirt particles from being caught and flung out by the spreading disc.

4.4.14 Dirt deflector extension SFG-E30 (only for AXIS 30.1/40.1)

If the protective function of the dirt deflector SFG 30 is not sufficient, the dirt deflector extension SFG-E 30 can be mounted additionally.

4.4.15 Spreader vane set Z14, Z16, Z18

This set of spreader vanes is used for spreading snail bait. The snail bait spreader vane replaces the short spreading vane on the right and left spreading disc.

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

4.4.16 Practice test kit PPS5

For checking the cross-distribution in the field.

4.4.17 Fertiliser identification system DiS

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

5 Axle load calculation

⚠ CAUTION

Risk of overload!

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 be loaded with a minimum weight of 20 % of the empty weight of the tractor at all times.

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

Calculation of total weight, axle loads and tyre load capacity as well as of the required minimum ballast weights.

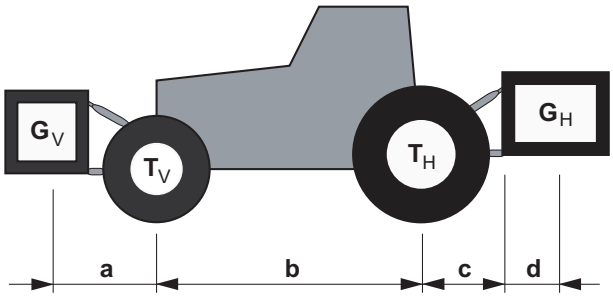


Figure 5.1: Loads and weights

You will need the following data for the calculation:

Character [unit]	Meaning	Calculation by (table footer)
T_L [kg]	Empty weight of the tractor	[1]
T_V [kg]	Front axle load of the empty tractor	[1]
T_H [kg]	Rear axle load of the empty tractor	[1]
G_V [kg]	Total weight of front-mounted unit/front ballast	[2]
G_H [kg]	Total weight of rear-mounted unit/rear ballast	[2]
a [m]	Distance between centre of gravity of front-mounted unit / front ballast and centre of front axle	[2], [3]
b [m]	Wheel base of the 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 / rear ballast	[2]

[1] See instruction manual of the tractor
[2] See price list and/or instruction manual of the unit
[3] To be measured

AXIS

Rear-mounted unit and/or front-rear combinations

Calculation of the minimum ballast 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 rear $H_{H\,min}$

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

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_{Vmin}), 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 front axle load as well as the admissible front axle load specified in the tractor's instruction manual in the table.

If the rear-mounted unit (G_H) is lighter than the minimum ballast at the rear (G_{Hmin}), 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 total weight as well as the admissible total weight specified in the tractor's instruction manual in the table.

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

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

Enter the calculated actual rear axle load as well as the admissible rear axle load specified in the tractor's instruction manual in the table.

Tyre load capacity

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

Axle loads table:

	Actual value according to calculation		Admissible value according to instruction manual		Twice the admissible 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 must be mounted on the tractor as an attachment or as ballast weight.

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

6 Transportation without tractor

6.1 General safety instructions

Read the following instructions before transporting the machine:

- If no tractor is used, the machine may only be transported with an empty hopper.
- The work may only be carried out by suitable, trained and expressly authorised personnel.
- Suitable means of transportation and lifting equipment (e.g. crane, forklift truck, lifting tackle ...) are to be used.
- Determine the transportation route early, and remove possible obstacles.
- Check that all safety and transportation devices are fully operational.
- Secure all danger areas appropriately, even if they only exist briefly.
- The person responsible for transportation must ensure that the machine is transported appropriately.
- Unauthorised persons are to be kept away from the transport route. The areas concerned must be cordoned off.
- Cautiously transport the machine and handle it with care.
- Make sure that allowance is made for the centre of gravity. If necessary, adjust the lifting tackle so that the machine is correctly suspended.
- Transport the machine to the final destination as close to the ground as possible.

6.2 Loading and unloading, parking

1. Determine the weight of the machine.

   Details are provided on the nameplate.

   If applicable, also note the weight of possible accessories and attachments.
2. Carefully lift the machine with suitable lifting equipment.
3. Carefully set the machine down on the loading platform of the transport vehicle or on solid ground.

7 Instructions regarding the spreading process

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

- Carry out spreading operations as described below.

Preparation

• Installing the spreader on the tractor	page 50
• Closing the metering slides	
• Presetting the mounting height	page 54
• Filling in the fertiliser	Chapter A.2 or chapter A.3[1]
• Adjusting the application rate	Chapter B.2[1]
• Setting the working width	Chapter B0.5[1]
- Selection of the correct spreading disc	
- Adjusting the drop point	Chapter B.5.3[1]

Spreading

• Travel to the spreading location	
• Check the mounting height	
• Engage the PTO shaft	
• Open the slides and start spreading	
• Finish spreading operations, and close the slides	
• Disengage the PTO shaft	
• Discharging residual material	Chapter B.10[1]

Cleaning/maintenance

• Open metering slides	
• Remove the spreader from the tractor	
• Cleaning and maintenance	Chapter C[1] and AXIS maintenance

1. See the register of your machine (AXIS 20.1, AXIS 30.1 or AXIS 50.1)

8 General commissioning (all machine types)

8.1 Taking delivery of the machine

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

The standard equipment includes

- 1 mineral fertiliser spreader of the AXIS series,
- 1 instruction manual AXIS 20.1, AXIS 30.1, AXIS 40.1, AXIS 50.1
- 1 fertiliser chart (on paper or CD),
- 1 calibration kit comprising chute and calculator,
- Lower link and upper link pins,
- 1 spreading disc set (according to order),
- 1 universal drive shaft (including instruction manual)
- 1 agitator
- 1 protective grid in hopper
- Version Q or W: Operating unit QUANTRON-A
- Version C: Operating unit E-CLICK
- AXIS 20.1/30.1/40.1 EMC (+ W): Operating unit QUANTRON-E2 M EMC

Please also check any optional equipment that you ordered.

Check for any shipping damage or missing parts. Any shipping damage must be confirmed by the shipping agent.

NOTICE

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

The right-hand spreading disc and left-hand spreading disc must be mounted facing the direction of travel.

If in doubt, contact your salesperson or the manufacturer directly.

8.2 Requirements for the tractor

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

- Universal drive shaft connection: 1 3/8 inches, 6 splines, 540 rpm (only for AXIS 50.1: optional 700 rpm),
- Oil supply: max. 200 bar, single or double-acting valve (depending on equipment)
- Operating voltage: 12 V,
- Three-point linkage, category II (AXIS 20.1, AXIS 30.1, AXIS 40.1)
- Three-point linkage, category III (AXIS 50.1)

8.3 Mount the universal drive shaft at the machine

⚠ CAUTION

Material damages due to unsuitable drive shaft.

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

The usage of incorrectly dimensioned or inadmissible drive shafts, for instance without guard or suspension chain, may lead to damages to the tractor and the machine.

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

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

- Universal drive shaft with shear pin protection (only AXIS 20.1),
  - See „Mounting the universal drive shaft with shear pin protection to AXIS 20.1“ on page 85.
- Universal drive shaft with ratchet clutch,
- Tele-Space universal drive shaft with ratchet clutch.

NOTICE

The drive shaft with **shear pin protection** is factory-mounted on the machine AXIS **20.1**. If you wish to mount a universal drive shaft and/or a Tele-Space drive shaft with ratchet clutch, please refer to the following paragraph.

8.3.1 Fitting and removing the PTO shaft

Fitting:

1. Check the installed position.
   ▷ The drive shaft end that is marked with a tractor symbol must point to the tractor.
2. Loosen the locking screw [1] of the universal drive shaft guard.
3. Turn the universal drive shaft guard to the demounting position.
4. Pull the universal drive shaft out.

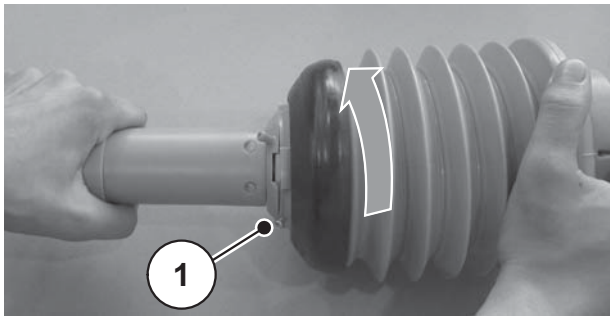


Figure 8.1: Loosen the universal drive shaft guard

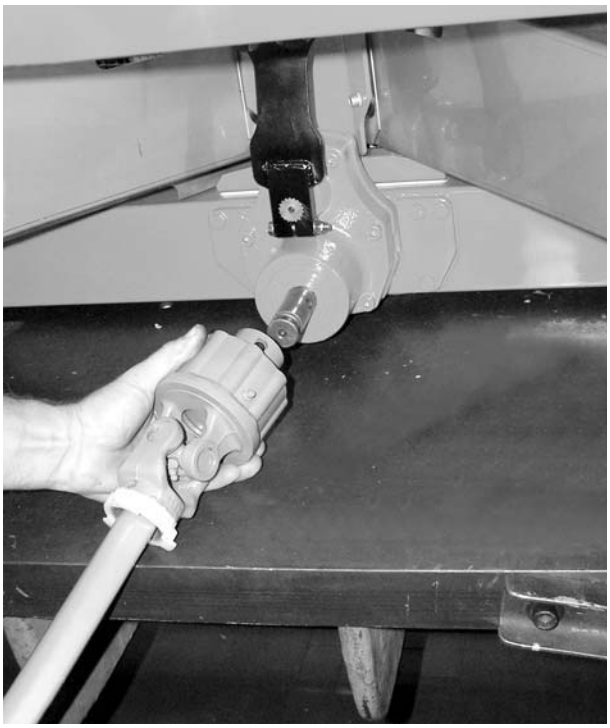


Figure 8.2: Push the universal drive shaft onto the transmission spigot

5. Remove the spigot protection and grease the transmission spigot. Push the universal drive shaft onto the transmission spigot.

Figure 8.3: Tele-Space universal drive shaft

6. Tighten hexagonal screw and nut with 17 mm wrench (max. 35 Nm).

7. Slide drive shaft guard with hose clamp over the universal drive shaft and place over the PTO stub neck (do not tighten).
8. Turn the universal drive shaft guard to the locking position.

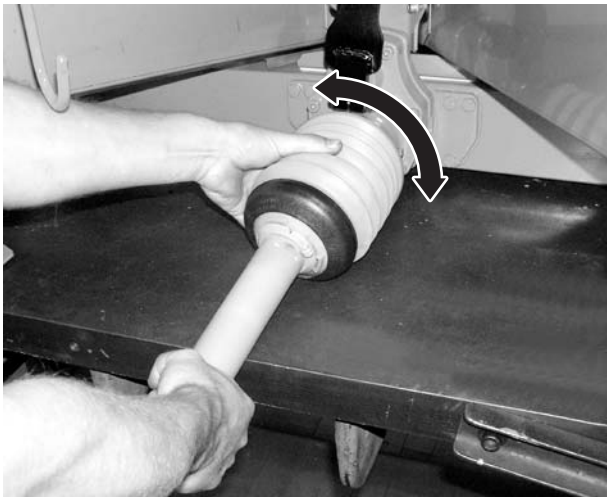


Figure 8.4: Put the universal drive shaft guard back on

9. Tighten locking screw.
10. Tighten hose clamp.

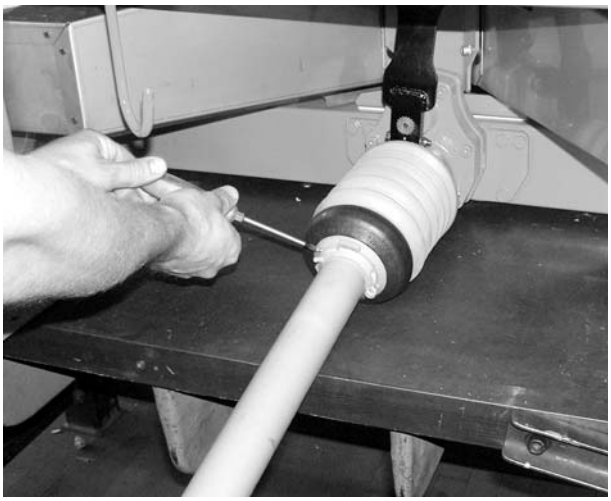


Figure 8.5: Secure universal drive shaft guard

Instructions for dismounting:

- Dismount the universal drive shaft in reverse order of attachment.
- Do not use the safety chain to suspend the universal drive shaft.
- Store uncoupled universal drive shaft on the retainer provided.
  - See chapter 4.2: Description of the machine, page 22.

NOTICE

Depending on the **version** of the mineral fertiliser spreader, the bracket is located in different positions. See figure 4.1 and figure 4.3.

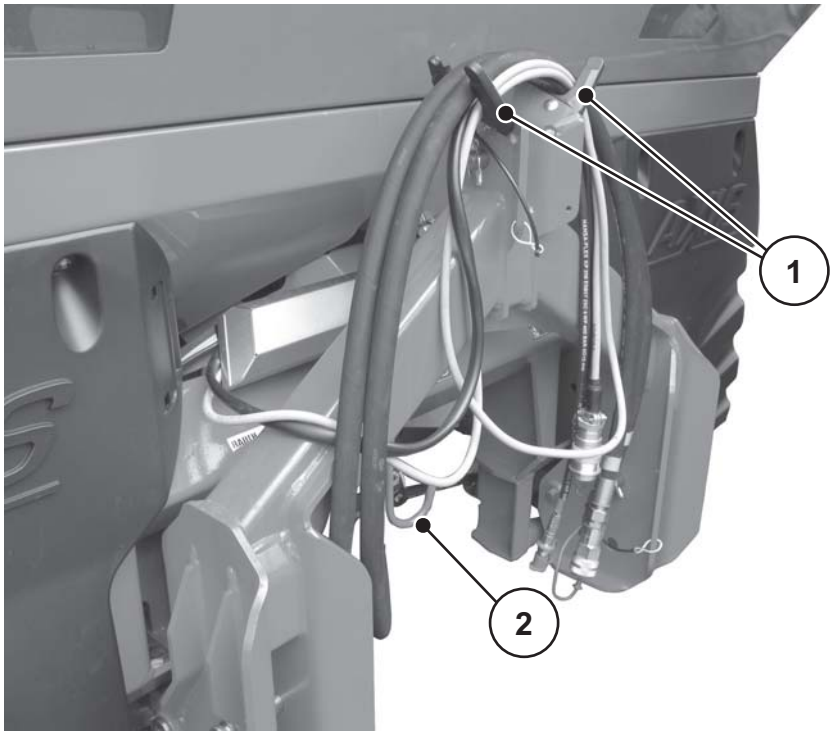


Figure 8.6: Storage of the cables and hydraulic hoses (example AXIS 50.1)

[1] Bracket for hoses and cables
[2] Universal drive shaft bracket

8.4 Installing the machine on the tractor

8.4.1 Preconditions

⚠ DANGER

Danger to life due to unsuitable tractor

Using an unsuitable tractor for the machine of the AXIS series may result in serious accidents during operation or road travel.

- ▶ Only use tractors that comply with the technical requirements of the machine.
- ▶ Use the vehicle's documentation to check if your tractor is suitable for the AXIS machine.

Check the following specific requirements:

- Are both the tractor and the machine in a reliable condition?
- Does the tractor comply with the mechanical, hydraulic, and electrical requirements (see „Requirements for the tractor“ on page 45)?
- Do the attachment categories of the tractor and the machine match (if necessary, consult your dealer)?
- Is the machine securely positioned on level and solid ground?
- Do the axle loads conform to the stipulated calculations (see „Axle load calculation“ on page 37)?

Position of the distance washers (only for AXIS 50.1, category III)

Ensure the correct position of the distance washers [2] included in the scope of delivery beyond the lower link ball [1].

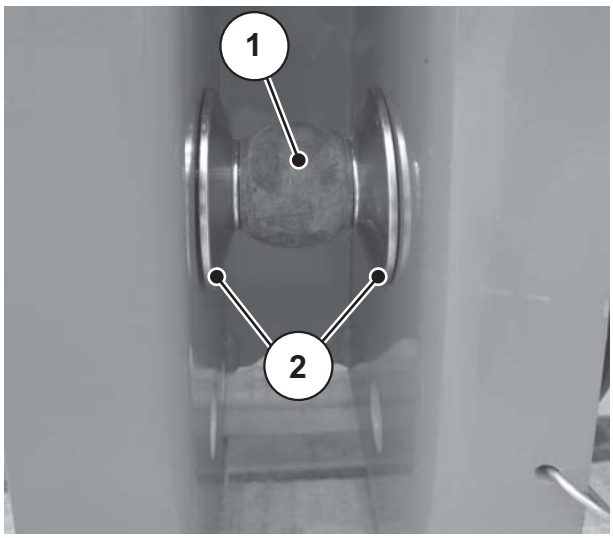


Figure 8.7: Position of the distance washers when installing the machine (AXIS 50.1,category III)

8.4.2 Attachment

⚠ DANGER

Danger to life due to inattention or faulty operation.

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

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

▶ Make sure that there is no one between the tractor and the machine.

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

NOTICE

For normal fertilisation and late fertilisation, **always** use the **upper coupling points** of the machine. See figure 8.8.

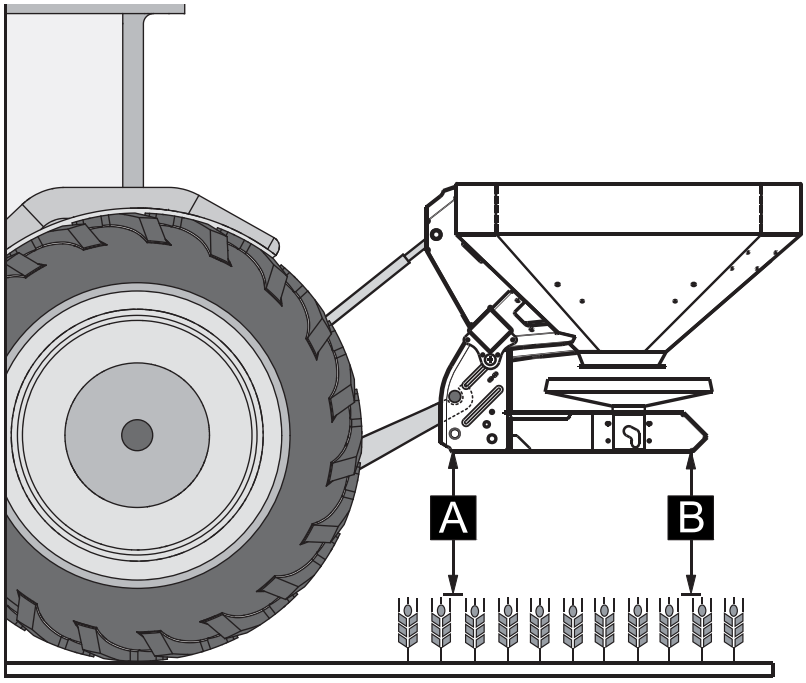


Figure 8.8: Mounting position

Mounting instructions

- **Only** AXIS **20.1/30.1/40.1**: The machine can only be connected to a tractor with category III linkage with category II clearance and the use of reducing sleeves.
- The bottom and top linkage pins must be secured with linch pins or spring clips.
- To ensure correct cross-distribution of the fertiliser, the machine must be mounted as specified in the fertiliser chart.
- In order to avoid sideways movements during the spreading operation, make sure that the machine does not have too much sideways play:
  - The lower link arms of the tractor are to be braced by means of stabilising struts or chains.

1. Start the tractor.
   - The PTO shaft is switched off.
2. Move the tractor to the machine.
   - Do not latch the lower link hooks into place yet.
   - Make sure there is enough space between the tractor and the machine in order to be able to connect the drives and control elements.
3. Turn the tractor motor off. Remove the ignition key.
4. Mount the drive shaft to the tractor.
   - If there is not enough space available, an extendable **Tele-Space universal drive shaft** must be used for safety reasons.
5. Connect the electric and hydraulic slide actuators and the lighting (see **section A.1** of the respective machine type).
6. From the tractor cab, connect the lower link hooks and the upper link to the designated coupling points, as described in the instruction manual of your tractor.

NOTICE

We recommend using bottom link hooks together with a hydraulic upper link for safety and comfort. See figure 8.8.

7. Check the tight seat of the machine.
8. Carefully raise the fertiliser spreader to the desired lifting height.

⚠ CAUTION

Material damage due to too long universal drive shaft

When the mineral fertiliser spreader is lifted up, the universal drive shaft halves can come into contact inside each other. This can cause damage to the universal drive shaft, the transmission or the machine.

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

9. Shorten the universal drive shaft, if required.

NOTICE

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

NOTICE

Observe the installation and shortening instructions provided in the **instruction manual of the drive shaft manufacturer** when checking and adjusting the drive shaft. The manual is attached to the drive shaft on delivery.

10. Preset the mounting height according to the fertiliser chart. See 8.6.2: Settings as per fertiliser chart, page 60.

AXIS

8.5 Presetting the mounting height

8.5.1 Safety

⚠ DANGER

Risk of being crushed under falling mineral fertiliser spreader

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

This may lead to severe personal injury and damages to the machines.

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

⚠ WARNING

Risk of injury from rotating spreading discs!

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

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

General instructions before setting the mounting height

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

NOTICE

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

- The lower coupling points on the machine which are meant for the lower links of the tractor should be used **only in exceptional circumstances** in late fertilisation.

8.5.2 Maximum admissible mounting height at front (V) and rear (H)

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

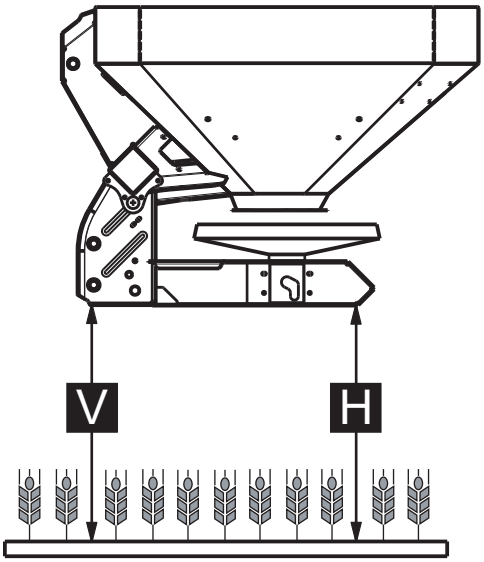


Figure 8.9: Maximum admissible mounting height V and H during normal and late fertilisation

The maximum admissible mounting height depends on the following factors:

- Normal or late fertilisation.

Spreader equipment	Maximum admissible mounting height			
	during normal fertilisation		during late fertilisation	
	V [mm]	H [mm]	V [mm]	H [mm]
AXIS 20.1/ AXIS 30.1/AXIS 40.1	1040	1040	950	1010
AXIS 50.1	990	990	900	960

8.5.3 Mounting heights A and B according to fertiliser chart

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

NOTICE

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

Setting the mounting height during normal fertilisation

Requirements:

- The machine is installed at the highest connecting point of the upper link at the tractor.
- The lower link of the tractor is installed at the **upper coupling point of the lower link** of the machine.

Proceed as follows when determining the mounting height (in normal fertilisation):

1. Determine the mounting heights **A** and **B** (above crop) from the fertiliser chart.
2. Compare the mounting heights **A** and **B** plus the crop height with the maximum admissible mounting heights at the front (V) and rear (H).

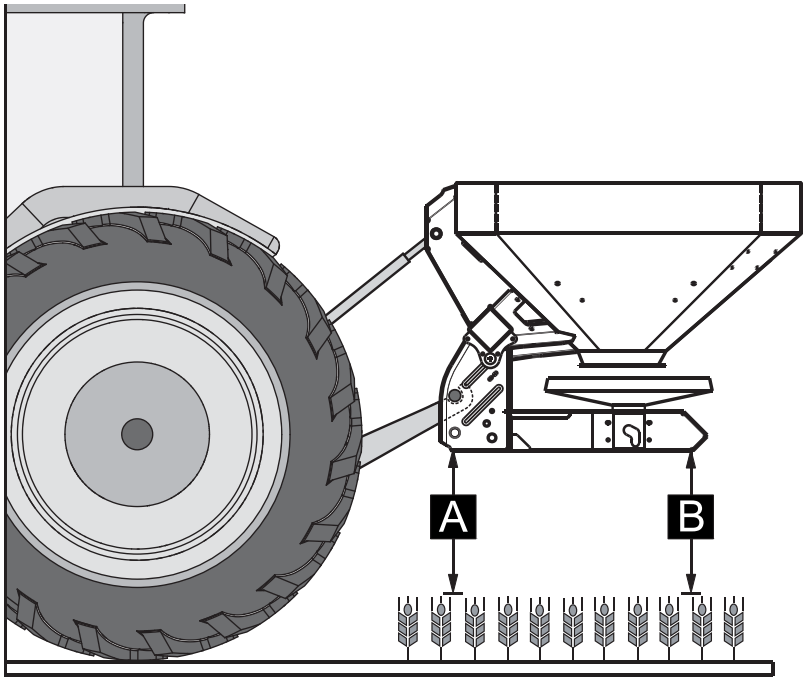


Figure 8.10: Mounting position and height during normal fertilisation

The following applies:

	AXIS 20.1/ AXIS 30.1/AXIS 40.1	**AXIS 50.1**
A + crop height ≤ V	Max. 1040 mm	Max. 990
B + crop height ≤ H	Max. 1040 mm	Max. 990

3. If the maximum admissible mounting height of the machine is exceeded in the normal fertilisation mode, or if the mounting heights A and B cannot be reached, the machine is to be mounted according to the **late fertilisation** values.

Setting the mounting height during late fertilisation

Requirements:

- The machine is installed at the highest connecting point of the upper link at the tractor.
- The lower link of the tractor is installed at the **upper coupling point of the lower link** of the machine.

Proceed as follows when determining the mounting height (in late fertilisation mode):

1. Determine the mounting heights **A** and **B** (above crop) from the fertiliser chart.
2. Compare the mounting heights **A** and **B** (plus the crop height) with the maximum admissible mounting heights at the front (V) and rear (H).

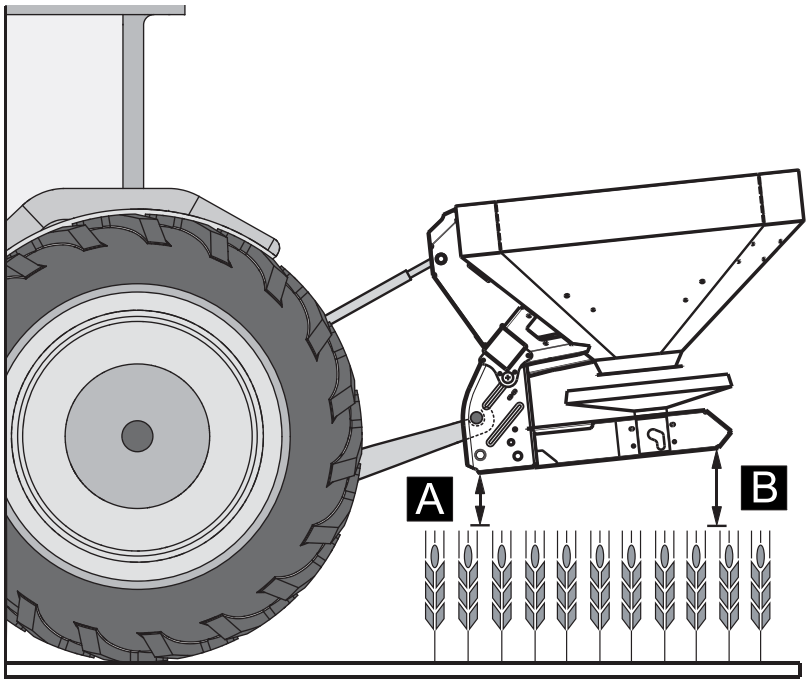


Figure 8.11: Mounting position and height during late fertilisation

The following applies:

	AXIS 20.1/ AXIS 30.1/AXIS 40.1	**AXIS 50.1**
A + crop height ≤ V	Max. 950 mm	Max. 900
B + crop height ≤ H	Max. 1010 mm	Max. 960

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

NOTICE

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

- Please observe the instructions in the instruction manuals provided by the tractor and upper link manufacturer.

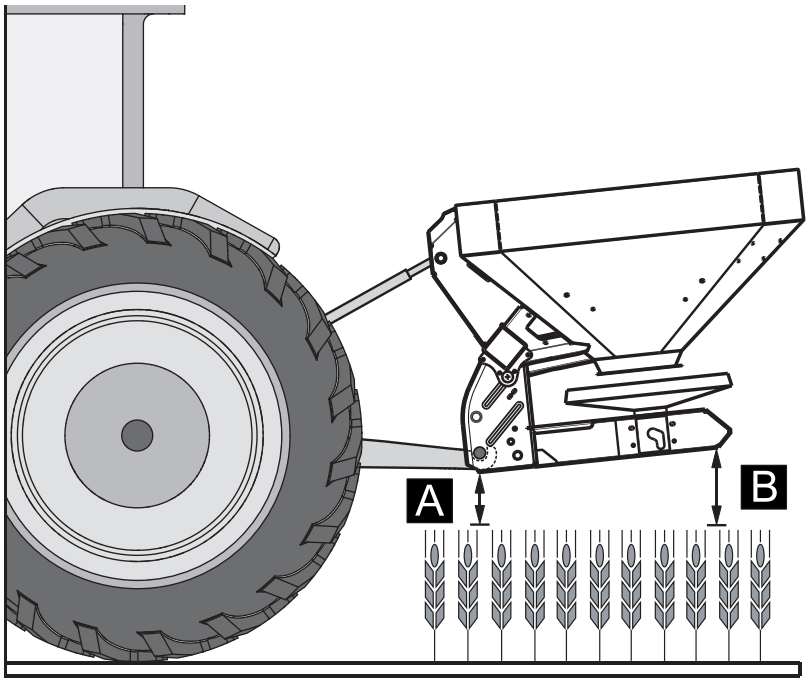


Figure 8.12: Machine mounted to the lower coupling point of the lower link

The following applies:

	AXIS 20.1/ AXIS 30.1/AXIS 40.1	**AXIS 50.1**
A + crop height ≤ V	Max. 950 mm	Max. 900
B + crop height ≤ H	Max. 1,010 mm	Max. 960

8.6 Using the fertiliser chart

8.6.1 Information on the fertiliser chart

The values in the fertiliser chart have been determined on the RAUCH test system.

The used fertiliser materials have been purchased from the fertiliser manufacturers or from dealers. Experience shows that, due to storage, transportation and other reasons, the fertiliser materials at your disposal - even with identical specification - might exhibit a different spreading behaviour.

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

Therefore, observe the following instructions:

- Always check the actual spreading volume discharged by performing a calibration test (see chapter B.6 of the corresponding type of machine).
- Check the working width of the fertiliser distribution with a practice test kit (optional equipment).
- Only use fertilisers listed in the fertiliser chart.
- Please contact us if you need to use a fertiliser that is not included in the fertiliser chart.
- Observe the setting values exactly. Even a slightly incorrect setting may adversely affect the spreading pattern.

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

- Due to a great number of fertiliser imports, urea is available in a wide variety of different qualities and grain sizes. It may therefore be required to adjust the settings of the spreader.
- Urea is more sensitive to wind and absorbs more moisture than other fertilisers.

NOTICE

The operator is responsible for making the correct spreader adjustments according to the fertiliser material in use.

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

8.6.2 Settings as per fertiliser chart

The operator determines the mounting height, fertiliser drop point, metering slide adjustment, spreading disc type and PTO speed for an optimum spreading from the **fertiliser chart** depending on the fertiliser type, working width, application rate, forward speed and fertilisation method.

Example of field spreading during normal fertilisation:

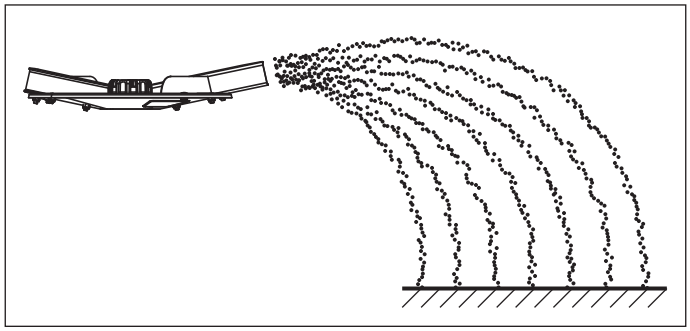


Figure 8.13: Field spreading during normal fertilisation

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

Specified parameters:

Fertiliser type:	KAS BASF
Application rate:	300 kg/ha
Working width:	24 m
Forward speed:	12 km/h

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

- Mounting height: 50/50 (A = 50 cm, B = 50 cm)
- Drop point 6
- Metering slide adjustment: 180
- Spreading disc type: S4
- PTO speed: 540 rpm

Example of border spreading during normal fertilisation (Optional equipment TELIMAT T25, T50):

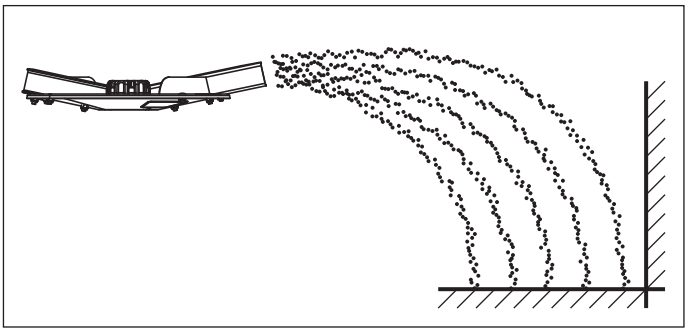


Figure 8.14: Border spreading in normal fertilisation mode

During border spreading in normal fertilisation mode, almost no fertiliser goes beyond the field boundary. Underfertilisation at the field boundary must be accepted in this case.

