



SM-1909/L

Pneumatic seed drill



STARTING MANUAL

MAINTENANCE AND DOSAGE

LAMUSA seed drills and fertilizer spreaders are manufactured in a highly specialized environment and our factory has a vast customer-endorsed experience.

LAMUSA machines use highly advanced technology and are guaranteed to work without malfunctions in a great variety of conditions. They are provided with easy-to-use and efficient devices. LAMUSA machines perform excellently with only minimum operator maintenance.

This manual will help you use your LAMUSA product with the upmost efficiency.



Certified quality system

2nd Edition – May 2016
Ref.: CN-811055/GB
Created by: LAMUSA AGROINDUSTRIAL, S.L.

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Specifications are subject to change or modification without notice.
The pictures included do not necessary show the standard version.

NEUMATICA SM-1909/L

STARTING MANUAL

MAINTENANCE

DOSAGE

SPARE PARTS

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1. INTRODUCTION

It is essential to read and follow the instructions and recommendations in this manual before operating the machine. Careful reading enables maximum operator efficiency, prevents accidents and damage, and increases the seed drill's capacity and life expectancy.

Please ensure that this manual has been read by any person involved in performing operational tasks, (including preparation, dealing with mechanical problems and supervising the machine), maintenance (inspection and technical assistance) and transport.

For your safety, please follow these technical safety instructions as LAMUSA will not be responsible for damages caused by not observing the information provided.

In the first chapters you will find the Technical Characteristics and Safety Instructions, as well as some essential sowing concepts. Basic concepts that are required to operate the machine are explained in the Starting and Maintenance sections. The last part of this manual consists of Dosage Tables, detailed by seed type.



LAMUSA RETAINS THE RIGHT TO MODIFY ILLUSTRATIONS, TECHNICAL DATA AND WEIGHTS INDICATED IN THIS OPERATING MANUAL, IF THESE CHANGES HELP TO IMPROVE THE QUALITY OF THE SEED DRILLS.



PLEASE, READ THIS MANUAL CAREFULLY BEFORE USING THE MACHINE

2. SAFETY INSTRUCTIONS

2.1 SAFETY SYMBOLS

In this operating manual you will find three different symbols relating to safety:



TO FACILITATE OPERATION WITH THE SEED DRILL.



TO AVOID DAMAGES ON THE SEED DRILL OR IN THE OPTIONAL EQUIPMENTS.



THIS SYMBOL WARNS OF THE RISK OF INJURY.

On the machine, you will find the following symbols:



READ THE INSTRUCTIONS CAREFULLY AND OBSERVE THE SAFETY ADVICE GIVEN IN THE OPERATING MANUAL.



DURING THE COUPLING MANOEUVRE, STAY AWAY FROM THE REAR PART OF THE TRACTOR. RISK OF SERIOUS PHYSICAL INJURY.



DURING MAINTAINING OR REPAIRING THE SEED DRILL, YOU MUST STOP THE TRACTOR'S ENGINE COMPLETELY, IT MUST NOT BE STARTED.



RISK OF BEING CRUSHED WHEN WORKING UNDER THE MACHINE, PLEASE SECURE THE MACHINE TO PREVENT THIS RISK.



NEVER USE THE LADDER TO ACCESS THE PLATFORM WHEN THE MACHINE IS RUNNING. IT IS FORBIDDEN TO RIDE ON THE MACHINE DURING OPERATION. RISK OF SERIOUS PHYSICAL INJURIES.



DANGER OF INFECTION FROM ESCAPING HYDRAULIC FLUID AT HIGH PRESURE! THIS CAN INFLICT SERIOUS INJURIES WITH POTENTIALLY FATAL CONSEQUENCES IF IT PASSES THROUGH THE SKIN AND INTO THE BODY. KEEP THE HOSE LINES IN GOOD CONDITION. RISK OF SERIOUS PHYSICAL INJURIES.



NEVER STAND UNDER TRACK MARKERS OR IN THEIR OPERATIONAL AREA. RISK OF SERIOUS PHYSICAL INJURIES.



COUPLING POINT FOR TRANSPORT BY CRANE.



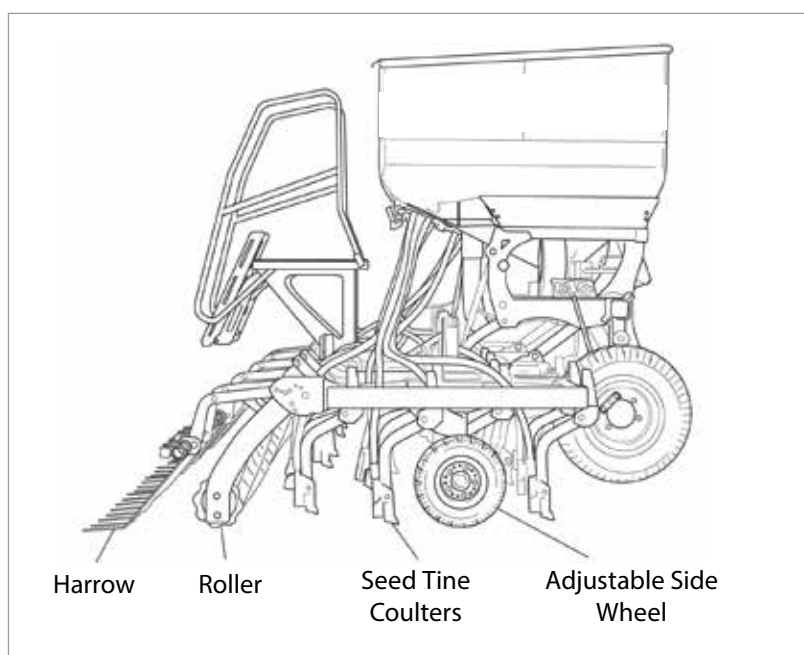
PTO SHAFT'S SPEED AND TURNING DIRECTION (ONLY IN MACHINES WITH MECHANICAL FANS).



3. TECHNICAL CHARACTERISTICS

3.1 TECHNICAL CHARACTERISTICS

TYPE / ROWS	ROWS SPACING	WORKING WIDTH	SEED HOPPER CAPACITY	WEIGHT (KGS)	TYRES TYPE	TRANSPORT WIDTH
500/31	16 cm	5 m	1.600 / 2.000 L.	2.250 kg	340/55-16	3 m
600/37	16 cm	6 m	1.600 / 2.000 L.	2.540 kg	340/55-16	3 m
700/43	16 cm	5 m	1.600 / 2.000 L.	2.830 kg	340/55-16	3 m



3.2 STANDARD EQUIPMENT

- 1.600 or 2.000 L Seed Hopper
- Sieve
- Kit for dosing test
- Monitor displaying: fan r.p.m., seed distributor shaft r.p.m., hopper level low and hectare counte.
- Signalling light equipment
- Working Lamps
- Adjustable side wheels
- Rear roller
- Harrow
- Mechanical fan with PTO shaft at 1000 rpm or hydraulic fan
- Tine coulters with tungsten carbide tips.

3.3 OPTIONAL EQUIPMENT

- Total sowing shut-off
- Shut-off sowing from folding parts
- Tramlines
- Hydraulic kit: hydraulic pump fitted on the tractor's universal joint shaft, refrigerated oil tank
- Hydraulic horizontal-folding track markers
- Pre-emergency track markers
- Monitor, radar and electric motor to control dosing
- Track erasers

3.4 USE ACCORDING TO DESIGN

The Seed Drill SM-1909/L has been designed for normal use in agricultural work, especially cereal and other kind of grain seeds.

If the machine is used in circumstances other than the above, the manufacturer will not be held responsible for any damage caused.

The user must observe all regulations concerning safety, traffic and hygiene.

If the machine is modified by the user, the manufacturer's warranty is cancelled. LAMUSA will not be held responsible for any damage caused.

3.5 GENERAL SAFETY INSTRUCTIONS

Before starting the machine, please check the machine is in good condition for work and is safe for road use.

In thoroughfare, please observe traffic signs and regulations.

It is forbidden to ride on the machine or climb into the machine when it is running.

Before using the machine, the user must be familiar with all operating elements.

Please be extremely careful when coupling and uncoupling the machine to the tractor.

Please check that the PTO shaft is in good condition and well protected.

Prevent the protective tube from turning by holding both the tube and chain provided for this purpose.

Mount the PTO shaft's transmission only when the tractor's engine is off.

Before connecting the PTO shaft, be sure that the danger zone surrounding the machine is clear.

Never leave the tractor's driver's seat while the machine is in operation.

Do not deposit external elements inside the hopper.

When maintaining the hydraulic system of the seed drill, make sure that it is depressurised and the tractor's engine is off.

Please regularly check the condition of the tubes and hosepipes in the hydraulic system. These parts age naturally and their life should not surpass six years. Please replace when necessary.

When raising the seed drill, the front axle is unloaded. Ensure that the machine has enough load to prevent it overturning. At this time you must ensure that the condition of both the steering and the brakes is optimal.

During transit with the raised seed drill, block the lowering switch. Before leaving the tractor, lower the seed drill onto the ground and remove the tractor's starting key.

Always use enough supporting elements when maintaining the machine in a raised position to prevent the machine from lowering or falling.

3.6 LOADING AND UNLOADING INSTRUCTIONS

Use a bridge crane to load and unload the truck. A specifically designed hook, as shown in figure 1, should be used to prevent damage caused by the weight of the machine itself. Tow ropes should be fastened to the machine's tripod as well as to the fasten points situated in the tine coulters' chassis.

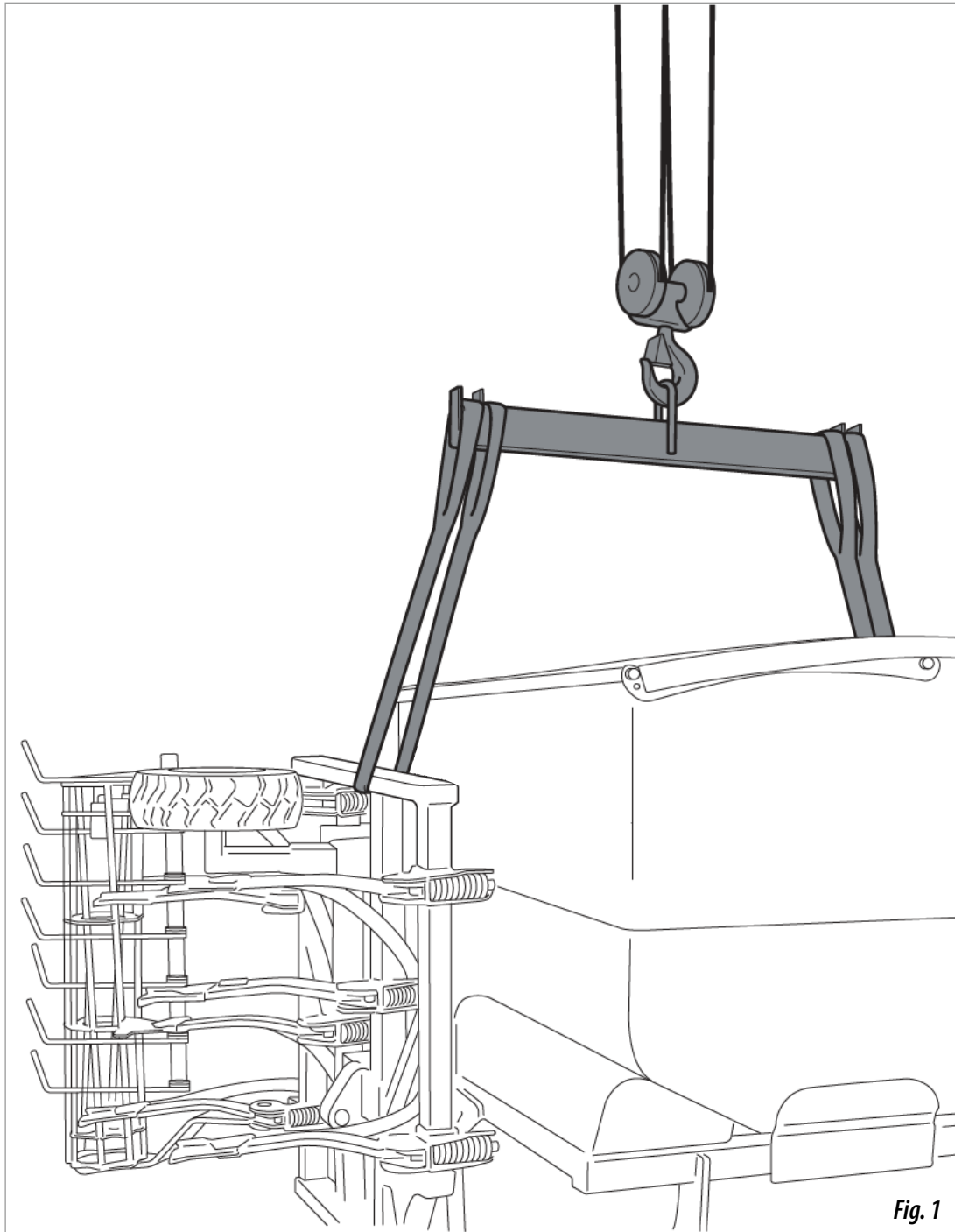


Fig. 1

4. ESSENTIAL SOWING CONCEPTS

4.1 TERRAIN

The better the soil condition, the better the sowing quality. Work is more difficult on big clods or uneven furrows.

