

OPERATING AND MAINTENANCE MANUAL COMBI DRILL

FORTE S300, S400
FORTE XT300, XT400

Original instructions 01/2018
Starting from serial number
000-090204-J1010

Multiva

www.multiva.info

TRACKING THE FUTURE

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1 Foreword

Thank you for trusting us by choosing a high-class Multiva Forte seed and fertiliser drill. We hope that the product you chose meets your requirements and serves you for a long time. **Please read these instructions thoroughly before operating the machine.** The inspection and maintenance measures referred to in this manual are essential to the flawless operation of the machine and the validity of its warranty.

You must follow, without exception, all the instructions, warnings and prohibitions related to the machine. They are provided to ensure the safety of the operator and the long service life of the machine.

Multiva Forte is an extremely efficient and versatile seed and fertiliser drill, which allow you to sow directly into stubble, grass or cultivated soil. Forte seed and fertiliser drill is equipped with seeding coulters ensuring precise sowing in the desired working depth. The mechanical feeder feeds the seeds and fertiliser precisely to all seeding coulters.

1.1 Use of the machine

The operator of the seed and fertiliser drill must get acquainted with the machine and read its operating instructions and understand their content before operating the machine.

The seed and fertiliser drill must only be operated when it is in flawless condition technically. The seed and fertiliser drill must be used in accordance with regulations, recognizing dangers and following the safety and operating instructions.

Original Multiva spare parts and accessories are designed for this particular seed and fertiliser drill. The manufacturer is not responding for the spare parts and accessories of other suppliers, so using them in certain circumstances may weaken the machine and compromise personal safety.

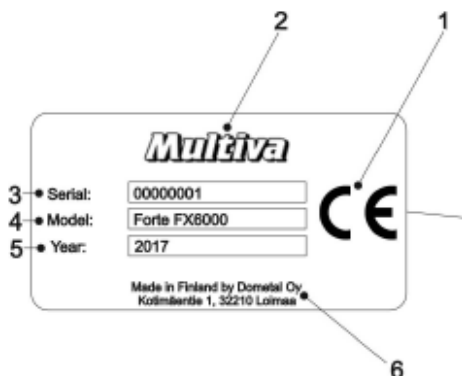
The machine is intended for sowing seeds and fertiliser. The structure of the machine allows it to be transported on a good and smooth road with its hoppers full at a maximum speed of 40km/h. On an uneven or bumpy road the maximum speed is 25km/h. Use exceeding this, such as using the machine as transportation equipment, is not appropriate use. Appropriate use includes following the operating instructions and manufacturer's instructions and 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 must be obeyed.

1.2 Specifications

Specifications:	300 XT	400 XT	300 S	400 S
Working width, cm	300	400	300	400
Transport width, cm	300	409	300	409
Hopper filling level, cm	210	210	210	210
Weight, kg	4200	5500	4200	5500
Hopper volume, l	3500	4800	3500	4800
Coulter weight, kg	50-200	50-200	50-175	50-175
Tyres	250/80-18	250/80-18	250/80-18	250/80-18
Coulters, pieces	20	26	20	26
Groove spacing, cm	150	154	150	154
Normal track width of tramlines, mm	1650	1694	1650	1694
Alternative track width of tramlines, mm	1950	2002	1950	2002
Widened track width of tramline, mm	1800	1848	1800	1848
Recommended working speed, km/h	8-12	8-12	8-12	8-12
Pulling power requirement, hp	90	120	90	120
Pulling power requirement with front disc cultivator, hp	150	190	150	190
Controller	RDS 200	RDS 200	RDS 200	RDS 200

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1.3 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

These operating instructions are made based on the manufacturer's long-term experience and customer feedback. The advice and instructions given in the operating instructions are indicative and in no way bind the manufacturer or manufacturer's representative. The owner/operator of the machine is fully responsible for transporting the machine on the road, operating it and servicing it.

Multiva seed drills are quality inspected and their operation is tested before delivery. However, the buyer/operator is responsible for the operation of the machine in practical circumstances. Indemnity claims for damages not concerning the machine itself will not be considered. This also includes the fact that we are not liable for damages caused by inappropriate use or inappropriate adjustments of the machine.

The manufacturer is not liable for any use of the machine that is against laws, safety regulations or this operating manual. Because situations may occur when operating the machine, for which no instructions or regulations exist, we recommend that machine operators abide by general machine safety instructions and directives.

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

The manufacturer is not liable for selecting an erroneous quantity of seeds, plant protecting agents or fertiliser or erroneous seeding depth. The operator must constantly make sure that the desired seeding depth is maintained. In lack of information and experience, please turn to an expert for advice. The manufacturer is not liable for failed sowing. The operator must monitor the consumption of seeds and fertiliser in every conjunction to make sure that seeding quantities remain appropriate 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 damages caused by the use of the machine to other machines or devices. The manufacturer reserves the right to develop or modify the structure of the machine. The owner of the machine is responsible for having all those operating the machine acquainted with the machine's operating and safety instructions.

2 Warranty terms

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


In warranty matters, please turn to the machine retailer. Always agree in advance with the manufacturer on any measures and their possible costs, before taking action.

3 Safety instructions

3.1 Noise

The noise from the machine on the working site is under 70 dB.




3.2 Residual risks

	<p>Read this operating and maintenance manual thoroughly before operating the machine and follow its instructions.</p>
	<p>Danger of crushing when connecting and disconnecting the seed and fertiliser drill. Safety distance 5m. Be extremely careful if someone else is near the seed drill and tractor giving instructions on connecting and disconnecting.</p>
	<p>Danger of crushing when lifting and lowering the seed drill, during servicing work and when adjusting seeding depth. When lifting and lowering the machine, make sure nobody is in its vicinity. During maintenance work and when adjusting seeding depth, make sure that stoppers are installed on the cylinder stems. Never go under the machine that is unsupported.</p>
	<p>Danger of crushing when lifting and lowering the center markers. When lifting and lowering the markers, make sure nobody is in the vicinity. Safety distance is 5m when the markers are up and the machine is running.</p>
	<p>Danger of crushing when seeding depth and accessories are adjusted. Before adjusting the seeding depth and accessories, make sure that the tractor is turned off, the key is not in the ignition and the parking brake is engaged.</p>
	<p>Hydraulic hoses under pressure may release a life-threatening jet of liquid. High-pressure liquid may also cause danger of crushing, cutting or impact.</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 couplers when the cylinders are in operation.</p>

	<p>Danger of cutting when operating the machine. Safety distance 5m.</p>
	<p>Danger of falling when working on the front or rear platforms. Be careful when working on the platforms</p>
	<p>Danger of falling. Staying on top of the machine during its transport and operation is strictly prohibited. Staying on top of the wheels is always prohibited.</p>
	<p>Before moving the machine, make sure that the markers are set in transport position, the machine is up, the ball valves for lifting the markers and machine are closed.</p>

	<p>Before performing a calibration test, make sure that power is switched off in the tractor, the key is not in the ignition and parking brake is engaged. Make sure that the ball valves for center markers are closed.</p>
	<p>Operate and service the machine only on even and solid ground.</p>
	<p>Depressurise the hydraulic system, disconnect the hoses and tractor's electric connections and let the machine cool off before servicing.</p>
	<p>Avoid breathing seed dressing dust and fertiliser dust when filling the hopper. Seed dressing agent causes a serious health risk. Read the material safety data sheet of the dressing agent and fertiliser and pay attention to their warnings.</p>
	<p>Never go under a lifted load when filling the hopper. Make sure that nobody is on top of the seed and fertiliser drill or inside the hopper when filling the hopper.</p>
	<p>Wear protective goggles when filling and servicing the machine.</p>
	<p>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.</p>

3.3 Symbols used in the operating manual

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



DANGER

Never adjust or clean a moving seed drill.



DANGER

Never stay on top of the seed drill or within its operating area during operation. Safety distance 5m.



DANGER

Follow the safety distance when the seed drill is immobile and the hydraulics are used. Staying near the seed and fertiliser drill is prohibited when it is connected to a tractor.



DANGER

Inspect the condition of the seed and fertiliser drill at least visually before moving or operating it. The points to inspect include transportation wheel bearings, tyre pressures, cleanliness of the machine and condition of the towing device and its attachment to the tractor.



DANGER

Before sowing, make sure that the machine is in working order. Make sure that the hoses are intact and no leaks are seen. Make sure that the coulters and mechanics are intact. Pay special attention 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 machine, 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 vehicle's traffic safety.



DANGER

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



DANGER

Never go under a lifted load when the hoppers are being filled.



DANGER

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



DANGER

When replacing hydraulic system components and hydraulic hoses, 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 handling instructions and safety regulations of the lubricant manufacturers. Synthetic oils are often corrosive and cause strong irritation of the skin. Contact a doctor, if oil or grease causes damage.



DANGER

Never spray water directly on electric equipment.



NOTE!

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



NOTE!

Collect oil wastes and dispose of them appropriately following national regulations.



NOTE!

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



NOTE!

Clean the machine whenever you change fertiliser of seed types.



ADVICE

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



ADVICE

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

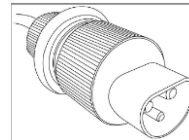
4 Commissioning and basic adjustment

4.1 Measures before commissioning and connecting to tractor

Fasten the controller display securely in the tractor cab using the bracket kit provided. Fasten the display in a location, where view is not hindered, but which is easily reachable by turning one's glance while driving. Fasten it at a suitable distance, so that the buttons can be reached effortlessly.

Fasten the control's data transfer cable to the display through the tractor's lead-through. Make sure the cable is not crushed by the tractor's rear window. Fasten the cable well to make sure it is not crushed by drawbars or possible rear plough joints when turning and lifting.

Connect the electric plug (DIN9680) of the controller to the tractor's socket. Never use a cigarette lighter as power source for the controller!



4.1.1 Connecting to tractor

1. Fasten the seed and fertiliser drill to the tractor drawbars
2. Connect the hydraulic hoses and electric cables
3. Make sure that the hoses and cables are not crushed even in sharp turns
4. Lock the side stoppers of the tractor drawbars
5. Open the ball valve of the lifting circuit

4.1.2 Disconnecting from tractor

1. Close the ball valve of the lifting circuit
2. Depressurise all the hydraulic hoses in the machine
3. Make sure that the machine stays in place and is on solid surface
4. Disconnect the hydraulic hoses and electric cables
5. Disconnect the seed drill from the drawbars

4.2 Hydraulic connections



DANGER

Hydraulic hoses must be depressurised before coupling and uncoupling them

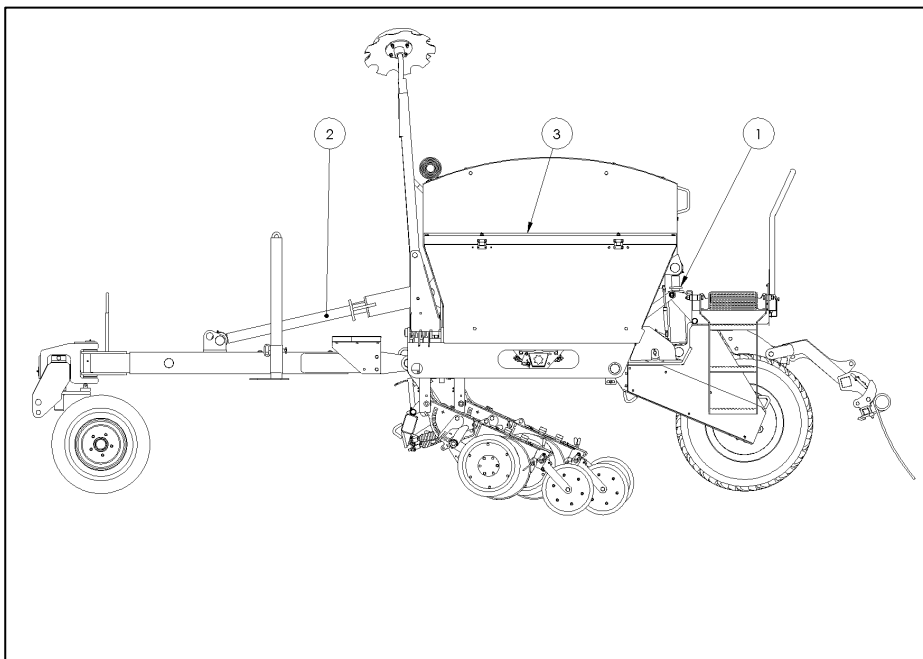


ADVICE

Connect hydraulic hoses in pairs so that the directions of flow are correct. Hydraulic hoses are marked with coloured collars.

	<p>Shaft control connection</p> <ul style="list-style-type: none"> • 2 male connectors of ½" <p>Coupled to the tractor's double acting spool valve</p>
	<p>Coulter weight control</p> <ul style="list-style-type: none"> • 2 male connectors of ½" <p>Coupled to the tractor's double acting spool valve</p>
	<p>Lifting the machine to transportation position</p> <ul style="list-style-type: none"> • 2 male connectors of ½" <p>Coupled to the tractor's double acting spool valve</p>
	<p>Front board position control</p> <ul style="list-style-type: none"> • 2 male connectors of ½" <p>Coupled to the tractor's double acting spool valve</p>
	<p>Front rake height control</p> <ul style="list-style-type: none"> • 2 male connectors of ½" <p>Coupled to the tractor's double acting spool valve</p>
	<p>Front disc harrow height control</p> <ul style="list-style-type: none"> • 2 male connectors of ½" <p>Coupled to the tractor's double acting spool valve</p>

4.3 Forte XT sowing position



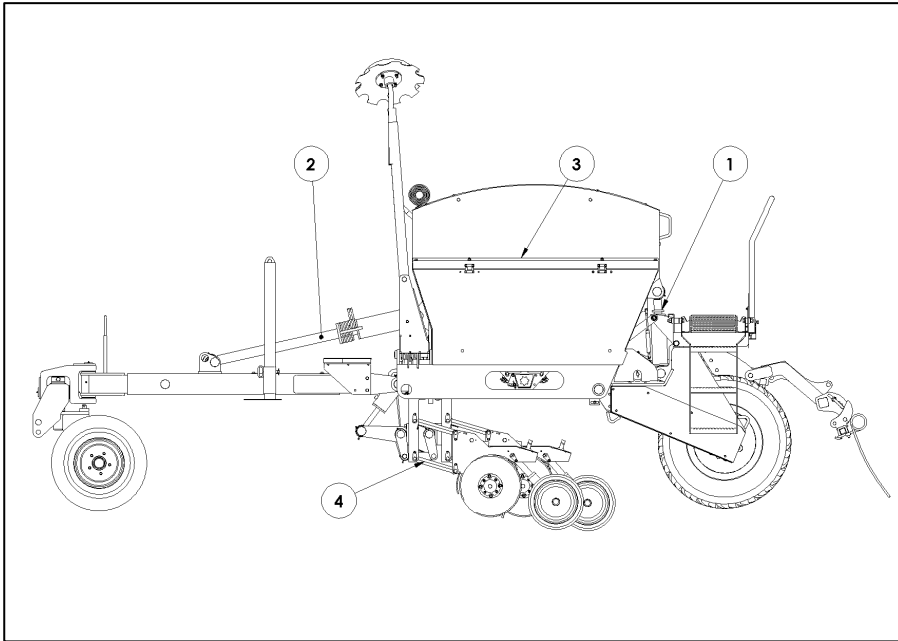
The machine is adjusted to sowing position so that, when sowing, the seed and fertiliser drill's lifting cylinder (1) is in the lower position. The tractor drawbars are set to horizontal position thus providing good steering ability.

The machine is adjusted to the correct sowing position using hydraulic cylinders (2) so that the sidebar (3) is horizontal. The length of the hydraulic cylinder can be limited in its lower position using stopper pieces; one piece is 10mm thick.

Note that adjusting the position of the seed drill may impact seeding depth. The greatest sowing precision is achieved when the machine is horizontal throughout the sowing process. While working, the front end and coulters of the machine may be lifted by lengthening the cylinder.

When using the intermediate packer wheels (accessory), the machine is set in the correct position using the hydraulic cylinders (2). When sowing without the intermediate packer wheels, note that the height of the tractor drawbar do not change during sowing.

4.4 Forte S sowing position



The machine is adjusted to sowing position so that, when sowing, the seed drill's lifting cylinders (1) is in the lower position. The tractor drawbars are set to horizontal position thus providing good steering ability.

The machine is set to the correct sowing position using a hydraulic cylinder (2) so that the sidebar (3) is horizontal on hard soil and on softer soil, the front edge of the sidebar is 20-50mm higher than the rear edge. The directional trailing arms (4) are thus slightly downward oriented; the machine sows best and climbs easily high obstacles. While working, the front end and coulters of the machine may be lifted by lengthening the cylinder.

When using the intermediate packer wheels (accessory), the machine is set in the correct position using the hydraulic cylinders (2). The length of the hydraulic cylinder can be limited in its lower position using stopper pieces; one piece is 10mm thick.

When sowing without the intermediate packer wheels, note that the height of the tractor drawbars do not change during sowing.

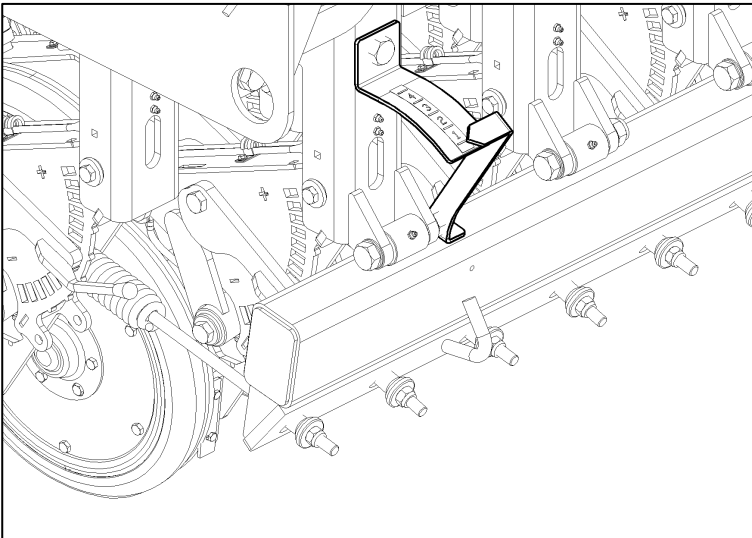
5 Controlling the drill

When sowing directly on stubble, the recommended seeding depth for grains is 2-3cm and for small-scale seed 1-1.5cm. Make sure not to sow too deep on fine and moist soil, because moist soil easily packs on top of the seed and the sprouts cannot penetrate the packed soil.

