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OPERATION MANUAL

SUBSOILER MGP / MGPH

Revision II
Gliwice 2025

TŁUMACZENIE INSTRUKCJI ORYGINALNEJ
ENG

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:

SUBSOILER MGP / MGPH
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
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

We would like to congratulate you on the acquisition of the MGP subsoiler. This manual provides information on the hazards that may occur when using the subsoiler, 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 MGP subsoiler can be found on a nameplate 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 subsoiler 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:

  http://mandam.com.pl/parts/

  +48 668 662 289

  parts@mandam.com.pl

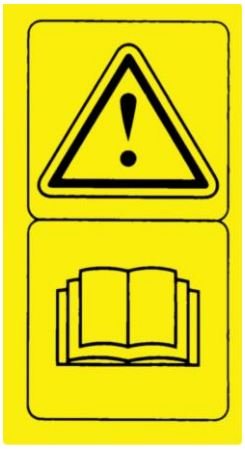
  - authorised distributors of machines from Mandam Sp. z o. o.

1.1. Information and warning signs

Remember! When using the MGP subsoiler, 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 from foldable and moving parts of the machine
	Do not reach into the crushing area if parts may move
	Pressurised liquid jet - bodily harm
	Fixing point for transport belts
	Lubrication point

2 General information

2.1. Construction of the MGP subsoiler

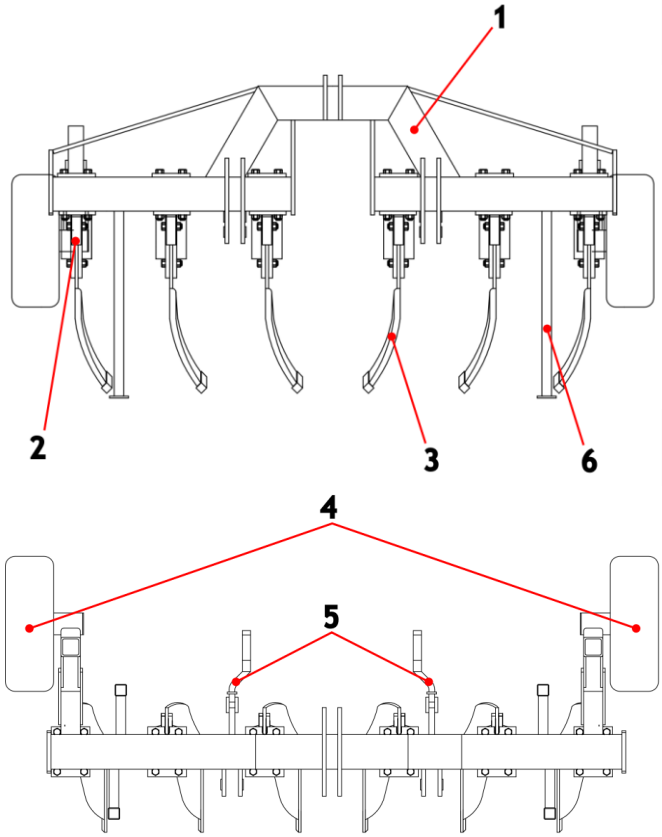


Figure 2 Construction of MGP subsoiler (1 - main frame, 2 - tine holder, 3 - tine with coulter, 4 - support wheels (optional), 5 - linkage with three-point hitch, 6 - support foot, 7 - top link, 8 - depth adjustment)

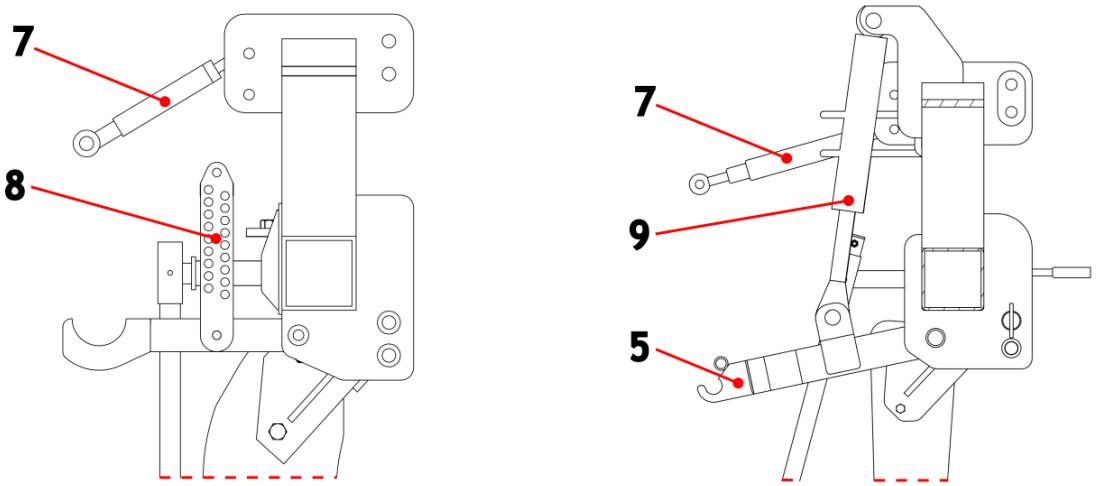


Figure 3 Side view of MGP subsoiler (left) and MGPH subsoiler (right) (5 - linkage with three-point hitch, 7 - top link, 8 - depth adjustment, 9 - depth adjustment actuator)

