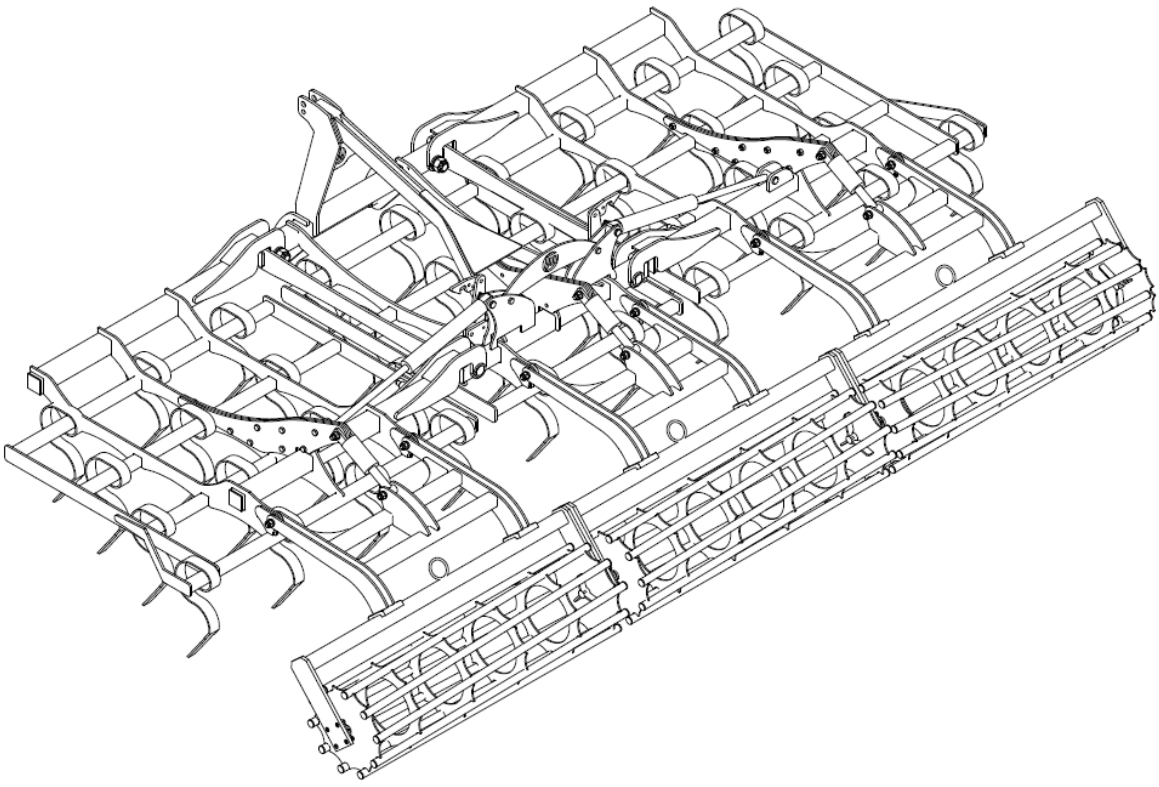
MANDAM Sp. z o.o.
ul. Toruńska 14, 44-100 Gliwice, Poland
e-mail: mandam@mandam.com.pl
Tel.: 032 232 26 60 Fax: 032 232 58 85
TIN: 648 000 16 74 REGON (Registration no.): P – 008173131

OPERATION MANUAL

CULTIVATOR SUPER



Issue III
Gliwice 2025

TŁUMACZENIE INSTRUKCJI ORYGINALNEJ ENG

DECLARATION OF CONFORMITY

FOR A MACHINE

Pursuant to the Ordinance of the Minister of Economy of 21 October 2008 (Journal of Laws No. 199, item 1228) and the Directive of the European Union 2006/42/EC of 17 May 2006

MANDAM Sp. z o.o.
ul. Toruńska 14
44-100 Gliwice
declares with full responsibility that the machine:

CULTIVATOR SUPER
typ/model: .....
rok produkcji: .....
nr. fabryczny: .....

under this declaration, complies with:

Ordinance of the Ministry of Economy of October 21, 2008 on the essential requirements for machines (Journal of Laws No. 199, item 1228) and the Directive of the European Union 2006/42/EC of 17 May 2006

Persons responsible for the technical documentation of the machine: Jarosław Kudlek, Łukasz Jakus
ul. Toruńska 14, 44-100 Gliwice

The following standards were also used to assess compliance:

PN-EN ISO 13857:2010,
PN-EN ISO 4254-1:2016-02,
PN-EN ISO 12100-1:2005/A1:2012
PN-EN ISO 12100-2:2005/A1:2012
PN-EN 982+A1:2008

This EC Declaration of Conformity loses its validity if the machine is modified or converted without the manufacturer's consent.

Prezes Zarządu
Dyrektor
inż. Bronisław Jakus

V-ce Prezes Zarządu
Dyrektor ds. Techniczno-Organizacyjnych
mgr inż. Józef Seidel

..... *Place and date of issue*

..... *Surname, first name, position and signature of the authorized person*

Contents

1 Introduction

Congratulations on your purchase of the cultivator SUPER. This manual provides information on the hazards that may occur when using the cultivator, technical data and the most important indications and recommendations, the knowledge and application of which are prerequisites for correct operation.

As used in the manual, the terms left, right and rear and front of the unit refer to the orientation of the observer facing the direction of travel. By following the recommendations in the following instructions, you will ensure long-term, trouble-free operation and reduce the cost of exploring the unit. Each of the following chapters discusses the relevant issues in detail. Keep this manual for future use.

If there is incomprehensible information in the instructions, or if the user of the machine has encountered an issue not addressed in the instructions, he/she can obtain comprehensive explanations by writing to the manufacturer's address - in which case the following should be included: the exact address of the purchaser of the machine, the machine symbol, the serial number, the year of manufacture, the year and issue number of the operating instructions.

- Notes that are important for safety reasons are marked with the sign:

With the welfare of our customers in mind, we are constantly improving our products and adapting our offerings to their needs. We therefore reserve the right to make changes to the products without notice.

Machine identification

The identification data of the cultivator SUPER can be found on a rating plate on the drawbar. The rating plate contains basic information about the manufacturer and the machine, as well as the CE mark.

Figure 1 Rating plate

The guarantee for cultivator SUPER is valid for 24 months from the date of sale.

- The warranty card is an integral part of the machine.

- Please always quote the serial number when making enquiries about spare parts.
- Information on spare parts can be found:

www.parts.mandam.com.pl

+48 668 662 289

parts@mandam.com.pl

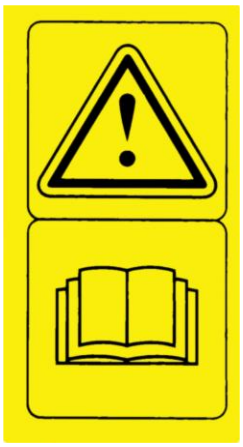
- authorised distributors of machines from Mandam Sp. z o. o.

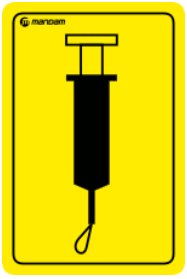
1.1 Information and warning signs

Remember! When using the cultivator, special care should be taken in areas marked with special information and warning signs (yellow stickers).

- The safety signs and inscriptions on the machine are listed below. They should be protected against loss and loss of legibility, if lost and/or illegible they should be replaced with new ones.

Table 1 Information and warning signs

Safety signs	*Meaning of the safety sign*
	Read the operating instructions before use.
	Crushing of the toes or foot.

Safety signs	*Meaning of the safety sign*
	Keep a safe distance form foldable and moving parts of the machine.
	Do not reach into the crushing area if part may move.
	Pressurised liquid jet – bodily harm.
	Fixing point for transport belts.
	Lubrication point

Safety signs	*Meaning of the safety sign*
	Note about riding ban on rollers.
	Opening sequence for machines fitted with hydraulic wing lock.

2 General information

2.1 Construction of the cultivator SUPER

Manufactured cultivator SUPER are available in non-folding options in widths 3.0m, and hydraulically foldable 4.0m, 5.0m, 6.0m.

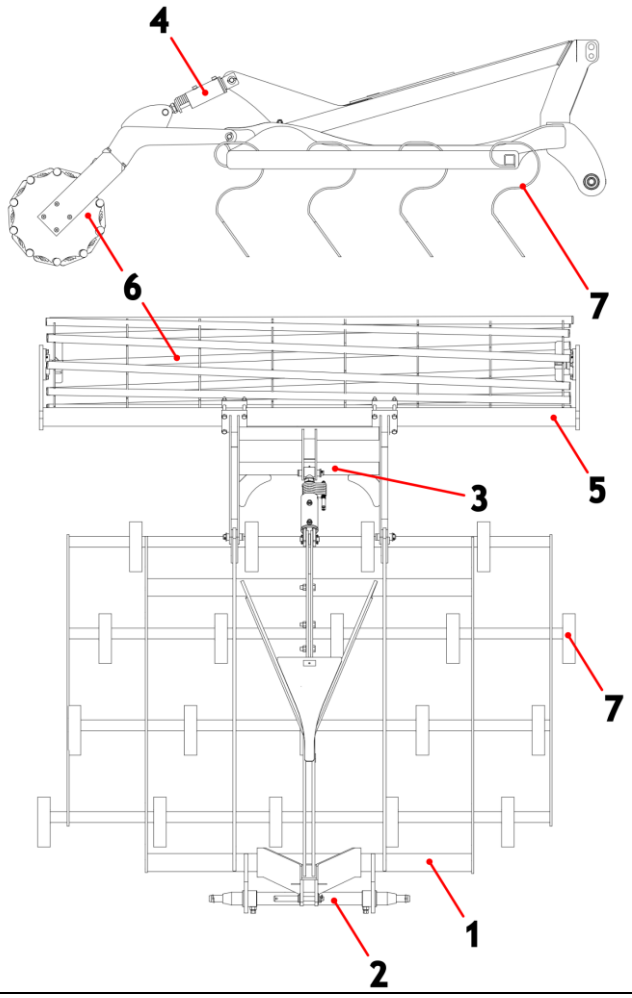


Figure 2 Construction of the cultivator SUPER in non-folding option with tubular roller option (1 - frame, 2 - drawbar, 3 - arms, 4 - hydraulic roller lifting unit, 5 - roller frame, 6 - tubular roller (option), 7 - spring tine)

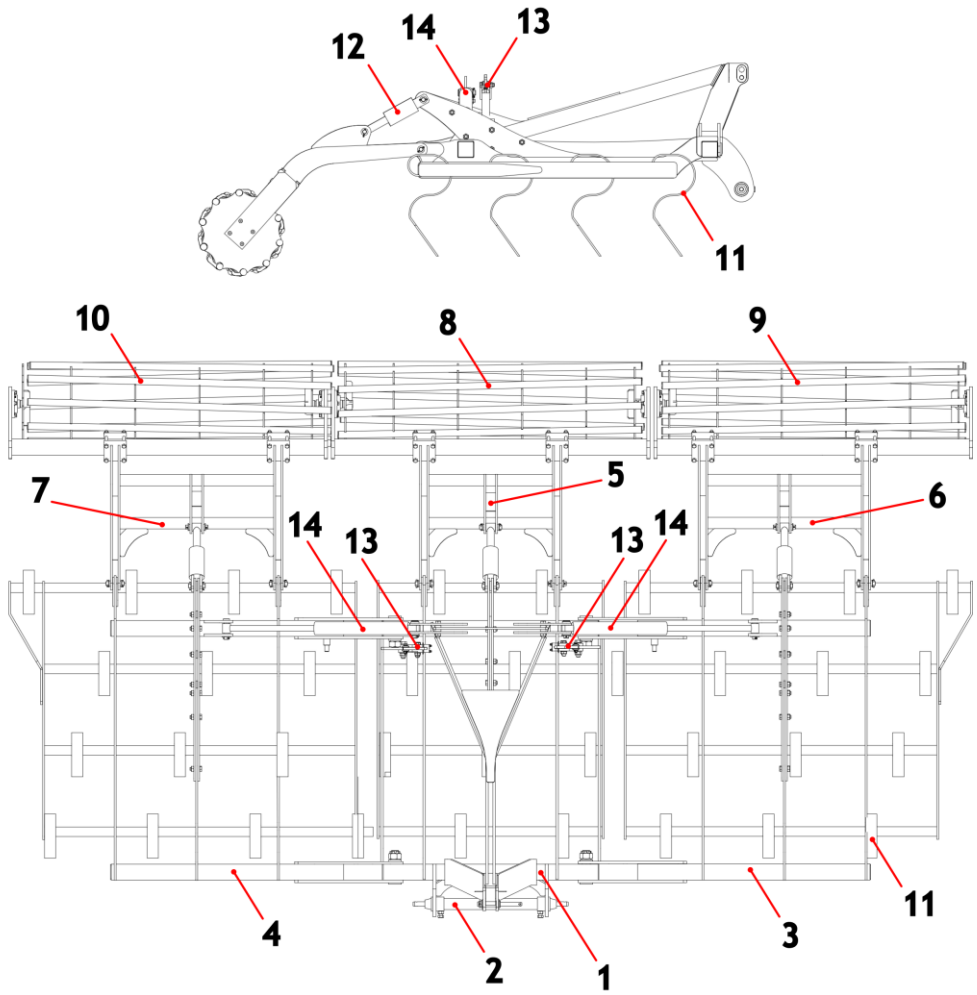


Figure 3 Construction of the cultivator SUPER hydraulically folded with tubular roller (option)(1 - centre frame, 2 - drawbar, 3 - left frame, 4 - right frame, 5 - centre frame arms, 6 - left frame arms, 7 - right frame arms, 8 - centre tubular roller, 9 - left tubular roller, 10 - right tubular roller, 11 - spring tine, 12 - hydraulic roller lifting unit, 13 - automatic wing lock, 14 - actuators)