The reason for the shallow seeding depth directly on stubble is that the seed's sowing base is solid and the soil covering the seed is packed. The capillary rising of water to the surface soil causes the seed to sprout well and fertiliser to dissolve. The stubble and straw mass impact the maintenance of moisture even in dry conditions. For this reason, the same working depth suits all types of soil.

When sowing on cultivated soil, apply the same working depth recommendations as with traditional seed drills i.e. seeding depth 4-5cm on hard clay soil and 3-4cm on light fine soil. Note that cultivation must not exceed the seeding depth not to leave under the seeds any loose soil that hampers sprouting and rising of capillary water.

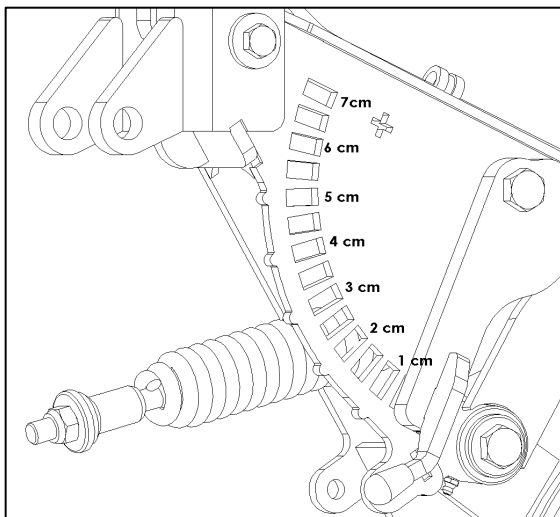
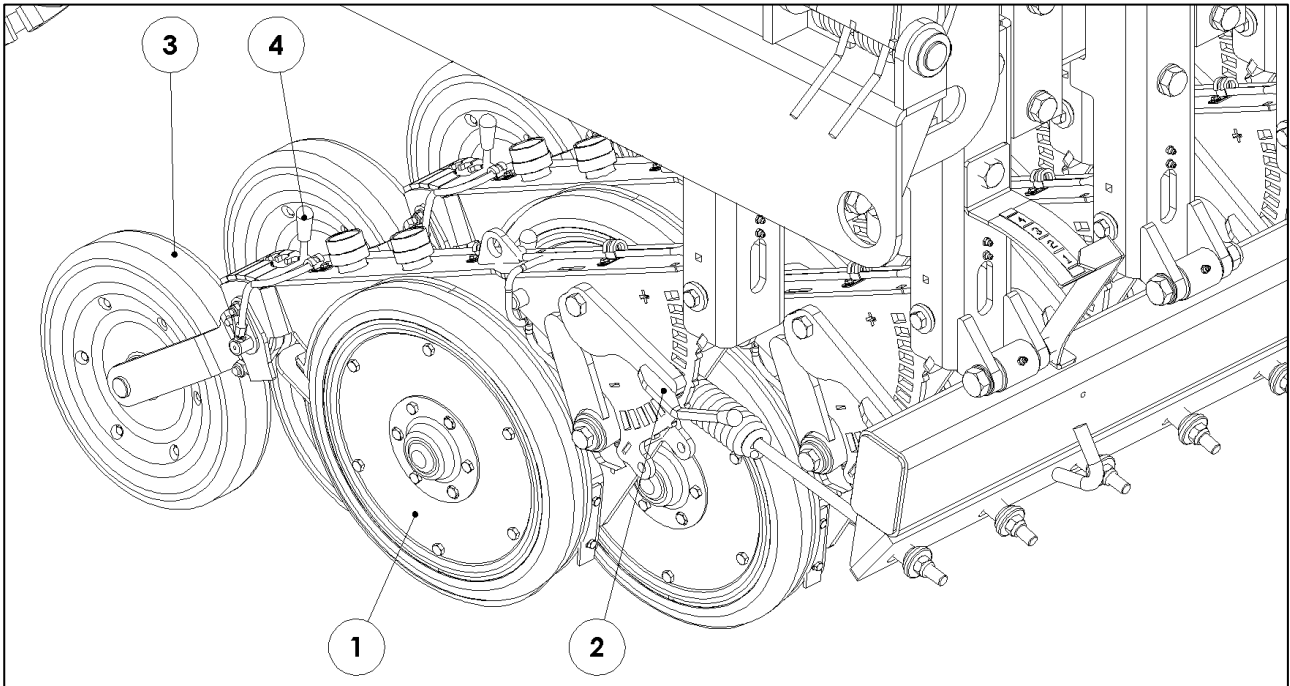
Coulter weight is adjusted according to soil type and hardness. The weight is freely adjustable in XT models in the range of 50-200kg and in S models in the range of 50-175kg. On light soil, use smaller weight and on hard soil, greater weight. Coulter weight is adjusted hydraulically and it can be adjusted while driving. The spring force of an XT coulter covering wheel must be adjusted so that the furrow is covered. For example, at the end of the field with light soil, the coulter weight may be lessened, and at the end with clay soil, increased to maintain the desired seeding depth. The dial on the right edge of the machine indicates the position of coulter weight on a scale of 1-4, in which 4 is the greatest coulter weight.



5.1 Controlling the seeding depth of XT coulters

The seeding depth of an XT coulters is adjusted per each coulters by adjusting the height of the side wheel (part 1). The height of the side wheel in relation to the coulters is adjusted mechanically using the depth control lever (part 2). The lever is pulled away from the coulters frame so that it comes out of the slot in the frame (15 pieces) so that it can be freely moved up and down to the desired seeding depth:

- seeding depth lever in the lowest slot: seeding depth = 0cm
- seeding depth lever in the highest slot: seeding depth = 7cm



The depth is adjustable in increments of 0.5cm. Depths of 1cm, 2cm, 3cm, 4cm and 5cm are marked with notches on the front of the coulters frame. After adjusting, check that the seeding depth lever is locked in its slot.

In addition to the position of the side wheel, seeding depth is impacted by the seed drill position, coulters weight, driving speed and softness of soil. Note that coulters weight increases when the front of the seed drill is lowered and, correspondingly, coulters weight decreases when the front is lifted. The optimal result is achieved when the machine is horizontally to the ground. After adjusting, check the seeding depth at a spot driven at the correct sowing speed. The recommended sowing speed is 8-12km/h.

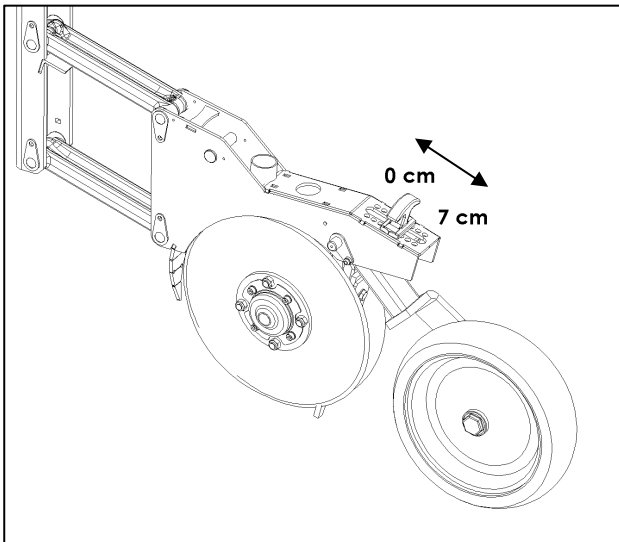
The covering wheel in the rear of the XT coulters covers the furrow. The pressure of the covering wheel can be adjusted with the lever behind the coulters. The pressure of the covering wheel is adjusted according to sowing conditions so that the furrow is closed and the seeds are not visible. Note that increasing the pressure of the covering wheel takes weight away from the coulters so that, especially on hard soil, "excessive tightening" of the covering wheel may weaken the coulters weight so much that the desired seeding depth is not reached.

5.2 Controlling the seeding depth of S couler



DANGER

Before adjusting the seeding depth, make sure that stoppers are installed on the cylinders. Never go under the machine that is not secured.



On an S couler, seeding depth is adjusted with a couler-specific wheel. The couler wheel adjusting the couler's working depth closes the furrow and seals the seeds. Adjusting seeding depth is done by moving the position of the seeding depth limiter. Fine tuning of seeding depth is done by setting the limiter diagonally in adjustment holes on different rows.

In addition to couler wheel adjustment, seeding depth is influenced by seed drill position, couler weight, driving speed and softness of soil. Note that couler weight increases when the front of the seed drill is lowered and, correspondingly, couler weight decreases when the front is lifted. The optimal result is achieved when the machine is horizontally to the ground.

5.3 Calibration test and seeding quantity

At the end of the seed drill box there is a seeding table that gives the basic values for adjusting seeding quantity. However, there are great differences between various seeds, which is why the actual seeding quantity must always be checked with a calibration test. Seed treatment such as seed dressing has considerable impact on fluidity.

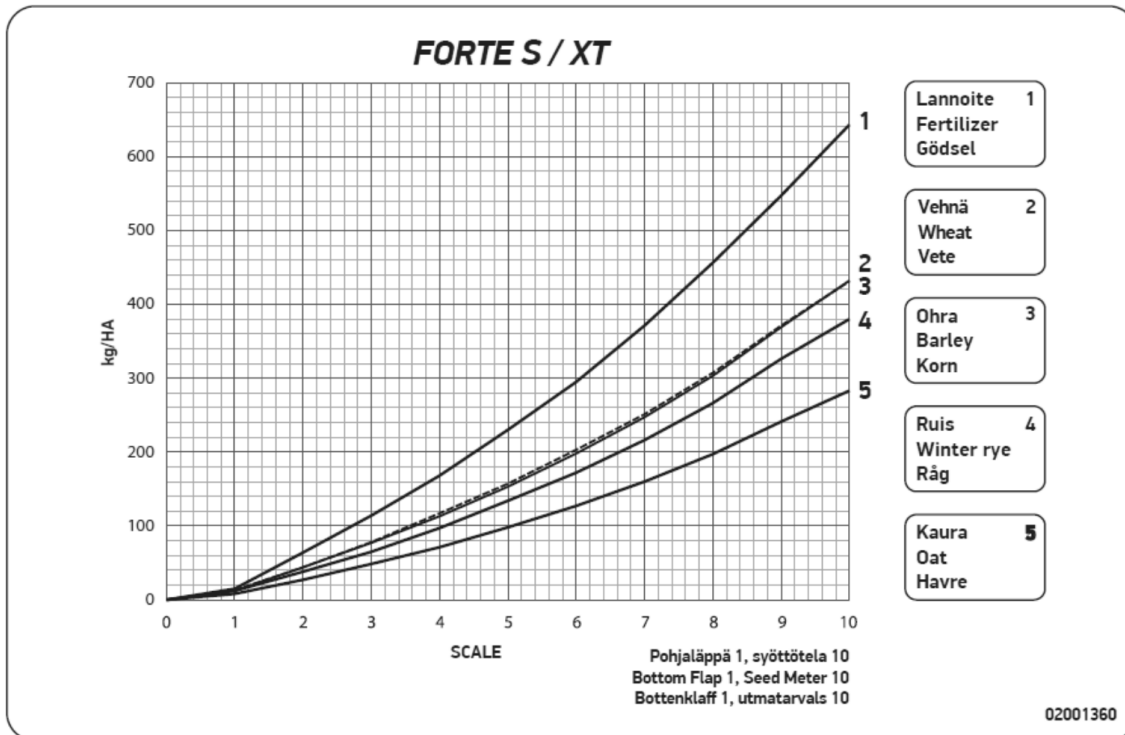
Always perform a calibration test when you make changes in feeding quantities, especially the fertiliser quantities may vary considerably based on the humidity and fluidity of the fertiliser. Always use only clean seeds that germinate well. Impurities in the seeds may cause stoppage or damage in the seed drill.

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 seeds come evenly out of all feeders when seeding begins.

If the machine is unused during a long rain season and humidity has entered the feeders or the fertiliser has arched due to vibration, perform a calibration test and check visually that all feeders feed evenly. Put the pin back in place after the test.

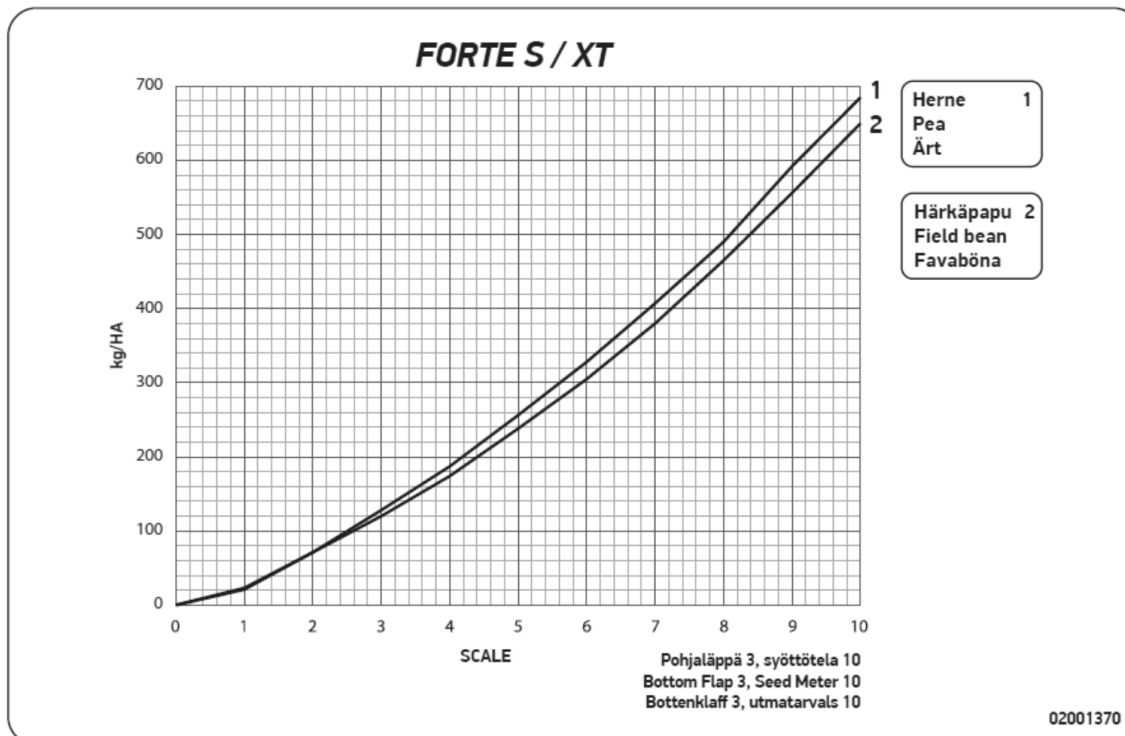
Feeding table grain and fertiliser



! ADVICE

Turn the feed roller to open it fully (value 10.0) and the bottom flap into position 1

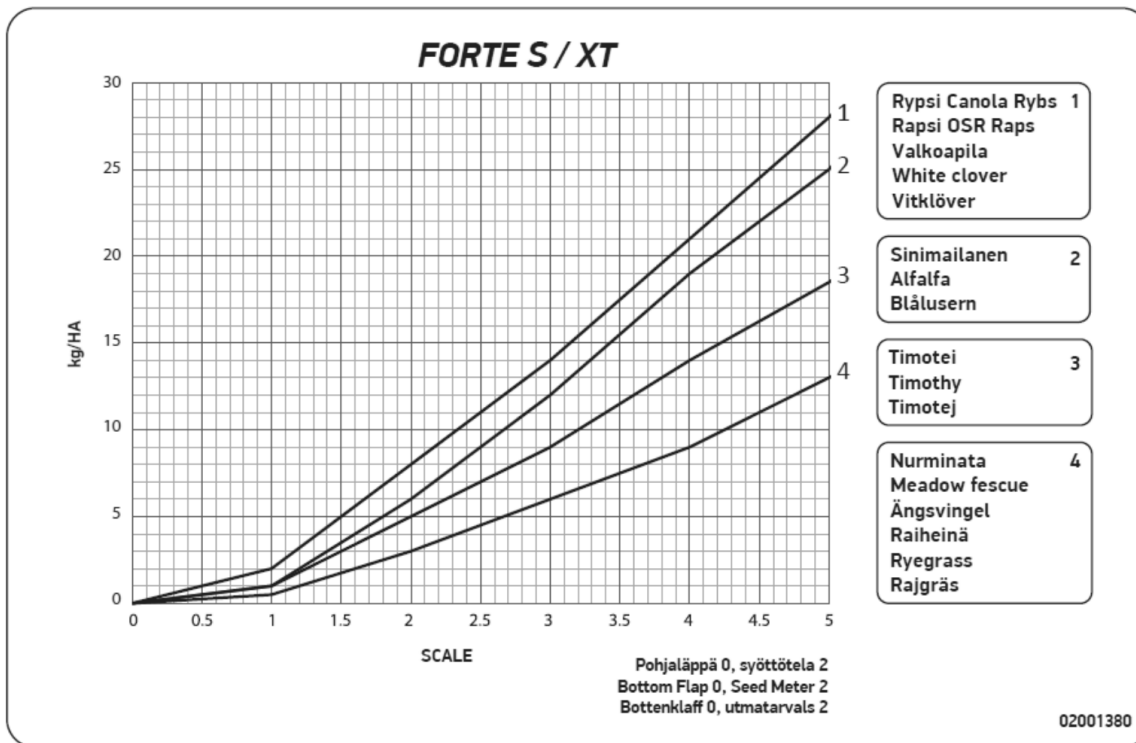
Feeding table pea and beans



! ADVICE

Turn the feed roller to open it fully (value 10.0) and the bottom flap into position 3

Feeding table small-scale seeds



ADVICE

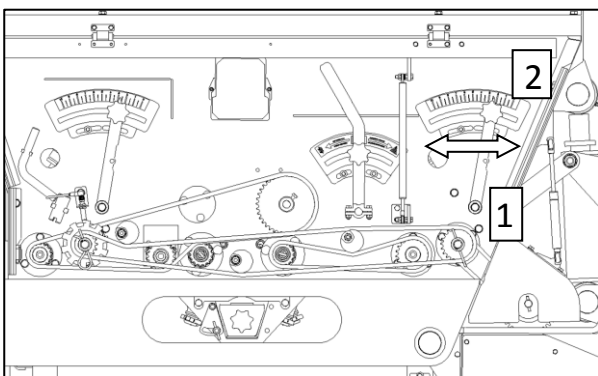
Turn the feed roller width to value 2.0 and bottom flap to position 0

Feeding quantities may be halved by turning the roller width to value 1.0. When seeding very small quantities of small-scale seeds (gearbox setting below 2), the shaft rotation guard in monitor may sound an alert. If necessary, the shaft rotation guard may in this case be switched off on the controller alarm page.

