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TUME-AGRI OY

## Instruction Manual

*JC 3000 Star XL*

*JC 4000 Star*

*Seed Drill*



Valid for serial numbers AB 50343 – onward



**Read this manual before commissioning!**

## Original Instructions

### EC Declaration of Conformity for the Machine (Machine Directive 2006/42/EC, Annex II A)

Manufacturer: Tume-Agri Oy  
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Name and address of person authorized to compile a technical file:

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Hereby declares that

Seed Drills TUME JC Star 3000 and 4000

- are in compliance with the applicable decrees of the Machine Directive (2006/42/EC)

and in addition declares, that

- the following standardized European directives and standards have been applied:  
SFS-EN ISO 12100-1:2003

Place and Date: Turenki, 01/03/2012

Signature:



Eero Tommila  
Managing Director

## Table of Contents

1.	For machine user and others responsible for the machine .....	4
2.	General safety regulations .....	4
3.	Intended use of machine .....	6
4.	Machine commissioning.....	7
5.	Drawbar installation .....	10
6.	Feeding equipment ground wheel.....	15
7.	Tank filling.....	16
8.	Tanks emptying .....	18
9.	Seed feeding equipment and adjustments.....	19
10.	Fertilizer feeding equipment and its adjustment .....	21
11.	Sowing table examples.....	24
12.	Rotation test.....	25
13.	Field test .....	28
14.	Fertilizer placement depth adjustment.....	29
15.	Adjusting the sowing depth.....	30
16.	Harrow adjustment.....	31
17.	Fertilizer drills.....	32
18.	Seed drills .....	33
19.	Area meter .....	33
20.	Drill maintenance .....	34
21.	Most common repairs .....	36
22.	Decommissioning of the machine .....	41
23.	Technical Information .....	41
24.	Optional equipment and accessories.....	42
25.	Warranty terms .....	43

Annex 1 User's Guide for Area Meter Flex Counter

Annex 2 User's Guide for Hydraulic Front Drag JC 3000 and 4000

Annex 3 Lubrication chart for JC 3000 and 4000 units

# 1. For the machine user and others responsible for the machine

We wish you every success with your TUME seed drill. This instruction manual provides best-practice instructions for the use, adjustment, maintenance and storage of Tume JC -machinery. Following the instructions in this book will ensure that your machine will provide you with long, trouble-free service.

It is very important that you familiarize yourself with the instructions before making full-time use of the machine. Please retain this manual and keep it in an easily accessible location. The replacement part number of the manual is printed on the cover. Please make a record of this number, as it will enable you to order a new copy should the need arise.

Both the manufacturer, Tume-Agri Oy, and authorized resellers will be happy to provide assistance in questions relating to the use or maintenance of this machine.

## About the presentation of this manual

As this publication is distributed across our international sales network, the equipment depicted in illustrations (both the standard equipment and accessories) may vary based on the country in which you are located. For certain countries, covers may for legal and otherwise important reasons be opened or removed in certain illustrations in order to provide a clearer view of the object in question. The machine must not be used without protective covers. In order to guarantee safe use, you must ensure that all covers are intact or installed in place before starting work.

When a reference is made in this manual to "left" and "right" sides, this is when viewed from the rear of the machine looking forwards in the direction of travel.

Tume-Agri Oy is continually developing its products, and therefore reserves the right to make changes and improvements without prior notice and with no commitment to make retro-active changes to any products sold prior to the changes.

## 2. General safety regulations



**All persons handling, maintaining or who have any form of access to a TUME-seed drill must be thoroughly familiar with this instruction manual before using, or performing maintenance or repairs on the machine. Be sure to comply with the instructions in this manual!**

**Entrust the performance of difficult repairs to an authorized brand repair shop.**

**Use only original Tume parts, and do not make structural modifications to the machine without the agreement of the manufacturer.**

**Working or being located under a machine without supported hydraulics is strictly prohibited. Secure the position of the machine by closing the lift cylinder safety vents, see Figs. 38-39. If you must leave the machine unattended, lower the machine and lock the markers mechanically. Staying on the machine or on the step level when the machine is in motion is strictly prohibited. The driver must ensure that no persons are close by when the machine is in motion or when hydraulic functions such as engine or lowering or raising markers are being used.**

**Before reversing the machine, make sure that no one, e.g. children, is standing to its rear.**

**Work machine lubrication, adjustments and cleaning are prohibited while the machine is in motion. Turn off the tractor engine and apply the hand brake during all maintenance. Ensure that no outsider can access the control equipment of the tractor or machinery when you are maintaining or repairing the machine!**

**All covers must be mounted in position when the machine is in operation.**

**Ensure that the traction device, hydraulic lines and electrical wiring are correctly connected to the tractor and work machine. Lines and cables must be laid out in such a way that they are not at risk of damage when the machine is in use.**

**Damaged hydraulic lines and connectors must be replaced without delay. Tractor hydraulic vents and connections must not leak, and must be in good condition. These ensure the correct transport position of the machine.**

**Hydraulic markers may raise or lower at high speed, especially if the throttle valve is set too wide or if the hydraulic flow rate produced by the tractor is high. Be particularly careful when attempting to raise or lower the markers for the first time. Ensure that nobody is under or in the path of the hydraulically-raised markers.**

**The markers must be mechanically locked into their upper position before transporting the machine by road, or when the machine is parked and the machine driver is not present.**

**Ensure that a minimum of 20% weight is placed on the tractor's front axle under all conditions. Use additional weights as required. Be particularly careful if connecting suspension arms to the tractor.**

**The maximum permissible driving speed under good conditions is 30 km/h. On uneven terrain, special care must be taken, and speed must be reduced. Transfers should preferably be performed with empty containers. Carrying loads on top of the machine is prohibited. Do not drive over rocks or other obstacles so as to avoid tire damage.**

**Use caution when moving on top of the machine to carry out cleaning or maintenance, or when filling the containers.**

**Make sure that the machine is carefully parked when disconnecting the machine from the tractor. The machine must be mechanically prevented as required from rolling downhill. The machine's lifting hydraulics should be locked at the stopcocks (see Figs. 38–39), markers should be mechanically locked into their transport position and the hydraulic lines to the tractor must be depressurized. The tow bar must be supported with a machine support stand.**

**When heated, coated surfaces may emit vapors that are harmful to human health. Ensure that work premises are properly ventilated, for example during welding. Remove the paint if necessary, e.g. by abrasion.**

**Use only manufacturer-approved accessories and equipment. Modifications which do not comply with the manufacturer's instructions and the consequences thereof are the responsibility of the party performing such modifications.**

**We in particular recommend the use of optional eye protection and a respiratory mask, especially when filling the seed dressing device. The use of protective equipment is particularly important when cleaning the machine with a high-pressure device.**

**The seed drill does not significantly increase noise levels inside the working area of the tractor cabin. Ear protectors may need to be used, dependent on tractor noise levels.**

**We recommend that safety boots be worn when handling heavy or sharp components (such as parts of the tow-bar and drill). You should also keep your machine up-to-date in terms of the required equipment for road use, in the event that the machine must be transported on public roads. Road use regulations may often change**

### 3. Intended use of the machine

The TUME JC seed drill can be used to plant most common grain, oil and herbaceous plant seeds, as well as peas and beans. Granular fertilizer can also be planted using a fertilizer drill. Seed dressing and grass seed drills may be acquired as optional equipment. Such equipment enables dressing during drilling and grass seed planting to protect the seeds. In addition, the machine can be used separately for fertilizing or drilling only.

Seeds and fertilizers needed for work can be transported to nearby fields in machine containers if the roads used for transport are in good condition. The maximum permissible driving speed in this case is **15 km/h**. On uneven roads and long drives, transport must be carried out with the machine in empty condition. The machine may not be used to transport anything else but seeds and fertilizers required for immediate use, and no additional load, objects, animals or passengers are allowed in the containers or on top of the machine.

#### General machine capabilities

The fertilizer feeding equipment is designed for the feeding of granular fertilizers only. The use of powder-type fertilizers will usually cause difficulties. At worst, powder fertilizers may cause the feeding equipment to jam, and for this reason, only granular fertilizers must be used.

Fertilizer application depth can be adjusted between 8 cm and the surface.

Drills can be fitted with different planting drills depending on the prevailing conditions, see Fig. 36. Under difficult, blocking conditions, the machine operates at its best when equipped with disc drills. Other alternatives include drag and wing drills. Drag drills are usually used in rigid ground types, when the basic tillage is plowing. Wing drills are best used for basic tillage, particularly for lighter ground types.

The drill weighting adjustment range covers the needs for all ground types. The drill's suspension is designed in such a way that ground unevenness will not significantly impact drill weighting. For shallow drilling, especially on light grounds, the drill suspension must be adjusted to a low level. For rigid ground types and deeper planting applications, higher weightings must be used.

Standard fertilizer drills, see Fig. 34, are narrow and operate in a vertical position. These can be used under most conditions. Fertilizer drills have a high degree of flexibility, and therefore do not block easily.

JC Laser models are supplied with standard plate drills on the seed side and single-disc fertilizer drills on the fertilizer side, see Fig. 35. Laser models are suitable for all kinds of sowing and especially to conditions where sowing is replaced by light tillage.

For conditions where wear is a particular concern, the tips of drag drills can be fitted with replaceable ceramic pieces, and fertilizer drill tips can be reinforced with wolfram carbide. This equipment can increase durability up to ten-fold compared to ordinary means.

The support wheels fitted to the rear of the JC also operate as roller wheels. Two rows of seeds and one row of fertilizer are applied by each wheel. Their rolling effect is adequate under normal conditions. The harrow fitted to the rear of the wheels spreads the earthwork left between the wheels, breaks up the run in the middle, and finalizes sowing. No easily smudged tracks are left on the field.

With the optional grass seed drill, the machine can simultaneously sow fertilizer, protective plant or grass seeds, or equivalent. In its so-called HST version, the same device can also be used to apply certain trace fertilizers and start phosphorus.

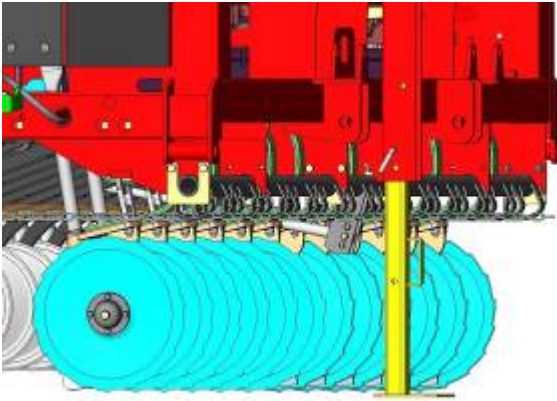
When equipped with a fertilizer remote control device, the machine is particularly suited for blocks with varying ground types. The driver can adjust the fertilizer feed from the cabin during the drive, optimally matching each ground type. Fertilizer remote control is fitted as standard with the AgroContPlus on-board computer (optional).

Other accessories are described in Section 23.

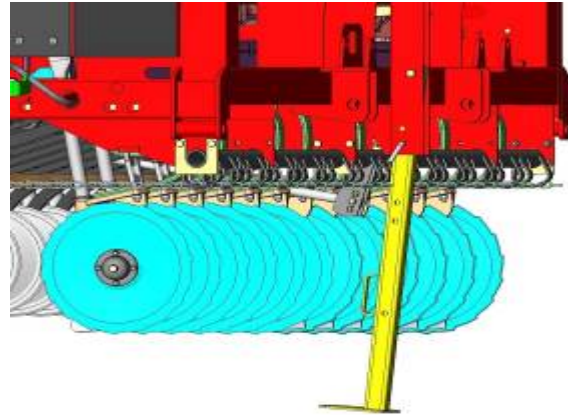
## 4. Machine commissioning

### Support stand

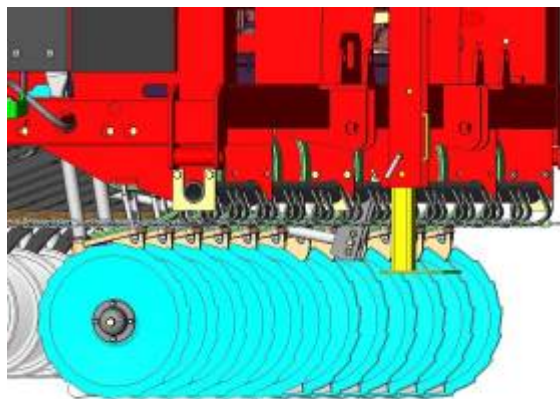
The support stand in the machine front wall is used for storing and transporting the machine, see Figs. 1 and 2. The support stand is raised during sowing, see Fig. 3.



**Figure 1. Support stand during storage**



**Figure 2. Support stand during vehicle transport**



**Figure 3. Support stand during sowing**

### Running gear, adjustable joints and lift cylinders

The adjustable joints of the running gear are locked and immobilized with a locking flat bar whenever the machine is being loaded or transported. When commissioning the machine, remove the flat bar and re-install it so that the pins protrude through the elongated slots. The running gear can then be adjusted to the unevenness of the terrain, see Fig. 4. The machine should not be used with its back level locked into a rigid position! Check that the lift cylinder locking taps are open, see Figs. 38–39.

If the machine must for any reason be used with the back level locked in a rigid position, special care must be taken when driving over uneven terrain. Severe loads will be applied on the back level and individual tires!



#### **Caution!**

**The machine must not be used without adjustable joint flat bars. These must always be installed during use.**



**Figure 4. Adjustable joint restriction and locking bar**



**Figure 5. Ground wheel in vehicle transport position**

### Using the ground wheel

The wheel which the machine uses for power transmission, the ground wheel, is positioned as shown in Fig. 5 for certain vehicle transport movements. Retract the wheel, see Fig. 15, and remove the transport support from the container seam.

