



Operation and maintenance manual

Seed drill

FX6000

Translation of the original manual
EN

www.multiva.info

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1. Foreword

Thank you for choosing a high-class Multiva Forte FX6000 seed drill. We hope the product will meet your requirements and provide years of reliable service. Please read this manual thoroughly before operating the machine. It is important that you perform the inspection and maintenance measures specified in this manual to ensure flawless operation of the machine and validity of its warranty. You must follow all the instructions, warnings and prohibitions related to the use of the machine. They are provided to ensure operator safety and the long service life of the machine.

The FX6000 is an extremely efficient and versatile seed drill, enabling you to seed directly into stubble, grass or tilled soil. The machine is equipped with a pneumatic feeder which ensures even flow of seeds and fertilisers to all seeding coulters.

1.1. Purpose of the machine

The operator of the seed drill must acquaint themselves with the machine and read and understand the contents of its operating manual before operating the machine. The seed drill may only be operated when it is in a flawless technical condition. The seed drill must be used in accordance with regulations, identifying hazards and following the safety and operating instructions.

Original Multiva spare parts and accessories are designed for this particular seed drill. The manufacturer bears no responsibility for spare parts and accessories provided by other suppliers. Using them in certain circumstances may weaken the machine and compromise personal safety.

The machine is intended for sowing seeds and applying fertiliser. The construction of the machine allows road transport with the hoppers full. Any use exceeding this, such as using the machine for transport, is not considered to be in accordance with the regulations. Use in accordance with the regulations includes following the operating instructions and manufacturer's instructions as well as regulations concerning service and maintenance. Occupational safety regulations concerning agricultural machinery, other rules and regulations on general safety technology and occupational health as well as traffic rules and regulations must be followed.

1.2. Specifications

Table. 1.2. - 1. Specifications

Specifications	FX6000
Working width (cm)	600
Transportation height (cm)	340
Transportation width (cm)	300
Hopper filling height (cm)	300
Weight (kg)	9,300
Hopper volume (L)	8,000

Coulter pressure (kg)	50-250
Tyres	500/50R-17
Coulters (pcs)	36
Furrow spacing (mm)	167
Recommended working speed (km/h)	8- 12
Normal track width of tramline (mm)	1,834
Alternative track width of tramline (mm)	1,500 / 2,168
Extended track width of tramline (mm)	1,660 / 2,000
Tractor power requirement (hp)	200
Automation	ISOCAN Artemis

1.3. Type plate

The type plate is located in the front of the seed drill frame.

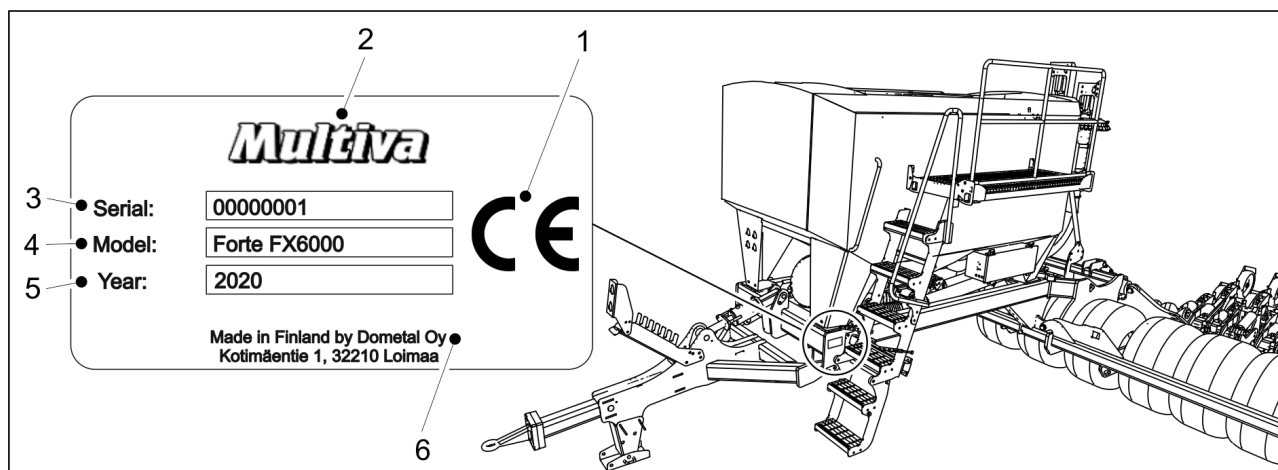


Figure. 1.3. - 1. Location and details of the type plate

Table. 1.3. - 2. Details of the type plate

1.	CE marking
2.	Machine manufacturer
3.	Machine serial number
4.	Machine model
5.	Manufacturing year
6.	Manufacturer's information

1.4. Liability terms and conditions

The FX seed drills have been quality inspected and their operation has been tested before delivery. However, the owner/operator is responsible for the operation of the machine in practical circumstances. Damage compensation claims not concerning the machine itself as well as those concerning damages caused by misuse or incorrect adjustments of the machine will be rejected.

The machine manufacturer is not liable for any use of the machine that is in violation of laws, safety regulations or this operating manual.

Note that inappropriate use of fertilisers and plant protecting agents may cause damage to plants, humans, animals, water system or soil. Follow the instructions provided by the manufacturers of these substances and other experts as well as the authorities in handling and using said substances.

The manufacturer is not responsible for the selection of an incorrect quantity of seeds, plant protecting agents or fertiliser or incorrect seeding depth. The operator must constantly make sure that the desired seeding depth is maintained. If you lack information or knowledge gained through experience, please consult an expert for advice. The manufacturer is not responsible for any failures in seeding. The operator must continuously monitor the consumption of seeds and fertiliser in order to make sure that sowing quantities stay at a proper level in all seeding coulters.

The manufacturer is not liable for damages caused by the use of components provided by other manufacturers. The manufacturer is not liable for damage caused to other machines or equipment that result from the use of this machine. The manufacturer reserves the right to develop or modify the construction of the machine. The owner of the machine is responsible for ensuring that all operators of the machine acquaint themselves with the machine's operating and safety instructions.

1.5. Tightening torques

The table below shows the tightening torques of steel screws and nuts. If the tightening torque to be used should be something other than what is listed in the table, the tightening torque will be provided with the task instructions.

Table. 1.5. - 3. Tightening torques of steel screws and nuts

Steel screws and nuts: 8.8 Zn	
Thread	Torque (Nm)
M8	15
M12	90
M16	230
M18	250
M20	350









2. Warranty terms





1. The machine's warranty period is 12 months.
2. The warranty period starts on the date when an authorised retailer delivers the machine.
3. The warranty covers manufacturing and raw material defects. Damaged parts are repaired or replaced with parts in proper operating condition at the customer's facilities, factory or authorised repair shop.
4. A warranty repair does not extend the warranty period.
5. Warranty does not cover:
 - damage caused by incorrect operation or maintenance in violation of the operating manual, excessive loading or normal wear.
 - loss of income, downtime, other consequential or indirect damage caused to the product's owner or a third party
 - travel or freight expenses, daily allowances
 - changing the original construction of the product.









In warranty matters, please contact the machine retailer or manufacturer. Any measures and costs must always be agreed upon with the manufacturer before the measures are taken.





3. Safety instructions

3.1. Residual risks




	Read this operating and maintenance manual thoroughly before operating the machine and follow the instructions given.
	Crushing hazard when connecting and disconnecting the seed drill. Minimum safe distance 10 m. Exercise extreme caution when someone else is near the seed drill and tractor giving instructions on connecting and disconnecting.
	Crushing hazard when lifting and lowering the coulters. When lifting and lowering the coulters, make sure there is no one in the vicinity. Ensure that stands or other support devices are placed under the coulters for support when servicing.
	Crushing, cutting and impact hazard when lifting and lowering the wing sections. The seed drill and its vicinity are off limits to persons when the wing sections are lifted and lowered. When lifting and lowering the wing sections, make sure there is no one in the vicinity. Minimum safe distance 10 m.
	Crushing hazard when lifting and lowering the middle markers. When lifting and lowering the markers, make sure there is no one in the vicinity. The minimum safe distance is 10 m when lifting and lowering the markers.
	Crushing hazard when the seeding depth is adjusted. Before adjusting the seeding depth, make sure that the tractor is turned off, the key is removed from the ignition and the parking brake is engaged.
	<p>Be careful not to crush or cut your hand or fingers in the feeder of the hopper.</p> <p>When the machine is in the seeding position, the radar detects if someone is walking past the machine and the feeder starts to rotate automatically.</p> <p>Ensure that the controller and tractor are turned off, the key is removed from the ignition and the parking brake is engaged when there are personnel in the hopper or near the machine.</p>
	<p>Hydraulic hoses under pressure may release a life-threatening jet of liquid. High-pressure liquid may also pose a crushing, cutting or impact hazard.</p> <p>The hydraulic system must be depressurised before pressure hoses are handled, connected or disconnected. Depressurise the hydraulic system and disconnect the hoses before maintenance work.</p> <p>Never touch the hydraulic cylinders, hoses and hydraulic connectors when the cylinders are in operation.</p>


	Falling hazard when performing work on the platform. Be careful when performing work on the platform.
	Falling hazard. Exercise caution when climbing onto the machine or tyres during maintenance. The machine and tyres may be extremely slippery when wet and muddy.
	Falling hazard. Standing or sitting on the machine, wheels and sensors is strictly prohibited during transport and operation.
	Before moving, ensure that the wing sections have been lowered and locked in their transport position and that the wing section ball valve is closed.


	Crushing hazard when lifting the seed drill from a bed using a hoist. Minimum safe distance 10 m. Exercise extreme caution.
	Before performing the calibration test, ensure that the tractor's parking brake is engaged and fans are turned off.
	Before moving, ensure that the tractor hitch is locked.
	Operate and service the machine only on even, solid ground.
	Depressurise the hydraulic system, disconnect the hoses and tractor's electrical connections and let the machine cool off before servicing.
	Avoid breathing seed dressing dust and fertiliser dust when filling the hopper. The seed dressing causes a serious health risk. Read the material safety data sheet of the dressing agent and fertiliser and follow their warnings.
	Never go under a lifted load when filling the hopper.
	Make sure that nobody is on top of the seed drill or inside the hopper when filling the hopper.


	Switch off the fan before dislodging a blockage from the feed line.
	Wear hearing protection in the vicinity of the machine when the fans are on.
	Wear protective eyewear when dislodging a blockage from the feed line.
	Wear protective gloves when handling oil or grease and when connecting and disconnecting hydraulic components. Avoid skin contact with oil and grease to prevent skin irritation and damage.


3.2. Symbols used in the operating manual


	DANGER warns of a dangerous situation which may lead to death or serious physical injury.
	CAUTION warns of a dangerous situation which may lead to damage to the equipment.
	ADVICE contains useful tips, advice and information in the instructions e.g. on tightening torques, adjusting values, liquid quantities and special tools.

 **DANGER**
When connecting and disconnecting hydraulic hoses and electrical wires, ensure that the tractor is turned off and the key is removed from the ignition.

 **DANGER**
Never adjust or clean a moving seed drill.

 **DANGER**
Never stand or sit on top of the seed drill or within its operating area during operation. Minimum safe distance 10 m.

 **DANGER**
Observe the minimum safe distance when the seed drill is standing still and the hydraulics are in use. When the seed drill is attached to the tractor, the vicinity of the seed drill and, in particular, the area under the raised wing sections are off limits.

 **DANGER**
Inspect the condition of the seed drill at least visually before moving or operating it. Items to be inspected include tyre pressure, machine cleanliness and the tightness of the bolts of the towing device.



DANGER

Before seeding, make sure that the machine is in working order. Make sure that the hoses are intact and have no leaks. Make sure that the coulters and mechanics are intact. Specifically ensure that all the pins are in place.



DANGER

When transporting the seed drill on public roads, exercise caution and observe all road traffic regulations, as well as specific regulations concerning slow-moving vehicles.



DANGER

Before moving the tractor, check that the slow-vehicle triangle is visible and tractor lights are lit and visible. Keep the triangle and lights clean, because they have a considerable impact on the combination vehicle's traffic safety.



DANGER

The transport height of the seed drill should be less than 4 m.



DANGER

The maximum allowed transportation speed of the seed drill is 40 km/h.



DANGER

Before starting the sowing, ensure that both wing sections are completely lowered so that the cylinder is fully extended.



DANGER

When servicing and performing maintenance work, ensure that the wing sections are fully lowered.



DANGER

When replacing hydraulic system components and conductors, only use spare parts with sufficient pressure resistance.



DANGER

Never use oil or lubrication grease to clean skin. These substances may contain small metal particles, which cause irritation of the skin or cuts. Follow the lubricant manufacturer handling instructions and safety regulations. Synthetic oils are often corrosive and cause severe irritation of the skin. Seek medical attention if oil or grease causes any injuries.



DANGER

Never spray water directly on electric equipment.



CAUTION

Use original machine spare parts whenever servicing and repairing the seed drill. Using generic parts will void the warranty.



CAUTION

Collect oil waste and dispose of it appropriately in accordance with national regulations.



CAUTION

If oil is spilled on the ground, absorb it with an absorbent material, such as turf, to prevent the oil spill from spreading. Handle the absorbent material in accordance with regulations.



CAUTION

Clean the machine whenever you change fertiliser or seed types.



CAUTION

If the machine will be unused overnight or over a long rain season, empty its fertiliser hopper in advance and clean the roller grooves of the feeder by adjusting the feed quantity from one extreme position to the other. Otherwise, the fertiliser may dissolve and clog the feeders.



CAUTION

Before using a detergent, make sure it is appropriate for washing a seed drill. Follow the safety and operating instructions of the detergent manufacturer.

3.3. Warning labels used on the machine

The warning labels on the front of the machine are shown in the next image.

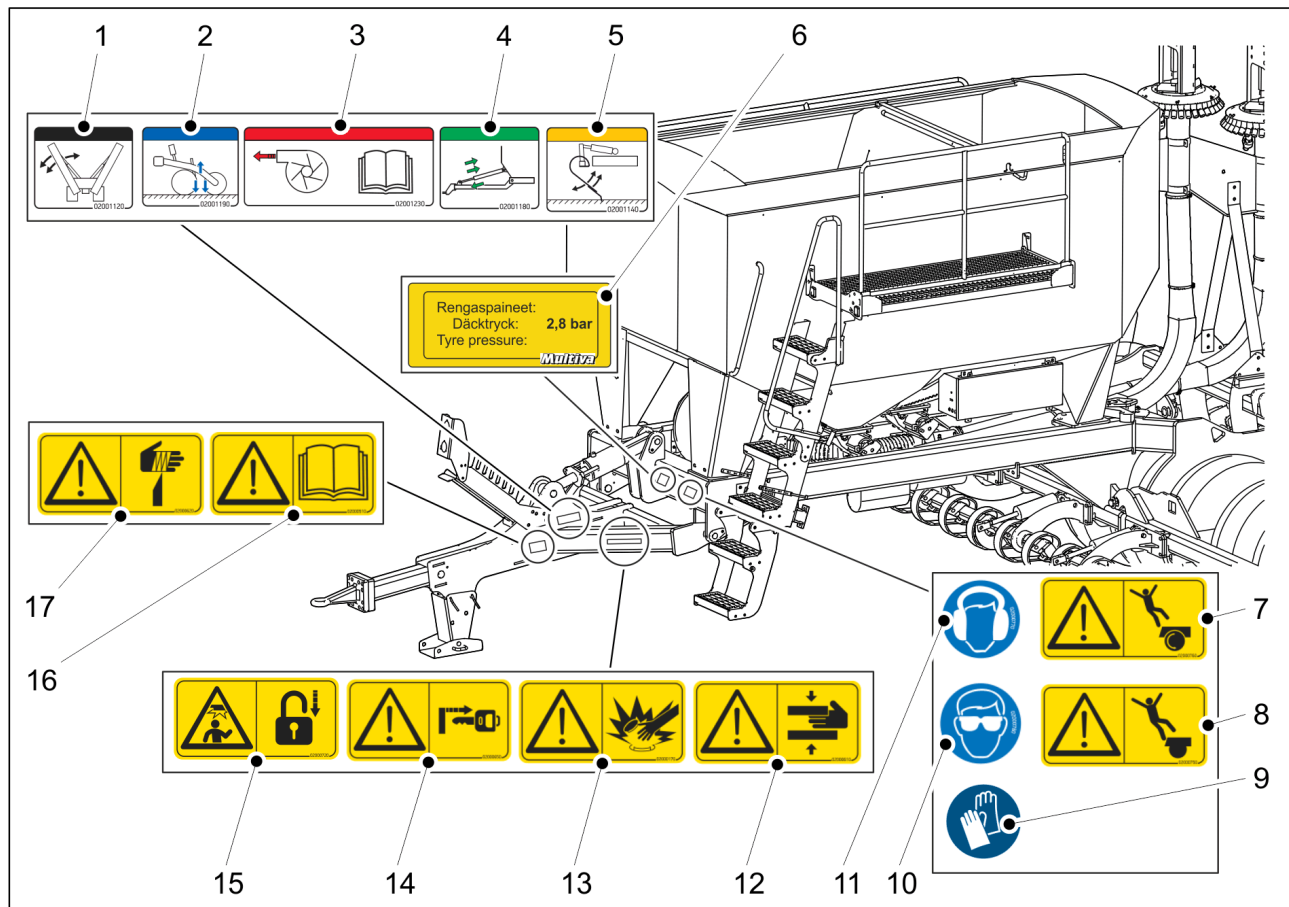


Figure. 3.3. - 2. Warning labels used on the front of the machine

Table. 3.3. - 4. Warning labels used on the front of the machine

1.	Hydraulic connection of the wing sections	1 pc
2.	Hydraulic connection of the coulters	1 pc
3.	Hydraulic connection of the fan	1 pc
4.	Hydraulic connection of the drawbar adjustment	1 pc
5.	Hydraulic connection of the front levelling board (optional)	1 pc
6.	Required tyre pressure	1 pc
7.	Falling hazard. Standing or sitting on the machine during operation and transport is prohibited.	1 pc
8.	Falling hazard	1 pc
9.	Protective gloves must be worn	1 pc
10.	Eye protection must be worn	1 pc
11.	Hearing protection must be worn	1 pc
12.	Crushing hazard	1 pc

13.	Beware of pressurised hydraulic hoses	1 pc
14.	Before servicing, make sure that the tractor is turned off, the key is removed from the ignition and the parking brake is engaged	1 pc
15.	Before moving, ensure that the wing sections are locked in place	1 pc
16.	Read the operation and maintenance manual carefully before operation	1 pc
17.	Cutting hazard	1 pc

The warning labels on the rear of the machine are shown in the next image. The same warning labels are affixed to the opposite side of the machine.

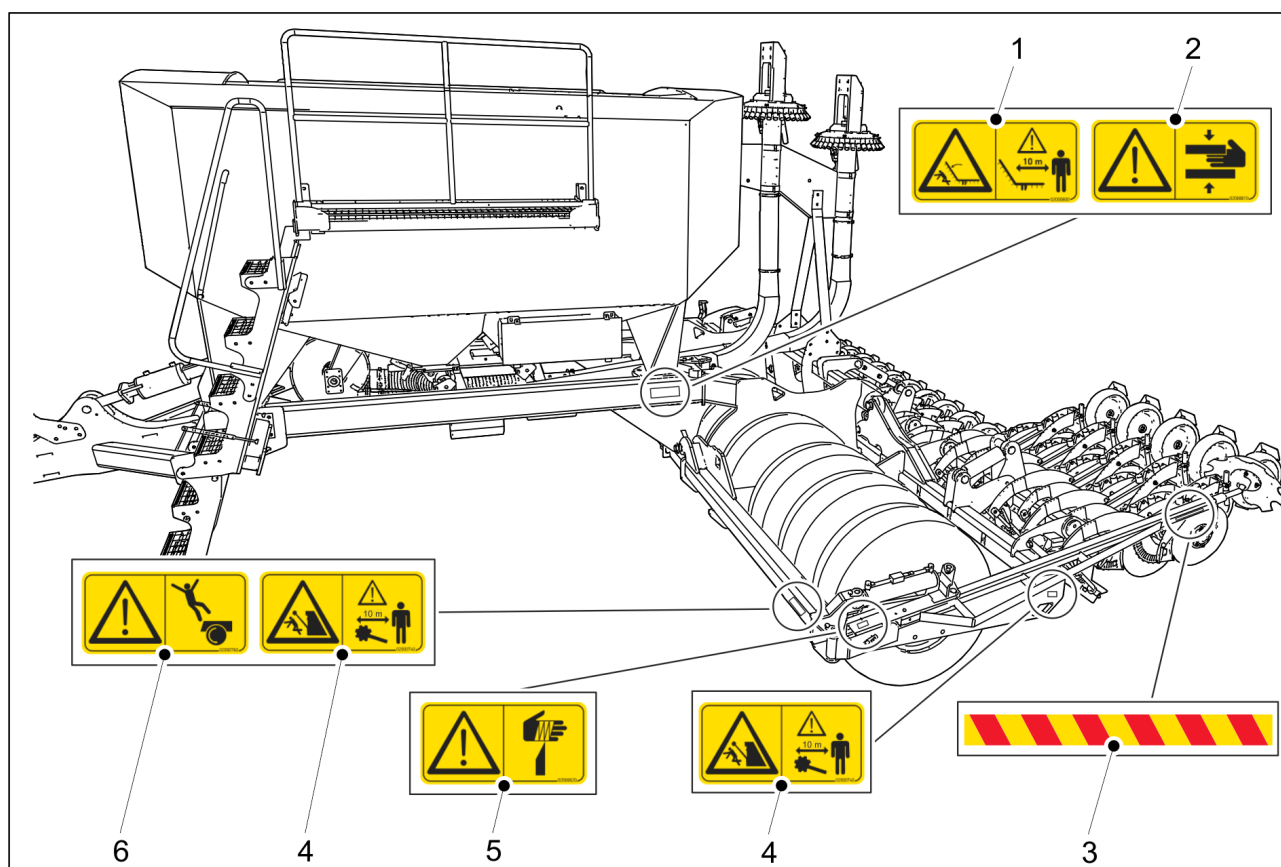


Figure. 3.3. - 3. Warning labels used on the rear of the machine

Table. 3.3. - 5. Warning labels used on the rear of the machine

1.	Crushing, cutting and impact hazard when lifting and lowering the wing sections	2 pc
2.	Crushing hazard	2 pc
3.	Marker warning tape	2 pc
4.	Crushing hazard when lifting and lowering the markers	4 pc
5.	Cutting hazard	2 pc
6.	Falling hazard. Standing or sitting on the machine during operation and transport is prohibited.	2 pc

4. Artemis control system

Artemis is an ISOBUS-compatible monitoring and control system for seed drills.

4.1. Control system components

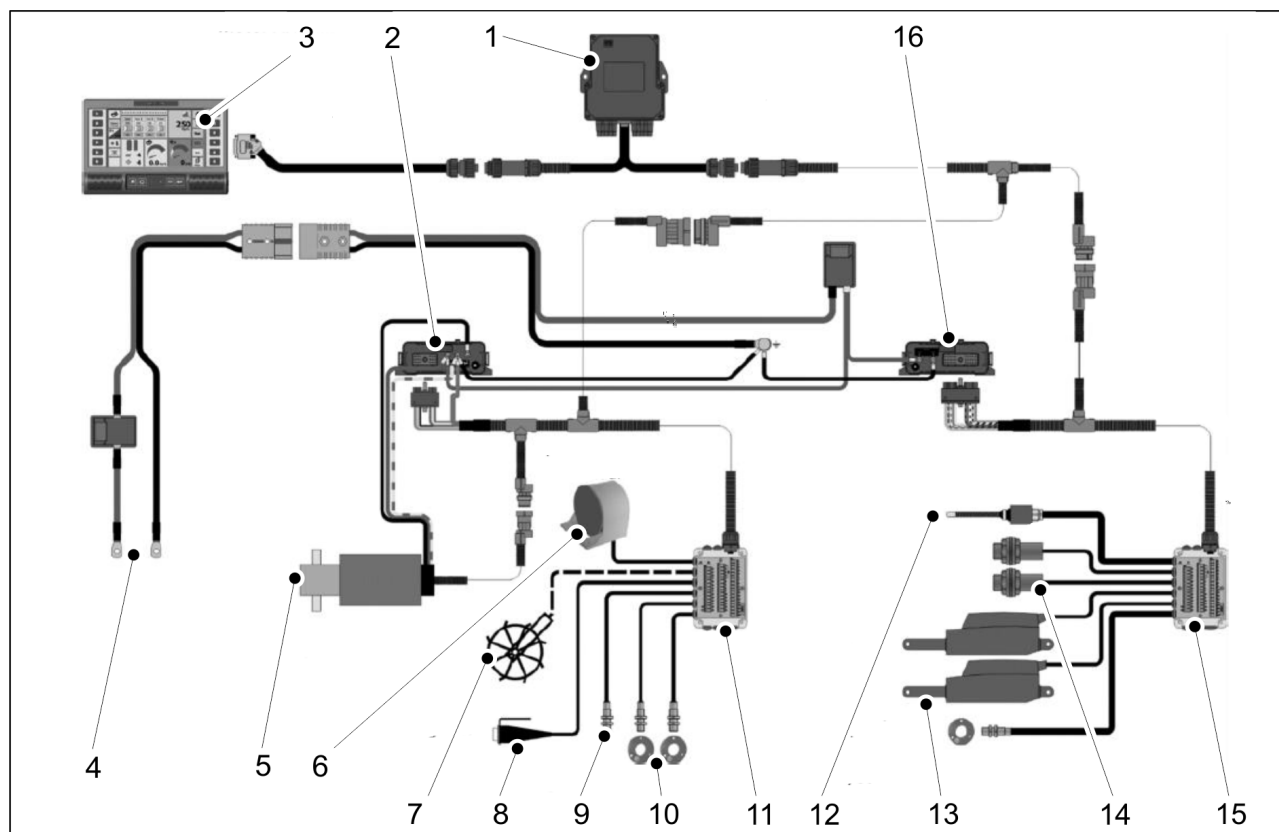


Figure. 4.1. - 4. Artemis control system components

1.	ISOBUS/CAN module	Includes the system software
2.	MCM CAN module	CANBUS interface for the feeder motor and sensors
3.	ISOCAN control panel	Colour touch screen
4.	Power supply	Power supply to the seed drill from the tractor electrical system
5.	Feeder motor	Controls one or more dispensers
6.	Radar	Measures driving speed
7.	Speed sensor	Disabled
8.	Push button for calibration test	
9.	Rotational speed sensors	Motor feed
10.	Magnetic sensor	Fan rotation speed sensor
11.	MCM junction box	

12.	Inductive sensor	The working position sensor detects when the machine is in its working position
13.	Linear motors	Half width (optional)
14.	Capacitive sensor	Hopper level sensor
15.	HBM junction box	
16.	HBM CAN module	CANBUS interface for other switches, sensors and actuators

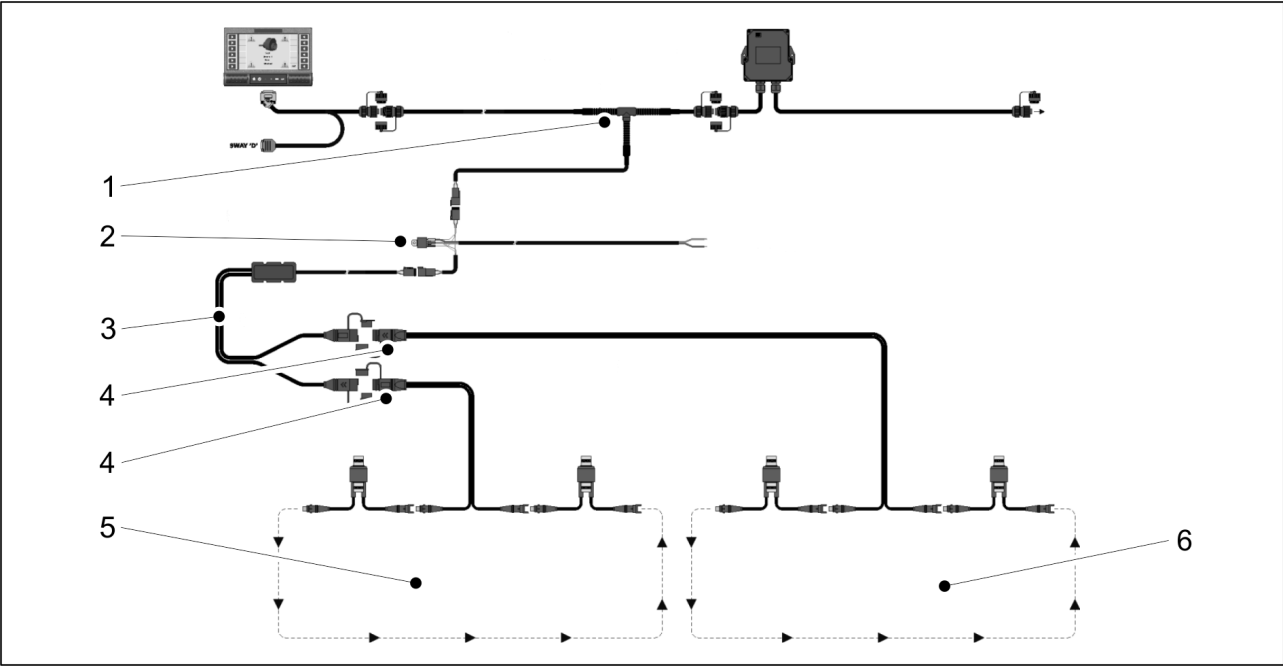


Figure. 4.1. - 5. Blockage monitoring system

1.	Extension cable
2.	Power cable
3.	ECU
4.	Y extension cable
5.	Seed sensor module
6.	Fertiliser sensor module

4.1.1. Working position sensor

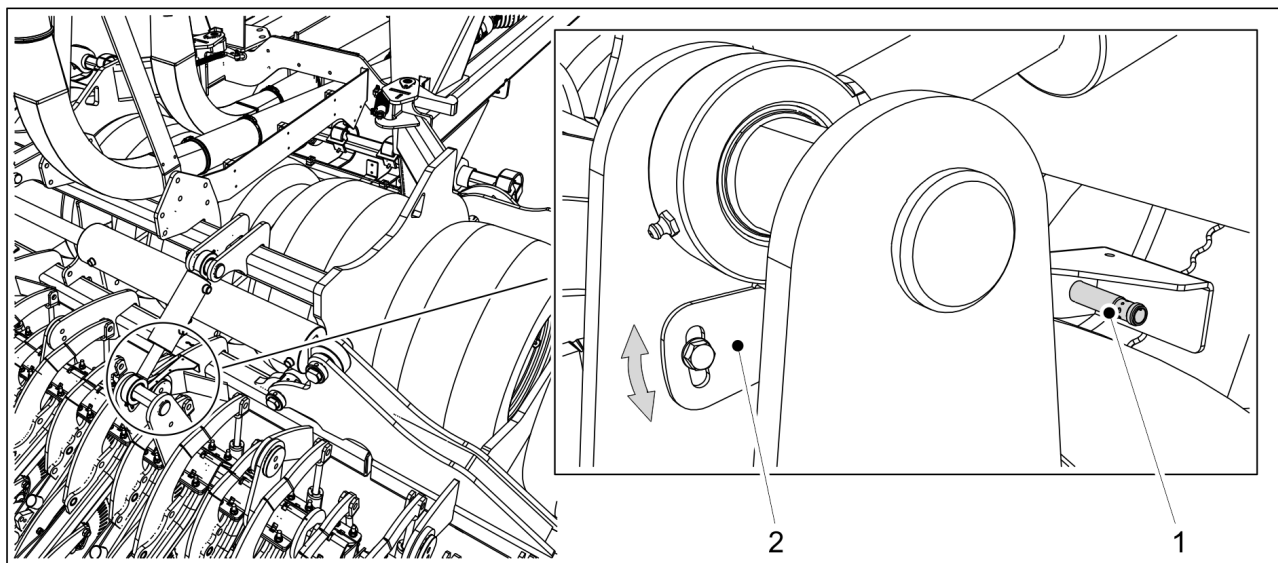


Figure. 4.1.1. - 6. Working position sensor

The working position sensor (1) is installed on the middle section coulters suspension. The working position sensor (M12 inductive sensor) turns on the feed and works as a counter. The sensor is adjusted by adjusting the height of the sensor mount (2). The lower the sensor, the later the feed will start when lowering the coulters and the earlier the feed will stop when raising the coulters. When the feed starts, there is a delay during which the seeds are run from the feeder to the coulters.

4.1.2. Radar

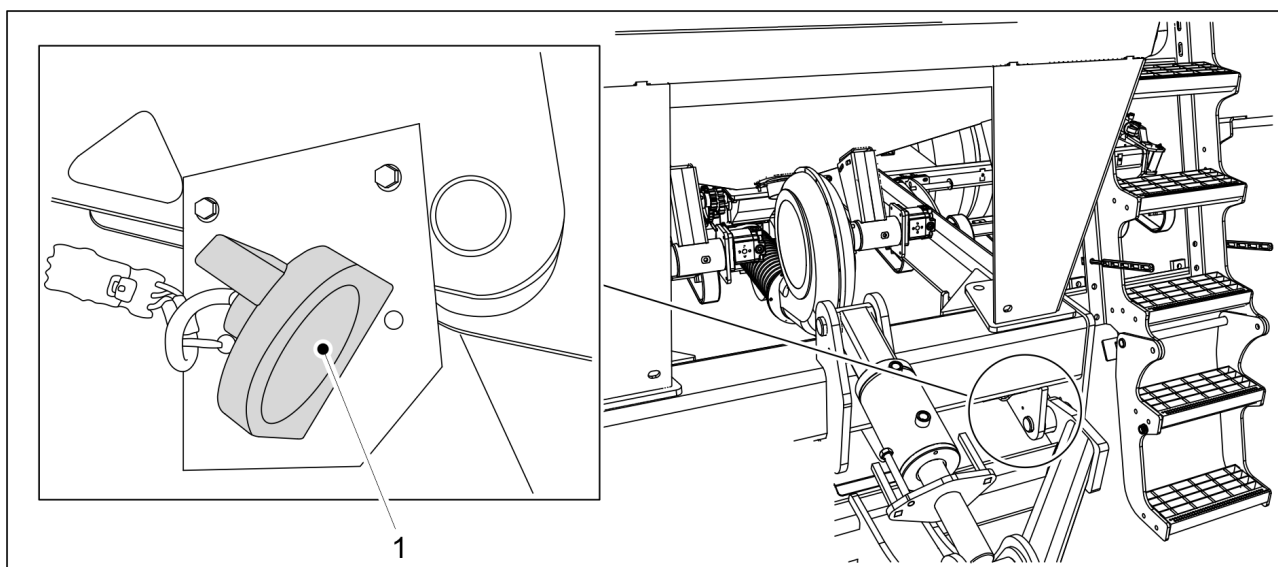


Figure. 4.1.2. - 7. Radar

A radar works as the machine's speed sensor. The radar is located in the machine frame, next to the boom mount and close to the ladder.

4.1.3. Hopper level sensors

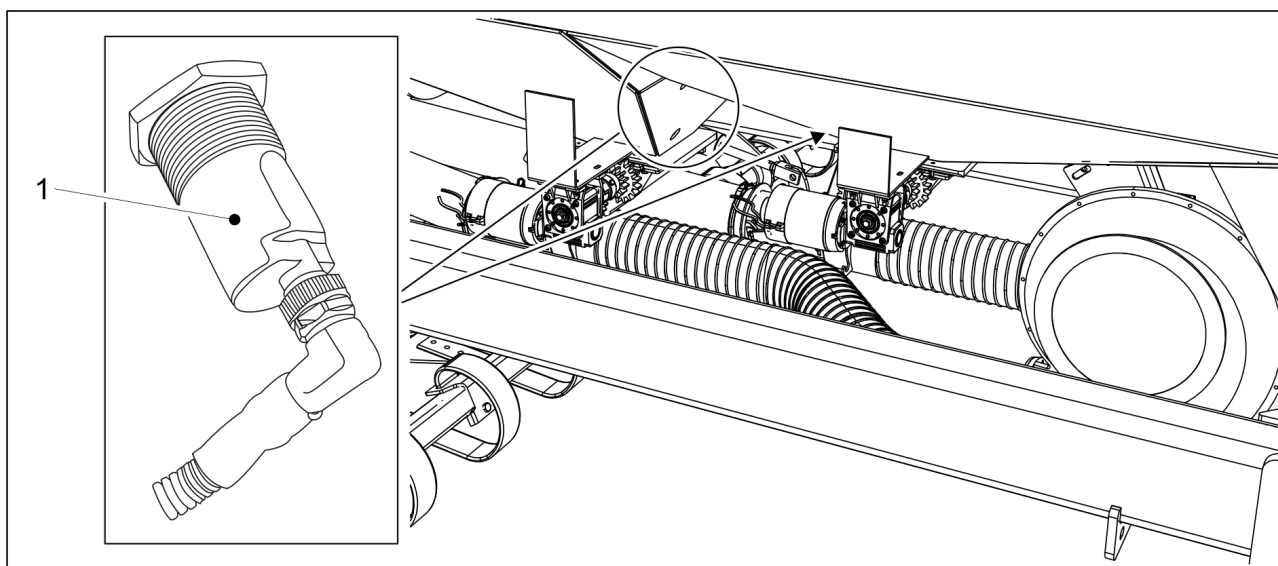


Figure. 4.1.3. - 8. Hopper level sensors

There is 1 hopper level sensor in the seed hopper and 1 in the fertiliser hopper. The sensors are located next to the dispenser at the bottom of the hopper. The hopper level sensors are capacitive sensors. If the seed or fertiliser level in the hopper is too low, an alarm is triggered in the control system.

4.1.4. Tramline motors

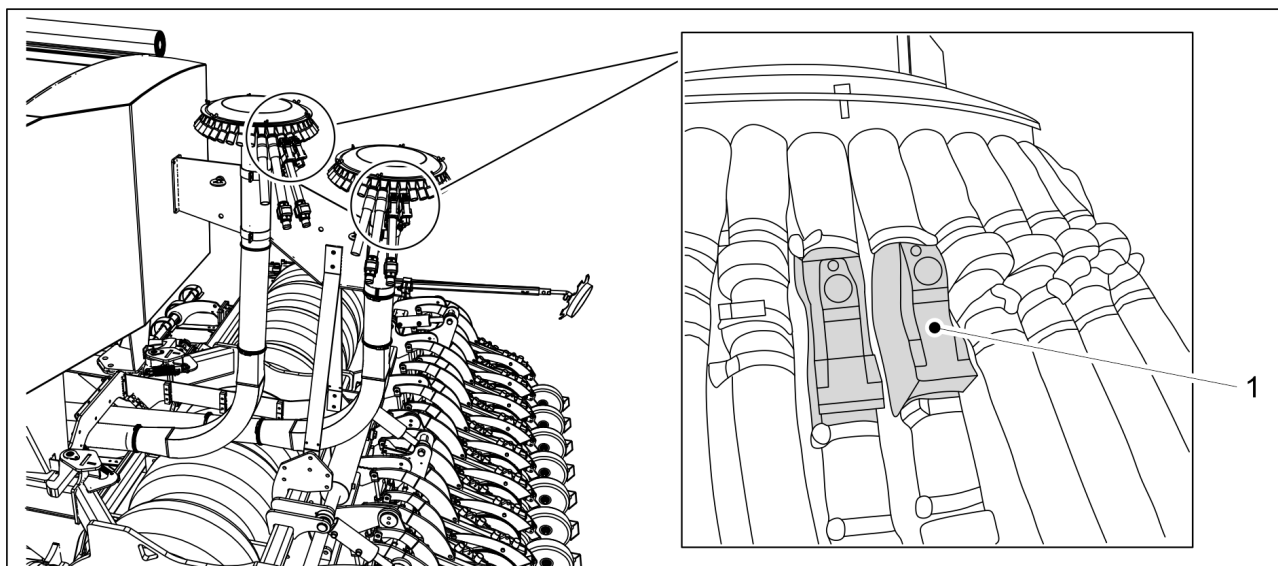


Figure. 4.1.4. - 9. Tramline motors

The tramline motors (1) are located at the bottom of the divider between the divider and transfer hose. The tramline motor can be used to shut off the feed for one coulter, thus making a tramline during seeding. Normally, there is a total of 4 tramline motors (2 motors/divider, located on different sides of the divider). An extended tramline track width is made with two side-by-side tramline motors (shown in the figure). In this case, there is a total of 8 tramline motors (4 motors/divider).

4.1.5. Blockage monitoring system sensors

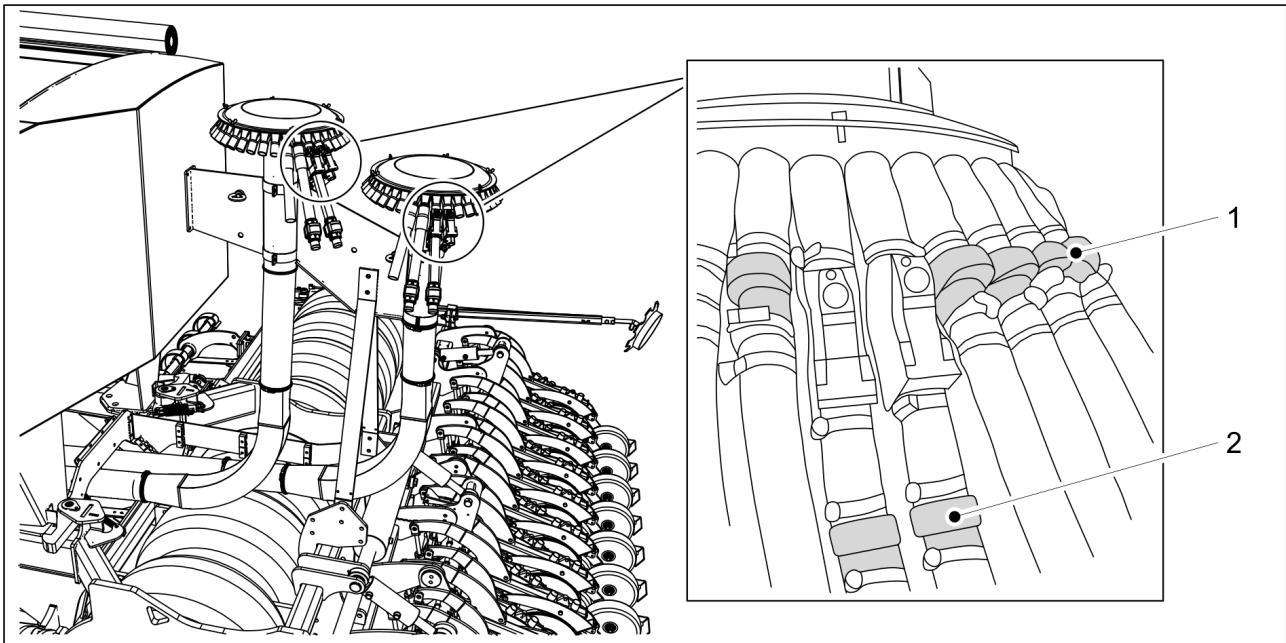


Figure. 4.1.5. - 10. Blockage monitoring system sensors

The blockage monitoring system sensors (1, 2) are located at the end of the transfer hoses coming from the divider. If a tramline motor is mounted at the bottom of the divider, the sensor is located immediate after the tramline motor. There is a total of 72 sensors, i.e. each fertiliser and seed transfer hose has its own sensor. If there is a blockage in the transfer hose, an alarm is triggered in the control system.

4.2. Control panel

4.2.1. Function buttons and connections

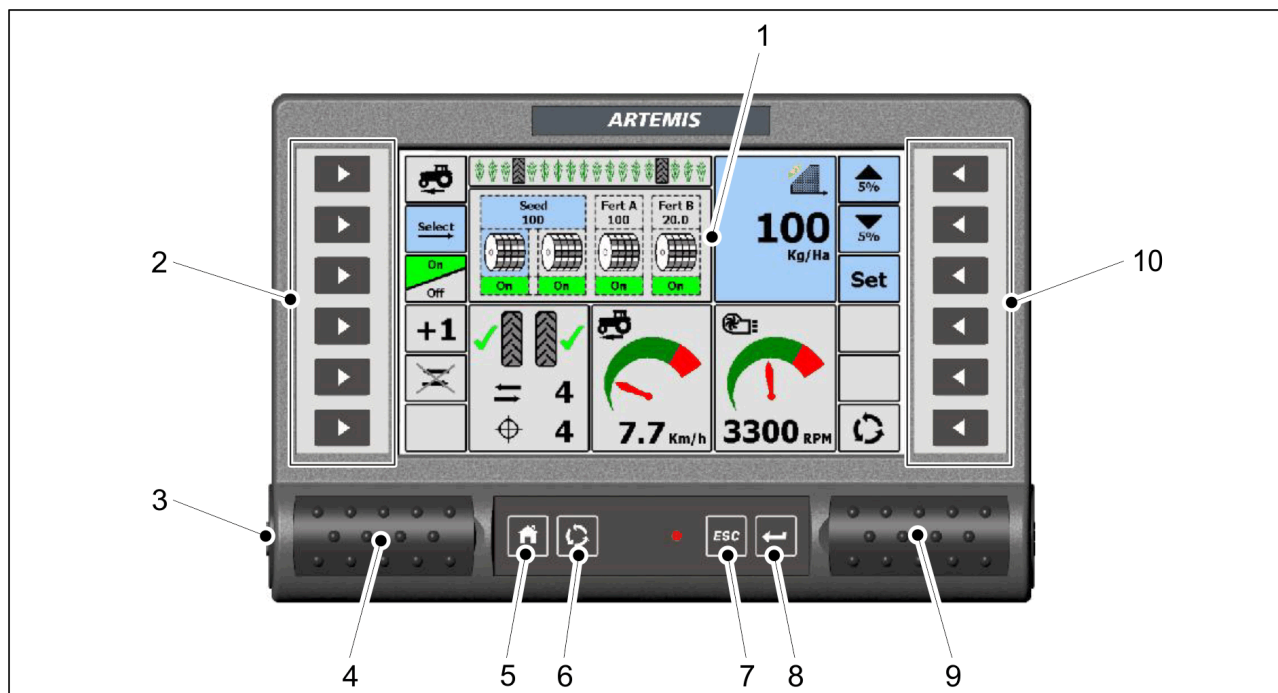


Figure. 4.2.1. - 11. Control panel buttons and connections

1.	Touch screen
2.	Selector buttons (functions correspond to the keys shown on the left side of the touch screen)
3.	Power switch
4.	Memory card reader (SD card)
5.	HOME button
6.	CYCLE button
7.	ESC button (stop function)
8.	ENTER button (acknowledge button)
9.	USB connection
10.	Selector buttons (functions correspond to the keys shown on the right side of the touch screen)

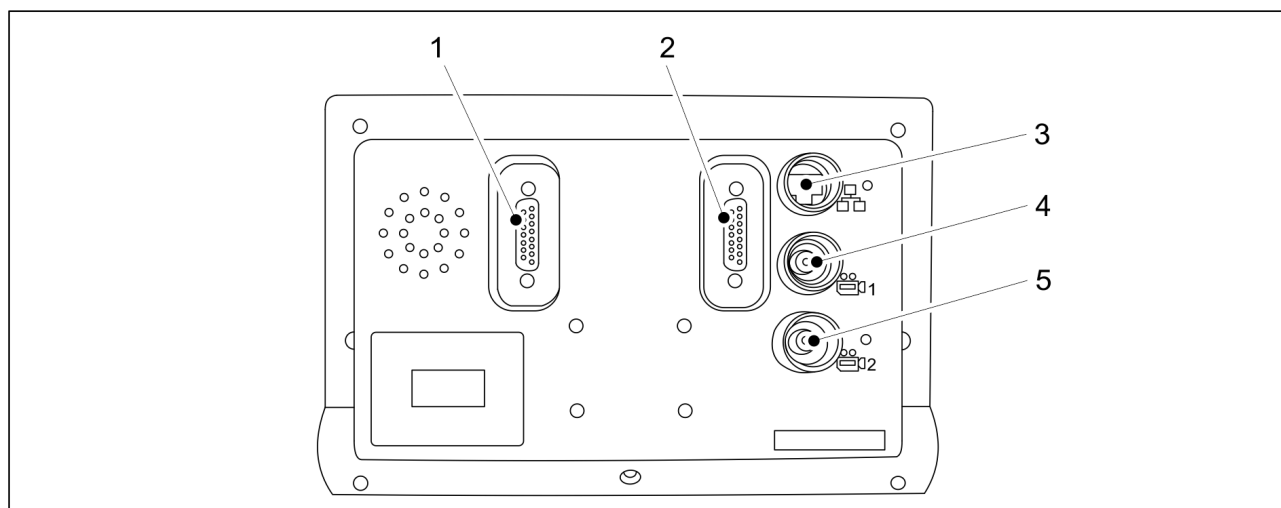


Figure. 4.2.1. - 12. Control panel connections (rear)

1	Serial port (disabled)
2	CAN bus connection
3	LAN network connection (disabled)
4	Camera 1 connection
5	Camera 2 connection

4.2.2. Touch screen

The control panel contains a 5-wire resistive touch screen. The 5-wire technology offers a long service life and reliability without requiring recalibration. The touch screen's plastic surface must be handled with care.



CAUTION

Do not touch the surface of the touch screen with sharp objects. The surface may be damaged beyond repair.



CAUTION

Do not clean the touch screen surface with solvents.



CAUTION

Do not clean the touch screen surface with a dirty cloth. Only use products intended for cleaning screens.

