OPERATING INSTRUCTIONS
LEEB 12 TD

TRANSLATION OF THE ORIGINAL OPERATING INSTRUCTIONS
READ CAREFULLY PRIOR TO STARTING UP!
KEEP OPERATING INSTRUCTIONS IN A SAFE PLACE!

ART.: 60015262
ISSUE: 08/2020

HORSCH
Farming with passion

- Translation of the Original Operating Instructions -

Machine Identification

The corresponding data is to be entered into the list below upon receiving the machine:

Serial number: .....
Machine type: .....
Year of construction: .....
Initial installation: .....
Fittings: .....
.....
.....
.....

Publication date of Operation Manual: 08/2020 60015262 Leeb 12 TD en
Latest change: 10/2020

Address of Retailer:
Name: .....
Road: .....
Town/City: .....
Tel.: .....

Customer No.:
Retailer: .....

Address of HORSCH:
HORSCH Maschinen GmbH
92421 Schwandorf, Sitzenhof 1
92401 Schwandorf, Postbox 1038

Tel.: +49 (0) 9431 / 7143-0
Fax: +49 (0) 9431 / 7143-9200
E-mail: info@horsch.com

Customer No.:
HORSCH: .....

Confirmation of receipt of machinery

Warranty claims become only effective when the first use of the machine is reported to HORSCH Maschinen GmbH within a week.

At *www.horsch.com* under *SERVICE PARTNERBEREICH* an interactive PDF form is available for download for this purpose (not available in all languages).
By clicking on *Send* – depending on the email program installed – a mail draft with the completed form is generated automatically. Alternatively, the form can be sent as email attachment to *machine.registration@horsch.com*.

A different form of registration (postal mail, by fax, etc.) is not allowed for.

CE

HORSCH

EG-Konformitätserklärung

Die

HORSCH LEEB Application Systems GmbH

Kleegartenstraße 54, D-94405 Landau a. d. Isar

erklärt hiermit in alleiniger Verantwortung als Hersteller, dass das nachfolgend genannte Produkt:

Gezogene Pflanzenschutzspritze

Typ: ***Leeb 12 TD***

den einschlägigen grundlegenden Sicherheits- und Gesundheitsanforderungen der Richtlinien 2006/42/EG und 2009/127/EG entspricht.

Landau, 31.01.2020

Theodor Leeb
Geschäftsführer

Klaus Winkler
Dokumentationsbevollmächtigter
HORSCH Maschinen GmbH
Sitzenhof 1
D-92421 Schwandorf

Translation of EC Declaration of Conformity

(Directive 2006/42/EC)

The manufacturer

HORSCH LEEB Application Systems GmbH
Kleegartenstraße 21
D-94405 Landau a. d. Isar

hereby declares that the product

Pulled crop protection sprayer

Type: **Leeb 12 TD**

this declaration refers to, conforms with all relevant fundamental health and safety requirements of the directive 2006/42/EC and 2009/127/EC.

Landau, 31/01/2020

Theodor Leeb
Managing director

Klaus Winkler
Documentation Representative
HORSCH Maschinen GmbH
Sitzenhof 1
D-92421 Schwandorf

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Introduction

Foreword

We would like to thank you for the trust you have expressed in us by buying this machine. Congratulations for having purchased a quality product from HORSCH.

Before commissioning the machine, read and strictly comply with the operating instructions. In doing so, you will avoid accidents, reduce repair costs and downtime and increase the reliability and service life of your machine. Pay attention to the safety notes!

HORSCH will not assume liability for any damage or malfunctions resulting from failure of complying with the operating instructions.

These operating instructions will assist you in getting to know your machine and using it correctly for its intended purposes.

The operating instructions must be read and strictly adhered to by all persons working on or with the machine e.g.:

- Operation (including preparation, fault rectification during work, care)
- Maintenance (maintenance, inspection)
- Transport

Trained personnel of our service and sales partners will instruct you in the operation and care of your machine. By submitting the acknowledgement of receipt you have confirmed proper acceptance of the machine.
The warranty period starts with the date of delivery.

The operating instructions were prepared based on the EC Machinery Directive, EN Standards and German laws and regulations. The national laws and regulations must be observed when using the machine. National laws and regulations supersede the information of the operating instructions!

We reserve the right to alter illustrations as well as technical data and weights contained in these operating instructions for the purpose of improving the machine.

The illustrations in these operating instructions show different versions of the implement and different equipment variants.
Because of technical progress, the instructions may contain illustrations that do no longer correspond to the current series status.

Notes on representation

Warning notes

These operating instructions distinguish between three different types of warning notes.

The following **signal words with warning symbols** are used:

⚠DANGER

Highlights a danger that **will lead** to death or severe injury if it is not avoided.

⚠WARNING

Highlights a danger **that may lead** to death or severe injury if not avoided.

⚠CAUTION

Highlights a danger that can lead to injury if not avoided.

Please read the warning notes given in these operating instructions!

Instructions

⚠ NOTE

Identifies important notes.

Take-action instructions are indicated by arrow points:

➢ ...

➢ Keep the order of the instructions. Alternatively, instructions may be numbered consecutively.

The designations *right*, *left*, *front* and *rear* apply as seen in travel direction.

Service

HORSCH Company would like you to be completely satisfied with your machine and our services.

If you encounter any problems, please feel free to contact your sales partner.
The service staff of our sales partners and the service employees at HORSCH will always be available to assist you.

In order to be able to solve technical problems as quickly as possible, we ask you kindly to support us.

Please help the service personnel by providing the following information to avoid unnecessary queries.

- Customer number
- Name of customer representative
- Name and address
- Machine model and serial number
- Purchasing date and operating hours or area performance
- Type of problem

Warranty claim processing

Warranty claim forms must be submitted to HORSCH through your local HORSCH sales partner.

Consequential damage

The machine has been manufactured by HORSCH with greatest care. However, despite the intended use deviations in placing quantity up to total failure may be caused by e.g.:

- damage caused by external influences
- wear of wear items
- missing or damaged tools
- incorrect travel speeds
- incorrect setting of the unit (incorrect connection, non-observance of setting tables)
- failure to comply with the operating instructions
- blockages or seed bridging
- neglect and improper care and maintenance

Therefore, it is crucial to always check your machine before and during use for correct operation and adequate application accuracy.

Compensation claims for damages that have not occurred on the machine are excluded. This also means that any liability for consequential damages caused by travel and operating faults is excluded.

Safety and responsibility

The following warnings and safety notes apply to all sections in these operating instructions.

The machine has been built in accordance with latest technical standards and generally accepted safety regulations. However, risks for life and limb of the operator or third parties and impairment of the machine or other material assets can occur during use.

Please read and comply with the following safety notes, **before** you start to use the machine!

Intended use

The machine is intended for the application of fluids on agricultural areas. The application of crop protection agents and liquid fertilizers (AHL) on agricultural land is particularly important. The machine can be used to mix, dose and transport the biocatalyst to be placed on the application area.
The intended use also includes taking note of and observing the notes and instructions given in these operating instructions, observing all pictograms and warnings on the machine, observing all maintenance and repair intervals and complying with the defined technical limits and areas of application.

When participating with the machine in public road traffic, the respective national registration and traffic law must also be complied with.
The permissible axle and drawbar loads must not be exceeded during road travel.

Any other kind of use of the machine contradicting the above, especially

- connecting/attachment to an agricultural tractor that is not suitable
- filling the machine with flammable fluids other than those approved in the scope of the operating instructions
- exceeding the permissible technical total weight
- operating the machine while persons are still in the danger zone (this includes in particular transport rides on the machine)
- carrying out maintenance and/or repair work on a machine that has not been shut down or is not secured against restarting

are considered not as intended.

Horsch does not assume any liability for damages resulting from the unintended use of the machine.

Spare parts

Genuine spare parts and accessories from HORSCH have been specially designed for this machine.
Spare parts and accessories which are not delivered by us have not been tested or approved by us.
Installation or use of non-original HORSCH products may have a detrimental effect on specific design features of the machine and impair the safety of machine operators and the machine itself.
HORSCH will not assume liability whatsoever for damage resulting from the use of non-original parts and accessories.

If the component to be replaced is marked with a safety sticker, these stickers must also be ordered and attached to the spare part.

Operating Instructions

The operating instructions are a part of the machine!
Failure to comply with the operating instructions can result in severe or even fatal physical injuries.

- Read and follow the corresponding sections in the operating instructions before starting work.
- Store the operating instructions and keep for future use.
- Pass the operating instructions on to a later user.

Qualification of personnel

Unintended use of the machine can lead to severe or even fatal physical injuries. In order to prevent accidents, each person involved in work with the machine must meet the following general minimum requirements:

- The person must be physically able to keep the machine under control.
- The person is able to perform work with the machine safely within the scope of these operating instructions.
- The person is acquainted with the function of the machine within the scope of its work and is able to assess and avoid any work related dangers. The person is able to recognize and avoid work related dangers.
- The person has understood the operating instructions and is able to implement the information given in the operating instructions accordingly.
- The person is fully familiar with the safe operation of the vehicle.
- The person knows all applicable road traffic regulations and is in possession of a valid driving permit for road travel.
- A person being instructed must only work with or on the machine under the supervision of an experienced person.

The owner of the machine must

- regulate the area of responsibility, competence and monitoring of personnel.
- if necessary train and instruct the personnel.
- make the operating instructions accessible for the machine operator.
- ensure that the operator has read and fully understood the operating instructions.

Groups of operators

Persons who work with the machine must have been trained for the different activities involved.

Instructed operators

These persons must have been trained for their respective activities by the owner or other qualified experts. This refers to the following activities:

- Road transportation
- Application and set-up work
- Operation
- Maintenance
- Troubleshooting and repair

Operators trained by HORSCH

Furthermore, for certain activities the corresponding personnel must have been trained by service personnel from HORSCH. This refers to the following activities:

- Loading and transport
- Commissioning
- Troubleshooting and repair
- Waste disposal

Certain work concerning maintenance and repair must only be carried out by an expert workshop. Such work is identified with the additional comment *Workshop work*.

Children in danger

Children are not able to assess dangers and may behave unpredictably. Children are therefore especially endangered:

- Keep children away from the machine.
- Especially before drive off and before triggering machine movements you must make sure that the danger zone is free of children.
- Shut down the tractor before leaving it. Children can trigger dangerous machine movements. An insufficiently secured machine parked without being attended poses a danger for playing children!

Personal protective outfit

⚠ WARNING

Health hazards caused by accidental contact with crop protection agents or spraying mixture!

Wear personal protective outfit:

- when preparing the spraying mixture
- when cleaning / replacing the spraying nozzles, during spraying operation, during all work for cleaning the crop protection sprayer after spraying operation.

To wear the required protective outfit always observe the operating instructions and the safety data sheet of the crop protection agent used.

Missing or incomplete protective equipment increases the risk of health damage. Personal protective equipment includes, e.g.:

- overall resistant to chemicals
- protective gloves resistant to chemicals
- shoes resistant to chemicals
- face protection
- safety goggles to protect against splashes
- Respirator
- Provide effective protective equipment in proper condition.
- Never wear rings, bracelets or other jewellery.

Wear the personal protective outfit stipulated in the safety data sheet of the crop protection agent last used when cleaning the crop protection sprayer.

⚠ NOTE

The owner must provide the necessary personal protective outfit as specified by the manufacturer of the crop protection agent used.

⚠ NOTE

Do not enter the tractor cabin with contaminated protective outfit!

Safety in traffic

⚠ DANGER

No passengers are allowed to ride on the machine!

- Pay attention to the permissible transport widths and heights. Pay attention to the transport height when passing under bridges and low hanging overhead power lines.
- When driving on public roads comply with the respective national road traffic regulations!
- Do not exceed the permissible axle load, tyre load bearing capacity and total weight, in order to ensure sufficient steering and braking capabilities. The front axle must be loaded with at least 20 % of the tractor weight.
- For machines without brake select the weight of the tractor and the speed so that the machine can be managed securely under all conditions.
- The tractor must ensure the adequate supply of the brake system of the connected vehicle.

- Travel characteristics, steering and braking ability are influenced by attached or hitched up equipment and ballasting weights. You should therefore pay attention to sufficient steering and braking ability!

- Before road travels check the correct connection of the supply lines:
- the brake and hydraulic system for apparent faults
- whether the parking brake is fully released
- function of the service brake

For road transport the machine must be set to transport position. The folding boom must be folded up and secured. The stroke of the parallelogram and optional steering must always be blocked via the shut-off valve before road travel, see chapter *shut-off valve*.

- Check lighting, warning and protective features for functioning and cleanliness.

☞ The permissible maximum speed specified in the type approval must be complied with for transport on public roads!

The specifications in the type approval document or in the technical data are decisive for the design dependent top speed.

Always match the travel mode to the road conditions to avoid accidents and damage to the undercarriage.
Consider your personal abilities, carriage way, traffic, sight and weather conditions.

☞ In addition, pay attention to the notes in chapter *Commissioning*!

Safety in operation

Commissioning

The operational safety of the machine cannot be guaranteed without orderly performed commissioning. This can lead to accidents with severe or even fatal physical injuries.

- The machine must only be put into operation after receiving instructions by employees of the authorized dealer or a HORSCH employee.
- The machine registration form must be completed and returned to HORSCH.

All protective features and safety equipment, such as detachable protective devices (wheel chocks, etc.), must be correctly in place and reliably functioning before the machine is put into operation.

- Check nuts and bolts, especially on wheels, regularly for a tight fit and re-tighten if necessary.
- Check the tyre pressure at regular intervals, see maintenance overview.

Damage to the machine

Damage to the machine can impair the operational safety of the machine and cause accidents. This can lead to severe or even fatal physical injuries.
The following machine parts are particularly important for safety:

- Hydraulics
- Brakes (if available)
- Connecting features
- Protective features
- Lighting

If in doubt about the safety-relevant status of the machine, e.g. in case of leaking operating fluids, visible damage or unexpected changes in travel behaviour:

- Immediately shut down and secure the machine.
- If possible locate and rectify the faults by following these operating instructions.
- Rectify possible causes for damage (e.g. remove dirt and tighten loose screws).
- Have damage that could affect safety and that cannot be rectified by you rectified by a qualified expert workshop.

Hitching and uncoupling

Faulty coupling of the machine to the pulling tool of the tractor causes dangers, which could result in severe accidents.

- Strictly comply with all operating instructions:
  - These operating instructions (chapter *Connecting*, *Transport position* and *Parking*)
  - Operating instructions of the tractor
  - if necessary the operating instructions for the propshaft

- Exercise special caution when reversing the tractor. Never stand between tractor and machine.
- Only park the machine on a firm and level surface.
- Secure the machine against rolling away.
- Do not uncouple the machine with the folding boom unfolded, with empty spraying mixture containers. Negative drawbar load can cause the crop protection sprayer to tip over.

Hydraulics

The hydraulic system is under high pressure. Escaping fluid can penetrate the skin and cause serious injuries. In the event of injury, consult a doctor immediately.

The machine's hydraulics has several functions, which can cause injury to persons or damage to the machine if operated incorrectly.

- Do not connect/disconnect hydraulic hoses to/from the tractor before both the hydraulics on machine and tractor are de-pressurised.
- Lock all hydraulically operated parts before any work on the hydraulic system. Depressurise the hydraulics on the tractor and implement side.
- The hydraulic system is under high pressure. Check all lines, hoses and screwed connections regularly for leaks and any visible external damage!
- Use only appropriate means when searching for leaks. Repair any damage immediately! Oil sprays can cause injuries and fire!
- Power sockets and connectors on the hydraulic connections should be marked in order to exclude operating errors.
- In the case of injury, contact a doctor immediately!
- Secure and lock the control unit on the tractor if not in use!
- Replace hydraulic hoses at the latest after six years, see *Maintenance overview*.

Pressure accumulator

The hydraulic system may be equipped with pressure accumulators.

- Do not open or work (welding, drilling) on pressure accumulators. Even when empty, the tanks are still preloaded by gas pressure.

The hydraulics must be depressurized before maintenance!

Brake system

Depending on the equipment, the machines can be equipped with a pneumatically or hydraulically operated service brake system.

For road travel the brake system must always be connected and fully functional.

- After coupling the machine and before transportation you should always check the function and condition of the brake system.
- Check the setting on the brake pressure regulator.
- Always release the parking brake before starting to drive.
- Always secure the machine against rolling away and apply the parking brake before unhitching.

Adjustments and repair work on the brake system must only be carried out in a professional workshop or by an operator, who has been specially trained by HORSCH for this purpose.

Overhead lines

When unfolding or folding the folding boom, the machine may reach the height of overhead lines. Possible voltage flashover to the machine may cause fatal electric shock or fire.

- Keep a safe distance to electric high voltage power lines when unfolding or folding the folding boom.
- Never unfold or fold the folding boom in the vicinity of power poles and power lines.
- With the folding boom unfolded and raised, keep a sufficient distance to electric high voltage power lines.
- Never leave or access the machine under overhead lines to avoid possible risks of electric shock or voltage flashover.
- When operating the sprayer under high voltage power lines disable the BoomControl and operate the slope compensation manually.

What to do in case of voltage flashover

Voltage flashover generates high electric voltages on the outside of the machine. This results in extreme voltage differences at the ground around the machine. Wide strides, laying on the ground or supporting yourself with your hands on the ground can cause life-threatening electric currents (pace voltage).

- Do not leave the cabin.
- Do not touch any metal objects.
- Do not create a conductive connection to ground.
- Warn persons: DO NOT come near the machine. Electric voltages at the ground can cause severe electric shock.
- Wait for professional rescuers. The overhead power line needs to be switched off.

If persons need to leave the cabin despite the voltage flashover, e.g. in case of a potential life-threatening risk of fire:

- Jump away from the machine. Ensure a safe stand when jumping. Do not touch the outside of the machine.
- Move away from the machine with short stepping strides.

PTO-shaft / propshaft

Persons can be caught, pulled in and seriously injured by the rotating PTO-shaft or propshaft. **Before** switching on the PTO-shaft:

- Always make sure that the PTO-shaft guard is in place and fully functional.
- Make sure that the chosen rotary speed and the sense of rotation of the propshaft or PTO-shaft correspond with the permissible values for the machine.
- Make sure that no persons are inside the danger zone around the PTO-shaft or propshaft. Never switch on or couple the PTO-shaft while the tractor motor is shut down.
- Shut down the PTO-shaft if the angles are too large. The machine could become damaged. Parts may be thrown off and injure persons.

- Switch off the PTO-shaft if it is no longer needed.
- Ensure sufficient overlapping of profile tube and PTO-shaft guard.
- Allow PTO-shaft locks to click into place.
- Secure the PTO-shaft guard with chains against rotating.
- Before assembly/disassembly of the propshaft as well as before all interventions on the machine:
  Uncouple the PTO-shaft (shut off from the tractor cab), switch off the tractor engine, pull off the ignition key and wait until all parts have come to a standstill.
- Follow the operating instructions for the propshaft.

Technical limiting values

If the technical limiting values of the machine are not complied with, the machine may sustain damage. This can lead to accidents with severe or even fatal physical injuries.
The following technical limiting values are of particular importance for safety:

- Permissible total weight
- maximum axle loads
- maximum drawbar load
- Top speed

See chapter *Technical data*, type plate and type approval.

- Also pay attention to the max. permitted loads for the tractor.

Use in the field

⚠DANGER

No passengers are allowed to ride on the machine!

- Observe the national legislation and regulations on crop protection!
- The personal protective outfit stipulated in the safety data sheets of the crop protection agent manufacturers must be carried along and worn during work.
- Check the area immediately around the machine (for children!) before driving off and commissioning the machine. Ensure sufficient visibility.
- Check the condition of the folding boom and their mounting before use.
- Ensure sufficient stability of the machine in case of longitudinal or transverse inclination when working in uneven terrain. Pay attention to the limiting values for the tractor.
- Do not remove any of the mandatory and supplied protective devices.
- Stay clear of the operating range of hydraulically operated parts.
- Use accessing aids and steps only at standstill.
- At the headland reduce the travel speed and disable spraying.
- Excessive, jerky steering movements at the beginning and the end of a curve will put extreme loads on the folding boom.
- The spraying agent may be blown away if the droplets are fine and the wind is strong. This may cause damage to people and nature!
- If the soil is very dry, the applied chemical can be blown away together with dust and cause damage. Ensure sufficient moisture of the soil!
- For tractors with cabins with ventilation fans replace the fresh air filters with activated-carbon filters! Observe notes and instructions of the tractor manufacturer.
- Ensure that the category of the tractor cabin is approved for the respective crop protection agent used.
- Always ensure a sufficient water supply in the machine to be able to wash off crop protection agent in events of emergency.
- Data concerning the preparations currently used must always be kept in the document roll so that these are available for rescue services in case of accidents.

Changing equipment / wear items

- Only pulling tools may be attached that meet the technical requirements according to these operating instructions.
  HORSCH does not assume any liability for damages resulting from the attachment of non-fitting pulling tools as well as incorrect mounting.
- For machines with valid type approval only pulling tools may be attached that are covered by the type approval. Attaching pulling tools not covered by the type approval will void the registration.
- Secure the machine against unintended rolling away!
- Secure raised frame parts you have to work under with suitable supports!
- Caution! Risk of injury caused by projecting parts (e.g. folding boom parts)!
- Assume ergonomic working postures with any assembly work.

Do not step on moving or other rotating parts to climb onto the machine. You could fall and be seriously injured.

Crop protection agents and liquid fertiliser

Improper handling of crop protection agents and liquid fertiliser may cause poisoning and death.

- Follow the specifications and instructions in the safety data sheet of the crop protection agent manufacturer. If necessary, ask the dealer for the safety data sheet or safety notes.
- Determine and provide the personal protective outfit as specified by the manufacturer of the crop protection agent.
- At the time the crop protection sprayer is manufactured the manufacturer is aware of only a few approved crop protection agents, which could have a damaging effect on the materials used in the crop protection sprayer.
- Store all relevant information about the crop protection agents used (safety data sheets, instructions for use, etc.) in the document roll.
- The water quality (the water hardness and mineral content in particular) influences the property of some fertilisers and crop protection agents. Precipitation and deflocculation can cause deposits in filters and nozzles.

  Example: Extremely hard water reacts with sulphate-bearing fertiliser to form calcium sulphate (gypsum) and causes white deposits in the filters.

  Pay attention to the conditions of use and the combination possibilities given by the corresponding manufacturers to avoid such problems!
- Observe the data on compatibility of crop protection agents with materials of the crop protection sprayer!
- Do not spray any crop protection agents that have a tendency to agglutination or solidification!
- Wear suitable protective clothing when handling crop protection agents.
- Do not eat, drink or smoke while handling crop protection agents!
- Keep crop protection equipment and crop protection agents out of the reach of children!
- Always ensure a sufficient water supply in the machine to be able to wash off crop protection agent in events of emergency.
- In case of physical contact with crop protection agents you may need to consult a physician.
- Thoroughly clean hands and face after the end of work.
- Extended exposure time of crop protection agents may cause damages to plastic components of the crop protection sprayer. Follow the notes of the crop protection agent manufacturers.
- The application notes of the crop protection agent manufacturers must be observed when mixing different crop protection agents.

Environmental protection

Crop protection agents and liquid fertiliser as well as operating materials such as hydraulic oil, lubricants, etc. can damage the environment and the health of persons.

- Do not allow operating materials to drain out into the environment.
- Pick up drained operating materials with absorbent material or sand, fill it into a leak tight container and dispose of in accordance with statutory regulations.
- Do not fill crop protection sprayers with water from public bodies of water.
- Filling in water protection zones is not permitted, depending on the crop protection agent used! Inquire with the “Water board” to be on the safe side!
- Observe the national and country-specific regulations and standards (e.g. water protection areas).

Retrofitting and conversions

Structural changes not approved by HORSCH may affect the functionality and operational safety of the machine and will void any warranty claim.

HORSCH is not liable for damages to life and limb as well as property damages resulting from unapproved retrofitting and conversions.

- Do not perform any structural changes to the pulling tool of the machine.
- Do not make any structural changes or extensions to the machine that have not been approved by HORSCH.
- Modifications and extensions approved by HORSCH are only to be performed at an authorized workshop or by an operator who has been trained by HORSCH for this purpose.
- Comply with country-specific instructions for weights, weight distribution and dimensions.

For equipment influencing the weight or weight distribution the regulations concerning towing facility, support and axle load must be checked and complied with.
For machines without brakes a brake system may need to be retrofitted if the permissible weight limits are exceeded.

In case of changes concerning data mentioned on the type plate, a new type plate with updated data must be attached.

In case of changes which concern the data in the type approval, this type approval needs to be renewed.

Care and maintenance

Inappropriate care and maintenance puts the operational safety of the machine at risk. This can lead to accidents with severe or even fatal physical injuries.

⚠ DANGER

- **Danger of poisoning - Do not climb into the spraying mixture container!**

- Conform to prescribed schedules for repetitive tests or inspections.
- Service the machine according to the maintenance plan, see chapter *Care and maintenance*.
- Only perform the work described in these operating instructions.
- Before starting maintenance and service work park the machine on level and firm ground and secure it against rolling away. Clean the crop protection sprayer, especially all parts which are contaminated by spraying mixture. Wear the stipulated protective outfit when cleaning.
- Lock hydraulically operated parts and depressurise the hydraulic system.
- Prior to working on the electrical system, disconnect it from the electric current supply.

- When performing welding work on the machine, disconnect the cables from computers and other electronic components. The ground connection must be as close as possible to the welding point.
- Secure all operating media like compressed air and hydraulics against unintended commissioning.
- Secure the raised machine or raised machine parts against accidental lowering before starting maintenance, repair and cleaning work!
- Repair work inside the spraying mixture container must only be performed after thorough cleaning and wearing protective outfit with a respirator. This work must be monitored by a second person outside the spraying mixture container for safety reasons! Ensure sufficient ventilation of the spraying mixture container! Only approved qualified personnel may enter the spraying mixture container!
- Before cleaning the machine with high pressure cleaner cover all openings, which should stay clear of water, steam or cleaning agents for reasons of safety or operation. Do not aim the water jet directly on electric or electronic components and bearings.
- When cleaning with high pressure cleaning equipment or steam jets keep a distance of at least 150 cm to machine components.
- After cleaning, check all hydraulic lines for leaks and loose connections.
- Check for chafing and signs of damage. Remedy any faults immediately!
- Screw connections loosened for the purpose of care and maintenance work must be retighten after work is completed.
- Dispose of oils, greases and filters according to regulations!
- If protective features are subjected to wear, they must be inspected at regular intervals and replaced in due time
- Do not clean new machines with a steam jet of a high pressure cleaner. The paint takes approx. 3 months to cure and could be damaged before this time.
- Pay attention to the following when repairing crop protection sprayers which have been used with ammonium nitrate - carbonyl diamide solution:

  residues of ammonium nitrate - carbonyl diamide solution may form salt on or inside the spraying mixture container through the evaporation of water. This results in pure ammonium nitrate and carbonyl diamide. In its pure form, ammonium nitrate in connection with organic matter, such as carbonyl diamide, becomes explosive, if critical temperatures (caused by e.g. welding work, grinding) are reached during repair work.

  By thoroughly cleaning the spraying mixture container or the parts to be repaired with water, this risk can be eliminated, because the salt of the ammonium nitrate - carbonyl diamide solution is water-soluble.
- **All other maintenance and repair tasks, which are not described in the operating instructions, must only be carried out by an authorized professional workshop or by an operator who has been trained by HORSCH for this purpose.**

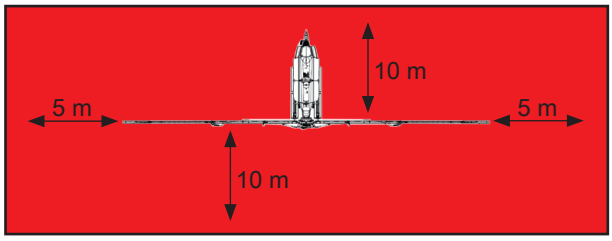
Danger zone

No person may be present in the danger zone while the machine is in operation!

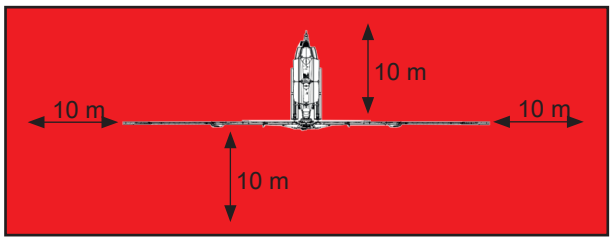
The danger zone around the machine poses the following hazards:

- Accidental operation of the hydraulics can trigger dangerous movements of the machine.
- With the drive still running, machine parts may rotate or swing out.
- Hydraulically raised machine parts can lower slowly and unnoticed.

Danger zone during operation of the machine:



Danger zone when folding the folding boom:



Failing to pay attention to the danger zone can result in severe or even fatal physical injuries.

- ➢ Do not stand under lifted loads. Lower such loads to the ground first.
- ➢ Instruct persons to leave the danger zone around the machine and tractor before any machine movements.
- ➢ Before working in the danger zone of the machine or between machine and tractor: **Shut down the tractor!**
  This also applies to temporary inspection work.
  Many accidents happen because of carelessness and running machines!
- ➢ Pay attention to the information in all operating instructions.

Safety stickers

Safety stickers on the machine warn of hazards at dangerous points and are an important part of the safety equipment of the machine. Missing safety stickers increase the risk of severe or even fatal injuries.

- Clean soiled safety stickers.
- Damaged or illegible safety stickers must be replaced immediately.
- Affix the specified safety stickers on spare parts.

Switch the engine off and pull out the key before starting maintenance and repair work!

04002983

Never reach into areas where there is a risk of crushing as long as parts could still be moving!

04001683

Before commissioning the machine you need to read and follow the operating instructions!

04002983

Danger caused by accidental movement of the machine!

04002983

No passengers are allowed to ride on the machine!

04001455

Do not open or remove protective features while the engine is running!

04002983

Caution of emerging high pressure fluid. Follow the notes in the operating instructions!

04002983

Keep sufficient distance to electric high voltage power lines!

04002983

Staying in the operating range of the drawbar between tractor and towed machine is prohibited!

04002622

Do not stand inside the range of a lifted but unsecured load!

04002626

Danger of burning on hot surfaces.
Keep a safe distance to hot surfaces! (Only with PTO-shaft pump option)

04001453

Keep a sufficient safety distance to the slewing range of the machine!

04001454

Danger of poisoning - never climb into the tank!
Danger from inhaling hazardous substances!

04001456

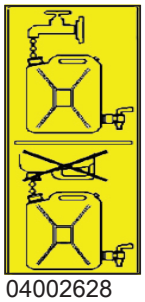
Avoid any contact with hazardous substances!
Wear protective clothing!

04003745

Danger of poisoning - no drinking water!

04002623

Fill the hand washing tank only with clear water!



04002628

Do not stand in the slewing range of the machine!

04002625

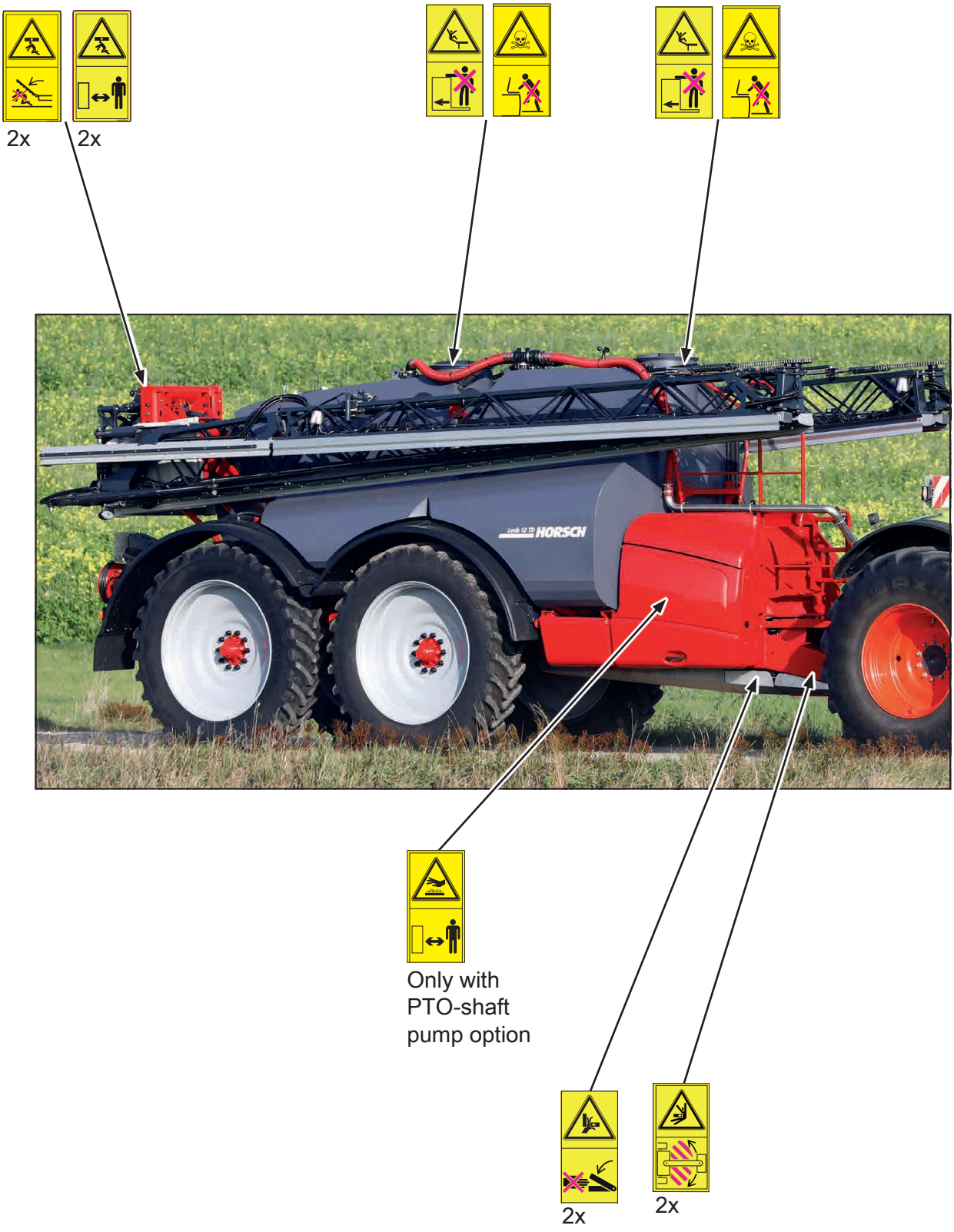
The maximum operating pressure in the hydraulic system is 200 bar.

04002983

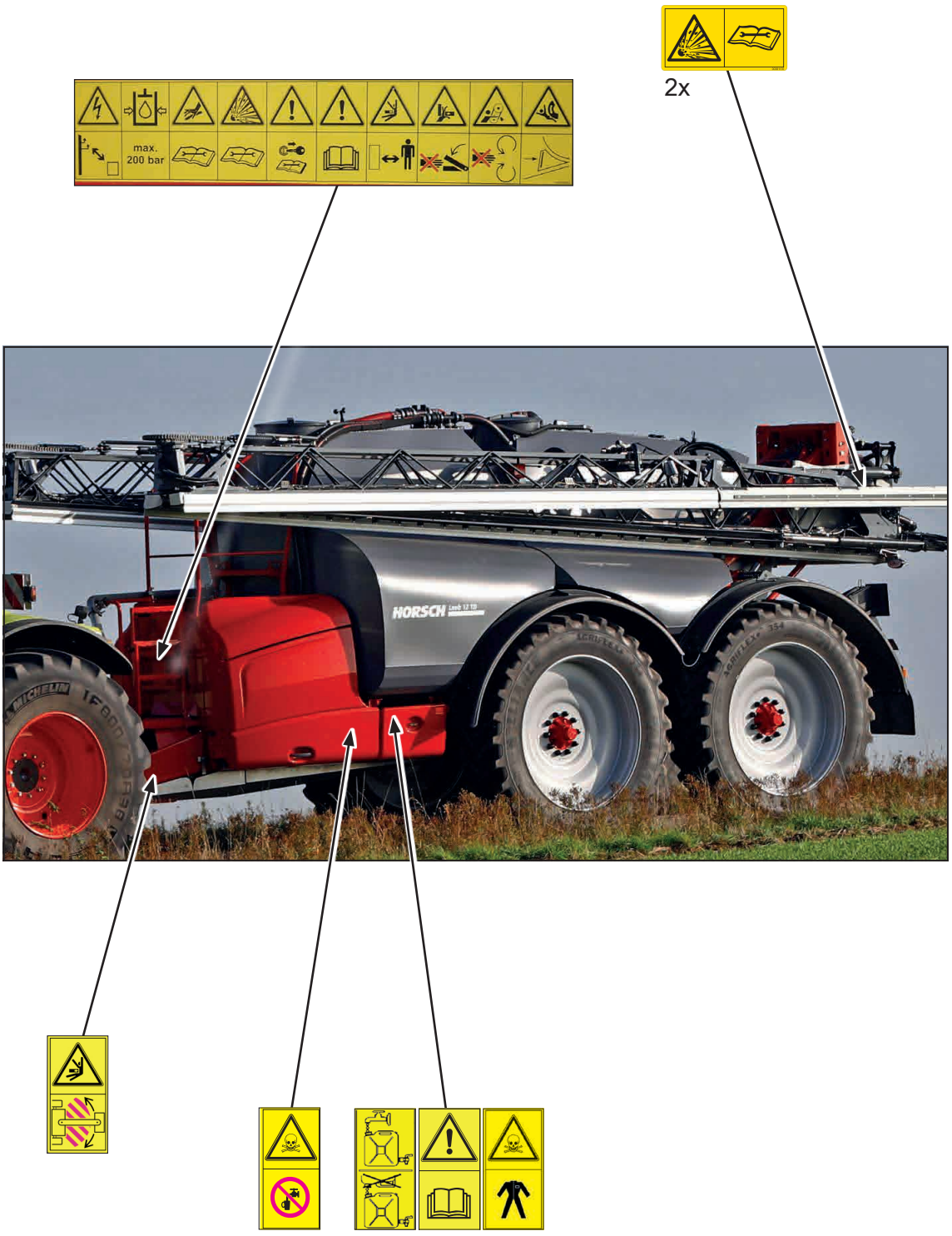
The pressure accumulator is charged with gas or oil pressure. Dismantle and repair only in strict compliance with the instructions in the technical manual.

00381135

Position of safety stickers
(depending on equipment)



Safety stickers with the addition “2x” can be found on either side of the machine.



Safety stickers with the addition “2x” can be found on either side of the machine.

Commissioning

⚠ NOTE

These work activities may be carried out only by persons trained by HORSCH for this purpose.

⚠ WARNING

Increased danger of accidents during commissioning.

- Observe the notes in the safety chapter.

Delivery

The machine is normally delivered completely assembled on a low loader.

If parts or assembly groups had to be disassembled for transport purposes, these will be assembled locally by our distributor or field technician.

Depending on the design of the low loader the machine can be unloaded with a tractor or needs to be lifted off with suitable lifting gear (forklift truck or crane).

- Use only lifting equipment and lifting gear with adequate lifting capacity and approval!

Lifting and lashing points are identified by labels. When using other lifting points pay careful attention to the centre of gravity and the weight distribution. These points must, in any case, only be on the frame of the machine.

With all machines, the hydraulic functions are possible without additional installation.

Transport

Depending on country-specific regulations and working width the equipment can be transported on public roads either attached to a tractor or on a trailer or low loader.

- The permissible dimensions and weights for transport must be complied with.
- The tractor must be large enough so that sufficient steering and braking abilities are ensured.
- On a trailer or low loader, the machine must be secured with tensioning straps or other means.
- Attach lifting tackle only at the marked points.

Installation

Instruction of the operator and initial installation of the machine will be carried out by our service technicians or distributors.

Any prior use of the machine is prohibited.

The machine can only be released for operation after the instruction session conducted by our service technician / distributor and after the operating instructions have been read.

⚠ WARNING

Increased danger of accidents during installation and maintenance.

- Read these operating instructions and become acquainted with the machine before starting this work.

Depending on scope of equipment

- Take loosely delivered parts off the machine!
- Check all important screw connections!
- Lubricate all grease nipples!
- Check air pressure in tyres.
- Check all hydraulic connections and hoses for correct fastening and function!
- Immediately rectify any occurring damage or have it corrected!

Initial commissioning of the service brake system

NOTE

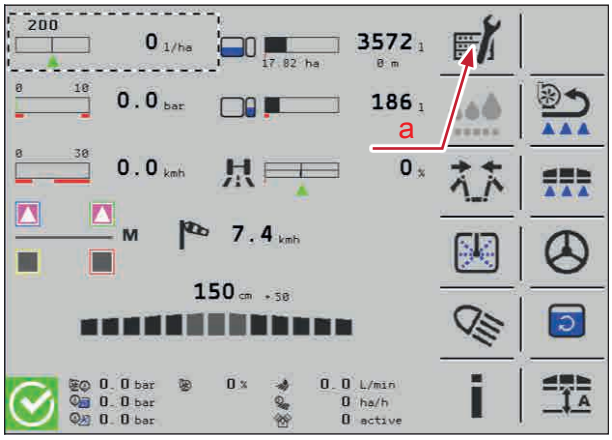
Perform test braking in empty and loaded condition of the crop protection sprayer thereby checking the braking behaviour of the tractor and the crop protection sprayer.

We recommend conducting a drawing adaptation between tractor and crop protection sprayer in a professional workshop to ensure optimal braking behaviour and minimal brake lining wear.

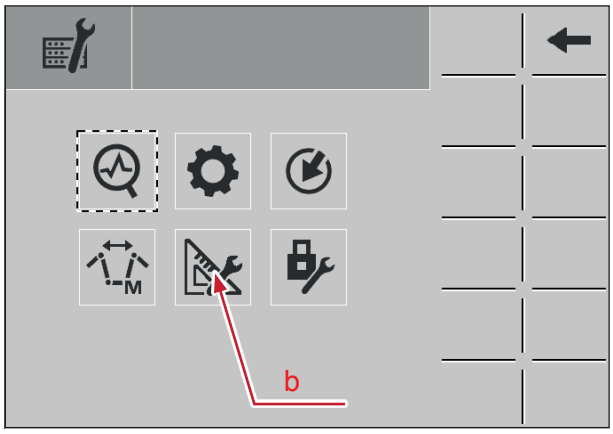
Initial commissioning of the suspension

For the transport on a truck, the machine's suspension must be lowered to the transport mode.

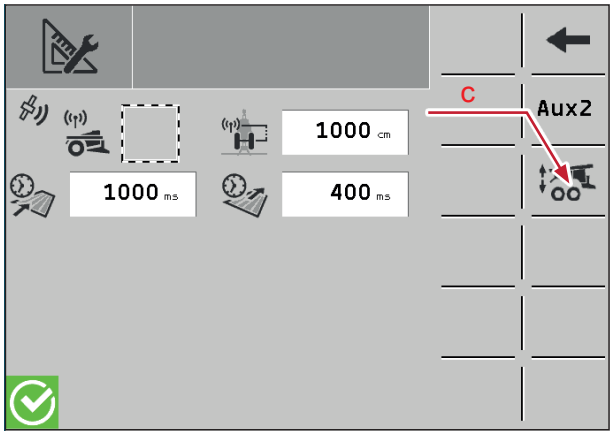
➢ Select the Settings (a) button in the menu.



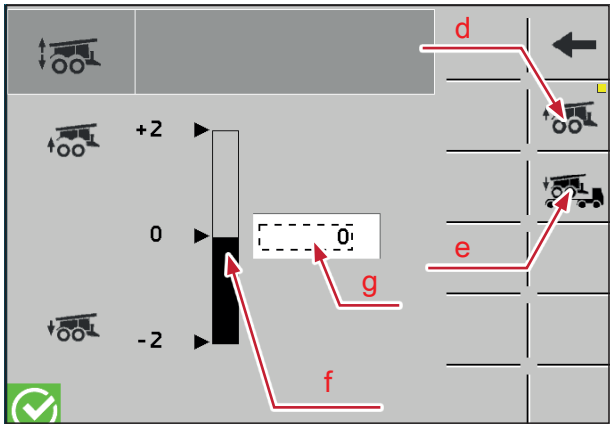
➢ Select the machine geometry (b).



➢ Press the softkey for the suspension height (c) in the submenu.



➢ The Suspension mode menu opens. You can choose between driving position (d) and transport position (e).



"Driving position" suspension mode:
Press the button until the dot on the symbol appears in green.

"Transport position" suspension mode:
Press the button until the dot on the symbol appears in green.

➢ The transport mode must be left as soon as the crop protection prayer shall move again on its own wheels. A warning message appears on the terminal if this is not done.

Adjusting the suspension height

The suspension height can be adjusted more exactly on the bar graph (f). When commissioning the machine for the first time or when changing the tractor, adjust the suspension height to the ball of the tractor until the axles are positioned straight.

➢ This requires entering a value between -2 and +2 on the input field (g), depending on the required height, and confirming it.

Whether the suspension height has been set correctly can be checked on the rear axle. The axle should be parallel to the ground.

Assemble the wheels

⚠ WARNING

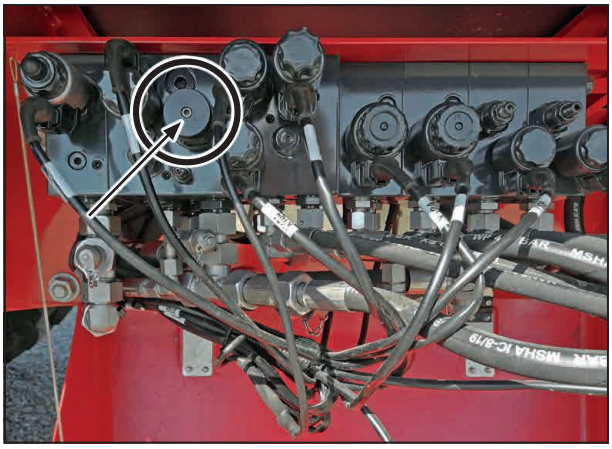
Use only approved tyres as specified in the technical data.

The rims matching the tyres must be suitable for the respective loads!

Adjusting the hydraulic system on the hydraulic valve block

⚠ NOTE

With initial commissioning and tractor change the hydraulic valve block the operator must set whether the machine is operated via a tractor with or without Load-Sensing-System. This adjustment must only be made in depressurized condition!



Setscrew with notch

The hydraulic valve block for the machine is located at the right machine side under the covering. The hydraulic valve block for the folding boom is located on the rear of the machine in the centre frame.

The existing tractor hydraulics determines the adjustment of the screw on the hydraulic valve block.

➢ Tractor without Load-Sensing-System: Unscrew the knurled screw completely and secure it with a locking nut.
➢ Tractor with Load-Sensing-System: Screw down the knurled screw completely and secure it with a locking nut.

Technical data

NOTE

Payload = permissible total weight - basic weight

DANGER

Exceeding the permissible payload is prohibited. Danger of accident caused by unstable driving! Carefully determine the payload and thus the permissible filling of the machine. Not all filling media allow a complete filling of the machine.