Although LAMUSA machines resist harsh conditions, if the seedbed does not satisfy appropriate conditions then the sowing quality will suffer.

4.2 THE SEED

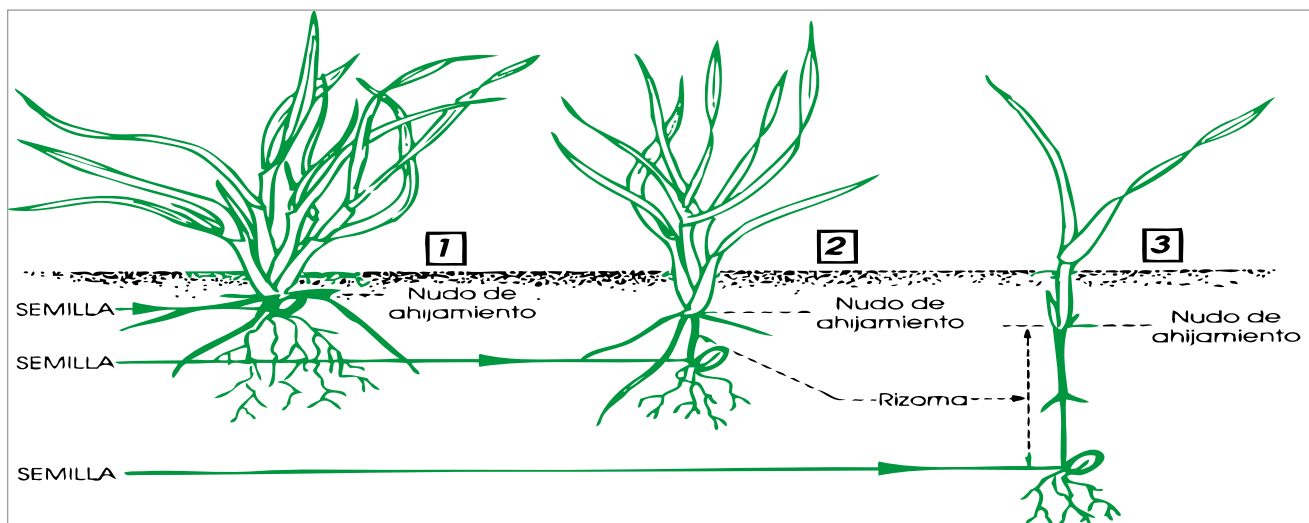
It is essential that seeds are well maintained and clean. Barley seeds should be trimmed.

4.3 SEED PLANTING DEPTH

The recommended seed planting depths are from three to five centimetres. Planting too deep causes problems as rhizome cannot reach the surface and the plant will die. It does not matter that some grains are visible because the harrow's tines will cover them eventually.

The seed planting depth has consequences for tillering, as well as for the plant's strength and its ability to resist frostbite or drought. The parent shoot grows from 1 to 2 cm under the ground, whatever the depth of the seed.

Planting deeper does not necessarily mean getting deeper roots. Only a few roots grow from the lower part of the seed. Most of them grow from a parent shoot close to ground level.



Normal Planting Depth: from 2 to 4 cm.

Thick stem, short rhizome, resistant to frostbite

Multiple tillering providing from 3 to 6 shoots and a lot of blades, from 6 to 10.

Deep and thick roots, approximately 5 cm in width and 10-12 cm in depth.

With less grains per sowing square metre, more ears are obtained.

Deeper Planting: from 5 to 6 cm.

Fine stem, rhizome exposed to frostbite.

Late and weak tillering, 1 or zero shoots and only a few blades, 3-4 aprox.

Medium quality roots of approximately 3 cm in width and 5 cm in depth

More grains per sowing square metre are required to obtain the same number of ears as in the previous case.

Very deep planting: from 8 to 10 cm.

Very fine stem. No tillering and only one blade.

Seed runs out of supplies by growing a long rhizome which frostbite can easily cut.

The plant takes weak roots, approximately 1 cm in width and 3 cm in depth.

Twice the number of grains per sowing metre are required to obtain the same number of ears as in the first case.



IN VERY COLD PLACES, REPEATED FROSTBITE CAN HAVE A HONEYCOMB EFFECT ON THE GROUND'S MOST SUPERFICIAL LAYER. IN THIS CASE THE PLANT'S VERY FIRST ROOTS CAN LOOSEN AND THE PLANT WILL DIE. SLIGHTLY DEEPER PLANTING IS RECOMMENDED AND IF POSSIBLE, THE USE OF ROLLERS TO COMPACT THE EARTH TO BETTER PROTECT THE SEEDS.



IN ALL LAMUSA MACHINES, THE RIGHT SIDE WHEEL ACTIVATES THE SEED DISTRIBUTOR'S MECHANICAL TRANSMISSION. CONSEQUENTLY, SHARP CURVES SHOULD BE PERFORMED TOWARDS THE LEFT SIDE, SINCE USING THE GROUND WHEEL DRIVE WOULD CAUSE A LESSER SEED DISTRIBUTION.



WHEN STARTING THE MACHINE, FURROWS WILL NOT CONTAIN ANY SEEDS FOR A METRE. WHEN STOPPING THE MACHINE, SEEDS WHICH WERE PREVIOUSLY INSIDE THE SEED HOSES, SLIDE FROM THE MACHINE AND END UP PILED ON THE GROUND. TAKE THIS INTO ACCOUNT WHEN STOPPING AND STARTING THE MACHINE IN ORDER TO ACHIEVE MORE ACCURACY.

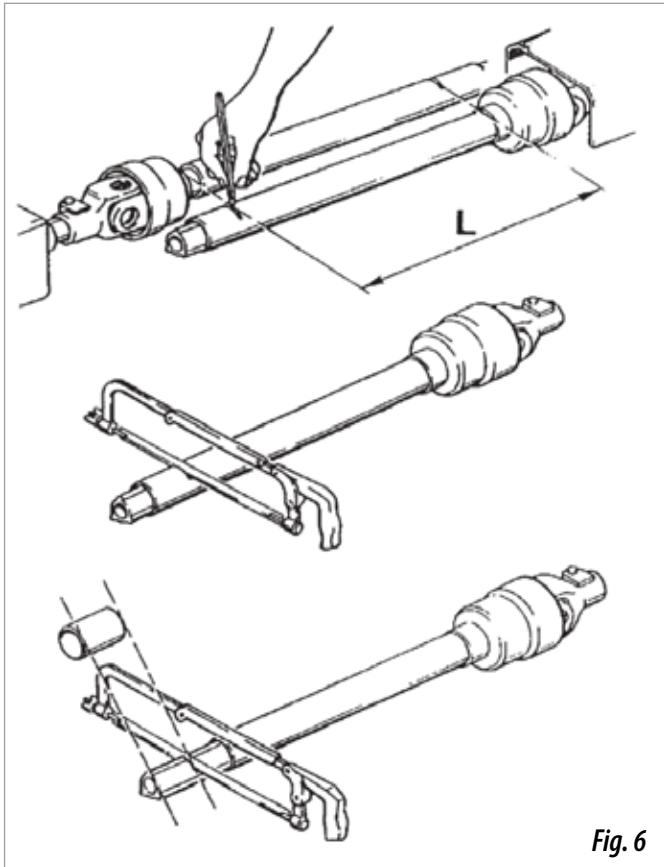
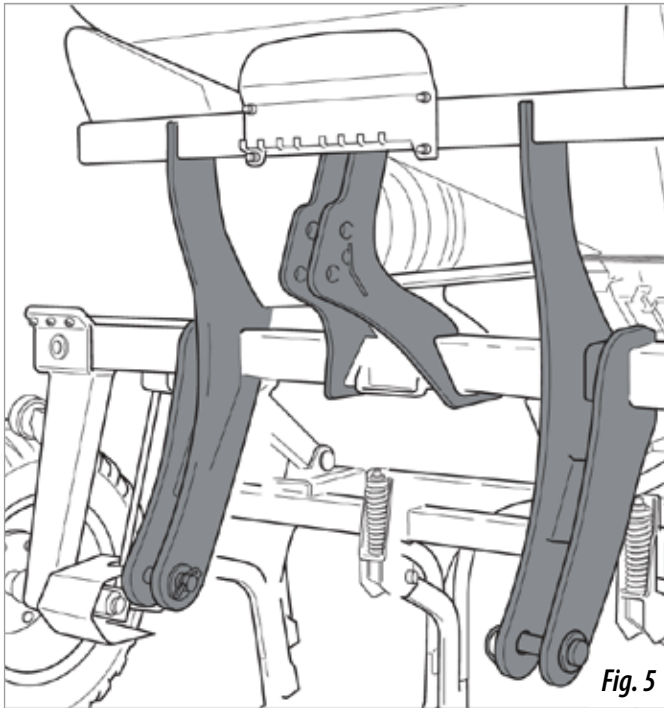


ALWAYS WORK AT A UNIFORM SPEED AS SUDDEN ACCELERATING AND SLOWING DOWN WILL CAUSE AN IRREGULAR SEED DISTRIBUTION.

5. STARTING

5.1 COUPLING THE SEED DRILL

Seed drill SM-1909/L is supplied with a three-point linkage of category 3.



BE ESPECIALLY CAREFUL DURING COUPLING AND UNCOUPLING THE MACHINE.

Once the seed drill is coupled with the tractor, the PTO shaft should be adapted. First dismount and insert one end into the tractor's universal joint shaft and the other end into the seed drill. Look for the minimal movement length "L" (fig. 6) by raising and lowering the hydraulic lift.

Cut the spare plastic and metal into parts of the same length and remount the PTO shaft.

Operate the hydraulic lift and check that the PTO shaft's movement is correct.



WHEN OPERATING THE PTO SHAFT CHECK THAT THE ENGINE IS OFF. ALWAYS WORK WITH THE PTO SHAFT PROTECTED AND IN GOOD CONDITION. PREVENT THE PTO SHAFT'S TUBE FROM TURNING BY SECURING IT WITH THE CHAIN PROVIDED.



WHEN LOWERING THE SEED DRILL TO THE GROUND, UNPLUG THE TRACTOR'S UNIVERSAL JOINT SHAFT SO THAT THE PTO SHAFT DOES NOT HAVE AN EXCESSIVE INCLINATION (MAX. 35°).



WHEN HOLDING THE TRACTOR UNIVERSAL JOINT SHAFT'S CLUTCH IN, PERFORM IT GENTLY. STARTING SUDDENLY COULD SERIOUSLY DAMAGE THE SEED DRILL.

5.2 HYDRAULIC CONNECTIONS

To use the machine's hydraulic connections you will need:

When folding the machine: a double-acting.

If the machine has hydraulic fan: one single-acting and free return line.

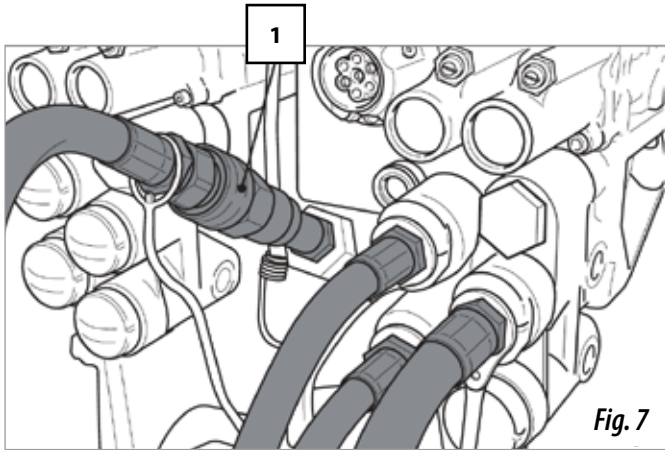


Fig. 7



FOR THE FREE RETURN LINE CONNECTION USE THE PLUG-ADAPTER PROVIDED (FIG. 7/1)

AUGER CONVEYOR (OPTIONAL)

The hydraulic connectors for the auger conveyor loader are located at the rear of the machine, beside the ladder.



TO AVOID INJURIES OR DAMAGE TO THE MACHINE, LOAD THE AUGER CONVEYOR HOPPER WITH THE MACHINE FULLY UNFOLDED.



MAKE SURE THAT THE ELECTRICAL AND HYDRAULIC CONNECTIONS ARE TIGHT.

To load:

- 1- Unfold the folding parts.
- 2- Connect the hydraulic terminals of the auger conveyor loader to the sockets located at the rear of the machine.
- 3- Press the load switch (position ON) at the front of the machine (Fig. 7.1).
- 4- Pressurize the hydraulic circuit for unfolding the folding parts.



To disconnect the auger conveyor:

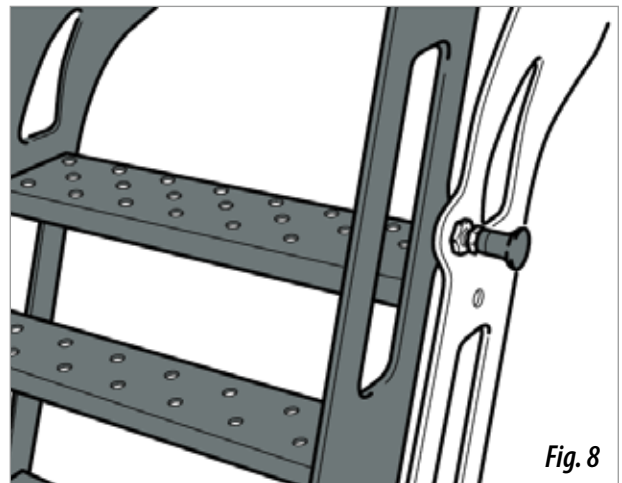
- 1- Depressurize the hydraulic circuit.
- 2- Press the load switch (position OFF) at the front of the machine (Fig. 7.1).
- 3- Remove the loader's hydraulic terminals from the sockets.