Specified parameters:

Fertiliser type:	KAS BASF
Application rate:	300 kg/ha
Working width:	24 m
Forward speed:	12 km/h

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

- Mounting height: 50/50 (A = 50 cm, B = 50 cm)
- Drop point 6
- Metering slide adjustment: 180 left, 150 right[1]
- Spreading disc type: S4
- PTO speed: 540 rpm
- TELIMAT settings: K12.5

1. Recommended quantity reduction of 20 % on border spreading side

Example of boundary spreading during normal fertilisation (Optional equipment TELIMAT T25, T50):

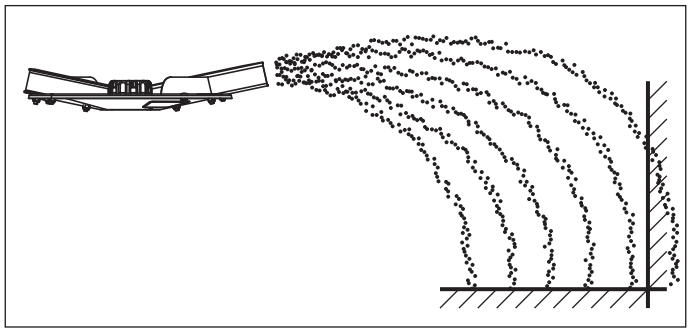


Figure 8.15: Boundary spreading in normal fertilisation mode

Boundary spreading in normal fertilisation mode refers to a spreading technique in which a bit more fertiliser lands beyond the boundary of the field. Therefore, there is just a slight underfertilisation at the field boundary.

Specified parameters:

Fertiliser type:	KAS BASF
Application rate:	300 kg/ha
Working width:	24 m
Forward speed:	12 km/h

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

- Mounting height: 50/50 (A = 50 cm, B = 50 cm)
- Drop point 6
- Metering slide adjustment: 180
- Spreading disc type: S4
- PTO speed: 540 rpm
- TELIMAT settings: S13

Example of field spreading during late fertilisation:

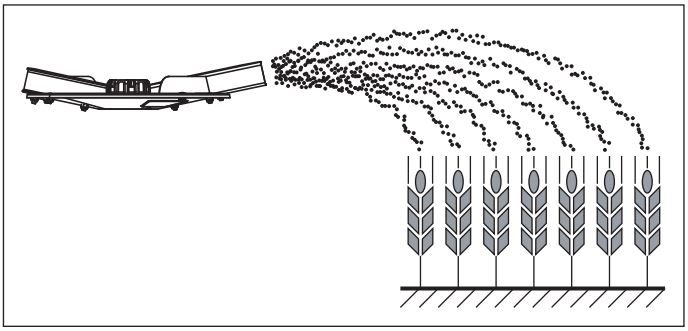


Figure 8.16: Field spreading during late fertilisation

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

Specified parameters:

Fertiliser type:	KAS BASF
Application rate:	150 kg/ha
Working width:	24 m
Forward speed:	12 km/h

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

- Mounting height: 0/6 (A = 0 cm, B = 6 cm)
- Drop point 6.5
- Metering slide adjustment: 90
- Spreading disc type: S4
- PTO speed: 540 rpm

Example of border spreading during late fertilisation (Optional equipment TELIMAT T25, T50):

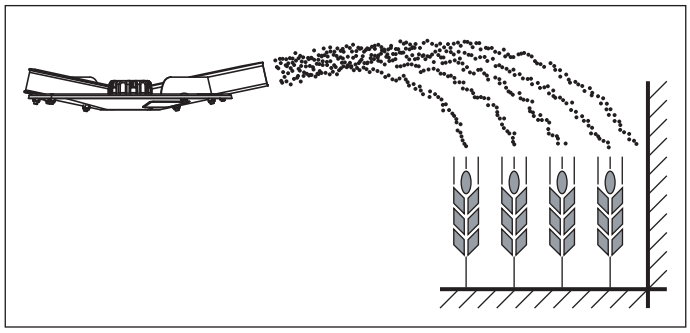


Figure 8.17: Border spreading in late fertilisation mode

During border spreading in late fertilisation mode, almost no fertiliser goes beyond the field boundary. Underfertilisation at the field boundary must be accepted in this case.

Specified parameters:

Fertiliser type:	KAS BASF
Application rate:	150 kg/ha
Working width:	24 m
Forward speed:	12 km/h

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

- Mounting height: 0/6 (A = 0 cm, B = 6 cm)
- Drop point 6.5
- Metering slide adjustment: 90 left, 72 right[1]
- Spreading disc type: S4
- PTO speed: 540 rpm
- TELIMAT settings: K12.5

1. Recommended quantity reduction of 20 % on border spreading side

Example of boundary spreading during late fertilisation (Optional equipment TELIMAT T25, T50):

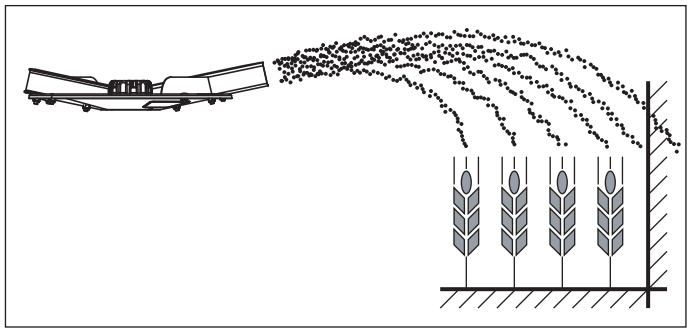


Figure 8.18: Boundary spreading in late fertilisation mode

Boundary spreading in late fertilisation mode refers to a spreading technique in which a bit more fertiliser lands beyond the boundary of the field. Therefore, there is just a slight underfertilisation at the field boundary.

Specified parameters:

Fertiliser type:	KAS BASF
Application rate:	150 kg/ha
Working width:	24 m
Forward speed:	12 km/h

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

- Mounting height: 0/6 (A = 0 cm, B = 6 cm)
- Drop point 6.5
- Metering slide adjustment: 90
- Spreading disc type: S4
- PTO speed: 540 rpm
- TELIMAT settings: S13

8.7 Spreading at the headland

In order to achieve a good fertiliser distribution at the headland, a precise arrangement of the tramlines is essential.

Environmentally optimised boundary spreading

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

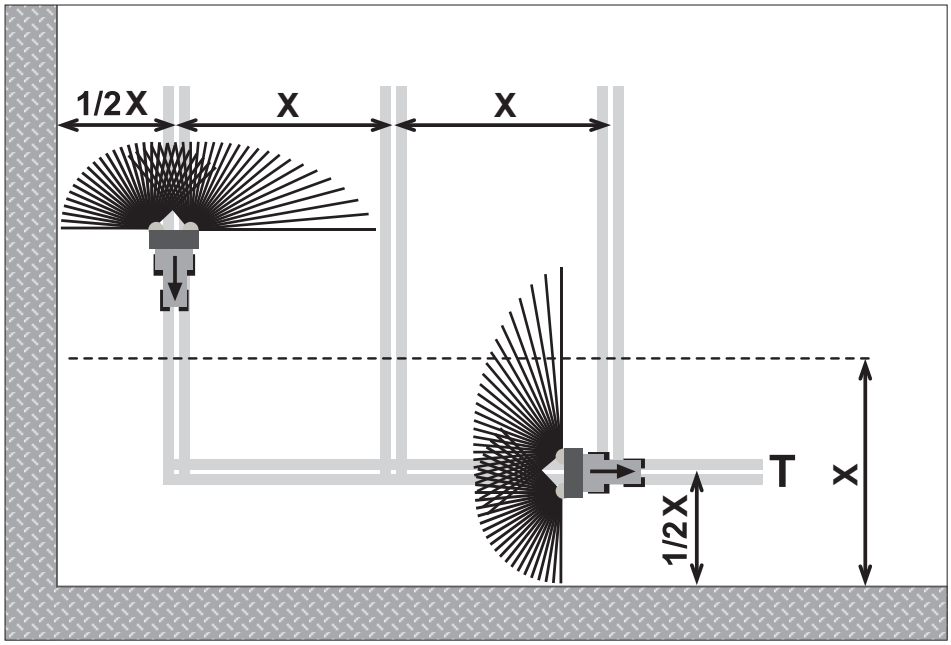


Figure 8.19: Environmentally optimised boundary spreading

[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

NOTICE

If you use a GPS System (e.g. QUANTRON-Guide) as well as the operating unit QUANTRON-E2 and/or QUANTRON-A for operating your machine, check that the software of the operating unit includes the **OptiPoint** function.

The **OptiPoint** function by RAUCH calculates the optimal switching-on and switching-off point for spreading in the headline based on the settings in the operating unit.

- You can skip the information in the present paragraph since the **OptiPoint** function assumes these settings.
- Please refer to the instruction manual of the respective operating unit.

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

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

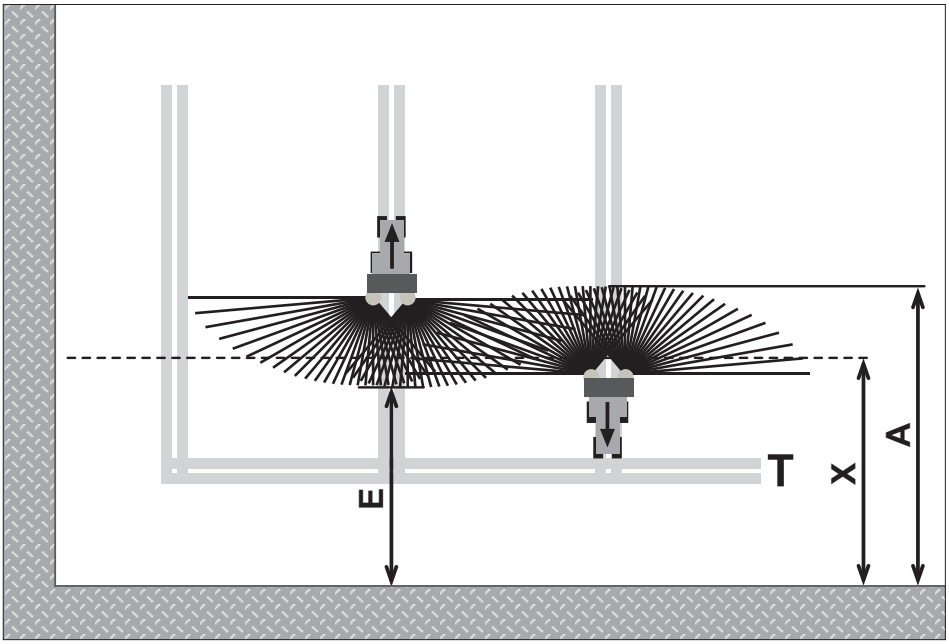


Figure 8.20: Normal spreading

[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 distances to the field border of the headland when travelling backwards and forwards.

Driving out of the headland tramline

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

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

Driving into the headland tramline

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

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

8.8 Setting the border spreading unit GSE (optional equipment) (only for AXIS 20.1, AXIS 30.1/40.1)

The border spreading unit limits the spreading width (either towards the left or right) to a range between approx. 0.5 m and 2 m from the centre of the tractor track to the outer edge of the field.

- The metering slide that points to the field edge is closed.
- Fold the border spreading unit downwards for border spreading.
- The border spreading unit must be hinged up again before starting the two-sided spreading.

8.8.1 Setting the border spreading unit

NOTICE

The settings for the border spreading unit refer to the **spreading disc working towards the inside of the field**.

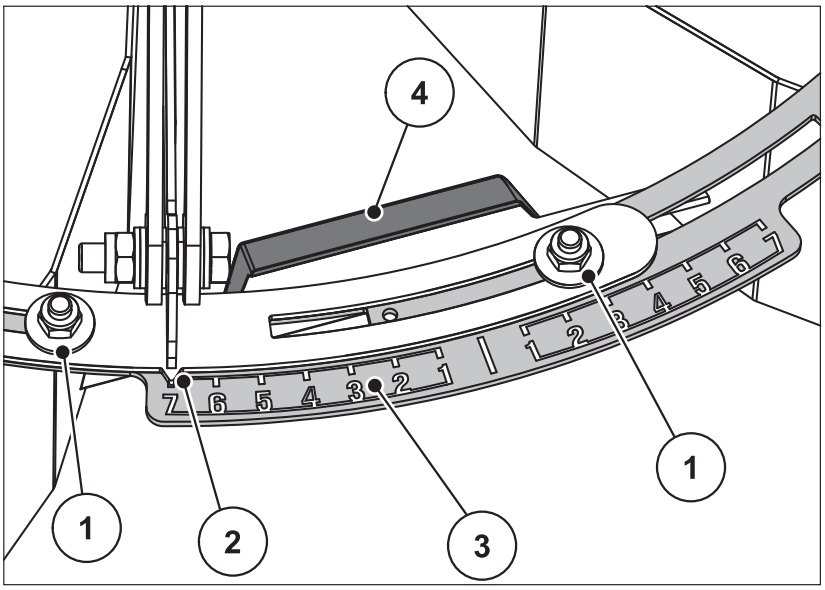


Figure 8.21: Setting the border spreading unit

[1] Nut
[2] Indicator
[3] Numeric scale
[4] Hand grip

1. The position of the pointer [2] is to be obtained from the assembly instruction manual included in the scope of delivery.
2. Loosen the 2 nuts [1].
3. Slide the numeric scale [3] so that the pointer is directed to the value determined. Use the hand grip [4] for this purpose.
4. Retighten the nuts [1].

Correcting the spreading distance

The specifications in the provided assembly instruction manual are standard values. If there are deviations in the fertiliser quality, it may be necessary to correct the setting.

- For **reducing** the spreading distance, move towards the spreading disc.
- For **increasing** the spreading distance, move away from the spreading disc.

8.9 Setting the optional equipment TELIMAT T25, T50

The TELIMAT T25, T50 is a remote-controlled border and boundary spreading system for working widths of **12 - 42 m** (or boundary spreading only, depending on the fertiliser type).

The TELIMAT T 25, T 50 is mounted on the **right** side to the machine. It is operated by a single-acting control valve from the tractor.

NOTICE

The attachment of the TELIMAT to the machine is described in detail in a separate assembly instruction manual. This assembly instruction manual is supplied with the TELIMAT.

8.9.1 Setting the TELIMAT

The TELIMAT is prepared for spreading in accordance with the **fertiliser type**, the **working width** and the desired **type of border spreading** (border or boundary spreading).

NOTICE

The setting values for the TELIMAT can be found in the fertiliser chart.

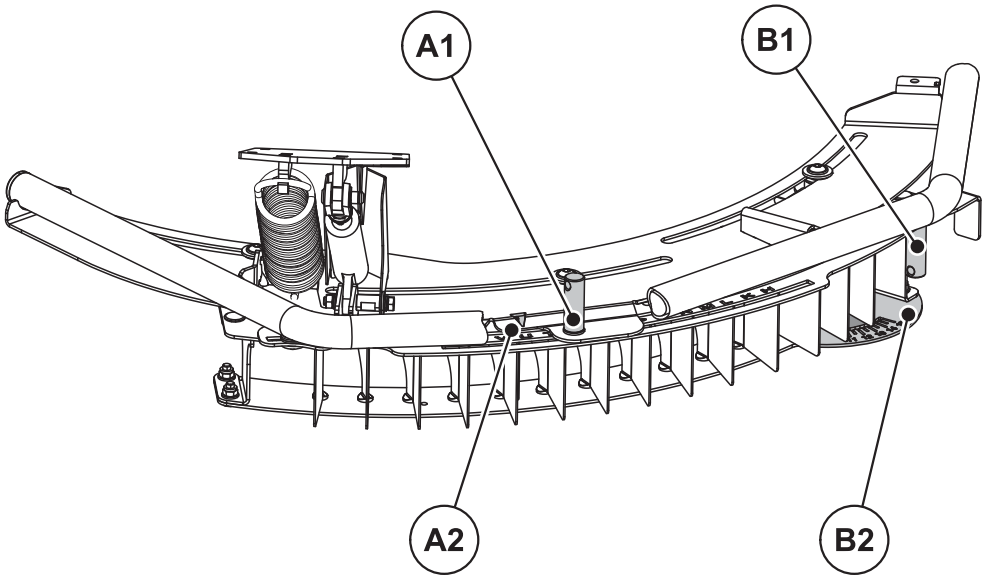


Figure 8.22: Setting the TELIMAT

[A1] Adjustment nut for alphabetic scale
[A2] Alphabetic scale for coarse adjustment
[B1] Adjustment nut for numeric scale
[B2] Numeric scale for fine adjustment

Coarse adjustment (alphabetic scale):

The complete TELIMAT housing can be rotated in guidings around the spreading disc pivot (alphabetic scale H to Z). The alphabetic scale is used to adjust the TELIMAT housing according to the fertiliser type, working width and border spreading type (border or boundary spreading).

1. Loosen the adjustment nut for the alphabetic scale using the adjustment lever of the machine.
2. Move TELIMAT housing (sliding section) to the letter specified in the calibration chart.

   ▷ The arrow is exactly above the specified letter.
3. Tighten the adjustment nut for the alphabetic scale using the adjustment lever of the machine.

Fine adjustment (numeric scale):

One-piece guiding plates are available inside the border spreading system and can be moved along a numeric scale (scale 11 to 15). The number is basically used for fine adjustment.

1. Loosen the adjustment nut for the numeric scale using the adjustment lever of the machine.
2. Move guiding plate to the number value specified in the calibration chart.

   ▷ The specified number value is precisely aligned with the first guiding plate.
3. Tighten the adjustment nut for the numeric scale using the adjustment lever of the machine.

8.9.2 Correcting the spreading distance

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

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

- To **decrease** the spreading distance relative to the calibration chart setting: Change the numeric scale guiding plate position in the direction of the **lesser value**.
- To **increase** the spreading distance relative to the calibration chart setting: Change the numeric scale guiding plate position in the direction of the **greater value**.

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

- To **decrease** the spreading distance relative to the calibration chart setting: Move the TELIMAT on the alphabetic scale towards the **smaller character** (according to alphabetic order).
- To **increase** the spreading distance relative to the calibration chart setting: Move the TELIMAT on the alphabetic scale towards the **greater character** (according to alphabetic order).

NOTICE

Border spreading at working widths 12 - 50m:

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

8.9.3 Instructions for spreading with the TELIMAT

The TELIMAT settings are changed to the position required for the spreading type from the tractor through a single-acting control valve.

- Border spreading: lower position,
- Normal spreading: upper position.

⚠ CAUTION

Spreading errors caused by the TELIMAT not reaching its end position

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

- ▶ Make sure that the TELIMAT is always in the specified end position.
- ▶ When switching from border spreading to normal spreading, actuate the control valve until the TELIMAT is **completely** in the top end position.
- ▶ During extended border spreading (depending on the state of your operating unit), actuate the control valve occasionally to return the TELIMAT to its end position.

NOTICE

When older control equipment is used, leaks are possible during border spreading. In such case, the TELIMAT may leave the already reached end position (lower position) again. Therefore, return the TELIMAT to the end position at regular intervals in order to prevent spreading errors.

Mechanical display of the spreading position

The mechanical display of the spreading position is located directly at the right side of the TELIMAT relative to the direction of travel. The display can be seen from the driver's cab of the tractor.

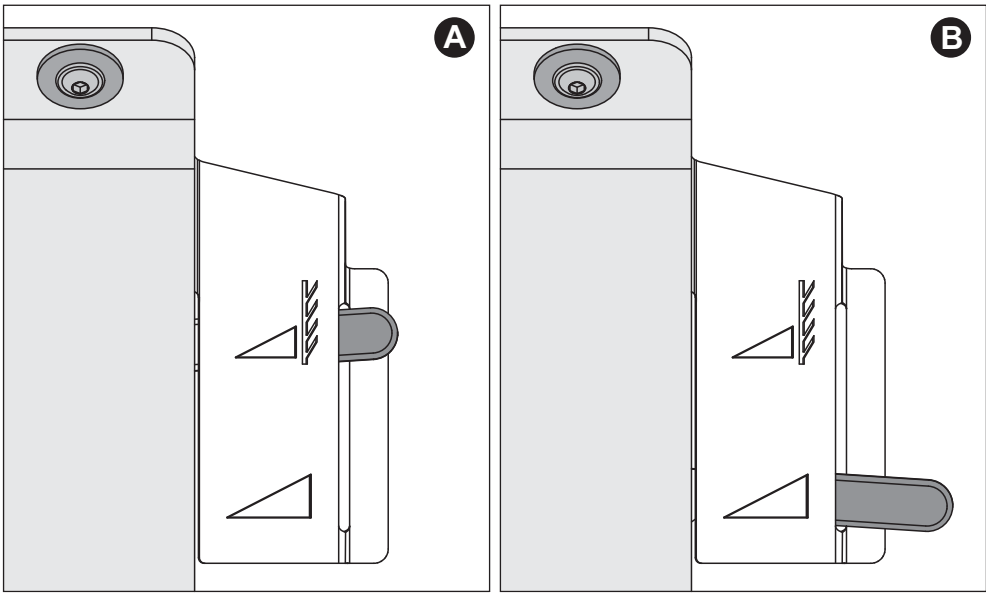


Figure 8.23: TELIMAT mechanical display

[A] Border spreading position
[B] Normal spreading position

8.10 Settings for unlisted fertiliser types

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

NOTICE

In order to calculate settings for unlisted fertiliser types, please also see the supplementary manual for the practice test kit.

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

To determine the spreader settings **accurately**, we recommend the layout for **three passes**.

8.10.1 Requirements and conditions

NOTICE

The requirements and conditions apply to 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 **cavities** or **heights** since this may distort the spreading pattern.
- Carry out the test either on freshly mown grass or on a field with low vegetation (max. 10 cm).

8.10.2 Running one pass

Layout:

NOTICE

We recommend the layout plan up to a spreading width of **24 m**. A layout plan for greater working widths is attached to the practice test kit.

- Length of testing area: 60 - 70 m

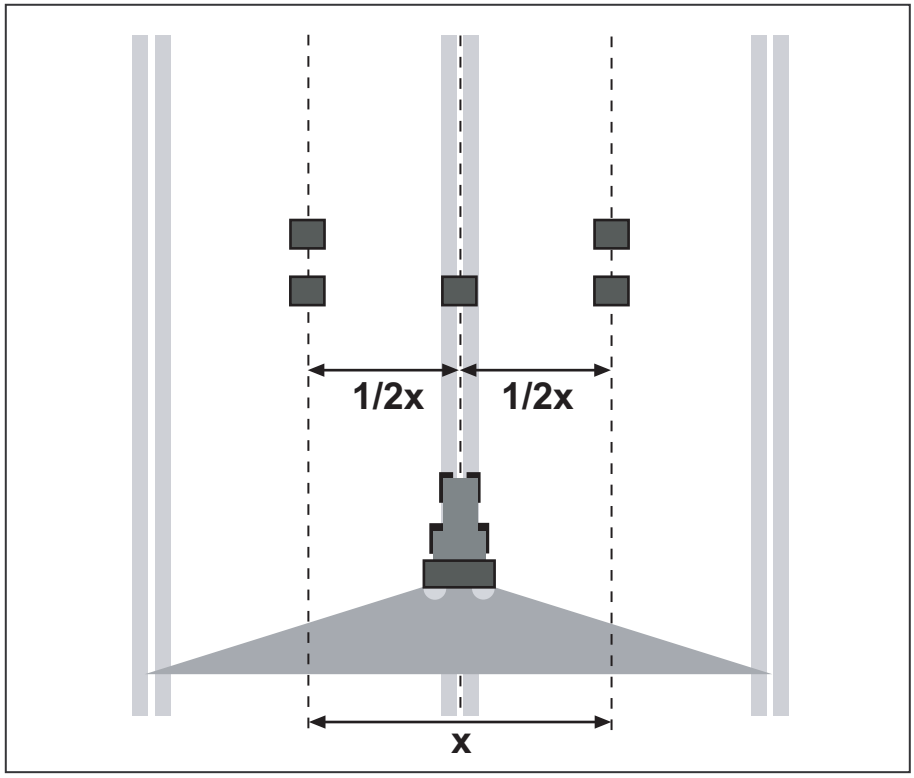


Figure 8.24: Layout for one pass

Preparing one pass:

- Choose a similar fertiliser from the fertiliser chart and adjust the spreader accordingly.
- Set the mounting height of the machine as specified in the fertiliser chart. Make sure that the mounting height includes the top edge of the trays.
- Check the spreading elements (spreading discs, spreader vanes, outlet) for correct functioning and completeness.
- Place two trays one after another at a distance of **1 m** in the overlap zones (between the tramlines) and one tray in the track (according to figure 8.24).

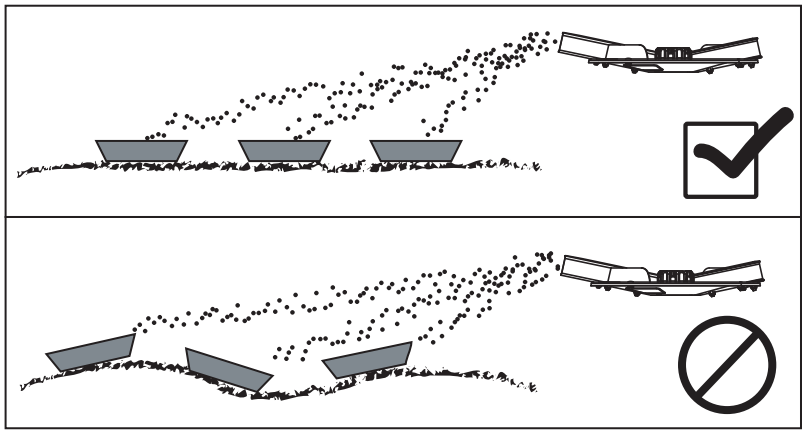


Figure 8.25: Layout of the catch trays

- Make sure that the trays are placed on level ground. Slanted trays may cause measuring errors (figure 8.25).
- Carry out the calibration test (see chapter B.6 of the corresponding machine type).
- Adjust and fix the metering slides on the right and left-hand side (see chapter B.4 of the corresponding machine type).

Run the spreading test with the openings set as calculated for the job:

- Forward speed: select **3 - 4 km/h**.
- Open the metering slide **10 m in front of the** catch trays.
- Close the metering slides approx. **30 m behind** the catch trays.

NOTICE

If the quantity collected in the trays is insufficient, repeat the run.

Do not change the adjustment of the metering slides.

Evaluate the results and correct if necessary:

- Pool the contents of the trays placed one behind another and pour them into the measuring tubes from the left-hand side.
- The quality of the horizontal spreading pattern can be read off the three inspection glasses.

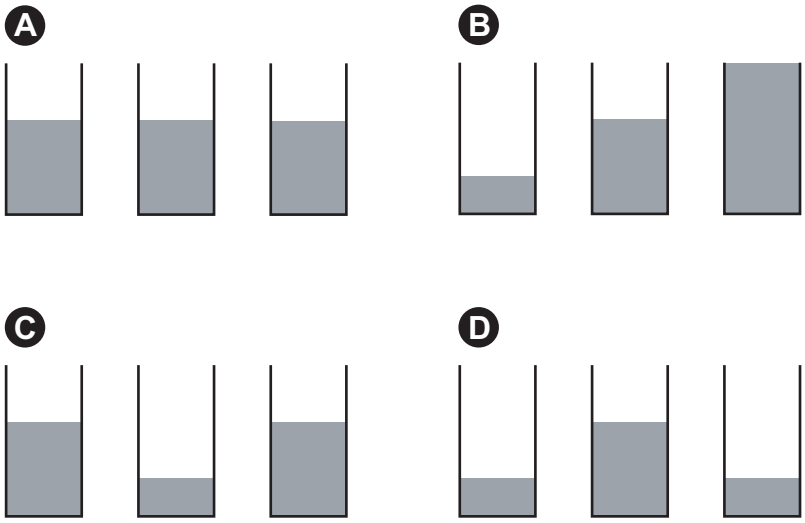


Figure 8.26: Possible results of pass

[A] All pipes contain the same amount.
[B] Asymmetrical fertiliser distribution.
[C] Too much fertiliser in the overlap zone
[D] To little fertiliser in the overlap zone.

Examples of spreader setting corrections:

Test result	Fertiliser distribution	Action, test
Case A	Even distribution (admissible deviation ±1 scale line)	Adjustments are correct.
Case B	Fertiliser quantity decreases from right to left (or vice versa).	Are the same drop points set on the right and left side?
		Is the metering slide setting on the left and right side the same?
		Tramline distances the same?
		Tramlines parallel?
		Was there a strong side wind during the test?
Case C	Too little fertiliser in the centre.	Select earlier drop point setting (e.g. change drop point from 5 to 4).
Case D	Too little fertiliser in the overlap zones.	Select later drop point setting (e.g. change drop point from 8 to 9).

8.10.3 Running three passes

Layout:

NOTICE

We recommend the layout plan up to a spreading width of **24 m**. A layout plan for greater working widths is attached to the practise test kit.

- Testing area width:3 x tramline distance
- Length of testing area: 60 - 70 m
- The three tracks must be parallel. If you are running the test without drilled tramlines, the paths must be measured using a tape measure and marked (e.g. with rods).

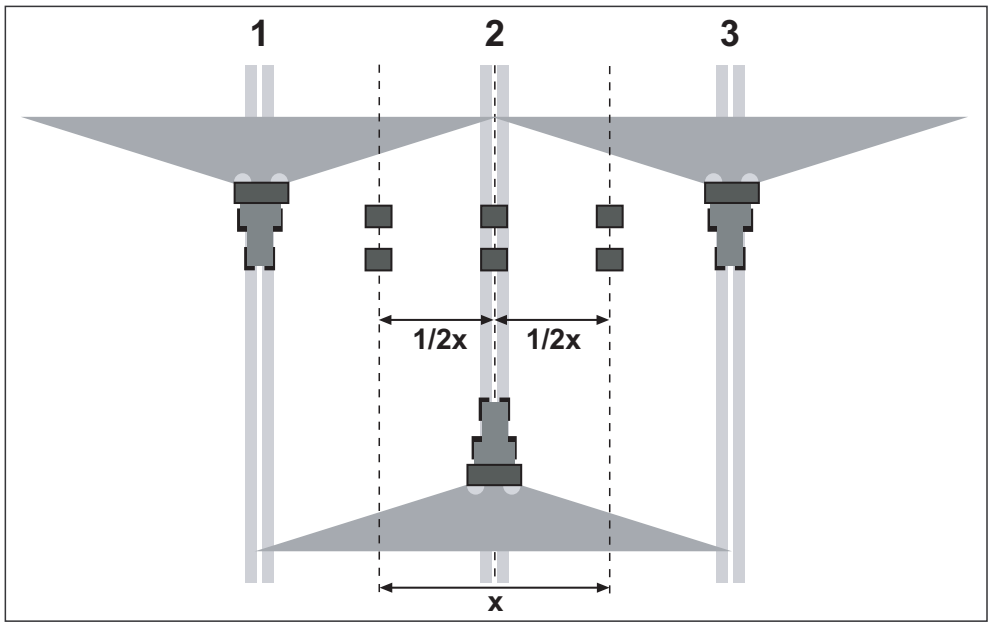


Figure 8.27: Layout for three passes

Preparing the three passes:

- Choose a similar fertiliser from the fertiliser chart and adjust the spreader accordingly.
- Set the mounting height of the machine as specified in the fertiliser chart. Make sure that the mounting height includes the top edge of the trays.
- Check the spreading elements (spreading discs, spreader vanes, outlet) for correct functioning and completeness.
- Place two catch trays each, one after another, at a distance of **1 m** in the overlap zones and in the centre track (according to figure 8.27).