Machine type	**12 TD**
Curb weight (kg)	7300 - 10000
Drawbar load empty (kg)	300 - 800
Axle load per axle empty (kg)	3500 - 4400
max. total length in transport position (m)	9.70 - 11.70
Transportwidth in transport position (m)	2.55 - 3.00
Height (m)*	3.88 - 3.98*
Track widths (m)	2.00 - 2.25
Ground clearance (m)*	0.85*
Tank	
Rated volume (litres)	12000
Actual volume (litre)	12800
Fresh water tank, stainless steel (litres)	900
Fresh water tank, plastic tank (litres)	850
Hand washing tank (litres)	15
Spraying boom	
Working widths	15 / 24 5-piece
	15 / 27 5-piece
	15 / 30 5-piece
	18 / 30 5-piece
	18 / 32 5-piece
	18 / 33 5-piece
	18 / 36 5-piece
	12 / 21 / 27 7-piece
	12 / 21 / 28 7-piece
	12 / 21 / 30 7-piece

	(12) / 24 / 30 7-piece
	(12) / 24 / 32 7-piece
	(12) / 24 / 33 7-piece
	(12) / 24 / 36 7-piece
	(14) / 27 / 38 7-piece
	(14) / 27 / 39 7-piece
	(14) / 27 / 40 7-piece
	(14) / 28 / 40 7-piece
	(14) / 28 / 40 7-piece
	(14) / 28 / 42 7-piece
	(14) / 30 / 44 7-piece
	(14) / 30 / 45 7-piece

Machine type12 TD	
min./max. Sections (pieces)	6 / 42
Working height (m)*	0.3 - 2.5
Pump capacity Centrifugal pump (litres/min) (at 0 bar and suction height = pump height)	1000
max. working pressure (bar)	8
Working speed (km/h)	4 - 20

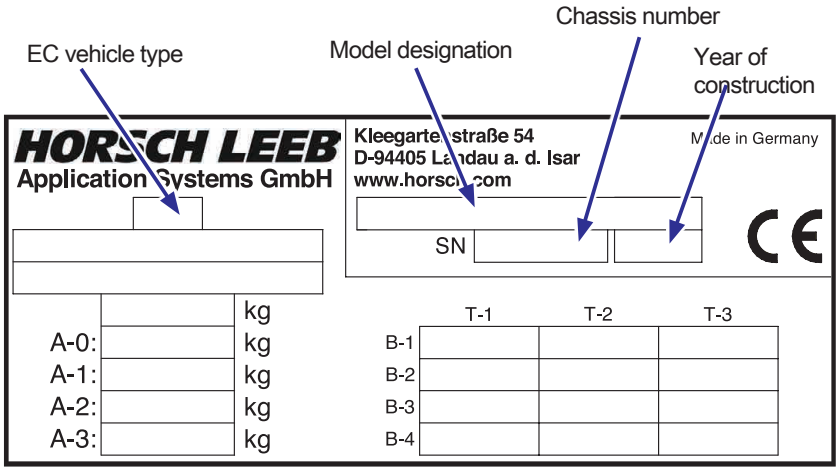
All dimensions and weights depend on boom width, tyres and equipment.
* Data with tyres IF 520/85 R 42

Machine type	**12 TD**
Technical residual quantities incl. pump **	
- level ground	on request
- Contour line	
15 % travel direction to the left	on request
15 % travel direction to the right	on request
- Line of fall	
15 % uphill	on request
15 % downhill	on request
Central control	electric, pneumatic single nozzle control
Spraying pressure adjustment	Electric
Spraying pressure - adjustment range	1 - 8 bar
Spraying pressure gauge	digital
Pressure filter	50 (80) meshes
Agitator	Adjustable at 4 stages
Placing quantity control	speed dependent via job computer
Jet height***	300 - 2500 mm

** depending on folding boom variant, incl. use of air function
*** depending on the tyres

Type plate

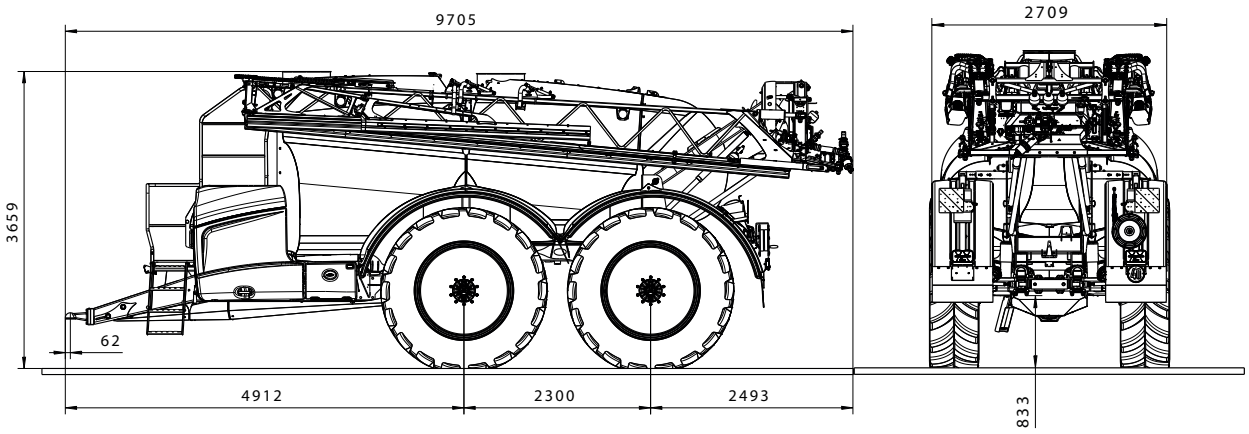
The type plate with the CE marking is located on the frame of the machine.
Data on the type plate:



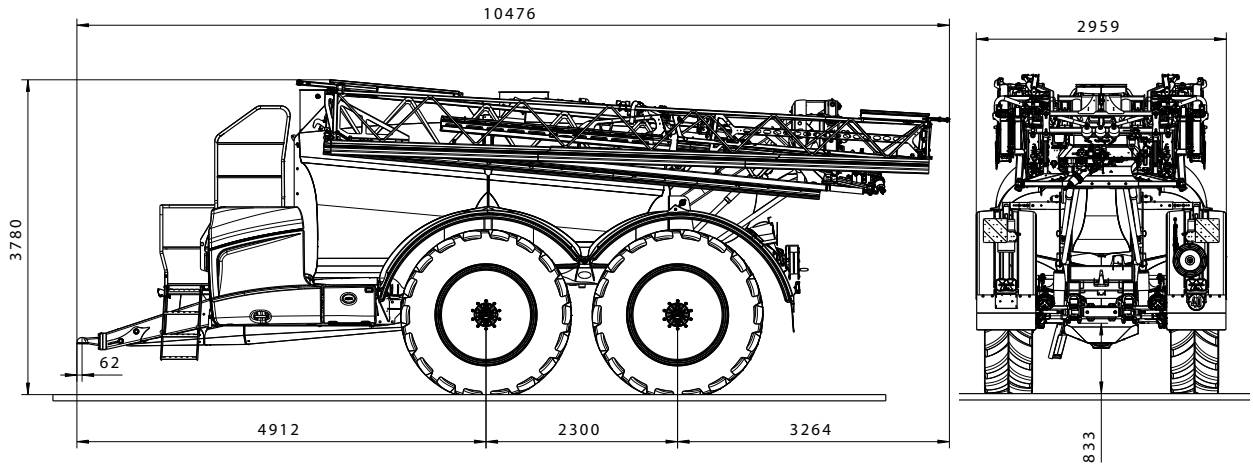
Dimensions

Data in mm (transport dimensions)

12 TD
Folding boom (15/24)



12 TD
Folding boom (14/28/42)



NOTE:
- Deviations due to technical further development reserved.
- The dimensions may vary depending on the machine equipment and design of the folding boom.
- The weight of the machine depends on the equipment.
- The permissible transport heights and transport width for road traffic may differ from country to country. Comply with the national registration regulations.

Permissible total weight and tyres

The permissible total weight of the machine depends on

- the permissible drawbar load
- the permissible axle load
- the permissible tyre load bearing capacity per wheel

The permissible total weight is the sum of

- the permissible drawbar load and
- the **smaller** value from
  - the permissible axle load
  - tyre load bearing capacity of both wheels

The values for determining the permissible total weight can be taken from the following tables.

Permissible drawbar load: 4,000 kg

permissible axle load: 10,000 kg

With decreasing tyre pressure, the tyre load bearing capacity will also decrease.
In this case pay attention to the reduced payload of the machine:

Load bearing capacity per wheel								
	Tyres	**Load index**	**25 km/h**		**40 km/h**		**50 km/h**	
			permissible load bearing capacity (kg)	with air pressure (bar)	permissible load bearing capacity (kg)	with air pressure (bar)	permissible load bearing capacity (kg)	with air pressure (bar)
1	Alliance 380/90 R46 VF	LI 173 D	3875	1.6	3875	1.6	3875	1.6
			4625	2.4	4625	2.4	4625	2.4
			5450	3.2	5450	3.2	5450	3.2
			6150	4.0	6150	4.0	6150	4.0
2	Alliance 380/105 R50	LI 171 A8	3100	1.2	2870	1.2	2750	1.2
			4660	2.4	4300	2.4	4130	2.4
			5510	3.2	5090	3.2	4880	3.2
			6280	4.0	5800	4.0	5570	4.0
3	Alliance 420/95 R50 VF	177 D	-	-	4050	1.2	-	-
			-	-	5430	2.0	-	-
			-	-	6330	2.8	-	-
			-	-	6830	3.2	-	-
4	Michelin SprayBIB 420/95 R50 VF	177 D	5150	1.8	5150	1.8	5150	1.8
			5800	2.4	5800	2.4	5800	2.4
			6625	3.0	6625	3.0	6625	3.0
			7300	3.6	7300	3.6	7300	3.6
5	Alliance 480/80 R42	169 B	5070	3.0	4570	3.0	4570	3.0
			5550	3.5	5000	3.5	5000	3.5
			6010	4.0	5410	4.0	5410	4.0
			6440	4.5	5800	4.5	5800	4.5
6	Michelin SPRAYBIB 480/80 R42 VF	176 D	5000	1.8	5000	1.8	5000	1.8
			5600	2.4	5600	2.4	5600	2.4
			6425	3.0	6425	3.0	6425	3.0
			7100	3.6	7100	3.6	7100	3.6
7	Michelin SPRAYBIB 480/80 R46 VF	177 D	5300	1.8	5300	1.8	5300	1.8
			5800	2.4	5800	2.4	5800	2.4
			6625	3.0	6625	3.0	6625	3.0
			7300	3.6	7300	3.6	7300	3.6
8	BKT Agrimax RT 855 480/80 R46	164 A8	-	-	2295	0.8	2295	0.8
			-	-	3655	1.6	3655	1.6
			-	-	4250	2.4	4250	2.4
			-	-	5000	3.2	5000	3.2

Load bearing capacity per wheel								
	Tyres	Load index	25 km/h		40 km/h		50 km/h	
			permissible load bearing capacity (kg)	with air pressure (bar)	permissible load bearing capacity (kg)	with air pressure (bar)	permissible load bearing capacity (kg)	with air pressure (bar)
11	Alliance 480/80 R50 VF	LI 171 D	3350	0.8	3350	0.8	3350	0.8
			4250	1.2	4250	1.2	4250	1.2
			5450	1.8	5450	1.8	5450	1.8
			6150	2.4	6150	2.4	6150	2.4
12	Michelin SprayBib 480/80 R50 VF	179 D	5450	1.8	5450	1.8	5450	1.8
			6150	2.4	6150	2.4	6150	2.4
			7010	3.0	7010	3.0	7010	3.0
			7750	3.6	7750	3.6	7750	3.6
13	Alliance 520/85 R38 IF	LI 167 D	3875	1.2	3875	1.2	3875	1.2
			4625	1.6	4625	1.6	4625	1.6
			5150	2.0	5150	2.0	5150	2.0
			5450	2.4	5450	2.4	5450	2.4
14	Alliance 520/85 R42 IF	169 D	4000	1.2	4000	1.2	4000	1.2
			4875	1.6	4875	1.6	4875	1.6
			5300	2.0	5300	2.0	5300	2.0
			5800	2.4	5800	2.4	5800	2.4
15	Alliance 520/85 R46 VF	170 D	3750	0.8	3750	0.8	3750	0.8
			4375	1.0	4375	1.0	4375	1.0
			4875	1.2	4875	1.2	4875	1.2
			5450	1.4	5450	1.4	5450	1.4
16	Alliance 580/85 R42 IF CFO	178 D	5800	1.6	5800	1.6	5800	1.6
			6300	2.0	6300	2.0	6300	2.0
			6700	2.4	6700	2.4	6700	2.4
			7500	2.8	7500	2.8	7500	2.8

⚠ NOTE

Die possible maximum speed depends on the registration of the vehicle!

⚠ WARNING

Never choose an air pressure lower than the one mentioned in the table above.
Risk of accident! The stability of the vehicle is no longer ensured.

Noise development data

The work place related emission value (sound pressure level) is 74 dB(A), measured in operating condition with the cabin closed at the ear of the tractor driver.
Measuring instrument: OPTAC SLM 5.
The sound pressure level mainly depends on the vehicle used.

Required tractor equipment

The tractor must meet the specified power requirements and be fitted with all necessary electric, hydraulic and brake connections for the brake system to be able to work with the machine.

Tractor engine power

12 TD from 132 kW (180 PS)

Note: These values apply to flat terrain. Depending on use conditions (e.g. very steep / hilly terrain) higher engine power may be required.

Electrics

Battery voltage: 12 V (Volt)
Socket for lighting: 7-pin

Hydraulics

Maximum operating pressure: 200 bar

Tractor pump capacity: Pump ACE FM 750-HYD M16:
min. 150 l/min for hydraulic pump drive

- The required pump capacity varies according to the function requirement!
- Operation requires pressureless return flow with max. 5 bar backpressure!

	Spraying pump ACE 750	Piston diaphragm pump	Steering	Parallelogram stroke	bending	Hydraulic compressor (optional)	High pressure cleaner (optional)
Max. required oil quantity	65	26	40	24	18	15	29

NOTE

All values represent the max. required amount of oil for the respective function!

Hydraulic oil in the machine: Hydraulic/gear oil OMV austromatik IGB
The hydraulic/gear oil in the machine is suitable for the combined hydraulic/gear oil circuits of all common tractor brands.

Tractor control units: 1x dual-acting for hydraulic support
1x pressureless return
1x pressure supply

for vehicle version with passive follow-up steering:
1X single acting control unit for locking the follow-up axle

with hydraulic oil supply via Load-Sensing port:
1x Load-Sensing control line

with hydraulic oil supply via tractor control unit:
1 x pressure supply in continuous operation (min. 60 l/min)

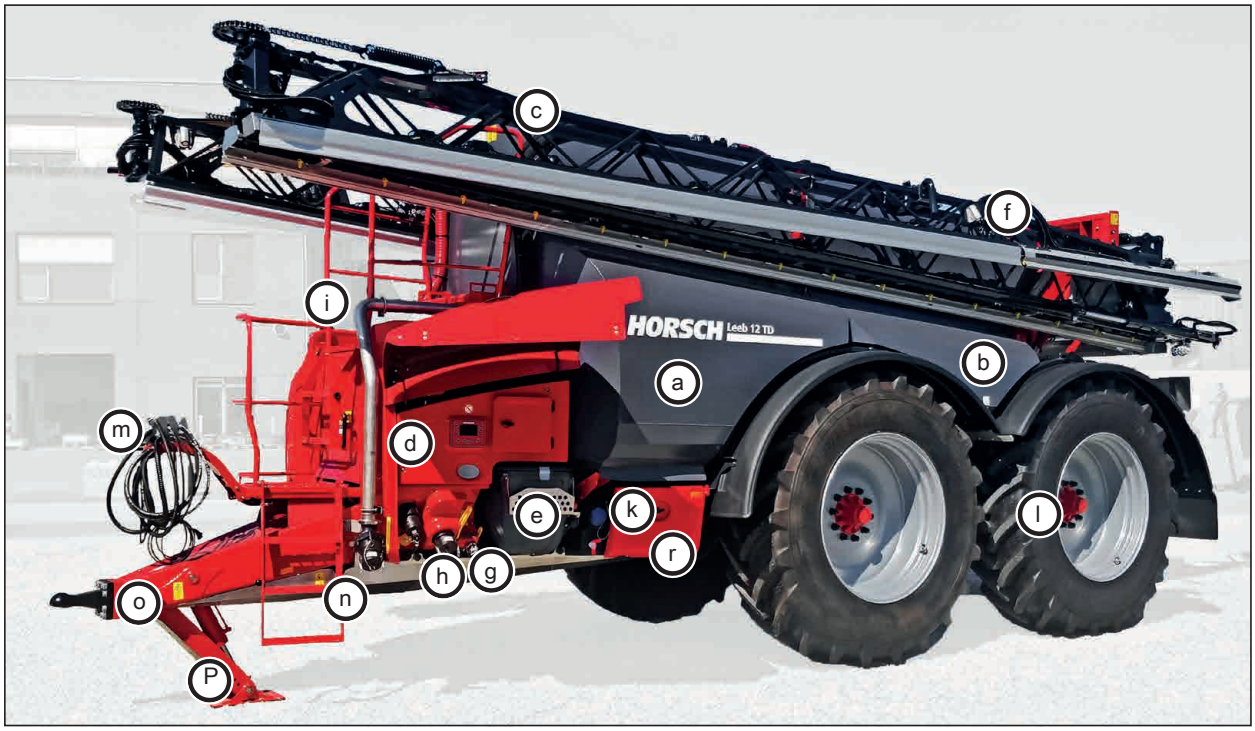
Two circuit service brake system:

1 coupling head (red) for the supply line
1 coupling head (yellow) for the brake line

Design

This chapter provides a comprehensive overview of the design of the machine and designates the individual assembly groups and actuating components. It is best to read this chapter directly on the machine.

Overview



a	Spraying mixture container 1	i	Platform
b	Spraying mixture container 2	k	Hand washing tank
c	Filling dome spraying mixture container	l	Wheels and tyres
d	External control terminal with Filling level indicator	m	Hoses
		n	Access ladder
e	Slewable illuviation valve	o	Drawbar
f	Fresh water tank	P	Support
g	Connection of fresh water tank	r	Stowage compartment
h	Connection for spraying mixture container		

⚠ DANGER

Danger of serious accidents
Transport rides on the machine, especially the steps or platform are prohibited!

Hydraulics

⚠ WARNING

Accidental hydraulic movements (e.g. caused by passengers, children or air in the hydraulic system) can lead to severe accidents and injuries!

- Secure or lock the control units on the tractor.
- Instruct persons to leave the slewing range of foldable machine parts.
- Switch all control units to the locked position before switching on the tractor again.
- Connect the hydraulic lines only when the hydraulics are without pressure on both tractor and machine.
- Vent the hydraulic system!

⚠ NOTE

- Operate the machine with mineral oils.
  Do not mix mineral oils with organic or ester oils!
  The hydraulic circulation of the tractor must contain mineral-based hydraulic oil.
- Oil purity acc. to ISO 4406: 18/16/13
- Always plug in all hydraulic lines! Otherwise components may get damaged because of interrelated functions.
- Ensure cleanliness and tight fit of all plug-and-socket connections!
- With all hydraulic movements slow down the control unit before the machine components reach the stop position.
- Observe the notes on hydraulics and pressure accumulator in chapter *Safety and responsibility*!

⚠ NOTE

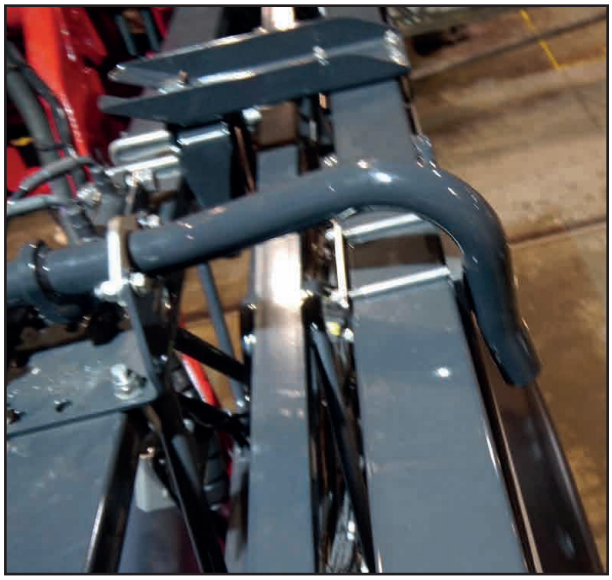
The hydraulic cylinders must be filled again with hydraulic oil after carrying out installation work on the hydraulic system. This is done by selecting all hydraulic functions several times. Hydraulic cylinders must extend and retract without jerking.

- Danger zones must be blocked off during commissioning.
- When performing installation work, raised machine parts must be lowered completely, moved to a safe position or secured at the particular level by suitable means.

Safety and protective features

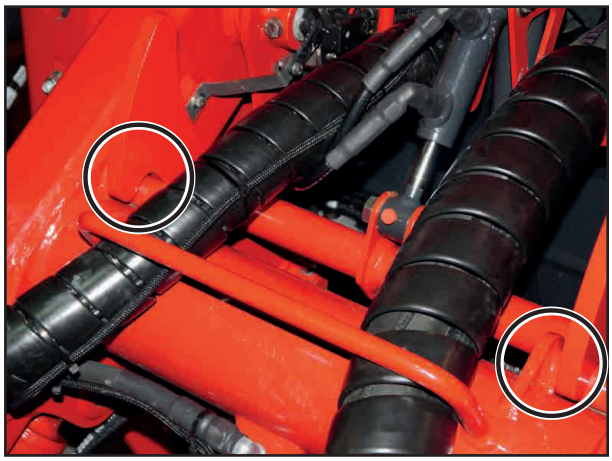
Folding boom rest for inside wing

Slope compensation



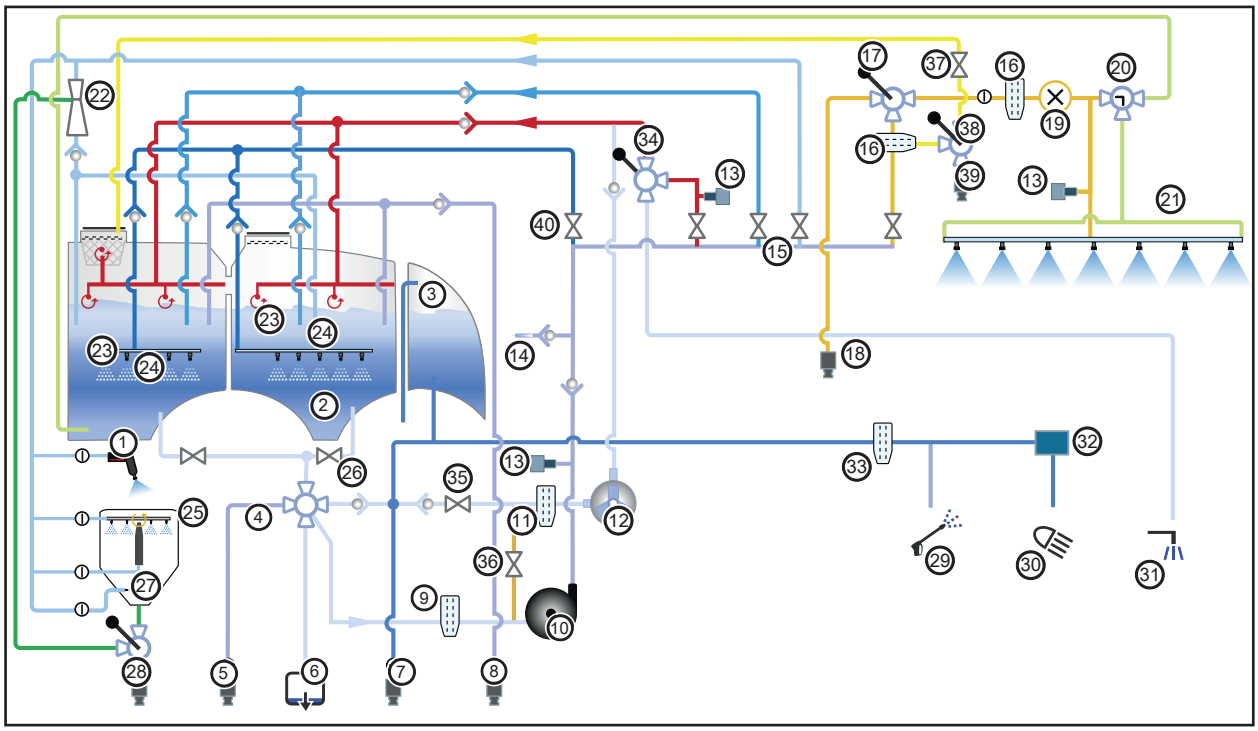
Folding lock

Railing for working platform



Parallelogram lock

Fluid circuit - Construction elements on machines of the CCS Pro variant



1. Spraying mixture container 1
2. Spraying mixture container 2
3. Fresh water tank
4. Electrical 5-way valve on suction side
5. Spraying mixture container filling via suction
6. Residue drain
7. Fresh water filling
8. Direct filling (optional)
9. Suction filter with drain valve
10. Centrifugal pump
11. Piston diaphragm pump suction filter
12. Piston diaphragm pump
13. Pressure sensor
14. Air function (optional)
15. Electrical control unit
16. Pressure filter
17. 3-way valve pressure output
18. Pressure output
19. Flow meter
20. 3-way valve circulation
21. Folding boom
22. Injector
23. Internal cleaning
24. Agitator
25. Switching unit tank 1 outlet
26. Switching unit tank 2 outlet
27. Illuviation valve
28. Eco Fill (optional)
29. High pressure cleaner (optional)
30. NightLight with cleaning (optional)
31. Outside cleaning (optional)
32. Electrical pump for NightLight cleaning (optional)
33. Filter for high pressure cleaner and Night-Light cleaning (optional)
34. Switch-over ball valve internal/outside cleaning
35. Fresh water supply - piston diaphragm pump switching unit
36. Suction assistance switching unit
37. Backflushing of the pressure filter switching unit
38. 3-way valve pressure filter
39. Pressure filter drain
40. Switching unit for filling process

Two-tank system with variant CCS Pro

The Leeb 12 TD is equipped with a tank capacity of 12,000 l. The tank is hereby divided into a 7,000 l front container and a 5,000 l rear container. Both tanks are connected by a connecting element and are filled simultaneously via a filling port.

The agitator and internal cleaning always run in both tanks.

Both tanks are filled automatically via the automatic filling function on the terminal. The concentration of the spraying mixture is controlled automatically so that it is identical in both tanks.

Gradual drainage

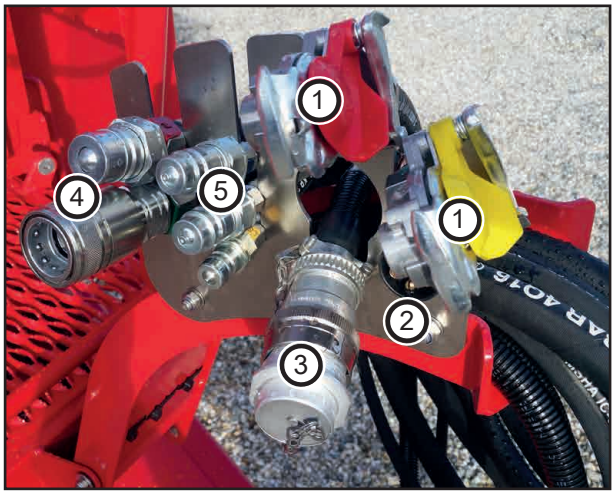
Drainage is performed in a step system. First, the rear tank (26) is drained to a certain point and then the front tank (25) is drained to a certain point, followed again by the rear tank.

The system guarantees optimal weight distribution to ensure sufficient drawbar load on the rear axle of the tractor when driving uphill. This allows the tractor maximum transfer of pulling force.

⚠ NOTE

➢ The drawbar load-optimised drainage of both tanks runs fully automatically in the background and can (at this time) not be influenced by the user.

Supply lines between tractor and machine

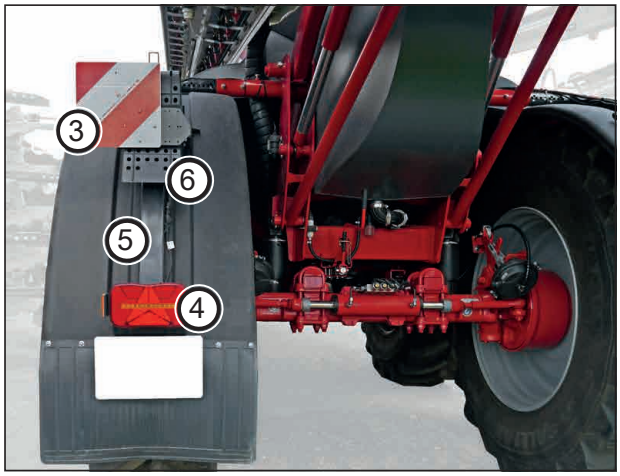


1 Pneumatic brake lines brake and reservoir
2 7-pin plug for lighting
3 ISOBUS
4 Hydraulic connections pressure supply and pressureless return
5 Hydraulic connections LS-control line (Load Sensing) and support

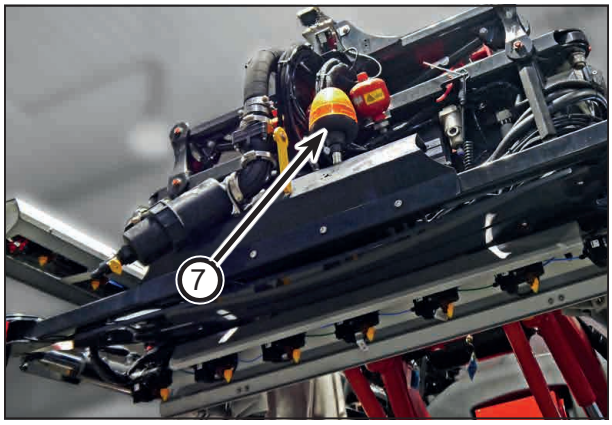
The vehicle variant with passive follow-up steering has an additional plug for locking the follow-up axle (optional).

Traffic compliant equipment

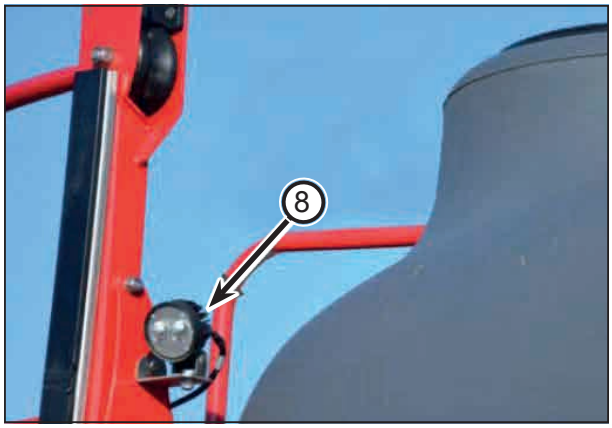
1 6 spotlights, yellow
2 Red/white clearance lamp



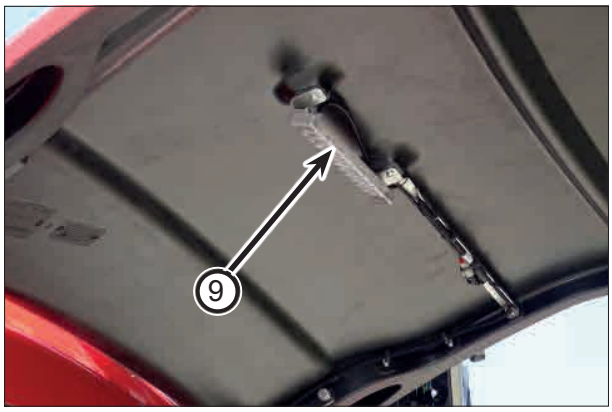
3 Warning board (square)
4 Tail light / turn-signal light
5 Identification plate holder with lighting (left)
6 Wheel chock (left)



7 Rotation beacon folding boom middle section (optional)



8 Folding boom headlands lighting (optional)



9 Illuviation centre lighting (optional)

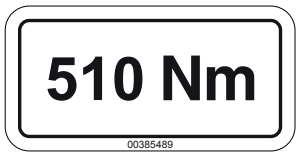
Instruction stickers

- Clean soiled stickers.
- Damaged or illegible stickers must be replaced immediately.
- Apply the specified stickers to spare parts.

Retighten the wheel nuts / wheel bolts after 50 km or 10 hours. Retighten every day - see maintenance overview.

00380359

Tighten with the appropriate torque



00385489

The return pressure of the hydraulics from the crop protection sprayer to the tractor must not exceed 5 bar.

04004899

Loading hook;
hook the load suspension gear (chains, ropes etc.) into this loading hook during loading.

00380880

Jack lifting point; area where the jack must be attached for the wheel change.

00385757

Do not clean the area with a high pressure cleaner. Keep a distance of at least 150 cm to electronic components!

00385620

Components

Drawbar and connecting

NOTE

Positively secure the coupling bolt after connecting the crop protection sprayer!

2 variants are available to connect the crop protection sprayer:

- Ball head K80 for lower link hitching
- Hitch ring Ø 50 mm for lower link hitching

Ball head coupling

Hitch ring connection

NOTE

- ➢ Check the connections regularly for wear!
- ➢ If a connection is worn, it must be replaced without delay.

Hydraulic support

The hydraulically operated support supports the uncoupled trailed sprayer.
Operation takes place via a double-acting control valve on the tractor.

Hydraulic support

The hydraulic support is secured via a locking block.
This prevents accidental lowering.

WARNING

Danger of accident when driving with the support in lowered position!
Before starting transport travels you must make sure that the support has been fully retracted!

NOTE

Never park the machine on the support with the full spraying mixture container!

Shut-off valve (only for machines with passive follow-up steering)

A lock valve is installed on the front of the machine to be able to lock or release the trailing steering axle.

trailing steering axle lock valve open (field travel)

trailing steering axle lock valve closed (parking position)

⚠ WARNING

Danger of accident caused by the machine tipping over!

- ➢ The shut-off valve must always be locked during road travel!

Hydraulics lockout switch

The electric switch on the tractor is used to switch off all hydraulic functions (folding the folding boom, steering axle active). The switch must be operated by the driver.
However, the spraying pump remains active, stirring is possible.

During road travel the switch must always be set to *OFF* so that steering is locked.

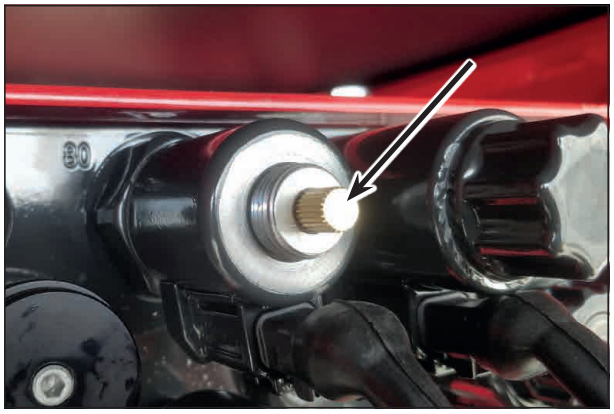
Switch for turning the hydraulics on and off

⚠ NOTE

If the steering axle is still activated or a folding process is started with the hydraulics turned off, an error message is displayed on the terminal. Refer to the pertaining terminal operating instructions.

Manual hydraulic operation if steering fails

If the electric switch on the tractor fails, an option is provided on the hydraulic valve block at the right machine side under the covering of reactivating all hydraulic functions manually. Unscrew the screw on the hydraulic valve block for this purpose.



Steering release fixture

⚠ WARNING

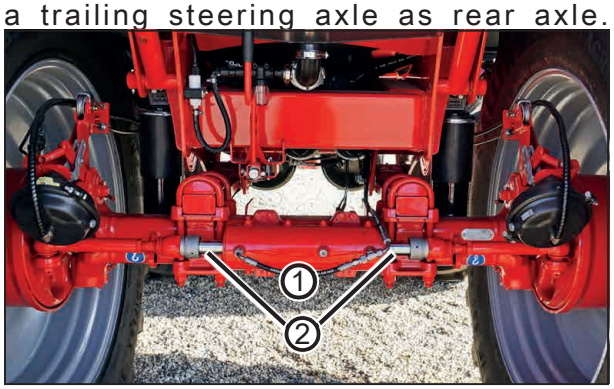
Danger of uncontrolled machine movements, e.g. Activation of the steering axle or folding of the folding boom.

➢ Manual operation of the control must be absolutely reset before road travel!

Steering

Vehicle version passive follow-up steering

In the standard version, the Leeb 12 TD has a rigid axle as front axle and a trailing steering axle as rear axle.



1 Trailing steering axle

2 Steering cylinder

The Ackerman steering of the trailing steered axle is thereby locked or released via the associated tractor control unit. The trailing steering axle is movable in the floating position. The trailing steering axle is centred and locked when the tractor control unit is pressurised.

Field mode

Switch the control unit to floating position. Open the shut-off valve. This allows the trailing steering axle to follow the tractor.

Road mode

At low travel speed the axle can also follow-up in road mode. At higher travel speed, the axle must be locked manually to increase driving stability and safety. This is done by pressurising the tractor control unit until the axle is centred. Then close the lock valve.

Manoeuvring mode

When manoeuvring, pressurise the tractor control unit and close the lock valve.

⚠ NOTE

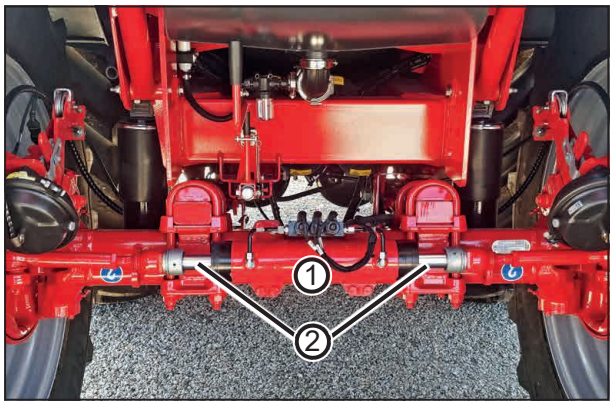
The trailing steering axle is centred and locked only under pressure. If necessary, pressurise the tractor control unit permanently until the lock valve was closed to prevent uncontrolled movements of the trailing steering axle!

⚠ CAUTION

Risk of accident from the machine topping over at excessive speeds in curves e.g. at the headland. Corner only with appropriate speed.

Vehicle variant Active steering of both axles (option)

Optionally, an automatic Ackerman steering for active steering of both axles is available.



1 Active steering axle

2 Steering cylinder

Field mode

Both axles are actively steered hydraulically. The machine can follow the tractor nearly exactly in the track. Turn the hydraulic switch to *ON* for this purpose.

With activated Ackerman steering:

- ➢ 0 - 10 km/h: Automatic Ackerman steering active (full steering angle)
- ➢ 10 - 15 km/h: Automatic Ackerman steering active (limited steering angle)
- ➢ Above 15 km/h: Automatic Ackerman steering switches off automatically!

NOTE

The angle is detected via a gyroscope. No additional component needs to be connected.

Road mode

- Front axle: Is locked in the centre position. Turn the hydraulic switch to *OFF*.
- Rear axle:
  - ➢ Under 25 km/h: The axle is in the follow-up mode
  - ➢ Above 25 km/h: The axle is disabled automatically to ensure increased driving stability and safety.

DANGER

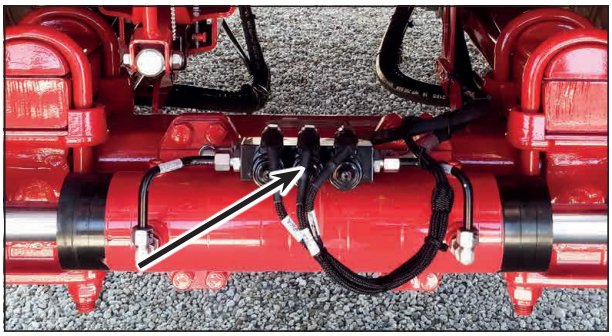
Danger of accident caused by the machine tipping over!
Activate the Ackerman steering by selecting road travel on the terminal for road and transport travel. In addition, the hydraulics lockout switch must be switched off.

CAUTION

Risk of accident from the machine topping over at excessive speeds in curves e.g. at the headland. Corner only with appropriate speed.

Mechanical release fixture for hydraulic steering

In case of problems with the steering there is a locking block with three valves on the rear steering axle. These valves can be operated manually by turning the hexagon socket screws. If the steering of the rear axle has to be locked, e.g. during manoeuvring work, the centre valve must be screwed in. After the repair is completed, the valve must be reset to its original state.



Steering release fixture

Adjusting the mechanical steering end stop

⚠ NOTE

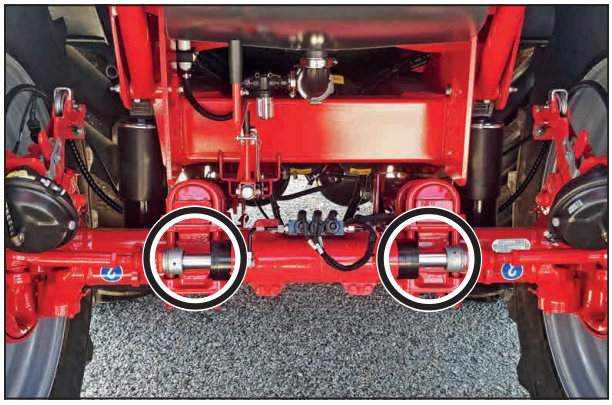
When using different tyres or track widths, the mechanical steering stop needs to be adjusted. In addition, the max. end stops must be taught again.

➢ Teach procedures must be carried out by HORSCH service staff.

⚠ CAUTION

Danger of fingers or hand being crushed by moving, accessible machine parts!
Never reach into the danger spot as long as the tractor engine is running with the hydraulic system connected!

1. Switch on the steering axle.
2. Use the teach menu on the terminal to steer the steering axle to the maximum position, whereby any collision of wheels with other machine parts must be avoided.
3. Depending on the desired steering angle, 0, 1, 2 or 3 stop discs are installed.



Mechanical steering stop

4. Make this adjustment on both sides.

⚠ NOTE

Adjust the mechanical steering end stop so that it is only activated when the electrical steering end stop fails.

Information on the adjustment of the electronic steering limitation is provided in the terminal operating instructions.

The undercarriage must be fully deflected. With the wheels steered to the limit, check them for freedom of movement.

Trailing control on hillside locations via manual control

When working on hillside locations (sprayer may slide down) the Ackerman steering can be manually corrected with the multi-function handle or on the terminal to achieve in-track trailing.
Activate the slope mode in the terminal for this purpose.

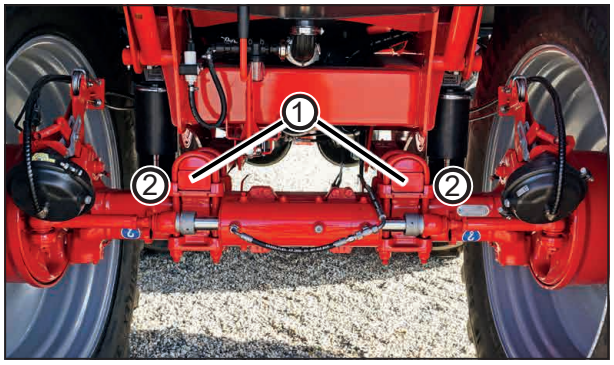
With appropriate manual correction, the hydraulic control reduces damage to the crop, especially for row crops (e.g. potatoes or vegetables) when driving or manoeuvring in and out of the rows.

⚠ NOTE

Information on the operation and adjustment of the slope mode with steering correction is provided in the HORSCH Terminal operating instructions.

Hydropneumatic suspension

The machine's suspension uses hydraulic cylinders. The system includes an automatic level control, independently of the load condition.



1 Leaf springs

2 Suspension cylinder

⚠ WARNING

Danger of crushing for body parts between undercarriage and body when lowering the machine! Instruct persons to leave the danger zone around the machine before lowering the machine.

The undercarriage height can be adjusted to the tractor between the minimum and maximum setting in increments of two. This is done in the suspension mode menu on the terminal.

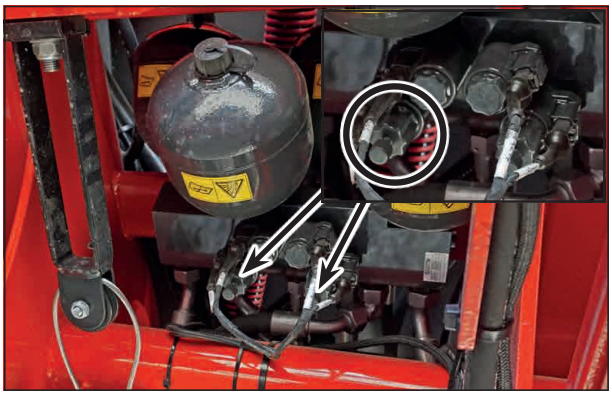
⚠ NOTE

During initial commissioning or when changing the tractor, the suspension height must be adapted to the tractor. Observe the *Commissioning* section and associated Terminal operating instructions in this regard.

Mechanical release mechanism of suspension

The undercarriage height can be lowered manually if the machine fails (e.g. for repair work on the axle or suspension hydraulics, removal or replacement of the anti-lock braking system (ALB). For this purpose there is a valve block with two screws on the rear of the machine. To lower the suspension, screw in both screws.

Keep the valve open as long as necessary and unscrew it again after the repair or tyre change.



Release mechanism of suspension

Brake system

⚠ DANGER

Uncontrolled rolling of the machine may cause severe injuries by crushing or rolling over.

- Park the machine only on level ground with sufficient load bearing capacity.
- Secure the machine with wheel chocks against rolling before releasing the brake.

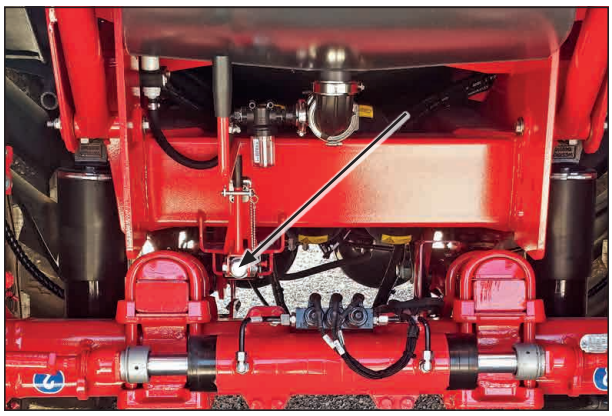
⚠ WARNING

Danger of crushing, cutting, being pulled in, being caught and impact caused by incorrectly functioning brake system.
Perform a function test of the brake system before each travel!

NOTE

Adjustments and repair work on the brake system must only be carried out in a professional workshop or by an operator, who has been specially trained by HORSCH.

The parking brake of the towed sprayer must be pulled each time when the unit is parked. To this end, fold down the crank and apply the brake by turning it. Now fold up the crank again into the bracket.



Parking brake

Actuating button to release the pneumatic brake

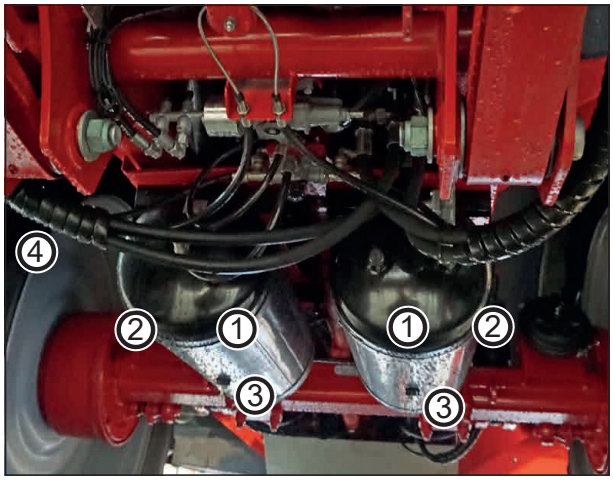
When uncoupling the machine from the tractor, the pneumatic brake of the sprayer automatically engages in the brake position. Press in the operating button down to the stop position to release the pneumatic brake of the towed sprayer. The pneumatic brake is activated again by pulling it up to the stop position with the air reservoir being filled.

NOTE

The operating button for releasing the pneumatic brake shall be used only for temporary work, e.g. for manoeuvring the machine or in case of emergency. The pneumatic brake must be applied again at the end. The parking brake must be pulled in addition.

WARNING

Danger of crushing, cutting, being caught, being pulled in and impact caused by unintentional rolling away of the machine! When the air vessel is empty, the pneumatic brake cannot be engaged again via the operating button! The air reservoir must be filled again first by coupling the crop protection sprayer to the tractor.



(1)Air vessel
(2)Tension straps
(3)Drainage valve for condensation water
(4)Test port for pressure gauge

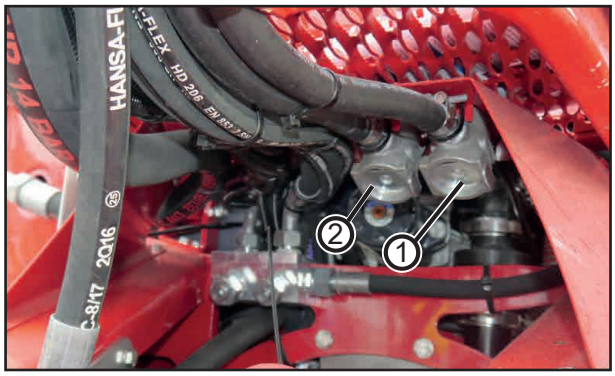
Twin-circuit pneumatic brake system

⚠ NOTE

Strict compliance with the specified maintenance intervals is mandatory for correct functioning of the twin-line brake system.

➢ Check the brake lining for wear.

Position of line filters



(1)Line filter in brake line (yellow)
(2)Line filter in supply line (red)

Automatic load dependent brake pressure regulator (ALB)

Brake pressure regulator with anti-lock braking system (ALB) for adjusting the brake force. The brake force is adjusted in dependence on the loading condition of the trailed sprayer.

⚠ WARNING

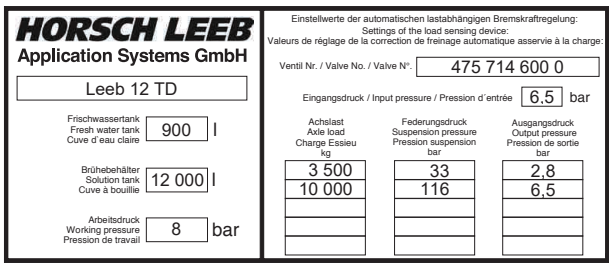
Danger of crushing, cutting, being pulled in, being caught and impact caused by incorrectly functioning brake system!
Perform a function test of the brake system before each travel!

⚠ NOTE

Do not change the adjustment measurement on the automatic load dependent brake pressure regulator. The adjustment measurement must match the value given on the ALB plate.

The ALB type plate is located on the frame of the right machine side under the covering.
Input pressure: 6.5 bar

The plate shows the setting data according to the axle load:



HORSCH LEEB
Application Systems GmbH

Leeb 12 TD

Frischwassertank / Fresh water tank / Cuve d'eau claire: 900 l
Brühebehälter / Solution tank / Cuve à bouillie: 12 000 l
Arbeitsdruck / Working pressure / Pression de travail: 8 bar

Einstellwerte der automatischen lastabhängigen Bremskraftregelung:
Settings of the load sensing device:
Valeurs de réglage de la correction de freinage automatique asservie à la charge:

Ventil Nr. / Valve No. / Valve N°: 475 714 600 0
Eingangsdruck / Input pressure / Pression d'entrée: 6,5 bar

Achslast / Axle load / Charge Essieu kg	Federungsdruck / Suspension pressure / Pression suspension bar	Ausgangsdruck / Output pressure / Pression de sortie bar
3 500	33	2,8
10 000	116	6,5

The anti-lock braking system (ALB) receives the signal about the load condition via the hydraulic pressure of the suspension. The suspension must be lowered completely when dismantling or changing the ALB. Observe the section *Mechanical release mechanism of suspension*.

Connection of brake system

⚠ WARNING

Danger of crushing, cutting, being pulled in, being caught and impact caused by incorrectly functioning brake system!
Perform a function test of the brake system before each travel!

Before coupling the brake and supply line make sure that

➢ the machine has been connected to the tractor.