- The screen may be touched with blunt, rounded plastic objects (such as the shaft or end of a pen)

4.3. User interface pages

4.3.1. Startup screen

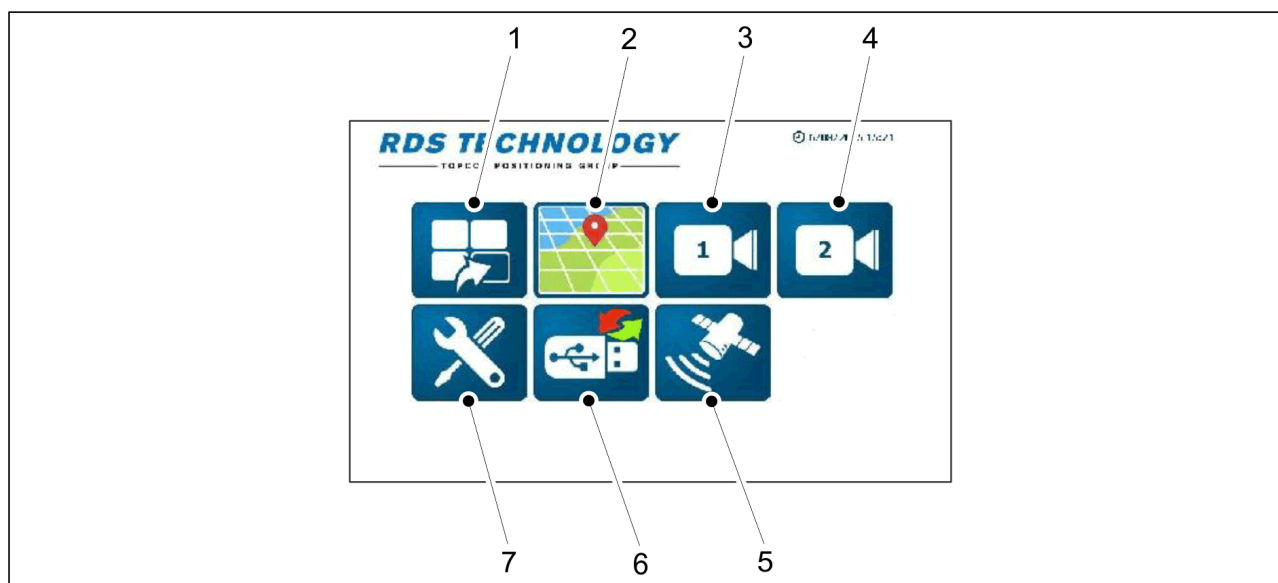


Figure. 4.3.1. - 13. Startup screen

1	Artemis application
2	Precision farming application (disabled)
3	Camera view 1 (optional)
4	Camera view 2 (optional)
5	GPS
6	Importing/exporting data
7	Settings

4.3.2. Pages of Artemis application

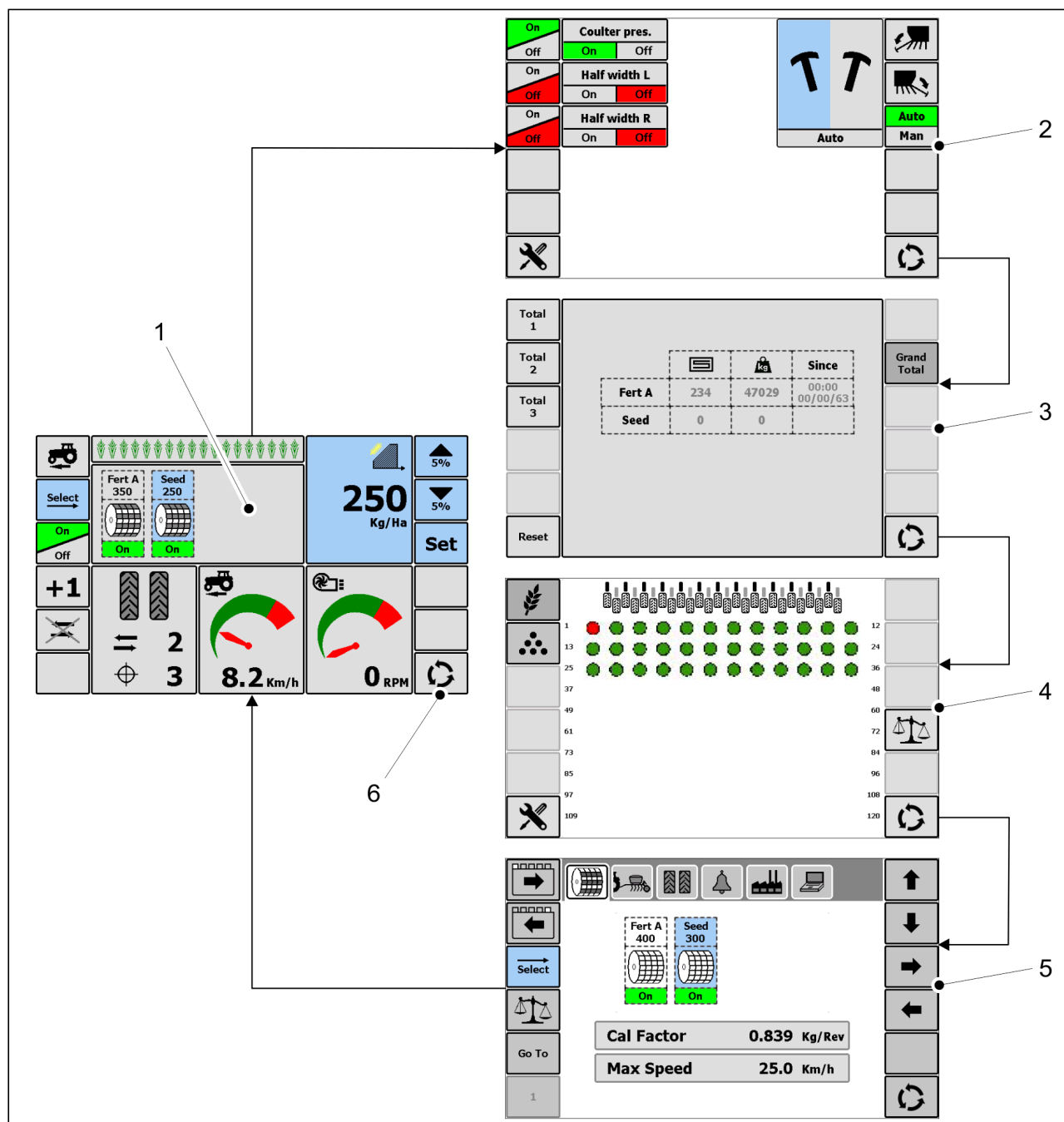


Figure. 4.3.2. - 14. Pages of Artemis application

1.	Main operating page
2.	Middle markers and hydraulics
3.	Seeding summary
4.	Blockage monitoring system
5.	Settings
6.	CYCLE key (on all pages 1-5)

4.4. Using the user interface

4.4.1. Main operating page

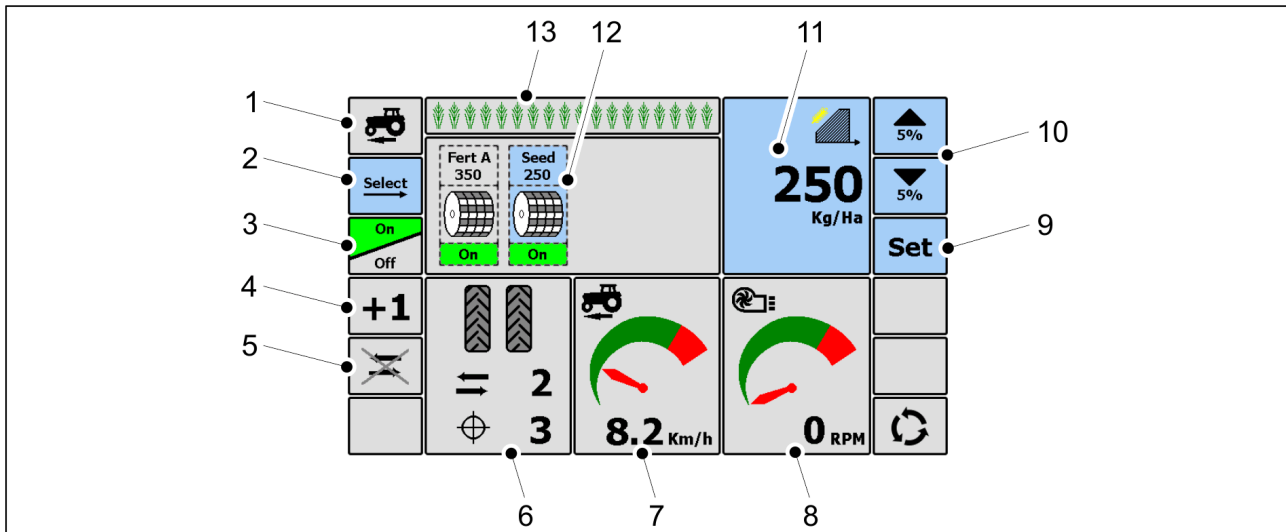


Figure. 4.4.1. - 15. Main operating page functions

1.	<p>PRESTART ON key</p> <ul style="list-style-type: none"> See section 5.1.3.2. Prestart setting
2.	<p>SELECT key for the channel (12) selection</p> <ul style="list-style-type: none"> The selected channel will be highlighted in blue
3.	<p>ON-OFF key for the selected channel</p> <ul style="list-style-type: none"> The channel is on when the On key is highlighted in green The channel is off when the Off key is highlighted in red
4.	<p>Tramline advance</p> <ul style="list-style-type: none"> See section 6.3.1.1. Tramline advance
5.	<p>Tramline counter hold</p> <ul style="list-style-type: none"> See section 6.3.1.2. Tramline counter hold <p>Use of the lift inhibit function</p> <ul style="list-style-type: none"> See section 6.3.2. Use of the lift inhibit function

6.	<p>Tramline status</p> <ul style="list-style-type: none"> • See section 6.3.1. Tramline status
7.	<p>Driving speed</p>
8.	<p>Fan rotation speed</p>
9.	<p>Setting the target rate</p> <ul style="list-style-type: none"> • See section 6.3.3. Feed rate setting
10.	<p>Adjusting the target rate</p> <ul style="list-style-type: none"> • See section 6.3.3. Feed rate setting
11.	<p>Target value of the selected channel</p>
12.	<p>Channel status</p> <ul style="list-style-type: none"> • The channels assigned a target value and selected for use are shown here • Seed = seed channel • Fert = fertiliser channel
13.	<p>Seeding and tramline status</p> <ul style="list-style-type: none"> • See section 6.3.1. Tramline status

4.4.2. Middle markers and hydraulics

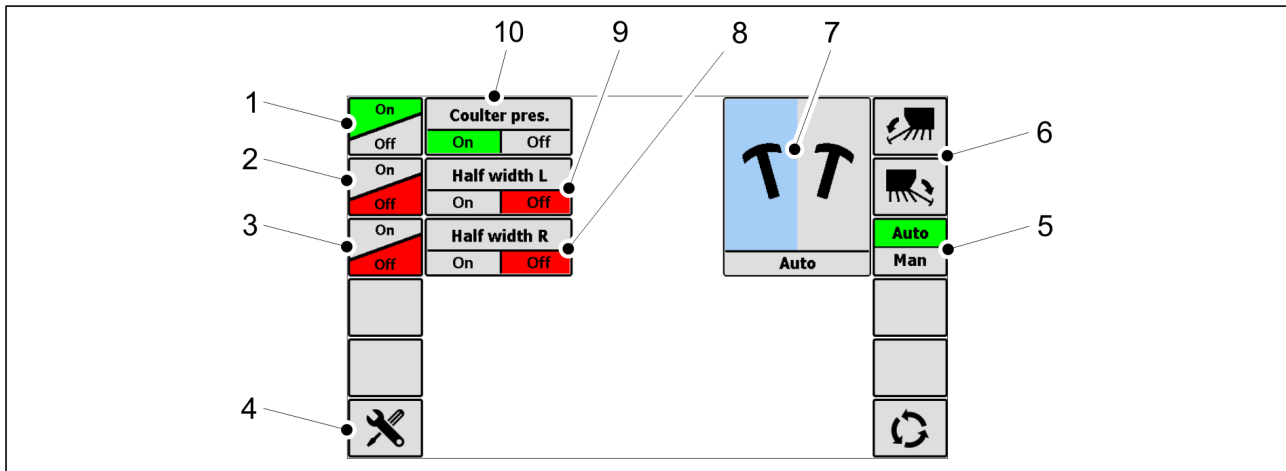


Figure. 4.4.2. - 16. Middle markers and hydraulics page functions

1.	ON-OFF key - Coulter pressure <ul style="list-style-type: none"> See section 6.10. Adjusting the coulter pressure
2.	ON-OFF key - Half width, left side <ul style="list-style-type: none"> See section 6.3.5. Half width
3.	ON-OFF key - Half width, right side <ul style="list-style-type: none"> See section 6.3.5. Half width
4.	Factory settings
5.	AUTO-MAN key - Selects the middle marker function <ul style="list-style-type: none"> See section 6.3.4. Middle marker settings and manual operation
6.	Selecting the middle marker side <ul style="list-style-type: none"> See section 6.3.4. Middle marker settings and manual operation
7.	Middle marker side in use <ul style="list-style-type: none"> The selected side is shown in blue
8.	Half width, right side - function mode information
9.	Half width, left side - function mode information
10.	Coulter pressure - function mode information

4.4.3. Seeding summary

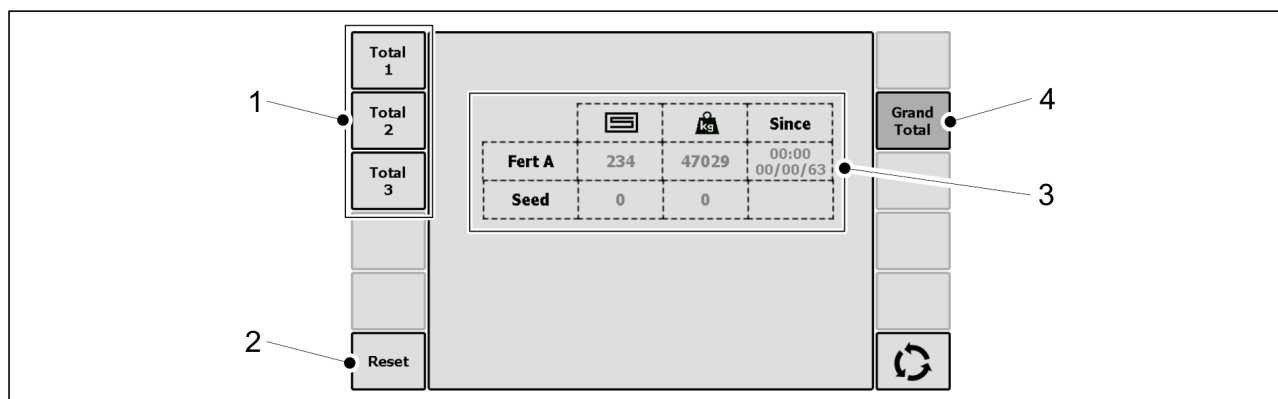


Figure. 4.4.3. - 17. Seeding summary page functions

1.	Memory register for seeding quantities (3 pcs) <ul style="list-style-type: none"> See section 6.3.6.1. Area counter data
2.	Resetting the memory register <ul style="list-style-type: none"> See section 6.3.6.2. Resetting area counters
3.	Seeding data <ul style="list-style-type: none"> See section 6.3.6.1. Area counter data
4.	Total seeding quantity <ul style="list-style-type: none"> See section 6.3.6.1. Area counter data

4.4.4. Blockage monitoring system

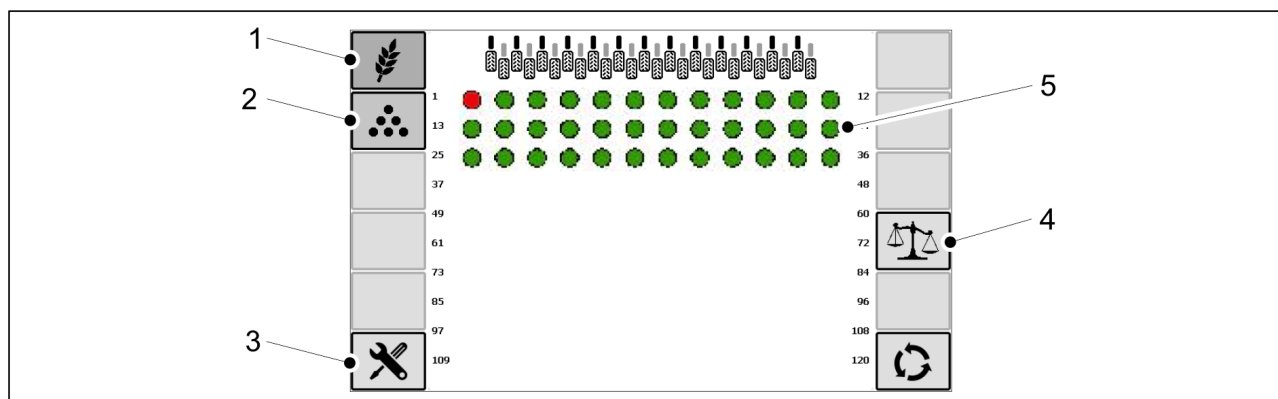


Figure. 4.4.4. - 18. Blockage monitoring system page functions

1.	Sensors for seed
2.	Sensors for fertiliser
3.	Factory settings (no user access)
4.	Sensor calibration <ul style="list-style-type: none"> See section 6.3.8.2. Calibrating the blockage monitoring system sensors
5.	Sensor status <ul style="list-style-type: none"> See section 6.3.8.1. Blockage monitoring system sensor status

4.4.5. Settings

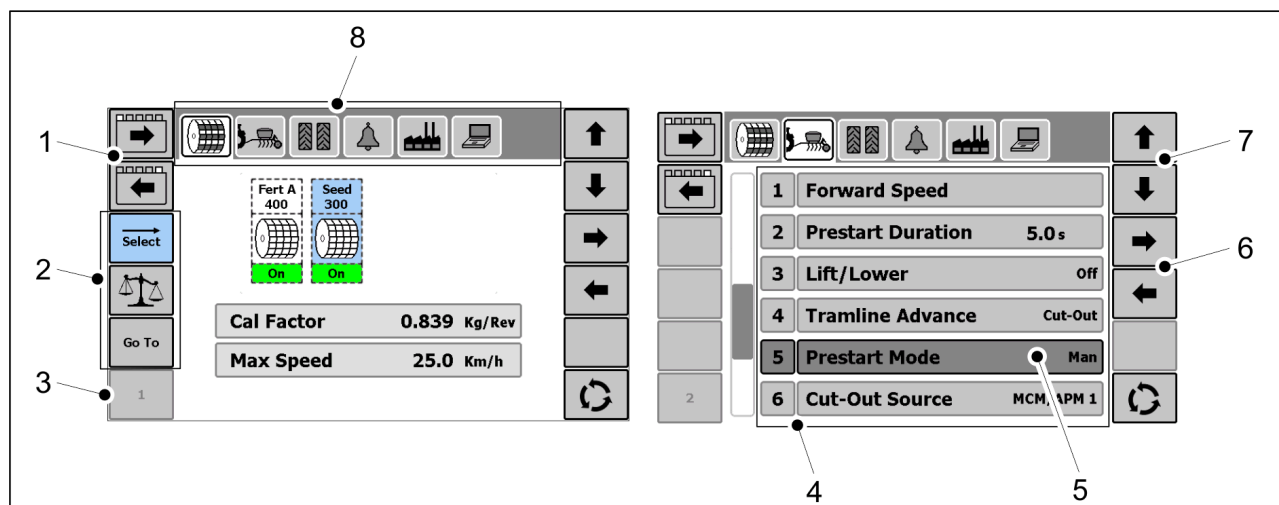


Figure. 4.4.5. - 19. Settings page functions

1.	Topic selection keys <ul style="list-style-type: none"> Use to activate a topic (8)
2.	Function keys <ul style="list-style-type: none"> Vary according to the setting page
3.	Setting page number
4.	Topic content <ul style="list-style-type: none"> The content and number of lines vary according to the topic (8) selected Use the UP/DOWN arrow keys (7) to scroll through the content
5.	Setting selected from a topic <ul style="list-style-type: none"> Shown on the list in a darkened colour Press the darkened line when you want to edit the setting
6.	LEFT/RIGHT arrow keys <ul style="list-style-type: none"> Use to navigate within the active setting
7.	UP/DOWN arrow keys <ul style="list-style-type: none"> Use to navigate within the active setting

8.	<p>Setting topics</p> <ul style="list-style-type: none">• Select the topic by pressing a symbol or by using the topic selection keys (1)• The symbol of a selected topic is highlighted in white
----	---

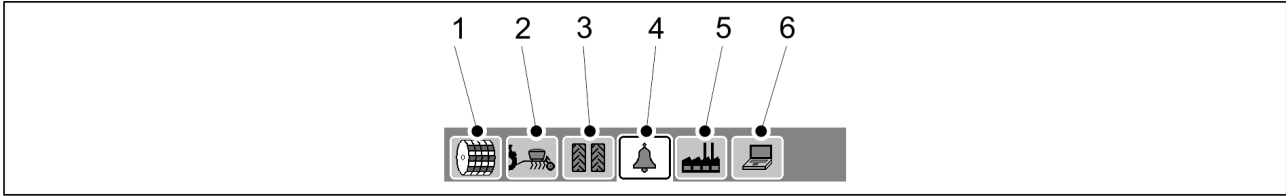


Figure. 4.4.5. - 20. Setting topics

1.	Product calibration
2.	Presets
3.	Tramlines
4.	Alarms
5.	Factory settings
6.	Diagnostics

5. Commissioning and basic settings

5.1. Commissioning

5.1.1. Installing the Artemis control panel

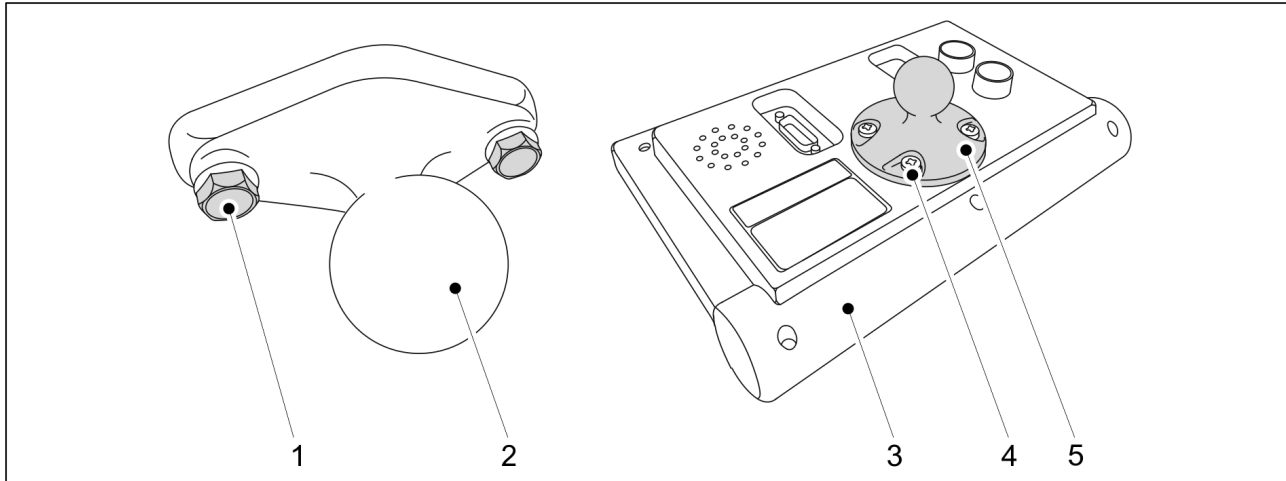


Figure. 5.1.1. - 21. Artemis control panel

1. Fasten the control panel bracket (2) to the tractor cabin with two fastening screws (1).
 - Place the control panel in a visible location in the tractor cabin so that it is not exposed to direct sunlight.
2. Fasten the control panel (3) counterpart (5) with the four fastening screws (4).
3. Fasten the control panel to the bracket using connecting pieces.
4. Pull the CAN bus cable from the rear of the tractor to the control panel.



DANGER

Fasten the bus cable to the tractor structures so that the seed drill operator does not trip over it.

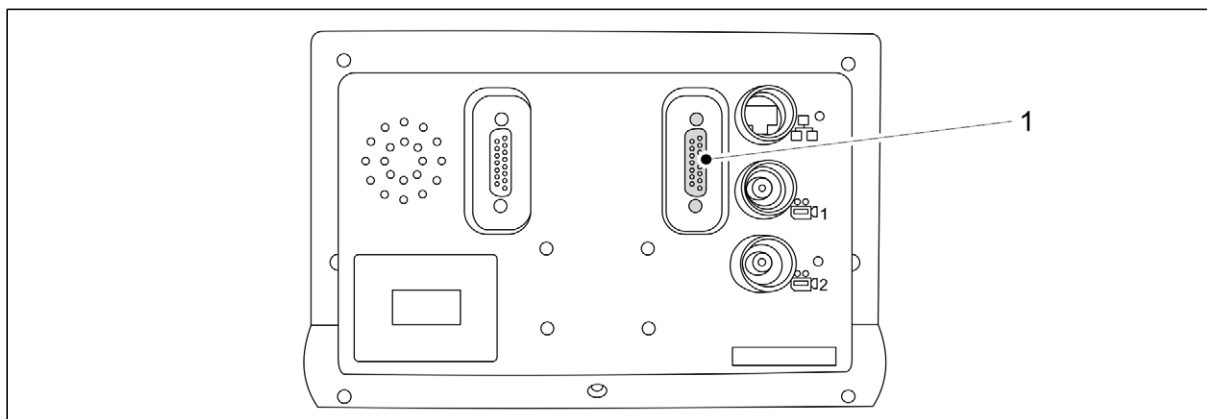


Figure. 5.1.1. - 22. Control panel CAN bus connector

5. Connect the CAN bus cable to the CAN bus connector (1) on the back of the control panel.

5.1.2. Power cable connection

- Power is supplied to the seed drill directly from the tractor battery to ensure an uninterrupted power supply. The seed drill feeding equipment consumes a maximum of 60 Ah. The seed drill is delivered with cabling (including a fuse box) to be fastened to the tractor.



DANGER

Turn off the tractor and remove the key from the ignition before installing.

1. Run the cable into the tractor engine bay.
 - The length of the power cable is 5 m.
2. Fasten the power cable to tractor structures using, for example, cable ties.



CAUTION

Ensure that the power cable does not come into contact with any hot or moving parts of the engine.

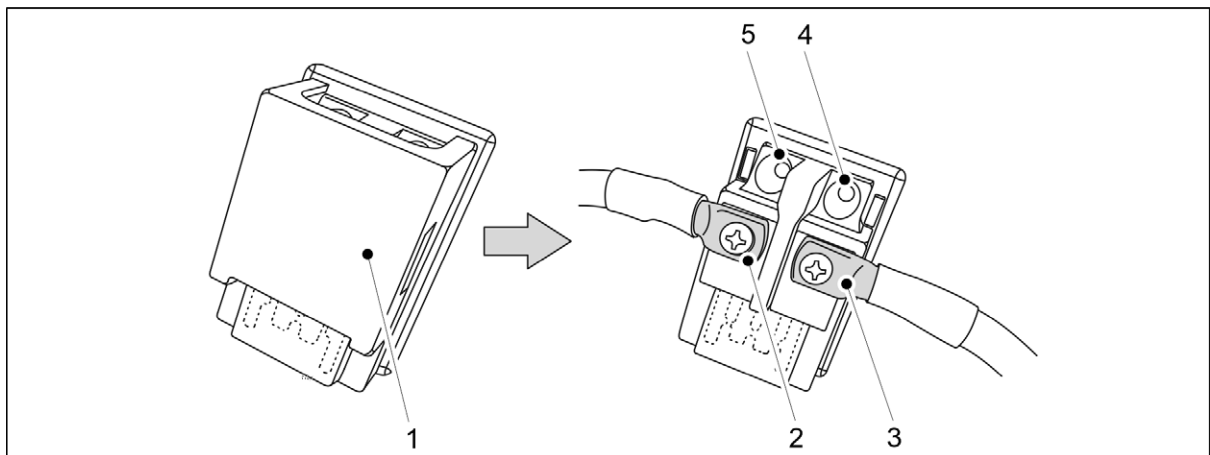


Figure. 5.1.2. - 23. Fuse box

3. Open the fuse box cover (1).
4. Mount the fuse box using the mounting holes (4, 5).
 - The cables coming into the fuse box can be connected through the side or the bottom.

The length of the positive lead coming from the tractor battery is 1.5 m.
5. Connect the positive lead coming from the rear of the tractor and the positive lead running to the battery (2, 3) to the fuse box.
6. Close the fuse box cover.

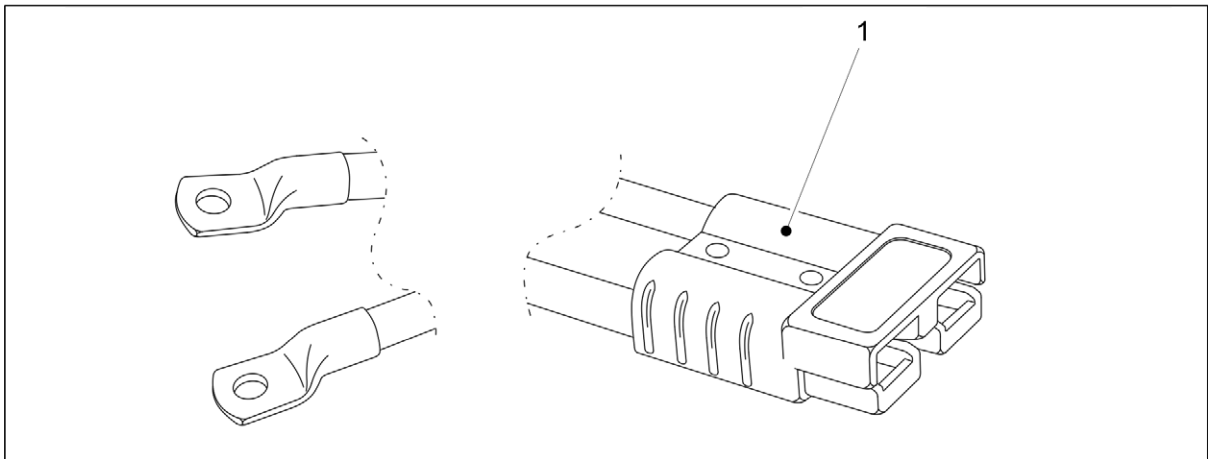


Figure. 5.1.2. - 24. Power cable

7. Connect the black negative lead of the power cable to the negative terminal of the battery.



DANGER

Never let metal implements simultaneously contact the positive and negative terminals.



CAUTION

Ensure that the cables are connected to the correct terminals.

- The cable polarity is also indicated on the battery connector (1) casing.
8. Connect the red positive lead coming from the fuse box to the positive terminal of the battery.

5.1.3. Artemis control system commissioning settings

5.1.3.1. Tramline setting

Tramline automation can be used to turn the tramline motor on or off. When the tramline motor is on, the rows are not seeded, but a tramline is made during seeding.

- The tramlines are made in the middle as a default.
If the number of passes is even, the tramlines will be asymmetric.

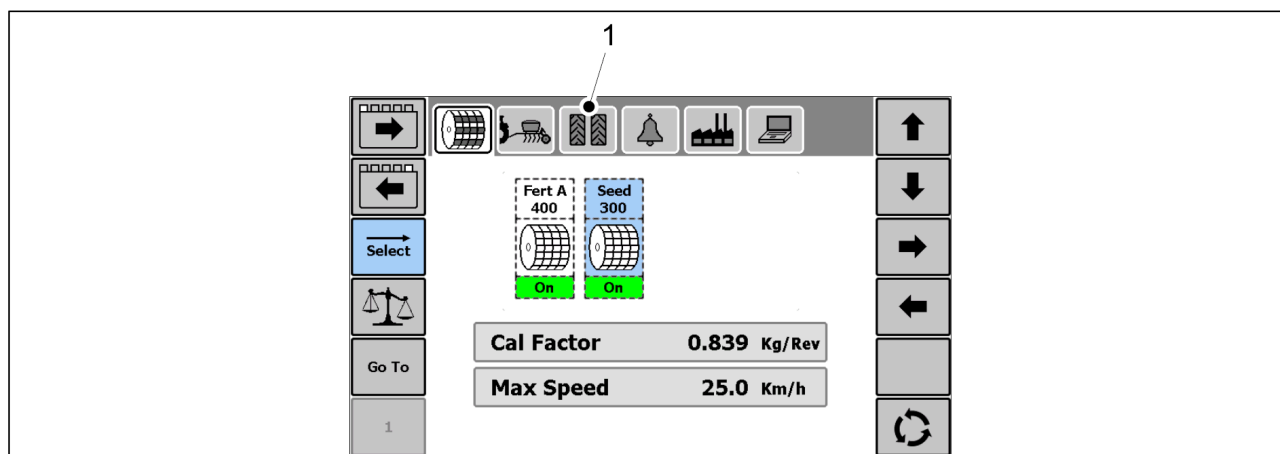


Figure. 5.1.3.1. - 25. Settings - Tramlines

1. Go to the Artemis Settings page and select TRAMLINES (1).

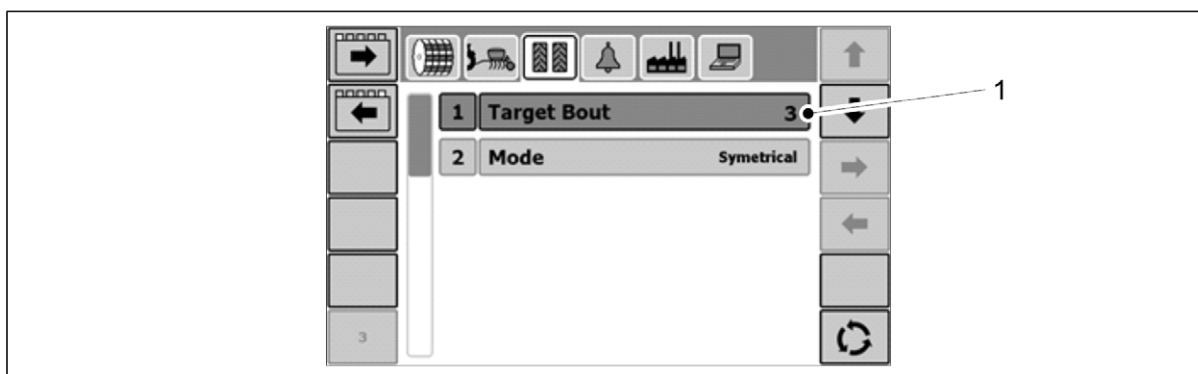


Figure. 5.1.3.1. - 26. Selecting the number of passes

2. Press the Target Bout line (1).
3. Enter the number of passes desired using the number keys and accept by pressing the OK key.

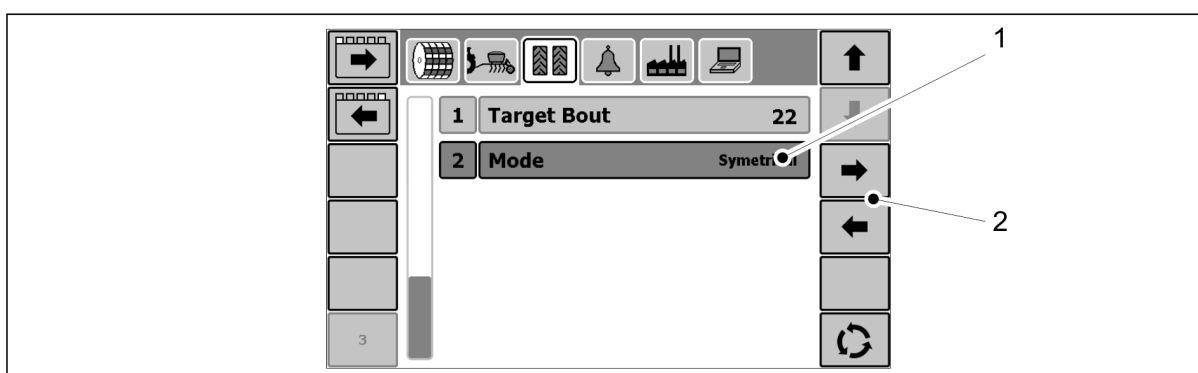


Figure. 5.1.3.1. - 27. Selecting the driving mode

4. Press the Mode line (1).
5. Select your desired driving mode using the LEFT/RIGHT arrow keys (2).
 - Symmetrical - symmetric tramlines
 - Asymmetrical - asymmetric tramlines

The tramline width options are shown in the table below.

Table. 5.1.3.1. - 6. Tramline widths

Track width (mm)	Extension	Tramline width (mm)	Number of tramline motors/track
1,500	No	350	1 pc
1,834	No	350	1 pc
2,168	No	350	1 pc
1,660	Yes	500	2 pc
2,000	Yes	500	2 pc

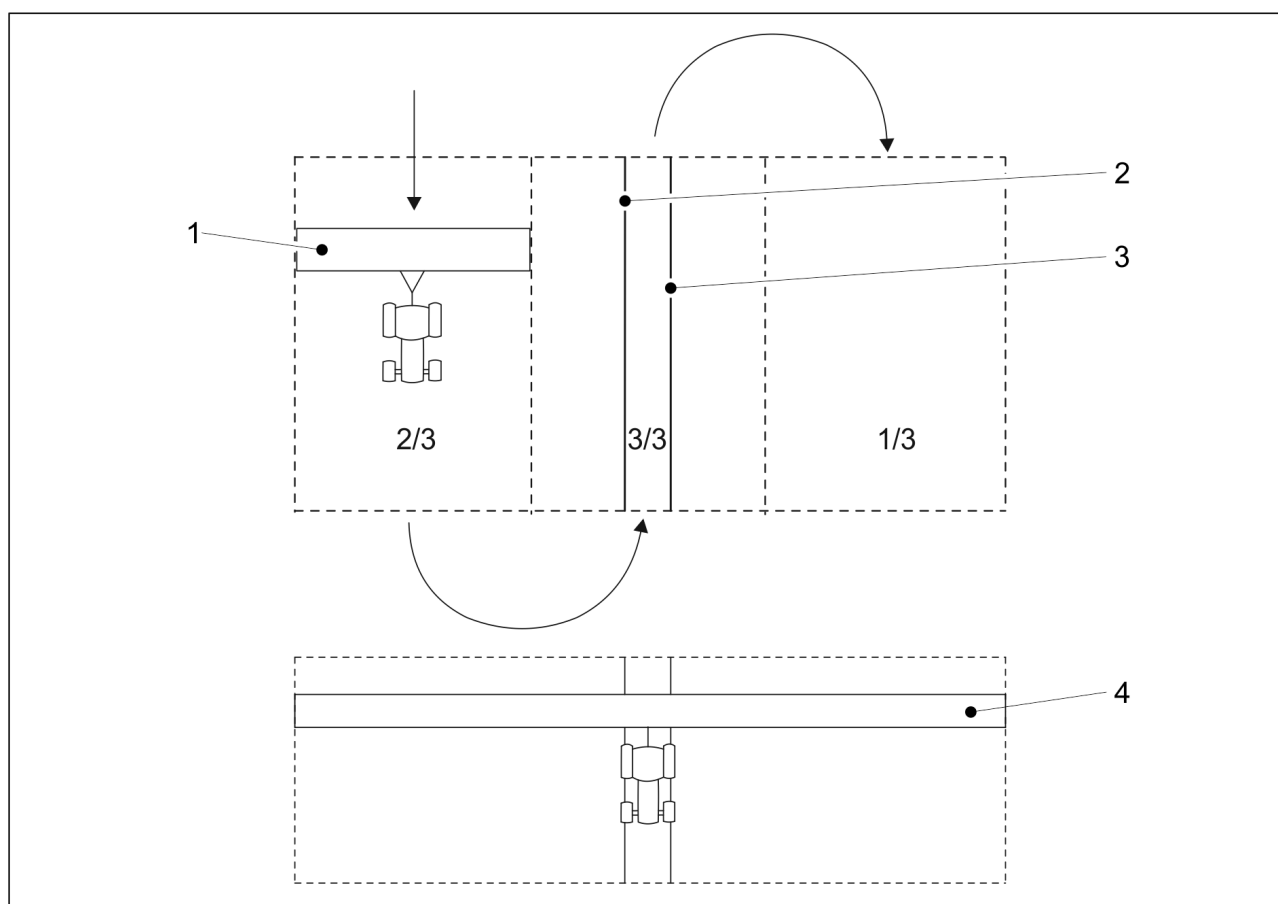


Figure. 5.1.3.1. - 28. Symmetric tramlines

- The width of the pass is the same as the width of the seed drill (1). In this case, there are 3 passes, thus making the application width (4) 18 m. When asymmetric tramline automation is selected, setting 2/3 is used when starting from the edge of the field and tramlines (2, 3) are made on the third pass. Symmetric tramlines are made for application widths of 18 m and 30 m.



-
- 38 (129)

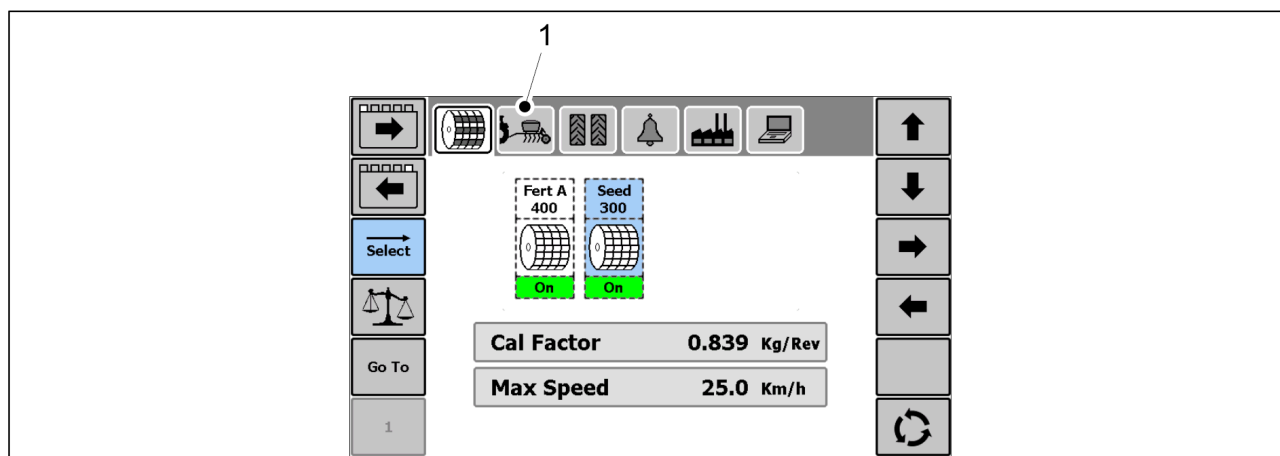


Figure. 5.1.3.2. - 30. Settings - Presettings

1. Go to the Artemis Settings page and select PRESETS (1).

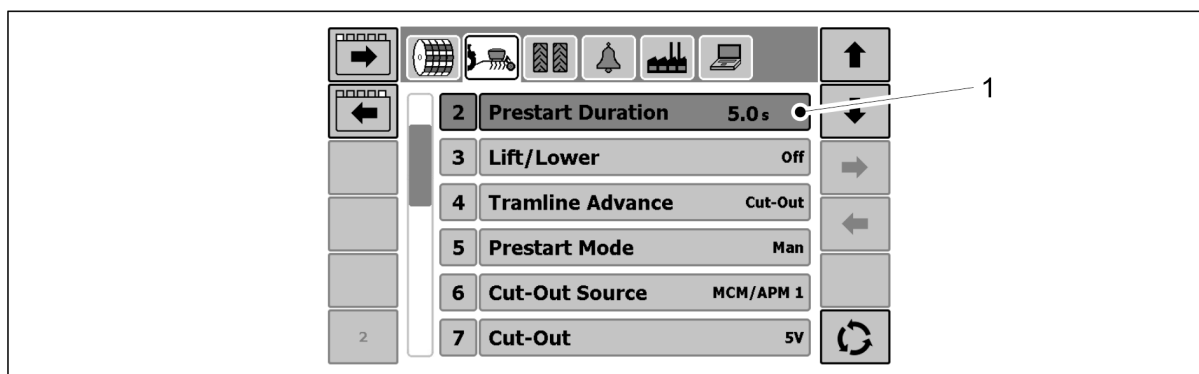


Figure. 5.1.3.2. - 31. Settings - Prestart duration

2. Press the Prestart Duration line (1).
3. Set the desired prestart duration using the number keys and then accept by pressing the OK key.
 - The value must be between 0 and 9.9 seconds.
You can determine a suitable value by trying different durations with the machine before starting a seeding pass.

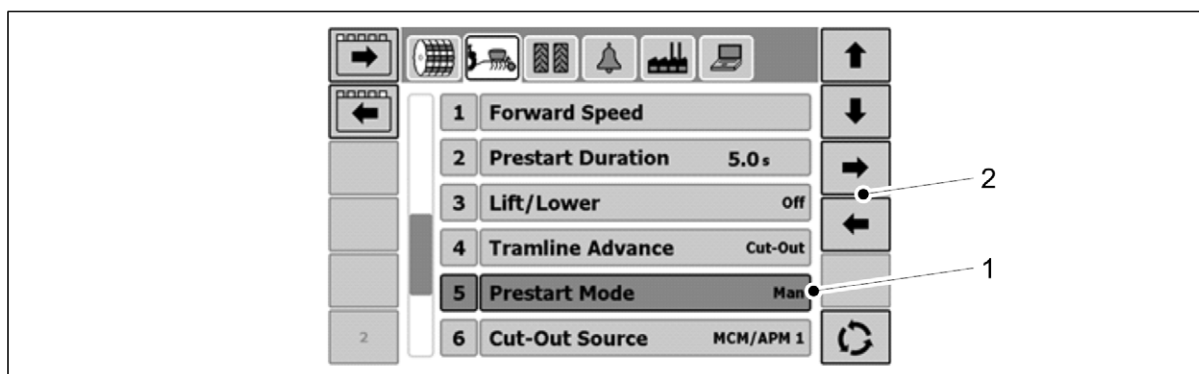


Figure. 5.1.3.2. - 32. Prestart mode

4. Press the Prestart Mode line (1).
5. Change the desired prestart mode using the LEFT/RIGHT arrow keys (2).

- Auto = the prestart will start automatically whenever the working position sensor detects that the machine is in its working position.
Man = prestart is started manually.
With both settings the feeder motors will run either at a simulated speed for a set duration or until the driving speed exceeds the simulated speed, at which time the application will shut off prestart.

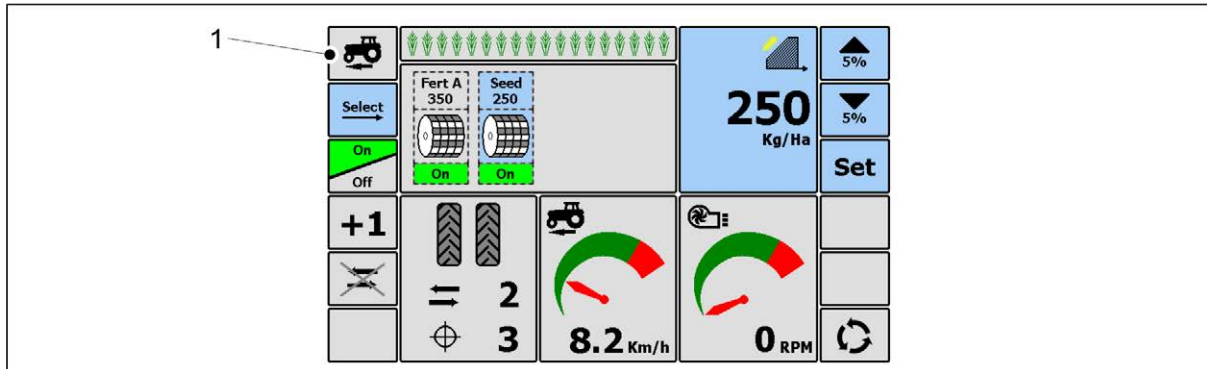


Figure. 5.1.3.2. - 33. Manually starting prestart

6. Start prestart manually on the Artemis Main operating page by pressing the PRESTART ON key (1).
 - The prestart can be started manually even when it is in Auto mode.

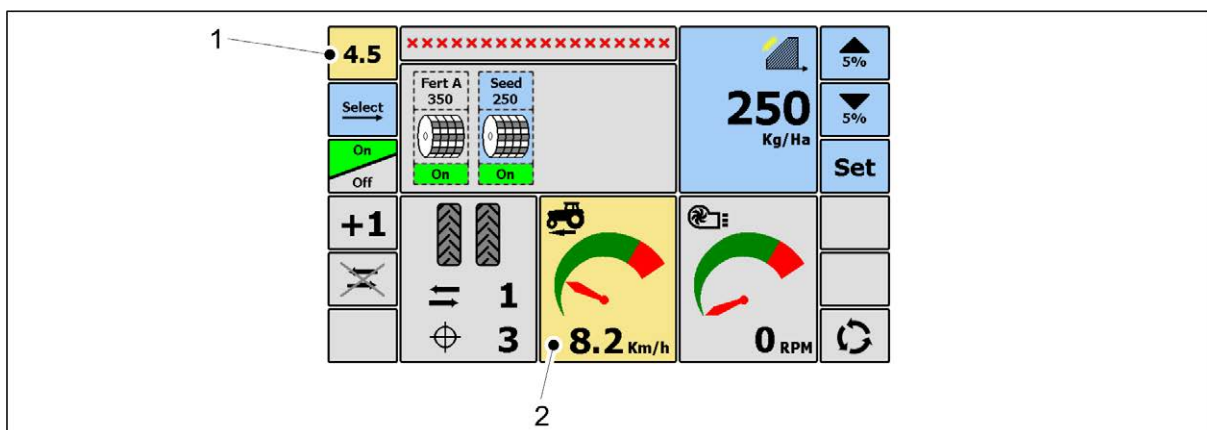


Figure. 5.1.3.2. - 34. Displaying prestart on the Main operating page

- When prestart is activated and the machine driving speed is lower than the simulated speed, the prestart duration (1) (displayed in seconds counting down) replaces the PRESTART ON key on the Artemis Main operating page. The driving speed icon (2) is also highlighted in yellow.
When the simulated speed has been reached, the prestart will stop automatically and the Main operating page will return to its normal mode.

5.1.3.3. Simulated speed

Simulated speed is intended for use in situations where the machine radar is damaged and can no longer provide speed data. Simulated speed bypasses the radar signal, thus allowing seeding to resume.

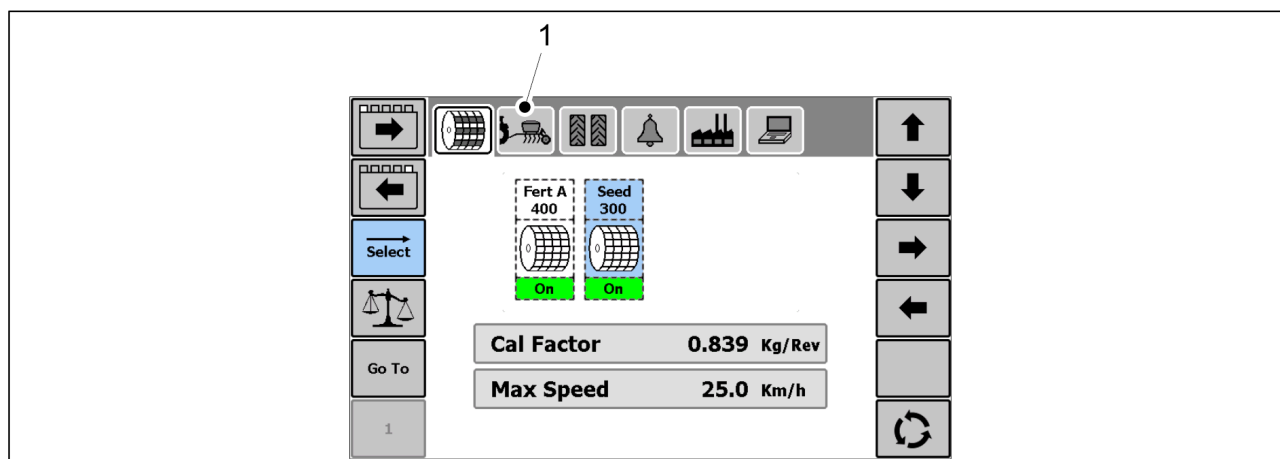


Figure. 5.1.3.3. - 35. Settings - Presets

1. Go to the Artemis Settings page and select PRESETS (1).

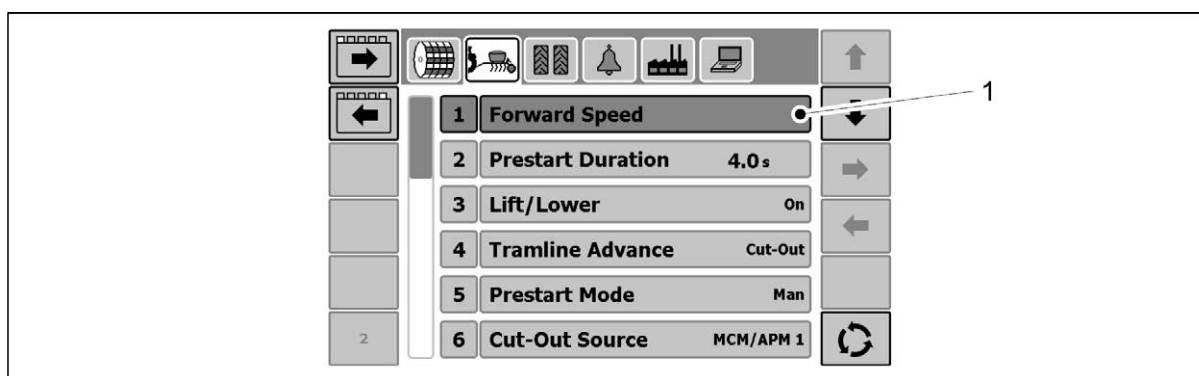


Figure. 5.1.3.3. - 36. Settings - Simulated speed

2. Press the Forward Speed line (1).

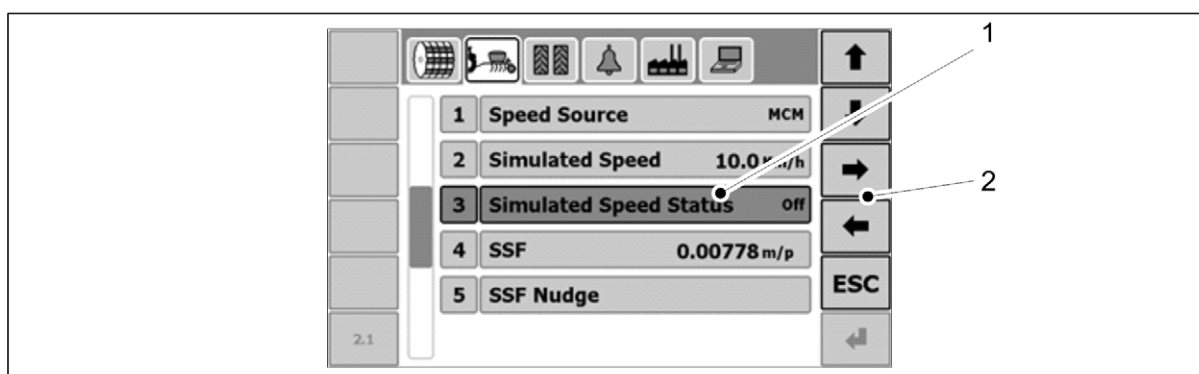


Figure. 5.1.3.3. - 37. Speed settings menu

3. Press the Simulated Speed Status line (1).
4. Change the desired simulated speed mode using the LEFT/RIGHT arrow keys (2).
 - When On is displayed at the right end of the line, simulated speed is on.
 - When Off is displayed at the right end of the line, simulated speed is off.