### Tow bar alternatives and bar installation

Tume JC machines are supplied as standard with a common lower side bar, with which the machine can be towed from a tractor tow-hook or agricultural towing device. Standard delivery also includes a tow-triangle, see Fig. 6. A tow-triangle is attached to a 3-point lifting device on the tractor (category 2). A tow-bar is usually packed to the back of the machine at the original manufacturer. Smaller parts are packed in containers.

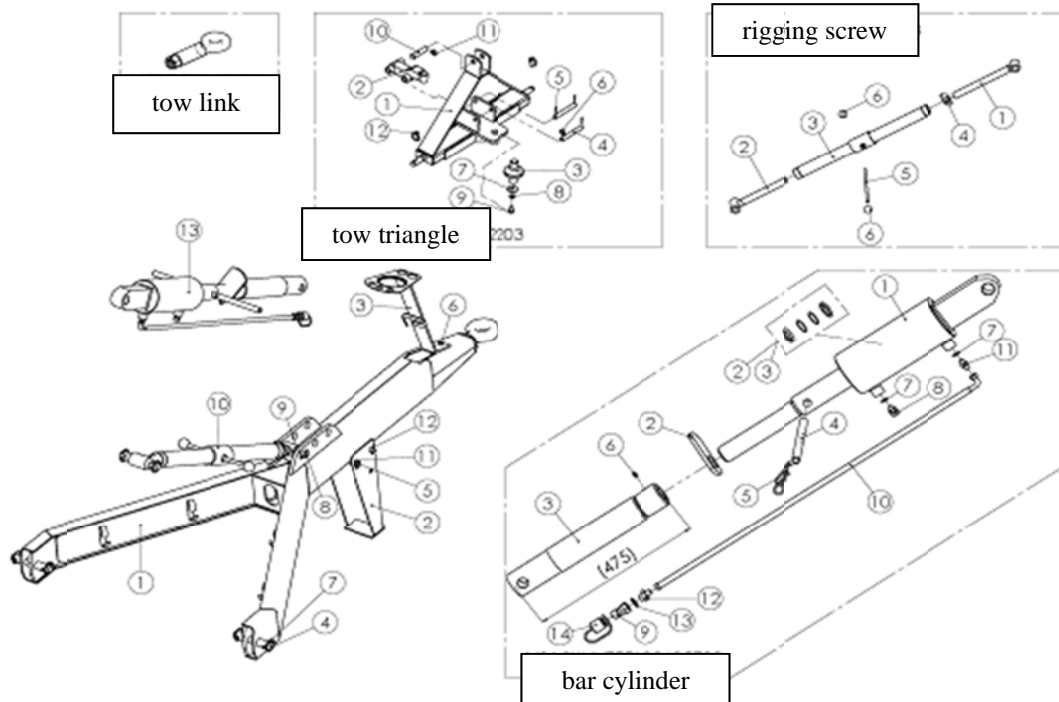
Alternatively, an adjustable multi-function shaft may be selected for the machine, which can be used either as an ordinary bottom-mounted side shaft, such as with the Tume CultiPack cultivator. A tow-triangle is not provided with the multi-function shaft.

Upper support for the seed drill tow-bar is provided either by a mechanical push-bar (provided as standard) or by a hydraulic push-bar (optional). The hydraulic push-bar allows the front part of the machine to be lifted up, regardless of whether the tow-bar is connected to the pull-hook of a tractor, agricultural towing device or optional roller.

The bottom side tow-bar with tow-triangle is assembled according to Fig. 6. Fig. 7 shows the tow-bar connection to the machine, when upper support is provided by a mechanical push-bar and the machine is connected to a tractor tow-hook or tow-triangle. Fig. 8 shows an assembly with a hydraulic push-bar. Here, the machine is connected to roller. **Note the position of the shaft pin in the upper and lower shaft positions.**

A multi-function tow-bar concept is shown in Fig. 9. The shaft installed in the bottom side position is depicted in Fig. 10 and as upper shaft in fig. 11. In pictures the upper side support of shaft is provided by a mechanical push-bar. The hydraulic installation for the hydraulic push-bar is shown in Fig. 8.



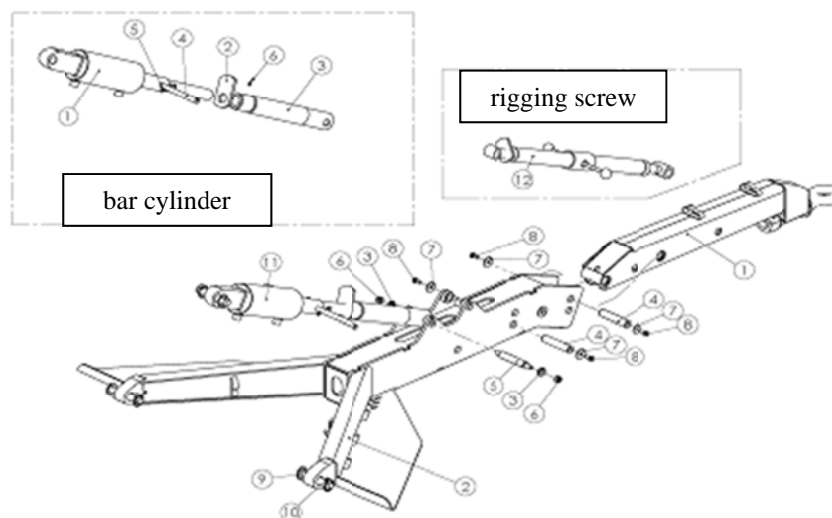


**Figure 6. Standard tow-bar assembly**

The towing device is attached to the machine frame side brackets. **The push-bar (hydraulic or mechanical) in the picture is connected to the upper holes of the bracket on the front of the container.**

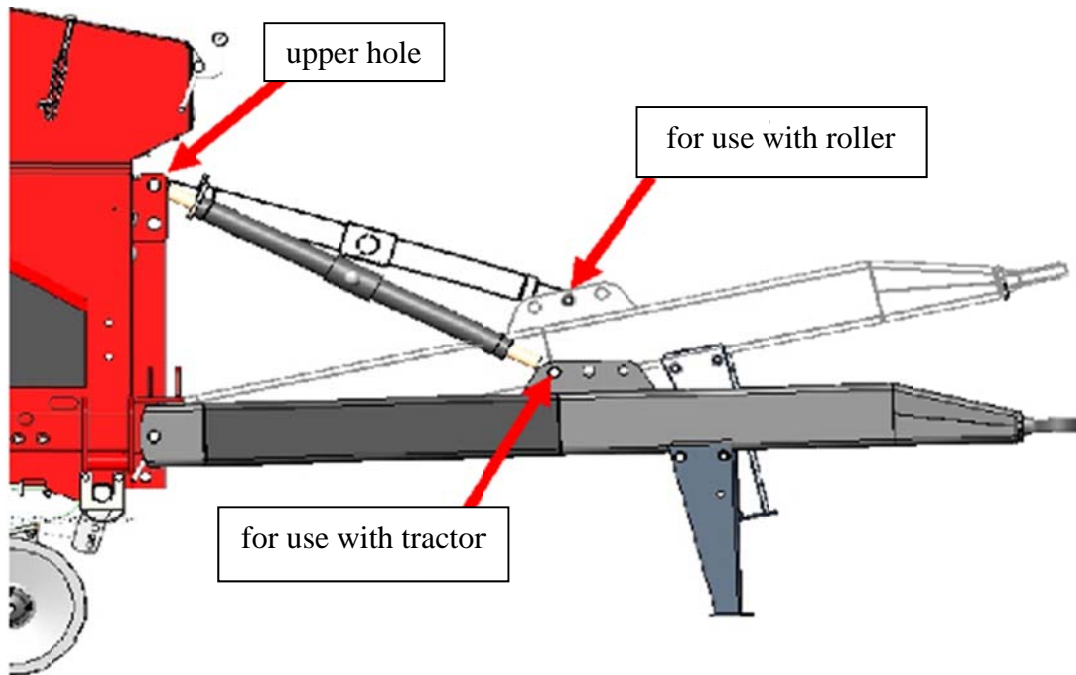
Hydraulic lines and electrical wires are pulled through the tow-bar and attached to hanging hooks on the tow-bar. The hydraulic push-bar (optional) tube is connected to its own, one-way hydraulic valve. Once the hydraulic line layout is completed, these should be fixed in position by bending the line supports so that the lines remain in place.

Adjust the push-bar working dimension so that the machine is horizontal when calculated in terms of working depth and attached to the tow-point at working height (tractor tow-hook, tow-bars in working position, intermediate cultivator towing point, etc.). Ensure that the push-bar cylinder is in its retracted position when carrying out this adjustment. Fine tuning of the towing device can be performed in the field, under sowing conditions.

