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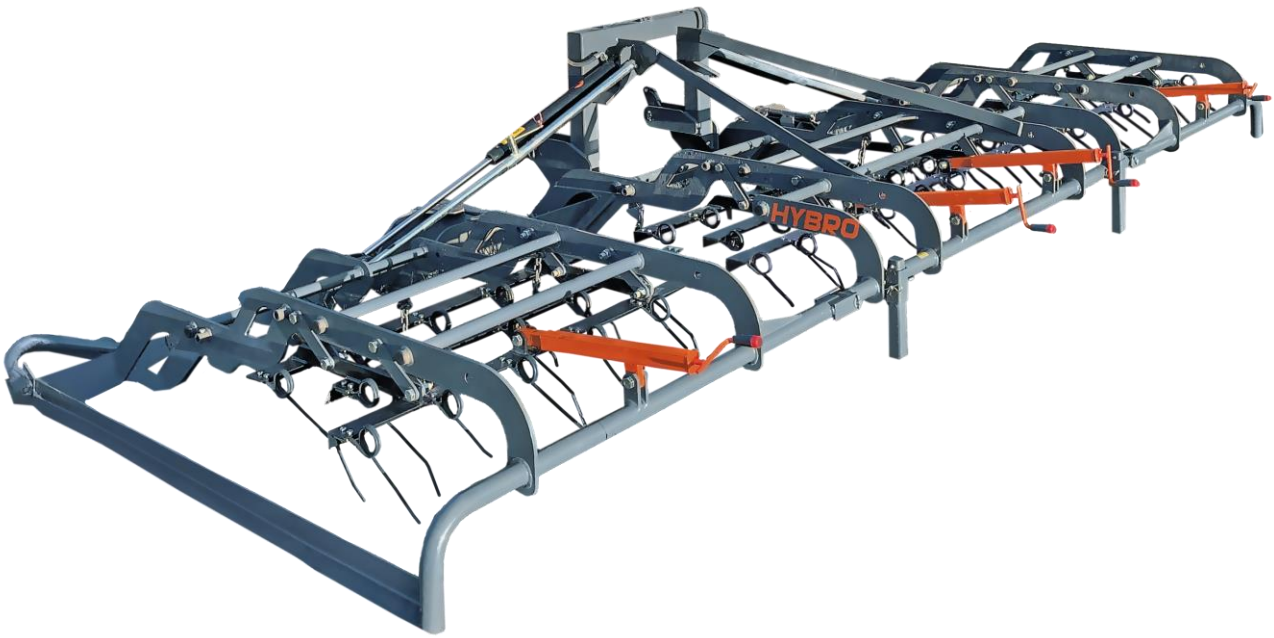
OPERATION MANUAL

Weeder harrow HYBRO



TŁUMACZENIE INSTRUKCJI ORYGINALNEJ
ENG

Revision II
Gliwice 2025

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:

WEEDER HARROW HYBRO
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 acquiring a HYBRO weeder harrow. This manual provides information on the hazards that can occur when using the weeder harrow, technical data and the most important indications and recommendations, the knowledge and application of which are a prerequisite 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:

Machine identification

The identification data of the weeder harrow can be found on the rating plate on the support frame. The rating plate contains basic information about the manufacturer and the machine, as well as the CE mark.

Figure 1 Rating plate

The HYBRO weeder harrow warranty 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:

https://parts.mandam.com.pl/

+48 668 662 289; 797 518 831

parts@mandam.com.pl

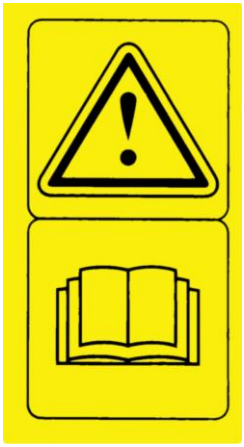
- authorised distributors of machines from Mandam Sp. z o. o.

1.1. Information and warning signs

Remember! When using the HYBRO weeder harrow, 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

Safety signs	*Meaning of the safety sign*
	Unlock the mechanical lock

2 General information

2.1. HYBRO weeder harrow construction

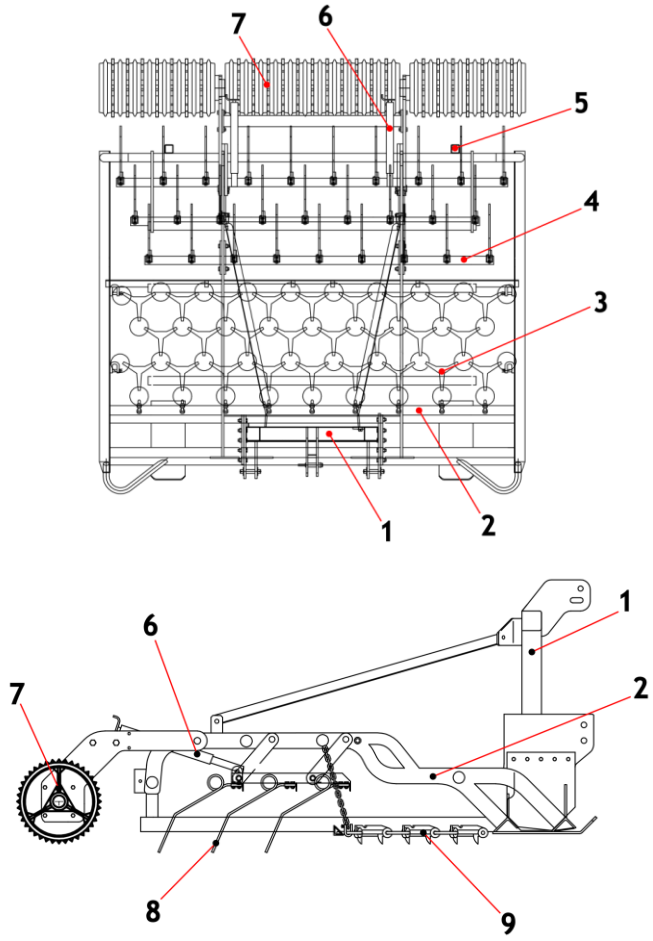


Figure 2 HYBRO weeder harrow (3m version with MCB roller) (1 - drawbar, 2 - frame, 3 - cast iron smoothing harrow, 4 - weeder section, 5 - support feet, 6 - adjustment cranks; 7 - MCB roller, 8 - spring tine, 9 - cast iron)