5.3 LOADING THE SEED DRILL

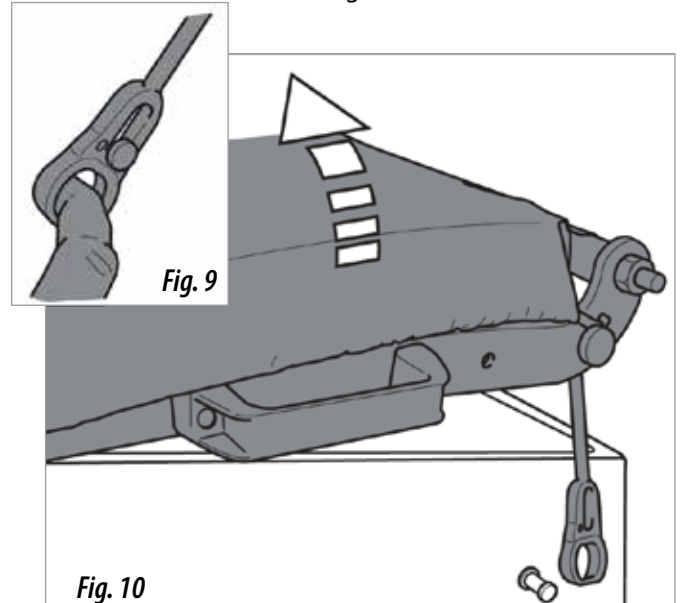
For access to the hopper, the access ladder should be unfolded.

Pull the trigger to free the folding flight to the ground.

To fold, return the folding flight until the safety trigger is secured.



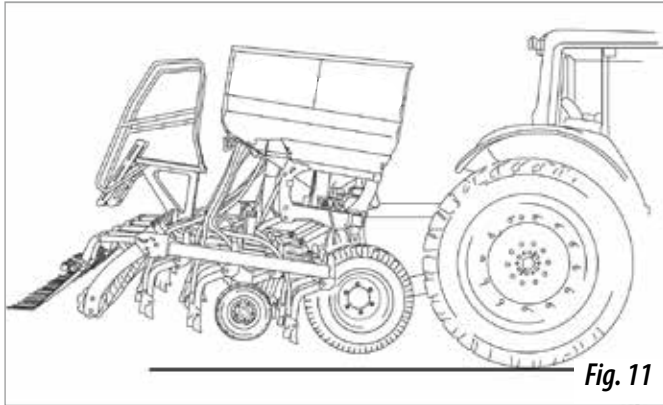
Retirar la goma de sujeción de la lona y replegarla hacia la izquierda. Remove the tension element of the hopper's folding cover and fold it over to the left using the handle.



5.4 TRANSPORT POSITION

To set up the transport position, follow these steps:

1. Folding the track markers (optional equipment).
2. Raise the machine until tine coulters are detached from the ground.



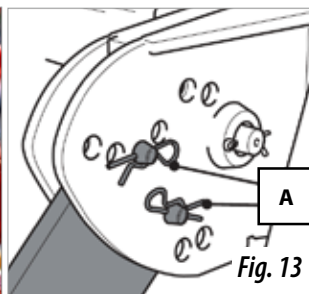
AFTER COUPLING THE MACHINE TO THE TRACTOR, CHECK THE ROAD HOLDING IS CORRECT AND THE STEERING IS WORKING PROPERLY.



PREVENT THE MOBILE ELEMENTS FROM MOVING.

3. Raise folding parts and check that the hydraulic safety trigger (fig. 12) is correctly fastened. This will prevent the folding parts from falling during transit.

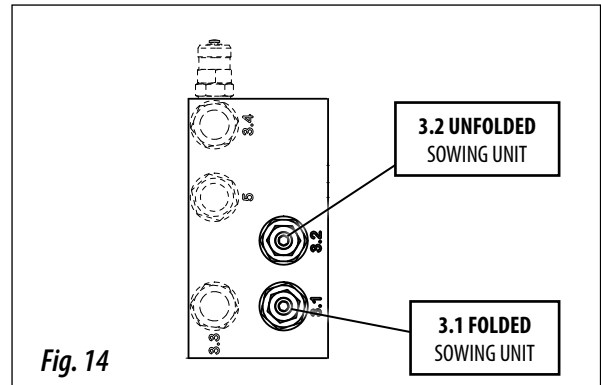
4. Place the 2 side rollers' bolts (fig. 13) in the holes to block their movement.



5.5 HYDRAULIC SYSTEM

FLOW REGULATORS

To ensure that the seed drill's folding parts fold and unfold smoothly, there are flow controllers (located in the hydraulic block installed on the right-hand side of the machine chassis), one for each operation, which must be adjusted to the hydraulic output supplied by the tractor.



NEVER STAND UNDER THE MACHINE'S EXTENSION ARMS OR IN THEIR SWIVEL AREA.

The machine is also provided with hydraulic safety triggers to secure the folding parts during transit. The figure shows the trigger in the safety position.



BEFORE UNFOLDING THE FOLDING PARTS TO START WORK, AS WELL AS AFTER PRESSURISING THE SYSTEM, MAKE SURE THE TRIGGERS HAVE BEEN UNFASTENED.

6. DOSAGE

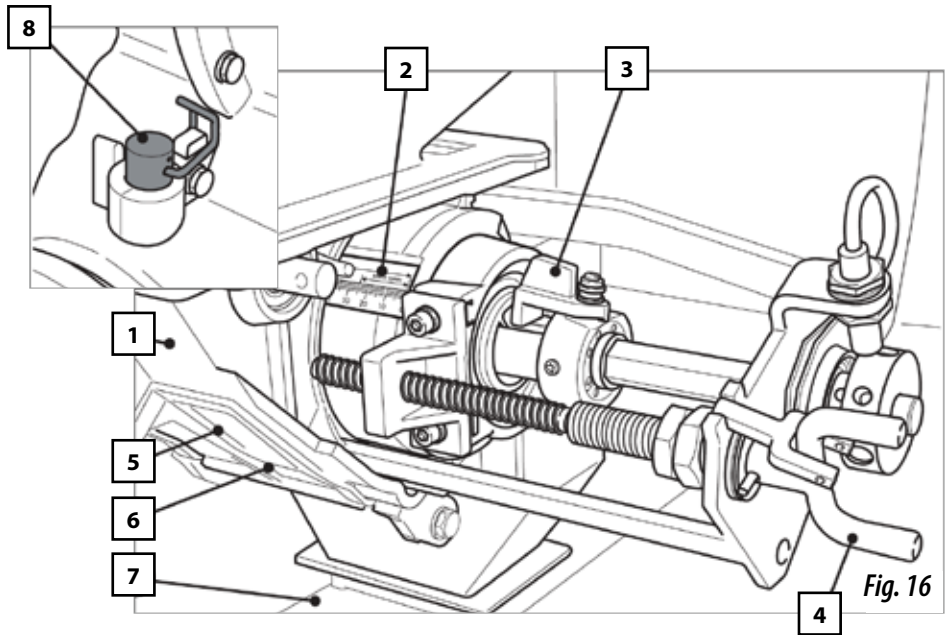
There are two ways of dosing:

- For regular seeds**
- For fine seeds with minimum flow rate**



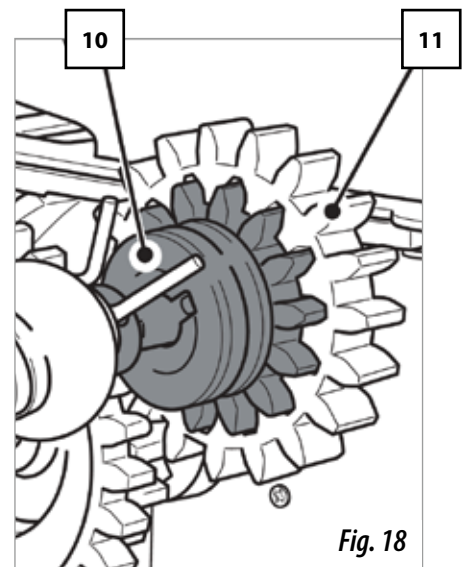
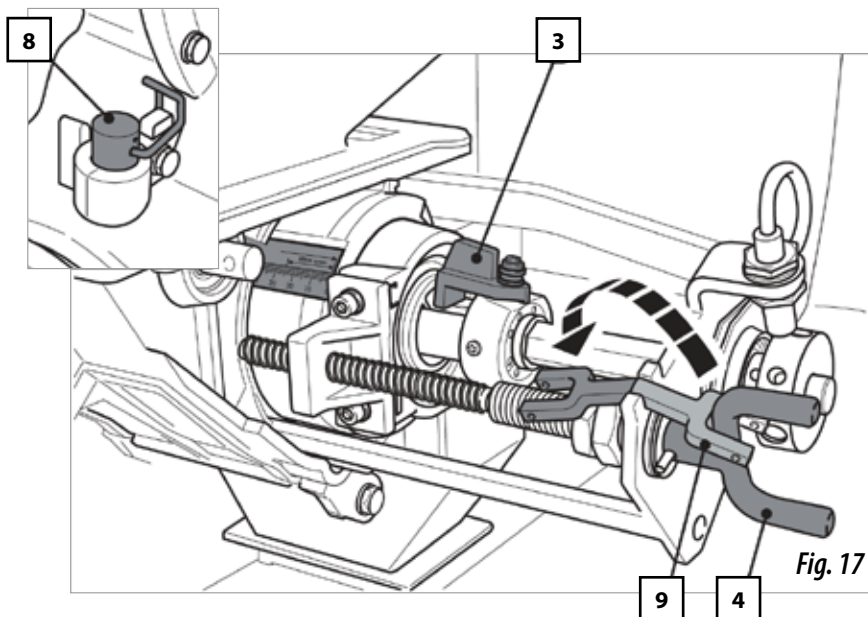
WHEN CHANGING THE POSITION BOLT AND THE CLIP PIN OF THE AIR OUTLET TO THE FAN, IT IS ESSENTIAL THAT THE SEED DOSING ROLLER CAN TURN FREELY AND THE HOPPER IS EMPTY.

1. Seed distributor
2. Dosing adjusting scale
3. Bolt N= regular seed F= fine or small seed
4. Spindle
5. Trap-door to empty the hopper and the seed distributor
6. Trap-door to empty the hopper and the seed distributor
7. Venturi injector sluice
8. Clip pin of the air outlet to fan N= regular seed F= fine or small seed



6.1 REGULAR SEEDS

- Remove the safety fork (fig. 17/9)
- Keep the bolt (fig. 17/3) in the position as indicated in the figure.
- Turn the spindle (fig. 17/4) to adjust dosing.
- Place the clip pin of the air outlet to fan (fig 17/8) in position N (regular seed)
- Pinion gear n°10 must be fit into pinion gear n°11 (fig. 18).



6.2 FINE SEEDS (microdosing)

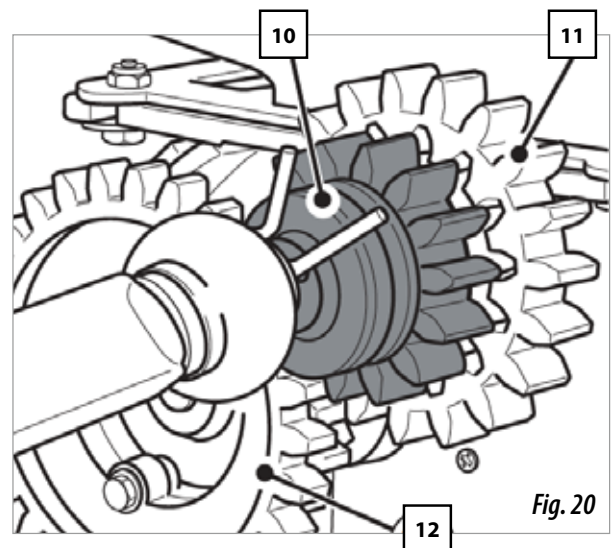
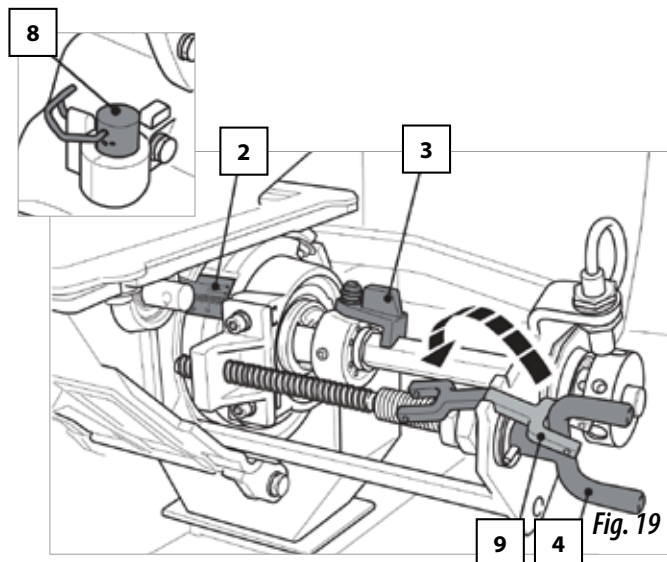
Remove the safety fork (fig. 19/9).

