RUBICON 9000
RA Boom

Original

Operator's manual

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www.hardi.com.au

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

Sprayer Use

The HARDI sprayer is for the application of crop protection chemicals and liquid fertilizers, and it is designed only for that purpose. If the sprayer is to be used for any other purposes than the ones described in this Operator's manual, a new risk assessment and a workplace assessment must be completed for this use. This obligation lies with the owner and operator of the sprayer.

Before first use of the sprayer, the owner and operator must take note of all of the following obligations:

- Workplace assessment
- Operator instructions
- Use of work equipment
- Statutory inspection
- Restricted use
- Maintenance regulations
- Health issues

For more details, please see "Before First Use of the Sprayer" on page 9 in this Operator's manual.

Operator's manual Formalities

The original Operator's manual is approved and published in English. All other languages are translations of the original Book. In the event of any conflicts, inaccuracies or deviations between the English Book and other languages, the English version shall prevail.

Illustrations, technical information and data in this manual are assumed to be correct at the time of printing.

As this Operator's manual covers more models and features or equipment, which are available in certain countries only, please pay attention to paragraphs dealing precisely with your model.

2 - General Safety Instructions

3 - Description

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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 applies 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.

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 the 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 minimise 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 jeopardise 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.

   When work equipment is used outside the undertaking it shall be accompanied by physical evidence that the last inspection has been carried out.

4. Member States shall determine the conditions under which such inspections are made.

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

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, the dealer must complete a statutory inspection of the sprayer. 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 specialised 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 authorised 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 fertiliser.
- 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, this fault must be eliminated immediately. If this is not the task of the operator, or if the operator does not possess the appropriate technical knowledge, then this fault must be reported to his superior (a qualified operator).

Risks in Handling the Sprayer

The sprayer has been highly developed and constructed to the recognised 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.
- Unauthorised 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 using non-approved spare parts, wear parts or aids.
- HARDI accepts no liability for disasters through the impact of foreign bodies, natural disasters or force majeure.

2 - General Safety Instructions

Organisational Measures

This Operator's Manual

- 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.

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!

Therefore, the labels should always be clean and readable! You must replace worn or damaged labels with new ones. Contact your HARDI dealer for new labels.

Not all labels shown hereafter will apply to your sprayer - this depends on the sprayer model and variant.

Explanation of labels:

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.

Lifting point!

Risk of falling off!

Do not ride on platform or ladder.

EasyCleanFilter service!

Open and clean filter monthly

Not for drinking!

This water must never be used for drinking.

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 Operator's Manual, also comply with the on farm general and national regulations related to:

- Accident prevention.
- Environmental protection.
- The applicable workplace safety.

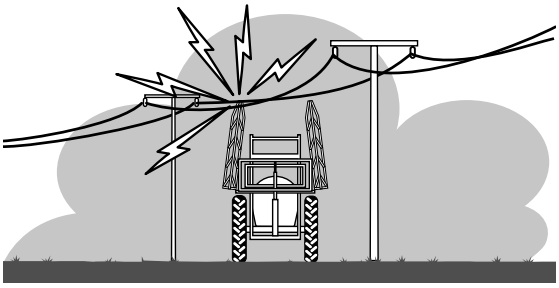
Follow these regulations, especially when:

- 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 fertiliser. Make sure you understand the information from the supplier regarding their use.

The boom must not be folded/unfolded while driving! Never use the folding/unfolding functions before the sprayer has been stopped! Failure to do so will damage the boom.

Keep the spray boom in folded position while driving outside the field. Park the sprayer 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.

DANGER! Stop 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.

DANGER! In the event of a boom wing AutoHeight sensor failure, the boom wing may rise to full tilt up. Power lines may be contacted in this instance causing a risk of fatal accidents!

ATTENTION! A label (HARDI item no. 978448) is fitted to the sprayer. This label must be placed in an easily visible position.

Operator Training

Authorised 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.

	Person especially trained for the activity [1)]	Trained operator [2)]	Person with specialist training (specialised 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 specialised workshop may carry out such work. The personnel of a specialised 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 Under 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 product 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.
- Heat from wheel motors.
- Heat from engines.
- Heat from hydraulic systems.

Hydraulic Energy

- Trapped oil under pressure in cylinders, hoses and accumulators.
- Heat from cylinders and oil tank.

Pneumatic Energy

- Air tank.
- Pressure dampers for fluid system.
- Tyres.

Electric Energy

- Energy stored in capacitors.
- Sprayer battery.

Service and Maintenance Work

Statutory Inspection

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.
- Turn off the isolation switch. Refer to "Initialise the system" on page 116.

Fluid system

- Turn off the vehicle and remove the ignition key.

Compressed air

- Turn off the vehicle and remove the ignition key.
- Drain the air tank

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.

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 damage to the sprayer and foreign objects while driving.
- Risk of inefficient spraying due to incorrect operation of the sprayer.

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:

- Roadworthiness
- Operational safety

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

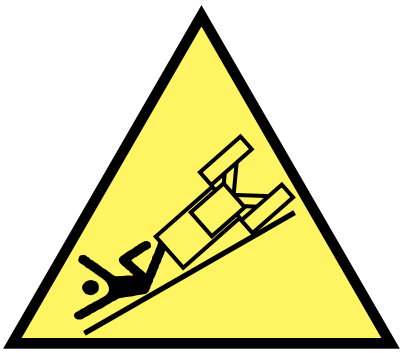
Beside these instructions, comply with the generally applicable national safety and accident prevention regulations.

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 unauthorised 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 unless in cabin or use it as a means of transport.

Only authorised 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 damage to your skin or face, immediately seek medical advice. Remember to identify the chemicals used.

Mixture Carried in the Tank

The total weight of the vehicle, including the loaded sprayer (tank mix, equipment, operator), must not exceed the vehicle's Gross Vehicle Mass (GVM). You must take into account that the mixture carried in the tank will be adjusted according to the density (e.g. liquid fertiliser, etc.).

WARNING! Care must be taken when filling the spray tank to ensure that the total laden weight of the self-propelled sprayer, including spray mixture, fuel, operator and any fitted equipment, does not exceed the Gross Vehicle Mass (GVM) specified by the manufacturer.

DANGER! Overloading can lead to dangerous situations or damage the sprayer (chassis, suspension, premature wear or burst of tyre).

Use of The Sprayer

Before starting work, ensure that you understand all equipment and its operation.

Operators should avoid loose-fitting clothing.

It is forbidden to:

- Stand in or near the working area of the sprayer.
- Climb the sprayer.

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

Only operate actuated sprayer parts when you are sure that no one is standing within the prescribed safety distance. Please refer "Working Area of the Sprayer" on page 32.

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.
- Activate the vehicles parking brake, put the transmission into (P).

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.

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.

Never engage AutoSteer on public road.

Checking the Vehicle

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

- Spray boom is folded and resting in transport brackets with the intended locks engaged.
- Parking brake is completely disengaged.
- The spray pump is turned off, if the MainTank is empty.
- Traffic lights and reflectors are in good working order, clean and free from damage.
- Signs or markings on the vehicle regarding road transport are correctly placed and visible.
- Brakes are in good working order and free from visible damage.
- Tyre pressure is correct according to the load.
- Crop residues and dirt are removed.
- 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.

Slow down as needed to avoid tilting or overturning of the vehicle, especially on sloping roads.

NOTE! Please refer to relevant Australian based state legislation for agricultural equipment on roads.

WARNING! Because of axle loadings it is not legal to fill tank and drive down the roads in Australia.

Hydraulic System

The sprayer is supplied with hydraulic functions operating under a high pressure.

In case of malfunction, there is a risk that the hydraulic system may act inadvertently. This can lead to:

- Fatalities or serious injuries to persons or animals in the working area of the sprayer.
- Material damage to the sprayer when colliding with trees, vehicles or other objects in the working area of the sprayer.

The operator-controls in the cabin, used 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.
- Engage the parking brake.
- Turn off the sprayer engine.
- Remove the ignition key.
- Isolate the system.

Have the hydraulic hose lines checked at least once during a calender 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.

The hydraulic hoses should not be in use for longer than 5 calender years, including any storage time of maximum 2 years. Even with proper storage and approved use, hoses and hose connections are subject to natural ageing, thus limiting storage time and the time of use. However, it may be possible to specify the length of use from experience values, in particular when taking the risk potential into account. In the case of hoses and hose connections made from thermoplastics, other guide values may be decisive.

Never attempt to plug leaks in hydraulic hose lines using your hand or fingers. Escaping high pressure fluid (hydraulic oil) may pass through the skin and ingress into the body. Risk of infection and serious injuries.

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

When searching for leaks, use PPE 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 is at risk of damage and or fire.

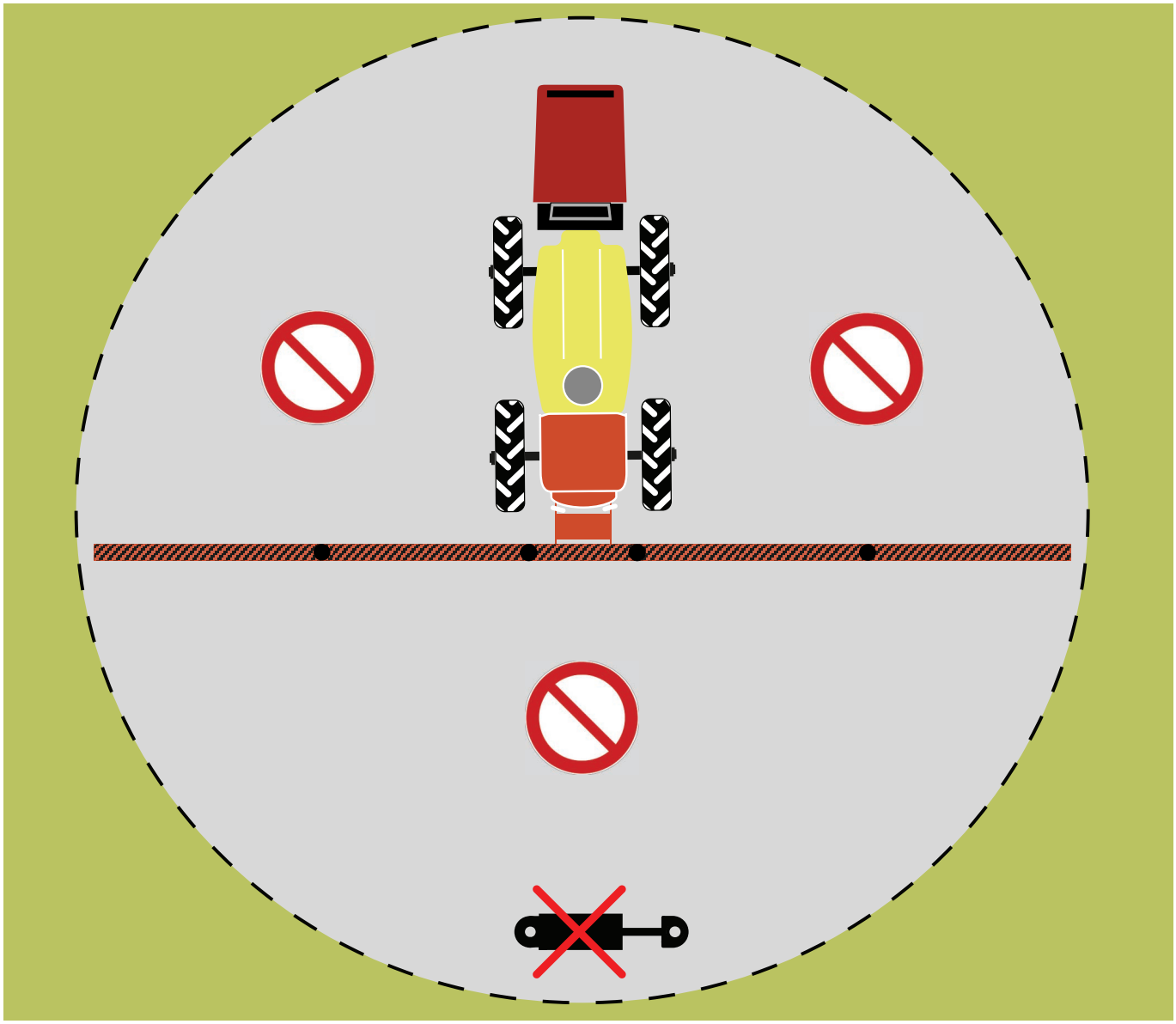
The sprayer may be equipped with electronic components whose functions are influenced by electromagnetic interference from other units. Such interference can pose risks to people, if the following safety information is not followed:

- 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.

Working Area of the Sprayer

Before operating the sprayer, the operator must ensure that the area around the sprayer is free.

This working area is defined as the area within the dashed line:



The working area includes the total width of the spray boom as well as the area used for boom folding. Please note the area immediately behind the sprayer, which is also defined as working area.
The size of the working area depends on the boom type and boom width. The operator must familiarise with the boom at hand before using the sprayer.

⚠ DANGER! Before the hydraulics for the sprayer is activated, there must be no risk of persons, animals or other machines or vehicles entering the working area of the sprayer. Risks of damage and fatalities!

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.

Sanitary and Phytosanitary measures (SPS)

The use of phytosanitary products to preserve and enhance crops makes agriculture one of the most dangerous professions. Therefore, anybody working with pesticides and or agricultural chemicals should always wear the appropriate personal protective equipment. At the very least it is expected that chemically protective coveralls conforming to category 111 type 4 should be chosen along with suitable respiratory devices, gloves and eye protection.

WARNING! When choosing the right PPE, the chemical permeation data for the barrier fabric and phytosanitary product and diluents should be considered.

WARNING! The risk of exposure to concentrations of active materials, solvents or diluents is especially high during preparation, cleaning, tank emptying and spray malfunctions, it is recommended that an apron or gown with an adequate chemical permeation barrier is further worn over the coverall to further protect areas of the body against organic chemicals.

NOTE! Further information exists on the Australian Government Agricultural and Fisheries website under Sanitary and Phytosanitary measures (SPS)

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 MainTank 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 MainTank. 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, the pressure sensor 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 partially filled with clean water.
- The plant protection chemicals must be added and mixed in the field to be sprayed.
- The tank can then be topped up to required volume for spraying purposes.
- Select a different location each time the sprayer is refilled.
- The sprayer because of its tare weight cannot legally be driven on roads with a full tank. It is recommended to use an in field or on farm mobile batch filling system.

Service Work Precautions

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

WARNING! 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 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 authorised persons nearby.
- Depressurise the hydraulic system for the sprayer to prevent unintentional movements of the sprayer.
- Stop all power outputs, i.e. the spray pump drive, hydraulics, etc.
- Activate the parking brake to prevent rolling.
- Switch off the vehicle and remove the ignition key to prevent unintentional starting.
- Put wheel chocks in front and behind of the wheels to prevent the sprayer from rolling.
- Machine must be isolated.
- 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!

To protect the environment, dispose of oils, greases and filters in the appropriate way.

Cleaning of tanks:

WARNING! Due to toxic vapours from spray liquids in the MainTank, climbing into the tank is very hazardous. Cleaning should only be done from the outside.

WARNING! Do NOT enter the MainTank.

WARNING! Do NOT inspect any of the tanks with the liquid pump running.

- Rinse and wash the equipment with clean water and appropriate cleaning agents after use and before servicing.

Sprayer Decontamination

Residues in sprayers of agricultural spray chemicals have the potential to cause significant damage to crops, even at very low concentrations.

Therefore, it is good practice to ensure you follow the instructions for decontamination that is given in the Chemical label of the active ingredient you have been using.

Decontamination should be carried out:

- Prior to using a new chemical mix.
- Before servicing the fluid system.

The sprayer has been designed to minimise dead spots in the fluid system however it must be understood that residues and deposits can remain and or build up, throughout the system, when carrying out normal spraying duties. Deposit points can include all components of the fluid system including but not limited to Tanks, pumps, valves, flowmeters, hoses, elbows, joints, nozzle bodies, hoppers and probes.

The use of the correct cleaning agent and following the described procedure in the chemical label will assist in the pathway to having your sprayer clean for the next work.

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 MainTank must only be carried out by a specialised workshop.

WARNING! Do NOT enter the MainTank.

WARNING! Do NOT enter the RinseTank.

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

If welding is performed on the vehicle, disconnect the cable to the alternator and battery.

Remove all loose, flammable or explosive materials from the sprayer to prevent fire.

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

WARNING! Do NOT disconnect hoses, pipes, or any equipment, if the sprayer is in operation.

Stay below the maximum speed (RPM) suitable for the pump drive.

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.

General information

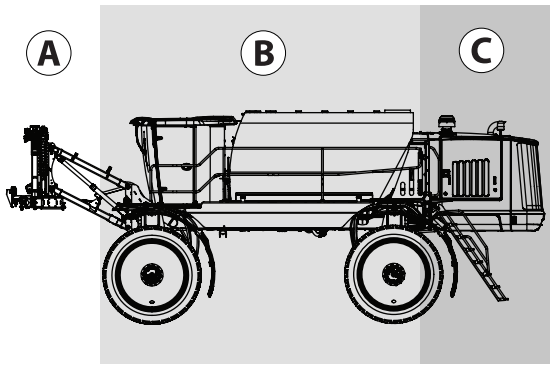
General View

1. MainTank
2. Tank lid
3. Ladder
4. Air inlet
5. Fuel tank
6. ParaLift lock
7. Engine Bay
8. Radiator Bay
9. Cabin door
10. Wheel Reduction Hub

1. Fluid system
2. In line boom filter
3. Mirror
4. GeoSelect box
5. FreshWaterFilter (located inside the highlighted panel)

3 - Description

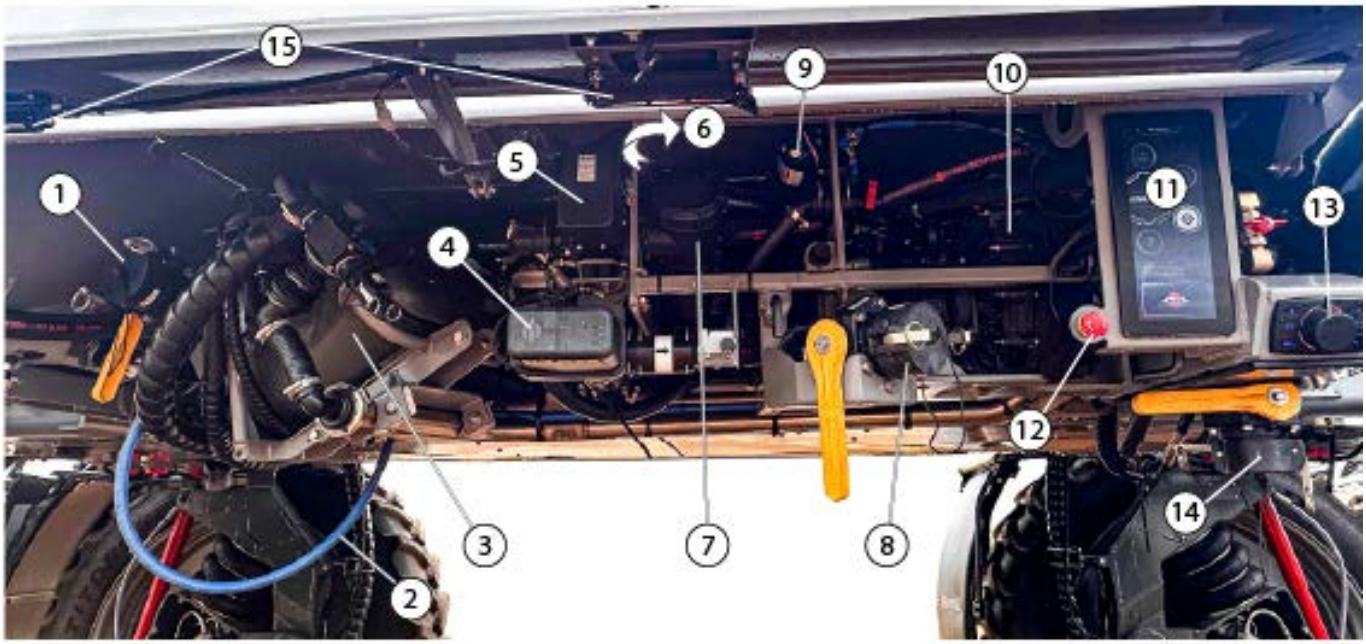
The RUBICON is divided into 3 zones: a Clean zone, a Working zone and an Application zone, referring to the level of possible pesticide contamination. In the following the functions and features are listed by zones. Please note that some of the features are optional equipments.



A. Application zone	Boom Nozzles
B. Working zone	Cabin Tank level indicator HIVE Batchfill/clean fill coupler Fluid platform/TurboFiller
C. Caution zone (Risk of chemicals/ hydrocarbons)	Engine Working platform with ladder Hand wash tank Access to Main tank (RH side)

The fluid system can be accessed by pushing the button (A) on the latch, and once the clip opens up, raise the cover panel. To close, just pull the cover downwards and push it against the fluid section until you hear a click sound.

The two lights (15) in the fluid section can be operated from the HIVE screen or by pulling the latch up and down.



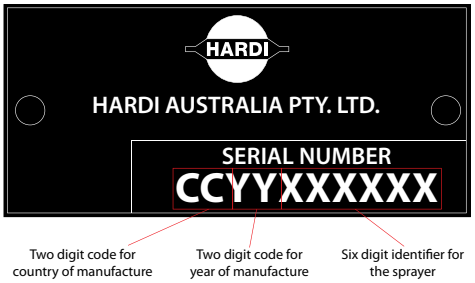
1. FastFill (BatchFill)
2. Clean water hose
3. TurboFiller
4. AgitationValve
5. RegulationValve
6. PressureValve
7. CycloneFilter
8. VenturiFill
9. FloJet Pump
10. Fresh Water Pump
11. HIVE Display
12. Fluid stop button
13. Multifunction Dial
14. FreshWaterFill
15. Lights

.

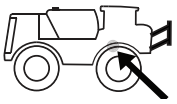
3 - Description

Identification plates

An identification plate is fitted near the front right hand side of the chassis on the sprayer. The reference number on plate will help you and your HARDI dealer to clearly identify your machine and assist in the correct supply of spare parts and service information.

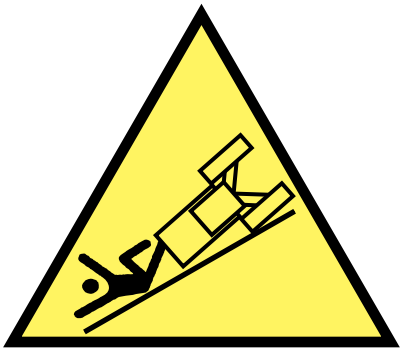


ATTENTION! The identification plate is regulatory, it should always be in place on the sprayer. For all information about the machine, please quote the serial number of the sprayer.



Driving in field

The operator should be very careful of the risk of overturning concerning the sprayer speed as well as the slope of the field.



DANGER! Boom manoeuvres should be carried out when the sprayer is stationary. Before any manoeuvre of the boom, make sure that there is no obstacle in the vicinity (electrical line, person, pole, etc.).

Sprayer Use

The HARDI sprayer is for the application of crop protection chemicals and liquid fertilisers. 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 personnel and the environment, when carrying out your spray job.

Tanks

The tanks are made of materials resistant to UV radiation and chemicals.

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

The tank lid 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 is also equipped with a TurboFiller, a RinseTank with a capacity of 600 litres and a Hand Wash Tank.

The sensors located inside main tank and rinse tank indicate the tank level on the HIVE screens located in cabin and fluid system.

Nominal main tank content is 9000 litres.

Lifetime

The expected lifetime for the sprayer is up to 10 years depending on use and conditions.

A sprayer's expected lifetime is the subject of multiple factors:

- Operating conditions and care of use
- Hours per year of operation
- Variations of agrichemicals used
- Service and Maintenance completed according to specifications.
- Cleaning the Sprayer
- Use of original parts

To obtain this successfully, these instructions should be followed:

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

ATTENTION! If using acidic liquid in a spray boom with stainless steel piping, this will shorten the lifetime significantly, as these pipes are not acid-proof. Risk of corrosion and leaks.

Boom

Boom and terminology

The Rubicon is available with two-folded RA booms in lengths 36,42,48,52 or 54m. The booms are supported by a wide ParaLift which enhances the stability of the boom and is hydraulically dampened for smooth ride and performance. The centre is specifically designed for stability. Yaw-dampening occurs through the fold cylinders. The booms are hydraulically operated with all functions controlled by HIVE and a joystick in cabin as previously described.

Boom features:

- Hydraulic centre lock
- Outer sections incorporate spring-loaded breakaway
- Wing tilt control
- AutoHeight
- Folding of outer sections. (This enables alternative boom widths)

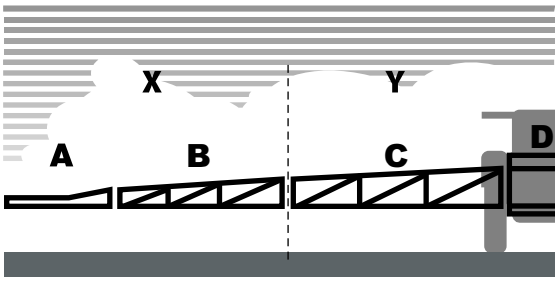
For RA booms the terminology is as follows:

A. Breakaway section

B. Outer section

C. Inner section

D. Centre section



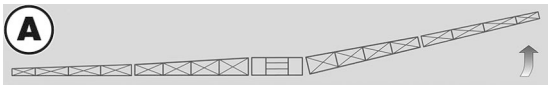
NOTE! When controlling the boom at the folding buttons, the folding sections are:

X First outer and breakaway section

Y Inner section

Standard Boom Features

A. Individual tilt of boom wings

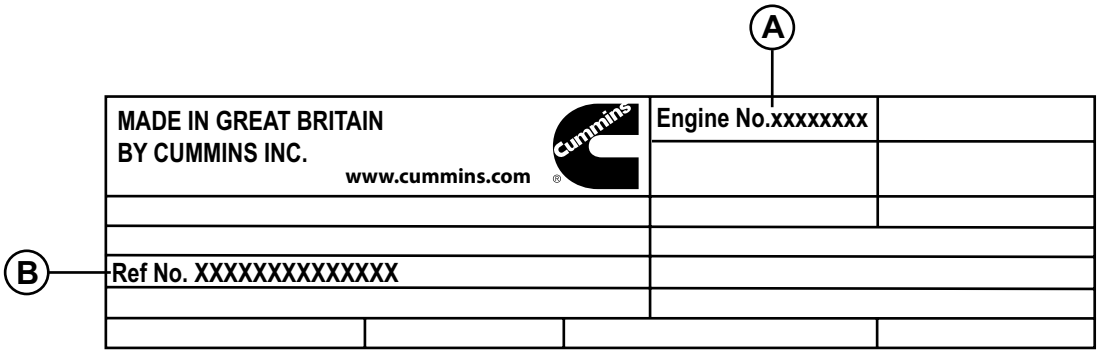


Engine

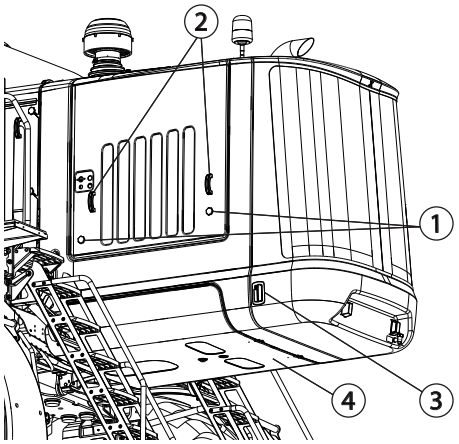
Rating Plates of Engine

The Engine number (A), Reference number (B), and technical data are stamped on the rating plate, which can be found on engine valve cover.

For all information, please provide the reference number and the engine number.



Access to the engine



Engine cover

The engine cover is opened and shut manually by unscrewing and screwing the nuts (1). The casing has double handles (2) for a better grip.

ATTENTION! Be careful with the cover's offset during opening.

To open the side covers (LH and RH):

1. Unscrew the nuts (1).
2. Lift the cover to remove it from its housing.

To close the side covers (LH and RH):

1. Hold the cover using both handles.
2. Position the cover on the top.
3. Press the cover against the engine cell and screw.

Rear cover

Rear cover can be opened by a door latch (3).

Bottom cover

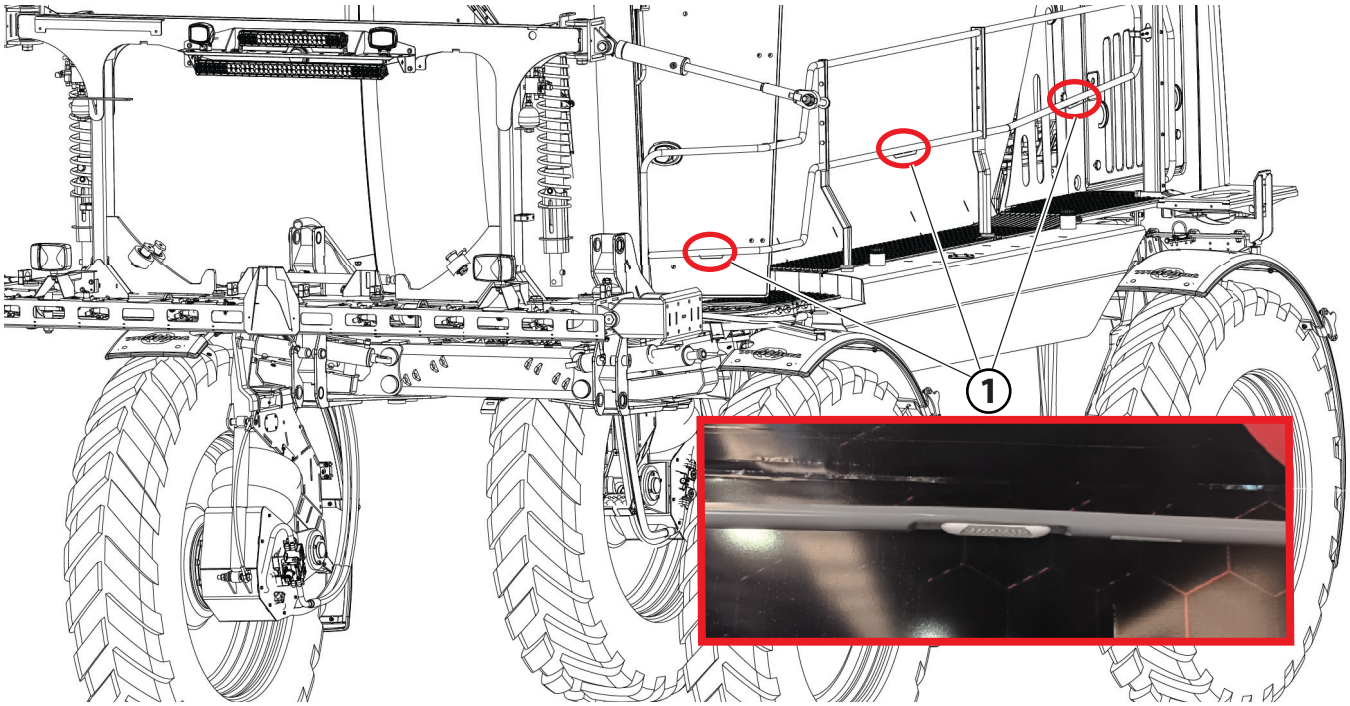
Opening the bottom cover (4) does not require a key.

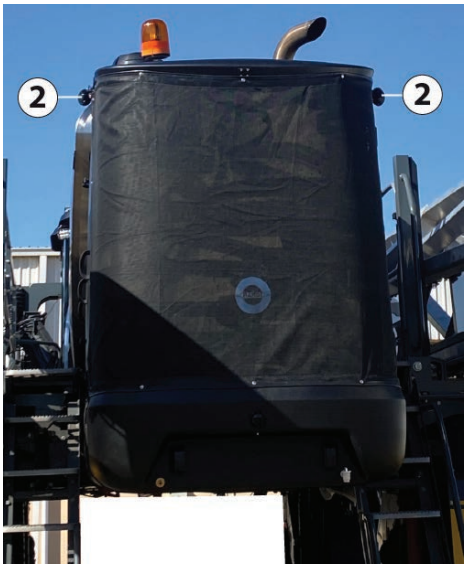
This cover is hinged, which enables fast access to various components.

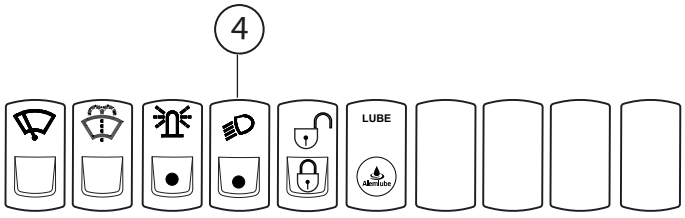
The upper cover is fitted using screws.

Lighting of the cabin walkway to access the driving position

The Rubicon is equipped with 3 LED lights marked as (1) on the left platform to facilitate access to the cabin and 2 lights (2) on top of engine cover. These lights can be operated by the worklight switch (3) located at the bottom of engine cover or by the switch (4) in cabin roof switch panel.





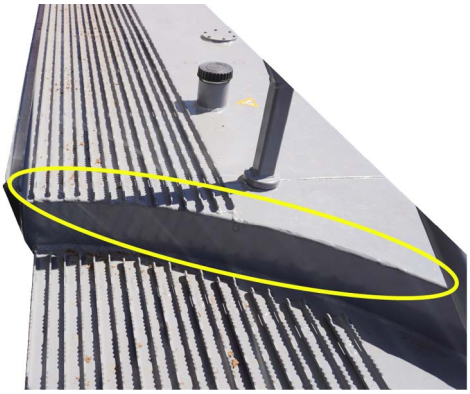


Reverse camera

A reverse camera is located at the rear engine cover. There is also a camera underneath the machine to view the ground. The views can be perceived on HIVE screen in cabin.

A translucent tube located at the corner of the tank indicates the tank level.

ATTENTION! Mind the step in the walkway.



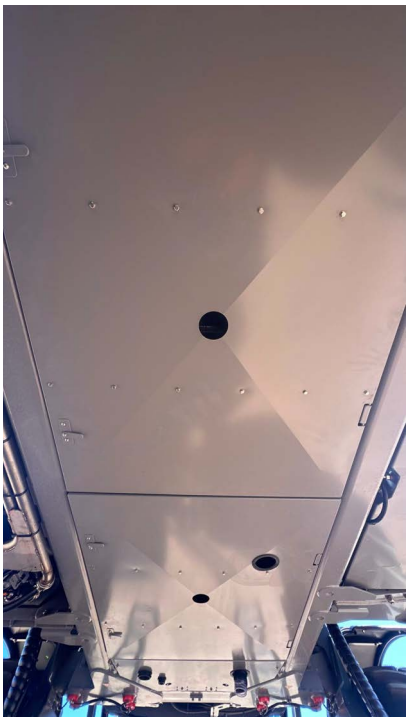
A lubrication system is fitted on the front of the sprayer. Please refer the separate catalogue supplied.

NOTE! Manual grease point is located next to it.

Two wheel nozzles are located on each rear mudguard to perform spraying in the wheel tracks.

A “negative-positive jump start” system is located underneath the sprayer near the engine compartment.

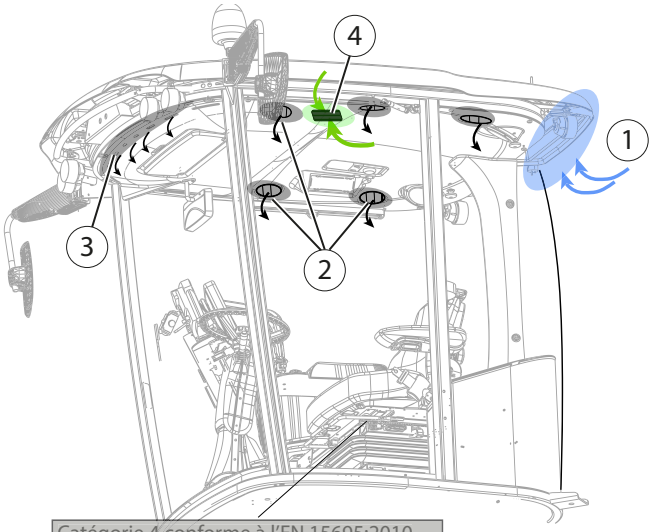
Bottom panels provide access underneath the sprayer.



Cabin

Description

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



Catégorie 4 conforme à l'EN 15695:2010
Category 4 according to EN 15695:2010

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.

WARNING! To reduce risk of exposure to dangerous substances:

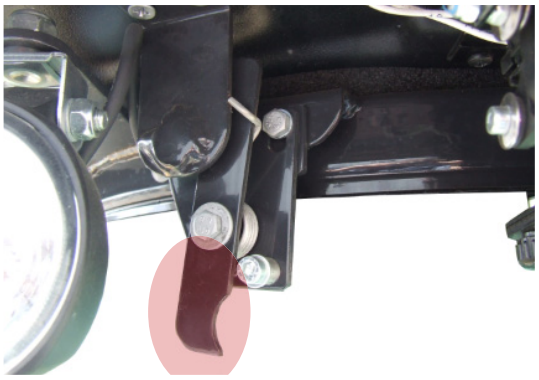
- Do not introduce or store pesticides in the cab.
- Keep the inside of the cab clean. Remove contaminated shoes and clothes.
- The Category 4 filter and the anti-dust used in the cab must be treated in accordance with the regulations in force for contaminant wastes. See section "Every 250 hours - Cabin combined air filter" on page 195.
- 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

1. Loosen the hand screws located in the cabin.
2. Push the lever to unlock the cabin roof
3. Raise the roof and put the end of the rod into the slot.

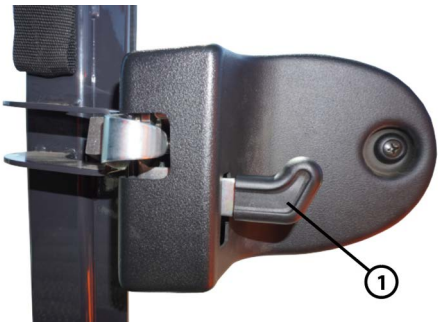


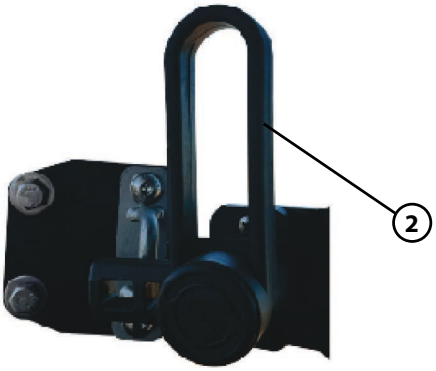
DANGER! To prevent the roof from falling, make sure that the rod is correctly positioned in the slot.

NOTE! For cabin pressure maintenance, see ."Every 250 hours - Cabin combined air filter" on page 195.

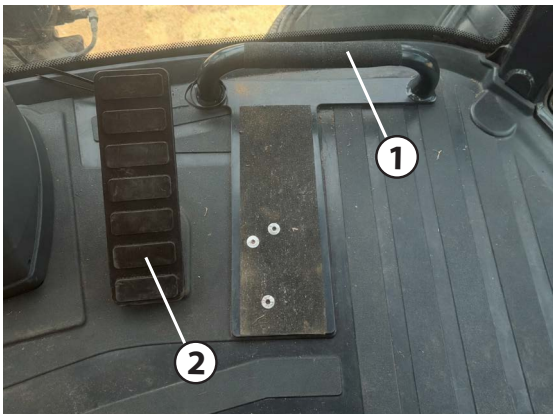
NOTE! For installing the combined air filter, see "Every 250 hours - Cabin combined air filter" on page 195.

The left hand side door can be opened from the cabin by pulling the latch (1) down. The right hand side door can be opened by rotating the latch (2) in clockwise direction and push the door outwards.





A pair of foot rests (1) and a brake pedal (2) are located on the floor.

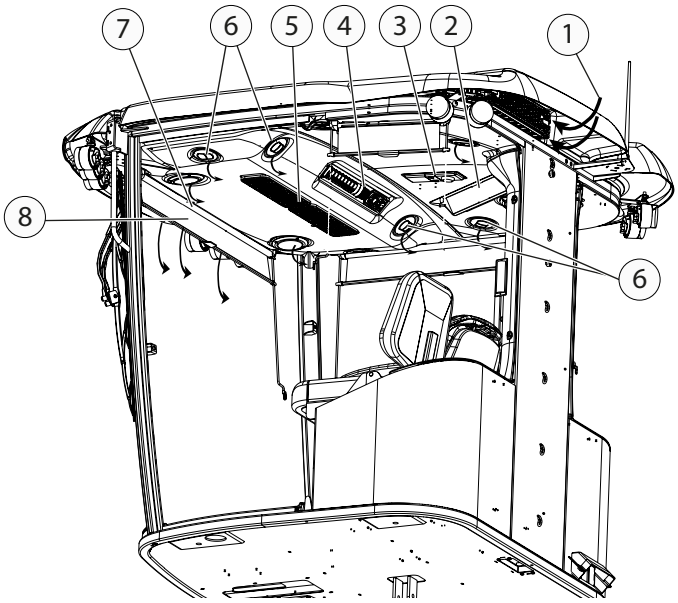


HIVE screen (1), Universal terminal (UT) screen (2) and DM 430E (3) screen.

Emergency Exit

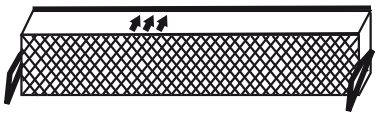
In case of emergency, a glass breaker is placed to the right of the driver's seat, on the opposite side to the access door to the cab.

Description



1. Fresh air inlet
2. AM/FM Radio location
3. Ceiling/map lighting
4. Cabin and roof switching
5. Air recycling trapdoor
6. Air diffusers
7. Air diffusers for demisting the windscreen
8. Sun-shield (on all windows)

Activated Carbon/Dust Filter



AM/FM Radio

Please refer to instructions provided in separate manual.

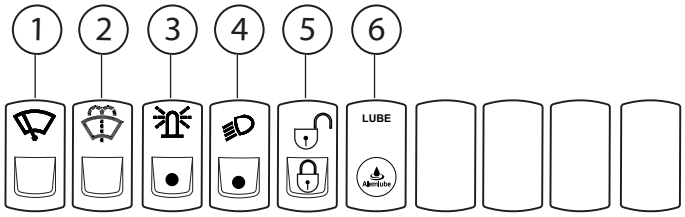
Microphone

A blue-tooth enabled microphone is fitted on the roof next to the switch panel. Please refer to set-up in AM/FM radio manual.

Ceiling lights

3 - Description

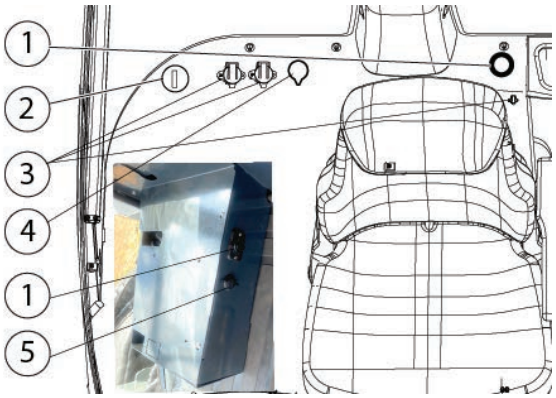
Cabin roof switching



1. Wipers switch
2. Windscreen washer switch
3. Beacon Light
4. Side work lights
5. Pendulum lock
6. Lube

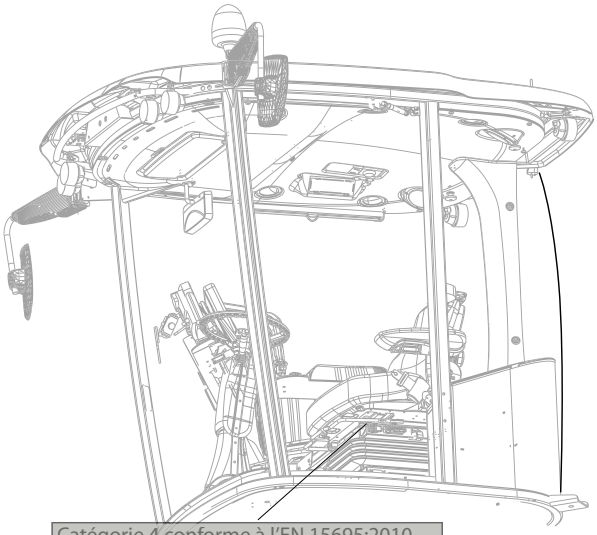
Ignition switch and 12V DC power supply

1. Cigar lighter (AUX Power)
2. Ignition switch
3. 12V DC socket
4. 12V DC socket
5. USB socket



Safety note

The cabin is equipped with a Category 4 combined air filtration device for the capture of solid particles, aerosol and sprays, organic vapours, in conformity with EN 15695-2 2009, the cabin is pressured to prevent unfiltered air from leaking into the cabin.



Catégorie 4 conforme à l'EN 15695:2010
Category 4 according to EN 15695:2010

WARNING! Check the filter in accordance with EN 15695-2 2009 is acceptable and is indicated on the label of the plant protection product as an option to protect against the potential dangers of plant protection products

WARNING! The operator must use, maintain and replace the filter as specified in the instructions provided by the filter manufacturer and the manufacturer of the plant protection products, if applicable.

WARNING! Before starting the spraying operation, the operator must verify that the correct filter is properly installed and that doors are hermetically closed.

WARNING! To reduce the risk of exposure to dangerous substances.

WARNING! Do not introduce or store pesticides into the cabin.

WARNING! Keep the inside of the cabin clean. Remove contaminated clothing and shoes before entering into the cabin.

ATTENTION! When handling and disposing of worn filter, see "Every 250 hours - Cabin combined air filter" on page195.

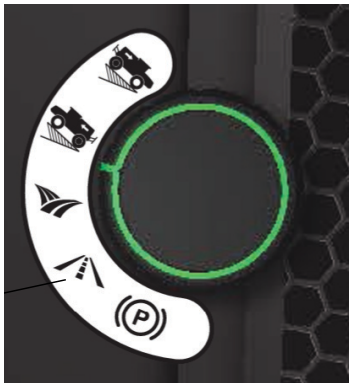
ATTENTION! Follow the instructions provided by the manufacturer of personal protection equipment, plant protection products, the outdoor air supply and filtration system of sprayer and national directives on Work Health and Safety.

NOTE! For cabin pressure maintenance, see "Every 250 hours - Cabin combined air filter" on page 195.

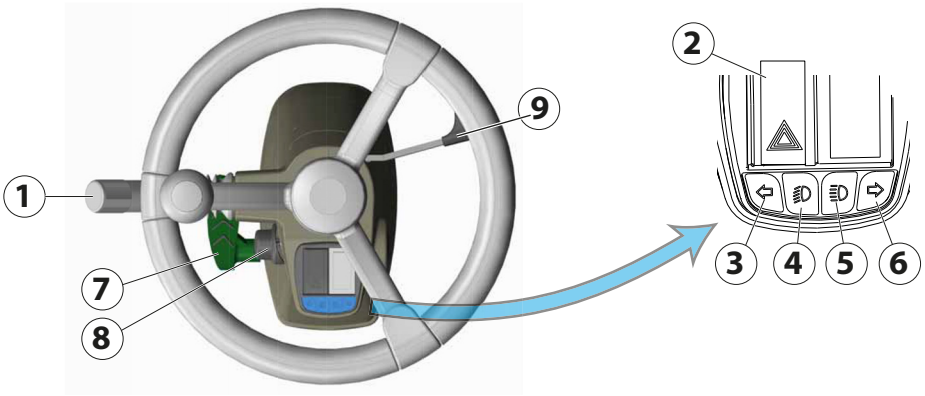
NOTE! For installing the combined air filter, see "Every 250 hours - Cabin combined air filter" on page 195.

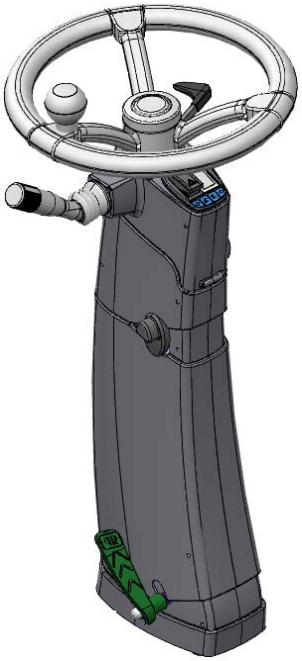
Access to the driving position

When the engine is off, the access ladders are lowered. The access ladders rise when the engine is running and the parking brake is released.