5.4 Feeders

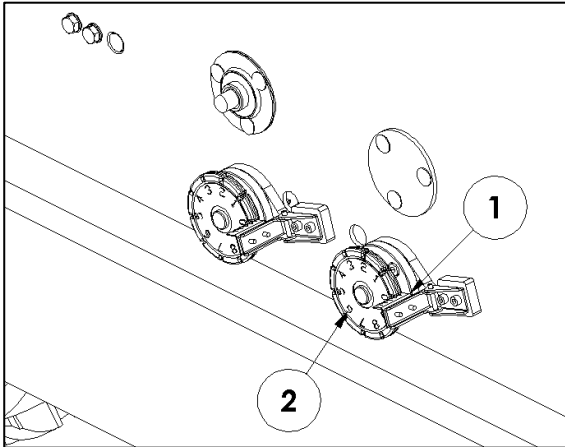
The feeders are such that feeding quantity is regulated by changing the feeder roller effective width. Fine tuning is done by changing the gear ratio of the gearbox. The feeders are powered by the machine's left running gear via a chain. In the feeder, there is a shut-off plate between the feeder chamber and the hopper to completely shut the opening of the feeder chamber. Shutting part of the feeders with a shut-off plate allows seeding with narrower working width or, for example, increasing row spacing by seeding with only every second coulter.

5.5 Gearbox rotation speed



Seeding quantities are controlled with the gearboxes by moving the control lever (1) to the desired position on the left side of the machine. The scale sticker (2) has a scale from 0 to 10, in which 0 means the smallest feed quantity and 10, correspondingly, the greatest. The scale is only indicative, the correct feed quantities must always be checked with a calibration test.

5.6 Feed roller width



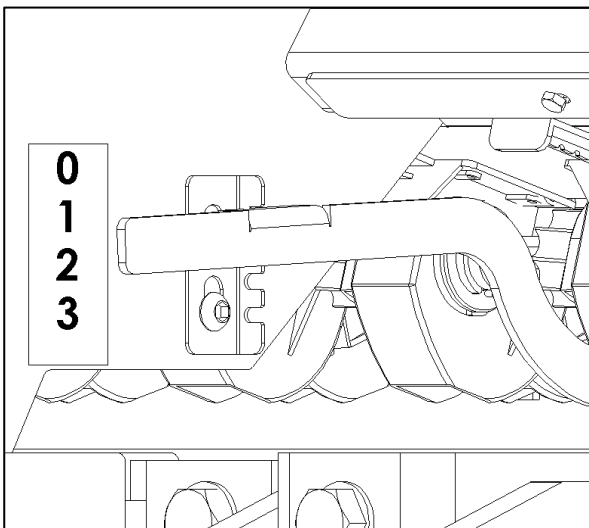
On the right side of the machine hopper, there are screw-type control wheels. The main scale (1) of seeding quantity is on the control wheel lock and the secondary scale (2) on the control wheel rim. When turning outward the control wheel on seed side, the seeding quantities increase. The fertiliser quantities sown will increase when the control wheel is turned inward on the fertiliser side. You can check this also by looking in the feeder: Quantities increase when the roller is inserted into the feeder and decreases when the roller is pulled out of the feeder.

5.7 Bottom flap position



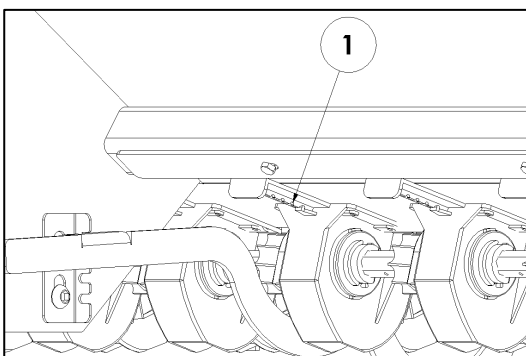
ADVICE

When seeding large-scale seeds (pea and beans etc.), the bottom flap must be set to its lowest position i.e. position 3. Otherwise the gearbox may break.



The position of the bottom flap essentially impacts the seed and fertiliser quantities. The 0 position of the bottom flap is meant for seeding small-scale seeds. Position 1 is meant for seed and fertiliser sowing. Position 3 is meant for large-scale seeds, such as peas. The position of the bottom flap is controlled by changing the position of the control lever on the notch scale. The 0 position of the control lever can further be adjusted on the notch scale so that bottom flap and feed rollers have no clearance. This can be verified by pressing the bottom flap against the feed roller with a finger. The clearance of an individual bottom flap can be adjusted separately at the bottom flap. This provides even quantities throughout the seeding width.

5.8 Shut-off plate



When seeding oil seed rape and canola, the shut-off plate (1) must be closed three notches and when seeding grass seeds, two notches. The shut-off plate must be completely open with grain, fertiliser and beans.

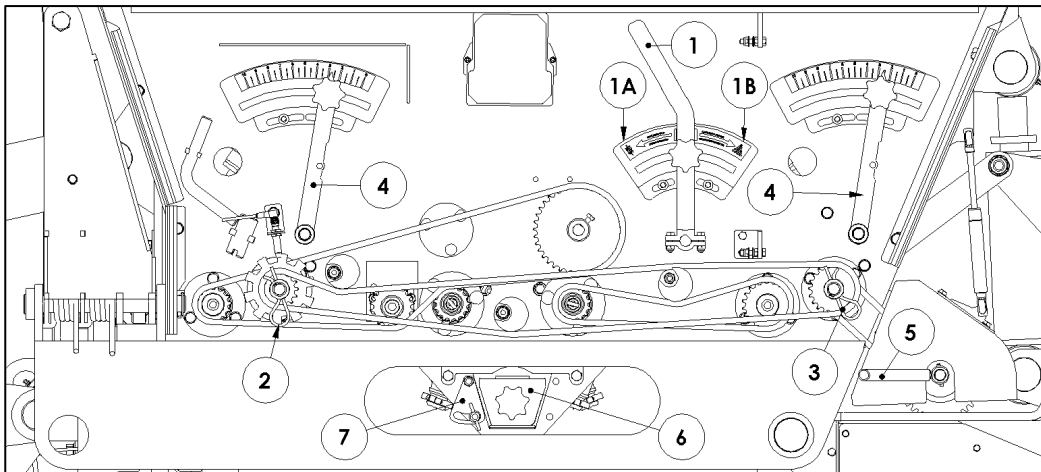
5.9 Calibration test



DANGER

Before performing a calibration test, make sure that power is switched off in the tractor, the key is not in the ignition and parking brake is engaged. Make sure that the ball valves of the center markers are shut.

1. Set basic settings of the seed drill applying the settings of the seeding table.
2. Lift the machine from working position with the lifting cylinders enough to disengage the gear wheels and lift up the transmission guard.
3. Move the calibration test tray to the desired feed shaft by turning the crank (1). The crank is moved backward (to position 1B) for the calibration test of the front hopper (=fertiliser side), and forward (to position 1A) for the calibration test of the rear hopper (=seed side). The centre position is the seeding position. Finally, check that the calibration test trays are at the feeders and their lock (7) is turned to the side.



4. Remove the pin of fertiliser (2) or seed (3) shaft from the feed shaft chain wheel. Make the calibration test at the feed row with the pin still in place. The front hopper is meant for fertiliser and the rear hopper for seed.
5. Attach the calibration test crank (5) to the calibration test shaft of the gearbox and turn it until an even amount of fertiliser or seed comes out of all feeders. After this, empty the trays.
6. Turn the axle anti-clockwise 1 round per second using the calibration test crank (5). An area of 100m² is obtained by turning the crank 17(300) / 13(400) rounds
7. Pull out the trays (6) and weigh the quantities they contain. If necessary, adjust the control lever of the gearboxes in the necessary direction and repeat the calibration test until the weighing result corresponds to the desired quantity. The received calibration test quantity corresponds to the area of 100m², so the quantities for a hectare will be hundredfold. When you place the calibration test trays back into the machine, make sure they are in the correct order and that they are connected to each other correctly.
8. Place the pins back in place after the calibration tests.
9. Put the transmission guard back in place.

5.10 Calibration test with fertiliser remote control



DANGER

Before performing a calibration test, make sure that power is switched off in the tractor, the key is not in the ignition and parking brake is engaged. Make sure that the ball valves of the center markers are shut.

1. Set the basic adjustments of seed drill according to the seeding table and lift the machine with the lifting cylinders from working position enough to disengage the transmission gear wheels and lift up the transmission guard.
2. Switch on power in the controller and then go to Setting page and select the Calibration test function. The program will ask for target quantity and you will confirm it by clicking OK.
3. Move the calibration test trays to the desired feed shaft by turning the crank. The crank is moved backward for the calibration test of the front hopper (=fertiliser side), and forward for the calibration test of the rear hopper (=seed side). Check that the calibration test trays are at the feeders and their lock is turned to the side.
4. Remove the cotter pin (3) of fertiliser (2) or seed shaft from the feed shaft chain wheel. Make the calibration test at the feed row with the cotter pin still in place.
5. Attach the calibration test crank to the calibration test shaft and turn it until an even amount of fertiliser or seed comes out of all feeders. After this, empty the trays.
6. Turn the axle anti-clockwise 1 round per second using the calibration test crank. An area of 100m² is obtained by turning the crank 17(300) / 13(400) rounds. For a hectare, the quantities are hundredfold.
7. Pull out the trays and weigh the quantities they contain.
8. Enter the weighing result in the controller in kilograms and confirm the corrections by clicking OK.
9. Repeat the calibration test and make sure that the result is sufficiently close to target quantity.
10. Put the pins back in place, turn the crank to set the feeder funnels in working position after the calibration tests and put the transmission guard back in place.

Note the following

After the calibration test, it is important to remember to put all the pins back in place in the feed shafts, because feed does not work on the shafts without the pin.

Always perform a calibration test when you make changes in feeding quantities, especially the fertiliser quantities may vary considerably based on the humidity and fluidity of the fertiliser.

6 Operating the machine



ADVICE

When commissioning the machine in the field open the valves and remove the stoppers on the lifting cylinders.



ADVICE

Check seeding depth after the first run with the actual seeding speed.



ADVICE

Never reverse the machine with the coulters on the ground, because they may block or break. If you must stop the machine during the work, always lift the machine all the way up and lower to the ground while the machine is in motion.

6.1 Checking seeding depth

Check seeding depth at the tractor wheels and between the wheels a few times per day. You can check seeding depth by scooping the seeding furrow with a trowel, for example.

Place the trowel flat on top of the furrow and then measure the depth of seeds with a tape measure. Note that driving speed affects seeding depth. The recommended driving speed is 8-12km/h.

6.2 Tractor's steering response

The steering response of a small tractor may be compromised when it pulls the seed and fertiliser 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. Also, switch off the tractor's weight transfer system.

The reason for this is that, when the weight transfer system is activated, the height of the tractor drawbars may change according to the load and it will impact seeding depth. You can install a two-branch chain on the drawbars with branches on the pins and the centre loop on the attachment point of the top link pin. The chain allows you to control the height of the drawbar and the tractor drawbars can be suspended by the chain.

6.3 Operating the seed and fertilizer drill on the field

The seed and fertilizer drill may be used in working position also in gentle curves. Turns of maximum 30 degrees are allowed with the coulters on the ground. Lift up the seed drill in turns that are steeper than this and when avoiding obstacles, and start in a straight line after the obstacle. Never make the 90 degree turns in the corners of the field with the coulters on the ground.

6.4 Filling the hoppers



DANGER

Danger of falling when working on the platform. Be careful when working on the platforms



DANGER

Never go under a lifted load.



DANGER

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



DANGER

Avoid breathing seed dressing dust and fertiliser dust.
Seed treatment agent causes a serious health risk.



DANGER

Read the material safety data sheet of the dressing agent and fertiliser and pay attention to their warnings.

Lower the machine to working position and turn down the steps on the rear platform. After this, let loose the hopper tarp loops and pull the string. The cover has a spring that rolls up the tarp. Never let the go of the tarp, but hold the end until it is open. Fill the hoppers with bulk bags or screw conveyor. We recommend that you open the bulk bags using a knife with a long handle. After filling, pull the tarp by a rope over the hoppers, attach the tarp loops, turn up the rear platform steps and lift the machine to transportation position.





6.5 Emptying the machine





Empty the hoppers by taking the excess seed or fertiliser from the hopper through the coulters onto a tarp. If the machine is nearly empty, a small quantity may be let through the feeders into the calibration test tray, and then taken out for storage. The bottom flap lever of the feeder allows you to measure out the quantity going into the calibration test tray. Finally, the flap is opened fully and feeders are turned by the calibration test crank so that the machine is emptied completely. Emptying can be enhanced with compressed air to blow all seeds and fertiliser out of the hoppers and feeders.

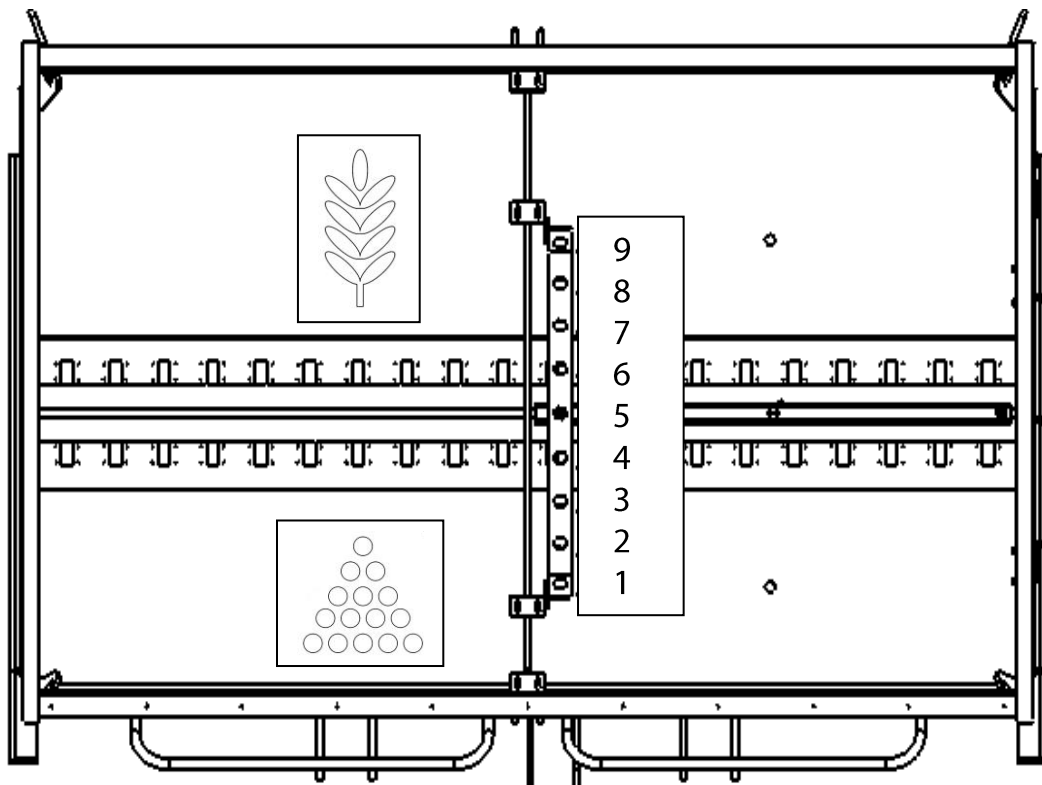
6.6 Adjusting the partition wall

When the hopper is empty, the partition wall of the hopper is adjustable according to the consumption of seed and fertiliser.

Adjusting the partition wall is done by removing first the locking pins of the partition wall on the other side and then by pushing the partition wall to the desired place. After adjusting, the pins are put back in place and the other side is adjusted. The table below shows hopper volumes with different positions of partition wall.

