

ALPHA EVO II

EcoDrive

(Tier 4 Final engine and Category 4 cab)



Original

Instruction book

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We congratulate you for choosing a HARDI plant protection product. The reliability and efficiency of this product depend upon your care. The first step is to carefully read and pay attention to this Instruction Book. It contains essential information for the efficient use and long life of this quality product.

The original instruction book is in English. The versions in other languages are translated from the original. In the event of contradiction or inaccuracy between the original version and the versions in other languages, the original French version shall prevail.

The instructions book are also available on the website **<http://www.agroparts.com>**

Illustrations, technical information and data in this book are to the best of our belief correct at the time of printing. As it is GROUPE HARDI FRANCE policy permanently to improve our products, we reserve the right to make changes in design, features, accessories, specifications and maintenance instructions at any time and without notice.

GROUPE HARDI FRANCE is without any obligation in relation to equipment purchased before or after such changes.

GROUPE HARDI FRANCE has made every effort in writing this instruction book to make it as accurate and complete as possible. It may not be held responsible for any omissions or inaccuracies.

As this instruction book covers all models, characteristics or equipment only available in certain countries may be described. Pay special attention to the paragraphs concerning the model that you own.

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EU Declaration of conformity



As manufacturer:

GRUPE HARDI FRANCE

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62990 BEAURAINVILLE - FRANCE

hereby declare that the following product

ALPHA Evo II EcoDrive 3500-4100 (variant 40351-40352-40353-40357 /MA/MB/MC)

fulfils all the relevant provisions of the following Directives of the European Parliament and of the council:

- 2006/42/EC, regarding the Machinery Directive (CE marking).
- 2009/127/EC and later amendments, regarding machinery for pesticide application.
- 2014/30/EU, regarding electromagnetic compatibility (EMC). Electronic components on the machine are tested and installed according to the requirements of the EMC Directive.

06 november 2017

A handwritten signature in black ink, appearing to read 'Jérôme DENORMANDIE', written over a horizontal line.

Jérôme DENORMANDIE

General Manager

GRUPE HARDI FRANCE

Obligations and Liability

Comply with the Instruction Book

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

Lack of knowledge or non-compliance of the safety instructions can lead to injuries and fatal accidents as well as damage to the sprayer and its surroundings.

Follow the safety instructions in this Instruction Book.



Before First Use of the Sprayer

The owner of the sprayer must take note of the following obligations before using the sprayer. These obligations also apply to the employer or the supervisor of the sprayer operators.

Workplace Assessment

This must be completed to start with. Check your national regulations regarding

- the content of the workplace assessment
- the frequency of repeating the workplace assessment.

Worker / Operator Instructions

Only let those people work with, or on the sprayer, who

- are aware of the basic workplace safety information and accident prevention regulations
- have been instructed in working with/on the sprayer and hereby achieving appropriate qualifications
- have read and understood this Instruction Book.

If you still have queries after reading the Instruction Book, or if something remains unclear after reading it, please contact the manufacturer or your HARDI dealer.

A worker is hereinafter called an operator. An operator is a person who installs, operates, configures, adjusts, maintains, cleans, repairs, transports or moves the sprayer.

Use of Work Equipment

Throughout the lifetime of the sprayer, the owner shall take every measure to ensure the safety of the sprayer and its equipment made available to operators according to European Directive 2009/104/EC – Use of Work Equipment. Amendments to the directive, as well as subsequent directive versions are to be followed when applicable.

In this directive, the “minimum safety and health requirements for the use of work equipment by workers at work” are described in full. To guide you in this matter, the issues concerning your work with the sprayer are listed below. However, HARDI do not accept liability that the issues listed cover the requirements in the directive fully. This responsibility lies with the owner of the sprayer.

From European Directive 2009/104/EC:

CHAPTER I GENERAL PROVISIONS

Article 1

Subject matter

1. This Directive, which is the second individual directive within the meaning of Article 16(1) of Directive 89/391/EEC, lays down minimum safety and health requirements for the use of work equipment by workers at work, as defined in Article 2.
2. The provisions of Directive 89/391/EEC are fully applicable to the whole scope referred to in paragraph 1, without prejudice to more stringent or specific provisions contained in this Directive.

2 - General Safety Instructions

Article 2

Definitions

For the purposes of this Directive, the following terms shall have the following meanings:

- (a) 'work equipment': any machine, apparatus, tool or installation used at work;
- (b) 'use of work equipment': any activity involving work equipment such as starting or stopping the equipment, its use, transport, repair, modification, maintenance and servicing, including, in particular, cleaning;
- (c) 'danger zone': any zone within or around work equipment in which an exposed worker is subject to a risk to his health or safety;
- (d) 'exposed worker': any worker wholly or partially in a danger zone;
- (e) 'operator': the worker or workers given the task of using work equipment.

CHAPTER II

EMPLOYER'S OBLIGATIONS

Article 3

General obligations

1. The employer shall take the measures necessary to ensure that the work equipment made available to workers in the undertaking or establishment is suitable for the work to be carried out or properly adapted for that purpose and may be used by workers without impairment to their safety or health.

In selecting the work equipment which he proposes to use, the employer shall pay attention to the specific working conditions and characteristics and to the hazards which exist in the undertaking or establishment, in particular at the workplace, for the safety and health of the workers, and any additional hazards posed by the use of the work equipment in question.

2. Where it is not possible in this way fully to ensure that work equipment can be used by workers without risk to their safety or health, the employer shall take appropriate measures to minimize the risks.

Article 5

Inspection of work equipment

1. The employer shall ensure that where the safety of work equipment depends on the installation conditions, it shall be subject to an initial inspection (after installation and before first being put into service) and an inspection after assembly at a new site or in a new location by competent persons within the meaning of national laws and/or practices, to ensure that the work equipment has been installed correctly and is operating properly.
2. In order to ensure that health and safety conditions are maintained and that deterioration liable to result in dangerous situations can be detected and remedied in good time, the employer shall ensure that work equipment exposed to conditions causing such deterioration is subject to:
 - (a) periodic inspections and, where appropriate, testing by competent persons within the meaning of national laws and/or practices;
 - (b) special inspections by competent persons within the meaning of national laws and/or practices each time that exceptional circumstances which are liable to jeopardize the safety of the work equipment have occurred, such as modification work, accidents, natural phenomena or prolonged periods of inactivity.
3. The results of inspections shall be recorded and kept at the disposal of the authorities concerned. They must be kept for a suitable period of time.
4. When work equipment is used outside the undertaking it shall be accompanied by physical evidence that the last inspection has been carried out.
5. Member States shall determine the conditions under which such inspections are made.

2 - General Safety Instructions

Article 6

Work equipment involving specific risks

When the use of work equipment is likely to involve a specific risk to the safety or health of workers, the employer shall take the measures necessary to ensure that:

- (a) the use of work equipment is restricted to those persons given the task of using it;
- (b) in the case of repairs, modifications, maintenance or servicing, the workers concerned are specifically designated to carry out such work.

Article 8

Informing workers

1. Without prejudice to Article 10 of Directive 89/391/EEC, the employer shall take the measures necessary to ensure that workers have at their disposal adequate information and, where appropriate, written instructions on the work equipment used at work.
2. The information and the written instructions shall contain at least adequate safety and health information concerning:
 - (a) the conditions of use of work equipment;
 - (b) foreseeable abnormal situations;
 - (c) the conclusions to be drawn from experience, where appropriate, in using work equipment.

Workers shall be made aware of dangers relevant to them, work equipment present in the work area or site, and any changes affecting them, inasmuch as they affect work equipment situated in their immediate work area or site, even if they do not use such equipment directly.

3. The information and the written instructions shall be comprehensible to the workers concerned.

Article 9

Training of workers

4. Without prejudice to Article 12 of Directive 89/391/EEC, the employer shall take the measures necessary to ensure that:
 - (a) workers given the task of using work equipment receive adequate training, including training on any risks which such use may entail;
 - (b) workers referred to in Article 6(b) receive adequate specific training.

2 - General Safety Instructions

Statutory Inspection

Before first use of the sprayer, a surveyor must complete a statutory inspection of the sprayer. However, the rules often allow the sprayer to be inspected separately before being connected. Contact your local HARDI dealer for more information on this inspection and when it has to be completed.

Restricted Use

As the use of the sprayer is likely to involve a specific risk, the owner shall ensure restricted access to its use as needed, and any modification of the restrictions is to be allowed to specialized persons only.

Maintenance Regulations

Throughout its working life, the owner shall keep the sprayer compatible with the current national Machinery Directive by means of adequate maintenance.

The owner shall ensure that the sprayer is installed and set up correctly and is operating properly by inspection/testing of the sprayer (initial, after assembly, periodic and special) by authorized persons. The results of inspection/testing shall be recorded and kept.

Health Issues

Ergonomics and occupational health aspects shall be taken fully into account by the owner.

Obligations of the Operator

Before starting work, the operator or anyone in charge of working with/on the sprayer is obliged to

- comply with the basic workplace safety instructions and accident prevention regulations.
- read and follow the safety instructions as described in this Instruction Book.
- read the section "Representation of Safety Symbols" in this Instruction Book and to follow the safety instructions represented by the danger, warning and attention symbols, when operating the sprayer.
- get to know the sprayer.
- read the sections of this Instruction Book that are important for carrying out the work.
- read the manufacturer's information regarding safety and use of chemical products for crop care, such as spray chemicals or liquid fertilizer.
- keep all the danger, warning and attention labels on the sprayer in a legible state.
- replace damaged labels on the sprayer.
- know the importance of the use of genuine HARDI spare parts.

If the operator discovers that a function is not working properly, he must eliminate this fault immediately. If this is not the task of the operator, or if the operator does not possess the appropriate technical knowledge, then he should report this fault to his superior (a qualified operator).

2 - General Safety Instructions

Risks in Handling the Sprayer

The sprayer has been highly developed and constructed to the recognized rules of safety. However, operating the sprayer may cause risks and restrictions to

- the health and safety of the operator or third parties
- the sprayer
- other property.

Only use the sprayer

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

Eliminate any faults immediately which could impair the safety.

Disclaimer

Our "General Terms of Sale and Delivery" are always applicable. These shall be available to the owner at the latest on conclusion of the contract.

Guarantee and liability claims for damage to people or property will be excluded by HARDI, if they can be traced back to one or more of the following causes:

- Improper use of the sprayer
- Improper installation, commissioning, operation and maintenance of the sprayer
- Operation of the sprayer with defective safety equipment, or improperly attached or non-functioning safety equipment
- Non-compliance with the instructions in the instruction manual regarding commissioning, operation and maintenance
- Unauthorized design changes to the sprayer
- Insufficient monitoring of sprayer parts which are subject to wear
- Improperly executed repairs
- Spare parts used are not genuine HARDI spare parts. If the operator decides to use a spare part, which is not approved by HARDI, the operator immediately assumes responsibility for any accident, damage or malfunction, which can be traced back to the use of this spare part. HARDI accept no liability for such incidents caused by the use of non-approved spare parts, wear parts or aids.
- Disasters through the impact of foreign bodies, natural disasters or force majeure.

2 - General Safety Instructions

Organizational Measures

This Instruction Book

- must always be kept together with the sprayer
- must always be easily accessible for the operator

Personal Protective Equipment

The operator must use the necessary personal protective equipment as per the information provided by the manufacturer of the plant protection product to be used, such as:



Chemical-resistant gloves



Chemical-resistant and disposable overalls



Water-resistant footwear



Face shield



Breathing protection



Eye protection



Head protection



Skin protection products

Representation of Safety Symbols

Explanation of Symbols

Safety symbols are used in the following chapters throughout this Instruction Book to designate, where the reader has to pay extra attention.

The signal word (DANGER, WARNING, ATTENTION or NOTE) describes the severity of the risk.

The symbols have the following meaning:



This symbol means DANGER. Be very alert as your safety is involved! The DANGER symbol indicates a high risk for an immediate death or serious physical injury, if the instruction is not followed.



This symbol means WARNING. Be alert as your safety can be involved! The WARNING symbol indicates a medium risk for immediate death or serious injury, if the instruction is not followed.



This symbol means ATTENTION. This indicates an obligation to special behaviour or an activity required for proper sprayer handling. This instruction will help you to avoid faults on the sprayer or disturbance to the environment.



This symbol means NOTE. This indicates handling tips and particularly useful information. This instruction will help you to use all the functions of your sprayer in the best way possible for a better, easier and more safe operation.

2 - General Safety Instructions

Warning Signs On The Sprayer

Explanation of Labels

The labels on the sprayer are designating potential dangerous areas on the machine. Operators, or anyone in close range of the sprayer, must respect these warnings!

The labels should always be clean and readable! Worn or damaged labels must be replaced with new ones. Contact your HARDI dealer for new labels.

Note that not all labels shown hereafter will apply to your sprayer - this depends on the sprayer model which labels apply.



Risk of death!
Do not attempt to enter tank.



Service!
Turn off the engine and remove ignition key before performing maintenance or repair.



Risk of burn!
Stay clear of hot surfaces.



Risk of injury!
Do not open or remove safety shields while engine is running.



Risk of injury!
Keep sufficient distance away from electrical power lines.



Risk of squeezing!
Stay clear of raised and unsecured loads.



Risk of squeezing
Never reach into the crushing danger area as long as parts are moving.



Grapping area!
Manual handling of the boom etc.



Risk of falling off!
Do not ride on platform or ladder.



Lifting point!



Not for drinking!
This water must never be used for drinking.



EasyClean filter service!
Open and clean filter monthly

2 - General Safety Instructions

Safety and Protection Equipment

Safety at Start-up

Each time before the sprayer is started up, all the safety and protection equipment must be properly attached and fully functional. Check all safety and protection equipment regularly. Repair or replace the equipment as needed.

Faulty Safety Equipment

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

2 - General Safety Instructions

Informal Safety Measures

Additional Safety Instructions

Together with the safety information in this Instruction Book, also comply with the general and national regulations related to

- A. Accident prevention
- B. Environmental protection
- C. The applicable workplace safety.

Follow these regulations, especially when

- driving on public roads and routes. Comply with the appropriate statutory road traffic regulations. These vary from country to country, and there may be local regulations which need to be followed.
- local law demands that the operator is certified to use spray equipment.
- using pesticides or liquid fertilizer. Make sure you understand the information from the supplier regarding their use.

Operator Training

Authorized Persons

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

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

Activity	Person	Person especially trained for the activity ¹⁾	Trained operator ²⁾	Person with specialist training (specialized workshop) ³⁾
Loading / Transport		X	X	X
Commissioning		0	X	0
Setup and tool installation		0	0	X
Operation		0	X	0
Maintenance		X	X	X
Troubleshooting and fault elimination		X	0	X
Disposal		X	0	0

Symbols: X - permitted, 0 - not permitted.

1. Persons who can assume a specific task, and who can carry out this task for an appropriately qualified company. Examples of these persons are truck drivers, machinery dealer and scrap dealers (depending on the activity).
2. Persons who have been instructed in their assigned tasks and in the possible risks in the case of improper behaviour, who have been trained if necessary, and who have been informed about the necessary protective equipment and measures. Examples of these persons are customers, farmers and farm workers.
3. Persons 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 appointed to and detect possible dangers. Examples of these persons are sprayer importers, dealers and service engineers and service technicians.

Comment:

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

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

2 - General Safety Instructions

Safety Measures in Normal Operation

Protection Equipment

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

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

Products manufacturer responsibility

The correct use and precautions to be taken for the proper use of the products are the sole responsibility of the products manufacturer, through the information on the packaging or other product sheets made available by this manufacturer.

Residual Energy

Possible Dangers

Note that there may be residual energy from mechanical, hydraulic, pneumatic and electric / electronic parts on the sprayer.

Use appropriate measures to inform the operators.

Prevent any accidents from happening due to residual energy.

Below are some examples on where the sprayer's residual energies may be present.

Mechanical Energy

- springs under tension
- weights exposed to gravity

Hydraulic Energy

- trapped oil under pressure in cylinders, hoses and accumulators
- heat from cylinders and oil tank.

Pneumatic Energy

- air tank
- air activated brake system
- pressure dampers for fluid system

Electric Energy

- energy stored in capacitors
- Sprayer battery

2 - General Safety Instructions

Service and Maintenance Work

Statutory Inspection

A surveyor must complete a statutory inspection of the sprayer prior to connecting the two.

Each country should regulate the level and frequency of this inspection. Contact your local HARDI dealer for more information, before using the sprayer the first time.

Preventive Measures

Before carrying out service and maintenance work, secure all media against unintentional start-up. This goes for:

Hydraulic system

- turn off the vehicle and remove the ignition key

Electric system

- turn off the vehicle and remove the ignition key

Fluid system

- turn off the vehicle and remove the ignition key.

Compressed air

- turn off the vehicle and remove the ignition key
- Depressurize the compressed air circuit

Carry out prescribed service, maintenance and inspection work in due time. This will help to eliminate faults on the sprayer, including safety related functions.

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

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

Design Changes

Operator Limitations

You may make no changes, expansions or modifications to the sprayer without an authorization from HARDI. This also applies when welding support parts.

Any expansion or modification work shall require the written approval from HARDI. Only use modification and accessory parts approved by HARDI, so that the type approval or other design approvals remain 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 local road traffic regulations, must be in the state specified by the approval.

It is strictly forbidden to:

Drill holes in the steel frame or in the running gear

Increase the size of existing holes in the steel frame or in the running gear

Weld support parts.

Risk of crushing, cutting, catching, squeezing, getting trapped, being drawn in or being struck by sprayer parts due to the failure of support parts.

Spare Parts, Wear Parts and Aids

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

Only use genuine HARDI spare and wear parts or those approved by HARDI, 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.

HARDI accept no liability for damage caused by the use of non-approved spare parts, wear parts or aids.

2 - General Safety Instructions

Cleaning and Disposal

Environmental Protection

Carefully handle and dispose of any materials used, in particular

- When carrying out work on oiled or lubricated sprayer parts.
- When cleaning using solvents.

Always follow local legislation regarding disposal.

Workstation

Intended Place for Operator

There may be only one person sitting in the driver's seat of the vehicle. This is the intended workstation for operating the sprayer.

Risks of Non-Compliance

During the operation or transport of the sprayer:

If another person disturbs or interferes with the operator, or if the operator is trying to operate the sprayer from other places than the vehicle driver seat, this can result in negligent or incorrect handling of the vehicle.

- Risk of the operator losing his concentration and focus on operating the vehicle correctly
- Risk of the operator losing his ability to operate the vehicle correctly
- Risk of fatal accidents while driving
- Risk of damages to the sprayer and foreign objects while driving
- Risk of inefficient spraying due to incorrect operation of the sprayer.

2 - General Safety Instructions

If the Safety Information is Ignored

Possible Risks and Dangers

Non-compliance with the safety information:

- Can pose a danger to people, to the environment and to the sprayer
- Danger to people through non-secured working areas
- Danger to people through mechanical and chemical influences
- Failure of important sprayer functions
- Failure of prescribed methods of maintenance and repair
- Leakage of hydraulic oil or spray fluid to the environment
- Can lead to the loss of all warranty claims.

Safety Information For Operators

General Safety and Accident Prevention

Before use or starting up the vehicle, always check their

- road-worthiness
- operational safety

Risk of crushing, cutting, catching, squeezing, getting trapped, being drawn in or being struck by sprayer parts due to inadequate road-worthiness and operational safety.

Beside these instructions, comply with the generally applicable national safety and accident prevention regulations.

The warning symbols and other labels attached to the sprayer provide important information on safe sprayer operation. Compliance with this information is in the interests of your safety.

Before driving off and starting up the sprayer, check the immediate area of the sprayer - look out especially for children and instruct them and other unauthorized persons to stay out of reach of the sprayer. Ensure that you can see clearly.

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

Slow down when driving in uneven terrain or when making sharp turns, as the sprayer might be in risk of turning over.

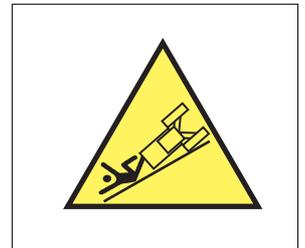
It is forbidden to ride on the sprayer or use it as a means of transport.

Only authorized persons are allowed inside or outside the cabin during operation.

Keep persons, children and animals away from the operation areas of the sprayer and from the sprayer's equipment. Be careful when manoeuvring the sprayer, especially when reversing, as there is a risk of hitting people or surroundings.

Avoid eating, drinking or smoking while spraying or working with equipment contaminated with chemicals.

The chemicals used for spraying are dangerous to your health! In case of ingestion, poisoning or damages to your skin or face, immediately seek medical advice. Remember to identify the chemicals used.



2 - General Safety Instructions

Mixture carried on the tank

The mixture carried on the tank must never exceed the permissible total laden weight (GVW). See data on "Identification plate" page 38

You must take into account that the mixture carried on the tank will be adjusted according to the density (e.g. liquid fertilizer, etc ...).



An overload can lead to dangerous situations or damage the self-propelled sprayer (chassis, suspension, premature wear or burst of tire....)

Road Transport

When driving on public roads or highways with the vehicle, the following instructions must be followed. Failure to do so will create a risk of:

- traffic accidents or fatalities!
- damage to the vehicle.

General Instructions

Comply with the national or local road traffic regulations when using public roads and highways.

When driving in areas with special rules and regulations for markings and lights on sprayers, you should observe these and equip your sprayer accordingly.

Make sure that you have a clear field of vision when driving.

Check the immediate vicinity of the vehicle; no persons, children or animals must be near the vehicle!

No one is allowed outside the cabin during road transport.

It is forbidden to use the sprayer as a means of transportation of people or goods.

The driver must not be disturbed by other people in the cabin during driving.

Adjust your driving speed to the prevailing conditions.

Before driving downhill, reduce forward speed.

When making turns, lower your speed.

Checking the Vehicle

Before transporting the sprayer on a road, complete the following check points for sprayer.

1. Spray boom is folded and resting in transport brackets with the intended locks engaged.
2. Engage transport locks on the steering cylinders.
3. Parking brake is completely disengaged.
4. The spraying pump is turned off, if the main tank is empty. If the main tank is filled with spray liquid, the need for agitation demands that the pump drive is turned on.
5. Traffic lights and reflectors are in good working order, clean and free from damages.
6. Signs or markings on the vehicle regarding road transport are correctly placed and visible.
7. Tyre pressure is correct according to the load.
8. Crop residues and dirt are removed.
9. All moveable or loose equipment are securely latched or stowed away in the designated compartments.

Braking and Steering

Braking distance is increased and steering capabilities are influenced, both when the sprayer's tank is empty and even more so with a full tank.

Hydraulic System

The hydraulic system is operating under a high pressure.

The operator controls in the cabin for hydraulic and electrical movements of components must stay unlocked, e.g. for folding, swivelling and pushing movements. The movement must stop automatically when you release the appropriate control. This does not apply to equipment movements that:

- Are continuous
- Are automatically controlled
- Require a floating position or pressed position to function.

Before working on the hydraulic system:

- Lower the spray boom to its lowest position or into the transport position
- Turn off the sprayer engine
- Engage the parking brake
- Remove the ignition key.

Have the hydraulic hose lines checked at least once during a calendar year by an expert to ensure that they are in safe working order.

Replace the hydraulic hose lines if they are damaged or worn, which is when:

- It is leaking
- Reinforcement material inside the hose is visible due to cracks in the outer layers.

Only use genuine HARDI hydraulic hose lines.

If you are injured by hydraulic oil, contact a doctor immediately.

When searching for leaks, use suitable aids to avoid the serious risk of infection and injury.

Electrical System

When working on the electrical system, always disconnect the battery.

When disconnecting the battery, disconnect the negative terminal first, followed by the positive terminal.

When connecting the battery, connect the positive terminal first, followed by the negative terminal.

Always place the appropriate cover over the positive battery terminal. If there is accidental earth contact, there is a risk of explosion.

If climbing onto the sprayer during service work, be aware of the low voltage danger from electric components.

Only use the prescribed fuses. If the fuses used are too highly rated, the electrical system will be destroyed. Risk of fire.

The sprayer may be equipped with electronic components whose functions are 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 sprayer 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.

2 - General Safety Instructions

Use of The Sprayer

Before starting work, ensure that you understand all the equipment and actuation elements of the sprayer and their function. There is no time for this when the sprayer is already in operation.

Only wear tight clothes. Loose clothing increases the risk of being caught by the drive shaft / PTO. or engine

It is forbidden to:

- stand in or near the working area of the sprayer
- climb the sprayer
- stand or sit on the sprayer
- stand in the turning and swivel range of the sprayer.

There are crushing and cutting points at externally actuated sprayer points, e.g. hydraulic cylinders.

Only actuate externally actuated sprayer parts when you are sure that no one is standing within the prescribed safety distance.

Before leaving the cabin:

- lower the spray boom to around waist height above the ground or lower, or
- fold the spray boom into the transport position
- turn off the engine
- remove the ignition key.

Always keep the sprayer under supervision when:

- the vehicle is parked with the engine running
- the sprayer pump is running
- the tank on the sprayer is being filled.

Indication of the product used

Inscribe on the label provided the name of the product loaded in the tank.

Field Sprayer Operation

Observe the recommendations from the manufacturer of the crop protection product in respect of:

- Personal protective equipment
- Warning information on exposure to crop protection products
- Regulations on dosing, applications and cleaning.

When there will be exposure to the crop protection product:

- Wear the proper personal protective equipment - this may differ depending on the chemical being sprayed.
- Wash and change clothes after spraying
- Wash tools if they have been contaminated.

Observe the information in the national plant protection law.

Keep hoses, pipes or other lines closed, when they are under pressure.

When use of the TurboFiller has ended, make sure that all valves on the TurboFiller are closed / deactivated.

Only use genuine HARDI hoses and hose clamps for replacement, which stand up to chemical, mechanical and thermal requirements.

The rated volume of the spray liquid tank must not be exceeded during filling. If overfilling, some sprayer functions may be disabled. However, the main tank is a little oversized to allow for foaming.

When using a cab with ventilation fans, replace the fresh air filters with activated carbon filters.

Observe the information on the compatibility of crop protections and substances for the field sprayer.

Be aware that some crop protection products have a tendency to stick together or settle when being mixed.

Do not fill the sprayer with water from bodies of water, which are open to the public. This is for the protection of people, animals and the environment due to the risk of contamination.

Only fill the sprayer using a free flow of water from the mains water supply or from an external water tank.

Environmental Precautions

It is essential to reduce the environmental impact of plant protection chemicals to a minimum. Particularly the soil, subsoil water, streams, lakes, flora and fauna must be in focus. Contamination of subsoil water must be prevented by paying particular attention to avoidance of spot contamination of the soil in connection with filling and washing and parking of the sprayer.

If any concentrated chemicals are spilled on the soil, the contaminated soil should be removed and sent for cleaning at a capable facility. Follow local regulations regarding disposal. This must be done to avoid seepage of chemicals to the subsoil waters. Avoid spillage - use the chemical filling device for filling the sprayer with chemicals.

Do not overfill the main tank. The rated volume inside the main tank is stated with large printed numbers on the outside of the tank. If overfilling, the spray liquid could leak from the sprayer causing contamination of the soil.

Before filling the sprayer with plant protection chemicals, the sprayer must be calibrated to apply the precise dose rate selected. The important input sensors are the flowmeter and the speed sensor.

It is recommended to establish a proper filling and washing location with hard, impenetrable surface drained to a receptacle if the sprayer is always filled or cleaned on the same spot at the farm. If a washing/filling location is NOT available, the following precautions should be taken:

- The sprayer should only be filled with clean water at the farm
- The plant protection chemicals must be added and mixed in the field to be sprayed
- Select a different location each time the sprayer is refilled.

2 - General Safety Instructions

Service Work Precautions

Before carrying out any service work, all of the following instructions must be followed in order to prevent damages to the sprayer, injuries and fatalities:

- Do not walk under any part of the sprayer, unless it is secured. The spray boom is secured when placed in the transport brackets
- If the spray boom is folded up and resting in the transport brackets for service, check visually that the paralift locks are engaged (the boom is locked in place)
- If the spray boom is unfolded for service, the boom must be lowered, until it reaches its end stop. Place strong trestles under the boom for support or use a lifting crane for support
- Never service or repair any equipment while it is operating
- Any service work is preferable carried out on level ground with only authorized persons nearby
- Depressurize the hydraulic system for the sprayer to prevent unintentional movements of the sprayer
- Switch off the PTO
- Switch off the vehicle and remove the ignition key to prevent unintentional starting
- Activate the parking brake to prevent rolling
- Put chocks in front of and behind the wheels to prevent rolling
- Electric power must be disconnected from the sprayer
- Any service work on electronic /electric parts must be carried out under dry conditions - no rain or splashes from water or other liquids.

Cleaning

When cleaning nozzles and filters, lower the spray boom to around waist height above the ground. For safety reasons, do not walk or stand below the boom or paralift during this cleaning work!

Dispose of oils, greases and filters in the appropriate way to protect the environment.

Cleaning of tanks:

- Due to toxic vapours from spray liquids in the main tank, climbing into this tank is very hazardous. Cleaning should only be done from the outside.
- Refrain from entering the main tank.
- Refrain from inspecting any of the tanks with the liquid pump running.

Rinse and wash equipment with clean water after use and before servicing.

2 - General Safety Instructions

Service and Maintenance

Always reassemble all safety devices or shields immediately after servicing.

After a longer period of standstill, the sprayer must be inspected by a qualified operator. Contact your HARDI dealer for more information.

Repair work in the main tank must only be carried out by a specialized workshop.

Do not attempt to enter the tank.

Access to the rinsing tank must only take place with the spray boom in transport position, and after it is verified that the transport locks are engaged.

Regularly check the nuts and bolts for firm seating and re-tighten them as necessary.

If electrical welding is used on the vehicle and on the attached sprayer, disconnect the cable to the alternator and battery before carrying out electrical welding work on the vehicle. Remove all inflammable or explosive materials from the area to prevent fire.

Pressure test the spray functions with clean water prior to filling with chemicals.

Refrain from dismounting hoses, pipes, or any equipment, if the sprayer is in operation.

Stay below the maximum speed (rpm) suitable for the PTO shaft.

When replacing spare parts, use suitable tools and personal protective equipment.

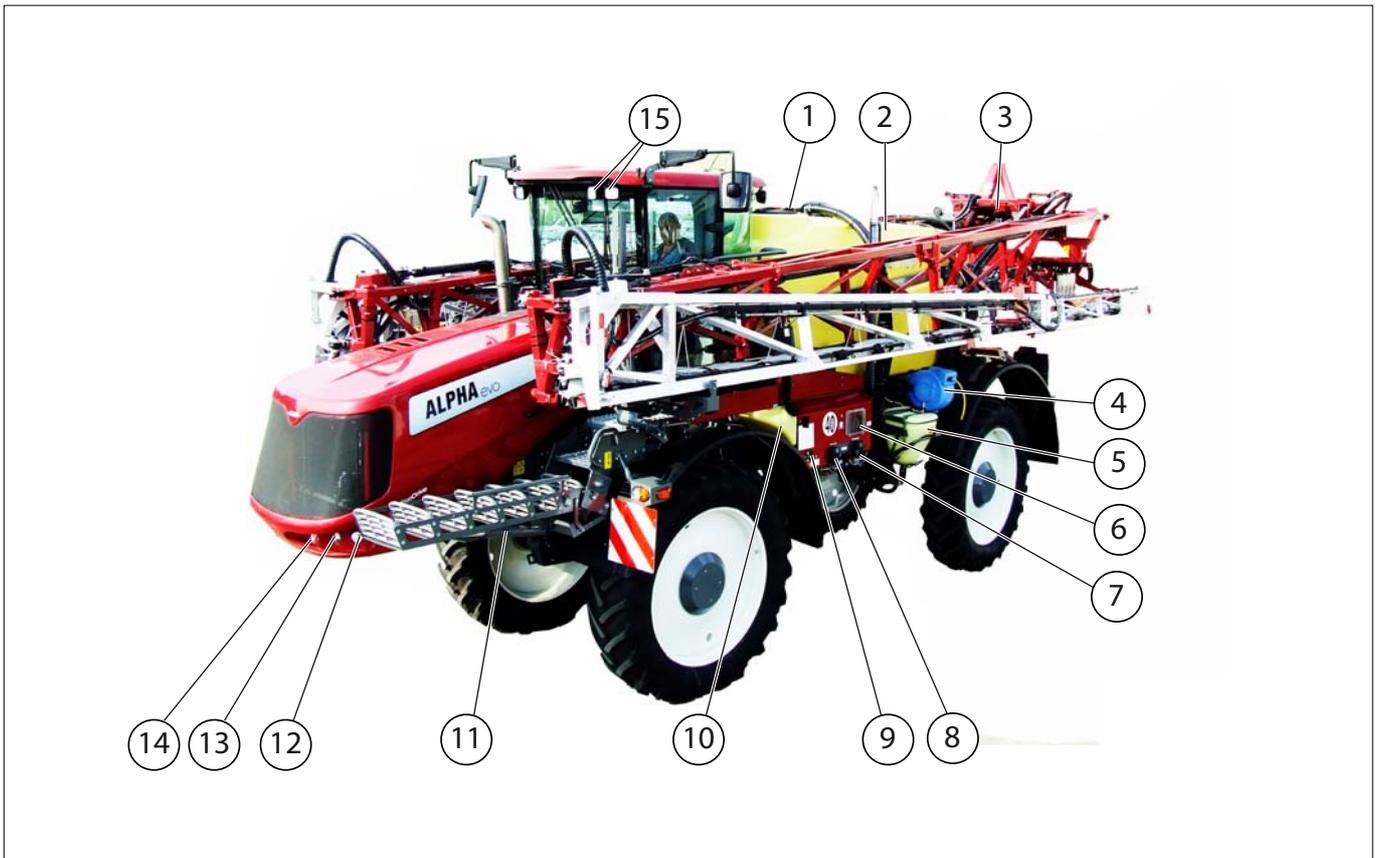
Spare parts must at least meet the specified technical requirements of HARDI. This is ensured through the use of genuine HARDI spare parts.



2 - General Safety Instructions

General Info

View



- | | |
|-------------------------------------|-----------------------------|
| 1. Tank lid | 9. External engine controls |
| 2. Main tank | 10. Hand wash tank |
| 3. Central frame | 11. Cab ladder |
| 4. External cleaning system | 12. Working lights |
| 5. Turbo Filler | 13. Dipped beam lights |
| 6. FluidBox (external control unit) | 14. Main beam lights |
| 7. Pressure Smart valve | 15. cab working lights |
| 8. Suction Smart valve | |

3 - Description

Identification plate

A manufacturer's plate is fixed to the right-hand side of the chassis. It indicates the following elements:



ATTENTION! The identification plate is regulatory, it should always be in place on the sprayer. For all information about the machine, please quote the serial number of the sprayer.

An identification plate indicating data for the sprayer is mounted in the steel frame near the front of the sprayer on the right-hand side.

The identification number for the sprayer is also punched into the steel frame near the ID plate.

Marque		N° de série	56250
Type-Variante Version	AH18 - 40412HA		
Année fabrication	2016	PV	10820
Masse maximale admissibles		PTAC	15420
Essieu 1 / attelage	7900	PTRA	
Essieu 2	7520	Réceptionné le	
Essieu 3		Par la DRIRE	

CE

56250- AH18 - 40412MA

Data

Marque		N° de serie	- 1 -
Type-Variante Version			- 2 -
Année fabrication	- 3 -	PV	- 7 - kg
Masse maximale admissibles		PTAC	- 8 - kg
Essieu1 / attelage	- 4 - kg	PTRA	- 9 - kg
Essieu 2	- 5 - kg	Réceptionné le	- 10 -
Essieu 3	- 6 -	Par la DRIRE	- 11 -



No.	Field name	Description
-1-	N° de série	The identification number uniquely identifies one specific sprayer amongst the lot. Defined type – related to type approvals definition: A grouping based on shared characteristics. E.g. lift sprayer, trailer sprayer, mist blower, field sprayer, self-propelled sprayer etc. In homologation and type approval context, the “Type” refers to the particular form and shape of a chassis (i.e. the chassis drawing number). Can be stated encoded
-2-	Type -Variante- Version	40: Speed 35 or 41: Tank capacity (3500 litre or 4100 litre) 1: TR4 or TR4R aluminium boom until 33 metre 2: RHA or RA boom more than 33 metre 3: HPZ or HAZ boom until 30 m 4: HPZ or HAZ boom more than 30 metre until 36 metre M: Axle mechanical variation H: Axle hydraulic variation A: MS18 (4 hydraulic motors) B: MS18 front and MS35 (2486/1091 cm ³) rear hydraulic. motors C: MS18 front and MS35 (2099/1049 cm ³) rear hydraulic. motors
-3-	Année fabrication	Year of shipment from factory
-4-	Essieu 1 / attelage	Axle load on front axle for a self-propelled
-5-	Essieu 2	Axle load on rear axle for a self-propelled unit
-6-	Axle 3	Unfilled
-7-	PV	Same as unladen weight. Vehicle net weight without load, but with fuel, driver etc. Typically the heaviest configuration is stated for all variants (most vehicles are lighter than the stated tare mass).
-8-	PTAC	Same as laden weight or gross weight. Definition: Weight of a vehicle, fully equipped and serviced, including the weight of the fuel, lubricants, coolant, vehicle tools and spares, crew, personal equipment, and load. Determined by design, dimensioning and/or homologation.
-9-	PTRA	Unfilled
-10-	Receptionné le	Unfilled
-11-	par la DRIRE	Unfilled

3 - Description

Sprayer Use

The HARDI sprayer is for the application of crop protection chemicals and liquid fertilizers. The equipment must only be used for this purpose. It is not allowed to use the sprayer for any other purposes.

If no local law demands that the operator must be certified to use spray equipment, it is strongly recommended to be trained in correct plant protection and in safe handling of plant protection chemicals to prevent unnecessary risk for persons and the environment, when carrying out your spray job.

Steel Frame

Very strong and compact steel frame / chassis with a strong chemically resistant and weatherproof electrostatic lacquer coat. Screws and bolts etc. are made of stainless steel, or they have been Delta/Magni-treated to resist corrosion.

Tanks

The tanks are made of impact-proof polyethylene, resistant to UV radiation and chemicals.

The main tank has a purposeful design with no sharp corners for easy cleaning.

The filling hole is placed so it can be accessed from the platform. This ensures an easy access for the filling and cleaning of the tank etc. The sprayer may also be equipped with a TurboFiller, a rinsing tank and a clean water tank. A large, easy-to-read tank level indicator is placed beside the platform, where it is visible from the cabin and in the work zone of the sprayer.

Nominal main tank content is 5100 litres.

Lifetime

The expected lifetime for the sprayer is 20 years.

To obtain this successfully, these instructions should be followed:

- All service and maintenance work must be completed in due time
- Repair any damages parts as quickly as possible
- Replace or change spare parts as instructed
- Only use original HARDI spare parts.

3 - Description

Liquid System

Pump

The design of the diaphragm pump is simple, with easily accessible diaphragms and valves, which ensures that liquid does not contact the vital parts of the pump.

Pump model 464/10 or 464/12



Valves and Symbols

The possible functions of valves are distinguished by coloured identification on the function labels. The modular valve system facilitates the addition of optional extras on both pressure side and suction side.

A function is activated by turning the handle towards the desired function.



ATTENTION! Only the functions used should be open - always close remaining valves.



ATTENTION! If a valve is too tight to operate, or too loose (= liquid leakage, the valve needs to be serviced. Please see "Adjustment of 3-Way Valve" on page 173 for further information.

Pressure Valve (Green symbols)

This valve is to select which function the pressurized liquid from the pump will be routed to.

The active function is indicated by the indicator.

The handle is turned so the desired symbol is just below the indicator mark. If the handle is turned to a position without a label with a symbol (unused function), the valve is closed.



Main tank



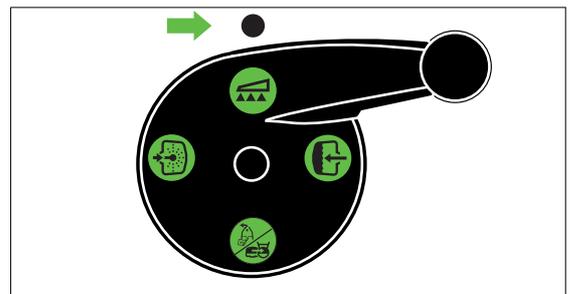
Spraying



Internal tank cleaning
(Rinsing nozzles)



Pressure draining or
TurboFiller



Suction SmartValve (Blue symbols)

This valve is to select suction from main tank or from the rinsing tank.

The handle is turned so the label for required function is directed to the indicator. If handle is turned to vertical position (indicator not pointing at a label) then the valve is closed.



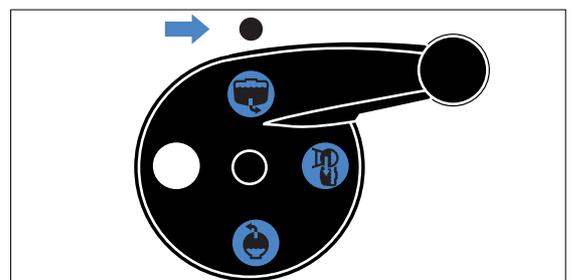
Main tank



Rinsing tank

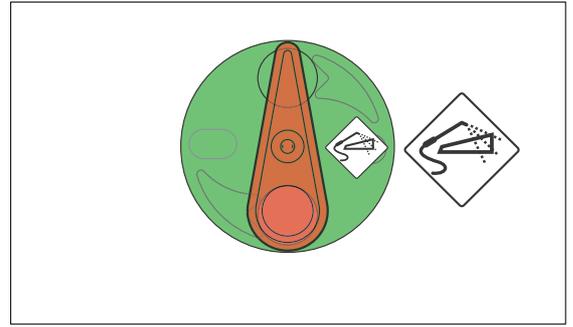


External filling (optional)



External cleaning (White symbol)

The valve is used for cleaning the outside of the sprayer



3 - Description

DynamicFluid4 Pressure Regulation

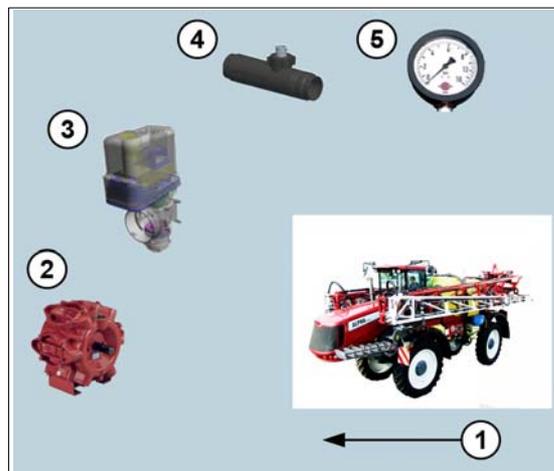
Traditional fluid regulation starts, when the nozzles are opened. With DynamicFluid4 (DF4), the regulation is a continuous process, even if the nozzles are closed. A synthetic or ceramic disc and a stainless steel disc regulate the pressure and ensure quick reaction and zero leakages. Used parameters are driving speed, PTO speed and the number of activated boom sections. The benefit is more precise application rates from the second the sprayer begins spraying.

The DF4 system is based on 5 sensors, which feed the sprayer's computer with data necessary for optimal regulation. It auto-primers at start-up and starts to move the regulation valve towards the final position, immediately after the operator makes changes. For example, when section valves are opened or closed, the regulation valve is started at the same time as the motors for the section valves are started. This prevents overpressure situations e.g. after running empty and refilling of the main tank.

The sensors are also back-up for each other, ensuring that the system can continue regulation - even if one or more sensor signals fails.

The applied 5 sensors measure:

1. Driving speed (km/h)
2. Pump speed (rpm)
3. Regulation valve, opening angle (degrees)
4. Fluid flow (l/min)
5. Fluid pressure (bar)



Features for DF4

- Very fast and accurate regulation when all sensors are active, setup in controller menus are correct, and pump, filters and valves are in good condition. The system measures and calculates 20 times per second.
- Quick reacting valve, when sections are turned ON/OFF, and at speed changes.
- Optimized Auto Section Control feature that predict boom sections to open and optimized nozzle pressure.
- Optimized for different PTO systems.
- Nozzle surveillance. No setup or tuning is required for nozzle change.
- Controller display can show the current nozzle output, which can be compared with the rated output. A significant difference in output is caused by failures occurring on boom plumbing, such as severe clogging of filters, or because of large leakages on hoses and fittings.
- All functions work through with degraded performance (limp-home modes), if filters are cleaned.

Screen icons

The sprayer driver selects one of three modes Auto, Manual or Increment steps. The sprayer computer detects one of three regulation modes Drop, Question mark or calibration jug. This makes 9 modes in total.

Auto	Manual	Increment steps	
When Automatic Volume Rate button is pressed on the SetBox.	When one of the Manual pressure control buttons is pressed on the SetBox.	When the Volume Rate is changed in steps with %-up or %-down buttons on the Terminal.	
			Calibration jug There is flow to section valves. Nozzle size (L/min at 3 bar) has been calculated.
			Drop There is no flow to section valves. The pump is not started or the pressure SmartValve is set to other function than spraying.
			Question mark There is flow to section valves but pressure and flow has not yet been stable, therefore the nozzle size (L/min at 3 bar) has not been calculated. The system uses the previously stored nozzle size.

3 - Description

Filters

Filters on your sprayer are there to protect the components and prevent nozzle blockage.

An Easy Clean suction filter is fitted in the working zone.

A Cyclone pressure filter is fitted on the sprayer's right side just in front of the hose reel, hidden behind the right front cover. It has a built-in self-cleaning function.

In-line pressure filters can be fitted at each boom section.

Nozzle filters are fitted at each nozzle.

A coarse filter is located below the top cover for the main tank.



ATTENTION! All filters should always be in use and their function should be checked regularly. Pay attention to the correct combination of filter and mesh size. For more, see the chapter "Technical Specifications" in this book.



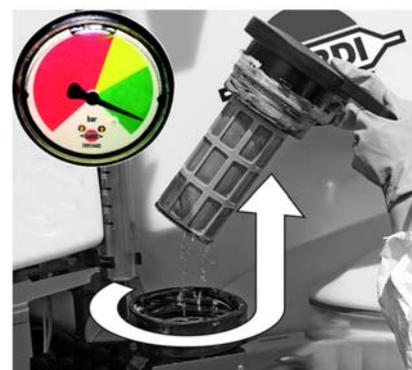
ATTENTION! Always run your sprayer with cleaned filters to ensure proper functions and to protect the interior of the pump and valves.

Easy Clean Filter

This filter collects impurities, when liquid is being sucked out of the main tank by the main pump.

To ensure proper function of the filter and its built-in valve, the filter must be opened at least once every month. A label on the lid also designates this.

Besides the spray pressure gauge a clogging indicator is installed. This works as a vacuum gauge for the filter during operation - the pointer moves from green towards red, if the filter starts clogging.



Clogging indicator	Filter condition
Green area	70 - 100 % capacity. No cleaning necessary.
Yellow area	55 - 70 % capacity It is possible to finish an ongoing spray job and then clean the filter afterwards.
Red area	0 - 55 % capacity Clean the filter immediately, as it is clogged too much for proper function.

Cyclone Filter

With the CycloneFilter, any impurities in the spray liquid will be cleaned out and returned to the main tank via the return flow.

Function diagram:

1. Filter lid
2. Piping from pump
3. Piping to boom
4. Return to tank
5. Return valve

The return valve (5) has three positions marked with small dots on the lever:

- A. This position is marked with 1 dot:

There is no return flow. This position is used when rinsing the boom, if there is spray liquid in the main tank. Also used when high spraying volume is required.

- B. This position is marked with 2 dots:

Normal position when spraying. With return flow to prevent filter from clogging during spraying. This position is used when rinsing the boom, if the main tank is empty.

- C. This position is marked with 3 dots:

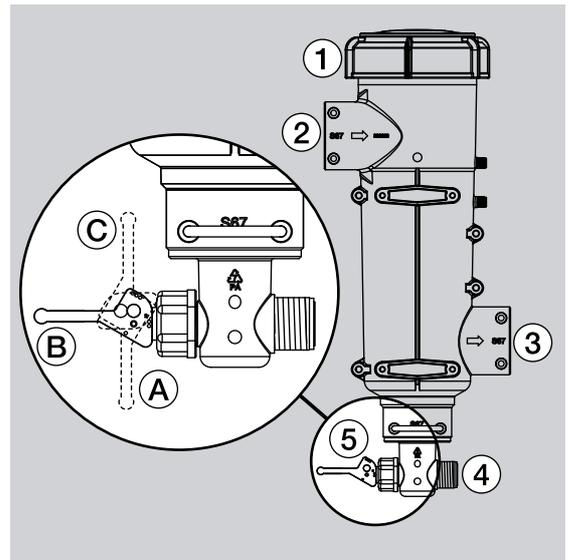
Flushing position which is used if the filter is clogged. Lift and hold the lever to use this position, which largely increases return flow and flushes the filter. The pressure SmartValve must be set for "Spraying".



ATTENTION! Use of position C is no guarantee for a clean filter. Always do a visual inspection and cleaning of the filter. For more about cleaning, see the section "CycloneFilter" on page 159.



DANGER! Never open the Cyclone filter unless the pressure SmartValve is set to 'Main tank'. Otherwise spraying liquid may hit you, when opening the filter, and this will also drain the main tank!



3 - Description

TurboFiller

The TurboFiller is where you add the chemicals to be mixed with water in the main tank.

Capacity: approximately 35 litres.

By operating the valves (A) on the side and valve (B) of the TurboFiller (C), you can do the following:

- Stir up the added chemicals with water from the sprayer.
- Transfer the mix to the main tank.
- Clean your chemical container or the TurboFiller inside by using the flushing nozzle.

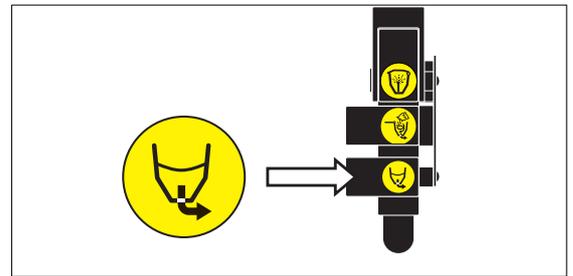
A spray gun (D) is also available for further cleaning.



TurboFiller Suction Valve

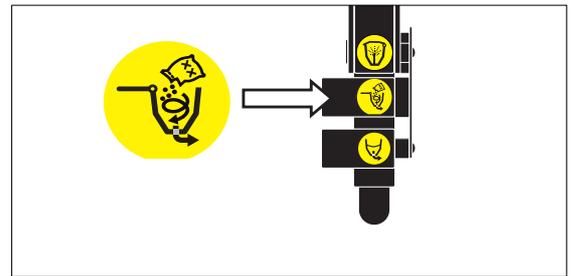
The valve is used simultaneously with the TurboFiller. The valve has 2 settings: Continuously open or spring-loaded normally closed.

Open the valve by lifting the lever up, when chemicals are to be filled into the TurboFiller and transferred to main tank.



TurboDeflector Valve

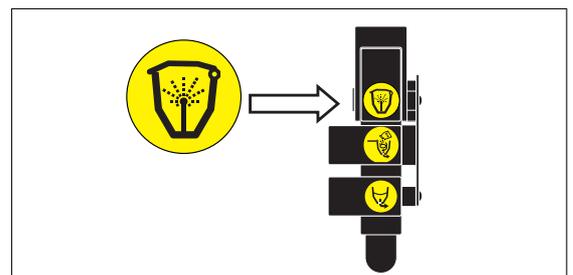
This TurboDeflector valve activates the vortex flushing of the TurboFiller. Lift the lever to lock it in open position for continuous liquid rotation in the hopper.



Rinsing of Chemical Containers

The upper lever is used for two purposes.

1. When the TurboFiller lid is open:
For rinsing empty containers. Place the container over the rotating flushing nozzle in the middle of the TurboFiller to rinse the inside of the container.
2. When the TurboFiller lid is closed:
Use the lever to rinse the hopper, when the filling of chemicals is completed.



DANGER! Do not activate this lever, unless the multi-hole nozzle is covered by a container, as spray liquid may otherwise hit the operator! Risk of injuries and spillage on the ground.

Rinse Tank

The rinsing tank is mounted in front of the main tank and made of polyethylene. It is used for rinsing and flushing of the main tank and liquid system.

Filling is done at the top of the tank or via the 1" threaded pipe socket in the working area.

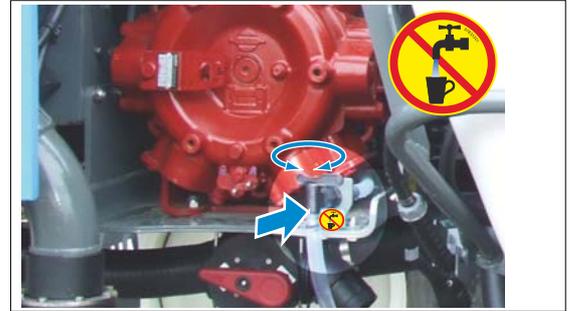
Capacity: approximately 600 litres.

Clean water Tank

A clean water tank is located on the left side of the sprayer

The water in this tank is for hand washing with clean water from the tap

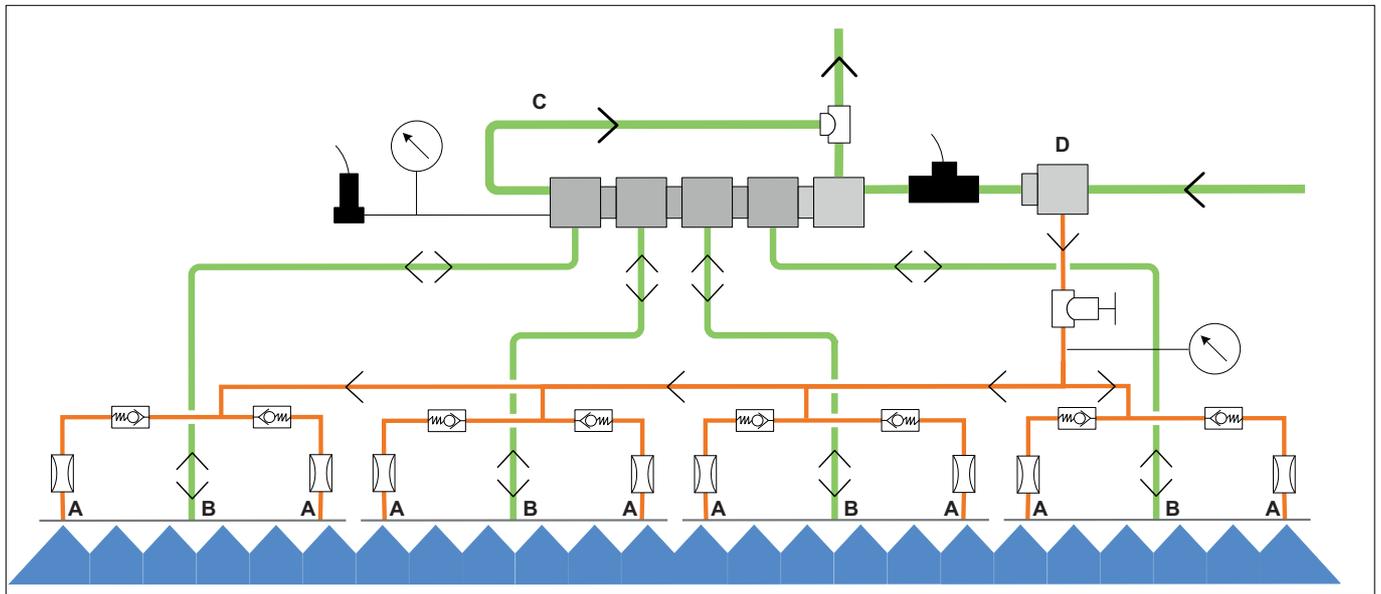
Capacity: approximately 15 litres.



3 - Description

BoomPrime

BoomPrime is a low pressure circulation system, which primes the spray boom tubes prior to spraying, ensuring a homogeneous fluid in the boom tubes and in the main tank. Below the illustration shows the BoomPrime system for the boom. Components are explained in the diagrams for the liquid systems.



- The BoomPrime system is attached to each end of a boom section (A).
- The boom spray sections are fed into the middle of each section (B).

Liquid for BoomPrime is led through a valve (D) just before the flowmeter (F). This valve operates in opposite phase:

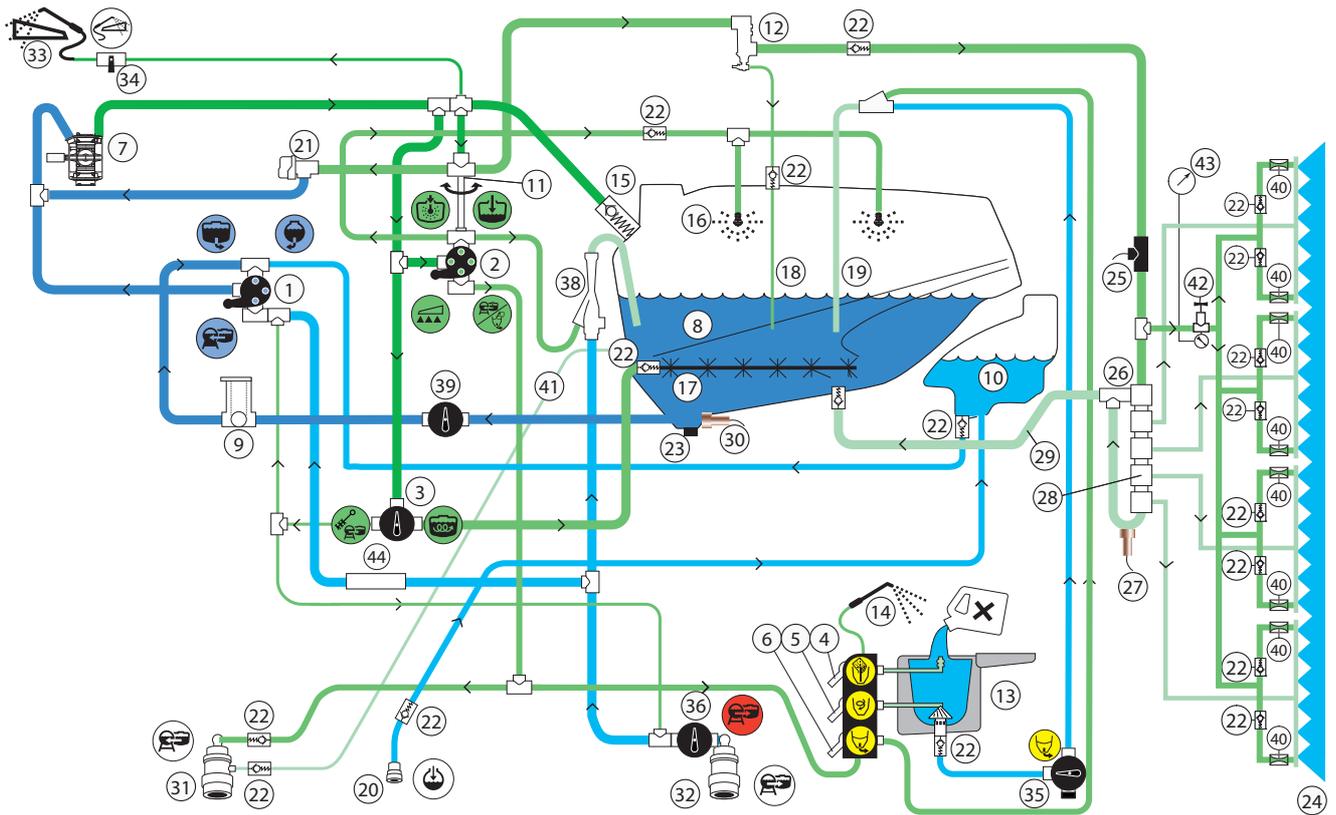
Operating state	Section valves	BoomPrime valve
Spraying	Open	Closed
Not spraying	Closed	Open

When priming, the direction of liquid flow will be reversed. The liquid will be fed into the nozzle pipes from each end, and they will then return any water back to the main tank through the return line for EFC section valves (C).

The BoomPrime pressure is adjusted by the handle on the control valve (E), which includes a pressure gauge.

For adjustment, see the section “BoomPrime Adjustment”.

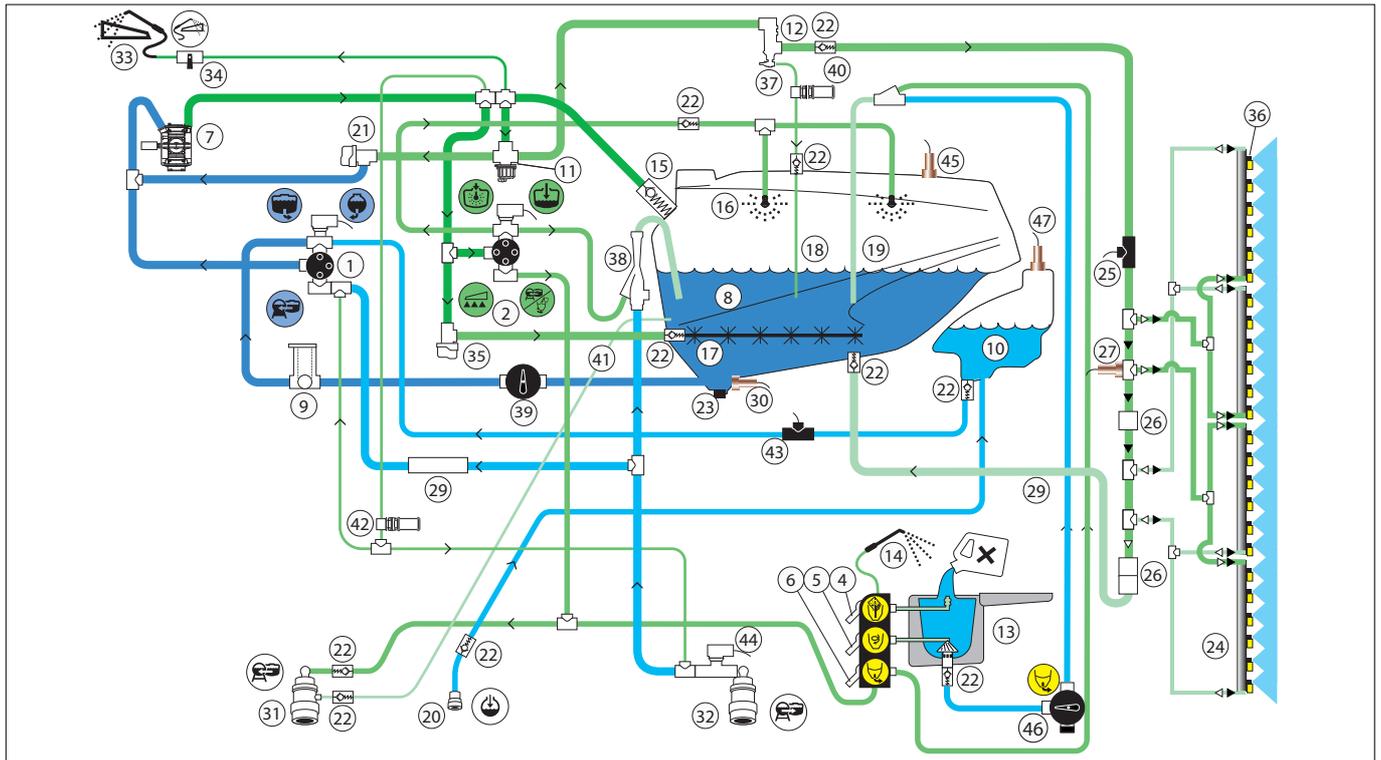
Diagram - Liquid system with optional extras



- | | |
|---|---|
| 1. Suction SmartValve | 23. Drain valve |
| 2. Pressure SmartValve | 24. Sprayer boom |
| 3. Agitation/Cleaning valve | 25. Flowmeter |
| 4. Chemical container cleaning valve | 26. Bypass valve |
| 5. TurboDeflector ON/OFF valve | 27. Sensor for pressure gauge |
| 6. TurboFiller suction ON/OFF valve | 28. Distribution valves |
| 7. Pump | 29. Return from distribution valves |
| 8. Main tank | 30. Main tank gauge sensor |
| 9. EasyClean filter | 31. Pressure draining coupler |
| 10. Rinse Tank | 32. FastFiller coupler |
| 11. Spray valve | 33. External cleaning device (optional) |
| 12. CycloneFilter | 34. External cleaning ON/OFF valve (optional) |
| 13. TurboFiller | 35. TurboFiller vacuum valve ON/OFF |
| 14. Lance for cleaning TurboFiller | 36. External fast filling ON/OFF valve (optional) |
| 15. Safety valve | 37. Boost valve |
| 16. Internal tank cleaning nozzles | 38. Ejector |
| 17. Agitation tube | 39. Main tank suction ON/OFF valve |
| 18. Return line for boost function | 40. Boom prime restrictor (optional) |
| 19. TurboFiller to tank tube | 41. Pressure relief line |
| 20. RinseTank coupler | 42. Boom prime pressure control valve (optional) |
| 21. DynamicFluid4 pressure regulation valve | 43. Pressure gauge for BoomPrime (optional) |
| 22. One-way valve | 44. Suction In-line filter |

3 - Description

Diagram - Intelligent liquid system with optional extras



- | | |
|---|--|
| 1. Suction SmartValve | 25. Flowmeter |
| 2. Pressure SmartValve | 26. Distribution valves |
| 3. Agitation/Cleaning valve | 27. Sensor for pressure gauge |
| 4. Chemical container cleaning valve | 28. Suction In-line filter |
| 5. TurboDeflector ON/OFF valve | 29. Suction In-line filter |
| 6. TurboFiller suction ON/OFF valve | 30. Main tank gauge sensor |
| 7. Pump | 31. Pressure draining coupler |
| 8. Main tank | 32. FastFiller coupler |
| 9. Easy Clean filter | 33. External cleaning device |
| 10. Rinse tank | 34. External cleaning ON/OFF valve |
| 11. Spray valve | 35. Auto Agitation valve |
| 12. CycloneFilter | 36. PrimeFlow ON/OFF valve (optional) |
| 13. TurboFiller | 37. Boost valve |
| 14. Lance for cleaning TurboFiller | 38. Ejector |
| 15. Safety valve | 39. Main tank suction ON/OFF valve |
| 16. Internal tank cleaning nozzles | 40. Boost line ON/OFF valve |
| 17. Agitation tube | 41. Pressure relief line |
| 18. Return line for boost function | 42. Clean valve |
| 19. TurboFiller to tank tube | 43. Rinse tank flowmeter |
| 20. Rinse tank coupler | 44. External Fast filling ON/OFF valve |
| 21. DynamicFluid4 pressure regulation valve | 45. Main tank full sensor |
| 22. One-way valve | 46. TurboFiller ON/OFF valve |
| 23. Drain valve | 47. Rinse tank full sensor |
| 24. Sprayer boom | |

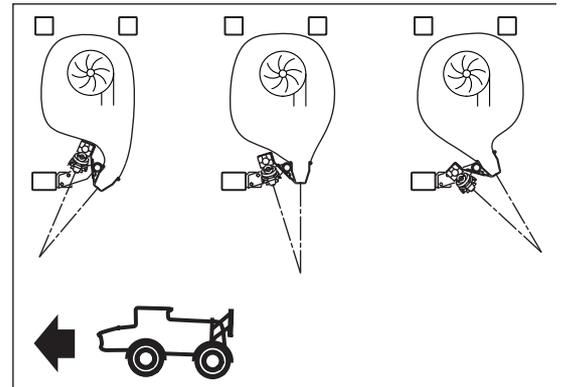
TWIN Air technique

General info

With TWIN air assistance energy is added to the spray droplets to improve control with the spray liquid. The main purpose of the TWIN angling system is to counteract for the negative influence which wind direction and driving speed have on the quality of the spray job. Further the “co-angling” of air and liquid can help “opening” dense crops for better penetration.