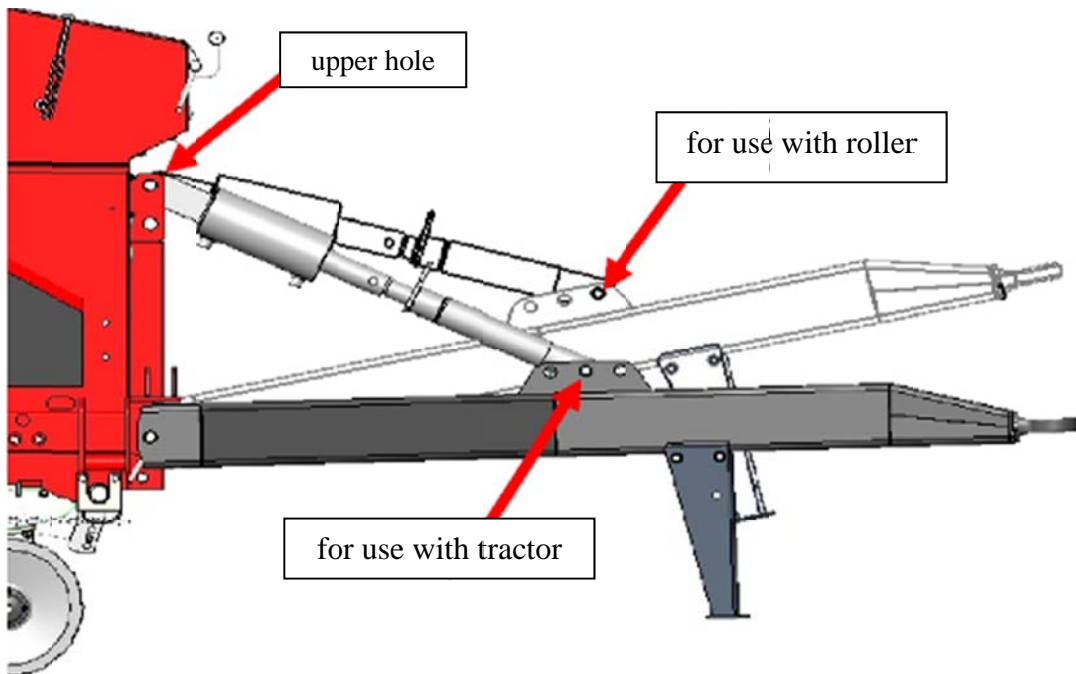


**Figure 7. Multi-function shaft assembly**

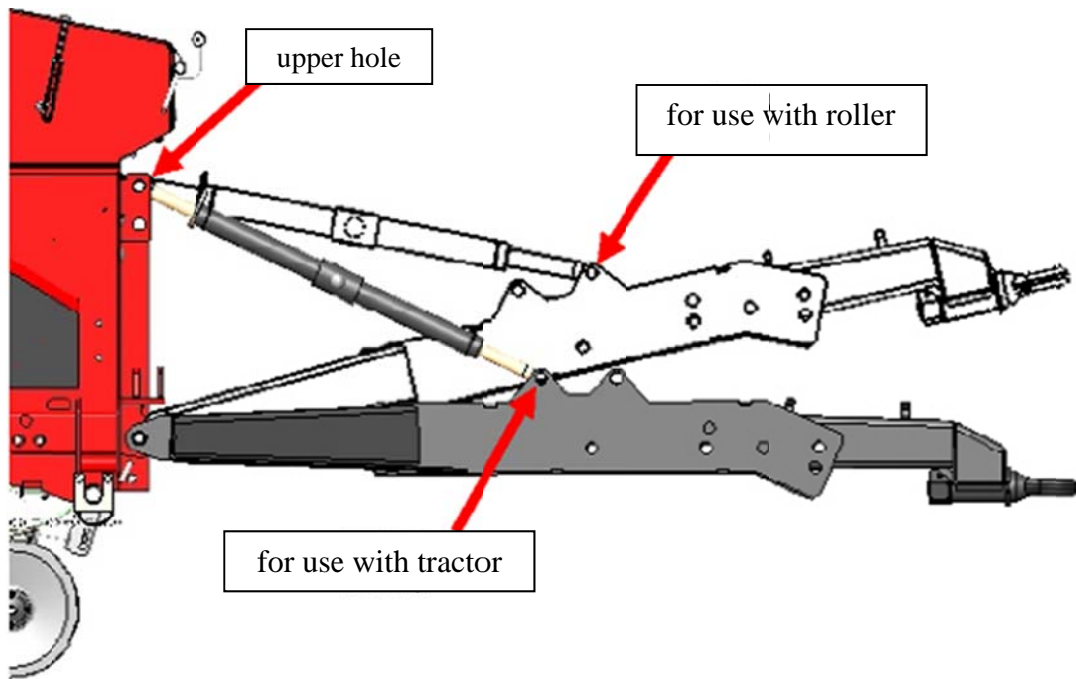
## 5. Drawbar installation



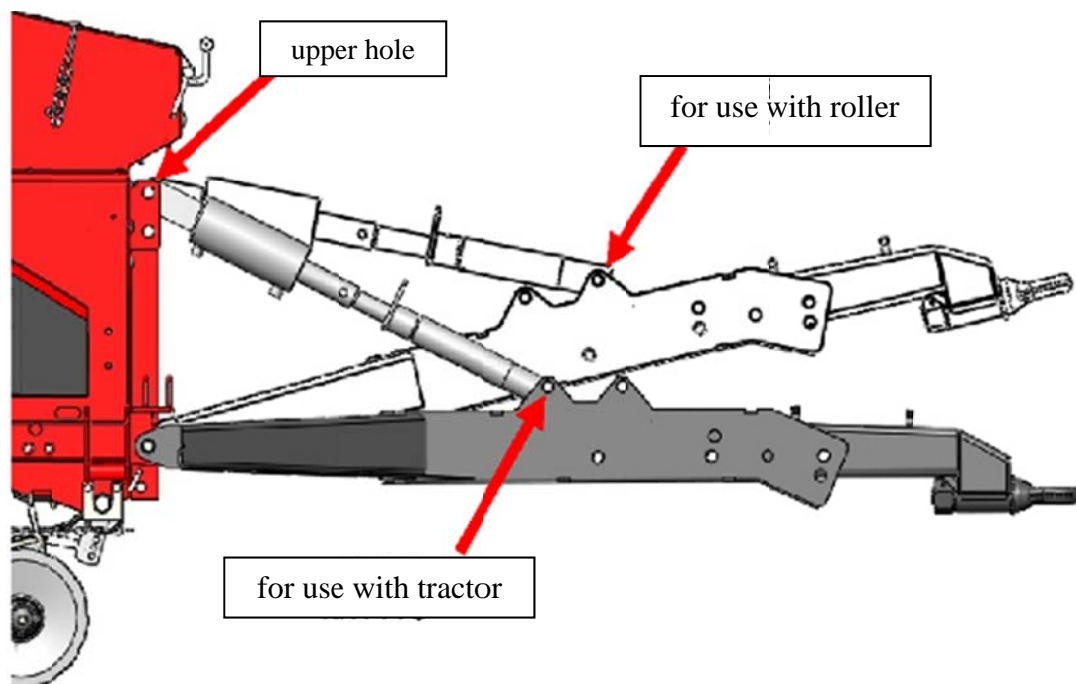
Standard tow-bar and turnbuckle



Standard tow-bar and tow-bar cylinder



Multi-function tow-bar and turnbuckle



Multi-function tow-bar and tow-bar cylinder

**WARNING - DANGER!**

Never over-extend the push-bar, as this may reach the outer limit of the adjustment range and the push-bar will bend or break. In a worst-case scenario, the person performing the adjustment may then become trapped under a tilting machine. Note that there are no restrictors on the helical bars of the push-bar preventing adjustment beyond the permissible range. The portion of exposed thread must always be less than the amount of thread within the inserted thread! Become acquainted with the adjustment range measurements provided in this instruction manual, Figs. 12 and 13.

## Machine connection to tractor

### Tow-bar alternatives and bar connections

#### Standard tow-bar

The JC seed drill is usually attached to a tractor tow-bar, agricultural towing device or to the towing point of an optional roller.

The bottom standard tow-bar also comes with a tow-triangle, with which the JC can be towed from a tractor 3-point lift device.



#### WARNING!

When using a tow-triangle connection, special attention must be paid to tractor front end weighting in order to maintain controllability. When the JC is connected to a tractor tow-bar with a tow-triangle, the machine containers must be empty during transport. In addition, ensure that the steering front axle bears at least 20% of the tractor's mass (use additional weights), and that the tractor's right and left side brakes are interconnected.



#### WARNING!

The tow-triangle must be connected in as vertical a position as possible. Adjust to the correct position using the tractor tow-bar. Never raise or lower the tow-triangle to an unnecessary height. Ensure that the tow-bar angle is not excessive when viewed from side-on. The maximum permissible angle to the horizontal is +/- 9°. Excessively sharp angles can destroy the tow-triangle or tow-link.

#### Multi-function tow-bar

If a multi-function tow-bar is selected for the JC, the machine can usually be connected as normal to a tractor tow-hook or agricultural towing device (with the bar installed as a lower tow-bar, see Fig. 10) or also to higher-mounted tow-points. A bar set as an upper tow-bar is depicted in Fig. 11. The upper tow-bar can for example be connected to the towing point of a Tume CultiPack intermediate cultivator.



#### WARNING!

The upper tow-bar must never be connected to a tractor push-bar bracket or other such tow-point that is located above the rear axle of the tractor.

When using the upper tow-bar with a milling cutter or other lifting device fitting cutter, it must be ensured that the tractor remains controllable even when the cutter is lifted such that it is supported by the lifting device. In road traffic, the steering front axle must for safety reasons have an adequate weighting of at least 20% of the tractor's total mass. Use additional weights if needed. Move the machine as necessary only with empty containers!



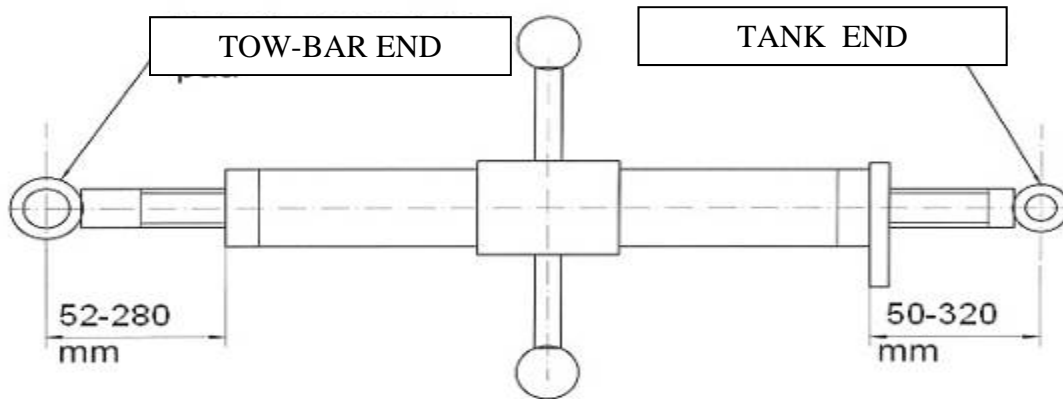
#### WARNING!

Check all tow-bar parts for wear and other problems regularly! Pay special attention to the tow-bar link and tow-bar connection pin and overall wear. Damaged or dangerously worn parts must be replaced or repaired without delay.

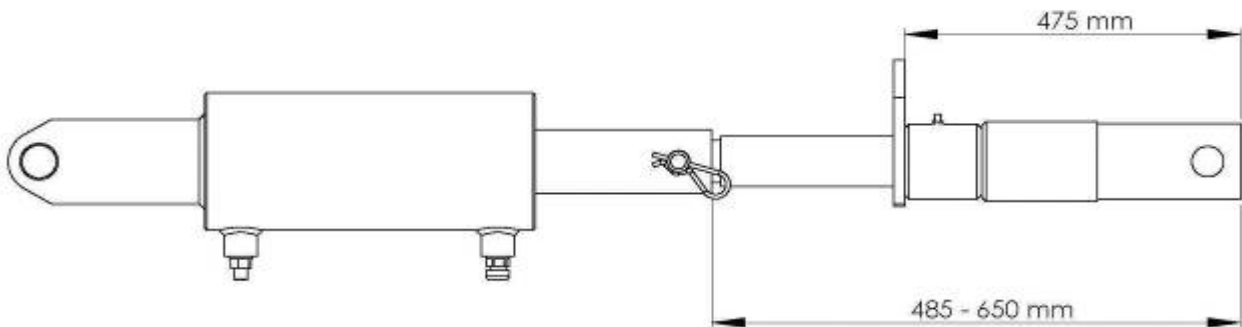
### Length adjustment ranges of push-bars supplied with tow-bars

**Caution!** Follow the instructions provided for length adjustment ranges! Incorrect adjustment can lead to serious personal injury or equipment damage.

Fig. 12 shows the length adjustment range of a mechanical push-bar provided as standard equipment. Note, that the area is not symmetrical. Pay separate attention to the measurement adjustment of each end! Lock the push-bar with the thread locking pin. Fig. 13 shows the equivalent hydraulic push-bar measurements.



**Figure 8. Length adjustment areas for mechanical push-bar**



**Figure 9. Length adjustment areas for hydraulic push-bar with adjustment sleeve**

## Connecting hydraulics

Standard JC hydraulic equipment is connected to a hydraulic outlet intended for external single-function cylinders. Bar cylinders supplied as optional equipment require a second single-function outlet.

If the seed drill is installed with dual-function lift cylinder equipped markers, the two tubes running from machine are connected to the tractor's dual-function outlet. Similarly, the hydraulic push-bar of a multi-function tow-bar (optional) is dual-function, and therefore requires another 2-function outlet.

**Caution!** When connecting hydraulic connectors, the tractor's hydraulic PTO control gear must be in the lowering or floating position to ease the connection.



### **WARNING!**

When connecting hydraulic lines to the tractor, ensure that the machine, tow-bar or markers cannot lower uncontrollably and thus harm adjacent people or other objects! Connect the tow-bar to the tow-point before connecting the hydraulics.

**Caution!** Certain tractor models require the use of non-standard hydraulic quick-change connectors recommended by the tractor manufacturer. Replace the relevant components with suitable components as required on your tractor in order to ensure proper hydraulic function.

**Caution!** Before starting sowing, the relative position of drills and harrow tines to each other must be ensured with a tow test. This can be carried out in a field or in soft sand. Each fertilizer drill must always travel at a distance half-way between two seed drills under direct tow. The gap between seed drills must be approximately 125 mm, and the harrow tines must travel between the seed rows. Move the drills and tines laterally as required. This check must be performed at least once per usage period.

## Driving instructions

### Driving instructions for transport

The machine is kept in its upper position by means of the tractor hydraulic valve. For this reason, it must be ensured during any transport that there are no leaks in the tractor hydraulics, and that the hydraulic lever controlling the raising or lowering of the machine is not moved accidentally. If fitted to the feeding equipment, set the ground wheel with its support chain, see Fig. 15. **Keep the lift cylinder safety taps open during transport as well as during seed tilling, see Fig. 39.**

During transport, the maximum permissible speed is 30 km/h. See general safety instructions, Section 2.

### Driving instructions for sowing work

If the ground wheel is in its raised position with the transport support (Fig. 5), lower it to its usage position, see Fig. 14.

**Caution! Always move this forward when lowering the machine. Otherwise the drill arms may become damaged or the drills may become clogged.**

Avoid unnecessary driving in the sown area. Select a driving technique that ensures that only minimal tire tracks are left in the sown area.

It is usually good to start seeding on the basis of a single block, so that sufficiently wide tracks can be generated (usually 1-2 times the width of protective plant spraying). Sowing is then performed back and forth, driving in the direction of the longest side of the block.

**Caution! Try wherever possible not to sow the corners of the block in a circular motion, and raise the machine at corners. Making steep turns with the machine and drills on the ground will cause unnecessary wear to the machine tow-bar and drills!**

All-around sowing is used on irregular blocks. Lift the machine at all corners! Only sow in a gentle circle in the ground on clearly wide corners!

Because of the hydraulic structures, the machine must always be lifted all the way to its upper position. Only then can the machine be lowered again. Conversely, when lowering the machine, the lower position must be reached before the machine can be raised again. When sowing, care must be taken not to lift the machine, as it cannot be lowered back to its correct working depth unless it is first raised high enough that the depth control valve (Fig. 31) is reopened.

Fig. 31 shows the valve controlling raising and lowering, moving with the wheel support arm. When the valve lever reaches the up and down positions of the guiding pins, the valve closes and the lifting or lowering motion is stopped.

Ensure that the harrow is raised sufficiently when lifting the machine. See Section 15, adjusting the harrow.

**Caution! Never reverse when the harrow tines are in contact the ground. Similarly, do not reverse into contact with the earth formation at a field edge or other obstacles.**

The machine must be able to work on even terrain in a horizontal position. See Section 13, fertilizer positioning depth adjustment. If the machine is angled forward as it moves (this can happen if towed in any other way than with the tow-triangle) the towing device push-bar must be extended. If the machine is angled backwards as it moved, the push-bar must be shortened. **Note the push-bar adjustment area.** Check the fertilizer and sowing depths after driving for a certain time. Check the adjustment of the markers (optional) by also studying the sowing seam area.

**Caution! Only lift and lower the machine when it is moving forward. Never reverse the machine when the drills are in the ground and power transmission is connected.**

Check periodically for drill blockages. Also check the state of all seed and fertilizer lines and clear any blockages.

At the start of sowing, check the area that can be sown with a single container. You will then be able to determine the next estimated filling time based on the area surface.

Keep sufficient amounts of seeds and fertilizer in the container. Particular attention must be paid to this due to the design of the bottom, especially at the start.

Do not store fertilizer or seeds in containers for several days, especially in moist weather. Damp fertilizer can lead to feeding problems.

Optimal seeding results are achieved at driving speeds of 7-10 km/h. **In rocky conditions, the driving speed must be reduced to suit the circumstances.**

**The maximum sowing speed with small and regular-sized seeds under good conditions is 15 km/h; that for sowing peas and beans is 6-7 km/h.**

## 6. Feeding equipment ground wheel

The feeding equipment receives the power to drive it from the ground wheel on the right side of the machine. The ground wheel is mounted on the container and is therefore lifted when the machine itself is lifted. When the machine is lifted, the ground-wheel is no longer in contact with the ground and it stops providing power. A separate power transmission clutch is therefore not required.