FORTE 300	 (l)	 (l)	 +  (l)
1	1100	2400	3500
2	1250	2250	3500
3	1350	2150	3500
4	1450	2050	3500
5	1600	1900	3500
6	1700	1800	3500
7	1850	1650	3500
8	1950	1550	3500
9	2150	1350	3500

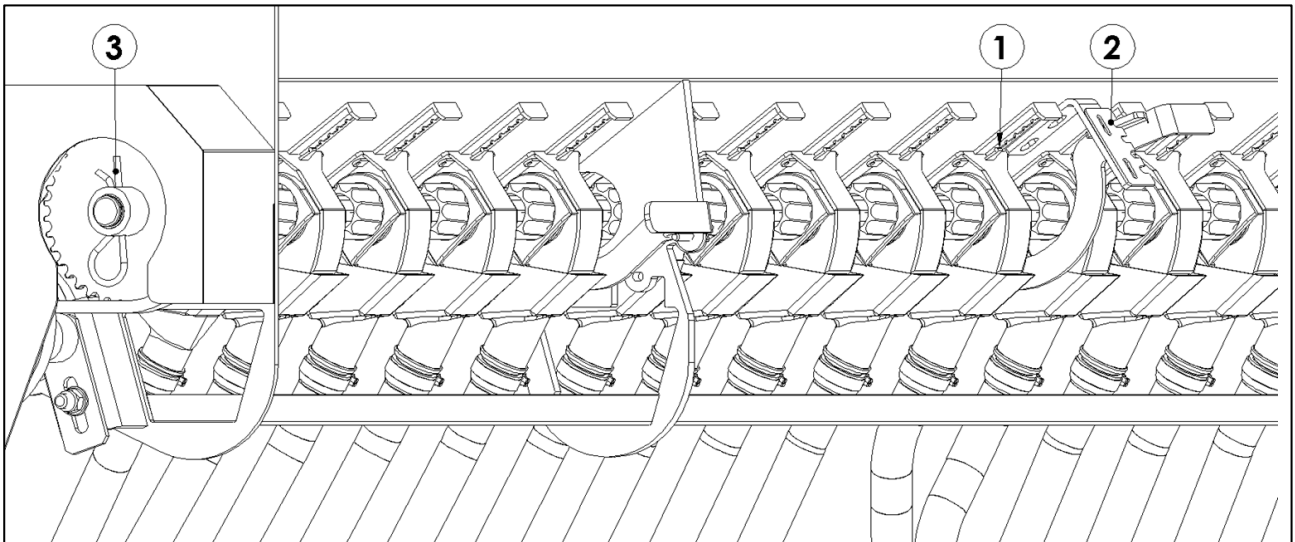
FORTE 400	 (l)	 (l)	 +  (l)
1	1500	3300	4800
2	1700	3100	4800
3	1850	2950	4800
4	2050	2750	4800
5	2200	2600	4800
6	2350	2450	4800
7	2500	2300	4800
8	2650	2150	4800
9	2800	2000	4800



6.7 Hopper for small-scale seed

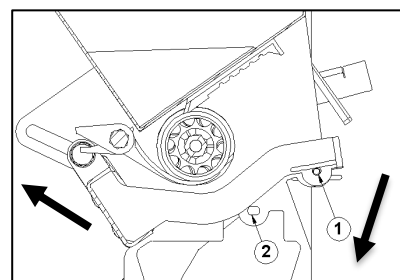
The hopper for small-scale seed that is offered as an accessory is attached behind the actual hopper and the seeds reguided through feeder tubes in front of the transportation wheels. Hopper volume is 240 litres.

The small-scale seed hopper's feeders are such that regulating feeding quantities is done by changing the effective width of the feeder roller. The feeders are powered by the machine's left running gear via chain. In the feeder, there is a shut-off plate between the feeder chamber and the hopper to completely shut the feed of the feeder chamber. Closing part of the feeders with a shut-off plate allows seeding with a narrower working width.



Calibration test of small-scale seed hopper

1. Set the basic adjustments of seed drill according to the seeding table and lift the machine with the lifting cylinders from working position enough to disengage the transmission gear wheels and lift up the transmission guard.
2. Open the pin (1) of the funnels and set the funnels to calibration test position by turning them down and pushing them toward the hopper. Lock the funnels in place with a pin (2). Then push the calibration test trays in place on the rail under the hopper.



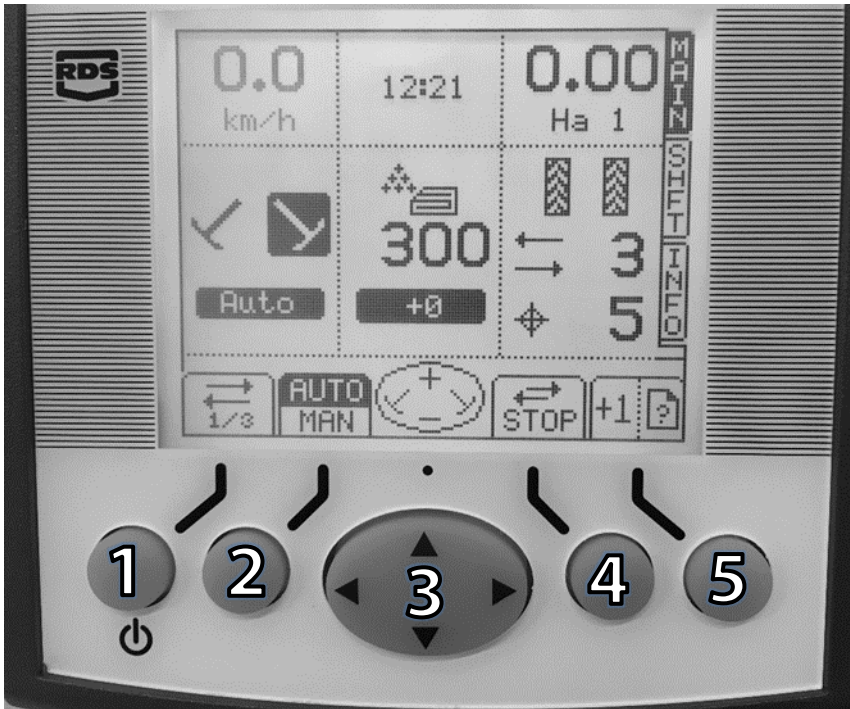
3. Remove the fertiliser and seed pin from the feed shaft chain wheel.
4. Attach the calibration test crank to the calibration test shaft and turn it until an even amount of fertiliser or seed comes out of all feeders. After this, empty the trays.
5. Turn the axle anti-clockwise 1 round per second using the calibration test crank. An area of 100m² is obtained by turning the crank 17(300) / 13(400) rounds. For a hectare, the quantities are hundredfold.

6. Pull out the trays and weigh the quantities they contain. If necessary, adjust the roller effective width in the necessary direction and repeat the calibration test until the weighing result corresponds to the desired quantity.
7. The received calibration test quantity corresponds to the area of 100m², so the quantities for a hectare will be hundredfold.
8. Repeat the calibration test and make sure that the result is sufficiently close to target quantity.
9. Put feeder funnels and pins back in place, calibration test trays back in place and transmission guard down.

7 RDS controller

The controller is used to measure and monitor acreage, tractor driving speed, average seeding acreage per hour, shaft turning, operation of tramlines, operation of gearboxes, emptying of hopper and operation of sensors.

The controller is controls or adjusts the operation of row markers, tramlines and fertiliser application rate

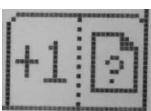


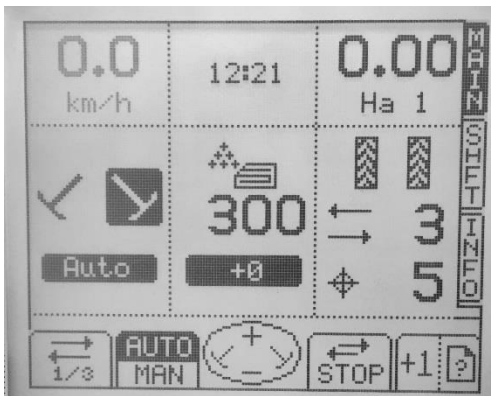
Display keys:

1	Power and lift inhibit operation
2	Selection button for marker operation mode
3	Arrow button (contains 4 buttons, up, down, left and right)
4	Stop tramline automatic advance button
5	Turn page and manual advance button

7.1 User interface

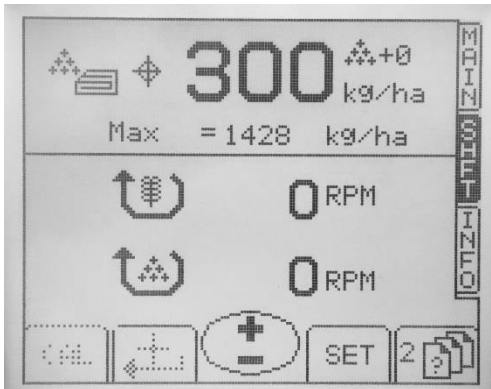
Use the right-hand button to move between pages. The page is changed by keeping the button pushed down for 3 seconds. Page number is shown on the left corner of the icon.





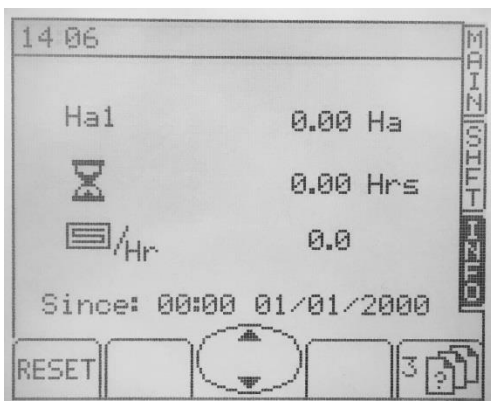
Main user page (1, MAIN) indicates

- driving speed
- active position and operation of markers
- value of active acreage measurement
- setting of remote control for fertiliser (accessory)
- status and current bout number for tramlines



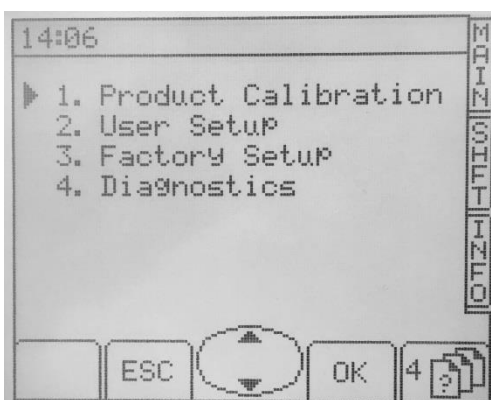
Control and rotation speed page (2, SHFT) indicates

- fertiliser remote control settings
- rotation speed of seed and fertiliser feed shafts



Counter page indicates (3, INFO)

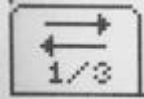
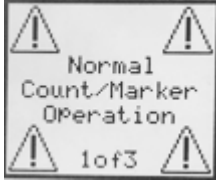


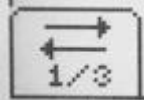



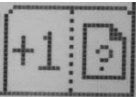
- sown acreages Ha1 and Ha2
- total acreage sown
- average work achievement



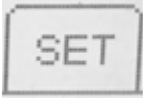


Setting page (4) shows setting menus:

1. Product calibration (fertilizer)
2. User settings
3. Factory settings
4. Diagnostics



7.1.1 Main user page functions (1, MAIN)

Key	Function	Help
<p>Lift inhibit function</p> 	 <p>Normal status</p>  <p>Lift inhibit activated</p>  <p>Counter and marker stop</p>	<p>Machine and markers function normally, counters and marker switch sides with each lifting</p> <p>Machine remains in seeding position but markers are lifted. Used when avoiding marker obstacles during work.</p> <p>Driving counter and marker side do not change. Used when filling, if the machine must be lowered.</p>
<p>Power button</p> 	<p>Switches off the controller.</p>	<p>Holding down for 3 seconds turns off the power of the controller.</p>
<p>Selection button for marker operation</p> 	<p>Marker side switches automatically or manually</p>	<p>Automatic selection shown, marker side switching is automatic.</p>
<p>Arrow button</p> 	<p>In horizontal direction activates the marker and horizontally changes the target quantity of electronic remote control preset increments (default 5%).</p>	<p>Pressing arrow sideways changes the marker side.</p>
<p>Tramline advance counter stop</p> 	<p>Stops the tramline counter</p>	<p>This can be used when work is interrupted or when filling.</p>
<p>Turn page and manual advance button</p> 	<p>Turns user interface pages or adds value 1 in the tramline advance counter</p>	<p>Turns page when kept down for 3 seconds.</p>

7.1.2 Control and rotation speed functions (2, SHFT)

Key	Function	Help
Activating fertiliser quantity setting 	Activates editing target quantity.	Change quantity by selecting the desired number by pressing the arrow button horizontally and adjust the number by pressing arrow up and down.
Arrow button 	Edit value to be bigger or smaller.	
Quantity display 	Indicates the current target quantity and below indicates the maximum quantity for the material in question.	Current setting +0 is shown on the right. To change target quantity, first press SET .

7.1.3 Counter page functions (3, INFO)

Key	Function	Help
Resetting 	Resets the value of active counter.	
Arrow button 	Moves the cursor between the display rows when pressed up or down.	

7.1.4 Settings page (4) functions

1. Calibration test

Calibration tests are made according to instructions shown in section 5.10 of this manual.

2. User settings

Setting	Description	Help
1.Display	Controls display contrast and brightness	
2.Customising	Sets fertiliser quantity increment	Default %
3.Time/date	Sets date and time	
4.Helpdesk	Helpdesk contact information	
5.Language	Selects language	
6.Seed drill	Seed drill basic settings	Seed drill width 3m or 4m. Speed sensor calibration, with factory setting for calibration factor set to 0.207. Recalibration of speed sensor may be done manually in the field in a stretch of 100m.

7. Tramlines	Tramline settings	Tramline width setting may be changed by pressing the arrows. Value 0 indicates the driving furrows are not activated. Only symmetrical driving furrows can be used.
8. Alarm settings	Hopper monitor alarms Feed shaft rotation alarms Gearbox alarm Speed alarm Low voltage alarm	All alarms can be deactivated. When seeding small-scale seeds, it may be advisable to deactivate the feed shaft rotation alarm.

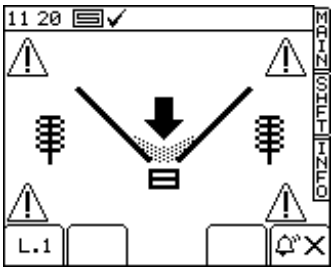
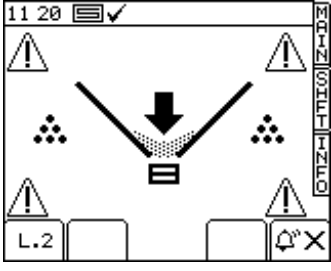
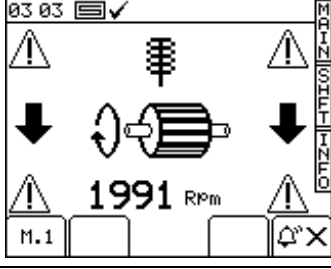
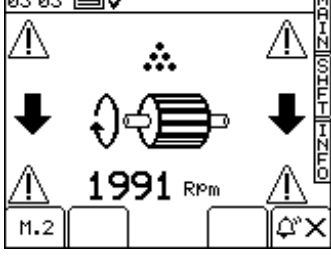
3. Factory settings

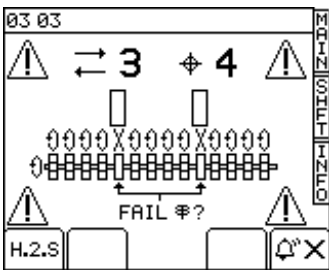
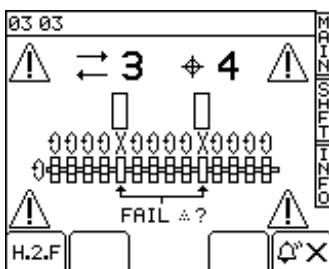
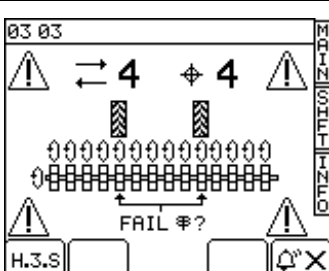
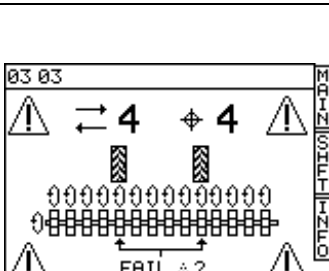
Settings are protected with PIN code; only authorised service technicians are entitled to change factory settings.

4. Diagnostics

1. Device	Display for tractor voltage output Display for voltage reading of hopper level sensors Display for lifting sensor status
2. Feeder	Display for speed sensor, shaft rotation speed and sensor frequency reading
3. History	Display for total acreage and operating time of the machine
4. Function testing	Tests machine sensors

7.2 Alarm codes

Code	Reason	Display	Checklist
L.1	Seed hopper level is low		Hopper is empty. Fill the hopper
L.2	Fertilizer hopper level is low		Hopper is empty. Fill the hopper.
M.1	Seed shaft speed low		Seed shaft is rotated too slow. Check the gearbox setting and that seed shaft is rotated.
M.2	Fertilizer shaft speed is low		Fertilizer shaft is rotated too slow. Check the gearbox setting and that shaft is rotated.

Code	Reason	Display	Checklist
H.2.S	Tramline clutch fail	 <p>The display shows a top status bar with '03 03' and two warning triangles. Below are two large numbers '3' and '4' with arrows and a diamond symbol. A central diagram shows a tramline with '00000X00000X00000' above it. At the bottom, it says 'FAIL #?' with a warning triangle and a bell icon.</p>	Seed shaft pulses are not being received. Check the shaft is rotating. Test sensors.
H.2.S	Tramline clutch fail	 <p>The display is identical to H.2.S, but the bottom left corner shows 'H.2.F' instead of 'H.2.S'.</p>	Fertilizer shaft pulses are not being received. Check the shaft is rotating. Test sensors.
H.3.S	Tramline clutch fail	 <p>The display shows a top status bar with '03 03' and two warning triangles. Below are two large numbers '4' and '4' with arrows and a diamond symbol. A central diagram shows a tramline with '0000000000000000' above it. At the bottom, it says 'FAIL #?' with a warning triangle and a bell icon.</p>	Seed shaft pulses are being received while making tramlines. Check the shaft is not rotating. Test sensors.
H.3.F	Tramline clutch fail	 <p>The display is identical to H.3.S, but the bottom left corner shows 'H.3.F' instead of 'H.3.S'.</p>	Fertilizer shaft pulses are being received while making tramlines. Check the shaft is not rotating. Test sensors.

