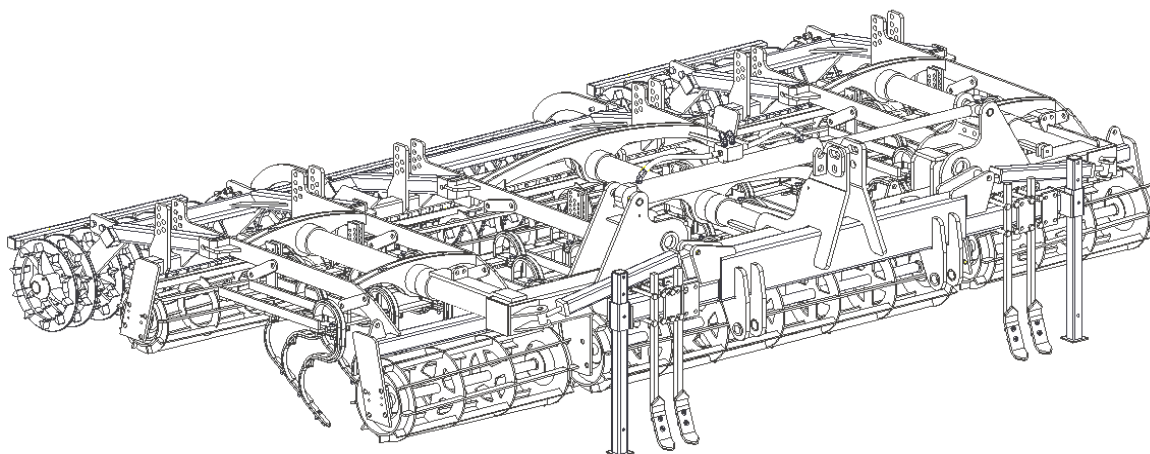




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OPERATION MANUAL

FLEX PRE-SEEDING CULTIVATOR 3.0; 4.0H; 5.0H; 5.8H



Revision V
Gliwice 2025

INSTRUKCJA
TŁUMACZENIE
ENG
ORYGINALNEJ

EC DECLARATION OF CONFORMITY

FOR THE 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:

FLEX PRE-SEEDING CULTIVATOR

type/model:

year of production:

factory no.:

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

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mgr inż. Józef Seidel

.....
Place and date of issue

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

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1 Introduction

Congratulations on your purchase of the FLEX pre-seeding cultivator. This manual provides information on the hazards that may occur when working with 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 FLEX pre-seeding cultivator 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 pre-seeding cultivator FLEX 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, 797 518 831
-  czesci@mandam.com.pl
- authorised distributors of machines from Mandam Sp. z o. o.

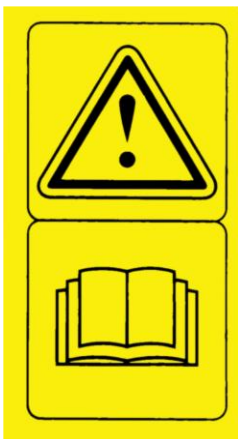
1.1 Information and warning signs




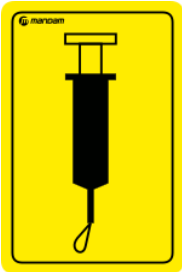

Remember! When using the cultivator, special care should be taken in areas marked with special information and warning signs (yellow stickers).

- 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

<i>Safety signs</i>	<i>Meaning of the safety sign</i>
	Read the operating instructions before use.

Safety signs	Meaning of the safety sign
	Crushing of the toes or foot.
	Keep a safe distance from foldable and moving parts of the machine.
	Do not reach into the crushing area if part may move.
	Pressurised liquid jet - bodily harm.

Safety signs	Meaning of the safety sign
	Fixing point for transport belts.
	Lubrication point.
	Note about riding ban on rollers.

2 General information

2.1 Construction of the FLEX pre-seeding cultivator.

The FLEX pre-sowing cultivators are available in widths of: 3.0m, 4.0m, 5.0m and 5.8m

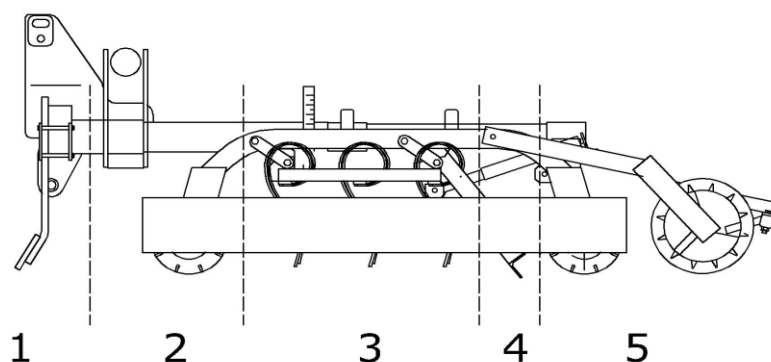


Figure 2 Working sections of the FLEX cultivator (1- track erradicators, 2- Ø350 mm crumbling and levelling roller, 3- tine section, 4- levelling bar, 5- Ø350 mm pressing and crumbling roller section and Ø400 mm pin shafts section)

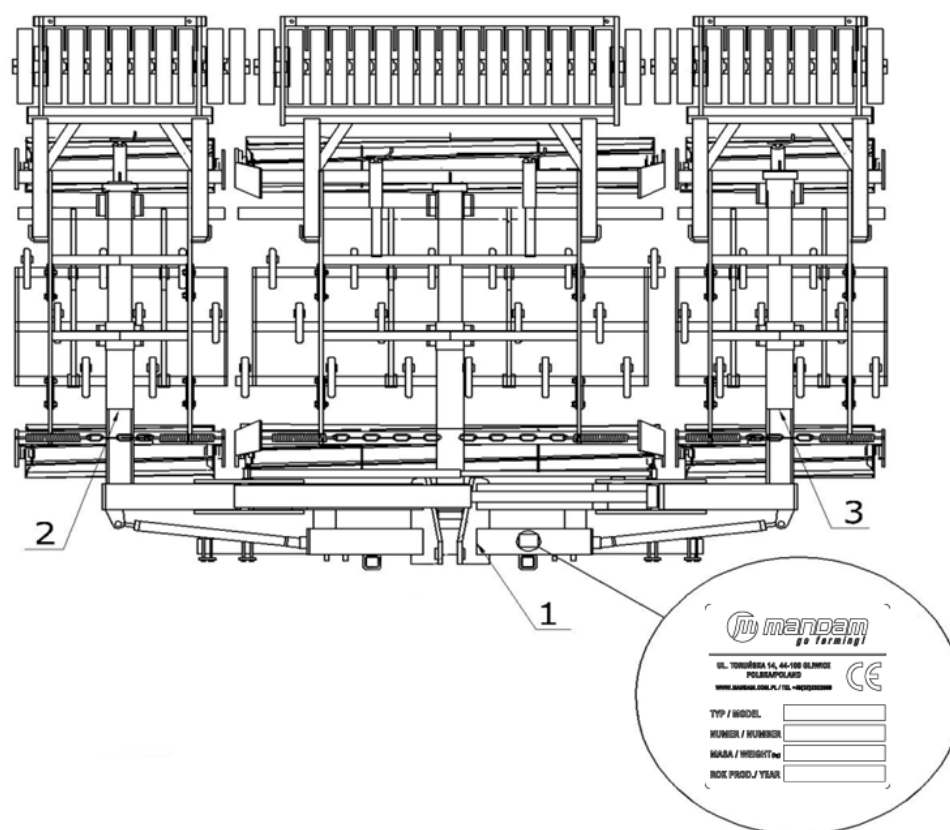


Figure 3 View of the FLEX H cultivator from the location of the rating plate (1- middle frame, 2- right frame of the working sections, 3- left frame of the working sections)

2.2 Purpose of the pre-seeding cultivator

The Flex cultivation unit is intended for soil cultivation before sowing. The Flex pre-sowing cultivator is intended for opening the topsoil, breaking up and crushing clod of encrusted field surface, leveling and pressing the subsoil for better ascent of ground waters. The Flex cultivator is especially useful during cultivation of plants which require particularly levelled field before sowing of seeds, e.g. before point sowing of sugar beet. Proper configuration of the unit enables preparation of the field for sowing in one passage. Working elements of the Flex unit include cultivator tines ending with cultivator points or duck feet. The cultivator tines are placed in three rows.

The working elements of the seedbed cultivator are:

- Front string roller with a diameter of Ø 355 mm,
- Three rows of reinforced tines with straight or duck foot shares,
- Leveling harrow,
- Rear string roller with a diameter of Ø 300 mm,
- Pin shafts with a diameter of Ø 400 mm,



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 pre-seeding cultivator FLEX 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 machine and tractor are in safe running and working condition,
- 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,
- do not approach the machine while it is being raised or lowered,
- it is forbidden to stay between the tractor and the machine while the engine is running,
- start up, lift and lower the machine slowly and gently without sudden jerks, taking care not to allow any bystanders in the vicinity,
- it is forbidden to reverse the tractor or make a U-turn with the machine lowered into the working position,
- the tractor's independent brakes must not be applied during turning,
- 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,
- the machine must not be operated on inclines greater than 12° ,
- carry out any repairs, lubrication or cleaning of working parts only with the engine switched off and the machine lowered and unfolded,
- during maintenance and when replacing parts, going inside or underneath the machine without adequate protection can cause head injuries - a helmet should be used in this case.
- when not in use, lower the machine to the ground and stop the tractor engine,
- weeder harrows with a working width greater than 3.00 m are fitted with a mechanical locking device to prevent the wings from opening uncontrolled when stationary and during road transport,
- driving and parking the unit next to a slope with unstable ground may cause a landslide.
- machinery must be stored in such a way as to prevent injury to people and animals.