**Caution! Do not rotate the ground-wheel to reverse direction! Always raise the machine before reversing the tractor. Both drills and the ground-wheel must be clearly off the ground.**



Figure 10. Ground-wheel in work position



Figure 11. Ground-wheel in transport position

## 7. Filling the container

### Using the tarpaulin covers

The drill is equipped with tarpaulin covers that can be rolled open with cranks located at its front and rear edges, see Figs. 16–17.

When filling the fertilizer container, you need only open the front part of the tarpaulin cover, and similarly, when filling the seed container, only open its back part. This will prevent mixing up the fertilizers and seeds when filling the containers.

During transport and sowing, the tarpaulin cover should preferably be kept closed and held in position with rubber mounts. This will avoid impurities penetrating the containers and securing the cover in position.

**Caution! On machines equipped with markers, the front edge crank must compulsorily be mounted whenever working with rubber holders, see Fig. 16. Otherwise, the crank can come into contact with a marker arm, leading to the risk of damage.**



Figure 12. Tarpaulin cover in work position



Figure 13. Tarpaulin cover in open position

### Use of sieves

Standard sieving equipment is normally fitted to the fertilizer and seed containers of JC seed and fertilizer drills (this may vary by country and market). These sieves prevent foreign objects from causing feeding disturbances, or fertilizer crumbs etc. developing in the feeding equipment. The fertilizer sieve must always be kept in place during container filling and seeding. The seed sieve must also be in place except in the event of certain exceptions.

Such exceptions include large or elongated seed shapes, which may be too large to fall through the sieve. For example, many types of oat cause problems, as the grains are long and light. **If it is reasonable to suspect that the seeds will not be able to pass through the sieve, the sieves must be temporarily dismantled and removed from the container. When filling or seeding without sieves, special attention must be paid to ensure that no foreign objects enter the feeding equipment, i.e. remnants of sack, tools etc.**

### Timing of the filling

When starting sowing, it is recommended that the machine be moved to the field in empty condition. Fertilizers and seeds are delivered to the field, i.e. with a trailer, and seed drill filling is carried out at the side of the field block. If the machine must be filled at a distance from the block to be sown, special caution must be exercised during transport with full containers.



**Caution! The maximum transport speed of 30 km/h may only be used on roads in good condition, and containers must be empty! The maximum permissible driving speed with full containers is 15 km/h! On potholed, rocky or extremely narrow roads, the transport speed must be adjusted downward according to circumstances.**

Monitoring of container levels is possible:

- By looking into the container from time to time, when the machine must be stopped.
- By observing the area meter of the machine, when the area size that can be sown with a full container is clear and the meter reading for the last filling has been recorded.
- With optional electronic monitoring equipment. Such devices issue an alert when a certain amount of fertilizer or seed remains in the container.



**WARNING!**

**Transporting an assisting person or other passengers on the steps of a moving machine or elsewhere in the machine is strictly prohibited. The seed drill must be at a standstill when leveling seeds or fertilizers in the containers!**

### Adjusting the fertilizer and seed container volumes

The position of the fertilizer and seed container partition can be adjusted so that the container volume ratios can be changed. Such adjustments are carried out by loosening the locking screws of the partition support arms (Fig. 18) and moving the partition to the desired position. Remember to re-tighten the support arm locking screws after making the adjustment. The partition adjustment area can be changed by moving the support arm ends to other attachments pins (Fig. 18). When using the machine for sowing only, the partition can be moved fully forward in order to maximize the seed space, see Fig. 19.

**Caution! Carry out the adjustment when the containers are empty or nearly empty!**



**Figure 14. Partition support arm**



**Figure 15. Seed container maximum volume**

Maximum fill liters	Fertilizer (max)	Seed (min)	Seed (max)	HS/HST device decreases seed volume
HKL 3000 JC Star XL	2360	1350	3320	330
HKL 4000 JC Star	2580	1580	3640	300

## Filling method

The large size of the containers means that their filling level is also relatively high, a consideration if 40-50 kg sacks must be lifted from ground level. For this reason we recommend working as follows: first place the sacks on pallets, then raise these with a pallet lifter or front-loader truck forks to a suitable height for machine filling.

Jumbo sacks (500–1000 kg) can be handled with different loaders. Jumbo sacks must never be placed on the seed drill structures. Do not overload the seed drill. Identify methods for partially emptying a jumbo sack.



### **WARNING!**

**When filling the machine, never pass under a load which is suspended from a loader or otherwise lifted, or under the lifting structure.**

When using loose fertilizer and/or seeds, we recommend the use of a high-tipping trailer or fill-screw. **When using a tipping trailer, the tipping point must be selected with care in order to prevent the carriage from overturning.** As the JC support wheels and harrow are located at the rear of the machine, certain filling carriages may not have sufficient reach. The containers can then be filled from the side of the machine as required.

## 8. Emptying containers

### Emptying the fertilizer container

- **The fertilizer container is emptied through the drills or by using the test seed troughs.**
- If the seed container is not fully emptied, care must be exercised to prevent seeds from falling into the fertilizer. For this reason, remove the seed feeding cassette (see Figs. 22 and 23) when the seed feeding does not rotate by means of the ground-wheel or by rotating the fertilizer shaft.
- Set the load cover under the machine.
- Set the fertilizer feed to the maximum feed amount.
- Lift the fertilizer side feeding equipment lever for the bottom flaps fully (Figs. 26 and 28). The container will then empty almost completely.
- Guide the remaining fertilizer, e.g. with a brush, to the feed chambers. Rotate the feeding device with the ground-wheel a number of times, see Fig. 29, until the chambers are empty. Then, swing the bottom flaps back and forth fast with the adjustment lever until the last fertilizer grains fall out through the drills.
- Pull the cover out from underneath, and install the seed side feeding equipment power transmission cassette back in the original manner.

### Emptying the feed container

- **The feed container can be emptied through the drills or using the test seeding troughs.**
- Empty through the drills, i.e. the load cover is spread underneath the drills.
- Adjust the feeder to the maximum feed amount during the emptying process.
- The seed container is emptied by lowering the bottom flap crank fully over the scale (Figs. 24 and 20). Guide the remaining seeds into the feed chambers.
- Rotate the feed equipment a few times so that the seeds remaining on the feed rollers flow downward. Note that when rotating the feeder, some of the fertilizer may flow on top of the load cover unless the fertilizer container has been emptied beforehand, or unless the fertilizer feed shaft has been rendered inoperable with a ring pin (Fig. 27).
- Swing the bottom flaps fast with the crank a few times so that no seeds are left on top of the flaps.

**The containers can be emptied using the test seeding troughs if only small amounts of seed and fertilizer remain in the containers. Use of the test seeding troughs is described in Section 11.**

The method for emptying is essentially as described above. If large amounts of seed remain in the containers, the bottom flap crank must be closed when emptying the troughs.

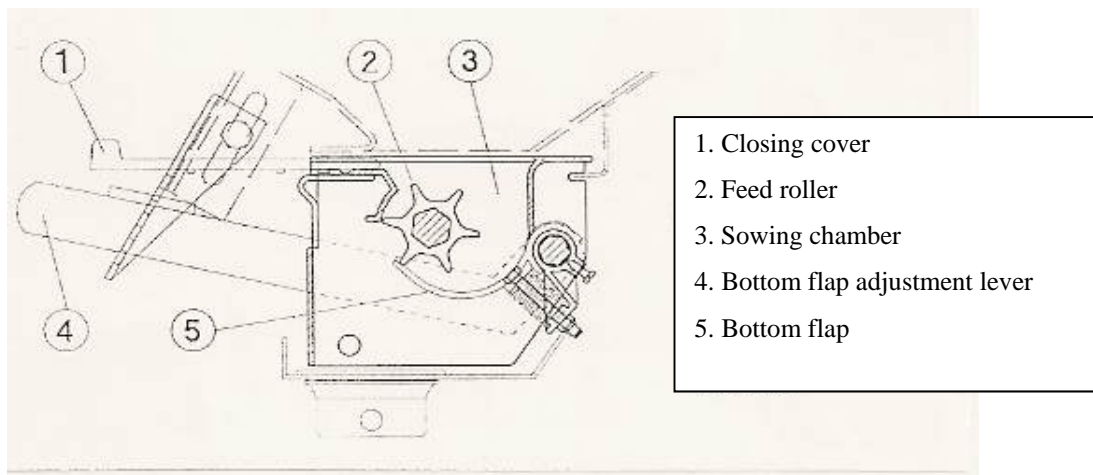
**WARNING!**

If compressed air is used to clean the containers, remember to use adequate protection to prevent pollen dust, seed treatment, etc. from penetrating the respiratory system and eyes!

## 9. Seed feeding equipment and adjustments

### Overview

JC seed drills use a groove feed on both the fertilizer and seed sides. The feeding bodies are called feed rollers. Under the feed rollers, you can find adjustable bottom flaps with springs, with closing covers on top of them, see Fig. 20. The feed chambers are located at the bottom of the containers. In practice, this solution provides independence in terms of sowing amounts, despite any tilting of the seed drill from side to side, or the driving direction. The feeding equipment is manufactured of corrosion-resistant materials. The bottom flap adjustment lever under the feed rollers is in the center of the rear of the machine, see Figs. 20 and 24. For sowing small seeds, the power transmission ratio can be adjusted by turning the power transmission cassette, see Figs. 22 and 23.



**Figure 16. Structure of seed feeding equipment**

The feed amount can be changed by adjusting the feed rollers mounted on the feeding shaft sideways in relation to the feed chambers, such that this changes the effective width of the feed rollers. Adjustments are made on the left side of the machine with a hand-wheel, see Fig. 21.



**Figure 17. Feed adjustment hand-wheel**

The hand-wheel is locked with a plastic lever on which is also marked the main feed scale, 0-10. The interval between numbers equals a single rotation of the hand-wheel. The outside of the hand-wheel is marked with 10 locking doors, labeled 0-9. Using these allows 100 different adjustment positions to be generated. With small seed transmission (cassette position II, see Fig. 23) 100 feeding adjustment positions can be generated in the same way from the smaller rotation number area. The main scale value is read from the inner edge of the hand-wheel.

Rotating the hand-wheel counter-clockwise increases the feed. When the desired seed sowing amount is known from the sowing table located inside the machine cover (or from this manual, see Fig. 25), the instructed feeding adjustment position can then be seen, see Section 10. Note the used power transmission cassette position, see Figs. 22 and 23.

The hand-wheel should always be adjusted so that the desired adjustment position is always approached from a greater adjustment position. If the original adjustment position is smaller than desired, the hand-wheel should be rotated counter-clockwise 1/2-1 times beyond the intended adjustment, and then rotated backwards to the desired adjustment position.

After this, the adjustment locking lever is inserted into a notch on the hand-wheel, which then locks both the wheel and lever.

Note that the adjustment position given in the seeding table is for reference only - the actual feed amount will change between different seed batches. **In order to determine actual feed amounts and obtain an objective value, you should always perform a rotation or field test, see Sections 11 – 12 below.**

If dirt accumulates on the feeding device or seed characteristics change, i.e. because of the seed dressing function, the actual feed amount may change significantly from its original value. We recommend cleaning as needed, but at least on a daily basis. Rollers can be cleaned by adjusting the feed amount to zero and then again to the desired adjustment value. In such cases the previously stated adjustment rule should be kept in mind - i.e. rotate first 1/2-1 times beyond the desired adjustment value. The real feed amount can be checked by repeating the rotation test.

**CAUTION! THE HAND-WHEEL must not be forced to a zero-position. Simultaneous rotation of the feeding axis will ease the adjustment.**

**CAUTION! the maximum speed when sowing peas and beans is 6-7 km/h. Ensure that the seed tubes do not become blocked. Blockages can cause damage to the driving track device clutch (optional).**

### Seed feeding device speed range selection using the power transmission cassette

The rotation speed of JC seed drill seed feeding devices in relation to the driving speed can be selected by rotating the power transmission cassette. Setting I shown in Fig. 22, where the word "GRAIN" is on the visible side, provides a higher rotation speed, which is suitable for sowing normal-sized seeds. Rotating the cassette, see Fig. 23, achieves 80–90% slower speed II, suitable for small seed sowing.



**Figure 18. Power transmission cassette I = GRAIN**



**Figure 19. II = SMALL SEED**

## Rotating the power transmission cassette between positions I and II

See Figs. 22 and 23. Remove the ring pins and pull the cassette from its shaft. Rotate the cassette so that it is in a backward position to the same cassette sleeves, with a different side exposed. Never turn the cassette upside down, i.e. so that the shaft and cassette sleeves switch places. The selected setting (I or II) is marked on the visible side of the cassette cover. The position shown in Fig. 23 allows very small seed amounts, i.e. rapeseed 5 kg/ha, to be sown.

## Bottom flaps

Feed accuracy is dependent on the appropriate distance between the bottom flap and roller feeder. It is important that the bottom flaps are in the correct position, and that they are not adjusted following a rotation test without repeating the rotation test. Bottom flaps are flexible, in case any external foreign object protrudes between the bottom flap and feed roller.



Adjustment instructions for the bottom flap adjustment lever:

<u>Seed type</u>	<u>Adjustment slot</u>
Small seeds, i.e. rapeseed	Slot 1
Ordinary seeds, grain	Slot 2
Large seeds, i.e. pea	Slot 3
Particularly large seeds	Slot 3 - 4
Granular fertilizer	Slot 2

**Figure 20. Bottom flap adjustment lever, seed**

Adjustment position 4 of the bottom flaps is used only when seeding especially large seeds (e.g. certain canned peas). Note that in position 4 the feed amount increases when driving uphill.

