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INSTRUCTION MANUAL

CZAJKOWSKI STRIP TILL CULTIVATION UNIT

STK 300, STK 400,

The original instruction manual

is in the Polish language

IM-STK-01

6th edition, 10.2024 issue

Before using the machine, read the instruction manual!

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Produkt Polski

CE

DECLARATION OF CONFORMITY CE
directive 2006/42/EU

Producer: Czajkowski Maszyny Sp. z o.o. Sokolowo 1C, 87-400 Golub-Dobrzyn

Product name: Strip till cultivation unit STK 300 and STK 400,
which is the subject of this declaration, conforms to the applicable regulations of safety and health protection defined in directive 2006/42/EU. In order to fulfil the requirements of safety and health protection resulting from the EU directive, the following norms and technical specifications have been included:

PN-EN ISO 4254-1:2016-02; PN-EN ISO 4254-8:2018-08; PN-EN ISO 4254-9:2019-01; PN-EN ISO 12100:2012; PN-EN ISO 4413:2011; PN-EN ISO 13857:2010; PN-ISO 3600:1998; PN-ISO 11684:1998; Journal of Laws 2016, item 2022;

<u>This declaration of conformity CE becomes invalid if the machine is altered or modified without the consent of the producer.</u>

Person authorized to develop documentation
Maciej Czajkowski

Sokolowo, 01.06.2024 r.
Place and date

.....
(President) Maciej Czajkowski

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INTRODUCTION

A cultivation unit for strip till CZAJKOWSKI STK has been manufactured for soil preparation before sowing. Before using the machine, read the instruction manual in detail. The manual mustn't be read in haste. By doing so, the user can cause machine failure or threaten health or life of others. It contains basic rules of conduct and the correct way to operate the machine as well as instructions, which should be followed at all times to ensure own safety, flawless operation of the machine, lower operating costs as well as reliability and durability of the machine. Individuals operating the machine must be trained, possess adequate qualifications and read the manual carefully. Machine users must learn about the intended use of all machine components and how to use them. Follow the provisions of occupational safety, pay special attention to warning signs, which failure to follow results in danger to both operators as well as the machine. The cultivation unit for strip till is intended for usual work in the field. The Producer does not bear responsibility for damage to the machine resulting from use other than intended. Warranty is lost following own repairs or modifications to the machine, negligence and use of non-original spare parts. If you encounter problems with operating the machine, refer to the Producer's sales department or service.

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1. Service

Our company has used its best efforts to ensure that you are fully satisfied with our work together and further use of our products. If you encounter any problems, we recommend direct contact with our company's service or our distributor. In order to solve the problem as fast as possible, we'd like you to prepare the following details:

- full name and address;
- model and serial number of the machine;
- problem description;
- purchase date, hours or hectares worked.

2. Consequential damages

Despite the correct use of the machine, failures caused by the following factors may occur:

- used wearing parts;
- damage resulting from external factors;
- failure to follow the user manual;
- excessive driving speed;
- neglected maintenance or its performance by an untrained individual;
- overload of the machine;
- incorrect setting of the machine (failure to follow instructions about settings, incorrect installation);

The machine must be supervised during use and checked for correct working. The company does not bear responsibility for consequential damages caused by mistakes resulting from incorrect handling, driving or transportation. Claims for damages that do not occur within the machine are automatically rejected.

3. Safety

This user manual contains safety instructions and warnings that apply to all chapters. Machines have been designed and constructed according to the modern technical requirements and recognized safety regulations. However, threats to third parties, health and property of the user, as well as material losses and damage to the machine, may still occur while operating the machine regardless of kept caution. Before starting work, read and follow bits of information and instructions of this user manual.

This warning symbol:  in this user manual indicates important information when there is a particular danger to the user or others.

Safety regulations:

1. Apart from the instructions of this manual, you also must follow the occupational health and safety regulations.
2. It is forbidden to allow minors and individuals under the influence of alcohol or narcotics to operate the machine.
3. It is forbidden for third parties and animals to be present inside the working zone of the machine.
4. Warnings (stick-on labels) placed on the machine help in avoiding accidents and provide instructions about safety of the user and third parties.
5. While using public roads you must follow the provisions of the applicable Traffic Code.
6. Before starting work, familiarize yourself with all systems, operating elements and their workings.
7. The operator's clothing shouldn't be too loose otherwise the moving parts of the machine may pull it in.
8. Check each time whether the tractor and the machine are correctly attached before starting them and whether they're safe for driving and working.
9. Before moving from the starting place, check the nearest surroundings of the machine and the tractor for unauthorized people. Pay attention to proper visibility.