5.1.4. Artemis control system alarm settings

5.1.4.1. Fan rotation speed alarms

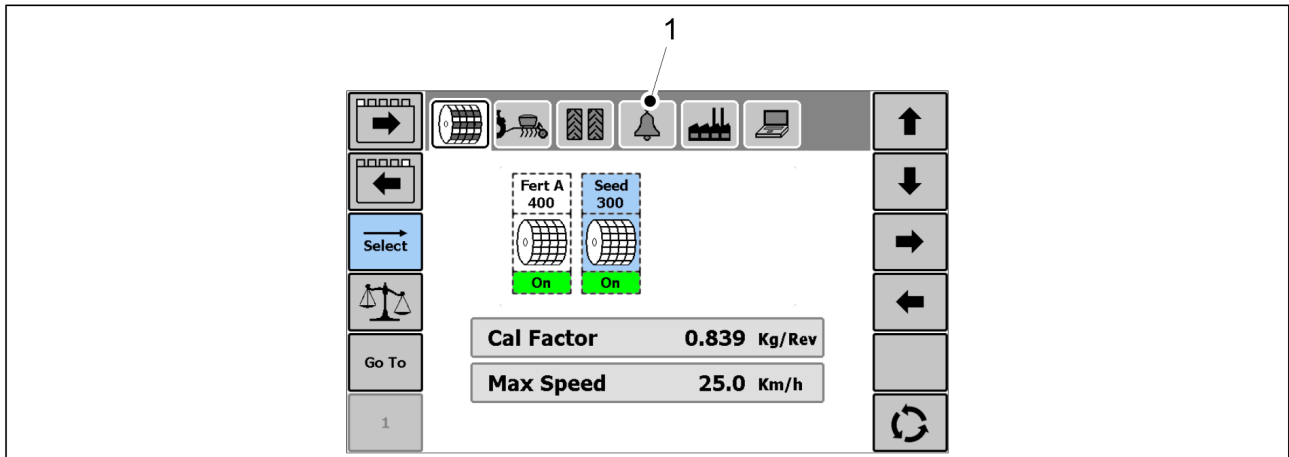


Figure. 5.1.4.1. - 38. Settings - Alarms

1. Go to the Artemis Settings page and select ALARMS (1).

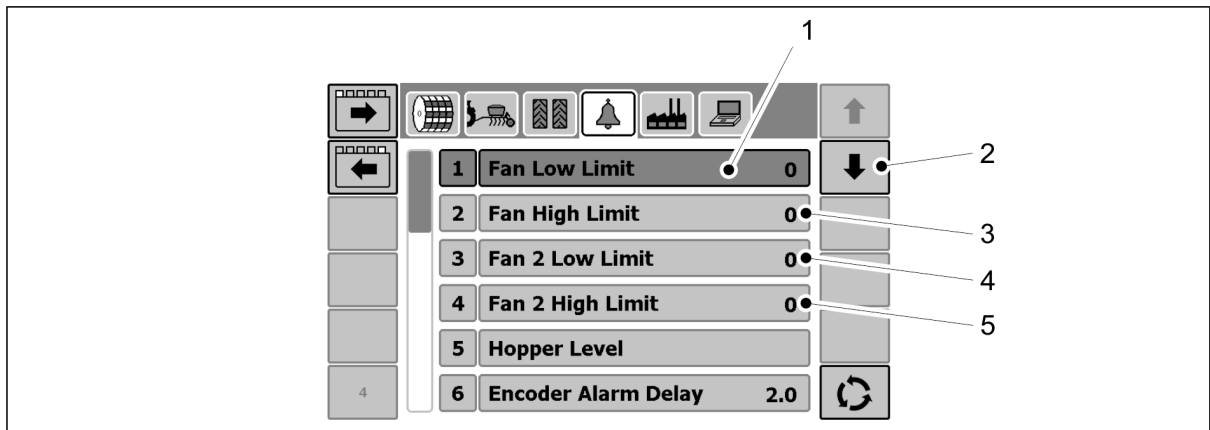


Figure. 5.1.4.1. - 39. Fan rotation speed alarms

- Activate the desired line using the UP/DOWN arrow keys (2).
When the line is activated, it will appear darkened.
2. Press the Fan Low Limit line (1).
 3. Enter the low rpm alarm limit for fan 1 and accept by pressing the OK key.
 - The rpm saved will appear at the right end of the line.
 4. Press the Fan High Limit line (3).
 5. Enter the high rpm alarm limit for fan 1 and accept by pressing the OK key.
 6. Press the Fan 2 Low Limit line (4).
 7. Enter the low rpm alarm limit for fan 2 and accept by pressing the OK key.
 8. Press the Fan 2 High Limit line (4).
 9. Enter the high rpm alarm limit for fan 2 and accept by pressing the OK key.

5.1.4.2. Activating the hopper level sensors

There is 1 hopper level sensor in the seed hopper and 1 in the fertiliser hopper. If the seed or fertiliser level in the hopper is too low, an alarm is triggered in the control system. This prevents seeding errors on long passes or unnecessary delays caused by the need to refill the hopper.

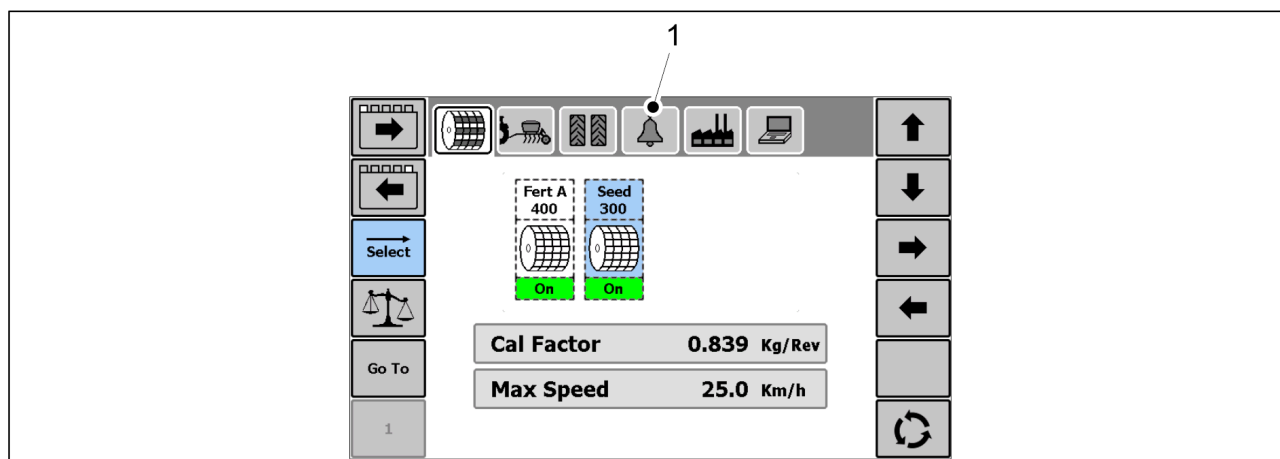


Figure. 5.1.4.2. - 40. Settings - Hopper level sensors

1. Go to the Artemis Settings page and select ALARMS (1).

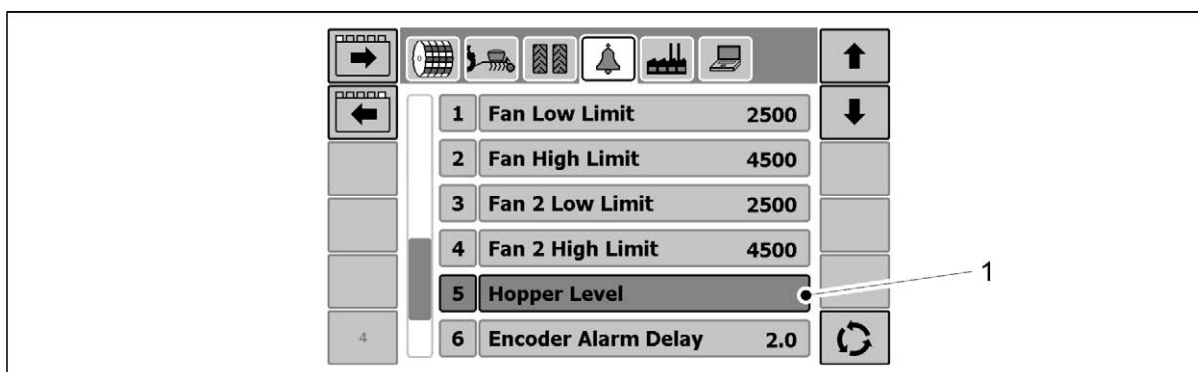


Figure. 5.1.4.2. - 41. Selecting hopper level sensors

2. Press the Hopper Level line (1).

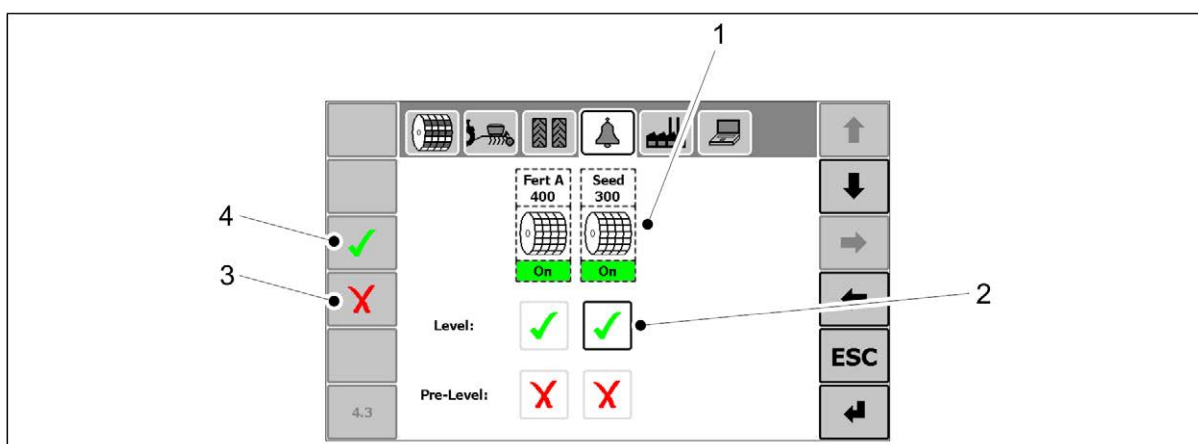


Figure. 5.1.4.2. - 42. Activating the hopper level sensors

3. Select the desired hopper level sensor (1) by pressing the Level box (2) below the channel.
 - Pre-Level (upper hopper level sensor) is disabled.
4. Activate the desired hopper level sensor by pressing key (4).
 - When there is a green checkmark in the box (2), the hopper level sensor is on.
5. Deactivate the desired hopper level sensor by pressing key (3).
 - When there is a red X in the box (2), the hopper level sensor is off.

5.2. Connecting to tractor



DANGER

Crushing hazard when connecting or disconnecting the seed drill. Minimum safe distance 10 m. Exercise extreme caution when someone else is near the seed drill and tractor giving instructions on connecting and disconnecting.

- Wear protective gloves when connecting the seed drill to the tractor.
1. Disconnect the drawbar of the seed drill from the tractor's hitch.
 2. Adjust the boom length in accordance with section 5.2.1. Adjusting the length of the boom.
 3. Raise the ground support to the top position according to the instructions given in section 5.2.2. Using the ground support.
 4. Connect the hydraulic hoses of the seed drill to the tractor.



DANGER

Ensure that the tractor is turned off and the key is removed from the ignition.



DANGER

Hydraulic hoses must be depressurised when connecting them.



CAUTION

Ensure that the fan lines (tank line and leakage line) are properly connected . A connector that comes loose during operation can damage the fan seals.

- Connect hydraulic hoses in pairs so that the directions of flow are correct. The hydraulic hoses are marked with colour-coded collars.
Valtra T Series hydraulic connections serve as the connection model shown in the figure. Check the tractor manual to ensure the hydraulic connections are suitable.

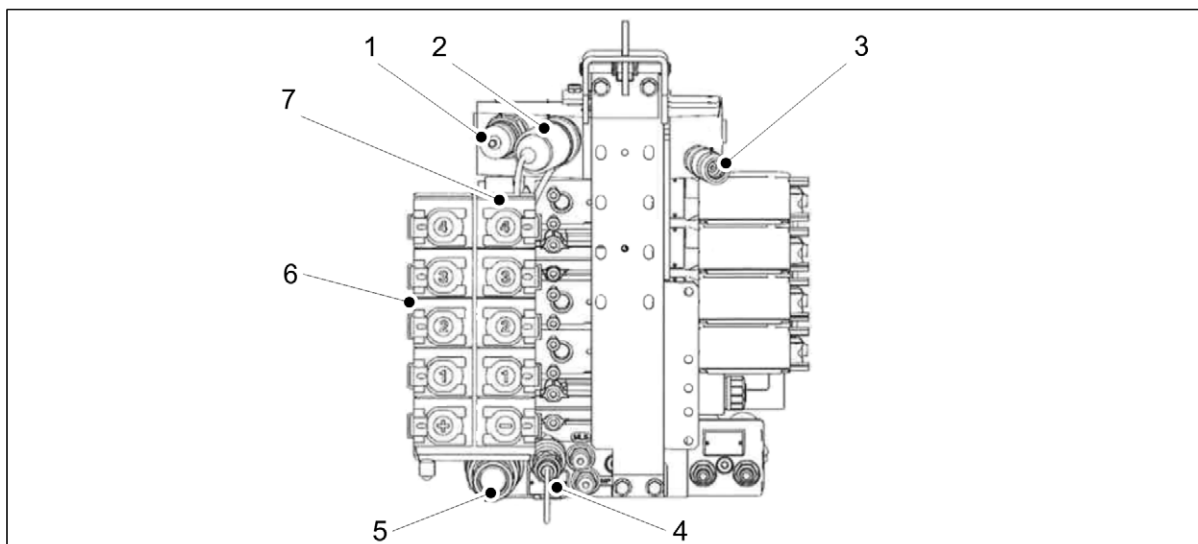
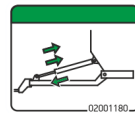
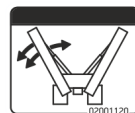
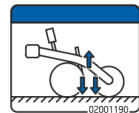



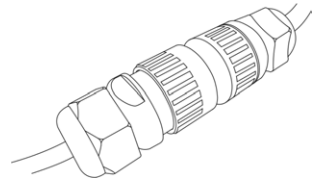
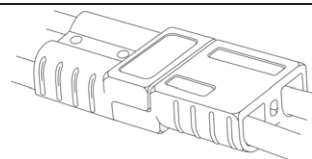
Figure. 5.2. - 43. Valtra T Series Hydraulic Integrated Circuit (HIC)

1.	Power Beyond return (back pressure 8 bar)
2.	Power Beyond pressure
3.	LS control
4.	Overflow connection (do not connect a return line)
5.	Free return connection
6.	Double-acting connections 1- 4. + function connections
7.	Double-acting connections 1- 4. - function connections

Number	Hydraulic hose	Colour code and symbol
1.	<p>Drawbar adjustment connection</p> <ul style="list-style-type: none"> 1 pc 1/2" male connection, machine front up. To be connected to the + side of the tractor valve. 1 pc 1/2" male connection, machine front down. To be connected to the negative side of the tractor valve. 	 <p>02001180</p>
2.	<p>Hydraulic connection of the wing sections</p> <ul style="list-style-type: none"> 1 pc 1/2" male connection, wing sections up. To be connected to the 2+ side of the tractor valve. 1 pc 1/2" male connection, wing sections down. To be connected to the 2- side of the tractor valve. 	 <p>02001120</p>

3.	<p>Coulter hydraulic connection</p> <ul style="list-style-type: none"> 1 pc 1/2" male connection, coulters up and increase coulters pressure. To be connected to the 3+ side of the tractor valve. 1 pc 1/2" male connection, coulters down and decrease coulters pressure. To be connected to the 3- side of the tractor valve. 	
4.	<p>Hydraulic connection of the fan</p> <ul style="list-style-type: none"> Pressure line 1/2" male connection, to be connected to the 1+ side of the tractor. The fan rotation speed is adjusted by decreasing or increasing the flow from the tractor. Requires flow adjustability. Tank line/return line 1" female connection, to be connected to the tractor's free return connection Leakage line 1/2" female connection, to be connected to the tractor's overflow connection without counterpressure. 	

5. Connect the seed drill electrical connections.

Number	Electrical connector	
1.	Artemis system bus cable	
2.	Seed drill power cable	

- If necessary, straighten the machine according to the instructions in section [5.2.3. Adjusting the longitudinal level of the machine.](#)
- Ensure the steerability of the tractor in accordance with the instructions in section [5.2.4. Ensuring the steerability of the tractor.](#)
- When driving on a field for the first time, set the middle markers according to the instructions given in section [5.2.5. Adjusting the middle markers.](#)

5.2.1. Adjusting the length of the boom

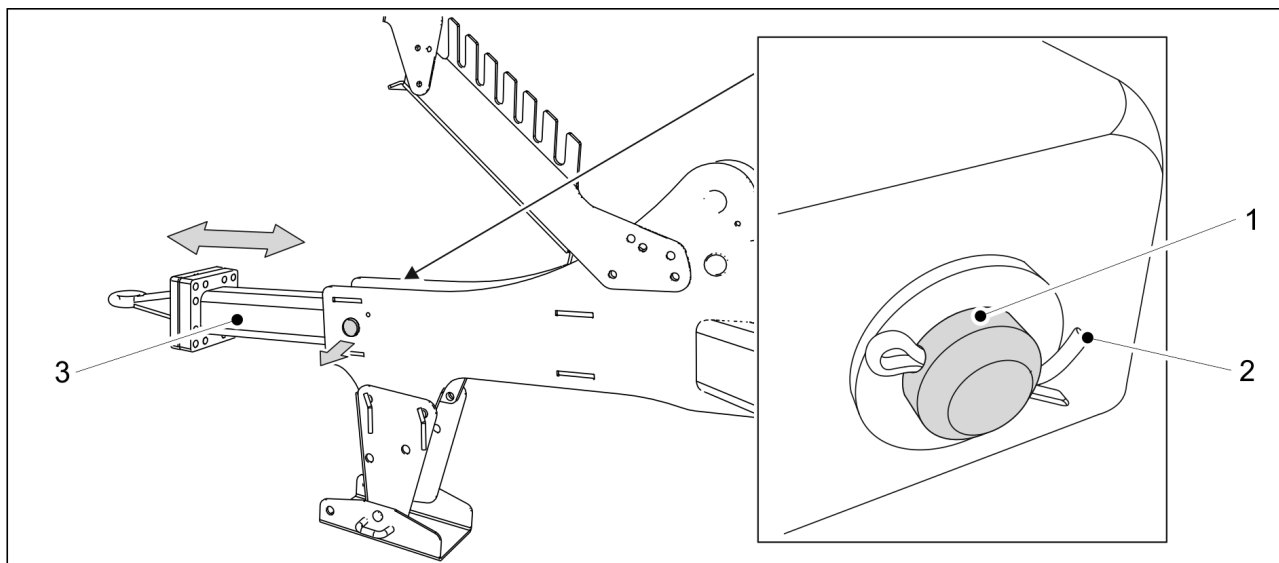


Figure. 5.2.1. - 44. Adjusting the length of the boom

1. Remove the boom mounting pin (1) cotter (2).
2. Remove the mounting pin.
3. Adjust the length of the boom (3) so that it is appropriate for the tractor.
 - The boom has three adjustment position at 200 mm intervals. The maximum length adjustment is 400 mm.
4. Attach the mounting pin to the boom.
5. Lock the mounting pin in place with a cotter.

5.2.2. Using the ground support

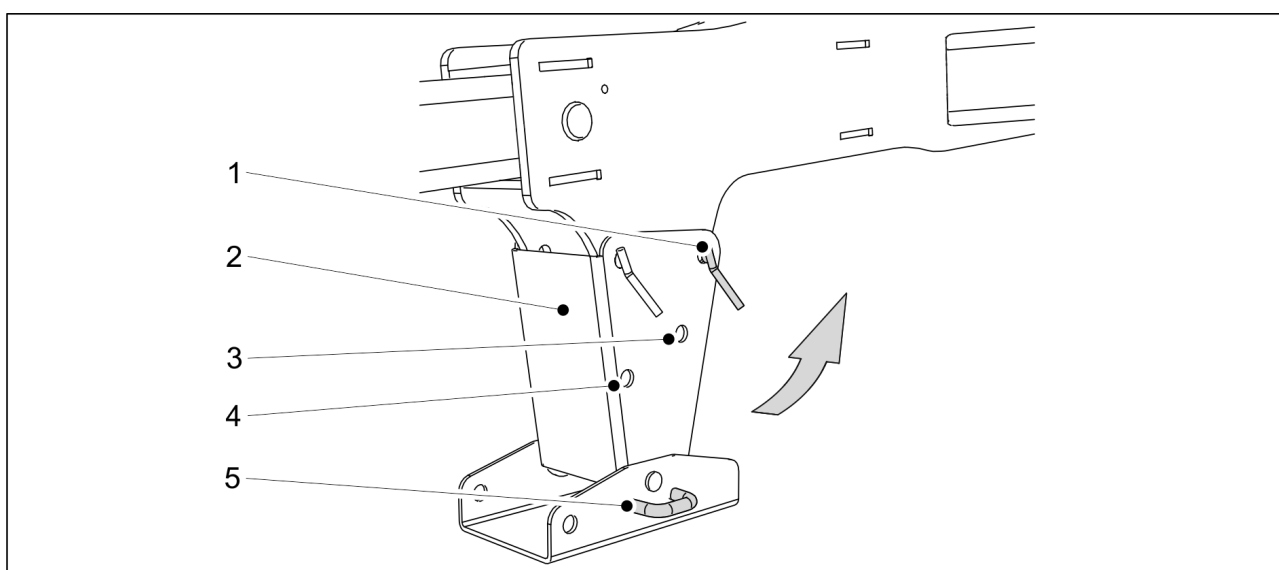


Figure. 5.2.2. - 45. Ground support

1. Remove the linchpin from the rearmost ground support (2) mounting pin (1).

2. Pull the mounting pin out of the ground support.
3. Tilt the ground support toward the seed drill using the handle (5).
4. Lock the ground support into place with the mounting holes (3, 4).
 - The upper mounting hole (3) locks the ground support at a 45° angle and the lower mounting hole (4) locks it as a 90° angle.

5.2.3. Adjusting the longitudinal level of the machine

- Connect the seed drill to the tractor before adjusting the longitudinal level in accordance with section 5.2. Connecting to tractor .
The tractor should be on during the adjustment.
Make the adjustment when the machine is on a level surface.

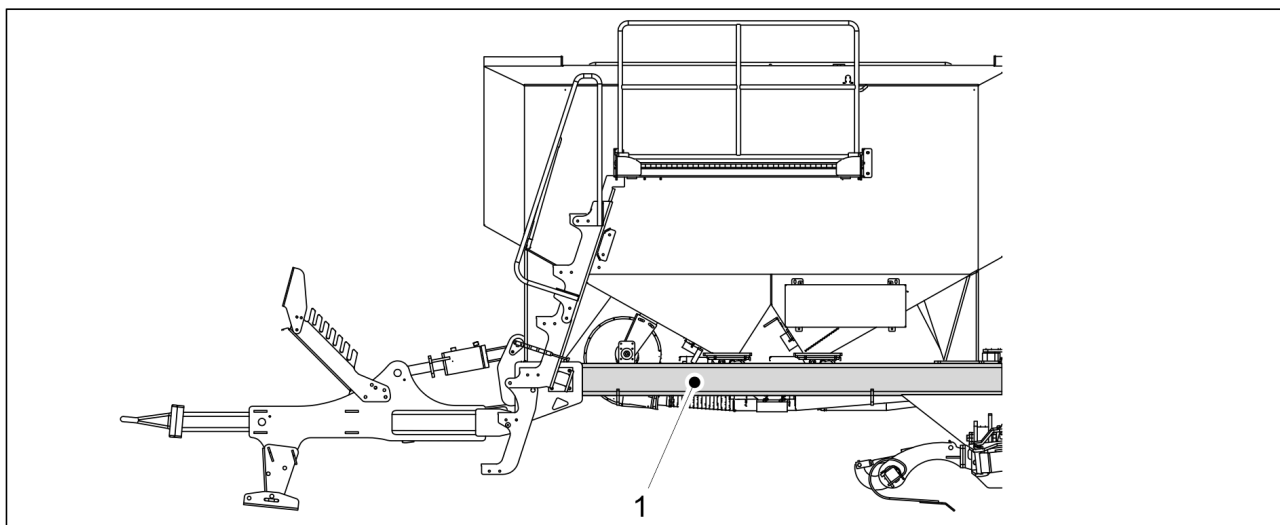


Figure. 5.2.3. - 46. Longitudinal level

- The seed drill is longitudinally level when its frame beam (1) is horizontal. The longitudinal level of the machine is affected by the height of the tractor hitch and type of drawbar eye.

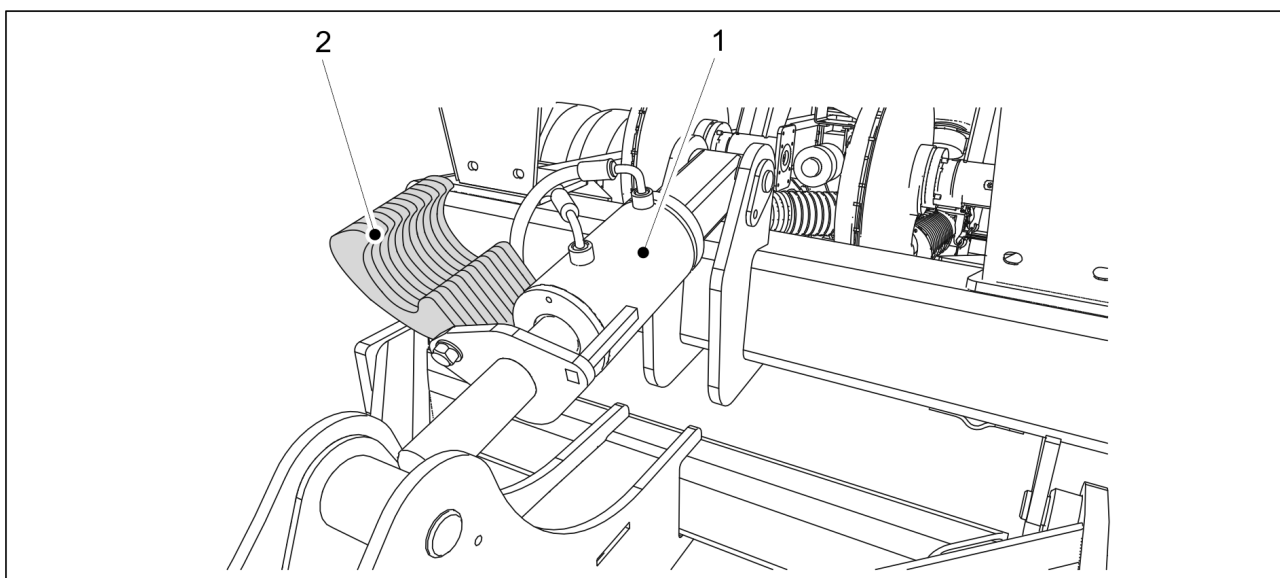


Figure. 5.2.3. - 47. Cylinder adjustment slats

1. Turn the required number of slats (2) over the cylinder (1) axle.
2. Run the cylinder against the slats and check the level of the seed drill.
 - If needed, extend the cylinder and add or remove slats, if needed, until the machine is level.

5.2.4. Ensuring the steerability of the tractor

The calculation of the stability of the tractor - seed drill combination is provided in the attachment *Calculating the stability of the tractor - seed drill combination*. The steering response of a small tractor may be compromised when it pulls the seed drill, because some of the weight of the seed drill rests on the tractor's rear axle. If steering response is weak, we recommend the use of front weights on the tractor. The tractor's weight transfer system should also be switched off, since when using the weight control system, the height of the lifting device may change based on the load and impact the seeding depth.

5.2.5. Adjusting the middle markers

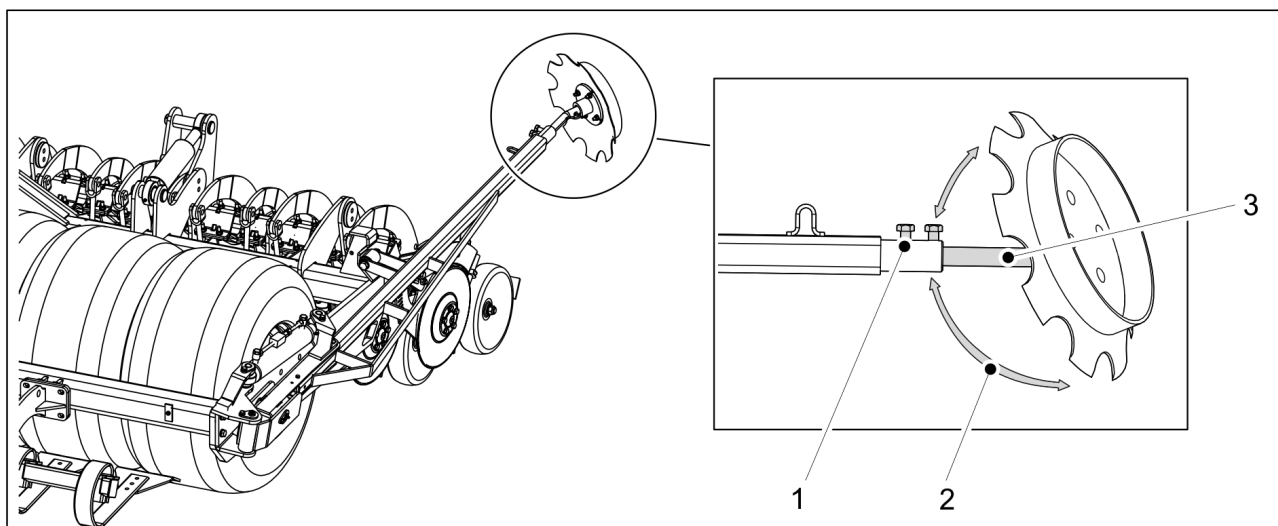


Figure. 5.2.5. - 48. Adjusting the middle markers

1. Loosen the two screws (1).
2. Adjust the width of the marker axle (3).
3. Adjust the marker toe-in (2) by turning the axle (3) of the marker disc.
 - The middle marker should plough a furrow deep enough to be visible in the ground.
The distance between the centreline of the seed drill and the furrow made by the markers should be 6 metres. However, the adjustment is indicative. Check the adjustment in the field to avoid seeding overlaps and stripes in accordance with section 6.12. Securing the position of the middle markers. Seeding overlaps and stripes may occur if the operator sits at an angle in the tractor, for example.
4. Tighten the two screws (1).

6. Machine adjustment and use

6.1. Rendering the machine to the transport position

1. Raise the coulters with the tractor hydraulics.
2. Raise the wing sections with the tractor hydraulics.
 - The wing sections will lock automatically.

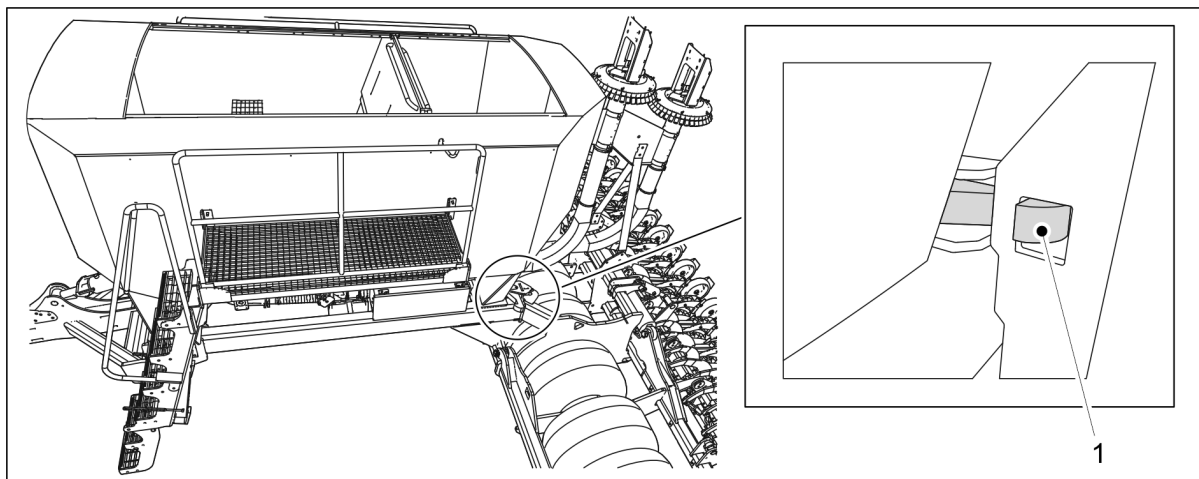


Figure. 6.1. - 49. Wing sections locked

3. Ensure that the wing sections are locked in place.
 - The latch (1) of the lock must be fully seated in the notch of the wing section.

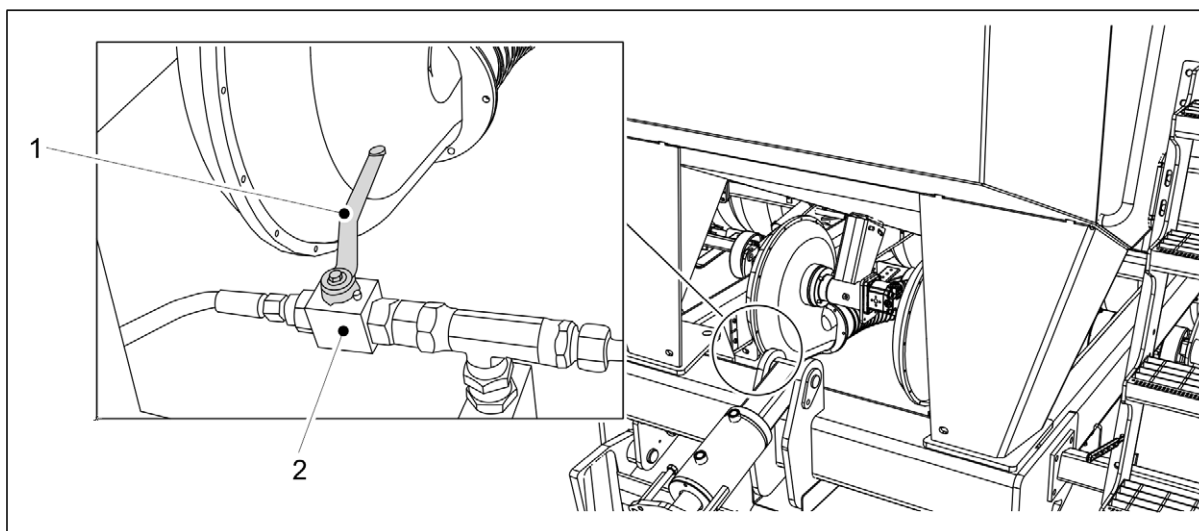


Figure. 6.1. - 50. Closing the ball valve

4. Close the wing section ball valve (2) by turning the handle (1) perpendicular to the hydraulic connector.

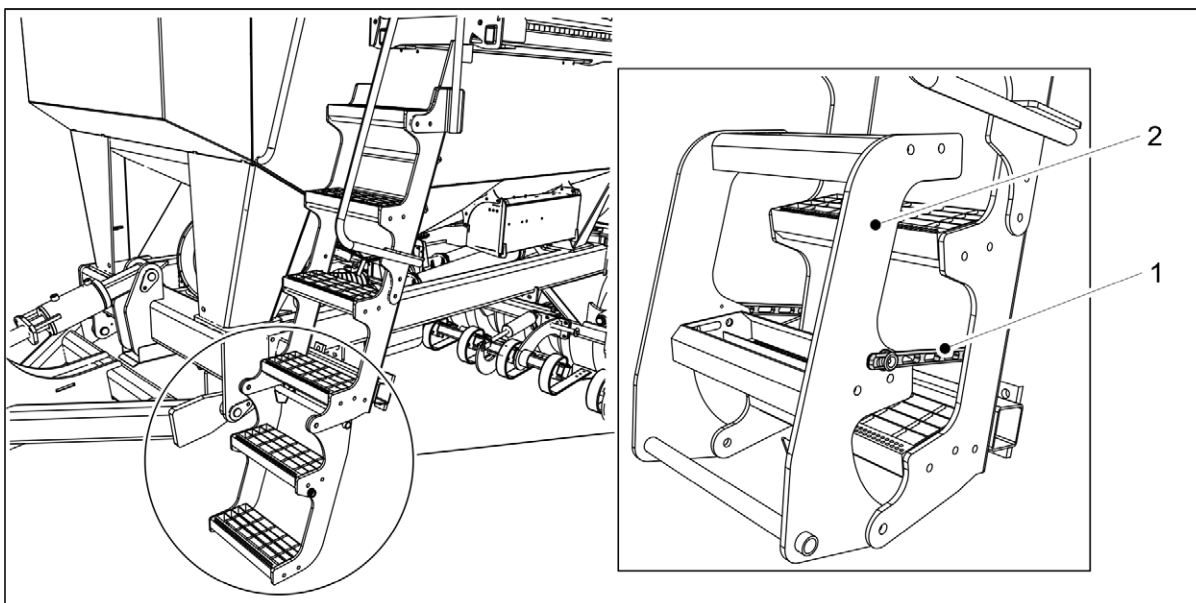


Figure. 6.1. - 51. Working platform stairs

5. Fold up the lowest working platform steps (2).
6. Lock the steps up with two rubber straps (1).
7. Check the tyre pressure in accordance with section [7.1.3. Checking tyre pressure](#).
8. Ensure that the machine is clean.
 - If needed, clean the hopper in accordance with section [7.3. Cleaning](#).
9. Ensure that the bolts have been tightened in accordance with section [7.1.2.1. Checking bolt tightness - Towing eye](#).
 - Tighten the bolts, if needed.

6.2. Rendering the machine to the working position

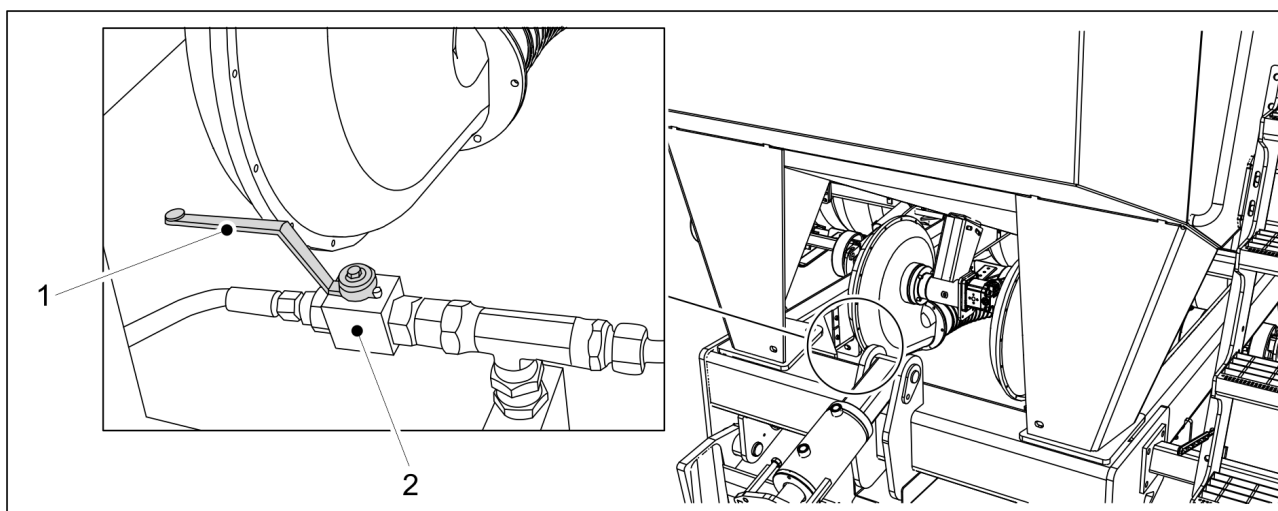


Figure. 6.2. - 52. Opening the ball valve

1. Open the wing section ball valve (2) by turning the handle (1) parallel to the hydraulic connector.
2. Raise the wing sections slightly using the tractor hydraulics.

3. Lower the wing sections using the tractor hydraulics until the wing section pressure is 30-50 bar.

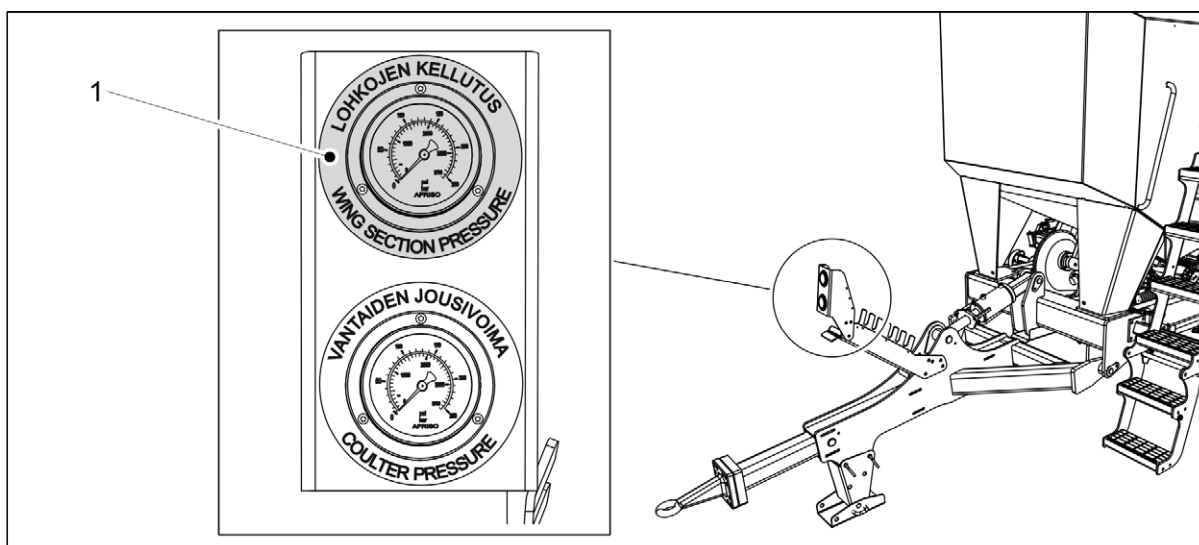


Figure. 6.2. - 53. Wing section pressure gauge

- The wing section pressure gauge (1) is located on a rack mounted on the drawbar boom.

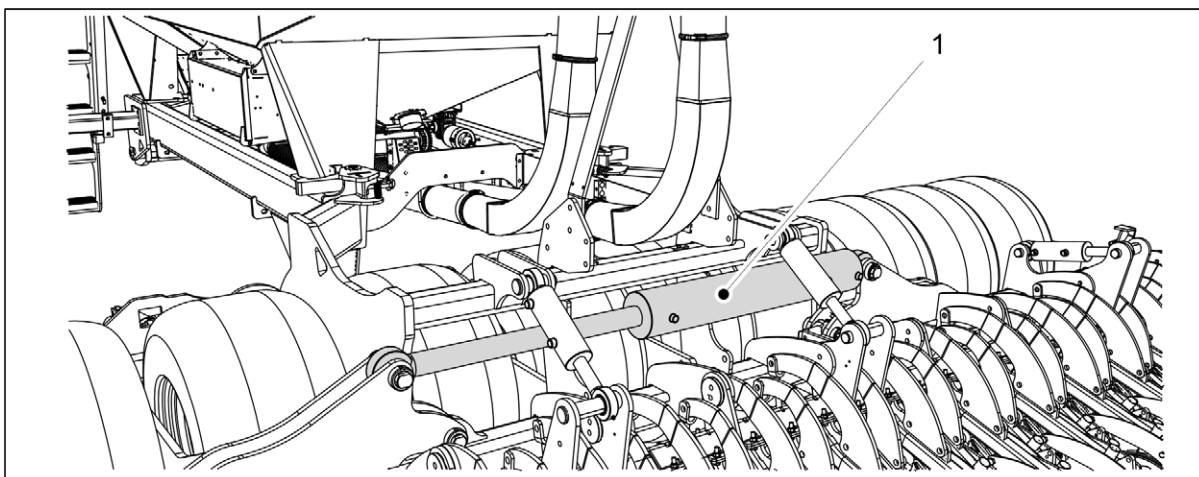


Figure. 6.2. - 54. Wing section cylinder



DANGER

Before starting the seeding, ensure that both wing sections are completely lowered so that the cylinder (1) is fully extended.

4. When the wing sections are lowered, adjust the coulter seeding depth in accordance with section [6.9. Adjusting the seeding depth of the coulter](#).
5. Select the suitable middle marker function in accordance with section [6.3.4. Middle marker settings and manual operation](#).

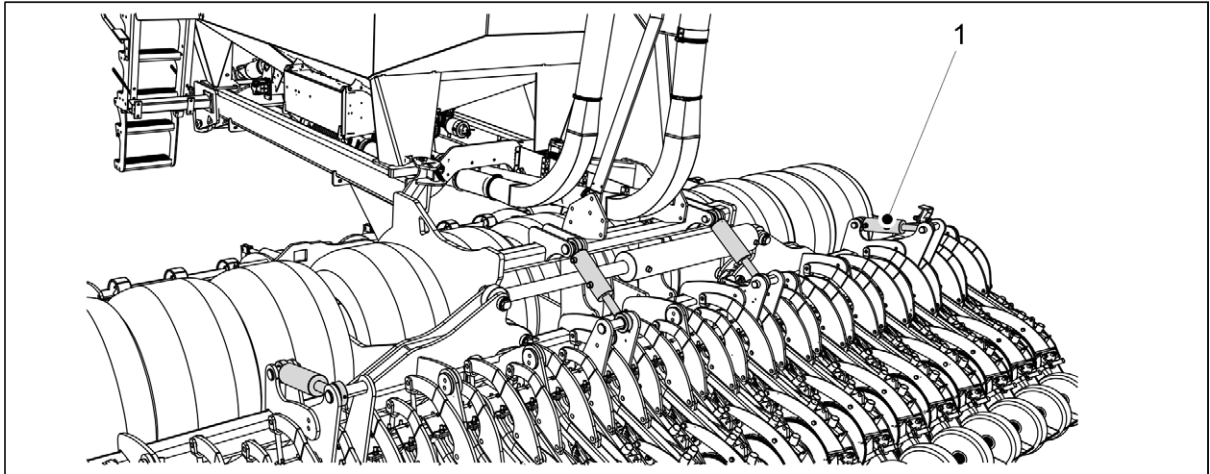


Figure. 6.2. - 55. Coulters cylinders

6. Lower the coulters using the tractor hydraulics until all four cylinders (1) are fully extended.
7. Before seeding, make sure that the machine is in working order.



DANGER

Make sure that the hoses are intact and have no leaks.



DANGER

Ensure that the coulters are intact.




DANGER

Ensure that the mechanisms are intact.



DANGER

Specifically ensure that all the pins are in place.

	<ul style="list-style-type: none"> Machine is seeding. Normal feed in use (unless it is overrun, see section 6.3.5. Half width). Area totals are accumulated on the counters. Displays the location of tramlines.
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6.3.1.1. Tramline advance

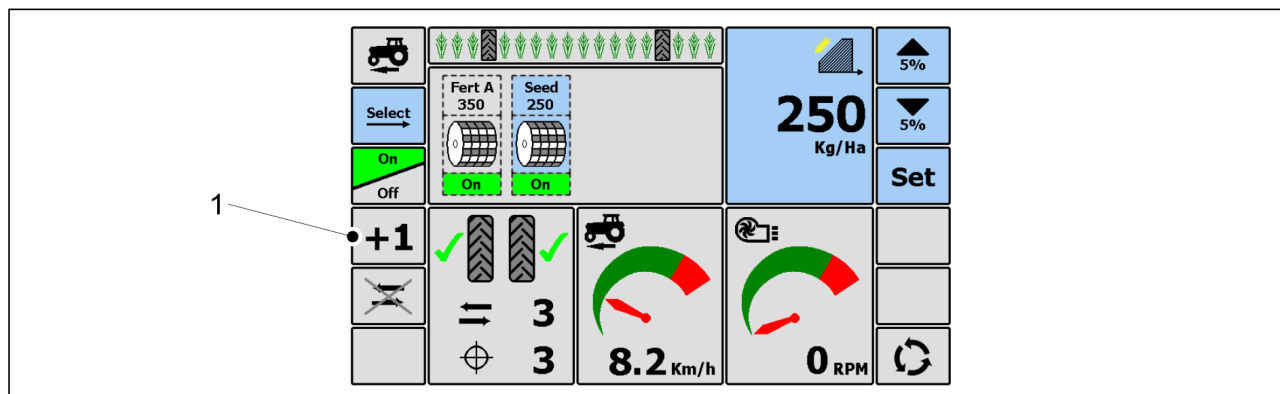


Figure. 6.3.1.1. - 57. Tramline advance

1. Add a tramline on the Artemis Main operating page by pressing the ADD A TRAMLINE key (1).

6.3.1.2. Tramline counter hold

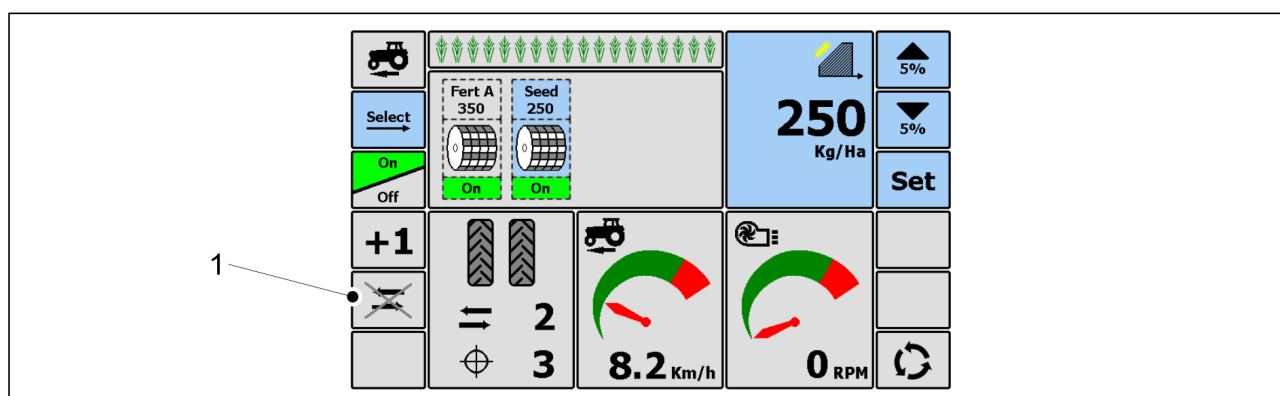


Figure. 6.3.1.2. - 58. Tramline counter hold

1. Stop the tramline counters on the Artemis Main operating page by pressing the COUNTER STATUS key (1) twice quickly.

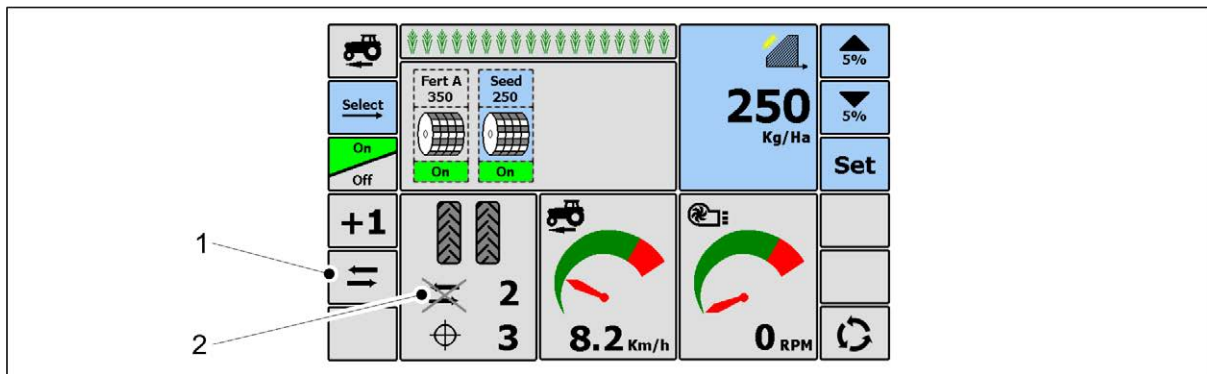


Figure. 6.3.1.2. - 59. Turn off tramline counters

- When the tramline counters are off, an X (2) will appear over the tramline arrows. In this mode, the middle marker side will not switch.
2. Turn the tramline counters back on by pressing the COUNTER STATUS key (1).

6.3.2. Use of the lift inhibit function

- When the lift inhibit function is on, the coulters will not be lifted even though the middle markers are raised.

