

# Operating Manual

## **AMAZONE**

### **Pantera 4001**

Self-propelled field sprayer



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MG4122  
BAG0093.7 02.14  
Printed in Germany

**en**

**Please read this operating  
manual before commissioning.  
Keep it in a safe place  
for future use.**



# *Reading the instruction*

*Manual and following it should seem to be inconvenient and superfluous as it is not enough to hear from others and to realize that a machine is good, to buy it and to believe that now everything should work by itself. The person in question would not only harm himself but also make the mistake of blaming the machine for possible failures instead of himself. In order to ensure success one should enter the mind of a thing, make himself familiar with every part of the machine and get acquainted with how it's handled. Only in this way could you be satisfied both with the machine and with yourself. This goal is the purpose of this instruction manual.*

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*Leipzig-Plagwitz 1872. Rud. Sark.*

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**Identification data**

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Please insert the identification data of the machine. The identification data are arranged on the type plate.

Machine ID no.:

Type: Pantera 4001

Year of manufacture:

Factory:

Basic weight (kg):

Permissible total weight (kg):

Maximum load (kg):

Engine number

---

**Manufacturer's address**

---

AMAZONEN-WERKE

H. DREYER GmbH & Co. KG

Postfach 51

D-49202 Hasbergen, Germany

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Fax: + 49 (0)5405 501-234

E-mail: amazone@amazone.de

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**Spare part orders**

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Spare parts lists are freely accessible in the spare parts portal at [www.amazone.de](http://www.amazone.de).

Please send orders to your AMAZONE dealer.

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**Formalities of the operating manual**

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## Foreword

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## Foreword

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Dear Customer,

You have chosen one of the quality products from the wide product range of AMAZONEN-WERKE, H. DREYER GmbH & Co. KG. We thank you for your confidence in our products.

On receiving the machine, check to see if it has been damaged during transport or if parts are missing. Using the delivery note, check that the machine has been delivered in full, including any special equipment ordered. Damage can only be rectified if problems are signalled immediately.

Before commissioning, read and understand this operating manual, and particularly the safety information. Only after careful reading will you be able to benefit from the full scope of your newly purchased machine.

Please ensure that all the machine operators have read this operating manual before the machine is commissioned.

Should you have any questions or problems, please consult this operating manual or contact your local service partner.

Regular maintenance and timely replacement of worn or damaged parts increases the lifespan of your machine.

## User evaluation

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Dear Reader,

We update our operating manuals regularly. Your suggestions for improvement help us to create ever more user-friendly manuals. Send us your suggestions by fax.

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# **1 User Information**

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The User Information section provides information on use of the operating manual.

## **1.1 Purpose of the document**

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This operating manual

- describes the operation and maintenance of the machine.
- provides important information on safe and efficient handling of the machine.
- is a component part of the machine and should always be kept with the machine or the towing vehicle.
- Keep it in a safe place for future use.

## **1.2 Locations in the operating manual**

---

All the directions specified in the operating manual are always seen in the direction of travel.

## **1.3 Diagrams**

---

### **Instructions and responses**

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Activities to be carried out by the user are given as numbered instructions. Always keep to the order of the instructions. The response to an instruction is given by an arrow. Example:

1. Instruction 1  
→ Machine response to instruction 1
2. Instruction 2

### **Lists**

---

Lists without an essential order are shown as a list with bullets. Example:

- Point 1
- Point 2

### **Item numbers in diagrams**

---

Numbers in round brackets refer to items in diagrams. The first number refers to the diagram and the second number to the item.

Example: (Fig. 3/6)

- Figure 3
- Item 6

## 2 General safety instructions

---

This section contains important information on safe operation of the machine.

### 2.1 Obligations and liability

---

#### Comply with the instructions in the operating manual

---

Knowledge of the basic safety information and safety regulations is a basic requirement for safe handling and fault-free machine operation.

#### Obligations of the operator

---

The operator is obliged only to let those people work with/on the machine who

- are aware of the basic workplace safety information and accident prevention regulations.
- have been instructed in working with/on the machine.
- have read and understood this operating manual.

The operator is obliged

- to keep all the warning symbols on the machine in a legible state.
- to replace damaged warning symbols.

#### Obligations of the user

---

Before starting work, anyone charged with working with/on the machine is obliged

- to comply with the basic workplace safety instructions and accident prevention regulations.
- to read and follow the "General safety information" section of this operating manual.
- to read the section "Warning symbols and other labels on the machine" (page 16) of this operating manual and to follow the safety instructions represented by the warning symbols when operating the machine.
- If you still have queries, please contact the manufacturer.

## General safety instructions

---

### Risks in handling the machine

---

The machine has been constructed to the state-of-the art and the recognised rules of safety. However, operating the machine may cause risks and restrictions to

- the health and safety of the user or third parties,
- the machine,
- other property.

Only use the machine

- for the purpose for which it was intended.
- in a perfect state of repair.

Eliminate any faults immediately which could impair safety.

### Guarantee and liability

---

Our "General conditions of sales and delivery" are always applicable. These shall be available to the operator, at the latest on conclusion of the contract. Guarantee and liability claims for damage to people or property will be excluded if they can be traced back to one or more of the following causes:

- Improper use of the machine.
- Improper installation, commissioning, operation and maintenance of the machine.
- Operation of the machine with defective safety equipment or improperly attached or non-functioning safety equipment.
- Non-compliance with the instructions in the operating manual regarding commissioning, operation and maintenance.
- Unauthorised design changes to the machine.
- Insufficient monitoring of machine parts which are subject to wear.
- Improperly executed repairs.
- Disasters through the impact of foreign bodies and Acts of God.

## 2.2 Representation of safety symbols

Safety instructions are indicated by the triangular safety symbol and the highlighted signal word. The signal word (danger, warning, caution) describes the severity of the risk, and carries the following meaning:



### **DANGER**

Indicates an immediate high risk which will result in death or serious physical injury (loss of body parts or long term damage) if not avoided.

If the instructions are not followed, then this will result in immediate death or serious physical injury.



### **WARNING**

Indicates a medium risk, which could result in death or (serious) physical injury if not avoided.

If the instructions are not followed, then this may result in death or serious physical injury.



### **CAUTION**

Indicates a low risk which could cause minor or medium level physical injury or damage to property if not avoided.



### **IMPORTANT**

Indicates an obligation to special behaviour or an activity required for proper machine handling.

Non-compliance with these instructions can cause faults on the machine or disturbance to the environment.



### **NOTE**

Indicates handling tips and particularly useful information.

These instructions will help you to use all the functions of your machine in the best way possible.

## 2.3 Organisational measures

---

The operator must provide the necessary personal protective equipment as per the information provided by the manufacturer of the crop protection agent to be used, such as:

- Chemical-resistant gloves,
- Chemical-resistant overalls,
- Water-resistant footwear,
- A face mask,
- Breathing protection,
- Safety glasses;
- Skin protection agents, etc.



The operating manual

- must always be kept at the place at which the machine is operated.
- must always be easily accessible for the user and maintenance personnel.

Check all safety equipment regularly.

## 2.4 Safety and protection equipment

---

Before starting up the machine each time, all the safety and protection equipment must be properly attached and fully functional. Check all safety and protection equipment regularly.

### Faulty safety equipment

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Faulty or disassembled safety and protection equipment can lead to dangerous situations.

## 2.5 Informal safety measures

---

As well as all the safety information in this operating manual, comply with the general, national regulations pertaining to accident prevention and environmental protection.

When driving on public roads and routes you should comply with the statutory road traffic regulations.



## 2.6 User training

Only those people who have been trained and instructed may work with/on the machine. The operator must clearly specify the responsibilities of the people charged with operation and maintenance work.

People being trained may only work with/on the machine under the supervision of an experienced person.

Activity \ Person	Person specially trained for the activity	Trained operator	Persons with specialist training (specialist workshop*)
Loading/Transport	X	X	X
Commissioning	--	X	--
Set-up, tool installation	--	--	X
Operation	--	X	--
Maintenance	--	--	X
Troubleshooting and fault elimination	X	--	X
Disposal	X	--	--

Legend:

X..permitted --..not permitted

- 1) A person who can assume a specific task and who can carry out this task for an appropriately qualified company.
- 2) Instructed persons are those who have been instructed in their assigned tasks and in the possible risks in the case of improper behaviour, have been trained if necessary, and have been informed about the necessary protective equipment and measures.
- 3) People with specialist technical training shall be considered as a specialist. Due to their specialist training and their knowledge of the appropriate regulations, they can evaluate the work with which they have been charged and detect possible dangers.

Comment:

A qualification equivalent to specialist training can be obtained from several years' experience in the relevant field.



If maintenance and repair work on the machine is additionally marked "Workshop work", only a specialist workshop may carry out such work. The personnel of a specialist workshop shall possess the appropriate knowledge and suitable aids (tools, lifting and support equipment) for carrying out the maintenance and repair work on the machine in a way which is both appropriate and safe.

## 2.7 Safety measures in normal operation

Only operate the machine if all the safety and protection equipment is fully functional.

Check the machine at least once a day for visible damage and check the function of the safety and protection equipment.

## 2.8 Danger from residual energy

Note that there may be residual mechanical, hydraulic, pneumatic and electrical/electronic energy on the machine.

Use appropriate measures to inform the operating personnel. You can find detailed information in the relevant sections of this operating manual.

## 2.9 Maintenance and repair work, fault elimination

Carry out prescribed setting, maintenance and inspection work in good time.

Secure all media such as compressed air and the hydraulic system against unintentional start-up.

Carefully fix and secure larger assemblies to lifting gear when carrying out replacement work.

Check all the screw connections for firm seating. On completion of the maintenance work, check the function of the safety devices.

## 2.10 Design changes

You may make no changes, expansions or modifications to the machine without the authorisation of AMAZONEN-WERKE. This also applies when welding support parts.

Any expansion or modification work shall require the written approval of AMAZONEN-WERKE. Only use modification and accessory parts approved by AMAZONEN-WERKE so that the type approval, for example, remains valid in accordance with national and international regulations.

Vehicles with an official type approval or with equipment connected to a vehicle with a valid type approval or approval for road transport according to the German road traffic regulations must be in the state specified by the approval.



### **WARNING**

**Risk of crushing, cutting, being trapped or drawn in, or impact through the failure of support parts.**

It is strictly forbidden to

- drill holes in the frame or on the running gear.
- increase the size of existing holes on the frame or the running gear.
- weld support parts.

### **2.10.1 Spare and wear parts and aids**

---

Immediately replace any machine parts which are not in a perfect state.

Only use genuine AMAZONE spare and wear parts, or those approved by AMAZONEN-WERKE, so that the type approval remains valid according to the national and international regulations. The use of spare and wear parts from third parties does not guarantee that they have been constructed in a way as to meet the requirements placed on them.

AMAZONEN-WERKE shall accept no liability for damage caused by the use of non-approved spare and wear parts or aids.

### **2.11 Cleaning and disposal**

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Handle and dispose of any materials used carefully, in particular

- when carrying out work on lubrication systems and equipment and
- when cleaning using solvents.

### **2.12 User workstation**

---

The machine may only be operated by one person sitting in the driver's seat of the tractor.

Otherwise no other person must remain in the cabin or on the machine when driving.

The helpers seat must only be used for manoeuvring trips.

Drive the machine only when wearing the seat belt.

## 2.13 Warning symbols and other signs on the machine



Always keep all the warning symbols on the machine clean and in a legible state. Replace illegible warning symbols. You can obtain the warning symbols from your dealer using the order number (e.g. MD 078).

### Warning symbols - structure

Warning symbols indicate danger areas on the machine and warn against residual dangers. At these points, there are permanent or unexpected dangers.

A warning symbol consists of two fields:



#### Field 1

is a symbol describing the danger, surrounded by triangular safety symbol.

#### Field 2

is a symbol showing how to avoid the danger.

### Warning symbols - explanation

The column **Order number and explanation** provides an explanation of the neighbouring warning symbol. The description of the warning symbols is always the same and specifies, in the following order:

1. A description of the danger.  
For example: risk of cutting
2. The consequence of non-compliance with the risk avoidance instructions.  
For example: causes serious injuries to fingers or hands.
3. Risk avoidance instructions.  
For example: only touch machine parts when they have come to a complete standstill.

## 2.13.1 Positions of warning symbols and other labels

### Warning symbols

The following diagrams show the arrangement of the warning symbols on the machine.

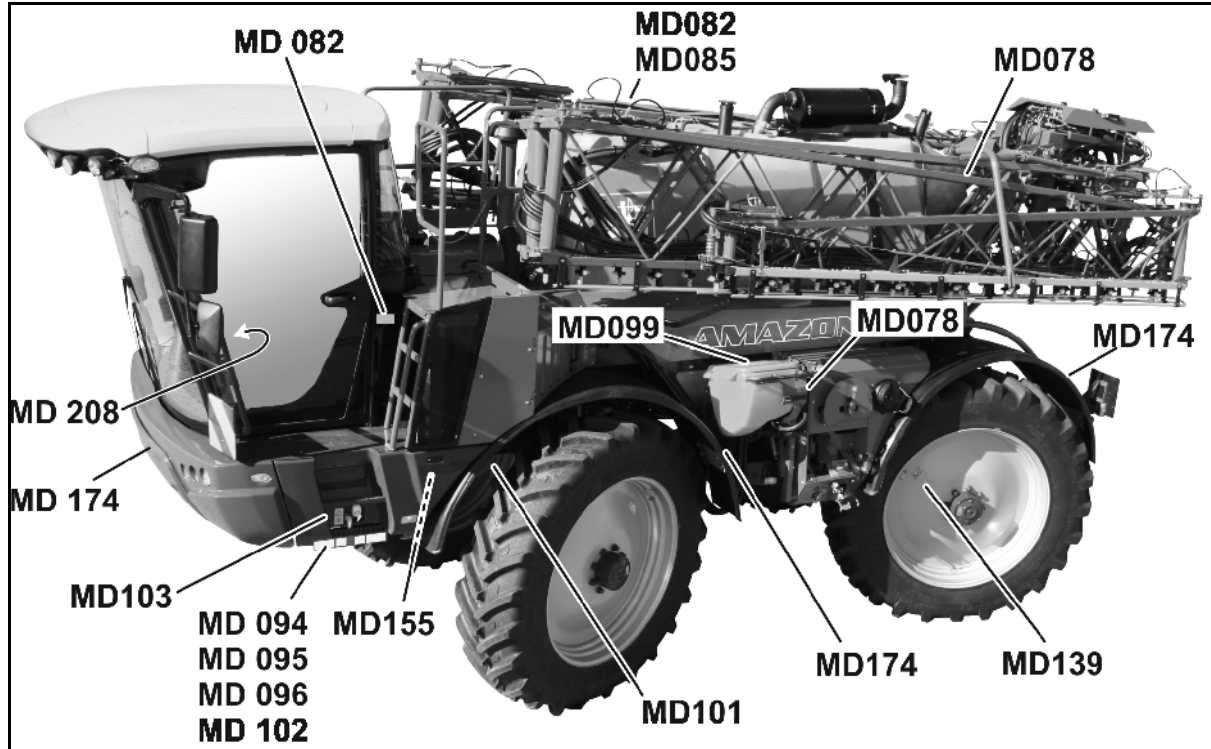


Fig. 1

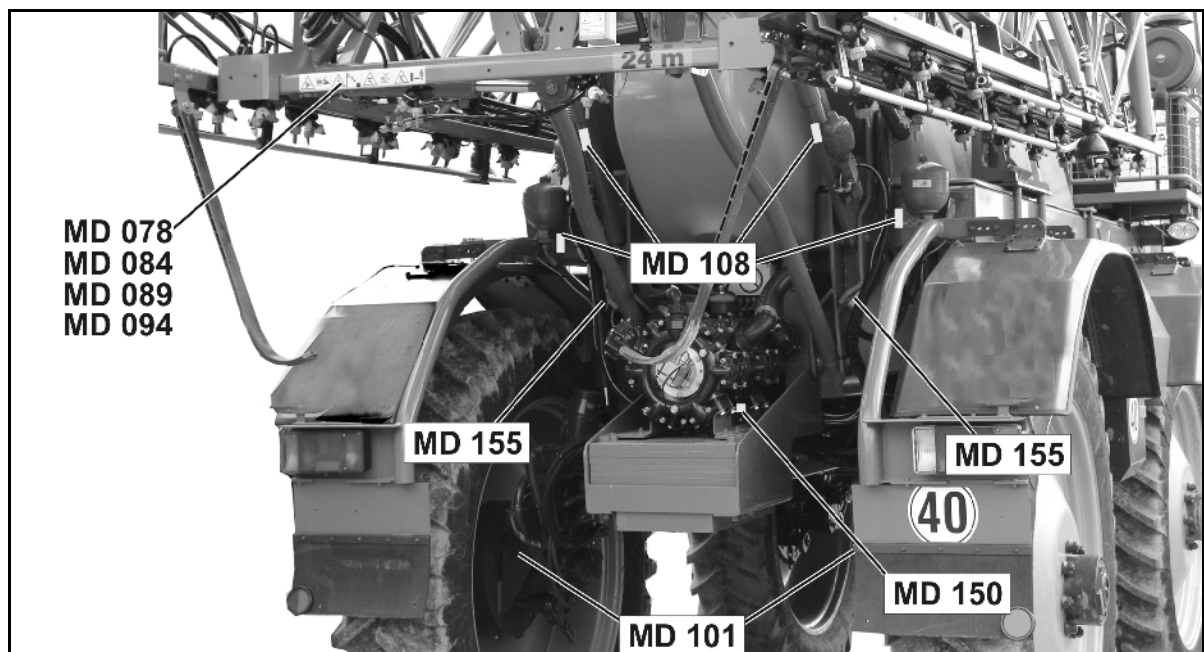


Fig. 2

Order number and explanation

Warning symbols

**MD 078**

**Risk of crushing fingers or hands by accessible moving machine parts.**

This danger causes serious injuries, including loss of body parts such as fingers or hand.

Never reach into the danger area while the tractor engine is running and the PTO shaft / hydraulic system is connected.



**MD 082**

**Danger of falling from treads and platforms when riding on the machine.**

This danger causes serious or potentially fatal injuries anywhere on the body.

It is forbidden to ride on the machine and/or climb the machine while it is running. This also applies to machines with treads or platforms.

Make sure that nobody is riding on the machine.



**MD 084**

**Risk of crushing the entire body due to standing in the swivel range when machine parts are being lowered.**

This danger can cause extremely serious and potentially fatal injuries.

- It is forbidden to stand in the swivel range of the machine when machine parts are being lowered.
- Instruct personnel to leave the swivel range of any machine parts which can be lowered before you lower the parts.

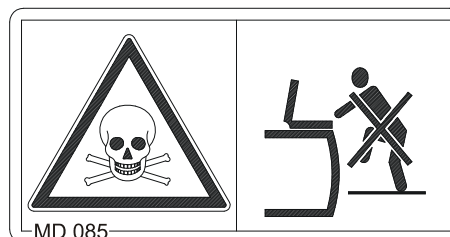


**MD 085**

**Vergiftungsgefahr durch giftige Dämpfe im Spritzbrühe-Behälter!**

Diese Gefährdung verursacht schwerste Verletzungen bis hin zum Tod.

Steigen Sie niemals in den Spritzbrühe-Behälter.

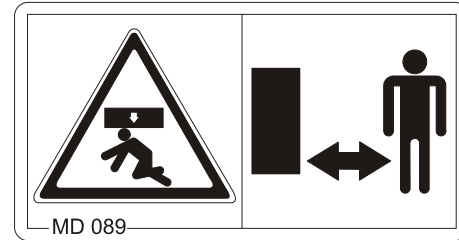


### MD 089

**Risk of crushing the entire body due to standing under suspended loads or raised machine parts.**

This danger can cause extremely serious and potentially fatal injuries.

- It is forbidden to stand under suspended loads or raised machine parts.
- Maintain an adequate safety distance from any suspended loads or raised machine parts.
- Ensure that all personnel maintain an adequate safety distance from suspended loads or raised machine parts.

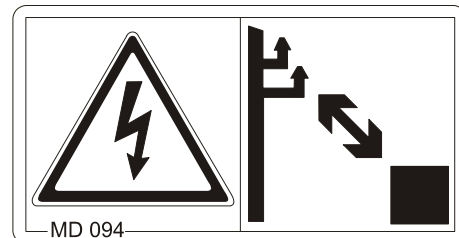


### MD 094

Risk of electric shock or burns from accidentally touching overhead power lines or by coming within the prohibited distance of high voltage overhead power lines.

This danger causes serious or potentially fatal injuries anywhere on the body.

Maintain a sufficient distance from electrical overhead cables when swinging any parts of the machine in and out.



Nominal voltage	Safety distance from transmission lines
up to 1 kV	1 m
over 1 up to 110 kV	2 m
over 110 up to 220 kV	3 m
over 220 up to 380 kV	4 m

up to 1 kV	1 m
over 1 up to 110 kV	2 m
over 110 up to 220 kV	3 m
over 220 up to 380 kV	4 m

### MD 095

Read and follow the operating manual and safety information before starting up the machine!



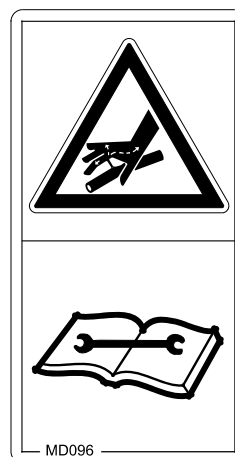
## General safety instructions

### MD 096

#### **Danger from escaping high-pressure hydraulic fluid due to leaking hydraulic hose lines.**

This danger may cause serious injuries, perhaps even resulting in death, if escaping high-pressure hydraulic fluid passes through the skin and into the body.

- Never attempt to plug leaks in hydraulic hose lines with your hand or fingers.
- Read and observe the information in the operating manual before carrying out maintenance work on the hydraulic hose lines.
- If you are injured by hydraulic fluid, contact a doctor immediately.

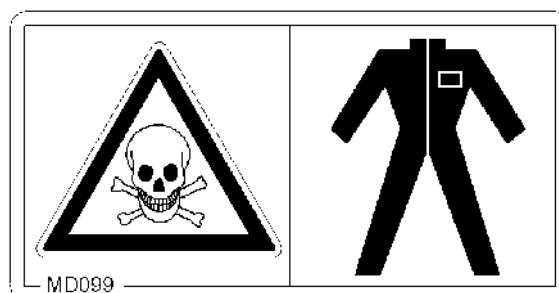


### MD 099

#### **Risk of contact with hazardous materials due to improper handling.**

This danger can cause extremely serious and potentially fatal injuries.

Before coming into contact with hazardous materials, put on protective clothing. Follow the manufacturer's safety instructions for the materials to be processed



### MD101

This symbol indicates jacking points for lifting gear (jack).



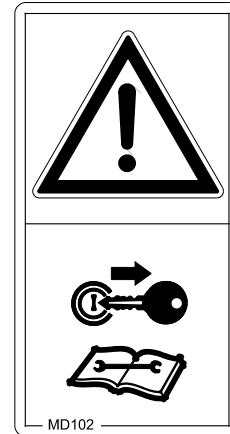


### MD 102

**Danger from intervention in the machine, e.g. installation, adjusting, troubleshooting, cleaning, maintaining and repairing, due to the tractor and the machine being started unintentionally and rolling.**

These dangers can cause extremely serious and potentially fatal injuries.

- Secure the tractor and the machine against unintentional start-up and rolling before any intervention in the machine.
- Depending on the type of intervention, read and observe the instructions in the appropriate sections of the operating manual.



### MD 103

**Risk of contact with hazardous materials due to improper use of clear fresh water from the hand wash tank.**

This danger can cause extremely serious and potentially fatal injuries.

Never use the clear fresh water from the hand wash tank as drinking water.

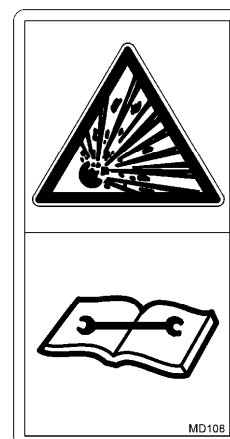


### MD 108

**Risk of explosion, or danger from hydraulic fluid escaping under high pressure, caused by the pressure accumulator which is under pressure from gas and oil.**

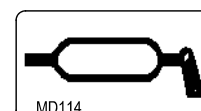
These dangers can cause serious and potentially fatal injuries if highly pressurised, escaping hydraulic fluid penetrates the skin and passes into the body.

- Read and observe the instructions in the operating manual before carrying out any maintenance or repair work.
- If you are injured by hydraulic fluid, contact a doctor immediately.



### MD 114

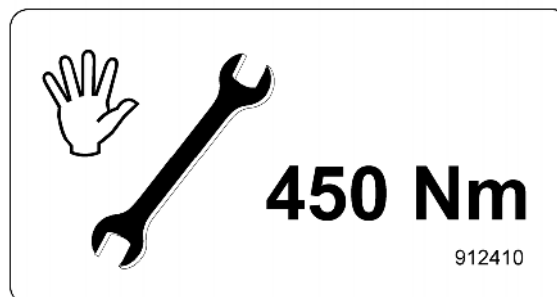
This symbol indicates a lubrication point



## General safety instructions

### MD139

The torque for the bolt connection is 450 Nm.

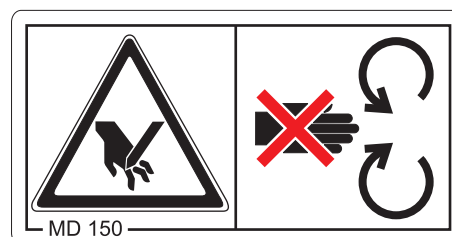


### MD 150

**Danger of your fingers and hands being cut or cut off by moving parts involved in the working process!**

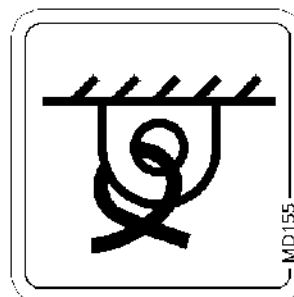
This hazard can cause extremely serious injuries resulting in the loss of limbs.

Never open or remove safety devices of moving parts that take part in the working process when the tractor's engine is running with the hydraulic and electrical system connected.



### MD 155

This icon designates the restraint points for tying the machine to a transport vehicle allowing the machine to be transported in a safe manner.

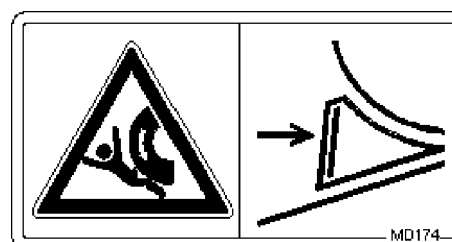


### MD 174

Danger from unintended continued movement of the machine.

Causes serious, potentially fatal injuries anywhere on the body.

Secure the machine against unintended continued movement before uncoupling the machine from the tractor. To do this, use the parking brake and/or the wheel chock(s).

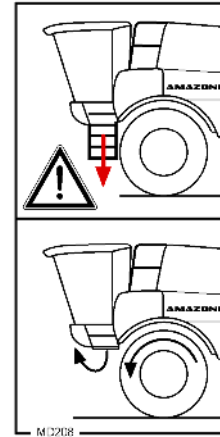


**MD208**

**Hazard caused by falling down from the machine when leaving the cabin resulting from the ladder not being slewed down!**

This danger can result in extremely serious injuries.

Slew down the ladder before leaving the cabin.



## 2.14 Potential risks from not observing the safety instructions

Non-compliance with the safety information

- can pose both a danger to people and also to the environment and machine.
- can lead to the loss of all warranty claims.

In particular, non-compliance with the safety information could pose the following risks:

- Danger to people through non-secured working areas.
- Failure of important machine functions.
- Failure of prescribed methods of maintenance and repair.
- Danger to people through mechanical and chemical influences.
- Risk to the environment through leakage of hydraulic fluid.

## 2.15 Safety-conscious working

Besides the safety information in this operating manual, the generally applicable national workplace safety and accident prevention regulations are binding.

Comply with the accident prevention instructions on the warning symbols.

When driving on public roads and routes, comply with the appropriate statutory road traffic regulations.

## 2.16 Safety information for users



### WARNING

**Risk of crushing, cutting, being trapped or drawn in, or impact through inadequate roadworthiness and operational safety.**

Before starting up the machine and the tractor, always check their roadworthiness and operational safety.

### 2.16.1 General safety and accident prevention information

- Beside these instructions, comply with the generally applicable national safety and accident prevention regulations.
- The warning symbols and other labels attached to the machine provide important information on safe machine operation. Compliance with this information is in the interests of your safety.
- Before moving off and starting up the machine, check the immediate area of the machine (children). Ensure that you can see clearly.
- Drive in such a way that you always have full control over the tractor with the attached machine.  
In so doing, take your personal abilities into account, as well as the road, traffic, visibility and weather conditions, the driving characteristics of the tractor and the connected machine.

### Use of the machine

- Before the engine is started, convince yourself that all drives are switched off.
- Before starting work, ensure that you understand all the equipment and actuation elements of the machine and their function. There is no time for this when the machine is already in operation.
- Do not wear loose-fitting clothing. Loose clothing increases the risk of being caught by the drive shaft.
- Only start-up the machine, when all the safety equipment has been attached and is in the safety position.
- Before starting work on the machine, check for damage or wear as well as leaking coolant or spray fluids. Check nuts and bolts regularly for tightness and re-tighten if necessary
- Comply with the maximum load for the machine. If necessary, drive only with a partially filled tank.
- The driving behaviour of the machine is influenced by the weight in the tank.
- It is forbidden to stand in the working area of the machine.
- It is forbidden to stand in the turning and swivel range of the machine.

- There are crushing and cutting points at externally-actuated (e.g. hydraulic) machine points.
- Only actuate externally-actuated machine parts when you are sure that no-one is standing within the prescribed safety distance.
- Take note of the working width when driving the machine, no obstacles should be in the way especially when driving on headlands with the sprayer boom folded out.
- Before leaving the tractor, secure it against unintended starting and rolling.  
To do this:
  - apply the parking brake
  - switch off the tractor engine
  - remove the ignition key
- Operation of the machine is carried out only when sitting down.
- Use only those fuels specified according to DIN / EN 590.

---

**Driving on public roads**

---

- When using public roads, national road traffic regulations must be observed.
- Adjust your driving speed to the prevailing conditions.
- Driving on slopes is permitted until a certain inclination! Where possible, driving should be performed vertically to the contours. Special care should be taken during wet weather conditions.
- Drive with great care in case of narrow track widths!
- Before starting up the machine each time, always check their traffic and operational safety.

### 2.16.2 Hydraulic system

---

- The hydraulic system is under a high pressure.
- Before working on the hydraulic system,
  - depressurise the hydraulic system
  - shut off the tractor engine
  - apply the parking brake
  - remove the ignition key
- Have the hydraulic hose lines checked at least once a year by a specialist for proper functioning.
- Replace the hydraulic hose lines if they are damaged or worn. Only use AMAZONE original hydraulic hose lines.
- The hydraulic hose lines should not be used for longer than six years. This period includes any storage time of a maximum of two years. Even with proper storage and approved use, hoses and hose connections are subject to natural ageing, thus limiting the length of use. However, it may be possible to specify the length of use from experience values, in particular when taking the risk potential into account. In the case of hoses and hose connections made from thermoplastics, other guide values may be decisive.
- Never attempt to plug leaks in hydraulic hose lines with the hand or fingers.

Escaping high pressure fluid (hydraulic fluid) may pass through the skin and ingress into the body, causing serious injuries.  
If you are injured by hydraulic fluid, contact a doctor immediately.  
Danger of infection.
- When searching for leakage points, use suitable aids, to avoid the serious risk of infection.
- The pressure accumulator in the system is always under pressure (gas and oil). Thus, take care that they are not damaged or exposed to temperatures higher than 150° Celsius.
- After connecting the hydraulic hoses, always make a check of the direction of function and therefore, the engine or direction of motion of the cylinder are still correct.

### 2.16.3 Electrical system

- When working on the electrical system, always disconnect the battery (negative terminal).
- Only use the prescribed fuses. If fuses are used that are too highly rated, the electrical system will be destroyed – risk of fire.
- Risk of explosion. Avoid sparking and naked flames in the area of the battery.
- Ensure that the battery is connected correctly - firstly connect the positive terminal and then connect the negative terminal. When disconnecting the battery, disconnect the negative terminal first, followed by the positive terminal.
- Always place the appropriate cover over the positive battery terminal. If there is accidental earth contact, there is a risk of explosion
- The machine may be equipped with electronic components whose function is influenced by electromagnetic interference from other units. Such interference can pose risks to people, if the following safety information is not followed.
  - If retrofitting electrical units and/or components on the machine with a connection to the on-board power supply, the user is responsible for checking whether the installation might cause faults on the vehicle electronics or other components.
  - Ensure that the retrofitted electrical and electronic components comply with the EMC directive 2004/108/EC in the appropriate version and bear the CE mark.
- The cable clips must be checked for tight fit on a regular basis. Corrosion to cable connections will lead to the loss of tension. Clean and grease with acid-free Vaseline.
- The battery acid is highly corrosive and any contact to skin should therefore be avoided. If however, acid should get into your eyes, immediately rinse under running water for 10 to 15 minutes and seek medical advice immediately.
- Replace damaged cables immediately.
- Old batteries must be disposed of according to regulations.
- Store the batteries in a dry area during the winter periods (corrosion).
- **ATTENTION:** Move the main switch to the zero position after completing the task. Several components consume current in stand-by mode.

## 2.16.4 Brake system

---

- Only specialist workshops or recognised brake services can carry out adjustment and repair work on the brake system.
- Have the brake system thoroughly checked regularly.
- If there are any malfunctions, stop the tractor immediately using the brake system. Have the malfunction rectified immediately.
- Before performing any work on the braking system, park the machine safely and secure the machine against unintentional lowering or rolling away (wheel chocks).
- Be particularly careful when carrying out any welding, torch cutting or drilling work in the area of the brake lines.
- Always carry out a braking test after any adjusting or repair work on the braking system.

### Pneumatic braking system

---

- You are only allowed to start to move the vehicle after the hand brake symbol no longer appears in red in AMADRIIVE

## 2.16.5 Tyres

---

- Repair work on tyres and wheels may only be carried out by specialists with suitable installation tools.
- Check the air pressure at regular intervals.
- Inflate tyres to the specified pressure. If the air pressure in the tyres is too high, then there is a risk of explosions.
- Park the machine in a safe place and lock the machine against unintentional lowering and rolling (parking brake, wheel chocks), before carrying out work on the tyres.
- Tighten or retighten all the fixing screws and nuts in accordance with the specifications of AMAZONEN-WERKE.



## 2.16.6 Field sprayer operation

- Observe the recommendations of the crop protection agent manufacturer in respect of
  - protective clothing
  - warning information on exposure to crop protection agents
  - regulations on dosing, applications and cleaning
- Observe the information in the German Plant Protection Law.
- Never open lines which are under pressure.
- The nominal volume of the spray liquid tank must not be exceeded during filling.
- When using fine drops in stronger winds, take care that the spraying agent can not be blown away and may cause damage to others!
  - When the ground is very dry, the spraying agent can be blown away to other fields along with dust and cause damage. Always wait until the ground is sufficiently moist!
  - We recommend that you check the success of the spraying operation every now and then, such as: dosage quantity, blocked nozzles, damage to machine parts, leaks and cleanliness of the machine.
- Reduce your speed when turning.  
The steering wheel must be turned slowly at the start and end of the curve otherwise the boom will be exposed to high loads.
- Switch off the sprayer on headlands.
- Always carry sufficient water with you so that you are able to rinse away the crop protectant in the event of an emergency. If necessary, seek medical advice if your body makes contact with crop protectant! Risk of infection.



- When there will be exposure to crop protection agent, wear the proper protective clothing, i.e. gloves, overalls, safety glasses, etc.
- Observe the information on the compatibility of crop protection agents and substances for the field sprayer.
- Do not spray any crop protection agents which have a tendency to stick together or set.
- Do not fill field sprayers with water from bodies of water which are open to the public, for the protection of people, animals and the environment.
- Only fill field sprayers
  - using a free flow from the mains water supply.
  - using genuine AMAZONE filling equipment.

**2.16.7 Cleaning, maintenance and repairs**

---

- Due to toxic vapours in the spray liquid tank, climbing into the spray liquid tank is always forbidden.
- Repair work in the spray liquid tank must only be carried out by a specialist workshop!
- As a general rule, only carry out maintenance or repair work or cleaning when
  - the drive is switched off
  - the ignition key has been removed
- The machine must be positioned in a stable position during repairs. Always use wheel chocks on slopes.
- Secure the raised machine and/or raised machine parts against unintentional lowering before performing any cleaning, maintenance or repair work on the machine.
- Regularly check the nuts and bolts for firm seating and retighten them as necessary.
- When replacing work tools with blades, use suitable tools and gloves.
- Dispose of oils, greases and filters in the appropriate way.
- When changing the oil or dismantling the hydraulic parts, take measures to prevent the risk of burns that can result from hot oil.
- The cooling system of the engine should be cleaned on a regular basis; oil and plant residues are highly inflammable.
- Always wear protective clothing when welding!
- Attention: If the machine had previously been used to spray liquid fertiliser (ammonium nitrate), there is a risk of explosion when carrying out welding work! Clean the respective work area before starting work.
- Spare parts must meet at least the specified technical requirements of AMAZONEN-WERKE.  
This is ensured through the use of genuine AMAZONE spare parts.
- Anti-freeze: The fluid must be drained from all lines, pumps and containers.
- When repairing field sprayers which have been used for liquid fertiliser application with ammonium nitrate / urea solution, observe the following points:  

Residues of ammonium nitrate / urea solutions may form salts by the evaporation of the water on or in the spray liquid tank. This produces pure ammonium nitrate and urea. In its undiluted form, ammonium nitrate is explosive when combined with organic substances, e.g. urea, and subjected to critical temperatures during repair work (e.g. welding, grinding, filing).

This danger can be eliminated by thoroughly washing out the spray liquid tank or the parts intended for repair with water, because the salt of the ammonium nitrate / urea solution is water-soluble. For this reason, clean the field sprayer thoroughly with water before carrying out repair work.

### 3 Loading

**DANGER**

The three lashing points marked must be used for securing the machine on a transport vehicle.

- 1 Front lashing point (Fig. 3/1)

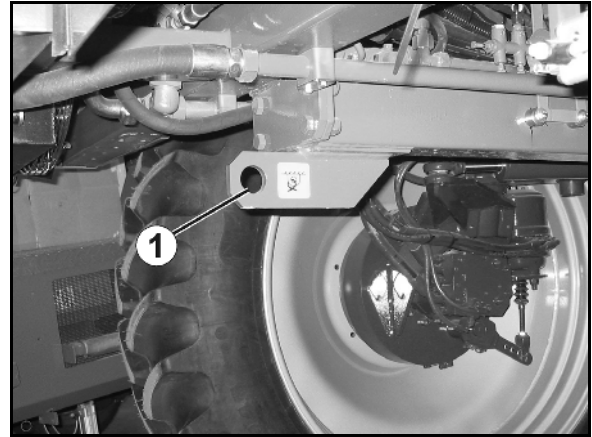


Fig. 3

- 2 Rear lashing points (Fig. 4/1)



When loading, lower the machine using the hydro-pneumatic spring suspension. Reactivate the hydro-pneumatic spring suspension again before use, see page 52.

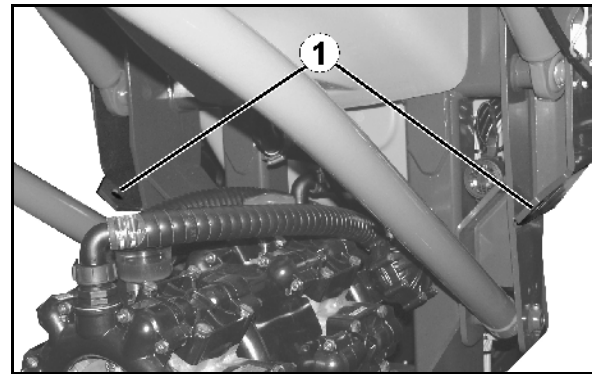


Fig. 4

## 4 Product description

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This section:

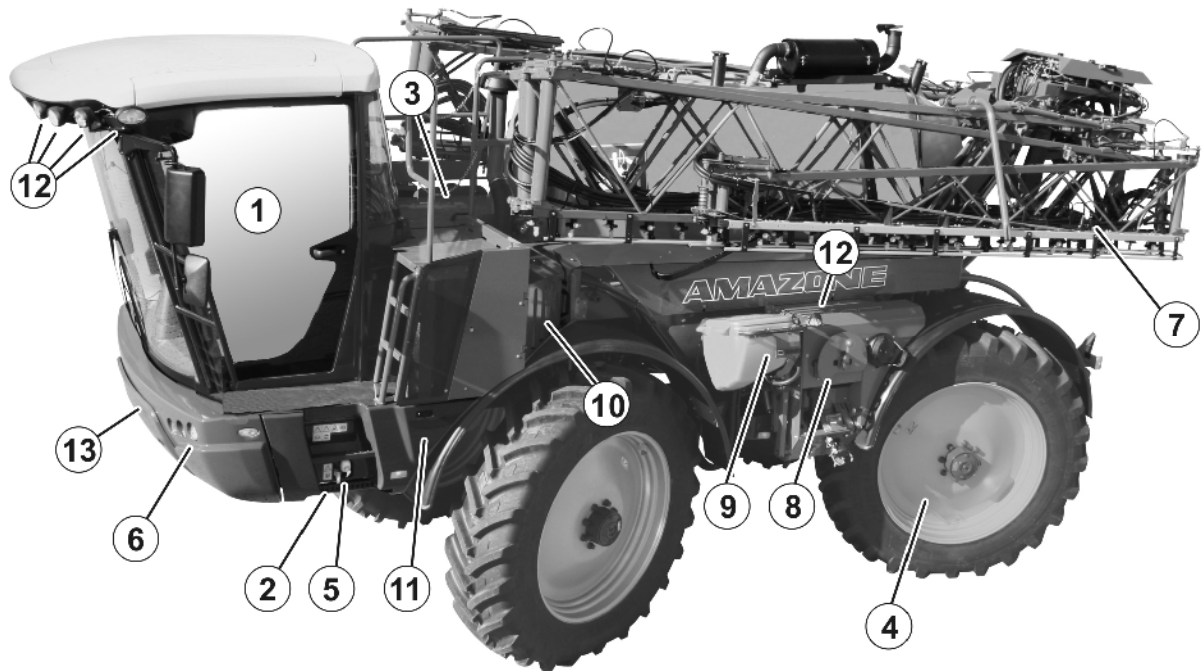
- provides a comprehensive overview of the machine structure.
- provides the names of the individual modules and controls.

If possible, read this section when actually at the machine. This helps you to understand the machine better.

The machine comprises the main assemblies:

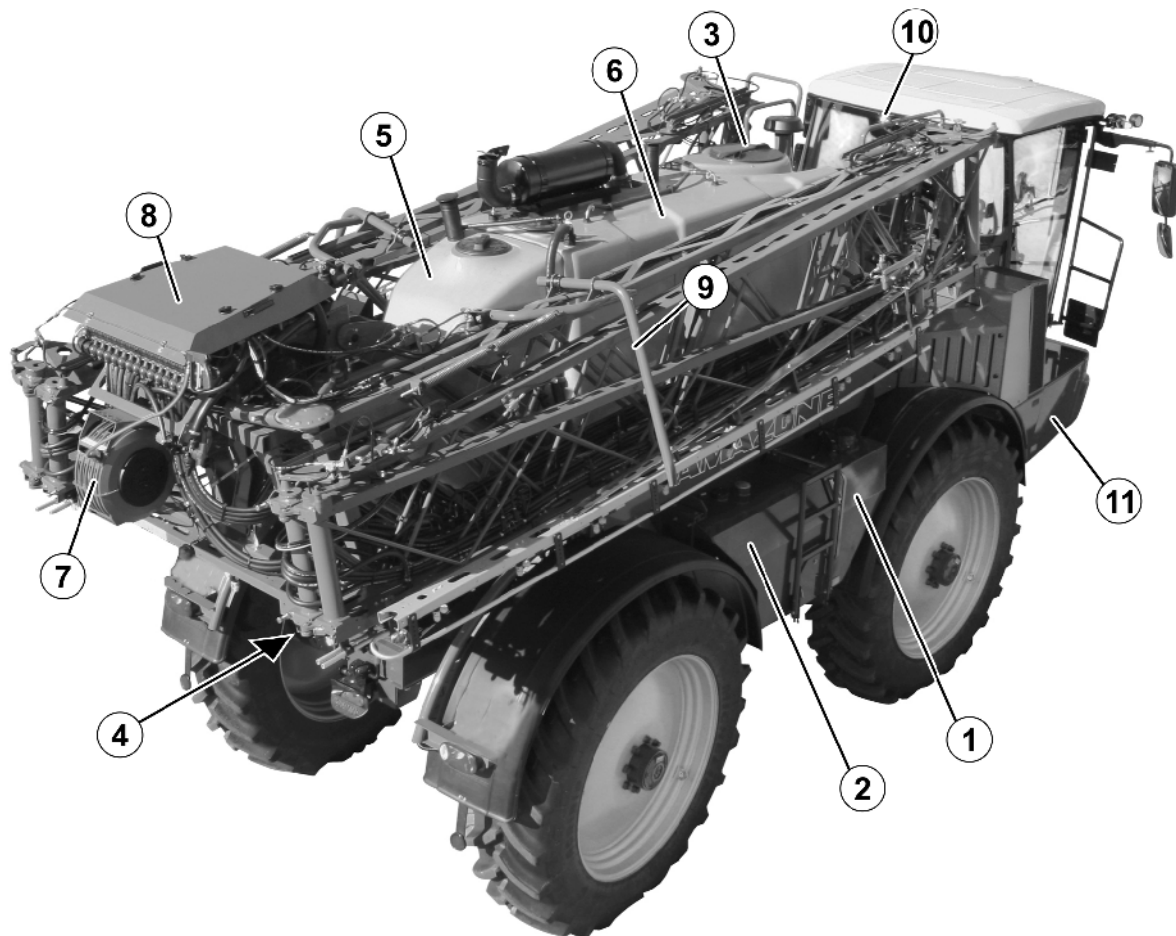
- Tandem chassis with hydro-pneumatic suspension and central track width adjustment.
- Hydraulic front-wheel steering system, all-wheel steering system and crab steering system
- Front-wheel steering system for road transport
- Continuously variable hydrostatic individual wheel drive with drum brakes and pneumatic brake system (travel speed 40 km/h)
- 6 cylinder DEUTZ turbo diesel engine
- Full-comfort CLAAS cab, heater, full-comfort seat with air suspension, adjustable steering column, CD-Radio, air conditioner, clock
- Spraying pump AR280 and agitator pump AR250
- Control terminal for spraying functions
- Super-L boom with field spray line, oscillation compensation, hydraulic slope compensation and Profi folding I (one-sided folding) or Profi folding II (angle-in / angle-out)
- Spray liquid tank with agitator, filling level indicator, flushing water tank
- Induction device, tank cleaning nozzles
- Electrical remote control of the field sprayer, order memory and GPS application with operating terminal and multi-function stick
- Vehicle operation with AMADRIVE control terminal

## 4.1 Overview of the assemblies



**Fig. 5**

- |  |   |
|--|---|
| (1) Driver's cabin                           | (8) Control terminal                                  |
| (2) Slewable ladder                          | (9) Pivoting induction bowl                           |
| (3) Operation platform with maintenance flap | (10) Foldable cover for the air filter                |
| (4) Wheels with hydrostatic drive            | (11) Foldable cover for the side storage compartment  |
| (5) Hand wash tank and soap dispenser        | (12) Work floodlights                                 |
| (6) Front lighting                           | (13) Foldable cover for the front storage compartment |
| (7) Sprayer boom                             |   |



**Fig. 6**

- |   |   |
|---|---|
| (1) Hydraulic oil tank                    | (6) Spray liquid tank                               |
| (2) Diesel fuel tank                      | (7) Exterior cleaning                               |
| (3) Filling dome of the spray liquid tank | (8) Boom equipment                                  |
| (4) Spraying pumps                        | (9) Boom locking mechanism                          |
| (5) Flushing water tank                   | (10) Work floodlights                               |
|   | (11) Foldable cover for the battery and main switch |

## 4.2 Operating instructions and third party documentation

This operating manual of the machine and documentation of third parties are located in the service case.



Please observe the enclosed third-party documentation!





## 4.4 Safety and protection equipment

- (1) Transport locking mechanism to prevent the Super-L boom from folding out unintentionally

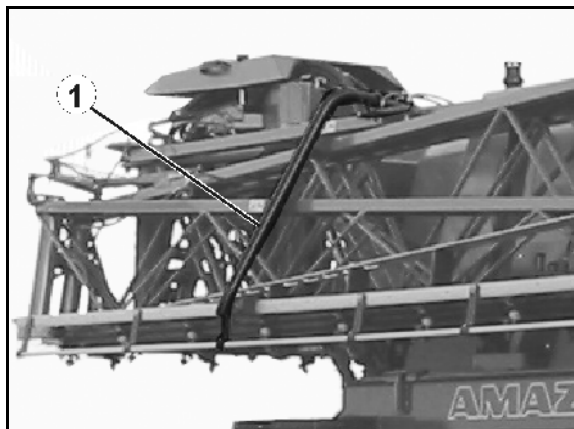


Fig. 8

- (1) Railing to protect against falling
- (2) Fire extinguisher behind the cover

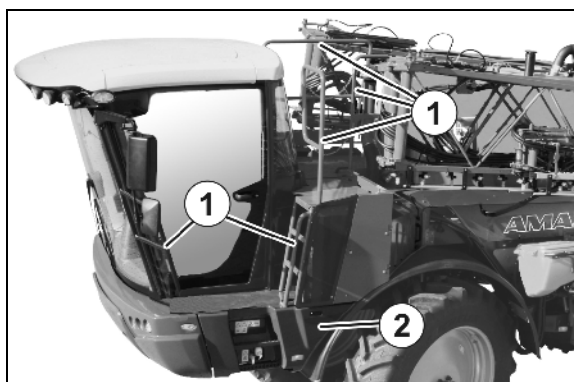


Fig. 9

- (3) Emergency exit on the right side of the cab-in



Fig. 10



## 4.5 Transportation equipment

- (1) High beam
- (2) Dipped beam
- (3) Indicators / parking light
- (4) Rear-view mirror

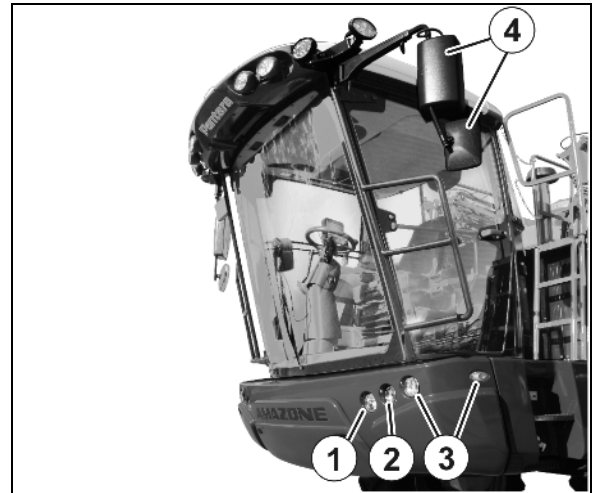


Fig. 11

- (1) Rear lights / brake lights
- (2) turn indicators
- (3) red reflectors (round)

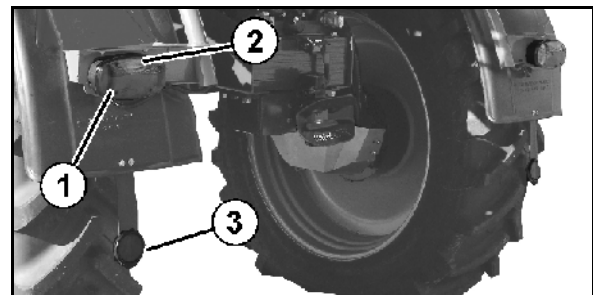


Fig. 12

- (1) 2 x 3 reflectors, yellow  
(lateral view: distance of max. 3m)

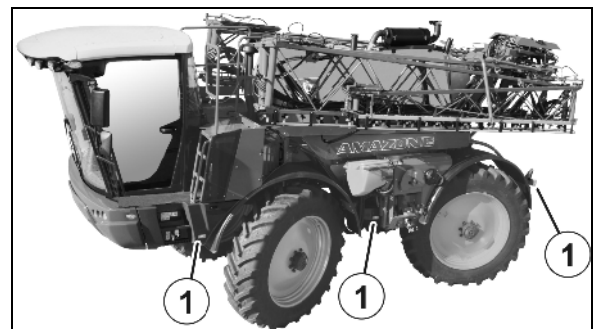


Fig. 13

## 4.6 Intended use

---

The self-propelled field sprayer Pantera 4001

- is intended for use in field crops and is used for transporting and spreading of crop protectant (insecticides, fungicides, herbicides, amongst others) in the form of suspensions, emulsions and mixtures as well as liquid fertiliser.
- is operated by one person in the cabin.
- a combination with other machines, devices and superstructures is not intended by the manufacturer.

### **Sloping terrain can be traversed as follows:**

- Along the contours  
Direction of travel to left    15 %  
Direction of travel to right   15 %
- **Along the gradient**  
Up the slope                      15 %  
Down the slope                  15 %

### **"Intended use" also covers:**

- Compliance with all the instructions in this operating manual.
- Execution of inspection and maintenance work.
- Exclusive use of genuine AMAZONE spare parts.

Other uses to those specified above are forbidden and shall be considered as improper.

For any damage resulting from improper use:

- the operator bears the sole responsibility,
- AMAZONEN-WERKE accepts no liability.

---

## 4.7 Consequences of using certain crop protection agents

---

We would like to draw attention to the fact that extended exposure (20 hours) to crop protection agents with which we are familiar, e.g. Lasso, Betanal and Trammat, Stomp, Iloxan, Mudecan, Elancolan and Teridox, can cause damage to the pump diaphragms, hoses, spray lines and tanks. The examples given are in no way intended to represent a comprehensive list.

In particular, we warn against unauthorised mixtures of two or more different crop protection agents.

Substances which have a tendency to stick together or set must not be applied.

When using such aggressive crop protection agents, it is recommended that the spray liquid be applied immediately after preparation and then that the sprayer be thoroughly cleaned with water.

Viton membranes are available as replacements for pumps. These are resistant to solvent-containing crop protection agents. However their service life is reduced by use at low temperatures (e.g. AUS in frosty conditions).

The materials and components used for AMAZONE field sprayers are safe for liquid fertiliser.

## 4.8 Danger areas and danger points

---

The danger area is the area around the machine in which people can be caught by:

- work movements made by the machine and its tools
- materials or foreign bodies thrown out of the machine
- tools rising or falling unintentionally
- unintentional rolling of the tractor and the machine

Within the machine danger area, there are danger points with permanent or unexpected risks. Warning symbols indicate these danger points and warn against residual dangers, which cannot be eliminated for practical reasons. In such cases, the special safety regulations in the appropriate section are valid.

No-one may stand in the machine danger area:

- if the tractor engine is running with the PTO shaft / hydraulic system connected.
- if the tractor and machine are not protected against unintentional start-up and rolling.

The operating person may only move the machine or switch or drive the tools from the transport position to the working position or vice-versa when there is no-one in the machine danger area.

Danger points exist:

- where there are moving components.
- on the moving machine.
- in the swivel range of the sprayer boom.
- in the spray liquid tank due to poisonous vapours.
- under raised, unsecured machines or machine parts.
- when unfolding/folding the sprayer boom in the vicinity of overhead electricity cables, through contact with the cables.

## 4.9 Rating plate and CE mark

The following diagrams show the positions of the rating plate (Fig. 14/1) and the CE mark (Fig. 14/2).

The rating plate shows:

- Vehicle- / machine ID no.:
- Type
- Basic weight kg
- Permissible support load kg
- Permissible rear axle load kg
- Permissible system pressure bar
- Permissible total weight kg
- Factory
- Model year



**AMAZONE**  
Amazonen-Werke H. Dreyer GmbH & Co. KG  
Am Amazonenwerk 9-13 D-49206 Hasbergen

Fahrz.-/Masch.-Ident-Nr.

Typ

Grundgewicht kg  zul. Gesamtgewicht kg

zul. Achslast vorne kg  Leistung kW

zul. Achslast hinten kg  Werk

zul. Systemdruck bar  Modelljahr

**CE** Baujahr   
année de fabrication   
year of construction   
Год изготовления



Fig. 14



Machines for France have an additional type plate.

## 4.10 Technical Data

Total length	[mm]	8400
Overall height	[mm]	3700-3800 (depending on the tyres)
Overall width	[mm]	2550
Ground clearance	[mm]	up to 1200

### 4.10.1 Basic weight (empty weight)



The basic weight (empty weight) is calculated from the total individual weights of the modules:

- Basic machine
- Tyres
- Sprayer boom
- Options

Tyres		
Basic machine	[kg]	7400
Tyres, 4 wheels		
300/95 R 52 149 A8	[kg]	1132
320/90 R 50 150 A8	[kg]	1100
340/85 R 48 151 A8	[kg]	1048
380/90 R 46 159 A8	[kg]	1080
380/90 R 46 173 D	[kg]	1080
420/80 R 46 151 A8	[kg]	1304
460/85 R 42 153 A8	[kg]	1108
480/80 R 42 156 A8	[kg]	1120
520/85 R 38 155 A8	[kg]	1248
620/70 R 38 170 A8/	[kg]	1248
650/65 R 38 160 A8/B	[kg]	1248
Other special equipment	[kg]	Max. 100

### Sprayer boom weights

Working width [m]										
24	27	27/15	28	28/15	30/15	32	33	36	39	40
760	764	932	765	936	964	1008	1012	1032	1136	1138
Weight [kg]										

#### 4.10.2 Permissible total weight and tyres



The permissible total weight of the machine depends on the wheels / tyres of the machine.