➢ the seal rings on the brake coupling heads are clean.

- the seal rings on the brake coupling heads are not damaged.
  - Damaged seal rings must be replaced without delay.
  - Drain water from the air vessel every day before the first ride.
  - Only start driving off with the coupled machine after the operating pressure required to release the brake has been reached (pressure gauge on tractor).

1 Supply line (red)
2 Brake line (yellow)

NOTE

The tractor brake must be engaged before coupling the brake line since the machine may otherwise start rolling off with the tractor.

1. Engage the brake of the tractor.
2. Open the lid of the coupling head on the tractor.
3. Fasten the coupling head of the brake line (yellow) correctly in the yellow coupling on the tractor.
4. Fasten the coupling head of the supply line (red) correctly in the red coupling on the tractor.
5. When coupling the supply line (red) the supply pressure from the tractor will push out the actuating button for the releasing valve on the trailer brake valve automatically.
6. Release the parking brake with the crank.

WARNING

Danger of crushing, cutting, being pulled in, being caught and impact caused by accidentally rolling machine after the service brake has been released! The machine must be secured against rolling away.

NOTE

Dual line pneumatic brake system:

- Always connect the coupling head of the brake line (yellow) first and the coupling head of the supply line (yellow) after.
- The service brake of the machine immediately opens after the red coupling head has been connected.

Uncoupling the brake system

1. Secure the machine against unintended rolling away. Use the parking brake and wheel chocks for this purpose.
2. Pull the parking brake tight via the crank.
3. Release the coupling head of the supply line (red) and uncouple from the tractor.
4. Release the coupling head of the brake line (red) and uncouple from the tractor.
5. Place the lines on the hose bracket.

⚠ WARNING

Danger of crushing, cutting, being pulled in, being caught and impact caused by accidentally rolling machine after the service brake has been released! The machine must be secured against rolling away.

⚠ NOTE

Dual line pneumatic brake system:

- Always disconnect the coupling head of the supply line (red) first, and the coupling head of the brake line (yellow) after.
- The service brake of the machine will only change to braking position after the red coupling head has been disconnected.
- Strictly adhere to this sequence, as otherwise the service brake will be released and the unbraked machine may start moving.

⚠ NOTE

When the machine is unhitched or torn off, the supply line to the trailer brake valve will be vented.
The trailer brake valve will automatically switch over and operate the service brake system in dependence on the automatic load dependent brake pressure regulator.

Hydraulic brake

The hydraulic line controls the brake power to the brake cylinders.

The brake inlet pressure must not exceed 150 bar.

Connecting

1. When hitching up connect the hydraulic brake line with the brake line on the tractor

Hydraulic coupling for brake

2. Fasten the breakaway protection cable at a suitable place on the tractor. The cable must hang freely. In case of loss of the machine, the cable must initiate emergency braking by switching the emergency brake valve and, as a consequence, by pulling out the spring pin!

⚠ WARNING

The cable may be caught by other machine parts and thus trigger flat-out braking when cornering. Danger of traffic accidents!

- Fasten the cable in such a way, that it cannot be caught in any place.

⚠ WARNING

A brake test must be carried out each time before starting to drive.

3. Release the parking brake. The wheels must be able to turn freely.

⚠WARNING

Danger of traffic accidents caused by brake failure!
During commissioning or after long periods of rest:

- ➢ Fill the pressure accumulator for emergency braking before starting to drive.
- ➢ Fully kick down the brake pedal on the tractor for this purpose.

With each actuation of the brake, the pressure accumulator is pressurized, if required.

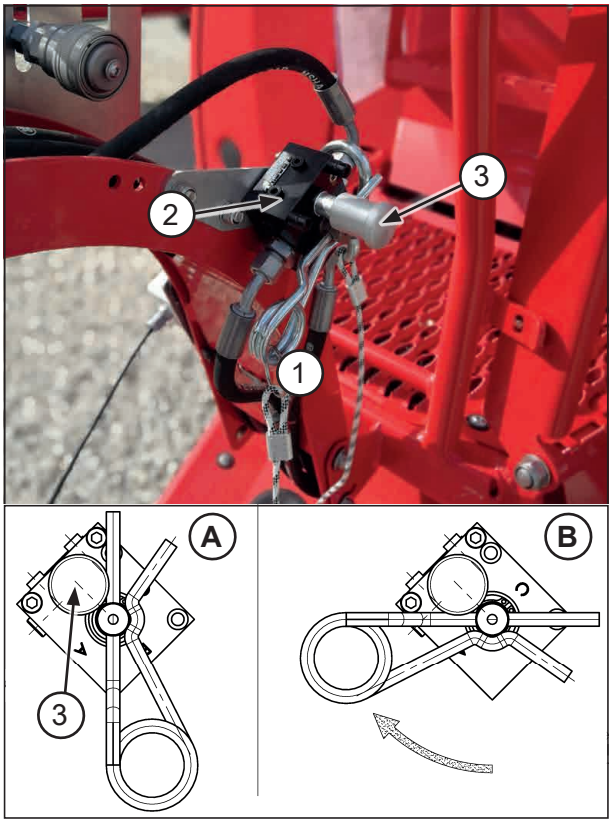
Unhitching

1 Park the machine.
2 Apply the parking brake.
3 Place wheel chocks under the wheels.
4 Uncouple the brake line. Place the hydraulic hose line on the hose bracket.
5 Disconnect the breakaway cable from the tractor.
6 Unhitch the machine.

Unhitching does not trigger the breakaway brake. Emergency braking is only triggered if the spring cotter is turned to the front.

Emergency brake valve with breakaway cable

If the machine is lost during road or field travel, the breakaway cable is tensioned. Tensioning causes the spring pin on the trailer brake valve to turn in the direction of the tractor and then to be torn out. The rotation releases the stored pressure of the pressure accumulator in the emergency brake valve and initiates the emergency braking of the trailer.



Emergency brake (figure similar)

1 Spring pin with breakaway cable
2 Brake valve
3 Releasing pump for brake relief
A Operating position of breakaway valve
B Emergency braking breakaway valve

Releasing pump

The brake can also be released manually after the emergency braking function has been triggered.

- ➢ Turn the spring plug back to operating position and operate the releasing pump, until the brake is released.

Maintenance

- ➢ Check brake lines and hoses for signs of damage.
- ➢ Check the brake lining for wear.
- ➢ Observe the section *Maintenance of the brake system*.

Spraying mixture container

⚠ WARNING

Poisoning hazard – Do not climb into the spraying mixture containers!

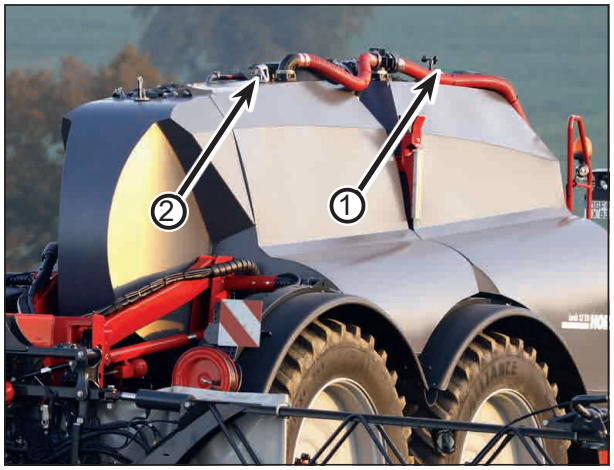
- Only approved technical personnel may enter the spraying mixture container.
- Before entering the spraying mixture container, it must have been completely drained and cleaned with the cleaning agents specified by the spraying agent manufacturer.
- Comply with the national regulations and laws for work in tight spaces!

⚠ WARNING

Danger of falling off when climbing on the spraying mixture containers!

- Do not climb on the spraying mixture containers.

The spraying mixture containers are designed to hold water, spraying agents and fertilisers.
With the aeration and venting system the spraying mixture container is aerated during spraying and vented during filling.
With the internal cleaning nozzles the spraying mixture containers are cleaned with fresh water after spraying.
The agitator mixes the spraying mixture inside the spraying mixture containers and ensures a homogeneous mixture.
The current contents of the spraying mixture containers can be read via the filling level indicator. As an option, the filling level of the spraying mixture containers can be displayed on the terminal.



1 Spraying mixture container 1 filling indicator

2 Spraying mixture container 2 filling indicator

Fresh water tank

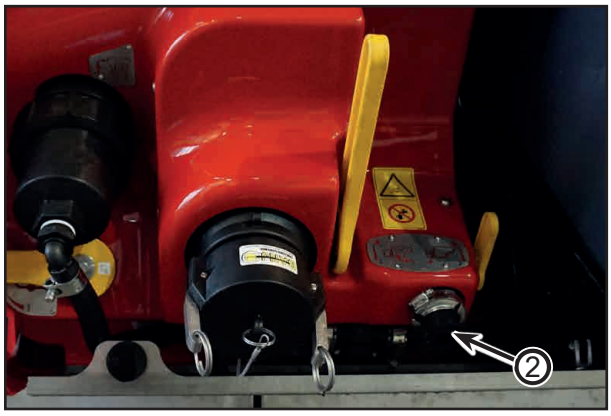
The fresh water tank (1) is located on the rear of the machine. The tank is designed to retain fresh water. The tank capacity is 900 litres.

Fresh water is used for:

- Dilution of the residual quantity in the spraying mixture containers.
- Cleaning (flushing) the entire crop protection sprayer in the field.
- cleaning the suction fitting as well as the spraying lines with the tank filled.
- Cleaning with 1/2” hose with hose reel and washing gun (optional)
- Cleaning with high pressure cleaner (optional).

Fresh water tank

The filling port (2) is located to the left of the illuviation valve.



Filling port for fresh water tank

The overflow of the fresh water tank is located at the rear of the machine and is routed via a line to the underside.

Fresh water tank overflow line

The tank lid with ventilation for the fresh water tank is located at the top side.

Tank lid with ventilation of the fresh water tank

NOTE

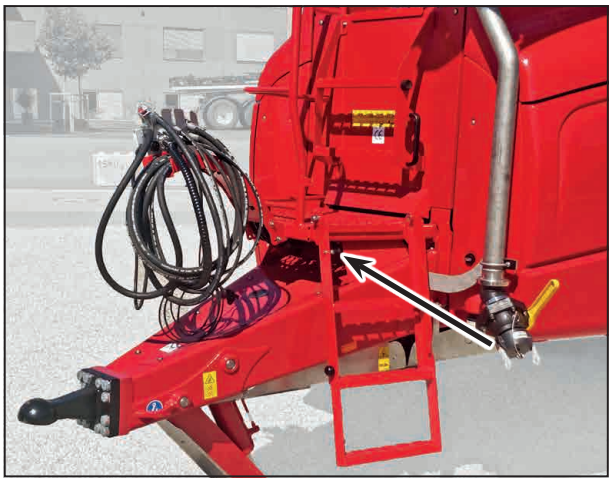
Fill the fresh water tank only with clear water, never with crop protection agent or spraying mixture!

WARNING

Danger of accident when performing repair work on the fresh water tank! Open the maintenance opening only for maintenance work and by trained personnel.

Access steps

The filling dome of the spraying mixture container can be accessed via the folding stairs.



Folding access steps – spring-loaded indexing bolt

- Pull out the spring-loaded indexing bolt and fold down the access ladder with the other hand.
- Fold up the ladder after use and especially before transport travel until the spring-loaded indexing bolt engages.

⚠ WARNING

Danger of traffic accidents.

➢ Always fold up the access ladder to the transport position before transport travel.

⚠ WARNING

Risk of crushing when folding the access ladder.

➢ Never reach into the crushing area of the ladder.

Platform

⚠ DANGER

Severe accident by falling down!

➢ No passengers are allowed to ride on the machine!

➢ When climbing the platform always maintain contact on at least 3 points (hands or feet) of the steps.

Working platform

Dome

⚠ DANGER

➢ Danger of injury by poisonous vapours! Do not climb into the spraying mixture container!

The dome screen is located on the front solution tank. A maintenance opening is located on the second solution tank.

⚠ WARNING

The solution tank must be cleaned before entering it.

➢ Comply with the national regulations for working in tight spaces!

➢ Observe the safety data sheets of the biocatalysts used last!

➢ Use the cleaning and rinsing agents stipulated by the manufacturer of the biocatalysts!

⚠ DANGER

Risk of falling!

- The opening on the second solution tank is only for maintenance purposes and not to be used as filling opening!
- The maintenance opening may only be entered by trained personnel for maintenance and repair!

Solution tank 2, maintenance access!

⚠ NOTE

The dome screen must be checked daily and cleaned as necessary!

Filling dome

Dome screen

Hand washing tank

⚠ NOTE

Fill only clean water into the hand washing tank!

⚠ WARNING

Danger or poisoning by contaminated water in the hand washing tank!
Never use the water in the hand washing tank as drinking water!

Hand washing tank

The hand washing tank with drain valve is located at the right hand side next to the illuviation valve.

A soap dispenser for hand cleaning is located to the right of the hand washing tank in the stowage compartment.

Soap dispenser

Spraying pump

The crop protection sprayer is equipped with a centrifugal pump for the spraying system. The pump is hydraulically driven via a proportional valve and adjusts to the required quantity.

The pump used does not require pulsation damping, because centrifugal pumps generate continuous flow and pressure.

- ➢ The spraying pump installed in this machine is nearly maintenance-free!
- ➢ The spraying pump is not equipped with dry running protection and may therefore be operated only temporarily without fluid!

⚠ NOTE

Fill the pump with fluid before initial commissioning and after each draining before switching on.

⚠ NOTE

Slight leaks may occur initially with new spraying pumps. Slight formation of oil drops on the pump housing may occur until the mechanical seal has been broken in.
Check the oil level of the pump regularly and top it up if necessary.

The following centrifugal pumps are installed on the machine, depending on the design:

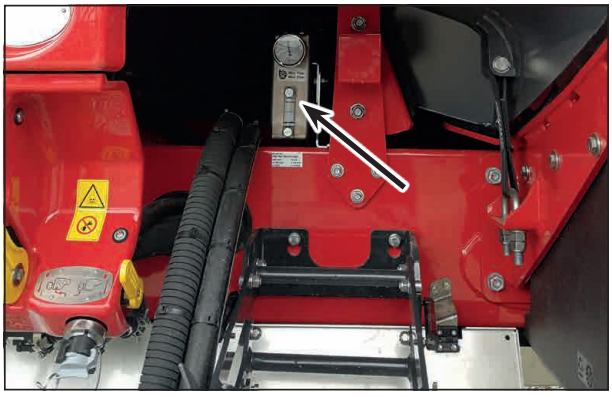
- ACE - FMC-750F-HYD
- HPRO 9316C3U-M10, 9316S3U-M10

ACE - FMC-750F-HYD

Technical data:	
Type	ACE - FMC-750F-HYD
Flow in l/min at 0 bar (acc. to Julius Kühn Institute)	1000
Flow rate in l/min at 5 bar	500
Maximum pressure in bar	10

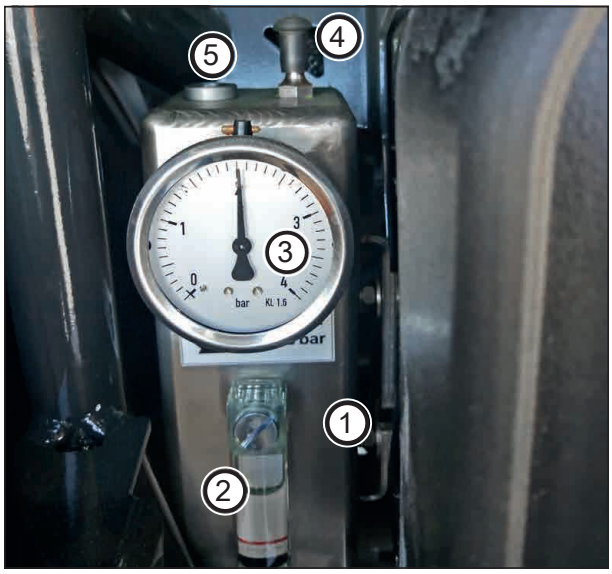
The pump has an oil-filled cavity as dry running protection and for cooling.

- ➢ Check the pressure on the pressure gauge (3) of the compensation tank. The compensation tank is located at the left side of the machine next to the illuviation valve.



Compensation tank position

- The pressure in the compensation tank (1) should lie permanently between 1 and 3 bar. Increase or lower the pressure via the tyre filler (4).
- If the pressure drops, check for leaks.
- Check the sealing fluid level using the filling level indicator (2).
- Release the pressure via the tyre filler (4) before topping up the sealing fluid.
- Open the screw (5) before filling the sealing fluid.



1 Compensation tank
2 Filling level indicator
3 Pressure gauge pressure indicator
4 Tyre filler
5 Screw for topping up the sealing fluid

HYPRO 9316C3U-M10, 9316S3U-M10

Technical data:	
Type	HYPRO 9316C3U-M10 HYPRO 9316S3U-M10
Flow in l/min at 0 bar (acc. to Julius Kühn Institute)	approx. 1000
Flow rate in l/min at 5 bar	approx. 600
Maximum pressure in bar	10

The pump has an oil-filled cavity as dry running protection and for cooling.

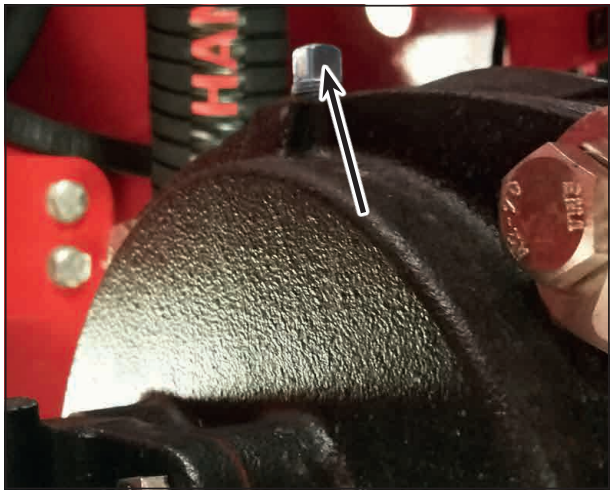
Spraying pump HYPRO 9316C3U

Check the level of the BarrierFluid regularly and top it up.

- Unscrew the plug on the top of the pump for this purpose.
- Fill the BarrierFluid to the upper rim.
- Screw the plug back into place.

⚠ NOTE

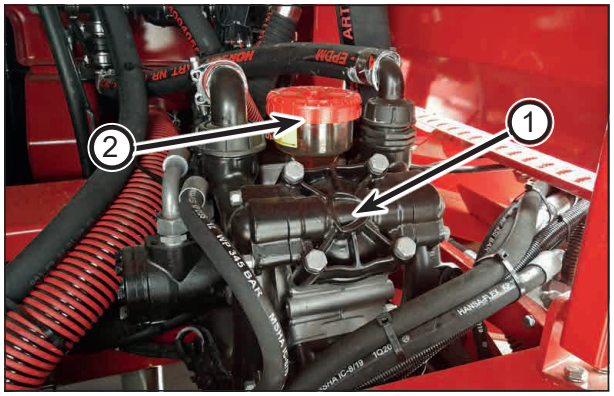
Top up the BarrierFluid every 1000 operating hours. Refer also to the *Maintenance overview* section.
Use only special sealing fluid for ForceField pumps.



Plug for topping up BarrierFluid

Piston diaphragm pump

The piston diaphragm pump is located in the front-end of the machine.



1 Piston diaphragm pump
2 Reservoir

Functions of the pump:

- Draws in fresh water during continuous inside cleaning (CCS).
- Suction aid during filling process

A reservoir (2) is located on the top side of the pump allows checking and topping up the oil level.

NOTE

- ➢ Do not overfill the reservoir; the oil level should lie between MIN and MAX.
- ➢ Switch off the pump to check or top up the oil level.
- ➢ Contact HORSCH Service if the oil must be topped up daily or if the oil is discoloured!

Technical data:	
Type	AR 185
Flow rate in l/min at 480 rpm	100
max. flow rate in l/min at 550 rpm	128
Maximum pressure in bar	20

Illuviation valve

The pivotable illuviation valve is used to pour in, dilute and draw in crop protection agents and carbonyl diamide. Two variants of the illuviation valve are available. An induction hopper with plastic funnel is installed on the machine as standard equipment. Optionally, an induction hopper with stainless steel funnel is available.

Illuviation valve with plastic funnel

1 Hinged lid
2 Handle to swing the illuviation valve

3 Parallelogram arm to swing the illuviation valve from transport to filling position

4 Switching fitting for canister flushing / closed circuit flushing line / shock nozzle and washing gun

5 Switch-over ball valve for sucking-off and Ecofill connection

6 Ecofill filling port

7 Washing gun

8 Activate/deactivate the washing gun

9 Activate/deactivate the canister flushing

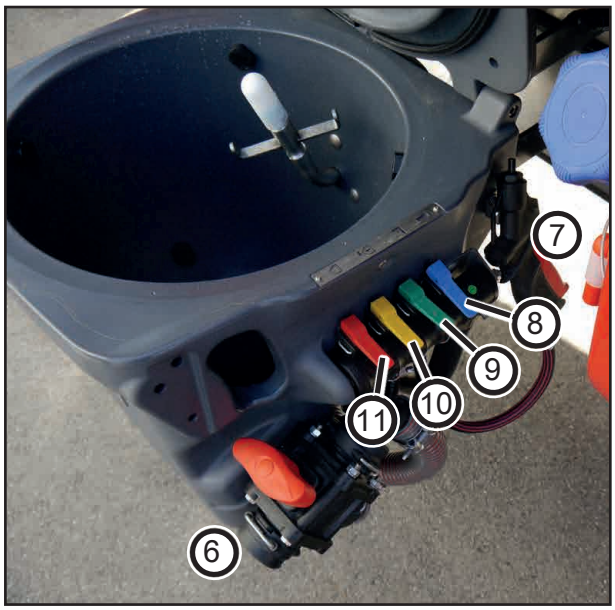
10 Activate/deactivate the shock nozzle (only with illuviation valve from stainless steel) / rinsing nozzle in the lower area

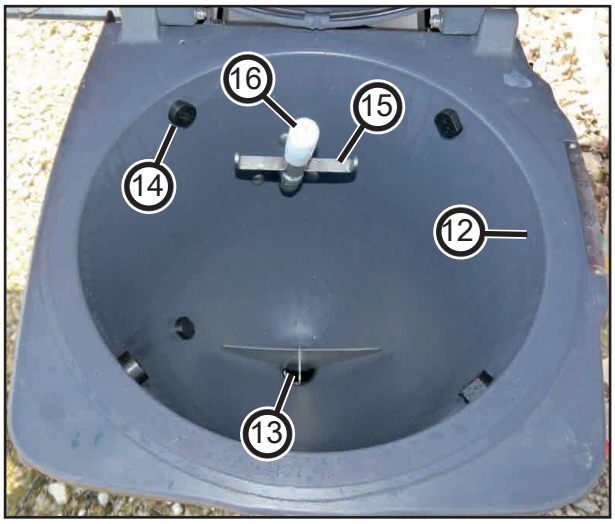
11 Activate/deactivate closed circuit flushing

12 Filling level gauge

13 Suction opening

14 Rinsing nozzles for dilution and illuviation of crop protection agents





15 Pressure plate

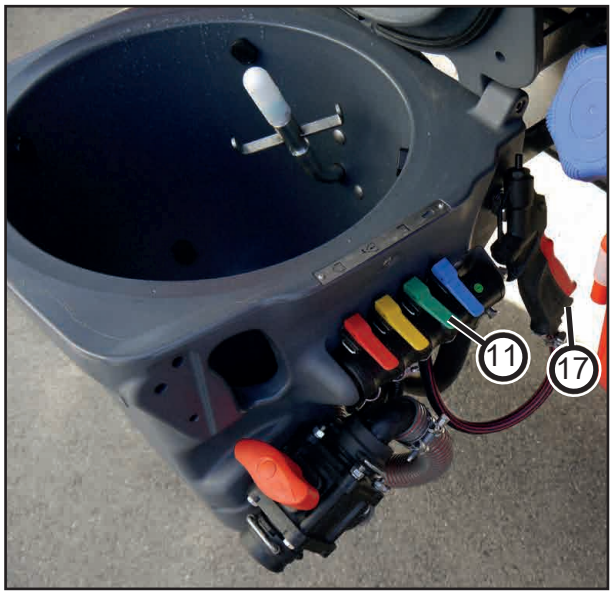
16 Rotating canister flushing nozzle to flush out canisters or other containers

NOTE

With the canister flushing switched on, water emerges from the rinsing nozzle (16) when the pressure plate (15) is pressed down.

Washing gun

A washing gun for cleaning the illuviation tank after filling can be found on the illuviation valve. Apart from this, deposited residues can be flushed out of the canisters.



Washing gun

- To fix the handle actuation press the button (17) during operation.
- Operate the handle to release
- After switching off (11) relieve the residual pressure.

Stainless steel illuviation valve

Retaining clip for metering cup

The retaining clip serves for a safe and firm stand of the metering cup.

- Fold down the retaining clip.
- Place the metering cup inside in order to be able to meter the crop protection agent in it.


Retaining clip

Tray on the housing

A folding tray is attached to the housing of the illuviation valve to facilitate filling. Bags with crop protection agent can be put down here.

Illuviation valve tray with stainless steel funnel

CCS - Continuous inside cleaning

(Continuous cleaning system)

NOTE

Fast cleaning process of the sprayer without leaving the tractor.

The complete cleaning process is controlled from the driver's cabin.

Mode of operation:

Principle of positive displacement instead of principle of dilution

An additional cleaning pump feeds clear water directly into the inside cleaning nozzles. The spraying pump draws this water out of the spraying mixture container and uses it to force the chemical residue through the nozzles out of the pipe system.
This means quick, thorough and water consumption optimized cleaning.

External cleaning system (option)

NOTE

Wash the machine for the first time after 3 months at the earliest with a steam jet or high pressure cleaner to avoid damage to the paintwork.
Keep the water jet at a distance of at least 150 cm from electronic ports to the cabin or sensors.
After cleaning, check the hydraulic lines for leaks and firm connections. Retighten screw connections if necessary. Relubricate all lubrication points.

NOTE

The external washing facility is supplied directly by the spraying pump of the fresh water tank.

WARNING

Danger through accidental contact with spraying mixture!

Wear personal protective outfit!

Before using the outside cleaning system the cleaning programs of the crop protection sprayer must be cycled through since the residual chemical still contained in the water system is pumped off via outside cleaning before fresh water arrives at the cleaning gun.

CAUTION

Risk of fluids escaping under pressure.
The external cleaning system may be contaminated with spraying mixture deposits!

Secure the washing gun with the lock against accidental spraying:

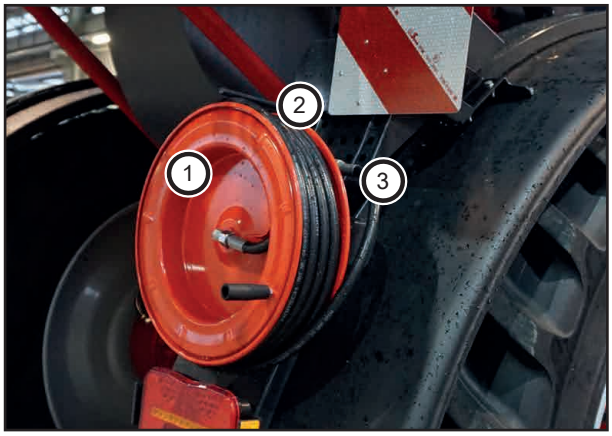
- ➢ before each spraying pause
- ➢ before the washing gun is stored again in its holder after cleaning is finished.

NOTE

Wear appropriate protective clothing when cleaning. Follow the recommendations of the crop protection agent manufacturers.

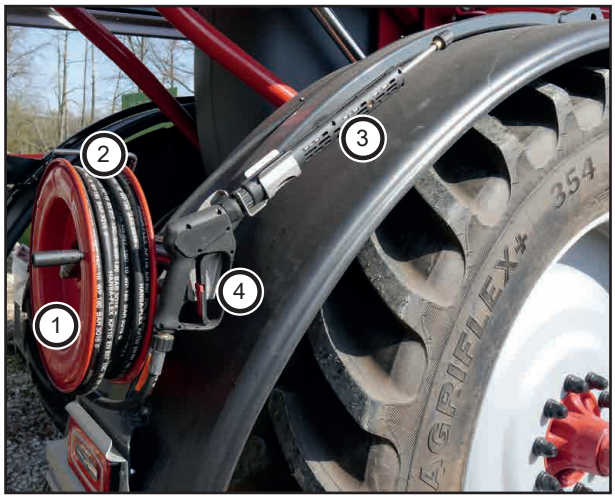
With the external cleaning system two optional variants are available:

- **1/2” hose with hose reel and washing gun**



1 Hose reel
2 Pressure hose
3 Washing gun

- **High pressure cleaner**



1 Hose reel
2 20 m Pressure hose
3 Washing gun
4 Grip with lock

Operating pressure: 140 bar
Water output: 15 l/min

Agitator

The two spraying mixture containers are equipped with a hydraulic agitator. Special injector nozzles in the agitator tube reinforce the stirring intensity. The switched on agitator mixes the spraying mixture inside the tanks and thus ensures a homogeneous mixture.

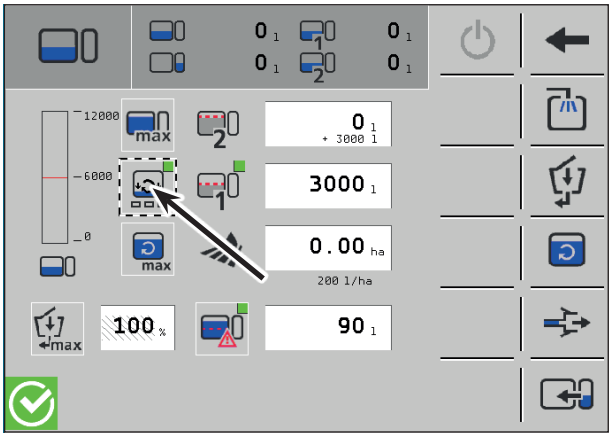
The agitator and the agitator limit can be adjusted in 4 stages on machines of the CCS Pro variant.

- on the external control terminal
- on the main terminal

The agitator can also be switched off completely in order to minimize the residual quantity inside the spraying mixture containers.
At the highest intensity, suctioning takes place only from tank 2 to generate turbulence in both tanks (only for machines of the CCS Pro variant).

Dropping solution level:
For machines of the CCS Pro variant, the agitator is automatically deactivated at a solution tank content smaller than 1000 litres.

In order to continue ensuring the homogeneity of the solution even below the standard set limit of 1000 litres, the agitator can also be activated for below this limit. For this purpose, the agitator limit can be lowered to 50 litres by using the *Lower agitator limit* button.



If the solution tank content is less than 50 litres, the agitator is deactivated permanently and cannot be reactivated.

Rising solution level:
The symbol status is displayed in yellow as long as the minimum volume of 50 litres has not been reached. The agitator has been preselected but is not active. The agitator is activated automatically and the status symbol becomes green as soon as the tank contains 50 litres of solution.

NOTE

The functions *Agitator preselection level* 1-3 and *Lower agitator limit* must be selected again each time the terminal is restarted.
A preselection of the agitator level 1-3 can always be made. If the solution level for switching on the agitator is reached, the agitator is activated.

NOTE

Following the illuviation of the preparations, stirring must be carried out for at least 5 minutes, or longer depending on the preparations, with the *Agitator max. stirring* stage in order to achieve homogeneity in both tanks.

The agitator normally remains switched on from filling to the end of spraying.
The information provided by the preparation manufacturer are decisive in this respect.

Filter

NOTE

Use all specified filters of the filter equipment. Clean the filters at regular intervals.

Trouble-free operation of the crop protection sprayer is only ensured with flawless filtration of the spraying mixture. Appropriate filtering considerably influences the treatment success of the crop protection measure.

Pay attention to the permissible filter combinations or mesh sizes. The mesh sizes of self-cleaning pressure filters and nozzle filters (optional) must always be smaller than the nozzle opening of the nozzles used.

Please note that the use of pressure filter elements with 80 or 100 meshes/square inch may cause the separation of biocatalysts with some crop protection agents.
If in doubt, contact the crop protection agent manufacturer.

Pressure filter

The pressure filter at the Illuviation centre prevents contaminants from entering into the nozzle line. Different degrees of fineness are available to suit each application. The filter is fitted with an 80 meshes/square inch element as standard.
In case of applications with liquid fertiliser or when using bigger nozzles it is recommended to use coarser elements in order to keep the pressure drop in the filter as low as possible.

The self-cleaning pressure filter prevents blocking of the nozzle filters in front of the spray nozzles.
In circulation mode (main sprayer switch “Off”) the inside surface of the pressure filter element is continuously flushed, and undissolved crop protection agent and dirt particles are returned to the spraying mixture tank.

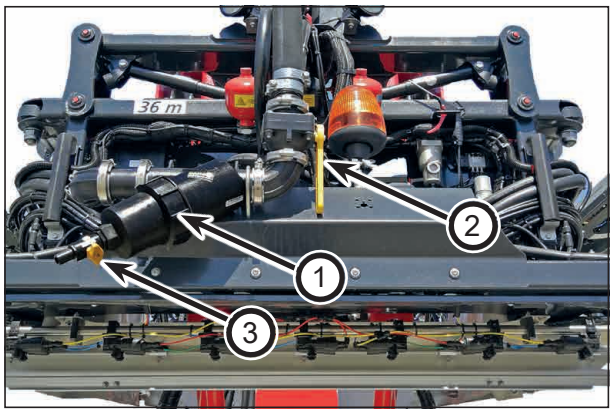
Auxiliary pressure filter

An additional pressure filter is installed on the centre piece of the folding boom.

With certain spraying agent combinations, it can happen that due to chemical reactions flocks form in the long lines and clog the nozzles. The auxiliary pressure filter shortens the line lengths between filter and nozzle and thus prevents flocculation.

If the first pressure filter is defective, for example due to excessive water pressure, the auxiliary pressure filter can be used to retain the dirt from the nozzles.

The pressure filter is equipped with 80 meshes/inch² insert as standard. Depending on the use, additional filter inserts with 50 or 100 meshes/inch² insert are available.



1 Auxiliary pressure filter
2 Shut-off lever
3 Valve

Clean the auxiliary pressure filter as needed. Lower the parallelogram for this purpose. Turn the yellow lever to the right (2) by 90° to thus block the flow to the pressure filter. Open the small yellow valve at the lift (3) and collect any draining agent. Dispose of the agent if necessary or return it to the spraying mixture container. Open the filter housing with the pressure filter wrench. Clean the auxiliary pressure filter.

Repeat all steps in the opposite order after cleaning.

Dome screen

The dome screen prevents contaminants from entering into the spraying mixture container during filling through the dome. The screen has a standard mesh size of 1 mm.

Drain filter in the tank

The drain filter in the tank prevents settled agents from being deposited in the suction fitting.

Suction filter

The suction filter filters the water / chemical before it enters into the centrifugal pump (mesh size 0.9 mm).

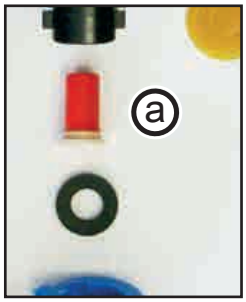
Overview of pressure filter elements

Meshes/ square inch	Nozzle size	Mesh size [mm]
32		
50	from ‘03’	0.35
80	‘02’	0.20
100	up to ‘015’	0.15

Filter cleaning, see chapter Cleaning, maintenance and repair.

Nozzle filter (optional)

The nozzle filter (a) prevents clogging of the spraying nozzles.



Overview of nozzle filters

24 meshes/square inch

from nozzle size: 06’ and bigger
Filter area: 5.00 mm²
Mesh size: 0.50 mm

50 meshes/square inch

for nozzle size: '02' to '05'
Filter area: 5.07 mm²
Mesh size: 0.35 mm

100 meshes/square inch

for nozzle size: 015’ and smaller
Filter area: 5.07 mm²
Mesh size: 0.15 mm

Control unit

Fittings

The external control terminal, filling connections and illuviation valve are arranged in travel direction on the left hand side.

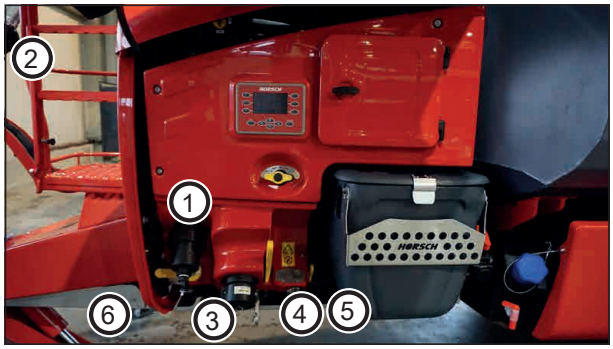
External control terminal, filling connections and illuviation valve

NOTE

For machines with the CCS Pro variant there is a storage box next to the external control terminal. The personal protective outfit can be stored here.

Ports

Overview of the ports



1 Pressure filter
2 Direct filling/external filling of spraying mixture container (optional)
3 Suction connection for spraying mixture container filling
4 Filling port for fresh water tank
5 Spraying mixture tank residue drain
6 Spraying mixture tank pressure output

Main control terminal

Spraying operation is controlled via the terminal in the tractor cabin.
The graphic user interface shows and controls current settings and measuring values in spraying operation.

➢ Input and monitoring of data in spraying operation.

The crop protection sprayer is equipped with an ISOBUS-compatible terminal Touch 800 as standard feature (alternatively Touch 1200).
Other ISOBUS compatible terminals may alternatively also be used. However, this should be discussed with the HORSCH- LEEB Service before use.

NOTE

Machines operated via the ISOBUS of the tractor are always active via terminal 15 of the tractor, even when the machine terminal is disabled!

The illustration shows: Terminal Touch 800

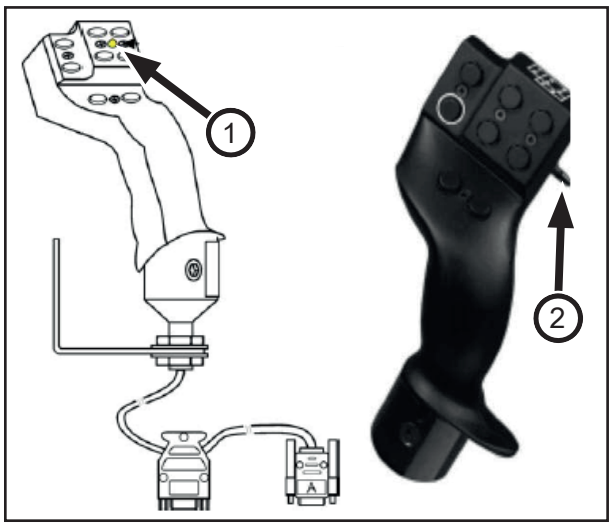
1 Switching the terminal ON/OFF
2 Making screenshots
3 Saves the window arrangement
4 Touch display

NOTE

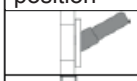
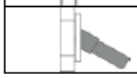
- Instructions for operating the terminal are included in the supplied operating instructions!
- Instructions for operating the sprayer software are included in the supplied terminal operating instructions from HORSCH.
- When using an alternative terminal the respective operating instructions issued by the manufacturer must be followed!

Multi-function handle

The multi-function handle is an ISOBUS-capable operating element and can additionally be connected to the terminal to ease operation.
It contains the functions most frequently needed during operation. This allows them to be selected hereby easily, quickly and without visual contact.
The number of screens is reduced by using the multi-function handle and thus provides a better overview.



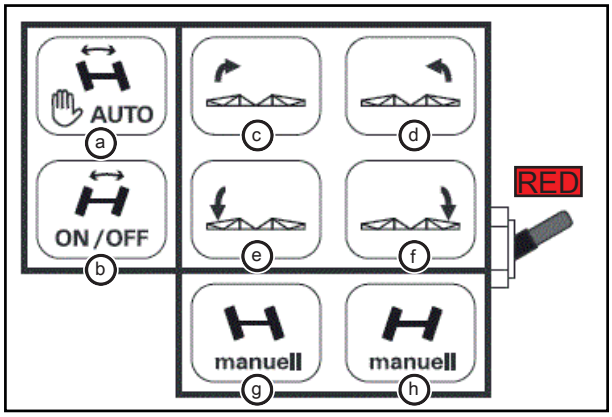
The multi-function handle has 8 buttons at the front side and a switch (2) at the right side.
It allows changing between 3 levels. The currently set level is indicated on the front with a colour LED (1).

Switch position	Coloured status LED
	Red
	Yellow
	Green

NOTE

More Information on the operation and configuration of the multi-function handle is provided in the HORSCH Terminal operating instructions.

Default assignment multi-function handle

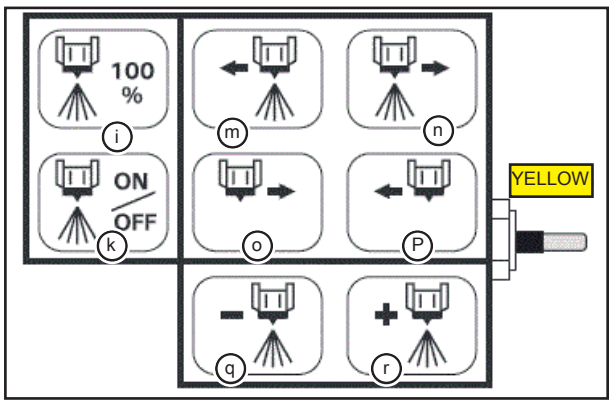


(a) Ackerman steering “Automatic mode”
(b) Ackerman steering “ON / OFF”

(c) Left folding boom wing up *
(d) Right folding boom wing up *

(e) Left folding boom wing down *
(f) Right folding boom wing down*

(g) Steering “manual” travel direction “left”
(h) Steering “manual” travel direction “right”

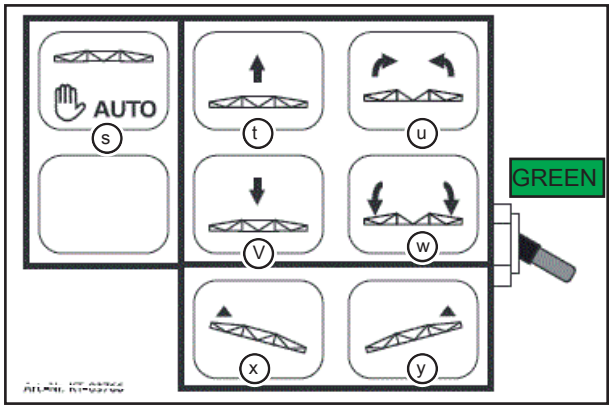


(i) Spraying quantity “100%”
(k) Spraying operation “ON / OFF”

(m) Sections “ACTIVATION” from “left”
(n) Sections “ACTIVATION” from “right”

(o) Sections “DEACTIVATION” from “left”
(p) Sections “DEACTIVATION” from “right”

(q) Spraying quantity “REDUCTION” by 5 %
(r) Spraying quantity “INCREASE” by 5 %



(s) Activate automatic folding boom guide

(t) Lift folding boom or parallelogram *
(u) Fold in folding boom automatically

(v) Lower the folding boom or parallelogram *
(w) Unfold folding boom automatically

(x) Slope compensation “left” up
(y) Slope compensation “right” up

Button assignment on the multi-function handle depending on the switch position or colour of the status LED
* optional

➢ Key assignment may also vary!

Transport, document and safety container

It is located at the right of the hand washing tank. Machines with the CCS Pro variant feature an additional storage bin to the right of the external control terminal.

- Transport and safety container for the storage of protective clothing and accessories.
- Document container for keeping and storing information.
- Machines of the CCS Pro variant contain the application quantity table in this bin.

only for machines of the CCS Pro variant

⚠ WARNING

To avoid contamination of the tractor cabin, it must not be entered with used protective clothing! Protective clothing shall always be stored in the transport and safety container provided for it.

- In addition, the transport container contains a tool holder in which a metering cup, filter wrench, assembly wrench, etc. can be stored.

Document roll

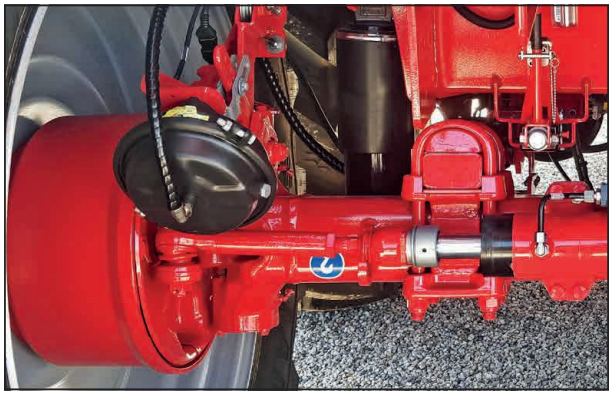
A document roll with bracket is located at the right machine side under the front covering. Documents about currently used crop protection agent need to be stored in it. They provide valuable information about the content of the tank and in the spraying boom for rescue personnel in case of accidents.

Document roll

Lifting points

The machine can be fastened at the following points to secure it for transportation:

Both sides at the front of the machine



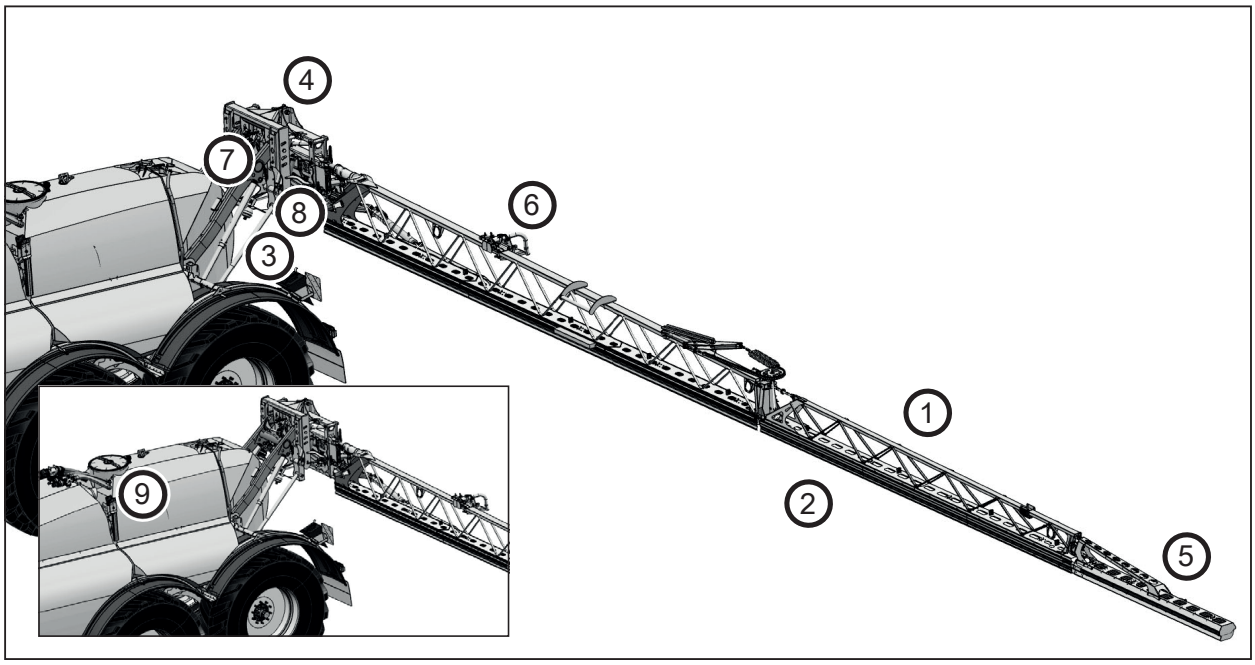
Both sides at the rear of the machine

⚠ NOTE

The chapter Safety notes must be followed!

Folding boom

Proper condition of spraying boom and suspension have a considerable influence on the distributing accuracy for the spraying mixture.
Complete wetting is achieved by correctly adjusted spraying height of the folding boom to the crop.



1 Spraying boom with spraying lines
2 Nozzle protection tube
3 Parallelogram
4 Middle section
5 Collision protection
6 Folding boom lock
7 Parallelogram lock
8 Slope compensation
9 Folding boom rest

⚠ WARNING

Danger of crushing and impact for persons when lifting or lowering for height adjustment of the spraying boom!
Instruct persons to leave the danger zone around the machine before lifting or lowering the spraying boom by means of the height adjustment.

⚠ NOTE

Adjust the spraying height (distance between nozzles and crop) as per currently applicable guidelines.
Always adjust the spraying boom parallel to the ground, because the specified spraying height can only be achieved in this condition.
Carry out all adjustment work on the spraying boom conscientiously.

Folding variants – folding boom

Folding boom, 5-piece with reduced working width 15 m

15 m

24 - 30 m

Folding boom, 5-piece with reduced working width 18 m

18 m

30 - 36 m

Folding boom, 7-piece with reduced working width 12 m and 21 m

12 m

21 m

27 - 30 m

Folding boom, 7-piece with reduced working width 24 m

24 m

30 - 36 m

Folding boom, 7-piece with reduced working width 27/28 m

27 / 28 m

38 - 42 m

Folding boom, 7-piece with reduced working width 30 m

30 m

44 - 45 m

BoomControl

⚠ WARNING

Danger caused by unexpected movements in automatic mode. Never come close to the ultrasonic sensor, while the BoomControl is in automatic mode!

When operating the sprayer under high voltage power lines disable the BoomControl and operate the slope compensation manually!

No persons may be present under the folding boom and in the danger zone!