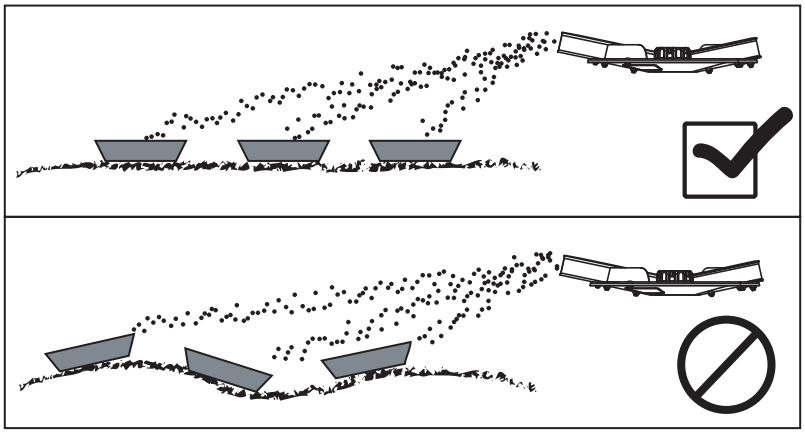


Figure 8.28: Layout of the trays

- Make sure that the trays are placed on level ground. trays set at an angle can cause measuring errors (figure 8.28).
- Carry out the calibration test (see chapter B.6 of the corresponding machine type).
- Adjust and fix the metering slides on the right and left-hand side (see chapter B.4 of the corresponding machine type).

Run the spreading test with the openings set as calculated for the job:

- Forward speed: select **3 - 4 km/h**.
- Spread along the tramlines 1-3 one after the other.
- Open the metering slide **10 m in front of the** trays.
- Close the metering slides approx. **30 m behind** the trays.

NOTICE

If the quantity collected in the catch trays is insufficient, repeat the run.

Do not change the adjustment of the metering slides.

Evaluate the results and correct if necessary:

- Pool the contents of the trays placed one behind another and pour them into the measuring tubes from the left-hand side.
- The quality of the horizontal spreading pattern can be read off the three inspection glasses.

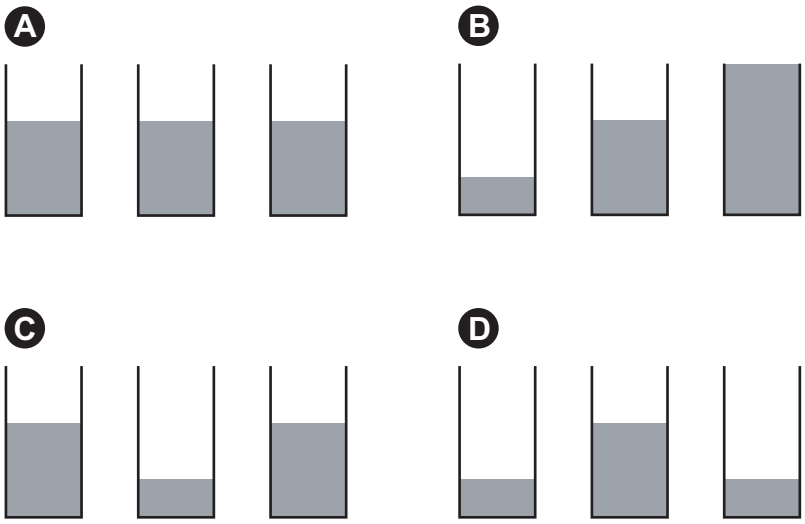


Figure 8.29: Possible results of pass

[A] All pipes contain the same amount.
[B] Asymmetrical fertiliser distribution.
[C] Too much fertiliser in the overlap zone
[D] To little fertiliser in the overlap zone.

Examples of spreader setting corrections:

Test result	Fertiliser distribution	Action, test
Case A	Even distribution (admissible deviation ±1 scale line)	Adjustments are correct.
Case B	Fertiliser quantity decreases from right to left (or vice versa).	Are the same drop points set on the right and left side?
		Is the metering slide setting on the left and right side the same?
		Tramline distances the same?
		Tramlines parallel?
		Was there a strong side wind during the test?
Case C	Too little fertiliser in the centre.	Select earlier drop point setting (e.g. change drop point from 5 to 4).
Case D	Too little fertiliser in the overlap zones.	Select later drop point setting (e.g. change drop point from 8 to 9).

8.11 Parking and unhitching the machine

The machine can be securely parked on the frame or the stabilising rollers (optional equipment).

⚠ DANGER

Crushing hazard between the tractor and the machine

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

▶ Make sure that there is no one between the tractor and the machine.

Requirements for parking the machine:

- Only park the machine on even and firm ground.
- Only park the machine when the hopper is empty.
- Relieve the load on the coupling points (lower/upper link) before removing the machine.
- After unhitching, place the universal drive shaft, hydraulic hoses, and electric cables in the brackets provided for the purpose.

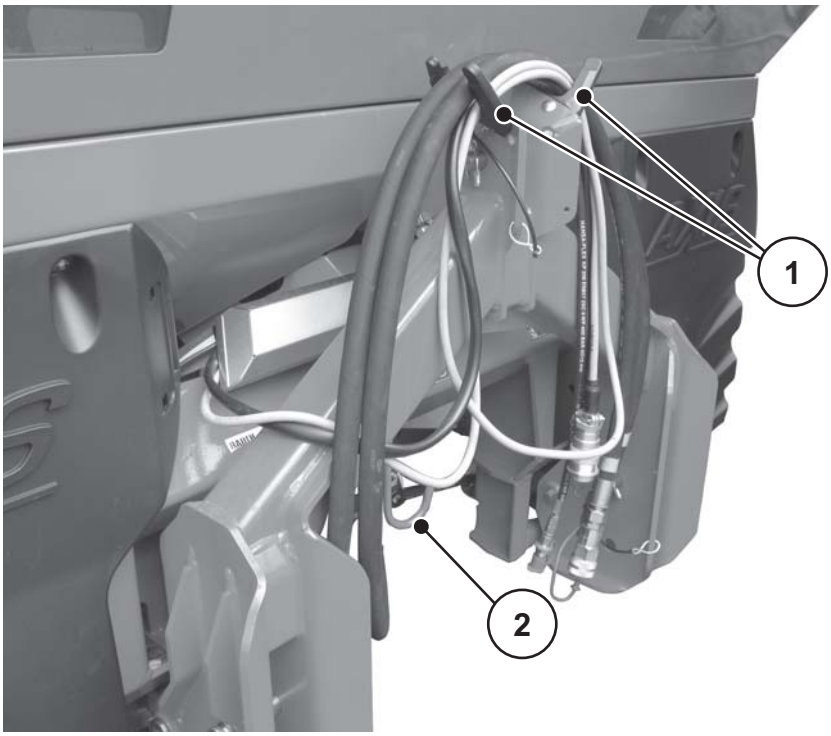


Figure 8.30: Storage of the cables and hydraulic hoses

[1] Bracket for hoses and cables
[2] Universal drive shaft bracket

⚠ WARNING

Danger of crushing and shearing due to uncoupled machine

If the locking screw (slide actuators K and R) is loosened while there is air in the hydraulic hose and the return spring is tensioned, the stop lever can unexpectedly and suddenly move to the end of the guide slot.

This may cause injury to fingers or cut fingers off and/or result in injury to the operating personnel.

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

- If the machine AXIS 20.1/AXIS 30.1/AXIS 40.1 is unhitched, the return springs of the single-acting hydraulic cylinders are to be de-tensioned. Here, proceed as follows:

1. Close the metering slide hydraulically.

2. Set the stop to the highest scale value.

3. Open metering slides.

4. Uncouple the hydraulic hoses.

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

AXIS 20.1

A Commissioning

A.1 Mounting the universal drive shaft with shear pin protection to AXIS 20.1

⚠ CAUTION

Material damages due to unsuitable drive shaft.

The mineral fertiliser spreader is equipped with a drive shaft that is designed according to the device and performance.

The usage of incorrectly dimensioned or inadmissible drive shafts, for instance without guard or suspension chain, may lead to damages to the tractor and the mineral fertiliser spreader.

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

NOTICE

If you want to mount a universal drive shaft with ratchet clutch, please proceed as described in chapter 8.3: Mount the universal drive shaft at the machine, page 46.

A.1.1 Mounting the universal drive shaft

1. Check the installed position.
   - ▷ The drive shaft end that is marked with a tractor symbol must point to the tractor.
2. Remove the protective cap.
3. Loosen the locking screw [1] of the universal drive shaft guard.
4. Turn the universal drive shaft guard to the demounting position.
5. Pull the universal drive shaft out.

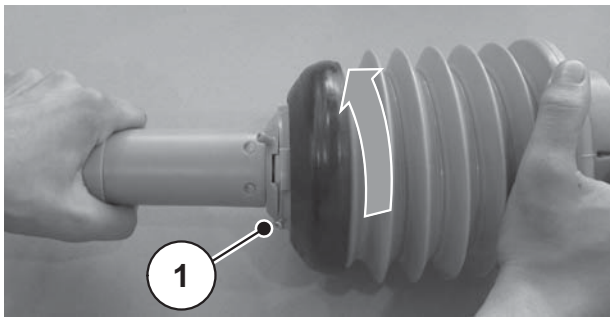


Figure 1: Loosen the universal drive shaft guard

6. Remove lubricating nipples

Figure 2: Remove lubricating nipples

7. Remove the spigot protection and grease the transmission spigot.

8. Push the universal drive shaft onto the transmission spigot.

9. Insert a hexagonal screw through the shaft coupling and transmission spigot. If required, use a rubber hammer for this purpose.

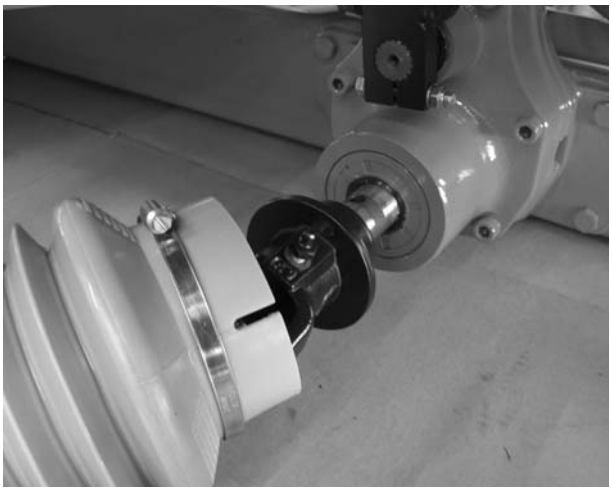


Figure 3: Push the universal drive shaft onto the transmission spigot

10. Tighten hexagonal screw and nut with 17 mm wrench (max. 35 Nm).

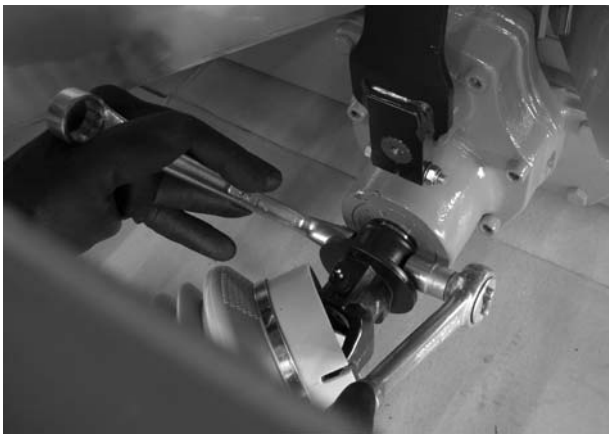


Figure 4: Tighten drive shaft

11. Retighten the lubricating nipples.

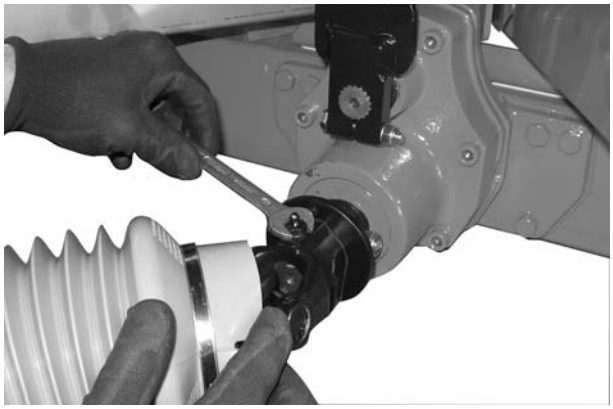


Figure 5: Tighten lubricating nipples

12. Slide drive shaft guard with hose clamp over the universal drive shaft and place over the PTO stub neck (do not tighten).

13. Turn the universal drive shaft guard to the locking position.

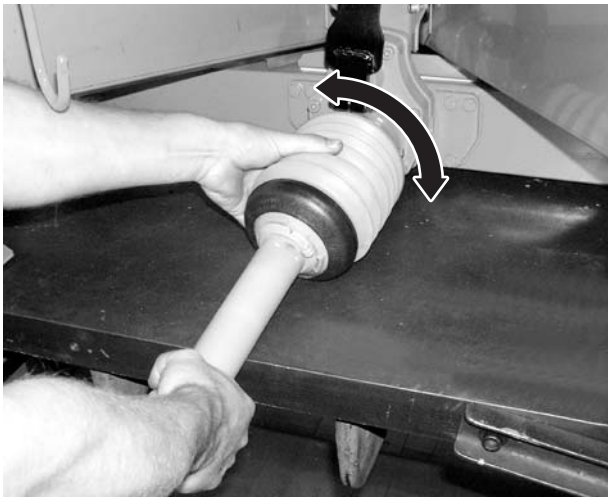


Figure 6: Put the universal drive shaft guard back on

14. Tighten locking screw.

15. Tighten hose clamp.

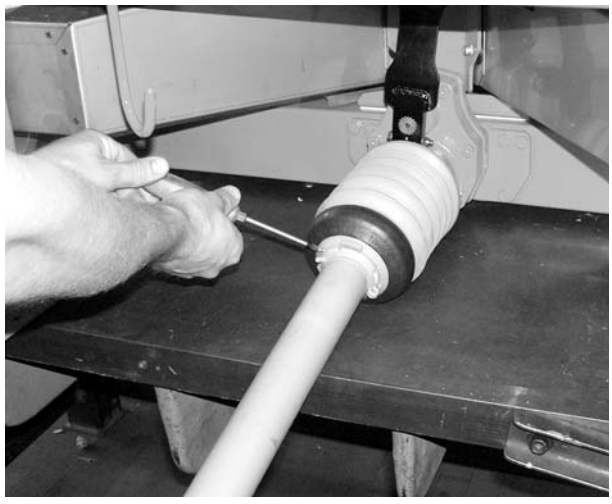


Figure 7: Secure universal drive shaft guard

A.1.2 Dismounting the universal drive shaft

Notes:

- Dismount the universal drive shaft in reverse order of attachment.
- Do not use the safety chain to suspend the universal drive shaft.
- Store uncoupled universal drive shaft on the retainer provided.
  - Please also refer to figure 8.30.

A.2 Connecting the slide actuators

A.2.1 Connecting the hydraulic slide actuators: Version K/D

Function

The opening slides are actuated separately by two hydraulic cylinders. The hydraulic cylinders are connected to the slide actuation on the tractor via hydraulic hoses.

Version	Hydraulic cylinder	Operation	Requirements for the tractor
K	Single-acting hydraulic cylinders	Oil pressure closes Spring force opens	Two single-acting control valves
D	Double-acting hydraulic cylinders	Oil pressure closes Oil pressure opens	Two double-acting control valves

Attachment

1. Depressurise the hydraulic system.
2. Remove the hoses from the brackets attached to the frame of the machine.
3. Insert the hoses into the corresponding couplings on the tractor.

NOTICE

Version K

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

A.2.2 Connecting the hydraulic slide actuators: Version R

Instructions for connecting a two-way unit

The two-way unit:

- is connected to version **R** as standard.
- is offered as optional equipment for version **K**.

Function

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

When using the two-way unit, the hydraulic hoses between the hydraulic cylinders and the slide actuators are additionally sheathed 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.

Version	Hydraulic cylinder	Operation	Requirements for the tractor
R	Single-acting hydraulic cylinder with two-way unit	Oil pressure closes Spring force opens	One single-acting control valve

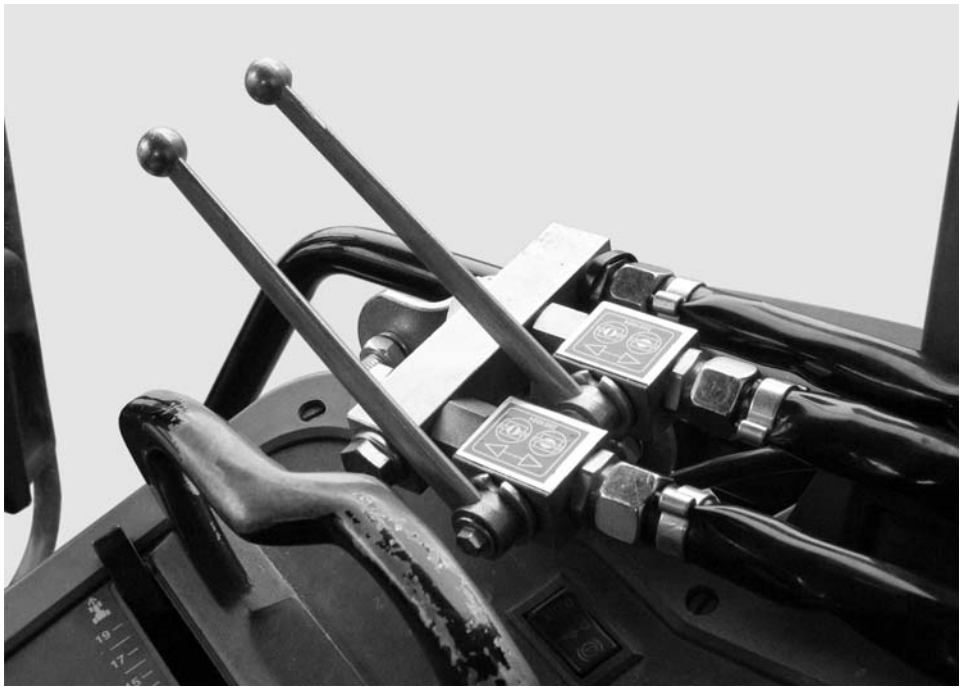


Figure 8: Slide actuator of the two-way unit

The metering slides can be actuated individually via the ball cocks of the two-way unit.

Attachment

1. Depressurise the hydraulic system.
2. Remove the hoses from the brackets attached to the frame of the machine.
3. Insert the hoses into the corresponding couplings on the tractor.

NOTICE

Version R

Before extended road travel or **during filling**, close the two ball cocks on the two-way unit. This prevents the automatic opening of the metering slide caused by valve leakages in the tractor hydraulics.

A.2.3 Connecting the electronic slide actuators: Version C

NOTICE

An electronic slide actuator is connected to the machine AXIS 20.1 C.

The electronic slide actuator is described in a separate instruction manual for the **E-CLICK** operating unit. This instruction manual is an integral part of the operating unit.

A.2.4 Connecting the electronic slide actuators: Version Q/W/EMC

NOTICE

The machines of the versions Q, W and EMC are equipped with electronic slide actuators.

The electronic slide actuator is described in a separate instruction manual for the operating unit. This instruction manual is an integral part of the operating unit.

A.3 Filling the machine

⚠ DANGER

Danger from running engine

Working on the machine while the engine is running may result in serious injuries caused by mechanical components and escaping fertiliser.

- ▶ Turn the tractor motor off.
- ▶ Remove the ignition key.
- ▶ Send third persons out of the danger area.

⚠ CAUTION

Inadmissible overall weight

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

- ▶ Before you start filling, calculate the amount you can load.
- ▶ Comply with the permissible overall weight.

Instructions on filling the machine:

- Close the metering slides and, if necessary, the ball cocks (versions K/R).
- Fill the machine **only** when it is attached to the tractor. Make sure that the tractor is standing on level and solid ground.
- Secure the tractor to prevent it moving. Apply the handbrake.
- Turn the tractor motor off. Remove the ignition key.
- For filling heights of more than 1.25 m, use suitable auxiliary equipment, e.g. front-end loader, feed screw conveyor.
- Fill the machine no higher than the top-edge. Check the filling level, e.g. through the inspection window in the hopper (depending on the model).

Filling level scale

A filling level scale is installed in the hopper to monitor the filling level.

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

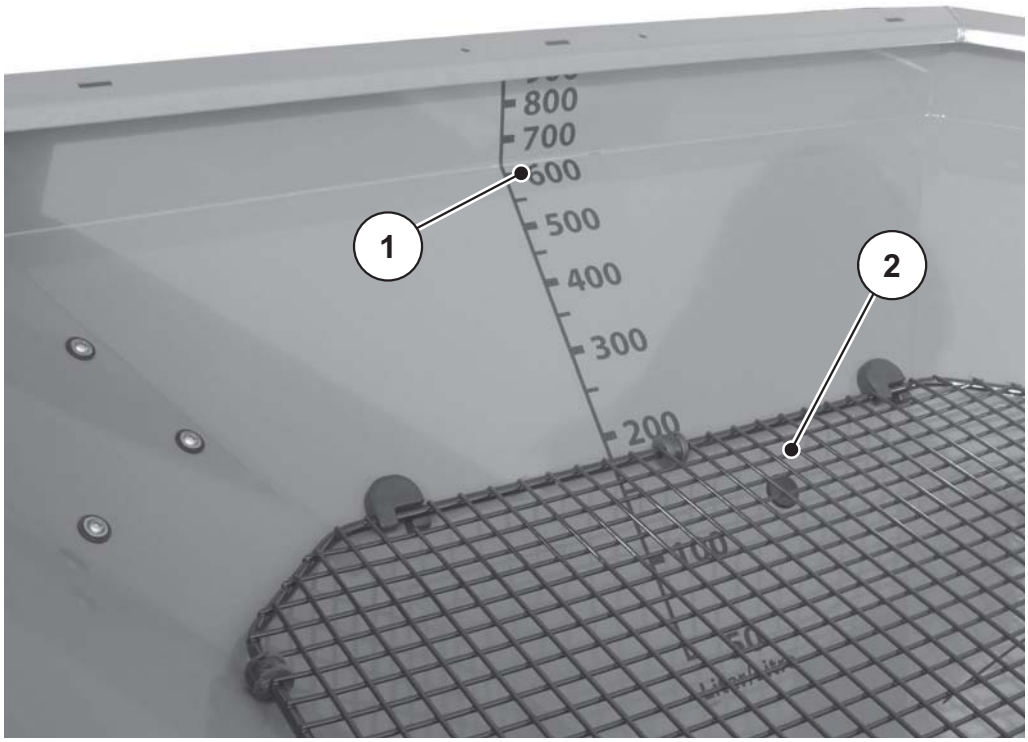


Figure 9: Filling level scale

[1] Filling level scale (in litres)
[2] Protective grid in hopper

B Spreading operation

B.1 Safety

⚠ DANGER

Danger from running engine

Working on the machine while the engine is running may result in serious injury caused by mechanical components and escaping fertiliser.

Wait until all rotating parts have come to a complete stop before making any adjustments.

- ▶ Turn the tractor motor off.
- ▶ Remove the ignition key.
- ▶ **Send third persons out of the danger area.**

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

- Volume setting is always carried out with the slide closed. With slide actuators using return springs (versions K+R), the ball cocks must be closed.
- Close the ball cocks (versions K+R) in order to prevent inadvertent escaping of fertiliser from the hopper (e.g. during road travel).

⚠ CAUTION

Risk of crushing or shearing by tensioned return springs, versions K+R (single-acting slide actuator)

If the metering slide is not closed hydraulically, this may cause the pre-tensioned stop lever to snap back hard against the end of the guiding slot when the retaining screw is loosened.

In the event of misuse or non-observance of the procedure for setting the spreading volume, the stop lever can snap back forcefully and unexpectedly to the end of the guiding slot.

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

- ▶ **Never** push against the spring pressure by hand to hold the stop lever in position when setting the quantity.
- ▶ Before carrying out any adjustment work (e.g. setting of the spreading volume), always close the metering slide hydraulically.

B.2 Using the fertiliser chart

NOTICE

Please observe chapter 8.6: Using the fertiliser chart, page 60.

B.3 Spreading at the headland

NOTICE

Please observe chapter 8.7: Spreading at the headland, page 67.

B.4 Adjusting the application rate

B.4.1 Version Q/W/EMC

NOTICE

The machines of the **versions Q, W and EMC** include electronic slide actuators for setting the spreading volume.

The electronic slide actuator is described in a separate instruction manual for the operating unit. This instruction manual is an integral part of the operating unit.

⚠ CAUTION

Damage to property caused by the incorrect position of the metering slide

The operation of the actuators via the QUANTRON operating unit may cause damage to the metering slides if the stop levers are incorrectly positioned.

▶ Always clamp the stop levers at the maximum scale position.

B.4.2 Version K/D/R/C

You can set the spreading volume of the machines of the versions K/D/R/C via the lower scale plate on both openings.

For this purpose, move the pointer to the position specified beforehand in the fertiliser chart or from a calibration test. This is the **Open** stop position which the slide approaches hydraulically or by spring force (depending on the version) while spreading.

The position depends on the **spreading volume** and the **forward speed**.

1. Close the metering slide.
2. Determine the position for the scale setting in the fertiliser chart or based on the calibration test.
3. Release the retaining screw [2] at the lower end of the scale plate [3].
4. Move the pointer [1] of the stop to the determined position.
5. Tighten the retaining screw.

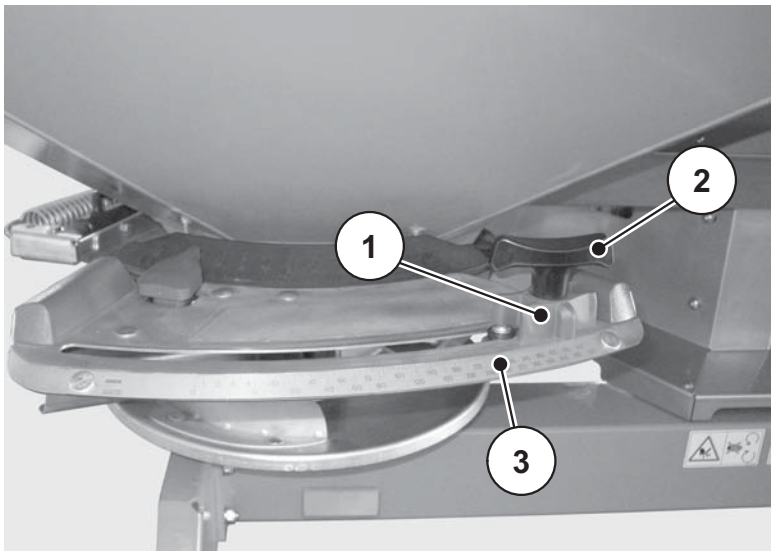


Figure 10: Adjustment scale for the spreading volume

[1] Pointer stop
[2] Retaining screw
[3] Lower end of the scale plate

B.5 Setting the working width

B.5.1 Selecting the correct spreading disc

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

Spreading disc type	Working width
S2	12-18m
S4	18-28 m

There are **two** different, permanently installed spreader vanes on every spreading disc. The spreader vanes are marked according to their model.

⚠ WARNING

Risk of injury from rotating spreading discs!

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

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

Spreading disc type	Spreading disc left	Spreading disc right
S2	S2-L-170 S2-L-240	S2-R-170 S2-R-240
S2 VxR plus (coated)	S2-L-170 VxR S2-L-240 VxR	S2-R-170 VxR S2-R-240 VxR
S4	S4-L-200 S4-L-270	S4-R-200 S4-R-270
S4 VxR plus (coated)	S4-L-200 VxR S4-L-270 VxR	S4-R-200 VxR S4-R-270 VxR

B.5.2 Removing and mounting spreading discs

⚠ DANGER

Danger from running engine

Working on the machine while the engine is running may result in serious injury caused by mechanical components and escaping fertiliser.

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

Removing the spreading discs

[1] Adjustment lever (hopper, left side according to direction of travel)

Figure 11: Adjustment lever

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

1. Remove the adjustment lever from the bracket.
2. Use the adjustment lever to loosen the cap nut of the spreading disc.

Figure 12: Loosen cap nut

3. Unscrew the cap nut.
4. Remove the spreading disc from the hub.
5. Put the adjustment lever back into the designated bracket.

Figure 13: Unscrew the cap nut

Mounting the spreading discs

Requirements:

- PTO and tractor engine are switched off and locked to prevent unauthorised starting.

Mount the left spreading disc on the left side in the direction of travel and the right spreading disc on the right side in the direction of travel. Make sure that the left and right spreading discs are not reversed.
The following procedure is for mounting the left-hand spreading disc. The right-hand spreading disc is to be mounted according to these instructions as well.

1. Put the left spreading disc onto the left spreading disc hub.

   The spreading disc must be evenly placed on the hub (if required, remove dirt).

NOTICE

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

2. Carefully position the cap nut (do not tilt).
3. Tighten the cap with 25 Nm until it is hand tight, do **not** use the adjustment lever.

NOTICE

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

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

B.5.3 Adjusting the drop point

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

The drop point is set using the top scale.

- Adjusting in the direction of smaller numbers: The fertiliser is ejected sooner. This results in spreading patterns for smaller working widths.
- Adjusting in the direction of larger numbers: The fertiliser is ejected later and spread more towards the outside into the overlap zones. This results in spreading patterns for larger working widths.

The operator moves the end stop to the position determined beforehand in the fertiliser chart.

Figure 14: Adjustment centre for drop point

1. Determine the position for the drop point in the fertiliser chart or by carrying out a test using the practice test kit (optional equipment).
2. Grip the left and right handle.
3. Press the pointer unit.

   ▷ The lock is released. The adjustment centre can be moved.
4. Move the adjustment centre with the pointer unit to the calculated position.
5. Release the pointer unit.

   ▷ The adjustment centre is locked.
6. Ensure that the adjustment centre is locked.

B.6 Calibration test

NOTICE

The **M EMC** function of the machine AXIS-M 20.1 EMC (+W) automatically regulates the application rate for each side.

Therefore, a calibration test is **not required**.

NOTICE

Execute the calibration test for the machine versions **Q/W/EMC** at the operating unit.

The calibration test is described in a separate instruction manual for the operating unit. This instruction manual is an integral part of the operating unit.

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

Carry out a calibration test:

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

The calibration test is to be conducted with engaged PTO at a standstill or during travel over a test track.

B.6.1 Determining the nominal output volume

Calculate the nominal output volume before starting the calibration test.

Calculating the exact forward speed

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

1. With a **semi-filled** machine, drive a distance of **100 m on the field**.
2. Stop the time required for this.
3. Store the exact forward speed at the scale of the calibration test calculator.

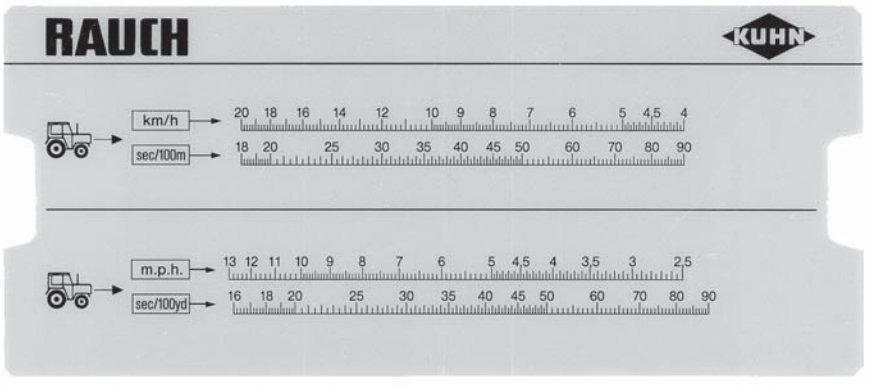


Figure 15: Scale for calculating the exact forward speed

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

$$\text{Forward speed (km/h)} = \frac{360}{\text{Stopped time on 100m}}$$

Example: You need 45 seconds for 100 m:

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

Determining the nominal output volume per minute

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

- The exact forward speed,
- the working width,
- the desired application rate.

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

NOTICE

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

If you cannot find your values in the fertiliser chart, they can be determined with the calibration test calculator or with a formula.

Calculation with the calibration test calculator:

1. Move the tab until it is at 300 kg/ha under 18m.
2. The value of the nominal output volume for both outlets can now be read off above the value of the forward speed of 8 km/h.

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

If the calibration test is carried out at one outlet only, the total value of the nominal output volume must be halved to calculate the value for one outlet.

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

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

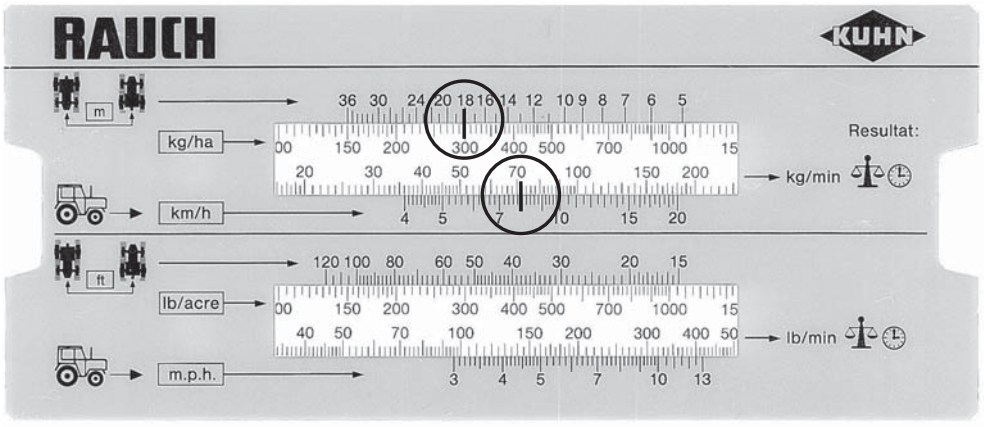


Figure 16: Scale for calculation of the nominal output volume per minute

Calculation with formula

The nominal output volume can also be calculated using the following formula:

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

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 forward speed.