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! The weeder harrow is not approved for use on public roads as standard.

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

The following points must be followed when coupling and uncoupling:

- 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 system

- The hydraulic and pneumatic 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 hoses.
- the unit must be taken out of service while the hydraulic 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 roller 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 FLEX cultivator 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. The harrow should be secured against unfolding with chain protection.

- **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 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.



Apart from the working elements mounted on the machine, the user does not receive any spare parts.

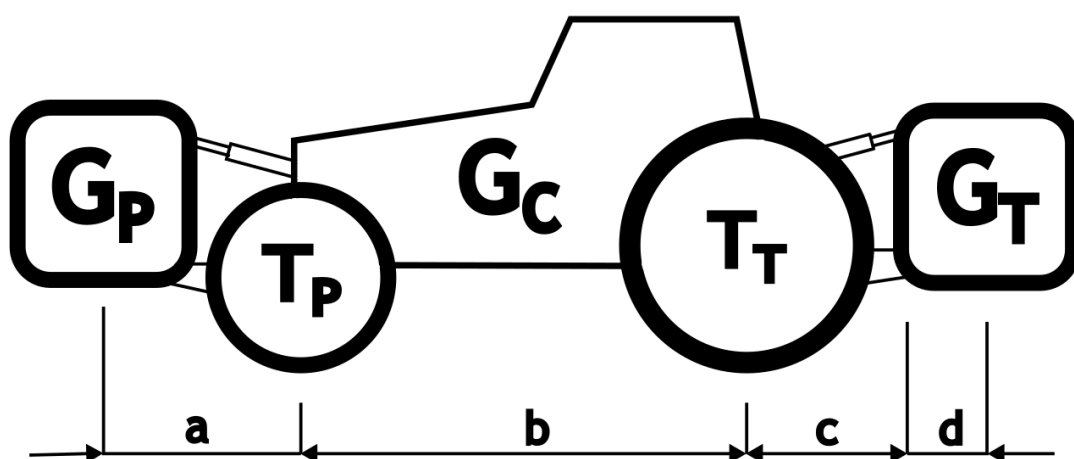


Figure 4 Diagram of tractor load designations

Minimum load at the front for rear-mounted machine:

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

Actual front axle load

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

Actual total weight

Designations:

G_C - tractor dead weight,

T_P - front axle load of the empty tractor,

T_T - rear axle load of the empty tractor,

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,

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

Actual rear axle load

$$T_{Tcal} = G_{cal} - T_{Pcal}$$

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 pre-seeding cultivator FLEX for work

The FLEX cultivator is most often delivered ready for operation. Due to transportation limitations, it can also be supplied partially disassembled - most commonly, this involves detaching the pin shaft from the frame.

If the cultivator is delivered with the roller detached, the pre-seeding cultivator should be placed on a flat, solid surface in an area that allows maneuvering of the roller. For transporting the roller, use a lifting device with a load capacity of at least 500 kg to ensure stability during handling. Position the arms in the mounts on the cultivator frame and fasten the arms to the frame with bolts (Fig. 5).

4.1.1 Installation of pin shaft

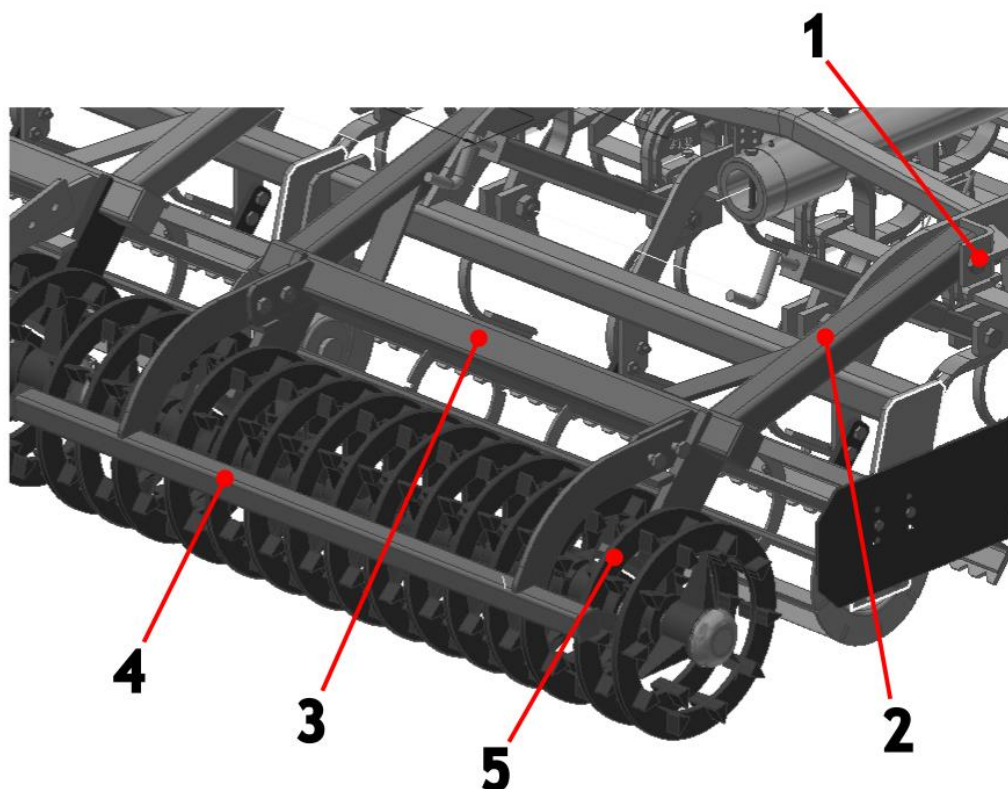


Figure 5 View of pin shaft installation on the FLEX cultivator
(1 - bolts for fastening the arms to the cultivator frame, 2 - roller clamp arms, 3 - roller clamp, 4 - roller scraper, 5 - pin shaft)

Due to the proper operation of the pre-seeding cultivator, the pin shafts are offset in relation to the string rollers, which ensures uniform soil cultivation across the entire working width of the implement. Because of this feature, the machine is equipped with rollers of different widths. This must be taken into account during the assembly of the seedbed cultivator, as each roller has a precisely designated mounting position on the machine. The widths of the pin shafts along with their locations are shown below. (Fig. 6, 7, 8, 9)

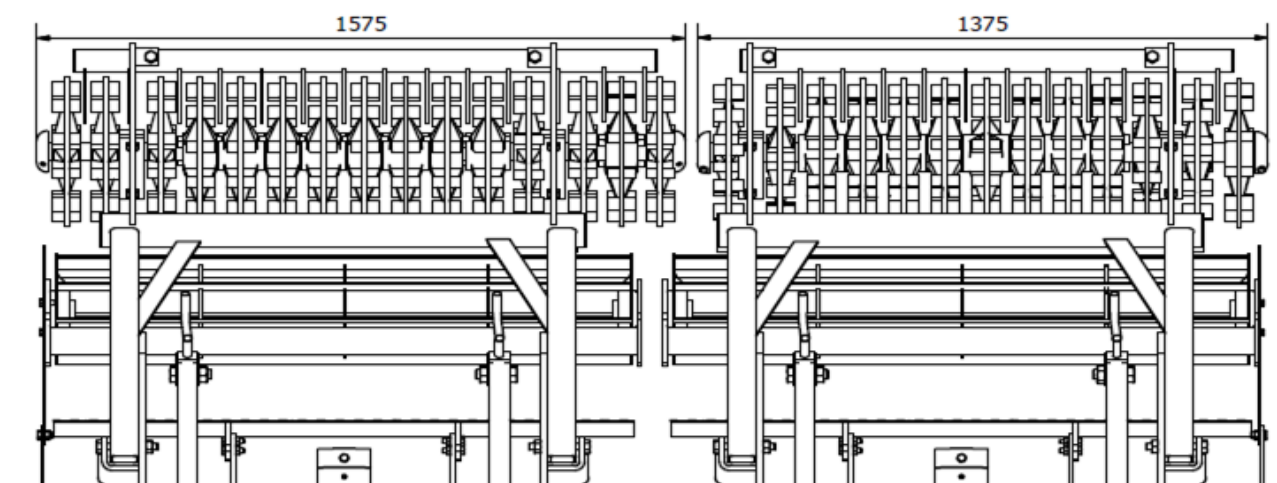


Figure 6 Arrangement of pin shafts of the FLEX 3.0 cultivator.