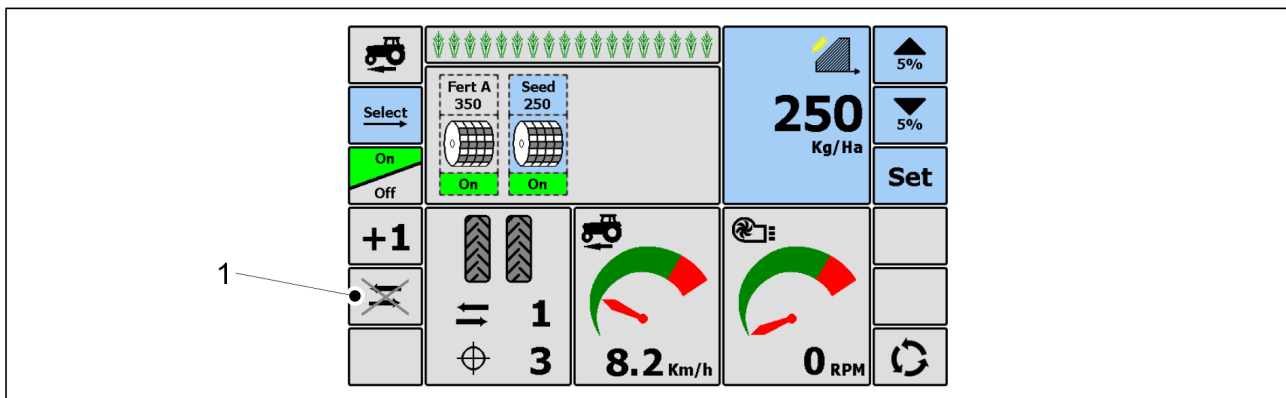


Figure. 6.3.2. - 60. Starting the lift inhibit function

1. Start the lift inhibit function by pressing the COUNTER STATUS key (1) on the Main operating page of Artemis.

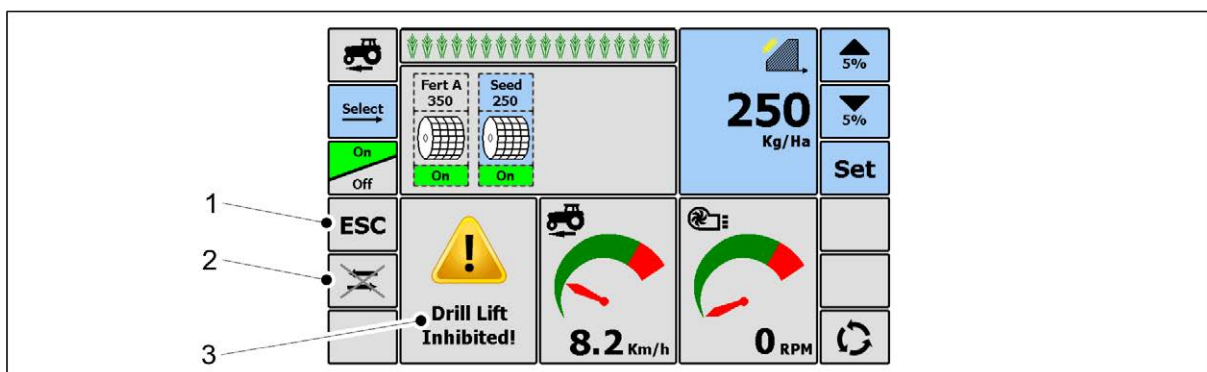


Figure. 6.3.2. - 61. Turning off the lift inhibit function

- When the lift inhibit function is on, the key (1) text will change from +1 to ESC and the icon (3) will blink on the screen.

2. Turn off the lift inhibit function by pressing the ESC key (1) or COUNTER STATUS key (2).
 - When returning to normal mode, the key (1) text will change from ESC back to +1.

6.3.3. Feed rate setting

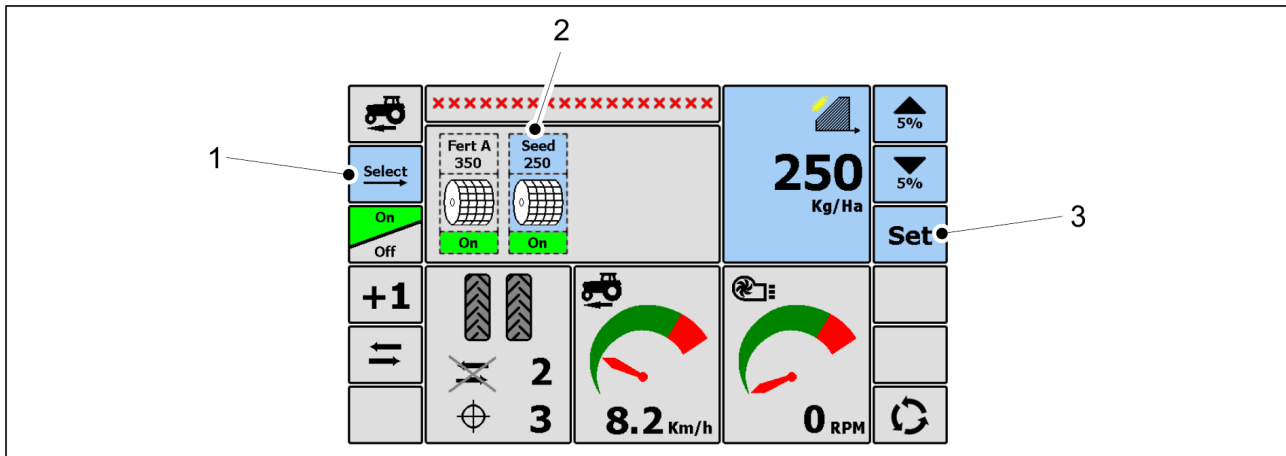


Figure. 6.3.3. - 62. Channel selection

1. Select the desired channel on the Main operating page of Artemis either by directly pressing the channel icon (2) or repeatedly pressing the SELECT key (1) until the desired channel appears as selected.
 - The selected channel is shown in blue.
2. Press the SET key (3).
3. Using the number keys, enter the new target rate and accept by pressing the OK key.

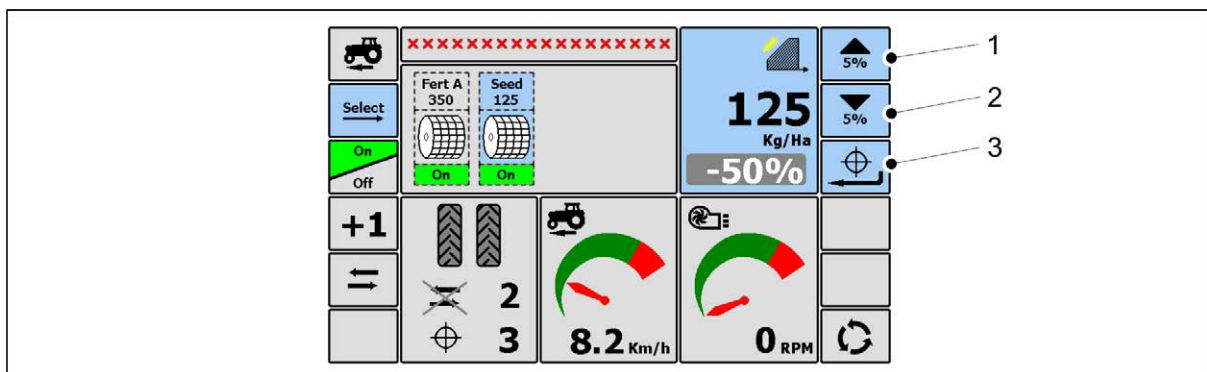


Figure. 6.3.3. - 63. Manually setting the target rate

- The selected channel target rate can be set manually in 5% increments. Press key (1) to increase the target rate by 5% and press key (2) to decrease the target rate by 5%. Maximum settings are +50%/-50%.
4. End manual setting by pressing key (3).

6.3.4. Middle marker settings and manual operation

- In automatic mode, the middle marker automatically switches the side when reaching the headland.
In manual mode, the middle marker is turned on and off manually.

1. Go to the Artemis Middle markers and hydraulics page

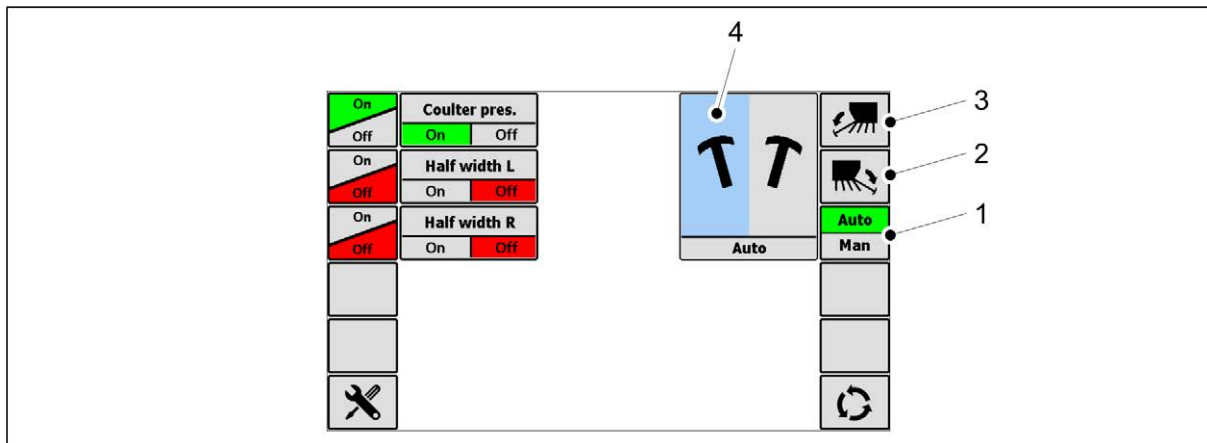


Figure. 6.3.4. - 64. Middle marker settings and manual operation

2. Change the middle marker function by pressing the AUTO-MAN key (1).
 - Automatic mode (Auto) is highlighted in green.
 - Manual mode (Man) is highlighted in red.
3. Press key (2) when you want to activate the right middle marker or press key (3) when you want to activate the left middle marker.
 - The selected middle marker side (4) is highlighted in blue.

6.3.5. Half width

- If you want to seed with only one half of the machine, the other half can be turned off.

1. Go to the Artemis Middle markers and hydraulics page.

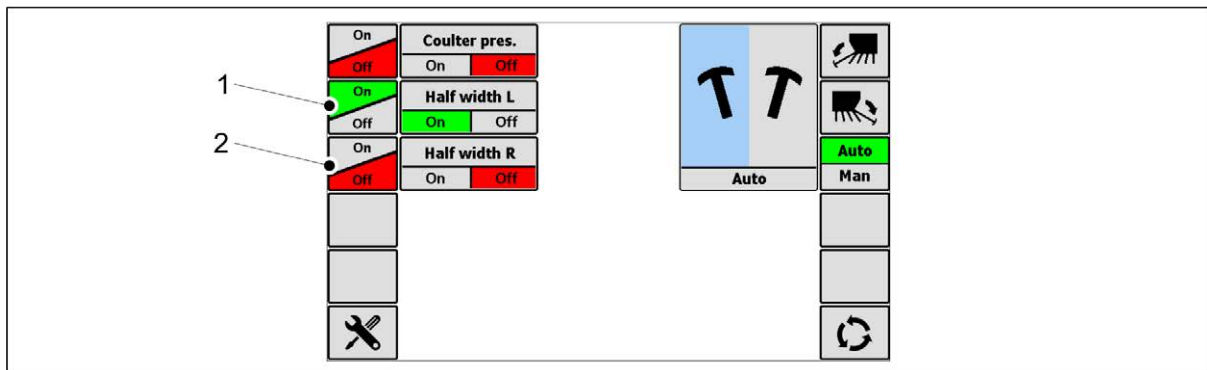


Figure. 6.3.5. - 65. Selecting the disabled and seeding half

2. Press ON-OFF key (1) to select the left side function and ON-OFF key (2) to select the right side.
 - Disabled half = Off appears highlighted in red in the key
 - Seeding half = On appears highlighted in green in the key
 - The left and right half must not be disabled at the same time, because this would cause a blockage in the feed lines.

6.3.6. Using the area counters

6.3.6.1. Area counter data

1. Go to the Artemis Seeding summary page.

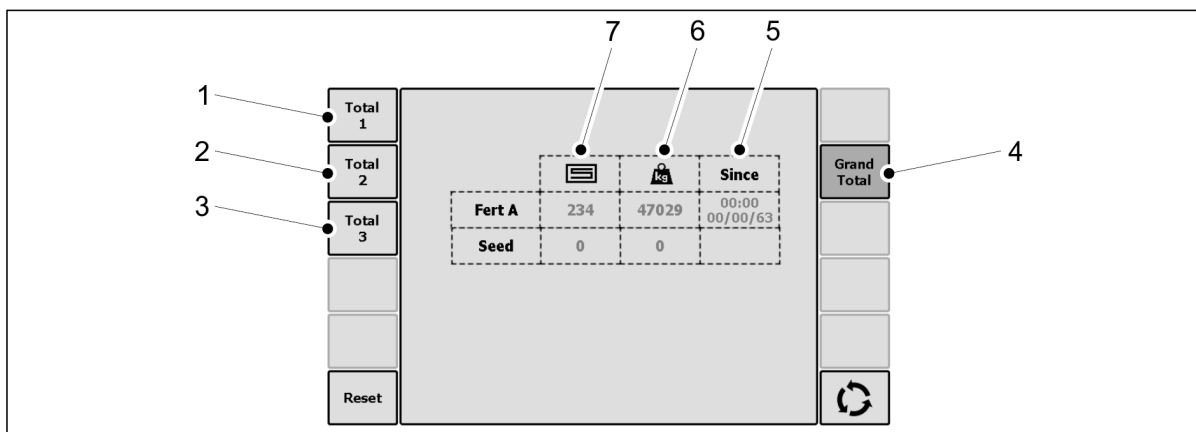


Figure. 6.3.6.1. - 66. Area counter data

2. Select the desired memory register by pressing the memory register key (1), (2) or (3).
 - The data saved in the memory register will appear on the screen: time of last reset (5), quantity seeded (kg) (6) and area seeded (7) since the last reset. The fertiliser data is displayed on line Fert A and seed data on line Seed.
3. Press the GRAND TOTAL key (4) if you want to check the quantity and area seeded by the machine as a sum total.

6.3.6.2. Resetting area counters

When the machine is seeding, the area increases on all counters. In order to obtain data for one field, one counter must be reset before starting to seed the field in question.

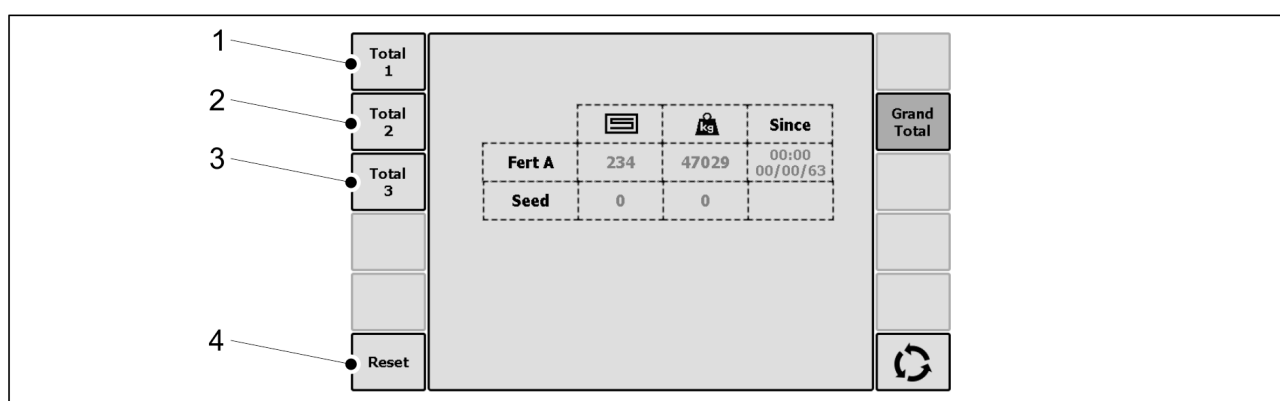


Figure. 6.3.6.2. - 67. Resetting area counters

1. On the Artemis Seeding summary page, press the key (1), (2) or (3) of the desired memory register.
2. Press the Reset key (4).
3. Press the Reset key (4) again to reset the data in the selected memory register.
 - Data on the total quantity seeded (Grand Total) cannot be reset.

6.3.7. Radar calibration

If the speed of the seed drill differs from the speed of the tractor or there are errors in the areas, the radar working as a speed sensor can be calibrated, if necessary.

- The radar is calibrated during seeding when running with normal settings.

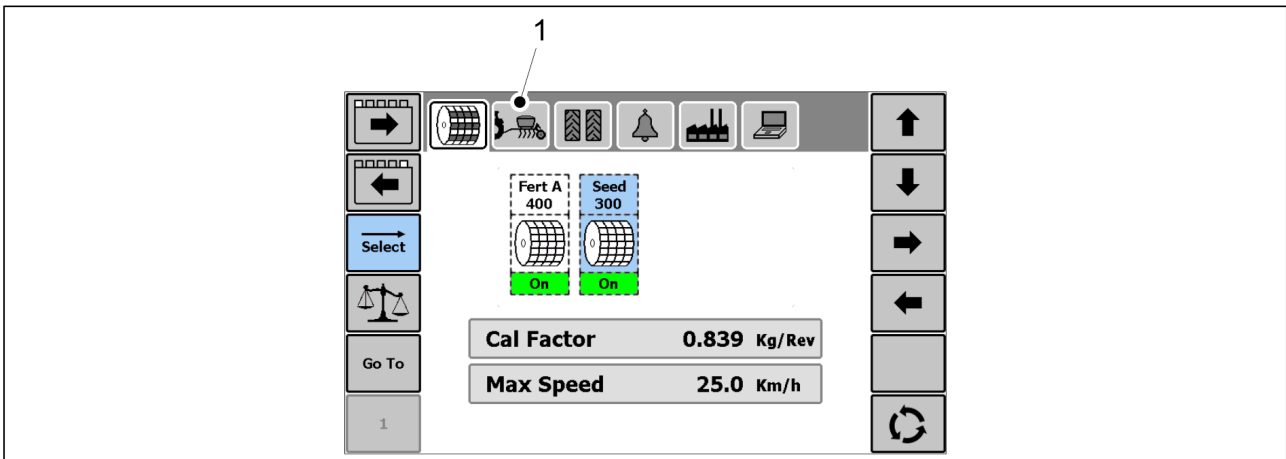


Figure. 6.3.7. - 68. Settings - Presets

1. Go to the Artemis Settings page and select PRESETS (1).

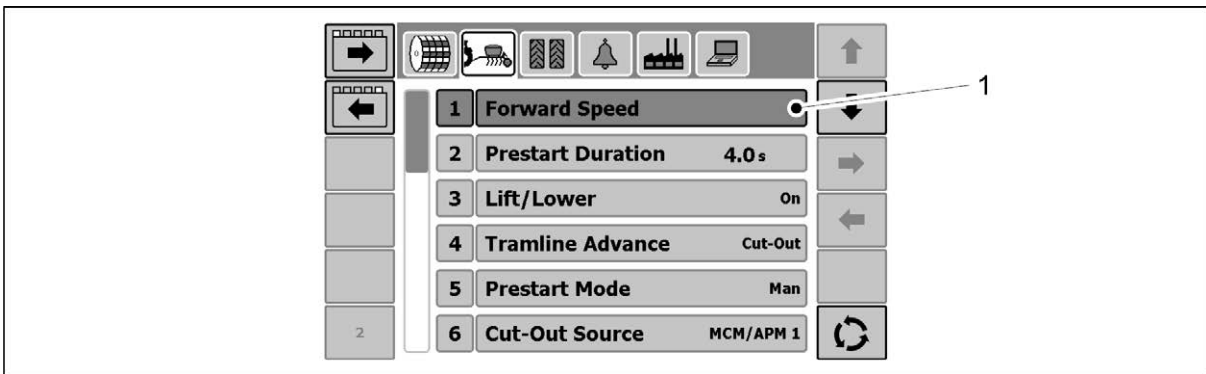


Figure. 6.3.7. - 69. Settings - Forward Speed

2. Press the Forward Speed line (1).

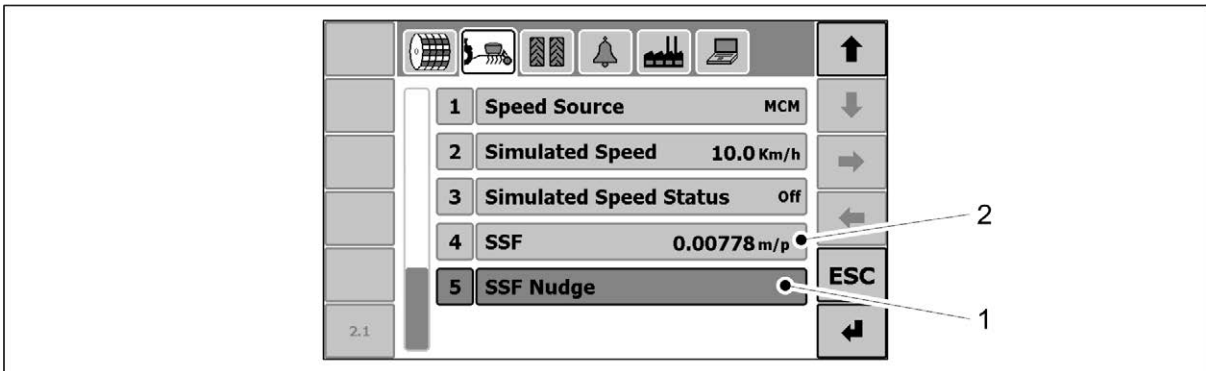


Figure. 6.3.7. - 70. Settings - SSF Nudge

- The current speed calibration value (the speed value given by the radar) is displayed on the SSF line (2).

3. Press the SSF Nudge line (3).

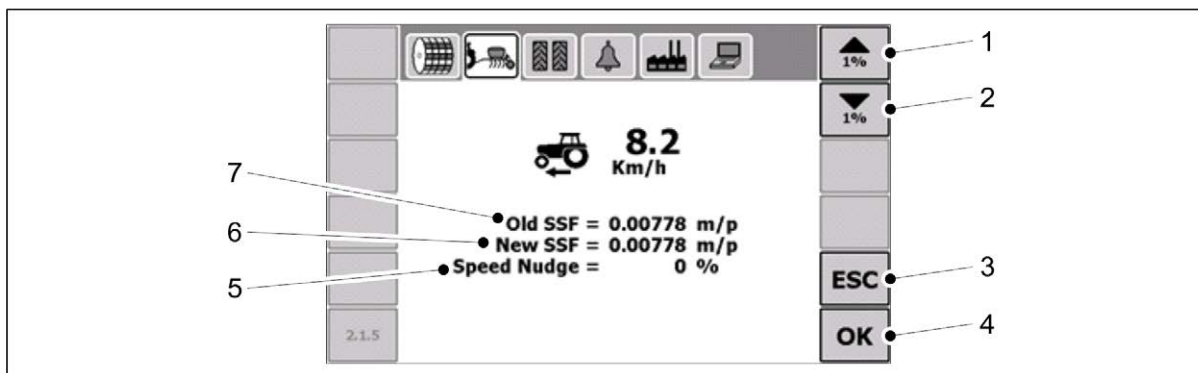


Figure. 6.3.7. - 71. Radar calibration data

4. Increase speed by pressing key (1) or reduce speed by pressing key (2).
 - The speed adjustment is made in 1% increments.
The previous speed (7), new speed (6) and change in speed (%) (5) are displayed on the screen.
5. Accept the new speed by pressing the OK key (4).
 - Pressing the ESC key (3) exits the screen and changes are not saved.

6.3.8. Using the blockage monitoring system

The blockage monitoring system sensors monitor the channels in the machine. The occurrence and location of blockages is displayed on the Artemis Blockage monitoring system page.

6.3.8.1. Blockage monitoring system sensor status

1. Go to the Artemis Blockage monitoring system page.

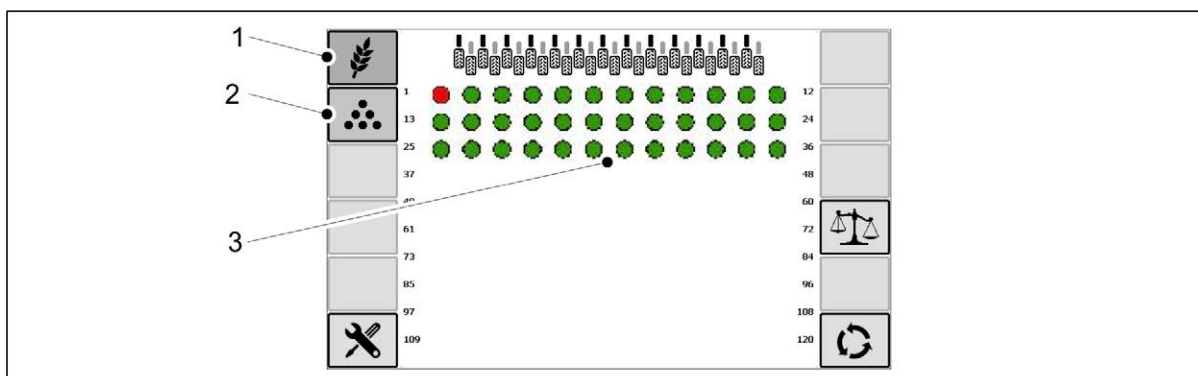



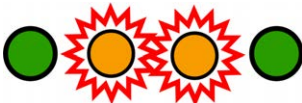
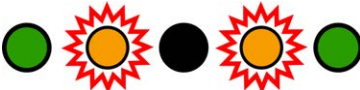


Figure. 6.3.8.1. - 72. Blockage monitoring system sensor status

2. Press the SEED key (1) when you want to check the status of the seed transfer hoses.
3. Press the FERTILISER key (2) when you want to check the status of the fertiliser transfer hoses.

The status of sensors and their location on the seeding line are displayed in the middle of the screen (3). The various options for sensor status are presented in the following table.

Table. 6.3.8.1. - 8. Sensor status

Status display	Status	Measures
	Sensor functioning normally	-
	The sensor is blocked. In cases involving a seed sensor, the error message "Seed Sensor [xx] Row [xx] Blocked" will be displayed on the screen. In cases involving a fertiliser sensor, the error message "Fert Sensor [xx] Row [xx] Blocked" will be displayed on the screen.	Remove the blockage.
	The channel is blocked and the sensor alarm has been bypassed.	Remove the blockage.
	See instruction 8.2. Blockage monitoring system troubleshooting	
	See instruction 8.2. Blockage monitoring system troubleshooting	

6.3.8.2. Calibrating the blockage monitoring system sensors

The sensors are calibrated during seeding when running with normal settings. Calibration should be done, for example, each morning when starting work.

- Before beginning calibration, ensure that all sensors are operating normally (normal status indicated by a green circle)

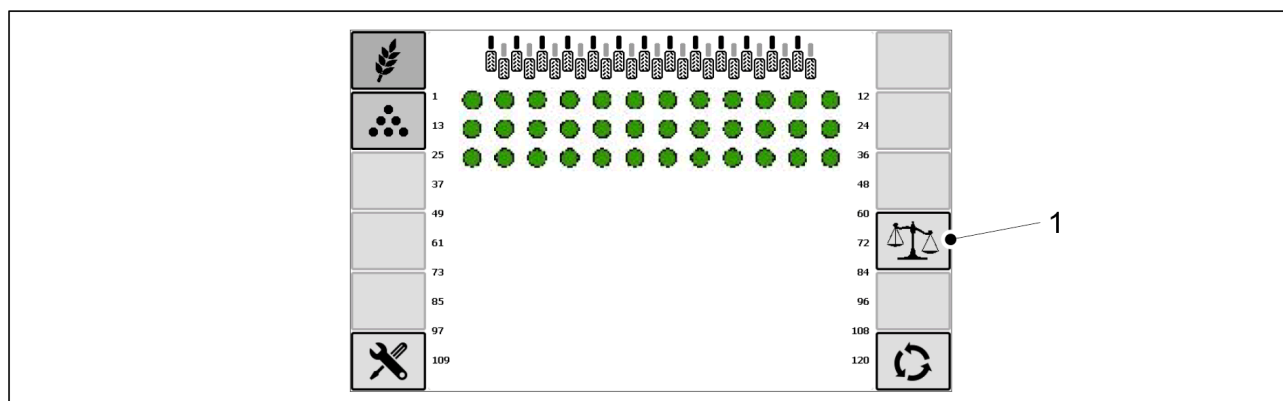


Figure. 6.3.8.2. - 73. Calibrating the blockage monitoring system sensors

- On the Artemis Blockage monitoring system page, press the CALIBRATION key (1).
 - All sensors are automatically calibrated at the same time.

6.3.8.3. Sensor alarm bypass

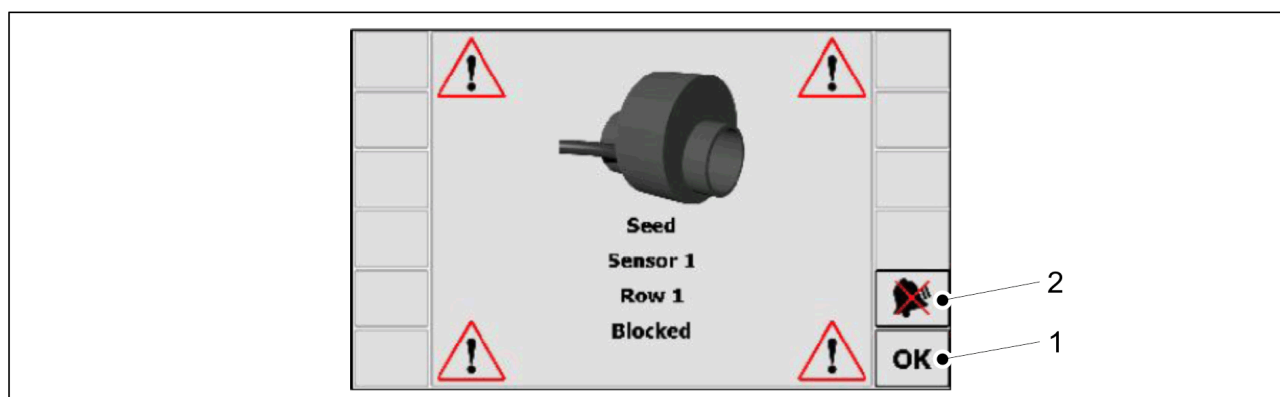


Figure. 6.3.8.3. - 74. Sensor alarm bypass

1. Press the OK key (1) if you want to temporarily delete an alarm from the screen.
 - The alarm will reappear every 30 seconds until the blockage has been removed.
2. Press the ALARM BYPASS key (2) if you want to bypass the alarm.

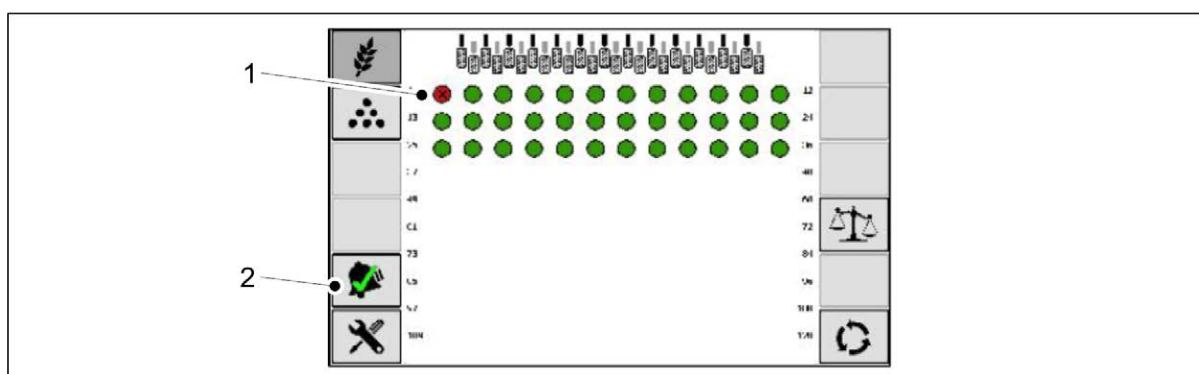


Figure. 6.3.8.3. - 75. Bypassed alarm symbol

- A sensor whose alarm has been bypassed (1) is indicated on the Blockage monitoring system page by a red circle with an X in the middle.
3. Press the NORMAL MODE key (2) to return the system to its normal monitoring mode.

6.4. Feeders

Seed and fertiliser from the seed drill hopper is fed by electrical feeders into the injectors. A hydraulic motor drives the two centrifugal fans. The air flow from the fans pushes seed and fertiliser pneumatically from the injector tube through the dividers and along the transfer hoses to the coulters. There is a separate feeder and divider for seed and fertiliser.

The seed and fertiliser quantity fed is set using the Artemis control system (see section [6.3.3. Feed rate setting](#)).

6.5. Preparations before filling the hopper

1. Ensure that the stability of the tractor - seed drill combination has been calculated.

- The calculation of the stability is provided in the attachment *Calculating the stability of the tractor - seed drill combination*.
2. Check that the hopper is empty, clean and dry.
 - If needed, clean the hopper in accordance with section 7.3.1. Cleaning the hopper.

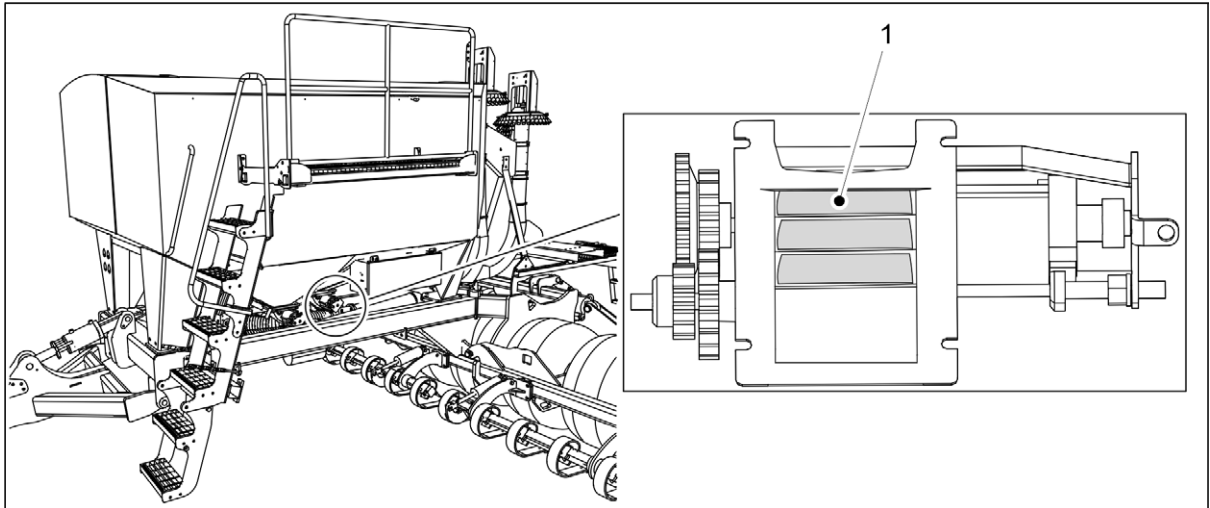


Figure. 6.5. - 76. Feeder roller grooves

3. Check that the roller grooves (1) of the feeder are clean and free of damp fertiliser
 - If needed, clean in accordance with section 7.3.4. Cleaning the feeder and feeder hoses.

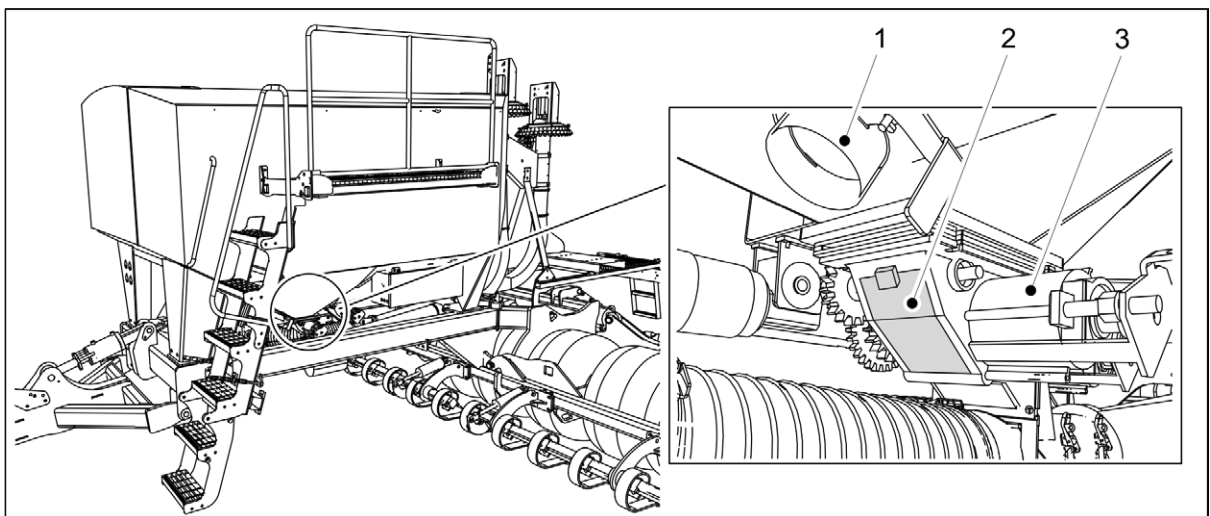


Figure. 6.5. - 77. Feeder

4. Ensure that the two feeders (3) are dry.
 - If necessary, dry the feeders with compressed air.
5. Ensure that the two draining valves (1) are closed.
6. Ensure that the two inspection hatches (2) are closed.
7. Check that the hopper divider is in the desired position.
 - If necessary, adjust the divider in accordance with section 6.5.1. Adjusting the hopper divider.
8. Adjust the length of the feeder roller in accordance with section 6.3.6.1. Area counter data.

6.5.1. Adjusting the hopper divider

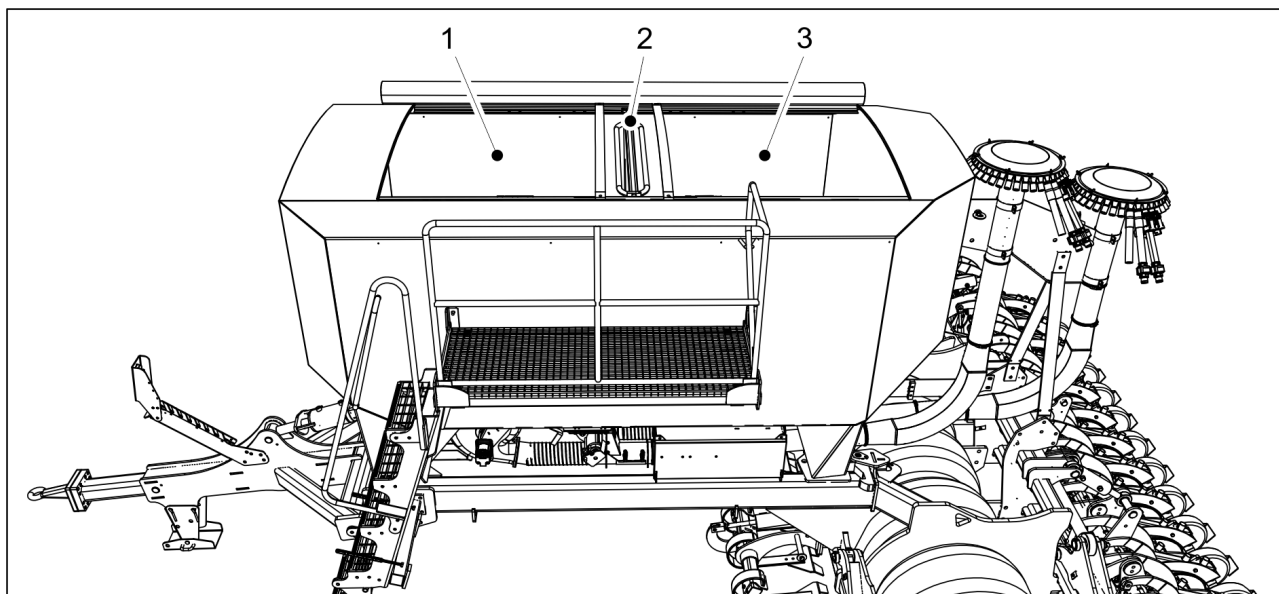


Figure. 6.5.1. - 78. Fertiliser hopper and seed hopper

The hopper is divided into a fertiliser hopper (1) and seed hopper (3) by a divider (2).

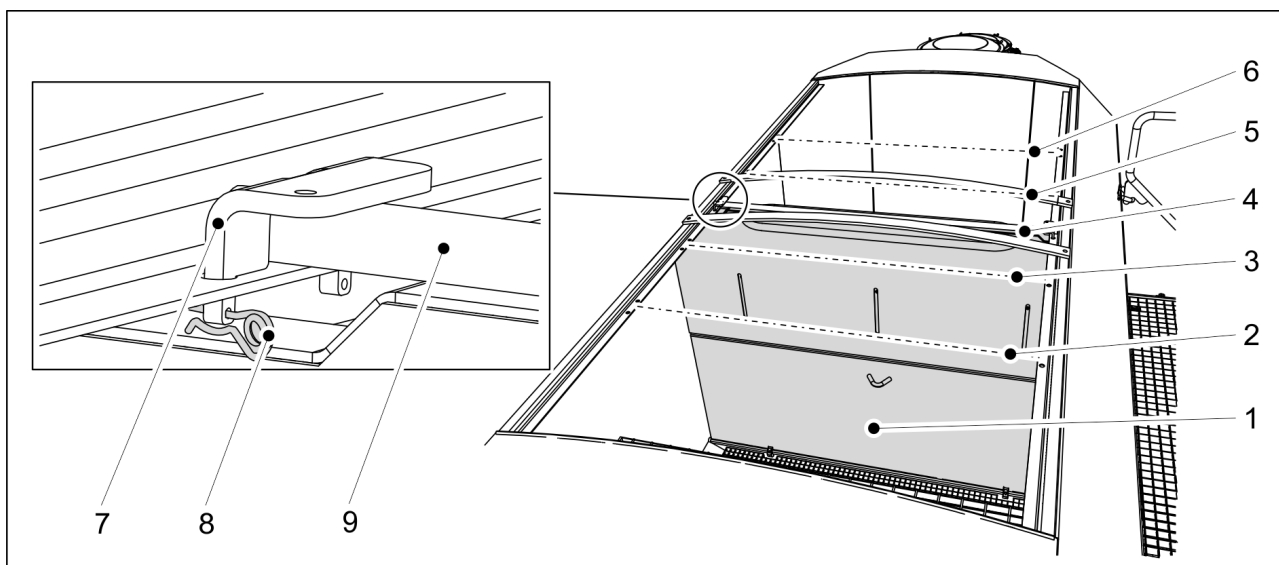


Figure. 6.5.1. - 79. Adjusting the divider



DANGER

Before adjusting the divider (1), ensure that the hopper is empty.

1. The divider position options are shown in the table below.

Table. 6.5.1. - 9. Fertiliser and seed hopper volume ratios

Fastening point number	Fertiliser hopper (%) : Seed hopper (%)
2.	40:60
3.	45:55
4.	50:50
5.	55:45
6.	60:40

2. Insert the bar (9) to the desired position between two holes.
3. Lock the bar by inserting the locking piece (7) into the holes.
4. Secure the locking piece with a cotter (8)
5. Perform steps 2 and 3 at both ends of the divider.

6.5.2. Adjusting the width of the feeder roller

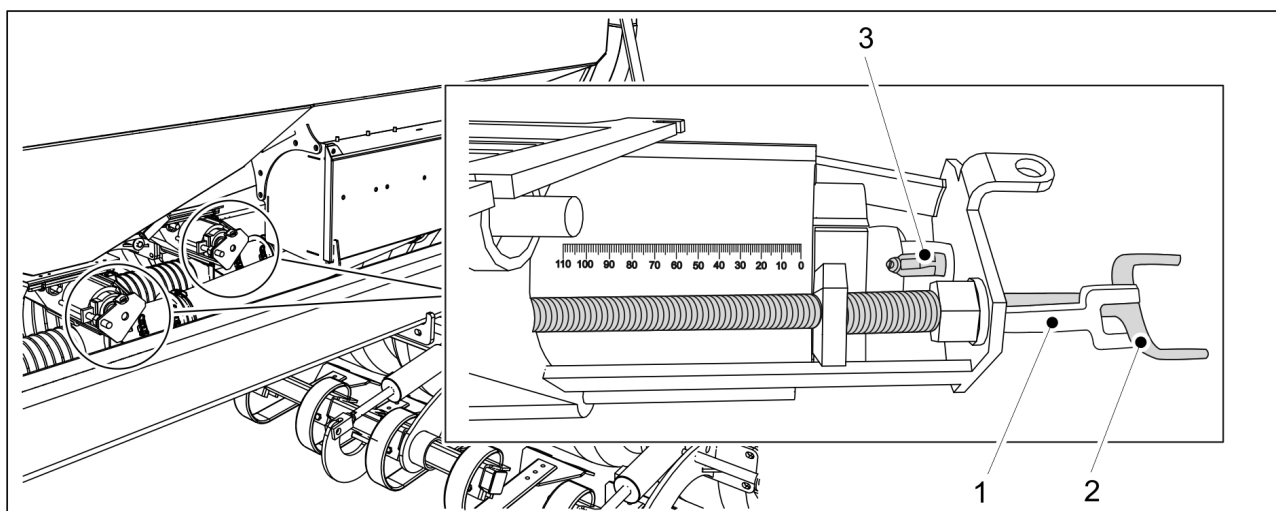
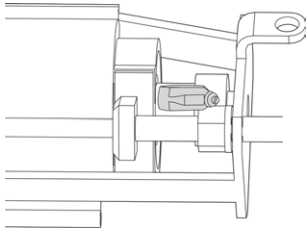
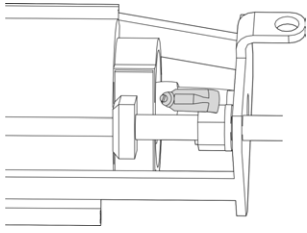


Figure. 6.5.2. - 80. Adjusting the width of the feeder roller

1. Open the locking bracket (1).
2. Set the proper roller width by rotating the screw (2).
 - For normal-sized seeds, set the roller to position 110 mm.
 - For small seeds, set the roller to position 25 mm.
3. Turn the feeder roller adjustment lever (3) to the appropriate position according to the table below.

Table. 6.5.2. - 10. Feeder roller adjustment lever positions

Normal-sized seeds and fertiliser	
Small seeds	

4. Close the locking bracket (1).

6.6. Filling the hoppers



DANGER

Falling hazard when performing work on the platform. Be careful when performing work on the platform.

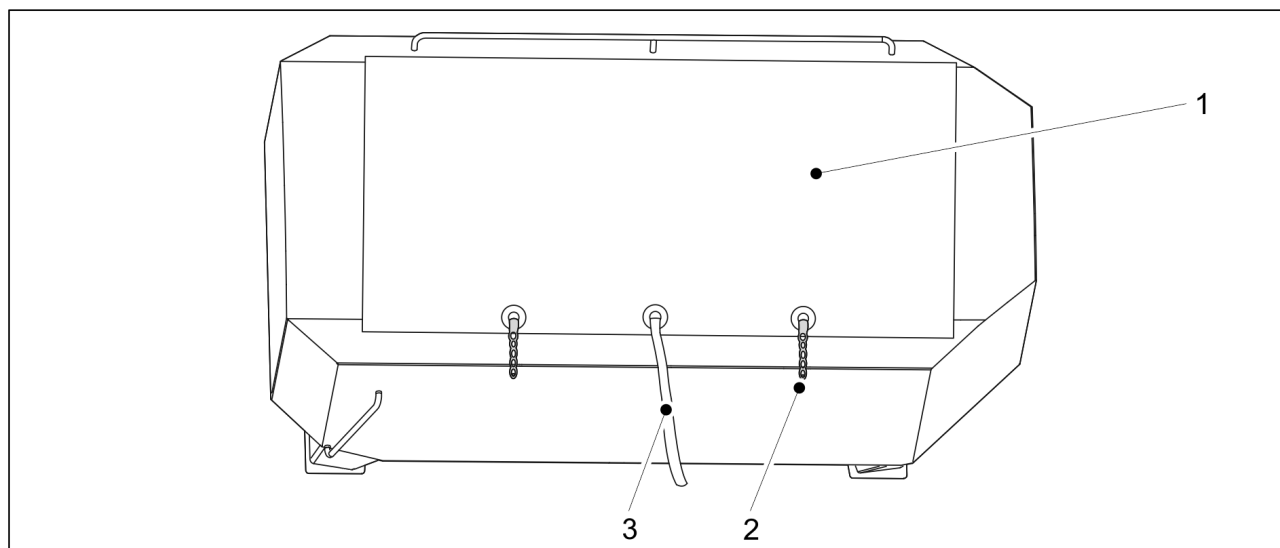


Figure. 6.6. - 81. Hopper tarp

1. Detach the two loops (2) of the hopper tarp (1).
2. Pull the cord (3).
 - There is a spring inside the tarp that will roll up the tarp. Never let the go of the tarp, but hold the end until the tarp is open.
3. Secure the end of the cord to the hole on the side to the hopper.
4. If necessary, adjust the divider in accordance with section 6.5.1. Adjusting the hopper divider.

5. Fill the hopper with seeds and/or fertiliser.



DANGER
Never go under a lifted load.



DANGER
Make sure that nobody is on top of the seed drill or inside the hoppers when the hoppers are being filled.



DANGER
Avoid breathing seed dressing dust and fertiliser dust. The seed dressing causes a serious health risk.



DANGER
Read the material safety data sheet of the dressing agent and fertiliser and follow their warnings.

- It is recommended that the hoppers be filled from the side of the hoppers. We recommend that you open the bulk bags using a knife with a long handle or a pruning hook.

6. Close the tarp (1) and attach the two tarp loops (2).

6.7. Product calibration

Because there are great differences between various seeds the actual seeding quantity must always be checked with a calibration test. Seed treatment, such as seed dressing, has considerable impact on fluidity.

The calibration test should be performed whenever changes are made to the feeding quantities. In particular, fertiliser quantities may vary a lot due to the moisture and fluidity of the fertiliser.

When driving on the road with hoppers full of fertiliser and seeds, the vibration may cause arching in the hoppers. In the autumn or after rain, the fertiliser may absorb humidity in the feeders, changing fertiliser fluidity. For this reason, it is good to monitor that fertiliser or seed flow evenly from all feeders when seeding begins. Performing a calibration test is in order and visually checking that the feed quantity is even in all feeders.

6.7.1. Performing a calibration test with the machine push buttons



DANGER
Before performing the calibration test, ensure that the tractor's parking brake is engaged and fans are turned off.

- Each hopper has its own feeder, and the calibration test is performed on each hopper separately.
1. On the Artemis Main operating page, set the desired target value for the channel being calibration tested in accordance with section [6.3.3. Feed rate setting](#).

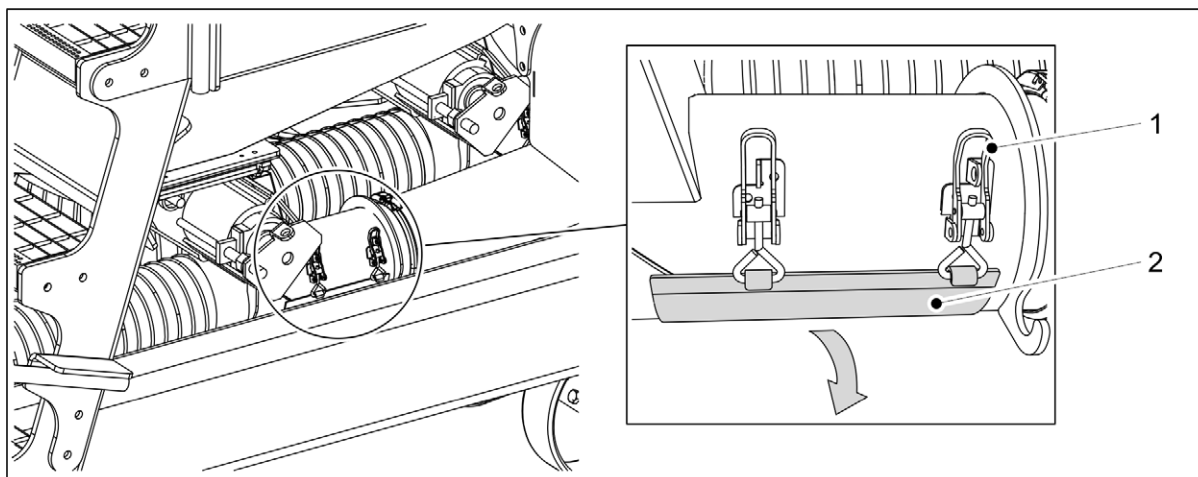


Figure. 6.7.1. - 82. Calibration test hatch

2. Open the calibration test hatch (2), which is located under the feeder, by releasing the two latches (1).

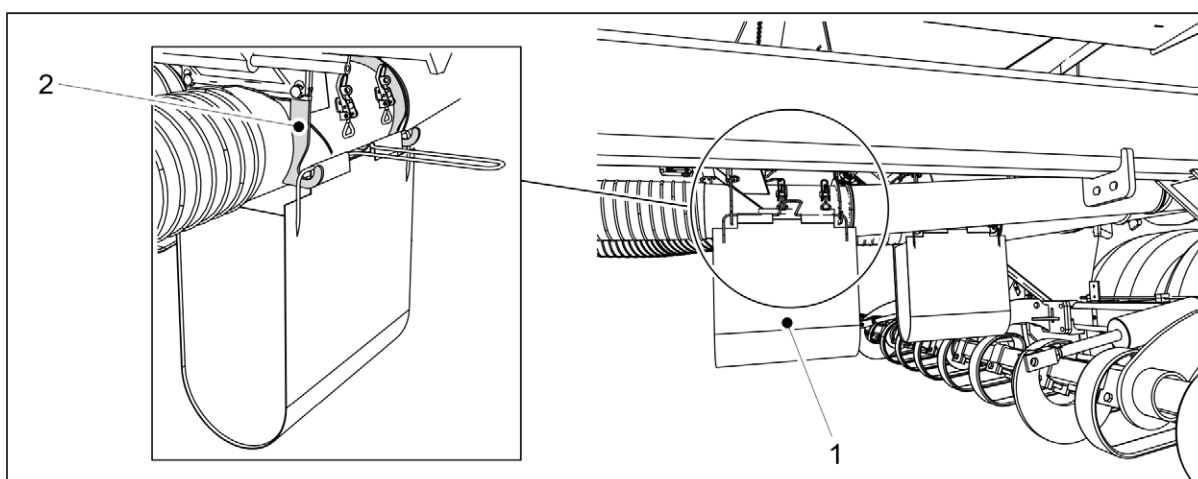


Figure. 6.7.1. - 83. Calibration test bag

3. Attach a calibration test bag (1) to the four hooks (2). The amount used in the calibration test will flow into the bag.