Example: a 10 % increased speed results in 10 % underfertilisation.

B.6.2 Run the calibration test

⚠ WARNING

Risk of injury due to chemicals

Escaping fertiliser may lead to injury to eyes and nasal mucous membrane.

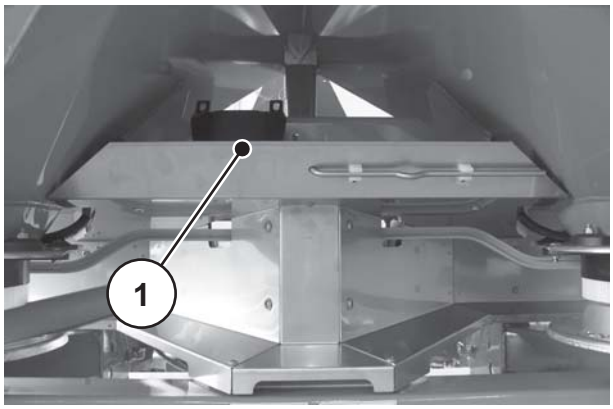
- ▶ Wear safety goggles during the calibration test.
- ▶ Before running the calibration test, ensure that all people leave the hazard zone of the machine.

Requirements:

- The metering slides are closed.
- PTO and tractor engine are switched off and locked to prevent unauthorised starting.
- Have a sufficiently large vessel ready for holding the fertiliser (holding capacity at least **25 kg**). Determine the empty weight of the tray.
- Have the calibration test chute ready. The calibration test chute is located in the centre behind the spreading disc guard.
- A sufficient quantity of fertiliser is placed in the hopper.
- Using the fertiliser chart, the pre-set values for the metering slide end stop, the PTO speed and the calibration test time are determined and known.

NOTICE

Select the values for the calibration test for the maximum possible spreading rate. The greater the quantity, the greater the precision of the measurement.



[1] Position of the calibration test chute

Figure 17: Calibration test chute

Running the test (example on left side of spreader):

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

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

Figure 18: Loosen cap nut

Icon:

2. Set the drop point to position **0**.

Figure 19: Attaching the calibration test chute

3. Suspend the calibration test chute under the left output (in the direction of travel).

4. Set the metering slide stop to the value specified in the fertiliser chart.

⚠ WARNING

Risk of injury due to 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.

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

5. Position a collection vessel under the left output.

Figure 20: Run the calibration test

6. Start the tractor.
7. Set the PTO shaft speed according to the values in the fertiliser chart.
8. Open the left metering slide for the calibration test time stipulated before from the tractor seat. Close the metering slide after this time.
9. Close the metering slide when this time has elapsed.
10. Determine the fertiliser weight (taking into consideration the empty weight of the collection vessel).
11. Compare the actual volume with the nominal volume.
    - ▷ Actual output volume = nominal output volume: output rate stop is set correctly. End calibration test.
    - ▷ Actual output volume < nominal output volume: Set the output rate stop to a higher position and repeat the calibration test.
    - ▷ Actual output volume > nominal output volume: Set the output rate stop to a lower position and repeat the calibration test.

NOTICE

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

Calculation with formula

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

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

12. End calibration test. Switch off the PTO shaft and tractor engine and lock them to prevent unauthorised starting.

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

NOTICE

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

14. Carefully position the cap nut (do not tilt).

15. Tighten the cap nut with **25 Nm** (hand tight). Do **not** use the adjustment lever.

Figure 21: Screw on the cap nut

NOTICE

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

16. Check that there is clearance between the spreader vanes and the outlet by turning the spreading discs by hand.
17. Re-mount the calibration test chute and the adjustment lever at their specified locations at the machine.
18. Reset the drop point to the determined spreading position.

B.7 Checking the mounting height

NOTICE

Check if the preset mounting height is correct while the hopper is full.

- Take the mounting height setting values from the fertiliser chart.
- Observe the maximum admissible mounting height.
- Please also refer to „Presetting the mounting height“ on page 54.

B.8 Setting the PTO speed

NOTICE

Take the correct PTO speed from the fertiliser chart.

B.9 Faults and possible causes

⚠ WARNING

Risk of injury when rectifying faults inappropriately

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

- ▶ Any faults are to be rectified **immediately**.
- ▶ Only carry out repairs yourself if you have the appropriate **qualifications**.

Troubleshooting requirements

Please make sure the following conditions are met before eliminating the faults.

- PTO and tractor engine are switched off and locked to prevent unauthorised starting.
- The power supply between tractor and machine is disconnected.
- The hopper is standing on the ground.

NOTICE

Please take particular note of the warnings in chapter 3: Safety, page 5 and section C: Maintenance and repair, page 114, before rectifying faults.

Fault	Possible cause/action
Uneven fertiliser distribution	● Remove clumps of fertiliser on spreading discs, spreader vanes and discharge ducts. ● Metering slides do not open completely. Check slide function. ● Drop point incorrectly adjusted. Correct the adjustment.
Too much fertiliser in the tractor track	● Check spreader vanes and outlets and replace faulty parts immediately. ● The fertiliser has a smoother surface than the fertiliser that was tested for the fertiliser chart. Select later drop point setting (e.g. from 4 to 5). ● PTO speed too low. Correct speed.
Too much fertiliser in the overlap area	● The fertiliser has a rougher surface than the fertiliser that was tested for the fertiliser chart. Select earlier drop point setting (e.g. from 5 to 4). ● PTO speed too high. Correct speed.

Fault	Possible cause/action
Spreading application higher on one side than the other. Hopper empties unevenly during normal spreading.	Fertiliser bridging above the agitator ● Remove fertiliser until the height of the protective grid on the affected side. ● Break up accumulated fertiliser with a wooden stick through the bars of the protective grid. Outlet blocked ● See blockages of the metering openings Defective agitator ● Remove fertiliser until the height of the protective grid on the affected side. ● Open the metering slide and break up accumulated fertiliser with a wooden stick through the bars of the protective grid so that the remaining fertiliser can run out of the outlet. ● Check the functionality of the agitator drive. See chapter 9.8: Checking the agitator drive, page 208. Metering slide set incorrectly ● Empty the hopper of remaining fertiliser. See chapter B.10: Discharging residual material, page 113. ● Check metering slide setting. See chapter C.4: Metering slide adjustment, page 117.
Irregular fertiliser feed to spreading disc	Fertiliser bridging above the agitator ● Remove fertiliser until the height of the protective grid on the affected side. ● Break up accumulated fertiliser with a wooden stick through the bars of the protective grid. Outlet blocked ● See blockages of the metering openings Defective agitator ● Remove fertiliser until the height of the protective grid on the affected side. ● Open the metering slide and break up accumulated fertiliser with a wooden stick through the bars of the protective grid so that the remaining fertiliser can run out of the outlet. ● Check the functionality of the agitator drive. See chapter 9.8: Checking the agitator drive, page 208.
Spreading discs are fluttering.	● Check cap nuts for tight fit and check threads.

Fault	Possible cause/action
Metering slide does not open	● Metering slides do not move easily. Check for smooth slide movement, check the lever and the joints, and improve if necessary. ● Check tension spring. ● The reducing plate in the female hose coupling is dirty.
Metering slide opens too slowly	● Clean reducing plate. ● Replace the 0.7 mm reducing plate by a 1.0 mm reducing plate. The plate is in the female hose coupling.
Agitator not working.	● Check agitator drive. See 9.8: Checking the agitator drive, page 208
Blockage of the metering openings due to: fertiliser clumps, damp fertiliser, miscellaneous impurities (leaves, straw, sack residues)	● Clear blockages. Proceed as follows: **1.** Park tractor, remove ignition key, disconnect the power supply, **2.** Open metering slide. **3.** Place collecting vessel underneath. **4.** Remove spreading discs. **5.** Clean the outlet **from below** with a wooden pole or the adjustment lever and push through the metering opening **6.** Remove any foreign objects in the hopper. **7.** Install spreading discs, close metering slides.
The spreading discs do not turn or stop suddenly after being turned on.	If you are using a universal drive shaft with shear pin protection: ● Check the shear pin protection, and replace if necessary (see the universal drive shaft manufacturer's manual).

B.10 Discharging residual material

⚠ WARNING

Risk of injury due to 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.

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

To maintain the value of your machine, discharge after every use. Proceed as with the calibration test to discharge the residue. See „Run the calibration test“ on page 105.

Position drop point to **0**.

Icon:

Instructions for completely discharging the residual material:

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

1. Empty hopper until no more spreading material comes out (normal discharge of residual material).
2. Switch off the PTO and the tractor engine and lock them to prevent unauthorised starting. Remove the ignition key of the tractor.
3. While the metering slide is open, move the drop point back and forth (position **0** to **9** and back).
4. Remaining fertiliser can be removed with a soft water jet; see also „Cleaning“ on page 205.

C Maintenance and repair

C.1 Safety

NOTICE

Please note the warnings in chapter 3: Safety, page 5.
Take **particular note of the instructions** in the section 3.8: Maintenance and service, page 11.

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

Any maintenance and repair work is to be conducted with increased alertness at all times. Work particularly thoroughly and cautiously.

Observe the following instructions in particular:

- Welding and work on the electrical and hydraulic systems is to be carried out by qualified technicians only.
- There is a **risk of tipping** when working at the lifted machine. Always secure the machine with suitable supporting elements.
- Always use **both** eyebolts in the hopper for lifting the machine with hoisting gear.
- There is a **risk of crushing and shearing** at power-operated components (adjustment lever, metering slide). Make sure that there is no one in close proximity to the moving parts during maintenance.
- Spare parts must at least comply with the technical standards specified by the manufacturer. This is assured e.g. with genuine spare parts.
- Before starting any cleaning, maintenance, or repair work and when troubleshooting, switch off the tractor's engine and wait until all moving parts of the machine have come to a stop.
- By controlling the machine with an operating unit, additional risks and hazards due to externally operated components may arise.
  - Ensure that the power supply between tractor and machine is separated.
  - Disconnect the power supply cable from the battery.
- Always have repairs carried out by a **qualified and authorised specialist workshop** only.

C.2 Lubrication of weighing spreader

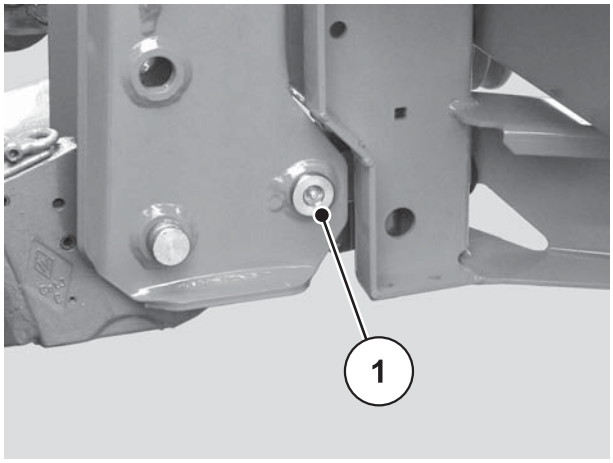


Figure 22: Lubrication point of weighing spreader

C.3 Checking the screw connections of the weigh cell

The mineral fertiliser spreader comes with 2 weigh cells, which are mounted with 2 screw connections per cell. The tie rod has one screw connection.

Check the screw connections for the weigh cells and the tie rod for tightness on both sides of the machine:

- before every spreading season
- also during the spreading season if necessary.

Checking:

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

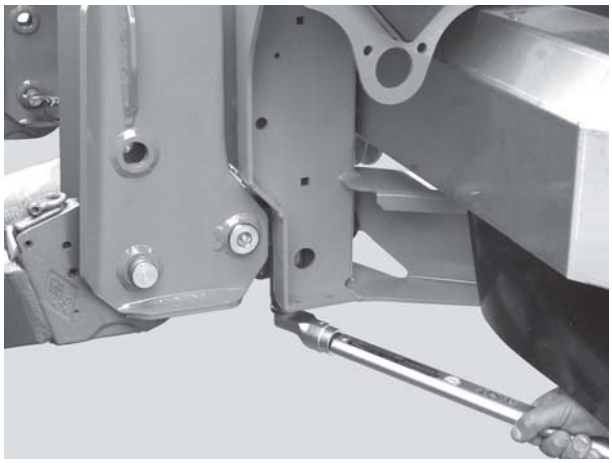


Figure 23: Fastening the weighing cell (on the left side of the direction of travel)

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

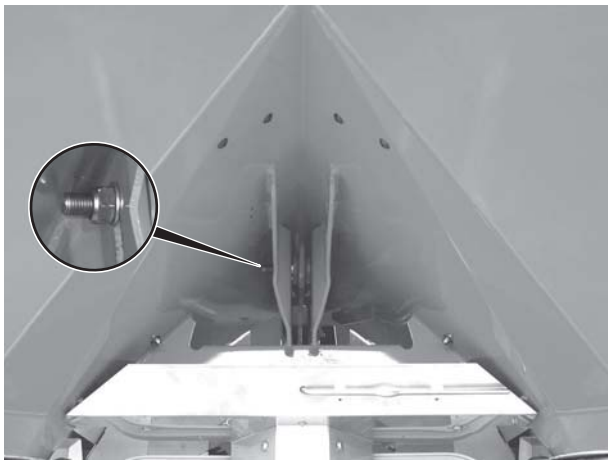


Figure 24: Fastening the tie rod (in the rear of the direction of travel underneath the intermediate roof)

NOTICE

After tightening the screw connections using the torque wrench, the weighing cells must be tared anew. Please follow the instructions in the chapter “Machine tare" of the instruction manual of the operating unit.

C.4 Metering slide adjustment

Check that the metering slides open smoothly before every working season, and during the season if necessary.

⚠ WARNING

Danger of crushing and shearing due to components operated by an external force

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

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

- ▶ Turn the tractor motor off.
- ▶ Remove the ignition key.
- ▶ Disconnect the power supply between the tractor and the machine.
- ▶ The actuation of the hydraulic metering slide during adjustment work is prohibited.

Requirements:

- In order to check the metering slide adjustment, the mechanism must be freely movable.
- The return spring is unhooked.
- The hydraulic cylinder is unhooked.

Check (e.g. left side of machine):

1. Take a lower link pin **d = 28 mm** and insert it centrally into the metering opening.

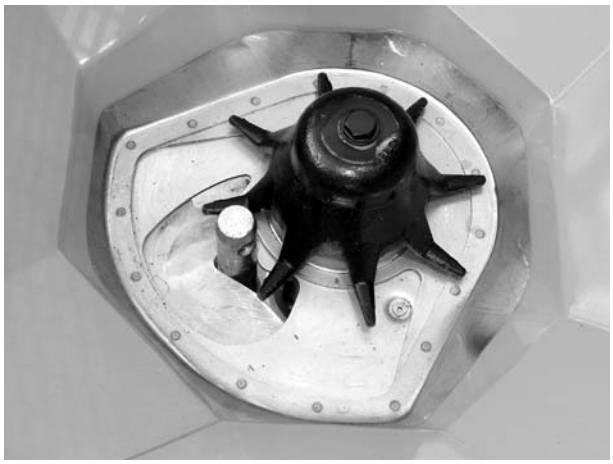


Figure 25: Lower link pin in metering opening

2. Push the metering slide against the pin, and lock it in this position by tightening the retaining screw.

▷ **The stop on the lower scale plate (metering scale) is positioned at the scale value 85. If the position is not correct, readjust the scale.**

To adjust:

The metering slide is in the position of step 2 (lightly pressed against the pin).

3. Loosen the fixing screws on the scale of the lower scale plate.

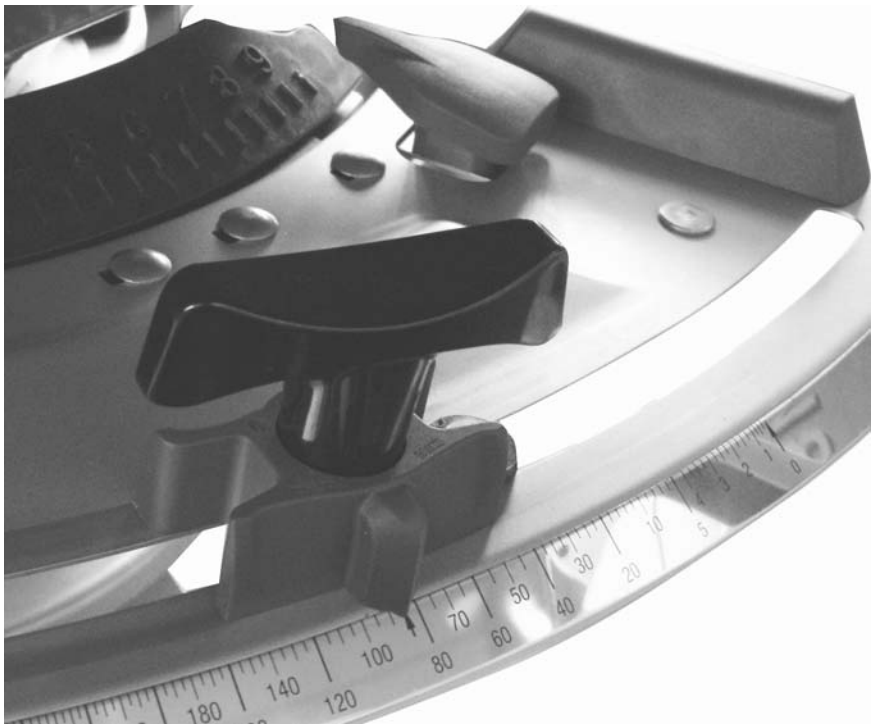


Figure 26: Adjustment scale of metering slide

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

5. Tighten the scale again.

6. Repeat working steps 1 - 4 for the right metering slide.

NOTICE

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

7. Reattach the return spring and the hydraulic cylinders.

NOTICE

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

Please observe the instruction manual for the operating unit.

C.5 Adjusting the drop point

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

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

The drop point is set using the top scale.

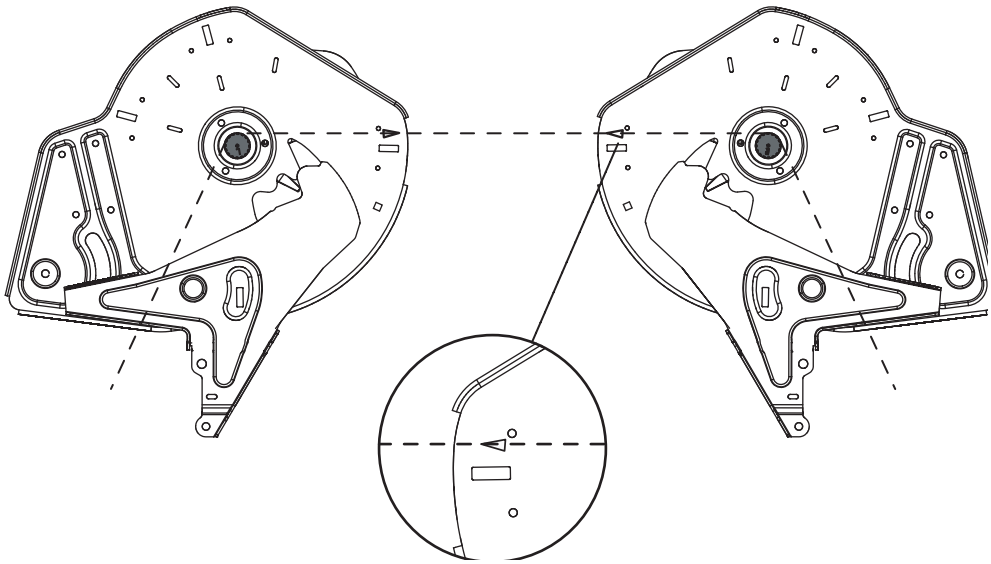


Figure 27: Checking the drop point

Checking:

NOTICE

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

1. Set the drop point to position **6**.
2. Remove both outlets along with their brushes at both openings.
3. Release both plastic levers (agitator drive) and slide them downwards until the splines of the agitator are showing.
4. Attach a suitably thin string at the **rear** in the direction of travel to the splines of the agitator shafts and tauten it.
   - ▷ The triangular mark on the base plate must be aligned to the taut string.
   - ▷ If the mark is not aligned to the string, the drop point must be readjusted.

To adjust:

5. Release the adjustment plate underneath the "drop point pointer" button (2 self-locking nuts).

Figure 28: Loosen the drop point adjustment plate

6. Turn the adjustment centre until the triangular mark lines up with the taut string.
7. Fasten the adjustment plate.
8. Push both plastic levers (agitator drive) back up and secure them. Mount the outlet with brushes.

Only for AXIS 20.1 W

9. Recalibrate the drop point positions with the operating unit.

NOTICE

Please follow the instructions in the chapter “Test/Diagnosis" of the operating unit instruction manual.

AXIS 30.1, AXIS 40.1

A Commissioning

A.1 Connecting the slide actuators

A.1.1 Connecting the hydraulic slide actuators: Version K/D

Function

The opening slides are actuated separately by two hydraulic cylinders. The hydraulic cylinders are connected to the slide actuatior on the tractor via hydraulic hoses.

Version	Hydraulic cylinder	Operation	Requirements for the tractor
K	Single-acting hydraulic cylinders	Oil pressure closes Spring force opens	Two single-acting control valves
D	Double-acting hydraulic cylinders	Oil pressure closes Oil pressure opens	Two double-acting control valves

Attachment

1. Depressurise the hydraulic system.
2. Remove the hoses from the brackets attached to the frame of the machine.
3. Insert the hoses into the corresponding couplings on the tractor.

NOTICE

Version K

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

A.1.2 Connecting the hydraulic slide actuators: Version R

Instructions for connecting a two-way unit (optional equipment)

The two-way unit

- is connected to version **R** as standard.
- is offered as optional equipment for version **K**.

Function

The opening slides are actuated separately by two hydraulic cylinders. The hydraulic cylinders are connected to the slide actuation on the tractor via hydraulic hoses.

When using the two-way unit, the hydraulic pipes between the hydraulic cylinders and the slide actuators are additionally sheathed 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.

Version	Hydraulic cylinder	Operation	Requirements for the tractor
R	Single-acting hydraulic cylinder with two-way unit	Oil pressure closes Spring force opens	One single-acting control valve

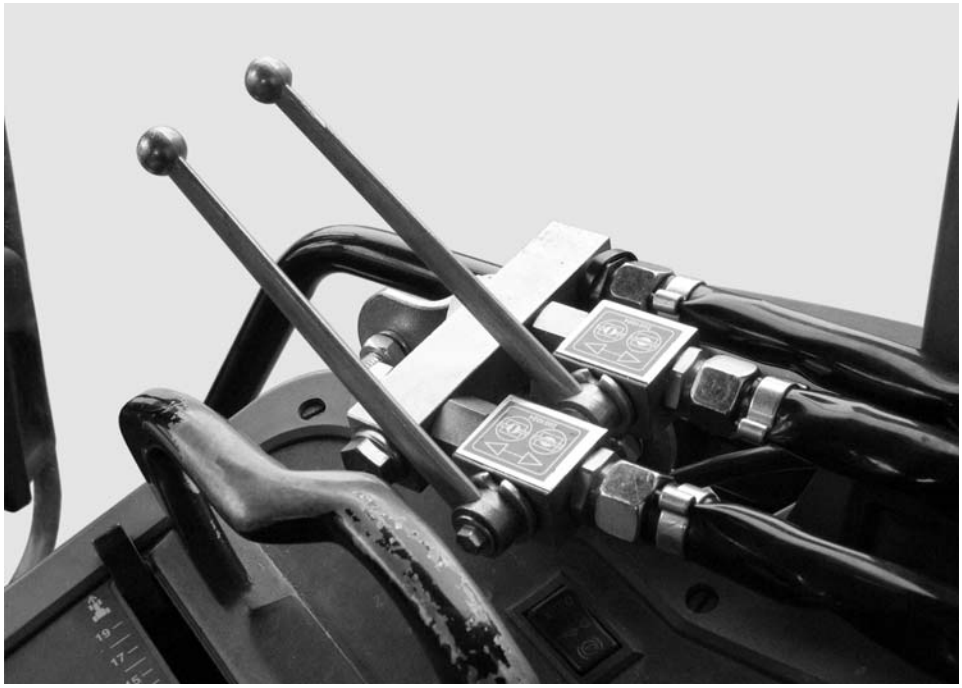


Figure 1: Slide actuator of the two-way unit

The metering slides can be actuated individually via the ball cocks of the two-way unit.

Attachment

1. Depressurise the hydraulic system.
2. Remove the hoses from the brackets attached to the frame of the machine.
3. Insert the hoses into the corresponding couplings on the tractor.

NOTICE

Version R

Before extended road travel or **during filling**, close the two ball cocks on the two-way unit. This prevents the automatic opening of the metering slide caused by valve leakages in the tractor hydraulics.

A.1.3 Connecting the electronic slide actuators: Version Q/W/EMC

NOTICE

The machines of the **versions Q, W and EMC** are equipped with electronic slide actuators.

The electronic slide actuator is described in a separate instruction manual for the operating unit. This instruction manual is an integral part of the operating unit.

A.1.4 Connecting the electronic slide actuators: Version C

NOTICE

An electronic slide actuator is connected to the machine AXIS 30.1 C and AXIS 40.1 C.

The electronic slide actuator is described in a separate instruction manual for the **E-CLICK** operating unit. This instruction manual is an integral part of the operating unit.

A.2 Filling the machine

⚠ DANGER

Danger from running engine

Working on the machine while the engine is running may result in serious injuries caused by mechanical components and escaping fertiliser.

- ▶ Turn the tractor motor off.
- ▶ Remove the ignition key.
- ▶ Send third persons out of the danger area.

⚠ CAUTION

Inadmissible overall weight

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

- ▶ Before you start filling, calculate the amount you can load.
- ▶ Comply with the permissible overall weight.

Instructions on filling the machine:

- Close the metering slide and, if applicable, the ball cocks (version K/R).
- **Only** fill the machine when it is attached to the tractor. Make sure that the tractor is standing on level and solid ground.
- Secure the tractor against rolling away. Apply the handbrake.
- Turn the tractor motor off.
- Remove the ignition key.
- For filling heights of more than 1.25 m, fill the machine by means of auxiliary equipment (e.g. front loader or screw conveyor).
- Fill the machine up to the edge maximally. Check the filling level e.g. by means of the inspection window in the hopper (depending on type).

Filling level scale

A filling level scale is installed in the hopper to monitor the filling level.

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

The filling level can be checked through two inspection windows in the side wall of the hopper.

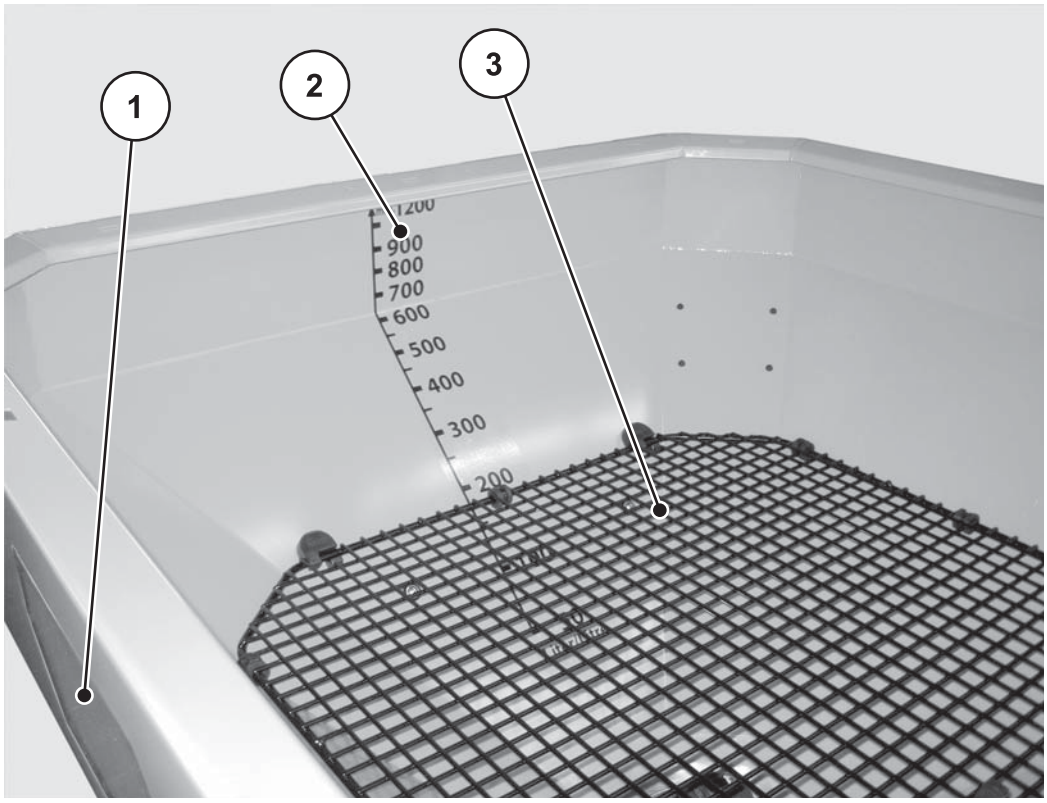


Figure 2: Filling level scale

[1] Inspection window
[2] Filling level scale (in litres)
[3] Protective grid in hopper

B Spreading operation

B.1 Safety

⚠ DANGER

Danger from running engine

Working on the machine while the engine is running may result in serious injury caused by mechanical components and escaping fertiliser.

Wait until all rotating parts have come to a complete stop before making any adjustments.

- ▶ Turn the tractor motor off.
- ▶ Remove the ignition key.
- ▶ **Send third persons out of the danger area.**

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

- Volume setting is always carried out with the slide closed. With slide actuators using return springs (versions K+R), the ball cocks must be closed.
- Close the ball cocks (versions K+R) in order to prevent inadvertent escaping of fertiliser from the hopper (e.g. during road travel).

⚠ CAUTION

Risk of crushing or shearing by tensioned return springs, versions K+R (single-acting slide actuator)

If the metering slide is not closed hydraulically, this may cause the pre-tensioned stop lever to snap back hard against the end of the guiding slot when the retaining screw is loosened.

In the event of misuse or non-observance of the procedure for setting the spreading volume, the stop lever can snap back forcefully and unexpectedly to the end of the guiding slot.

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

- ▶ **Never** push against the spring pressure by hand to hold the stop lever in position when setting the quantity.
- ▶ Before carrying out any adjustment work (e.g. setting of the spreading volume), always close the metering slide hydraulically.

B.2 Using the fertiliser chart

NOTICE

Please observe chapter 8.6: Using the fertiliser chart, page 60.

B.3 Spreading at the headland

NOTICE

Please observe chapter 8.7: Spreading at the headland, page 67.

B.4 Adjusting the application rate

B.4.1 Version Q/W/EMC

NOTICE

The machines of the **versions W, Q and EMC** include electronic slide actuators for setting the spreading volume.

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

⚠ CAUTION

Damage to property caused by the incorrect position of the metering slide

The operation of the actuators via the QUANTRON operating unit may cause damage to the metering slides if the stop levers are incorrectly positioned.

▶ Always clamp the stop levers at the maximum scale position.

B.4.2 Version K/D/R/C

You can set the spreading volume of the machines of the versions K/D/R/C via the lower scale plate on both openings.

For this purpose, move the pointer to the position specified beforehand in the fertiliser chart or from a calibration test. This is the **Open** stop position which the slide approaches hydraulically or by spring force (depending on the version) while spreading.

The position depends on the **spreading volume** and the **forward speed**.

1. Close the metering slide.
2. Determine the position for the scale setting in the fertiliser chart or based on the calibration test.
3. Release the retaining screw [2] at the lower end of the scale plate [3].
4. Move the pointer [1] of the stop to the determined position.
5. Tighten the retaining screw.

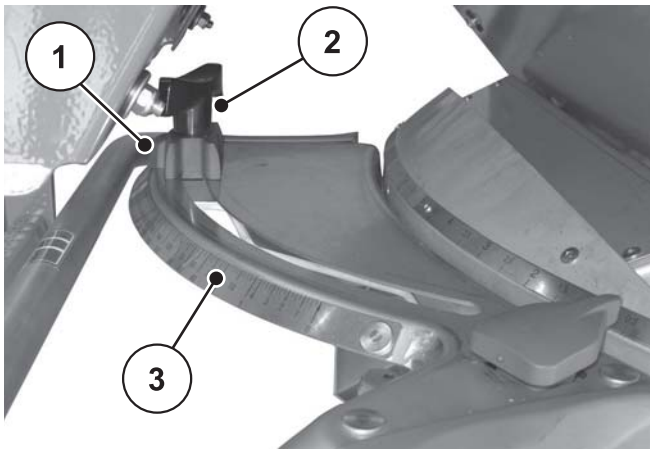


Figure 3: Adjustment scale for the spreading volume

[1] Pointer stop
[2] Retaining screw
[3] Lower scale of the scale plate

B.5 Setting the working width

B.5.1 Selecting the correct spreading disc

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

Spreading disc type	Working width	AXIS 30.1/AXIS 40.1	
S2	12-18m	●	●
S4	18-28 m	●	●
S6	24-36 m	●	●
S8	30-42 m	●	●

There are two different, permanently installed spreader vanes on every spreading disc. The spreader vanes are marked according to their model.

