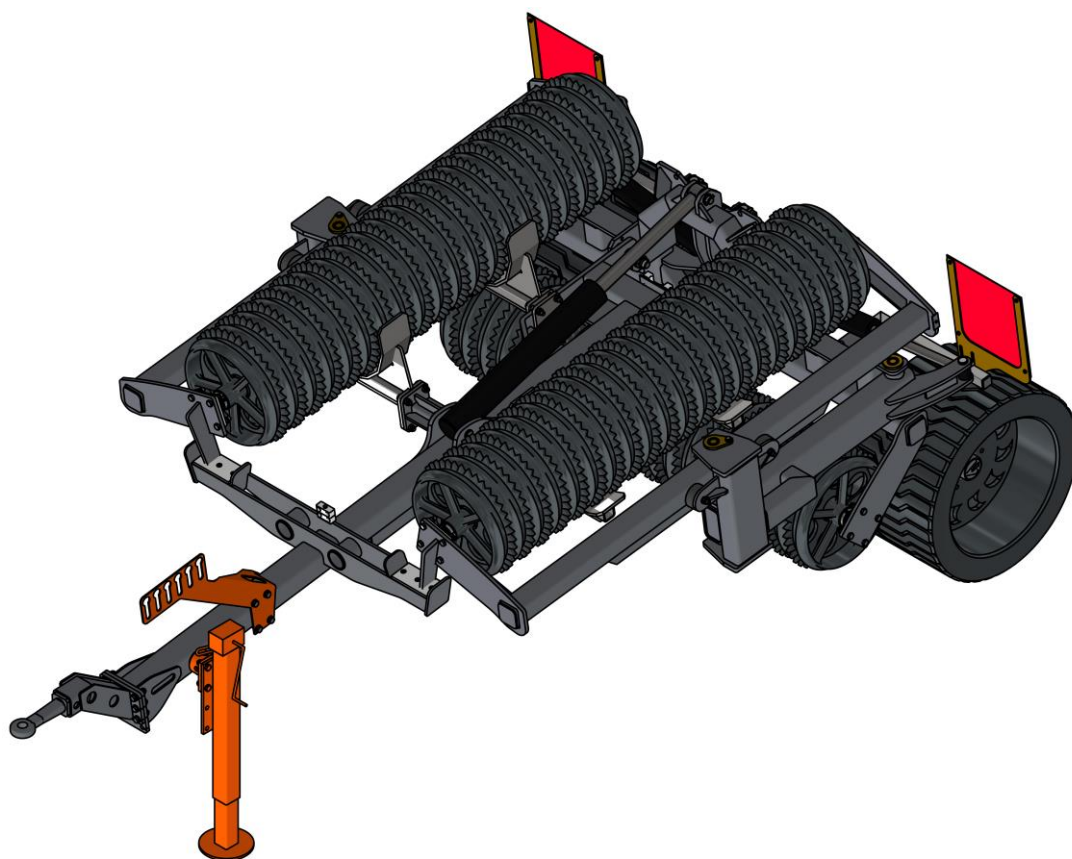




MANDAM Sp. z o.o.
44-100 Gliwice ul. Toruńska 14
e-mail mandam@mandam.com.pl
Tel.: +48 32 232 26 60 Fax: 032 232 58 85
NIP: 648 000 16 74 REGON: P - 008173131

OPERATION MANUAL

CAMBRIDGE MCB SWING CULTIVATION ROLLER



Revision II
Gliwice 2025

INSTRUKCJA
TŁUMACZENIE
ENG
ORIGINALNEJ

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:

CAMBRIDGE MCB SWING CULTIVATION ROLLER

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	4
1.1	Information and warning signs	5
2	General information.....	8
2.1	Construction and purpose of the MCB SWING cultivation roller.	8
2.2	Purpose of the Cambridge roller.....	10
2.3	Additional markings of the MCB SWING with road approval	11
3	General safety rules.....	11
3.1	Proper coupling and uncoupling of the machine to/from the tractor	12
3.2	Tyres.....	12
3.3	Hydraulic and pneumatic system	13
3.4	Noise and vibrations.....	13
3.5	Compliance with standards.....	13
3.6	Safety regarding transport on public roads	14
3.7	Description of residual risk.....	15
3.8	Assessment of residual risk.....	15
4	Information on handling and use	15
4.1	Preparing the roller for work.....	17
4.2	Coupling the cultivation roller to the tractor.....	17
4.3	Mounting points for the leveling harrow on the MCB roller.	19
4.4	Folding and unfolding the MCB roller equipped with a leveling harrow.....	19
5	Operation and adjustments	21
5.1	Cultivation roller operation	21
5.2	Adjustment of the cultivation roller during operation	22
5.3	Adjustment of the cultivator roller harrow (option).....	22
5.4	Construction and adjustment of the spring harrow of the MCB SWING roller (option)	24
5.5	Construction of seed drill with access platform (option)	25
5.6	Rules for transporting the roller on public roads and lighting the machine	26
5.7	Maintenance and lubrication of the machine	28
5.8	Screw tightening torque	30
6	Braking system	31
6.1	Air brake	31
6.2	Hydraulic single-circuit brake.....	32
6.3	Hydraulic double-circuit brake	33
6.4	Automatic brake valve with spring brake - 206613	33
7	Hydraulic system quick couplings	41
8	Maintenance of the cultivation roller MCB SWING	42
8.1	Main machine dimensions	43
8.2	Specification	44
8.3	Malfunctions and irregularities in the operation of the cultivation roller	45
9	Replacement procedures	46
10	Storage of the MCB cultivation roller	48
11	Disassembly and disposal	49
12	Spare parts of the MCB SWING cultivation roller	50

1 Introduction

Congratulations on your purchase of the Cambridge SWING cultivation roller. This manual provides information on the hazards that may occur when working with the roller, 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 MCB SWING cultivation roller can be found on a rating plate on the drawbar. The rating plate contains basic information about the manufacturer and the machine, as well as the CE mark.



Figure 1 Rating plate

The guarantee for Cambridge Swing cultivation roller is valid for 24 months from the date of sale.

- The warranty card is an integral part of the machine.
- Please always quote the serial number when making enquiries about spare parts.
- Information on spare parts can be found:

-  www.parts.mandam.com.pl
-  +48 668 662 289, 797 518 831
-  czesci@mandam.com.pl
- authorised distributors of machines from Mandam Sp. z o. o.

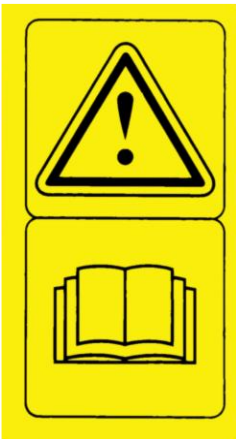
1.1 Information and warning signs



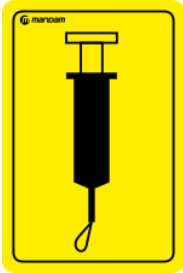
Remember! When using the cultivator, special care should be taken in areas marked with special information and warning signs (yellow stickers).

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

Table 1 Information and warning signs

Safety signs	Meaning of the safety sign
	Read the operating instructions before use.

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

<i>Safety signs</i>	<i>Meaning of the safety sign</i>
	Fixing point for transport belts.
	Lubrication point
	Designation of hydraulic system couplings

2 General information

2.1 Construction and purpose of the MCB SWING cultivation roller.

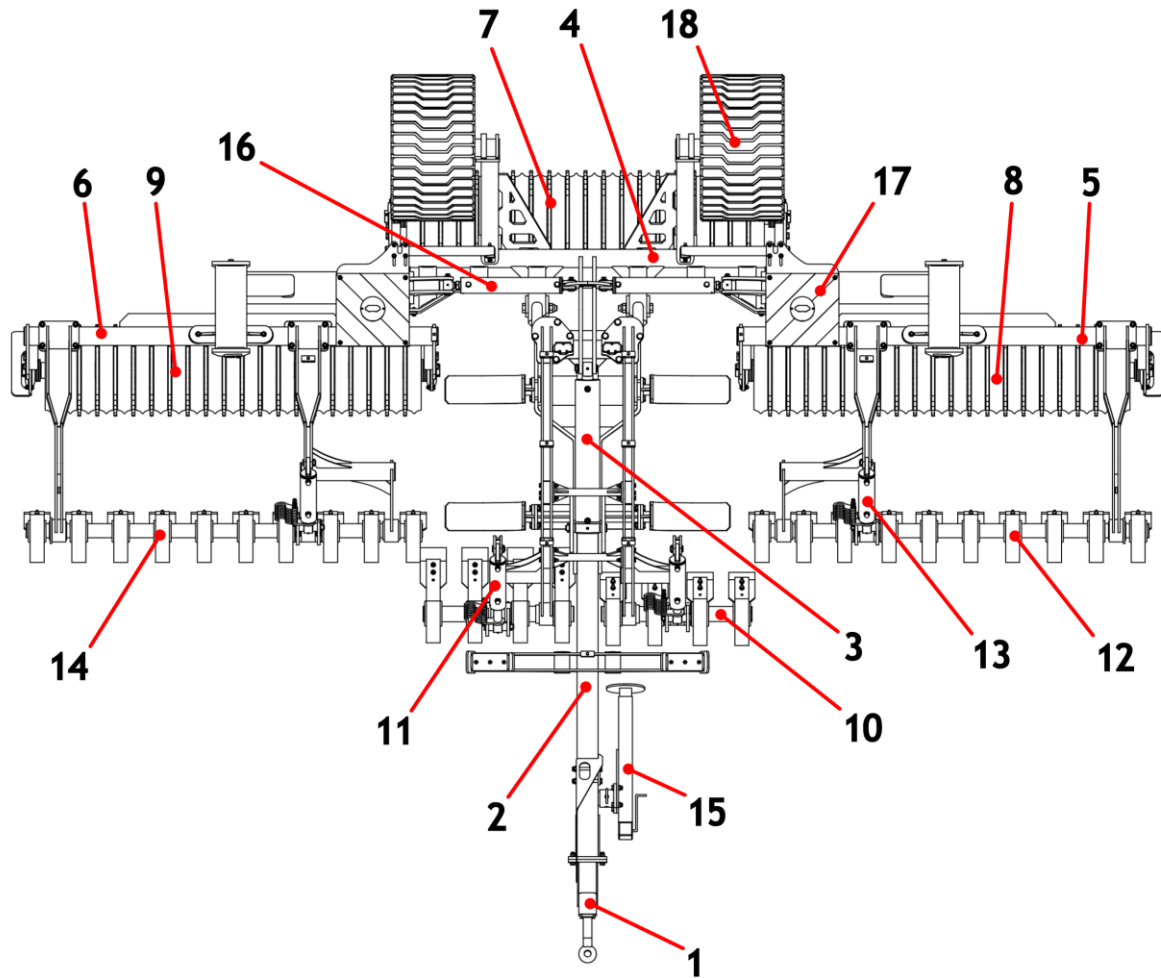


Figure 2 Construction of the MCB SWING cultivation roller based on the 6.2H model (1 - hitch, 2 - drawbar, 3 - drawbar hydraulic cylinder, 4 - central frame, 5 - left frame, 6 - right frame, 7 - central working roller, 8 - left working roller, 9 - right working roller, 10 - middle SKAN harrow (optional), 11 - middle SKAN harrow hydraulic cylinder (optional), 12 - left SKAN harrow (optional), 13 - left SKAN harrow hydraulic cylinder (optional), 14 - right SKAN harrow (optional), 15 - support foot, 16 - side frame folding hydraulic cylinder, 17 - lighting panels (optional), 18 - running wheels)

- The **central frame** of the roller serves as the load-bearing structure for the working sections and, optionally, for the leveling harrow. The central frame consists of wings (right and left), an optional central, right, and left leveling harrow, as well as the running gear. It is made of closed-section profiles.
- The roller **drawbar** is a structural component that enables the attachment of the roller to a tractor and allows for the horizontal positioning of the central frame. The position is adjusted using a hydraulic cylinder mounted on the drawbar. The drawbar is equipped with supports on which the working sections rest during transport. It is made of closed-section profiles.

- The **working section** (roller) consists of a series of cast iron elements mounted on the working shaft (Fig. 3), secured at the end with a retaining ring. The smooth wheel is mounted directly on the shaft, while the larger-diameter toothed wheel is mounted on the protruding part of the smooth wheel's hub and can rotate independently. The difference in rotational speed between the wheels enables self-cleaning of the roller from sticking soil. Maintenance-free bearings in metal housings are used at the ends of the roller shafts.

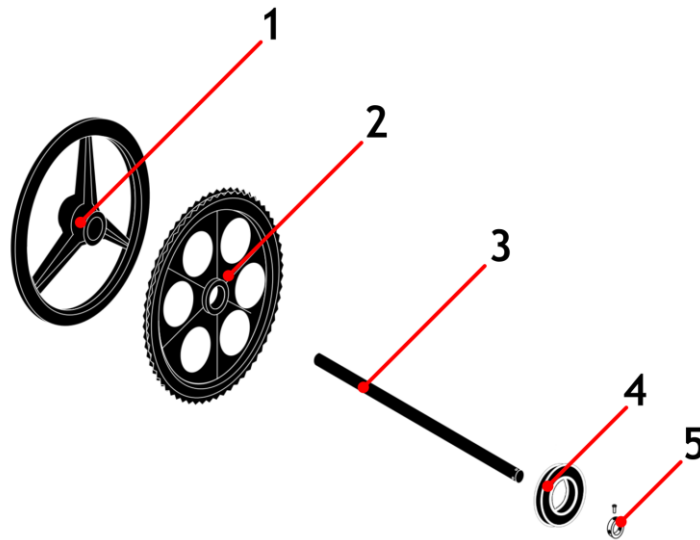


Figure 3 Components of the working section of the MCB SWING cultivator roller (1 - Smooth wheel, 2 - Toothed wheel, 3 - Roller shaft, 4 - Disc spring, 5 - Retaining ring)

- The **leveling harrow** is optional equipment consisting of a section of tines working in front of the roller, mounted to the roller frame via an arm. The angle of attack—and consequently the working depth relative to the roller—can be adjusted either by the movement of a hydraulic cylinder piston or by tightening/loosening a turnbuckle (depending on the selected configuration). The purpose of the harrow is to break up clods and level the surface, ensuring even operation of the cultivator roller.

