



METAL-FACH



**REPAIR AND MAINTENANCE BOOK
“KRUK” CULTIVATOR AND SEED DRILL**

**U710
MAY 2020**

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The information included in this Repair and Maintenance Book is valid as of the date of its drawing up. The manufacturer reserves its right to make design changes to machines, and due to this, some values or illustrations might not correspond to the actual state of the machine supplied to the user. The manufacturer reserves its right to make design changes without amending this Repair and Maintenance Book.



CAUTION

CAUTION

When repairing and maintaining the machine, use the Repair and Maintenance Book and the Instruction Manual written for this machine model.

1 Cultivator's identification

Identification data of the U710 cultivator is located on the rating plate attached to the main frame, on the right-hand side. The machine's VIN number (identification number) is stamped on the rating plate and next to it, on the right side of the main frame.

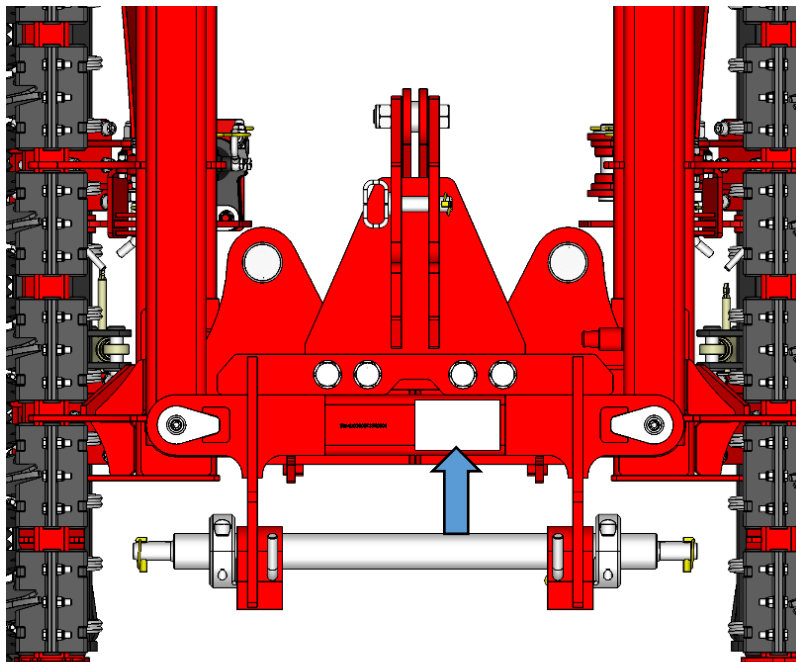


Figure 1. Location of the rating plate and the VIN number on the machine




 ul. Kresowa 62, 16-100 Sokółka, Poland tel.: +48 (85) 711 98 40-45; fax: +48 (85) 711 90 65 Agregat uprawowo-siewny KRUK Symbol: U710/2 Nacisk na zaczep: 22,6 kN Typ: 00 KJ Rok produkcji: 2019 Masa własna: kg VIN: SUMU05210KSSK0001  www.metalfach.com.pl		A METAL-FACH SP. Z O.O. B S2a C e20*167/2013*XXXXX D SUMU05210KSSK0001 E 4600 kg F A-0: 2300 kg G A-1: 4600 kg	<table border="1"> <thead> <tr> <th></th> <th>T-1</th> <th>T-2</th> <th>T-3</th> <th></th> </tr> </thead> <tbody> <tr> <td>B-1</td> <td>-</td> <td>-</td> <td>-</td> <td>L</td> </tr> <tr> <td>B-2</td> <td>-</td> <td>-</td> <td>-</td> <td>M</td> </tr> <tr> <td>B-3</td> <td>-</td> <td>-</td> <td>-</td> <td>N</td> </tr> <tr> <td>B-4</td> <td>-</td> <td>-</td> <td>-</td> <td>O</td> </tr> </tbody> </table>		T-1	T-2	T-3		B-1	-	-	-	L	B-2	-	-	-	M	B-3	-	-	-	N	B-4	-	-	-	O
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Figure 2. Sample rating plate

Explanation of fields:

- A** – Manufacturer’s name;
- B** – Category, Subcategory, and Vehicle-Speed Indicator;
- C** - EU-Type Approval Number;
- D** – VIN;
- E** – Permissible total design weight of the vehicle;
- F** – Vertical load at coupling point;
- G** – Permissible design weight per front axle;
- H** – Permissible design weight per rear axle;
- I** – Permissible towable design weight with drawbar;
- J** – Permissible towable design weight with rigid drawbar;
- K** –Permissible towable design weight with central axle;
- L** – Permissible towable design weight without brake;
- M** – Permissible towable design weight with overrun braking;
- N** – Permissible towable design weight with hydraulic braking;
- O** – Permissible towable design weight with overrun braking.


	<p>CAUTION!</p> <p>Identification data of the cultivator is located on the rating plate attached to the main frame, on the right-hand side.</p>
<p>CAUTION</p>	

2 Storage

Store the machine opened on an even hardened surface. During stoppages, store the cultivator at sites without access for unauthorised persons or animals;


Before long-term storage, clean the cultivator and remove any faults found. Protect it from the adverse weather conditions.