2.2 Construction of the cultivator SUPER FRONT for work on the front three-point linkage

Manufactured cultivator SUPER FRONT are available in non-folding options in widths 3.0m, and hydraulically foldable 4.0m, 5.0m, 6.0m

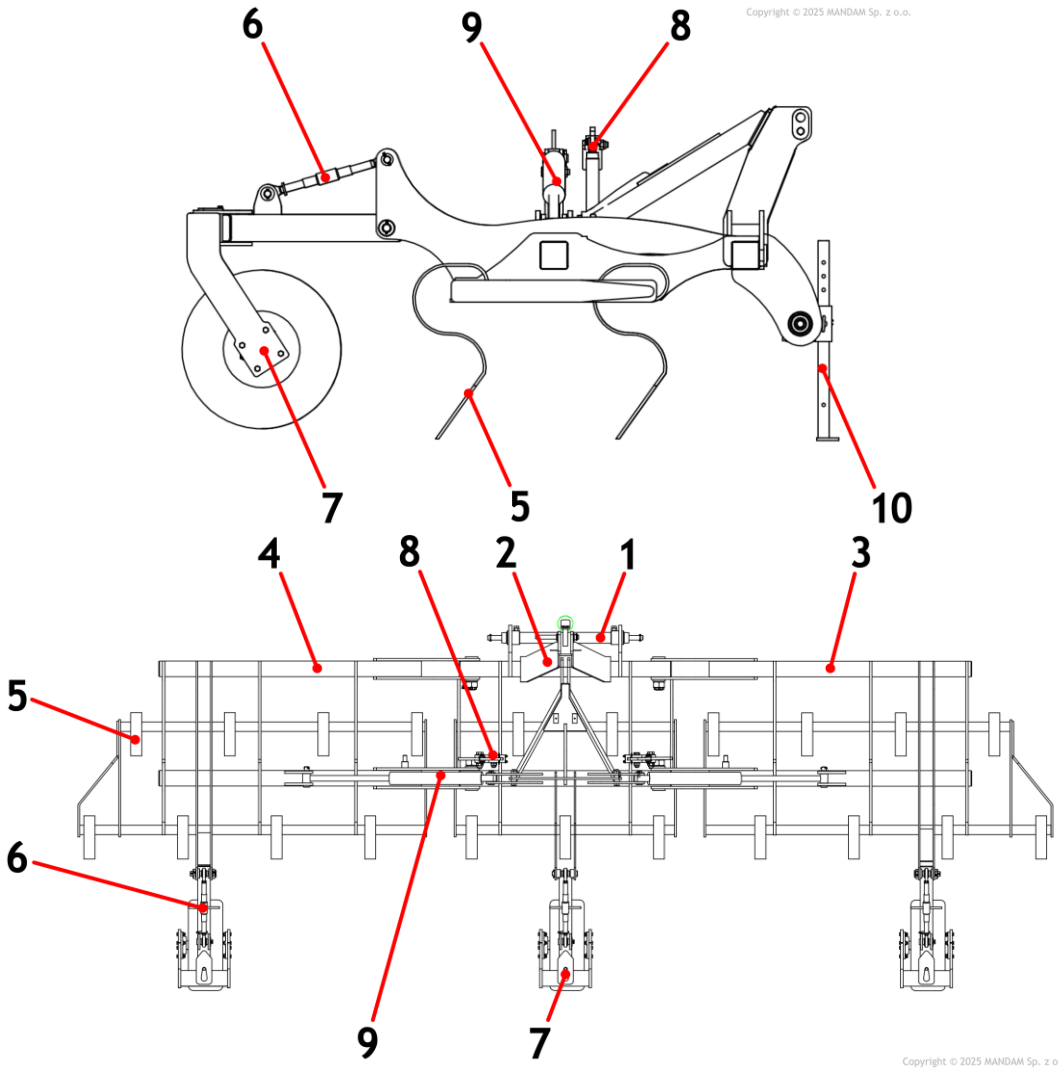


Figure 4 Construction of the cultivator SUPER hydraulically folded 6,0m wide (1 - drawbar, 2 - centre frame, 3 - left frame, 4 - right frame, 5 - spring tine, 6 - turnbuckles for adjusting the support wheel, 7 - support wheels, 8 - automatic wing lock (HBS), 9 - actuators, 10 - support foot)

2.3 Intended use of the cultivator SUPER

The cultivator is designed to work at depths of 5-15 cm. It is designed to cut the stubble accurately, mix the plant residues, as well as press and crush the soil evenly. The cultivator SUPER can be used for post-harvest cultivation as well as for pre-sowing.
With the front-mounted version, only the stubble is cut and the residue is mixed. This suspension frees the rear three-point linkage from other uses.

The workpieces are 70x12 spring tines mounted on 4 rows of transverse beams(in the cultivator SUPER) and on 2 rows (in the cultivator SUPER FRONT) so that stubble undercutting is ensured over the entire working width (depending on the tool selected) of the implement. The spring tine can be equipped with different coulter types.

NOTE! The cultivator is designed exclusively for agricultural use. Use for any other purpose will be construed as misuse and will void the warranty. Failure to comply with the recommendations in these operating instructions will also be construed as misuse.

NOTE! The manufacturer is not liable for damage resulting from the operation of the machine not in accordance with its intended use.

3 General safety rules

The cultivator may only be used and repaired by persons who are familiar with its operation and the mating tractor and with the rules of conduct for the safe operation and handling of the cultivator.

- **The manufacturer is not responsible for arbitrary changes to the design of the cultivator.**

During the warranty period, only factory-made "MANDAM" parts must be used. The cultivator should be operated with all precautions in mind, in particular:

- before each start-up, check that the cultivator and the tractor are in safe condition when moving and working,
- Use of the machine by minors, persons who are ill or under the influence of alcohol or other intoxicants is prohibited,
- Use work clothes, footwear and gloves when carrying out maintenance work,
- Permissible axle loads and transport dimensions must not be exceeded,
- Use only original safety and split pins,
- When working with the cultivator, when lifting, lowering and unfolding, there should be no bystanders in the vicinity, especially children,
- It is forbidden to stay between the tractor and the cultivator while the engine is running,
- Move forward, lift and lower the cultivator slowly and smoothly without sudden jerks, making sure that nobody stays in the vicinity,
- Do not stand on the machine or put any additional weight on it during operation or

transport,

- During U-turns, special care should be taken if there are bystanders in the vicinity,
- Carry out any repairs, lubrication or cleaning of working parts only with the engine switched off and the machine lowered and unfolded,
- When not in use, the machine must be lowered to the ground and the tractor engine stopped, machines must be stored in such a way as to prevent injury to people and animals,
- It is forbidden to turn or reverse with the machine lowered.

IMPORTANT! In addition to these operating instructions, traffic, health and safety regulations must also be observed. When driving on public roads, the regulations contained in the Highway Code must be observed without exception.

NOTE! Cultivator SUPER are not permitted on public roads as standard.

NOTE! It is forbidden to reverse with the machine penetrated in the ground!

3.1 Proper coupling and uncoupling of the machine to/from the tractor

- The attachment of the machine to the tractor must be made as specified, remembering to secure the pins and to secure the suspension pins with split pins.
- When coupling the tractor to the cultivator, it is forbidden for persons to stay between the machine and the tractor during this time.
- The tractor working with the cultivator must be fully operational. Coupling to a tractor with a defective hydraulic system is prohibited.
- Make sure that the tractor with the attached unit is stable, and the tractor steerability and stopping power can be maintained. The load on the front axle cannot drop below 20% of the total load on the tractor axle – set of front-mounted weights.
- In the resting position, the machine, when uncoupled from the tractor, should maintain a stable equilibrium.

3.2 Hydraulic and pneumatic system

The hydraulic system is under high pressure. All precautions should be taken, in particular:

- Do not connect or disconnect the hydraulic lines when the tractor's hydraulic system is under pressure (hydraulics set to neutral),
- Regularly check the condition of the connections and the hydraulic and pneumatic hoses.
- The unit must be taken out of service while the hydraulic or pneumatic failure is being rectified.

3.3 Noise and vibrations

- When the machine is in operation, there is no noise hazard to the operator contributing to hearing loss, as it is a passive tool and the operator's workplace is in the tractor cab. It should be added that the noise caused by the unit's operation does not exceed 70dB.

- If the cultivator SUPER is used on stony soils, significant noise may result. In this case, it is advisable to keep the windows and doors of the tractor closed. You can also wear ear protectors.

- Operator hazards caused by vibration do not occur during operation of the unit. This is because the operator's workstation is located in the tractor cab and the seat is cushioned.

- In very dry conditions, very heavy dusting can occur. In such cases, it is recommended that the doors and windows of the tractor remain closed. In extreme conditions, a dust mask is recommended.

3.4 Compliance with standards

Our unit has been designed and manufactured in accordance with the safety standards of the engineering industry in force on the day the unit was launched. In particular, the following legislation and standards have been taken into account:

- Machine directive 2006/42/EC,
- EN ISO 13857:2010 'Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs'.
- Standard EN ISO 4254-1:2016-02 "Agricultural machinery -- Safety -- Part 1: General requirements.
- EN ISO 12100-1:2005/A1:2012 "Safety of machinery -- Basic concepts, general principles for design -- Part 1: Basic terminology, methodology"
- Standard PN-EN ISO 12100-2:2005/A1:2012 " Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles "
- EN 982+A1:2008 standard "Safety of machinery -- Safety requirements for hydraulic and pneumatic systems and their components -- Hydraulics".
- EU commission delegated regulation 167/2023.

3.5 Safety regarding transport on public roads

For transport, the side sections of the cultivator SUPER must be folded into the transport position using the hydraulic system. Before folding, the machine must be raised to the extent that the side sections do not interfere with the ground during folding. To do this, the wheels of the cultivator must be lowered to the point where the working sections do not interfere with the ground during folding.

- **During transport, the clearance under the machine should be at least 30 cm**

When transporting the unit on public roads, the use of a luminous device, a distinguishing sign and side reflectors is mandatory.

WARNING! It is stipulated that it is against the highway code to drive on public roads without an approval certificate. The travel can take place under the responsibility of the user or with individual approval.

The travelling speed during transport must not be exceeded:
- on roads with a smooth surface (asphalt) up to 15 km/h,
- on dirt or paved roads 6-10 km/h,
- on bumpy roads not more than 5 km/h.

The driving speed must be adapted to the condition of the road and the conditions on the road to ensure that the chisel cultivator does not jump up on the tractor's linkage and that there are no excessive loads on the frame of the machine and the linkage of the tractor.

Particular care should be taken when passing and overtaking and on bends. The permissible width of the machine running on public roads is 3.0 m.

- It is forbidden to transport the unit where the slope transverse to the unit exceeds 7°.

WARNING! Failure to comply with the above rules may create hazards for the operator and bystanders as well as damage to the machine. Damage resulting from non-compliance with these rules is the responsibility of the user.

3.6 Description of residual risk

Mandam Sp. z o.o. makes every effort to eliminate the risk of accidents. There is, however, a residual risk that could result in an unfortunate accident.

The greatest danger occurs when:
- Using the machine for purposes other than those described in the instructions,
- Using the machine by minors, persons who are not authorised, who are ill or who are under influence of alcohol or other drugs,
- persons and animals are within the operating range of the machine are present,
- No caution is paid when transporting and manoeuvring the tractor,
- Staying on the machine or between the machine and the tractor while the engine is running,
- During operation and failure to comply with operating instructions,
- Driving on public roads.

3.7 Assessment of residual risk

Residual risk can be minimised by applying the following recommendations:
- Prudent and unhurried operation of the machine,
- Careful reading of operating instructions,
- Keeping a safe distance from danger zones,
- prohibition on being on the machine and in the operating area of the machine while the tractor engine is running,
- Carrying out maintenance work in accordance with safety rules,

- Use of protective clothing and, if working under machinery, a helmet,
- Prevention of unauthorised access to the machines, especially by children.