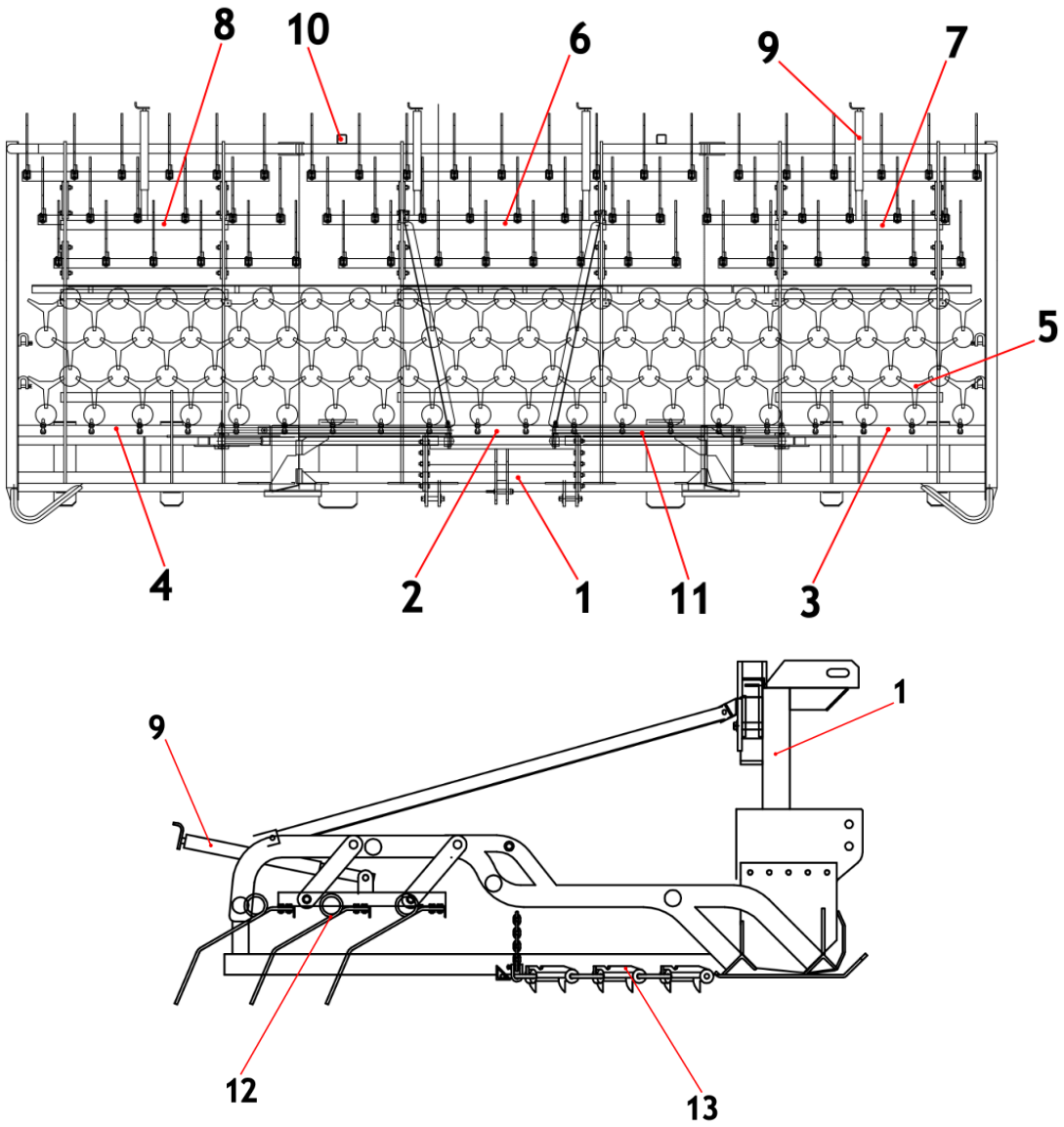


Figure 3 HYBRO weeder harrow (hydraulically folded version) (1 - drawbar, 2 - main frame, 3 - left frame, 4 - right frame, 5 - cast iron smoothing harrow, 6 - central weeder section, 7 - left weeder section, 8 - right weeder section, 9 - adjustment cranks, 10 - support feet, 11 - mechanical locking actuators, 12 - spring tine, 13 - cast iron)

The HYBRO weeder harrow consists of a main frame (in the hydraulically folded version, the main frame and hydraulically lowered side arms allow the machine to be folded for transport).

The other assemblies are the drawbar and the working sections. The working sections consist of beams on which the tines are fixed and a smoothing harrow made of cast iron. The tines are made of spring steel and guarantee accurate ground penetration. The smoothing harrows are connected by steel rings to form a kind of grid, which is suspended from special brackets welded to the frame. The design of the grips and the construction of the smoothing harrow allow the grid to be removed and inserted in the opposite position from the factory.
The three-point linkage is located at the front of the frame and is used to
suspend the weeder harrow from the hydraulic linkage of the agricultural tractor. An

elongated cut-out in the upper hitching eye (for connecting to the tractor linkage) is provided to increase the freedom of movement of the machine in relation to the ground.

- A hydraulic side segment lifting system is provided for all HYBRO weeder harrow types with working widths in excess of 3m.

2.2. Purpose of the HYBRO weeder harrow

The HYBRO weeder harrow is used to mechanically remove weeds and to aerate the soil by moving the soil surface. It is designed for the care of grasslands - meadows, pastures. The use of the HYBRO weeder harrow causes aeration, thinning of the turf, resulting in a faster start to the growing season, increasing the development of new stronger plants. This has a positive effect on the feed value of the concentrate feed.

- The smoothing harrow breaks up molehills and levels the surface.
- Equipping the harrow with a seed drill allows grass or fertiliser to be reseeded.
- The cast iron roller presses the seed into the soil allowing for trouble-free emergence and turf replenishment and, in the case of fertilisers, faster dissolution.

NOTE! The HYBRO weeder harrow 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 weeder harrow must not be used on soils with stones of significant 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 HYBRO weeder harrow may only be started up, used and repaired by persons who are familiar with its operation and the tractor involved, as well as with the rules of conduct for the safe operation and handling of the harrow.

- 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,
- 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 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. It is forbidden to couple the harrow with a tractor with defective pneumatic (if the machine has a braked axle) and hydraulic systems.

- 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. 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 power unit must be taken out of service while the hydraulic system fault 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 seat is in the tractor cab. It should be added that the noise caused by the operation of the machine 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.

3.4. 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. 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.

3.6. 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 Hybro weeder harrow 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 a mechanical lock.

- **When folding and unfolding, remember to unlock the lock with the string.**
- **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, so that the machine does not jump up on the tractor's linkage and there is no undue stress on the machine frame and the tractor's linkage.

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

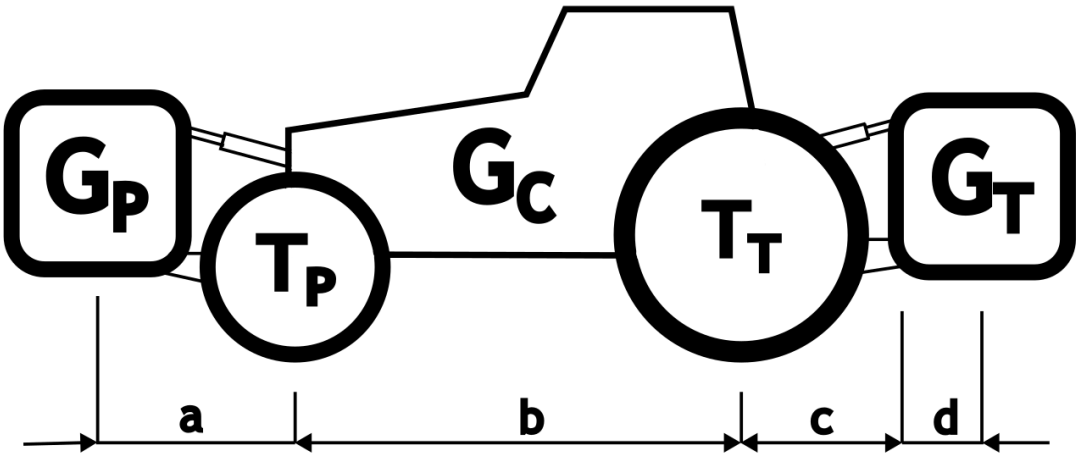


Figure 6 Diagram of tractor load designations

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. Hitching a HYBRO weeder harrow to a 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.

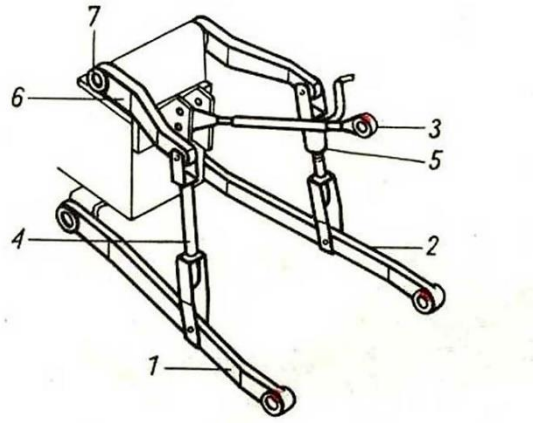


Figure 5 Three-point linkage of the tractor: 1,2 - lower links, 3 - upper fastener, 4 - left suspension, 5 - right suspension with adjustable length, 6 - lift arm, 7 - lift roller

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

- 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
- Ensure that the category of hitch and tie rod is identical
- Switch the tractor hydraulic system to position control
- Back the tractor up to a distance that allows the hitch of the unit to be connected to the lower links of the tractor,
- Align the lower links at an equal distance from the ground
- First connect the lower links of the tractor
- Secure the connection with pins and locks
- Connect the top link of the 3-point hitch and adjust the connection
- Connect electrical cables (if lighting is optional) and check for correct operation
- Connect the hydraulic lines and check for leaks
- If the unit has a support foot, it must be raised and secured
- Raise the unit and check that the tractor retains full steering control

NOTE! Coupling of the tractor to the unit must be carried out carefully, at minimum tractor speed! When hitching the machine, make sure there are no bystanders in the vicinity.

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. Preparing the HYBRO weeder harrow for operation

The weeder harrow is usually sold ready for work. Due to the limitations of transport facilities, it is also possible to deliver it in a partially dismantled state.