⚠ WARNING

Risk of injury from rotating spreading discs!

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

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

Spreading disc type	Spreading disc left	Spreading disc right
S2	S2-L-170 S2-L-240	S2-R-170 S2-R-240
S2 VxR plus (coated)	S2-L-170 VxR S2-L-240 VxR	S2-R-170 VxR S2-R-240 VxR
S4	S4-L-200 S4-L-270	S4-R-200 S4-R-270
S4 VxR plus (coated)	S4-L-200 VxR S4-L-270 VxR	S4-R-200 VxR S4-R-270 VxR
S6 VxR plus (coated)	S6-L-255 VxR S6-L-360 VxR	S6-R-255 VxR S6-R-360 VxR
S8 VxR plus (coated)	S8-L-390 VxR S8-L-380 VxR	S8-R-390 VxR S8-R-380 VxR

B.5.2 Removing and mounting spreading discs

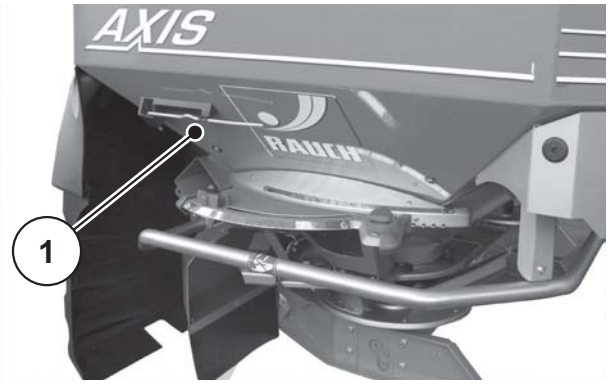
⚠ DANGER

Danger from running engine

Working on the machine while the engine is running may result in serious injury caused by mechanical components and escaping fertiliser.

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

Removing the spreading discs



[1] Adjustment lever (hopper, left side according to direction of travel)

Figure 4: Adjustment lever

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

1. Remove the adjustment lever from the bracket.
2. Loosen the cap nut of the spreading disc by means of the adjustment lever.

Figure 5: Loosen cap nut

3. Unscrew the cap nut.
4. Remove the spreading disc from the hub.
5. Put the adjustment lever back into the specified bracket.

Figure 6: Unscrew the cap nut

Mounting the spreading discs

Requirements:

- Switch off the PTO and the tractor engine and lock them to prevent unauthorised starting.

Mount the left spreading disc on the left side in the direction of travel and the right spreading disc on the right side in the direction of travel. Make sure that the left and right spreading discs are not reversed.
The following procedure is for mounting the left-hand spreading disc. The right-hand spreading disc is to be mounted according to these instructions as well.

1. Put the left spreading disc onto the left spreading disc hub. The spreading disc must be evenly placed on the hub (if required, remove dirt).

NOTICE

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

2. Carefully position the cap nut (do not tilt).
3. Tighten the cap with 25 Nm until it is hand tight, do **not** use the adjustment lever.

NOTICE

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

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

B.5.3 Adjusting the drop point

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

You can set the drop point via the upper scale plate.

- Adjusting in the direction of smaller numbers: The fertiliser is ejected sooner. This results in spreading patterns for smaller working widths.
- Adjusting in the direction of larger numbers: The fertiliser is ejected later and spread more towards the outside into the overlap zones. This results in spreading patterns for larger working widths.

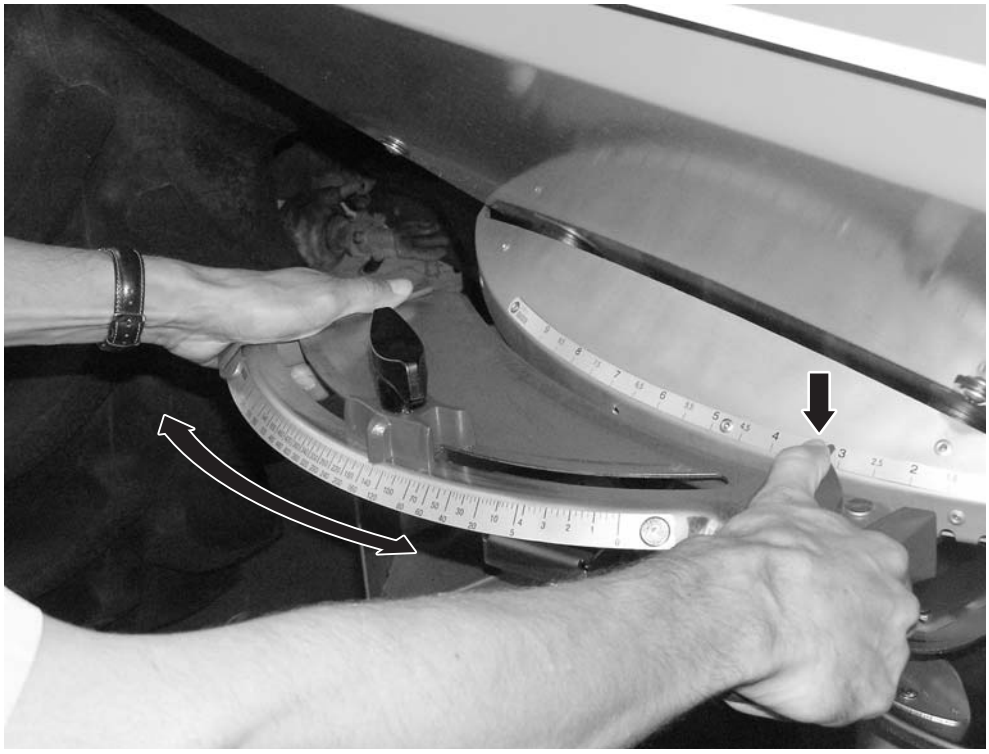


Figure 7: Adjustment centre for drop point

1. Determine the position for the drop point in the fertiliser chart or by carrying out a test using the practice test kit (optional equipment).
2. Grip the left and right handle.
3. Press the pointer unit.

   ▷ The lock is released. The adjustment centre can be moved.
4. Move the adjustment centre with the pointer unit to the calculated position.
5. Release the pointer unit.

   ▷ The adjustment centre is locked.
6. Ensure that the adjustment centre is locked.

B.6 Calibration test

NOTICE

The **M EMC** function of the machine AXIS30.1/40.1 EMC (+W) automatically regulates the application rate for each side.

Therefore, a calibration test is **not required**.

NOTICE

Execute the calibration test for the machine versions **Q/W/EMC** at the operating unit.

The calibration test is described in a separate instruction manual for the operating unit. This instruction manual is an integral part of the operating unit.

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

Carry out a calibration test:

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

The calibration must be conducted with engaged PTO at a standstill or during travel over a test track.

B.6.1 Determining the nominal output volume

Calculate the nominal output volume before starting the calibration test.

Calculating the exact forward speed

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

1. With a **semi-filled** machine, drive a distance of **100 m on the field**.
2. Stop the time required for this.
3. Store the exact forward speed at the scale of the calibration test calculator.

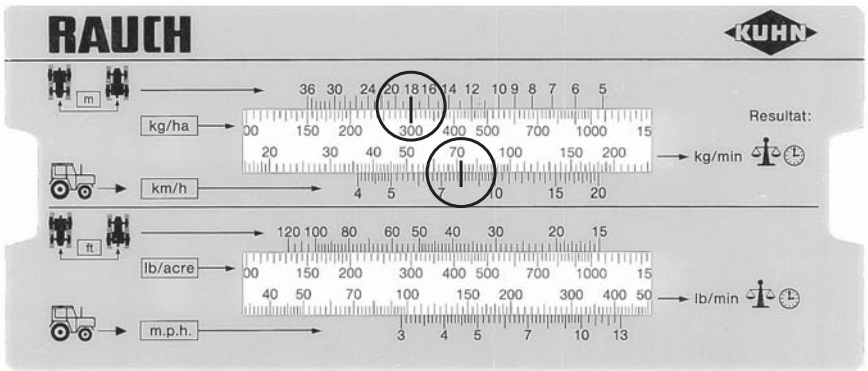


Figure 8: Scale for calculating the exact forward speed

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

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

Example: You need 45 seconds for 100 m:

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

Determining the nominal output volume per minute

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

- The exact forward speed,
- the working width,
- the desired application rate.

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

NOTICE

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

If you cannot find your values in the fertiliser chart, they can be determined with the calibration test calculator or with a formula.

Calculation with the calibration test calculator:

1. Move the tab until it is at 300 kg/ha under 18m.
2. The value of the nominal output volume for both outlets can now be read off above the value of the forward speed of 8 km/h.

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

If the calibration test is carried out at one outlet only, the total value of the nominal output volume must be halved to calculate the value for one outlet.

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

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

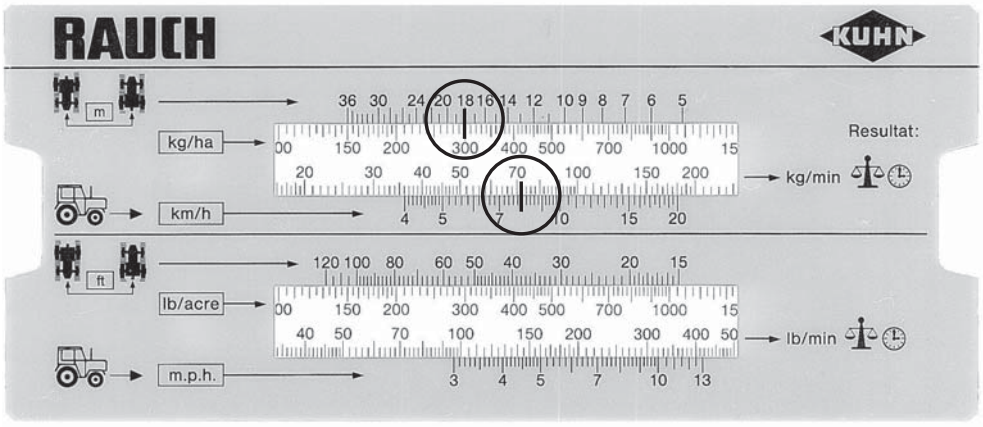


Figure 9: Scale for calculation of the nominal output volume per minute

Calculation with formula

The nominal output volume can also be calculated using the following formula:

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

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 forward speed.

Example: a 10 % increased speed results in 10 % underfertilisation.

B.6.2 Run the calibration test

⚠ WARNING

Risk of injury due to chemicals

Escaping fertiliser may lead to injury to eyes and nasal mucous membrane.

- ▶ Wear safety goggles during the calibration test.
- ▶ Before running the calibration test, ensure that all people leave the hazard zone of the machine.

Requirements:

- The metering slides are closed.
- PTO and tractor engine are switched off and locked to prevent unauthorised starting.
- Have a sufficiently large vessel ready for holding the fertiliser (holding capacity at least **25 kg**). Determine the empty weight of the tray.
- Have the calibration test chute ready. The calibration test chute is located in the centre behind the spreading disc guard.
- A sufficient quantity of fertiliser is placed in the hopper.
- Using the fertiliser chart, the pre-set values for the metering slide end stop, the PTO speed and the calibration test time are determined and known.

NOTICE

Select the values for the calibration test for the maximum possible spreading rate. The greater the quantity, the greater the precision of the measurement.

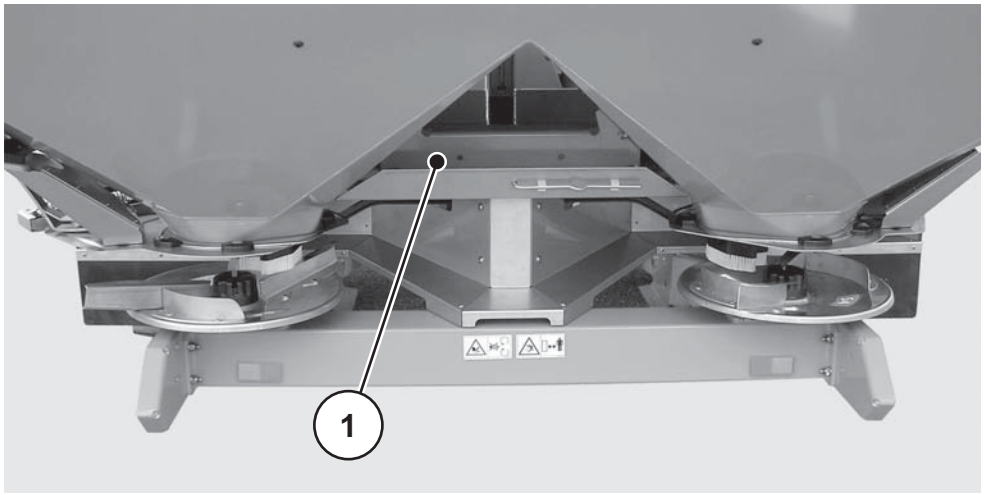


Figure 10: Calibration test chute

[1] Position of the calibration test chute

Running the test (example on left side of spreader):

NOTICE

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

Figure 11: Loosen cap nut

1. Use the adjustment lever to loosen the cap nut of the spreading disc. Remove the spreading disc from its hub.

Icon:

2. Set the drop point to **0**.

Figure 12: Attaching the calibration test chute

3. Suspend the calibration test chute under the left output in the direction of travel.
4. Set the metering slide stop to the value specified in the fertiliser chart.

⚠ WARNING

Risk of injury due to 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.

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

5. Position a collection vessel under the left output.

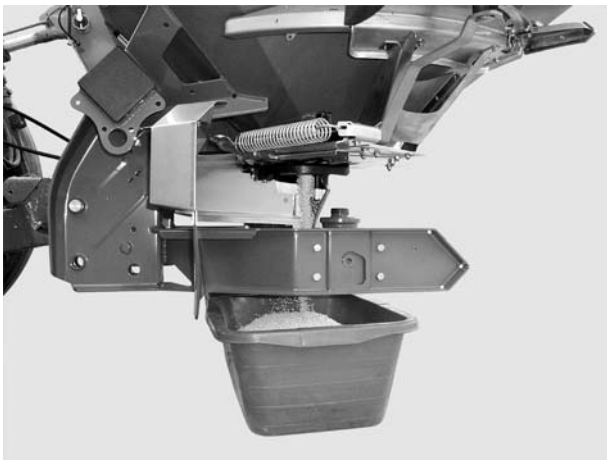


Figure 13: Run the calibration test

6. Start the tractor.
7. Set the PTO shaft speed according to the values in the fertiliser chart.
8. Open the left metering slide for the calibration test time stipulated before from the tractor seat. Close the metering slide after this time.
9. Determine the fertiliser weight (taking into consideration the empty weight of the collection vessel).
10. Compare the actual volume with the nominal volume.
    - ▷ Actual output volume = nominal output volume: output rate stop is set correctly. End calibration test.
    - ▷ Actual volume < nominal volume: Set the output rate stop to a higher position and repeat the calibration test.
    - ▷ Actual volume > nominal volume: Set the output rate stop to a lower position and repeat the calibration test.

NOTICE

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

Calculation with formula

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

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

11. End calibration test.

12. Switch off the PTO shaft and the engine of the tractor and secure

Secure them against unauthorised activation.

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

NOTICE

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

14. Carefully position the cap nut (do not tilt).

15. Tighten the cap nut with **25 Nm** (hand tight). Do **not** use the adjustment lever.

Figure 14: Screwing on the cap nuts

NOTICE

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

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

17. Re-mount the calibration test chute and the adjustment lever at their specified locations at the machine.

18. Reset the drop point to the determined spreading position.

B.7 Checking the mounting height

NOTICE

Check if the preset mounting height is correct while the hopper is full.

- Take the mounting height setting values from the fertiliser chart.
- The preset mounting height should not exceed the maximum allowed mounting height.
- Please also refer to „Presetting the mounting height“ on page 54.

B.8 Setting the PTO speed

NOTICE

Take the correct PTO speed from the fertiliser chart.

B.9 Faults and possible causes

⚠ WARNING

Risk of injury when rectifying faults inappropriately

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

- ▶ Any faults are to be rectified **immediately**.
- ▶ Only carry out repairs yourself if you have the appropriate **qualifications**.

Troubleshooting requirements

Please make sure the following conditions are met before eliminating the faults.

- PTO and tractor engine are switched off and locked to prevent unauthorised starting.
- The hopper is standing on the ground.

NOTICE

Please take particular note of the warnings in chapter 3: Safety, page 5 and section C: Maintenance and repair, page 146, before rectifying faults.

Fault	Possible cause/action
Uneven fertiliser distribution	• Remove clumps of fertiliser on spreading discs, spreader vanes and discharge ducts. • Metering slides do not open completely. Check slide function. • Drop point incorrectly adjusted. Correct the adjustment.
Too much fertiliser in the tractor track	• Check spreader vanes and outlets and replace faulty parts immediately. • The fertiliser has a smoother surface than the fertiliser that was tested for the fertiliser chart. Select later drop point setting (e.g. from 4 to 5). • PTO speed too low. Correct speed.
Too much fertiliser in the overlap area	• The fertiliser has a rougher surface than the fertiliser that was tested for the fertiliser chart. Select earlier drop point setting (e.g. from 5 to 4). • PTO speed too high. Correct speed.

Fault	Possible cause/action
Spreading application higher on one side than the other. Hopper empties unevenly during normal spreading.	Fertiliser bridging above the agitator ● Remove fertiliser until the height of the protective grid on the affected side. ● Break up accumulated fertiliser with a wooden stick through the bars of the protective grid. Outlet blocked ● See blockages of the metering openings Defective agitator ● Remove fertiliser until the height of the protective grid on the affected side. ● Open the metering slide and break up accumulated fertiliser with a wooden stick through the bars of the protective grid so that the remaining fertiliser can run out of the outlet. ● Check the functionality of the agitator drive. See chapter 9.8: Checking the agitator drive, page 208. Metering slide set incorrectly ● Empty the hopper of remaining fertiliser. See chapter B.10: Discharging residual material, page 145. ● Check metering slide setting. See chapter C.5: Metering slide adjustment, page 152.
Irregular fertiliser feed to spreading disc	Fertiliser bridging above the agitator ● Remove fertiliser until the height of the protective grid on the affected side. ● Break up accumulated fertiliser with a wooden stick through the bars of the protective grid. Outlet blocked ● See blockages of the metering openings Defective agitator ● Remove fertiliser until the height of the protective grid on the affected side. ● Open the metering slide and break up accumulated fertiliser with a wooden stick through the bars of the protective grid so that the remaining fertiliser can run out of the outlet. ● Check the functionality of the agitator drive. See chapter 9.8: Checking the agitator drive, page 208.
Spreading discs are fluttering.	● Check cap nuts for tight fit and check threads.

Fault	Possible cause/action
Metering slide does not open	● Metering slides do not move easily. Check for smooth slide movement, check the lever and the joints, and improve if necessary. ● Check tension spring. ● The reducing plate in the female hose coupling is dirty.
Metering slide opens too slowly	● Clean reducing plate. ● Replace the 0.7mm reducing plate by a 1.0mm reducing plate. The restrictor is in the female hose coupling.
Agitator not working.	● Check agitator drive. See 9.8: Checking the agitator drive, page 208
Blockage of the metering openings due to: fertiliser clumps, damp fertiliser, miscellaneous impurities (leaves, straw, sack residues)	● Clear blockages. Proceed as follows: **1.** Park tractor, remove ignition key, disconnect the power supply, **2.** Open metering slide. **3.** Place tray underneath. **4.** Remove spreading discs. **5.** Clean the outlet **from below** with a wooden pole or the adjustment lever and push through the metering opening **6.** Remove any foreign objects in the hopper. **7.** Install spreading discs, close metering slides.

B.10 Discharging residual material

⚠ WARNING

Risk of injury due to 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.

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

We recommend emptying the machine immediately after every use to maintain its value. Proceed as with the calibration test to discharge the residue. See „Run the calibration test“ on page 136.

Position drop point to **0**.

Icon:

Instructions for completely discharging the residual material:

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

1. Empty hopper until no more spreading material comes out (normal discharge of residual material).
2. Switch off the PTO and the tractor engine and lock them to prevent unauthorised starting. Remove the ignition key of the tractor.
3. While the metering slide is open, move the drop point back and forth (position **0** to **9** and back).
4. Remaining fertiliser can be removed with a soft water jet; see also „Cleaning“ on page 205.

C Maintenance and repair

C.1 Safety

NOTICE

Please note the warnings in chapter 3: Safety, page 5.
Take **particular note of the instructions** in the section 3.8: Maintenance and service, page 11.

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

Any maintenance and repair work is to be conducted with increased alertness at all times. Work particularly thoroughly and cautiously.

Observe the following instructions in particular:

- Welding and work on the electrical and hydraulic systems is to be carried out by qualified technicians only.
- There is a **risk of tipping** when working at the lifted machine. Always secure the machine with suitable supporting elements.
- Always use **both** eyebolts in the hopper for lifting the machine with hoisting gear.
- There is a **risk of crushing and shearing** at power-operated components (adjustment lever, metering slide). Make sure that there is no one in close proximity to the moving parts during maintenance.
- Spare parts must at least comply with the technical standards specified by the manufacturer. This is assured e.g. with genuine spare parts.
- Before starting any cleaning, maintenance, or repair work, and when troubleshooting, switch off the tractor's engine and wait until all moving parts of the machine have come to a stop.
- Always have repairs carried out by a **qualified and authorised specialist workshop** only.

C.2 Use steps (optional equipment)

C.2.1 Safety

Always keep in mind that troubleshooting involves additional hazards in case you are climbing into the hopper.

Use the steps with extra care. Work particularly thoroughly and cautiously.

Observe the following instructions in particular:

- Turn the tractor motor off and wait until all moving parts have stopped moving. Take the ignition key out.
- Only use the steps when the machine is lowered.
- Only use the steps if they are folded out.
- Do not climb over the hopper cover into the hopper.
- Use the handle on the hopper cover.
- Do not climb into a fully filled hopper.

NOTICE

Take **particular note of the instructions** in the section C.2.4: Use the steps securely, page 149.

⚠ DANGER

Risk of injury due to moving parts in the hopper

There are moving parts in the hopper.

The rotating agitator can cause injury to hands and feet.

- ▶ Turn off the agitator.
- ▶ Climb into the hopper **only** for troubleshooting purposes.
- ▶ The protective grid may **only** be opened for maintenance purposes or in the event of a fault.

C.2.2 Folding out the steps

Before folding out the steps:

- Disengage the PTO shaft
- Turn the tractor motor off.
- Lower the fertiliser spreader.

Please follow the following instructions for folding out steps.

1. Lift the steps up at the bottom and fold them out.
2. Carefully lower the steps until the stop.

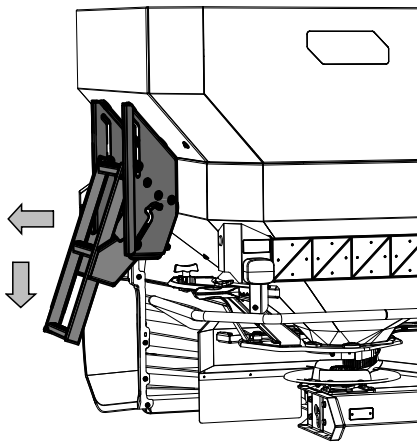


Figure 15: Folding out the steps

C.2.3 Folding in the steps

Before every trip and during spreading operation:

- Folding in the steps.

1. Move the steps at the lower step upwards.
2. Fold in the steps and latch them securely.

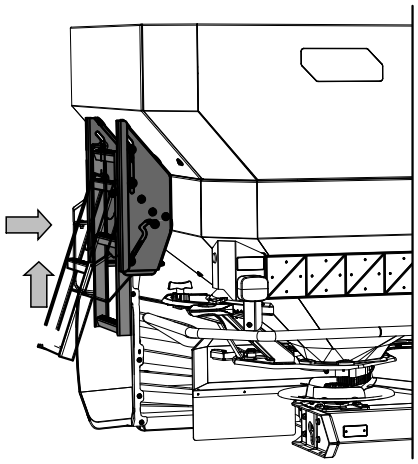


Figure 16: Folding in the steps in closed position

C.2.4 Use the steps securely

Use hand grips when climbing onto the machine.

- Only use latched and folded-out steps.
- Without hopper cover; use the side wall of the hopper as hand grip in order to securely climb onto the machine.
- With hopper cover; use the hand grip at the hopper cover in order to securely climb onto the machine.

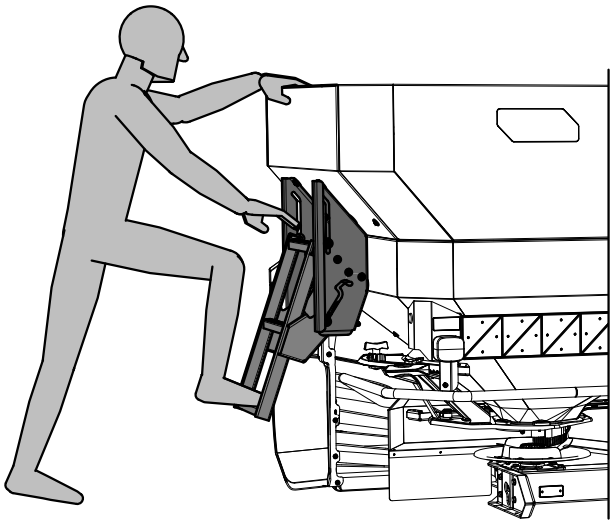


Figure 17: Climbing onto the machine without hopper cover

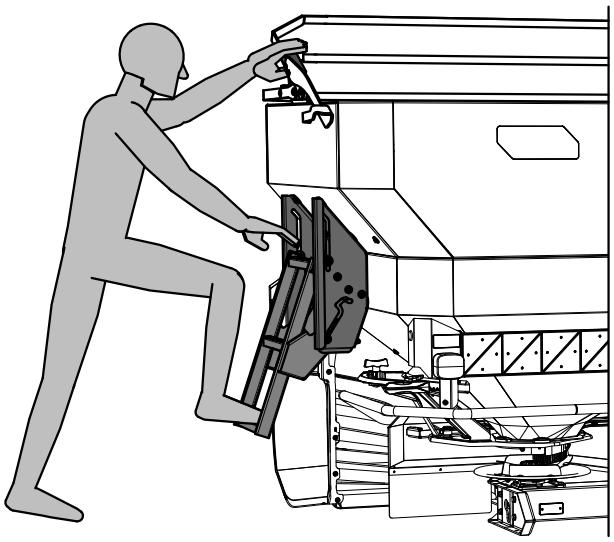


Figure 18: Climbing onto the machine with hopper cover

C.3 Lubrication of weighing spreader

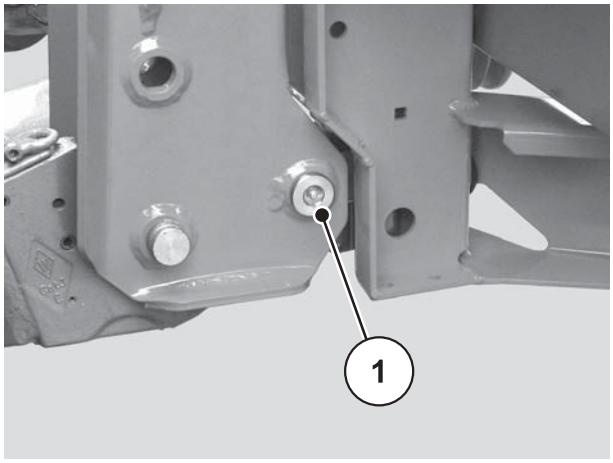


Figure 19: Lubrication point of weighing spreader

C.4 Checking the screw connections of the weigh cell

The mineral fertiliser spreader comes with 2 weigh cells, which are mounted with 2 screw connections per cell. The tie rod has one screw connection.

Check the screw connections for the weigh cells and the tie rod for tightness on both sides of the machine:

- before every spreading season
- also during the spreading season if necessary.

Checking:

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

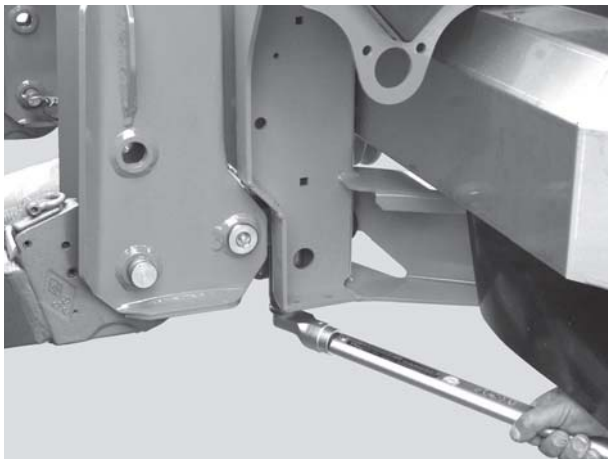


Figure 20: Fastening the weighing cell (on the left side of the direction of travel)

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

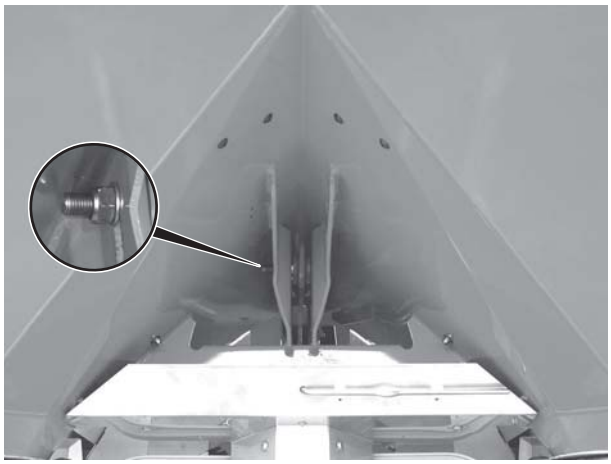


Figure 21: Fastening the tie rod (in the rear of the direction of travel underneath the intermediate roof)

NOTICE

After tightening the screw connections using the torque wrench, the weighing cells must be tared anew. Please follow the instructions in the chapter “Machine tare" of the instruction manual of the operating unit.

C.5 Metering slide adjustment

Check that the metering slides open smoothly before every working season, and during the season if necessary.

⚠ WARNING

Danger of crushing and shearing due to components operated by an external force

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

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

- ▶ Turn the tractor motor off.
- ▶ Remove the ignition key.
- ▶ Disconnect the power supply between the tractor and the machine.
- ▶ The actuation of the hydraulic metering slide during adjustment work is prohibited.

Requirements:

- In order to check the metering slide adjustment, the mechanism must be freely movable.
- The return spring is unhooked.
- The hydraulic cylinder is unhooked.

Check (e.g. left side of machine):

1. Take a lower link pin **d = 28 mm** and insert it centrally into the metering opening.

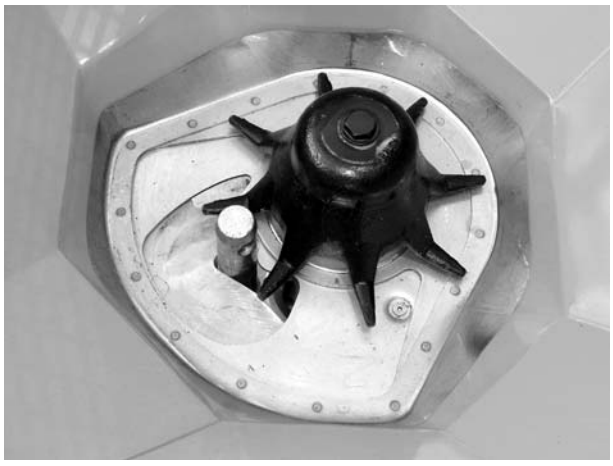


Figure 22: Lower link pin in metering opening

2. Push the metering slide against the pin, and lock it in this position by tightening the retaining screw.

▷ **The stop on the lower scale plate (metering scale) is positioned at the scale value 85. If the position is not correct, the scale must be reset.**

To adjust:

The metering slide is in the position of step 2 (lightly pressed against the pin).

3. Loosen the fastening screws on the scale of the lower scale plate.

Figure 23: Adjustment scale of metering slide

4. Adjust the scale in such a way that the **scale value 85** lies exactly under the pointer element. Screw the scale back on.

5. Repeat the work steps 1-4 for the right metering slide.

NOTICE

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

6. Reattach the return spring and the hydraulic cylinders.

NOTICE

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

Please observe the instruction manual for the operating unit.

C.6 Adjusting the drop point

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

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

The drop point is set using the top scale plate.