3 Service activities



CAUTION!
 Inspection activities regarding the cultivator.
 Use spare parts recommended by the manufacturer only.

CAUTION



WARNING!
 Carry out the servicing activities when the machine is unassembled. Carrying out the servicing activities in the transport position may lead to uncontrolled unfolding of the cultivator, and consequently, to bodily injury or death.

WARNING

3.1 Servicing activities during start-up

The servicing activities during start-up are described in the table below.

Table 1. Servicing activities during start-up

Inspected assembly	Activity
Wheels and tyres	Check the tightening of the wheel nuts, according to the tightening torque table. Check the tyre pressure.
Threaded connections	Check the tightness of bolts and nuts, according to the tightening torque table.
Transport protection components	Check the condition of the locks and pins securing the machine against uncontrolled unfolding.
Braking system	Check the braking system for proper operation and air-tightness.
Hydraulic system	Check the proper operation of the hydraulic system. If you find any leaks at the connections, tighten the nuts of hydraulic hoses.

3.2 Service activities during daily operation

The servicing activities during daily operation are described in the table below.

Table 2. Servicing activities during daily operation

Inspected assembly	Activity
Wheels and tyres	If the wheel nuts are loose, check the nut pins for damage. Tighten the wheel nuts with a torque wrench, to 270 Nm. Check the condition of tyres for damage. Check the tyre pressure. The correct tyre pressure is marked on the tyre side wall.
Threaded connections	Check the condition of the bolted joints and if any play is found, tighten them, according to the bolt torque table.
Braking system	Check the condition of brake hoses and couplers. If they are damaged, replace with new ones.
Hydraulic system	Check the condition of the hydraulic hoses and connections for damage and leaks. If they are damaged, replace with new ones.
Transport protection components	Check the condition of the locks and pins securing the machine against uncontrolled unfolding.
Working tools	Check the condition and completeness of the working tools. Replace worn or damaged working components with new ones.
Bearing units	Check the condition of bearing unit housings and replace as required.
Lighting	Check the technical condition and operation of lights.

3.3 Weekly service activities

The servicing activities during weekly operation are described in the table below.

Table 3. Service activities

Inspected assembly	Activity
Wheel nuts	Tighten the wheel nuts, according to the bolt torque table.
Threaded connections	Tighten the bolts and nuts, according to the bolt torque table.
Braking system	Check the condition of lines and of the working and control components of the braking system (pneumatic or hydraulic brake). Use the drain valve to drain water from the compressed air tank (pneumatic system). Check the technical condition of the parking brake system.
Bearing units	Check and lubricate all bearing units, cylinders, and upper connecting rods.

4 Lubrication

Durability and good working order of the cultivator depends primarily on systematic lubrication.

Use mineral greases for lubrication. Before applying the grease, clean the lubrication points. Carry out lubrication as per Fig. 3. Use **LT-4S-3 grease**.

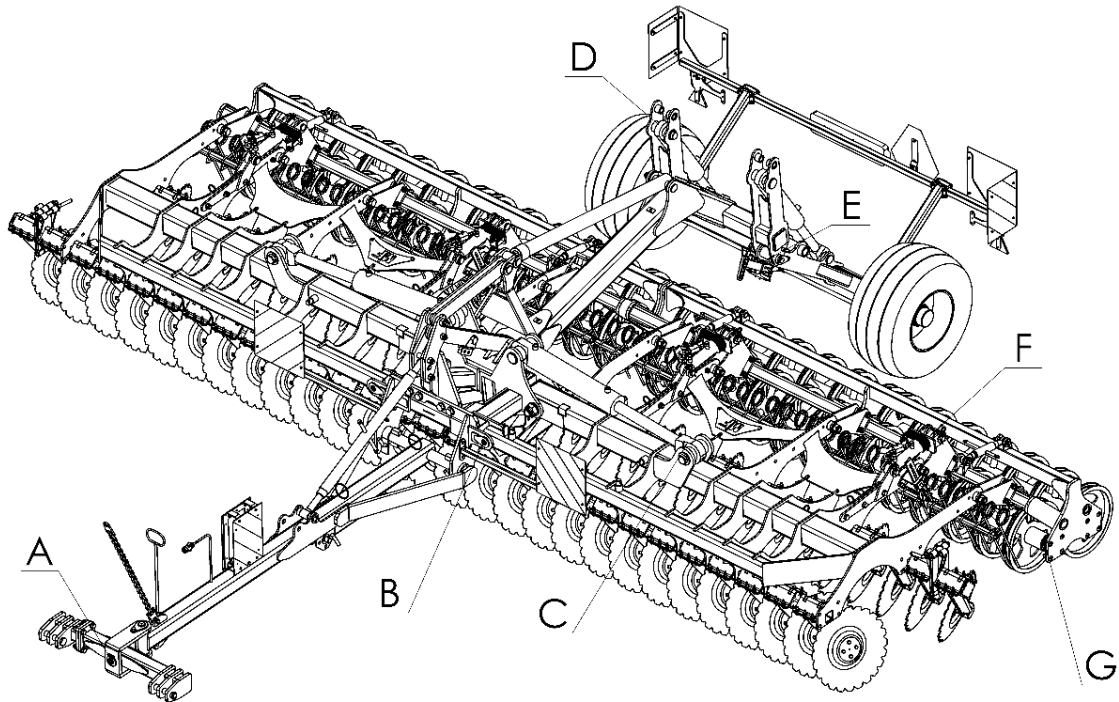


Figure 3. Lubrication points of the tine unit



CAUTION

CAUTION!