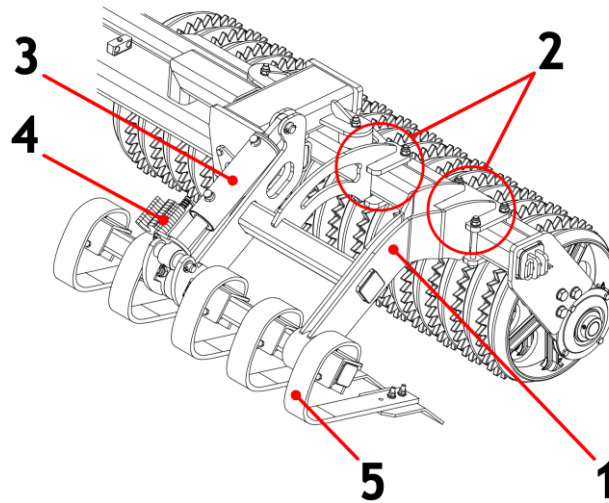


Figure 4 Left wing harrow option of the MCB roller (1 - Harrow frame, 2 - Mounting points to the wing, 3 - Hydraulic cylinder (optional), 4 - Adjustment notches for cylinder operation, 5 - Harrow tine)

2.2 Purpose of the Cambridge roller

Cultivation rollers are used to compact the topsoil immediately after ploughing, before sowing or after sowing, and to create a tubular structure. They crumble the clods and compact the soil while leaving the surface slightly loosened.

Cultivation rollers are particularly useful on compact, clayey soils where they are excellent at breaking up ploughed furrow slices and clods. Cultivation provides compaction and levelling of the topsoil. The high weight per metre width results in good hardening and levelling of the arable layer, so that deep ruts do not form during subsequent passes and, due to the improved capillarity of the soil, a much higher emergence capacity is achieved.



NOTE! Tractors working with a roller suspended on the rear three-point linkage must be equipped with a set of front axle weights.



NOTE! The rollers are designed exclusively for agricultural use. The use of the rollers for other purposes will be understood as a misuse. Cultivation rollers 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.

2.3 Additional markings of the MCB SWING with road approval

Based on the approval documents, the machine is equipped with nameplates and an individual VIN number. The VIN number is marked on the machine's drawbar.



Figure 5 Example of the nameplate of an approved machine and the VIN number.

3 General safety rules

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

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

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

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

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



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



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 roller's markings for road use are not standard equipment. The user can purchase them at agricultural machinery and parts dealers.

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

The following points must be followed when coupling and uncoupling:

- The attachment of the machine to the tractor must be made as specified, remembering to secure the pins and to secure the suspension pins with split pins.
- When coupling the tractor to the cultivator, it is forbidden for persons to stay between the machine and the tractor during this time.
- The tractor working with the cultivator must be fully operational. Coupling to a tractor with a defective hydraulic system is prohibited.
- Make sure that the tractor with the attached unit is stable, and the tractor steerability and stopping power can be maintained. The load on the front axle cannot drop below 20% of the total load on the tractor axle - set of front-mounted weights.
- In the resting position, the machine, when uncoupled from the tractor, should maintain a stable equilibrium.
- 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.
- Each time the wheels are fitted, the tightness of the nuts should be checked after 50km.

3.3 Hydraulic and pneumatic system

- The hydraulic and pneumatic system is under high pressure.

All precautions should be taken, in particular:

- do not connect or disconnect the hydraulic lines when the tractor's hydraulic system is under pressure (hydraulics set to neutral),
- regularly check the condition of the connections and the hydraulic and pneumatic hoses.
- the unit must be taken out of service while the hydraulic or pneumatic failure 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.
- If the roller is used on stony soils, significant noise may result. In this case, it is advisable to keep the windows and doors of the tractor closed. You can also wear ear protectors.
- Operator hazards caused by vibration do not occur during operation of the unit. This is because the operator's workstation is located in the tractor cab and the seat is cushioned.
- In very dry conditions, very heavy dusting can occur. In such cases, it is recommended that the doors and windows of the tractor remain closed. In extreme conditions, a dust mask is recommended.

3.5 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 Safety regarding transport on public roads

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

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



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

The travelling speed during transport must not be exceeded:

- on roads with a smooth surface (asphalt) up to 15 km/h,
- on dirt or paved roads 6-10 km/h,
- on bumpy roads not more than 5 km/h.

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

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

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



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

3.7 Description of residual risk

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

The greatest danger occurs when:

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

3.8 Assessment of residual risk

Residual risk can be minimised by applying the following recommendations:

- Prudent and unhurried operation of the machine,
- Careful reading of operating instructions,
- Keeping a safe distance from danger zones,
- prohibition on being on the machine and in the operating area of the machine while the tractor engine is running,
- Carrying out maintenance work in accordance with safety rules,
- Use of protective clothing and, if working under machinery, a helmet,
- Prevention of unauthorised access to the machines, especially by children.

4 Information on handling and use

Before starting the machine for the first time:

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



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



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

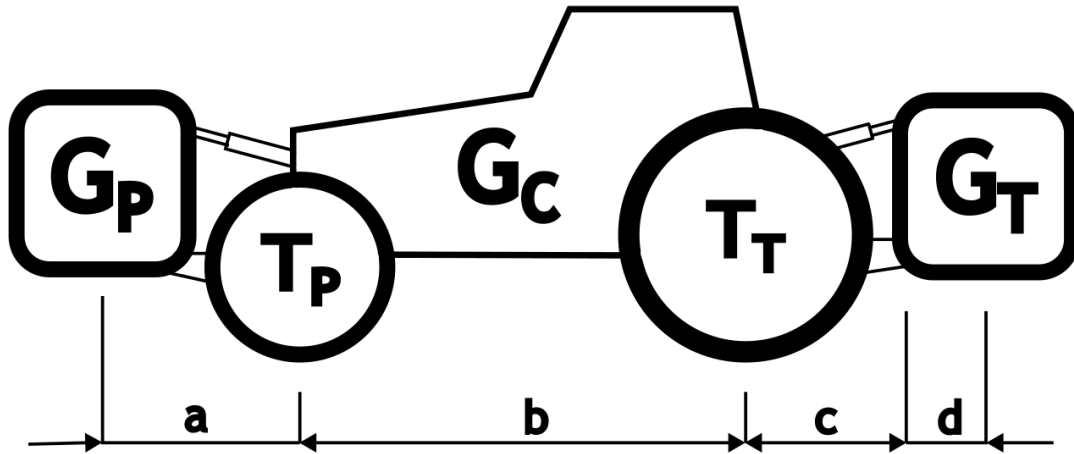


Figure 6 Diagram of tractor load designations

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

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

Actual total weight

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

Actual rear axle load

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

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% of the total load. The tyre pressure should be in accordance with the manufacturer's recommendations.

4.1 Preparing the roller for work

The cultivator rollers are delivered by the manufacturer as complete units, fully assembled and ready for operation.

4.2 Coupling the cultivation roller to the tractor

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

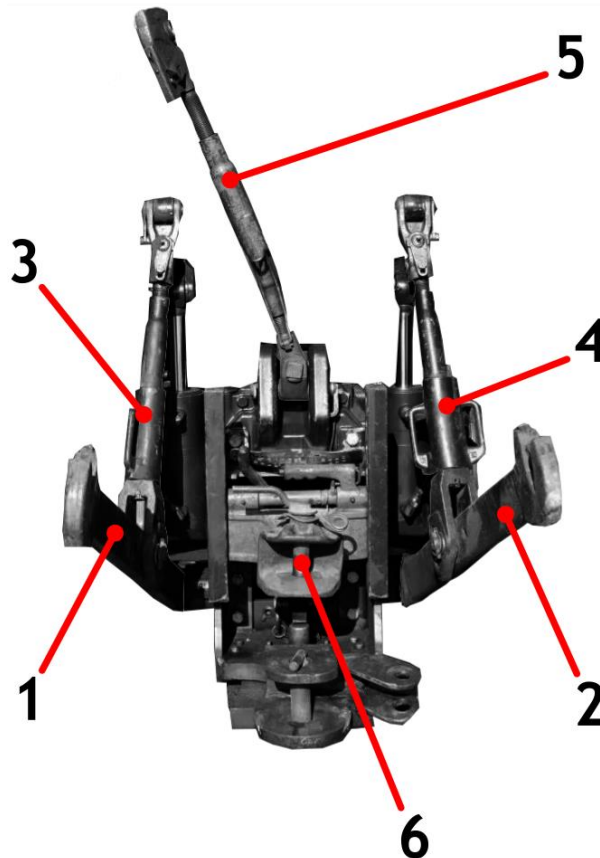


Figure 7 Three-point linkage of the tractor (1,2 - lower links, 3 - left suspension with adjustable length, 4 - right suspension with adjustable length, 5 - upper fastener, 6 - transport hitch)

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

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

When connecting trailed machine to the tractor, perform the following operations:

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



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



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

4.3 Mounting points for the leveling harrow on the MCB roller.

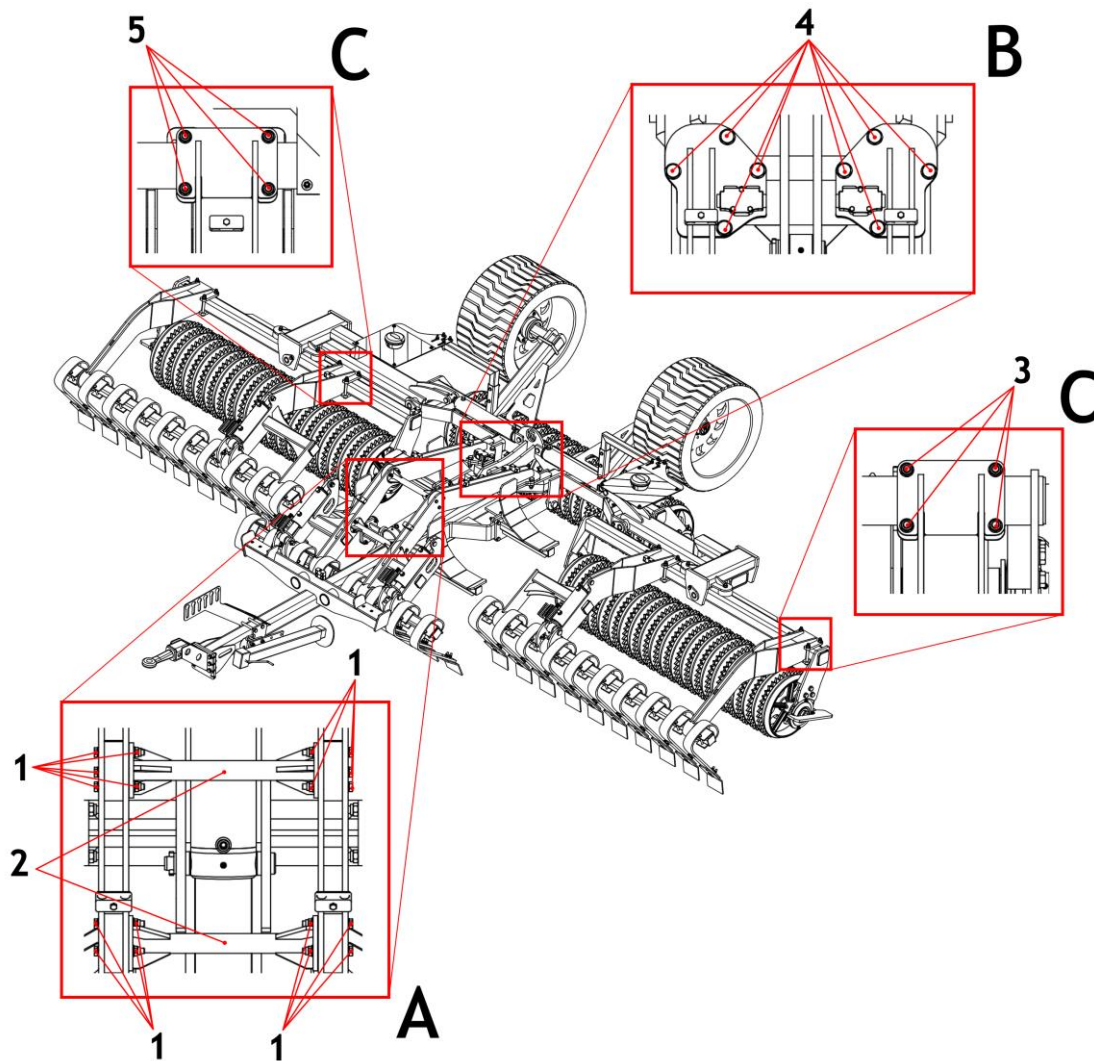


Figure 8 Mounting points for the leveling harrow on the cultivator roller MCB 6,2 H (1,3,4,5 - mounting bolts, 2 - connecting beams)

A - Connecting beams between the harrow arms of the central roller with marked mounting bolts

B - Harrow mounting points on the central frame with marked mounting bolts

C - Harrow mounting points of the side roller to the wing frame with marked mounting bolts

4.4 Folding and unfolding the MCB roller equipped with a leveling harrow



Before starting the folding or unfolding process, make sure there is no interference between the harrows or between the harrow and the central frame, as shown in Figure 9. The hydraulic cylinder must be fully retracted, or the turnbuckle must be tightened to the maximum in order to avoid collision.