Turn the spindle (n°4, fig. 19) to position 0 on the scale (fig. 19/4).

Place the clip pin of the air outlet to fan (fig 19/8) in position F (fine seed).

Turn the spindle (fig. 19/4) to adjust dosing between 0 and 25.

Turn the bolt (fig. 19/3) until it is inserted into axle slot.



6.3 PREVIOUS FLOW TEST



YOU MUST TURN THE WHEEL UNIFORMLY USING THE CRANK AT APPROXIMATELY ONE REVOLUTION PER SECOND, DEPENDING ON THE LAND'S CHARACTERISTICS, TYRE'S MANUFACTURER OR TYRE PRESSURE. IT IS HIGHLY RECOMMENDED TO PERFORM A FIELD TEST AS DESCRIBED IN THIS MANUAL.



IT IS DANGEROUS TO TURN THE WHEEL WITH YOUR HANDS AS THE MUD SCRAPER CAN CAUSE INJURIES.



WHEN MICRODOSING FINE SEEDS, DO NOT EXCEED NUMBER 25 IN ADJUSTING SCALE (FIG 19/2)

The aim of microdosing is to better distribute both fine and regular seeds in small numbers.

Micro position

Pull the pinion gear n°10 until it is released from the pinion gear n°11 and fit it into pinion gear n°12 (fig. 20).

The correct value for using microdosing M-system in fine seeds can be found in the dosing tables (see section).



CHECK THE CLEANING BRUSH IS IN GOOD CONDITION BEFORE BEGINNING TO SOW FINE SEEDS.

Accurately weigh the collected seeds.

At a selected opening, you can obtain the kilograms per hectare distributed by the machine, by multiplying the weight by 40.

For ease of performing these operations the machine should be coupled to the tractor in a slightly elevated position (wheels should not be in contact with the ground). It is also necessary that the hopper is only half-filled with seeds to alleviate difficulty in turning the wheel with the crank.

If seeds show excess treatment powder, flow can be reduced, consequently a second control is recommended after sowing approximately three hoppers.



TO PERFORM THE PREVIOUS FLOW TEST IT IS ESSENTIAL THAT THE MACHINE, THE TRACTOR AND THE UNIVERSAL JOINT SHAFT ARE ALL SWITCHED OFF.

Close the trap-door (fig. 21/5)
 Open the hopper's folding cover (fig. 21) and fill the hopper with seeds.
 Open the lower trap-door (fig. 21/7)

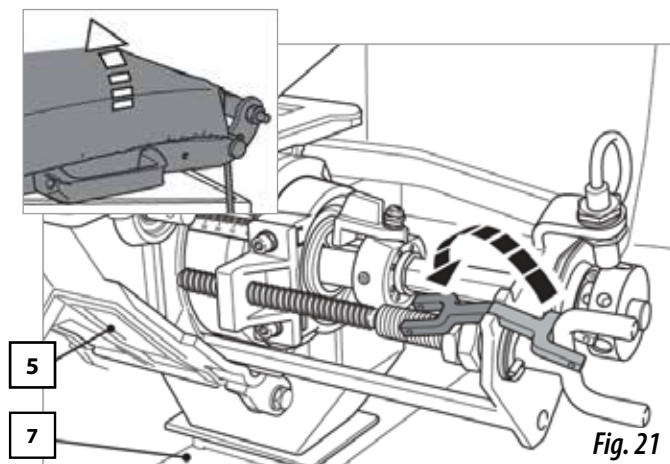


Fig. 21

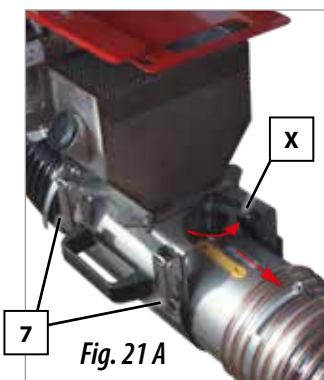


Fig. 21 A

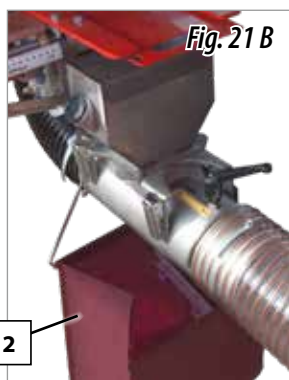


Fig. 21 B

Turn the handle for unblock him (X, Fig. 21 A) and move it to position "NO" (Test position).

Place a sack or a container under the exit of the venturi injector sluice which has previously been opened.

Place the crank in the right wheel of the seed drill and turn it clockwise as many times as indicated below.

TYPE MACHINE	TYRE 340/55-16
SM 400/25	26,5 turns
SM 450/29	23,5 turns
SM 500/31	21 turns
SM 600/37	17,6 turns
SM 700/43	15,1 turns



WHEN YOU END THE TEST, CLOSE THE COVER OF VENTURI INJECTOR, MOVE HANDLE IN POSITION "OK" AND LOCK IT.

6.4 COMPLEMENTARY DOSING TESTS

1- Test to determine the number of wheel turns.

If differences exist between the test and the actual dose distribution (due to a very uneven or light soil, low pressurised tyres, etc.), an experimental test can be performed.

First of all, the distance (in metres) as shown in the table below should be marked on the field's ground using a tape measure:

WORKING WIDTH	METRES TO COVER
SM 400	62,5
SM 450	55,6
SM 500	50,0
SM 600	41,7
SM 700	35,7

Next, the seed drill in working position should cover that distance.

By means of a mark made previously on the tyre, count the number of turns performed in the covered distance. A good place whereby which to count could be the wheel's mud scraper.

By following these steps we can obtain the actual number of turns performed in the seed dosing test. By performing the test, we will know the actual kilograms per hectare distributed by the machine.

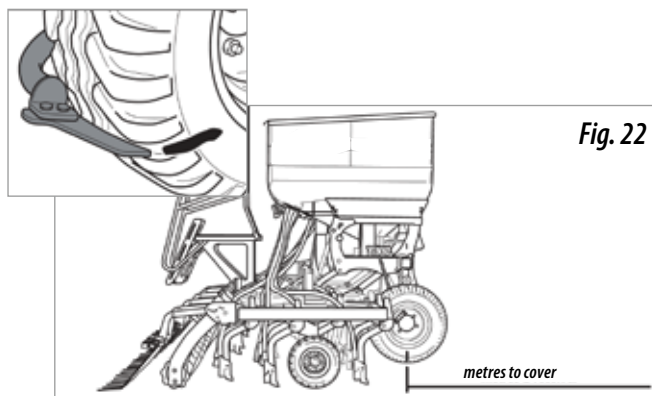


Fig. 22

2- Seed dosing adjustments.

When using high quality certified seeds it is not enough to know the weight in kilograms distributed by the machine, as the final result of the harvest will depend on the number of plants which eventually ripen.

Every plant requires a certain amount of land from which nutrients will be absorbed. Therefore, both a low or an excessive plant density can be detrimental. To determine how many kilograms per hectare are to be sown, you should know the number of plants per square metre that are going to be planted. As a guidance, the recommended number of plants per square metre when sowing wheat or barley in un-irrigated land can be found in following table :

AUTUMN	SPRING
Premature sowing, 200 plants per m ²	Premature sowing, 310 plants per m ²
Late sowing: 265 plants per m ²	Late sowing: 445 plants per m ²

Please note that in spring there is less tillering so more seeds should be sown.



LAMUSA AGROINDUSTRIAL, S.L. RECOMMENDS THAT THE FARMER SEEKS PROFESSIONAL ADVICE ABOUT THIS SUBJECT FROM A TECHNICAL SOWING CENTRE



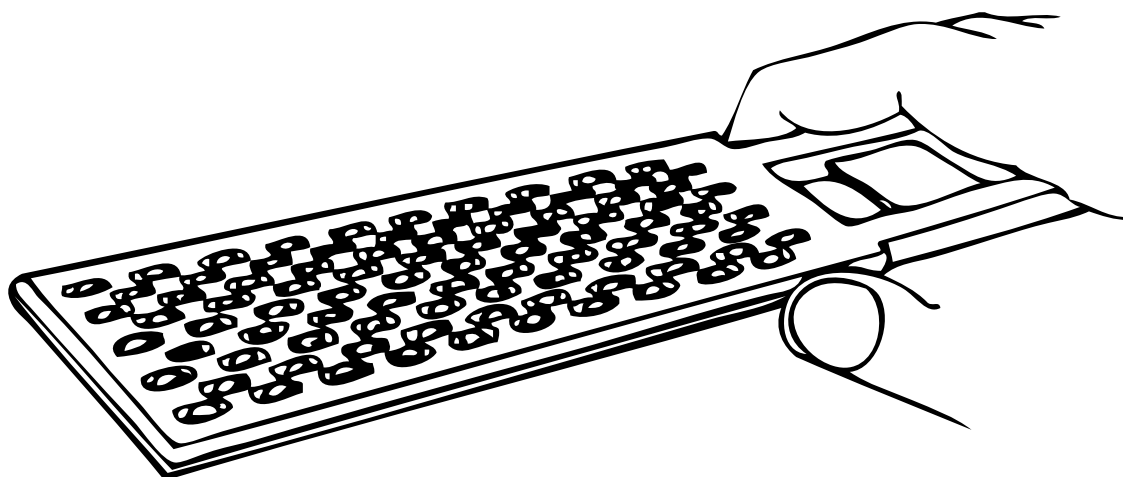
SEED DOSING SHOULD BE ADJUSTED TO EACH TERRAIN, DEPENDING ON THE: TEXTURE, FERTILIZING LEVEL, PLUVIOMETER RESULTS AND SOWING SEASON, GRAIN QUALITY, GERMINATING AND TILLERING POWER, ETC

It should be taken into account that a seed's germinating power is variable and dependant on multiple factors. It can be experimentally calculated to be between 70% and 80%, which is practically equivalent to multiplying the number of grains to be sown by 1,43 or 1,25 respectively.

Next, we describe a practical method to determine the number of kilos per hectare to be distributed once we know how many plants per square metre we want to obtain.

1- Place seeds on the "seed counter" (fig. 23)

Wipe seed counter with your hand to make sure that there is only one grain per slot (100 grains in total). Do the same 10 more times to obtain 1000 grains



2- Weigh 1000 grains with the precision scales. We call the result the OPERATIVE WEIGHT

3- Once we know how many seeds per square metre we are going to sow, we should adjust the following kilograms per hectare in the dosing control:

$$\text{Kilograms per hectare} = (\text{grains per m}^2 \times \text{OPERATIVE WEIGHT}) / 100$$

7. ADJUSTING SEED PLANTING DEPTH



SEED DRILL SHOULD ALWAYS WORK HORIZONTALLY, WITH BOTH THE REAR AND FRONTAL TINE COULTERS EQUALLY PENETRATING THE LAND.



VERY IMPORTANT: THE TRACTOR'S CONTROLLER THAT MOVES THE FOLDING PARTS' CYLINDER MUST BE IN FLOTATION MODE, TO BETTER ADAPT TO THE GROUND.

7.1 ADJUSTING RATCHETS AND SPINDLES

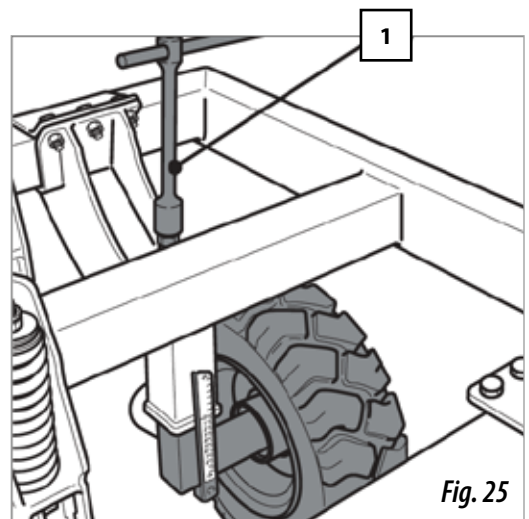
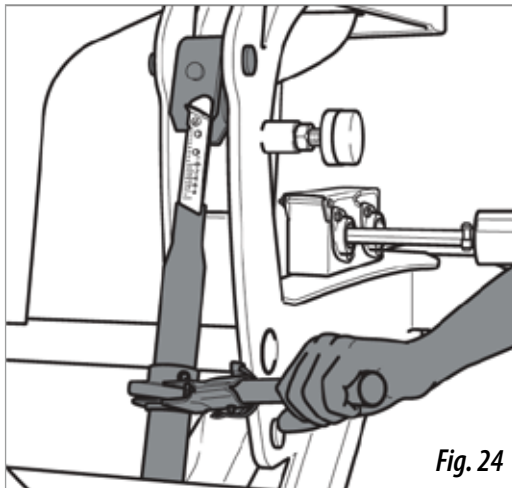
There are two ratchets in the machine's central body and two spindles in the side wheels. All of them have an adjusting scale to indicate their position. Their adjustment positions in the respective scales should be the same.