This way TWIN makes it possible to:

- carry the spray droplets safely to the target and increase plant deposit.
- minimize off-target deposit due to wind drift or loss on the ground.
- open the crop and obtain good penetration even with a low volume rate.
- ensure a high coverage.



The TWIN FORCE air system can be set at any angle from 40° forward to 30° back (defined by the air stream). The fan speed is infinitely variable and can produce from 0 to 35 m/s (78 mph) air speed at the air outlet. This equals from 0 to 2000 m³ air/m boom/hour (3.872 CFM/A boom/hour).

3 - Description

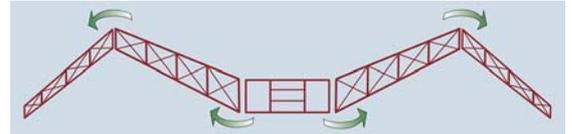
Boom

Standard Boom Features

- Individual tilt of boom wings.
(HAZ boom type only)



- Each boom wing is 2-folded.



- Alternative boom width:
The boom may be used in 1/2-folded boom width.



- Spring-loaded breakaway section.

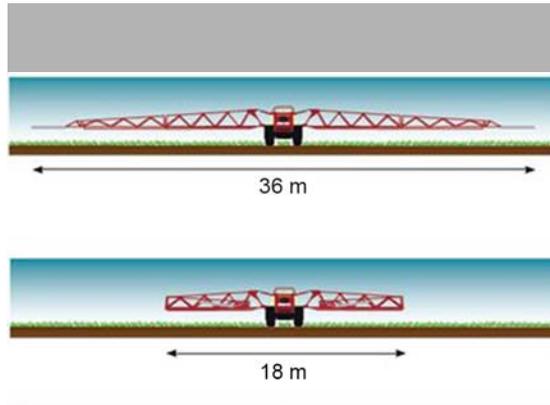


- Air blowers for TWIN Air system.
These are driven by a built-in hydrostatic transmission powered by the engine.
The air speed can be adjusted from the cabin.



Available Working Widths - Aluminium

Full working width (meters)	1/2-folded width (meters)	Type
24	15	TR4
27	15	TR4
28	15	TR4
30	16	TR4
32	18	TR4
33	18	TR4
36	18	RHA
36	18	RHA
19	38	RA
40	20	RA
42	21	RA
44	22	RA



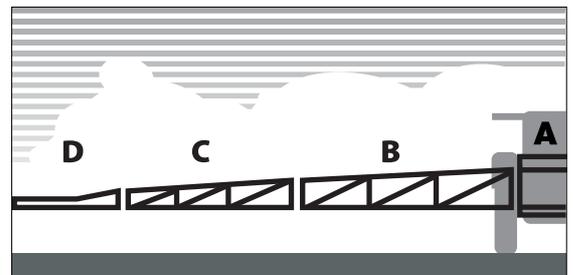
Available Working Widths - TWIN Force

Full working width (meters)	Type
24	Force TWIN Force
27	Force TWIN Force
28	Force TWIN Force
30	Force TWIN Force
32	Force TWIN Force 3.1
33	Force TWIN Force 3.1
36	Force TWIN Force 3.1

Terminology

For this 2-folded boom the terminology is as follows:

- A. Centre section
- B. Inner wing
- C. Outer wing
- D. Breakaway section



3 - Description

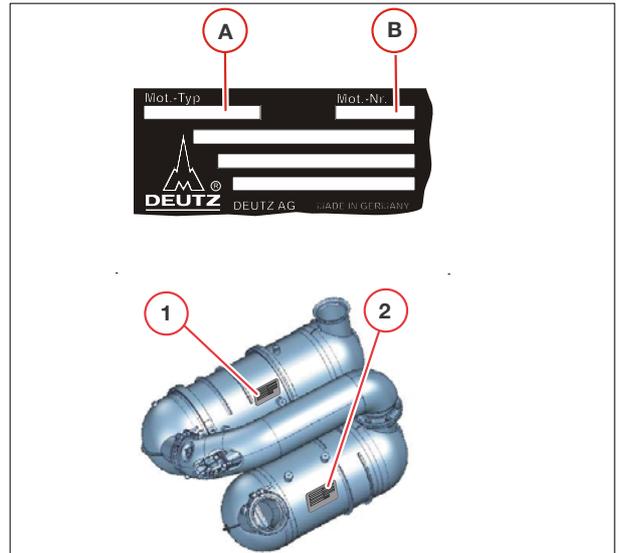
Engine

Rating plates of engine and aftertreatment gas system

The type (A), serial number (B), and technical data are stamped on the rating plate

1. Rating plate of the diesel particle filter
2. Rating plate of the SCR catalyst

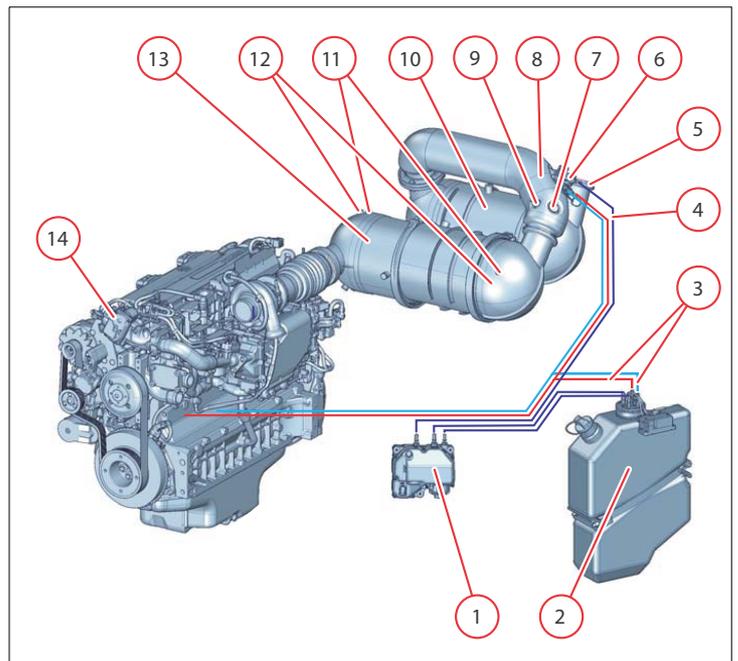
For all information, please provide the type and the engine serial number



Exhaust gas after-treatment

DEUTZ TIER 4 TCD 6.1L6 160 KW or 180 KW series are provided with a diesel oxidation catalytic converter and a particle filter. The regeneration of this diesel particle filter is automatic and no actions is necessary.

1. AdBlue supply pump
2. AdBlue tank
3. Coolant line to pre-heat the AdBlue tank to cool the dosing device
4. AdBlue line
5. NOx sensor
6. Dosing device
7. NOx sensor
8. Exhaust temperature sensor
9. Pressure sensor
10. SCR catalytic converter
11. Differential pressure sensor
12. Exhaust temperature sensor
13. Diesel particle filter
14. Throttle valve



Diesel oxidation catalytic converter

The diesel oxidation catalytic converter has a catalytic surface which is used to convert the pollutants in the exhaust gas into harmless substances. Here, carbon monoxides and unburned hydrocarbons are made to react with oxygen and converted into carbon dioxide and water. In addition, the nitrogen monoxides are converted to nitrogen dioxides. Temperatures greater than 250 °C are necessary for a high degree of efficiency.

Diesel particles filter

The combustion of diesel fuel results in soot, which is separated in the diesel particle filter. This must be regenerated as the contamination with soot increases. That means that the soot in the diesel particle filter is burned. The regeneration is based on a continuous regeneration process, which is activated as soon as the exhaust temperature of 250 °C is exceeded at the inlet of the exhaust gas after-treatment system. The filter contamination with soot is monitored continuously by the engine control unit.

Regeneration

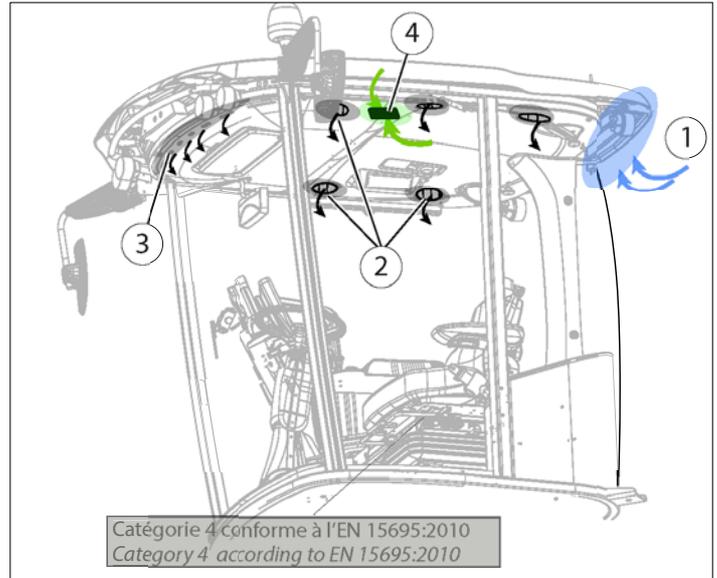
The passive particle filter system burns the soot in the filter with the nitrogen oxides in the exhaust which are oxidised in the DOC beforehand. This process runs continuously once the exhaust temperature has exceeded 250°C. The passive particle filter system does not contain a burner. A prerequisite for the passive continuous regeneration is having a sufficient ratio of nitrogen oxides to soot in the raw exhaust gas of the engine.

3 - Description

Cabin

Description

1. Filter air inlet
2. Adjustable air vent
3. Air circulation for demisting
4. Air recirculation gratings



In compliance with Standard EN 15695, the cab is equipped with:

- a Category 4 air filter;
- a ventilation and pressurization system capable of injecting at least 30 m³/h of fresh external air into the cab and maintaining cab pressure at least at 20 Pa higher than the pressure outside. This keeps external air from passing through the openings into the cab that are inevitably present and mixing with the suspended chemical substances.



to reduce risk of exposure to dangerous substances:

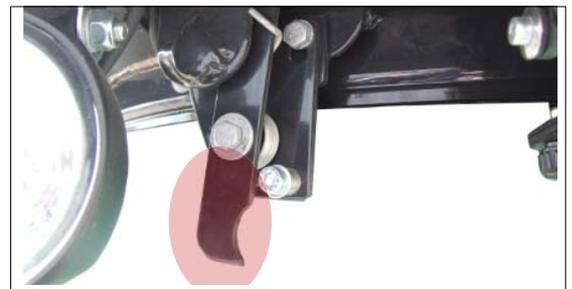
- Do not store used pesticides in the cab;
- Keep the inside of the cab clean. Remove contaminated shoes and clothes;
- The Category 4 filter and the anti-dust used in the cab must be treated in accordance with the regulations in force for contaminant wastes. See section: "Greasing the pump" page 160 ;
- Follow manufacturer's instruction for cleaning personal protective clothing and equipment (PPE), in compliance with the regulations in force

Open the cabin roof

For maintenance of the cabin (air conditioning, fuses, electrical circuits, etc ...), It is necessary to lift the roof of the cabin.

Servicing

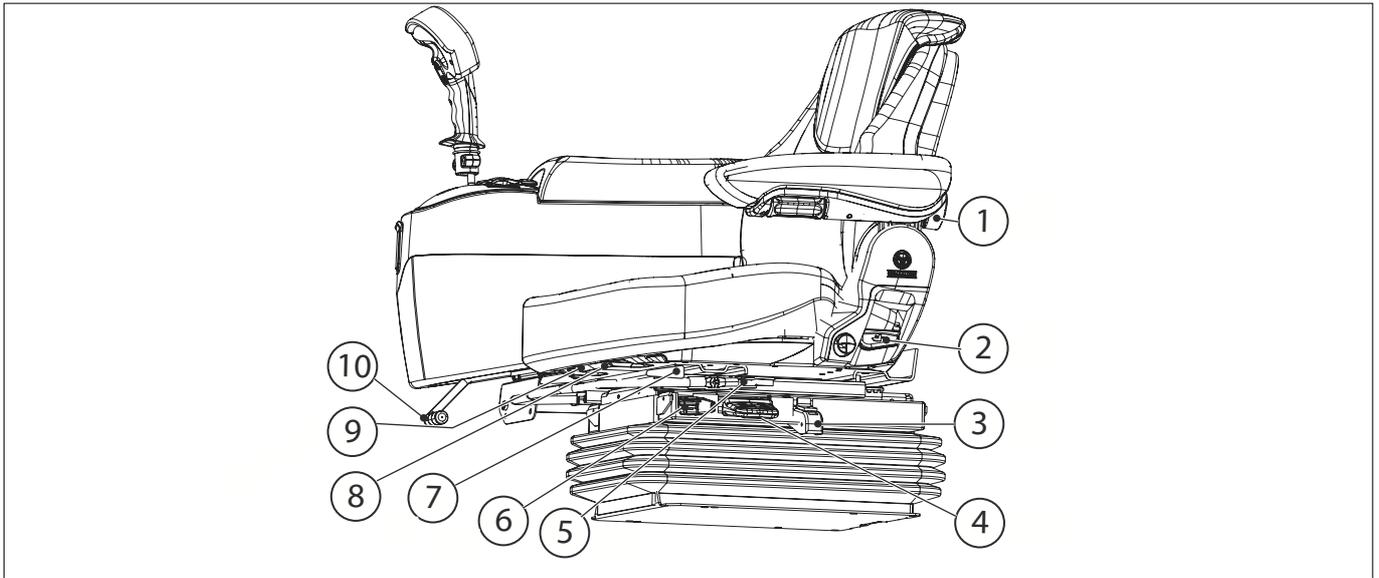
- Loosen the hand screws located in the cabin.
- Handle the lever to unlock the cabin roof
- Raise the roof et put the end of rod into the slot.



DANGER! To prevent the roof from falling, make sure that the rod is correctly positioned in the slot

Description of driver's seat

ALPHA Evo EcoDrive is fitted with high quality professional seats. A user guide for the seat is supplied separately. You should read it in full before using the vehicle for the first time, and comply with the safety instructions on how the seat operates.



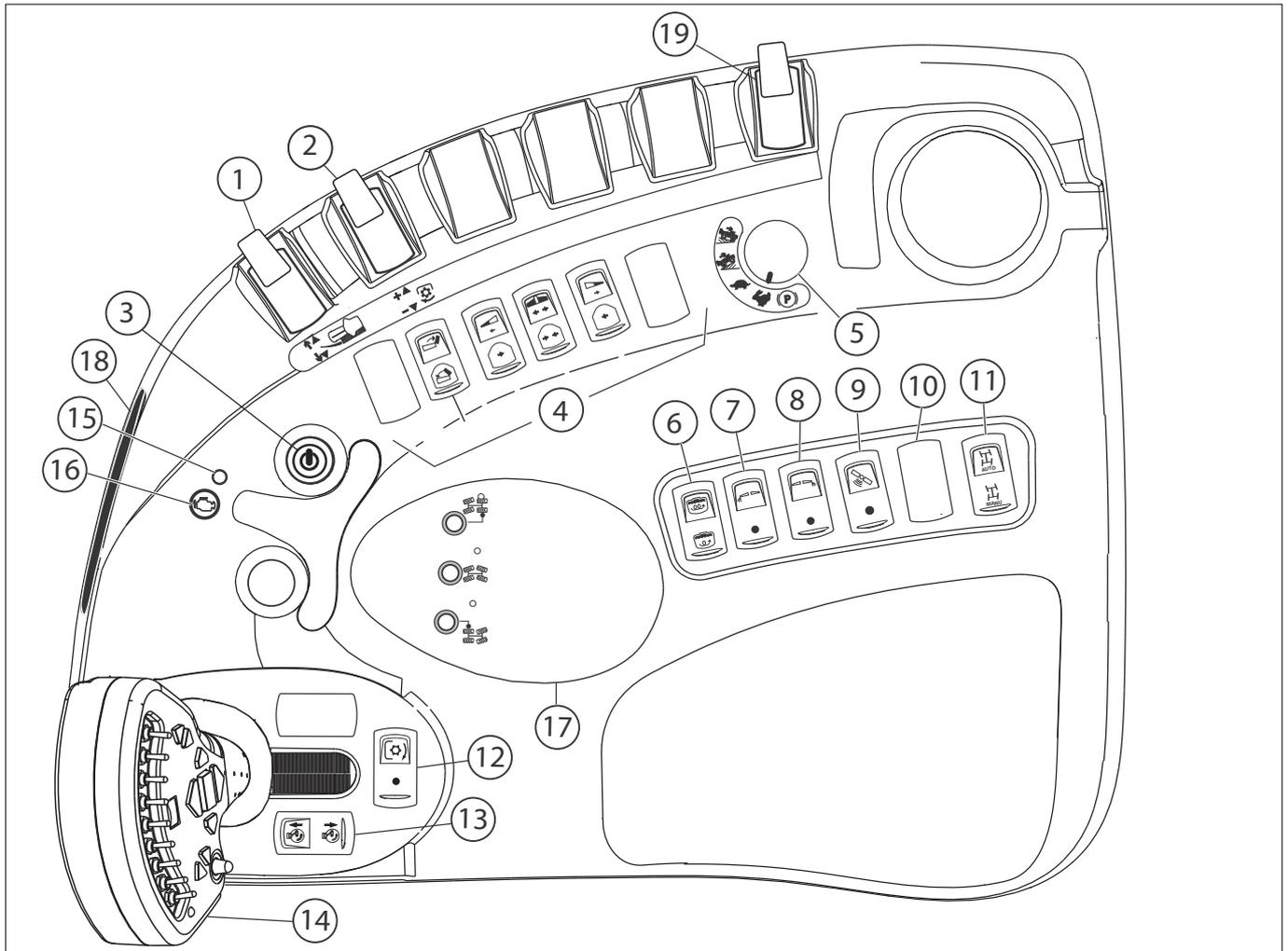
- | | |
|--|--------------------------------------|
| 1. Adjusting the backrest | 6. Horizontal damper |
| 2. Adjusting the inclination of the backrest | 7. Lengthwise adjustment |
| 3. Seat damping | 8. Seat inclination adjustment |
| 4. Weight + seat height adjustment | 9. Seat depth adjustment |
| 5. Rotation mechanism | 10. Lengthwise adjustment of console |



NOTE! The numbers in brackets correspond to the description in the GRAMMER seat user manual.

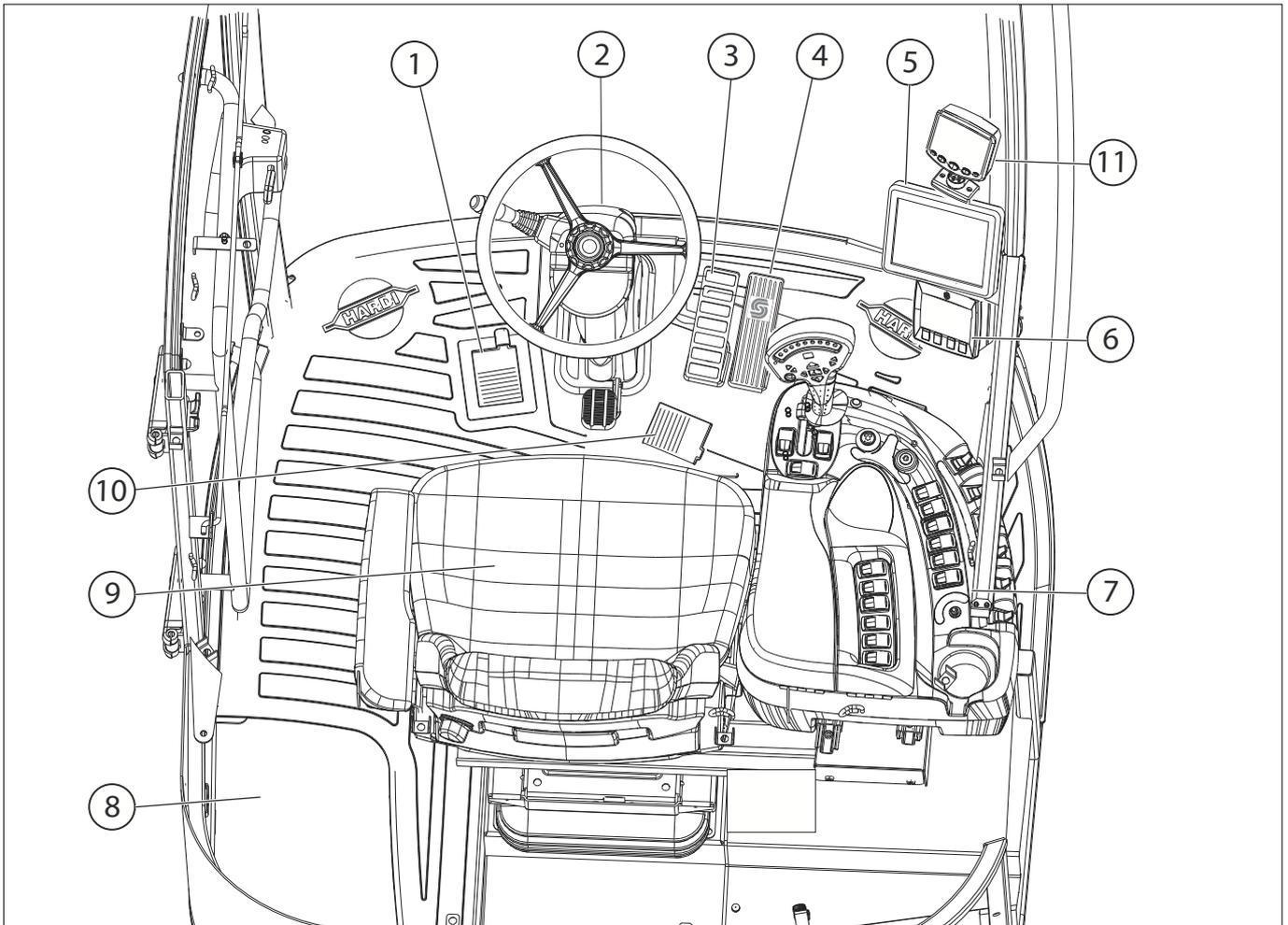
3 - Description

Control Panel

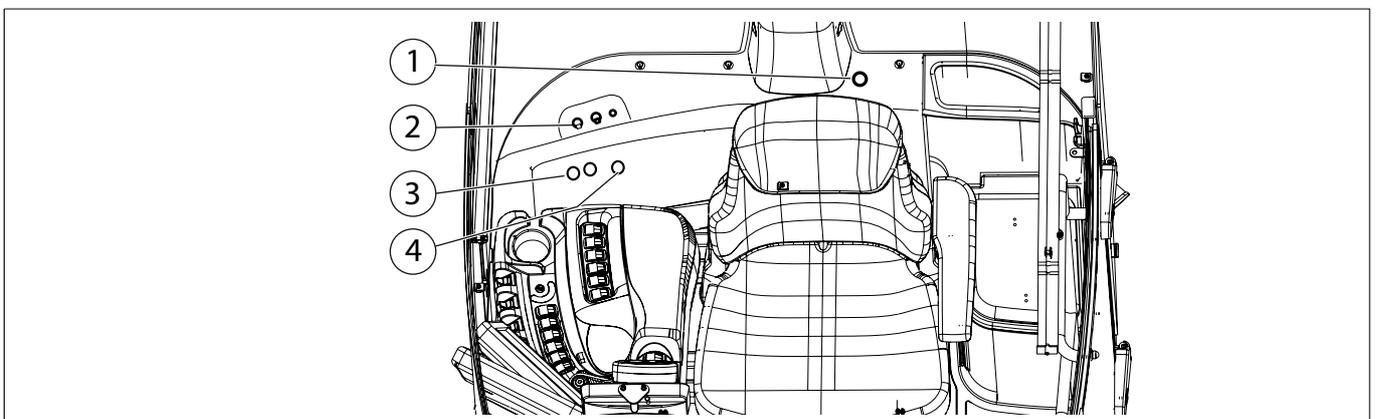


1. Interrupteur Ouverture / Fermeture de la passerelle.
2. Interrupteur de réglage de la vitesse de rotation de la pompe de pulvérisation.
3. Interrupteur Marche/Arrêt antipatinage (option)
4. Interrupteurs des fonctions hydrauliques de la rampe.
5. Sélecteur de vitesse et frein de stationnement.
6. Interrupteur de l'agitation en cuve principale.
7. Interrupteur de commande buse d'extrémité gauche
8. Interrupteur de commande buse d'extrémité droit
9. Interrupteur marche et arrêt du dispositif de guidage.
10. Non utilisé.
11. Interrupteur Marche/Arrêt du système 4 roues directrices automatique.
12. Interrupteur d'embrayage de pompe de pulvérisation.
13. Interrupteur de variation du régime moteur.
14. Poignée d'avancement multifonctions.
15. Voyant de mise sous tension des calculateurs.
16. Voyant de défaut du moteur.
17. Commande du mode 2 / 4 roues directrices.
18. Cendrier.
19. Interrupteur voie variable hydraulique

General description of operator's seat



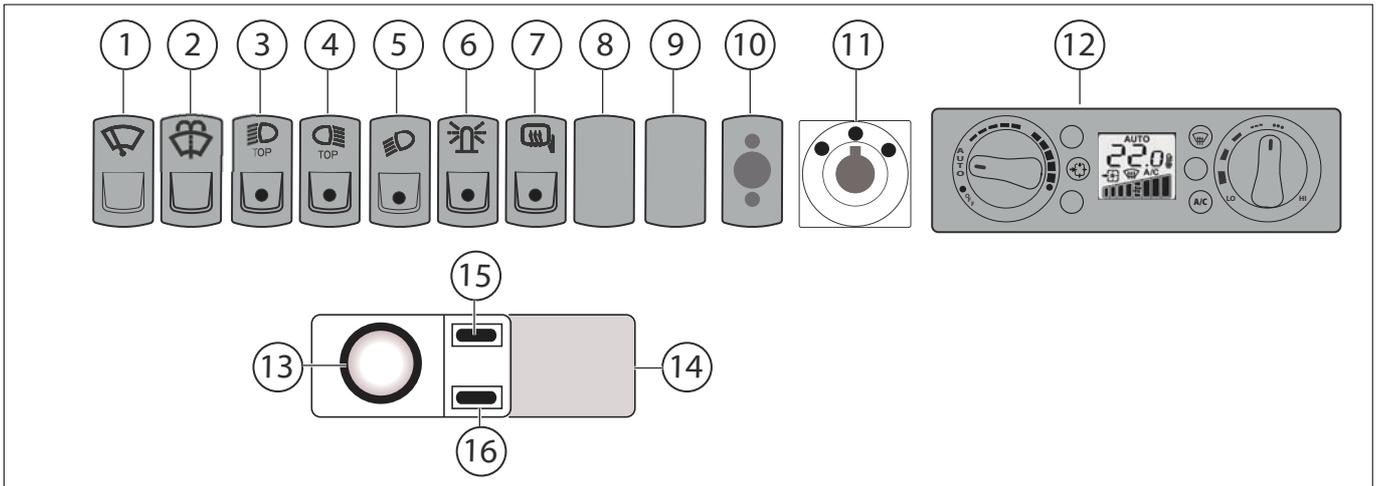
- | | |
|--------------------------------|-----------------------------------|
| 1. 4-wheel drive control pedal | 6. Multi-function display |
| 2. Adjustable steering column | 7. Side console |
| 3. Brake pedal | 8. Refrigerated lunch box |
| 4. Throttle pedal | 9. Adjustable driver's seat |
| 5. HC9500 ISOBUS console | 10. Difflock pedal |
| | 11. Adjustable track control unit |



- | | |
|-----------------------------|----------------------|
| 1. Cigarette lighter socket | 3. Diagnostic socket |
| 2. 12V sockets | 4. Diagnostic socket |

3 - Description

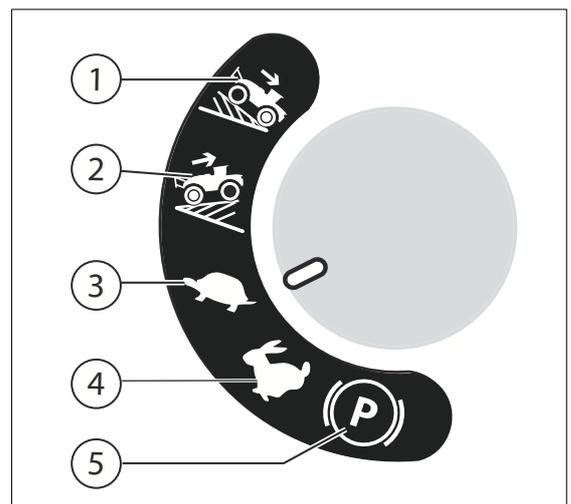
Cabin ceiling controls



1. 2-position windscreen wiper switch (permanent, intermittent) switch
2. Windscreen washer switch.
3. Front working headlights switch.
4. Rear working headlights switch.
5. Boom lighting switch.
6. Hazard light switch.
7. Not used.
8. Not used
9. Not used.
10. Temperature sensor.
11. Wing mirror adjustment switch.
12. Air conditioning control unit.
13. Map light.
14. Cabin lightning.
15. 3-position ceiling light switch.
16. Map light switch.

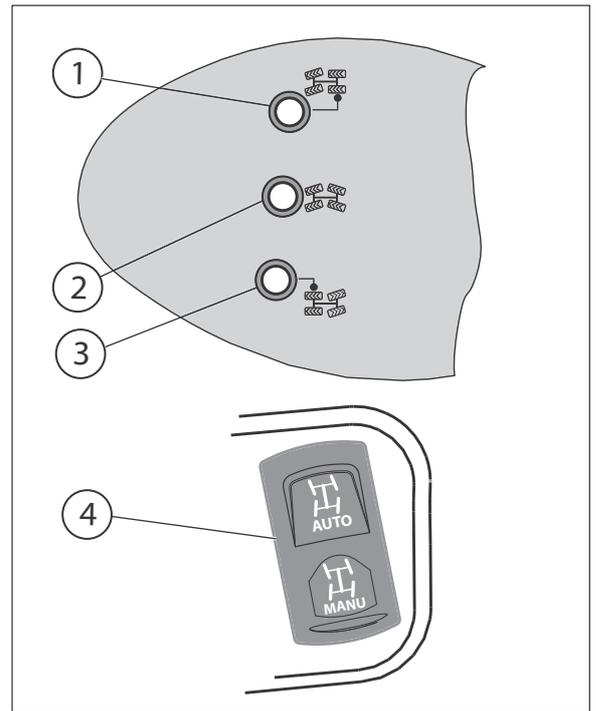
Speed selector and Parking brake

1. FIELDS mode (Downhill).
2. FIELDS mode (Uphill).
3. FIELDS mode
4. AUTOMOTIVE mode (Road).
5. Parking brake.



4-Wheels Steering (standard)

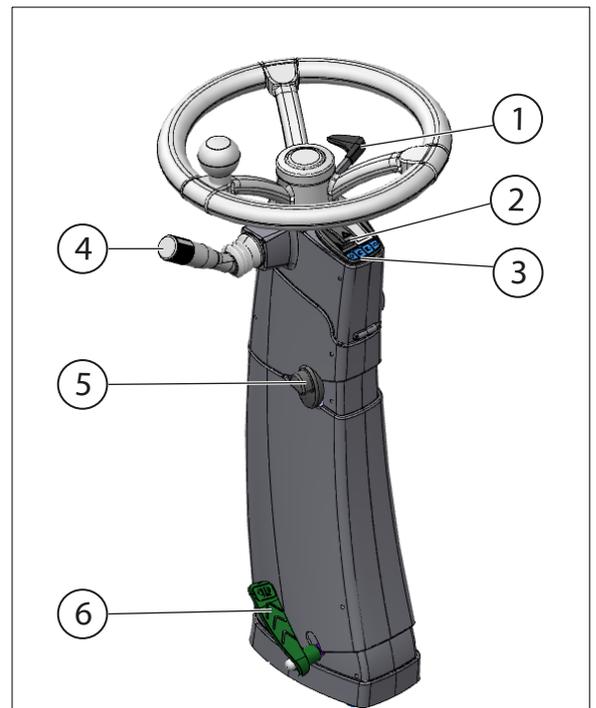
1. Green indicator - Rear wheels aligned.
2. Blue indicator - 4-wheels engaged.
3. Green indicator - Front wheels aligned.
4. Automatic/ Manual mode



Steering column

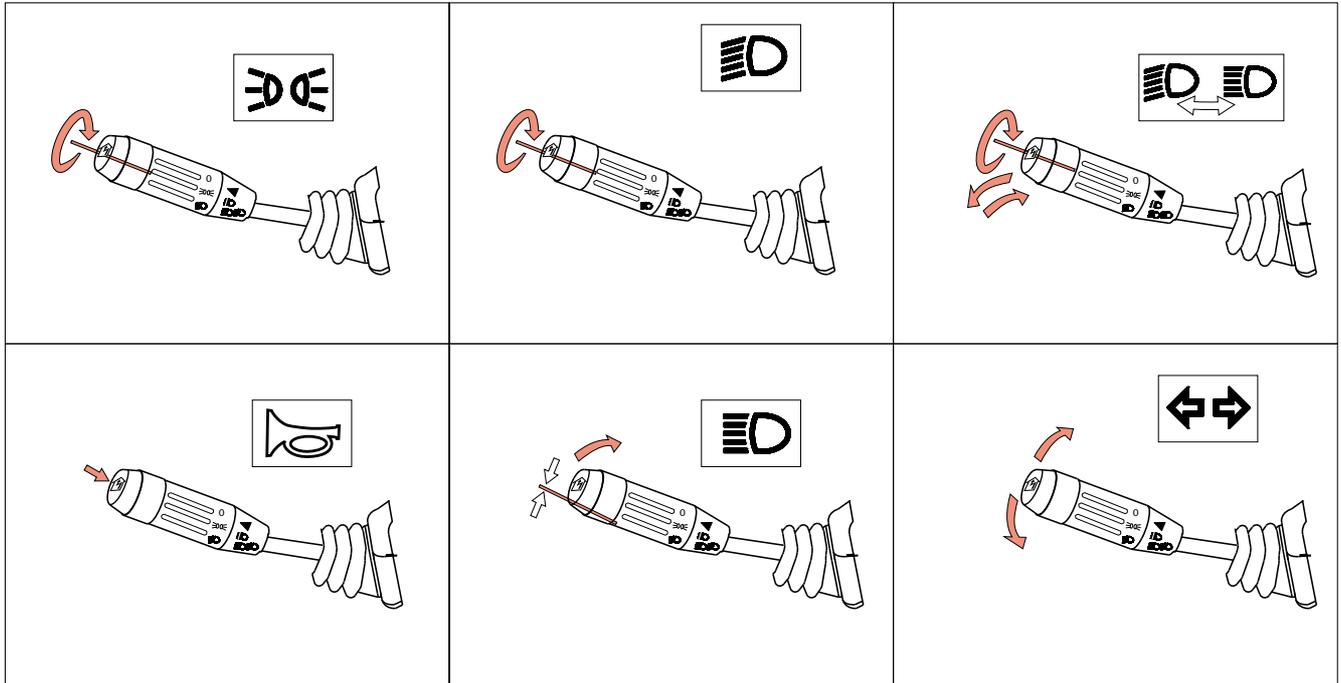
Description

1. Wheel steering move up or down handle
2. Hazard light control
3. Direction and main beam indicator
4. Lights and horn controls
5. Wheel steering tilting
6. Steering column tilting



3 - Description

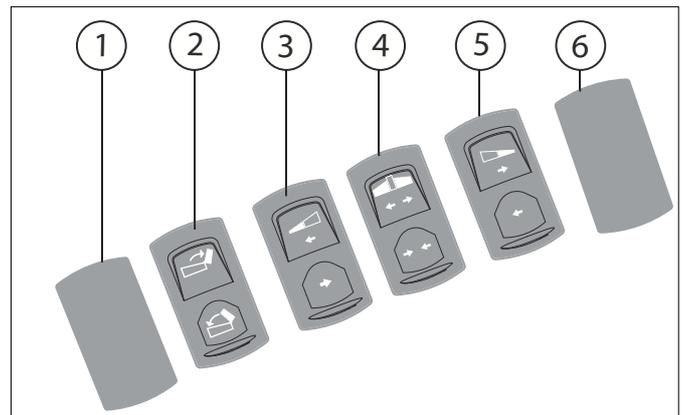
Lights controls



Aluminium Hydraulic controls

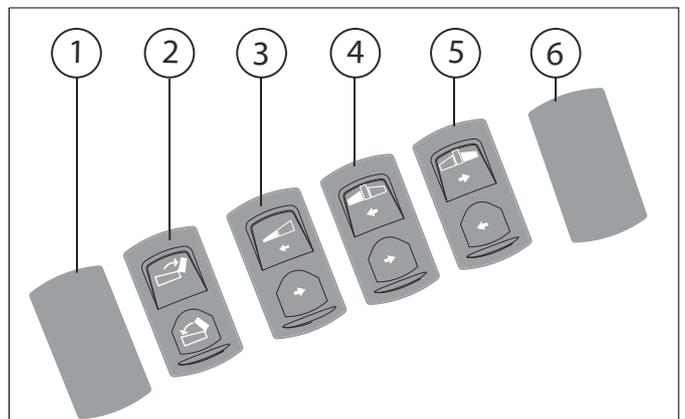
Inner wings simultaneously controlled .

1. Not used
2. Right and left extensions.
3. Left outer section
4. Folding left and right inner sections.
5. Right outer section.
6. Not used.



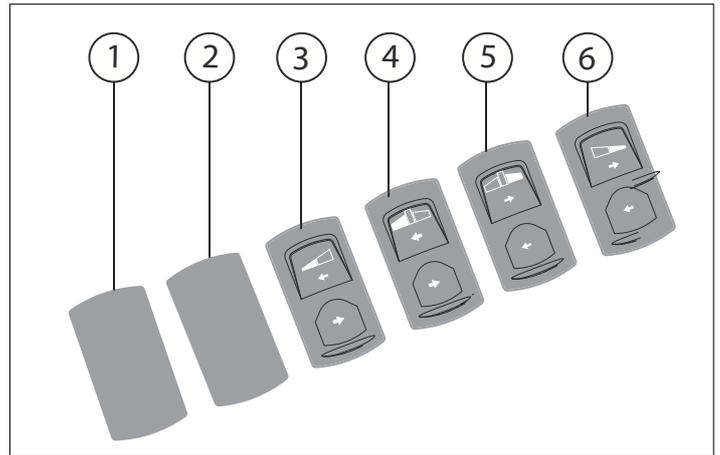
Inner and outer wings simultaneously controlled.

1. Not used.
2. Right and left extensions.
3. Left and right outer sections.
4. Left and right inner sections.
5. Left and right inner sections.
6. Not used.



Inner and outer wings independently controlled.

1. Not used.
2. Not used.
3. Folding left outer sections.
4. Folding left inner sections.
5. Folding right inner sections.
6. Folding right outer sections

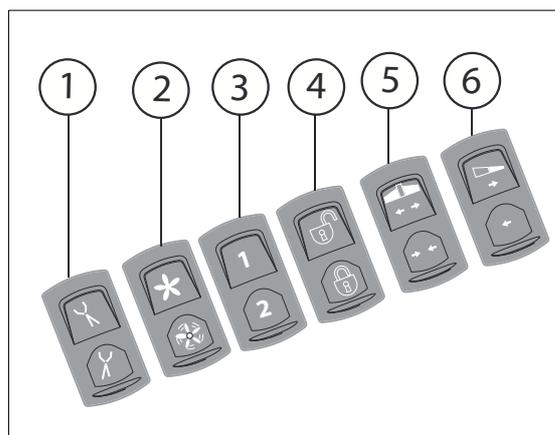


3 - Description

HAZ boom hydraulic function controls

This configuration relates to sprayers equipped with the HAZ central frame with simultaneous control of the inner and outer sections.

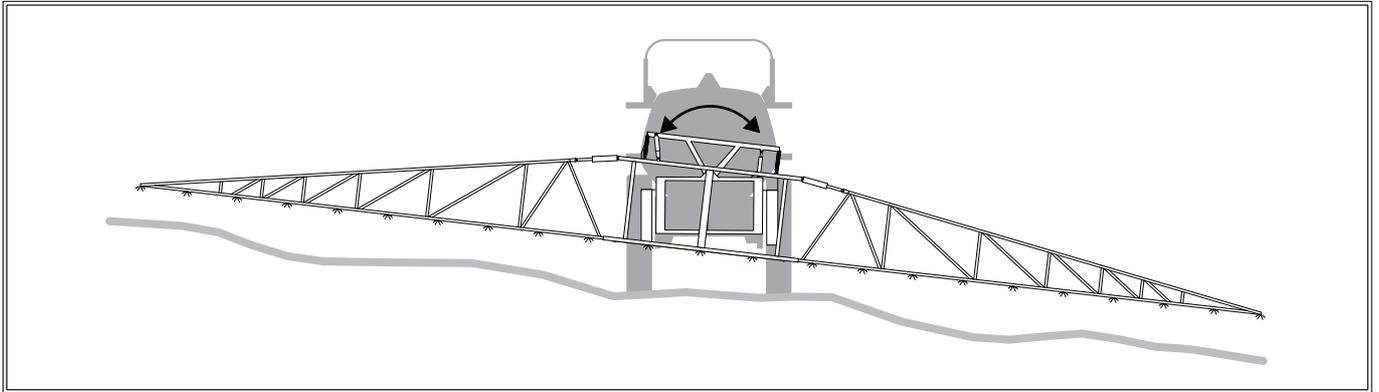
1. Air outlets inclination control
2. Blower speed variation control
3. TWIN memory 1 and 2
4. Pendulum lock control
5. Inner section control
6. Outer section control



AutoSlant

When the AutoSlant function is installed, sensors placed on the boom are used to adjust the main slant angle of the boom relative to the terrain.

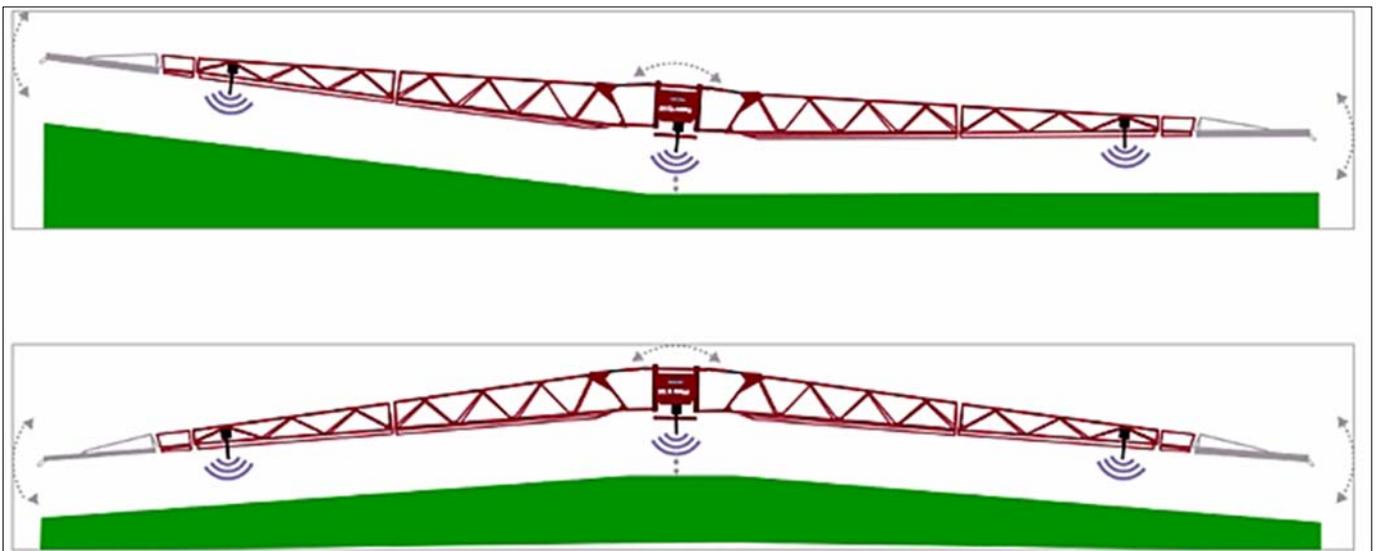
To spray efficiently on hilly terrain, it is important to adjust the boom to be parallel to the terrain.



AutoTerrain

When the AutoTerrain function is installed, sensors placed on the boom are used to adjust the angle of each boom side relative to the terrain.

To spray efficiently on hilly terrain, it is important to adjust the boom to be parallel to the terrain.



3 - Description

Multi-function display

General info

The multifunction display manages the data for the engine and the hydraulic transmission of the self-propelled, such tachometer, engine temperature, hydraulic pressure, fuel level, etc..).

It also allows you to select operating modes (speed limits, traction control, etc.), and alarms related to the engine and hydraulic transmission.

- 1. LCD screen
- 2. Selection and controls Push-buttons
- 3. Alarms



Menu description



The push button (1) is used to scroll through the messages, or they can also appear automatically when events or malfunctions appear on the engine or the transmission.

The push button (2) is used to program the operating modes of transmission and engine (speed limitation, transmission operation mode, etc.)

Transmission

Diff-Lock differential locking front/back

General Info

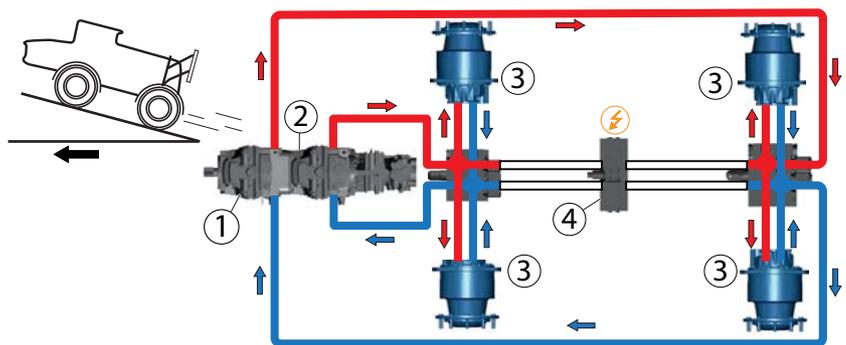
The Diff-Lock system is only suitable on ALPHA Evo EcoDrive versions 40 or 50 km/h. The controller drive a hydraulic valve " located between the front and rear hydraulic circuit. When the valve is controlled, the hydraulic circuit of each pump becomes independent. Conversely when the valve is disabled, the flow of 2 pumps is uniformly distributed through the circuit.

The differential lock Diff-lock is only engaged in FIELDS mode.

When the AUTOMOTIVE (Road) or PARKING mode is selected, the differential lock is automatically disengaged

The differential lock is automatically disengaged, when the travel speed is greater than 15 kph.

1. Pump n°1
2. Pump n°2
3. Motors
4. Differential valves



Anti-Skid (SAPE)

General info

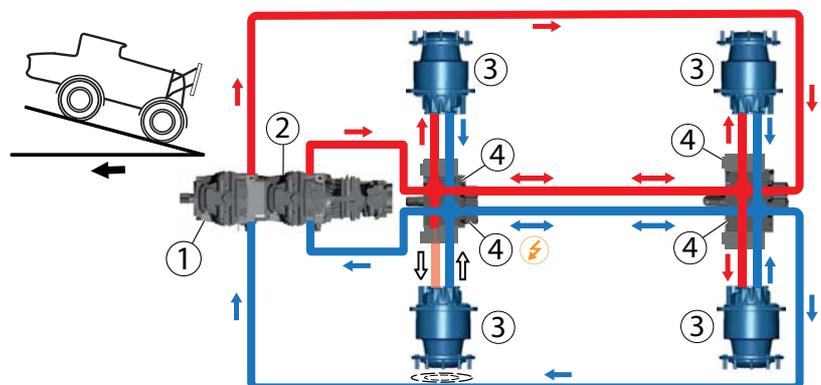
The SAPE anti-skid system consists in supervising the number of revolutions of each one of the hydraulic motor, and if necessary, limit the oil flow on the motor of which speed is higher than different (skating). The oil flow is thus distributed on the motors of which the conditions of adherences make it possible to maintain the rate of advance of the motorized one.

To optimize the regulation in the turns, the controller is equipped with angular sensors placed on the front and rear axle of the machine.

The anti-skid regulation is automatically suspended, but it remains active, when the travel speed is higher than 20 kph.

In the event of faulty operation of the system, the regulation is automatically disabled and an error message is displayed on the screen.

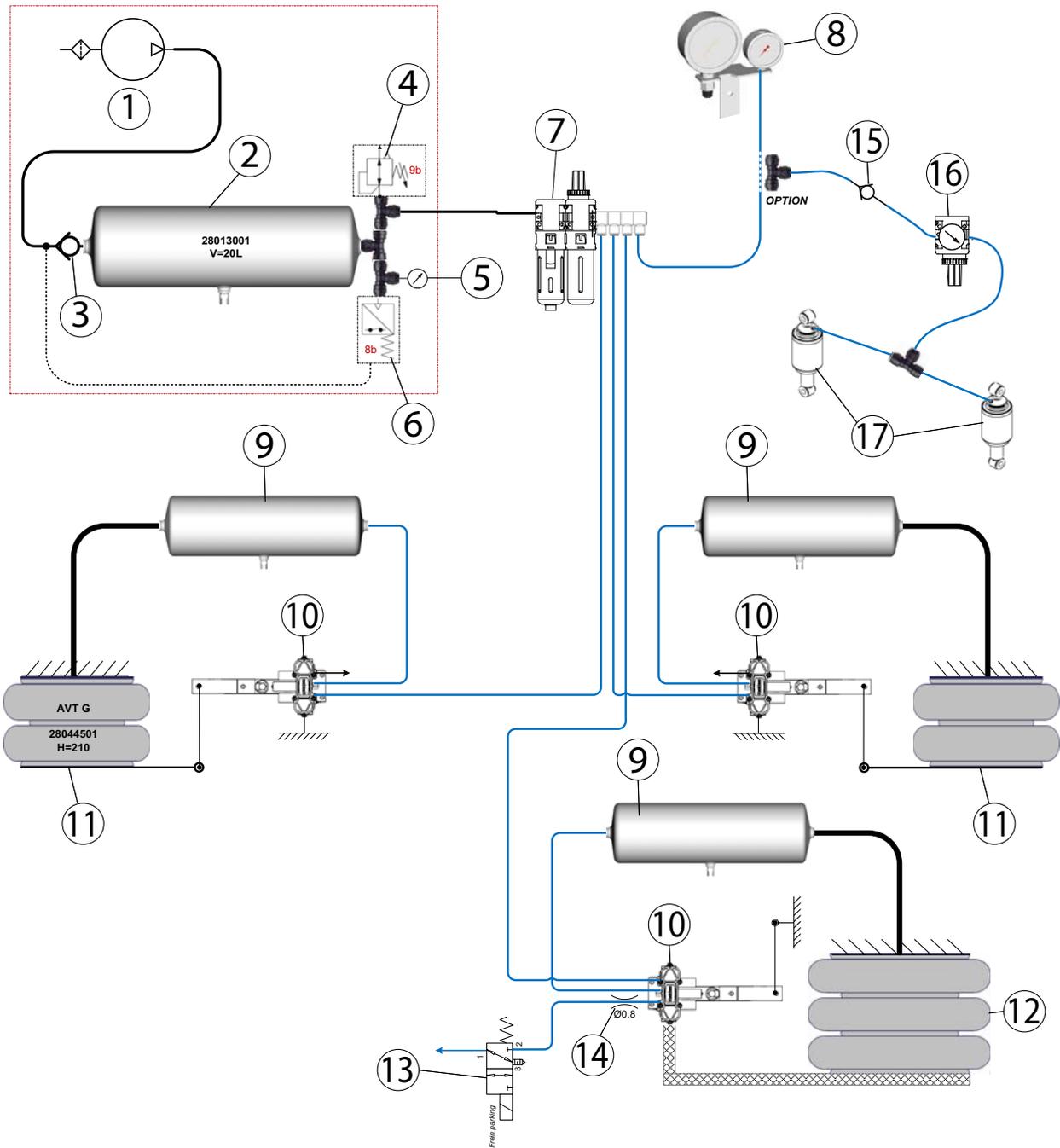
1. pomp n°1
2. pomp n°2
3. motors
4. valves



3 - Description

Pneumatic system

Pneumatic diagram (with optional equipment)



- | | |
|------------------------------|-----------------------------|
| 1. Air compressor | 10. Levelling valve |
| 2. Main air tank | 11. Front suspension airbag |
| 3. No-return valve | 12. Rear suspension airbag |
| 4. Safety valve | 13. Solenoid valve |
| 5. Pressure gauge | 14. Restrictor |
| 6. Pressure switch | 15. No-return valve |
| 7. Air filter and lubricator | 16. Air regulator |
| 8. Pressure gauge | 17. Cabin dampers |
| 9. Suspension air tank | |

Cabin

Recommendations before installing the filter

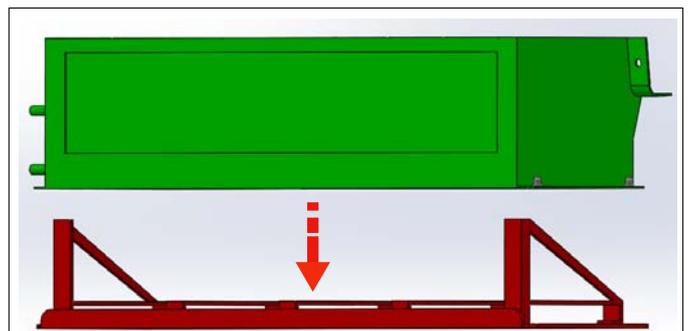
- Read carefully this instruction book before proceeding. Keep this instructions for retain consultation,
- Before taking in place the filter, check the packaging is not damaging. Do not install a filter if the cardboard is rugged.
- Remove the cardboard packaging as late as possible and remove the filter from the plastic bag close to his place of assembly.
- Handle with carry; at no time the joint, center piece of the tightness of the filter must not be damaged (beware of cutters, the screwdriver, nails...)
- Never fit a deformed filter
- Never mount a filter that falls even from heights
- Never touch a filter at its center

Install the filter

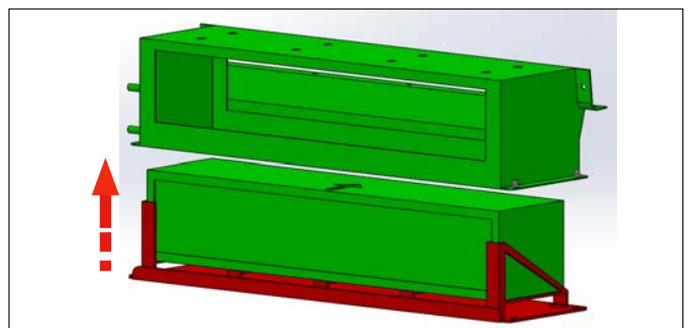
- Fit the filter gently into this slot provided at the cabin level. Handle the filter by its frame, do not touch the filter media and avoid relying on the protection grid.



- Remove screws (1) from the filter chassis
- Fit the filter in the correct direction of air flow taking into account the marking of the direction indication affixed to it..



- Place the frame equipped with the filter in the housing
- Screw completely the 4 screws (1).



4 - Sprayer Setup

Unloading the sprayer from the truck



NOTE! The machine can only be unloaded if the engine is running. It cannot be towed if the engine is not running (parking brake engaged when engine is stopped).



WARNING! Ensure that no one is parked near the unloading area.



WARNING! The machine can only be unloaded if you are familiar with the method described below.

Method

- Turn the battery switch to supply the machine's electrical and electronic circuits.
- Move the grip to neutral and check that the parking brake is on.
- Turn the contact key to start the engine and accelerate to at least 1600 r.p.m.
- Turn the speed selector from the [PARKING] position to the [FIELDS] position.
- Push the grip gently forwards or backwards to move the machine in the required direction.

Accessories

Some accessories are supplied separately with the machine. The list varies according to the equipment and options:

1. Key for tightening the external connectors
2. Wrench
3. Multi-jet spray ⁽¹⁾
4. ISO nozzle disc
5. Table of ISO nozzle flow rates
6. Drain plugs (rinse tank-hand wash tank-storage box)
7. Graduated pot
8. Hydraulic pump lever (brake release - open the bonnet)
9. Nozzles ⁽²⁾
10. Instruction books ⁽³⁾
11. External suction hose and filter
12. Emergency push-button ⁽⁵⁾

⁽¹⁾ Optional hose reel

⁽²⁾ Variable according to nozzle type and quantity ordered

⁽³⁾ The number of manuals varies according to the equipment



Precautions before putting the sprayer into operation

Your sprayer is protected by a resistant lacquer coat. However, we recommend regular application of a layer of anti-corrosion lubricant on all metal parts to avoid plant protection chemicals and fertilisers damaging the paintwork. If this is done before the sprayer is put into operation for the first time, it will be easier to clean the sprayer and keep the paintwork clean for many years. This treatment should be carried out every time the protection film starts to wash off.

Fuel and AdBlue tanks

The fuel tank has a 320-litre capacity. Before filling, shut down the engine and do not smoke. Clean the plug **(1)** carefully so that no impurities can enter the tank. Use a funnel if necessary.

The AdBlue tank has a 32 litre capacity

1. Fuel tank
2. AdBlue tank



NOTE! Before a prolonged stop, we recommend filling the tank to avoid condensation

Permissible fuels

In order to satisfy the exhaust gas legislation, diesel engines that are equipped with an exhaust aftertreatment system may only be operated with a sulphur-free diesel fuel. The operational reliability and durability of the individual exhaust aftertreatment technologies cannot be assured upon failure to comply.

The following fuel specifications / standards are approved:

- Fuels
 - EN 590
 - Sulphur < **10** mg/kg
 - ASTM D 975 Grade 1-D S15
 - ASTM D 975 Grade 2-D S15
 - Sulphur < **15**mg/kg



For engines with DCR® DEUTZ common rail injection, the mixing of petroleum and adding of extra low additives is not permissible.



NOTE! For more information, refer to the DEUTZ TCD 6.1 L6 instruction book.

AdBlue description



The urea solution AUS 32 is known in the United States and North America under the designation Diesel Exhaust Fluid (DEF).

Check for sufficient ventilation. Keep in a perfect state of cleanliness. The residues of AdBlue® should be disposed of in an environmentally friendly way. Observe the instructions in the product safety data sheets.

AdBlue® is an ultra-pure, aqueous 32.5% urea solution that is used as a NOX reducer for exhaust aftertreatment (SCR) from vehicles equipped with diesel engines. The product is referred to as AdBlue® or AUS 32 (AUS: Aqueous Urea Solution) and must comply with DIN 70070, ISO 22241-1 or ATSTM D 7821.

The life of AdBlue® without losing quality will be influenced by the storage conditions. It crystallizes at a temperature of -11 ° C. and above + 35 ° C. a hydrolysis reaction occurs, that is to say a slow dissociation to ammonia and carbon dioxide.

The AdBlue® can only be filled with AdBlue®. Filling the tank with other fluids can cause system destruction. In this case, the dosing pump must be replaced. AdBlue® must remain in the tank for a maximum of 4 months. Empty and clean the AdBlue® tank when the system is off. Please contact your DEUTZ partner.

4 - Sprayer Setup

Spraying

Spraying pump

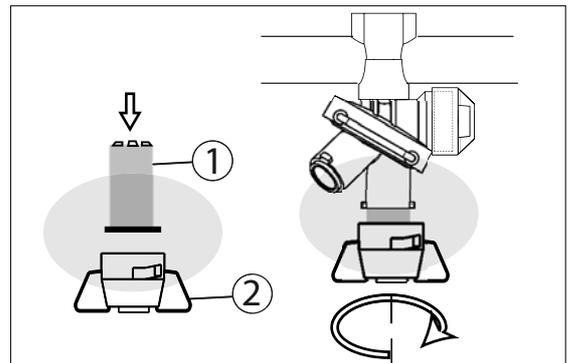
- Screw the plug (1) (if necessary) in the 464 pump.



Fitting the nozzles

Install appropriate nozzles to achieve optimum spray quality

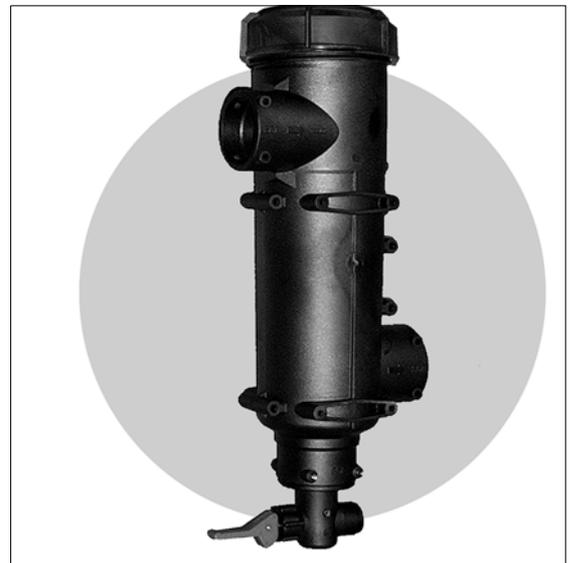
- Place the nozzle filter (1) in the nozzle nut (2)
- Fit the nozzles equipped on the nozzle holder, by turning the nut a 1/4 turn.



CycloneFilter

Standard filter size is 80 mesh. Filters of 50 and 100 mesh are available and can be changed by opening the filter top.