Tyres	permissible total weight	axle load 40 km/h	Spraying range	at air pressure
	[kg]	[kg]	[mm]	[b]
300/95 R 52 148 A8/B (12.4 R 52)	13000	6500	1800 - 2250	3,6
320/90 R 50 150 A8 (12.8 R 50)	13000	6500	1800 - 2250	3,6
340/85 R 48 151 A8/B (13.6 R 48)	14200	7100	1800 - 2250	4,0
380/90 R 46 151 A8/173 D (14.9 R 46)	14500	8750	1800 - 2250	3,2
420/80 R 46 153 A8 (16.9 R46)	13800	6900	1800 - 2250	2,4
460/85 R 42 149 A8/B (18.4 R 42)	14500	7300	1800 - 2350	2,1
480/80 R 42 156 A8 (18,4 R 42)	13000	6500	1800 - 2250	3,6
520/85 R 38 155 A8/B (20.8 R 38)	14500	7750	1800 - 2400	1,6
620/70 R 38 170 A8/B	14500	7500	1900 - 2500	1,6
650/65 R 38 160 A8/B	14500	8260	1900 - 2500	1,4



#### WARNING

Only discs without openings, welded all-round are permitted for the wheels for safety reasons.

**Payload = permissible total weight - basic weight**



#### DANGER

Exceeding the permitted payload is prohibited.

Risk of accident because of unstable driving conditions.

Carefully determine the payload, and therefore the permitted filling amount for your machine. Not all filling media can be used to fill the tank completely.

**4.10.3 Technical data spraying system**

Spray liquid tank		
• Actual volume	[l]	4200
• Nominal volume		4000
Flushing water tank volume	[l]	500
Filling height		
• from the ground	[mm]	ca. 3300 (depending on the tyres)
• of working platform		900
Hand wash tank volume	[l]	18
Permissible system pressure		10
Technical residue incl. pump		
• On the flat		24
• Along the contours		
o Direction of travel 15 % to left	[l]	27
o Direction of travel 15 % to right		21
• Along the gradient		
o 15% up the slope		32
o 15% down the slope		32
Central switching mechanism		Electric, part width section valve coupling
Spray pressure adjustment		Electric
Spray pressure setting range	[bar]	0,8 – 10
Spray pressure display		digital spray pressure display
Suction filter		50 (80) mesh
Main agitator		Fill level dependent control
Additional agitator		Infinitely adjustable
Spray rate control		Ground speed related, via job computer
Nozzle height	[mm]	500 - 2500



#### 4.10.4 Technical data, carrier vehicle

<b>Frame:</b>		
System		Oscillating axle with springs and shock absorbers
Wheelbase		3100 mm
Track width		1800 - 2250 (2600) mm
Turning radius		4500 mm
Steering	Front axle	Hydraulic via Orbitrol
	Rear axle	Electric hydraulic
<b>Drive:</b>		
		Hydraulic all-wheel drive
Drive pump	Manufacturer, type Maximum operating pressure	LINDE, HPV 165 (165 ccm/revs), 420 bar
Wheel motor	Manufacturer, type Maximum operating pressure	LINDE, HVM 75 (75 ccm/revs), 420 bar
Wheel gears	Manufacturer, type Ratio	BREVINI, CWD 2050 i=22.6
Auxiliary pump	Manufacturer, type Operating pressure (Spraying pump drive, cooler fan)	LINDE, HPR 75 (75 ccm/revs), 210 bar
Auxiliary pump	Manufacturer, type Operating pressure (Cylinder / steering system)	LINDE, HPR 55 (55 ccm/revs), 200 bar
Travel speed	o Field work	0 - 20 km/h
	o Transport	0 - 40 km/h
Ground clearance		1100 - 1200mm (depending on the tyres)
<b>Diesel engine:</b>		
Manufacturer		DEUTZ
Engine type		TCD 2012 L 06 2V Four stroke diesel engine with direct injection and turbocharger / intercooler
Emission standard		Tier IIIA
Number of cylinders		6 in a row
Cylinder bore / piston stroke		101 x 126 mm
Engine capacity		6060 ccm
High-performance		147 kW
At speed		2300 rpm
Maximum speed		770 Nm
At speed		1500 rpm
Cooling		Cooling agent
Electrical system		12 Volt
Battery		12 Volt 180 Ah
Alternator		12 Volt 200 A
Fuel tank		approx. 200 l

## 5 Structure and function, carrier vehicle

---

### 5.1 Drive

---

A Deutz diesel engine serves as the drive.

The diesel engine can be operated in two states:

**Eco mode:**

- Requirement-orientated adoption of the engine speed with regard to an optimum fuel consumption and maximum output.
- Reduced speed level.
- Moderate driving dynamics.
- Highest speed, 40 km/h at 1250 min<sup>-1</sup>.
- Idling speed 800 min<sup>-1</sup>.

**Standard mode:**

- Full driving dynamics.
- Maximum engine speed of 2300 min<sup>-1</sup> possible.
- Manual adjustment of the engine speed in field mode.

#### 5.1.1 Driving-in the engine

---

We recommend that you treat the engine with great care during the first 50 operational hours. This means that the engine has to warm-up first during this period before it is sped up to high load and not at full speed straight away.

Following work at maximum load, allow the engine to idle for a while until the temperature of the motor sinks to a normal value to prevent heat accumulation if the engine is stopped immediately.

The oil has to be changed after the first 50 to 150 operational hours (while the engine is still warm!), the oil filter and fuel filters also have to be replaced.

In the event of queries on maintenance, observe the details of the engine manufacturer.

### 5.1.2 Engine fuel system

The fuel tank is located on the right side of the machine.

- (1) Fuel tank
- (2) Slewable ladder for filling the fuel tank in its transport position
- (3) Locking mechanism of the ladder pivoted upwards

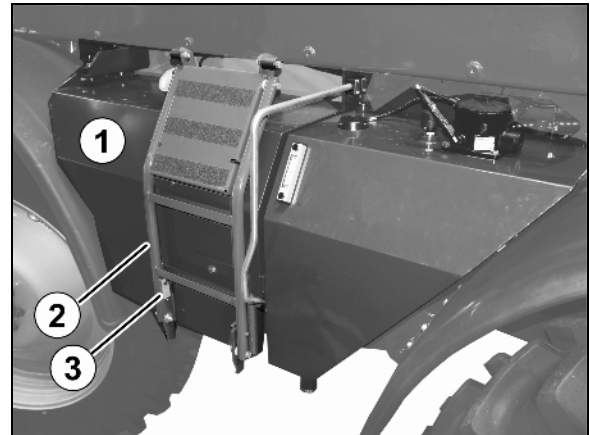


Fig. 15

Ladder and platform can be pivoted:

Fig. 15: ladder and platform in transport position

Fig. 16: ladder and platform in operational position

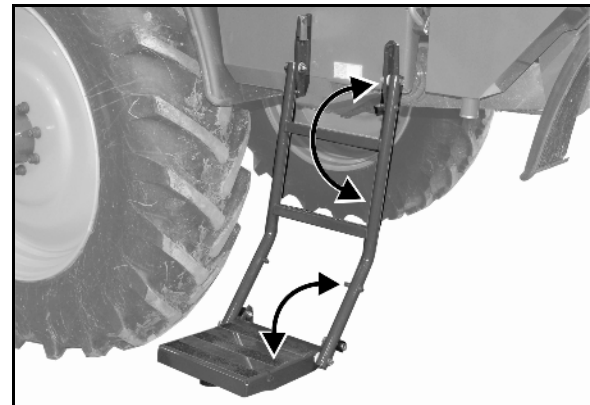


Fig. 16



#### WARNING

Risk of accidents resulting from the ladder folding out unintentionally.

The ladder must be pivoted up to the transport position and secured mechanically with locking device.

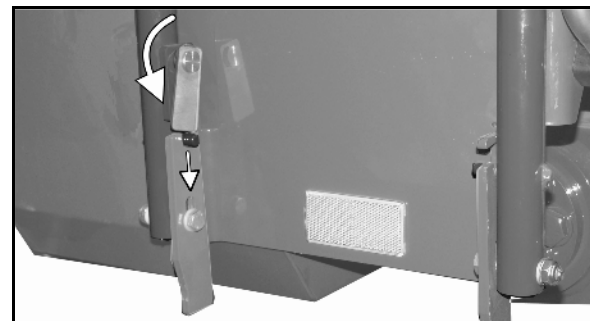


Fig. 17



#### CAUTION

- Turn off the engine when filling the fuel tank.
- Never smoke when filling the fuel tank!
- Take care that no oil / petrol penetrates into the ground → Environmental pollution!

## Structure and function, carrier vehicle

---



- Also make sure that no dirt is able to enter the fuel tank.
- Before you open the tank, you have to clean the cover and the opening thoroughly first.
- Small contaminants may seriously damage the fuel system.
- Preferably, the tank should be filled in the evening immediately after working in order to avoid the accumulation of condensed water in the tank.
- Water can cause damage to the fuel system and leads to the formation of rust.



Avoid driving until the fuel tank is empty.

- Air and impurities in the residual petrol may enter the system and reduce the service life or block the fuel pump.

## Fuel quality

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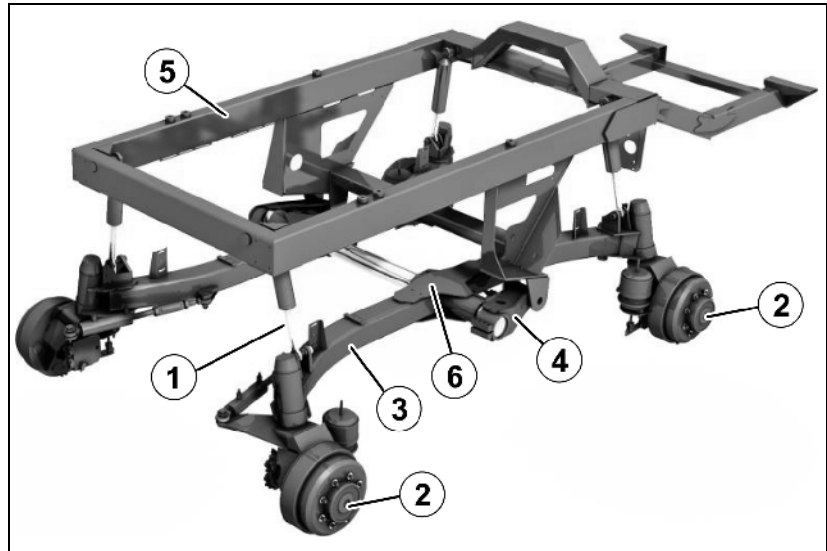


Take care that you fill the tank with the fuel for the respective season!

Additives are contained in winter fuel that prevent the formation of paraffin and ice crystals at low temperatures. Otherwise this may lead to blockages in the fuel system.

When using the machine in transitional periods, you should therefore fill the tank with fuels complying with DIN/EN 590.

## 5.2 Running gear



**Fig. 18**

- (1) Spring suspension
- (2) Wheel motor with drum brake
- (3) Tandem running gear
- (4) Oscillating yoke
- (5) Main frame
- (6) Track width adjustment

### 5.2.1 Hydraulic track width adjustment

The machine has an infinitely variable track width adjustment.

The track width of the machine can be adjusted between 1800 mm and 2250 mm to 2600 mm depending on the wheels mounted.

- The track width is adjusted and displayed via the AMADRIVE.
- When driving on public roads, the wheels are not allowed to protrude over the outer dimensions of the machine.



For France only: If the track width is not adjusted sufficiently small enough, the AMADRIVE will display a warning message and limit the speed.



The track width is entered via the AMADRIVE and adjusted during an automatic adjustment drive.

## 5.3 Steering



Depending on the requirements, the steering system is switched via the AMADrive or the multi-function stick, see Page 121.

### Two-wheel steering system (Fig. 19):

possible when in road and field mode!

- The steering system is carried out only using the front wheels with the Orbitrol in the steering column.
- The automatic steering system keeps the rear wheels parallel to the longitudinal axle.

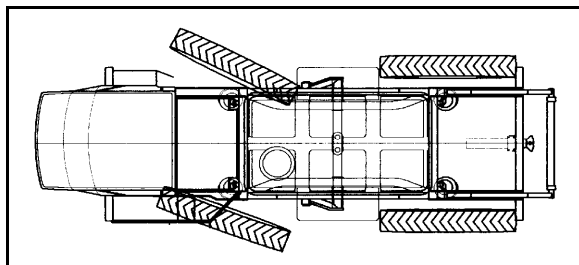


Fig. 19

### Manual rear-wheel steering system (Fig. 20):

Only possible when in field mode!

- For the manual steering system of the rear wheels (e.g. "crab steering system").
- The steering system of the front wheels is carried out using the Orbitrol in the steering column.

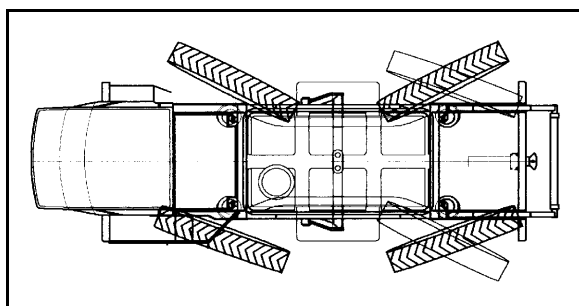


Fig. 20

### Four-wheel steering system (Fig. 21):

Only possible when in field mode!

- Steering of all four wheels is carried out using the steering wheel.
- From a speed of 10 km/h the four-wheel steering is limited.
- From a speed of 16 km/h the four-wheel steering system is deactivated.

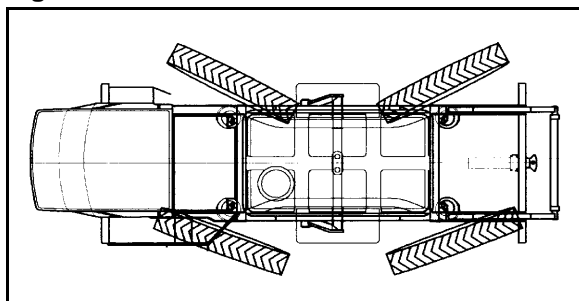


Fig. 21



After starting the engine:

- the two-wheel steering system is activated.
- the rear wheels automatically align to the direction of driving.

### 5.3.1 Perform a track correction



- Perform the track correction every day.
- Perform the track correction in event of the following conditions:
  - the engine is running
  - the engine is not running
  - four-wheel steering system is activated

#### Perform a track correction, front

1. Turn the steering wheel to the left as far as it will go and keep it there.



2. Keep the button pressed forwards for a minimum of three seconds.


3. Let go of the button and then turn the steering wheel to the right as far as it will go and keep it there.



4. Keep the button pressed forwards for a minimum of three seconds.

5. Let go of the button and then turn back the steering.

#### Perform a track correction, rear

1.  Turn the manual rear-wheel steering (via AMADRIVE or the multi-function stick) to the left as far as it will go and keep it there.



2. Keep the button pressed backwards for a minimum of three seconds.

3. Let go of the button and then turn the manual rear-wheel steering (via the multi-function stick) to the right as far as it will go and keep it there.



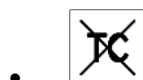
4. Keep the button pressed backwards for a minimum of three seconds.

5. Let go of the button and then turn back the steering.

### 5.4 Traction control system

The machine is equipped with an automatic traction control system.

The electronic traction control system continues to monitor each wheel and regulates the drive torque of the wheel motors.



- The traction control system can be deactivated.

→ The deactivated traction control system is displayed on the AMADRIVE.

## 5.5 Hydro-pneumatic spring suspension

The hydro-pneumatic spring suspension contains an automatic level regulation device independent of the load status.

Fig. 22/...

- (1) Hydraulic cylinder
- (2) Pressure accumulator
- (3) Valve unit

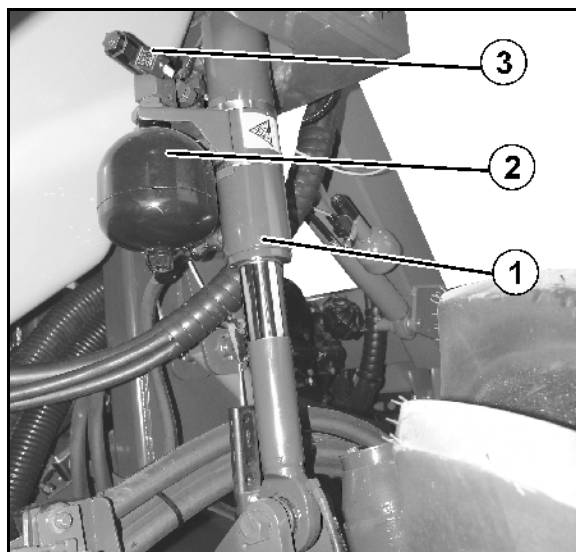


Fig. 22

When loading the machine, the oil can be drained from the spring suspension cylinders.

- This prevents the lashed machine from swivelling up.
- Open the shut-off valves on the hydraulic block (Fig. 23/1).
- The machine is lowered.
- Close the shut-off valve (Fig. 23/2):
- When the engine is running, the machine is raised back to the standard height.

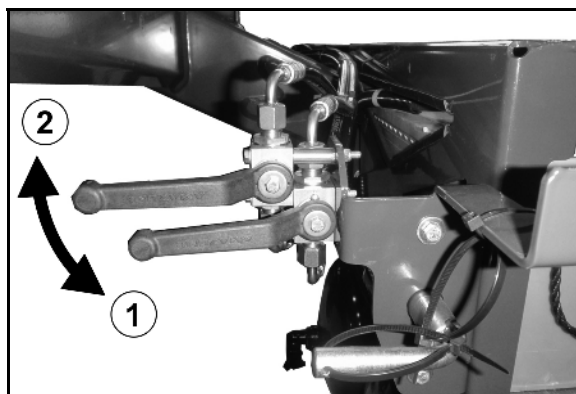


Fig. 23

The shut-off valves are located behind the right cover under the cabin.



### DANGER

- Risk of crushing parts of your body between the chassis and the superstructure when lowering the machine!
- Risk of colliding machine parts when lowering the machine if the track width is less than 1950 mm!



## 5.6 Pneumatic brake system

The self-propelled field sprayer is fitted with 4 brake drums that are operated pneumatically with the foot throttle in the cabin. The brake drums are fitted with self regulating brake levers that make sure that the wear to the brake linings is compensated.

The rear axle is equipped with an automatic load related braking valve (ALB).

Input pressure: 6.5 bar

Setting data dependent on the axle load:

Axle load [kg]	Bellows pressure [bar]	Output pressure [bar]
4350	44	3,4
7050	100	6,5

## 5.7 Wheel drive

The wheel motors are mounted on the reduction gear unit. The planetary wheel drive is combined with a drum brake on the outer side. The drum brakes are actuated pneumatically via diaphragm cylinders and are additionally used as a hand brake.

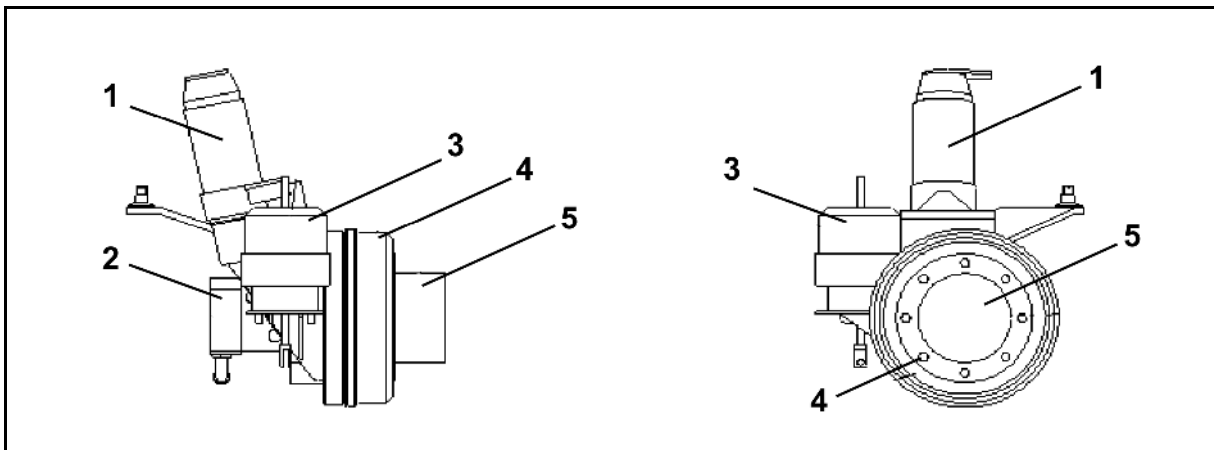


Fig. 24

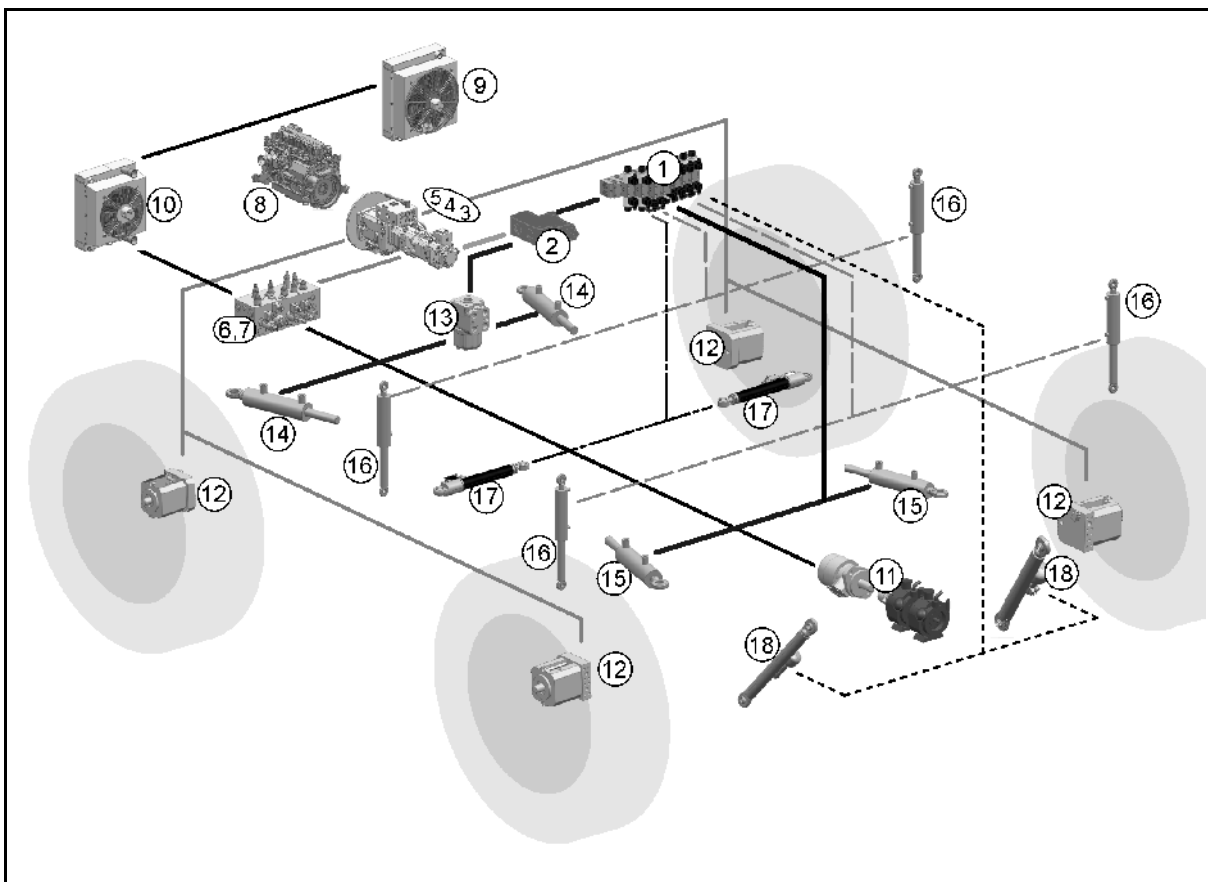
- (1) Stub axle
- (2) Wheel motor
- (3) Brake cylinder
- (4) Drum brake
- (5) Reduction gear unit

## 5.8 Hydraulic system

The machine has

- a hydrostatic wheel drive,
- a hydraulic spray pump drive,
- a hydraulic steering system,
- a hydraulic cylinder for the track adjustment, for boom height adjustment and for folding the boom
- a hydro-pneumatic suspension.

The machine has 3 hydraulic pumps that are flanged direct to the diesel engine. The hydraulic components are mounted at different locations on the machine.



**Fig. 25**

- |                            |                              |
|----------------------------|------------------------------|
| (1) Valve block 1          | (11) Sprayer pump drive      |
| (2) Priority valve         | (12) Wheel motor             |
| (3) Constant pressure pump | (13) Orbitol steering system |
| (4) Load sensing pump      | (14) Front steering system   |
| (5) Driving pump           | (15) Rear steering system    |
| (6) Valve block 2          | (16) Spring suspension       |
| (7) Retarder brake         | (17) Track                   |
| (8) Diesel engine          | (18) Boom                    |
| (9) Radiator fan 1         |                              |
| (10) Radiator fan 2        |                              |

### 5.8.1 Hydraulic pumps

- The drive pump drives the 4 parallel switched wheel motors in a closed circuit.
- The feed pump supplies the system with leakage oil and flushing oil.
- The pump for the drive of the spraying pump and the fan motor is a regulating pump load sensing controller. The operating pressure of the pump is adjusted automatically depending on the output required.
- The regulating pump with constant pressure controller supplies the steering system and hydraulic cylinder with oil.



Adjusting and checking the system is carried out in the factory. Normally, the settings do not need to be corrected.

The operator requires special tools and special knowledge of the system in order to adjust the highest pressure, the operating pressure and the speed. This is why the adjustment work may only be carried out in the factory.

### 5.8.2 Hydraulic wheel motors and gearbox



- The four motors and the HPV 165 driving pump must all be precisely adjusted to each other.
- Have all repair work or adjustments carried out by a specialist workshop.



#### CAUTION

**The adjustment bolt for the top speed (smallest capacity) is sealed in the factory. Unauthorized adjusting of this bolt is forbidden as it will lead to extensive damage to the hydraulic system.**

### 5.8.3 Hydraulic oil tank

- (1) Hydraulic oil tank
- (2) Inspection glass
- (3) Fill opening with integrated oil filter
- (4) Electric sensor for measuring the oil level

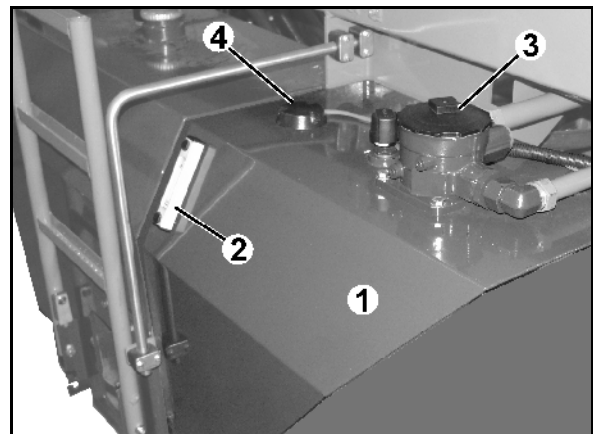


Fig. 26

## 5.9 Radiator

The machine is equipped with a total of four radiators on both sides behind the cabin.

Right side:

- Radiator for the engine cooling water
- Condenser of air conditioner

Left side:

- Radiator for hydraulic oil
- Radiator for charged air of the turbocharger



Fig. 27



**The air flow through the radiator may not be obstructed.**

For this reason the radiators have to be checked on a regular basis and cleaned using compressed air.

## 5.10 Driver's cabin

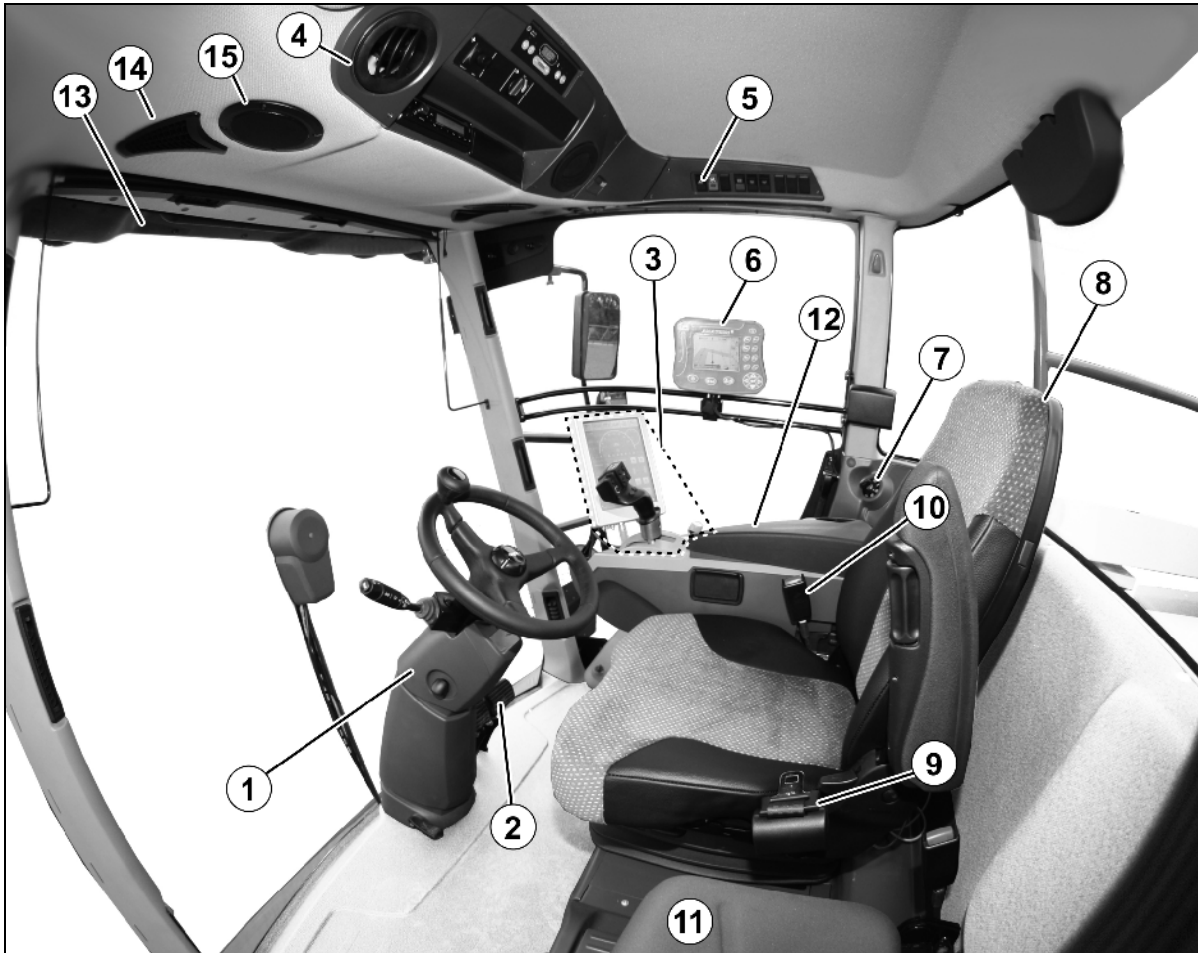


Fig. 28



- (1) Steering column with multi-function switch
- (2) Brake pedal
- (3) Vehicle operation
- (4) Operating elements: Comfort and light
- (5) Operating elements: Safety and maintenance
- (6) Operating terminal
- (7) Ignition lock
- (8) Driver's seat
- (9) Seat belt for wearing on the drivers seat
- (10) Seat belt buckle
- (11) Foldable helpers seat with cooling compartment underneath
- (12) Height-adjustable and foldable armrest and operating unit
- (13) Sunblind
- (14) Ventilation nozzles
- (15) Loudspeaker



- The helpers seat must only be used for manoeuvring trips.
- Drive the machine only when wearing the seat belt.

### 5.10.1 Foldable access ladder

You can access and exit the cabin via the foldable ladder.

- 
 The access ladder is lowered and raised via a switch in the cabin.
- 
 The AMADrive displays the position of the ladder.



The ladder can also be folded down when the diesel engine is turned off.



Fig. 29



#### **WARNING**

**Risk of injuries from falling from the cabin.**

When leaving the cabin, make sure that the ladder has been lowered completely.

You cannot see if the ladder has been lowered from inside the cabin.



An acoustic signal sounds as soon as the driver leaves the driver's seat if the ladder has not been lowered completely.

### 5.10.2 Steering column with multi-function switch and brake pedal

The steering column has the following functions:

- (1) Steering wheel
- (2) Switch for horn, lighting, direction of motion, windscreen washer system and windscreen wiper
  - o Press in: Horn
  - o Upwards: High beam
  - o Downwards: Dipped beam
  - o To the front: Indicator, right side (in field mode: Side View floodlight, right side)
  - o To the rear: Indicator, left side (in field mode: Side View floodlight, left side)
  - o Press in the ring: → Windscreen washer system
  - o Turn the ring: → Windscreen wiper, switch on / fast
- (3) Steering column adjustment, forwards / backwards
- (4) Steering wheel adjustment, forwards / backwards
- (5) Steering wheel adjustment, higher / lower
- (6) Brake pedal
- (7) Machine Info unit

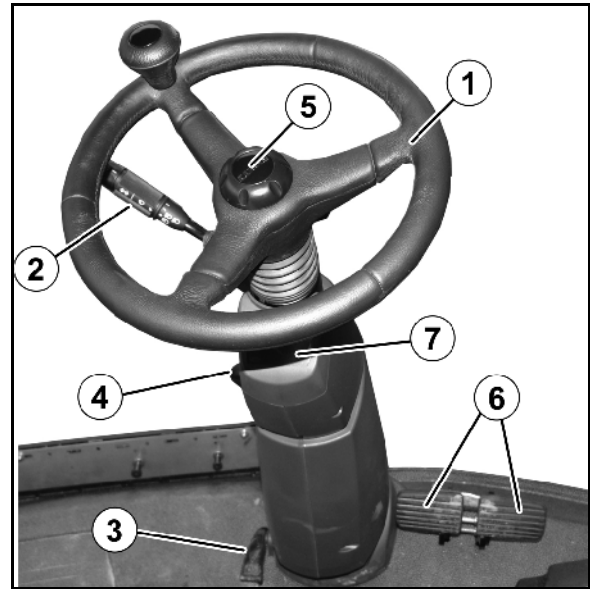


Fig. 30

#### Brake pedal



- Always use the brake pedal for emergency braking.
- Operating the brake pedal once briefly leads to stopping the machine despite the driving lever being operated.

- The machine can be slowed down using
  - o the brake pedal.
  - o the driving lever.
- The delay via the driving lever may be sufficient depending on the driving situation.
- When braking using the brake pedal, the slowing down is carried out by the pneumatic brake system and the hydrostatic drive.



After performing the braking using the brake pedal, the driving lever must briefly be moved to the neutral position before continuing to drive.

## Machine Info unit

Fig. 31/...

- (1) No function
- (2) Battery charger lamp
- (3) Indicators of the machine
- (4) High beam display
- (5) No function
- (6) Main warning lamp

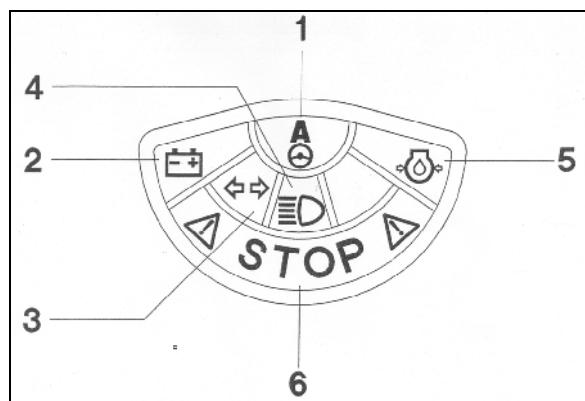
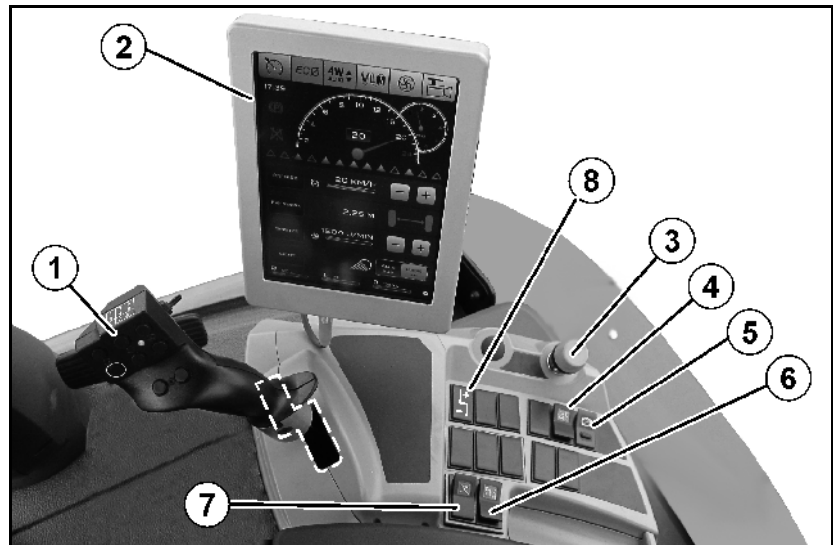


Fig. 31



### 5.10.3 Vehicle operation



**Fig. 32**

(1) Driving lever with multi-function stick

(2) **AMADRIIVE**

(3) Emergency-off actuation



(4) Button for actuating the ladder on the cabin side

o Position +: Lifts the ladder.

o Position -: Lowers the ladder



(5) Hand brake switch with locking function in parking position.



Hand brake that has not been actuated via the switch:

The hand brake is activated automatically when turning off the ignition and released again when the ignition is switched on.



(6) Button for aligning the track



(7) Button for switching off the traction control system.



(8) Operate the lifting module switch (option).



When operating the multi-function handle, also observe the operating instructions of the software operating manual AMABUS / ISOBUS!

### 5.10.4 Emergency-off actuation

- The driving operation is interrupted upon pressing the emergency-off actuation. The cooling fans rotate at maximum speed.
- Pressing the emergency-off actuation and pulling on the black plastic ring at the same time unlocks the emergency-off actuation again.

After the emergency-off actuation:

1. Switch-off the engine.
2. Wait 20 seconds.
3. Unlock emergency-off.
4. Start the engine.

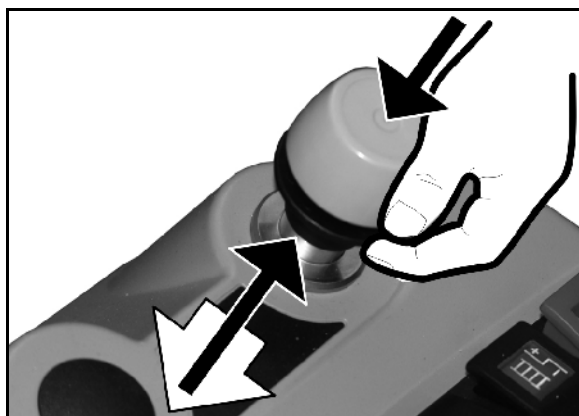


Fig. 33

### 5.10.5 Operating elements, Comfort and Light

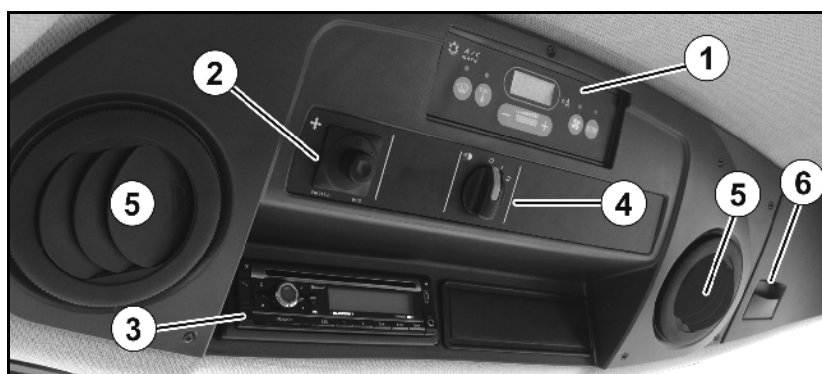


Fig. 34

On the inside of the roof, you will find the switch for the ventilator, the heater, the air conditioner, the travelling lights, the mirror adjustment and the radio.

- (1) Automatic air-conditioning system
- (2) Mirror adjuster switch
- (3) CD radio with Bluetooth hands-free system
- (4) Rotary switch with parking light and driving light
- (5) Ventilation nozzles
- (6) Cooling compartment

## 5.10.6 Operating elements, Safety and Maintenance

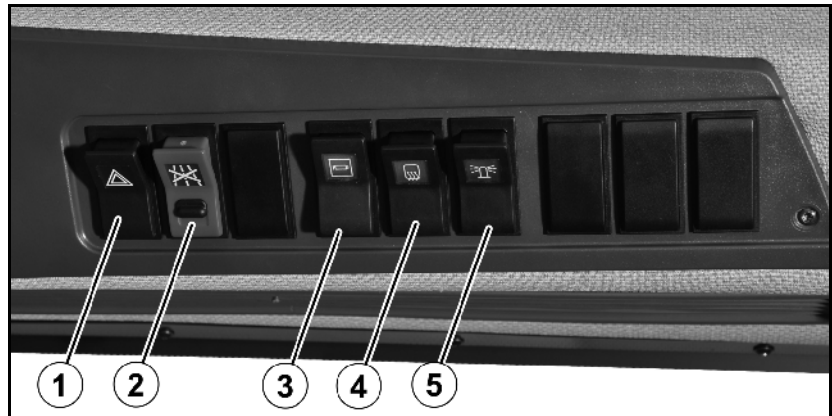









Fig. 35

- (1)  Hazard warning light switch
- (2)  Switch for travelling on the road / field with locking mechanism
- (3)  Button for manual lubrication by the lubricating device (Option)
- (4)  Switch for the mirror heating
- (5)  Switch for the warning beacon (Option)

### 5.10.6.1 Road travelling / field travelling

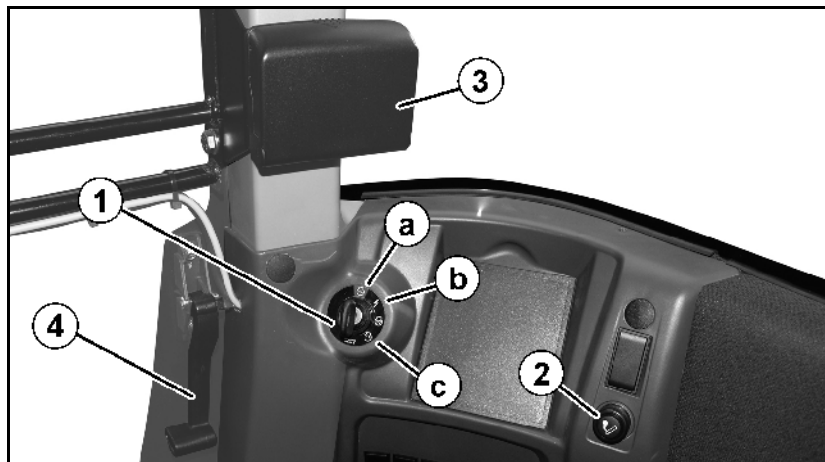
Road mode: Push rocker switch  downwards.

- Only two-wheel steering possible.
- No cruise control function.
- Warning: Driving with ladder lowered.
- Warning: Track width set according to the type approval.

Field mode: Unlock rocker switch  and push upwards.

- Speed limited to 20 km/h.
- Warning when driving with ladder lowered.

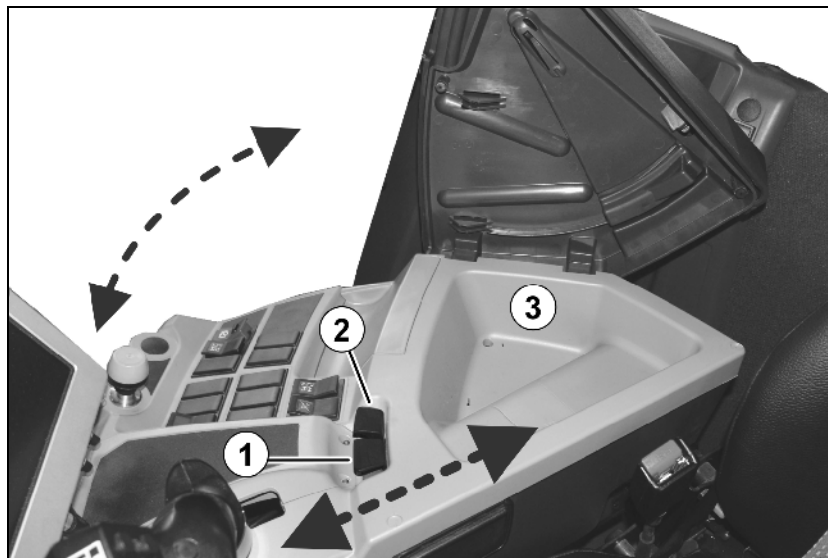
### 5.10.7 Rear right side in the cabin



**Fig. 36**

- (1) Ignition lock
- (a) Engine off
- (b) Power supply on
- (c) Start the engine
- (2) Cigarette lighter
- (3) Drink holder
- (4) Unlocking device for the emergency exit

### 5.10.8 Armrest



**Fig. 37**

- (1) Moving the armrest
- (2) Pivoting the armrest
- (3) Storage compartment under the armrest

### 5.10.9 Drivers seat

The drivers seat is spring suspended and has various adjustment options.

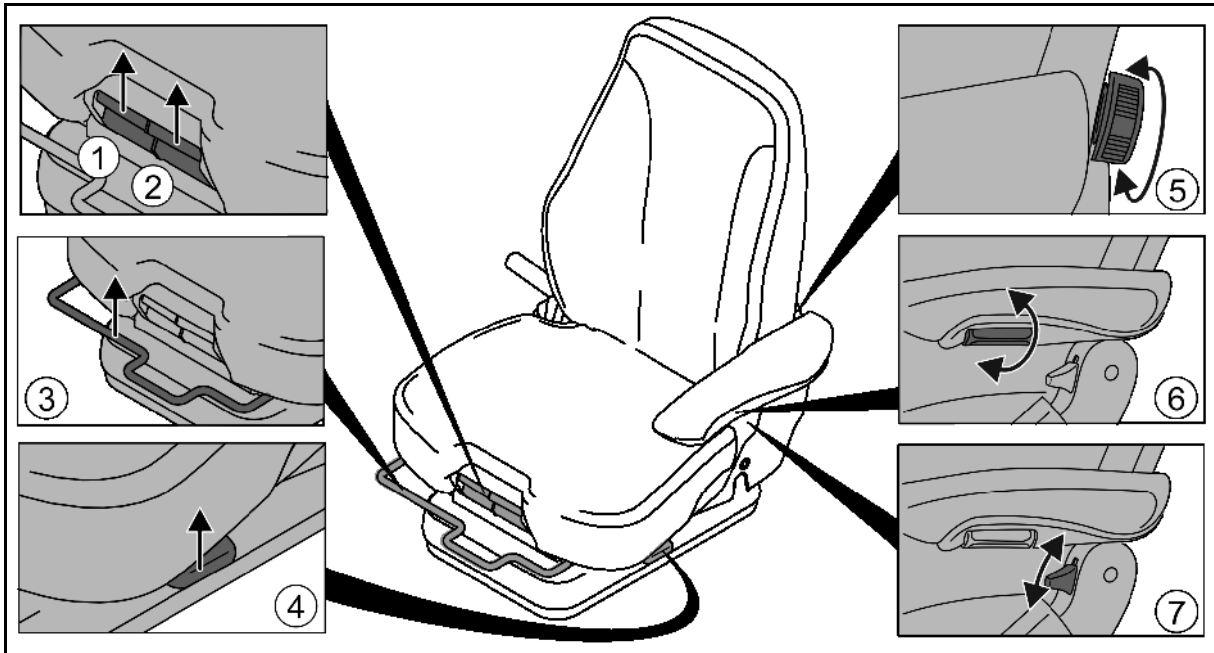


Fig. 38

Adjustments:

- (1) inclination of the seat surface
- (2) move the seating surface to the front / rear
- (3) move the seat to the front / rear
- (4) seat height
- (5) backrest
- (6) inclination of the armrests
- (7) inclination of the backrest

### 5.10.10 Cooling compartment and ashtray

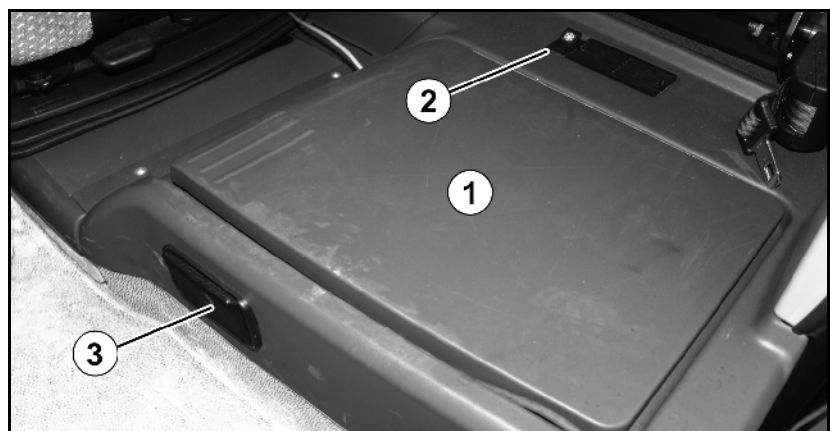


Fig. 39

Under the helpers seat:

- (1) Cooling compartment
- (2) Switch for the cooling compartment
- (3) Ashtray

### 5.10.11 AMATRON 3 / AMAPAD for operating the field sprayer



AMATRON 3

AMAPAD

Fig. 40

#### Base functions:

- entry of the data in the spraying technology.
- entering the job-related data.
- controlling the field sprayer to change the spray rate used in spraying operation.
- the operation of all functions on the sprayer boom.
- the monitoring of the field sprayer during spraying operation.

#### GPS options

- Fully automatic part width section control
- Parallel driving aid (integrated in the GPS switch application)

### 5.10.12 Air conditioner

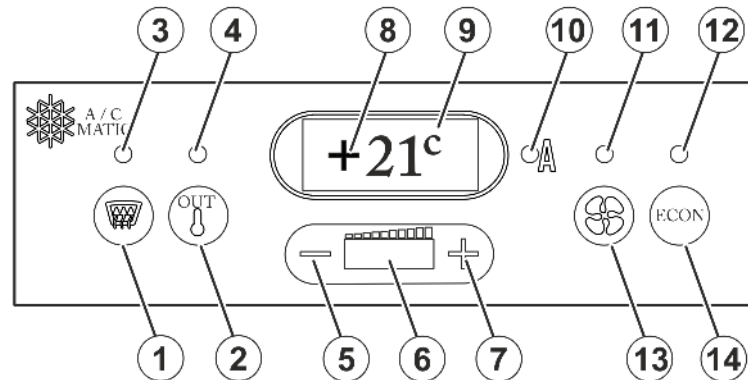


Fig. 41

- |   |  |
|---|--|
| (1) Switch on and off / REHEAT - Function   | (8) Three-digit seven segment display for showing the desired cabin temperature / outside temperature / error codes in event of malfunction. |
| (2) Toggle set temperature display / outside temperature display.   | (9) Displays the unit in Celsius or Fahrenheit   |
| (3) LED: Lights up when REHEAT is switched on.  | (10) LED: Indicates fully-automated mode.  |
| (4) LED: Lights up when the outside temperature is shown in the display.                                    | (11) LED: Lights up when the evaporator fan speed has been set manually.   |
| (5) Setting the desired cabin temperature down or fan speed.  | (12) LED, lights up when in ECON mode.   |
| (6) LED bar display indicates the evaporator fan speed of 0 - 100%.   | (13) Toggle button evaporator fan speed manual / automatic   |
| (7) Setting the desired cabin temperature upwards or fan speed when the manual fan speed has been selected. | (14) Switch on the ECON mode (Compressor off)  |

#### Put the automatic air conditioning system into operation

When the engine is standing still and the ignition is switched on, the evaporator fan speed reduces to 30 % of the nominal speed after 10 minutes. This takes place to prevent faster discharging of the battery.

The software version is displayed for 3 seconds after switching on the ignition. The controller carries out a self-test. The executing of the self test takes about 20 seconds.

In order to prevent faulty temperature controlling of the automatic system, close the cooling compartment flap immediately after use.

#### Set the cabin temperature

The cabin temperature is shown in display field 8. The cabin temperature can be set by pressing buttons 5 and 7.

- Reduce temperature:      **-** Pressing once → -1° C
- Increase temperature:    **+** Pressing once → +1° C



### Set the evaporator fan speed

---

- **Automatically:** Button 13; LED 10 lights up.
- **Manually:** Press toggle button 13; LED 11 lights up. The manual fan speed is shown. You can set the desired speed using the buttons 5 (-) and 7 (+).

### Switch on ECON mode

---

The compressor of the air conditioner is switched off in ECON mode.

- Switch on ECON mode: Press button 14; LED 12 lights up.  
The evaporator fan speed currently indicates 40% on the light strip display (6). The evaporator fan and the heater are also controller automatically in ECON mode.
- Switch on ECON mode: Select button 14.

### REHEAT mode

---

(Defog the cabin windows)

- Switch on REHEAT mode: Press button 1; LED 3 lights up. REHEAT mode is activated.

The fan speed is 100% and after switching the button 13, can be controlled manually using button 5 (-) and 7 (+).

The compressor is switched on continuously in REHEAT mode for dehumidifying the room air.

- Switch off REHEAT mode: Press button 1 again

### Toggle ° Celsius / °F

---

- Press button 2 and 5 at the same time for approx. 3 seconds.  
Pressing the buttons 2 and 5 again switches the display back to degrees Celsius.

### Malfunction / fault (displayed flashing)

---

- |        |   |
|--------|---|
| F0     | Room temperature sensor fault.                  |
| Blue   | Switching outputs are switched off.             |
| F1     | Outlet air temperature sensor malfunction.      |
| Yellow | Switching outputs are switched off.             |
| F2     | Outside air temperature sensor fault.           |
| Red    | Switching outputs are still ready for operation |



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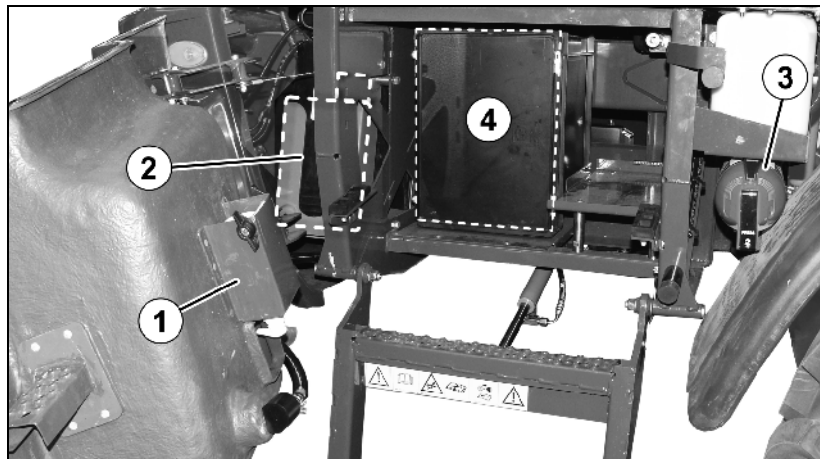
**Important information about the air conditioner**

---

**CAUTION**

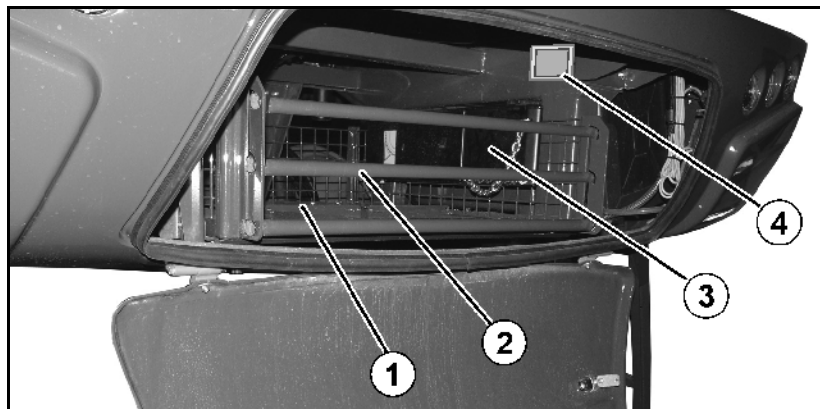
1. **Avoid any contact with the refrigerant. Wear protective gloves and goggles!**
2. **When sprayed in your eyes, rinse with water immediately. Seek medical advice!**
3. **Have maintenance and repair work only carried out by a specialist workshop for refrigerant.**
4. **No welding tasks may be carried out on the refrigerant circuit and in the immediate vicinity - Danger of poisoning!**
5. **Maximum ambient temperature for refrigerant: 80° C**

### 5.10.13 Covers and compartments outside the cabin



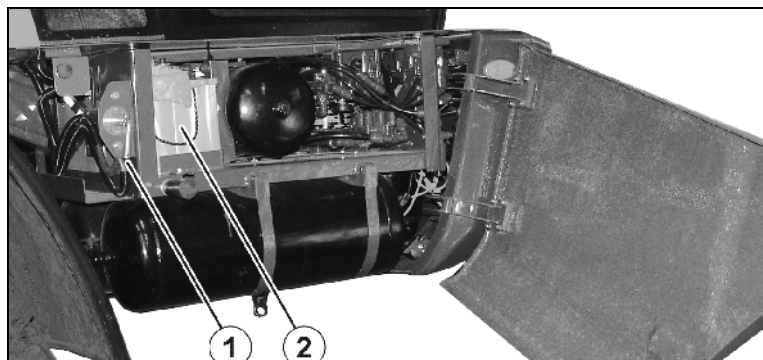
**Fig. 42**

- (1) Soap dispenser
- (2) Fresh water tank
- (3) Fire extinguisher
- (4) Storage box



**Fig. 43**

- (1) Extraction hose storage (maximum payload 100 kg)
- (2) Removable protective brace
- (3) Wheel chock
- (4) Switch for the lighting



**Fig. 44**

- (1) Main switch
- (2) Battery

### 5.10.14 Main switch

The main switch (Fig. 45/1) is located under the cover on the right side of the cabin.