Steering column

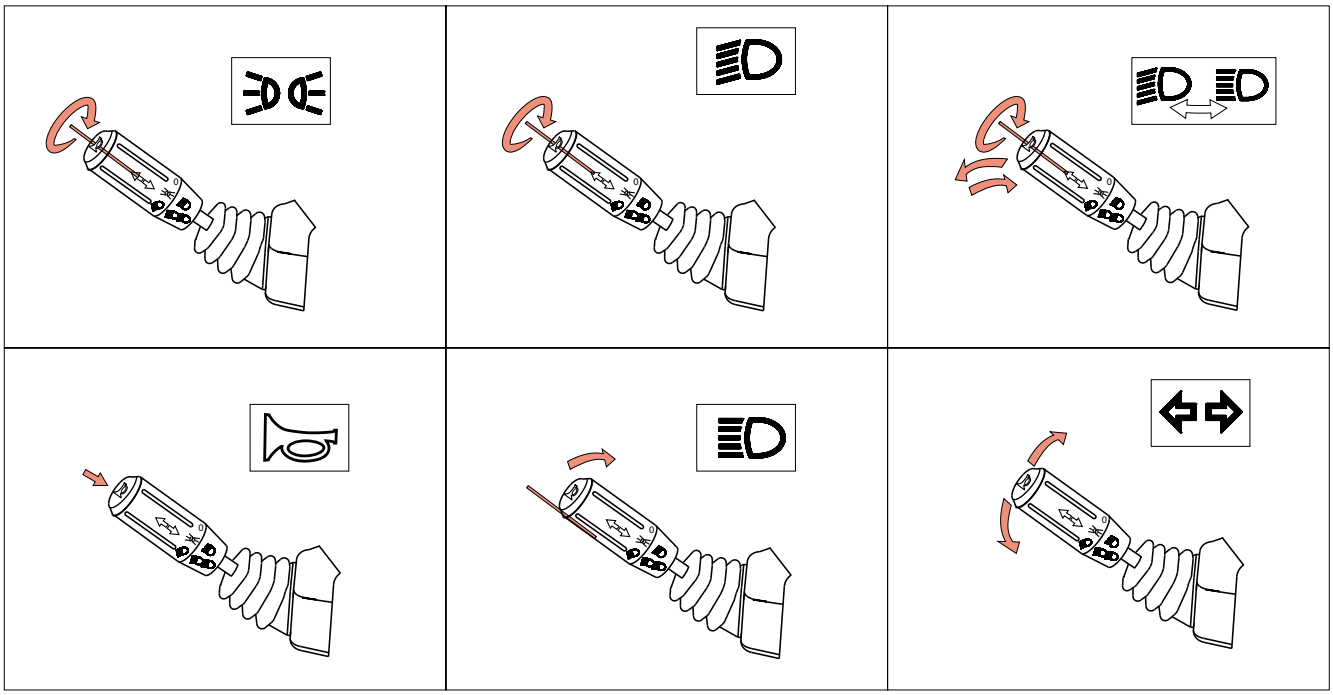




1. Headlights control
2. Hazard warning switch
3. Left direction indicator
4. Low beam headlights
5. High beam headlights
6. Right direction indicator
7. Tilting steering column lever
8. Tilting steering wheel lever
9. Telescopic steering wheel lever

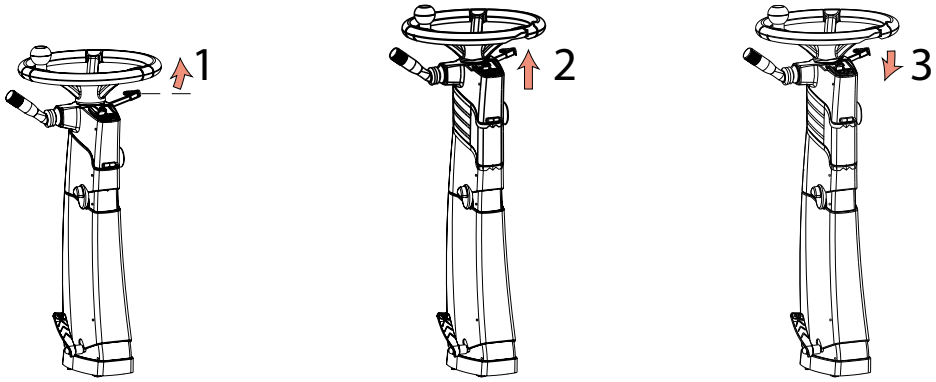
3 - Description

Headlights controls

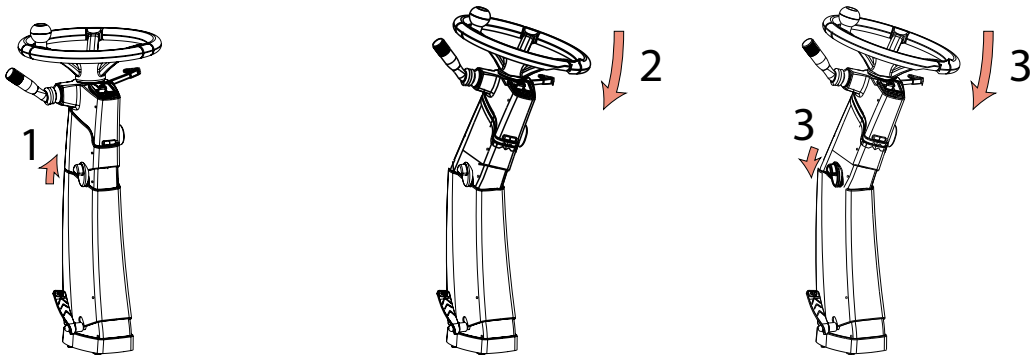


Steering Column Adjustment

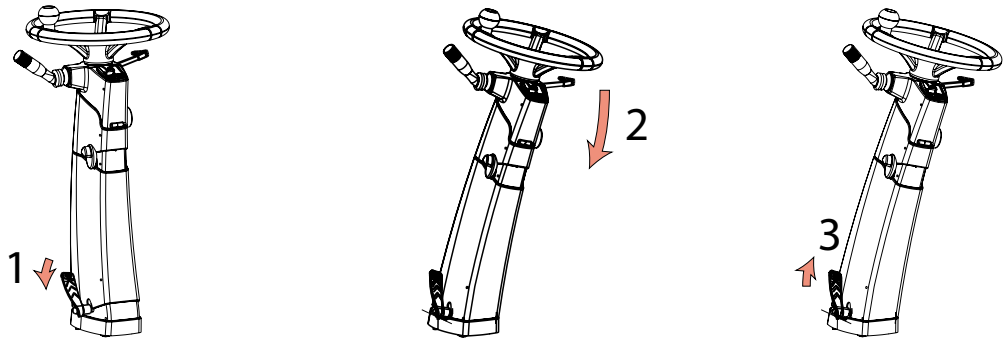
Telescopic steering wheel adjustment



Steering wheel tilt adjustment



Steering column adjustment



Driver's Seat

Description

1. Weight adjustment
2. Height adjustment
3. Fore/aft isolator
4. Absorber
5. Fore/aft adjustment (without control carrier equipment)
6. Armrest
7. Armrest adjustment
8. Headrest
9. Backrest adjustment
10. Seatbelt
11. Trainer's seat
12. Trainer's seat fold lock

General instructions

- The operating instructions must be read in full before use.
- The operating instructions must be kept in the vehicle and always be at hand.
- The driver's seat may only be fitted, serviced and repaired by specialist personnel.
- The respective national regulations and the vehicle manufacturer's fitting instructions must be observed.
- Worn parts such as rollers, shock absorbers and the fixation must be checked from time to time.
- A correctly functioning and individually adjusted driver's seat is essential to your health.

DANGER! The functional checks are to be carried out at least as regularly as vehicle services.

Safety instructions

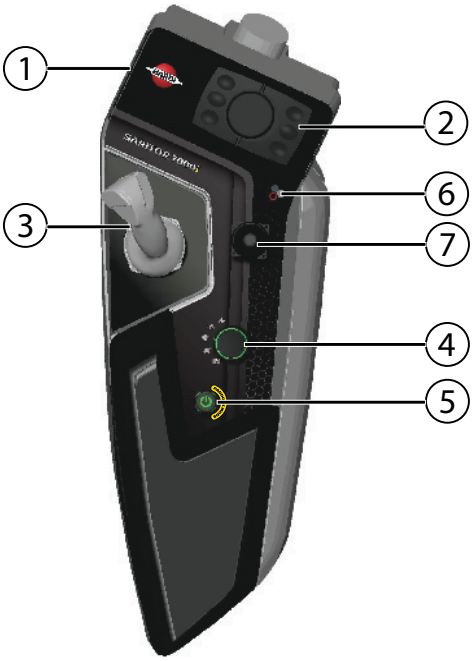
- Driver's seats that have been adjusted incorrectly have a smaller moving area. In order to prevent any personal injury, the seat must be adjusted for the driver's weight before use and before every change of driver.
- To prevent injury, no objects should be placed within the moving area of the driver's seat.
- Before commissioning of the driver's seat, possible packaging material has to be removed from the seat cushion and the backrest upholstery.
- To eliminate any risk of accident, the settings must be checked to ensure they are correctly engaged before the vehicle is driven.
- Adjustments must not be made while driving.
- Only touch the handle for setting the fore/aft adjustment at the indented grip provided for that purpose.

Risk of crushing

- After removal of the backrest upholstery, the backrest frame must be supported, for example held in place, before the backrest adjuster is operated. If you fail to do so, there is a danger that the backrest frame may jerk forward and cause injury.
- Any changes to the series standard of the seat (for example fitting parts which are not original GRAMMER AG parts) may impair the safety standard to which it has been tested. Functions may be impaired, threatening your safety. For this reason, any change in design of the seat must be approved by GRAMMER AG.
- During the removal and installation of the driver's seat, the corresponding instructions by the specific vehicle manufacturer must be strictly observed!
- Do not hold onto the covers for lifting the driver's seats. If you do so anyway, there is an increased risk of injury due to loosening or breaking covers.
- Before you remove the driver's seat, disconnect all plug-in connections between the seat and the vehicle supply network. When you replace the plug-in connectors, make sure they are tight (dust, water).
- Seatbelts are fitted or can be retrofitted to the driver's seat. Seatbelts may only be fitted on the approval of the vehicle manufacturer, as they increase the load in the seat mounting area. Seatbelts must be fitted in accordance with specific national regulations and guidelines, and must be approved by GRAMMER AG.
- Seatbelts must be fastened before driving.
- The seatbelts must be replaced after an accident. Where seatbelts are fitted to the driver's seat, the seat and seat mounting must be checked additionally by specialist personnel after an accident has occurred.
- Fasteners must be checked regularly for tight seat. If the seat wobbles, there may be loose bolts or other faults.
- If you find that the seat does not function correctly (for example a defective suspension of the driver's seat; improper curvature of the lumbar support, etc.) or is damaged (e.g. damaged bellows etc.) contact a specialist workshop immediately to arrange for repairs to be carried out. If you fail to do so, your health may be affected and the risk of accident increased.
- Before the vehicle is used, switches that might be in the seat (for shutting down mechanical equipment when the driver leaves his/her seat) must be checked for proper function.
- Loads must not be placed on seats (e.g. with a built-in switch) except for the driver's weight during normal use, as the vehicle may otherwise start to move by itself.

- If you take off the weight from the seat while driving, this will cause the vehicle to stop.
- Do not indent the bellows while there is load on the driver’s seat.
- Make sure that the interior of the driver's seat remains free of foreign particles or liquids.
- The driver's seat is not watertight and must be protected against splashes of water!
- Any conversion or refitting work on a GRAMMER AG driver's seat must be performed exclusively in authorised workshops by trained or suitably qualified personnel and in adherence with the applicable operating, maintenance and installation instructions and in compliance with all relevant national regulations.
- Improper installation and assembly bear the risk of bodily injury or property damage and the proper function of the driver's seat or mounted parts can no longer be guaranteed.
- Before driving, you must check if all seat settings selected guarantee a safe operation of the vehicle.

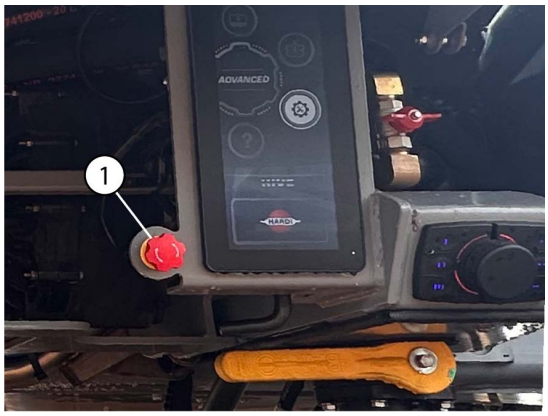
Console



1. Fascia Plate
2. Multifunction Dial
3. Primary Joystick
4. Mode Selector
5. Steering Controller and Hydraulic lockout (for road transport)
6. Engine Warning Light
7. Secondary Joystick

Fluid Stop

The fluid stop buttons are located at the right hand side of the console. When activated, it shuts down all HIVE fluid functions. The engine is not shut down.

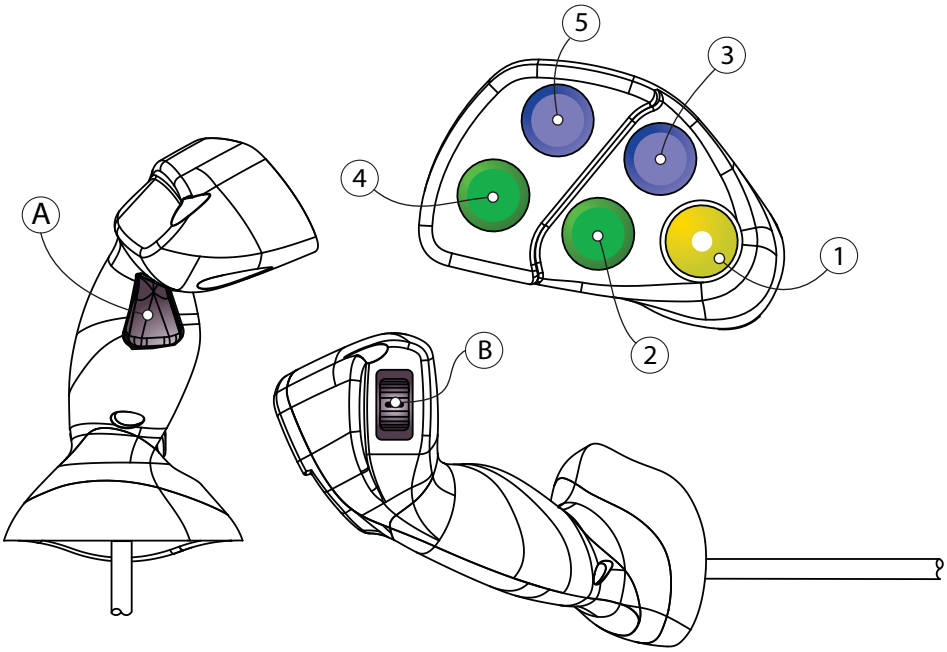


ATTENTION! To disengage fluid stop mode, rotate the button to release.

3 - Description

The primary joystick

The joystick allows the operator fast access to the Master Fluid Switch, Paralift, Boom Wing Tilt, AutoHeight and AutoSteer resume.



NOTE! Secondary functions are activated by pressing the secondary switch (A) simultaneously with primary buttons.

Primary function	Secondary function
1. Master on/off	**1A.** Single button fold
2. Right side boom tilt down	**2A.** Auto Steering engage
3. Right side boom tilt up	**3A.** Right side end nozzle
4. Left side boom tilt down	**4A.** Norac engage
5. Left side boom tilt up	**5A.** Left side end nozzle
A. Secondary switch	**AB.** Paralift up/down
B. Engine rpm up/down	

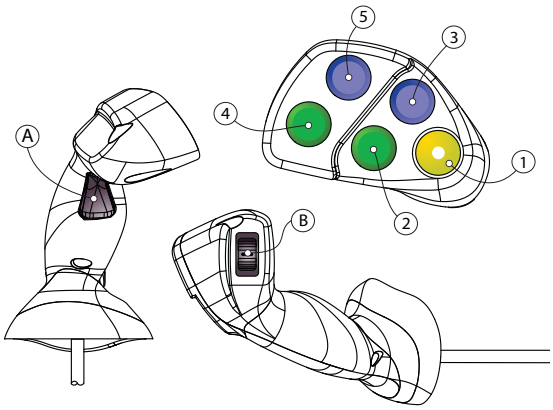
NOTE! Single button fold option is also available on Hydac screen (boom control screen) in cabin.

NOTE! The same functions can be accessed via HIVE screen.

NOTE: Please refer section HIVE of this manual.

Autofold (Single button fold) of Boom

Autofold or single button fold is currently performed by holding down the "Alt" button (A) and the yellow No. (1) button. Pressing again will pause the process.



Activation criteria are:

- The boom is either fully open or fully closed **and**
- The machine is stationary

The process will halt if:

- Any button is hit
- Any sensor reports an unhealthy state

NOTE! The 'autofold' option is also available on Hydac screen (boom control screen) in cabin.

WARNING! Never fold/unfold or lift/lower boom if any people/bystanders are in the safety zone. See "Additional Safety Instructions" on page 18.

To unfold boom "with engine running"

- Lift ParaLift up by pressing button (A) and then button (B) upwards.
- Ensure boom wings are clear of supports.
- Release buttons (B) and (A).
- Press button (A), then 'yellow' No.(1) button and boom should unfold with inner section opening first followed by outer section.

To fold boom (Engine must be running)

- Reverse of above.

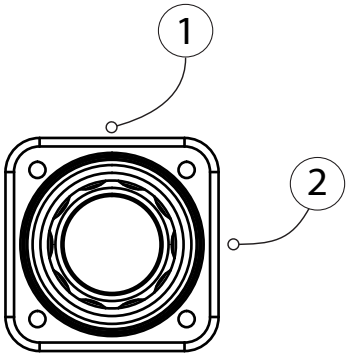
A. Secondary Joystick

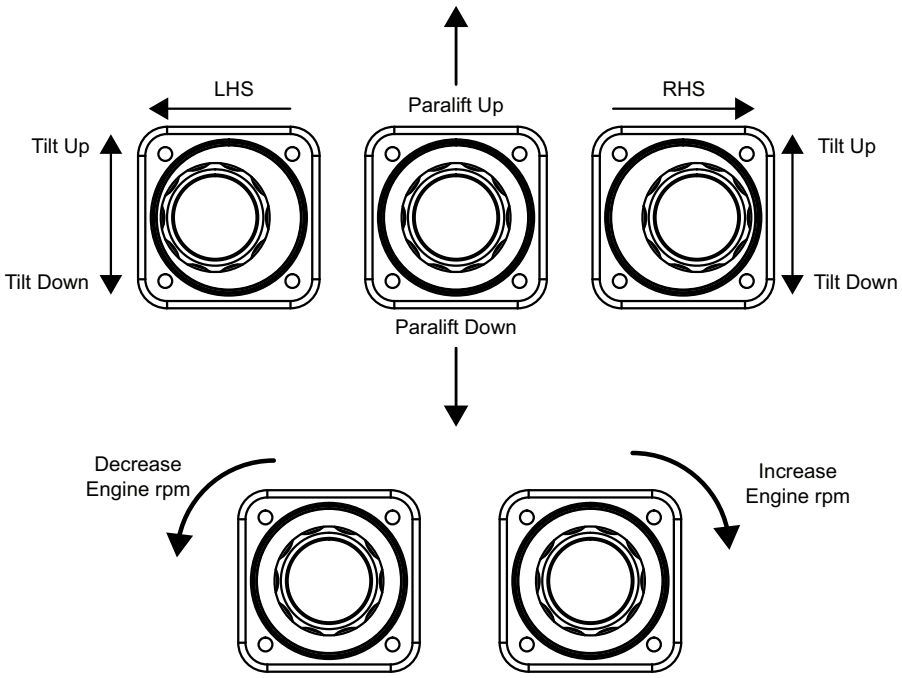
This joystick controls all boom hydraulic functions.

NOTE! No automatic boom fold is active if using this joystick.

NOTE! When folding or unfolding the boom, centre is subject to uneven fold forces.

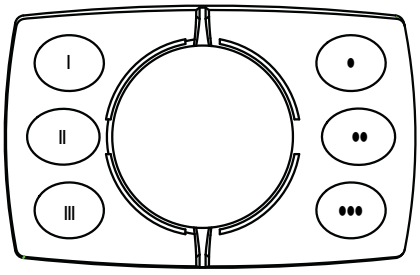
1. X-Axis
2. Y-Axis





Multifunction Dial

The multifunction dial is an integrated dial that interacts with cabin HIVE screen.



3 - Description

The multifunction display (DM 430E)

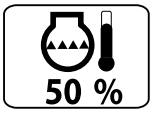
The multifunction display shows the information relating to the operation of the engine, (tachometer, temperature, etc.) and the various driving modes (road, field, etc.). The display also shows the errors that may occur during the use of the machine (temperature and pressure of the engine oil, transmission error, etc.). The DM 430E is controlled by navigation through a set of four soft keys located at the lower front of the display. The keys are context dependent.

A. LCD screen
B. Alarms
C. Selector button 1
D. Selector button 2
E. Selector button 3
F. Selector button 4
G. Drive mode status
H. Display of the function
I. Tachomater

Display of functions

- Press the push button (1) to scroll through various functions.

Messages in normal operating mode



Engine temperature

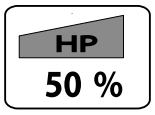
0 to 100%.

Engine oil pressure

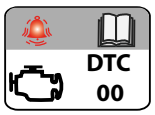
Turbocharger pressure

Hydraulic pressure of the transmission

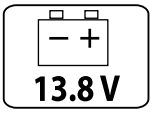
Instant fuel consumption



Power supplied by the engine



Engine diagnostic trouble codes (level 1)

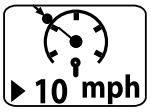


Battery charge voltage

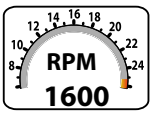
Limitation of the motor speed mode [field]

See “Limitation of engine speed - hydraulic oil temperature too low” on page 123.

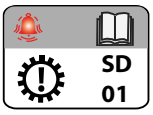
Restricting the speed of movement in mode [Road]



Restricting the speed of movement in mode [Field]



Displays the speed of the engine



Errors of functioning of the drive shaft

See “Transmission error codes” on page 214.

Preheating of the engine

Messages in selection mode

COMFORT Mode of conduct

See "Driving mode" on page 121.

Anti-slip disabled

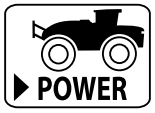
See "Driving mode" on page 121.

NORMAL Driving Mode

See "Driving mode" on page 121.

Anti-slip engaged

See "Driving mode" on page 121.



Mode of conduct POWER

See "Driving mode" on page 121.

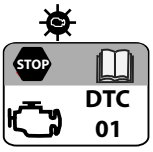
Alarm Messages - priority

WARNING! The display of these alerts requires immediate shut-down of the engine.

Alarm engine overheating

Alarm pressure of the turbo-compressor

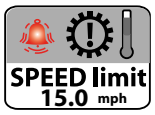
Alarm engine oil pressure.



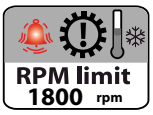
Alarm engine defect (level 3)

Alarm Messages - 'Degraded mode'

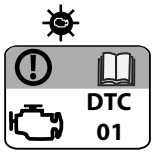
WARNING! These warning messages are displayed when the operating anomalies appear on the self-propelled.



Temperature of the hydraulic transmission too high



Temperature of the hydraulic transmission too low



Alarm engine defect (Level 2)

Alarm Messages - Maintenance

These warning messages are displayed when maintenance work must be performed on the self-propelled.

Maintenance (level 1)

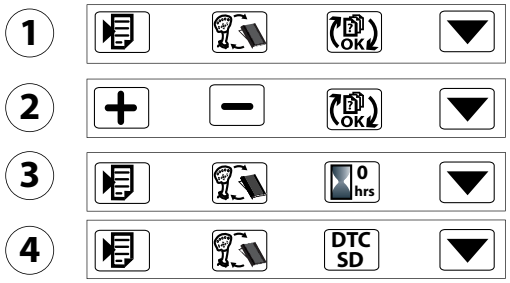
Maintenance (level 2)

3 - Description

Horizontal Menus

Press button to select the menu corresponding to the symbol.

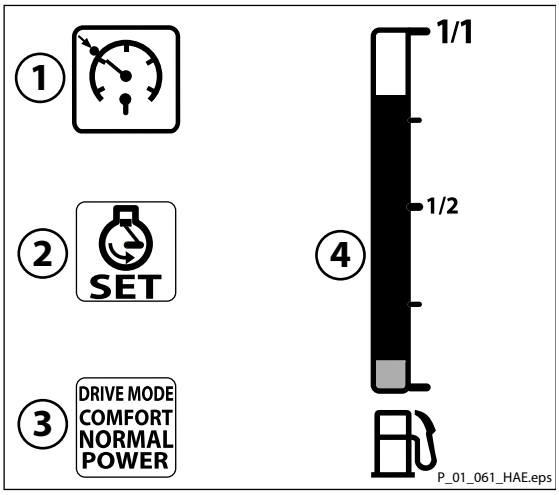
1. Normal Mode of Operation
2. Settings / settings
3. Hour meter
4. Management of errors of the transmission (SD) and the engine (DTC).



Vertical Menus

Press button to select the menu corresponding to the symbol.

1. Forward speed limitation
2. Engine speed limitation
3. Driving mode selector switch
4. Fuel gauge



NOTE! The fuel gauge (4) is displayed by default, or after 5 seconds of inactivity on one of the push buttons placed vertically.

Hydraulic System

AutoHeight

AutoHeight is a computer controlled boom stability & auto height control system which maintains the correct relationship and height of the boom to different field conditions. AutoHeight highly tuned computer controlled proportional electro hydraulics and ultrasonic sensors help spray more safely, reducing potential ground strikes and prevents incorrect spray height.

WARNING! The boom should never be used to spray with the pendulum lock engaged.

ATTENTION! For optimum AutoHeight performance the stability & height control sensors must be checked and cleaned regularly.

ATTENTION! Dusty, damp or missing sensors pads will not read accurately and AutoHeight will be compromised. Foam pads must be washed and dried daily. The boom should not be used if foam pads are missing from the sensors.

ATTENTION! Regarding AutoHeight, please refer to Norac UC7 manual for information about Operation, Calibration and Maintenance.

Autoheight Hydraulic block

On sprayers with AutoHeight, the hydraulic block manages hydraulic pressure for automatic boom height control functions. Functions controlled include:

- Lift (paralift)
- Wing Tilt

3 - Description

Liquid System

General information - valve system

All of the spray functions are operated via centrally situated valves with colour coded pictorial symbols for easy operation. The fluid system is located on the sprayer's right hand side under the cover. To access the Fluid Working Zone open the cover. Most valves can be operated from both the Fluid Working Zone or from the cab.

Pump

The product pump and valves are easy to access, they isolate the moving parts from the liquid.

Valves and symbols

The valves are identified by coloured symbols according to their function. They correspond to the different possible functions of the valves, thus facilitating their use. A function is activated by turning the handle towards the desired function.

Suction valve

TurboFiller empty

Chemical Probe Transfer

Rinse Venturi

Suction from external source

FlushTank Fill

MainTank Fill

MainTank drain

Pressure valve

TurboFiller Venturi/Probe

Spray boom

TurboFiller

TurboFiller = yellow symbols

The TurboFiller is located in the Fluid Working Zone on the sprayer's right side. The TurboFiller is where you add the chemicals to mix with water in the MainTank.

Capacity: approximately 35 litres.

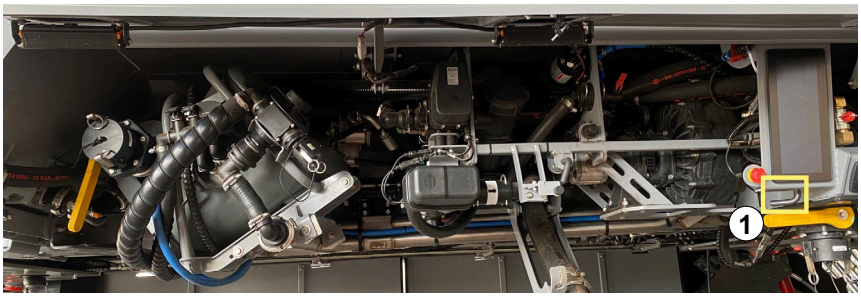
Before Use

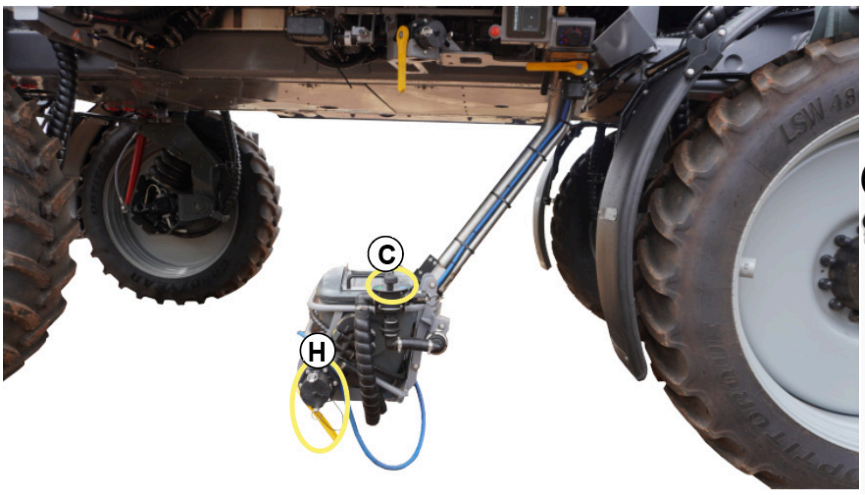
When being lowered it should be unlocked by pulling the locking lever (1). Press "Lower Hopper" on HIVE screen.

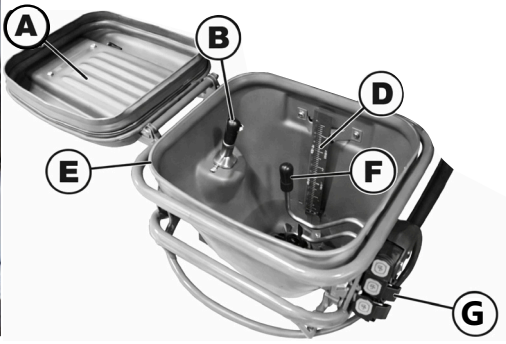
After Use

When retracting the TurboFiller after use, press "Raise Hopper" on HIVE screen. It automatically locks once it is back in storage position.

⚠ DANGER! Never operate the cleaning nozzle with the lid open unless it is covered by a chemical container!







Refer "Diagram - Fluid system" on page 76.

The TurboFiller features are:

- **A.** TurboFiller lid.
- **B.** Container Rinsing Nozzle
- **C.** Suction source tap (item#50 in fluid diagram)
- **D.** Hopper Scale
- **E.** TurboFiller Hopper
- **F.** TurboFiller Cleaning Nozzle (Drum Rinse)
- **G.** Levers for Rinsing and Swirl Functions (Manifold)
- **H.** 3"coupler (item#45 In fluid diagram)

3 - Description

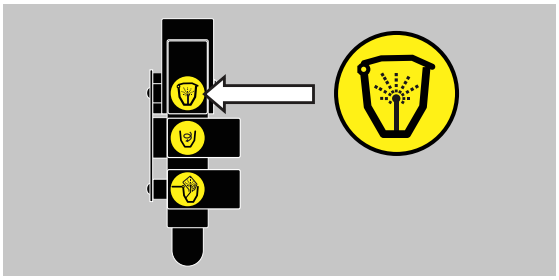
By operating the three levers on the right side of the TurboFiller, you can do the following:

- TurboFiller agitation.
- Drum rinse.
- Hopper rinse.

NOTE! A spray gun is also available for further cleaning.

Rinsing of TurboFiller Hopper

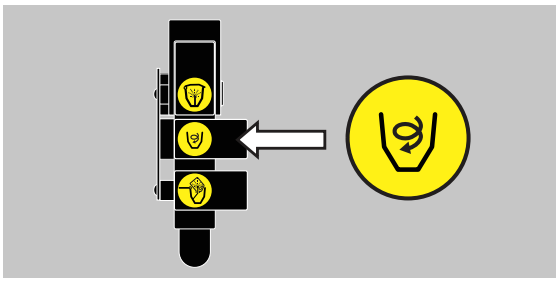
Use the upper lever for rinsing the hopper, when the filling of chemicals is completed and the lid is closed.



⚠ DANGER! Do not activate this lever, unless closing the TurboFiller lid, as spray liquid may otherwise hit the operator! Risk of injuries and spillage on the ground.

TurboDeflector Valve

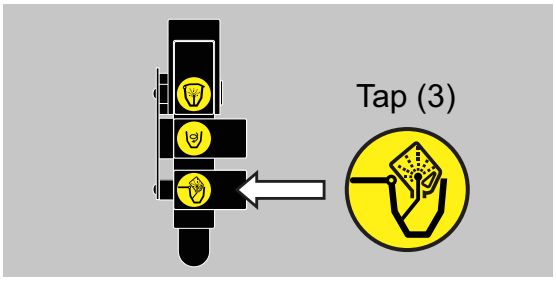
This TurboDeflector valve activates the vortex flushing of the TurboFiller. Push the lever for continuous liquid rotation in the hopper.



Rinsing of Chemical Containers

Use the valve for rinsing empty containers.

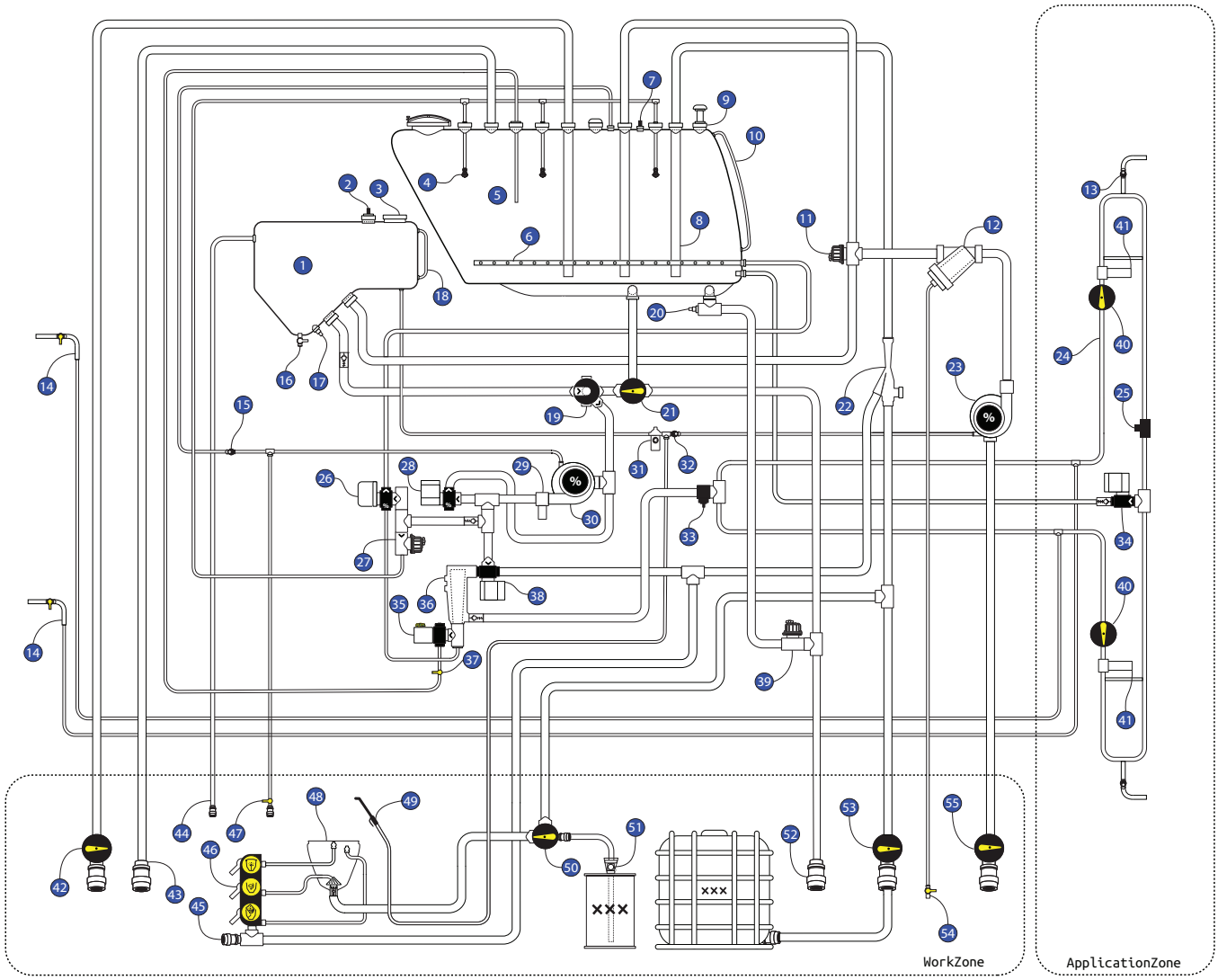
Enable the push-activated chemical container-rinsing nozzle, by lifting the lever up. Place the container over the rotating flushing nozzle in the left side of the TurboFiller. Then push to rinse the inside of the container.



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

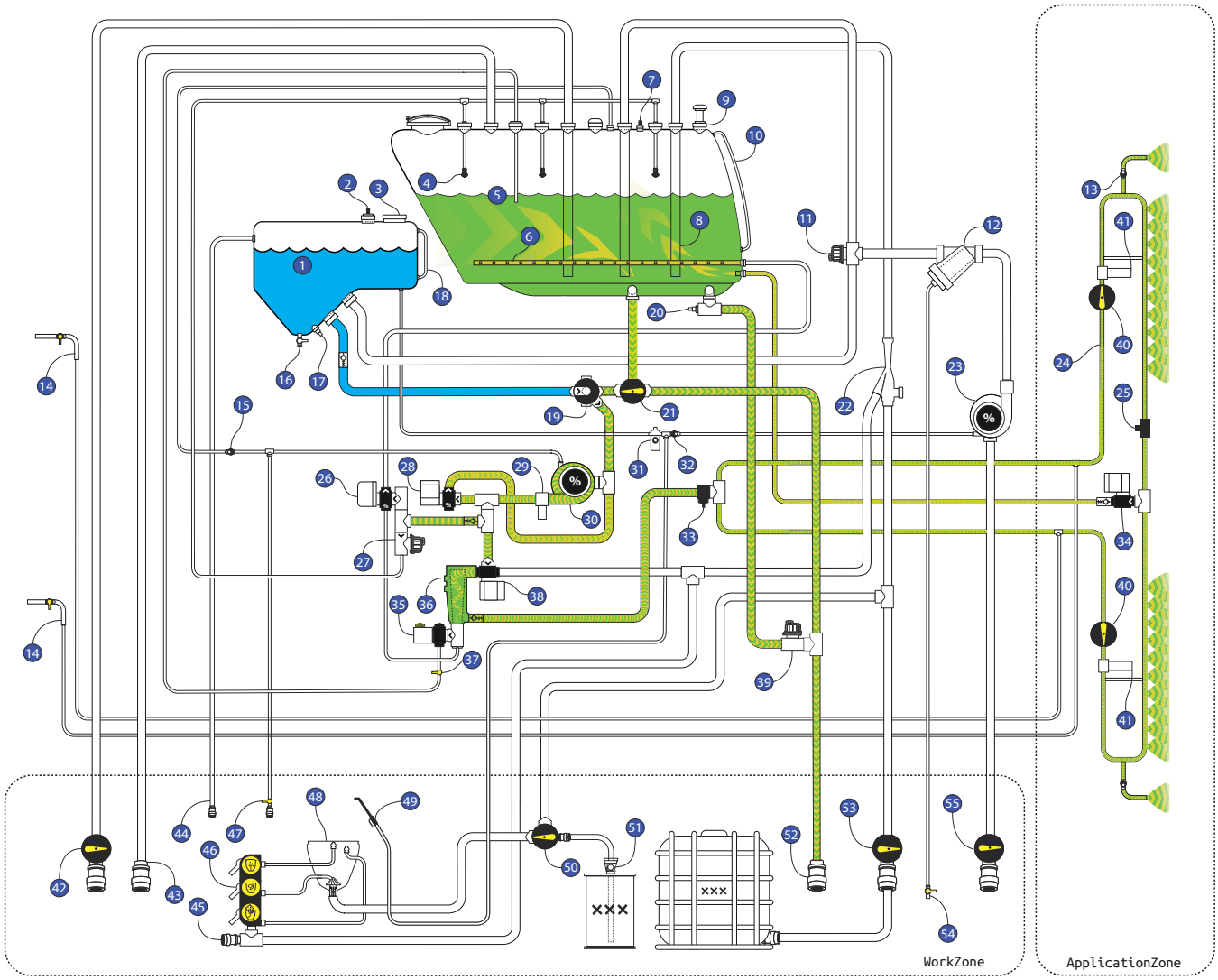
3 - Description

Diagram - Fluid system



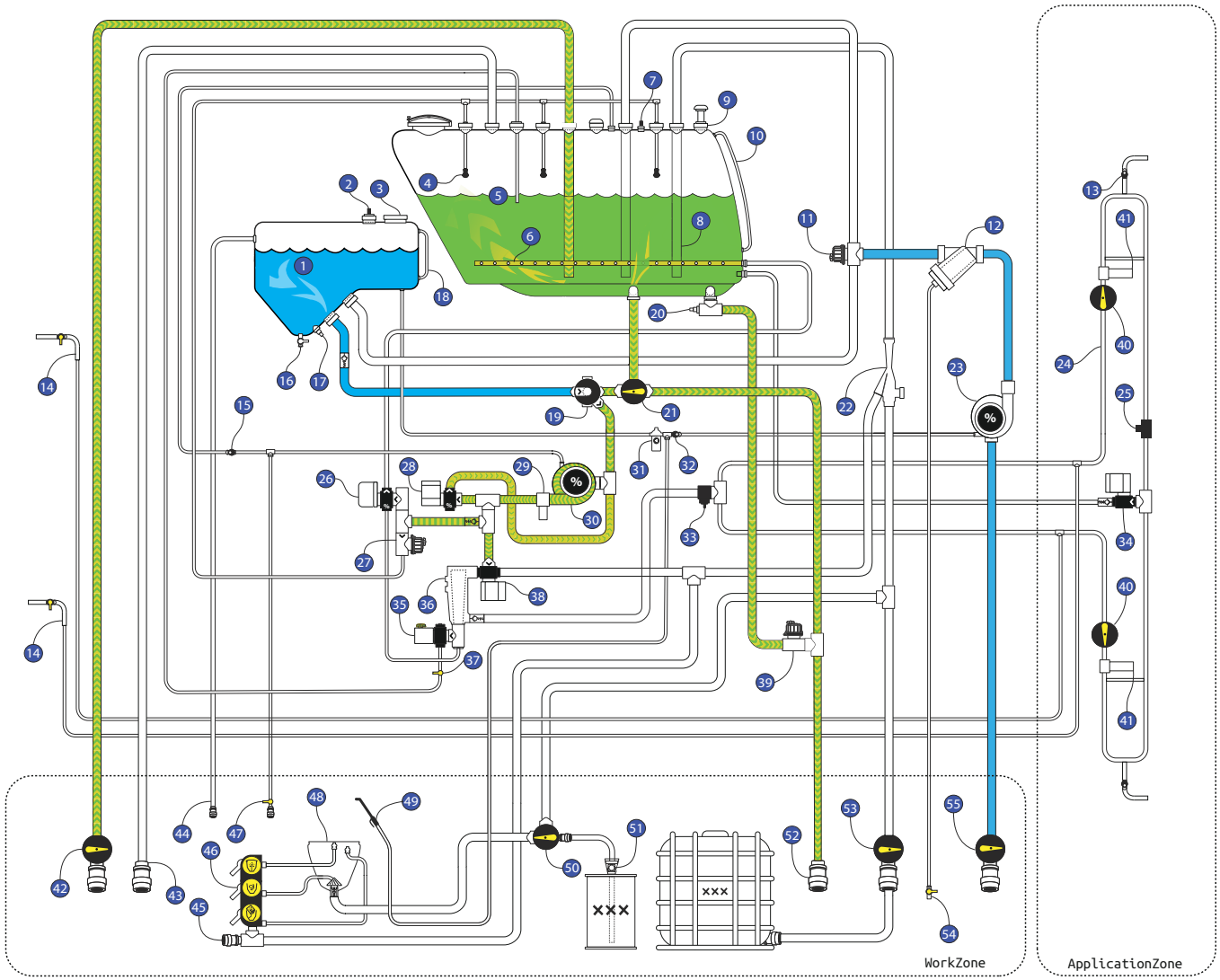
1. Fresh water tank
2. Fresh water tank full sensor
3. Fresh water lid
4. Rinse nozzle
5. Cyclone filter bypass return
6. Agitation outlet tube
7. Main tank full sensor
8. Inlet downpipe/s
9. Vacuum valve
10. Main tank level indicator
11. Fill direction valve
12. Fresh water Y-Strainer filter
13. Fence line nozzles
14. Wheel track nozzles
15. Product pump bleed valve
16. Fresh water drain tap
17. Fresh water level sensor
18. Fresh water level indicator
19. Suction valve
20. Main tank level sensor
21. Main tank manual drain valve
22. Venturi
23. Fresh water pump
24. Boom circuit
25. Boom pressure sensor
26. Agitation valve
27. Rinse nozzle valve
28. Regulation valve
29. Product pump pressure sensor
30. Product pump
31. 12V fresh water pump
32. Fresh water pump prime valve
33. Flow meter
34. Boom bypass valve
35. Cyclone filter return bypass valve
36. Cyclone filter
37. Cyclone filter boost tap
38. Pressure valve
39. Main tank dump valve
40. Boom shutoff tap/s
41. Boom filter/s
42. Main tank batch filling coupler
43. Main tank overflow
44. Fresh water tank overflow
45. Venturi coupler
46. Chemical hopper controls
47. Product pump bleed tap
48. Chemical hopper
49. Fresh water pressure gun
50. Suction source tap
51. Chemical drum coupler
52. Main tank dump coupler
53. Venturi fast fill coupler
54. Fresh water filter clean tap
55. Fresh water pump fill coupler

Diagram - Fluid system - MODE SPRAY



1. Fresh water tank
2. Fresh water tank full sensor
3. Fresh water lid
4. Rinse nozzle
5. Cyclone filter bypass return
6. Agitation outlet tube
7. Main tank full sensor
8. Inlet downpipe/s
9. Vacuum valve
10. Main tank level indicator
11. Fill direction valve
12. Fresh water Y-Strainer filter
13. Fence line nozzles
14. Wheel track nozzles
15. Product pump bleed valve
16. Fresh water drain tap
17. Fresh water level sensor
18. Fresh water level indicator
19. Suction valve
20. Main tank level sensor
21. Main tank manual drain valve
22. Venturi
23. Fresh water pump
24. Boom circuit
25. Boom pressure sensor
26. Agitation valve
27. Rinse nozzle valve
28. Regulation valve
29. Product pump pressure sensor
30. Product pump
31. 12V fresh water pump
32. Fresh water pump prime valve
33. Flow meter
34. Boom bypass valve
35. Cyclone filter return bypass valve
36. Cyclone filter
37. Cyclone filter boost tap
38. Pressure valve
39. Main tank dump valve
40. Boom shutoff tap/s
41. Boom filter/s
42. Main tank batch filling coupler
43. Main tank overflow
44. Fresh water tank overflow
45. Venturi coupler
46. Chemical hopper controls
47. Product pump bleed tap
48. Chemical hopper
49. Fresh water pressure gun
50. Suction source tap
51. Chemical drum coupler
52. Main tank dump coupler
53. Venturi fast fill coupler
54. Fresh water filter clean tap
55. Fresh water pump fill coupler

Diagram - Fluid system - MODE FILL



1. Fresh water tank
2. Fresh water tank full sensor
3. Fresh water lid
4. Rinse nozzle
5. Cyclone filter bypass return
6. Agitation outlet tube
7. Main tank full sensor
8. Inlet downpipe/s
9. Vacuum valve
10. Main tank level indicator
11. Fill direction valve
12. Fresh water Y-Strainer filter
13. Fence line nozzles
14. Wheel track nozzles
15. Product pump bleed valve
16. Fresh water drain tap
17. Fresh water level sensor
18. Fresh water level indicator
19. Suction valve
20. Main tank level sensor
21. Main tank manual drain valve
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25. Boom pressure sensor
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29. Product pump pressure sensor
30. Product pump
31. 12V fresh water pump
32. Fresh water pump prime valve
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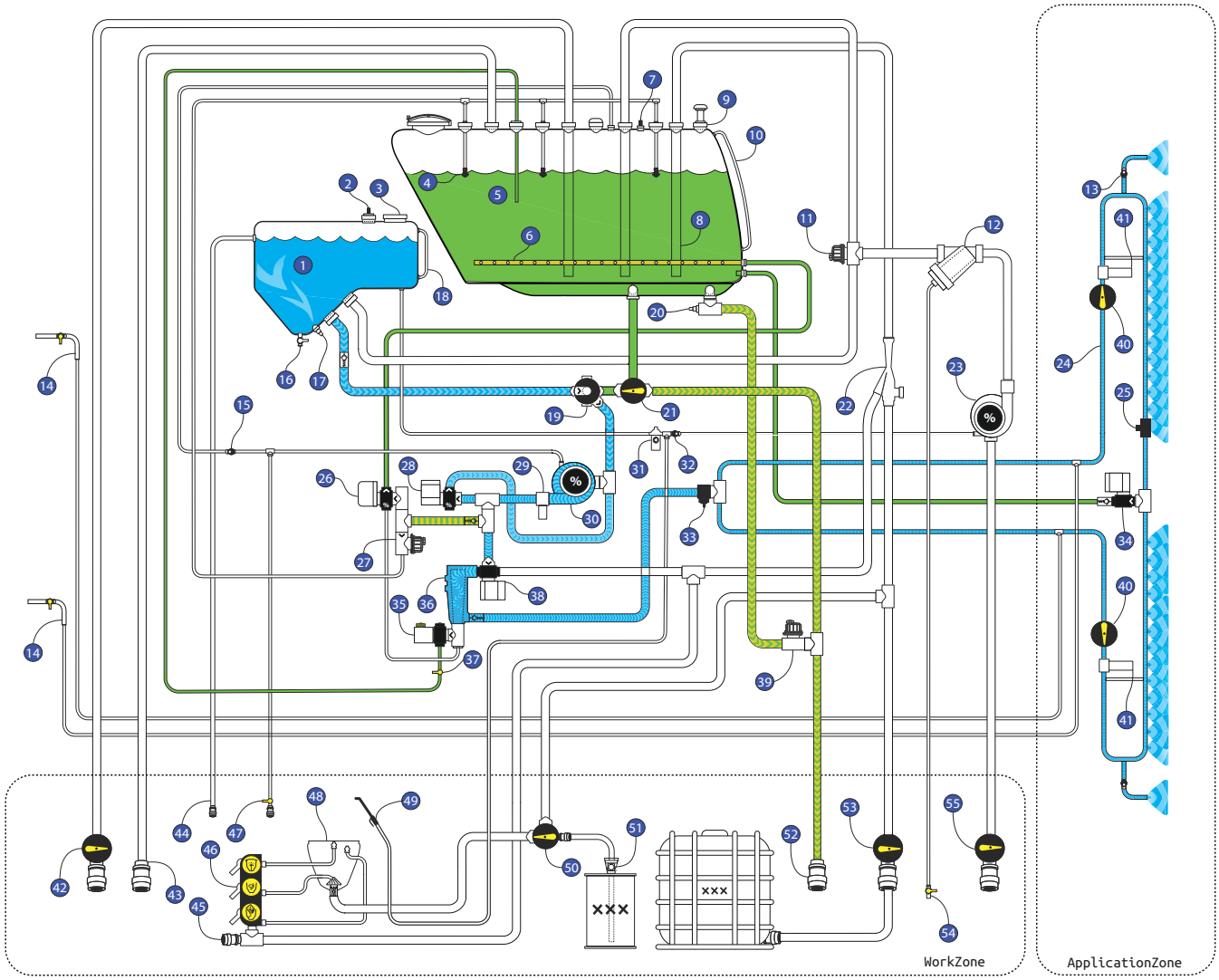
37. Cyclone filter boost tap
38. Pressure valve
39. Main tank dump valve
40. Boom shutoff tap/s
41. Boom filter/s
42. Main tank batch filling coupler
43. Main tank overflow
44. Fresh water tank overflow
45. Venturi coupler
46. Chemical hopper controls
47. Product pump bleed tap
48. Chemical hopper
49. Fresh water pressure gun
50. Suction source tap
51. Chemical drum coupler
52. Main tank dump coupler
53. Venturi fast fill coupler
54. Fresh water filter clean tap
55. Fresh water pump fill coupler