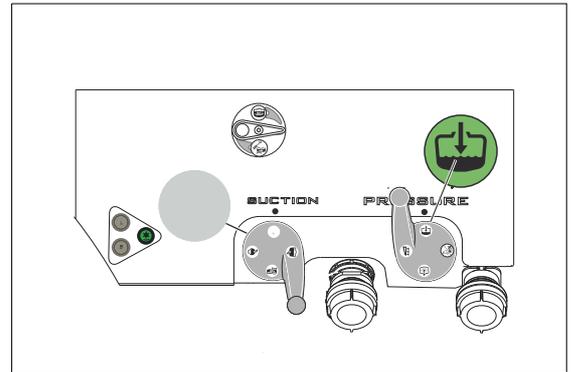
Check condition of O-rings and lubricate if necessary, or replace them if damaged, before reassembly.



4 - Sprayer Setup

 **DANGER!** Never open the Cyclone filter unless the top green pressure manifold valve and bottom black suction manifold valve are both the suction valve is turned to the unused position, and the pressure valve is set to "main tank" turned to the unused position).

Otherwise spraying liquid may hit you, when opening the filter and thereby draining the main tank!



BoomPrime Adjustment

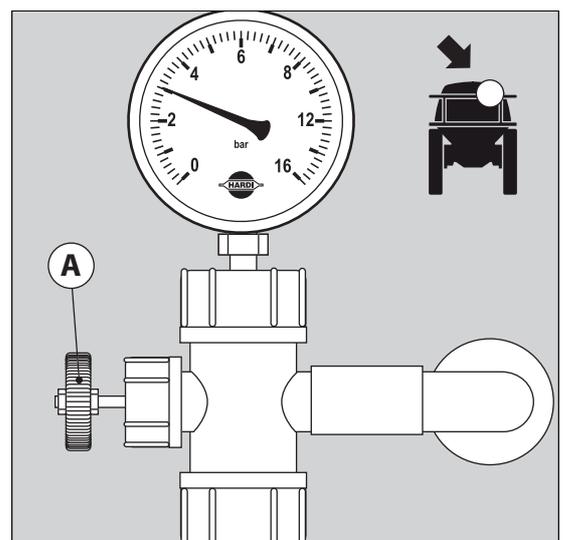
The BoomPrime system works within a fixed pressure range of around 3 bar, but it must be adjusted for the specific spray job (due to different choice of nozzles etc.):

1. Unfold the spray boom and start the PTO.
2. Set pressure valve to "Spraying", suction valve to "Main tank" and agitation valve to "Agitation".
3. Only open the agitation valve to suit the tank contents, e.g. half open.
4. Adjust the spray pressure to what will be used when spraying.
Close all nozzles.
5. Turn the BoomPrime adjustment screw (A) to increase the BoomPrime pressure to 3 bar or until the nozzles start to leak.
6. If nozzles leak, then lower the BoomPrime pressure by 1 bar on the adjustment screw (A).

 **ATTENTION!** If not adjusted correctly, the nozzles will not close (i.e. they will leak), when the spraying is stopped, or the tubes will not be primed.

The possible priming circulation speed of BoomPrime relies on the non-drip valves to keep the nozzles closed. For this boom, the valves will open at a spray pressure of 0.8 - 0.9 bar. If an extended amount of circulation is necessary, the non-drip valves can be changed to a version with higher pressure setting (later opening time

Non-Drip Valve	Opening Pressure (bar)
Green (standard)	0.5
Yellow	0.7



4 - Sprayer Setup

Chassis

Altering the track width

Track width (m) for ground clearance 1.20 m														
	300/95R52		340/85R48		380/90R46		420/80/ R46		480/80R42 480/80R46		520/85R38 520/85R42		650/65R38	
Rim offset	+125		+100		+90		+60		+15		-15		-30	
Axle type	min	max	min	max	min	max	min	max	min	max	min	max	min	max
S	NA	NA	NA	NA	1.76	2.00	1.82	2.05	1.91	2.14	1.97	2.20	2.06	2.29
M	1.90	2.23	1.94	2.29	1.95	2.31	2.02	2.37	2.10	2.46	2.16	2.52	2.25	2.61
L	2.12	2.63	2.18	2.69	2.19	2.71	2.25	2.76	2.34	2.85	2.40	2.91	2.49	3.00
XL	2.53	3.05	2.59	3.10	2.60	3.12	2.66	3.17	2.75	3.26	2.81	3.32	2.90	3.41
XXL	2.78	3.30	2.84	3.35	2.85	3.37	2.91	3.42	3.00	3.51	3.06	3.57	3.15	3.66

Track width (m) for ground clearance 1.65 m														
	300/95R52		340/85R48		380/90R46		420/80/ R46		480/80R42 480/80R46		520/85R38 520/85R42		650/65R38	
Rim offset	+125		+100		+90		+60		+15		-15		-30	
Axle type	min	max	min	max	min	max	min	max	min	max	min	max	min	max
M	1.97	2.33	2.02	2.38	2.04	2.40	2.10	2.46	2.20	2.55	2.25	2.61	2.28	2.64
L	2.21	2.72	2.26	2.78	2.28	2.79	2.34	2.85	2.34	2.95	2.49	3.01	2.52	3.04
XL	2.62	3.13	2.67	3.19	2.69	3.20	2.75	3.26	2.85	3.36	2.90	3.42	2.93	3.45

HTA axle Track wt width (m) for ground clearance 1.20 m														
	300/95 R52		IF 320/90 R50		VF 380/90 R46 VF 380/90 R50		420/80 R46		480/80/ R42		520/85 R42		650/65 R38	
Rim offset	+125		+100		+90		+60		+15		-15		-30	
Axle type	min	max	min	max	min	max	min	max	min	max	min	max	min	max
HTA - S	1.75	2.75	1.80	2.80	1.82	2.82	1.88	2.88	1.97	2.97	2.03	3.03	2.06	3.06
HTA - M	2.02	3.12	2.07	3.17	2.09	3.19	2.15	3.25	2.24	3.34	2.30	3.40	2.33	3.43

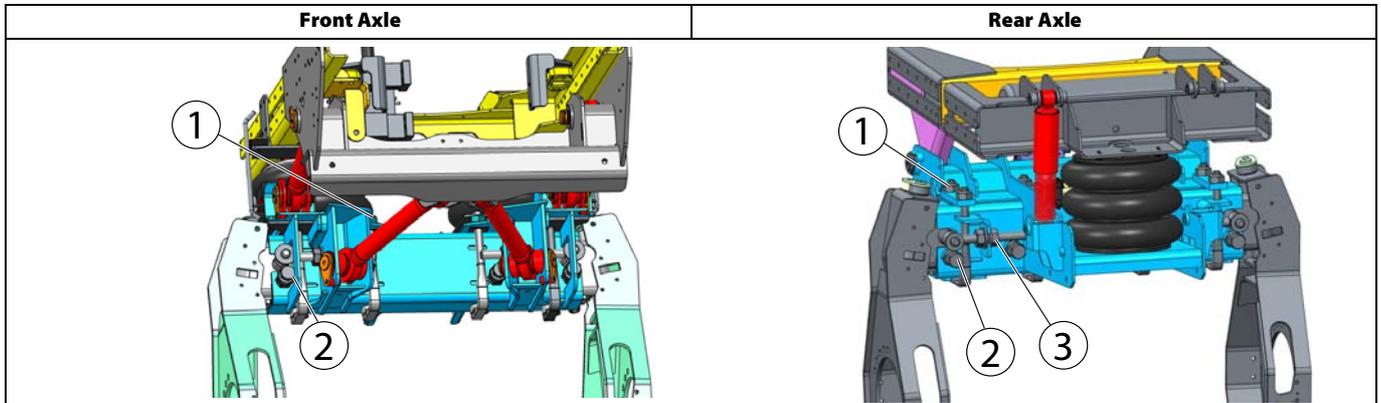
HTA axle Track width (m) for ground clearance 1.65 m														
	300/95 R52		IF 320/90 R50		VF 380/90 R46 VF 380/90 R50		420/80 R46		480/80/ R42		520/85 R42		650/65 R38	
Rim offset	+125		+100		+90		+60		+15		-15		-30	
Axle type	min	max	min	max	min	max	min	max	min	max	min	max	min	max
HTA - S	1.85	2.85	1.90	2.90	1.92	2.92	1.98	2.98	2.07	3.07	2.13	3.13	2.16	3.16
HTA - M	2.12	3.22	2.17	3.27	2.19	3.29	2.25	3.35	2.34	3.44	2.40	3.50	2.43	3.53

(*) mini track width is 2.00 m in ground clearance 1.65 m

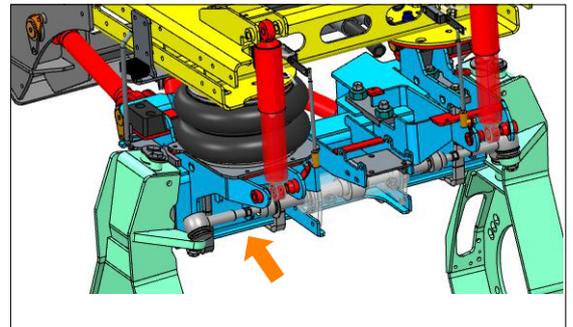
Procedure for Altering the track width

The track width of the sprayer can be altered by sliding the axle according to the table above:

- Loosen bolts (1) and clamping screws (2)
- Measure the current track width (centre of right tyre to centre of left tyre). Each side must be extended or retracted half the desired alteration.
- Extend or retract the wheel axle by acting on the adjustable rod (3)



- Adjust the steering rod. Replace it if necessary.



NOTE! Check that the track adjustment is identical on both sides of the machine.

Tyres inflate pressure

- Check the tyres pressure. See section "Inflation Pressure" page 212

Tightening lug nuts

See section "Tightening lug nuts" page 158

4 - Sprayer Setup

Driving

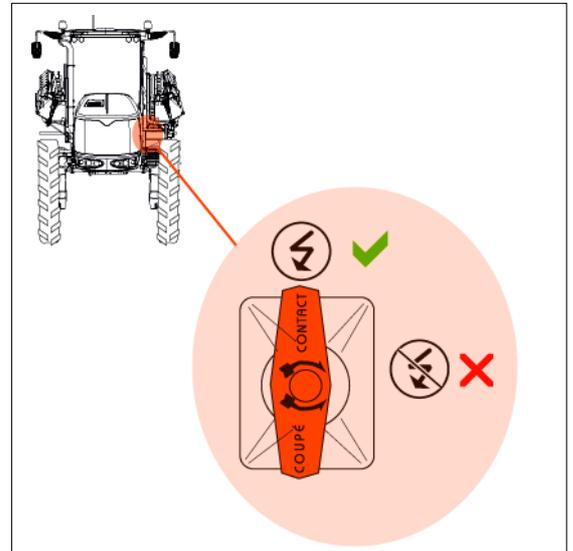
Starting up and shutting down the engine



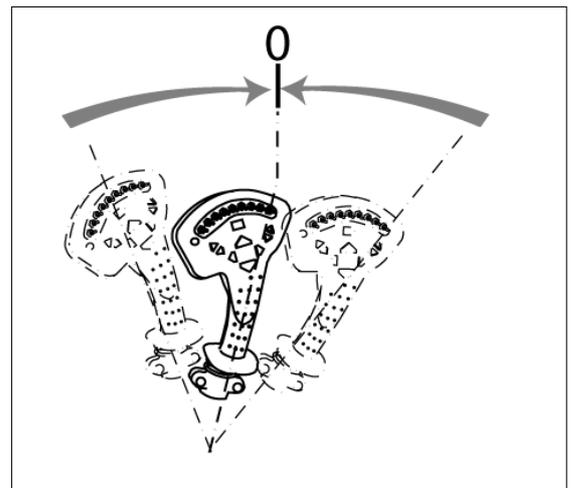
NOTE! Before starting up the engine, check the level of the engine oil, coolant, fuel and hydraulic oil.

Starting up

- Turn on the battery switch to «CONTACT» position



- Place the grip in neutral position. A detector ensures safe engine start-up.



- Turn the ignition key to position 1 to power on electrical circuits.[1],

- Turn the ignition key to position 2 to start the engine. Release it after starting up and the key will automatically return to position 1.

- Insert key

- Position 0 = no operating voltage

- Turn key to the right

- Position 1 = operating voltage
- Engine ready for operation

- Below the temperature specified in the electronic engine control, the pre-heating phase begins with turning on the ignition

- The electronic engine control controls and activates the current feed to the glow plugs via the engine coolant temperatures

- Push the key in and turn further clockwise against spring pressure

- Level 2 = start

- Release the key as soon as possible the engine starts up



5 - Operation



If errors messages appears on the display and an audible alarm sounds, you must stop the engine immediate



Always start up engine before starting up HC9500 controller

Shutting down

- Place the grip to neutral position to stop the machine.
- Engage the parking brake.
- Turn the key to position 0 to shut down the engine.
- Turn off the electronic controls units.
- Turn off the battery switch.



Always turn off HC9500 controller before cutting off the battery switch (risk of damage)



Reduce the engine speed for a few seconds to slow down the turbocharger and stabilise the engine temperature.

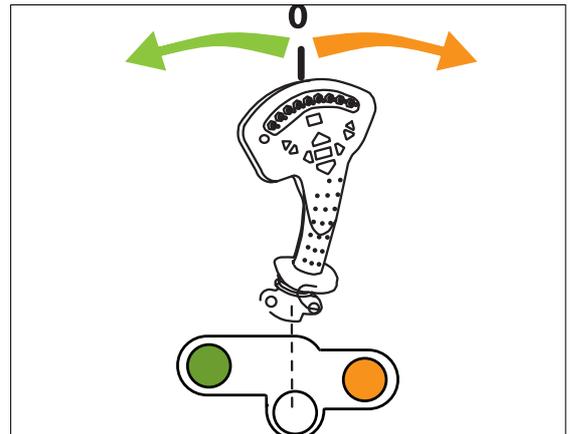


NOTE! Always extinguish headlights when the engine is no longer running. The battery will quickly run down and the engine will no longer start.

Travelling and braking

The machine is move forward as follows :

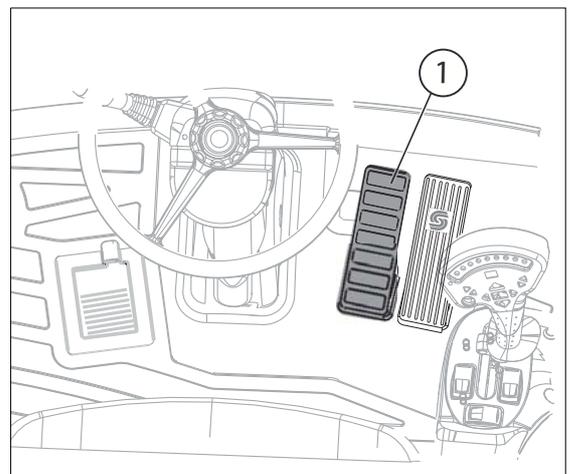
- Fold away the gangway (if equipped).
- Turn the speed selector to exit the parking brake.
- Increase the engine speed if the speed selector is in FIELDS mode (Fields - Fields Uphill or Fields Downhill).
- Push the grip to move ahead or backwards to reverse the machine.
- Pull the grip towards neutral to make the machine brake (hydrostatic braking). The machine comes to a complete stop when the grip is in neutral position.



- Gradually press the brake pedal (1)

The system will respond in order to achieve the best braking performance. If the brake is applied until the machine comes to a complete stop, in order to move again you should pull the grip into neutral, then push it or pull it to start again in forward or reverse gear.

If the brake is applied slightly, i.e. without the machine coming to a complete stop, the speed will be reduced. As soon as the brake pedal is released, the machine will accelerate again to reach the travel speed corresponding to the position of the grip.

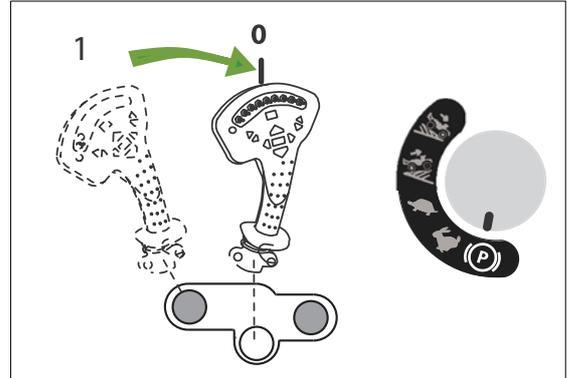


Parking brake

The parking brake is used to keep the machine at a standstill. It acts on discs incorporated into the front and rear hydraulic motors. The brakes are activated when the hydraulic pressure reaches zero.:

Engage the parking brake

- Pull the grip to neutral position to make the machine brake (hydrostatic braking).
- Turn the speed selector to the parking brake position to immobilise the machine.



When the parking brake is engaged, any action on the grip has no effect of the movement of the machine

Release the parking brake

- Turn the speed selector to release the parking brake
- Make sure that the grip is in neutral position before pushing or pulling it to move the machine. .



WARNING! The parking brake is very effective. Avoid engaging it when the machine is moving, except in an extreme emergency.

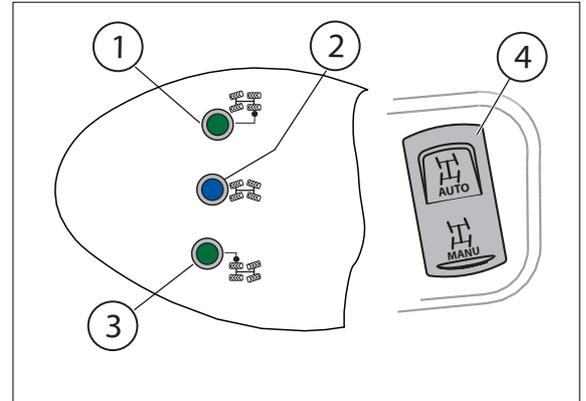
5 - Operation

Steering - automatic 4-wheel steering version (standard)

General information

The automatic 4-wheel steering is made up of two position sensors fitted on the front and rear rods, a 4-wheel steering activation pedal, a switch and indicators on the control panel.

1. Rear wheels aligned.
2. 4-WHEEL STEERING in operation.
3. Front wheels aligned.
4. On-Off / 2 and 4-wheel steering switch



i NOTE! As a safety measure, before travelling on the road, ensure that the rear wheels are aligned. The lamp (1) lights up to indicate that the rear wheels are aligned.

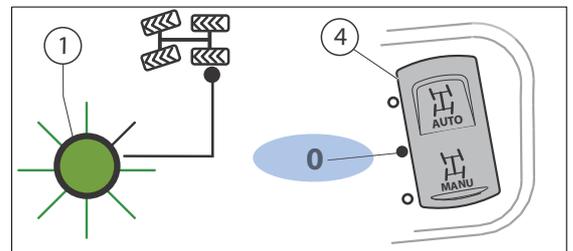
Start

- Press the switch (4) to [AUTO] or [MANU] according to the operating mode

Shut down

i NOTE! As a safety measure, before travelling on the road, ensure that the rear wheels are aligned.

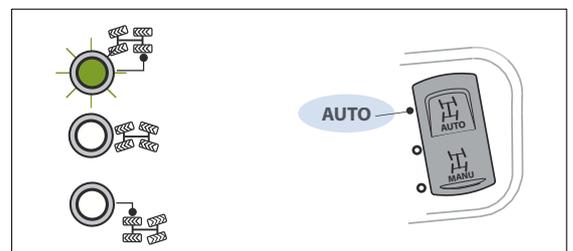
- Put the system in 2-Wheel steering. The indicator (1) lights up indicating that the rear wheels are aligned.
- Press the switch to position O



Driving in 2-wheel steering

In this mode, only the front wheels turn and the rear wheels remain in a straight line.

- Press on the switch to activate [AUTO] mode.



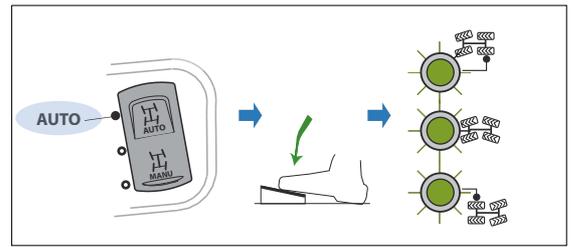
If the rear wheels are not in a straight line, the indicator (1) remains lit up:

- Turn the steering wheel until the rear wheels are aligned, the indicator (2) is switched off.

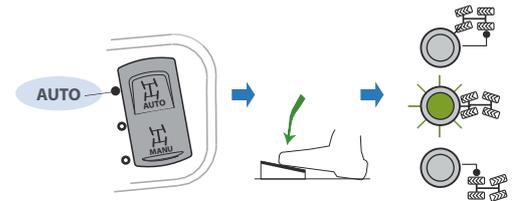
Driving in 4-wheel steering

In this mode, the front and rear wheels turn in opposite directions

- Press on the switch to activate [AUTO] mode
- Press the pedal and turn the steering wheel until the front wheels are in a straight line.
The 3 indicators light up to indicate that the operating conditions for 4-WHEEL STEERING are met



- Keep the pedal pressed and turn the steering wheel until the front wheels are in a straight line.



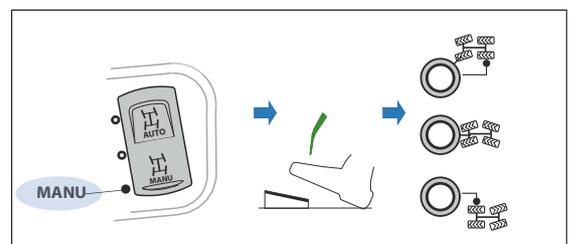
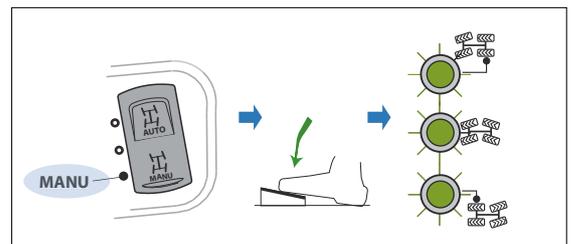
To exit the 4-wheel steering mode:

- Release the pedal and turn the steering wheel to put the rear wheels in straight line.

Driving in offset 2-wheel steering

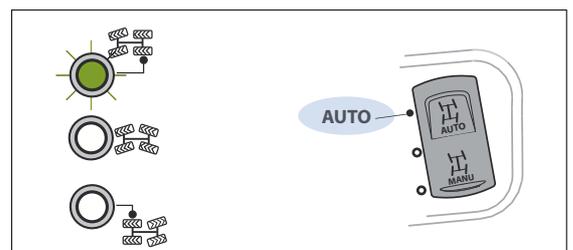
In this mode, only the front wheels can turn, while the rear wheels can be slightly inclined to the left or right. To use this mode:

- Press the switch to activate [MANU] mode.
- Press the pedal and turn the steering wheel so that the front and rear wheels are in a straight line. The indicators (1) and (3) light up to indicate that the operating conditions in offset rear wheel steering have been met.
- Press and hold the pedal, then turn the steering wheel until the front wheels are in a straight line.
- Turn the wheel slightly while holding the pedal down to offset the rear wheels as required.



To exit offset rear wheel steering:

- Press the switch on [AUTO] position to activate 4-WHEEL STEERING mode.
- Turn the steering wheel until the rear wheels are aligned, the lamp 2-WHEEL STEERING light up.



5 - Operation

Steering - Automatic 4-WS

General info

The 4-wheel steering system with crab steering is made up of potentiometers placed on the front and rear axle, a pedal in relation with the selector mode and the grip.

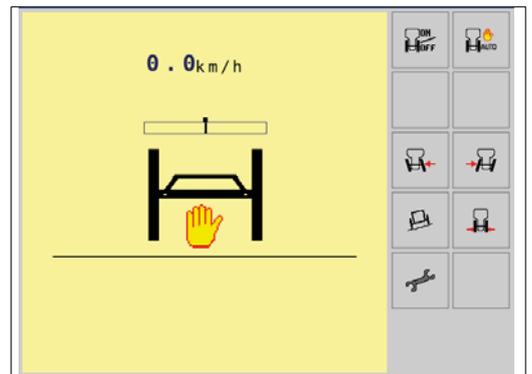
Operation

When the machine is started, the 4-WS system is operational. However, if the system has been deactivated when the machine is turn off, it will be necessary to re-engage it for use:

- Press the button  on the screen to engage the system

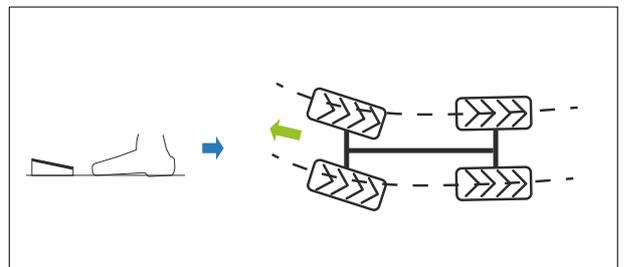


For proper operation, the 4-WS system the screen must be displayed as shown in the illustration. If this is not the case, some features will not be available.



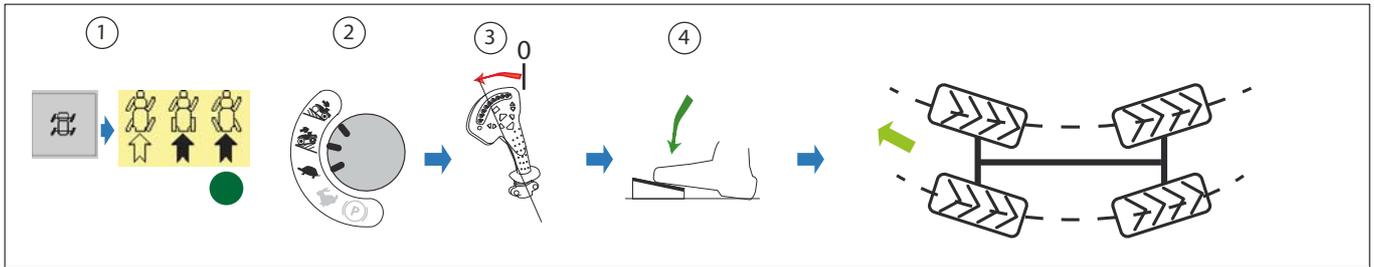
2-Wheel Steering mode

This is the default operating mode, the rear wheels remain in a straight line, and the position of the wheels is permanently regulated by the electronic device.



'Follower' Mode

In this mode, the front and rear wheels steer in the opposite direction, so that the rear wheels pass through the traces of the front wheels. For maximum accuracy, the system takes into account the distance between the axles (wheelbase) and the speed of the machine.



1. Select the 4-Wheel Steering mode
2. Turn the speed selector to select «Fields» mode
3. Push the grip towards to move the machine
4. Press and hold the pedal to engage the 'Follow' mode



«Follow» mode is not compatible with «Road» mode

- Release the pedal to return to 2-Wheel Steering

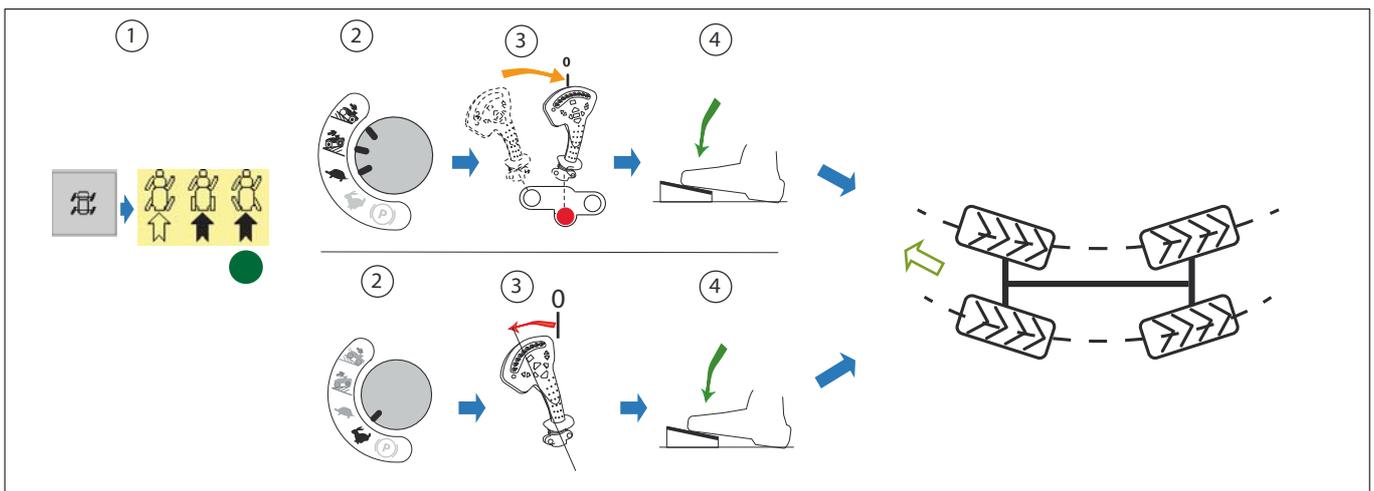


If the travel speed exceeds 25 kph, the system automatically switches to the 2-wheel steering mode (rear wheels aligned).

Steering Axle Mode

In this mode the front and rear wheels immediately steer in the opposite direction, so that the rear wheels pass through the traces of the front wheels. In this case, the front and rear wheels simultaneously

The Steering mode can be used both in «Field» mode and «Road» mode.



Operation in 'Fields'

1. Select 4-Wheels Steering «4WS»
2. Select «Field» mode»
3. Put the grip at the neutral position, the machine is parked
4. Press and hold the pedal to engage the 4-Wheels Steering
 - Release the pedal to return to 2-Wheel Steering

5 - Operation

Operation in 'Road'

1. Select 4-Wheels Steering mode
2. Select «Road» mode
3. Push the grip towards to move the machine
4. Press and hold the pedal to engage the 'Steering Axle' mode
 - Release the pedal to return to 2-Wheel Steering



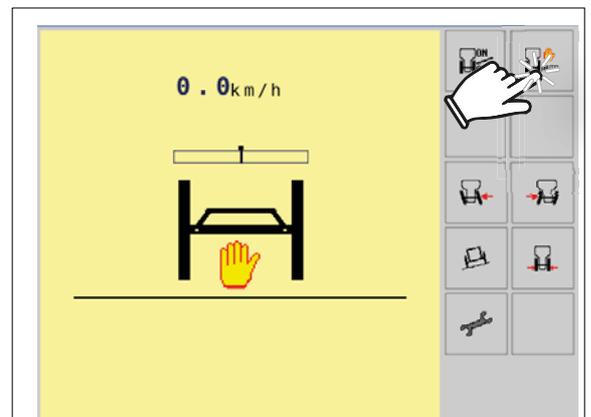
If the travel speed exceeds 25 kph, the system automatically switches to the 2-wheel steering mode (rear wheels aligned).

Manual Mode

The manual mode allows the control of the rear wheels, using the buttons of the grip.

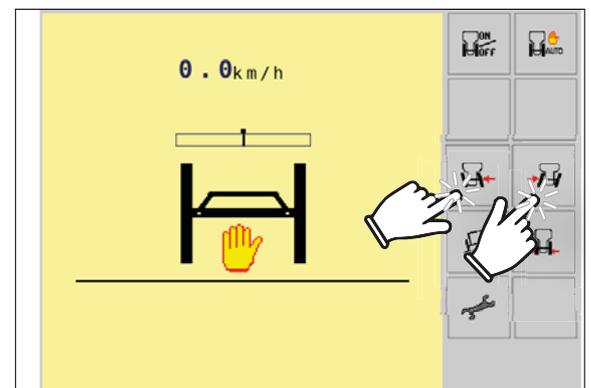
Select the manual mode

- From the Trail Control screen, press on  button



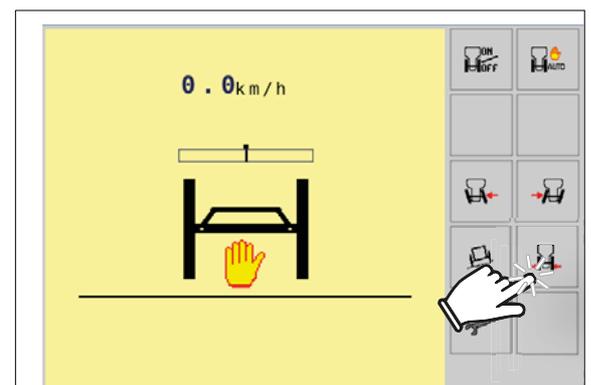
Control the rear axle

- From the Trail Control screen, press on   button



Realignment of rear wheels

- From the Trail Control screen, press on  button



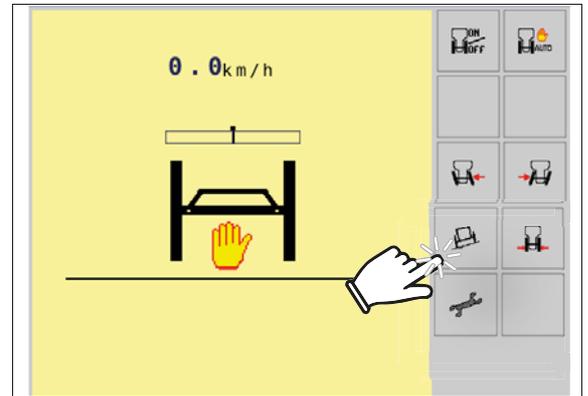
Slope counter-steering function

When you activate the 'slope counter-steering' function you can offset the track of the trailer device to the left or right. The direction in which the track is offset depends if the slope climbs or falls to the left or right of the machine. The aim of the 'slope counter-steering' function is to avoid the sprayer driving obliquely to the direction of work on a slope.

A slope sensor on the chassis permanently measures the slope to allow the angle of inclination of the wheels to be adjusted. It also automatically reverses the inclination of the wheels when the slope changes direction (Headland).

i This function is available in 2-wheel steering, Steering axle and 'follower' axle

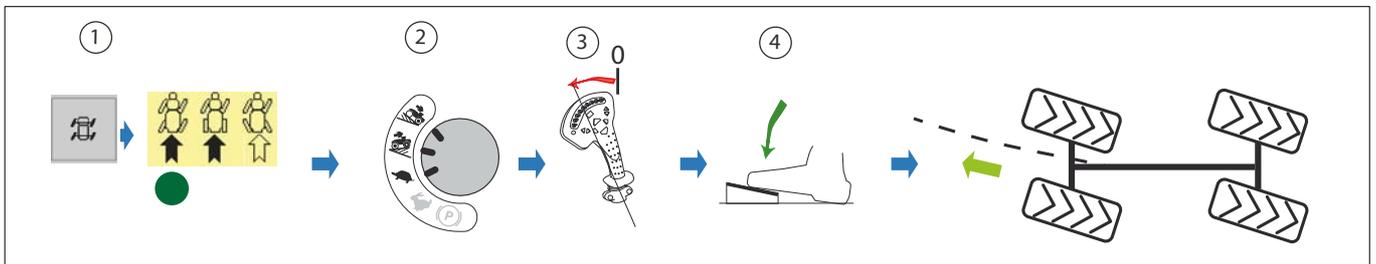
- From the Trail Control screen, press on  button to engage the slope counter-steering function



«CRAB» Mode

In this mode the front and rear wheels turn in the same direction and are parallel. This mode is little used and is reserved only for parking manoeuvre.

! «Crab» mode should not be used on public road



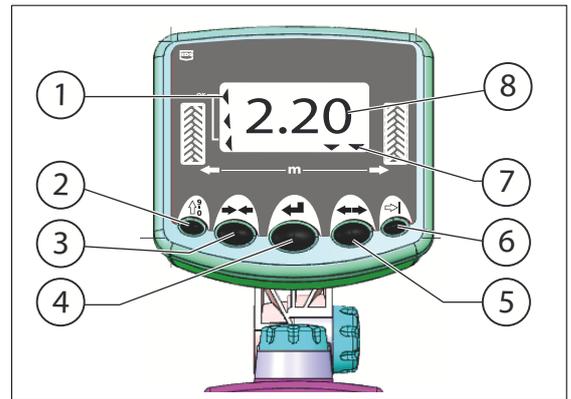
1. Select the «Crab» mode
2. Select 'Field' mode
3. Push the grip to move the machine
4. Press and hold the pedal to engage the «Crab» mode
 - Release the pedal to return to 2-Wheel Steering

5 - Operation

Hydraulic Track Adjustment (optional)

HTA control unit display

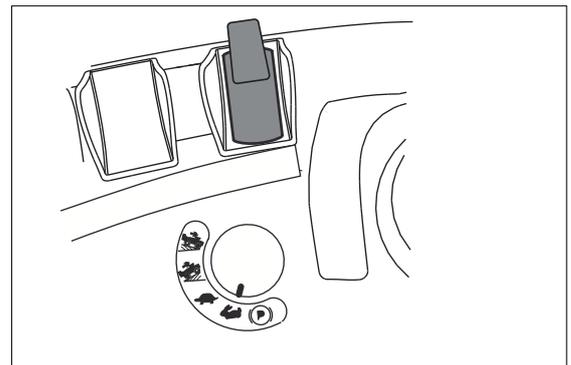
1. Forward Speed status.
2. Scrolling numbers (0 to 9).
3. Retracting Track button.
4. Valid button.
5. Extending Track button
6. Moving the cursor.
7. Status indicator.
8. Track width display.



When adjusting the track, make sure that nobody is in close proximity to the machine.

- The ISO terminal is power on.
- - Set the engine speed at least 1500 r.p.m.
- - The machine should be on a flat surface.

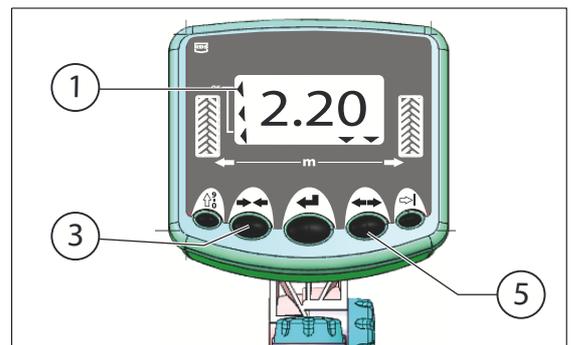
- Switch on the control unit



How to use the HTA display

To adjust the track width:

- Drive the machine between 2 to 12 kph, the status indicator (1) is flashing
- Press the button (3) or (5) to retract or extend the track cylinders, then release the button when the track width is reached on the display.



At first, only the left rear wheel moves. It serves as a reference to the display, then after releasing the button (3) or (5) the other wheels take their place.



During operation the hazard warning lights light up.

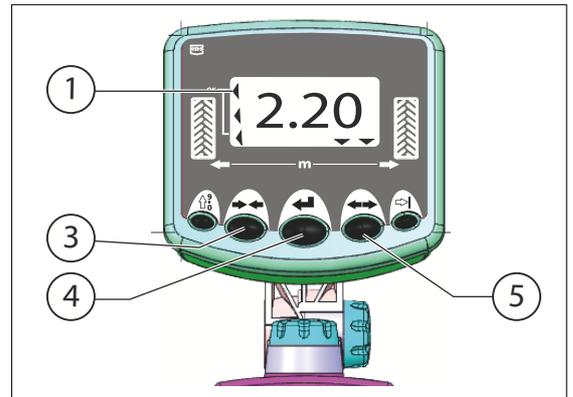
Defects in the operation

Defects in the operation may be caused by:

- A forward speed out of the required speed range, while changing the track.
- One or more wheels have not reached their position after 30 seconds (rut, mechanical, hydraulic or electronic defaults).

In these cases, the status indicator (1) flashes. To cancel errors:

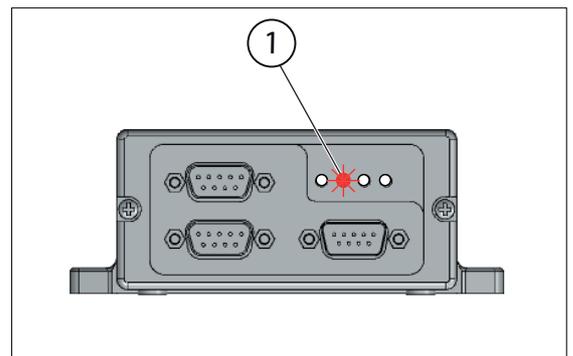
- Press and hold (4) for 2 seconds.
- Press the button (3) or (5) briefly to reset the system.



ATTENTION: If the reset procedure fails, the control unit must be turned off.

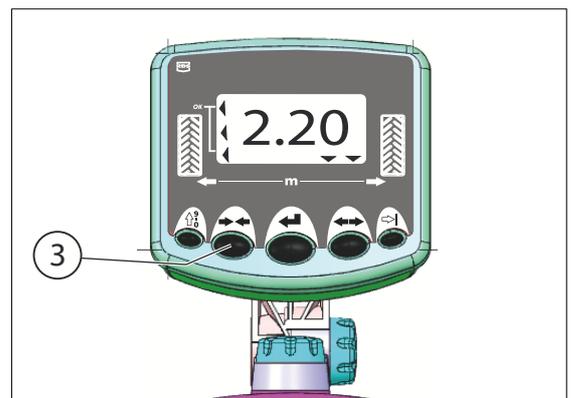
Limp Mode

Limp mode appears if an angular sensor is defective., A red light (1) comes on



Only the retracting of the track width is authorized, but the ends stop are not detected

- Drive the machine between 2 to 12 kph.
- Press and hold the button (3) for controlling the track width



For maintenance see "Hydraulic Track Axle" page 206

5 - Operation

Transmission and engine operation

General info

This chapter describes how to use the control terminal for transmission and engine management

Information messages

- Press on  button to scroll the following messages



Engine overheating
0 to 100%.



Oil engine pressure



Turbocharger pressure



Battery voltage



fuel consumption



Hour meter and maintenance



Engine and transmission management



Hydraulic pressure



Number of internal engine faulties



Power transmission



Number of transmission faulties



Travel speed (kph)

Settings driving mode

- Press on  button to scroll the messages:



Speed limitation in «Field» mode, «Uphill», «Downhill»



Speed limitation in «Road» mode,



Engine RPM limitation



Electronic Traction Control (SAPE) disengaged



Drive mode «NORMAL»



Electronic Traction Control (SAPE) engaged



Drive mode «POWER»



Drive mode «COMFORT»

Field / Uphill / Downhill mode

The machine has 3 modes used in the field, according to the constraints of work related to the terrain (flat ground, up or down) to optimize the power of hydraulic motors

In field, uphill, downhill modes, the engine speed remains constant and does not depend of the position of forward grip. Field mode is typically used on flat ground or in small slopes. In this case the front and rear hydraulic motors are in full displacement. However, if the travel speed exceed 15 kph, the front hydraulic motors run on half displacement (Up-shift), thus increasing the maximum travel speed of the machine.

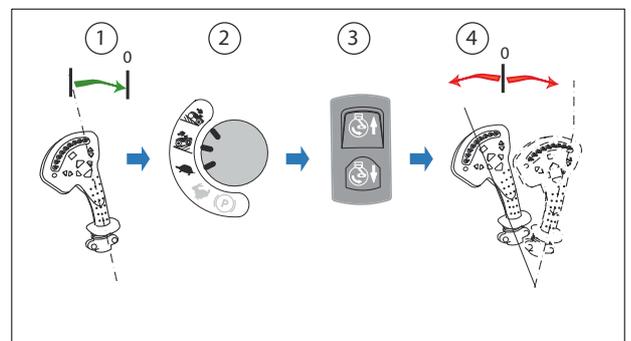
In Uphill mode, the front hydraulic motors are in half displacement and the rear hydraulic motors are in full displacement. In downhill mode, the front hydraulic motors are in full displacement and the rear hydraulic motors are in half displacement.



ATTENTION! Field, Uphill, Downhill mode require a minimum engine speed of 1500 r.p.m. for the transmission to give enough traction and braking torque

Change from Road mode to Field, Uphill, downhill

- Place the grip in neutral position.
- Turn the speed selector on one of the 3 positions.
- Increase the speed engine to a minimum of 1500 r.p.m
- Push the grip towards to achieved the required the travel speed.



«Field» mode engaged



«Uphill» engaged



«Downhill» engaged

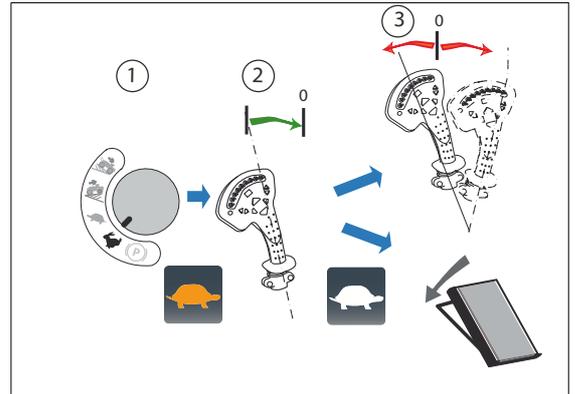
5 - Operation

Change between Field, Uphill, downhill mode

The change from one mode to the other Field mode can be achieved while driving

Change from Field, Uphill, downhill to Road mode

1. Turn the speed selector to Road mode, the status appear in orange.
2. Pull the grip in neutral position, the automotive mode is engaged when the status become in white.
3. Pull the grip toward or press the pedal, depending the selected control mode.

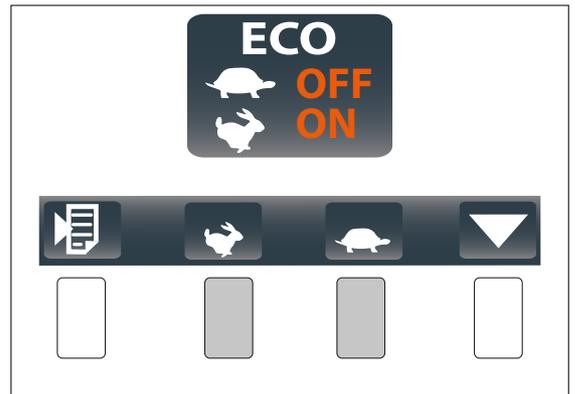


Automotive mode

The machine has an automotive mode, it works as well in road mode as in field mode. The Automotive mode simplifies the driving of the machine, significantly reducing the noise and fuel consumption. The engine speed is proportional to the position of the grip or the pressure on the throttle pedal, except during the braking phase. In this case the engine speed depend directly of the hydraulic motors displacement (Half displacement of front and rear motors).

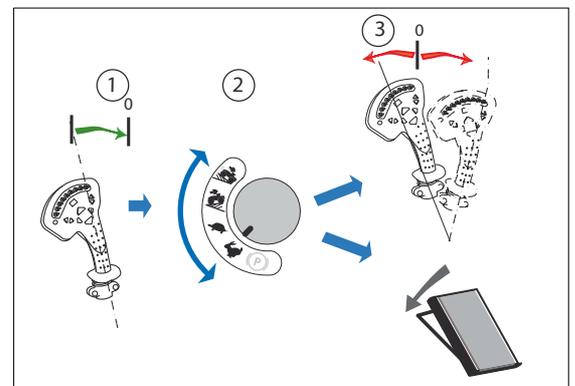
Before use the automotive mode :

- Press on  button to select the message «ECO»
- Press the buttons to enable or disable the Road or/and Field automotive mode



How to use the automotive mode

- Place the grip in neutral position.
 - Turn the speed selector in road position (rabbit). The engine is idling
 - Turn the speed selector to the desired position
 - Gradually push the grip to achieve the required travelling speed
- or
- Move the grip forward or backward according to the direction of travel of the machine and press the throttle pedal to move the machine.



The display shows the control mode in use



Grip control



Throttle pedal control

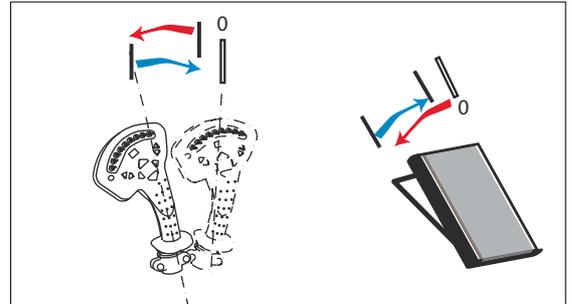
How to change the control of the advancement

The control of advancement can be controlled by either the grip or by the throttle pedal. Changing the control mode is only possible when the machine is stopped

- Place the grip to the neutral position
- Press on  button to change the travel speed control

Braking and stopping in automotive mode

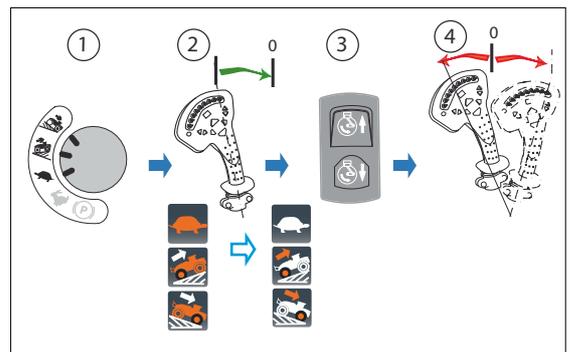
- To slow down, pull more or less the grip to neutral position or release the throttle pedal, the engine speed automatically adapts to the travel speed of the machine.
- Press the braking pedal to reduce progressively the travel speed of the machine. When the pedal is release, the travel speed stabilizes.
- To accelerate again, pull the grip to neutral position, until the travel speed corresponding to the position of the grip is lower than the forward speed of the machine, or press the throttle pedal.



How to escape the automotive mode

To escape the automotive mode is only possible when the machine is completely stopped

- Turn the speed selector to the desired position, the icon appears in orange.
- Pull the grip to the neutral position, to engage the new selected mode. The icon appears in white

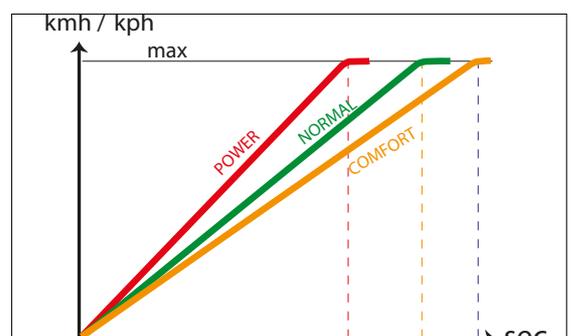


Comfort, Normal, Power Mode

Acceleration and deceleration of the machine are adjustable with 3 predefined driving mode to match the profile of the driver

These driving modes allows to obtain different behaviours of the machine in terms of reactivity. The Acceleration and deceleration ramps are defined by the time required to reach the maximum speed

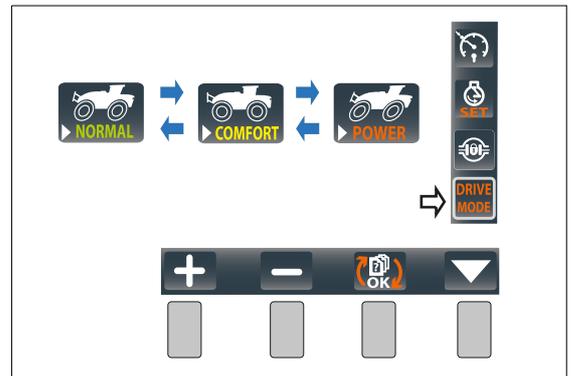
- **COMFORT**: Progressive acceleration.
- **NORMAL**: Intermediate acceleration.
- **POWER**: Reactive driving.



5 - Operation

Select Drive Mode

- Press on  button to display the menu
- Press on  button again to navigate to the drive mode menu
- Press on  or  buttons to select the required mode
- Press on  button to valid



Status



Normal Mode



Comfort Mode



Power mode



NOTE! The change of the driving mode can be carried out when the machine is moving



WARNING To keep control of the machine in all circumstances, adapt the driving mode to the conditions of use.

EcoDrive Mode

The EcoDrive function optimizes the engine speed and transmission depending on the transmission power required. The EcoDrive mode allows a significant reduction of fuel consumption and noise level of the machine.



Engine speed continuously adapts depending on the power required to drive the machine.

Enable / Disable EcoDrive function

- Press on  button et navigate to display the EcoDrive menu
- Press on  button to change the selection.

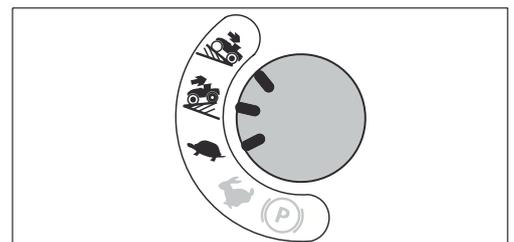


If the EcoDrive function is active (ECO= on), it is recommended to disable the engine speed limiter

Limitation of travel speed in field, uphill, downhill modes

The evo EcoDrive sprayers are standard equipped with a travel speed limitation. It keeps a constant travel speed when the grip is pushed fully forward.

- Place the grip to the neutral position
- Select one of 3 modes



Enable / disable the speed limiter

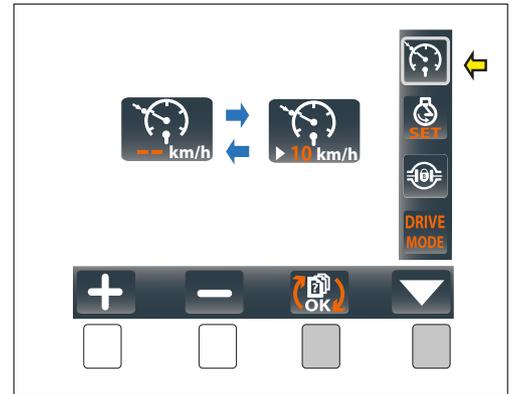
- Press on  button and navigate to display the menu
- Press on  button and navigate to select speed limiter menu
- Press on  button to enable or disable the speed limiter



Speed limiter disabled

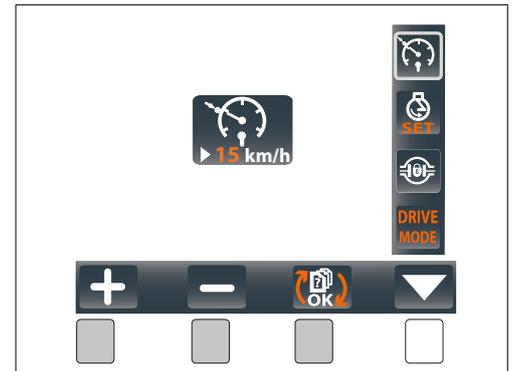


Speed limiter enabled (e.g. 10 kph)



Set-point of speed limitation

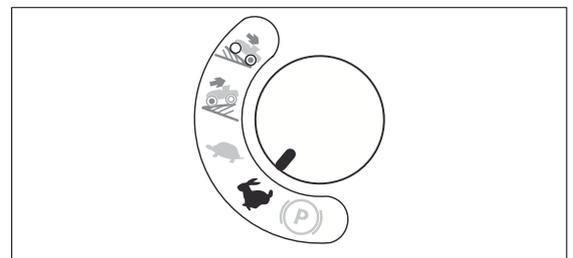
- Enable the speed limiter function
- Press on  or  buttons to change the value
- Press on  button to valid the set-point value
- Push fully toward the grip to travel at the selected speed



Limitation of travel speed in automotive mode

The Evo EcoDrive sprayer are standard equipped with a travel speed limitation in Automotive mode. It keeps a constant travel speed when the grip is pushed fully forward

- Place the grip to the neutral position
- Select the Automotive mode



Enable / disable the speed limiter

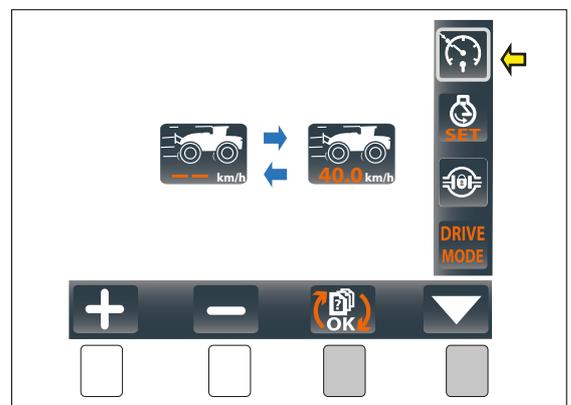
- Press on  button and navigate to display the menu
- Press on  button and navigate to select speed limiter menu
- Press on  button to enable or disable the speed limiter.



Speed limiter disabled



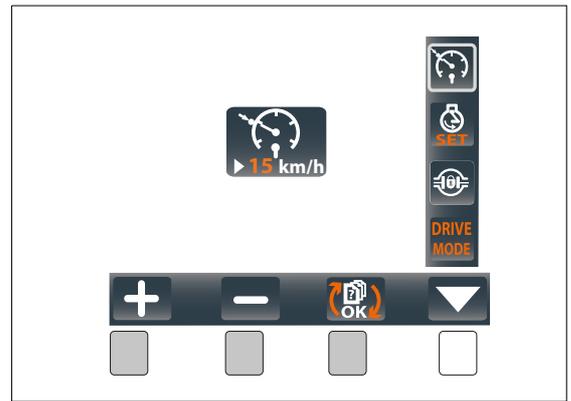
Speed limiter enabled (e.g. 40 kph)



5 - Operation

Set-point of speed limitation

- Enable the speed limiter function
- Press on  or  to change the value
- Press on  to valid the set-point value
- Push fully toward the grip to travel at the selected speed



Engine R.P.M. limitation

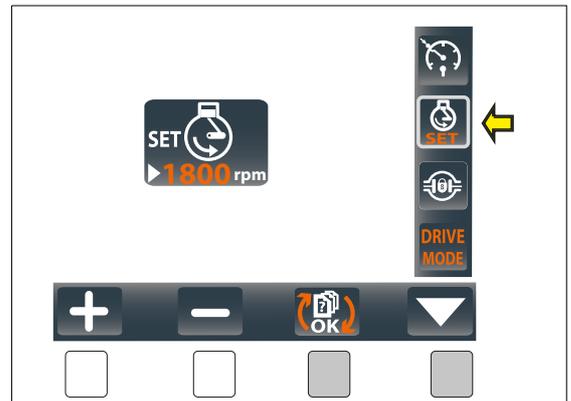
ALPHA evo EcoDrive sprayers are equipped as standard with an engine r.p.m. limiter



Engine r.p.m. limitation is only active in Field, Uphill, Downhill modes.

Enable / disable the engine r.p.m. limiter

- Press on  button and navigate to display the menu
- Press again on  button and navigate to select engine r.p.m. limiter menu
- Press on  button to enable or disable the engine r.p.m. function.



Set-point of engine r.p.m. limiter

- Enable the engine r.p.m. limiter function
- Press on  or  buttons to change the value
- Press on  button to valid the set-point value

Status



Engine r.p.m. limiter disabled



Engine r.p.m. enabled (e.g. 1800 r.p.m.)



The engine r.p.m. limiter is in standby mode when the parking brake is engaged



If Engine r.p.m. limiter is active, it is recommended to disable the EcoDrive system (ECO = off)

Inter-axle Differential Lock (DiffLock)

The DiffLock system can be only engaged in Field, Uphill, Downhill modes and automatically disengages when Automotive or parking brake is selected



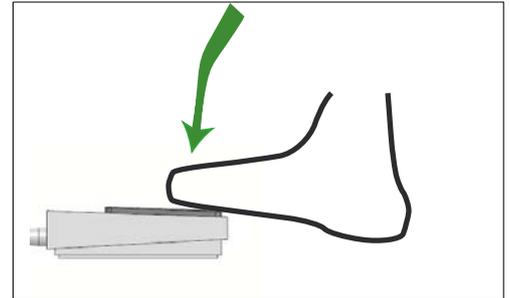
The DiffLock system is automatically disengaged when travel speed is beyond 20 kph.

- Press on DiffLock pedal to engage the inter-axle differential lock.

Status



DIFF-LOCK engaged



Electronic Traction Control (SAPE)

The traction control system can be switched on at any time, in "ROAD" or "FIELD" modes



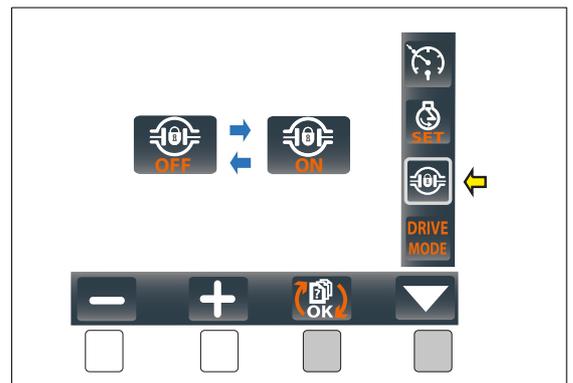
The regulation goes into standby mode when the travel speed is higher than 20 kph.

- Press on button and navigate to display the menu
- Press again on button and navigate to select engine r.p.m. limiter menu
- Press on button to enable or disable the Electronic Traction Control.

Status



Slipping detected



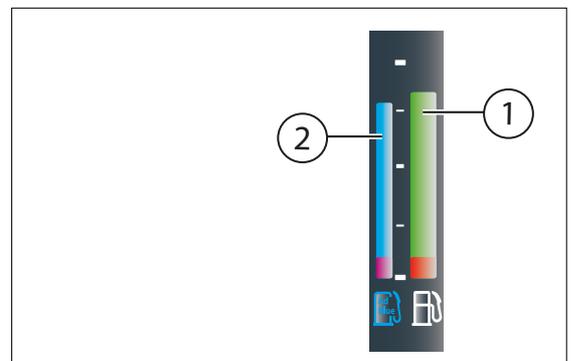
In the event of faulty operation of the system, the regulation is automatically disabled.

Fuel and AdBlue gauges



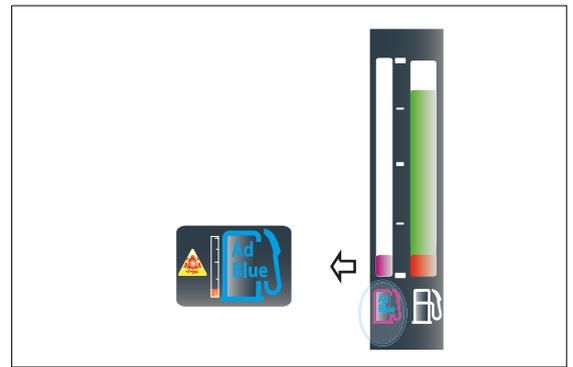
For the choice of the fuel and AdBlue, refer to chapter "Fuel and AdBlue tanks" page 73.

1. Fuel gauge
2. AdBlue gauge



5 - Operation

A warning message appears when the AdBlue level drops below 15%.



The AdBlue filling must be completed as soon as possible. If this is not the case, several stages of alert will appear that can go as far as the reduction of engine performance.

Message	AdBlue Level (%)		Performances moteur
	> 15%	Engine warning lamp OFF	
	< 15%	Engine warning lamp OFF Alarm lamp ON	
	< 10%	Engine warning lamp flashes (2 sec.) Alarm lamp ON Beep sound	
	< 5% and duration > 10 min	Engine warning lamp flashes (1 sec.) Alarm lamp ON Beep sound	Stage 1 Torque reduction
	< 5% and duration > 20 min	Engine warning lamp flashes (0.5 sec.) Alarm lamp ON Beep sound	Stage 2 Torque reduction + Engine speed. limitation



Operation monitoring

Electronic engine control

The status are displayed by the error lamp. The system monitors the condition of the engine and itself.

- Function test
 - Ignition on, error lamp lights up for approx. 2 seconds and then goes out
 - Check the error lamp if there is no reaction after switching on the ignition.
- The lamp does not light
 - After the lamp test an extinguished lamp indicates an error-free and trouble-free operating state within the scope of the control possibility.
- Continuous light
 - Error in the system.
 - Operation continued with restrictions.
 - The engine must be checked by a DEUTZ partner.
 - If a lamp lights steadily a monitored measuring variable (e.g. coolant temperature, lubricating oil pressure) has left the permissible value range. Depending on the fault, the engine power may be reduced by the electronic engine control to protect the engine.
- Flashing
 - Serious error in the system.
 - Switch off prompt for the operator. Attention: Failure to do so will lead to loss of guarantee!
 - The engine has reached switch-off condition.
 - Engine forced to run with power reduction to cool the engine, with automatic shut-down if necessary.
 - The switch-off process has been accomplished
 - There may be a start lock after engine stop.
 - The start lock is deactivated by switching off the system with the ignition key for approx. 2 min.
 - If necessary, additional indicator lamps are switched on, e.g. for lubricating oil pressure or the coolant temperature.

Messages related to events

These warning messages appear to indicate that an event has occurred on the machine. They are associated with a beep sound of 2 seconds.