Carry out lubrication according to the recommended lubrication frequency depending on the point of lubrication.

Table 4. Frequency of lubrication

Lubrication point	Number of lubricating points	Working time (h)				After the season	Before the season
		10	20	50	100		
A	2			x		x	x
B	4		x			x	x
C	4			x		x	x
D	4			x		x	x
E	2			x		x	x
F	8				x	x	x
G	4/8*/16**			x		x	x

** applies to a 3.5 m U-box roller

** applies to a 3.5 m double U-box roller

5 Adjustment

5.1 Adjusting working depth and position settings of the scrapers

Adjust the working depth of the scrapers by means of the pins [1] fixed in the proper holes of the plough standards, securing them with cotter pins. The angle can be adjusted with the lower pins [2] that fix the scrapers.

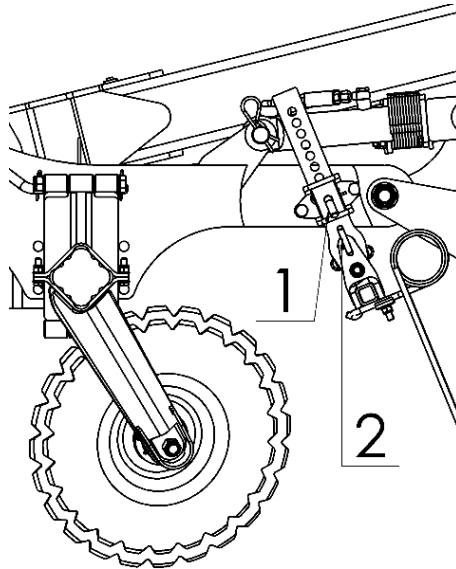


Figure 4. Adjusting the position of the scrapers

Make adjustments after stopping the tractor's engine and follow all the safety rules. Use special care when working with components that could crush feet or hands.

5.2 Roller adjustment

The working depth is adjusted by configuring the compaction roller and the three-point linkage of the tractor. The position of the roller is adjusted by means of the hydraulic cylinders [A] and retaining pawls [B]. The retaining pawls allow you to set the same position for the hydraulic cylinders.

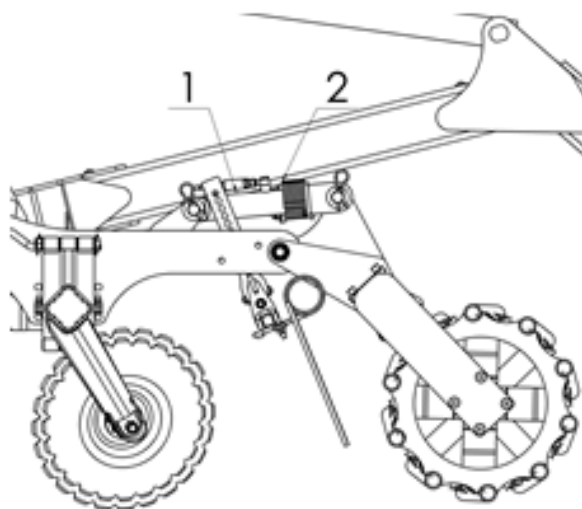


Figure 5. Roller adjustment

5.3 Drawbar adjustment

The height of the machine's hitching points [2] must be adjusted, depending on the type of the tractor and the adjusted height of the pulling links [1]. Adjust the height of the hitching points [2], using the adjusting screw [3]. Shortening the screw lifts the drawbar, while it extending lowers the drawbar

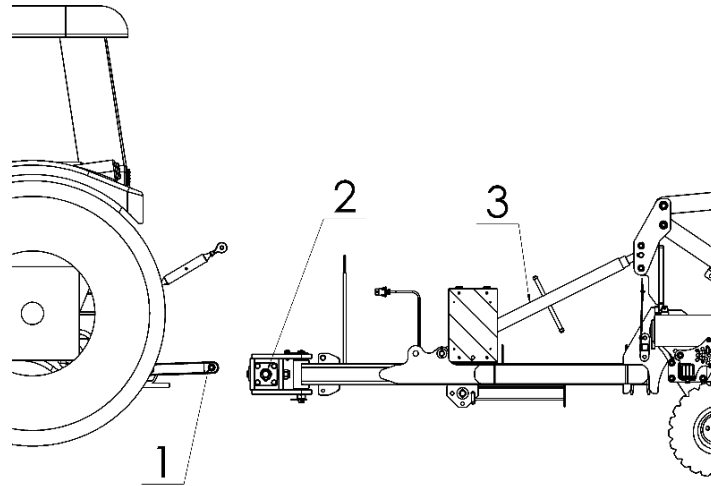


Figure 6. Drawbar adjustment

5.4 Adjustment of the braking system

Adjust the brakes, when:

- excessive play forms between the brake lining and the drum, which reduces the brake performance, resulting from wearing out of the brake shoes;
- the brakes are applied non-uniformly.