**Caution! The seed can flow out of the container freely when the bottom flap lever is moved below past the scale.**

## 10. Fertilizer feeding equipment and adjustments

### Overview

On the machine, fertilizer feed chambers make up half the number of the seed feed chambers. Feed amount adjustments are made by turning the feed rollers mounted on the fertilizer feed axis sideways in relation to the feed chambers. Adjustments are made using a hand-wheel on the left side of the machine. Electrical adjustment is also available as an option.

The feed chambers are located at the bottom of the containers. This solution provides an almost standard seed amount despite any tilting of the seed drill from side to side, or the driving direction. The feed is a groove-feed type, in which the feed bodies are called feed rollers, see Fig. 28. The feed rollers are equipped with a helical thread and are made of plastic. The bottom flaps under the feed rollers are adjustable, by means of an adjustment lever in the center of the front end of the machine, see Fig. 26. The entire fertilizer feeding machine is manufactured of corrosion-resistant materials. The fertilizer container enables the application of all types of granular fertilizer. The use of powdered fertilizers should be avoided. A mixing shaft is available as an option.

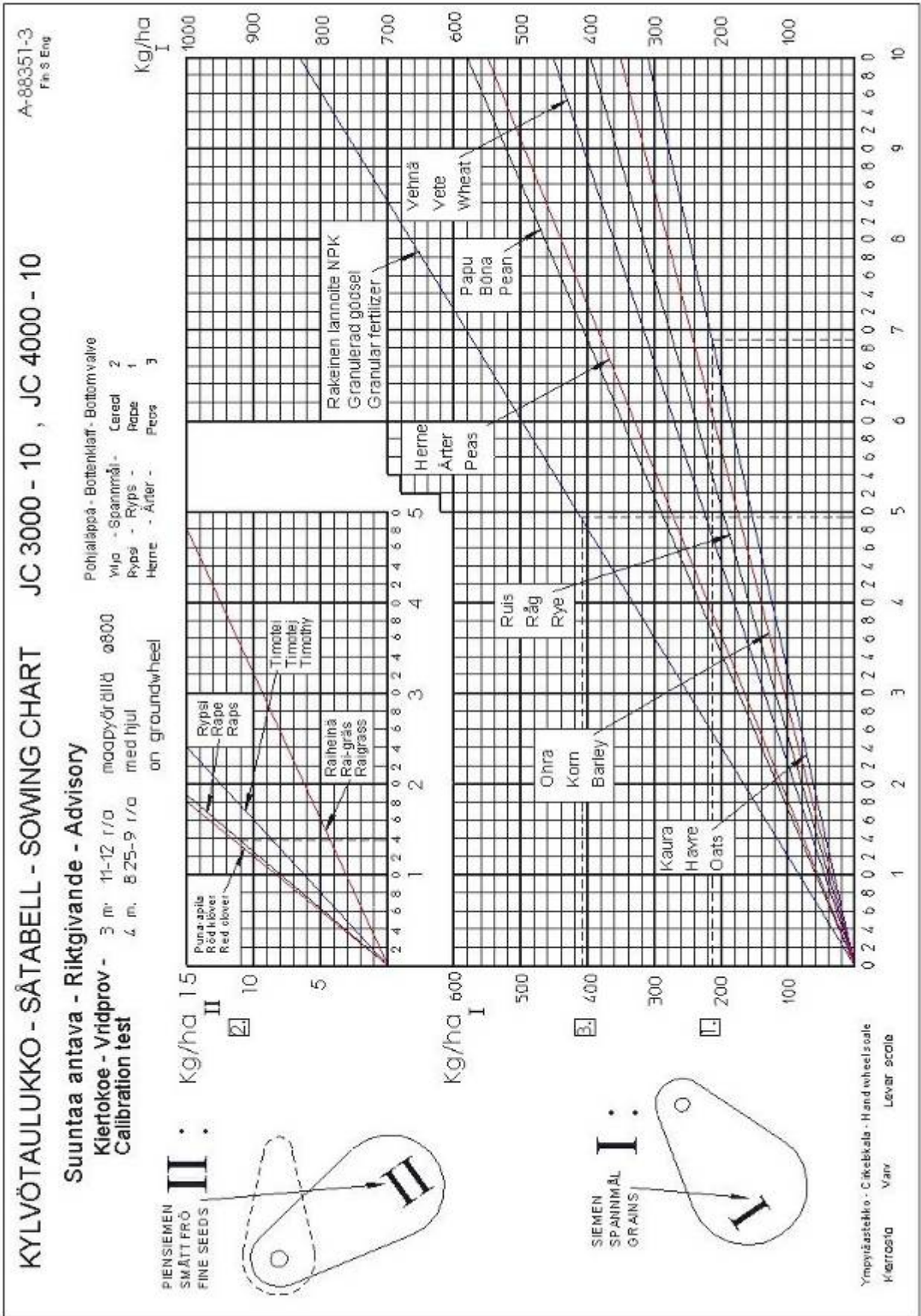


Figure 21. Seeding table and usage examples

## Fertilizer feed amount adjustment

The feed amount is adjusted using the hand-wheel on the left side of the machine (Fig. 21). The hand-wheel is locked with a plastic component on which can also be found the main feed scale. The feed value is read from the part of the scale that is on the inner edge of the hand-wheel. Decimal-step feed adjustment can be read from the scale on the hand-wheel cover, which is located at the locking lever slots.

The hand-wheel adjustment range is 10 rotations, with ten locking slots on the wheel circumference for each rotation. This means that the feed has 100 different adjustment values.

**Caution! In order to adjust the feed, the plastic main scale lever must be pressed towards the machine side in the direction of the arrow and pressed inward so as to rotate 90 degrees forward when releasing the hand-wheel lock. After adjustment, the lever should be returned to its locked position in the handwheel slot.**

Rotating the hand-wheel counter-clockwise increases the feed. When the desired fertilizer sowing amount is known, the sowing table located inside the machine or the sowing table in this manual, see Fig. 25, provides a rated feeding adjustment position.

The hand-wheel should always be adjusted so that the desired adjustment position is always approached from a greater adjustment position. If the original adjustment position is smaller than desired, the hand-wheel should be rotated counter-clockwise 1/2-1 times beyond the intended adjustment, and then rotated backwards to the desired adjustment position.

After this, the adjustment locking lever is inserted into a notch on the hand-wheel, which then locks both the wheel and lever. Note that the adjustment position given in the seeding table is for reference only - the actual feed amount will change between different seed batches. A rotation test must be carried out in order to determine the actual feed amount.



**Figure 22. Bottom flap adjustment lever, fertilizer**



**Figure 23. Fertilizer feed chain wheel**

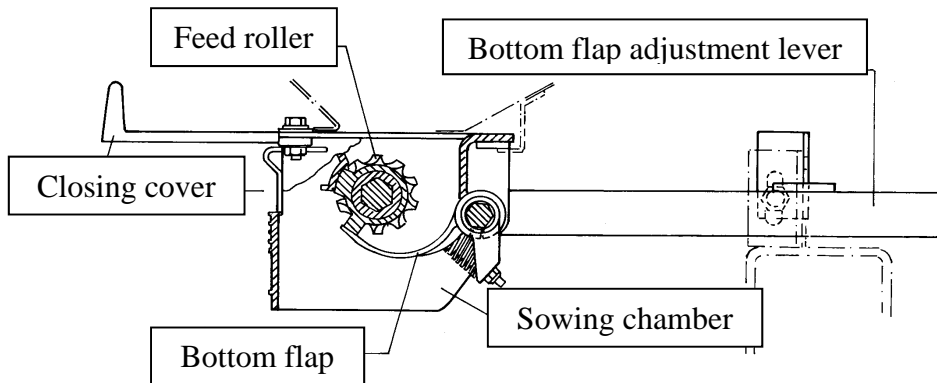
The normal position of the bottom flap is slot 2, see Fig. 19. Slot 1 can also be used for very small grained fertilizers (granular size 1-2.5 mm).

**Caution! The fertilizer may flow out of the container if the bottom flap adjustment lever is moved past slot 2 on the scale.**

If moist fertilizer enters the feeding device, the feed rollers can become blocked. Certain fertilizer types may also tend to become sticky. This can significantly impact the feed amount.

Feed rollers can be cleaned by adjusting the feed amount to zero and again back to the desired adjustment value. In this case, remember the adjustment rule above; first rotate 1/2-1 times past the desired value and after this back to the correct value. Seed table instructions and rotation test performance instructions are given below.

**The fertilizer feeding device can be turned off by removing the ring pin from the fertilizer feed shaft end on the right side of the machine, see Fig. 27.**



**Figure 24. Fertilizer feeding device**

## 11. Sowing table examples

### General

The sowing table shown in Figure 25 gives three different use sowing examples.

Note that the sowing amount indicated in the sowing table is for reference only. The actual sowing amount will depend on the characteristics of the seed used, which will vary significantly based on year and type.

Sowing amounts must be checked with a rotation test, the performance of which is explained later in Sections 11 and 12.

### Seed feed adjustment example for sowing grain

Case 1 To sow oats at 215 kg/ha

- The correct bottom flap lever adjustment position is noted in the sowing table. The slot position is "2"
- Select the label "oats"
- The machine power transmission cassette is set to "I"
- Start from the left margin table along the line 215 kg/ha
- Move horizontally to the part where the line crosses the descriptor "oats"

From the intersection, proceed directly down to the lowest scale. The adjustment value is 6.9, and therefore between 6 and 7 on the main scale. Slot "9" should then be selected on the circumference scale. Lock this to 6.9.

### Adjustment example for sowing rapeseed

Case 2 To sow rapeseed at approx. 11 kg/ha

- Note that the correct position of the bottom flaps is defined as "1" in the upper right corner of the sowing table
- Review the small sowing table inserted into the upper left-hand corner of the table



- Identify your starting point in the left margin of the small sowing table, at 11 kg/ha
- Move horizontally to the right along the 11 kg/ha line to where it intersects with "rapeseed"
- Move vertically down to the sub-scale, where it can be seen that the correct adjustment value on the main scale is "1", and circumference "4". Then rotate the hand-wheel 1.4 times from zero
- Note the label "transmission II" in the upper left-hand corner of the small sowing table. In power transmission, **the small seed setting must therefore be used**, meaning that the cassette must be rotated so that transmission code "II" is visible, and the power transmission cassette is installed according to Fig. 23, i.e. the rotation speed is in the slower position, with the upper side of the cassette connected to the shaft further behind.

### Adjustment example, fertilizer side

Case 3 To sow NPK mixed fertilizer at 410 kg/ha

- Note that the adjustment of the bottom flaps for granular fertilizer in the upper right-hand corner of the sowing table is "2"
- Start from the left margin of the large sowing table and move to "410 kg/ha"
- Proceed horizontally along the 410 kg/ha line to the right to where this intersects with the line with descriptor "granular fertilizer"
- Move vertically down from the intersection to the lowest scale, where it can be seen that the main scale reading set on the adjustment wheel locking lever should be "4". Similarly, the adjustment wheel adjustment value must be "9".

**Caution! Rotation tests should be carried out after any adjustments in order to ensure the correct seed and fertilizer amounts. Rotation test rotation amounts dependent on machine type can be seen in the upper left-hand corner of the sowing table, in the "Rotation test" section.**

## 12. Rotation test

### General

As the adjustment values provided in the sowing table are for reference only, a rotation test must be performed before starting sowing. Before starting the rotation test, the machine must be adjusted according to Section 10 of the sowing table.

**Caution! Dressed and undressed seeds may require completely different feed adjustment values in order to achieve the desired feed value. If a seed dressing device is used on the fertilizer drill, the correct feed adjustment must be ensured and final adjustments should only be performed as required on the machine after the first filling, once an approx. 2000 m stretch has been sown. Note also that different seed dressing agents will also affect the feed amounts in different ways, and can have a reducing effect of up to 20% compared to undressed seed! Ensure that dressing agents are not applied to seeds which are not meant to be dressed. I.e. sprouting rapeseed deteriorates easily. In such cases, we recommend fully removing the dressing containers from the seed drill container.**

**Before starting the rotation test, check:**

- The power transmission cassette setting, I or II (Figs. 22 and 23)
- The position of the bottom flaps (seed and fertilizer)
- The seed feed amount set on the hand-wheel
- The fertilizer feed amount set on the hand-wheel
- That the cover doors on both fertilizer and seed sides are fully open
- That there is seed and fertilizer in the containers
- That the tire track device is not active

The machine is slightly lifted from the ground, meaning that the feed equipment can be rotated with the machine ground-wheel, see Fig. 29. Rotation is achieved with a crank pin located under the cover on the right side of the machine. Note that the machine must be balanced horizontally.

Tume JC drills are fitted with rotation test troughs as standard on both the seed and fertilizer sides, see Fig. 30. You can retain both troughs in position during sowing. However, always remember to empty the troughs of dust etc before carrying out any rotation test.

The machine tubes (for both seed and fertilizer) must be set to the rotation test position simultaneously. This is done using the handle on the right side of the machine, see Fig. 30 position A. The rotation test can be carried out in 3 different ways:

- Simultaneously for both the seed and fertilizer, when the power transmission is in sowing position, in other words the ring pin on the fertilizer feed shaft is in the inner hole, see Fig. 27.
- Separately for seed, then the ring pin is removed, see Fig. 27. **Remember to replace the pin in the inner hole following the rotation test.**
- Separately for fertilizer, in which case the ring pin is in the inner hole, see Fig. 27, and the power transmission cassette is removed, see Fig. 30. **Remember to replace the cassette following the rotation test.**



**Figure 25. Rotation test**



**Figure 26. Using the seed side rotation test system  
Simultaneous rotation test for fertilizer and seed**

Place the machine tubes in the rotation test position. Rotate the crank a few times in order to fill the feed chambers. Then check that each feeding device contains seed and fertilizer. Following this, empty the rotation test trough carefully.