5.2.1 Installation of the roller

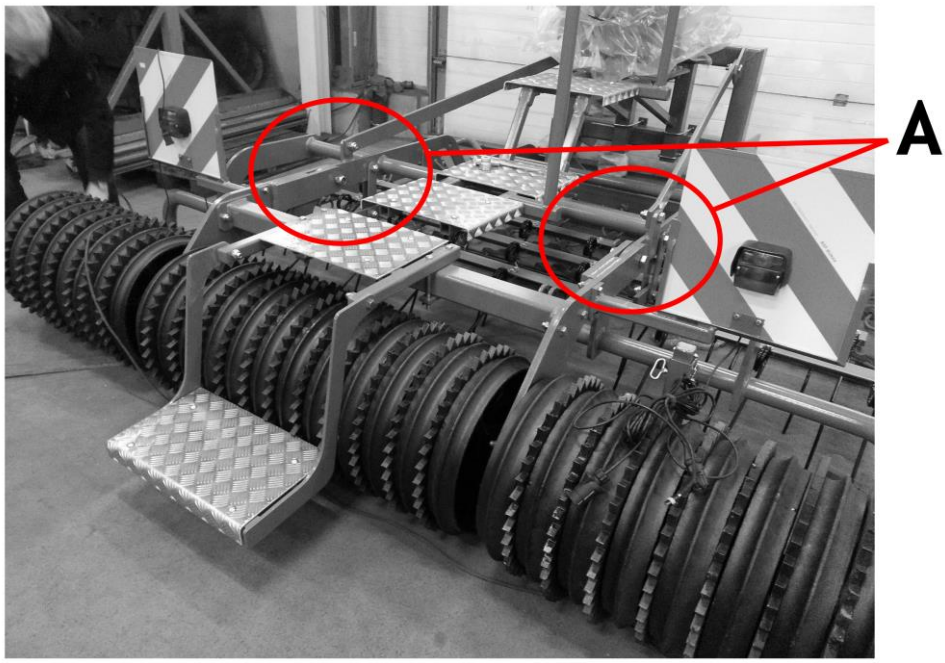
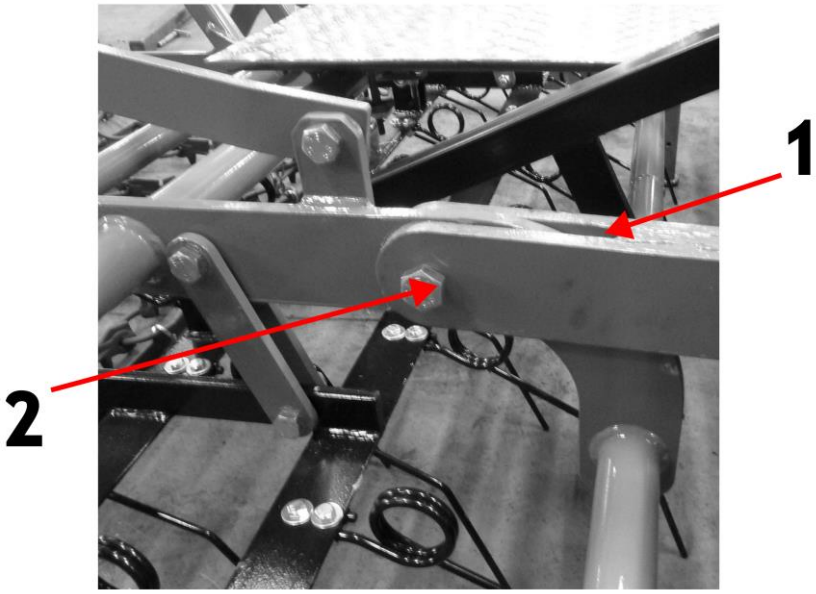


Figure 6 Assembly of the Cambridge roller to HYBRO 3.0 (plan A shown below)



View A (1 - roller arm, 2 - screw M24x90-8.8)

Installation sequence:

1) Set up the HYBRO harrow on firm level ground,
2) Place the roller at the rear of the harrow according to figure 6
3) Fit the roller arm eye on the harrow frame
4) Screw the roller arm to the frame with two screws

5.2.2 Installation of the platform

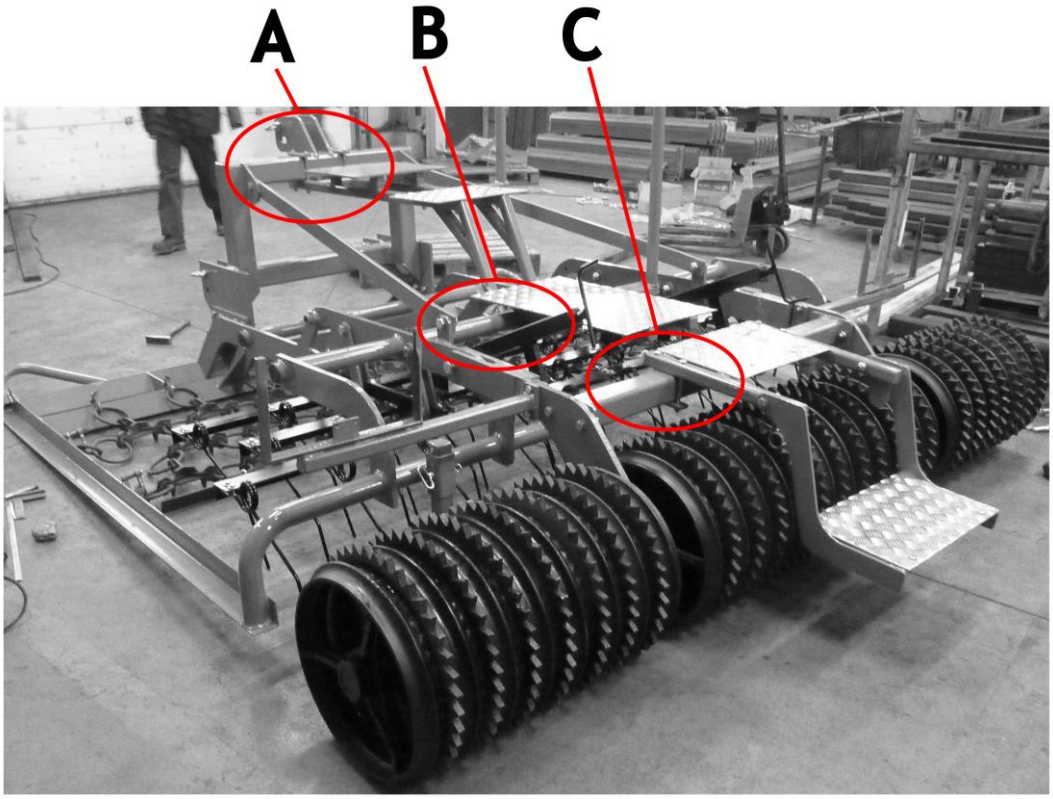
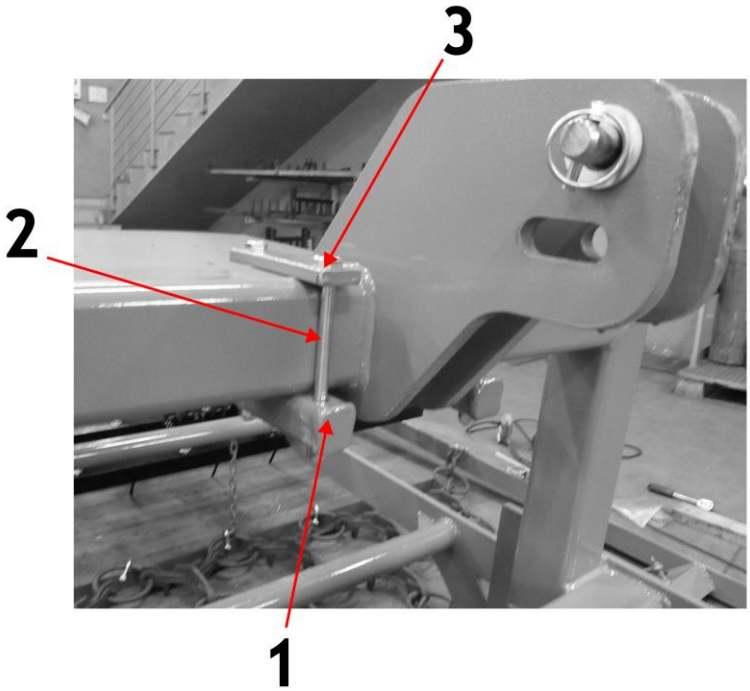
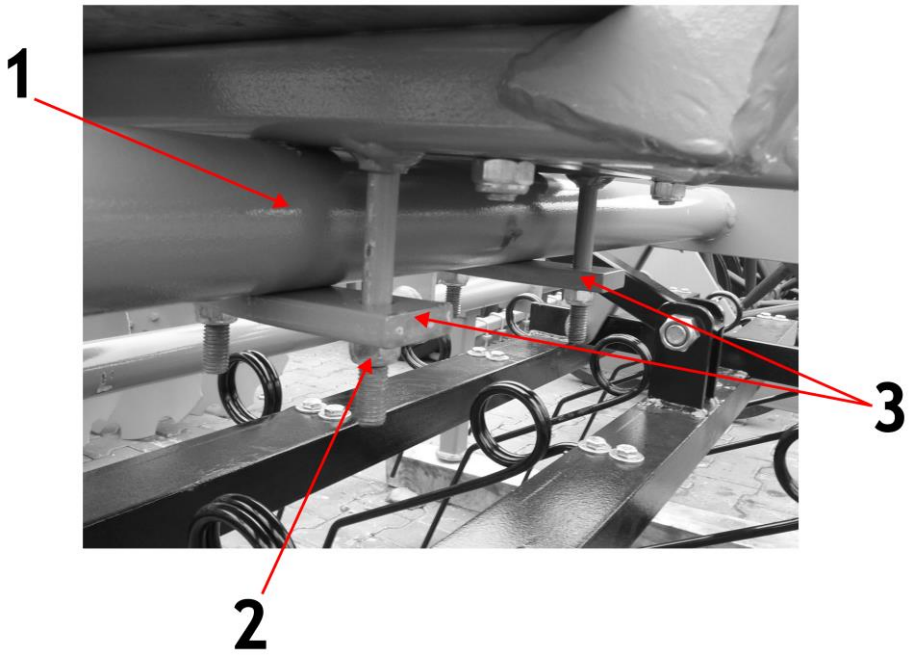