You can adjust the play with the pusher rod of the brake cylinder or by shifting the lever of the brake expander. Carry out the adjustment for both wheels.

If the adjustment of friction components is carried out correctly, the wheel should rotate freely, without stoppage or evident resistance resulted from friction of the brake shoes against the drum. Slight friction of the shoes against the drum in a new machine or after brake replacement is a typical occurrence.

5.5 Wheel dismounting and mounting



CAUTION

CAUTION!

Carry out the dismounting and mounting on a solid and level surface. Lifting the machine on inclined terrain may cause the cultivator to tip over. Never place any items between the lift and the jacking point in the machine. Never walk under the machine if it is lifted!!!

The lifting capacity of the lift must be adequate to the machine.

Before starting to lift the machine, disable the tractor's engine, apply the parking brake in both the tractor and the cultivator. Prop the wheels on the ground with chocks. Place the hydraulic lift at the places for lifting the machine, which are shown in Fig. 7. Loosen the wheel nuts counter-clockwise by half a turn. Lift the machine so that the wheel has no contact with the ground. Unscrew the nuts and dismount the wheel. When mounting the wheel, ensure that you embed the rim on the axle drum correctly. Tighten the wheel nuts with a torque wrench to a torque of 270 Nm. Lower the machine to the ground and re-check the tightness of the wheels. After driving for a few kilometres, check the wheel nuts for tightness, and if loose nuts are found, re-tighten them.

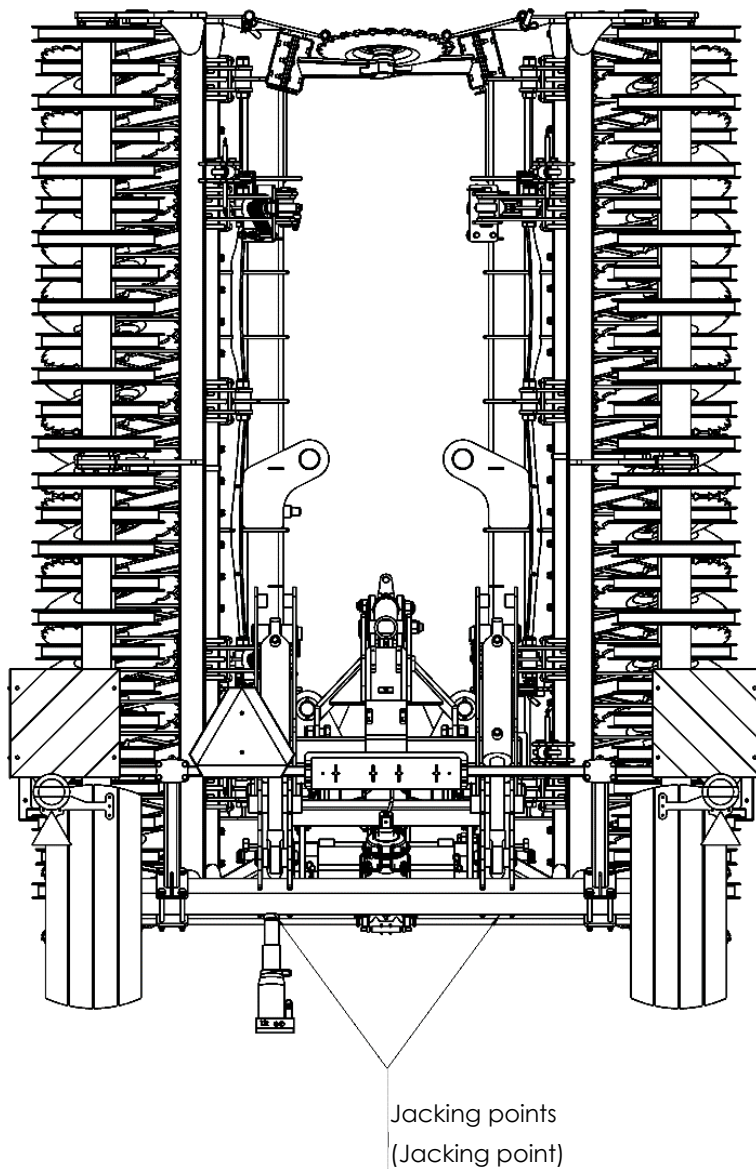


Figure 7. Jacking point

6 Dismantling and Disposal

The cultivator and seed drill is made of materials that do not create any environmental hazards. After the end of its service life and further operation is not justified, the cultivator must be dismantled.

To dismantle the machine, use lifting devices, for example an overhead crane or a fork lift, since its components are heavy.

Send the metal parts to a scrap metal yard, and dispose of the rubber parts or send them to sites that are licensed to store such waste. Gather all the used oil from the hydraulic system in the leakproof containers and carry out the disposal.