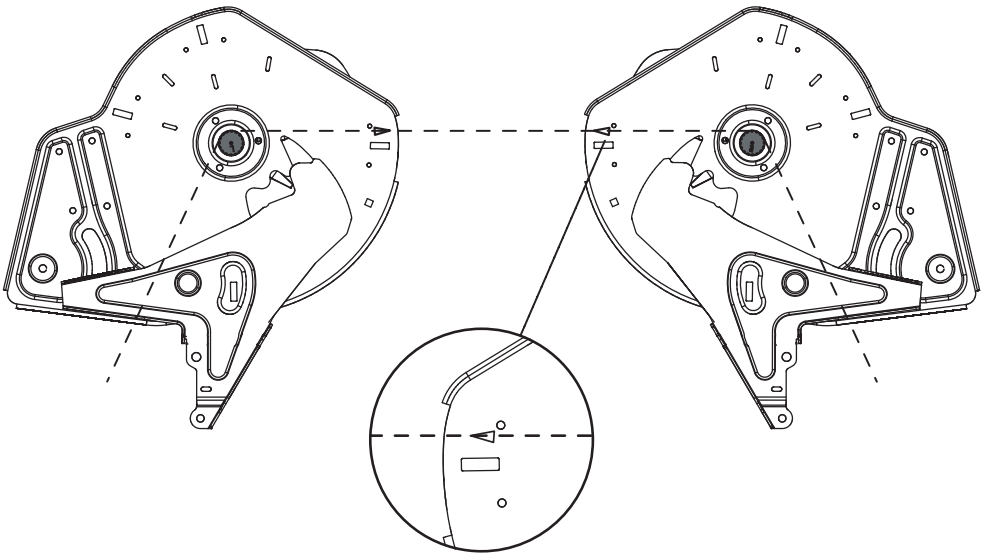


Figure 24: Checking the drop point

Checking:

NOTICE

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

1. Set the drop point to position **6**.
2. Remove both outlets along with their brushes at both openings.
3. Release both plastic levers (agitator drive) and slide them downwards until the splines of the agitator are showing.
4. Attach a suitably thin string at the **rear** in the direction of travel to the splines of the agitator shafts and tauten it.
   - ▷ The triangular mark on the base plate must be aligned to the taut string.
   - ▷ If the mark is not aligned to the string, the drop point must be readjusted.

Only for AXIS 30.1/40.1 with version W/Q/EMC

5. Recalibrate the drop point positions with the operating unit.

NOTICE

Please follow the instructions in the chapter “Test/Diagnosis" of the operating unit instruction manual.

To adjust:

Figure 25: Loosen the drop point adjustment plate

6. Release the adjustment plate underneath the "drop point pointer" button (2 self-locking nuts).
7. Turn the adjustment centre until the triangular mark lines up with the taut string.
8. Fasten the adjustment plate.
9. Push both plastic levers (agitator drive) back up and secure them. Mount the outlet with brushes.

AXIS 50.1

A Commissioning

A.1 Connecting the slide controls

A.1.1 Connecting the hydraulic slide controls: AXIS 50.1, Version D

Function

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

Version	Hydraulic cylinder	Operation	Requirements for the tractor
D	Double-acting hydraulic cylinders	Oil pressure closes Oil pressure opens	Two double-acting control valves

Attachment

1. Depressurise the hydraulic system.
2. Remove the hoses from the brackets attached to the frame of the machine.
3. Insert the hoses into the corresponding couplings on the tractor.

A.1.2 Connecting the electric slide controls: AXIS 50.1, Versions W

NOTICE

An electric slide actuator is connected to the machine AXIS 50.1W.

The electronic slide actuator is described in a separate instruction manual for the operating unit. This instruction manual is an integral part of the operating unit.

A.1.3 Connecting the electric slide controls: AXIS 50.1, Version C

NOTICE

An electronic slide actuator is connected to the machine AXIS 50.1 C.

The electronic slide actuator is described in a separate instruction manual for the **E-CLICK** operating unit. This instruction manual is an integral part of the operating unit.

A.2 Filling the machine

⚠ DANGER

Danger from running engine

Working on the machine while the engine is running may result in serious injuries caused by mechanical components and escaping fertiliser.

- ▶ Turn the tractor motor off.
- ▶ Remove the ignition key.
- ▶ Send third persons out of the danger area.

⚠ CAUTION

Inadmissible overall weight

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

- ▶ Before you start filling, calculate the amount you can load.
- ▶ Comply with the permissible overall weight.

Instructions on filling the machine:

- The machine may only be filled on a firm, level surface.
- Fill the machine **only** when it is attached to the tractor. Make sure that the tractor is standing on level and solid ground.
- Secure the tractor to prevent it moving. Apply the handbrake.
- Turn the tractor motor off. Remove the ignition key.
- For filling heights of more than 1.25 m, fill the machine by means of auxiliary equipment (e.g. front loader or screw conveyor).
- Fill the machine no higher than the top-edge.
- Check the fill level either by climbing up on the folded-down step or by looking through the inspection window in the hopper.
  - Please refer to the climbing instructions provided in chapter „Using the steps“ on page 180.

B Spreading operation

B.1 Safety

⚠ DANGER

Danger from running engine

Working on the machine while the engine is running may result in serious injury caused by mechanical components and escaping fertiliser.

Wait until all rotating parts have come to a complete stop before making any adjustments.

- ▶ Turn the tractor motor off.
- ▶ Remove the ignition key.
- ▶ **Send third persons out of the danger area.**

B.2 Using the fertiliser chart

NOTICE

Please observe chapter 8.6: Using the fertiliser chart, page 60.

B.3 Spreading at the headland

NOTICE

Please observe chapter 8.7: Spreading at the headland, page 67.

B.4 Using the fertiliser chart

B.4.1 AXIS 50.1 W

NOTICE

The machine AXIS 50.1 W is provided with an electric slide actuator for adjusting the application rate.

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

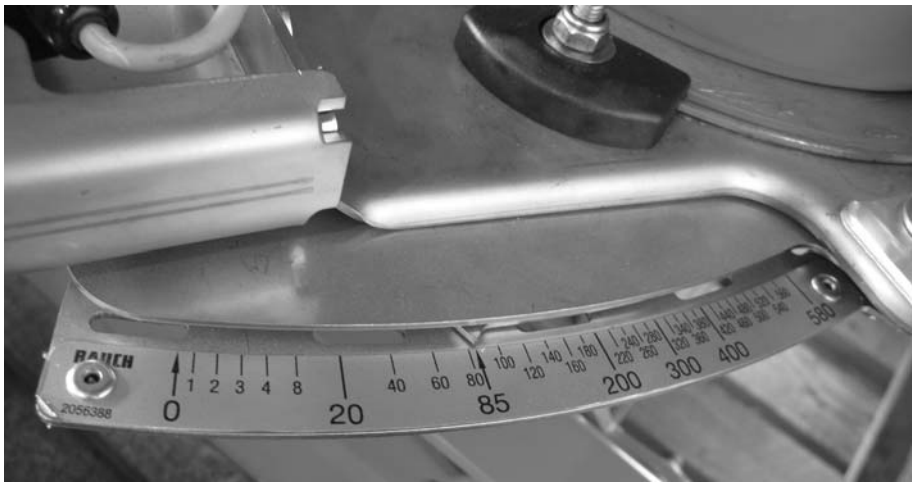


Figure 1: Scale for setting the spreading quantity

B.4.2 AXIS 50.1 D/C

For the machines AXIS 50.1 C/D, set the spreading volume at both openings by the lower scale plate.

The operator moves the pointer to the position specified beforehand in the spreading table or from a calibration test. This is the **Open** stop position which the slide approaches hydraulically or by spring force (depending on the version) while spreading.

The position depends on the **spreading volume** and the **forward speed**.

1. Close the metering slide.
2. Determine the position for the scale setting in the fertiliser chart or based on the calibration test.
3. Release the retaining screw [2] at the lower end of the scale plate [3].
4. Move the pointer [1] of the stop to the determined position.
5. Tighten the retaining screw.

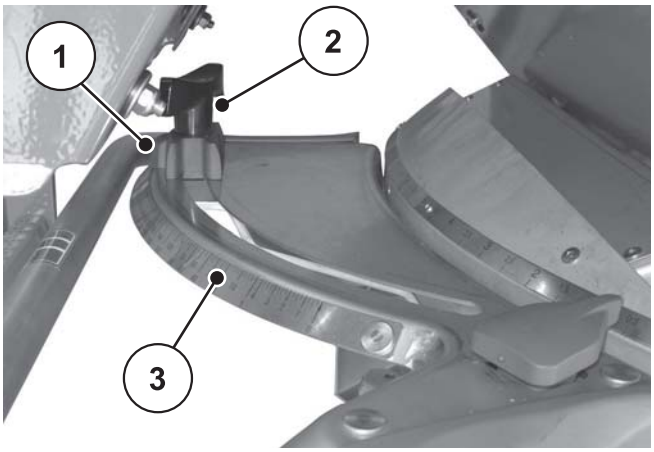


Figure 2: Adjustment scale for the spreading quantity

[1] Pointer stop
[2] Retaining screw
[3] Lower scale of the scale plate

B.5 Setting the working width

B.5.1 Selecting the correct spreading disc

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

Spreading disc type	Working width
S4	18-28 m
S6	24-36 m
S8	30-42 m
S10	32-48 m
S12	42-50 m

There are two different, permanently installed spreader vanes on every spreading disc. The spreader vanes are marked according to their model.

⚠ WARNING

Risk of injury from rotating spreading discs!

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

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

Spreading disc type	Spreading disc left	Spreading disc right
S4	S4-L-200 S4-L-270	S4-R-200 S4-R-270
S4 VxR plus (coated)	S4-L-200 VxR S4-L-270 VxR	S4-R-200 VxR S4-R-270 VxR
S6 VxR plus (coated)	S6-L-255 VxR S6-L-360 VxR	S6-R-255 VxR S6-R-360 VxR
S8 VxR plus (coated)	S8-L-390 VxR S8-L-380 VxR	S8-R-390 VxR S8-R-380 VxR
S10 VxR plus (coated)	S10-L-340 VxR S10/S12-L-480 VxR	S10-R-340 VxR S10/S12-R-480 VxR
S12 VxR plus (coated)	S12-L-360 VxR S10/S12-L-480 VxR	S12-R-360 VxR S10/S12-R-480 VxR

B.5.2 Removing and mounting spreading discs

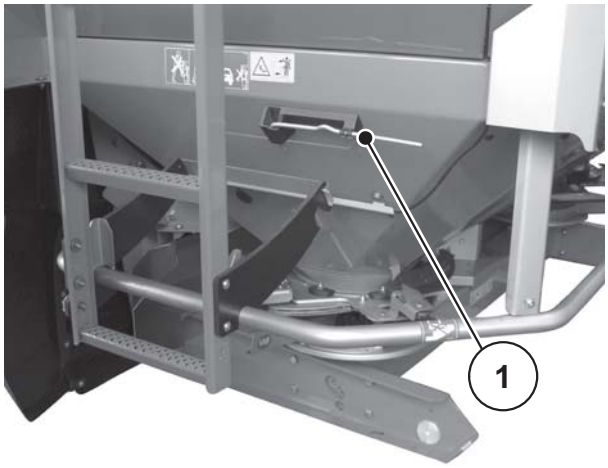
⚠ DANGER

Danger from running engine

Working on the machine while the engine is running may result in serious injury caused by mechanical components and escaping fertiliser.

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

Removing the spreading discs



[1] Adjustment lever (hopper, left side according to direction of travel)

Figure 3: Adjustment lever

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

1. Remove the adjustment lever from the bracket.
2. Use the adjustment lever to loosen the cap nuts on the spreading disc.

Figure 4: Loosen cap nut

3. Unscrew the cap nut.
4. Remove the spreading disc from the hub.
5. Put the adjustment lever back into the specified bracket.

Figure 5: Unscrew the cap nut

Mounting the spreading discs

Requirements:

- PTO and tractor engine are switched off and locked to prevent unauthorised starting.

Mount the left spreading disc on the left side in the direction of travel and the right spreading disc on the right side in the direction of travel. Make sure that the left and right spreading discs are not reversed.
The following procedure is for mounting the left-hand spreading disc. The right-hand spreading disc is to be mounted according to these instructions as well.

1. Put the left spreading disc onto the left spreading disc hub. Make sure that the spreading disc is evenly placed on the hub (remove dirt if necessary).

NOTICE

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

2. Carefully position the cap nut (do not tilt).
3. Tighten the cap with 25 Nm until it is hand tight, do **not** use the adjustment lever.

NOTICE

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

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

B.5.3 Adjusting the drop point

AXIS 50.1 W

NOTICE

The machine AXIS 50.1 W is equipped with an electronic drop point adjustment.

The electronic drop point adjustment is described in a separate instruction manual for the operating unit. This instruction manual is an integral part of the operating unit.

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

The drop point is adjusted and set using the operating unit.

- Adjusting the upper scale plate in the direction of smaller numbers: The fertiliser is ejected sooner. This results in spreading patterns for smaller working widths.
- Adjusting the upper scale plate in the direction of larger numbers: The fertiliser is ejected later and spread more towards the outside into the overlap zones. This results in spreading patterns for larger working widths.

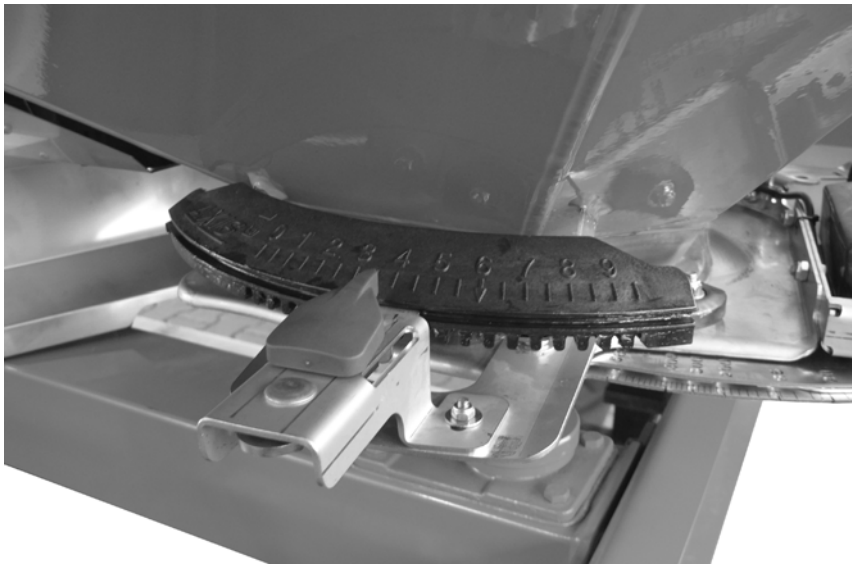


Figure 6: Drop point gauge

⚠ CAUTION

Risk of material damage due to stuck or blocked indicator

The fertiliser drop point is adjusted and set using the electronic controls. If the indicator is blocked manually, the electrical adjusting cylinders can be damaged.

▶ Never push the indicator forwards or block it.

AXIS 50.1 D/C

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

You can set the drop point via the upper scale plate.

- Adjusting in the direction of smaller numbers: The fertiliser is ejected sooner. This results in spreading patterns for smaller working widths.
- Adjusting in the direction of larger numbers: The fertiliser is ejected later and spread more towards the outside into the overlap zones. This results in spreading patterns for larger working widths.

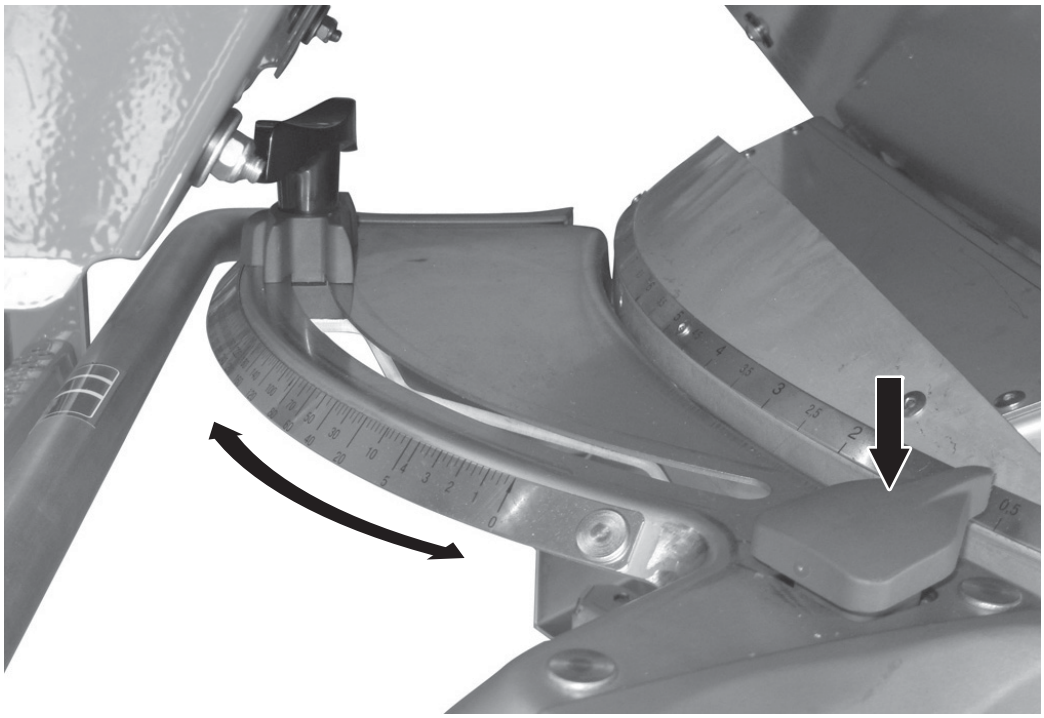


Figure 7: Adjustment centre for drop point

1. Determine the position for the drop point in the fertiliser chart or by carrying out a test using the practice test kit (optional equipment).
2. Grip the left and right handle.
3. Press the pointer unit.

   ▷ The lock is released. The adjustment centre can be moved.
4. Move the adjustment centre with the pointer to the calculated position.
5. Release the pointer unit.

   ▷ The adjustment centre is locked.
6. Ensure that the adjustment centre is locked.

B.6 Calibration test

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

Carry out a calibration test:

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

The calibration must be conducted with engaged PTO at a standstill or during travel over a test track.

NOTICE

The machines AXIS 50.1 W are tested for calibration using the operating unit.

The calibration test is described in a separate instruction manual for the operating unit. This instruction manual is an integral part of the operating unit.

NOTICE

The machine AXIS 50.1 W is equipped with an electronic drop point adjustment.

The drop point is automatically moved to the calibration position (drop point 0) by the operating unit.

B.6.1 Determining the nominal output volume

Calculate the nominal output volume before starting the calibration test.

Calculating the exact forward speed

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

1. With a **semi-filled** machine, drive a distance of **100 m on the field**.
2. Stop the time required for this.
3. Store the exact forward speed at the scale of the calibration test calculator.

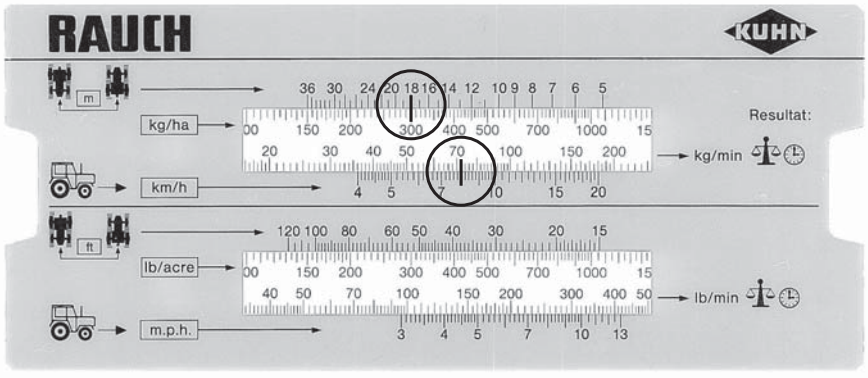


Figure 8: Scale for calculating the exact forward speed

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

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

Example: You need 45 seconds for 100 m:

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

Determining the nominal output volume per minute

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

- The exact forward speed,
- the working width,
- the desired application rate.

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

NOTICE

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

If you cannot find your values in the fertiliser chart, they can be determined with the calibration test calculator or with a formula.

Calculation with the calibration test calculator:

1. Move the tab until it is at 300 kg/ha under 18 m.
2. The value of the nominal output volume for both outlets can now be read off above the value of the forward speed of 8 km/h.

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

If the calibration test is carried out at one outlet only, the total value of the nominal output volume must be halved to calculate the value for one outlet.

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

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

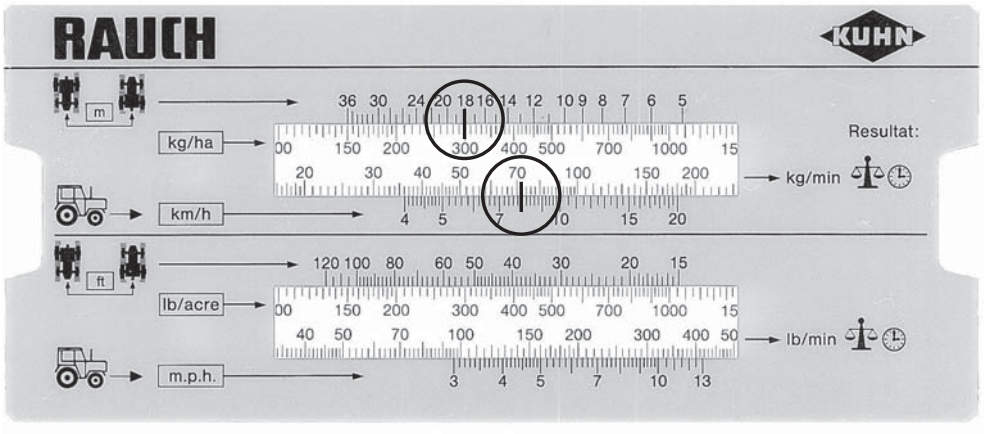


Figure 9: Scale for calculation of the nominal output volume per minute

Calculation with formula

The nominal output volume can also be calculated using the following formula:

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

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 forward speed.

Example: a 10 % increased speed results in 10 % underfertilisation.

B.6.2 Run the calibration test

⚠ WARNING

Risk of injury due to chemicals

Escaping fertiliser may lead to injury to eyes and nasal mucous membrane.

- ▶ Wear safety goggles during the calibration test.
- ▶ Before running the calibration test, ensure that all people leave the hazard zone of the machine.

⚠ WARNING

Danger of crushing and shearing due to components operated by an external force

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

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

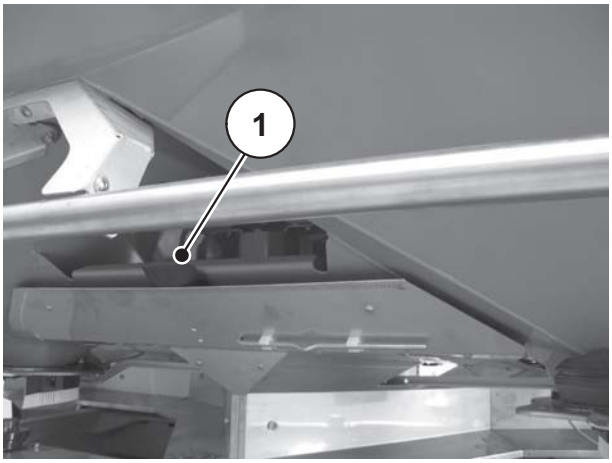
- ▶ Turn the tractor motor off.
- ▶ Remove the ignition key.
- ▶ Disconnect the power supply between the tractor and the machine.
- ▶ The actuation of the hydraulic metering slide during adjustment work is prohibited.

Requirements:

- The metering slides are closed.
- PTO and tractor engine are switched off and locked to prevent unauthorised starting.
- Have a sufficiently large vessel ready for holding the fertiliser (holding capacity at least **25 kg**). Determine the empty weight of the tray.
- Prepare the calibration test chute. The calibration test chute is located in the centre behind the spreading disc guard.
- A sufficient quantity of fertiliser is placed in the hopper.
- Thanks to the fertiliser chart, the speed of the PTO shaft is known.
- Desired application rate, working width and mean speed are entered into the operating unit.

NOTICE

Select the time for the calibration test for the maximum possible spreading rate. The greater the quantity, the greater the precision of the measurement.



[1] Position of the calibration test chute

Figure 10: Calibration test chute

Running the test (example on left side of spreader):

NOTICE

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

1. Use the adjustment lever to loosen the cap nut of the spreading disc. Remove the spreading discs from the hub.

Figure 11: Loosen cap nut

Figure 12: Attaching the calibration test chute

2. Suspend the calibration test chute under the left output (in the direction of travel).

⚠ WARNING

Risk of injury due to 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.

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

3. Position a collection vessel under the left output.

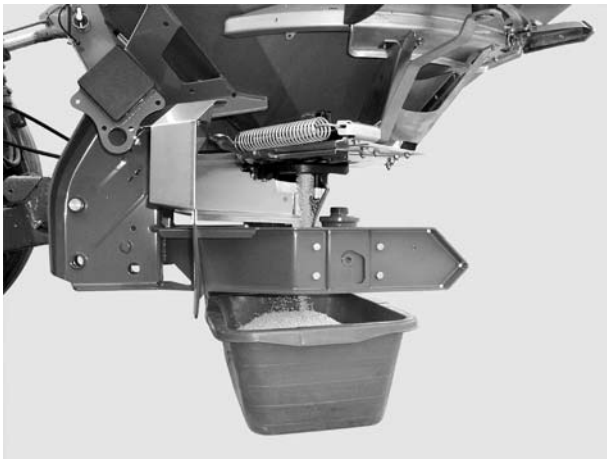


Figure 13: Run the calibration test

4. Start the tractor.
5. Set the PTO shaft speed according to the values in the fertiliser chart.
6. Carry out further steps of action according to the operating unit instruction manual.
7. End calibration test:
   - Turn the PTO shaft and tractor motor off.
   - against unauthorised activation
8. End calibration test:

   Turn the PTO shaft and tractor motor off;

   secure them against unauthorised activation.
9. Mount the spreading discs. Make sure that the left and right spreading discs are not reversed.

NOTICE

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

10. Carefully position the cap nut (do not tilt).
11. Tighten the cap nut with **25 Nm** (hand tight). Do **not** use the adjustment lever.

Figure 14: Screwing on the cap nuts

NOTICE

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

12. Check that there is clearance between the spreader vanes and the outlet by turning the spreading discs by hand.
13. Re-mount the calibration test chute and the adjustment lever at their specified locations at the machine.

B.7 Checking the mounting height

NOTICE

Check if the preset mounting height is correct while the hopper is full.

- Take the mounting height setting values from the fertiliser chart.
- The preset mounting height should not exceed the maximum allowed mounting height.
- Please also refer to „Presetting the mounting height“ on page 54.

B.8 Setting the PTO speed

NOTICE

Take the correct PTO speed from the fertiliser chart.

B.9 Faults and possible causes

⚠ WARNING

Risk of injury when rectifying faults inappropriately

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

- ▶ Any faults which may occur are to be rectified **immediately**.
- ▶ Only carry out repairs yourself if you have the appropriate **qualifications**.

Troubleshooting requirements

Please make sure the following conditions are met before eliminating the faults.

- PTO and tractor engine are switched off and locked to prevent unauthorised starting.
- The hopper is standing on the ground.

NOTICE

Please take particular note of the warnings in chapter 3: Safety, page 5 and section C: Service and maintenance, page 179, before rectifying faults.

Fault	Possible cause/action
Uneven fertiliser distribution	• Remove clumps of fertiliser on spreading discs, spreader vanes and discharge ducts. • Metering slides do not open completely. Check slider function. • Drop point incorrectly adjusted. Correct the adjustment.
Too much fertiliser in the tractor track	• Check spreader vanes and outlets and replace faulty parts immediately. • The fertiliser has a smoother surface than the fertiliser that was tested for the fertiliser chart. Select later drop point setting (e.g. from 4 to 5). • PTO speed too low. Correct speed.
Too much fertiliser in the overlap area	• The fertiliser has a rougher surface than the fertiliser that was tested for the fertiliser chart. Select earlier drop point setting (e.g. from 5 to 4). • PTO speed too high. Correct speed.

Fault	Possible cause/action
Spreading application higher on one side than the other. Hopper empties unevenly during normal spreading.	Fertiliser bridging above the agitator ● Remove fertiliser until the height of the protective grid on the affected side. ● Break up accumulated fertiliser with a wooden stick through the bars of the protective grid. Outlet blocked ● See blockages of the metering openings Defective agitator ● Remove fertiliser until the height of the protective grid on the affected side. ● Open the metering slide and break up accumulated fertiliser with a wooden stick through the bars of the protective grid so that the remaining fertiliser can run out of the outlet. ● Check the functionality of the agitator drive. See chapter 9.8: Checking the agitator drive, page 208. Metering slide set incorrectly ● Empty the hopper of remaining fertiliser. See chapter B.10: Discharging residual material, page 178. ● Check metering slide setting. See chapter C.5: Adjusting the metering slides, page 184.
Irregular fertiliser feed to spreading disc	Fertiliser bridging above the agitator ● Remove fertiliser until the height of the protective grid on the affected side. ● Break up accumulated fertiliser with a wooden stick through the bars of the protective grid. Outlet blocked ● See blockages of the metering openings Defective agitator ● Remove fertiliser until the height of the protective grid on the affected side. ● Open the metering slide and break up accumulated fertiliser with a wooden stick through the bars of the protective grid so that the remaining fertiliser can run out of the outlet. ● Check the functionality of the agitator drive. See chapter 9.8: Checking the agitator drive, page 208.
Spreading discs are fluttering.	● Check cap nuts for tight fit and check threads.
Metering slide opens with difficulty or not at all.	● Metering slides do not move easily. Check for smooth slide movement, check the lever and the joints, and improve if necessary.

Fault	Possible cause/action
Agitator not working.	● Check agitator drive. See 9.8: Checking the agitator drive, page 208
Blockage of the metering openings due to: fertiliser clumps, damp fertiliser, miscellaneous impurities (leaves, straw, sack residues)	● Clear blockages. Proceed as follows: **1.** Park tractor, remove ignition key. **2.** Open metering slide. **3.** Place tray underneath. **4.** Remove spreading discs. **5.** Clean the outlet **from below** with a wooden pole or the adjustment lever and push through the metering opening. **6.** Remove any foreign objects in the hopper. **7.** Install spreading discs, close metering slides.

B.10 Discharging residual material

⚠ WARNING

Risk of injury due to 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.

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

We recommend emptying the machine immediately after every use to maintain its value. Proceed as with the calibration test to discharge the residue.

NOTICE

If the machine AXIS 50.1 W is connected to an operating unit, a warning message will appear indicating that the drop point will temporarily be set to position 0 during emptying of residual material.

Please observe the instruction manual for the operating unit.

Instructions for completely discharging the residual material:

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

1. Empty hopper until no more spreading material comes out (normal discharge of residual material).
2. Switch off the PTO and the tractor engine and lock them to prevent unauthorised starting. Remove the ignition key of the tractor.
3. Remaining fertiliser can be removed with a soft water spray; see also „Cleaning“ on page 205.

C Service and maintenance

C.1 Safety

NOTICE

Please note the warnings in chapter 3: Safety, page 5.
Take **particular note of the instructions** in the section 3.8: Maintenance and service, page 11.

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

Any maintenance and repair work is to be conducted with increased alertness at all times. Work particularly thoroughly and cautiously.

Observe the following instructions in particular:

- Welding and work on the electrical and hydraulic systems is to be carried out by qualified technicians only.
- There is a **risk of tipping** when working at the lifted machine. Always secure the machine with suitable supporting elements.
- Always use **both** eyebolts in the hopper for lifting the machine with hoisting gear.
- There is a **risk of crushing and shearing** at power-operated components (adjustment lever, metering slide). Make sure that there is no one in close proximity to the moving parts during maintenance.
- Spare parts must at least comply with the technical standards specified by the manufacturer. This is assured e.g. with genuine spare parts.
- Before starting any cleaning, maintenance, or repair work and when troubleshooting, switch off the tractor's engine and wait until all moving parts of the machine have come to a stop.
- Always have repairs carried out by a qualified and authorised specialist workshop only.

C.2 Using the steps

C.2.1 Safety

Always keep in mind that troubleshooting involves additional hazards in case you are climbing into the hopper.

Use the steps with extra care. Work particularly thoroughly and cautiously.

Observe the following instructions in particular:

- Turn the tractor motor off and wait until all moving parts have stopped moving. Take the ignition key out.
- Only use the steps when the machine is lowered.
- Only use the steps if they are folded out.
- Do not climb over the hopper cover into the hopper.
- Use the handle on the hopper cover.
- Only climb into the empty hopper.

⚠ DANGER

Risk of injury due to moving parts in the hopper

There are moving parts in the hopper.

The rotating agitator can cause injury to hands and feet.

- ▶ Turn off the agitator.
- ▶ Climb into the hopper **only** for troubleshooting purposes.
- ▶ The protective grid may **only** be opened for maintenance purposes or in the event of a fault.

C.2.2 Folding out the steps

Before folding out the steps:

- Disengage the PTO shaft
- Turn the tractor motor off.
- Lower the fertiliser spreader.