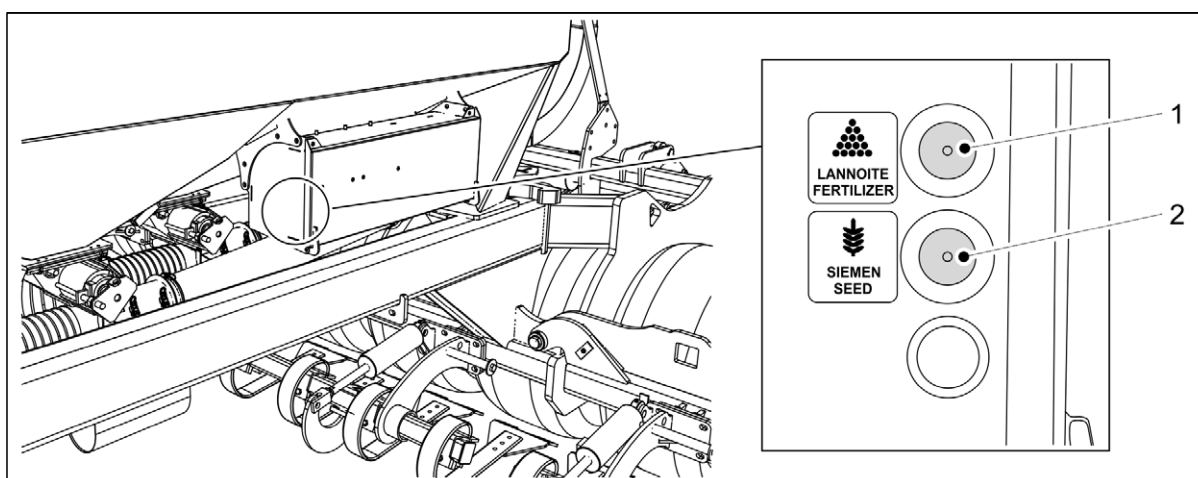


Figure. 6.7.1. - 84. Push buttons for fertiliser and seed feed

4. Press the fertiliser push button (1) or seed push button (2) to start the feeder.

- Holding the push button down will keep the feeder running.
5. Release the push button when the calibration test bag is sufficiently full of seed or fertiliser.
 - Releasing the push button stops the feeder.
 6. Weigh the amount in the bag.
 - Take the weight of the bag into consideration when weighing the amount.

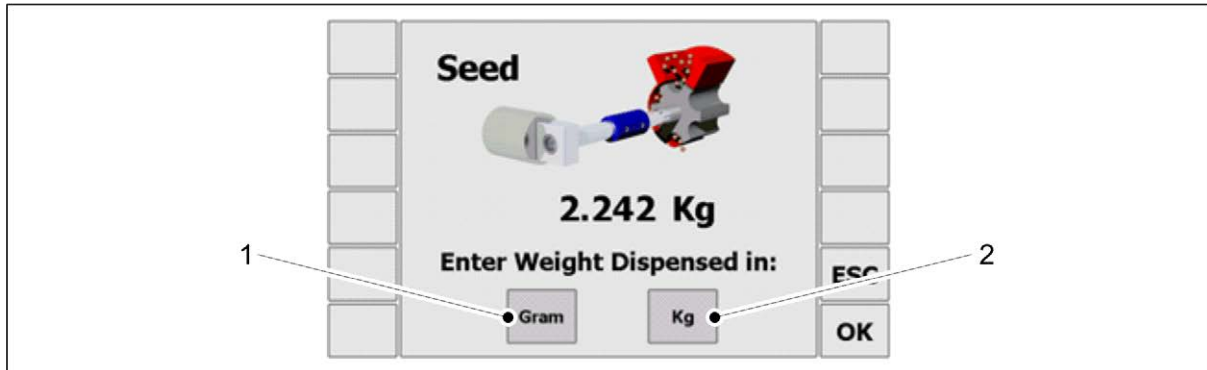


Figure. 6.7.1. - 85. Selecting a weight unit

7. Select grams (1) or kilograms (2) as the weight unit.
8. Enter the measured weight using the number keys and accept by pressing the OK key.

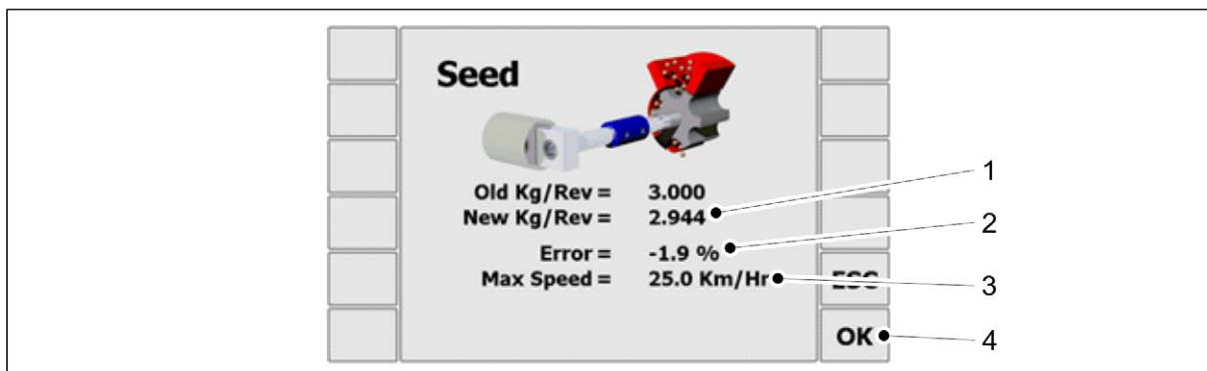


Figure. 6.7.1. - 86. Calibration test data

- The calibration quantity (1), comparison value (2) and maximum allowable speed (3) are shown on the screen.
9. Accept the calibration test result by pressing the OK key (4).

6.7.2. Performing a calibration test with the machine control panel



DANGER

Before performing the calibration test, ensure that the tractor's parking brake is engaged and fans are turned off.

- Each hopper has its own feeder, and the calibration test is performed on each hopper separately.
1. On the Artemis Main operating page, set the desired target value for the channel being calibration tested in accordance with section [6.3.3. Feed rate setting](#).

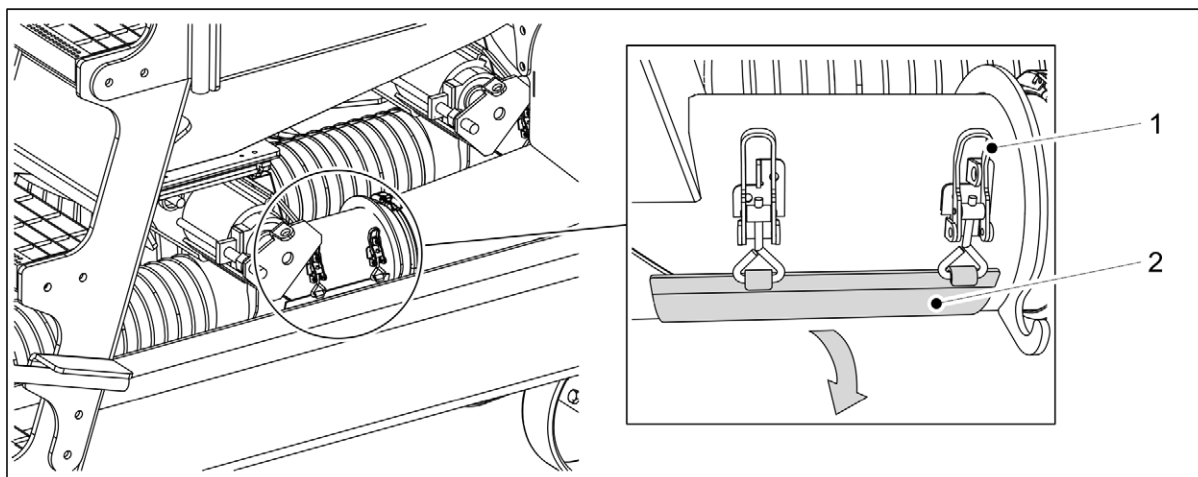


Figure. 6.7.2. - 87. Calibration test hatch

2. Open the calibration test hatch (2), which is located under the feeder, by releasing the two latches (1).

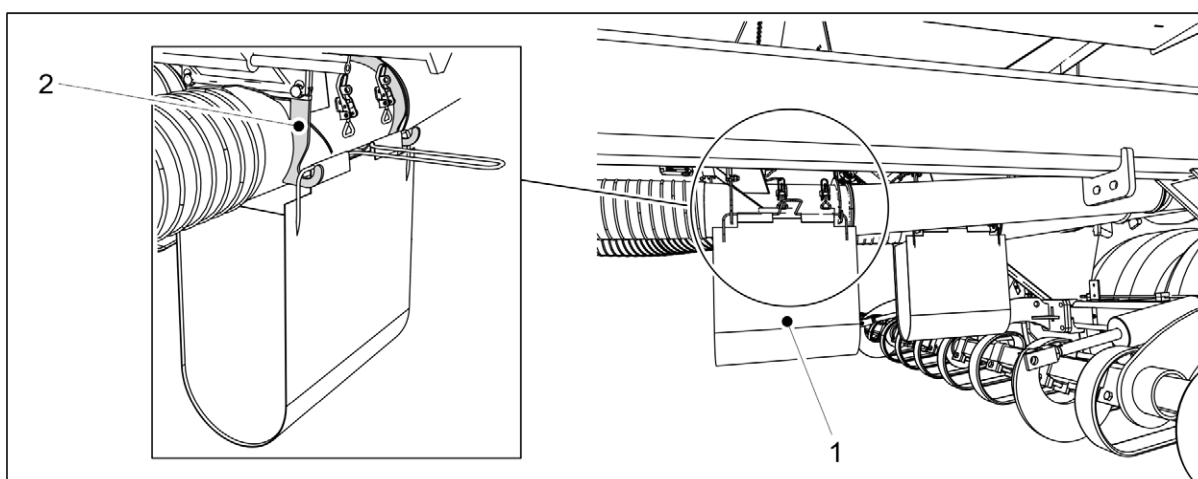


Figure. 6.7.2. - 88. Calibration test bag

3. Attach a calibration test bag (1) to the four hooks (2). The amount used in the calibration test will flow into the bag.

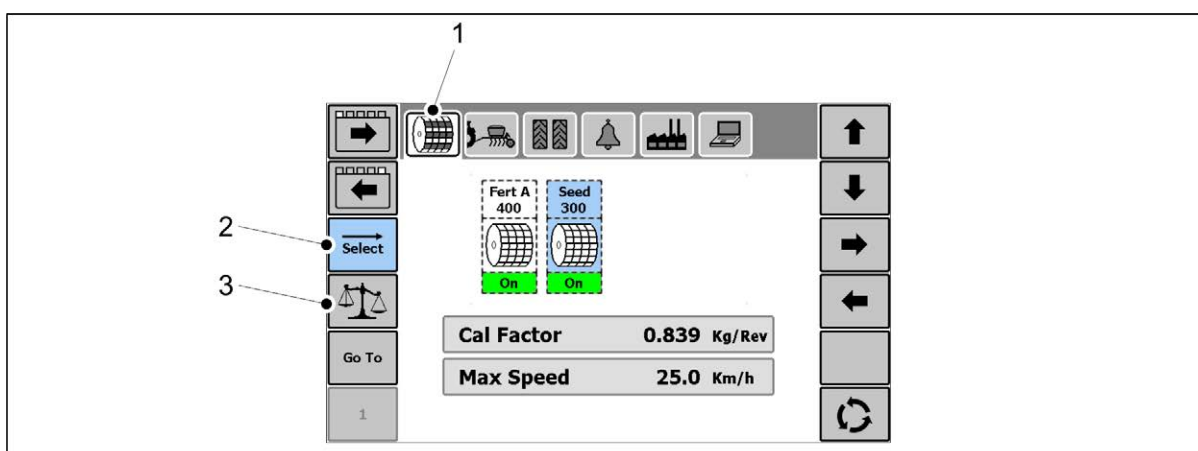


Figure. 6.7.2. - 89. Starting a calibration test on the Settings page

4. Go to the Artemis Settings page and select CALIBRATION TEST (1).

5. Select the channel to be calibration tested by pressing the SELECT key (2).
 - The selected channel is highlighted in blue.

The calibration test is to be performed separately on each channel.
6. Press the WEIGHING key (3).



Figure. 6.7.2. - 90. Selecting a weight unit

7. Select grams (1) or kilograms (3) as the weight unit.
8. Enter the desired calibration test quantity. The application will feed seed or fertiliser according to the set number.
9. Press the RUN key (2).

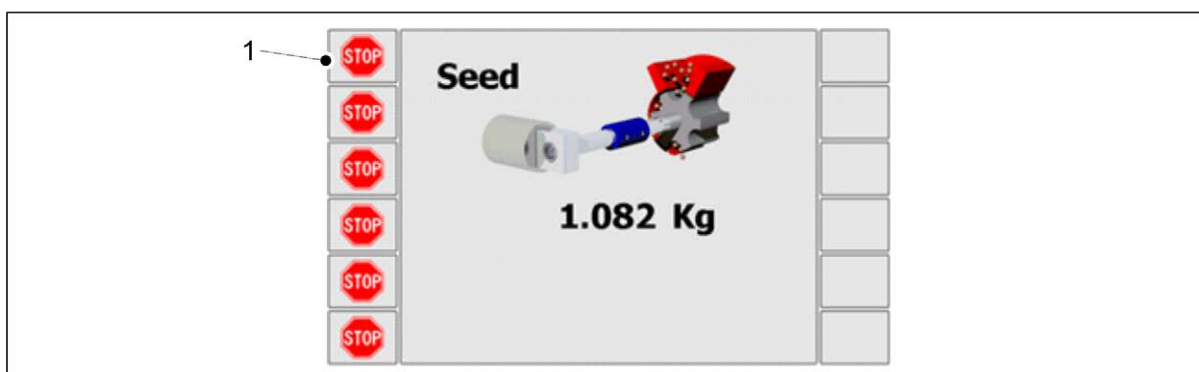


Figure. 6.7.2. - 91. Running the motor

- The screen will show when the motor is running. The calibration test duration can be shortened by pressing the STOP key (1).
10. Weight the amount dispensed into the calibration test bag.
 - Take the weight of the bag into consideration when weighing the amount.



Figure. 6.7.2. - 92. Selecting a weight unit

11. Select grams (1) or kilograms (2) as the weight unit.
12. Enter the measured weight using the number keys and accept by pressing the OK key.

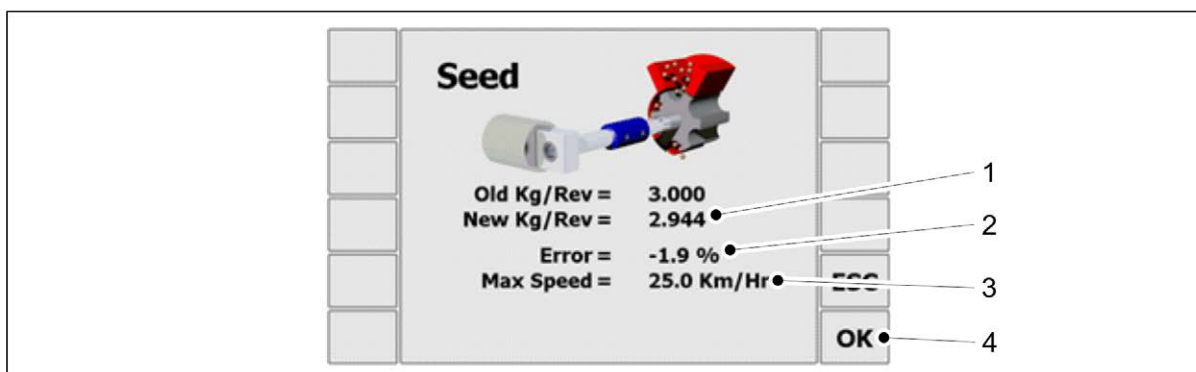


Figure. 6.7.2. - 93. Calibration test data

- The calibration quantity (1), comparison value (2) and maximum allowable speed (3) are shown on the screen.
13. Accept the calibration test result by pressing the OK key (4).

6.8. Air flow settings

There are separate fans for the fertiliser and seed hoppers. The fans are connected in series, i.e. both fans always run at the same speed. The rotation speed of the fan hydraulic motors is controlled by changing the output of the tractor hydraulics.

When fertilising and seeding at the same time, the rotation speed of the fans is determined by the larger feed rate of the two.

1. Select the desired fan rotation speed that corresponds to the feed rate using the table below.

Table. 6.8. - 11. Indicative rotation speeds, driving speed 10 km/h

Feed rate (kg/ha)	Fan rotation speed (rpm)
< 200	3,500
200- 300	4,000
> 300	4,500

2. Set the final rotation speed value based on prevailing conditions.
 - If the seeds will remain in the tilled layer, reduce the rotation speed.
 - If there is a blockage in the feed lines, increase the rotation speed.

The maximum fan rotation speed is 4500 rpm.

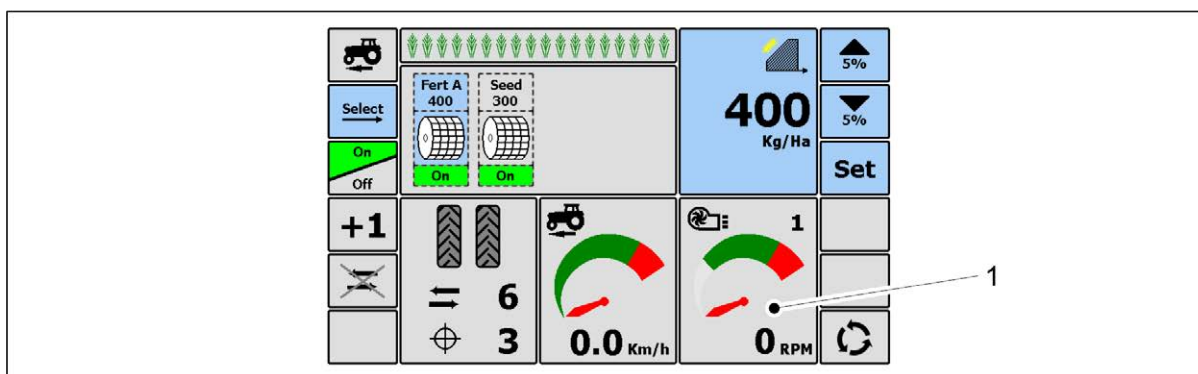


Figure. 6.8. - 94. Fan rotation speed on the Main operating page

- The fan rotation speed (1) is displayed on the Artemis Main operating page.

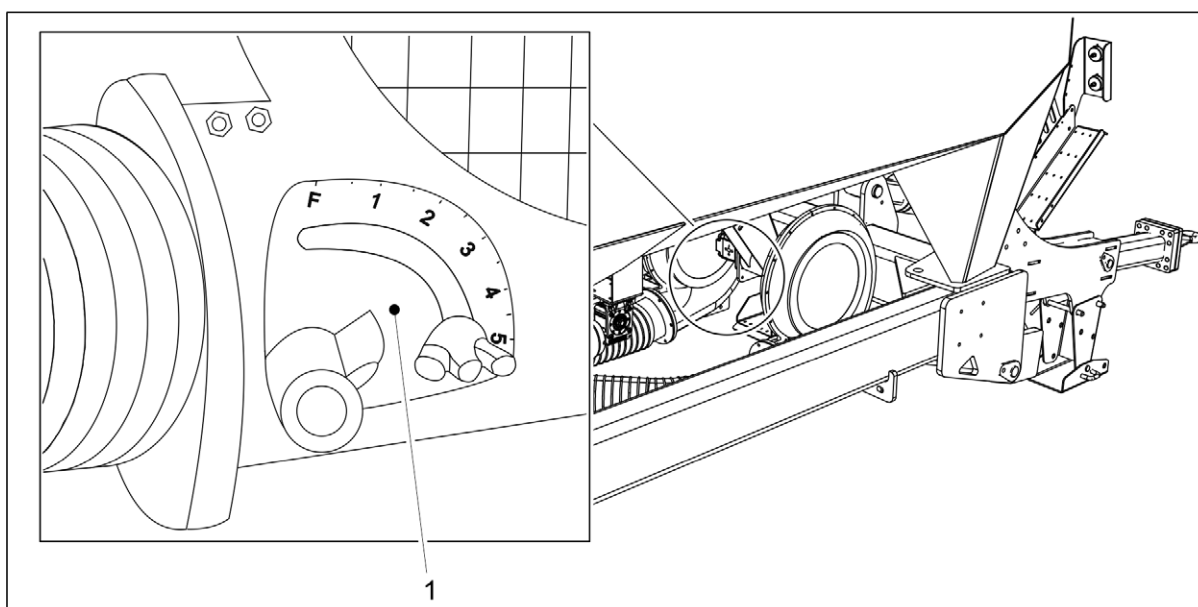


Figure. 6.8. - 95. Fan butterfly valve

3. The air flow is controlled by turning the fan butterfly valve (1).

- In position F, the fan butterfly valve is fully closed and in position 5 it is fully open. The butterfly valve is set closed for small seeds and open for normal-sized seeds. If the feed lines are blocked, the butterfly valve can be opened slightly.

6.9. Adjusting the seeding depth of the coulter

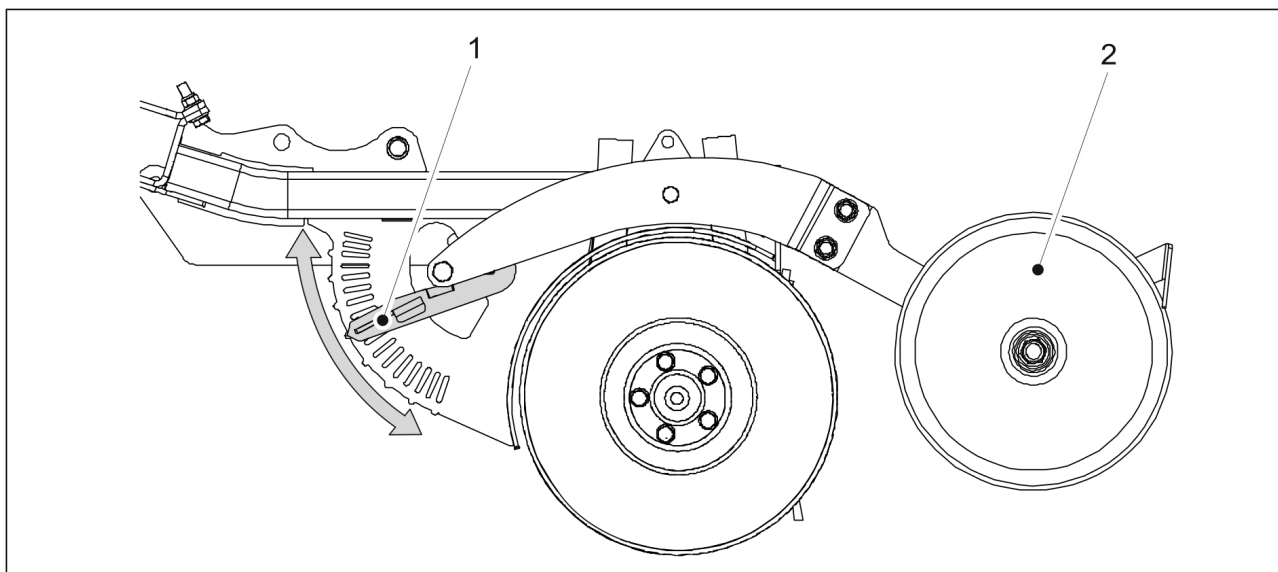


Figure. 6.9. - 96. Adjusting the seeding depth of the coulter

1. Adjust the height of the covering wheel (2) in relation to the coulter by moving lever (1) to the desired slot on the adjuster plate.
 - When the lever is down, the seeding depth is at maximum (i.e. 8 cm).
When the lever is up, the seeding depth is 0 cm.
The height can be adjusted in 0.5 cm increments.
2. Repeat step 1 on all coulters.

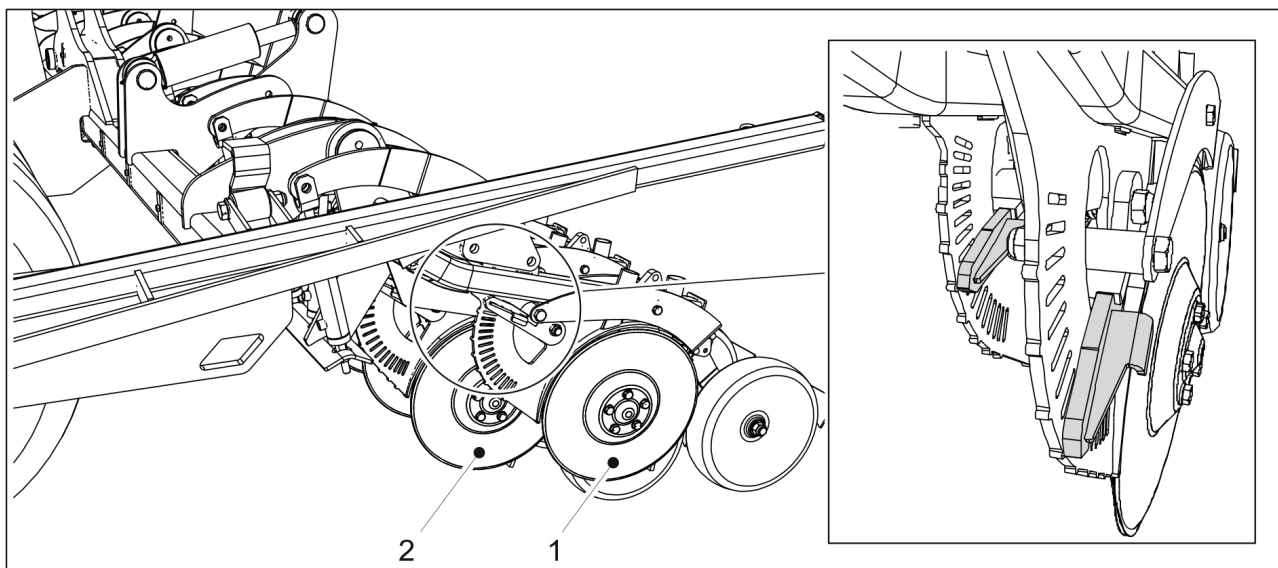


Figure. 6.9. - 97. Foremost and rearmost coulter

- The foremost (1) and rearmost (2) coulter must be adjusted the same. Ensure that the levers are set to the same slot on both adjuster plates.

6.10. Adjusting the coulter pressure

1. Go to the Artemis Middle markers and hydraulics page

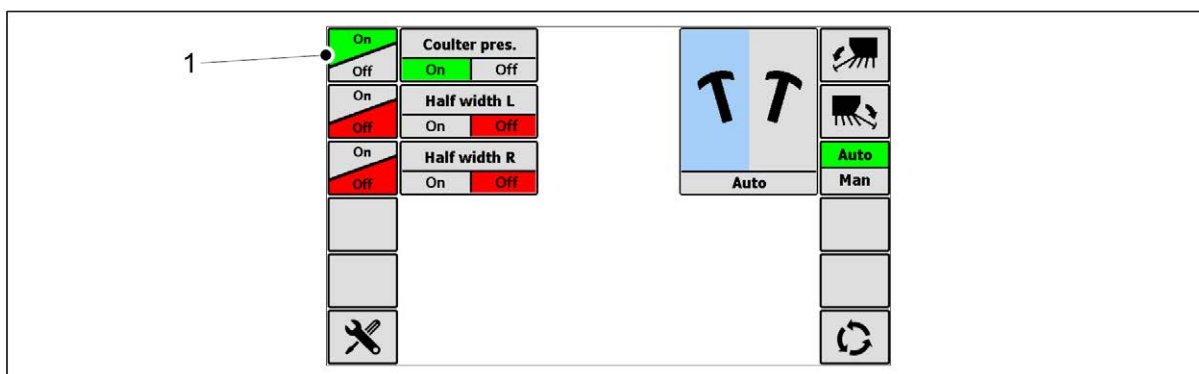


Figure. 6.10. - 98. Starting coulter pressure

2. Press the ON- OFF key (1).
 - Coulter pressure is on when the On key is highlighted in green.
Coulter pressure is off when the Off key is highlighted in red.
3. Adjust the coulter pressure using the tractor hydraulics.
 - When set to 0 bar, the coulter pressure is 50 kg.
When set to 150 bar, the coulter pressure is 250 kg.

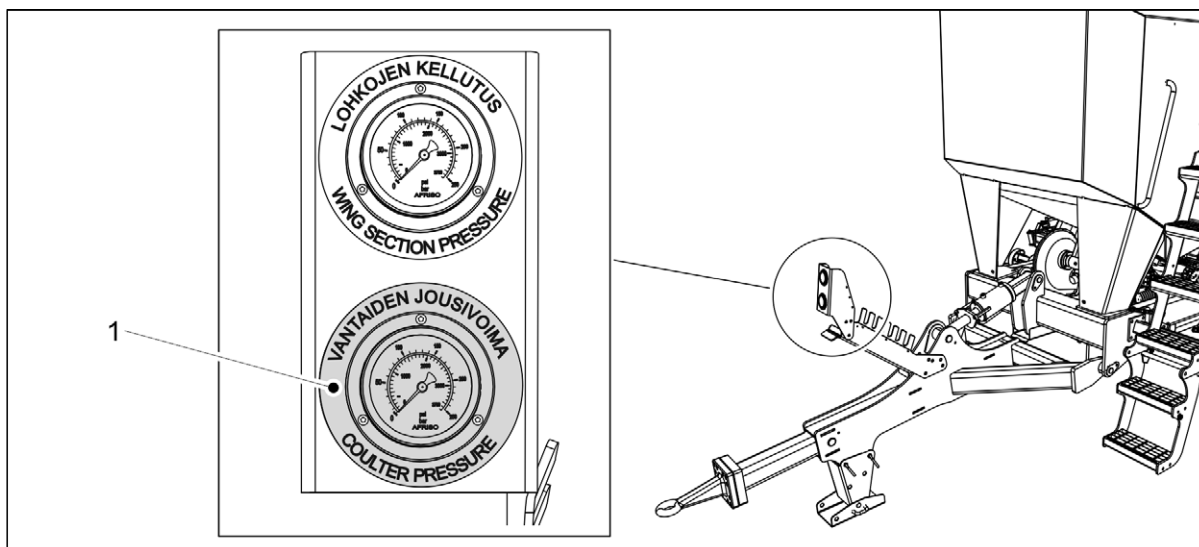


Figure. 6.10. - 99. Coulter pressure gauge

- The coulter pressure gauge (1) is located on a rack mounted on the drawbar boom.

6.11. Controlling the seeding depth

1. Drive at the normal seeding speed (8- 12 km/h) approximately 10 metres and stop.
2. Stop the tractor, switch off the power and engage the parking brake.
3. Walk to the area you just sowed in the field and sweep loose soil from the surface of the field.
4. Check the depth of the seeding furrow and that there are seeds and fertiliser in the furrow.
 - If needed, adjust the seeding depth in accordance with section [6.9. Adjusting the seeding depth of the coulter](#).

6.12. Securing the position of the middle markers

1. When you drive along the second sowing lane, stop.
2. Stop the tractor, switch off the power and engage the parking brake.
3. Check the distance between the outermost rows of the sowing lanes.
 - The distance between the outermost rows should be 167 mm.
4. If the distance is incorrect, adjust the middle markers in accordance with section [5.2.5. Adjusting the middle markers](#).

6.13. Emptying the hopper

1. Place a container under the feeders.
 - You can attach a Ø100mm plastic tube to the drain valve to direct the seed and fertiliser flowing from the hopper into the container.

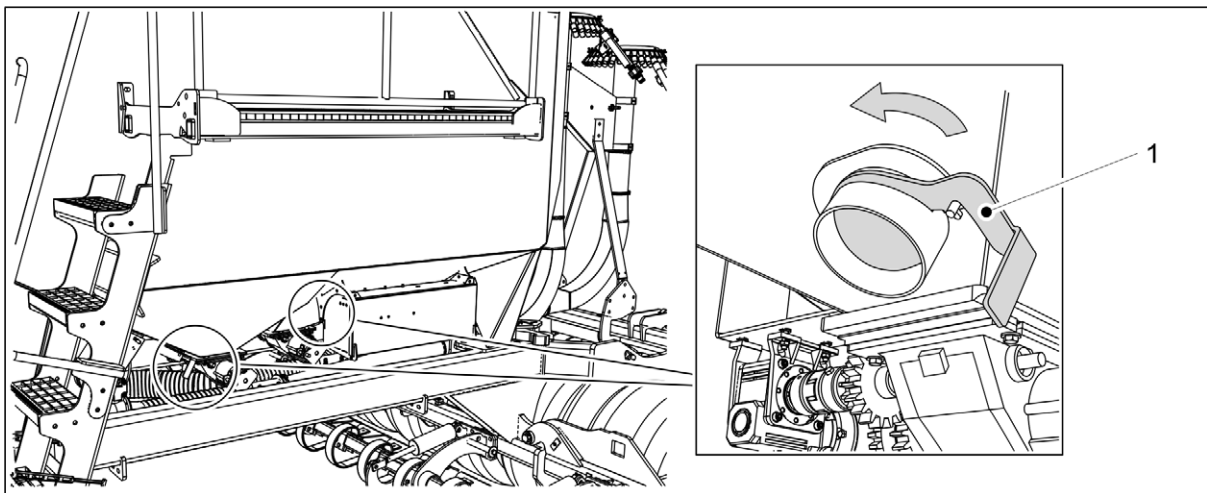


Figure. 6.13. - 100. Drain valve

2. Open the drain valve (1), which is located at the bottom of the hopper next to the feeder.
 - The fertiliser hopper and seed hopper each have their own drain valve.

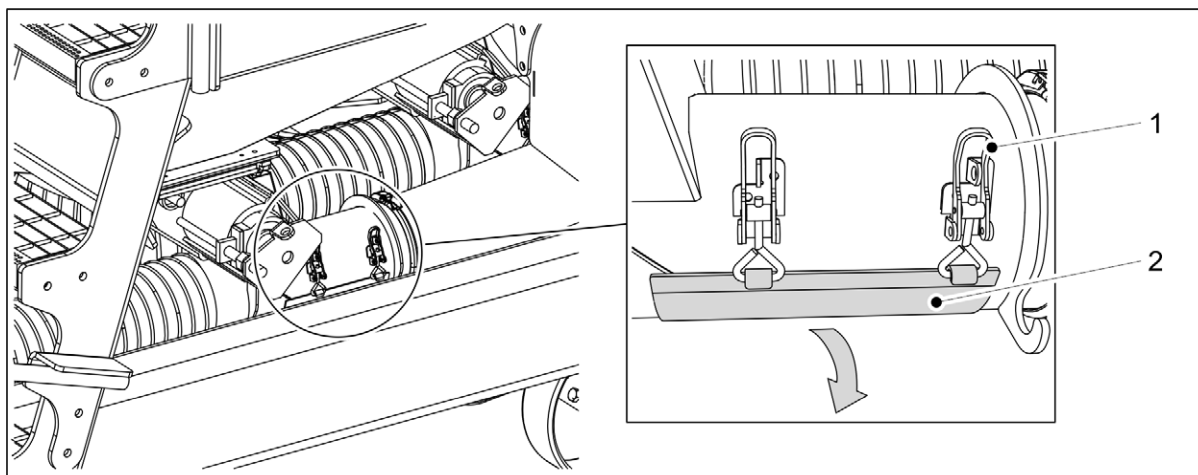


Figure. 6.13. - 101. Calibration test hatch

3. If a small amount of seed or fertiliser remains on top of the feeder, open the calibration test hatch (1) located below the feeder. Press the calibration test push button to empty the feeder.
 - The fertiliser and seed hoppers each have their own push button. See the instructions in section [6.7.1. Performing a calibration test with the machine push buttons](#).

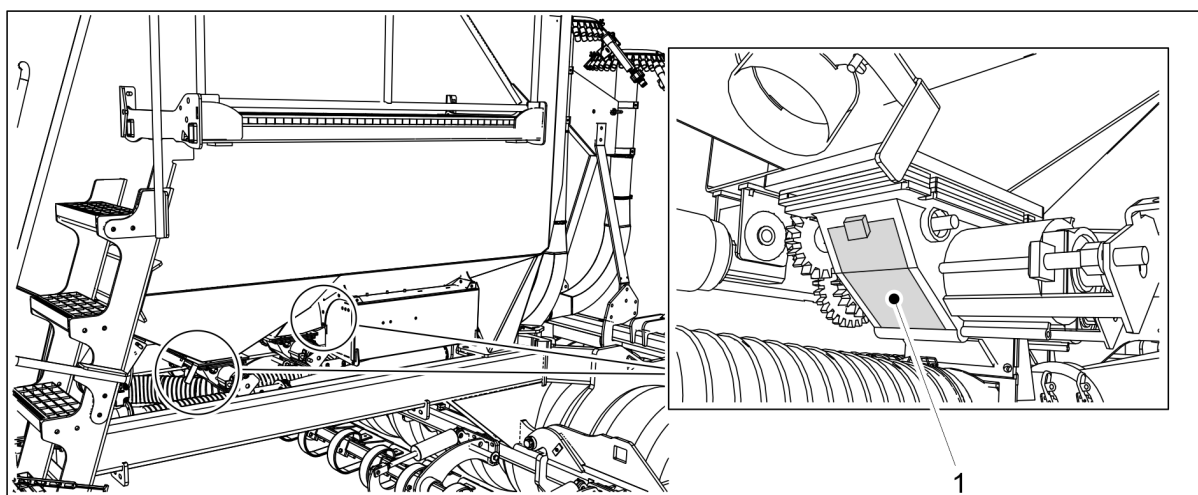


Figure. 6.13. - 102. Feeder inspection hatch

4. Open the feeder inspection hatch (1).
 - There is a separate feeder for fertiliser and seed.
5. Clean out the hopper and feeder by using compressed air until empty.

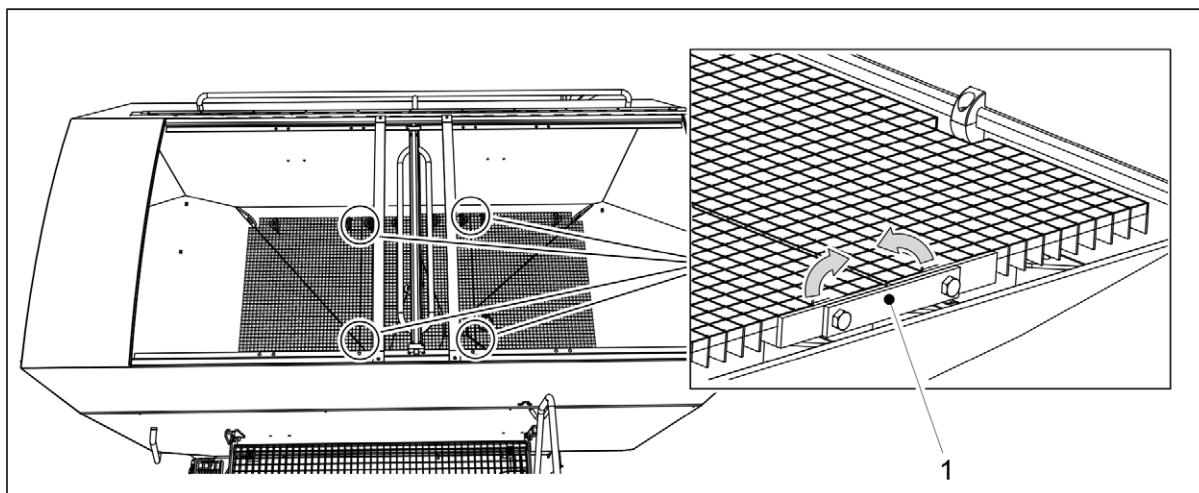


Figure 6.13. - 103. Hopper steel mesh platform

- The steel mesh platform at the bottom of the hopper is hinged along its edges (1).
6. If necessary, raise one half of the steel mesh platform to blow compressed air down to the bottom of the hopper funnel.

6.14. Disconnecting from the tractor



DANGER

Crushing hazard when connecting or disconnecting the seed drill. Safety distance 10 m. Be extremely careful if someone else is near the seed drill and tractor giving instructions on connecting and disconnecting.



DANGER

Ensure that the tractor is turned off and the key is removed from the ignition.

1. Disconnect the electric connections of the seed drill.
2. Disconnect the hydraulic hoses of the seed drill from the tractor.



DANGER

Depressurise the hydraulic system before disconnecting it. Follow the tractor manufacturer's instructions.



DANGER

Wear protective gloves when disconnecting the hydraulics.

3. Disconnect the drawbar of the seed drill from the tractor's hitch.

6.15. Machine storage

1. Clean the machine in accordance with section [7.3. Cleaning](#).
2. Lubricate all lubrication points in accordance with section [7.2. Lubrication](#).
 - Damaged paint can be touched up after washing. The painted surface can be protected with a light application of oil, using protective oil intended for the purpose.

3. For seasonal storage of the machine, raise the sections and coulters in a raised position and use a dry place protected from sunlight.
4. Use wheel wedges or blocks to prevent the machine from moving during long-term storage.

7. Maintenance



DANGER

Depressurise the hydraulic system, disconnect the hoses and tractor's electrical connections and let the machine cool off before servicing.



DANGER

Service the machine only on even and solid ground.



DANGER

When servicing and performing maintenance work, ensure that the wing sections are fully lowered.



DANGER

Place stands or other support devices under the coulters before performing any maintenance.

7.1. Inspections

7.1.1. Quick instructions, inspections

The inspections to be performed on the seed drill are shown in the table below. The inspections to be carried out once per operating season must be performed in the spring when the machine is commissioned after winter storage.

Table. 7.1.1. - 12. Inspections to be performed on the seed drill

	After the first 10 hectares	Every 50 hectares	Every 500 hectares or once per operating season
<u>7.1.2. Checking bolt tightness</u>	X		X
<u>7.1.3. Checking tyre pressure</u>		X	X
<u>7.1.4. Checking the bearing clearance of the wheel packer hubs</u>			X
<u>7.1.5. Checking the condition of hydraulics</u>			X
<u>7.1.6. Checking the condition of electric wires</u>			X
<u>7.1.7. Inspecting the towing eye</u>			X
<u>7.1.8. Checking the wing section locking function</u>			X
<u>7.1.9. Inspecting the coulter discs</u>			X
<u>7.1.10. Checking the condition of transfer hoses</u>			X

7.1.2. Checking bolt tightness

7.1.2.1. Checking bolt tightness - Towing eye

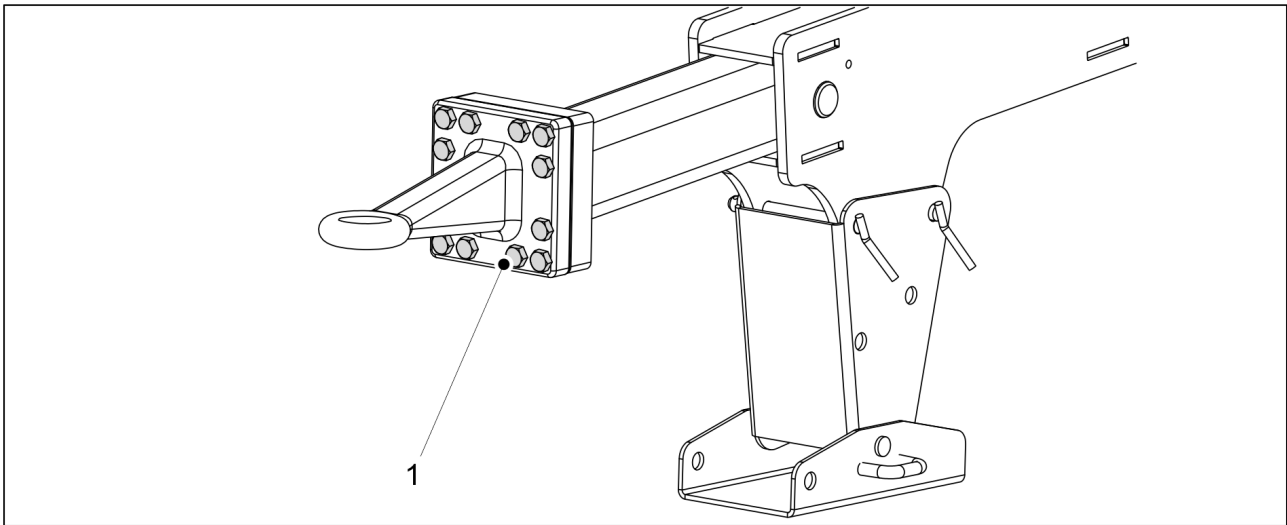


Figure. 7.1.2.1. - 104. Towing eye bolts

1. Check that the 12 bolts (1) of the towing eye are tight.
 - If needed, tighten the bolts to torque 400 Nm.

7.1.2.2. Checking bolt tightness - Hopper

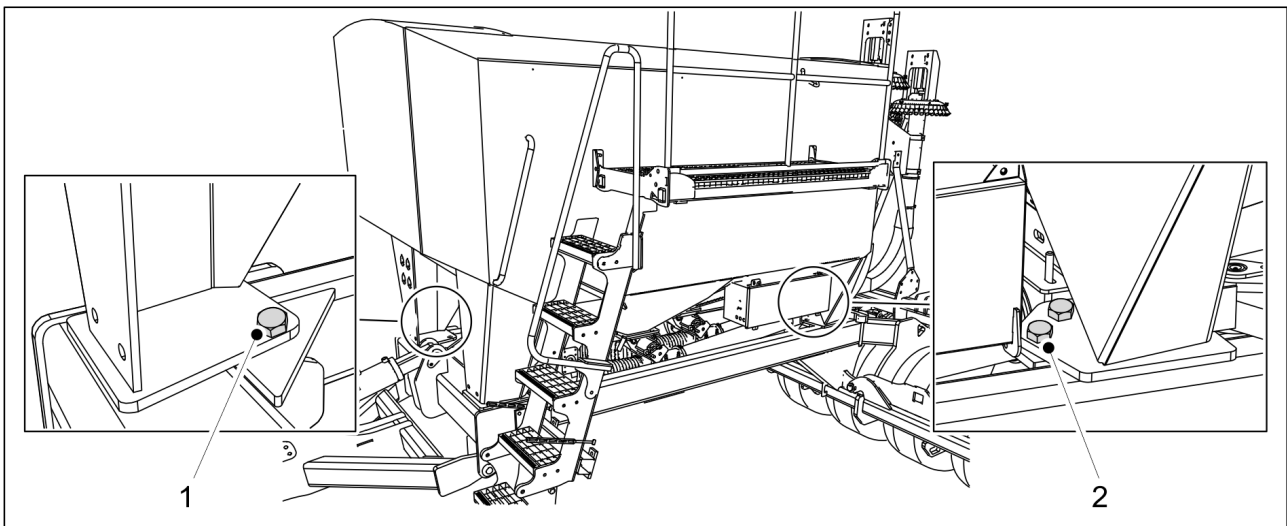


Figure. 7.1.2.2. - 105. Hopper mounting bolts

1. Check that the hopper mounting bolts (1, 2) against the frame are tight.
 - There is 1 bolt (1) on each of the front legs of the hopper.
There are two bolts (2) on each of the rear legs of the hopper.
Tighten the bolts, if needed.

7.1.2.3. Checking bolt tightness - Ladder

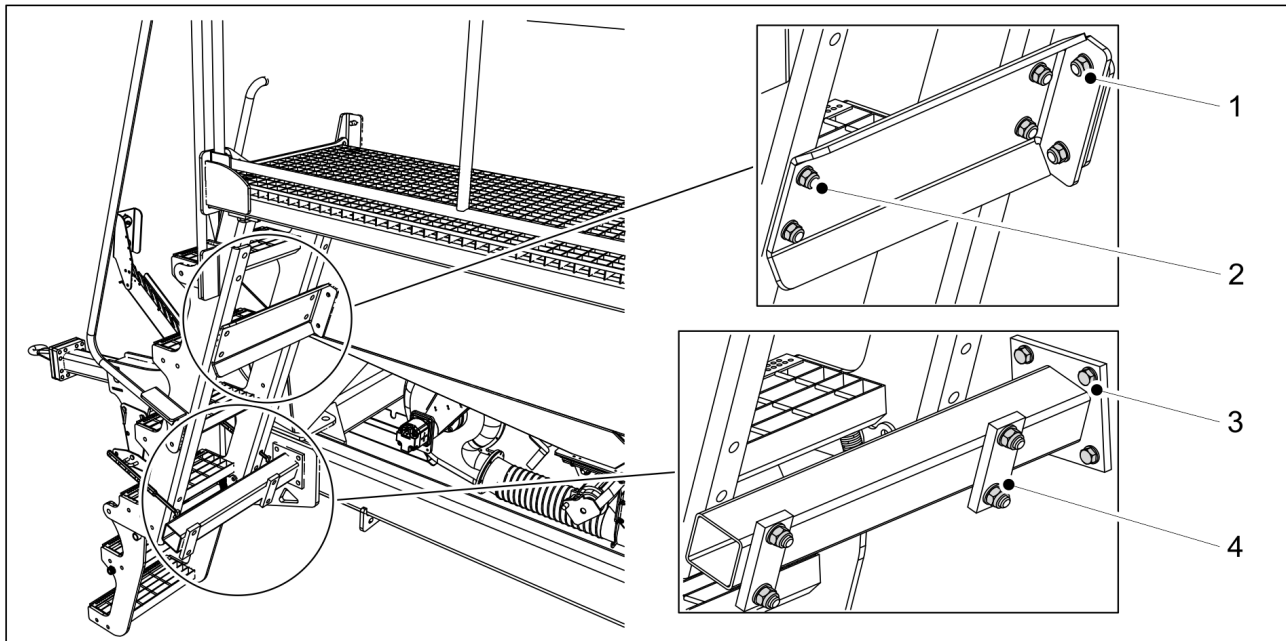


Figure. 7.1.2.3. - 106. Ladder mount

1. Check the upper ladder brace frame mount by ensuring that the two mounting bolt nuts (1) are tight.
 - Tighten the nuts, if needed.
2. Check the ladder mount to the upper ladder brace by ensuring that the four mounting bolt nuts (2) are tight.
 - Tighten the nuts, if needed.
3. Check the lower ladder brace frame mount by ensuring that the four mounting bolts (3) are tight.
 - Tighten the bolts, if needed.
4. Check the ladder mount to the lower ladder brace by ensuring that the four mounting bolt nuts (4) are tight.
 - Tighten the nuts, if needed.

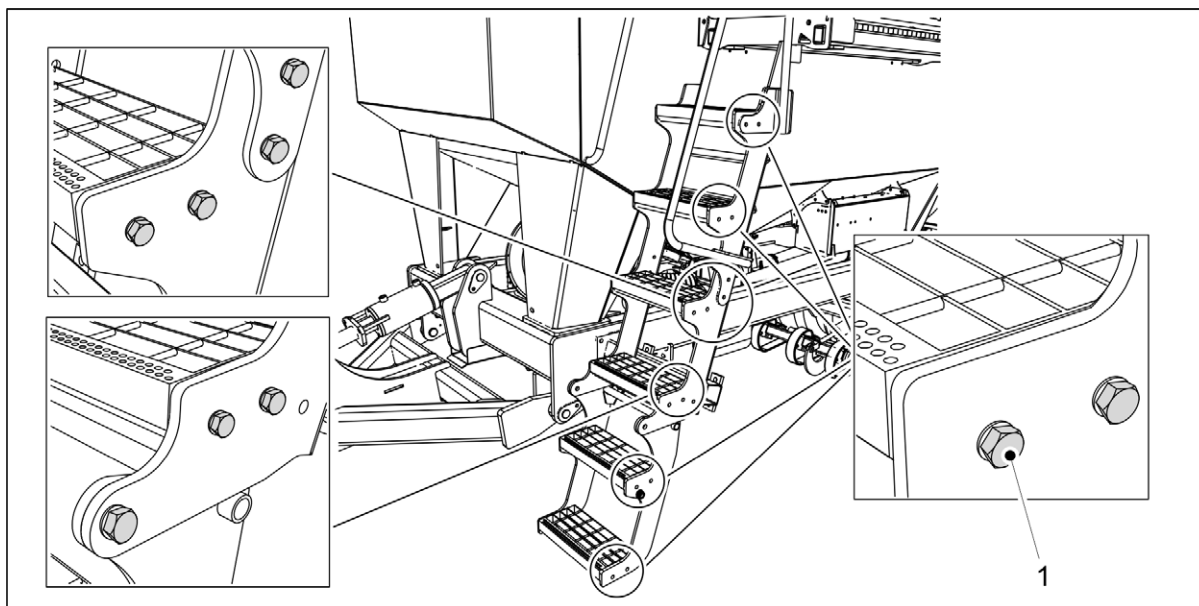


Figure. 7.1.2.3. - 107. Ladder bolts

5. Check that the ladder bolts (1) are tight.
 - There are bolts on both ends of the ladder. There is a total of 28 bolts. Tighten the bolts, if needed.