4 Information on handling and use

Before starting the machine for the first time:

- Refer to the operating instructions,
- Make sure the machine is in good working order,
- Check the condition of the hydraulic and pneumatic systems (replace components if damaged, e.g. pressure lines),
- Make sure that the machine's pressure hose couplings fit into the sockets on the tractor,
- Check the tightness of the individual bolts and nuts,
- Check the air pressure in the wheels in accordance with the manufacturer's recommendations,
- Ensure that all components requiring lubrication are lubricated,
- Ensure that the pressure in the tractor wheels is the same on each axle to ensure even operation.

NOTE! It is forbidden to work the chisel cultivator at an angle greater than 5°. For proper operation, all working elements must be in constant contact with the ground.

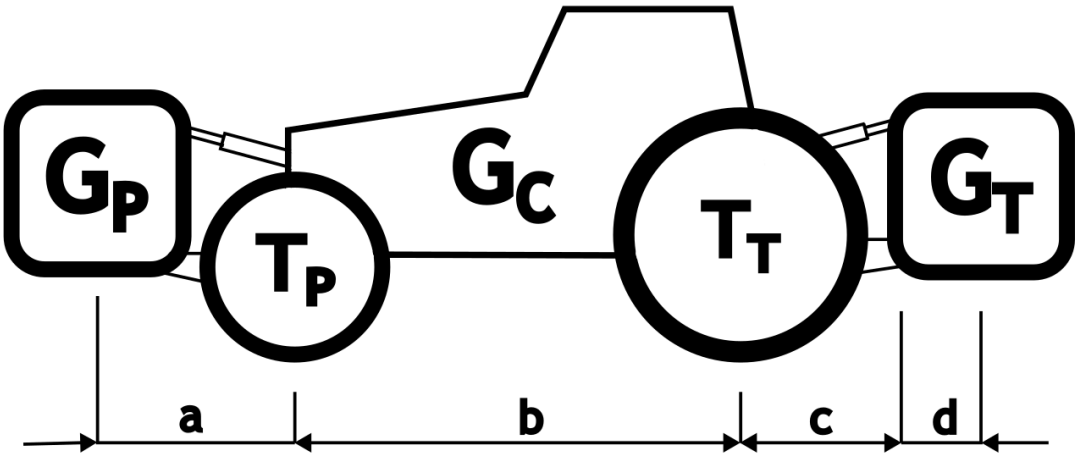


Figure 4 Diagram of tractor load designations

Minimum load at the front for rear-mounted machine:

$$G_{P\,min} = \frac{G_T \cdot (c+d) - T_P \cdot b + 0{,}2 \cdot G_C \cdot b}{a+b}$$

Designations:

G_C – tractor dead weight,

T_P – front axle load of the empty tractor,

T_T – rear axle load of the empty tractor,

Actual front axle load

$$T_{P\,cal}=\frac{G_P\cdot(a+b)+T_P\cdot b-G_T\cdot(c+d)}{b}$$

Actual total weight

$$G_{cal}=G_P+G_C+G_T$$

Actual rear axle load

$$T_{T\,cal}=G_{cal}-T_{P\,cal}$$

G_P – total weight of front-mounted device,

G_T – total weight of rear-mounted device,

a – distance between the centre of gravity of the front-mounted device and the centre of the axle,

b – tractor wheel track,

c – distance between the centre of the rear axle and the centre of the hitch bolt of the rear device,

d - distance of the machine's centre of gravity from the tractor's hitching pins (suspended machine - assume 1.4 m, semi-mounted machine - assume 3 m and 0.6 weight),

x – distance of the centre of gravity from the rear axle (if the manufacturer does not specify this parameter, enter 0.45).

NOTE! The permissible axle loads and tyre load capacities must not be exceeded. The front axle load must not be less than 20% of the total load. The tyre pressure should be in accordance with the manufacturer's recommendations.

4.1 Preparing the cultivator for work

- Before starting the work, check the condition of the cultivator, especially the condition of the working parts and bolted connections.

The cultivator SUPER is usually supplied ready for sale. Due to the limitations of transport facilities, it is also possible to deliver it in a partially dismantled state - this usually involves disconnecting the roller.

When the unit is first prepared for operation, its components (roller) must be assembled. To do this, place the disc harrow on flat paved ground in a position that allows the roller to manoeuvre. A lifting device with a lifting capacity of at least 500 kg must be used to transport the roller for reasons of stability during transport. Position the arms in the brackets on the machine frame and connect the arms to the roller bracket with screws (fig 5).

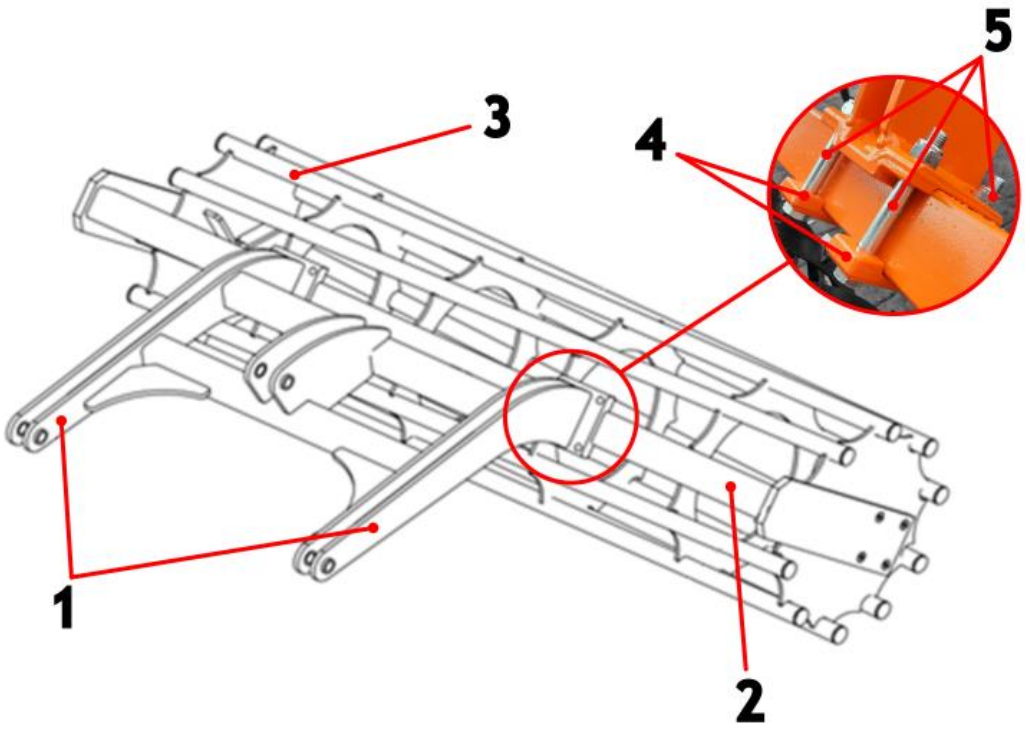


Figure 5 Construction and connection of the arms to a tube-roller (1 - arms, 2 - tube-roller bracket, 3 - tube-roller, 4 - mounting plates, 5 - mounting screws)

NOTE! The correct procedure for mounting the rollers in the arm holders requires that the bolts be evenly tightened diagonally, so that the entire plane of the arm holders is adjacent to the plane of the roller clamp profile. This provides the most secure way of connecting the roller arms to the machine!

4.2 Coupling the cultivator to the tractor

The tractor wheel tyre pressure should be in accordance with the manufacturer's recommendations. The lower links of the three-point hitch should be at an equal height, at a spacing corresponding to the spacing of the lower suspension points. When connecting the disc harrow to the tractor, the harrow should stand on firm and level ground.

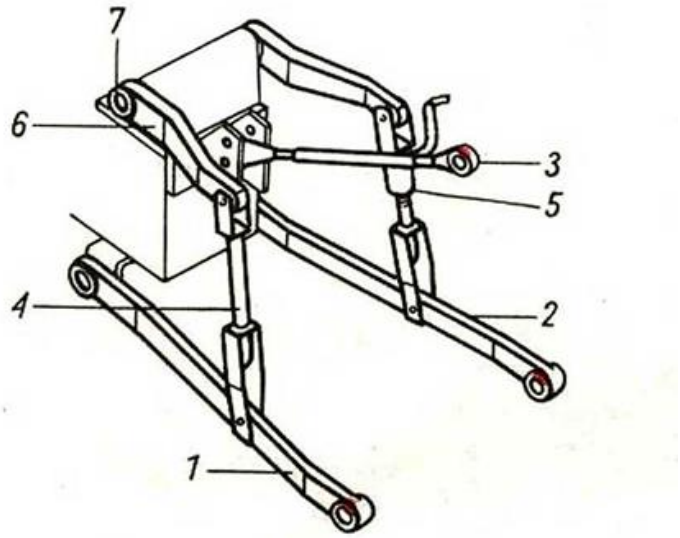


Figure 6 Three-point linkage of the tractor (1,2 - lower links, 3 - upper fastener, 4 - left suspension, 5 - right suspension with adjustable length, 6 - lift arm, 7 - lift roller)

When connecting the mounted unit to the tractor, perform the following steps:

1) Check the pressure in the wheels on one axle of the tractor, it must be the same to ensure even working depth of the unit,
2) Ensure that the category of hitch and tie rod is identical,
3) Switch the tractor hydraulic system to position control,
4) Back the tractor up to a distance that allows the hitch of the unit to be connected to the lower links of the tractor,
5) Align the lower links at an equal distance from the ground,
6) First connect the lower links of the tractor,
7) Secure the connection with pins and locks,
8) Connect the top link of the 3-point hitch and adjust the connection,
9) Connect electrical cables (if lighting is optional) and check for correct operation,
10) Connect the hydraulic lines and check for leaks,
11) If the unit has a support foot, it must be raised and secured,
12) Raise the unit and check that the tractor retains full steering control,

When connecting trailed machine to the tractor on rear 3-point hitch, perform the following operations:

1) Check pressure in the wheels on one axle of the tractor must be the same to ensure an even working depth of the unit,
2) Switch the tractor hydraulic system to position control,
3) Disconnect the suspension axle from the unit and place it on the lower links of the tractor,

4) Back the tractor to a distance that allows the connection of the suspension axle with the frame plates,
5) Secure the suspension axle in the frame plates using clamps and cotter pins,
6) Connect the upper link of the 3-point hitch and adjust the connection,
7) Connect the electrical cables (if lighting is an option) and check for correct operation,
8) Connect the hydraulic cables and check their tightness,
9) If the unit has a support foot, it must be raised and secured,
10) Raise the unit and check whether the tractor maintains full steerability,

When connecting trailed machine to the tractor on front 3-point hitch, perform the following operations:

1) Check pressure in the wheels on one axle of the tractor must be the same to ensure an even working depth of the unit,
2) Switch the tractor hydraulic system to position control,
3) Disconnect the suspension axle from the unit and place it on the lower links of the tractor,
4) Drive the tractor to a distance that allows the connection of the suspension axle with the frame plates,
5) Secure the suspension axle in the frame plates using clamps and cotter pins,
6) Connect the upper link of the 3-point hitch and adjust the connection,
7) Connect the electrical cables (if lighting is an option) and check for correct operation,
8) Connect the hydraulic cables and check their tightness,
9) If the unit has a support foot, it must be raised and secured,

Raise the unit and check whether the tractor maintains full steerability

Any tractor that is used with the machine must be equipped with a set of weights and must remain steerable during transport, i.e. a minimum of 20% of the tractor's weight must be on the front axle.

NOTE! Hitching the tractor to the cultivator must be done carefully, at minimum tractor speed! When hitching the machine, make sure there are no bystanders in the vicinity.

5 Operation and adjustment

In the cultivator SUPER, before starting work in the field, the position of individual working units should be pre-set. The machine should also be leveled longitudinally with the upper link of the tractor and transversely with the hanger of the right lower link. Then, the first working pass should be performed to determine the optimal working speed and correct the adjustment based on the assessment of the correct operation of individual units. The working speed should be 8 - 12 km/h. In a well-adjusted machine, the frame must be parallel to the ground, and all working units should penetrate the soil equally across the entire working width.

5.1 Automatic machine wing lock

On machines with folding sections, automatic wing locking is available, requiring no additional operation. The lock uses a mechanism consisting of an actuator and a hook (fig. 7).