After adjustments, the control lever of the ratchet should be pulled back towards the inner part of the machine.



WHEN SOWING ON TILLED OR NON-COMPACT GROUND, TAKE THE PRECAUTION OF SELECTING ONE OR TWO POINTS LOWER IN THE ADJUSTING SCALE ON THE SIDE WHEELS IN ORDER TO AVOID SINKING INTO THE GROUND.

To adjust the side wheels, use the crank provided (1, fig. 25).



7.2 HEIGHT-ADJUSTABLE TINE COULTERS

Tine coulters which are aligned with both the tractor's wheels and the seed drill, have an adjustable height by means of a slide with holes which allows them to be lowered up to 7 cm. This allows to compensate the track mark effect and to achieve a more uniform seed planting depth. Pressure performed by the tine coulters can be adjusted by using the nut on top of the spring (fig. 27/1)

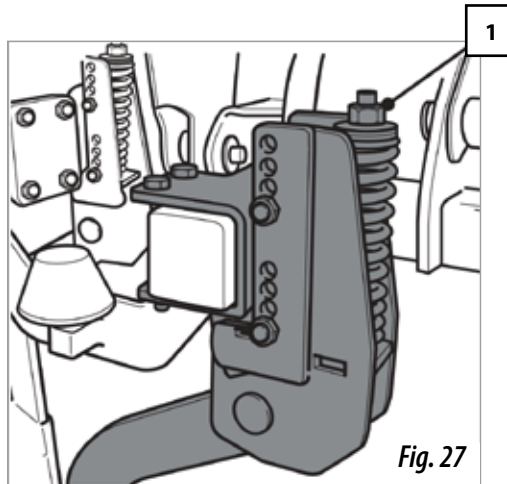


Fig. 27



EXCESSIVE LOOSENING OF THE NUT COULD CAUSE THE SPRING TO JUMP OUT DANGEROUSLY DUE TO PRELOADING.

7.3 INCLINATION OF THE FOLDING PARTS

At the connection point between the folding parts and the central chassis, there are adjustable stops (two each side) which allow the folding parts' inclination angle to change. During normal sowing conditions, the folding parts should be slightly lower than usual to adapt to terrain irregularities.

In very tilled or loose land, as well as in soils with high humidity, the folding parts should be levelled to stay horizontal.

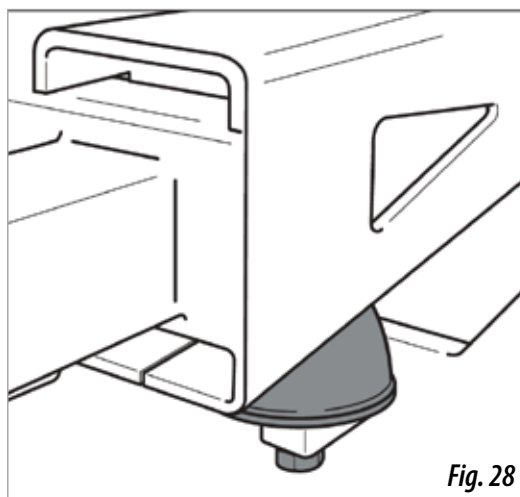
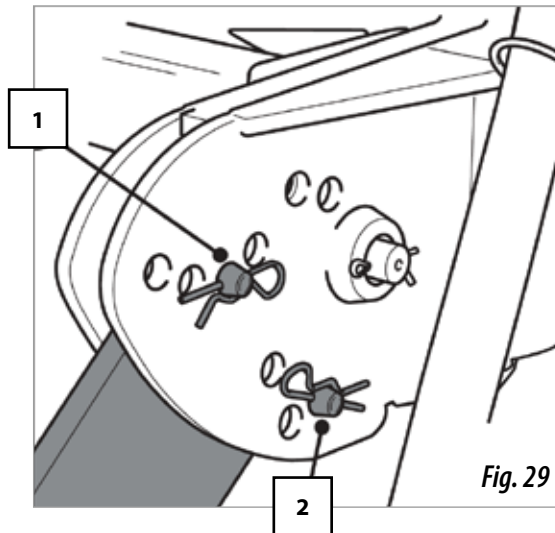


Fig. 28

7.4 ADJUSTING THE ROLLER

The arms that support each roller have two bolts to perform the following adjustments:

- a. By using the upper bolt (n°1, fig. 29), the depth of the tine coulters equipment can be adjusted and therefore the pressure on the ground can be controlled.
- b. By using the lower bolt (n°2, fig 29), the roller's penetration into the ground can be controlled and the roller can also be secured ready for transit..



WHEN USING PNEUMATIC MACHINES, THE AIR PRESSURE ALONG WITH ABSENCE OF STOPS IN THE TINE COULTERS' SOWING SHOES WILL CAUSE A GREATER PLANTING DEPTH THAN ACHIEVED USING CONVENTIONAL MACHINES. AFTER SOME MINUTES WORKING, CHECK THAT THE PLANTING DEPTH IS ADEQUATE.



VERY IMPORTANT: NOT TO FIX THE ROLLER, THIS ONE MUST WORK WIDELY BETWEEN THE SCREWS (1 Y 2, FIG. 29)..

8. TYPES OF DISTRIBUTION

8.1 SEED DISTRIBUTION BY MECHANICAL FAN

To ensure that seeds are supplied to the tine coulters' sowing shoes, it is essential that the fan speed is between 4200 and 4500 rpm. For this purpose, the PTO shaft must be plugged into the 1000 rpm vent. If the turning speed is lower then some seeds are likely to remain in the seed hoses.

Before the wheel controlling the distributor's transmission starts turning, please ensure that the fan's turning speed is between 4200 and 4500 rpm. When raising the machine, never decrease the fan's turning speed until the wheel is detached from the ground.

Please note that if you work with the machine while the fan is off, seeds will block the collecting pipe of the venturi injector sluice. In case this happens, the collector should be taken out and emptied before using the seed drill again.



IF THE FAN'S TURNING SPEED IS ABOVE OR BELOW 4200 AND 4500 RPM, THEN TURNING THE WHEEL THAT CONTROLS THE DISTRIBUTOR'S TRANSMISSION CAN CAUSE A BLOCKAGE INSIDE THE SEED HOSES.

8.2 SEED DISTRIBUTION BY HYDRAULIC FAN

MACHINE TYPE	HYDRAULIC MOTOR		OIL SUPPLY		
	Absorbing capacity (cm ³)	Speed (rpm)	Minimum output pressure (bars)	Maximum return pressure (bars)	Oilflow (L/min)
400/450	8	4.200	130	1,5	36
500/600/700	8	4.500	160	1,5	40

CONNECTIONS

Connect the fan's small hydraulic hose line to a pressurised tractor control unit. The fan's 1/2" hydraulic hose line should be connected to a depressurised return tractor control unit.



IN THE RETURN LINE THE PRESSURE MUST BE A MAXIMUM OF 1,5 BAR. A HIGHER PRESSURE CAN CAUSE DAMAGE TO THE TRACTOR'S MOTOR.

ADJUSTMENT

The fan's rpm is adjusted by regulating the tractor control unit. The fan's turning speed must be adjusted to 4200 rpm or to 4500 rpm as shown in table above.



IF OIL IS OVERHEATED DUE TO AN EXCESSIVE FLOW OR DUE TO LOW OIL SUPPLY, THEN AN ADDITIONAL OIL TANK WILL BE REQUIRED.



IF THE FLOW OF THE TRACTOR'S HYDRAULIC PUMP IS NOT HIGH ENOUGH IT WILL NOT BE ABLE TO POWER THE FAN'S MOTOR OR ACTIVATE THE OTHER ELEMENTS REQUIRED. IN THIS CASE AUXILIARY EQUIPMENT CONSISTING OF A HYDRAULIC PUMP FITTED ON THE TRACTOR'S UNIVERSAL JOINT SHAFT THAT DRIVES THE FAN'S HYDRAULIC MOTOR AS WELL AS A REFRIGERATED OIL TANK WILL BE REQUIRED.

9. OPTIONAL EQUIPMENT

9.1 HARROW

Some adjustments can be performed on the harrow so that it can adapt to all types of ground :

- 1- Height adjustment, by operating the lower nut (fig 30/1)
- 2- Pressure adjustment, by using the spindle's upper nut (fig 30/2)
- 3- Tines's inclination, by operating the slide (fig 30/7) which holds the tines' chassis

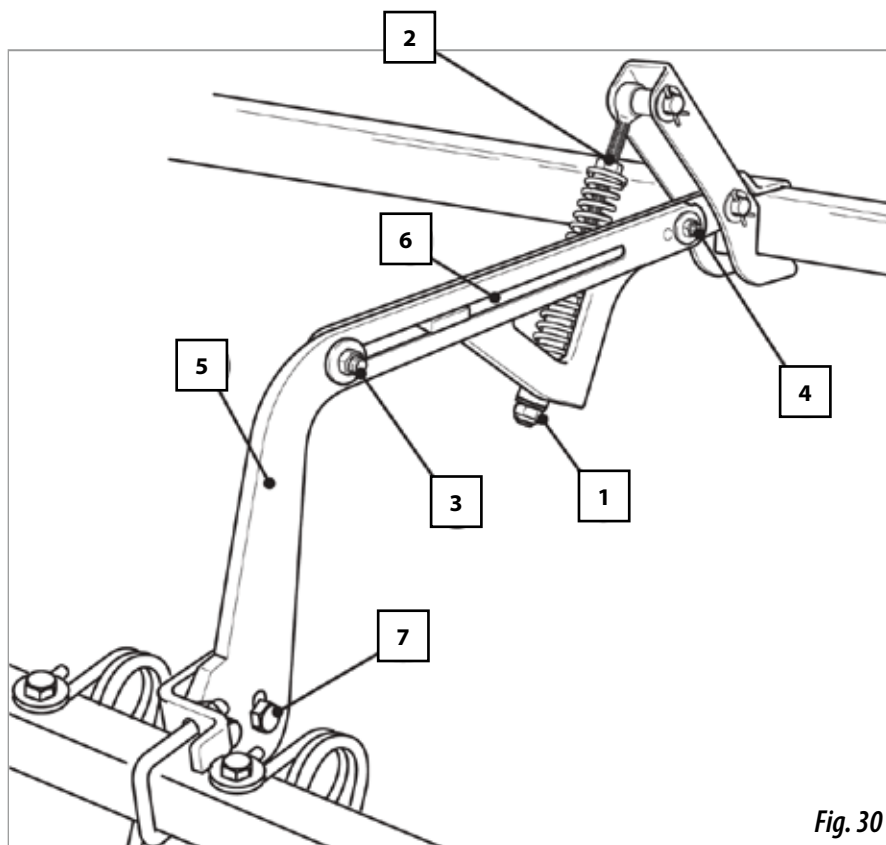


Fig. 30

If you raise the roller so that it becomes inactive, the harrow must be recoiled by following these instructions :

- Loosen the nut (fig. 30/3)
- Take out both the screw and the nut (fig. 30/4)
- Pull back the bar (fig. 30/5) and place both the screw and the nut in the hole that is in the middle of the bar (fig. 30/6).

9.2 HYDRAULIC TRACK MARKERS

Track markers should be assembled in the sides of the folding parts. They are hydraulic and should be connected to tractor control unit. It is essential to fold the track markers before folding the machine for transit.

Track discs can be orientated to achieve the correct penetration angle and their supporters are extensible in order to be correctly adjusted.



PLEASE NOTE: PERFORM THE CALCULATION USING MEASUREMENTS IN CENTIMETRES.



IT IS NOT RECOMMENDED TO INCLINE THE TRACK DISCS TOO MUCH THUS PREVENTING SERIOUS DAMAGE TO THE MACHINE.



HIGH PRESSURE OIL MAY ESCAPE, PASS THROUGH THE SKIN AND INGRESS INTO THE BODY, CAUSING SERIOUS INJURIES. KEEP HYDRAULIC HOSE LINES IN GOOD CONDITION.



NEVER STAND UNDER THE TRACK DISCS OR WITHIN THEIR OPERATIONAL AREA.