8 Maintenance



DANGER

Always make sure that tractor transmission and hydraulics are disengaged and the engine is not running, before performing maintenance, cleaning, lubrication, installation or adjustment work. Depressurise hydraulic hoses before maintenance. Remove the ignition key and engage the parking brake to prevent the tractor or machine from moving accidentally.



DANGER

Secure the machine carefully in place using service stands and lifting cylinder stoppers before starting maintenance work and make sure the ground carries the weight of the machine.



DANGER

Close the ball valves in the machine's lifting circuit and ball valves in the marker hydraulic circuit.

8.1 Inspections

Inspections to be made on the seed drill. Detailed instructions are provided on the following pages. Once per operating season inspections are made before the season.

Table columns:

- 1) After the first 10 hectares
- 2) every 50 hectares
- 3) every 500 hectares or once per season

	1) 10 ha	2) 50 ha	3) 500 ha
Bolt tightness	X		X
Tyre pressures		X	X
Bearing clearance in the intermediate packer wheel			X
Condition and tension of transmission chains			X
Transmission gear wheel contact			X
Gearbox oil levels			X
Hydraulics			X
Coulter weight control			X
Coulter disc condition			X

8.1.1 Bolt tightness

Check the tightness of all bolts after the first 10 hectares and after that, annually.

Check annually that trunnions and their pins are in place.

	Tightening torque
Transportation wheel bolts (M20x1.5)	350 Nm
Intermediate packer wheel bolts (M18x1.5)	250 Nm
Flange bearing bolts (M16) of transportation running gear	230 Nm
Coulter carrier pin bolts (M12)	90 Nm
Coulter shank fastening bolts (M20)	300Nm
M8 bolts	27 Nm
M10 bolts	50 Nm
M12 bolts	90 Nm
M16 bolts	230 Nm

8.1.2 Tyre pressures

Coulter side wheel and covering wheel are semi-pneumatic. Tyre pressure cannot be adjusted in semi-pneumatic tyres. Rear tyre (250/80-18) pressure is 1.5bar. The tyre pressure of the intermediate packer wheels, available as accessory, is 3.0bar.

8.1.3 Bearing clearance in the intermediate packer wheel

Checking is made before greasing the hubs. You would not be able to feel the play if the bearings are just greased.

The packer wheels are lifted off the ground. Remove the bar between the wheel frames. Take a firm grip on the wheel and twist it to feel the bearing play. The wheel must rotate without resistance, but there should not be any noticeable clearance in the bearings. You can check the tightness of the wheel bolts at the same time.

If you need to tighten the bearings, remove the hub bearing cup. Remove the locking pin of the castle nut of the shaft and tighten the nut while simultaneously rotating the wheel until you feel slight resistance in the bearing. After this, loosen the nut until the locking pin fits the hole of the next nut, where the bearing is rotating. If the nut is already in line with the hole, loosen the nut until the next hole becomes visible (a maximum of 30 degrees). Tighten the hub cap. Connect the bar between wheels. Press grease to the nipple until it comes out through the sealing.

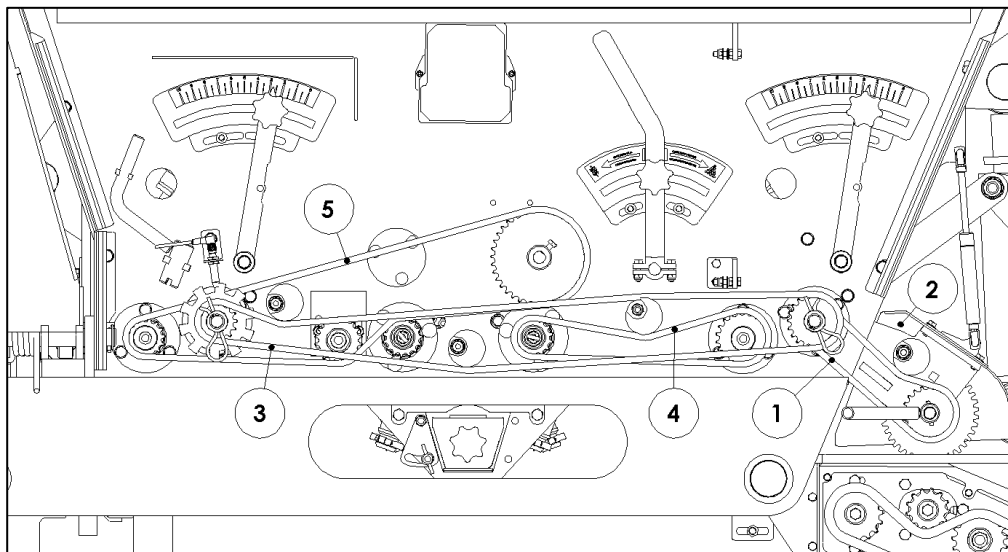
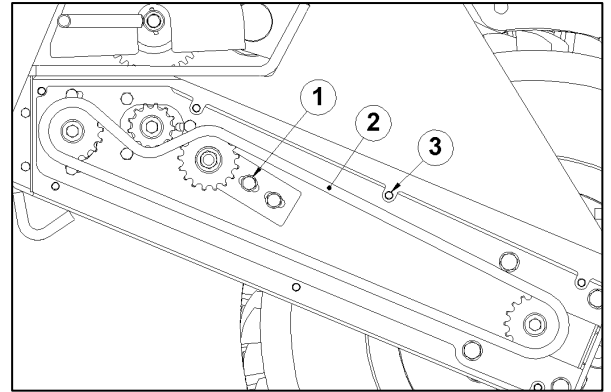
8.1.4 Power transmission

Power transmission has chains that require maintenance. Adjust the chains to correct tension before the operating season begins. The ball bearings on the power transmission are lubricated for life.

! ADVICE

The tension of all power transmission chains must be checked after the first 10 hectares and after that, once per operating season before the season begins.

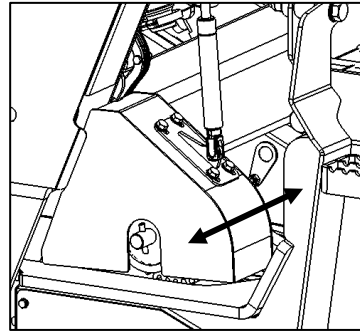
1. The main power transmission chain is located inside the sidebar of the rear axle. The main power transmission cover is attached with screws (7 pieces) to the rear axle frame and it must be removed in order to check chain tension. Loosen the fastening screws and press the chain tensioner upward to make the chain tenser. When the desired tension is achieved (10mm movement when lifted in the underside of the chain), tighten the fastening screws.



2. The gear wheel (1) chain tension is adjusted with a plastic roll type chain tensioner. The chain guard (2) of the gear wheel must be removed before tensioning the chain.
3. The power transmission chain (3) tension is adjusted with a plastic roll type chain tensioner.
4. Seed shaft transmission chain (4) is tensioned with a plastic roll type chain tensioner.
5. Tension the fertiliser shaft and dispersing axle chain (5) with a tensioning wheel. Tensioning is done by loosening the tensioner's tensioning screws and pressing down the tensioning wheel.
6. It is good to check the tightness of power transmission fastening bolts, such as bearing units and gearboxes, before each operating season. Check the tension of roller chains, however, immediately on the first seeding day!

8.1.5 Transmission gear wheel contact

The contact of gear wheels must be adjusted when the machine is in working position. The gas spring must not press the gear wheels against each other; there should be slight clearance when the upper gear wheel is moved to the side.



8.1.6 Hydraulics



DANGER

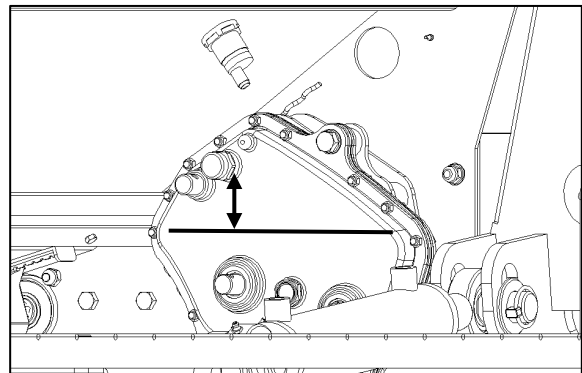
The hydraulic system must be depressurised when maintenance and inspections are done.

Check the hydraulic systems and tighten the couplings if necessary. Check the condition of hydraulic hoses visually. The pressure of the pressure accumulator must be checked in an authorised service shop every five years.

8.1.7 Gearbox

Check the gearbox oil level at least once every seeding season. The oil must be changed at least every five years to remove condensed water from the gearbox. The correct oil volume is 0.8 litres. Use ISO VG32 grade hydraulic oil. Oil level should be 40-45mm from the filling plug.

Outside of operating season, adjust the gearbox to 0 position.

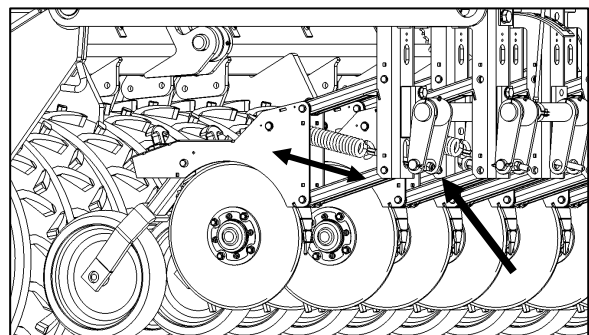


8.1.8 Coulter weight setting

The basic setting of coulter weight must be checked before the operating season. The springs must have no play, i.e. not move, when you try to move them in lengthwise direction. However, the springs must not have tension. Most of the time it is enough to check a few coulters on the machine, and then adjust the others to the same setting.

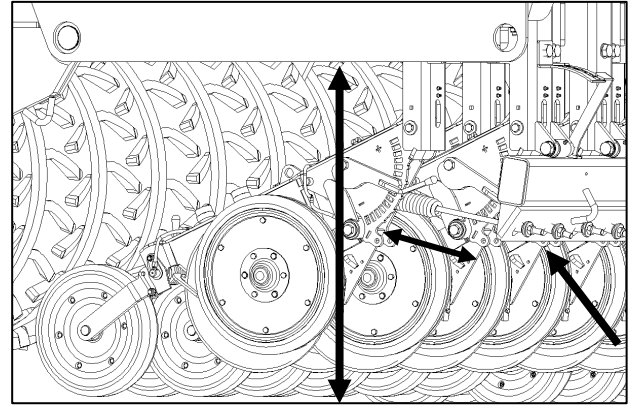
S coulters

Lift up the machine and adjust coulter weight to position 1 on the scale (smallest coulter weight). After this, tighten the springs so that they have no play.



XT coulters

Lower the machine on a level surface, make sure that the machine is horizontal and adjust coulter weight to position 1 (smallest coulter weight). The lower edge of the front cross tube of the machine frame should now be 740mm from the ground. After this, the compression springs are tightened to have no play. Use e.g. locking pliers to hold on to the threaded pin of the compression spring.



8.1.9 Condition of discs

The condition of coulter discs and bearings is an important part of the appropriate operation of the machine. The minimum outer diameter of the discs is 350mm; replace discs with smaller diameter. There must be sufficient pre-tension between the discs against each other. Pre-tension is sufficient when you can barely rotate the cutting discs against each other manually. No play is allowed in the bearings when you twist the disc by its rear edge. Excessive bearing clearance removes pre-tensioning between the discs.

8.2 Lubrication

When lubricating, make sure that the grease nipple is open and that you lubricate so long that grease squeezes out of the joint. Wipe away excess grease. Usually, 1-2 squeezes of grease is enough for the grease nipples.

After the operating season, when the machine is stored after washing with pressure washer and drying, all lubrication points must be lubricated and we recommend that metal surfaces are sprayed with the appropriate machine shield oil. Never spray oil on the access bridges!

Table columns:

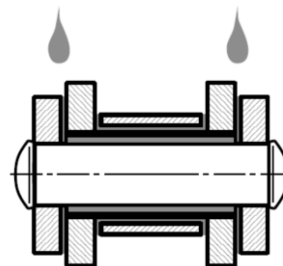
- 1) After the first 10 hectares
- 2) every 50 hectares
- 3) every 500 hectares or once per operating season

Lubrication point	1) 10ha	2) 50ha	3) 500ha	S300 pieces	S400 pieces	XT300 pieces	XT400 pieces
Power transmission chains			X	5	5	5	5
Coulter bushings	X	X	X	80	104	20	26
Covering and side wheel arms	X	X	X	20	26	40	52
Coulter weight cylinders			X	2	4	2	4
Coulter weight shaft			X	20	26	10	13
Mounting plain bearings of rear axles			X	2	2	2	2
Wheel axle flange bearings			X	6	6	6	6
Lifting cylinder			X	2	6	2	6
Towing device	X	X	X	4	4	4	4
Intermediate packer wheel			X	6	6	6	6
Marker cylinders			X	4	4	4	4
Drawbar cylinder			X	2	2	2	2
Roller chains			X	5	5	5	5
Front levelling board			X	2	2	2	2
Front harrow			X	12	12	12	12
Disc harrow cylinder			X	2	2	2	2
Rear harrow cylinder			X	2	2	2	2

Tough, long-fibre grease can be used in coulter bushings. Never use it elsewhere, because it breaks ball bearings.

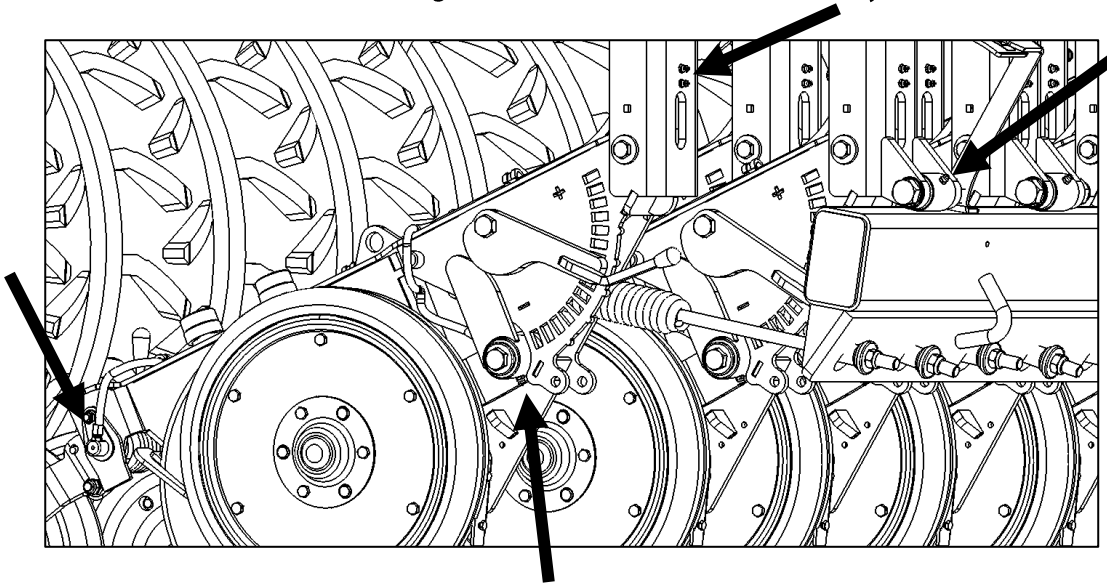
8.2.1 Power transmission chains

Power transmission chains must be lubricated once per operating season. Use clean motor oil of high-quality for lubrication. Make sure that oil goes between the chain discs and not only in the roller.



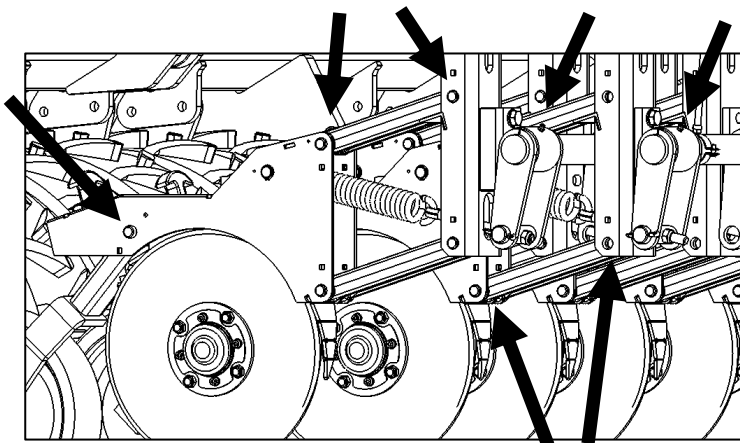
8.2.2 XT coultter and weight shaft

XT coultter has a total of 3 nipples to grease. One nipple each in the coultter mounting bushing and the side wheel arm. Covering wheel joint has one nipple. The joints of the coultter weight shaft have grease nipples and in total there are 10/13 nipples. In machines equipped with grease hoses, the nipples in the side wheel arm and covering wheel are brought to the front of the coultter shank. The bearings of side wheel, coultter discs and covering wheel are lubricated for life so they need no lubrication.

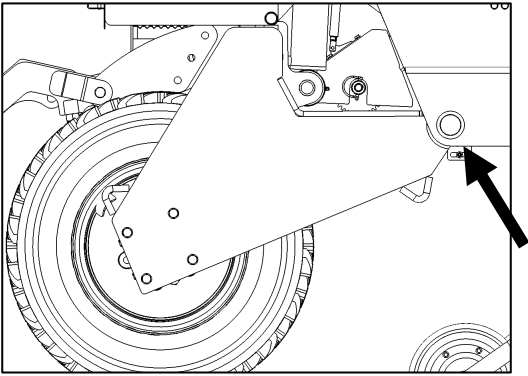


8.2.3 S coultter and weight shaft

The coultter's articulated arms have a total of four nipples and the covering wheel joint has one nipple. The joints of the coultter weight shaft have grease nipples and in total there are 20/26 nipples. In machines equipped with grease hoses, the nipple of the covering wheel and the rearmost nipple of the upper articulated arm are brought via hoses to the front of the coultter shank. The bearings of coultter discs and covering wheel are lubricated for life so they need no lubrication.