If the event does not disappear, press on  button to erase the message. It will appear again when the machine is turned on..

Messages	Description	Message	Description
	Beep sound 2 sec. Engine pre-heating		Beep sound 2 sec. Regeneration of the particle filter in progress
	Beep sound 2 sec. Gangway opened		Beep sound 2 sec. AdBlue level low
	Beep sound 2 sec. Load of the particle filter too high		Beep sound 2 sec. Regular maintenance every 500 hour
	Beep sound 2 sec. First maintenance (150 hour)		Beep sound 2 sec. Changing the lubricating oil not scheduled

5 - Operation

Error messages

When an operating anomaly occurs, an error message is displayed accompanied by a beep sounds continuously. If the message reads «STOP» the engine must be stopped immediately and the checks carried out.

The message and beep can be cancelled by pressing buttons (2) and (3) for 2 seconds. If the fault has not disappeared the message will reappear after 30 seconds and the beep will sound after 15 minutes.

Beep sounds cancellation

- Press simultaneously on buttons (2) and (3) to cancel the beep.



Priority alarms

These alarms correspond to serious malfunctions, requiring to stop immediately the engine. They are associated with:

- Engine warning lamp flashes (1 sec.)
- Alarm lamp light up
- Beep sound.i

Messages	Description
	Engine overheating
	Turbo-charger Pressure
	Oil lubricating pressure
	Nombre de défauts du moteur

Non-priority engine alarms

These alarms concern malfunctions, which do not require to stop the engine immediately. They are associated with:

- Engine warning lamp flashes (1 sec.)
- Alarm lamp light up
- Beep sound

Messages	Description	Messages	Description
	Battery level too low		Affichage code erreur de la transmission
	Hydraulic level too low in the tank		Clogged air filter
	Request for standstill regeneration		Presence of water in the fuel pre-filter
	Particle filter error		Hydraulic circuit overheating
	Replacing the particle filter (Ash-load =100%)		

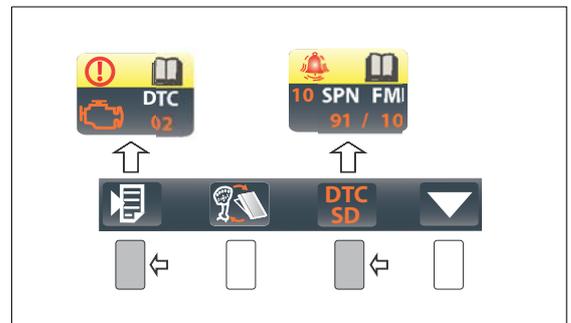
Severity of engine defects

The messages and the associated warning lamp indicates the severity level of engine faults

Messages	Engine warning lamp	Note
	 OFF	Severity step 1 Minor event
	 ON	Severity step 2 Reduction performance
	 Flashes	Severity step 3 STOP IMMEDIATELY THE ENGINE

The DTC (Diagnostic Trouble Code) message indicates the number of errors on the motor:

- Press on  button and navigate to display the DTC menu
- Press on  button to display the SPN/FMI codes



FMI: Failure Mode Identifiers

SPN: Suspect Mode Identifiers

For more details on FMI et SPN codes, report to chapter "Engine Errors Codes" page 195

Exhaust gas aftertreatment system with SCR

Normal Operation

Under normal operating conditions (exhaust temperature > 250 °C), the filter contamination with soot remains in a permissible range and no actions are necessary. The regeneration lamp is off.

Support mode

If the operating conditions of the engine do not permit any passive regeneration permit any passive regeneration, the contamination of the diesel particle filter with soot will increase. A throttle valve controlled via the engine control unit is located in the combustion air inlet. This is used to increase the exhaust gas temperature for regeneration of the diesel particle filter, if this is not reached during normal operation.

This can be the case if:

- The engine only has short operating times.
- The engine workload is not high.

This process is automatically activated by the engine control unit, the operator does not need to perform any actions. The regeneration lamp is off.

Power reduction

If a serious fault occurs or a fault is not remedied, the system reacts by reducing the engine performance. There is a one or two-stage performance reduction depending on the type of fault.

- Stage 1 Power reduction
- Stage 2 Torque reduction + Engine speed limitation

5 - Operation

Standstill regeneration



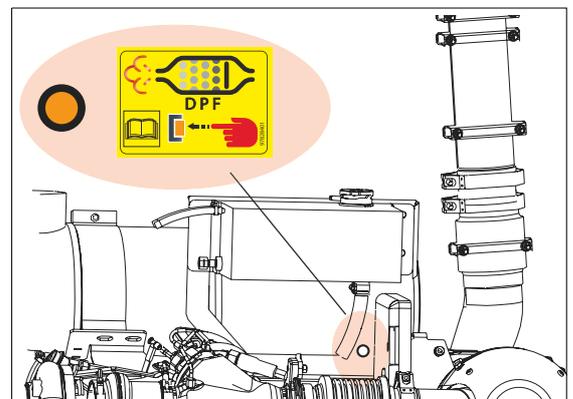
Temperatures of approx. 600 °C occur on the exhaust pipe during regeneration. A special engine operating state becomes active during standstill regeneration and the machine is not allowed to be used during the active standstill regeneration. Danger of burns!

If the support mode does not attain an adequate reduction of the soot contamination, the filter will continue to become contaminated with soot and a standstill regeneration will be necessary. This is displayed by a flashing regeneration lamp. The standstill regeneration must be initiated by the operator. We recommend carrying out a necessary standstill regeneration as quickly as possible, as otherwise the diesel particle filter will continue to become contaminated with soot. If the standstill regeneration is not carried out, the engine control unit will activate the specified engine protection functions, depending on the contamination of the diesel particle filter. Every standstill regeneration slightly dilutes the engine oil with fuel. The number of standstill regenerations is therefore monitored.

Implementation of the standstill regeneration

The engine must be brought into a «safe state» for the regeneration:

- Shut down the engine on an open terrain at a safe distance to flammable objects.
- Warm up the engine; the coolant temperature must reach at least 75°C.
- Operate the engine in idling.
- The engine control unit now requires a signal indicating that the unit is safely parked (stationary signal). This occurs, depending on the application, for ex-ample by: – Activating the parking brake.
- Operating the release button. Position depends on application, see device manual. The regeneration lamp lights up continuously.



Once the standstill regeneration has been released, the engine automatically increases the speed level. Using the device during standstill regeneration is prohibited. The regeneration lasts 35 to 40 minutes on average. The standstill regeneration can be interrupted at any time by pressing the regeneration button again or by removing the regeneration release. Using the device during standstill regeneration also leads to it being interrupted. The request for standstill regeneration remains until it is completed without interruption. Certain engine faults lead to excessive carbon emission which cannot be seen due to the diesel particle filter. In such cases, the diesel particle filter can be loaded very quickly, among other things, to a level which no longer allows a standstill regeneration by the operator. Very short intervals between two standstill regenerations (<10h) can be an indication of such a defect. Please contact the DEUTZ service. The regeneration lamp goes out when regeneration has been successfully completed. If the standstill regeneration request is not observed and the DPF is overloaded to an impermissible level, then the filter can only be regenerated via the DEUTZ service.

Replacing the diesel particle filter

It may be necessary to replace the diesel particle filter after a high filter running time as non-combustible residues accumulate in the filter - so-called ash.

If the ash loading goes beyond a certain level, this will be indicated by the ash lamp.

The diesel particle filter needs to be replaced

The machine can operate normally until the replacement is carried out by the service.

The time interval between two regeneration requests is shortened in proportion to the run time. Please contact your DEUTZ partner DEUTZ particle filters come with a catalysing coating, so require a special cleaning procedure to prevent damage to the coating.

The DEUTZ filter replacement programme guarantees that the filter medium is properly cleaned, and the medium fully functions and performs as if it were a new part!

Regeneration messages

Messages	Warning lamp	Power reduction	Note
	Engine Warning lamp is off		Normal Operation
	Engine Warning lamp is off		Support mode
	Engine Warning lamp is off		Standstill regeneration required Approval by the operator required
	Engine Warning lamp is on	Stage 1	Standstill regeneration required Approval by the operator required
	Engine Warning lamp is flashes	Stage 2	Standstill regeneration required
	Engine Warning lamp is off		Standstill regeneration in progress
	Engine Warning lamp is off		Ash load = 100% Please contact your DEUTZ partner
	Engine Warning lamp is on	Stage 1	Ash load = 110% Please contact your DEUTZ partner

Engine Anti-Stall

This device avoids engine stalling if the power demanded by the transmission is higher than that supplied by the engine. This can happen, for example, on steep hills in fields or on the road. In this case, the capacity of the transmission pump is automatically reduced, which will significantly reduce the travel speed.

This function ensures that the engine speed will not fall below a defined threshold. This results in automatic reduction of the travel speed.

Engine Overspeed

This function avoids the transmission making the engine accelerate beyond a maximum acceptable speed on braking caused by the grip (hydrostatic braking). This results in slower deceleration of the machine, so that the engine speed does not exceed a maximum acceptable value.

Hydraulic overheating

To preserve the life of the transmission, the hydraulic overheating system check that the temperature in the transmission does not exceed a certain threshold temperature. If the temperature of the oil exceeds this threshold, the travel speed decrease following a reduction coefficient of the displacement of the pump.

When the temperature has lowered, the system return to the normal operation.



5 - Operation

Hydraulic oil too low

This message appears when the hydraulic oil level is too low. This requires an immediate shutdown of the machine.



A too low level of hydraulic oil can lead to overheating the hydraulic system or damage the transmission

- Check for leaks
- Refill the tank with a appropriate oil. Refer to chapter "Suitable Lubricants" page 141



Battery voltage too low

This message appears when the battery charge level drops below 10 volt. A low voltage lead to the safety of the machine and may cause a sudden stop of the machine. To avoid this,, the engine speed is reduced to 1200 r.p.m. in order to reduce a too abrupt stop of the machine.

Stop the machine immediately and check the electrical circuits (battery, alternator)



Retractable Gangway

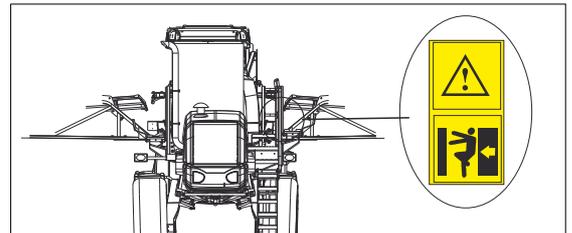
The gangway is retractable to allow the boom to be maintained at the authorized road size.



DANGER! Before moving the retractable gangway, ensure that nobody is on or near the gangway.

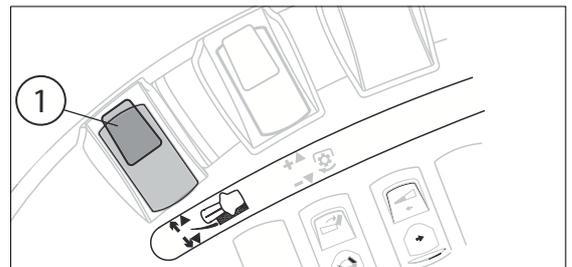


A sticker shows the risk related to the operation of the gangway.



Gangway control

- Press the switch (1) to control the gangway.



Gangway alert

When the gangway is not fully retracted, the road speed is limited to 25 kph (only Road mode)

- Press the switch to retract fully the gangway.
- Pull the grip in neutral position to reduce speed below 25 kph, and then push towards to reach the maximum speed.

The message is automatically cleared when the gangway is retracted



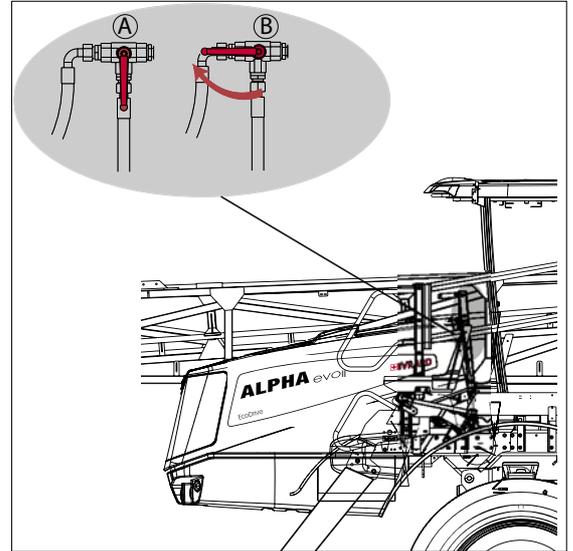
Gangway manual control

i NOTE! The retractable gangway automatically moves away when the engine is shut down.

If the machine is fitted with a LPA5 central frame, it may in case of electrical or hydraulic failure, the retractable gangway does not deviate from the cab. To remedy this, an emergency valve, located outside the cab allow to control manually the retractable gangway.

- A. Normal Operation (position A)
- B. Emergency mode: Use only in case of jamming of the gangway

i Replace the handle vertically immediately after use.



5 - Operation

Cabin

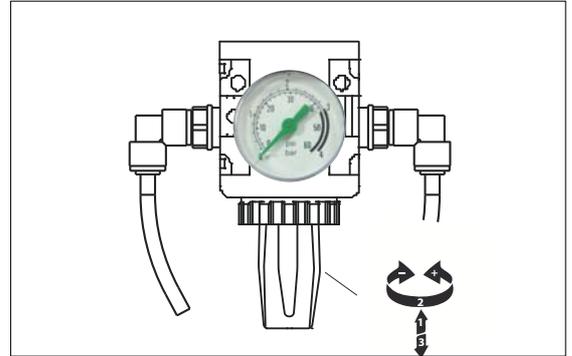
Suspension of the cab (If fitted)

The suspension of the cabin is pneumatic with 2 dampers placed between the chassis and the floor of the cabin. An air pressure regulator maintains a constant pressure into the pneumatic dampers.

Setting the correct regulator pressure is essential for optimizing the suspension and comfort in the cabin.

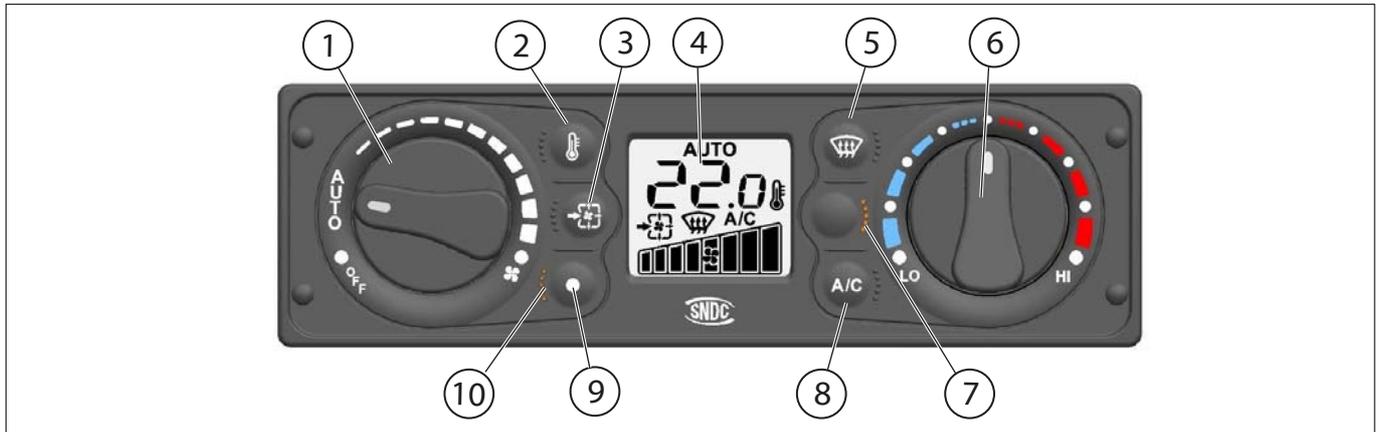
- Pull down and turn the knob clockwise to increase the pressure.
To decrease, turn counterclockwise.

Operating pressure : 2,4 bar (34,8 psi)



Air conditioning

Description control panel



- | | |
|---|--|
| 1. Ventilation control knob | 6. Temperature knob |
| 2. Temperature inside or outside of the cab | 7. Pressurisation indicator light |
| 3. Cab pressurisation button | 8. Air conditioning button. |
| 4. LCD screen | 9. Reset the counter hours button |
| 5. Defrost button | 10. Filter replacement indicator light |

Operating modes

OFF mode

When the speed blower knob is OFF, the system is stopped. In this case:

- Heating valve is closed
- A/C compressor is disabled
- The pump is disabled
- Blower is stopped
- Pressurisation is not operate
- LCD screen is off

Automatic mode

When the speed blower knob is on AUTO, in this case:

1. Heating valve is automatically controlled, depending of:
 - Set-point temperature
 - Ambient temperature
 - Outside temperature

2. Speed blower is automatically controlled depending of:
 - Set-Point temperature
 - Ambient temperature
3. A/C compressor is operated or no operated, depending of the position of the air conditioning knob position
4. The pressurisation blower is operated or not operated, depending of the pressurisation knob position
5. Icons on the screen the operating mode selected
6. LCD screen is ON
7. Indicator light function
8. Buttons back light are lit

5 - Operation

Speed blower knob position	Pushbutton A/C	Screen	Descriptions
	AC ON		Automatic mode <ul style="list-style-type: none"> - heating valve is automatically controlled - Speed blower is automatically controlled - A/C compressor is automatically controlled
	AC ON		Automatic mode with manual speed control <ul style="list-style-type: none"> - heating valve is automatically controlled - Speed blower controlled manually
	AC OFF		Automatic mode with A/C compressor stopped <ul style="list-style-type: none"> - heating valve is automatically controlled - Speed blower automatically controlled - A/C compressor stopped
	AC OFF		Automatic mode with manual speed control and A/C compressor stopped <ul style="list-style-type: none"> - heating valve is automatically controlled - Speed blower manually controlled - A/C compressor stopped

Automatic mode with manual speed selection

When the speed blower knob is in a different position from «OFF» or in automatic mode, the ATC control module ATC goes into semi-automatic mode with a manual speed selection.

In this mode, the operation is identical to the automatic mode, except for the fan speed which depends on the position of the button.

LO mode

When the temperature control knob is in «LO» position, the ATC control module forces the system as follows:

When the temperature knob is in «LO», the ATC control module

- Water valve is closed
- Speed blower at the maximum speed (if the knob is in «AUTO»)
- A/C compressor is engaged

The screen displays «LO» and «A/C on».

HI mode

When the temperature control knob switch is in «HI» position, the ATC control module forces the system as follows:

- Water valve is opened
- Speed blower at $\frac{3}{4}$ of Max (if the selector knob is on «AUTO»)
- A/C compressor is stopped

The screen displays «HI» and «A/C off»

Defrost function

- Press the  button, the ATC selects the defrost function, and forces the following conditions:
 - Water valve fully opened
 - Maximum blower speed (if the blower speed knob is in «AUTO» position)
 - AC compressor is engaged (independent of the external temperature)
 - Flap fresh air doesn't change the position

ATC displays «HI», the ATC and «DEFROST» icons are on

- Press again the  button, the ATC exits from «DEFROST» function.

Also in the ATC goes into «OFF» mode, it exit from «DEFROST» function.

Pressurization operating mode

Pressurization operating modes

When the ATC is in a climate operating mode different from OFF mode, it is possible to obtain the following operation modes, pressing the button 

No-Pressurization mode

When the symbol  is off, the auxiliary outside air fan is off.

The depressurization cabin led and the hour meter led are off.

The flap fresh air is close.

Overpressure mode

- Press the button  the ATC set the overpressure function and activates the auxiliary outside air fan.

The symbol  is on.

5 - Operation

The flap fresh air is open.

LED

Depressurization cabin LED



Function

When overpressure button is «ON», after 30 seconds a pressure switch gives information of measure of the difference between inside and outside pressure of the cabin.

If the cabin:

- is pressurized the led is ON
- isn't pressurized the led is flashing at 1Hz frequency.

Hour meter LED

When the hour meter of the pressurization filter arrives at its limit (150 hours with 1 second resolution) the LED is «ON»



Reset hour meter



For hygiene and safety of the operator, the hour meter resetting must be carried out only after the replacement of the cabin filter.

- push the buttons  and  during 5 seconds to reset the hour meter of the pressurization filter

Default Codes

Sensors faulty

If a temperature sensor is faulty, the display will show one of the following codes: See chapter "Diagnostic" page 208

«AUTO» symbol light off



If the anti-ice sensor is faulty, the button



flashes at a frequency of 2 times per second. The A/C output is deactivated.

Water valve faulty

If the heating valve is faulty, the display will show one of the following message:

Vanne de chauffage	Anomalies	Error Code
Water valve	Not-connected or opened	E9
	Blocked	EA

Water valve calibration

Water valve calibration is performed automatically the first time control unit is powered on, or by disconnecting and reconnecting the water valve with the control unit switched on (also if the ATC is in «OFF» mode). The duration of the calibration is about 24 seconds.

During the water valve calibration the code «CA» appears on the display if the ATC is not in «OFF» mode

General Info

Environmental Info

For environmental info, please refer to the following parts in the Spray Technique Book:

- Nozzles.
- Spray quality.
- Choosing nozzles for arable crops.
- Spraying speed.

Sprayer Use

The HARDI sprayer is for the application of crop protection chemicals and liquid fertilizers. The equipment must only be used for this purpose.

If the sprayer is to be used for any other purposes than the ones described in this instruction book, a new risk assessment and a workplace assessment must be completed for this use. This obligation lies with the owner and operator according to EU directive 2009/104/EC - see "Before First Use of the Sprayer" on page 11.

Improper use of the sprayer results in risks to your safety, health, and even a risk of death.

If no local law demands that the operator must be certified to use spray equipment, it is strongly advised to be trained in correct plant protection and in safe handling of plant protection chemicals to prevent unnecessary risk for persons and the environment, when carrying out your spray job.

5 - Operation

Symbols for Valves

The following symbols are shown on labels on the sprayer, where the operator can set a valve to stop or start a function.

The labels must be readable when operating the sprayer. Damaged or unreadable labels must be replaced.

The symbols are explained here.

Symbol on label	Symbol description	Label color	HARDI item number
	Suction from main tank	Black / Blue	97809900
	Suction from Rinse Tank	Black / Blue	97810000
	Filling of main tank from external tank	Black / Blue	97810100
	Filling of main tank	Black / Green	97810300
	Spraying / Pressurized nozzles	Black / Green	97810400
	Cleaning of main tank inside	Black / Green	97810500
	Pressure emptying of main tank to external tank	Black / Green	97810600
	Agitation in main tank	Black / Green	97810900
	External cleaning	Black / Green	97811000
	Flushing of external filling	Black / Green	97826900
	Pressure emptying of main tank and TurboFiller to external tank	Black / Green	97825500
	Cleaning of empty chemical containers	Black / Yellow	97821600
	Agitation in TurboFiller	Black / Yellow	97821500
	Filling of main tank from TurboFiller	Black / Yellow	97821400

Spray Boom

Safety Info

Keep the spray boom in folded position while driving outside the field. Park the vehicle on level ground before using the folding/unfolding functions.

Failure to comply will damage the boom and cause dangerous situations to people and the surroundings.

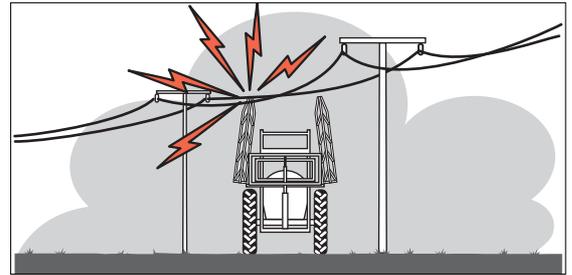


DANGER! When folding or unfolding the boom, make sure that no persons or objects are within the operating area of the boom.



DANGER! Always follow the guidelines listed below when driving in areas with overhead power lines:

Keep from using the folding/unfolding functions in areas with overhead power lines. Unintended boom movements may cause contact with overhead power lines, causing a risk of fatal accidents.



ATTENTION! A label (HARDI item no. 978448) follows the sprayer. This label must be placed in the cabin visible from the operator's seat.

Operating the Grip

The buttons on the grip controls the following sprayer functions in the field:

A. Status light for power ON/OFF.

The light must be ON.

B. Boom tilt up/down - left boom side.

Adjust the boom height individually for the right and left boom side, if the terrain is hilly.

C. Boom tilt up/down - right boom side.

D. Boom slant - left boom side.

Adjust the boom height to match the slope, when driving across a hillside.

E. Boom slant - right boom side.

F. Main valve for spraying ON/OFF.

Turn it ON for spraying, OFF to stop spraying.

G. Boom height up.

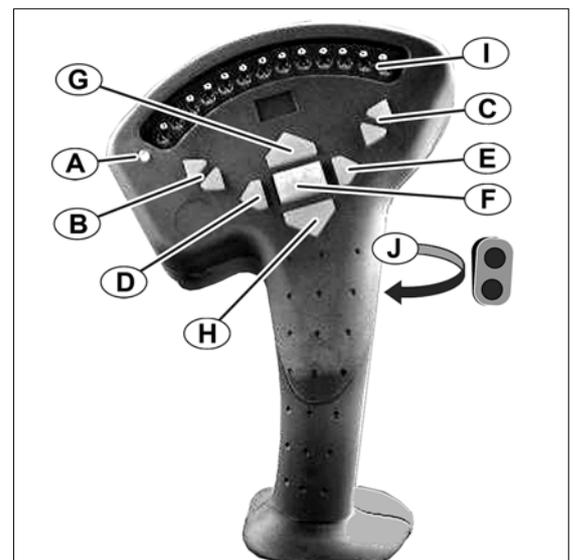
Aim for a height of 50 cm above the crop when spraying.

H. Boom height down.

I. Boom sections spraying ON/OFF.

Switch pushed up is OFF, down is ON.

J. Presets 1 and 2 for the TWIN air system - the selected air angle and air volume during spraying.



5 - Operation

Manoeuvring of the Boom

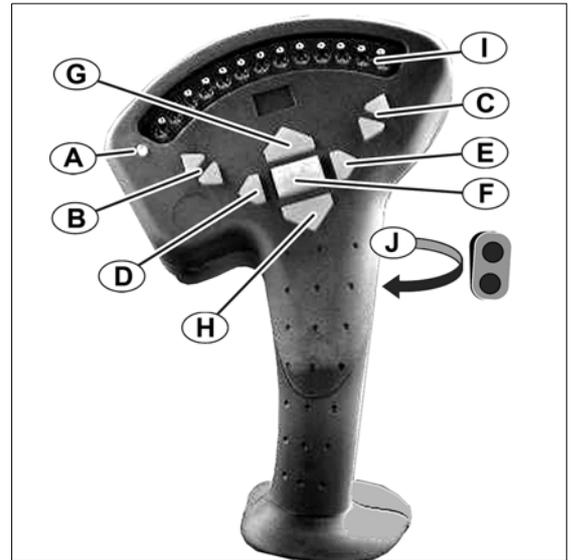
Applicable for HC 6500 / HC 8600 / HC 9600 / ISOBUS.



WARNING! The folding functions must only be operated, when the sprayer is stationary! Failure to do so will damage the boom.

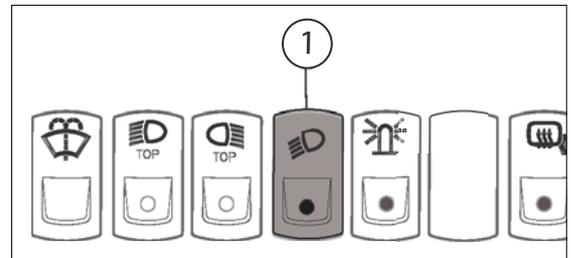
How To Unfold the Boom

1. Push the button (G) to lift the boom clear of the transport brackets. This takes approximately 3 seconds.
2. The symbol  is now shown on the display.
3. If not, lock the pendulum by pushing  for 1 second.
4. Push the button to the left (K) to unfold inner boom sections completely.
5. Push the button in the middle to unfold outer sections 1.
6. Push the button to the right to unfold outer sections 2.
7. Push the button (H) to lower the boom to the correct working height.
8. Unlock the pendulum by pushing  for 1 second.
The symbol  is now shown on the display.



Night Spraying Light

The night spraying light is activated by a switch located on the cabin ceiling.

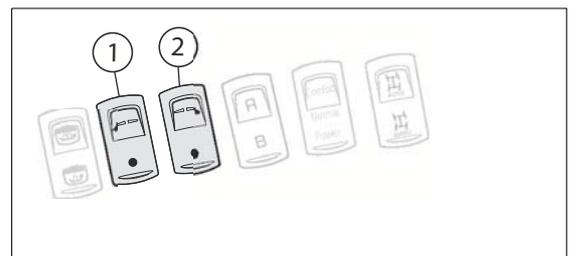


To avoid any risk of dazzle and to save battery, we recommend switching off the boom lights on leaving the field.

End nozzles (optional)

The boom can be fitted with end nozzles.

- Press the switch (1) to operate the end nozzle on the left side of the boom.
- Press the switch (2) to operate the end nozzle on the right side of the boom.



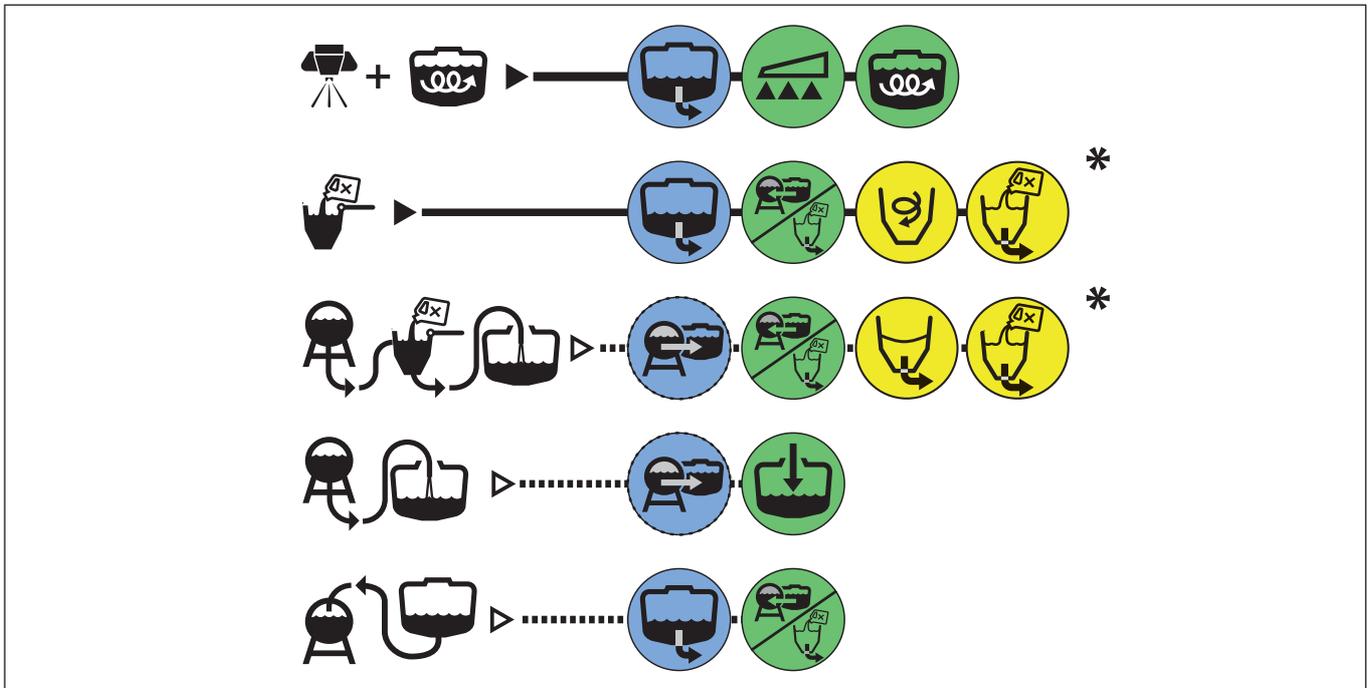
Liquid System

General Info

Please refer to the Spray Technique book for instructions on the use of filters, nozzles etc., and their combination in use with specific spraying applications.

Quick Reference - Operation

In the following diagram, the handle positions for different options are described.



5 - Operation

Filling/Washing Location Requirements

When filling the sprayer with chemicals and water, it is important to avoid spot contamination by spraying chemicals in order to protect the subsoil water resources.

At a dedicated filling site

If the sprayer is always filled on the same location, a special filling/washing location should be established. This should have a hard, liquid-impenetrable surface (e.g. concrete) securing against seepage, together with edges securing against run-off to the surrounding areas. The location should be drained to an adequate receptacle (e.g. slurry tank or similar).

Any spillage or washings should be retained and diluted in order to be distributed in a larger area. This is to ensure minimal environmental impact and avoid build-up of larger chemical concentrations at one spot.

If no other requirements of distances exist, the following general recommendation of distance can be used. Filling location must be no closer than:

1. 50 metres from public water supplies for drinking purposes.
2. 25 metres from non-public water supplies for drinking purposes and from treatment sumps and cesspools of drainage systems, and
3. 50 metres from surface water (watercourses, lakes and coastal waters) and from nature reserves.

In the field

Alternatively the sprayer can be filled in the field, where the spraying is to take place. If so, choose a different location for each refilling.

If no other requirements of distances exist, the filling should not take place closer than:

1. 300 metres from public or non-public water supplies for drinking purposes, and
2. 50 metres from surface water (watercourses, lakes and coastal waters), treatment sumps, cesspools of drainage systems, and nature reserves.



ATTENTION! Legislation and requirements vary from country to country. Always follow local legislation in force.



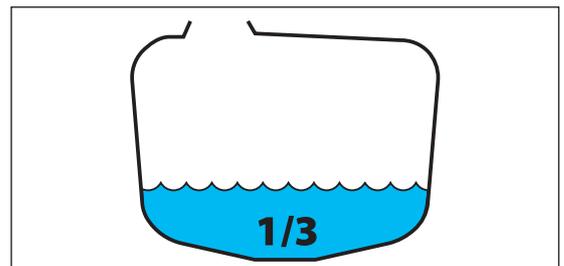
ATTENTION! It is the responsibility of the sprayer owner/operator to comply with all relevant legislation. HARDI cannot undertake any responsibilities for incorrect operation and use.

Filling of Water

The tank should normally be filled 1/3 with water before adding chemicals. Always follow the instructions given on the chemical container!



WARNING! If the sprayer is put aside with liquid in the main tank, all manifold valves must be closed.



Filling Through Tank Lid

The tank lid is provided with a hinge (1) so it can be lifted. A locking system (2) prevents it from being opened.

Opening:

- Unlock and turn the lid anticlockwise then lift.

Closing:

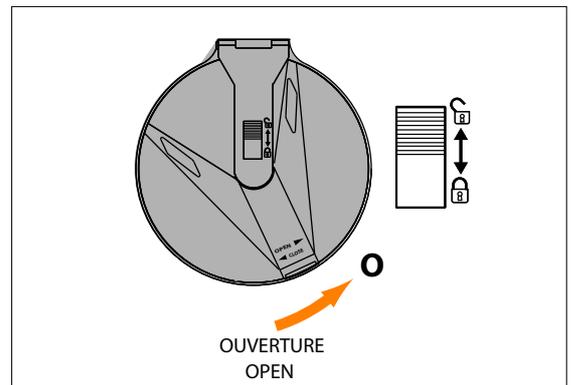
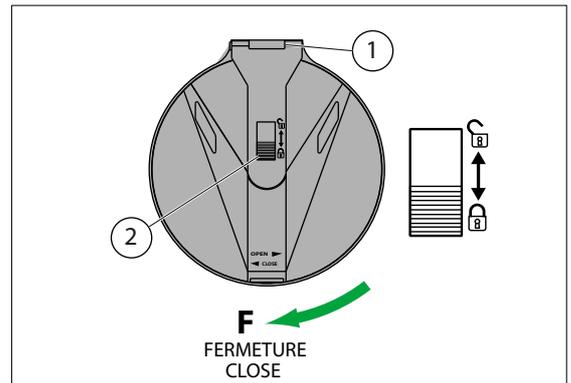
- Put the lid down and turn it clockwise, then lock it.



NOTE! The lid filter should always remain in place to avoid impurities falling into the tank.

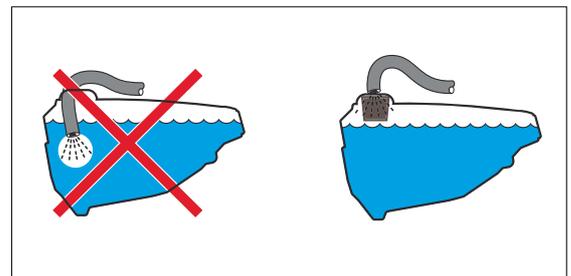


NOTE! The tank lid should always be locked before moving the vehicle.



Water is filled into the tank by removing the tank lid, which is located at the top of the sprayer tank near the front, which is accessible from the platform top of the tank on the sprayer's left side. Always fill water through the strainer basket to prevent foreign particles from entering the tank. An overhead tank can be used in order to obtain high filling capacity.

Water is filled into the tank by removing the big tank lid, which is located at the top of the sprayer tank near the front, which is accessible from the platform top of the tank on the sprayer's right side. It is recommended to use as clean water as possible for spraying purposes. Always fill water through the strainer basket to prevent foreign particles from entering the tank. An overhead tank can be used in order to obtain high filling capacity.



WARNING! Do not let the filling hose enter the tank. Keep it outside the tank, pointing towards the filling hole. If the hose is led into the tank, and the water pressure drops at the water supply plant, chemicals may be sucked back and contaminate the water supply lines, supply plant and supply well.



WARNING! The water supply line should be provided with a check valve as additional safety precaution. Follow local legislation in force at any time.



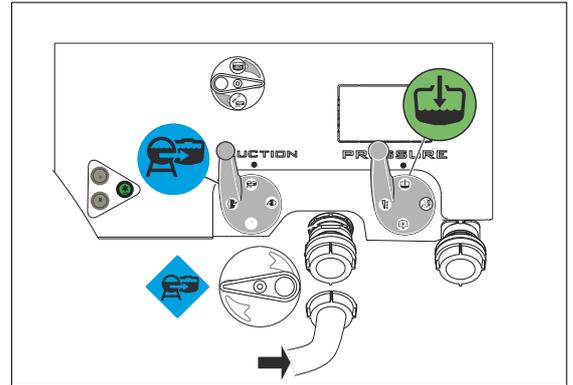
WARNING! The water supply should be provided with a water meter to avoid spillage by overfilling. Follow local legislation in force at any time.

5 - Operation

External Filling Device

The External Filling Device is operated as follows:

1. Remove cover and connect suction hose to the suction manifold.
2. Turn pressure Smartvalve to "Main tank"
3. Turn handle on External Filling Device valve towards Filling Device
4. Engage the pump and set PTO revolutions at max. 540 r.p.m.
5. The tank is now filled with water. keep an eye on the liquid level indicator
6. Turn handle on suction manifold away from Filling Device to discontinue filling process. Now disengage the pump.
7. Disconnect suction hose and replace cover



 **DANGER!** Prevent contamination or injury. Do not open suction valve towards Filling Device, unless the pump is running and the filling hose is connected. If this valve is opened without the pump running, liquid will stream out of the coupler.

 **WARNING!** Do not leave the sprayer while filling the tank, and keep an eye on the level indicator in order NOT to overfill the tank.

 **WARNING!** If suction hose/filter is carried on the sprayer during spraying, it can be contaminated by spray drift which will be transferred to lake/river when filling!

 **ATTENTION!** Observe local legislation regarding use of filling device. In some areas, it is prohibited to fill from open water reservoirs (lakes, rivers etc.). It is strongly recommended only to fill from closed reservoirs (mobile water tanks etc.) to prevent contamination.

Filling of Rinsing Tank

The rinsing tank is filled via the 1" threaded connection piece (1)

1. Remove the filler cap, then fit the external water hose to the threaded connection piece
2. Engage external water, if any
3. keep an eye on the level in order not to overfill the tank
4. Stop filling and refit the cap

Volume approximate 600 litres



 **ATTENTION!** Only fill rinsing tank with clean water! To avoid algae developing in the rinsing tank, always drain this tank, if the sprayer is not in use for a longer period of time.

 For cleaning and inspection purposes, the rinsing tank is accessible via the tank on top of the tank

Filling of Clean water tank

To fill the clean water tank:

1. Remove the screw cap
2. Fill with clean water
3. Refit the screw cap

Volume 15 litres

For use of clean water

The water from this tank is for hand washing, cleaning of clogged nozzles etc. This water never not to be used as drinking

- Turn the ball valve. The ball valve is located next to the spraying pump



Only fill this tank with clean water. To avoid algae developing in the clean water tank, drain the tank, if the sprayer is not in use for a longer period of time

5 - Operation

Safety Precautions - Crop Protection Chemicals

Always be careful when working with crop protection chemicals!



WARNING! Always wear proper protective clothing before handling chemicals!

Personal protection

Depending on chemical type, protective gear/equipment should be worn to avoid contact with the chemicals, such as:

- Gloves
- Waterproof boots
- Headgear
- Respirator
- Safety goggles
- Coverall with chemical resistance



WARNING! Protective clothing/equipment should be used, when preparing the spray liquid, during the spray job and when cleaning the sprayer. Follow the chemical manufacturer's instructions given on the chemical label and/or local legislation.



WARNING! It is always advisable to have clean water available, especially when filling the sprayer with chemicals.



WARNING! Always clean the sprayer carefully and immediately after use.



WARNING! Only mix chemicals in the tank according to directions given by the chemical manufacturer.



WARNING! Always clean the sprayer before changing to another chemical.



The correct use and precautions to be taken for the proper use of the products are the sole responsibility of the products manufacturer, through the information on the packaging or other product sheets made available by this manufacturer.

Operating the TurboFiller

The TurboFiller is where you add the chemicals to be mixed with water in the main tank.

Capacity: approximately 35 litres.

Before Use

- raise the handle (A) to unlock the position of the TurboFiller.
- Grab the handle above and pull the TurboFiller towards you.
- Lower completely the TurboFiller.
- Pull up the lid (B) in the right side and open it fully.
- Place the chemicals for the coming spray job here ready to be filled into the TurboFiller.



After Use

- Clean the inside of the TurboFiller with the spray gun to remove chemical residues.
- Place the spray gun in its storing position
- Close the lid on top of the TurboFiller.
- Grab the handle above and push the TurboFiller upwards.
- Push the TurboFiller back in storage position, until it locks.



ATTENTION! When unlocking the TurboFiller, always keep a hand on the handle to avoid abrupt movement of the TurboFiller!

On the next page is a short description on how to operate the valves by using the levers on the side of the TurboFiller.

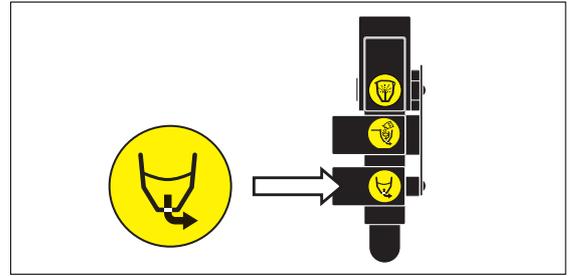
For more details, see the following sections in this Instruction Book about the procedure for operating the TurboFiller while filling chemicals.

5 - Operation

TurboFiller Suction Valve

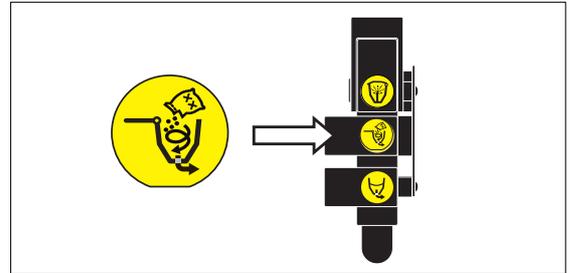
The valve is used simultaneously with the TurboFiller. The valve has 2 settings: Continuously open or spring-loaded normally closed.

Open the valve by lifting the lever up, when chemicals are to be filled into the TurboFiller and transferred to main tank.



TurboDeflector Valve

This TurboDeflector valve activates the vortex flushing of the TurboFiller. Lift the lever to lock it in open position for continuous liquid rotation in the hopper.



Rinsing of Chemical Containers

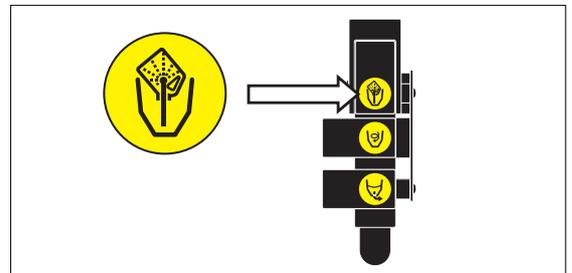
The upper lever is used for two purposes.

1. When the TurboFiller lid is open:

For rinsing empty containers. Place the container over the rotating flushing nozzle in the middle of the TurboFiller to rinse the inside of the container.

2. When the TurboFiller lid is closed:

Use the lever to rinse the hopper, when the filling of chemicals is completed.



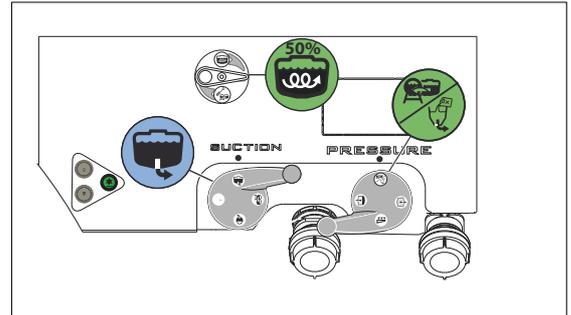
DANGER! Do not activate this lever, unless the multi-hole nozzle is covered by a container, as spray liquid may otherwise hit the operator! Risk of injuries and spillage on the ground.

Filling Liquid Chemicals Using the TurboFiller



ATTENTION! We advice to use the TurboFiller, when you fill chemicals on the sprayer.

1. Fill the main tank at least 1/3 with water (unless otherwise stated on the chemical container label).
2. Turn the handle of the suction valve towards "suction from Main tank". Turn pressure SmartValve towards "Pressure draining/TurboFiller" an unused function closed position. Set the agitation valve to 50% approx.



ATTENTION! If filling water from an external tank, this can be continued while doing the next steps.



DANGER! Before turning Pressure SmartValve to "Pressure draining/TurboFiller" it is very important to be sure that the quick coupler lid is correct and completely mounted to the filling stud into its locked position. Failure to do so may cause risk of contamination and injury from quick coupler lid being "shot" off when pressurized! If not possible to mount lid completely, lubricate the rubber seal and the grip hooks.

3. Engage the pump and set PTO speed at max. 540 r.p.m.
4. Open TurboFiller lid. Measure the correct quantity of chemical and fill it into the hopper.



DANGER! Always wear face shield and other appropriate personal safety equipment, when filling chemicals.



ATTENTION! The scale in the hopper can only be used, if the sprayer is parked on level ground! It is recommended to use a measuring jug for best accuracy.

5. Engage the hopper transfer device by opening the TurboFiller suction valve to transfer chemicals to the main tank. The TurboFiller suction valve must be open for at least 20 seconds after the chemical is no longer visible in the hopper, in order to empty the transfer hoses completely into the main tank.



DANGER! If the TurboFiller and the transfer hoses are not completely emptied, there is a risk of chemicals being sucked out of the main tank!

6. If the chemical container is empty, it can be rinsed by the Chemical Container Cleaning device. Place the container over the multi-hole nozzle and push the container for cleaning.



DANGER! In order to avoid spray liquid hitting the operator, do not press the lever, unless the multi-hole nozzle is covered by a container, as spray liquid may otherwise hit the operator!



ATTENTION! The rinsing device uses spray liquid to rinse containers for concentrated chemicals. Before disposal, always rinse the chemical containers with clean water several times, until they are clean.

7. Flush the TurboFiller with clean water from the rinsing tank or from an external tank by shifting to suction. The TurboFiller suction valve must be open for at least 20 seconds after the rinse water is no longer visible in the hopper, in order to empty the transfer hoses completely into the main tank.



ATTENTION! If not flushed with clean water, the hopper rinsing device uses spray liquid for rinsing the hopper! Cleaning the TurboFiller must always be done, when the spray job is ended, and together with cleaning the entire sprayer. A cleaning after the last filling, and before spraying, does not ensure a clean TurboFiller!

8. Close the TurboFiller suction valve, when the hopper has been rinsed. Close the lid.

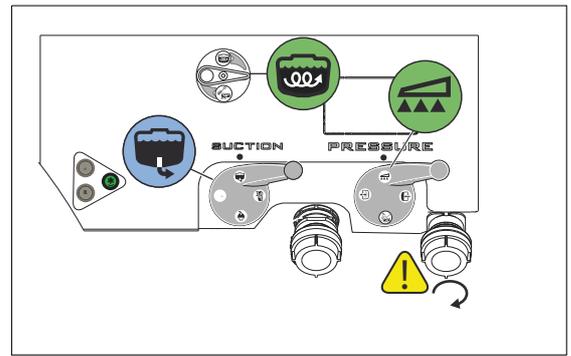
5 - Operation

- Turn the agitation valve towards “agitation”.



ATTENTION! If foaming is a problem, turn down the agitation.

- When the spray liquid is well agitated, turn handle of the pressure SmartValve towards “spraying” position. The agitation continues during spraying of the crop.



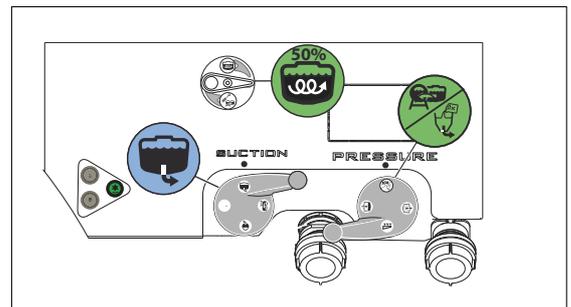
Filling Powder Chemicals Using the TurboFiller

- Fill the main tank at least 1/2 with water (unless otherwise stated on the chemical container label). See section “Filling of water”.
- Turn the handle of the suction valve towards “Main tank”.

Turn pressure SmartValve towards «Pressure draining/TurboFiller an unused function closed position.» Main tank

Turn the agitation valve towards “agitation” as required: A fully open agitation valve will result in very little suction from the TurboFiller; a fully closed agitation valve will result in no agitation, while the powder is being transferred into the tank, resulting in poor mixing. Choose your own setting for this valve.

Close remaining valves.



ATTENTION! For increased suction from the TurboFiller the agitation valve can be kept closed.



ATTENTION! If filling water from an external tank, this can be continued while doing the next steps.



DANGER! Before turning Pressure SmartValve to “Pressure draining/TurboFiller” it is very important to be sure that the quick coupler lid is correct and completely mounted to the filling stud into its locked position. Failure to do so may cause risk of contamination and injury from the quick coupler lid being “shot” off when pressurized! If not possible to mount lid completely, lubricate the rubber seal and the grip hooks.

- Engage the pump at max. 540 r.p.m.
- Open TurboFiller lid. Open TurboDeflector valve and TurboFiller suction valve.
- Measure the correct amount of powdered chemical and sprinkle it into the hopper as fast as the transfer device can flush it down. The TurboFiller suction valve must be open for at least 20 seconds after the chemical is no longer visible in the hopper in order to completely empty the transfer hoses into the main tank.



DANGER! If the TurboFiller and the transfer hoses are not completely emptied, there is a risk of chemicals being sucked out of the main tank!



DANGER! Always wear face shield and other appropriate personal safety equipment, when filling chemicals.

- If the chemical container is empty, it can be rinsed by the Chemical Container Cleaning device. Place the container over the multi-hole nozzle and push the upper lever to the left of the TurboFiller.



DANGER! In order to avoid spray liquid hitting the operator, do not press lever unless the multi-hole nozzle is covered by a container, as spray liquid may otherwise hit the operator!



ATTENTION! The rinsing device uses spray liquid to rinse containers for concentrated chemicals. Always rinse the chemical containers with clean water several times, until they are clean before disposal.

- Flush the TurboFiller with clean water from the rinsing tank or from an external tank by shifting to suction. The TurboFiller suction valve must be open for at least 20 seconds after the rinse water is no longer visible in the hopper, in order to completely empty the transfer hoses into the main tank.

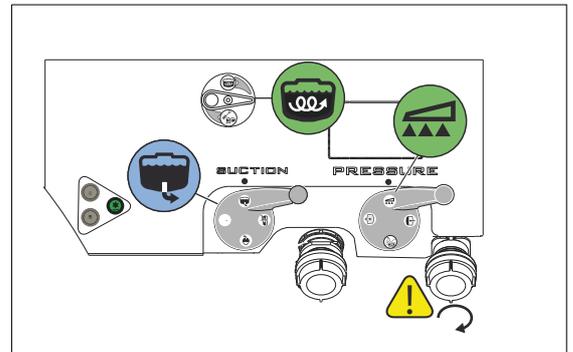


ATTENTION! If not flushed with clean water, the hopper rinsing device uses spray liquid for rinsing the hopper! Cleaning the TurboFiller must always be done, when the spray job is ended, and together with cleaning the entire sprayer. A cleaning after the last filling, and before spraying, does not ensure a clean TurboFiller!

- Close TurboFiller suction valve, when the hopper has been rinsed. Close the lid.
- If closed, turn the agitation valve towards "agitation".
- When the spray liquid is well agitated, turn handle of the pressure SmartValve towards "spraying" position. The agitation continues during spraying of the crop.



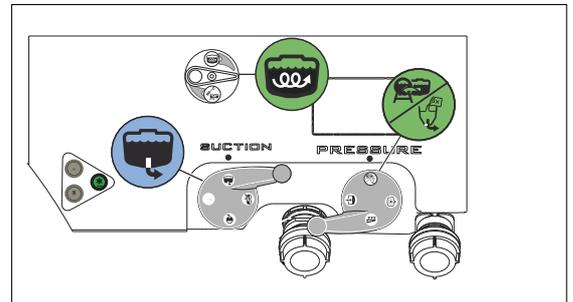
ATTENTION! If foaming is a problem, turn down the agitation.



Agitation Before Resuming a Spray Job

If a spray job has been interrupted for a while, severe sedimentation may occur depending on the chemicals being used. Before resuming the spray job, it might be necessary to agitate sediment material.

- Turn the handle at the suction valve towards "Suction from main tank". Turn the pressure SmartValve towards "Pressure draining/TurboFiller" an unused function closed position and turn the agitation valve towards "Agitation". Other valves are closed.
- Engage the pump and set PTO speed to max. 540 r.p.m.
- Agitation has started and should be continued for at least 10 minutes.
- The spray job can now be resumed. Turn pressure Smartvalve towards "Spraying" and start spraying.



DANGER! Before turning Pressure SmartValve to "Pressure draining/TurboFiller" it is very important to be sure that the quick coupler lid is correct and completely mounted to the filling stud into its locked position. Failure to do so may cause risk of contamination and injury from quick coupler lid being "shot" off when pressurized! If not possible to mount lid completely, lubricate the rubber seal and the grip hooks.

TurboFiller Rinsing

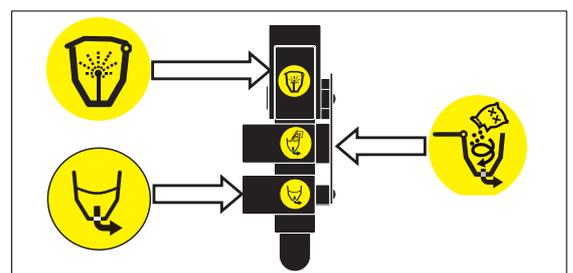


NOTE! It is important to suck from the rising tank or an external tank with clean water.

Rinse the TurboFiller and chemical containers as follows:

Cleaning empty containers - TurboFiller lid is open

- Put container over the rotating flushing nozzle in the middle of the TurboFiller, so that the nozzle is inside the container.



5 - Operation

2. Simultaneously press the Chemical Container Cleaning lever and the TurboFiller suction valve. This rinses the chemical container with the flushing nozzle, while the rinsing liquid is emptied out of the TurboFiller.

TurboFiller rinsing - TurboFiller lid is closed

1. Close TurboFiller lid.
2. Turn the suction SmartValve towards "Rinsing tank" or "External Filling Device", if clean water is available here.
3. Open the Turbo Deflector Valve  for 1 minute to get plenty of clean water through the hoses.
4. Simultaneously press the Chemical Container Cleaning lever and the TurboFiller suction valve. This rinses the hopper with the flushing nozzle, while the rinsing liquid is emptied out of the TurboFiller.
5. Rinse the hopper for 30-40 seconds.
6. Open the lid to inspect if the TurboFiller is empty. If not, close the lid again and press the TurboFiller suction valve, until the TurboFiller is empty.
7. After the last flushing, the TurboFiller suction valve must be open for at least 20 seconds, after the rinse water is no longer visible in the hopper, in order to completely empty the transfer hoses into the main tank.



ATTENTION! The TurboFiller needs to be cleaned thoroughly after finishing spraying. This is to ensure that it is clean, before spraying other crops that may be sensitive to the chemicals just used. See the section "Cleaning" on page 130 for details.

BoomPrime

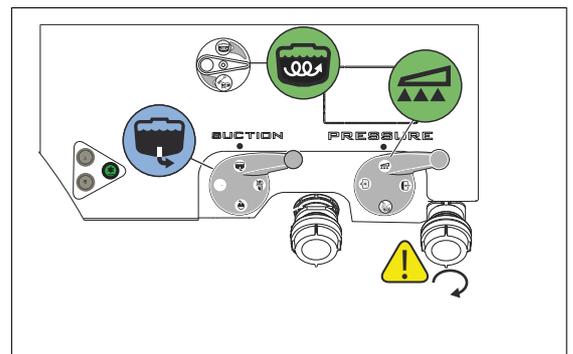
The BoomPrime system works automatically, and it is activated, when a spray job is prepared:

1. Unfold the boom and turn on the PTO.
2. Set pressure valve to "Spraying", suction valve to "Main tank" and agitation valve to "Agitation", if needed.
3. Adjust the spray pressure to what will be used when spraying.
4. The boom will then be fully primed within 1-2 minutes.

If the nozzles start to leak, when closing one or more sections during a spray job, proceed as follows:

1. Adjust the pressure on the BoomPrime pressure regulation.
2. Turn pressure valve to "Main tank".
3. Disconnect the PTO.

If adjustment of the BoomPrime system might be necessary, please refer to "BoomPrime Adjustment" on page 75.



BoomFlush - Manual Cleaning

When having the BoomFlush valves fitted to the end(s) of boom piping, the cleaning procedure is as follows:

1. Follow the cleaning procedure to clean the sprayer the first two times.
2. Open all BoomFlush valves by hand.
3. Continue the cleaning procedure to clean the sprayer for the third time.
4. Close BoomFlush valves.



WARNING! To prevent contamination of the soil, the BoomFlush valves must only be opened at the last step of cleaning!

Before Returning to Refill the Sprayer

If the sprayer is to be refilled at the farm, or at a fixed filling place without a filling space with hard surface and drain to a closed reservoir, the sprayer should be rinsed before returning to refill.

Dilute the residues of the spraying circuit, and spray it on the crop. Now rinse the sprayer on the outside with the External Cleaning Device (optional equipment), before returning to the farm.



WARNING! Always follow local legislation in force at any time

Parking the sprayer

To avoid spot contamination, the sprayer should always be parked at either the washing/filling location or under roof.

This prevents rainfall from washing down chemical residues from the sprayer's surfaces.

- Parking at the washing/filling location will retain residues.
- Always park the machine out of reach of children, animals and unauthorized persons.
- Always follow local regulations when parking your sprayer.

Liquid Fertilizer

Spraying pressure

If you are spraying with liquid fertiliser instead of pesticides, the spraying pressure must be increased in comparison to pesticide spraying to get the desired output (l/ha).

The density for liquid fertiliser is normally higher than for water and spray liquids - so to get the correct output (l/ha), the spraying pressure must be adjusted.

Example:

Nozzle output is 2.40 l/min at 3.0 bar pressure. Density of liquid fertiliser is 1.20 g/cm³.

Multiply the pressure value with the density value: 3.0 x 1.20 = 3.6.

The adjusted pressure is now 3.6 bar for spraying the liquid fertiliser.

In the table below, adjusted pressure values can be found for different densities of liquid fertilisers.

Calibrated pressure (bar) when spraying with pesticides	Density (g/cm ³) for liquid fertiliser				
	1.10	1.15	1.20	1.30	1.40
	Adjusted pressure (bar) when spraying with liquid fertilizer				
1.5	1.7	1.7	1.8	2.0	2.1
2.0	2.2	2.3	2.4	2.6	2.8
2.5	2.8	2.9	3.0	3.3	3.5
3.0	3.3	3.5	3.6	3.9	4.2
3.5	3.9	4.0	4.2	4.6	4.9
4.0	4.4	4.6	4.8	5.2	5.6
4.5	5.0	5.2	5.4	5.9	6.3
5.0	5.5	5.8	6.0	6.5	7.0



ATTENTION! Pressure values below 1.5 bar or above 5.0 bar are considered to be out of range for the nozzles.



NOTE! Find the density for your liquid fertilizer on the packaging or on the material safety data sheet (MSDS) included.

Additional Information

See the other book delivered from HARDI - Spray Technique - to get further information about:

- Calibration of the sprayer

5 - Operation

- Nozzle Choice
- Nozzle Wear
- Spray Distribution
- Spray Pressure
- Water Volume Rates
- Weather Influence on Spraying
- Useful Formulae

For optional equipment - see other books delivered or contact HARDI.

Operating Limits

The following things are important when considering the performance of the sprayer.

- Maximum driving speed
- Pressure setting
- Minimum / maximum flow rate

The operating limits for your sprayer are closely related to:

1. Pump size
2. Boom width
3. Nozzle size

In the table below, the operating limits for volume rate are calculated, when driving at different speeds.

Nozzle size, type HARDI ISO F-110	Min. volume rate (l/ha) at 4 km/h	Max. volume rate (l/ha) at 4 km/h	Min. volume rate (l/ha) at 8 km/h	Max. volume rate (l/ha) at 8 km/h	Min. volume rate (l/ha) at 12 km/h	Max. volume rate (l/ha) at 12 km/h	Min. volume rate (l/ha) at 16 km/h	Max. volume rate (l/ha) at 16 km/h
02 (yellow)	171	309	86	155	57	103	43	77
025 (purple)	213	387	107	194	71	129	53	97
03 (blue)	255	465	128	233	85	155	64	116
04 (red)	339	621	170	311	113	207	85	155
05 (brown)	423	774	212	387	141	258	106	194
06 (grey)	510	930	255	465	170	310	128	233
08 (white)	678	1239	339	620	226	413	170	310
10 (light blue)	849	1548	425	774	283	516	212	387



NOTE! The specified nozzle type is a standard flat fan nozzle. Other special nozzle types will show different results. Ask your HARDI dealer if in doubt.



ATTENTION! It is recommended not to drive faster than 16 km/h when spraying.



ATTENTION! The pressure range for the nozzles are 1.5 - 5 bar (except for HARDI INJET nozzles, which are ranging from 3-8 bar). The spraying pressure should be within these limits.



ATTENTION! In the table below, the specified combination of nozzle size and sprayer setup is not suitable, as the full pressure range of 5 bar for the nozzle cannot be reached, when spraying the maximum volume rate (l/ha) on the crop. This is due to the nozzle design.

Combinations not suitable		
Pump model	Boom width	Nozzle size
464-10	36 - 39 meters	06 (grey)
464-10	27 - 39 meters	08 (white)
464-10	All	10 (light blue)



According to the standard for environmental requirements for sprayers, ISO 16119 / EC Directive 2009/127/EC (amending 2006/42/EC), the farmer shall be able to use the full pressure range.

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Cleaning

General Info

In order to derive full benefit from the sprayer for many years, the following service and maintenance program should be followed.



ATTENTION! Always read the individual paragraphs. Read instructions for service/maintenance jobs carefully before starting on the job. If any portion remains unclear, or if it requires facilities which are not available, then please leave the job to your HARDI dealer's workshop for safety reasons.



ATTENTION!

Clean sprayers are safe sprayers.