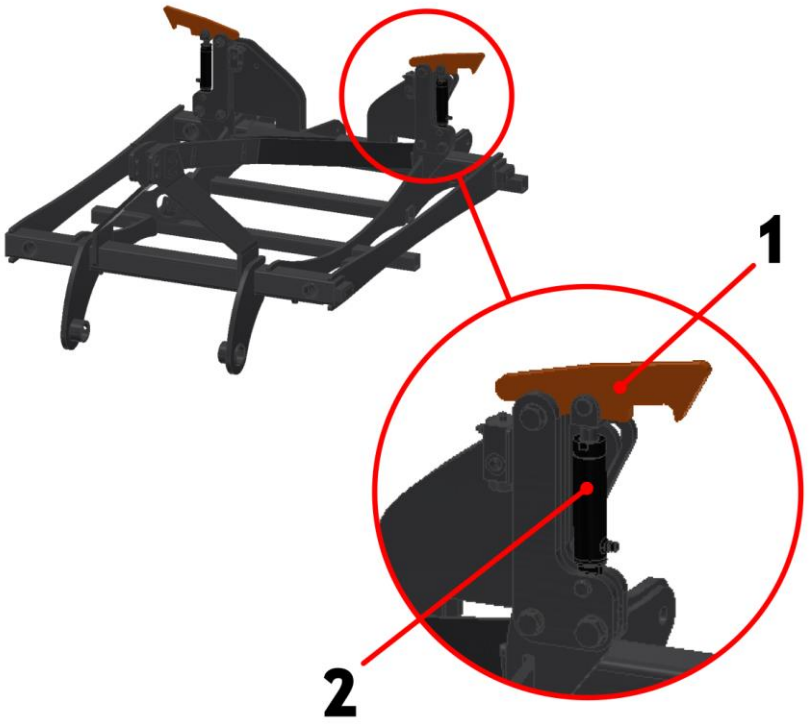


Figure 7 Projection central frame of cultivator with automatic wing locking mechanism (1 - hook of mechanism, 2 - actuator)

5.2 Opening sequence of a hydraulically folded machine

Before unfolding hydraulically folding machines, it is important to familiarise yourself with the opening sequence that allows you to do this correctly.

The illustrations below show the subsequent stages of unfolding the machine's wings, for the SUPER cultivator on the left side and for the SUPER FRONT cultivator on the right side.

1) Raise the machine on the tractor's three-point linkage to a height that does not allow the outermost inner wing disc to collide with the ground (fig. 8),

2) Fold the machine wings into the "closed" position to unlock the wing locking mechanism (fig. 8 item 2),

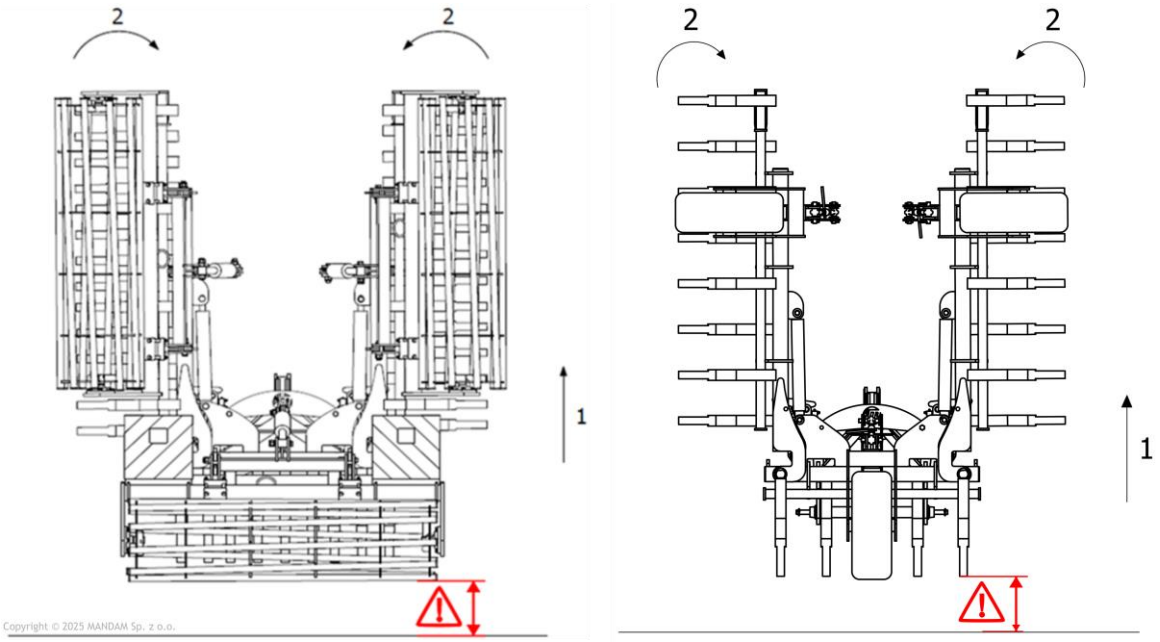


Figure 8 Sequence for opening the machine (1 - lifting the machine up to the maximum (at least 60 cm), 2 - folding the machine wings into the "closed " position).

3) Unlock the wing locking mechanism (fig. 9),

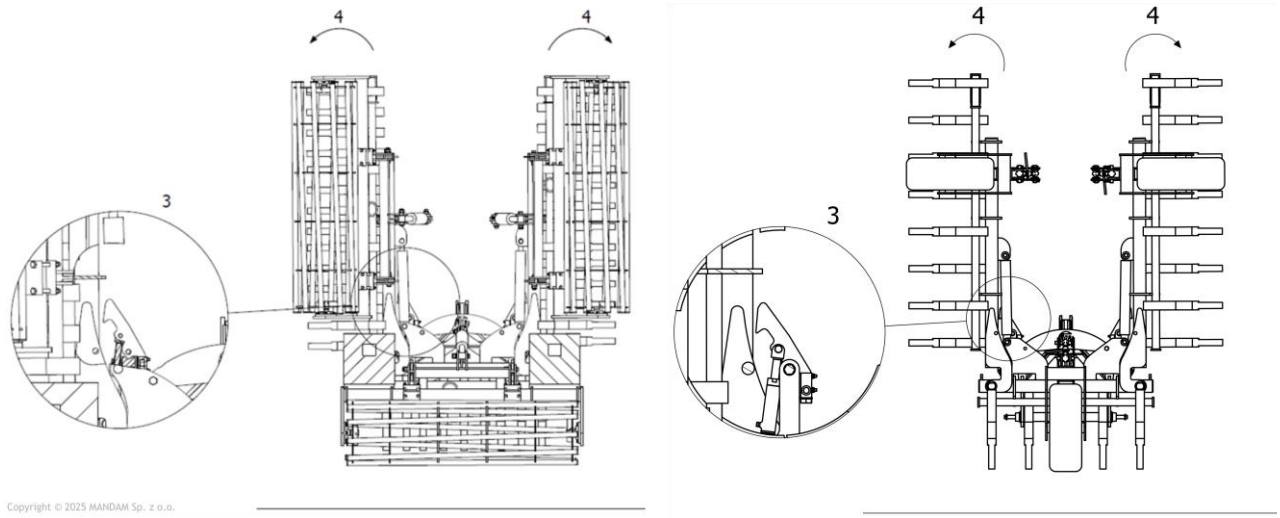


Figure 9 Machine opening sequence (3 - release of the hook of the hydraulic wing lock mechanism, 4 - opening of the machine wings)

4) Start opening the wings of the machine (pay attention to the correct height to prevent snagging to the ground!),

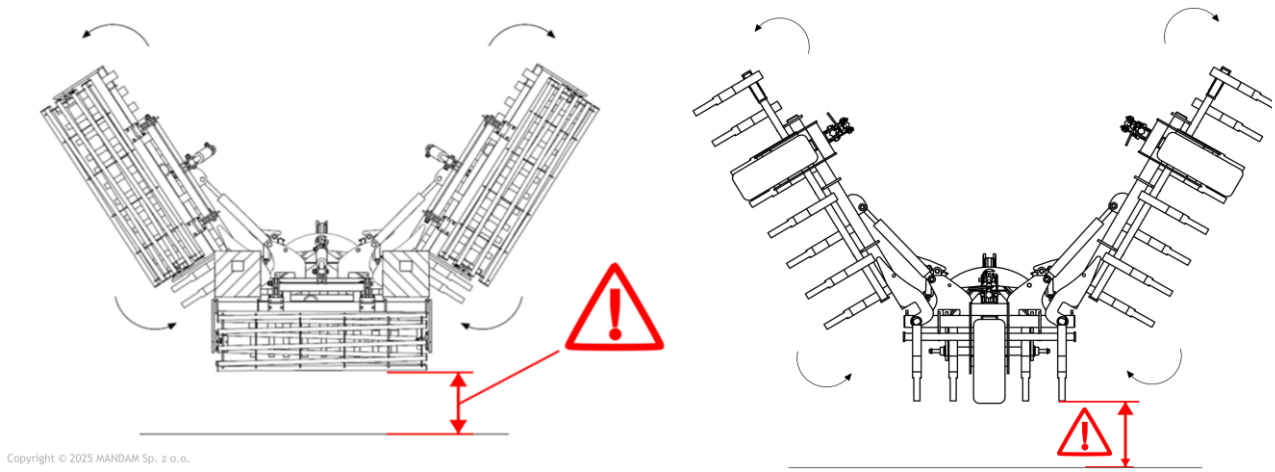


Figure 10 Machine opening sequence: opening the machine with special attention to the height of the arm ends from the ground.

5) Continue and do not interrupt the process of opening the wings until they are fully open (fig 10),
6) Once the opening sequence is complete, check the levelling of the machine (fig. 11),

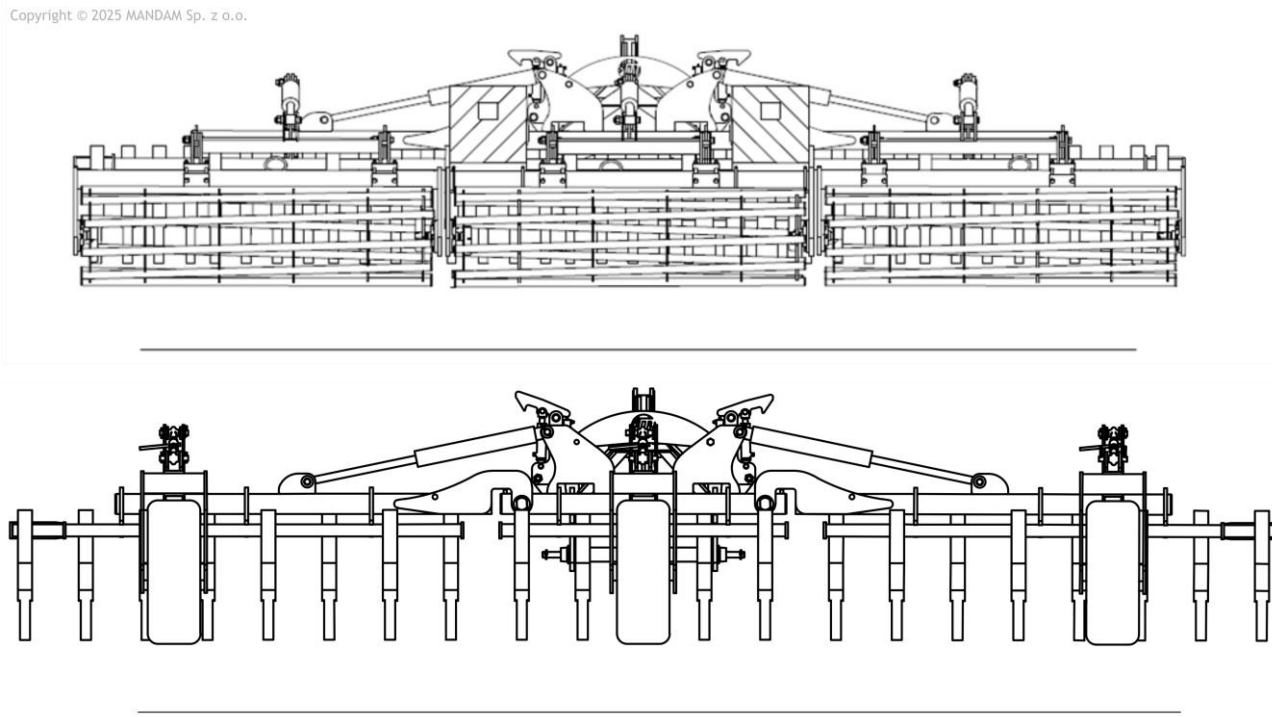


Figure 11 View of the machine at the end of the wing opening sequence. The arms of the machine are fully open.

NOTE! After completion of work, on machines with folding wings, the unit and the rollers must be thoroughly cleaned so that soil residues do not put additional strain on the machine wings and thus on the actuators!