7 Coupling to a tractor

Mandatory components of the tractor:

- Two-line pneumatic or hydraulic braking system;
- Electric socket;
- Rear and front axle weights to ensure adequate stability;
- A hitch for coupling the machine;

Preparing the tractor:

- Check the pressure in the tractor's tyres;
- Make sure that the tractor's suspension category is compatible with the suspension category of the machine;
- Set the tractor's connecting links at an even height from the ground;
- Fit the front axle weights without exceeding the permissible tractor axle loads;



CAUTION

CAUTION!

Each tractor must be equipped with a set of weights. 20% of the tractor's weight must be exerted on the front axle for the tractor to maintain controllability.

To ensure correct and safe coupling of the cultivator to the tractor, the latter must stand on solid and level ground.

7.1 The actions performed when coupling a semi-suspended machine to a tractor

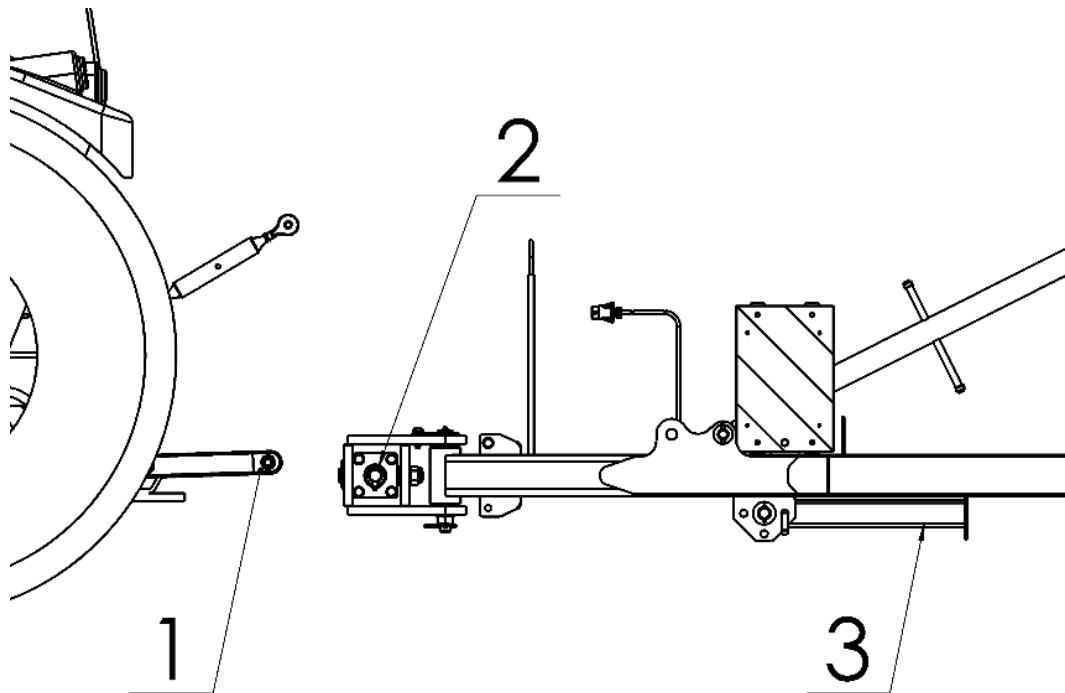


Figure 8. Connecting the cultivator to the tractor (a semi-suspended version)

When connecting the cultivator to the tractor, perform the following actions:

- reverse the tractor to a distance that enables connecting the cultivator's hitch [2] to the lower connecting links of the tractor [1],
- connect the cultivator's hitch chain to the top mounting point of the connecting link on the tractor,
- connect the hydraulic lines of the cultivator to the tractor's external hydraulic system,
- lift the cultivator and fold up the support foot [3],
- check the hydraulic system of the cultivator for leaks; also, the hydraulic lines cannot be kinked or damaged,
- connect the cultivator's braking system and check it for proper operation,
- connect the cultivator's lights and check them for proper operation.

7.2 The actions performed, when coupling a suspended machine to a tractor

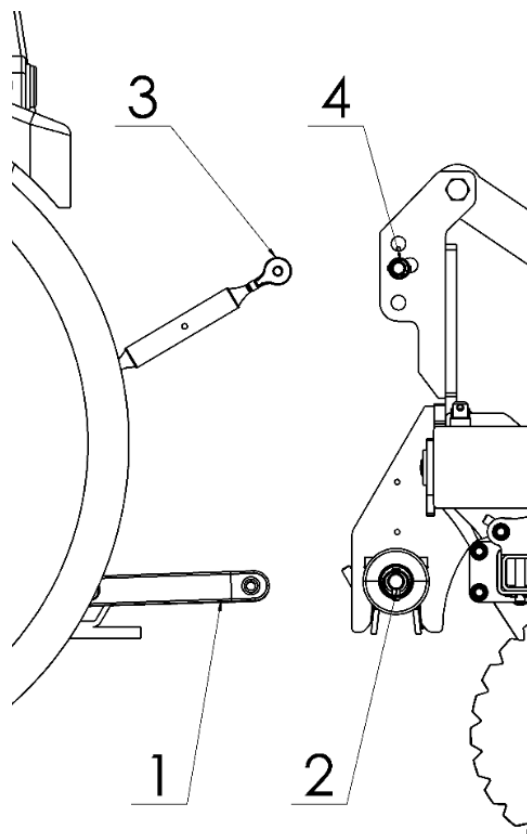


Figure 9. Connecting the cultivator to the tractor (a suspended version)

When connecting the cultivator to the tractor, perform the following actions:

- reverse the tractor to a distance that enables connecting the cultivator's drawbar [2] to the lower connecting links of the tractor [1],
- use the pin [4] to connect the upper link [3] to one of the three holes in the machine,
- connect the hydraulic lines of the cultivator to the tractor's external hydraulic system,
- check the hydraulic system of the cultivator for leaks; also, the hydraulic lines cannot be kinked or damaged,
- connect the cultivator's lights and check them for proper operation.