- Before commissioning the machine, switch on the main switch, position **A**.
- After parking the machine, switch off the main switch, position **B**.

The lever of the main switch can be removed when in this position.



Switch off the main switch 18 seconds after switching off the engine at the earliest as the operating data still has to be saved.

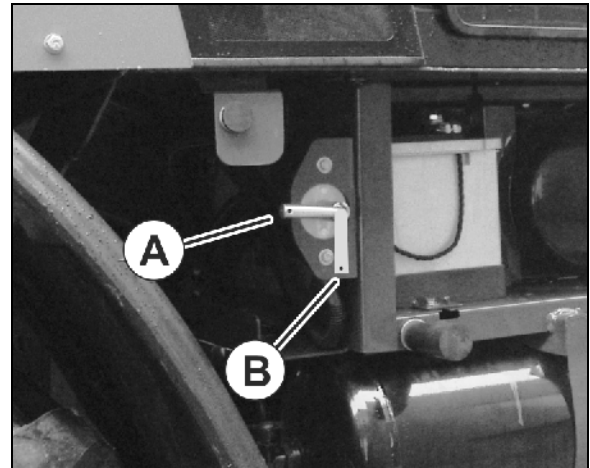


Fig. 45

## 5.11 Driving lever with multi-function stick

### 5.11.1 Driving lever

The driving lever is used for

- o continuously variable accelerating and decelerating of the vehicle,
- o driving forwards and backwards.

- (1) Driving forwards
- (2) Neutral, stationary
- (3) Driving backwards

The speed is dependent on the displacement of the driving lever



A trailer being towed is also braked via the driving lever using the pneumatic brake system.

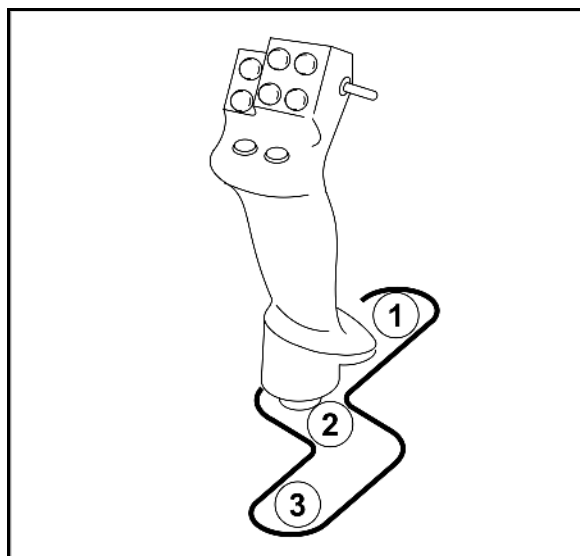





Fig. 46

### 5.11.2 Multi-function handle




The multi-function stick allows the operation of all important spraying functions and the four-wheel steering system.

The multi-function stick has 8 buttons available for operation. The assignment of the buttons can be changed 3-fold by means of a switch (Fig. 47/2).

The switch (Fig. 47/1) default position is

-  Central position (A) and can be pressed
-  Up (B) or
-  Down (C).

The position of the switch is indicated by an LED (Fig. 47/2).

-  LED display, yellow
-  LED display, red
-  LED display, green

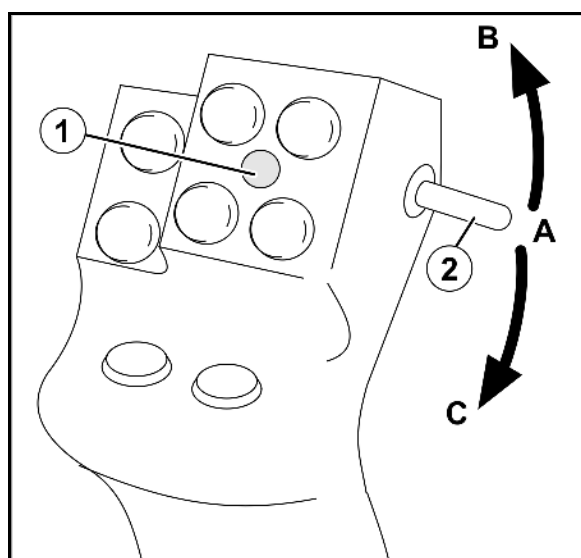








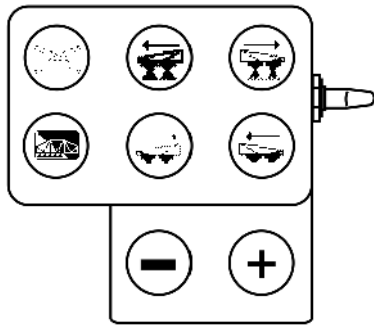








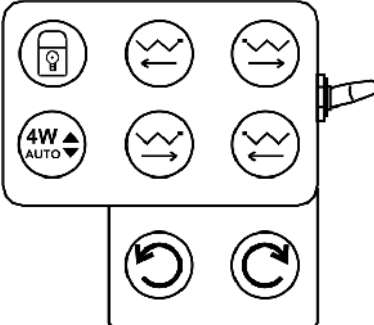







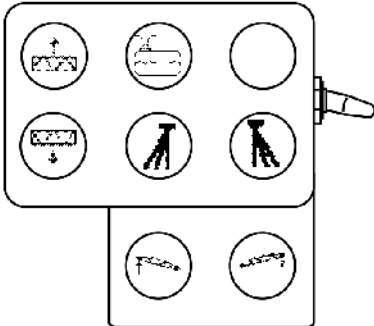




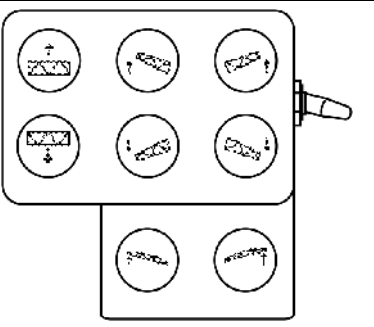


Fig. 47

# Assignment of multi-function stick

 Mirroring the slope  Switch on boom part width sections, left side  Switch on boom part width sections, right side  Switch spraying on / off  Switch off boom part width sections, left side  Switch off boom part width sections, right side  Reduce application rate  Increase application rate		B
 Swing compensations lock / unlock  Fold out boom, left side  Fold in boom, left side  Switchover from two-wheel steering / four-wheel steering  Fold out boom, right side  Fold in boom, right side  Rear wheel steering to the left  Rear wheel steering to the right		A
<b>Profi I</b>  Raise the boom  Replenish the spray liquid tank  Lower the boom  Boundary nozzle, right side  Boundary nozzle, left side  Sprayer boom inclination, right side  Sprayer boom inclination, left side		C
<b>Profi II</b>  Angle-in the boom, left side  Angle-in the boom, right side  Angle-out the boom, left side  Angle-out the boom, right side		C

## 5.12 Camera system (option)

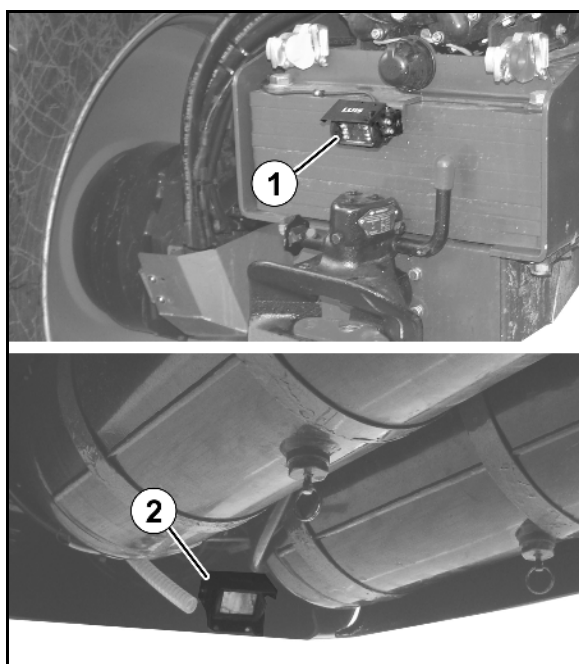
The machine can be equipped with two cameras.

- Selective display of the rear-view camera or the camera for the right front wheel.
- The rear-view camera is switched on automatically when reversing

Features:

- Viewing angle of 135°
- Heater and lotus coating
- Infrared night-view technology
- Automatic backlight compensation

- (1) Rear-view camera for reversing safely.
- (2) Camera for the right front wheel for driving through the tramline correctly.



**Fig. 48**

### 5.13 Working platform with ladder

Working platform with swivel-down ladder for reaching the drivers cabin and filling dome.

- The ladder is lowered or raised on the dash panel in the drivers cabin.



#### **DANGER**

**Risk of accidents resulting from the ladder being pivoted down when driving.**

Raise the ladder to the transport position when driving.



#### **DANGER**

**Risk of falling when leaving the cabin.**

Lower the ladder before leaving the cabin.



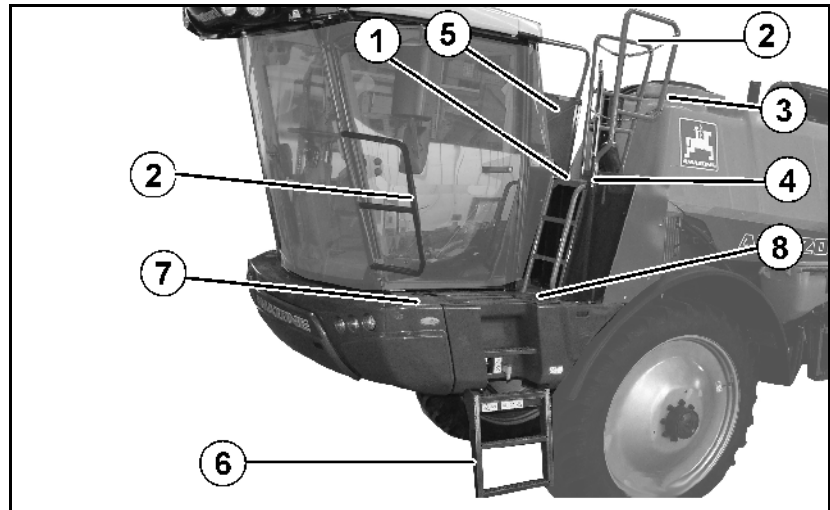
#### **DANGER**

**Never climb into the spray liquid tank.**

→ Risk of injury from poisonous vapours!

- **It is strictly forbidden to ride on the field sprayer!**

→ Riding on the machine creates a risk of falling!



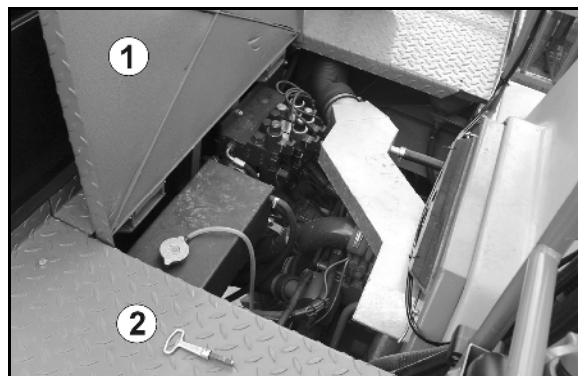
**Fig. 49**

- |  |   |
|--|---|
| (1) Operation platform   | (5) Maintenance flap  |
| (2) Railing to protect against falling   | (6) Hydraulically slewable ladder with switch in the dash panel |
| (3) Pivotal railing to protect against falling   | (7) Refilling opening for the hand wash tank                    |
| The pivotal railing collides with the 40-metre boom.   | (8) Refilling opening for the windscreen washer water           |
| → In doing so, the railing is pivoted outwards only for the purpose of accessing the operation platform. | (9) Work platform for accessing the drivers cabin               |
| (4) Locking mechanism of the pivotal railing   |   |

## Structure and function, carrier vehicle

The maintenance flap (Fig. 50/1) on the operation platform, to be opened using the square spanner (Fig. 50/2).

The square spanner is located in the storage box in the drivers cabin.



**Fig. 50**



## 5.14 Drawbar for trailers

The automatic drawbar serves to pull the braked trailers

- with a permissible total weight of 12000 kg and pneumatic brake.
- with a permissible total weight of 8000 kg and overrun brake.
- without drawbar load.
- with towing eye 40 DIN 74054.

- (1) Drawbar
- (2) Connection for lighting of the trailer
- (3) Connection for brake of the trailer

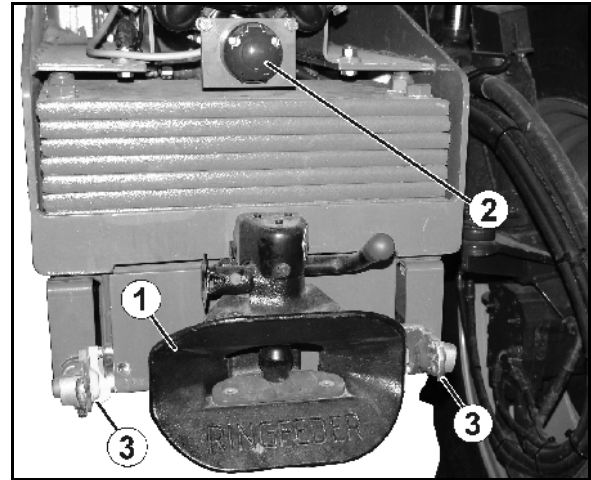


Fig. 51

To unlock the drawbar, pull the rotary knob (Fig. 52/1) and turn until it engages in the upper groove (Fig. 52/2) Then raise the lever (Fig. 52/3) until the pin disengages.

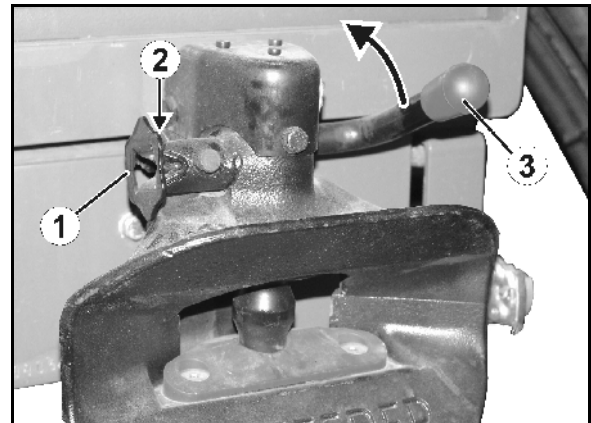


Fig. 52



Braking of the trailer is achieved by pressing the foot brake pedal as well as by actuating the driving lever.

**WARNING**

**Risk of crushing, cutting, being caught or drawn in, or impact through the accidentally rolling machine, if the service brake is released.**

**Dual-circuit pneumatic braking system:**

- Always couple the hose coupling on the brake line (yellow) first and then the hose coupling on the supply line (red).
- The service brake on the machine is immediately released from the brake setting if the red hose coupling is coupled.
- Always uncouple the supply line hose coupling (red) first, and then the brake line hose coupling (yellow).
- The service brake of the machine only moves into the brake position when the red hose coupling has been uncoupled.
- Halten Sie diese Reihenfolge unbedingt ein, da sonst die Betriebs-Bremsanlage löst und sich die ungebremsste Maschine in Bewegung setzen kann.

**WARNING**

**Risk of crushing from unintentional starting and rolling of the machine and trailer when coupling or uncoupling!**

secure the machine and trailer against unintentional start-up and rolling before entering the danger area between the machine and trailer.

**WARNING**

**Risk of crushing when coupling the machine and standing between the machine and the trailer!**

Instruct people to leave the danger area between the machine and the trailer before you approach the trailer.

Coupling the trailer via the automatic drawbar is a one-man operation.

Helpers as guides are not necessary.

### 5.14.1 Coupling the trailer

1. Unlock the drawbar.
2. Instruct people to leave the danger area between the machine and the trailer before you approach the trailer.
3. Drive the machine backwards to the trailer so that the connecting device couples automatically.
4. Secure the machine against unintentional start-up and rolling.
5. Couple the supply lines to the trailer.
  - 5.1 Fasten the brake line coupling head (yellow) as directed in the machine coupling with the yellow marking.
  - 5.2 Fasten the supply line coupling head (red) as directed in the machine coupling with the red marking.
  - 5.3 Plug-in the connector of the trailer lighting to the socket of the machine.
6. Move the trailer in the transport position.

### 5.14.2 Uncoupling the trailer

1. Place the trailer on a level parking surface on solid ground.
2. Secure the machine against unintentional start-up and rolling.
3. Move the trailer in the parking position.
4. Disconnect the supply lines.
  - 4.1 Release the supply line coupling head (red).
  - 4.2 Release the brake line coupling head (yellow).
  - 4.3 Pull out the connector of the trailer lighting.
5. Decouple the connecting equipment.

### 5.15 Towing device (option)

The towing device is used to tow the attached implement on the field.

Procedure, see page 163.

Before towing, mount the towing device at the front under the machine.

- (1) Towing device
- (2) Pins for mounting the towing device, secured using 2 pins.
- (3) Pins for picking up the towing bar, secured using 2 pins.

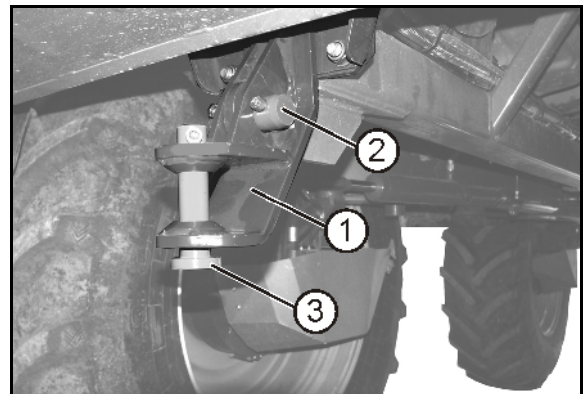
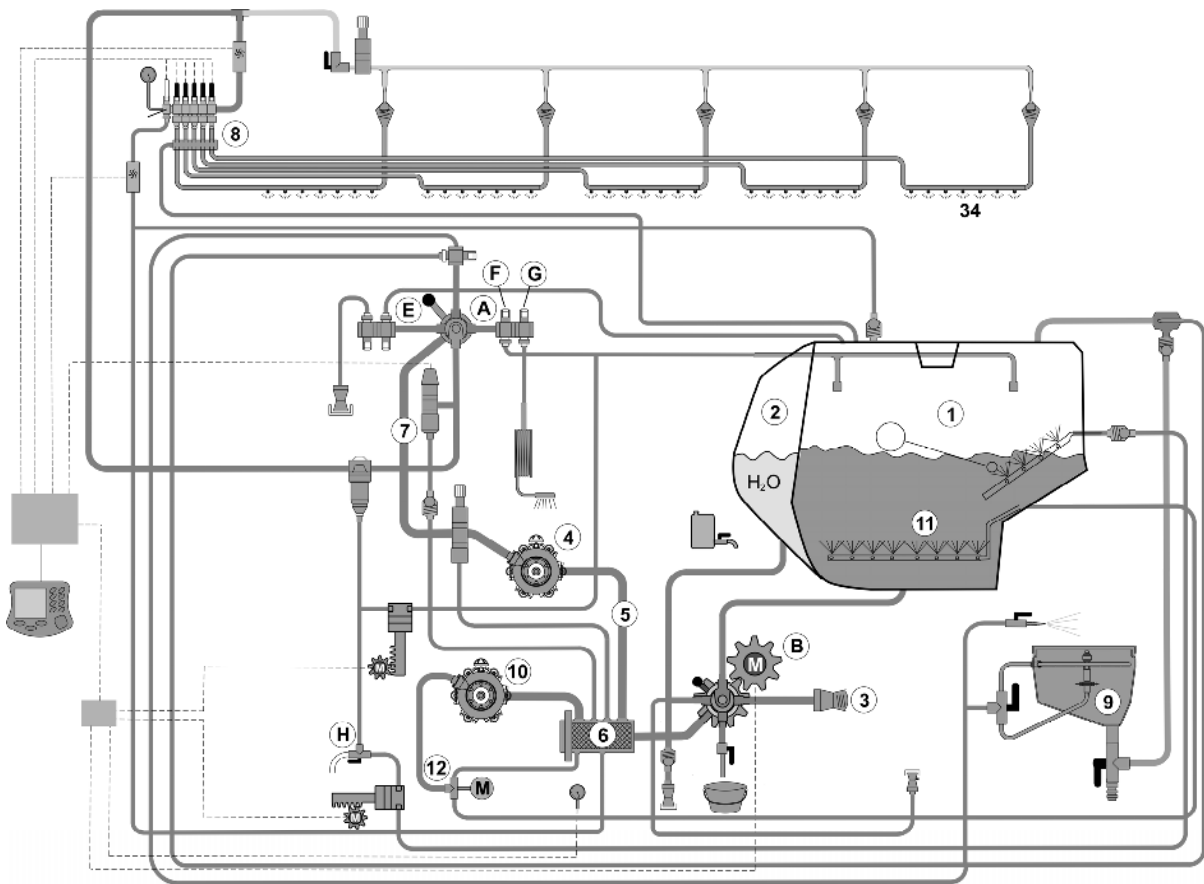


Fig. 53

## 6 Construction and function of the field sprayer

## 6.1 Functionality of the field sprayer



**Fig. 54**

Via the suction chest (B), suction line (5) and suction filter (6), the spraying pump (4) sucks

- the spray liquid from the spray liquid tank (1).
- flushing water from the flushing water tank (2).  
The flushing water serves to clean the spray system.
- fresh water via the external suction port (3).

The liquid that has been drawn in is fed via the pressure hose (7) to the pressure equipment switch tap (A), and from there is fed

- via the self cleaning pressure filter to the part width section valves (8). The part width section valves then send the liquid to separate spray lines.

Via the additional agitator setting tap (I) on the pressure filter, the stirring performance can be increased when stirring spray liquid.

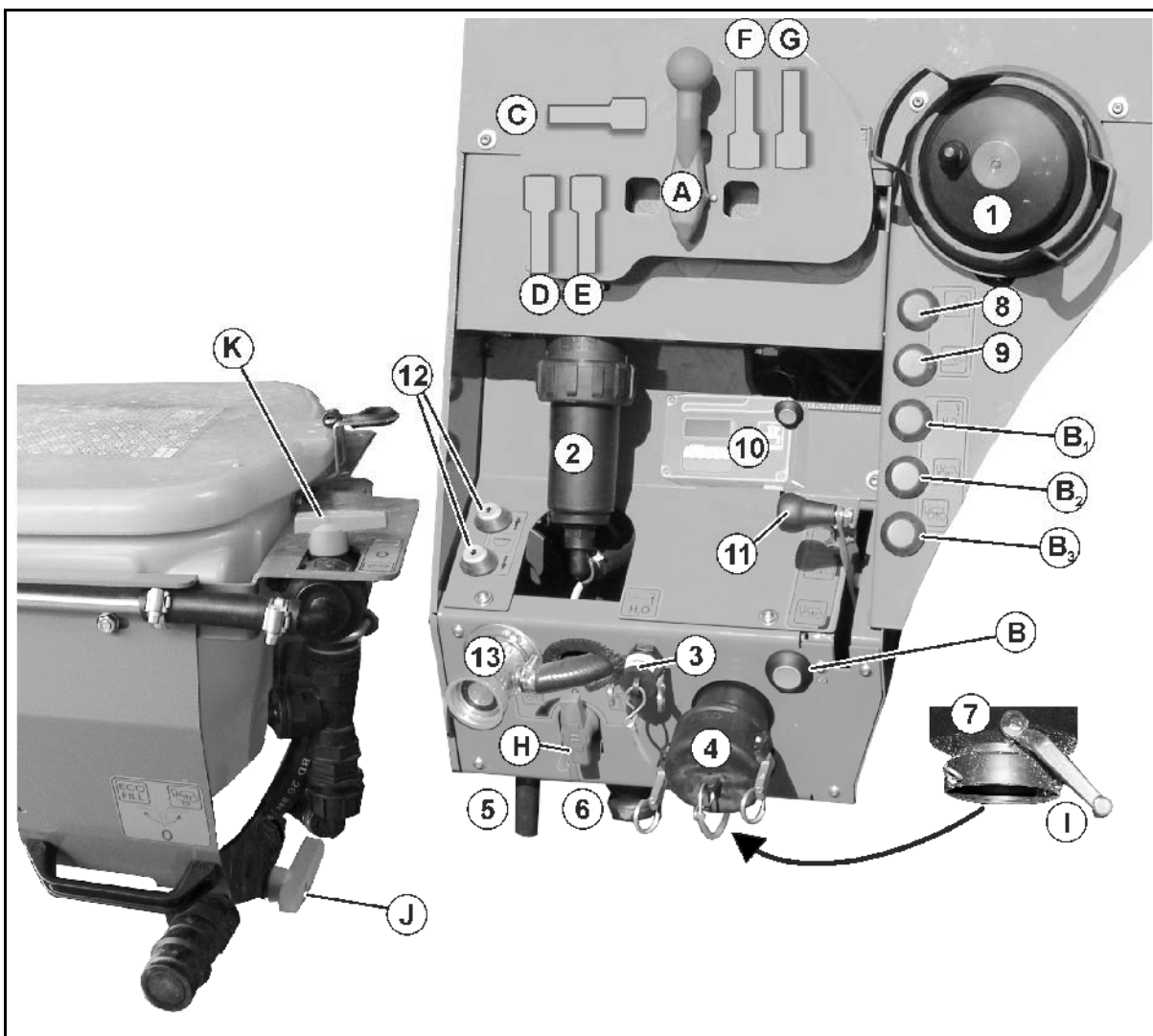
- to the injector and induction bowl.

To prepare the spray liquid, pour the relevant quantity of agent required to fill the spray liquid tank into the induction bowl (9) and evacuate into the spray liquid tank.

- directly into the spray liquid tank (E).
- to the internal (F) or external cleaning switch tap (G).

The agitator pump (10) supplies the main agitator (11) in the spray liquid tank. The automatic filling level dependent regulation (12) of the main agitator ensures for a homogeneous spray liquid in the spray liquid tank

## 6.2 Overview control terminal



**Fig. 55**

- |  |   |
|--|---|
| (A) Pressure equipment -lever                        | (1) Suction filter  |
| (B) Button for suction chest operation               | (2) Pressure filter   |
| o Standard: 1 button,                                | (3) Flushing water tank filling connection                              |
| o Comfort Package 2 (Option) - Buttons B1, B2, B3    | (4) Filling connection of the suction chest for suction hose            |
| (C) Injector switch tap                              | (5) Pressure filter outlet  |
| (D) Quick emptying switch tap -                      | (6) Quick emptying via pump   |
| (E) Filling switch tap                               | (7) Suction filter / spray liquid outlet                                |
| (F) Internal cleaning switch tap                     | (8) Work lights   |
| (G) External cleaning switch tap                     | (9) Pump On / Off   |
| (H) Additional agitator switch tap / drain residue   | (10) Filling level indicator  |
| (I) Drain tap for the spray liquid tank              | (11) Display position of the suction chest                              |
| (J) Evacuate switch tap for induction bowl / Ecofill | (12) Button to lift / lower the induction bowl                          |
| (K) Ring line / canister flushing switch tap         | (13) Filling connection for pressure filling of the spraying agent tank |

## 6.3 Explanation for the valve chest

### • A - Pressure equipment switch tap

- o Spraying operation
- o Cleaning
- o Injector mode
- o Fill and empty the spraying agent tank

### • C - Injector switch tap

### • D – Quick emptying switch tap

### • E – Filling switch tap

### • F - Internal cleaning switch tap

### • G – External cleaning switch tap

### • B – Button for actuating the suction chest

- o Sucking from flushing water tank
- o Sucking from spray tank
- o Sucking via suction hose



Suction hose can only be selected if the filling menu is active on the operating terminal.

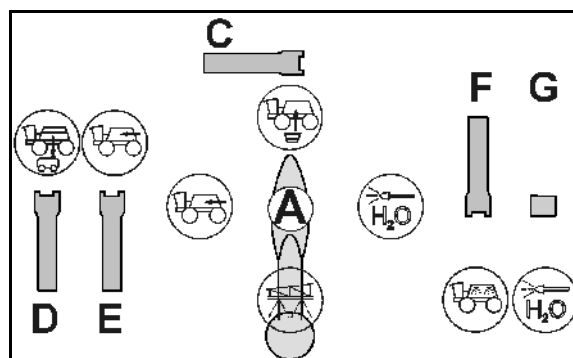


Fig. 56

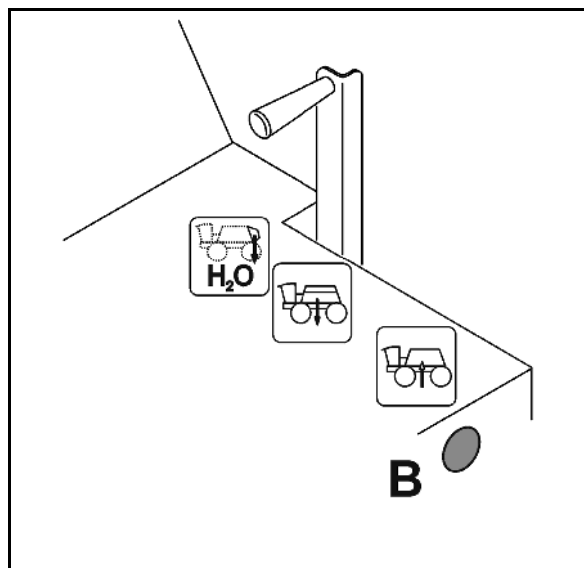


Fig. 57

### • H - Additional agitator switch tap

- o Release residue
- o Agitator

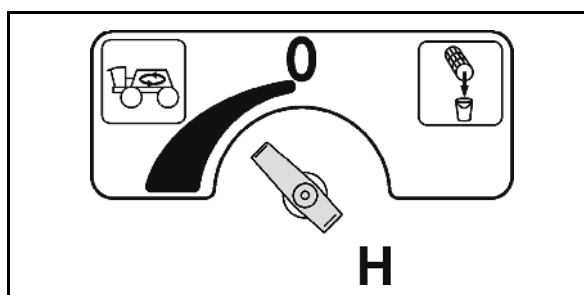


Fig. 58

- **I - Drain tap for the spray liquid tank**

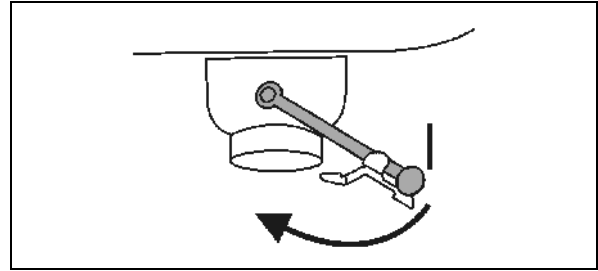



Fig. 59

- **J - Evacuate switch tap for induction bowl / Ecofill**
  - **0** Zero setting
  -  Evacuate induction bowl
  - **Ecofill** filling connection for the spray liquid tank

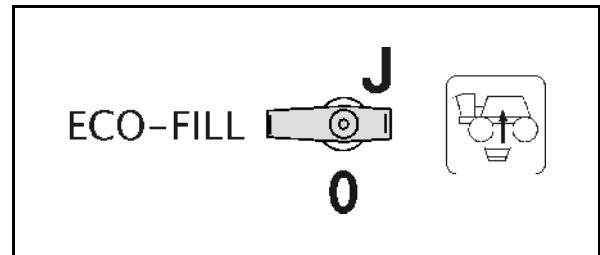




Fig. 60

- **K - Ring line / canister flushing switch tap**
  - **0** Zero setting
  -  Canister flushing
  -  Ring line

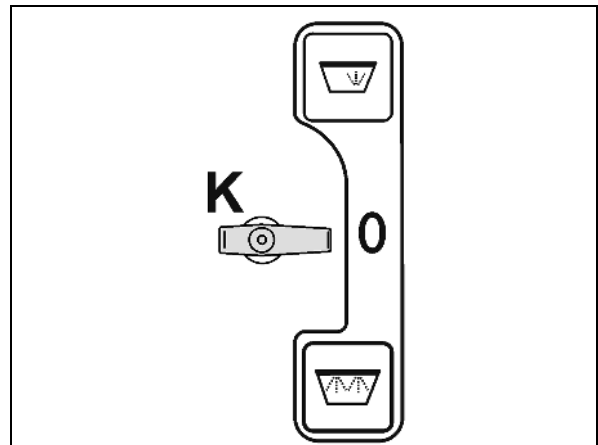


Fig. 61



All stop taps are

- open when lever position is in direction of flow
- closed when lever position is transverse to direction of flow



## 6.4 Agitators

The field sprayer has a main agitator and an additional agitator. Both agitators are designed as hydraulic agitators. The additional agitator is also combined with pressure filter rinsing for the self cleaning pressure filter.

The main agitator has its own agitator pump. The additional agitator is supplied by the operation pump.

When the agitators are switched on, they mix the spray liquid in the spray liquid tank, thereby providing a homogeneous spray liquid.

- The main agitator is controlled automatically depending on the filling level of the spray liquid tank.
- The additional agitator must be set on the setting tap (Fig. 62/1).

The additional agitator is switched off when in setting tap position 0. The fastest stirring performance is available in position (Fig. 62/2).

Safety device for drainage function on the pressure filter (Fig. 62/3).

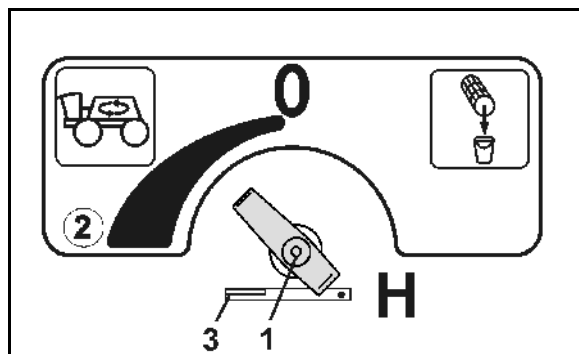


Fig. 62

## 6.5 Fill level indicator

The digital fill level indicator shows the tank capacity [l] in the spray liquid tank (Fig. 63/1).

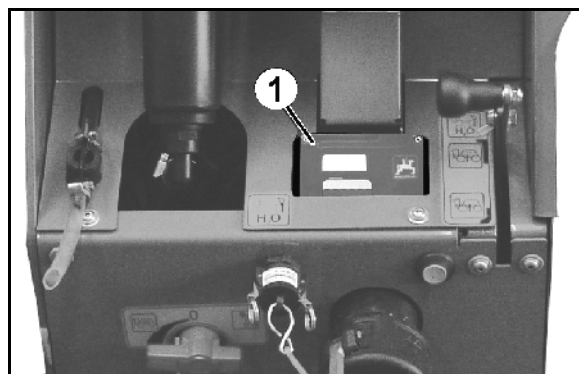


Fig. 63



## 6.6 Suction port for filling the spray liquid tank

(optional)

Fig. 64/...

- (1) Suction hose (8 m, 3").
- (2) Quick coupling.
- (3) Suction filter for filtering the intake water.
- (4) Non-return valve. Prevents liquid already in the spray liquid tank from running out if the vacuum suddenly collapses during the filling process.



Fig. 64

## 6.7 Filling connection for filling the spray liquid tank with pressure (option)

- Filling with free flow path and swivel spout (Fig. 65).
- Return flow safe direct filling.



Fig. 65

- Filling connection with switch tap (Fig. 66).

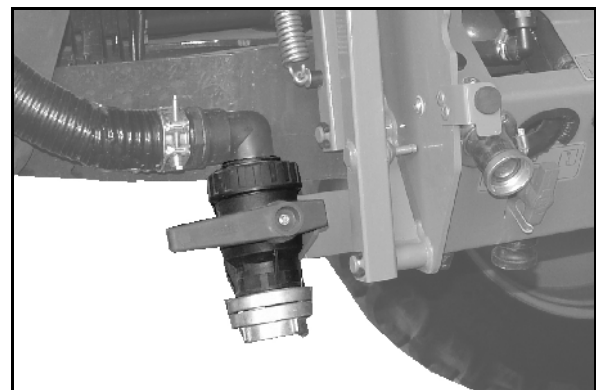


Fig. 66

## 6.8 Filter equipment



- Use all the filters provided with the filter equipment. Clean the filters regularly (refer to the "Cleaning" section, page 188). Fault-free field sprayer operation can only be achieved by correct filtering of the spray liquid. Correct filtering has a significant effect on the success of the crop protection measures.
- Pay attention to the permissible combinations of filters and mesh sizes. The mesh sizes for the self cleaning pressure filter and the nozzle filters must always be smaller than the nozzle opening of the nozzles in question.
- Ensure that the use of pressure filter inserts with 80 or 100 mesh / inch for some crop protection agents can filter out active agents. In individual cases, enquire with crop protection agent manufacturers.

### Filling sieve

The filling sieve prevents the spray liquid from becoming contaminated while filling the spray liquid tank via the filling dome.

Mesh size: 1.00 mm

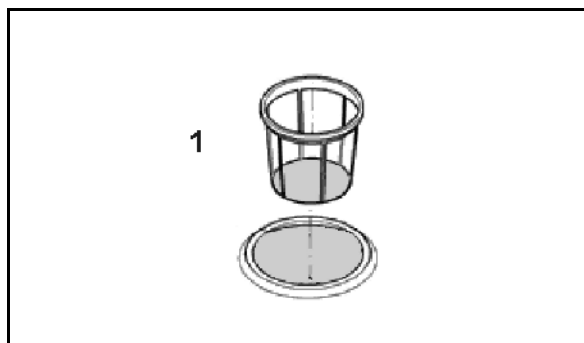


Fig. 67

### Suction filter

The suction filter (Fig. 68/1) filters

- the spray liquid during the spraying operation.
- the water when filling the spray liquid tank via the suction hose.

Mesh size: 0.60 mm

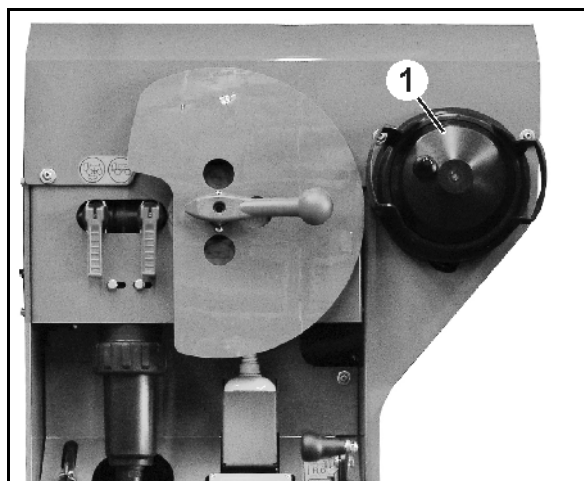


Fig. 68

### Self cleaning pressure filter

The self cleaning pressure filter (Fig. 69/1)

- prevents the nozzle filter upstream of the spraying nozzle from becoming blocked.
- has a greater mesh count/inch than the suction filter.

With the additional agitator switched on, the inside surface of the pressure filter insert is constantly rinsed through, and undissolved particles of spraying agent and dirt are conveyed back into the spray liquid tank.

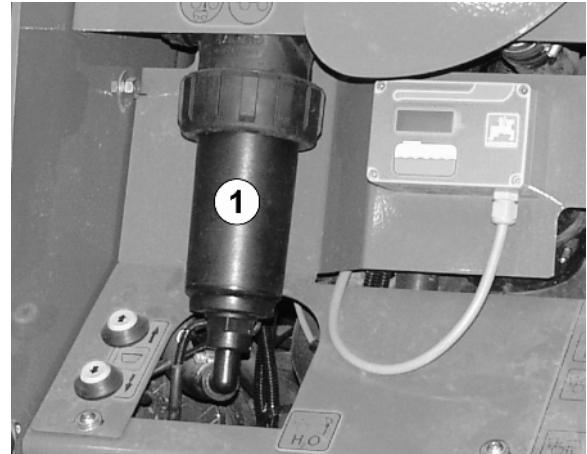


Fig. 69

### Overview of the pressure filter inserts

- 50 mesh/inch (standard), blue  
for nozzle size '03' and larger  
Filter area: 216 mm<sup>2</sup>  
Mesh size: 0.35 mm  
Orderno.: ZF 150
- 80 mesh/inch, yellow  
for nozzle size '02'  
Filter area: 216 mm<sup>2</sup>  
Mesh size: 0.20 mm  
Orderno.: ZF 151
- 100 mesh/inch, green  
for nozzle size '015' and smaller  
Filter area: 216 mm<sup>2</sup>  
Mesh size: 0.15 mm  
Orderno.: ZF 152

### Nozzle filters

The nozzle filters (Fig. 70/1) prevent the spraying nozzle from becoming blocked.

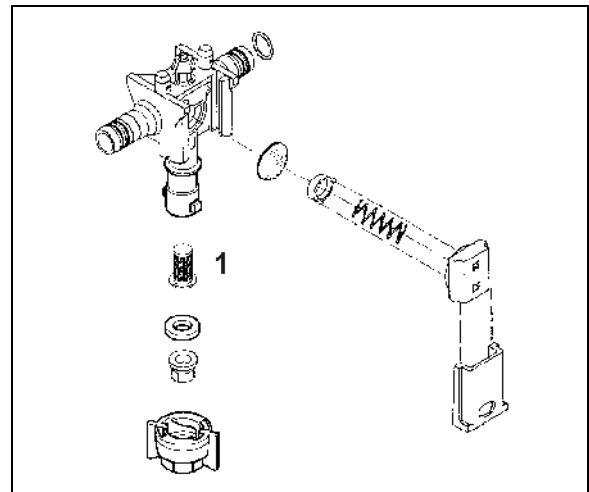


Fig. 70

### Overview of the nozzle filters

- 24 mesh/inch,  
for nozzle size '06' and larger  
Filter area: 5.00 mm<sup>2</sup>  
Mesh size: 0.50 mm  
Orderno.: ZF 091
- 50 mesh/inch (standard),  
for nozzle size '02' to '05'  
Filter area: 5.07 mm<sup>2</sup>  
Mesh size: 0.35 mm  
Orderno.: ZF 091
- 100 mesh/inch,  
for nozzle size '015' and smaller  
Filter area: 5.07 mm<sup>2</sup>  
Mesh size: 0.15 mm  
Orderno.: ZF 169

### Bottom sieve in the induction bowl

The bottom sieve (Fig. 71/1) in the induction bowl prevents lumps and foreign bodies from being drawn in.

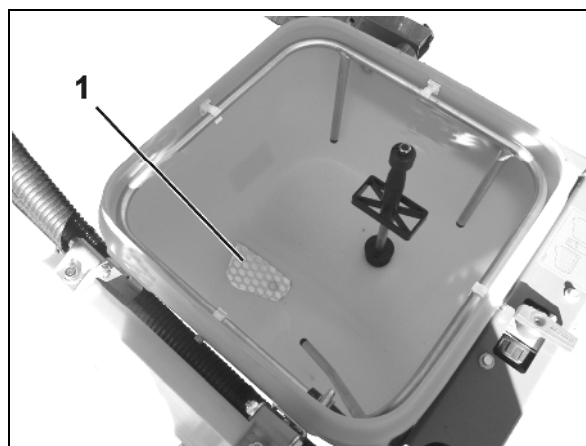


Fig. 71

## 6.9 Flushing water tank

Clear water is also fed into the flushing water tank. The water serves to

- thin the residue in the spray liquid tank at the end of spraying operation.
- clean (flush) the whole field sprayer in the field.
- clean the suction chest and the spray lines when the tank is full.



Only fill the flushing water tank with clear fresh water.

### Filling via the filling connection (Fig. 73/1):

1. Connect filling hose.
  2. Fill the flushing water tank via the water network.
- observe fill level display (Fig. 74/1).
3. Fit the stopper cap on the filling connection.

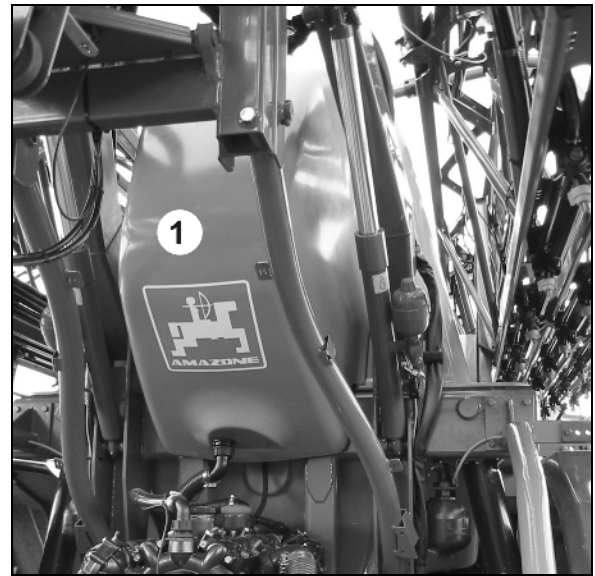


Fig. 72

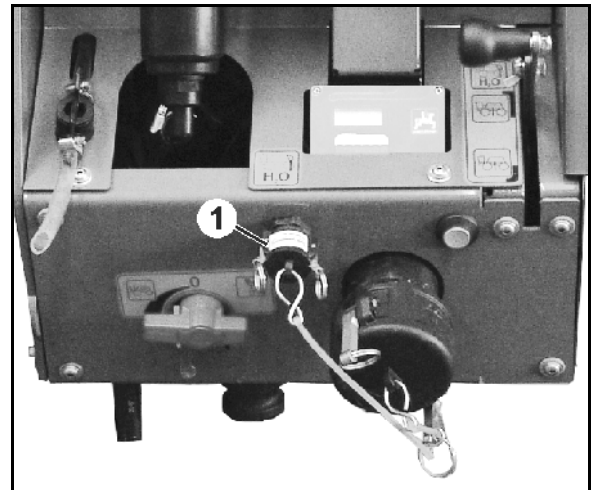


Fig. 73

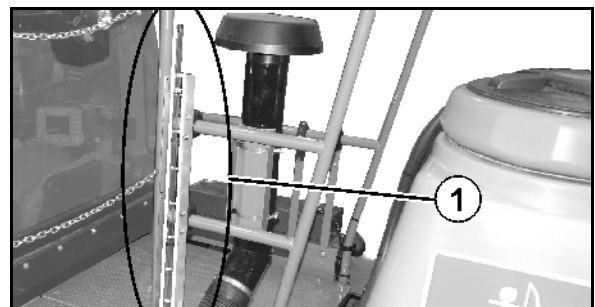


Fig. 74

## 6.10 Induction bowl with filling connection for Ecofill and canister flushing

**Fig. 75/...**

- (1) Swivel-out induction bowl for receiving, dissolving and drawing in crop protection agents and urea.
- (2) Hinged lid.
- (3) Handle for swivelling the induction bowl.
- (4) Parallelogram arm for swivelling the induction bowl from transport to filling position.
- (5) Switch tap for ring line / canister flushing.
- (5) Locking device for the transport position.

Induction bowl with transport safety catch for preventing the induction bowl from being swivelled down while in transport position.

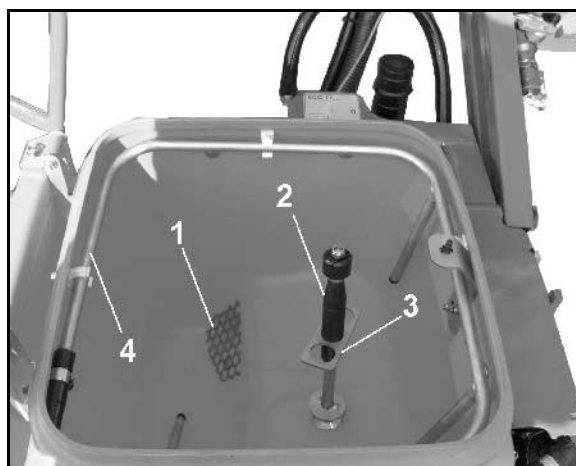
- To swivel the induction bowl in filling position:
  1. Take hold of the handle on the induction bowl.
  2. Unlock safety catch.
  3. Swivel the induction bowl down.



**Fig. 75**

**Fig. 76/...**

- (1) Bottom sieve
- (2) Rotating canister flushing nozzle for washing out canisters or other containers.
- (3) Pressure plate.
- (4) Ring line to dissolve and induct crop protection agent and urea.

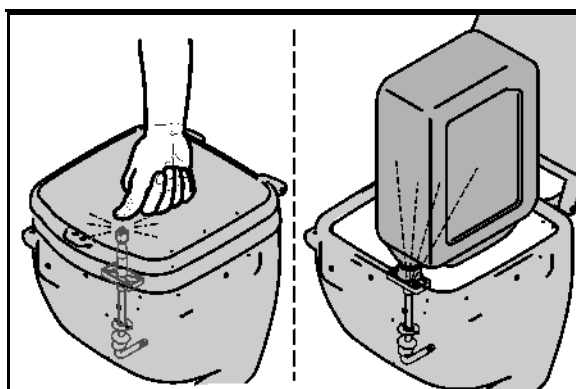


**Fig. 76**



Water escapes from the canister flushing nozzle if

- the pressure plate is pressed downwards.
- the closed folding cover is pressed downwards.



**Fig. 77**



### Spray gun for flushing the induction bowl

The spray gun is used for flushing the induction bowl during or after the flushing process.

The spray gun can be operated using spraying agent or flushing water, depending on the ring line in the induction bowl.



#### WARNING

**Danger from liquids escaping under pressure and contamination with spray liquid if the spray gun is activated accidentally.**

Secure the spray gun against unintentional spraying using the locking mechanism (Fig. 78/1)

- before each pause in spraying.
- before depositing the spray gun in its holder after cleaning work is complete.

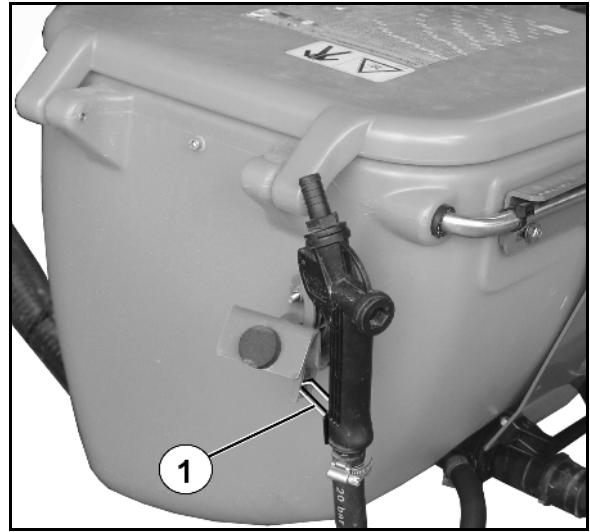


Fig. 78

### Hydraulically operated induction bowl

(Option)

↑ Button to lift the induction bowl.

↓ Button to lower the induction bowl.

Always lift the induction bowl to the end position so that the permissible transport width is not exceeded.

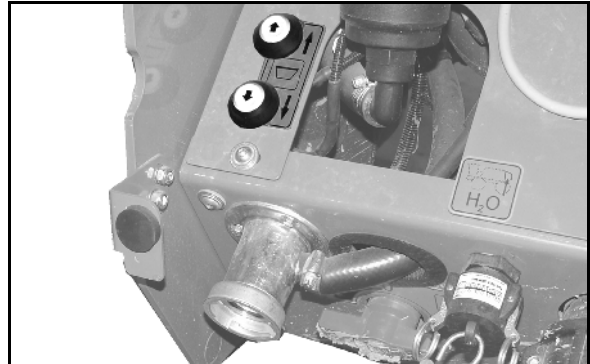


Fig. 79

### Ecofill filling connection (option)

Ecofill connection for extracting spraying agent from Ecofill tanks.

Fig. 80/...

- (1) ECOFILL filling connection L (Option).
- (2) Flushing port for Ecofill counter.
- (J) Switch tap Ecofill

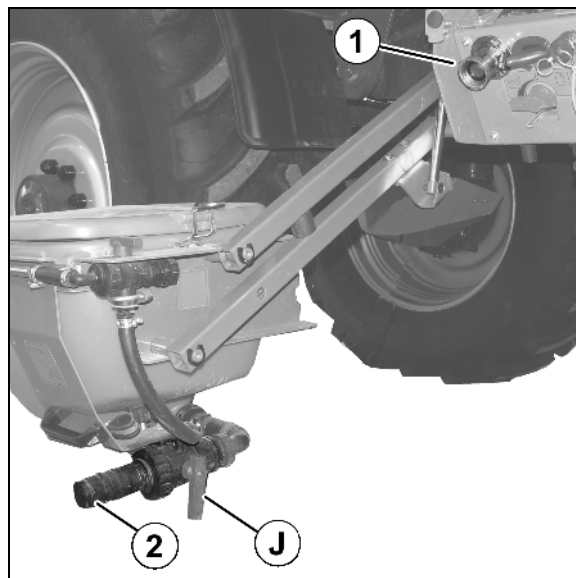


Fig. 80

### 6.11 Hand wash tank

Hand wash tank (20 l) for clear freshwater for cleaning your hands and spray nozzles.

Fig. 81/...

- (1) Hand wash tank behind the cover
- (2) Filling connection
- (3) Stop tap.
- (4) Discharge
- (5) Soap dispenser

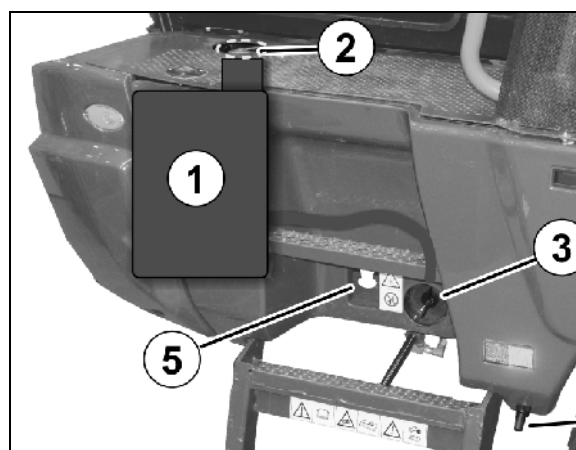


Fig. 81



#### WARNING

**Danger of poisoning from using unclean water in the fresh water tank.**

Never use the water from the hand wash tank as drinking water. The materials used to construct the fresh water tank are not food-safe.



## 6.12 Pump equipment

The field sprayer has 2 diaphragm pumps for applying for the spraying agent. Both pumps are connected to each other with a coupling and are driven by a hydro-motor. The pumps are mounted between the rear wheels and the frame.

The spraying pumps are switched on and off via the AMADRIVE or via the buttons on the control terminal.

The pump speed can be adjusted on the AMA-DRIVE (operating speed 400 to 540 rpm).

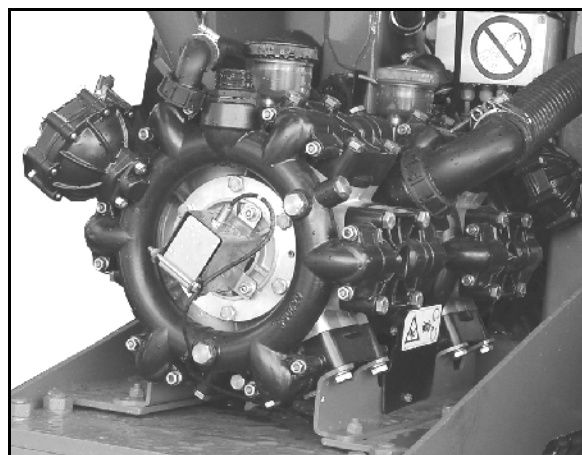


Fig. 82

### Technical data: pump equipment

Pump equipment			<b>2 x AR 280</b>
Delivery capacity at nominal speed	[l/min]	bei 0 bar	2 x 260
		bei 10 bar	2 x 245
Power requirement	[kW]		2 x 6,9
Construction type			6- cylinder piston diaphragm pump
Pulsation damping			Pressure reservoir

## 6.13 Construction and function of the sprayer boom

---

The proper condition of the sprayer boom and how it is suspended have considerable influence on the distribution accuracy of the spray liquid. With the spraying height of the sprayer boom to the crop set correctly, a complete overlap is achieved. Nozzles are attached to the boom at intervals of 50 cm.



- Adjust the spraying height (gap between the nozzle and crop) according to the spray table.
- Always align the sprayer boom parallel to the ground; only then can the specified spraying height be achieved on all nozzles.
- Carry out all adjustment work to the sprayer boom carefully.



Operation of the boom is carried out via the operating terminal or multi-function stick.

### Profi-folding:

Profi-folding consists of the following functions:

- Folding the sprayer boom in and out,
- Hydraulic height adjustment,
- Hydraulic tilt adjustment,
- Folding in one side of the sprayer boom
- One-sided, independent raising and lowering of the sprayer boom / boom extension (Profi-folding II only).



Refer to the software operating manual AMABUS / ISOBUS!

### Outer boom locking

The outer boom locking mechanisms protect the boom from damage if the outer boom sections come into contact with solid obstructions. The respective plastic clutch (Fig. 83/1) enables the outer boom section to avoid collision by moving around the articulated axle (Fig. 83/2), in and against the direction of travel; it is then automatically returned to its working position.

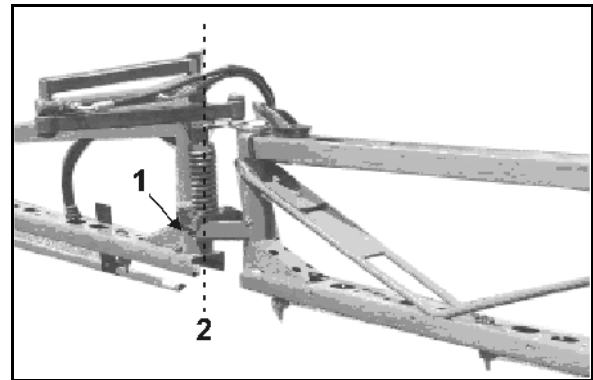


Fig. 83

### Adjust spraying height



#### WARNING

**Risk of crushing and impact for personnel who are caught while the height of the sprayer boom is being raised or lowered.**

Direct people out of the danger area of the machine before raising or lowering the sprayer boom using height adjustment.