Diagram - Fluid system - MODE BOOM RINSE



1. Fresh water tank
2. Fresh water tank full sensor
3. Fresh water lid
4. Rinse nozzle
5. Cyclone filter bypass return
6. Agitation outlet tube
7. Main tank full sensor
8. Inlet downpipe/s
9. Vacuum valve
10. Main tank level indicator
11. Fill direction valve
12. Fresh water Y-Strainer filter
13. Fence line nozzles
14. Wheel track nozzles
15. Product pump bleed valve
16. Fresh water drain tap
17. Fresh water level sensor
18. Fresh water level indicator
19. Suction valve
20. Main tank level sensor
21. Main tank manual drain valve
22. Venturi
23. Fresh water pump
24. Boom circuit
25. Boom pressure sensor
26. Agitation valve
27. Rinse nozzle valve
28. Regulation valve
29. Product pump pressure sensor
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32. Fresh water pump prime valve
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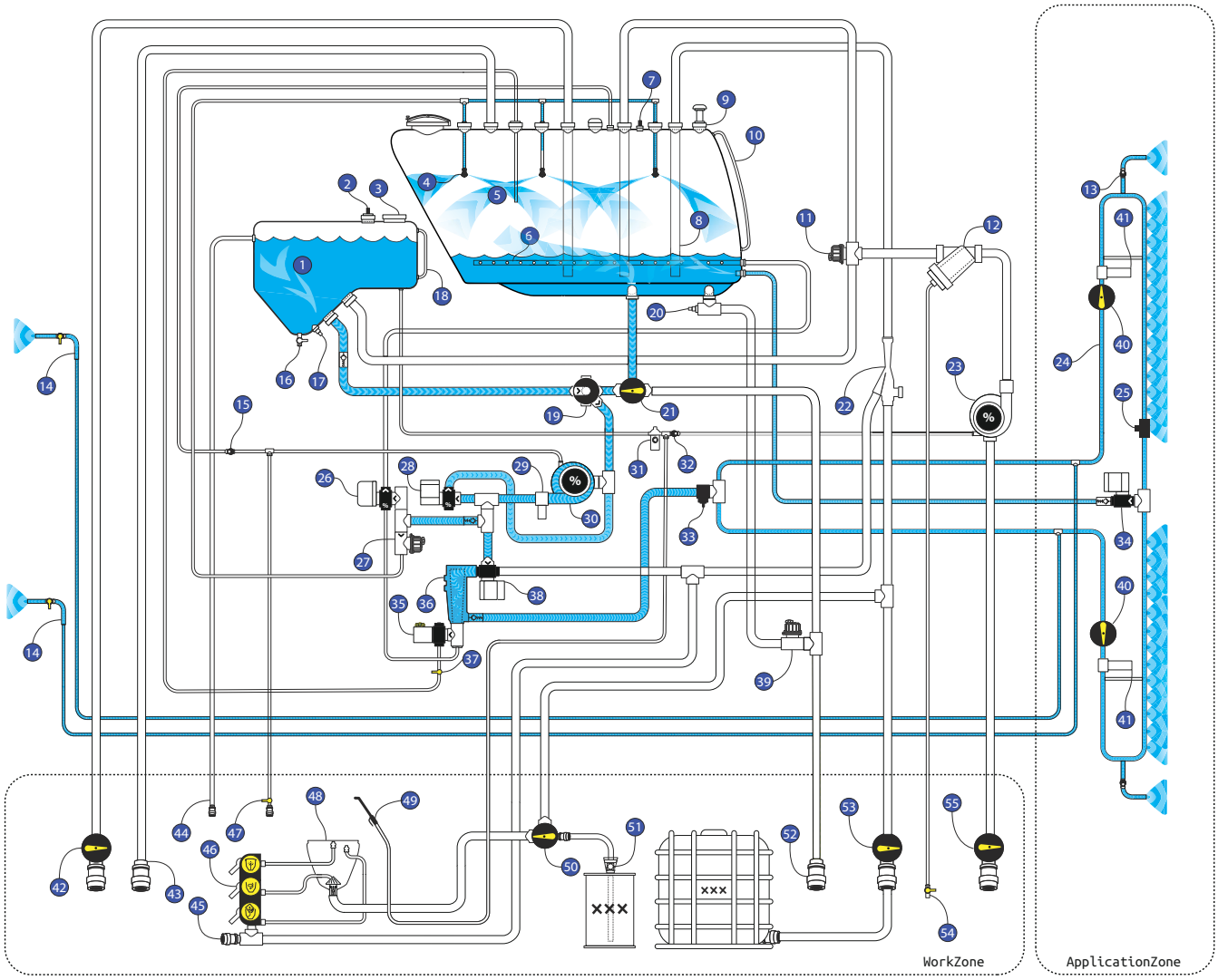
36. Cyclone filter
37. Cyclone filter boost tap
38. Pressure valve
39. Main tank dump valve
40. Boom shutoff tap/s
41. Boom filter/s
42. Main tank batch filling coupler
43. Main tank overflow
44. Fresh water tank overflow
45. Venturi coupler
46. Chemical hopper controls
47. Product pump bleed tap
48. Chemical hopper
49. Fresh water pressure gun
50. Suction source tap
51. Chemical drum coupler
52. Main tank dump coupler
53. Venturi fast fill coupler
54. Fresh water filter clean tap
55. Fresh water pump fill coupler

Diagram - Fluid system - MODE COMPLETE RINSE



1. Fresh water tank
2. Fresh water tank full sensor
3. Fresh water lid
4. Rinse nozzle
5. Cyclone filter bypass return
6. Agitation outlet tube
7. Main tank full sensor
8. Inlet downpipe/s
9. Vacuum valve
10. Main tank level indicator
11. Fill direction valve
12. Fresh water Y-Strainer filter
13. Fence line nozzles
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16. Fresh water drain tap
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23. Fresh water pump
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26. Agitation valve
27. Rinse nozzle valve
28. Regulation valve
29. Product pump pressure sensor
30. Product pump
31. 12V fresh water pump
32. Fresh water pump prime valve
33. Flow meter
34. Boom bypass valve
35. Cyclone filter return bypass valve
36. Cyclone filter
37. Cyclone filter boost tap
38. Pressure valve
39. Main tank dump valve
40. Boom shutoff tap/s
41. Boom filter/s
42. Main tank batch filling coupler
43. Main tank overflow
44. Fresh water tank overflow
45. Venturi coupler
46. Chemical hopper controls
47. Product pump bleed tap
48. Chemical hopper
49. Fresh water pressure gun
50. Suction source tap
51. Chemical drum coupler
52. Main tank dump coupler
53. Venturi fast fill coupler
54. Fresh water filter clean tap
55. Fresh water pump fill coupler

12 Volt pump

The set-up comprises of a hose, spray gun and an electric pump.

This pump is used for:

1. Priming the fresh water pump (Banjo).
2. Supply clean water to spray gun.

ATTENTION! Never point the water jet at people, animals, electric installations or equipment, overhead power lines or other sensitive objects.

ATTENTION! Never try to clean clothing or foot wear, especially if being worn by a persons.

ATTENTION! Never operate without approved chemical safety wear including face mask, gloves, respirator, boots and cover-alls.

Filters

A CycloneFilter is fitted in the liquid area. It has a built in self-cleaning function.

In-line filters are fitted on left and right of the boom.

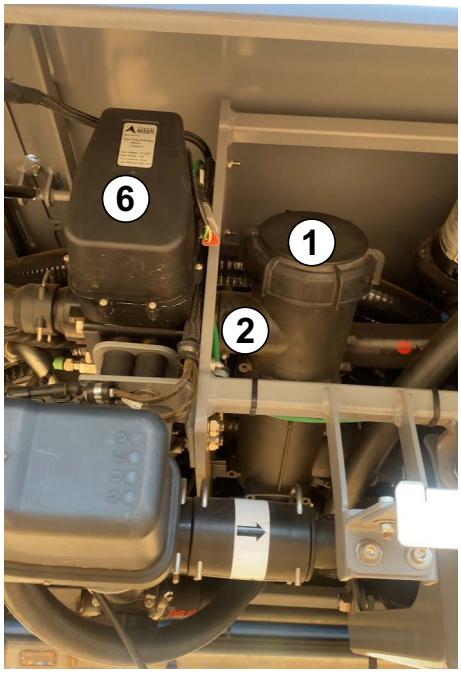
All filters should always be in use and their function checked regularly. Pay attention to the correct combination of filter and mesh size. The mesh size should always be less than the average of the nozzles in use.

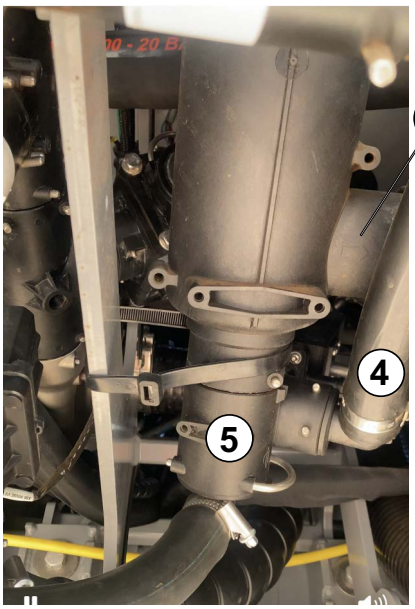
CycloneFilter

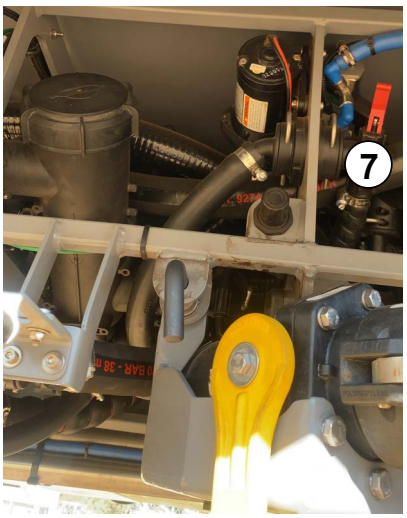
With the Cyclonefilter any impurities in the spray liquid will by-pass the filter and be recirculated back to the tank via the return flow.

Function diagram:

1. Filter lid
2. From pump through pressure valve
3. To boom
4. Return to tank
5. CycloneFilter Return Bypass valve
6. Pressure valve (Altek)
7. CycloneFilter Boost Tap







DANGER! The shutoff valve must always be turned to the closed position before opening the filter! Otherwise, the spraying liquid can hit you when opening the filter and drain the main tank content!

ATTENTION! Always do a visual inspection and cleaning of the filter regularly.

This filter demands attention when a chemical change mandates that the sprayer must be decontaminated for the next spray job to continue.

The operator chooses an electronic state in the Hive prior to any service. This closes all valves so liquid from tanks and booms will not continue to flow out of the filter once operator has opened it.

ATTENTION! The cyclone filter when opened will contain liquid. It is imperative that as this filter is located above head height the operator must have:

- Carried out a full decontamination of the sprayer prior to any maintenance being carried out.

- Work on a platform that will allow the operator to be comfortably able to open and remove the filter element, clean and reinstall and close.

ATTENTION! Be wearing all safety PPE,s as has been identified at start of this manual. See “Sanitary and Phytosanitary measures (SPS)” on page 33.

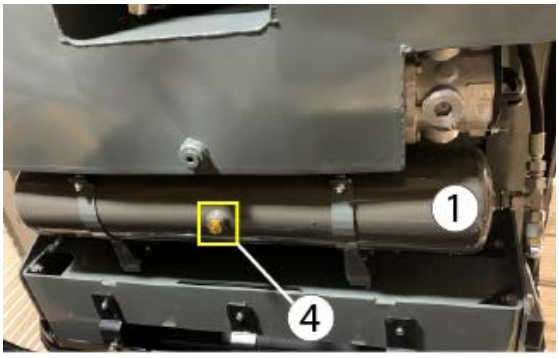
Air System

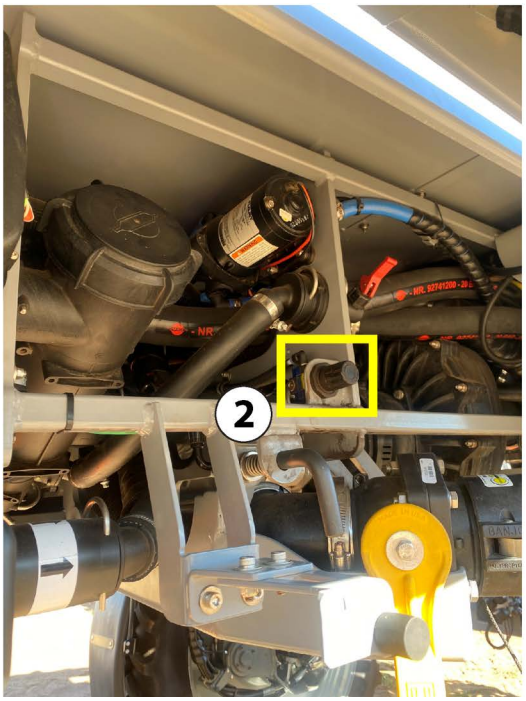
General Info

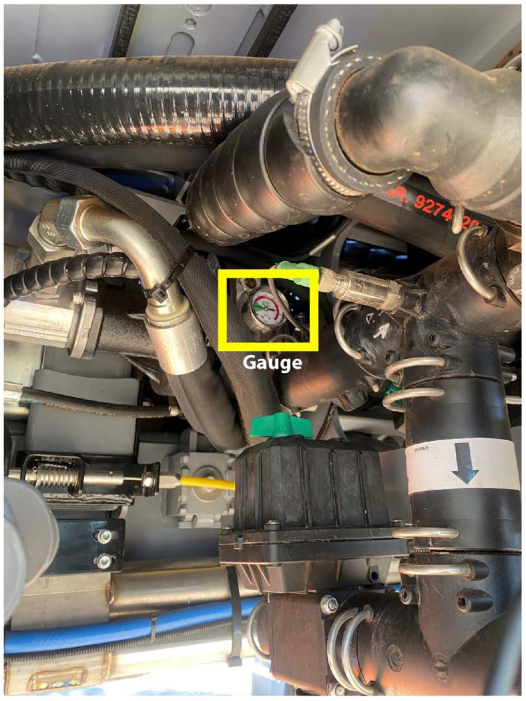
The compressor fills the air storage tank (1) to 8.5 bar.

Regulator (2) located in the fluid system regulates the air pressure in the pump at 30psi.

NOTE! Drain the air tank daily by pushing the relief valve (4).





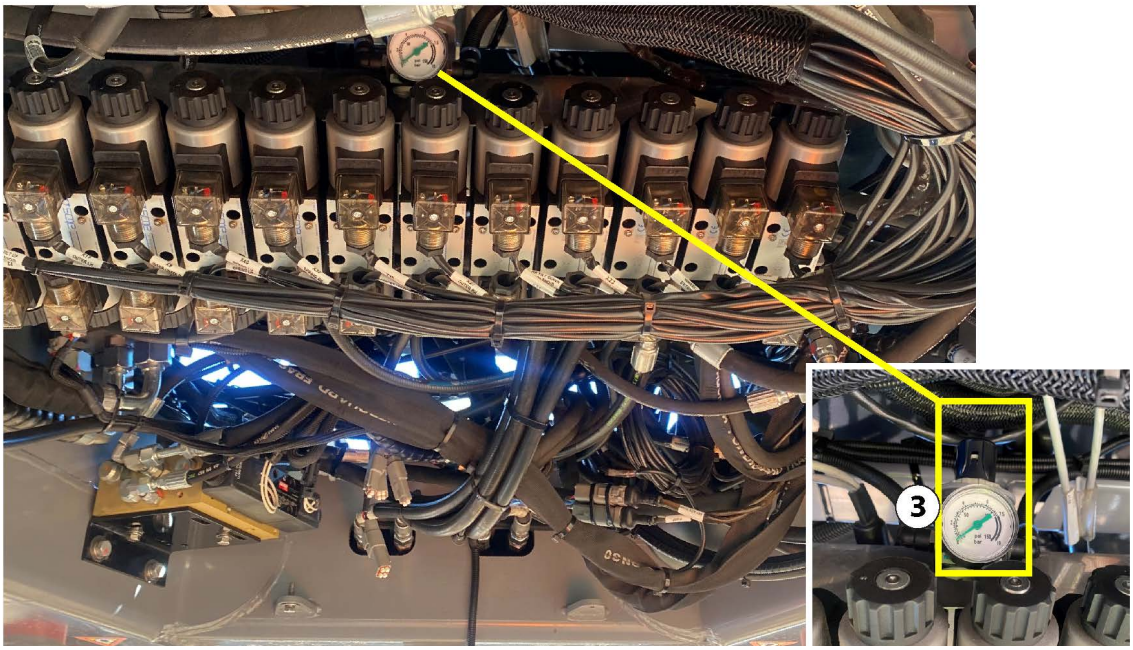


3 - Description

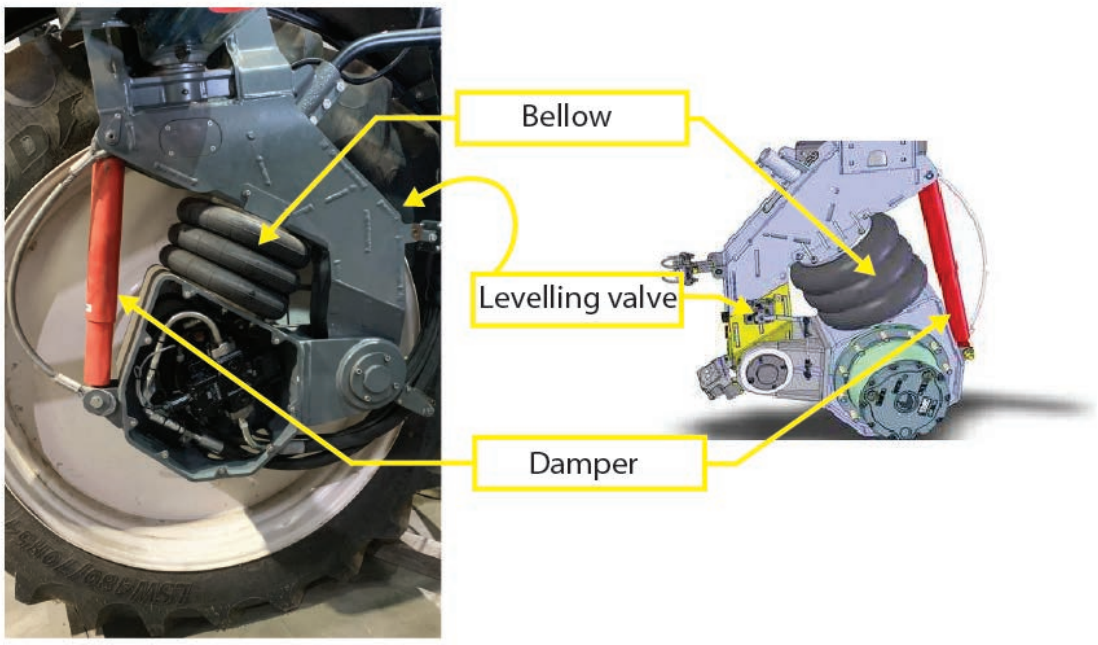
Regulator (3) located underneath the cabin maintains the height in the air suspension bellows and the system air pressure at 110psi.

A levelling valve mounted on each wheel maintains a constant suspension height, whatever the load (full/empty tank).

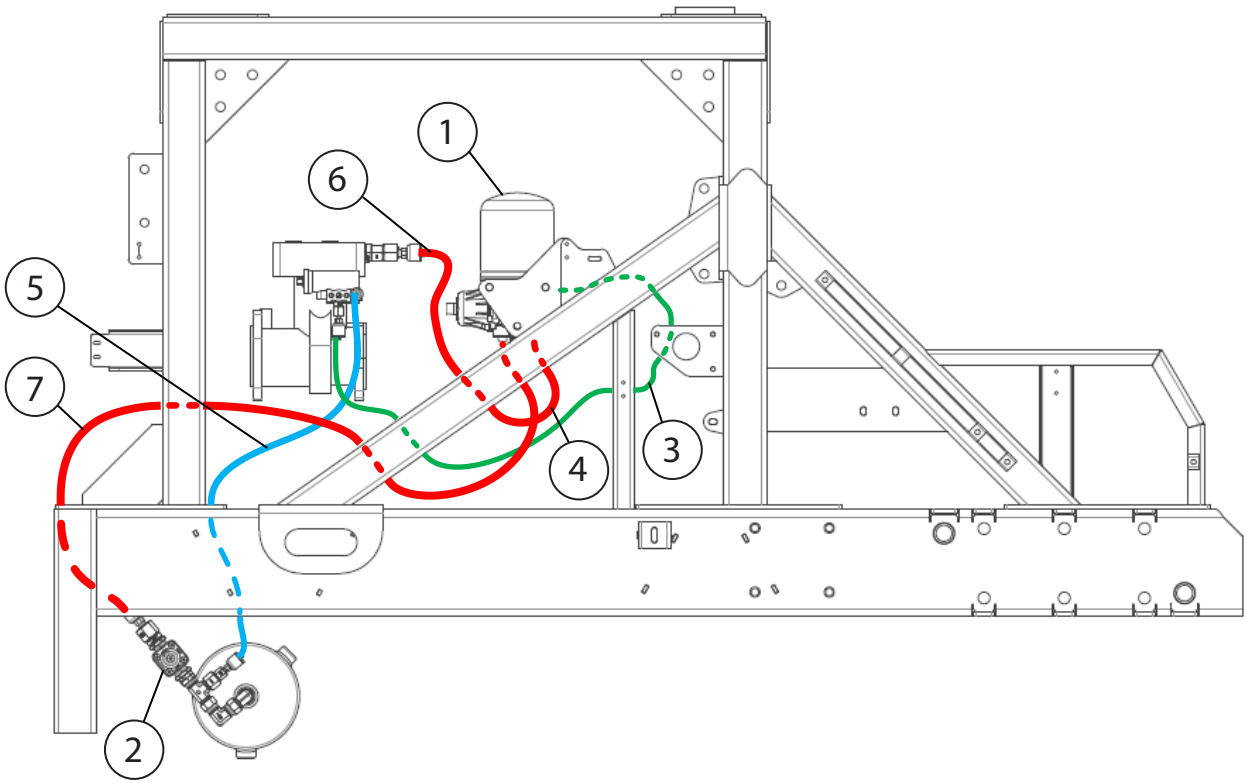
The dampers mounted on each wheel minimise the bouncing effect.



Please refer "Air Suspension Adjustment" on page 202 for more info.



Wabco Air Dryer System



1. Wabco air dryer
2. Wabco pressure-control check valve
3. Air dryer governor supply hose
4. Air dryer supply hose
5. Compressor unload hose
6. Compressor supply hose
7. Tank supply hose

Electrical System

Overview

This section outlines the key components and safety guidelines for the electrical system and Electronic Control Units (ECUs) responsible for managing the machine's transmission, hydraulics, and spraying functions. A clear understanding of these components is crucial for ensuring the safe and efficient operation of the machine.

Safety

- Battery Handling: Batteries contain corrosive materials and should be handled with care. Always wear appropriate personal protective equipment (PPE).
- Electrical Hazards: Electrical systems can pose serious risks. To reduce the risk of electrical shock or equipment damage, always disconnect the battery before performing any maintenance or repairs on the electrical system.
- Fuse and Relay Replacement: When replacing fuses and relays, ensure that the correct type and amperage are used to avoid electrical damage or potential system failure.
- Risk of System Failure: Unapproved alterations, such as splicing into power sources, may disrupt the balance of the electrical system, potentially causing malfunctions in critical systems like transmission, hydraulics, or spraying operations.
- Void of Warranty: Any unauthorised modifications, causing overloading, will void the manufacturer’s warranty. This is to ensure that the system operates as designed, without any unintended interference.

Transmission Control Unit (ECU): Danfoss MC050-110

Purpose:

- Controls the hydrostatic transmission, regulating speed and direction.

Function:

- Adjusts engine speed to maintain desired vehicle speed.
- Controls the hydrostatic pump and motor to achieve forward, reverse, and neutral.
- Monitors and protects the transmission system.

Boom Hydraulic Control Unit: HCH590

Purpose:

- Manages the boom hydraulic system, controlling the flow of the hydraulic fluid. It has an automotive-grade enclosure, which protects it from dust, moisture, and vibration.

Function:

- Activates and controls hydraulic cylinders and for various boom functions via UT screen in cab. For HCH 590 controller fault codes, see "HCH590 Controller fault codes" on page 224.

Safety:

- Hydac controller incorporates short-circuit protection on all outputs.
- It is not allowed to use any other connector or cable harness than the ones provided by HARDI.

Servicing and Maintenance of Connectors:

- This controller is a programmable unit that may require software updates to maintain optimal performance. For any necessary updates, please contact your local HARDI dealer.
- The connectors and pins used are specifically designed for the operational demands and may not be compatible with standard components. Using non-approved parts could compromise the performance and safety of the machine. For further assistance or to order replacement parts, please contact your local HARDI dealer.

Spraying Control Unit: HCM3

Purpose:

- Controls the spraying system, regulating the application of chemicals.

Function:

- Controls the flow rate and pressure of the spraying pump.
- Monitors the level of chemicals in the spray tank.
- Provides features to limit over-application.

Safety:

- Do not use the system if some of its parts are damaged. Damaged parts can cause malfunctions and lead to injuries.
- Only use original components.

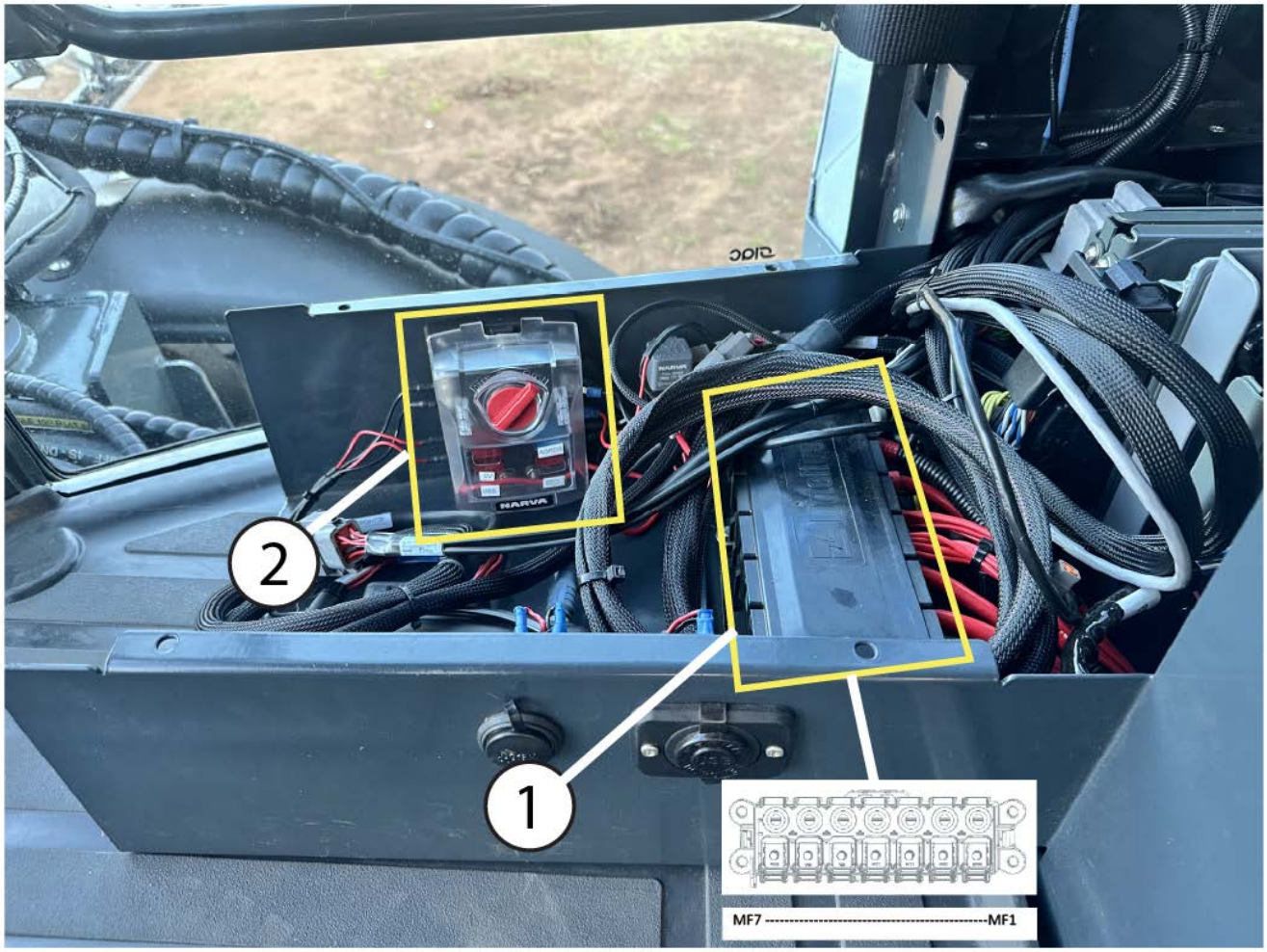
3 - Description

1. Fuse locations

1.1 Main fuse

The main fuse (1) is inside the floor box located under the console in the cabin. These fuses are critical as it distributes power to all systems throughout the machine.

Fuse	Amp (A)	Description
MF1	400A	ALTERNATOR POWER
MF2	100A	FUSE BOARD POWER
MF3	100A	CAB POWER DISTRIBUTION MODULE (P14)
MF4	125A	ECU POWER (HCH590, NORAC, HCM3)
MF5	150A	FLUID POWER DISTRIBUTION MODULE (P14)
MF6	100A	GEOSELECT
MF7	80A	CAB FLOOR BOX



1.2 Auxiliary fuse box

This fuse box (2) is also located inside the floor box.

NOTE: If any of these fuses need to be replaced, please contact HARDI dealer for spare parts.

1.3 Fuse board

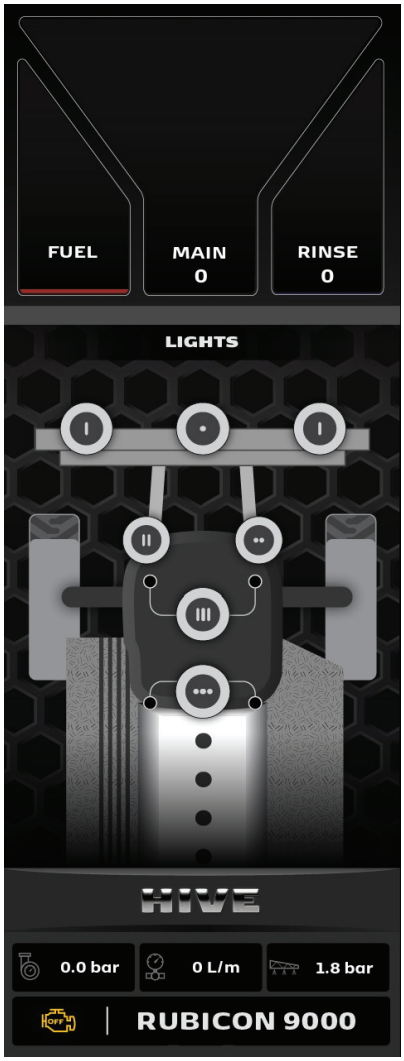
There is a fuse board located behind driver's seat. This can be accessed by opening the highlighted panel.

RELAYS	Amp.(A)	DESCRIPTION	RELAYS	Amp.(A)	DESCRIPTION
K01	30A	Fan speed 3 relay	K16		Timer
K02	30A	Fan speed 2 relay	K17	25A	Sidelight micro relay
K03	30A	Air conditioning and fan speed 1 relay	K18	25A	Micro relay for controller-released starter
K04	25A	Air conditioning compressor micro relay	K19	25A	Ignition micro relay for neutral position
K05	25A	Additional micro relay	K20	40A	After ignition relay
K06	25A	Additional micro relay	K21	40A	After ignition relay
K07	25A	Not used	K22	25A	Brake light relay
K08	25A	Not used	K23	25A	Tool option relay
K09	25A	Hazard light micro relay	K24	25A	Micro relay for parking brake solenoid valve
K10	25A	Not used	K25	25A	Micro relay for valve group lighting
K11	25A	Not used	K26	25A	Additional micro relay 1
K12	25A	Not used	K27	25A	Not used
K13	25A	Not used	K28	25A	Not used
K14	25A	Not used	K29	40A	Additional micro relay 4
K15	25A	Not used	K30	40A	Additional micro relay 5
			K31	40A	Additional micro relay 6

Fuse	Amp.(A)	DESCRIPTION	Fuse	Amp.(A)	DESCRIPTION
F1	3A	Timer	F30	15A	Fuse for ignition key input
F2	25A	Sidelight fuse	F31	10A	Fuse for starter
F3	3A	Cab inside lighting fuse	F32	15A	Fuse for low beam headlights
F4	15A	Fuse for main beam, low beam and sidelight switch input	F33	15A	Fuse for main beam headlights
F5	15A	Fuse for K01 relay – fan speed 1	F34	10A	Not used
F6	15A	Fuse for K02 relay – fan speed 2	F35	25A	Fuse for windscreen washer and wipers
F7	30A	Fuse for air conditioning and K03 relay – fan speed 3	F36	7.5A	Fuse for audible alarms
F8	5A	Before ignition fuse for vehicle radio	F37	10A	After ignition BOOM SENSORS / FLOOR BOX
F9	7.5A	Electronic side rear-view mirror fuse	F38	10A	After ignition CONSOLE
F10	10A	Air conditioning compressor fuse	F39	10A	After ignition fuse for HYDAC, NORAC, HCM3 controller
F11	7.5A	Sauer controller input fuse	F40	10A	After ignition CAB & FLUID PDM
F12	7.5A	Sauer controller input fuse	F41	10A	After ignition fuse for Cummins engine controller
F13	10A	Console	F42	10A	Fuse for parking brake solenoid valve
F14	10A	Not used	F43	10A	Brake light fuse
F15	10A	Not used	F44	7.5A	Sauer controller input fuse
F16	15A	Free	F45	7.5A	12 V Battery not used
F17	15A	Free	F46	7.5A	Sauer controller input fuse
F18	20A	Fuse for battery flashing indicator unit	F47	5A	Sauer controller input fuse
F19	15A	Not used	F48	5A	Free in X290-15
F20	15A	Not used	F49	5A	Fuse for nitrogen ball oil pressure buzzer
F21	15A	Hazard light fuse	F50	5A	Fuse for hydraulic oil level buzzer + 1 free connected input
F22	15A	Not used	F51	7.5A	Fuse for reverse ignition input, rear camera and engine indicator light
F23	15A	Fuse for pneumatic seat compressor unit	F52	5A	Fuse for Sauer display
F24	15A	Not used	F53	5A	After ignition fuse for flashing indicator unit
F25	15A	Not used	F54	5A	Fuse for cab headlight switch input
F26	15A	Not used	F55	3A	After ignition fuse for air conditioning
F27	15A	Not used	F56	3A	Fuse for CAN diagnostics socket
F28	15A	Not used	F57	7.5A	Fuse for rear sidelights
F29	15A	Not used	F58	7.5A	Fuse for front sidelights

2. CAB Power distribution

The main function of the electronic power distribution box is to power the working lights. This unit is integrated into the HIVE CAN network, allowing all lights to be controlled directly via the HIVE screen. For more details on light operation, please refer to the section HIVE.

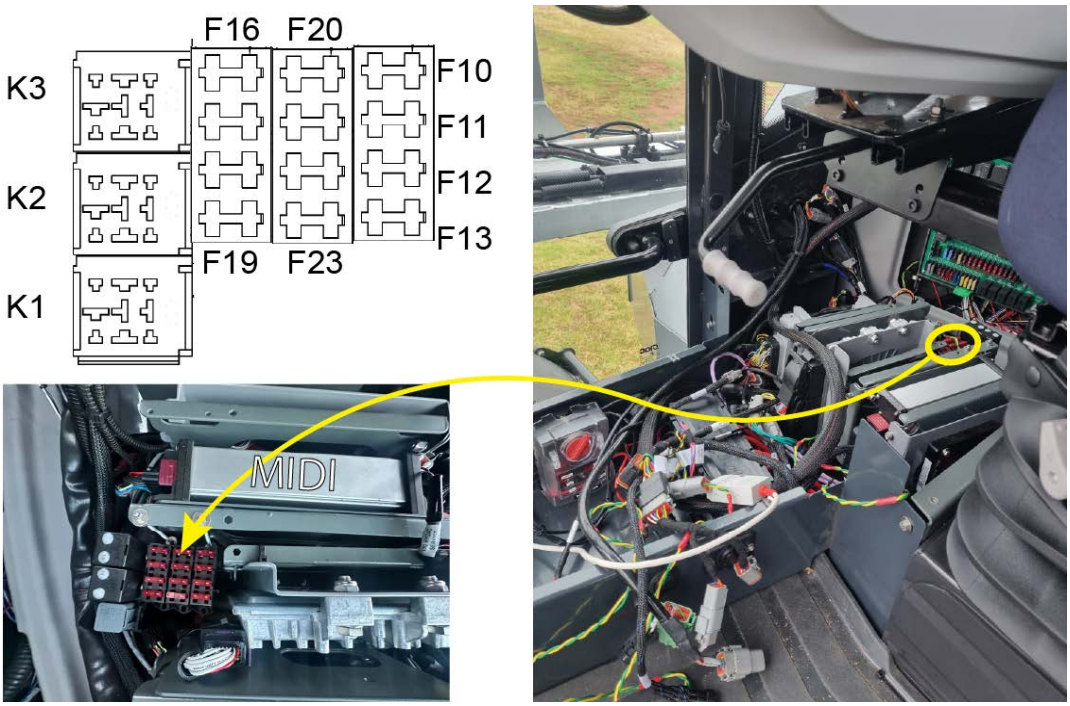


WARNING! DO NOT splice into any power lines without prior consultation with HARDI dealer.

WARNING! Overloading the system by splicing or adding unapproved power sources can cause malfunction, such as lights flashing or system errors.

3. ECU POWER

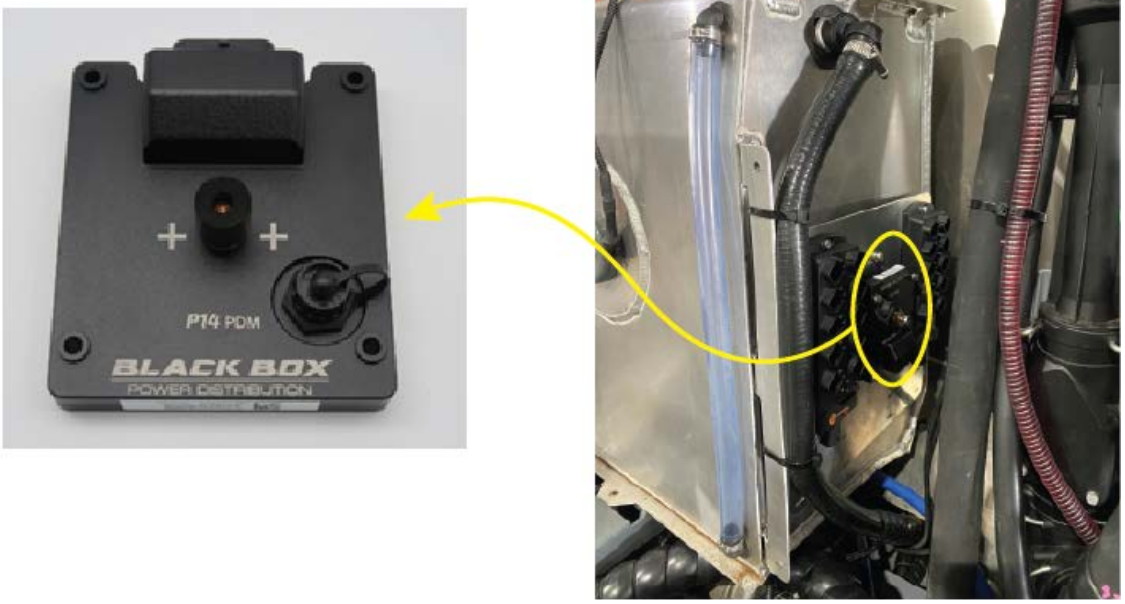
The fuse arrangement is designed to protect key components such as the HCH590, NORAC, and HCM3. Relays K3 and K2 are responsible for initiating the start-up sequence of the control units, with K1 and K2 waking up the HCH590 and NORAC first. After 30 seconds, relay K3 will then activate the HCM3.



*A-Auxiliary

Fuse	Amp (A)	Description
A-F10	10 A	+12 BATT HCM3
A-F11	10 A	+12 BATT HCM3
A-F12	10 A	+12 BATT HCM3
A-F13	10 A	+12 BATT HCM3
A-F16	10 A	+12 BATT HCH590
A-F17	10 A	+12 BATT HCH590
A-F18	10 A	+12 BATT K3(30)
A-F19	10 A	+12 BATT K3(30)
A-F20	10 A	+12 BATT HCH590
A-F21	10 A	+12 BATT HCH590
A-F22	10 A	+12 BATT HCH590
A-F23	10 A	+12 BATT HCH590

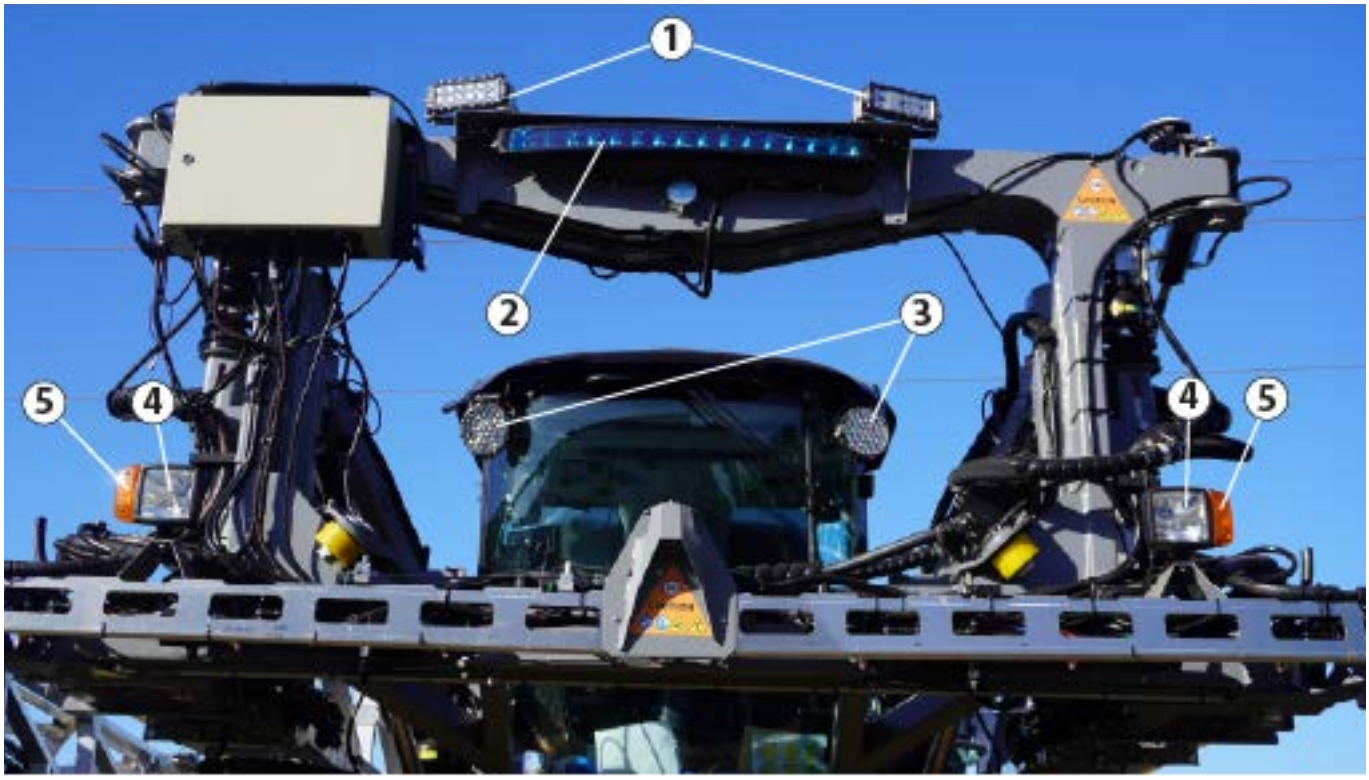
4. Fluid Power distribution



As a programmable device integrated into the HIVE CAN network, it has been specifically configured to provide power to each valve in the fluid platform.

WARNING! DO NOT to splice into any power source connected to this unit, as doing so can lead to system overload or case malfunction in the components, potentially disrupting the operation of the entire platform.