Rotate the crank the number of times mentioned for the machine type in question in the sowing table. The sowing table can be found on the inner surface of the left side of the machine. The rotation speed must correspond approximately to the driving speed used.

Weigh the seed and fertilizer that has entered the test sowing troughs. If the rotation test was carried out with a number of rounds equivalent to an acre (reference number is given in table), the sowing amount per hectare can be determined by multiplying the weighing results by 100.

The obtained results may differ from the desired results because of ordinary variations in fertilizer and seed batches:

- If the results obtained differ excessively from the desired feed results, the feed amounts must be made more accurate by rotating the hand-wheel
- The feed adjustment must be increased or reduced by as many percentage points as the weighed rotation test amount exceeded or fell below the desired level
- The above can be presented as follows:

$$\text{New feed adjustment value} = \frac{\text{Desired feed amount}}{\text{Observed feed amount}} \times (\text{present adjustment value})$$

- If we then insert sample figures into the formula above:

Desired fertilizer feed amount = 650 kg/ha  
 Feed amount based on rotation test = 600 kg/ha  
 Hand-wheel adjustment used in rotation test = 6.5  
 Corrected value according to formula =  $(650/600) \times 6.5 = 7.0$

**Caution! The given calculation formula is intended to simplify the determination of correct adjustment. The end result must however always be checked with a rotation or field test if an accurate end-result is desired!**

**Caution! The calculation example given above is for reference only, and is only intended to demonstrate the use of the calculation formula.**

After performing the rotation test and adjustments, remember to return the funnel shelves to sowing position B, see Fig. 30. Also remember to replace the crank pin in position and close the protective covers.

### Performing the fertilizer side rotation test:

- Remove the power transmission cassette, see Fig. 30
- Check that the fertilizer side bottom flaps are adjusted to the correct position, usually slot 2
- Check, that all closing doors are open. Open these if necessary
- Select the desired feed amount from the sowing table by adjusting the hand-wheel
- Rotate the ground-wheel several times so that the fertilizer chambers fill and the fertilizer feed from the test sowing chambers stabilises
- Set an empty, clean rotation test trough in position
- Perform a rotation test by rotating the ground-wheel the number of times stated in the sowing table
- Weigh the fertilizer collected in the trough. Use an accurate scale!
- If the result does not match the desired feed amount, correct the adjustment with the hand-wheel. Familiarize yourself with the method given for calculating probable corrections.

- Perform a new rotation test to ensure that the feed amount is correct.
- Remove the crank pin and return it to its position in the right side cover
- Return the power transmission cassette to its position

If the machine is equipped with an Agrocont - Plus on-board computer providing remote fertilizer control, please refer to the additional instructions in the Agroconti manual, Section 10.2.

**Clean the fertilizer side feed rollers by occasionally rotating the hand-wheel so that the feed is fully closed. This will enable you to ensure correct feed amounts during rotation tests and during actual sowing.**

- When returning the feed adjustment back to the value in practice or otherwise changing the feed amount, always approach the desired adjustment value from the same direction.

### Carrying out a rotation test only on the seed side

It is quite normal to perform the fertilizer side rotation test less often than the seed side test. For the duration of the seed-side only rotation test, the power transmission to the fertilizer side should be switched to idle so that no fertilizer is wasted, see Fig. 27. The fertilizer side is switched to idle by removing the ring pin shown in the figure. If despite this removal the fertilizer feeding shaft appears to attempt to rotate during the rotation test due to friction, the fertilizer shaft can be temporarily locked by installing a 17 mm wrench on the fertilizer side so as to prevent rotation. **Remember to remove the 17 mm wrench immediately after the rotation test!**

**Caution! If you perform a seed side rotation only and for this reason remove the pin from the chain-wheel located on the fertilizer shaft, BE SURE TO REMEMBER TO REPLACE THE PIN IN POSITION BEFORE STARTING SOWING. FORGETFULNESS WILL HINDER THE FULL FUNCTION OF THE FERTILIZER FEED!**

### Instructions for improving sowing accuracy

Rotation test values given in the sowing table are for reference only. Their accuracy depends on ground quality, cultivation depth, tire pressure, and tire manufacturing tolerances.

The sowing accuracy can be however improved by doing a tow test under sowing conditions. The tow test is performed by towing the machine over the distance required to sow one acre under sowing conditions and by simultaneously reducing the ground-wheel rotations. Record the value obtained and use this when carrying out rotation tests.

If the value measured differs widely from the seeding table value, carry out a new test. In the table below, the distance W used in the tow test refers to different working widths, each matching a one-acre sowing area:

L = 33.3 m when working width = 3.0 m  
L = 25.0 m when working width = 4.0 m

Check the area meter accuracy when performing the measurement.

## 13. Field test

Field tests are by far the most secure testing method for feed amounts. Performing a field test on a field to be sown as well as on an already upturned seed bed establishes conditions which match sowing very accurately. Field tests can be performed for both the seed and fertilizer.

To perform the field test:

- Adjust the machine and configure it according to instructions
- Measure the driving distance required to sow one acre, dependent on the machine type:

JC 3000	33.3 m
JC 4000	25.0 m

- Drive outside of the test length for approx. 10 meters with the machine in working position so that each feed chamber is sowing seeds
- Empty the contents of the test sowing trough into the container
- Drive the distance in accordance with the sowing table above with the machine lowered to sowing position
- Weigh the seeds in the test sowing trough. Multiply the weighing results by 100 to obtain the amount of seed in kg/ha
- If tuning adjustments are required, perform the rotation test as described

**If the machine is equipped with Agrocont, make sure that the tire track function is not switched on while carrying out the test!**

## 14. Fertilizer application depth adjustment

### Overview

The fertilizer application depth can be adjusted steplessly, from surface application to a depth of approx. 8 cm. Ordinary fertilizer depth for grain plants is 6-7 cm. The depth can be adjusted by changing the closing moment of the hydraulic valve on the tire support arm, see Fig. 31, and by modifying the length of the tow-bar push-bar using the adjustment screw, so that the machine always travels in a horizontally balanced manner in the direction of travel.



**Figure 27. Fertilizer depth adjustment**

Changing the slot of pin 1, see Fig. 31, will produce a change in closing moment. The scale above the slot, 10-5-0, is equivalent to the application depth in centimeters. Pin 2 limits the machine lifting height by closing the valve when the machine is lifted high enough.

The tow-bar (meaning the tractor tow-bar height) is adjusted so that the machine travels in its sowing position horizontally. The length of the towing device push-bar can also be adjusted. If the machine is equipped with a tow-bar with a hydraulic push-bar (recommended, for example with rollers), this can be used to adjust the fertilizer depth. The cylinder in question is actuated by a separate hydraulic valve on the tractor. This function is in completely independent of the machine's raising/lowering circuit. Increasing the push-bar length raises the fertilizer drills correspondingly. Adjustments of this kind can be necessary, for example on soft ground. It is recommended not to raise the roller, but rather to adjust it using the push-bar.

## Adjusting the fertilizer application depth

Adjustments must be performed in the field or on soft ground in order to enable the fertilizer drills to press into the ground. Adjust pin 1, see Fig. 31, and centre this on the desired placement level (along the 10-5-0 cm scale).

Lower the machine while driving forward. Stop the tractor once the machine has lowered. Do not allow the tractor to move backwards, so as not to block the drills. Check the correct position of the machine. The machine must be horizontal. Adjust as required using the tow-bar push-bar adjustment screw or by raising or lowering the tractor tow-bars.

If the machine working position is in the field direction and the towing device push-bar does not require adjustment, the fertilizer application depth can be measured. Application depth is measured from the sowing track by digging up visible fertilizer grains. During the measurement, you can also define the seed sowing depth, see Section 14.

If the fertilizer application depth is incorrect, change the adjustment and perform a new test. Application depth changes depend somewhat on the fill of the machine, ground type etc. The effect of these factors can be reduced by measuring application depths under different conditions and by adjusting the machine application depth according to an average value. Variations of a few centimeters in the fertilizer application depth are permissible without having a major impact on the crop.

## 15. Adjusting the sowing depth

### General

**Correct sowing depth is one of the most important factors influencing sprouting. In a JC-type machine, sowing is carried out at the moist bottom of the tillage layer. The best guarantee of successful sowing is correctly performed tillage. Tillage must be performed in a properly timed manner such that the crumb size in the tillage layer is adequately refined. Excessive tillage can cause a risk of smudging or crusting.**

Tillage should be performed to the intended sowing depth. Sowing depths should be selected based on the sowed plant and ground humidity conditions. With small seeds, the correct sowing depth is 1-3 cm based on the sowed plant and ground humidity conditions. The sowing depth between grains may vary between 2.5-5 cm. As with all plants, it is essential that sowing is performed on humid, level ground in order to ensure sprouting. Become acquainted with the conditions appropriate for different plants and their sowing depths with the help of guides and study materials.

The tractor must be equipped with wheels suitable to ensure that the surface pressure remains low enough to avoid compression or tire grooves. The use of additional devices to condense the area of the roller or between the tractor wheels is recommended. This will ensure even sprouting across the entire working width.

Driving speeds must be adapted to conditions. At excessively high driving speeds, the drills may bounce and rise from the set sowing depth. Sufficient drill spring loading will secure the drills to the ground.

On light and moist terrains, the drill working depth can be limited by using disc drills, which are equipped with a limiting cup on the disc. In light tillage conditions, where managing tillage depth may already cause problems, disc drills may also be a suitable choice to prevent excessively deep sowing. Adequate moisture should be ensured so that the seeds are not planted in a ground layer which is either too dry or too loose.

### Setting the sowing depth

As noted above, the sowing depth is to a major degree determined by tillage depth. Changing the drill spring loading can significantly impact the sowing depth. On light grounds and when sowing at shallow depths, the spring loading should be kept low, and increased on more solid terrain. Correct drill weighting must always be ensured under practical conditions and the seed placement in the tillage layer must be observed.

The drill spring load can be adjusted either drill-specifically or by using so-called central adjustment. Drill loads against the ground can be adjusted between 2 and 20 kg. The respective operating depth is dependent on the drill type, tillage and ground type. Sowing depths should always be checked under actual conditions, and it should be ensured that the seeds are sown into a moist ground layer. Sowing depth adjustment can be performed most conveniently by means of the main adjustment screw, located in the center of the rear of the machine, see Fig. 32. Rotating the crank clockwise will increase the drill weighting. The storage location for the adjustment crank is inside the frame tube, see Fig. 5 (arrow).

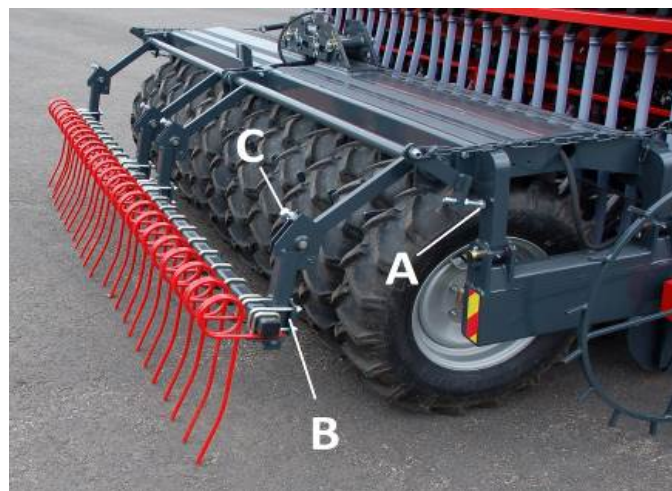
The sowing depth can also be adjusted drill-specifically. To do this, move the weighting spring extension chain on the retaining hook on the front of the machine.

Adjusting the chain, e.g. 1-2 loops tighter, is usually required to compensate for tractor tire tracks. The drill springs of TUME drills are designed in such a way that the drill height has no significant impact on drill weighting. Therefore, any change in placement depth will not significantly impact the weighting of the drills.



**Figure 28. Main adjustment screw**

## 16. Harrow adjustment



**Figure 29. Harrow**

Basic adjustments to the harrow tines in terms of vertical direction and working width are performed at the original manufacturer. It is however useful to secure these adjustments during commissioning and, for example, annually the start of seasonal use. The angle of the tines must always be adjusted according to working conditions. The support chain adjustments must then be checked periodically, and it must in particular be ensured that the harrow is raised sufficiently high when the machine is raised to a vertical position. Adjustments are described below.

The operating depth of the tines can be adjusted by **adjusting the tines vertically**.

Vertical adjustments are mainly performed by changing the lower angle of the harrow, by adjusting the limiting screws (see "A", Fig. 33). The operating height can also be changed by adjusting the tine mounting bar installation height in relation to their mounting arms (see "B", Fig. 33). The adjustment is made by changing the position of the U-holders on the square tube of the arm.

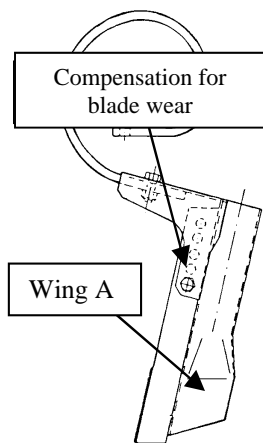
**The harrow tines can be adjusted** by changing the adjustment of the limiting screws (see "C", Fig. 33). Especially where large amounts of plant waste can be found on the ground, the tines should be adjusted to a gentle "surrendering" angle. On rigid terrains where basic tillage is carried out by plowing, steeper angles can be used in order to obtain better ground penetration.