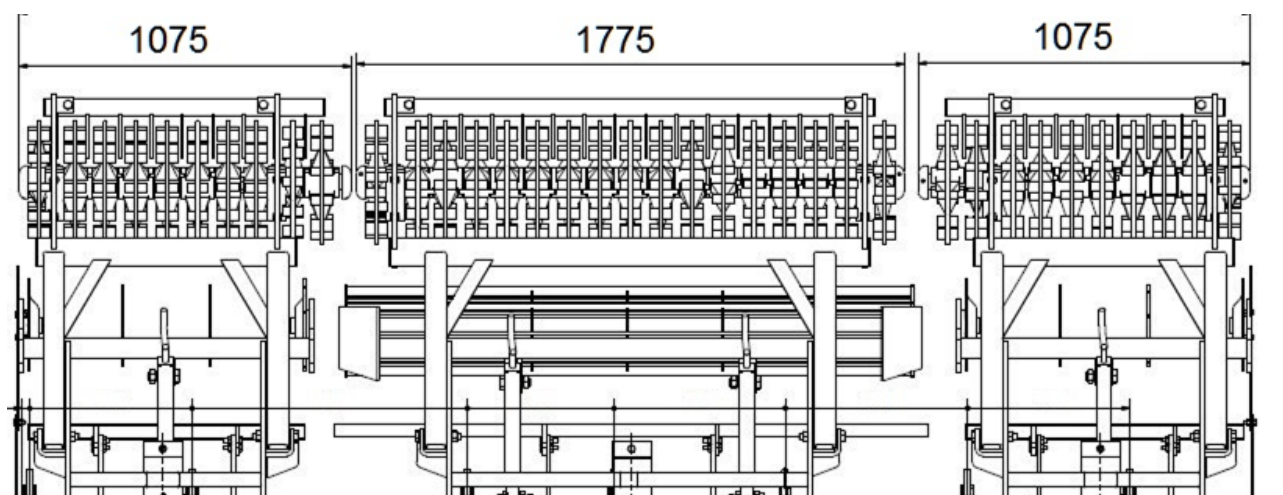


Figure 7 Arrangement of pin shafts of the FLEX 4.0H cultivator.

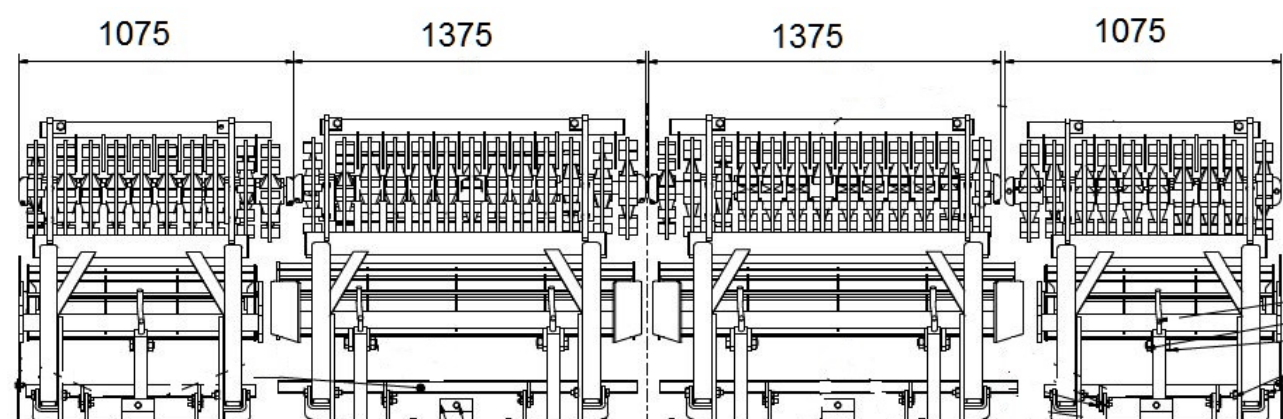


Figure 8 Arrangement of pin shafts of the FLEX 5.0H cultivator.

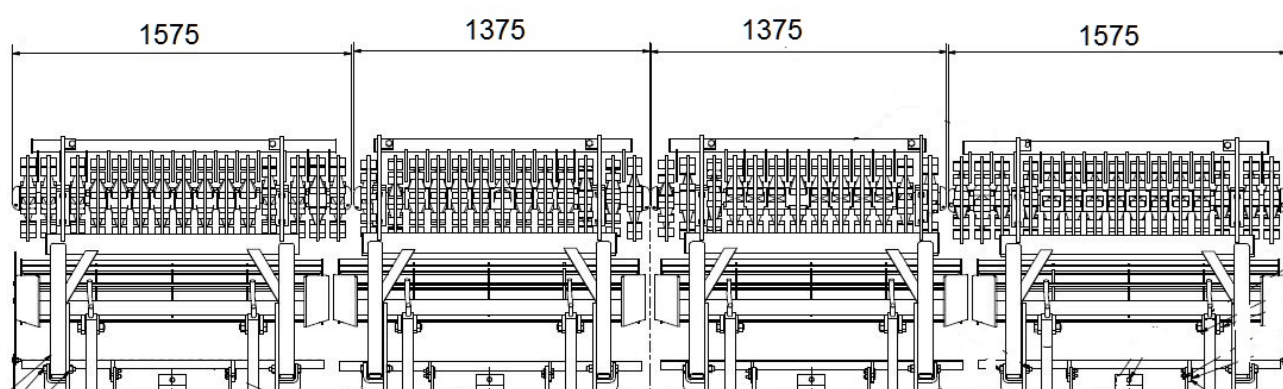


Figure 9 Arrangement of pin shafts of the FLEX 5.8H cultivator.

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.

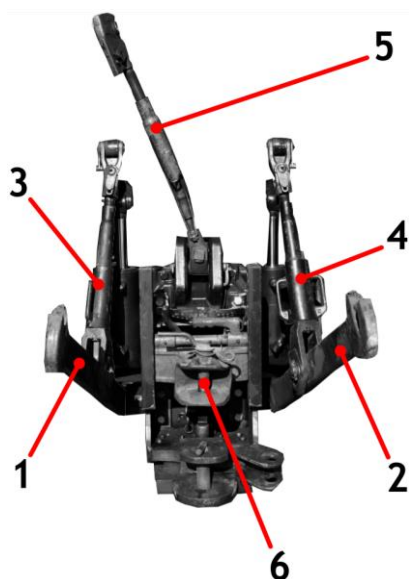


Figure 10 Three-point linkage of the tractor (1,2 - lower links, 3 - left suspension with adjustable length, 4 - right suspension with adjustable length, 5 - upper fastener, 6 - transport hitch)

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,



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 adjustments

5.1.1 Chain lock to transporting the pre-seeding cultivator

With transport safety of the pre-seeding cultivator in mind, safety chains have been installed. Before unfolding the machine's folding wings, the shackle securing the chain must be removed, and then the safety lock can be released. (Fig. 11)

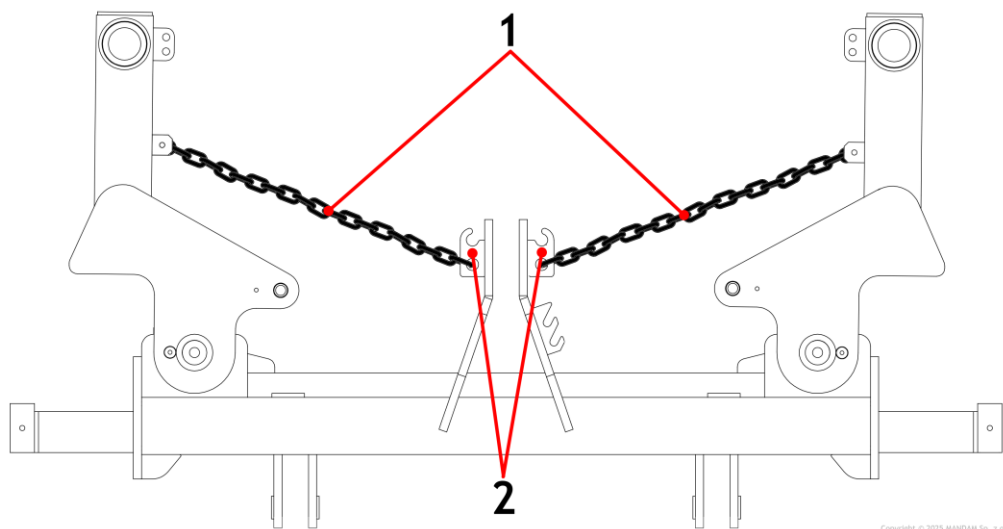


Figure 11 Chain protection preventing cultivator unfolding during transport
(1 - safety chains, 2 - chain holders)

Before starting field work, the position of each working section of the implement must be preliminarily adjusted.