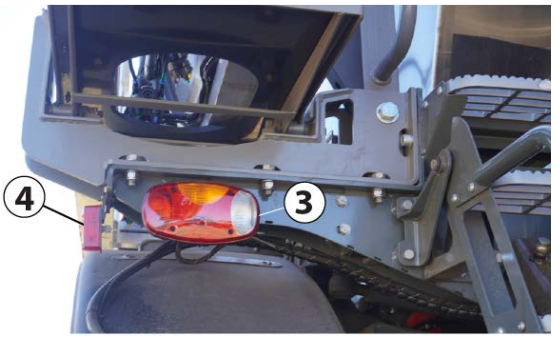
Lights (Front)



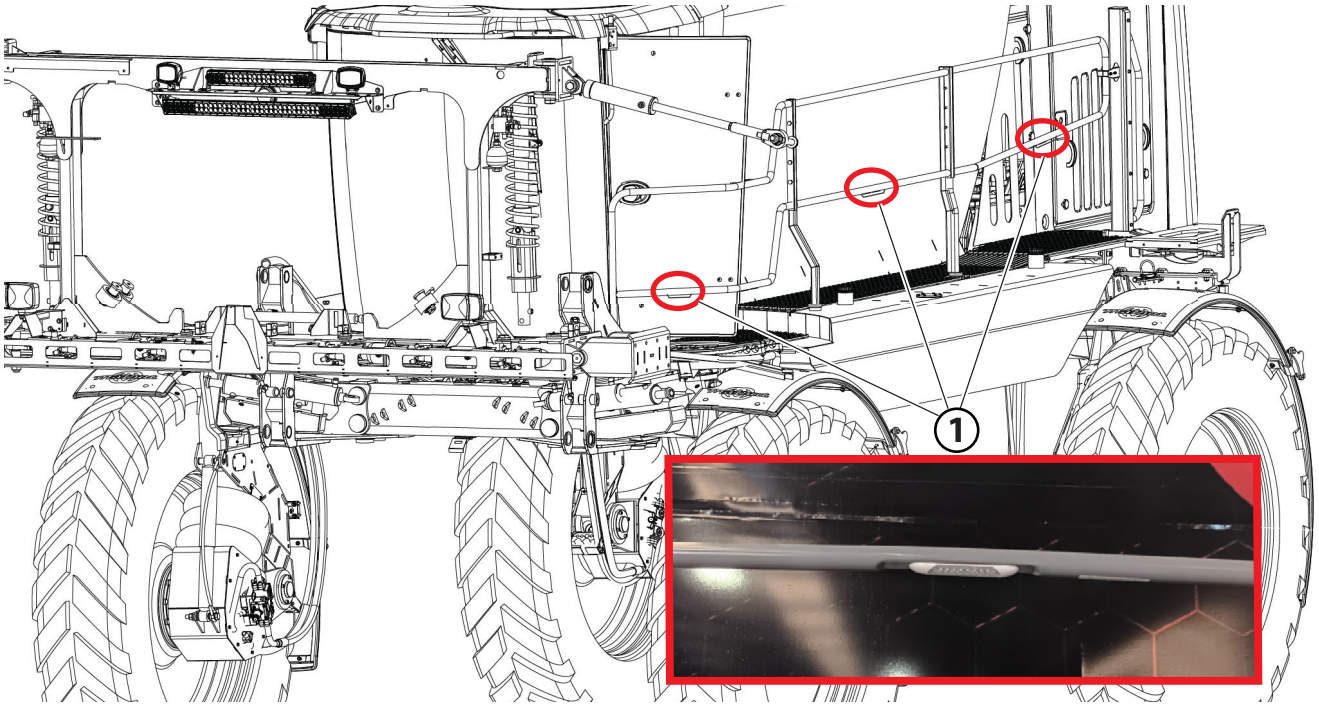
1. Work lights
2. Drive light
3. Spot lights
4. Low/High beam lights
5. Indicator lights
6. Roof light bars

Lights (Rear)

1. Rotating beacon light
2. Rear Egress lights
3. Rear combination lights
4. Side clearance lights

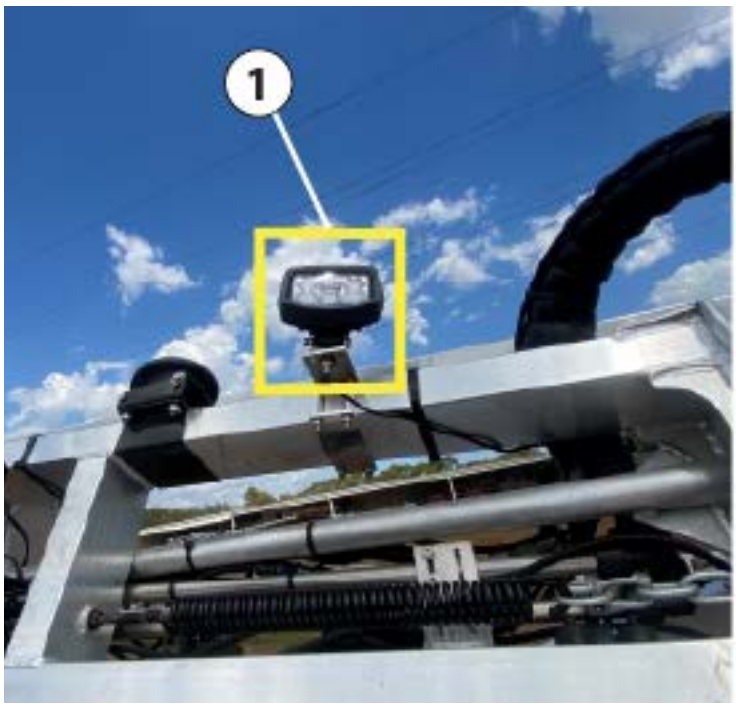


Lights (Walkway)

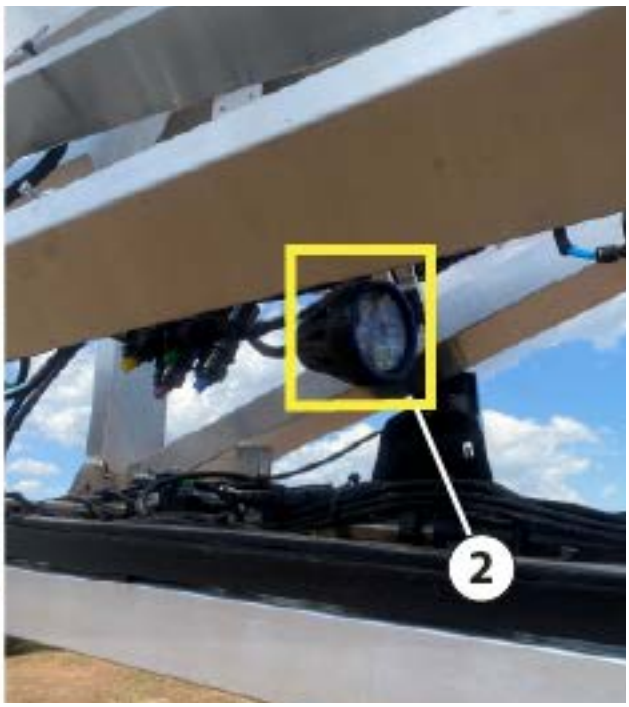


1. Platform (walkway) lights

Lights (Boom)



1. Over boom lights



2. Under boom lights

GeoSelect (Optional)

General Information

GeoSelect is a ground breaking technology in the development of spot spraying for farmers. Using scanned imagery and the HARDI Australia software program, weed location can be identified, given a GPS coordinate and sprayed at any time, day or night. Using just the right amount of chemical mix required equates to a significant reduction in chemical usage and costs.

- Geo-locate every weed in the paddock. Once processed, transfer the Dynamap to the sprayer for spot spraying.
- GPS receivers mounted on the boom continuously measure boom height and yaw and adjust chemical placement at speeds up to 30km/h and an application accuracy rate of up to 99.7%.
- The software calculates exactly how much chemical is required before you start. Chemical use can be reduced by up to 90%.

NOTE: GeoSelect box (1) is located at the top right corner of the Rubicon boom centre.

NOTE! More information can be found at https://myhardi.com.au/geoselect

HIVE

General Information

The HIVE brings together components and subsystems into one integrated system, ensuring that together they all function seamlessly as one. This advanced control system includes a completely remodelled armrest console with integrated dial and joystick interface and a display that promotes situational awareness inside and outside the cab by displaying critical information at eye level.

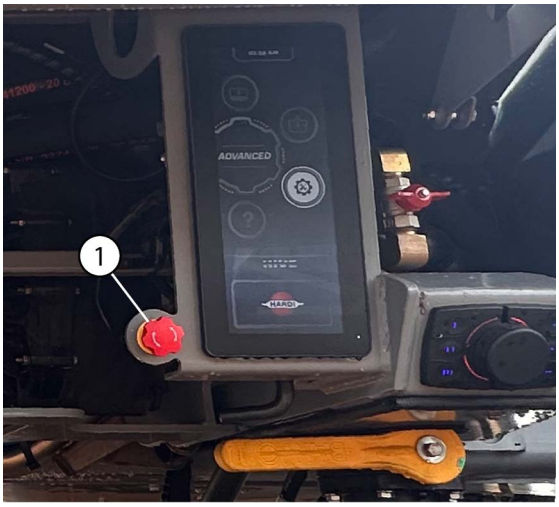
The "HIVE" concept extends to the filling station, with its new HIVE system screen. This displays clear filling information plus a set of visual guides and videos, so the operators can master filling the sprayer quickly. The Fill Station displays valve positions and pump speeds allowing hopper functions to be done automatically.

Other main functions like track width adjustment, boom controls, operating lights, etc. can also be performed via HIVE.

HIVE User Interface - Overview

Operation of the fluid functions is performed either using the HIVE display located in the cabin or using the multifunction dial located at the fluid station work zone. The display interface provides the operator with a familiar and easy way of selecting and controlling the fluid station functions.

The red button (1) is to stop the pump and to close all fluid valves.



ATTENTION! The red button does not stop the engine or turn the machine OFF.

ATTENTION! It is recommended to use the multifunction dial in order to keep the screen clean from chemicals.

General information

Unloading the sprayer from the truck

The machine can only be unloaded if the engine is running. To move the machine, you must observe the following points.

Turn the main switch to power the electrical circuits.

Place joystick in neutral position.

Check park brake is engaged.

Turn the ignition key to start the engine.

Select 'Field' mode (grass icon).

Increase engine rpm to 1600.

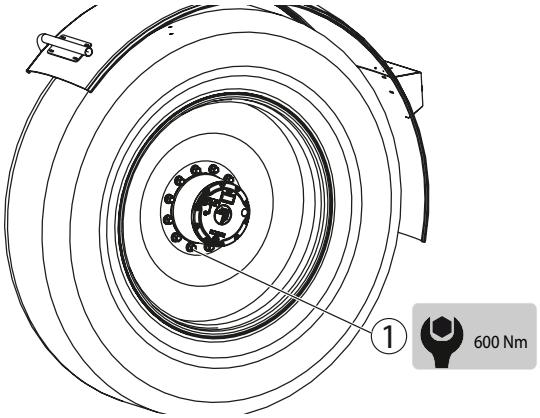
Ensure that no one is in the unloading area.

Move the joystick slowly.

NOTE! Setting cruise control in Danfoss screen to 3km/h may assist in loading.

Wheel nuts

- Tighten the nuts and apply a tightening torque of **650** Nm (**479.4** lb.ft).

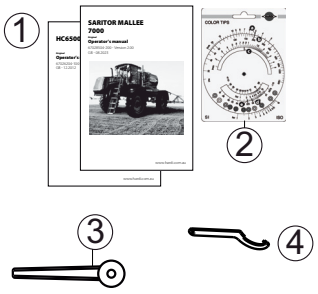


WARNING! Never oil or grease the wheel nut threads. Observe the tightening torque.

Accessories

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

1. Operator's manual
2. ISO nozzle disc
3. Brake release handle
4. Key for external connector



Check engine

The main elements must be verified before the first commissioning of the engine:

- Coolant Level and engine Oil Level
- Correct tightness of oil cartridge and fuel filter.
- Tension on the belts

Filling the fuel tank

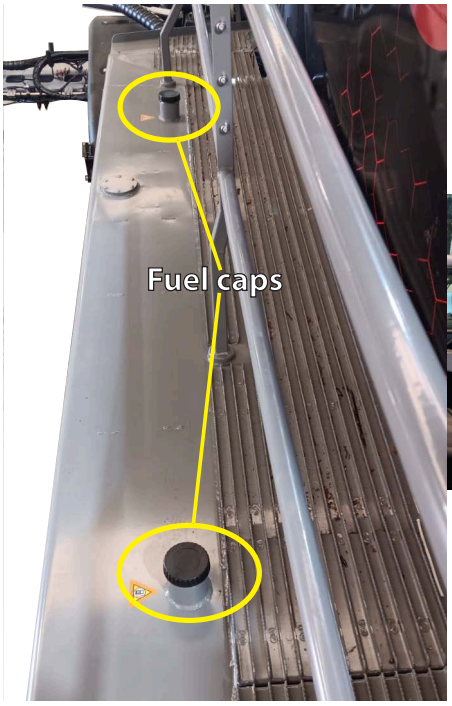
The fuel tank has a 1000 litre capacity. Before filling:

- Turn the engine off.
- The fuel tank is filled from left hand side platform (walkway).
- Thoroughly clean the cap to prevent the introduction of impurities into the tank. Use a funnel and a filter if necessary.

DANGER! Do not smoke when filling up the tank.

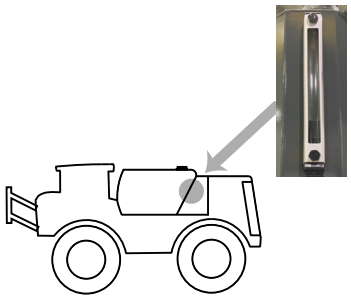
NOTE! Do not leave the tank completely empty, in order not to introduce any impurities or air in the circuit.

NOTE! Before a prolonged shutdown, it is preferable to keep the tank filled, in order to avoid any trace of condensation in the tank.



Hydraulic Oil Level

A visual gauge is installed on the hydraulic reservoir with a capacity of 200 litre. A detector warns the user that the level in the tank is too low. Periodically check hydraulic oil level.



WARNING! When the audible alarm sounds, stop the sprayer and engine immediately to avoid any risk of damage to the hydraulic components.

The fill hole of the hydraulic reservoir is located in the vicinity of the platform for access to the cab. To fill the tank, it is recommended that:

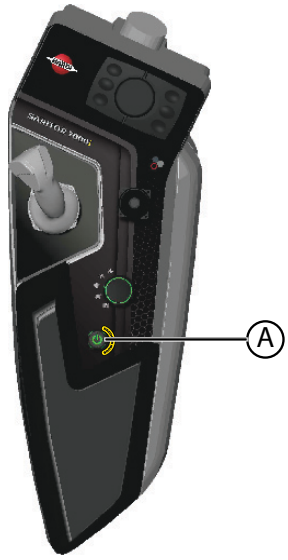
- Thoroughly clean the tank cap, to eliminate all traces of dirt and moisture.
- Filter the oil when filling.

NOTE! It is essential to observe the quality of the recommended oil. See "Table of recommended lubricants" page 241.

NOTE! To avoid backsplash when filling, ensure that you fill slowly.

AutoSteering

AutoSteering system and warnings



ATTENTION! Autosteering is a GPS controlled system that guides the sprayer along a predetermined heading. Whilst user-friendly, improper setup can result in overly aggressive steering behaviour.

WARNING! Engage AutoSteer only when the sprayer is close to the intended heading. Engaging it too far off the line may cause aggressive steering corrections or induce uncontrolled boom yaw movement. Excessive boom movement can lead to fatigue and damage to the boom, mounting hardware and frames.

- To ready the system and to enable AutoSteer. press button (A). The button backlight must be **green** to indicate that the system is active.
- To disable AutoSteer engage, press button (A) again.

WARNING! The steering controller is operational only when button (A) is pressed and illuminated **green**.

ATTENTION! Re-tuning AutoSteer is strongly recommended to reduce sprayer oscillation and boom yaw movement.

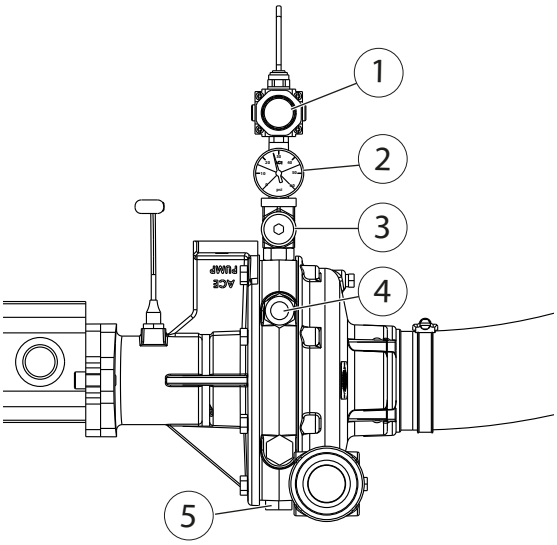
Contact your dealer or guidance system provider to:

- Install the latest firmware updates.
- Access improved line acquisition settings.
- Evaluate and adjust your AutoSteer aggressiveness for optimal performance.

Product pump

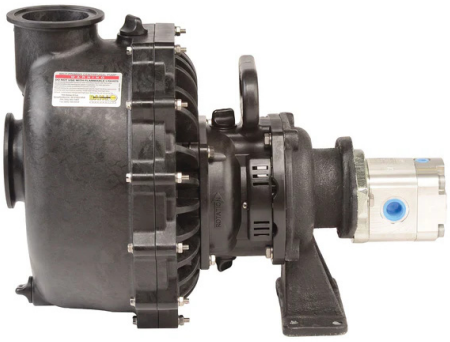
Before using the pump for first time:

1. Check the air pressure at the gauge (2). Air supply is regulated to 30 psi, adjust the regulator (1) if necessary.
2. Check barrier fluid level in site gauge (4).



Fresh Water Pump (PWSP series)

Do not operate the wet seal pump until you have filled the wet seal reservoir 3/4 full (the seal assembly should be submerged) with a 50% ethylene glycol (anti-freeze) and 50% water mixture. Do not run the pump dry. Always fill the pump with water or the fluid being pumped before starting the drive unit to avoid premature pump seal failure.



NOTE! The Rubicon has an external coolant reservoir line which runs up the fluid platform.

NOTE! There are no points on the pump that need lubrication. The pump seal is cooled and lubricated by the fluid being pumped

NOTE! Make sure reservoir is 3/4 full and seal is completely submerged

NOTE! Check coolant mixture every 8 hours of use.

Please refer to "Poly-self priming centrifugal pumps instruction manual provided, and its available online at "https://www.banjocorp.com/medias/M350PHYW-manual.pdf?context=YmFuam98cm9vdHw1OTg3MjEwfGFwcGxpY2F0aW9uL3BkZnxoMTYvaGNjLzg4MTQwOTM5OTE5NjYucGRmfDYwZTA4YmE2ZWM3YmVkZDRhODYyZDdkYzkyYzgwYTc4NzQzYjgwNTk4ZmYyZjA4MGI5YmRhZDJiZTE2YzdlNGM&attachment=true"

Track width adjustment

Procedure for Altering the Track Width

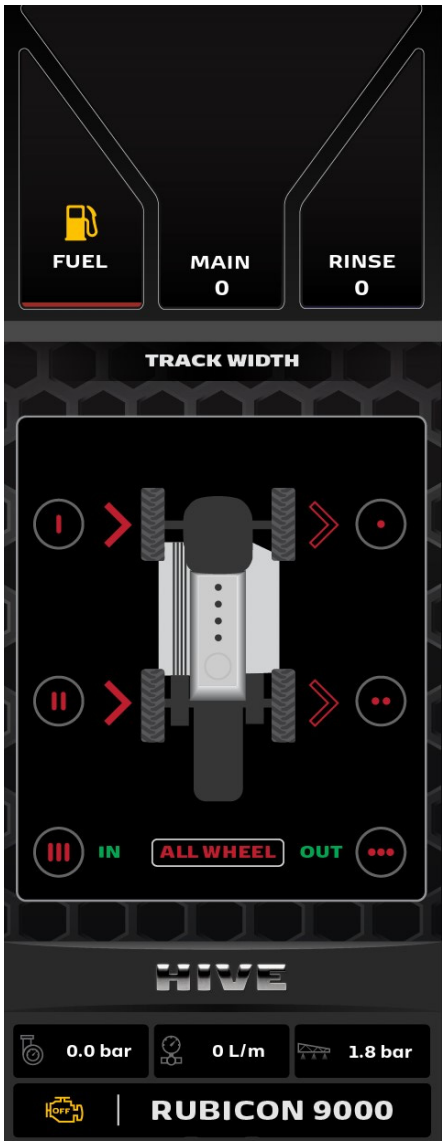
The RUBICON axle track width can be adjusted, on-the-run to provide the ultimate flexibility for different applications and improved productivity. The maximum variation of the track width is 1 metre (up to 500mm per side). Each wheel can be adjusted independently or all together. The override suspension moves in and out with the wheel track width. The track width can be altered via HIVE screen or UT screen.

ATTENTION! The wider the track width, the better the stability of the sprayer. HARDI recommends to work with widest possible track width.

WARNING! To prevent imbalances in the machine, the clearance between the left and right wheels must be identical (relative to the centre).

NOTE: Adjusting the width of the track gauge must be carried out in the field, away from deep ruts, whilst travelling at low speed.

NOTE! Please refer to Hydraulic Controller (HYDAC) section for the procedure for altering the track width.



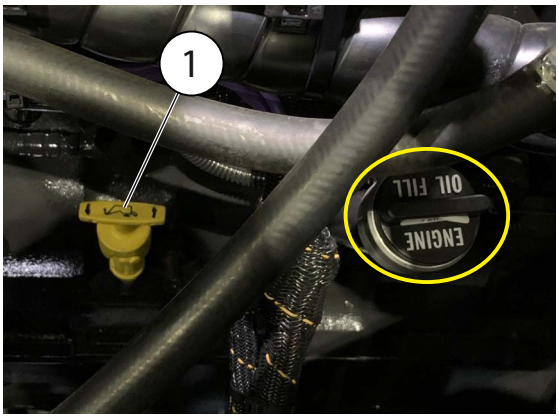
Starting and stopping of the machine

General information

WARNING! Before starting the engine, check the level of the engine oil, coolant and hydraulic oil. Check that the engine radiator and air filter is clean.

Pre-start checks

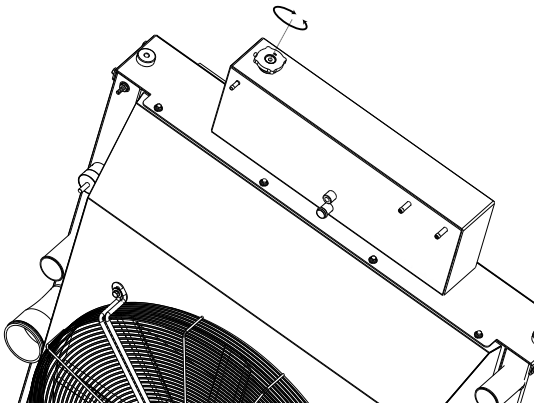
1. Check engine oil level.



2. Check cleanliness of air filter cartridges.

3. Check coolant level.

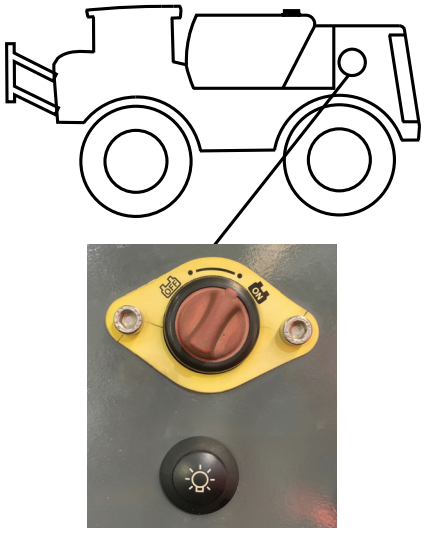
WARNING! Make sure the engine is cold before checking the coolant.



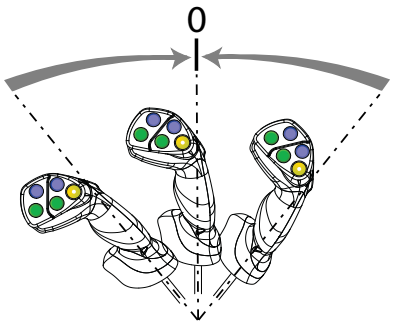
4. Check hydraulic oil level (¾ of level indicator).

Initialise the system

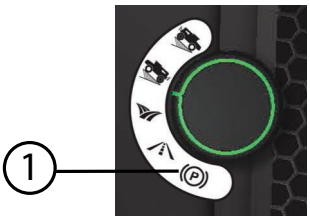
- Turn the isolator switch to power the electrical circuits of the sprayer.



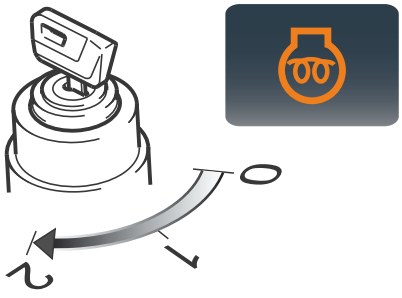
- Place the joystick in neutral to start the engine.



- Turn the mode selector switch to the parking position (1).



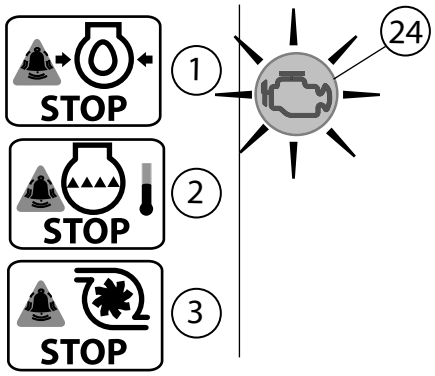
- Turn the ignition key to position (1) to initialize the system.
- Turn the key to position (2) to start the engine. Release it after start-up and the key will automatically return to position (1).



NOTE! The symbol only appears if engine preheat is required to start.

WARNING! After starting the engine, if the default light (24) lights up and that one of the 3 priority messages appears on the screen, you must stop the engine immediately to prevent any deterioration of the engine.

1. Engine oil pressure is too low.
2. Engine overheating.
3. Turbo-compressor pressure is too low.

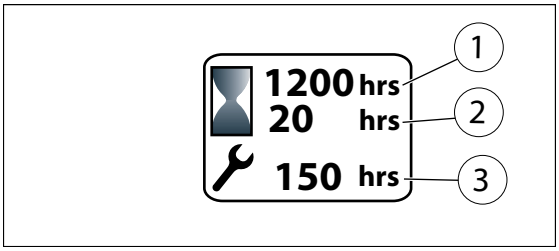


NOTE! For more information on the error messages, see "CUMMINS engine error codes" on page 215.

Hour Meter

Description

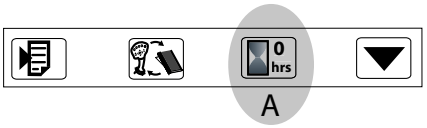
1. Total hours of the machine
2. Maintenance Meter (Hours since last maintenance)
3. Time remaining until next maintenance



For more information on the maintenance of the self-propelled sprayer, see "Periodic Maintenance" on page 180.

Reset the Maintenance Meter (2)

At any time, you can reset the maintenance meter, by pressing the button(A) for few seconds.

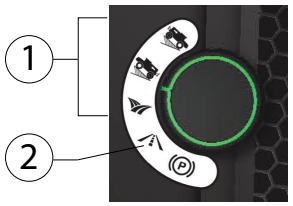


Field / Road Mode

Mode Selector

The mode Field/Road is obtained from the mode selector.

1. "FIELD" modes
2. "ROAD" mode



Road Mode using the joystick

The sprayer movement is obtained by pushing the joystick forward or backward.

The engine speed varies according to the position of the joystick.

Braking is achieved by pulling the joystick towards the neutral point. The machine comes to a complete stop when the joystick is in the neutral position.

To use the Road mode;

1. Place the joystick in neutral position.
2. Ensure mode (1).
3. Move the joystick forward/backward to move the sprayer.

ATTENTION! To change the direction, bring the joystick to neutral position and push it in the opposite direction.

WARNING! Come to complete stop before changing direction.

WARNING! Failing to do so will void warranty!

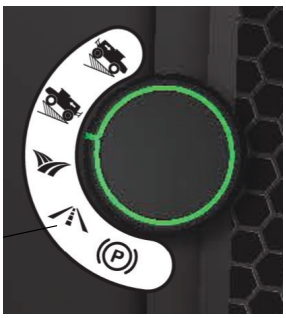
Field mode displacement

The field mode has 3 modes of use. Each of these modes affects the speed of travel as well as the torque of the transmission.

In this mode the speed of the engine remains constant, regardless of the position of the joystick.

NOTE! The passage in one of the 3 modes (field-uphill-downhill) can be performed when the self-propelled is in motion.

NOTE! FIELD mode requires a minimum 1600 rpm.



- "FIELD" mode: The transmission pump flow is evenly distributed in all the hydraulic motors. This flow is proportional to the position of the joystick.
- "UPHILL" mode: In order to limit the slippage of the front wheels in the strong slope, the displacement of the rear motors is greater than that of the front motors
- "DOWNHILL" mode: In order to limit the slipping of the self-propelled in a steep descent, the displacement of the front motors is greater than that of the rear motors.

- Turn the selector switch to one of the modes.
- Push the joystick to obtain the desired travel speed.
- The screen shows the current mode of use (1)

NOTE: In FIELD mode, the maximum speed is 30 km/h. However the ground speed may be limited. For more information, see section "Restricting the speed of movement in road mode" on page 123.

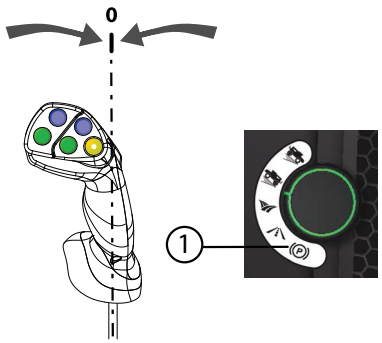
Braking

Braking of the machine is obtained by moving the joystick to neutral point or by operating/pressing the foot brake. The foot brake is very effective and should be used in case of emergency.

Parking brake

The parking brake is used to keep the machine at a standstill. To engage the parking brake:

- Pull the joystick in the neutral position to immobilise the sprayer.
- Turn the mode selector switch to the parking position.



- The display indicates that the parking brake is engaged (1).

NOTE! When the parking brake is on, any action on the joystick will not make the machine move.

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

Driving mode

The sprayer has 3 modes of operation, which allows you to optimize the overall performance of the transmission (speed/torque, acceleration and progressive braking) depending on the variations and conditions of use.

The mode [COMFORT] is designed for a gradual acceleration of the self-propelled. The [NORMAL] allows a superior acceleration compared to the mode COMFORT. The [POWER] mode allows a more reactive operation of the self-propelled.

- Press the key (1) to select [DRIVE MODE].
- Press the keys (2) to change the driving mode.

NOTE! The mode can be changed while driving.

Traction Control System

Sensors built into the hydraulic motors constantly measure the speed of each wheel. A computer compares these speeds and if necessary operates a reduction in the hydraulic power to the wheel motor that is slipping.

To improve the control of the traction control system in the turns, the angular sensors placed on the front axle measure the turning angle of the wheels to allow the computer to optimize the traction control system.

The traction control function is operational only in the field mode.

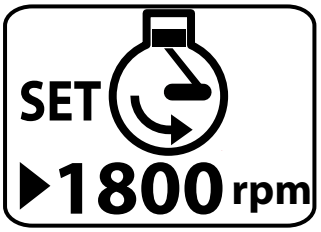
- Press the key (1) to select the traction control system
- Press the key (2) to engage the traction control system

NOTE! Activation can be done while driving.

Preset the speed of the engine

This feature allows you to optimise the power of the engine, while reducing fuel consumption. Preset the engine speed to vary between 1200 rpm and 2500 rpm. This limitation applies only in field mode.

NOTE! It is recommended that for the transmission to give enough traction, braking torque and for adequate hydraulic flow for boom and pump performance, the engine rpm be set to 2000.



To change the value of the preset of the engine speed:

- Press two times on the push button (1). The symbols (2) and (3) show that the preset function of the engine speed is selected.
- Press the push buttons (4) to increase or decrease the value.
- Press the key (5) to save the value and return to the previous menu.

The symbol (6) indicates the value of the pre-adjustment of the engine speed.

NOTE! The fuel gauge reappears after 5 seconds of inactivity on the push buttons.

To disable the pre-setting the speed of the engine, it is sufficient to press the acceleration switch on the dashboard.

NOTE! The default rpm is 2500.

Restricting the speed of movement in field mode

It is possible to limit the travel speed in field mode.

- Turn the speed selector switch to one of the 3 positions of the field mode
- Press the button (1) to select cruise control
- Press the button (2) or (3) to adjust the value.
- Press the button (4) to enable/disable.

Maximum Value = 30 km/h

Minimum Value = 3 km/h

The displayed speed gives current limit.

Restricting the speed of movement in road mode

It is possible to limit the travel speed in road mode.

- Turn the speed selector switch to the road mode.
- Press the button (1) to select cruise control
- Press the buttons (2) or (3) to adjust the value.
- Press the button (4) to enable/disable.

Maximum Value = 50 km/h

Minimum Value = 3 km/h

Limitation of engine speed - hydraulic oil temperature too low

When the temperature of the hydraulic oil is less than 30 degrees Celsius, the engine speed is limited to 1600 rpm, this effect is to protect components of the hydraulic transmission.

When the hydraulic oil temperature becomes greater than 30 degrees Celsius, the engine rpm increases to reach the set rpm.

Limitation of engine speed - hydraulic oil temperature too high

When the temperature of the oil in the transmission reaches 88 degrees Celsius, the computer reduces the flow of oil in the motors, which has the effect of limiting the engine speed.

ATTENTION! The transmission will stop if the hydraulic oil temperature reaches 98 degrees Celsius.

Engine management

Management of the system Anti-stall

This device avoids engine stalling if the power demanded by the transmission is higher than that supplied by the engine. To prevent the engine from dropping below the threshold of normal operation, the displacement of hydraulic motors increase, then the displacement of pumps will be reduced.

When the anti-stall feature is enabled, the ground speed is decreased slightly compared to the normal operation of the machine.

Management of the engine Overspeed

This feature allows that the transmission does not accelerate the engine beyond a maximum bearable speed during a hydrostatic deceleration.

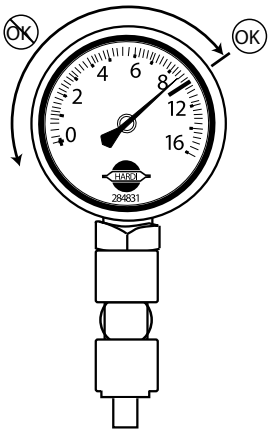
If the engine speed exceeds a specified threshold, the displacement of the wheel motors is increased and the displacement of the hydraulic pump is decreased, allowing the sprayer speed to be slowed in a controlled manner.

When the overspeed function is enabled, the hydrostatic braking is less effective in relation to the normal operation of the machine.

NOTE! The management of the engine overspeed is not active when the brake pedal is used.

Air Suspension

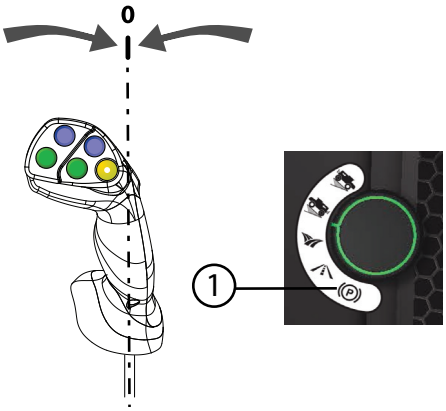
WARNING! Before traveling, wait until the air suspension is operational. A pressure gauge installed on the outside of the cab indicates the pressure in the circuit. The value must be at 8 bar (116 psi). To adjust the air pressure, see "Compressed air pressure adjustment" on page 202.



DANGER! The suspension components may adjust rapidly if the 8bar is not achieved when the park brake is released.

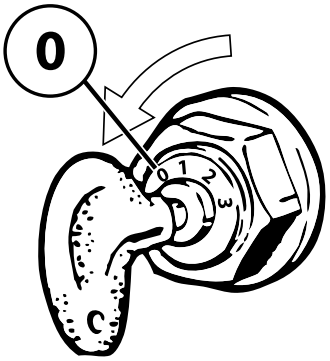
Stopping the engine

- Place the joystick in neutral position (0) to immobilise the sprayer, and turn the mode selector switch to parking position (1).
- Reduce the engine speed to slow down the turbocharger and allow to stabilise the engine temperature.
- Wait for the ladder to lower.

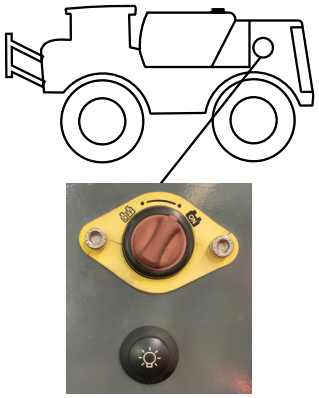


- Turn the ignition key to position (0) to shut down the engine.

DANGER! When the engine is stopped the access ladder to the cab is automatically lowered.

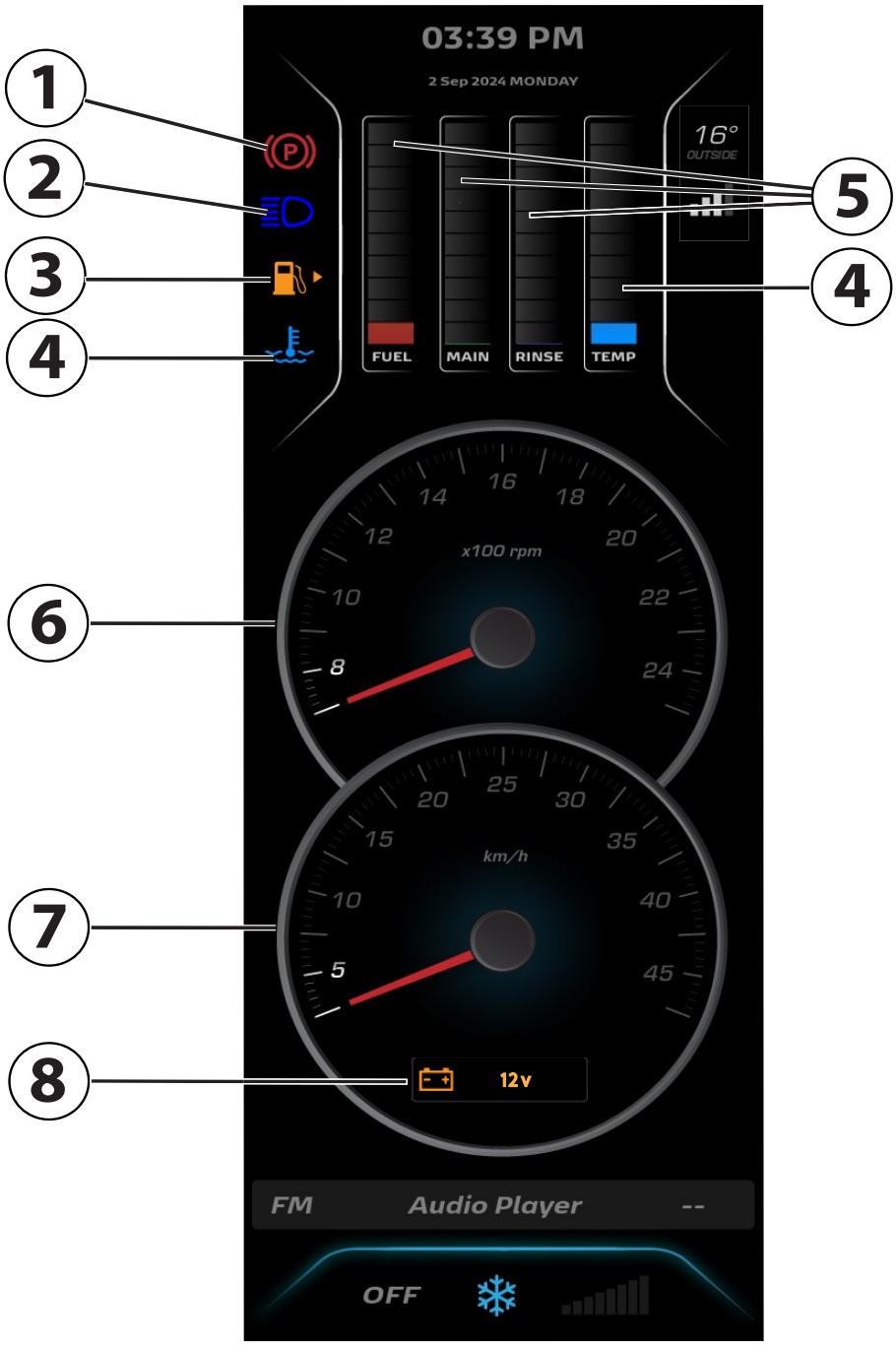


WARNING! Turn the isolator switch OFF to disconnect power from the electrical and electronic circuits and prevent battery discharge.



HIVE Cabin - operation

Main screen



1. Park mode enabled
2. High beam light
3. Low fuel alarm
4. Engine Temperature
5. Tank volumes
6. Engine rpm
7. Speed
8. Engine data display

Homepage

The available functions are listed below.

Fluid Functions

Spray

When activated, the pump supplies the spray solution from the main tank to the boom, and the nozzles distribute it evenly at the set pressure and flow rate. This function is used during field operation to apply chemicals accurately and consistently.

Boom Rinse

The Boom Rinse function cleans only the spray boom and nozzle lines. Clean water is flushed through the boom, hoses, and nozzles to remove remaining spray solution after spraying. It is mainly used to prevent nozzle blockage and reduce contamination between applications, while leaving the rest of the system unchanged.

Complete Rinse

The Complete Rinse function cleans the entire spray system. Clean water is circulated through the pump, filters, valves, hoses, tanks, spray boom and nozzles. This function removes chemical residues from the liquid system and is used after completing a spraying job or before changing products.

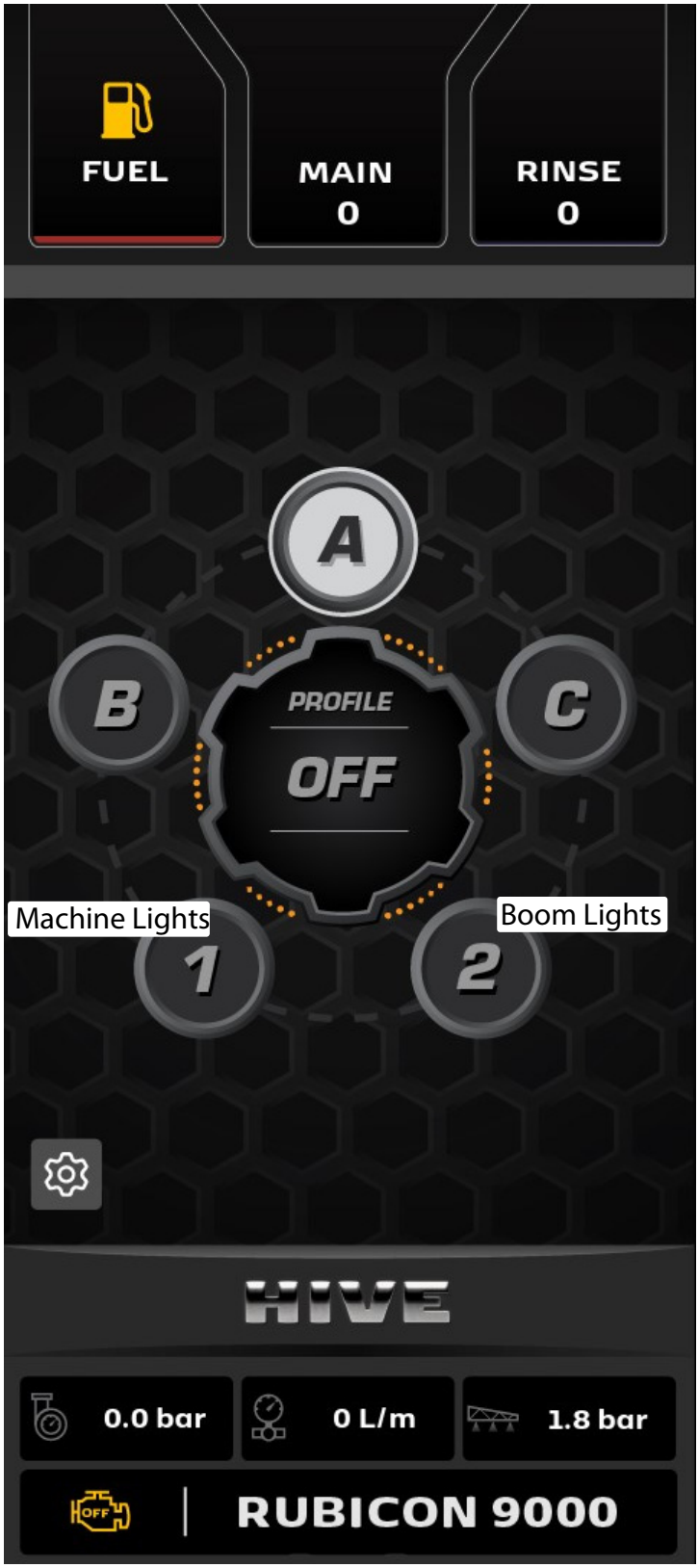
ATTENTION! It is recommended to run the Complete Rinse function at least 3 times to reduce the risk of contamination.

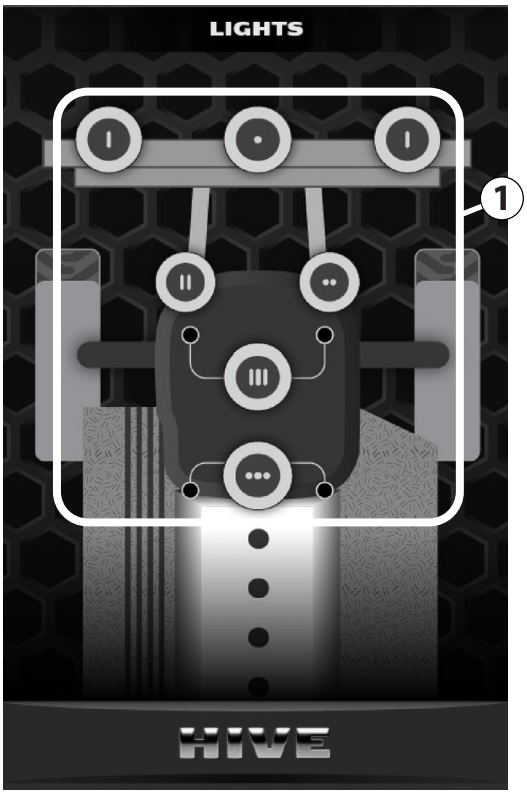
ATTENTION! Perform a Complete Rinse when changing chemicals or if the sprayer will be stored for an extended period.

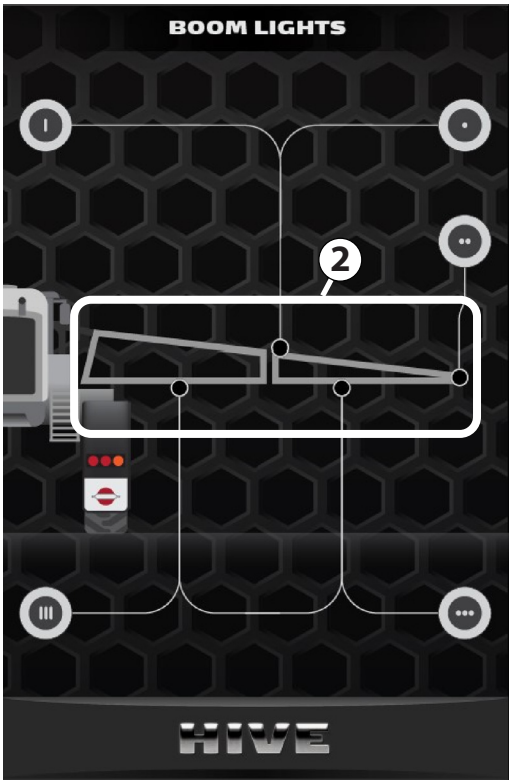
NOTE! The Complete Rinse includes Boom Rinse.

Lights

NOTE! A, B and C are configurable light profiles.







Machine Lights
Indicate the operational status, warnings, and system conditions of the machine for safe and efficient operation.

Boom Lights
Illuminate the boom and working area to ensure clear visibility and safe operation in low-light or night conditions.

Air conditioning

WARNING! indicates the cabin pressure is low.

Turn ON/OFF

Push the Multifunction Dial to toggle the air conditioning ON or OFF.

Use and buttons to manually set the fan speed.

Use to activate auto fan speed.

Set temperature

Turn the Multifunction Dial to set the desired temperature.

Pressurisation

The system controls cabin pressure that verifies and maintains a minimum pressure air flow and cabin pressure higher than pre-set values.

NOTE! If the warning light turns on, it means that the cabin pressure is too low. To fix the problem, see chapter "Pressuriser maintenance instructions" on page 213.

Combined air filter usage

The warning light will light after 250 hours of use to indicate that it is necessary to replace the combined air filter. Please refer to the section "Every 250 hours - Cabin combined air filter" on page 195.

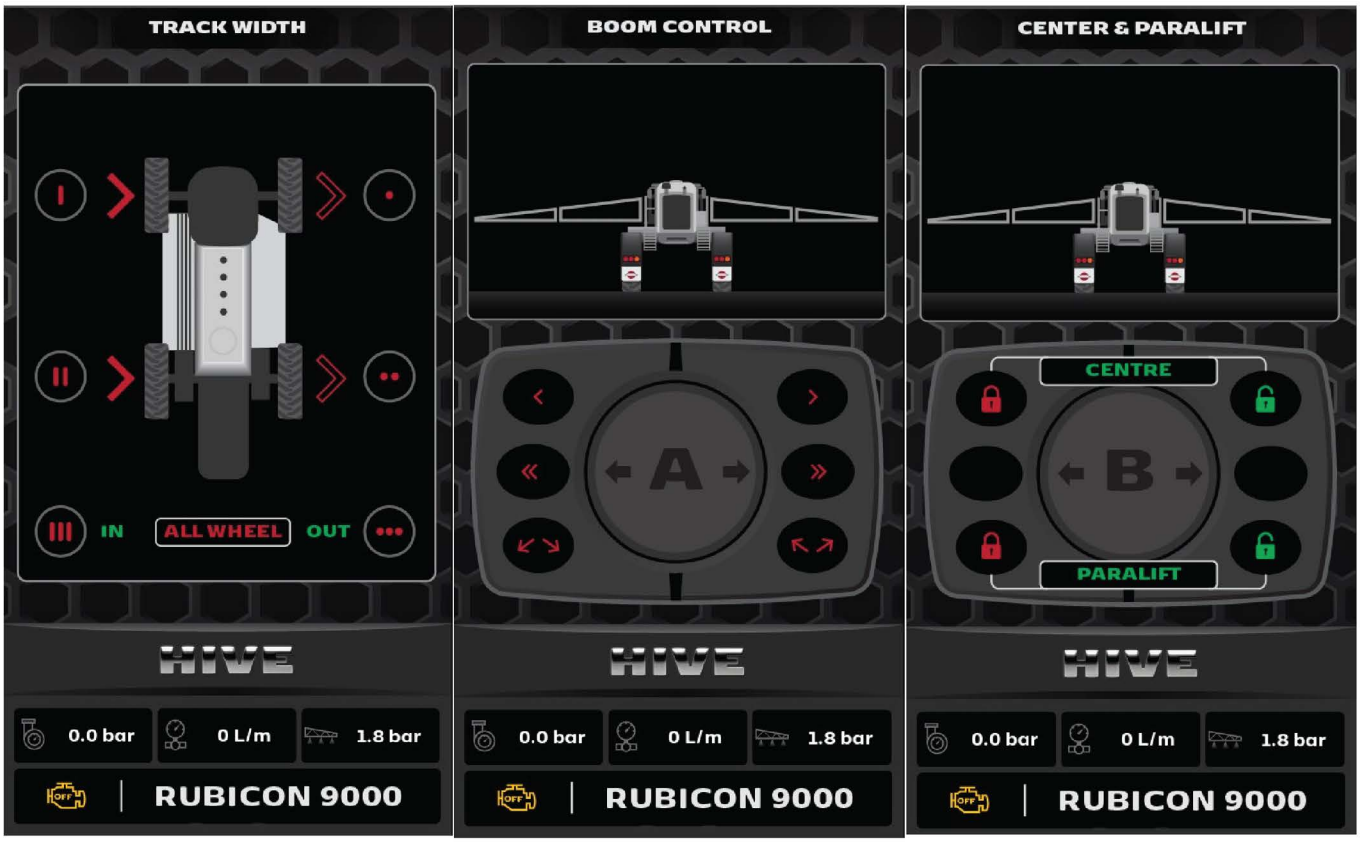
Combined air filter storage

For a long lasting performance, only use the filter during the spraying period. Store it carefully after use into a hermetic packaging.