ATTENTION **Presence of children in the vicinity of the unit (especially in the field) is dangerous. Children should be under the supervision of a caregiver, parents or another adult !!!**

10. It's forbidden to stay on the machine while it's working and when it's being transported.
11. Keep extreme caution when attaching/detaching the seeder to/from the tractor.
12. Before attaching the seeder check if the front axle of the tractor has sufficient load.
13. Strictly follow rules for axle loads, allowable total weight and transport loads.
14. Before driving out to a public road check if light signals work (headlights, reflective lights) and are placed in accordance to the requirements set forth in the provisions of the Traffic Code.
15. All wires (hoses, cables...) must be fixed in such a way that eliminates all possibilities of unexpected disconnection, because such unexpected disconnection may cause accidents or damage.
16. Before driving out to a public road, the machine must be in its transport position.
17. Never leave the operator's cabin while driving the tractor.
18. Speed and the way of driving the tractor must always be suitable for terrain and road conditions. Sudden changes of driving direction should be avoided at all times and in all circumstances.
19. While turning, consider a greater scope of deviation and an increased weight of the machines.
20. It's forbidden to stay in the working zone of the machine and the tractor.
21. Each time before driving the machine, check whether all protective equipment is in good working condition.
22. Pay attention to crush hazard zones, especially those remotely and hydraulically operated.
23. Start the hydraulic folding of the frame only when there aren't any people in the deviation zone.
24. Before leaving the tractor cabin, lower the machine to the ground, turn off the engine, remove the key from the ignition and make sure that all spinning elements have stopped.
25. You mustn't stay between the tractor and the attached machine before pulling the parking brake or placing anti-roll chocks under the tractor wheels.
26. The folded frame and the lifting system must be secured in the transport position
27. Track markers must be locked in the transport position.
28. Before carrying out any activities around the machine, make sure that it won't start on its own.
29. Do not use a jack or a lift to lift the filled machine.
30. Keep the machine clean to avoid fire hazards.
31. Pay attention to danger zones near the rotating elements of the machine.
32. You must be outside the danger zone while, starting, operating, folding or unfolding the machine.

33. Do not place undesirable objects when filling the tank.
34. Before filling the machine, check if the fertilizer and seed chambers are empty and free of dirt and any foreign bodies.
35. Follow the given quantities when filling the seeder.
36. During each break, the machine drive should be turned off.
37. It's forbidden to enter the fertilizer/seed chamber while the tank is being filled.
38. The hydraulic system is a high-pressure system. The escaping liquid may get through the skin and cause serious harm. If you suffer any injuries, immediately see a doctor.
39. There are pressure accumulators inside the hydraulic system. It's forbidden to modify and open them. Before maintenance, remove the pressure from the hydraulic system. After emptying, there's gas pressure in the tank.
40. Use only telescopic shafts with CE marking allowed by the producer of the machine.
41. Anti-slip mats should be replaced with new ones if they are damaged or after a maximum of 5 years of using the machine. New anti-slip mat strips must be at least 5 cm wide.
42. The machine with the tank full must always be coupled to the tractor. The machine can only be uncoupled from the tractor when the tank is empty.

4. Residual risk

The Czajkowski Maszyny Company has made its best to limit the risk of an accident. However, there's still some residual risk, which may lead to an accident if you don't follow the instructions:

- read the user manual carefully;
- operate the machine cautiously and without haste;
- don't put your hands into forbidden places;
- secure the machine against children;
- don't stay in the vicinity of the machine while it's working;
- keep a safe distance from dangerous places;
- have the machine maintained and repaired solely by qualified individuals;
- have the machine operated by individuals familiar with the user manual.

You can eliminate residual risk by following the above-presented instructions.

The most frequent mistakes while operating the machine include:

- using the machine for purposes other than intended;
- having an untrained person operate it;
- having a person under the influence of alcohol or narcotics operate it;
- performing diagnostics while the machine is working;
- maintaining and cleaning the machine when its engine is running;
- staying outside the tractor cabin while the machine is working;
- staying between the tractor and the machine while attaching them or while the machine is working.