The machine should also be levelled:

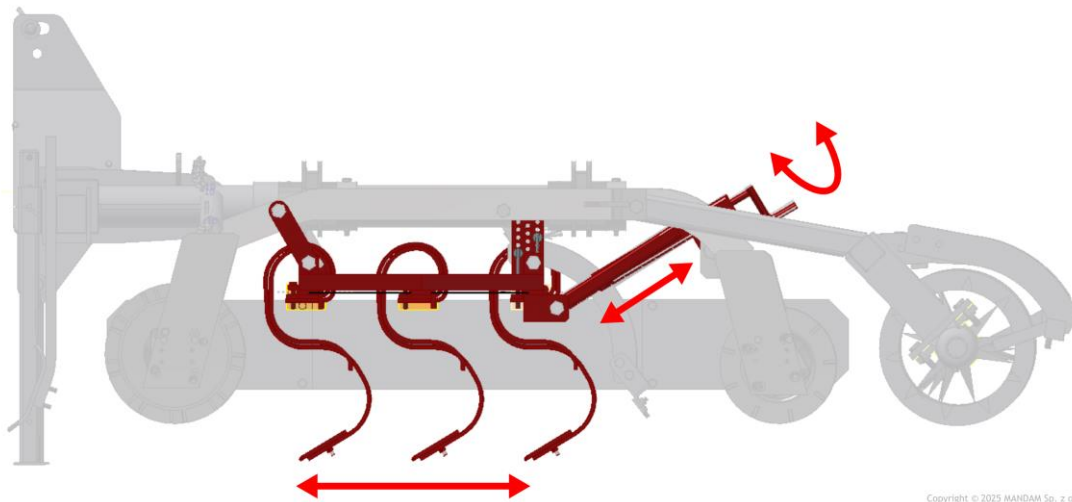
- longitudinally, using the tractor's top link or the turnbuckle on the drawbar,
- laterally, using the right lower link lift rod on the tractor.

Next, perform the first working pass to determine the optimal operating speed and to fine-tune the adjustments based on the observed performance of individual working units.

The recommended operating speed is **8-12 km/h**. In a properly adjusted implement, the frame should remain parallel to the ground, and all working elements should penetrate the soil evenly across the entire working width.

5.1.2 Tine depth regulation of the cultivator

The working depth of the tines on the FLEX pre-seeding cultivator is adjusted using the crank handles located above the string roller (Fig. 12). The crank handles are accessible from the rear of the machine.



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Figure 12 Tine depth regulation of the pre-seeding cultivator

5.1.3 Leveling bar adjustment of the cultivator

The leveling bar located behind the tines can be adjusted in two ways. The first method is by limiting its backward tilt using a pin above the leveling bar arm, allowing the bar to work under its own weight. By inserting the pin below the leveling bar arm, the downward movement of the bar is restricted, which helps prevent soil from accumulating in front of it. The second adjustment method involves changing the pivot point of the leveling bar arm by moving it up or down. To do this, the arm should be shifted up or down to align with the desired holes, then the pin should be repositioned and secured.

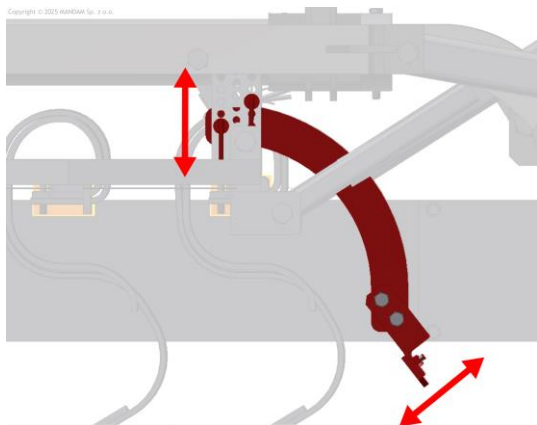
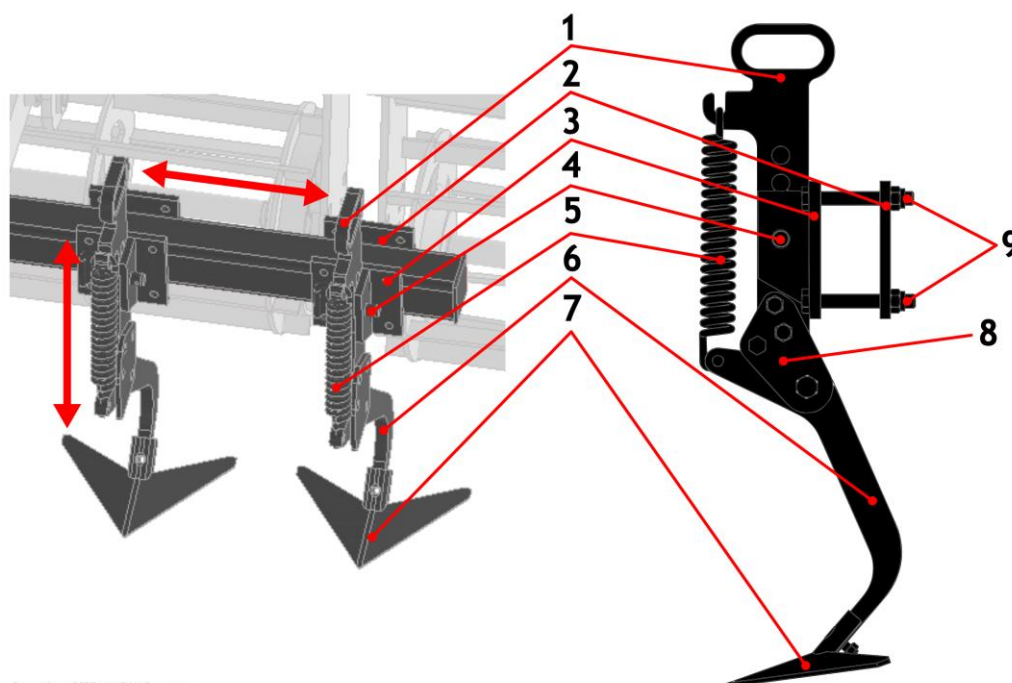


Figure 13 Way of regulation leveling bar

5.1.4 Construction and adjustment track erradocators

The track looseners are attached to the front bar using fixing plate and screws. Their position and working depth can be adjusted to match the spacing and type of the tractor wheels. This is done by loosening and remove the pin on the fixing plate, repositioning the teeth by pull handle and then reinstall the pin.

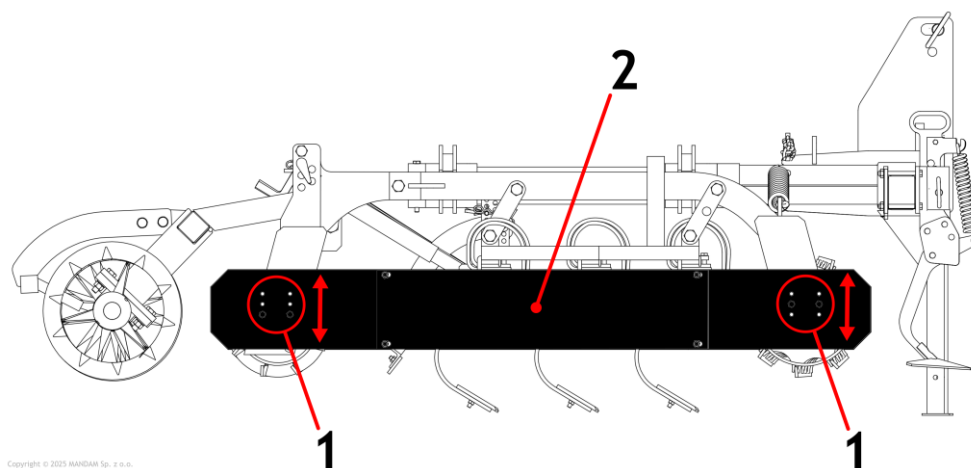


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Figure 14 Construction and regulation track erradicators (1 - handle, 2 - flat bar, 3 - fixing plate, 4 - holding pin, 5 - spring, 6 - eradicator tine, 7 - tine, 8 - fixing plate, 9 - mounting screws)

5.1.5 Adjustment height side screen

The height of the side screen is adjusted according to the working depth of the tines. There are three holes available in the each side of screen, allowing for vertical adjustment. New position of side screen should secure with screws and nuts.



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Figure 15 Adjustment height side screen of the cultivator (1 - points of regulations with screws, 2 - three parts side screen)

5.1.6 Adjustment pin shafts comb

The pin shaft comb can be tilted to remove any stones, branches, or other foreign objects that may be obstructing the shaft's rotation. To do this, unscrew and remove the screws (Fig. 16, item 2) and loosen the screws (Fig. 16, item 1) on the comb arm, which will allow the comb to tilt. To disassemble, unscrew and remove the screws (Fig. 16, item 1).

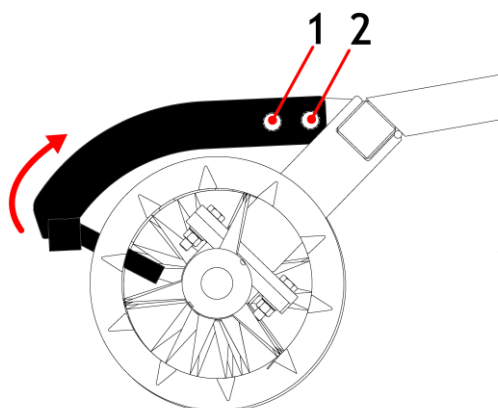


Figure 16 Change of position comb (1 and 2 - screws holding comb arm)

5.1.7 Adjustment and regulations of the chain-spring stay of work field

The purpose of work field tensioning is to provide horizontal stabilization of them. The goal is to prevent and/or cushion lateral movement of the field during operation. Shortening the stay chain increases the spring tension, which stiffens the work field. To maintain proper work field alignment, ensure that both stays are the same length.