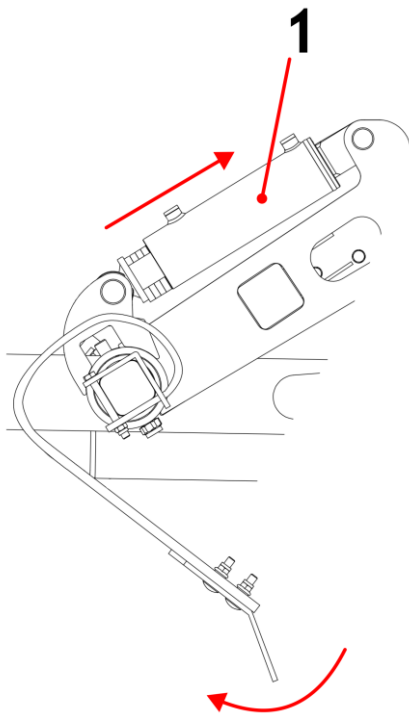


Figure 9 Direction of cylinder rod and tine movement during harrow folding (1 - hydraulic cylinder)

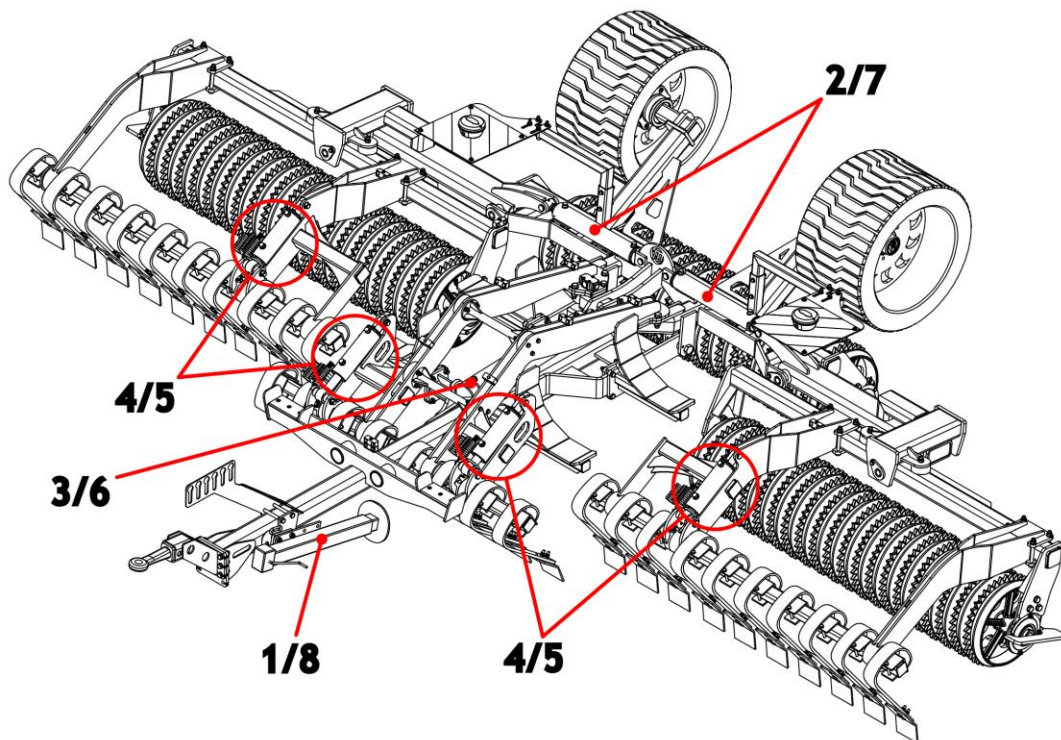


Figure 10 Diagram of the MCB SWING cultivator roller with SKAN harrow option (sequence of folding and unfolding the roller indicated)

Unfolding (fig. 10):

- 1) Fold the support leg and secure it,
- 2) Unfold the side rollers using the side hydraulic cylinders,
- 3) Lower the central working section using the main hydraulic cylinder,
- 4) Extend the harrow hydraulic cylinders to set the desired working angle.

Folding (fig. 10):

- 5) Retract the hydraulic cylinders to fold the harrow,
- 6) Raise the central working section using the main hydraulic cylinder,
- 7) Fold the side rollers using the side hydraulic cylinders,
- 8) Fold the support leg and secure it.

5 Operation and adjustments

The roller operates under its own weight and is not subject to any adjustments affecting its working characteristics.



The pressure force of the central section can be adjusted to some extent using the hydraulic cylinder mounted on the drawbar.

5.1 Cultivation roller operation

Start with an initial test run to check the alignment and behaviour of the roller. If necessary, adjust the length of the tractor coupling so that the shaft frame is horizontal. Travel speed with the cultivating roller during work should not exceed 8 km/h.



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

A properly hitched and adjusted roller should move evenly behind or in front of the tractor during operation and compact the soil uniformly over the entire working width. The frame of the roller should take a horizontal position in relation to the field surface (adjust with the tractor's top link).



NOTE! Do not work the roller on soil that is too wet, as this causes the roller to become coated with soil.



NOTE! Do not work the roller on stony soil, as this risks cracking the roller's working elements.

5.2 Adjustment of the cultivation roller during operation

➤ Setting up the machine correctly for operation

Position the machine for work so that the rollers are parallel to the ground. The front drawbar should be aligned horizontally.

➤ It is forbidden to operate the machine with the drawbar at an angle!

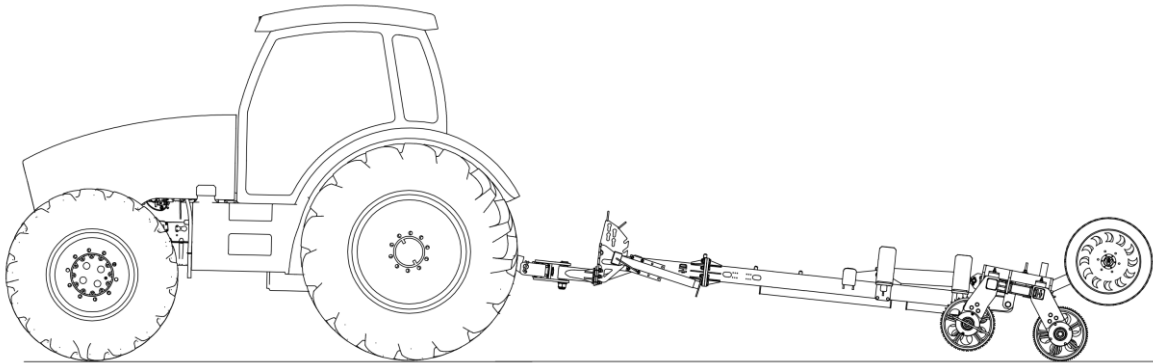


Figure 11 Incorrect working position of the roller.

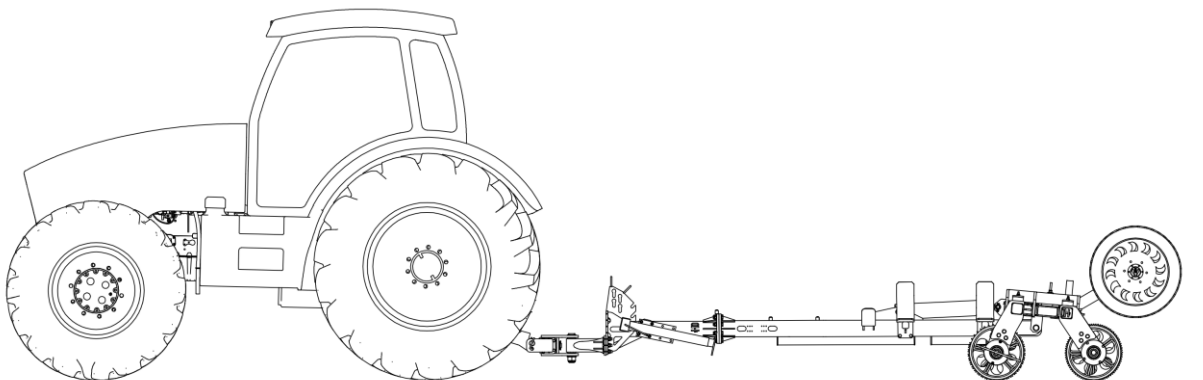


Figure 12 Correct working position of the roller.

5.3 Adjustment of the cultivator roller harrow (option)

The harrow is a section of teeth that work in front of the roller. It is mounted using an arm and adjustable by a hydraulic cylinder, allowing for the regulation of the angle of attack of the teeth. The main task of the harrow is to level the surface, ensuring uniform operation of the unit and breaking up clods of soil.

The harrow is adjusted by changing the angle of attack, which also affects the working depth relative to the roller. This adjustment is performed using the hydraulic cylinder

mounted on the harrow arm in front of the roller in the working position, or by adjusting the installed turnbuckle (Fig. 13). The more the cylinder rod is extended, the smaller the angle of attack of the harrow tines.

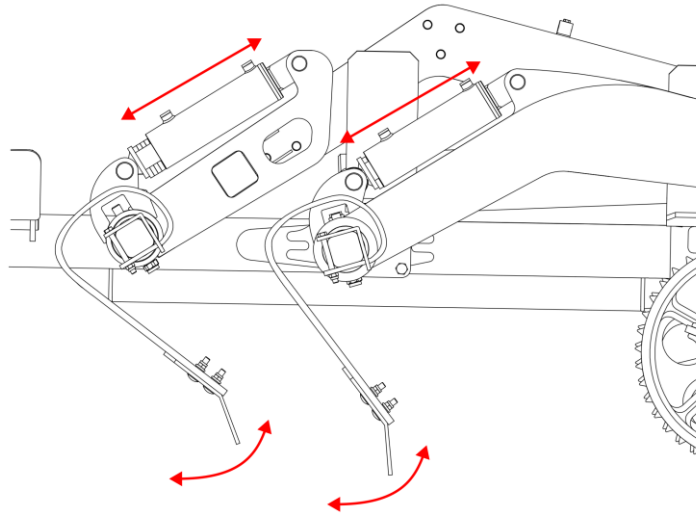


Figure 13 Adjustment of the harrow tine angle of attack (hydraulic adjustment version)

An additional adjustment for the harrow is the change in the tooth setting. To do this, the following steps should be taken:

- Unscrew the mounting bolts (Fig. 14, item 3)
- Position the tooth in the new setting by sliding it onto the available holes (Fig. 14, item 4)
- Tighten the bolts with the correct torque
- Remember that all the teeth of the harrow should be adjusted in the same way!

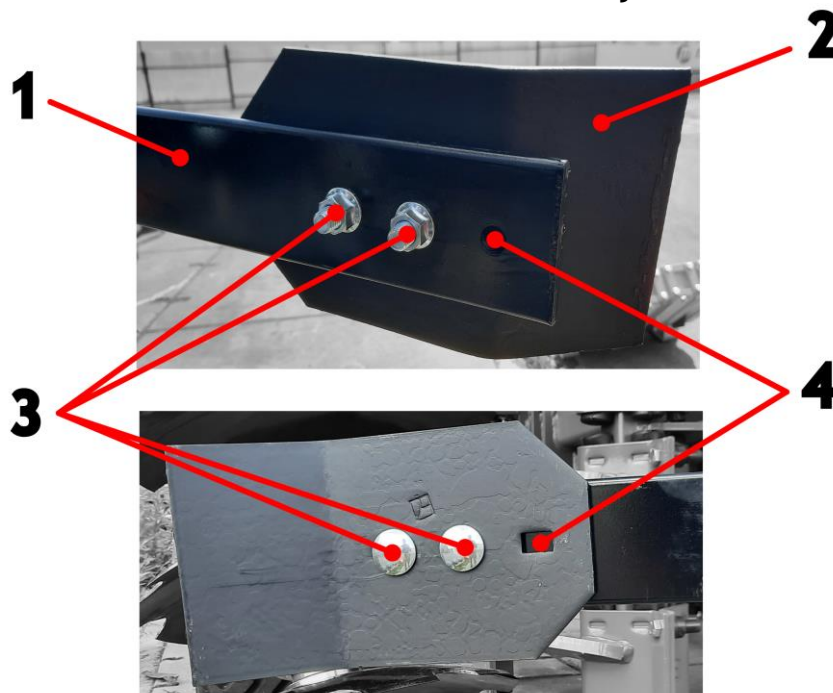


Figure 14 SKAN harrow tooth (1 - harrow, 2 - tooth, 3 - mounting bolts with nuts, 4 - adjustment holes)



Caution! Reversing with the harrow engaged is prohibited!

5.4 Construction and adjustment of the spring harrow of the MCB SWING roller (option)

Cultivation roller can be equipped with the spring harrow. The harrow is a section of long-finger tines that work in front of the roller. It is mounted using an arm and adjustable by a hydraulic cylinder, allowing for the regulation of the angle of attack of the tines. Long-finger tines are suitable for a slight loosening of the surface, leveling of damage from wheels and molehills.

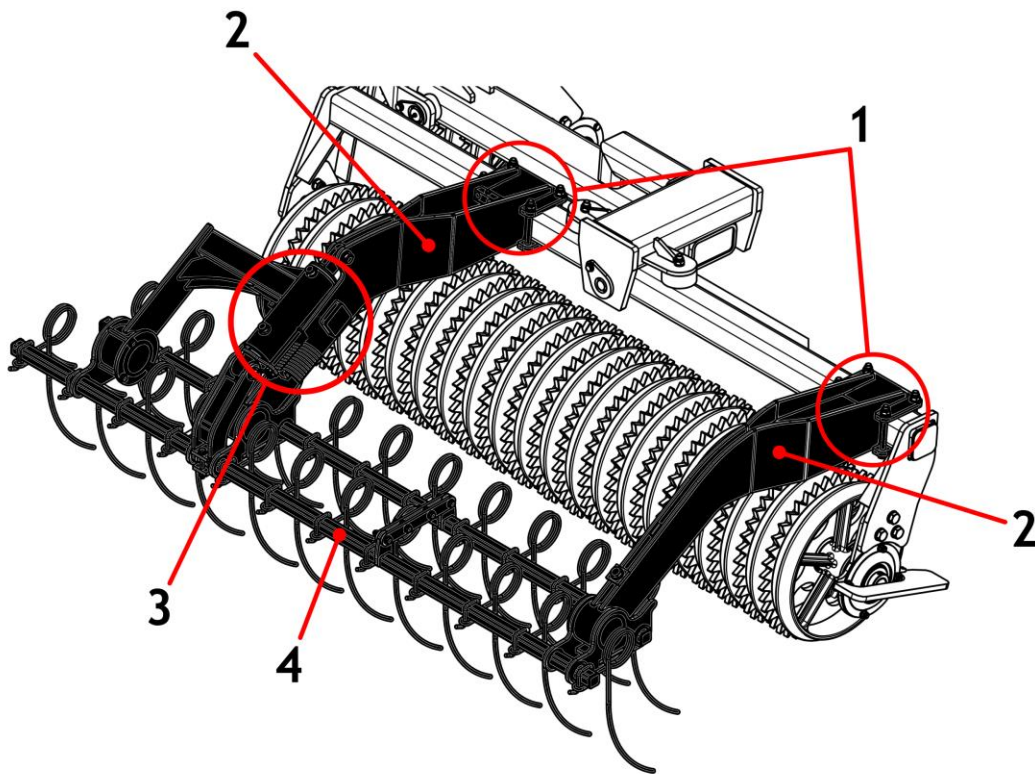


Figure 15 Construction of the spring harrow - based on the left side of the roller (1 - mounting points of the spring harrow, 2 - harrow arms, 3 - hydraulic cylinder with pawls, 4 - spring harrow frame with tines)

The working depth of the spring harrow is set using pawls located at the piston rod of the actuator. As more pawls are folded, the operation of the harrow becomes shallower. In a configuration where none of the pawls are installed, the machine is in its greatest working depth configuration.