8 Tyres

- When handling the tyres, make sure that the cultivator cannot move on its own.
- Any repair work on tyres and wheels should be carried out by skilled persons who are equipped with suitable tools.
- Check the air pressure regularly. Incorrect tyre pressure may result in faster tyre wear or tyre damage. (The maximum tyre pressure is shown on the outer flank of the tyre and in the “Tyre type” table).
- Tyres must be protected from sunlight over longer machine stoppages.
- Avoid driving on sharp edges.

The tyres installed on the cultivator are shown in the table below.

Table 5. Tyre type of the cultivator

Tyre type/size	Maximum tyre pressure
Mitas 19.0/45-17	4.0 bar
Staco SG Flotation 480/45-17	3.2 bar



CAUTION

CAUTION!

It is not allowed to drive the cultivator if the tyre pressure is not correct or the tyres are damaged. Driving with damaged tyres may result in accidents. The maximum tyre pressure is given on the tyre external side. The value for tyre pressure may differ depending on the tyres used. Exceeding the recommended tyre pressure values may result in their damage.



CAUTION

CAUTION!

Inspect regularly the tightening of the wheel nuts. Tighten the wheel nuts during weekly inspections, or after any play of the axle and rim connection is found. Wheel tightening torque 270 Nm

9 Hydraulic system of the cultivator.



CAUTION

CAUTION!

The cultivator's hydraulic system operates under high pressure. There is a risk of injuries from a high pressure oil stream or from burns caused by hot hydraulic oil. If injured due to high pressure or hot oil burn, seek medical help immediately.



CAUTION

CAUTION!

Before performing any work on the hydraulic system, disconnect the hydraulic hoses and deactivate the tractor's engine. Carry out routine inspections of the hydraulic hoses and if any damage is found, replace them immediately with new ones that meet the technical requirements of the manufacturer.



This sign indicates the direction of oil flow (the piston rod slides into the cylinder)



This sign indicates the direction of oil flow (the piston rod slides out of the cylinder)