7.1.2.4. Checking bolt tightness - Working platform

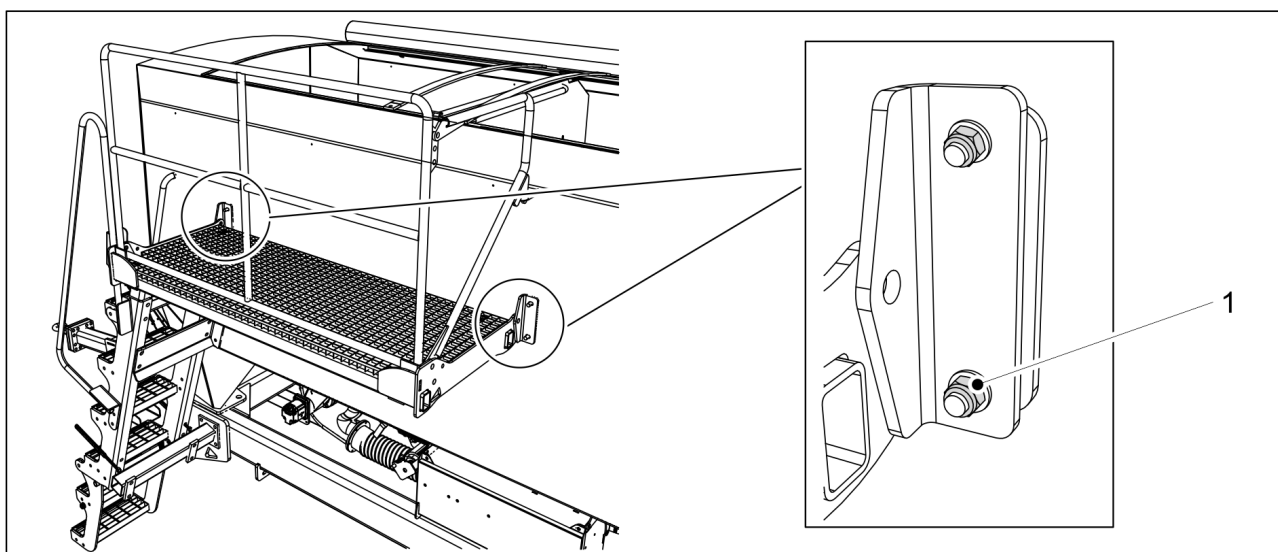


Figure. 7.1.2.4. - 108. Mounting the working platform to the hopper

1. Check that the four nuts (1) on the working platform bolts are tight.
 - Tighten the nuts, if needed.

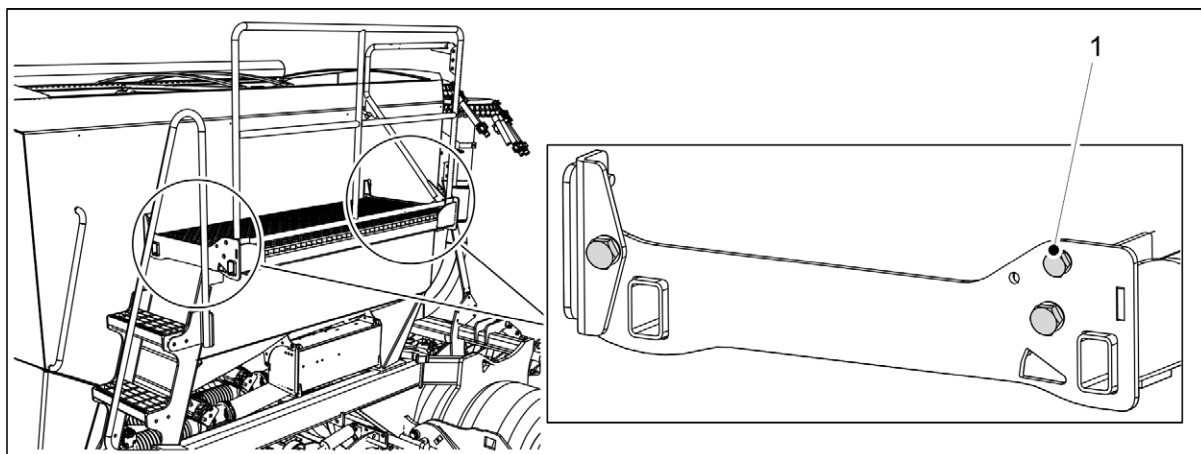


Figure. 7.1.2.4. - 109. Bolts at the end of the working platform

2. Check that the bolts (1) at the end of the working platform are tight.
 - There are three bolts on each end plate.
Tighten the bolts, if needed.

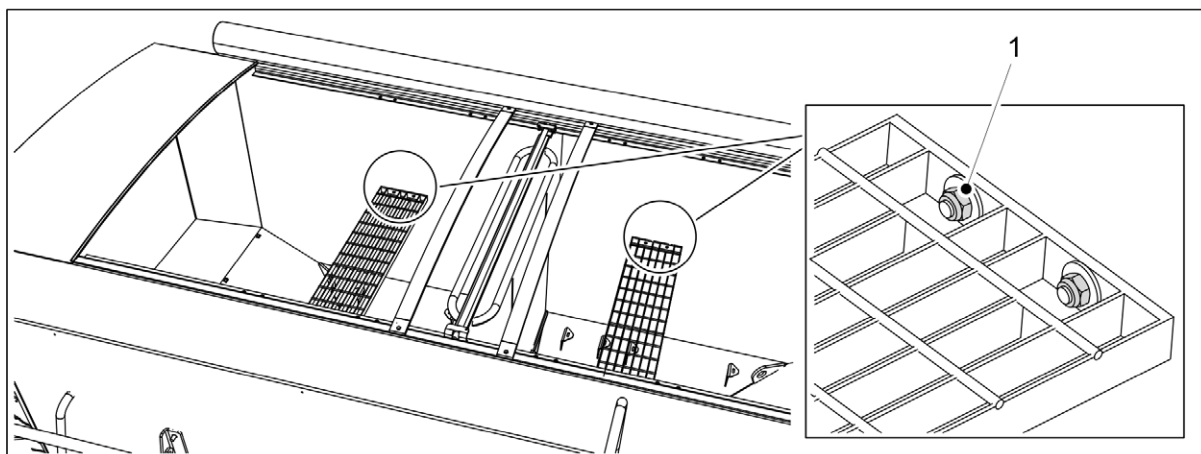


Figure. 7.1.2.4. - 110. Mounting the hopper platform to the hopper

3. Check that the nuts (1) on the hopper platform mounting bolts are tight.
 - There are four nuts on one platform.
Tighten the nuts, if needed.

7.1.2.5. Checking bolt tightness - Middle markers

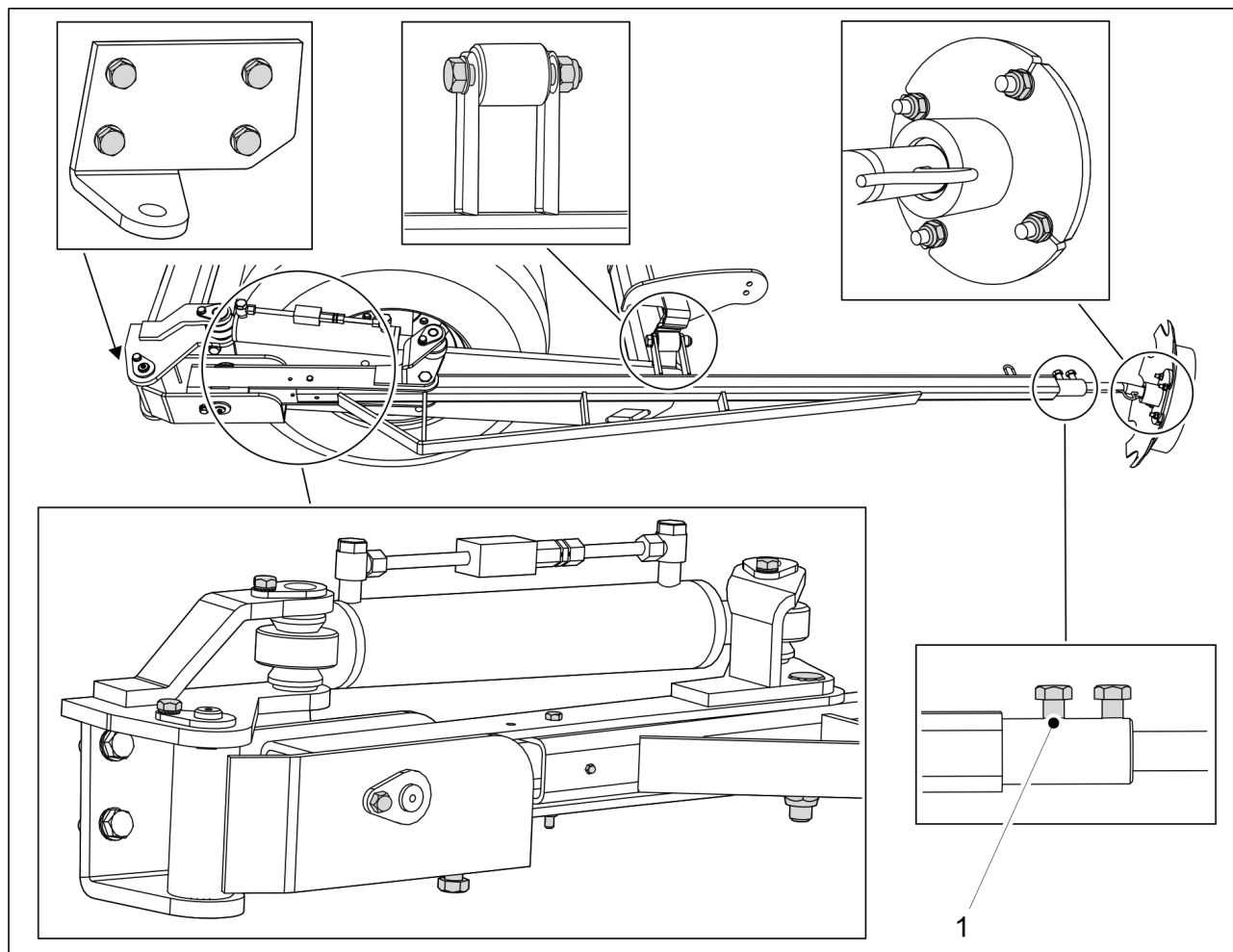


Figure. 7.1.2.5. - 111. Middle marker bolts

1. Check that the 19 bolts (1) of the towing eye are tight.
 - Tighten the bolts, if needed.

7.1.2.6. Checking bolt tightness - Coulters

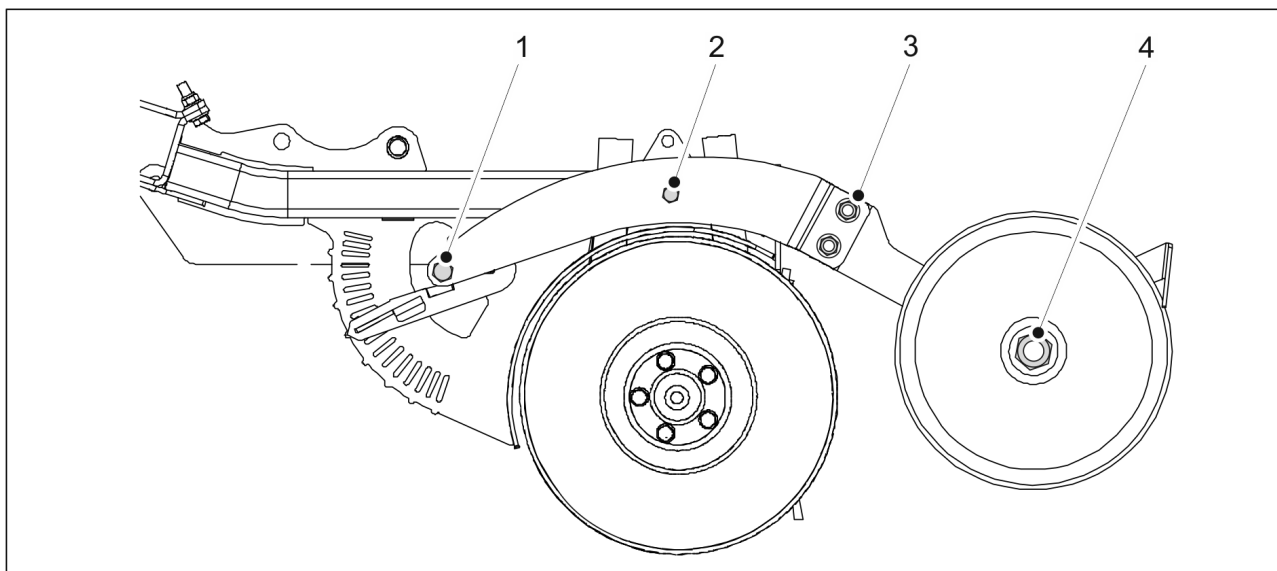


Figure. 7.1.2.6. - 112. Bolts of the coulters covering wheel and depth adjustment

1. Check that the two bolts (M16) (3) and M20 (4) on all the coulters covering wheels are tight.
 - Tighten the bolts, if needed.
2. Check that the depth adjustment bolts (M16) (1) and M12 (2) on all coulters are tight.
 - Tighten the bolts, if needed. The torque to be used on the M12 bolt (2) is 120 Nm.

7.1.2.7. Checking bolt tightness - Rear light panel

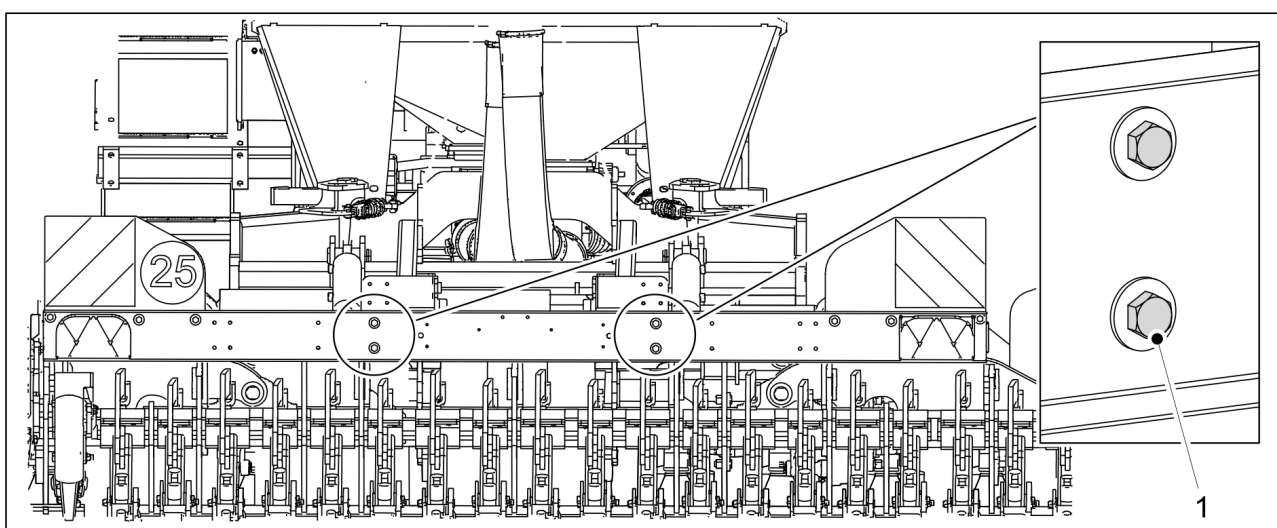


Figure. 7.1.2.7. - 113. Rear light panel mounting bolts

1. Check that the four bolts (1) of the rear light panel are tight.
 - Tighten the bolts, if needed.

7.1.2.8. Checking bolt tightness - Distributor cover

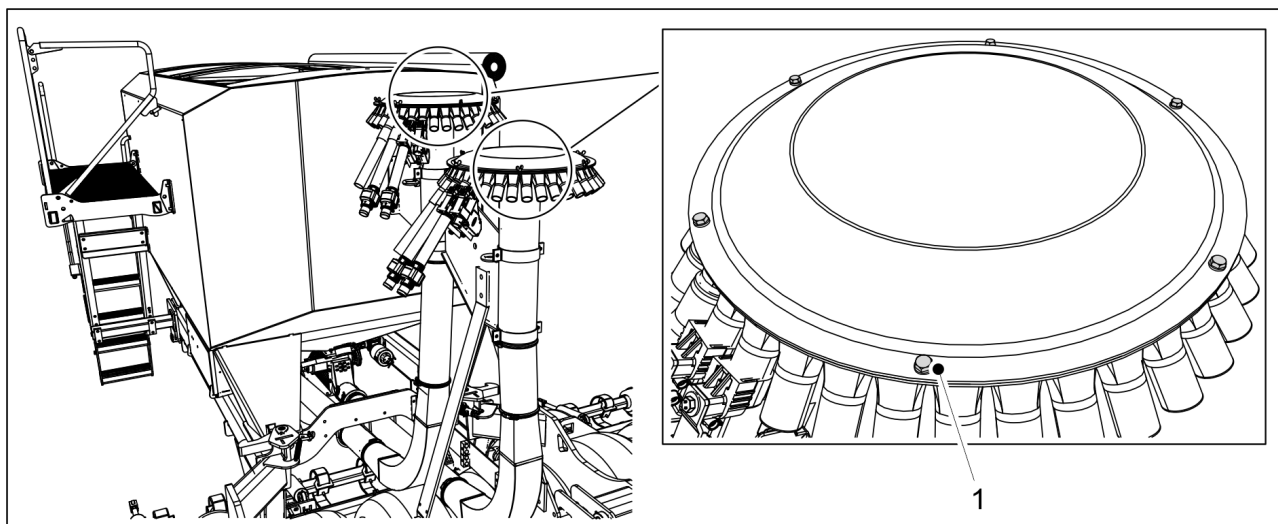


Figure. 7.1.2.8. - 114. Distributor cover mounting bolts

1. Check that the distributor cover bolts (1) are tight.
 - There are six mounting bolts on each distributor cover.
Tighten the bolts, if needed.

7.1.2.9. Checking bolt tightness - Transport wheels

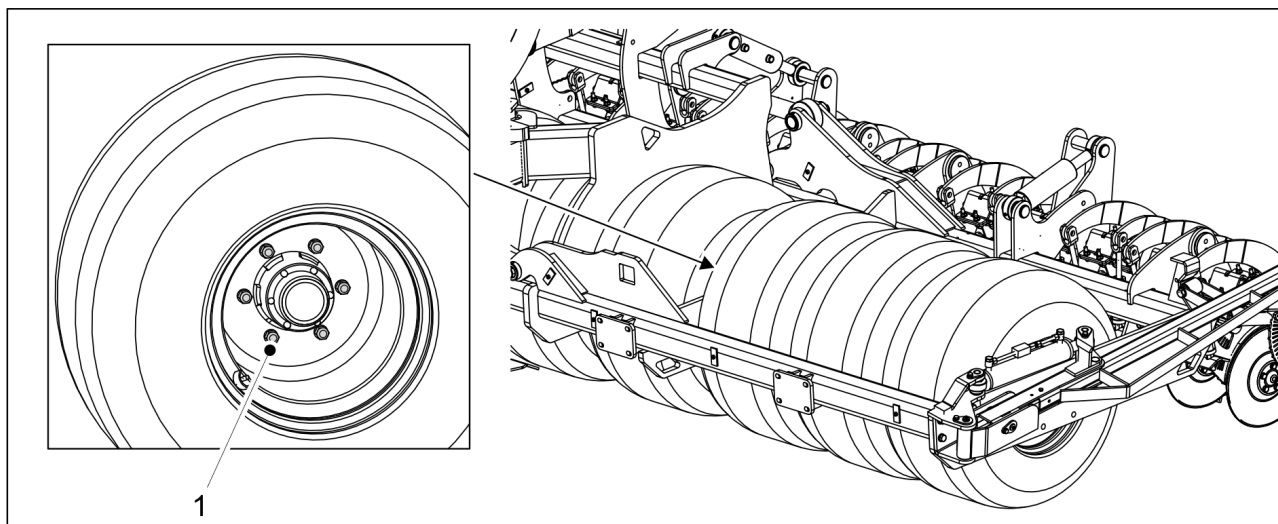


Figure. 7.1.2.9. - 115. Wheel bolts of the transport wheels

1. Check that the six nuts (1) on each transport wheel are tight.
 - Tighten the nuts, if needed.

7.1.2.10. Checking bolt tightness - Transport wheel assembly flange bearings

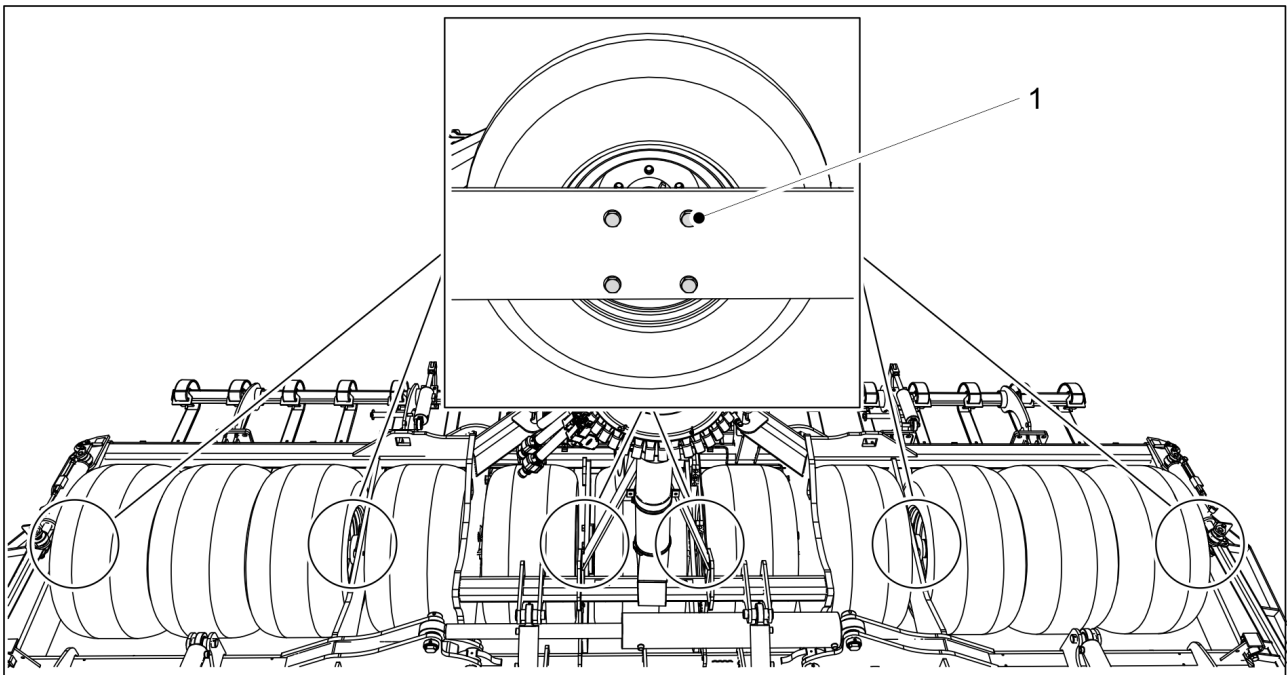


Figure. 7.1.2.10. - 116. Fastening bolts for the transport wheel assembly flange bearings

1. Check that the four fastening bolts (1) for the transport wheel assembly flange bearings are tight.
 - There are two flange bearings on each wing section.
There are two flange bearings on middle wheel of the middle section.
Tighten the bolts, if needed.

7.1.3. Checking tyre pressure

- The correct tyre pressure is 2.8 bar.

7.1.4. Checking the bearing clearance of the wheel packer hubs

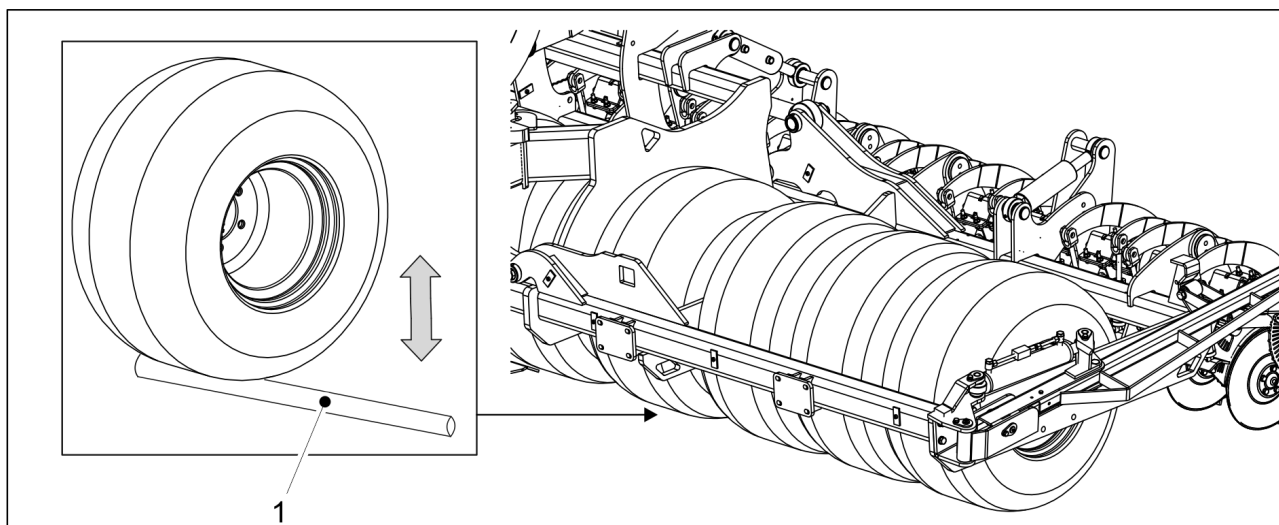


Figure. 7.1.4. - 117. Checking the bearing clearance of the wheel packer hubs

1. Insert a bar (1) between the wheel and the platform.
2. Move the bar to ensure that there is no looseness in the wheel bearing.
 - If there is looseness in the wheel hub bearing, tighten the bearing in accordance with [7.4.1. Tightening the bearing](#).

7.1.5. Checking the condition of hydraulics

1. Check the tightness of the hydraulic system.
2. If needed, tighten the connections.
3. Make sure that the hydraulic hoses are intact and have no leaks.
 - If necessary, contact maintenance.

7.1.6. Checking the condition of electric wires

1. Ensure that the insulation of the wires is not worn and that the wires are visible.
2. Ensure that the insulation of the wires have not melted and have no signs of heating or burning.
 - If needed, repair by using, for example, tape as additional insulation.
If a wire or leads of the wire are cut, contact maintenance.

7.1.7. Inspecting the towing eye

1. Check that the towing eye is not too worn.

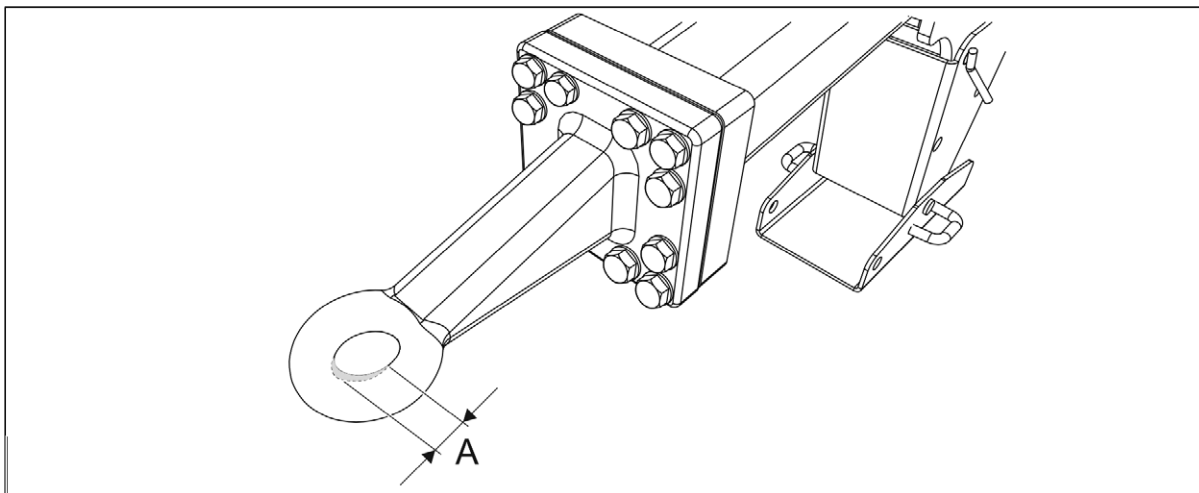


Figure. 7.1.7. - 118. Wear in the towing eye

- The maximum wear (A) is 2.5 mm. The maximum size for the opening is 52.5 mm.
2. Check that there are no fractures in the towing eye.
- If necessary, replace the towing eye in accordance with section [7.5.1. Replacing the towing eye](#).

7.1.8. Checking the wing section locking function

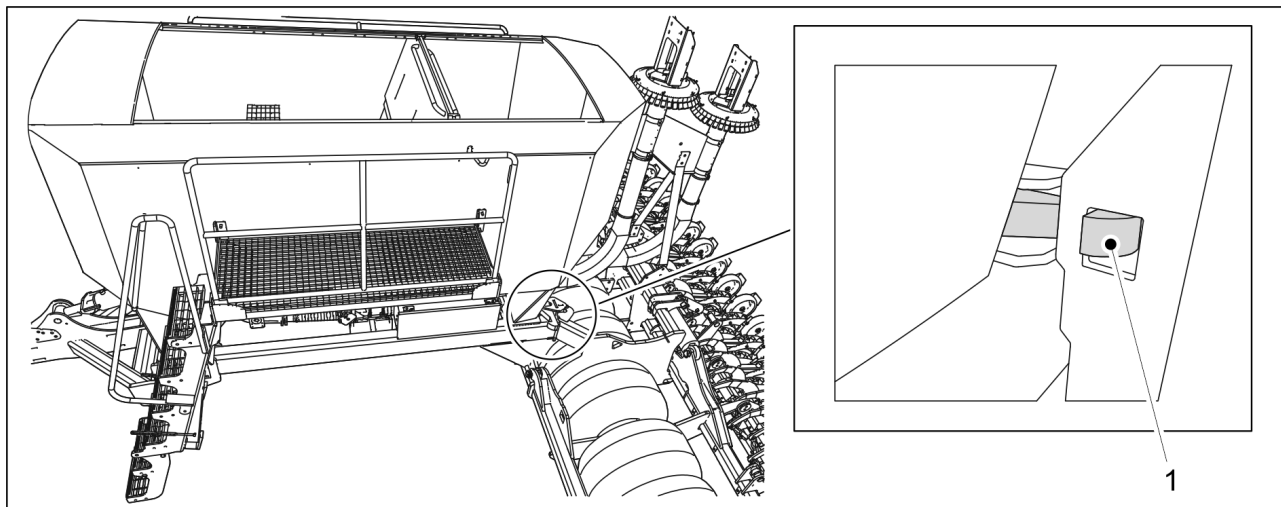


Figure. 7.1.8. - 119. Wing section locking

1. Ensure that the latch (1) of the lock is fully seated in the notch located in the wing section.
2. If the latch fails to seat in the notch properly, remove any soil accumulated between the latch and the notch.
 - If the locking still does not work, contact authorised maintenance.

7.1.9. Inspecting the coultter discs

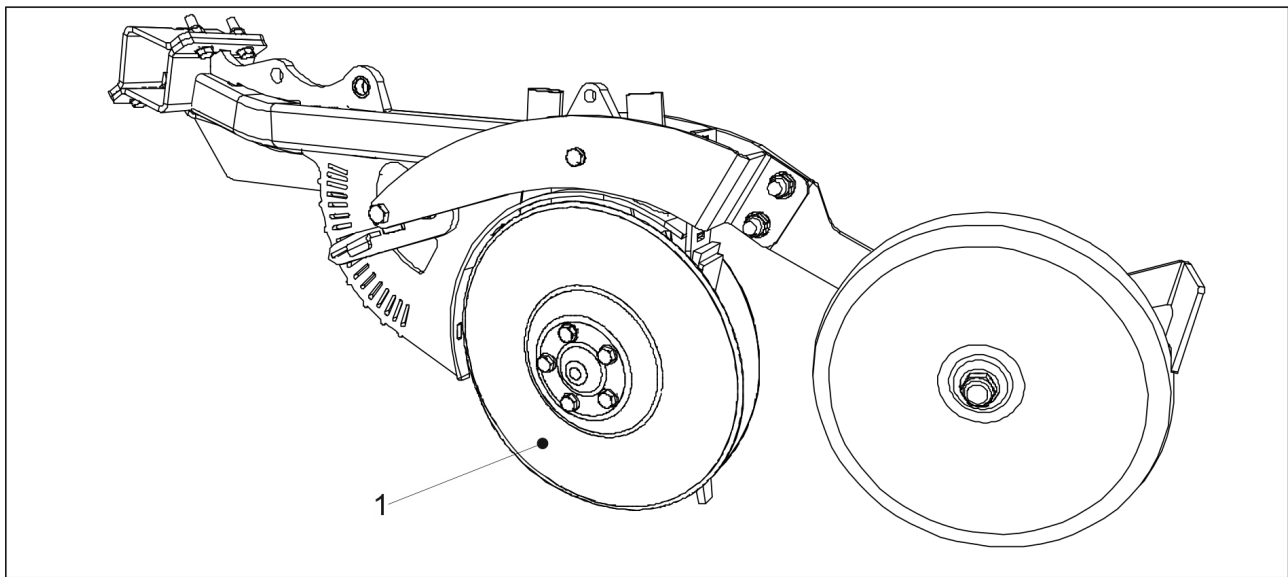


Figure. 7.1.9. - 120. Coultter discs

1. Check that the movement of discs (1) in relation to one another is slightly restrained and no clearance is felt in the bearing when turning a disc from the rear edge.
 - If the discs move easily in relation to one another or the bearing clearance is excessive, adjust the pretension with a shim.
If a disc does not rotate, clean the discs, if necessary, in accordance with section 7.3.3. Cleaning the coultter discs. If the disc still does not rotate, replace the disc, if needed, in accordance with section 7.6.2. Replacing a coultter disc or replace the bearing in accordance with section 7.6.3. Replacing a coultter bearing.
2. Measure the diameter of the disc.
 - The disc should be round, with a minimum diameter of 350 mm. If the diameter is less than 350 mm, replace the disc, if necessary, in accordance with section 7.6.2. Replacing a coultter disc.

7.1.10. Checking the condition of transfer hoses

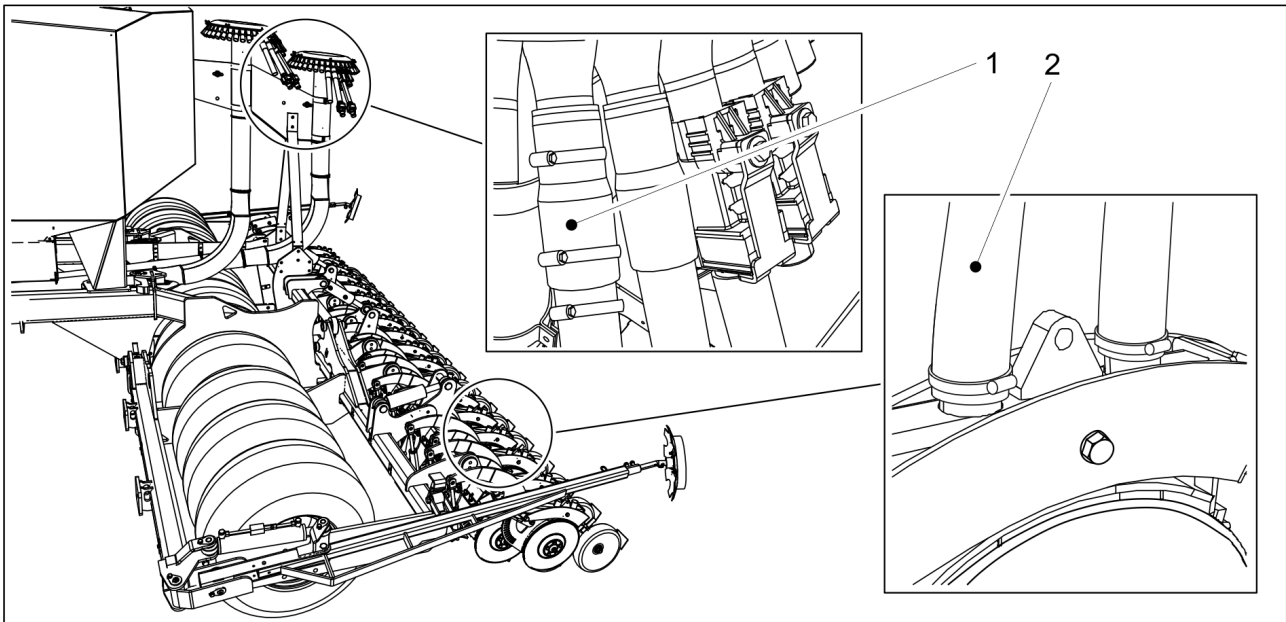


Figure. 7.1.10. - 121. Transfer hoses

1. Check that the transfer hoses (1, 2) have not worn out.
2. Check that the transfer hoses are not bent so that the cross-sectional area of the hose is reduced
3. Check that the transfer hoses have not become brittle.
 - If needed, replace the transfer hoses in accordance with section [7.7.1. Changing a transfer hose](#).
 - If needed, repair the transfer hoses in accordance with section [7.7.2. Repairing a transfer hose](#).

7.2. Lubrication

After the commissioning of the machine, all lubrication points should be lubricated after the first 10 hectares.

The disc coulters are equipped with self-lubricating bearings, which do not need to be lubricated.

When lubricating, make sure that the grease nipple is open. Lubricate the point until grease flows out of the joint. Usually, 1- 2 squeezes of a grease gun is enough for the grease nipples. Wipe off excess grease. Use lithium-based lubricating grease for lubrication. The use of viscous, long-fibre grease and grease containing solid lubricant particles (molybdenum sulphide and graphite) is prohibited.

7.2.1. Quick instructions, lubrication

Table. 7.2.1. - 13. Lubrication points

	Every 500 hectares or once per operating season	Number of lubricating nipples in the machine (pcs)
<u>7.2.2. Lubricating the wheel axle bearings</u>	X	6
<u>7.2.3. Lubricating the wing section cylinder</u>	X	2
<u>7.2.4. Lubricating the wing section hinges</u>	X	4
<u>7.2.5. Lubricating the wing section locking</u>	X	2
<u>7.2.6. Lubricating the towing eye</u>	X	1
<u>7.2.7. Lubricating the middle markers and middle marker cylinders</u>	X	4
<u>7.2.8. Lubricating the coulter cylinders</u>	X	4

7.2.2. Lubricating the wheel axle bearings

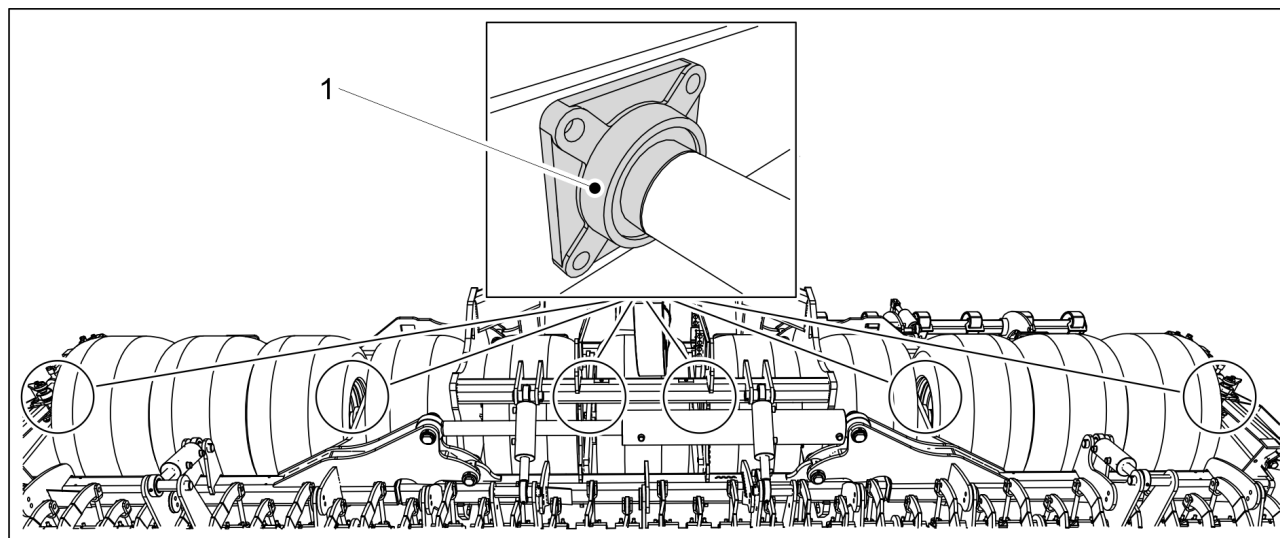


Figure. 7.2.2. - 122. Wheel axle bearings

1. Lubricate the six wheel axle bearings (1).

7.2.3. Lubricating the wing section cylinder

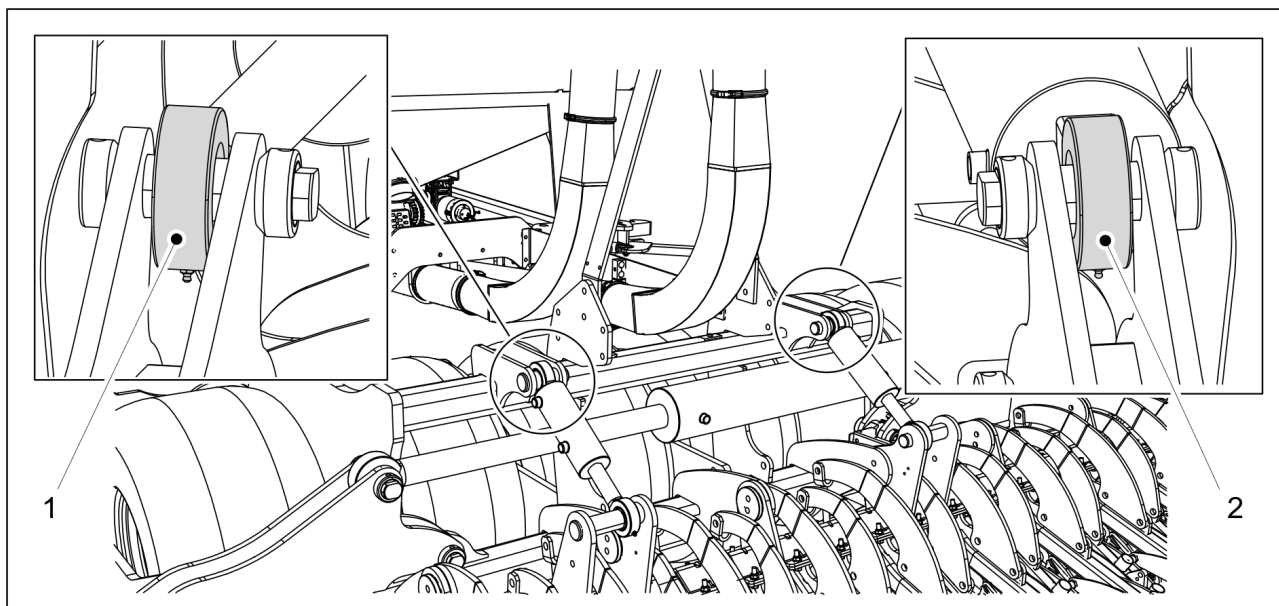


Figure. 7.2.3. - 123. Wing section cylinder articulation bearings

1. Lubricate the articulation bearings (1, 2) at both ends of the cylinder.

7.2.4. Lubricating the wing section hinges

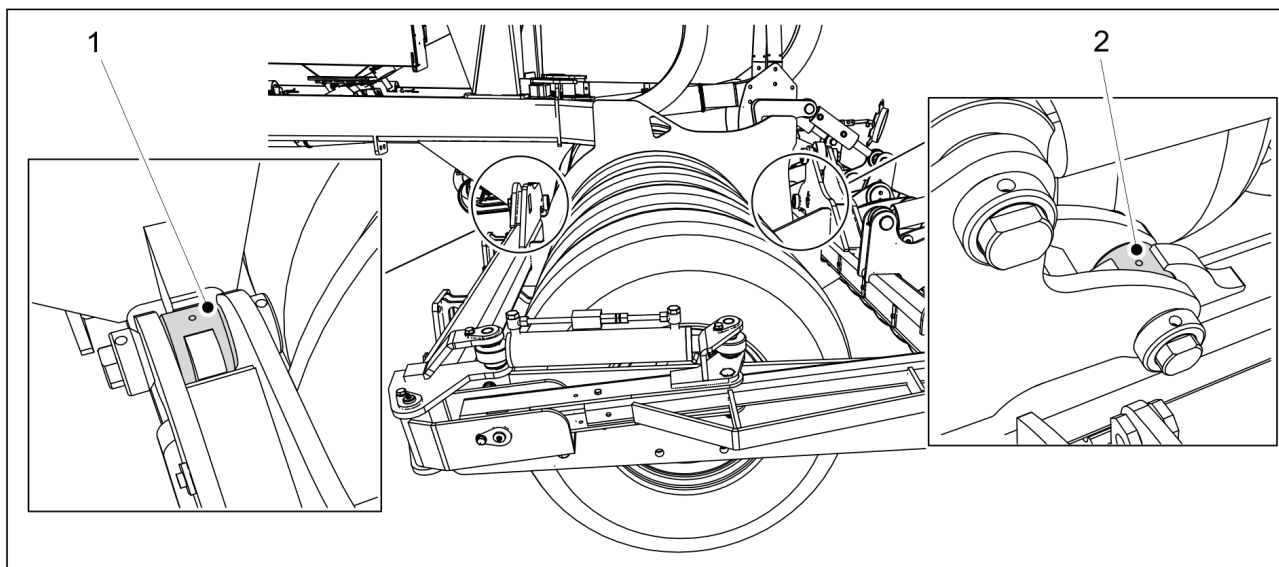


Figure. 7.2.4. - 124. Wing section hinges

1. Lubricate the four joints (1, 2) on both wing sections.

7.2.5. Lubricating the wing section locking

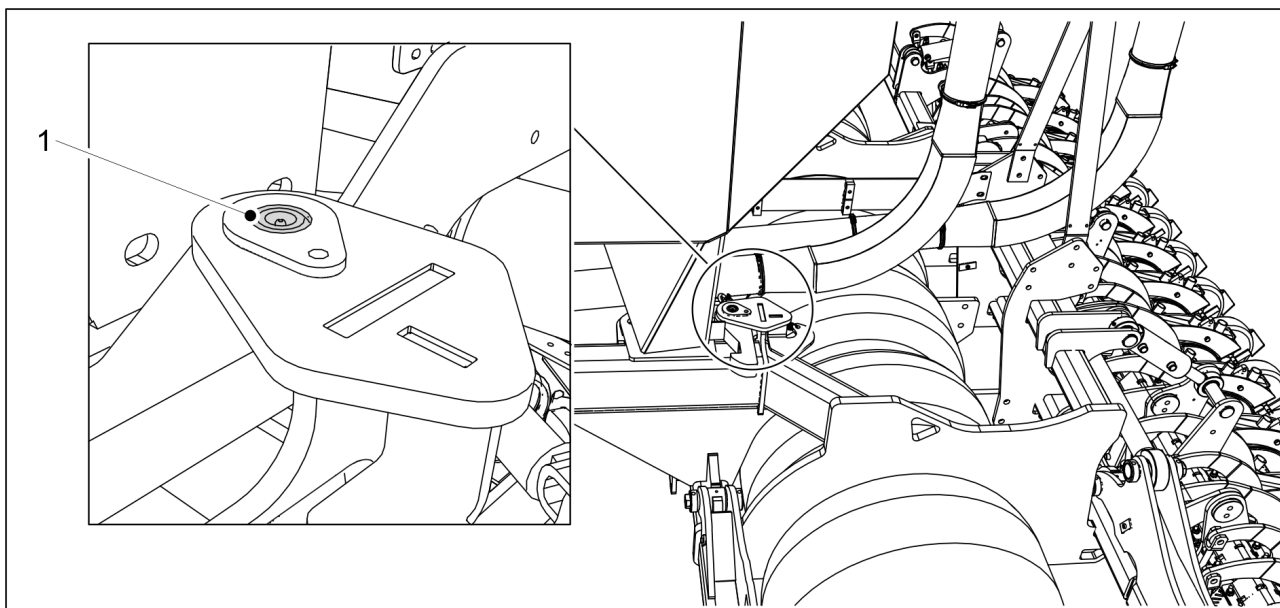


Figure. 7.2.5. - 125. Wing section locking

1. Lubricate the two latches (1) on both wing sections.

7.2.6. Lubricating the towing eye

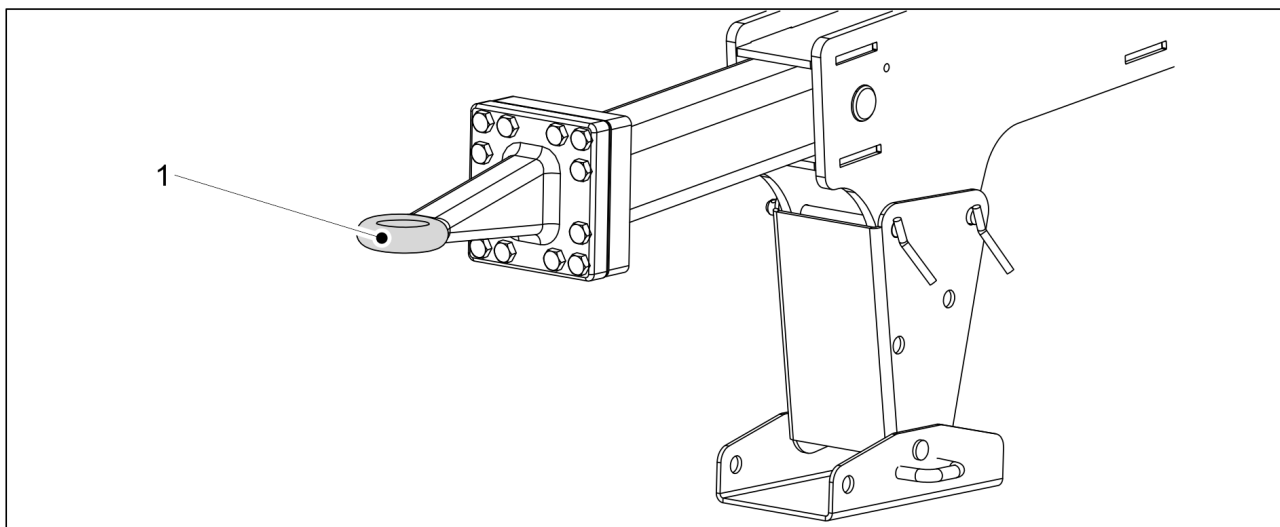


Figure. 7.2.6. - 126. Towing eye

1. Clean the towing eye (1) by wiping it.
2. Apply lubricant on the towing eye.

7.2.7. Lubricating the middle markers and middle marker cylinders

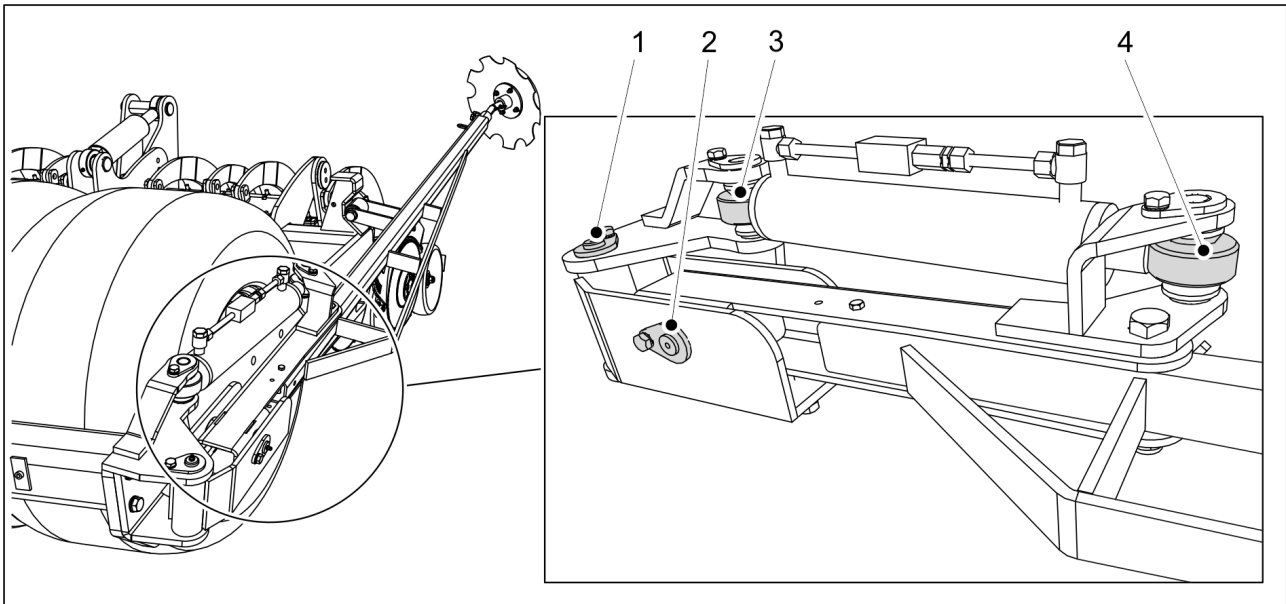


Figure. 7.2.7. - 127. Lubricating the middle markers

1. Lubricate the joint shafts (1, 2) and cylinder ends (3, 4) of both middle markers.

7.2.8. Lubricating the coulter cylinders

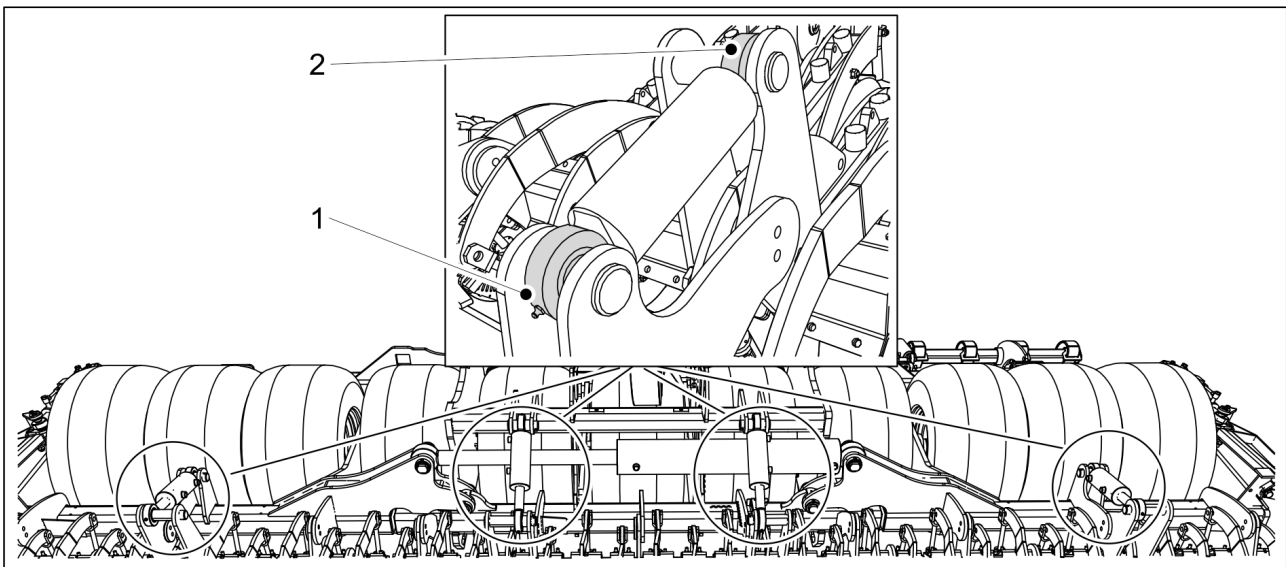


Figure. 7.2.8. - 128. Coulter cylinders

1. Lubricate both ends of the cylinder (1, 2).
 - There are four coulter cylinders.

7.3. Cleaning

7.3.1. Cleaning the hopper

- Wear protective goggles and protective gloves when cleaning the hoppers. Clean the small seed hopper when the variety to be seeded changes and at the end of the seeding season. Clean the fertiliser hopper at the end of the seeding season.