5.5 Construction of seed drill with access platform (option)



Only seed drills included in the MANDAM range should be fitted. The installation of other seed drill models is prohibited.



Any arbitrary change to the design of the seed drill mounting by the user of the machine will be regarded as interference with the design. This may result in the guarantee being honoured in the event of structural or seed drill damage.

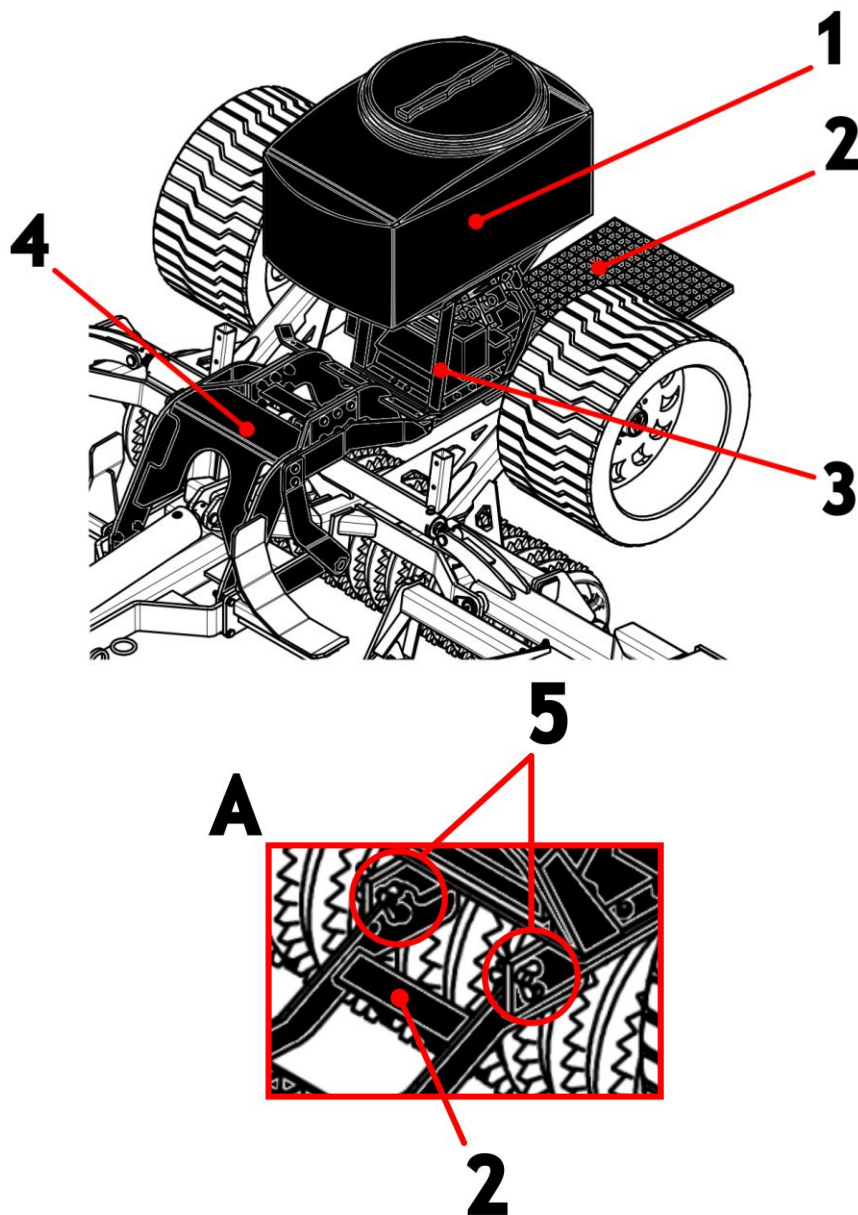


Figure 16 Representation of a mounted seed drill on cultivator roller (1 - seed drill, 2 - access platform, 3 - seed drill mounting frame, 4 - mounting frame)

View A - wing screw to fold access platform before work or transport (5 - wing screw)

5.6 Rules for transporting the roller on public roads and lighting the machine

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



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

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

For transport, the side sections of the cultivation roller 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.

After folding, secure the right and left wings to the machine's drawbar using a chain and lock them with pins. (*applicable only to the MCB SWING cultivation roller 8,3H*)

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

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



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

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



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

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



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

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



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

- When work is complete (in the case of hydraulically foldable units for which the width of the machine in the working position exceeds 3.0 m), fold the machine into the transport position.
- The permissible width of the machine running on public roads is 3.0 m.
- 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.
- It is forbidden to transport the roller 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.



It is strictly forbidden to transport people or any items that are not part of the machine's permanent equipment on the cultivator roller.

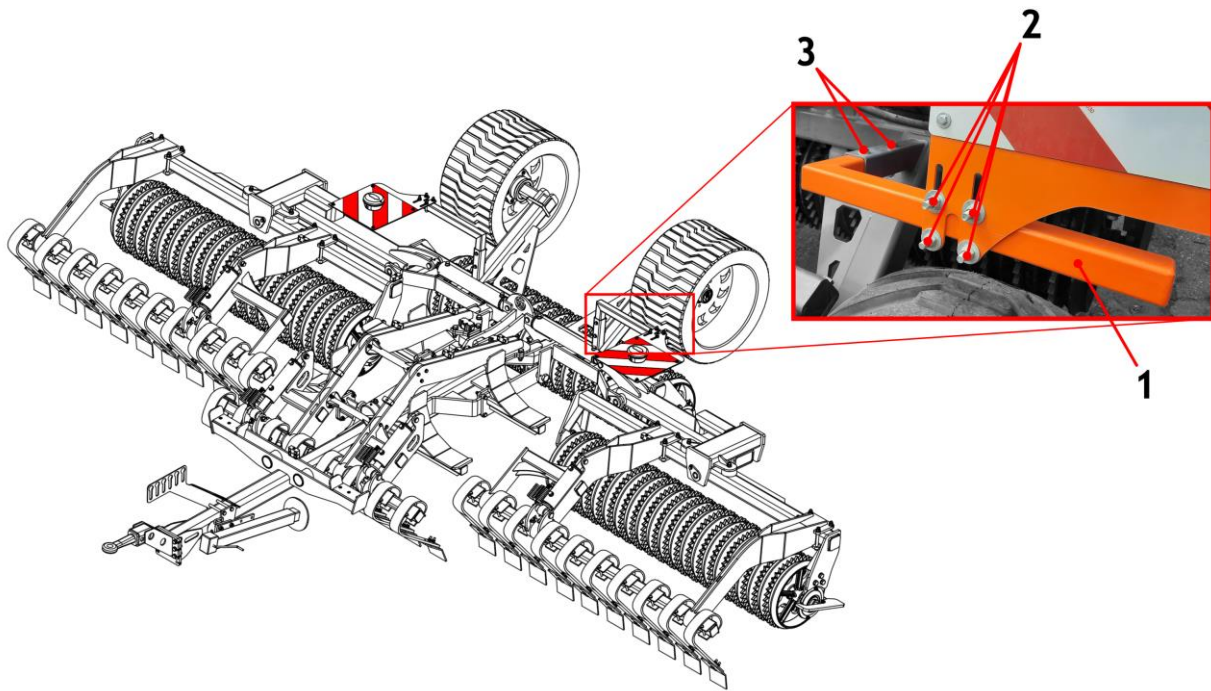


Figure 17 Positioning and mounting of warning-light device on cultivator roller MCB SWING (option) (1 - panel bracket, 2 - mounting clamps, 3 - mounting bolts)

5.7 Maintenance and lubrication of the machine

- Lubricators should be well cleaned before lubrication. The points should be lubricated according to the intensity of use,
- Each time the work with cultivation roller is completed, the soil must be cleaned, followed by an inspection of the parts and assemblies. **Otherwise, there may be a problem with the folding of the machine if the rollers are clogged with soil and there is an additional load!**
- Re-tighten all screws after the first 4 hours of operation and periodically check the tightness. **Failure to do so will exacerbate backlash and result in damage to the machine.**
- When replacing worn components, use thread glue, original bolts and nuts.
- Always ensure that screw connections are properly tightened.
- 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.
- Lubricate all lubrication points until the friction surfaces are completely filled. Remove any residual grease. Too much grease causes dust and soil particles to stick together.