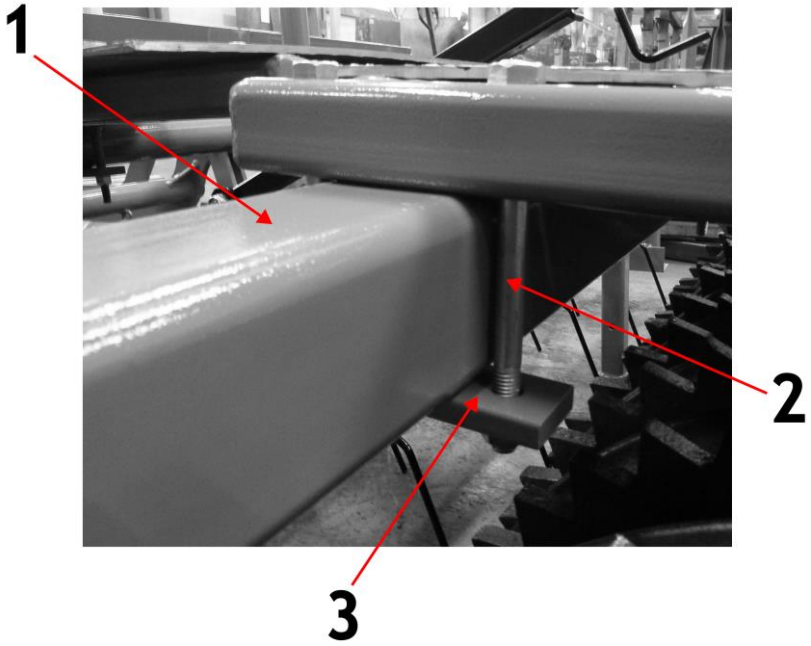
Figure 7 Assembly of HYBRO platform (view A, B, C below)



Plan A (1 - platform beam, 2 - screw M12x160-8.8 + nut M12, 3 - fixing plate (hole distance 114 mm))



Plan B (1 - frame tube, 2 - M12 nut, 3 - mounting plate (hole spacing 94 mm))



Plan C (1 - roller beam, 2 - screw M12x160-8.8 + nut M12, 3 - mounting plate (hole distance 94 mm))

Installation sequence:

1) Place the HYBRO platform on the machine according to figure 7
2) Ensure that the screws shown in plan B enclose the frame tube.
3) Position the platform bar below the draw bar
4) Screw according to plan A
5) Screw according to plan B
6) Attach the platform to the roller beam
7) Screw according to plan C

5.2.3 Installation of the seeder

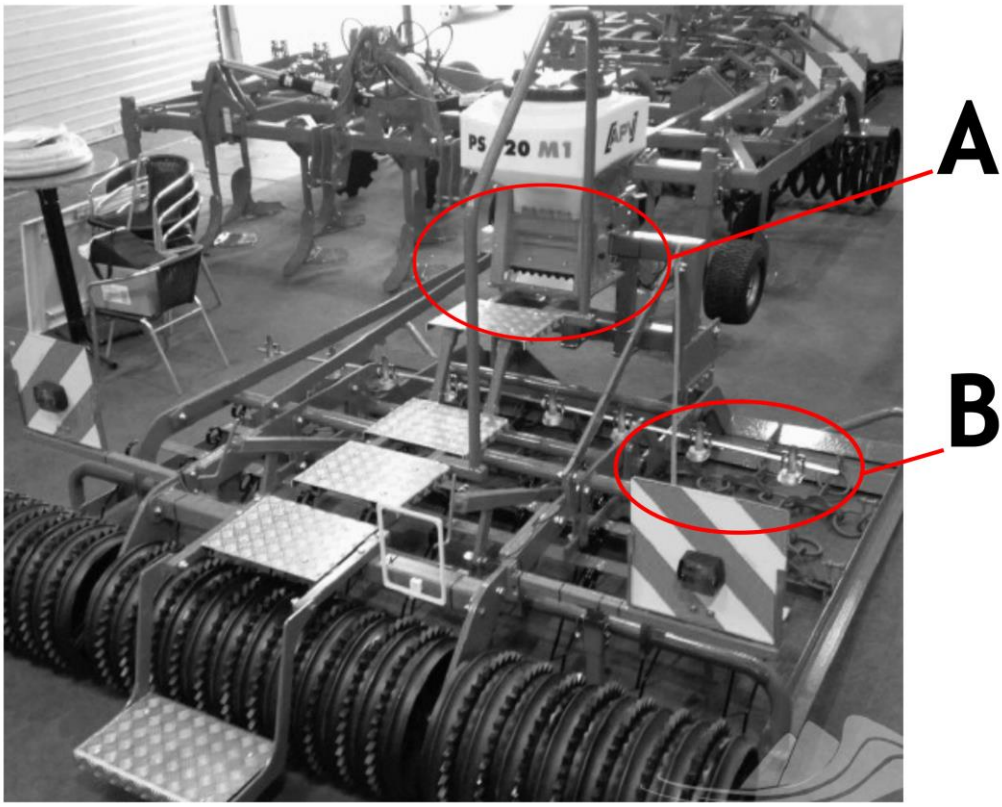
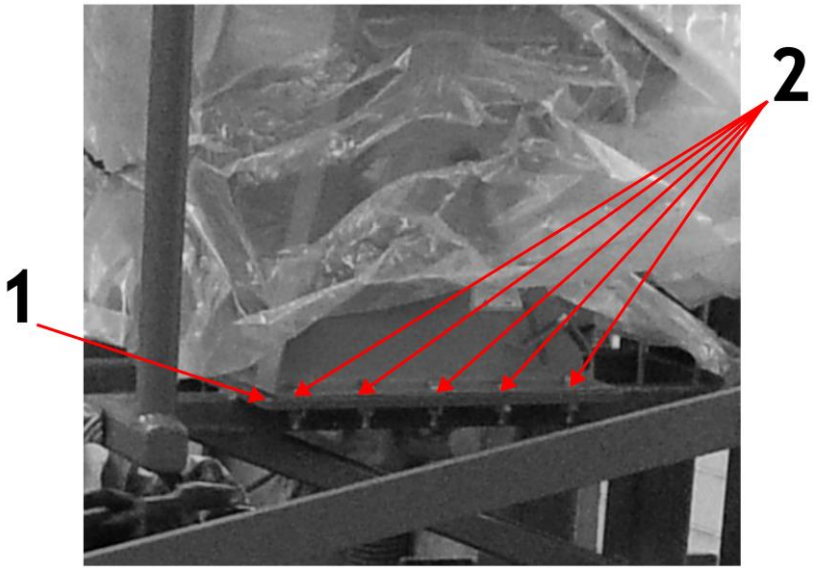
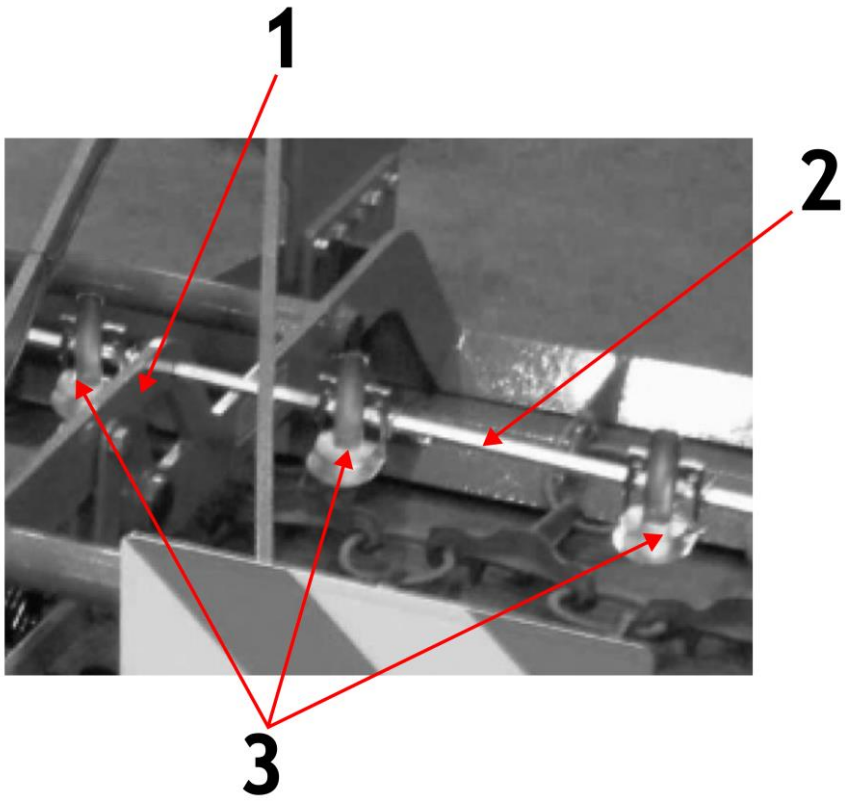


Figure 8 Assembly of HYBRO seeder (view A, B below)



Plan A (1 - seeder fixing plate, 2 - screw M12x40-8.8 + nut M12)



Plan B (1- frame with rod hole, 2 - hexagonal rod, 3 - seed dispersal plate)