- **It is forbidden to work without lashings or with different lengths of lashing chains !**

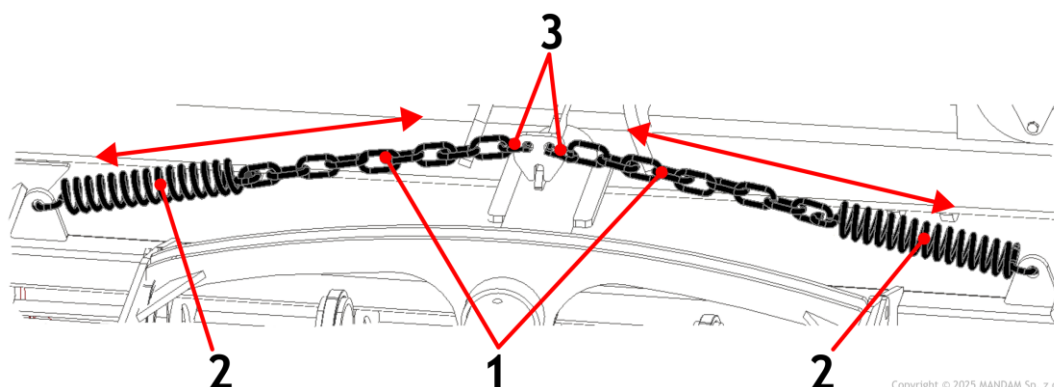


Figure 17 Chain-spring stay (1 - chain, 2 - spring, 3 - shekel)

5.1.8 Location and adjustment rubber bumpers work field (option)

An alternative solution for chain-spring stays for working fields is the use of buffers. They limit the working field's deflection during work, travel, or turning, keeping the fields in a horizontal position. Unscrewing the rubber bumpers limits the working field's deflection, while screwing it in allows for freer movement.

- It is forbidden to work without rubber bumpers it may provoke damage of the machine !

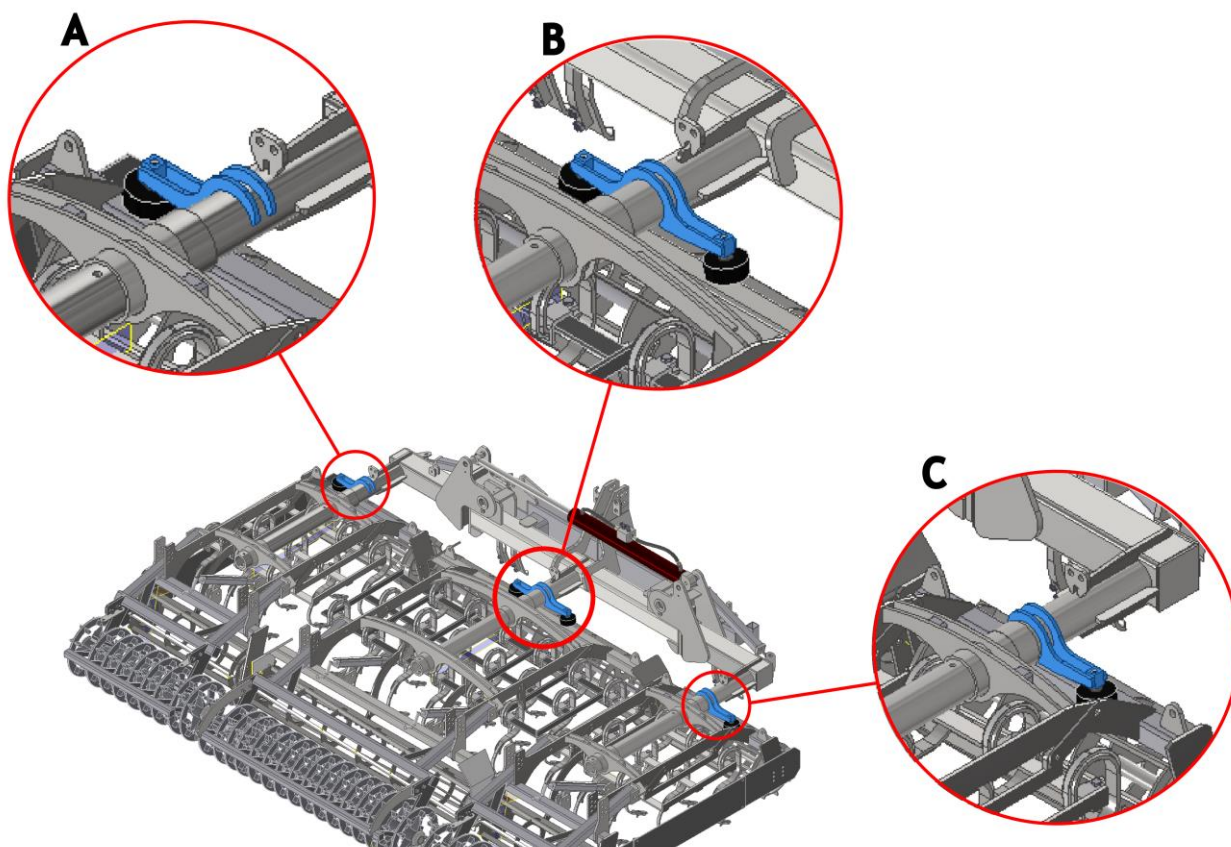


Figure 18 Locations of rubber bumpers on example of pre-seeding cultivator FLEX 4.0 H (A - rubber bumper for the side work field, B - rubber bumpers for the middle work field, C - rubber bumper for the side work field)

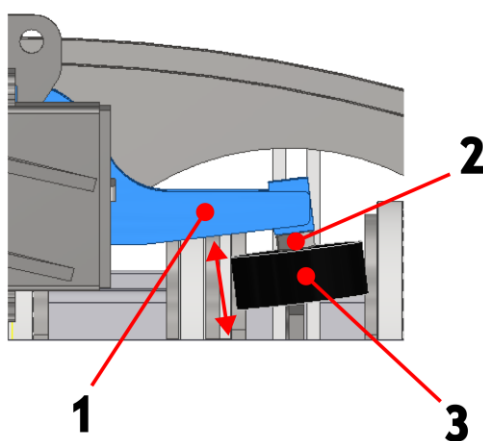


Figure 19 Construction of the rubber bumper (on example rubber bumper of the side working field (1 - arm of the bumper, 2 - lock nut, 3 - rubber bumper)

5.2 Positioning of the cultivator in the field work and transport

➤ Turning the cultivator correctly

Turning with the machine buried in the spoil in or turning on rollers is not permitted

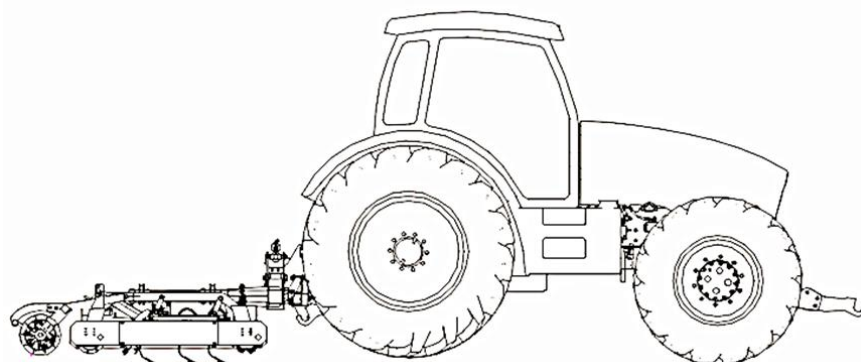


Figure 20 Incorrectly turning the cultivator

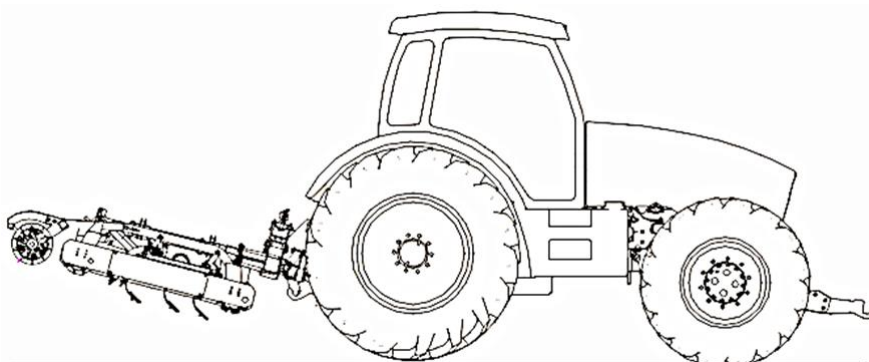


Figure 21 Correctly turning the cultivator

Turning at field ends/headlands only permitted with the machine raised !