5.3 Hydraulic working depth adjustment of cultivator SUPER

The working depth is determined by the position of the roller, whose arms are adjustable by actuators. To maintain a constant roller position (working depth) during operation, clamps are fitted to the actuator piston rods (fig.12). Initially, the working roller should be set above the lower edge of the spring tine at a height that roughly corresponds to the anticipated working depth, and the setting should be adjusted during the work once the roller's settlement has been taken into account. **The maximum permissible working depth is 15cm.**

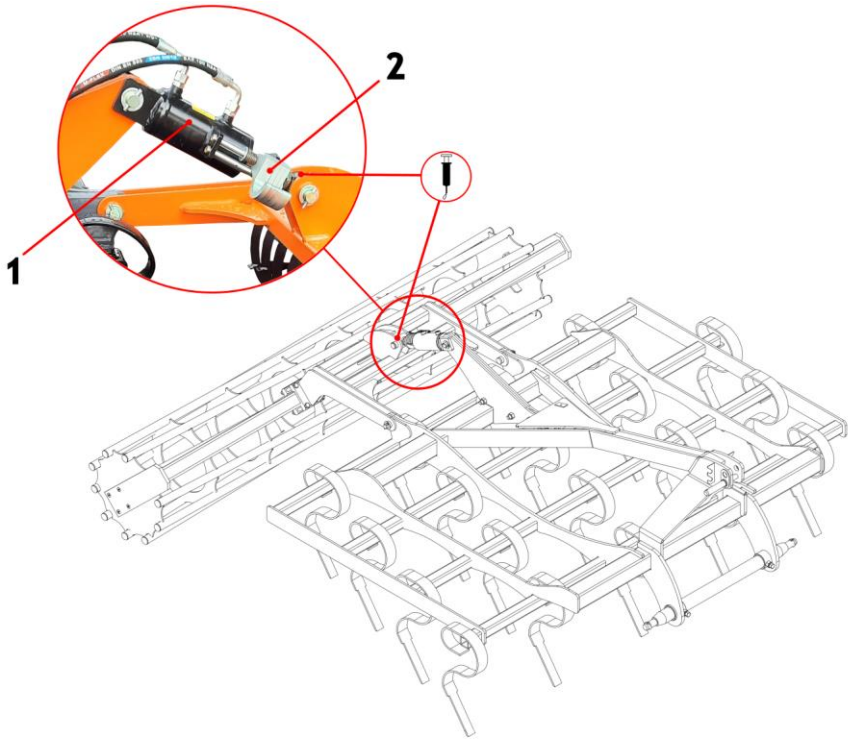


Figure 12 Actuator with pawls to the hydraulic roller lifting unit (1 – actuator, 2 – pawls)

The working depth of the machine is set using pawls located at the piston rod of the actuator. As more pawls are folded, the operation of the machine becomes shallower. In a configuration where none of the pawls are installed, the machine is in its greatest working depth configuration. In fig. 13 and fig. 14, the correct way of installing the subsequent pawl plates on the actuator and the incorrect way of installing them are shown.

- **The number of pawls on all shaft arm cylinders must always be equal!**
- **Cultivator can by used without roller but working depth must by maintained by hydraulic regulation of the tractor and the soil will remain loose.**

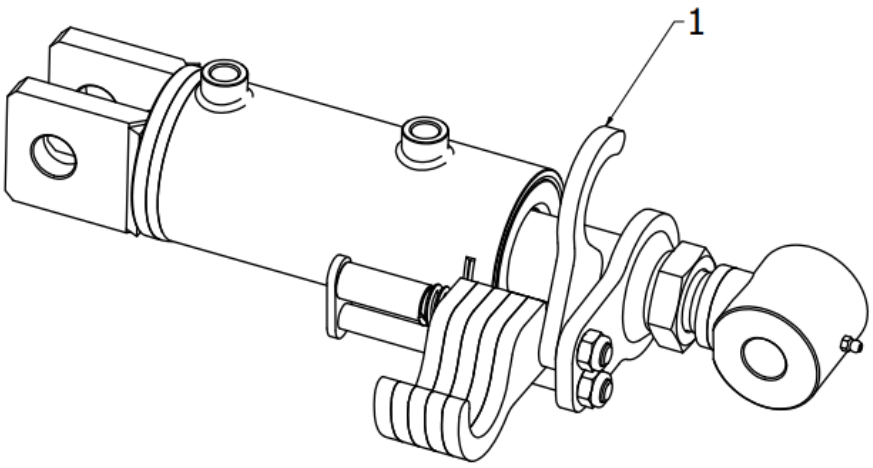


Figure 13 Correct way to put the first (1) ratchet on the piston rod of the actuator to adjust the working depth of the machine.

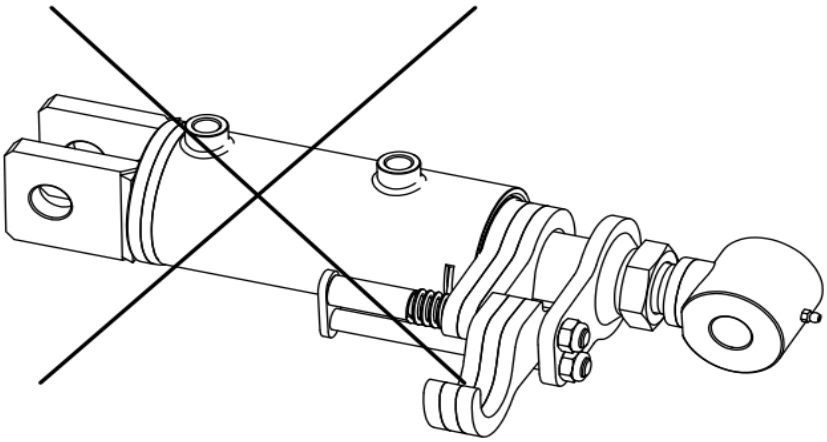
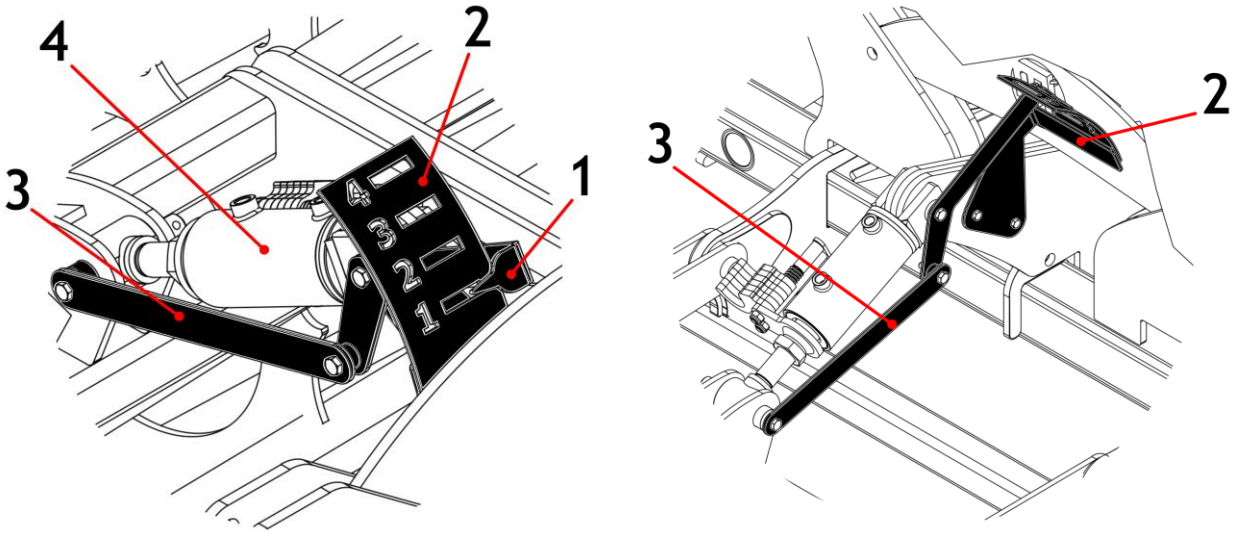


Figure 14 31 Incorrect way of fitting the ratchets to the piston rod of the actuator. Partial omission of the attachment of the pawls to the actuator results in uneven distribution of the forces acting on the piston rod and can lead to piston rod buckling resulting in damage to the entire actuator assembly. This kind of adjustment is ***unacceptable!***

5.4 Working depth indicator

Cultivator is equipped with scale illustration setting of the roller relative to machine. Large and clear scale gives operator a preview in what position will be roller during work.



Side view (indicator mounting points)

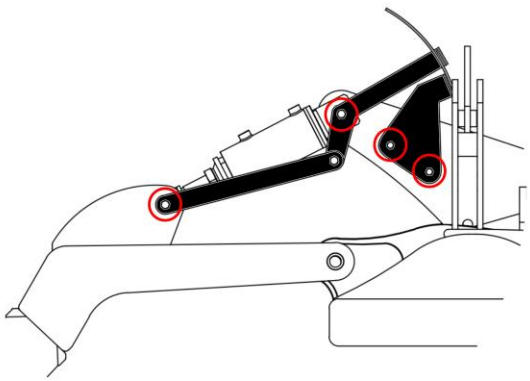


Figure 15 Working depth indicator (1 - Indicator, 2- Scale, 3 - Indicator arm, 4 - Actuator of hydraulic working depth)

5.5 Working depth adjustment of cultivator SUPER FRONT

Working depth is adjusted using the three-point linkage arms and the position of the support wheels relative to the spring tines. Adjustment is made using turnbuckles on both support wheel assemblies (Fig. 16). Initially, the wheels should be set above the lower edge of the tines at a height that approximately corresponds to the intended working depth. This setting should be corrected during operation after taking into account the depth of the spring tines. The position (height) of both support wheels must always be equal to ensure even operation across the entire working width of the cultivator. The maximum working depth is 15 cm.

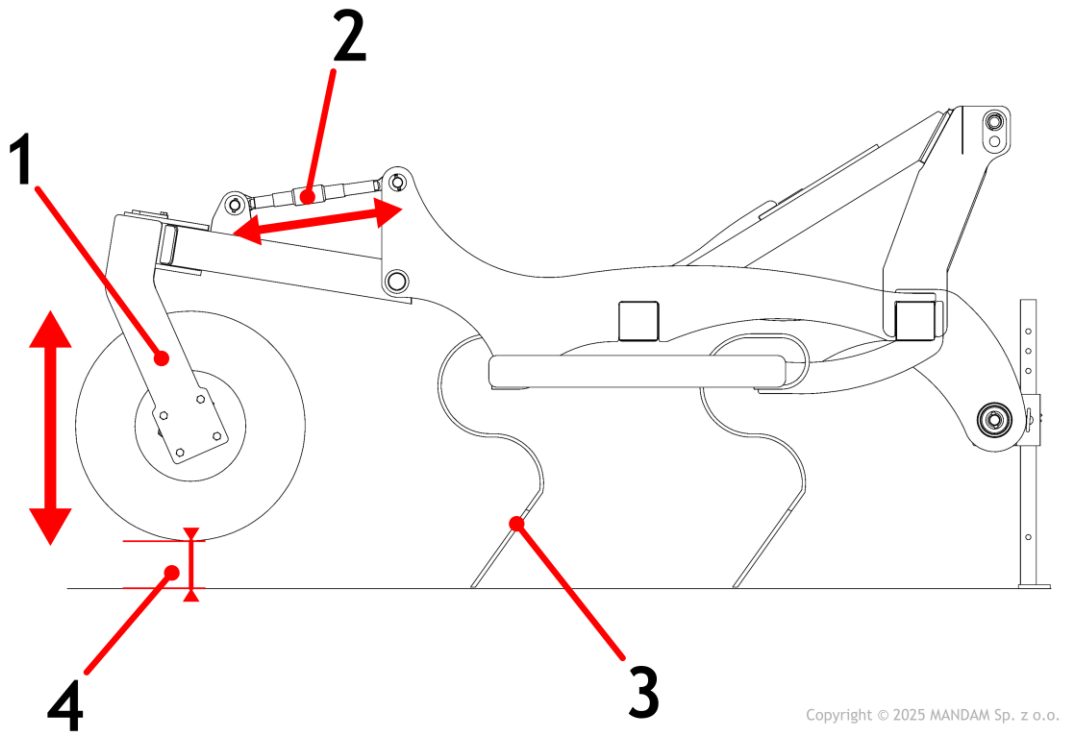


Figure 16 Working depth adjustment (1 - support wheel, 2 - turnbuckle, 3 - spring thin, 4 - working depth)

5.6 Rules for transporting the cultivator on public roads and lighting the machine.

In accordance with the road safety regulations (Regulation of the Minister of Infrastructure of 31.12.2002. Journal of Laws No. 32 of 2002 item 262) - unit consisting of an agricultural tractor and the agricultural machine coupled with it must meet the same requirements as the tractor itself.

NOTE! Special care must be taken when transporting the disc harrow. It is forbidden to drive on public roads without appropriate additional warning signage.

Before transporting, the machine should be cleaned from the soil and the operation of the lights checked.

- **After lifting the machine, check the clearance under the lowest working elements, which should be at least 30 cm.**

The permissible transport speed for the tractor with the machine on smooth roads is up to **15 km/h**. On roads with poorer surfaces (dirt or cobblestones) it should be lowered to a maximum of **10 km/h**, and on bumpy roads to **5 km/h**. Extreme caution should be exercised when passing and overtaking other vehicles, avoiding obstacles and crossing large irregularities in fields and dirt roads.