Always align the sprayer boom parallel to the ground; only then can the specified spraying height be achieved on all nozzles.

### Folding out and in



#### CAUTION

It is prohibited to fold the sprayer boom in and out during travel.



#### DANGER

Always maintain an adequate distance from overhead cables when folding the sprayer boom out and in. Contact with overhead cables may lead to fatal injuries.



#### WARNING

**Risk of crushing the entire body and impact due to personnel becoming trapped by laterally-swivelling machine parts.**

These dangers can cause extremely serious and potentially fatal injuries.

Maintain an adequate safety distance from moving machine parts while the tractor engine is running.

Ensure that all personnel maintain an adequate safety distance from moving machine parts.

Instruct personnel to leave the swivel range of any moving machine parts before swivelling the parts.



#### WARNING

**Danger for third parties from crushing, being drawn in and/or caught by the moving parts of the boom or impact if they stand in the swivel range of the boom while it is folding out or in.**

- Instruct personnel to leave the swivel range of the boom before you fold the boom out or in.
- Release the control for folding the boom out and in immediately if someone enters the swivel range.



The hydraulic cylinders for boom folding maintain their respective end positions (transport position and working position) in both the folded-in and folded-out boom state.

### Working with the sprayer boom folded out on one side

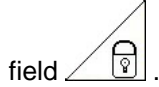


Working with the sprayer boom only folded out on one side is only permissible

- with the swing compensation locked.
- briefly for passing obstacles (trees, electricity pylons, etc.).

### Unlocking the swing compensation (Fig. 84/1):

Unlock the swing compensation via the function



- The opened lock symbol appears in the menu Work.
- The swing compensation unlocks and the unfolded sprayer boom can swing free opposite the boom frame. For illustration purposes, in this image the protective device has been removed from the swing compensation.

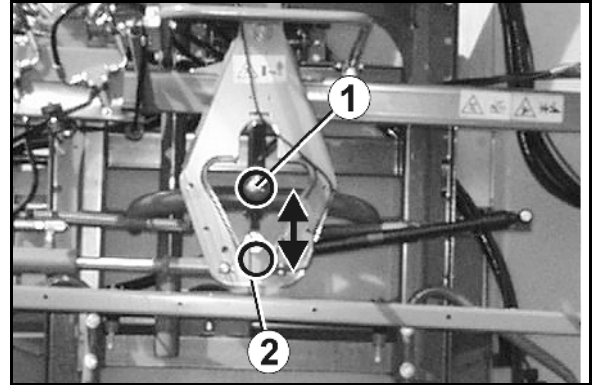


Fig. 84




Even lateral distribution can only be achieved with the swing compensation unlocked.

### Locking the swing compensation (Fig. 84/2):



#### CAUTION

- Always lock the swing compensation in the transport position
  - when driving on public roads!
  - when folding the boom out and in!

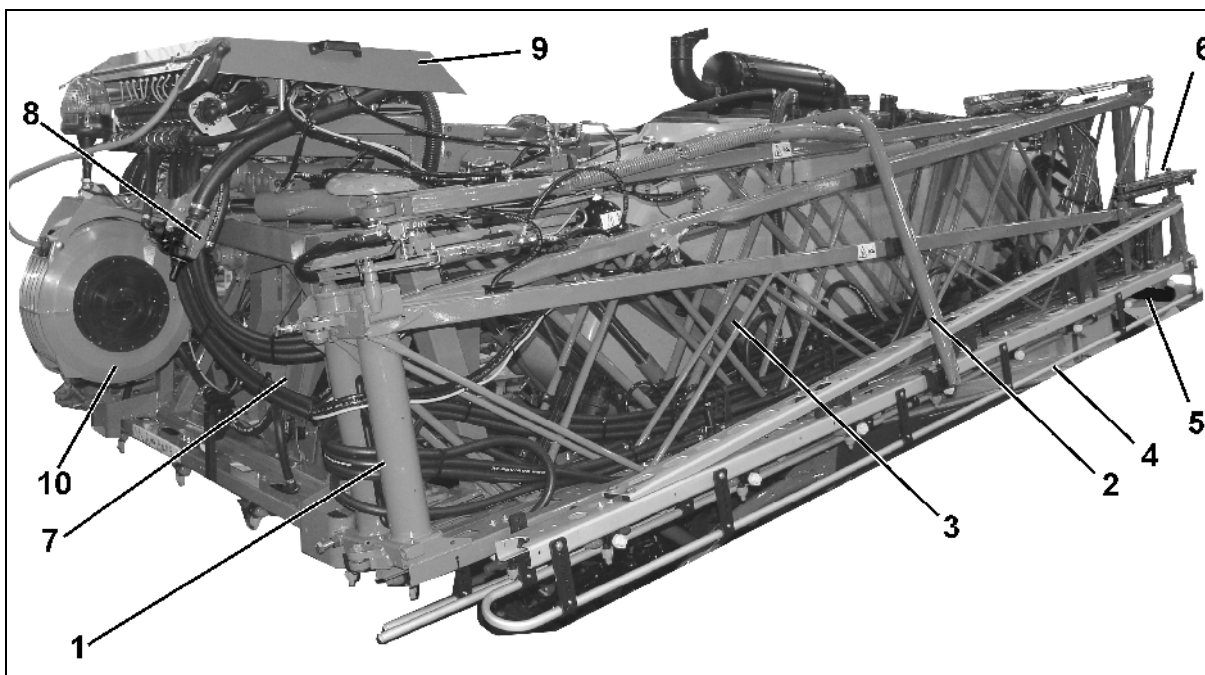
Lock the swing compensation via the function field .

- The closed lock symbol appears in the menu Work.
- If the swing compensation is locked, the sprayer boom cannot pivot freely between the sprayer carrier.



- The swing compensation (Fig. 84/2) is locked when the closed lock symbol appears in the display.
- To lock the swing compensation, keep the button pressed!

### 6.13.1 Super-L boom

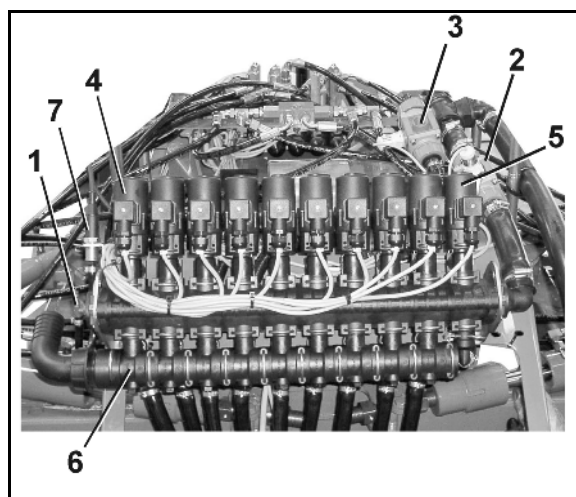


**Fig. 85**

- |   |   |
|---|---|
| (1) Sprayer boom with spray lines   | (4) Nozzle protection tube              |
| (2) Transport safety bow<br>The transport safety bows are used for securing the folded sprayer boom against accidental unfolding while in transport position. | (5) Spacer                              |
| (3) Parallelogram frame for adjusting the height of the sprayer boom  | (6) Outer boom locking, see on page 95  |
|   | (7) Swing compensation, see page 97     |
|   | (8) Valve and switch tap for DUS system |
|   | (9) Boom equipment, see Fig. 86         |
|   | (10) Outer rinsing unit                 |

**Fig. 86/...**

- |  |
|--|
| (1) Pressure connection for the spraying-pressure pressure gauge   |
| (2) Flow meter for determining the spray rate [l/ha]   |
| (3) Return flow meter for determining the spray liquid that has been fed back into the spray liquid tank |
| (4) Motor valves for switching the boom part width sections on and off                                   |
| (5) Bypass valve   |
| (6) Pressure relief  |
| (7) Pressure sensor  |



**Fig. 86**

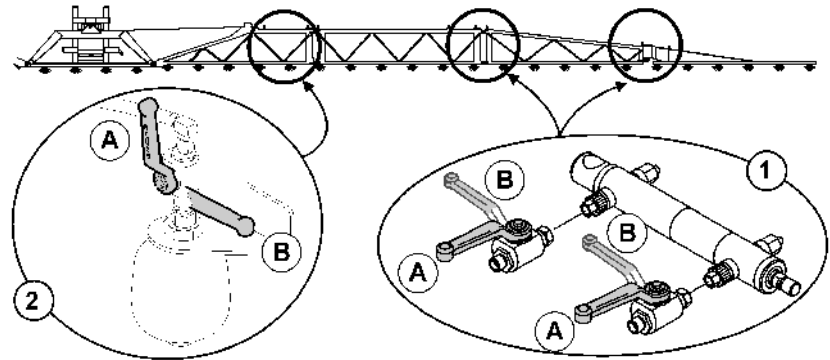
## 6.14 Boom width reduction (option)

With the boom width reduction, one or two booms can remain folded in during operation depending on the version.

The boom damping has to be switched on as well.



The respective boom part width sections have to be activated in the on-board computer.



**Fig. 87**

- (1) Boom width reduction
- (2) Boom width damping
- (A) Stop tap opened
- (B) Stop tap closed

### Working with reduced working width

1. Reduce the boom width hydraulically.
2. Close the stop taps for the boom width reduction.
3. Open the stop tap for the boom damping.
4. Deactivate the respective boom part width sections in the on-board computer.
5. Perform work with reduced working width.



Close the stop tap for the boom damping.

- For road transport
- For use with full working width

## 6.15 Boom extension (option)

The boom extension increases the working width infinitely up to 1.20 metres.

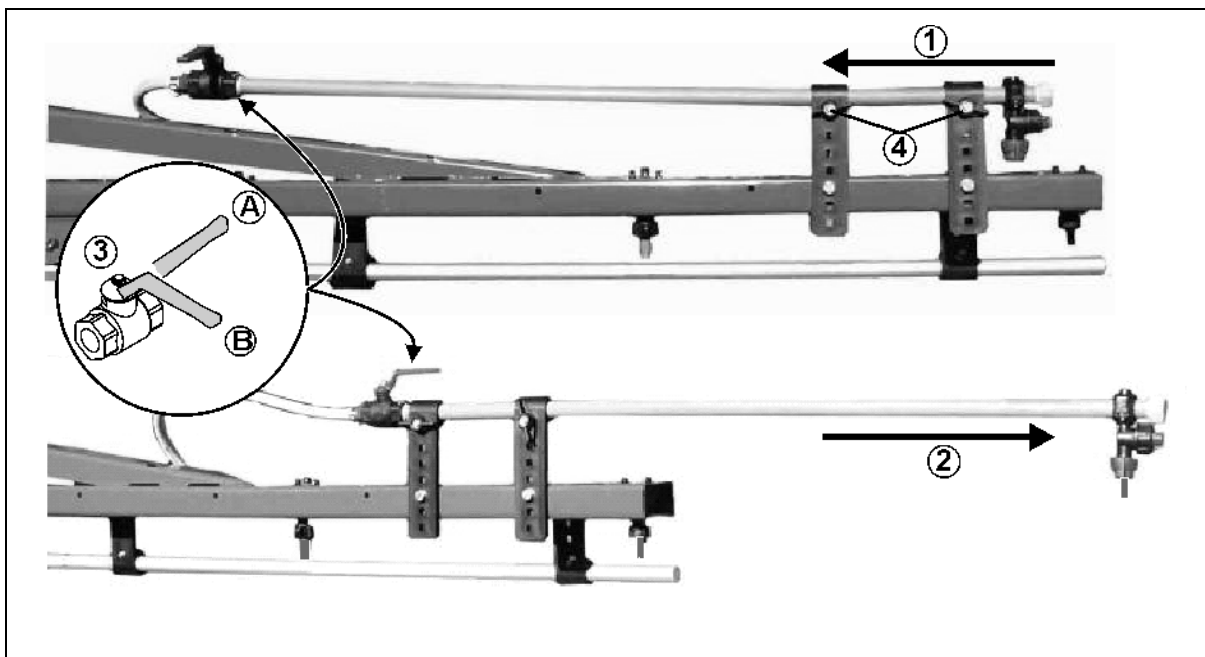


Fig. 88

- (1) Boom extension in transport position
- (2) Boom extension in working position
- (3) Stop tap for the outer nozzle
  - (A) Stop tap opened
  - (B) Stop tap closed
- (4) Wing bolts for securing the boom extension in the transport or working position

## 6.16 Tilt adjustment

(optional)

In unfavourable ground conditions, e.g. when there are ruts of variable depth or when driving with one side of the vehicle in a furrow, the sprayer boom can be aligned parallel to the ground or to the target surface using hydraulic tilt adjustment.

Adjust using operating terminal.



## 6.17 DistanceControl

(optional)

The DistanceControl regulating unit for the sprayer boom automatically holds the sprayer boom parallel at the desired distance from the target surface.

Two ultrasound sensors (Fig. 89/1) detect the distance to the ground or the crop. If the height deviates from the desired measurement on one side, the distance control regulates the tilt adjustment in order to adjust the height. If the terrain rises on both sides, the height adjustment raises the entire boom.

Switching off the sprayer boom on a headland will automatically raise the sprayer boom by approx. 50 cm. When switched back on again, the sprayer boom is lowered back to the calibrated height.



See software AMABUS / ISOBUS operating manual.

- Setting the ultrasound sensors:  
→ see Fig. 89

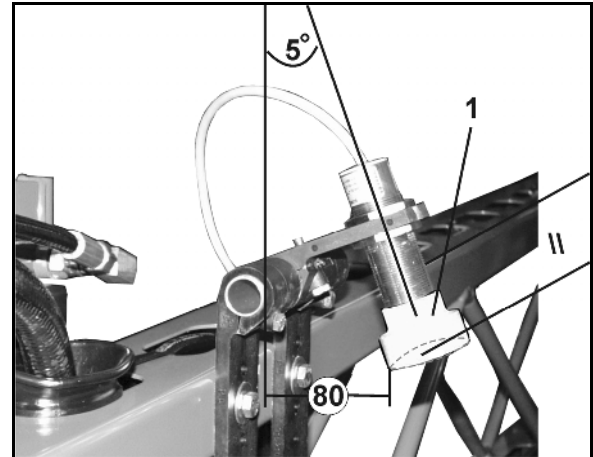


Fig. 89

## 6.18 Spray lines and nozzles

The sprayer booms can be fitted with various spray lines. In turn, the spray lines can be fitted with single nozzles or multi nozzles, depending on the predominant conditions of use.

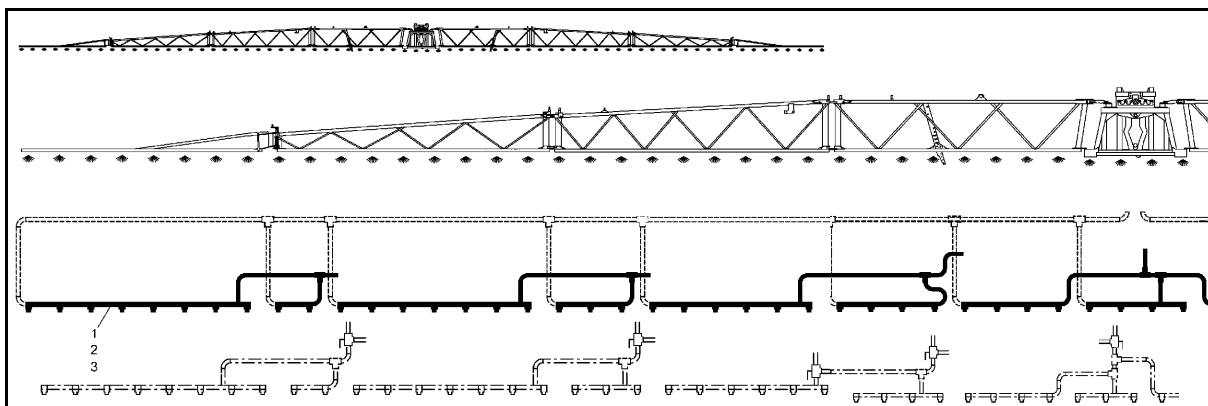


Fig. 90

### 6.18.1 Technical data



Ensure that the residue in the spray line is still being sprayed at an undiluted concentration. Always spray this residue on an untreated area. The residue contained in the spray line is dependent on the sprayer boom working width.

**Formula for calculating the required distance in [m] for spraying out the undiluted residue in the spray line:**

$$\text{Required distance [m]} = \frac{\text{Undiluted residue [l]} \times 10,000 \text{ [m}^2\text{/ha]}}{\text{Spray rate [l/ha]} \times \text{working width [m]}}$$

### Spray line Super-L sprayer boom with single nozzles or multi-nozzles

Working width	Number of part width sections	Number of nozzles per part width sections	Residue	dilutable	not dilutable	total	Residue in pressure circulating system (DUS)	dilutable	not dilutable	total	Weight
[m]			[l]								[kg]
24	5	9-10-10-10-9		5.0	10.0	15.0		16.0	1.5	17.5	20,0
	7	6-6-8-8-8-6-6		5,0	11,5	16,5		17,5	1,5	19,0	22,0
	9	6-5-5-5-6-5-5-5-6		5.5	17.0	22.5		23.5	2.0	25.5	28,0
27	7	8-7-8-8-8-7-8		5,0	12,5	17,5		18,5	2,0	20,5	27,0
	9	6-6-6-6-6-6-6-6-6		5,5	17,5	23,0		24,0	2,0	26,0	29,0
28	7	9-7-8-8-8-7-9		5,0	13,0	18,0		19,0	2,0	21,0	28,0
	9	7-6-6-6-6-6-6-6-7		5,5	17,5	23,0		24,0	2,0	26,0	30,0
30	9	8-7-6-6-6-6-6-7-8		5,5	18,0	23,5		24,0	2,5	26,5	32,0
	11	5-5-5-6-6-6-6-6-5-5-5		6.0	22.5	28.5		29.0	2.5	31.5	39,0
32	9	8-6-7-7-8-7-7-6-8		5,5	18,5	24,0		24,0	2,5	27,0	34,0
33	9	7-8-7-7-8-7-7-8-7		5,5	19,0	24,5		25,0	2,5	27,5	35,0
	11	6-6-6-6-6-6-6-6-6-6-6		6,0	23,0	29,0		29,5	2,5	32,0	37,0
36	7	10-10-10-12-10-10-10		5,0	16,0	21,0		21,5	3,0	24,5	36,0
	9	9-9-7-7-8-7-7-9-9		5,5	19,5	25,0		25,5	3,0	28,5	38,0
	11	8-7-6-6-6-6-6-6-6-7-8		6.0	23.0	29.0		29.5	3.0	32.5	45,0
	13	6-6-6-5-5-5-5-5-5-6-6-6-6		6.5	27.0	33.5		34.0	3.0	37.0	47,0
36/24	9	6-7-(9+1)-9-10-9-(9+1)-7-6		5.5	19.5	25.0		25.5	3.0	28.5	43,0
	13	6-7-6-5-5-5-6-5-5-6-7-6		6.5	27.0	33.5		34.0	3.0	37.0	47,0
39	9	7-9-9-9-10-9-9-9-7		5,5	20,5	26,0		26,5	3,0	29,5	41,0
	11	7-6-7-7-8-8-8-7-7-6-7		6.0	24.0	30.0		30.5	3.0	33.5	44,0
	13	6-6-6-6-6-6-6-6-6-6-6-6-6		6,5	28,0	34,5		35,0	3,0	38,0	47,0
40	9	8-9-9-9-10-9-9-9-8		5,5	21,0	26,5		27,0	3,0	30,0	42,0
	11	8-6-7-7-8-8-8-7-7-6-8		6.0	24.0	30.0		30.5	3.0	33.5	45,0
	13	7-6-6-6-6-6-6-6-6-6-6-6-6-7		6.5	28.0	34.5		35.0	3.0	38.0	48,0

## 6.18.2 Single nozzles

Fig. 91/...

- (1) Nozzle body with bayonet connection (standard).
- (2) Diaphragm. If the pressure in the spray line falls below approx. 0.5 bar, the spring element (3) presses the diaphragm onto the diaphragm seat (4) in the nozzle body. This ensures that when the sprayer boom is switched off, the nozzles are deactivated without subsequent dripping.
- (3) Spring element.
- (4) Diaphragm seat.
- (5) Slider - holds the entire diaphragm valve in the nozzle body.
- (6) Nozzle filter; **fitted as standard on machines with 50 mesh/inch**, is inserted from below into the nozzle body. Refer to the "Nozzle filter" section.
- (7) Rubber seal.
- (8) Nozzle.
- (9) Bayonet connection.
- (10) Coloured bayonet cap.
- (11) Spring element housing.

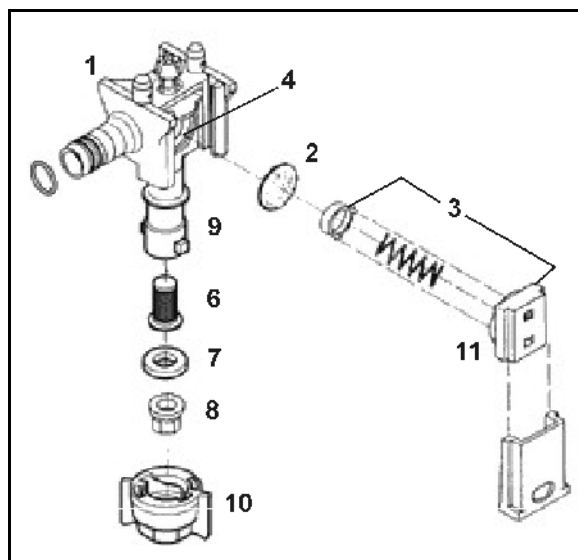


Fig. 91

## 6.18.3 Multi nozzles (optional)

When using multiple nozzle types, it is beneficial to use multi nozzles (Fig. 92). In each case, the nozzle pointing upwards is the one that is supplied.

Turning the multi nozzles head (Fig. 92/1) anti-clockwise brings a different nozzle into play.

The multi nozzles head is switched off in the intermediate positions. This provides the possibility of reducing the working width of the boom.



Rinse the spray lines before twisting the multi nozzles head onto another nozzle type.

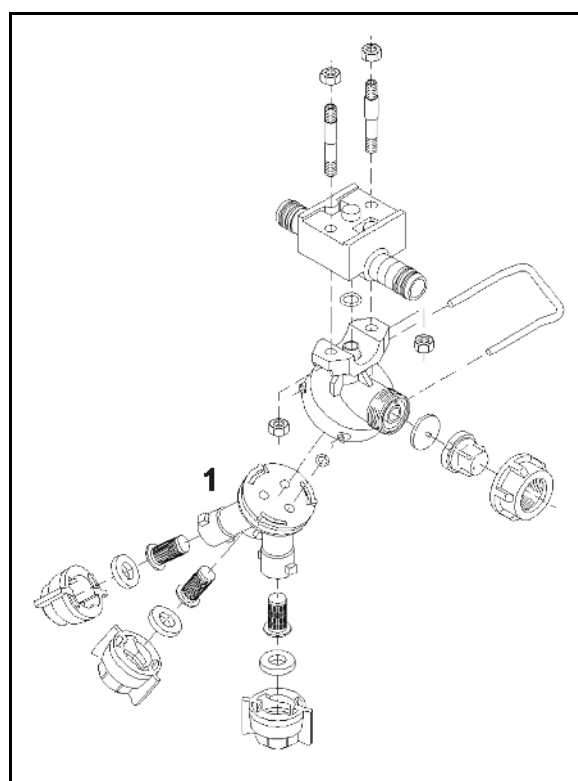
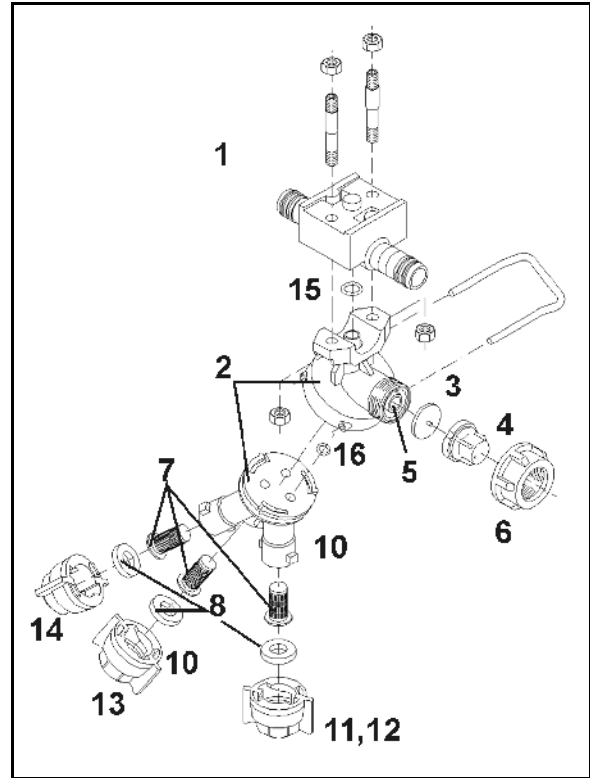


Fig. 92

- (1) Nozzle carrier.
- (2) Triple nozzle head.
- (3) Diaphragm. If the pressure in the nozzle line falls below approx. 0.5 bar, the spring element (4) presses the diaphragm onto the diaphragm seat (5) in the three-way nozzle carrier. This ensures that when the sprayer boom is switched off, the nozzles are deactivated without subsequent dripping.
- (4) Spring element.
- (5) Diaphragm seat.
- (6) Sleeve nut - holds the entire diaphragm valve in the three-way nozzle carrier.
- (7) Nozzle filter; fitted as standard on machines with 50 mesh/inch.
- (8) Rubber seal.
- (9) Bayonet connection.
- (10) Red bayonet cap.
- (11) Green bayonet cap.
- (12) Black bayonet cap.
- (13) Yellow bayonet cap.
- (14) O-ring.
- (15) O-ring.



**Fig. 93**

#### 6.18.4 Electric boundary nozzles (optional)

Using boundary nozzle switching, the last nozzle can be switched off from the tractor and a boundary nozzle can be electrically switched on 25 cm further out (right at the edge of the field).

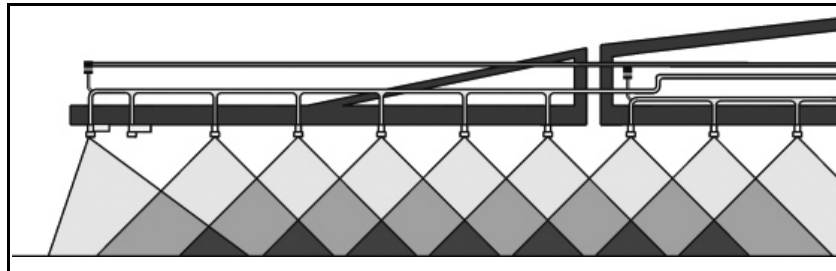


Fig. 94

#### 6.18.5 Electric end nozzle switching (optional)

Using end nozzle switching, up to three of the outer nozzles at the edge of the field close to a water source can be electrically switched off from the tractor).

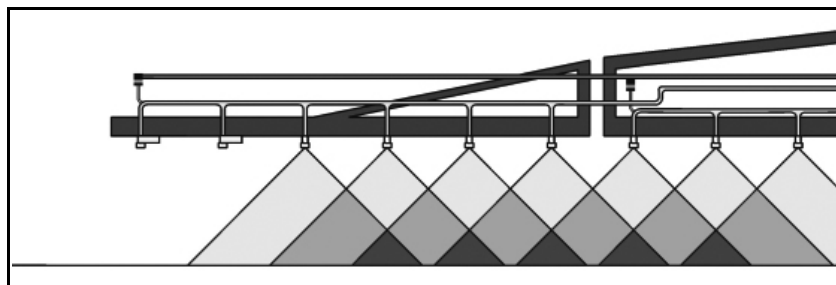


Fig. 95

#### 6.18.6 Electric additional nozzle switching (optional)

With the additional nozzle switching, another exterior nozzle is cut in, increasing the working width by one metre.

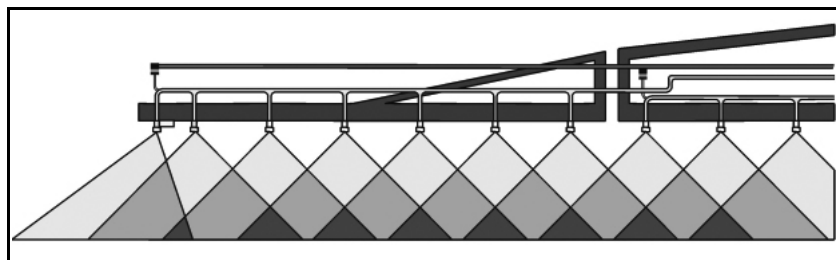


Fig. 96

## 6.19 Special optional equipment for liquid fertiliser

There are currently two main types of liquid fertiliser available:

- Ammonium nitrate / urea solution (AUS) with 28 kg N per 100 kg AUS.
- An NP solution 10-34-0 with 10 kg N and 34 kg P<sub>2</sub>O<sub>5</sub> per 100 kg NP solution.



If the liquid fertiliser is sprayed using flat-fan nozzles, multiply the corresponding values from the spray table for the spray rate (l/ha) by 0.88 for AUS and by 0.85 for NP solutions, as the spray rates listed (in l/ha) only apply for water.

### As a rule:

Use coarse-dropped application for liquid fertiliser to avoid chemical burns to the plants. Overly large drops roll off the leaf and drops which are too small cause a magnifying glass effect, which burns the leaves. Too much fertiliser may cause burns to appear on the leaves due to the salt concentration in the fertiliser.

As a rule, do not spray more liquid fertiliser than, for example, 40 kg N (see also "Conversion table for spraying liquid fertiliser"). Always discontinue nozzle-based AUS fertilisation at development stage EC-39, because chemical burns on ears have a particularly bad effect.

### 6.19.1 Three-ray nozzles

(optional)

The use of three-ray nozzles for applying liquid fertiliser is beneficial if the liquid fertiliser needs to be taken up more by the roots of the plant than through the leaves.

Thanks to its three openings, the dosing aperture, which is integrated into the nozzle, ensures a coarse-dropped, almost depressurised distribution of the liquid fertiliser. This prevents an undesirable spray mist and the formation of smaller drops. The coarse drops produced by the three-ray nozzle hit the plants with little force and roll off their surface.

**Although this avoids damage from burns to the greatest extent possible, avoid the use of three-ray nozzles for late top dressing and use drag hoses.**

For all three-ray nozzles listed in the following, only use the black bayonet nut.

#### Different three-ray nozzles and their operational areas (at 8 km/h)

- yellow 50 - 80l AUS / ha
- red 80 - 126l AUS / ha
- blue 115 - 180l AUS / ha
- white 155 - 267l AUS / ha

## 6.19.2 7 hole nozzles / FD nozzles (optional)

The same conditions apply for using 7 hole nozzles / FD nozzles as for the three-ray nozzles. In contrast to the three-ray nozzle, in the case of the 7 hole nozzle / FD nozzles, the outlets are not oriented downwards, but instead point to the side. This allows very large drops to be produced on the plants using only slight impact forces.

Fig. 97: → 7 hole nozzle

Fig. 98: → FD nozzle



**Fig. 97**



**Fig. 98**

### The following 7-hole nozzles are available

- |             |                |             |
|-------------|----------------|-------------|
| • SJ7-02-CE | 74 – 120l AUS  | (at 8 km/h) |
| • SJ7-03-CE | 110 – 180l AUS |             |
| • SJ7-04-CE | 148 – 240l AUS |             |
| • SJ7-05-CE | 184 – 300l AUS |             |
| • SJ7-06-CE | 222 – 411l AUS |             |
| • SJ7-08-CE | 295 – 480l AUS |             |

### The following FD nozzles are available

- |         |                     |             |
|---------|---------------------|-------------|
| • FD 04 | 150 - 240 l AHL/ha  | (at 8 km/h) |
| • FD 05 | 190 - 300 l AHL/ha  |             |
| • FD 06 | 230 - 360 l AUS/ha  |             |
| • FD 08 | 300 - 480 l AUS/ha  |             |
| • FD 10 | 370 - 600 l AUS/ha* |             |

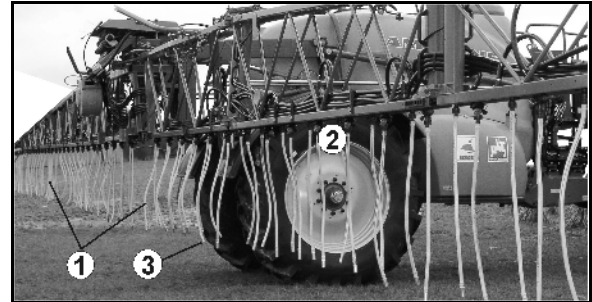


## 6.20 Drag hose equipment for Super-L boom (optional)

- with dosing discs for late top dressing with liquid fertiliser

**Fig. 99/...**

- (1) Drag hoses at 25 cm intervals, after fitting the 2nd spray line.
- (2) Bayonet connection with dosing discs.
- (3) Metal weights - stabilise the position of the hoses during operation.



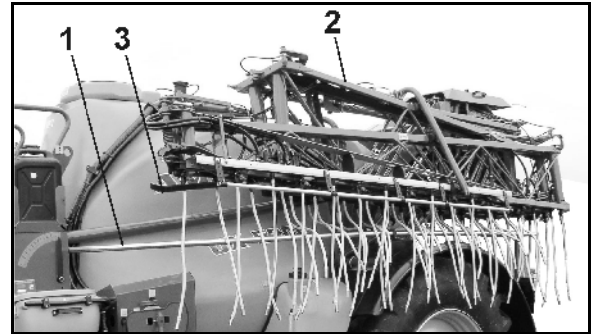
**Fig. 99**

**Fig. 100/...**

- (1) Deflector hoop for the transport position.
- (2) Transport position raised by lowering the transport hook
- (3) Spacing runners



Remove both spacing runners (Fig. 100/3) when operating drag hoses.



**Fig. 100**

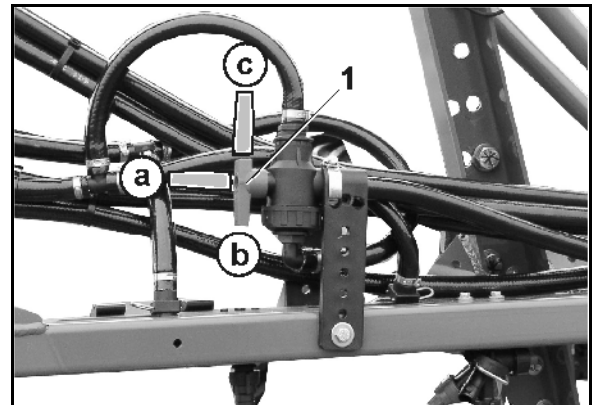
**Fig. 101/...**

- (1) one setting tap for every boom part width section:
  - a Spraying via both spray lines with drag hoses
  - b Spraying via a standard spray line
  - c Spraying via the 2nd spray line only



Remove drag hoses for normal spraying operation.

After removing the drag hoses, seal off the nozzle bodies with blanks



**Fig. 101**

## 6.21 Spray pistol, with 0.9 m long spray tube without pressure hose

(Option)



Use the spray pistol only for cleaning. An accurate distribution of the crop protectant is not possible due to individual handling

## 6.22 Foam marker

(optional)

The **foam marker** (Fig. 102/1 and Fig. 102/3), which can be retrofitted at any point, makes it possible to **drive the next bout precisely** when spraying **fields without marked-out tramlines**.

Marking involves the use of **foam bubbles**. The foam bubbles are laid at adjustable intervals of approx. 10 – 15 metres, providing a **clearly-visible orientation line**. The foam bubbles dissolve after a certain time without leaving any residue behind.

Set the **interval between the individual applications of bubbles** using the slotted screw as follows:

- o turn **clockwise** - distance is increased,
- o turn **anti-clockwise**, - distance is decreased.

**Foam marker: /...:**

- **Super-L boom Fig. 102/...**

- (1) Tank
- (2) Slotted screw

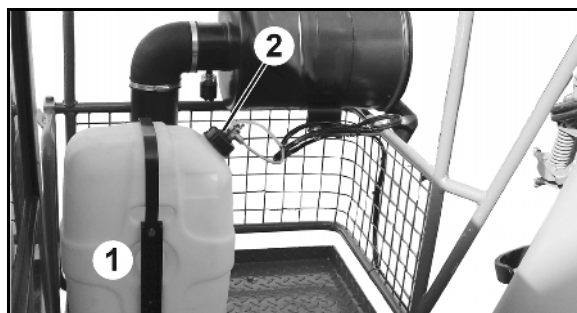
- **Compressor Fig. 103**

**Fig. 104/...**

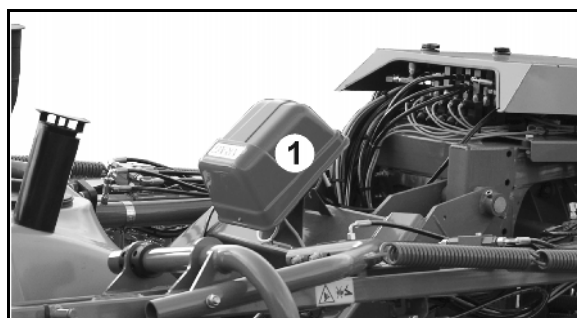
- (1) Air and liquid agitator
- (2) Flexible plastic nozzle



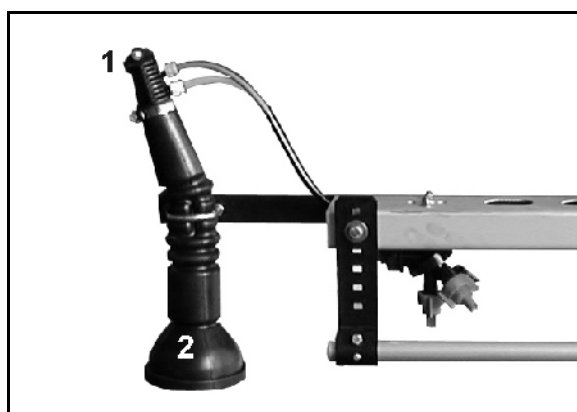
See also Software AMABUS / ISOBUS operating manual



**Fig. 102**



**Fig. 103**



**Fig. 104**

## 6.23 Pressure circulating system (DUS) (optional)



- For normal spraying operation, the pressure circulating system should usually be switched on.
- When using drag hoses, the pressure circulating system should usually be switched off.

### The pressure circulating system

- enables the constant circulation of liquid in the spray line. For these purposes, a suction port hose (Fig. 105/1) is assigned to each part width section.
- enables operation using spray liquid or flushing water, as desired.
- reduces the undiluted residue for all spray lines to 2 l.

### The constant circulation of liquid

- enables production of an even spray pattern right from the start, because spray liquid is available at every spraying nozzle immediately after the sprayer boom is switched on, with no delay.
- prevents damage to the spray line.

### The principal components of the pressure circulating system are:

- one suction port hose (Fig. 105/1) per part width section.
  - the DUS switch tap (Fig. 106/1).
  - the DUS pressure relief valve (Fig. 106/2). The DUS pressure relief valve is permanently set at the factory and reduces the pressure in the pressure circulating system to 1 bar.
- If the DUS switch tap is in position (Fig. 106/A), the pressure circulating system is switched ON.
- If the DUS switch tap is in position (Fig. 106/B), the pressure circulating system is switched OFF.
- If the DUS switch tap is in position (Fig. 106/C), liquid can be drained from the field sprayer.

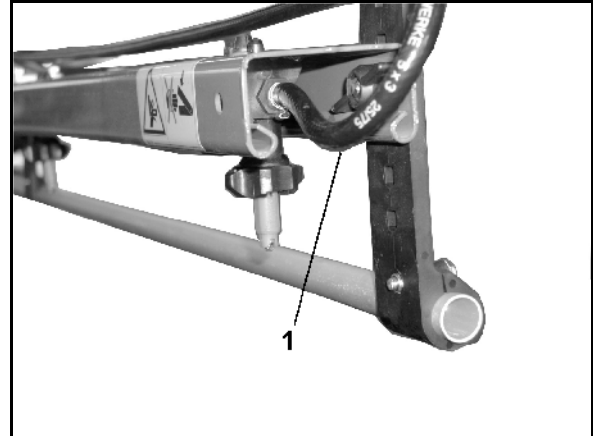


Fig. 105

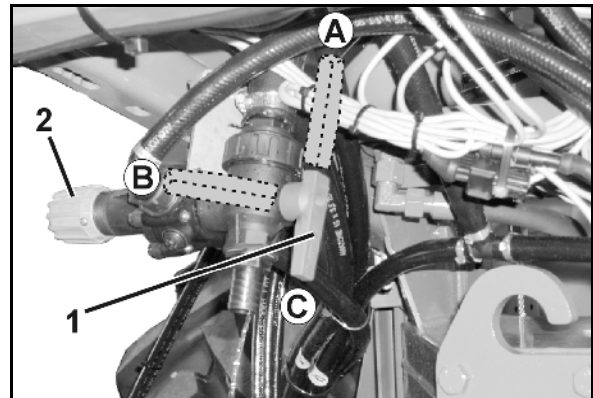
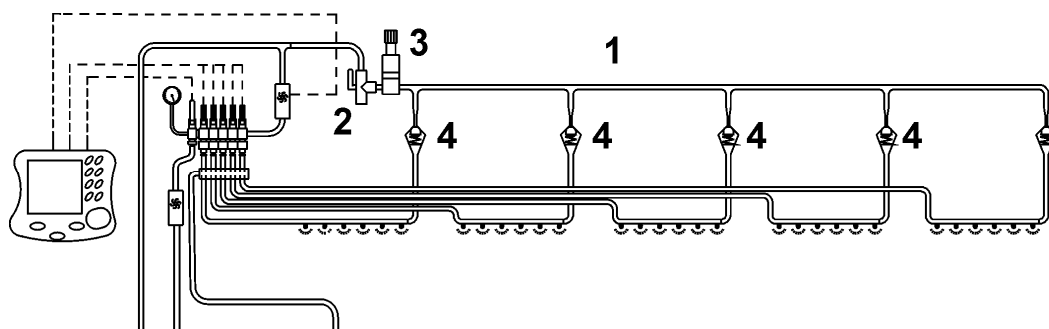


Fig. 106

## Overview – pressure circulating system (DUS)



- (1) Pressure circulating system (DUS)
- (2) DUS switch tap
- (3) DUS pressure limiting valve
- (4) DUS return valve

## 6.24 Line filter for spray lines (optional)

Line filters (Fig. 107/1) are

- fitted in the spray lines in each part width section.
- an additional measure to avoid contamination of the spraying nozzles.

### Overview of the filter inserts

- Filter insert with 50 mesh/inch (blue)
- Filter insert with 80 mesh/inch (grey)
- Filter insert with 100 mesh/inch (red)

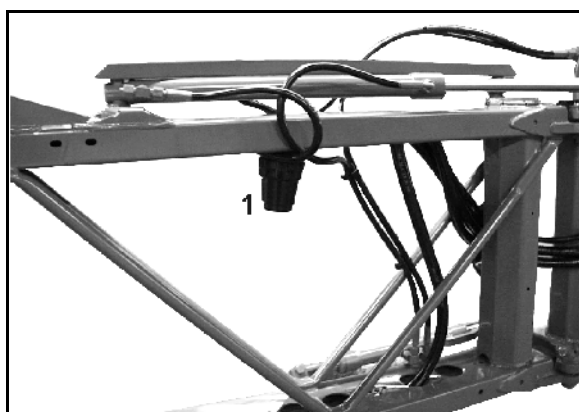


Fig. 107

## 6.25 Exterior wash down kit

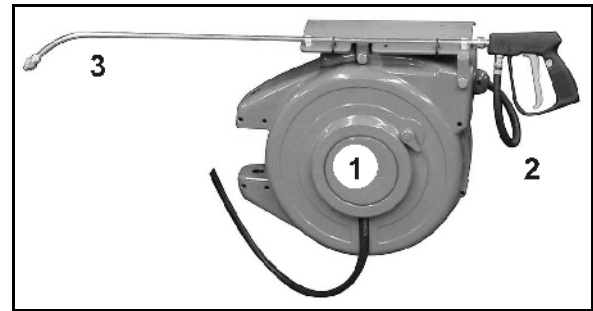
**Fig. 108/...**

Exterior wash down kit for cleaning the field sprayer, includes

- (1) Hose coiler,
- (2) 20 m pressure hose,
- (3) Spray gun

Operating pressure: 10 bar

Water output: 18 l/min



**Fig. 108**



### **WARNING**

**Danger from liquids escaping under pressure and contamination with spray liquid if the spray gun is activated accidentally.**

Secure the spray gun against unintentional spraying using the locking mechanism (Fig. 109/1)

- before each pause in spraying.
- before depositing the spray gun in its holder after cleaning work is complete.

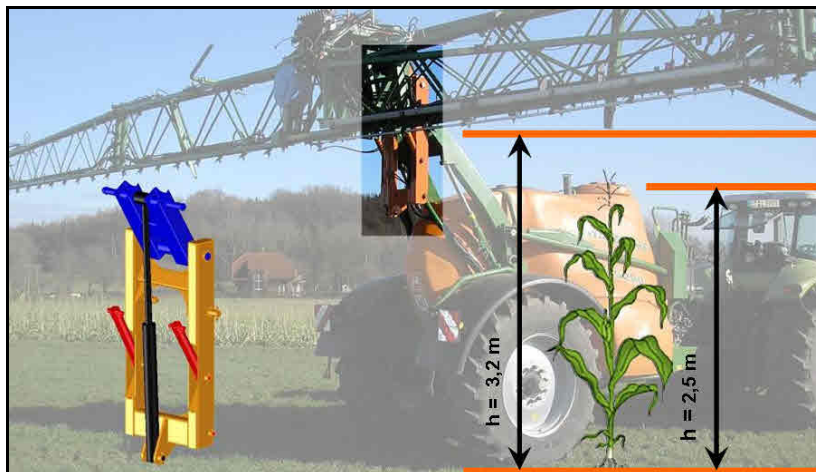


**Fig. 109**

## 6.26 Lift module

(Option)

The lifting module allows the sprayer boom to be raised by an additional 70 cm to a nozzle height of 3.20 m.



The lifting module is operated using a switch in the cabin.

- + Lift the sprayer boom additionally using the lifting module.
- + Lower the sprayer boom additionally using the lifting module.



### DANGER

#### Risk of accidents and danger of damaging the machine.

- When driving on the roads, the sprayer boom must not be raised above the lifting module.
- The total height of the machine with lifting module can be considerably higher than 4 m.
- Use the lifting module only when the sprayer boom is folded out.
- Lower the lifting module again before folding in the sprayer boom. The sprayer boom can otherwise not be put into the transport lock.
- Adjustment of the lifting module must always be carried out in the end position!
- Always lift or lower the lifting module to the end position!



## 6.27 Control terminal cover

(Option)

The cover keeps the control terminal clean.

- (1) Control terminal cover
- (2) Lock
- (3) Handle
- (4) Control terminal illumination
- (5) Switch for the lighting

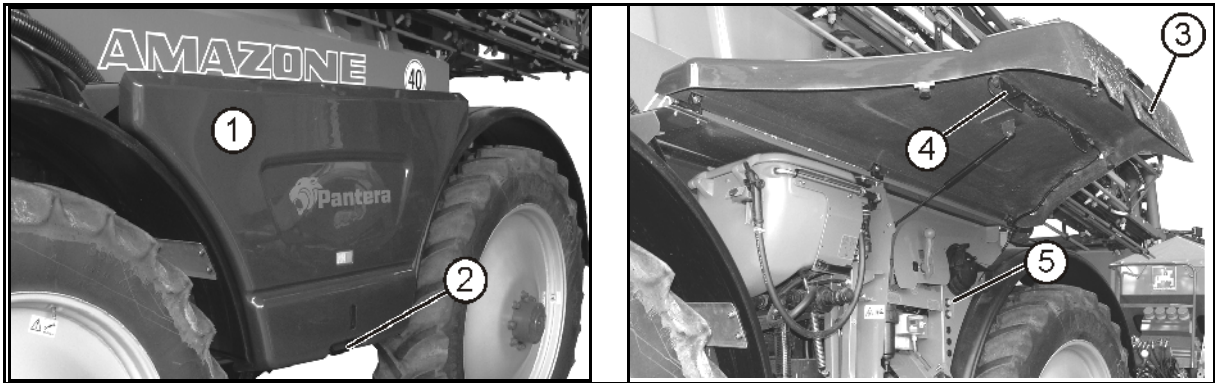


Fig. 110

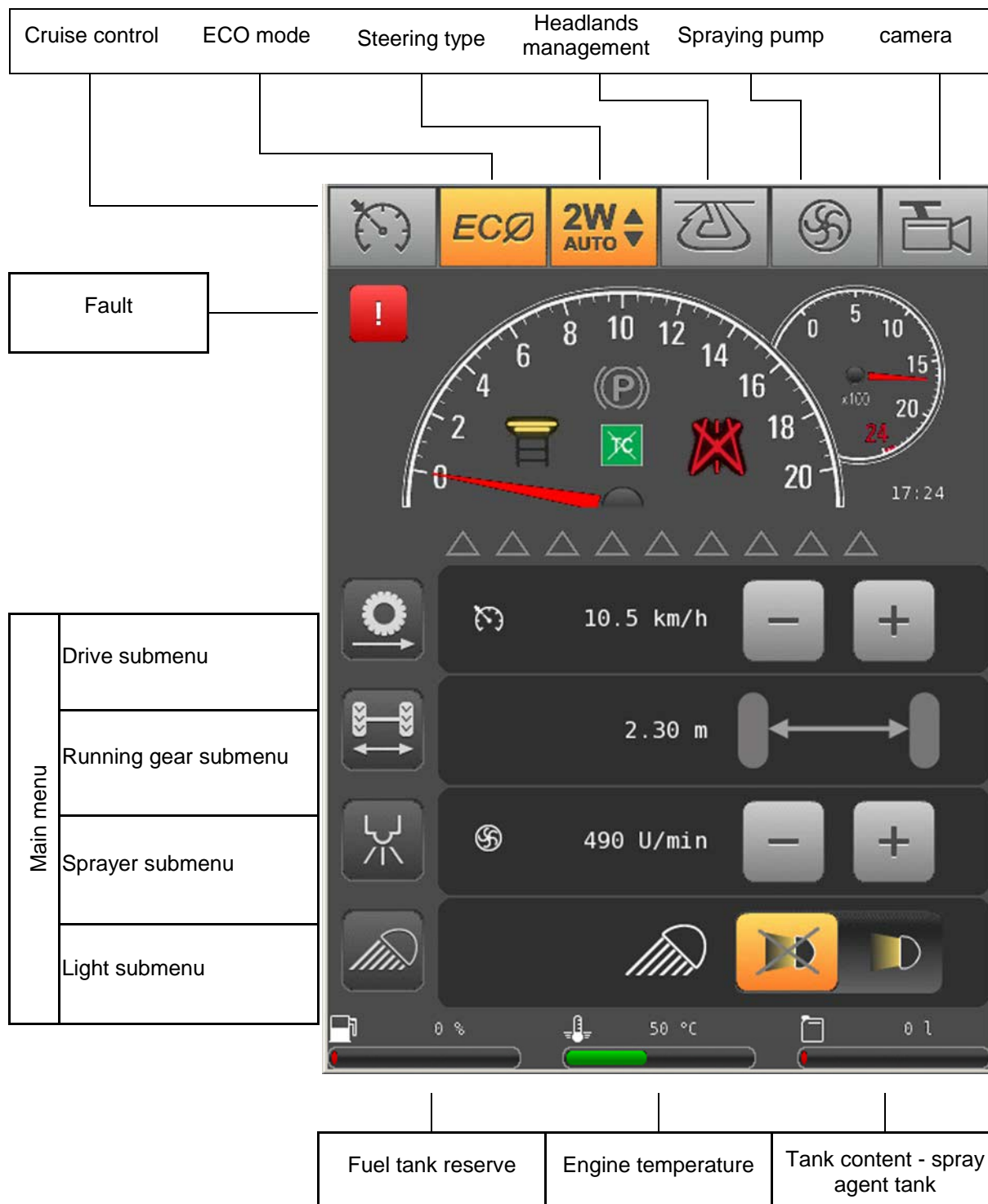
## 7 AMADRIVE operating terminal

The **AMADRIVE** is used for adjusting and monitoring almost all functions of the vehicle and several functions of the field sprayer.

Operation is carried out via the 10.4" large touchscreen terminal.

### Operating and display bar

active→ yellow not active→ grey





## 7.1 Softkeys



By pressing the softkeys, the respective function is switched on and marked in yellow on the display.



**Switch the cruise control on and off**



**Switch the ECO mode on and off**

→ The ECO mode is active after starting the engine and switching from road to field.



**Displaying the steering type**

Two-wheel steering – Yellow display

Automatic four-wheel steering – Yellow display

Manual four-wheel steering (crab steering) – Green display



**Headlands management switched on:**

- Driving with four-wheel steering system in the headlands.
- Driving with two-wheel steering system in the tramline.

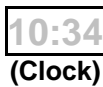
→ The headland management can be overridden using the or the multi-function stick.



**Switch the spraying pump on and off**



**Camera system with night-view technology**



(Clock)

**Call up the configuration and diagnosis menu**



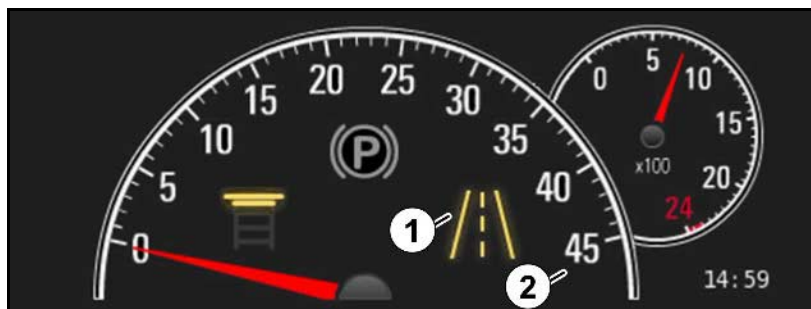
**Warning / Fault**

**Press the soft key for more information!**

## 7.2 Instrument panel

### Display in road mode

- (1) Road mode selected
- (2) Speed with display range of 0-45 km/h









### Display in field mode

- (1) Field mode selected
- (2) Speed with display range of 0-20 km/h

















### Explanation of the displays

- (1) Engine speed
- (2) Hand brake
- (3) Time of day  
and  
Softkey configuration and diagnosis
- (4) Traction control system deactivated
- (5) Boom part width sections
  - o  switched on (green)
  - o  switched off (not with ISOBUS)
- (6) Position of the ladder
  - o raised:  When driving (grey), when stationary (yellow)
  - o lowered:  When driving (red), when stationary (grey)
  - o When raising  (yellow), in top end position (green)
  - o When lowering  (yellow), in bottom end position (green)



## 7.3 Main menu

	Sub-menu	Quick access
Drive sub-menu with display and cruise control adjuster		 10.5 km/h  
Running gear sub-menu with display and current track width.		2.30 m 
Sprayer sub-menu with display and pump speed adjuster.		 490 U/min  
Lighting sub-menu with operation of the work lights.		  



The main menu is called back up in the sub-menu by pressing the respective button in the sub-menu.



Quick access in the main menu allows the spontaneous switching of several functions without having to call up the respective sub-menu.

## 7.4 Drive submenu





### Cruise control function in field mode



First activate the speed control in the menu bar.





- Setting the set speed via , .
- The set speed set is displayed.
- When the driver moves the multi-function stick into the foremost position, the Pantera will accelerate to the set speed.
- The speed can be adapted to the situation at any time - the cruise control remains active.
- The cruise control cannot be activated in road mode.

### Engine speed selection (only if ECO mode is deactivated and the Field mode is activated):



- Engine speed selection by pressing one of the pre-assigned softkeys.



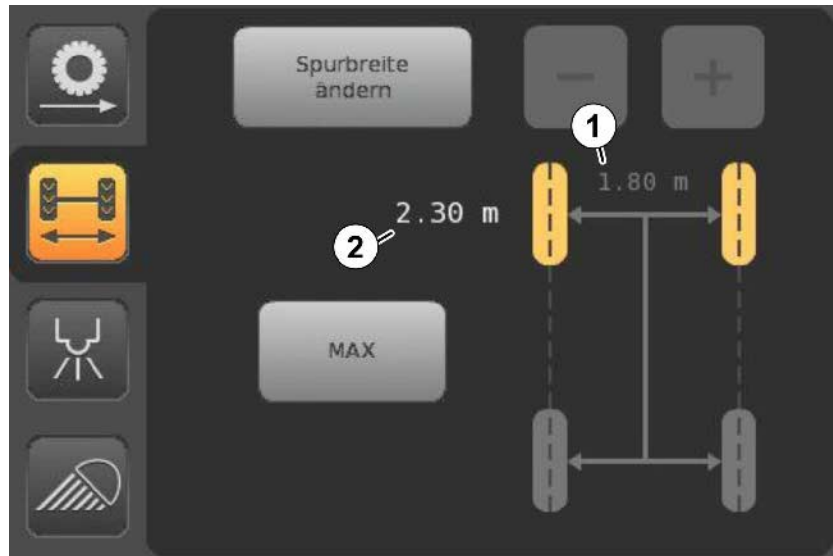
- Selection of the engine speed via , .
- The engine speed set is displayed.

### Assign softkeys with the desired engine speed:







1. Selection of the engine speed , .
  2. Keep one of the four pre-assigned soft keys pressed for at least three seconds.
- Speed will be taken over and displayed.

## 7.5 Running gear submenu



### Change track width


- (1) Set track width display
- (2) Actual track width display

1. Press .
    - Machine changes to the mode for changing the track.
    - Increase idling speed is set.
  2.   Entering the setpoint track width.
  3. Press the driving lever forwards.
    - The machine runs forwards at 3 km/h until the desired track width is reached and then automatically stands still.
  4. Pull the driving lever backwards to the neutral position.
  5.  Back to the main menu.
- The track width can be preset between 1.80 m and 2.40 m depending on the type of tyres.