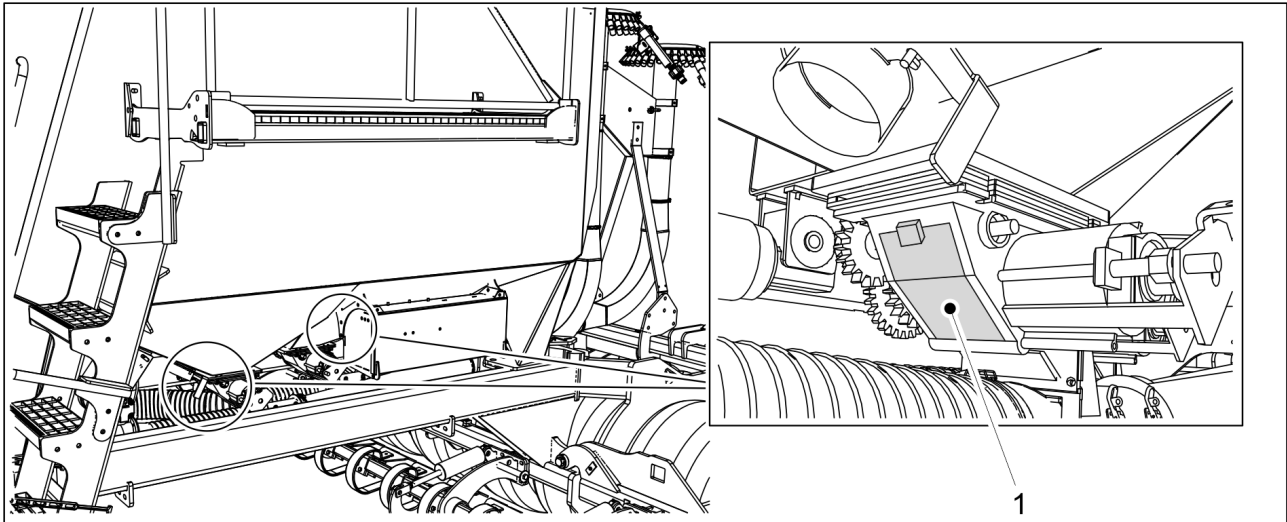


Figure. 7.3.1. - 129. Feeder inspection hatch

1. Open the feeder inspection hatch (1).
 - There is a separate feeder for fertiliser and seed.

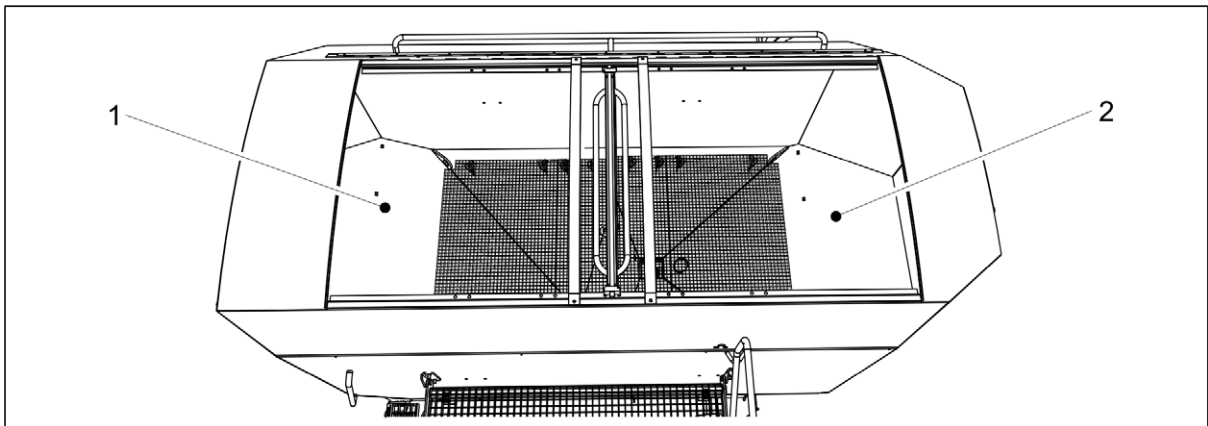


Figure. 7.3.1. - 130. Cleaning the hoppers

2. Clean the fertiliser hopper (1) and seed hopper (2) using a brush and compressed air.
3. If needed, clean the hopper with a pressure washer.



CAUTION

Pay special attention to the fertiliser hopper corners. Dissolving fertiliser will corrode paint and steel over time.

- Use a mild detergent to clean the components
4. Dry the hopper with pressurised air.
 5. Close the feeder inspection hatches.

7.3.2. Cleaning the paint surface

- Wear protective goggles and protective gloves when cleaning the paint surface.
Clean the paint surface at the end of the seeding season.
1. Clean the seed drill's paint surface brushing and using pressurised air.
 2. If needed, clean the paint surface with pressure washer.
 - Use a mild detergent to clean the components

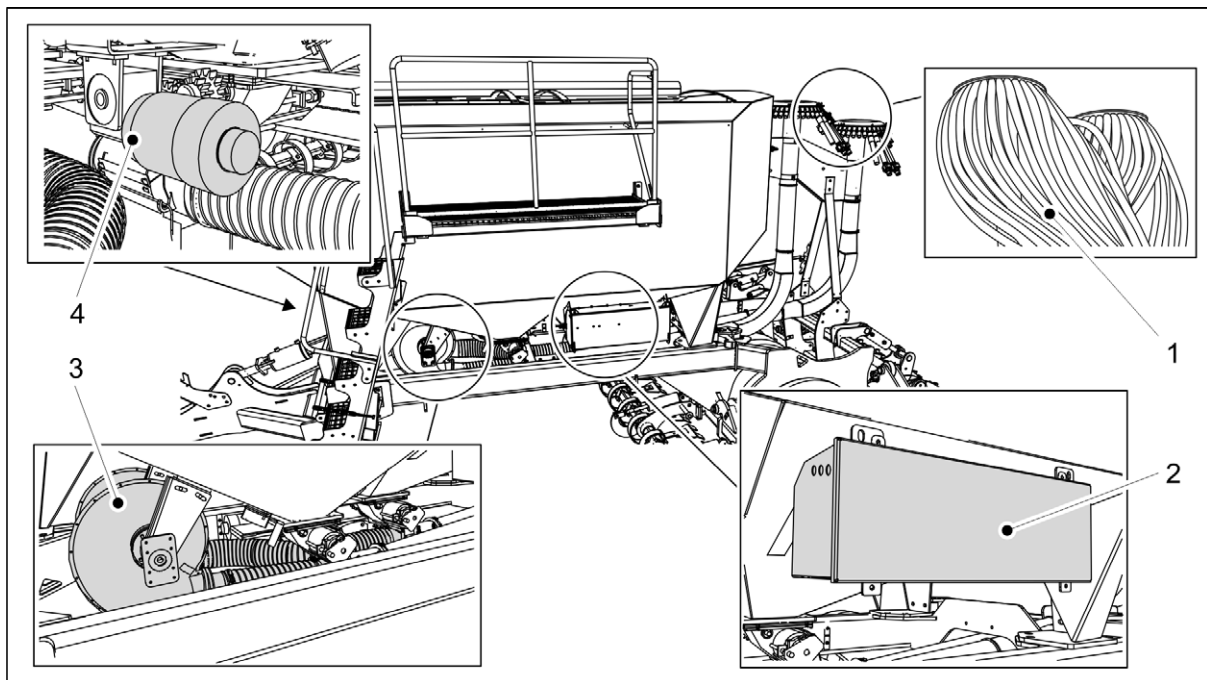


Figure. 7.3.2. - 131. Cleaning - no power washer spray



CAUTION

Do not aim the power washer spray at the splitters (1) of the fan line, the electronics box (2), the fans and transfer hoses (3) of the fan line or the electrical motors (4). Clean the components with compressed air and a damp cloth.

3. Lubricate the seed drill after washing in accordance with section [7.2. Lubrication](#).
4. Protect the wear parts of the seed drill with preservative oil.
 - Damaged paint can be touched up after washing. The painted surface can be protected with a light application of oil, using protective oil intended for the purpose. Entry of protective oil on rubber and plastic parts should be avoided.

7.3.3. Cleaning the coulter discs

- Wear protective goggles and protective gloves when cleaning the discs of the coulters.

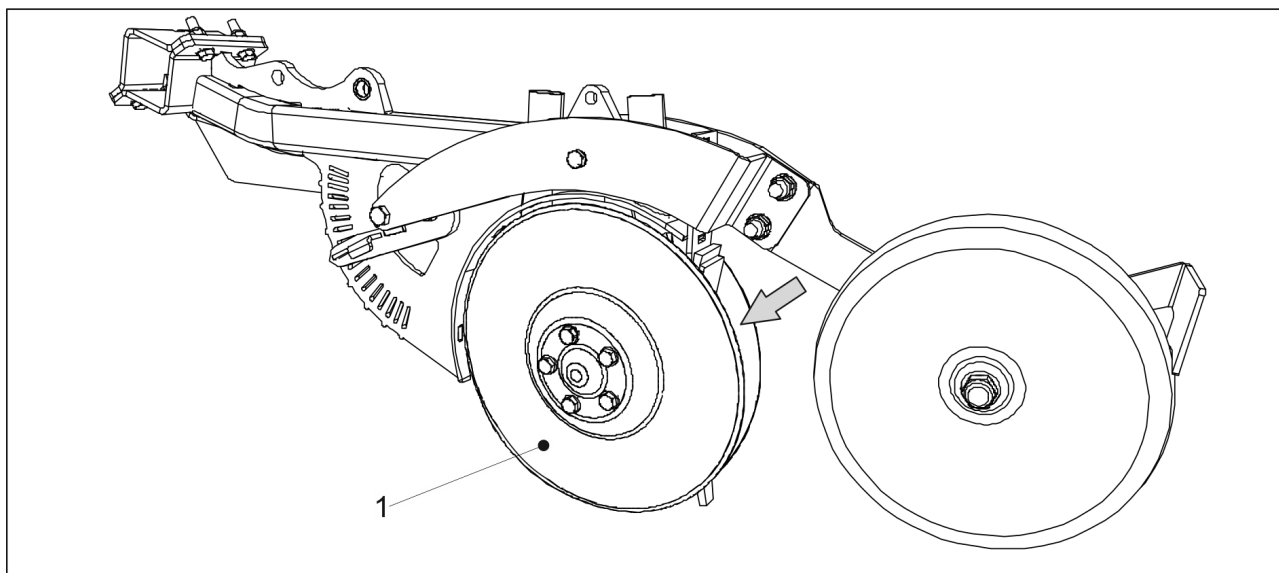


Figure. 7.3.3. - 132. Coulter discs

1. Clean the discs (1) of the coulters with a pressure washer.
 - Clean the clearance between the scraper and covering wheel as well.
2. Apply protective oil on wear parts to protect them from corrosion.
3. Once the discs are dry, turn each pair of coulter discs a few turns so that the scrapers remove the dry dirt from the inside of the discs.

7.3.4. Cleaning the feeder and feeder hoses

- Wear protective goggles and protective gloves when cleaning the feeders and feeder hoses.
Clean the feeders and feeder hoses at the end of the sowing season.
There is a separate feeder and feeder hose for fertiliser and seed.

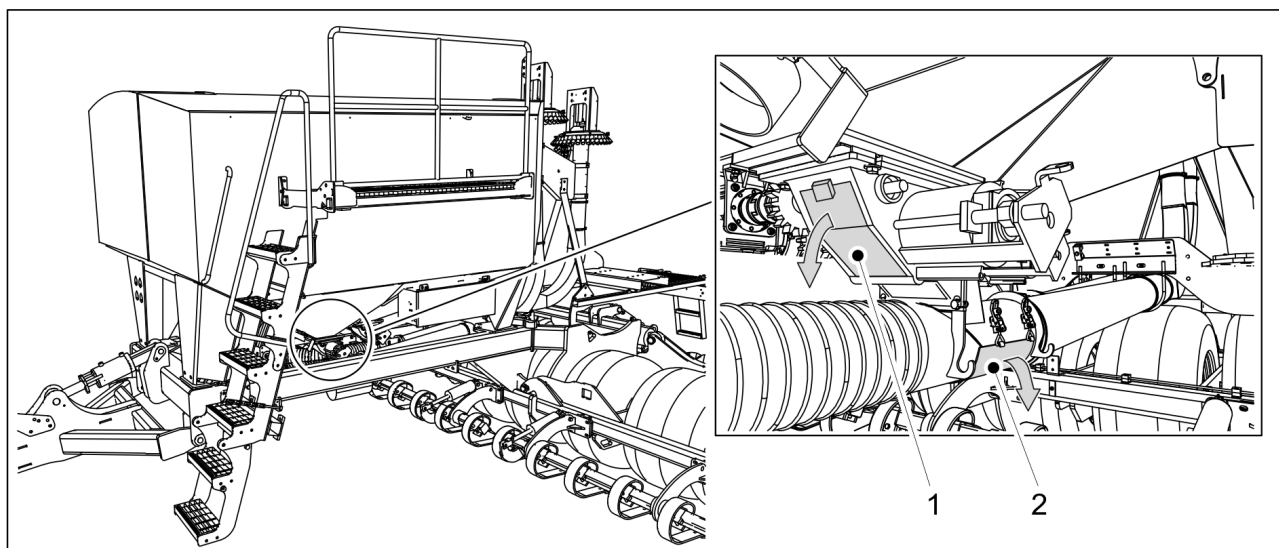


Figure. 7.3.4. - 133. Cleaning the feeder and feeder hoses

1. Open the fertiliser feeder inspection hatch (1) and calibration test hatch (2).
2. Clean the feeder and feeder hose by spraying water into the fertiliser hopper.

- The water cleans the feeder and feeder hose as it runs through the feeder.
- 3. Dry the area around the feeder and feeder hose with compressed air.
- 4. Close the fertiliser feeder inspection hatch (1) and calibration test hatch (2).
- 5. Repeat steps 1-4 on the seed feeder and feeder hose.
 - In step 2, spray the seed hopper with water.

7.4. Wheel hub bearing clearance

7.4.1. Tightening the bearing

1. Raise the tyre off the ground.

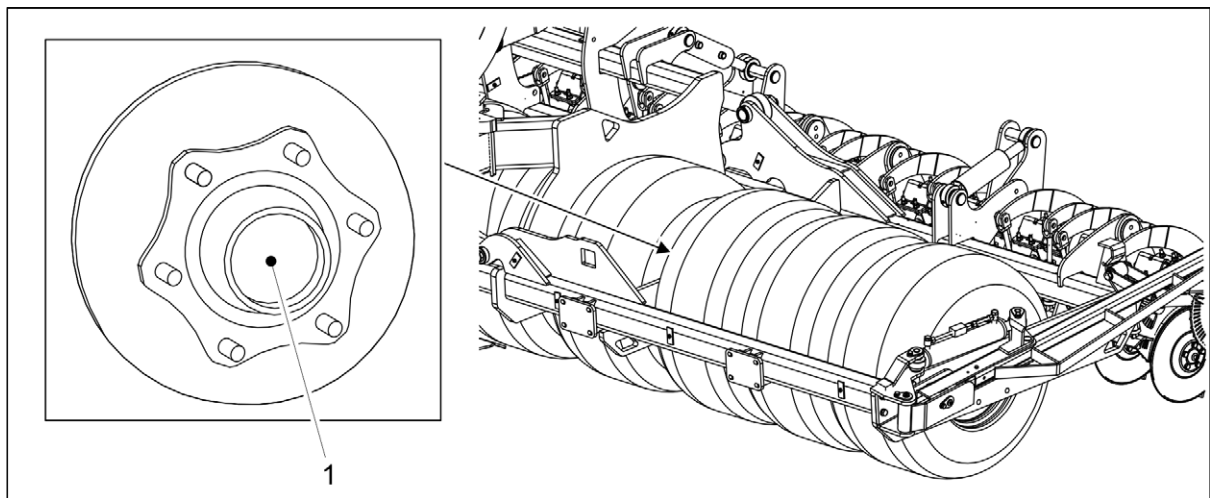


Figure. 7.4.1. - 134. Hub cap

2. Open the hub cap (1).

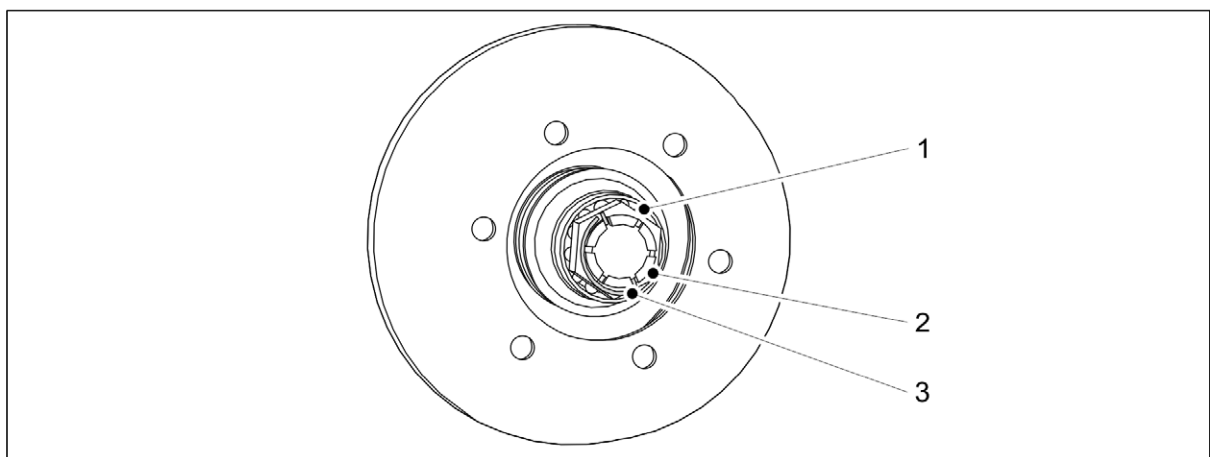


Figure. 7.4.1. - 135. Tightening the bearing of the wheel hub

3. Remove the locking pin (3) of the slotted nut (2) on the axle.
4. Tighten the nut by turning the wheel simultaneously until light resistance is felt in the bearing (1).
5. Loosen the nut until the closure pin fits into the next slot where the bearing is rotating freely.
 - If the nut is already aligned with the hole, loosen the nut to the next slot (no more than 30 degrees).

6. Lock the pin in place.
7. Fill a third of the cup's volume with lubricant and reinstall the hub cap by turning it clockwise.
 - The tightening torque is 50 Nm.

7.5. Towing eye

7.5.1. Replacing the towing eye

7.5.1.1. Detaching the towing eye

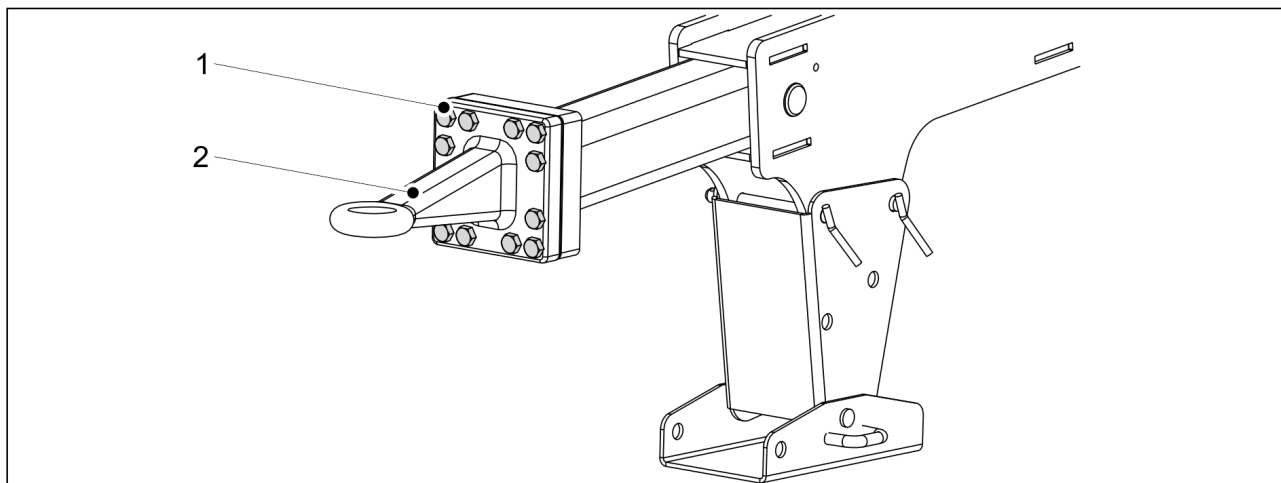


Figure. 7.5.1.1. - 136. Towing eye

1. Remove the 12 bolts (1) of the towing eye.
2. Remove the towing eye (2).

7.5.1.2. Installing the towing eye

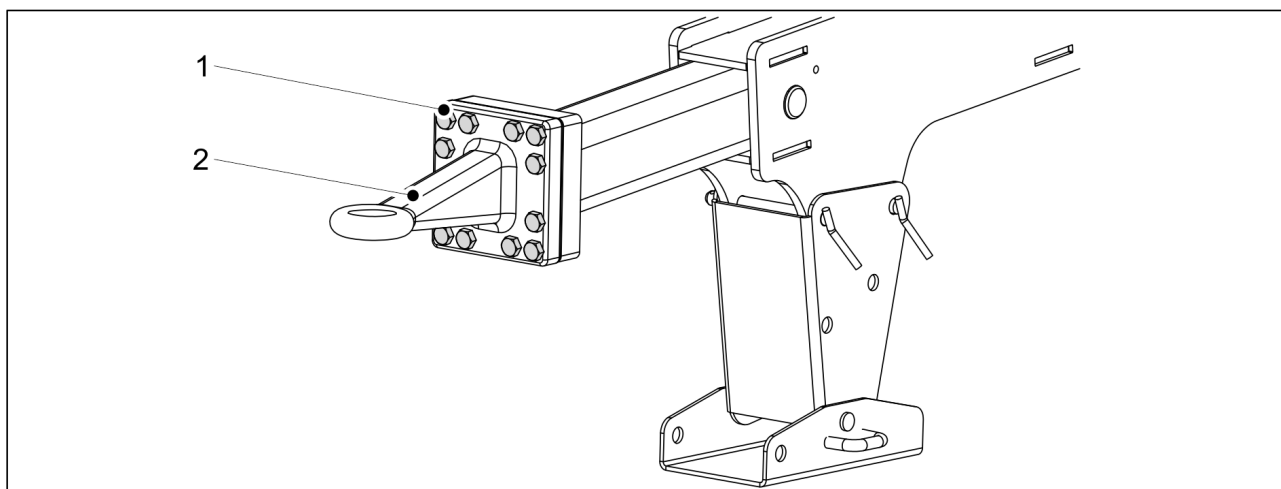


Figure. 7.5.1.2. - 137. Towing eye

1. Replace the towing eye (2).
2. Tighten the 12 bolts (1).

- The tightening torque is 400 Nm.

7.6. Coulters



DANGER

Wear protective gloves during the servicing of the coulters.

- Wash the coulters before servicing.

7.6.1. Replacing a coulter

7.6.1.1. Demounting a coulter



DANGER

Use a lifting aid to lift and move the coulter. The coulter weighs more than 60 kg and has sharp edges.



DANGER

Place stands or other support devices under the coulters before performing any maintenance.

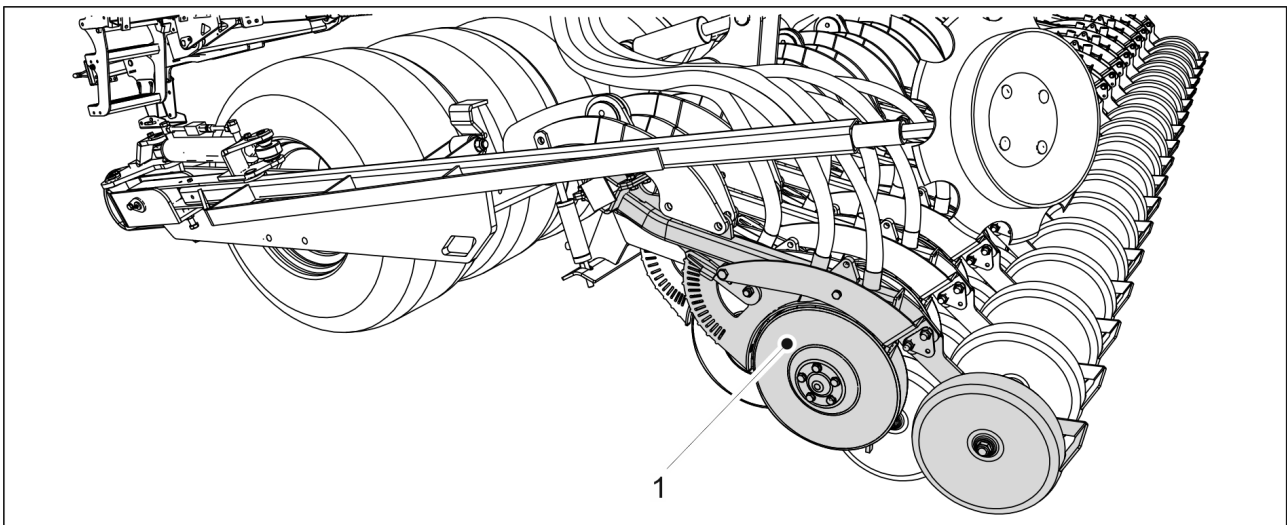


Figure. 7.6.1.1. - 138. Lowering the coulter to the ground

1. Lower the coulters to the ground and support the coulter to be demounted (1) in place.

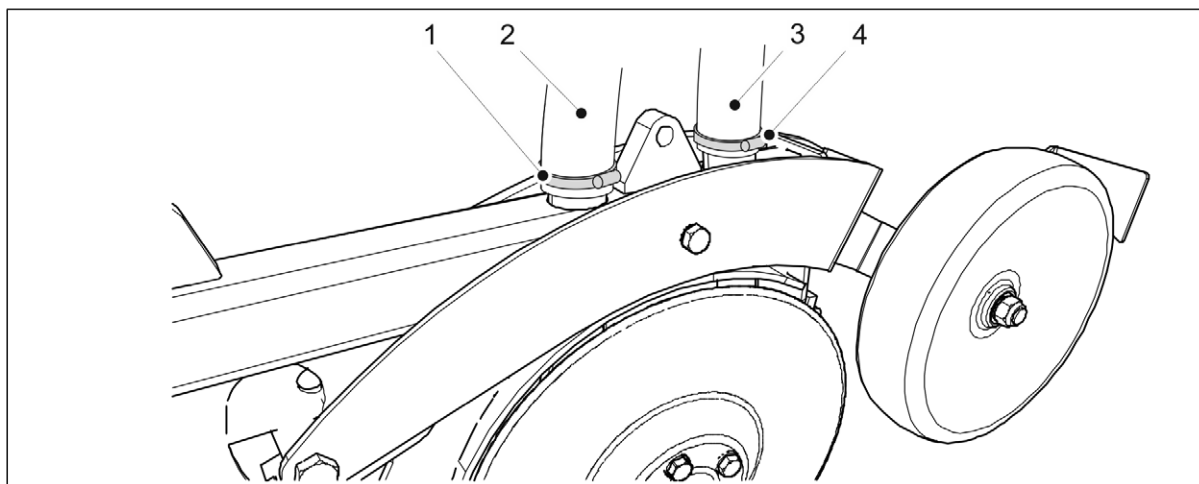


Figure. 7.6.1.1. - 139. Disconnecting coulters transfer hoses

2. Open the transfer hose (2, 3) clamps (1, 4) at the end of the coulters and pull the hoses off of the coulters.

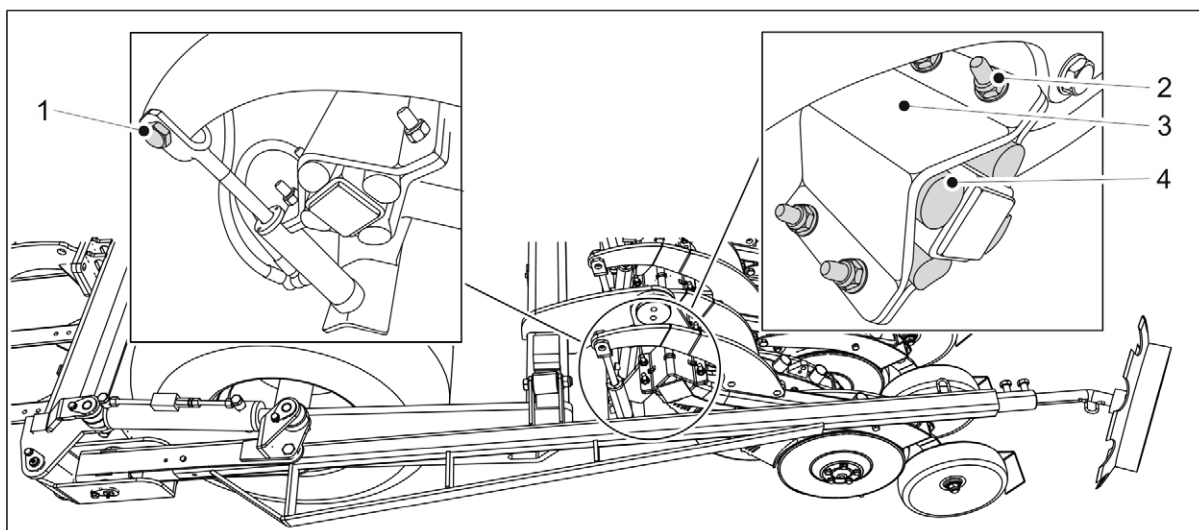


Figure. 7.6.1.1. - 140. Demounting a coulters

3. Remove the fastening bolt (1) of the coulters pressure cylinder.
4. Loosen the four fastening bolts (4) of the coulters.
 - Do not remove the bolt right away but loosen all four bolts equally.
5. Remove the bolts (2), installation plate (3) and the four dampening rubbers (4).
6. Move the coulters from its location.

7.6.1.2. Installing a coulters



DANGER

Use a lifting aid to lift and move the coulters. The coulters weighs approx. 60 kg and has sharp edges.

1. Move the coulters into place.

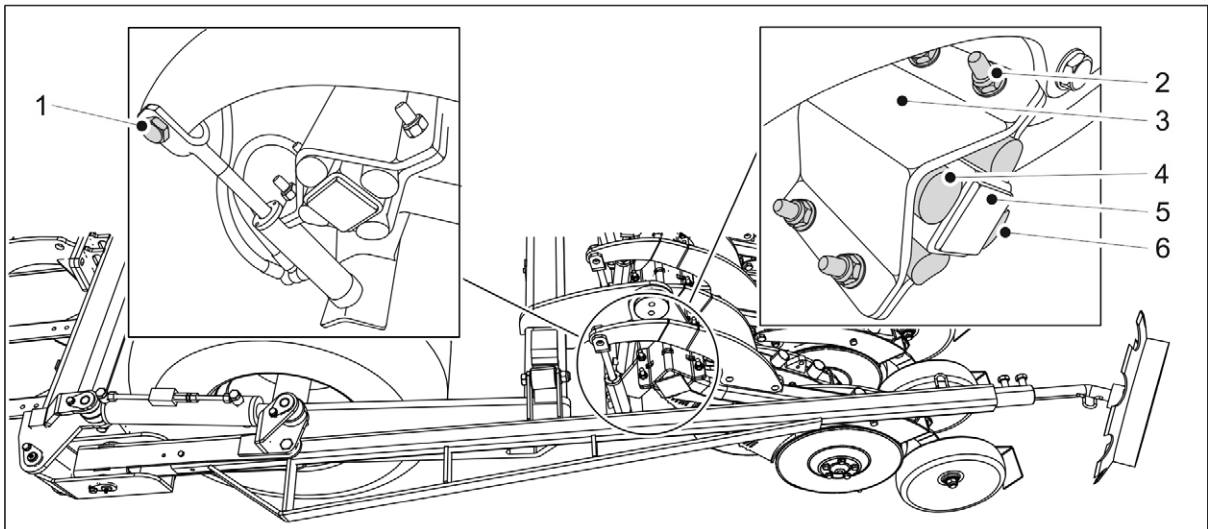


Figure. 7.6.1.2. - 141. Fastening the coulter

2. Set the lowest dampening rubber (6) in its place and lift the coulter against the mounting beam (5).
3. Install the remaining 3 rubber dampers (4).
4. Replace the washer (3).
5. Install the 4 fastening bolts and nuts (4) and tighten the bolts evenly to eliminate any gap between the mounting plates.
 - Use new locknuts with a strength rating of 10 to fasten.
6. Remove the fastening bolt (1) of the coulter pressure cylinder.
 - Use new locknuts to fasten.

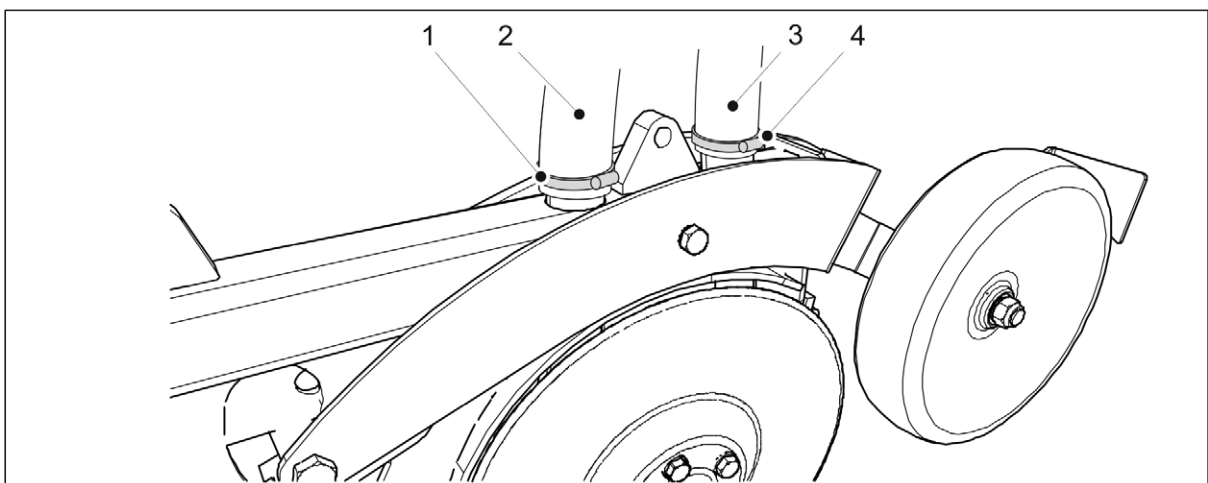


Figure. 7.6.1.2. - 142. Connecting coulter transfer hoses

7. Connect the transfer hoses (2, 3) to their appropriate positions on the coulter.
 - Looking from the front of the machine, the front transfer hose (2) comes from the fertiliser hopper and the rear hose (3) comes from the seed hopper.
8. Tighten the hose clamps (1,4).

7.6.2. Replacing a coulter disc

7.6.2.1. Detaching a disc

- If necessary, demount the coulter in accordance with section [7.6.1.1. Demounting a coulter](#).

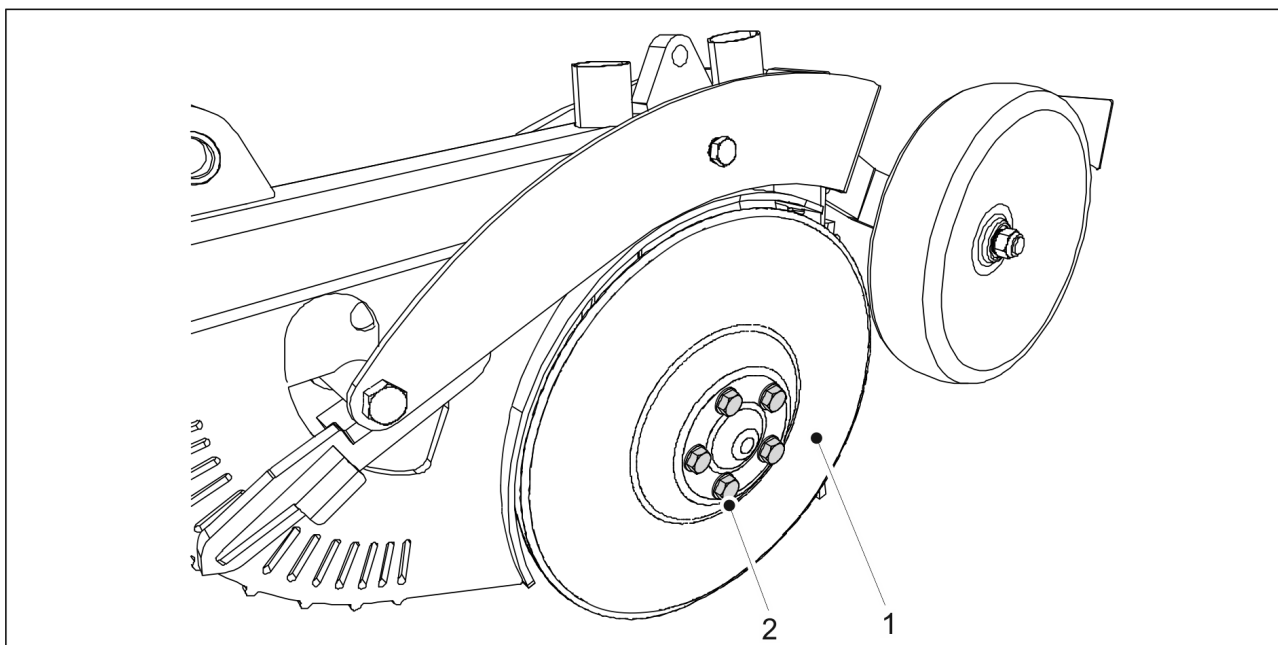


Figure. 7.6.2.1. - 143. Detaching a disc

1. Remove the mounting bolts (2) (5 pcs) of the disc (1).
 - The disc will fall off.
Replace the bearing when changing a disc.

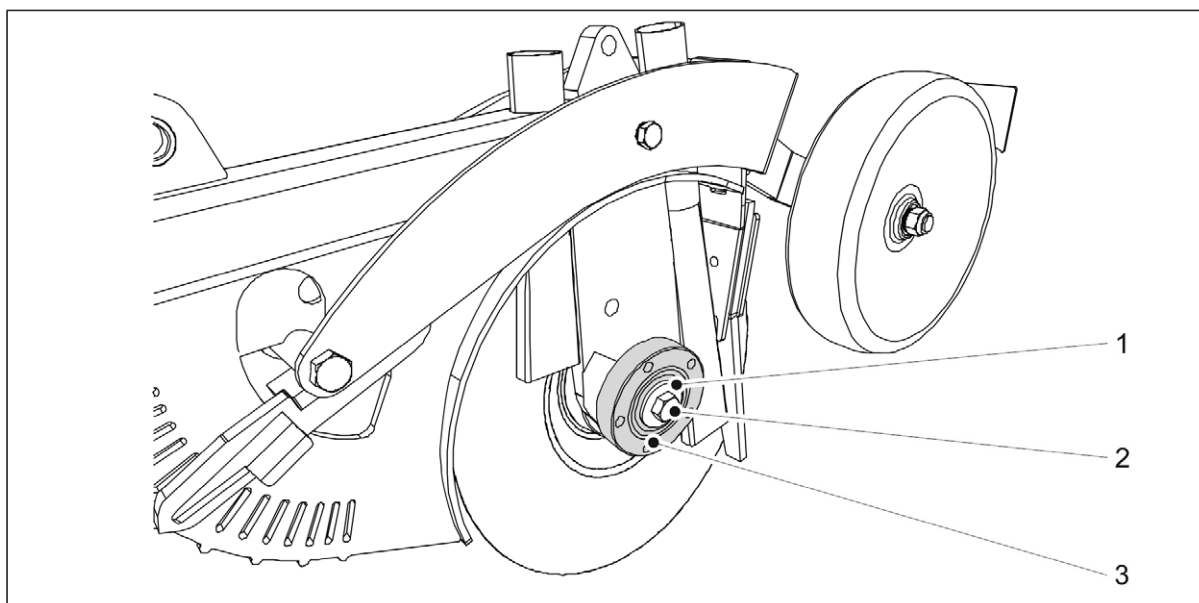


Figure. 7.6.2.1. - 144. Detaching the bearing housing

2. Loosen the bearing bolt (2) and remove the bolt and the washer (1).

- The left-side disc has a left-hand thread and the right-side disc has a right-hand thread.
3. Remove the bearing housing (3).
 - Use a puller to remove the bearing housing.

7.6.2.2. Installing a disc

- Install the bearing in accordance with section [7.6.3.2. Installing a bearing](#).

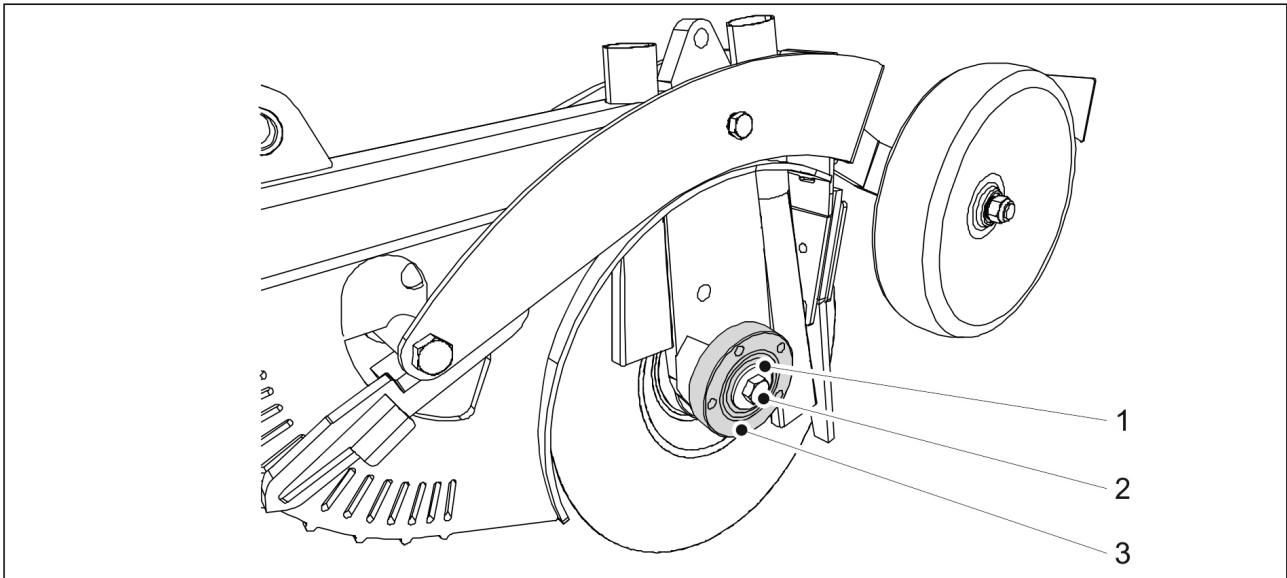


Figure. 7.6.2.2. - 145. Installing the bearing housing

1. Clean the plane surface (3) of the bearing housing.
2. Mount the bearing housing onto the coultter axle.
3. Place the M16 washer (1) and fasten the M16 bolt (2).
 - The left-side disc has a left-hand thread and the right-side disc has a right-hand thread.

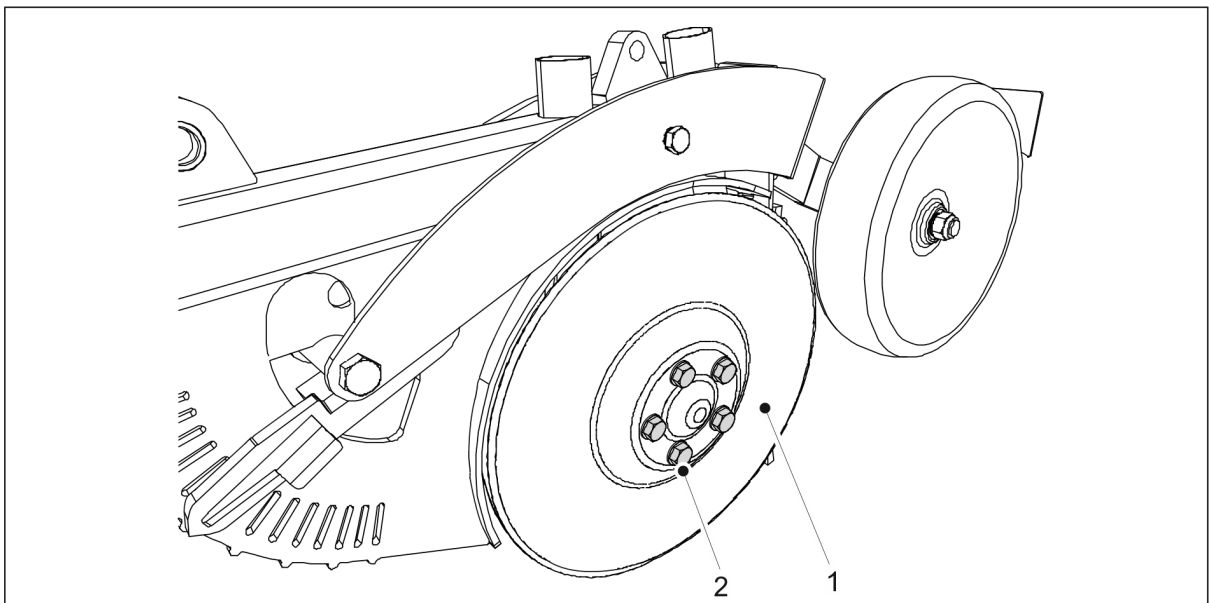


Figure. 7.6.2.2. - 146. Installing a disc

4. Mount the disc (1) onto the coultter axle.
5. Fasten the M12 x 1.5 bolts (2) (5 pcs) of the bearing cap.

7.6.3. Replacing a coultter bearing

7.6.3.1. Detaching a bearing

- Remove the coultter disc in accordance with section [7.6.1.1. Demounting a coultter](#).

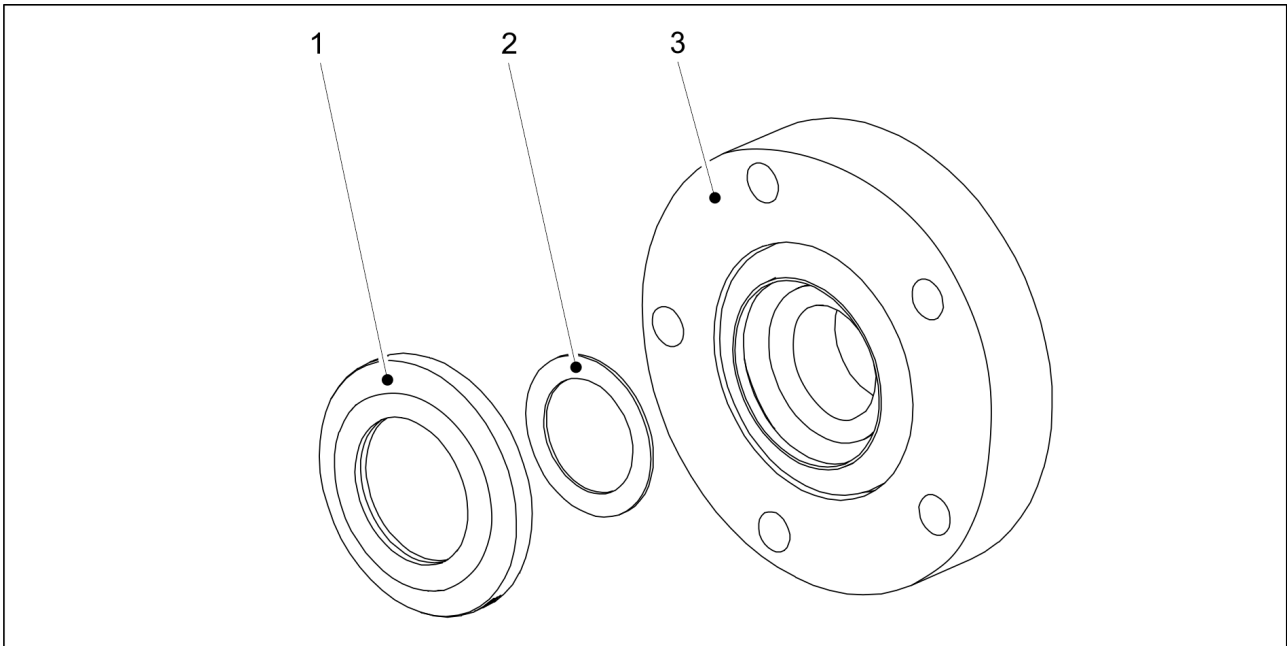


Figure. 7.6.3.1. - 147. Bearing seal and shim

1. Detach the bearing seal (1) and shim (2) from the back of the bearing housing (3).

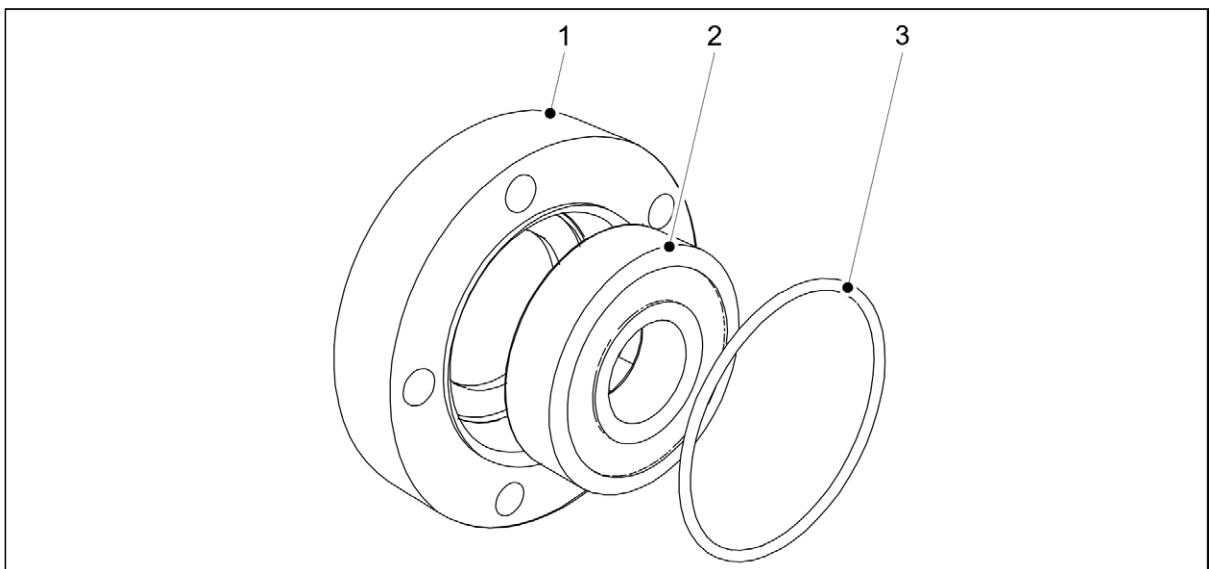


Figure. 7.6.3.1. - 148. Removing the bearing and O-ring

2. Detach the O-ring (3) from the front of the bearing.
3. Remove the bearing (2) from the bearing housing (1).
 - Detach the bearing from the back of the bearing housing using a clamp.