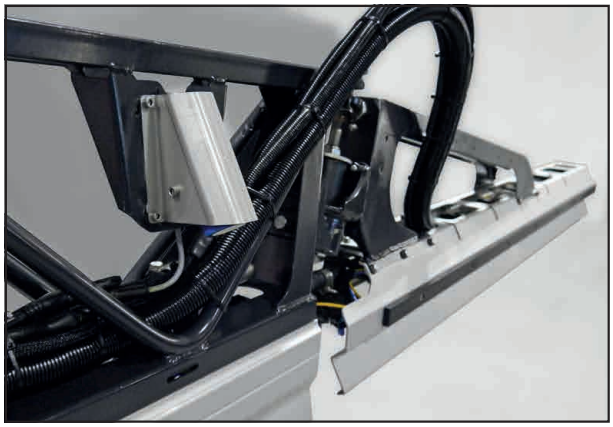
The BoomControl function must be disabled when leaving the cab!

The BoomControl folding boom control is used for the automatic distance control of the spraying boom.
Ultrasonic sensors measure the distance to the ground or the crop and the folding boom is then adjusted in accordance with the nominal distance values. An automatic height and inclination control thus adapts the folding boom distance to the crop. The crop should be closed and not show any gaps.

The scanning width of a sensor is approx. 0.5 m. If a gap in crop or a trench wider than 0.5 m is detected under a sensor, the corresponding boom segment will be lowered (danger of damages).
When passing over very smooth surfaces, such as e.g. water puddles, the ultrasonic signal may be reflected. The control must in these areas be deactivated.

- BoomControl does not relieve the driver from his responsibility to constantly check the position of the folding boom and to interfere manually, if needed!

The folding boom can be equipped with up to 6 sensors for height adjustment and slope compensation.



Ultrasonic sensor on the folding boom

⚠ NOTE

When the spraying boom is switched off at the headland, the spraying boom is automatically raised by a previously defined value.
When switched back on, the spraying boom will return to its set height.

BoomControl modes

Various equipment versions are available. Depending on the mode, there are different designs.

BoomControl ECO
Design with 2 or 4 sensors for height adjustment and slope compensation.

BoomControl Pro
Design with 4 or 6 sensors for height adjustment, slope compensation and angle adjustment.

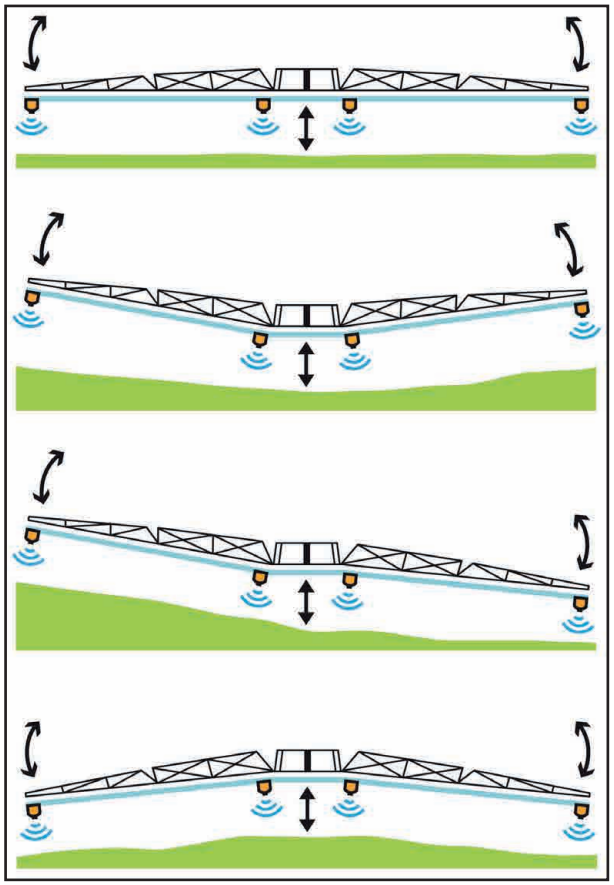
BoomControl ProPlus
Design with 6 sensors for height adjustment, slope compensation and angle adjustment of the outside wings.

⚠ NOTE

In case of irregular population and/or empty spaces in the population, the folding boom control must be deactivated or manually overridden to avoid unintended lowering of the folding boom!

BoomControl Pro (optional)

Automatic folding boom control with active adjustment by the sensors on the folding boom wings. This ensures minimum drift at the lowest possible working height, even at high speeds, on flat or slightly hilly terrain.



Active adaptation of the folding boom via middle section height guidance and independent bending of both folding boom halves (controlled by 4 sensors, distributed over the entire folding boom).

MotionControl (optional)

Folding cylinder with MotionControl (figure similar)

For certain folding boom widths an optional horizontal folding boom damping is available. The folding boom damping absorbs the mass inertia of the folding boom in horizontal direction. This increases the service life of the folding boom.

MotionControl dampens:

- at drive off
- when braking
- when cornering at excessive speed

➢ MotionControl does not absolve the driver from driving responsibly!

The folding boom is straight during normal operation or when stopped.

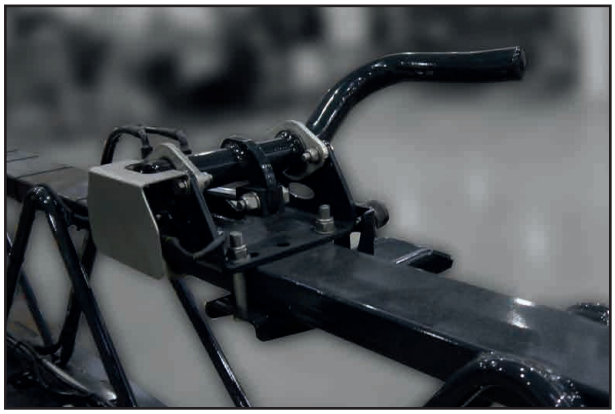
Transport lock

⚠ WARNING

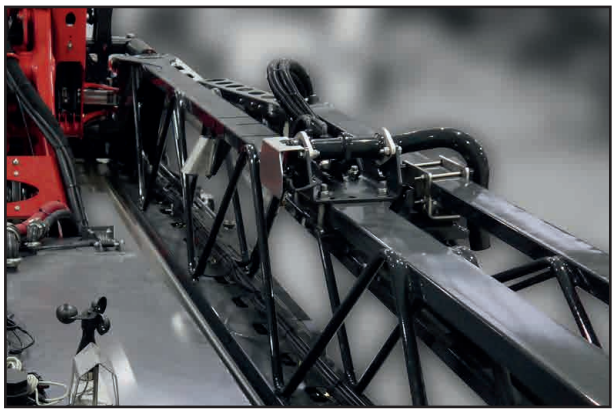
The folding boom package must be locked and checked during each road travel!

Folding boom lock

The folding boom lock is used to lock the folded folding boom during road travel. It prevents accidental unfolding.



Folding boom lock open



Folding boom lock closed

Folding boom rest

The folding boom rest is used to rest the folded folding boom during road travel and prevents accidental unfolding.

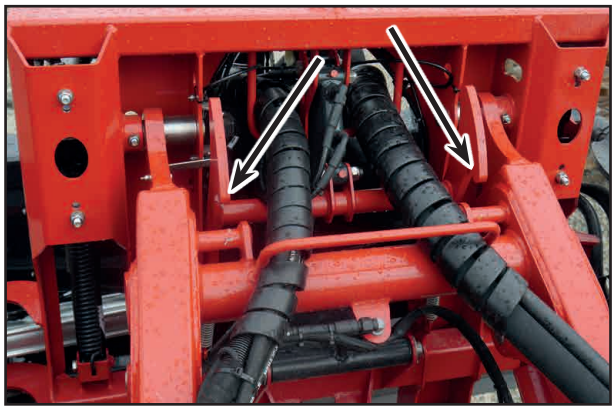
Bow for folding boom rest

Folding boom rest

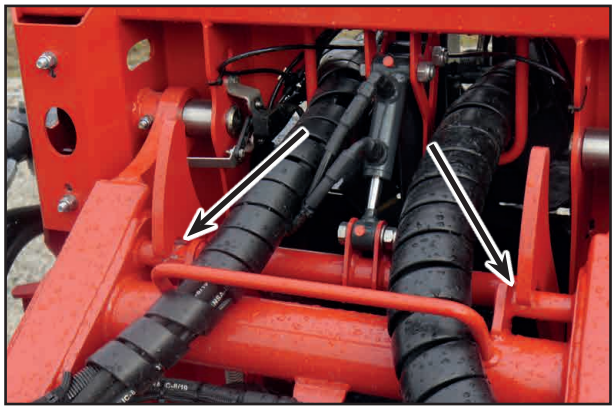
Folding boom put down

Parallelogram lock

The stroke of the parallelogram must always be locked during road travel. The parallelogram is locked automatically as soon as the folded folding boom is in the end position of the rest.
When the folded folding boom is lifted from the rest, the parallelogram is first unlocked automatically.



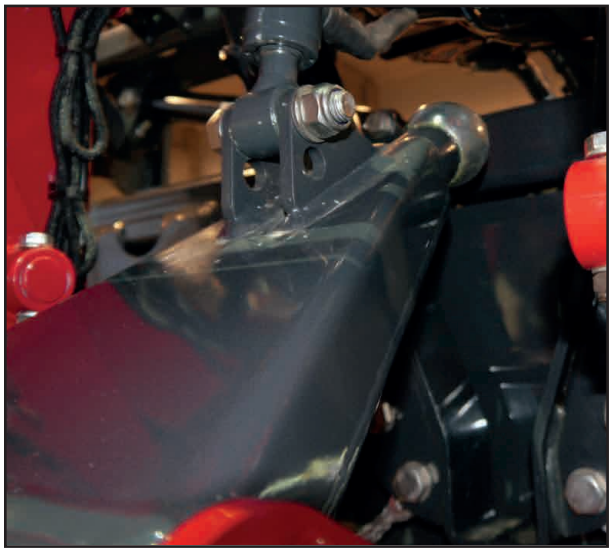
Parallelogram interlock open



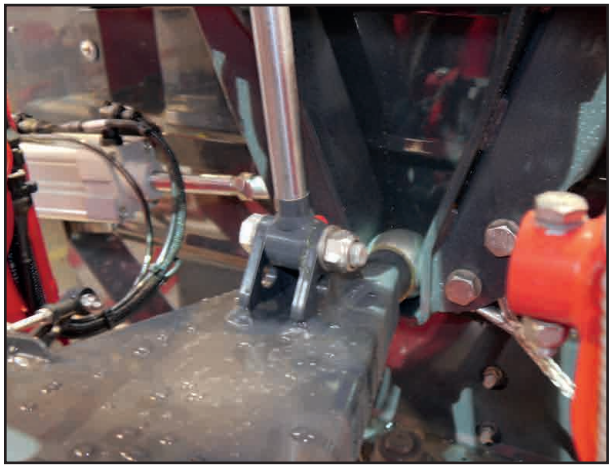
Parallelogram interlock closed

Slope compensation

The folding boom is aligned horizontally via the slope compensation.
If the terrain is uneven, the centre of gravity of the folding boom can be changed using the pneumatic or hydraulic slope compensation. Changing the centre of gravity allows the folding boom to be positioned parallel to the ground on a slope.
The slope compensation must always be locked before road travel.
Slope compensation is locked automatically as soon as the folding boom is folded.
When unfolding the folding boom, the slope compensation is unlocked automatically after successful folding.



Slope compensation unlocked



Slope compensation locked

Uniform transverse distribution is only achieved with the slope compensation unlocked.

NOTE

Before starting road travel make sure that the folding boom is locked and rests securely in the folding boom rest. In addition, the parallelogram and the slope compensation must be locked.

Collision protection

The collision protection protects the folding boom against damage caused by collision with a solid obstacle. The joint mechanism enables escaping a collision in travel direction and in opposite direction.

After the escape movement the collision protection will swing back to the initial position.

NOTE

Collision protection only with fully extended working width. With reduced working width pay attention to any obstacles around the outside of the machine!

Spraying line

The spraying line is made of stainless steel pipe. The nozzle control has been designed as pneumatic single nozzle control for all versions. Section separation is achieved by combining the control of several nozzle bodies.

The spraying line can be fitted with single or multiple nozzle bodies.

Circulation system

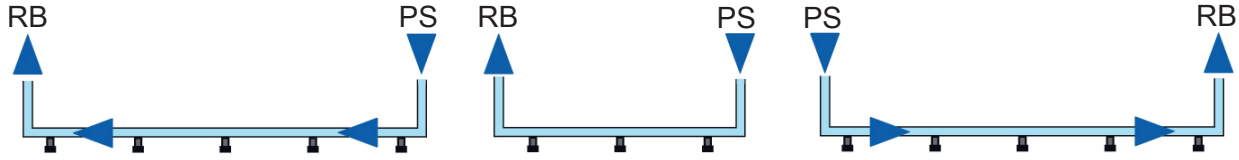
Due to the permanent circulation of the biocatalytic solution through the complete folding boom while the sprayer is switched off, spraying fluid is permanently applied to the nozzle.
When switching on individual sections or the entire spraying line for the first time, the biocatalytic solution is directly and well mixed available.
This circulation successfully prevents the formation of deposits and blockage.

Cleaning of nozzle pipe and nozzles

The spraying line is cleaned by the circulation system. The suction side of the crop protection sprayer is set to fresh water for this purpose. The nozzle line is flushed with fresh water.
To clean the nozzles, all nozzles must be open for approx. 3 sec.

Circulation

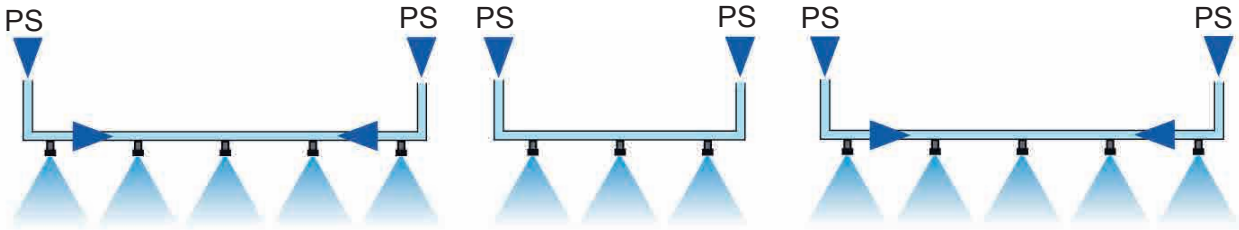
PS = Pressure supply RT = Return spraying mixture container



Folding boom left Middle section Folding boom right

Spraying

PS = Pressure Supply

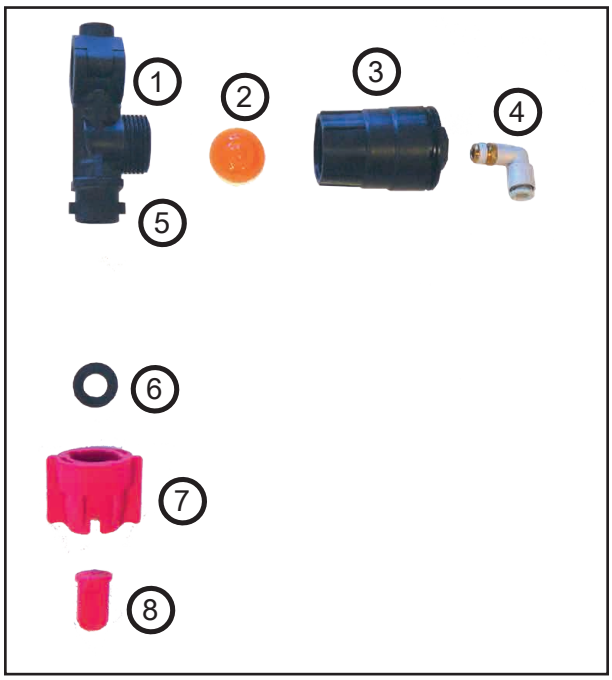


Folding boom left Middle section Folding boom right

Nozzle body

Single nozzle body with pneumatic control valve

If a pressure of more than 4 bar is applied to the compressed air connection (4), the valve will open and fluid can flow out. Without pressure the valve is closed.



1 Nozzle body
2 Diaphragm
3 Pneumatic control valve
4 Compressed air connection
5 Bayonet connection
6 Rubber seal
7 Bayonet cap
8 Nozzle

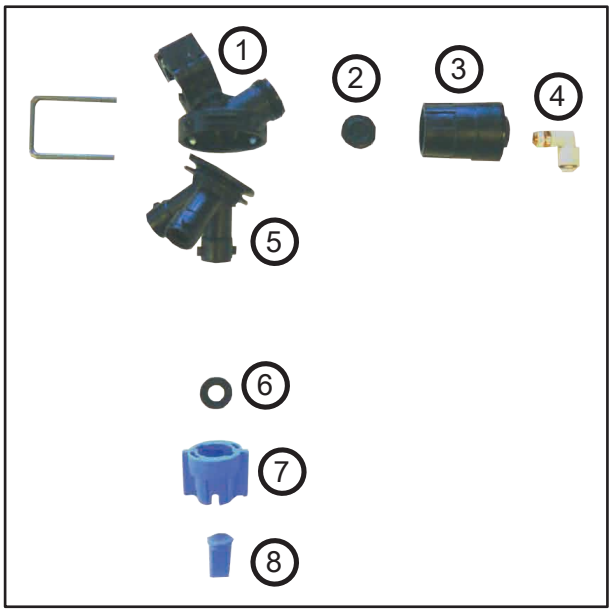
Multiple nozzle body manual triple

The triple nozzle body is used if more than one nozzle type is used. Only the vertically arranged nozzle will be supplied.
By turning the nozzle body, another nozzle is brought into use.
In intermediate positions the nozzle body is switched off.

NOTE

Flush the spraying lines and the active nozzle before turning the 3-fold nozzle body to another nozzle type!

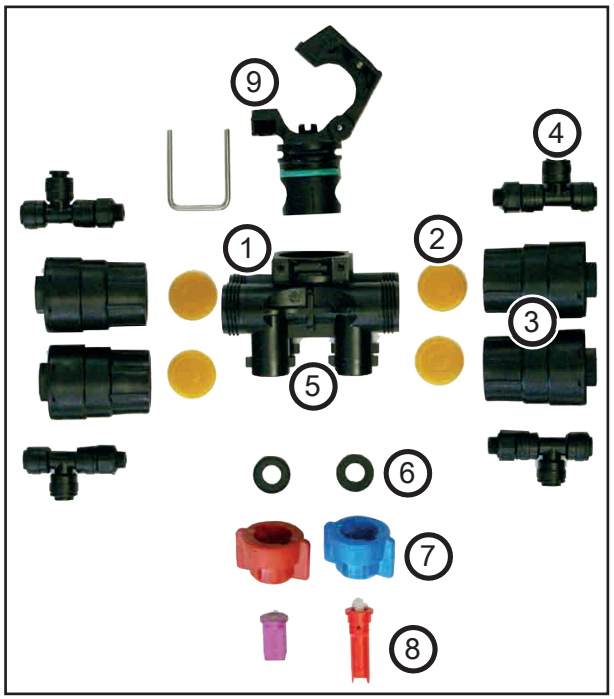
Fluid always escapes on all vertical nozzles. If a pressure of more than 4 bar is applied to the compressed air connection (4), the valve will open and fluid can flow out. Without pressure the valve is closed.



1 Nozzle body
2 Diaphragm
3 Pneumatic control valve
4 Compressed air connection
5 Bayonet connection
6 Rubber seal
7 Bayonet cap
8 Nozzle

Multiple nozzle body pneumatic

These multiple nozzle bodies are installed in the form of dual or 4-fold versions.
In this case it is possible to switch the desired nozzle from the terminal. You may even switch on several nozzles at a time. The pneumatic control valves are integrated in the nozzle carrier. If a pressure of 4 bar is applied to the compressed air connection (4), the valve will open and fluid can escape. Without pressure the valve is closed.



1 Nozzle body
2 Diaphragm
3 Pneumatic control valve
4 Compressed air connection
5 Bayonet connection
6 Rubber seal
7 Bayonet cap
8 Nozzle
9 Hinged clamp

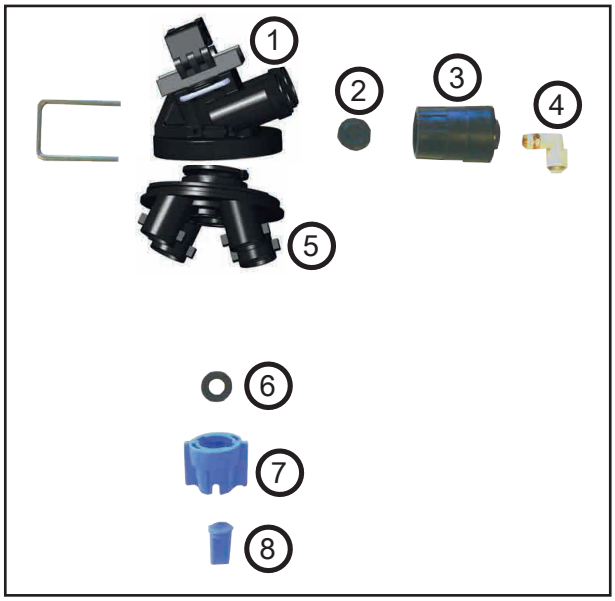
Multiple nozzle body manual 4-fold

The 4-fold nozzle body is recommended if more than only one nozzle type is used. Only the two vertical nozzles will be supplied. They can be activated individually via the terminal.
By turning the nozzle body, the other two nozzles are used.
In intermediate positions the nozzle body is switched off.

⚠ NOTE

Flush the spraying lines and the active nozzle before turning the 4-fold nozzle body to another nozzle type!

Fluid always escapes on all vertical nozzles. If pressure greater than 4 bar is applied to the compressed air connection (4), the valve will open and fluid can escape. Without pressure the valve is closed.



1 Nozzle body
2 Diaphragm
3 Pneumatic control valve
4 Compressed air connection
5 Bayonet connection
6 Rubber seal
7 Bayonet cap
8 Nozzle

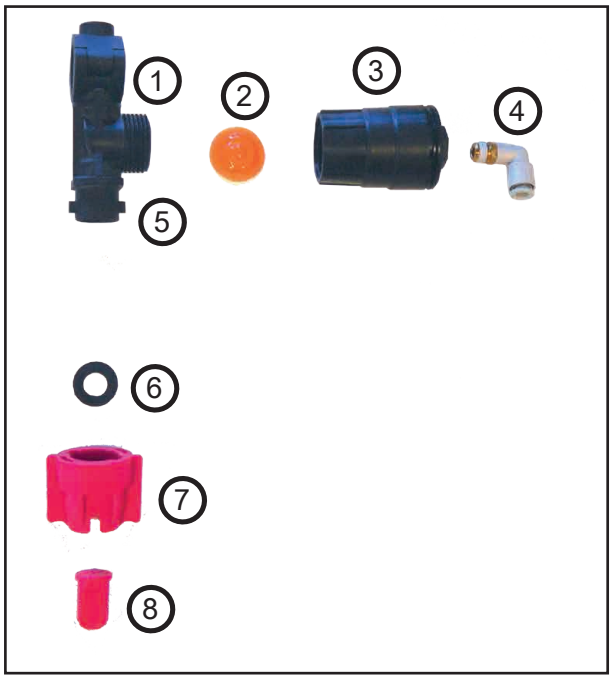
Nozzle assembly and cleaning

Nozzle assembly

⚠ CAUTION

CAUTION Spraying mixture running out!
Use appropriate protective outfits. Catch spraying mixture in a suitable container and dispose of it.

1. Insert the nozzle (8) into the bayonet cap (7).
2. Insert the rubber seal (6) above the nozzle (8).
3. Press the rubber seal (6) into the seat of the bayonet cap (7).
4. Position the bayonet cap (7) on the bayonet connection (5).
5. Twist the bayonet cap (7) against the stop position.



⚠ NOTE

Observe the correct installation of the nozzle during assembly! Observe the specifications of the nozzle manufacturer.

Nozzle replacement

- Turn the nozzles each by approx. 45° (to end position) to remove and install them.
- Use the delivered tool for this purpose:

Nozzle cleaning

- Clean the nozzles, if required.
- Do not damage nozzles and nozzle filters when cleaning.

⚠ CAUTION

CAUTION Spraying mixture running out!
Never blow out the nozzles with your mouth.

Removing the diaphragm valve on dripping nozzles

Deposits on the diaphragm seat are the cause of nozzles dripping after the folding boom has been switched off.

In this case clean the corresponding diaphragm as follows:

1. Unscrew the pneumatic control valve (3) from the nozzle body (1).
2. Take out the diaphragm (2).
3. Clean the diaphragm seat.
4. Insert the diaphragm (2) again in the pneumatic control valve (3).
5. Screw the pneumatic control valve (3) again on the nozzle body (1).

⚠ CAUTION

CAUTION Spraying mixture running out!
Use appropriate protective outfits. Catch the spraying mixture in a suitable container and dispose of it properly.

Optional equipment

Hydraulic connections

⚠ WARNING

Danger of infection caused by high pressure hydraulic oil from the hydraulic system penetrating into the body!
Danger of severe injuries!

When coupling or decoupling hydraulic hoses make sure that the hydraulic system has been depressurized on both tractor and machine side.

If injured by hydraulic oil, consult a doctor immediately!

Coupling hydraulic hoses

⚠ WARNING

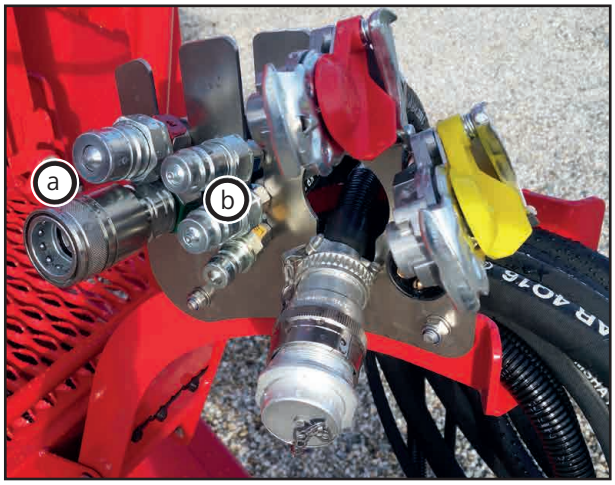
Danger of crushing, cutting, being pulled in, being caught and impact caused by faulty hydraulic functions in case of incorrectly connected hydraulic hoses!
When coupling hydraulic hoses ensure correct assignment of the hydraulic connections.

- Check the compatibility of hydraulic oils before you connect the machine to the tractor hydraulic system.Do not mix mineral oils with bio-oils!
- Observe the maximum permissible hydraulic oil pressure of 200 bar.
- Only connect clean hydraulic couplings.
- Insert the hydraulic plugs into the hydraulic sockets, until they noticeably click into place.
- Check all coupling points of hydraulic hoses for correct and leak tight fit.

1. Actuate the control lever on the tractor mounted control valve to floating position (or neutral position).
2. Clean the hydraulic plugs on the hydraulic hoses before connecting the hydraulic hoses to the tractor.
3. Couple the hydraulic hoses to the tractor control unit and ensure that they are interlocked.

Uncoupling hydraulic hoses

1. Turn the control lever on the tractor control unit to floating position (neutral position).
2. Unlock the hydraulic plugs from the hydraulic sockets and pull them off.
3. Place the hydraulic hoses in the hose bracket.



Hydraulic connections

(a)- Pressure supply
- pressureless return flow

(b)- Support
- LS - control line (Load-Sensing)

PTO-shaft pump (optional)

In case of insufficient hydraulic power of the tractor the PTO-shaft pump can optionally be used.

➢ For machines of the CCS Pro variant!

The pump in this case supports the hydraulic circuit for spraying.

Installation

➢ Plug the pump on to the PTO-shaft.

➢ Fasten the anti-twist lock.

For this purpose fix the adjusting rod in the slot and in the bolt for the upper link without applying any tension.

PTO-shaft pump on tractor

The pump must not move during operation, otherwise shaft and bearings may be damaged!

⚠ NOTE

➢ Before switching on the PTO-shaft make sure that the chosen PTO-shaft speed of the tractor complies with the permissible speed of the device.

➢ max. permissible speed 750 rpm

➢ Check all screw connections in regular intervals.

⚠ DANGER

Danger of injuring during assembly!

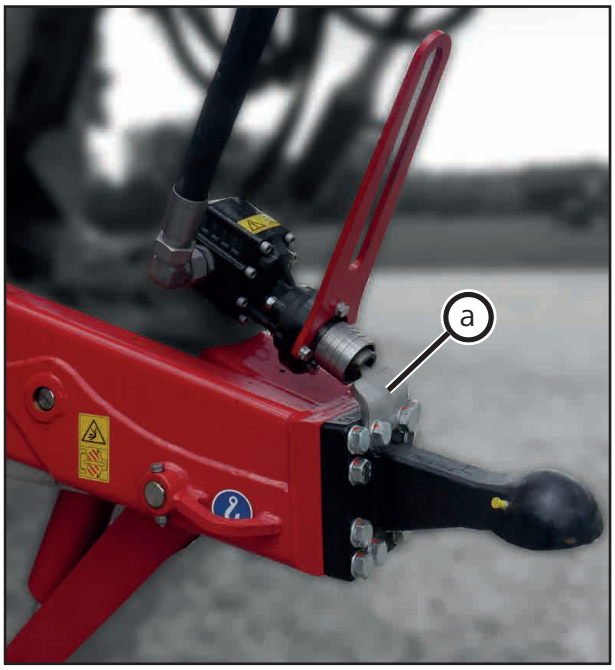
➢ Before performing assembly work shut down the tractor and pull off the ignition key!

➢ Never switch on the PTO-shaft with the engine shut down!

➢ Before switching on the PTO-shaft make sure that there are no persons in the danger zone of the machine.

Parking position

➢ After parking the machine plug the pump on the holding plate (a).



PTO-shaft pump in parking position

⚠ WARNING

Risk of accident during travel if the PTO-shaft pump is in parking position!

Parking position must only be used with the machine shut down!
For road travel or in the field the pump should always be mounted to the tractor!

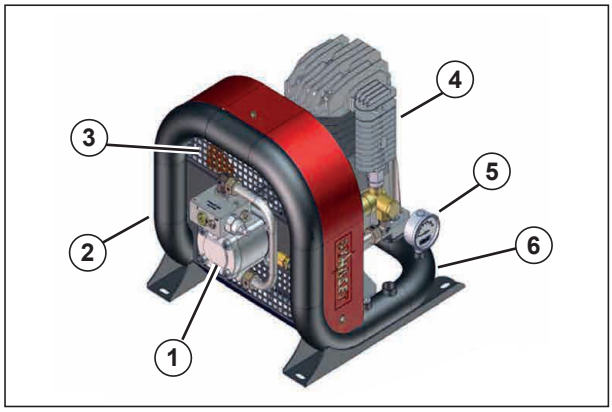
Hydraulic compressor (optional)

A hydraulic compressor is installed at the front of the platform. It is operated via the tractor hydraulics.

Compressed air supply takes place for

- Folding boom control
- Nozzle control and blow-out function
- Air bellows

The hydraulic compressor is automatically activated, if the system pressure drops below 6 bar.



Hydraulic compressor

1 Hydraulic motor
2 Frame tubing
3 Cooling fan
4 Compressor block
5 Pressure gauge for air pressure
6 Vent valve

Maintenance

⚠ WARNING

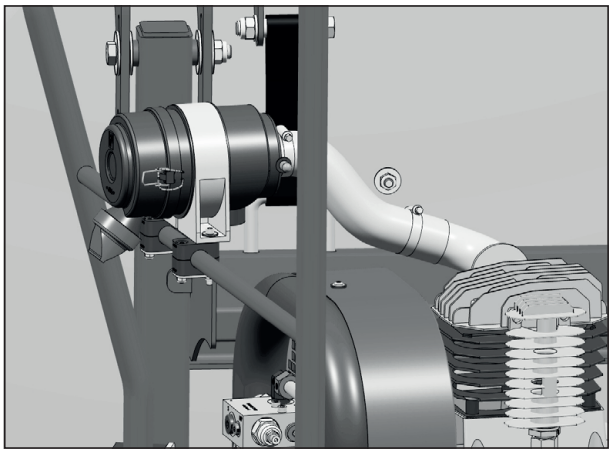
Before starting maintenance, the tractor must be shut down and the compressor depressurized! The pressure gauge should not indicate any pressure.

Keep a safe distance to hot surfaces!

➢ Check the intake filter daily for contamination. Clean as required.

➢ Replace the intake air filter every 500 operating hours, but at the latest after 6 months, under severe operating conditions even earlier.

Thereby clean the housing from inside.



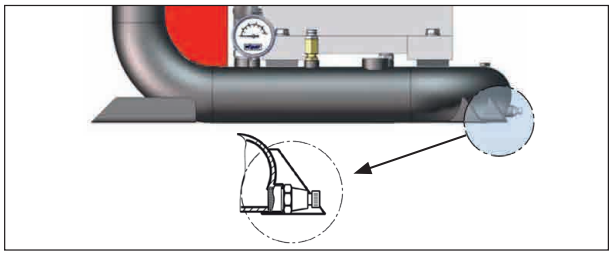
Intake air filter

➢ Clean compressor block and fan protection grille daily or when required. Carefully use compressed air for this purpose.

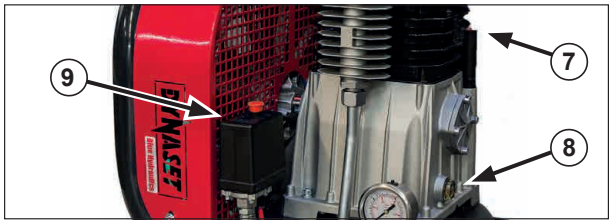
Otherwise the compressor could overheat.

➢ Drain the water from the frame tube at least once every week. For this purpose open the drain valve slowly.

At ambient temperatures below 0 °C drain off water after each work day / shift.



➢ First oil change after 150 hours,
then every 500 hours / 12 months
Specification: SAE 10W-30 (0.9 l)



7 Filler neck with oil dipstick (min./max.)
8 Drain plug
9 Electronic pressure switch with ON/OFF switch

Technical data

max. air flow rate (l/min)	450
max. air pressure (bar)	8
Air volume in frame tube (l)	4.27
rated hydraulic volume (l/min) at 130 bar	14
Oil quantity (l)	0.9
Pressure switch	electronic

Troubleshooting

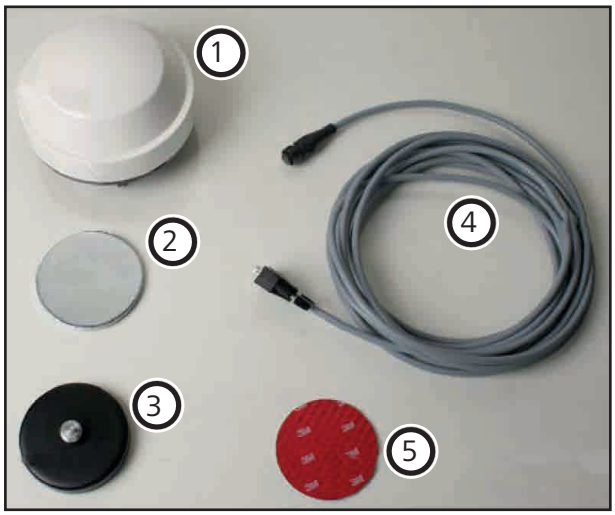
Fault	Possible cause	Remedy
Compressor does not start, even though the tractor is in operation	Fault on hydraulic valve of compressor or on solenoid valve in hydraulic valve block	Check and repair, if necessary (workshop work)
	Compressor switched off by ON/OFF-switch on pressure switch	Switch on compressor
Compressor does not start or difficult to start, even though the tractor is in operation	Fault in hydraulic system	• Check hydraulic pressure and flow rate, adjust as necessary (workshop work) • Check hydraulic motor for leakage, repair if necessary (workshop work)
Air pressure too low	Electronic pressure switch defective or incorrectly adjusted	Check and repair or replace, if necessary (workshop work)
	Suction filter blocked	Check and replace if necessary
Compressor does not produce compressed air/ runs without load	Output valve incorrectly adjusted or faulty	Check and rectify fault (workshop work)
	Intake air filter or connection blocked	Check and replace the filter or clean the connection
Oil consumption too high	Piston rings worn	Check and rectify fault (workshop work)
	Compressor filled with unsuitable oil	Fill in suitable oil
Compressor overheats	Compressor block and fan guard soiled	Check and clean
	Oil level too low	Fill in a sufficient amount of oil

GPS receiver (optional)

The description applies to the GPS receiver version of Müller Elektronik A101. Additional versions of other manufacturers may deviate.

Description

The GPS receiver serves to determine the exact position of the machine.



1 GPS receiver
2 Metal plate
3 Magnetic base
4 Connecting cable
5 Self-adhesive plate

Meaning of the LED light

The GPS receiver indicates the quality of the connection via a status LED:

- Red: The GPS receiver is connected to the terminal but cannot receive a GPS signal
- Orange: The GPS receiver can receive GPS signals but the differential signal is absent. Accuracy is therefore very low.
- Green: The GPS receiver receives GPS signals and differential signals.

Installation

⚠ CAUTION

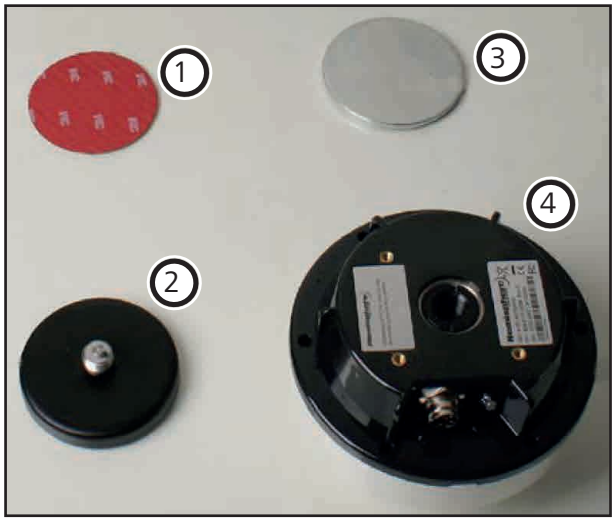
Risk of crushing from very powerful magnet on the base of the GPS receiver!
When installing the GPS receiver, hold it firmly with both hands to make sure no fingers get between the magnetic base of the GPS receiver and a metal surface!

⚠ NOTE

The GPS receiver requires unobstructed view of the sky!
Mount the GPS receiver on the roof of the vehicle cabin or the crossbeam of the crop protection sprayer. A pre-installed carrier plate is available there for the GPS receiver.
Shadowing of the GPS receiver is to be avoided.

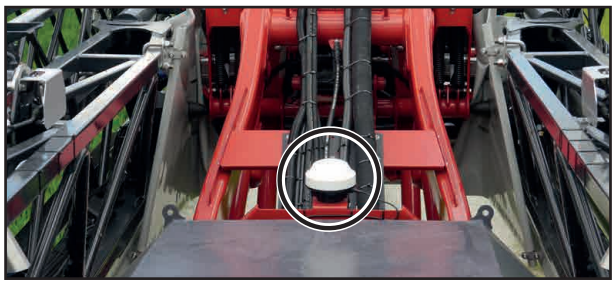
Carrier plate for the GPS receiver of the crossbeam

Assembly accessories



1 Self-adhesive plate
2 Magnetic base
3 Metal plate
4 GPS receiver

1. Thoroughly clean the location where the GPS receiver shall be mounted with alcohol.
   - ➢ for installation on the tractor: centred on the front of the roof
   - ➢ for installation on the crop protection sprayer: on the carrier plate of the crossbeam
2. Glue the double-sided self-adhesive plate (1) on the cleaned surface.
3. Clean the metal plate (3).
4. Pull the paper off the self-adhesive plate (1) and glue the metal plate (3) onto it.
5. Screw the magnetic base (2) into the GPS receiver (4).
6. Position the GPS receiver (4) with the magnetic base on the metal plate (3).



GPS receiver mounted on the carrier plate of the crossbeam

Connecting the GPS receiver to the terminal

⚠ CAUTION

The plug of the terminal carries voltage. Damages to the terminal may occur from a short-circuit.
Switch off the terminal before connecting the connecting cable of the GPS receiver to it!

1. Switch off the terminal.
2. Route the connecting cable of the GPS receiver into the vehicle cabin.
3. Connect the connecting cable to the RS232 port on the terminal.
   - ➢ For more information about the right connection, refer to the HORSCH Terminal TOUCH 800 or Terminal TOUCH 1200 operating instructions.
4. During initial starting it may take up to 30 minutes until the GPS receiver has reception. For all other starts it will only take approx. 1 - 2 minutes.

⚠ NOTE

Information on the configuration of the GPS receiver is provided in the associated terminal operating instructions.

Technical data

Features

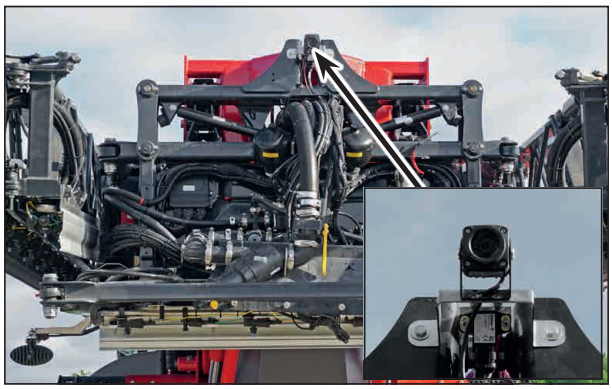
Operating voltage	7 - 36 VDC
Current consumption	249 mA at 12 VDC
Power consumption	< 3 W at 12 VDC
GPS Standard	NMEA 0183

Configuration

Frequencies	5 Hz (GPGGA, GPVTG)
	1 Hz (GPGSA, GPZDA)
Transfer rate	19200 Baud
Data bits	8
Parity	no
Stop bits	1
Flow control	none

Camera (optional)

The machine can optionally be equipped with rear view camera. The camera image is displayed on the terminal.



Rear view camera

⚠ WARNING

Do not only use the camera system for manoeuvring! Persons or objects can be overlooked! This may cause severe or even fatal injuries!

⚠ NOTE

Information on the configuration of the camera is provided in the associated terminal operating instructions.

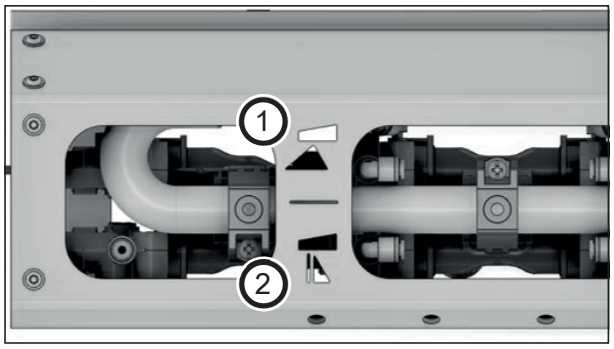
Wind meter (optional)

A wind meter can be mounted on the top side of the spraying mixture container. It provides current values on wind speeds. Drifting can thus be prevented to reach optimal treatment success of the crop protection measure.
The current values can be read on the terminal.

Wind meter (figure may differ depending on the machine variant)

Edge and border nozzles

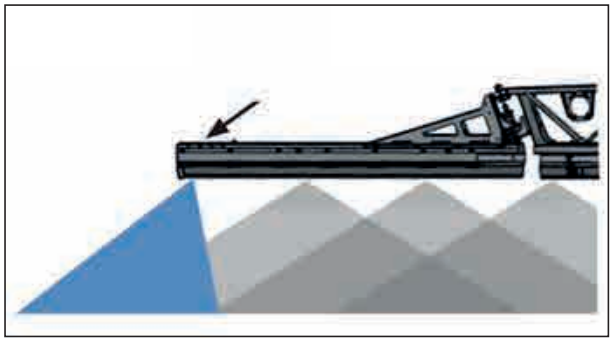
Each folding boom has a border and an edge nozzle. They are located 10 cm outside of the last main nozzle. This applies only to folding booms without PrecisionSpray.



Border or edge nozzle

1 Border nozzle
2 Edge nozzle

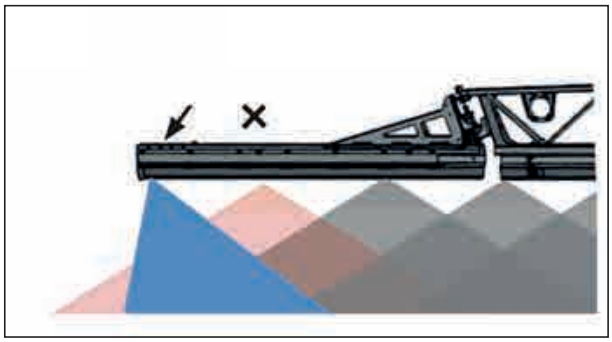
➢ A border nozzle can always be activated in addition via the terminal. All main and auxiliary nozzles remain in use.



Border nozzle

➢ If an edge nozzle is activated via the terminal,

- with 1-fold nozzle bodies, level 1 of the first or last main nozzle is switched off.
- with 2-fold nozzle bodies, levels 1 and 2 of the first or last main nozzle are switched off.
- with 4-fold nozzle bodies, levels 1 and 2 of the first or last main nozzle are switched off.



Edge nozzle

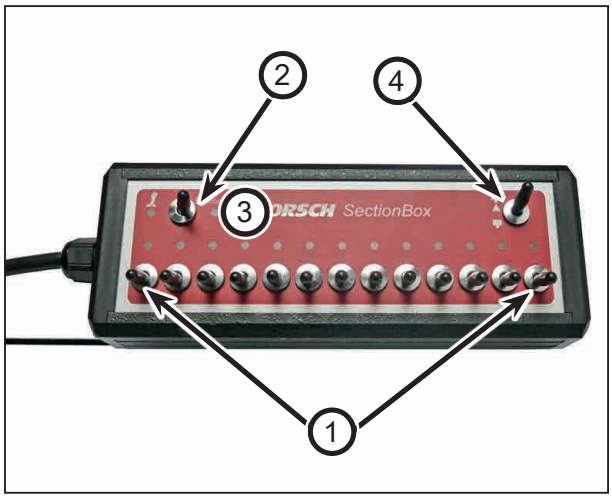
Example:
When an edge nozzle is activated, the first blue and the first yellow nozzle are automatically switched off.

SectionBox (optional)

The SectionBox is available in the versions with 13 or 18 switches. Border/edge nozzles or sections can be assigned to the switches (1).

The SectionBox can be used in addition to the multi-function handle or alone to operate the sections. The switch (2) allows switching between the input devices.

Active sections or border/edge nozzles can be identified by the illuminated LED of the respective switch (3).



HORSCH SectionBox, 13 sections

- ➢ When the main switch (4) is activated, all active sections or border/edge nozzles are enabled.
- ➢ If the main switch (4) is deactivated, all active sections or border/edge nozzles are in the *preselected* state.

Regarding the allocation of the respective sections or border/edge nozzles to the switches of the SectionBox, observe the associated terminal operating instructions.

Installation

The SectionBox can be mounted in two different variants:

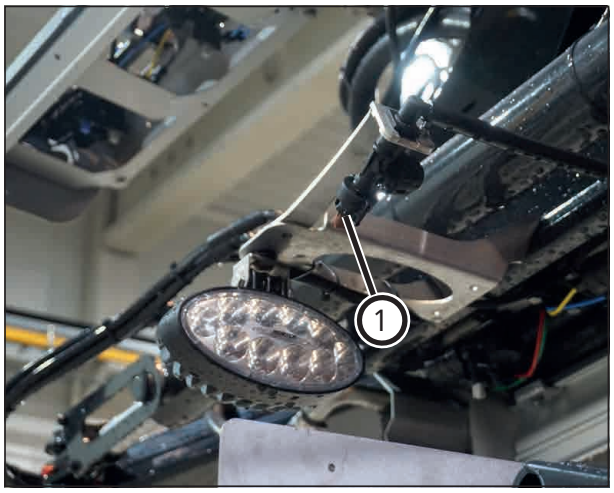
- with a sub-D connector for connection to the terminal
- with a CPC plug for connection to an in-cab socket

NOTE

- ➢ At the terminal the SectionBox must always be switched to AUX-N.
- ➢ The multi-function handle must always be configured to AUX2.
- ➢ For the combination terminal + SectionBox, the following connection sequence must be observed!
  1. ISOBUS
  2. SectionBox
  3. Multi-function handle
  4. Terminal

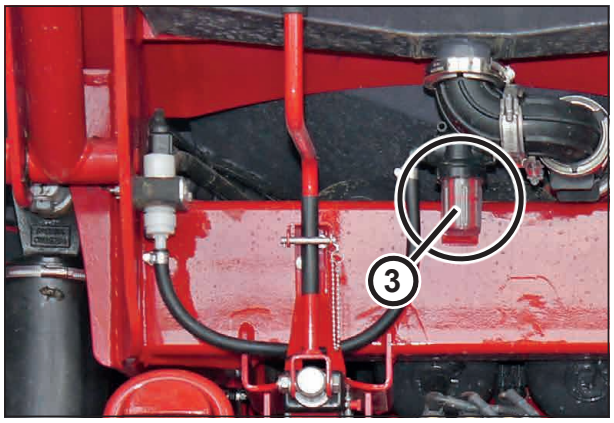
NightLight (optional)

Extremely bundled light (LED spotlight) to illuminate the spraying cones.
When the spraying process is switched off at the headland the lights are automatically cleaned by a washing facility (optional).
The LED spotlights are controlled via the terminal.



NightLight with cleaning nozzle

The cleaning cycle (optional) is activated automatically when switching off the nozzles (e.g. at the headland). At each cycle the pump (3) is activated for approx. 4 seconds and delivers approx. 0.4 litres of fresh water with 2.5 bar to the cleaning nozzle (1).