### Adjust the maximum track width

---

The maximum track width can be set in field mode when driving for travelling over a particularly sloping terrain.

1.  should be pressed when driving.

→ The maximum track width is set.

2.  should be pressed again when driving.

→ The old track width is reset.



If the vehicle is stopped during when the track width is set to the maximum position, the maximum track width will be taken over as the nominal track width.

## 7.6 Sprayer submenu





### Display the current operating data

- Application rate
- Spraying pressure
- Spraying pump speed
- Application area



### Setting the spraying pump speed



- Spray pump speed selection by pressing one of the five pre-assigned soft keys.

- Selection of the spray pump speed via  .
- The spray pump speed set is displayed.

Setting the pump speed between 380 rpm and 540 rpm:

- Fast filling: 540 rpm.
- For standard applications (~ 200 l/ha and ~ 10 km/h) without granules and fertiliser: 420 - 460 rpm
- In case of high demands on the stirring performance and application rates: 480 - 540 rpm

### Assign softkeys with the desired spray pump speed:

- Selection of number of spray pumps via  .
  - Keep one of the five assigned soft keys pressed for at least three seconds.
- Speed will be taken over and displayed.










## 7.7 Light submenu work lights



### Adjustment of the vehicle, working and boom illumination

The headlights can be switched separately:

-   Work lights in the cabin roof.
-  Boom illumination from the front.
-  Work lights on flushing dome and control centre and fuel tank.
-  Nozzle illumination from the rear.
-  Switches the work lights (1, 2, 3) together.
-  Switches the work lights off.



The work lights can only be switched on when the engine is running.



The side-view floodlights are switched on via the control lever for the indicators when in field mode.



## 7.8 Configuration

**10:34**  
(Clock)

- The configuration menu comprises the sub-menus:



- Lower section in every sub-menu:

Operating hours: 0 h Total area: 0,0 ha			
Display	Input disregard	Input confirm	
<ul style="list-style-type: none"> <li>Operating hours</li> <li>Total area</li> </ul>			



1	Uhrzeit  17 H   12 M  
2	Helligkeit  5  
3	Schrittweite Tempomat 0.5 km/h  
4	Schrittweite Spurweite 50 mm  
5	Berührungsempfindlichkeit 100 %  

- Setting the time: Hours Minutes
- Setting the display brightness:  
Setting range from 1 to 5
- Increment of the speed setting of the cruise control in the drive menu:  
Setting range from 0.1 km/h to 0.5 km/h
- Increment when setting the track width in the running gear menu:  
Setting range from 5 cm to 10 cm
- Touch sensitivity of the touchscreen display.  
Setting range 0% to 100%

2

1 Sprache

Index	Name
1	Deutsch
2	Eesti
3	English
4	Français
5	Svenska

2 Reifentyp

Index	Name
1	300/95 R52 ET165
2	340/85 R48 ET165
3	380/90 R46 ET165
4	420/80 R46 ET165
5	460/85 R38 ET110
6	460/85 R42 ET115

(1) Language selection

(2) Entering the tyres mounted



### DANGER

**Risk of accident due to invalid track width size.  
Risk of tipping due to track width being too narrow.**

The tyre size have to be selected correctly so that the set track width corresponds with the real track width.

3

Only for customer services, password required

6

1 Teilbreiten

9 - +

2 Kameras

2 - +

(1) Entering the number of part width sections

(2) Entering the number of cameras mounted

## 8 Commissioning



- Before operating the machine for the first time the operator must have read and understood the operating manual.
- The machine must meet the national road traffic regulations.
- The operator and the user shall be responsible for compliance with the statutory road traffic regulations.

### 8.1 Securing machine against accidental starting and rolling



#### WARNING

**Risk of crushing, shearing, cutting, being caught and/or drawn in, or impact when making interventions in the machine, through**

- **unintentional falling of raised, unsecured machine parts.**
- **unintentional start-up and rolling of the machine.**
- Secure the machine against unintentional start-up and rolling before making any intervention in the machine.
- It is forbidden to make any intervention in the machine, such as installation, adjustment, troubleshooting, cleaning, maintenance and repairs
  - when the machine is running
  - for as long as the tractor engine is running with a connected PTO shaft / hydraulic system.
  - when the ignition key is inserted in the ignition lock.
  - when the machine is not secured against unintentional rolling using their parking brakes and/or wheel chocks.

When carrying out such work, there is a high risk of contact with unsecured components.

## 9 Driving on public roads



- During driving on public roads, follow the instructions given in the section "Safety instructions for the operator", page 25.
- Before moving off, check:
  - the lighting system for damage, proper operation and cleanliness,
  - the braking and hydraulic systems for obvious defects.
  - the function of the brake system



### WARNING

**Risk of crushing, cutting, being caught and/or drawn in, or impact from tipping and insufficient stability.**

- Drive in such a way that you always have full control over the tractor with the attached machine.  
In so doing, take your personal abilities into account, as well as the road, traffic, visibility and weather conditions, the driving characteristics of the tractor and the connected machine.



### WARNING

**Risk of falling when riding on the machine, contrary to instructions.**

It is forbidden to ride on the machine and/or climb the machine while it is running.  
Instruct people to leave the loading site before approaching the machine.



### WARNING

**Risk of breaking during operation, insufficient stability and insufficient tractor steering and braking power from improper use of the tractor.**

Comply with the maximum load of the connected machine. If necessary, drive only with a partially filled tank.



### DANGER

**Risk of accident from excess machine width!**

The permissible overall width of the machine may not be exceeded when travelling on the roads.

If required, reduce the track width in order to maintain the permissible overall width of 2550 mm.

**Track width to be set when travelling on roads compared with the tyres:**

Tyres	Track width for travelling on the road (depending on the permissible overall width of the machine)
	Overall width 2,55 m
300/95 R 52	1900
320/90 R 50	1900
340/85 R 48	1900
380/90 R 46	1900
420/80 R 46	1900
460/85 R 38	1900
480/80 R 42	1900
520/85 R 38	1950
620/70 R 38	1900
650/65 R 38	1900

**Table 1**

## 9.1 Requirements for driving on public roads



### **DANGER**

**Risk of accident if the following measures are not carried out.**

- Select road mode.
  - Two-wheel steering system is activated..
  - No cruise control function.
- With three-piece booms, check that the additional rear lights and the additional red reflector are ready for operation.
- Move the sprayer boom to the transport position and secure mechanically.
- The cabin ladder must be folded up.
- The track width must be set so that the width 2550 mm is not exceeded.
- When filling the spray liquid tank, note the permissible total weight or the permissible wheel and axle loads.
- The induction bowl must be pivoted up to the transport position and secured mechanically.
- The ladder on the fuel tank must be pivoted up to the transport position and secured mechanically.
- If a boom extension (option) is mounted, move it into the transport position.
- Switch the work lights off during transport to avoid blinding other motorists.
- Lower the lifting module (option) when transporting so that the maximum transport height of 4 m is maintained.

## 10 Driving with the Pantera

### 10.1 Starting the engine

1. Insert the main switch and turn to on.
  2. Check the neutral position of the driving lever.
  3. Turn the ignition key to the start position. When the engine starts and runs, let go of the key.
- After standing for a long while, the **AMADrive** needs 90 seconds until the display appears on the screen.
- You are however, already able to start driving.
4. Allow the engine to run warm before you start to drive, do not start with full speed.



The diesel engine does not have a pre-glowing function.



#### CAUTION

**It is not possible to start the engine by jump starting (towing). Damage will be caused to the drive when attempting this!**

**Always use an auxiliary battery when the battery of the machine is empty.**

### 10.2 Driving with the machine



#### DANGER

**Risk of accidents when driving on the road in field mode.**

When driving on the road, select the road mode.



#### DANGER

#### DANGER

**Risk of accident from excess machine width!**

The permissible overall width of the machine may not be exceeded when travelling on the roads, see page 130.

1. Start the engine.

After starting the engine:

2. If necessary, release the parking brake.


3. Push rocker switch  in position **+** and keep pressed.

→ The ladder pivots to the transport position.

→ Observe the **AMADrive** display.






4. Push rocker switch  downwards.
  - Select road mode for driving on roads and field mode for driving on fields.
5. Adjust the track width.
  - When driving on public roads, the wheels are not allowed to protrude over the outer dimensions of the machine.
  - For France: Set the track width to maximal 1900 mm.
6. Start to drive using the drive actuator
7. For braking, use the drive actuator or, where necessary, the brake pedal at the same time.

**CAUTION****Perform a track correction!**

Otherwise there is a risk of causing an accident due to the track being set incorrectly, see page 51.

## 10.3 Stopping the engine

1. Depending on the previous loading, allow the engine to run idle for a few minutes.
2. Move the driving lever to neutral.
3. Actuate the hand brake via the switch.
4. Push rocker switch  in position - and keep pressed.
  - The ladder pivots to the park position.
  - Observe the **AMADrive** display.
5. Turn the ignition key back and pull it out of the lock.
  - The motor is stopped.
6. After switching off the engine, wait at least 18 seconds and then switch off the main switch.



Cooling-down when the engine is running is especially important for the turbocharger bearing. The turbocharger is cooled with oil as long as the engine is running.

Stopping the engine immediately after work may lead to very high temperatures in the turbocharger. This will reduce the operating life of the turbocharger considerably.

**WARNING****Risk of injuries from falling from the cabin.**

When leaving the cabin, make sure that the ladder has been lowered completely.

You cannot see if the ladder has been lowered from inside the cabin.

## 11 Using the field sprayer



When using the machine, observe the information in the following sections:

- "Warning symbols and other labels on the machine" starting on page 16 and
- "Safety information for the user", starting on page 24 ff.

Observing this information is important for your safety.

### 11.1 Using the machine with comfort package

The comfort package comprises a remote control filling and cleaning. It enables the intake side to be switched using:

- the operating terminal,
- the **B** button on the control terminal.

Functions of the comfort package:

Before spraying:

- Fill the spray liquid tank via the suction coupling with automatic filling stop.

While spraying:

- Automatic filling level dependent regulation of the main agitator.

After spraying:

- Remote controllable dilution of the remaining amount.
- Remote controllable cleaning of the machine when the machine is filled or empty.
- Cleaning the filled machine intake filter.



For using the comfort package, see the software AMABUS / ISOBUS operating instructions, chapter Comfort Package.

## 11.2 Preparing for spraying operation



- The field sprayer must be operating properly in order to guarantee correct application of the crop protection agent. Have the field sprayer tested regularly on a test rig. Rectify any deficiencies immediately.
- Make sure of using the correct filter equipment, see page 86
- Clean the field sprayer thoroughly before spreading a different crop protection agent.
- Flush the nozzle line before:
  - each time changing a nozzle.
  - before rotating the multiple-nozzle head to another nozzle.See the section on "Cleaning", page 169
- Fill the flushing water tank and the clear water tank.

### 11.3 Preparing the spray liquid

**WARNING**

**Risk of accidental contact with crop protection agent and/or spray liquid.**

- Always induct the crop protection agent into the spray liquid tank using the induction bowl.
- Swivel the induction bowl into the filling position before pouring in crop protection agent.
- Observe the safety regulations on physical protective equipment and breathing apparatus for use when handling crop protection agent and preparing the spray liquid, in the instructions for use of the crop protection agent.
- Do not prepare the spray liquid in the vicinity of wells or surface water.
- Avoid leaks and contamination with crop protection agent and/or spray liquid through appropriate conduct and wearing appropriate physical protection equipment.
- To avert risks to third parties, do not leave the prepared spray liquid, unused crop protection agent or used crop protection agent canisters and the uncleaned field sprayer unattended.
- Protect contaminated crop protection agent canisters and the contaminated field sprayer from precipitation.
- During and after preparing the spray liquid, ensure sufficient cleanliness in order that risks may be kept as low as possible (e.g. thoroughly wash used gloves before removing them and dispose of the washing water and cleaning fluid in the proper manner).



- The prescribed water and agent spray rate can be found in the directions for use of the crop protection agent.
- Please read intently the directions for use of the agent and observe the specified precautions!



- Next to the general applicable instructions listed here, also observe the product specific procedures for crop protectant described in the instructions for use.
- The prescribed water and agent spray rate can be found in the directions for use for the crop protection agent.
- Read the directions for use for the agents and observe the specified precautions.
- We recommend that customers/operators visit our website, [www.Wirkstoffmanager.de](http://www.Wirkstoffmanager.de). The site contains a program which will calculate your filling quantity or re-fill quantity.
- As it is difficult to dispose of residues in an environmentally-friendly manner, carefully calculate the required filling quantity or re-fill quantity to avoid leaving any residue at the end of the spraying operation.
  - To calculate the required re-fill quantity for topping up the spray liquid tank, use the "Filling table for remaining spray area". To do this, subtract the technical, undiluted residue in the sprayer boom from the calculated re-fill quantity.

Refer to the section "Filling table for remaining areas" page 141.
- Carefully wash out the empty agent tank (e.g. using canister flushing) and add the flushing water to the spray liquid.



While filling, pay attention to the permissible load capacity of your field sprayer. Always take the differing specific weights [kg/l] for the individual liquids into account while filling your field sprayer.

## Specific weights of different liquids

Liquid	Water	Urea	UAN	NP solution
Density [kg/l]	1	1.11	1.28	1.38



- As it is difficult to dispose of residues in an environmentally-friendly manner, carefully calculate the required filling quantity or refill quantity to avoid leaving any residue at the end of the spraying operation.
  - To calculate the required refill quantity for final filling of the spray liquid tank, use the "Filling table for remaining spray area". To do this, subtract the technical, undiluted residue in the sprayer boom from the calculated refill quantity!

Refer to the section "Filling table for remaining areas".

## Procedure

1. Determine the required water and agent spray rate by consulting the directions for use of the crop protection agent.
2. Calculate the filling quantity or refill quantity for the area to be treated.
3. Fill the machine and blend in the agent.
4. Agitate the spray liquid before commencing spraying operations in accordance with the instructions of the spraying agent manufacturer.



Fill the machine preferably using a suction hose and blend in the agent while filling.

The induction area is thereby flushed with water constantly.



- During the filling process, start blending in the agent once the tank filling level has reached more than 20%.
- When using more than one agent:
  - Clean the canister immediately after each induction of an agent.
  - Flush the induction port after each induction of an agent.



- When filling, no foam must escape from the spray liquid tank.  
The addition of a froth-inhibiting agent also prevents the spray liquid tank from frothing over.



The agitators normally remain switched on from the initial filling to the end of the spraying operation. The instructions of the agent manufacturer, however, have priority.



- With the agitator running, feed the water-soluble plastic film bag directly into the spray liquid tank.
- Before spraying, fully dissolve the urea by circulating the liquid. When dissolving large quantities of urea, the temperature of the spray liquid falls more sharply; the urea consequently dissolves more slowly. The warmer the water, the faster and more completely the urea can dissolve.



- Carefully wash the empty agent canisters, render them unusable, collect and dispose of them in a proper manner. Do not re-use them for other purposes.
- If only spray liquid is available for washing the agent canisters, first use this to carry out preliminary cleaning. Then wash them meticulously when clear fresh water is available, e.g. before preparing the next load for the spray liquid tank or when diluting the residue from the last load.
- Carefully wash out the empty agent tank (e.g. using canister flushing) and add the flushing water to the spray liquid!

### 11.3.1 Calculating the filling and re-fill quantity



To calculate the required re-fill quantity for final filling of the spray liquid tank use the "Filling table for remaining spray area", page 141.

#### Example 1:

##### The following are given:

Tank nominal volume	1000 l
Residue in the tank	0 l
Water consumption	400 l/ha
Agent required per ha	
Agent A	1.5 kg
Agent B	1.0 l

##### Question:

How many litres of water, how many kg of Agent A and how many litres of Agent B must be used to treat a surface of 2.5 ha in area?

##### Answer:

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

#### Example 2:

##### The following are given:

Tank nominal volume	1000 l
Residue in the tank	200 l
Water consumption	500 l/ha
Recommended concentration	0.15 %

##### Question 1:

How many litres or kg of agent are needed to fill the tank?

##### Question 2:

How large is the area to be treated in ha if a residue of 20 l remains in the tank after spraying?

##### Formula and answer to Question 1:

$$\frac{\text{Refill amount of water [l]} \times \text{Concentration [\%]}}{100} = \text{Addition of agent [l or kg]}$$

$$\frac{(1000 - 200) \text{ [l]} \times 0.15 \text{ [\%]}}{100} = 1.2 \text{ [l or kg]}$$



### Formula and answer to Question 2:

$$\frac{\text{Quantity of liquid available [l]} - \text{Residue [l]}}{\text{Water consumption [l/ha]}} = \text{Area to be treated [ha]}$$

$$\frac{1000 \text{ [l]} (\text{tank nominal volume}) - 20 \text{ [l]} (\text{residue})}{500 \text{ [l/ha]} \text{ Water consumption}} = 1.96 \text{ [ha]}$$

### 11.3.2 Filling table for remaining spray area



To calculate the required re-fill quantity for final filling of the spray liquid tank use the "Filling table for remaining spray area". Deduct the residue in the spray line from the calculated re-fill quantity. See "Spray lines" section, page 102.



The specified re-fill quantities apply for a spray rate of 100 l/ha. For other spray rates, the re-fill quantity increases by a multiple.

Distance travelled [m]	Re-fill quantities [l] for sprayer booms with working widths [m] of													
	15	16	18	20	21	24	27	28	30	32	33	36	39	40
10	2	2	2	2	2	2	3	3	3	3	3	4	4	4
20	3	3	4	4	4	5	5	6	6	6	7	7	8	8
30	5	5	5	6	6	7	8	8	9	10	10	11	11	12
40	6	7	7	8	8	10	11	11	12	13	13	14	15	16
50	8	8	9	10	11	12	14	14	15	16	17	18	19	20
60	9	10	11	12	13	14	16	17	18	19	20	22	23	24
70	11	11	13	14	15	17	19	20	21	22	23	25	27	28
80	12	13	14	16	17	19	22	22	24	26	26	29	30	32
90	14	15	16	18	19	22	24	25	27	29	30	32	34	36
100	15	16	18	20	21	24	27	28	30	32	33	36	38	40
200	30	32	36	40	42	48	54	56	60	64	66	72	74	80
300	45	48	54	60	63	72	81	84	90	96	99	108	114	120
400	60	64	72	80	84	96	108	112	120	128	132	144	152	160
500	75	80	90	100	105	120	135	140	150	160	165	180	190	200

Fig. 111

#### Example:

Distance still to travel (travel distance): 100 m  
Spray rate: 100 l/ha  
Working width: 21 m  
Number of part width sections: 5  
Spray line residue: 5.2 l

1. Calculate the re-fill quantity using the filling table. For the example, the re-fill quantity is **21 l**.
2. Deduct the residue in the spray line from the calculated re-fill quantity.

**Required re-fill quantity: 21 l – 5.2 l = 9.8 l**



## 11.3.3 Fill the spray liquid tank via the suction port and blend in the agent at the same time



Preferably perform the filling from a suitable container and not from an open water access point.



Please observe the relevant instructions when filling the spray liquid tank via the suction hose from public water points (please also see the section "Use of the machine", page 145).

1. Connect the suction hose to the filling connection and water access point.
  2. Press button **B**, suction chest in position .
  3. Move the pressure gauge switch tap **A** to position .
  4. Open switch tap **E**.
  5. Press button **L**, run the pump.
- The tank is filled automatically up the signal limit.
- After the filling, the intake side is automatically switched over to spraying.
- Pressing the **B** button again completes the filling operation prematurely.



- The fill level signal limit must be entered correctly!
- An acoustic signal indicates when the tank is full.

6. Start blending in the agent when more than 20% of the tank filling level has been reached.



Fig. 112

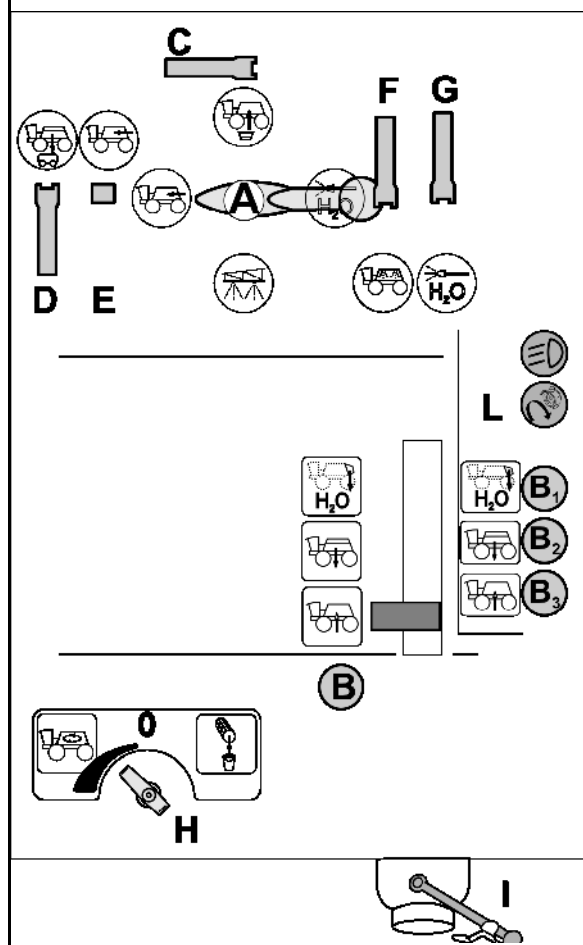


Fig. 113

### Blending in the agent:



Blending in the agent via Ecofill, see page 145.

7. Open the induction bowl lid.
8. Move switch tap **J** to position **0**.
9. Move the pressure gauge switch tap **A** to



position

10. Move switch tap **K** to position



11. Move switch tap **J** to position



suction power can be adjusted between **0** and Maximum.

12. Pour the quantity of agent calculated and measured for filling the tank into the induction bowl.
13. Open switch tap **C** and fully evacuate the contents from the induction bowl.
14. Close switch tap **C** again.
15. Move switch tap **K** to position **0**.
16. Move switch tap **J** to position **0**.



To increase the user's protection, for example when handling powder agents, first pour the agent into the induction bowl (maximum 50 l), close the cover and only then dissolve and extract the ingredient.

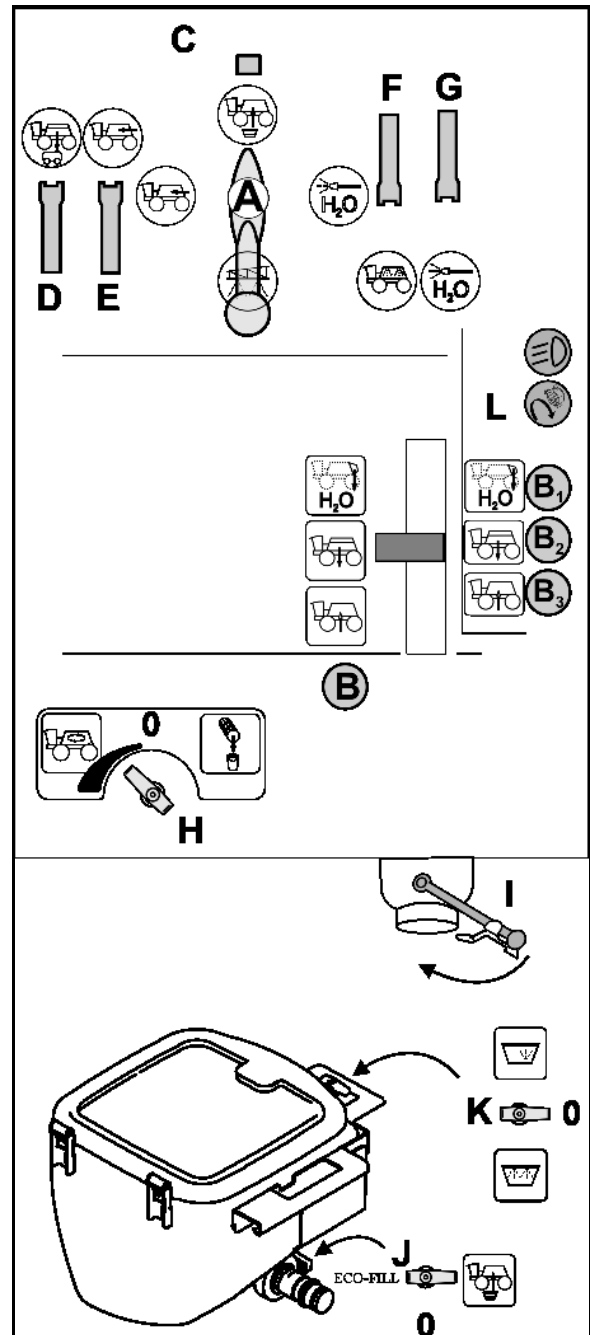


Fig. 114

## Using the field sprayer

### Rinse the canister:

17. Wash the canister or other containers using the canister flushing.



18. Move switch tap **K** to position .
19. Press the canister down for at least 30 secs.
- The canister is rinsed with water.
20. Move switch tap **K** to position **0** and remove the canister.
21. Move switch tap **J** to position **0**.
22. Close switch tap **C**.



23. Move switch tap **A** to position .

### Once the tank has reached the set filling level:

- If the filling level entered in the filling menu is reached, the filling is ended automatically.



24. Operating terminal: Accept the value for the current fill level.

- After the filling, the intake side is automatically switched over to spraying.

25. Decouple the suction hose from the filling connection.

- The suction hose is still filled with water

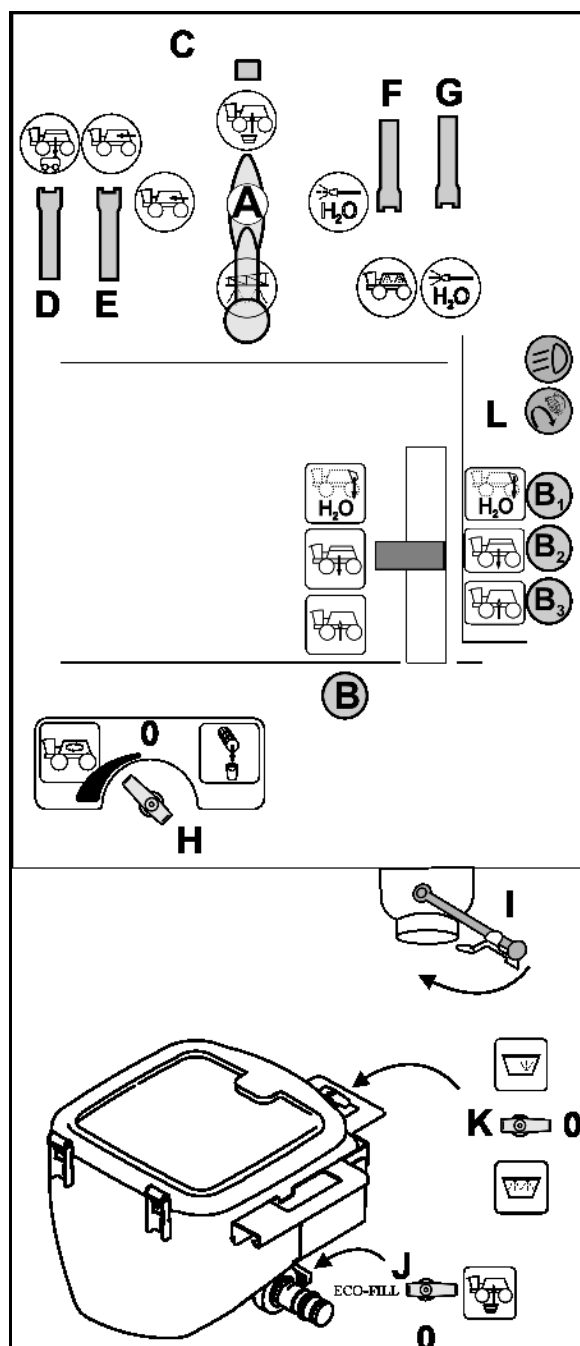




Fig. 115

## Filling from open water access points



Follow regulations closely when filling the spray liquid tank from an open water access point with a suction hose.

### 11.3.4 Induction using Ecofill

1. Couple the Ecofill container with Ecofill connection.
2. Press button **B**, suction chest in position .
3. Move the switch tap for pressure gauge **A** to position .
4. Open switch tap **C**.
5. Move switch tap **K** to position **0**.
6. Move switch tap **J** to position **Ecofill**.
7. Press button **L**, run the pump.
8. Move switch tap **J** to position **0** when the desired quantity has been evacuated from the Ecofill container.

#### Rinsing the Ecofill counter:

1. Decouple the hose from the Ecofill container and couple it to the flushing foot.
  2. Move switch tap **J** to position **Ecofill**.
- The counter is flushed.
3. Move switch tap **J** and **C** back to 0 and disconnect the counter.

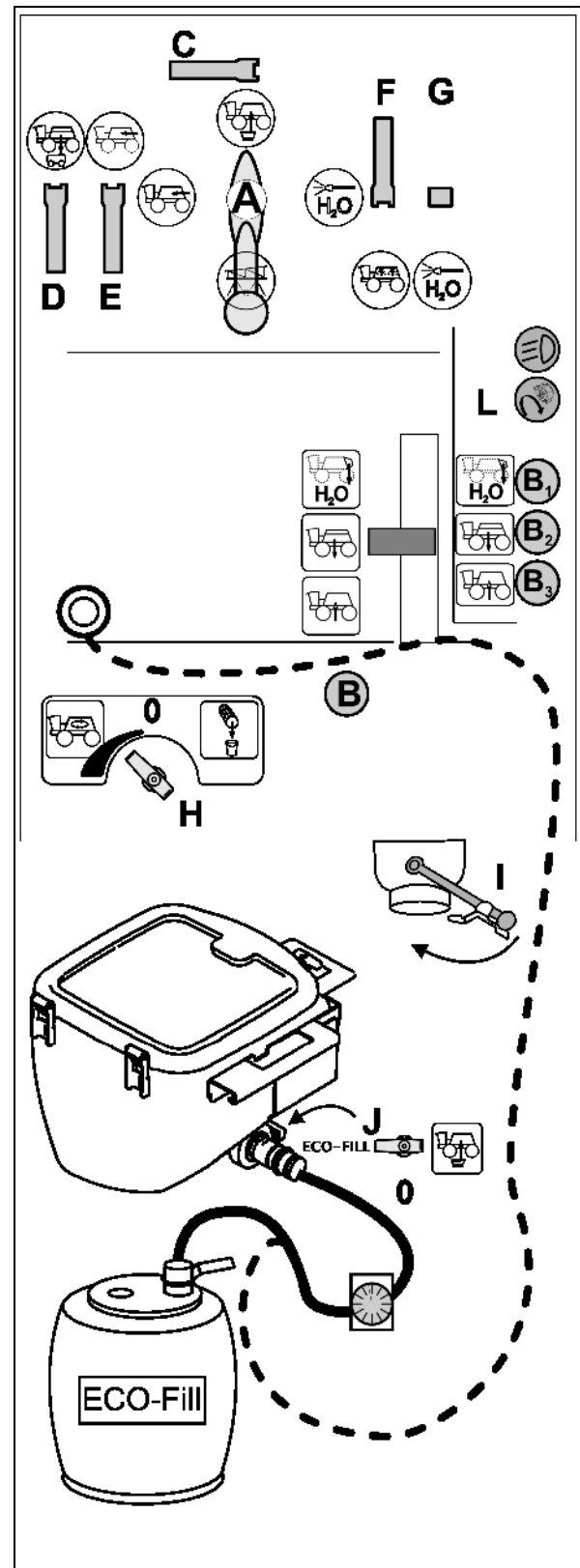


Fig. 116

### 11.3.5 Filling the spray liquid tank via the filling connection and blending in the agent







Call up the fill menu from the Work menu on the operating terminal in order to enter the re-filling amount and to use the automatic filling stop.

1. Connect the pressure line to the filling connection on the control terminal.
2. Open the stop tap on the filling connection.
3. Start blending in the agent once 20% of the tank filling level has been reached.

#### Blending in the agents:

(Blending in the agent via Ecofill, see page 145)

4. Open the induction bowl lid.
5. Move switch tap **J** to position **0**.
6. Press button **B**, suction chest in .
7. Move the switch tap for pressure gauge **A** to position .
8. Move switch tap **K** to position .
9. Move switch tap **J** to position .  
suction power can be adjusted between **0** and Maximum
10. Pour the quantity of agent calculated and measured for filling the tank into the induction bowl (max. 60 l).
11. Open switch tap **C** and fully evacuate the contents from the induction bowl.

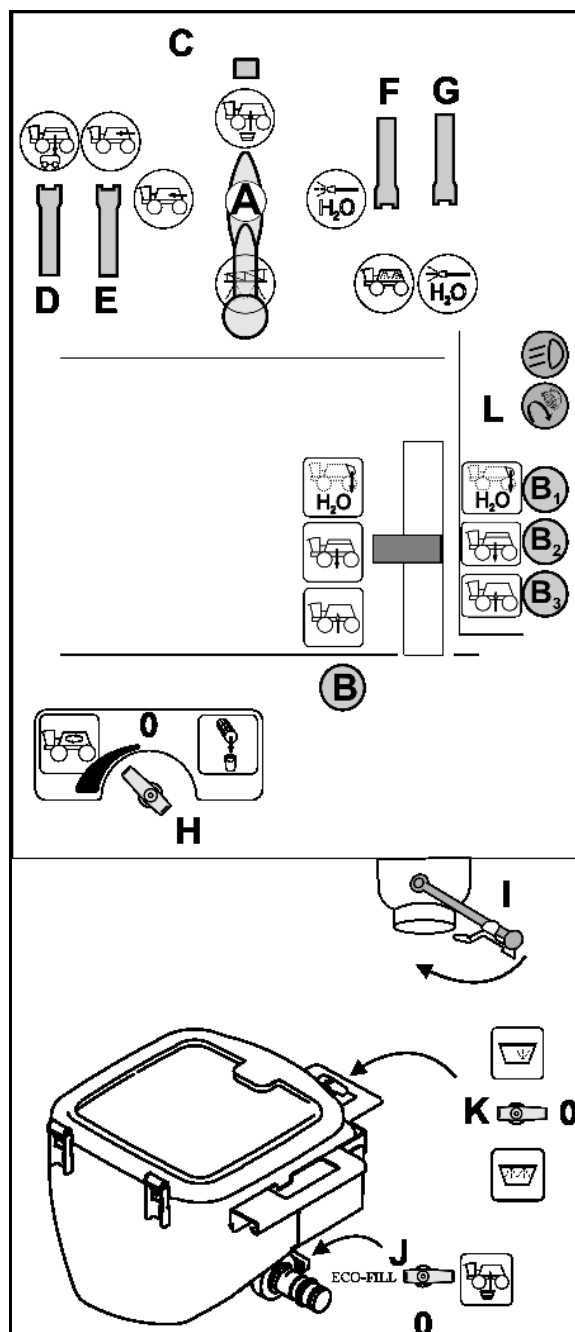


Fig. 117



Z To increase the user's protection, for example when handling powder agents, first pour the agent into the induction bowl (maximum 50 l), close the cover and only then dissolve and extract the ingredient.

#### Rinse the canister:

12. Wash the canister or other containers using the canister flushing equipment.



Move switch tap **K** to position

13. Press the canister down for at least 30 secs.

→ The canister is washed with spray liquid.



To flush a number of canisters, flush them with spray liquid immediately after they are emptied.

Then wash all canisters with flushing water one after another.



14. Press button **B**, suction chest in

15. Close switch tap **C**.

16. Press the canister down for at least 30 secs.

→The canister is washed with flushing water.



If spray liquid was previously being used, it takes a little time before the flushing water reaches the nozzle.

17. Move switch tap **K** to position **0** and remove the canister.

18. Open switch tap **C**.



Due to the high consumption of flushing water, keep switch tap **C** open only as long as necessary.



19. Move switch tap **J** to position

The content of the induction bowl is evacuated.



20. Move switch tap **K** to position

→ The induction bowl is cleaned.

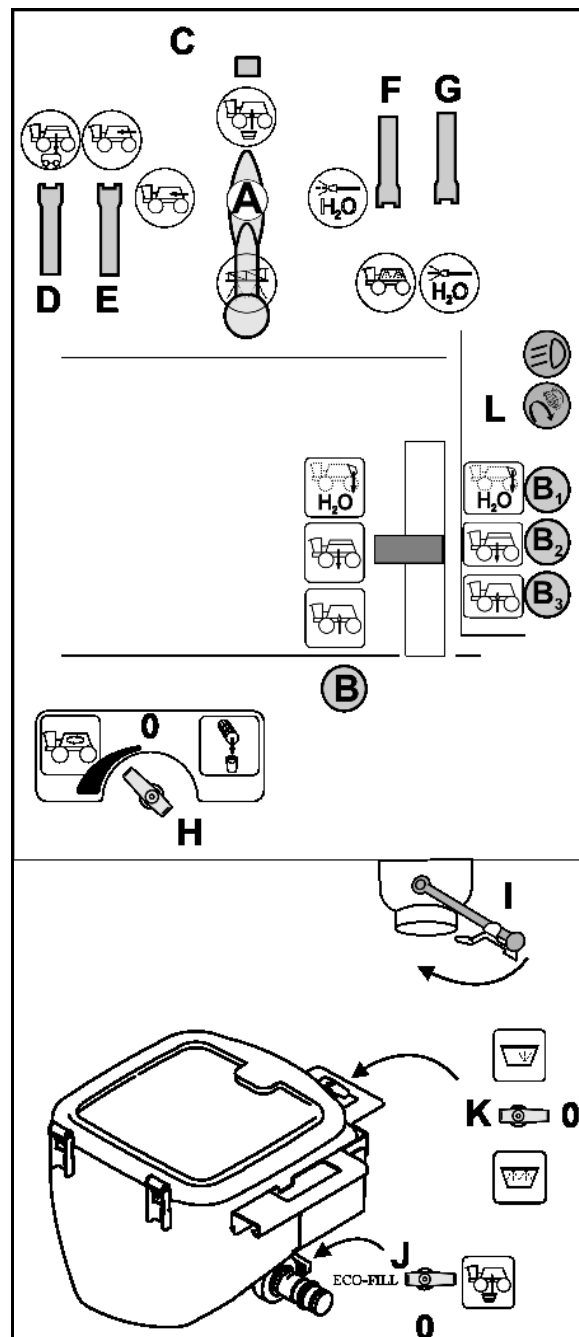


Fig. 118

## Using the field sprayer

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21. Move switch taps **K** and **J** to position **0**.
22. Close switch tap **C** again.
23. Move the pressure gauge switch tap **A** to

position .



In order to avoid overfilling, close the stop tap on the filling connection when reaching 80 percent of the filling level at the latest.

→ This allows you to clean the canister with no hurry.

Complete filling the spray liquid tank:

24. Close the stop tap on the filling connection.
25. Decouple the pressure line.



## 11.4 Spraying operation

### Special instructions for spraying operation



- Test the field sprayer by carrying out calibration
    - before the start of the season.
    - in the case of deviations between the actual indicated spray pressure and the spray pressure prescribed in the spray table.
  - Before starting spraying, determine the exact spray rate required, referring to the instructions of the crop protection agent manufacturer.
  - Before starting spraying, enter the required spray rate (target rate) in operating terminal.
  - During spraying operation, precisely adhere to the required spray rate [l/ha]
    - in order to achieve the best possible results from your crop protection measure.
    - to avoid unnecessary pollution of the environment.
  - Select the required nozzle type from the spray table before spraying starts, taking account of
    - the intended operational speed,
    - the required spray rate and
    - the required atomisation characteristic (fine, medium or coarse-dropped) of the crop protection agent used for the crop protection measure.

Refer to the section "Spray tables for flat-fan, anti-drift, injector and airmix nozzles", on page 232.
  - Select the required nozzle size from the spray table before spraying starts, taking account of
    - the intended operational speed,
    - the required spray rate and
    - the target spray pressure.

Refer to the section "Spray tables for flat-fan, anti-drift, injector and airmix nozzles", on page 232.
  - Select a low operational speed and a low spray pressure to prevent wastage from drifting.
- Refer to the section "Spray tables for flat-fan, anti-drift, injector and airmix nozzles", on page 232.
- At wind speeds of 3 m/s, take additional drift reduction measures (refer to the section "Measures for drift reduction", page 152.



- Refrain from use if average wind speeds top 5 m/s (leaves and thin twigs move).
- Only switch the sprayer boom on and off during travel to avoid the application of excessive doses.
- Avoid the application of excessive doses through overlapping caused by imprecise bout tracking from one spray path to the next and/or when cornering on the headland with the sprayer boom switched on.
- When increasing operational speed, make sure that the maximum permissible pump drive speed of 550 rpm is not exceeded.
- During spraying operation, constantly check actual spray liquid consumption with reference to the area treated.
- Calibrate the flow meter if there are any differences between the actual and displayed spray rate.
- Calibrate the distance sensor (pulses per 100 m) if there are differences between the actual distance covered, and that displayed.  
See operating terminal operating manual.
- If spraying operation is interrupted due to bad weather, clean the suction filter, the pump, the valve chest and the spray lines. See page 162.



- Spray pressure and nozzle size influence drop size and the volume of liquid sprayed. The higher the spray pressure, the smaller the droplet diameter of the spray liquid. The smaller droplets are subject to increased, undesirable drifting.





- The agitator normally remains switched on from filling to the end of spraying operation. On this account, the instructions of the agent manufacturer are decisive.
- If there is a sudden significant drop-off in spray pressure, the spray liquid tank is empty.
- If the spray pressure drops off while conditions remain otherwise unaltered, the suction or pressure filter are blocked.

## 11.4.1 Applying the spray liquid

### Example:

Required spray rate:	200 l/ha
Intended operational speed:	8 km/h
Nozzle type:	LU/XR
Nozzle size:	'05'
Permissible pressure range for the spraying nozzle when fitted	min. pressure 1 bar max. pressure 5 bar
Target spray pressure:	3.7 bar
Permissible spray pressure:	min. 2.8 bar and max. 4.6 bar 3.7 bar $\pm 25\%$


1. Prepare and stir the spray liquid correctly in accordance with the instructions from the crop protection agent manufacturer.
2. Press button **B**, suction chest in position  position
3. Move suction chest switch tap **A** to position .
4. Adjust additional agitator **H**. The stirring performance can be infinitely adjusted.



In order to achieve the maximum application rate, switch off the additional agitator, position **0**.



The main agitator is automatically controlled depending on the filling level.

5. Switch on the operating terminal.
6. Fold out the sprayer boom.
7. Depending on the nozzles being used, set the working height of the sprayer boom (gap between the nozzles and the crop) according to the spray table.
8. Enter the value for the required spray rate in the operating terminal.
9. Switch on the pump via AMADRIIVE and operate with pump operating speed.
10. Switch on spraying  using the operating terminal.

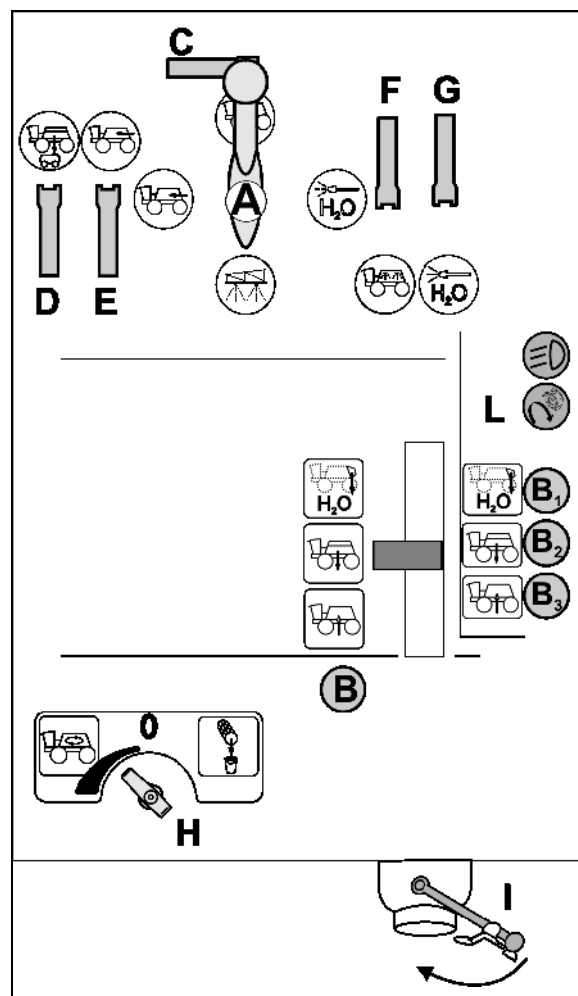


Fig. 119



## Driving to the field with the agitator switched on

1. Switch off the operating terminal.
- The agitator operates with a filling level-dependent intensity.

## 11.4.2 Drift reduction measures

- Reschedule treatment for the early morning or the evening hours (there is generally less wind).
- Choose larger nozzles and a higher water spray rate.
- Reduce spray pressure.
- Precisely maintain the working height of the boom, because the risk of drifting rises very sharply as the distance between the nozzles increases.
- Reduce operational speed (to below 8 km/h).
- Use so-called anti-drift (AD) nozzles or injector (ID) nozzles (nozzles which produce a high proportion of coarse drops).
- Observe the distance requirements of the respective crop protection agent

## 11.4.3 Dilute the spray liquid with flushing water

1. Operating terminal:  start dilution.
- Flushing water is fed to the tank via the auxiliary agitator.
2. Observe the fill level of the tank.
3. Operating terminal:  stop dilution.



The spray line is flushed on machines with nozzle control. When restarting the spraying, two to five minutes will elapse until the spraying agent can be spread.

<b>Zustand:</b>		<b>spülen</b>	
<b>Füllstand:</b>	<b>2300</b>	<b>Liter</b>	
<b>verdünnen:</b>		<b>aus</b>	
<b>Behälterinnen-</b>		<b>aus</b>	
<b>reinigung:</b>			
<b>Rührwerk:</b>		<b>automatisch</b>	
<b>Rührdruck:</b>		<b>3.5 bar</b>	

Fig. 120

## 11.5 Residues

There are three types of residue:

- excessive residue remaining in the spray liquid tank when the spraying operation is finished
  - This excessive residue is discharged diluted or pumped-out and disposed of.
- the technical residue that remains in the spray liquid tank, the suction chest and the spray line when the spray pressure drops off by 25%
 

The suction chest is composed of the suction filter, pump and pressure controller sub-assemblies. Observe the values for the technical residues given on page 102.




  - This technical residue is discharged diluted onto the field while cleaning the field sprayer.
- The final residue that remains in the spray liquid tank, the suction chest and the spray line after being cleaned with air discharge from the nozzles.
  - This final diluted residue is drained off after cleaning.

### 11.5.1 Disposing of the residues



- Make sure that the residue in the spray line continues to be sprayed in an undiluted concentration. Always spray this residue on an untreated area. The distance needed to use up this undiluted residue can be found in the section "Technical Data - spray lines", page 102. The residue contained in the spray line is dependent on the sprayer boom working width.
- Switch on the agitator for spraying the spray liquid tank empty when the residue in the spray liquid tank is only 5% of the nominal volume. With the agitator switched on, the technical residue increases in comparison to the specified values.
- Measures intended for the user's protection apply when emptying residues. Observe the instructions from the crop protection agent manufacturer and wear appropriate protective clothing.

### 11.5.2 Diluting the excess residue in the spray liquid tank and spraying out the diluted residue remaining at the end of spraying operations

1. Operating terminal:  switch-off the spraying.
2. Drive the pump with pump operating speed.
3. Operating terminal:  start dilution.
- Dilute the excess residues with the 10-fold amount of flushing water.
4. Observe the fill level of the tank.
5. Operating terminal:  stop dilution.
6. Switch on the spraying on the operating terminal.
- Flush out the excess residues on the surfaces already treated.
- Keep flushing the diluted residues until air escapes from the nozzles.
7. Switch-off the spraying on the operating terminal.
8. Cleaning the field sprayer.

<b>Zustand:</b>		<b>spülen</b>	
<b>Füllstand:</b>	<b>2300</b>	<b>Liter</b>	
<b>verdünnen:</b>		<b>aus</b>	
<b>Behälterinnen-</b>		<b>aus</b>	
<b>reinigung:</b>			
<b>Rührwerk:</b>		<b>automatisch</b>	
<b>Rührdruck:</b>	<b>3.5 bar</b>		
			

Fig. 121



When spreading residue, observe the maximum permissible application quantity of the agent on areas already treated.

### 11.5.3 Draining the spray liquid tank using the pump (Option)

Fig. 122/...

1. Connect the drainage hose to the drainage connection using a two-inch camlock coupling.
2. Move suction chest switch tap **A** to position



- 2.1 Open switch tap **D**  (optional).

3. Press button **B**, suction chest in



position

4. Adjust the additional agitator **H** setting tap to the centre position.

5. Press button **L**, run the pump

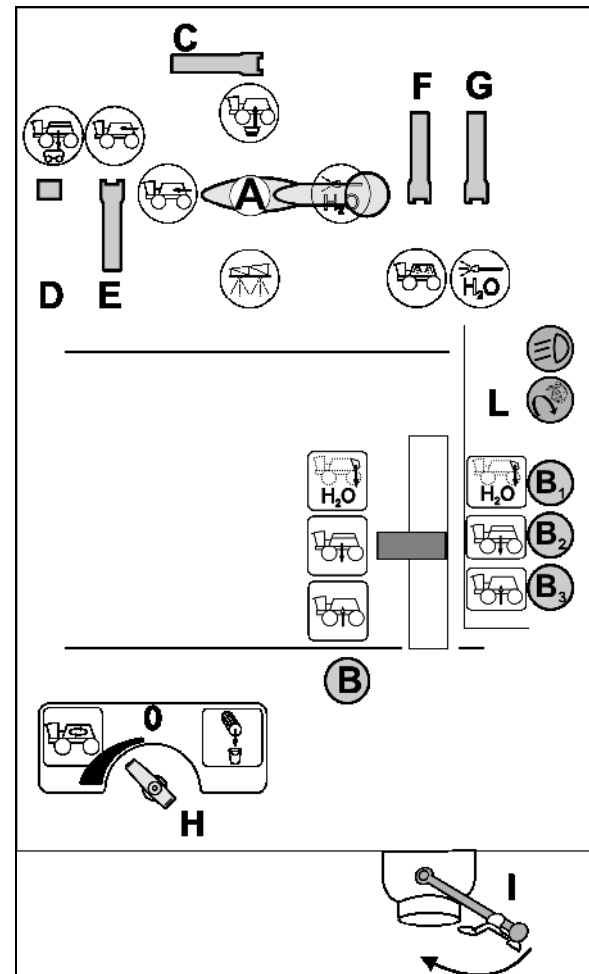


Fig. 122

## 11.6 Cleaning the field sprayer



- Keep the exposure time as short as possible, for example by daily cleaning of the utensils after the spraying operation is completed. Do not leave the spray liquid in the spray liquid tank for an excessively long period, e.g. overnight.

The service life and reliability of the field sprayer mainly depend on how long the materials of the field sprayer are exposed to the crop protection agent.

- Clean the field sprayer thoroughly before applying a different crop protection agent.
- Carry out the cleaning process on the field where you last carried out the treatment.
- Carry out the cleaning process using water from the flushing water tank.
- You can carry out the cleaning process in the courtyard if you have a collecting facility installed (e.g. a Biobed).

Observe all national regulations involved.

- When spreading residues on areas already treated, observe the maximum permissible spray rate of the agents.



## 11.6.1 Cleaning the sprayer with the tank empty



- Clean the spray liquid tank on a daily basis!
- The flushing water tank must be filled completely.
- The cleaning process should be carried out in a threefold reduction procedure.

### Cleaning:

Prerequisite: Fill level of the tank < 1 percent (tank empty if possible).

1. Set the pump drive pumping speed to 450 rpm.



2. Operating terminal: Start cleaning.

- Main and auxiliary agitator are flushed, tank inside cleaning switched on.
- When the fill level of the tank is 4 percent, cleaning is cancelled automatically.
- For machines equipped with nozzle control, the spray line is also cleaned automatically.

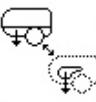
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<b>Füllstand:</b>	<b>2300</b>	<b>Liter</b>	
<b>verdünnen:</b>		<b>aus</b>	
<b>Behälterinnen-</b>		<b>aus</b>	
<b>reinigung:</b>			
<b>Rührwerk:</b>		<b>automatisch</b>	
<b>Rührdruck:</b>	<b>3.5 bar</b>		

Fig. 123

### Empty tank:



3. Operating terminal: Switch on the spraying.
4. Spreads residues already diluted on the treated area when driving.

Switch sprayers on/off at least 10 times when driving.



The valves and return lines are flushed by switching on and off.

- Keep flushing the diluted residues until air escapes from the nozzles.




5. Operating terminal: switch-off the spraying.
6. Repeat steps 1 to 3 once or twice..
7. Evacuate the final residues, see page 158.
8. Cleaning the suction filter and pressure filter, see page 159, 161.

## 11.6.2 Draining the final residues




- On the field: Spread the final residues over the field.
- In the courtyard:
  - Place a suitable collecting container under the drain opening of the suction chest and the drain hose for the pressure filter and collect the final residues.
  - Dispose of the collected spray liquid residue in accordance with the corresponding legal guidelines.
  - Collect the spray liquid residues in suitable containers.

1. Switch off the pump.

2. Operating terminal:  switch the suction chest to spraying /  
Manually move suction chest **B** to position



3. Move switch tap **H** to position .

4. Open stop tap **I**.

→ Evacuate the final residues.

5. Close switch tap **I** again and move switch tap **H** to position **0**.

<b>Zustand:</b>		<b>spülen</b>	
<b>Füllstand:</b>	<b>2300</b>	<b>Liter</b>	
<b>verdünnen:</b>		<b>aus</b>	
<b>Behälterinnen-</b>		<b>aus</b>	
<b>reinigung:</b>			
<b>Rührwerk:</b>		<b>automatisch</b>	
<b>Rührdruck:</b>		<b>3.5 bar</b>	

Fig. 124

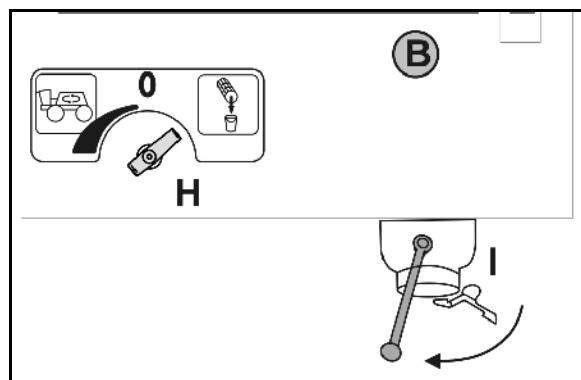


Fig. 125

### 11.6.3 Cleaning the suction filter when tank is empty



Clean the suction filter (Fig. 126) on a daily basis after cleaning the field sprayer.

1. Unscrew the cover of the suction filter (Fig. 126/2).
2. Remove the cover with suction filter (Fig. 126/3) and clean with water.
3. Reassemble the suction filter in the reverse sequence.
4. Check the filter housing for leaks.

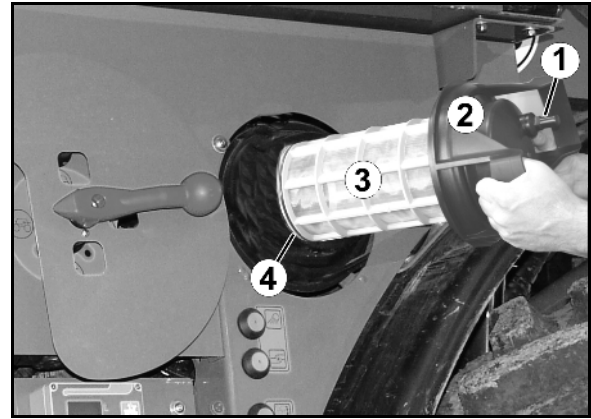







Fig. 126

## 11.6.4 Cleaning the suction filter when tank is full

To clean the suction filter when the tank is full, the filling menu must be called up.

1. Operating terminal:  call up the filling menu.
  2. Press button **L**, run the pump.
  3. Attach the sealing cap to the suction coupling.
  4. Move the pressure gauge switch tap **A** to position .
  5. Switch off additional agitator **H** (position **0**)
  6. Press button **B**, suction chest in position .
- The contents of the filter cup are sucked out.
7. Unscrew the cover of the suction filter (Fig. 126/2).
  8. Activate the relief valve on the suction filter (Fig. 126/1).
  9. Remove the cover with suction filter (Fig. 126/3) and clean with water.
  10. Reassemble the suction filter in the reverse sequence.
  11. Check the filter cover for leaks..
  12. Press button **B**, suction chest in position .
  13. Move switch tap **A** to position .


- 
  - Grease the O-ring seal at the bottom of the suction filter (Fig. 126/4).
  - Make sure that the O-ring seals are correctly fitted.



Fig. 127

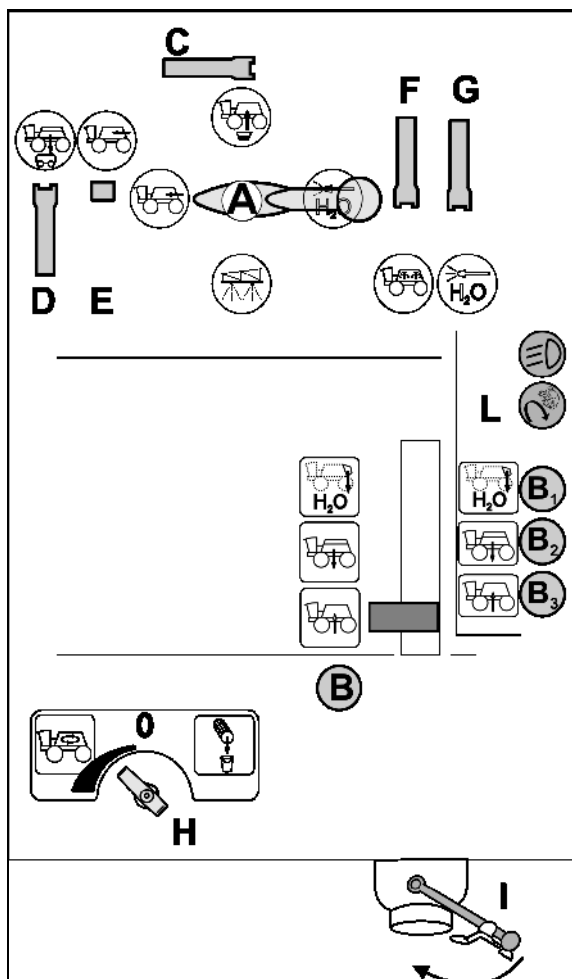


Fig. 128

### 11.6.5 Cleaning the pressure filter when the tank is empty

1. Undo the sleeve nuts.
2. Remove the pressure filter (Fig. 129/1) and clean with water.
3. Refill the pressure filter.
4. Check the screw connection for leaks.