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

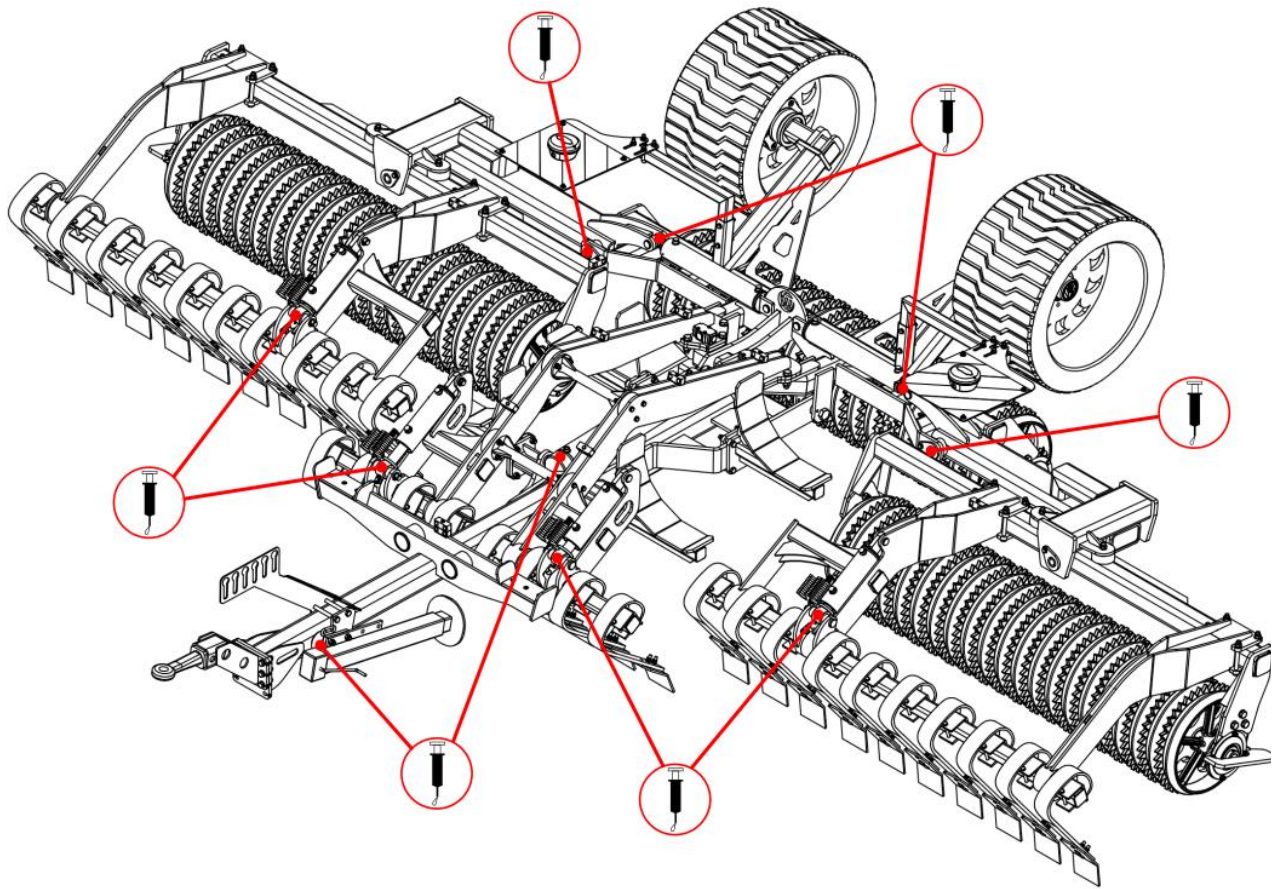


Figure 18 Points of lubrication of the MCB SWING 6,2 H cultivation roller

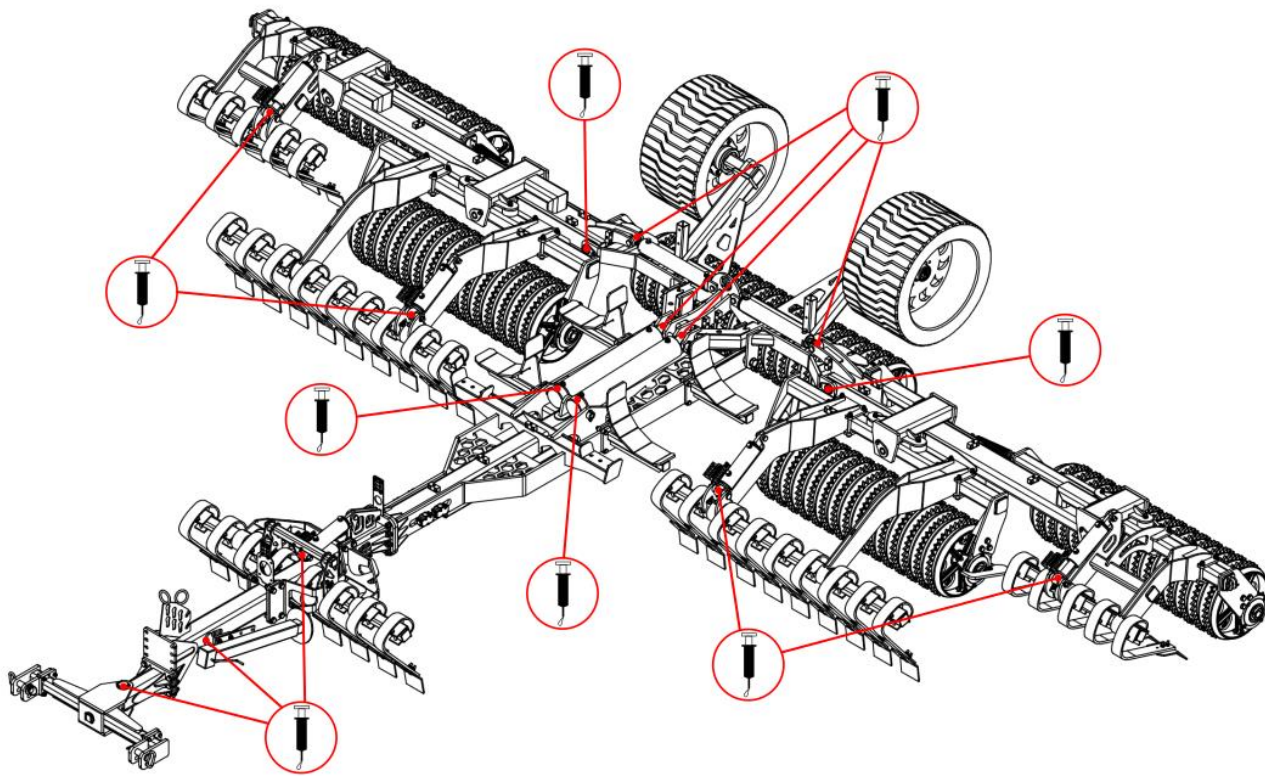


Figure 19 Points of lubrication of the MCB SWING 8,3 H cultivation roller.

5.8 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 in Table 2.

Table 2 Tightening torque values for nuts and bolts.

Tightening torques for nuts and bolts [Nm]

		Bolt strength class			
		8.8	10.9	12.9	
Dimension	Thread pitch				
	M4	0,7	3,2	4,5	5,2
	M5	0,8	6	8,4	10
	M6	1,0	11	15	17
	M8	1,3	27	34	40
		1,0	21	30	35
	M10	1,5	46	65	76
		1,3	41	75	67
		1,0	36	50	59
	M12	1,8	79	111	129
		1,3	65	91	107
	M14	2,0	124	174	203
		1,5	104	143	167

M16	2,0	170	237	277
	1,5	139	169	228
M18	2,0	258	363	422
	1,5	180	254	296
M20	2,5	332	469	546
	1,5	229	322	375
M22	2,5	415	584	682
	1,5	282	397	463
M24	3,0	576	809	942
	2,0	430	603	706
M27	3,0	740	1050	1250
	2,0	552	783	933
M30	3,5	1000	1450	1700
	2,0	745	1080	1270
M36	4,0	1290	1790	2020
	2,0	960	1340	1500



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

6 Braking system

The MCB SWING cultivation roller can be equipped with three types of braking systems - single-circuit hydraulic brake, dual-circuit hydraulic brake or air brake, the diagrams of which are shown below.

6.1 Air brake

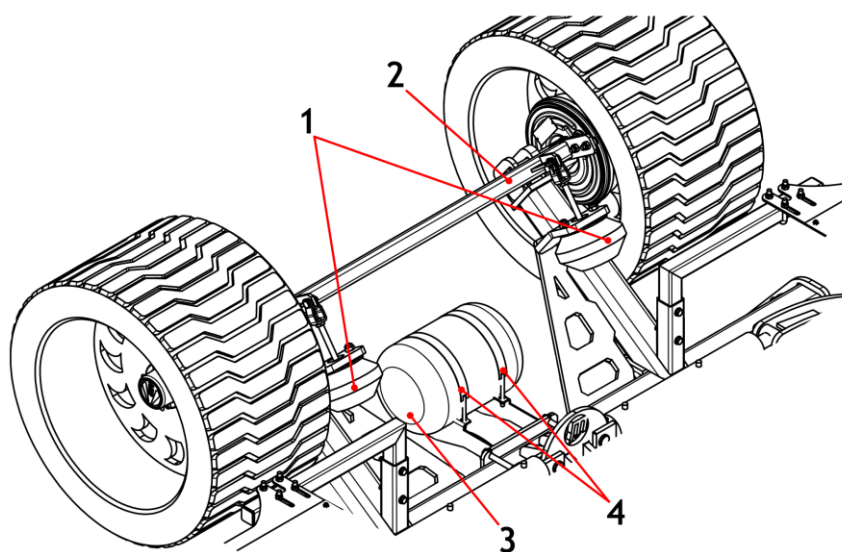


Figure 20 Main parts of cultivation roller air brake (1 - diaphragm cylinder, 2 - break beam, 3 - air tank, 4 - air tank holders)

6.2 Hydraulic single-circuit brake

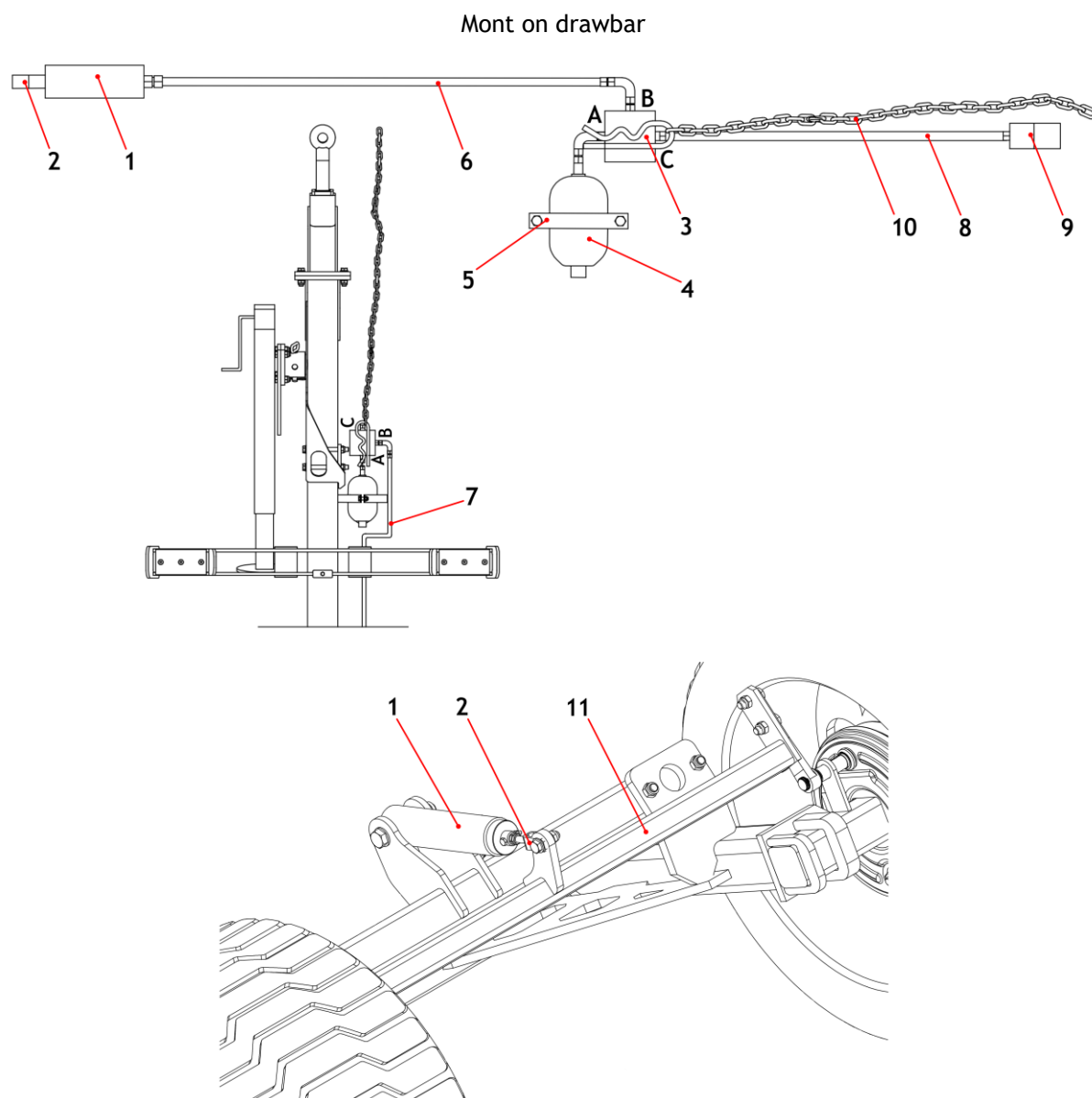


Figure 21 Diagram and construction of single-circuit brake system MCB SWING cultivation roller (1 - hydraulic cylinder, 2 - hydraulic cylinder holder, 3 - safety valve, 4 - hydraulic accumulator, 5 - hydraulic accumulator bracket, 6,7,8 - hydraulic line, 9 - quick coupler, 10 - chain, 11 - brake beam)

Valve setting:

B-C - brake released

A-B - brake locked

6.3 Hydraulic double-circuit brake

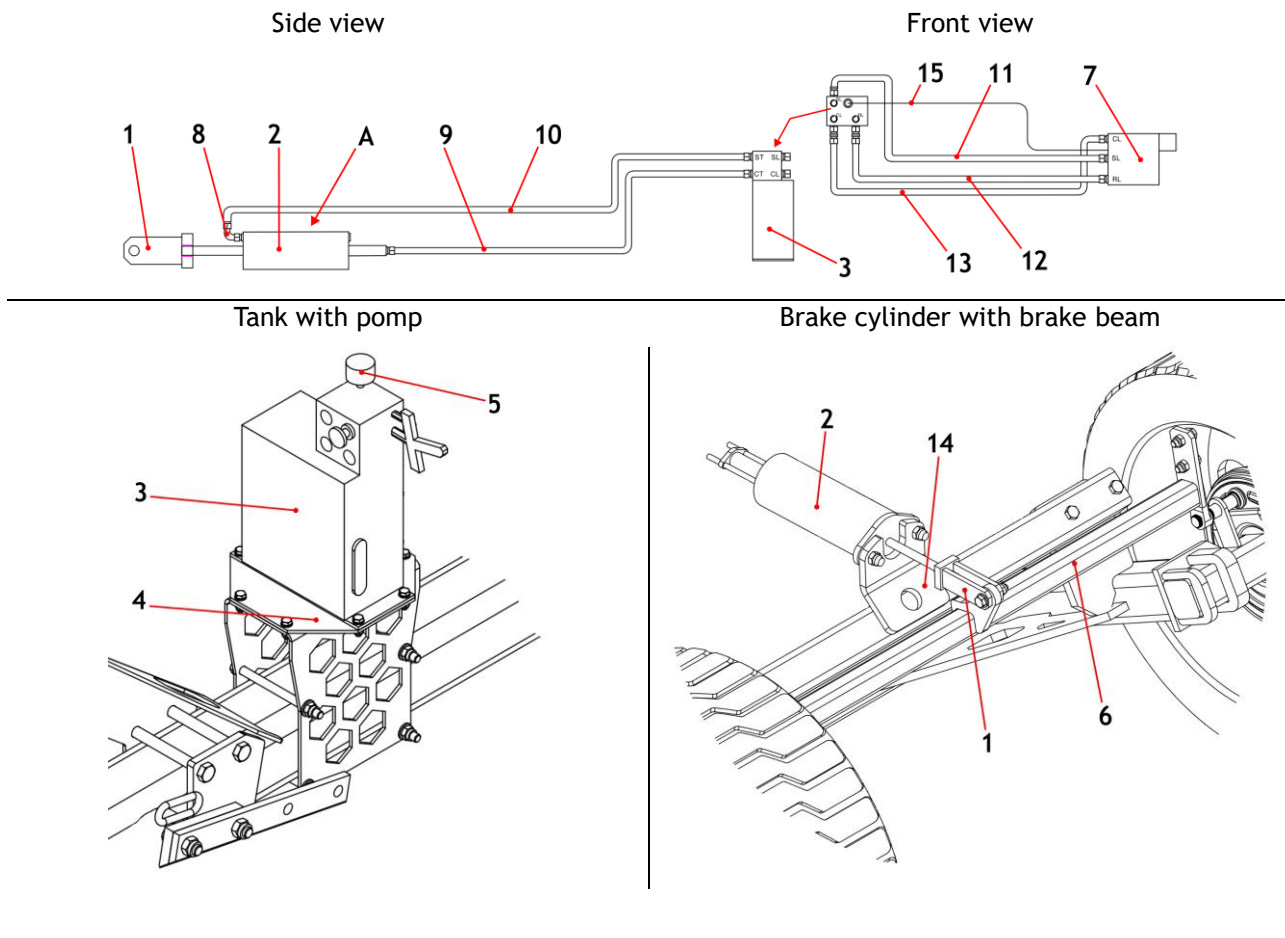


Figure 22 Diagram of the dual-circuit hydraulic brake of the MCB SWING roller (1 - hydraulic cylinder mount for brake beam, 2 - brake hydraulic cylinder, 3 - valve with pump reservoir, 4 - bolted tank base mounted on the drawbar, 5 - pressure gauge, 6 - brake beam, 7 - DLC-duble-circuit coupling with cable, 8 - elbow connector, 9,10,11,12,13 - hydraulic line, 14 - hydraulic actuator mounting plate, 15 - cord)

6.4 Automatic brake valve with spring brake - 206613

The SAFIM valve on the machine is designed to manage the service and emergency braking functions of the two-circuit hydraulic braking system. If the trailer is disconnected from the tractor, the automatic brake valve activates the emergency braking function. This function is achieved by using the energy previously stored on the compressed spring of the SAHR actuators, which become active when the oil of the spring brake section is discharged into the reservoir.