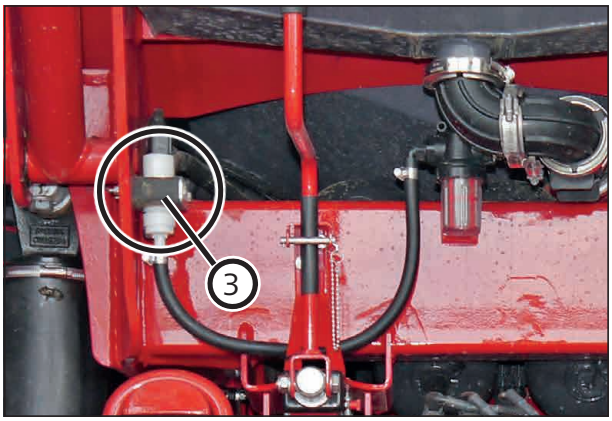


Filter NightLight cleaning (2)

The filter is located below the fresh water tank.

⚠ NOTE

Clean the filter as required.



Pump NightLight cleaning (3)

The pump is located at the undercarriage on the left machine side below the spraying mixture container between the pressure fitting and the travel axis of the crop protection sprayer.

⚠ NOTE

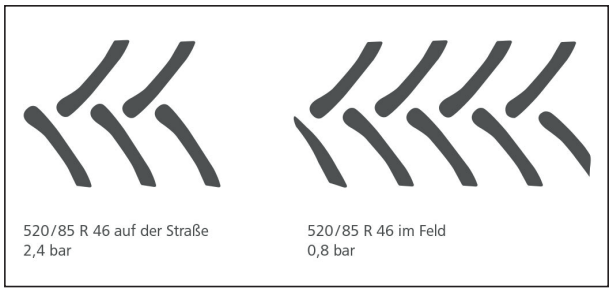
The cleaning cycle is also activated in the daytime when the NightLight is switched off. This avoids deposits on the spreading disc also during daytime.

Automatic Tyre Pressure Control (ATP) (optional)

The tyre pressure control system detects whether the machine is driving on the field or on the road or the filling level in the spraying mixture container. The tyre pressure and thus the tyre ground contact area is automatically adjusted to the respective requirement.

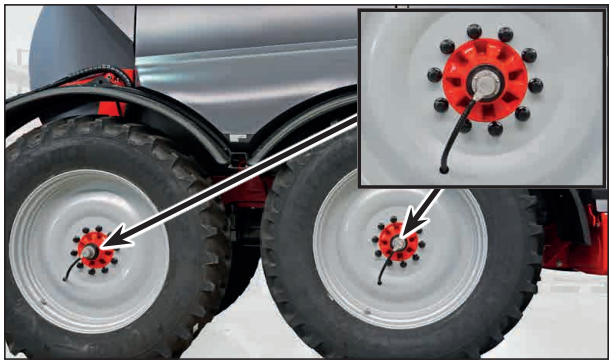
Road travel is done with high tyre pressure. The tyre ground contact area is small. This ensures good driving stability and low tyre wear.

At the field, the tyre pressure is lowered automatically and quickly. The tyre ground contact area is larger. This reduces the ground pressure.



Tyre ground contact area depends on the tyre pressure

The settings on the tyre pressure control system are made on the machine terminal. Refer to the pertaining terminal operating instructions.

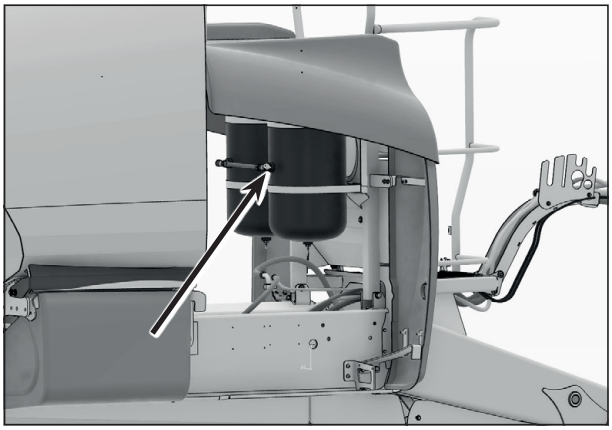


NOTE

The maximum settings on the compressed air controller of the control valve must not be changed. Danger of tyre exploding! Settings may only be made by the HORSCH service.

Maintenance

Two additional air reservoirs are installed for the tyre pressure control system. The air reservoirs are located in the front-end under the claddings. Open the cover flap on the right side for this purpose.

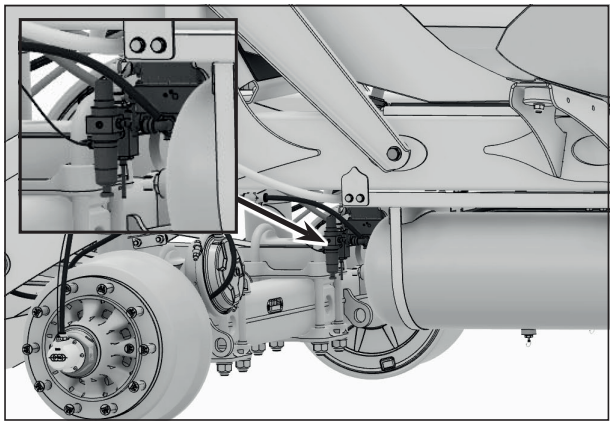


Air reservoir

The air reservoirs must be drained daily before starting work by operating the valve.

- Pull the drain valve until water stops running out from the air reservoir through the valve.
- In case of contamination unscrew the drain valve from the air vessel and clean the air vessel.

A control valve is located on the underside of the machine to which a service unit is attached. Drain the filter-regulator combination no later than every 100 operating hours or as needed by turning the grey drain plug.



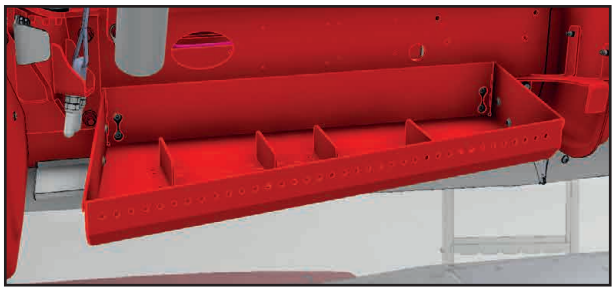
Filter-regulator combination

NOTE

Release the pressure before drainage!
When getting the machine ready for winter storage, check whether the water separator and the filter-regulator combination are empty. Drain them if necessary.
Drain the air vessels daily!

Pack storage (optional)

An optional pack storage can be installed at the right machine side under the covering. This is provided for the secure transport of crop protection agents.



Pack storage

WARNING

Transport crop protection agents only in tightly sealed and undamaged containers in the tray. Leaking containers may pollute the environment.

Operation

Whenever working on the machine pay attention to the associated safety notes in the chapter “Safety and prevention of accidents” as well as the accident prevention instructions!

Commissioning / Tractor change

During initial commissioning and when changing the tractor, the machine must be adapted to the tractor.

⚠WARNING

Dropping or lowering machine parts can cause severe crushing injuries etc.!

- ➢ Instruct persons to leave the danger zone.
- ➢ Comply with the accident prevention instructions.

Connecting/Parking

⚠DANGER

There is a risk that persons may become crushed and severely injured between machine and tractor!

- ➢ Instruct persons to leave the area between tractor and machine.

  No person must be present between machine and tractor when the tractor approaches the machine or moves away from it!

⚠DANGER

Danger of severe accidents when manoeuvring. Keep an eye on your environment.

- ➢ Keep persons (children) out of the manoeuvring range of the machine.

⚠ WARNING

Leaking hydraulic fluid can cause serious injuries! Danger of injury by unwanted machine movements.

- ➢ Connect and disconnect the hydraulic lines only when the hydraulics have been de-pressurized on both machine and equipment sides.

Connecting

The machine must be properly connected to a tractor before any machine movements.

⚠ DANGER

Serious accidents caused by the machine rolling away!

- ➢ Do not move the machine without a brake line connected.
- ➢ When connecting machines with pneumatic brake always connect the **yellow** connection (brake line) first.

⚠ NOTE

- ➢ Route cables, lines and hoses so that they will not be damaged during operation (when cornering).
- ➢ Check all plug-and-socket connections (hydraulic, electric and pneumatic) for cleanliness and firm seating.

  Dirty connectors will contaminate the flowing media. The connectors therefore become worn and this results in malfunctions and failures in the connected assembly groups.

1. Clean the towing facilities of machine and tractor and check for wear.
2. Drive the seed wagon up to the crop protection sprayer and engage the brake of the tractor. Secure the tractor against unintended starting and rolling.
3. Couple the machine.

   Machines with drawbar eye:
   - Adjust the height of the drawbar eye by cranking the support so that the machine can be picked up.
   - Engage the machine.
   - Insert the bolts and secure them.

   Machines with ball and socket coupling:
   - Lower the drawbar or spherical cap with the hydraulic support onto the ball.
   - Position the hold-down.
   - Check the gap between hold-down and spherical cap and adjust; see chapter *Maintenance overview*.
4. Connect hydraulic hoses, brake system lines and cables for lighting.
5. Connect the sprayer controls to the ISOBUS socket on the tractor.
6. Couple the propshaft to the PTO-shaft of the tractor. To do so, slide the propshaft over the PTO-shaft until it engages. Secure the propshaft guard against rotating along.
7. Lift the support foot to transport position. Pay attention to the chapter *Support*.
8. Remove the wheel chocks and insert them into the brackets provided and secure them.
9. Release the parking brake.
10. Check before starting to drive whether the machine has been properly connected and secured.

Connecting the hydraulics

- ➢ Connect the hydraulics only when the system has been de-pressurized on both tractor and machine sides. The hydraulic system is under high pressure.
- ➢ Escaping fluid can penetrate the skin and cause serious injuries. In the event of injury, consult a doctor immediately.

To rule out wrong connections, the plug-in couplings are marked.

- ➢ With all hydraulic movements, slow down the control unit before the machine components reach the stop position.

Transport position

⚠ WARNING

Danger of road accidents caused by losing the machine or machine parts.

- Lock the control units mechanically or electrically, depending on the version, during transport travel. Never switch them to the floating position.
- Check all interlocks before starting to drive.
- Check the service brake.
- Check whether all securing elements of the connection are in place as set correctly.
- Check components of the connection for wear.
- In regard to the ball and socket coupling follow the notes in the *Maintenance overview* chapter.

⚠ NOTE

- Make sure before driving on public roads that the machine meets all respective applicable national road traffic regulations.

⚠ NOTE

Check the following prior to road travel:

- the shut-off valve must be set to road travel.
- If equipped with an optional steering drawbar, it must be brought to the centre position and the road travel mode activated on the terminal. The bolt must be inserted and secured on the left side of the steering drawbar to lock the steering mechanically.
- the proper connection of the supply lines.
- the lighting system for damage, function and cleanliness
- the brake and hydraulic system for apparent defects.
- the function of the brake system.
- that the folding boom securely rests in the folding boom rest, the parallelogram and the slope compensation are locked.
- the overall machine for cleanliness.

⚠ WARNING

Danger of crushing, cutting, being caught, being pulled in and impact due to insufficient stability and tipping over.

- Adapt your travel mode so that you are able to safely manage the tractor with or without the connected crop protection sprayer at any time.

Be aware of your own abilities, account for the road, traffic, sight and weather conditions, the driving characteristics of the tractor and the influences of the towed machine.

Make the following additional adjustments before road transport:

- Check whether the illuviation valve has been swivelled to the transport position.
- The access ladder must be secured against unintentional dropping down.

Parking

DANGER

Serious accidents caused by the machine rolling away!

- ➢ Park the machine on a flat, paved surface.
- ➢ Secure the machine with wheel chocks before unhitching.
- ➢ When unhitching machines with pneumatic brake you must always disconnect the **red** connection (supply line) first.

WARNING

Risk of accident by uncoupling the crop protection sprayer with the folding boom unfolded!
Negative drawbar load can cause the machine to tip over!

- ➢ Always park the machine in transport position!

NOTE

- ➢ The must only be parked on a level and firm surface when loaded and, preferably, also when empty. Observe the load bearing capacity of the tyres in the section total weight and tyres.
- ➢ Clean the machine and prepare properly before parking it for an extended period; see chapter *Care and Maintenance.*

1. Position the machine at a suitable location and set the tractor brake.
2. Secure the machine with wheel chocks against rolling away.
3. Lower the support to the parking position. Pay attention to the chapter *Support*.
4. Pull or operate the parking brake.
5. Uncouple the propshaft from the PTO-shaft of the tractor and deposit it in the holder.
6. Unplug the brake lines, ISOBUS and lighting and hook in the bracket. Attach the covering caps.
7. Depressurise the hydraulic lines and disconnect them.
8. Unhitch the machine.

   Machines with drawbar eye
   - Position the drawbar using the hydraulic support to be able to release the bolt.
   - Release the bolt and move the machine to clear.

   Machines with ball and socket coupling
   - Release the hold-down.
   - Lift the drawbar with the hydraulic support until the ball has cleared.
9. Drain the air reservoir of the pneumatic brake system (option).

Manoeuvring the uncoupled machine

DANGER

Special caution must be exercised during manoeuvring work with released service brake system since the crop protection sprayer is now braked solely by the shunting vehicle.
The machine must be connected with the shunting vehicle before the releasing valve on the trailer brake valve is operated.
The shunting vehicle must be braked.

NOTE

If the air pressure inside the air reservoir drops below 3 bar (e.g. because of several actuations of the releasing valve or leakages in the brake system), the service brake system can no longer be released via the releasing valve.

1. Completely fill the air reservoir.
2. Connect the machine to the shunting vehicle.
3. Brake the shunting vehicle.
4. Remove the wheel chocks. Release the parking brake.

5. only for pneumatic brake system:

   Press in the button (service brake) on the releasing valve against the stop position.

   The service brake system releases and the machine can be manoeuvred.

   Once the manoeuvring process is finished, pull out the button (service brake) on the release valve to the stop position.
6. Brake the shunting vehicle once again after the manoeuvring process is finished.
7. Secure the machine with wheel chocks against rolling away. Apply the parking brake again.
8. Uncouple the machine and the shunting vehicle.

Folding the folding boom

⚠WARNING

Dropping or lowering machine parts can cause severe crushing injuries etc.!

- ➢ No persons may stay under raised machine parts!
- ➢ Order persons to leave the danger zone around the machine. Make sure before folding that no persons are present in the danger zone.
- ➢ Comply with the accident prevention instructions.

⚠ CAUTION

Damages to the machine and the supporting surface!

- ➢ Fold the machine only on a level and firm surface.

⚠ WARNING

Danger of crushing, being pulled in, being caught or impact for operator and third parties may arise if third parties remain in the operating range of the folding boom when unfolding or folding in the folding boom and are caught by the moving parts of the folding boom!
These hazards can cause severe and possibly also fatal injuries.
Keep a sufficient safety distance to moving parts of the machine as long as the engine is running.
Make sure that persons keep a sufficient safety distance to moving parts of the machine.
Order persons to leave the slewing range of the machine.
Immediately release the actuator for unfolding or folding in the folding boom, if a person enters into the slewing range of the folding boom.

⚠ DANGER

Always keep a sufficient distance to overhead power lines when unfolding or folding in the spraying boom! Contacting overheat power lines can cause fatal injuries.

⚠ WARNING

Avoid folding under high voltage power lines. When folding under high voltage power lines, the minimum distances between folding boom and the line must be observed during the folding process. The minimum distances to be observed are in accordance with national laws and guidelines in connection with the current strength of the overhead line.

⚠ CAUTION

There are shearing and crushing points on all hydraulically actuated folding components! Folding or unfolding the spraying boom while travelling is prohibited!
Only drive with the machine in locked transport position.

⚠ NOTE

The folding boom is controlled via the terminal. In folded and unfolded condition of the folding boom, the hydraulic cylinders for boom folding maintain the corresponding end position (transport and working position).

⚠ NOTE

The folding boom must be flushed through before folding it to avoid contamination of the machine. Check the diaphragm valve at regular intervals to prevent subsequent dripping of the nozzles. Refer to the section *Nozzle assembly and cleaning*.

⚠ NOTE

The folding process must be performed while the machine is at standstill since the folding boom may otherwise sustain damages.

⚠ NOTE

➢ Instructions for operating the terminal are included in the supplied operating instructions!

The folding boom is folded via the terminal. For this purpose access the *Folding* page.
Optionally, the folding boom can be folded using the multi-function handle.

Unfolding

1. Call up the folding menu on the terminal.
2. Select the Lift the Folding Boom function.
3. Lift the folding boom to the stop position.
4. Select the Unfold folding boom function.
5. Unfold the folding boom completely.
6. Select the Slope Compensation function.
7. The slope compensation is unlocked.

Folding

1. Call up the folding menu on the terminal.
2. Lift the folding boom to the stop position.
3. Select the Close Slope Compensation function.
4. The slope compensation is locked.
5. Select the Fold in Folding Boom function.
6. Fold in the folding boom completely.
7. Lower the folding boom until both halves of the folding boom are fully lowered in the rest and locked.

⚠ NOTE

➢ Move the machine to transport position before road travel, see *Transport position*.

Preparation for spraying operation

⚠ WARNING

Danger caused by accidental contact with crop protection agents / spraying mixture!

Wear personal protective outfit

- when preparing the spraying mixture.
- when cleaning / replacing spray nozzles.
- during all work for cleaning the crop protection sprayer after spraying operation.

When wearing the required protective outfit always follow the instructions of the manufacturer, the product information, the instructions for use, the safety data sheet or the operating instructions for the crop protection agent to be handled.

⚠ NOTE

Basic prerequisite for the proper application of crop protection agents is the proper function of the crop protection sprayer.

- The prescribed maintenance tasks and legal regulations on crop protection sprayers must be complied with. Rectify apparent faults immediately. Have the crop protection sprayer checked, as requested.
- Before starting with spraying check the following value on the control terminal:
  - The spraying pressure range defined on the terminal must agree with the permissible spraying pressure range of the spraying nozzles installed.
- Use all specified filters.
- Clean the filters at regular intervals.

  Trouble-free operation of the crop protection sprayer is only ensured with flawless filtration of the spraying mixture. Appropriate filtering considerably influences the treatment success of the crop protection measure.
- Pay attention to the permissible filter combinations or mesh sizes.

  The mesh sizes of pressure filters and nozzle filters must always be smaller than the nozzle opening of the nozzles used. Notes given by the manufacturer of the crop protection agent must be followed.

  The standard pressure filter element used in the pressure filter has a mesh size of 0.18 mm with 80 meshes/inch. This pressure filter element is adequate for a nozzle size from 02'.

  The pressure filter element with 100 meshes/inch is required for nozzle sizes '015' and '01' (optional equipment).
- Remember that the use of pressure filter elements with 100 meshes/inch will have the effect that with some crop protection agents active components may be filtered out. Contact the crop protection agent manufacturer in the respective case.
- Generally clean the crop protection sprayer before placing a different crop protection agent.
- Flushing nozzle line and nozzles:
  - with each nozzle change
  - before installing other nozzles
  - before turning the manual three-fold / five-fold nozzle head to another nozzle.
- Couple the crop protection sprayer properly to the tractor (see chapter *Connecting/Parking*).
- Take appropriate action if an error message appears in the display during spraying operation.
- Check the displayed spraying pressure during spraying operation.
- Make sure that the displayed spraying pressure does under no conditions deviate from the specified spraying pressure from the spraying table by more than ±25%, e.g. when changing the application quantity
- More significant deviations from the specified spraying pressure will adversely affect the optimal treatment success of the crop protection measure and/or cause environmental damage.
- Reduce or increase the travel speed, until the permissible spraying pressure range (of the intended spraying pressure) is reached again.

Preparing the spraying mixture

⚠ DANGER

Danger caused by accidental contact with crop protection agents and/or spraying mixture!
When preparing spraying mixture there is the highest risk of coming into contact with crop protection agent.

- Use the stipulated protective outfit!
- Follow the notes of the crop protection agent manufacturer.
- Observe the national and country-specific regulations and standards (e.g. water protection areas).

- Generally flush the crop protection agents through the illuviation valve into the spraying mixture container.
- Swing the illuviation valve to filling position, before crop protection agent is filled into the illuviation valve.

⚠ NOTE

To reduce the filling height, the machine can be lowered to the transport position via two buttons on the terminal. Follow the Terminal operating instructions. Return the suspension to the starting position after filling.

- Follow the safety regulations when handling crop protection agents and when preparing the spraying mixture: Read the instructions for use for the crop protection agent.
- Do not prepare the spraying mixture in the vicinity of wells or surface waters.
- Avoid leakages and contamination with crop protection agents and / or spraying mixture by acting appropriately and by wearing appropriate body protection.
- Do not leave the prepared spraying mixture, unused crop protection agent, uncleaned crop protection agent canisters and the uncleaned crop protection sprayer unattended to avoid dangers to other persons.
- Protect contaminated crop protection agent canisters and the contaminated crop protection sprayer against precipitation.
- Ensure sufficient cleanliness during and after spraying mixture preparation to keep the risks as low as possible (e.g. thoroughly wash off and dispose of used gloves. Dispose of washing water and cleaning fluid in a proper manner).

⚠ NOTE

Besides the generally valid information listed hereunder, you should also follow the product-specific procedures described in the instructions for use of the crop protection agents!

- Pay attention to the prescribed water and preparation application quantities as per instructions for use for the crop protection agent.
- Follow the instructions for use for the preparation and the specified precautions!
- Carefully determine the required filling or refill quantities to avoid residual quantities, because an environmentally friendly disposal of residual quantities is very difficult.

  Use the “Filling table for residual areas” to calculate the required refill quantity for the last spraying mixture container filling. In this case subtract the technical, undiluted residual quantity in the spraying boom from the calculated refill quantity.
  - In this context see chapter “Filling table for residual areas”
- Thoroughly rinse emptied preparation containers (e.g. with canister flushing agent) and mix in the flushing water to the spraying mixture!

General procedure

1. Determine the required water and preparation application quantity as per instructions for use for the crop protection agent.
2. Calculate the filling or refill quantity for the area to be treated.
3. Fill half of the spraying mixture container with water.

4. Switch on the agitator.
5. Add the calculated preparation quantity.
6. Top up the water shortfall.
7. Before starting the spraying operation stir up the spraying mixture as instructed by the crop protection agent manufacturer.

Calculating filling / refill quantities

NOTE

Use the “Filling table for residual areas” (chapter 8.2.2) to calculate the required refilling quantity for the last spraying mixture container filling.

Example 1: Filling quantities

The following is known:
Rated tank volume 1000 l
Residual quantity in tank0 l
Required water 400 l/ha

Required amount of chemical per ha
Product A 1.5 kg
Product B 1.0 l

Question:

How many l of water, how many kg or product A and how many l of product B do you have to fill in, if the area to be treated is 2.5 ha?

Calculation formula and solution

Component [quantity/ha] x area [ha]

= required quantity [l] or [kg]

Water: 400 l/ha x 2.5 ha = 1000 l
Product A: 1.5 kg/ha x 2.5 ha = 3.75 kg
Product B: 1.0 l/ha x 2.5 ha = 2.5 l

Example 2: Addition of product, area

The following is known:
Rated tank volume 1000 l
Residual quantity in tank200 l
Required water 500 l/ha
Recommended concentration0.15 % l/l or kg/l

Question 1:

How many l or kg preparation must be metered for one container filling?

Calculation formula and answer to question 1:

Water refill quantity [l] x concentration [%]

100

= product addition [l] or [kg]

(1000-200) [l] x 0.15 [%]

100

= 1.2 [l] or [kg]

Question 2:

What is the area in hectares that can be treated with one tank filling, if the tank can be sprayed empty to a residual quantity of 20 l?

Calculation formula and answer to question 2:

Available amount of chemical [l] – Residual quantity [l]

Required water [l/ha]

= area [ha]

1000 [l] (rated volume) – 20 [l] (residual quantity)

500 [l/ha] (required water)

= 1.96 [ha]

Filling table for residual areas

NOTE

- Use the “Filling table for residual areas” to calculate the required refill quantity for the last spraying mixture container filling.
- Subtract the residual quantity in the spraying line from the calculated refill quantity!
  - See also chapter “Spraying line”.
- The specified refill quantities apply for an application quantity of 100 l/ha.
- For other application quantities the refill quantity may multiply.

Refill quantity [l] for spraying boom:

Working width [m] / Travel distance [m]	24 m	27 m	28 m	30 m	32 m	33 m	36 m	38 m	39 m	40 m	42 m	44 m	45 m
10	2	3	3	3	3	3	4	4	4	4	4	4	5
20	5	5	6	6	6	7	7	8	8	8	8	9	9
30	7	8	8	9	10	10	11	11	12	12	13	13	14
40	10	11	11	12	13	13	14	15	16	16	17	18	18
50	12	14	14	15	16	17	18	19	20	20	21	22	23
60	14	16	17	18	19	20	22	23	23	24	25	26	27
70	17	19	20	21	22	23	25	27	27	28	29	31	32
80	19	22	22	24	26	26	29	30	31	32	34	35	36
90	22	24	25	27	29	30	32	34	35	36	38	40	41
100	24	27	28	30	32	33	36	38	39	40	42	44	45
200	48	54	56	60	64	66	72	76	78	80	84	88	90
300	72	81	84	90	96	99	108	114	117	120	126	132	135
400	96	108	112	120	128	132	144	152	156	160	168	176	180
500	120	135	140	150	160	165	180	190	195	200	210	220	225

Example: Refill quantity

Remaining residual distance: 100 m
Application quantity: 100 l/ha
Working width: 21 m
Residual quantity in spraying line: 5.2 l

1. Use the filling table to calculate the refill quantity.

   In the example the refill quantity is 21 l.

2. Subtract the residual quantity in the spraying line from the calculated refill quantity.

   Required refill quantity: 21 l - 5.2 l = 15.8 l

Filling with water

NOTE

When filling, pay attention to the permissible payload of your crop protection sprayer!

When filling the crop protection sprayer you must strictly consider the different specific densities [kg/l] of the individual fluids!

Fluid	Density [kg/l]
Water	1
Carbonyl diamide	1.11
Ammonium nitrate - carbonyl diamide solution	1.28
NP-solution	1.38

Example: With 4000 l ammonium nitrate - carbonyl diamide solution the spraying mixture container is filled with a mass of 4000 l x 1.28 kg/l = 5120 kg!

WARNING

Danger to persons / animals due to accidental contact with spraying mixture when filling the spraying mixture container!

- Wear your personal protective outfit when processing crop protection agents or draining spraying mixture from the spraying mixture container.

  The required personal protective outfit depends on the information of the manufacturer, the product information, the instructions for use, the safety data sheet or the operating instructions for the crop protection agent to be used.
- Before each filling check the crop protection sprayer for damage, e.g. leaking tanks and hoses as well as the correct positioning of all operating elements.
- Never leave the crop protection sprayer unattended during filling.
- Never exceed the rated volume when filling the spraying mixture container.
- Never exceed the permissible payload of the crop protection sprayer when filling the spraying mixture container.
- Pay attention to the specific weight of the fluid to be filled in.
- When filling keep an eye on the level gauge to avoid overfilling of the spraying mixture container.
- When filling the spraying mixture container pay attention to sealed surfaces, so that no wash runs into the sewer system.
- No foam should escape from the spraying mixture container during filling.

  A large cross-section funnel that reaches down to the bottom of the spraying mixture container, most effectively prevents the formation of foam.

  Adding an anti-foaming agent will also prevent the formation of foam in the spraying mixture container.
- When filling the spraying mixture container do not make a direct connection between the filling hose and the contents in the spraying mixture container!

  Only this prevents back siphoning or back pressing of spraying mixture into the drinking water line.
- Fasten the end of the filling hose at least 10 cm above the filling opening in the spraying mixture container.

  The free outflow created this way offers the highest level of safety against the back flow of spraying mixture into the drinking water line.
- Fill the spraying mixture container only with the filling screen in place.

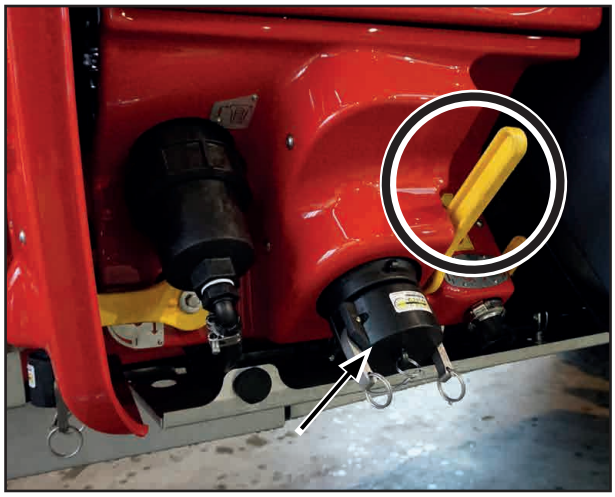
NOTE

Filling at the edge of the field is permitted only under certain conditions. Filling in water protection zones is not permitted, depending on the crop protection agent used! Inquire with the “Water board” to be on the safe side!

Filling the spraying mixture container through the filling port

Pay attention to the applicable regulations for filling the spraying mixture container through the suction hose from open water taps. (See also the chapter “working with the machine”).

- ➢ Always keep an eye on the level gauge while filling.
- ➢ Stop filling the spraying mixture container at the latest
  - • when the filling limit is reached.
  - • before the permissible payload of the crop protection sprayer is exceeded by the filled in amount of fluid.



Filling connection for spraying mixture container

Machines of the CCS Pro variant:

1. Enter the desired container content in the terminal.
2. Connect the suction hose to the filling connection.
3. Open the filler valve.
4. Start the filling process via the external control terminal.
5. The suction fitting switches off automatically when the desired filling level is reached.

   The filling process can be aborted at any time.
6. Using the *Pulling suction* function on the external control terminal, the supply line to the filling valve can be sucked empty.
7. Close the filling valve.
8. Uncouple the suction hose.
9. Close the connection with the cap.

Direct filling / External filling (optional)

At the direct filling connection fluid from an external tank can be pressed directly into the solution tank.

⚠ NOTE

Danger caused by overfilling the spraying mixture container. No automatic shut-down when the tank is full!

- ➢ Pay attention to the max. permissible flow rate. This must not exceed 1000 l/min.

Direct filling connection

- ➢ The procedure for direct filling is the same for all machine variants!

1. Connect the filling hose.
2. Open the filler valve.

3. Fill the spraying mixture container.
   - ➢ Watch the level gauge! No automatic shut-down when the tank is full!
4. Close the filling valve.
5. Uncouple the hose.
6. Close the connection with the cap.

Filling via the filling dome

⚠ NOTE

Danger caused by overfilling the spraying mixture container. No automatic shut-down when the tank is full!

1. Determine the exact filling quantity. Refer to the chapter “Calculating filling/refill quantities”.
2. Open the lid of the filling dome from the platform.
3. Fill the spraying mixture container through the filling opening using a water line with “free outflow”.
4. Always keep an eye on the level gauge on the terminal while filling.
5. Stop filling the spraying mixture container at the latest
   - ➢ when the filling limit is reached.
   - ➢ before the permissible payload of the crop protection sprayer is exceeded by the filled in amount of fluid.
6. Close the lid of the filling dome from the platform.

⚠ NOTE

The dome screen must be checked daily and cleaned as necessary!

Filling dome

Dome cleaning nozzle

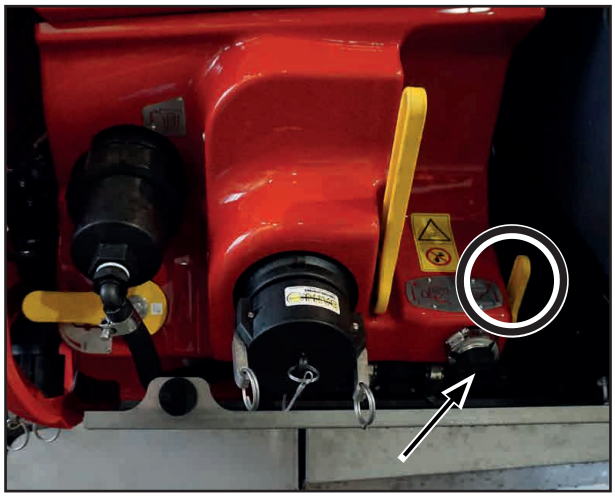
Filling the fresh water tank through the filling port

⚠ WARNING

Avoid impermissible contamination of the fresh water tank with crop protection agent or spraying mixture!

⚠ NOTE

Fill the fresh water tank only with clear water, never with crop protection agent or spraying mixture!



Filling connection for fresh water tank

1. Connect the filling hose.
2. Open the filler valve.
3. Fill the fresh water tank.
   - ➢ Watch the level gauge! No automatic shut-down when the tank is full!
   - ➢ On machines of the CCS Pro variant the filling level can be read on the external control terminal.
4. Close the filling valve.
5. Uncouple the hose.
6. Close the connection with the cap.

Always have a sufficient amount of fresh water on board when using the crop protection sprayer. When filling the spraying mixture container check and refill also the fresh water tank.

Illuviation of preparations

Illuviation valve

⚠ DANGER

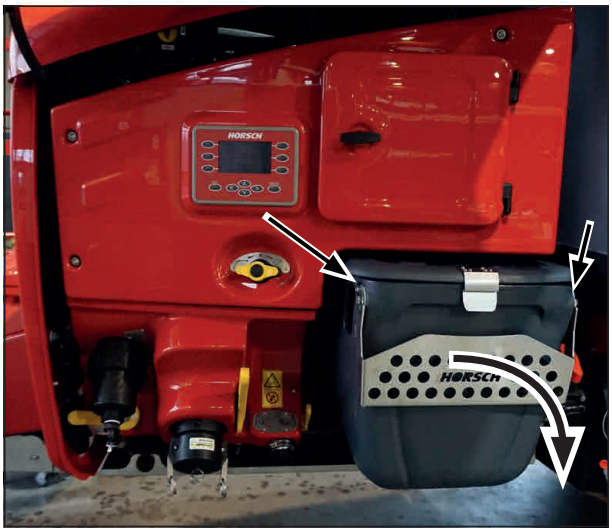
Wear appropriate protective clothing for the illuviation flush in the preparations.
Observe the regulations and notes as well as the safety data sheet of the crop protection agent manufacturer!

⚠ NOTE

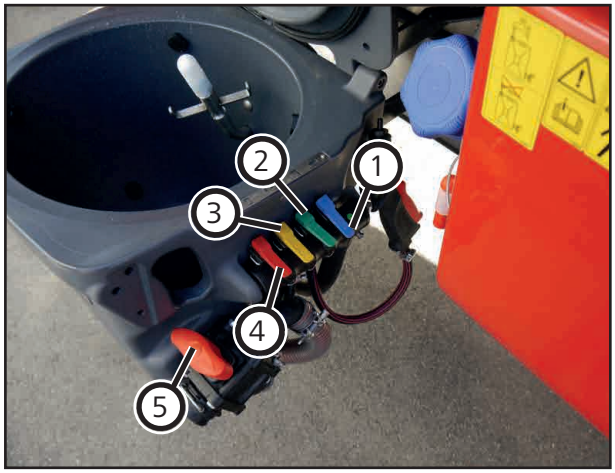
After the preparations have been illuviated, stirring must be carried out for at least 5 minutes, or longer depending on the preparations, with the *Agitator max. stirring* stage in order to achieve homogeneity in both tanks.

The agitator normally remains switched on from filling to the end of spraying.
The information provided by the preparation manufacturer are decisive in this respect.

Crop protection agent and carbonyl diamide are poured into the illuviation valve, dissolved and drawn in.
Swing the illuviation valve down by pulling it by the handle.



Flush the respective preparation through the illuviation valve into the water of the spraying mixture container. A difference is in this case made between the illuviation of fluid and powdery preparations or carbonyl diamide.



1 Activate/deactivate the canister flushing

2 Activate/deactivate the washing gun

3 Activate/deactivate the shock nozzle (only with illuviation valve from stainless steel)

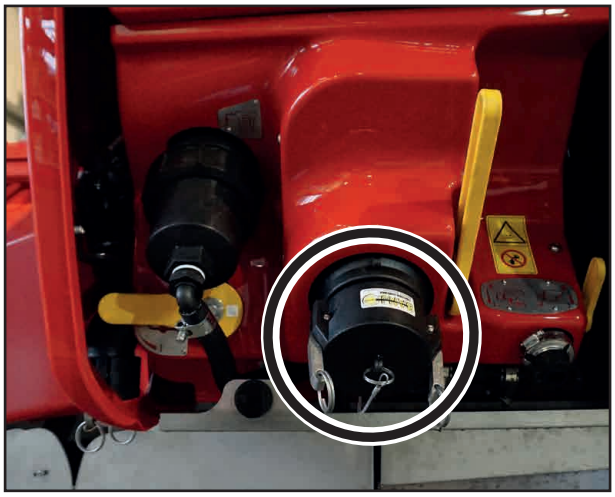
- for illuviation valve with plastic funnel: A rinsing nozzle is activated in the lower area of the valve.
- for illuviation valve with stainless steel funnel: Two rinsing nozzles and the shock nozzles in the lower area of the valve are activated.

4 Activate/deactivate closed circuit flushing

5 Switch-over ball valve sucking-off / Ecofill

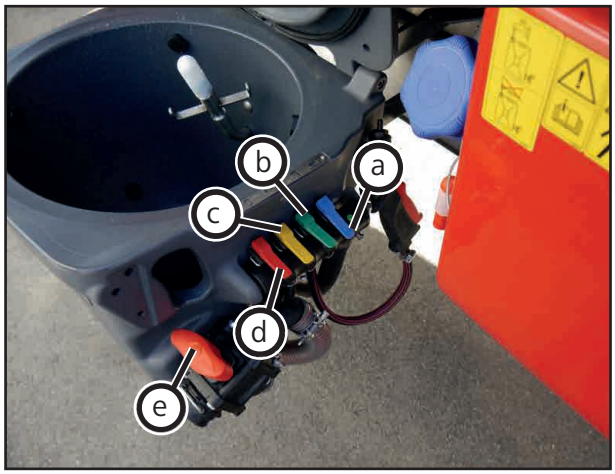
Flushing in liquid preparations during the filling process on machines of the CCS Pro variant

1. Enter the desired container content in the terminal
2. Connect the suction hose to the filling connection.



Filling connection

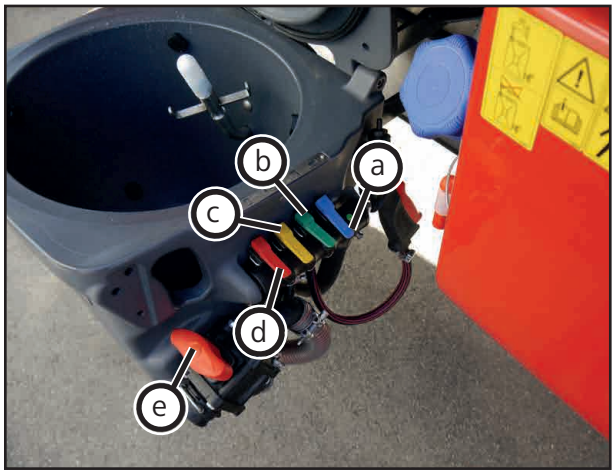
3. Start filling via terminal.
4. Switch on the illuviation valve on the terminal.
5. Open the lid on the illuviation valve.
6. Fill the preparation quantity calculated and measured for filling the tank into the illuviation valve.
7. Turn the switch-over ball valve (e) to the position for sucking-off. Have the content completely sucked off from the illuviation valve.
8. Close the switch-over ball valve (e) again. The process may need to be repeated if the required preparation could not be filled in during a single process.
9. Pre-clean the illuviation valve with the closed circuit flushing (d).
10. Open the switch-over ball valve and have the contents sucked off.
11. Close the switch-over ball valve (e) again.
12. Switch off the illuviation valve on the terminal.
13. Top up the water shortfall.
14. Adjust the desired agitator power.



At the beginning of the filling process the water sucked in through the suction hose is applied to the illuviation valve.
Once the desired tank contents is reached, the suction valve will automatically switch over to the spraying mixture container. Chemical is then present at the illuviation valve.

Use the washing gun to remove any residues from the illuviation valve. Pull lever (b) and operate the gun to do so.
Make sure that no undesired point-type entries of preparation are generated!

Flushing in liquid preparations for full or partly filled spraying mixture container on machines of the CCS Pro variant



1. Open the lid on the illuviation valve.
2. Switch on the illuviation valve on the terminal.
3. Fill the required preparation quantity as calculated for filling the tank into the illuviation valve.
4. Turn the switch-over ball valve (e) to the position for sucking-off. Have the content completely sucked off from the illuviation valve.
5. Close the switch-over ball valve (e) again. The process may need to be repeated if the required preparation could not be filled in during a single process.
6. Pre-clean the illuviation valve with the closed circuit flushing (d).
7. Open the switch-over ball valve and have the contents sucked off.
8. Clean the illuviation valve with the washing gun.
9. Close the switch-over ball valve (e) again.
10. Switch off the illuviation valve on the terminal again.
11. Adjust the desired agitator power.

Illuviation of powdery preparations and carbonyl diamide on machines of the CCS Pro variant

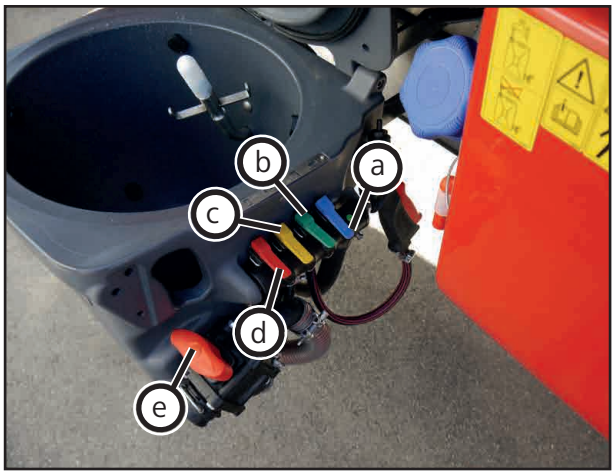
⚠ NOTE

Exercise particular caution when handling powdery preparations or carbonyl diamide! Strictly wear protective outfit and face protection!

Before spraying completely dissolve the carbonyl diamide by the activated agitator. When dissolving larger carbonyl diamide quantities the temperature of the spraying mixture will drop considerably, this dissolves the carbonyl diamide much slower. The warmer the water, the quick and better the dissolving of carbonyl diamide.

1. Fill the spraying mixture container with approx. 500 litres of water.
2. Switch on the illuviation valve on the terminal.
3. Open the lid on the illuviation valve.
4. Turn the switch-over ball valve (e) to the position for sucking-off.
5. Switch on closed circuit flushing (d).
6. Switch on the shock nozzle (c) (only for illuviation valve from stainless steel).
7. Fill the preparation quantity calculated and measured for filling the tank into the illuviation valve.
8. Clean the illuviation valve with the washing gun.
9. Close the switch-over ball valve (e) again.
10. Switch off the illuviation valve on the terminal again.
11. Top up the water shortfall.
12. Adjust the desired agitator power.

Pre-cleaning the canister with spraying mixture



1. Open the lid on the illuviation valve.
2. For machines of the CCS Pro variant: Switch on the illuviation valve on the terminal; the spraying pump starts automatically.

   For machines of the CCS variant: Set the ball valve on the suction side to *spraying mixture container* and the ball valve on the pressure side to *illuviation valve*. Switch on the pump on the external control terminal Mini.

   For machines of the ECO variant: Set the ball valve on the suction side to *spraying mixture container* and the ball valve on the pressure side to *illuviation valve*. Switch on the PTO-shaft.
3. Set the switch-over ball valve (e) to sucking-off.
4. Switch on canister flushing (a).
5. Put the canister or any other container over the canister flushing facility and press it down for at least 30 seconds. Turn the containers during this process.
6. Switch off canister flushing again (a).
7. Close the switch-over ball valve (e) again.
8. For machines of the CCS Pro variant: Switch off the illuviation valve on the terminal.

⚠ NOTE

Water or chemical emerges from the canister flushing nozzle when the pressure plate is pressed down.

Canister cleaning with fresh water

NOTE

Cleaning the canisters with flushing water dilutes the spraying mixture concentration!

1. Open the lid on the illuviation valve.
2. For machines of the CCS Pro variant: To be able to use clean water for illuviation, the Recirculate fresh water function on the terminal and the illuviation valve must be activated.
   - ➢ Switch on the illuviation valve on the terminal. The spraying pump starts automatically.
3. Set the switch-over ball valve (e) to sucking-off.
4. Switch on canister flushing (a).
5. Put the canister or any other container over the canister flushing facility and press it down for at least 30 seconds. Turn the containers during this process.
6. Switch off canister flushing again (a).
7. Close the switch-over ball valve (e) again.
8. For machines of the CCS Pro variant: Deactivate the Recirculate fresh water function and switch off the illuviation valve on the terminal.

NOTE

Water or chemical emerges from the canister flushing, when the pressure plate is pressed down.

Empty preparation containers

- ➢ Thoroughly wash out empty preparation containers, make them unusable, collect then and dispose of according to regulations. Do not use for other purposes.
- ➢ If only spraying mixture is available for cleaning the preparation containers, you should just use this for preliminary cleaning.

  Thoroughly clean if clear water is available, e.g. before preparing the next spraying mixture container filling or when diluting the residual quantity for the last spraying mixture container filling.

Spraying operation

Special notes for spraying operation

- ➢ Check the crop protection sprayer by volumetric measurement
  - before the start of the season.
  - in case of deviations between the actually displayed spraying pressure and the spraying pressure required according to the spraying table.
- ➢ Before starting the spraying operation exactly determine the necessary application quantity by using the instructions for use issued by the crop protection agent manufacturer.
- ➢ Enter the required application quantity (nominal quantity) into the terminal before starting spraying operation.
- ➢ Strictly adhere to the required application quantity [l/ha] during spraying operation,
  - to achieve an optimal treatment success with this crop protection measure.
  - to avoid unnecessary impact on the environment.
- ➢ Choose the required nozzle type from the spraying table before starting spraying – under due consideration
  - of the intended travel speed.
  - of the required application quantity.
  - of the required atomizing characteristic (fine, medium or large drops) of the crop protection agent used for the crop protection measure to be carried out.
  - of recommended distances.
    - ➢ See also chapter “Nozzle selection”.
- ➢ Choose the required nozzle size from the spraying table before starting spraying – under due consideration
  - of the intended travel speed.
  - of the required application quantity.
  - the planned spraying pressure.
    - ➢ See also chapter “Nozzle selection”.

- Choose a slow travel speed and a low spraying pressure to prevent losses by windward drifting!
  - See also chapter “Nozzle selection”.
- Apply additional measures for windward drift reduction at wind speeds of 3 m/s.
  - See chapter “Measures for windward drift reduction”.
- Refrain from treatments at average wind speeds in excess of 5 m/s (leaves and small twigs are moving).
- Switch spraying on and off only when driving to avoid overdosing.
- Avoid overdosing caused by overlapping
  - in case of inaccurate joining passes from one spraying track to the next and/or
  - when cornering at the headland with spraying boom switched on!
- During spraying operation keep an eye on the actual spraying mixture consumption in relation to the treated area. In case of discrepancies between the actual and the displayed placing quantity calibrate the flow meter.
  - Teach procedures must be carried out by HORSCH service staff.
- In case of deviations between the actual and the displayed distance calibrate the position sensor (pulses per 100 m). This activity should always be executed in the field.
  - Teach procedures must be carried out by HORSCH service staff.
- In case of weather related interruptions of spraying operation it is mandatory to clean filters, pump, fitting and spraying lines!

Folding boom control

⚠ WARNING

Danger of crushing and impact for persons staying in the danger zone when lifting or lowering for height adjustment of the spraying boom!

Instruct persons to leave the danger zone around the machine before lifting or lowering the spraying boom by means of the height adjustment.

⚠ NOTE

Adjust the spraying height (distance between nozzles and crop) as per currently applicable guidelines.

Always adjust the spraying boom parallel to the ground, because the specified spraying height can only be achieved in this condition.

Spraying pressure, nozzle size, placing quantity, travel speed, agitator

Should the spraying pressure drop considerably all of a sudden, the spraying mixture container is empty.

Should the spraying pressure drop under otherwise unchanged conditions, the suction or pressure filters are blocked.

Spraying pressure and nozzle size have an influence on the drop size and the sprayed out fluid volume.
The higher the spraying pressure, the smaller the drop diameter of the sprayed spraying mixture. The smaller droplets are subject to higher, undesired windward drift!

- Increasing the spraying pressure also increases the placing quantity.
- Decreasing the spraying pressure also reduces the placing quantity.

Increasing the travel speed while leaving both nozzle size and spraying pressure unchanged, reduces the placing quantity.

Reducing the travel speed while leaving both nozzle size and spraying pressure unchanged, increases the placing quantity.

The travel speed is freely selectable, based on the automatic, area related placing quantity control via the spraying computer.

The agitator normally remains switched on from filling to the end of spraying. The information provided by the preparation manufacturer are decisive in this respect.

Example:

Required application quantity:	200 l/ha
Intended Travel speed:	8 km/h
Nozzle type:	AI / ID
Nozzle size:	03
Permissible pressure range of the installed spraying nozzles:	3 bar (min.) - 8 bar (max.)
Intended spraying pressure:	3.7 bar
Permissible spraying pressures:	3.7 bar ±25% 2.8 bar (min.) - 4.6 bar (max.)

Spraying

1. Switch on the terminal.
2. Adjust the agitator.
3. Prepare the spraying mixture as specified by the crop protection agent manufacturer and stir it up.
4. Unfold the spraying boom.
5. Set the working height of the spraying boom (distance between nozzles and plants) in dependence of the nozzles used according to the spraying table.
6. In the terminal check the value “min. pressure” and “max. pressure” for the permissible spraying pressure range (for the installed spraying nozzles).
7. Enter the value for “Nominal quantity” for the required application quantity into the terminal or check the stored value.
8. Switch on spraying via the terminal.