Installation sequence:

1) Position the seeder so that the seed hoses are pointing towards the rear of the machine
2) Screw according to plan A
3) Pass the rod through the holes in the frame
4) Distribute seed dispersal plates evenly
5) Screw according to plan B

5.2.4 Installation of lighting

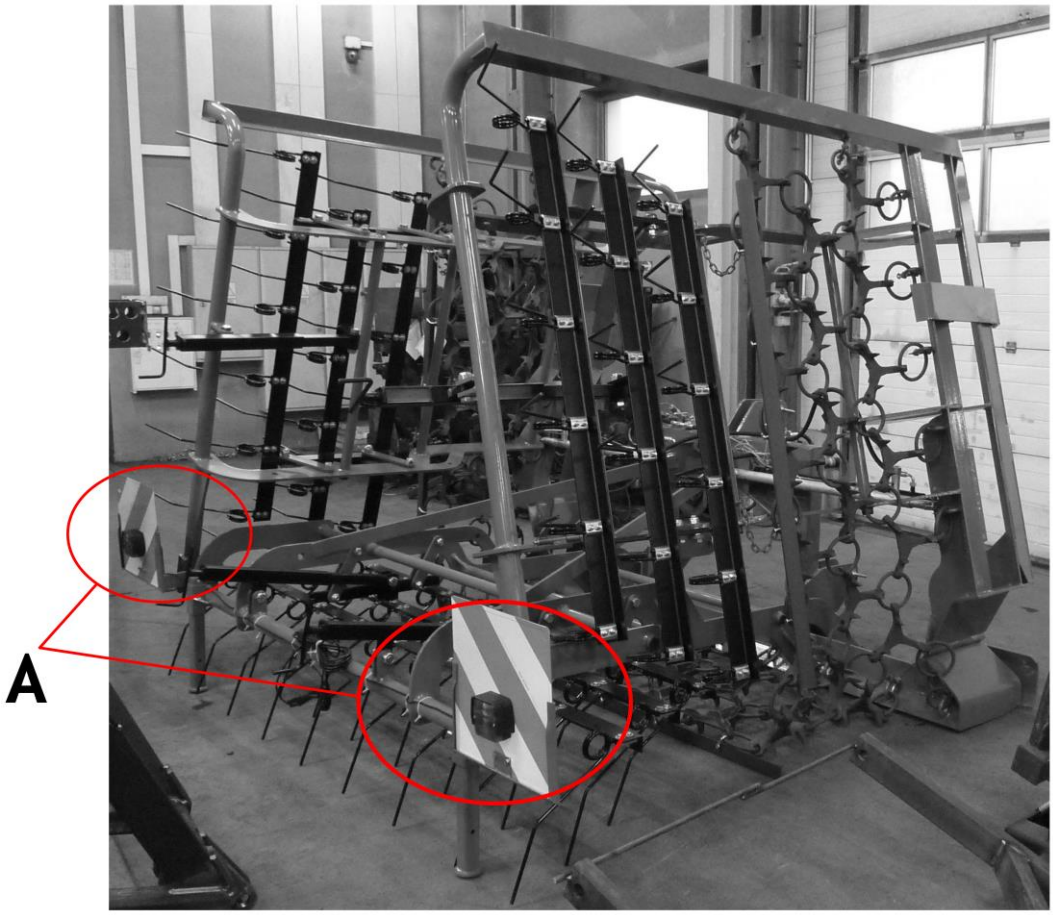
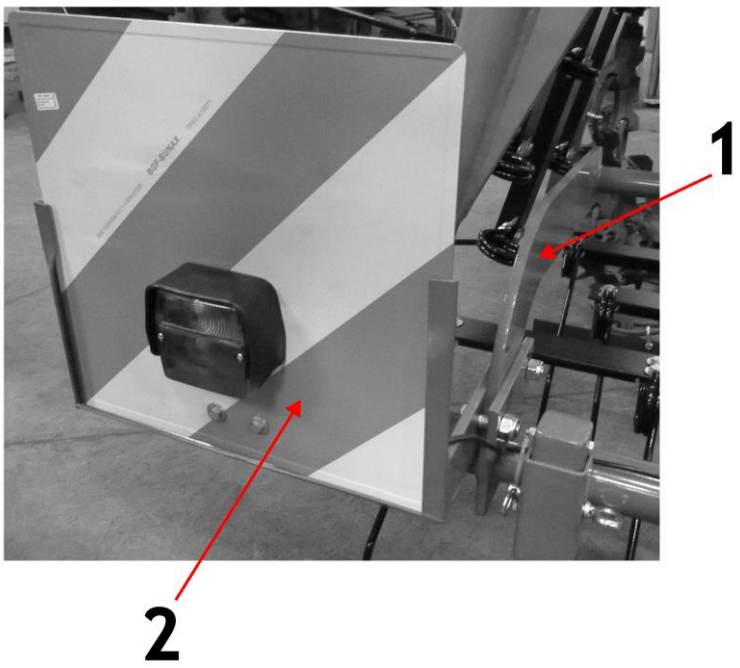
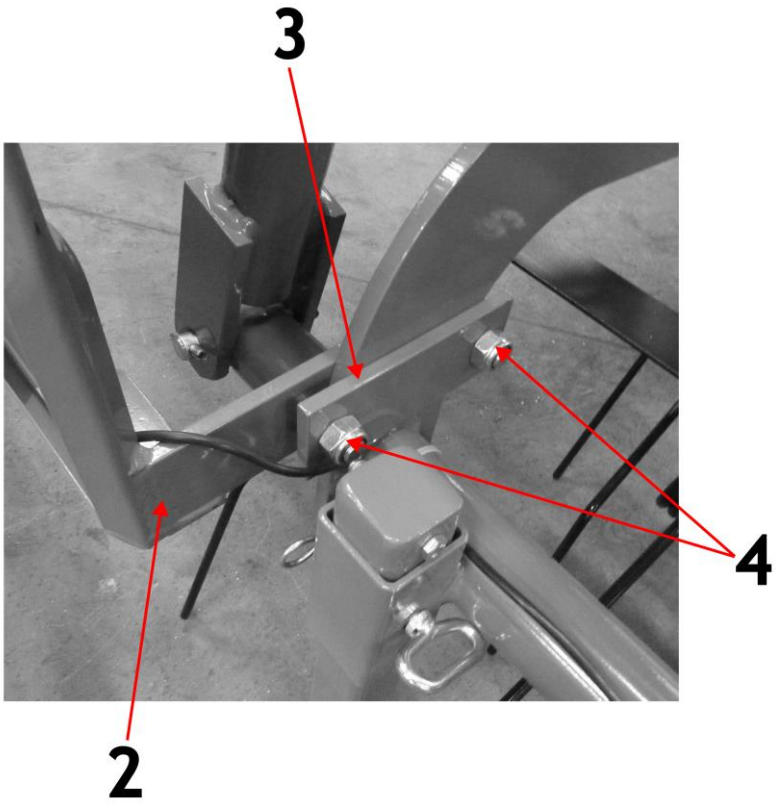


Figure 9 Assembly of HYBRO lighting (plans A shown below)



Plan A (1 - longitudinal frame reinforcement, 2 - right/left light boards with fixings)



Plan A (2 - right/left light boards with fastening, 3 - fastening plate, 4 - screws M16x50-8.8 + nut M16)

Installation sequence:

1) Apply the right and left lighting assemblies to the longitudinal frame reinforcement according to plan A
2) Screw according to plan A, embracing the frame element
3) Use fastening plates pos. 3 when screwing.
4) Route electrical cables to the front of the machine
5) Connect the cables to the components with cable ties

NOTE! Route the machine's lighting cables so that no loose sections remain. On folding machines, route the cables so that they do not interfere with the opening and closing of the machine.