Please follow the following instructions for folding out steps.

1. Lift the steps up at the bottom and fold them out.
2. Securely lock the steps into open position.

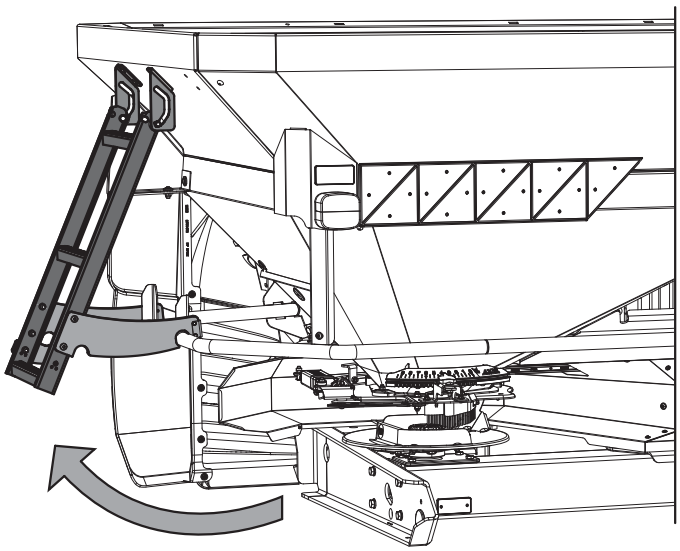


Figure 15: Folding out the steps

C.2.3 Folding in the steps

Before every trip and during spreading operation:

- Folding in the steps.

1. Lift the steps up at the bottom and fold them inwards.
2. Securely lock the steps into closed position.

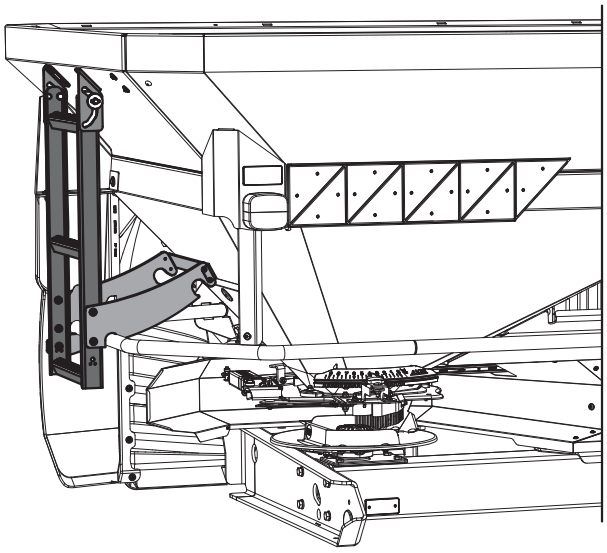


Figure 16: Folding in the steps in closed position

C.3 Lubrication of weighing spreader

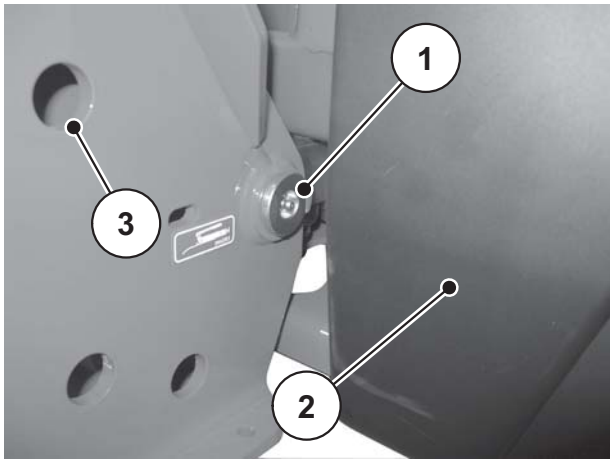


Figure 17: Lubrication point of weighing spreader

[1] Lubrication point (2x)
[2] Dirt deflector at the front in direction of travel
[3] Coupling point of the lower link for weighing spreader

NOTICE

Partly remove the dirt deflector in order to reach all lubrication points.

C.4 Checking the screw connections of the weigh cell

The mineral fertiliser spreader comes with 2 weigh cells, which are mounted with 2 screw connections per cell. The tie rod has one screw connection.

Check the screw connections of the weigh cells and tie rod on both sides of the machine before each spreading season, and if necessary during the season to make sure that all connections are tight.

Checking:

Figure 18: Fastening the weighing cell (on the left side of the direction of travel)

1. Tighten the screw connections with a torque wrench (Tightening torque = **300 Nm**).

2. Tighten the screw connection [1] with a torque wrench (Tightening torque = **300 Nm**).

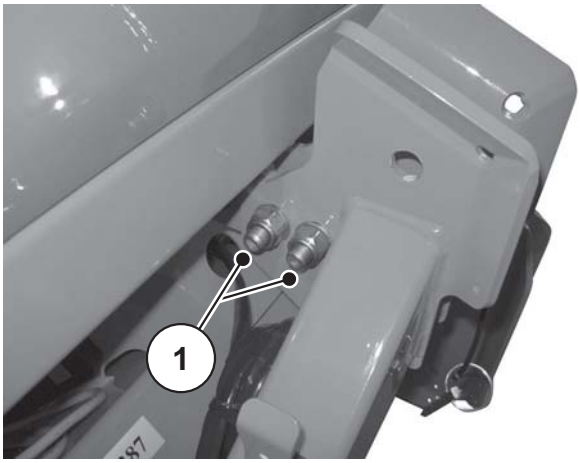


Figure 19: Fastening the tie rod

NOTICE

After tightening the screw connections using the torque wrench, the weighing cells must be tared anew. Please follow the instructions in the chapter “Machine tare" of the instruction manual of the operating unit.

C.5 Adjusting the metering slides

Check that the metering slides open smoothly before every working season, and during the season if necessary.

⚠ WARNING

Danger of crushing and shearing due to components operated by an external force

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

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

- ▶ Turn the tractor motor off.
- ▶ Remove the ignition key.
- ▶ Disconnect the power supply between the tractor and the machine.
- ▶ The actuation of the hydraulic metering slide during adjustment work is prohibited.

Requirements:

- In order to check the metering slider adjustment, the mechanism must be freely movable.
- The actuator is disengaged.

Check (e.g. left side of machine):

1. Take a lower link pin **d = 28 mm** and insert it centrally into the metering opening.

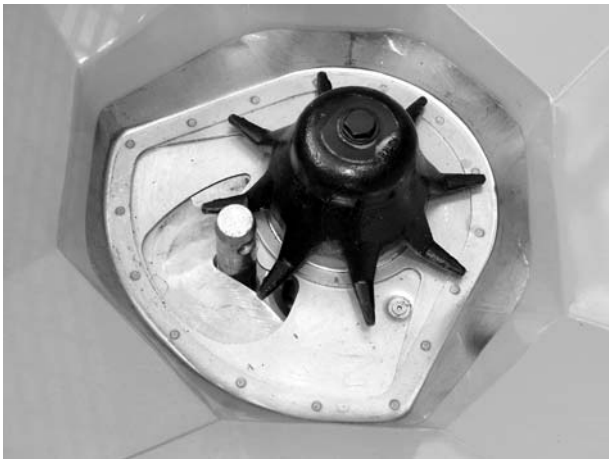


Figure 20: Lower link pin in metering opening

2. Push the metering slide against the pin.

▷ **The pointer must point to a scale value of 85 on the metering slide scale.. If the position is not correct, the scale must be reset.**

Adjusting AXIS 50.1 W:

The metering slide is in the position of working step 2.

3. Loosen the fixing screws of the scale plate.

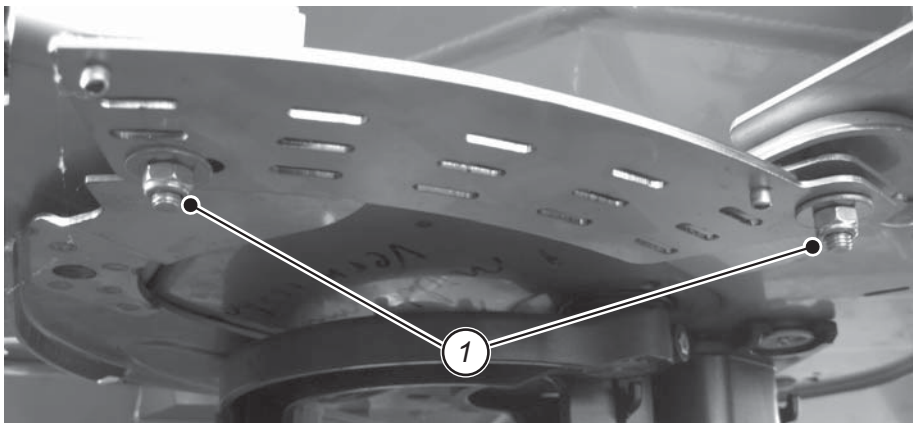


Figure 21: Scale fixing screws

4. Adjust the scale in such a way that the **scale value 85** lies exactly under the pointer element. Screw the scale back on.

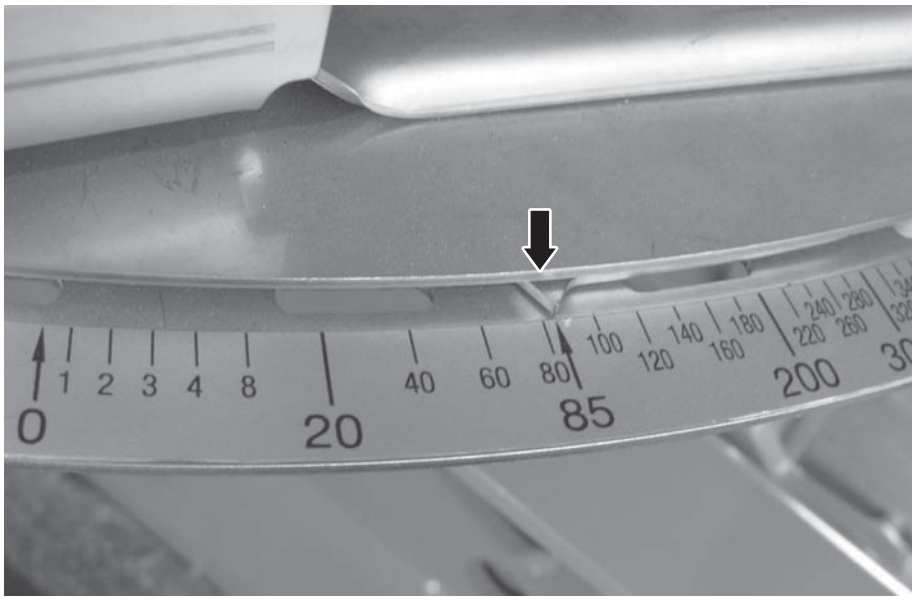


Figure 22: Metering slide pointer on position 85

5. Repeat working steps 1 - 4 for the right metering slide.

6. Reconnect the actuator to the metering slide.

NOTICE

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

After scale correction with electric slide actuation, a correction of the slide testing points in the operating unit is necessary.

Please observe the instruction manual for the operating unit.

Adjusting AXIS 50.1 C/D:

The metering slide is in the position of step 2 (lightly pressed against the pin).

7. Loosen the fixing screws on the scale of the lower scale plate.

Figure 23: Adjustment scale of metering slide

8. Adjust the scale in such a way that the **scale value 85** lies exactly under the pointer element. Screw the scale back on.

9. Repeat working steps 1 - 2 and 7 - 8 for the right metering slide.

NOTICE

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

10. Reattach the return spring and the hydraulic cylinders.

NOTICE

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

Please observe the instruction manual for the operating unit.

C.6 Adjusting the drop point

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

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

⚠ WARNING

Danger of crushing and shearing due to components operated by an external force

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

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

- ▶ Turn the tractor motor off.
- ▶ Remove the ignition key.
- ▶ Disconnect the power supply between the tractor and the machine.
- ▶ The actuation of the hydraulic metering slide during adjustment work is prohibited.

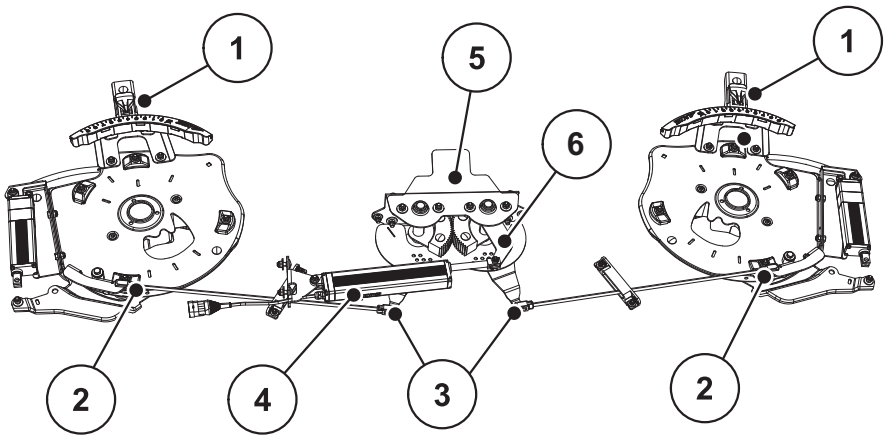


Figure 24: Checking the drop point

[1] Left/right adjustment centre
[2] Left/right outer yoke
[3] Left/right inner yoke
[4] Actuator
[5] Setting unit
[6] Control lever

NOTICE

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

C.6.1 Checking the standard setting of the toothed segments

1. Remove the protection device from the setting unit (5) by undoing the 2 screws.
2. There are markings **on the underside** of the toothed segments

▷ **These must coincide (see figure 25 and figure 26).**

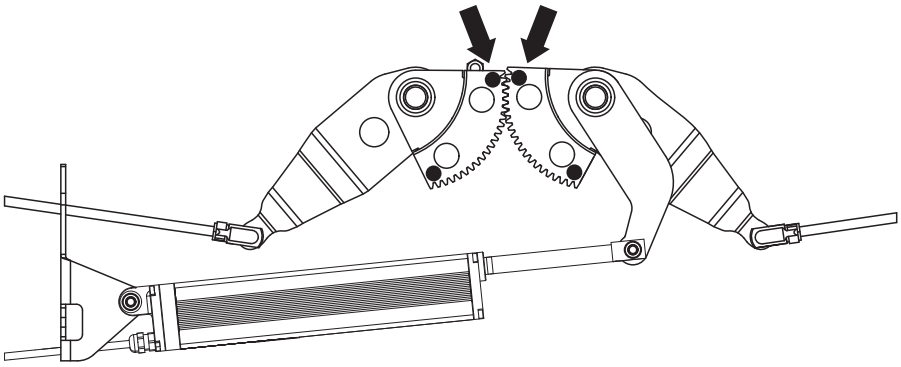


Figure 25: Position of the markings on the toothed segments

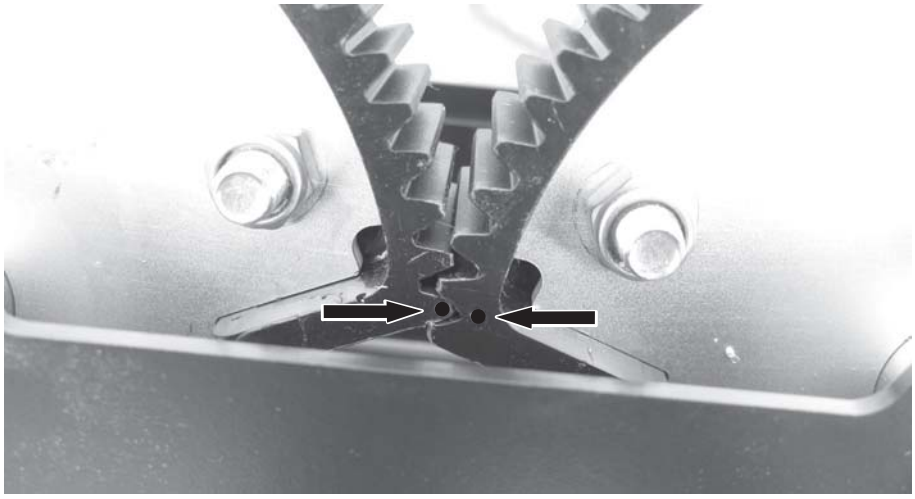
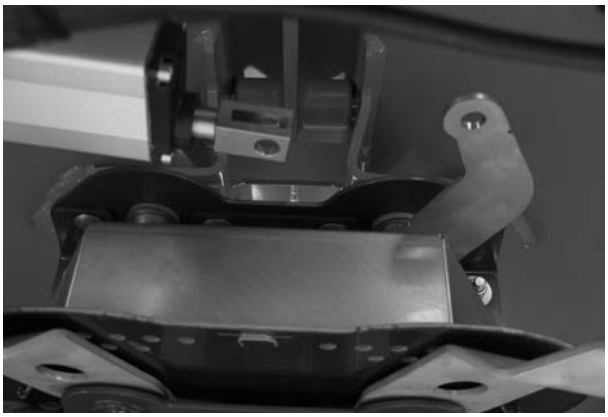


Figure 26: Underside of the toothed elements, markings must coincide: Markings must coincide

3. After checking or adjusting is complete, refit the protection device.

C.6.2 Disengaging the actuator for the drop point adjustment



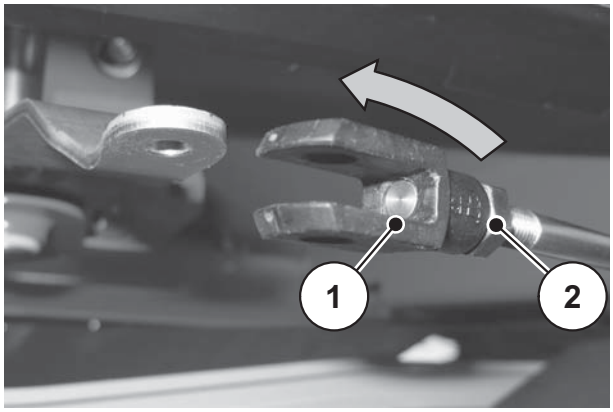
- Remove the pin.

Figure 27: Disengaging the actuator

Standard setting of the inner yoke

NOTICE

The inner and outer yokes must have the **same** setting on both sides. Proceed as described below for both sides.



1. Screw the yoke (1) in until the threaded rod rests flush on the inner edge of the yoke.
2. Screw the yoke out again by 2 turns.
3. Tighten the counter nut (2).

Figure 28: Disengaging the inner yoke

4. Engage the yoke and secure it by tightening the locknut.

Figure 29: Engaging the inner yoke

Standard setting of the outer yoke

1. Disengage the outer yoke at the left and right adjustment centres.
2. Screw the yoke (1) in until the threaded rod rests flush on the inner edge of the yoke.
3. Screw the yoke out again by 2 turns.

   Do not tighten the counter nut (2) **yet**!

   Do **not** engage the yoke.

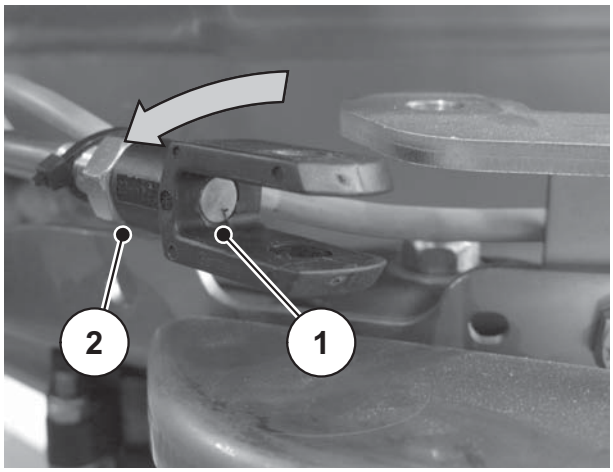


Figure 30: Disengaging the outer yoke

4. Set the drop point to **position 6** by turning the adjustment centre on both sides.

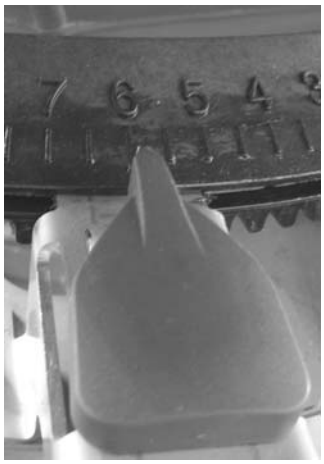


Figure 31: Setting the drop point to position 6.

5. Release the screw under the pointer using a SW13 spanner.
6. Push the pointer forward to lock it.

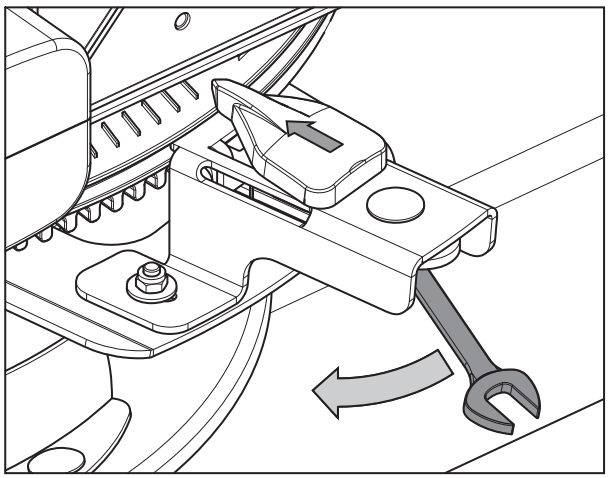


Figure 32: Setting the pointer manually

C.6.3 Checking AXIS 50.1 D/C:

1. Attach a suitably thin string [1] from below at the rear in the direction of travel (as shown) through the grooves [a] of the left and right adjustment centres and tauten it.

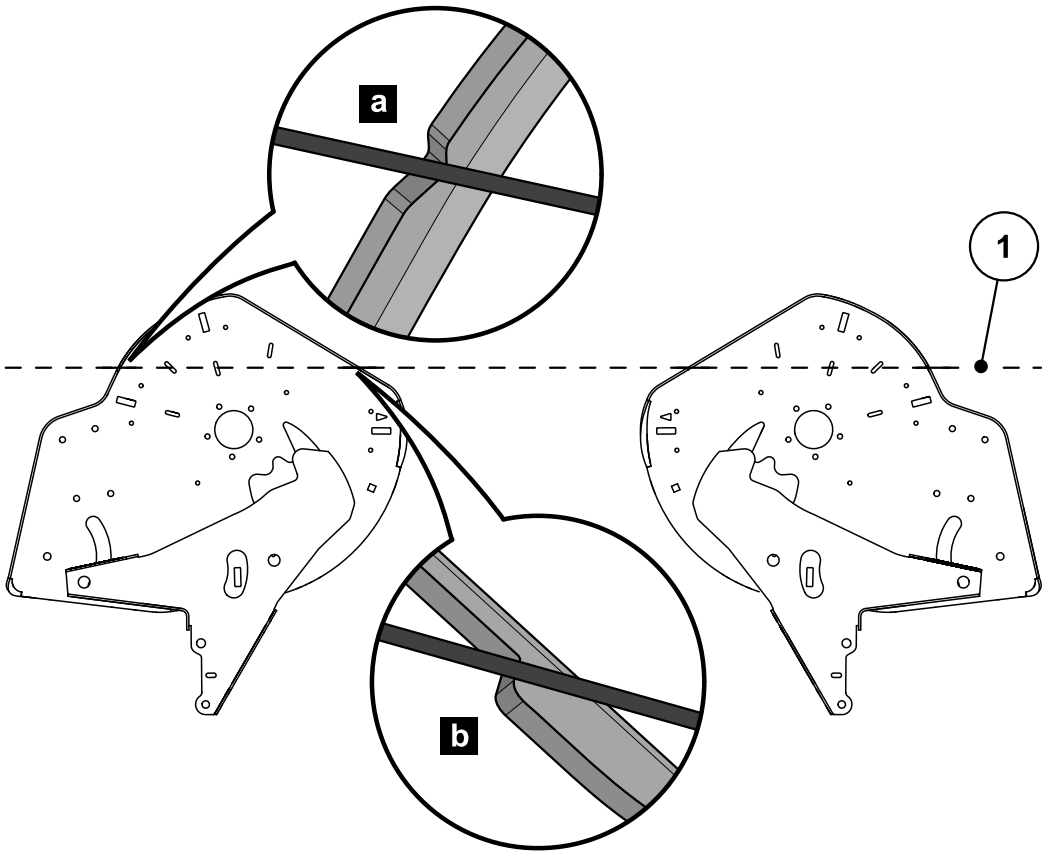


Figure 33: Checking the drop point

NOTICE

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

- The string must be correctly and easily attached to the edge of the relevant plate [b].
- If the string is not correctly attached, the drop point must be readjusted.

C.6.4 Adjusting AXIS 50.1 D/C:

2. Release the adjustment plate underneath the "drop point pointer" button (2 self-locking nuts).

Figure 34: Loosen the drop point adjustment plate

3. Turn the adjustment centre until the triangular mark lines up with the taut string.

4. Fasten the adjustment plate.

5. Push both plastic levers (agitator drive) back up and secure them.

6. Mount the outlet with brushes.

C.6.5 Checking AXIS 50.1 W

1. Attach a suitably thin string **at the rear** in the direction of travel (as shown) to the lower sides of the left and right adjustment centres and tauten it.

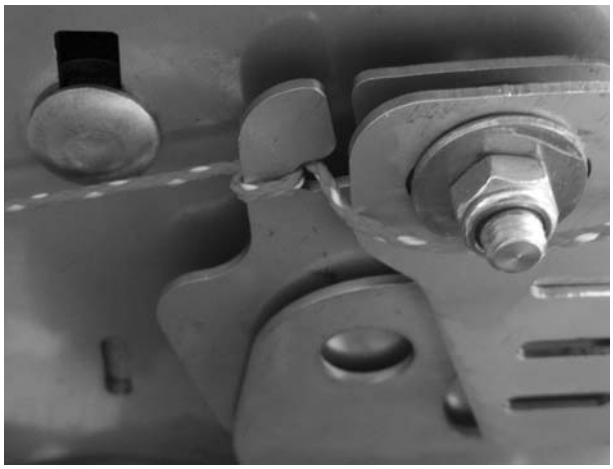


Figure 35: Attaching the string to the adjustment centre

2. The triangular mark on the adjustment centre must coincide with the tensioned string.

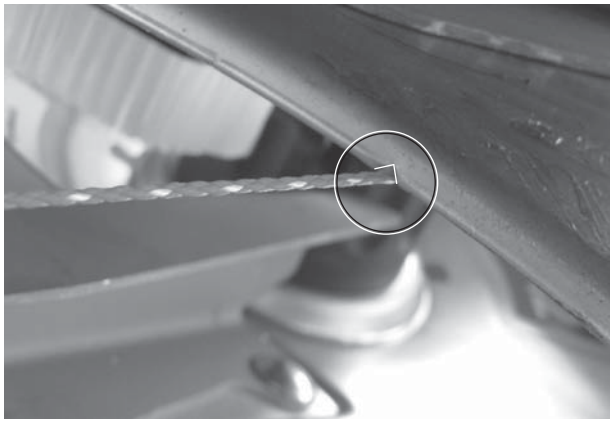


Figure 36: Markings on the adjustment centre

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

C.6.6 Adjusting AXIS 50.1 W

3. Loosen both of the pointer fixing screws.
4. Turn the adjustment centre until the triangular mark lines up with the taut string.
5. Retighten the two pointer fixing screws.
   - When tightening, make sure that the pointer is parallel to and flush with the base plate.
6. Remove the string.

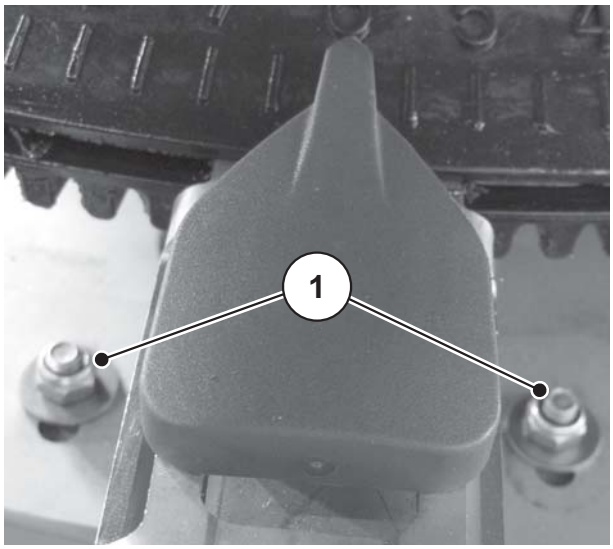


Figure 37: Releasing/tightening the fixing screws

7. Push the pointer back again.

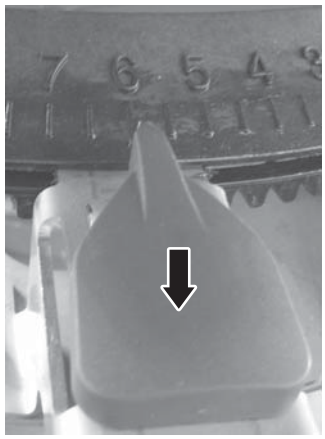


Figure 38: Pushing the pointer back again

8. Set the drop point to 0 on both sides.
9. Push the pointer forward to lock it.

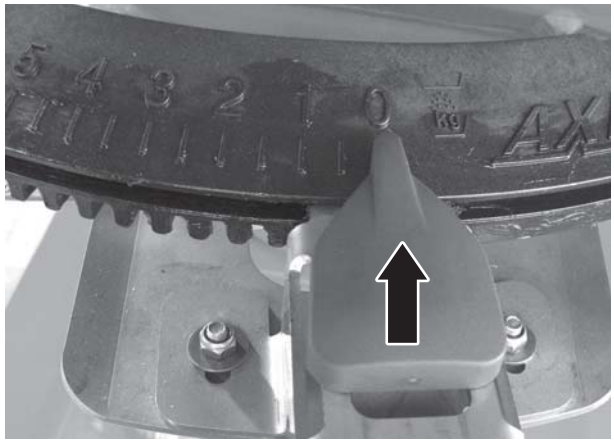


Bild 39: Set the drop point to position 0.

10. Adjust the outer yokes in such a way that the adjustment centre and the adjusting rod can be coupled by the pin (1).

11. Tighten the counter nut.

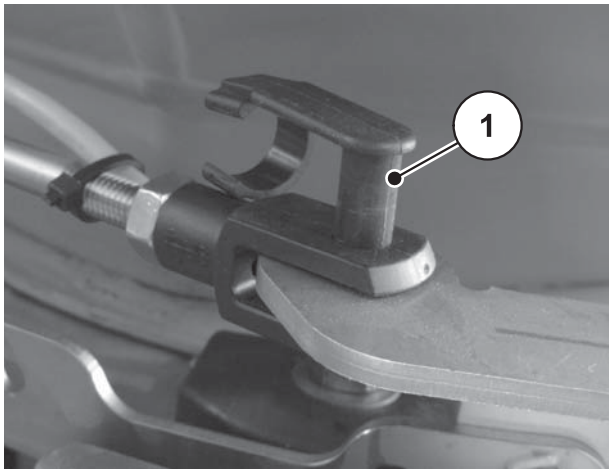


Figure 40: Engaging the outer yoke.

12. Push the pointer back

13. Tighten the screw.

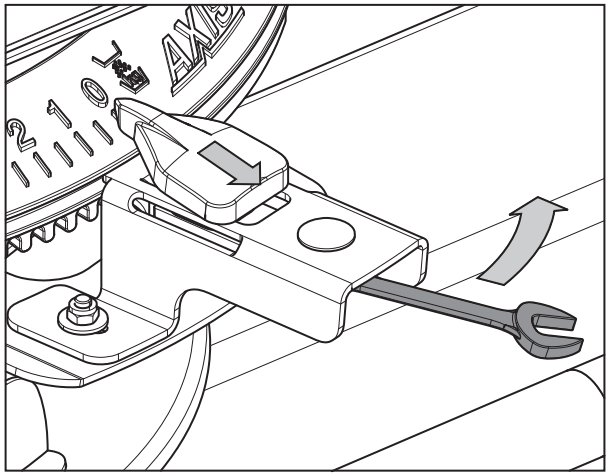


Figure 41: Pushing the pointer back again

14. Adjust the drop point manually to check that the settings on the left and right sides coincide (e.g. check that drop points 1, 6 and 9 coincide).

Figure 42: Checking the adjustment of the drop point

15. Hook the actuator back in and secure it.

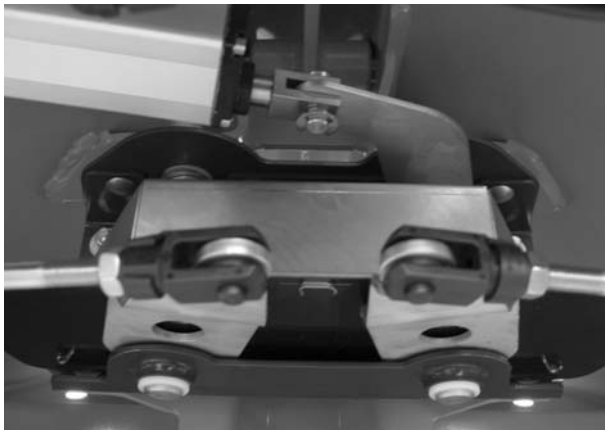


Figure 43: Engaging the actuator

16. Recalibrate the drop point positions with the operating unit.

NOTICE

Please follow the instructions in the chapter “Test/Diagnosis" of the operating unit instruction manual.