When working with the machine, it is also advisable to use an additional weight on the front of the tractor to enable more stable and comfortable working.

➤ **Levelling**

To level the machine, use the screws located under the hinges between the main frame and the wings. Use a wrench suitable for the unscrewing or screwing. Remember to do regulation on solid and horizontal surface.

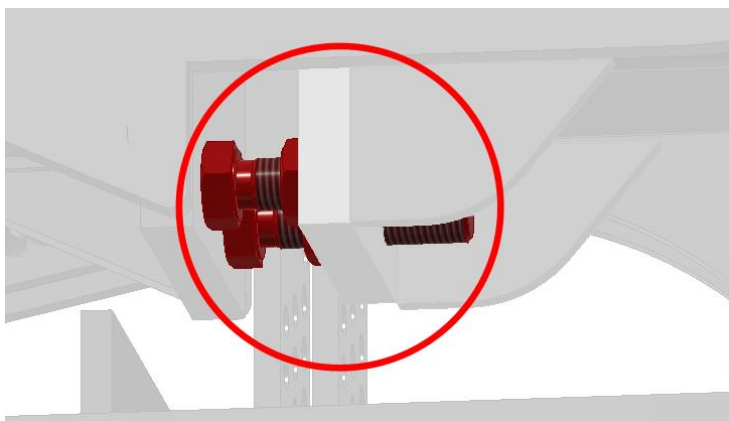


Figure 22 Screws for leveling of the cultivator

5.3 Rules of transporting the pre-seeding 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.



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.

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.



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 disc harrow equipment. 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. **Do not forget to secure the automatic wing lock!**
- 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 disc harrow 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.

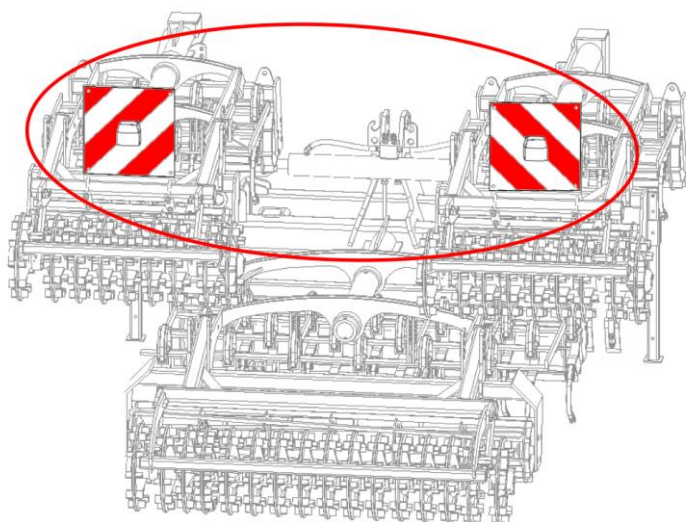


Figure 23 Rear light arrays and location on the cultivator FLEX 4,0H

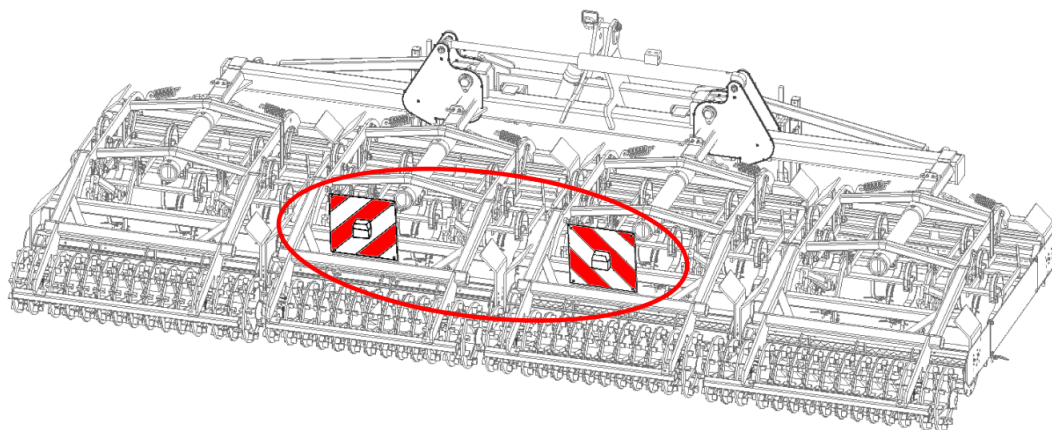


Figure 24 Rear light arrays and location on the cultivator FLEX 3,0m, 5,0m and 5,8m

5.4 Maintenance and lubrication

- The pre-seeding cultivator FLEX must be cleaned of soil after each operation, followed by an inspection of the parts and assemblies. During cleaning, remove any plant debris and strings that get caught in the shaft bearing points. **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,**
- Lubricate the grease points on the hinge pins daily during the life of the machine. Lubricate the bearings of the rollers every 25 operating hours,
- When replacing worn components, use thread glue, original bolts and nuts,
- Always ensure that screw connections are properly tightened. Look on table of the tightening torque for nuts and bolts,



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

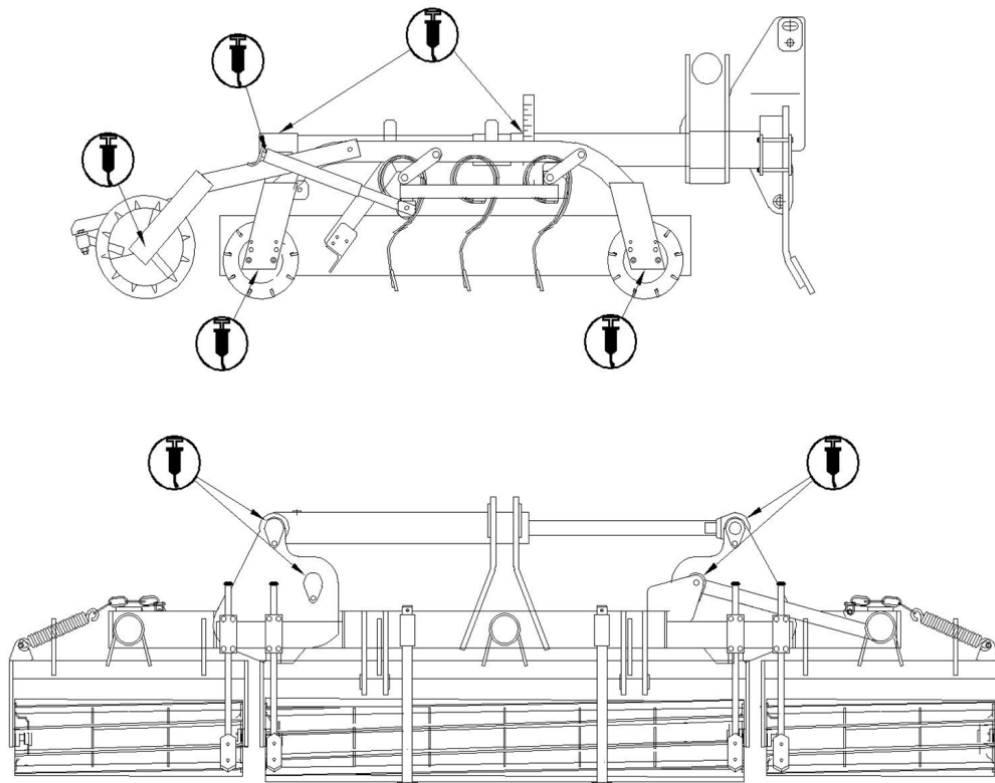


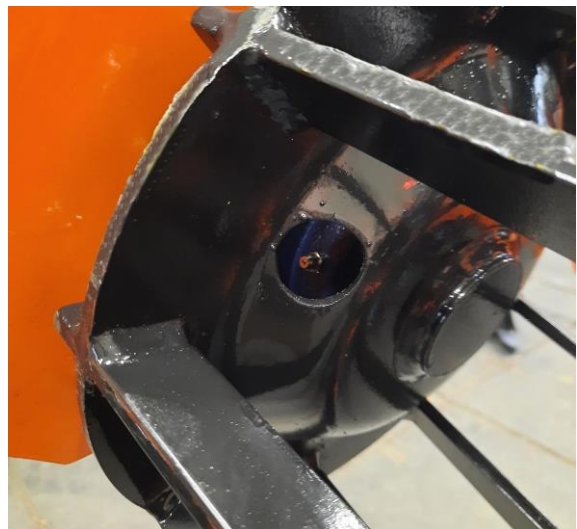
Figure 25 Lubrication points of the pre-seeding cultivation FLEX

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.