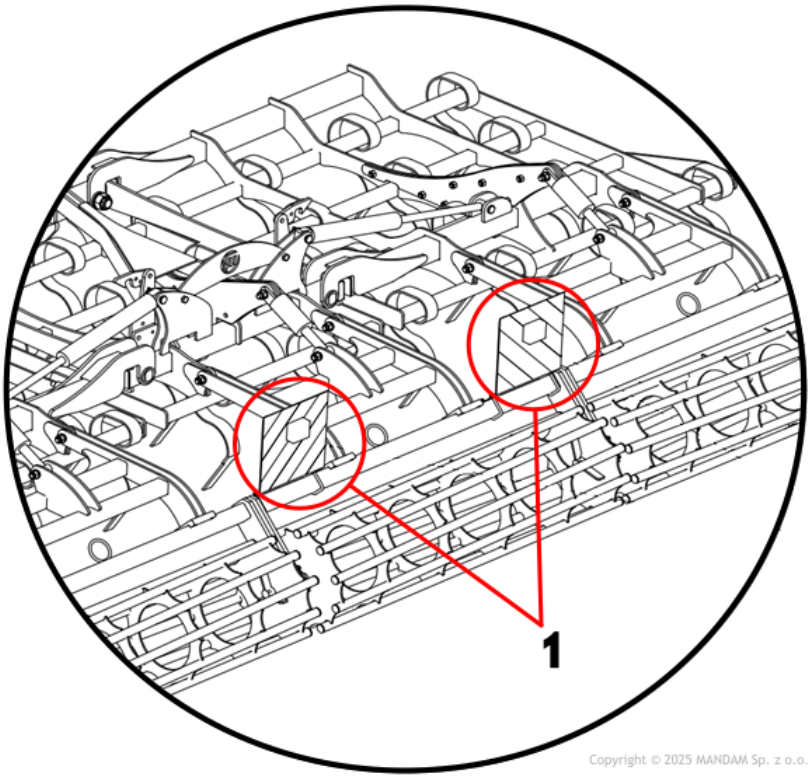


Figure 17 Light arrays and their location (1 - lighting boards mounted on the roller bracket)

NOTE! If the tractor's lighting is obscured by a suspended machine, such lighting should be duplicated on the machine (using dedicated lighting boards) to improve the team's visibility on the road.

The machine must be thoroughly cleaned of adhering plant debris and soil before being driven on the public road. Portable light and warning devices and a marking sign for slow-moving vehicles (in accordance with applicable road traffic regulations) should be attached to the ends of the roller frame. The machine must be fitted with rear lights and front contour lights (according to current traffic regulations) and side reflectors.

NOTE! The unit as a part of the vehicle protruding beyond the rear side contour of the tractor obscuring the rear lights of the tractor poses a danger to other vehicles on the road. It is forbidden to travel on public roads without appropriate markings.

Once the plates have been fixed, the electrical wires of the warning-light device should be connected to the socket of the tractor's electrical installation.

- **The manufacturer does not supply warning signs as standard equipment on the machine.**

WARNING! It is stipulated that it is against the highway code to drive on public roads without an approval certificate. The travel can take place under the responsibility of the user or with individual approval.

Warning signs are available commercially. Driving style should always be adapted to the road conditions - this will help avoid accidents and damage to the chassis. Consider your own skills and the intensity of the movement, the prevailing visibility and the weather.

NOTE! Lighting and warning devices are not part of the equipment of the cultivation roller. The user can purchase them at agricultural machinery dealers.

- When work is complete (in the case of hydraulically foldable units for which the width of the machine in the working position exceeds 3.0 m), fold the machine into the transport position.
- The driving speed must be adapted to the condition of the road and the conditions on the road, so that the agricultural equipment does not jump on the tractor's suspension system and there are no excessive loads on the machine's frame and the tractor's suspension system.
- Particular care should be taken when passing and overtaking and on bends. On sharp turns, the machine swings in the opposite direction to the direction of the turn. This can lead to collisions with obstacles or other road users. Be aware of the length of the machine.
- The permissible width of the machine running on public roads is 3.0 m.
- It is forbidden to transport the cultivator SUPER if the slope transverse to the machine exceeds 7°.

WARNING! Failure to comply with the above rules may create hazards for the operator and bystanders as well as damage to the machine. Damage resulting from non-compliance with these rules is the responsibility of the user.

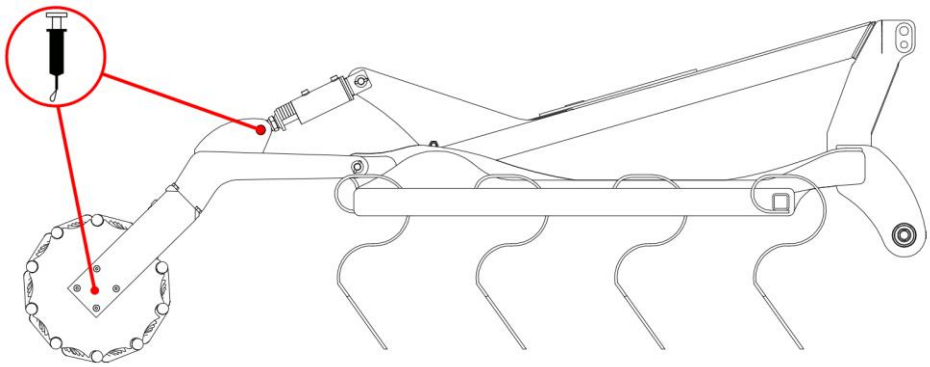
NOTE! The unit must be brought into line with the road traffic laws of the country in which it will be on the road.

5.7 Maintenance and lubrication

- Each time the cultivator is finished working, the soil must be cleaned, followed by an inspection of the parts and assemblies. **Otherwise, there may be a problem with the folding of the machine if the rollers are clogged with soil and there is an additional load!**
- Re-tighten all screws after the first 4 hours of operation and periodically check the tightness. **Failure to do so will exacerbate backlash and cause damage to the machine as a result.**
- The sweep and share can be used almost until they are worn down, until the working surface is equal to the initial tine surface. However, it is advisable to replace the tool early enough before there is a possibility of wear and damage to the tine.
- Lubricate the grease points on the hinge pins daily during the life of the machine.

- Lubricate the bearings of the shaft every 25 operating hours (does not apply to maintenance-free bearings - these bearings do not need to be serviced and lubricated)
- When replacing worn components, use thread glue, original bolts and nuts.
- Damaged or worn parts must be replaced with new or reconditioned parts.
- Always ensure that screw connections are properly tightened.

Side view



Top view

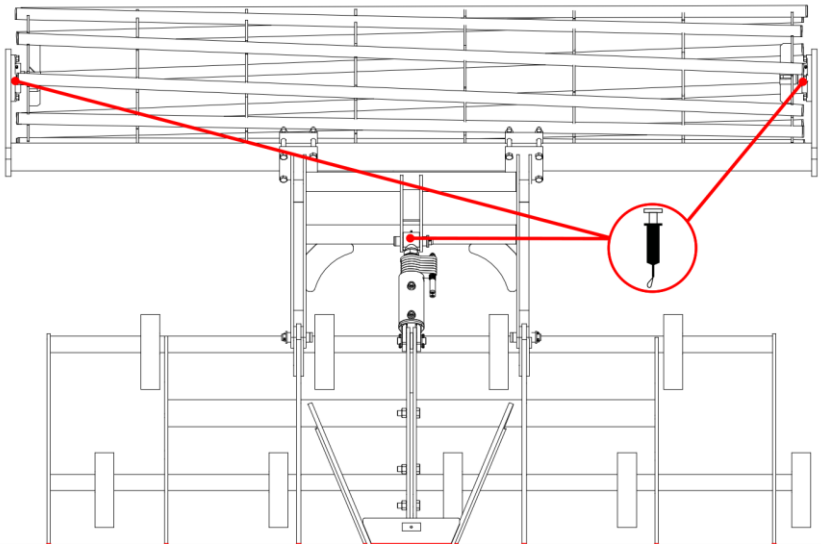


Figure 18 Lubrication points of the cultivator SUPER non-folding version (with tubular roller option)

Side view

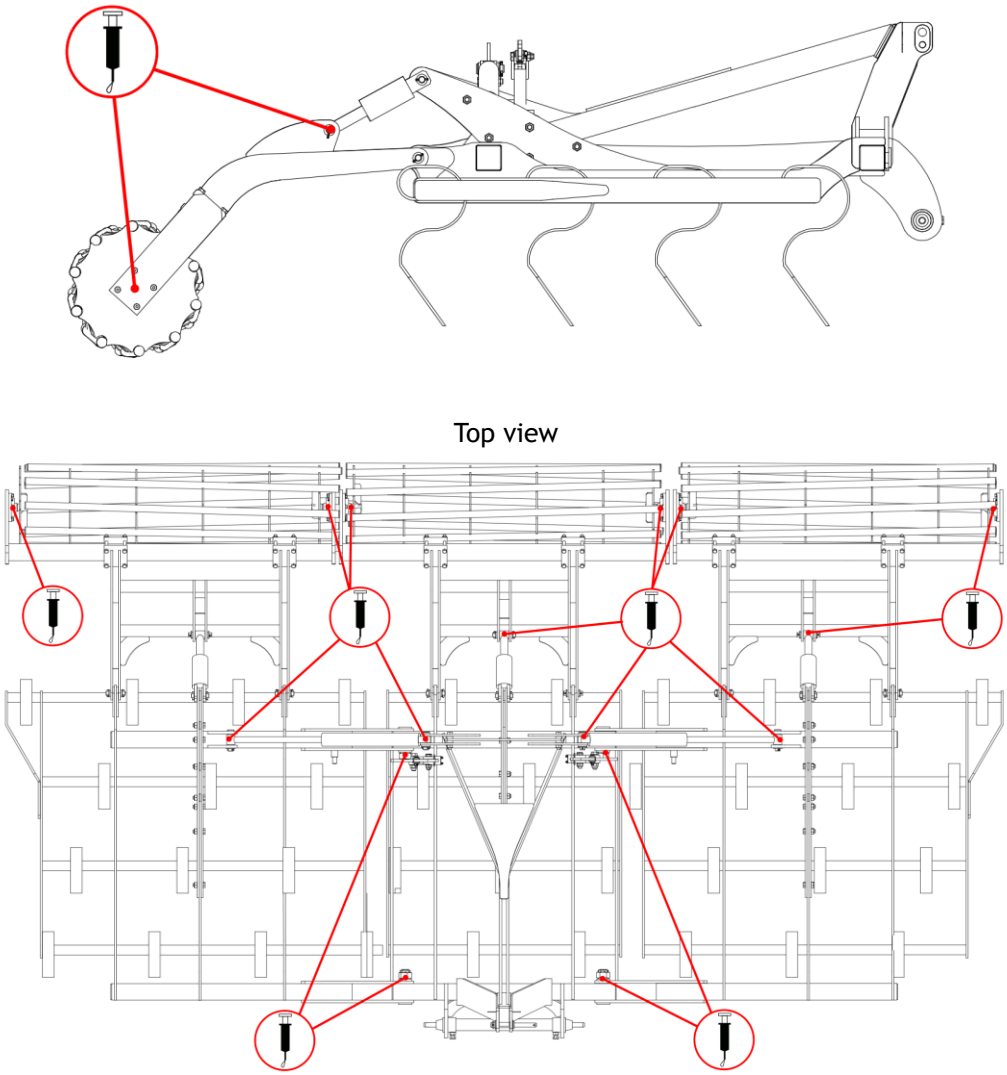


Figure 19 Lubrication points of the cultivator SUPER with hydraulic folding version (with tubular roller option)

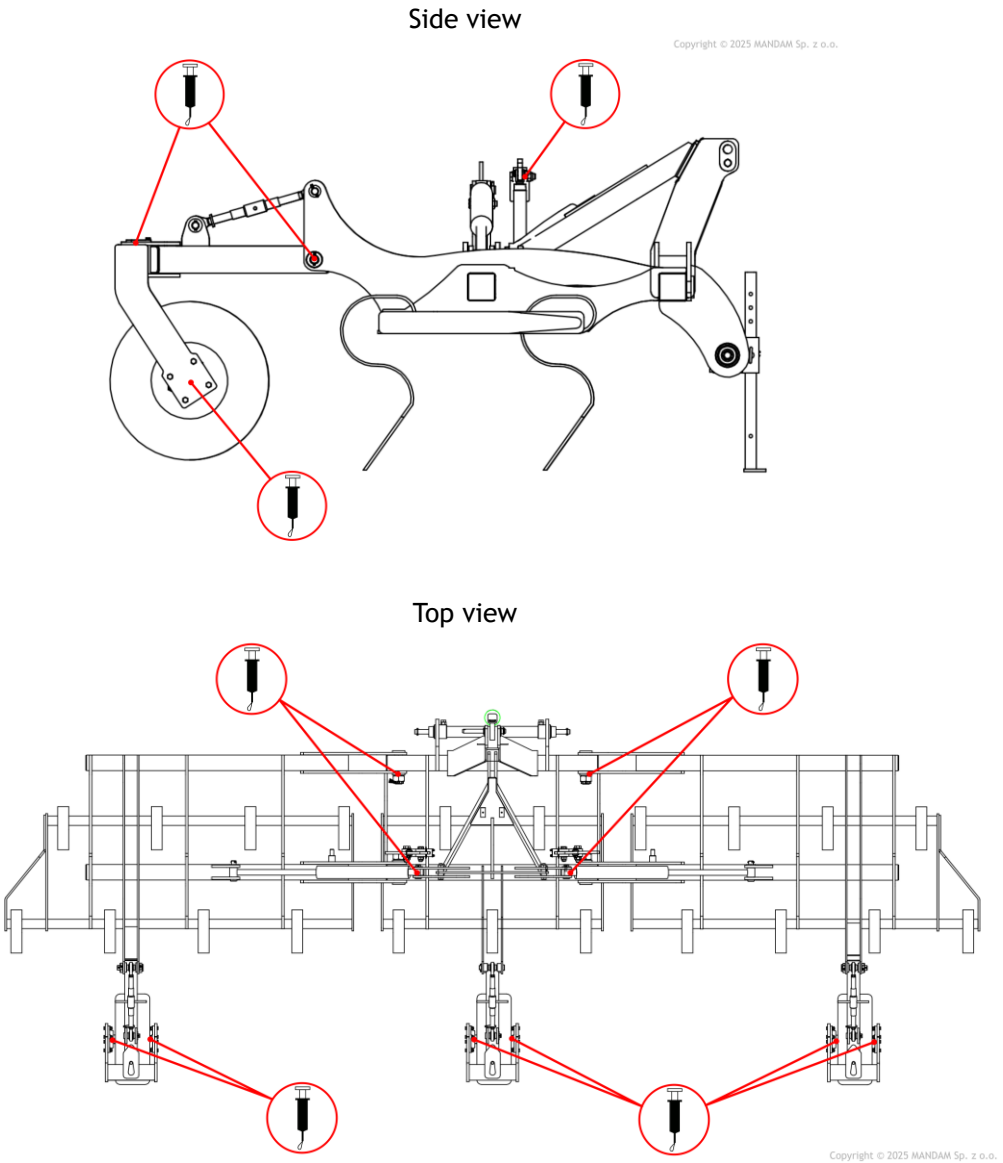


Figure 20 Lubrication points of the cultivator SUPER FRONT with hydraulic folding version.