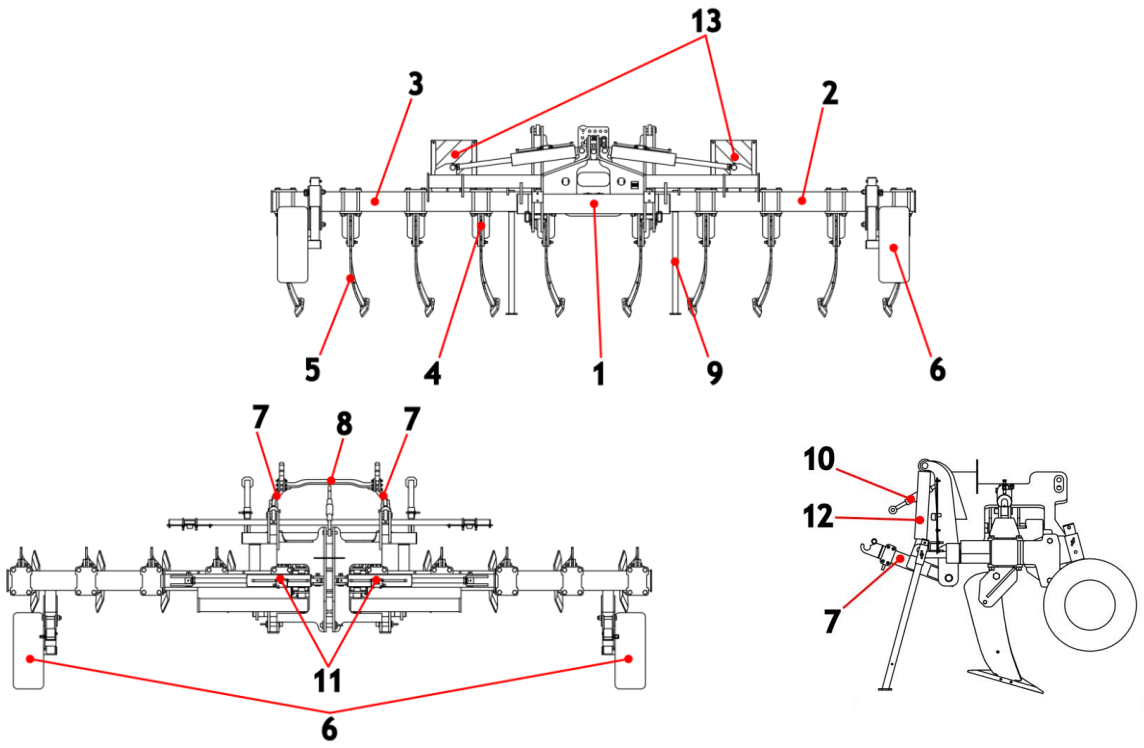


Figure 4 Construction of MGPH10 and MGPH12 subsoiler (1 - centre frame, 2 - left frame, 3 - right frame, 4 - tine holder, 5 - tine with coulter, 6 - support wheels (optional), 7 - linkage with three-point hitch, 8 - linkage reinforcement bar, 9 - support feet, 10 - top link, 11 - actuators, 12 - depth adjustment actuator, 13 - lighting boards (optional))

- The MGPH10 and MGPH12 subsoiler consists of a central frame and side frames that can be folded hydraulically into the transport position.
- The main frame of the subsoiler is the primary load-bearing element of the entire machine. Tines are attached to the frame of the subsoiler. Subsoilers can be fitted with support wheels that are used to adjust and maintain the depth of the subsoiler.

2.2. Purpose of the MGP subsoiler

The MGP subsoiler is an agricultural machine designed to loosen, and in particular destroy the plough sole, aerate the soil (20 to 60 cm) without disturbing its stratified structure. The result is an improvement in its physical and biological properties, especially on heavy, sandy soils. The aeration and improvement of water and air circulation in the soil profile achieved by using a subsoiler provides an excellent agronomic effect.

The MGP subsoiler is designed for use with active machines. Thanks to the equipment of the three-point linkage and the design of the frame that does not interfere with the PTO shaft, it allows two-layer soil cultivation. This allows comprehensive cultivation also for crops that are demanding in terms of soil structure (potato, sugar beet).

NOTE! The subsoiler 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.

REMEMBER! The subsoiler must not be used on soils with stones of considerable size lying on the surface

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 subsoiler may only be started up, used and repaired by persons who are familiar with its operation and the mating tractor, as well as with the rules of conduct for safe operation and handling of the subsoiler.

The manufacturer is not responsible for unauthorised changes to the design of the machine. During the warranty period, only factory-made "MANDAM" parts must be used.
The unit 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,
- 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 MGP / MGPH subsoiler is not authorised for use on public roads as standard.