NOTE! Please refer to "Every 250 hours - Cabin combined air filter" on page 195 for more information.

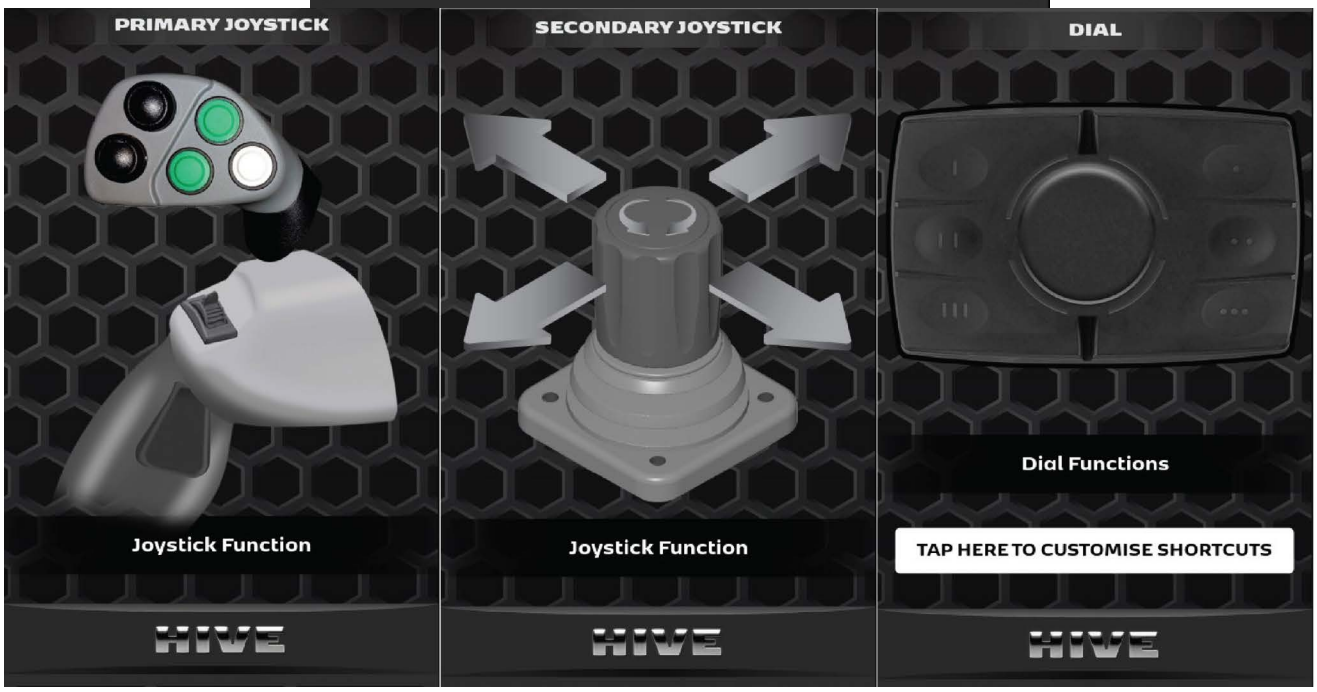
Hydraulic Functions

All hydraulic functions can alternatively be controlled by HIVE. Please refer HYDAC section for primary controls.

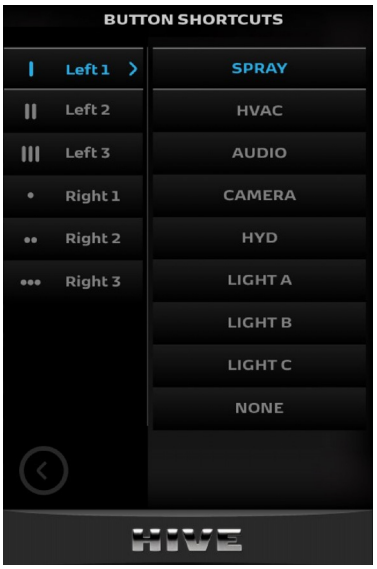


SETUP

This page is used to test and verify button functions.



NOTE! Dial can be customised to add short-cuts.



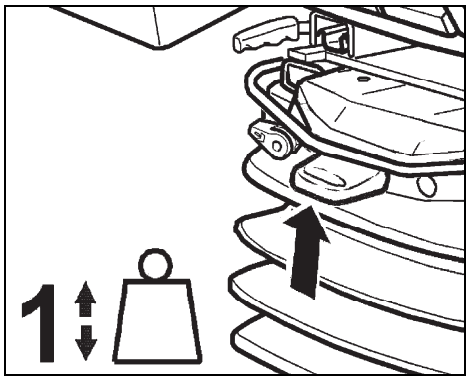
Camera

Camera can be viewed by selecting the camera menu on HIVE screen.

It can be automatically viewed when the machine is in reverse mode.

Driver's Seat functions and operation

Weight adjustment



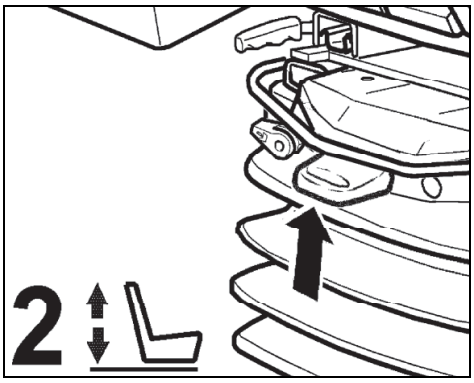
The seat must be adjusted for the driver's weight by briefly pulling the actuator lever of the automatic weight and height adjuster (arrow) with the vehicle at a standstill and the driver sitting on the seat.

The driver must sit absolutely still during adjustment.

DANGER! Before adjusting the weight, adjust shock absorbers to the position "soft".

ATTENTION! To prevent damage to the health, the setting for the driver's weight must be checked and adjusted individually before the vehicle is driven.

Height adjustment



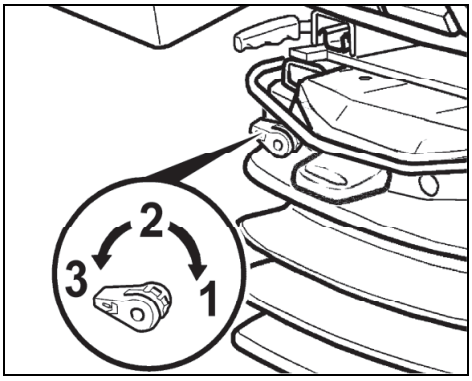
The seat height can be set pneumatically and is continuously adjustable.

The seat height can be altered by pulling or pushing the adjustment lever fully up or down (arrow). If the adjustment reaches the top or bottom endstop, the height is adjusted automatically in order to guarantee a minimum spring travel.

DANGER! Before adjusting the height, adjust shock absorbers to the position "soft".

ATTENTION! In order to avoid damage, do not operate compressor for more than 1 minute.

Absorber



The absorber setting of the seat can be varied to suit the on and off-road driving conditions. The cushioning effect can be individually adjusted for this purpose.

Turn the lever to the desired position and release

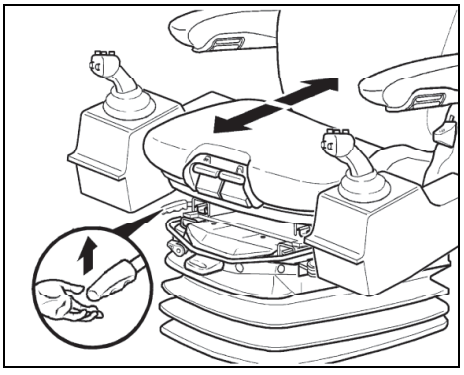
Position 1 = soft

Position 2 = medium

Position 3 = hard

Position 2 is the basic setting recommended by the manufacturer for an average driver's weight.

Fore/aft adjustment



The fore/aft adjustment is released by lifting the locking lever.

DANGER! Risk of accident! Do not operate the locking lever while driving.

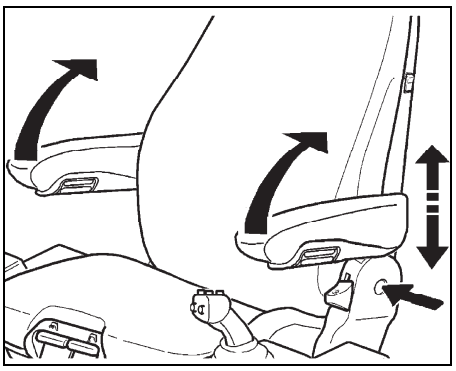
ATTENTION! The locking lever must latch into the desired position. It should not be possible to move the driver seat into another position when it is locked.

ATTENTION! Do not lift the locking lever with your leg or calf.

Armrests

The armrests can be folded up if required and the height individually adjusted.

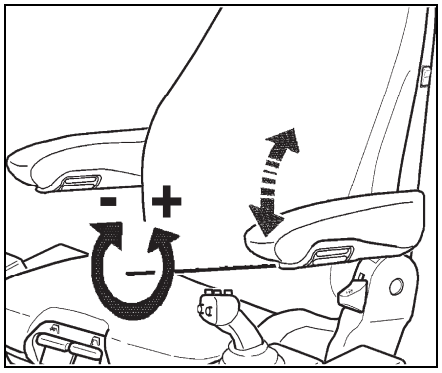
To adjust the armrests for height, separate the round cap (see arrow) from the cover, loosen the hexagon nut (size 13 mm) behind it and adjust the armrests to the desired position (5-steps) and tighten the nut again (25Nm). Replace the cap onto the nut.



Armrest adjustment

The inclination of the armrests can be modified by turning the adjustment knob.

When turning the knob to the outside (+) the front part of the armrest will be lifted, when turning the knob to inside (-) it will be lowered.

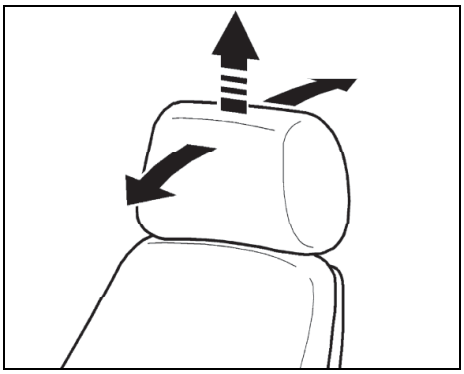


Headrest

The headrest can be individually adjusted for height by pulling it upward over the various increments up the end stop.

By pushing forward or rearward the angle of the headrest can be adjusted individually.

To remove the headrest, pull it over the end stop.

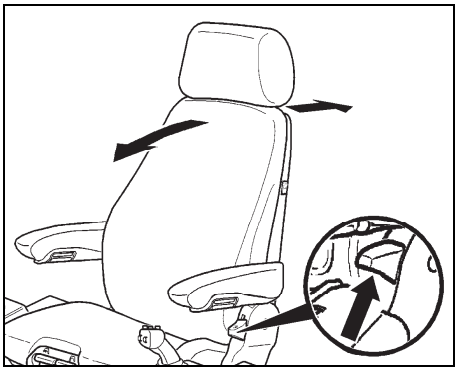


Backrest adjustment

Pull up the locking lever to release the backrest catch. When releasing the backrest catch, do not apply load to the backrest by pressing against it.

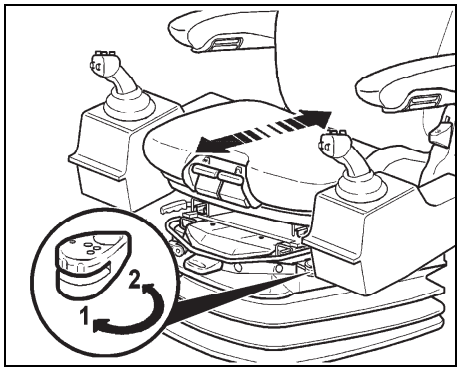
By exerting pressure on or off the front or rear part of the seat pan it can be moved to the desired position. Release the locking lever to lock the backrest.

ATTENTION! It should not be possible to move the backrest into another position after it has been locked.



Fore/aft isolator

Under certain driving conditions (for example with a trailer attached), it is useful to activate the fore/aft isolator. This means that shock impacts in the driving direction can be better absorbed by the driver seat.



Position 1 = fore/aft isolator off

Position 2 = fore/aft isolator on

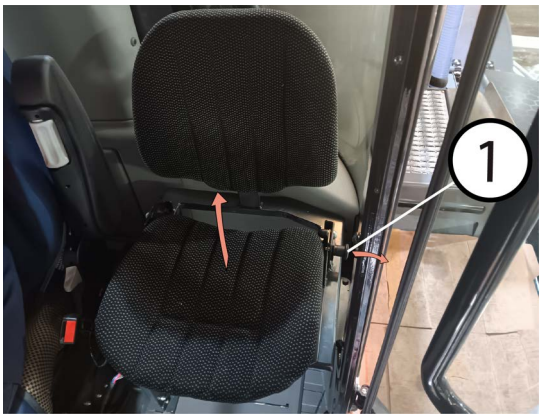
ATTENTION! After the adjustment of position 1, the locking lever must latch into the desired position. For that, the seat must be pressed backwards until it latches with an audible click.

ATTENTION! It should not be possible to move the fore/aft isolator into another position when it is locked.

Trainer seat

The trainer seat can be folded.

Pull the lever (1) and raise the seat. Release the lever to lock the seat in position.



Boom

General info

ATTENTION! A manual control of the centre lock is possible through the HYDAC hydraulics universal terminal.

WARNING! Compress the springs on both sides evenly to prevent the pendulum from tilting or slanting. Please refer Hydraulic Controller HYDAC section.

WARNING! Only operate the folding functions when the sprayer is stationary! Failure to do so may damage the boom.

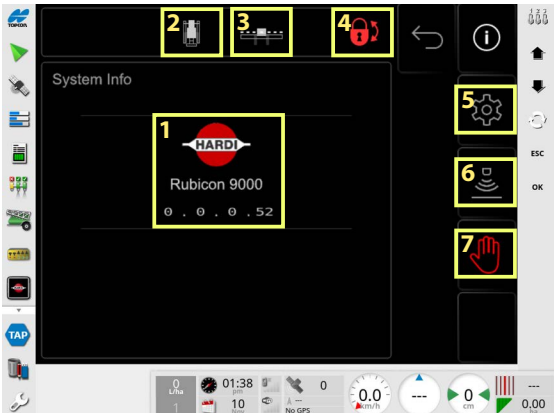
ATTENTION! If a folding sequence is not completed, a warning message will ask you to complete this sequence before starting next sequence.

Hydraulic Controller (HYDAC)

Introduction

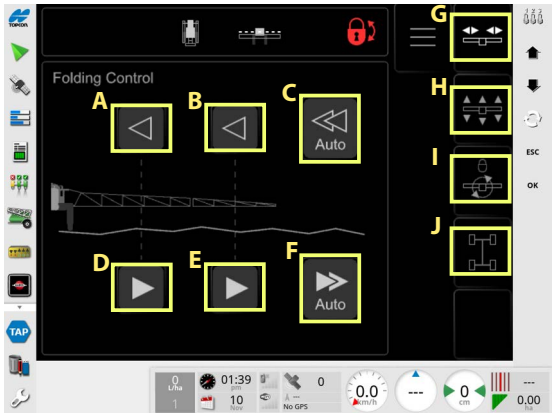
The main screen of the HCH-590 ISOBUS hydraulic control system is displayed below.

1. Profile description and firmware version
2. Status of the boom. (Folded/unfolded)
3. Boom height
4. Centre lock/unlock
5. Control setup
6. Sensor status
7. Emergency mode



Folding Control

A. Inner Fold In
B. Outer Fold In
C. Auto Fold In
D. Inner Fold out
E. Outer Fold Out
F. Auto Fold Out
G. Folding control
H. Paralift/tilt controls
I. Centre lock controls
J. Track width and spring controls



All boom functions have visual feedback on the relative screen. This feedback is activated from the UT screen soft keys and/or from the HIVE joystick.

ATTENTION! Only one function can be used at a time (including joystick).

ATTENTION! If the vehicle speed is above 1.5km/h a warning message will popup. STOP the machine before unfolding or folding.

ATTENTION! The boom must be raised above a certain set point before it can be folded or unfolded. The set point is indicated by the boom height position icon on the top row.

5 - Operation

Operating the boom

ATTENTION! A manual override of the centre lock is possible through the centre lock control screen.

WARNING! Only operate the folding functions when the sprayer is stationary! Failure to do so may damage the boom.

WARNING! Before starting any hydraulic functions, make sure "Paddock mode" is enabled via the button on the console.

ATTENTION! If a folding or unfolding sequence is not completed, a warning message will ask you to complete this sequence before starting next sequence.

Procedure for unfolding the boom

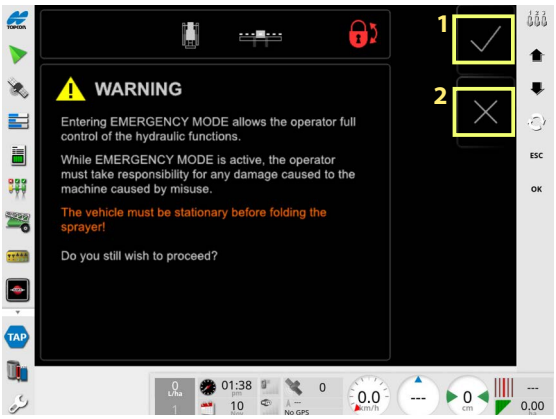
1. Tilt up both wings to the maximum.
2. Unfold the inner wings
3. Level inner wings. (Tilt down)
4. Unfold the outer wings
5. Raise the paralift to clear the hooks.
6. Unlock the paralift lock via the button on the roof console.
7. Unlock the centre. (Lock sign changes to green)
8. Lower the boom to desired height.

NOTE! Functions (1) and (7) can also be done using joystick.

Procedure for folding the boom

1. Raise the boom to maximum.
2. Lock the centre
3. Lock paralift hooks
4. Slowly lower paralift until it is fully locked.
5. Make sure that the boom is lowered to the hooks.
6. Fold outer wings.
7. Tilt both wings to maximum height
8. Start folding the inner wings.
9. Once the wings are fully folded, secure them on to the cradles.

Emergency mode screen



Access to the emergency mode is restricted, and the following must be acknowledged by the operator before proceeding:

"Entering EMERGENCY MODE allows the operator full control of the hydraulic functions."

ATTENTION! While EMERGENCY MODE is active, the operator is responsible for any damage caused to the machine.

"Do you still wish to proceed?"

1. Pressing the tick (1) will enter emergency mode.
2. Pressing the cross (2) will return the user to the settings screen.

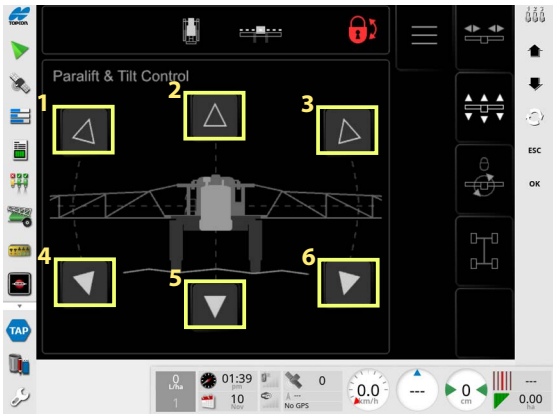
The emergency mode screen allows all hydraulic functions regardless of sensor signals or boom fold logic. The following is a list of reasons when emergency mode may be required:

1. To allow folding or unfolding of the boom when normal operations have been interrupted.
2. To allow unfolding of the boom so that critical spraying operations may be completed, or to affect repairs to damaged sensors.
3. To allow folding of the boom for safe transport of the machine.

WARNING! Serious damage to the machine may occur when operating in this mode. Only use EMERGENCY MODE when necessary.

ATTENTION! Contact your local HARDI dealer as soon as practicable if repairs to the machine are required to bring it back into a normal state of readiness.

ParaLift & Tilt Control screen



The boom height control screen of the hydraulic control allows lifting and lowering of the boom and wings.

The available functions are:

1. LH wing tilt up
2. Raise boom
3. RH wing tilt up
4. LH wing tilt down
5. Lower boom
6. RH wing tilt down

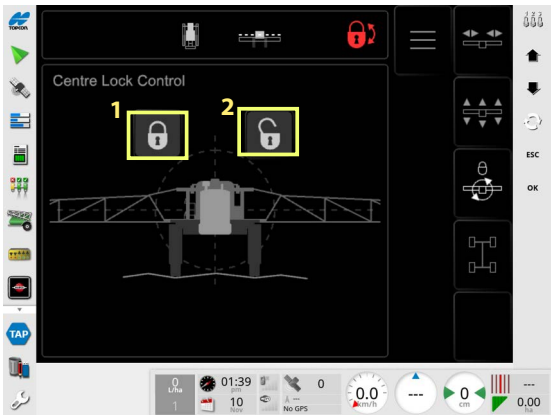
All boom functions have visual feedback on the relative screen. This feedback is activated from the UT screen soft keys and/or from the HIVE joystick.

Centre Lock Control screen

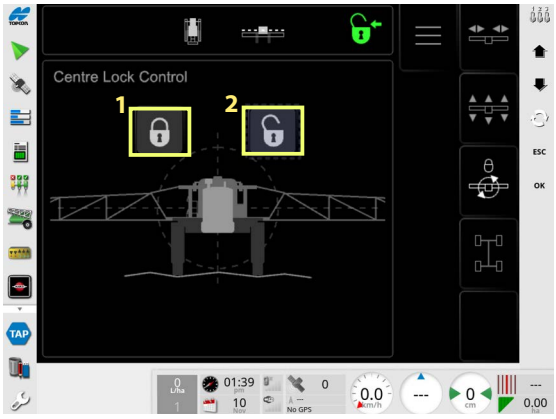
The centre lock control screen of the hydraulic control allows locking and unlocking of the centre.

The available functions are:

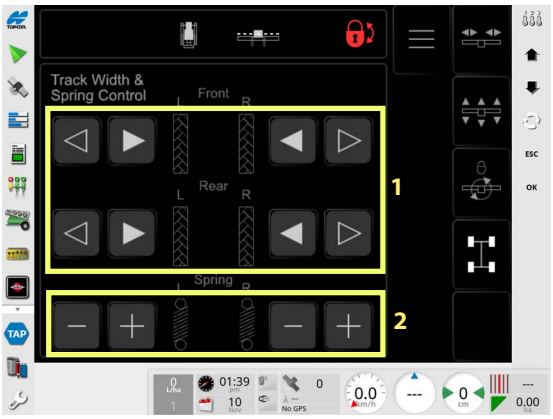
1. Lock the boom centre
2. Unlock the boom centre



WARNING! The boom centre lock must be unlocked before engaging the auto-height control. Failure to do so will result in erratic boom movement and damage to the machine.



Track Width & Spring Control screen



The centre lock control screen allows the adjustment of track width when the machine is moving slowly at the set speed.

The available functions are:

1. Individual wheel track width control

   Allows independent adjustment of the left and right wheel track width for both front and rear axles. This enables precise alignment, improved stability, and adaptation to varying field or operating conditions.

NOTE! The recommended speed is 3km/hr for track width adjustment.

2. Independent spring setting

   Allows separate adjustment of the left and right suspension springs to optimize load distribution, machine balance, and stability under varying operating conditions.

ATTENTION! The wider the track width, the better the stability of the sprayer. HARDI recommends to work with widest possible track width.

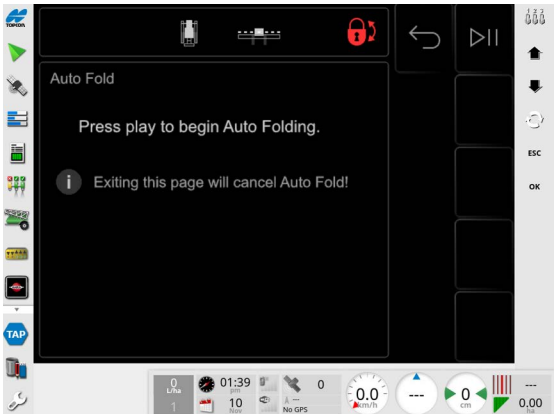
Autofold

The autofold screen will display current state of control & warnings.

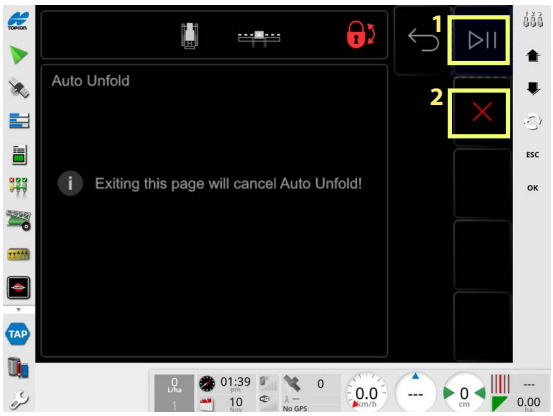
WARNING! Make sure the machine is stationary and surroundings are clear and is safe to operate.

Attention! Autofld/unfold will not work if boom is partially closed/open.

DANGER! If you notice any hazard and want to halt the autofold/unfold operation, press any button on the joystick or press (1) or (2).



NOTE! This function can also be done using the master on/off + secondary switch on the joystick. Refer section "The primary joystick" on page 62.



5 - Operation

Liquid system

Filling/washing location requirements

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

A. If the sprayer is always filled at the same place, a special filling/washing location should be established. This should have a hard, liquid-impenetrable surface (e.g. concrete) and edges securing against run-off to the surrounding areas. The place 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 on a larger area 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 could be used. Not 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.

B. 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! When filling the sprayer, care must be taken to ensure the gross weight of the machine does not exceed manufacturer limits.

ATTENTION! Heavier chemicals can make the loaded weight significantly greater than water alone.

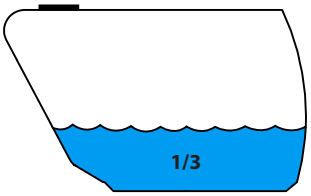
ATTENTION! Machine damage, tyre overload or unsafe operation may result if the sprayer is over-weight.

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

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

Filling MainTank with 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 MainTank, all manifold valves must be closed.

Main Tank Filling

The Main Tank can be filled in 3 different ways:

1. Batch Fill System
2. Fresh Water Filtered Fast Fill System
3. Venturi Fast Fill system

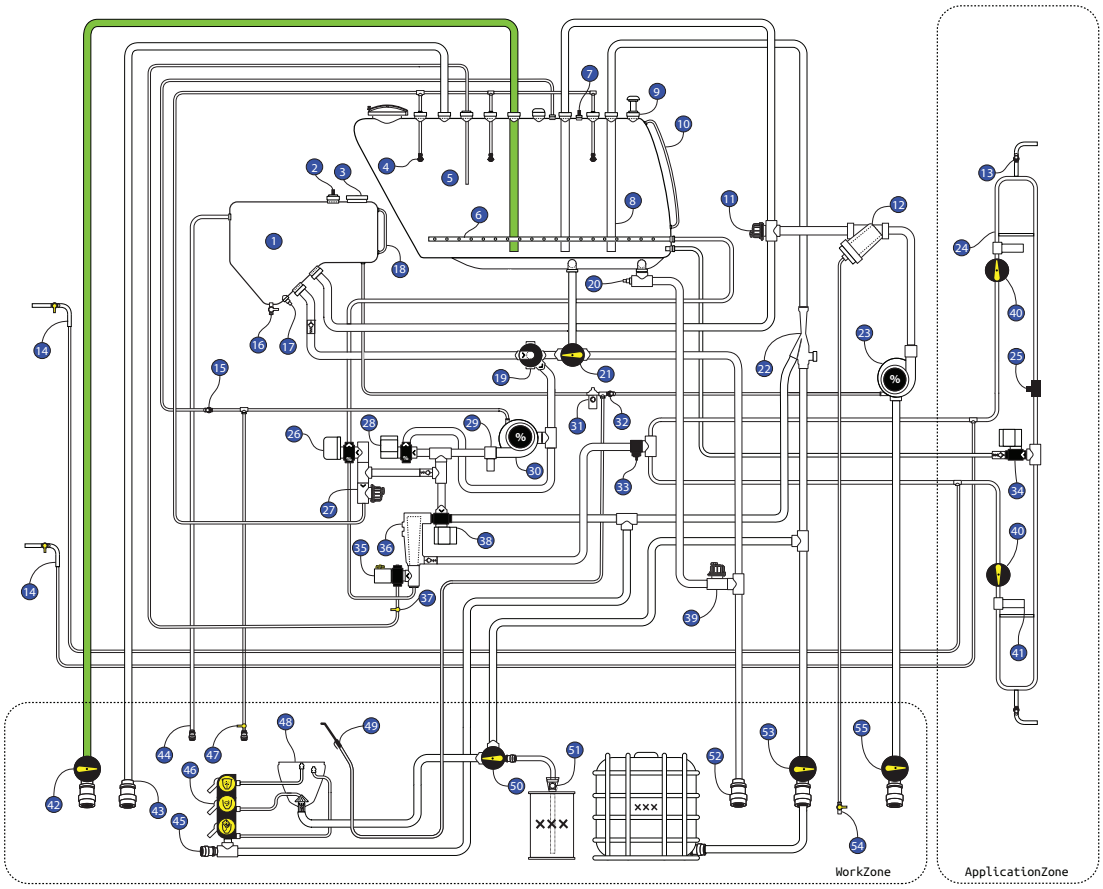
Batch Fill System

The Batch Fill System allows the operator to fill the using an auxiliary pump. The operator can also control the speed at which is filling takes place by adjusting the quick fill ball valve on the sprayer.

ATTENTION! Batch Fill System circuit does not include a filter or strainer! It is highly recommended you use a remote in line filter to remove any debris and impurities. For more information please contact your HARDI dealer.

ATTENTION! This function cannot be performed through HIVE!

1. Remove the cap from the 3 inch cam-lock and connect the hose to a water source.
2. Start the water supply or remote fill pump that will be connected to a clean water supply.
3. Open the Batch Fill Valve (42).
4. Fill Main Tank to required volume.
5. Close the Batch Fill Valve (42).
6. Turn off water supply or remote fill pump.
7. Disconnect hose and fit the cam-lock cap.

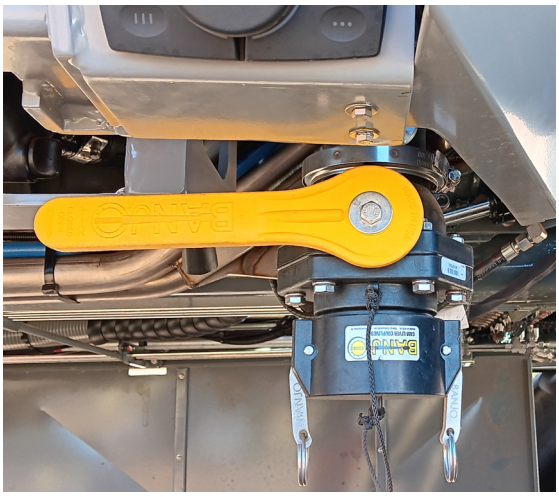


COMPONENTS

ID	Description
1	Fresh water tank
2	Fresh water tank full sensor
3	Fresh water lid
4	Rinse nozzle
5	Cyclone filter bypass return
6	Agitation outlet tube
7	Main tank full sensor
8	Inlet downpipe/s
9	Overflow / vacuum valve
10	Main tank level indicator
11	Fill direction valve
12	Fresh water Y-Strainer filter
13	Fence jet valve/s
14	Mudgaurd nozzle valve/s
15	Product pump bleed valve
16	Fresh water drain tap
17	Fresh water level sensor
18	Fresh water level indicator
19	Suction valve
20	Main tank level sensor
21	Main tank drain tap
22	Venturi / eductor
23	Fresh water pump
24	Boom circuit
25	Boom pressure sensor
26	Agitation valve
27	Rinse nozzle valve
28	Regulation valve
29	Product pump pressure sensor
30	Product pump
31	12v fresh water pump
32	Fresh water pump prime valve
33	Flow meter
34	Boom bypass valve
35	Cyclone filter return bypass valve
36	Cyclone filter
37	Cyclone filter boost tap
38	Pressure valve
39	Main tank dump valve
40	Boom shutoff tap/s
41	Boom filter/s
42	Main tank batch filling coupler
43	Main tank overflow
44	Fresh water tank overflow
45	Pressure empty coupler
46	Chemical hopper controls
47	Product pump bleed tap
48	Chemical hopper
49	Fresh water pressure gun
50	Suction source tap
51	Chemical drum coupler
52	Main tank dump coupler
53	Venturi fast fill coupler
54	Fresh water filter clean tap
55	Fresh water pump fill coupler

Fresh Water Filtered Fast Fill System

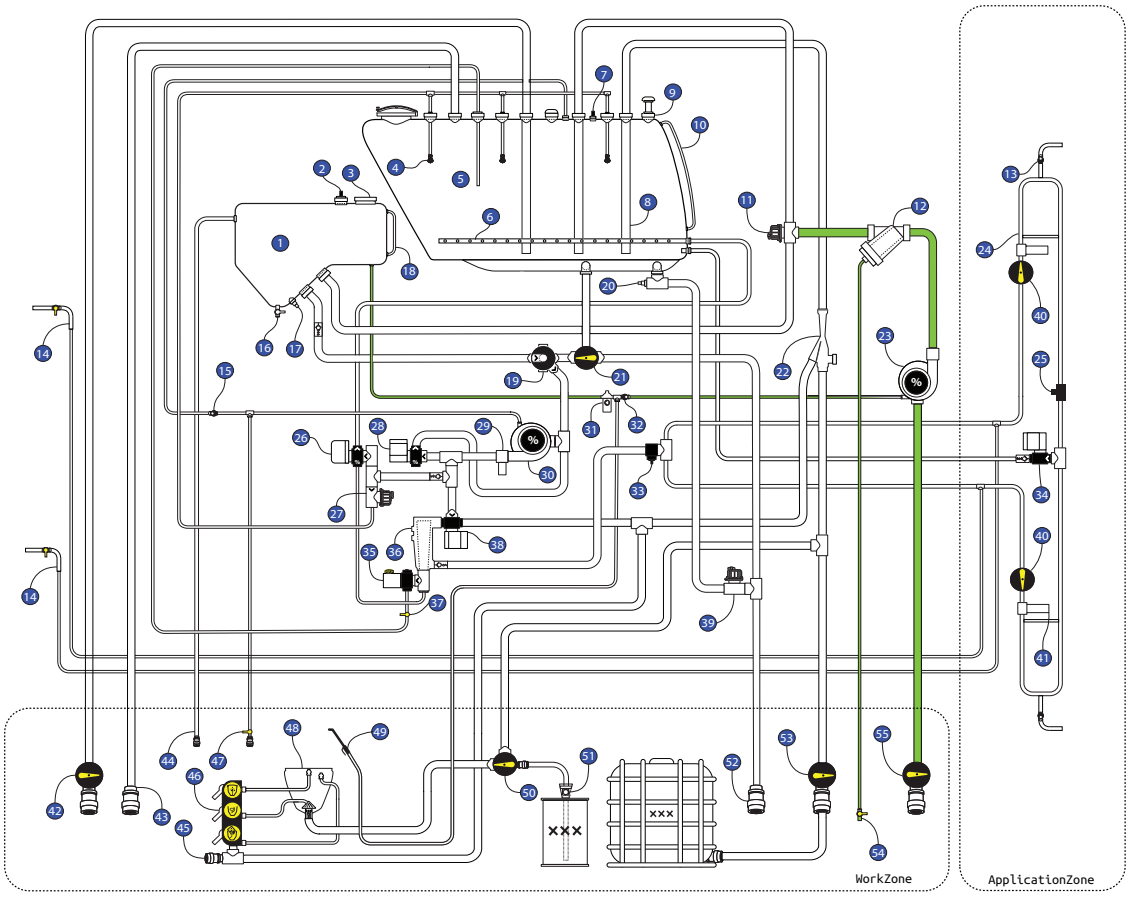
The Fresh Water Fill System employs a high capacity pump driven by a hydraulic drive motor. The fluid is filtered through the cam-lock coupling size is 3,0 inch and can be located on side of the sprayer.



ATTENTION! The Fresh Water Filtered Fast Fill is not to be used with chemicals.

1. Ensure the machine is running.
2. Remove the cap from the cam-lock and connect a suction hose to a water source. (55)
3. Open the valve.
4. Start the "FILL" from HIVE display.
5. Select Volume.
6. Select Specific Gravity. (Default value is 1.00)
7. Select "MAIN TANK" on HIVE display using .
8. Start the pump using .
9. Adjust the flow rate via the motor accelerations buttons located on the control panel.
10. When filling is done, close the valve and fit the cam-lock cap.

NOTE! If pump does not prime, turn on (31), turn on (32) and prime pump (23). To facilitate cleaning and maintenance of filling filter (12), fresh water filter clean tap (54) is opened and drained to ground.



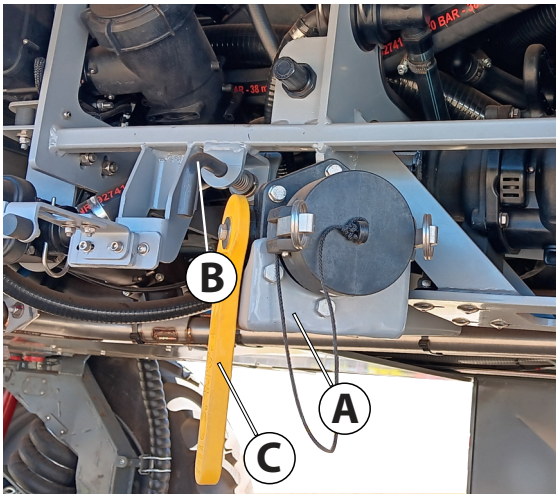
FLUID SYSTEM

COMPONENTS

ID	Description
1	Fresh water tank
2	Fresh water tank full sensor
3	Fresh water lid
4	Rinse nozzle
5	Cyclone filter bypass return
6	Agitation outlet tube
7	Main tank full sensor
8	Inlet downpipe/s
9	Overflow / vacuum valve
10	Main tank level indicator
11	Fill direction valve
12	Fresh water Y-Strainer filter
13	Fence jet valve/s
14	Mudgaurd nozzle valve/s
15	Product pump bleed valve
16	Fresh water drain tap
17	Fresh water level sensor
18	Fresh water level indicator
19	Suction valve
20	Main tank level sensor
21	Main tank drain tap
22	Venturi / eductor
23	Fresh water pump
24	Boom circuit
25	Boom pressure sensor
26	Agitation valve
27	Rinse nozzle valve
28	Regulation valve
29	Product pump pressure sensor
30	Product pump
31	12v fresh water pump
32	Fresh water pump prime valve
33	Flow meter
34	Boom bypass valve
35	Cyclone filter return bypass valve
36	Cyclone filter
37	Cyclone filter boost tap
38	Pressure valve
39	Main tank dump valve
40	Boom shutoff tap/s
41	Boom filter/s
42	Main tank batch filling coupler
43	Main tank overflow
44	Fresh water tank overflow
45	Pressure empty coupler
46	Chemical hopper controls
47	Product pump bleed tap
48	Chemical hopper
49	Fresh water pressure gun
50	Suction source tap
51	Chemical drum coupler
52	Main tank dump coupler
53	Venturi fast fill coupler
54	Fresh water filter clean tap
55	Fresh water pump fill coupler

Venturi Fast Fill system

The Venturi Fast Fill option uses an on-board venturi system to draw water directly from an external source.

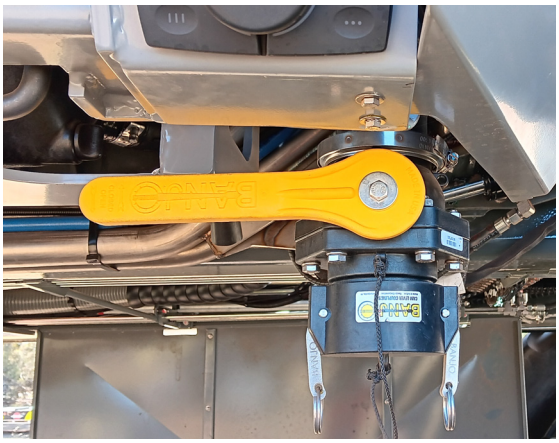


ATTENTION! The MainTank must have 1/3 of water in it before adding any chemical.

1. For easy filling, the fluid refill arm (A) can be lowered. To do so release locking pin (B) and at the same time pull the arm down.
2. Remove cam-lock cap and connect a suction hose with the other end connected to an external source.
3. Open the Suction Valve (19).
4. Turn on the Product Pump from the external HIVE display on work zone.
5. Open the manual MainTank Valve (C).
6. Monitor tank level to prevent over filling.
7. Close (C).
8. Turn off the Product Pump from HIVE display.
9. To stop filling, disconnect the suction hose and replace the quick coupling dust cover.
10. Remove external hose.
11. Fit cam-lock cap.
12. Return the fluid refill arm (A) to transport position.

ATTENTION! The Fast Fill circuit does not include a filter or strainer! It is highly recommended you use a remote in line filter to remove any debris and impurities. For more information please contact your HARDI dealer.

Filling of Rinse tank

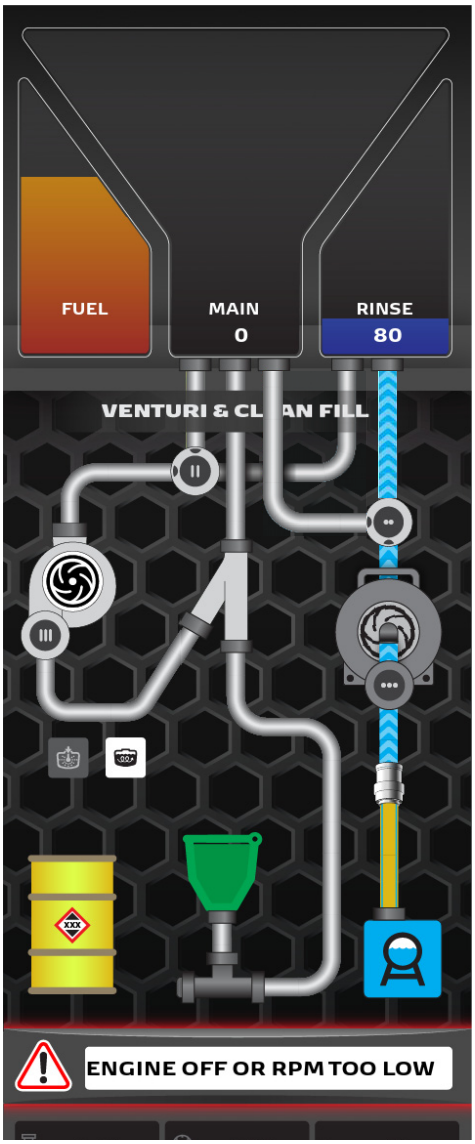


The rinse tank is filled via a 3 inch cam-lock connection. To fill the rinse tank proceed as follows:

1. Remove the cap from the cam-lock and connect a suction hose to a water source.
2. Open the valve.
3. Start the "FILL" from HIVE display.
4. Select Volume.
5. Select Specific Gravity=0.00. (Default value is 1.00)
6. Select "RINSE TANK" on HIVE display using .
7. Start the pump using .
8. Adjust the flow rate via the motor accelerations buttons located on the control panel.
9. When filling is done, close the valve and fit the cam-lock cap.

ATTENTION! Only fill the rinse tank with clean water. To avoid algae developing, always drain the rinse tank if the sprayer is not used for an extended period of time.

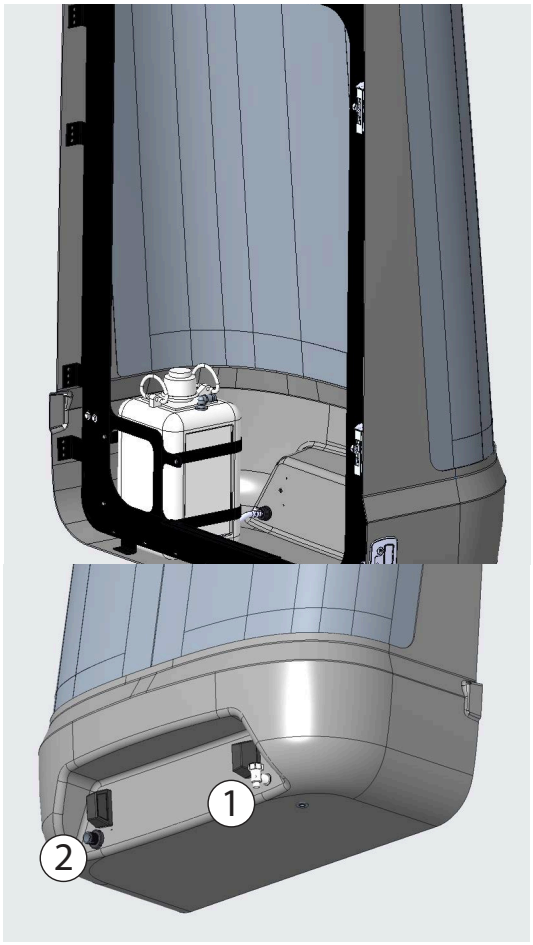
NOTE! If pump does not prime, turn on (31), turn on (32) and prime pump (23). To facilitate cleaning and maintenance of filing filter (12), fresh water filter clean tap (54) is opened and drained to ground.



Filling of hand wash tank

A hand wash tank is fitted inside the engine radiator cover with tap (1). Fill with clean water only. The water from this tank is for hand washing, cleaning of clogged nozzles etc. A garden hose can be connected at the point (2) for filling the tank.

WARNING! Although the hand wash tank is only filled with clean water, this water must never be used for drinking.



Chemical Filling - TurboFiller

Safety Precautions - Crop Protection Chemicals

Always be careful when working with crop protection chemicals!

WARNING! Always wear proper protective clothing before handling chemicals!

NOTE! See “Sanitary and Phytosanitary measures (SPS)” on page 33.

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 chemical.

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

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

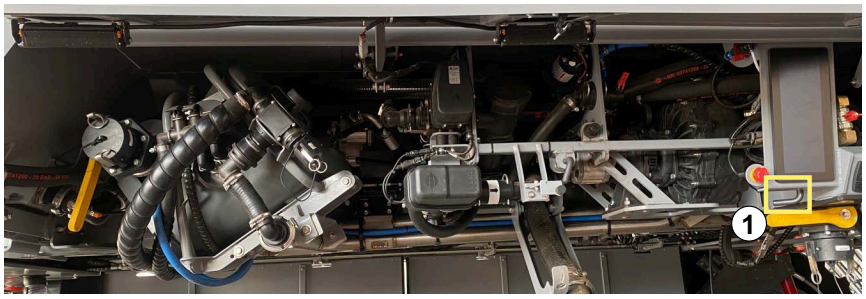
WARNING! Always decontaminate the sprayer before changing to another chemical.

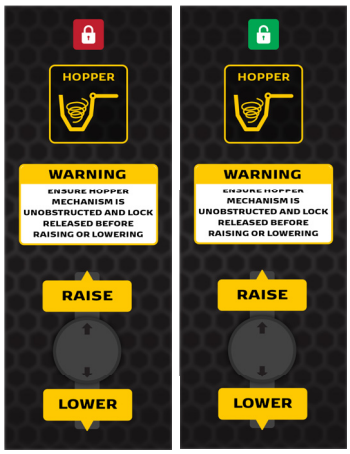
Operating the TurboFiller

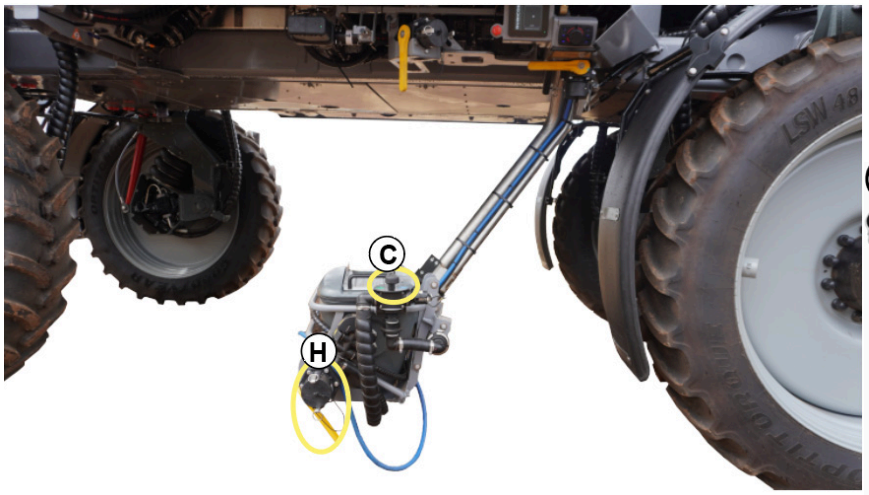
The TurboFiller can be used to transfer chemicals to the main tank.

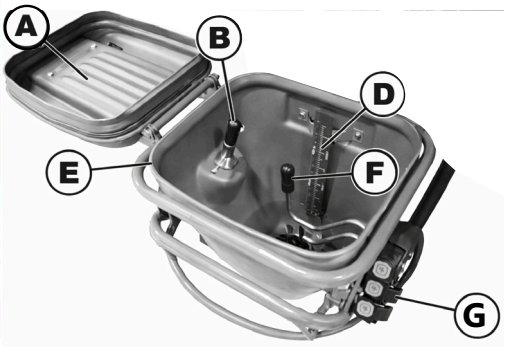
The filler will work with Liquids, Granules and Powders

Hopper capacity is approximately 35 litres and has a measuring scale. Please note and check the accuracy of this scale as with machine on different angles slightly different readings can occur. Accuracy can be enhanced with use of measuring jug and or weigh scales.