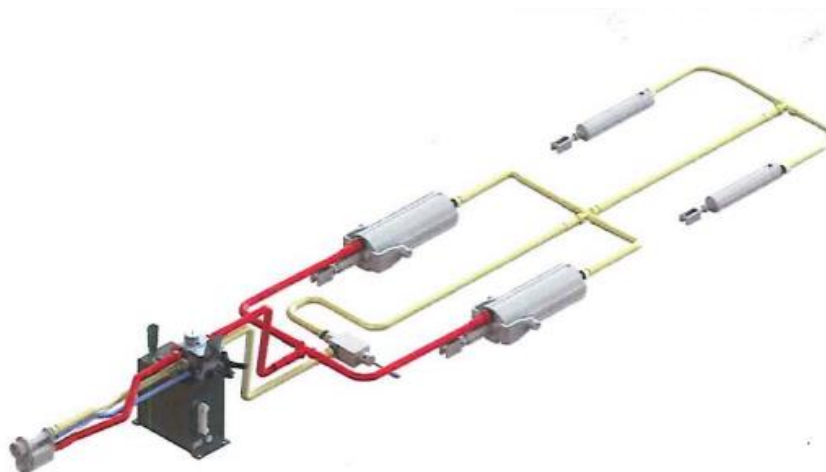


Figure 23 Overview view of the two-line hydraulic brake system

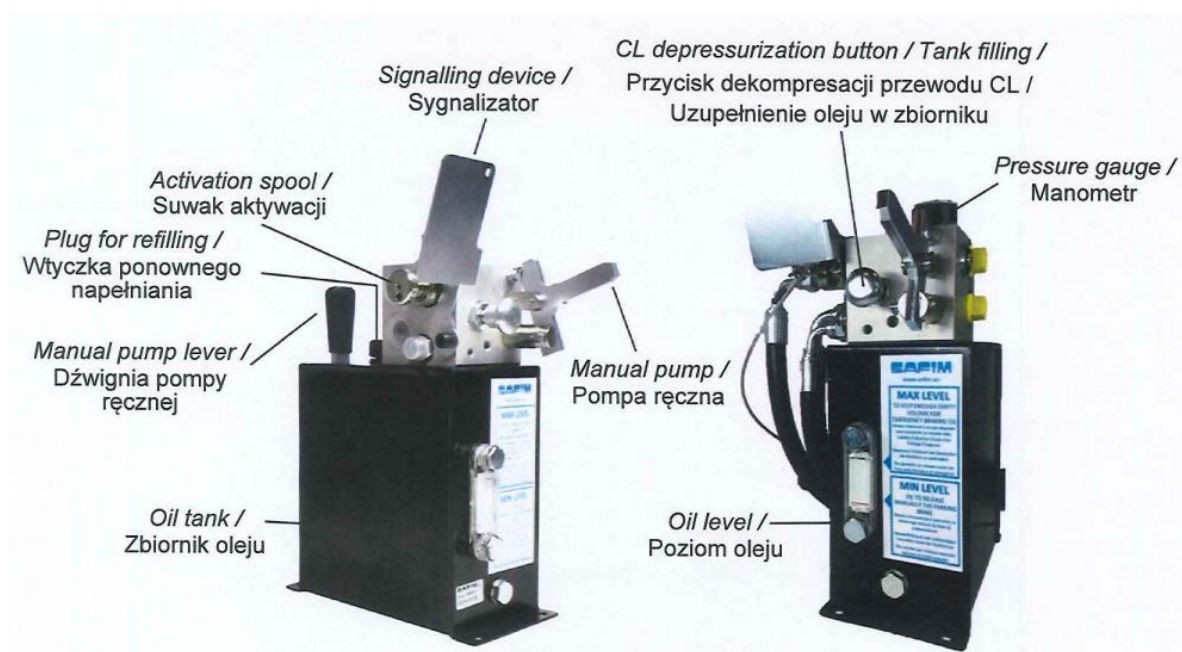


Figure 24 Valve with marked components.

Figures 24 and 25 show the respective valve plans with the designations of the most important wires and connectors, where they denote in sequence:

- CL - control cable (from coupling joint),
- SL – auxiliary line (from the coupling joint),
- RL – return line (from the coupling joint),

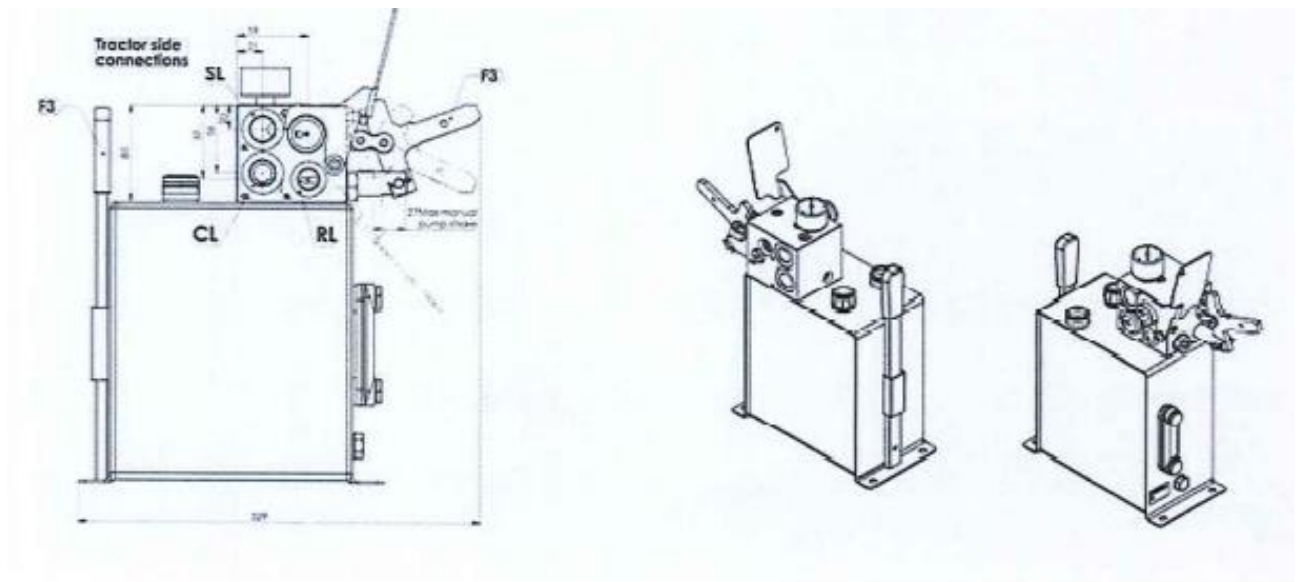


Figure 25 Plan showing the connectors on the tractor side

- CT – output port (of brake actuators or load sensing valve, if fitted),
- ST – output port (spring brake sections of the combined SAHR actuators - SL port),
- SL-A – return line from the automatic load sensing valve, if fitted,

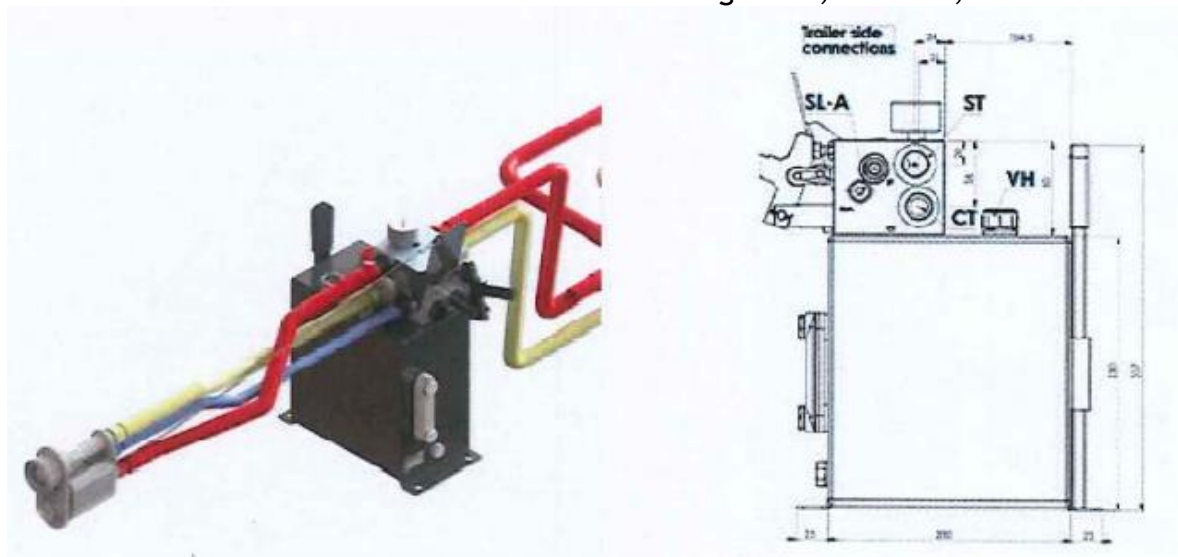


Figure 26 Plan showing the joints on the side of the disc harrow..

It is important to note that during installation, the metal cable (pre-mounted on the coupling joint) must be connected to its dedicated housing on the valve. Also ensure that the length of the cables is 20-30 cm shorter than the length of the hydraulic lines.

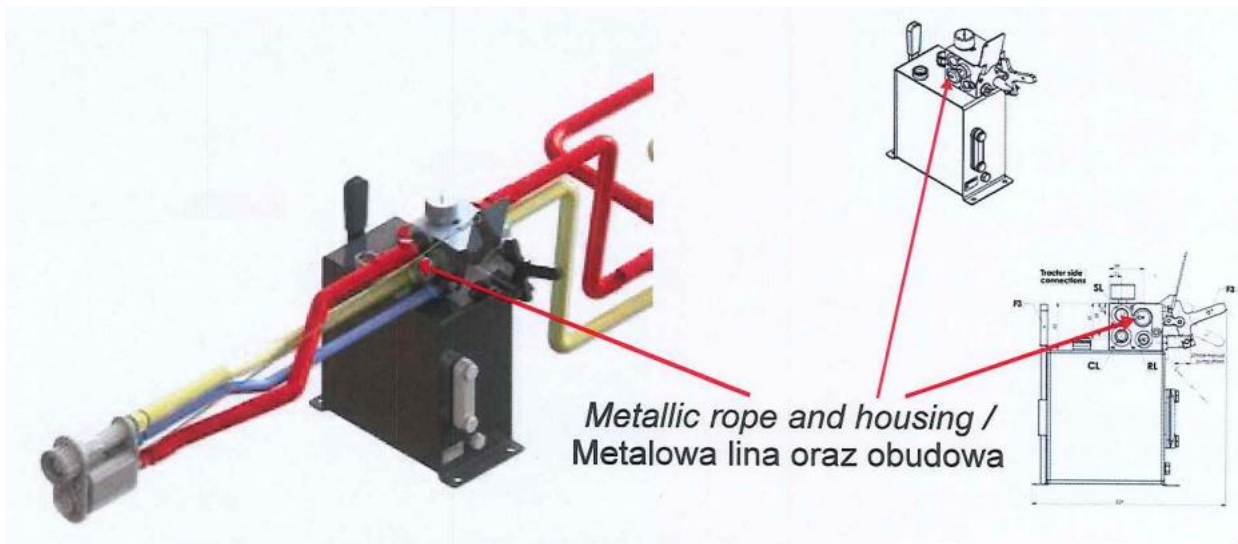


Figure 27 Marking where the metal cable is connected to its dedicated housing.

If the braking system contains an automatic load detection valve of type 206104/xx, connect the SL-A port of the automatic brake valve to the SL port of the load detection valve.

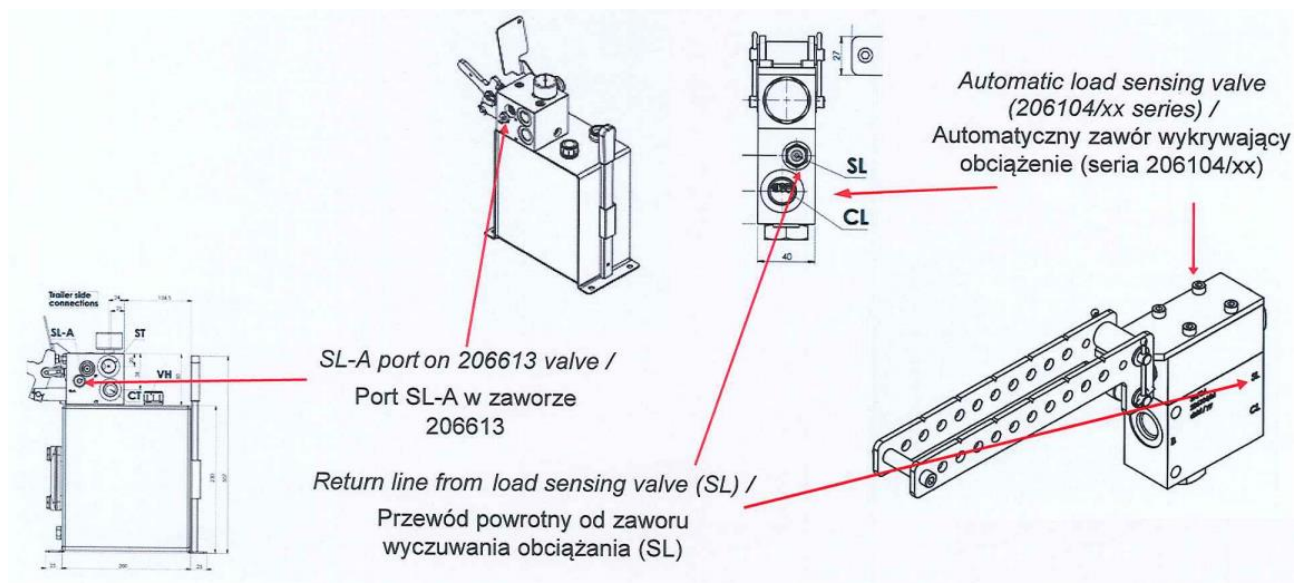


Figure 28 Marking of the connection point when using automatic load sensing valve type 206104/xx.