3.1. Proper coupling and uncoupling with 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.
- It is forbidden for people to be between the machine and the tractor when coupling the tractor and the unit.
- The tractor working with the unit must be fully operational. Coupling with a tractor with defective pneumatic (if the machine has a braked axle) and hydraulic systems 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.
- The support foot should be rested on a stable surface. It is forbidden to use foot pads that may cause instability of the support.

3.2. Tyres

- Tyre pressures must not exceed those recommended by the manufacturer and it is forbidden to transport the machine at too low a pressure. This may damage the machine and cause an accident on large uneven surfaces and when driving too fast.
- Significantly damaged tyres (particularly profile damage) must be replaced immediately.
- When replacing tyres, the machine must be secured against rolling.
- Repair work on wheels or tyres should be carried out by persons trained and authorised for this purpose. This work should be carried out with appropriately selected tools.

➢ <u>Each time the wheels are fitted, the tightness of the nuts should be checked after 50km.</u>

3.3. Hydraulic 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 hydraulic lines,
- the unit must be taken out of service while the hydraulic fault is being rectified.

3.4. 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.

- 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.

3.5. 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

3.6. Description of residual risk

MANDAM Sp. z o.o. makes every effort to eliminate the risk of accidents. There is 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

4.1. Transport safety

For transport, the side sections of the MGPH 10 and MGPH 12 subsoiler should 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 subsoiler must be raised with the three-point linkage to the point where the working sections do not collide with the ground when folded.

- **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 20 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 subsoiler 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.

5 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 with the subsoiler at an angle greater than 5°. For proper operation, all working elements must be in constant contact with the ground.

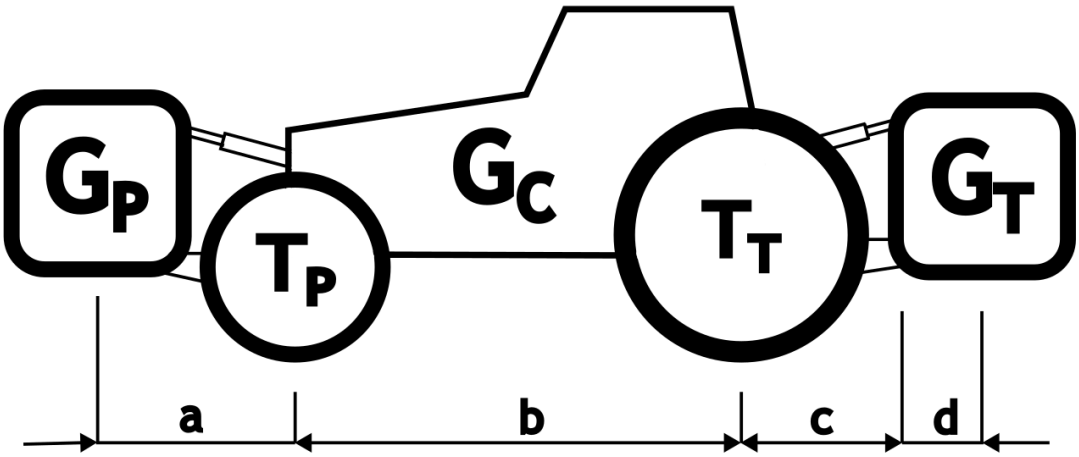


Figure 4 Diagram of tractor load designations

Minimum load at the front for rear-mounted machine:

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

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

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

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,

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%.

5.1. Coupling the chisel subsoiler to the tractor

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

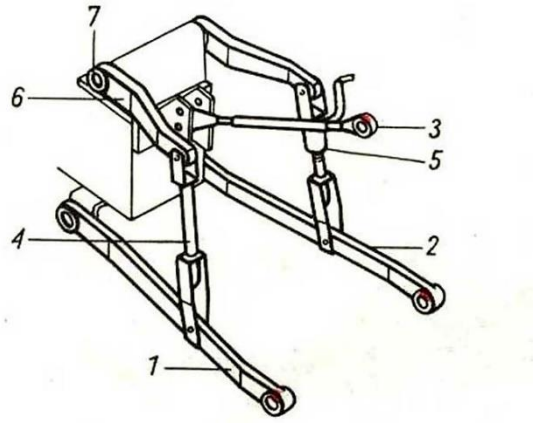


Figure 6 Three-point linkage of the tractor: 1,2 - lower links, 3 - upper fastener, 4 - left suspension, 5 - right suspension with adjustable length, 6 - lift arm, 7 - lift shaft

Before starting work with the subsoiler, it must be suspended from the tractor's three-point linkage for this purpose:

1) remove the lower link pins,
2) carefully reverse the tractor and insert the towing pins into the tractor's lower links, then secure them with the cotter pins,
3) connect the tractor's top link,
4) check the raising and lowering of the subsoiler.