➢ For more information on the adjustment of parameters, refer to the HORSCH Terminal operating instructions.

NOTE

Comply with the applicable country specific regulations! Comply with regulations concerning the distance to waters and adjacent areas!

Travelling to the field with the agitator switched on:

➢ Switch on the agitator via the terminal and adjust the intensity.

The required agitating power depends on the preparations used and must be checked by the user.

After filling the agitator may be set to maximum intensity to avoid separation during longer transport travels!

Before starting spraying operation you should reset the stirring intensity you had set for travelling, if it deviates from the stirring intensity required for spraying!

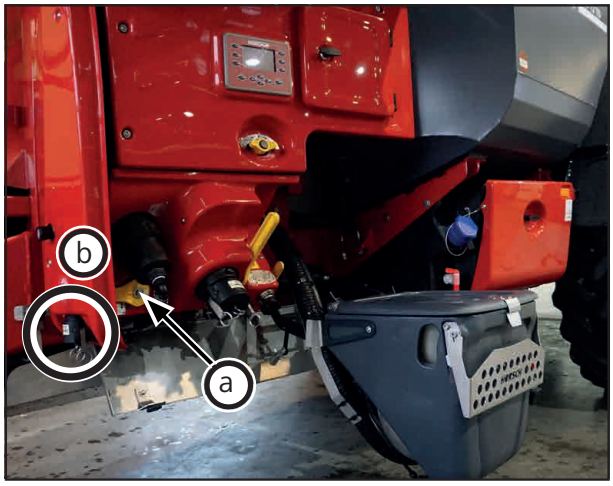
Measures for windward drift reduction

- Schedule your work for early morning or evening (generally less wind).
- Reduce the spraying pressure.
- Choose bigger nozzles and high water application quantities.
- Strictly maintain the exact folding boom working height, because the risk of windward drift will increase considerably with increasing nozzle distance.
- Reduce the travel speed (below 8 km/h).
- Use of so-called antidrift (AD) nozzles or injector (ID) nozzles (nozzles with a high proportion of coarse drops).
- Follow the distance instructions for the corresponding crop protection agent.

Spraying with 25 cm nozzle spacing and reduced target area distance

- The risk of windward drifting can be considerably reduced by reducing the target area distance to less than 50 cm.
- This reduction of the target area distance is only possible with a continuous 25-cm nozzle pitch. Otherwise there is danger of strip formation caused by non-existing overlap of the spraying cones.
- A distance reduction is only possible if all nozzles used at a time are of the same type and the same size.
- The minimum target area distance corresponds with half the minimum target area distance for a corresponding 50 cm nozzle pitch.
  - see nozzle manufacturer's data

Draining the spraying mixture container via the pressure output



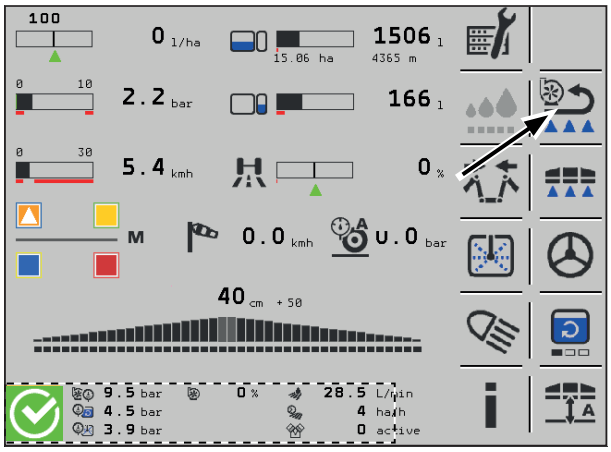
(a) Ball valve for pressure output
(b) Pressure output

1. Couple a discharge hose with 2” Camlock coupling on the pressure output (b).
2. Open the ball valve (a).

NOTE

Drainage output can be controlled with the ball valve (a).
If the valve is fully open, the spraying pump delivers with full output via the pressure output.

3. Switch on the circulation on the terminal.



Control screen terminal - circulation

4. After drainage switch off the circulation to shut off the pump.
5. Close the ball valve (a) and remove the discharge hose.
6. Close the pressure output (b) with the cap.

Faults

⚠ WARNING

Danger of crushing, shearing, cutting, cutting off, being caught, winding up, being pulled in and impact caused by

- accidental lowering of lifted, unsecured machine parts.
- accidental starting and unintended rolling of the tractor/machine combination.

Secure the tractor combination against unintended starting and accidental rolling away before faults on the machine can be rectified. Wait until the machine has come to a halt before entering the danger zone.

Fault	Cause	Remedy
The pump does not prime.	Blockage in the suction side (suction hose) / fitting	Remove the blockage.
	Pump draws in air.	• Check the hose connection on the suction hose for leakage. • Drain valve on suction filter open. • Suction filter housing leaking.
Pump does not generate any power.	Jammed or damaged ball valves.	Replace the ball valves.
	Pump draws in air, noticeable air bubbles in the spraying mixture container.	Check the hose connections on the suction hose for leak tightness.
Wobbling of the spraying cone	Irregular fluid flow from the pump.	Check valves on suction and pressure side, replace if necessary.
The required and entered application quantity is not reached.	High travel speed; low pump drive speed	Reduce the travel speed and increase the pump drive speed, until both the error message and the audible warning disappear.
	Clogged nozzles / nozzle filter or suction filter / pressure filter	Clean nozzles / nozzle filters with compressed air. For this purpose unscrew the nozzles and blow them out with a compressed air gun (on the boom middle section). In case of frequent appearance check the suction filter / pressure filter.
The permitted spraying pressure range of the installed spraying nozzles is not complied with.	Changed specified travel speed which affects the spraying pressure.	Change the travel speed to reach the travel speed range that has been determined for spraying operation.
The spraying pressure does not maintain the nominal value.	Spraying pressure too low	• Cleaning the filter. • Increase the engine speed.
Main cleaning process stops at internal cleaning.	Manual switch-over ball valve internal/outside cleaning set to outside cleaning.	Switch valve to internal cleaning.

Nozzle selection

NOTE

For the selection and use of nozzles you should also follow the data and recommendations of the respective nozzle manufacturer!

General

This chapter describes two possibilities for determining the appropriate nozzles and their characteristics as per ISO 10625.

NOTE

All application quantities (in l/ha) mentioned in the spraying tables apply for **water.**
For liquid fertiliser these application quantities must first be converted:
For conversion to ammonium nitrate - carbonyl diamide solution multiply the application quantity with 0.88.
For conversion to NP-solution multiply the application quantity with 0.85.

H_2O $\underset{\text{x 1.14}}{\overset{\text{x 0.88}}{\rightleftharpoons}}$ Ammonium nitrate - carbonyl diamide solution

H_2O $\underset{\text{x 1.18}}{\overset{\text{x 0.85}}{\rightleftharpoons}}$ NP-solution

The diagram (a) serves the purpose of selecting the suitable **nozzle type**.
The nozzle type is determined by

- the intended travel speed
- the required application quantity
- the required atomizing characteristic (fine, medium or large drops) of the crop protection agent used for the crop protection measure to be carried out.

The universal table (b) serves the purpose of determining

- the **nozzle size**
- the required **spraying pressure**
- the required individual nozzle output for volumetric measurement of the crop protection sprayer.

Procedure

- The tables apply to 50 cm nozzle spacing.
- Nozzle sizes and colour coding acc. to ISO 10625

With diagram and universal table

1. Determine application quantity, travel speed and atomizing characteristic.

   Nozzle type ⟶ diagram (a):
2. Determine the operating point. The operating point is the intersection of travel speed and application quantity.
3. Draw a vertical from the operating point down.
4. Choose the suitable nozzle type for the required atomizing characteristic.
   For this purpose follow the classification in the left diagram (fine, medium, coarse drops). Pay attention to the possible nozzle sizes.

   Characteristics ⟶ Universal table:
   Change to the universal table for a more accurate determination of the characteristic values.
5. In the column with the determined application quantity find the line with the determined travel speed (if necessary use an approximate value).
6. In the right hand line read the nozzle output and the suitable nozzle sizes with the associated pressure.

Example:

to 1.	Application quantity:	200 l/ha
	Travel speed:	8 km/h
	Atomization characteristic:	coarse droplets
to 2 / 3.	See diagram (a)	
to 4.	Nozzle type:	ID/AL
	Possible nozzle sizes:	-025 or -03
to 5.	See Universal table	
to 6.	Nozzle output:	1.35 l/min
	Nozzles:	Size 025 with 5.5 bar Size 030 with 3.8 bar

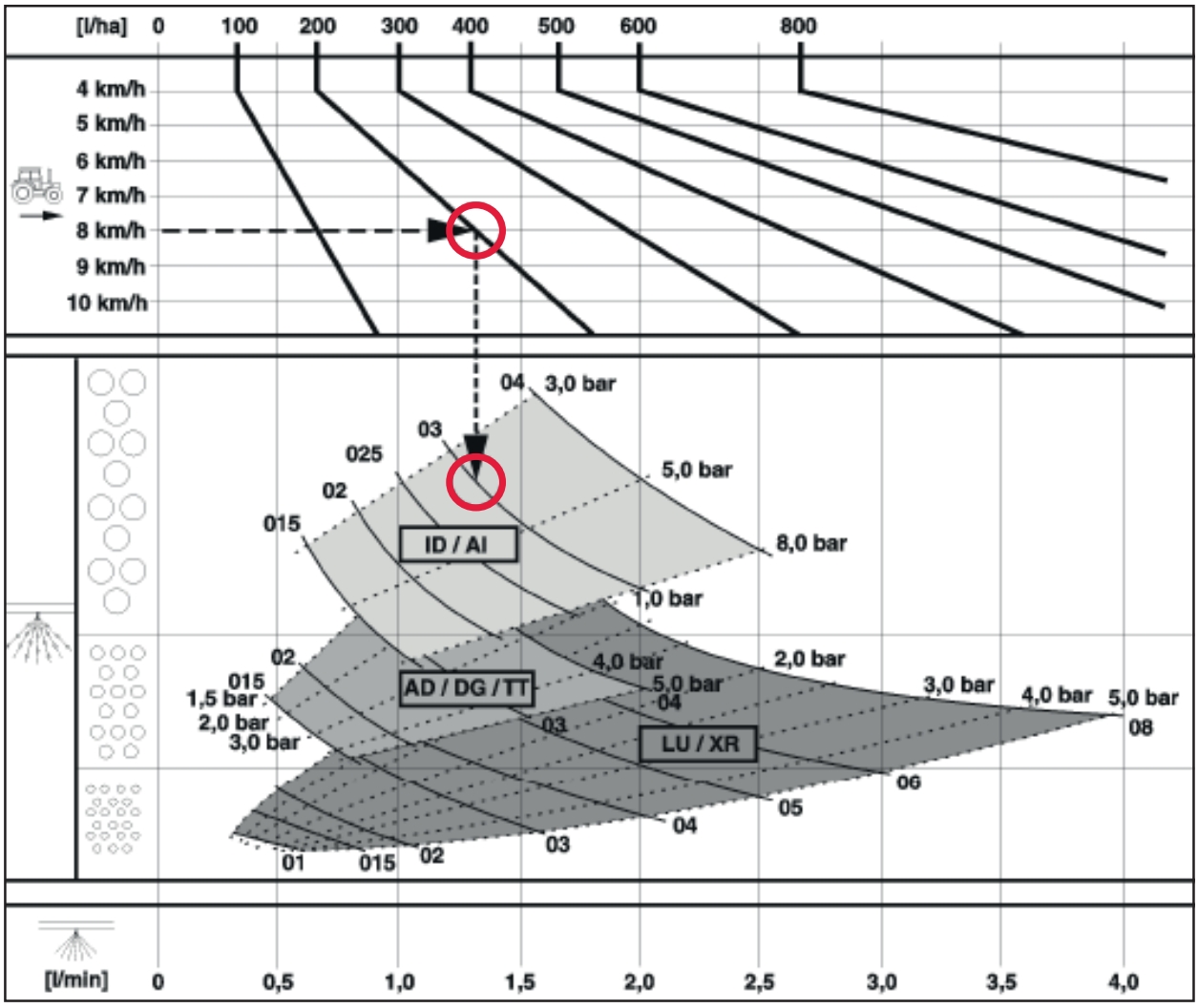


Diagram (a) with example

Application quantity l/ha										Nozzle output l/min	Nozzle size									
100	125	150	175	200	225	250	300	400	500		-01	-015	-02	-025	-03	-04	-05	-06	-08	-10
										0,25	1,2								
										0,30	1,7								
										0,35	2,3	1,0							
4,8				Travel speed km/h						0,40	3,0	1,3			Pressure bar				
5,4										0,45	3,8	1,7							
6,0	4,8									0,50	4,7	2,1	1,2						
6,6	5,3									0,55	5,7	2,5	1,4						
7,2	5,8	4,8								0,60	6,7	3,0	1,7	1,1					
7,8	6,2	5,2								0,65	7,9	3,5	2,0	1,3					
8,4	6,7	5,6	4,8							0,70	9,2	4,1	2,3	1,5	1,0				
9,0	7,2	6,0	5,1							0,75		4,7	2,6	1,7	1,2				
9,6	7,7	6,4	5,5	4,8						0,80		5,3	3,0	1,9	1,3				
10,2	8,2	6,8	5,8	5,1						0,85		6,0	3,4	2,2	1,5				
10,8	8,6	7,2	6,2	5,4	4,8					0,90		6,8	3,8	2,4	1,7				
11,4	9,1	7,6	6,5	5,7	5,1					0,95		7,5	4,2	2,7	1,9	1,1			
12,0	9,6	8,0	6,9	6,0	5,3	4,8				1,00		8,4	4,7	3,0	2,1	1,2			
12,6	10,1	8,4	7,2	6,3	5,6	5,0				1,05		9,2	5,2	3,3	2,3	1,3			
13,2	10,6	8,8	7,5	6,6	5,9	5,3				1,10		10,1	5,7	3,6	2,5	1,4			
13,8	11,0	9,2	7,9	6,9	6,1	5,5				1,15			6,2	4,0	2,8	1,5	1,0		
14,4	11,5	9,6	8,2	7,2	6,4	5,8	4,8			1,20			6,7	4,3	3,0	1,7	1,1		
15,0	12,0	10,0	8,6	7,5	6,7	6,0	5,0			1,25			7,3	4,7	3,3	1,8	1,2		
15,6	12,5	10,4	8,9	7,8	6,9	6,2	5,2			1,30			7,9	5,1	3,5	2,0	1,3		
16,2	13,0	10,8	9,3	8,1	7,2	6,5	5,4			1,35			8,5	5,5	3,8	2,1	1,4		
16,8	13,4	11,2	9,6	8,4	7,5	6,7	5,6			1,40			9,2	5,9	4,1	2,3	1,5	1,0	
17,4	13,9	11,6	9,9	8,7	7,7	7,0	5,8			1,45				6,3	4,4	2,5	1,6	1,1	
18,0	14,4	12,0	10,3	9,0	8,0	7,2	6,0			1,50				6,8	4,7	2,6	1,7	1,2	
19,2	15,4	12,8	11,0	9,6	8,5	7,7	6,4	4,8		1,60				7,7	5,3	3,0	1,9	1,3	
20,4	16,3	13,6	11,7	10,2	9,1	8,2	6,8	5,1		1,70				8,7	6,0	3,4	2,2	1,5	
21,6	17,3	14,4	12,3	10,8	9,6	8,6	7,2	5,4		1,80				9,7	6,7	3,8	2,4	1,7	1,0
22,8	18,2	15,2	13,0	11,4	10,1	9,1	7,6	5,7		1,90					7,5	4,2	2,7	1,9	1,1
24,0	19,2	16,0	13,7	12,0	10,7	9,6	8,0	6,0	4,8	2,00					8,3	4,7	3,0	2,1	1,2
	20,2	16,8	14,4	12,6	11,2	10,1	8,4	6,3	5,0	2,10					9,2	5,2	3,3	2,3	1,3
	21,1	17,6	15,1	13,2	11,7	10,6	8,8	6,6	5,3	2,20					10,1	5,7	3,6	2,5	1,4
	22,1	18,4	15,8	13,8	12,3	11,0	9,2	6,9	5,5	2,30						6,2	4,0	2,8	1,6	1,0
	23,0	19,2	16,5	14,4	12,8	11,5	9,6	7,2	5,8	2,40						6,7	4,3	3,0	1,7	1,1
	24,0	20,0	17,1	15,0	13,3	12,0	10,0	7,5	6,0	2,50						7,3	4,7	3,3	1,8	1,2
		20,8	17,8	15,6	13,9	12,5	10,4	7,8	6,2	2,60						7,9	5,1	3,5	2,0	1,3
		21,6	18,5	16,2	14,4	13,0	10,8	8,1	6,5	2,70						8,5	5,5	3,8	2,1	1,4
		22,4	19,2	16,8	14,9	13,4	11,2	8,4	6,7	2,80						9,2	5,9	4,1	2,3	1,5
		23,2	19,9	17,4	15,5	13,9	11,6	8,7	7,0	2,90						9,9	6,3	4,4	2,5	1,6
		24,0	20,6	18,0	16,0	14,4	12,0	9,0	7,2	3,00							6,7	4,7	2,6	1,7
			21,3	18,6	16,5	14,9	12,4	9,3	7,4	3,10							7,2	5,0	2,8	1,8
			21,9	19,2	17,1	15,4	12,8	9,6	7,7	3,20							7,7	5,3	3,0	1,9
			22,6	19,8	17,6	15,8	13,2	9,9	7,9	3,30							8,2	5,7	3,2	2,0
			23,3	20,4	18,1	16,3	13,6	10,2	8,2	3,40							8,7	6,0	3,4	2,2
			24,0	21,0	18,7	16,8	14,0	10,5	8,4	3,50							9,2	6,4	3,6	2,3
				21,6	19,2	17,3	14,4	10,8	8,6	3,60							9,7	6,7	3,8	2,4
				22,2	19,7	17,8	14,8	11,1	8,9	3,70							10,3	7,1	4,0	2,6
				22,8	20,3	18,2	15,2	11,4	9,1	3,80								7,5	4,2	2,7
				23,4	20,8	18,7	15,6	11,7	9,4	3,90								7,9	4,5	2,9
				24,0	21,3	19,2	16,0	12,0	9,6	4,00								8,3	4,7	3,0
					21,9	19,7	16,4	12,3	9,8	4,10								8,8	4,9	3,2
					22,4	20,2	16,8	12,6	10,1	4,20								9,2	5,2	3,3
					22,9	20,6	17,2	12,9	10,3	4,30								9,6	5,4	3,5
					23,5	21,1	17,6	13,2	10,6	4,40								10,1	5,7	3,6
					24,0	21,6	18,0	13,5	10,8	4,50									5,9	3,8
						22,1	18,4	13,8	11,0	4,60									6,2	4,0
						22,6	18,8	14,1	11,3	4,70									6,5	4,1
Travel speed km/h						23,0	19,2	14,4	11,5	4,80	Pressure bar								6,8	4,3
						23,5	19,6	14,7	11,8	4,90									7,0	4,5
						24,0	20,0	15,0	12,0	5,00									7,3	4,7

Universal table (b) with 50 cm nozzle spacing (with example)
The values apply for water of 20 °C, pressure measured directly at the nozzle.
Check the values with a measuring vessel before the start of application.

With placing quantity table

1. Determine placing quantity and travel speed.
2. In the placing quantity table look for the column with the required travel speed.
3. Look for the line(s) with the required placing quantity (use approximate values, if necessary).
4. Read nozzle size, pressure and nozzle output.

Example:

1.	Placing quantity:		200 l/ha
	Travel speed:		8 km/h
2.	See placing quantity table		
3.	See placing quantity table		
4.	Nozzles: a)	Size:	025
		Pressure	5.0 bar
		Nozzle output:	1.29 l/min
	b)	Size:	03
		Pressure:	4.0 bar
		Nozzle output:	1.39 l/min

Type Colour	Pressure bar	l/min	Placing quantity in l/ha at km/h							
			5	6	7	8	10	12	14	16
-01 orange	1,0	0,23	55	46	40	35	28	23	20	17
	1,5	0,28	68	57	49	42	34	28	24	21
	2,0	0,33	78	65	56	49	39	33	28	25
	2,5	0,37	88	73	63	55	44	37	31	27
	3,0	0,40	96	80	69	60	48	40	34	30
	4,0	0,46	111	92	79	69	55	46	40	35
	5,0	0,52	124	103	89	78	62	52	44	39
	6,0	0,57	136	113	97	85	68	57	49	42
	7,0	0,61	147	122	105	92	73	61	52	46
	8,0	0,65	157	131	112	98	78	65	56	49
-015 green	1,0	0,35	83	69	59	52	42	35	30	26
	1,5	0,42	102	85	73	64	51	42	36	32
	2,0	0,49	118	98	84	74	59	49	42	37
	2,5	0,55	132	110	94	82	66	55	47	41
	3,0	0,60	144	120	103	90	72	60	51	45
	4,0	0,69	166	139	119	104	83	69	59	52
	5,0	0,78	186	155	133	116	93	78	66	58
	6,0	0,85	204	170	146	127	102	85	73	64
	7,0	0,92	220	183	157	138	110	92	79	69
	8,0	0,98	235	196	168	147	118	98	84	74
-02 yellow	1,0	0,46	111	92	79	69	55	46	40	35
	1,5	0,57	136	113	97	85	68	57	49	42
	2,0	0,65	157	131	112	98	78	65	56	49
	2,5	0,73	175	146	125	110	88	73	63	55
	3,0	0,80	192	160	137	120	96	80	69	60
	4,0	0,92	222	185	158	139	111	92	79	69
	5,0	1,03	248	207	177	155	124	103	89	77
	6,0	1,13	271	226	194	170	136	113	97	85
	7,0	1,22	293	244	209	183	147	122	105	92
	8,0	1,31	313	261	224	196	157	131	112	98
-025 lilac	1,0	0,58	138	115	99	87	69	58	49	43
	1,5	0,71	170	141	121	106	85	71	61	53
	2,0	0,82	196	163	140	122	98	82	70	61
	2,5	0,91	219	183	157	137	110	91	78	68
	3,0	1,00	240	200	171	150	120	100	86	75
	4,0	1,15	277	231	198	173	138	115	99	87
	5,0	1,29	310	258	221	194	155	129	111	97
	6,0	1,41	339	283	242	212	170	141	121	106
	7,0	1,53	367	306	262	229	183	153	131	115
	8,0	1,63	392	326	280	245	196	163	140	122
-03 blue	1,0	0,69	166	139	119	104	83	69	59	52
	1,5	0,85	204	170	146	127	102	85	73	64
	2,0	0,98	235	196	168	147	118	98	84	74
	2,5	1,10	263	219	188	164	131	110	94	82
	3,0	1,20	288	240	206	180	144	120	103	90
	4,0	1,39	332	277	237	208	166	139	119	104
	5,0	1,55	372	310	266	232	186	155	133	116
	6,0	1,70	407	339	291	255	204	170	145	127
	7,0	1,83	440	367	314	275	220	183	157	137
	8,0	1,96	470	392	336	294	235	196	168	147
-04 red	1,0	0,92	222	185	158	139	111	92	79	69
	1,5	1,13	271	226	194	170	136	113	97	85
	2,0	1,31	313	261	224	196	157	131	112	98
	2,5	1,46	351	292	250	219	175	146	125	110
	3,0	1,60	384	320	274	240	192	160	137	120
	4,0	1,85	444	370	317	277	222	185	158	139
	5,0	2,07	496	413	354	310	248	207	177	155
	6,0	2,26	543	453	388	339	272	226	194	170
	7,0	2,44	587	489	419	367	293	244	209	183
	8,0	2,61	627	522	448	392	313	261	224	196

Type Colour	Pressure bar	l/min	Placing quantity in l/ha at km/h							
			5	6	7	8	10	12	14	16
-05 brown	1,0	1,16	277	231	198	173	139	116	99	87
	1,5	1,41	339	283	242	212	170	141	121	106
	2,0	1,63	392	327	280	245	196	163	140	122
	2,5	1,83	438	365	313	274	219	183	157	137
	3,0	2,00	480	400	343	300	240	200	171	150
	4,0	2,31	554	462	396	346	277	231	198	173
	5,0	2,58	620	516	443	387	310	258	221	194
	6,0	2,83	679	566	485	424	339	283	242	212
	7,0	3,06	733	611	524	458	367	306	262	229
	8,0	3,26	783	653	560	490	392	326	280	245
-06 grey	1,0	1,39	333	277	238	208	166	139	119	104
	1,5	1,70	407	339	291	255	204	170	145	127
	2,0	1,96	470	392	336	294	235	196	168	147
	2,5	2,19	526	438	376	329	263	219	188	164
	3,0	2,40	576	480	411	360	288	240	206	180
	4,0	2,77	665	554	475	416	333	277	238	208
	5,0	3,10	744	620	531	465	372	310	266	232
	6,0	3,39	815	679	582	509	407	339	291	255
	7,0	3,67	880	733	628	550	440	367	314	275
	8,0	3,92	941	784	672	588	470	392	336	294
-08 white	1,0	1,85	444	370	317	277	222	185	158	139
	1,5	2,26	543	453	388	339	272	226	194	170
	2,0	2,61	627	523	448	392	314	261	224	196
	2,5	2,92	701	584	501	438	351	292	250	219
	3,0	3,20	768	640	549	480	384	320	274	240
	4,0	3,69	887	739	633	554	443	369	317	277
	5,0	4,13	992	826	708	620	496	413	354	310
	6,0	4,53	1086	905	776	679	543	453	388	339
	7,0	4,89	1173	978	838	733	587	489	419	367
	8,0	5,22	1254	1045	896	784	627	522	448	392
-10 black	1,0	2,31	554	462	396	346	277	231	198	173
	1,5	2,83	679	566	485	424	339	283	242	212
	2,0	3,27	784	653	560	490	392	327	280	245
	2,5	3,65	876	730	626	548	438	365	313	274
	3,0	4,00	960	800	686	600	480	400	343	300
	4,0	4,62	1108	924	792	693	554	462	396	346
	5,0	5,16	1239	1033	885	775	620	516	443	387
	6,0	5,66	1357	1131	970	848	679	566	485	424
	7,0	6,11	1466	1222	1047	917	733	611	524	458
	8,0	6,53	1567	1306	1119	979	783	653	560	490
-12 turquoise	1,0	2,77	665	554	475	416	333	277	238	208
	1,5	3,39	814	679	582	509	407	339	291	255
	2,0	3,92	941	784	672	588	470	392	336	294
	2,5	4,38	1051	876	751	657	526	438	376	329
	3,0	4,80	1152	960	823	720	576	480	411	360
	4,0	5,54	1330	1109	950	831	665	554	475	416
-16 violet	1,0	3,70	887	739	634	554	444	370	317	277
	1,5	4,52	1086	905	776	679	543	453	388	339
	2,0	5,23	1254	1045	896	784	627	523	448	392
	2,5	5,84	1402	1168	1001	876	701	584	501	438
	3,0	6,40	1536	1280	1097	960	768	640	549	480
	4,0	7,39	1774	1478	1267	1109	887	739	633	554
-20 bright-blue	1,0	4,62	1108	924	792	693	554	462	396	346
	1,5	5,66	1358	1131	970	849	679	566	485	424
	2,0	6,53	1568	1306	1120	980	784	653	560	490
	2,5	7,30	1753	1461	1252	1095	876	730	626	548
	3,0	8,00	1920	1600	1371	1200	960	800	686	600
	4,0	9,24	2217	1848	1584	1386	1109	924	792	693

Universal table with 50 cm nozzle spacing (with example)
The values apply for water of 20 °C, pressure measured directly at the nozzle.
Check the values with a measuring vessel before the start of application.

Pressure ranges of different nozzles

Nozzle type	Nozzle size	Permissible pressure range [bar]	
		min. pressure	max. pressure
LU / XRC - nozzles	015	1	1.5
LU / XRC - nozzles	02	1	2.5
LU / XRC - nozzles	03	1	3.0
LU / XRC - nozzles	04 - 08	1	5.0
AD / DG / TT	all sizes	1.5	6
AI	all sizes	2	8
ID	all sizes	2	8
Air-Mix nozzles	all sizes	1	6
IDK / IDKN	all sizes	1	6
TTI	all sizes	1	6
AVI	all sizes	2	8

Permissible pressure ranges of different nozzle types and nozzle sizes

Residual quantities

A differentiation is made between two types of residual quantities:

- **Excess residual quantity** after the end of spraying operation, e.g. resulting from errors in the calculation of the application quantity, in filling or spraying operation.
- **Technical residual quantity**, which still remains in the spraying mixture container, the suction fitting and in the spraying line after a considerably drop in spraying pressure. The suction fitting consists of the assembly groups switch-over ball valve, short lines and pump.

Technical residual quantities

It must be remembered that the residual quantity in the sections will be placed in the form of undiluted concentration. This is the case when switching to fresh water with the nozzles activated.
Strictly spray this residual quantity from the spraying line on an untreated area. The residual quantity in the spraying line depends on the width of the boom.

Draining off technical residual quantities

⚠ NOTE

Make sure that the residual quantity in the spraying line will be sprayed out in the form of undiluted concentration.

- Spray this residual quantity from the spraying line on an untreated area.
- Refer to the section *Technical residual quantities* for the travel distance required to spray the residual quantity in the spraying line. The residual quantity in the spraying line depends on the working width of the folding boom.
- Once the residual quantity in the spraying mixture container has reached a level of just 100 litres switch off the agitator to spray the spraying mixture container empty.

  With the agitator switched on the technical residual quantity increases in contrast to the specified values.

  For machines of the CCS Pro variant, the agitator is automatically deactivated at a solution tank content smaller than 1000 litres.

  At the terminal the agitator can also be restarted below this limit using the function *Lower agitator limit*.

  If the solution tank content is less than 50 litres, the agitator is deactivated permanently and cannot be reactivated.
- The user protection measures do apply when emptying residual quantities; follow the instructions of the crop protection agent manufacturers and wear personal protective outfit.
- Dispose of the collected residual quantity of spraying mixture in accordance with the relevant statutory regulations.
- Collect the residual quantity of spraying mixture in suitable containers.
- Dispose of the residual spraying mixture quantities in the specified way.

Draining of technical residual quantities on machines of the CCS Pro variant

A port is provided under the pump space for draining the technical residual quantities.

Port with cap

1. Take off the cap.
2. Place a suitable collection vessel under the port for draining off the residual quantity.

3. Activate the *Pulling suction* function on the external control terminal for approx. 10 sec. to drain the suction connection for filling the spraying mixture container.
4. Activate the *residue drain* function on page 3 on the external control terminal.
5. Deactivate the function again on the terminal after complete drainage.
6. Properly dispose of the collected residual quantity!

NOTE

Close the port again with the cap each time after draining the technical residual quantities.

Diluted residual quantity

Perform the dilution and spraying out of residual quantities from the spraying mixture container after the end of spraying operation as follows:

Procedure

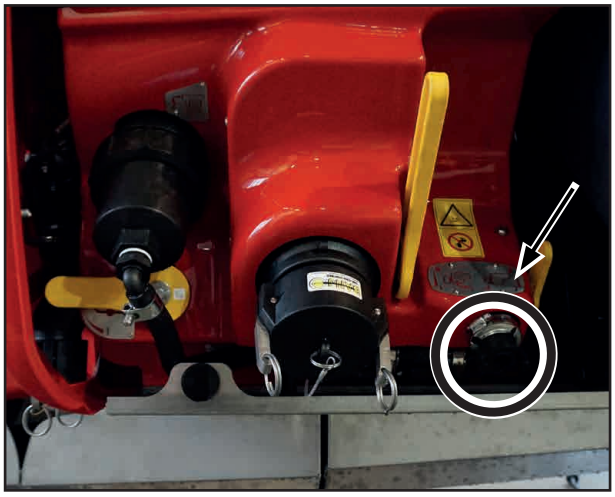
1. Spray the undiluted residual quantity from the spraying line on an untreated residual area.
2. Dilute the residual quantity in the spraying mixture container with 200 litres of fresh water.
3. Spray the diluted residual quantity also on an untreated residual area.
4. Repeat steps 2 and 3 for a second (if necessary a third) time.

Diluting the residual quantity with machines of the variant CCS Pro:

1. Call up the cleaning menu on the main control terminal.
2. Select the submenu Dilute the spraying mixture or recirculate fresh water into the spraying mixture container.
3. Select the ratio of fresh water to spraying mixture.
4. Start the process.

In case of multiple nozzle bodies all existing nozzles must be opened for cleaning. There is danger of deposits if this instruction is not followed!

Draining the fresh water tank



Connection of fresh water tank

The port of the fresh water tank is located to the left of the illuviation valve. It serves to fill the fresh water tank and to drain the fresh water. Remove the cap for drainage, open the ball valve and let the water drain out. Now shut the ball valve again and close the port with the cap.

WARNING

Danger of poisoning by contaminated water in the fresh water tank!
Never use the water in the fresh water tank as drinking water! The materials of the fresh water tank are not food-compatible.

Cleaning

⚠ WARNING

Danger of crushing, shearing, cutting, cutting off, being caught, winding up, being pulled in and impact caused by

- accidental lowering of lifted, unsecured machine parts
- accidental starting and unintended rolling of the tractor/machine combination.

Secure both tractor and crop protection sprayer against accidental starting and unintended rolling before you start cleaning the machine.

Before starting cleaning work under the parallelogram of the folded folding boom, check the interlocking of the parallelogram.

⚠ WARNING

Danger of crushing, shearing, cutting, cutting off, being caught, winding up, being pulled in and impact caused by unprotected danger spots!

- Reattach all protective features previously removed for cleaning the machine.
- Replace defective protective features with new ones. Use only HORSCH original parts.

⚠ CAUTION

Contamination with crop protection agents. Wear the personal protective outfit when cleaning the crop protection sprayer!

- Perform all maintenance work on the crop protection sprayer only after cleaning it.

- Pay particular attention to the brake, air and hydraulic lines.
- Never use gasoline, benzene, petroleum or mineral oils on brake, air and hydraulic oil hoses.
- After cleaning, check all hydraulic lines for leaks and loose connections.
- Lubricate the crop protection sprayer after cleaning, especially after cleaning with a high pressure cleaner / steam jet or when using grease-dissolving cleaning agents.
- Pay attention to the statutory regulations concerning the handling and waste disposal of cleaning agents.
- Check for chafing and signs of damage. Remedy any faults immediately!
- Prior to working on the electrical system, disconnect it from the electric current supply.

Cleaning with high pressure cleaner / steam jet

⚠ NOTE

Do not clean **new machines** with a steam jet or high pressure cleaner.
The paint takes approx. 3 months to cure and could be damaged before this time.

Strictly observe the following points when cleaning with a high pressure cleaner/steam jet:

- Do not clean any electrical components.
- Do not clean any chrome-plated components.
- Before cleaning the machine cover all openings, which should stay clear of water, steam or cleaning agents for reasons of safety or functioning.
- Do not aim the water jet directly at electrical or electronic components and bearings. Keep the water jet at a distance of at least 150 cm. Use only a flat jet.
- Do not direct the cleaning jet of the high pressure cleaner/steam jet directly on lubrication points and bearings, lines and stickers.
- Always keep a minimum distance of 300 mm between cleaning nozzle and machine.
- Avoid the use of dirt removing tools on the high pressure cleaner, if necessary, keep a greater distance.
- Pay attention to the safety regulations when using high pressure cleaners.

Cleaning the crop protection sprayer

NOTE

Regular cleaning of the crop protection sprayer is a prerequisite for proper maintenance and eases operation of the machine.

Service life and reliability of the crop protection sprayer essentially depend on the time the material of the crop protection sprayer is exposed to the crop protection agent.

- Keep the exposure time to the spraying mixture as short as possible, e.g. by daily cleaning after the end of spraying.
- Do not leave the spraying mixture for an unnecessary period of time in the spraying mixture container, e.g. not over night.
- Generally clean the crop protection sprayer before placing a different crop protection agent.
- Dilute the residual quantity in the spraying mixture container and subsequently spray out the diluted residual quantity.
- Before the actual cleaning preliminarily cleaning of the crop protection sprayer should be done in the field.
- Dispose of any cleaning residues in an environmentally friendly manner each time after cleaning the crop protection sprayer.
- Disassemble the spraying nozzles at least once per season.
- Check the disassembled spraying nozzles for contamination, if necessary clean the nozzles with a soft brush.
- Flush the spraying lines without the spraying nozzles in place.

CCS - Continuous inside cleaning (Continuous Cleaning System)

- Continuous inside cleaning is only possible with machines of the CCS and CCS Pro variants.

The complete cleaning process is controlled from the driver's cabin.
Mode of operation: Principle of positive displacement instead of principle of dilution.
The additional piston diaphragm pump feeds clear water through the internal cleaning nozzles directly into the spraying mixture container. The spraying pump sucks in this water and uses it to force the chemical residue through the nozzles out of the pipeline system.

NOTE

The initially placed residual quantity is undiluted (up to 40 l). Place the residual quantity on an untreated surface!

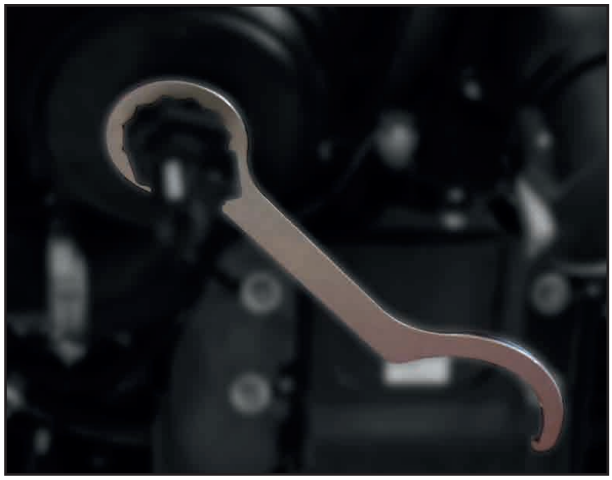
- For machines of the CCS Pro variant, CCS cleaning is automatically included in the cleaning program.
- CCS cleaning can only be carried out by starting the automatic cleaning program.
- CCS cleaning can be closed manually after thorough cleaning or it ends automatically when the fresh water tank contains no more water.
- Start of the automatic cleaning program with CCS cleaning, see the section *Main cleaning*.

NOTE

- The duration of the “Continuous inside cleaning” process depends on how heavily the crop protection sprayer is soiled with the crop protection agent used.
- Operate the CCS-function until only fresh water runs out of the nozzles.
- Follow the instructions of the crop protection agent manufacturer.

Cleaning the filter

A ring spanner for work on the pressure and suction filters is supplied with the machine.



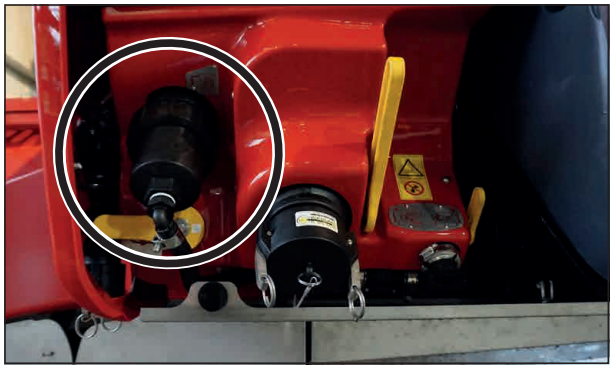
Pressure filter

⚠ CAUTION

Spraying mixture running out! Use appropriate protective outfits.

The pressure filter is located to the left of the filling fitting.
The pressure value **on the folding boom** is shown on the terminal.

- Compare the values and clean the filter from a pressure difference of 1.5 bar or every day.
- A warning appears on the terminal if the pressure differential is too high!



Pressure filter

1. Switch off the folding boom circulation.
2. Close the ball valve for pressure output.
3. Drain the filter. Open the valve for this purpose.
4. Unscrew the filter.
5. Cleaning the filter. Collect deposits in a suitable container and dispose of them.
6. Screw in the cleaned filter again and close the shut-off valve.

Suction filter

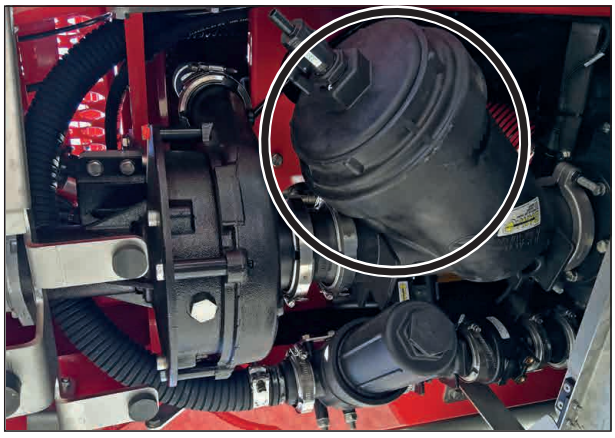
⚠ CAUTION

Spraying mixture running out! Use appropriate protective outfits.

⚠ NOTE

Clean the filter after suctioning contaminated water every day.

The suction filter of the centrifugal pump is located near the centrifugal pump. To this end, fold the covering at the bottom of the machine down.

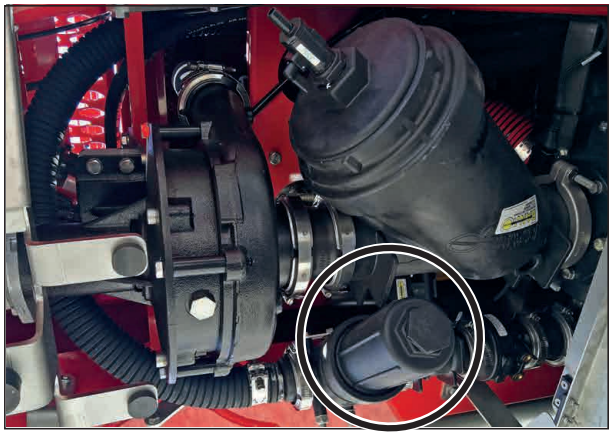


Centrifugal pump suction filter

Machines of the CCS Pro variant:

1. Start the Filter cleaning function on the external control terminal.
2. A note appears on the terminal that the filter can now be cleaned/replaced.
3. Confirm the message with “ENTER”.
4. Drain the filter. Open the valve for this purpose.
5. Unscrew the suction filter.
6. Clean/replace the suction filter. Collect the deposits in a suitable container and dispose of properly.
7. Screw in the filter again and close the shut-off valve again.
8. Disable the filter cleaning function again on the external control terminal.
9. Close the covering again.

The suction filter of the piston diaphragm pump is located near the centrifugal pump. To this end, fold the covering at the bottom of the machine down.



Piston diaphragm pump suction filter

1. Unscrew the filter.
2. Cleaning the filter. Collect deposits in a suitable container and dispose of them.
3. Screw in the cleaned filter again.
4. Close the covering again.

Cleaning the sprayer with the tank empty

NOTE

The initially placed residual quantity is undiluted. Therefore place the residual quantity on an untreated surface!
Clean the spraying mixture container after use!

Main cleaning on machines of the CCS Pro variant:

1. Empty the spraying mixture container completely.
2. The fresh water tank must be filled with at least 300 litres of water.
3. Call up the cleaning menu on the terminal.
4. Select the “Automatic cleaning” function in the submenu.
5. The border and edge nozzles can be cleaned as well, if necessary.
6. Start the program.
   - ➢ When the program is running, the folding boom, quick filling valve, pressure filter, agitator and inside tank are cleaned automatically.
   - ➢ The message appears on the terminal prompting to spray the residual quantity on an untreated residual area.
   - ➢ CCS cleaning starts.
7. CCS cleaning can be closed manually after thorough cleaning or it ends automatically when the fresh water tank and spraying mixture container contain no more water and the folding boom pressure is 0 bar.

NOTE

In multiple nozzle systems all existing nozzles must be opened for cleaning. There is danger of deposits if this instruction is not followed!

Washing program on machines of the CCS Pro variant:

1. Fill the spraying mixture container with approx. 100 l of water.
2. Call up the cleaning menu on the terminal.
3. Select the *Washing program* function in the submenu.
4. Start the program.
5. Activate cleaning of the illuviation valve.
6. Set the switch-over ball valve on the illuviation valve to sucking-off.
7. Switch on the canister flushing nozzle and operate the canister flusher, using a suitable container, until only clear water runs out.
8. Switch on closed circuit flushing until only clear water runs out.
9. Switch on the shock nozzle for approx. 10 sec. (only for illuviation valve from stainless steel).
10. Switch on the spray gun and spray into the tank until only clear water runs out.
11. Switch off the illuviation valve.
12. Stop cleaning after the desired time.
13. Switch on circulation.
14. Spray the diluted residual quantity on an untreated residual area.
15. Activate the “Air Valve” function, in order to clean the folding boom with air (optional).
16. Repeat steps 1-15 for a second time (if necessary a third time) (dilution principle).
17. Cleaning suction and pressure filters.

NOTE

In multiple nozzle systems all existing nozzles must be opened for cleaning. There is danger of deposits if this instruction is not followed!

Cleaning the sprayer with the tank filled

NOTE

The initially placed residual quantity is undiluted. Therefore place the residual quantity on an untreated surface!
Strictly clean the suction fittings (pumps, pressure regulator) and spraying line in case of weather-dependent interruptions of the spraying operation!

- Perform cleaning in the field by using water from the fresh water tank.
- Refer to the chapter “Technical residual quantities” for the travel distance required to spray this undiluted residual quantity.

Procedure for machines of the CCS Pro variant:

1. Switch off the nozzles.
2. Call up the cleaning menu on the terminal.
3. Select the *Folding boom cleaning* function in the submenu.
4. Start the program.
5. A message on the terminal indicates that the required travel distance can be travelled with the nozzles activated (on untreated residual area).
6. The cleaning process ends automatically.
7. Activate the “Air Valve” function, in order to clean the folding boom with air (optional).

NOTE

In multiple nozzle systems all existing nozzles must be opened for cleaning. There is danger of deposits if this instruction is not followed!

Folding boom cleaning with “Air Valve” (option)

This function blows out the technical residual quantities left in the folding boom lines after the cleaning process.

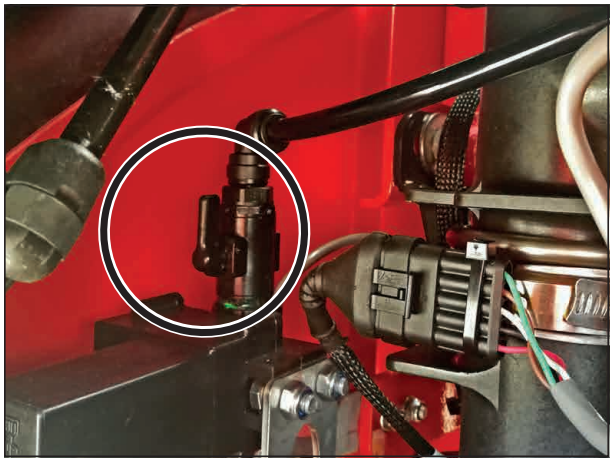
This reduces deposits in nozzles and folding boom lines.

Blow-out process

1. The air reservoirs on tractor and sprayer must be filled.
2. Switch off all spraying functions. Switch off pressure agitator, internal cleaning, injector and spraying pump as well.
3. Call up the cleaning menu on the terminal.
4. Select the “Air Valve” function in the submenu.
5. Start the program.
6. The blow-out process ends automatically.
7. Repeat the function if necessary until no more fluid escapes from the nozzles.

Manual disabling of the blow-out function

On the left side of the machine under the covering there is a lock valve with which the air valve function can be deactivated manually. To deactivate, turn the lock valve to the right.



Air valve lock valve

Changing the track width

The track width can be changed by swapping the wheels.

Three variants are available here, depending on the pressing depth of the rims:

	Flange dimension	Track width
Variant 1	2.10 m	2.00 - 2.25 m
Variant 2	2.10 m	2.05 - 2.20 m
Variant 3	2.10 m	2.10 - 2.15 m

⚠ WARNING

Traffic and work accidents from improper mounting!

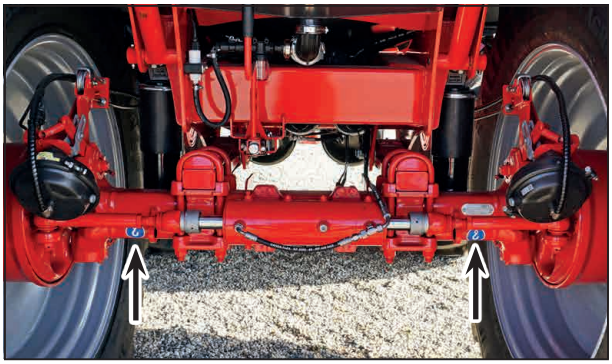
- Swap the wheels only when the machine is hitched to the tractor and in stable position.
- Swap the wheels only when all required tools are available.
- Have the wheel swapping carried out by a qualified technician or shop.
- Observe the specified tightening torques.
- Follow the road traffic regulations of the respective country.

Wheel swapping

⚠ NOTE

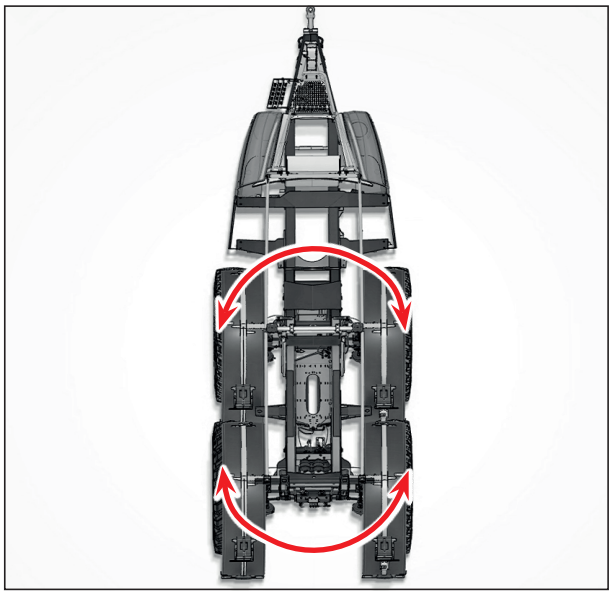
Perform wheel swapping only per axle. Danger of machine toppling over!