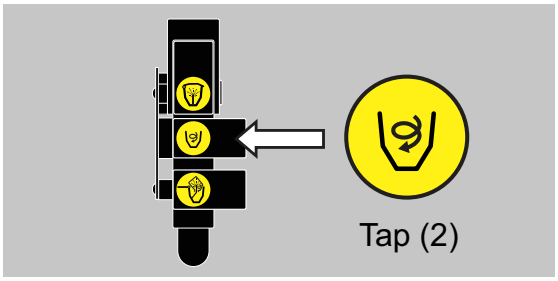
A. TurboFiller lid
B. Container Rinsing Nozzle
C. Suction source tap (Item#50 in fluid diagram)
D. Hopper Scale
E. TurboFiller Hopper
F. TurboFiller Cleaning Nozzle (Drum Rinse)
G. Levers for Rinsing and Swirl Functions (Manifold)
H. Pressure empty coupler (45 In fluid diagram)

Before use

- Engine to be running
- Lower hopper
    - Pull pin (1) that secures hopper in raised position

ATTENTION! The red lock sign on HIVE screen tuns to green when the pin is pulled correctly.

    - In the HIVE screen at the fluid station select 'lower hopper'.
- Open the lid
- On HIVE screen select 'Mix & Fill'.
- Select tank via suction valve (19).
- Start product pump.
- Fluid flow will also be directed to (G) (Item#46 in fluid diagram) on side of hopper and the Venturi.
- Check that fluid is present in system by firstly activating tap (2) momentarily.
- Operate Tap (C) to ensure this fluid can be drawn into the tank and system is ready to use.



- Handgun is primed with fresh water.

ATTENTION! Before operating the TurboFiller, ensure that the surrounding area is clear of all personnel and obstructions. Operate the machine only when the area is confirmed safe to prevent injury or damage.

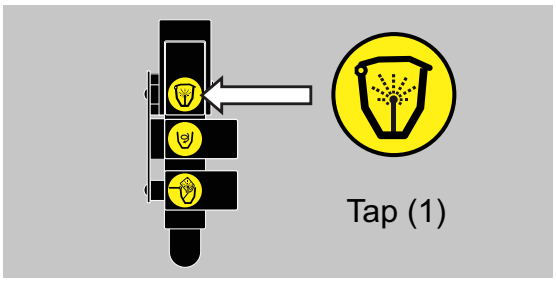
NOTE! Chemical manufacturer's instructions override these instructions.

Liquid Chemicals

1. Add the liquid to the hopper.
2. Turn Tap (C) (suction source tap) to hopper position and vacuum the contents from the hopper to main tank.

NOTE! If it less than 35 litres add the required volume to the hopper before Tap C is turned on so contents can be measured.

3. Keep tap (C) active for approximately 20 seconds after chemical is not visible in the bowl. This ensures hoses are empty.
4. Close the lid (A) and use the spray rinse tap (1) to clean the inner walls of the hopper.

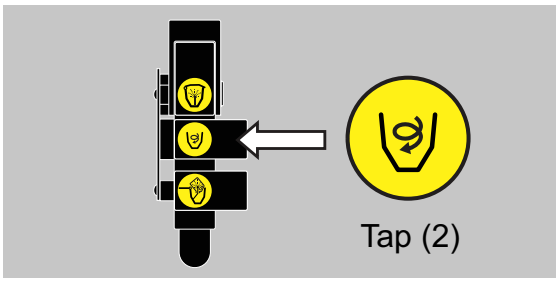


NOTE! Note that if operator has chosen to use the source as main tank then this feature uses fluid that is now contaminated.

5. Ensure rinse tap (1) is closed and open lid.
6. Use the hand gun provided or a source of clean water and rinse the hopper thoroughly.
7. Turn off Tap (C).
8. Close lid (A).

Powders or Granules

1. Turn Tap (C) (suction source tap) to hopper.
2. Turn on Tap (2) so there is a whirlpool effect of liquid in the base of the hopper.
3. Add measured or weighed volume of granules or powders to the hopper in a controlled manner that allows the whirlpool to continue.

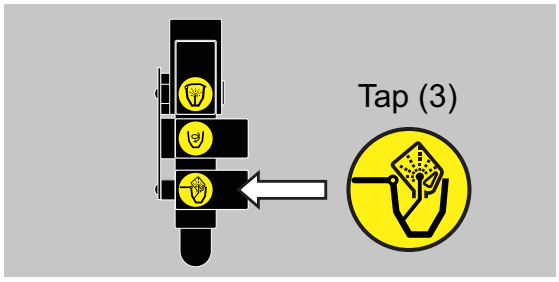


NOTE! Do not dump high volume all at once into the hopper!

4. The whirlpool effect will push heavy undissolved or unmixed particles away from the central intake port and dissolved product will then be drawn into the base and into the tank.

NOTE! Use tap (C) to control water height in hopper.

5. Keep tap (C) active for approximately 20 seconds after chemical is not visible in the bowl. This ensures hoses are empty.
6. Turn off Tap (2).
7. Close the lid and use the spray rinse tap (1) to clean the inner walls of the hopper.



NOTE! If operator has chosen to use the source as main tank then this feature uses fluid that is now contaminated.

8. Ensure rinse tap 1 is closed and Open lid
9. Use the handgun provided or a source of clean water and rinse the hopper thoroughly.
10. Turn off Tap C.
11. Close Lid.

Chemical Container Rinse

It is possible to do an internal spray rinse of smaller containers as follows

1. Lid is open
2. Turn Tap C (suction source tap) to hopper

3. Activate the tap (3).
4. Place container so the opening is over the rinse nozzle (B) and push the container down.

NOTE! If operator has chosen to use the source as main tank then this feature uses fluid that is now contaminated.

5. Turn off tap (3).
6. Remove container from nozzle.
7. Rinse the container thoroughly with clean water and tip diluted contents into hopper.
8. Continue until container is clean.
9. Rinse hopper with clean water and wait for 20 seconds before Tap C is turned off.
10. Close lid.

After use

At HIVE screen

1. Turn off 'Mix & Fill'.
2. Exit the mode.
3. Raise hopper on HIVE to transport position and ensure the pin clicks into place.
4. Close side cover and latch.

Spraying

General info

Main pump (30) draws liquid from main tank via an electrically controlled valve (19) which allows fluid to flow from Main.

Fluid flows past a pressure sensor that (confirms pump on) through a pressure regulator valve (28) and is directed into cyclone filter via a directional valve (38).

A percentage of this flow is drawn off through the Agitation valve (26) for the purpose of tank agitation.

The majority of the fluid is now directed through the cyclone filter that in turn is directed to both the base of the cyclone filter return valve (35) for filter flushing purposes and the majority of flow continues through a flow meter and onto the boom.

This boom flow is split to both the LH and RH wing sets and circulates firstly through two filters (41) on LH and RH wings and onwards through boom tubes.

A boom pressure sensor (25) controls nozzle spray pressure.

If boom is not spraying the flow circulates through the boom bypass valve (34) and back to tank.

Engaging spray mode

1. Ensure the machine is running and is safe.
2. Enter mode "FLUID" on HIVE screen.
3. The pump will automatically prime.

NOTE! Product pump will be in last used pump control mode. (Auto/Manual)

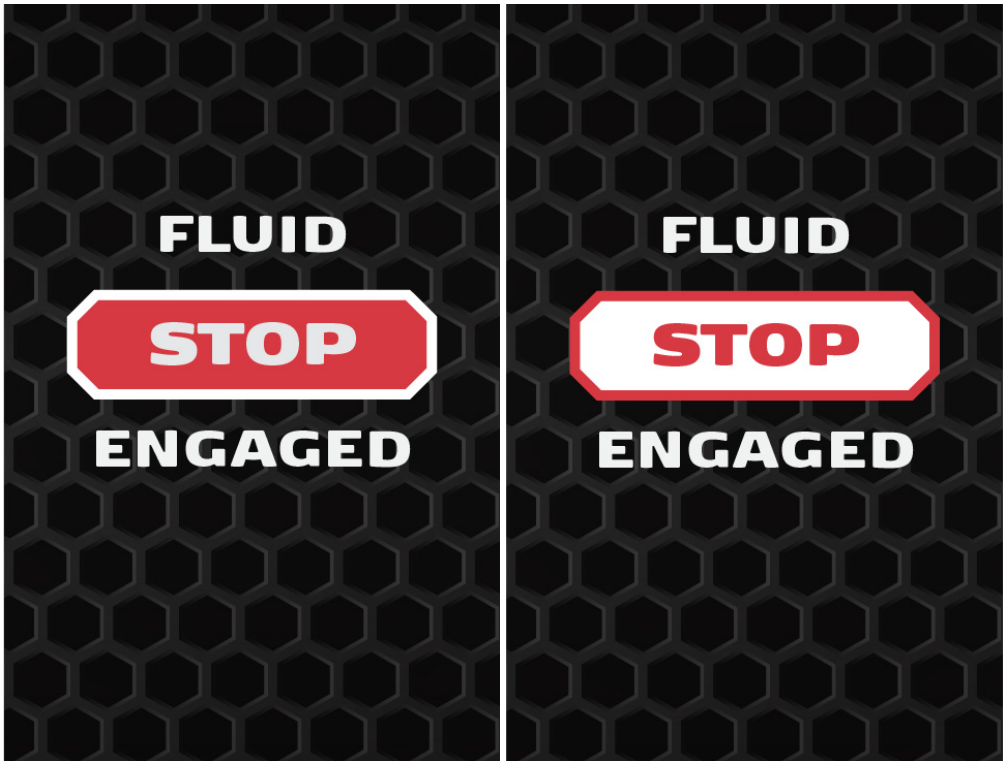
4. To change pump control mode, push wheel (Multifunction Control dial) 'in' to switch modes.
5. Rotate mode in manual to set pump speed. This is shown as a percentage.
6. You are now ready to spray.

Disengaging spray mode

1. To disengage spray mode, hold the Multifunction dial control to the left hand side for 3 seconds.

ATTENTION! In the event of an emergency, press either fluid stop button. Buttons are located on the console side and in the work zone.

ATTENTION! To disengage fluid stop mode, rotate the button to release.

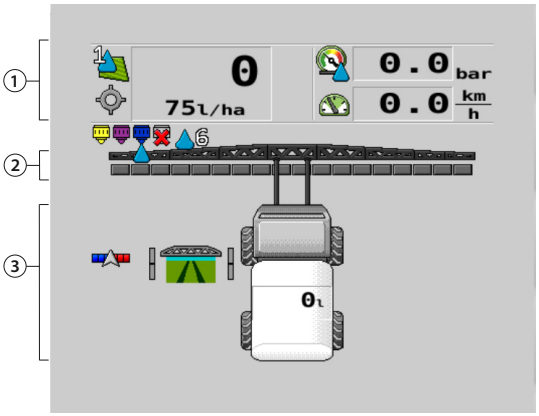


Spray Controller (Muller)

Introduction

Layout of the Work Screen

The work screen is always shown during work and informs you of the status of the field sprayer. The work screen is divided into several areas. In each area, information on specific topics may appear. With the configuration of the ECU, the areas can be changed by the field sprayer manufacturer for a specific field sprayer model. For this reason, the following graphs only show the standard version of the overview.



Areas on the work screen

Item	Description
1	Spray data area
2	Boom area
3	Implement image with icons

You can read about the information that appears in these areas in the following sections. Function icons appear beside the work screen, which perform functions when they are tapped. Their position and operation depend on the type of ISOBUS terminal.

In the table below, you can see the meaning of the function icons on the work screen.

Function Icon	Function
	Opens the "Results" screen.
	Opens the "Parameters" screen.
	Switches between manual and automatic regulation of the application rate.
	Shows the next page with function icons.
	Switches between two levels of icons.

Spray data area

Depending on the configuration, the following icons may appear:

Function Icon	Meaning	Function Icon	Meaning
	The application rate will be automatically regulated. An additional number can appear on the icon. This number indicates the pre-set density. The current value (current application rate) appears next to it. If you are working with band spraying, the icon for the application rate changes accordingly: 		The bar graph only appears when the target rate is changed in automatic mode using the +10% and - 10% buttons. It shows the deviation from the original target rate.
	No flow. The main valve cannot be opened because one of the requirements has not been fulfilled: • Speed slower than the set value • Section status • Target rate out of reach • SECTION-Control has terminated the application		Trip counter is deactivated.
	The application rate will be automatically regulated. The target rate appears next to it.		The sprayer functions will be switched on and off through an “S-Box”.
	The application rate will be manually regulated.		The target rate is defined by an external source: Task Controller, prescription map, external sensor, etc.
	Automatic mode is deactivated. The flow will not be regulated. The current speed is lower than the “Regulation off below” parameter and higher than “Sprayer off below"		• A problem has occurred with the transmission of the target rate from an external source. • The sprayer is outside of the area defined in the prescription map or in an area that should not be sprayed.
	Simulated speed activated.		The vehicle is driving in reverse.
	Speed. If the numbers are red, it means that the regulation or the application have been interrupted because the speed is too low.	  (Background is flashing)	The speed signal from the tractor / ISOBUS cannot be adopted. The system will now determine the speed using the sensor connected to the junction box. Ensure that the number of impulses per 100m is correctly entered. The icon can only appear if the signal source was automatically selected.
	Pressure control is active.		The pressure measured by the pressure sensor is too low compared to the flow measured by the flow meter.
	Pressure. Per default, the pressure is determined by a pressure sensor. If there is no pressure sensor, a calculated pressure can be shown.		

Boom Display Area

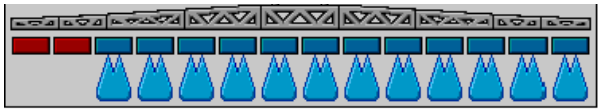
In the boom display you find the following information:

- Number of sections
- Which sections are preselected or switched off
- Which sections are applying

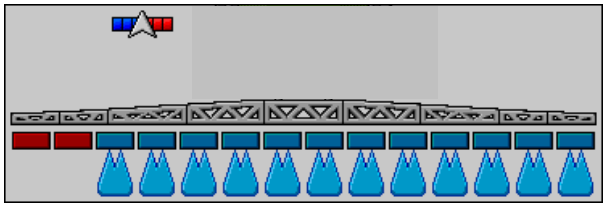
The diagrams below show how the sections may appear in the boom display area.

Each rectangle corresponds to a section valve.

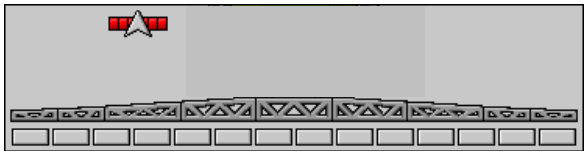
Sections 1 and 2 are closed and deactivated.



Sections 1 and 2 are closed. All of the other sections are open and spraying.



When SECTION-Control is activated, the SECTION-Control icon also appears.



If SECTION-Control is not possible, the colour of the SECTION-Control icon changes.

Section Status

Picture	Status of the section valve	Status of the control/main valve
	Closed valve	Closed valve
	Opened valve	Closed valve
	Opened valve	Opened valve
	Closed valve	Opened valve
	The section is permanently deactivated	

When the sections are automatically switched using SECTION-Control, you have to ensure that the sections are not deactivated using an S-Box or a joystick. In this case, the section would be marked with a red cross and remain closed.

Section Status with EDS

Picture	Nozzle A	Nozzles B, C, D
	Open nozzle	Closed nozzle

Starting the Master ON/OFF switch

Before you begin, make sure:

ATTENTION! You have folded out the boom.

ATTENTION! Ensure that all prerequisites have been fulfilled.

 - Start application

Manual mode: The field sprayer starts the application.

ATTENTION! As long as the sprayer is not moving, the following icon appears on the work screen, depending on the "Sprayer off below:" parameter:

Automatic mode: The sprayer will be prepared for application.

If you are in automatic mode, start driving and exceed the minimum speed for the automatic regulation (parameter: "Regulation off below").

ATTENTION! As long as the field sprayer is not regulating, the following icon appears on the work screen, depending on the "Regulation off below:" parameter:

As soon as the minimum speed is exceeded, the field sprayer starts regulating.

You have started the application.

Immediate Application

There may be situations where you want to start spraying while the sprayer is still at a standstill. For example, when you have stopped on the field.

To start immediate application in automatic mode, make sure:

ATTENTION! The tractor with the field sprayer is on the field.

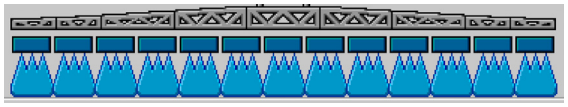
ATTENTION! You have configured the ECU.

ATTENTION! You have folded out the boom.

ATTENTION! Automatic mode is activated.

1. Press  or Master ON/OFF on the joystick for three seconds.
2. The field sprayer starts the application.

   Spray cones appear under the boom icon:



3. Start driving within 5 seconds and exceed the minimum speed for the automatic regulation (parameter: "Sprayer off below"). Otherwise, the application will be automatically terminated.

Regulating the Application Rate

On Rubicon, the application rate regulation system can control the opening of a regulation valve.

Work modes:

You can regulate the application rate manually or you can leave the regulation to the ECU:

- In manual mode, you can control the opening of the regulation valve with two buttons.
- In automatic mode, the ECU regulates the opening of the regulation valve such that the application rate defined as the set rate is reached.

Use the following function keys to operate the function:

Function Icon	Function
	Switches the mode between manual and automatic.

You will learn how to operate the system in the following sections.

Changing the Application Rate in Manual Mode

When the field sprayer is in manual mode, the application is not regulated according to a specified rate. The application rate must be set manually instead.

The application rate must be regulated manually when the following icon appears in the spray data area of the work screen: 

Application in manual mode

Please note that the pressure is also automatically changed when you change the application rate.

Use the following function keys to operate the function:

Function Icon	Function
	Increases the application rate.
	Reduces the application rate.

Using Automatic Mode

In automatic mode, the ECU regulates the degree of opening of the control valve and the main valve on the manifold such that the target rate defined for the application rate can be reached.

You are in automatic mode when one of the following icons appears in the spray data area of the work screen:

Function Icon	Meaning
	Sprayer can apply.
	The speed of the sprayer is lower than "Regulation off below" Sprayer can apply. The flow will not be regulated. The control valve remains in the last known position until the speed changes.
	The speed of the sprayer is lower than "Sprayer off below" The main valve is closed automatically.
	Regulation is not possible because the application was deactivated by the SECTION-Control app.

To use automatic mode, the following conditions must be fulfilled:

- Target rate has been entered.
- Flow meter is calibrated.
- A speed signal is available.
- Working width is set.
- The speed of the field sprayer is higher than the speed for the "Regulation off below" parameter.
- The parameter "Regulation factor" has been set.

In the following cases, the flow is automatically adjusted:

- Speed of the sprayer has changed.
- Number of switched-on sections has changed.
- You have changed the target rate manually.
- The application rate has been changed by the information from the application map.

The speed and precision of the regulation depends on the value of the "Regulation factor" parameter.

You can change the target rate manually while driving in Automatic mode.

Function Icon	Function
	Increases the target rate by 10%.
	Reduces the target rate by 10%.
	Restores the target rate back to 100%.
	Changes to the entered “Rate 1”.
	Changes to the entered “Rate 2”.
	Increases the pressure.
	Increases the pressure by a previously defined value.

To change the target rate during work:

1.  - Activate automatic rate control.
2.  - Open main valve.

   Spray cones appear under the boom icon on the work screen. Still, the sprayer is not spraying.

   As long as you are at a standstill, the sprayer cannot start spraying. See icons:  and 
3. Exceed the speed defined in the “Regulation off below” parameter.

   The sprayer begins adjusting the application rate to the defined target rate.
4.  or  - Press to change the target rate.

   The degree of change appears on the work screen.
5.  - Restores the original target rate.
6. If you have entered several target rates in the configuration, you can also use the function icons: 

   and  to switch among the target rates.

To change the target rate during work:

A. 

- Activate automatic rate control.

B.  - Open main valve.

Spray cones appear under the boom icon on the work screen. Still, the sprayer is not spraying.

As long as you are at a standstill, the sprayer cannot start spraying. See icons:  and  .

C. Exceed the speed defined in the "Regulation off below" parameter.

D. The sprayer begins adjusting the application rate to the defined target rate.

E. 

or 

- Press to change the target rate.

The degree of change appears on the work screen.

F. 

- Restores the original target rate.

Setting Target Rate

The target rate is the quantity of spray liquid you want to apply per hectare.

The ECU will attempt to maintain this rate during the work.

There are several ways to specify the rate:

1. Enter rate on the "Parameters" screen.
2. The target rate can be adopted from external sources using the "ISOBUS-TC" app:
   - from tasks,
   - from prescription maps,
   - from external sensors.

Target rate from parameters

Target rate from an external source

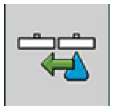
Target rates from external data sources have a higher priority than the target rate entered in the ECU. For this reason, you do not have to adjust the "Rate" parameter when you are working with prescription maps.

As an option, you can enter up to three different target rates in the ECU. To do so, use the "Rate 1" and "Rate 2" parameters in addition to the "Target rate" parameter.

Stopping Application

You can stop application in the following ways:

 - Close main valve.

 or  - Close the section valves consecutively.

Drive slower than the set minimum speed (only in automatic mode).

Operating Sections

Use the following function keys to operate the function:

Function Icon	Function
	Closes section valves from left to right.
	Closes section valves from right to left.
	Opens section valves from left to right. or When all of the section valves are closed, then the first section valve is opened from the left.
	Closes section valves from right to left. or When all of the section valves are closed, then the first section valve is opened from the right.
	If the sections were deactivated via SECTION-Control, press and hold for approx. 3 seconds to override the deactivation of the sections. The sections are then opened for approx. 5 seconds. On the work screen, check marks appear at the respective sections for the 5 seconds.

If your implement has an external main switch, you can use it to open or close all of the sections.

For more information, refer to Muller manual available on www.myhardi.com.au

Cleaning

General Info

Follow the below cleaning and maintenance program, in order to derive full benefit from the sprayer for many years.

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

ATTENTION! A clean sprayer:

- Is a safe sprayer.
- Is ready for action.
- Reduces risk of crop damage from crop protection chemical residue.

Guidelines

- Read the complete 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 chemical washings, mandatory decontamination methods, etc. If in doubt, contact the appropriate authority.
- Usually the chemical washings are sprayed out on the field just sprayed or at a suitable 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, retain the washings in an appropriate receptacle, diluted and distributed over a larger cultivated area - also see "Filling/washing location requirements" on page 146.
- Cleaning starts with the calibration, as a well-calibrated sprayer will ensure the minimal amount of remaining spray liquid.
- Good practice is 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. Strongly advised is 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.
- Sometimes it is 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.
- Recommended is to coat all metal parts of the sprayer before and after use with a suitable rust inhibitor, if the product applied is corrosive.
- Always park the sprayer under cover to avoid rain-washing off pesticides causing spot contamination in the soil. If parked outside, park the sprayer on the filling/washing location in order to retain possible pesticides.

Use of Cleaning Agents

- It is recommended to use an appropriate cleaning agent for cleaning agricultural sprayers.
- It is recommended to use cleaning agents containing a suitable lube or conditioner.
- If not available, and instead using triple ammonia water, it is important to rinse the liquid system 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.

Technical Residue

An amount of spray liquid will inevitably remain in the system. As the pump takes in air when the tank is just about empty, spraying the crop properly is not possible.

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.

ATTENTION! Liquid in the spray lines is undiluted residue. There should be an untreated paddock area available to spray this liquid out.

ATTENTION! Follow national regulations when disposing of chemical residues.

Lubrication

General information

Always store lubricants in a clean, dry and cool place - preferably at a constant temperature. Keep oil filling jugs, hoppers and grease guns clean, and clean the lubricating points thoroughly before lubricating. Avoid skin contact with oil products for longer periods. Always follow the recommendations concerning quantity. If no quantity is indicated, lubricate up to the required level.

Preventive Maintenance – Cumulative Service Checklist

ATTENTION! Maintenance intervals are based on operating hours or calendar time, whichever occurs first.

ATTENTION! All service intervals are cumulative.

ATTENTION! Any maintenance item specified at a lower interval must be repeated at all higher service intervals, unless explicitly stated otherwise.

10 Hours / Daily Inspection (Operator Responsibility)

Engine & Fluids	Visual Inspection	Spray System	Electrical & Safety	Cab
Engine oil level checked	No engine, hydraulic or coolant leaks	Pump running smoothly	Working lights and beacons operational	Steering response normal
Coolant level checked	Tyres inspected for damage and pressure	Suction hoses secure	Horn operational	Service brake and park brake functional
Hydraulic oil level checked (sight glass)	Wheel nuts visually inspected Check hub oil for any leaks	Boom hoses and nozzle bodies intact	Fluid stop functional (if fitted)	Joystick and switches operating correctly
Fuel level checked	Steps, handrails and mirrors secure			
Fuel water separator drained (if fitted)				

50 Hours / Weekly Service (Includes all 10-Hour / Daily Items)

Engine	Hydraulic System	Steering & Suspension	Boom & Chassis	Electrical
Air filter inspected	Hoses and fittings inspected for leaks or chafing	Steering cylinders inspected	Boom pivots and hinge points inspected	Battery terminals clean and tight
Air restriction indicator checked	Hydraulic oil cooler cleaned	Steering joints and linkages inspected	ParaLift and centre frame inspected	
Drive belts inspected (alternator / A/C)	Hydraulic tank breather inspected	Suspension components inspected for leaks or damage	All lubrication points greased	Wiring looms checked for abrasion
Engine mounts inspected			NORAC sensors inspected and cleaned	

250 Hours / 3-Monthly Service (Includes all 50-Hour and 10-Hour Items)

Engine – Mandatory	Hydraulic System	Drive line & Brakes	Spray System	Boom & AutoHeight	Cab & Diagnostics
Engine oil replaced	Hydraulic oil level and condition checked	Wheel hubs / planetary oil levels checked	Pump oil level checked (if applicable)	Boom structure inspected	Cab air filters inspected
Engine oil filter replaced	Hydraulic filters are replaced	Service brake and park brake tested	Pressure filters cleaned	Boom fold and unfold tested	Air conditioning performance checked
Fuel system inspected (lines, separator)	Pumps, motors and valve blocks inspected for leaks		Section valves checked	Auto height control tested	Fault codes checked
Coolant hoses and clamps inspected			Pressure regulation tested		Functional test drive completed
Fuel filters are replaced					Main ground points* inspected All nuts and bolts inspected and tightened.

*Ground point is located behind the floor box in cabin.

500 Hours / 6-Monthly Service (Includes all 250-Hour, 50-Hour and 10-Hour Items)

Engine – Mandatory	Hydraulic System-Mandatory	Chassis & Structure	Drive line	Electrical	Calibration & Function
Engine oil replaced	Hydraulic filters replaced	Wheel nuts torque checked	Wheel hubs / planetary oil replaced	Complete wiring harness inspection	Steering calibration checked
Engine oil filter replaced	Hydraulic oil inspected for contamination	Boom pivot bolts torque checked		Electrical connectors inspected for corrosion	Spray system calibration checked
Fuel filters replaced		Frame and axle mounts inspected			Drive and braking performance tested
		Suspension mounting points inspected			

750 Hours / 9-Monthly Service (Includes all Previous Service Interval Items)

Engine – Mandatory	Structural Inspection	Steering & Cooling	Electrical
Engine oil replaced	Boom pins and bushes inspected	Steering sensors inspected and secured	ECU / PDU connections inspected
Engine oil filter replaced	Centre frame and boom welds inspected	Cooling system inspected (radiator, fan, hoses)	CAN wiring inspected
	Cab mounts and isolation bushes inspected		

1000 Hours / Annual Service (Includes all Previous Service Interval Items)

Engine – Mandatory	Hydraulic System – Mandatory	Fluids & Cab	Mechanical & Safety
Engine oil replaced	Hydraulic filters replaced	Coolant condition checked / replaced if required	Wheel bearings inspected
Engine oil filter replaced	Hydraulic oil replaced	Cab air filters replaced	Suspension accumulators / airbags inspected
Fuel filters replaced			Brake system inspected

Time-Based Servicing – Low Hour Operation (Rubicon 9000)

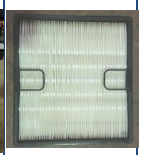
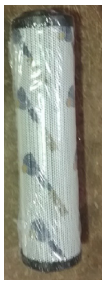
ATTENTION! If the machine does not reach 250 operating hours within 12 months, an annual service equivalent to the 250-hour cumulative service must still be completed.

Low Hour Operation - annual service
Engine oil and oil filter replaced
Fuel filters replaced
Hydraulic filters replaced
Full inspection completed
Diagnostic check completed

List of filters

HARDI
The Sprayer

RUBICON

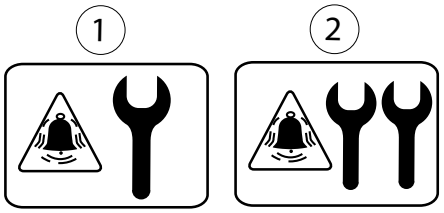
MOTOR CUMMINS						HYDRAULIC TANK	HYDRAULIC FILTERS		CAB
MA520004004 Oil Filter	27028301 Fuel Pre Filter	MA520002008 Fuel Filter	MA520007001 Coolant Filter	MA520003001 Air Filter Outer	MA520003002 Air Filter Inner	78626601 Suction Filter	782856 Cartridge Filter 3 Required	MA520001014 Cartridge Filter 1 Required	27054201 Cabin Filter
									

Maintenance

Display of the frequency of maintenance

When maintenance is required on the self-propelled, the display shows the symbols of alerts corresponding to the different periods:

1. Maintenance after 250 hours of use
2. Servicing every 500 hours



The message (1) appears every 250 hours to indicate that maintenance is required on the machine.

The message (2) appears periodically at every 500 hours to indicate that maintenance is required on the machine.

Reset the Hour Meter

- Simultaneously press the key (1) for 5 seconds to reset the hours for maintenance

NOTE! This message should be cancelled after the maintenance work has been completed.".

After 10 hours - Hydraulic system

- Check the tightness of the hydraulic hoses and the oil level in the hydraulic reservoir.
- Check the tightness of the wheel studs.

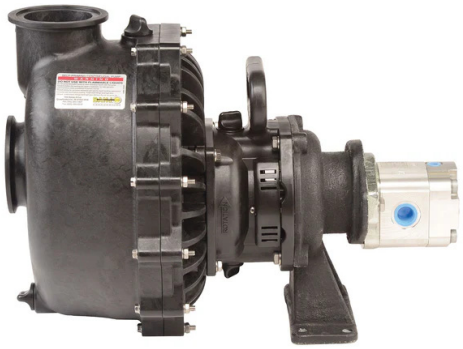
Periodic Maintenance

Daily

- Check sprayer filters
- Check spraying circuit
- Check engine oil level
- Filling the fuel tank
- Check hydraulic oil level
- Cleaning of the engine radiators
- Check air compressor/compressor dryer
- Check air filter is not clogged
- Check barrier fluid level of product pump
- Check the mixture coolant of the Fresh Water Pump (PWSP series)
- Check tyre pressure
- Check wheel studs

Filling the Fresh Water Pump (PWSP series)

The pump is ready for operation after you have filled the wet seal reservoir 3/4 full (the seal assembly should be submerged with a 50% water ethylene glycol (antifreeze) and 50% water mixture.



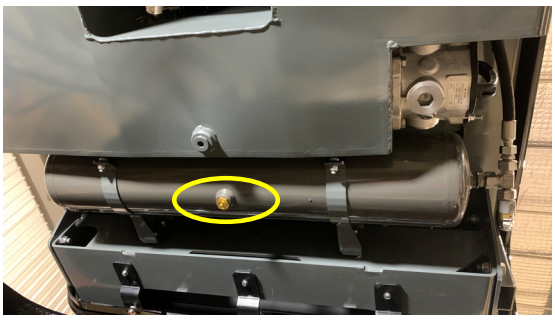
- Check and refill coolant mixture every 8 hours of use.
- Coolant fill is located above fluid platform.
- Hose to remain filled with coolant.
- Change the antifreeze every 500 hours or annually.

NOTE! The Rubicon has an external coolant reservoir line which runs above the fluid platform.

NOTE! See "Table of recommended lubricants" on page 241 for antifreeze specs.

Compressed air reservoir

- Turn the bleed valve to eliminate the condensate content in the tank.



Daily

Engine - Recommended lubricants

The motor oil used to fill the engine's crankcase is an API 'CD/SF' classed oil TOTAL RUBIA SAE 30 suitable for the running-in period.

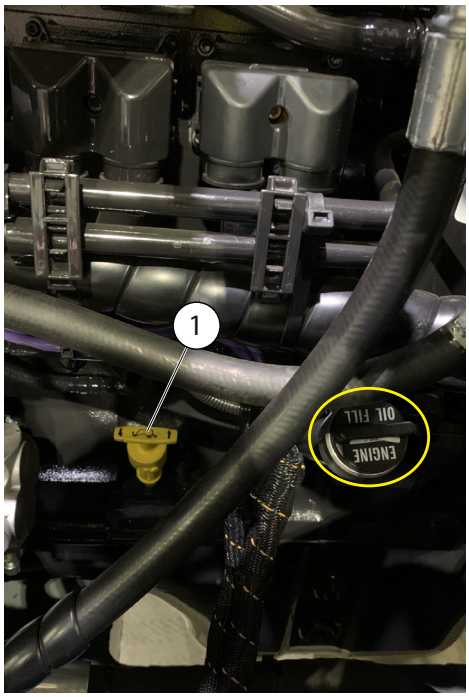
Engine - Drainage intervals

1st oil change after 50 hours of operation
Then every 500 hours

WARNING! Do not spill used oil on the ground. Dispose of used oil in compliance with environmental protection legislation! (Directive no. 87/101/EEC).

NOTE! Check the oil level every morning.

NOTE! For further information, see the CUMMINS engine user and maintenance manual.



Engine cooling system

- Release the latch and open the cover fully.
- Clean the cooling radiator regularly (honeycomb grills).

Coolant filter	MA520007001

The cooling system is filled with a -35°C anti-freeze product such as:

TOTAL COOLELF AUTO SUPRA -37°C

DANGER! Water must not be added to the coolant.

NOTE! The multifunction display is used to monitor the temperature.

WARNING! HARDI shall not be held liable if temperatures fall below freezing and in the event of incorrect maintenance.

WARNING! During cleaning operations, take precautions not to damage the cells of heat exchangers.

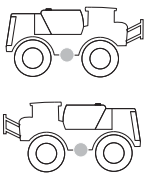
NOTE! When the machine is operating in areas with a lot of dust or pollen, the cleaning intervals should be shortened.

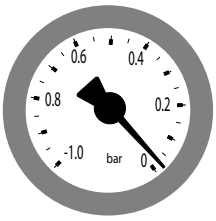
NOTE! The residue of oil and fuel promotes the clogging of the engine and the radiators. Hence it is advised to carefully check the sealing of the engine.

NOTE! For further information, see the CUMMINS engine user and maintenance manual.

Every 250 hours - Hydraulic filter

The hydraulic suction filters are fitted with clogging indicators.





NOTE! The clogging indicator is read when the hydraulic oil is at the normal temperature for use.

- Regularly check the clogging level.

Less than 0.2 = filters in good condition.

More than 0.2 = filters to be replaced.

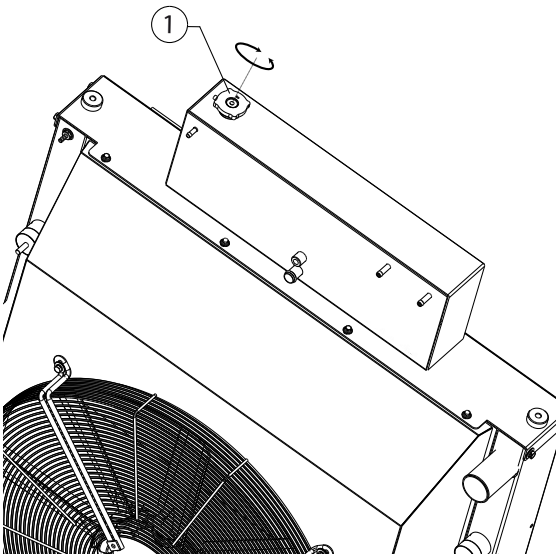
Every 250 hours - Engine

NOTE! For the maintenance of the engine, refer to Cummins engine user and maintenance manual.

Coolant level

DANGER! In the event of overheating of the engine's cooling system, wait a few minutes before opening the expansion tank plug, in order to avoid any risk of projection that could cause serious burns.

WARNING! Regularly check the coolant level.



DANGER! To avoid burns, unscrew the plug (1) when the temperature is below 50 °C.

NOTE! For further information, see the Cummins engine user and maintenance manual.

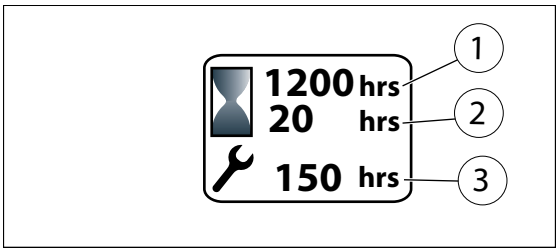
NOTE: HARDI shall not be held liable if temperatures fall below freezing and in the event of incorrect maintenance.

ATTENTION! Only use the coolant recommended, see "Table of recommended lubricants" page 241.

Every 500 hours - Hour Meter

This message appears every 500 hours of use, to indicate that an intervention of mandatory maintenance is to perform on the machine.

1. Total hours of the machine
2. Hours since last maintenance
3. Time remaining until next maintenance

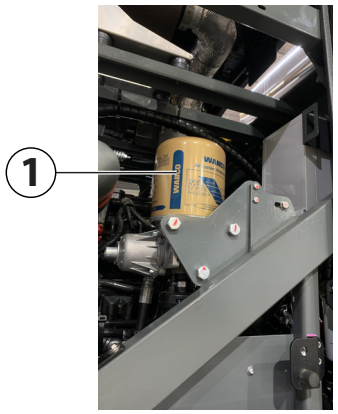


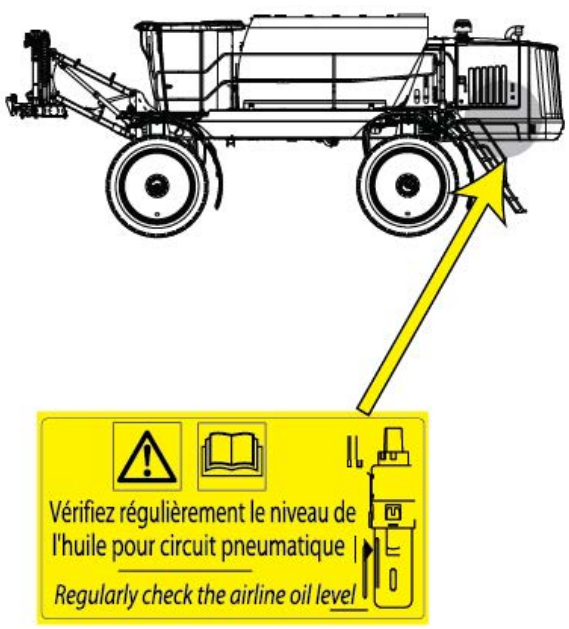
- Change of engine oil and replacement of oil filter cartridge.
- Replacement of fuel filter.
- Bleed the fuel pre-filter.
- Inspection of tightness and tension of engine belts.
- Draining of the hydraulic reservoir and replacement of hydraulic filters.
- Replace the cabin active carbon filter.

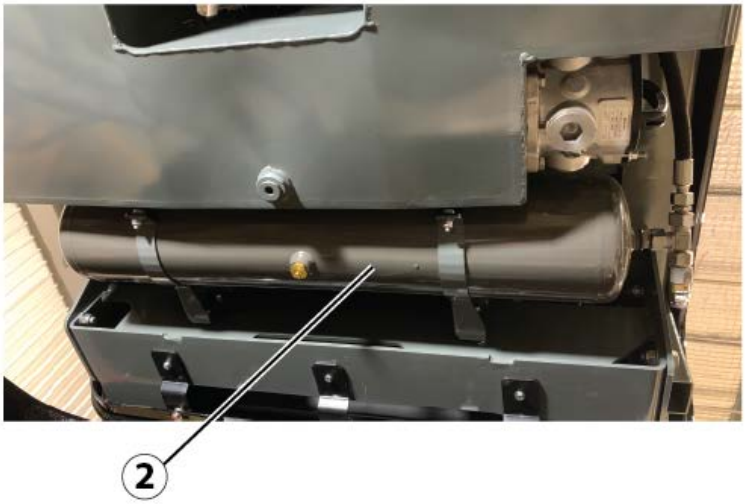
Bleed the pneumatic system

Sprayers fitted with a compressed air system have filter, dryer and lubricator mechanisms for the compressed air which is necessary for correct operation of the pneumatic components.

During system pressure build-up, compressed air passes into the air dryer (1) where the filter system removes contaminants and passes the air into the drying stage. Moisture-laden air passes through the desiccant bed in the air dryer cartridge and moisture is retained by the desiccant.







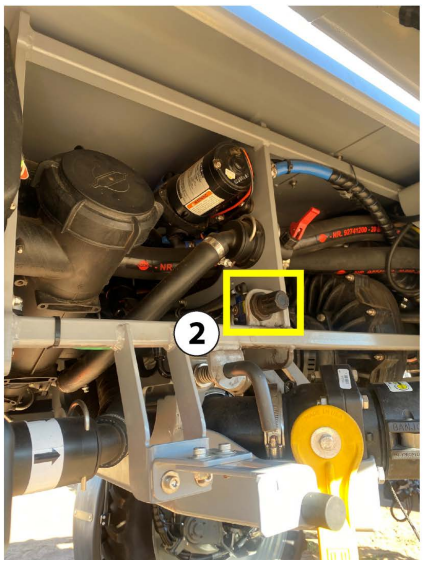
The engine air compressor fills the air storage tank (2) to 10 bar.

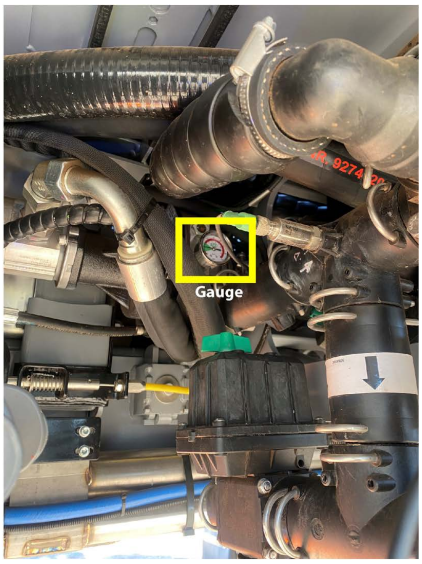
Regulator (3) maintains a constant pressure (2 bar) for the ace pump wet seal pressure.

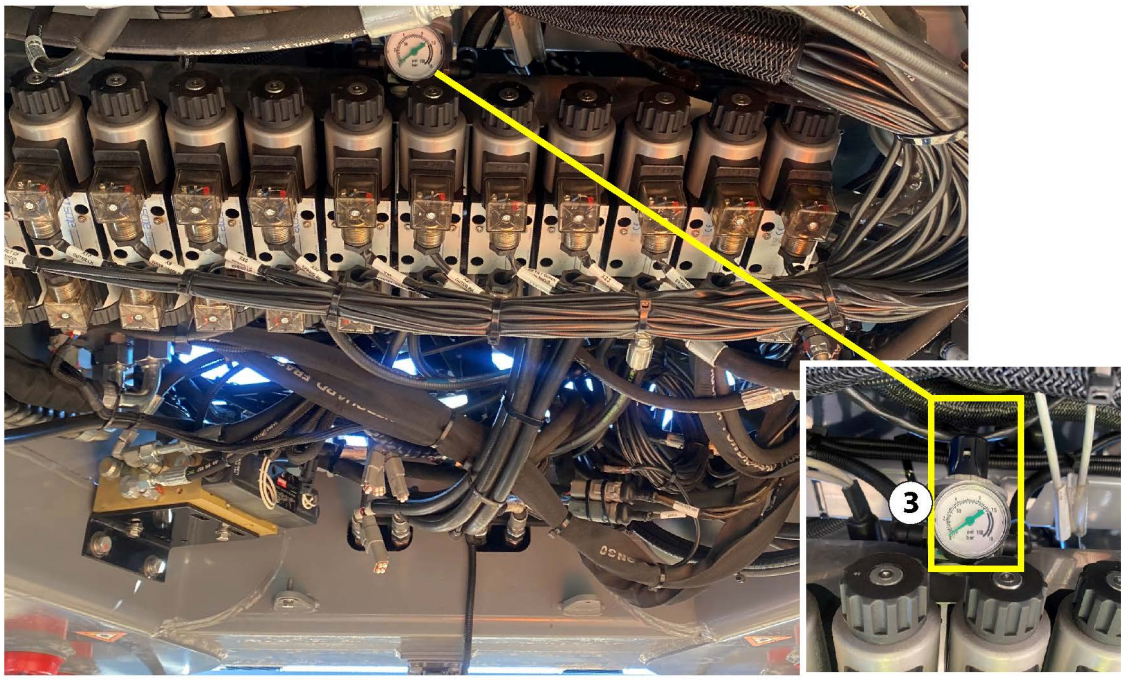
Regulator (4) maintains a constant pressure (8.5 bar) in boom solenoid valves, the air suspension bellows, the box's interlock system and the paralift hooks for the lifting mechanism.

Push the relief valve, the tank releases air pressure to bleed air or condensed water until all air pressure is released. It shuts off automatically.

ATTENTION! Air system bleeding frequency: Daily prior to operating the sprayer

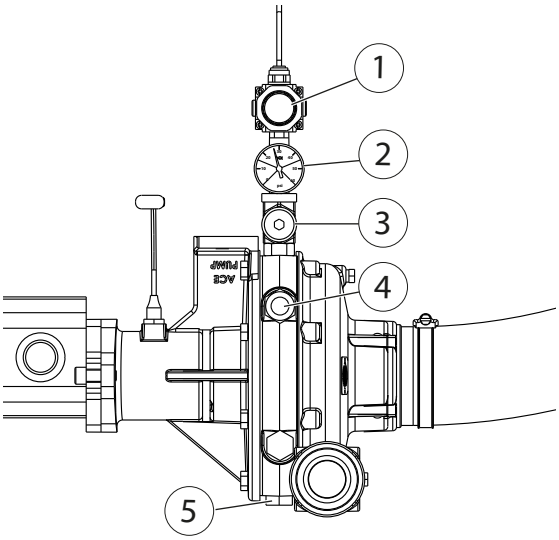

2


Gauge


3

Product pump

The seal reservoir fluid and pressure must be monitored and maintained to ensure proper operation of the WetSeal feature



Daily

Check the air pressure at the gauge (2). Air supply is regulated to 30psi, adjust the regulator (1) if necessary.

Weekly

Check barrier fluid level. A small amount of barrier fluid will be consumed under normal operating conditions.

If the barrier fluid appears cloudy or discoloured in site gauge (4), drop the air pressure, then drain until fluid runs clear, remove the refill plug (3) with clean fluid and recharge pressure. Check again in one week. If fluid is cloudy or discoloured again, this is an indication of inboard seal leakage. A seal kit installation should be scheduled for next machine downtime.

Season End

Remove drain plug (5) and drain barrier fluid from the reservoir into a clean bucket.

1) If the fluid is clear: reinstall plug, refill with barrier fluid, and recharge air pressure.

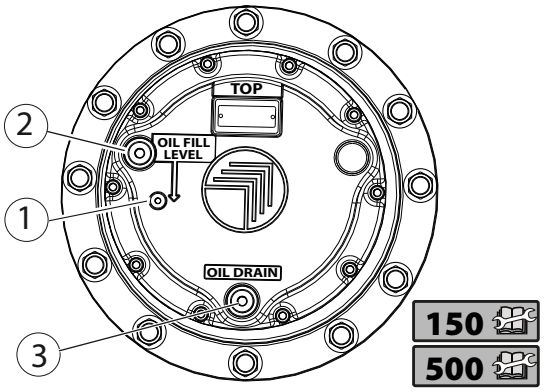
2) If fluid is cloudy, discoloured, or contains water: this could be the indication that a seal leak is developing. Installation of a seal kit is recommended to ensure trouble free operation for the next season.

Flush pump thoroughly to prevent corrosion.

Fill pump with recreational vehicle antifreeze to protect from corrosion and freezing.

Wheel Drive Gearbox Draining

- Move the self-propelled to orient the reducers as shown in the illustration.
- Unscrew the cap (1) and (3) to drain the gearbox.
- Add the oil from the orifice (2) until it flows out from the level orifice (1).