To suspend the machine working with the MGP subsoiler (Figure 7):

1) adjust the distance of the link hooks from the ground so that they are below the hitching pins of the mating machine by means of pins placed above the depth setting beam,
2) carefully back up the tractor with the subsoiler to the mating machine,
3) raise so that the hitching hooks engage with the pins,
4) lock the hitching hooks onto the pins,
5) connect the top link to the mating machine.

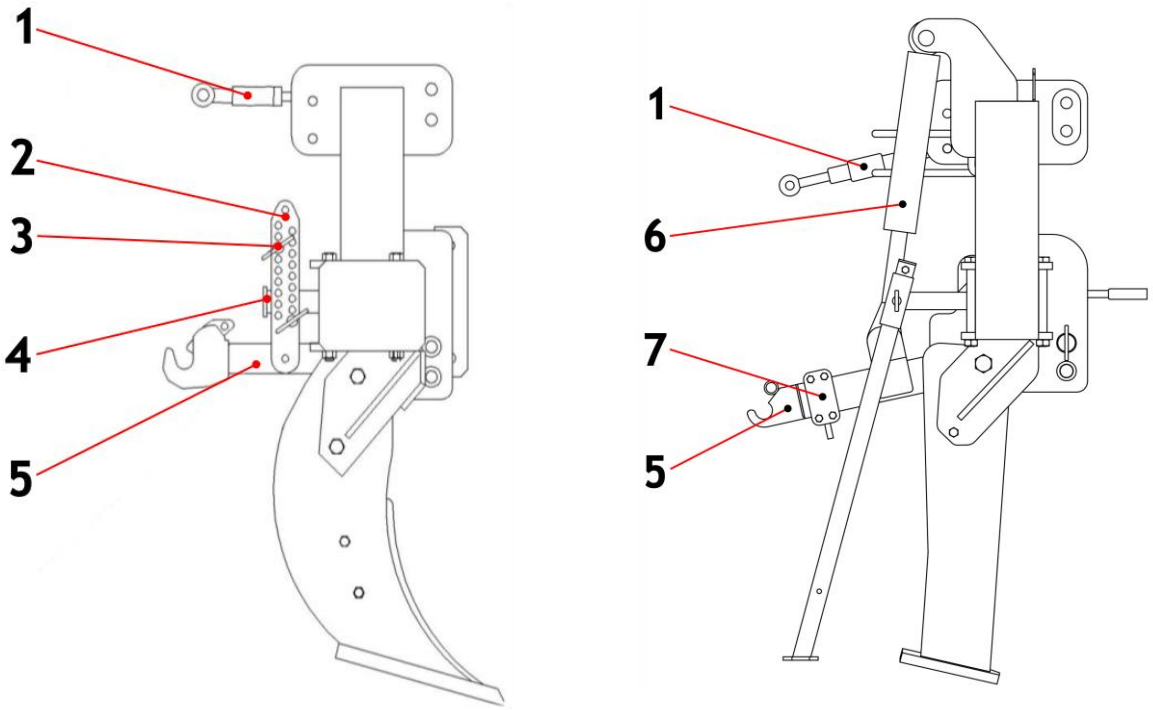


Figure 7 Three-point linkage components of the MGP (left) and MGPH (right) subsoiler (1 - top link, 2 - depth adjustment, 3 - depth adjustment pin, 4 - depth setting beam, 5 - rod with three-point linkage hitch, 6 - depth adjustment actuator, 7 - rod reinforcement beam)

- A properly hitched subsoiler should follow the tractor evenly during operation and loosen the soil evenly over the entire working width. The subsoiler frame should occupy a horizontal position in relation to the field surface (adjust with the tractor's top link).
- The tractor hydraulics should be set to position control, but force or mixed control can be used in adverse conditions.
- The depth relative to the mating machine is set using pins in the depth adjustment by inserting them into a suitable hole below the depth setting beam (Figure 7).
- The working depth of the tines relative to the mating machine is adjusted by setting the depth adjustment of the three-point linkage accordingly.

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.

5.2. Preparation of the subsoiler for operation

- The subsoiler is delivered for sale ready to work. Due to the limitations of transport facilities, it is also possible to deliver it in a partially dismantled state - this usually involves disconnecting the support wheels from the MGP subsoiler.

MGP support wheel installation

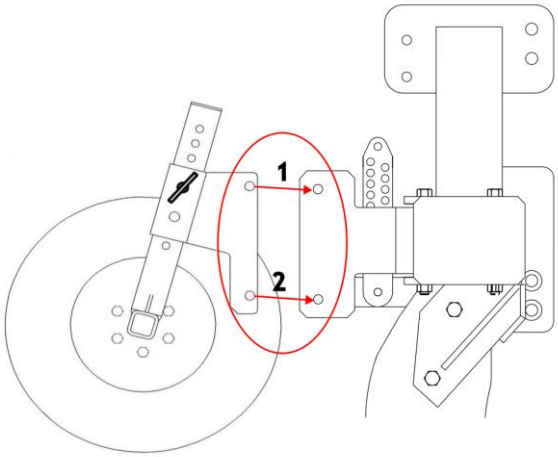


Figure 8 Installation of the support wheel assembly to the brackets in the MGP subsoiler frame

Procedure for fitting the support wheel assembly:

1) Place the wheel beam holder in the pocket on the subsoiler frame
2) Maintain axial alignment of holes 1 and 2
3) Secure the holes with the screws provided (do not use spare parts!)