The brake valve has several modes of operation. All modes are listed in sequence below with their descriptions:

Mode 1 - Drive mode:

- Two-line connector: connection to the tractor
- Tractor engine: on
- Parking brake: released

The activation slider automatically returns to the drive mode position when the pressure in the secondary line (SL) increases to its normal value.

The valve's normal function mode is engaged each time the operator connects the two-line connector, starts the tractor engine and releases the parking brake. The device provides all standard trailer braking functions when the driver brakes. If the trailer is disconnected from the tractor, the automatic brake valve activates the automatic emergency braking function.

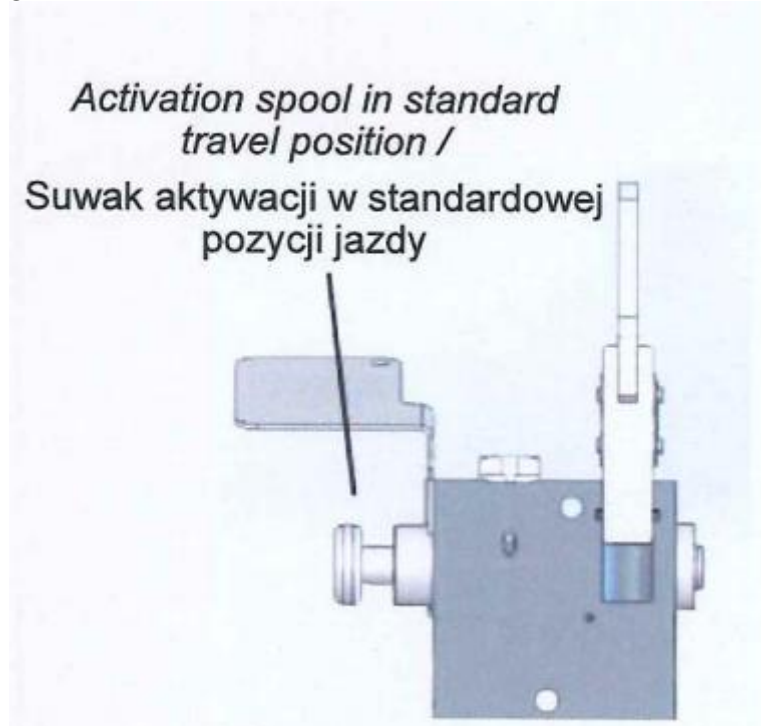


Figure 29 Standard position of the activation slider in the driving position.

Mode 2 - Emergency mode:

When the trailer is disconnected from the tractor, an automatic brake valve connects the spring brake section of the SAHR actuators to the reservoir. The oil holding the springs under tension is discharged into the reservoir, the spring action activates the emergency brake function.

The automatic emergency brake function is activated even if the pressure in the auxiliary line (SL) drops while the DLC connector is still connected to the tractor. The activation slider remains in its normal function position when the automatic brake function is activated.

Mode 2a - Parking mode:

In a spring brake trailer braking system, the application of the automatic emergency braking function overlaps with that of the parking brake, as spring brakes generate both functions. Therefore, disconnecting the DLC connector ensures that the vehicle is parked correctly.

If the operator disconnects the two-line joint from the tractor, it is recommended to connect it to the dummy connection of the valve housing to avoid contamination.

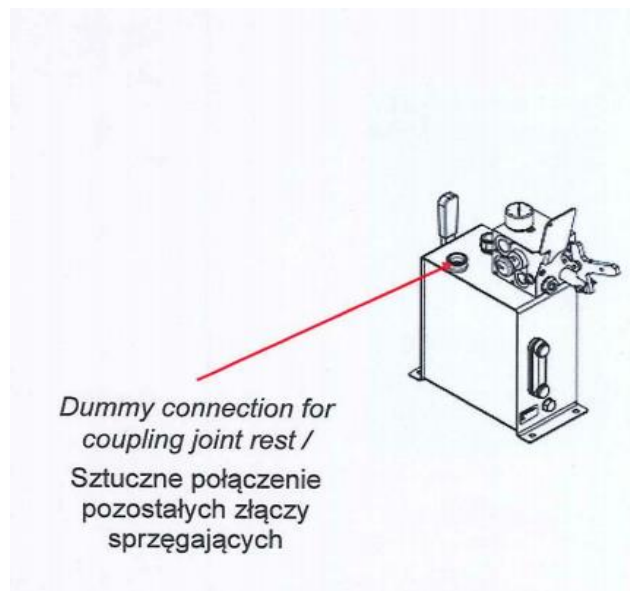


Figure 30 Port of artificial connection of the remaining coupling connectors.

Mode 3 - Deactivation of automatic brake function:

To deactivate the automatic brake function (if towing a trailer by a non-two-wheel tractor or other type of vehicle):

- Press the activation slider (as in the image on the right) until it is fully extended. The signalling device will move downwards generating a switch on manual mode operation;
- Pump oil from the reservoir into the spring brakes using a hand pump. The automatic/parking brake function will be deactivated.

NOTE: the brakes will be released when the pressure in SL towards the spring section of the SAHR actuators is over 15 bar. When pumping, check the pressure gauge to ensure that it indicates the correct pressure not exceeding 35 bar.

NOTE: Whenever the activation slider is in "manual operation mode", automatic application of the parking brake is not ensured. If the vehicle has to park again, check that the activation slider is in the "standard driving position".

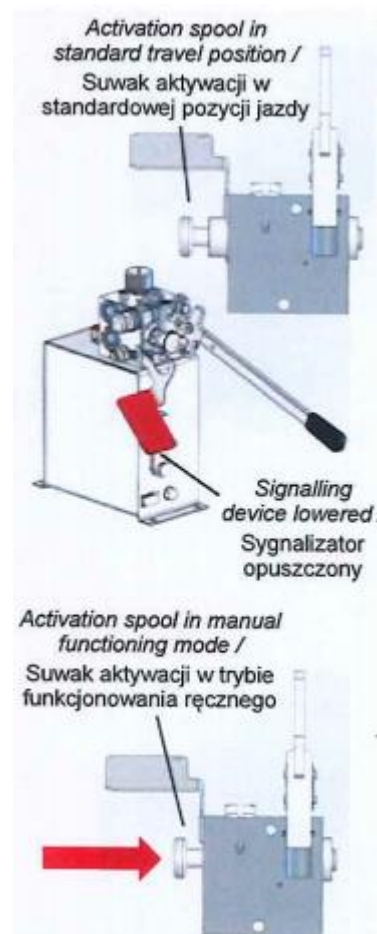


Figure 31 Removal of automatic brake function

Mode 4 - Reconnecting to the tractor:

The activation slider automatically returns to its normal function position every time the pressure in the secondary line (SL) increases to its normal value.

The valve's normal function mode is engaged each time the operator connects the two-line joint, starts the tractor engine and releases the parking brake. In this situation, all emergency functions are switched on.

Place the signal box back into its running position before switching on the tractor engine and before releasing the tractor parking brake. If the slider is already in the driving position, it will be impossible to reset the signalling device.

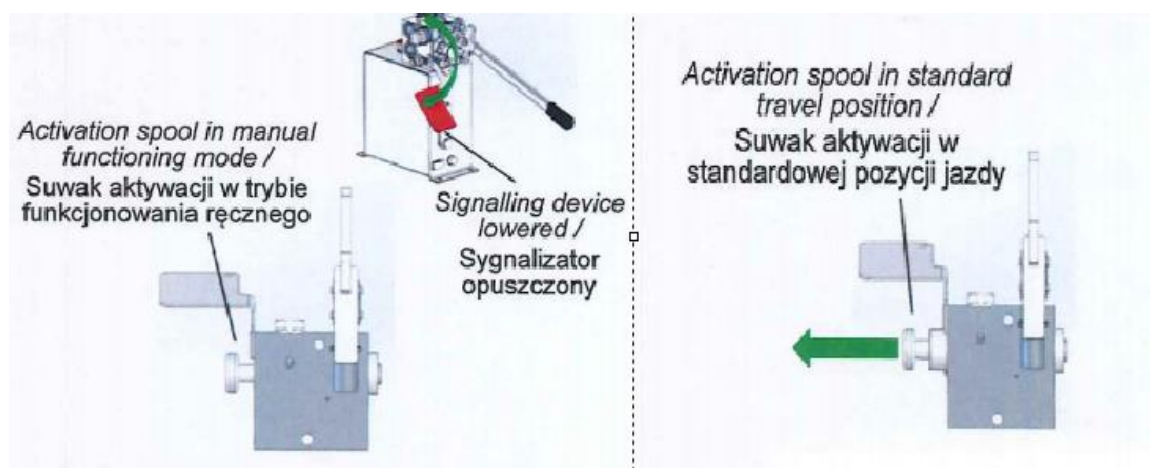


Figure 32 Activation slider positions in manual operation and standard driving position.

Two alternative procedures are allowed for filling the installation's oil tank after installation. To do that:

- Unscrew the oil plug from the top and fill the tank with the correct amount of oil*;
- Press the "**decompression/reservoir fill**" button on the front side of the valve and, keeping it in the same position, slightly depress the tractor brake pedal (this procedure requires two operators, one to operate the tractor and one to operate the valve). The oil coming from the tractor via the control line (CL) will be directed to the tank. When the oil has reached the correct level, let go of the „**decompression/tank fill**” button.

* Use oil complying with SAE 10W30 standard or that used to fill the tractor's oil tank

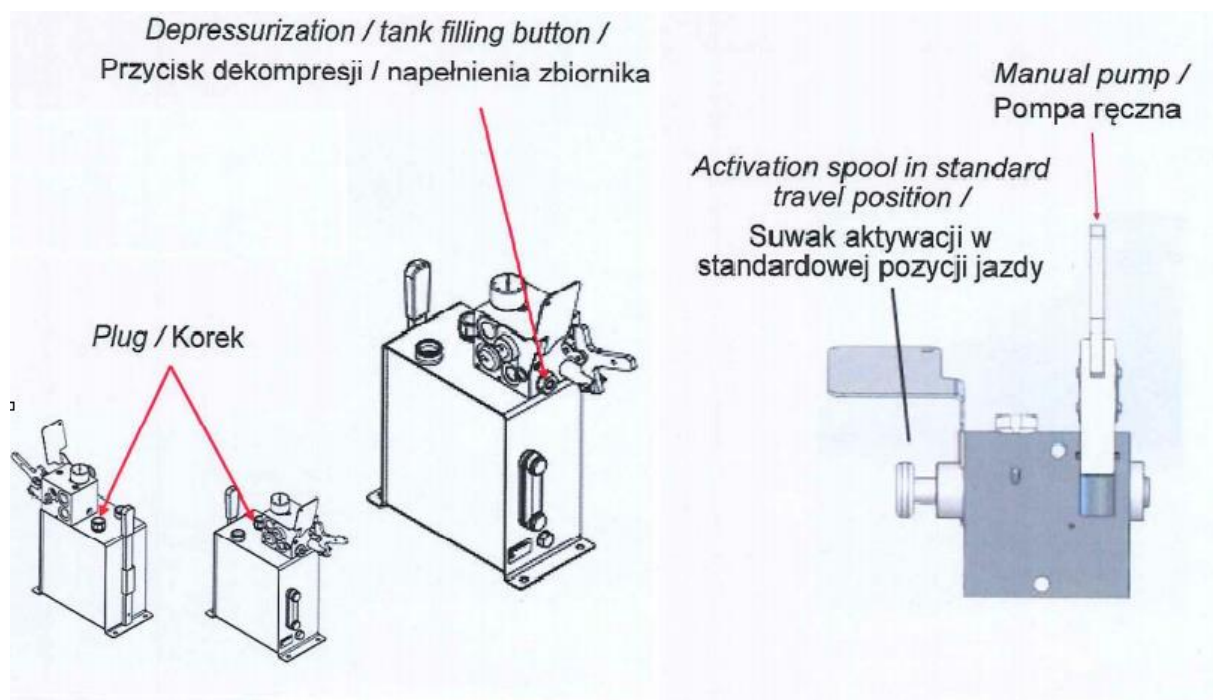


Figure 33 Location of tank cap, decompression button and hand pump.

Check the oil level in the tank regularly: the level must always be between the „**max**” and „**min**” positions on the oil level indicator.

If the oil level is below the minimum, follow one of the previously described procedures to refill the tank.

If the oil level is above the maximum, use the hand pump when the trailer is connected to the tractor (the activation slide is in the „**normal function position**”). The oil will flow from the tank to the tractor tank via an additional line (SL).

If it is difficult to reconnect the tractor's two-line joint due to residual pressure inside the lines, it is possible to relieve the pressure by pressing the decompression button for a few seconds. This can happen if the vehicle is left parked in the sun for some time. Excess oil will be drained into the reservoir and the DLC connector can be reconnected.

You can push the decompression button with tools such as a screwdriver, spanner or lever to the hand pump supplied with the valve assembly kit.

7 Hydraulic system quick couplings

The machine's hydraulic system has quick couplings for quick and easy connection of the hoses and other hydraulic installation. Each quick connector has its own designation (Rys. 34):

QUICK COUPLERS:		
- red		- folding/unfolding machine wings
- blue		- adjustment of the working depth of the machine
- green		- control of the running gear
- yellow		- adjustment of the drawbar actuator
- black		- accessory connector

Figure 34 Designation and purpose of individual quick couplings on the machine.

8 Maintenance of the cultivation roller MCB SWING

➤ Everyday service

Whenever you have finished working with the cultivation roller, clean the machine thoroughly of soil and crop residue, inspect the bolt and pin connections and the condition of the working elements and other parts. When cleaning, plant debris and strings winding up at the bearing points of the roller should be removed. After operation, lubricate the shaft bearings, hinges and actuator pins (not less frequently than every 25 operating hours). LT-43 grease can be used for lubrication. 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

After the working season, the implement must be thoroughly cleaned. Any damaged paint coating should be repaired, and worn working surfaces of the cultivator roller wheels, as well as the threads of the adjustment screws, should be washed with Antykor-type kerosene and protected against corrosion with anti-corrosion grease. Additionally, all grease points must be fully lubricated. During periods of non-use, it is recommended to store the machine under a roof. However, if this is not possible, the condition of the protective coating should be checked periodically, and any grease washed away by rain should be replenished as necessary.