**Support chain adjustment** must be sufficiently tight so that the harrow tines cannot touch the ground when the machine is raised. Rough adjustments to the support chain can be made by attaching the spring to a suitable link in the support chain. Fine tuning can then be done by selecting the most suitable of the two holes at each end of the support chain.

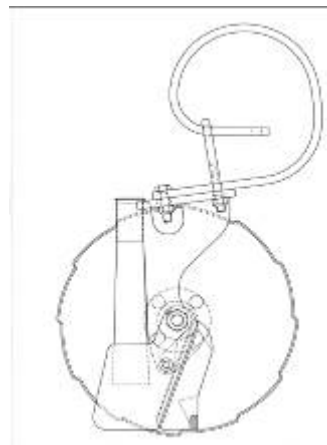
Because the support chain is fitted with a spring, adequate adjustments can be made to lighten the harrow in its working position.

**Caution! Reversing the machine when the harrow tines are in contact with the ground is prohibited. Reversing with the harrow in an excessively low position may damage the harrow and machine tires. Ensure that the harrow support chains are sufficiently adjusted!**

## 17. Fertilizer drills



**Figure 30. Fertilizer drill**



**Figure 31. Laser fertilizer drill**

The fertilizer drills supplied as standard are very narrow and operate at an almost perpendicular angle to the ground surface. For these reasons, the drills do not noticeably bring moist clods of earth to the surface. The blade of the fertilizer drill can be dropped down in order to compensate for wear, see Fig. 34. The blade has several mounting holes. As required, remove the hexagonal screw and adjust the worn blade one hole downwards. Lock again with the hexagonal screw. If the wing part "A" has worn thin, it must be changed. A weldable consumable part is available - as for more information from your distributor or from the original manufacturer.



JC Laser drills have single-disc fertilizer drills, which have the advantage of not becoming blocked, such as in light tillage conditions. One requirement for the trouble-free function of the laser-fertilizer drill is the washer between the disc and scraper, see Fig. 35. This washer spacing must be 0.2-1.2 mm. Excessively wide or narrow washer spacing can cause disc stoppages.

## 18. Seed drills

Seed drills consist of a drill tube and tip part. The major seed drill types include drag drills and disc drills. In addition to the above, the JC drill range also includes a wing drill. All of these drill types incorporate the same tube component. Changing the tip is a relatively fast task, which means that the machine can be adjusted to a variety of different conditions as required by acquiring the required drill set.

Drag drills can be used under most conditions. The most suitable applications are found in clay areas where plowing is the form of basic tillage. Because of its flexibility, the drill is not likely to become blocked. Drag drills are also available fitted with an aluminum oxide or ceramic tip, which increases tip durability approximately ten-fold compared to a cast tip.

**Disc plates are recommended for conditions where plant waste occurs in significant amounts. Disc drills are also suitable for general use (i.e. minimal tillage and cultivation without plow).**

Wing drills sow the seeds across an approx. 70 mm wide swath. Wing drills usually provide a larger crop than row sowing, especially on moist and irrigated grounds with favorable conditions. Wing drills are not suited to crusted ground types or conditions where there is plenty of plant waste in the tillage layer.



**Figure 32. Drag, disc and wing drills**

## 19. Area meter

Electric area meters are fitted to TUME drills as standard, and come with large-sized numbering and convenient location, so that the tractor driver can easily read the meter during operations.

When the area which can be sown with a single full container is known, the meter can easily provide a indication for refill timings, by adding the last fill area measurement to the measurement of the area to be sown with a full container. The numbers on the left side of the centerline of the area meter display the full hectares, while those on the right display tenths and hundreds.



**Figure 33. Area meter**

### Area meter instructions

Please refer to Annex 1 for instructions.

## 20. Drill maintenance

### General

We would ask that you turn to your distributor for assistance with more demanding maintenance tasks. The tasks listed below are those which often most conveniently performed on farm premises. Read the instructions carefully. Following the instructions and your TUME drill will function impeccably year after year. Non-compliance with the instructions will lead to the voiding of the warranty.

Machine lifting points are located on the front edge of the container in the tow-bar push-bar bracket hole (1 point) and on the rear bridge, on the adjustment joint brackets (2 points). All three mounting points must be used when lifting the machine in order to maintain stability. **The adjustment joint must be locked to a rigid position with a flat bar during lifting (see Fig. 4).** We recommend using an optional lifting bar.



**WARNING!**

**Always turn off the tractor engine before starting maintenance and set the hand brake. Ensure that no other person is able to turn the engine on during maintenance or actuate control equipment during maintenance or repair work.**



**WARNING!**

**When heated, coated surfaces may emit vapors that are harmful to human health. Ensure that work premises are properly ventilated, for example during welding. Remove the paint from surfaces to be welded!**

**WARNING!**

Always close the safety valves of both lift cylinders in case the machine must be lifted during maintenance, see Figs. 38–39. Never pass under a machine that is only supported hydraulically.



**Figure 34. Lift cylinder safety valve closed**



**Figure 35. Lift cylinder safety valve open**

**Caution! Travel movements are not allowed with safety valves closed.**

## Ordering spare parts

Spare parts needed for the machine can be ordered either through your distributor or from the original manufacturer. Please identify the spare part number required before placing an order - this can be found in the spare parts list supplied with the machine. This will ensure the delivery of the correct part.

## TYPICAL MAINTENANCE MEASURES

### Drill lubrication

#### SEE LUBRICATION CHART IN ANNEX 4.

Roller chains can be lubricated based on circumstances either every 20-50 hours, or as needed. SAE 10W-30 lubricant can for example be used. There are roller chains in the following locations:

- 1 unit inside the ground wheel arm, see Fig. 14
- 1 unit under the engine on the right-hand side
- 2 units under the cover on the right-hand side, see Fig. 22
- Additional equipment (HS device, mixing shaft) roller chains on the right-hand side
- Cassette gear, see Fig. 22, roller chains must be lubricated once every two years. The cassette must be opened for lubrication. When assembling the cassette, attention care be taken to ensure that the chain wheels are in their right positions. Simultaneously adjust the chain tightness and lubricate the chain wheel bearings with Vaseline.

**The sliding bearings of the support arms in supporting wheels should be lubricated with Vaseline once annually. Each of these has a lubrication nipple on the lower side of the bearing tube.**

The towing device mechanical / hydraulic push-bar adjustment screws and sowing drill main adjustment screw should be lubricated with lubricant and Vaseline once annually.

The bearings to the rear of the support wheels must be lubricated annually with Vaseline. JC 3000 8 nipples and JC 4000 10 nipples.

The wheel level and the harrow joints must be lubricated annually by pouring oil onto the joint surfaces and by oiling the nipples. The wheel axles should always be washed after seasonal use and treated with moisture-resistant oil and rust preventatives. This will facilitate the disconnection of tire rods in the event of tire damage.

## Storage

When the machine is not in use, it should be stored in a covered space and fully maintained. Containers should be emptied of fertilizer and seeds. See Section 7, Emptying the containers.

**The machine must be washed internally and externally with water. Use high-pressure jets with care, and do not aim the jet directly at the bearings. If the machine is equipped with a seed dressing device, its containers must be dismantled and removed before washing or corrosion protection.**

**Lubricate the machine according to instructions. Withdraw the fertilizer tubes from the fertilizer drills for storage. Protect the machine against corrosion by spraying it for example with rust-preventative oil, which will be easy to flush away before the next season.**

**The spring loading of the drills should be adjusted to zero.**

Defects detected during cleaning should be recorded. It is best to order spare parts in advance of the season so that repairs can be performed in due time.

## 21. Most common repairs

### Fertilizer drill damage

When fixing the fertilizer drills, select an even, hard surface and lock the support leg in front of the machine container. If there is no support leg in the tow-bar (multi-function tow-bar) and the machine is disconnected from the tractor, ensure the stability of the machine by positioning sufficient support under the tow-bar.

The machine containers should be as empty as possible in order to minimize stress and support leg sinkage. Keep the hydraulic control lever in its lowered position until the machine has with all certainty descended to its lowest position. The fertilizer drills will then be slightly above the ground surface. Turn the tractor hydraulic valve into the holding position.



**WARNING**

!

**The support leg on the front part of the container is not designed to bear asymmetrical loads! Use sufficient additional support, e.g. under the machine front bar or tow-bar, if you must disconnect the loaded drill from the tractor!**



**WARNING**

!

**The hydraulic push-bar cylinder of the towing device is not secured with a lock valve! The machine may suddenly lower in the event of a broken hose or valve problem if the front of the machine is supported on the push-bar cylinder or on an unsecured tractor lifting device!**

Spring and drill parts can be replaced separately. The torque of the mounting screws is 80 Nm. Spring parts can be replaced by dismantling the spring from its fastener. Fastener screws with a strength class at least 8.8 must be used. After renewing the drill or spring, the screws must be retightened after driving a few hectares.

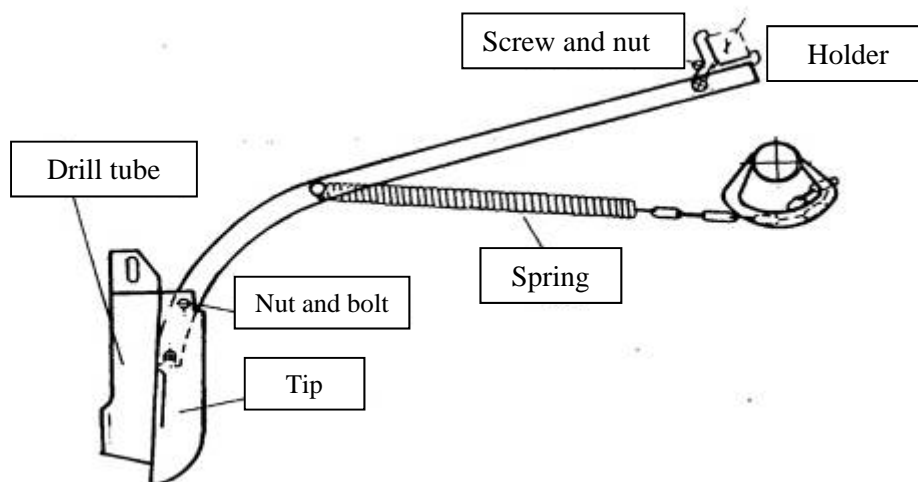
## Drill repairs

If you are unable to reach the drills to change these when the machine is in its fully lowered position, proceed as follows:

- Ensure that the machine tow-bar is either fastened to a lifting device secured with chains or to a mechanically-locked tractor towing hook
- Disconnect the harrow chains as required in order to gain access to the area between the step and container
- Raise the machine fully
- Close the safety valves of both lift cylinders as per Fig. 38
- Allow any bar cylinder to retract fully, before starting repair work
- Keep the external valve of the tractor in its lowered position until the front part of the machine is fully lowered. Then turn the valve to its holding position.

The drill tips and drill tubes can be changed by loosening the tip part nut, removing the bolt from the hole and pulling the tip downwards, see Fig. 40.

The installation and adjustment of the disc drill are explained in the following paragraph. If looseness is detected in the front-end mounting of the drill arm, this can be mitigated to a certain degree by tightening the arm mounting piece screw, see Fig. 40.



**Figure 36. Drill and arms**

The arm must be agile and must be able to drop vertically under its own weight. If the arm appears stiff, lubricate the front end mounting parts of the arm by dropping oil onto the arm and bearing surfaces.

## Mounting and adjusting a disc drill

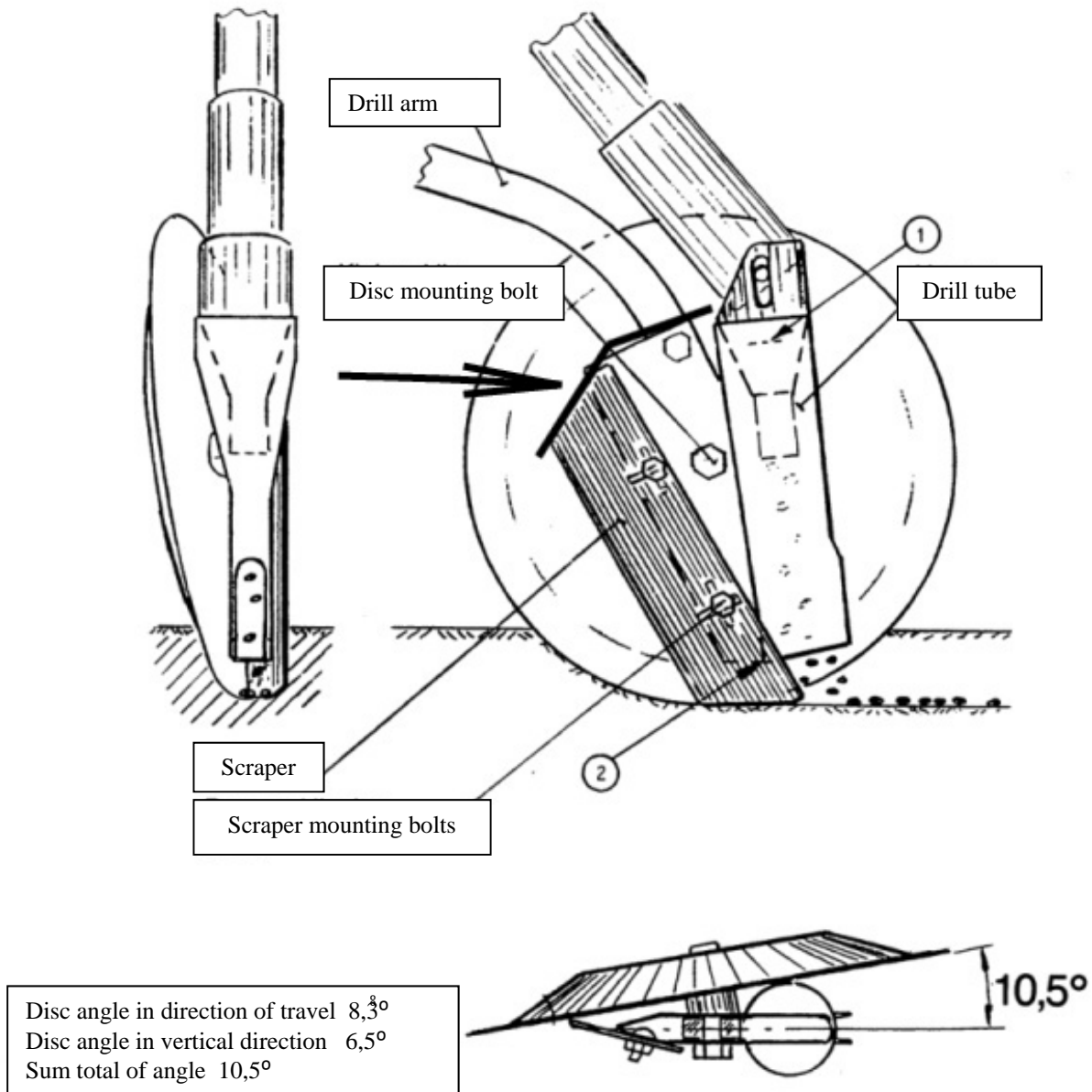
Disc drills can be fitted facing either the left or right sides. In drills, the disc drill is usually assembled so that the disc is always located to the side of the fertilizer drill.