Depth adjustment with support wheels

- Determine the working depth of the tines by adjusting the position of the support wheels in the adjustment brackets (Figure 9),

- The correct working depth of the subsoiler is established by adjusting the pins in the holes of the support wheel adjustment brackets (Figure 9 item 1).

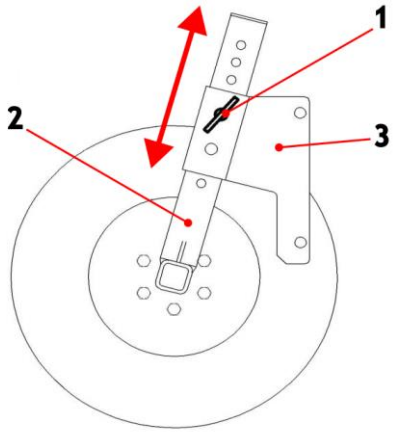


Figure 9 Adjustment of the support wheel (1 - working depth safety pin, 2 - support wheel height adjustment beam, 3 - support wheel beam adjustment handle)

- The subsoiler must be secured against tipping over with appropriately positioned

support legs (these are standard equipment on the subsoiler).

NOTE! Before starting work with the subsoiler, check all bolted connections and the reliability of the machine's connection to the tractor.

5.2.1 Adjusting the machine during operation / correct turning

Setting up the machine correctly for operation

The machine must be set up parallel to the ground to be used (See Figure 10). The front drawbar should be aligned horizontally. It is forbidden to operate the machine with the drawbar at an angle!

- Setting up the machine correctly for operation:

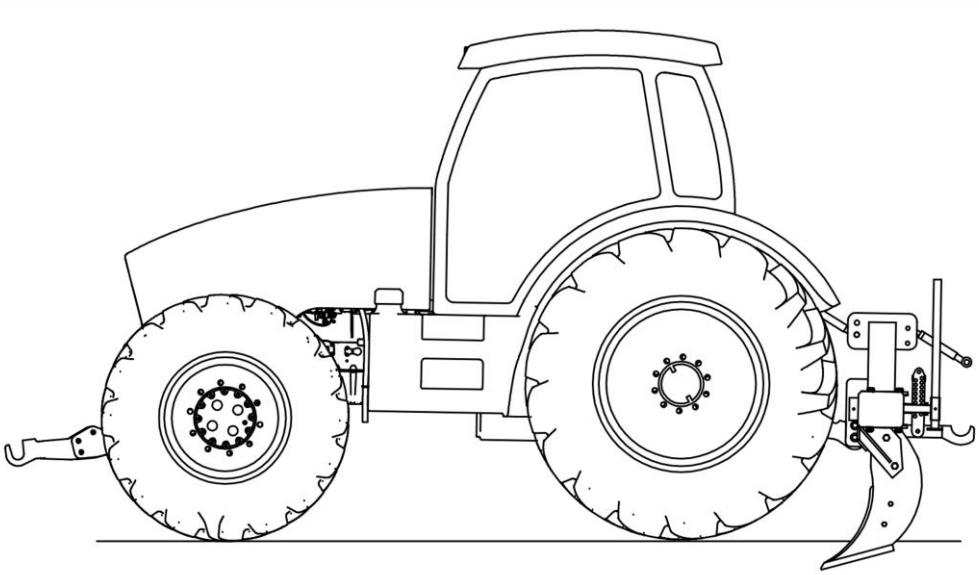


Figure 10 Properly positioned machine parallel to the ground.

Turning at field ends/headlands only permitted with the machine raised on the chassis.

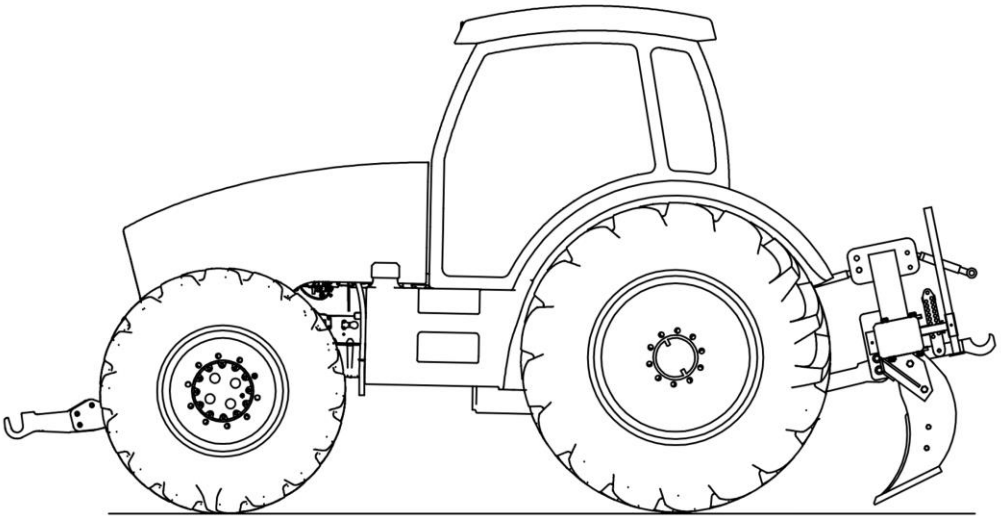


Figure 11 Turning the machine correctly.