NOTE! Periodic lubrication is a guarantee of the durability of the machine.

The service life and efficiency of the machine depend to a large extent on regular lubrication. Mineral lubricants should be used for lubrication. Lubrication points must be thoroughly cleaned before pressing in or applying grease.

5.8 Tightening torque for nuts and bolts

Bolts and nuts should be tightened in the machine with the correct torque depending on the strength class of the bolt and its thread size and pitch. Their respective tightening torque values are shown in Table 2.

Table 2. Tightening torque values for nuts and bolts.

Tightening torques for nuts and bolts [Nm]

Dimension	Thread pitch	Bolt strength class 8.8	10.9	12.9
M4	0,7	3,2	4,5	5,2
M5	0,8	6	8,4	10
M6	1,0	11	15	17
M8	1,3	27	34	40
	1,0	21	30	35
M10	1,5	46	65	76
	1,3	41	75	67
	1,0	36	50	59
M12	1,8	79	111	129
	1,3	65	91	107
M14	2,0	124	174	203
	1,5	104	143	167
M16	2,0	170	237	277
	1,5	139	169	228
M18	2,0	258	363	422
	1,5	180	254	296
M20	2,5	332	469	546
	1,5	229	322	375
M22	2,5	415	584	682
	1,5	282	397	463
M24	3,0	576	809	942
	2,0	430	603	706
M27	3,0	740	1050	1250
	2,0	552	783	933
M30	3,5	1000	1450	1700
	2,0	745	1080	1270
M36	4,0	1290	1790	2020
	2,0	960	1340	1500

NOTE! It is forbidden to work on a damaged machine caused by any event resulting in a broken, or deformed frame, shaft or other assembly of the machine!

6 Operation of the cultivator SUPER

- **Everyday service**

Each time you finish working with the unit, thoroughly clean the soil and plant debris and inspect the bolt and pin connections and the condition of the working elements and other parts. When cleaning, plant debris and strings winding up at the bearing points of the roller should be removed. If parts are found to be damaged or worn, they should be replaced. All loose screw connections must be tightened and damaged cotter pins and pins must be replaced.

- **Post-season service**

At the end of the operating season, the unit must be thoroughly cleaned, any damage to the paintwork repaired, and the stripped working surfaces of the tines and roller, as well as the threads of the adjusting screws, must be washed with "Antykor" paraffin and protected against corrosion with anti-corrosion grease. Additionally, all grease points must be fully lubricated. During periods of non-use, it is recommended to store the machine under a roof. However, if this is not possible, the condition of the protective coating should be checked periodically, and any grease washed away by rain should be replenished as necessary.

NOTE! During maintenance work, the unit should be secured against rolling (it should be connected to the tractor with the parking brake on) and unfolded.

Regular control of wheel pressure.

If there is a significant loss of air from the tyres, check the air valve for leaks. Next, take the wheel to a specialised workshop to locate and repair the damage. Significantly damaged tyres (particularly profile damage) must be replaced immediately.

Setting of wheel bearing axial clearance.

It is recommended that this operation is carried out by a specialised company.
Performed by tightening the nut on the wheel hub after the wheels have been removed. Recommended play is 0.12-0.15 mm. Inspection and adjustment should take place every 2 years.

Axial play removal procedure:

- Removal of the hub cover and the spring pin securing the spring nut.
- At the same time, while turning the hub, press down and tighten the crown nut.
- Tightening is complete when no more than half a turn of the hub is caused by vigorous hand rotation.
- Partially loosen the nut until the hub rotates freely and repeat the tightening.
- After repeated rotation locking, loosen the nut by 30° max. until the immediate nut locking with the pin is possible. Mark the position with a line.

- From the marked position, unscrew the nut by half a turn and, with a gentle tap, press the hub against the nut as far as it will go.
- Tighten the nut to the position marked with the line.
- Fit the hub cover.

➢ Operation of the hydraulic system

Maintenance of the hydraulic system consists of a visual inspection for leaks. Remember to put plugs on the quick-release couplings. Oil leakage at the connections of the hydraulic lines should be tightened. If this does not rectify the fault, the component or hose must be replaced with a new one. Leakage occurring outside the connector - the leaking hose must be replaced with a new one.

Mechanical damage also requires replacement of the component. It is recommended to replace the hydraulic hoses every 5 years.

Appearance of oil on the piston rod of the hydraulic actuator - check the nature of the leak. When the piston rod is fully extended, check the sealing points. Minor leaks characterised by wetting of the piston rod with an "oil film" are permissible (defective sealing ring). In the event of heavier sweating or the appearance of drops, the unit should be switched off while the fault is being rectified (defective seal).

6.1 Main transport dimensions of the cultivator SUPER

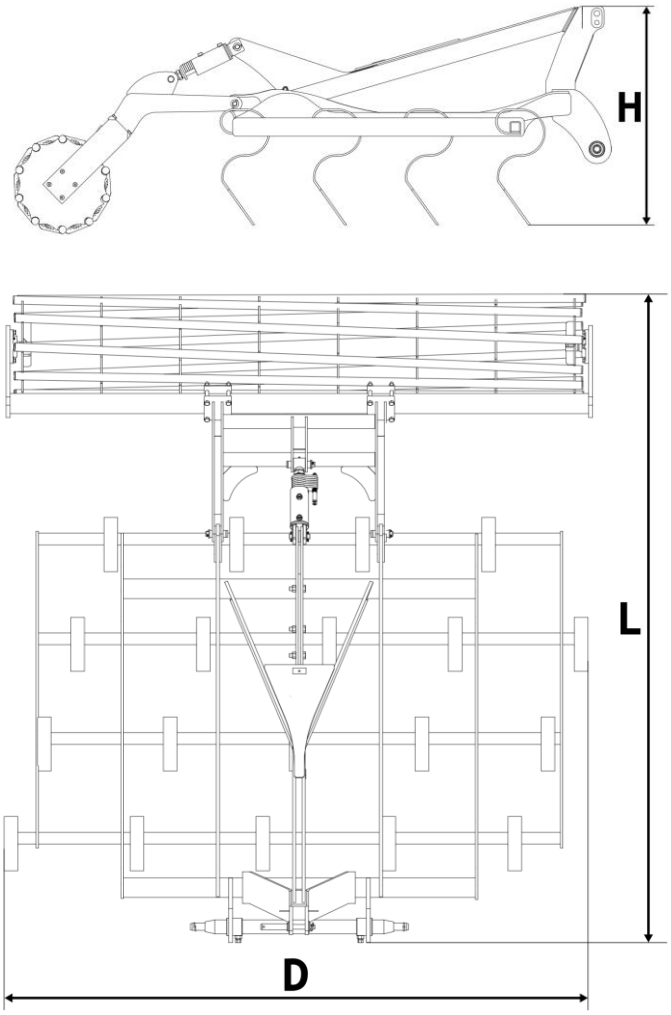


Figure 21 Transport dimensions of the cultivator SUPER 3,0m wide with tubular roller option (D – width, L – length, H – height) (see Table 3)

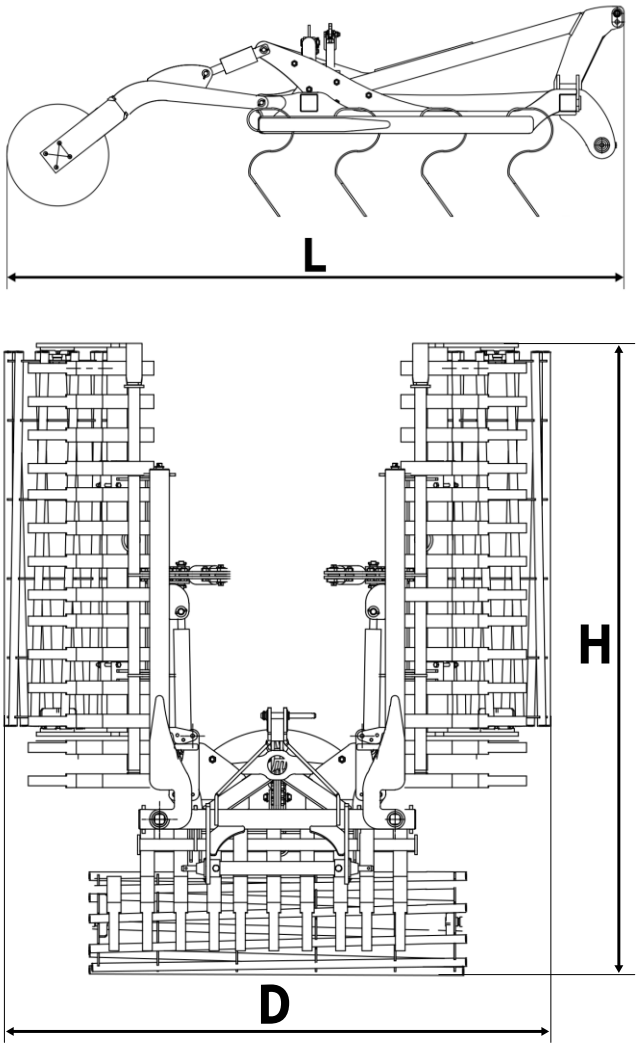


Figure 22 Transport dimensions of the cultivator SUPER 4,00m, 5,00, and 6,00 wide with tubular roller option (D – width, L – length, H – height) (see Table 3)

- Optional version to work on the front tree-point linkage

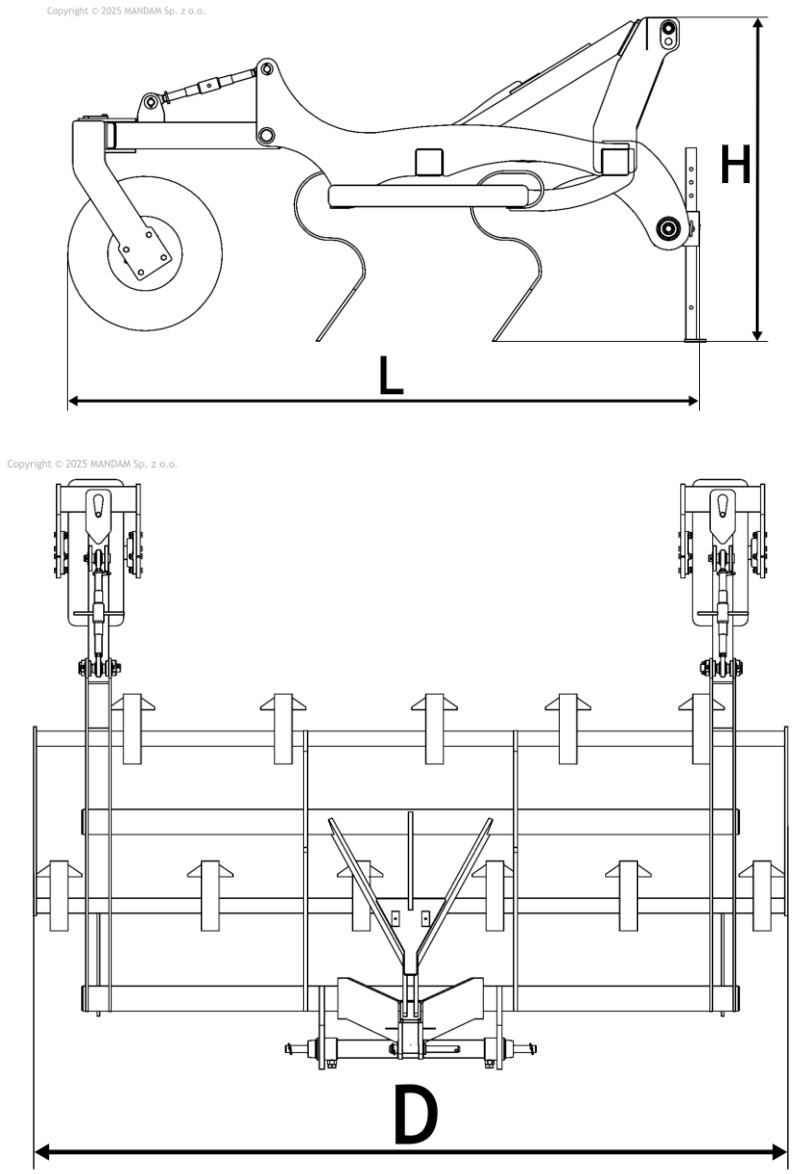


Figure 23 Transport dimension of the cultivatior SUPER FRONT 3,00m (L - length, H - height, D - width) (see Table 4)