9.1 Diagram and design of the hydraulic system

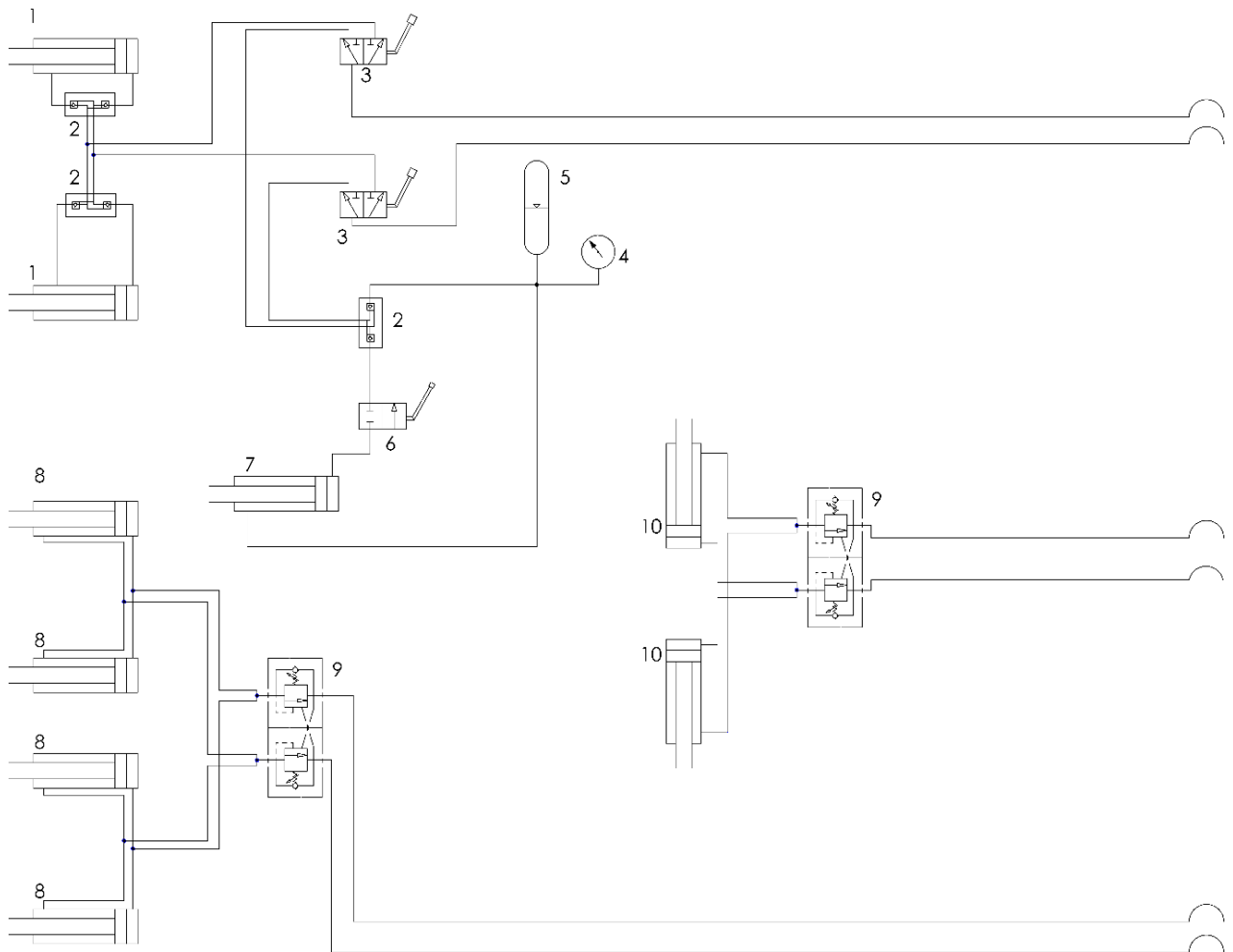


Figure 10. Hydraulic system diagram

- | | |
|--------------------------------------|-----------------------------------|
| 1) Trolley's lifting cylinder. | 6) Two-way ball valve. |
| 2) Controlled twin non-return valve. | 7) Connector's actuator. |
| 3) Three-way ball valve. | 8) Adjusting actuator for shafts. |
| 4) Pressure gauge. | 9) Overload / block valve. |
| 5) Hydraulic accumulator. | 10) Arms' folding actuator. |

9.2 Hydraulic system connection

- When connecting the hydraulic hoses, make sure you connect them to the tractor correctly.
- When connecting the hydraulic hoses, ensure that there is no pressure in the hydraulic system.

Connect the hydraulic hoses in pairs to one control section; the pairs of hoses in one hydraulic section are marked with the same colour.

10 Electrical system.

The cultivator comes equipped with a 12 V electric system. After connecting the power supply plug, make sure that all the lighting components operate correctly. The machine is fitted with an electrical pin socket compliant with the ISO 1724 standard.