9.2.1 Adjusting track marker's LENGTH

To calculate the horizontal spacing between track discs and the last lateral tine coulters, use following formula:

$$B = \frac{A \times (\text{number of tine coulters} + 1) - C}{2}$$

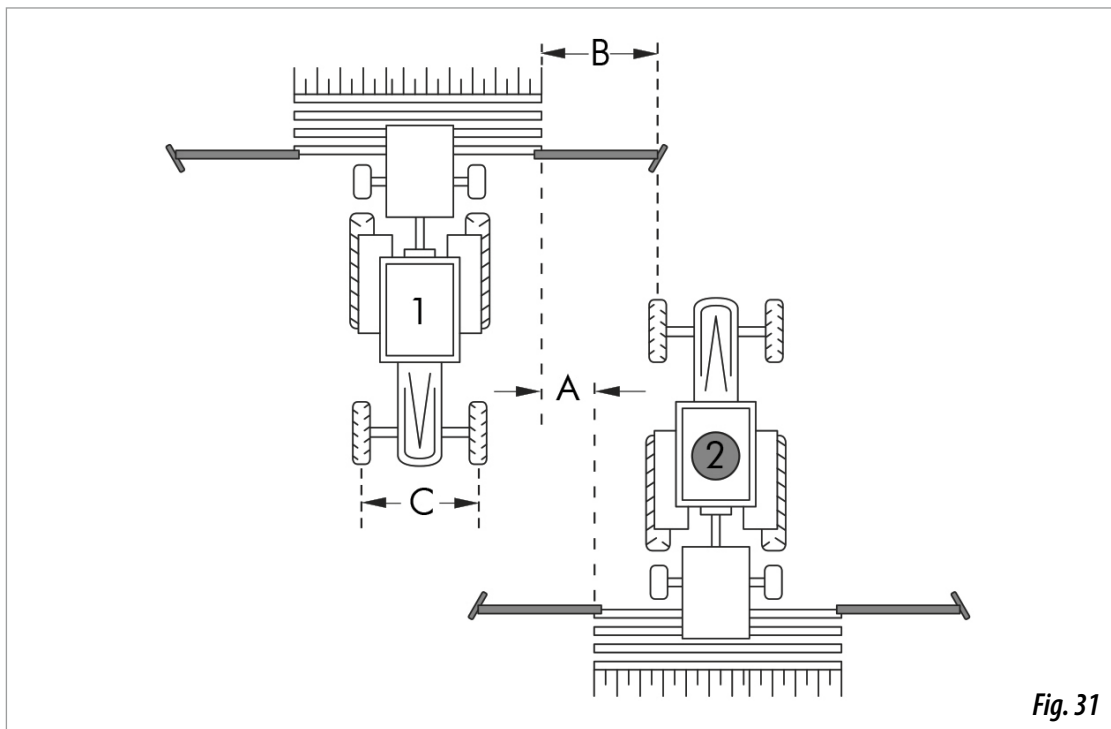
A= distance between tine coulters

B= horizontal distance between track disc and the the last lateral tine coulters.

C= track width of the tractor.



PERFORM THE CALCULATION USING MEASUREMENTS IN CENTIMETRES.



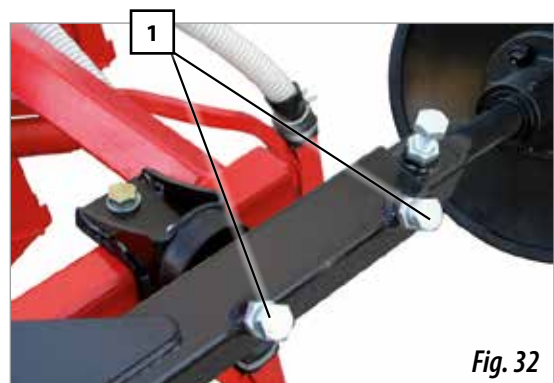
To adjust the distance of the track disc, proceed as following:

- 1- Loosen the 2 nuts (1, fig. 33).
- 2- Place track disc at the distance B previously calculated.



B= DISTANCE BETWEEN THE TRACK DISC AND THE LAST LATERAL TINE COULTER.

- 3- Tight the 2 nuts (1, fig. 33) after finishing these operations.



10. ELECTRONICAL CONTROLLER

10.1 FRONT PANEL DESCRIPTION

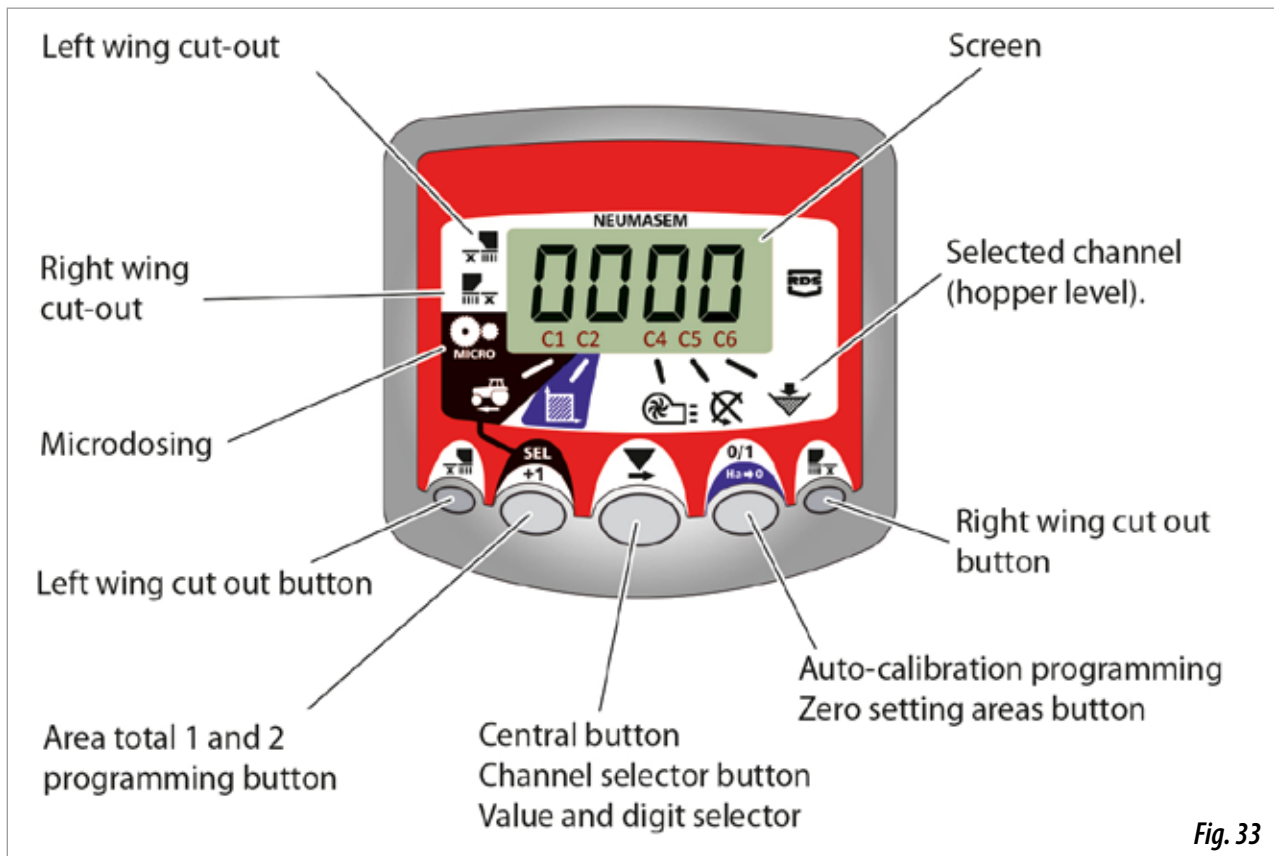


Fig. 33

The monitor provided comes programmed especially for your model of seed drill. The user will only need to observe the displayed values and no extra programming is required.

The monitor shows 6 different channels or readings, as well as 3 different arrows showing the states.

- C1** shows forward speed in m/sec.
- C2** shows two different hectares (for example on partial and one total hectare).
- C3** not in use.
- C4** shows the fan's rpm.
- C5** shows the turning speed of the distributor's axle's in rpm.
- C6** shows if the hopper's seed level is too low.

By default the forward movement speed is displayed on the monitor. When some abnormal readings are shown, the screen will display "Alarm" intermitently, the alarm will sound and the corresponding malfunction channel will be activated. The alarm will not stop until the malfunction is fixed.

To display a desired reading, press the central button and scroll to the required channel. After 10 seconds, the reading will change back to C1 again.

10.2 FORWARD SPEED – C1



Select a channel by using the central button. The alarm is activated when the speed is under 2.6 km/h and can be turned off using programming mode 2.

Calibrating the speed sensor

Theoretical calibration is achieved by entering a calibration factor in programming mode 2, as indicated in the following table.

MODEL	4M	4.5M	5M	6M	7M
CALIBRATION FACTOR	1,818	1,574	1,449	1,258	1,111




Selecting speed channel (C1)

- 1- Press  to switch to mode 1. While holding the button, press the central button  to modify the digit.
- 2- Hold the central button for some seconds to modify the flickering digit.
- 3- When the buttons are released, the monitor will return to its normal state.



PLEASE NOTE: THE IMPULSE NUMBER AUTO-CALIBRATION MODE IS MORE ACCURATE AND A FIELD TEST PERFORMANCE IS REQUIRED.


Auto-calibrating the speed sensor

- 1- Mark 100 metres.
- 2- Select channel 1 (speed).
- 3- Press  and hold it while pressing . The screen will display "Auto". Release it.
- 4- Cover the 100 marked metres. The monitor will count the sensor's impulses.
- 5- After finishing, press  again. By doing this, the monitor retains the impulse number in the memory.



10.3 TOTAL AREA / SEED DRILL WIDTH – C2

Two independent total areas can be marked.


Displaying the total area

- 1- Select channel 2.
- 2- Press  to display total areas 1 and 2 on the screen. First, "tot. 1" will be displayed and immediately afterwards the value in Ha will be shown.


Setting to zero the total areas


- 1- Select channel 2.
- 2- Press  to display.
- 3- Press and hold  for more than 5 seconds..

Programming the working width

- 1- Select channel 2 of the area.
- 2- Press and hold  for more than 5 seconds until the width value is displayed and, without releasing it, press the central button to modify the flickering digit.
- 3- Press and hold the flickering digit for more than 5 seconds to modify its value.
- 4- Release all buttons to return to the normal state.

Working in micro mode

When working with the distributor in the micro-dosing mode (for small hoppers and minimal doses), press and hold  button for more than 3 seconds until the arrow indicating the micro mode is displayed. In this situation, the monitor will keep the speed and actual real working area.

Press and hold  for more than 5 seconds until the indicating arrow disappears to resume normal position.

10.4 FRONT PANEL WITH MARKER PATHS (OPTIONAL)

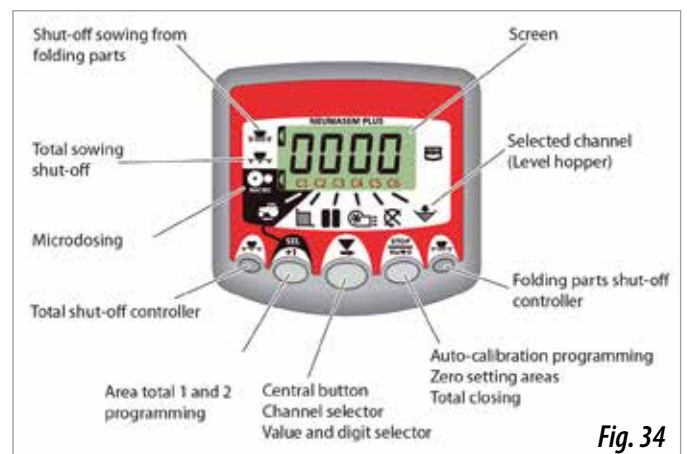


Fig. 34

The monitor provided comes programmed especially for your model of seed drill. The user will only need to observe the displayed values and no extra programming is required.

The monitor shows 6 different channels or readings, as well as 3 different arrows showing the states.

- C1** shows forward speed in m/sec.
- C2** shows two different hectares (for example on partial and one total hectare).
- C3** tramlining.
- C4** shows the fan's rpm.
- C5** shows the turning speed of the distributor's axle's in rpm.
- C6** shows if the hopper's seed level is too low.


10.4.1 TRAMLINING - C3

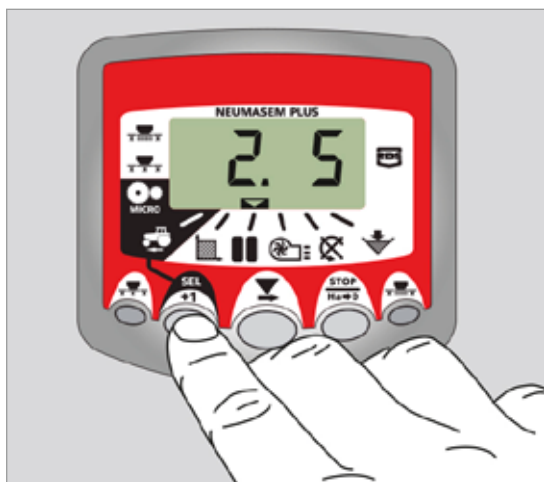
The display defaults to the  channels after 10 seconds (unless the Area Total was selected).

There are five systems of tramlining - symmetric, asymmetric left, asymmetric right, 10 bout and 18 bout. The tramline bout is programmable from 1 to 15 in symmetric, asymmetric left and asymmetric right sequences.


Selection of asymmetric tramlining is denoted by a decimal point on the display between the current bout number on the left and the tramline bout number on the right. Left or right asymmetric tramlining is selected in the programming mode.

Manually advance the bout number


Press  to advance the current bout number by 1.



Hold the bout number

Press  to "hold" the current bout when the drill goes out of work.

The display will flash 'STOP'.