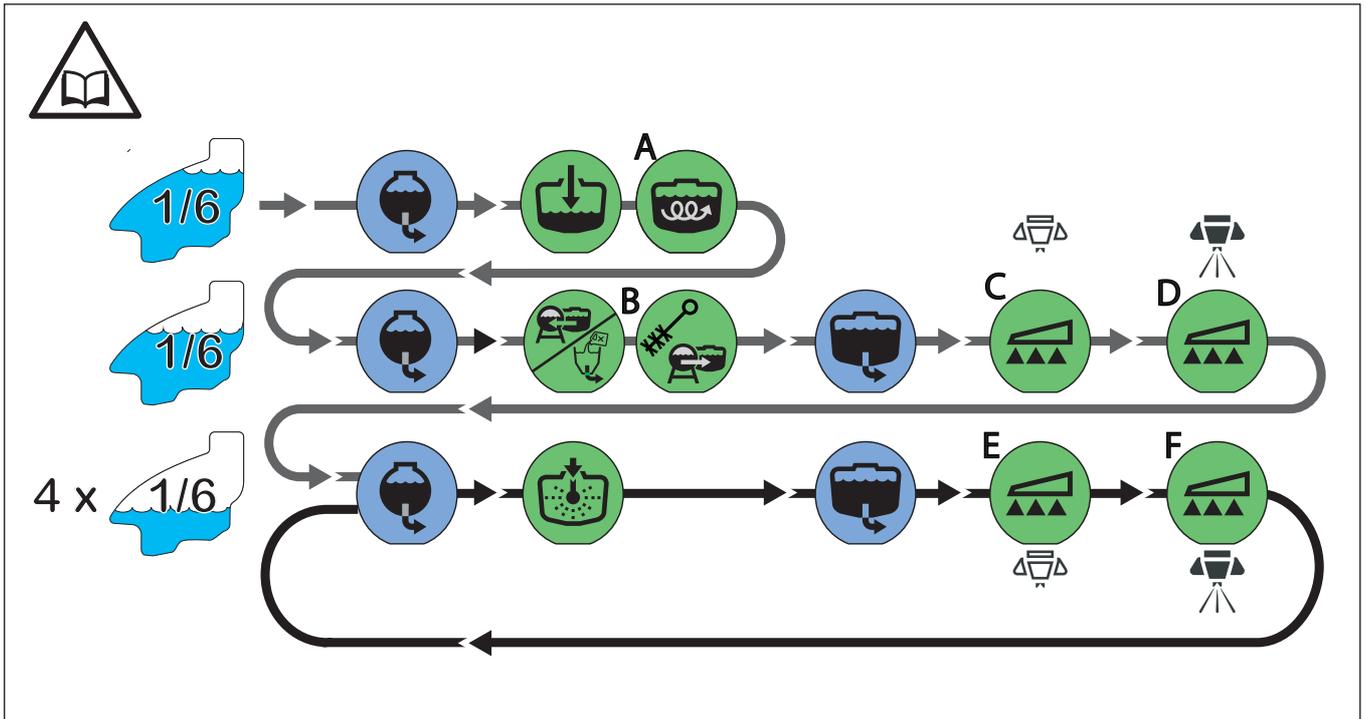
Clean sprayers are ready for action.

Clean sprayers cannot be damaged by pesticides and their solvents.

Guidelines

- Read the whole chemical label. Take note of any particular instructions regarding recommended protective clothing, deactivating agents, etc. Read the detergent and deactivating agent labels. If cleaning procedures are given, follow them closely.
- Be familiar with local legislation regarding disposal of pesticides washings, mandatory decontamination methods, etc. Contact the appropriate authority if you are in doubt.
- Pesticide washings can usually be sprayed out on the field just sprayed or at a suitable cultivated area. Avoid emptying the washings at the same spot every time and keep sufficient distance to the water environment. You must prevent seepage or runoff of residue into streams, watercourses, ditches, wells, springs, etc. The washings from the cleaning area must not enter sewers. Alternatively the washings can be retained in an appropriate receptacle, diluted and distributed over a larger cultivated area - see also "Filling/Washing Location Requirements" on page 116.
- Cleaning starts with the calibration, as a well calibrated sprayer will ensure the minimal amount of remaining spray liquid.
- It is good practice to clean the sprayer immediately after use, and thereby rendering the sprayer safe and ready for the next pesticide application. This also prolongs the life of the components. It is strongly advised to perform an internal cleaning of the sprayer, when high concentrations of acids or chloride are present in the active ingredients, or if the spray liquid is corrosive. For the best result, use a cleaning agent recommended by HARDI, e.g. AllClearExtra.
- It is sometimes necessary to leave spray liquid in the tank for short periods, e.g. overnight, or until the weather becomes suitable for spraying again. Unauthorized persons, children and animals must not have access to the sprayer under these circumstances.
- If the product applied is corrosive, it is recommended to coat all metal parts of the sprayer before and after use with a suitable rust inhibitor.
- The sprayer must always be parked under roof to avoid rain washing off pesticides as well as build-up of spot contamination in the soil. If parked outside, the sprayer should be parked on the filling/washing location in order to retain possible pesticides.

Quick Reference - Cleaning



ATTENTION! Pump speed 250-280 r.p.m..

- A. Full agitation.
- B. Wait 3 seconds before changing valve position.
- C. Minimum 45 seconds with nozzles OFF.
- D. Spray until comes out nozzles
- E. Minimum 45 seconds with nozzles OFF
- F. Spray until comes out of nozzles

5 - Operation

Standard Cleaning



ATTENTION! For cleaning between spray jobs, where crops are not very sensitive towards chemicals just sprayed.

1. Engage the pump with engine in idle, so that pump speed is as low as possible (approx. 250/550 rpm, depending on pump type).
2. Turn the suction valve towards  and the pressure valve towards  while transferring approximately 1/3 of the Rinse Tank content into the main tank.
It is important to have full agitation for approximately 20 seconds; and then close the agitation valve completely.
3. Turn the suction valve towards  and the pressure valve towards  with all boom sections OFF for approximately 45 seconds.
4. Switch all boom sections ON. Spray until air comes out of nozzles. When the pressure drops, close the regulation valve by pressing the  button, until yellow LED lights on the valve. When the boom is completely empty, press the  button for a few seconds to avoid a pressure spike

Repeat the Following Three Steps 5 Times:

5. Turn the suction valve towards  and the pressure valve towards  while transferring approximately 1/6 of the Rinse Tank content into the main tank.
6. Turn the suction valve towards  and the pressure valve towards  with all sections off for approximately 45 seconds.
7. Turn all sections on. Spray until air comes out of nozzles. When the pressure drops, close the regulation valve by pressing the  button, until yellow LED lights on the valve. When the boom is completely empty, press the  button for a few seconds to avoid a pressure spike close the main ON/OFF valve.

Cleaning the Tank and Liquid System



ATTENTION! Thorough cleaning of the sprayer is to be carried out when shifting to crops, which are very sensitive to chemicals just sprayed, or prior to storage for a longer period of time.



NOTE! Prior to the described cleaning, a standard cleaning should be carried out.

- Select and use the appropriate protective clothing. Select detergent suitable for cleaning and suitable deactivating agents if necessary.
 - Rinse and clean sprayer externally. Use detergent if necessary.
1. Remove tank filters and suction filters and clean the sprayer. Be careful not to damage the filter mesh. Put back the suction filter top. Put back all filters, when the sprayer is completely clean.
 2. With the pump running, rinse the inside of the tank. Do not forget to clean the tank roof. Rinse and operate all components and any equipment, which have been in contact with the chemical. Before opening the distribution valves and spraying the liquid out, decide whether this should be done in the field or on the seepage location.
 3. After spraying the liquid out, stop the pump and fill at least 1/5 of the tank with clean water. Note that some chemicals require the tank to be completely filled. Add appropriate detergent and/or deactivating agent. Special detergents for sprayer cleaning is recommended as some also lubricate ball valves etc.
 4. Start the pump and operate all controls enabling the liquid to come into contact with all the components. Operate the distribution valves as the last thing. Some detergents and deactivating agents work best, if they are left in the tank for a short period. Check the label.
 5. Drain the tank and let the pump run dry. Rinse inside of the tank, again letting the pump run dry.
 6. Stop the pump. If the pesticides used have a tendency to block nozzles and filters, remove and clean them immediately.
 7. Put back all the filters and nozzles and store the sprayer. If it is noted, from previous experiences, that the solvents in the pesticides are particularly aggressive, store the sprayer with the tank lid open.



ATTENTION! It is advisable to increase the forward speed (double, if possible) and reduce the spraying pressure to 1.5 bar, when spraying diluted remaining liquid in the field just sprayed.



ATTENTION! If a cleaning procedure is given on the chemical label, follow it closely.



ATTENTION! If the sprayer is cleaned with a high pressure washer, lubrication of the entire machine is recommended.

Cleaning and Maintenance of Filters

Clean filters ensure:

- Sprayer components such as valves, diaphragms and operating units are not hindered or damaged during operation.
- Nozzle clogging do not occur whilst spraying.
- Long life of the pump. A blocked suction filter will result in pump cavitation. The main filter protecting sprayer components is the suction filter. Check it regularly.

Use of Cleaning Agent

It is recommended to use an appropriate cleaning agent suitable for cleaning agricultural sprayers.

- Cleaning agents containing a suitable lube or conditioner are recommended.
- If for some reasons this is not available, triple ammonia water is used. It is important to rinse the spray circuit immediately after, and add some lubricant to the rinsing water to prevent ball valves etc. seizing up.
- Use of automotive antifreeze/radiator coolant (ethylene glycol) will protect valves and seals from drying or seizing up.

5 - Operation

Use of Rinsing Tank and Rinsing Nozzles

The integrated rinsing tank can be used for three different purposes:

- A. Full internal rinsing or cleaning. In-field diluting before cleaning.
- B. Rinsing spray circuit without diluting main tank content. Rinsing when main tank is not empty.
- C. External cleaning of the sprayer (can only be carried out on completion of "A").



ATTENTION! The cleaning procedures stated requires the TurboFiller to be cleaned on beforehand (directly after the last chemical filling). If the TurboFiller for some reason is not already cleaned, please do this before attempting the cleaning procedures below - see "TurboFiller Rinsing" on page 125.

Note that cleaning the TurboFiller will then use water from the rinsing tank thus reducing the available quantity for cleaning procedures below.



ATTENTION! Do NOT fill any cleaning agents into the rinsing tank. If cleaning agents are to be used, they should be filled into the main tank, e. g. via the TurboFiller.

A. Full Internal Rinsing or Cleaning.

In-field diluting of remaining spray liquid residues in the spraying circuit for spraying the liquid in the field, before cleaning the sprayer.



NOTE! This rinsing is adequate/sufficient when the sprayer is going to be used again shortly (e.g. next day) in same or similar crops (No risk by cross contamination and subsequent crop damages).



WARNING! If the next crop to be sprayed is sensitive to the latest chemical used a full cleaning should be carried out. See "Full Internal Cleaning (Soak Wash)" on page 137.



WARNING! Never clean the sprayer if there are risks of contamination of surface or underground water! Choose a different spot for cleaning every time to avoid spot contamination to build up.



DANGER! Before commencing this rinsing procedure ensure that the blind cap is securely fitted and tightened on the Pressure Empty quick-coupler! If this is not fitted and tightened properly, it may burst off during the rinsing process and lead to injuries for the operator or persons in proximity of the machine!

This rinsing procedure will rinse the spraying circuit and main tank as follows:

1. Empty the sprayer as much as possible. Close the agitation valve (no agitation). Allow the pump to run for at least 1 minute after the liquid has stopped coming out of the nozzles to ensure that all relevant liquid has been expelled.
2. Turn suction SmartValve towards "Rinsing tank" and pressure SmartValve towards "Main tank". Set agitation valve to "Full agitation".
3. Engage and set the pump at approximately 300 r.p.m.
4. Use 1/6 (approximately 75 litres) of the rinsing tank content at this valve setting.
5. Now turn the pressure SmartValve towards "Pressure Empty/TurboFiller" for minimum 3 seconds to burst and flush the safety valve. The TurboFiller is not flushed by this operation.
6. Turn the agitation valve towards "FastFiller flushing" and use another 1/6 (approximately 75 l) of the rinsing tank content for flushing the FastFiller lines.
7. Shut off all nozzles by the main ON/OFF button on the grip.
8. Turn suction SmartValve towards "Main tank" and the pressure SmartValve towards "Spraying". Set the spraying pressure at 3-5 bar. If the pressure is set outside this range the rinsing result may be insufficient.
9. Allow the rinsing water in the main tank to circulate for minimum 45 seconds with the nozzles shut to flush the return lines from boom to tank.
10. Open all nozzles and spray the rinsing water from the main tank through the nozzles while driving in the field. Choose a different location each time to distribute the rinsing water over larger areas. Continue until all fluid is expelled from the boom pipes and nozzles - this may take several minutes after the spray fan has collapsed.

11. Shut off all nozzles by the main ON/OFF button.
12. Now turn the suction SmartValve towards "Rinsing tank" and the pressure SmartValve on "Tank rinsing".
13. Use another 1/6 (approximately 75 l) for this. The tank strainer should be removed to avoid shading the rinsing nozzle.
14. Turn the suction SmartValve towards "Main tank" and the pressure SmartValve towards "Spraying". With the nozzles shut allow the liquid to circulate for minimum 30 seconds to flush the return lines from boom to tank.
15. Open all nozzles by the main ON/OFF switch and spray the rinsing water from the main tank through the nozzles until all liquid is expelled from the boom pipes and nozzles.
16. Repeat step 11-14 another 3 times using 1/6 (approximately 75 l) of the rinsing tank content in each of the 3 sequences until the rinsing tank is empty.
17. Shut off the nozzles at the main ON/OFF button once the rinsing process is complete.

B: Rinsing When Main Tank Is Not Empty

This procedure is used to rinse the pump, operating unit, spray lines, etc. in case of stopping the spray job before the main tank is empty (e.g. at the beginning of rain etc.).

Cleaning of the liquid system:

1. Turn Suction SmartValve towards "Rinsing tank". (Keep pressure SmartValve in "Spraying"-position).



NOTE! The main ON/OFF function on the grip must be ON. Closing the main ON/OFF will transfer the rinse water back to the main tank!

2. Close agitation valve (no agitation).
 1. Turn off the Cyclone Filter Boost Valve to avoid dilution of main tank content.
 1. Engage the pump and spray water from the rinsing tank into the field, until all boom pipes and nozzles are flushed with clean water.
 1. Disengage the pump when finished.



ATTENTION! It is advisable to increase the forward speed (double if possible) and reduce the spray pressure to 1.5 bar when spraying diluted spray liquid in the field just sprayed.



ATTENTION! If a cleaning procedure is given on the chemical label, follow it closely.

C: Cleaning the Sprayer on the Outside

This procedure is used to clean the sprayer on the outside in the field as required with the External Cleaning Device.



NOTE! Before attempting an external rinsing, make sure the main tank is rinsed ("A.") and empty! Any liquid left in the main tank will be mixed with the clean water for external rinsing!



NOTE! Approximately 100 litres of clean water in the rinsing tank will allow approximately 15 minutes of rinsing (the spray gun uses 6 litres per minute at 10 bar pressure).



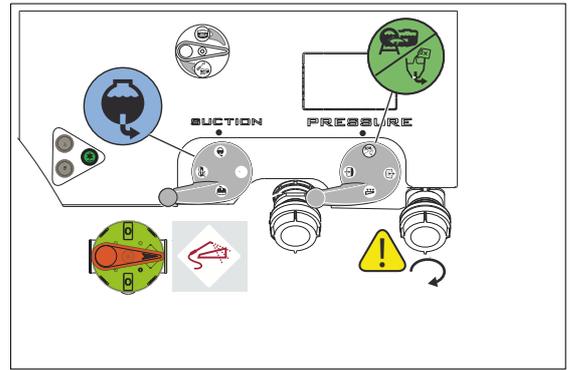
WARNING! Never clean the sprayer if there are risks of contamination of surface or underground water! Choose a different spot for cleaning every time to avoid spot contamination building up.

5 - Operation

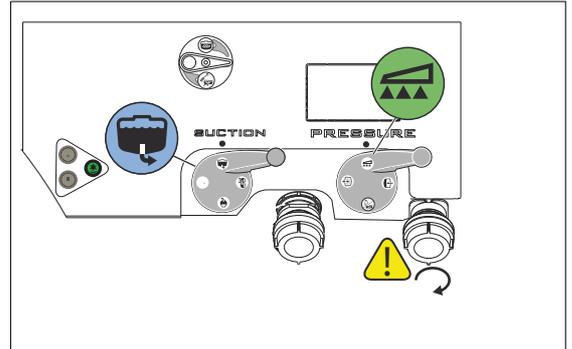
1. Engage pump at approximately 300 r.p.m.
2. Turn suction SmartValve towards "Rinsing tank" and pressure SmartValve towards "Internal Tank Rinsing".



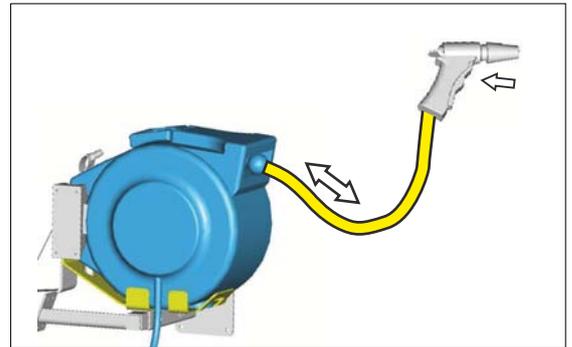
DANGER! Before turning Pressure SmartValve to "Pressure draining/TurboFiller" it is very important to be sure that the quick coupler lid is correct and completely mounted to the filling stud into its locked position. Failure to do so may cause risk of contamination and injury from quick coupler lid being "shot" off when pressurized! If not possible to mount lid completely, lubricate the rubber seal and the grip hooks.



3. When enough water from the rinsing tank is transferred, turn suction SmartValve towards main tank.
4. Keep/turn pressure SmartValve towards "Spraying position" and close the agitation valve. Adjust the pressure manually to approximately 10 bar.



5. Pull out the hose from the reel.
6. Adjust the pressure manually to approximately 10 bar.
7. Wash the sprayer with the cleaning gun.
8. When finished, disengage the pump
9. Retract the hose.



NOTE! Do not let go of the hose. Gently restrict the roll-in of the hose. If the sprayer is cleaned with a high pressure cleaner, lubrication of the entire machine is recommended afterwards

Full Internal Cleaning (Soak Wash)



ATTENTION! This cleaning procedure is always used, if one or more of these situations occur:

- A. The next crop to be sprayed is at risk of being damaged by the chemical just used
- B. The sprayer is not going to be used right away for the same chemical or crop
- C. Before any repair or maintenance job is going to be carried out on the sprayer.



ATTENTION! Washing the sprayer between jobs with incompatible crops must be done according to prescriptions from the chemical manufacturer. Use a commonly used cleaning agent. If your chemical prescribes a different cleaning agent and/or another cleaning procedure, you must follow that.

Procedure for Washing with a Cleaning Agent

1. Rinse the sprayer in the field (see the section "Use of Rinsing Tank and Rinsing Nozzles" on page 134).
2. Drive to the filling location.
3. Prepare sprayer for cleaning. Fill water in the main tank to 10% of its capacity. Fill the rinsing tank completely. This water is later used for rinsing.
4. Add the cleaning agent to the main tank by using the TurboFiller. Follow instructions on the label of the cleaning agent.
5. Set suction SmartValve for "Main tank" and pressure SmartValve for "Main tank". Set agitation valve for "Full agitation".
6. Engage and set the pump speed at approximately 300 rpm. Allow the liquid to circulate the system for 3 minutes.
7. Set the pressure SmartValve for "Pressure Empty/TurboFiller" for minimum 10 seconds without activating the TurboFiller in order to burst and flush the safety valve.
8. Open the TurboFiller transfer valve and the deflector valve. Allow the liquid to circulate for 3 minutes.
9. Close the lid and activate the container rinsing valve to clean the hopper inside.
10. Shut all three valves on the TurboFiller again.
11. Set the SmartValve for "FastFiller flushing" for 3 minutes to clean the FastFiller lines.
12. Verify that all nozzles are shut on the main valve ON/OFF switch on the grip.
13. Set the pressure SmartValve for "Spraying".
14. Allow the liquid in the main tank to circulate for minimum 3 minutes with the nozzles shut. This is done to clean the return lines from boom to tank.
15. Set the pressure SmartValve for "Tank cleaning nozzles". Allow the liquid to circulate for 3 minutes.
16. Spray out water with cleaning agent and chemical residue.

Set the spray pressure at 3-5 bar.

Note that the washing water still contains active chemical and choose an appropriate area to spray this out. Alternatively, the washings can be dumped at the filling/washing location and retained in an appropriate receptacle (e.g. slurry tank or similar). Spot contamination and accumulation must be prevented.

Continue to spray until all liquid has exited from the boom pipes and nozzles.

17. Shut all nozzles with the main ON/OFF switch.
18. Rinse the sprayer again with clean water to rinse out all remains of the cleaning agent. This prevents the cleaning agent remaining in the fluid system, which could damage the next spray chemical filled into the main tank.
19. Include rinsing of the TurboFiller in step 18. Operate all 3 valves during this process.
20. Dismantle all filters (suction, pressure, in-line and nozzle filters) and clean the filter screens using clean water and detergent and a brush.

5 - Operation



WARNING! It is the responsibility of the sprayer operator or owner, that the sprayer is cleaned sufficiently to prevent contamination of the environment, crop damages and health and safety hazards to the operator and the public. HARDI cannot be held responsible for any damages or incidents related to insufficient cleaning.



ATTENTION! The rinsing nozzles cannot always guarantee a 100% cleaning of the tank. Clean manually with a high pressure cleaner afterwards, especially if the next crop is sensitive to the chemical just sprayed!

PrimeFlow - Manual Cleaning

In the event of an AutoWash failure, sprayers equipped with PrimeFlow can follow the same manual washing procedure as described in this book, when the following detail is observed:

- Open all nozzles before flushing the spray lines. This is to prevent chemical residues from the boom lines are returned into the main tank.

BoomFlush - Manual Cleaning

When having the BoomFlush valves fitted to the end(s) of boom piping, the cleaning procedure is as follows:

1. Follow the cleaning procedure to clean the sprayer the first two times.
2. Open all BoomFlush valves by hand.
3. Continue the cleaning procedure to clean the sprayer for the third time.
4. Close BoomFlush valves.



WARNING! To prevent contamination of the soil, the BoomFlush valves must only be opened at the last step of cleaning!

Technical Residue

An amount of spray liquid will inevitably remain in the system. It cannot be sprayed properly on the crop, as the pump takes in air, when the tank is just about empty.

This technical residue is defined as the remaining amount of liquid in the system, when the first clear pressure drop appears on the pressure gauge.

The residues in the tank should be diluted immediately in a ratio of 1:10 with clean water. Afterwards it should be sprayed on the crop just sprayed with increased driving speed.

In addition, also pump, linkage and armature can be separately rinsed with water from the rinsing tank. However, it must be ensured that the liquid in the spray lines are in unchanged concentration. Therefore there should be an untreated field area available to spray this liquid out.

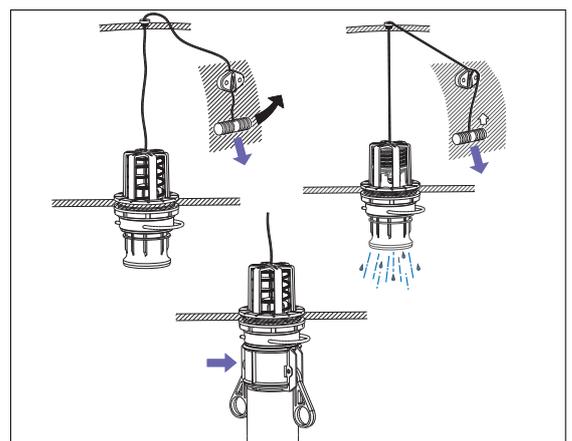
Follow national regulations when disposing of chemical residues.

Using the Drain Valve

The drain valve is operated from the rear of the tank.

1. Pull the handle downward to open the drain valve.
2. The valve is spring-loaded, but can be kept open by pulling the handle upwards in the V-shaped slit.
3. To release, pull the handle downward and the valve will close automatically.

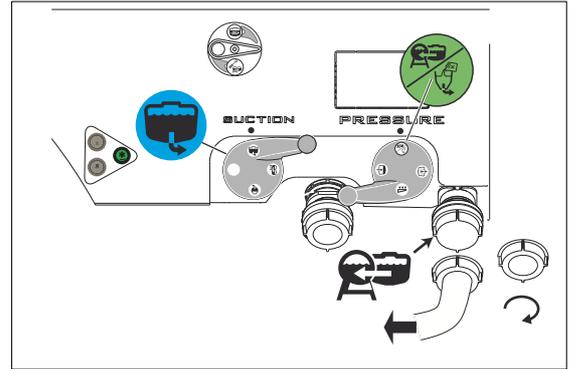
If draining residues, e.g. liquid fertilizer into a reservoir, a snap coupler with hose can rapidly be connected to the drain valve, and the liquid is safely drained.



Pressure Draining

It is possible to drain to an external tank. This is done the following way:

1. Connect a hose from an external tank to the quick coupler on the sprayer.
2. Turn the Pressure SmartValve towards .
3. Turn the suction valve towards .
4. Start the pump.
5. When the tank is drained, then turn off the pump again.
6. Disconnect the hose and mount the cap for the quick coupler.

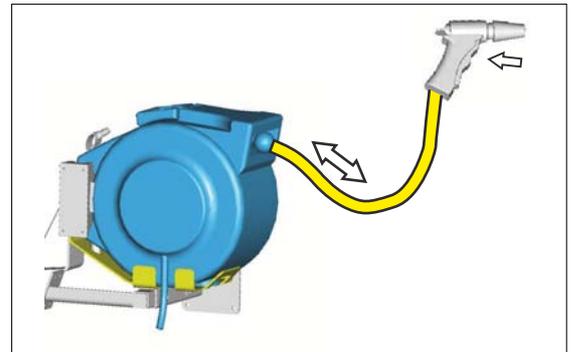


DANGER! Ensure that the cap for the quick coupler is correctly mounted on the filling stud in its locked position. Failure to do so causes a risk of contamination and injury from the quick coupler cap being "shot" off when pressurized! If it is not possible to mount the lid completely, lubricate the rubber seal and the grip hooks and try again.

Outside Cleaning - Use of External Cleaning Device

Use the External Cleaning Device to wash everything on the outside of the sprayer.

1. Unroll the hose from the reel.
2. Engage pump speed to approximately 250 r.p.m.
3. Set the suction SmartValve for  "Suction from Rinsing tank" and pressure SmartValve for  "External filling device" or unused function.
4. Turn ball valve (position A) and clean the sprayer with the spray gun.
5. After cleaning, close the ball valve (position B) again.
6. Roll the hose on the reel again.



Before setting Pressure SmartValve to , it is very important to ensure that the quick coupler lid is correctly and completely mounted to the filling stud in its locked position. Failure to do so causes a risk of contamination and injury from quick coupler lid being "shot" off when pressurized! If it is not possible to mount lid completely, lubricate the rubber seal and the grip hooks.



ATTENTION! If the safety valve is activated, then lower the PTO speed to minimize the amount of rinsing water being lost into the main tank.



ATTENTION! If the sprayer is cleaned with a high pressure washer, lubrication of the entire machine is recommended.

Lubrication

General information

Always store lubricants in a clean, dry and cool place - preferably at a constant temperature. Keep the containers and funnels.

Clean lubrication points before applying the lubricants.

Always follow the recommendations concerning quantity. If no recommended quantity is given, feed lubricator until new grease becomes visible.

Suitable Lubricants

Components	Quantity	Recommended lubricants - TOTAL	Type
DEUTZ TCD 6.1L6 engine crank case + filter	15.5 litre	TRACTAGRI HDZ FE 10W30 DEUTZ - DQC- III- LA	A
Hydraulic Transmission	50 litre	EQUIMS ZS46 AFNOR NF E 48-603HV ISO 6743/4HV	B
General greasing		Multis EP2 ISO-L-XBCFB 2	C
Spraying pump 464-10 or 464-12	35 gram	TOTAL COMPLEX SHD 460	D
Coolant	20 litre	COOLELF AUTO SUPRA -37°C COOLELF AUTO SUPRA -37°C AFNOR NFR 15-601 - BS 6580	E
Pneumatic lubricator		Mineral Oil ISO VG22 viscosity 22 mm ² /s à 40°C	F
Air Compressor	40 millimeter	Synthetic Oil - SAE30	G



ATTENTION! values are given are for information. Only level indicated by the gauge should be taken into consideration

Maintenance intervals



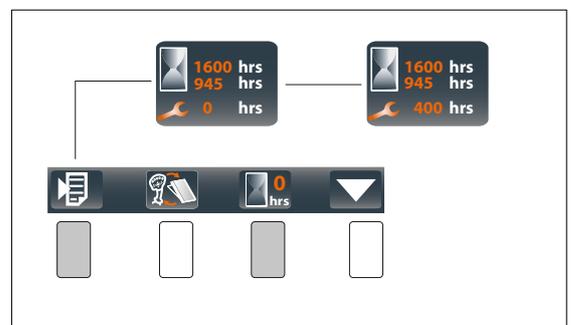
First maintenance at **150** hours



Regular maintenance every **500** hours

Resetting the maintenance intervals

- Press on  button and navigate to display the hour meter reading
- Simultaneously press for 5 sec.   buttons for resetting.
The screen indicates the next period of maintenance



6 - Maintenance

Recommended part list

The table below shows the filters used for the first maintenance of the sprayer

Components	Filters	Part number	Quantity	First maintenance
Deutz engine - Tier 4 final Stage IV	Oil Lub. filter	27012701	1	500
	Fuel Pre-filter	27009001	1	500
	Fuel Filter	278793	2	500
	AdBlue filter	27065001	1	500
Hydraulic (Transmission + auxiliary)	Hyd. Oil Tank	78626601	1	150
		78626801	1	150
	Auxiliary filter	782856	3	150
Category 4 cabin	Category 4 Filter	27076101	1	150

Kit Part Number: 76015201

Service intervals

	Daily	Interval +500 hours												
		x1												
		20	150	250	500	1000	1500	2000	2500	3000	3500	4000	4500	5000
Hydraulic														
Hydraulic oil level	●													
Hydraulic oil			☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Check hydraulic filters clogged				●	●	●	●	●	●	●	●	●	●	●
Hydraulic filters			☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Drain the hydraulic tank			☐							☐				
Cabin														
Windshield washer fluid level	●													
Air cabin filter - category 4														☐ (Every 150 hours)
Air conditioning gas														☐ (Every 5 years)
Clean air conditioning condenser			●		●	●	●	●	●	●	●	●	●	●
Air conditioning belt			●		●	●	●	●	●	●	●	●	●	●
Engine⁽¹⁾														
Clean cooler	●													
Check oil level	●													
Check coolant level	●		●	●	●	●	●	●	●	●	●	●	●	●
Replace engine coolant														☐ (Every 2 years)
Clean air filter	●													
Replace air filter														☐
Replace safety air filter														☐
Drain lubricating oil														☐
Empty water fuel pre-filter														☐ Every 250 hours
Replace fuel pre-filter														☐
Replace fuel filter														☐
Filling the fuel tank	●													
Clean fuel tank														☐
Replace AdBlue filter														☐
Inspect V-belts roller														☐ (Every 2 years)
Battery (maintenance + terminals)														☐
Pneumatic system														
Empty the air tank and the compressed air filter bowl														☐ (Every 20 hours)
Replace filter of the compressor and the compressed air filter														☐ (Every 500 hours)
Compressor oil drain (TWIN only)														☐ (Every 250 hours)
Compressed air pressure														●
Chassis and boom														
Tighten lug nuts														● (150 hours)
Lubricate chassis and axles														● (50 hours)
Check tyres and inflation pressure														● (150 hours)
Dynamic brake accumulator														● (5 years)
Spraying														
Check the boom		●		●										
Inspect spraying circuits			●	●	●	●	●	●	●	●	●	●	●	●
Lubricate 464 diaphragms pump														☐ (Every 50 hours)
Inspect line filters	●													
Remove and inspect the pressure gauge				●	●	●	●	●	●	●	●	●	●	●

● Check

☐ Replacement

(1) See DEUTZ manual

6 - Maintenance

Engine

Lubricating oil level



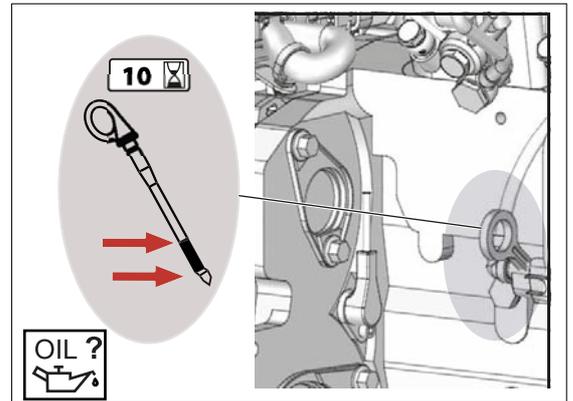
Low lubricating oil level and overfilling lead to engine damage. The lubricating oil level may only be checked with the engine in a horizontal position and switched off. If the engine is warm, switch off the engine and check the lubricating oil level after 5 minutes. If the engine is cold you can check it immediately.



Be careful of hot lubricating oil. Danger of scalding! Do not pull out the dipstick while the engine is running. Danger of injury!

Servicing

- Pull out the lubricating oil dipstick and wipe off with a lint-free, clean cloth.
- Insert the lubricating oil dipstick as far as it will go.
- Extract the lubricating oil dipstick and read off the oil level.
- The oil level must always be between the MIN and MAX marks! Top up to the MAX mark if necessary.

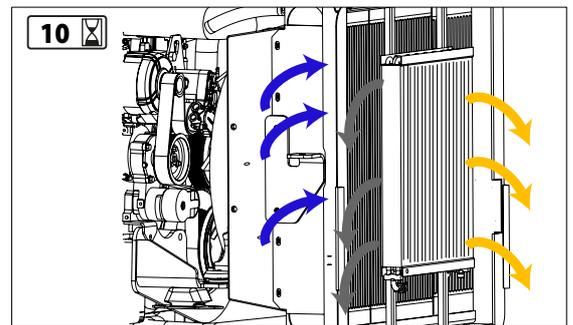


Use the recommend lubricating oil. See "Suitable Lubricants" page 141.

Engine radiators

Cleaning the radiators

- Raise the hood to access the radiators..
- Clean the radiators preferably with compressed air



NOTE! Take care not to damage the radiators fins during cleaning operations.



ATTENTION! When the machine is operating in areas with a lot of dust or pollen, the cleaning intervals can be shortened.

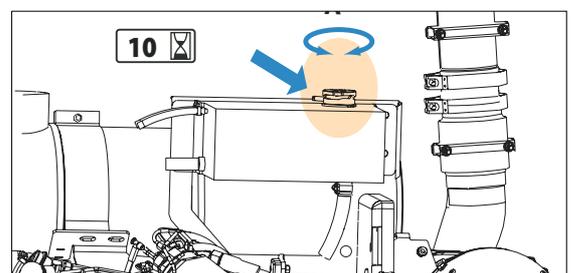


WARNING! Oil and fuel residue increase the risk of clogging. This is why it is advisable to carefully check the sealing, particularly when the machine is working in a dusty environment.

Coolant

Servicing the coolant level

- Check preferably the coolant level when the engine is cold
- Remove the cap to add coolant.
- Fill up the expansion tank to **3/4** of capacity



i The excess of coolant is automatically eliminated through the outlet pipe

ATTENTION! Only use the recommended coolant. Never mix with other coolants. If in doubt, drain the cooling circuit completely.

Engine Suction System

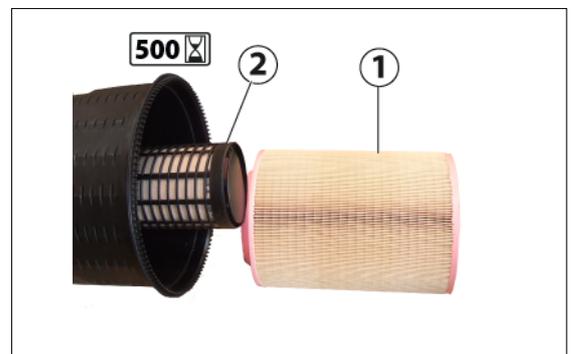
ATTENTION! Do not work when the engine is running!

i Pay attention to utmost cleanliness when working on the intake system, close intake openings if necessary. Dispose of old filter elements properly.

Dry air filter

ATTENTION! Do not clean the filter element (1) with petrol or hot liquids!
Renew damaged filter elements.

- Lift up the clamping yoke.
- Remove the filter hood and pull out the filter element
- Filter element
 - blow out with dry compressed air (max. 5 bar) from the inside if soiling is only slight
 - renew if heavily soiled

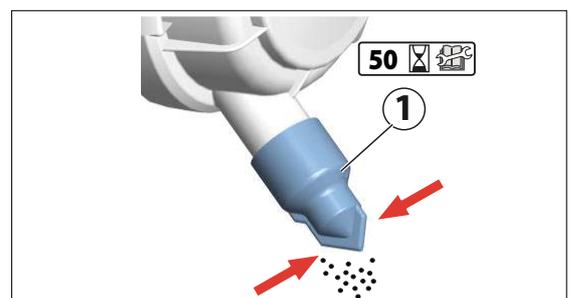


Renewing the safety cartridge of the dry air filter

- Renew safety cartridge according to the interval in the maintenance schedule
- To do this:
 - Unscrew hexagon nut, pull out safety cartridge
 - Insert new safety cartridge, screw on hexagonal nut
- Insert filter element, mount hood and fix with clamping yoke

Clean the dust discharge valve of the dry air filter

- Empty the dust discharge valve by pressing together the discharge slit
- Remove any caked dust by pressing together the upper section of the valve
- Clean the discharge slit



i The intervals of verification and cleaning can be reduced depending on the usage environment of the machine

i For more information, Refer to DEUTZ TCD 6.1 L6 manual in chapter «Suction System»

6 - Maintenance

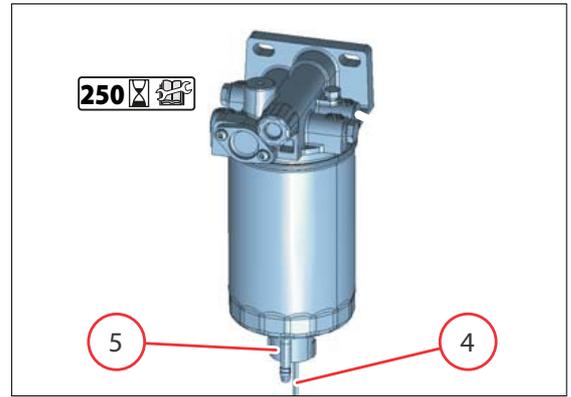
Fuel Pre-filter Draining

Empty water tank

- Switch off the engine
- Place suitable collecting containers underneath
- Electrical connection
 - disconnect cable connections (4)
- Loosen drain plug (5)
- Drain fluid until pure diesel runs out
- Mount drain plug



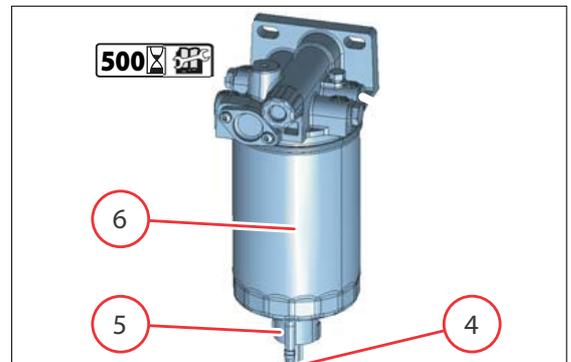
For more information, refer to DEUTZ TCD 6.1 L6 manual instruction in chapter «Fuel System»



Fuel Pre-filter

Change the Pre-filter

- Switch off the engine
- Place suitable collecting containers underneath.
- Electrical connection
 - Disconnect cable connections (4).
- Loosen drain plug (5) and drain liquid.
- Disassemble filter insert (6).
- Clean any dirt off the sealing surfaces of the new filter cartridge and opposite side of filter head.
- Wet the sealing surfaces of the filter cartridge slightly with fuel and screw back on to the filter head, clockwise (17-18 Nm).
- Mount drain plug (5).
- Electrical connection
 - Connect cable connections (4).

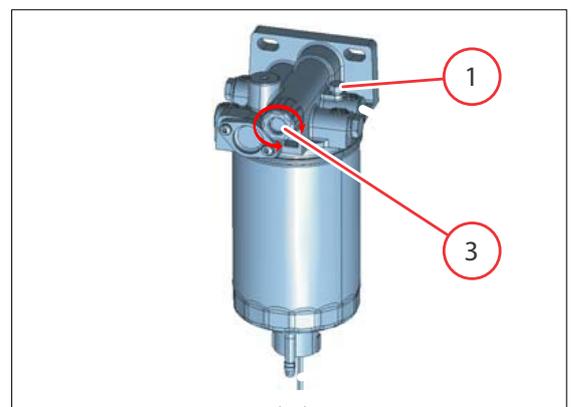


Vent the fuel system

- Loosen vent screw (1).
- Unlock the bayonet connection (3) of the fuel supply pump by pressing upwards and simultaneously turning anticlockwise. The pump pistons are now pressed out through the spring.
- Pump until no more air escapes at the vent

Tightening torque 1.6 ± 0.3 Nm Tightening torque 1.6 ± 0.3 Nm.

- Keep pumping until a very strong resistance can be felt and the pumping only progresses very slowly.
- Lock the bayonet connection of the fuel supply pump by pressing upwards and simultaneously turning clockwise.
- Start the engine and operate approx. 5 minutes in idling mode or at low load. Check the pre-filter for leaks while doing this.



For more information, refer to DEUTZ TCD 6.1 L6 manual instruction in chapter «Fuel System»

Engine Lubricating Oil

Regulation for working on lubrication of oil



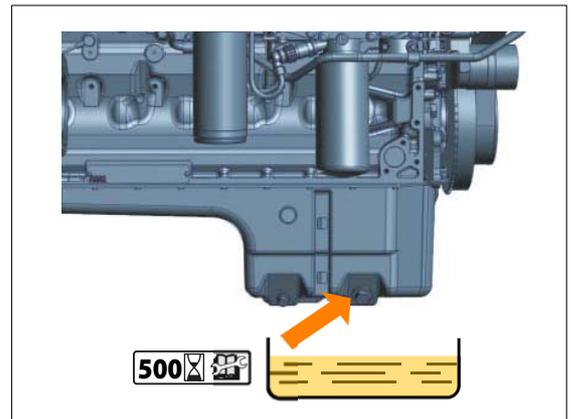
Do not work when the engine is running! Smoking and naked lights prohibited! Be careful of hot lubricating oil. Danger of scalding!



Pay attention to utmost cleanliness when working on the lubricating oil system. Clean the area around the components concerned carefully. Blow damp parts dry with compressed air. Observe the safety regulations and national specifications for handling lube oils. Dispose of leaking lubricating oil and filter elements properly. Do not allow used oil to seep away into the ground. Perform a trial run after all work. Pay attention to tightness and lubricating oil pressure and then check the engine oil level.

Draining of lubricating oil

- Warm up the engine (lubricating oil temperature > 80 °C).
- Ensure that the engine or vehicle is in a level position.
- Switch off the engine.
- Place a collecting receptacle underneath the lube oil drain screw.
- Unscrew the lube oil drain screw, drain oil.
- Turn in and tighten lubricating oil drain plug fitted with new sealing ring.
- Pour in lube oil
 - Quality/viscosity data and filling volume. See “Suitable Lubricants” page 141.



Tightening torque 55 Nm

- Warm up the engine (lubricating oil temperature > 80 °C).
- Ensure that the engine or vehicle is in a level position.
- Check lubricating oil level, if necessary top up.
- Confirm the lubricating oil change
 - Reset the hour counter

Change lubricating oil cartridge

- Loosen and unscrew filter with a tool
- Collect draining lubricating oil
- Clean the sealing surface of the filter support with a lint-free, clean cloth.
- Oil the gasket of the new DEUTZ original filter cartridge lightly.
- Screw on new filter by hand until the gasket is touching and tighten with a torque of: 15-17 Nm
- Fasten clamps of the twist protection (optional).



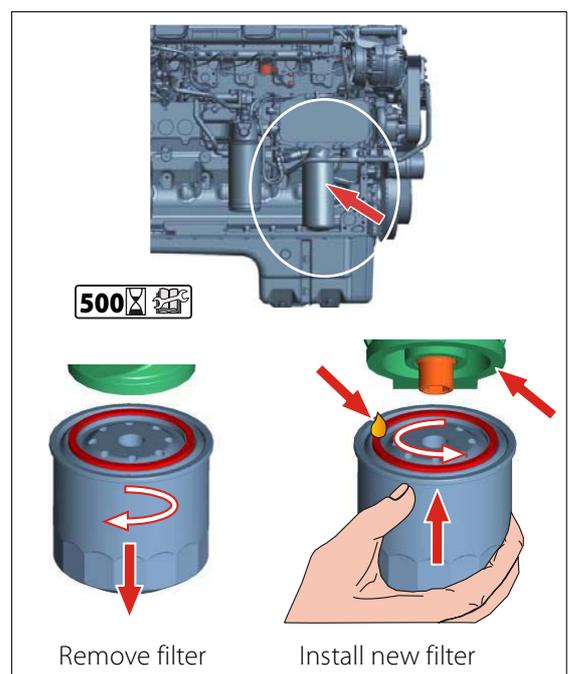
NOTE! It is essential to use genuine filters.



Incorrect operation can cause damage to the engine, so it must be confirmed that the oil changes have been made



For more information, refer to DEUTZ TCD 6.1 L6 manual instruction in chapter «Lubricating Oil System»



6 - Maintenance

AdBlue Filter Replacement



Protective gloves are to be worn when working with Selective Catalytic Reduction (SCR) components. Ensure cleanliness.

Servicing

- Switch off the engine.
- Electrical connection
 - Disconnect cable connections.
- Place suitable collecting containers underneath.
- Remove cover (1).

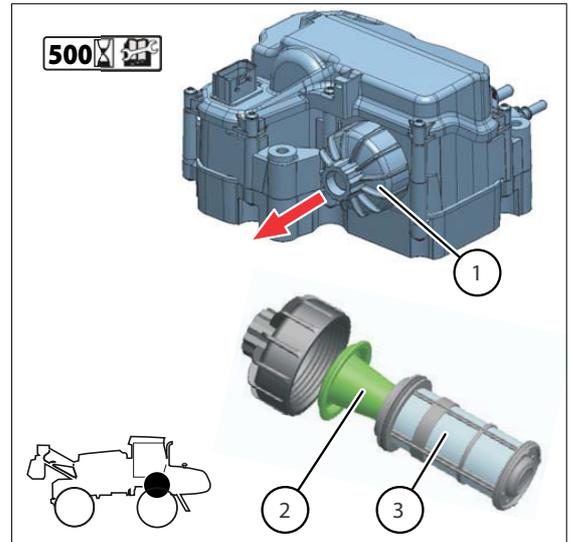
Socket wrench insert 27 mm

- Pull out filter insert and compensation body (2).
- Insert new filter (3) insert with compensation body.
- Mount cover.

Tightening torque 22.5 ± 2.5 Nm

- Electrical connection
 - Connect cable connections.
- Start

Filter Cartridge Part Number: 27065001



For more information, refer to DEUTZ TCD 6.1 L6 manual instruction in chapter «SCR»

Cooling System

Specifications when working on the cooling system



Danger of scalding from hot coolant! Cooling system under pressure!

Only open the cap when cool! The coolant must have a prescribed concentration of cooling system corrosion protection agent!

Observe safety regulations and national specifications when handling cooling media.

Dispose of leaking liquids properly and do not allow them to seep into the ground.

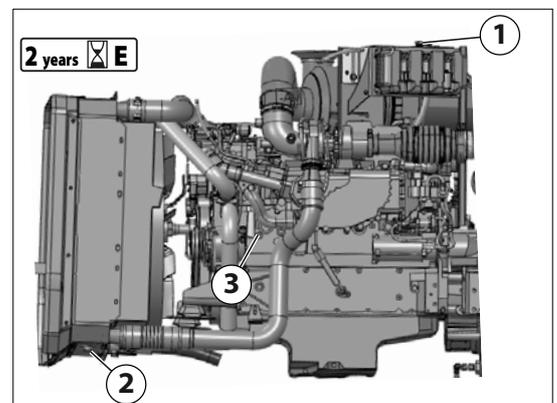
Never operate the engine without coolant, even for a short time!

Emptying the coolant system

- Open cooler locking cap (1) carefully.
- Place suitable collecting containers underneath
- Remove screw (2) in the radiator and screw (3) if it is accessible
- Drain coolant.
- Insert screw again with sealant

Filling and bleeding coolant circuit

- Open the cooling system cap (1) carefully.
- Fill coolant up the expansion tank to the filling limit.
- Switch on any available heating and set to the highest level so that the heating circuit is filled and vented.
- Close cooler locking cap.



- Run engine up to operating temperature (opening temperature of the thermostat) allow to bleed the coolant circuit
- Switch off the engine.
- Check coolant level in cooled engine and top up to the MAX mark or filling level on the expansion tank if necessary.



NOTE! The excess of coolant is automatically eliminated through the outlet pipe



NOTE! Never mix with other coolants. If in doubt, drain the cooling circuit completely. Only use the recommended coolant. See "Suitable Lubricants" page 141.

Battery

The battery does not require any special maintenance. It has optimum starting power even in low temperatures or intense heat.



WARNING! The electrical and electronic equipment requires a battery in good working order. A damaged battery could cause damage to the electronic equipment.



WARNING! Never disconnect the battery when the engine is running.



WARNING! Always disconnect the terminals before recharging the battery or performing welding operations.



WARNING! To avoid any risk of the battery exploding, it should be recharged in a ventilated area where no smoking is allowed. Never short circuit the terminals.



WARNING! Never reverse the polarity.

6 - Maintenance

Cabin and air conditioning

Replacement the cabin filter (category 4)

Recommendation



Change the filter every 150 hours of use or at least once a year once the packaging is opened



WARNING: Always wear protective clothing and gloves, before servicing

- Read carefully this instruction book before proceeding. Keep this this instructions for retain consultation,
- Before taking in place the filter, check tha the packaging is not damaging. Do not install a filter if the cardboard is rugged.
- Remove the cardboard packaging as late as possible and remove the filter from the plastic bag close to his place of assembly.
- Handle with carry; at no time the joint, centre piece of the tightness of the filter must not be damaged (beware of cutters, the screwdriver, nails...)
- Never fit a deformed filter
- Never mount a filter that falls even from heights
- Never touch a filter at its centre

Installation

- Place the machine in a non-sprayed area.
- Handle with carry the straps for removing the filter
- Position new filter into the housing. Never handle the filter by its centre.
- Store the used filter into the original packaging.



Do not throw the filter in the trash, but it must be recycled.



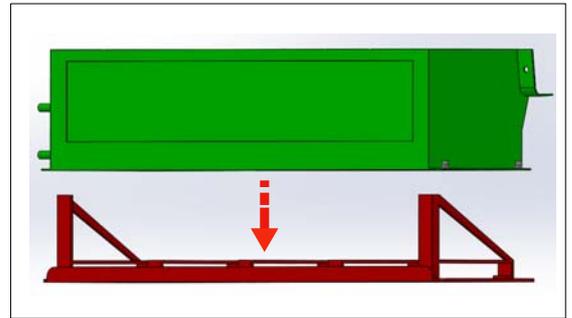
Do not try to blow with air or wash the filter

Fit the filter gently into this slot provided at the cabin level. Handle the filter by its frame, do not touch the filter media and avoid relying on the protection grid.

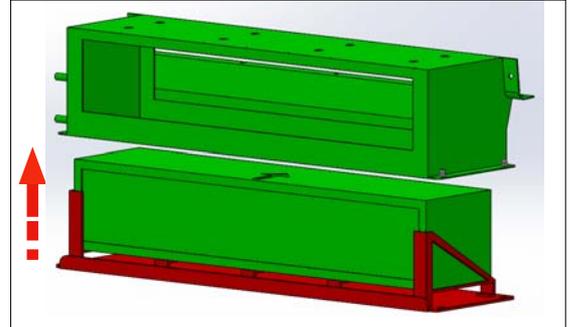


- Remove screws (1) from the filter chassis

- Fit the filter in the correct direction of air flow taking into account the marking of the direction indication affixed to it.



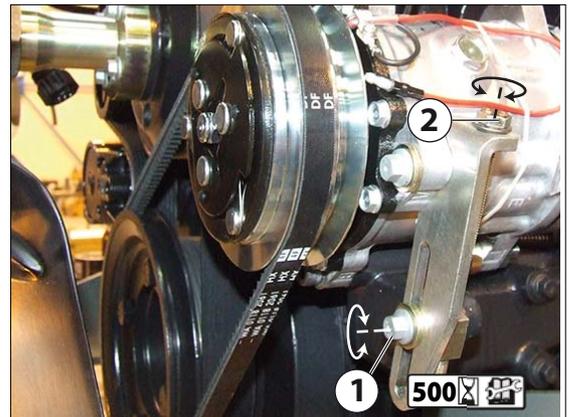
- Place the frame equipped with the filter in the housing
- Screw completely the 4 screws (1).



Air conditioning compressor

The belt of compressor drive should be checked regularly.

- Loosen the counter nut (1).
- Screw the nut (2) to retain the belt, then tighten the counter nut (1).



Air Conditioning gas

Checking the R134a charge load. It should be carried by a specialist. The filter driers is replaced every 5 years.

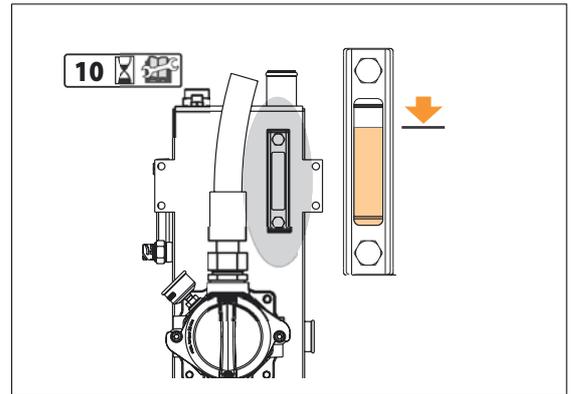
6 - Maintenance

Hydraulic

Hydraulic system

Oil level

- Top up the hydraulic tank until maximum level



Hydraulic Filter Clogging Indicator

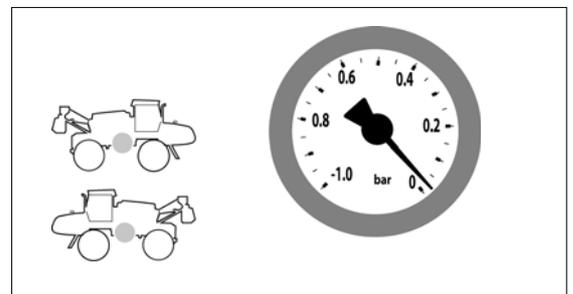
Hydraulic suction filters are fitted with clogging indicators.

i NOTE! Reading the clogging indicator occurs when the hydraulic oil is at normal operating temperature.

- Regularly check the filters clogging level.

Less than 0.5 bar = filters in good working order.

Greater than 0.5 bar = Replace filters



 Use the recommended hydraulic oil. Refer to "Suitable Lubricants" on page 141.

Hydraulic filters replacement

! WARNING! Before replacing the filters, wear protective gloves to avoid the oil making any contact with the skin.

! DANGER! Hot oil can cause serious burns

i NOTE! It is essential to use genuine filters.

i When changing the filter elements, take care to ensure absolute cleanliness

A pan should be put in place to collect the used oil contained in the filter housing (approx. 5 litre).

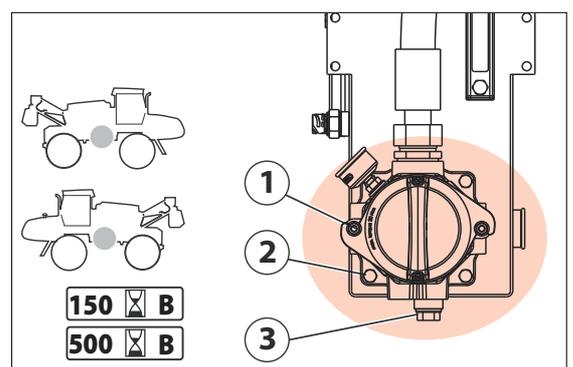
Filters elements should be fitted on either side of the tank. They should always be replaced at the same time.

i NOTE! Right and left filter are different - Left: 78626601 - Right: 78626801

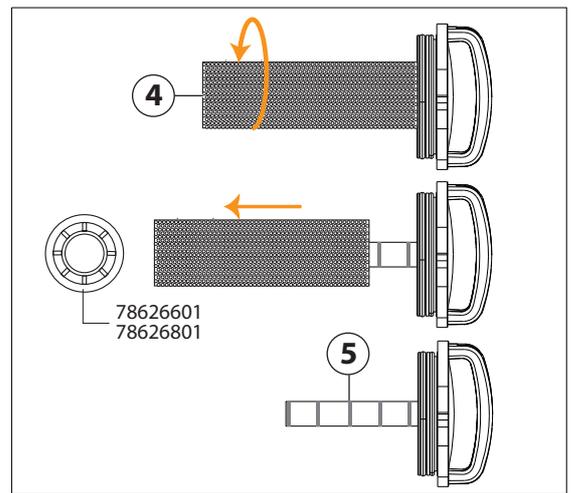
Servicing filters

- Loosen the hex nut until it is roughly flush with the stud.
- Disengage the hook cover by rotating it gently, and pull it to the limit of the nut
- Rotate the filter cover to disengage the locking mechanism and pull to remove. The filter element is mounted with the cover.

i Pulling the cover releases the spring thus closing the valve



- The spent element can be unscrewed from the cover by rotating it anticlockwise
- Check seals for damage and replace if necessary
- Clean the magnetic core by wiping it lengthwise with a cloth.
- Screw the new filter element onto the cover at clockwise as far as it will go, otherwise the tank bottom valve may be damaged during subsequent procedure. Now reassemble all parts in reverse order. Tighten the cover screws M8 with maximal 20 Nm.

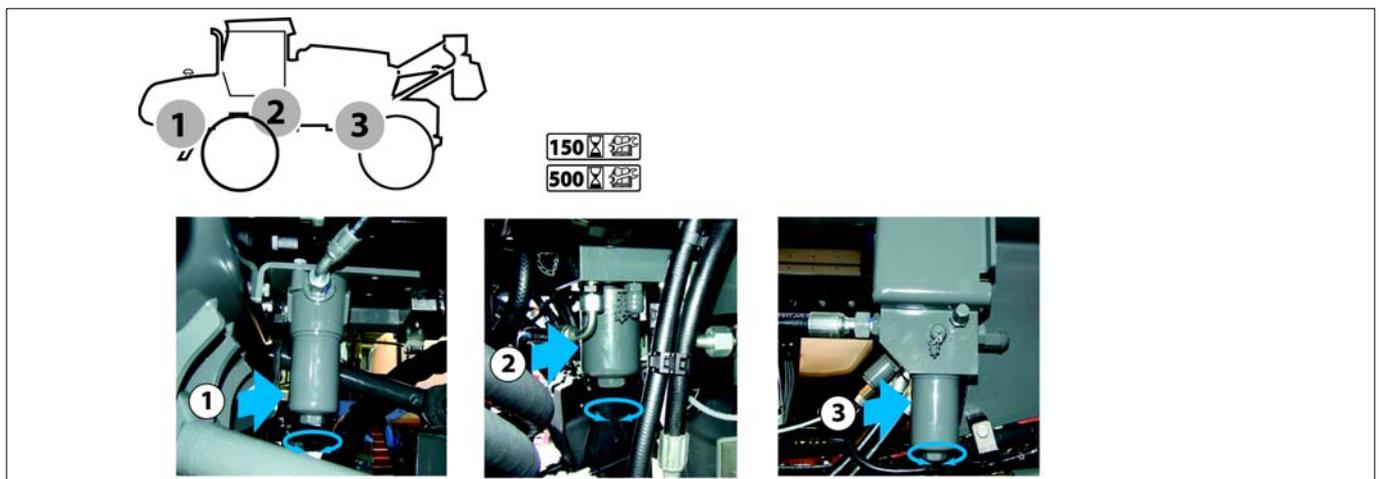


Auxiliary hydraulic filters

Servicing filters

- Unscrew the filter housing
- Replace the filter cartridge.

i NOTE! It is essential to use genuine filters.



1. Brake system

2. Steering priority valve

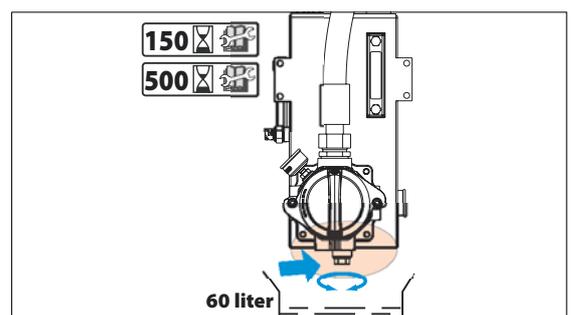
3. Spray pump control valve

Drain the hydraulic tank

The hydraulic tank is draining after 150 hours, The drain of the tank should also carried out after changing components.

Servicing

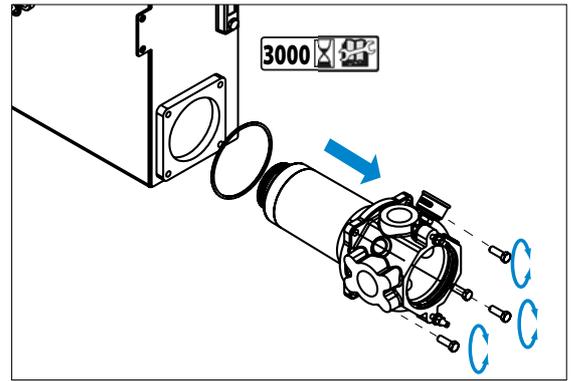
- Place a collecting container with a minimum capacity of 60 litre underneath the tank.
- Unscrew the drain plug and let drain



6 - Maintenance

Cleaning the hydraulic tank

- Drain the hydraulic tank. Refer to the chapter: "Drain the hydraulic tank" on page 153
- Loosen screws(2) and pull out the filter body
- Thoroughly clean the tank
- Reassembly the filter body, change the seals if necessary and use a new plug seal

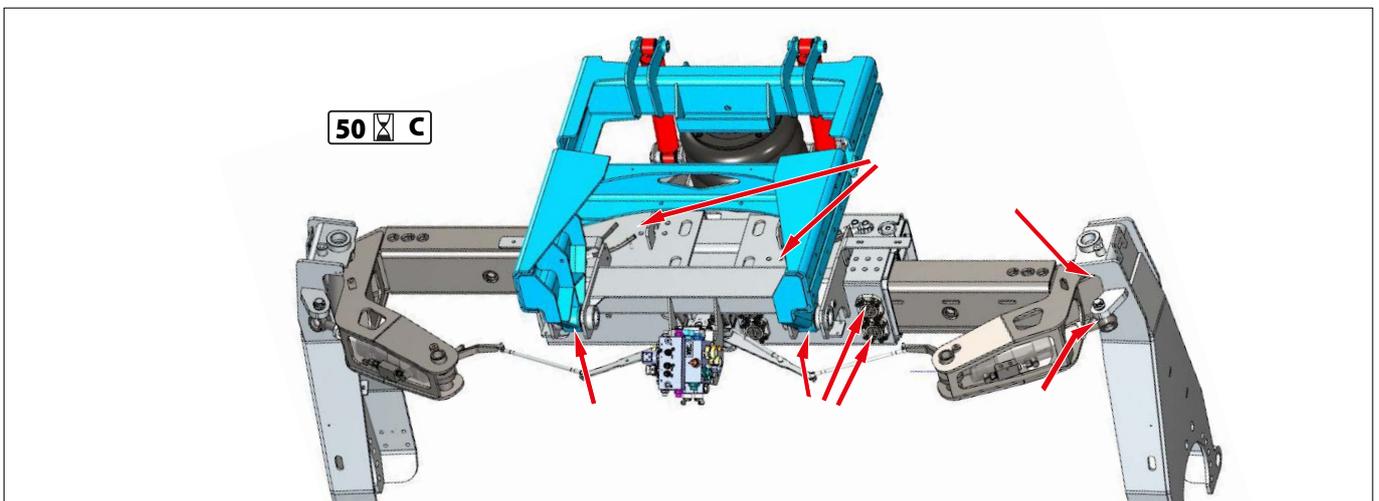
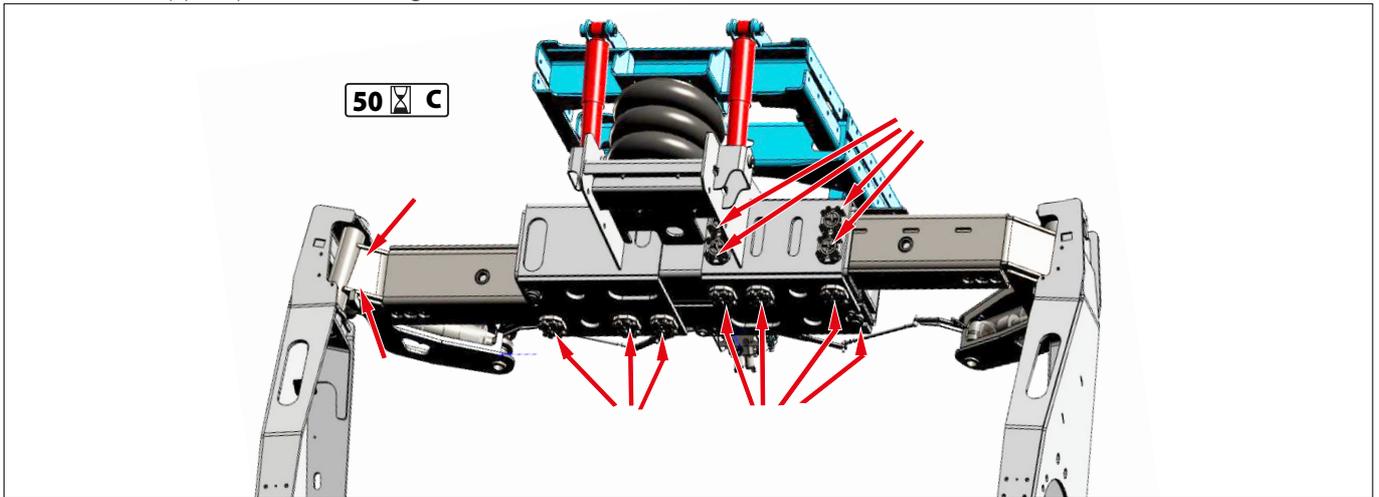


Use the recommended hydraulic oil. Refer to "Service intervals" on page 143.