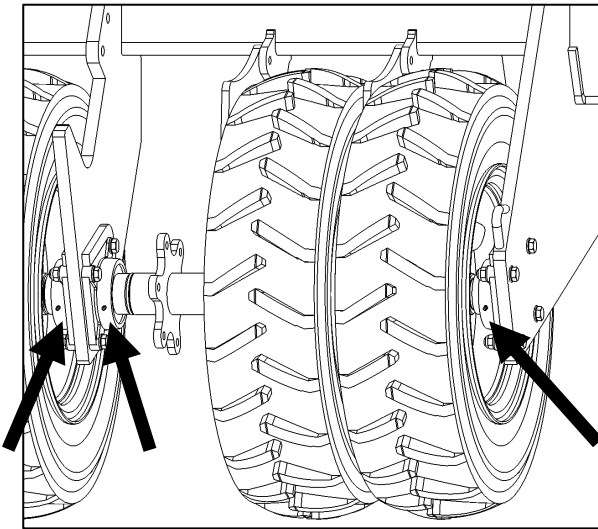


8.2.4 Mounting plain bearing of rear axle



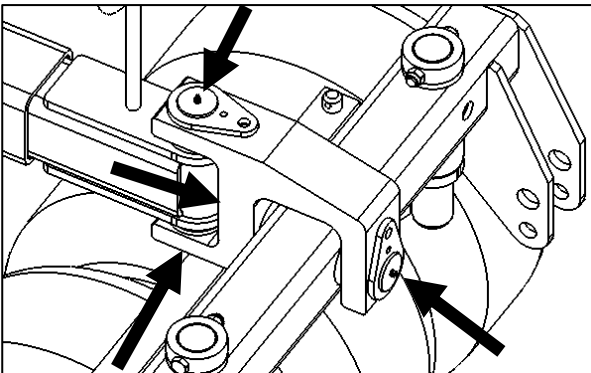
Rear axle mounting plain bearings have grease nipples. The 2 nipples are located in the rear ends of hopper.

8.2.5 Rear running gear



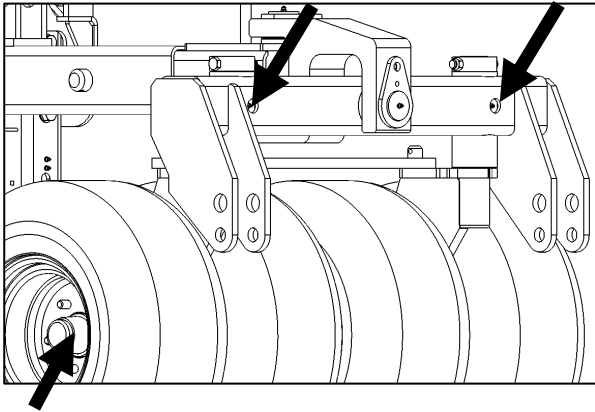
The flange bearings of rear running gear axles have a total of six nipples.

8.2.6 Towing device



Both ends of the towing device pins have grease nipples, a total of four nipples. Weight of the machine must be on the support leg during lubrication. The joint must not be under load to make sure that grease penetrates the bearing on all sides

8.2.7 Intermediate packer wheel



The vertical pins of the intermediate packer wheel have four nipples. Lubricate the vertical pins when the wheels are off the ground to make sure grease penetrates the bearing on all sides. The hub has grease nipples; add grease until it squeezes out between the hub and the seal.

8.2.8 Front levelling board

Grease the joint bearings of the front board cylinders, total of two grease nipples.

8.2.9 Front harrow

Both ends of the articulated arm and the joint bearings of the cylinders have grease nipples. The machine has a total of twelve nipples.

8.2.10 Front disc harrow

The joint bearings of the working depth cylinder of the front disc harrow have two nipples. The bearings of the harrow discs are lubricated for life, so they need no lubrication.

8.2.11 Rear harrow

The joint bearings of the rear harrow cylinder have two nipples.

8.2.12 Markers

The joint bearings of marker cylinders have a total of four nipples.

8.3 Removing the coulter, side wheel and disc and changing the bearings

Before replacing parts of the coulter, it must be disconnected from the machine. Washing the coulters before starting to replace parts makes it easier.



DANGER

Make sure the machine is firmly placed, the lifting cylinder is in the lower position and tractor's parking brake engaged, power is switched off and the key is not in the ignition. Always wear protective gloves and glasses during maintenance work and avoid sharp edges.



DANGER

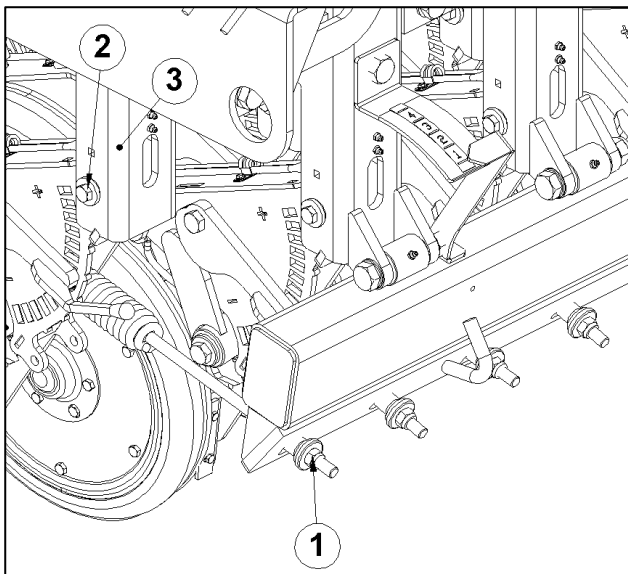
Danger of crushing and cutting when removing the coulter!



DANGER

Secure the machine carefully in place using service stands and lifting cylinder stoppers before starting maintenance work and make sure the ground carries the weight of the machine.

8.3.1 Removing XT coultter from the machine



1. Remove the nut and bushing of the coultter weight adjusting screw and release the screw from the coultter weight shaft (1).

2. Remove seed tubes from the coultter by opening the hose clamps.

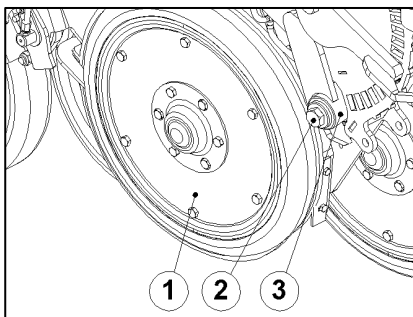
3. Remove the pivot pin (2) of the coultter. The pin is fastened with two M12 bolts and tapered sleeves. First open the bolts and the knock the pin with a small hammer back and forth until the the sleeves come out. After that the pin can be pushed off.

4. Lift up the machine with lifting cylinder, which leaves the coultter on the ground; the coultter can now be pulled from under the machine.

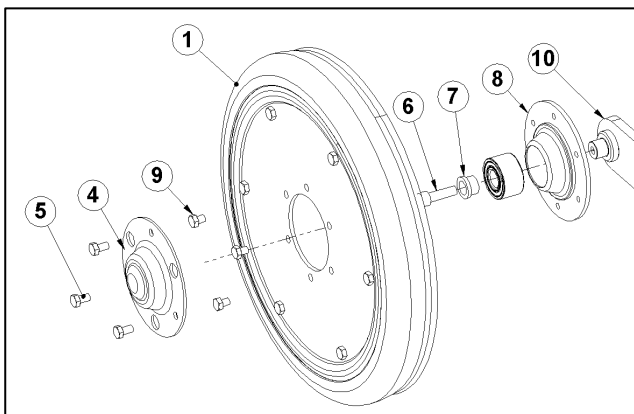
8.3.2 Assembling the coultter to the machine

Assembly is done in reverse order. The tightening torque for coultter pivot pin bolts is 90Nm. Basic coultter weight setting has to be checked after assembly according to instructions shown in section 8.1.8.

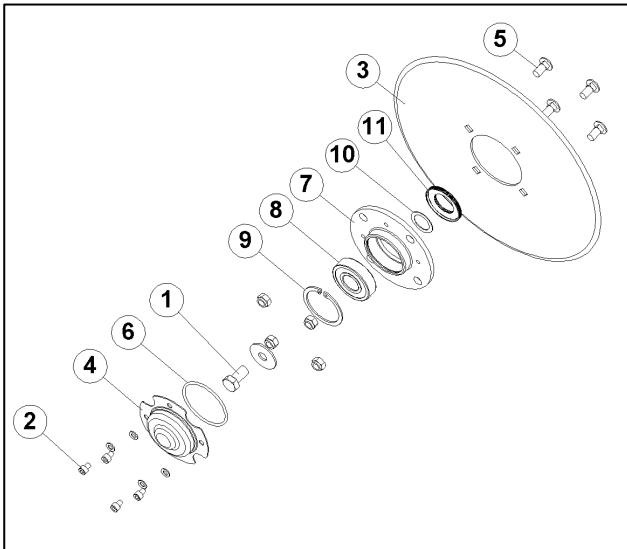
8.3.3 Removing the side wheel and cutting disc and changing their bearings



You must remove the side wheel (1) and its arm (3) before you can remove the cutting disc. Remove the fixing bolt (2) of the side wheel arm and pull the arm away from the coultter frame.



To replace the side wheel bearing, remove the three bolts (5) of the side wheel bearing cover and pull off the bearing cover (4). After this, open the M10 hex screw with left-handed thread (6) and remove the bushing (7). Now, you can pull off the side wheel from the axle of its arm. The bearing housing (8) of the side wheel is fastened to the rim with three bolts (9). The bearing of the side wheel on the right side is fastened with bolts (M10 hex bolt) that have right-handed thread.

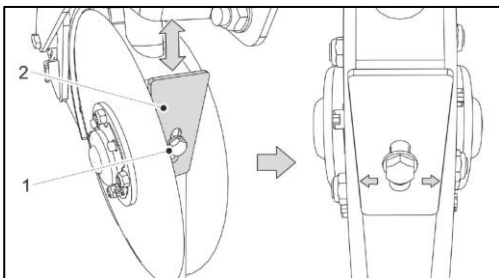


The cutting disc (3) is locked with a bolt (1) to couler frame. You can access the bolt by opening 4 hex bolts on the bearing cover and removing the cover (4). On the left side, the bolt is left-handed and on the right side, right-handed. The bearing housing (7) of the disc couler is fastened to the disc with four lock bolts (5). Attach the couler to a bench vice for removing the bolts.

The bearings of cutting discs are locked in their bearing housings with a lock ring (9), which is removed with lock ring pliers. After removing the lock ring the bearing is pressed out of the bearing housing with a workshop press. The side wheel bearing is attached to its housing with a press fit. The bearings are lubricated for life, so they cannot be greased.

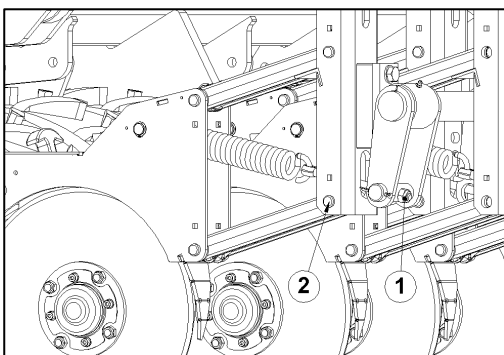
When installing new components, pay attention to sufficient pre-tensioning of disc coulters against each other. Normal pre-tension is achieved when the discs touch each other on a distance of 50-60mm of their circumference and the discs can barely be rotated against each other manually. When the couler wears, you can increase pre-tension by removing the shim under the bearing or replacing it with a thinner one. In normal circumstances, disc couler tensioning or replacement will be done after several operating seasons, when the disc has worn to 350mm in diameter.

8.3.4 Adjusting the scraper plate



Between the disc cutters there is a scraper plate, which cleans the discs on the inside. Adjust the scraper by loosening the fastening bolts (1) and moving the scraper plate up or down. The scraper must be as close to the discs as possible, but make sure that under no circumstances does the scraper plate touch the disc. Then, tighten the scraper plate fastening bolt.

8.3.5 Removing S couler from the frame



1. Remove the nut of the couler weight adjusting screw and release the adjusting screw from the couler weight shaft (1).

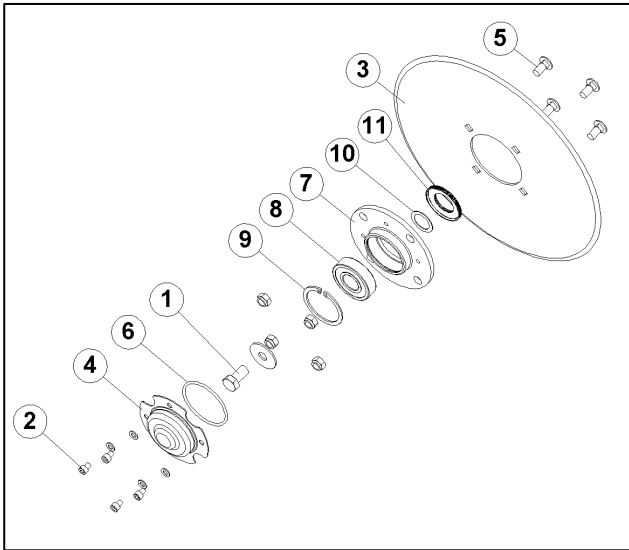
2. Remove the pivot pins (2) of the couler. The pins are locked to the couler frame with a lock bolt and nut.

3. Lift up the machine with lifting cylinder, which leaves the couler on the ground; the couler can now be pulled from under the machine.

8.3.6 Assembling the S couler to the frame

Assembly is done in reverse order. Basic couler weight setting has to be checked after assembly according to instructions shown in section 8.1.8.

8.3.7 Removing disc and changing bearings, S coulters

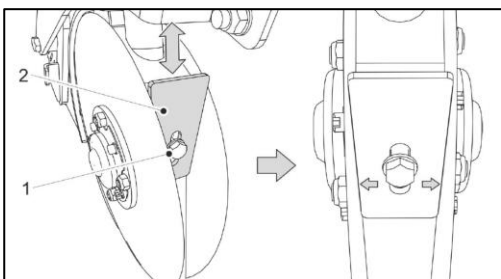


The cutting disc (3) is locked with a fixing bolt (1) to coulters frame. You can access the fixing bolt by opening 4 hex bolts on the bearing cover and removing the cover (4). On the left side, the bolt is left-handed and on the right side, right-handed. The bearing housing (7) of the disc coulters is fastened to the disc with four lock bolts (5). Attach the coulters to a bench vice for removing the screws.

The bearings of cutting discs are locked in their bearing housings with a lock ring (9), which is removed with lock ring pliers. After removing the lock ring the bearing is pressed out of the bearing housing with a workshop press. The bearings are lubricated for life, so they cannot be greased. Between bearing cover and housing there is an O-ring. In the bearing housing behind the coulters disc there is a grease seal that keeps the bearing clean. Change damaged seals and O-rings.

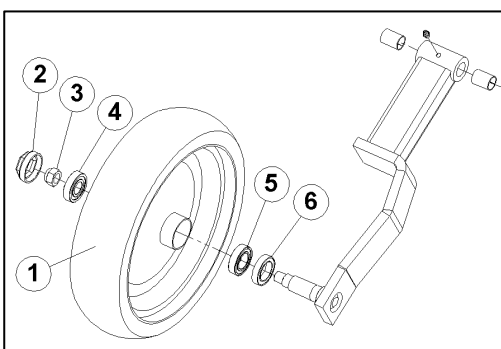
When installing new components, pay attention to sufficient pre-tensioning of disc coulters against each other. Normal pre-tension is achieved when the discs touch each other on a distance of 50-60mm of their circumference. When the coulters wear, you can increase pre-tension by removing the shim under the bearing or replacing it with a thinner one. In normal circumstances, disc coulters tensioning or replacement will be done after several operating seasons, when the disc has worn to approximately 350mm in diameter.

8.3.8 Adjusting the scraper plate



Between the disc cutters there is a scraper plate, which cleans the discs on the inside. Adjust the scraper by loosening the fastening bolts (1) and moving the scraper plate up or down. The scraper must be as close to the discs as possible, but make sure that under no circumstances does the scraper plate touch the disc. Then, tighten the scraper plate fastening bolt.

8.3.9 Replacing the covering wheel



Replace the covering wheel (1) by removing the protective cup (2) and the nut (3) under it which fastens the covering wheel to the arm. Replace the covering wheel bearings by pressing them out with a workshop press. Grease seal between wheel arm and bearing has to be changed if damaged.

8.4 Removing the rear running gear tyres



DANGER

Make sure the machine is firmly placed, the lifting cylinder is in the lower position and tractor's parking brake engaged, power is switched off and the key is not in the ignition.



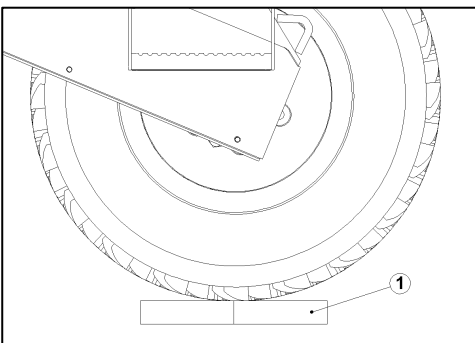
DANGER

Great danger of crushing and cutting when removing the wheels!