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

Operating the running gear of the cultivation roller

Regular control of wheel pressure.

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

Setting of wheel bearing axial clearance.

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

Axial play removal procedure:

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

➤ **Operation of the hydraulic system**

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

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

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

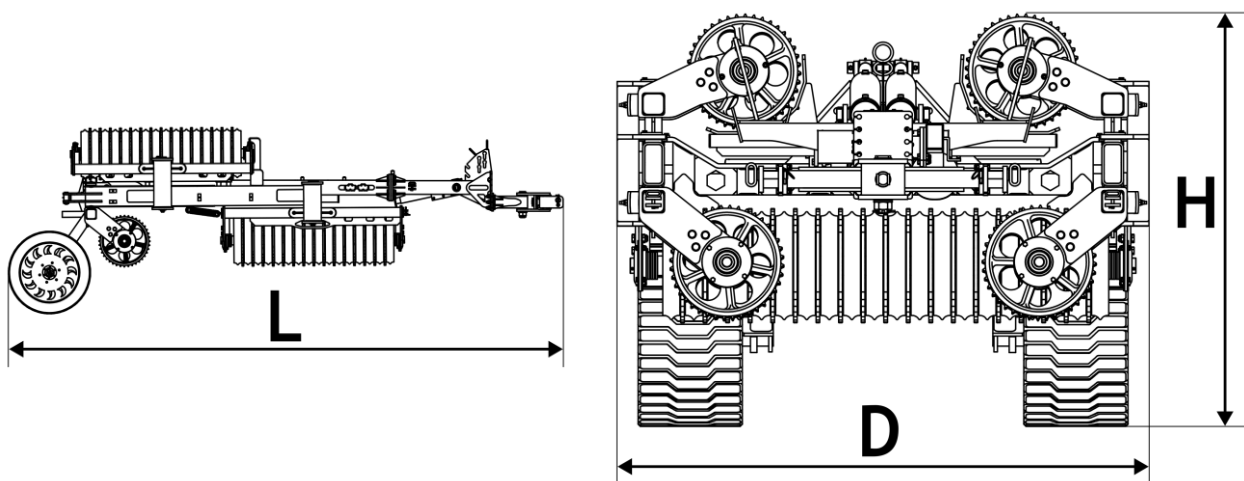
8.1 Main machine dimensions

Figure 35 Transport dimensions of the roller MCB SWING 8,3H no options (D - width, L - length, H - height) (see table 3)

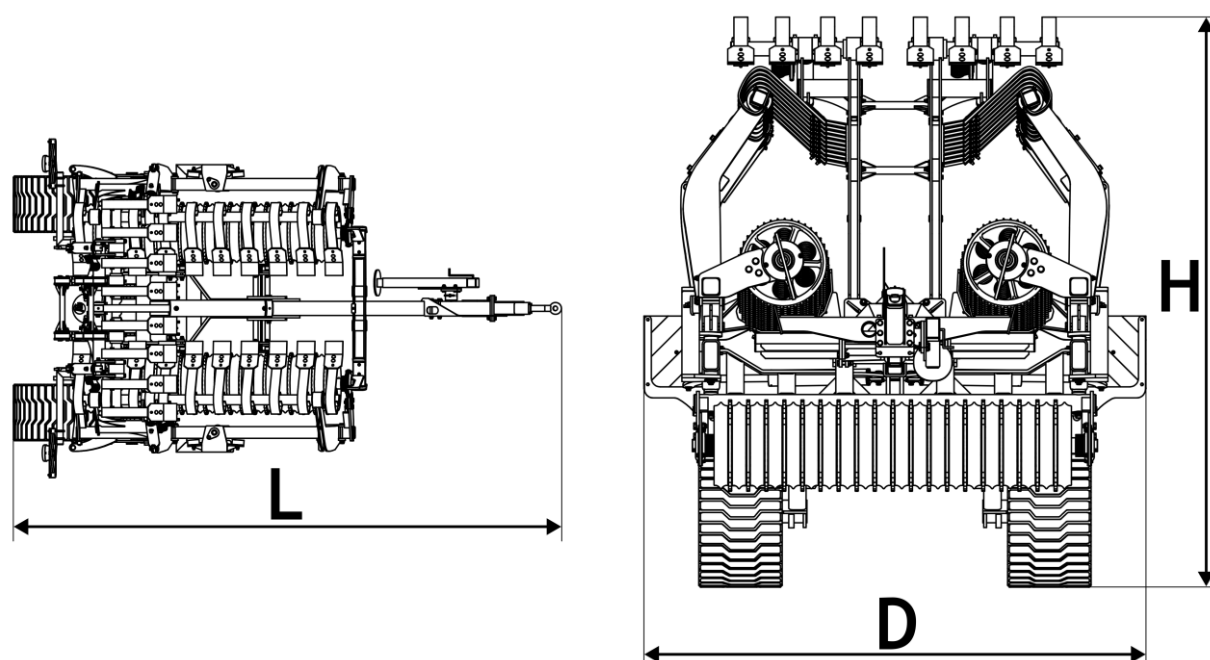


Figure 36 Transport dimensions of the roller MCB SWING 6,2H with harrow (D - width, L - length, H - height) (see table 3)

8.2 Specification

Table 3 Technical characteristics of the cultivation roller MCB SWING

No.	Parameters	Unit			
1	Machine type		MBC SWING PRB 6,2 H	MCB SWING PRB 8,3 H	MCB SWING PRB 9,5 H
2	Working width	m	6,20	8,30	9,50
3	Diameter of cast iron wheels	Ø	525		
4	Unit dimensions in transport position:				
	- Length [L]	mm	4670	5700	nd.
	- Height [D]	mm	2890	2890	nd.
	- Width [H]	mm	1900 (3280*)	1900 (2750*)	nd.
5	Unit dimensions in work position:				
	- Length [L]	mm	5100	6000	nd.
	- Height [D]	mm	6600	8530	nd.
	- Width [H]	mm	1430	1430	nd.

6	Power requirement	KM	80	120	160
7	Total unit weight**	kg	3400	5200	nd.
8	Quality of iron cast wheels	szt.	121	163	189
8	Tyres	-	Tire 480/45-17"	Tire 480/45-17"	Tire 480/45-17"
9	Number of transport wheels	szt.	2	2	2
10	Transport wheel spacing	mm	2300	2300	nd.
11	Transport speed	km/h	max. 15	max. 15	max. 15
12	Braking system		Pneumatic or hydraulic (booth option)	Pneumatic or hydraulic (booth option)	Pneumatic or hydraulic (booth option)

* Transport height of the roller equipped with a harrow

** Weight of the cultivator roller with standard equipment

8.3 Malfunctions and irregularities in the operation of the cultivation roller

The simple design of the rollers and the materials used make the cultivator rollers exceptionally reliable and low-maintenance. Thanks to the use of high-strength GG20 cast iron for the ring castings, their durability has been significantly increased. It is important to note that following all the recommendations in this manual regarding operation, adjustment, lubrication, transport, and storage of the roller greatly contributes to extending the effective service life of the machine..

Table 4 Causes and remedies for defects and malfunctions of cultivation roller MCB SWING.

Fault, malfunction	Reason	Repair method
The actuator does not work	- Incorrect connection - Insufficient oil - Leakage in the installation - Obstruction	✓ Improve connections ✓ Add oil ✓ Remove leaks ✓ Check patency
The roller wheels do not rotate	- Damaged shaft bearing - Wheels caked with dirt and mud	✓ Replace the bearing with a new one ✓ Clean the shaft and unblock the wheels
Uneven pressure on individual sections	Hydraulic lever in the wrong position	✓ Move the lever to the "floating" position
Individual sections of the shaft are distributed slowly and/or unevenly	- Contaminated oil in the system - Lack of adequate system	✓ Change the oil in the system ✓ Check the tightness and patency of the hydraulic

	pressure	system
--	----------	--------



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.

9 Replacement procedures

Bearing replacement

In the event of roller bearing failure, it should be replaced as follows:

1. Place the machine on a level surface.
2. Secure it against movement using wheel chocks.
3. Unscrew the bolts securing the bearings to the clamp on both sides of the roller (Fig. 37, item 1).
4. Move the roller away from the machine (due to its weight, the use of a lifting device is recommended).
5. Loosen the grub screws on the locking ring (Fig. 37, item 5) on the bearing to be replaced.
6. Remove the locking ring.
7. Pull off the bearing to be replaced (use a bearing puller if necessary).
8. Unscrew the four bolts securing the bearing to the mounting plate (Fig. 37, item 3).
9. Remove the old bearing (Fig. 37, item 4) and replace it with a new one (see Spare Parts for the Roller - section 10).
10. Clean the roller shaft of any dirt and grease residue.
11. Apply thread locker to all screws to prevent loosening.
12. Fasten the bearing to the mounting plate using the screws (Fig. 37, item 3).
13. Slide the new bearing loosely onto the shaft.
14. Secure the bearing by fitting the locking ring and tightening the grub screws.
15. Move the roller between the side plates of the bearing clamp, position it correctly, and fasten it using the designated bolts (Fig. 37, item 1).
16. Check that the assembly has been performed correctly.

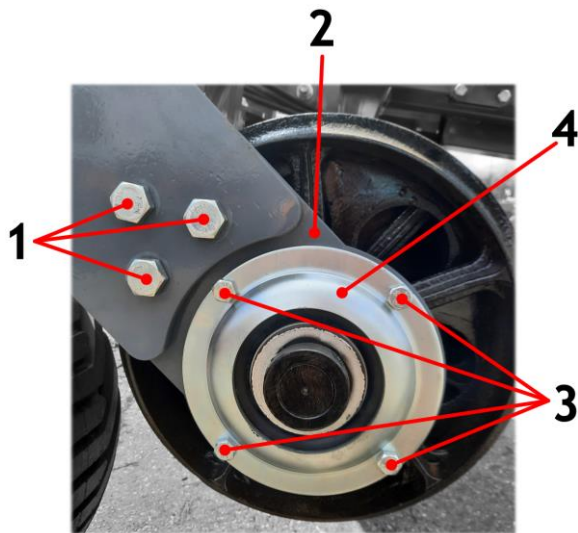


Figure 37 Components of the working roller bearing assembly - MCB SWING
(1 - bolts securing the bearing assembly to the clamp,
2 - bearing mounting plate,
3 - bolts securing the bearing,
4 - bearing,
5 - locking ring)

Replacement of hydraulic cylinders

- A malfunctioning hydraulic cylinder (e.g. leakage or other issues) **must be disassembled and sent to a specialized service facility**. After connecting the replacement cylinder to the hydraulic system, it should be cycled several times to ensure the cylinder is fully filled with oil.
- **Before starting any service work on the cylinders, hoses, or accumulator, the system pressure must be reduced.** To do this, connect the hydraulic system to the tractor and reduce the spring tension on the valve by turning the adjustment screw until the gauge indicates zero.
- **The ball valve must be in the open (operating) position.** Residual pressure may remain in the system, which can cause hydraulic oil to be ejected suddenly under pressure.

Exercise extreme caution during operation and always wear full protective equipment (gloves for hand protection and a face mask).



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 elements hinder the operation of the cultivator roller and may cause damage. In such cases, the working elements of the roller must be replaced. The replacement must be carried out with the machine lowered to the ground and the tractor engine turned off.

When replacing the castings of the working section roller, the following steps must be performed:

1. Unscrew the bolts securing the bearings to the clamps on each side of the roller (Fig. 37, item 1).
2. Move the roller away from the machine (due to the weight, use of lifting equipment

- is recommended).
3. Loosen the headless screws on the retaining ring (Fig. 37, item 5) at the bearing to be replaced.
 4. Remove the retaining ring.
 5. Remove the bearing to be replaced (use a bearing puller if necessary).
 6. Remove the spring washers.
 7. Remove the successive wheels from the shaft until the damaged element is reached.
 8. Clean the roller shaft of any soil and grease residues.
 9. Replace the casting with a new one (Spare parts for the roller - section 10).
 10. Reinstall the previously removed wheels in the correct order.
 11. Reinstall the spring washers.
 12. Apply threadlocker to all bolts to prevent loosening.
 13. Fasten the bearing together with the mounting plate using bolts (Fig. 37, item 3).
 14. Place the bearing loosely on the shaft.
 15. Secure the bearing by fitting the retaining ring and tightening the headless screws.
 16. Move the roller between the bearing clamps, position it correctly, and tighten the dedicated bolts (Fig. 37, item 1).
 17. Check the correctness of the assembly.



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 other machine components, for example. Tools should be replaced when their wear and tear exceeds the limits allowed by the manual. If the recommendations are not followed, damage may occur for which the manufacturer is **NOT RESPONSIBLE!**



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.

10 Storage of the MCB cultivation roller

- After the cultivation season is over, the roller should be thoroughly cleaned of soil and crop residues, the bolt 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 cultivation roller should be stored in a covered area. In the absence of a covered area, outdoor storage of the machine is permitted.

- **The roller should be stored in a place where it does not pose danger to people and the environment stably supported on support feet.** 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 shaft frame must rest on the support foot during storage. The roller 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.

11 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.
- Dismantling and disposing of a used cultivation roller 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.

12 Spare parts of the MCB SWING cultivation roller

To search for, price and order genuine spare parts for MANDAM machines, please visit our website at: www.mandam.com.pl/en/, under the "parts" tab.

- 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 terms and conditions 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.

Parts are shipped directly to the address provided and payment is made on delivery. If you are not sure, please contact the Mandam spare parts department on the following telephone numbers



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



+48 797 518 831 (Mateusz)



+48 668 662 289 (Jerzy)

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

All rights reserved. Any copying, reproduction, use or distribution of this material is strictly prohibited without the prior written consent of MANDAM Sp. z o.o. This reservation applies in particular to the provisions of the Polish Act on Copyright and Related Rights of 4 February 1994 (Journal of Laws 1994 No. 24, item 83, as amended).