D Appendix

Manual adjustment of the drop point on AXIS 50.1 W (only in event of an electrical fault)

NOTICE

If the drop point can no longer be electrically actuated, it is adjusted manually.

D.1 Deactivating the actuator control

The actuators which are electrically operated for drop point adjustment, must be disconnected prior to manual adjustment of the drop point.

1. Disconnect the adjusting rod of the adjustment centre **on both sides**. Remove the pin to do this.

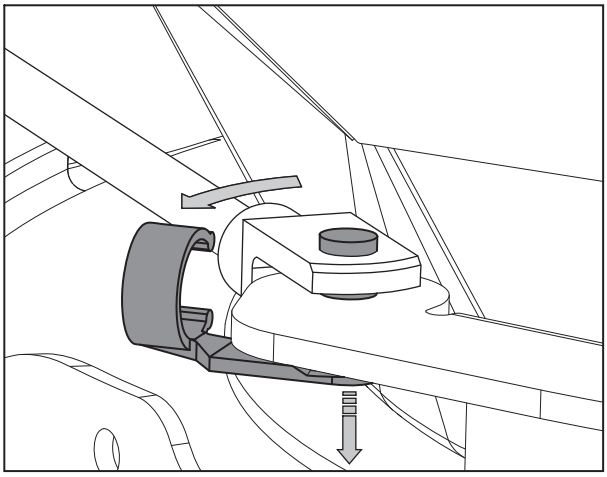


Figure 44: Removing the pin

2. Push rod to the side.
3. Put pin back into the yoke and lock it.

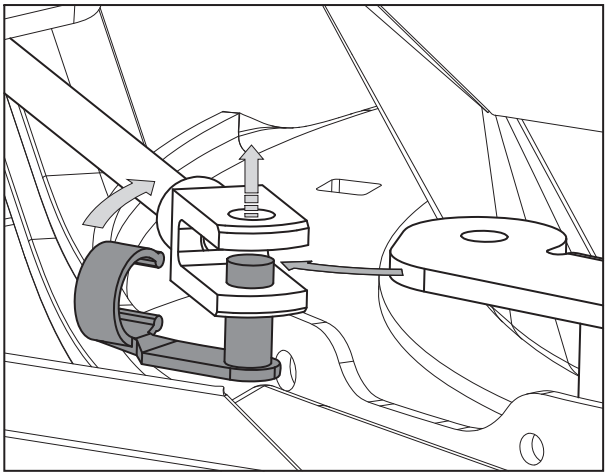


Figure 45: Removing the rod

D.2 Adjusting the drop point

The drop point is manually adjusted using the scale plate **on both sides**.

NOTICE

Ensure that the drop point **on both sides** is set the same.

1. Release the screw under the pointer using a SW13 spanner.
   ▷ The lock is released and the pointer can be moved freely (see figure 46).

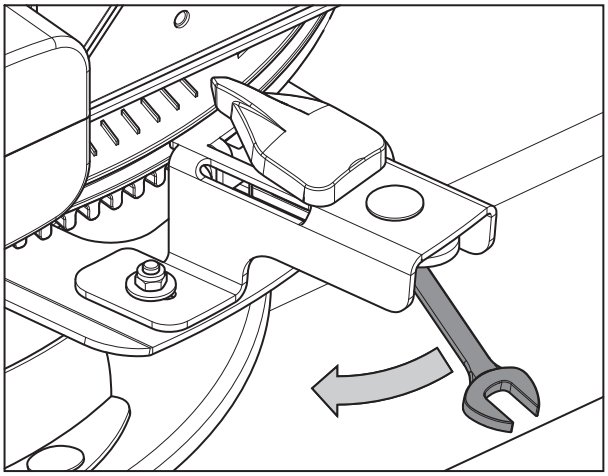


Figure 46: Releasing the lock

2. Set the pointer to the desired value.

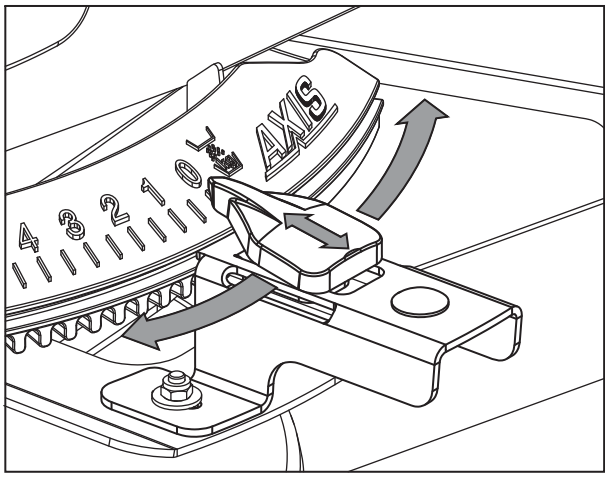


Figure 47: Manually adjusting the drop point

3. Push pointer forward at the desired value.

▷ **The pointer engages.**

4. Tighten the lock.

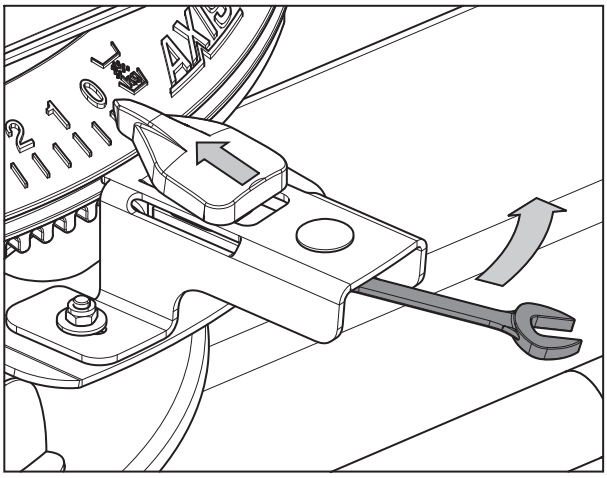


Figure 48: Tighten the lock.

9 General maintenance and service (all types)

9.1 Safety

NOTICE

Please note the warnings in chapter 3: Safety, page 5.
Take **particular note of the instructions** in the section 3.8: Maintenance and service, page 11.

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

Any maintenance and repair work is to be conducted with increased alertness at all times. Work particularly thoroughly and cautiously.

Observe the following instructions in particular:

- Welding and work on the electrical and hydraulic systems is to be carried out by qualified technicians only.
- There is a **risk of tipping** when working at the lifted machine. Always secure the machine with suitable supporting elements.
- Always use **both** eyebolts in the hopper for lifting the machine with hoisting gear.
- There is a **risk of crushing and shearing** at power-operated components (adjustment lever, metering slide). Make sure that there is no one in close proximity to the moving parts during maintenance.
- Spare parts must at least comply with the technical standards specified by the manufacturer. This is assured e.g. with genuine spare parts.
- Before starting any cleaning, maintenance, or repair work and when troubleshooting, switch off the tractor's engine and wait until all moving parts of the machine have come to a stop.
- Always have repairs carried out by a **qualified and authorised specialist workshop** only.

9.2 Maintenance plan

Component parts	Maintenance tasks Maintenance plan	Notes
Wearing parts and bolted connections	Inspect regularly	page 206.
Cleaning	To be carried out after each deployment	page 205
Protective grid in hopper	Open the protective grid before starting any maintenance work	page 203
Agitator	Check for wear	page 208
Removing and mounting spreading discs	Check for wear	Chapter B.5.2[1]
Replacing spreader vanes	Check for wear	page 210
Disc hub	Check position	page 207
Metering slide adjustment	Adjustment	AXIS 20.1: Chap. C.2[1] AXIS 30.1: Chap. C.4[1] AXIS 50.1 W: Chap. C.5[1]
Drop point setting	Adjustment	AXIS 20.1: Chap. C.3[1] AXIS 30.1: Chap. C.5[1] AXIS 50.1 W: Chap. C.6[1]
Gear oil	Quantity and types; Change oil	page 212
Lubrication chart		page 205

1. See the register of your machine (AXIS 20.1, AXIS 30.1, AXIS 40.1 or AXIS 50.1)

9.3 Opening the protective grid in the hopper

⚠ DANGER

Risk of injury due to moving parts in the hopper

There are moving parts in the hopper.

The rotating agitator can cause injury to hands and feet.

- ▶ Turn off the agitator.
- ▶ Climb into the hopper **only** for troubleshooting purposes.
- ▶ The protective grid may **only** be opened for maintenance purposes or in the event of a fault.

⚠ WARNING

Risk of injury due to moving parts in the hopper

There are moving parts in the hopper.

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

- ▶ It is important that the protective grid is installed and locked before commissioning and operating the machine.
- ▶ The protective grid may **only** be opened for maintenance purposes or in the event of a fault.

The protective grids in the hopper are automatically locked by means of a protective grid lock.

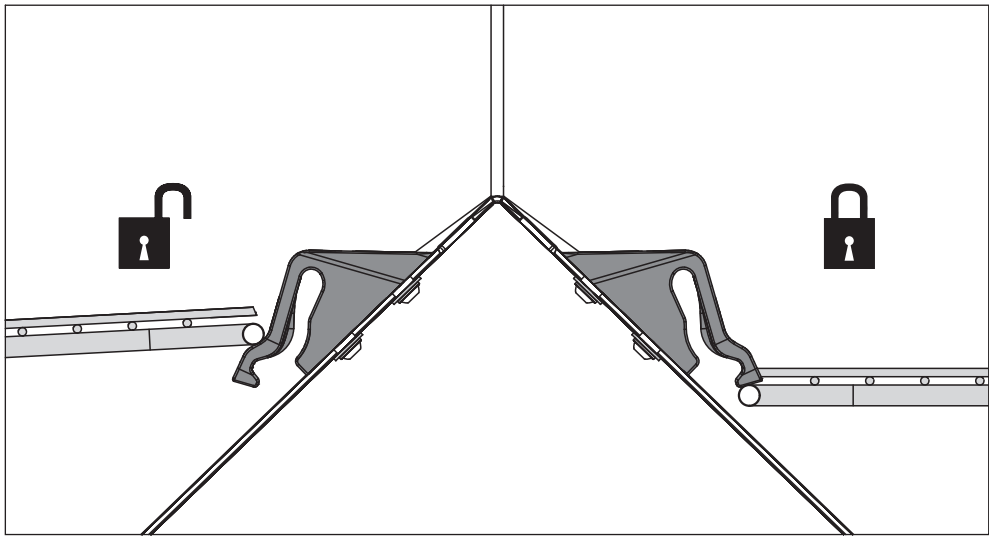


Figure 9.1: Protective grid lock open/closed

In order to avoid an inadvertent opening of the protective grid, the protective grid lock can only be released by using a tool (adjustment lever, see figure 6.10).

Before opening the protective grid:

- Disengage the PTO shaft
- Lower the fertiliser spreader.
- Turn the tractor motor off.

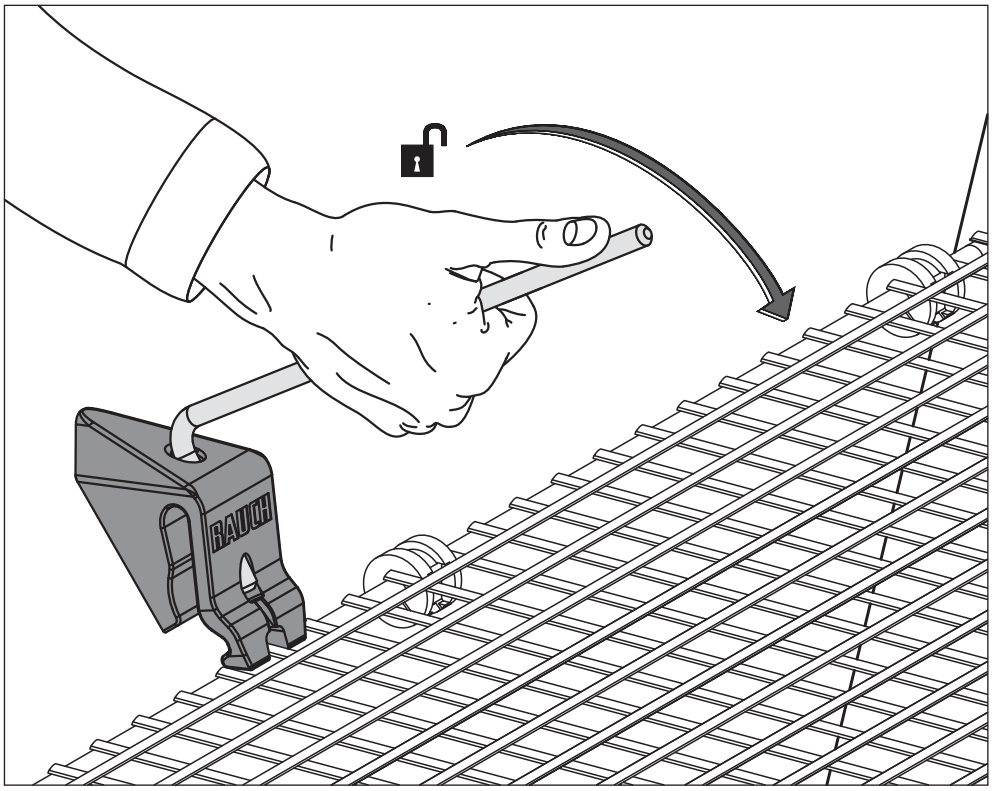


Figure 9.2: Opening the protective grid lock

- Execute a regular function check of the protective grid lock. See figure below.
- Immediately replace defective protective grid locks.
- If required, correct the setting by moving the protective grid lock [1] up/down (see figure below).

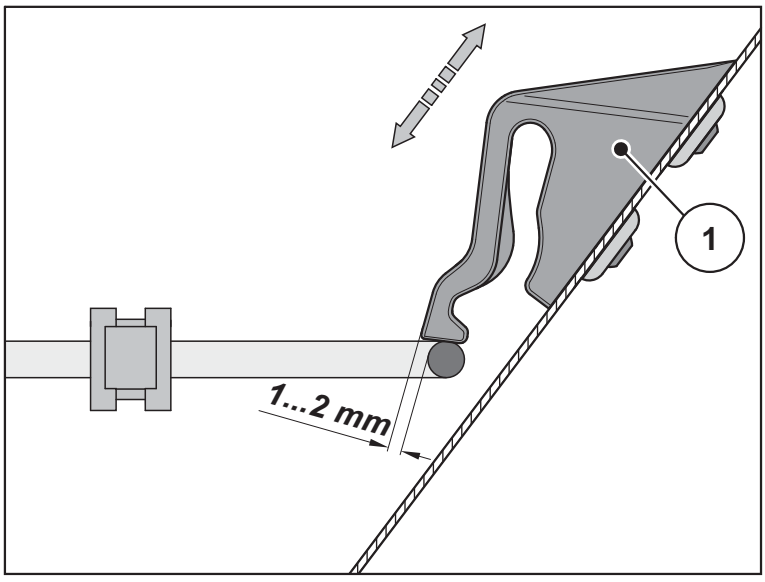


Figure 9.3: Test dimension for functional check of the protective grid lock

9.4 Cleaning

We recommend cleaning the machine with a light jet of water immediately after every use in order to maintain its value.

To facilitate cleaning, the protective grids in the hopper can be folded up (see chapter 9.3: Opening the protective grid in the hopper, page 203).

The following instructions must be observed for cleaning:

- Clean the outlets and the area of the slide guide from below only.
- Only clean oiled machines at washing points fitted with an oil separator.
- When cleaning with high-pressure water, never aim the jet directly at warning signs, electrical equipment, hydraulic components, and sliding bearings.

After cleaning, we recommend treating the **dry** machine, **especially the coated spreader vanes and stainless steel parts**, with an environmentally friendly anti-corrosion agent.

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

9.5 Lubrication chart

Lubrication points	Lubricant	Notes
Universal drive shaft	Grease	See manufacturer's manual.
Metering slide, stop lever	Grease, oil	Ensure smooth movement and grease regularly.
Disc hub	Graphite grease	Ensure smooth movement of pivot and sliding surfaces and grease regularly.
Upper and lower hitch balls	Grease	Grease regularly.
Joints, bushes (agitator drive)	Grease, oil	Designed for dry operation but can be lightly greased.
Drop point adjustment, adjustable floor	Oil	Ensure smooth movement and oil regularly from the outer edge inward and from the base outward.

9.6 Wearing parts and bolted connections

9.6.1 Checking wearing parts

Weare-prone parts are: **Spreader vanes, agitator head, outlet, hydraulic hoses**.

- Check wearing parts.

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

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

9.6.2 Check the bolted connections

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

- With new machines, all screw connections are to be checked for their tight seat after approx. 30 operating hours.
- Check all the bolted connections regularly for tightness, and definitely before the start of the spreading season.

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

9.7 Checking the position of the spreading disc hub

The spreading disc hub must be centred exactly under the agitator.

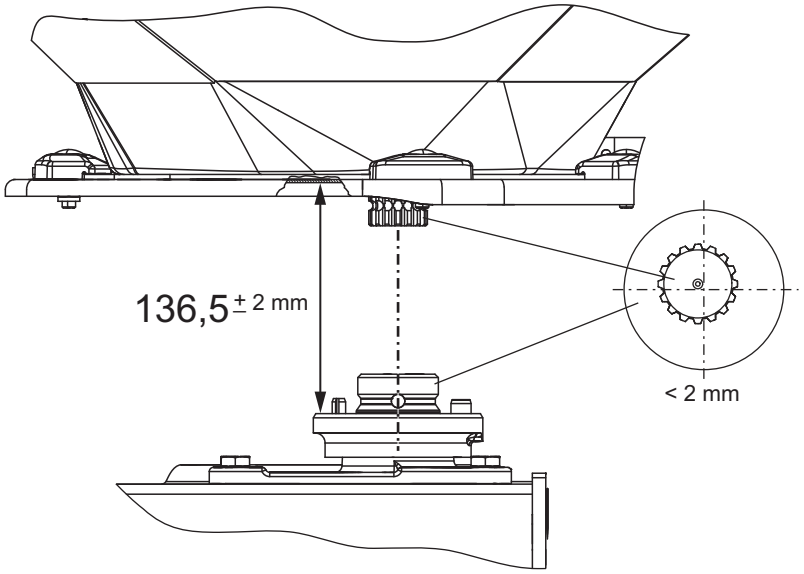


Figure 9.4: Checking the position of the spreading disc hub

Requirements:

- The spreading discs are removed (see section B.5.2).

Testing the centring:

1. Use suitable equipment to check that the spreading disc hub and agitator are centred (e.g. straight edge ruler, protractor)

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

If this tolerance is exceeded, please contact your dealer or authorised specialist workshop.

Checking the distance:

2. Measure the gap between the upper edge of the spreading disc hub and the lower edge of the agitator.

   ▷ The distance must amount to **136.5 mm** (admissible tolerance ± 2 mm).

If this tolerance is exceeded, please contact your dealer or authorised specialist workshop.

AXIS

9.8 Checking the agitator drive

NOTICE

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

The agitator must operate at a constant speed in order to ensure an even flow of the fertiliser.

- Agitator speed: **15 - 20** rpm at a PTO shaft speed of **540** rpm.

In order to attain the correct agitator speed of **15-20** rpm, the agitator requires the resistance of the spreading material inside it. This is the reason why it is entirely possible that even with a fully functional agitator, the correct speed cannot be attained or that the hopper seasaws, when the hopper is empty.

If the speed **with full hopper** lies outside of this range, the agitator needs to be checked for wear and tear.

Checking the functions of the agitator

Preconditions

- The tractor is parked.
- The ignition key has been removed.
- The machine is parked on the floor.

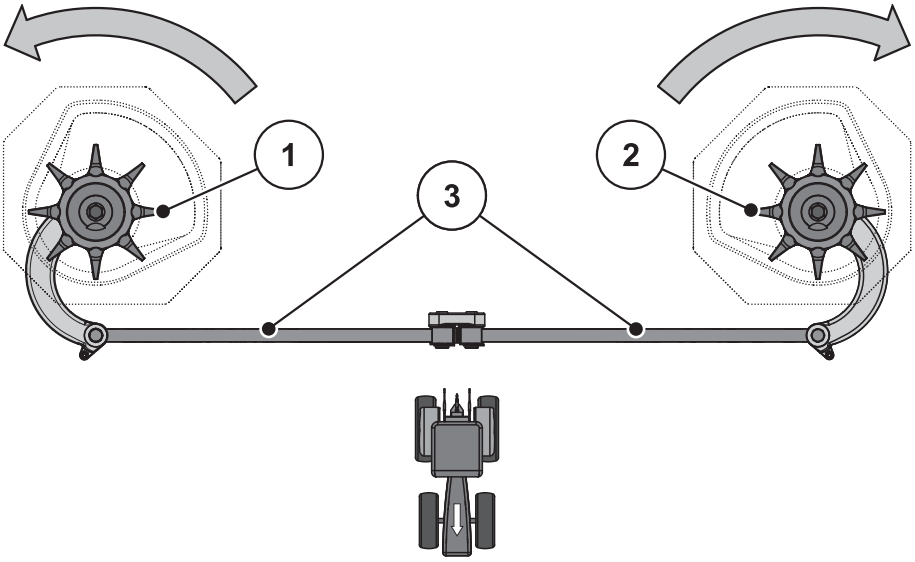


Figure 9.5: Checking the agitator drive

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

1. Check the connecting rods.
   - Connecting rods may not show any cracks or other signs of damage.
   - Check pivoting bearing for wear and tear.
   - Check safety element functions at all joints.
2. Manually turn the agitator head **into the rotational direction of the spreading disc**. See figure 9.5.
   - The agitator head must be able to turn.

   ▷ If the head does not turn, replace the agitator head.
3. Turn the head manually or with the help of an oil filter belt forcefully **against the rotational direction of the spreading disc**. See figure 9.5.
   - The agitator head should not turn.

   ▷ If the head can be turned, replace the agitator head.

▷ **If the checkup does not identify a cause, please contact your authorised specialist workshop for further inspections.**

Checking the agitator head for wear and tear:

- Check the fingers of the agitator head for wear.

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

  ▷ The fingers must not be bent.

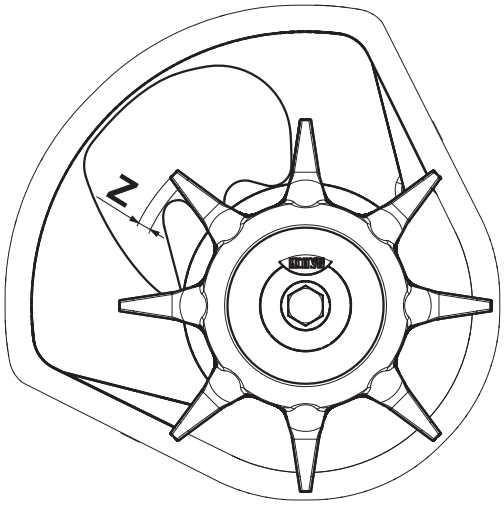


Figure 9.6: Agitator head wearing zone

9.9 Replacing spreader vanes

Worn spreader vanes must be replaced.

NOTICE

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

Precondition:

- The spreading discs are removed (see section B.5.2).

Determining the vane type:

⚠ CAUTION

Matching the vane types

Type and size of the vanes are matched to the spreader disk. Incorrect spreader vanes can cause damage to the machine and the environment.

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

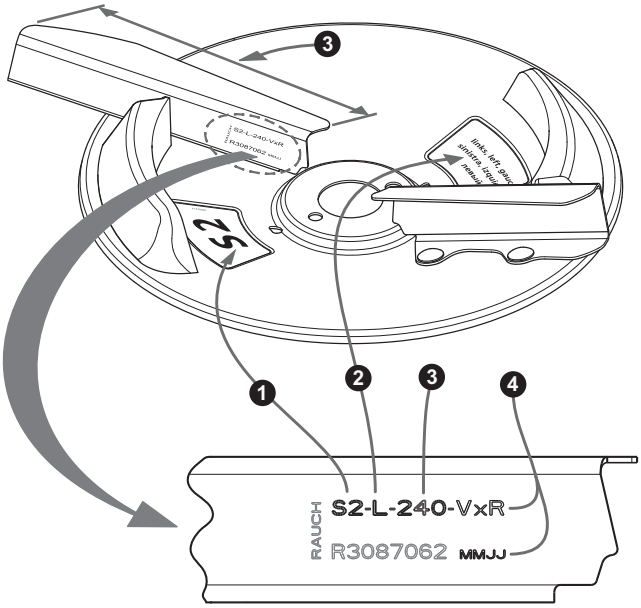


Figure 9.7: Spreading disc label

[1] Spreading disc type
[2] Spreader side
[3] Vane length
[4] Coating

Replacing a vane:

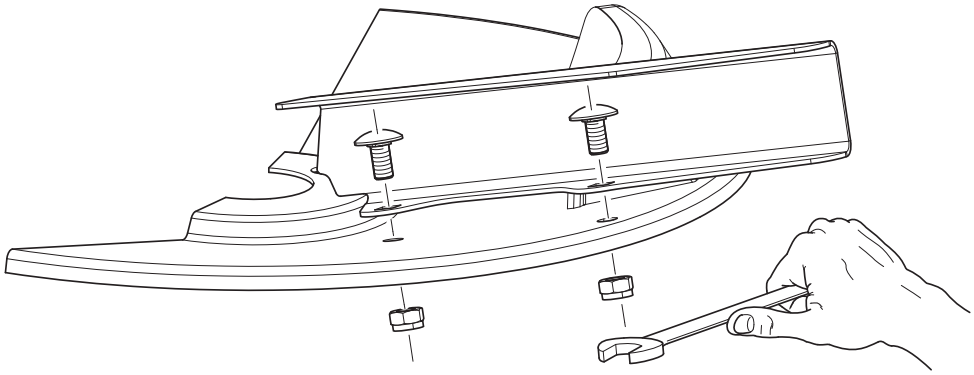


Figure 9.8: Remove the vane screws

1. Loosen the self-locking nuts at the spreader vane and take them off the spreader vane.
2. Install the new spreader vane onto the spreading disc. Make sure that you have the correct spreader vane type.

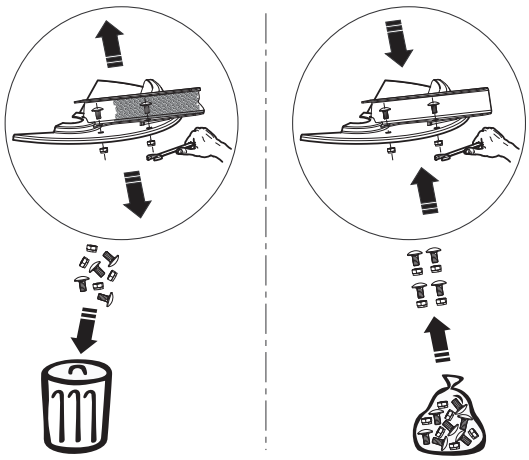


Figure 9.9: Use new self-locking nuts.

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

9.10 Gear oil (not for EMC machines)

NOTICE

The transmission of the machines with the M EMC function is maintenance free.
The present chapter is not relevant for these machine variants.

9.10.1 Quantity and types

The transmission of the machine is filled with approx. **5.5 l** (AXIS 20.1, AXIS 30.1) and/or **10, 5 l** (AXIS 50.1) gear oil.

All oils that meet the requirements of CLP 460 DIN 51517 (SAE 140 GL-4) are suitable for filling the transmission. Some of these oils are listed in the table below.

Manufacturer	Oil type
Aral	Degol BG 460
BP	Energol GR-XP 460
Castrol	Alpha SP 460
DEA	Falcon CLP 460
Esso	Spartan EP 460
Fina	Giran 460
Mobil	Mobilgear 634
Shell	Omala Oil 460
Total	Carter EP 460
Texaco	Meropa 460

NOTICE

Only use one type of oil.

- **Never** mix different oil types.

9.10.2 Checking the oil level, changing the oil

The transmission does not need to be lubricated under normal operating conditions. However, we recommend changing the oil after 10 years.

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

Requirements:

- The machine must be in a horizontal position to check the oil and to fill in oil. To drain the oil, the machine must be in slightly tilted position (approx. 200mm).
- PTO drive and tractor engine are stopped, the ignition key of the tractor is removed.
- When draining the oil, have a sufficiently large tray (approx. 11l) ready.

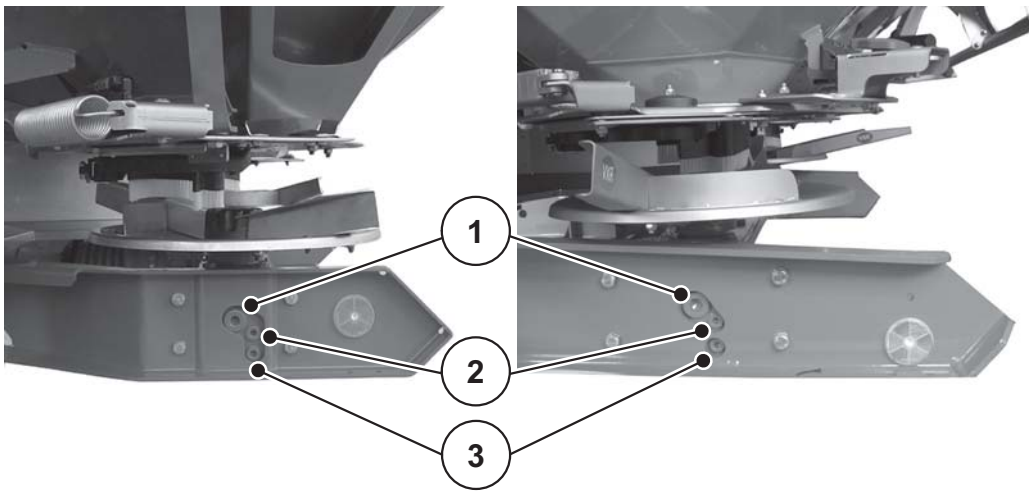


Figure 9.10: Gear oil filling and draining points; left: AXIS 20.1, AXIS 30.1, right AXIS 50.1

[1] Filling screw
[2] Oil level checking screw
[3] Drain screw

Checking the oil level:

- Open the oil level checking screw.
  ▷ The oil level is satisfactory when the oil reaches the lower edge of the hole.

Draining oil:

- Tilt the machine sideways (tilt approx. 200 mm).
- Position the collection vessel under the oil drain plug.
- Open the oil drain plug and let the oil drain completely.
- Close the oil drain plug.

⚠ CAUTION

Environmentally correct disposal of used oil

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

▶ Dispose of used oil in accordance with the applicable local provisions.

AXIS

Filling with oil:

- Only use SAE 140 GL-4 gear oil.
- Open the filler hole and the check plug.
- Fill gear oil into the filling opening until the oil level at the check plug reaches the lower edge of the hole.
- Close the filler hole and the check plug again.

10 Disposal (all machine types)

10.1 Safety

⚠ WARNING

Environmental pollution due to unsuitable disposal of hydraulic and gear oil

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

- ▶ The professional removal of escaped oil may only be conducted by authorised maintenance staff.
- ▶ Collect/dam escaped oil with sand, earth or other absorptive 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.
- ▶ Oil must be prevented from spilling and draining into the sewers.
- ▶ The ingress of oil into the sewage system must be prevented by building dams made of sand and/or earth or by other suitable damming means.

⚠ WARNING

Environmental pollution caused by inappropriate disposal of packaging materials

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

- ▶ An appropriate disposal of packaging materials is to be implemented with an authorised waste management company respecting the national regulations.
- ▶ Packaging material may **not** be burned or disposed of with the domestic waste processing.

⚠ WARNING

Environmental pollution caused by inappropriate disposal of components

The incorrect disposal of ingredients and materials is a threat to the environment.

- ▶ Only authorised companies may be commissioned with the disposal.

10.2 Disposal

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

1. All components, auxiliary and operating materials from the machine must be removed by specialist staff.

   Hereby, these components and substances must be cleanly separated into 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.

Terms/conditions of 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 supplied product. Warranty claims are rendered void if RAUCH original spare parts were not used. Therefore, the directions in the operating manual must be observed. In all cases of doubt contact our sales 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 must be indicated. 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 RAUCH machines themselves will be accepted. This also means that no liability will be accepted for damage resulting from spreading errors. Unauthorised modifications of RAUCH machines may result in consequential damage, for which the manufacturer will not accept any liability. The manufacturer's liability exclusion will not apply in case of wilful intent or gross negligence by the owner or a senior employee, and in cases where – according to the product liability law – there is liability for personal injury or material damage to privately used objects in the event of defects in the supplied product. It will also not apply in the event that assured properties are absent, if the purpose of the assured properties was to protect the purchaser against damage that does not involve the supplied product itself.

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RAUCH
POWER FOR PRECISION

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