Chassis and boom

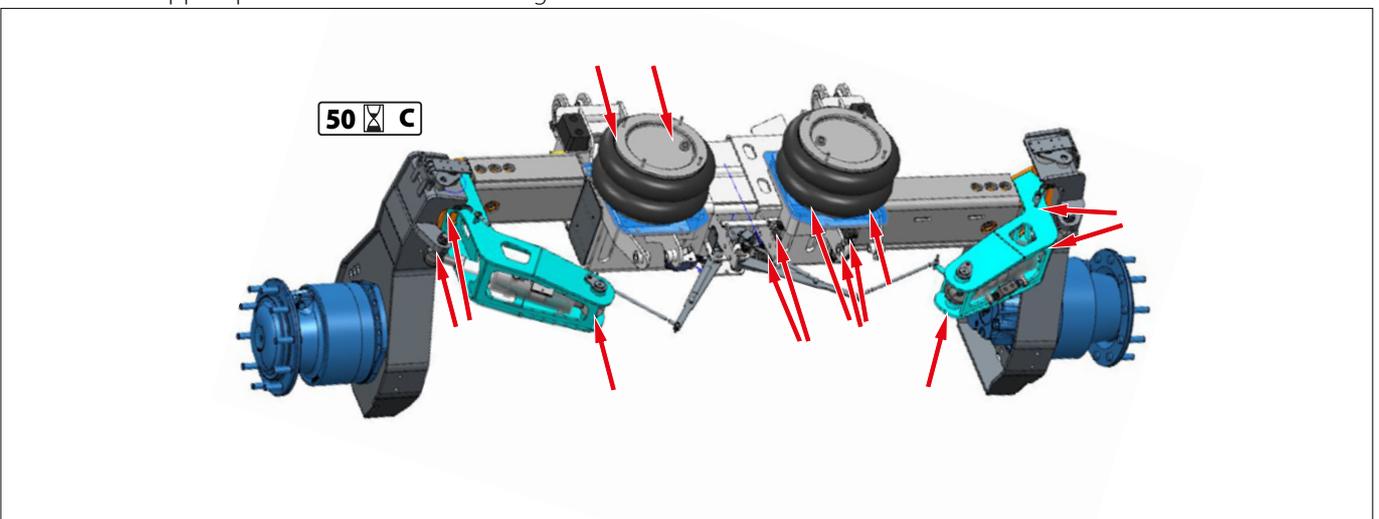
HTA Rear Axle Lubrication

- Grease nipples points according to illustration

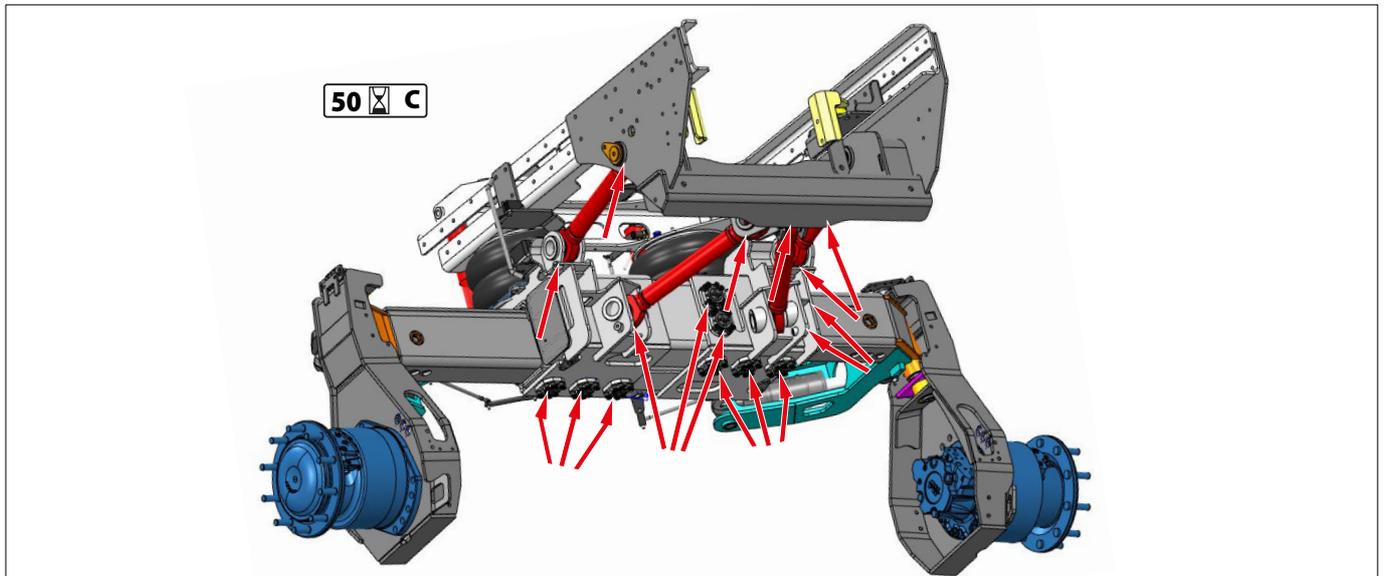


HTA Front Axle Lubrication

- Grease nipples points of the HTA according to the illustration

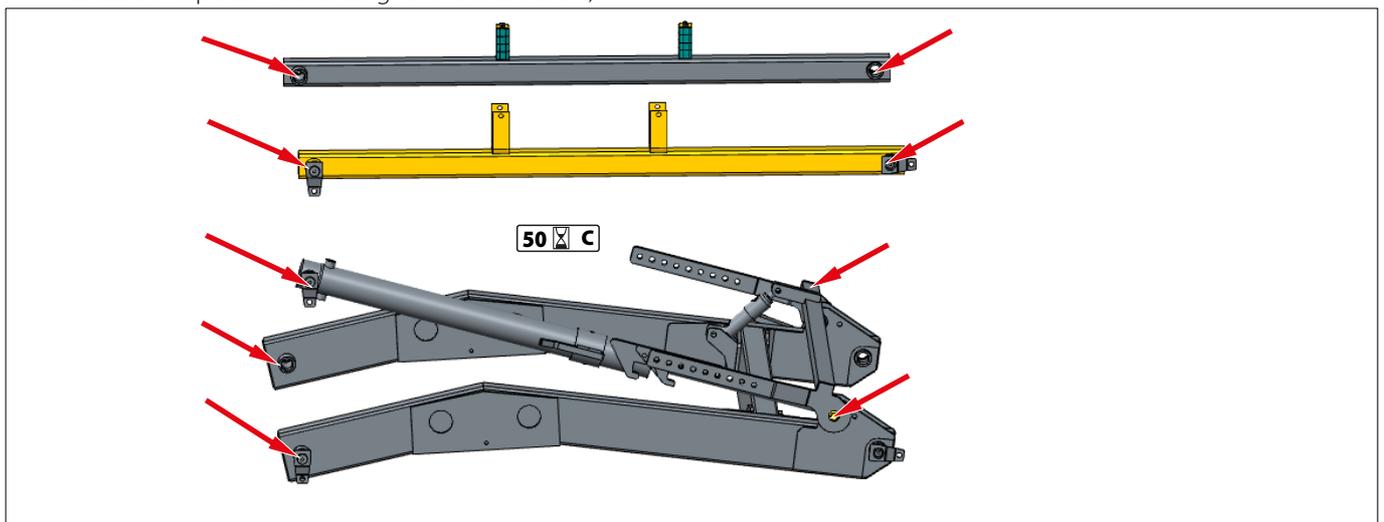


6 - Maintenance



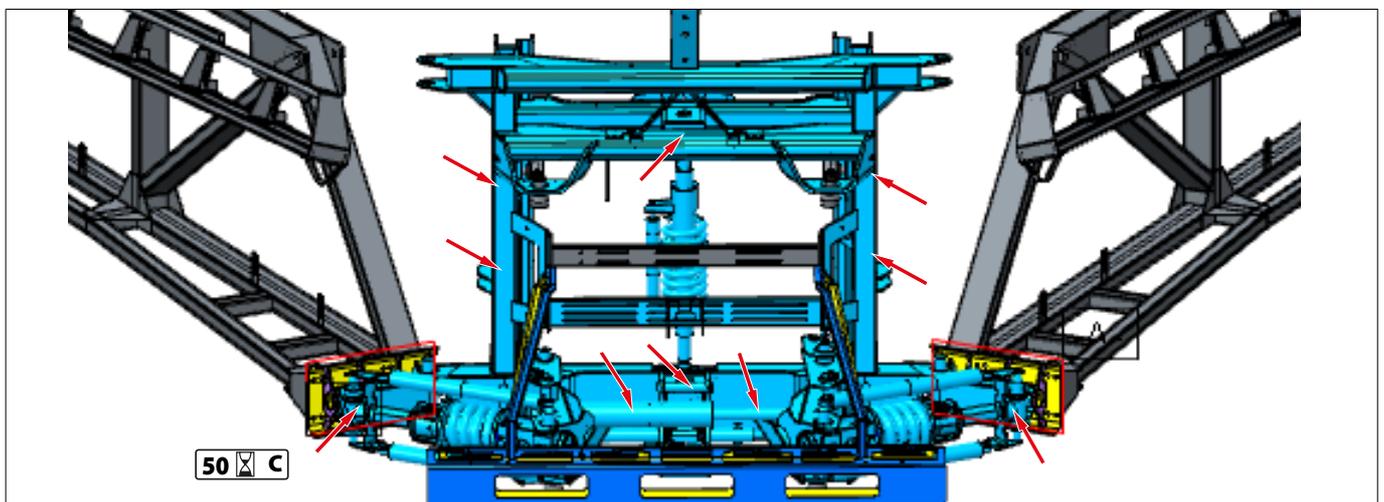
Paralift Lubrication

- Grease the paralift according to the illustration)



LPA5 Central Frame Lubrication

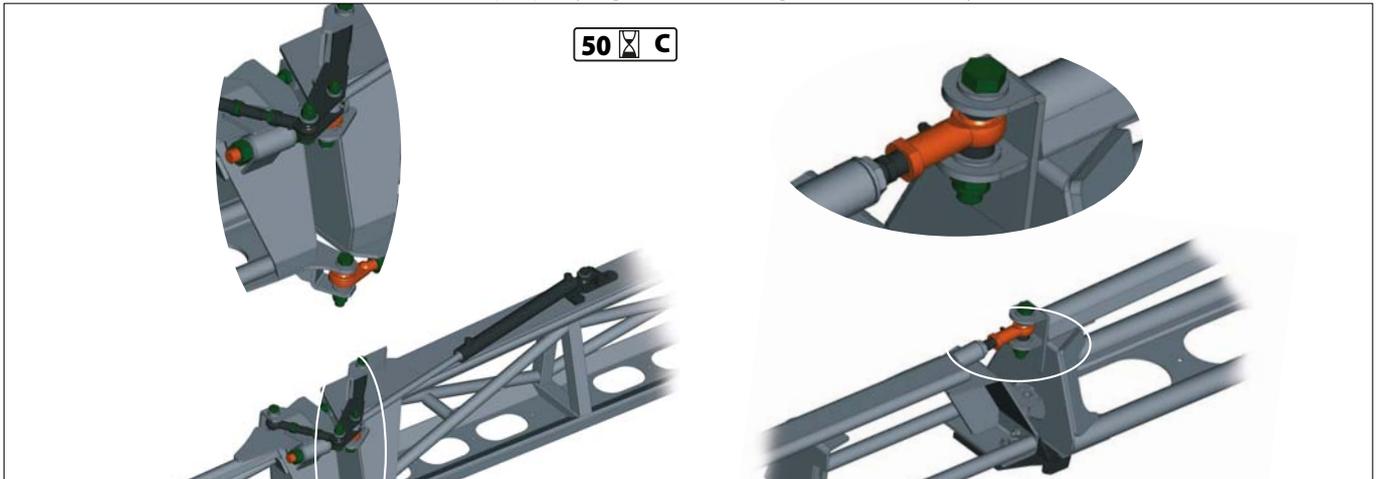
- Grease nipples of the central frame according to the illustration



TR4 Boom Lubrication

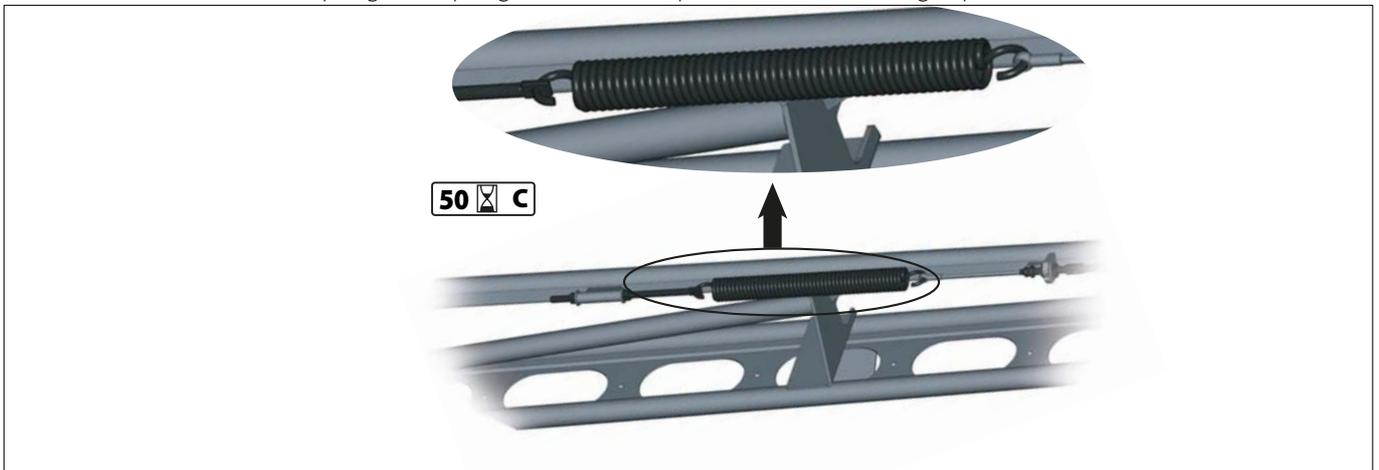
Bolts tightening

- Make sure that all nuts and screws are properly tightened and tighten if necessary. (Use a wrench with a 1.00 m lever)



Adjustment of Spring in Breakaway Section

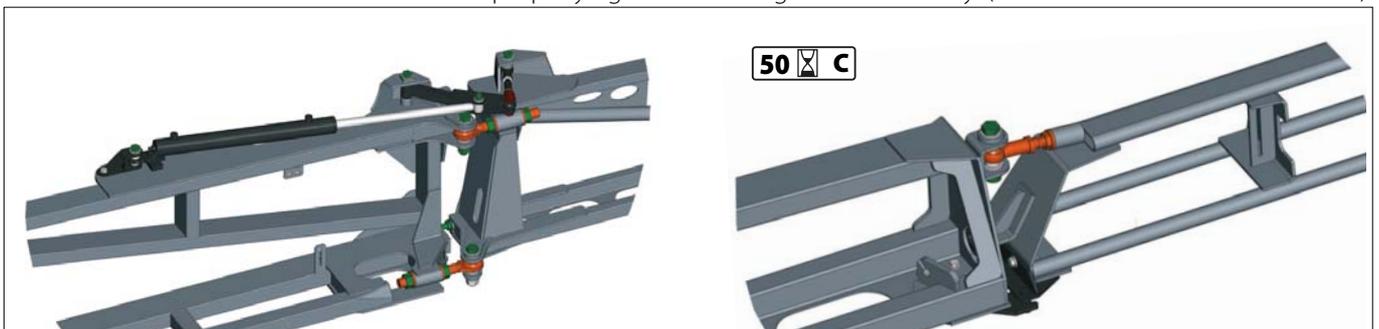
- Check the load of the spring. The Spring tension corresponds to its initial length plus 100 mm



RHA Boom lubrication

Bolts tightening

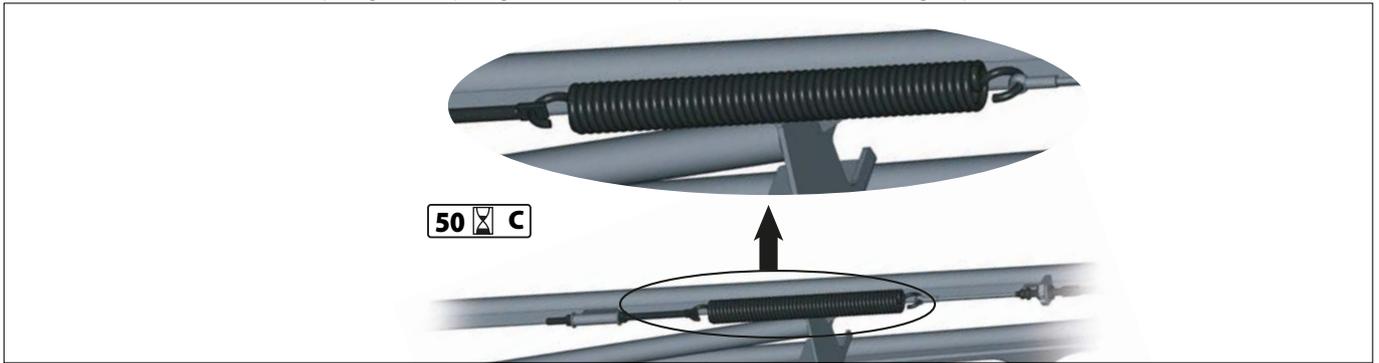
- Make sure that all nuts and screws are properly tightened and tighten if necessary. (Use a wrench with a 1.00 m lever).



6 - Maintenance

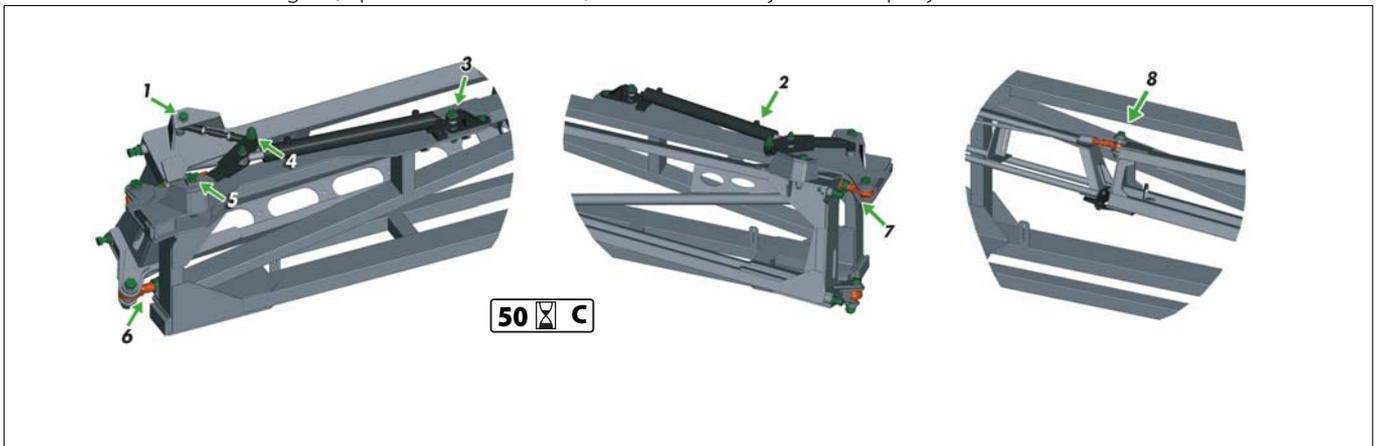
Spring Load for Breakaway Section

- Check the load of the spring. The Spring tension corresponds to its initial length plus 100 mm



TR4 Boom Lubricating

- Lubricate all the hinges (8 points of lubrication) and all the ball joints and pin joints



Tightening lug nuts

- Check and tighten the lug nuts (1) if necessary, applying a torque of 1050 N.m +/- 105 N.m (9293 lbf.in +/- 929 lbf.in).

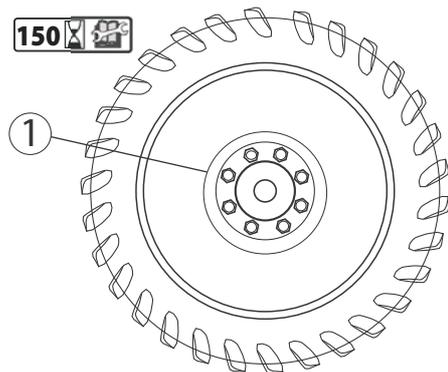


Hex. nut 22x1.5 Class 12.9



Tightening torque too high can damage lug nuts

150 N.m C



Spraying

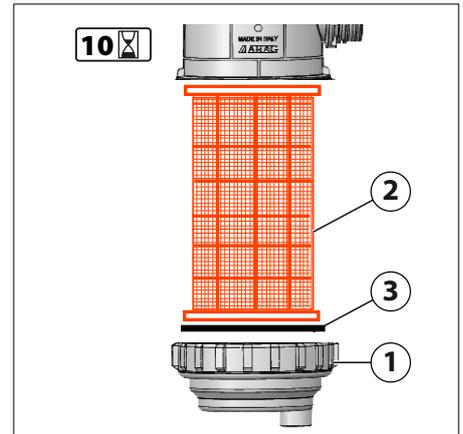
Suction filter (if fitted)

Servicing the filter

- Turn the pressure SmartValve towards the unused function or to tank cleaning nozzles
- Unscrew the body nut (1)
- Clean the filter element (2)

Reassemble

- Grease the O-ring (3) on the body nut guide
- Install the element into the housing and screw it on the filter.



WARNING: Always wear protective clothing and gloves, before servicing

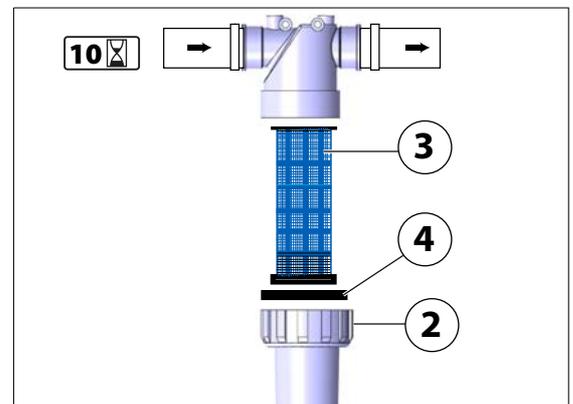
Pressure filter (if fitted)

Servicing the filter

- Open the valve to drain the filter
- Turn the pressure SmartValve towards the unused function or to tank cleaning nozzles
- Unscrew the body nut (2)
- Clean the filter element (3)

Reassemble

- Grease the O-ring on the body nut guide
- Install the element into the housing and screw it on the filter



WARNING: Always wear protective clothing and gloves, before servicing

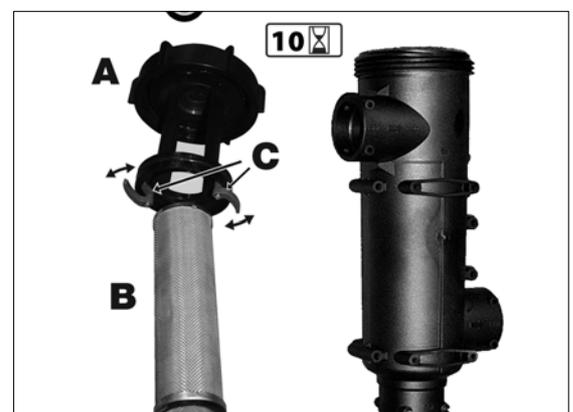
CycloneFilter

Servicing the Filter

1. Close the suction valve and turn the pressure SmartValve towards the unused function or to 'tank cleaning nozzles'
2. Unscrew the filter lid (A).
3. Lift lid and filter (B) away from the housing.
4. Turn the two locks (C) outwards to unlock the filter from the lid.
5. Separate filter from the integrated filter guide in the lid. Clean the filter.

To reassemble

1. Grease the two O-rings on the lid/filter guide. Due to small space at the lid, use a brush to apply the grease.
2. Mount the filter onto the recess (which may not be greased) in the lid/filter guide.
3. Turn the two locks (C) inwards to lock the filter into position.



6 - Maintenance

4. Place the filter/filter lid into the housing and screw the lid, until it hits the stop.



WARNING! Always wear protective clothing and gloves, before servicing the filter!



DANGER! Both the suction valve and The pressure SmartVvalve must always be closed turned to the unused function or to "tank cleaning nozzles", before opening the CycloneFilter! If not, the spraying liquid can hit you, when opening the filter, and the main tank content will drain away!

In-Line Filter

If PrimeFlow is equipped with In-Line-Filter in the spray boom, these filters are not included

If the boom is equipped with In-Line Filters, unscrew the filter bowl to inspect and clean the filter. When reassembling, the O-ring should be greased.

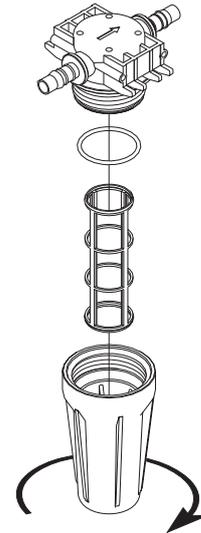
Alternative filter meshes are available. See section "Technical specifications" - Filters and nozzles.



WARNING! Be careful not to splash out liquid, when unscrewing the filter bowl.



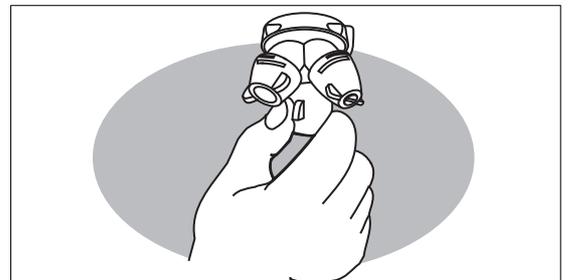
WARNING! Always wear protective clothing and gloves, before servicing the filter!



Nozzle Filter

The filters are located in the nozzle holder.

Check the filter condition and clean the filter.



Spraying circuit

Fill with clean water and operate all functions

Check for leaks using a higher spray pressure than normal.

Check nozzle spray patterns visually using clean water

Greasing the pump

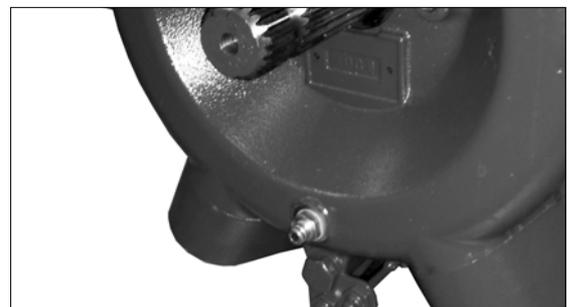
When operating the pump, it must be greased every 50 hours with 30 grams of grease into each lubrication point.



ATTENTION! In order to avoid excessive wear, it is important to use a recommended lubricant! See the section "Recommended Lubricants" for more information.



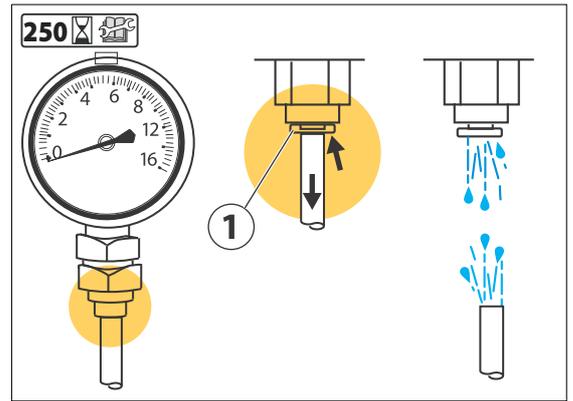
ATTENTION! The pump MUST be stopped during greasing!



Spraying Pressure Gauge

If the pressure gauge may no longer display the pressure with sufficient accuracy. This may be due to clogging of the hose connecting it to the liquid system. In this case, you can dismantle the pressure gauge to rinse the hose.

1. Push the ring (1) and remove the hose.
2. Spray clean water to rinse the pressure gauge hose.
3. Reconnect the pressure gauge by simply pushing the hose into the connector.



ALERT! The hose may be subject to residual pressure and cause liquid splatter. To avoid all risk of injury, wear protective goggles and gloves.

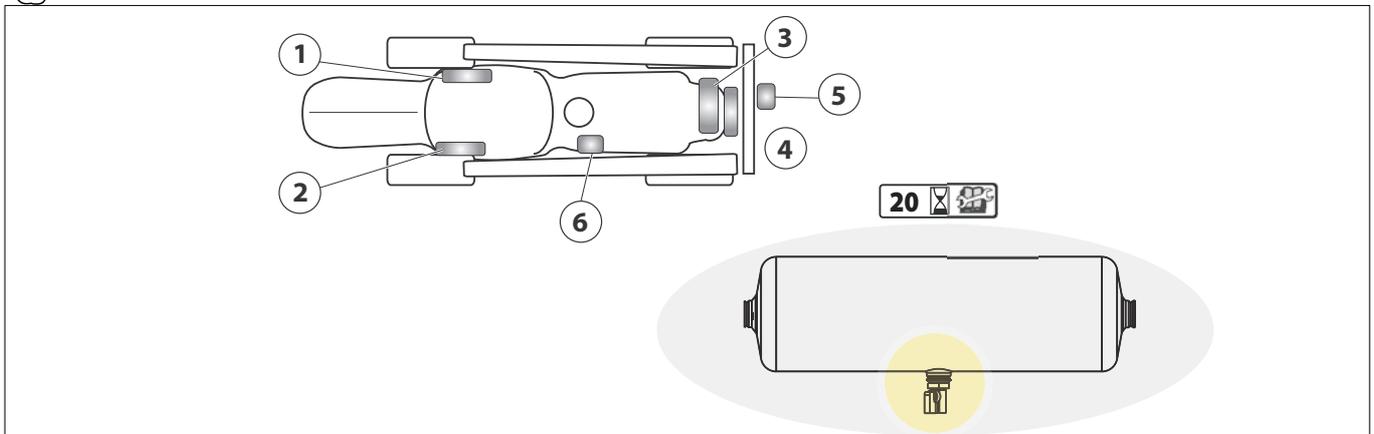
6 - Maintenance

Compressed air system

Draining air tanks



ALERTE! Air tanks may contain a residual air pressure!



1. Front right air tank for suspension
2. Front left air tank for suspension
3. Main air tank
4. Rear air tank for suspension

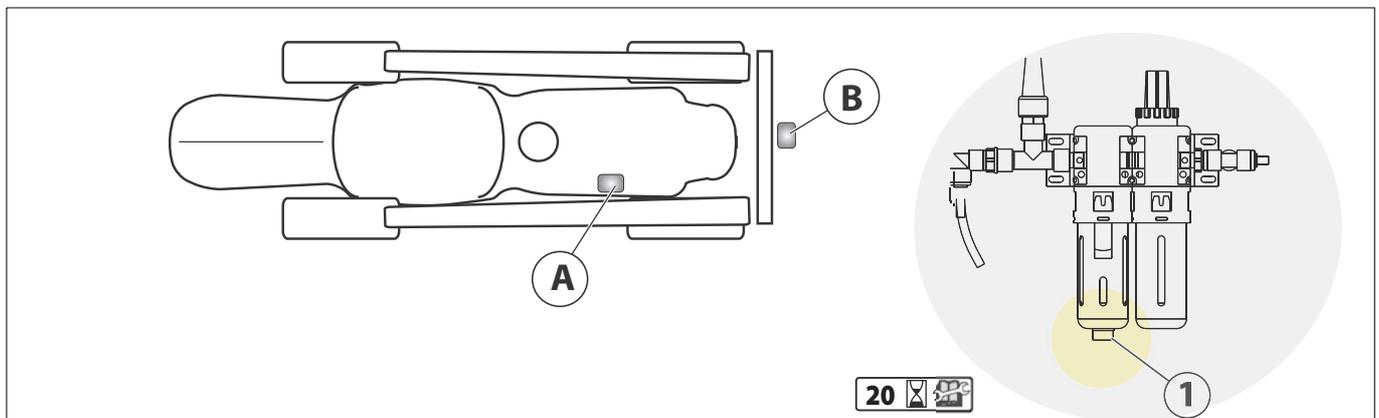
- Drain the air tanks for condensed water by opening the drain valve..



Air tank number depends of the equipment

The air is filtered and lubricated for a proper operation of equipments.

Drain the condensed water from the air filter device



- Drain the bowl for condensed water by pressing plunger (1)



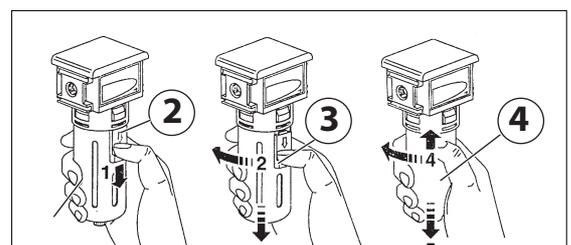
NOTE! Draining is possible when the circuit is under pressure.

Replenish oil



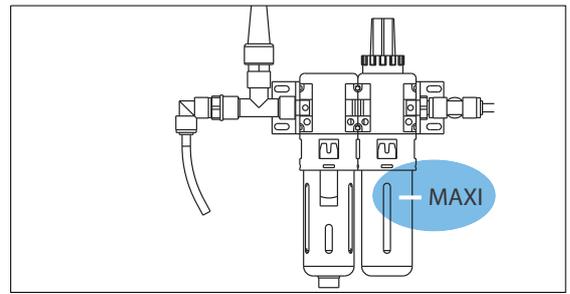
NOTE! To avoid splatter, depressurize the air system before dismantling the bowl.

- Press the clip (2) to unlock the protective bowl.
- Turn 1/8 turn to remove the protective bowl.
- Turn 1/4 turn the tank (4) to dismantle it.



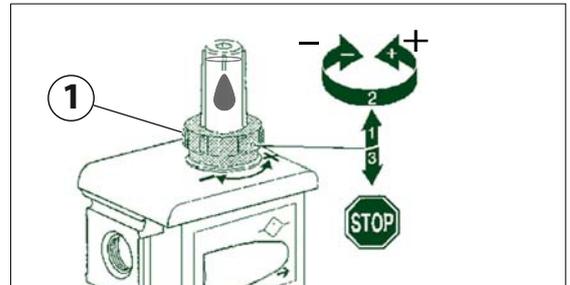
NOTE! The lubricator is designed to operate only with a special lubricant for pneumatic systems (recommended lubricant – reference: 6HU8000).

- Replenish oil whenever necessary the bowl without exceeded the maximum level.



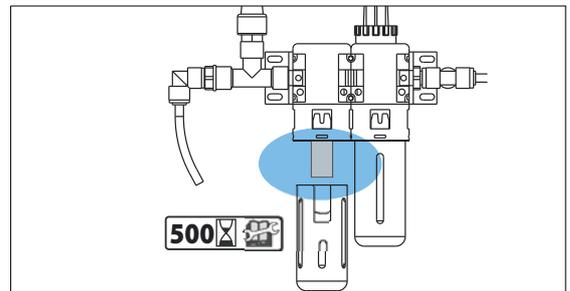
Oil flow rate adjustment

- Adjustment by means of knob with "pull-turn-push" type locking system
- Set oil flow rate during the passage of air.
- Oil flow rate: one drop of oil per minute.



Replace the compressed air filter

- Turn 1/8 turn to remove the protective bowl.
- Turn 1/4 turn the tank (4) to dismantle it
- Remove the filter and replace it



Maintenance

- Clean the bowl with an alkaline solution (soapy water) .



NOTE! The tank is made from polycarbonate, never use a solvent-based solution.

Air Compressor

TWIN FORCE sprayer is equipped with an air compressor fitted on the right side:

Draining oil after 20 hours of use, then every 250 hours of service

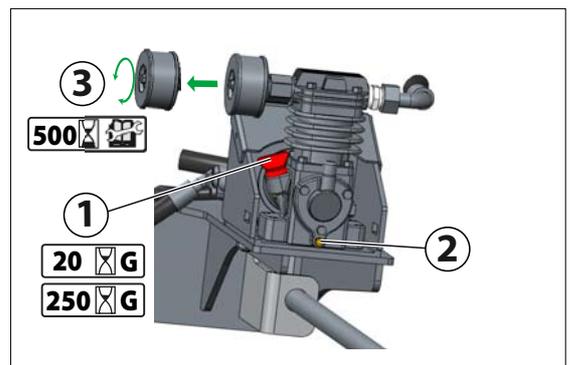
- Place a collecting receptacle underneath the oil drain screw.
- Unscrew the oil drain screw (2), drain oil.
- Fill new oil through the dipstick (1), See "Suitable Lubricants" page 141.

Check oil level

- check the oil level indicated by the dipstick. Add oil if necessary not exceeding the maximum level

Replace air filter

- Remove the cover and replace the air filter (3).

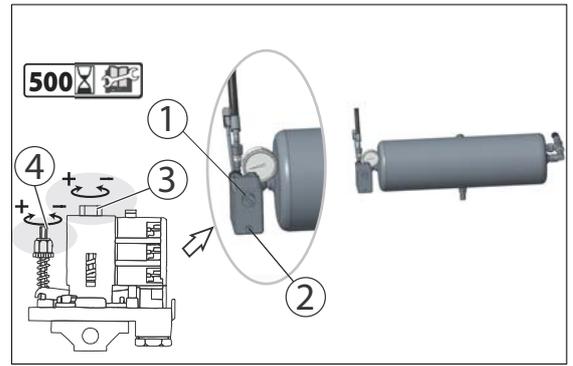


6 - Maintenance

Air pressure switch adjustment

To adjust the pressure in the circuit:

- Turn the knob (1) on AUTO position
- Loosen the screw (2) and remove the cover
- Always adjust the cut-out first to set the operating point. The contacts will open on high pressure. Turn the hex. nut (3) clockwise to increase pressure, counterclockwise to decrease.
- Adjust the differential set point by rotating the small hex nut (4) CW or CCW.



cut-out pressure setting = 8,0 bar (116 psi)

cut-in pressure setting = 7,0 bar (101,5 psi)

Occasional Maintenance

General Info

The maintenance and service intervals for the following components will depend very much on the conditions under which the sprayer is operated, and therefore it is almost impossible to specify the intervals beforehand.

The operator must select appropriate intervals for the occasional maintenance.

If in doubt, contact your local HARDI dealer.

Lifting and Removing the Pump

When lifting and removing the pump, use a shackle fitted to the built-in lifting eye located between the heads (A).



WARNING! To prevent damages in case of a free-falling pump, use lifting gear and a steel shackle with at least 3.5 tonnes max. tensile strength.

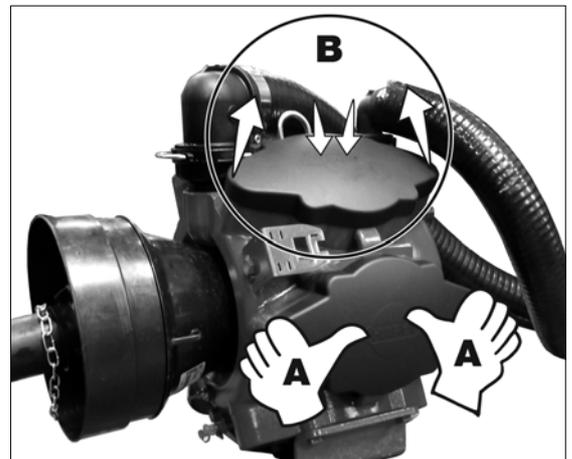
NOTE! Pump weight is approximately 75 kg



Pump Valves and Diaphragms Renewal

Pump mode: 464

1. Lift off the plastic covers with your hands (A) by pulling with the finger tips while pushing with the thumbs in the centre, as shown in (B).



6 - Maintenance

Valves

2. Loosen the 4 head bolts (1).
3. Remove the head (2).
4. Change the valves (3) - note their orientation, so that they are replaced correctly!



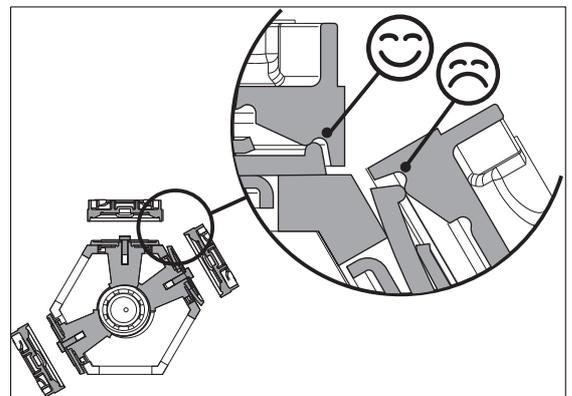
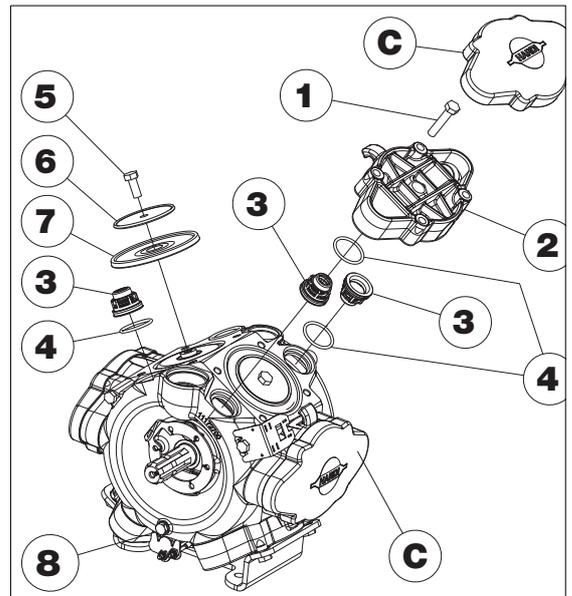
ATTENTION! It is recommended to use new gaskets (4), when changing or checking the valves.

Diaphragms

5. Loosen the diaphragm bolt (5).
6. Remove the diaphragm washer (6).
7. The diaphragm (7) may then be changed.
8. Check that the drain hole (8) at the bottom of the pump is not blocked.
9. Apply a small amount of pump grease on the underside of the diaphragms (between diaphragm and conrod washer).
10. Reassemble the pump with the following torque setting.
 - Diaphragm head bolts (1): 90 Nm.
 - Diaphragm bolt (5): 90 Nm.
11. Refit the plastic covers (C).
12. NOTE! The diaphragm bolt on 1000 r.p.m. pumps must be secured with a locking compound.



ATTENTION! Before tightening the 4 bolts for the head (2), the diaphragm must be positioned between centre and top to ensure correct sealing between diaphragm pump housing and diaphragm cover. Turn the crank shaft if necessary.



Lubrication After Assembly

After disassembling the pump (diaphragm renewal, etc.), the pump MUST be lubricated with 200 g grease into each lubrication point.

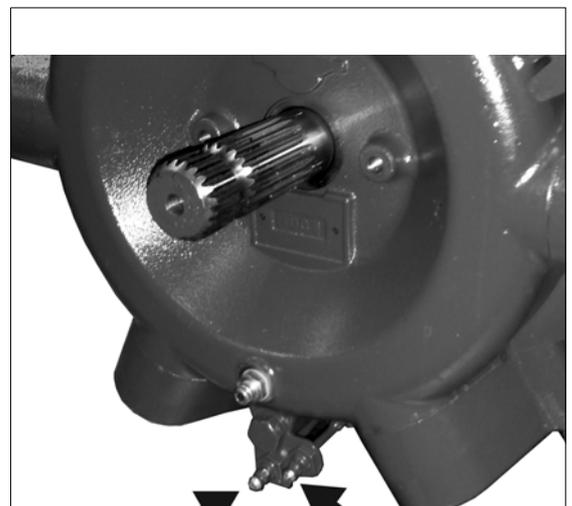
HARDI pump grease cartridge (400g): HARDI item no. 28164600

Overhaul Kit

Pump model: 464

Diaphragm pump overhaul kit (valves, seals, diaphragms etc.) can be ordered. Detect the pump model - the overhaul kit can be ordered by your local dealer.

Model 464: HARDI item no: 75586000



Speed Sensor for pump

The speed transducer, measuring rounds per minute (r.p.m.), is located at the inner side of the PTO shield. This sensor is an inductive type, which requires metallic protrusions to pass by it to trigger a signal.

If the sensor is exchanged, it must be installed accurately to function.

Adjustment

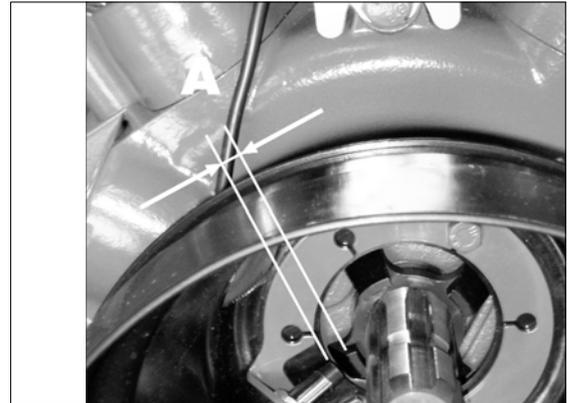
1. Adjust the air gap (A) between sensor tip and pump part is set by turning the nuts on the support bracket for the sensor.

The air gap (A) must be set to 1 mm (+0.3/-0.0 mm). Use a feeler gauge or similar tool to verify.

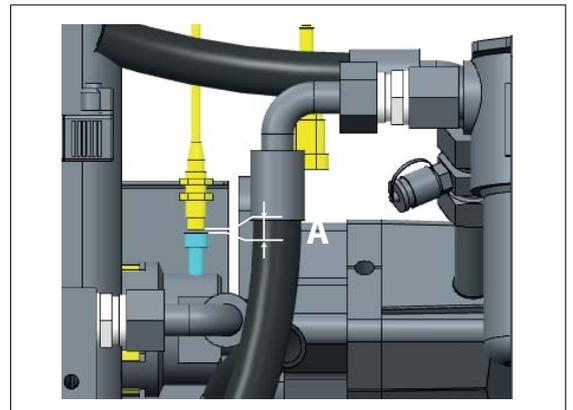
2. Verify transducer function on the controller:

- HC 6500 / ISOBUS VT: Monitor the menu [4.5.4.9.6 PTO pump frequency].

Standard regulation



DynamicFluid4 regulation



Level Indicator Adjustment

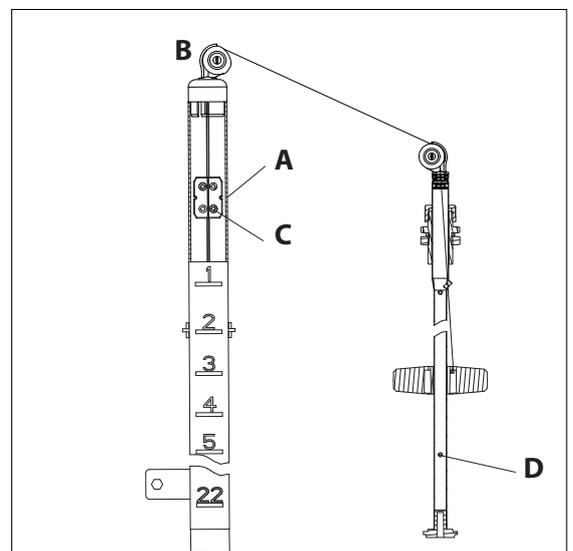
The level indicator reading should be checked regularly. When the tank is empty, the float should lie on the stop pin (D) of the rod, and the O-ring on the indicator should be positioned at the top position line (A).



ATTENTION! The wire guide wheels should be directed so they follow the direction of the wire

If any deviation is found, do the following:

1. Pull out the plug (B).
2. Loosen screws (C).
3. Adjust the length of the cord, until it reads correctly.
4. Push the plug (B) back into place.



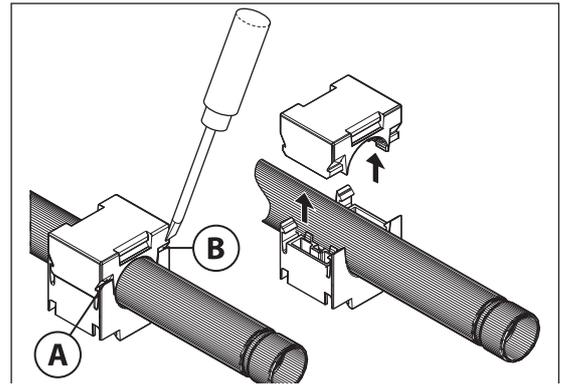
6 - Maintenance

Feed Pipe Clamp Assembly

A feed pipe can be removed from the pipe clamps the following way:

1. Use a flat bladed screwdriver to prize the cover off the first corner (A).
2. Hold the clamp top with your hand and prize off the opposite corner (B) with the screwdriver.
3. Prize off the other side of the pipe clamp with the screwdriver.

Take out the feed pipe.



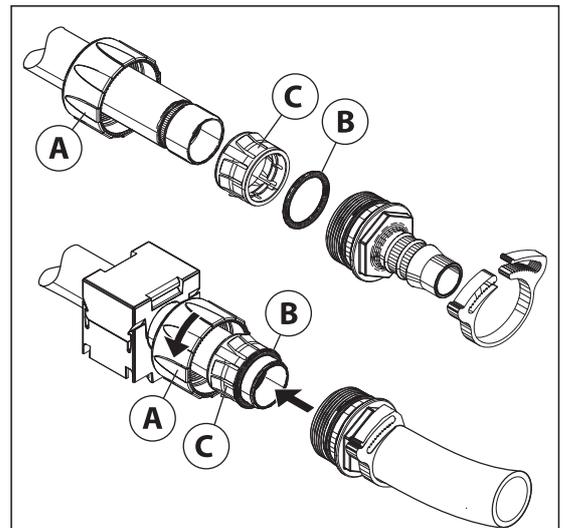
Feed Pipe Snap-Lock Assembly

Disassembly

1. Unscrew the union nut (A) completely.
2. Pull the feed piping and hose barb apart.
3. Take out the O-ring (B).
4. Inspect and oil O-ring (B). Change the O-ring (B) if worn, before reassembly.

Reassembly

1. Check that the barbed lock ring (C) is fitted to the feed pipe with barb pointing away from pipe opening.
2. Fit the oiled O-ring (B) on top of the lock ring (C).
3. Push the feed pipe and hose barb together.
4. Screw the union nut (A) on the hose barb and tighten union nut (A) by hand.

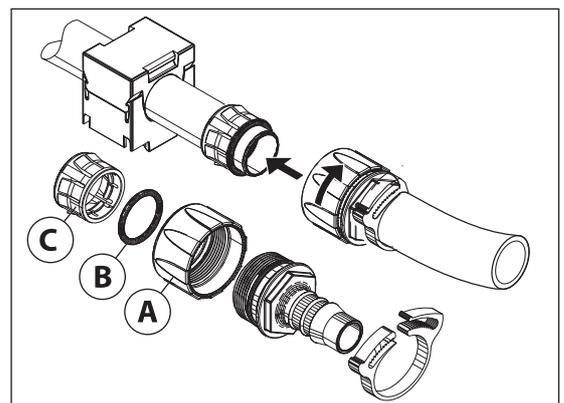


Initial Assembly of Fittings



ATTENTION! This method can only be used for pipes not fitted into pipe clamps.

1. Fit the barbed lock ring (C) to the feed pipe with barb pointing away from pipe opening.
2. Fit the oiled O-ring (B) on top of the lock ring (C).
3. Screw the union nut (A) on the hose barb.
4. Press the feed pipe and hose barb together.
5. Tighten the union nut (A) by hand if needed.



Nozzle Holder Assembly

If leaks of fluid occur in the nozzle holders on the spray boom, it is necessary to check the gaskets. The nozzle holder need to be disassembled to locate the gaskets. Occasional maintenance of the gaskets and nozzle holders is recommended.

Poor sealing are usually caused by:

- Missing O-rings
- Damaged or incorrectly seated O-rings
- Dry or deformed O-rings
- Foreign objects.

In Case of Leaks

1. Disassemble the pipe fitting.
2. Check condition and position of O-ring. Replace it if damaged or cracked.
3. Clean and lubricate the O-ring. Lubricate all the way around using a non-mineral lubricant.
4. Reassemble the O-ring or gasket and pipe fittings. When tightening the fittings, a little mechanical leverage may be used.

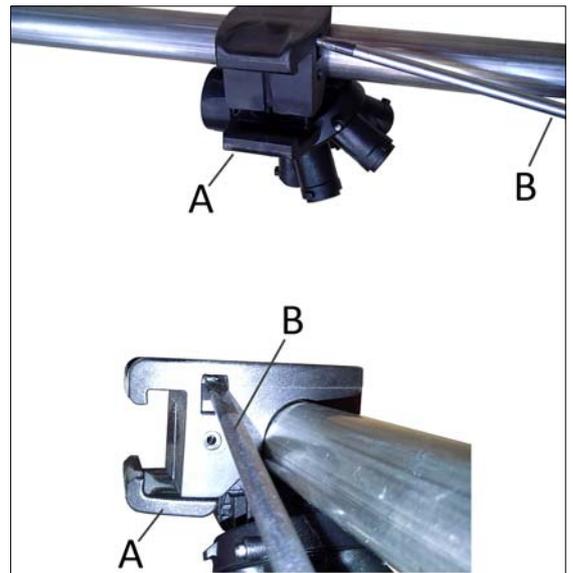
How To Disassemble Nozzle Holders

Nozzle holder assembled and mounted on the spray boom.

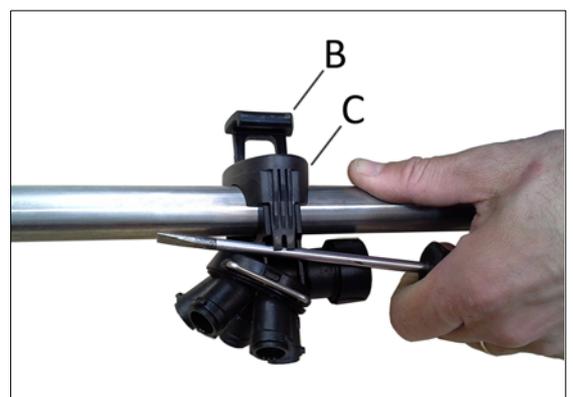


The black plastic parts are snapped together.

To disassemble, insert a slotted screwdriver (B) and press, until the locking piece (A) snaps out.



With the locking piece (B) removed, place the screw driver as shown and pull to remove the upper part (C) of the nozzle holder.



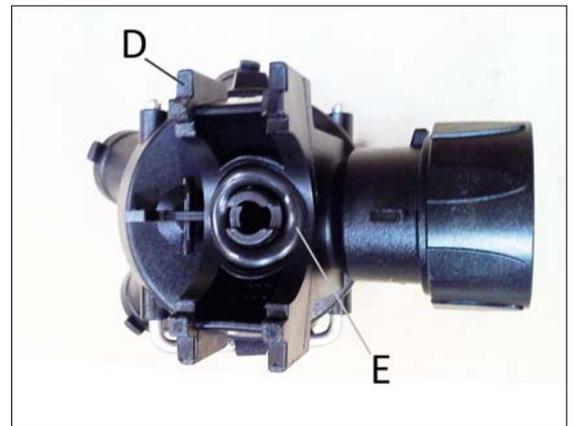
6 - Maintenance

Locking piece (B) and upper part separated (C).



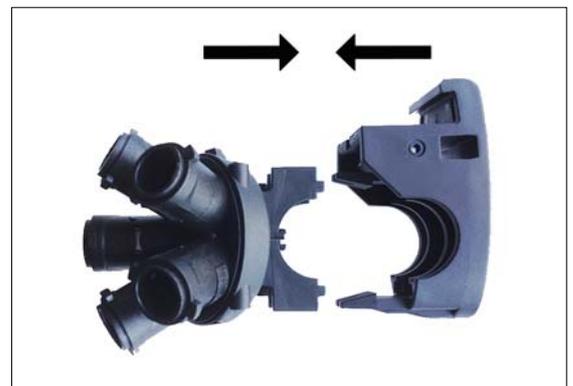
Inside the lower part (D), the O-ring (E) is located, and it can now be removed for maintenance.

Note that the O-ring, when seated, is supposed to be a little out of shape to fit tightly around the hole in the nozzle pipe.



How To Reassemble Nozzle Holder

1. Place the O-ring inside the lower part.
2. Place the lower part on the nozzle pipe. The O-ring fits around the hole in the nozzle pipe, where the spray liquid exits to the nozzle holder.
3. Place the upper part on the opposite side of the nozzle pipe.
4. Click the parts together by pressing relatively hard.



5. Insert the locking piece in the upper part to secure it on the spray boom.



Nozzle Pipe Assembly

If leaks of fluid occur in the pipelines on the spray boom, it is necessary to check the gaskets. The pipe fittings need to be disassembled to locate the gaskets. Occasional maintenance of the gaskets and pipe assemblies is recommended.

Poor sealing are usually caused by:

- Missing O-rings or gaskets
- Damaged or incorrectly seated O-rings
- Dry or deformed O-rings or gaskets
- Foreign objects.

In Case of Leaks

DO NOT over-tighten the pipe fitting - follow this procedure instead:

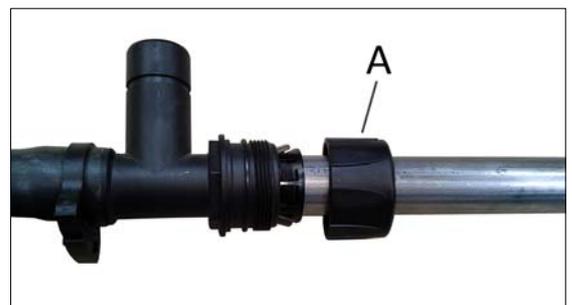
1. Disassemble the pipe fitting.
2. Check condition and position of O-ring or gasket. Replace it if damaged or cracked.
3. Clean and lubricate the O-ring or gasket. Lubricate all the way around using a non-mineral lubricant.
4. Reassemble the O-ring or gasket and pipe fittings. When tightening the fittings, a little mechanical leverage may be used.

How To Disassemble Pipe Fittings

Pipe fittings assembled.



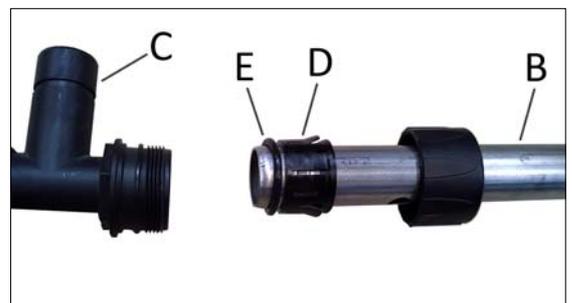
Unscrew the connector (A) on the steel pipe.



Pull the nozzle pipe (B) away from the T-piece (C).

A lock ring (D) and an O-ring (E) is located at the end of the pipe.

The O-ring can now be removed from the pipe for maintenance.



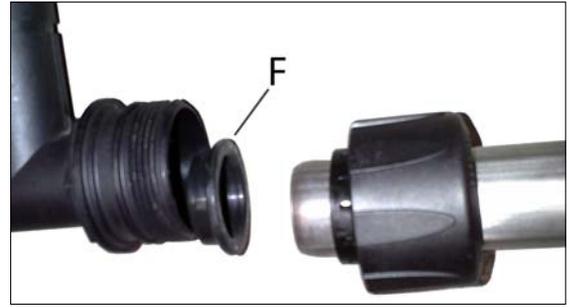
How To Reassemble Pipe Fittings

To reassemble the fittings, place the connector, lock ring and O-ring on the pipe in that order. Tighten the connector onto the T-piece.

6 - Maintenance

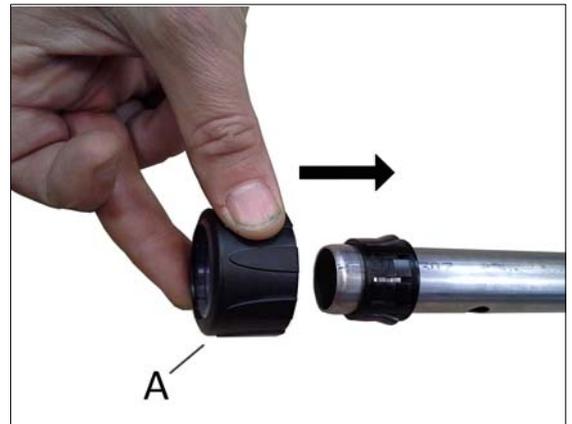
Gasket Types

Usually an O-ring is used, but there is also a different type of gasket in use (F).



How To Remove Lock Ring

If the lock ring needs to be replaced, this can be done by mounting a connector (A) in reverse direction.



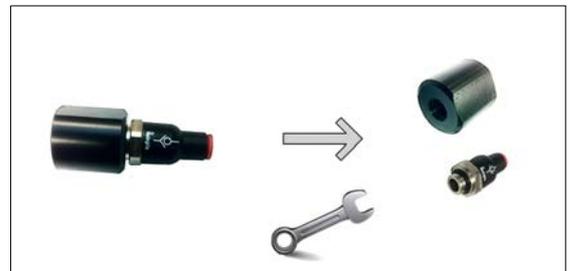
- Push the connector over the lock ring.
- Place the connector right behind the lock ring and pull to remove the lock ring from the pipe.



BoomPrime One-Way Valve

If the one-way valves for the BoomPrime system are clogged, they must be cleaned.

1. Disassemble the two parts.
2. Clean the parts as needed. Check the state of the black O-ring.
3. Assemble the parts again and tighten with a torque of 1 Nm.
4. ATTENTION! If any part is worn or damaged, it should be replaced.



Adjustment of 3-Way Valve

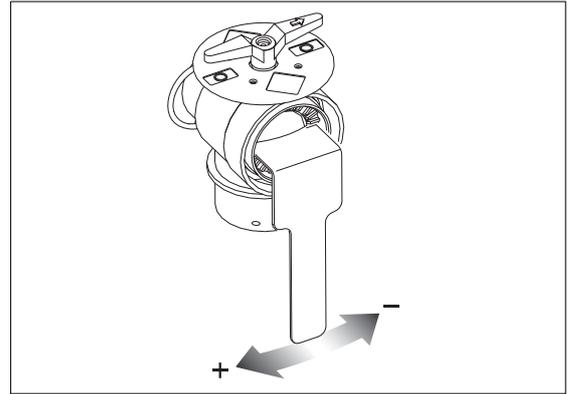
The large ball valve used for SmartValves and valves for filling equipment (type s93) can be adjusted, if it is too tight to operate - or if it is too loose (= liquid leakage).