1. Follow the *Changing wheels* section.
2. Lift both sides of an axle with the wheel jack, one after the other, and secure each side with a tripod trestle against lowering.



Jack lifting points

3. For each axle, attach the left wheel to the right in running direction and the right wheel to the left in running direction.



4. Secure the wheels with the wheel nuts. Tighten all wheel nuts crosswise. Tightening torque: 510 Nm.

⚠ NOTE

- Retighten the wheel nuts after 10 km.

⚠ NOTE

The dimensions of the track widths apply at the time of drafting the operating instructions. The dimensions of the track width may change due to further technical developments.

Care and maintenance

⚠ WARNING

Danger of crushing, shearing, cutting, cutting off, being caught, winding up, being pulled in and impact caused by

- **accidental lowering of lifted, unsecured machine parts.**
- **accidental starting and rolling of the machine.**

Secure the crop protection sprayer against accidental starting and unintended rolling before you start care, service or maintenance work on the machine.

Before starting work under the parallelogram of the folded folding boom, check the interlocking of the parallelogram.

⚠ WARNING

Danger of crushing, shearing, cutting, cutting off, being caught, winding up, being pulled in and impact caused by unprotected danger spots!

- Reattach all protective features that were removed for the purpose of care, service and maintenance work on the machine.
- Replace defective protective features with new ones. Use only HORSCH original parts.

⚠ DANGER

- Observe all safety notes when carrying out care, service and maintenance work!
- Maintenance and/or repair work under raised, moveable machine parts must only be carried out, after these parts have been positively secured against accidental lowering with appropriate means.

⚠ CAUTION

Contamination with crop protection agents.

- Perform all maintenance work on the crop protection sprayer only after cleaning it.

⚠ NOTE

- Regular and proper maintenance will keep the crop protection sprayer for a long time in an operable state and prevents premature wear.

Your machine has been designed and built to offer maximum performance, economy and operator friendliness under a vast variety of operating conditions.

Before delivery the machine was inspected at the factory and by your dealer to make sure that it is in optimal condition. For trouble-free operation it is very important to carry out the necessary work for care and maintenance at the recommended intervals.

- Ensure that regular tests and inspections are always carried out to schedule as specified in the operating instructions.
- For service and maintenance work park the machine on level and solid ground, secure it against rolling away.
- Use only spare parts approved by HORSCH.
- Use only spare hoses approved by HORSCH and always use hose clamps made of V2A for assembly.
- When performing care and maintenance work pay attention to environmental protection measures.
- Strictly comply with the statutory regulations for the waste disposal of operating materials, such as oils and greases. These statutory regulations also apply to parts coming into contact with such operating materials.

- Initiate protective measures (e.g. cover or even disassemble lines at particularly critical points)
  - when welding, drilling or grinding
  - when working with abrasive cutting wheels in the vicinity of plastic hoses and electric lines.
- Thoroughly clean the crop protection sprayer before each repair or maintenance, especially the parts contaminated by the spraying mixture.
- Carry out repairs only on machines shut down and secured against restarting.
- Switch off the main battery switch with all care and maintenance work.

  This applies in particular to welding work on the machine. The ground connection must be as close as possible to the welding point.
- Screw connections loosened for the purpose of care and maintenance work must be retighten after work is completed.

Appropriate expert knowledge is the prerequisite for the performance of tests and maintenance work. This expert knowledge cannot be obtained from these operating instructions!

The following is generally prohibited:

- drilling on the undercarriage
- enlarging existing boreholes on the vehicle frame
- welding on load-bearing parts

Conversions affect specifications in the operating instructions.

NOTE

Before each commissioning

- Check hoses, pipes and connecting pieces for apparent faults or leaking connections.
- Remedy chafed sections on hoses and pipes.
- Immediately replace worn or damaged hoses and pipes.
- Seal leaking connections immediately.

Maintenance intervals

The maintenance intervals are determined by many different factors.
For example, the different operating conditions, weather impact, travel and working speeds, dust accumulation and type of soil, crop protection agents and carbonyl diamide agents used, etc. affect the maintenance intervals. The quality of the lubricants and cleaning agents also affects the time to the next care activities.

The specified maintenance intervals therefore only serve as a reference.
In case of deviations from normal operating conditions the intervals must be adapted accordingly.

Regular maintenance is the basis for a fully operable machine. Properly serviced machines reduce the risk of failing and ensure economical use and operation of the machines.

Lubricating the machine

The machine should be lubricated at regular intervals and after each cleaning action.
This ensures operability and reduces repair costs and downtimes.

⚠ CAUTION

Hygiene
Lubricants and mineral oil products are not harmful to health as long as they are used as instructed.
Prolonged skin contact or the inhalation of vapours should, however, be avoided.

Handling lubricants
Wear gloves or use protective creams to protect against direct contact with oils.
Thoroughly clean any oil off your skin by washing with warm water and soap.

Lubricate / grease the machine at the indicated intervals. Carefully clean lubrication points and grease gun before lubricating, so that no dirt is pressed into the bearings. Press the used up grease completely out of the bearings and replace it with fresh grease!

Lubricants

⚠ NOTE

- A lithium-saponified multi-purpose grease with EP additives must be used for lubrication tasks.
- Use only cleaned hydraulic oil that complies with the demanded cleanliness class:
  - Cleanliness class 9 as per NAS 1638
  - Cleanliness class 18/16/13 as per ISO 4406

Brand	Lubricant designation **Normal** operating conditions
ARAL	Aralub HL 2
FINA	FINA Marson L2
ESSO	ESSO Beacon 2
SHELL	SHELL Ratinax A

Brand	Lubricant designation **Extreme** operating conditions
ARAL	Aralub HLP 2
FINA	FINA Marson EPL-2
ESSO	ESSO Beacon EP 2
SHELL	Tetinax AM

Brake shaft bearings, outer and inner

⚠ CAUTION

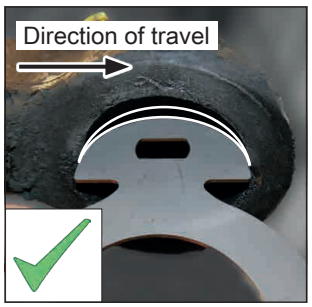
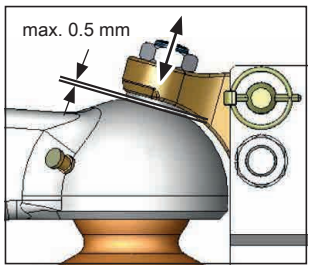
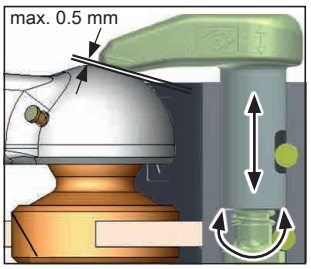
No grease or oil must enter into the brake. Use only lithium saponified grease with a dropping point higher than 190 °C.

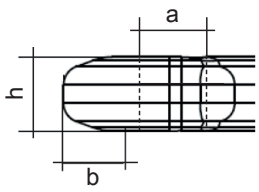
Maintenance overview Leeb 12 TD

Maintenance location	Work instructions	Interval
After 10 operating hours		
Retighten all screw and plug-in connections as well as the hydraulic connections.	Even firmly tightened screw connections can come loose (e.g. because of material settlement or paint residues between the screw elements). This can lead to loose screw connections and leaking hydraulic connections.	Once
Retighten all wheel nuts M18 x 1.5 - 300 Nm M22 x 1.5 - 510 Nm	➢ initially after 10 hours or 50 km ➢ again after 10 hours or 50 km ➢ then retighten daily until the screws have settled and further tightening is no longer possible. ➢ then always before the start of the season and every 50 operating hours during use.	
Before the season		
Complete machine	Read the operating instructions carefully as a refresher.	
	Check all screw connections for firm seating and retighten as necessary	
	Check condition and function of all protective features and replace, if necessary	
	Check electrical lines for damage and replace, if necessary.	
	Check the function and leak tightness of the hydraulic system and water system.	
In use		
Hydraulics		
⚠ WARNING	Lock all hydraulically operated parts before any work on the hydraulic system. Depressurise the hydraulics on the tractor and implement side! Empty the pressure accumulators.	
	Allow hydraulic oil and hydraulic components heated during operation to cool down before any work on the hydraulic system.	
	Observe the notes on hydraulics in the chapter *Safety and Responsibility*.	
Hydraulic system and components	Check all hydraulic components and hoses for function, leak tightness, fastening and chafing	50 h
Hydraulic hoses	Check the hydraulic hoses regularly for damage (cracks, chafing, etc.).	
	Replace damaged and faulty hoses immediately.	
	Hydraulic hoses must be replaced after 6 years. Pay attention to the manufacturing date on the crimp sleeve (year/month) and the hose (quarter/year):  Crimp sleeve Hose Depending on the conditions of use (e.g. weather influences) or in case of higher strains on the machine the hoses may need to be replaced earlier.	
	Have the hydraulic system checked by an expert at least once every year.	
	In addition, follow the country specific regulations and directives.	
Pressure filter	Replace element	yearly

Maintenance location	Work instructions	Interval
Electrics		
Electrical lines	Check for damage	50 h
Lighting	Check function	daily
Water system		
Piston diaphragm pump	Cleaning, flushing	daily
Spraying mixture container		
Pressure filter		
Suction filter		
Dome screen		
Line filters in the nozzle lines		
Spraying nozzles		
Centrifugal pump		
Piston diaphragm pump	check for leaks	daily
Centrifugal pump	check for leaks	daily
Hose assembly	check for leaks	50 h
Line filters	Replace damaged filter elements	50 h
Piston diaphragm pump	Check pressure and oil level	50 h
Centrifugal pump	Check the BarrierFluid level, top up if necessary	1000 h
Spraying nozzles	Replace worn nozzles	yearly
Flow meter	Calibrating the flow meter	yearly

Ball-and-socket coupling

Maintenance location	Work instructions	Interval
Ball-and-socket coupling		
Before connecting:	Clean ball and spherical cap.	daily
	Replace the foam ring if damaged and/or heavily soiled.	daily
	Place the foam ring.	daily
	Check ball and spherical cap for wear. The wear limit has been reached when the gauge rests fully on the ball or enters the spherical cap. Hold the gauge lengthwise toward the direction of travel:  Ball OK  ball worn	40 h
Before connecting:	 Spherical cap OK  spherical cap worn	40 h
	Note possibly existing wear limits on the hold-down.	40 h
	Lubricate the ball socket.	as required
After connecting:	Adjust the distance of the hold-down to the ball to max. 0.5 mm:   For this purpose, according to the design, e.g. - turn upper stop screw and secure with nut or - remove hold-down and turn lower setscrew. Now secure the hold-down with bolts and cotter pins.	daily
After unhitching:	Place the protective cap on the ball.	daily

<table>
<tr><th>Maintenance location</th><th>Work instructions</th><th>Interval</th></tr>
<tr><td colspan="3">Drawbar eye</td></tr>
<tr><td>Wear
 
</td><td>➢ Replace the component concerned if one of the wear limits has been exceeded or fallen short of (workshop work):
<table>
<tr><th>Designation</th><th>Nominal dimension (mm)</th><th>Wear dimension (mm)</th></tr>
<tr><td>ø eye a</td><td>40</td><td>42.5</td></tr>
<tr><td>Width of ring b</td><td>30</td><td>27.5</td></tr>
<tr><td>Height of ring h</td><td>42</td><td>39.5</td></tr>
</table>
<table>
<tr><th>Designation</th><th>Nominal dimension (mm)</th><th>Wear dimension (mm)</th></tr>
<tr><td>ø eye a</td><td>50</td><td>52.5</td></tr>
<tr><td>Width of ring b</td><td>33</td><td>31.5</td></tr>
<tr><td>Height of ring h</td><td></td><td>max. -1.5</td></tr>
</table></td><td>40 h</td></tr>
<tr><td colspan="3">Folding boom</td></tr>
<tr><td>Complete machine</td><td>Check for apparent faults</td><td>daily</td></tr>
<tr><td>Folding boom / parallelogram</td><td>Visual inspection of folding joints for zero clearance, apparent faults and wear. In case of play or lose components, have faults corrected by HORSCH Customer Service.</td><td>50 h</td></tr>
<tr><td>Folding boom</td><td>Check setting</td><td>yearly</td></tr>
<tr><td colspan="3">Wheels / brakes</td></tr>
<tr><td rowspan="3">Undercarriage / wheels</td><td>Check for damage (cracks, etc.)</td><td>daily</td></tr>
<tr><td>Check fastening / retighten wheel nuts - see above</td><td>see above</td></tr>
<tr><td>Check air pressure</td><td>daily</td></tr>
<tr><td>Bearing of wheel hub</td><td>Check clearance and adjust if necessary (must only be carried out by an expert workshop)</td><td>200 h</td></tr>
<tr><td rowspan="14">Brake system</td><td>Check condition and function</td><td>daily</td></tr>
<tr><td>Drain air reservoir</td><td>daily</td></tr>
<tr><td>Check brake lines and hoses for damages, crushing points and kinks</td><td>daily</td></tr>
<tr><td>check for leaks</td><td>200 h</td></tr>
<tr><td>Check pressure in air reservoir</td><td>200 h</td></tr>
<tr><td>Check pressure of brake cylinders</td><td>200 h</td></tr>
<tr><td>Check joints on brake valves, brake cylinders and brake linkage</td><td>200 h</td></tr>
<tr><td>Check brake settings on folding boom actuator</td><td>200 h</td></tr>
<tr><td>Inspection of brake lining</td><td>200 h</td></tr>
<tr><td>Clean the pipe filter</td><td>200 h</td></tr>
<tr><td>Check brake settings</td><td>yearly</td></tr>
<tr><td>Check parking brake Bowden cable</td><td>200 h</td></tr>
<tr><td rowspan="2">Brake drum</td><td>Check for contamination</td><td>yearly</td></tr>
<tr><td>Check tapered bolts on steering cylinder, tightening torque 85 Nm</td><td>yearly</td></tr>
<tr><td colspan="3">Suspension / steering</td></tr>
<tr><td>Diaphragm reservoir</td><td>Check hydrogen pressure</td><td>yearly</td></tr>
<tr><td>Tie rods and wishbone</td><td>Check rubber gaskets and suspension pins</td><td>600 h</td></tr>
</table>

Maintenance location	Work instructions	Interval
Optional equipment		
PTO-shaft pump	Check oil level at sight glass	daily
	Change hydraulic oil (HVLP 46) and filter	yearly
Safety installations		
Lighting and warning boards	Check condition and function	daily
Warning and safety stickers	Check that they are in place and legible	50 h
At the end of the season		
Complete machine	Perform care and cleaning work; do not spray plastic parts with oil or similar	
	Spray the piston rods of the hydraulic cylinder with a suitable corrosion protection agent	
	Check all screw and plug-and-socket-connections for firm seating (see torque table)	
	Check frame and connecting parts for condition and firm seating	
	Check electrical lines for damage and replace, if necessary.	
	Store terminal in a dry place	
Brake system	Drain air reservoir, close brake lines, check setting	

NOTES:

- The *daily* maintenance interval refers to maintenance on each working day before working with the machine
- Follow additional maintenance notes in the respective chapters.

Tapered bolts on steering cylinder

Lubrication instructions

NOTE

- Lubricate all grease nipples (keep seals clean).
- Lubricate the lubrication points on the middle section and folding boom every 50 operating hours or once every week!
- Lubricate the lubrication points on the basic machine every 100 operating hours!

Lubricate / grease the machine at the indicated intervals. Carefully clean lubrication points and grease gun before lubricating, so that no dirt is pressed into the bearings. Press the used up grease completely out of the bearings and replace it with fresh grease!

Lubricants

NOTE

- A lithium-saponified multi-purpose grease with EP additives must be used for lubrication tasks.
- Use only cleaned hydraulic oil that complies with the demanded cleanliness class:
  - Cleanliness class 9 as per NAS 1638
  - Cleanliness class 18/16/13 as per ISO 4406

Brand	Lubricant designation **Standard** working conditions
ARAL	Aralub HL 2
FINA	FINA Marson L2
ESSO	ESSO Beacon 2
SHELL	SHELL Ratinax A

Brand	Lubricant designation **Extreme** working conditions
ARAL	Aralub HLP 2
FINA	FINA Marson EPL-2
ESSO	ESSO Beacon EP 2
SHELL	Tetinax AM

Steering cylinder heads on steering axles

Besides these lubrication tasks make sure also that the steering cylinders and the supply lines are always properly bled.

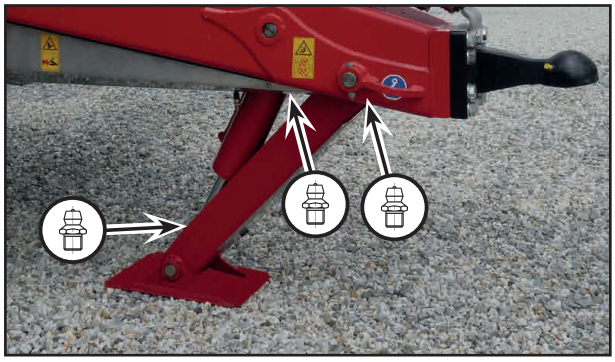
Brake shaft bearings, outer and inner

CAUTION

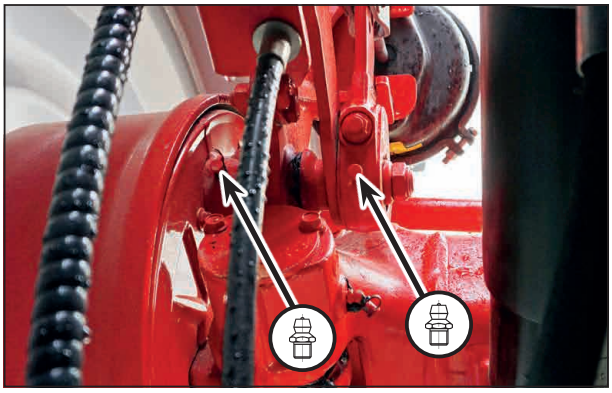
No grease or oil must enter into the brake. Use only lithium saponified grease with a dropping point higher than 190 °C.

Lubrication points (lubricating grease: DIN 51825 KP/2K-40) - Lubricate the following, number of lubrication points in brackets		
Hydraulic support	lubricate (3)	100 h
Parking brake	lubricate (1)	100 h
Steering axle	lubricate (4 on both sides)	100 h
Ball socket	lubricate (1)	100 h
PTO-shaft pump	lubricate (1)	100 h
Suspension cylinder	lubricate (4 on both sides, 2 on top, 2 on bottom)	100 h
Pendulum frame / central frame connection	lubricate (5)	50 h
Pendulum frame / central frame connection	lubricate (5)	50 h
Pendulum frame	lubricate (4)	50 h
Pendulum lock	lubricate (1)	50 h
Central frame	lubricate (2)	50 h
Central frame / middle frame tractor link arm	lubricate (2)	50 h
Parallelogram interlock cylinder	lubricate (2)	50 h
Pendulum lock cylinder	lubricate (1)	50 h
Parallelogram	lubricate (6 each on both sides)	50 h
Folding boom 5-piece double folding		
Outside wing / collision protection	lubricate (2 on both sides)	50 h
Inside wing / outside wing	lubricate (7 on both sides)	50 h
Middle section / inside wing	lubricate (5 on both sides)	50 h
Folding boom 5-piece 2-fold folding with chain		
Outside wing / collision protection	lubricate (2 on both sides)	50 h
Inside wing / outside wing	lubricate (6 on both sides + chain)	50 h
BoomControl ProPlus (optional)	lubricate (3 on both sides)	50 h
Middle section / inside wing	lubricate (5 on both sides)	50 h
Folding boom 7-piece 2-fold folding with coupling bar		
Outside wing / collision protection	lubricate (2 on both sides)	50 h
Middle wing / outside wing	lubricate (7 on both sides)	50 h
BoomControl ProPlus (optional)	lubricate (3 on both sides)	50 h
Inside wings / centre wings	lubricate (8 on both sides)	50 h
Middle section / inside wing	lubricate (4 on both sides)	50 h
Folding boom 7-piece triple folding		
Outside wing / collision protection	lubricate (2 on both sides)	50 h
Middle wing / outside wing	lubricate (7 on both sides)	50 h
BoomControl ProPlus (optional)	lubricate (3 on both sides)	50 h
Inside wings / centre wings	lubricate (7 on both sides)	50 h
Middle section / inside wing	lubricate (5 on both sides)	50 h

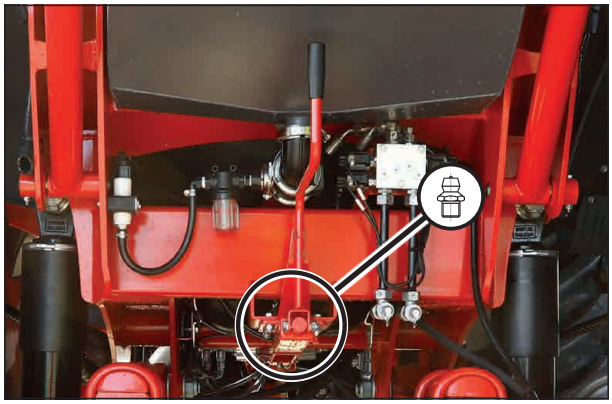
Overview of lubrication points basic machine



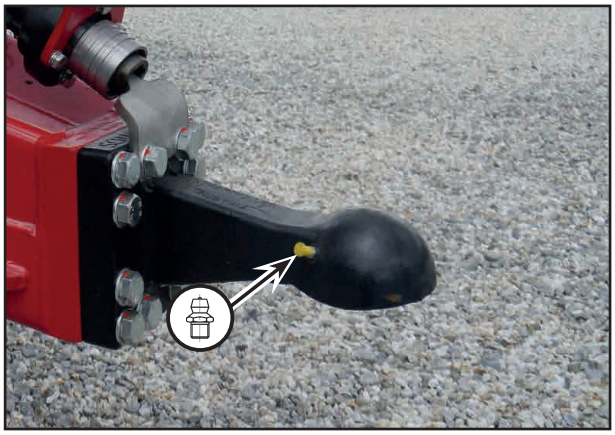
Hydraulic support



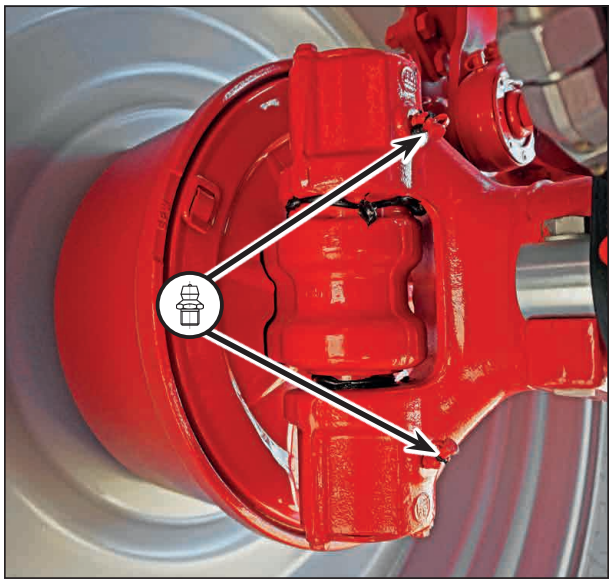
Brake lever



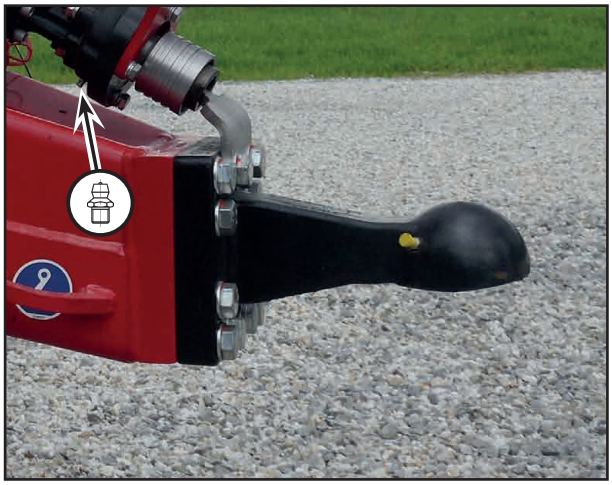
Parking brake



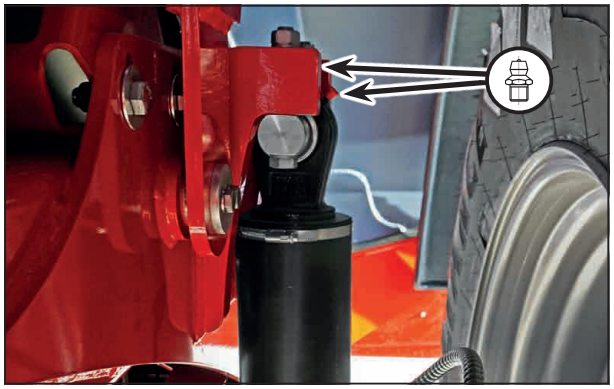
Ball socket



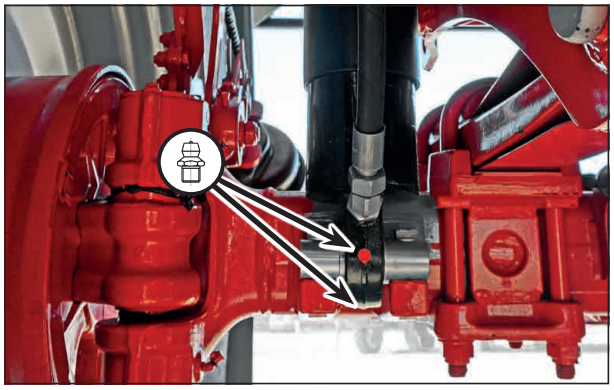
Steering axle



PTO-shaft pump



Suspension cylinder

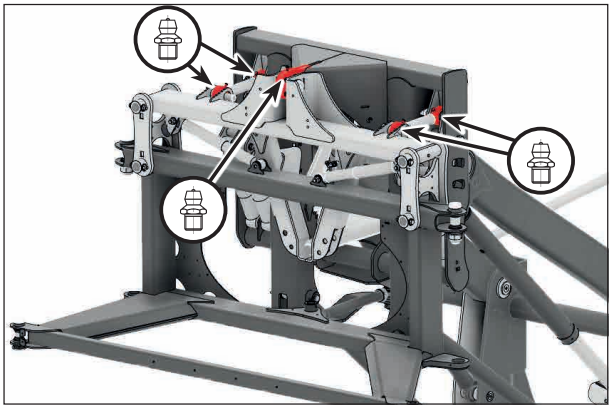


Suspension cylinder

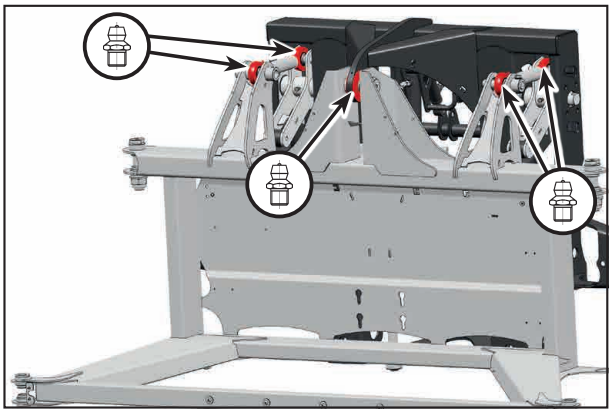
Overview of lubrication points middle section

NOTE

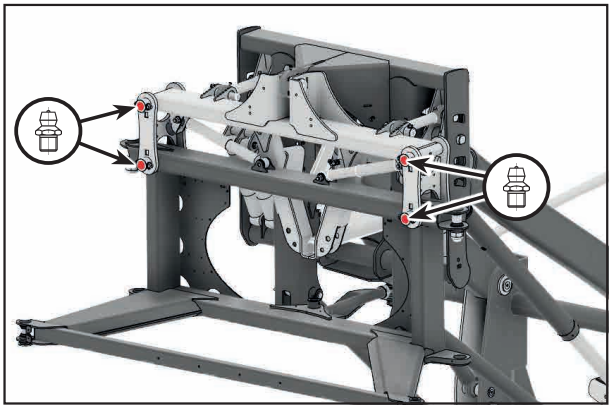
Certain lubrication points can only be reached when the folding boom is unfolded or the parallelogram is raised or lowered.



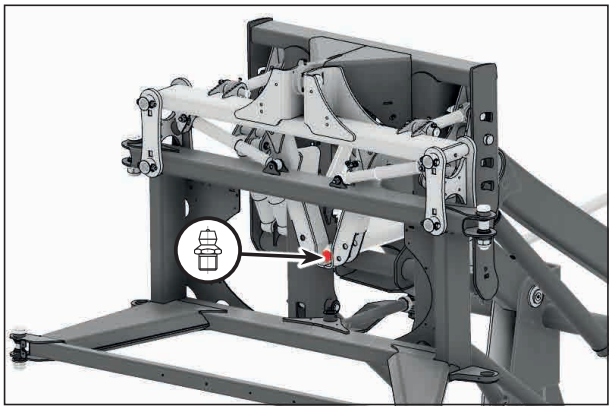
Pendulum frame / central frame connection (for folding booms over 30 m standard, for folding booms under 30 m optional)



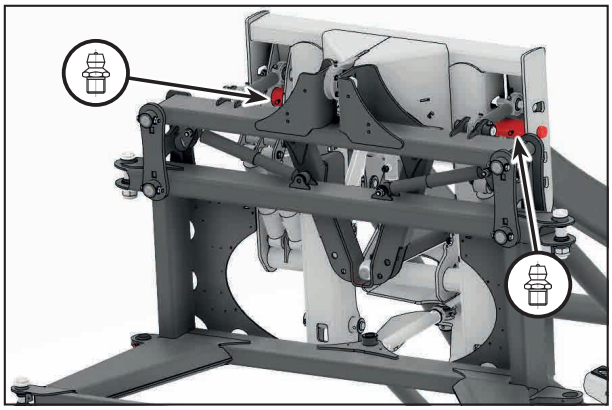
Middle frame / central frame connection (for folding booms under 30 m)



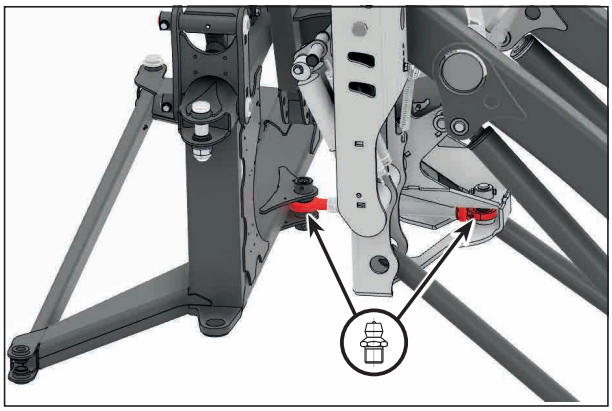
Pendulum frame (for folding booms over 30 m standard, for folding booms under 30 m optional)



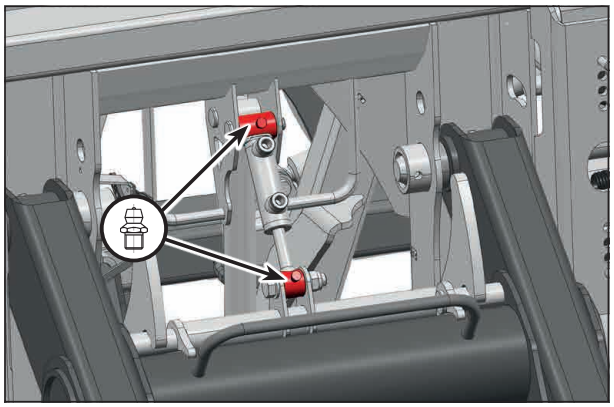
Pendulum lock



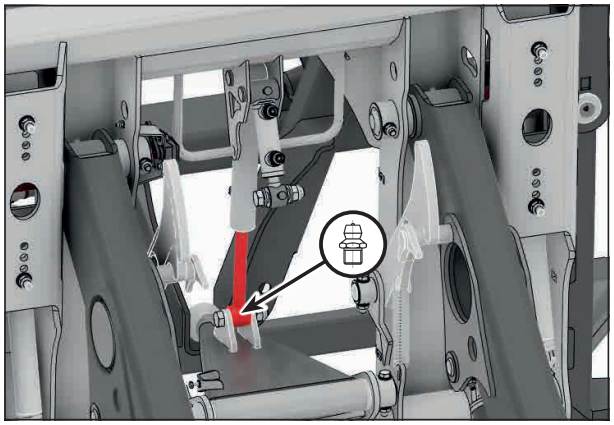
Central frame



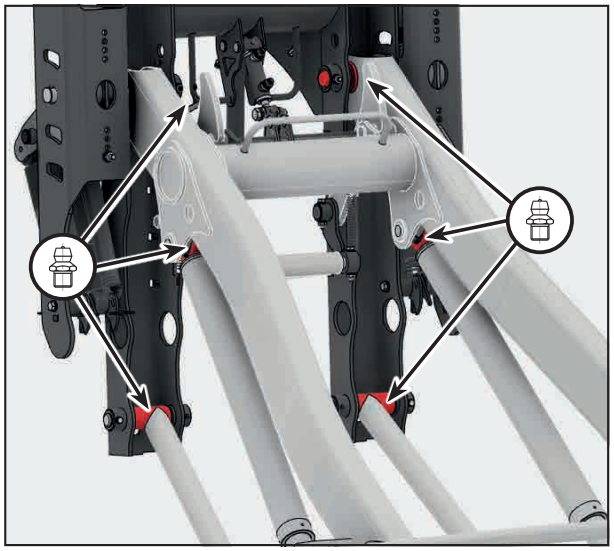
Central frame / middle frame tractor link arm



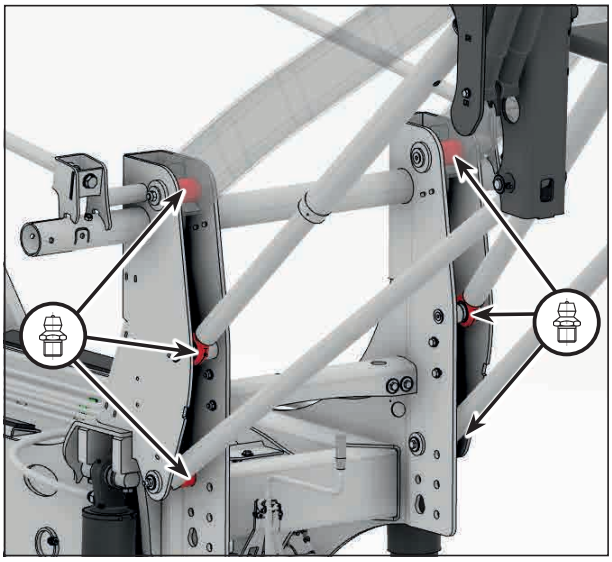
Parallelogram lock



Pendulum lock cylinder



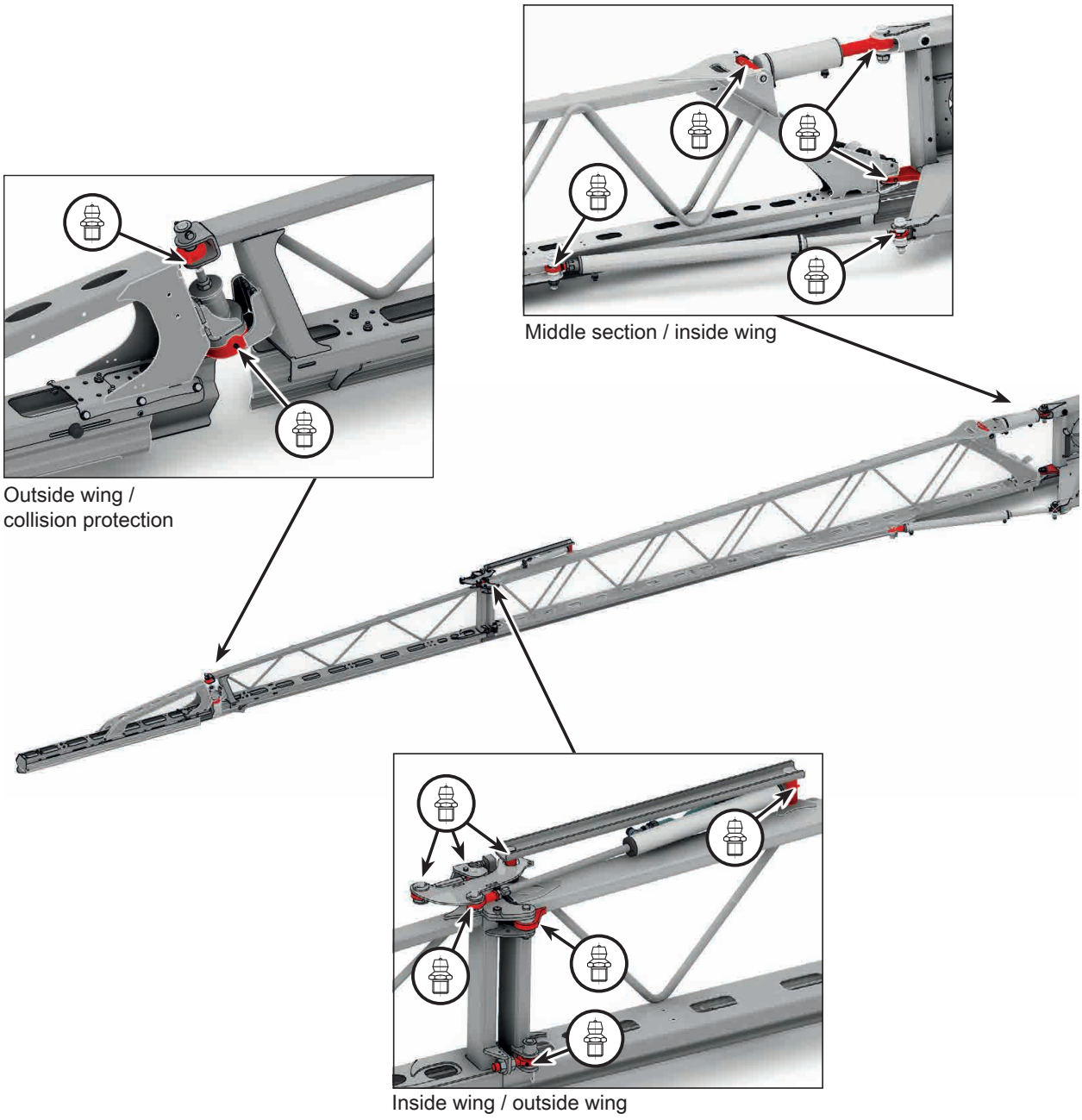
Parallelogram



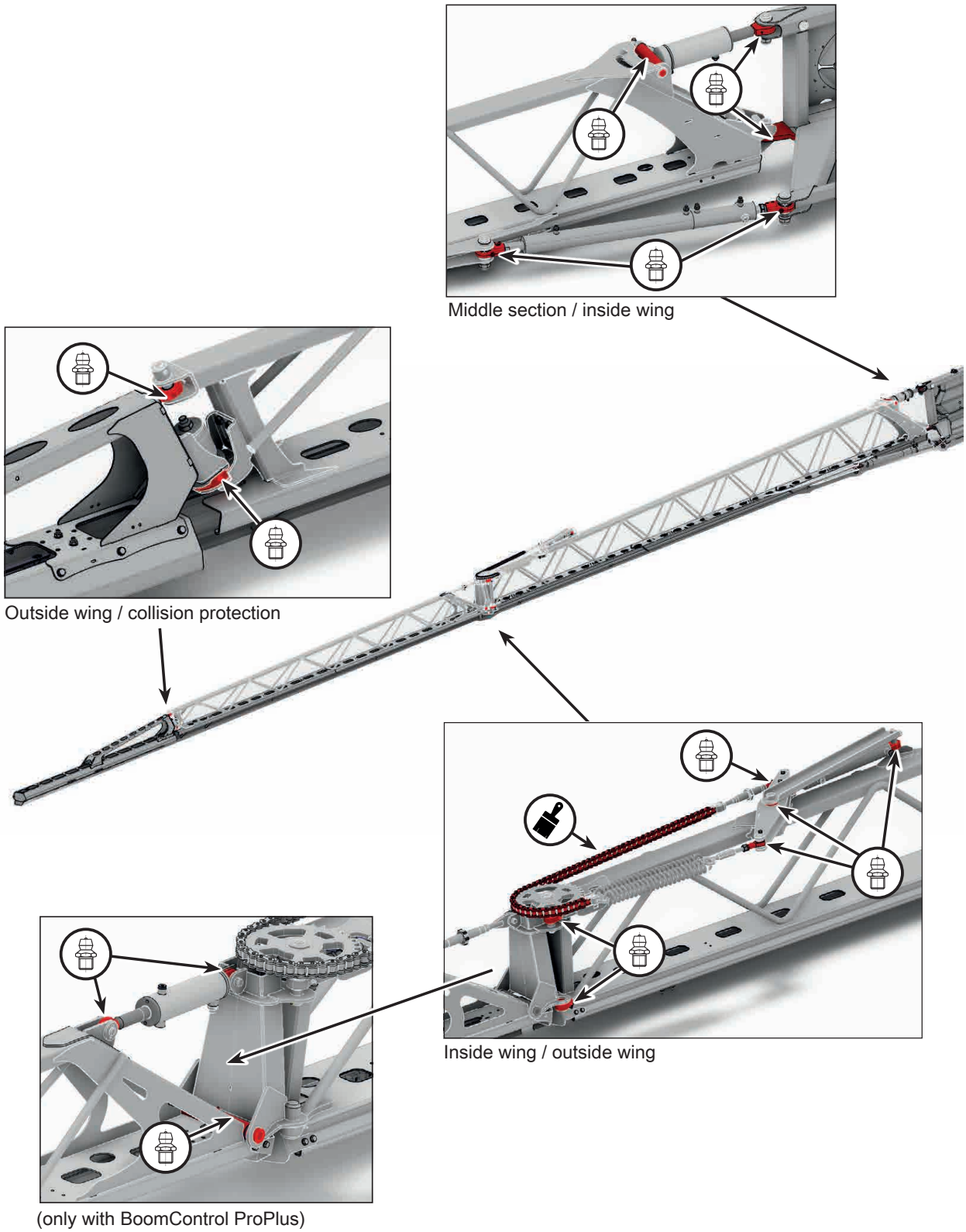
Parallelogram

Overview of folding boom lubrication points

Folding boom 5-piece double folding

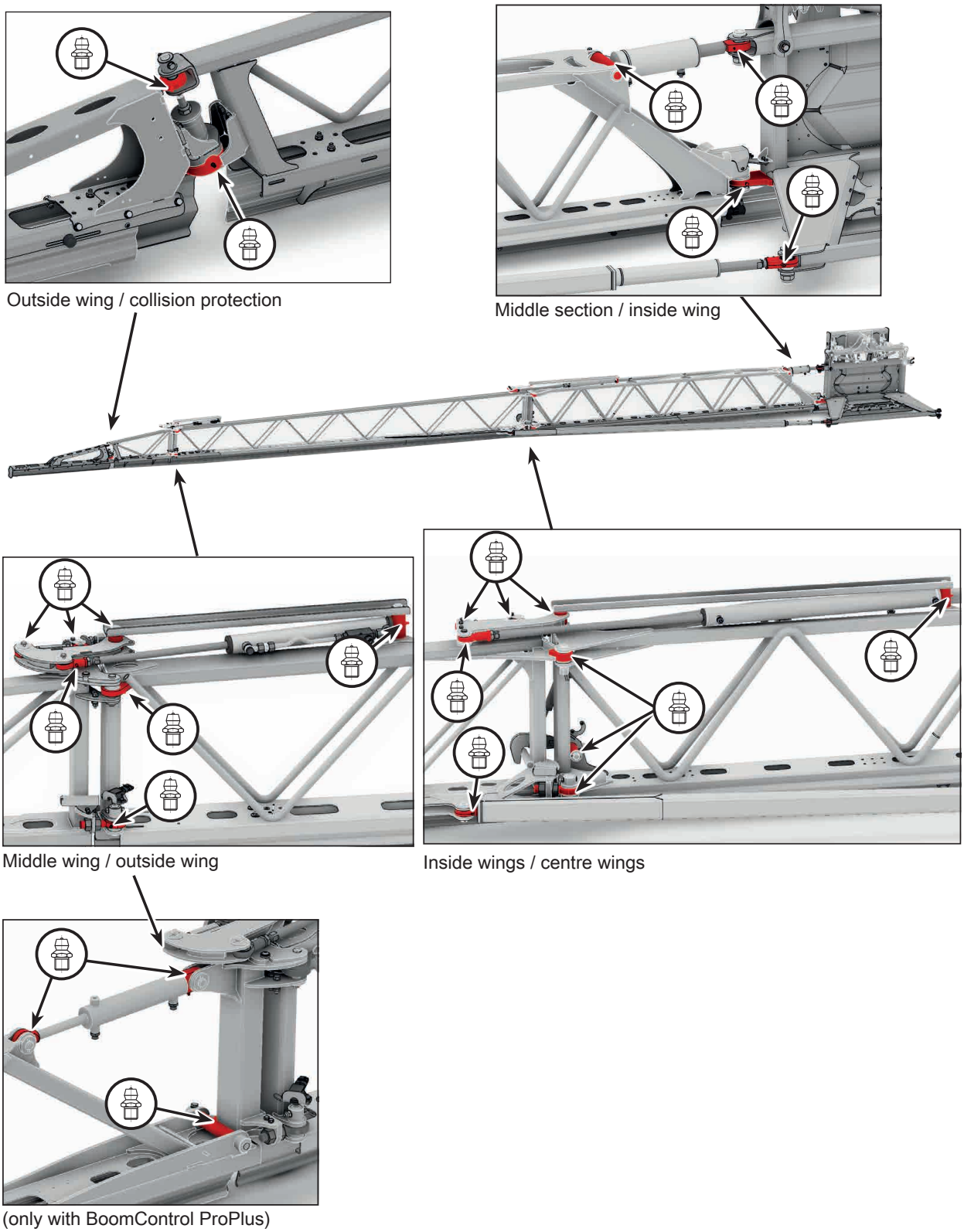


Folding boom 5-piece with chain



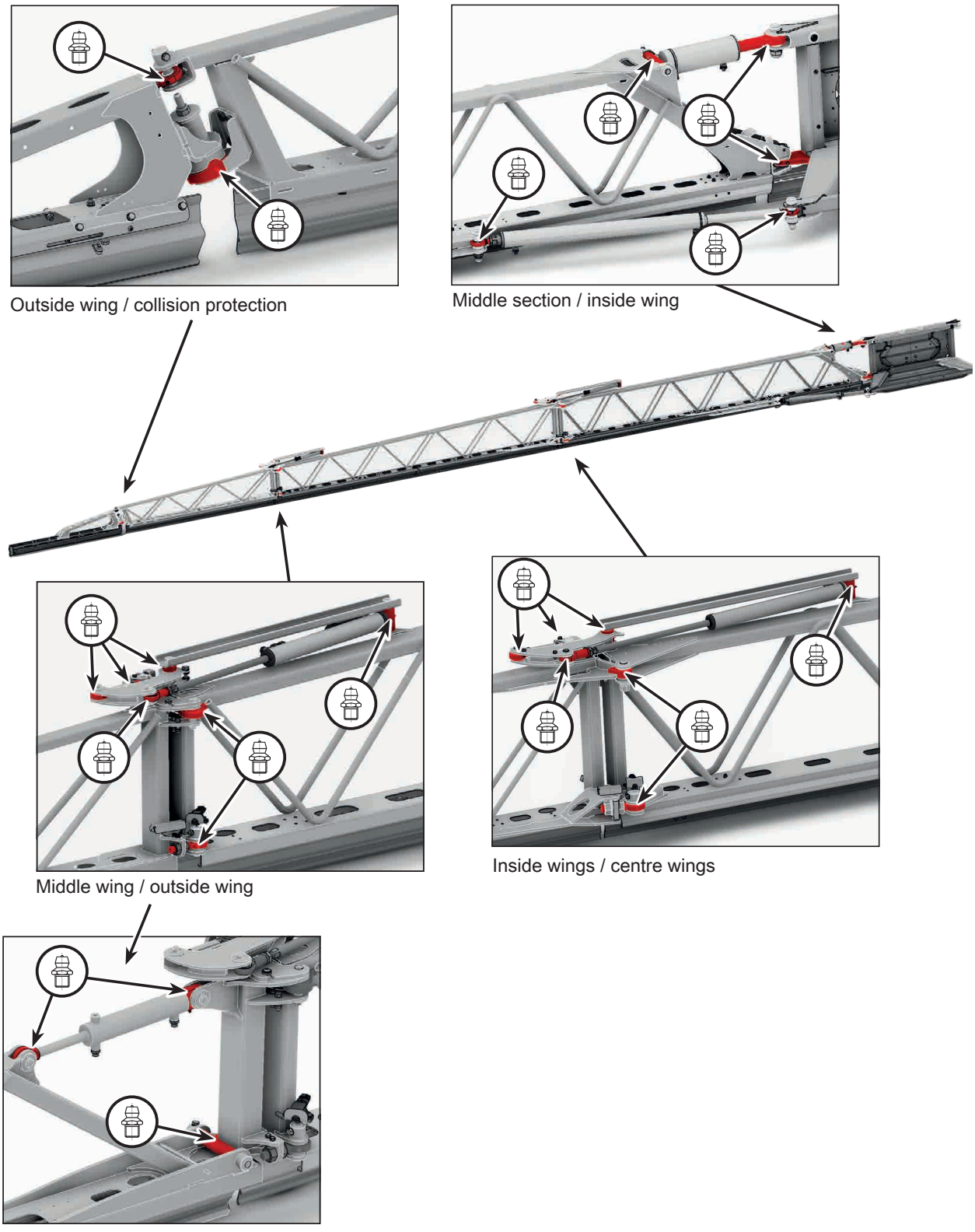
The illustration may differ depending on the design of the folding boom control. The BoomControl ProPlus comes with three additional lubrication points.