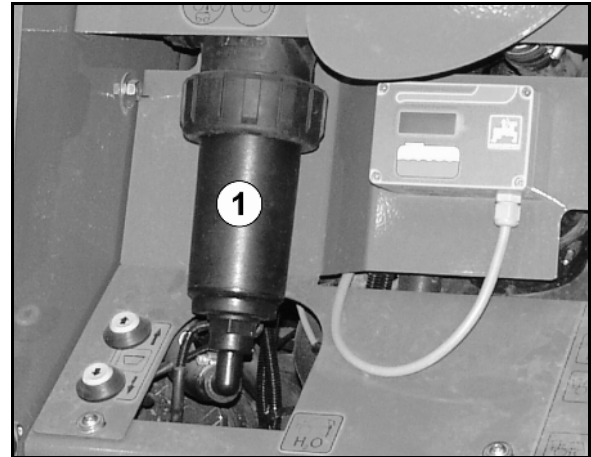


Fig. 129

### 11.6.6 Cleaning the pressure filter when the tank is full

1. Press button **B**, suction chest in



2. Move switch tap **H** to position .

→ Drain the residue into the pressure filter.

3. Undo the sleeve nuts.
4. Remove the pressure filter (Fig. 129/1) and clean with water.
5. Refill the pressure filter.
6. Check the screw connection for leaks.
7. Move switch tap **H** to position **0**.

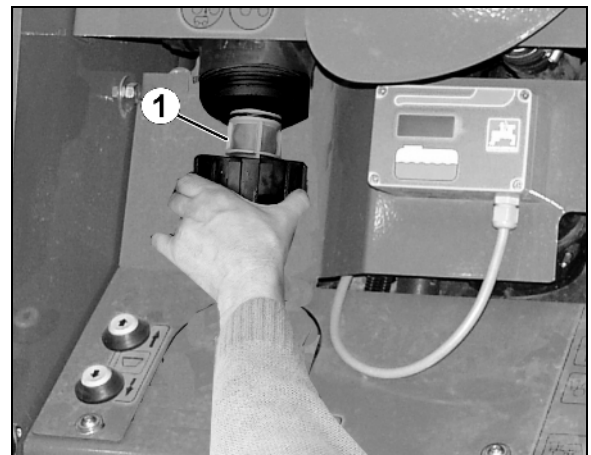


Fig. 130

### 11.6.7 Cleaning the sprayer during a critical agent change

1. Clean the sprayer in three runs as always, see page 157
2. Fill up the flushing water tank.
3. Clean the sprayer, two runs, see page 157.
4. If the sprayer has been previously filled via the pressure connector:  
Clean the induction bowl using the spray pistol and extract the content of the induction bowl.
5. Drain the final residue, see page 158.
6. By all means, clean the suction filter and pressure filter, see page 159, 159.
7. Clean the sprayer, one run, see page 157.
8. Drain the final residue, see page 158.

## 11.6.8 Cleaning the sprayer with a full tank (work interruption)



If spraying operations must be interrupted because of bad weather, by all means clean the suction chest (suction filter, pumps, pressure controller) and the spray line.

1. Run the pump.



2. Operating terminal: switch the suction chest to flushing water suction.

→ Flushing water is sucked in, close agitators.

### Without nozzle control:



3. Operating terminal: switch on the spraying.

Spread at least 50 litres of flushing water to an untreated area when driving.

→ The sprays are cleaned with flushing water.

- **Hopper, agitators are not clean!**
- **The spray agent concentration in the tank is unchanged.**

<b>Zustand:</b>		<b>spülen</b>	
<b>Füllstand:</b>	<b>2300</b>	<b>Liter</b>	
<b>verdünnen:</b>		<b>aus</b>	
<b>Behälterinnen-</b>		<b>aus</b>	
<b>reinigung:</b>			
<b>Rührwerk:</b>		<b>automatisch</b>	
<b>Rührdruck:</b>	<b>3.5 bar</b>		

Fig. 131

### With nozzle control:

→ The sprays are cleaned with flushing water. For this purpose, use two litres of flushing water for each working width meter (observe the filling level).



4. Operating terminal: switch on the spraying temporarily.

→ The nozzles are flushed.

5. Switch the pump off immediately as the agent concentration reduces.

- **Hopper, agitators are not clean!**
- **The spray liquid concentration in the tank has changed.**

### Continuing the spraying operation



Before continuing with the spraying operation, activate the pump for five minutes at 540 min<sup>-1</sup> and switch on the agitators completely.

## 12 Faults



### WARNING

**Risk of crushing, shearing, cutting, being caught and/or drawn in, or impact through**

- **unintentional falling of raised, unsecured machine parts.**
- **unintentional start-up and rolling.**

Secure the machine against unintentional start-up and rolling before eliminating faults on the machine. See page 128.

Wait for the machine to stop before entering the machine danger area.

### 12.1 Towing the machine



Towing the implement on public roads is not permitted.

If the machine has to be towed away, the hat-shaped cover (Fig. 132/1) has to be turned.

1. Undo the bolts (Fig. 132/2).
  2. Remove the cover.
  3. Mount the cover with the hat shaped ridge to the wheel drive.
- If necessary, turn the wheel a little by hand when mounting the cover.
4. Tighten the bolts again.
- The central gear wheel is pressed away from the cover and the drive between the wheels and the wheel motors is deactivated in the process.

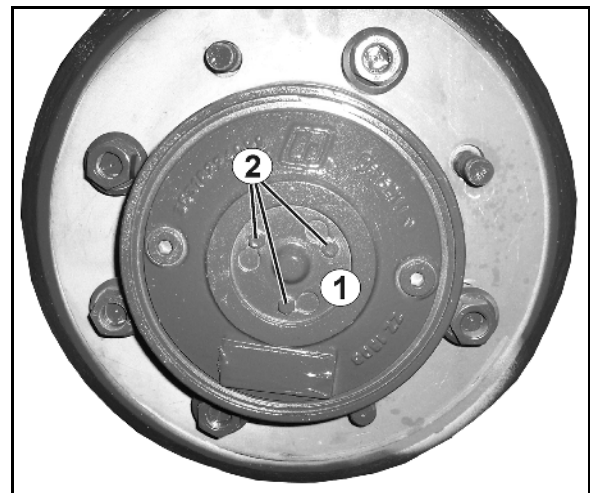


Fig. 132

After towing away, mount the cover with the hat shaped ridge to the wheel drive to the outside.



- Mount the towing device (option).
- In event of engine failure and / or hydraulic malfunction, there will be no oil pressure for steering system. Thus, steering will be very difficult.
- Maximum speed when towing: 5 km/h
- Using the pressure gauge, check if sufficient air pressure is at hand for releasing the brake.
- Empty the spray liquid tank before towing.
- If the engine has stopped, the machine must be towed away using a drawbar in all cases.

## 12.2 AMADRIVE faults and warning messages

Description	Sensor type	Control device	Warning message! Fault entry PIN
ESB above	Switch	MMC1	! - Induction bowl is not above
Automatic steering	Switch	MMC2	
Brake circuit air pressure 1	Switch	MMC2	Supply pressure too low
Brake circuit air pressure 2	Switch	MMC2	Supply pressure too low
Hydraulic oil filter	Switch	MMC2	! - Hydraulic oil filter polluted
Hydraulic oil temperature	Switch	MMC2	! - Hydraulic oil temp high
Low hydraulic oil level	Switch	MMC2	! - Hydraulic oil level low
Central lubrication fault	Switch	MMC2	! - Central lube system error
Handbrake switch	Switch	MMC2	! - Parking brake
Driving lever	Potentiometer	MMC1	AE Pin 38
Lift module	Potentiometer	MMC1	AE Pin 40
Front steering system	Potentiometer	MMC2	AE Pin 38
Rear steering system	Potentiometer	MMC2	AE Pin 39
Level at the front	Potentiometer	MMC2	AE Pin 42
Level at the rear	Potentiometer	MMC2	AE Pin 43
Track, left side	Potentiometer	MMC2	AE Pin 40
Track, right side	Potentiometer	MMC2	AE Pin 41
Stairs	Potentiometer	MMC2	AE Pin 5
Diesel	Potentiometer	MMC2	AE Pin 4
Hydraulic system temperature	Temperature sensor	MMC2	AE Pin 45
Water temperature	Temperature sensor	MMC2	AE Pin 44
Drive control, forwards	Pressure sensor	MMC1	AE Pin 44
Drive control, backwards	Pressure sensor	MMC1	AE Pin 45
Speed, front left	Speed sensor	MMC1	FQ Pin 62
Speed, front right	Speed sensor	MMC1	FQ Pin 63
Speed, rear right	Speed sensor	MMC1	FQ Pin 64
Speed, rear left	Speed sensor	MMC1	FQ Pin 65



Description	Valve type	SG	Fault entry PIN
Pump forwards	Proportional valve	MMC1	PV Pin 6
Pump, backwards	Proportional valve	MMC1	PV Pin 7
Motor, front left	Proportional valve	MMC1	PV Pin 8
Motor, front right	Proportional valve	MMC1	PV Pin 9
Motor, rear left	Proportional valve	MMC1	PV Pin 11
Motor, rear right	Proportional valve	MMC1	PV Pin 10
Spraying pump motor	Proportional valve	MMC1	PV Pin 12
Retarder brake	Proportional valve	MMC1	PV Pin 13
El. ABV	Proportional valve	MMC2	PV Pin 10
Steering, left side	Proportional valve	MMC2	PV Pin 6
Steering, right side	Proportional valve	MMC2	PV Pin 7
Fan motor, water	Proportional valve	MMC2	PV Pin 8
Fan motor, oil / air	Proportional valve	MMC2	PV Pin 9
Increase left track width	Switching valve	MMC2	SA Pin 14
Reduce left track width	Switching valve	MMC2	SA Pin 15
Increase right track width	Switching valve	MMC2	SA Pin 16
Reduce right track width	Switching valve	MMC2	SA Pin 17
Lift level, front	Switching valve	MMC2	SA Pin 18
Lower level, front	Switching valve	MMC2	SA Pin 19
Lift level, rear	Switching valve	MMC2	SA Pin 20
Lower level, rear	Switching valve	MMC2	SA Pin 21

## 12.3 Malfunctions during spraying operation

Fault	Cause	Remedy
<b>There is no suction from the pump</b>	Blockage on the suction side (suction filter, filter insert, suction hose).	Remove the blockage.
	Pump is sucking in air.	Check the hose connection of the suction hose (optional) on the suction port for leak tightness.
<b>The pump does not have any power</b>	Suction filter and filter insert dirty.	Clean suction filter and filter insert.
	The valves are jammed or damaged.	Change the valves.
	Pump is sucking in air, recognisable from the air bubbles in the spray liquid tank.	Check the hose connections on the suction hose for leak tightness.
<b>The spray cone vibrates</b>	Irregular delivery flow from the pump.	Check, and if necessary replace, the suction and pressure-side valves (see on page 214).
<b>Oil/spray liquid mixture in the oil filler neck or clearly visible consumption of the oil</b>	Pump diaphragm defective.	Change all six piston diaphragms (see 215).
<b>Operating terminal: The required spray rate entered is not achieved</b>	High operational speed; low pump drive speed;	Reduce the operational speed and increase the pump drive speed until the fault message disappears and the audible alarm signal stops
<b>Operating terminal: There has been a deviation from the permissible spray pressure range for the nozzle fitted to the sprayer boom</b>	Deviation from the prescribed operational speed, which has an effect on the spray pressure	Alter your operational speed to return to the prescribed operational speed range set for spraying operation

## 13 Cleaning, maintenance and repair



### WARNING

**Risk of crushing, shearing, cutting, being caught and/or drawn in, or impact through**

- unintentional falling of the machine raised using the tractor's three-point linkage.
- unintentional falling of raised, unsecured machine parts.
- unintentional start-up and rolling of the tractor-machine combination.

Secure the tractor and machine against unintentional start-up and rolling, before carrying out cleaning, maintenance or repair work on the machine; see page 128.



### WARNING

**Risk of crushing, shearing, cutting, being caught and/or drawn in, or impact through unprotected danger points.**

- Mount protective equipment removed when cleaning, maintaining and repairing the machine.
- Replace defective protective equipment with new equipment.



### DANGER

- When carrying out maintenance and repair, observe the safety instructions, particularly "Field sprayer operation" section, on page 29.
- You may only carry out maintenance or repair work under moving machine parts that are in a raised position if such parts are secured with suitable, positive-fit locking devices against accidental lowering.



- Regular and proper maintenance will keep your trailed sprayer in good condition for a long time, and will prevent early signs of wear. Regular and proper maintenance is a requirement of our warranty conditions.
- Use only genuine AMAZONE spare parts (see "Spare and wear parts and aids" section, page 15).
- Use only genuine AMAZONE replacement hoses, and hose clamps made of V2A for assembly.
- Specialist knowledge is the requirement for carrying out testing and maintenance operations. This specialist knowledge is not given here in this operating manual.
- Observe environmental protection measures when carrying out cleaning and maintenance work.
- Observe legal requirements when disposing of lubricants, e.g. oils and grease. Also affected by these legal requirements are parts that come into contact with these lubricants.
- Do not exceed a greasing pressure of 400 bar when greasing with high pressure grease guns.
- The following are prohibited:
  - drilling the running gear.
  - drilling through pre-existing holes on the transport frame.
  - welding load-bearing components.
- Protective measures are necessary, such as covering lines or extending lines in particularly critical locations
  - during welding, drilling and grinding work.
  - when working with cut-off wheels near plastic wires and electric wires.
- Clean the field sprayer thoroughly with water before carrying out repair work.
- Carry out repair work on the field sprayer with the pump switched off.
- Thorough cleaning must be carried out before repair work can be carried out inside the spray liquid tank. Keep out of the spray liquid tank.



During welding work on the machine.

- Always separate the power supply to the on-board computer.
- Turn off the main switch.
- Disconnect the battery cable.
- Disconnect the EMR plug (Fig. 133/1) from the controller in the central electrics in the cabin on the right side under the armrest next to the cabin.

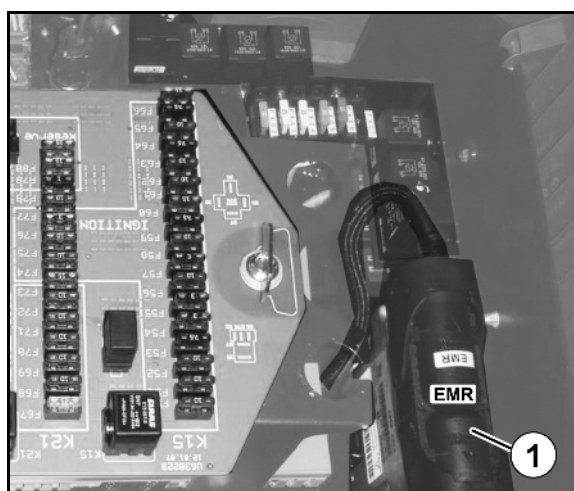


Fig. 133

## 13.1 Cleaning



- Monitor brake, air and hydraulic hose lines particularly carefully
- Never treat brake, air or hydraulic hose lines with benzin, benzene, petroleum or mineral oils.
- Lubricate the trailed sprayer after cleaning, particularly after cleaning with a pressure washer / steam jet, or fat-soluble mediums.
- Observe the statutory requirements for the handling and removal of cleaning agents.

### Cleaning with a pressure washer / steam jet



- Always observe the following points when using a pressure washer / steam jet for cleaning:
  - Do not clean any electrical components.
  - Do not clean any chromed components.
  - Never aim the cleaning jet from the cleaning nozzle of the pressure washer / steam jet directly on lubrication and bearing points.
  - Always maintain a minimum jet distance of 300 mm between the pressure washer or steam jet cleaning nozzle and the machine.
  - Comply with safety regulations when working with pressure washers.

### 13.1.1 Contact of the implement with liquid fertiliser




Liquid fertiliser that spills or escapes causes corrosion damage to the implement, in particular to the engine and surrounding assemblies.

Clean points thoroughly with clean water!

### 13.1.2 External cleaning

1. Press button **B**, suction chest in



2. Move switch tap **A** to position 
3. Open switch tap **G**
4. Press button **L**, run the pump.
5. Clean the field sprayer and the sprayer boom with the spray gun.

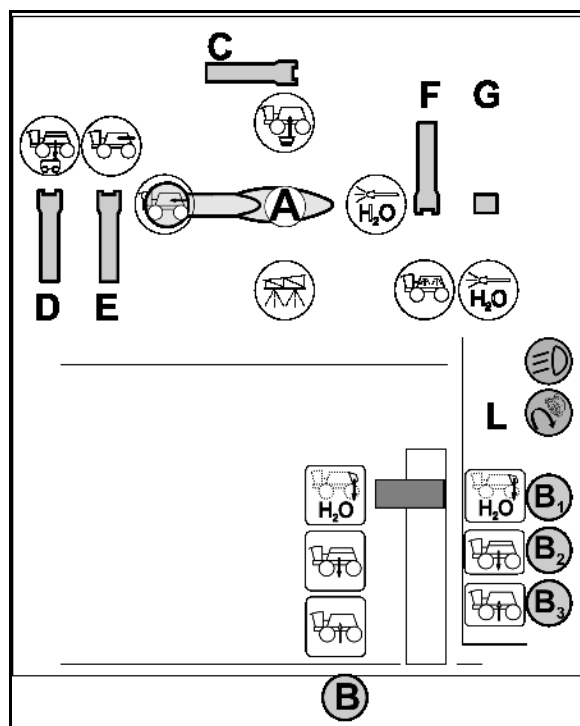





Fig. 134

### 13.1.3 Internal tank cleaning

1. Press button **B**, suction chest in position .
2. Move pressure equipment switch tap **A** to position .
3. Open switch tap **F** .
4. Press button **L**, run the pump.
5. Close switch tap **F** again after 15 minutes.

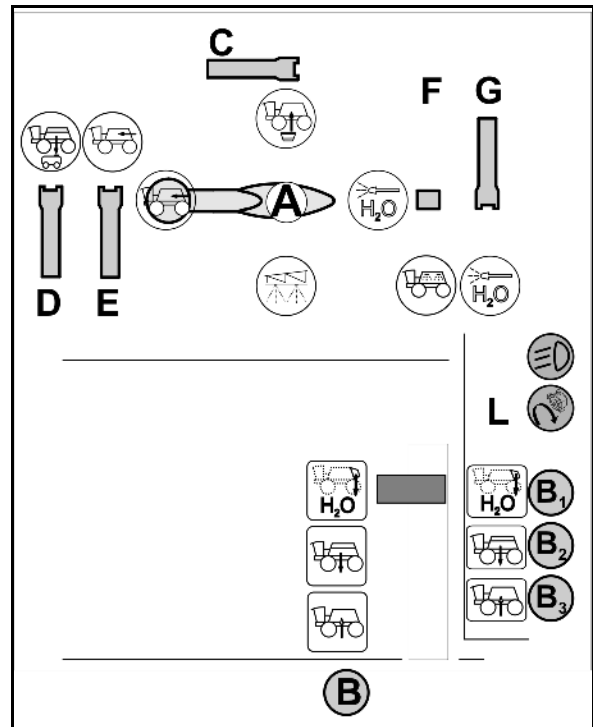


Fig. 135

## 13.2 Winter storage and long periods out of operation

1. Thoroughly clean the machine prior to overwinter breaks.
2. Drive the spray pump and allow the "air to be pumped" once the flushing work has been completed and liquids no longer run out of the spray nozzles.
3. Using the suction switching, change between the "**Drain the spray liquid tank**" and "**Spraying operation**" several times.
4. Using the pressure gauge switching, change between the positions "**Tank cleaning**" and "**Spraying operation**" several times.
5. For each sprayer boom part width section, remove a diaphragm valve from a nozzle body in order to allow the nozzle line to run empty.
6. Switch off the sprayer pump drive when liquid no longer runs out of any section of the nozzle line after changing the positions of the suction chest and the pressure gauge several times.
7. Dismantle and clean the suction filter. See the chapter "Clean suction filter" for this purpose.



- Store the dismantled suction filter until it is needed again in the field sprayer filling sieve.
- Do not refit the pressure hose until it is needed again

8. Dismantle the pressure hose of the sprayer pump so that the remaining water can flow out of the pressure hose and pressure gauge.
9. Change the positions of the pressure gauge at all positions once again.
10. Actuate the sprayer pump for approx. ½ minute until fluid no longer runs out of the connection on the pressure side of the pump.
11. Cover the pump pressure connection to protect it from dirt.
12. Drain the pressure sensor, see page 172
13. Perform an oil change on the pumps before storing for the winter.



- At temperatures below freezing, hand crank the piston diaphragm pumps before starting to prevent residual ice from damaging the piston and piston diaphragm.
- Store the pressure gauge and any other electronic accessories in a place where they are safe from frost.

### Drain the pressure sensor

The pressure sensor (**Fehler! Verweisquelle konnte nicht gefunden werden./1**) is located on the fitting of the sprayer boom.

1. Lower the sprayer boom.
2. Remove the pressure sensor, blow-out with compressed air and re-install.

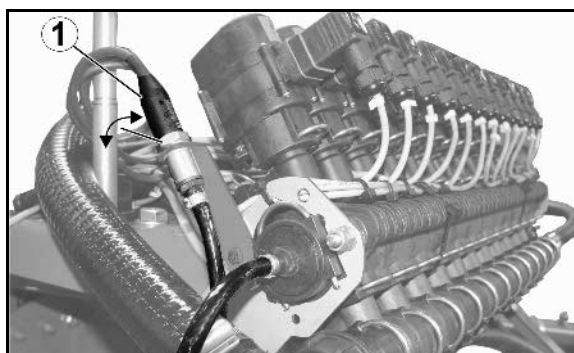


Fig. 136



### Emptying the flushing water tank

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1. Press button **B**, suction chest in position
2. Open the filling connection.  
→ Flushing water tank is emptied via the filling connection.
3. Open stop tap **I** and drain the technical residues in a suitable collecting vessel.
4. Open the drain tap under the fitting.  
→ Flushing water flows out of the fitting.

### Measures on the carrier vehicle

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Ensure for sufficient frost resistance of the coolant.  
Turn off the main switch under the cabin.

### 13.3 Maintenance schedule – overview



- Carry out maintenance work when the first interval is reached.
- The times, continuous services or maintenance intervals of any third party documentation shall have priority.
- Also note the maintenance sheet.

#### After the first working run

Component	Servicing work	see page <input type="checkbox"/>	Work-shop work <input type="checkbox"/>
<b>Wheels</b>	<ul style="list-style-type: none"> <li>• Tighten wheel bolts</li> </ul>	<b>197</b>	
<b>Hydraulics</b>	<ul style="list-style-type: none"> <li>• Visual inspection of the hose lines for defects</li> <li>• Check leak tightness</li> </ul>	<b>199</b>	
<b>Whole machine</b>	<ul style="list-style-type: none"> <li>• Perform lubrication</li> </ul>	<b>178</b>	

#### After the first 50 hours of operation:

Order the initial maintenance kit where necessary.

Component	Servicing work	see page <input type="checkbox"/>	Work-shop work <input type="checkbox"/>
<b>Wheel gears</b>	<ul style="list-style-type: none"> <li>• Oil change</li> </ul>	<b>196</b>	<b>X</b>
<b>Cab</b>	<ul style="list-style-type: none"> <li>• Check the front and rear shock absorber bearings and, where necessary, tighten the bolts.</li> </ul>	<b>207</b>	<b>X</b>
<b>Hydraulics</b>	<ul style="list-style-type: none"> <li>• Replace the hydraulic return filter</li> </ul>	<b>204</b>	<b>X</b>
	<ul style="list-style-type: none"> <li>• Replace the hydraulic pressure filter</li> </ul>	<b>204</b>	<b>X</b>
<b>Deutz engine</b>	<ul style="list-style-type: none"> <li>• Oil change</li> </ul>	<b>186</b>	<b>X</b>
	<ul style="list-style-type: none"> <li>• Replace the engine oil filter</li> </ul>	<b>186</b>	<b>X</b>

## Daily

Component	Servicing work	see page	Work-shop work
Deutz engine	<ul style="list-style-type: none"> <li>Check engine oil level</li> </ul>	186	
Hydraulics	<ul style="list-style-type: none"> <li>Check the oil level</li> </ul>	204	
	<ul style="list-style-type: none"> <li>Visual inspection of the hose lines for defects</li> </ul>	199	
	<ul style="list-style-type: none"> <li>Check leak tightness</li> </ul>		
Lighting	<ul style="list-style-type: none"> <li>Check function</li> </ul>	-	
Brakes	<ul style="list-style-type: none"> <li>Check function</li> </ul>	-	
Steering system	<ul style="list-style-type: none"> <li>Track correction</li> </ul>	51	
Spraying pumps	<ul style="list-style-type: none"> <li>Check the oil level</li> </ul>	213	
Spray liquid tank	<ul style="list-style-type: none"> <li>Clean or rinse</li> </ul>	169	
Suction filter		160	
Self-cleaning pressure filter		87	
Nozzles		203	
Machine	<ul style="list-style-type: none"> <li>Check for leaks</li> </ul>	-	

## Every 100 operating hours

Component	Servicing work	See Page	Work-shop work
Air intake system of the engine	<ul style="list-style-type: none"> <li>Clean</li> </ul>	188	
Spraying nozzles	<ul style="list-style-type: none"> <li>Check</li> </ul>	203	
Compressed air system	<ul style="list-style-type: none"> <li>Draining the air reservoir</li> </ul>	195	
Whole machine	<ul style="list-style-type: none"> <li>Perform lubrication</li> </ul>	167	

## Halbjährlich / Every 250 operating hours

Component	Servicing work	see page	Work-shop work
Sprayer boom	<ul style="list-style-type: none"> <li>Clean the line filters</li> <li>Replace damaged filter inserts</li> </ul>	204	
Deutz engine	<ul style="list-style-type: none"> <li>Oil change (Diesel &gt; 0,5% S)</li> </ul>	186	X
	<ul style="list-style-type: none"> <li>Replace the engine oil filter</li> </ul>	186	X
	<ul style="list-style-type: none"> <li>Check cooling agent and antifreeze levels</li> </ul>	190	
	<ul style="list-style-type: none"> <li>Drain the fuel pre-filter</li> </ul>	184	X



The oil change interval depends on the sulphur content in the diesel fuel.  
 Diesel fuel >0.5 % S – every 6 months / > 0.5 % S – annually

### Annually / 500 operating hours (maintenance scope A)

→ Order maintenance kit A if necessary.

Component	Servicing work	see page	Workshop work
Deutz engine	• Oil change (Diesel < 0,5% S)	186	
	• Replace the engine oil filter	186	
Wheel gears	• Check the oil level	196	
Hydraulics cooler, engine radiator, air conditioner	• Clean with compressed air	191	
Air conditioner	• Check the V-belt compressor	194	X
Hydraulics	• Replace the hydraulic return filter	204	
Spraying pumps	• Oil change	213	

### Annually / 1000 operating hours (maintenance scope B)

→ Order maintenance kit B if necessary (includes maintenance kit A)

Component	Servicing work	see page	Workshop work
	• <b>Carry out scope of maintenance A</b>		
Cab	• Replace the outer air filter	206	X
	• Clean the circulation filter		
Deutz engine	• Replace the main fuel filter	183	X
	• Replace the fuel pre-filter	184	X
	• Check the ribbed V-belt and tensioning roller, replace as required	193	X
Hydraulics	• Hydraulic oil change	204	X
Hydraulics	• Replace the hydraulic pressure filter	204	X
Wheel gears	• Oil change	196	X
Spraying pumps	• Oil change	213	X
	• Check the valves, replace if required	214	X
	• Check piston diaphragm, replace if required	215	X
Brakes	• Check the brake linings / brake drums	186	
Sprayer boom	• Determine the volume of the field sprayer and check the lateral distribution, replace worn nozzles	203	
Flow meter / return flow meter	• Calibrate	217	
Air intake system of the engine	• Replace the inner and outer air filters	188	X

**Every 2 years / 2000 operating hours (maintenance scope C)**

→ Order maintenance kit C if necessary (includes maintenance kit B)

Component	Servicing work	see page	Workshop work
	<ul style="list-style-type: none"> <li>Carry out scope of maintenance B</li> </ul>		
Deutz engine	<ul style="list-style-type: none"> <li>Check the valve clearance and adjust, if necessary</li> </ul>	193	X
	<ul style="list-style-type: none"> <li>Replace the coolant</li> </ul>	190	X
	<ul style="list-style-type: none"> <li>Replace the ribbed V-belt</li> </ul>	193	X
	<ul style="list-style-type: none"> <li>Replace the tensioning roller</li> </ul>		
Air conditioner	<ul style="list-style-type: none"> <li>Air conditioner compressor, replace the V-belt</li> </ul>	194	X
	<ul style="list-style-type: none"> <li>Clean the evaporator and warm water radiator</li> </ul>	210	X
	<ul style="list-style-type: none"> <li>Replace the filter drier</li> </ul>	209	X
Compressed air system	<ul style="list-style-type: none"> <li>Replace the air drier cartridge</li> </ul>	194	X
Fire extinguisher	<ul style="list-style-type: none"> <li>Inspection by Gloria customer services</li> </ul>	-	

**As required**

Component	Servicing work	see page	Workshop work
Hydraulic sprayer boom	<ul style="list-style-type: none"> <li>Adjust the throttle valve</li> </ul>	197	
Wheels	<ul style="list-style-type: none"> <li>Tighten the wheel bolts (after the first trip after changing the wheels)</li> </ul>	184	
	<ul style="list-style-type: none"> <li>Check tyre pressure</li> </ul>	197	
Brakes	<ul style="list-style-type: none"> <li>Adjust the brake shoes after working on the brakes</li> </ul>	186	X
	<ul style="list-style-type: none"> <li>Replace the brake shoes</li> </ul>		
Air intake system of the engine	<ul style="list-style-type: none"> <li>Clean the outer air filter</li> </ul>	188	X
Fuel system	<ul style="list-style-type: none"> <li>Bleed</li> </ul>	185	X
Air conditioner	<ul style="list-style-type: none"> <li>Commissioning following longer standing times</li> </ul>	208	
Battery	<ul style="list-style-type: none"> <li>Replace</li> </ul>	195	
Hydraulics cooler, engine radiator, air conditioner	<ul style="list-style-type: none"> <li>Clean with compressed air</li> </ul>	191	

## 13.4 Lubrication specifications



Lubricate all grease nipples (keep gaskets clean).

Lubricate / grease the machine at the specified intervals.

Lubrication points on the machine are indicated with the foil (Fig. 137).

Carefully clean the lubrication points and grease gun before lubrication so that no dirt is pressed into the bearings. Press the dirty grease out of the bearings completely and replace it with new grease.

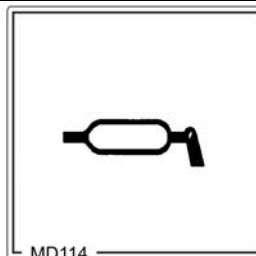


Fig. 137

### Lubricating grease

Lithium soaped with EP additive, NLGI Class 2 (also suitable for the central lubricating system)	Brand	Designation
	Agip	GR MU EP 2
	Aral	Aralub HLP 2
	Avia	Avialith 2 EP
	BP	Energrease LS 2 - EP 2
	Castrol	Spheerol AP 2
	Esso	Beacon EP 2
	Fina	Marson EPL2A
	Fuchs	Renolit FLM 2
	Shell	Alvania EP 2
	Mobil	Mobilux EP 2

### Lubrication point overview

Fig. 138/...	Lubrication point	Interval [h]	Number of lubrication points	Type of lubrication
(1)	Steering cylinder	100	4 x 2	Lubricating nipple
(2)	Oscillating yoke	100	2 x 2	Lubricating nipple
(3)	Track width cylinder	100	2 x 2	Lubricating nipple
(4)	Oscillating axle	100	2 x 2	Lubricating nipple
(5)	Brake linkage adjuster	100	4	Lubricating nipple
(6)	Stub axle	100	4 x 4	Lubricating nipple
(7)	Hydropneumatic sprung suspension	100	4 x 2	Lubricating nipple

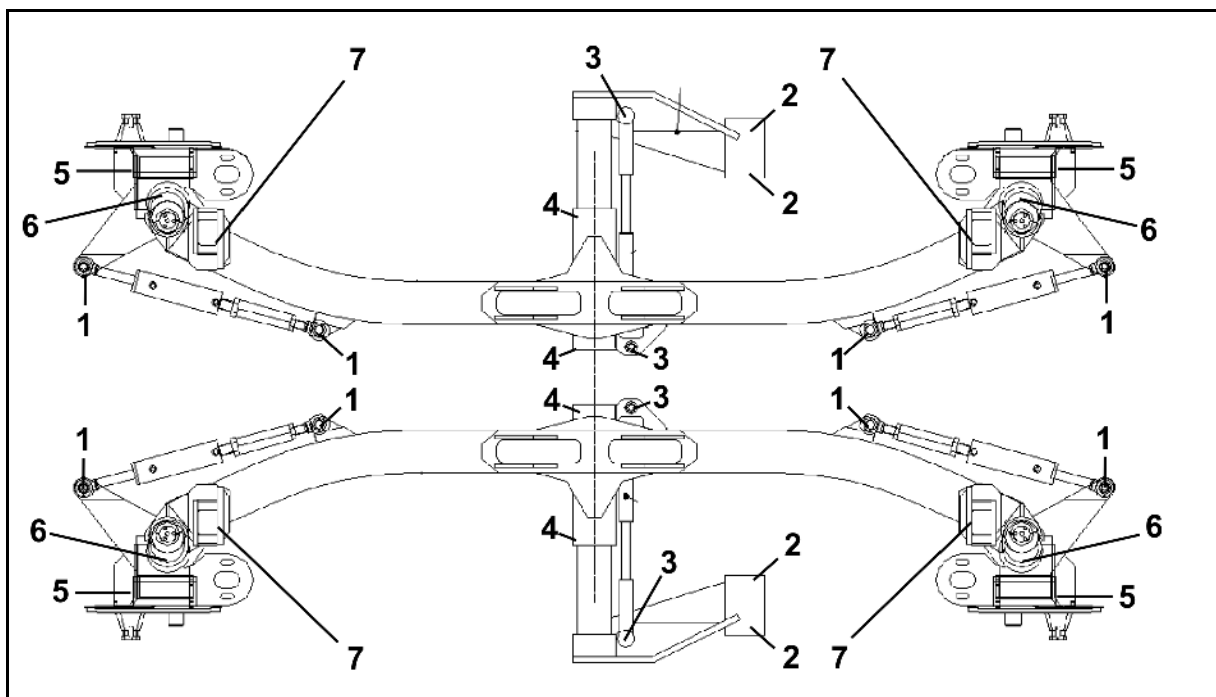


Fig. 138

### 13.4.1 Central lubrication

(option)

Function of the central lubrication:

- Includes all the lubrication points on the machine (56 points)
- Automatic dosage
- Additional manual dosing using a button in the cabin, where required

Fig. 139/...

- (1) Lubricant tank
- (2) Connection for refilling
- (3) Maximum filling level
- (4) Operating unit



Fill the tank of the central lubricating unit in due time.

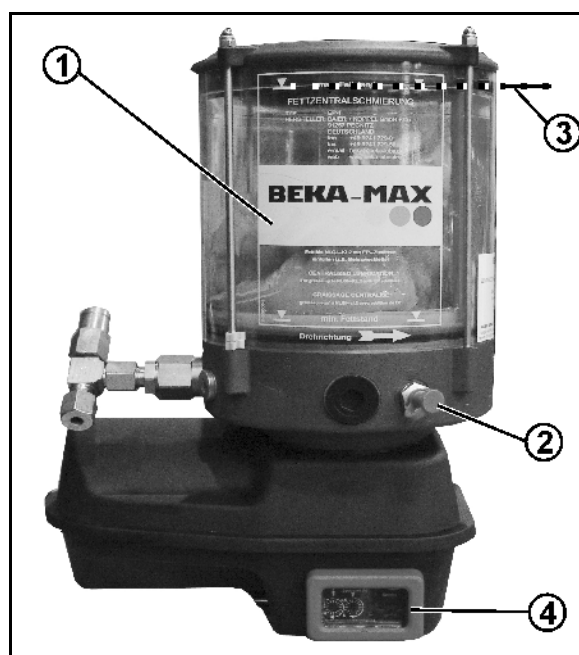


Fig. 139

#### Operating unit

- (1) Set the period for one lubricating sequence (standard setting, 6 minutes)
- (2) Setting the time interval between the lubricating sequences (standard setting, 2.5 hours)
- (3) Fault display - red
- (4) Lubrication sequence active display - green
- (5) Socket, service connection

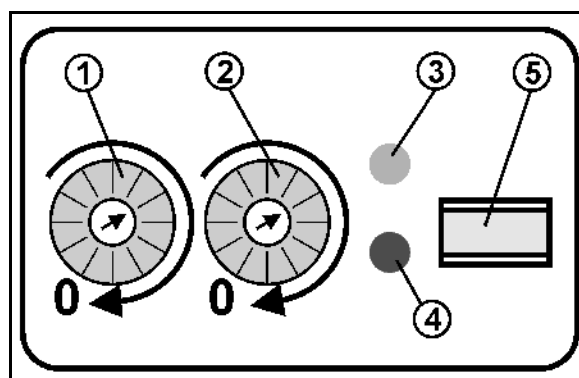


Fig. 140



## 13.5 Maintenance of the carrier vehicle



- Self-adhesive maintenance images for the diesel engine are supplied with each machine. Stick these on the machine at locations that are well visible.
- Please also observe the operating instructions of the Deutz engine Type TCD 2012 L04/06 2V.
- Have all maintenance work carried out on the engine by Deutz authorised dealers.

### 13.5.1 Oils and operating fluids



Mix other brands only upon request. A written confirmation of the supplier when using other oils is required in order to guarantee that no malfunctions occur.

**The guarantee of the machine voids immediately when using other oils than specified!**

#### Filling quantities of the operating fluids

Component	Designation	Fill-in quantity
Deutz engine	Engine oil	approx. 14 l
	Cooling agent	approx. 38 l
Hydraulic system	Hydraulic oil	approx. 120 l
Wheel gears	Wheel transmission oil	approx. 1.6 l
Air conditioner	Coolant	1,900 g
	Contrast medium	10 g
	Compressor oil	5 g
Spraying pumps	Engine oil 15W40	2 x 2.5 l

#### Admissible hydraulic oils



Fill only cleaned hydraulic oil. Required purity class:

- Purity class 9 according to NAS 1638
- Purity class 18 /16/ 13 according to ISO 4406/1999

Brand	Designation
BP	Batran HV 68 (HPVL oil in keeping with DIN 51524)
Castrol	Hyspin AWH 68
ELF	Hydrelf 68
ESSO	Univis N+ ISO VG68
FINA	Hydran HV 68
Mobil	DTE 10M / DTE 30
OK	Hovis 68
Q8	Handel 68
Shell	Tellus T68
Texaco	Rando HD-Z 68
Total	Equvis ZS 68
Valvoline	Ultramax HVLP 68

### Admissible engine oils

SAE 10W/40	Brand	Designation
	Aral	Aral Mega Tuboral
	BP	SAE 10W/40
	Castrol	Castrol Enduron
	DEUTZ	TLX 10W-40FE Europa
	ESSO	Essolube XTS 501
	Shell	Shell Rimula Ultra
	Total Fina Elf	TOTAL RUBIA TIR 8600

### Admissible oils for the wheel transmission

Brand	ISO VG 220 Mineral oils	ISO VG 220 Synthetic oils
Aral	Drgol BG 220	Drgol PAS 220
BP	Energol GR-XP 150	Enersyn – EP – XF220
Castrol	Alphamax 220	Alphasyn EP 220
ESSO	Spartan EP 220	Spartan SEP 220
Mobil	Mobilgear XMP 220	Mobilgear SHC XMP 150
Optimol	Optigear BM220	Optigear synthetic A 150
Q8	Goya NT 220	El Greco 220
Shell	Omala 220	Omala HD 220
Texaco	Meropa 220	Pinnacle EP 220
Total Fina Elf	Carter EP 220	Carter SH 220

### Admissible protective agent for cooling systems

	Brand	Designation
	Deutz AG	TN 0101 1490 (5 litres, litres, litres) TN 0101 1490 (20 litres, litres, litres)
	ARAL	Antifreeze Extra
	AVIA	Antifreeze APN
	BASF	Glysantin G48 Protect Plus
	BP	BP anti-frost Code No. X 2270 A
	ESSO	ESSO Antifreeze Extra
	Mobil	Mobil Antifreez Extra
	Shell	GlycoShell
	Castrol	Castrol Antifreeze NF
	TOTAL	Glacelf MDX

### 13.5.2 Fuel filter

The engine has a fuel filter (Fig. 141/1). The fuel filter is equipped with a replaceable filter insert.

#### Changing the filter

1. Loosen the fuel filter cartridge using standard commercial tools and unscrew it.
2. Collect escaping fuel.
3. Clean the sealing surface of the filter support from any dirt.
4. Slightly oil or wet the rubber seal of the fuel filter with diesel fuel.
5. Screw in the cartridge by hand until the seal rests.
6. Tighten the fuel filter cartridge by another half a turn.
7. Check for leaks.

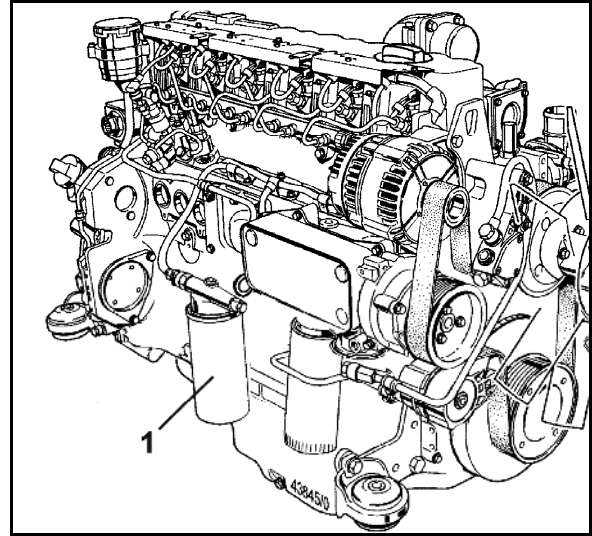


Fig. 141



#### **DANGER**

**No naked flames when working on the fuel system!**

**Do not smoke!**



- Check the seal of the lubricating oil filter cartridge again for leaks after 30 minutes of operation.
- Filter cartridges are disposable articles and are chemical waste!
- The fuel filter must be replaced after the first 50 to 150 hours and then once each year.

### 13.5.3 Fuel pre-filter

- (1) Fuel supply to the pump.
- (2) Fuel return from the FCU control block.
- (3) Manual fuel pump with bayonet connection for locking and unlocking.
- (4) Thermostat valve with stop lever (optional).
- (5) Filter insert.
- (6) Electric water level sensor.
- (7) Drain cock.
- (8) Water collection tank (bowl).
- (9) Fuel entry from the fuel tank.
- (10) Fuel return to the fuel tank.
- (11) Connector for the water level sensor.

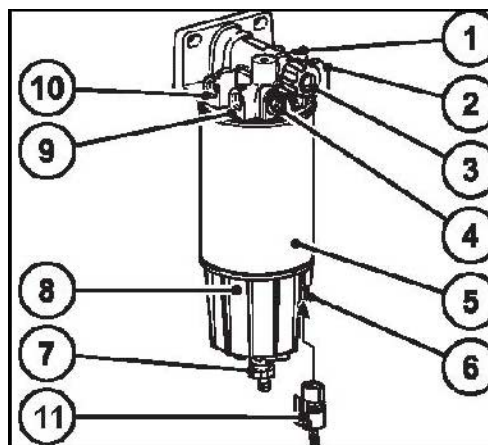


Fig. 142

#### Draining

1. Keep the drain cock under the filter open until clean fuel runs out.
2. Collect all drained fuel / water mixture and dispose of environment friendly.

#### Changing the filter

1. Place a fuel collecting tank under the fuel pre-filter.
2. Loosen the draining cock and drain the water and fuel completely.
3. Screw the filter insert together with the water collecting tank out anti-clockwise and remove.
4. Close the fuel stop tap (with tanks positioned higher).
5. Undo the water collecting tank from the old filter insert anti-clockwise and remove.
6. Drain the remaining fuel in the fuel collecting tank and remove the water collecting tank.
7. Screw the water collecting tank clockwise onto the new filter insert.
8. Clean the sealing surface of the new filter insert and the counter side of the filter head from any possible soiling.
9. Wet the sealing surface of the filter insert slightly with fuel and screw clockwise back onto the filter head (17-18 Nm).
10. Bleed the system, see bleeding the fuel system.
11. Dispose of the fuel collected and old filter inserts in a correct manner.

### Bleeding the fuel system

1. Unlock the bayonet connection of the manual fuel pump by pressing and turning anti-clockwise at the same time. The piston of the pump is now pressed through the spring.
2. Keep pumping until a high resistance can be noticed and the pump still runs only very slowly.
3. Now continue to pump a few times. (The return line must be filled).
4. Lock the bayonet connection of the manual fuel pump by pressing and turning clockwise at the same time.
5. Start the engine and allow to run idle for approx. 5 minutes or at low load. Check the pre-filter for leaks in the process.

**DANGER**

**No naked flames when working on the fuel system!**

**Do not smoke!**



Dispose of old fuel environmentally friendly!

### 13.5.4 Diesel engine oil level check and oil change

The oil level must be checked using the dipstick every day. The dipstick is located on the right side of the engine. We recommend that the oil level is checked in the morning before the engine has started.

1. The machine must be standing on a level surface.
  2. Pull out the dipstick (Fig. 143/1) and clean it using a clean cloth.
  3. Insert the dipstick into the opening again and pull it back out.
- The correct oil level lies between the markings.
4. When required, the oil level must be topped-up through the filling opening (Fig. 143/2,3) using the specified oil.
- Clean the filling opening thoroughly first.
5. Check the oil level and then close the cover.

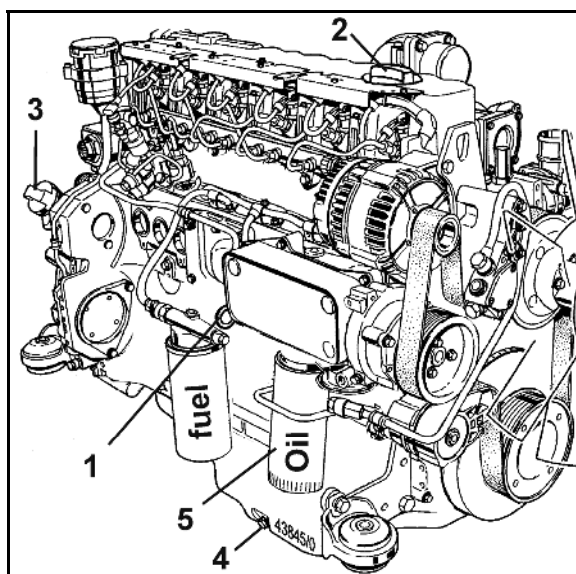


Fig. 143



**Never fill oil when the engine is running!**

### Oil change



The oil change interval depends on the sulphur content in the diesel fuel.

Diesel fuel more than 0.5 % S – every 6 months

Diesel fuel less than 0.5 % S – annually

1. Run the engine warm.
2. Park the vehicle horizontally. Lubricating oil temperature approx. 80° Celsius.
3. Turn off the engine.
4. Place an oil drip pan under the engine.
5. Unscrew the oil drain plug (Fig. 143/4).
6. Drain the oil and, where applicable, drain the oil cooler content.
7. Screw in the oil drain plug with a new seal and tighten.
8. Fill with lubrication oil.
  - o Details for quality / viscosity, see above.
  - o Initial filling quantity 24 – 26.5 litres.
  - o The maximum marking on the dipstick is decisive for the filling quantity.
9. Check the oil level.



**CAUTION**

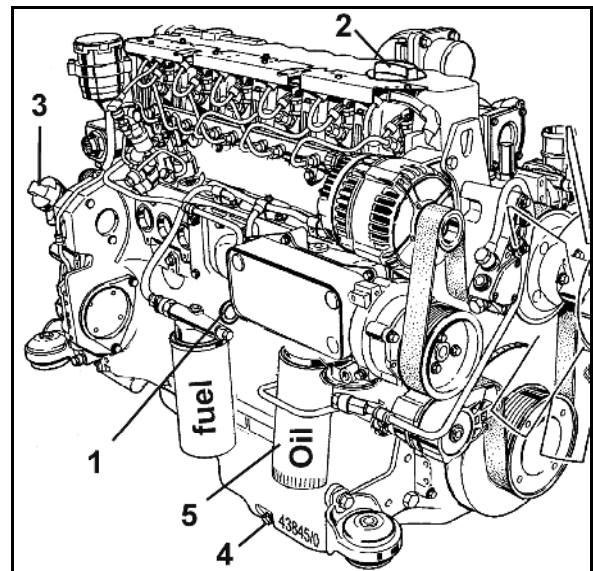
**Risk of scalding when draining due to hot oil!**



- Always park the machine so that all oil can drain.
- Always store your old oil at a special location, it is chemical waste!
- Dispose of the oil according to national guidelines.
- The oil filter is a disposable article. Please note that oil filters are chemical waste! Please also observe the official regulations.
- Check the seal of the lubricating oil filter cartridge again for leaks after 30 minutes of operation.

**Oil filter change**

1. Turn off the engine.
2. Undo the lubricating oil filter cartridge (Fig. 144/5) using standard commercial tools and unscrew it.
3. Collect any possible escaping oil.
4. Clean the sealing surface of the filter support from any dirt.
5. Slightly oil the rubber seal of the new lubricating oil filter cartridge.
6. Screw in the cartridge by hand until the seal rests.
7. Tighten the lubricating oil filter cartridge by another half a turn.
8. Check the oil level and oil pressure.
9. Check the seal of the lubricating oil filter cartridge again for leaks.



**Fig. 144**



**CAUTION**

**Caution with hot oil: Risk of scalding!**

### 13.5.5 Air intake system of the engine

The air filter must be cleaned on a regular basis. The period between the cleaning depends on the operating conditions.

Fig. 145/...

- (1) Dry air filter
- (2) Dust discharge valve

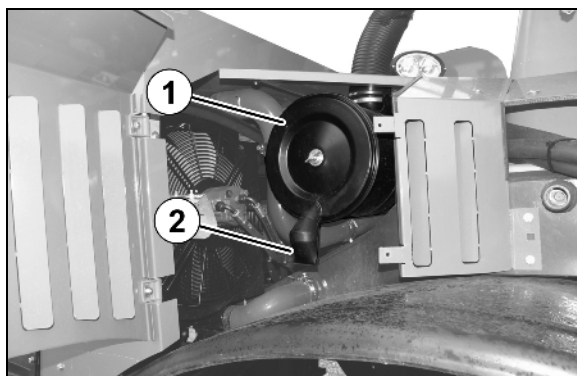


Fig. 145

The soiling of the combustion air filter depends on the dust content of the air and the filter size selected.

#### Dust discharge valve

- Empty the dust discharge valve (Fig. 145/4) by pressing the discharge slots together.
- Clean the discharge slots every now and then.
- Remove any dust caking that may be at hand by pressing the upper area of the valve together.

#### Filter cartridge

1. Undo the wing nut of the filter hood (Fig. 146/1).
2. Remove the filter hood and pull out the outer filter element (Fig. 146/2).
3. Clean the outer filter element, renew after one year at the latest.
4. Clean the outer filter element:
  - o Blow-out with dry compressed air (max. 5 bar) from the inside to the outside.
  - o Knock-out (**only in emergencies**). Do not damage the cartridge in the process, or
  - o replace according to manufacturer instructions.
5. Check the outer filter element for damage to the filter paper (shine through it) and check the seals. If necessary, replace.
6. annually, renew the inner filter element (Fig. 146/3) (never clean it).

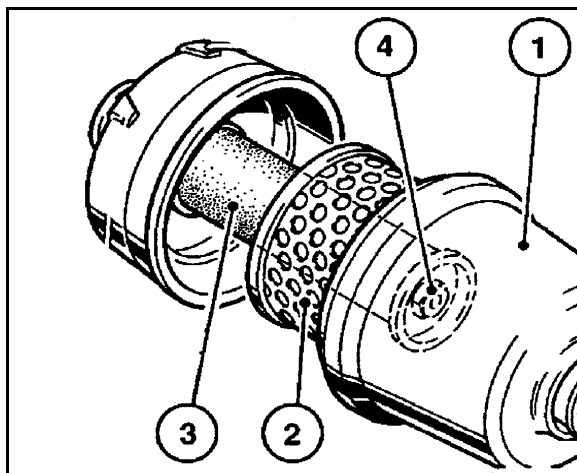


Fig. 146



For this:

- o Loosen the hex. nut (Fig. 146/4) and pull out the inner filter element.
  - o Insert a new inner filter element.
  - o Remount the hex. nut and tighten.
7. Insert the outer filter element, close the filter hood and secure with the wing nut.

**CAUTION**

**Never clean the inner filter element with petrol or hot liquids!**

### 13.5.6 Cooling system of the engine

- (1) Compensating reservoir for coolant

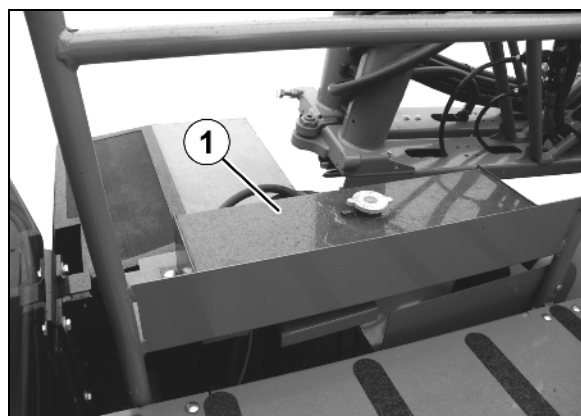


Fig. 147

#### Draining the diesel engine cooling system:

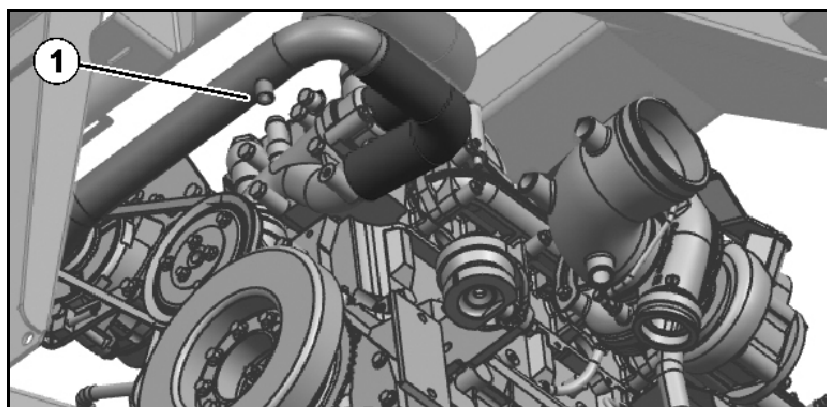


Fig. 148

1. Setup a collecting tray under the sealing bolt (Fig. 148/1).
2. Remove the filling plug.
3. Drain the coolant.
4. Retighten the filling plug.
5. Filling / bleeding the cooling system.



#### CAUTION

**When draining hot coolant: Risk of scalding! Collect the coolant when draining!**

**Dispose of in the correct way!**

### Filling / bleeding the diesel engine cooling system

Check the coolant level when the engine is cold. And refill if required.

1. Open the cover for the compensating reservoir.
2. Fill coolant to the maximum marking via the compensating reservoir.
3. Seal the cover for the compensating reservoir.
4. For bleeding, allow the engine to run until the thermostat opens.
5. If necessary, top up with water when cold.

### Coolant



With liquid-cooled engines, take special care with the processing and checking of the coolant otherwise corrosion, cavitation and damage caused by freezing may be caused to the engine.

Preparing the coolant is carried out by admixing cooling agent to the cooling water.

Thus, the coolant level as well as the concentration of the cooling system agent must be checked on a regular basis.



- Cooling system protection agent must be disposed of environmentally friendly.
- Only use approved coolants otherwise damage will be caused and claims for guarantee are voided.
- Never mix coolants with each other.

### 13.5.7 Radiator

Clean the radiator and the condenser to the left and right side of the cabin using compressed air.

1. Remove the side cover.
2. Pull the grille outwards.
3. Clean the radiator and the condenser to the left and right side of the cabin using compressed air.
4. If necessary, clean the grille separately.

**Compressed air, maximum 5 bar!**

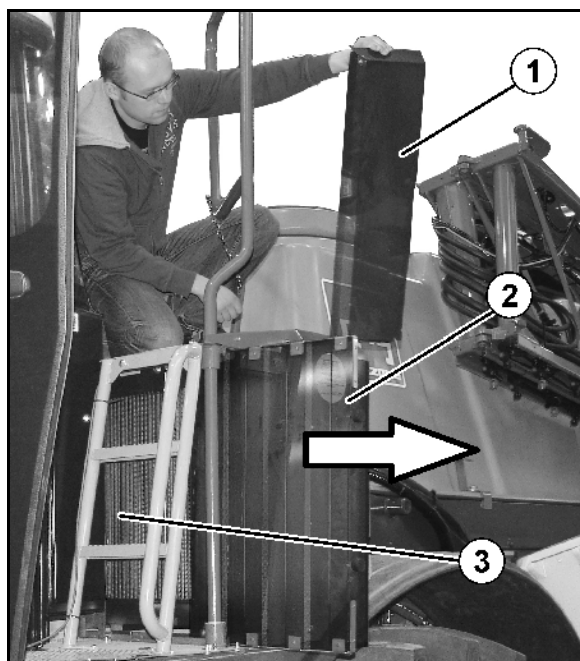


Fig. 149

### 13.5.8 Valve play



Have the valve play adjustment only carried out by an authorised Deutz workshop.