- Correct setting is when the valve can be operated smoothly by one hand.

Use a suitable tool and adjust the toothed ring inside the valve as shown on the drawing.



ATTENTION! The small ball valves (type s67) cannot be adjusted



Safety Valve Activation

To make the fluid system work perfectly over time, it is good practice to regularly provoke opening of the safety valve.



This prevents clogging and ensures proper function of the safety valve. Opening of the valve is done by turning the pressure SmartValve to "Pressure draining or an unused function, when the pump is running. This is good practice for all sprayers; particularly for sprayers without optional equipment.



DANGER! Before turning pressure the SmartValve to "Pressure draining", it is very important to be sure that the quick coupler lid is correctly and completely mounted to the filling stud in its locked position. Failure to do so causes a risk of contamination and injury from the quick coupler lid being "shot" off when pressurized! If it is not possible to mount lid completely, lubricate the rubber seal and the grip hooks. Both the suction valve and pressure valve must be close, before opening the Cyclone filter! If they are not closed spraying liquid can hit you, when opening the filter and the main tank content will be drained.

6 - Maintenance

HAZ Boom

Readjustment of Boom - General Info

Before commencing adjustment jobs, please go through this check list.

1. The sprayer must be well lubricated (see the section "Lubrication").
2. Place the sprayer on level and solid ground.
3. Activate parking brake.
4. Put wedges under the wheels to prevent rolling.
5. Unfold the boom.
6. Place strong supports below the centre section and all boom sections to relieve the load from the hydraulic cylinders.
7. If you have a lifting crane, support the centre sections as a minimum, as this is the heaviest boom part (up to 1000 kg).
8. Set slanting angle to neutral position (horizontal).



DANGER! No one is allowed under the boom, while the adjustment is carried out.



DANGER! Adjustment of hydraulic cylinders is to be carried out without pressure in the system.



ATTENTION! For information on boom terminology, see page 55.



ATTENTION! To check the boom alignment, you can use a spirit level, or you can measure the distance to the ground from similar points in both ends of the boom wing (this method is used for horizontal alignment and only on level ground). When using the latter method, both distances should be equal to obtain a horizontal boom.



ATTENTION! Boom sections, which are not support during adjustment jobs, might fall down or be difficult to adjust.



ATTENTION! Adjustments are to be completed equally for both right and left boom wings.



ATTENTION! The following types of arrows are used when describing the different boom adjustments:

Point of adjustment	Boom is adjusted upwards	Boom is adjusted downwards	Boom is adjusted away from you	Boom is adjusted towards you

Adjustment of Springs in Centre Section

Description of Spring Function

The adjustable spring arrangement in the centre section will level out abrupt movements of the spray boom. If different field conditions appear, for example hilly or sloping fields, the spring arrangement may need manual adjustment.

When driving over an uneven area in the field, or when turning at headlands, the boom will move up or down compared to the direction of the wheel axle of the sprayer.

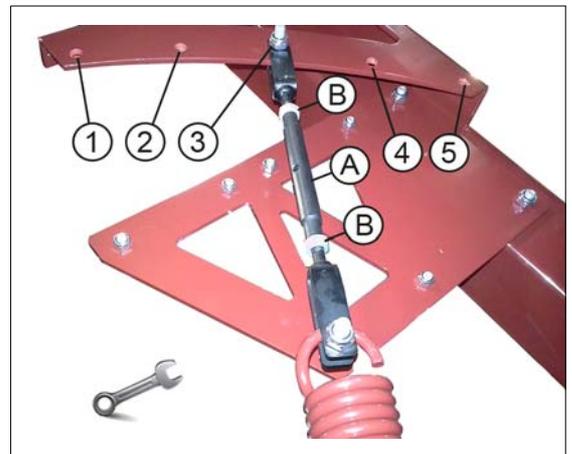
The boom movement can be adjusted by moving the spring to another position.



Adjustment of Boom Movement

On the top bracket there are 5 hole positions, where for the springs controlling each boom wing can be mounted:

Hole closest to centre (1)	Less straightening of the boom. The boom is moving only slightly and working towards a horizontal position (pendulum style). Suitable for flat and even fields.
Middle hole (3)	Medium straightening of the boom. The boom movement is at a medium level.
Hole farthest away from centre (5)	Powerful straightening of the boom. The boom will follow the direction of the wheel axle to some extent (trapeze style). Suitable for sloping fields.



ATTENTION! If AutoHeight for the boom is installed, the springs should be mounted in the top holes (1).

Moving Spring Position

1. Loosen the rigging screw (A) by turning the nuts (B). Before loosening the rigging screw, note the positions of the nuts and the tension in the spring - this should be the same after moving the spring position.
2. Dismount the upper bolt (shown here in hole position 3) and move the spring arrangement to the selected hole 1-5.
3. Refit the bolt and tighten the rigging screw. The rigging screw should be plenty tightened - however the spring should not be stretched out further compared to the tension in the previous position.
4. Both springs should have the same tension, when the boom is levered.

Replacement of Spring

1. Adjust the rigging screw (A) by loosening the nuts (B), until there is no more tension in the spring.
2. Dismount the spring.
3. Mount the new spring and refit the rigging screw.
4. Tighten the nuts plenty to the create the same spring tension as before.

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Adjustment of Boom Tilt

The unfolded spray boom must be horizontal to begin with, before you start a spray job. If needed, horizontal adjustment of the boom wings is possible when adjusting the ram eye on the hydraulic cylinder for tilt motion on both sides of the sprayer.



NOTE! This boom can tilt down to max. 4 degrees below horizontal level (only if the AutoHeight function is installed).

Steps for adjustment:



ATTENTION! If the hydraulic cylinder is not to be replaced, it is not necessary to disassemble the ram eye / hydraulic cylinder from the boom, when using a wrench for adjustment, as it is described in the following steps. Instead, the piston rod can be rotated by turning it with a wrench placed just behind the ram eye, thus avoiding decoupling the hydraulic cylinder from the boom.

1. Disconnect the ram eye from the boom parts.
2. Loosen the counter nut (A) and the pin bolt inside. This will unlock the ram eye from the cylinder's piston rod.
3. With a wrench fitted on the flat surfaces on the end of the ram eye (above A), the ram eye is now turned inwards or outwards in relation to the cylinder. The direction depends on your need for adjustment.

To raise the boom wing: Turn the ram eye inwards.

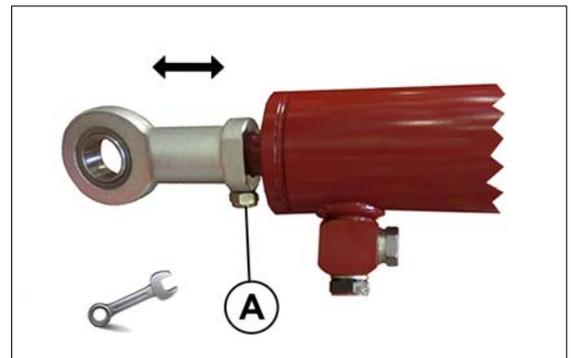
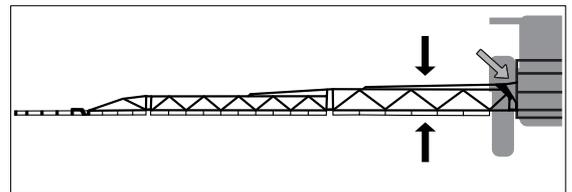
To lower the boom wing: Turn the ram eye outwards.

4. To be able to lock the ram eye to the piston rod after adjustment, turn the ram eye 1 full round at a time; this will move the ram eye 2 mm sideways.
5. Reconnect the ram eye to the boom parts to check the horizontal level of the boom wing.

If further adjustment is needed, go back to step 2.

If horizontal alignment is OK, tighten the pin bolt and the counter nut (A).

Adjustment is now completed.

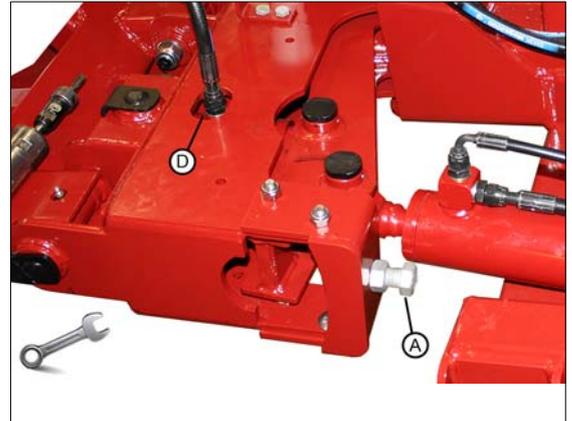
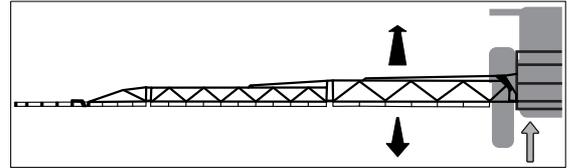


Horizontal Alignment of Inner Sections

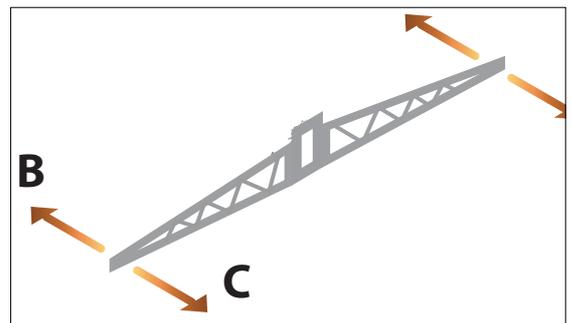
This alignment is to compensate for the wind resistance when driving with an unfolded boom, as well as keeping a good balance in the boom when driving on uneven fields. The boom is adjusted relatively to the direction of driving.

Steps for adjustment:

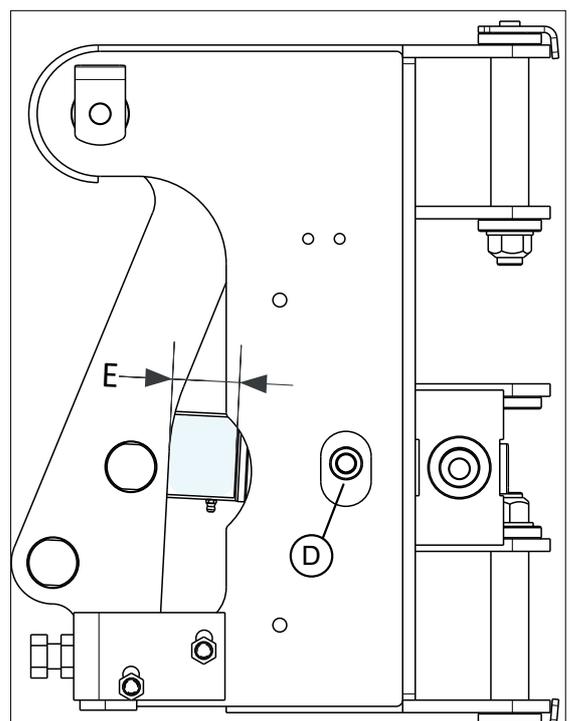
1. Turn the stop bolt (A). Wrench = 30 mm.
 - To bring the boom forward (B):
Turn the stop bolt counterclockwise and tighten the counter nut.
Torque = 250 Nm.
 - To bring the boom backward (C):
Loosen the counter nut and turn the stop bolt clockwise.



2. Stand near the boom centre and look towards the boom end. Compared to being on a perpendicular line to the direction of driving, the boom should now be adjusted a little forward (B).
The boom tip must be between 100 and 450 mm ahead of the perpendicular line.



3. When the plunger cylinder (D) is fully pressurized, the piston stroke (E) must not exceed 38 mm. Adjust the stop bolt (A) accordingly.



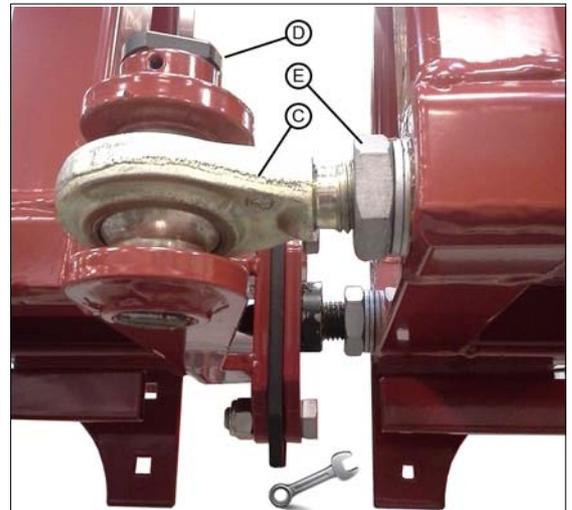
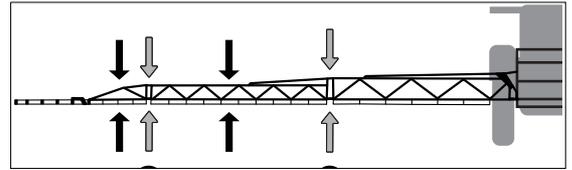
4. Adjustment is completed, when the boom is aligned within the range mentioned in step 2. After aligning other boom sections, check if realigning is needed here.

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Vertical Alignment of Middle and Outer Sections

Steps for adjustment:

1. Start with the middle section, which is aligned with the inner section.
2. At the top of the boom, the nuts (A,B) are turned. Wrench = 41 mm.
Raise the boom: Loosen (A), tighten (B).
Lower the boom: Loosen (B), tighten (A).
3. At the bottom of the boom, the ram eye (C) can be adjusted, if needed. Remove the black pin (D), loosen the counter nut (E) and turn the ram eye 180°. Tighten the counter nut and refit the black pin. Check alignment of the boom section.
4. When the middle section is aligned, tighten the counter nuts.
Adjustment is completed when the alignment is straight, and the folding is trouble-free.
5. Now the outer section is aligned with the middle section in the same way by completing steps 2 - 4.



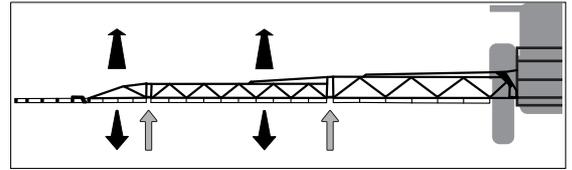
Adjustment of Boom Lock

Description of Boom Lock Mechanism

To prevent accidental folding of the spray boom while spraying, the boom joints interlock automatically when fully unfolded. The conical bolt (A) will guide the boom sections into the interlocking position.

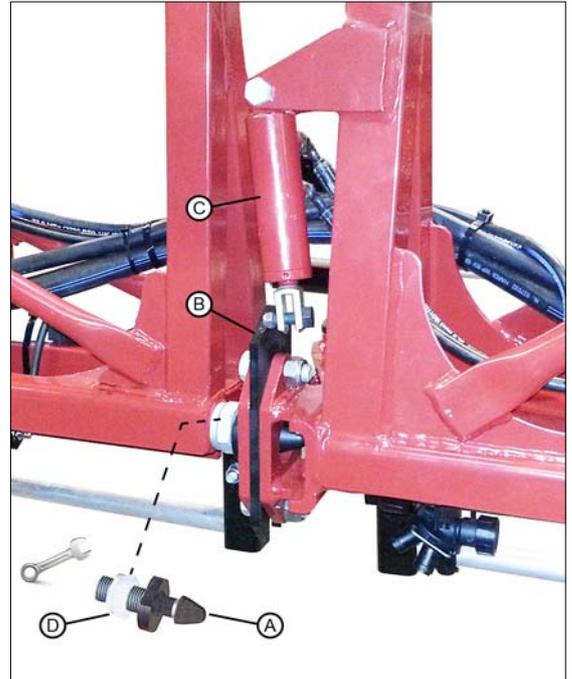
A specially designed steel plate (B) will be lifted up, as the conical bolt (A) passes through the plate. The plate (B) will fall down behind the bolt head, thus securing the unfolded position.

When folding, a hydraulic cylinder (C) will temporarily pull up the steel plate (B) to allow the boom sections to separate.



i NOTE! On the picture, the cylinder (C) is detached from the steel plate (B). It must be attached during operation of the boom.

⚠ ATTENTION! The following boom alignment is only carried out, if changing the positions of the rubber pads on the boom is insufficient to steer the boom sections into the folded transport position. When folding the boom, the upper edges of the boom sections should align to allow the hydraulic boom locks to engage.



Horizontal Alignment of the Boom

The bolt (A) can be adjusted sideways as needed.

1. Loosen the lock nut (D). Wrench = 41 mm.
2. Turn lock bolt (A), until the boom sections align. Wrench = 46 mm.

⚠ ATTENTION! The lock bolt is eccentric. Always turn it 1 full round at a time; this will move the lock bolt 3 mm back or forth. Ensure that the lock bolt aligns with the centre of the hole in the lock mechanism, when the adjustment is completed.

3. Re-tighten the lock nut (D). Torque = 250 Nm.

Adjustment completed.

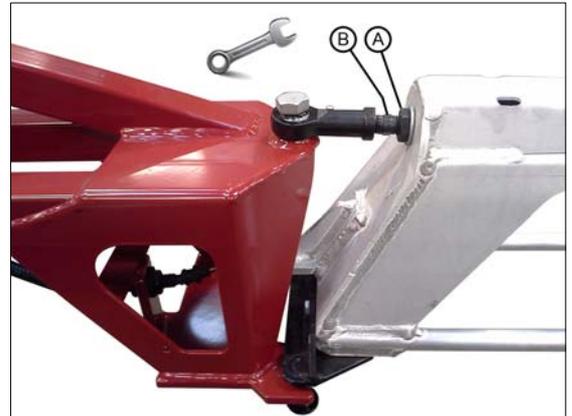
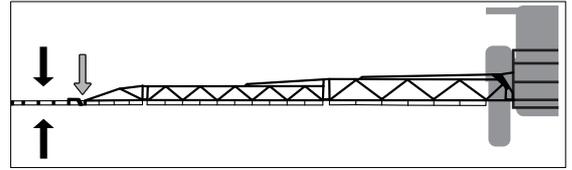
6 - Maintenance

Vertical Alignment of Breakaway Section

Align the breakaway with the outer section of the boom.

Step for adjustment:

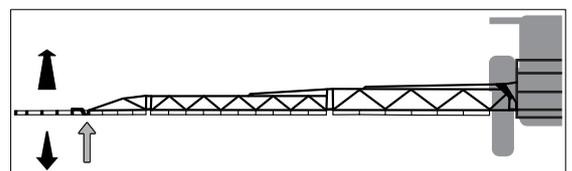
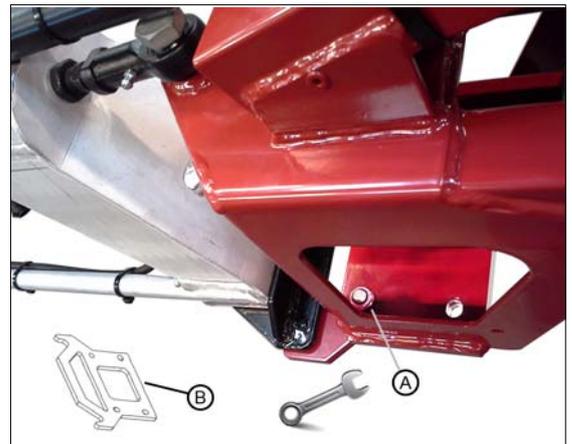
1. Loosen the nut (A). Wrench = 24 mm.
2. The hexagon (B) is turned. Wrench = 17 mm.
Turn clockwise: The breakaway is raised.
Turn counter-clockwise: The breakaway is lowered.
3. When the breakaway is aligned, tighten the nut (A).
Adjustment is completed.



Horizontal Alignment of Breakaway Section

Complete the following steps to adjust the breakaway to align it with the outer section of the boom.

1. Loosen the bolts and lock nuts (A) - but do not remove them.
1. There are four sets of bolts and nuts in all, mounted in both sides of the steel bracket (B). Wrench = 17 mm.
On the picture, the bolt and nut are already removed from the one hole. The slot holes in the steel bracket allows adjustment. The steel bracket is attached to the breakaway
2. Align the breakaway with the outer section by moving the bracket.
3. Re-tighten the bolt and nuts. Torque = 180 Nm.
Adjustment is completed.

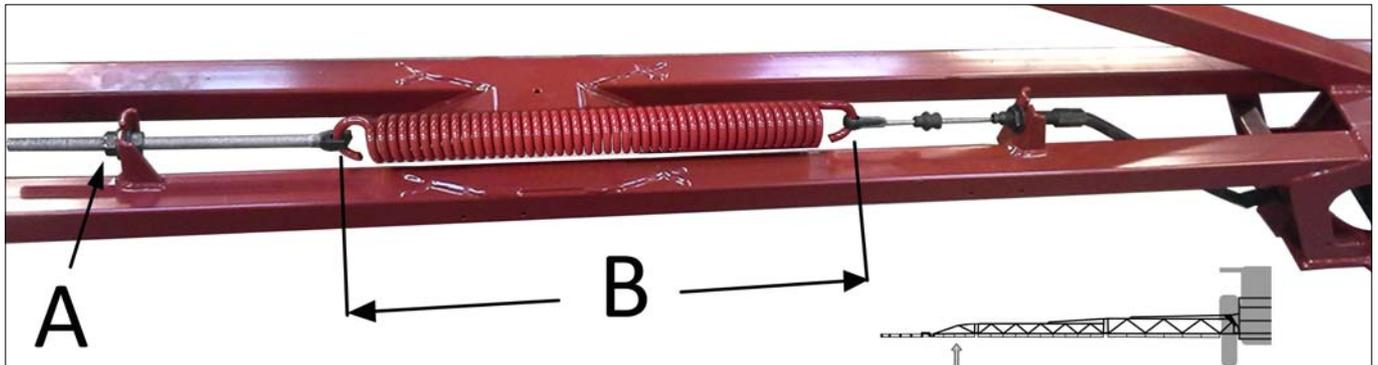


Adjustment of Breakaway Section

The breakaway section at the boom end will move back or forth, if it hits a stationary object, e.g. a pole or a tree, when driving with an unfolded spray boom. The spring on the outer section of the boom will pull the breakaway back into place, when the boom is clear of the object. When spraying, the breakaway may also sway a little if driving on uneven ground.

The spring is preloaded from the factory - but adjustment is needed, if:

- the breakaway is continuously swaying a lot due to a bumpy field (tighten the spring).
- the breakaway has become very hard to move by hand, when the sprayer is at a standstill (loosen the spring).
- reattachment is necessary due to replacement of the spring, cable for spring or other parts.



Steps for adjustment:

- A. Turn these nuts to adjust the spring
- B. Dimension of preload of the spring. Factory settings is 480 mm. Maximum preload is 550 mm.



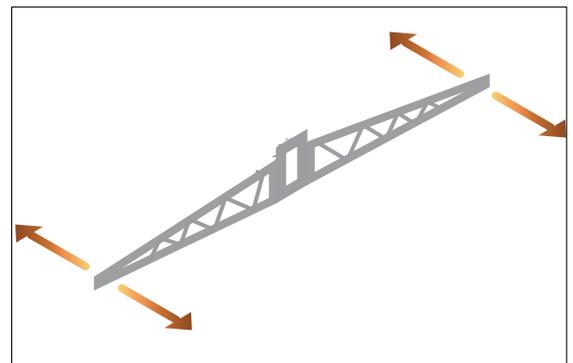
WARNING! Risk of squeezing. Keep fingers and clothes away from the spring windings, when adjusting the spring.

Yaw Damping

The unfolded spray boom will create yaw movements, when

- driving over uneven terrain
- turning on headland
- speeding up
- braking.

The three accumulators located in the boom centre act as dampers for the yaw movements, when driving in the field.



Damping Function

Each accumulator contains nitrogen gas and hydraulic oil, separated by a diaphragm. When the boom makes a yaw movement, hydraulic oil will be transferred into the accumulator. The oil pushes the diaphragm while compressing the gas. When this compression overcomes the oil pressure from the boom, the boom wing is moved back to its original position damped by the oil flow in the circuit.

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Accumulator Service

If the yaw damping seems to be insufficient, the accumulators need to be recharged or replaced. Ask your HARDI dealer to assist you.

1. Check for any leaks.
2. Check pressure setting for the accumulators in the test sockets, which are located in the hydraulic block below. Hydraulic hoses for the accumulators are also connected to this block.
3. Fill nitrogen gas (N₂) into the accumulators, until you reach a pressure of 18 bar (factory setting). The gas volume in the accumulator is approx. 0.5 litres.
4. Fill hydraulic oil, until you reach a pressure of 35 bar (factory setting) in the accumulators.



DANGER! Do not fill the accumulators with other gases, such as air or pure oxygen. Risk of explosion.

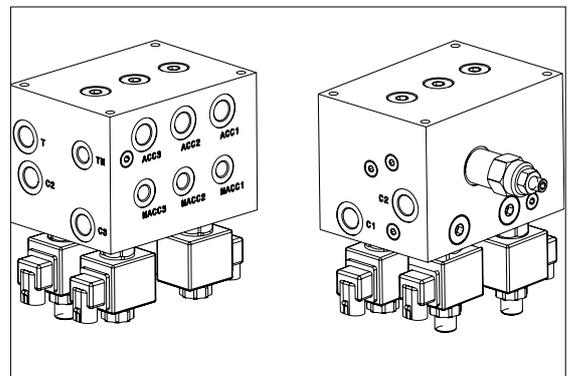


Hydraulic Block for Yaw

Item	Port on hydraulic block
Hydraulic hoses for accumulators	ACC1, ACC2, ACC3
Test sockets for accumulators	MACC1, MACC2, MACC3, TM
Yaw cylinders on spray boom	C1, C2, C3
Return oil back to tank	T



NOTE! For more details, see the hydraulic diagram in the section "Technical Specifications" in this book.

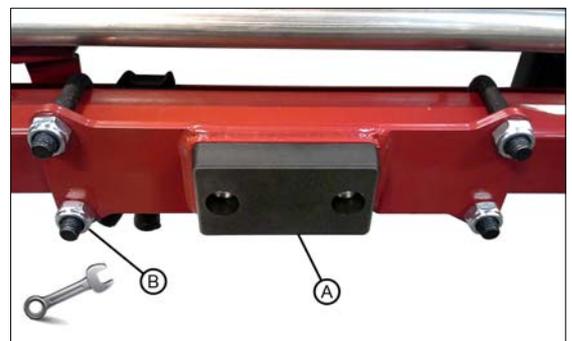


Alignment of Rubber Pads on Spray Boom

When the boom is folded, it must be checked that it rests correctly on the rubber pads. The rubber pads protect the boom parts during folding and transport, so please check them for misalignment. The rubber pads also help to steer the boom into the transport position.

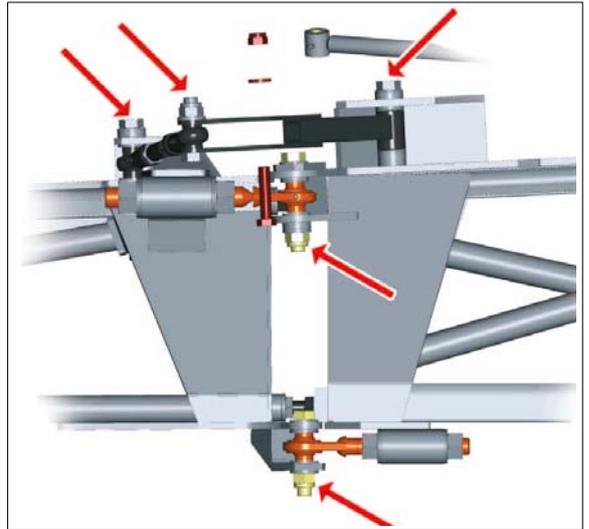
Steps for adjustment:

1. Fold the boom and check the positions of the rubber pads (A). They must be touching, when folding is completed.
2. If realigning is needed, loosen the four lock nuts (B) slightly. Wrench = 17 mm.
3. Move steel bracket with the rubber pad sideways to the wanted position.
4. Tighten the four lock nuts to lock the position of the rubber pad.
5. Adjust other rubber pads on the boom as needed.

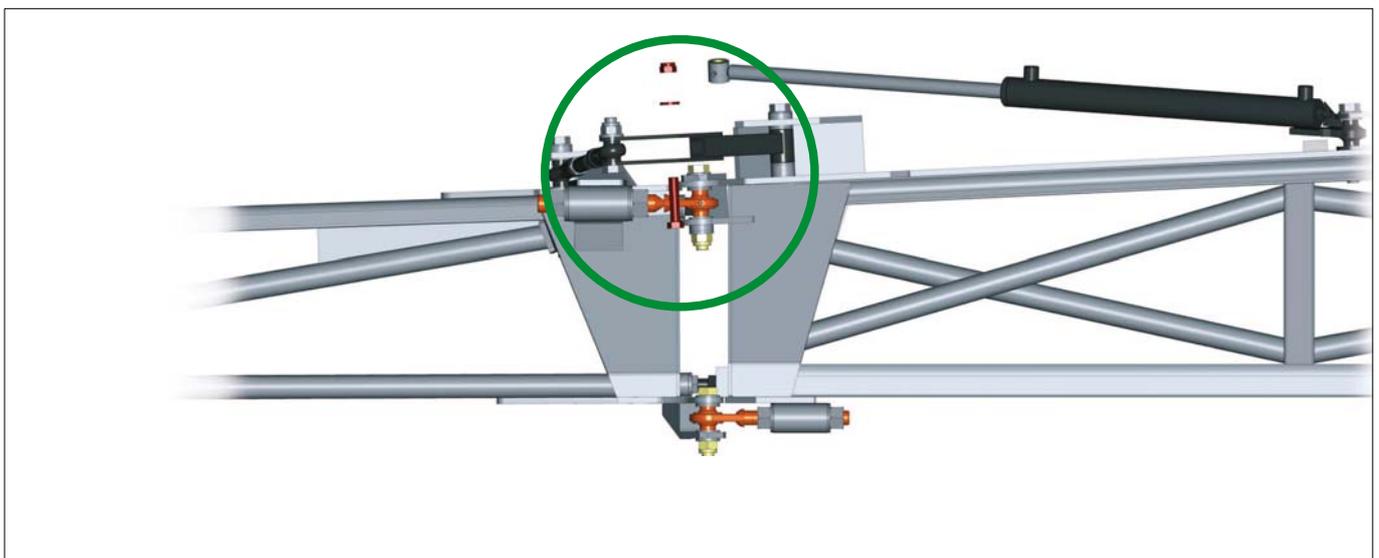
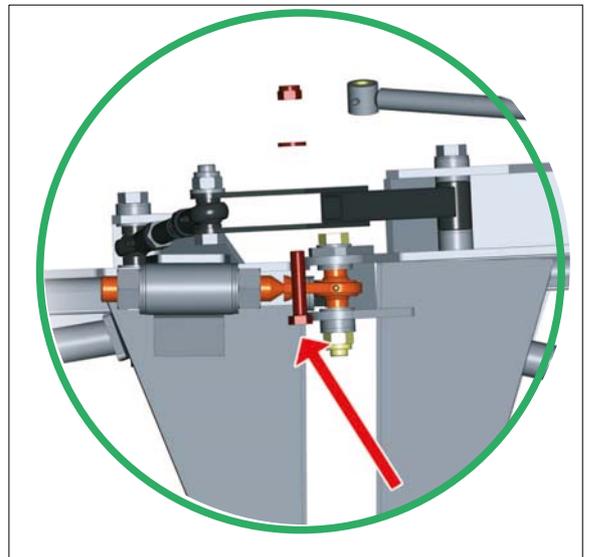


TR4 Boom

i Before starting adjustment of the boom, Tighten all the bolts at the hinge points before adjusting the boom



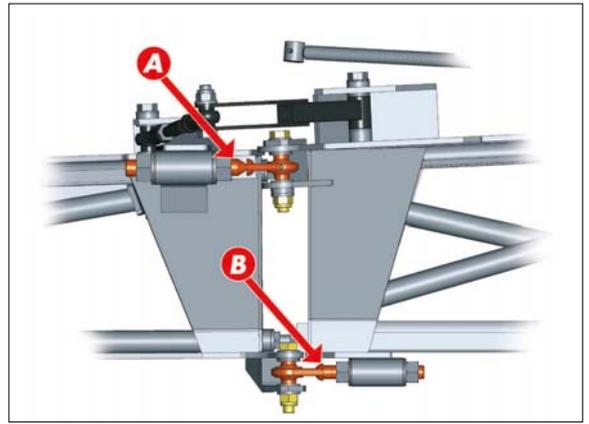
1. Unfold the boom and remove the bolts from the cylinder



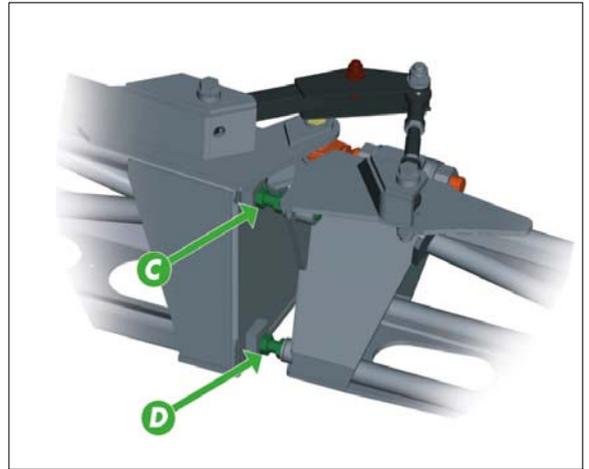
6 - Maintenance

2. If the 1st arm and the 2nd arm are not horizontal alignment, turn the eye bolt A and B.

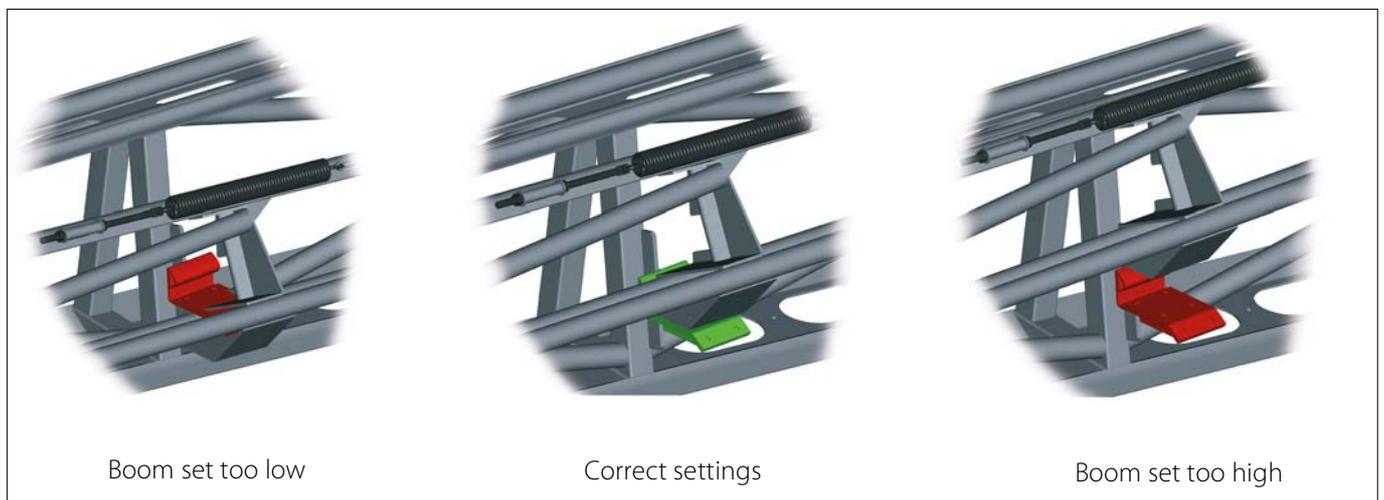
When the boom is horizontal position, tighten slightly the counter nuts



At the same time, pre-adjust the 2 stops (C) and (D) between the 1st and 2nd arms, so that the boom is perfectly aligned

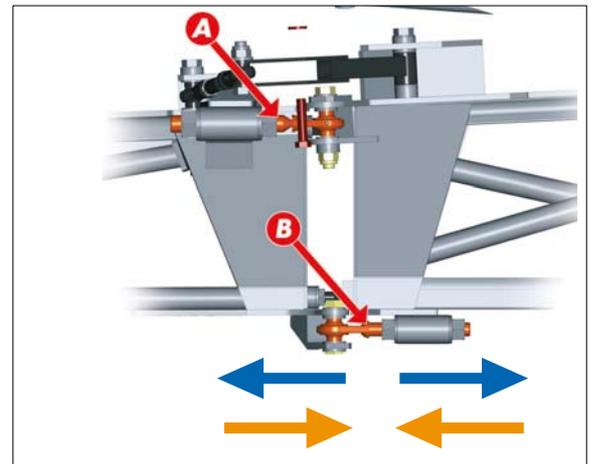


3. Fold the boom by hand so that the 2nd section gently rests in its brackets on the 1st section



- If the 2nd section is too high, unfold the boom again, without disturbing the horizontal setting of either arm, adjust the two eye bolts A and B to move the 1st arm away from the 2nd arm.

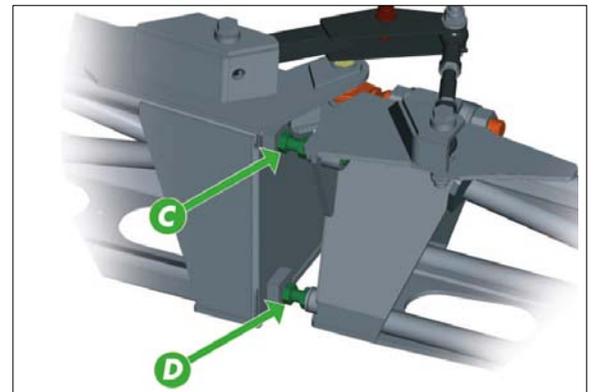
If the 2nd arm is too low, it is necessary to approach the 2nd arm



- When the 2nd arm is correctly in its bracket, you can tighten the counter nuts of eye bolts

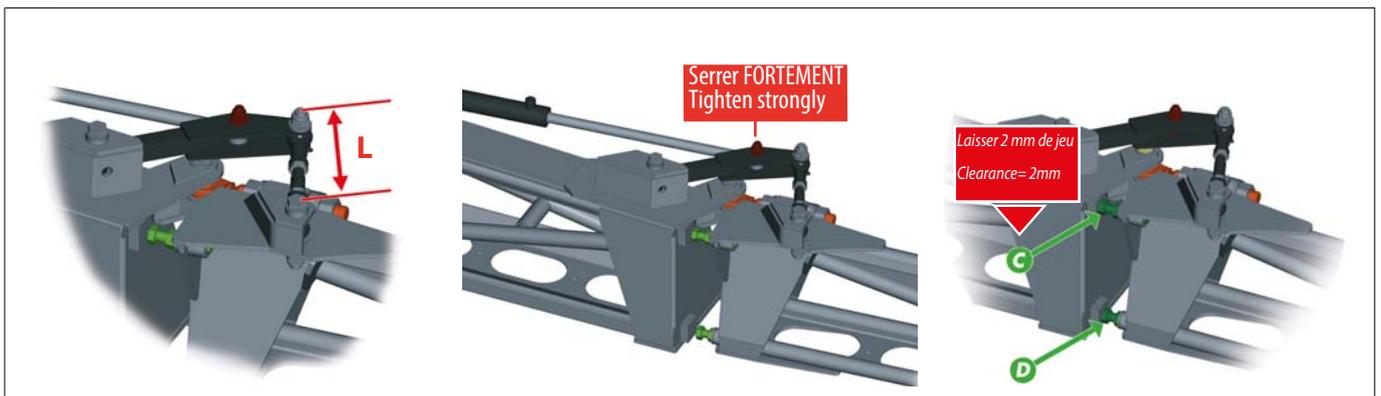
i For tightening, we recommend to use an extension bar to the end of the spanner to ensure the nuts are fully tightened.

i **IMPORTANT**
Stop (D) should be touching the other section
There should be at 2 mm gap between stop (C) and the aluminium part



- Re-attach the rod eye of cylinder to the hinge, and firmly tighten the nut
- Close the distance «L» as much as possible between the sockets on the eye bolt. Fully extend the cylinder hydraulically and then increase the distance «L» until the lower stop (D) is touching the other section

i when the stop (D) touching the other section, the stop (C) must be at 2 mm from the aluminium part



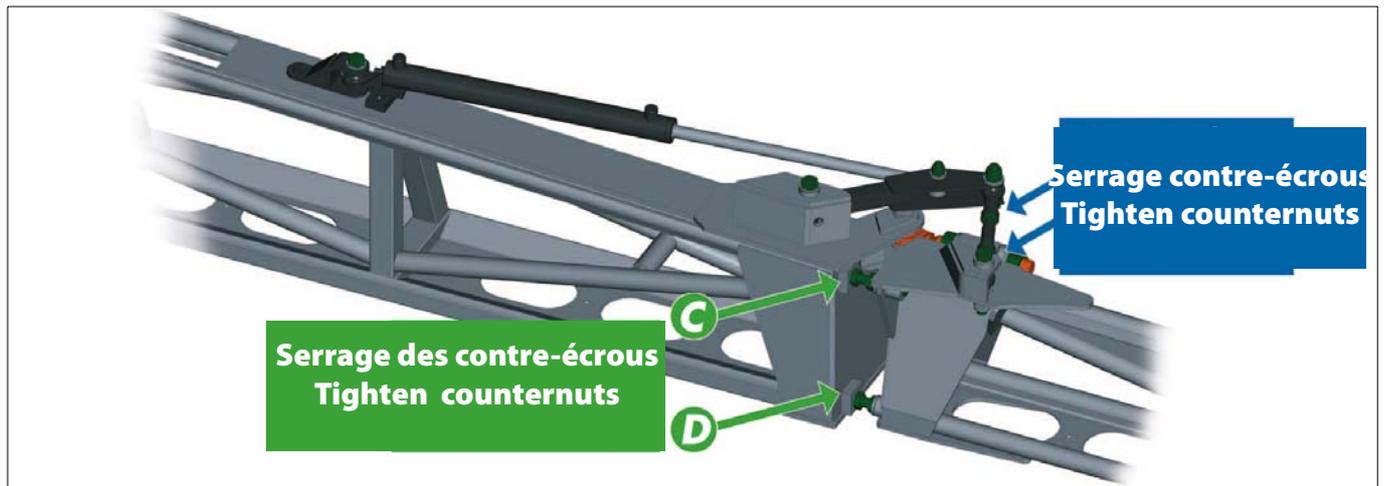
- Continue increasing the distance «L» until the stop (C) comes into contact with the other section
- Loosen the eye bolt again until you see the cylinder rod buckle slightly (This buckling corresponds to approximately 2 to 3 mm of additional stroke of the cylinder rod).

i **ATTENTION**
During this step, make sure that the cylinder is fully extended and that it does not retract when loosen the double ball joint.

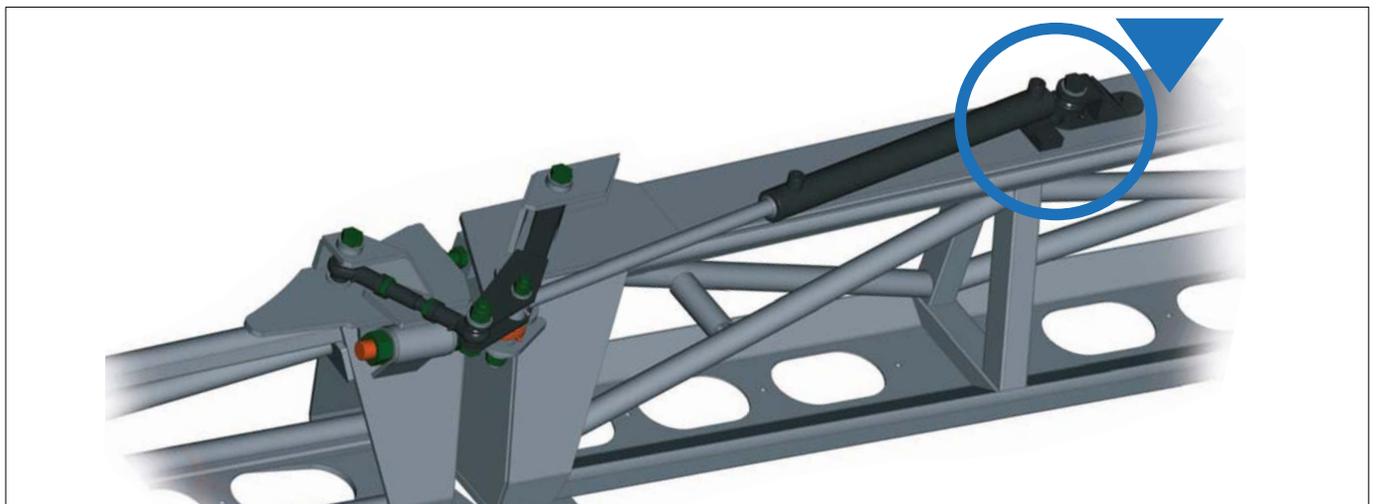
- The force of the cylinder can cause the boom slightly out of alignment - Check again whether the boom is still properly aligned
Repeat step 6 if you need to adjust the stops (C) and (D).

6 - Maintenance

When the boom is correctly aligned, firmly tighten the locknut on the stops (C) and (D) and eye bolts.



11. Remove the hydraulic hoses and loosen screws (G)
Fold the boom by hand so that the 2nd arm is in its bracket on the 1st arm.



- Tighten screw (G) until you feel it resist. This means that the screw is pushing against the cylinder rod.
- When the screw is in contact with the rod, undo it by approx. 2 or 3mm and tighten the locknut. Screw (G) adjusts the retraction stroke of the cylinder rod.

Off-Season Storage

General Info

To preserve the sprayer intact and to protect its components, the following off-season storage program is carried out.

Before Storage

When the spraying season is over, you should devote some extra time to the sprayer.

If chemical residues are left over in the sprayer for longer periods, it may reduce the life of its individual components.

1. Clean the sprayer completely - inside and outside - as described under "Cleaning" on page 130. Make sure that all valves, hoses and auxiliary equipment have been cleaned with a cleaning agent and flushed with clean water afterwards, so that no chemical residues are left in the sprayer.
2. Replace any damaged seals and repair any leaks.
3. Empty the sprayer completely, and let the pump work for a few minutes. Operate all valves and handles to drain as much water off the spraying circuit as possible. Let the pump run, until air comes out of all nozzles. The rinsing tank is also drained.

4. Protection against frost:

First complete the cleaning inside and outside the sprayer.

Pour approximately 50 litres of antifreeze mixture (e.g glycol and water), into the main tank. Include any remaining water in hidden places in the sprayer circuit in the mixture.

Depending on your winter temperatures, use the recommended mixture ratio in the table below:

Temperature (°C)	Water volume (litres)	Glycol volume (litres)
-7	10	2.5
-12	10	4.3
-20	10	6.7
-31	10	10
-40	10	12.2

Engage the pump and operate all valves and functions, operating unit, chemical inductor etc., allowing the antifreeze mixture to be distributed around the entire circuit without leaving any unmixed water in hidden places.

Unmixed water will freeze and possibly damage the sprayer's components!

Open the operating unit main valve ON/OFF and distribution valves, so that the antifreeze is sprayed through the nozzles as well. The antifreeze will also prevent O-rings, seals, diaphragms etc. from drying out.

Empty filters and boom pipes. Remember to unscrew the end plugs, as unmixed water can build up in blind pipe ends causing a risk of a broken end plug or pipe, when the boom pipes are pressurized at the next spray job.

5. Remove the glycerine-filled pressure gauges and store them frost-free in a vertical position.
6. Lubricate all lubricating points according to the lubricating intervals.
7. When the sprayer is dry, remove rust from scratches or damage in the paint, if any, and touch up the paint.
8. Apply a thin layer of anti-corrosion oil (e.g. SHELL ENSIS FLUID, CASTROL RUSTILO or similar) on all metal parts. Avoid oil on rubber parts, hoses and tyres.
9. Fold the boom into transport position and relieve pressure from all hydraulic functions.
10. All electric plugs and sockets are to be stored in a dry plastic bag to protect them against moisture, dirt and corrosion.
11. Remove the control boxes and computer display from the cabin. Store them dry and clean (indoor) in a non-condensing environment.
12. Wipe hydraulic snap couplers clean and fit the dust caps.
13. Apply grease to all hydraulic ram piston rods, which are not fully retracted in the housing, to protect against corrosion.
14. Drain air brake tank for condensed water

6 - Maintenance

After Storage

1. After a storage period, the sprayer should be prepared for the next season the following way:
2. Adjust the tyre pressure
3. Wipe off the grease from hydraulic ram piston rods.
4. Fit the pressure gauges again. Seal with Teflon tape or similar.
5. Antifreeze is drained from the tank and spray boom.
6. Fill with clean water and check all functions. Liquid test: Fill a small amount of water in the tank and circulate it around the liquid system. Spray pressure = 5 bar. Repair leaks if any. Check spray patterns.
7. Rinse the entire liquid circuit of the sprayer with clean water.
8. Check that the main tank is clean inside and close the drain valve.
9. Traffic lights are visible and in good working order. The protection glasses are clean and without damages.
10. Check all electric functions.
11. Check that the spray boom folds correctly - make adjustments if needed. Repair oil leaks if any. Check that hydraulic hoses and electric cables are in place, and that they and follow the folding movements without being damaged.
12. Sensors are in good condition and free of dirt.

Operational problems

General Info

Operational incidents are often due to the same reasons:

- A suction leakage reduces the pump pressure and may interrupt suction completely.
- A clogged suction filter may damage suction or interrupt and prevent the pump from running normally.
- A clogged pressure filter increases pressure in the fluid system in front of the pressure filter. This may blow the safety valve.
- Clogged in-line filters or nozzle filters increase pressure in the pressure gauge, but it decreases pressure at the nozzles.
- Impurities sucked in by the pump may prevent the valves from closing correctly, thus reducing the pump flow.
- A bad reassembly of the pump elements, especially the diaphragm covers, causes air intakes or leaks and reduces the pump flow.
- Rusted or dirty hydraulic components cause bad connections and early wears.
- A poorly charged or faulty battery causes failure and misbehaviour in the electrical system.

Therefore ALWAYS check that

- Suction and pressure filters, as well as nozzles, are clean.
- Hoses are free of leaks and cracks, especially suction hoses.
- Gaskets and O-rings are present and in good condition.
- Pressure gauges are in good working order. Dosage accuracy depends on it.
- Operating unit functions properly. Use clean water to check.
- Hydraulic components are clean.
- The battery and its connectors are in good condition.

7 - Repair

Spraying

FAULT	POSSIBLE CAUSES	SOLUTION
No spray from boom	Air leak on suction line	Check tightness of suction filter Check external hose connection
	Air being sucked into system	Check diaphragm pump (diaphragms, valves, valve covers) Start the sprayer pump
	Suction/pressure filter clogged	Clean the filters
Lack of pressure	Faulty fitting	Faulty safety valve (if fitted)
	Faulty pump valves (463 pump)	Check that valves are not obstructed
	Incorrect pressure reading	Check that pressure gauge is not obstructed
Pressure dropping	Filters clogged	Clean the filters and fill with clean water. If liquid is powdery, check that agitation is activated.
	Nozzles worn	Check flow rate of nozzles and replace if necessary if the difference in flow is greater than 10%
	Tank under negative pressure	Check vent is working correctly
	Sucking air towards end of tank load	Reduce pump speed
Increase in pressure	Nozzles not suitable for flow rate	Use a nozzle with a higher flow rate
Formation of foam	Air is being sucked into system	Check connectors
	Excessive agitation	Reduce pump speed
		Check safety valve (if fitted)
		Ensure returns inside tank are present
	Use foam damping additive	
Liquid leaks from bottom of pump	Pump diaphragms damaged	Replace diaphragms
Motorised valve not working or malfunctioning	Blown fuse(s)	Check operation of limit switches. Use a rust removing agent for contacts if necessary.
		Check electrical current absorbed by vacuum motor: 450-500 milli-Amperes max.
	Polarity inversion	Brown - pos. (+). Blue - neg. (-).
	Valve does not close completely	Check valve seals (obstruction)
		Check position of microswitch brackets. Loosen flange screws by 1/2 turn
No power	Wrong polarity. Check brown wire = pos. (+), blue = neg. (-). Check printed circuit welds or loose connections. Check tightening of fuse holder and fuse.	

Hydraulic functions

FAULT	POSSIBLE CAUSES	SOLUTION
No boom movements when activated	Insufficient hydraulic pressure	Check that solenoid valve is operating correctly Check/adjust hydraulic pressure
	Insufficient oil supply	Check hydraulic pump concerned
	Faulty fuse	Check/replace fuse
	Faulty distributor or by-pass	Check solenoid and connector Check distribution valve tray. Replace distribution valve if necessary.
Ram not functioning	Jet clogged	Dismantle connector and clean jet
	Faulty distribution valve	Check solenoid Check distribution valve tray
		Power supply

Transmission

FAULT	POSSIBLE CAUSES	SOLUTION
Vehicle does not move forward	Incorrect use	Check that the parking brake is disengaged. Lever in neutral.
	Electronic failure	Read the error code SD or DTC and contact technical support Check electrical circuits (connections, cables etc.)
	Hydraulic failure	Check feed pressure of transmission pump (28 bar) Check operating pressure (max 450 bar)
Travel speed too low	Incorrect use	Speed limiter positioned at 10 Speed selector positioned at fast position Gangway folded away (40 km/hr version)
	Operating faults	Read the error code(s) and contact technical support
	Electrical faults	Check retractable gangway is working correctly (position sensor)

Transmission

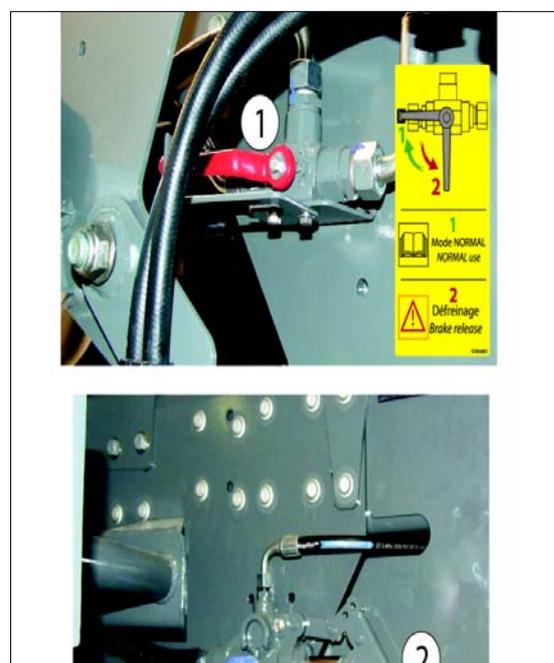
DEFAUTS	CAUSES POSSIBLES	REMEDES
Le véhicule n'avance pas	Mauvaise utilisation	Vérifier que le frein de stationnement est désengagé. Lever au point neutre.
	Défaillance électronique	Relever le code erreur SD ou DTC et contacter le service technique Vérifier les circuits électriques (connexions, câbles, etc.)
	Défaillance hydraulique	Vérifier la pression de gavage de la pompe de transmission (28 bar) Vérifier la pression de service (450 bar maxi)
Vitesse d'avancement trop faible	Mauvaise utilisation	Limiteur de vitesse enclenché Sélecteur de vitesse positionné sur la position lièvre Passerelle rétractable non fermée (version 40 km/h)
	Défauts de fonctionnement	Relever le(s) code(s) erreur(s) et contacter le service technique
	Défauts électriques	Vérifier le bon fonctionnement de la passerelle rétractable (capteur de position)
	Limitation de vitesse	Limitation de la puissance hydraulique Perte du signal du capteur de frein (version 40 km/h) Défaut sur le sélecteur de mode Défaut CAN calculateur / Afficheur multifonctions Défaut sur le moteur

Release the brake

- A. Valve in NORMAL operating mode.
- B. Valve in BRAKE RELEASE mode.

For releasing the brakes of the hydraulic motors, apply the following procedure:

- Move the security bar and put the valve handles into vertical position.
- Fit the handle on the hand pump.
- Actuate the hand pump until the brakes on motors are fully released.



7 - Repair



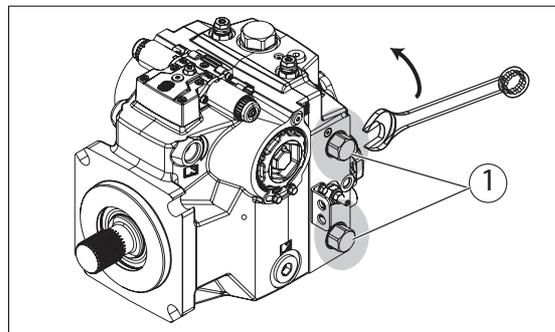
Do not continue to actuate the hand pump after the brakes have been fully released. Excessive pressure could damage the motor braking mechanism.

After towing or before starting the machine again, always engage the parking brake by turning the valve handle to a horizontal position and placing the safety bar (2) in position, as indicated in the picture (A).

Transmission pump high pressure relief valves

This operation consists of releasing the 2 high pressure valves (1) located on the transmission pump to allow free circulation of oil in the system when towing the machine.

- Loosen the 2 valves (3) by a maximum of 3 turns to allow free circulation of the oil in the hydraulic transmission.



The high pressure valves should be tightened before starting up the machine again.