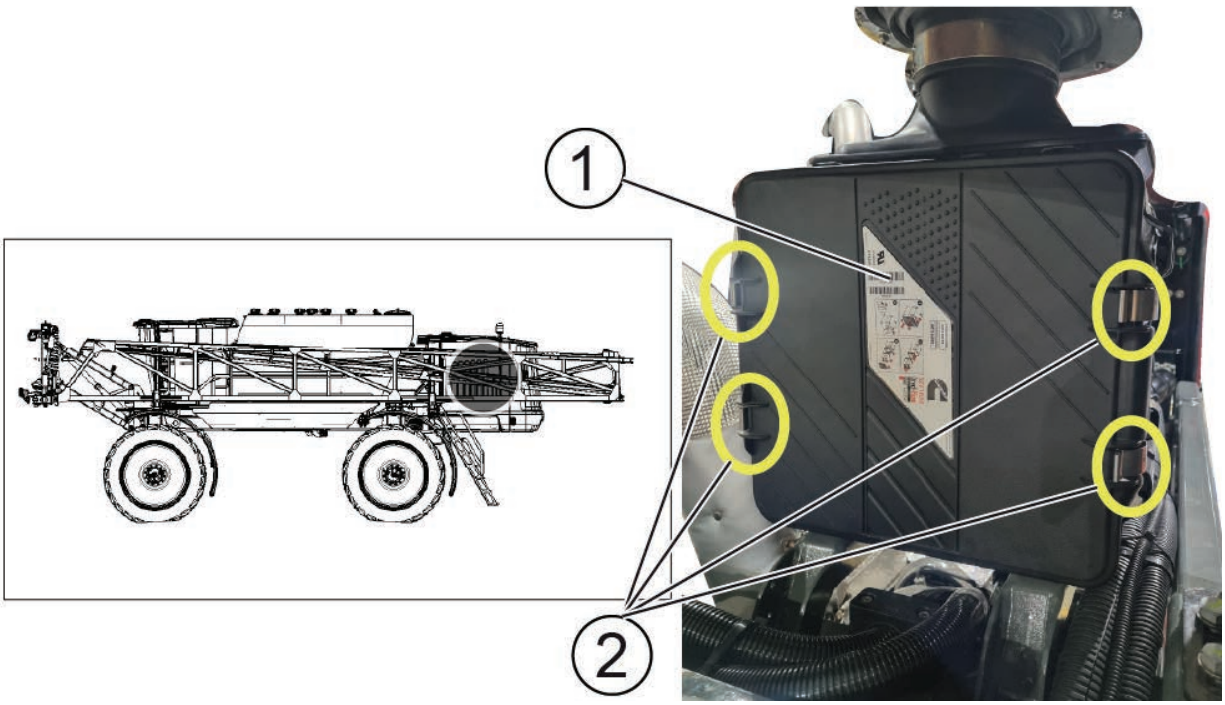
NOTE! Use new O rings for plugs.

NOTE! Use exclusively recommended transmission oil. See "Table of recommended lubricants" on page 241.

Replacement of engine air filters

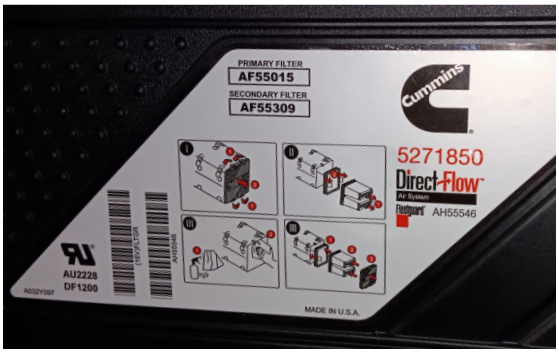
The Rubicon is equipped with a dry air filter.

WARNING! Wear goggles and a mask for protection to avoid the inhalation of dust and to protect the eyes.



To access the filter cartridges,

- Release the clips (2).
- Remove the cover (1).
- Follow the instructions on the sticker.
- Replace the filter.



Primary cartridge	Secondary cartridge
MA520003001	MA520003002

NOTE! A warning light (3) in console turns on when cartridges are clogged.

NOTE! To ensure the best protection, make sure to use original air filters.

NOTE! Refer to Cummins instruction manual for additional practical information.

NOTE! For information on air filter cleaning and filter cartridge replacement frequencies, see the "Preventive Maintenance – Cumulative Service Checklist" on page 176.

Replacement of engine filters

WARNING! Wear goggles and a mask for protection to avoid the inhalation of dust and to protect the eyes.

NOTE! To ensure the best protection, make sure to use original air filters.

1. Coolant filter

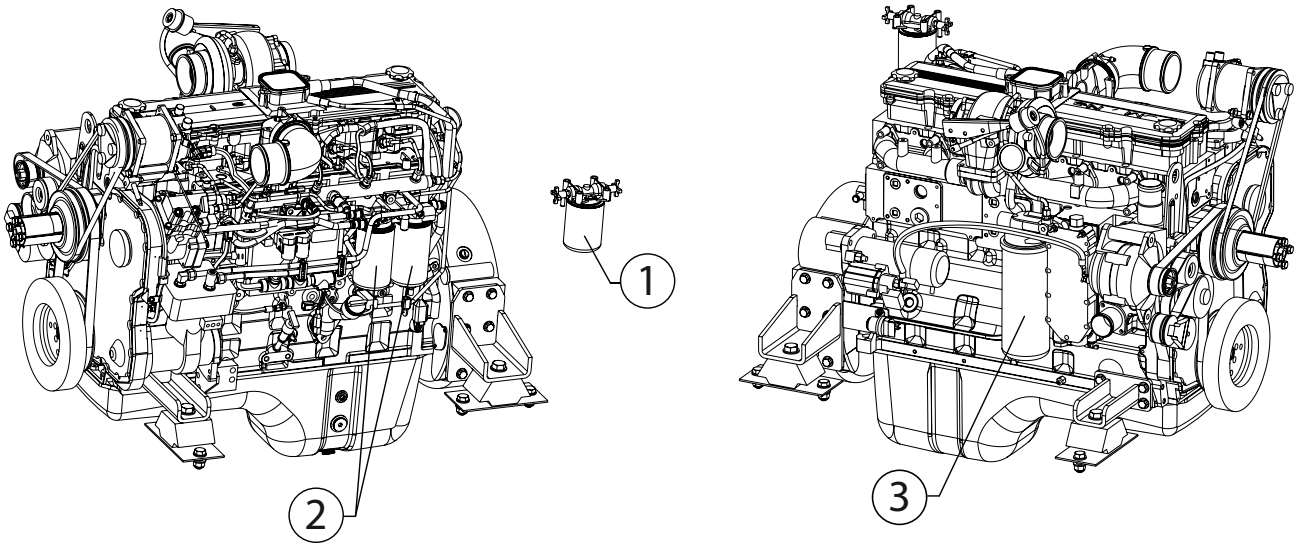
Coolant filter	MA520007001

2. Fuel filters

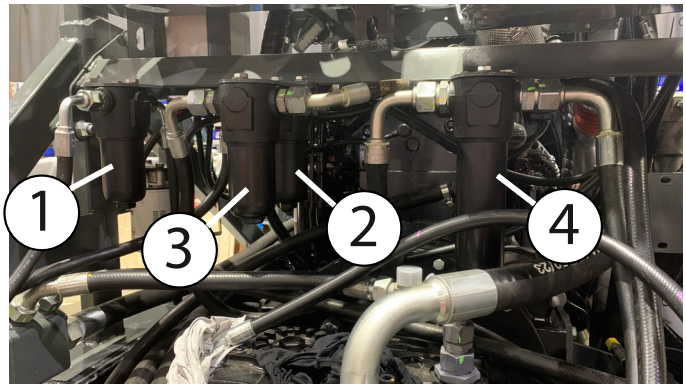
Fuel filter	MA 520002008
Fuel/water separator pre-filter	MA520002007

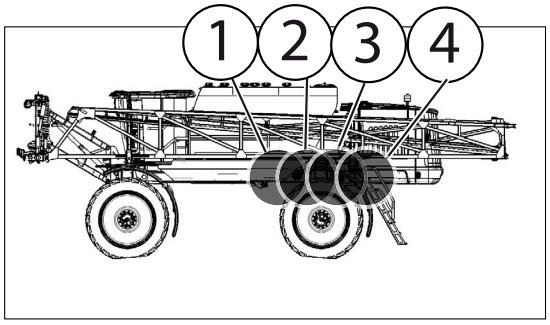
3. Engine oil filter

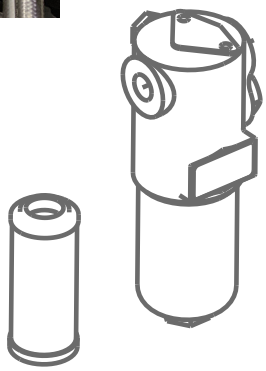
Oil filter	MA 20004004



Replacement of hydraulic suction filters (pressure filters)







ATTENTION! Make sure you have a container at hand to collect any oil that may drip from the filters.

To replace the filter cartridge:

- Unscrew the filter housing.
- Remove the filter cartridge and replace it with a new one.
- Screw the housing back into place.

Filter cartridge reference:

Cartridge (forward direction) (1): MA 520,001,010

Cartridge (brake + reverse direction) (2): MA 520,001,010

Cartridge (boom) (3): MA 520,001,010

Cartridge (spraying pump) (4): MA 520,001,014

WARNING! It is essential to use an original filter.

WARNING! Never store machine with an empty hydraulic system.

WARNING! Never start the engine if there is no oil in the system.

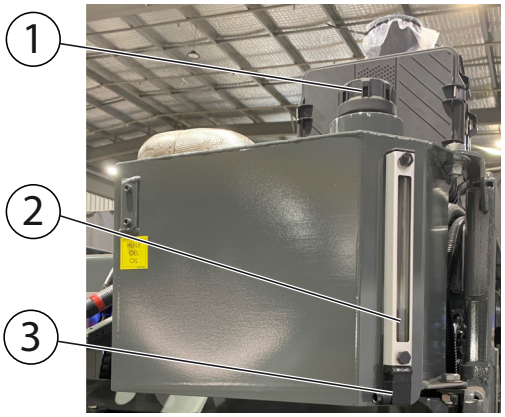
WARNING! If the oil level is abnormally low, an alarm sounds. Stop the engine immediately and refill with the recommended oil.

Oil tank hydraulic filters

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.

WARNING! It is essential to use original HARDI spare parts for filter elements.



- Access to fill the hydraulic oil reservoir (1)
- Hydraulic oil level (2) (Level when cold: 75% of the maximum oil level limit)
- Sensor (3) for detecting when the minimum oil level limit is reached. (Indicated by a buzzer alarm in the cabin)

NOTE! Under normal operating conditions, filter element must be replaced 250 hours after the vehicle was first commissioned, then every 500 hours.

NOTE! Filter cartridge reference: MA520001012

ATTENTION! The filter cartridge should be changed only when the engine is switched off.

Replace the filter cartridge

- Unscrew the filter cover (4) and remove the cartridge.
- Clean the gasket surface of the filter housing.
- Engage the cartridge into the filter housing.
- Screw the filter cover back on (oil the gasket).

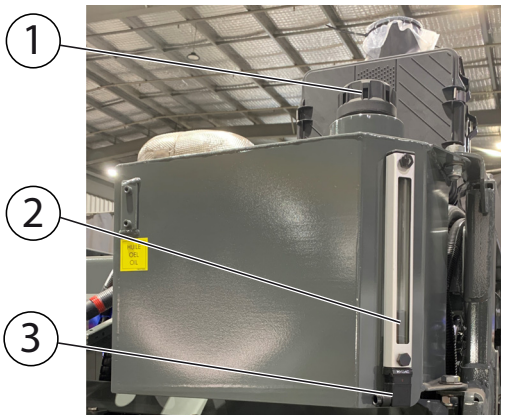
NOTE! The oil running from the filters must never be re-used as it may damage the hydraulic system components.

WARNING! Inspect for leaks. A leak in the suction system can cause considerable damage to the pump and hydraulic motor.

WARNING! Never disconnect an electrical probe as this may lead to considerable damage to the pump and the hydraulic motor.

Replacing oil and oil levels

Under normal operating conditions, hydraulic oil is replaced every 500 hours or every two years.



- A buzzer located in the cabin sounds when the oil level is too low.
- It is recommended you drain the system when the oil is warm.
- Dispose of used oil in compliance with environmental protection legislation (Directive no. 87/101/EEC).

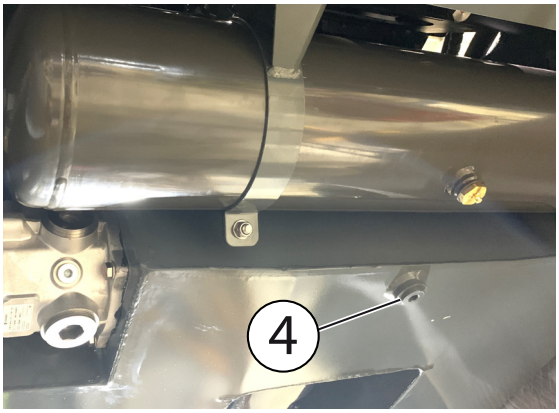
- Access to fill the hydraulic oil reservoir (1)
- Hydraulic oil level (2) (Level when cold: 75% of the maximum oil level limit)
- Sensor (3) for detecting when the minimum oil level limit is reached. (Indicated by a buzzer alarm in the cabin)
- Hydraulic oil draining cap (4)

DANGER! Hot oil can cause serious burns.

ATTENTION! Do not mix with other products.

ATTENTION! Store them in well-closed leak-tight containers.

ATTENTION! Contact an approved oil collecting and/or a 'light' used oil regeneration/recycling company to get your oil collected and recycled.



The Rubicon is delivered with TOTAL EQUIVIS ZS 46 oil.

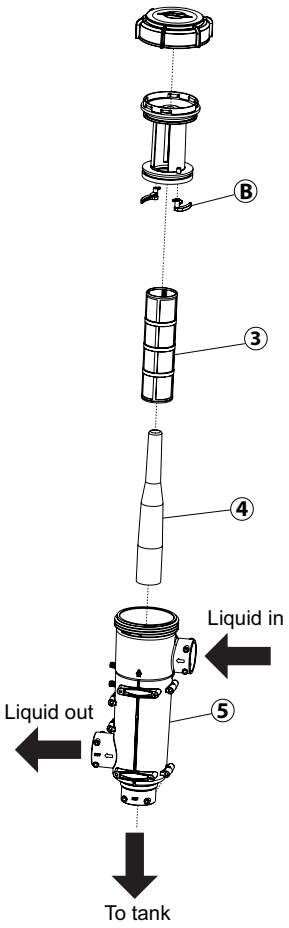
WARNING! Once the reservoir has been drained, the filter cartridge must be changed as the new oil may have impurities in it.

Cleaning of Cyclone filter

After decontamination and prior to a chemical change.

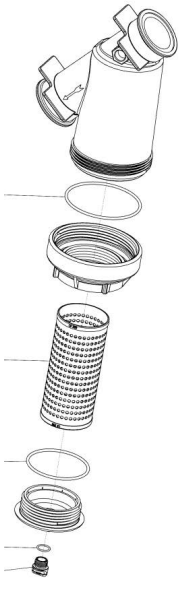
To service this filter:

1. Operator will unscrew lid anticlockwise and set aside.
2. Reach into filter and remove central cyclone component to which filter is attached. (2 filter clamps (B))
3. At point where above assembly cannot be further removed from hosing, operator will need to open filter clamps thus splitting this assembly into two parts.
4. Now remove upper cyclone component and lower filter element as separate items.
5. Clean filter.
6. Assemble in reverse.



Cleaning of Fresh water filter

Fresh water filter (No#12 in fluid diagram) is used to ensure water in main and flush tank is filtered. This filter has a drain valve on base of bowl. This allows operator to drain fluid from filter before opening.



Precautions after changing filter cartridges or oil

- Start the engine and let it idle for one minute to allow the feed pump to be correctly primed.
- Ensure that there are no leaks in the suction lines.
- Drive the self-propelled vehicle forwards and then in reverse it to check it operates correctly.

Practical advice

- If you change a hydrostatic pump or a flexible hose on the pump, once it has been assembled and before the engine is started, you must fill the crankcase via the draining tube hole.
- The leak-tightness of hydraulic systems must be checked regularly.
- The oil cooler must be cleaned regularly (clean the honeycomb grills).
- Check the feed pressure (between 20 and 30 bar).
- Any disassembly and reassembly must take place in a clean location.

Every 250 hours - Cabin combined air filter

General info

The warning light will turn on usually after 250 hours of operation on HIVE screen.

Store the air filter carefully into a hermetic packaging after operation.

ATTENTION! Use only an genuine category 4 combined air filter.

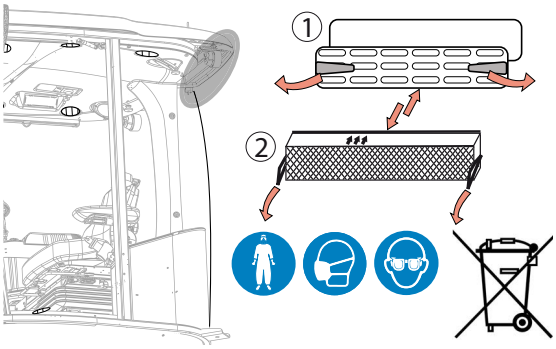
Safety recommendations

WARNING! The frequency of replacement is given for information purposes. However, a daily check is highly recommended for optimum efficiency of the filter.
In any case, if bad odours would appear in the cabin, that would mean that the filter is no longer completely effective, it must be replaced in the shortest time possible, to avoid any risk of contamination.

WARNING! Stricly follow instructions: Do not blow, wash or open the filter. For a long lasting performance, use the filter only during the spraying period.

Operating procedure

- Unlock the 2 latches and pull and remove the filter cover (1) from the K-Protect pressuriser.
- Simultaneously pull the two strips of the filter and extract it.
- Install the filter (2) following the arrows direction.



ATTENTION! If you use a non combined air filter (category 4) the warning light will remain on.

Every 1000 hours

- Cleaning of the hydraulic reservoir
- Check the engine belts
- Drain the engine coolant
- Checking the charge of gas from the air conditioning
- Cleaning the condenser of the air conditioning

Driver's seat

Dirt can impair the function of the seat, so make sure you keep your seat clean.

Upholstery does not need to be removed from the seat frame for cleaning.

WARNING! Be attentive with the backrest - it may jerk forward and cause injury!

WARNING! The backrest must be held in place when operating the backrest lever and when cleaning the backrest cushion.

ATTENTION! Do not clean the seat with a pressure washer!

ATTENTION! When cleaning the upholstery, make sure the upholstery is not soaked.

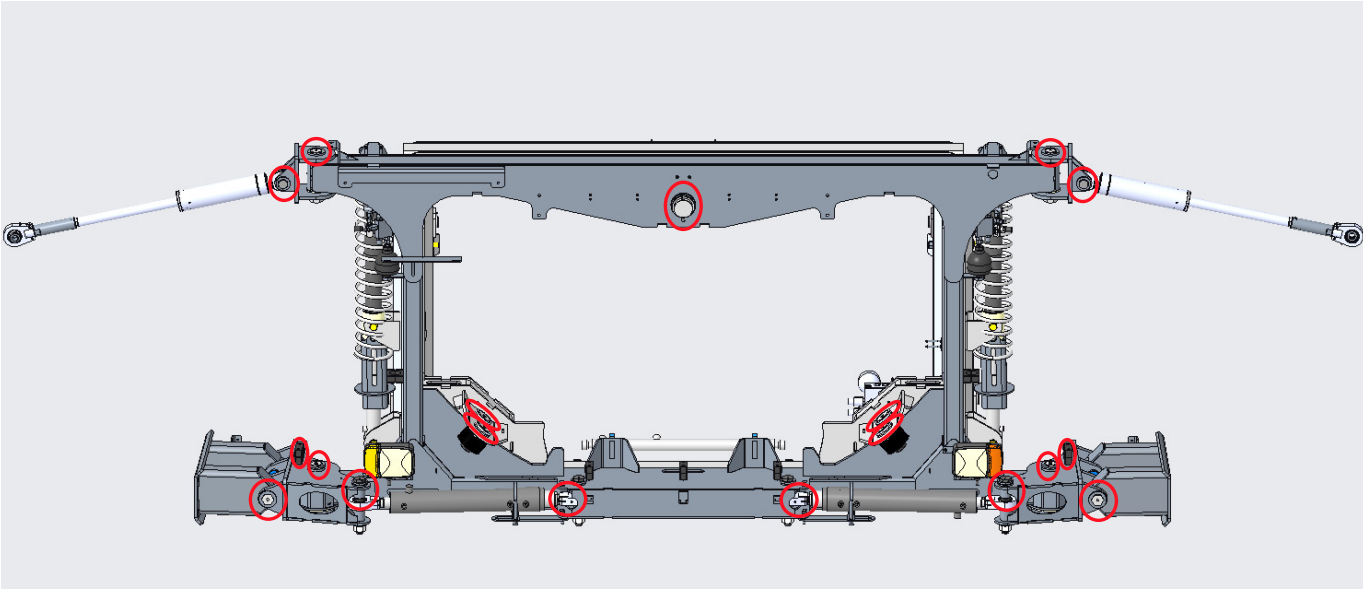
ATTENTION! Use commercially available standard upholstery or plastics cleaning agent. Before use, test first for compatibility on a small, concealed area.

Boom and Centre

Auto-terrain centre

As standard, this machine is fitted with Auto Grease Lubrication System. Please refer separate manual supplied by "Alemlube" for further details.

Grease points are identified below.



Service and maintenance intervals

After first use - Tighten Bolts and nuts

- Check that all bolts and nuts are properly tighten and re-tighten if necessary using suitable tool. Large bolt and nuts should be really tight, it is recommended to use a spanner with a 1-metre extension bar.
- Tighten the nuts on the parallelograms arms.

8 hours service - AutoTerrain centre

Some lubrication points on the boom and centre parts need extra attention when having AutoTerrain system. These lubrication points, marked in “Auto-terrain centre” page 198, need attention every 8 working hours to work correctly.

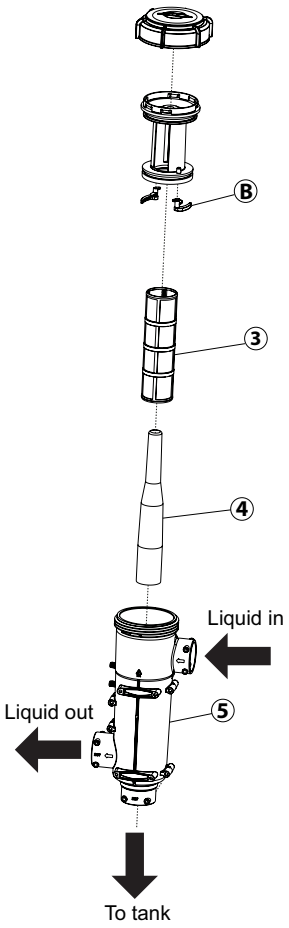
6 - Maintenance

Cleaning of Cyclone filter

After decontamination and prior to a chemical change.

To service this filter:

1. Operator will unscrew lid anticlockwise and set aside.
2. Reach into filter and remove central cyclone component to which filter is attached. (2 filter clamps (B))
3. At point where above assembly cannot be further removed from hosing, operator will need to open filter clamps thus splitting this assembly into two parts.
4. Now remove upper cyclone component and lower filter element as separate items.
5. Clean filter.
6. Assemble in reverse.



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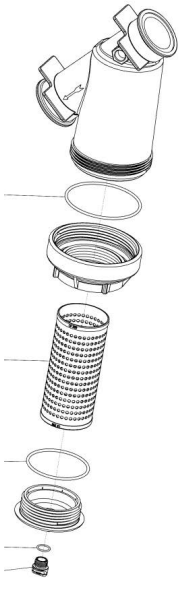


250 hours service - Readjustment of the boom

See section "Readjustment of Boom - General Info" page 203.

Break-away

Adjustment should be performed regularly to prevent uncontrolled breakaway movement during cornering and when avoiding obstacles.

250 hours service - Hydraulic circuit

Check the hydraulic circuit for leaks and repair if any.

Refill Nitrogen accumulators.

- Yaw system
- Tilt system

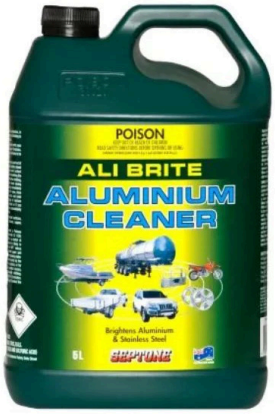
WARNING! Hoses for boom lifting device must be changed after every 5 years of use.

WARNING! Nitrogen accumulators contain oil under pressure.

Yearly service - Aluminium Boom etching cleaning

Use ALI BRITE Aluminium Cleaner or similar product to remove corrosion and oxide film.

ALI BRITE can be bought from most boat/car part shops.



Occasional maintenance

General Info

The maintenance and service intervals for the following components will depend very much on the operating conditions, and therefore it is almost impossible to specify the intervals beforehand.

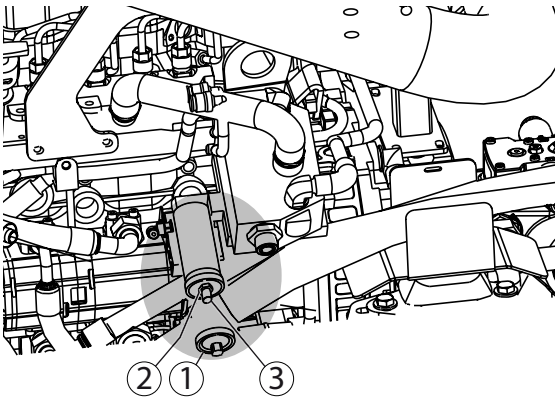
The operator must select appropriate intervals for the occasional maintenance.

If in doubt, contact your local HARDI dealer.

Compressed air pressure adjustment

Compressed air is used for the operation of the suspension of the sprayer. The operation pressure must be at 8 bar (**116** psi).

- Raise the engine cover to access the adjustment of the air compressor, located on the left side of the engine.
- Unscrew the protection cover (1).
- Loosen the lock nut (2) and turn the screw to adjust the pressure of service of the suspension.

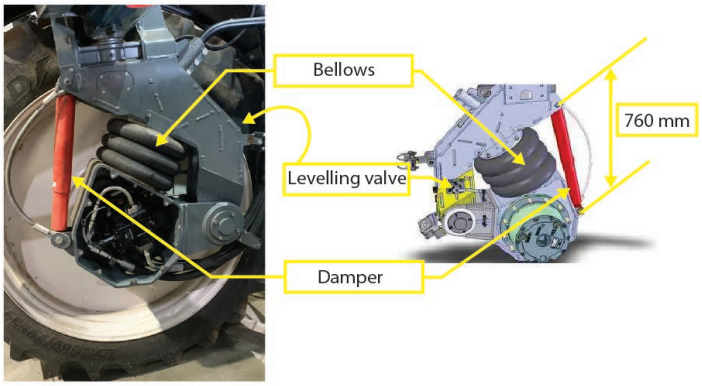


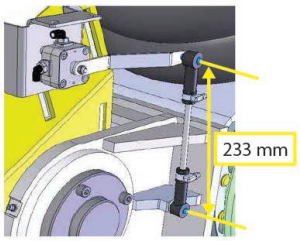
Air Suspension Adjustment

NOTE! The air suspension adjustment is to be done only with an empty tank.

- Check beforehand that the compressed air pressure is adjusted correctly.
- If the height of the front pneumatic cushion is different from 233mm (9.17 in) you can modify it by adjusting the front connecting rod (1)
- If the height of the rear pneumatic cushion is different from 235mm (9.25 in) you can modify it by adjusting the rear connecting rod (2)

ATTENTION! Air system bleeding frequency: Every morning





Readjustment of Boom - General Info

Before commencing adjustment jobs, please go through this checklist.

1. Keep the sprayer well lubricated. See "General information" on page 175.
2. Place the sprayer on level and solid ground.
3. Place wheel chocks under the wheels to prevent rolling.
4. Unfold the boom.
5. Set slanting angle to neutral position (horizontal).
6. Place strong supports below the centre section and all boom sections to relieve the load from the hydraulic cylinders.

   If you have a lifting crane, support the centre section as a minimum, as this is the heaviest boom part (up to 1000 kg).

DANGER! While carrying out adjustment, allow no one under the boom.

ATTENTION! Boom sections not supported during an adjustment job might fall down or be difficult to adjust.

7. Check the boom alignment.

   Use a spirit level, or measure the distance to the ground from similar points in both ends of the boom wing (use this method for horizontal alignment and only on level ground). When using the latter method, both distances should be equal to obtain a horizontal boom.

DANGER! Carry out adjustment of hydraulic cylinders without pressure in the system.

DANGER! If maintenance is to be done on the tilt cylinder, make sure the boom rests on sturdy support before commencing any work.

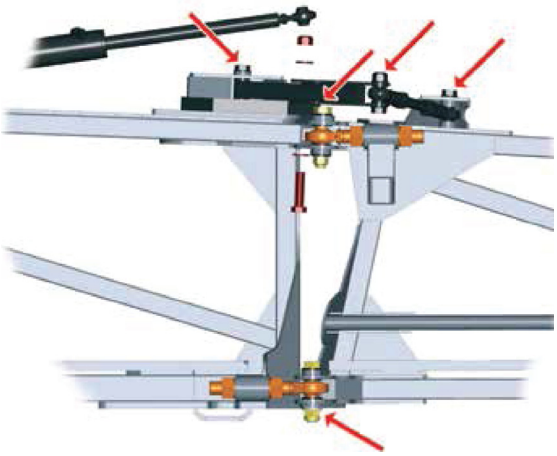
ATTENTION! Carry out adjustment equally for both the left and right boom wings.

WARNING! Nobody is allowed to remain near the boom during adjustment operations.

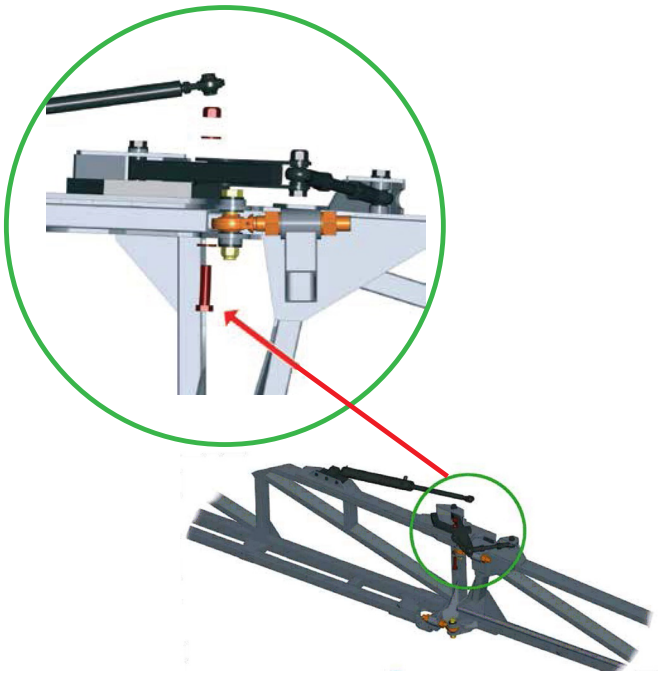
Boom adjustment

Tighten all bolts at the hinge points before adjusting the boom.

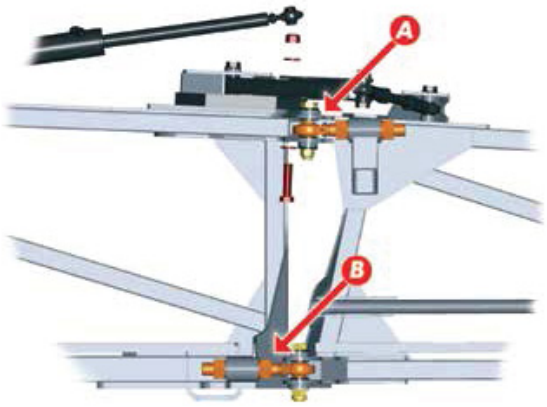
ATTENTION! Use a breaker bar and socket to tighten the bolts to maximum.



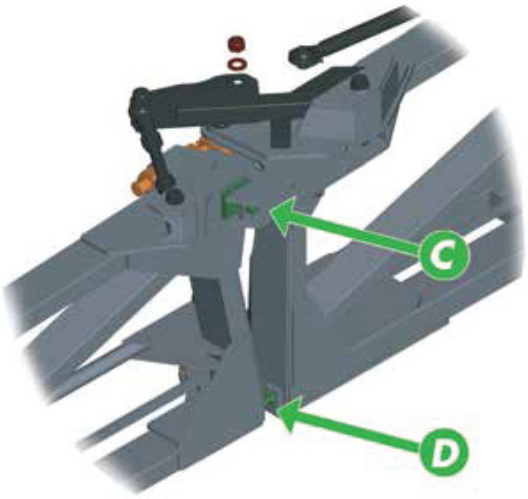
8. Unfold the boom and remove the bolt at the cylinder rod end.



9. Ensure that the inner and outer sections are perfectly horizontal by tightening or loosening the two ball joints A and B. Tighten the ball joint nuts very slightly once the boom is perfectly horizontal.



At the same time, pre-adjust the two stops C and D between the inner and outer sections so that the boom is lined up perfectly straight.



10. Fold the boom by hand so that the outer section gently rests in its bracket on the inner section.

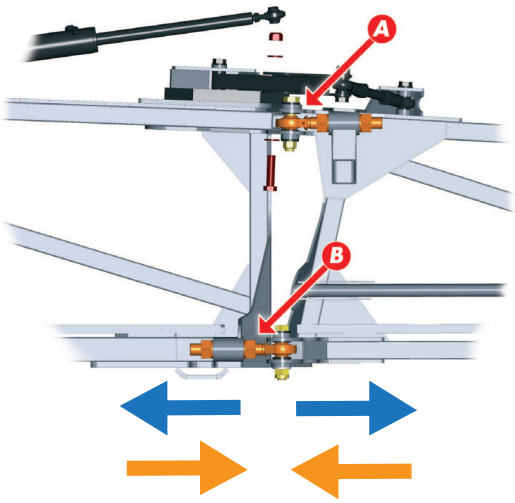
Ajustment too low

Correct adjustment

Adjustment too high

11. If the outer section is too high, unfold the boom again and, without disturbing the horizontal setting of either arm, adjust the two ball joints A and B to move the outer section away from the inner section.

    On the other hand, if in folded position, the outer section is too low, bring the outer section closer to the inner section. When the outer section sits correctly on its bracket, tighten the ball joint nuts.



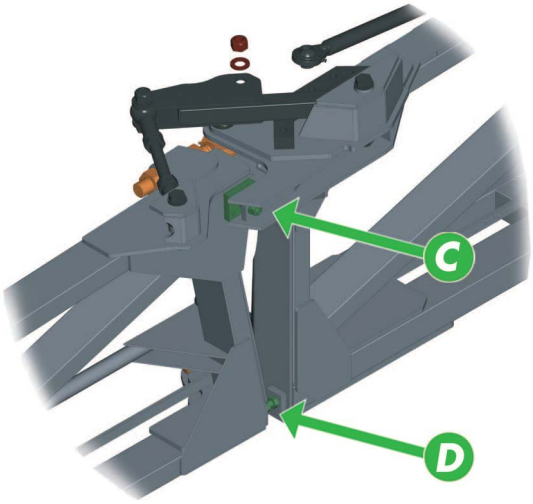
ATTENTION! Use a breaker bar to tighten the bolts to maximum. We recommend using a socket to ensure the nuts are fully tightened.

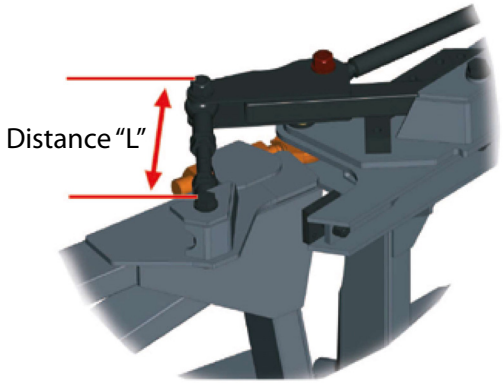
Recheck the alignment of the boom by refining the adjustment of stops C and D.

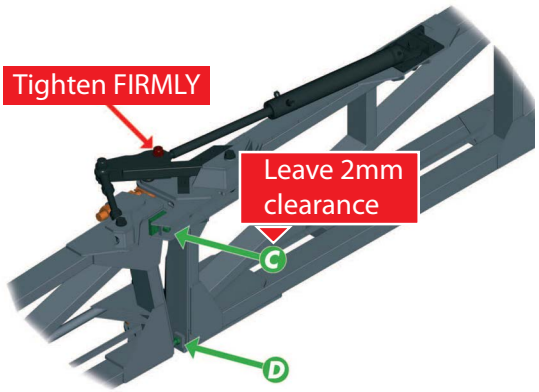
ATTENTION! Stop D must be in contact with the other section. There should be a 2mm gap between stop C and the aluminium.

12. Re-attach the end of cylinder rod to the hinge arm and bolt firmly into place.
13. Reduce the distance «L» as much as possible on the double ball joint. Fully extend the cylinder hydraulically and then increase the distance «L» until the stop D is touching the other section.

    When stop D is in contact, stop C should still be at 2mm from the aluminium.





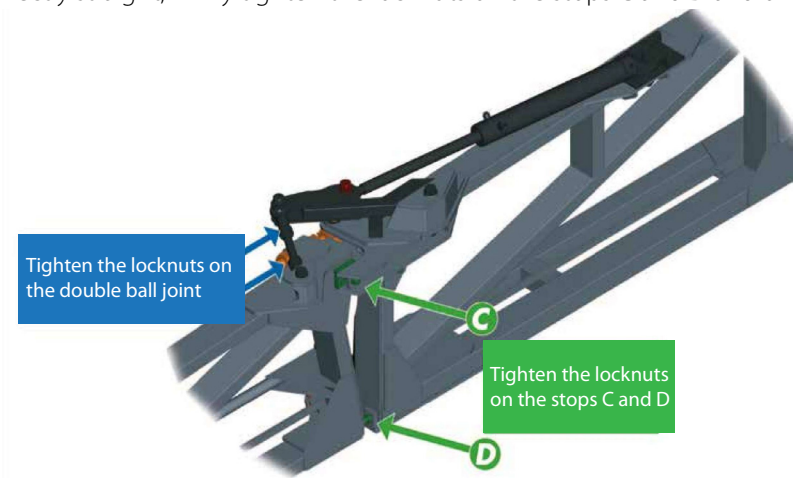


14. Continue to increase the distance «L» of the double ball joint until stop C comes in contact with the other section.
15. Loosen the double ball joint until a slight buckling is visible on the cylinder rod. (The buckling increases the rod stroke by approximately 2 to 3mm of additional stroke on the rod) approximately.

ATTENTION! During this operation, make sure that the cylinder is fully extended and that it does not retract when you loosen the double ball joint.

16. The force on the cylinder can put the boom slightly out of alignment. Check again that the boom is still well aligned. Repeat step 6 if you need to readjust the stops C and D.

    With the boom perfectly straight, firmly tighten the locknuts on the stops C and D and on the double ball joint.



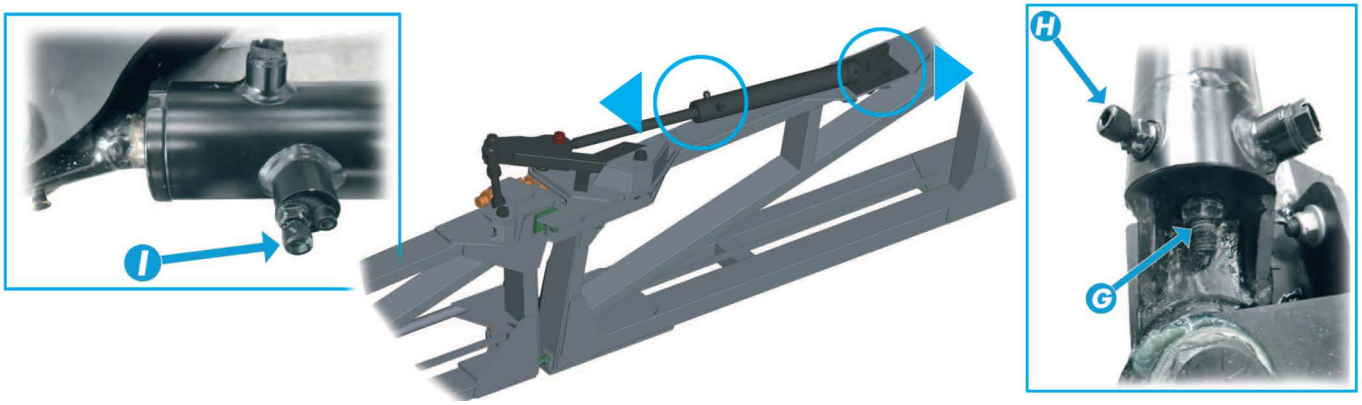
Adjustment of end-of-stroke dampers

Screw H adjusts the end cushioning of the retraction stroke, screw I adjusts the end cushioning of the extension stroke. Fold the boom approximately halfway, then loosen the locknut and tighten screw H completely without forcing. Fold the boom completely.

The boom will suddenly stop at the point where the cushioning takes effect. Now loosen the screw H to control the speed at which the boom moves and prevent it from smashing into the bracket.

ATTENTION! The setting is very sensitive, so proceed slowly by rotating the screw one tenth of a turn at a time. It is better to carry out the adjustment while the oil is hot.

Once the adjustment is complete, hold the screw H firmly and tighten the locknut. Then adjust the screw I by repeating the same steps.

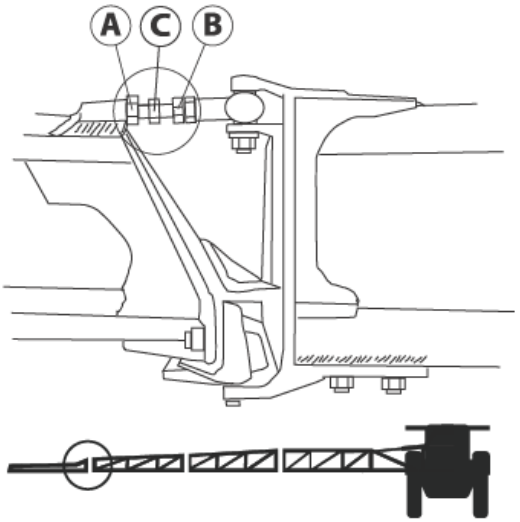


Remove the hydraulic hoses and loosen screw G. Fold the boom manually until the outer section is in its bracket on the inner section.

Tighten screw G until you feel the resistance. This means the screw is pushing against the cylinder rod. When the screw is in contact with the rod, undo it by approximately 2 to 3 mm and tighten the locknut. Screw G adjusts the retraction stroke of the cylinder rod.

Vertical alignment of outer sections with break-away sections

1. Undo counter-nuts **A** and **B.**
2. Turn the rod **C** for vertical adjustment of the outer section.
3. Tighten the counter-nuts **A** and **B** again.



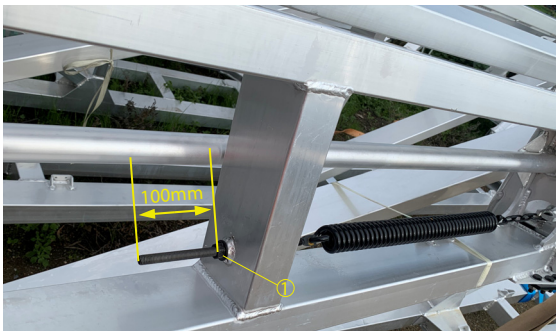
RA Boom - Adjustment of break-away spring

The end sections of the boom can break away. The spring tension determines activation of break-away when the section encounters an obstacle.

- Change the spring tension by working on the nuts (**1**).

The 100mm distance corresponds to the spring tension.

The tension corresponds to the distance of the spring when idle, to which 100mm should be added.



NOTE! A tension value that is too low can cause untimely activation of the safety system.

ParaLift Lock

An air activated ParaLift locking system secures the boom into position for safe road transport.

The boom is mechanically held in transport position with ParaLift lock mechanisms. The mechanical locks are engaged by the lock switch in the roof console of cabin. This means the boom is not supported by hydraulic oil pressure when in transport.

WARNING! When the sprayer is being transported along rough road and is bounced over potholes, in extreme cases there is a risk that the lock arms can disengage. ParaLift locks should be checked before and after transport to ensure positive lock engagement.

WARNING! The Rubicon is fitted with pilot operated hydraulic ParaLift locks which operate automatically. Do not rely on hydraulic locks as a safety device. Always use mechanical locks.

6 - Maintenance

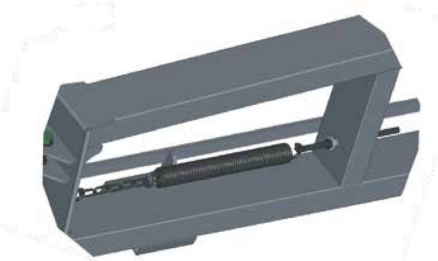
Weekly checks

Bolts and nuts

Check all the bolts and nuts are properly tightened and re-tighten if necessary using suitable tools (breaker bar and socket).

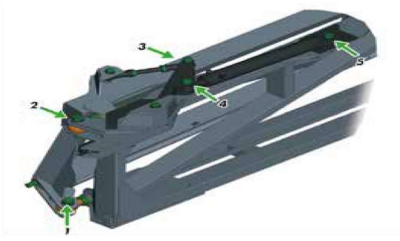
Springs

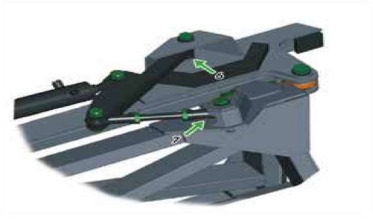
Check the breakaway spring tension. The tension of the spring is its zero state plus 100mm.



Lubrication

Lubricate all hinge points (8 points along the boom), all ball joints and pin joints.





Cabin

Pressuriser maintenance instructions

The HIVE screen features a warning light that indicates a cabin pressure problem.

Follow the instructions below to troubleshoot.

If the problem persists, contact your HARDI dealer.

FAULT	PROBABLE CAUSE	SOLUTION
The pressuriser fan doesn't work	Power supply	Connect the pressuriser fan directly to a power supply
FAULT	**PROBABLE CAUSE**	**SOLUTION**
The pressuriser fan works but the ⚠ light is on	Category 4 filter is missing	Make sure a category 4 filter is installed in the pressurizer
		Install a filter if necessary
	Cabin door is open or not properly close	Close the cabin door
	Air diffuser is closed or blocked	Check and open the diffusers
	Cabin is not sealed	Check the roof panel is firmly closed Check the seals on the cabin door
		Replace if necessary
	Door adjustment	Check the adjustment of the cabin openings
	Cabin pressure sensor	Check and replace the pressure sensor if necessary
	Air flow sensor	Check and replace the air flow sensor if necessary

NOTE! For more details about errors, please refer to HVAC in HIVE service menu.

7 - Fault Finding

Transmission

Transmission error codes

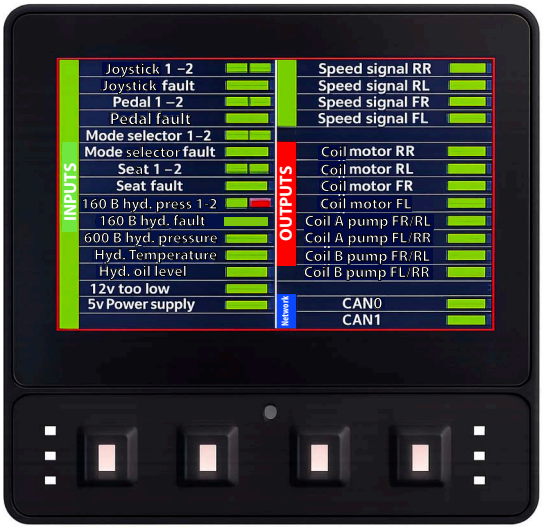
The Transmission Error Codes will automatically appear on the DM430E screen whenever the system detects a transmission fault.

The screen shows 'Quantity of codes'.

Push button (1) to get the list of errors.

To exit press (1) again.

To clear the displayed codes, perform key cycle.



ERROR CODE	DESCRIPTION	ERROR CODE	DESCRIPTION
001	Low battery voltage	070	Loop error
002	Low battery voltage	071	PWM2 current loop error
003	12V sensor low supply voltage	074	Loop error pump 1
004	12V sensor high supply voltage	080	Brake pressure sensor signal out of range
005	5V sensor low supply voltage	083	CAN bus communication error: signal not received
006	5V sensor high supply voltage	084	High pressure sensor signal out of range
007	Stack overflow	092	Joystick sensor error
008	E2prom memory error	097	Analogue mode selector sensor error
009	FLASH memory error	100	Joystick limitation control error
010	RS232 memory error	200	Offroad SD: high battery voltage
011	CAN bus connection error	201	Offroad SD: low battery voltage
012	Current return protection	202	Offroad SD: 12V supply voltage sensor out of range
020 to 045	Internal system error		
051	MAF loading error		
052	Inconsistent key		
053	Inconsistent MAF		
054	Inconsistent input/output		
055	Error in sensitive parameter		
056	SDPHASE code error		
057	Checksum error		
058	Min/Max error in parameter		

Engine

CUMMINS engine error codes

The CUMMINS engine error codes are displayed on the DM430E screen.

Push button (1) to get quantity of codes

Push button (1) to get SPN/FMI

To exit press (1) again.

To clear the displayed codes, perform key cycle.