5.2.5 Assembly of HYBRO lighting with Cambridge roller

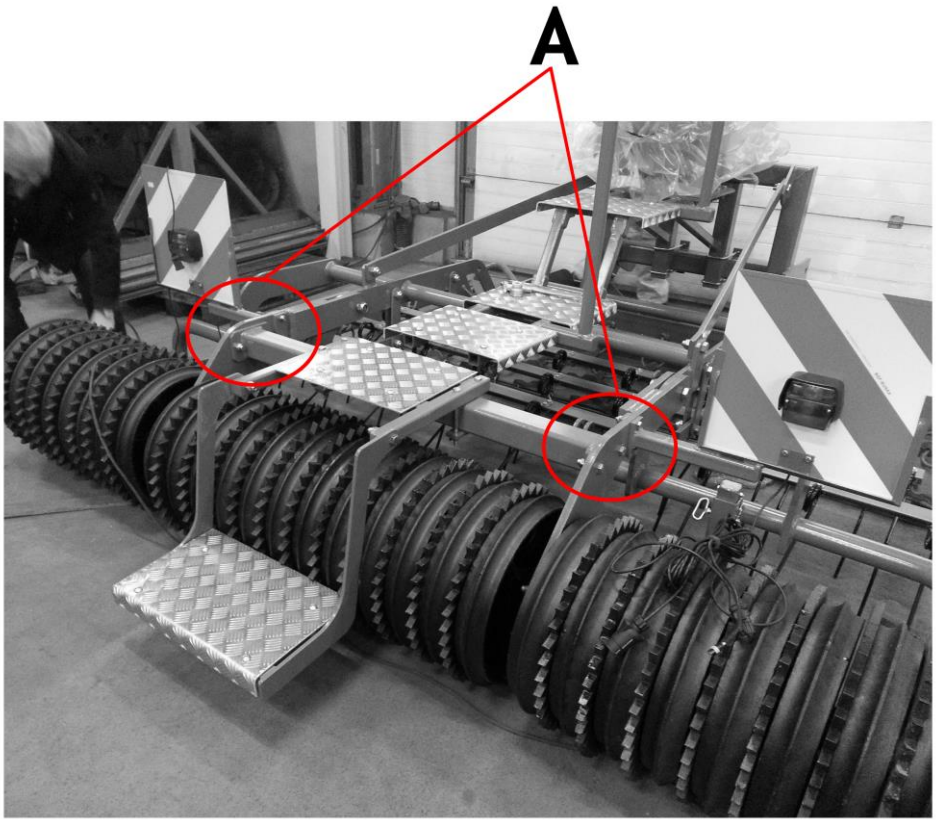
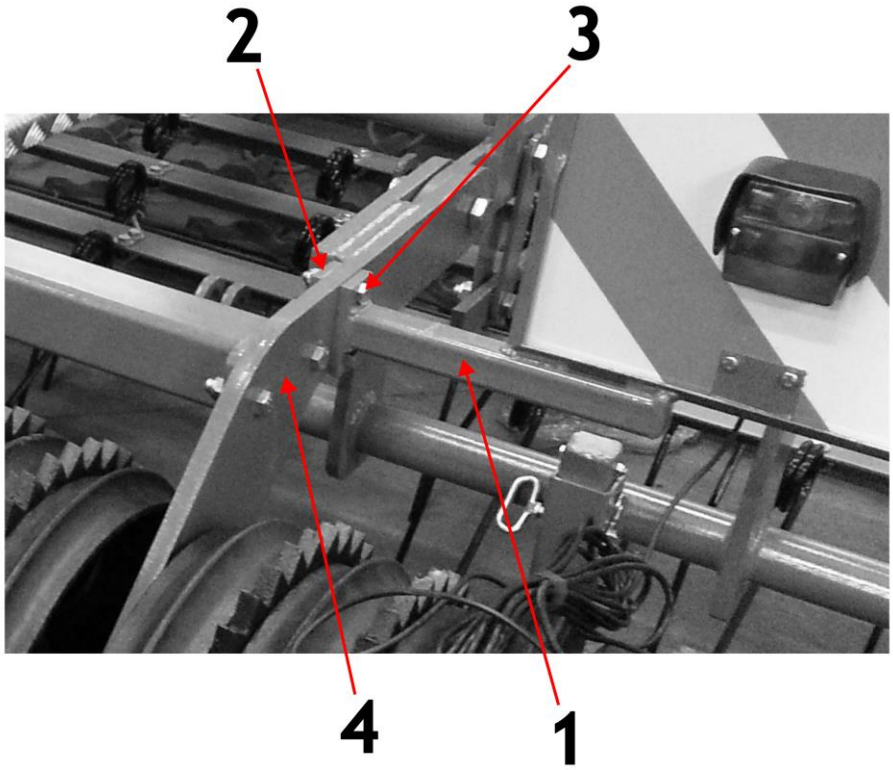


Figure 10 Assembly of HYBRO 3.0 lighting with Cambridge roller



Plan A (1 - lighting beam, 2 - mounting plate (hole distance 73 mm), 3 - screw M12x70-8.8 + nut M12, roller frame)

Installation sequence:

1) Apply the right and left light assembly to the arm according to plan A
2) Screw according to plan A
3) Use fastening plates pos. 2 when screwing.
4) Route electrical cables to the front of the machine
5) Connect the cables to the components with cable ties

NOTE! Route the machine's lighting cables so that no loose sections remain.

5.3. Operation and adjustment

- When operating, a properly suspended HYBRO weeder harrow should move evenly behind the tractor and sit freely on the ground over its entire surface (the frame must be horizontal in relation to the field surface).
- **The recommended operating speed is 8 km/h.**
- Reversing of the tractor is permitted provided the HYBRO weeder harrrow is raised to the transport position. The transport position of the HYBRO weeder harrow during operation does not require the outer weeder sections to be folded.

5.3.1 Adjustment of the weeder section

On the Hybro weeder harrow, the working depth of the rear weeder section is adjustable (Fig. 11).

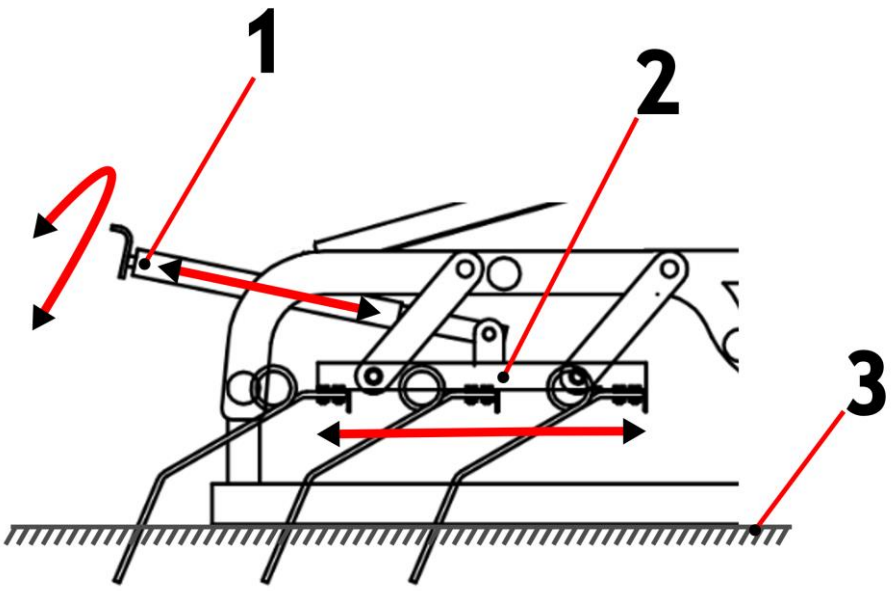


Figure 11 Adjustment of the weeder section (1 - adjustment crank, 2 - weeder section, 3 - ground level)

- The working depth is adjusted by means of a crank handle

5.3.2 Operating and replacement instructions for mechanical locking of actuators

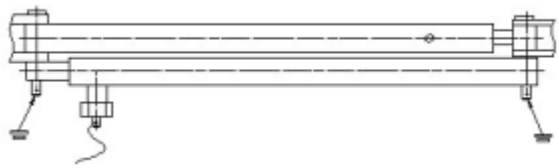
- The mechanical safety device must be unlocked before the right and left sides of the unit can be unfolded. To do this, pull the cord that unlocks the safety catch and then start unfolding. When unfolded, the locking mechanism secures itself.
- **TELESCOPE** – safety bar against the opening of the side wings of agricultural machines in accordance with EU standard No. 2006/42/EG (EU PATENT PENDING)
- The telescope locks the actuators mechanically. When folding the wings of the machine, the bolt automatically locks the telescopic mechanism and the wings are mechanically interlocked.

To fit a new lock, follow the instructions below:

1) Pull out the existing actuator retaining pins

2) Replace the pins with new longer ones

3) Mount the telescope on pins parallel to actuator and secure with pins



4) On the pawl (telescopic latch) hook the cord and lead it all the way to the tractor cab

Figure 12 Instructions on how to install a new mechanical actuator lock

- **Telescope safety lock operating instructions**

To release the bolt in the telescope, the actuators must be fully retracted using the tractor's hydraulic pump (close the side frames all the way) and at the same time pull the cord, which must be held until they open completely (both sides of the harrow), then the wings of the machine will open under their own weight or forced by the movement of the actuators (depending on whether they are single-acting or double-acting).

The condition of the cord and its position should be checked. The cord should be placed freely above the machine so that the user can access it from the tractor cab at all times - it should not be blocked by anything. It is not necessary to tension the cord when folding the machine, it secures itself automatically.