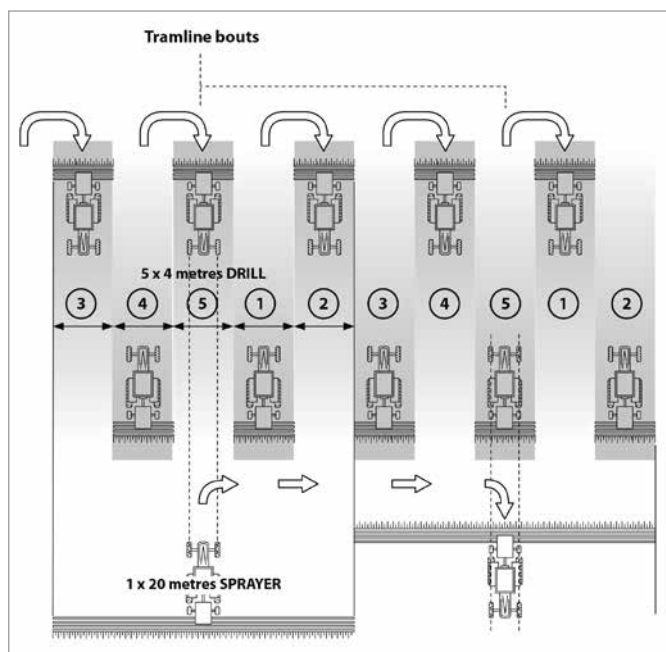
Press  againsts to resume the normal bout sequence.



Symmetric Tramlining Sequence

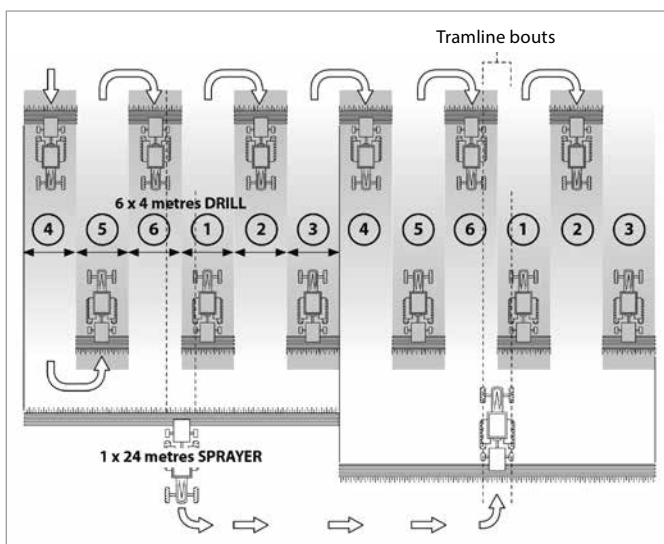
2+2 seed spouts are closed during the tramline bout only.

The instrument will beep once the beginning of the tramline bout, and the display will continue flashing for the duration of the bout.



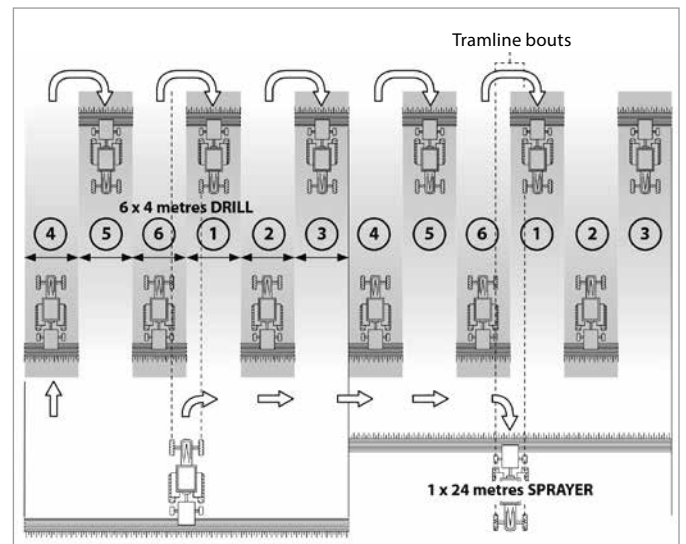
Asymmetric Left Tramlining Sequence

Two seed spouts are closed on the left hand side of the drill on the tramline bouts. The instrument will beep once the beginning of each tramline bout, and the display will continue flashing for the duration of the bout.



Asymmetric Right Tramlining Sequence

Two seed spouts are closed on the right hand side of the drill on the tramline bouts. The instrument will beep once the beginning of each tramline bout, and the display will continue flashing for the duration of the bout.

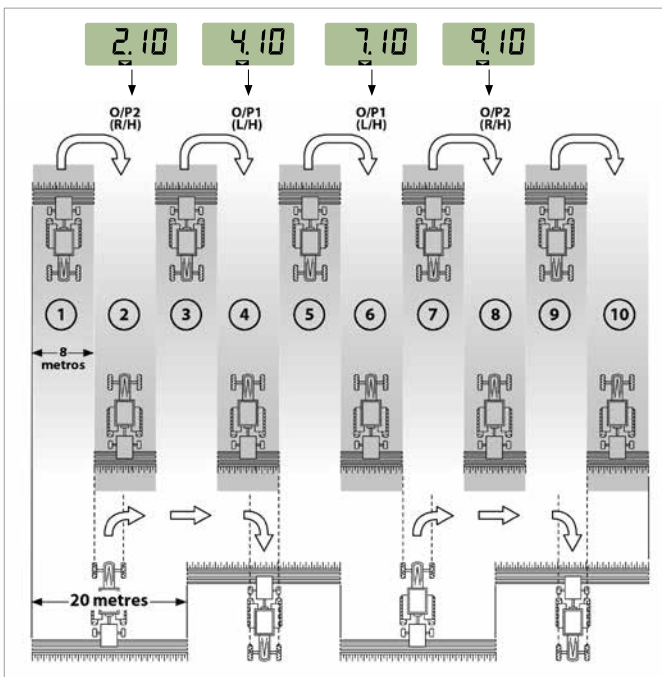


10 Bout Tramlining Sequence

For use with 4 metre drill/10 metre sprayer, or 8 metre drill/20 metre sprayer combinations. (2 x 2 left hand seed spouts are closed on bouts 4 and 7, and 2 x 2 right hand seed spouts closed on bouts 2 and 9). Starting on bout 1 requires turning RIGHT at the end of the first bout.



NOTE: TO TURN LEFT AT THE END OF THE FIRST BOUT, ADVANCE THE BOUT NUMBER TO 6 BEFORE COMMENCING DRILLING.



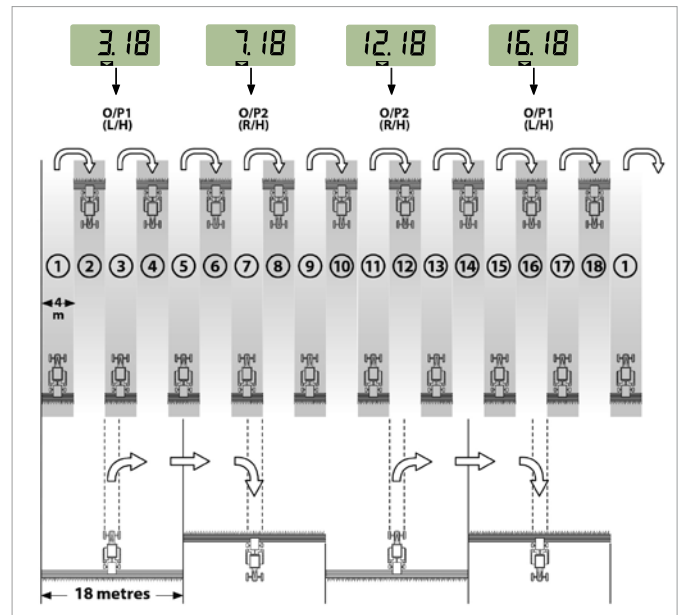
18 Bout Tramlining Sequence

For use with 4 metre drill and an 18 metre sprayer. (2 x 2 left hand seed spouts are closed on bouts 3 and 16, and 2 x 2 right hand seed spouts closed on bouts 7 and 12). Starting on bout 1 requires turning RIGHT at the end of the first bout.



NOTE: TO TURN LEFT AT THE END OF THE FIRST BOUT, ADVANCE THE BOUT NUMBER TO 10 BEFORE COMMENCING DRILLING.

The instrument will beep once the beginning of each tramline bout and the display will flash for the duration of the tramline bout.



Selecting the Tramline Sequence

1- Select the channel.

2- Hold to enter programme mode 1.

After 5 seconds the first two digits flash, indicating the tramline sequence currently set:

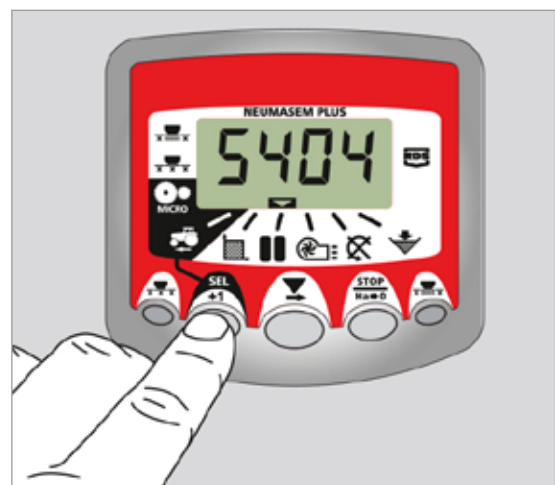
'SY' = Symmetric

'AL' = Asymmetric Left


'Ar' = Asymmetric Right

'AS' = Special Asymmetric sequence e.g. 10 bout and 18 bout.

3- Continue holding the button and press and HOLD the button to select the required sequence.



Setting the Tramline Bout

- 1- PRESS and RELEASE the  button to toggle between the tramline sequence and tramline bout number display.


The 3rd and 4th digits flash indicating the tramline bout number currently set.

- 2- PRESS and RELEASE the  button to cycle the tramline bout from 1 to 15.



10.5 FAN RPM / FAN ALARMS – C4



To display the fan's speed in rpm

Select channel 4 using the central button  .

Fan alarms






The fan's minimum turning speed can be programmed. Under 2 Km/h these alarms will deactivate.

Fan's minimum speed


- 1- Select channel 4.
- 2- Press and hold  button for more than 5 seconds.
- 3- Hold it and press the  to change value and digits as explained in former cases. Default speed is 3800 rpm.
- 4- Release all buttons to resume the normal position.

Selecting the fan's number of impulses per revolution (default value is set to 2).

PLEASE NOTE: FAN'S NUMBER OF IMPULSES PER REVOLUTION SHOULD ALWAYS BE 2. ONLY USE THIS PROGRAMMING MODE IN CASE OF MALFUNCTION.


- 1- TO SELECT PROGRAMMING MODE 2, PRESS  (MONITOR NEUMASEM) OR  (MONITOR NEUMASEM PLUS) BUTTON WHILE SWITCHING ON THE SCREEN USING REAR SWITCH.
- 2- PRESS  (MONITOR NEUMASEM) OR  (MONITOR NEUMASEM PLUS) TO CHANGE THE CHANNEL AND SELECT CHANNEL 4 (FAN).
- 3- PRESS AND HOLD THE  TO MODIFY THE FLICKERING DIGIT (IT SHOULD ALWAYS BE 2).
- 4- RELEASE THE BUTTON TO CHANGE BACK TO NORMAL POSITION.

10.6 SEED SHAFT RPM – C5

Select channel 5 using the central button  .

40 seconds after the seed shaft stops turning, an alarm beeps 5 times consecutively. If it remains still, this alarm will repeat every 30 seconds.



To turn off the beeping, switch off the screen and switch it on again. This alarm will deactivate under 2 Km/h.

The seed shaft's alarm can be deactivated by pressing the button  for more than 5 seconds on the selected channel. The screen will display "Off". In this situation the alarm will not be activated even if the screen is switched off and on again.

10.7 HOPPER LOW LEVEL ALARM – C6


When the seed level is below the sensor, an alarm is activated and beeps 5 times consecutively. In this case the screen will display «ALA».


Activate and deactivate hopper level alarm

- 1- Select channel 6 using the central button  .
- 2- Press and hold  button and...
- 3- Press the central button to select "0" (alarm is off) or "1" (alarm is on).
- 4- Release the buttons to change back to the normal position.

10.8 TOTAL SOWING SHUT-OFF (OPTIONAL)



NEUMASEM electronic controller

Press  to **lock** the seed's exit. The screen will display the flickering text «**CORT**».

Press  again to **unlock** the seed's exit and return to a normal working position. The screen will display the flickering text «**OPEN**».





NEUMASEM PLUS electronic controller

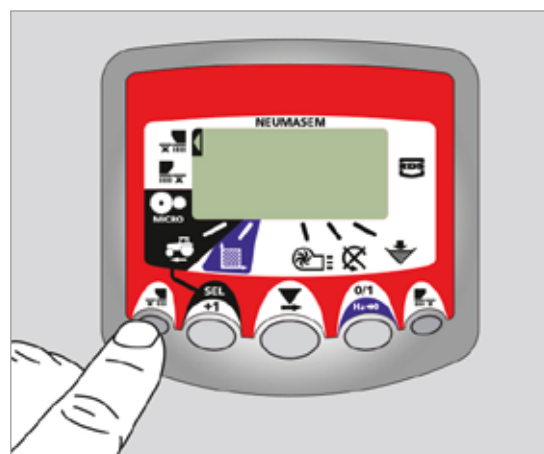
Press  to **lock** the seed's exit. The screen will display the indicating arrow and the text «**CORT**» will be displayed every 2 seconds «**CORT**». Press  again to **unlock** the seed's exit and return to a normal working position. The screen will display the flickering text «**OPEN**».