SPN	COMPONENT/LOCATION	DESCRIPTION (ERROR LOCATION)	FMI
29	Hand throttle	Cable break or short circuit, signal implausible compared to signal or 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 Overspeed 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
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

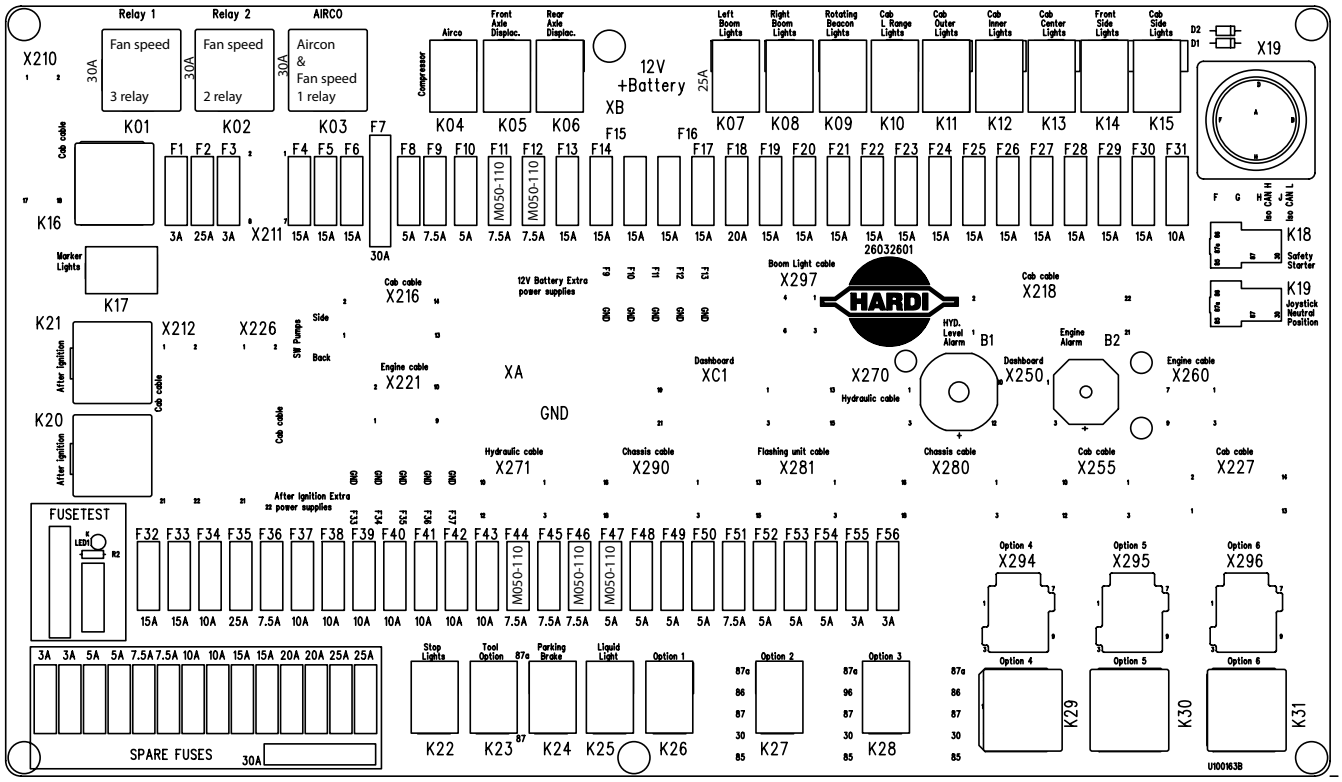
SPN	COMPONENT/LOCATION	DESCRIPTION (ERROR LOCATION)	FMI
656	Single injector	Short circuit (injector 6)	3, 4, 11, 13
656	Single injector	Cable break (injector 6)	5, 13
657	Single injector	Short circuit (injector 7)	3, 4, 11, 13
657	Single injector	Cable break (injector 7)	5, 13
658	Single injector	Short 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 break (internal)	Internal engine brake: Cable break or short circuit	3, 4, 5, 11
1074	Engine break 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
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 (tempereature 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

SPN	COMPONENT/LOCATION	DESCRIPTION (ERROR LOCATION)	FMI
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 above 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 sent message	11, 12
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	Over voltage	3, 11
523612	ECU internal hardware monitoring	Under voltage	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

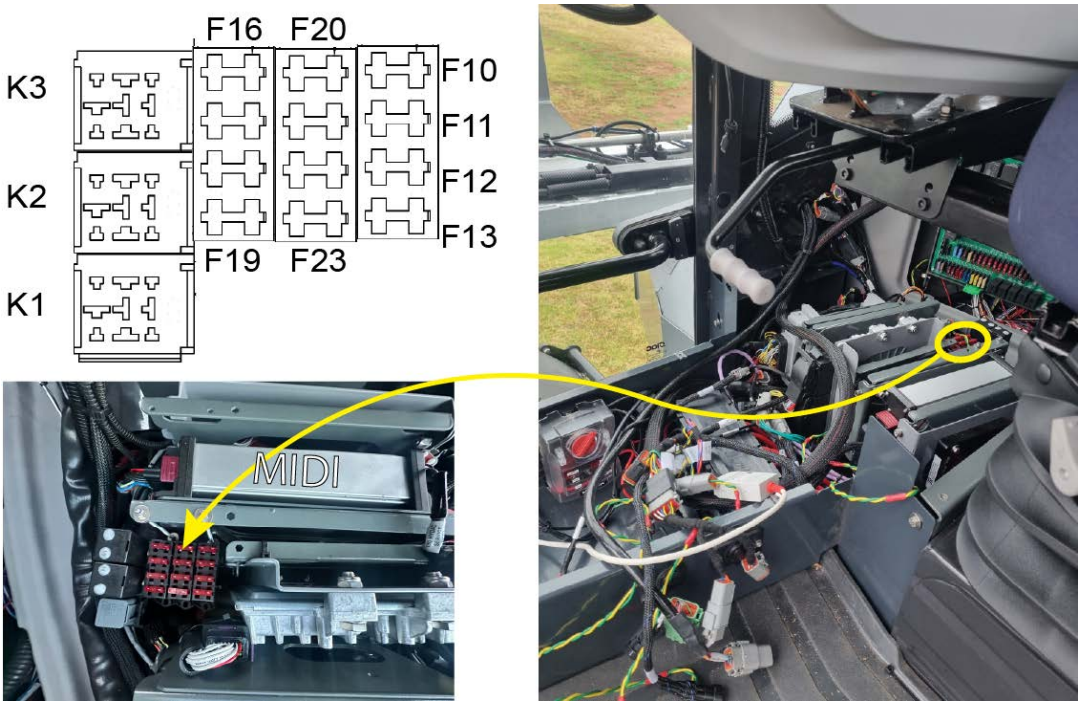
SPN	COMPONENT/LOCATION	DESCRIPTION (ERROR LOCATION)	FMI
-	Customer-specific sensor	Cable break or short circuit (sensor 1)	2, 3, 4, 11
-	Customer specific temperature	Outside target range with system reaction (temperature 1)	2, 11

Electrical incidents

Main circuit fuses and relays (U100163B)



U100163B



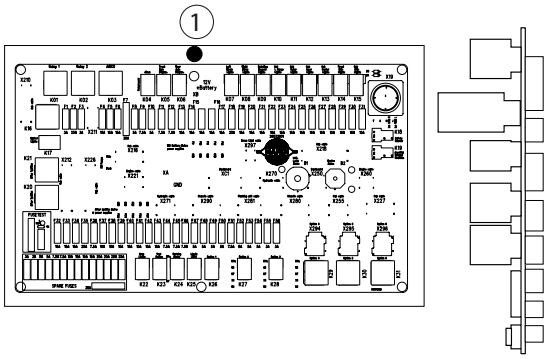
*A-Auxiliary

Fuse	Amp (A)	Description
A-F10	10 A	+12 BATT HCM3
A-F11	10 A	+12 BATT HCM3
A-F12	10 A	+12 BATT HCM3
A-F13	10 A	+12 BATT HCM3
A-F16	10 A	+12 BATT HCH590
A-F17	10 A	+12 BATT HCH590
A-F18	10 A	+12 BATT K3(30)
A-F19	10 A	+12 BATT K3(30)
A-F20	10 A	+12 BATT HCH590
A-F21	10 A	+12 BATT HCH590
A-F22	10 A	+12 BATT HCH590
A-F23	10 A	+12 BATT HCH590
A-K1	10 A	Norac Wake-up
A-K2	10 A	HCH590 Wake-up
A-K3	10 A	HCM3 Wake-up

Position Lights Fuse

The main printed circuit is placed at the rear inside the cabin to protect the lighting circuit.

- Remove the screw (1) and rock the main printed circuit to access the fuses.
- Check and replace the defective fuse.



NOTE! Spare fuses are available on the main printed circuit.

NOTE! Ensure that the replacement fuse has the same capacity as the original fuse.

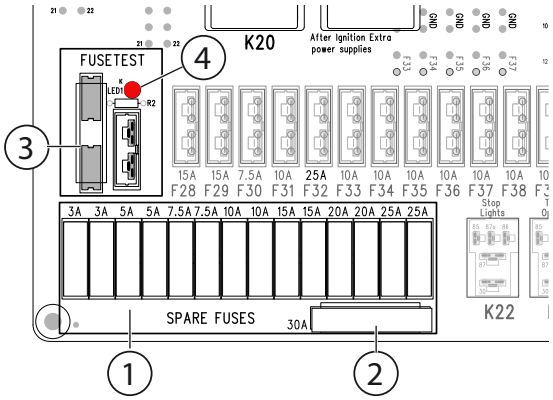
Fuse test

The main circuit has "Autofuse" type spare fuses (1) and a "Maxifuse" (2).

To test a fuse.

- Remove the fuse to be checked and place it in the fuse holder (3) according to the model.

  If the indicator (4) lights up, this means that the fuse is in good working order. If not, use an "Autofuse" (1) or "Maxifuse" (2) replacement fuse.



NOTE! Ensure that the replacement fuse has the same capacity as the original fuse.

Fuses

NOTE! Always use the appropriate fuse listed in the table located in the fuses box

Fuse	Amp (A)	Description	Fuse	Amp (A)	Description
F1	3A	Timer	F30	15A	Fuse for ignition key input
F2	25A	Sidelight fuse	F31	10A	Fuse for starter
F3	3A	Cab inside lighting fuse	F32	15A	Fuse for low beam headlights
F4	15A	Fuse for main beam, low beam and sidelight switch input	F33	15A	Fuse for main beam headlights
F5	15A	Fuse for K01 relay – fan speed 1	F34	10A	Not used
F6	15A	Fuse for K02 relay – fan speed 2	F35	25A	Fuse for windscreen washer and wipers
F7	30A	Fuse for air conditioning and K03 relay – fan speed 3	F36	7.5A	Fuse for audible alarms
F8	5A	Before ignition fuse for vehicle radio	F37	10A	After ignition BOOM SENSORS / FLOOR BOX
F9	7.5A	Electronic side rear-view mirror fuse	F38	10A	After ignition CONSOLE
F10	10A	Air conditioning compressor fuse	F39	10A	After ignition fuse for HCH590, NORAC, HCM3 controller
F11	7.5A	Sauer controller input fuse	F40	10A	After ignition CAB &FLUID PDM
F12	7.5A	Sauer controller input fuse	F41	10A	After ignition fuse for Cummins engine controller
F13	10A	Console	F42	10A	Fuse for parking brake solenoid valve
F14	10A	Not used	F43	10A	Brake light fuse
F15	10A	Not used	F44	7.5A	Sauer controller input fuse
F16	15A	Free	F45	7.5A	12 V Battery not used
F17	15A	Free	F46	7.5A	Sauer controller input fuse
F18	20A	Fuse for battery flashing indicator unit	F47	5A	Sauer controller input fuse
F19	15A	Not used	F48	5A	Free in X290-15
F20	15A	Not used	F49	5A	Fuse for nitrogen ball oil pressure buzzer
F21	15A	Hazard light fuse	F50	5A	Fuse for hydraulic oil level buzzer + 1 free connected input
F22	15A	Not used	F51	7.5A	Fuse for reverse ignition input, rear camera and engine indicator light
F23	15A	Fuse for pneumatic seat compressor unit	F52	5A	Fuse for Sauer display
F24	15A	Not used	F53	5A	After ignition fuse for flashing indicator unit
F25	15A	Not used	F54	5A	Fuse for cab headlight switch input
F26	15A	Not used	F55	3A	After ignition fuse for air conditioning
F27	15A	Not used	F56	3A	Fuse for CAN diagnostics socket
F28	15A	Not used	F57	7.5A	Fuse for rear sidelights
F29	15A	Not used	F58	7.5A	Fuse for front sidelights

Relays

Relay	Amp (A)	Description	Relay	Amp (A)	Description
K01	30A	Fan speed 3 relay	K16		Timer
K02	30A	Fan speed 2 relay	K17	25A	Sidelight micro relay
K03	30A	Air conditioning and fan speed 1 relay	K18	25A	Micro relay for controller-released starter
K04	25A	Air conditioning compressor micro relay	K19	25A	Ignition micro relay for neutral position
K05	25A	Additional micro relay	K20	40A	After ignition relay
K06	25A	Additional micro relay	K21	40A	After ignition relay
K07	25A	Not used	K22	25A	Brake light relay
K08	25A	Not used	K23	25A	Tool option relay
K09	25A	Hazard light micro relay	K24	25A	Micro relay for parking brake solenoid valve
K10	25A	Not used	K25	25A	Micro relay for valve group lighting
K11	25A	Not used	K26	25A	Additional micro relay 1
K12	25A	Not used	K27	25A	Not used
K13	25A	Not used	K28	25A	Not used
K14	25A	Not used	K29	40A	Additional micro relay 4
K15	25A	Not used	K30	40A	Additional micro relay 5
			K31	40A	Additional micro relay 6

HCH590 Controller fault codes

Below is a table that display a list of conditions that may be required for a fault to be detected.

CONDITION	DESCRIPTION
SC_HYD_BYPASS_LS_ON	Hydraulic Bypass low-side switch is turned on
SC_HYD_BYPASS_LS_OFF	Hydraulic Bypass low-side switch is turned off
SC_CENTRE_LOCK_UNLOCK_FX_OFF	Centre lock and unlock functions are not running
SC_NONE	SC_NONE
RELEASE CONDITION	**DESCRIPTION**
RC_RESET_BTN	The operator has "pressed" the fault reset button on the screen.

Below is a table of alarms and warnings relevant for the hydraulic control unit which may occur in the terminal display. Cross reference the DTC (Diagnostic Trouble Code) to the description below.

DTC	DESCRIPTION	CONDITION	RELEASE BEHAVIOR
SPN: 1005	CPU core error - check source code and EMI		
SPN: 1006	Memory error		
SPN: 1007	Error during watchdog startup - check watchdog timing constraints		
SPN: 1013	Battery voltage fell below lower threshold		
SPN: 1014	Battery voltage exceeds upper threshold		
SPN: 1015	Temperature at lower threshold		
SPN: 1016	Temperature at upper threshold		
SPN: 9000	Hydraulic Bypass Solenoid HS - Open load	SC_HYD_BYPASS_LS_ON	RC: RC_RESET_BTN
SPN: 9001	Hydraulic Bypass Solenoid HS - Short to power		RC: RC_RESET_BTN
SPN: 9002	Hydraulic Bypass Solenoid HS - Short to ground		RC: RC_RESET_BTN
SPN: 9003	Hydraulic Bypass Solenoid HS - Internal driver error		RC: RC_RESET_BTN
SPN: 9006	Hydraulic Bypass Solenoid LS - Short to ground	SC_HYD_BYPASS_LS_OFF	RC: RC_RESET_BTN
SPN: 9007	Hydraulic Bypass Solenoid LS - Internal driver error		RC: RC_RESET_BTN
SPN: 9008	Paralift Raise Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9009	Paralift Raise Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9010	Paralift Raise Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9011	Paralift Raise Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9012	Paralift Lower Solenoid - Open load		RC: RC_VT_RESET_BTN
SPN: 9013	Paralift Lower Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9014	Paralift Lower Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9015	Paralift Lower Solenoid - Internal driver error		RC: RC_RESET_BTN

DTC	DESCRIPTION	CONDITION	RELEASE BEHAVIOR
SPN: 9016	Flow Control Solenoid - Open load / Short to power		RC: RC_RESET_BTN
SPN: 9018	Flow Control Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9020	Flow Control Solenoid - Internal error		RC: RC_RESET_BTN
SPN: 9021	Inner Fold Solenoid - Open load		RC: RC_RESET_BTN
SPN: 9022	Inner Fold Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9023	Inner Fold Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9024	Inner Fold Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9025	Inner Unfold Solenoid - Open load		RC: RC_RESET_BTN
SPN: 9026	Inner Unfold Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9027	Inner Unfold Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9028	Inner Unfold Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9029	Outer 1 LH Fold Solenoid - Open load		RC: RC_RESET_BTN
SPN: 9030	Outer 1 LH Fold Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9031	Outer 1 LH Fold Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9032	Outer 1 LH Fold Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9033	Outer 1 RH Fold Solenoid - Open load		RC: RC_RESET_BTN
SPN: 9034	Outer 1 RH Fold Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9035	Outer 1 RH Fold Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9036	Outer 1 RH Fold Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9037	Outer 1 LH Unfold Solenoid - Open load		RC: RC_RESET_BTN
SPN: 9038	Outer 1 LH Unfold Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9039	Outer 1 LH Unfold Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9040	Outer 1 LH Unfold Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9041	Outer 1 RH Unfold Solenoid - Open load		RC: RC_RESET_BTN
SPN: 9042	Outer 1 RH Unfold Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9043	Outer 1 RH Unfold Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9044	Outer 1 RH Unfold Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9045	Yaw LH Solenoid - Open load		RC: RC_RESET_BTN

DTC	DESCRIPTION	CONDITION	RELEASE BEHAVIOR
SPN: 9046	Yaw LH Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9047	Yaw LH Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9048	Yaw LH Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9049	Yaw RH Solenoid - Open load		RC: RC_RESET_BTN
SPN: 9050	Yaw RH Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9051	Yaw RH Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9052	Yaw RH Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9053	Centre Lock Solenoid - Open load		RC: RC_RESET_BTN
SPN: 9054	Centre Lock Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9055	Centre Lock Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9056	Centre Lock Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9057	Centre Unlock Solenoid - Open load		RC: RC_RESET_BTN
SPN: 9058	Centre Unlock Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9059	Centre Unlock Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9060	Centre Unlock Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9061	Tilt LH Up Solenoid - Open load		RC: RC_RESET_BTN
SPN: 9062	Tilt LH Up Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9063	Tilt LH Up Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9064	Tilt LH Up Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9065	Tilt LH Down Solenoid - Open load		RC: RC_RESET_BTN
SPN: 9066	Tilt LH Down Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9067	Tilt LH Down Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9068	Tilt LH Down Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9069	Tilt RH Up Solenoid - Open load		RC: RC_RESET_BTN
SPN: 9070	Tilt RH Up Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9071	Tilt RH Up Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9072	Tilt RH Up Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9073	Tilt RH Down Solenoid - Open load		RC: RC_RESET_BTN

DTC	DESCRIPTION	CONDITION	RELEASE BEHAVIOR
SPN: 9074	Tilt RH Down Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9075	Tilt RH Down Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9076	Tilt RH Down Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9077	Front LH Wheel Extend Solenoid - Open load		RC: RC_RESET_BTN
SPN: 9078	Front LH Wheel Extend Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9079	Front LH Wheel Extend Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9080	Front LH Wheel Extend Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9081	Front LH Wheel Retract Solenoid - Open load		RC: RC_RESET_BTN
SPN: 9082	Front LH Wheel Retract Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9083	Front LH Wheel Retract Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9084	Front LH Wheel Retract Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9085	Front RH Wheel Extend Solenoid - Open load		RC: RC_RESET_BTN
SPN: 9086	Front RH Wheel Extend Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9087	Front RH Wheel Extend Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9088	Front RH Wheel Extend Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9089	Front RH Wheel Retract Solenoid - Open load		RC: RC_RESET_BTN
SPN: 9090	Front RH Wheel Retract Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9091	Front RH Wheel Retract Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9092	Front RH Wheel Retract Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9093	Rear LH Wheel Extend Solenoid - Open load		RC: RC_RESET_BTN
SPN: 9094	Rear LH Wheel Extend Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9095	Rear LH Wheel Extend Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9096	Rear LH Wheel Extend Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9097	Rear LH Wheel Retract Solenoid - Open load		RC: RC_RESET_BTN
SPN: 9098	Rear LH Wheel Retract Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9099	Rear LH Wheel Retract Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9100	Rear LH Wheel Retract Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9101	Rear RH Wheel Extend Solenoid - Open load		RC: RC_RESET_BTN

DTC	DESCRIPTION	CONDITION	RELEASE BEHAVIOR
SPN: 9102	Rear RH Wheel Extend Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9103	Rear RH Wheel Extend Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9104	Rear RH Wheel Extend Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9105	Rear RH Wheel Retract Solenoid - Open load		RC: RC_RESET_BTN
SPN: 9106	Rear RH Wheel Retract Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9107	Rear RH Wheel Retract Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9108	Rear RH Wheel Retract Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9109	Hopper Raise Solenoid - Open load		RC: RC_RESET_BTN
SPN: 9110	Hopper Raise Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9111	Hopper Raise Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9112	Hopper Raise Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9113	Hopper Lower Solenoid - Open load		RC: RC_RESET_BTN
SPN: 9114	Hopper Lower Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9115	Hopper Lower Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9116	Hopper Lower Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9125	Boom Height Sensor - Short to power		RC: RC_RESET_BTN
SPN: 9126	Boom Height Sensor - Short to ground		RC: RC_RESET_BTN
SPN: 9127	Boom Height Sensor - Invalid software parameter		RC: RC_RESET_BTN
SPN: 9128	Boom Height Sensor - Unknown internal error		RC: RC_RESET_BTN
SPN: 9134	Centre LH Locked Proxy - Low voltage / short to ground		RC: RC_RESET_BTN
SPN: 9135	Centre LH Locked Proxy - High voltage / short to power		RC: RC_RESET_BTN
SPN: 9136	Centre LH Locked Proxy - Voltage out of valid range		RC: RC_RESET_BTN
SPN: 9137	Centre LH Locked Proxy - Software parameter invalid		RC: RC_RESET_BTN
SPN: 9138	Centre LH Locked Proxy - Software initialization error		RC: RC_RESET_BTN
SPN: 9139	Centre LH Unlocked Proxy - Low voltage / short to ground		RC: RC_RESET_BTN
SPN: 9140	Centre LH Unlocked Proxy - High voltage / short to power		RC: RC_RESET_BTN
SPN: 9141	Centre LH Unlocked Proxy - Voltage out of valid range		RC: RC_RESET_BTN
SPN: 9142	Centre LH Unlocked Proxy - Software parameter invalid		RC: RC_RESET_BTN

DTC	DESCRIPTION	CONDITION	RELEASE BEHAVIOR
SPN: 9143	Centre LH Unlocked Proxy - Software initialization error		RC: RC_RESET_BTN
SPN: 9144	Centre LH lock/unlock sensors disparity	SC_CENTRE_LOCK_UNLOCK_FX_OFF	
SPN: 9145	Centre LH lock timeout		
SPN: 9146	Centre LH unlock timeout		
SPN: 9147	Centre RH lock/unlock sensors disparity	SC_CENTRE_LOCK_UNLOCK_FX_OFF	
SPN: 9148	Centre RH lock timeout		
SPN: 9149	Centre RH unlock timeout		
SPN: 9152	Paralift Unlock Solenoid - Open load		RC: RC_RESET_BTN
SPN: 9153	Paralift Unlock Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9154	Paralift Unlock Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9155	Paralift Unlock Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9156	Spring RH Compress Solenoid - Open load		RC: RC_RESET_BTN
SPN: 9157	Spring RH Compress Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9158	Spring RH Compress Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9159	Spring RH Compress Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9160	Spring RH Release Solenoid - Open load		RC: RC_RESET_BTN
SPN: 9161	Spring RH Release Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9162	Spring RH Release Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9163	Spring RH Release Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9164	Spring LH Compress Solenoid - Open load		RC: RC_RESET_BTN
SPN: 9165	Spring LH Compress Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9166	Spring LH Compress Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9167	Spring LH Compress Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9168	Spring LH Release Solenoid - Open load		RC: RC_RESET_BTN
SPN: 9169	Spring LH Release Solenoid - Short to power		RC: RC_RESET_BTN
SPN: 9170	Spring LH Release Solenoid - Short to ground		RC: RC_RESET_BTN
SPN: 9171	Spring LH Release Solenoid - Internal driver error		RC: RC_RESET_BTN
SPN: 9172	Inner LH Position - Short to power		RC: RC_RESET_BTN

DTC	DESCRIPTION	CONDITION	RELEASE BEHAVIOR
SPN: 9173	Inner LH Position - Short to ground		RC: RC_RESET_BTN
SPN: 9174	Inner LH Position - Invalid parameter		RC: RC_RESET_BTN
SPN: 9175	Inner LH Position - Unknown internal error		RC: RC_RESET_BTN
SPN: 9176	Inner RH Position - Short to power		RC: RC_RESET_BTN
SPN: 9177	Inner RH Position - Short to ground		RC: RC_RESET_BTN
SPN: 9178	Inner RH Position - Invalid parameter		RC: RC_RESET_BTN
SPN: 9179	Inner RH Position - Unknown internal error		RC: RC_RESET_BTN
SPN: 9180	Outer 1 LH Position - Short to power		RC: RC_RESET_BTN
SPN: 9181	Outer 1 LH Position - Short to ground		RC: RC_RESET_BTN
SPN: 9182	Outer 1 LH Position - Invalid parameter		RC: RC_RESET_BTN
SPN: 9183	Outer 1 LH Position - Unknown internal error		RC: RC_RESET_BTN
SPN: 9184	Outer 1 RH Position - Short to power		RC: RC_RESET_BTN
SPN: 9185	Outer 1 RH Position - Short to ground		RC: RC_RESET_BTN
SPN: 9186	Outer 1 RH Position - Invalid parameter		RC: RC_RESET_BTN
SPN: 9187	Outer 1 RH Position - Unknown internal error		RC: RC_RESET_BTN
SPN: 9188	Tilt LH Position - Short to power		RC: RC_RESET_BTN
SPN: 9189	Tilt LH Position - Short to ground		RC: RC_RESET_BTN
SPN: 9190	Tilt LH Position - Invalid parameter		RC: RC_RESET_BTN
SPN: 9191	Tilt LH Position - Unknown internal error		RC: RC_RESET_BTN
SPN: 9192	Tilt RH Position - Short to power		RC: RC_RESET_BTN
SPN: 9193	Tilt RH Position - Short to ground		RC: RC_RESET_BTN
SPN: 9194	Tilt RH Position - Invalid parameter		RC: RC_RESET_BTN
SPN: 9195	Tilt RH Position - Unknown internal error		RC: RC_RESET_BTN
SPN: 9228	Inner LH Fold - Timeout		
SPN: 9229	Inner RH Fold - Timeoutt		
SPN: 9230	Outer 1 LH Fold - Timeout		
SPN: 9231	Outer 1 RH Fold - Timeout		
SPN: 9236	Tilt LH - Raise Timeout		

DTC	DESCRIPTION	CONDITION	RELEASE BEHAVIOR
SPN: 9237	Tilt LH - Lower to Support Timeout		
SPN: 9238	Tilt RH - Raise Timeout		
SPN: 9239	Tilt RH - Lower to Support Timeout		
SPN: 9244	Paralift - Raise Timeout		
SPN: 9245	Paralift - Lower Timeout		
SPN: 9117	Centre RH Locked Proxy - Low voltage / short to ground		RC: RC_RESET_BTN
SPN: 9118	Centre RH Locked Proxy - High voltage / short to power		RC: RC_RESET_BTN
SPN: 9119	Centre RH Locked Proxy - Voltage out of valid range		RC: RC_RESET_BTN
SPN: 9120	Centre RH Locked Proxy - Software parameter invalid		RC: RC_RESET_BTN
SPN: 9121	Centre RH Locked Proxy - Software initialization error		RC: RC_RESET_BTN
SPN: 9122	Centre RH Unlocked Proxy - Low voltage / short to ground		RC: RC_RESET_BTN
SPN: 9123	Centre RH Unlocked Proxy - High voltage / short to power		RC: RC_RESET_BTN
SPN: 9124	Centre RH Unlocked Proxy - Voltage out of valid range		RC: RC_RESET_BTN
SPN: 9252	Centre RH Unlocked Proxy - Software parameter invalid		RC: RC_RESET_BTN
SPN: 9253	Centre RH Unlocked Proxy - Software initialization error		RC: RC_RESET_BTN
SPN: 9254	Emergency mode active		
SPN: 1139	UC7 Heartbeat Timeout		
SPN: 9130	Sensor Supply 12V - Short to power		
SPN: 9131	Sensor Supply 12V - Short to ground		
SPN: 9132	Sensor Supply 12V - Internal driver error		
SPN: 1116	HIVE System Command 1 - Message timeout		
SPN: 1126	HIVE System Command 2 - Message timeout		
SPN: 1157	HIVE System Status - Message timeout		
SPN: 9133	Inner LH Unfold - Timeout		
SPN: 9262	Inner RH Unfold - Timeout		
SPN: 9263	Outer 1 LH Unfold - Timeout		
SPN: 9264	Outer 1 RH Unfold - Timeout		

VT Popup Messages - Boom

VT POPUP MESSAGE	REASONS FOR ACTIVATION
SYSTEM NOT CONFIGURED. A valid boom type must be selected in the MST.	No boom type has been selected in the MST. (CfgBoomType->BoomType)
Complete the folding of the 1st outer wing.	Inner fold button pressed when the 1st outer is not folded. 1st outer fold button must be held for the configured time (Cfg03Fold->Outer1FoldTime) before it is considered folded.
Lock the pendulum before folding the inner or 1st outer wings.	Inner fold or 1st outer fold buttons pressed while the pendulum is not locked.
Complete the folding of the 2nd outer wing.	1st outer fold button is pressed when 2nd outer is not folded. 2nd outer fold button must be held for the configured time (Cfg03Fold->Outer2FoldTime) before it is considered folded.
Unfold the inner wing before folding the outer wings.	1st outer fold or 2nd outer fold button pressed when inner RH boom has not been unfolded. Inner RH boom sensor is still reading folded or a sensor fault has occurred.
Centre the boom before folding or unfolding.	Any fold or unfold button pressed when the pendulum has not been centred (Cfg02Pendulum->SlantAngle). Pendulum not at the configured centre position, or the slant angle sensor has a fault.
Raise the boom before folding or unfolding the inner wing.	Inner fold or inner unfold button pressed when the boom is not above the configured paralift fold height (Cfg01Paralift->FoldEnableHeight). Paralift not at the configured fold height, or the height sensor has a fault.
Stop the vehicle before folding or unfolding.	Any fold or unfold button pressed when the vehicle speed is still above the zero-speed threshold (Cfg05Speed->SpeedZeroThreshold).
Pendulum lock failed!	Pendulum lock function times out after configured time (Cfg02Pendulum->LockTimeout) – expected lock feedback was not achieved. Potential issue with sensor feedback, cylinder position or hydraulic controls.
Pendulum lock state unknown!	Any function button pressed (apart from pendulum lock / unlock) when the pendulum state cannot be determined as locked or unlocked. The lock cylinder is not fully extended or retracted, or the feedback sensors have a fault.
Pendulum unlock failed!	Pendulum unlock function timed out when the vehicle was below the zero-speed threshold. (Cfg02Pendulum->UnlockTimeout) (Cfg05Speed->SpeedZeroThreshold) Potential issue with sensor feedback, cylinder position or hydraulic controls.
STOP! PENDULUM LOCKED!	Pendulum unlock function timed out when the vehicle was moving faster than the zero-speed threshold. (Cfg02Pendulum->UnlockTimeout) (Cfg05Speed->SpeedZeroThreshold) Potential issue with sensor feedback, cylinder position or hydraulic controls.
Centre the boom before locking the pendulum.	Pendulum lock button pressed while the boom is not centred.
Complete the unfolding of the 1st outer wing.	2nd outer unfold button is pressed when the 1st outer is not unfolded. 1st outer unfold button must be held for the configured time (Cfg03Fold->Outer1UnfoldTime) before it is considered folded.
Complete the unfolding of the inner wing.	1st outer or 2nd outer unfold buttons pressed when the inner RH boom is not fully unfolded. Inner RH boom sensor is still reading folded or a sensor fault has occurred.
Boom angle sensor fault.	Any fold or unfold button pressed when the boom angle sensor has a fault (voltage outside expected range 0.2…4.8V).
Boom height sensor fault.	Inner fold or unfold button pressed when the boom height sensor has a fault (voltage outside expected range 0.2…4.8V).
Inner RH boom fold sensor fault.	Any fold or unfold button pressed when the inner RH boom fold sensor has a fault (voltage outside high/low logic levels: 0.5…1.5V, 4.9…5.0V).
Pendulum lock sensor fault.	Any fold or unfold button pressed when the pendulum lock sensor has a fault (voltage outside high/low logic levels: 0.5…1.5V, 4.9…5.0V).
Pendulum unlock sensor fault.	Any fold or unfold button pressed when the pendulum unlock sensor has a fault (voltage outside high/low logic levels: 0.5…1.5V, 4.9…5.0V).
Auto-centre failed due to timeout.	Auto-centre process stopped due to the boom angle feedback not reaching the centre position within the configured time (Cfg02Pendulum -> AutoCentreTimeout).
Unfold the inner wing before unlocking the pendulum.	Pre-condition: FTZ boom selected and pendulum lock option has been enabled. Pendulum unlock button pressed while the inner wing is still folded.

Hydraulic incidents

General info

Before any towing of the machine following a failure in the engine or the hydraulic transmission, it is essential to check the hydraulic motors and the transmission pump.

NOTE! To avoid any risk of damage to the transmission components (pump, motors etc.), the machine should be towed over a short distance and at low speed.

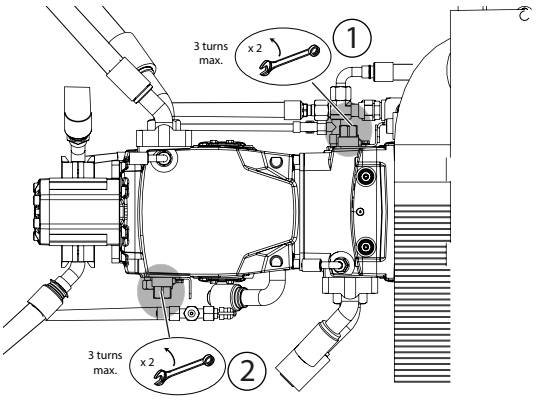
Before moving the machine, you should:

1. Release the high pressure valves on the transmission pump. See "Transmission pump high pressure valves" on page 233.

Transmission pump high pressure valves

This operation consists of releasing the 2 high pressure valves located on the transmission pump to allow free circulation of oil in the system when towing the machine.

- Loosen the 2 valves (1) and (2) by a maximum of 3 turns to allow free circulation of the oil in the hydraulic transmission.



WARNING! The high pressure valves should be tightened before the machine is started up again.

7 - Fault Finding

HIVE incidents

Completion bar

Error bar

Info bar

Warning bar

Awaiting input

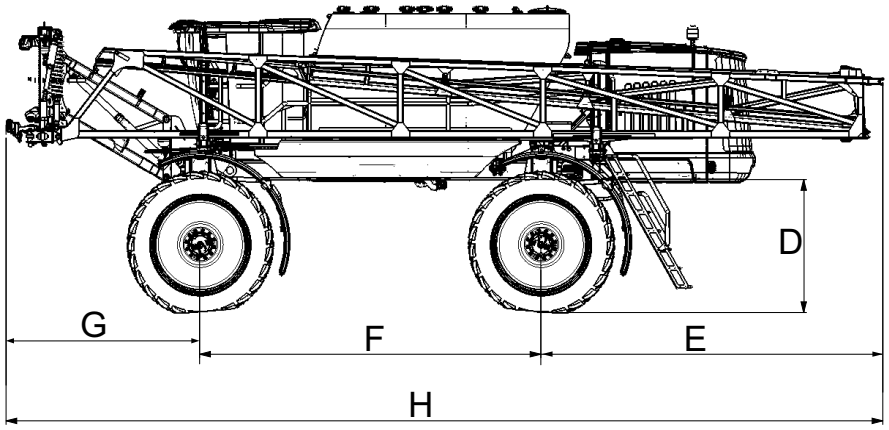
Below is the list of common errors/incidents/faults displayed on the HIVE screen.

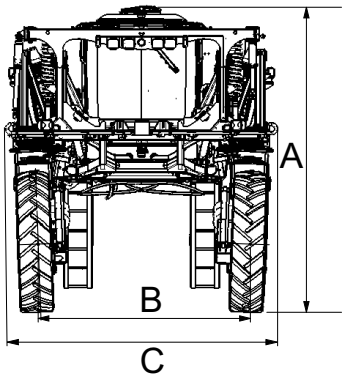
MAIN TANK VOLUME LOW
FLUSH TANK VOLUME LOW
MAIN TANK FULL
FLUSH TANK FULL
MAIN PUMP LOW PRESSURE
BOTH TANKS VOLUME LOW
MAIN TANK INITIAL VOLUME LOW
FLUSH TANK INITIAL VOLUME LOW
MAIN TANK INITIAL VOLUME HIGH
TURN MASTER SWITCH ON TO CONTINUE
MASTER SWITCH TURNED OFF UNEXPECTEDLY
FLUID STOP ENABLED
FLUID STOP DISABLED - PLEASE WAIT
MAIN PUMP OVER CAPACITY
FUNCTION COMPLETE
CHANGING MODES - PLEASE WAIT
PRIMING PUMPS - PRESSURE TEST - PLEASE WAIT
PRIMING IS TAKING A LONG TIME - CHECK FLUID CONNECTIONS
ENGINE OFF OR RPM TOO LOW
BOTH TANKS OVER CAPACITY
PUMP PRIMED - PURGING LINES - PLEASE WAIT
RINSE ERROR
PRIMING ERROR
FILL ERROR
SPRAY FUNCTION IS RUNNING
FILL COMPLETE
SPRAY ERROR
FLUID STOP ENGAGED

ATTENTION! If the unit cannot pump, cannot enter spray mode, or if the emergency or fluid stop icon is displayed on the screen, ensure that the emergency stop buttons are disengaged.

Overall dimensions

Dimensions





	36m	40m	52m	54m
A	4.25m			
B	2.95m			
C	4.0m			
D	1.75m			
E (Rear overhang in relation to rear axle)	3.0m	4.0m	5.5m	6.3m
F	4.7m			
G	2.9m			
H	10.6	11.6	13.1	13.9

Weight (Kg)

		Empty Folded	
	FL 4580	Front Total 7970	Total 18331
	RR 5675	Rear Total 10361	
	RL 4686		
	FR 3390		
RA 52m		**Empty Unfolded**	
	FL 5709	Front Total 10199	Total 18336
	RR 4551	Rear Total 8137	
	RL 3586		
	FR 4490		
		Empty Folded	
	FL 4260	Front Total 7580	Total 17320
	RR 5410	Rear Total 9740	
	RL 4330		
	FR 3320		
RA 48m		**Empty Unfolded**	
	FL 5390	Front Total 9850	Total 17410
	RR 4290	Rear Total 7560	
	RL 3270		
	FR 4460		

Tyre pressures

Please refer to manufacturer for further specifications.

Type	Pressure (psi)	Manufacturer	Load Index
LSW480/70R54	64	Goodyear	181D
VF480/70R54	73	Uniglory	181D

8 - Technical Specifications

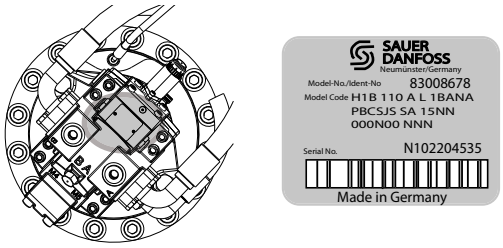
Identification plates

A. Identification of moto-hydraulic reducers:

B. Identification of hydraulic pumps
1. Hydraulic Pump primary transmission, placed behind the engine.
2. Hydraulic Pump of secondary transmission.

C. Identification of hydraulic n,s

The model and serial number are shown on the identification plate, as shown in the illustration.



Lubrication

General information

Always store lubricants in a clean, dry and cool place - preferably at a constant temperature Keep oil filling jugs, hoppers and grease guns clean, and clean the lubricating points thoroughly before lubricating. Avoid skin contact with oil products for longer periods. Always follow the recommendations concerning quantity. If no quantity is indicated, lubricate up to the required level, unless otherwise indicated.

For the opening of the engine hood, see the section "Access to the engine" page 44.

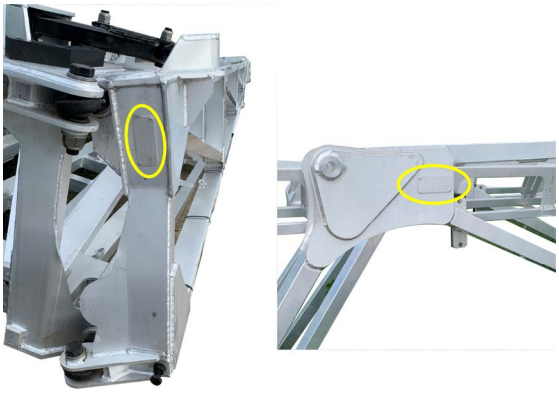
Table of recommended lubricants

Components	Capacity (litres)		Recommended lubricants
	Housing	With filter	
Crankcase - Cummins QSB 6.7 Diesel Engine	18	18.5	Delo® 400 SLK SAE 15W-40 Delo® 400 MGX SAE 15W-40 Delo® Gold Ultra SAE 15W-40
Hydraulic/Hydrostatic Transmission	100		Rando® HDZ 46
Final Drives - Moto-reducers	3.0		Delo®Gear EP-5 SAE 85W-140 (Gear Oil)
Radiator	25		Delo® XLC Antifreeze/Coolant Premixed 50/5
Grease-General lubrication	--		Delo® Starplex® Moly 3% EP2 Caltex Multifak® Moly EP 2
Fresh Water Pump Coolant	--		ACDelco Dex-Cool Extended Life (Red) Antifreeze/Coolant 19375294
Ace - Product Pump Barrier Fluid	--		Barrier Fluid (1quart) for Ace Wet Seal Pumps 55032

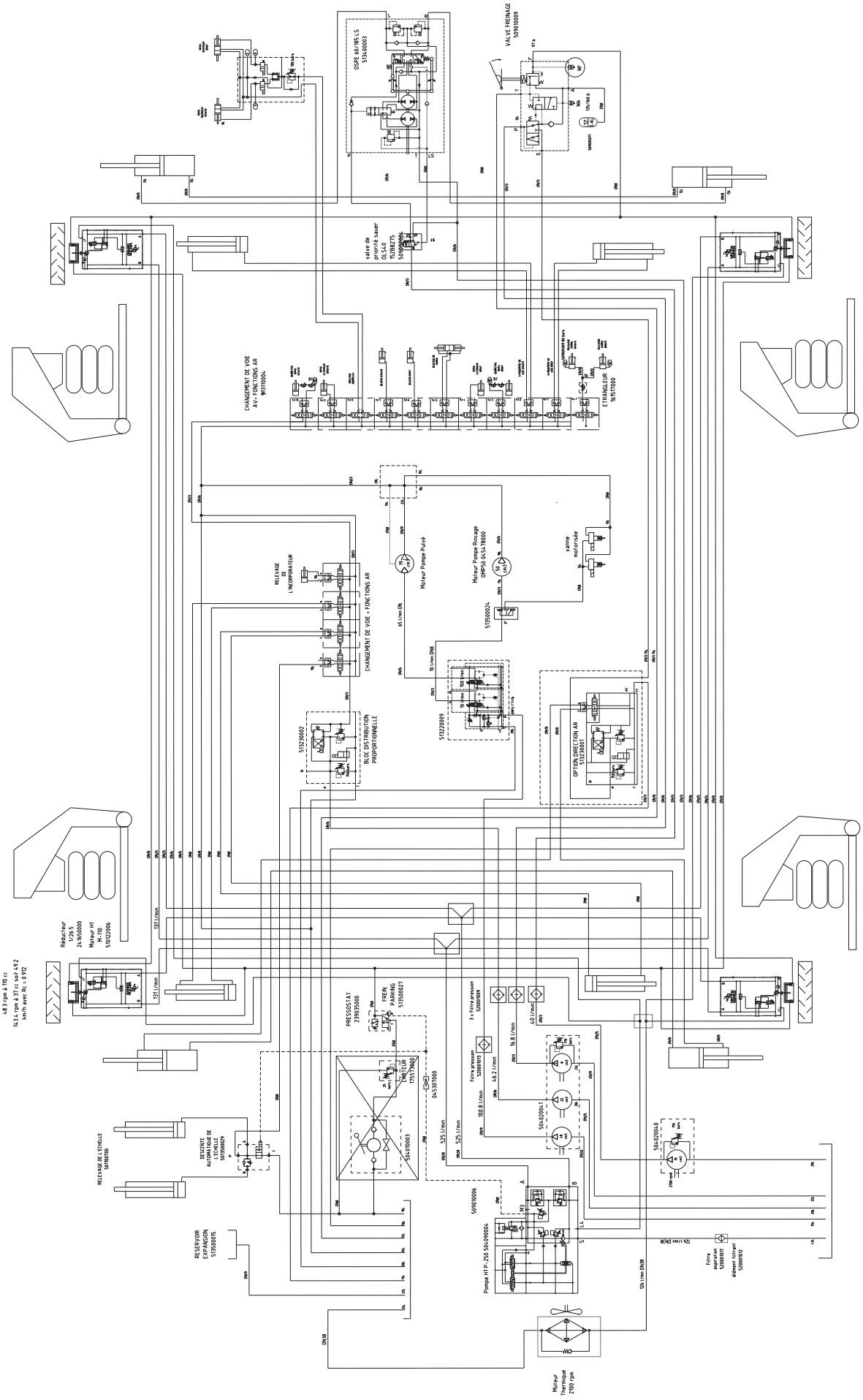
NOTE! The data values in the table above are indicative to titles. Only the level indicated by the gauge should be taken into consideration.

Boom identification RA

The serial number of the aluminium boom is engraved on the inner section. This serial number is identical for both sides of the boom. If needed to order boom section replacement, please provide this number.

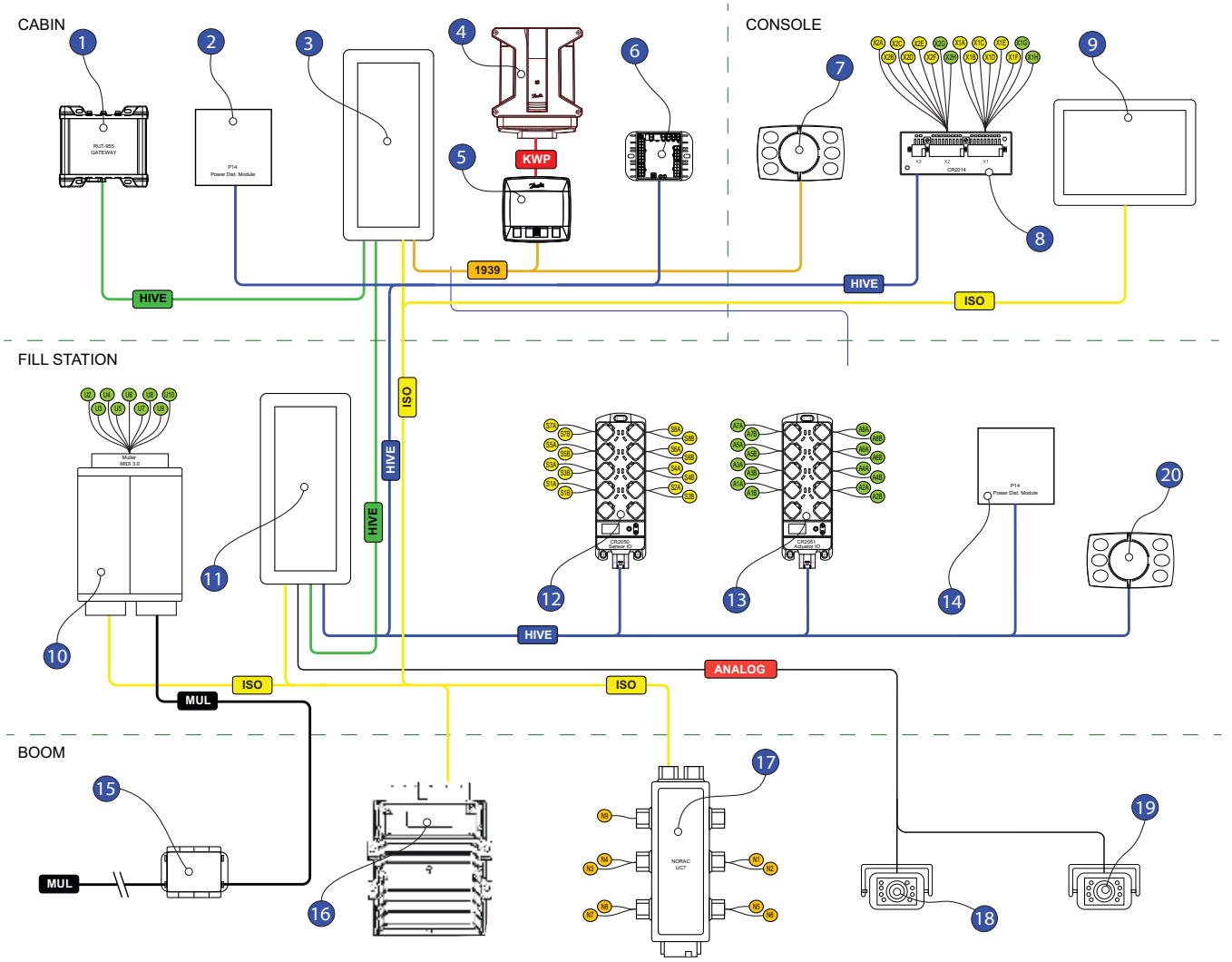


RA Boom with AutoHeight



8 - Technical Specifications

Communication Layer Overview



1. Gateway / Switch
2. Cabin PDM
3. HIVE corner-post HMI
4. Danfoss MC050 ECU
5. Danfoss DM430E Interface
6. HVAC KanBox Controller
7. HIVE Multifuction Dial
8. Console CAN bridge
9. ISO Virtual Terminal
10. ISO Task Controller
11. HIVE Fluid HMI
12. Sensor IO
13. Actuator IO
14. Fill Station PDM
15. EDS module
16. Hydraulic PLC
17. Height Controller
18. Analogue camera 1
19. Analogue camera 2
20. HIVE Multifunction Dial

Spare Parts Information

To see updated spare part information, visit the Agroparts website on the internet.

Here all parts information can be accessed in the spare parts catalogue:

1. Go to www.agroparts.com, register for free and log in.
2. Select "HARDI" in the menu on the left.
3. Select "Spare parts catalogue" and find your spare part.
4. Online ordering is also possible.
5. Contact your HARDI dealer for further information on spare parts.

User Evaluation

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We update our instruction books regularly. Your suggestions for improvement are appreciated and will help us to create ever more user-friendly instructions. Send us your suggestions to this e-mail address:

hau.marketing@hardi.com

Thank you.

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