### 13.5.9 Belt drive

#### 13.5.9.1 Replace the flat belt and tensioning roller

1. Press the tensioning roller (Fig. 150/1) using a socket (Fig. 150/3) in the direction of the arrow until a Ø6 mm retention pin (Fig. 150/4) can be fixed in the assembly bore.  
Now the ribbed V-belt (Fig. 150/2) is free of tension.
2. First remove the ribbed V-belt (Fig. 150/2) from the smallest roller or from the tensioning roller.
3. Mount a new tensioning roller.
4. Apply a new ribbed V-belt (Fig. 150/2).
5. Counterhold the tensioning roller using a socket and remove the retaining pin.
6. Retension the ribbed V-belt using the tensioning rollers and socket (Fig. 150/3). Check if the ribbed V-belt is fitted correctly in its guide.

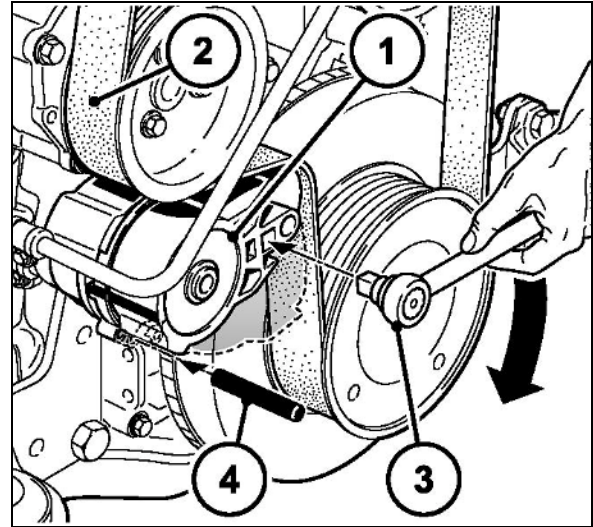


Fig. 150



Always replace the flat belt and tensioning roller together.

#### Check the belt length

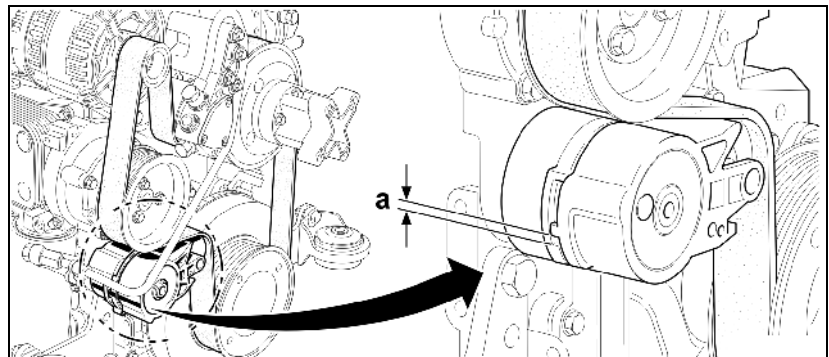


Fig. 151

Measure the distance between the notch of the movable tensioning arm and the stop of the fixed tightening housing. If distance "a" is smaller than 3 mm, the belt must be replaced.

### 13.5.9.2 V-belt air conditioner compressor

When required or following replacement, tension the V-belt via the nut (Fig. 152/1) of the tensioning device.

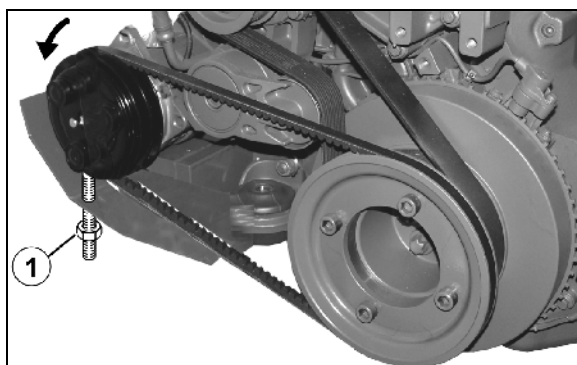


Fig. 152



Only carry out work / functional checks on the belt drive when the engine is stopped!

### 13.5.10 Compressed air system

#### Air drier cartridge

The air drier cartridge (Fig. 153/1) is located under the cabin behind the right-hand maintenance flap.

Before replacing the air drier cartridge, depressurize all four air pressure vessels via the condensation drain.

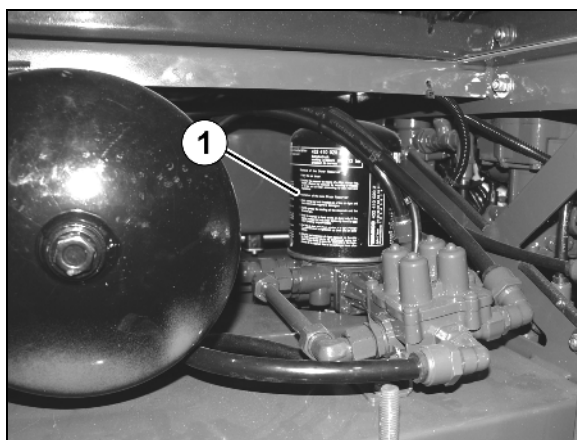


Fig. 153

## Air reservoir

A total of four air reservoirs are located under the cabin behind the right-hand maintenance flap (Fig. 154/1-4)

1. Pull the drainage valve (Fig. 154/5) in a sideways direction using the ring until no more water escapes from the air reservoir.
- Water flows out of the drainage valve.
2. Unscrew the drainage valve from the air reservoir and clean the air reservoir if there are signs of dirt.

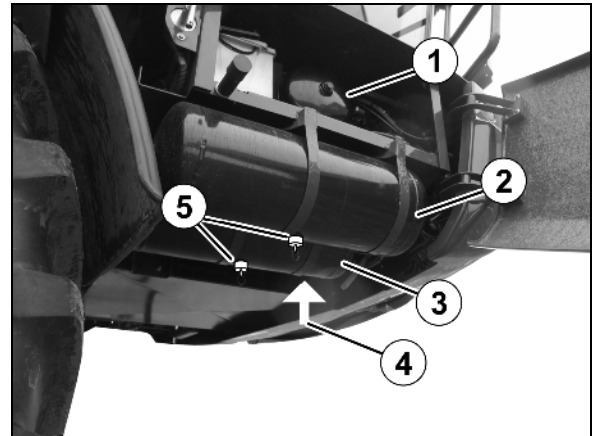


Fig. 154

## 13.5.11 Electrical system of the engine

A well conducting connection must always be at hand between the engine and the ground connection of the battery. All parts of the system such as the cable, connector, etc. must be connected correctly. The cable insulation must not be damaged.



### CAUTION

Repair damaged cables immediately!

## Battery

The battery (Fig. 155/1) is located under the cabin behind the right-hand maintenance flap.

- The battery is maintenance free.
- If the battery has to be charged using a quick charger, first remove the pole terminals.

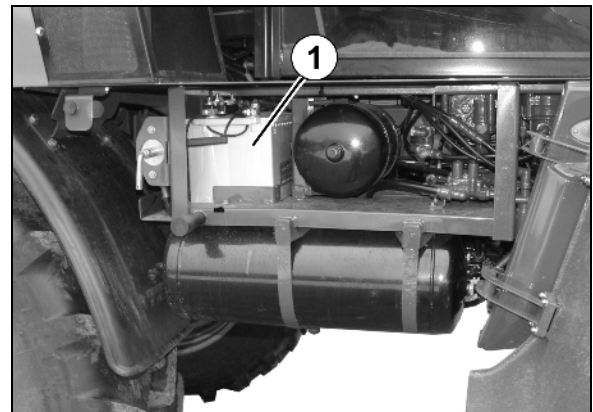


Fig. 155



### 13.5.12 Wheel gears

The reduction gear unit that is a planetary gear is coupled via a coupling part on the wheel motors.

The maintenance is limited to an initial oil change after 100 operational hours and then every 1000 operational hours!

#### Oil level check:

1. Park the machine so that the screw connections of the wheel gears are located in position 1.
2. Open the screw connection.

→ The oil level must be up to the opening.

#### Oil change:

Perform the oil change using warm oil!

1. Park the machine so that the screw connections of the wheel gears are located in position 2.
2. Open both screw connections and collect the oil flowing out.
3. Park the machine so that the screw connections of the wheel gears are located in position 1.
4. Fill with oil to the bore (Fig. 156/3) and screw the closures back in.
5. Carry out several rotations of the gearbox and check the filling level again.

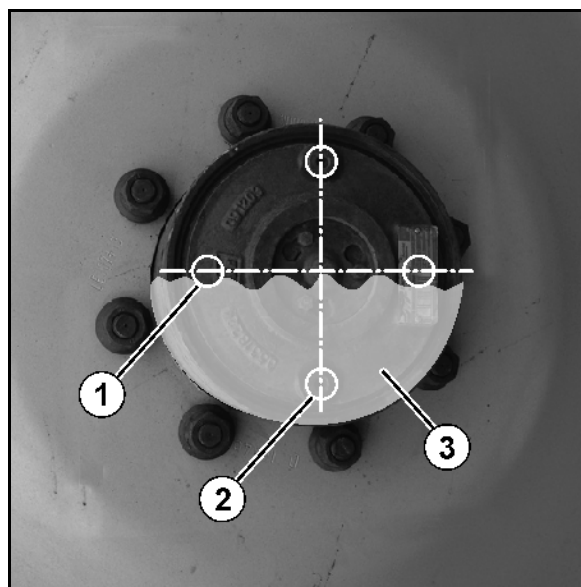


Fig. 156



Always consult your technical professional in the event of malfunctions in the wheel drives.



### 13.5.13 Tyres / wheels



- Required tightening torque for wheel nuts or bolts:  
450 Nm
- Tyre pressure, see on page 45.



After tightening the wheel nuts, re-mount the protective caps.

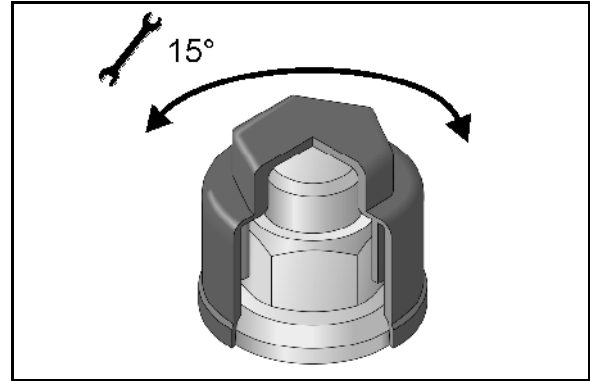


Fig. 157



- Regularly check the
  - wheel nuts for firm seating.
  - tyre pressure (for information on this, see section 0).
- Only use the tyres and wheels which we have specified (see page 42).
- Repair work on tyres must only be carried out by specialists using suitable assembly tools.
- Tyre fitting requires sufficient skills and proper assembly tools.
- Use the jack only at the jacking points indicated.



- When working on the running gear, the jack may only be positioned under the marked lifting points (MD101).
- The minimum load bearing capacity must be 5 tons.
- Take care that the jack is positioned correctly in the sleeve (Fig. 158/1).



Fig. 158

**Replacing the wheels with another offset depth**

The offset depth influences the track width of the machine.

The wheels used must be entered for the correct display of the track width on the AMADRIVE.

- The minimum track width must be no less than 1,800 mm. Otherwise, the wheels will collide with the running gear and there is a risk of tipping.

**Tyre pressures**

- The required tyre pressure is dependent on
  - tyre size.
  - tyre loading capacity.
  - speed.
- The operational performance of the tyres is reduced
  - by overloading.
  - if tyre pressure is too low.
  - if tyre pressure is too high.



- Check tyre pressures regularly when the tyres are cold, i.e. before starting a run (see page 42).
- The difference in pressure between the tyres on one axle must be no greater than 0.1 bar.
- Tyre pressure can be raised by up to 1 bar after a fast run or in warm weather. Tyre pressure should on no account be reduced as it is then too low when the tyres cool down.

**Fitting tyres**

- Remove any instances of corrosion from the wheel rim seating surfaces before fitting a new / another tyre. Corrosion can cause damage to the wheel rims when the vehicle is in operation.
- When fitting new tyres, always use new valves for tubeless tyres or new inner tubes.
- Always fit the valves with valve caps which have a gasket insert.

### 13.5.14 Brakes



Changing the brake pads should only be performed by an authorized repair shop!

Perform a brake test following all work on the brakes.

- The braking distance from a speed of 40 km/h should be between 18 m and 24 m.
- The machine must not pull to one side when braking.

#### Check the brake lining thickness

There is an inspection window (Fig. 159/1) in the anchor plate of the brake drum in order to check the wear of the brake linings.

Brake lining thickness:

- 14 mm → Fitting thickness
- 6 - 7 mm → Change the brake lining and check the brake drum.  
We recommend that you check the brake drum for wear and defects once a year in all cases.

#### Brake adjustment

Due to its function resulting from wear to the brake shoes, the brake adjustment must be checked and, where applicable, make a readjustment.

1. Remove the safety plate on the adjustment screw.
2. Screw the bolt (Fig. 159/2) in completely and loosen by a ¼ turn.
3. Refit the safety plate.

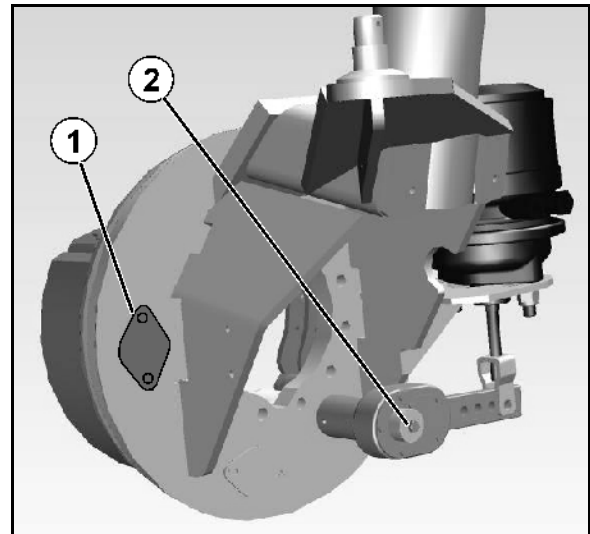


Fig. 159

### 13.5.15 Hydraulic system



#### WARNING

**Risk of infection through the high pressure hydraulic fluid of the hydraulic system entering the body.**

- Only a specialist workshop may carry out work on the hydraulic system.
- Depressurise the hydraulic system before carrying out work on the hydraulic system.
- When searching for leak points, always use suitable aids.
- Never attempt to plug leaks in hydraulic hose lines with your hand or fingers.

Escaping high pressure fluid (hydraulic fluid) may pass through the skin and ingress into the body, causing serious injuries.

If you are injured by hydraulic fluid, contact a doctor immediately. Risk of infection



- When connecting the hydraulic hose lines to the hydraulic system of connected machines, ensure that the hydraulic system is depressurised on both the drawing vehicle and the trailer.
- Ensure that the hydraulic hose lines are connected correctly.
- Regularly check all the hydraulic hose lines and couplings for damage and impurities.
- Have the hydraulic hose lines checked at least once a year by a specialist for proper functioning.
- Replace the hydraulic hose line if it is damaged or worn. Only use genuine AMAZONE hydraulic hose lines.
- The hydraulic hose lines should not be used for longer than six years. This period includes any storage time of a maximum of two years. Even with proper storage and approved use, hoses and hose connections are subject to natural ageing, thus limiting the length of use. However, it may be possible to specify the length of use from experience values, in particular when taking the risk potential into account. In the case of hoses and hose connections made from thermoplastics, other guide values may be decisive.
- Dispose of old oil in the correct way. If you have problems with disposal, contact your oil supplier.
- Keep hydraulic fluid out of the reach of children!
- Ensure that no hydraulic fluid enters the soil or waterways.

## Labelling hydraulic hose lines

Valve chest identification provides the following information:

Fig. 160/...

- (1) Manufacturer's marking on the hydraulic hose line (A1HF)
- (2) Date of manufacture of the hydraulic hose lines (02 04 = February 2004)
- (3) Maximum approved operating pressure (210 BAR).

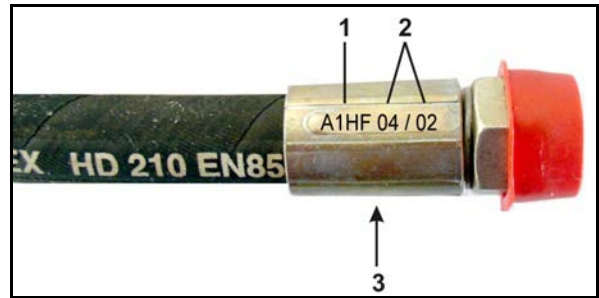


Fig. 160

## Maintenance intervals

**After the first 10 operating hours, and then every 50 operating hours**

1. Check all the components of the hydraulic system for tightness.
2. If necessary, tighten screw unions.

**Before each start-up:**

1. Check the hydraulic hose lines for visible damage.
2. Repair any areas of chafing on hydraulic hose lines and pipes.
3. Replace any worn or damaged hydraulic hose lines immediately.

## Inspection criteria for hydraulic hose lines



For your own safety and in order to reduce pollution, ensure the following inspection criteria.

**Replace hoses if the respective hose fulfils at least one of the following criteria:**

- Damage to the outer layer up to the ply (e.g. scouring points, cuts, cracks).
- Brittleness of the outer layer (crack formation of the hose material).
- Deformations which do not match the natural shape of the hose. Both in a depressurised and pressurised state or when bent (e.g. layer separation, bubble formation, pinching, bends).
- Leak points.
- Damage or deformation of the hose assembly (sealing function restricted); minor surface damage is not a reason for replacement.
- Movement of the hose out of the assembly.
- Corrosion of assembly, reducing the function and tightness.
- Installation requirements not complied with.
- Life span of 6 years has been exceeded.

The date of manufacture of the hydraulic hose line on the assembly is decisive for determining these six years. If the date of manufacture on the assembly is "2004", then the hose should not be used beyond February 2010. See also "Labelling of hydraulic hose lines".

## Installation and removal of hydraulic hose lines



When installing and removing hydraulic hose lines, always observe the following information:

- Use only genuine AMAZONE replacement hoses.
  - Ensure cleanliness.
  - Always install the hydraulic hose lines to ensure the following in all operating positions
    - There is no tension, apart from the hose's own weight.
    - There is no possibility of jolting on short lengths.
    - External mechanical influences on the hydraulic hose lines are avoided.

Use appropriate arrangements and fixing to prevent any scouring of the hoses on components or on each other. If necessary, secure hydraulic hose lines using protective covers. Cover sharp-edged components.

  - The approved bending radii may not be exceeded.
- When connecting a hydraulic hose line to moving parts, the hose length must be appropriate so that the smallest approved bending radius is not undershot over the whole area of movement and/or the hydraulic hose line is not overtensioned.
- Fix the hydraulic hose lines at the specified fixing points. There, avoid hose clips, which impair the natural movement and length changes of the hose.
- The coating of hydraulic hose lines is not permitted.

### 13.5.16 Hydraulic oil

Correct oil level at oil temperature

- 60° Celsius – Centre inspection glass
- 20° Celsius – lower third of inspection glass

The oil quantity is correct when the oil level is located

- at the lower third (cold oil),
- up to the middle

of the inspection glass.

Where required, oil can be refilled through a filling opening on the top side of the tank.

If the oil level falls below the minimum measurement or the oil temperature increases too high, a warning signal is output in the cabin.

#### Oil change:

1. Stop the engine, allow the hydraulic oil to cool sufficiently so that there is no risk of burns.
2. Place an oil drip pan under the hydraulic tank.
3. Unscrew the oil drain screw on the bottom side of the tank.
4. Draining oil.
5. Screw in the oil drain plug with a new seal and tighten.
6. Fill with lubrication oil.
  - o Details for quality / viscosity, see on page 186.
  - o Filling quantity 120 litres.
  - o The inspection glass is decisive for the filling quantity.
7. Check the oil level.

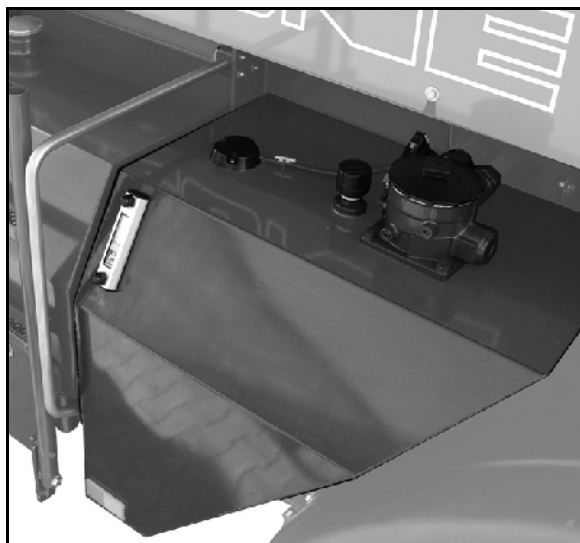


Fig. 161



#### CAUTION

Risk of scalding when draining due to hot oil!

#### Hydraulic oil filter



- Changing the hydraulic oil filter can be carried out when the hydraulic oil tank is filled.
- Collect any possible escaping oil.
- Risk of scalding when draining due to hot oil!



### Return filter in the oil tank

The return filter is located in the filling opening of the hydraulic oil tank.

#### Changing the filter:

1. Remove the cover (Fig. 162/1) from the housing (Fig. 162/3).
2. Replace the return filter (Fig. 162/2).
3. Refit the cover.

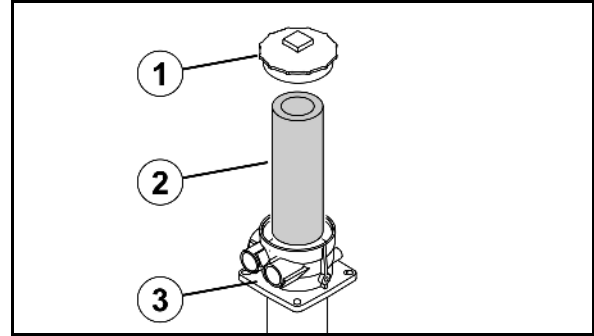


Fig. 162

### Hydraulic pump pressure filter

The pressure filter is mounted under the machine behind the cabin (Fig. 163/1).

#### Changing the filter:

1. Turn off the engine.
2. Undo the lubricating oil filter cartridge using standard commercial tools and unscrew it.
3. Collect any possible escaping oil.
4. Clean the sealing surface of the filter support from any dirt.
5. Slightly oil the rubber seal of the new lubricating oil filter cartridge.
6. Screw in the cartridge by hand until the seal rests.
7. Tighten the lubricating oil filter cartridge by another half a turn.
8. Check the seal of the lubricating oil filter again for leaks.

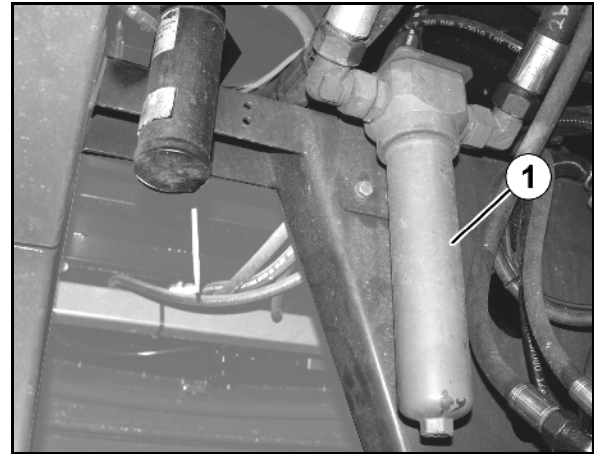


Fig. 163

## 13.5.17 Control

### 13.5.17.1 Clean / change the cabin air filter



#### WARNING

Air filter installed incorrectly or a defective filter. Dust enters the cabin. Dust is inhaled and causes health problems.

- Make sure the filter has a tight fit.
- Replace defective air filters immediately.

1. Open the cover (Fig. 164/1) on the cabin roof, left side.
2. Unlock the filter (Fig. 164/2), take out and replace.
3. Replace damaged filters and sealing profiles in all cases.



When using activated carbon filters, replace only the filter insert!

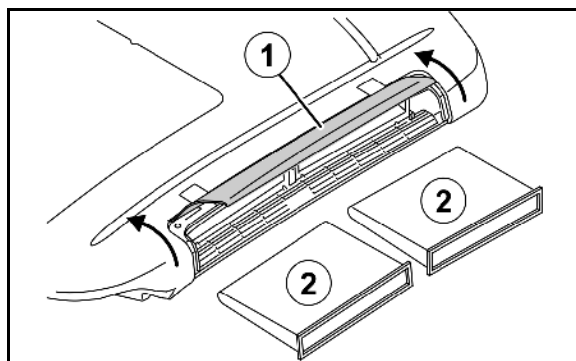


Fig. 164

### 13.5.17.2 Clean the cabin circulation filter

1. Remove the circulating air grille (Fig. 165/1).
2. Vacuum clean, knock or blow-out filters with soiling on the surface with compressed air.
3. Renew damaged filters.
4. Install the circulating air grille.



Fig. 165

1. Remove the circulating air grille (Fig. 166/1).
2. Vacuum clean, knock or blow-out filters with soiling on the surface with compressed air.
3. Renew damaged filters.
4. Install the circulating air grille.

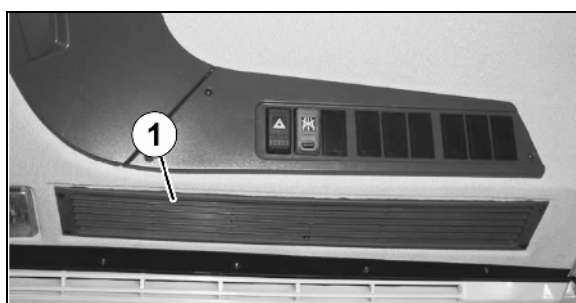
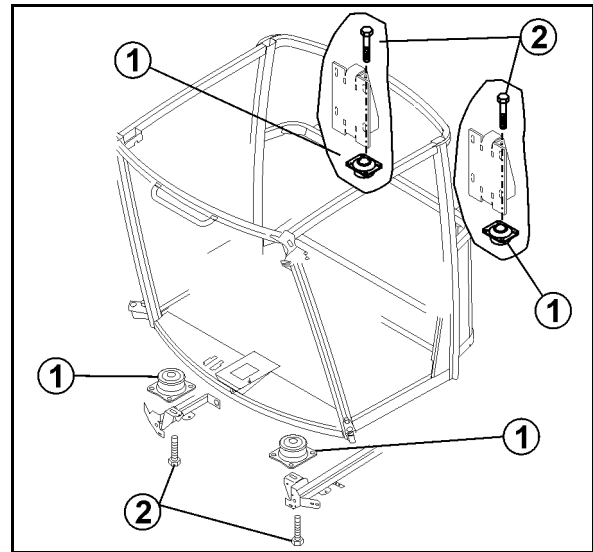


Fig. 166

**13.5.17.3 Check the damping bearings of the cabin for their correct fit**

- (1) Four damping bearings
- (2) Damping bearing screw connection

**Fig. 167**

## 13.5.18 Air conditioner

### 13.5.18.1 Put the air conditioning system into operation

In order to prevent damage to the compressor with machines fitted with air conditioner, the air conditioner should be put back into operation after longer standing times.

The commissioning makes sure that the oil is distributed in the air conditioner.

1. Switch on the diesel engine and run in idle speed.
2. Open all fan jets completely.
3. Open both doors.
4. Switch on the air conditioner.
5. Set the temperature controller (Fig. 168/1) to the lowest temperature.
6. Blower to level 3 or automatic mode.
7. Allow the machine to run for minimum 5 minutes at idle speed.

The air conditioning system can now be operated as normal.

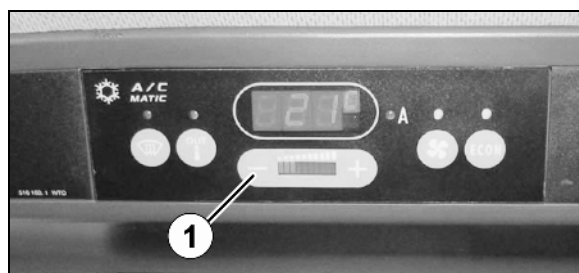


Fig. 168

### 13.5.18.2 Working with refrigerant



#### **DANGER**

**Death or severe injuries resulting from refrigerant.**

**Work on the air conditioning system may only be carried by an authorised workshop.**

- Avoid any contact with the refrigerant.
- Wear protective gloves and protective goggles.
- No welding tasks may be carried out on the refrigerant circuit and in their immediate vicinity.
- Maximum ambient temperature for refrigerant: 80° Celsius

### 13.5.18.3 Replace the filter drier

The filter drier is located between the front wheels.

- When installing a new filter drier, refill with 10 cm<sup>3</sup> refrigerant oil.
- Renew the seal with each assembly.

#### Removing

1. Drain the refrigerant.
2. Unlock and remove the connector from the switch.
3. Unscrew the hose line.  
Seal the opening tight.
4. Remove the filter drier.



Fig. 169

#### Installation

1. Mount the filter drier.
2. Screw on the hose line.
3. Plug the connector onto the switch.
4. Fill with refrigerant.
5. Perform functional check.
6. Perform leak test.

### 13.5.18.4 Air conditioning system filling quantity

- Coolant: 1,900 g
- Contrast agent: 10 g
- Compressor oil: 5 g



Dispose of all replaced components of the air conditioning system correctly.

### 13.5.18.5 Air conditioning unit in the cabin roof



Soiled units lead to reduced heating and cooling performance. Un-economical use of the machine.

- Observe prescribed maintenance intervals.
- With extensive dust accumulation, clean the unit more frequently.



#### CAUTION

Clean sensitive components with stronger compressed air or other cleaning devices. Components will be damaged.

- Do not hold the compressed air jet close to sensitive components, such as cooling ribs or filter inserts.
- Never use a steam-jet cleaning device for cleaning.

1. Unscrew the hood (Fig. 170/1) from the cabin roof.
2. Blow out the evaporator (Fig. 171/2) and warm water radiator (Fig. 171/3) with compressed air (maximum 5 bar).
3. Renew damaged seals (Fig. 171/1) under the cover.
4. Remount and screw on the hood.

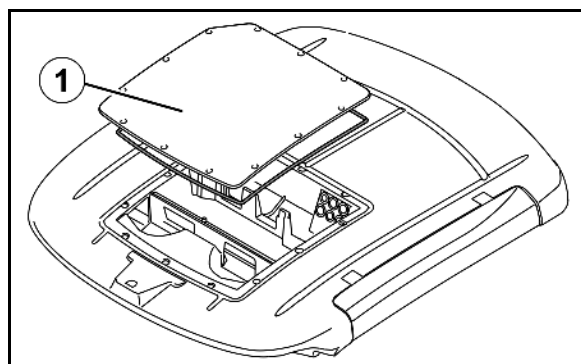


Fig. 170

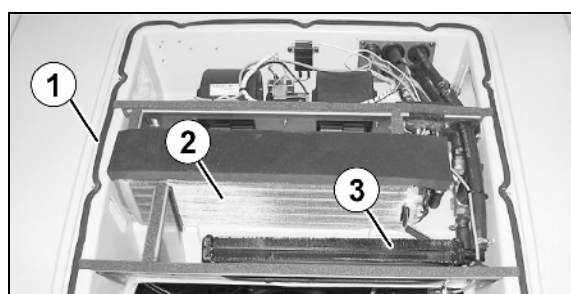


Fig. 171

## 13.6 Field sprayer maintenance

### 13.6.1 Adjusting the hydraulic throttle valve

The operating speeds for the individual hydraulic functions are set at the factory from the valve block using the respective hydraulic throttle valves (fold/unfold sprayer boom, lock/unlock the swing compensation, etc.). However, depending on the type of tractor, it may be necessary to correct these speed settings.

The operating speed for a hydraulic function associated with a particular throttle pair can be adjusted by screwing the hexagon socket head screw on the corresponding throttle in or out.

- Reduce operating speed = screw in hexagon socket head screw.
- Increase operating speed = screw out hexagon socket head screw.



Always adjust the two throttles in a throttle pair equally when correcting the operating speed of a hydraulic function.

### Profi-folding I

Fig. 172/...

- (1) Throttle - fold in the right-hand boom.
- (2) Throttle - fold out the right-hand boom.
- (3) Throttle - lock the swing compensation.
- (4) Throttle transport safety catch.
- (5) Hydraulic joints – tilt adjustment (the throttles are located on the hydraulic cylinder for tilt adjustment).
- (6) Throttle - fold in the left-hand boom.
- (7) Throttle - fold-out the left-hand boom.

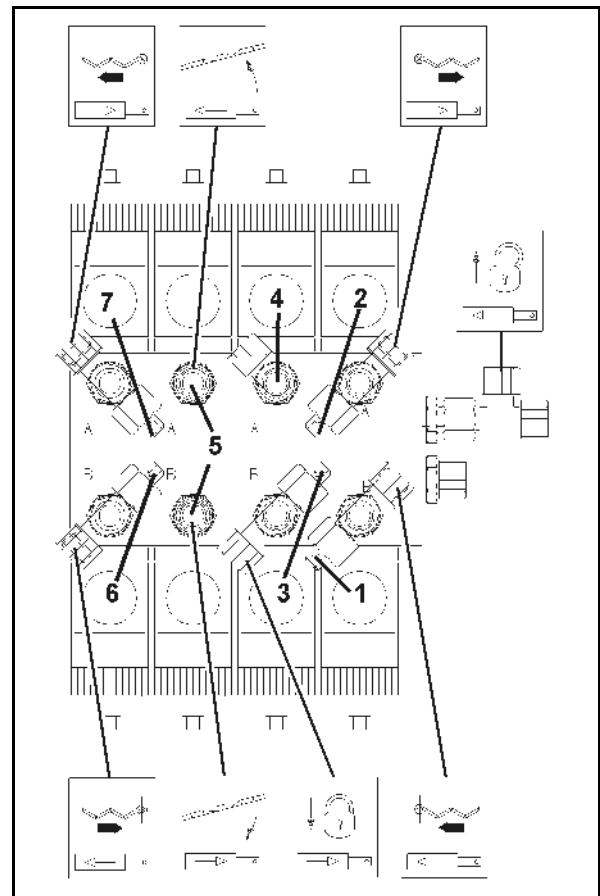
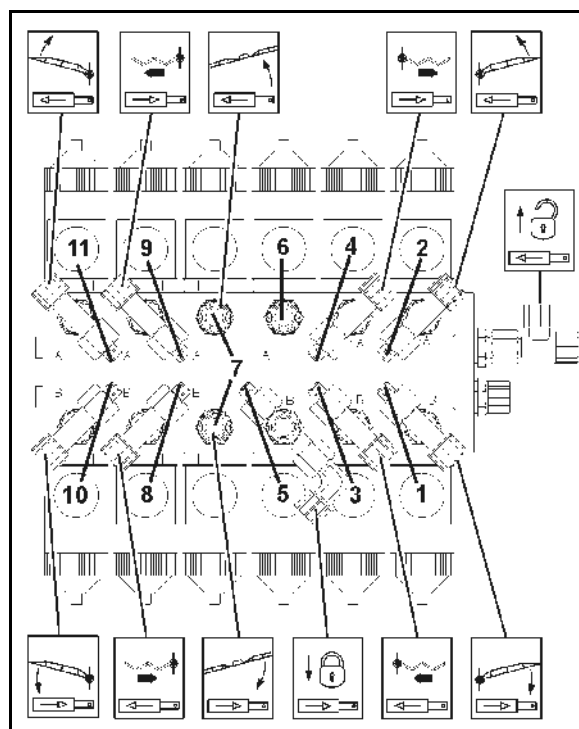


Fig. 172

## Profi-folding II

**Fig. 173/...**

- (1) Throttle - lower the right-hand boom.
- (2) Throttle - raise the right-hand boom.
- (3) Throttle - fold in the right-hand boom.
- (4) Throttle - fold out the right-hand boom.
- (5) Throttle - lock the swing compensation.
- (6) Throttle transport safety catch.
- (7) Hydraulic joints – tilt adjustment (the throttles are located on the hydraulic cylinder for tilt adjustment).
- (8) Throttle - fold in the left-hand boom.
- (9) Throttle - fold-out the left-hand boom.
- (10) Throttle - lower the left-hand boom.
- (11) Throttle - raise the left-hand boom.



**Fig. 173**



## 13.6.2 Pump

### 13.6.2.1 Check the oil level



Ensure the correct oil level. Damage may be caused both by the oil level being too low or too high.

1. Check whether the oil level is visible at the mark (Fig. 175/1) with the pump not running and standing on a flat surface.
2. If the oil level is not visible at the mark (Fig. 175/1), remove the lid (Fig. 175/2) and top up with oil.

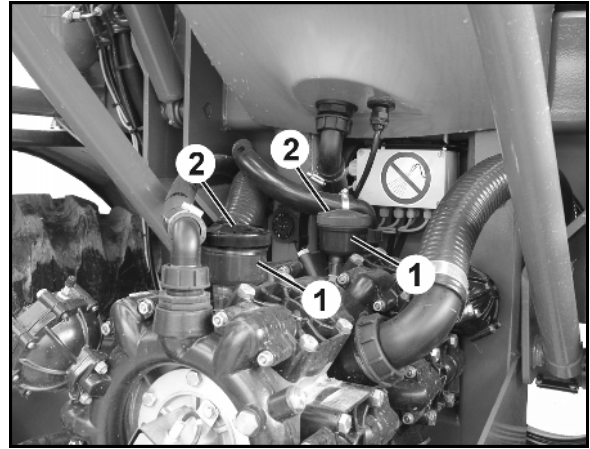


Fig. 174

### 13.6.2.2 Changing the oil



- After a few operating hours, check the oil level; top up if necessary.

1. Remove the pump.
2. Remove the lid (Fig. 175/2).
3. Drain the oil.
  - 3.1 Turn the pump on its head.
  - 3.2 Rotate the drive shaft by hand until the used oil has all run out.

The option also exists to drain the oil from the drain plug. However, with this procedure a slight oil residue remains in the pump; we therefore recommend the first approach.
4. Place the pump on an even surface.
5. Turn the drive shaft left and right alternately and slowly fill with new oil. The right quantity of oil has been reached when the oil is visible at the mark (Fig. 175/1).

### 13.6.3 Checking and replacing the suction and pressure-side valves



- Pay attention to the respective installation positions of the valves on the suction and pressure sides before removing the valve groups (Fig. 175/5).
- When reassembling, ensure that the valve guide (Fig. 175/9) is not damaged. Damage may cause the valves to jam.
- Always tighten the nuts (Fig. 175/1,2) in a crosswise fashion using the specified torque. Improper tightening of the screws causes warping, which results in leaks.

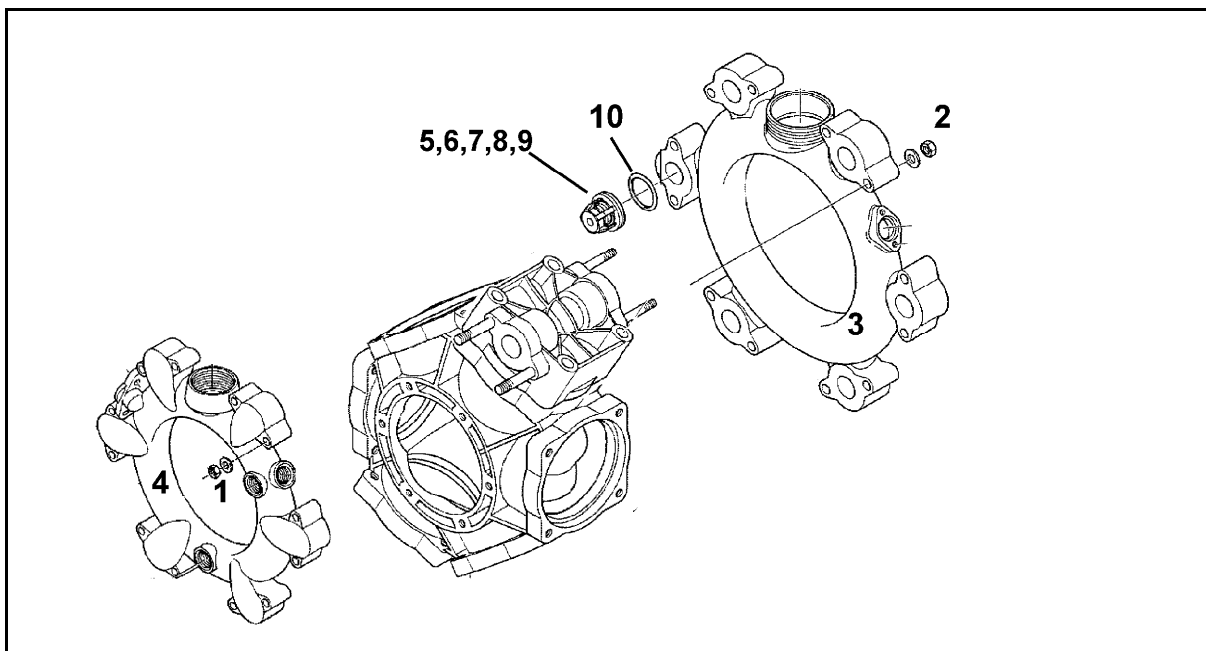


Fig. 175

1. If necessary, remove the pump.
2. Remove the nuts (Fig. 175/1,2).
3. Remove the suction and pressure port (Fig. 175/3 and Fig. 175/4).
4. Remove the valve groups (Fig. 175/5).
5. Check the valve seat (Fig. 175/6), valve (Fig. 175/7), valve spring (Fig. 175/8) and valve guide (Fig. 175/9) for wear or damage.
6. Remove the O-ring (Fig. 175/10).
7. Replace defective parts.
8. After testing and cleaning, fit the valve groups (Fig. 175/5).
9. Insert new O-rings (Fig. 175/10).
10. Mount the suction (Fig. 175/3) and pressure port (Fig. 175/4) on the pump housing.
11. Tighten the nuts (Fig. 175/1,2) in a crosswise fashion using a torque of **11 Nm**.

### 13.6.4 Checking and replacing the piston diaphragm



- At least once a year, check that the piston diaphragm (Fig. 176/8) is in perfect condition by removing it.
- Pay attention to the respective installation positions of the valves on the suction and pressure sides before removing the valve groups (Fig. 176/5).
- Check and replace the piston diaphragm for each piston individually. Only remove the next piston in sequence after the currently removed piston has been completely checked and refitted.
- Always swivel the piston to be checked upwards so that the oil in the pump housing does not run out.
- As a rule, replace all piston diaphragms (Fig. 176/8), even if only one piston diaphragm distorted, punctured or porous.

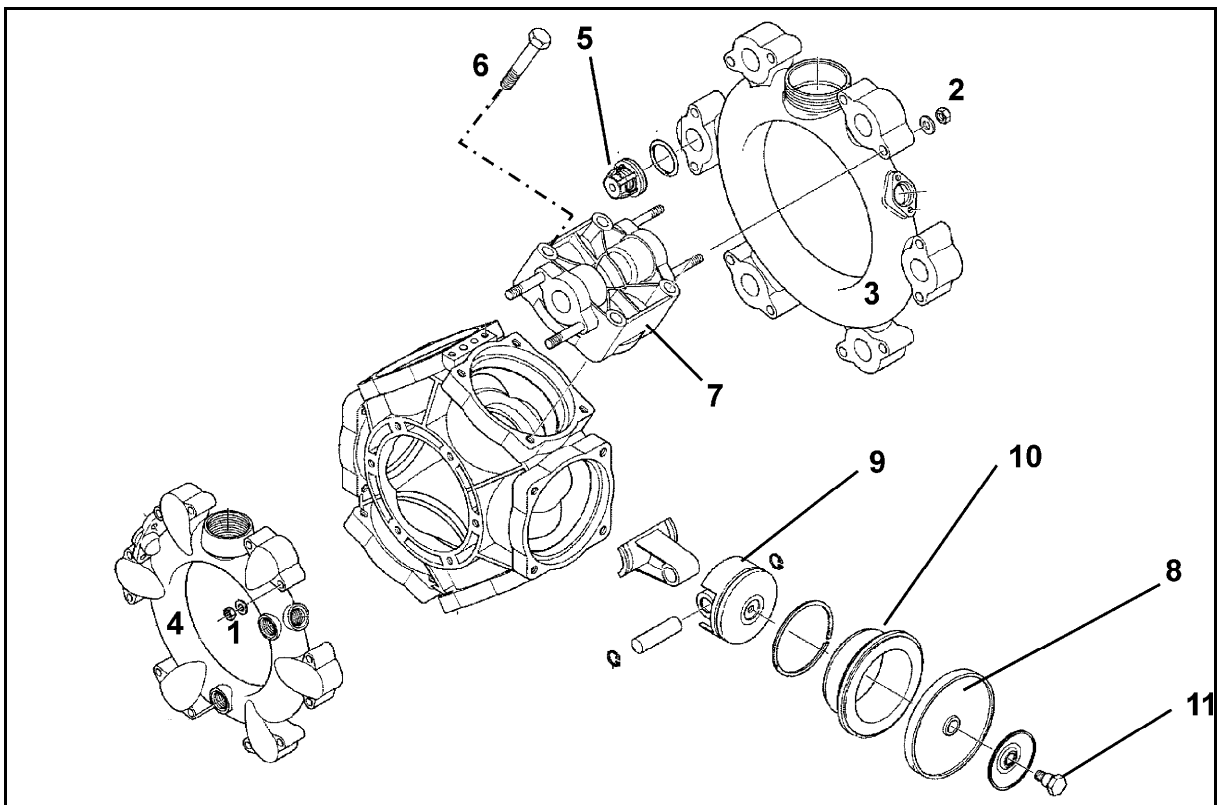


Fig. 176

#### Checking the piston diaphragm

1. If necessary, remove the pump.
2. Slacken the nuts (Fig. 176/1, 2).
3. Remove the suction and pressure port (Fig. 176/3 and Fig. 176/4).
4. Remove the valve groups (Fig. 176/5).
5. Remove the screws (Fig. 176/6).
6. Remove the cylinder head (Fig. 176/7).
7. Check the piston diaphragm (Fig. 176/8).
8. Replace the damaged piston diaphragm.

## Replacing the piston diaphragm



- Ensure the correct position for the recesses and/or holes on the hydraulic cylinders.
- Secure the piston diaphragm (Fig. 176/8) with a washer disc and a screw (Fig. 176/11) on the piston (Fig. 176/9), so that the rim shows on the cylinder head side (Fig. 176/7).
- Always tighten the nuts (Fig. 176/1,2) in a crosswise fashion using the specified torque. Improper tightening of the nuts causes warping, which results in leaks.

1. Undo the screw (Fig. 176/11) and remove the piston diaphragm (Fig. 176/8) and the washer disc from the piston (Fig. 176/9).
2. If the piston diaphragm has been punctured, drain the oil/spray liquid mixture from the pump housing.
3. Remove the hydraulic cylinder (Fig. 176/10) from the pump housing.
4. Clean the pump housing by flushing it thoroughly with diesel oil or paraffin.
5. Clean all sealing faces.
6. Insert the cylinder (Fig. 176/10) back into the pump housing.
7. Fit the piston diaphragm (Fig. 176/8).
8. Mount the cylinder head (Fig. 176/7) on the pump housing and tighten the screws (Fig. 176/6) an equal amount in a crosswise fashion.
9. After testing and cleaning, fit the valve groups (Fig. 176/5).
10. Insert new O-rings.
11. Mount the suction (Fig. 176/3) and pressure port (Fig. 176/4) on the pump housing.
12. Tighten the nuts (Fig. 176/1,2) in a crosswise fashion using a torque of **11 Nm**.

### 13.6.5 Calibrate the flow meter



- Calibrate the flow meter at least once a year.
- Calibrate the flow meter:
  - after removing the flow meter.
  - After long periods of operation, because spray residue deposits can form in the flow meter.
  - If differences occur between the required spray rate and the actual spray rate.
- Note the displayed "Impulse" value when you drive the field sprayer away from your location for determining the amount of water applied. The impulse value displayed lapses when transporting the field sprayer.
- Compare the flow meter with the flow meter at least once a year.
- Calibrate the flow meter with the return flow meter at the following times:
  - after calibrating the flow meter.
  - After removing the return flow meter.
- Move-out in work menu "Sprayer". The comparison can only be carried out when no fluid is used via the boom.



For information on this, observe the software AMABUS / ISOBUS operating manual; section "Impulses per litre".

### 13.6.6 Nozzles

From time to time, check the seating of the slider (Fig. 177/7).

- To do this, insert the slider into the nozzle body (Fig. 177/2) as far as possible using moderate thumb pressure.

Do not insert the slider up to the stop when in a new condition under any circumstances.

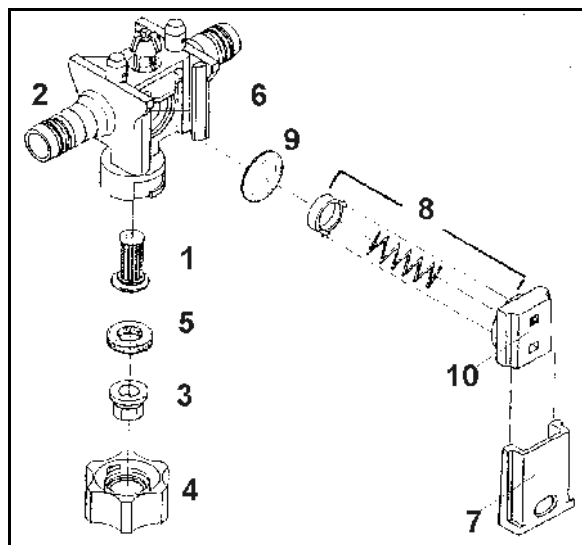


Fig. 177

### 13.6.6.1 Fitting the nozzle

1. Insert the nozzle filter (Fig. 177/1) into the nozzle body (Fig. 177/2) from below.
2. Insert the nozzle (Fig. 177/3) into the bayonet nut (Fig. 177/4)



Different coloured bayonet nuts are available for the different nozzles.

3. Insert the rubber seal (Fig. 177/5) above the nozzle.
4. Press a rubber seal into the seat for the bayonet nut.
5. Position a bayonet nut on the bayonet connection.
6. Screw on the bayonet nut up to the stop.

### 13.6.7 Removing the diaphragm valve if the nozzle is dripping

Deposits on the diaphragm seat (Fig. 177/6) can cause the nozzles to drip after the boom is shut-off. If this occurs, clean the diaphragm in question as follows:

1. Pull the slider (Fig. 177/7) out of the nozzle body (Fig. 177/2) towards the bayonet nut.
2. Remove the spring element (Fig. 177/8) and the diaphragm (Fig. 177/9).
3. Clean the diaphragm seat (Fig. 177/6).
4. Reassembly occurs in the reverse sequence.



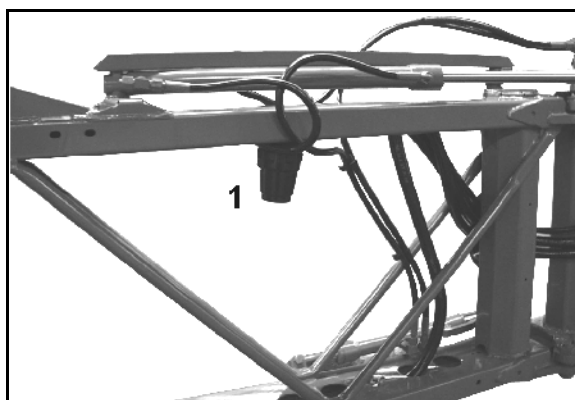
Note the correct orientation for installing the spring element. For installation, the stepped, upwards-sloping edges on the left and right of the housing of the spring element (Fig. 177/10) must slope up in the direction of the boom profile.

### 13.6.8 Line filter

- Clean the line filters (Fig. 178/1) 3 - 4 months depending on operating conditions).
- Change damaged filter inserts.



1. Press the locking piece together on the two lugs.
2. Remove the locking piece with O-ring seal, pressure spring and filter insert.
3. Clean (rinse out) the filter insert with petrol or thinner and then blow it dry with compressed air.
4. To reassemble, reverse the procedure and make sure that the O-ring seal is not twisted in the guide slot.



**Fig. 178**

### 13.6.9 Instructions on testing the field sprayer



- Only authorised centres are permitted to carry out spray tests.
- According to law, a spray test must be carried out:
  - 6 months after commissioning (if not performed at time of purchase) at the latest, then
  - every two years thereafter.

#### Field sprayer test kit (special equipment), order no.: 930 420

- Hose connection (Order no.: GE 112)
- Push-on cap (Order no.: 913 954) and connector (Order no.: ZF 195)
- Flow meter connection (Order no.: 919 967)
- Pressure gauge connection (Order no.: 710 7000)
- Hose connection (Order no.: GE 095)
- O-Ring (Order no.: FC 122)
- Sleeve nut (Order no.: GE 021)
- Hose clip (Order no.: KE 006)

#### Pump test - testing pump performance (delivery capacity, pressure)

Connect the test kit to the pump pressure connection (Fig. 179/1).

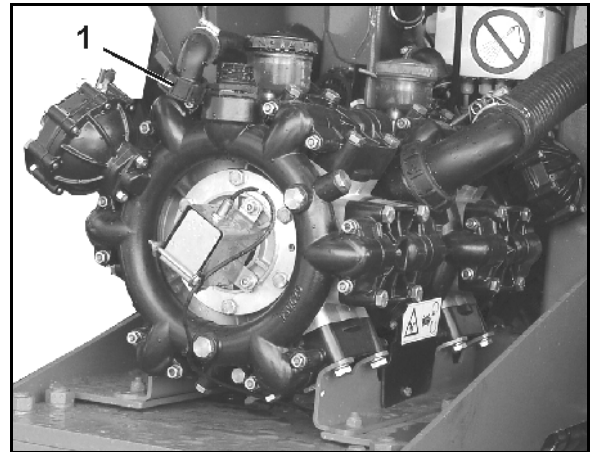


Fig. 179



### Flow meter test

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1. Remove all spray lines from the part width section valves.
2. Connect the flow meter connection to a part width section valve and connect to the tester.
3. Block the connections for the remaining part width section valves using blanks.
4. Switch on spraying.