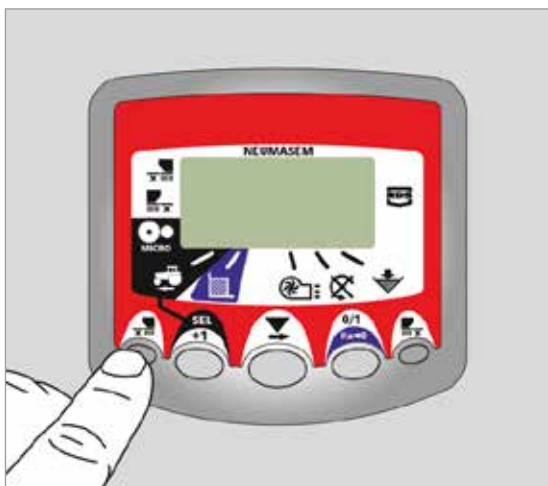


10.9 SHUT-OFF SOWING FROM FOLDING PARTS (OPTIONAL)

NEUMASEM electronic controller

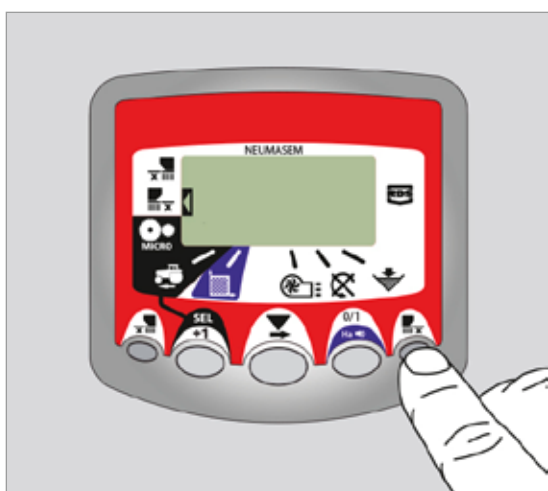
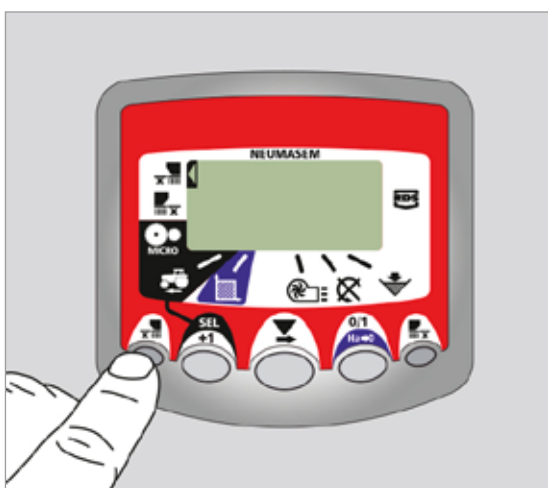
Press  to **lock** the seed's exit from the arms on the folding parts (exits on the left and right sides of the folding parts will lock). The screen will display the indicating arrow. Press  again to **unlock** the seed's exit and change back to normal position.



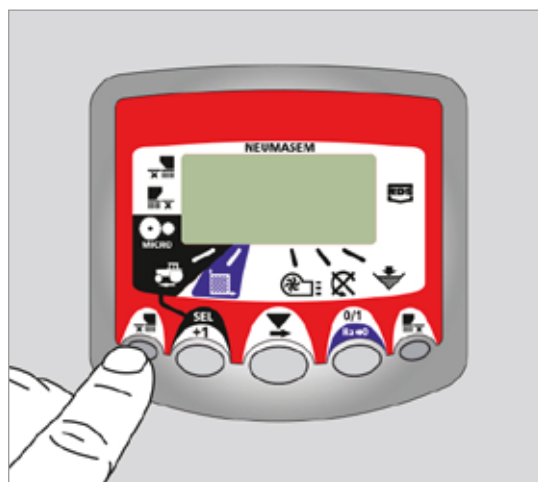


NEUMASEM electrical controller for independent folding parts

To **lock** the seed's exit from the arms on the folding parts, press (to **lock** the left side in the driving direction) or (to **lock** the right side in the driving direction). The screen will display the indicating arrow.



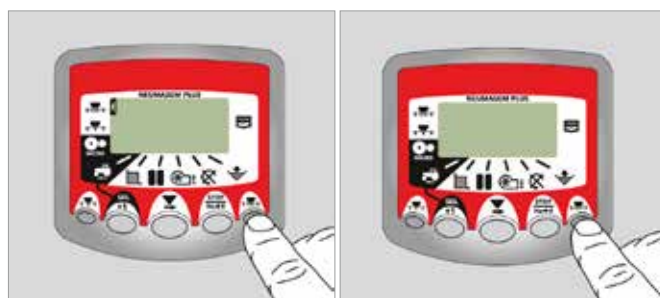
Press or again to **unlock** the seed's exit and change back to normal position.



NEUMASEM PLUS electrical controller

Press to **lock** the seed's exit from the arms on the folding parts. The screen will display an arrow indicating the selected mode.

Press again to **unlock** the seed's exit and change back to normal position.



11. MAINTENANCE

11.1 LUBRICATION

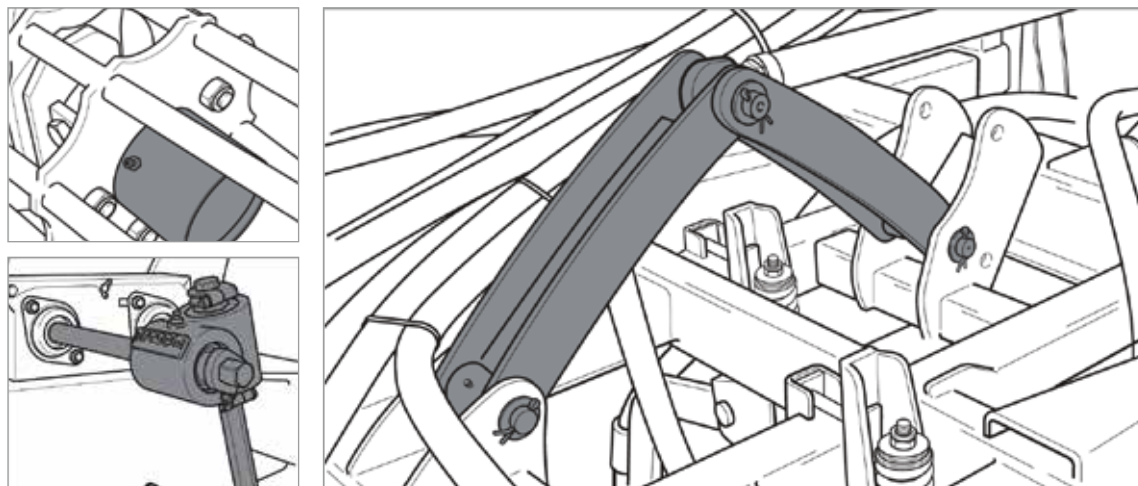
The following parts should be lubricated with solid calcium grease :

All the joints of the cardan shaft should be greased daily.

The joints of the folding parts should be greased every 100 Ha.

Both the wheel's and transmission's bushings should be greased every 400 Ha.

After finishing a sowing season, chains should be cleaned and greased with special chain grease.



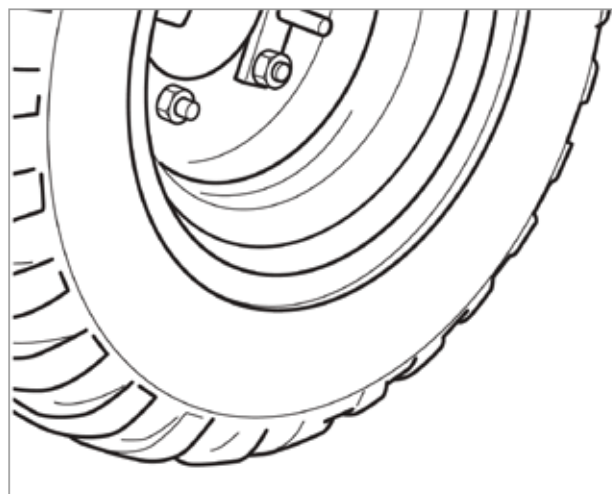
11.2 TYRES PRESSURE

Tyres 340/55-16 ----- 3,75 kg/cm²

Side wheels 18x7"-8" 14 PR -- 3,75 kg/cm²

Indicated pressures are provided by the manufacturer, at maximum load.

In general use and especially when working on irregularly tilled terrains, it is recommended to use a slightly lower pressure to absorb the ground's irregularities and get a higher regularity in sowing.



11.3 SCREWS

All the screws used in the seed drill SM1909 are size 8.8

After working for some hours, all screws should be checked and tightened.

11.4 DISTRIBUTOR HEAD AND SEED HOSES

Before starting work, check that the distributor head and the seed hoses are not blocked. Before performing this check, make sure that the fan is on and the hopper is full. Now use the crank provided to turn the wheel controlling the distributor's transmission a few times and check that the seeds are coming out from every tine coultter. In case of a failure, stop the machine so that the fan is off and take apart the distributor head's cap to check that there are no foreign bodies inside

12. DOSAGE TABLE



INDICATED QUANTITIES SHOWN IN THE FOLLOWING TABLE SHOULD BE CONSIDERED FOR GUIDANCE ONLY, FORESEEN FLOWS CAN VARY DEPENDING ON THE ACCIDENTAL PRESENCE OF DISINFECTING PRODUCTS, UNEVEN SEED SIZE, DENSITY, HUMIDITY, ETC.



FOR PRECISION SOWING, FOLLOW DOSING PROCESS DESCRIBED IN SECTION 6 OF THIS MANUAL.

	WHEAT	RYE	BARLEY	OATS	BEANS	PEAS	LUPIN	CAROB	CORN	CORN		RAPE	FIELD CLOVER	GRASS	TURNIPS				
Spec. weight (kg/l)	0,77	0,74	0,68	0,5	0,85	0,81	0,76	0,83	0,79	0,36	Spec. weight (kg/l)	0,65	0,77	0,39	0,7				
Adj. dosing scale value	Regular seeds kg/ha (Bolt in position N)										Adj. dosing scale value	Fine seeds kg/ha (Bolt in position F)							
10	31	31	29,8	22	21	19,8	26	29,8	7,44	-	2,5	1,98	0,99	2,11	1,07	-	-	2,36	1,12
15	47,1	45,9	44,6	32	38,4	37,2	42,2	47,1	22,3	17,4	5	4,22	2,11	4,84	2,36	-	-	4,22	2,23
20	64,5	62	59,5	43	57	54,6	57	64,5	43,4	23,6	7,5	6,32	3,1	7,94	3,97	2,6	1,3	6,94	3,43
25	79,5	76,9	73,2	53	73,2	71,9	73,2	83,1	64,5	31	10	8,43	4,22	11,2	5,58	4,84	2,36	9,3	4,65
30	96,7	93	88	66	90,5	90,5	89,3	100	85,6	38,4	12,5	10,5	5,33	14,3	7,07	6,7	3,35	11,7	5,83
35	114	109	103	76	108	109	105	118	107	45,9	15	12,8	6,32	16,7	8,43	8,56	4,28	13,9	6,94
40	130	124	118	87	125	126	120	135	128	-	17,5	14,8	7,32	19,7	9,8	10,4	5,21	16,2	8,13
45	146	140	133	98	143	144	136	154	145	-	20	16,9	8,43	22,3	11,2	12,3	6,08	18,6	9,3
50	161	156	148	109	160	161	153	171	162	-	22,5	19,1	9,55	24,7	12,3	13,9	6,94	20	9,99
55	179	171	161	120	177	180	169	188	180	-	25	21,2	10,5	25,5	12,8	15,1	7,56	21,4	10,7
60	195	186	177	131	195	198	184	206	197	-		N	F	N	F	N	F	N	F
65	212	202	191	143	212	216	201	224	215	-	N= regular speed F= microdosing								
70	229	218	206	154	229	233	217	242	232	-	PREVIOUS FLOW TEST								
75	246	234	221	165	247	250	233	259	348	-	Seed drill		Turns						
80	262	250	234	176	263	268	249	277	265	-	400	26,5							
85	277	267	249	186	280	288	265	294	283	-	450	23,5							
90	294	280	264	197	298	305	280	312	300	-	500	21							
95	311	296	279	208	314	322	298	330	317	-	600	17,6							
100	327	312	294	219	331	340	312	347	335	-	700	15,1							
105	343	329	309	231	347	358	329	366	353	-	Number of turns performed to the small wheel to simulate the sowing of 250m ² . Flow in kg/ha is obtained by multiplying collected weight by 40.								
110	360	345	324	242	366	376	345	383	370	-									

TABLE FOR **SM 1909/L** WITH FLOTATION WHEELS **340-50.16**

If you want to sow small quantities (seeding roller <= 25mm), you can obtain a most uniform sowing through the micro-dosage, even in normal sowing (cereal and thick seeds)



LAMUSA AGROINDUSTRIAL, S.L.

Ctra. de Igualada, s/n. 08280 **CALAF** (Barcelona) España
Tel. (0034) 93 868 00 60 - Fax (0034) 93 868 00 55