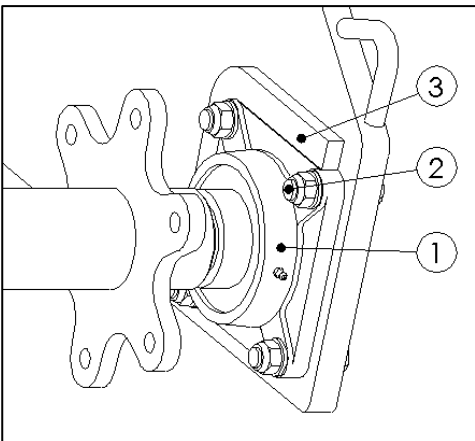


DANGER

It is important to ensure that the seed drill cannot move in any direction at any stage!

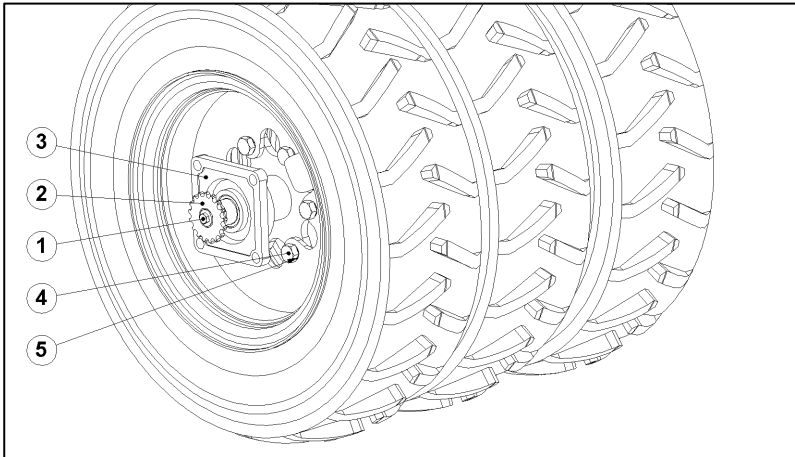


Put e.g. planks on an even and hard surface at those wheel sets, which do not need to be removed. Drive the seed drill onto the planks (1). The wheel set to be removed now remains slightly off of the ground (app. 5-7cm). Turn off the tractor, engage its parking brake and take the keys out of the ignition to prevent accidental starting of the engine.



Remove the flange bearing bolts (2) of the broken wheel set. The intact wheel sets that are on top of planks are suspended by the brackets (3) even though the fixing bolts of the flange bearing are removed. When the fixing bolts are removed, the wheel set to be replaced falls down and it may be rolled away.

8.4.1 Dismantling the wheel set for repairing a tyre



Dismantling a wheel set (left)

1. Loosen the tensioner of the main power transmission chain and remove the chain.
2. Remove the chain wheel (2) at the end of the axle. The chain wheel is attached with a M10 bolt.
3. Remove the flange bearing (3) from the axle. The bearing is tightened to the axle with a set screw.
4. Remove the wheel bolts on the wheels that needs to be removed.
5. Pull the wheel off the axle.

Dismantling the wheel set (middle and right set)

1. Remove the wheel set to be repaired from the seed drill.
2. Remove the flange bearing from the axle. The bearing is tightened to the axle with a set screw.
4. Remove the wheel bolts on the wheels that needs to be removed
5. Pull the wheel off the axle.

Take the flat tyre to a tyre repair shop. The tyre has an inner tube.

Tighten the wheel bolts evenly by increasing torque several times. The final tightening torque must be 350Nm. Check the tightness of bolts on the next day the machine is operated.

8.5 Cleaning and storage of machine

The fertiliser hopper and painted surfaces of the machine must be cleaned well after use, first by blowing with compressed air. Remove the protective nets in the fertiliser hopper for cleaning. Wash the hoppers and painted surfaces with appropriate detergent and warm water. Be careful not to let water into electric equipment, never point a high-pressure water spray at electric equipment.

After washing, lubricate all lubrication points to remove water from bearings.

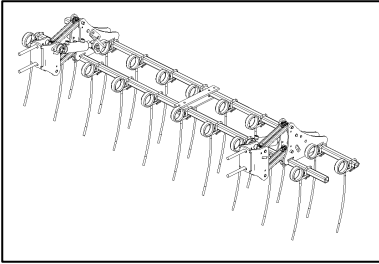
Discs are cleaned with a pressure washer, after which they are sprayed lightly with oil to prevent rusting. Once the discs are dry, turn each pair of coulter discs a few turns so that the scrapers remove the dry dirt inside the discs.

Damaged paint is touched up after washing. The painted surface is protected with a light application of oil, especially with the appropriate protective oil.

The machine is stored in a dry place and protected from sunlight. Store the machine so that the coulters are slightly raised off the ground and the spring pressure of coulters is at its smallest position. Gearbox control must be in position 0.

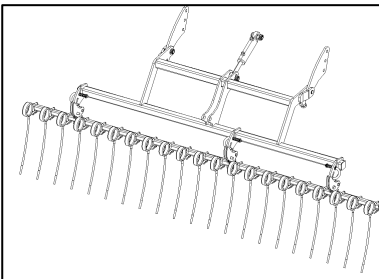
9 Accessories

9.1 Front harrow



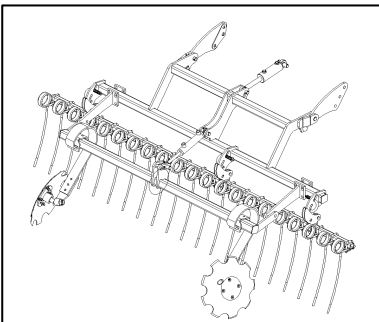
Front harrow grabs the straw on the field and spreads it to an even carpet. It also draws a seeding trace for the coulter on the plant mass on the field. Front harrow height is controlled with hydraulic cylinders. Set the lowest position of tines with an adjusting screw.

9.2 Rear harrow



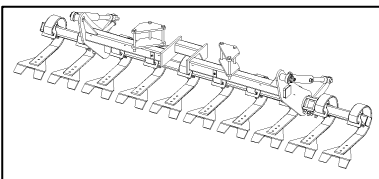
Rear harrow is attached to the rear frame of the seed drill. Limit the lowest position for the harrow by controlling the length of the adjusting screws. Tine angle has three positions; the gentlest position is recommended for soil containing a lot of plant residue. The rear harrow will rise with the seed drill to transportation position.

9.3 Tramline disc marker



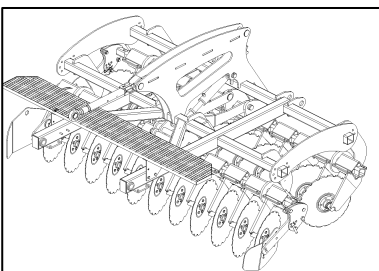
Disc markers are attached to the rear harrow frame. The markers lower automatically with the machine when tramlines are made.

9.4 Front levelling board



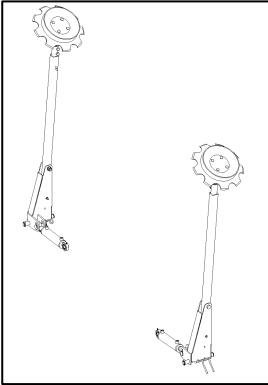
The front levelling board is used to level the field when seeding on tilled soil. The front board is controlled with a hydraulic cylinder. The lowest position of front board is limited with stoppers placed on the cylinder stem. The front board is attached to the drawbar.

9.5 Front disc harrow



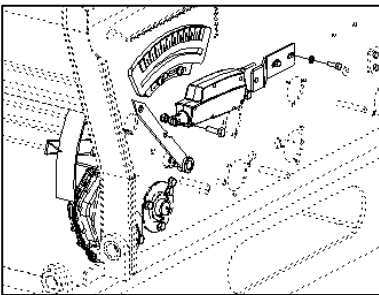
The disc harrow cultivates stubble and ploughed soil and earths up manure and plant residue. Restricting the cylinder stroke limits the lowest cultivation depth. In both edges there are plates that level the ridges between runs.

9.6 Center markers



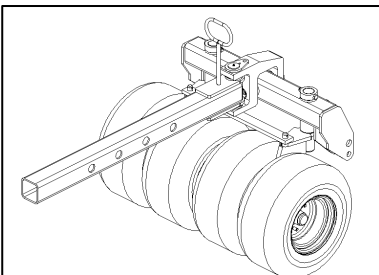
Center markers mark the centre line of the next run. Lift inhibit function is included in the equipment. You must shut the hydraulic cylinder ball valves for the duration of transportation and service work.

9.7 Fertiliser remote control



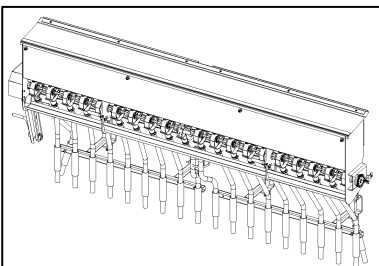
Use the RDS controller and electric motor to adjust the quantity of fertiliser while driving.

9.8 Intermediate packer wheels



The intermediate packer wheel is used to pack the space between tractor wheels to make all the soil evenly compressed. This makes for even sprouting and simultaneous ripening of the grain. The intermediate packer wheel must be lifted up when driving on the road and kept down only during work on the field and while driving forward.

9.9 Hopper for small-scale seed



Small-scale seed hopper is attached to the back of the machine. Hopper volume is 270 litres. The seed is guided to the front of the transportation wheels.

10 EC Declaration of conformity

DOMETAL OY
Kotimäentie 1
32210 Loimaa
Finland

Hereby assures that the following machines

FORTE S300, S400, XT300 and XT400, starting from serial number 000-090204-J1010

meet the requirements of Machinery Directive 2006/42/EC.

The following harmonised standards were applied in the design of the machine:

SFS-EN 12100
SFS-EN 14018 + A1

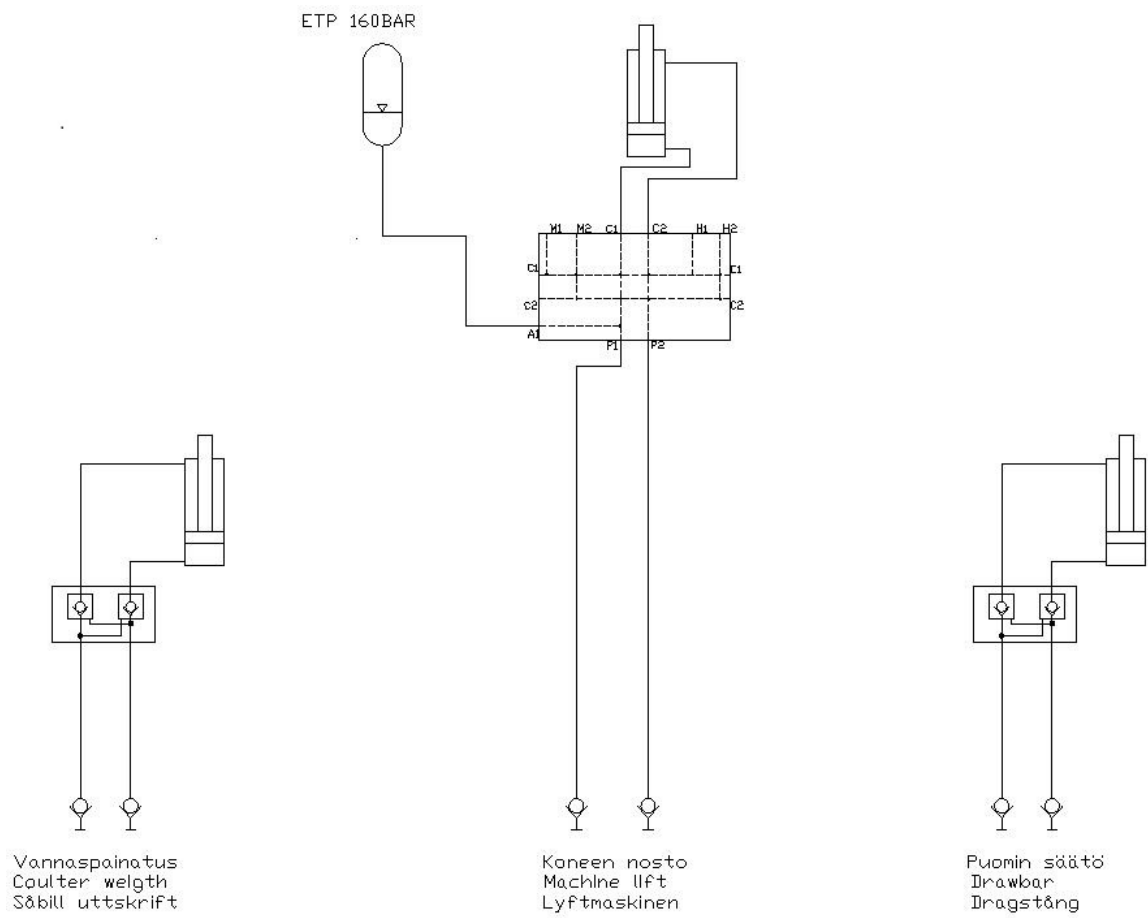
Loimaa, 12 September 2017



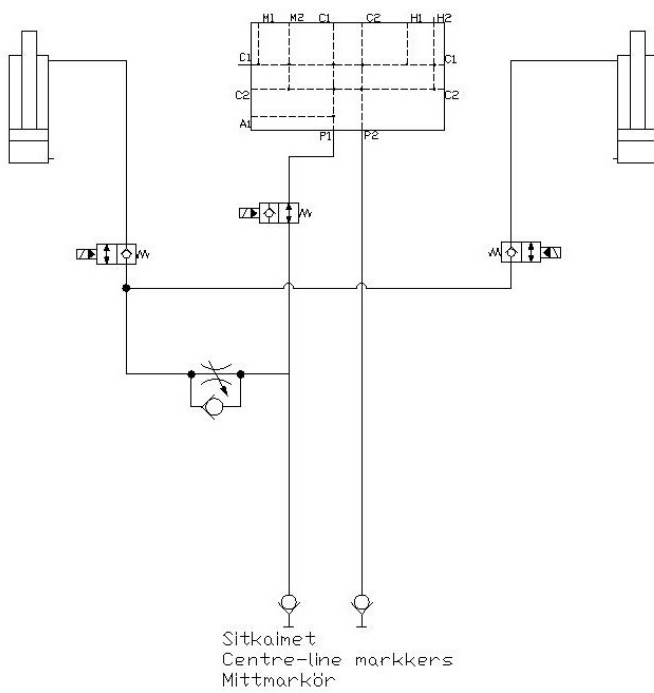
Vesa Mäkelä
Kotimäentie 1
32210 Loimaa
Finland

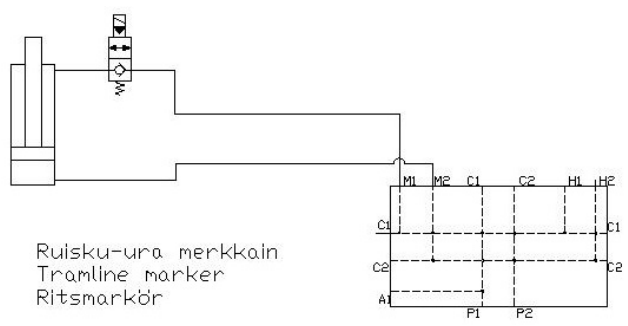
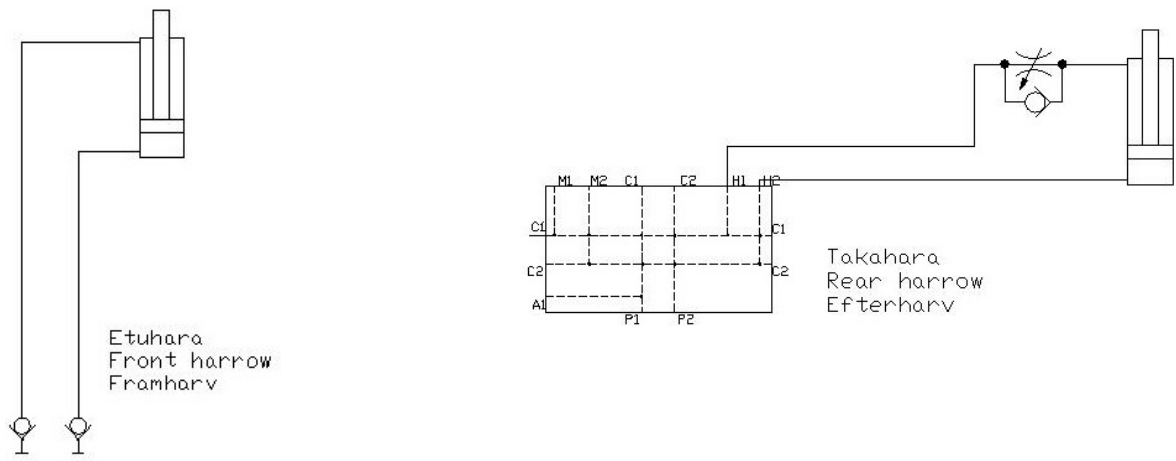
The undersigned is authorised to compile the technical file of the machine.
Original