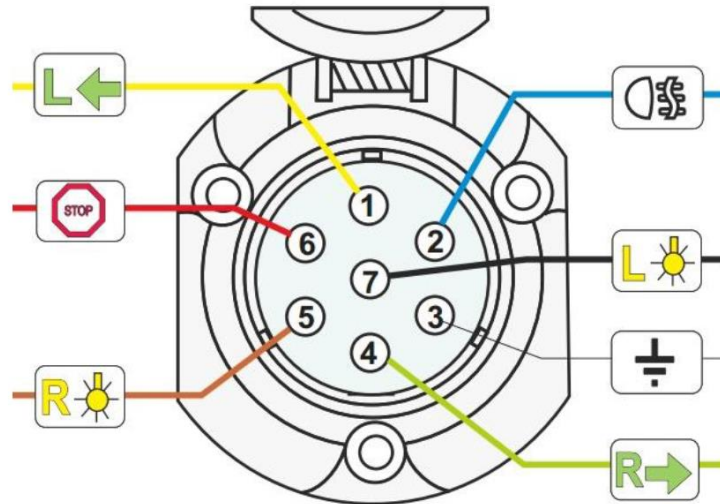


Figure 11. Diagram of the electrical plug connection

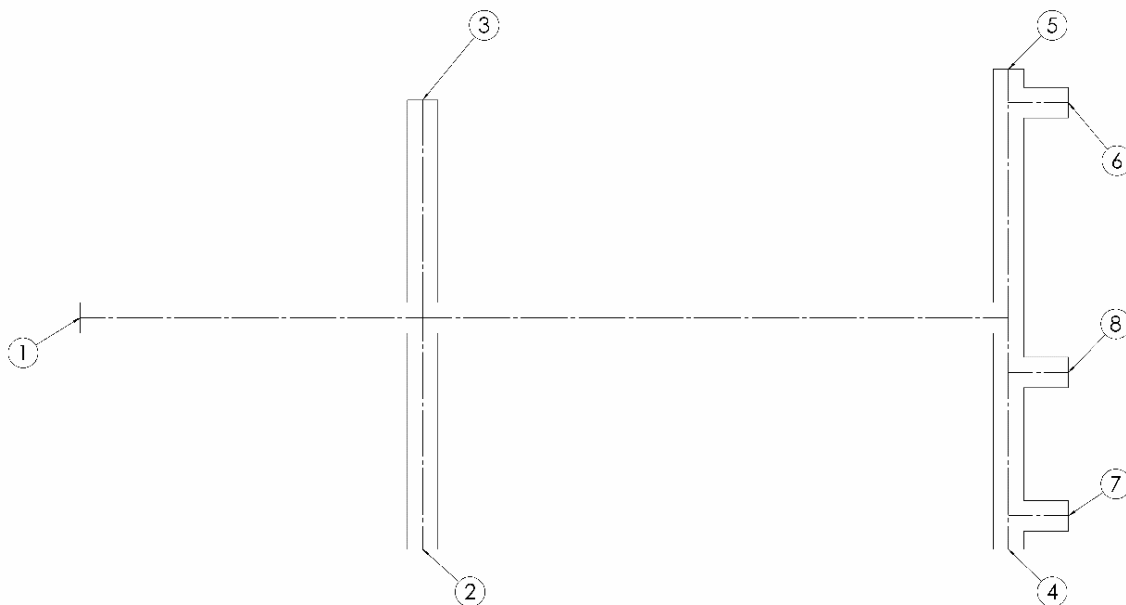


Figure 12. Wiring Diagram

- | | |
|--|----------------------------------|
| 1) 7-Pin plug, according to PIN PN-ISO 1724, | 4) Rear marker lamp, left side |
| 2) Front marker lamp cluster, left side | 5) Rear marker lamp, right side |
| 3) Front marker lamp cluster, right side | 6) Rear lamp cluster, right side |
| | 7) Rear lamp cluster, left side |
| | 8) Licence plate lights |

11 Table of metric bolt tightening torques

Optimised torque values for bolts or screws and nuts [Nm] are shown in Table 6.

Table 6. Bolt tightening torques

Bolt-tightening torques – metric bolts in Nm							
Size Ø mm	Pitch mm	Bolt version – strength classes					Wheel nuts, wheel screws
		4.8	5.8	8.8	10.9	12.9	
3	0.50	0.9	1.1	1.8	2.6	3.0	
4	0.70	1.6	2.0	3.1	4.5	5.3	
5	0.80	3.2	4.0	6.1	8.9	10.4	
6	1.00	5.5	6.8	10.4	15.3	17.9	
7	1.00	9.3	11.5	17.2	25	30	
8	1.25	13.6	16.8	25	37	44	
8	1.00	14.5	18	27	40	47	
10	1.50	26.6	33	50	73	86	45
10	1.25	28	35	53	78	91	
12	1.75	46	56	86	127	148	
12	1.50						80
12	1.25	50	62	95	139	163	
14	2.00	73	90	137	201	235	
14	1.50	79	96	150	220	257	140
16	2.00	113	141	214	314	369	
16	1.50	121	150	229	336	393	220
18	2.50	157	194	306	435	509	
18	1.50	178	220	345	491	575	300
20	2.50	222	275	432	615	719	
20	1.50	248	307	482	687	804	400
22	2.50	305	376	502	843	987	
22	2.00						450
22	1.50	337	416	654	932	1090	500
24	3.00	383	474	744	1080	1240	
24	2.00	420	519	814	1160	1360	
24	1.50						550
27	3.00	568	703	100	1570	1840	
27	2.00	615	760	1200	1700	1990	
30	3.50	772	995	1500	2130	2500	
30	2.00	850	1060	1670	2370	2380	

12 Defects and troubleshooting

Table 7. Possible faults

No.	Type of defect	Possible cause	Solution
1.	Clogging of the cultivator	Incorrectly adjusted cultivator.	Adjust the cultivator.
		The scraper beam is too low.	Lift the scraper beam and adjust the scraper's angle of inclination.
2.	The hydraulic system does not work.	No power supply to the hydraulic outputs.	Activate the hydraulic outputs from the tractor.
		Damaged hydraulic lines.	Change the hydraulic lines.
		Incorrectly adjusted brake and pressure relief valve.	Adjust the brake and pressure relief valve.
		Oil leak in cylinders (oil goes past the piston).	Replace the seals at the cylinders.
		The hydraulic hoses are not connected correctly to the external sockets of the tractor hydraulic circuit.	Check and, if necessary, carefully tighten the quick-release coupling in the external sockets of the tractor's hydraulic circuit.
3.	The electric system does not work.	The 7-pin plug is dirty.	Clean the pins in the plug.
		Burnt bulbs in the lamps.	Replace the bulbs.
		The wire harness is damaged.	Repair or replace the wire harness.
4.	The braking system does not work properly.	Worn out brake shoes.	Replace the brake shoes.
		Leakage in the braking system.	Replace the brake lines or connections.
5.	The roller does not rotate or rotates with difficulty.	The roller is contaminated with soil and vegetative residues.	Clean the roller.
		Damaged bearing unit of the roller.	Change and lubricate the roller's bearings.
6.	The disc cutter does not rotate or rotates with difficulty.	The disc assembly is contaminated with soil and plant debris.	Clean the space between the disc cutters.
		The disc cutter's hub is damaged.	Replace the hub.
		The hub was tightened incorrectly.	Tighten the disc cutter's hub to 300 Nm.
7.	Loose disc cutter.	The hub was tightened incorrectly.	Tighten the disc cutter's hub to 300 Nm.
		Incorrectly tightened cutting disc.	Tighten the cutting disc.

NOTES

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Original spare parts are available from authorised dealers, both in Poland and abroad, and also at the Metal-Fach retail outlet.

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