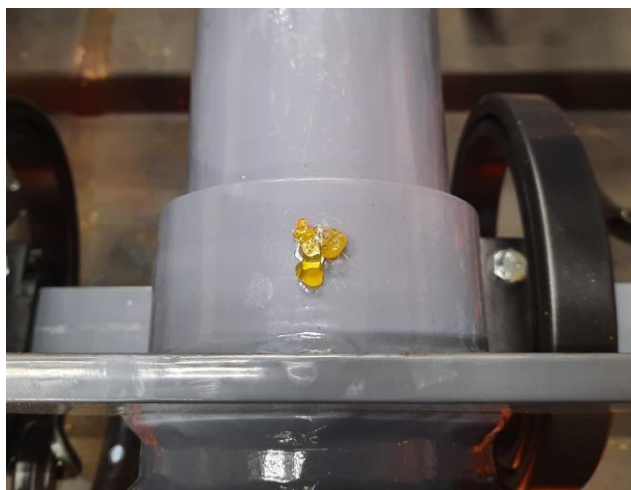
Access to bearings are difficult because of cultivator construction. Under will show place with difficult access.



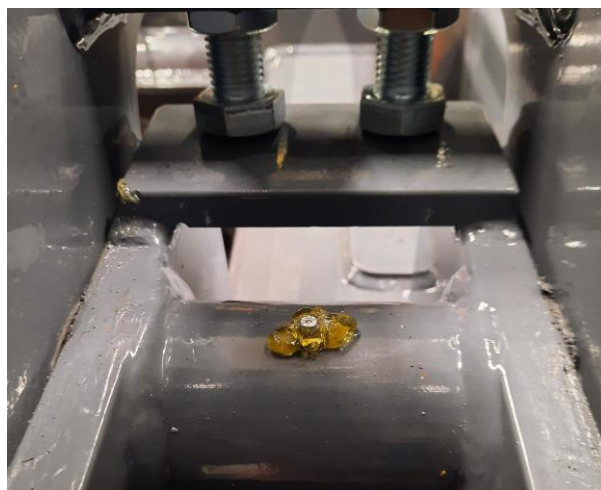
This grease gun connection is most suitable for lubricating the shaft.



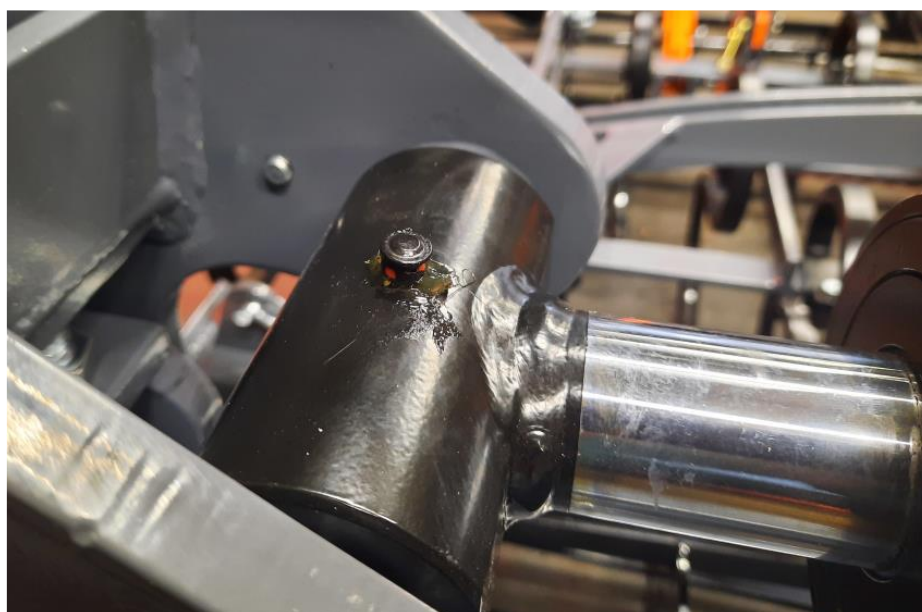
Best way to lubrication bearings rear rollers on the back of the cultivator.



Lubrication point on the frame



Lubrication point on the sash hinge sleeve



Hydraulic cylinder head lubrication point

Figure 26 Hard-to-reach lubrication points on the pre-seeding cultivator FLEX.



NOTE! The use of lubrication-free bearings in the string roller assemblies facilitates the operation and maintenance of the pre-seeding cultivator.



NOTE! During maintenance and replacement work, the pre-seeding cultivator should be secured against rolling. It should be connected to the tractor with the parking brake engaged, and the tractor engine should be turned off. The side sections should be folded down. During maintenance and repairs, use appropriate wrenches, protective gloves, and, if necessary, a helmet.

5.5 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 3.

Table 2. Tightening torque values for nuts and bolts.

Tightening torques for nuts and bolts [Nm].				
	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

Dimension



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

6 Operating of the pre-seeding cultivator FLEX

➤ 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 discs

and 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.

➤ **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 Transport dimensions

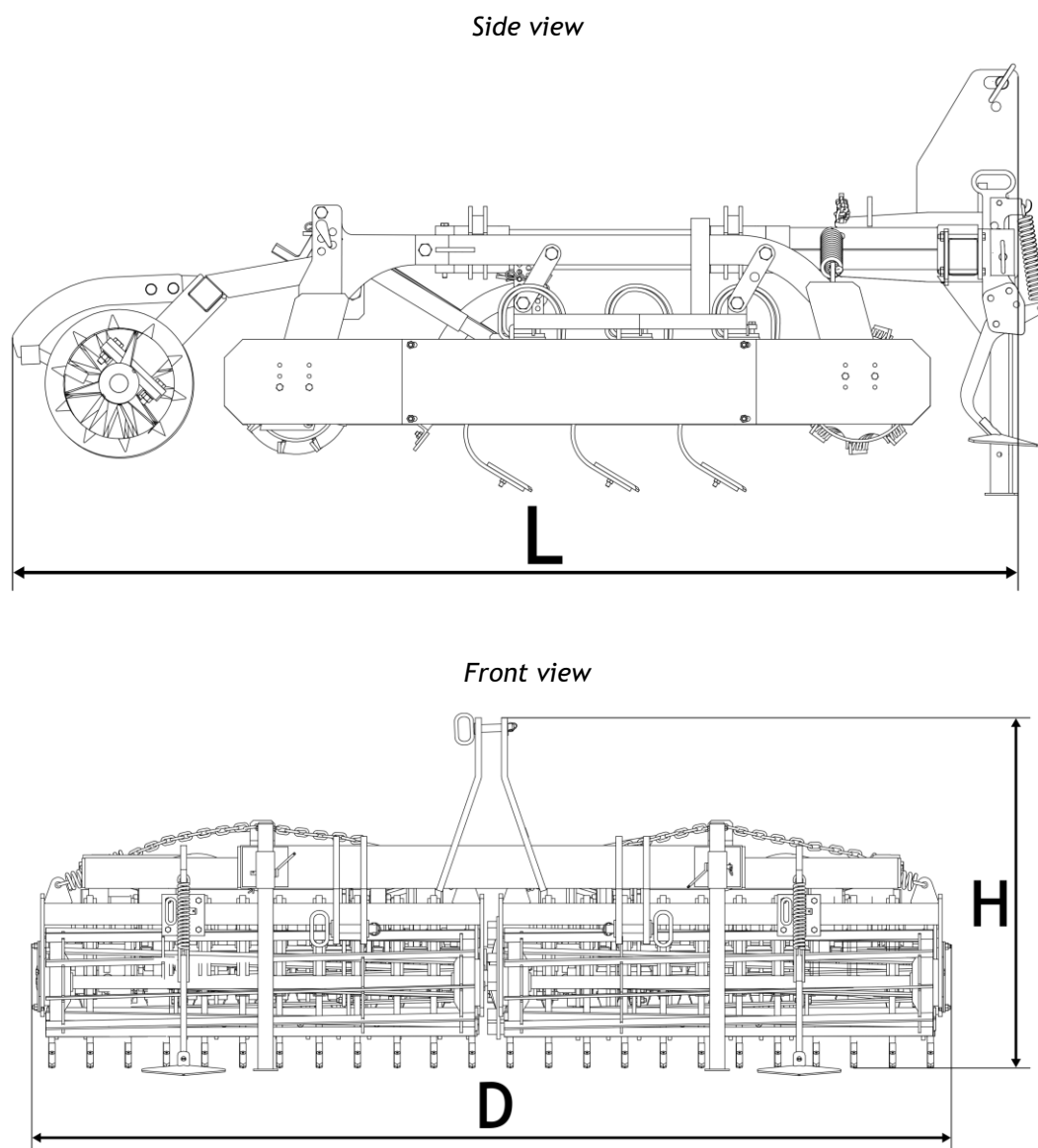
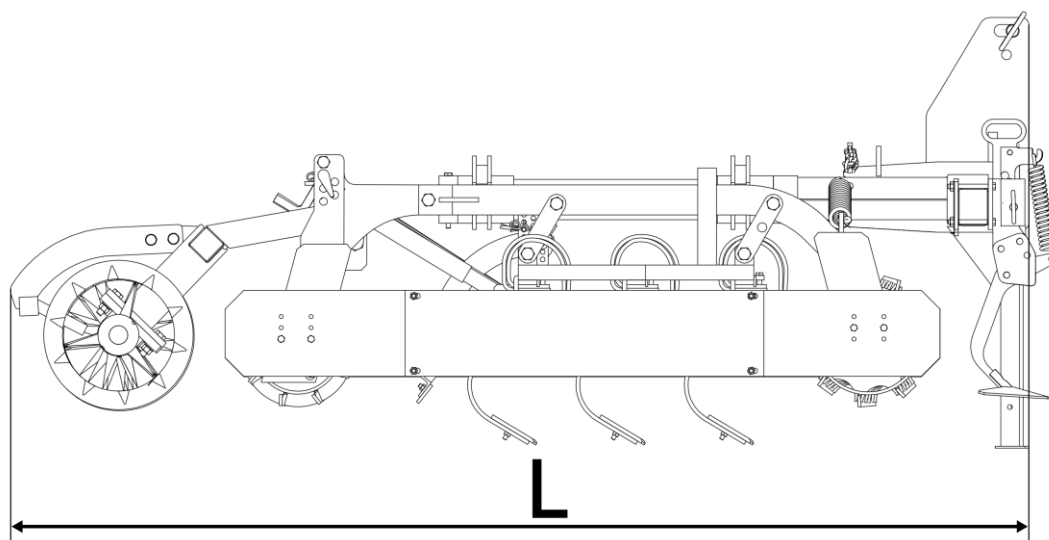