Note that the triangular splash guard, equipped with a hole (indicated by the arrow in Fig. 41), must be dropped into position on the arm first during assembly.

The angle of the disc can be adjusted before mounting the scraper. Once the angle is correct, the disc distances from the top and bottom edges of the drill tube must be equal. This can be adjusted by turning the disc mounting screw. For the duration of the adjustment, the disc mounting nut must be relatively loose. Check the angle again after tightening.

Mount the scraper and reduce its distance from the disc surface as much as possible, however in such a way that it does not obstruct the rotation of the disc. Adjust the scraper edge so that it is the same distance from the surface of the drill along its entire edge.

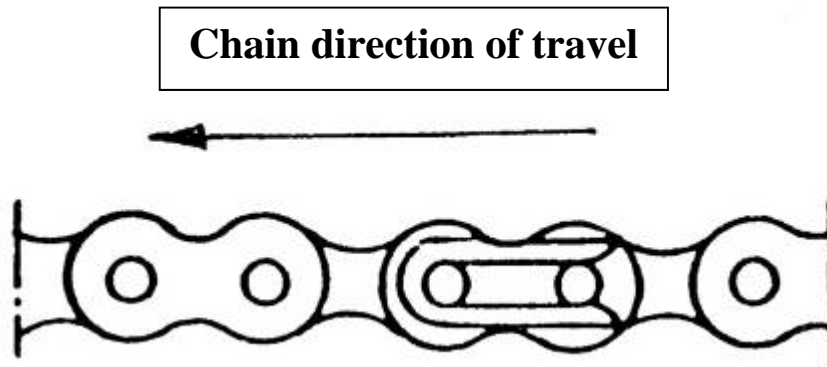
If this is not possible within the scraper adjustment range, alter the disc angle position slightly. Finally, check the rotation of the disc as well as the distance of the scraper from the disc after tightening the mounting screws.



**Figure 37. Disc drill**

### Roller chain adjustments and repairs

The roller chains are located both on the front and back ends of the machine, as well as inside the ground wheel. These must be kept equally tight. Stretched roller chains and worn tensioners must be replaced well in advance. Pay attention to the accurate installation of the chain lock, see Fig. 42.



**Figure 38. Chain lock installation**

**Caution! Check the roller chain tension on a new machine after the first day of driving.**

## Hydraulic repairs

The trouble-free, safe use of the machine requires that the tractor and work machine hydraulic control devices are in proper working order. If the hydraulic tubes or connectors become damaged during use, these should be replaced without delay. Ensure that no impurities enter the hydraulic system during maintenance or when connecting rapid-release connectors.

Two return valves are installed with the three-way valve for controlling raising and lowering, see Fig. 31, and these function to stop the machine lowering or rising when the three-way valve is in operation. If the machine rises or lowers even if the three-way valve is closed, there may be a malfunction associated with the return valves. The return valves are built into the three-way valve, and for this reason the 3-way valve must be replaced in such instances.

## Changing of tires and checking the air pressure

The support wheels are divided into blocks. There are two blocks in the HKL 3000 JC, and three in the HKL 4000 JC. Each block has one or two wheel packages respectively, see Fig. 43.

When replacing a tire, the wheel package of the block in question must be disconnected. This is done by loosening the bearing housing mounting nuts (M16) and raising the wheels by approx. 10 cm with a jack. This allows the axle to be removed together with the wheels to descend and thus be removed from underneath the machine. In order to facilitate this work, the adjustment joints must be locked by setting the restriction flat bar to its locked position, see Fig. 4. The wheel rods are mounted to the axle by means of hexagonal screws.

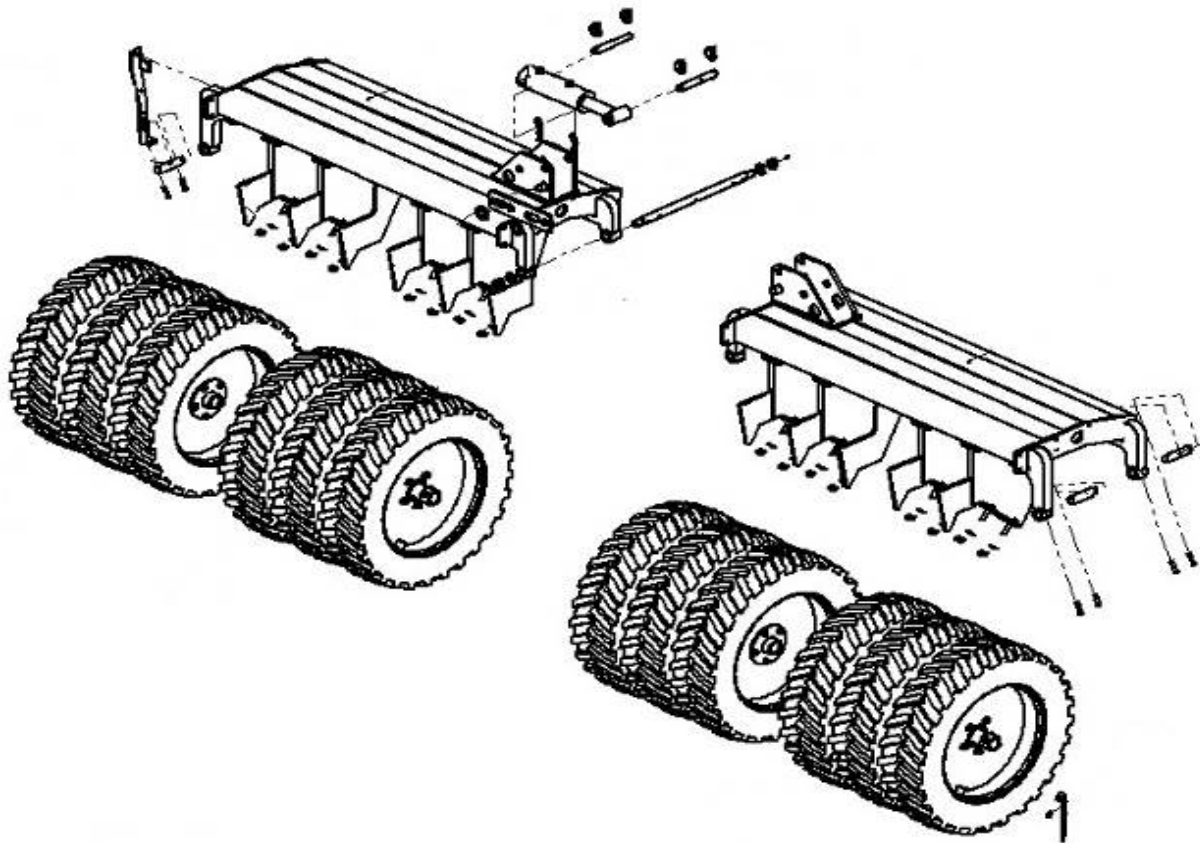


### **WARNING!**

**The machine must be carefully supported when changing a tire. Risk of crushing!  
Working, replacement or changing a wheel must be performed in a workshop.**

When reassembling the axle, the axle must be carefully lubricated with Vaseline and rust-preventive oil in order to facilitate further subsequent disconnection. Ensure during reassembly that the bearing housing

sleeves are all on the same side that they were before disconnecting the bearing housings from the axle. Remember to release the adjustment joint restriction flat bar from its locking position.



**Figure 39. Removing the wheel-packages**

Use only flawless wheel hubs. Never make any modifications or changes to a wheel hub. The installation of wheels to a wheel hub can only be carried out by a tire-professional, who possesses adequate training, experience and tools. Installation without the necessary expertise may cause a risk of death.

The tire valve cap is fitted with a valve, see Fig. 44. This enables tire pressure checks to be performed with the extension tube supplied with the machine, see Fig. 45.



**Figure 40. Tire valve**



**Figure 41. Checking the tire pressure**

### **Drill maintenance of JC LASER – models**

Permanently lubricated bearings are fitted in drills and fertilizer drills, and require no lubrication.



## 22. Decommissioning the machine

If the TUME drill must be decommissioned due to serious damage or obsolescence, it must be disassembled as appropriate. We recommend that the machine be sent for recycling by a suitable officially licensed demolition plant which has the necessary skills for the recycling of separated materials.

## 23. Technical Information

Type/Feature	JC 3000 Star XL	JC 4000 Star
Working width (m)	3.0	4.0
Container volumes (l) – Total – Seed, min – Seed, max – Fertilizer, max	3720 1350 3320 2360	4160 1580 3640 2580
Weight of basic machine (kg) – Empty, drag or wing drill – Empty, Laser-model – With full containers, grain and fertilizer	2535 2735 Approx. 6100	3100 3350 Approx. 7200
Dimensions of basic machine (cm) – Height to edge of container – Width – Length without towing device	179 338 250	167 438 250
Tires – Size – Surface pattern – Number of tires – Pressure (bar)	7.50L-16 6PR Tractor pattern 12 1.5	7.50L-16 6PR Tractor pattern 16 1.5
Hydraulics – Pressure (bar) – Connection with standard equipment	160 Single-function	170 Single-function
Fertilizer drills (units) Seed drills (units)	12 24	16 32

## 24. Optional equipment and accessories

TUME drills can only be used with the following, original TUME accessories. The original manufacturer's instructions must be fully observed when installing the accessory. Ask your TUME service shop, importer or original manufacturer for additional instructions if necessary. The incorrect installation or use of other than original TUME accessories may place the safety of users at risk or cause damage to the machine. The manufacturer will not be responsible for damage arising from non-compliance with the manufacturer's instructions.

TUME is continuously improving its machines and ancillary equipment. If new parts are needed for old equipment, it is sensible to ensure the compatibility of the equipment by contacting the manufacturer's representatives.

Optional equipment and accessories:

- Markers, marking the middle line. For instructions, see Annex 2
- Multi-function tow-bar (optional)
- Tow-bar hydraulics for multi-function tow-bar (optional)
- Tow-bar hydraulics for standard tow-bar (optional)
- Front drag with hydraulic adjustment
- AgroCont on-board computer
  - Tire tracking and monitoring device
  - Electronic marker control
- Electronic area meter
- Mixing shafts
- Start fertilizer equipment
- Grass seed sowing equipment
- Seed dressing equipment
- Ceramic drag drills (optional)
- Carbide fertilizer drill blades (optional)
- Hydraulic drill weighting adjustment
- Front-step levels
- Hydraulic harrow



Figure 42. Middle markers + step levels



Figure 43. Start fertilizer equipment



Figure 44. AgroContPlus on-board computer

## 25. Warranty terms

Tume-Agri Oy products are provided with a one (1) year warranty. The warranty is valid from the date of delivery to the end-user. The warranty only covers damage that must be claimed from the manufacturer within three (3) years of delivery of the product from the original manufacturer to the reseller.

The warranty covers manufacturing and material defects. The warranty does not cover malfunctions resulting from wear, negligence or incorrect use, incorrect installation or faulty maintenance. The warranty does not cover malfunctions resulting from use under unusually difficult or wearing circumstances. Parts deemed to be consumables such as drills, blades, tubes, tires, connectors, seals etc. are not covered by the warranty.

Occurring damage must be brought to the attention of manufacturer without delay, and will result in an inquiry to determine whether the issue is within the scope of the warranty. If the manufacturer deems it necessary, the machine/part must be returned to the original manufacturer for processing under the terms of warranty. The following information must be provided with any return: Machine type, serial number, date of delivery, name and address of owner.

Warranty claims will be disbursed as a part, or at the net price of the part valid at the time of occurrence. Applicants for warranty claims are responsible for the freight and installation costs of the warranty part. The warranty does not cover damages resulting in a warranty claim of less than fifty (50) Euro. The warranty shall be voided if the machine is modified so that it differs from its original specification, e.g. by means of modifications, tune-ups, additional structures or replacements to the original manufacturer's parts and spare parts.

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