5.3.3 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 13). 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:

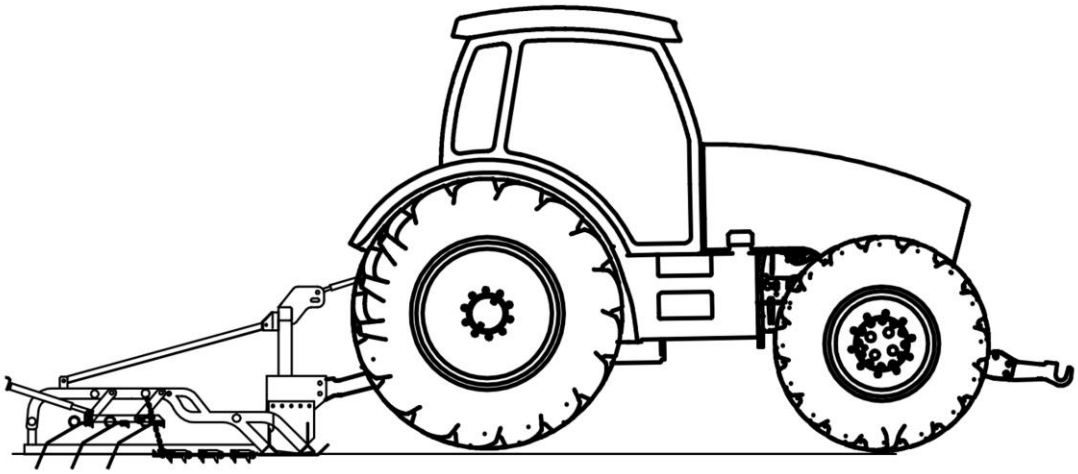


Figure 13 Properly positioned machine parallel to the ground.

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

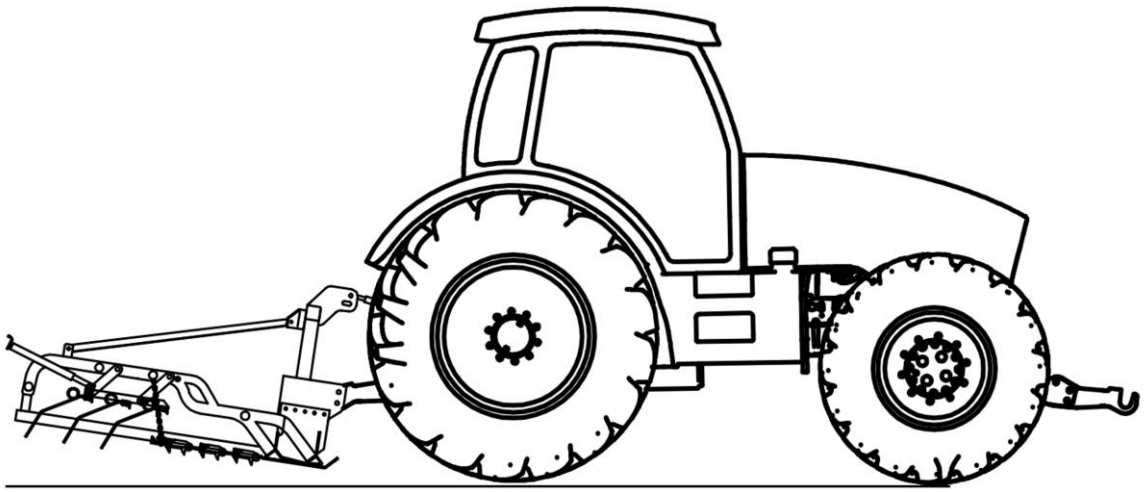


Figure 14 Turning the machine correctly.

- Turning with the machine buried in the soil or turning on the rollers is not permitted:

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.

5.4. Rules for transporting the harrow on public roads and lighting

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 unit. 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 **20 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 warning-light devices and a distinguishing sign for slow-moving vehicles (according to current traffic regulations) should be attached to the ends of the machine 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. **Do not forget the mechanical arm 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 machine if the slope transverse to the machine exceeds 7°.

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

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

5.5. 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. **Otherwise, there may be a problem with the height adjustment of the rollers if there is soil clogging them and the resulting 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,**
- When replacing worn components, use thread glue, original bolts and nuts and pins,
- Always ensure that screw connections are properly tightened.

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 event resulting in a broken, or deformed frame, roller or other assembly of the machine!

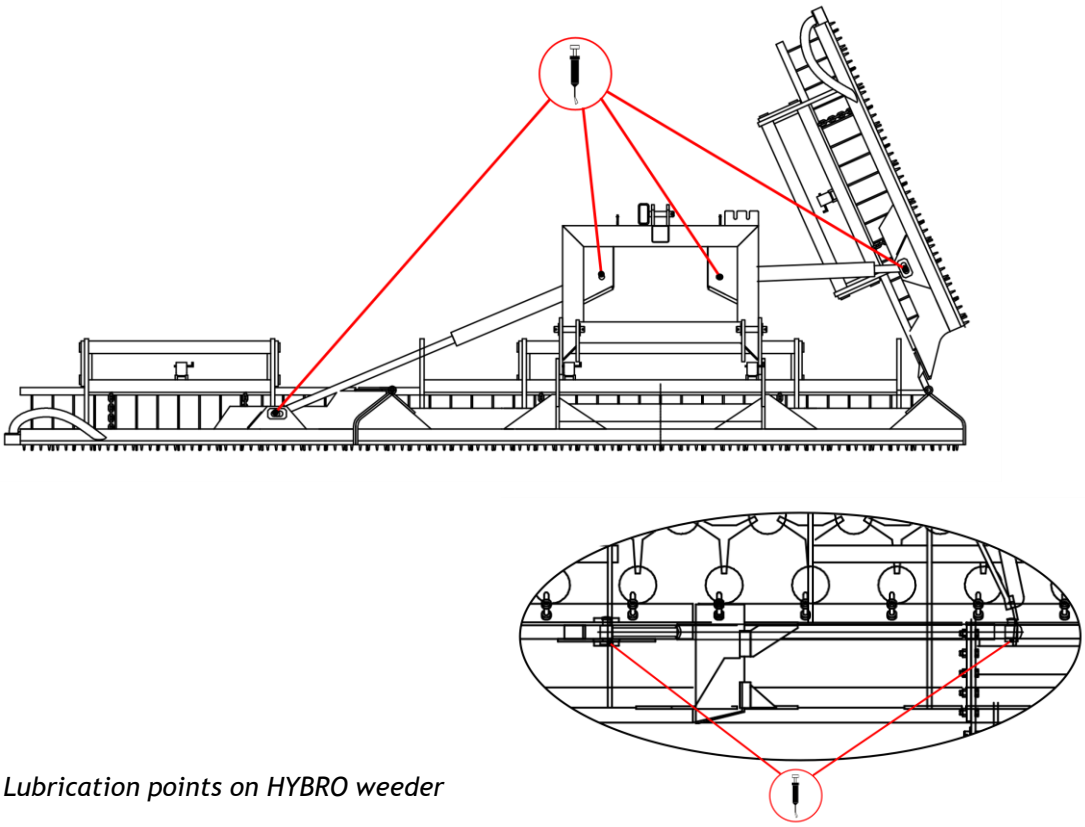


Figure 15 Lubrication points on HYBRO weeder harrow

5.6. 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 event resulting in a broken, or deformed frame, roller or other assembly of the machine!

6 Operation of the HYBRO weeder harrow

➢ **Everyday service**

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

➢ **Post-season service**

At the end of the operating season, the unit must be thoroughly cleaned, any damage to the paintwork repaired, and the stripped working surfaces of the tines and roller, as well as the threads of the adjusting screws, must be washed with "Antykor" paraffin and protected against corrosion with "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.

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 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).

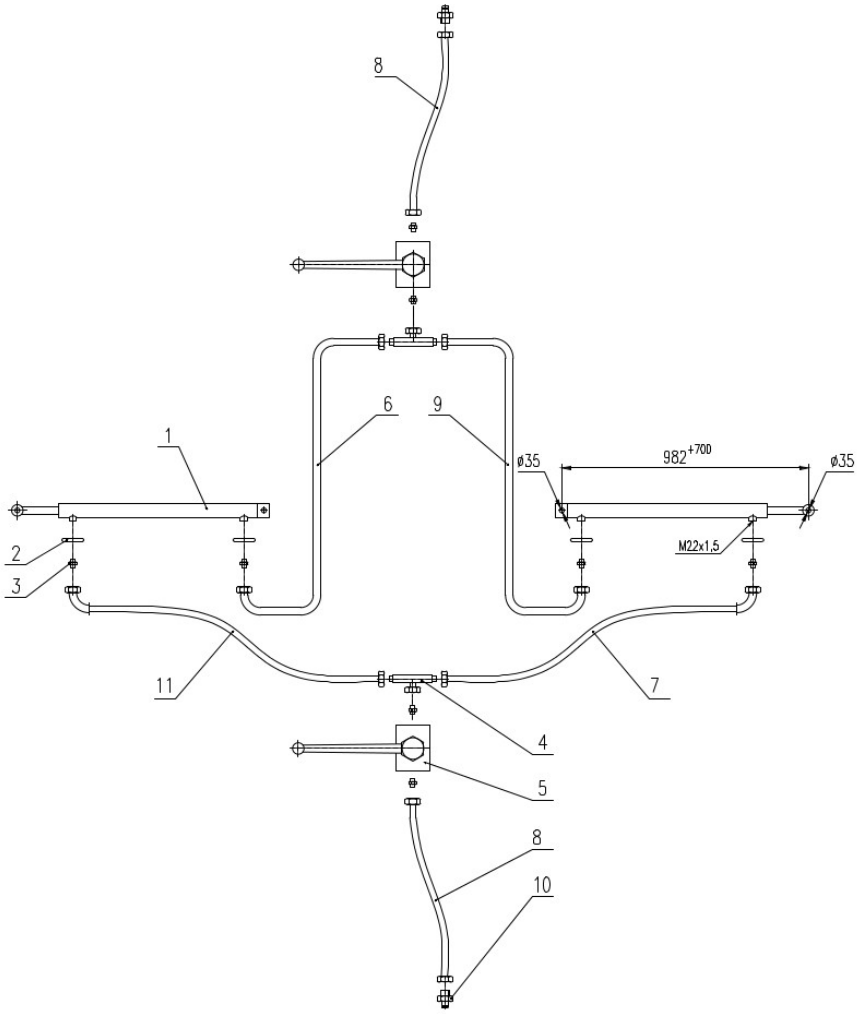


Figure 65 Diagram of the Hybro 4.0 H, 6.0 H, 8.0 H hydraulic system: 1- actuator, 2- washer, 3- reducing nipple straight, 4- tee-connector, 5- valve, 6- hydraulic line 0.7 m, hydraulic line 1.25 m, hydraulic line 1.35 m, hydraulic line 0.8 m, 10- quick coupling, 11- hydraulic line 1.5 m