11 Hydraulic circuits XT/ S 300

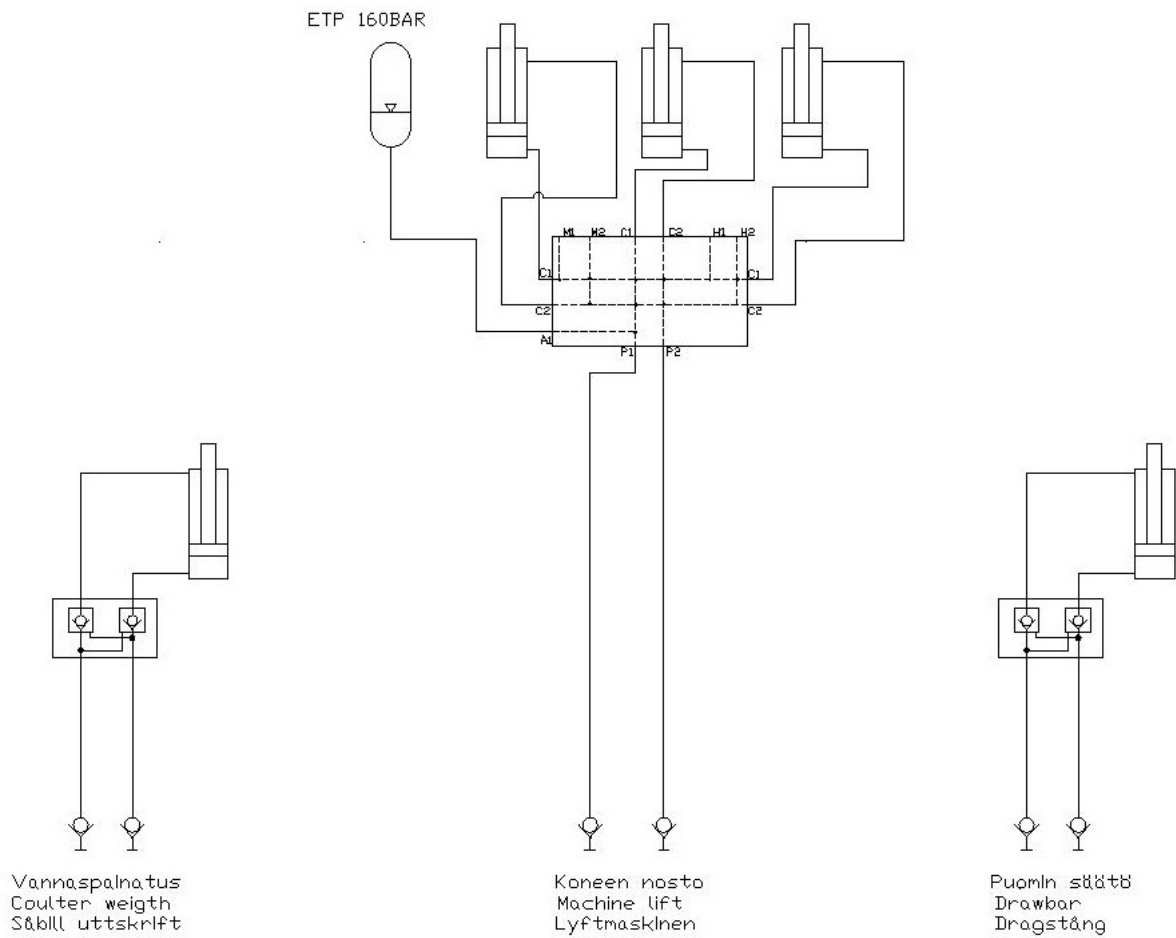


XT/ S 300 Accessories

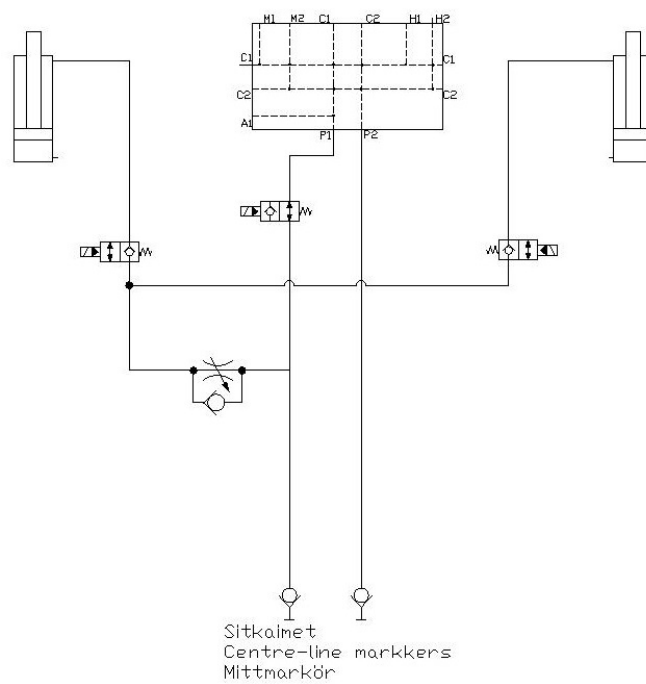


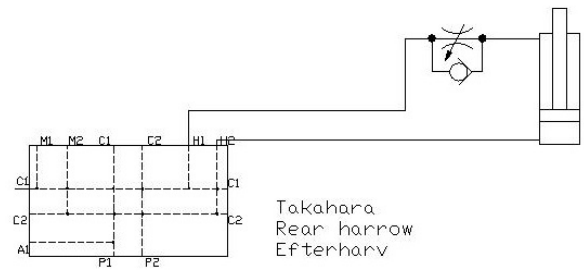
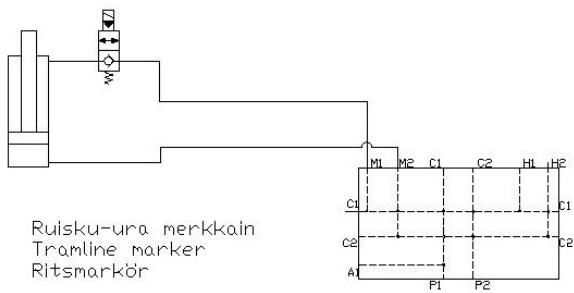
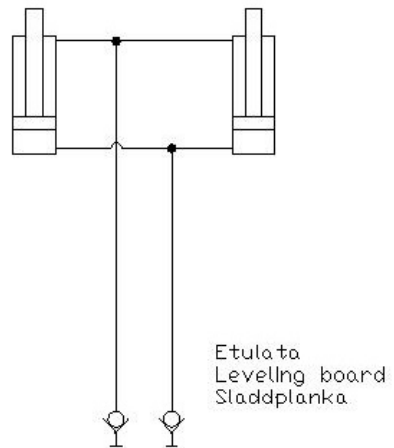
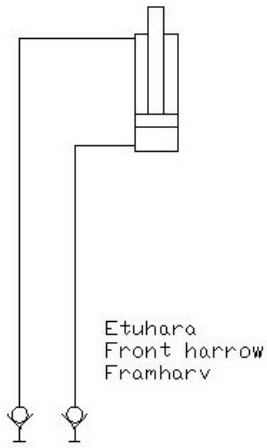


12 Hydraulic circuits XT/ S 400

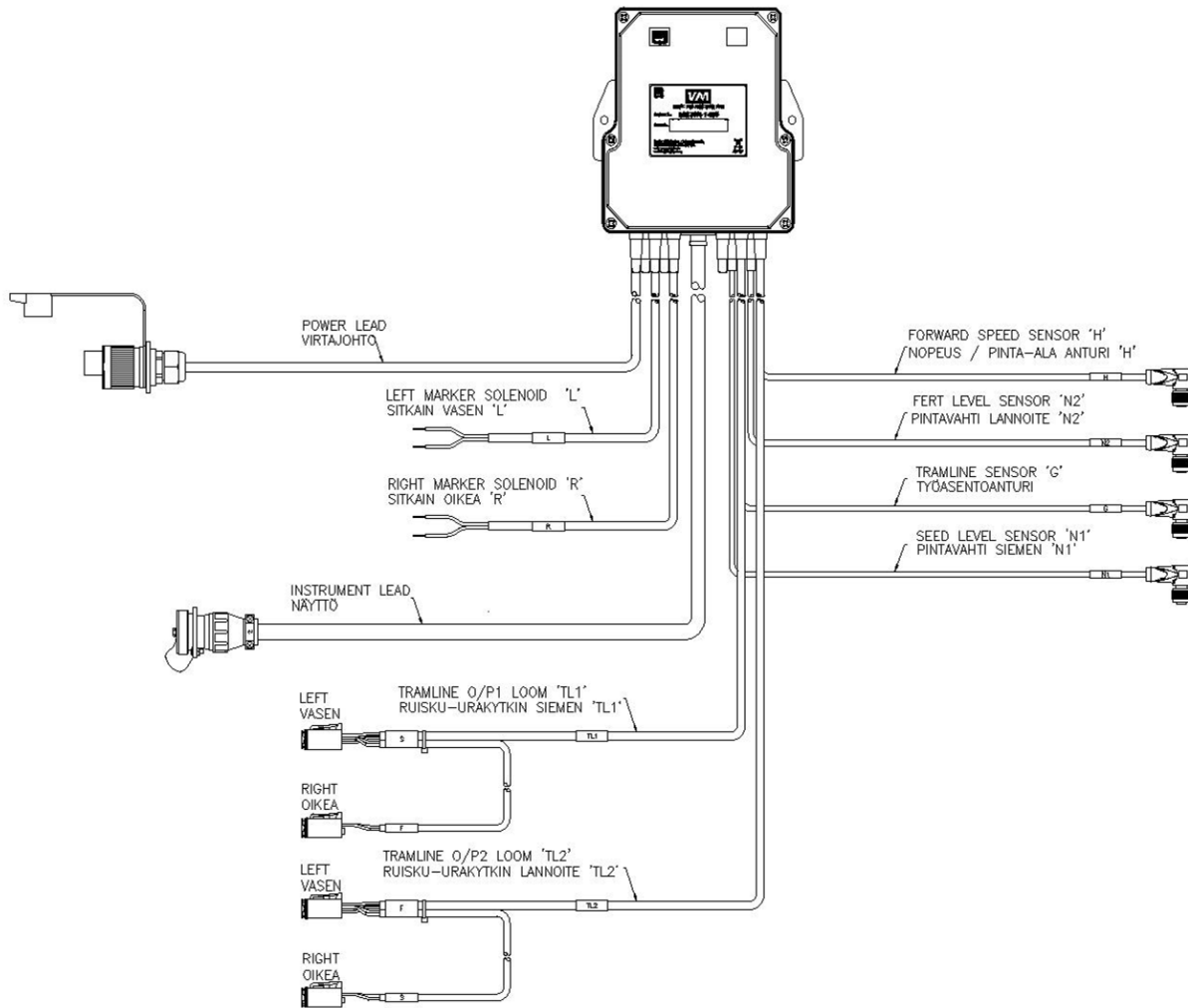


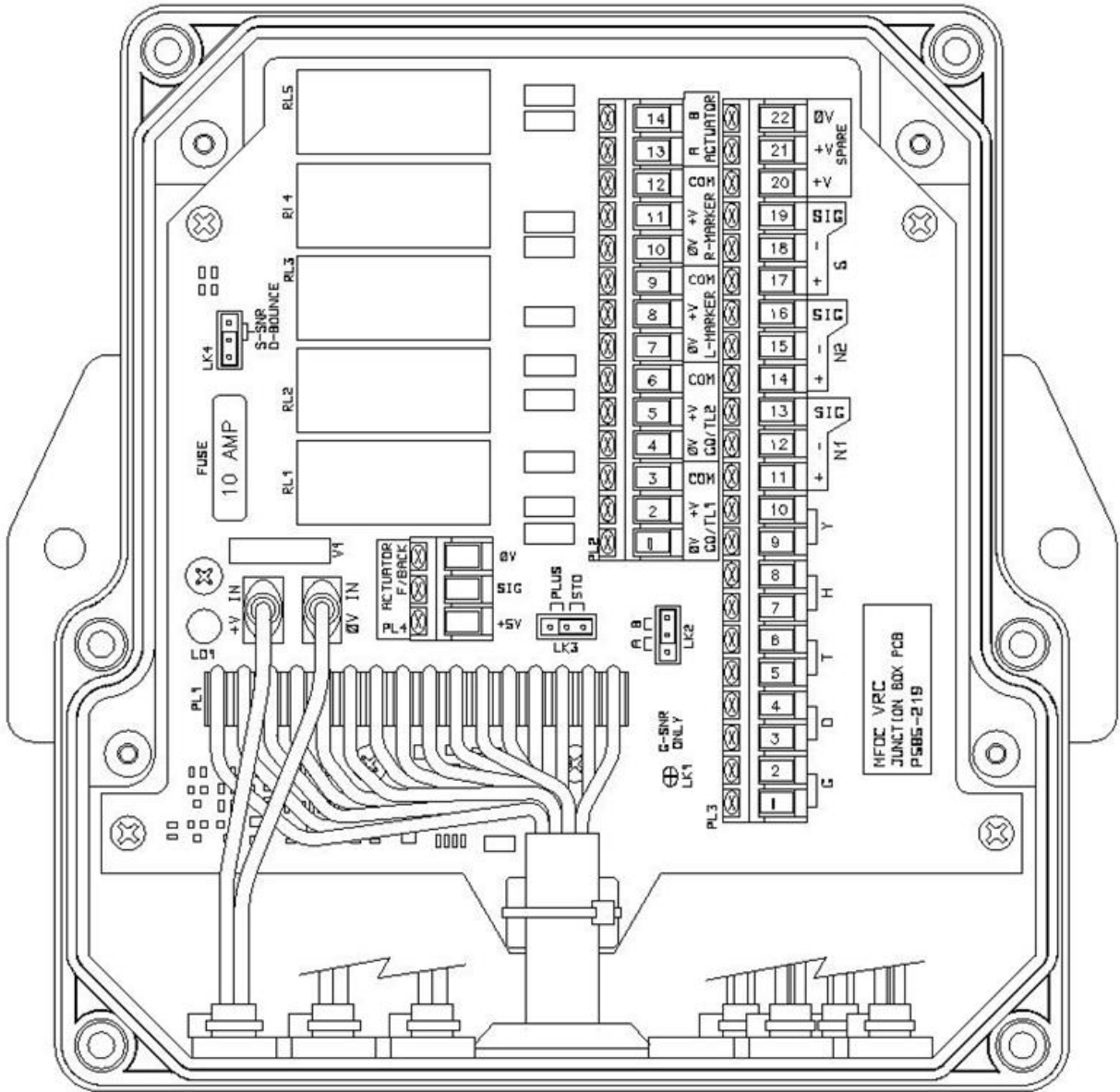
XT/ S 400 Accessories





13 Electrical diagram



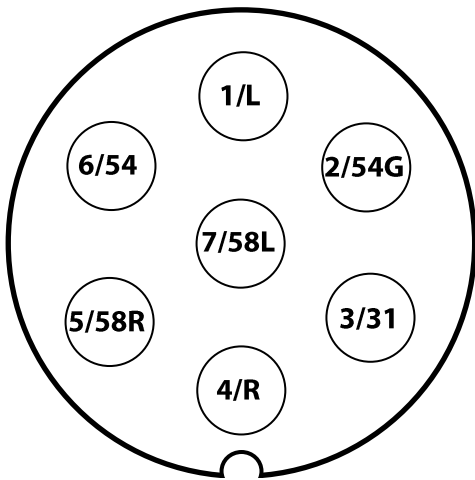


If lift inhibit, move
 PL2-5->PL2-2 and
 PL2-6-> PL2-3
 Lift inhibit coil will be
 connectet to PL2-5
 and PL2-6

PCB LINK INFORMATION	
LK1	SOLDERED
LK2	JUMPER PRE-FITTED IN POSITION 'B'
LK3	JUMPER PRE-FITTED IN POSITION 'STD' FERTILISER REMOTE CONTROL 'PLUS'
LK4	JUMPER PRE-FITTED POSITIONED ON 2 PINS CLOSEST TO THE FUSE
LK5	TRACKED THROUGH (NO ACTION REQUIRED)

PCB INTERNAL WIRING			
CABLE ASSEMBLY	CORE COLOUR	PCB POSITION	FUNCTION
POWER LEAD	BROWN	+V IN	+V
	BLUE	0V IN	0V
TRAMLINE O/P1 LOOM (TL1)	BLUE	PL2 - 2	TRAMLINE O/P1 +V
	RED	PL2 - 3	TRAMLINE O/P1 COMMON
	GREEN	PL3 - 18	TRAMLINE O/P1 0V
	YELLOW	PL3 - 19	TRAMLINE O/P1 SIG
TRAMLINE O/P2 LOOM (TL2)	BLUE	PL2 - 5	TRAMLINE O/P2 +V
	RED	PL2 - 6	TRAMLINE O/P2 COMMON
	GREEN	PL3 - 5	TRAMLINE O/P2 0V
	YELLOW	PL3 - 6	TRAMLINE O/P2 SIG
LEFT SOLENOID LEAD (L)	BROWN	PL2 - 8	LEFT SOLENOID +V
	BLUE	PL2 - 9	LEFT SOLENOID COMMON
RIGHT SOLENOID LEAD (R)	BROWN	PL2 - 11	RIGHT SOLENOID +V
	BLUE	PL2 - 12	RIGHT SOLENOID COMMON
TRAMLINE SENSOR LEAD (G)	BLUE	PL3 - 1	TRAMLINE SENSOR 0V
	BLACK	PL3 - 2	TRAMLINE SENSOR SIG
	BROWN	PL3 - 20	TRAMLINE SENSOR +V
FORWARD SPEED LEAD (H)	BLUE	PL3 - 7	FORWARD SPEED 0V
	BLACK	PL3 - 8	FORWARD SPEED SIG
	BROWN	PL3 - 21	FORWARD SPEED +V
SEED LEVEL SENSOR LEAD (N1)	BROWN	PL3 - 11	SEED LEVEL SENSOR +V
	BLUE	PL3 - 12	SEED LEVEL SENSOR 0V
	BLACK	PL3 - 13	SEED LEVEL SENSOR SIG
FERT LEVEL SENSOR LEAD (N2)	BROWN	PL3 - 14	FERT LEVEL SENSOR +V
	BLUE	PL3 - 15	FERT LEVEL SENSOR 0V
	BLACK	PL3 - 16	FERT LEVEL SENSOR SIG

14 Connection socket according to SFS 2473



1/L	Left turn signal	yellow
2/54G	Free	-
3/31	Ground	white
4/R	Right turn signal	green
5/58R	Right rear light+reg. plate light	brown
6/54	Brake light	red
7/58L	Left rear light	black