Figure 27 Transport dimension of the pre-seeding cultivator FLEX without hydraulic folding(L - length, D - width, H - height)(look table 3)

Side view



Front view

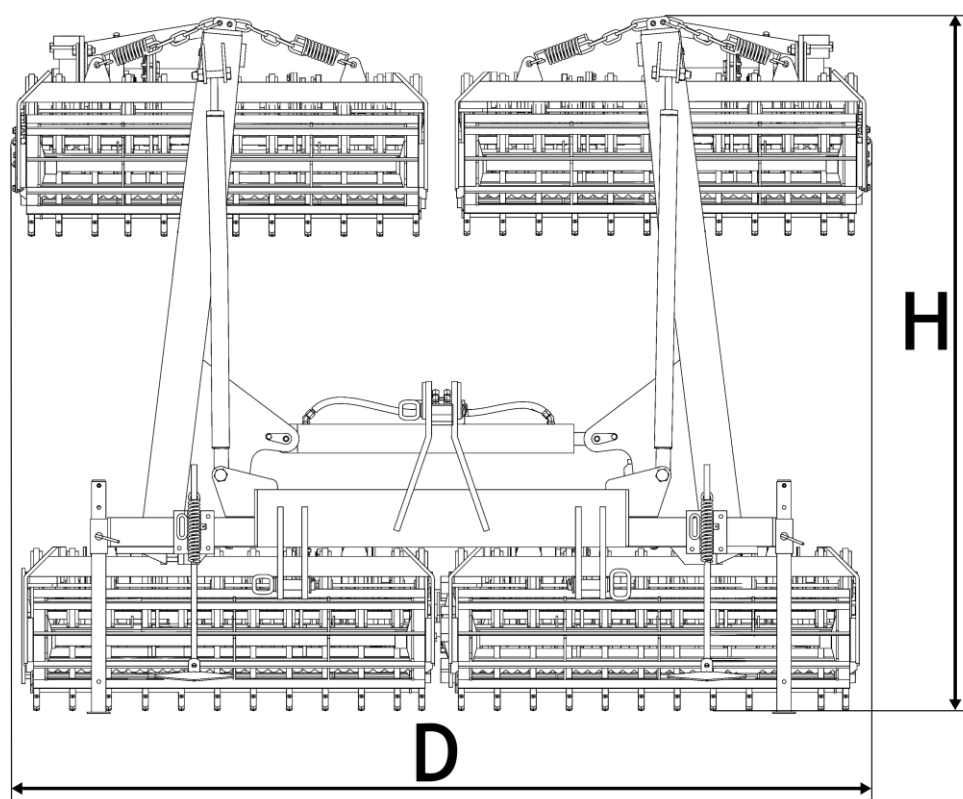


Figure 28 Transport dimension of the pre-seeding cultivator FLEX with hydraulic folding (L - length, D - width, H - height)(look table 3)

6.2 Specifications

Table 3 Technical characteristic of the cultivator FLEX

L.p.	Parameters	Unit				
1	Machine type		FLEX 3.0	FLEX 4.0H	FLEX 5.0 H	FLEX 5.8 H
2	Working width	m	3,00	4,00	5,00	5,80
3	Hydraulically foldable	-	NO	YES	YES	YES
4	No. of tine	pcs.	24	32	40	47
5	No. of sweep share	pcs.	16	23	28	32
6	String rollers diameter	ø	300 mm and 355 mm			
7	Pin shaft diameter	ø	400 mm			
8	Unit dimensions in transport position	Length [L]	2730	2950	2950	2950
		Height [H]	1150	1700	2200	2400
		Width [D]	2960	3000	3000	3000
9	Power requirement	KM	110	140	180	210
10	Total unit weight	kg	1557	2334	2850	3100
11	Optional equipment with rubber field bumpers	-	YES	YES	YES	YES
12	Transport speed	km/h	15	15	15	15

7 Replacement procedures

➤ Bearing replacement of the string roller

If the roller bearing are damage, they must be replaced as fallows:

- Place the machine on a horizontal surface,
- The machine should be connected to the tractor with the engine turned off and the parking brake engaged,
- In case of side rollers first unscrew side screen,
- Unscrew the four screws holding the roller on each side,
- Move roller away,
- Loosen the two headless screws on each bearing,
- 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,

➤ Bearing replacement of the pin shaft

If the pin shaft roller bearing are damage, they must be replaced as fallows:

- Place the machine on a horizontal surface,
- The machine should be connected to the tractor with the engine turned off and the parking brake engaged,
- Unscrew pin shafts comb and move to the side,



- Unscrew the screw securing the bearing to the shaft clamp,
- Move roller away,
- Remove the ring from the shaft axle located behind the last wheel located closer to the damaged bearing by removing the expansion pin,
- Remove outer wheel to reach bearing,
- Unscrew the headless screw securing the bearing,
- Pull of the bearing using an extractor,
- Install the new bearing so that it fits snugly against the wheels and tighten the headless screw,
- Put on the outer wheels and the ring and secure with the expansion pin (use a new pin)

➤ **Replacement of working components**

- The working components must be changed on the machine lowered to the ground after the tractor engine has been switched off. Sturdy shims must be provided to ensure that the component to be replaced does not come into contact with the ground.
- 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 damage to machine components. Tools should be replaced when they do not fulfil their intended function. 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! 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.

Table 4 Causes and remedies of defects and malfunctions of the pre-seeding cultivator FLEX

Fault, malfunction	Reason	Repair method
<ul style="list-style-type: none"> ○ Uneven immersion of working elements, uneven pressure of string rollers on the ground, 	<ul style="list-style-type: none"> • Poor levelling of the machine, 	<ul style="list-style-type: none"> ✓ Level the machine longitudinally and transversely
<ul style="list-style-type: none"> ○ The string roller does not turn or there is a lot of resistance when turning, 	<ul style="list-style-type: none"> • Plant residues or strings wound on the bearings, • Damaged bearing, 	<ul style="list-style-type: none"> ✓ Clean the bearings, ✓ Replace the bearing,
<ul style="list-style-type: none"> ○ The pin shaft does not rotate, 	<ul style="list-style-type: none"> • There are stones between the roller wheels that hit the cleaning comb, 	<ul style="list-style-type: none"> ✓ Unscrew the mounting screws, tilt the comb and pull out the stones,
<ul style="list-style-type: none"> ○ The crank adjusting the working depth of the tines presents a lot of resistance when turning, 	<ul style="list-style-type: none"> • Non-lubricated crank, • Too much difference in crank extension in one field, 	<ul style="list-style-type: none"> ✓ Lubricate the crank, if no effect, disassemble the crank, clean the thread and lubricate, ✓ Reduce the protrusion difference,
<ul style="list-style-type: none"> ○ The aggregate fields do not copy the field crosswise, 	<ul style="list-style-type: none"> • Stabilizing springs too tight, • Non-lubricated points on the section's rotation axis, 	<ul style="list-style-type: none"> ✓ Loosen the tension of the springs on the chains, ✓ Intensively lubricate the lubrication points,
<ul style="list-style-type: none"> ○ The drag pushes large amounts of earth and increases the working resistance, 	<ul style="list-style-type: none"> • Leveling harrow is too low, 	<ul style="list-style-type: none"> ✓ Raise the leveling harrow on the adjustment pins,
<ul style="list-style-type: none"> ○ Insufficiently erased tractor tracks, 	<ul style="list-style-type: none"> • Inappropriate spacing of track eradicators, • Too shallow work of the track removers, 	<ul style="list-style-type: none"> ✓ Adjusting the track eradicator spacing to the tractor wheel spacing, ✓ Reducing the level of work of the track loosening tines,
<ul style="list-style-type: none"> ○ Soil falling outside the working width of the cultivator 	<ul style="list-style-type: none"> • Side screen raised too high, 	<ul style="list-style-type: none"> ✓ Lower the side screen,

8 Storage of the pre-seeding cultivator FLEX

- 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 vaseline 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 pre-seeding cultivator FLEX


- 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 ext. 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.