6.1. Main machine dimensions

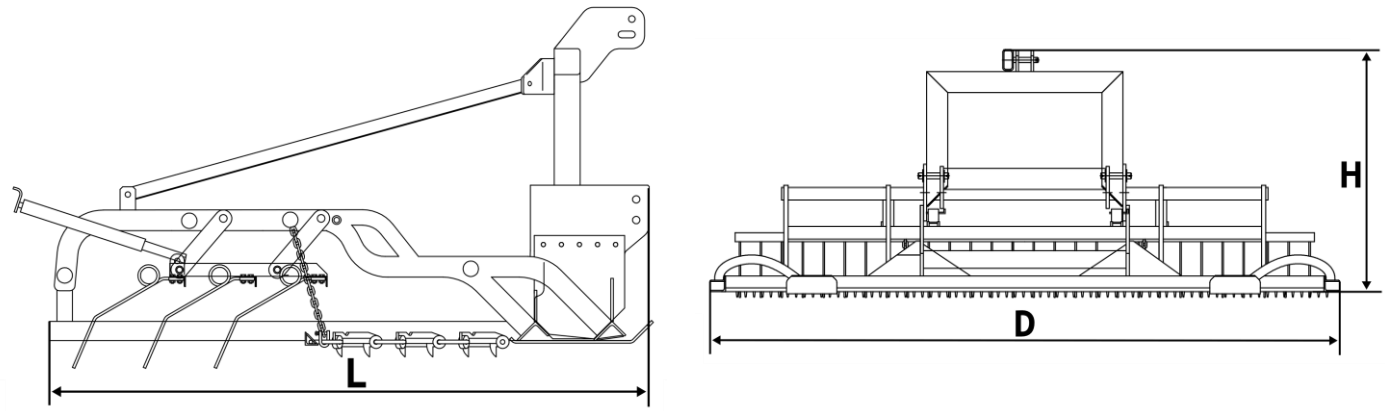


Figure 17 Transport dimensions of HYBRO 3,0 weeder harrow

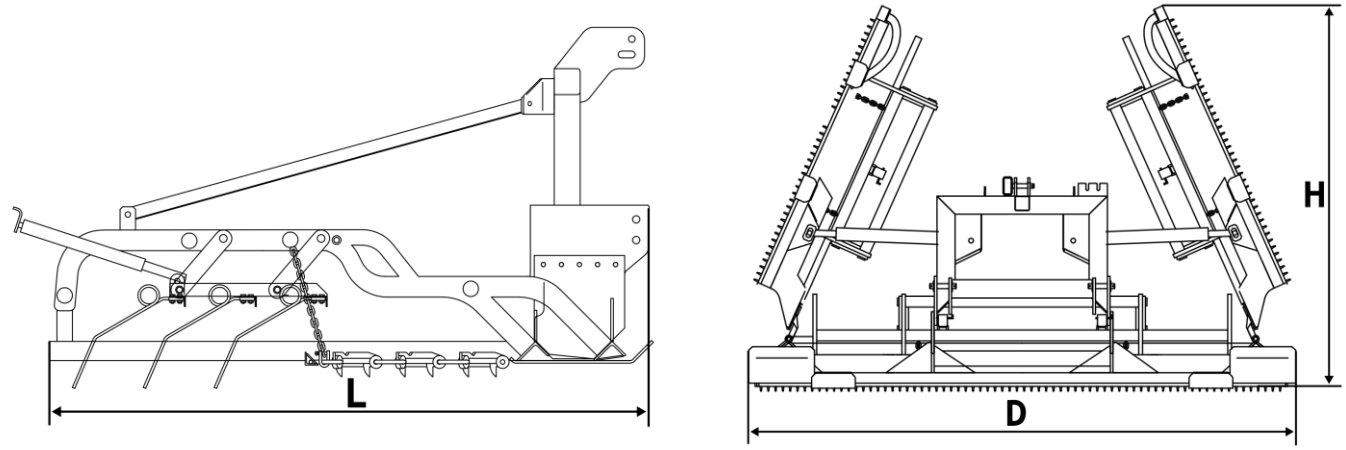


Figure 18 Transport dimensions of HYBRO weeder harrow with hydraulic folding

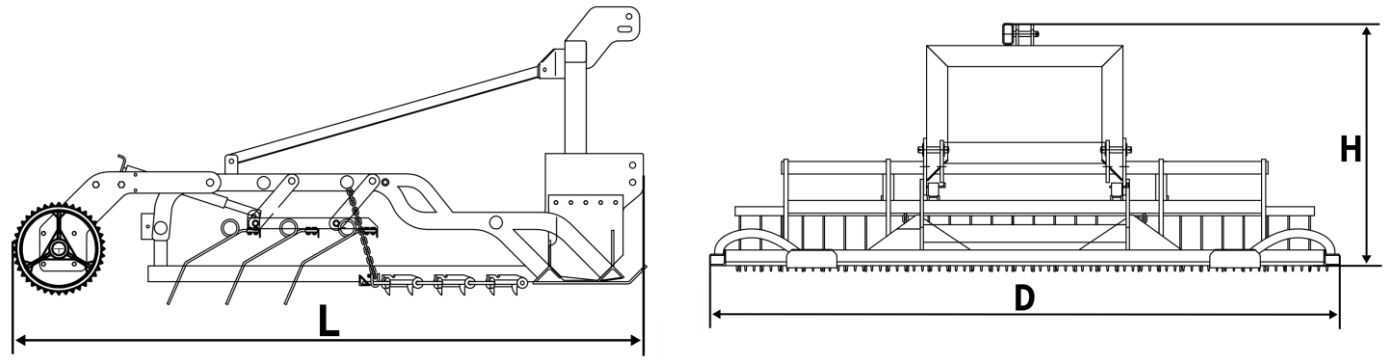


Figure 19 Transport dimensions of harrow harrow 3.0 with Cambridge roller

Table 3 Transport dimensions of the HYBRO weeder harrow

No.	Type	Transport height (H) [mm]	Transport width (D) [mm]	Transport length (L) [mm]
1	HYBRO 3.0	1110	2980	2350
2	HYBRO 3.0 + MCB roller	1110	2980	2960
3	HYBRO 4.0 H	1350	2910	2300
4	HYBRO 6.0 H	2090	2910	2300
5	HYBRO 8.0 H	2900	2910	2300

6.2. Specifications

Table 4 Technical characteristics of the HYBRO weeder harrow

No.	Parameters	Unit					
1	Machine type		HYBRO 3.0	HYBRO 3.0 + MCB roller	HYBRO 4.0 H	HYBRO 6.0 H	HYBRO 8.0 H
2	Working width	m	3.00	3.00	4.00	6.00	8.00
3	Number of castings	pcs.	26	26	41	59	77
4	Number of spring tines	pcs.	28	28	41	61	80
5	Hydraulic folding	-	NO	NO	YES	YES	YES
	Reseeding roller	-	-	YES	-	-	-
	Seeder	-	OPTION	OPTION	OPTION	OPTION	OPTION
	Platform	-	OPTION	OPTION	OPTION	OPTION	OPTION
6	Unit dimensions in transport position	m	*	*	*	*	*
7	Power requirement	KM	40	65	50	65	85
8	Total unit weight	kg	610	1376	1060	1270	1635
11	Transport speed	km/h	max. 20	max. 20	max. 20	max. 20	max. 20

* transport dimensions can be found in Table 3

7 Replacement procedures

Bearing replacement

If the roller bearings are damaged, they must be replaced as follows:

- Place the machine on a horizontal surface
- Loosen the screws holding the roller to the machine
- Set aside the roller screw the retaining ring on the end of the roller
- Slide off the cast iron wheels to access the bearings
- Unscrew the bearing and replace with a new one
- Lubricate
- Refit the cast iron wheels in the correct order

- Screw the retaining ring
- Screw the roller assembly onto the machine

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.

8 Storage of the weeder harrow

- At the end of the working season with the unit, the machine and 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 machine should be stored in a place that poses no danger to persons or the environment.** 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 unit 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 working elements 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 HYBRO weeder harrow

- 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.