Errors Messages

Transmission errors

When an operating error appears in the hydraulic transmission the an icon is displayed on the screen

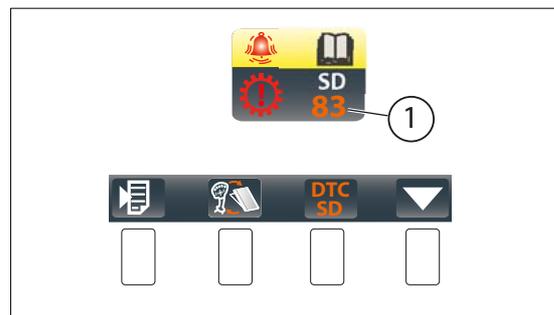


Table of SD error code

Error Codes	Description	Error Codes	Description
001	Low battery voltage		
002	Low battery voltage		
003	12V sensor low supply voltage		
004	12V sensor high supply voltage		
005	5V sensor low supply voltage		
006	5V sensor high supply voltage	200	SAPE SD: high battery voltage
007	Stack overflow	201	SAPE SD: low battery voltage
008	E2prom memory error	202	SAPE SD: 12V supply voltage sensor out of range
009	FLASH memory error	203	SAPE SD: 5V supply voltage sensor out of range
010	RS232 memory error	204	SD SAPE : E2prom
011	CAN bus connection error		
012	Current return protection	200	SmartDrive Auto Slave error - Regulation PWM 1
020 to 045	Internal system error	201	SmartDrive Auto Slave error - Régulation PWM 2
051	MAF loading error	202	SmartDrive Auto Slave error - Régulation PWM 3
052	Inconsistent key	203	SmartDrive Auto Slave error - Régulation PWM 4
053	Inconsistent MAF	206	SmartDrive Auto Slave error - Voltage battery too low
054	Inconsistent input/output	207	Erreur sur le SmartDrive Auto Esclave - Voltage battery too high
055	Error in sensitive parameter	156	Selector mode error. 2 modes engaged simultaneously
056	SDPHASE code error	172	Transfer function error : non-increasing curve
057	Checksum error	184	Steering CAN bus error
058	Min/Max error in parameter	197	Configuration error of the system
59	Unit not compatible	204	SmartDrive Auto Slave error - Régulation PWM 5
61	Difference between entre RAM and EEPROM	205	SmartDrive Auto Slave error - Régulation PWM 6
070	Loop error	208	SmartDrive Auto Slave error - Voltage battery too low
071	PWM2 current loop error	209	SmartDrive Auto Slave error - Voltage battery too high
72	PWM3 current loop error	210	SmartDrive Auto Slave error - 5 VDC sensor too low
73	PWM4 current loop error	211	SmartDrive Auto Save error -T5 VDC sensor too high
080	Brake pressure sensor signal out of range	212	SmartDrive Auto Slave error- Current return protection
083	CAN bus communication error: signal not received	235	SD SAPE : communication CAN bus
084	High pressure sensor signal out of range	236	SD SAPE : battery voltage too high
85	SmarDrive Auto error "slave" : Configuration	237	SD SAPE : battery voltage too low
91	Pédal error signal - Translation	238	SD SAPE : 12 V supply voltage sensor out of range
92	Joystick sensor error	239	SD SAPE : 5 V supply voltage sensor out of range
97	Selector mode error	240	SD SAPE : memory error
102	Tranmission overheating error	241	SD SAPE : DAC valve error
115	Communication CAN bus with the engine error	242	SD SAPE : I2C bus error
124	CAN error from the display. Missing signal	243	SD SAPE : CAN bus communication error

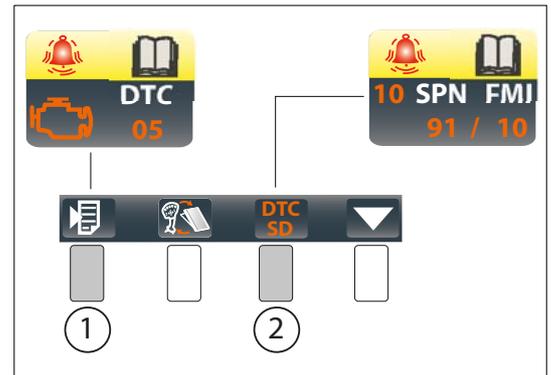
7 - Repair

Error Codes	Description	Error Codes	Description
133	CAN bus error- from SmartDrive Auto 'slave'. Missing signal	244	SD SAPE : checksum parameter error
136	Speed sensor error (overspeed)	245	SD SAPE : Min/Max parameter error
153	Supply voltage error between the machine and software	246	SD SAPE : Front left speed sensor error
247	SD SAPE : Front left speed sensor error	252	SD SAPE : Rear left valve error
248	SD SAPE : Rear left speed sensor error	253	SD SAPE : Rear right valve error
249	SD SAPE : Rear right speed sensor error	254	SD SAPE : Front curve sensor error
250	SD SAPE : Front left valve error	255	SD SAPE : Rear curve sensor error
251	SD SAPE : Front right valve error		

Engine Errors Codes

When an operating fault appears, the error code is displayed on the screen

- Press the button (1) and navigate until the DTC menu appear
An icon indicates the number of errors.
- Press the button (2) to display the SPN and FMI error code of the engine



7 - Repair

Engine codes errors

SPN	Component / Location	Description (Error location)	FMI
29	Hand throttle	Cable break or short circuit, signal implausible compared to signal of idle sensor	2,3,4,11
84	Vehicle speed signal	Speed above target range, signal missing or implausible	0,8,12,14
91	Accelerator pedal	Cable break or short circuit, signal implausible compared to signal of idle sensor (analog pedal)	2,3,4,11
91	Accelerator pedal	Cable break or short circuit, bad PWM signal range or frequency (digital pedal)	2,8
91	Accelerator pedal	Bad PWM pulse-width repetition rate (digital pedal)	8,11
94	Fuel low pressure sensor	Cable break or short circuit	3,4,11
94	Fuel low pressure	Below target range with system reaction	2,11
97	Fuel filter water level sensor	Cable break or short circuit	3,4,11
97	Water level in fuel filter	Above target range	11,12
100	Oil pressure sensor	Cable break or short circuit	0,2,3,4
100	Oil pressure sensor	Pressure value implausible low	1,11
100	Oil pressure	Above target range	0,11
100	Oil pressure	Below target range	1,11
102	Charge air pressure sensor	Cable break or short circuit	2,3,4
102	Charge air pressure	Outside target range with system reaction	2,11
105	Charge air temperature sensor	Cable break or short circuit	2,3,4,11
105	Charge air temperature	Outside target range with system reaction	0,11
107	Air filter condition	Pressure loss above target range with system reaction	0,11
108	ECU internal error	Ambient pressure sensor defective	2,3,4,11
110	Coolant temperature sensor	Cable break or short circuit	2,3,4
110	Coolant temperature	Outside target range with system reaction	0,11
111	Coolant Level	Outside target range with system reaction	1,11
157	Rail pressure sensor	Cable break or short circuit	3,4,11
157	Rail pressure sensor	Deviation of signal during start or after-run above target range	0,1,11
158	Terminal 15	Ignition ON not detected	11,12
168	Battery	Voltage below target range	0,1,11
168	Battery voltage	Above target range with system reaction	2,11
174	Fuel temperature sensor	Fuel temp. sensor: Cable break or short circuit	3,4,11
174	Fuel temperature	Above target range with system reaction	0,11
175	Oil temperature sensor	Cable break or short circuit	2,3,4
175	Oil temperature	Below target range with system reaction	0,11
190	Engine speed sensor	Engine running with cam-shaft speed signal only	11,12
190	Engine speed sensor	Speed signal from cam-shaft bad or missing	8,11,12
190	Engine speed sensor	Speed signals from crank-shaft bad or missing	8,11,12
190	Engine speed sensor	Speed signals of crank-shaft and cam-shaft are phase-shifted	2,11
190	Overspeed	Engine over-speed with system reaction	0,11
190	Overrun conditions	Overrun conditions with system reaction	11,14
520	CAN message	Missing (message "TSC1-TR")	11,12
563	Main relay	Short circuit to ground or emergency shut-off (relay 3)	7,11,12
624	Diagnostic lamp	Cable break or short circuit, disabled by ECU	2,3,4,5
630	ECU internal error	EEPROM memory access	11,12
639	CAN bus off-state	Cable break or short circuit, off-state (CAN bus A)	11,14

SPN	Component / Location	Description (Error location)	FMI
651	Single injector	Short circuit (injector 1)	3, 4, 11, 13
651	Single injector	Cable break (injector 1)	5, 13
652	Single injector	Short circuit (injector 2)	3, 4, 11, 13
652	Single injector	Cable break (injector 2)	5, 13
653	Single injector	Short circuit (injector 3)	3, 4, 11, 13
653	Single injector	Cable break (injector 3)	5, 13
654	Single injector	Short circuit (injector 4)	3, 4, 11, 13
654	Single injector	Cable break (injector 4)	5, 13
655	Single injector	Short circuit (injector 5)	3, 4, 11, 13
655	Single injector	Cable break (injector 5)	5, 13
656	Single injector	Short circuit (injector 6)	3, 4, 11, 13
656	Single injector	Cable break (injector 6)	5, 13
657	Single injector	Short circuit (injector 7)	3, 4, 11, 13
657	Single injector	Cable break (injector 7)	5, 13
658	Single injector	Short circuit (injector 8)	3, 4, 11, 13
658	Single injector	Cable break (injector 8)	5, 13
676	Air heater relay	Cable break or wrong connection	4, 11
676	Air heater relay	Inoperable during shut-off	2, 5, 11
677	Start relay	Start relay (high side): Short circuit	3, 4, 11
677	Start relay	Start relay (low side): Cable break or short circuit, disabled by ECU	3, 4, 5, 11
701	Reserve output	Short circuit to Ubatt (output 1)	11
701	Reserve output	Short circuit to ground (output 1)	11
701	Reserve output	Cable break or ECU internal error (output 1)	11
702	Reserve output	Short circuit to Ubatt (output 2)	11
702	Reserve output	Short circuit to ground (output 2)	11
702	Reserve output	Cable break or ECU internal error (output 2)	11
703	Engine operating signal lamp	Cable break or ECU internal error	2, 3, 4, 5
704	Coolant temperature warning lamp	Cable break or short circuit	11
705	Oil pressure warning lamp	Cable break or short circuit	2, 3, 4, 5
729	Air heater relay	Cable break or short circuit	3, 4, 5, 11
730	Air heater magnetic valve	Cable break or short circuit	3, 4, 5, 11
898	CAN message	Missing (message "TSC1-TE")	11, 12
923	Engine power output	Engine power output: Cable break or short circuit	2, 3, 4, 5
975	Fan actuator	Fan actuator: Cable break or short circuit	2, 3, 4, 5
1072	Engine brake (internal)	Internal engine brake: Cable break or short circuit	3, 4, 5, 11
1074	Engine brake flap actuator	Engine brake flap actuator: Cable break or short circuit	3, 4, 5, 11
1079	ECU internal error	Wrong voltage of internal 5V reference source 1	3, 4, 11
1080	ECU internal error	Wrong voltage of internal 5V reference source 2	3, 4, 11
1081	Preheating signal lamp	Cable break or short circuit	2, 3, 4, 5
1109	Shut-off request	Shut-off request ignored by operator	2, 11
1231	CAN bus off-state	Cable break or short circuit, off-state (CAN bus B)	11, 14
1235	CAN bus off-state	Cable break or short circuit, off-state (CAN bus C)	11, 14
1237	Override switch	Switch hangs	2, 11

7 - Repair

SPN	Component / Location	Description (Error location)	FMI
1322	Multiple cylinders	Misfire detected	11,12
1323	Single cylinder	Misfire detected (cylinder 1)	11, 12
1324	Single cylinder	Misfire detected (cylinder 2)	11, 12
1325	Single cylinder	Misfire detected (cylinder 3)	11, 12
1326	Single cylinder	Misfire detected (cylinder 4)	11, 12
1327	Single cylinder	Misfire detected (cylinder 5)	11, 12
1328	Single cylinder	Misfire detected (cylinder 6)	11, 12
1346	Misfire	Misfire detected with system reaction	0, 11
1450	Single cylinder	Misfire detected (cylinder 7)	11, 12
1451	Single cylinder	Misfire detected (cylinder 8)	11, 12
1638	Customer-specific sensor	Cable break or short circuit (sensor 2)	3, 4, 11, 12
1638	Customer-specific temperature	Outside target range with system reaction (temperature 2)	2, 11
2634	Main relay	Short circuit to Ubatt (relay 1)	3, 11
2634	Main relay	Short circuit to ground (relay 1)	4, 11
2634	Main relay	Short circuit to ground or emergency shut-off (relay 2)	7, 11, 12
2634	Main relay	Short circuit to ground or emergency shut-off (relay 3)	7, 11, 12
2791	EGR actuator (external)	Short circuit to Ubatt	3, 11
2791	EGR actuator (external)	Short circuit to ground	4, 11
2791	EGR actuator (external)	Cable break or ECU internal error	2, 5, 11
2791	EGR actuator (external)	Cable break or short circuit	2, 3, 4, 5
523212	CAN message	Missing (message "EngPrt" = engine protection)	11, 12
523216	CAN message	Missing (message "PrHtEnCmd" = Preheat and engine command)	11, 12
523218	CAN message	Missing (message "RxCCVS" = cruise control)	11, 12
523222	CAN message	Missing (message "TCO1" = speedo signal)	11, 12
523238	CAN message	Missing (message "SwtOut" = switch outputs)	11, 12
523239	CAN message	Missing or value abote target range (message "DecV1" = pseudo pedal)	2, 12
523240	CAN message	Missing (message "FunModCtl" = function mode control)	11, 12
523350	Multiple injectors	Short circuit (cylinder bank 1)	3, 4, 11, 13
523351	Multiple injectors	Cable break (cylinder bank 1)	5, 13
523352	Multiple injectors	Short circuit (cylinder bank 2)	3, 4, 11, 13
523353	Multiple injectors	Cable break (cylinder bank 2)	5, 13
523354	ECU internal error	Injector power stage A	2, 3, 12, 14
523355	ECU internal error	Injector power stage B	12
523370	Rail pressure	Compression test active: Rail-pressure monitoring is going to be disabled	11, 14
523420	ECU internal error	Watchdog counter exceeds maximum	11, 14
523450	Multi state switch	Cable break or short circuit, input voltage outside target range (switch 1)	2, 3, 4, 11
523451	Multi state switch	Cable break or short circuit, input voltage outside target range (switch 2)	2, 3, 4, 11
523452	Multi state switch	Cable break or short circuit, input voltage outside target range (switch 3)	2, 3, 4, 11
523470	Rail pressure limiting valve	Opening failure	2, 11, 12, 14
523470	Rail pressure limiting valve	Opening failure with system reaction	11, 12
523490	ECU internal error	Redundant shut-off conditions detected	3, 4, 11, 12
523500	CAN message	Time-out of at least one sended message	11, 12

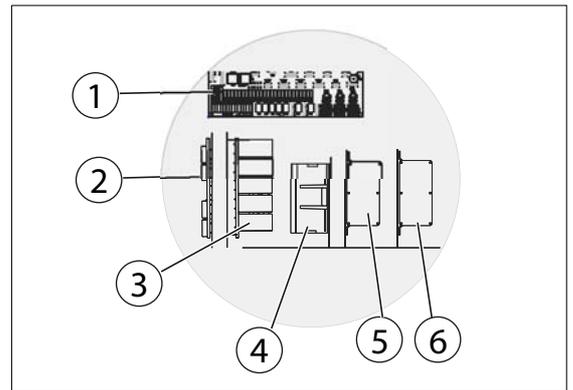
SPN	Component / Location	Description (Error location)	FMI
523550	Terminal 50	Engine start switch hangs	11, 12
523550	ECU internal error	Time processing unit (TPU) defective	2, 11
523561	Begin of injection period	Outside target range or missing (cylinder 1)	2
523562	Begin of injection period	Outside target range or missing (cylinder 2)	2
523563	Begin of injection period	Outside target range or missing (cylinder 3)	2
523564	Begin of injection period	Outside target range or missing (cylinder 4)	2
523565	Begin of injection period	Outside target range or missing (cylinder 5)	2
523566	Begin of injection period	Outside target range or missing (cylinder 6)	2
523567	Begin of injection period	Outside target range or missing (cylinder 7)	2
523568	Begin of injection period	Outside target range or missing (cylinder 8)	2
523600	ECU internal error	Serial communication interface defective	11, 12
523601	ECU internal error	Wrong voltage of internal 5V reference source 3	3, 4, 11
523602	Fan speed	Above target range with system reaction	2, 11
523604	CAN message	Missing (message "RxEngTemp" = engine temperature)	11, 12
523605	CAN message	Missing (message "TSC1-AE")	11, 12
523606	CAN message	Missing (message "TSC1-AR")	11, 12
523607	CAN message	Missing (message "TSC1-DE")	11, 12
523608	CAN message	Missing (message "TSC1-DR")	11, 12
523609	CAN message	Missing (message "TSC1-PE")	11, 12
523610	CAN message	Missing (message "TSC1-VE")	11, 12
523611	CAN message	Missing (message "TSC1-VR")	11, 12
523612	ECU internal hardware monitoring	A recovery occurred which is stored as protected	11, 14
523612	ECU internal hardware monitoring	A recovery occurred which is not stored	11, 14
523612	ECU internal hardware monitoring	A recovery occurred which is visible in the error memory	11, 14
523612	ECU internal hardware monitoring	Overvoltage	3, 11
523612	ECU internal hardware monitoring	Undervoltage	4, 11
523613	Rail pressure	Positive deviation (speed dependent) outside target range	0, 11
523613	Rail pressure	Positive deviation (flow dependent) outside target range (=> Leakage!)	0, 11
523613	Rail pressure	Negative deviation (flow dependent) outside target range	0, 11
523613	Rail pressure	Negative deviation (speed dependent) outside target range	1, 11
523613	Rail pressure	Pressure above target range	0, 11
523613	Rail pressure	Implausible (leakage, injector needle blocked in open position)	2, 11
523615	Metering unit valve	Flow rate outside target range	3, 4, 11
523615	Metering unit valve	Not connected or output disabled	5, 11, 12
523615	Metering unit valve	Short circuit to Ubatt	11, 12
523615	Metering unit valve	Short circuit to ground	11, 12
523617	ECU internal error	Communication with chip CJ940 disturbed	11, 12
-	Customer-specific sensor	Cable break or short circuit (sensor 1)	2, 3, 4, 11
-	Customer specific temperature	Outside target range with system reaction (temperature 1)	2, 11

7 - Repair

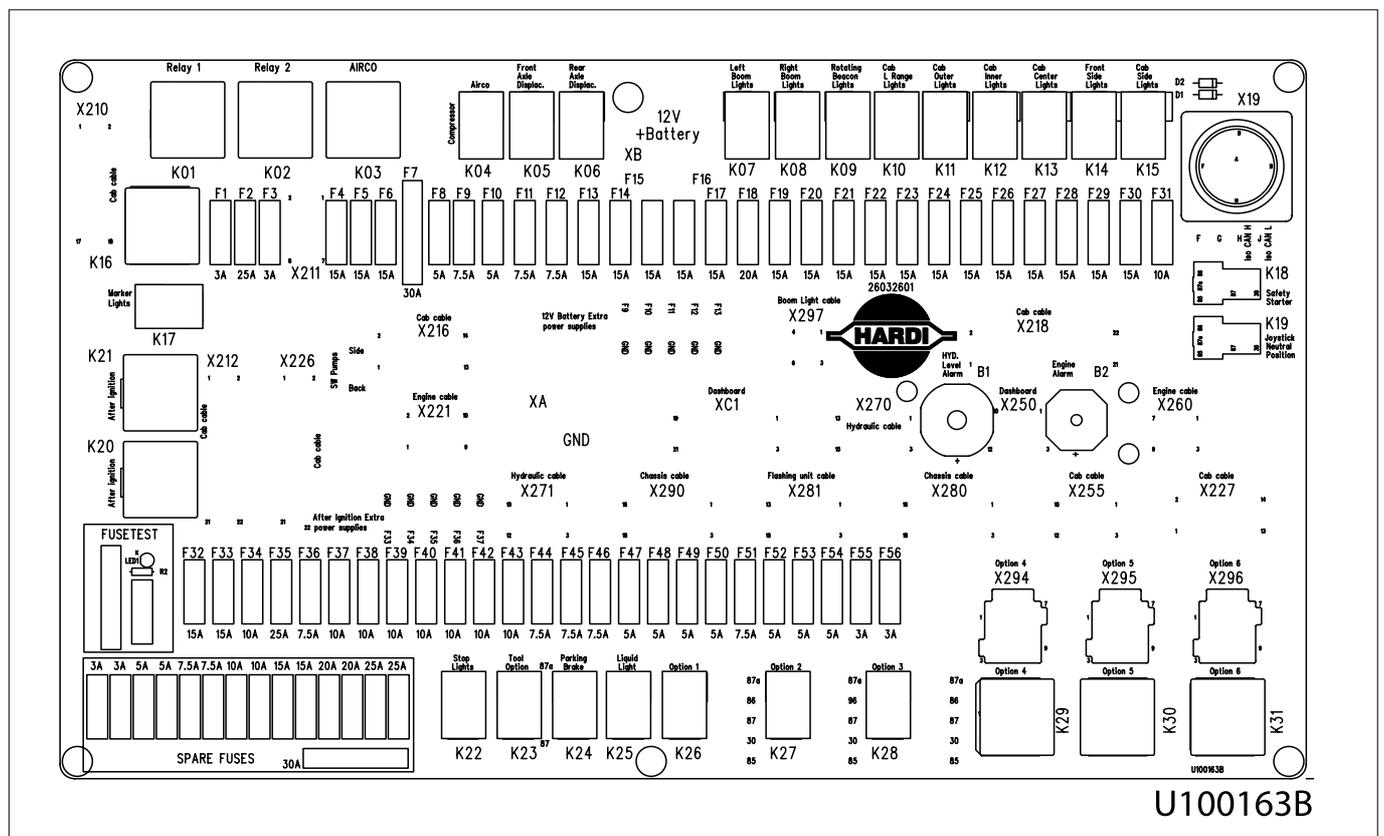
Location of main components

The main control unit are located in the cab under the driver's seat.

1. Main circuit fuses and relays.
2. Retractable gangway control system.
3. 4-wheel drive control system (4RD version).
4. Flashing indicator unit.
5. Hydraulic controller (master).
6. Hydraulic controller (extended).



Main circuit fuses and relays.



Code		Description	Code	Amp. (A)	Description
F1	3.0	not used	F29	15.A	front side cabin lights
F2	10 A	side lights/backlighting	F30	15 A	starter contactor
F3	3 A	12V BAT - ceiling	F31	10 A	starter solenoid
F4	15 A	flasher unit - control	F32	15 A	dipped beam
F5	15 A	not used	F33	15 A	main beam headlights
F6	15 A	not used	F34	10 A	work area lighting (optional)
F7	30 A	12V BAT - air conditioning	F35	25 A	windscreen washer pump - windscreen wipers
F8	5 A	12V BAT - car radio	F36	7.5 A	acoustic alarm
F9	7.5 A	rear view mirrors	F37	10 A	12 V after ignition - 4-wheel steering
F10	5 A	air conditioning compressor	F38	10 A	12 V after ignition - optional
F11	7.5 A	front hydraulic motor capacity	F39	10 A	12 V after ignition - optional
F12	15 A	rear hydraulic motor capacity	F40	10 A	12 V after ignition - adjustable track width VTK only
F13	15 A	12V BATT -Trimble CFX750- optional	F41	10 A	12 V after ignition - Off-Road unit
F14	15 A	12V BATT - AutoHeight control- optional	F42	10 A	road- parking - 4-wheel drive standard mode
F15	15 A	12V BATT - adjustable track width VTK only- optional	F43	5.0 A	brake lights
F16	15 A	12V BATT - adjustable track width controller VTK only	F44	7.5 A	12 V after contact with SD module- input 1
F17	15 A	12V BATT - optional	F45	7.5 A	permanent 12 V battery - HC9500 console
F18	20 A	flasher unit	F46	7.5 A	12 V after contact with SD module- input 2
F19	15 A	boom ligts 1 and 2 (HC9500 only)	F47	5 A	not used
F20	15 A	boom ligts 3 and 4 (HC9500 only)	F48	5 A	Footbridge control
F21	15 A	hazard lights	F49	5 A	brake pressure - hydraulic level - alarms
F22	15 A	cigarette lighter - 12V sockets	F50	5 A	hydraulic oil level alarm
F23	15 A	seat compressor unit	F51	7.5 A	12 V after ignition - engine error reversing buzzer
F24	15 A	not used	F52	5 A	12 V after ignition - 'CANCOCKPIT' console-HC9500
F25	15.0 A	right front cabin lights	F53	5 A	12 V after ignition - right and left direction indicator
F26	15 A	left rear cabin lights	F54	5 A	12 V after ignition - cabin switches
F27	15 A	not used	F55	3 A	12 V after ignition - air conditioning and car radio
F28	15 A	front cabin lights	F56	3 A	12 V after ignition - J1939 diagnostic socket



Always use the appropriate fuse listed in this table

Relays	Description	Relays	Description
K01	not used (F5)	K16	not used
K02	not used (F6)	K17	backlighting - side lights
K03	air conditioning power	K18	engine starter control
K04	air conditioning compressor	K19	forward handle neutral position
K05	front hydraulic motor capacity	K20	after ignition control circuit
K06	rear hydraulic motor capacity	K21	after ignition control circuit
K07	boom ligts 3 and 4 (HC9500 only)	K22	BRAKE lights
K08	boom ligts 1 and 2 (HC9500 only)	K23	ROAD mode
K09	hazard lights	K24	parking brake
K10	not used	K25	work area lighting (optional)
K11	right rear cabin lights	K26	not used
K12	left rear cabin lights	K27	not used
K13	not used	K28	Diff-Lock control (optional)
K14	front cabin lights		
K15	front cabin side lights		

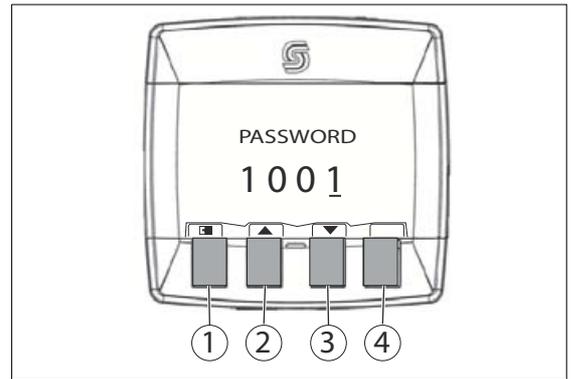
7 - Repair

Multifunction display

To access to the diagnosis menu:

- Press simultaneously during **3 sec** the buttons **(1)** and **(2)**
- Enter the password by pressing the buttons **(1)** and/or **(4)** :

Password : **1 0 0 1**



CAN 0 Engine CAN bus

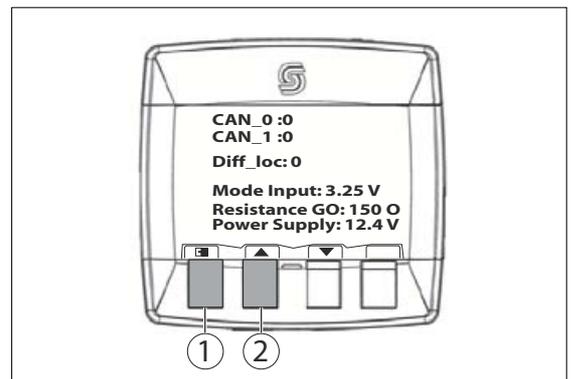
CAN_1 Smart Drive CAN bus

DiffLock

- 0** pedal released
- 1** pedal pressed

Input mode : Analog signal of the speed selector

Parking **0.25 v - 1.15V**



function	Typical signal (V)	Rangel (V)
Short-circuit5 V	0.7	0.25 -1.15
Parking	0.7	0.25 -1.15
Dowhill	1.6	1.15 - 2.00
Uphill	2.50	2.00 - 2.95
Field	3.40	2.95 - 3.85
Automotive	4.30	3.85 - 4.75
Short-circuit 0V		0.00 - 0.25

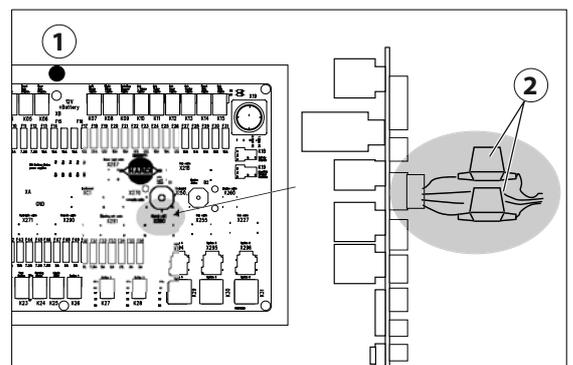
Resistance GO : Fuel gauge resistance

- 0** short-circuit
- 1 - 200** operating range
- 65535** cable break

Side Lights Fuses

Two fuses are located to the rear of the main PCB to protect side lights circuit

- Loosen the screw (1) and tilt the main PCB.
- Check and replace if necessary the fuse (7.5 A).



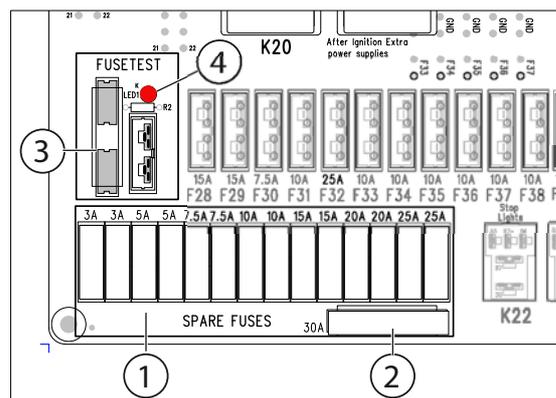
i Spare fuses are available on the main PCB.

i NOTE! Always use a correct fuses rating.

Fuses Test

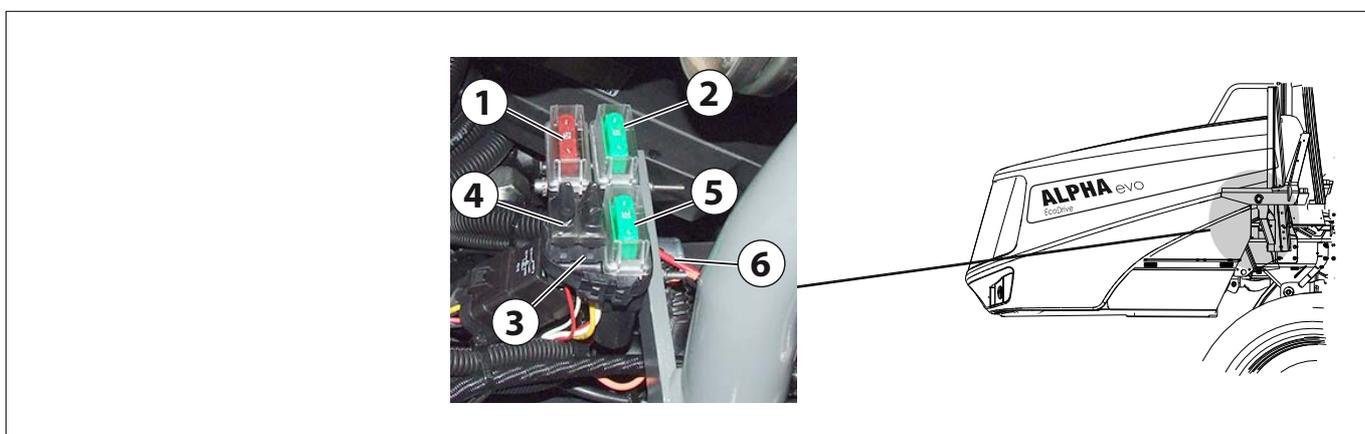
The PCB is equipped with «Autofuse» fuses (1) and «Maxifuse» fuse (2).

- Take off the fuse to be tested and put it in the test fuse holder. If the indicator (4) light up, this means that the fuse is not blown.



Engine and JobCom fuses

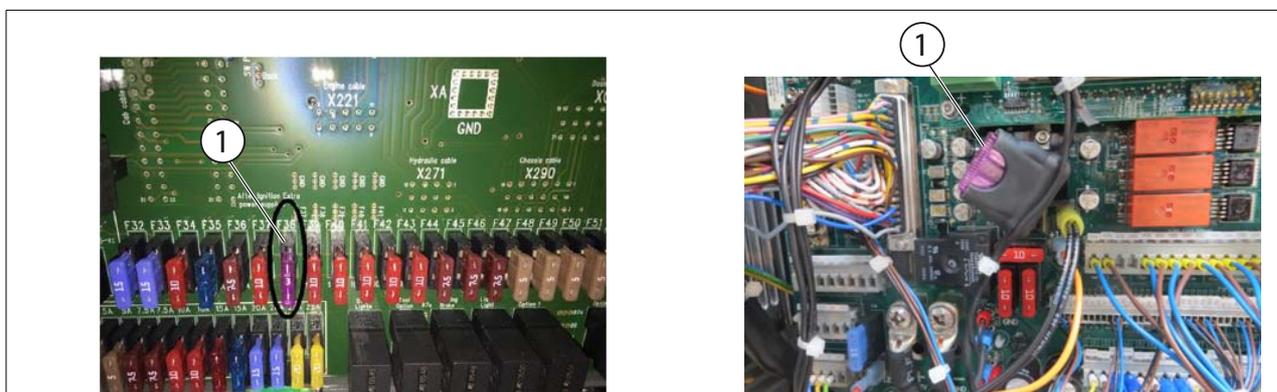
This fuses are located at the left hand side of engine compartment



N°	I (A)	Description	N°	I (A)	Description
1	50	JOB COM (blue / brown)	4	15	NoX 12V AI 12V 46/1
2	30	SCR AdBlue 12V perm.	5	30	EMR 12V 12V EMR
3	10	EGR 12V AI 12V 23/38	6	10	Not used 12V perm. (orange)

Air compressor fuse

This fuse is located either the JobCom box or the fuses board of the cabin. It concern only sprayers equipped with an air compressor driven by a hydraulic motor



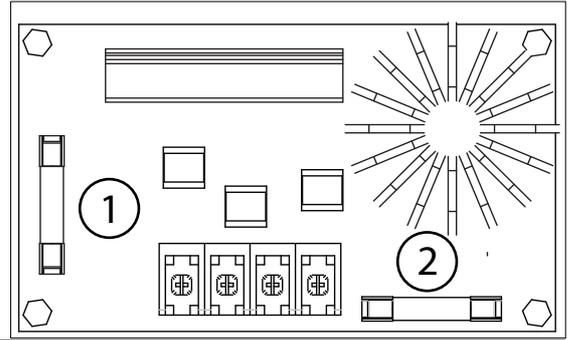
Fuse (1) = 3 Amp. F38 on fuses board or on the JobCom box

7 - Repair

JobCom with PrimeFlow

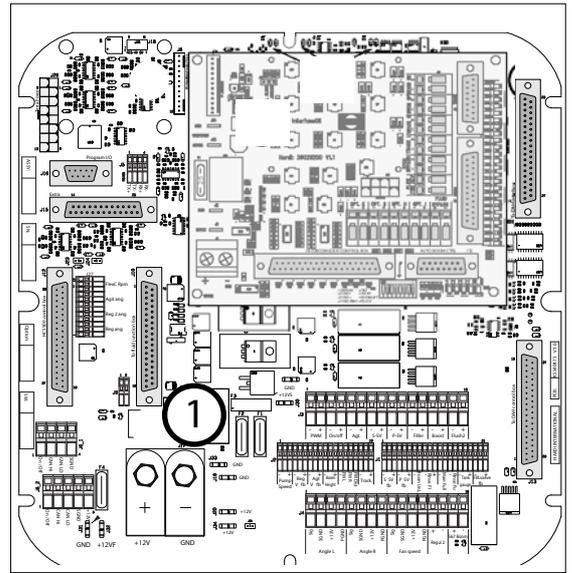
The converter has two fuses:

1. 30AT F2 / 32V
2. 10AT F1 / 32V, Hardi P/N 26023500



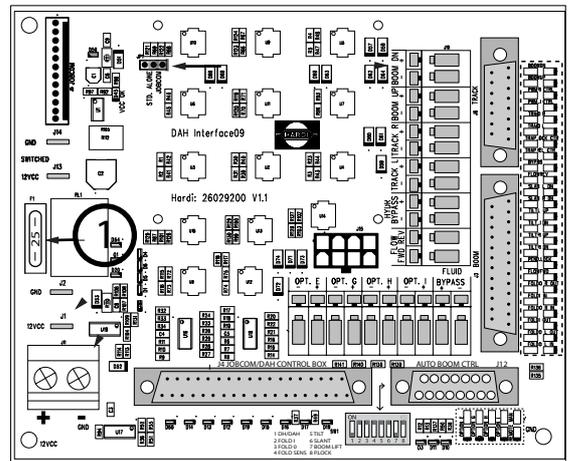
JobCom connections

1. 10A blade fuses for TWIN actuators left and right



Direct Activated Hydraulic, DAH, PCB #93 connections

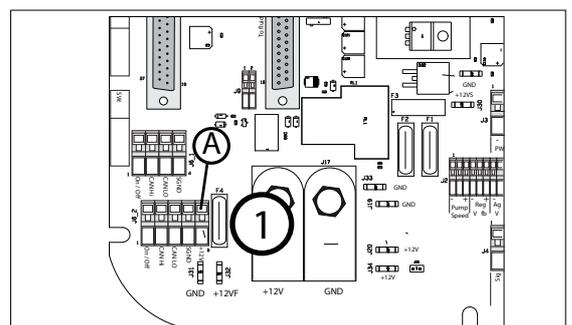
1. Fuse: 1x25AT ATO blade fuse



Optional Power Supply connection, out

Main power supply connector connection

1. Spade are protected by the fuses F3 and F4 (1)



Lightening

Highlights

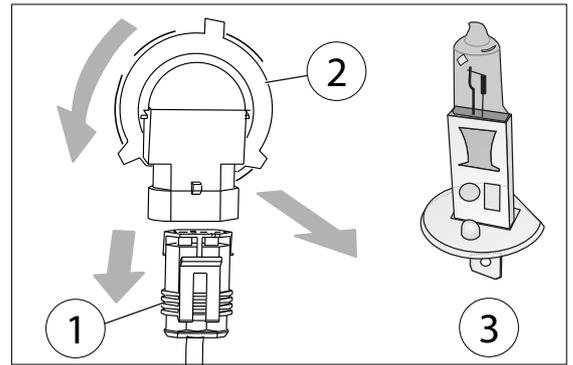
A. Replace the halogen lights bulb:



ATTENTION! Before changing the bulb, make sure the unit is turned off and wait until the lamp is completely cooled if you do not want to burn yourself.

- Disconnect the connector (1).
- Turn the lamp holder (2) counter-clockwise.
- Replace the halogen bulb.

Halogen bulb type: H1 - 12V - 55W.



NOTE! Never touch the halogen lamp directly with the fingers, but hold it with a cloth.

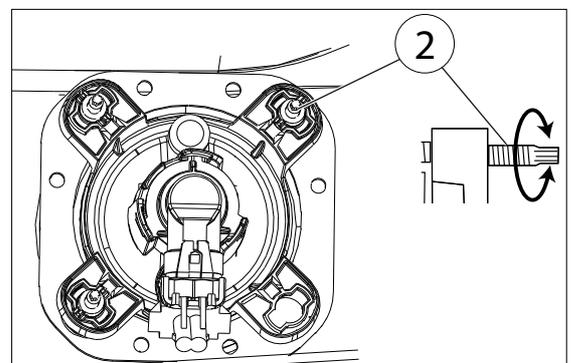
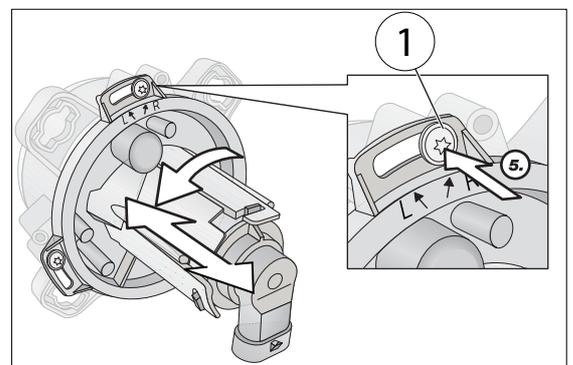
B. Adjusting the projector

When you need to replace a projector, make sure it is designed according to the direction of traffic, right for most countries, or left for other countries⁽¹⁾

L : Left-hand traffic.

R : Right-hand traffic

1. Traffic direction screw.
2. Light beam adjustment screw.



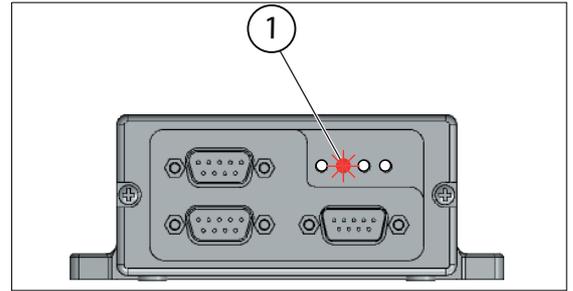
1. United kingdom, South Africa Australia, etc..).

7 - Repair

Hydraulic Track Axle

Angular sensor faulty

If an angular sensor is faulty, the red light (1) turns on.

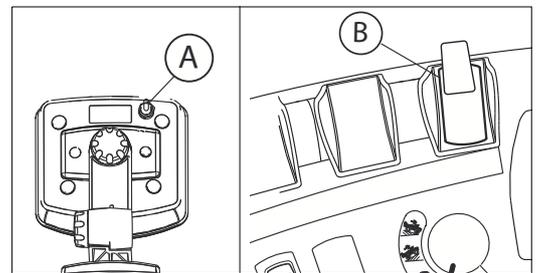


Calibrating the angular sensor stops

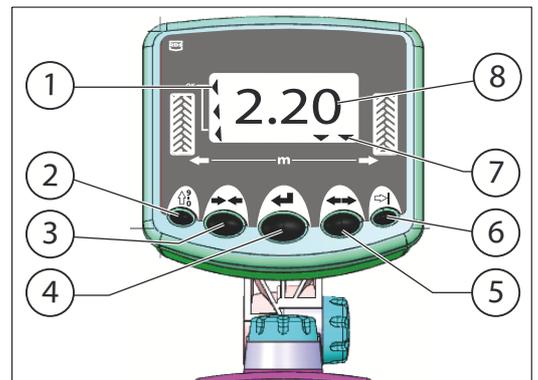
After replacing an angular sensor, it is necessary to recalibrate the control unit, indicating the range of the sensor

i Before starting this procedure, make sure that the engine is running and the control unit is off.

1. Press the switch (A) to power the display.



2. Press and hold the buttons (3) and (5) and power on the control unit, the status indicator (7) flashes for a few seconds, then release the buttons
3. Drive the machine between 2 and 12 kph.
4. Press the button (3) to get the minimum track width.
5. Press and hold the button (3) and press the button (4) until the status indicator (7) goes out, then release the buttons (3) and (4). The sensor position for minimal track is saved.
6. Press the button (5) to get the maximum track width.
7. Press and hold the button (5) and press the button (4) until the status indicator (7) goes out, then release the buttons (4) and (5). The sensor position for maximal track is saved.
8. Press the switch (B) to turn off the control unit then power on it again.

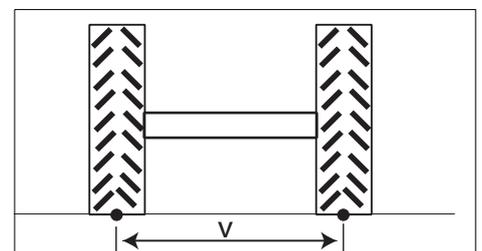


i During the sensors calibration, hazard warning lights up, and turn off when minimum or maximum position is reached. If the procedure is failed, the warning lights stay on.

Track Width Calibration

The control unit is calibrated according to the wheels installed on your machine. If the wheels are changed it is necessary to recalibrate the system, so that the track width displayed truly corresponds to that of the sprayer.

1. Press and hold the buttons (2) and (6) to enter in calibration mode. The message 'U1' is displayed briefly, then signal from control unit is displayed.
2. Press and hold the button (3) to get the minimum track. Measure and note the value (V).
3. Press the button (4), the message «d1» appear briefly.



4. Press the button (2) to scroll the first digit.
5. Press the button (6) to move the cursor to the 2nd digit.
6. Press the button (4), the message «U2» is displayed briefly, then signal from control unit is displayed
7. Press and hold the button (5) to get the minimum track. Measure and note the value (V).
8. Press the button (4), the message «d2» appear briefly
9. Press the button (2) to scroll the first digit.
10. Press the button (6) to move the cursor to the 2nd digit.
11. Press the button (4) to exit the calibration menu.

7 - Repair

Cabin

Diagnostic

Diagnostic mode

The ATC will be provided with a diagnostic procedure in order to perform some checks on the control led devices.

The ATC goes on diagnostic mode by pressing simultaneously the  et  buttons (during power on of the ATC) with the blower speed knob in «OFF» position and temperature knob on «LO» position

On the display appear the software version (sequence of four data) for about 10 seconds)

Subsequently is visualized the mixed air temperature value.

The initial configuration is the following:

- AC blower speed off
- Water valve position fully close
- AC compressor off
- Flap in air fresh position
- Auxiliary fan off

In diagnostic mode the «AUTO» symbol is flashing and the hour meter is not update

To exit diagnostic mode, it is necessary to switch off the ATC

When the one of these sensors:

- Outside air temperature sensor
- Mixed air temperature sensor
- Inside air temperature ventilated sensor
- anti-icing temperature sensor

are wrong (open circuited or short circuited), on the display appears an error code (E1 to E8)

Temperature sensor	Anomalies	Error Code
Outside temperature sensor	Not connected or opened	E1
	Short-circuited	E2
Inside air temperature	Not connected or opened	E3
	Short-circuited	E4
Mixed air temperature	Not connected or opened	E5
	Short-circuit	E6
Anti-ice temperature	Not connected or opened	E7
	Short-circuit	E8

Mixed air temperature sensor control

Normally is visualized the mixed air temperature value

The symbol  is off

Outside temperature sensor control

Press the  button on the display appear the value of the outside temperature for 5 seconds

The symbol  is lit when the outside temperature is visualized

Inside temperature sensor control

Press the  button when is visualized the outside temperature on the display appear the value of the inside temperature

The symbol  is flashing when the inside temperature is visualized

Anti-icing temperature sensor control

Every time that the button  is pressed, the anti-icing value temperature is visualized for 5 seconds

The symbol  is off

The symbol  is on

Pressure switch control (differential pressure sensor)

When the pressure switch is close the light  is on



Water valve control

The temperature knob can assume 13 different positions knob position following opening rate of the valve

Temperature knob	Position	Valve position [%]	position	Valve Position [%]
	0	0	7	35
	1	5	8	45
	2	10	9	55
	3	15	10	65
	4	20	11	75
	5	25	12	99,5
	6	30		

During the temperature knob rotating on display appear the water valve position [%] and it is flashing.

When the valve is fully open on display appear 99.5%

The symbols  and  are off.

AC blower speed control

The blower speed knob can assume 10 different position

- OFF (speed = 0)
- AUTO (speed = 0)
- 1 à 8 manual speed

Bouton de ventilation	Position	Niveau ventilation [%]	position	Niveau ventilation [%]
	1	0	5	50
	2	34	6	59
	3	38	7	71
	4	42	8	100

7 - Repair

Compressor control

Every time that the  button is pressed, the AC output change the state
When the AC output is on, the «A/C» symbol is lit.



The anti-icing function is disable

Pressurization control

Press the  button, the auxiliary fan output change the state.

When the symbol  is on, the auxiliary fan is on.

Fresh air flap control

Every time that the  button is pressed, the flap changes its position

When the flap is in recirculation air position the led  is lit and the actuator rotate in clockwise direction

Check LCD segments

Press simultaneously the   buttons, the ATC lit all the LCD segments for 4 seconds.

Manual valve calibration

Press simultaneously the   buttons, the ATC force the water valve for calibration.

Temperature Unit

Press simultaneously the   buttons, the ATC change the temperature unit from °C to °F and vice and versa.

On display appear for 2 seconds the new selected temperature unit.

With the Fahrenheit unit, the selected temperature assume 13 values

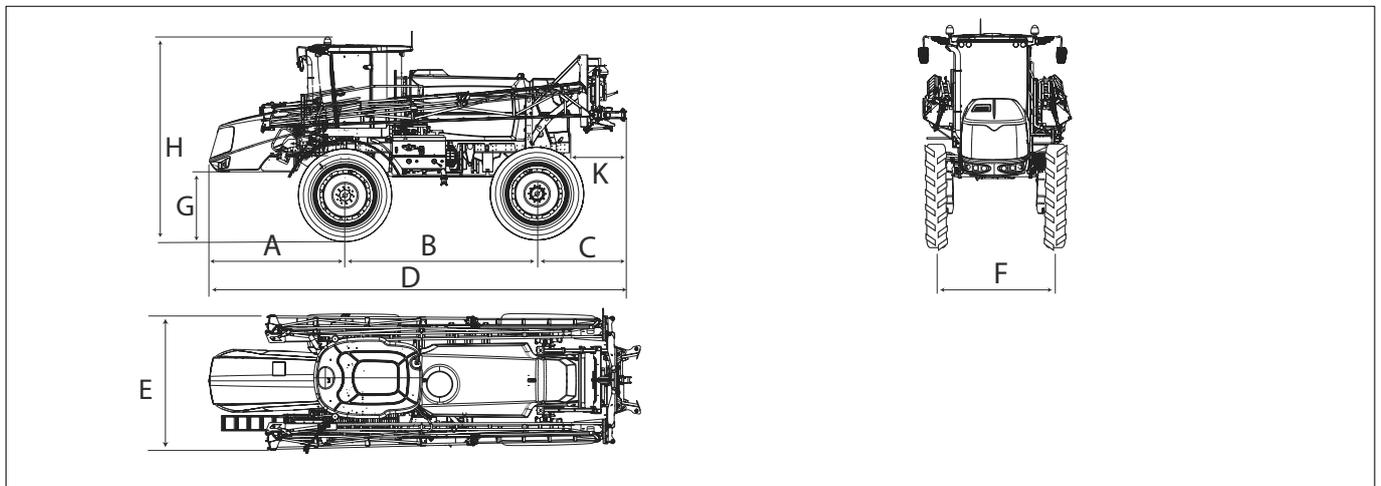
- LO
- HO
- from 64°F à 84°F step 2°C

Characteristics

Main Characteristics

Tank size (litres)	5000 (+5%)
Pumps	464-10 / 464-12
Boom	ALUMINIUM TR4 / TR4R / RHA /RA/ FORCE/TWIN FORCE
Electronics (Spraying)	HC9600
Engine	6 cylinder Deutz engine 180 KW Tier 4 final - Stage IV
Transmission	2 Sauer Pumps H1 (2x115 cc) on 40 kph
Suspension	Front axle : 2 airbags + 2 extra air tank Rear: Central airbag with double acting shock absorber integrated
Steering	2 wheels and 4 wheels steering mode
Axle adjustment	Mechanical adjustable axle 182/206 (depending of wheel)
Turning radius (m) (380/90R50)	6,55m (2 WS) - 12.05 m (4 WS)
Overall width (Aluminium boom)- (mm)	2550
Mini track width (D)	see table below
Wheel base (E) (mm)	4300 mm
Chassis ground clearance - mm	1200 / 1650
Rinsing tank (litres)	600
Hand washing tank (litre)	15
Storage box (litre)	180
AdBlue tank	32
Fuel tank (litre)	400

Overall dimensions



Variant	Boom (m)	A	B	C	D	E	F	G	H	I	J	K	
Hydraulic motor Front: MS18 Rear: MS18	15/24 TR4	2900	4300	1780	8980	2550	1800à 2230	1340 à 1790	4200 à 4650	7310	0	640 à 840 (*)	
	15/28 TR4			1980 (*)	9180 (*)								
	16/30 TR4												7810
	17/32-17/33 TR4												8310
Hydraulic motor Front : MS18 Rear : MS35	18/36 RHA	2900	4300	2920 to 3120 (*)	10070 to	2550				9220	0	1750 to 1950 (*)	
	19/38 RHA				10270 (*)					9720			
	20/36 RHA	2900 (*) to 3000	10220 à 10270 (*)	10220	0 (*) to 100								
	20/40 RA	2940 (*) to 3140	10360	10360	40 (*) à 240								
	21/42 RA	3440 (*) to 3640	10860	10860	540(*) to 740								
	22/44 RA	3940 (*) to 4140	11360	11360	1040 (*) to 1240								

8 - Technical Specifications

Weight

Empty weight

Basic vehicle weight. It may vary depending on the equipment and options

Variant	401MA 401MB	402MA 402MB	401HA 401HB	402HA 402HB
Total	10850	11380	11350	11880
Axle 1	6720	6810	6970	7060
Axle 2	4130	4570	4380	4820

Gross weight

Permissible laden weight of the vehicle

Variant	401MA 401MB	402MA 402MB	401HA 401HB	402HA 402HB
Maximum permissible load in service in the State	16540	17070	17040	17570
Technically permissible weight	16540	17070	17040	17570
Maximum permissible load				
- on front axle	8540	8630	8790	8880
- on rear axle	8000	8440	8250	8690

Tyres

Inflation Pressure

Type	Pressure (bar)	Manufacturer		Load Index
320/90R50	4.4	ALLIANCE	354	TL161D
520/85R42	2.0	MITAS	AC85	TL162A8/159B
380/90R50	2.2	MICHELIN	SPRAYBIB	TL175D
480/80R42	1.8	MICHELIN	SPTAYBIB- ULTRAFLEX	TL176D
520/85R42	1.2	MICHELIN	CEREXBIB	TL177A8
650/65R42	1.6	MITAS	AC65	TL165D/168A8
340/85R48	2.4	ALLIANCE	350	TL159A8/156D
380/90R46	2.4	MITAS	HC1000	TL173D
380/90R46	2.4	MICHELIN	SPRAYBIB	TL173D
420/80R46	2.8	ALLIANCE	385	TL159D/170A2
380/90R46	2.4	MITAS	HC1000	173D
380/90R46	2.4	MICHELIN	SPRAYBIB	173D
480/80R46	2.4	MICHELIN	AGRIBIB	TL158A8/158B
480/80R46	2.4	MICHELIN	SPRAYBIB	TL177D
520/85R38	2.4	ALLIANCE	333	TL160A8/157B
650/65R38	2.4	ALLIANCE	360	TL178A8/175B



NOTE! It is imperative to observe the inflation pressure indicated in the table. In case of doubt about the technical characteristics of the tires, consult a specialist.

8 - Technical Specifications

Other tyres



NOTE! When replacing tires, check that the new tires have the correct load index.



Other optional tyres are possible, provided that the static loaded radius and the load index are in accordance with the table below at a speed of 40 kph, resulting in no change in track and / or width of the vehicle.

Variant - Version	401MA 401MB	402MA 402MB	401HA 401HB	402HA 402HB
Static loaded radius (m)			0,916	
Mini static load index (kg)	4270	4315	4395	4440

Accumulator

Boom	Width (m)	Pressure (bar)
TR4	24	45
	28	65
	30	80
TR4R	32-33	80
	36-38	80
TR5	32	75
	36-38-40	80

Hydraulic pressure

Hydraulic circuit	Pressure (bar)
Transmission	450
auxiliary	180
Charge	28
Dynamic brake	180

Air pressure

circuit	Pressure (psi)	Pressure (psi)
Main circuit	7 - 8	101,5 - 116,0
cab suspension	2,4	34,8
Boom spraying	5,5	79,7

Air Conditioning

Gas = R134a

Charge = 1,150 kilogramme

Sound Level

Noise level measured at the driver's seat: 76 dB (A) (ventilation is at maximum and engine speed at 2200 r.p.m.).

8 - Technical Specifications

Identification plates

Cabin

An identification plate is fitted below the driver's seat.



Transmission pump

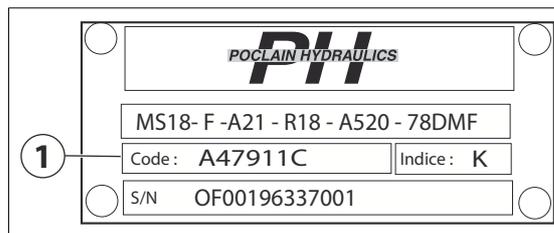
An identification plate is fitted on the pump

Deutz engine

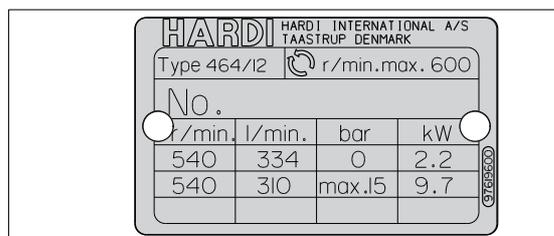
An identification plate is fitted on the engine

Hydraulic motor

An identification plate is fitted on the motor



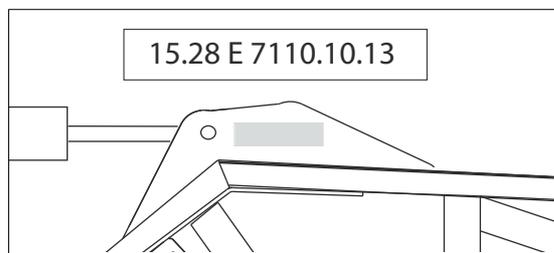
464-12 Pump



Aluminium Boom

E boom TR4/R

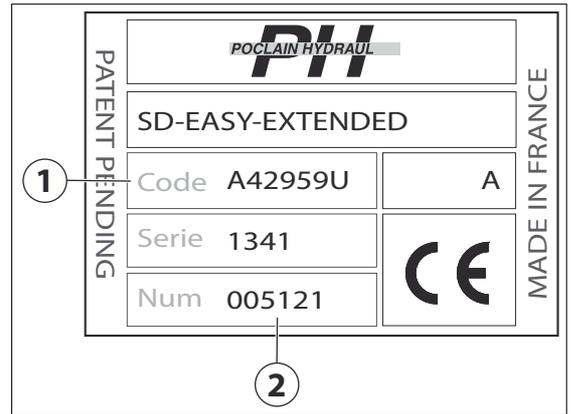
C boom RHA



8 - Technical Specifications

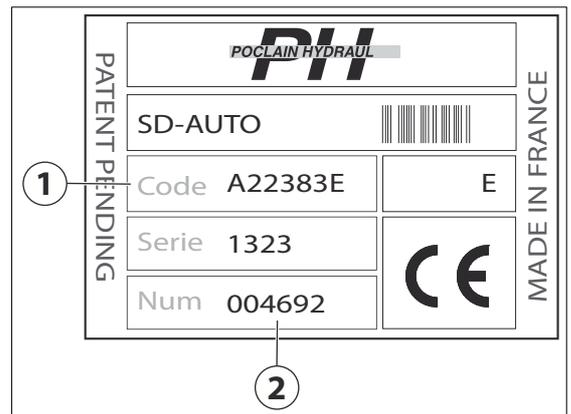
Transmission Controller SD-EASY EXTENDED plate

To request information, note the Code **(1)** and the Num **(2)**



Transmission Controller SD-AUTO plate

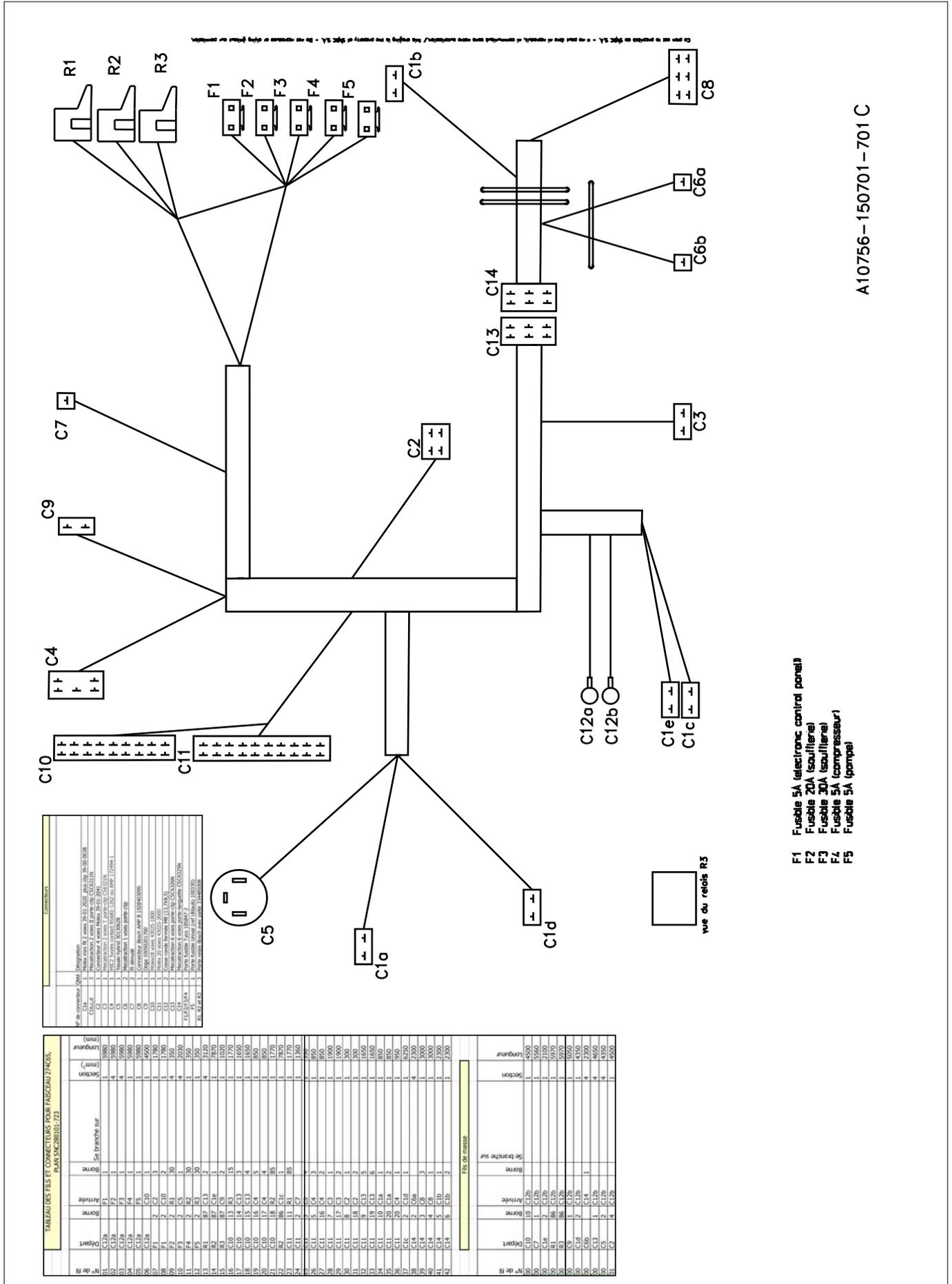
To request information, note the Code **(1)** and the Num **(2)**



8 - Technical Specifications

Cabin

Air conditioning diagram ATC 273F60

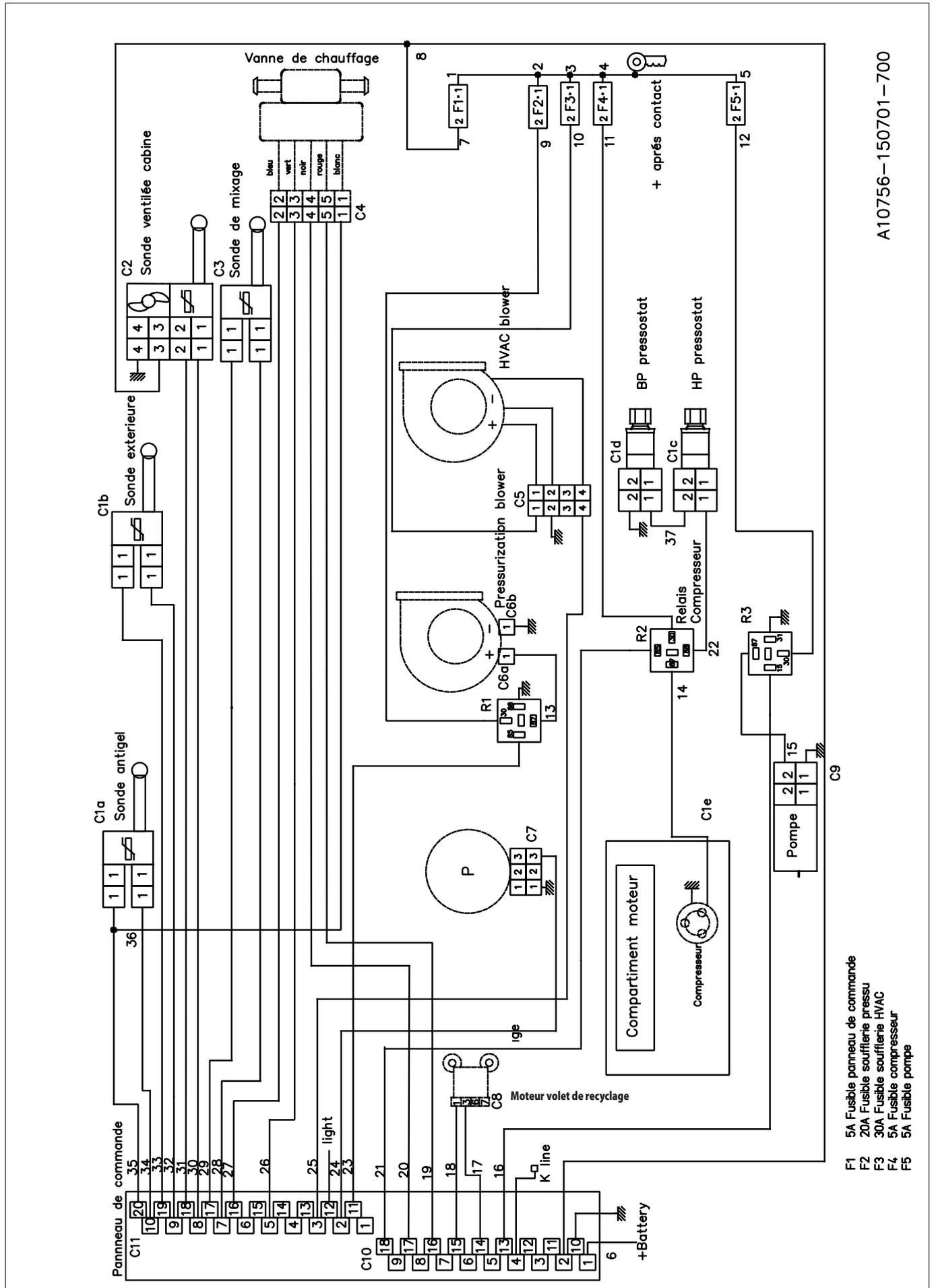


A10756-150701-701 C

TABLEAU DES FUSIBLES ET COMPOSANTS POUR FANUCOU 273F60, - (MAN 34000011-22)

N° de fil	Quantité	Arrivée	Sortie	Spécification	Section
C12a	1	F1	1	5980	1
C12b	1	F2	1	5980	1
C12c	1	F3	1	5980	1
C12d	1	F4	1	5980	1
C12e	1	F5	1	5980	1
C12f	1	F6	1	5980	1
C12g	1	F7	1	5980	1
C12h	1	F8	1	5980	1
C12i	1	F9	1	5980	1
C12j	1	F10	1	5980	1
C12k	1	F11	1	5980	1
C12l	1	F12	1	5980	1
C12m	1	F13	1	5980	1
C12n	1	F14	1	5980	1
C12o	1	F15	1	5980	1
C12p	1	F16	1	5980	1
C12q	1	F17	1	5980	1
C12r	1	F18	1	5980	1
C12s	1	F19	1	5980	1
C12t	1	F20	1	5980	1
C12u	1	F21	1	5980	1
C12v	1	F22	1	5980	1
C12w	1	F23	1	5980	1
C12x	1	F24	1	5980	1
C12y	1	F25	1	5980	1
C12z	1	F26	1	5980	1
C12aa	1	F27	1	5980	1
C12ab	1	F28	1	5980	1
C12ac	1	F29	1	5980	1
C12ad	1	F30	1	5980	1
C12ae	1	F31	1	5980	1
C12af	1	F32	1	5980	1
C12ag	1	F33	1	5980	1
C12ah	1	F34	1	5980	1
C12ai	1	F35	1	5980	1
C12aj	1	F36	1	5980	1
C12ak	1	F37	1	5980	1
C12al	1	F38	1	5980	1
C12am	1	F39	1	5980	1
C12an	1	F40	1	5980	1
C12ao	1	F41	1	5980	1
C12ap	1	F42	1	5980	1
C12aq	1	F43	1	5980	1
C12ar	1	F44	1	5980	1
C12as	1	F45	1	5980	1
C12at	1	F46	1	5980	1
C12au	1	F47	1	5980	1
C12av	1	F48	1	5980	1
C12aw	1	F49	1	5980	1
C12ax	1	F50	1	5980	1
C12ay	1	F51	1	5980	1
C12az	1	F52	1	5980	1
C12ba	1	F53	1	5980	1
C12bb	1	F54	1	5980	1
C12bc	1	F55	1	5980	1
C12bd	1	F56	1	5980	1
C12be	1	F57	1	5980	1
C12bf	1	F58	1	5980	1
C12bg	1	F59	1	5980	1
C12bh	1	F60	1	5980	1
C12bi	1	F61	1	5980	1
C12bj	1	F62	1	5980	1
C12bk	1	F63	1	5980	1
C12bl	1	F64	1	5980	1
C12bm	1	F65	1	5980	1
C12bn	1	F66	1	5980	1
C12bo	1	F67	1	5980	1
C12bp	1	F68	1	5980	1
C12bq	1	F69	1	5980	1
C12br	1	F70	1	5980	1
C12bs	1	F71	1	5980	1
C12bt	1	F72	1	5980	1
C12bu	1	F73	1	5980	1
C12bv	1	F74	1	5980	1
C12bw	1	F75	1	5980	1
C12bx	1	F76	1	5980	1
C12by	1	F77	1	5980	1
C12bz	1	F78	1	5980	1
C12ca	1	F79	1	5980	1
C12cb	1	F80	1	5980	1
C12cc	1	F81	1	5980	1
C12cd	1	F82	1	5980	1
C12ce	1	F83	1	5980	1
C12cf	1	F84	1	5980	1
C12cf	1	F85	1	5980	1
C12cg	1	F86	1	5980	1
C12ch	1	F87	1	5980	1
C12ci	1	F88	1	5980	1
C12cj	1	F89	1	5980	1
C12ck	1	F90	1	5980	1
C12cl	1	F91	1	5980	1
C12cm	1	F92	1	5980	1
C12cn	1	F93	1	5980	1
C12co	1	F94	1	5980	1
C12cp	1	F95	1	5980	1
C12cq	1	F96	1	5980	1
C12cr	1	F97	1	5980	1
C12cs	1	F98	1	5980	1
C12ct	1	F99	1	5980	1
C12cu	1	F100	1	5980	1

Air Conditioning Diagram



- F1 5A Fusible panneau de commande
- F2 20A Fusible soufflerie pressu
- F3 30A Fusible soufflerie HVAC
- F4 5A Fusible compresseur
- F5 5A Fusible pompe

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Spare parts

For information about spare parts, you can visit www.agroparts.com after registering your details on the home page.



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