- **<u>Turning with the machine buried in the spoil in or turning on shafts is not permitted:</u>**

- 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.

5.3. Rules for transport on public roads and lighting of 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 MGP subsoiler. 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 **<u>20 km/h</u>**. On roads with poorer surfaces (dirt or cobblestones) it should be lowered to a maximum of **<u>10 km/h</u>**, and on bumpy roads to **<u>5 km/h</u>**. Extreme caution should be exercised when passing and overtaking other vehicles, avoiding obstacles and crossing large irregularities in fields and dirt roads.

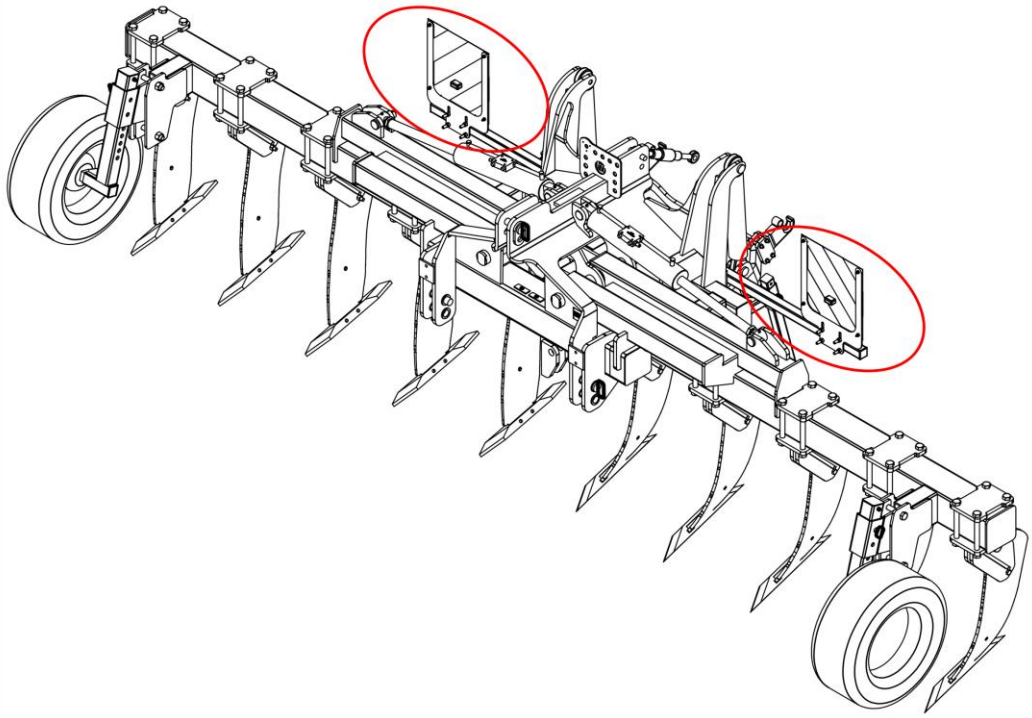


Figure 12 Lighting panel assembly (using MGPH10 as an example)

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 warning-light devices and a distinguishing sign for slow-moving vehicles (according to current traffic regulations) should be attached to the ends of the unit 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! Warning-light devices are not included in the unit. 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 MGP subsoiler when 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.