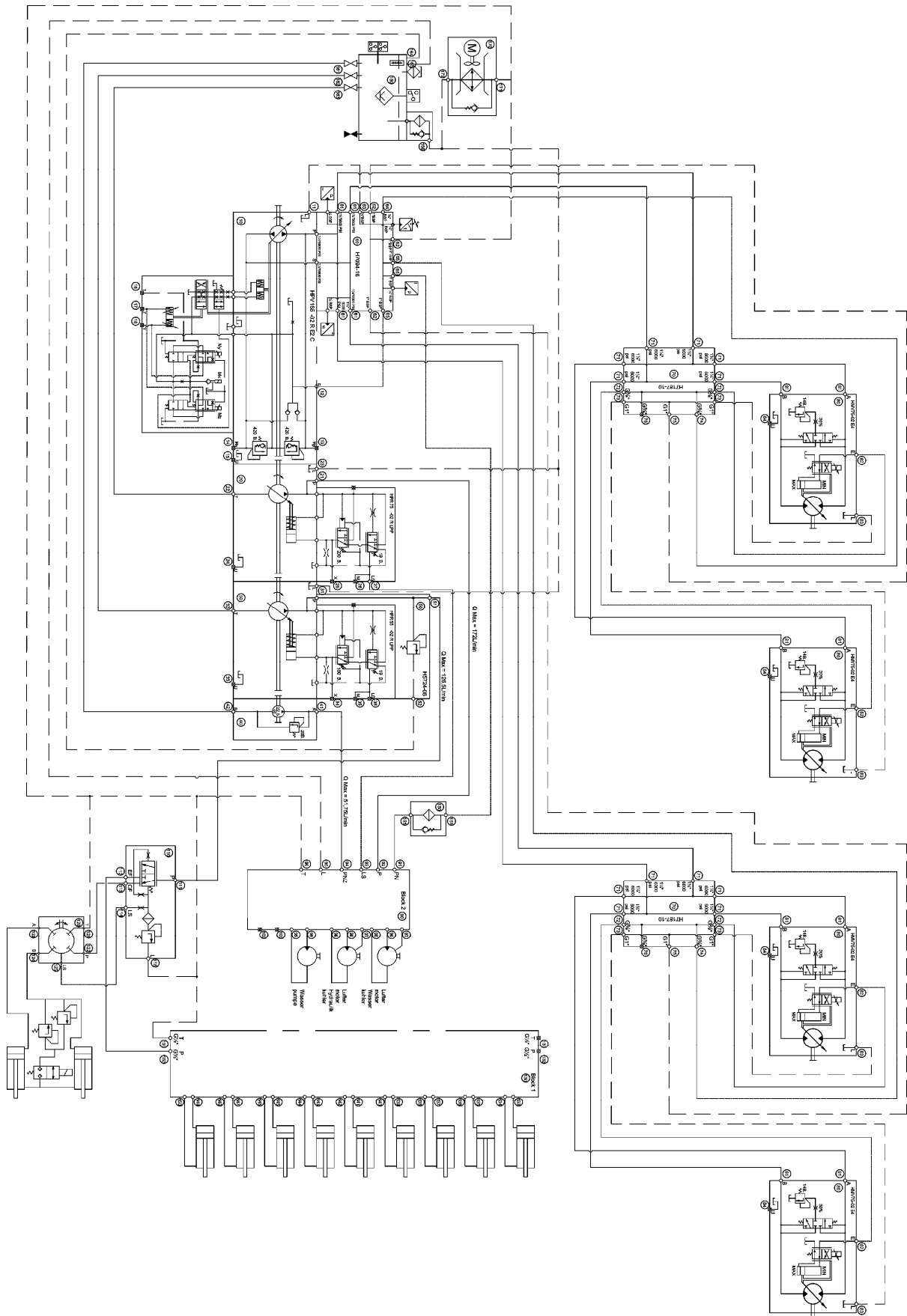
### Pressure gauge test

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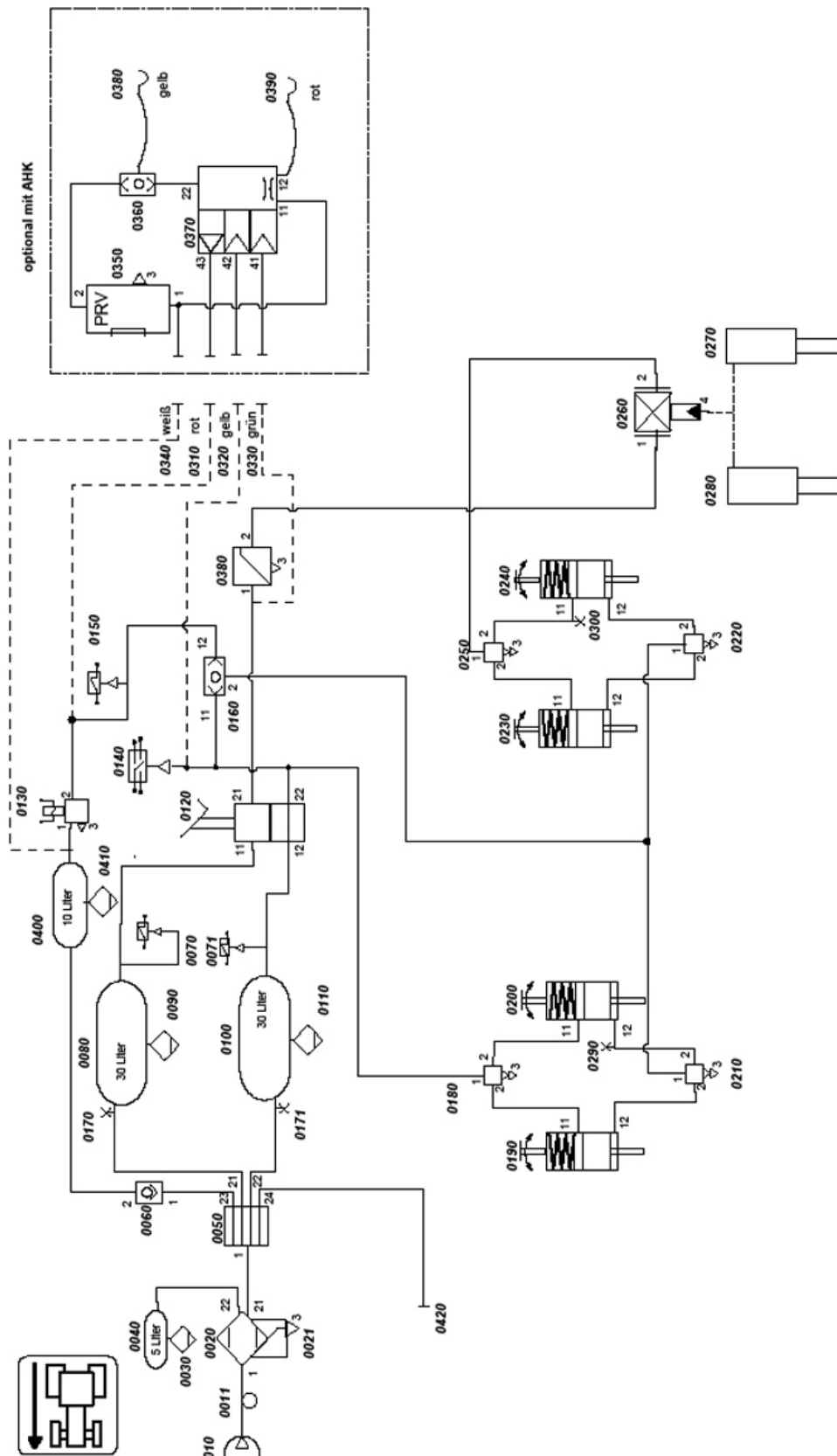
1. Remove a spray line from a part width section valve.
2. Connect the pressure gauge connection to a part width section valve with the help of the turned socket.
3. Screw the check gauge 1/4 of an inch into the inside thread.



## 13.7 Hydraulic diagram



### 13.8 Pneumatic diagram



## 13.9 Overview of fuses and relay



The fuses and relays are located in the cabin

- (1) Top left in the cabin roof,
- (2) under the foldable arm rest,
- (3) on the central electrics under the foldable arm rest.

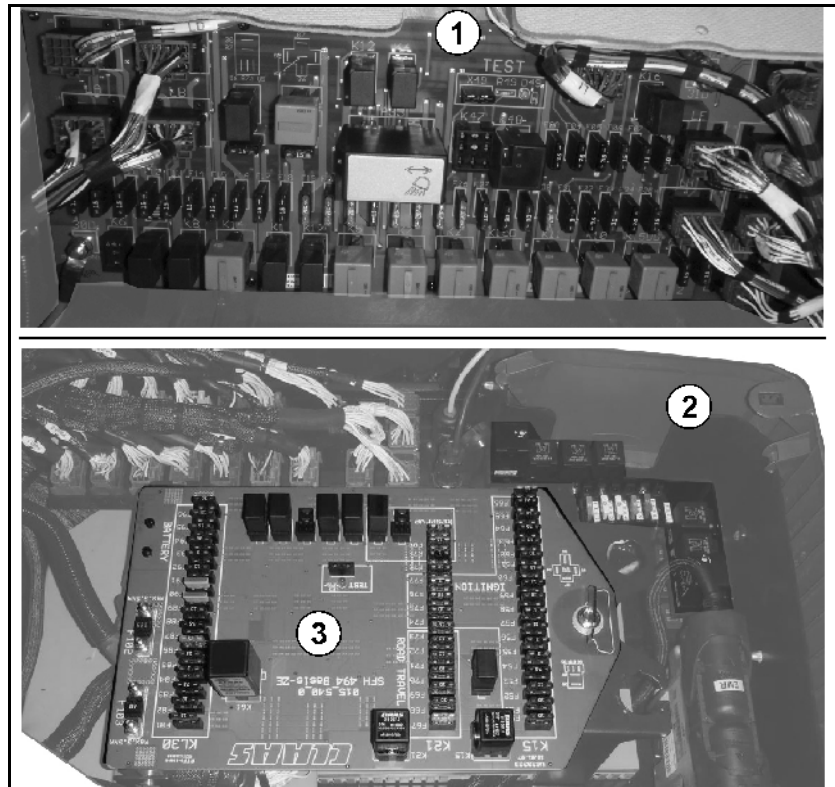


Fig. 180

- Fuses on the vehicle battery

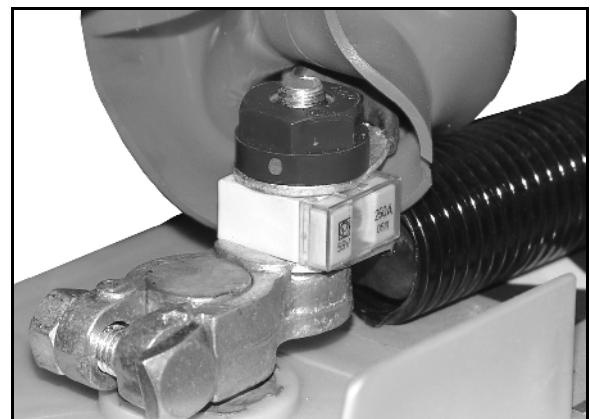
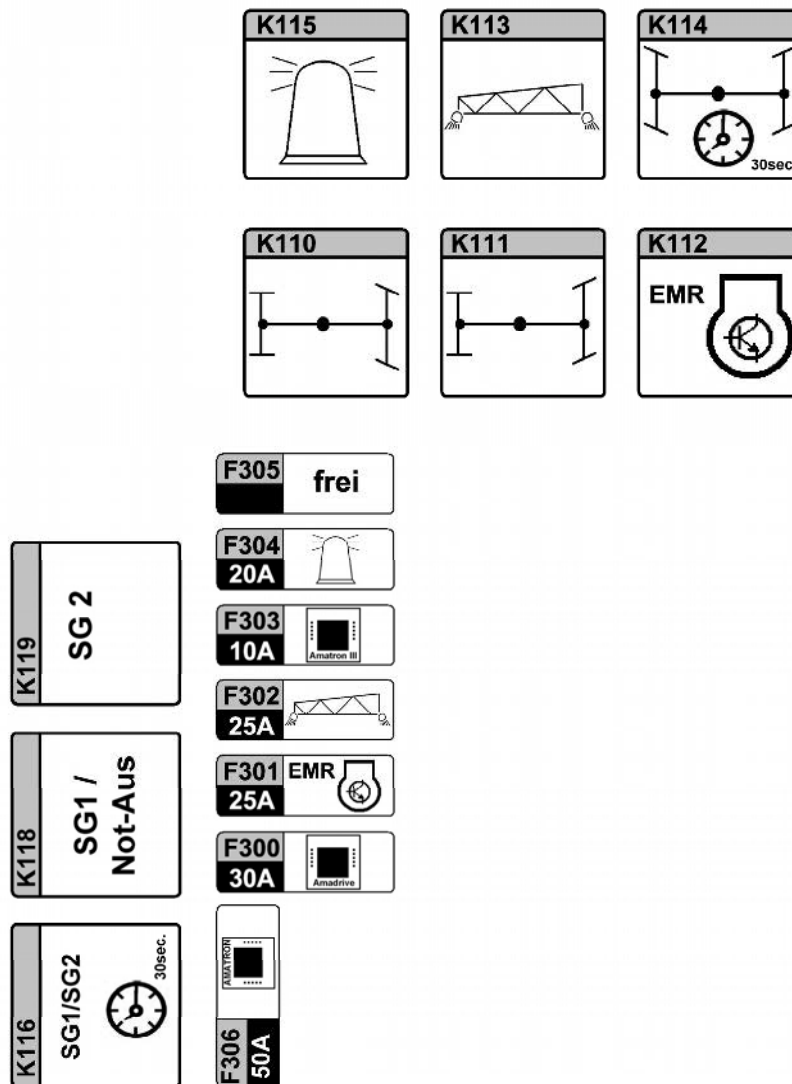
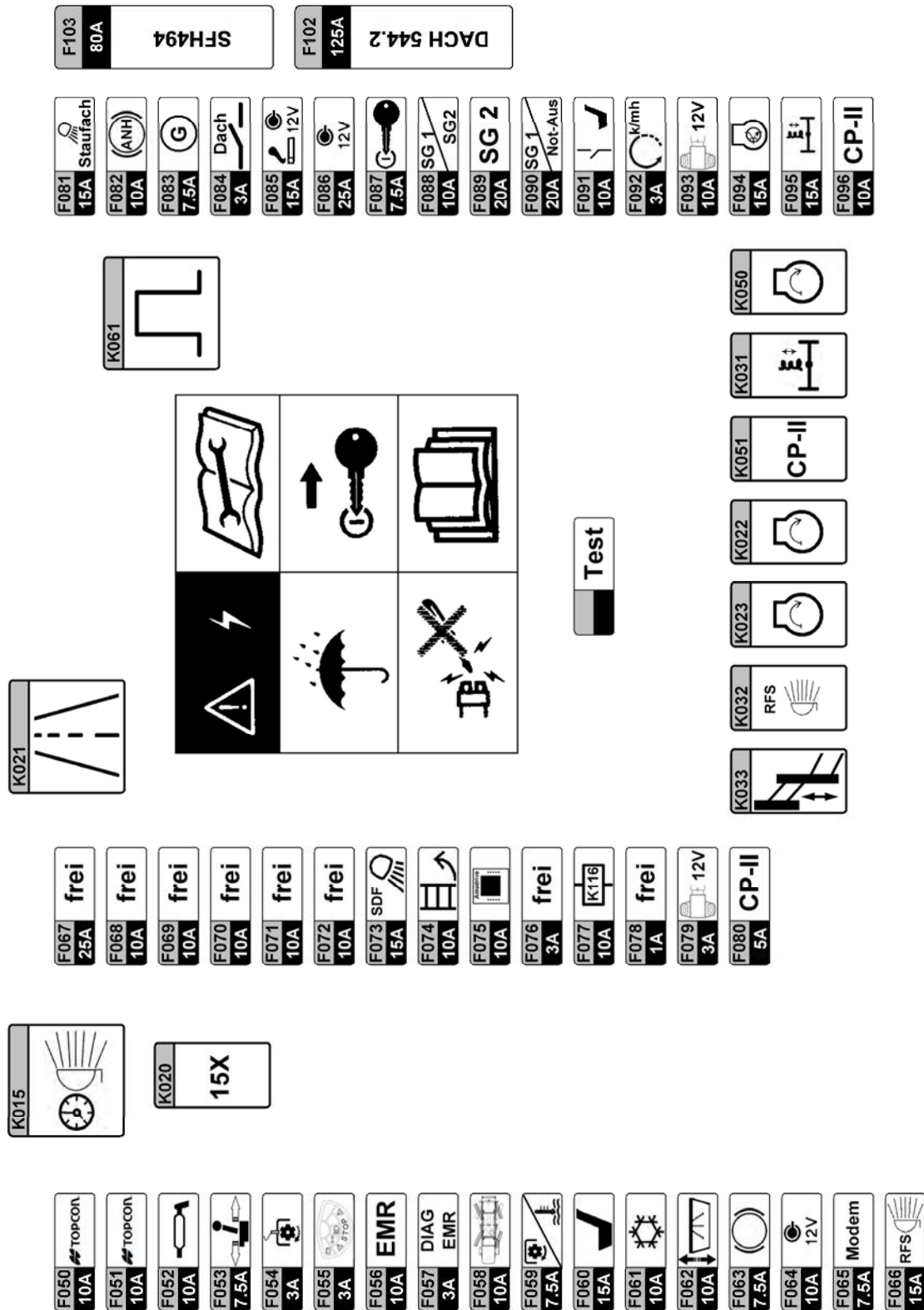


Fig. 181

### 13.9.1 Fuses and relays under the foldable arm rest

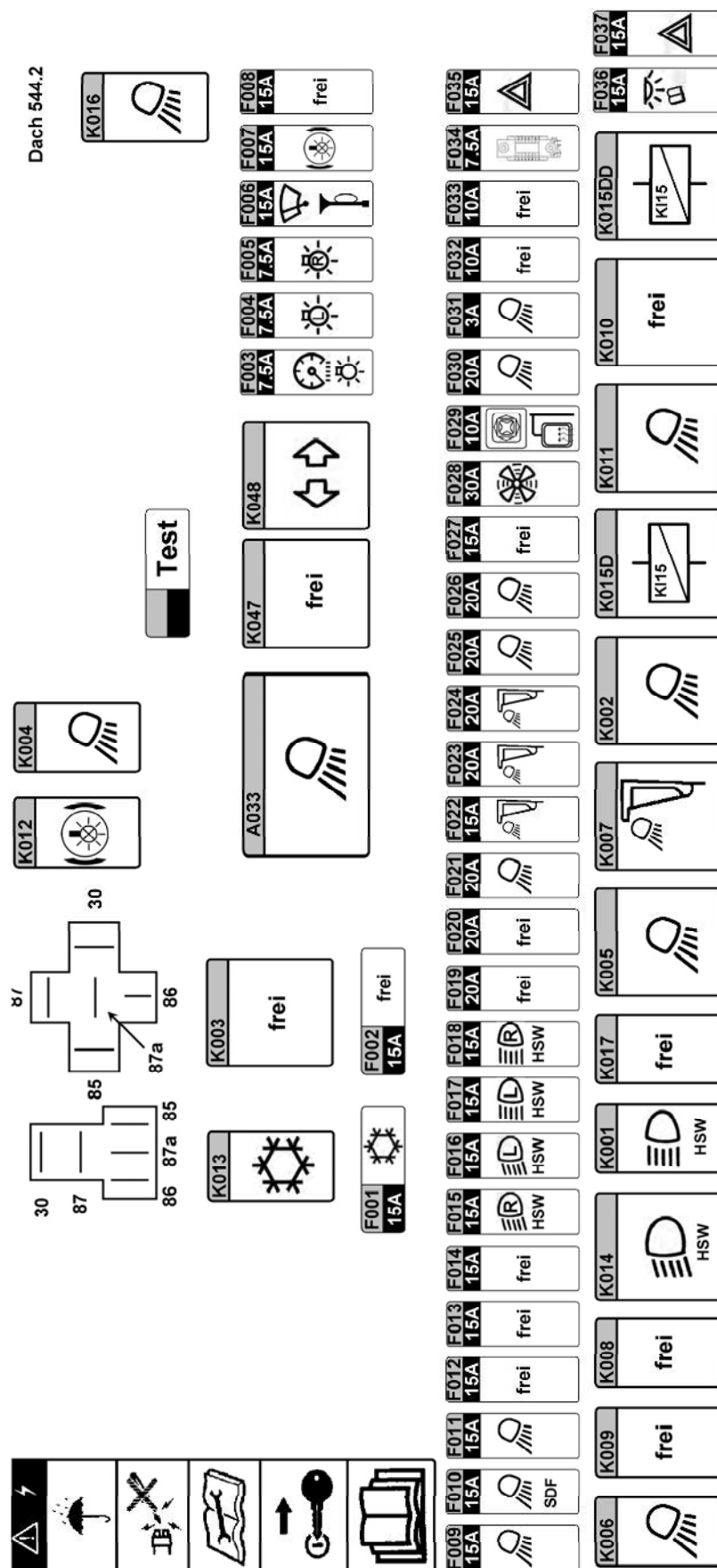


### 13.9.2 Fuses on the central electrics under the arm rest



SHF 494

### 13.9.3 Fuses and relay in the cabin roof



### 13.10 List of the fuses

Number	Amperage	Function	Location
F001	15 A	Air conditioner compressor	Roof 544.2
F002	15 A	spare	Roof 544.2
F003	7.5 A	Switch illumination, instrument illumination	Roof 544.2
F004	7.5 A	Parking light left side, left outline marker lamp, parking light left side, rear light trailer socket	Roof 544.2
F005	7.5 A	Rear right light, right outline marker lamp, 3rd rear light, parking light right side	Roof 544.2
F006	15 A	Windscreen wiper, washer pump, signal horn	Roof 544.2
F007	15 A	Brake light left / right side, 3rd brake light, Brake light trailer socket	Roof 544.2
F008	10 A	spare	Roof 544.2
F009	15 A	Dipped beam right / left side, high beam right / left side, rear light right / left side	Roof 544.2
F010	15 A	Sidelfinder, Coming Home	Roof 544.2
F011	15 A	Work lights, platform right side	Roof 544.2
F012	15 A	spare	Roof 544.2
F013	15 A	spare	Roof 544.2
F014	15 A	spare	Roof 544.2
F015	15 A	Dipped beam, right side	Roof 544.2
F016	15 A	Dipped beam, left side	Roof 544.2
F017	15 A	High beam, left side	Roof 544.2
F018	15 A	High beam, right side	Roof 544.2
F019	20 A	spare	Roof 544.2
F020	20 A	spare	Roof 544.2
F021	20 A	Work lights, platform left side	Roof 544.2
F022	15 A	Cabin roof work lights, outside right / left side	Roof 544.2
F023	20 A	Cabin roof work lights, inside right / left side	Roof 544.2
F024	20 A	Cabin roof work lights, inside right	Roof 544.2
F025	20 A	Work lights, railing right side	Roof 544.2
F026	20 A	Work lights, railing left side	Roof 544.2
F027	10 A	spare	Roof 544.2
F028	30 A	Automatic air-conditioning system module	Roof 544.2
F029	10 A	Rear view mirror heating on right / left side, rear view mirror adjustment on right / left side	Roof 544.2
F030	20 A	Work lights ESB, cabin roof at rear, hydraulic tank	Roof 544.2
F031	3 A	Sidelfinder module	Roof 544.2
F032	10 A	spare	Roof 544.2
F033	10 A	spare	Roof 544.2
F034	7.5 A	Radio	Roof 544.2
F035	15 A	Hazard warning flashers	Roof 544.2
F036	15 A	Reading lamp, Radio	Roof 544.2
F037	15 A	Hazard warning flashers	Roof 544.2



Number	Amperage	Function	Location
F050	10 A	TOPCON Terminal, AGI-3	SFH 494
F051	10 A	TOPCON foot button	SFH 494
F052	10 A	Air drier, central lubrication system	SFH 494
F053	7.5 A	Driving lever operation	SFH 494
F054	3 A	Sensor pump, switch S022	SFH 494
F055	3 A	Warning light module	SFH 494
F056	10 A	EMR	SFH 494
F057	3 A	Diagnosis connector EMR	SFH 494
F058	10 A	Safety relay steering wheel_HA	SFH 494
F059	7.5 A	Cooling water level, spraying pump on, hydraulic oil temperature sensor, cooling water temperature sensor, lighting ESB / tank	SFH 494
F060	15 A	Drivers seat	SFH 494
F061	10 A	Coolbox	SFH 494
F062	10 A	Hydr. ESB	SFH 494
F063	7.5 A	High-pressure sensor A / B, diesel filling level, hydraulic tank temperature, hydraulics filling level, hydraulic filter, brake pressure circuit 1/2, hand brake pressure, brake sensor	SFH 494
F064	10 A	12 VDC socket, 12 VDC diagnosis socket	SFH 494
F065	7.5 A	Modem	SFH 494
F066	15 A	Reversing headlight right / left side, reversing warner	SFH 494
F067	25 A	spare	SFH 494
F068	10 A	spare	SFH 494
F069	10 A	spare	SFH 494
F070	10 A	spare	SFH 494
F071	10 A	spare	SFH 494
F072	10 A	spare	SFH 494
F073	3 A	Sidefinder module	SFH 494
F074	10 A	Steps, track correction, lifting module	SFH 494
F075	10 A	Amadrive	SFH 494
F076	3 A	spare	SFH 494
F077	10 A	Drive control SG_1, steering control SG_2, SG_3 CP-II, EMERGENCY STOP	SFH 494
F078	1 A	spare	SFH 494
F079	3 A	Potentiometer track width right / left side, potentiometer steering wheel_HA, potentiometer level RA / FA, stair sensor, lifting module potentiometer	SFH 494
F080	5 A	12 VDC button CP-II, SG3 CP-II	SFH 494
F081	15 A	Storage compartment light	SFH 494
F082	10 A	Pressure sensor, electric trailer brake valve	SFH 494
F083	7.5 A	12 VDC charge control	SFH 494
F084	3 A	Flashing beacon, manual central lubrication	SFH 494
F085	15 A	Cigarette lighter, 12 VDC electrical socket	SFH 494
F086	25 A	12 VDC diagnosis socket	SFH 494
F087	7.5 A	Ignition lock, Sidefinder module, automatic air conditioning module, handbrake valve, KI15x, KI15, KI15D, KI15DD	SFH 494
F088	10 A	Drive control SG_1, steering control SG_2, SG_3 CP-II, EMERGENCY STOP	SFH 494
F089	20 A	Steering control SG_2	SFH 494
F090	20 A	Drive control SG_1, SG_3 CP-II, 30 sec relay steering wheel_HA, 30 sec relay wake-up, EMERGENCY STOP, modem	SFH 494
F091	10 A	Seat contact	SFH 494
F092	3 A	12 VDC wheel sensoren	SFH 494

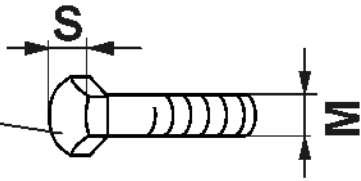


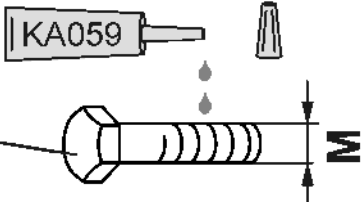
Number	Amperage	Function	Location
F093	10 A	Stair sensor, suction cock potentiometer, agitator pressure sensor, filling level H2O	SFH 494
F094	15 A	Start relay KI50	SFH 494
F095	15 A	Spring suspension hard / soft	SFH 494
F096	10 A	SG_3 CP-II	SFH 494
F102	125 A	12 VDC Roof CE 544.2	SFH 494
F103	80 A	12 VDC SFH494	SFH 494
F104	250 A	12 VDC cabin	Battery
F300	30 A	12 VDC Amadrive	E-BOX
F301	25 A	EMR	E-BOX
F302	25 A	Work lights, boom	E-BOX
F303	10 A	ISOBUS basic equipment	E-BOX
F304	20 A	Revolving beacons	E-BOX
F305	-	spare	E-BOX
F306	50 A	ISOBUS basic equipment	E-BOX

## 13.11 List of the relays

Number	Amperage	Function	Location
K001	10 / 20 A	High beam	Roof 544.2
K002	20 / 40 A	Work lights, railing left / right side	Roof 544.2
K003	20 / 40 A	spare	Roof 544.2
K004	10 / 20 A	Cominghome	Roof 544.2
K005	20 / 40 A	Work lights, platform left side	Roof 544.2
K006	10 / 20 A	Work lights, platform right side	Roof 544.2
K007	20 / 40 A	Work lights, roof	Roof 544.2
K008	10 / 20 A	spare	Roof 544.2
K009	10 / 20 A	spare	Roof 544.2
K010	20 / 40 A	spare	Roof 544.2
K011	20 / 40 A	Work lights ESB / tank	Roof 544.2
K012	10 / 20 A	Brake light	Roof 544.2
K013	20 / 40 A	Air conditioner compressor	Roof 544.2
K014	20 / 40 A	Dipped beam	Roof 544.2
K015	20 / 40 A	KI 15	SFH 494
K015D	20 / 40 A	Start (KI 15D)	Roof 544.2
K015DD	20 / 40 A	Start (KI 15DD)	Roof 544.2
K016	10 / 20 A	Work lights, railing left / right side	Roof 544.2
K017	10 / 20 A	spare	Roof 544.2
K020	10 / 20 A	KI 15x	SFH 494
K021	20 / 40 A	Field / road	SFH 494
K022	10 / 20 A	Neutral	SFH 494
K023	10 / 20 A	drive	SFH 494
K031	10 / 20 A	Spring suspension hard / soft	SFH 494
K032	10 / 20 A	Reversing light	SFH 494
K033	10 / 20 A	Lifting module enable	SFH 494
K048	2+1(6)x21W+5 EP W,	Indicator sender	Roof 544.2
K050	10 / 20 A	Start relay	SFH 494
K051	10 / 20 A	12 VDC SG_3	SFH 494
K061	Time control	Charge control	SFH 494
K110	20 / 40 A	Safety relay steering wheel_HA, left side	E-BOX
K111	20 / 40 A	Safety relay steering wheel_HA, right side	E-BOX
K112	20 / 40 A	Motor relay EMR	E-BOX
K113	20 / 40 A	Work lights, boom	E-BOX
K114	TIME RELAY DEP. DE-LAY 1 - 30 SEC.	Safety relay steering wheel_HA, right / left side	E-BOX
K115	20 / 40 A	Rotating beacon	E-BOX
K116	TIME RELAY DEP. DE-LAY 1 - 30 SEC.	12 VDC SG_1, SG_2, SG_3, Emergency stop	E-BOX
K118	20 / 40 A	SG_1, Emergency stop	E-BOX
K119	20 / 40 A	SG_2	E-BOX

## 13.12 Screw tightening torques

<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;"> <b>8.8</b>  <b>10.9</b>  <b>12.9</b> </div>  </div>				
M	S	Nm		
		8.8	10.9	12.9
M 8	13	25	35	41
M 8x1		27	38	41
M 10	16 (17)	49	69	83
M 10x1		52	73	88
M 12	18 (19)	86	120	145
M 12x1,5		90	125	150
M 14	22	135	190	230
M 14x1,5		150	210	250
M 16	24	210	300	355
M 16x1,5		225	315	380
M 18	27	290	405	485
M 18x1,5		325	460	550
M 20	30	410	580	690
M 20x1,5		460	640	770
M 22	32	550	780	930
M 22x1,5		610	860	1050
M 24	36	710	1000	1200
M 24x2		780	1100	1300
M 27	41	1050	1500	1800
M 27x2		1150	1600	1950
M 30	46	1450	2000	2400
M 30x2		1600	2250	2700

<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;"> <b>A2-70</b>  <b>A4-70</b> </div>  </div>												
M	M4	M5	M6	M8	M10	M12	M14	M16	M18	M20	M22	M24
Nm	2,3	4,6	7,9	19,3	39	66	106	162	232	326	247	314

## 14 Spray table

### 14.1 Spray tables for flat-fan, anti-drift, injector and airmix nozzles, spraying height 50 cm



- The spray rates [l/ha] listed in the spray tables are only valid for water. To convert the spray rates given into AUS, multiply these by 0.88 and, for NP solutions, by 0.85.
- Fig. 182 helps with the selection of the right nozzle type. The nozzle type is determined by
  - the intended operational speed,
  - the required spray rate and
  - the required atomisation characteristic (fine, medium or coarse-dropped) of the crop protection agent used for the crop protection measure.
- Fig. 183 is used to
  - determine the nozzle size.
  - determine the required spray pressure.
  - determine the required individual nozzle output for calibrating the field sprayer.

#### Permissible pressure ranges for different nozzle types and sizes

Nozzle type	Manufactur- er	Permissible pressure range [bar]	
		min. pressure	max. pressure
<b>XRC</b>	TeeJet	1	5
<b>AD</b>	Lechler	1,5	5
<b>Air Mix</b>	agrotop	1	6
<b>IDK / IDKN</b>	Lechler	1	6
<b>ID / IS</b>		2	8
<b>IDN</b>		2	8
<b>AI</b>	TeeJet	2	8
<b>TTI</b>		1	7
<b>AVI Twin</b>	agrotop	2	8
<b>TD Hi Speed</b>	agrotop	2	10



For further information about the nozzle characteristics, see the nozzle manufacturer's website.

[www.agrotop.com](http://www.agrotop.com) / [www.lechler-agri.de](http://www.lechler-agri.de) / [www.teejet.com](http://www.teejet.com)

## Selecting the nozzle type

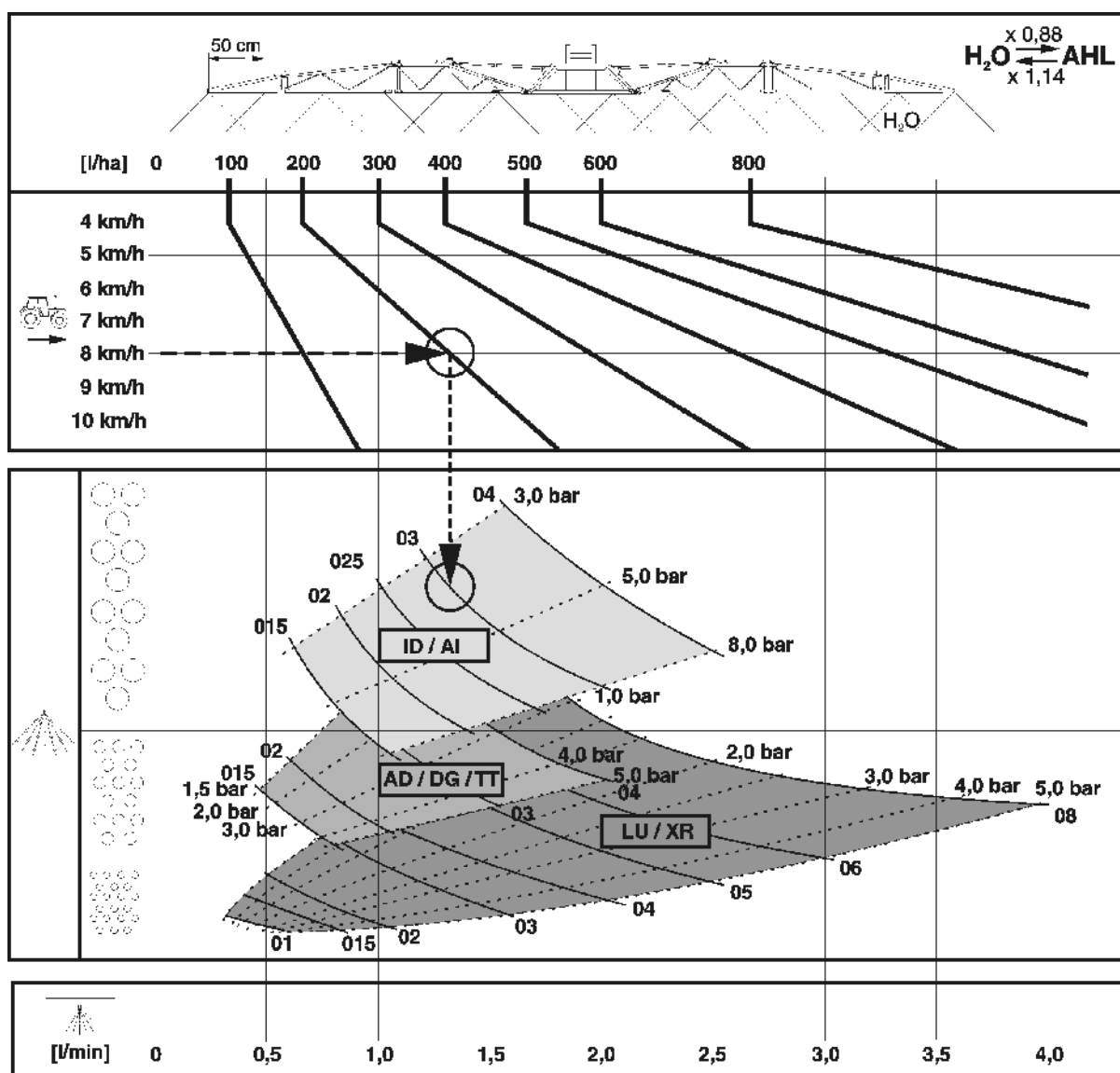


Fig. 182

### Example:

Required spray rate:	200 l/ha
Intended operational speed:	8 km/h
Required atomisation characteristic for the crop protection measure:	<b>coarse-dropped</b> (fine drifting)
Required nozzle type:	?
Required nozzle size:	?
Required spray pressure:	? bar
Required individual nozzle output for calibrating the field sprayer:	? l/min

## Determining the nozzle type, nozzle size, spray pressure and individual nozzle output

1. Determine the working point for the required spray rate (**200 l/ha**) and the intended operational speed (**8 km/h**).
  2. At the working point, trace a line down the table. Depending on the position of the working point, this line will run through the cells for various nozzle types.
  3. Select the best nozzle type for the crop protection measure in question, with reference to the required atomisation characteristic (fine, medium or coarse-dropped).
- Nozzle choice for the example given above:
- Nozzle type: **AI or ID**
4. Go to the spray table (Fig. 183).
  5. In the column with the intended operational speed (**8 km/h**), find the required spray rate (**200 l/ha**) or a figure which is as close as possible to the required spray rate (in this case, for example, **195 l/ha**).
  6. In the line with the required spray rate (**195 l/ha**),
    - o read the nozzle sizes in question. Select a suitable nozzle size (e.g. **'03'**).
    - o where the nozzle size column intersects with the selected nozzle size, read the required spray pressure (e.g. **3.7 bar**).
    - o read the required individual nozzle output (**1.3 l/min**) for calibrating the field sprayer.

Required nozzle type:	<b>AI / ID</b>
Required nozzle size:	<b>'03'</b>
Required spray pressure:	<b>3.7 bar</b>
Required individual nozzle output for calibrating the field sprayer:	<b>1.3 l/min</b>

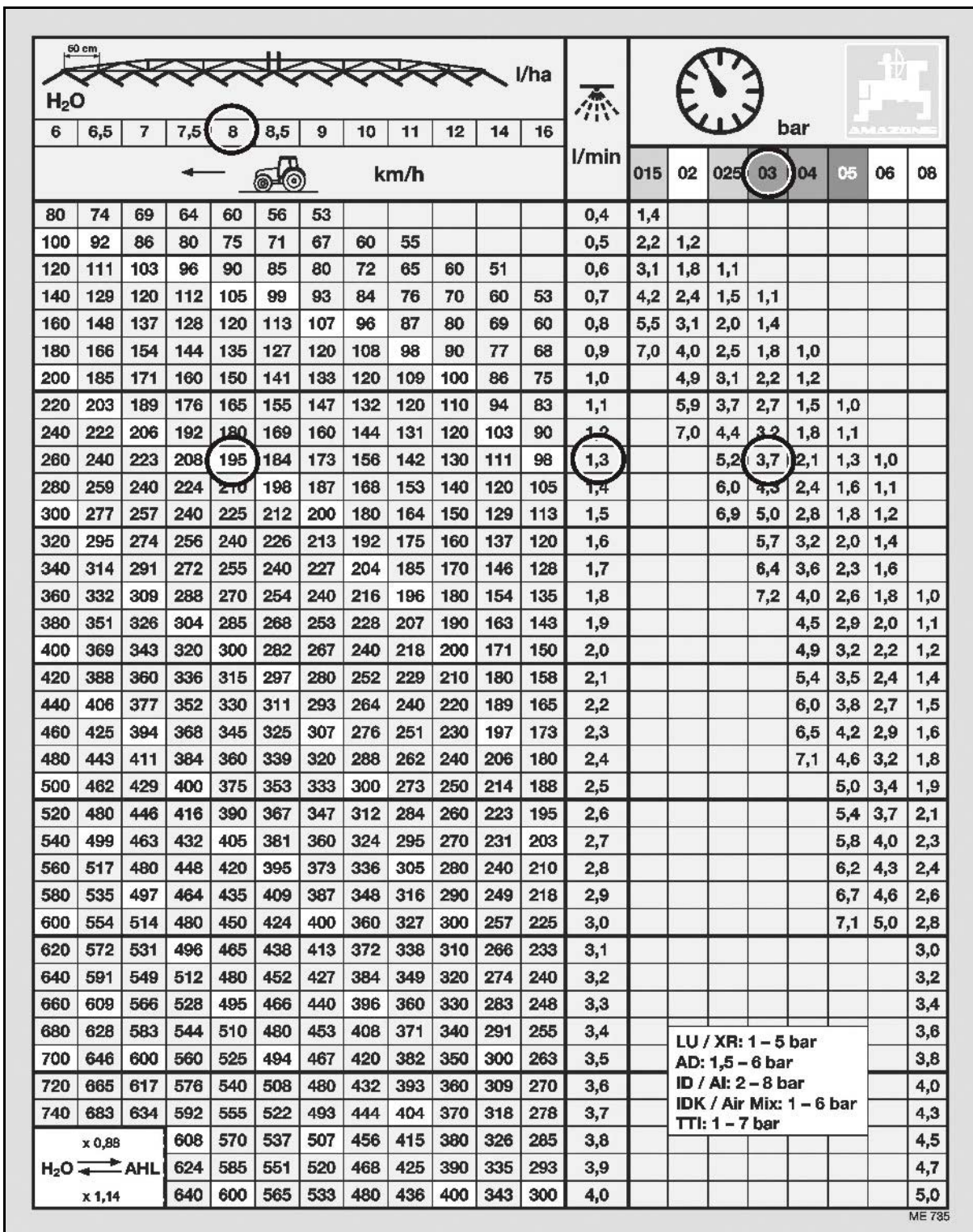


Fig. 183

## 14.2 Spraying nozzles for liquid manure

Nozzle type	Manufacturer	Permissible pressure range [bar]	
		min. pressure	max. pressure
3- jet	agrotop	2	8
7- hole	TeeJet	1,5	4
FD	Lechler	1,5	4
Drag hose	AMAZONE	1	4

### 14.2.1 Spray table for three-ray nozzle, spraying height 120 cm

#### AMAZONE - spray table for three-ray nozzles (yellow)

Pressure (bar)	Nozzle output		AUS spray rate (l/ha) / km/h								
	Water	AUS	6	7	8	9	10	11	12	14	16
	(l/min)										
1.0	0.36	0.32	64	55	48	43	39	35	32	28	24
1.2	0.39	0.35	69	60	52	47	42	38	35	30	26
1.5	0.44	0.39	78	67	59	53	47	43	39	34	30
1.8	0.48	0.42	85	73	64	57	51	47	43	37	32
2.0	0.50	0.44	88	75	66	59	53	48	44	38	33
2.2	0.52	0.46	92	78	69	62	55	50	46	39	35
2.5	0.55	0.49	98	84	74	66	57	54	49	52	37
2.8	0.58	0.52	103	88	77	69	62	56	52	44	39
3.0	0.60	0.53	106	91	80	71	64	58	53	46	40

#### AMAZONE - spray table for three-ray nozzles (red)

Pressure (bar)	Nozzle output		AUS spray rate (l/ha) / km/h								
	Water	AUS	6	7	8	9	10	11	12	14	16
	(l/min)										
1.0	0.61	0.54	108	93	81	72	65	59	54	47	41
1.2	0.67	0.59	118	101	88	78	70	64	59	51	44
1.5	0.75	0.66	132	114	99	88	79	72	66	57	50
1.8	0.79	0.69	138	119	104	92	83	76	69	60	52
2.0	0.81	0.71	142	122	107	95	85	78	71	61	54
2.2	0.84	0.74	147	126	111	98	88	80	74	63	56
2.5	0.89	0.78	155	133	117	104	93	84	78	67	59
2.8	0.93	0.82	163	140	122	109	98	87	82	70	61
3.0	0.96	0.84	168	144	126	112	101	92	84	72	63



**AMAZONE - spray table for three-ray nozzles (blue)**

Pres- sure  (bar)	Nozzle output		AUS spray rate (l/ha) / km/h								
	Water (l/min)	AUS	6	7	8	9	10	11	12	14	16
1.0	0.86	0.76	152	130	114	101	91	83	76	65	57
1.2	0.94	0.83	166	142	124	110	99	91	83	71	62
1.5	1.05	0.93	186	159	140	124	112	102	93	80	70
1.8	1.11	0.98	196	167	147	131	117	107	98	84	74
2.0	1.15	1.01	202	173	152	135	121	110	101	87	76
2.2	1.20	1.06	212	182	159	141	127	116	106	91	80
2.5	1.26	1.12	224	192	168	149	135	122	112	96	84
2.8	1.32	1.17	234	201	176	156	141	128	117	101	88
3.0	1.36	1.20	240	206	180	160	144	131	120	103	90

**AMAZONE - spray table for three-ray nozzles (white)**

Pres- sure  (bar)	Nozzle output		AUS spray rate (l/ha) / km/h								
	Water (l/min)	AUS	6	7	8	9	10	11	12	14	16
1.0	1.16	1.03	206	177	155	137	124	213	103	89	78
1.2	1.27	1.12	224	192	168	149	134	222	112	96	84
1.5	1.42	1.26	252	217	190	168	151	138	126	109	95
1.8	1.56	1.38	277	237	207	184	166	151	139	119	104
2.0	1.64	1.45	290	249	217	193	174	158	145	125	109
2.2	1.73	1.54	307	263	230	204	185	168	154	132	115
2.5	1.84	1.62	325	279	244	216	195	178	163	140	122
2.8	1.93	1.71	342	293	256	228	205	187	171	147	128
3.0	2.01	1.78	356	305	267	237	214	194	178	153	134

## Spray table

### 14.2.2 Spray table for 7-hole nozzles

#### AMAZONE spray table for 7-hole nozzle SJ7-02VP (yellow)

Pressure (bar)	Nozzle output per nozzle		AUS spray rate (l/ha) / km/h								
	Water	AUS	6	7	8	9	10	11	12	14	16
	(l/min)										
1.5	0.55	0.49	98	84	74	65	59	53	49	42	37
2.0	0.64	0.57	114	98	86	76	68	62	57	49	43
2.5	0.72	0.64	128	110	96	85	77	70	64	55	48
3.0	0.80	0.71	142	122	107	95	85	77	71	61	53
3.5	0.85	0.75	150	129	113	100	90	82	75	64	56
4.0	0.93	0.82	164	141	123	109	98	89	82	70	62

#### AMAZONE spray table for 7-hole nozzle SJ7-03VP (blue)

Pressure (bar)	Nozzle output per nozzle		AUS spray rate (l/ha) / km/h								
	Water	AUS	6	7	8	9	10	11	12	14	16
	(l/min)										
1.5	0.87	0.77	154	132	116	103	92	84	77	66	58
2.0	1.00	0.88	176	151	132	117	106	96	88	75	66
2.5	1.10	0.97	194	166	146	129	116	106	97	83	73
3.0	1.18	1.04	208	178	156	139	125	113	104	89	78
3.5	1.27	1.12	224	192	168	149	134	122	112	96	84
4.0	1.31	1.16	232	199	174	155	139	127	116	99	87

#### AMAZONE spray table for 7-hole nozzle SJ7-04VP (red)

Pressure (bar)	Nozzle output per nozzle		AUS spray rate (l/ha) / km/h								
	Water	AUS	6	7	8	9	10	11	12	14	16
	(l/min)										
1.5	1.17	1.04	208	178	156	139	125	113	104	89	78
2.0	1.33	1.18	236	202	177	157	142	129	118	101	89
2.5	1.45	1.28	256	219	192	171	154	140	128	110	96
3.0	1.55	1.37	274	235	206	183	164	149	137	117	103
3.5	1.66	1.47	295	253	221	196	177	161	147	126	110
4.0	1.72	1.52	304	261	228	203	182	166	152	130	114

#### AMAZONE spray table for 7-hole nozzle SJ7-05VP (brown)

Pressure (bar)	Nozzle output per nozzle		AUS spray rate (l/ha) / km/h								
	Water	AUS	6	7	8	9	10	11	12	14	16
	(l/min)										
1.5	1.49	1.32	264	226	198	176	158	144	132	113	99
2.0	1.68	1.49	298	255	224	199	179	163	149	128	112
2.5	1.83	1.62	324	278	243	216	194	177	162	139	122
3.0	1.95	1.73	346	297	260	231	208	189	173	148	130
3.5	2.11	1.87	374	321	281	249	224	204	187	160	140
4.0	2.16	1.91	382	327	287	255	229	208	191	164	143

**AMAZONE spray table for 7-hole nozzle SJ7-06VP (grey)**

Pressure (bar)	Nozzle output per nozzle		AUS spray rate (l/ha) / km/h								
	Water	AUS	6	7	8	9	10	11	12	14	16
	(l/min)	(l/min)									
1.5	1.77	1.57	314	269	236	209	188	171	157	135	118
2.0	2.01	1.78	356	305	267	237	214	194	178	153	134
2.5	2.19	1.94	388	333	291	259	233	212	194	166	146
3.0	2.35	2.08	416	357	312	277	250	227	208	178	156
4.0	2.61	2.31	562	396	347	308	277	252	231	198	173

**AMAZONE spray table for 7-hole nozzle SJ7-08VP (white)**

Pressure (bar)	Nozzle output per nozzle		AUS spray rate (l/ha) / km/h								
	Water	AUS	6	7	8	9	10	11	12	14	16
	(l/min)	(l/min)									
1.5	2.28	2.02	404	346	303	269	242	220	202	173	152
2.0	2.66	2.35	470	403	353	313	282	256	235	201	176
2.5	2.94	2.60	520	446	390	347	312	284	260	223	195
3.0	3.15	2.79	558	478	419	372	335	304	279	239	209
4.0	3.46	3.06	612	525	459	408	367	334	306	262	230

**14.2.3 Spray table for FD nozzles**
**AMAZONE Spray table for FD-04- nozzle**

Pressure (bar)	Nozzle output per nozzle		AUS spray rate (l/ha) / km/h								
	Water	AHL	6	7	8	9	10	11	12	14	16
	(l/min)	(l/min)									
1,5	1,13	1,00	200	171	150	133	120	109	100	86	75
2,0	1,31	1,15	230	197	173	153	138	125	115	99	86
2,5	1,46	1,29	258	221	194	172	155	141	129	111	97
3,0	1,60	1,41	282	241	211	188	169	154	141	121	106
4,0	1,85	1,63	326	279	245	217	196	178	163	140	122

**AMAZONE Spray table for FD-05- nozzle**

Pressure (bar)	Nozzle output per nozzle		AUS spray rate (l/ha) / km/h								
	Water	AHL	6	7	8	9	10	11	12	14	16
	(l/min)	(l/min)									
1,5	1,41	1,24	248	213	186	165	149	135	124	106	93
2,0	1,63	1,44	288	247	216	192	173	157	144	123	108
2,5	1,83	1,61	322	276	242	215	193	176	161	138	121
3,0	2,00	1,76	352	302	264	235	211	192	176	151	132
4,0	2,31	2,03	406	348	305	271	244	221	203	174	152

## Spray table

### AMAZONE spray table for FD-06 nozzle

Pressure (bar)	Nozzle output per nozzle		AUS spray rate (l/ha) / km/h								
	Water	AUS	6	7	8	9	10	11	12	14	16
	(l/min)										
1.5	1.70	1.49	298	255	224	199	179	163	149	128	112
2.0	1.96	1.72	344	295	258	229	206	188	172	147	129
2.5	2.19	1.93	386	331	290	257	232	211	193	165	145
3.0	2.40	2.11	422	362	317	282	253	230	211	181	158
4.0	2.77	2.44	488	418	366	325	293	266	244	209	183

### AMAZONE spray table for FD-08 nozzle

Pressure (bar)	Nozzle output per nozzle		AUS spray rate (l/ha) / km/h								
	Water	AUS	6	7	8	9	10	11	12	14	16
	(l/min)										
1.5	2.26	1.99	398	341	299	265	239	217	199	171	149
2.0	2.61	2.30	460	394	345	307	276	251	230	197	173
2.5	2.92	2.57	514	441	386	343	308	280	257	220	193
3.0	3.20	2.82	563	483	422	375	338	307	282	241	211
4.0	3.70	3.25	650	557	488	433	390	355	325	279	244

### AMAZONE spray table for FD-10 nozzle

Pressure (bar)	Nozzle output per nozzle		AUS spray rate (l/ha) / km/h								
	Water	AUS	6	7	8	9	10	11	12	14	16
	(l/min)										
1.5	2.83	2.49	498	427	374	332	299	272	249	214	187
2.0	3.27	2.88	576	494	432	384	345	314	288	246	216
2.5	3.65	3.21	642	551	482	429	385	350	321	275	241
3.0	4.00	3.52	704	604	528	469	422	384	352	302	264
4.0	4.62	4.07	813	697	610	542	488	444	407	348	305

## 14.3 Spray table for drag hose unit

### AMAZONE Spray table with dosing disc 4916-26, (dia. 0.65 mm)

Pressure (bar)	Nozzle output per dosing disc		AUS spray rate (l/ha) / km/h								
	Water	AUS	6	7	8	9	10	11	12	14	16
	(l/min)										
1,0	0,20	0,18	71	61	53	47	43	37	36	31	27
1,2	0,22	0,19	78	67	58	52	47	43	39	34	29
1,5	0,24	0,21	85	73	64	57	51	47	43	37	32
1,8	0,26	0,23	92	79	69	61	55	50	46	40	35
2,0	0,28	0,25	99	85	74	66	60	54	50	43	37
2,2	0,29	0,26	103	88	77	68	62	56	52	44	39
2,5	0,31	0,27	110	94	82	73	66	60	55	47	41
2,8	0,32	0,28	113	97	85	76	68	62	57	49	43
3,0	0,34	0,30	120	103	90	80	72	66	60	52	45
3,5	0,36	0,32	127	109	96	85	77	70	64	55	48
4,0	0,39	0,35	138	118	104	92	83	76	69	59	52

**AMAZONE Spray table with dosing disc 4916-32, (dia. 0.8 mm)**

Pressure  (bar)	Nozzle output per dosing disc		AUS spray rate (l/ha) / km/h								
	Water  (l/min)	AUS	6	7	8	9	10	11	12	14	16
1,0	0,31	0,27	110	94	82	73	66	60	55	47	41
1,2	0,34	0,30	120	103	90	80	72	66	60	52	45
1,5	0,38	0,34	135	115	101	90	81	74	68	58	51
1,8	0,41	0,36	145	124	109	97	87	79	73	62	55
2,0	0,43	0,38	152	130	114	101	92	83	76	65	57
2,2	0,45	0,40	159	137	119	106	96	87	80	69	60
2,5	0,48	0,42	170	146	127	113	102	93	85	73	64
2,8	0,51	0,45	181	155	135	120	109	98	91	78	68
3,0	0,53	0,47	188	161	141	125	113	103	94	81	71
3,5	0,57	0,50	202	173	151	135	121	110	101	87	76
4,0	0,61	0,54	216	185	162	144	130	118	108	93	81

**AMAZONE Spray table for dosing disc 4916-39, (dia. 1.0 mm) (standard)**

Pressure (bar)	Nozzle output per dosing disc		AUS spray rate (l/ha) / km/h								
	Water (l/min)	AUS	6	7	8	9	10	11	12	14	16
1,0	0,43	0,38	153	131	114	101	92	84	77	66	57
1,2	0,47	0,41	167	143	124	110	100	91	84	72	62
1,5	0,53	0,47	187	160	141	126	112	102	94	80	71
1,8	0,58	0,51	204	175	154	137	122	112	102	88	77
2,0	0,61	0,53	216	185	162	144	130	118	108	93	81
2,2	0,64	0,56	227	194	170	151	136	124	114	97	85
2,5	0,68	0,59	240	206	180	160	142	132	120	103	90
2,8	0,71	0,62	251	215	189	168	151	137	126	108	95
3,0	0,74	0,64	262	224	197	175	158	143	131	112	99
3,5	0,79	0,69	280	236	210	186	168	153	140	118	105
4,0	0,85	0,74	302	259	226	201	181	165	151	130	113

**AMAZONE Spray table for dosing disc 4916-45, (dia. 1.2 mm)**

Pressure  (bar)	Nozzle output per dosing disc		AUS spray rate (l/ha) / km/h								
	Water	AUS	6	7	8	9	10	11	12	14	16
	(l/min)										
1,0	0,57	0,50	202	173	151	135	121	110	101	87	76
1,2	0,62	0,55	219	188	165	146	132	120	110	94	83
1,5	0,70	0,62	248	212	186	165	149	135	124	106	93
1,8	0,77	0,68	273	234	204	182	164	148	137	117	102
2,0	0,81	0,72	287	246	215	192	172	157	144	123	108
2,2	0,86	0,76	304	261	228	203	183	166	152	131	114
2,5	0,92	0,81	326	279	244	217	196	178	163	140	122
2,8	0,96	0,85	340	291	255	227	204	186	170	146	128
3,0	1,00	0,89	354	303	266	236	213	193	177	152	133
3,5	1,10	0,97	389	334	292	260	234	213	195	167	146
4.0	1,16	1.03	411	352	308	274	246	224	206	176	154

## Spray table

### AMAZONE Spray table for dosing disc 4916-55, (dia. 1.4 mm)

Pressure (bar)	Nozzle output per dosing disc		AUS spray rate (l/ha) / km/h								
	Water (l/min)	AUS (l/min)	6	7	8	9	10	11	12	14	16
1,0	0,86	0,76	304	261	228	203	183	166	152	131	114
1,2	0,93	0,82	329	282	247	219	198	180	165	141	124
1,5	1,05	0,93	372	319	278	248	223	203	186	160	139
1,8	1,15	1,02	407	349	305	271	245	222	204	175	153
2,0	1,22	1,08	432	370	324	288	259	236	216	185	162
2,2	1,27	1,12	450	385	337	300	270	245	225	163	168
2,5	1,35	1,19	478	410	358	319	287	261	239	205	179
2,8	1,43	1,27	506	434	380	337	304	276	253	217	190
3,0	1,47	1,30	520	446	390	347	312	284	260	223	195
3,5	1,59	1,41	563	482	422	375	338	307	282	241	211
4,0	1,69	1,50	598	513	449	399	359	327	299	257	225

## 14.4 Conversion table for spraying ammonium nitrate / urea solution (AUS) liquid fertiliser

(Density 1.28 kg/l, i.e. approx. 28 kg N for 100 kg of liquid fertiliser or 36 kg N for 100 litres of liquid fertiliser at 5

N kg	Sol. N l	Sol. N kg	N kg	Sol. N l	Sol. N kg	N kg	Sol. N l	Sol. N kg	N kg	Sol. N l	Sol. N kg	N kg	Sol. N l	Sol. N kg
10	27.8	35.8	52	144.6	186.0	94	261.2	335.8	136	378.0	485.0			
12	33.3	42.9	54	150.0	193.0	96	266.7	342.7	138	384.0	493.0			
14	38.9	50.0	56	155.7	200.0	98	272.0	350.0	140	389.0	500.0			
16	44.5	57.1	58	161.1	207.3	100	278.0	357.4	142	394.0	507.0			
18	50.0	64.3	60	166.7	214.2	102	283.7	364.2	144	400.0	515.0			
20	55.5	71.5	62	172.3	221.7	104	285.5	371.8	146	406.0	521.0			
22	61.6	78.5	64	177.9	228.3	106	294.2	378.3	148	411.0	529.0			
24	66.7	85.6	66	183.4	235.9	108	300.0	386.0	150	417.0	535.0			
26	75.0	92.9	68	188.9	243.0	110	305.6	393.0	155	431.0	554.0			
28	77.8	100.0	70	194.5	250.0	112	311.1	400.0	160	445.0	572.0			
30	83.4	107.1	72	200.0	257.2	114	316.5	407.5	165	458.0	589.0			
32	89.0	114.2	74	204.9	264.2	116	322.1	414.3	170	472.0	607.0			
34	94.5	121.4	76	211.6	271.8	118	328.0	421.0	175	486.0	625.0			
36	100.0	128.7	78	216.5	278.3	120	333.0	428.0	180	500.0	643.0			
38	105.6	135.9	80	222.1	285.8	122	339.0	436.0	185	514.0	660.0			
40	111.0	143.0	82	227.9	292.8	124	344.0	443.0	190	527.0	679.0			
42	116.8	150.0	84	233.3	300.0	126	350.0	450.0	195	541.0	696.0			
44	122.2	157.1	86	238.6	307.5	128	356.0	457.0	200	556.0	714.0			
46	127.9	164.3	88	242.2	314.1	130	361.0	465.0						
48	133.3	171.5	90	250.0	321.7	132	367.0	471.0						
50	139.0	178.6	92	255.7	328.3	134	372.0	478.0						



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