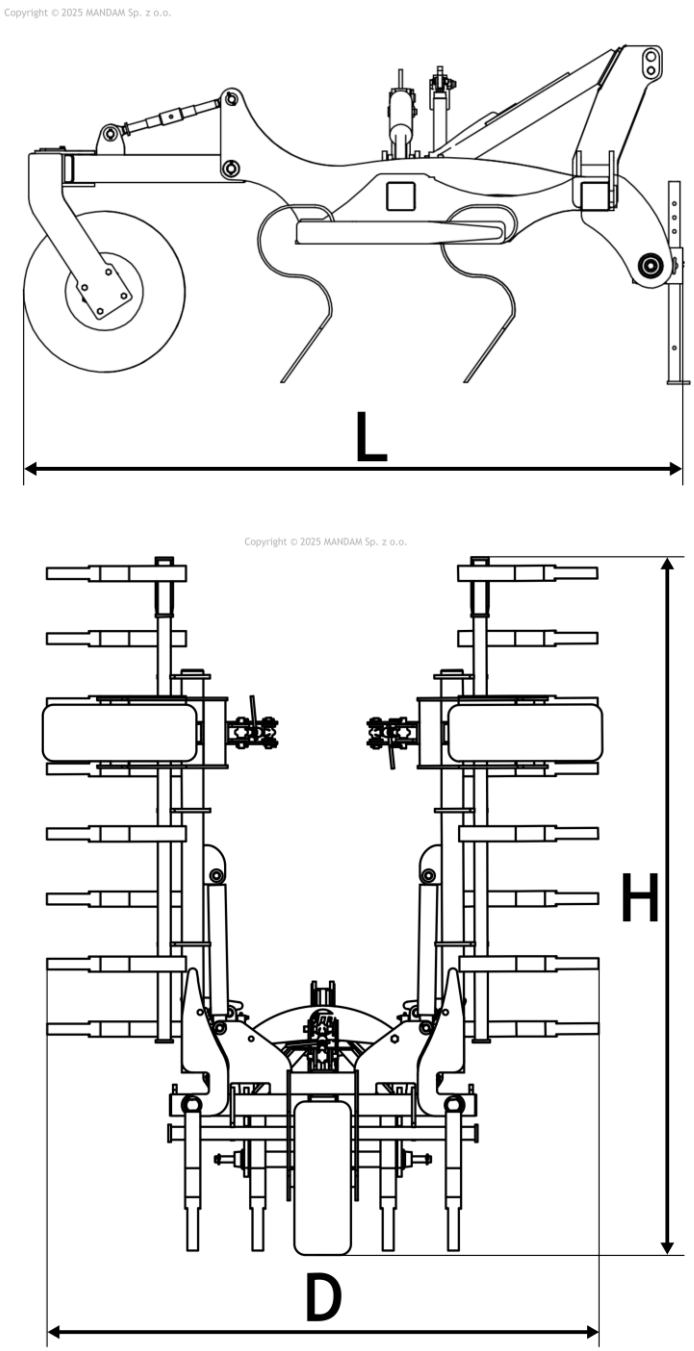


Figure 24 Transport dimensions of the cultivator SUPER FRONT 4,00m, 5,00m, 6,00m (L – length, H – height, D – width)(see table 4)

6.2 Specifications

Table 3 Technical characteristics of the cultivator SUPER

L.p.	Parameters	Unit				
1	Machine type		SUPER 3,0	SUPER 4,0 H	SUPER 5,0 H	SUPER 6,0 H
2	Working width	m	3,00	4,00	5,00	6,00
3	Hydraulically foldable	-	NO	YES	YES	YES
4	No. of tine	pcs.	19	25	31	37
5	Distance between tine	mm	644			
6	Type of tool	mm	Sweep 180 mm (standard) or 200 mm (option) / Share ALL X (option)			
7	Unit dimensions in transport position**	Length [L]	3280	3640	3640	3640
		Height [H]	1260	2620	2920	3220
		Width [D]	3000	2770	2770	2770
8	Power requirement	KM	80	100	120	140
9	Total unit weight*	kg	735	1556	1730	1972
10	Transport speed	km/h	max 15	max 15	max 15	max 15

** weight of the cultivator SUPER without work roller*

*** dimensions of cultivator SUPER with tubular roller*

Table 4 Technical characteristics do the cultivator SUPER FRONT

L.p.	Parameters	Unit				
1	Machine type		SUPER F 3,0	SUPER F 4,0 H	SUPER F 5,0 H	SUPER F 6,0 H
2	Working width	m	3,00	4,00	5,00	6,00
3	Hydraulically foldable	-	NO	YES	YES	YES
4	No. of tine	pcs.	11	13	17	21
5	Distance between tine	mm	530	600		
6	Type of tool	mm	Sweep 180 mm (standard) or 200 mm (option) / Share ALL X (option)			
7	Unit dimensions in transport position	Length [L]	2340	2380	2380	2380
		Height [H]	1220	2600	2900	3200
		Width [D]	3000	2600	2600	2600
8	Power requirement	KM	70	110	130	150
9	Total unit weight	kg	750	1100	1250	1400
10	Transport speed	km/h	max 15	max 15	max 15	max 15

7 Replacement procedures

If the roller bearings (V-ring, T-ring, C-ring) are damaged, they must be replaced as follows:

- Place the machine on a horizontal surface,
- Remove the two screws between the rings on each side,
- Move the roller away,
- First, remove the retaining ring at the end of the roller secured by headless screws and pull off the roller wheels,
- Pull the bearings using an extractor.
- Fit the new bearings loosely onto the roller, fit the wheels and retaining rings; screw in the headless screws using glue to prevent loosening),
- Roll the roller between the bearing plates and screw the bearings to them.

If the roller bearings (tubular, rubber, disc) are damaged, they must be replaced as follows:

- Place the machine on a horizontal surface,
- Unscrew the four screws holding the ball bearings on each side,
- Move the tubular roller away,
- Loosen the two headless screws on each bearing and pull off the bearings using an extractor,
- Fit the new bearings loosely onto the roller,
- Roll the roller between the bearing plates and screw the bearings to them. Screw in headless screws using adhesive to prevent loosening,

➢ **Replacement of working components**

Excessively worn working element make it difficult for tools to penetrate and cause an increase in working resistance. The working components must be changed on the machine lowered to the ground after the tractor engine has been switched off. To ensure that the elements to be replaced do not come into contact with the ground, sturdy shims (e.g. wooden blocks approx. 20 cm thick underneath adjacent elements or the roller) must be provided. In the case of a trolley, the maximum lowered wheels can also be used as supports. After lowering the harrow, switching off the tractor engine and applying the handbrake, check the stability of the tractor-machine combination. Only typical screws should be used to fix new components.

If machine components are disassembled several times, it is necessary to inspect and possibly replace connecting elements such as bolts, washers or nuts, excessive wear of which may lead to uncontrolled loosening of the connecting elements and subsequent damage.

When working on extremely worn work tools, such work can cause, for example, bearing damage in the case of a small disc diameter. Tools should be replaced when their wear and tear exceeds the limits allowed by the manual. Failure to follow the recommendations may result in damage, for which the manufacturer is NOT RESPONSIBLE!

- **Replacement of actuators**

A malfunctioning actuator, leakage, etc. must be replaced by dismantling and returning it to a specialist workshop. Replacement of the actuator must be carried out on an unfolded machine. Connect the actuator to the system and mounted on one side, it should cycle a few times to fill the actuator completely with oil. Failure to do so may result in a sudden fall of the drop section.

NOTE! Before dismantling, the unit must be disconnected from the tractor.

NOTE! When carrying out repairs and maintenance, the machine should be lowered to the ground and supported on supports to ensure full stability and the tractor engine switched off. Use proper spanners and protective gloves during maintenance and repairs.

8 Storage of the cultivator SUPER

- After finishing work, you should:
  - Lower the machines gently onto a firm, level surface,
  - Hydraulically folding machines should be unfolded so that the working tools are pointing downward.
  - Place wooden, plastic or rubber pads under the working elements. These pads will precent direct contact with the ground and prevent deformation or cracking of the working elements due to the weight of the machine,
  - Secure against uncontrolled movement (e.g., use wedges under the wheels and roller),
  - Disconnect the machine form the tractor,

- At the end of the working season with the unit, the roller should be thoroughly cleaned of soil and plant residues, the bolted and pin connections should be inspected and the condition of the working elements and other parts should be checked. When cleaning, plant debris and strings winding up at the bearing points of the roller should be removed.

- If parts are found to be damaged or worn, they should be replaced. All loose screw connections must be tightened and damaged cotter pins and pins must be replaced. The unit should be stored in covered premises. In the absence of a covered area, outdoor storage of the machine is permitted.

- **The unit should be stored in a place that does not pose a threat to people and the surroundings.** If the machine is stored outdoors for a long period of time, the maintenance of the working parts should be repeated when the preservative layer is rinsed off.

Clean the piston rods of the hydraulic actuators during winter and when the machine is not in use for a long period of time and protect them with technical petroleum jelly or acid-free grease to protect them from corrosion.

NOTE! The unit must rest on the support feet during storage. The machine should only be placed on hardened ground with a slope of no more than 8.5°. Wedges should be placed under the roller.

- The machine, when uncoupled from the tractor, should support itself on firm and level ground, maintaining a firm balance. All work units should rest on the ground. The machine should be lowered gently so as not to expose the working parts to impact on hard ground.

- Once the machine is down, disconnect the suspension system and drive the tractor away. Also, components dismantled from the machine must be stored securely supported on the ground, excluding the possibility of uncontrolled movement. It is advisable to store the machine in a paved and covered area that is inaccessible to bystanders and animals.

Store the machine securely supported on a hard surface to prevent injury to people or animals.

- For safety reasons, the unit with a working width of more than 3.00 m should be stored unfolded with the discs facing downwards.

9 Disassembly and disposal

- A machine used in accordance with the rules in the operating instructions will last for many years, but worn or damaged components must be replaced with new ones. In the event of emergency damage (cracks and deformation of the frames) impairing the quality of the machine's work and posing a danger to further operation, the machine must be scrapped.

- The disassembly of the machine should be carried out by persons previously familiar with its construction. These operations should be carried out after the machine has been set up on a level and stable surface. Disassembled metal parts should be scrapped and rubber parts should be taken to a recycling facility. The oil should be poured into a sealed container and taken to a recycling facility.

- The dismantling and disposal of the used machine poses little risk to the environment. Start dismantling the machine by removing small components (pins, bolts, etc.) before moving on to larger ones. The dismantled machine should be taken to a steel scrap collection point as secondary material.

NOTE! When dismantling the machine, every precaution must be taken using operable tools and personal protective equipment. Disassembled parts must be disposed of in accordance with environmental protection requirements.

NOTE! Before dismantling, the unit must be disconnected from the tractor.

10 Spare parts for the cultivator SUPER

- To search for, price and order original spare parts for MANDAM Sp. z o.o. machinery, please visit our website at: www.mandam.com.pl/en/, tab “parts”.

- On this page, we provide catalogues and spare parts sheets in PDF format, containing up-to-date parts diagrams for each machine, together with their numbers and prices. The ordering regulations can also be found there.

Parts orders, or enquiries regarding them, can be made directly from this page (tab: “contact/order”) or via e-mail:

@ parts@mandam.com.pl

- The order should include the part numbers and quantities, as well as the purchaser/payer's details including a contact telephone number.

The parts are dispatched directly to the address given, and payment is made by bank transfer or by collection on delivery. In case of doubt, please contact the Mandam Sp. z o.o. spare parts department on the following telephone numbers:

+48 32-232-26-60 wew. 35, 39

+48 797 518 831 (Mateusz)

+48 668 662 289 (Jerzy)

Original spare parts are also available from all authorised distributors of MANDAM Sp z o o machines.