5.4. Maintenance and lubrication

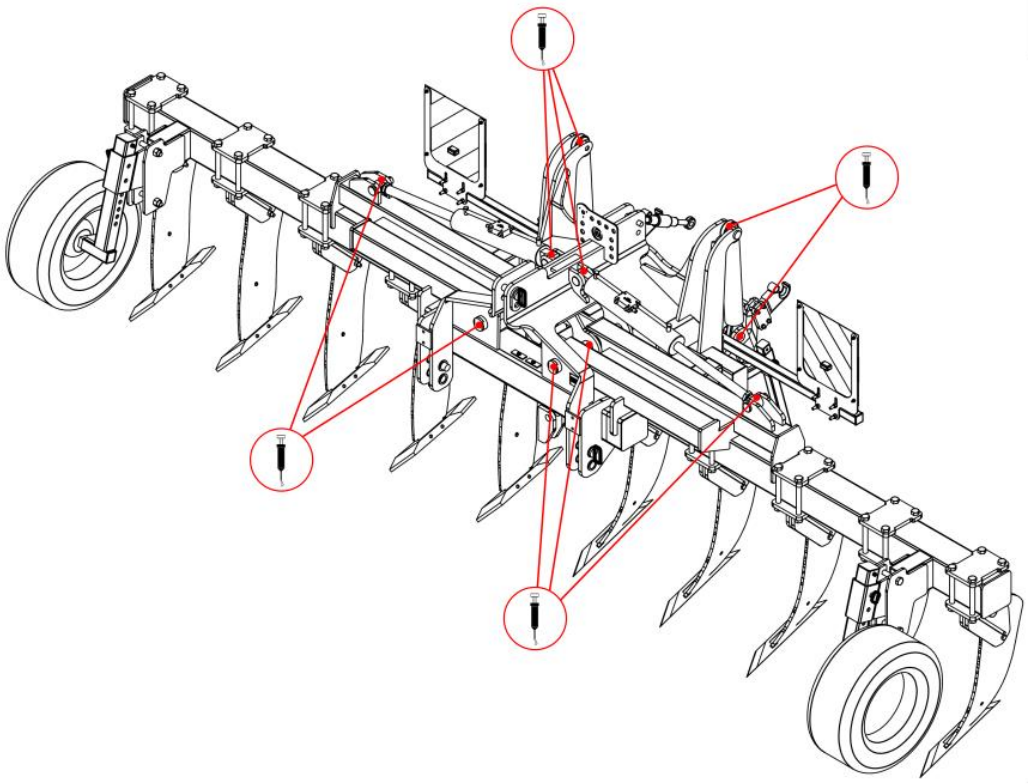
- Lubricators should be well cleaned before lubrication. The points should be lubricated according to the intensity of use:
- Clean the machine from the soil each time after use, followed by an inspection of the parts and assemblies.
- Re-tighten all screws after the first 4 hours of operation and periodically check the tightness. **Failure to do so will exacerbate backlash and cause damage to the machine as a result,**

- During the service life of the machine, the lubrication points at the connections (bushings at the hinges) must be lubricated every 10 operating hours,
- When replacing worn components, use thread glue, original bolts and nuts and pins,
- Always ensure that screw connections are properly tightened.
- The tine spikes can be used almost until the working surface is equal to the initial tooth surface. However, it is advisable to replace the spikes early enough, before there is a possibility of wear and damage to the subsoiler tines.
- Damaged or worn parts must be replaced with new or reconditioned parts.

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.

NOTE! It is forbidden to work on a damaged machine caused by any incident resulting in a broken or deformed frame or other machine assembly!



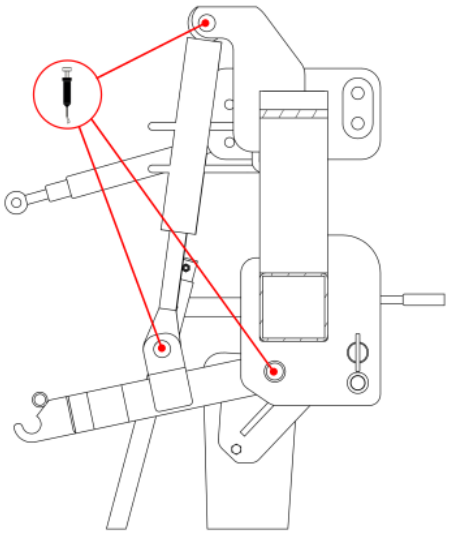


Figure 13 MGPH (top) and MGP (bottom) subsoiler lubrication points with hydraulic depth adjustment

5.5. Screw tightening torque

- 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 below (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 incident resulting in a broken or deformed frame or other machine assembly!

6 Operation of the subsoiler

- **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. 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, as well as the threads of the adjusting screws, must be washed with "Antykor" paraffin and protected against corrosion with "Antykor 1" grease; in addition, full lubrication must be carried out. It is advisable to store the machine under a canopy when not in use. However, if this is not possible, the condition of the protection should be checked from time to time and, if necessary, the rain-washed grease should be replenished.

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.

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.

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.

➢ **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 cylinder - 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 machine dimensions