Folding boom 7-piece 2-fold folding with coupling bar



The illustration may differ depending on the design of the folding boom control. The BoomControl ProPlus comes with three additional lubrication points.

Folding boom 7-piece triple folding



The illustration may differ depending on the design of the folding boom control. The BoomControl ProPlus comes with three additional lubrication points.

Maintenance of brake system

NOTE

In order to achieve optimal braking characteristic and minimal wear of brake linings we recommend the performance of a drawing adaptation between tractor and crop protection sprayer.

- Have the drawing adaptation carried out in a specialist workshop after a reasonable running-in time of the service brake system.

WARNING

- Repair and adjustment work on the service brake system must only be performed by specially trained specialists.
- Use extreme caution when performing welding, torch cutting and drilling work near brake lines.
- After completing setting and maintenance work on the brake system you should generally perform a brake test.

NOTE

Continuously check the brakes for wear and function!

General visual inspection

WARNING

A general visual inspection of the brake system must be performed!

The following criteria must be checked and observed at this:

- Pipe, hose lines and coupling heads must not show any external damage or corrosion.
- Joints, e.g. on fork heads must be properly secured, light moving and should not be worn.

Ropes and actuating cables

- must be properly guided.
- must not show any noticeable damage.
- must not be knotted.
- Check the piston stroke on brake cylinders, adjust if necessary.

The air vessel must

- not be damaged.
- not show any external corrosion damage.

Check the brake drum for contamination (workshop work)

- Dismantle the brake drum.
- Remove any dirt and crop residues that may have entered.
- Check the condition of the brake drum and lining thickness.
- The drum must be measured when the wear edge is approached. Once the max. degree of utilisation has been reached, it must be replaced immediately.
- Reassemble the brake drum.

CAUTION

Risk of accident from dirt that has entered the brake linings! It may settle there and significantly affect the braking power.
If there is dirt inside the brake drum, the brake linings should be inspected in an expert workshop. Wheel and brake drum must be disassembled for this purpose.

Inspection of brake lining

Open the inspection opening for checking the brake lining thickness by folding the rubber tab open.
The brake lining must be replaced when the bottom edge of the wear pocket has been reached. The residual lining thickness must be at least 2 mm.
Reinsert the rubber tab again after the check.

Brake adjustment

The function and wear of the brakes must be checked continuously and adjusted, if this should be necessary.
Resetting the brake is necessary, if approx. 2/3 of the max. cylinder stroke is utilized for flat-out braking.
Adjustment work must be carried out by technical personnel of a workshop!

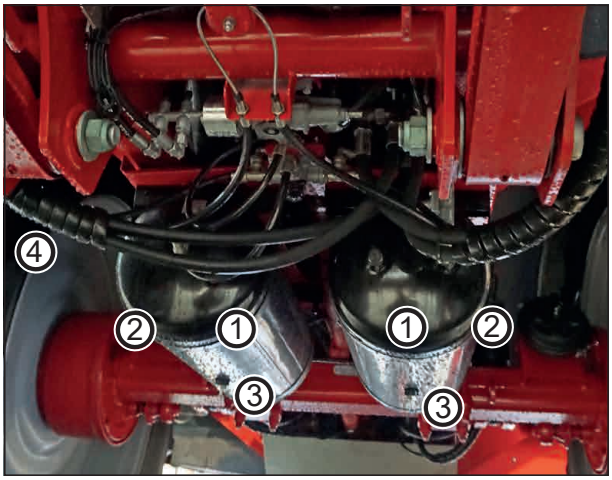
Air vessel

NOTE

The air vessel must be drained daily!

Pull the drain valve (3) until water stops running out from the air vessel through the valve.

In case of contamination unscrew the drain valve (3) from the air vessel and clean the air vessel.



1 Air vessel
2 Tension straps
3 Drain valve
4 Test port for pressure gauge

Test instructions for dual line service brake system (workshop work)

1. Leak test
   - ➢ Check all ports, pipe, hose and screw connections for leak tightness.
   - ➢ Seal any leaks.
   - ➢ Remedy chafed sections on hoses and pipes.
   - ➢ Replace porous and defective hoses.
   - ➢ The twin-line service brake system is considered leak tight if the pressure drop over a period of 10 minutes does not exceed 0.15 bar.
   - ➢ Seal any leaking locations and replace leaking valves.
2. Check pressure in compresses air vessel
   - ➢ Connect a pressure gauge to the test port on the air vessel.

     Nominal value 6.0 to $8.1^{+0.2}$ bar
3. Check the brake cylinder pressure
   - ➢ Connect a pressure gauge to the brake cylinder test port.

     Nominal value: 0.0 bar with the brake not operated
4. Visual check of brake cylinder
   - ➢ Check the brake cylinder for damage.
   - ➢ Replace damaged parts.
5. Joints on brake valves, brake cylinders and brake linkages
   - ➢ Joints on brake valves, brake cylinders and brake linkages must be light moving.
   - ➢ Lubricate or lightly oil if necessary.

Maintenance of axle

Checking the bearing play of the wheel hub (workshop work)

⚠ WARNING

Danger of crushing, shearing, cutting, cutting off, being caught, wound up, pulled in, caught and knocked by accidental starting and rolling away of the tractor-machine combination.

Secure both tractor and crop protection sprayer against accidental starting and unintended rolling before you start working on the machine.

To check the wheel hub bearing play the axle must be lifted until the tyres are off the ground. Now release the brake. Place a lever between tyres and ground and check the clearance.

Adjust the bearing play if it can be felt.

1. Dismantling the wheels and hub capsules.
2. Remove the cotter pin from the castle nut.
3. Tighten the castle nut with torque spanner (150 Nm) while turning the wheel hub. If an axle nut wrench is used for this purpose, tighten the castle nut until the freewheeling wheel hub is slightly retarded.
4. Turn the castle nut back to the next possible cotter pin hole. In case it is already aligned with the hole, turn to the next hole (max. 30°).
5. Insert the cotter pin and bent it slightly open.
6. Fill some long-term grease in the hub capsule.
7. Apply long-term grease to the thread of the capsule and knock into the wheel hub or screw down with torque spanner (500 Nm).
8. Assemble the wheels again.

Replacing the grease of the wheel hub bearing

⚠ WARNING

Danger of crushing, shearing, cutting, cutting off, being caught, wound up, pulled in, caught and knocked by accidental starting / rolling away of the tractor - machine combination or incorrect jacking of the machine.

Secure the tractor and crop protection sprayer against unintentional starting/rolling away before beginning to work on the machine. Jack up the machine in a safe condition and secure against falling!

1. Jack up the machine in a safe condition and release the brake.
2. Remove wheels and dust caps.
3. Remove the cotter pins and unscrew the axle nut.
4. Dismantle the wheel hub with brake drum, tapered roller bearing as well as sealing elements with a suitable puller off the steering knuckle.

⚠ NOTE

Mark disassembled wheel hubs and bearings to prevent mixing up during re-assembly! The inner races of the bearings with rollers must be placed on the same hub again during assembly!

5. Clean the dismantled brake. Check the brake at the same time for wear, intactness and proper function. Replace worn parts immediately. The inside of the brake must be kept free of soiling and lubricants.
6. Clean the wheel hubs thoroughly from inside and outside. Old grease must be completely removed. Clean seals and bearings also thoroughly and check if they can be reused.
7. Slightly grease the bearing seats and assemble all parts in reverse order.
8. Carefully force on the parts to a tight fit with the help of pipe bushings avoiding cocking and damages during this process.
9. Grease the bearing shall in the mounted hub.
10. Fill grease between the tapered rollers and cage of the bearing until the rollers are completely covered.
11. Remove old grease from the dust cap and clean thoroughly.
12. Fill the cap with long-term grease before reassembling it.
13. Mount the wheel hub and axle nut again.
14. Adjust the bearing and brake settings.
15. Perform a function check and corresponding test drive after the adjustment. Correct any detected deficiencies immediately.

⚠ NOTE

- For lubricating the wheel hub bearings one should only use special long-term grease with a dropping point higher than 190 °C.
- Wrong grease types and excessive quantities can cause damage.
- Mixing lithium saponified and monosodium carbonate saponified greases can cause damage because of incompatibility.

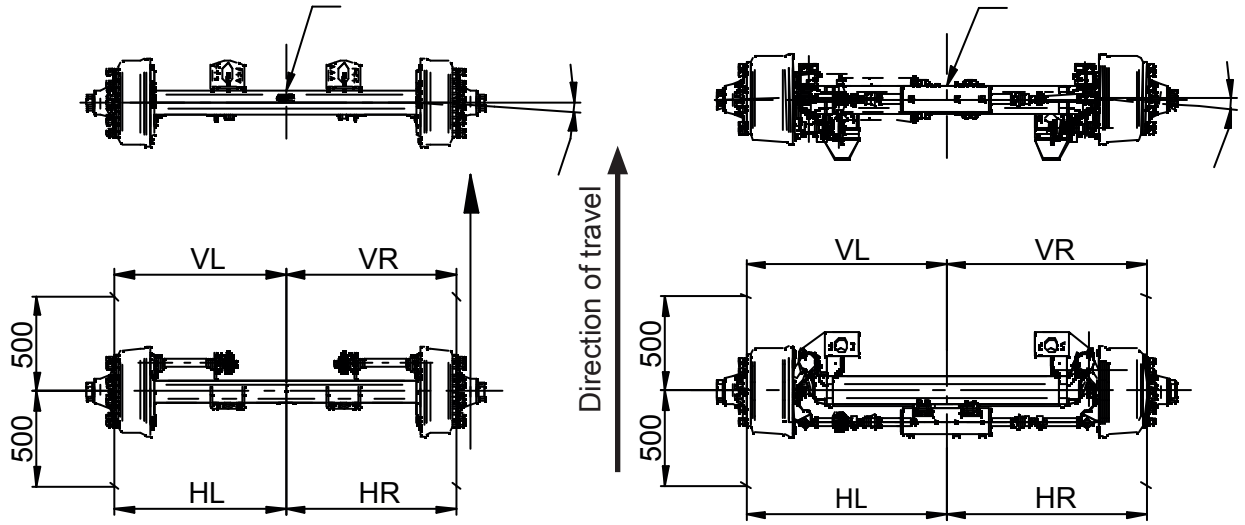
Axle adjustment (workshop work)

Below, the values for adjusting toe-in, straight position and camber on the axle are listed.

⚠ WARNING

Danger of crushing, shearing, cutting, cutting off, being caught, wound up, pulled in, caught and knocked by accidental starting and rolling away of the tractor - machine combination.

Secure both tractor and crop protection sprayer against accidental starting and unintended rolling before you start working on the machine.



Rigid axle with hollow axle body		
Toe-in	Straight position	Camber
(RL+RR) - (FL+FR)	RR-FR and RL-FL	Alpha
+1.5 / -1 mm	± 1 mm	0.5%

Steering/follow-up axle		
Toe-in	Straight position	Camber
(RL+RR) - (FL+FR)	RR-FR and RL-FL	Alpha
0 - 6 mm	± 2 mm	1.25%

Maintenance of the hydraulic system

⚠ WARNING

Danger of infection caused by high pressure hydraulic oil from the hydraulic system penetrating into the body!
Danger of severe injuries!

If injured by hydraulic oil, consult a doctor immediately!

- Work on the hydraulic system must only be performed by specialist workshops!
- Always depressurize the hydraulic system before starting work in the hydraulic system!
- Only use appropriate aids when checking for leaks!
- Never try to seal off leaking hydraulic hoses with your hands or fingers!
- Ensure correct connection of the hydraulic hoses.
- Check all hydraulic hoses and couplings regularly for damage and contamination.
- Have the hydraulic hoses inspected by an expert under safety related aspects at least once every year!
- Replace hydraulic hoses if damaged or excessively aged! Use only original hydraulic hoses from HORSCH!

⚠ NOTE

When connecting the hoses to the tractor hydraulics you must make sure that both the hydraulic systems on tractor and trailer are pressureless!

⚠ NOTE

The hydraulic cylinders must be filled again with hydraulic oil after carrying out installation work on the hydraulic system. The complete hydraulic system must subsequently be bled. This is done by selecting all hydraulic functions several times. Hydraulic cylinders must extend and retract without jerking.

- Danger zones must be blocked off during commissioning.
- When performing installation work, raised machine parts must be lowered completely, moved to a safe position or secured at the particular height by suitable means.

Even if properly stored and under permissible stress, hoses and hose connections are subject to natural ageing. This limits their shelf life and their utilization period.

Deviating from this, the utilization period can also be determined on the basis of empirical values, particularly under due consideration of the endangering potential. For hoses and hose lines made of thermoplastics other guide values may be decisive.

The utilization period of hydraulic hoses should not exceed six years, including a possible storage time of maximum two years.

Depending on the conditions of use (e.g. weather influences) or in case of higher strains on the machine the hoses may need to be replaced earlier.

- Dispose of old oil environmentally. Strictly adhere to the corresponding country-specific regulations. In case of waste disposal problems consult your oil supplier!
- Keep hydraulic oil out of the reach of children!
- Make sure that no hydraulic oil enters into the ground or into water!
- In addition, follow the country specific regulations and directives.

NOTE

Additional specifications of the hydraulic system (circuit diagrams, etc.) can be obtained from the HORSCH service department.

Inspection criteria for hydraulic hoses

NOTE

The following inspection criteria must be observed in the interest of your own safety and to reduced environmental damages!

Replace hoses, if these fulfil at least one criterion from the following list:

- Damage to the outer layer to the ply (e.g. chafing, cuts, cracks).
- Embrittlement of the outer layer (formation of cracks in the hose material).
- Deformations, which do not correspond with the natural shape of the hose. Both in pressureless and pressurized condition or in case of bending (e.g. layer separation, formation of blisters, squeezing, buckling).
- Leakages.
- Failure to comply with installation requirements.
- The max. utilization period of 6 years has expired.

  The date of manufacture on the hydraulic hose fitting plus 6 years is decisive. If the fitting is marked with the manufacturing date “2014”, the utilization period ends in January 2020. See also “Identification of hydraulic hoses”.

NOTE

Leaking hoses / pipes and connecting pieces are frequently the result of:

- missing O-rings or seals
- damaged or poorly fitted O-rings
- brittle or deformed O-rings or seals
- foreign objects
- loose hose clamps

Assembly and disassembly of hydraulic hoses

NOTE

Use only original spare hoses from HORSCH. These spare hoses withstand the chemical, mechanical and thermal loads.

- Generally use hose clamps made of V2A when installing hoses.

When installing and disassembling hydraulic hoses strictly comply with the following notes.

Generally ensure strict cleanliness!
Hydraulic hoses must generally be installed in such a way, the following is ensured under any operating condition:

- no tensile loads, except by own dead weight
- no buckling stress in case of short lengths
- no falling below the permissible bending radii
- avoiding external mechanical stresses on the hydraulic hoses
- no rubbing of hoses on components or against each other through appropriate arrangement and fastening
- if necessary, protection through protective sheathing
- covering sharp-edged components

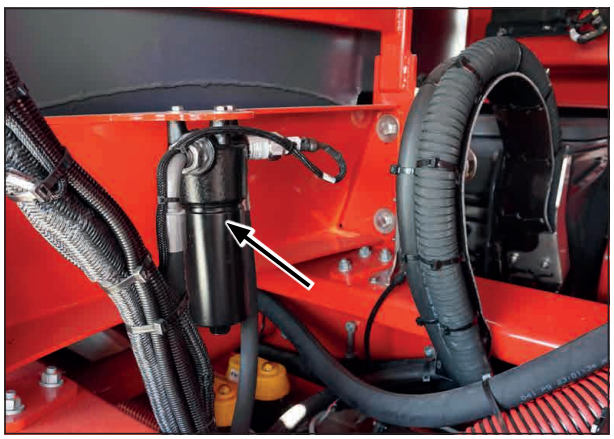
- Fasten hydraulic hoses at the intended fastening points.
- Hose clamps are to be avoided at locations where natural movements and changes of the hose length may be interfered with.
- It is not permitted to cover hydraulic hoses with paint!

NOTE

When connecting a hydraulic hose to moving parts, the length of the hose must be dimensioned in such a way that over the total movement range the bending range is not lower than permitted and/or the hydraulic hose is not additionally subjected to tensile loads.

Replacing the pressure filter of the hydraulic system

The pressure filter is located on the right hand side
of the machine under the covering. The hydraulic hoses must be without pressure during replacement. The personal protective outfit must be worn during the replacement!



Hydraulic pressure filter

1. Unscrew the housing.
2. Remove the element and dispose of properly.
3. Insert the new element.
4. Close the housing again.

Calibrating the flow meter

The flow meter is calibrated by using the tank method. A major amount of water is thereby discharged from the tank over a certain period of time.

With the help of simulated travel speed and the spraying duration the distance the machine will travel can be calculated.

Distance = travel speed x spraying duration

Multiplied with the working width gives you the area that would be processed when working with the simulated travel speed and spraying time.

Processed area = distance x working width

You can then calculate the required amount of spraying mixture and compare it with the amount actually used.

Required placing quantity =
processed area x placing quantity

The correction factor for the set pulses/100 l is thereby determined. This is the required quantity, divided by the quantity actually placed.

$$\text{Correction factor} = \frac{\text{required quantity}}{\text{placed quantity}}$$

- The value is finally corrected under parameter 457 and a new calibration is made by using the new values.

  For the crop protection sprayer the standard value is 2,100 pulses/100 l.

NOTE

for more information on the adjustment of parameters, refer to the HORSCH Terminal operating instructions.

Example:

The numerical values in the example were randomly chosen and may differ from practice.

- Machine with 36 m working width.
- Setting on terminal: 2,100 pulses / 100 l

➢ Set 200 l / ha as placing quantity.

➢ Set 10 km/h as simulated travel speed.

➢ Write down the filling level indicated by the Tank Control.

➢ Read the value under parameter 457 (pulses/100 l) in the terminal and write it down.

➢ Switch on the sprayer and run it for 15 minutes.

The distance thereby is:

10 km/h x 0.25 h = 2,500 m

Multiplying this with the working width gives you a processed area of:

2,500 m x 36 m = 90,000 m^2 = 9 ha

The product of this area and the set placing quantity results in the required amount of spraying mixture:

9 ha x 200 l/ha = 1,800 l

This value is now set into relation to the quantity actually placed. The actually placed quantity is the difference in filling level of the tank control before and after calibration.

Here the quantity actually placed is: 1,850 l

The correction factor in this case is:

$$\text{Correction factor} = \frac{1{,}800\ \text{l}}{1{,}850\ \text{l}} = 0.973$$

The placed quantity is too high, the value under parameter 457 therefore needs to be corrected.

New value (pulses/100 l):

2,100 x 0.973 = 2,043

Wheels and tyres

➢ Check the tyres regularly for damage and tight fit on the rim.

➢ Check the wheel nuts regularly for tight fit.

➢ Check the tyre pressure regularly while the tyres are cold.

Pay attention to the chapter *Maintenance*.

➢ Use only tyres and rimes approved by HORSCH.

Changing wheels

⚠ WARNING

Traffic and work accidents from improper mounting!

➢ Perform the wheel change only when the machine is hitched to the tractor and in stable position.

➢ Position the jack only at the lifting points marked.

➢ Perform the wheel change only if all tools are available.

➢ Have the wheel change performed by a qualified shop or tyre service if not fully knowledgeable about the procedure and/or not all tools are available.

➢ The wheel must be changed with two persons if no special devices (e.g. Wheel changing trolley) are available. The persons must be able to handle the wheel securely.

➢ Danger of explosion! Do not exceed the specified tire pressure, see *Maintenance overview*.

➢ Observe the tightening torque for the wheel nuts.

Required tools

- Ring spanner, with extension, if necessary
- Torque wrench
- Jack with sufficient lifting power
- Tripod trestle with sufficient permissible load capacity

Procedure

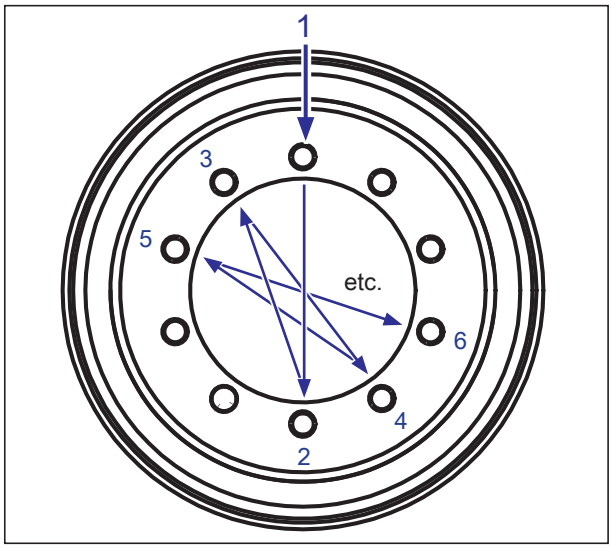
1. Park the machine on a level and paved area.
2. Engage the brake.
3. Place the jack on the side of the wheel to be changed at the jack lifting point of the axle. The jack lifting points are listed in the chapter *Safety stickers* and marked on the machine with the following stickers:

4. When using a hydraulic jack without safety lock, use a tripod trestle or similar support device in addition to secure the load against lowering.
5. Loosen the wheel nuts by half a turn.
6. Lift the axle with the jack until the wheel is clear.
7. Adjust the tripod trestle to the correct length and put it under the axle.
8. Loosen the wheel nuts and remove the wheel.

⚠ WARNING

➢ Never park the machine without securing it when the wheel(s) is/are dismantled!

9. Attach the new wheel and fasten it with the wheel nuts. Tighten all wheel nuts crosswise:



10. Remove the tripod trestle and lower the machine.
11. Tighten the wheel nuts with the torque wrench.

⚠ NOTE

➢ Retighten the wheel nuts after 10 km.

⚠ NOTE

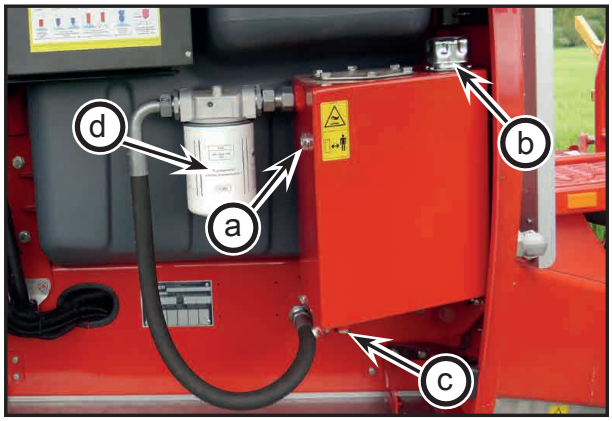
The required tightening torque of the wheel nuts is 510 Nm.

Autonomous hydraulic system (optional)

PTO-shaft pump oil change

NOTE

Wear your personal protective outfit (appropriate clothes, nitrile- / butyl gloves, safety goggles, etc.).



Oil tank

(a) Inspection glass
(b) Filling opening
(c) Drain plug
(d) Filter

1. Place a suitable collecting vessel under the drain plug.
2. Carefully unscrew the drain plug.
3. Collect the entire oil and dispose of properly.
4. Screw down the drain plug again.
5. Replace the filter.
6. Fill new oil (HVLP 46, approx. 25 litres) via the filling opening.
7. Check the oil tank daily for leaks. Check the filling level on the sight glass. The oil level shall be at half the height of the sight glass.

NOTE

Use only specified hydraulic oil. Change the oil and filter every 1200 h or annually. Do not fill in too much oil; the oil level must not be higher than half the sight glass.

Inspection of the crop protection sprayer

Sprayer testing must only be carried out by authorized bodies. The national legal inspection intervals must be complied with!

Pump capacity test

1. Connect the test hose on the pressure output (2" Camloc coupling required)

Pressure output

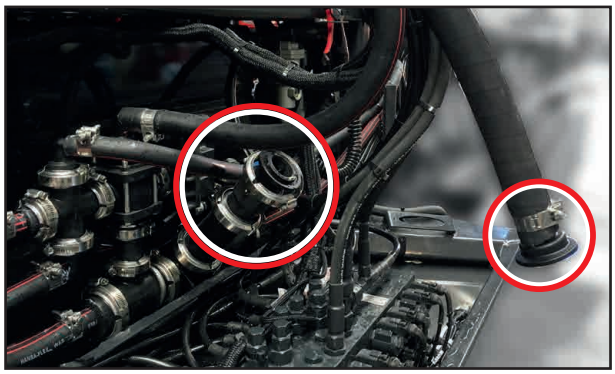
2. Open the filling valve.
3. Adjust the pressure control to 8 bar.
4. **Machines of the CCS Pro variant:** Switch on the circulation on the terminal. Adjust the rotational speed of the tractor so the pump runs at full capacity.

5. Deactivate circulation on the terminal again after the test has been completed.
6. Close the filling valve.
7. Uncouple the test hose on the pressure output.
8. Close the pressure output with the cap.

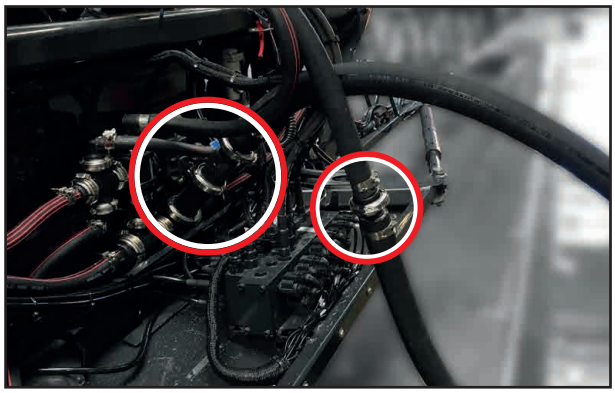
Flow meter test

➢ To test the flow meter, the test adapter set can be ordered from HORSCH.

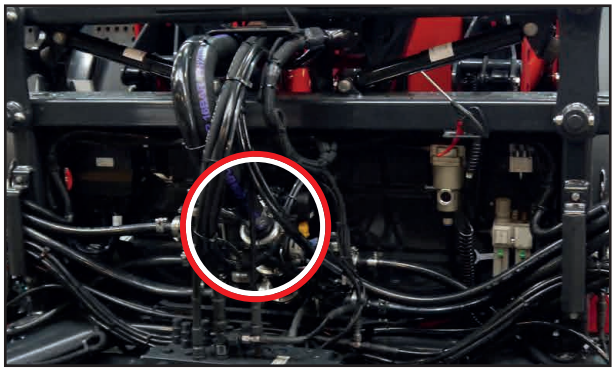
1. Disconnect the hose union to the flow meter on the middle section.



2. Connect the first hose of the test adapter set to the flow meter. Connect the second hose of the test adapter set to the dismantled hose on the flow meter.



3. Connect the two other ends of the hoses of the test adapter set to the test device.
4. To perform the test, circulation must be activated on the terminal.
5. Deactivate circulation on the terminal again after the test has been completed.
6. Uncouple both hoses of the test adapter set on the test device and on the sprayer.
7. Establish the hose connection again on the flow meter on the middle section of the machine. Ensure a correct and watertight connection!



Storage

- Clean the machine thoroughly. Chaff and dirt will attract moisture, which causes corrosion.
- To prevent the brake pads from sticking to the brake drum, apply the brake of the machine after washing until it warms up to allow any water that has entered to evaporate.
- Park the machine indoors and secure with wheel chocks against rolling away.
- Unplug the terminal and store it in a dry place.
- Protect the machine against corrosion. For spray coating use only biodegradable oils.
- Protect the hydraulic cylinder piston rods against corrosion.

NOTE

- Do not spray the plastic and rubber parts with oil or corrosion protection agent. These parts would become brittle and break.

At the end of the season

NOTE

If a high pressure cleaner is used for cleaning, **do not** direct the water jet to bearings, electrics/ electronic components and sensitive cover panels.

- Clean the filter elements of suction and pressure side.
- Lubricate the crop protection sprayer according to the lubrication plan.
- Grease the visible threads of setscrews and similar.
- Wet all lever joints and bearing points, which are not subjected to lubrication, slightly with oil.

NOTE

Make a note of all service and maintenance work that has to be done before the start of the next season and place a corresponding order with your HORSCH sales partner in due time. Your HORSCH sales partner will be in a much better position to execute the maintenance service and possibly necessary repairs outside the season.

Drain

Draining the spraying mixture container

1. Switch off all functions.
2. Open the suction filter.
3. Remove the cap on the residue drain.
4. Put a suitable collecting vessel under the drain.
5. Open the pertaining ball valve.
6. **Machines of the CCS Pro variant:** Activate the residue drain function on the external control terminal to completely drain the solution tank.
7. Empty the pressure and suction filter via the valve.
8. **Machines of the CCS Pro variant:** Deactivate the residue drain function again on the external control terminal after the complete drainage.
9. Then close the port again with the cap.
10. Properly dispose of the collected remaining solution.

Draining the fresh water tank

1. Remove the cap on the connection for fresh water filling and open the pertaining ball valve.
2. Allow the fresh water to drain.
3. Close the ball valve again at the end and closed the connection with the cap.

Putting the sprayer system into winter storage

Clean machine with fresh water

➢ See chapter *Cleaning*.

Empty the machine completely

➢ Activate the air function (optional).
➢ Drain and clean suction filter.
➢ Operate the high pressure cleaner until all water has run out (optional).
➢ Operate the "NightLight" until all water has run out (optional).
➢ Drain and clean pressure filter.
➢ Drain fluid from the compressed air vessel

➢ Empty the hand washing tank. Open the drain plug on the bottom of the tank for this purpose and then close it again.

Hand washing tank drain plug

➢ Open the cap and filling valve of the fresh water tank to drain it completely.

Open the cap and filling valve of the suction connection to fill the spraying mixture container.

Filling connections

➢ Open the cap and filling valve of direct filling to drain it completely.

Direct filling

➢ Open the cap and filling valve of the residue drain.

Residue drain

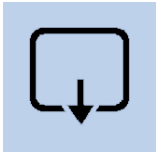
➢ Open the cap and drain valve of the pressure output to drain the port.

Pressure output

Residue drain on machines of the CCS Pro variant:

➢ Activate the *Pulling suction* function on the external control terminal for approx. 10 sec. to drain the suction connection for filling the spraying mixture container.

➢ Activate the *residue drain* function on page 3 on the external control terminal to completely drain the tank. In addition, all valves and taps will be drained.



➢ Deactivate the *residue drain* function again on the external control terminal after tank and lines have been completely drained. Close the ball valve for direct filling, filling the fresh water tank, suction connection for filling the spraying mixture container, residue drain and pressure output again. Put on the cap again for pressure output, direct filling, filling the fresh water tank, suction connection for filling the spraying mixture container and residue drain.

NOTE

Refer to the supplied HORSCH terminal operating instructions (Chapter *Winter storage of spraying system*) for the further procedure putting the sprayer system in winter storage.

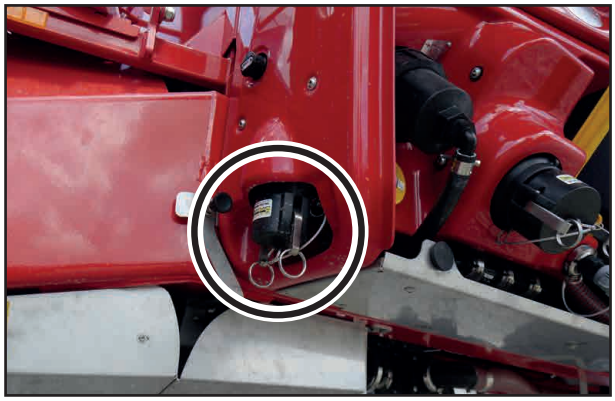
Before the new season

Before the start of the new season the machine should be thoroughly examined. A machine in technically mint condition rules out costly malfunctions during the season.
Clean the machine thoroughly from inside and outside.

➢ Let the antifreeze agent drain into a suitable collection vessel via the residue drain.

Residue drain

- Keep or dispose of anti-freeze in due form or as specified by the manufacturer.
- Drain the fluid in the pressure fitting via the pressure output (left front) also into a suitable collection vessel.



Pressure output

- Clean the spraying system thoroughly with fresh water. This is the only way of ensuring that no more antifreeze mix is present in the sprayer.

  Machines of the CCS Pro variant: Let the existing cleaning programs run through several times with fresh water.
- Completely lubricate the machine as per lubrication chart.
- Check whether all bolts have been tightened and that all cotter pins are in place.
- Check the tyre pressure!

Waste disposal

NOTE

Clean the entire crop protection sprayer thoroughly from inside and outside, before disposing of it!

Oils, greases and waste contaminated with these substances represent a great danger for the environment and must be disposed of environmentally friendly and in compliance with the corresponding legal regulations.
If necessary contact your local authorities to obtain all relevant information.

Various substances will accumulate during use and maintenance, which must be disposed of appropriately.
For the waste disposal of auxiliary and operating media as well as other chemicals you must strictly comply with the specifications in the respective safety data sheets.

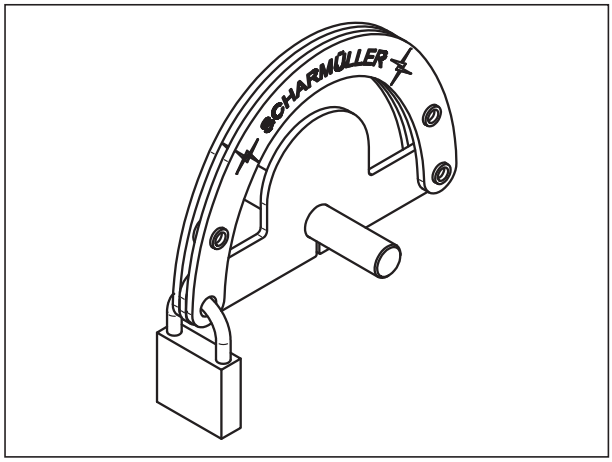
Decommissioning

If the machine is no longer suitable for use and needs to be disposed of, it must be decommissioned. All machine parts must be separated by material and passed on to environmentally friendly waste disposal or recycling. Attention must be paid to all valid regulations.

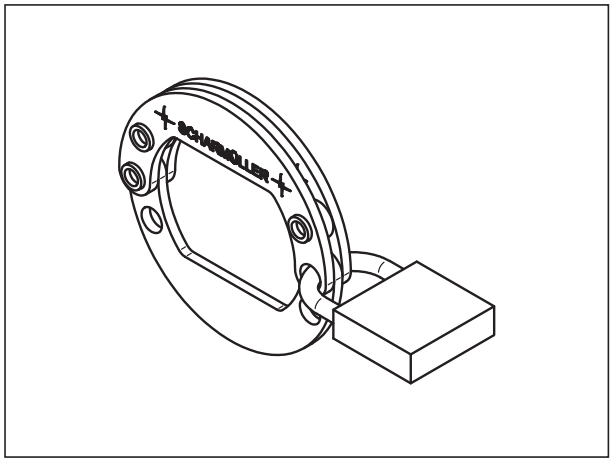
Decommissioning and waste disposal must only be carried out by operators who have been trained by HORSCH.
Contact a waste disposal company, if this should be necessary.

Protective devices

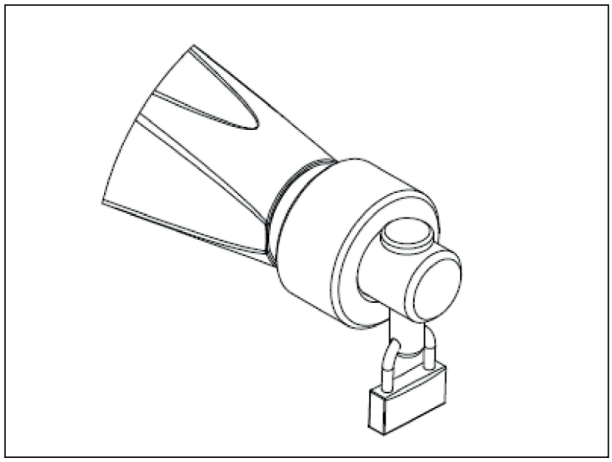
The protective devices prevent the machine against unauthorised use. The devices are mounted on the coupling device or the hitch rings and secured with a lock.



Protective device for ball head



Protective device for hitch rings



Protective device for tractor link arm hitching

Machines with lower links tool hitch are protected against unauthorised use by putting a padlock through the hole of the lower link shaft.
This makes it impossible to put a ball on the shaft and thus connect the machine to a tractor.

Appendix

Tightening torque

NOTE

- The tightening torques only serve as guidelines and are generally valid. Actual data given at the corresponding points in the operating instructions have priority.
- Screws and nuts must not be treated with lubricants, since this would change the friction value.

Metric screws

Tightening torques - metric screws in Nm							
Size ø mm	Pitch mm	Screw design - property classes					Wheel nuts
		4.8	5.8	8.8	10.9	12.9	
3	0.50	0.9	1.1	1.8	2.6	3.0	
4	0.70	1.6	2.0	3.1	4.5	5.3	
5	0.80	3.2	4.0	6.1	8.9	10.4	
6	1.00	5.5	6.8	10.4	15.3	17.9	
7	1.00	9.3	11.5	17.2	25	30	
8	1.25	13.6	16.8	25	37	44	
8	1.00	14.5	18	27	40	47	
10	1.50	26.6	33	50	73	86	
10	1.25	28	35	53	78	91	
12	1.75	46	56	86	127	148	
12	1.25	50	62	95	139	163	
14	2.00	73	90	137	201	235	
14	1.50	79	96	150	220	257	
16	2.00	113	141	214	314	369	
16	1.50	121	150	229	336	393	
18	2.50	157	194	306	435	509	
18	1.50	178	220	345	491	575	300
20	2.50	222	275	432	615	719	
20	1.50	248	307	482	687	804	
22	2.50	305	376	502	843	987	
22	1.50	337	416	654	932	1090	510
24	3.00	383	474	744	1080	1240	
24	2.00	420	519	814	1160	1360	
27	3.00	568	703	1000	1570	1840	
27	2.00	615	760	1200	1700	1990	
30	3.50	772	995	1500	2130	2500	
30	2.00	850	1060	1670	2370	2380	

Inch screws

Tightening torques - inch screws in Nm							
Screw diameter		Strength 2		Strength 5		Strength 8	
		No marks on head		3 marks on head		6 marks on head	
Inch	mm	Coarse thread	Fine thread	Coarse thread	Fine thread	Coarse thread	Fine thread
1/4	6.4	5.6	6.3	8.6	9.8	12.2	13.5
5/16	7.9	10.8	12.2	17.6	19.0	24.4	27.1
3/8	9.5	20.3	23.0	31.2	35.2	44.7	50.2
7/16	11.1	33.9	36.6	50.2	55.6	70.5	78.6
1/2	12.7	47.5	54.2	77.3	86.8	108.5	122.0
9/16	14.3	67.8	81.3	108.5	122.0	156.0	176.3
5/8	15.9	95.0	108.5	149.1	169.5	216.0	244.0
3/4	19.1	169.5	189.8	271.1	298.3	380.0	427.0
7/8	22.2	176.3	196.6	433.9	474.5	610.0	678.0
1	25.4	257.6	278.0	650.8	718.6	915.2	1017
1 1/8	28.6	359.3	406.8	813.5	908.4	1302	1458
1 1/4	31.8	508.5	562.7	1139	1261	1844	2034
1 3/8	34.9	664.4	759.3	1491	1695	2414	2753
1 1/2	38.1	881.3	989.8	1966	2237	3128	3620

Stainless steel screws

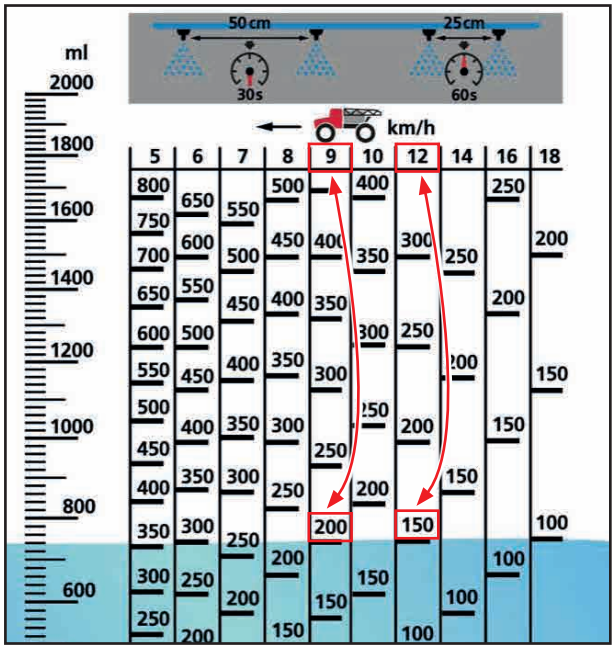
Tightening torques - stainless steel screws in Nm				
Size ø mm	Pitch mm	Screw design		
		Property class 50	Property class 70	Property class 80
5	0.80	1.7	3.5	4.7
6	1.00	3.0	6.0	8.0
8	1.25	7.1	16	22
10	1.50	14	32	43
12	1.75	24	56	75
16	2.00	59	135	180
20	2.50	114	280	370
24	3.00	198	455	605
30	3.50	393	1050	1400

HORSCH Leeb metering cup

The HORSCH Leeb metering cup is used to adjust and check agricultural spraying implements. Before starting the measurement, the field sprayer to be calibrated must be filled with clean water. Now open the nozzles with the desired settings for placing the crop protection agents. All nozzles should always be opened during setting or checking.

Determining the placing quantity in l/ha

To determine the placing quantity, the HORSCH Leeb metering cup is held under a spraying nozzle of the field sprayer for 30 seconds at 50 cm nozzle spacing and for 60 seconds at 25 cm nozzle spacing. The pump must be switched on for the entire period and the placing quantity set on the terminal must not be changed. Now place the metering cup on a level surface. The fluid level indicates the measured placing quantity at different travel speeds.



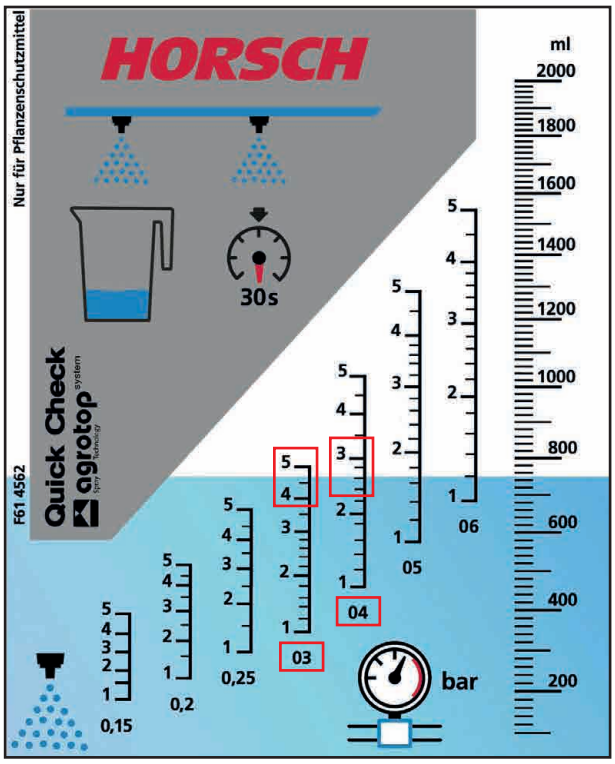
The example shows: 150 l/ha at 12 km/h or 200 l/ha at 9 km/h etc.

- Placing quantity too high, lower spraying pressure.
- Placing quantity too low, increase spraying pressure.

Nozzle selection and control

The fluid level, which indicates the placing quantity in l/ha on one side of the HORSCH Leeb metering cup, shows at the same time on the other side of the measuring cup with which nozzle size and at which spraying pressure this placing quantity is reached.

- At a nozzle distance of 50 cm the respective nozzle sizes can be read off directly.
- At a nozzle distance of 25 cm the respective nozzle sizes must be halved.



Example: The previous fluid level indicates that at 50 cm nozzle distance the desired placing quantity of 150 l/ha is achieved at 12 km/h with nozzle size 04 (red) at 2.7 bar or with nozzle size 03 (blue) at 4.8 bar etc. Accordingly, with a nozzle spacing of 25 cm, the placing quantity of 150 l/ha at 12 km/h is achieved with nozzle size 02 (yellow) at 2.7 bar or with nozzle size 015 (green) at 4.8 bar.

All values apply to water with a temperature of 15 °C and the pressure measured at the nozzle. As a rule, the spraying pressure displayed at the terminal is slightly higher, as pressure losses occur between the fittings and nozzles.

Liquid fertiliser operation

At present there are mainly two different types of liquid fertiliser available:

- Ammonium nitrate - carbonyl diamide solution (AHL) with 28 kg N per 100 kg AHL.
- An NP-solution 10-34-0 with 10 kg N and 34 kg P_2O_5 per 100 kg NP-solution.

When using flat jet nozzles the corresponding values for the application quantity (l/ha) from the spraying table must be multiplied with 0.88 for AHL and 0.85 for NP-solution. The listed application quantities (l/ha) apply only for water.

The following is generally valid:

Place liquid fertiliser in the form of coarse drops to prevent burning of plants. Excessively large drops will roll off the leaf and small drops enhance the magnifying glass effect.
Due to the salt concentration in the fertiliser, excessive application of fertiliser can cause burning on the leaves.

3-jet nozzles (optional)

The use of 3-jet nozzles for the application of liquid fertiliser is beneficial if the liquid fertiliser is to enter into the plant through the roots rather than through the leaf.

The nozzle orifice integrated in the nozzle with its opening ensures an almost pressureless, coarse drop distribution of the liquid fertiliser. This prevents the generation of undesired spray mist and the formation of small droplets. The coarse drops created by the 3-jet nozzle hit the plants with low energy and roll off their surface.

Even though damage caused by burning is almost completely prevented, one should not use 3-jet spray nozzles for late top dressing, but use trailed hoses instead.

Only use the black bayonet nuts for all the following 3-jet nozzles.

Various 3-jet nozzles and their fields of application (at 8 km/h)	
3 - jet - yellow	50 - 80 l/ha (AHL)
3 - jet - red	80 - 126 l/ha (AHL)
3 - jet - blue	115 - 180 l/ha (AHL)
3 - jet - white	155 - 267 l/ha (AHL)

NOTE

The pump must be flushed with fresh water after each liquid fertiliser operation. If not flushed with fresh water, the pump seals may become damaged!

Conversion table for spraying liquid fertiliser AHL

(Ammonium nitrate - carbonyl diamide solution)

NOTE

When filling pay attention to the different densities [kg/l] of the individual fluids and the permissible payload of the crop protection sprayer!

N	Sol. N	Sol. N	N	Sol. N	Sol. N	N	Sol. N	Sol. N
kg	litre	kg	kg	litre	kg	kg	litre	kg
10	27.8	35.8	70	194.5	250.0	130	361.0	465.0
12	33.3	42.9	72	200.0	257.2	132	367.0	471.0
14	38.9	50.0	74	204.9	264.2	134	372.0	478.0
16	44.5	57.1	76	211.6	271.8	136	378.0	485.0
18	50.0	64.3	78	216.5	278.3	138	384.0	493.0
20	55.5	71.5	80	222.1	285.8	140	389.0	500.0
22	61.6	78.5	82	227.9	292.8	142	394.0	507.0
24	66.7	85.6	84	233.3	300.0	144	400.0	515.0
26	75.0	92.9	86	233.3	307.5	146	406.0	521.0
28	77.8	100.0	88	242.2	314.1	148	411.0	529.0
30	83.4	107.1	90	250.0	321.7	150	417.0	535.0
32	89.0	114.2	92	255.7	328.3	155	431.0	554.0
34	94.5	121.4	94	261.2	335.8	160	445.0	572.0
36	100.0	128.7	96	266.7	342.7	165	458.0	589.0
38	105.6	135.9	98	272.0	350.0	170	472.0	607.0
40	111.0	143.0	100	278.0	357.4	175	486.0	625.0
42	116.8	150.0	102	283.7	364.2	180	500.0	643.0
44	122.2	157.1	104	285.5	371.8	185	514.0	660.0
46	127.9	164.3	106	294.2	378.3	190	527.0	679.0
48	133.3	171.5	108	300.0	386.0	195	541.0	696.0
50	139.0	178.6	110	305.6	393.0	200	556.0	714.0
52	144.6	186.0	112	311.1	400.0			
54	150.0	193.0	114	316.5	407.5			
56	155.7	200.0	116	322.1	414.3			
58	161.1	207.3	118	328.0	421.0			
60	166.7	214.2	120	333.0	428.0			
62	172.3	221.7	122	339.0	436.0			
64	177.9	228.3	124	344.0	443.0			
66	183.4	235.9	126	350.0	450.0			
68	188.9	243.0	128	356.0	457.0			

Density: 1.28 kg/l, i.e. approx. 28 kg N for 100 kg liquid fertiliser or
36 kg N for 100 litres liquid fertiliser at 5 - 10 °C

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All details on technical specifications and pictograms are approximate and for information only. Subject to technical product revisions.

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