7.6.3.2. Installing a bearing

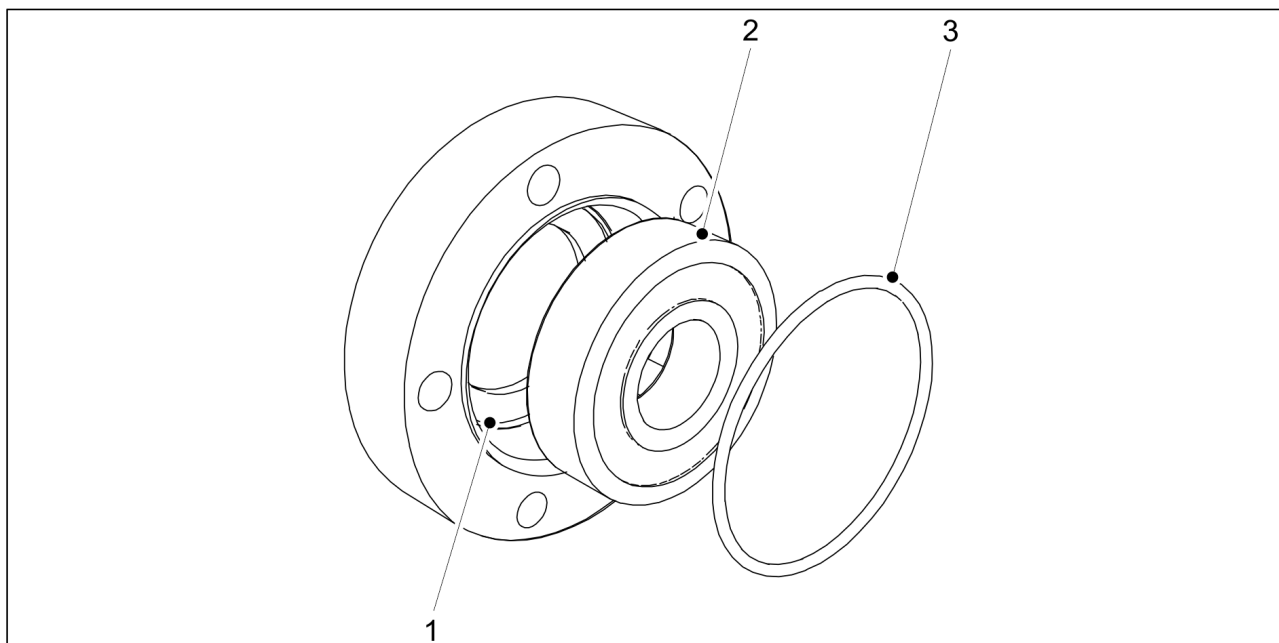


Figure. 7.6.3.2. - 149. Installing a bearing

1. Clean the bearing housing (1).
2. Install the new bearing (2).
 - Install the bearing using a clamp.
3. Replace the O-ring (3).

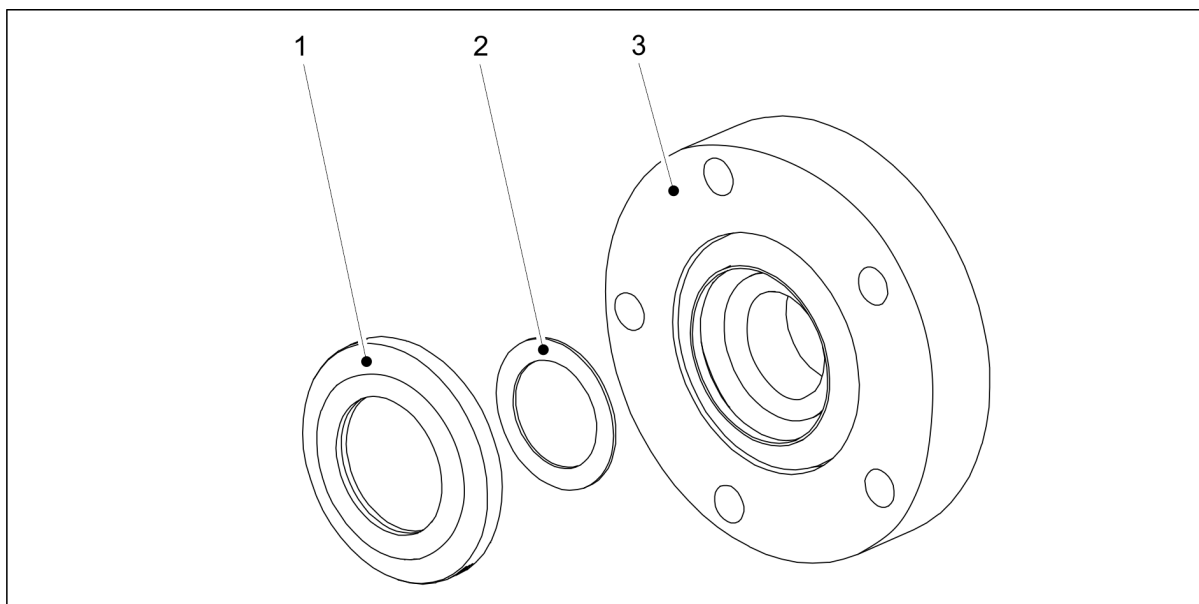


Figure. 7.6.3.2. - 150. Bearing seal and shim

4. Replace the shim (2) and bearing seal (1) in the bearing housing (3).
 - The seal should be changed when the bearing is changed.

7.6.4. Replacing the coulter covering wheel

7.6.4.1. Demounting the covering wheel

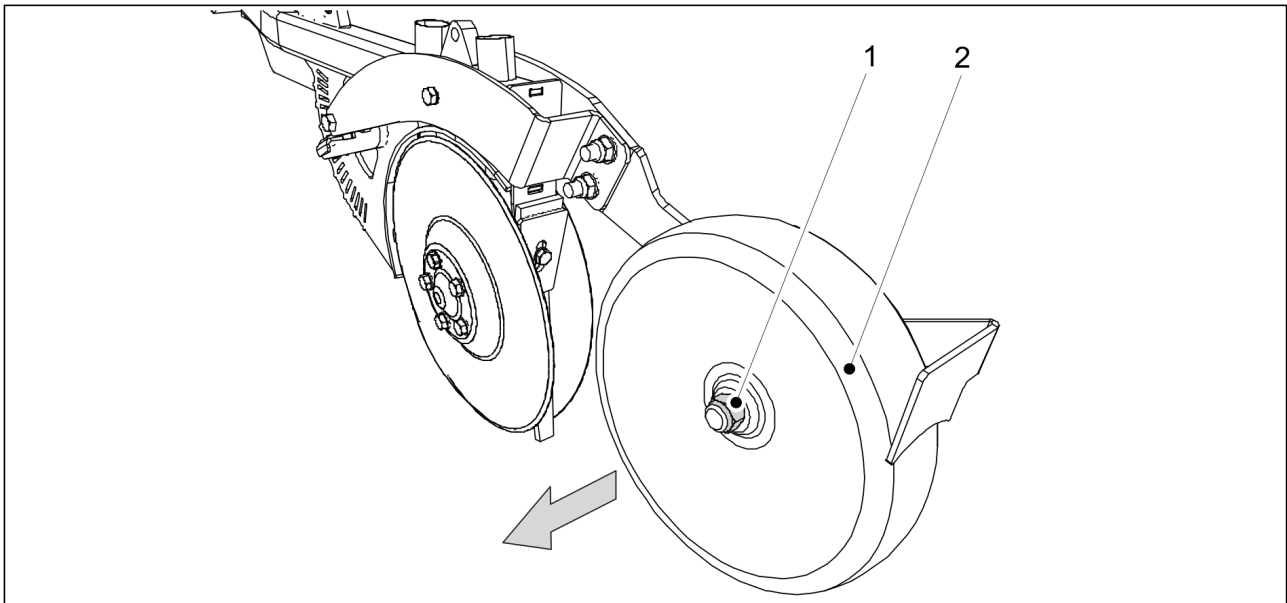


Figure. 7.6.4.1. - 151. Demounting the covering wheel

1. Remove the locknut (1) of the covering wheel (2) and pull the covering wheel off of the coulter.

7.6.4.2. Installing the covering wheel

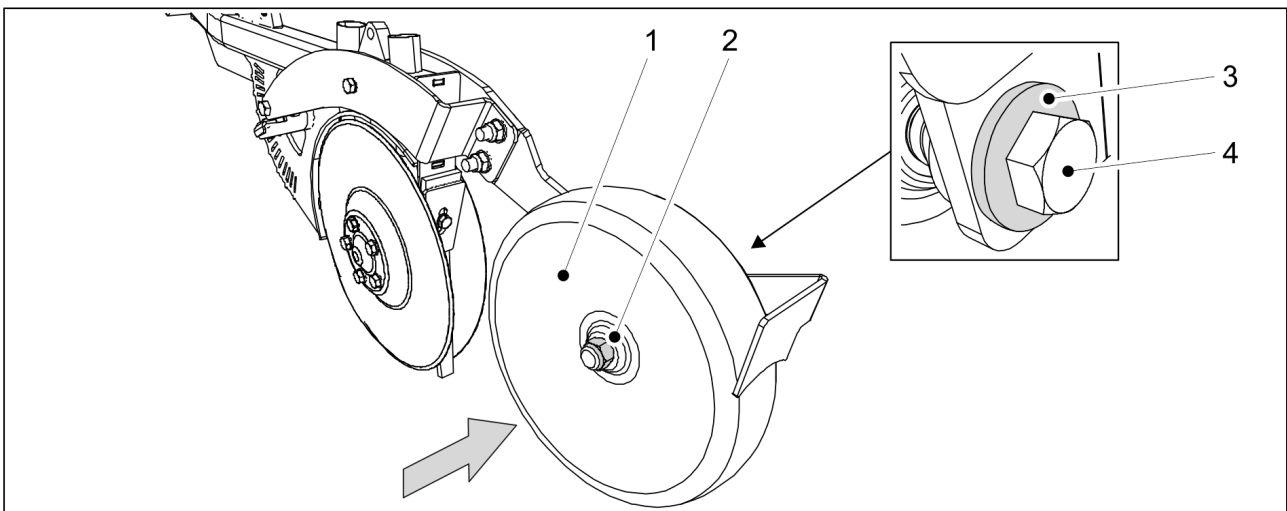


Figure. 7.6.4.2. - 152. Installing the covering wheel

1. Reattach the covering wheel (1) and fasten it with an M20 x 120 bolt (4), two M20 washers (3) and an M20 nut (2).
 - Use new locknuts when installing.

7.6.5. Adjusting the scrapers

7.6.5.1. Adjusting the disc scraper



DANGER

Use caution - the disc edges are sharp.

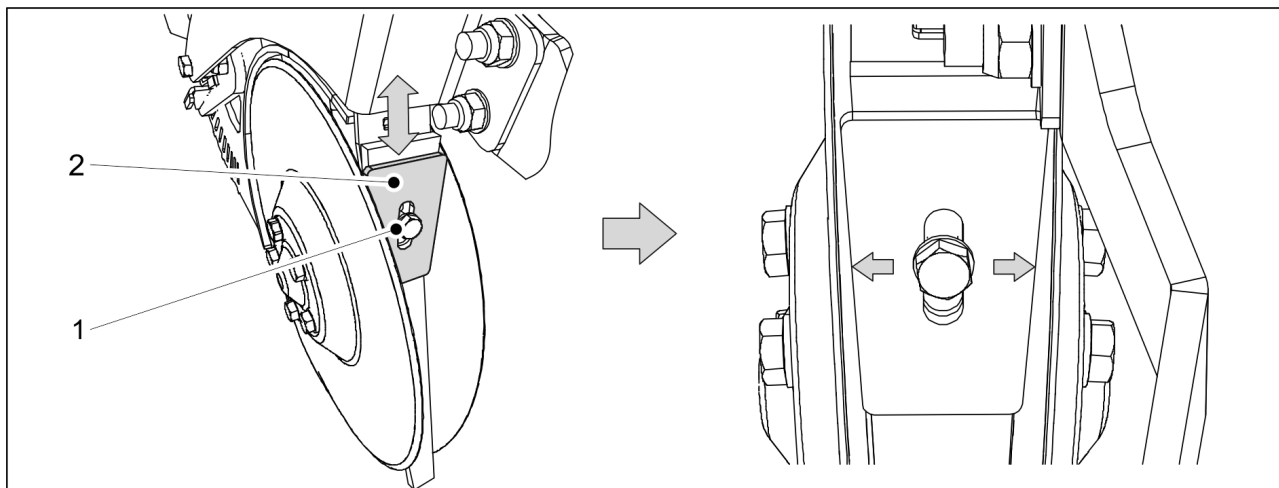


Figure. 7.6.5.1. - 153. Disc scraper

1. Loosen the bolt (1) of the scraper (2).
2. Adjust the distance between the scraper and the discs by moving the scraper up or down.
 - The scraper and inner plate under it must be kept together. Adjust the scraper and inner plate as close to the discs as possible but ensure that the disc does not make contact with the scraper or inner plate at any point. The disc must turn freely.
3. Tighten the scraper fastening bolt.

7.6.5.2. Adjusting the cover wheel scraper

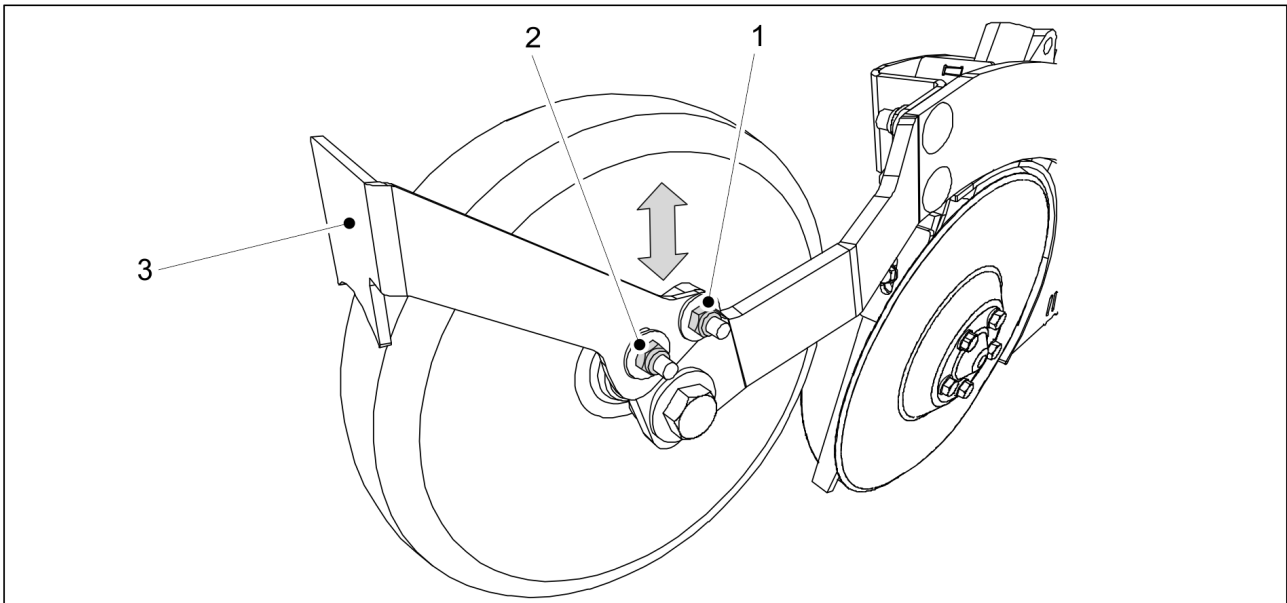


Figure. 7.6.5.2. - 154. Cover wheel scraper

1. Loosen the two fastening nuts (1, 2) of the cover wheel scraper (3)
2. Adjust the distance between the scraper and the cover wheel by moving the scraper up or down.
 - The distance between the scraper and the cover wheel should be 2- 3 mm.
3. Tighten the scraper fastening nuts.

7.7. Transfer hoses

7.7.1. Changing a transfer hose

7.7.1.1. Removing a transfer hose

1. Lower the coulter to the down position.
2. Detach the cable ties of the transfer hose to be replaced.

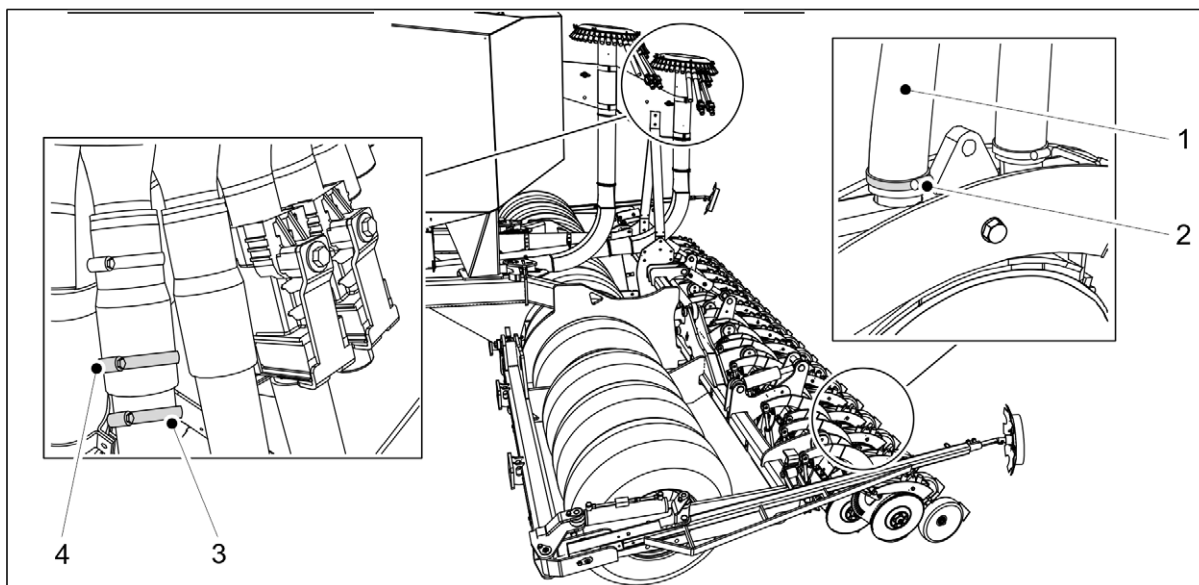


Figure. 7.7.1.1. - 155. Removing a transfer hose

3. Loosen the hose clamps (3, 4) at the top end of the transfer hose to be replaced.



DANGER

Exercise caution when climbing onto the machine or tyres during maintenance. The machine and tyres may be extremely slippery when wet and muddy.

4. Pull the transfer hose out of the top connection.
5. Remove the hose clamp from the transfer hose.
6. Loosen the hose clamp (2) at the top end of the transfer hose to be replaced.
7. Pull the transfer hose (1) out of the couler.

7.7.1.2. Connecting a transfer hose

1. Measure the length of the disconnected transfer hose.
2. Cut a piece of the new hose to the measured length.



CAUTION

Do not let the hose get dirty.

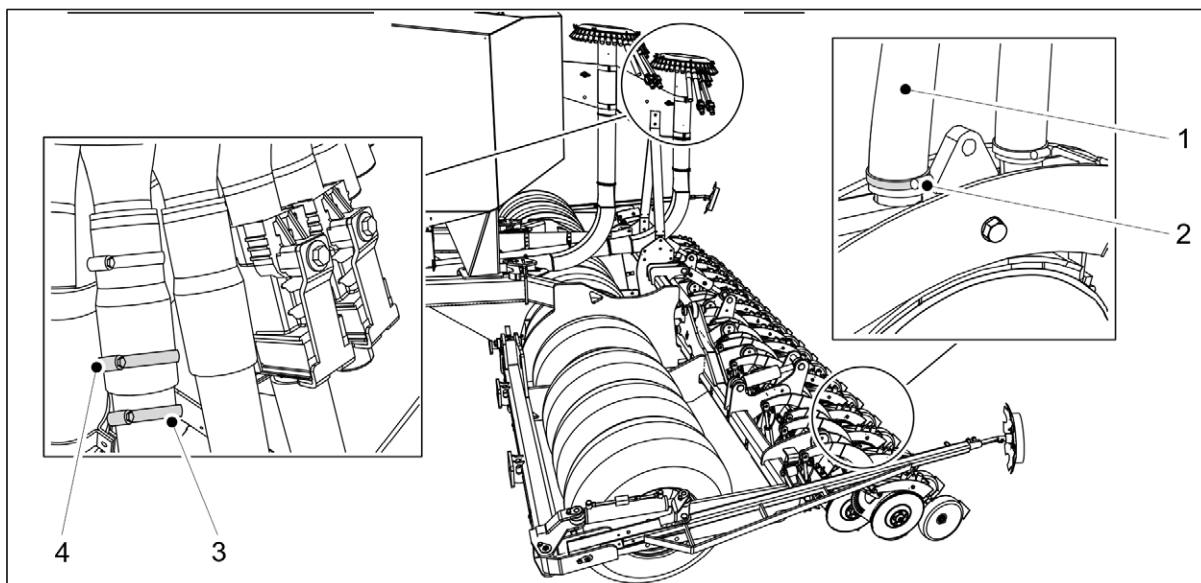


Figure. 7.7.1.2. - 156. Connecting a transfer hose

3. Insert the bottom end of the new transfer hose into the connector in the couler.
4. Tighten the hose clamp (2).
5. Insert the top end of the transfer hose into a branch of the splitter.
6. Tighten the hose clamps (3, 4) at the top end.
7. Fasten the new transfer hose to the other transfer hoses with cable ties.
 - Ensure that there are no sharp bends in the transfer hose.

7.7.2. Repairing a transfer hose

1. Lower the coulters to the down position.

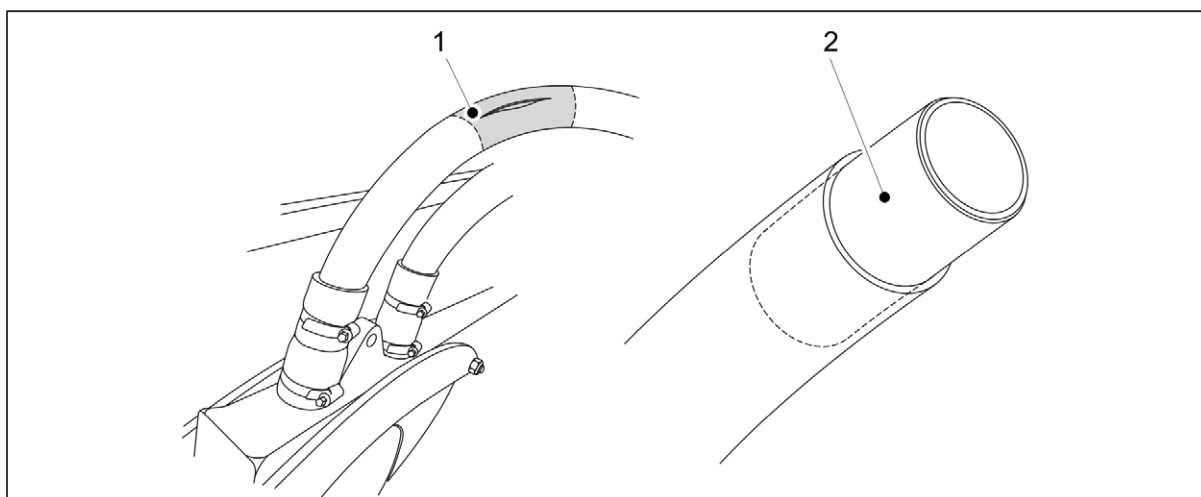


Figure. 7.7.2. - 157. Repairing a transfer hose

2. Cut the split section (1) out of the hose.
3. Place two hose clamps over the transfer hose.
4. Insert a tube (2) in the hose.
 - The diameter of the tube to be inserted in the transfer hose should be approximately 32 mm and its length should be approximately 50 mm. Bevel the ends of the tube to facilitate insertion.

5. Fasten the hoses with hose clamps.

7.7.3. Removing a blockage from a transfer hose

1. Check the Artemis Blockage monitoring system page to determine which hose is affected.
2. Lower the coulters to the down position.

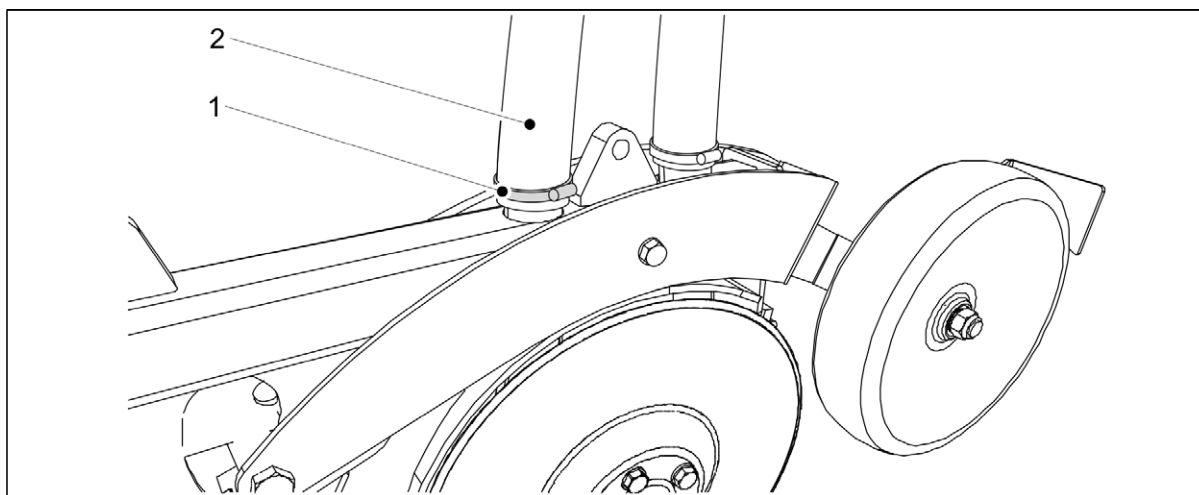



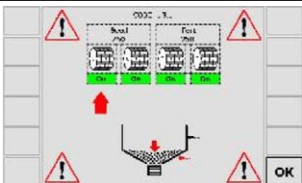


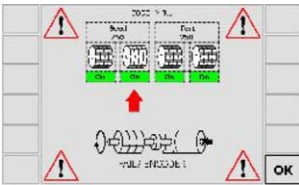
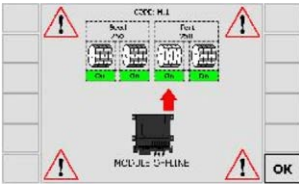
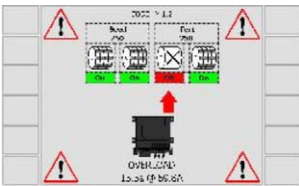
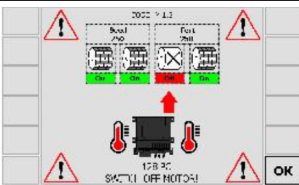
Figure. 7.7.3. - 158. Removing a blockage from a transfer hose

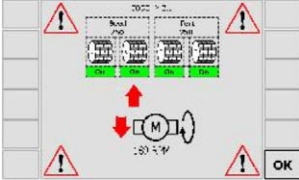
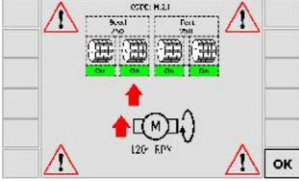
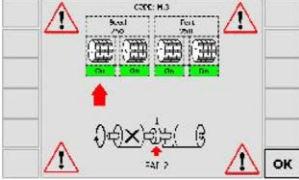
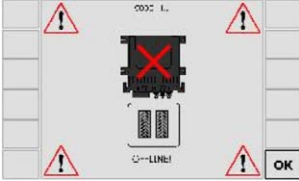
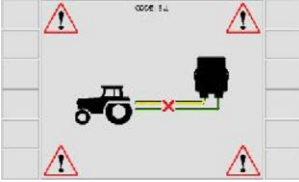
3. Loosen the hose connector (1) at the coulter end of the blocked transfer hose (2).
 - Looking from the direction of the machine, the front transfer hose is for fertiliser and the rear transfer hose is for seed.
4. Disconnect the end of the transfer hose and shake it to dislodge the blockage and try to dislodge the blockage using a long, flexible object.
5. Reconnect the transfer hose to the coulter.
6. Tighten the transfer hose connector.





8. Fault situations

8.1. Artemis control system troubleshooting

Code	View	Cause	Measures
N/A		<p>Excessive driving speed</p> <ul style="list-style-type: none"> The driving speed exceeds the maximum calculated seeding speed. 	<ul style="list-style-type: none"> Ensure that the calibration quantity is realistic. Adjust the feeder and recalibrate to reduce the feeding rate. This will increase the maximum allowable speed.
L.1		<p>Low fan rotation speed</p> <ul style="list-style-type: none"> The fan rotation speed is lower than the set alarm limit 	<ul style="list-style-type: none"> Ensure that the fan is functioning Check that the fan rotation speed sensor is functioning Check the tractor hydraulics adjustment
L.2		<p>High fan rotation speed</p> <ul style="list-style-type: none"> The fan rotation speed is higher than the set alarm limit 	<ul style="list-style-type: none"> Check that the fan rotation speed sensor is functioning Check the tractor hydraulics adjustment
L.3.1		<p>Low seed or fertiliser level</p> <ul style="list-style-type: none"> The channel with a low level is indicated by an arrow 	<ul style="list-style-type: none"> Ensure that the level is actually low Check that the hopper level sensor is functioning properly Check that the connection between the level sensors and MCM junction box is correct

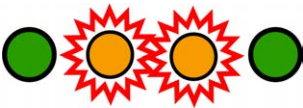
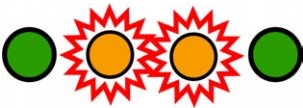
M.3.1		<p>Speed signal not being received from the motor.</p>	<ul style="list-style-type: none"> • Check to see whether there are any signs of mechanical damage in the motor sensor or cables • Ensure that the motor connections are correct
M.1		<p>MCM is offline</p>	<ul style="list-style-type: none"> • Ensure that the MCM junction box and MCM CAN module connections are correct
M.1.2		<p>Feeder motor shuts down due to an overload</p> <ul style="list-style-type: none"> • The motor current requirement has been exceeded, thus causing the module to shut down and motor operation to be locked out 	<ul style="list-style-type: none"> • Check to see if the motor has stopped running • Check to see whether the feeder is damaged or has a blockage
M.1.3		<p>Feeder motor shuts down due to temperature</p> <ul style="list-style-type: none"> • The motor temperature has exceeded the set limit 	<ul style="list-style-type: none"> • Check to see if the motor speed is extremely low • Check whether the motor is being overloaded, which, if prolonged, will cause the motor temperature to rise and the motor to shut down • Check to see whether the feeder is damaged or has a blockage • Recalibrate to make the motor run faster

M.2.L		<p>Low motor speed</p> <ul style="list-style-type: none"> The error between the actual motor speed and target speed is more than 10%. 	<ul style="list-style-type: none"> Check for an incorrect speed signal Check the calibration of the feeder
M.2.H		<p>High motor speed</p> <ul style="list-style-type: none"> The error between the actual motor speed and target speed is more than 10%. 	<ul style="list-style-type: none"> Check for an incorrect speed signal Check the calibration of the feeder
M.3		<p>The feeder is not running</p>	<ul style="list-style-type: none"> Check to see if the feeder runs when the motor runs Ensure that the sensor is functioning properly Ensure that the PPR value is set correctly Check that the connection between the sensor and junction box is correct Check that the connection between the level sensors and CAN junction box is correct
H.1		<p>The HBM module is offline</p>	<ul style="list-style-type: none"> Check to see whether the module is receiving power from the power cable Ensure that the HBM junction box connections are correct
B.1		<p>The ISOBUS/CAN module is offline</p>	<ul style="list-style-type: none"> Check the connections

B.M.1		The blockage monitoring system ECU is offline	<ul style="list-style-type: none"> • Ensure that the ECU is receiving power • Check the ECU wiring from the power cable • Ensure that the ECU LED indicator lights are on and are blinking
B.M.2		An incorrect number of sensors has been detected in the blockage monitoring system	<ul style="list-style-type: none"> • Ensure that the ECU has been programmed with the correct number of sensors • Check the sensor wiring and ensure that all sensors are connected to the system.
B.M.3		Blocked sensor/row	<ul style="list-style-type: none"> • Check to see if there is a blockage in the transfer hose
B.M.4		Interruption in data between the blockage monitoring system sensors	<ul style="list-style-type: none"> • Check the wiring between the sensors • Ensure that the ECU has been programmed with the correct number of sensors

8.2. Blockage monitoring system troubleshooting

Table. 8.2. - 14. Blockage monitoring system troubleshooting

Fault symbol	Fault message	Cause	Measures
	<p>Seed Communication Error</p> <ul style="list-style-type: none"> • applies to seed sensors <p>Fert Communication Error</p> <ul style="list-style-type: none"> • applies to fertiliser sensor 	<p>1. The sensor is detected in the CAN bus, but the connection between the bus and sensor is cut.</p>	<p>1. Check sensor connections.</p>
	<p>Seed Communication Error</p> <ul style="list-style-type: none"> • applies to seed sensors <p>Fert Communication Error</p> <ul style="list-style-type: none"> • applies to fertiliser sensor 	<p>1. Sensor not detected in the CAN bus, which cuts the connection to other sensors.</p> <p>2. Faulty sensor.</p>	<p>1. Check sensor connections.</p> <p>2. Replace sensor: A new sensor must be configured in the system with the same ID number as used by the old sensor.</p>

8.3. Troubleshooting of the seed drill

Table. 8.3. - 15. Troubleshooting of the seed drill

Problem	Cause	Measures
The quantity of seed or fertiliser fed by the machine is higher than indicated by the calibration test.	1. Seed moves in a different manner at the beginning and after a few hectares	1. Run a calibration test again in accordance with section 6.7. Product calibration after a few hectares, particularly at the beginning of the season.
The quantity of seed or fertiliser fed by the machine is lower than indicated by the calibration test.	1. The seed or fertiliser bridging has occurred in the hopper.	1. Ensure that the fertiliser is not clumping and there is no excess material in the hopper.
	2. The feeder roller is obstructed.	2. If needed, clean the feeder roller in accordance with section 7.3.4. Cleaning the feeder and feeder hoses .
Coulter will not lift	1. The lift inhibit function is enabled	1. Disable the lift inhibit function in accordance with section 6.3.2. Use of the lift inhibit function .
	2. The quick coupling is open	2. Check the connection of the quick coupler
	3. The coulters pressure adjustment function is on	3. Turn off the coulters pressure adjustment function in accordance with section 6.10. Adjusting the coulters pressure .
Coulter will not lower	1. The quick coupling is open	1. Check the connection of the quick coupler
	2. The coulters pressure adjustment function is on	2. Turn off the coulters pressure adjustment function in accordance with section 6.10. Adjusting the coulters pressure .
Hopper alarm does not function	1. The alarm has been disabled	1. Enable the alarm from the settings in accordance with section 5.1.4.2. Activating the hopper level sensors .

9. Attachments

1. EC Declaration of Conformity
2. Hydraulic schematics
3. Connection socket according to SFS 2473
4. Calculating the stability of the tractor - seed drill combination

EC DECLARATION OF CONFORMITY

DOMETAL OY

Kotimäentie 1
FI-32210 Loimaa
Finland

hereby states that the following seed drills in question

Multiva FORTE FX6000 starting from serial number 000-091106-L1030136

meet the requirements of Machinery Directive 2006/42/EC with respect to the construction of machinery.

Furthermore, the following standards were applied in the design of the machine:

SFS-EN 12100 (2010)

SFS-EN 14018 + A1 (2010)

SFS-EN ISO 4254-1 (2013)

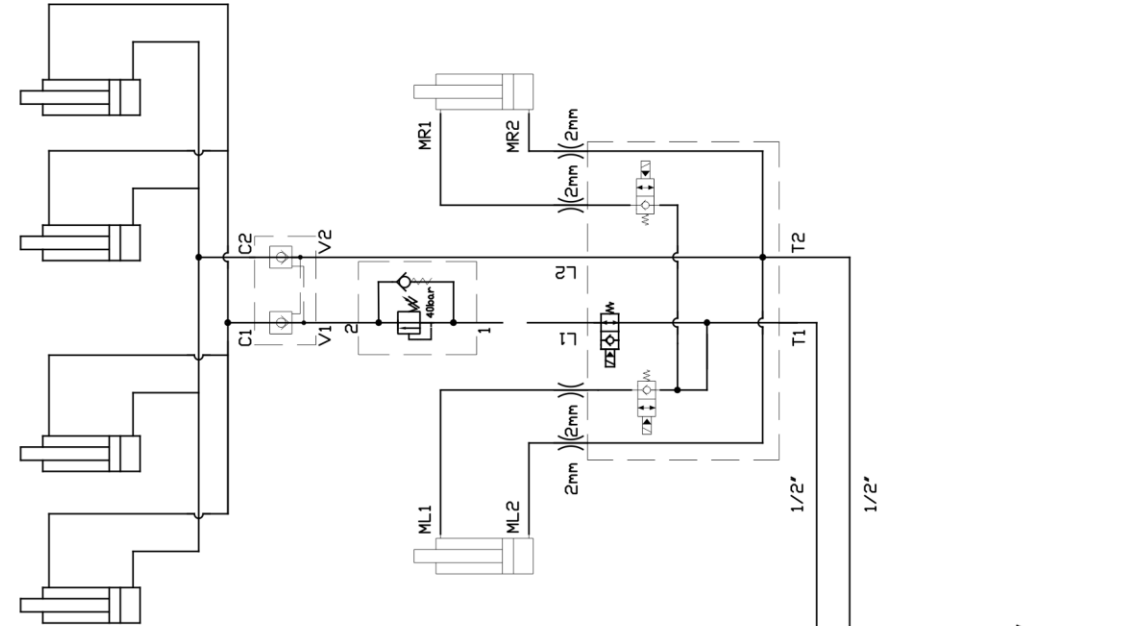
Loimaa, 28 October 2019



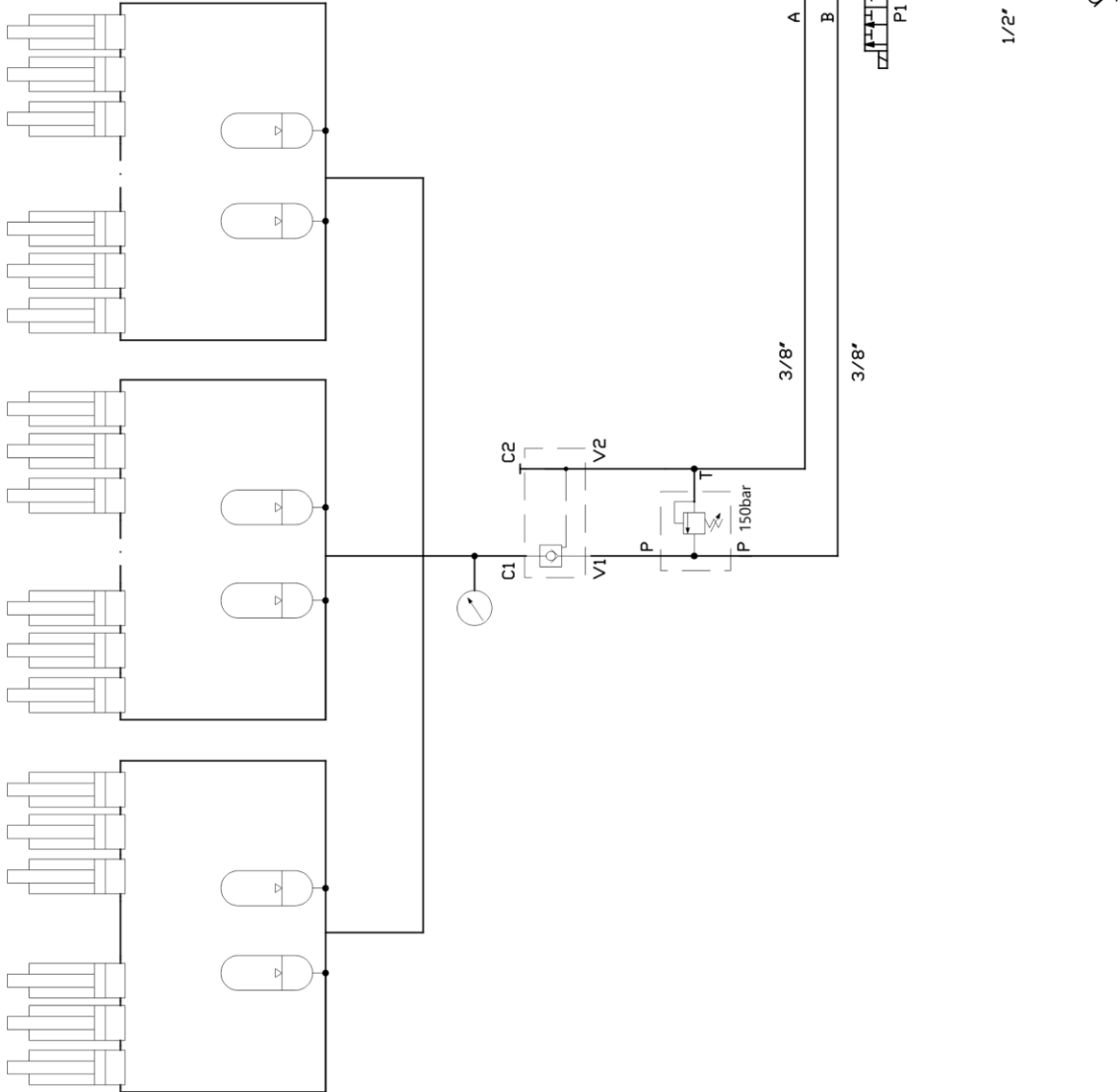
Vesa Mäkelä
Kotimäentie 1
FI-32210 Loimaa
Finland

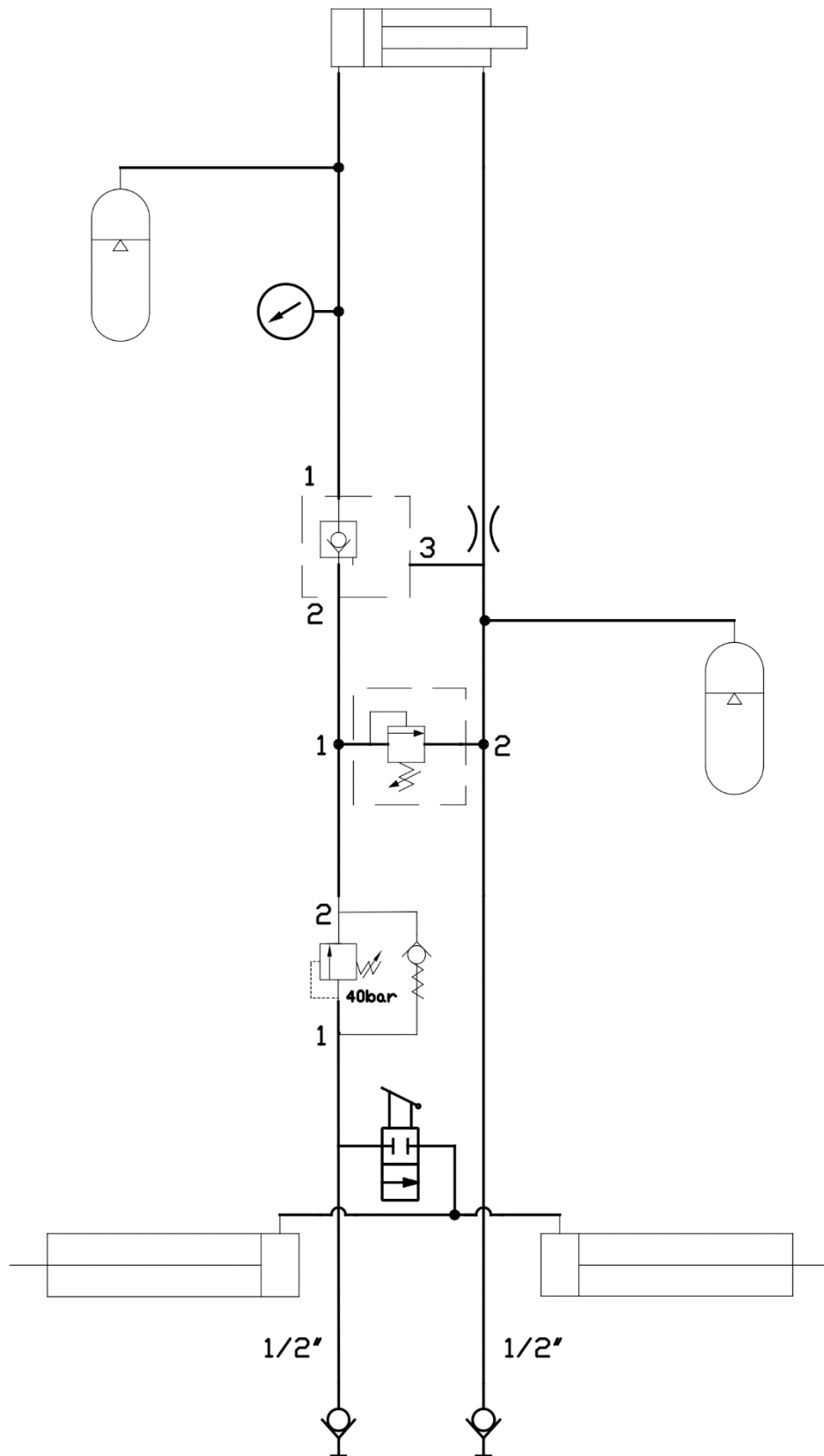
The undersigned is also authorised to compile technical documentation for the above machines.
Translation of the original file

Lifting and lowering of the coulters

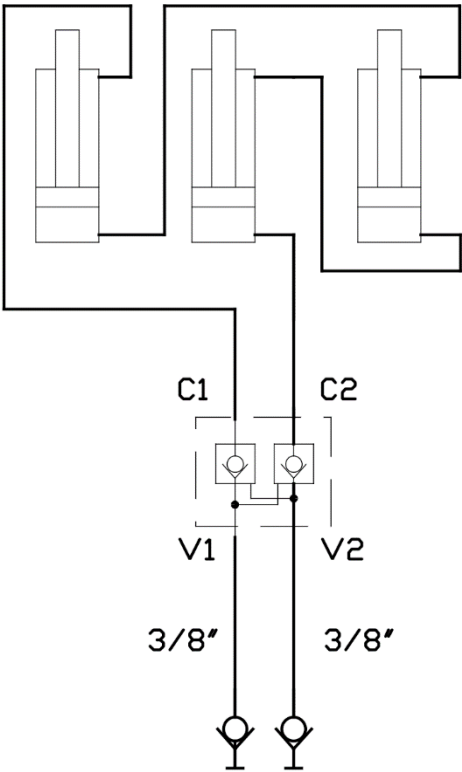


Coulter pressure

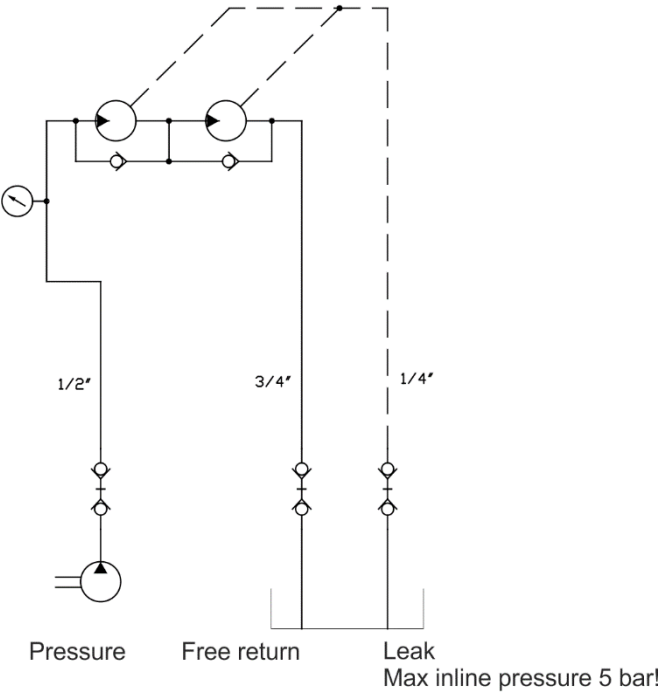




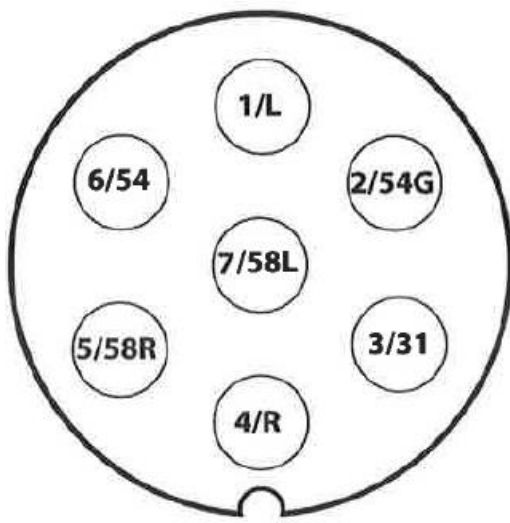
Lifting and lowering of the wing sections



Front levelling board



Fan

Connection socket according to SFS 2473

1/L	Left turn signal
2/54G	Free
3/31	Ground
4/R	Right turn signal
5/58R	Right rear light + lic. plate light
6/54	Brake light
7/58L	Left rear light

Calculating the stability of the tractor - seed drill combination

The load may impact the steerability of the tractor. The dead weight of the machine and the materials in the hoppers may result in the loss of the stability of the tractor - seed drill combination.

This Appendix provides a recommendation on how to ensure the stability of the tractor - seed drill combination by means of calculation.

The following formula can be used to calculate the tractor's minimum weight $I_{F,min}$, which will allow the load on the front axle to be 20% of the weight of an empty tractor:

$$I_{F,min} = \frac{(I_R \times (c+d)) - (T_F \times b) + (0,2 \times T_E \times b)}{a+b}, \text{ in which}$$

T_E	[kg]	Tractor's dead weight ¹⁾
T_F	[kg]	Front axle load of an empty tractor ¹⁾
T_R	[kg]	Rear axle load of an empty tractor ¹⁾
I_R	[kg]	Total weight of the implement or rear ballast installed in the rear ²⁾
I_F	[kg]	Total weight of the implement or front installed in the front ²⁾
a	[m]	Distance between the centre of mass of the implement or front ballast installed in the front and the centre of the front axle ^{2) 3)}
b	[m]	Tractor's wheelbase ¹⁾
c	[m]	Distance between the centre of the rear axle and the centre of the connecting point of the link arm ^{1) 3)}
d	[m]	Distance between the centre of the connecting point of the link arm and the centre of mass of the implement or rear ballast installed in the rear ²⁾

- 1) See the tractor manual
- 2) See the implement manual
- 3) To be measured

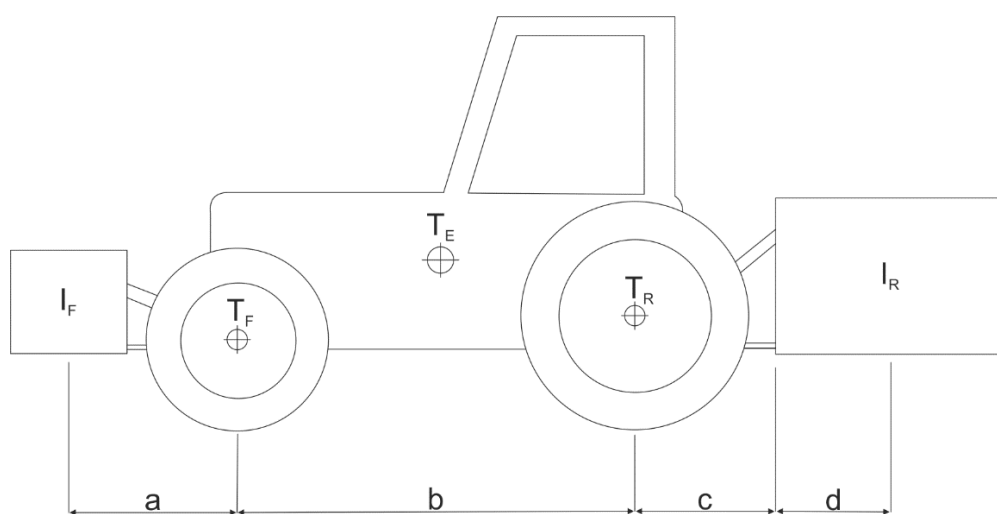


Figure 1. Calculating the stability of the tractor - seed drill combination