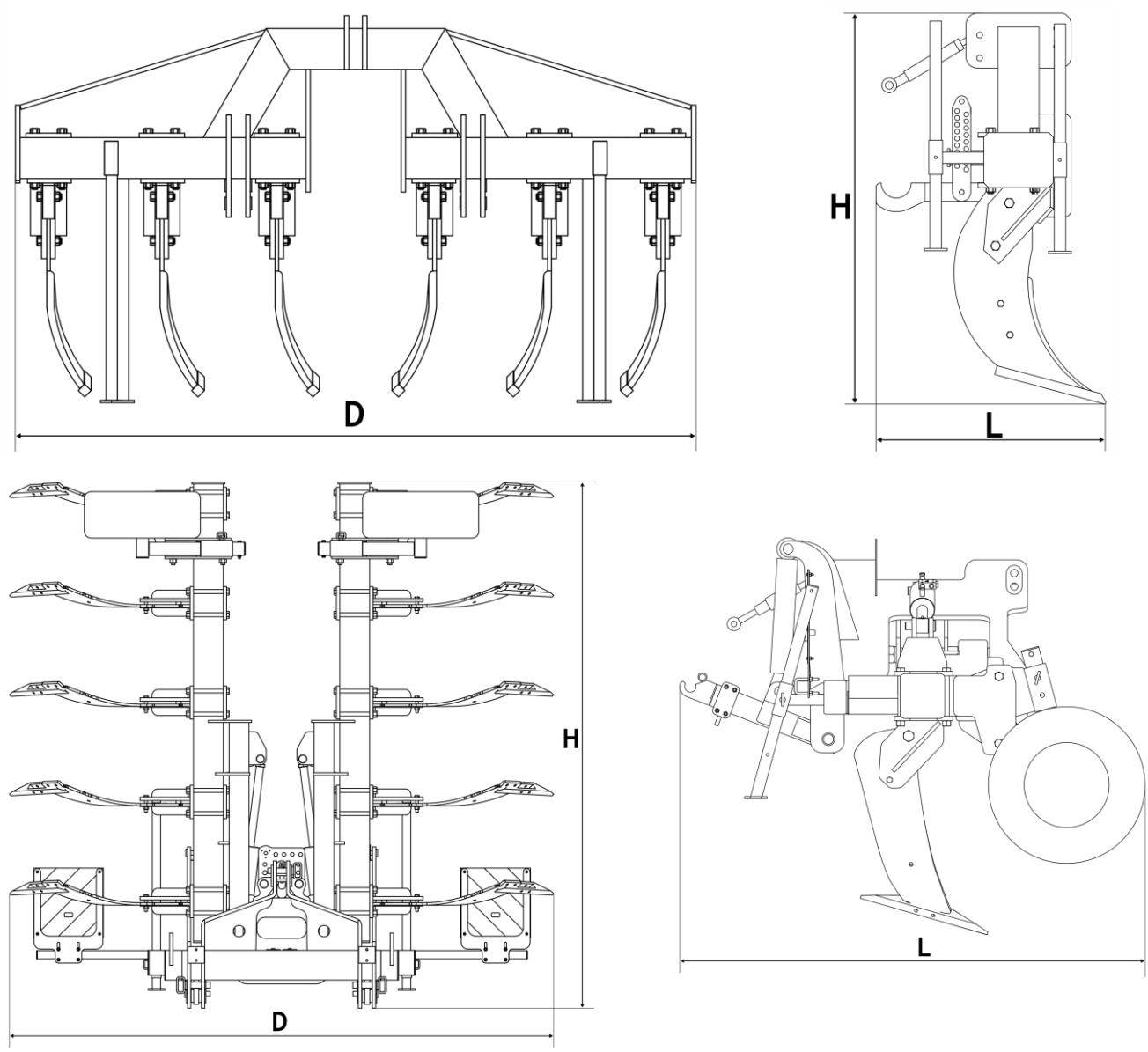


Figure 14 Transport dimensions of MGP and MGPH subsoiler (D - width, L - length, H - height) (see Tables 3 and 4)

6.2. Specifications

Table 3 Technical characteristics of MGP subsoiler

No.	Parameters	Unit		
1	Machine type		MGP6 3000	MGP8 4000
2	Working width	m	3.00	4.00
3	Hydraulically foldable	-	NO	NO
4	Number of teeth	pcs.	6	8
7	Unit dimensions in transport position	Length [L] Height [H] Width [D]	925 1700 3000	925 1700 4000
8	Power requirement	KM	190	250
9	Total unit weight	kg	995	1210
12	Transport speed	km/h	max. 20	max. 20

Table 4 Technical characteristics of MGPH subsoiler

No.	Parameters	Unit				
1	Machine type		MGPH6 3000	MGPH8 4000	MGPH10 6000	MGPH12 6000
2	Working width	m	3.00	4.00	6.00	6.00
3	Hydraulically foldable	-	NO	NO	YES	YES
4	Number of teeth	pcs.	6	8	10	12
7	Unit dimensions in transport position	Length [L] Height [H] Width [D]	925 1700 3000	925 1700 4000	2000 2800 2500	2000 2800 2500
8	Power requirement	KM	190	250	300	360
9	Total unit weight	kg	1024	1315	2160	2225
12	Transport speed	km/h	max. 20	max. 20	max. 20	max. 20

7 Replacement procedures

Damaged actuators should be taken to a specialist reconditioning workshop or replaced with new ones. When reassembling the actuator:

- connect the wires accordingly as in the adjacent actuator,
- first insert into the centre frame and secure,
- support the cylinder so that the piston rod does not interfere with any part of the machine during extending,
- cycle the machine several times to bleed the actuator (otherwise the side frame will suddenly collapse, causing damage to the machine or an accident),
- insert the actuator in the eye of the frame and secure with a pin.

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.

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. Sturdy shims (e.g. wooden blocks approx. 20 cm thick underneath adjacent workpieces) must be placed so that the workpieces to be replaced do 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 tooth damage, for example. 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!

8 Storing the subsoiler

- At the end of the season, the unit 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.

- 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 cylinders 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°.

- 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, units with a working width of more than 3.00 m that are folded hydraulically should be stored unfolded with the tools 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 Replacement parts for MGP subsoiler

- 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, 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.