5. Intended use of the machine

The machine is to be used in land cultivation and any other way of using it, for instance, as a means of transport, may lead to injuries to the body or even death. The user is solely responsible for the risk associated with improper use of the machine. The machine is to be used only in perfect condition. All faults must be removed immediately, especially those that might affect occupational safety. You must follow the applicable OHS regulations issued by industry organizations and the generally accepted regulations of occupational medicine, traffic safety and technical safety. The machine can be maintained, used and repaired only by individuals, who have read the user manual, know how the machine works and have been informed about possible threats. The user manual is an integral part of the machine and must be kept in an easily accessible place. If the machine is resold, the new owner should also receive the user manual. Original accessories and spare parts have been designed uniquely for this machine. Installation and use of non-original parts may cause unfavourable construction changes and affect safety of people and machines in a negative way. The producer does not bear responsibility for damage resulting from use of unauthorized parts.

6. Personnel qualifications

In order to avoid accidents, all people using the machine must meet the basic requirements:

- understand the workings of the machine;
- recognize possible threats and prevent them from occurring;
- have proper physical attributes required to handle the machine;
- perform work using the machine in a safe way described in the manual;
- understand the user manual and use information contained herein;
- have experience in driving vehicles;
- have a driving license if the machine is to be used on public roads;
- apprentices can use the machine only under supervision;
- people operating the machine must have adequate educational background.

The owner or persons who will work with the machine must undergo training conducted by service staff during the first start-up and read the operating manual.
It is the duty of the owner to:

- train and instruct operators;
- give the user manual to the operator and make sure that he or she understands information contained therein;

Machine operators must have appropriate knowledge so they can cover the following:

- maintenance;
- use;
- finding and removing faults and failures;
- transportation on public roads;
- adjustment and setting of the machine.

6.1. Mounted and trailed equipment

1. Before attaching/detaching mounted equipment to the three-point linkage, the lever of the hydraulic lift (of an agricultural tractor) must be left in the position that makes it impossible for the hydraulic system to start on its own.
2. When using the three-point linkage, you must use matching categories of the tractor and the seeder (optionally categories 3 and 4 of the linkage are available).
3. You must be especially careful in the working section of the three-point linkage. You can get crushed or suffer cuts. No one should stay between the Czajkowski STK unit and the PS attachment, or the precision seeder, while the unit is reversing towards the attachment.

4. While operating the three-point linkage from the outside it's forbidden to stay between the tractor and the Czajkowski STK unit, the PS seeder and the precision seeder.
5. When the machine is in the transport position, pay attention to the protruding elements (hooks, rods, cables) of the three-point linkage (if neither the PS seeder nor precision seeder are attached to the unit).
6. Secure the machine against unwanted movement and rolling with anti-roll chocks.
7. If you're mounting equipment with the use of a drawbar, pay attention to the sufficient movement scope of the drawbar at the mounting point.

6.2. Fire safety regulations

- The tractor must be equipped with a fire extinguisher placed in the holder;
- Fuel and hydraulic leaks from the machine and the tractor must be prevented;
- Using open fire or smoking is forbidden when fuelling up and operating the fuel system of the tractor;
- Fuel cap of the tractor must be tightly closed;
- The engine must be turned off when fuelling up;
- Flammable materials mustn't be stored in the vicinity of the machine.

6.3. Hydraulic system

Hydraulic system is a high-pressure system. The escaping liquid may get through the skin and cause serious harm. If you suffer any injuries, immediately see a doctor. The hydraulic system of the machine can be dangerous to humans and the machine if it's incorrectly operated.

It's important to remember that:

- It is a high-pressure system;
- Hydraulic hoses can be connected to the tractor only after the hydraulic systems of the tractor and the equipment have been depressurised.
- Leaking oil may cause fire or pose a threat to health.
- All hydraulic cables (hoses, quick release couplings) must be checked regularly for visible damage of tightness. If damage is noticed, the damaged elements must be replaced at once.
- Sockets and plugs of hydraulic connections must be marked to eliminate operational errors.
- Hydraulic hoses must be replaced not later than after 6 years.
- The hydraulic system is equipped with pressure accumulators.
- It's forbidden to modify pressure accumulators. Before starting maintenance operations, it's necessary to depressurize the hydraulic system. After emptying, there's gas pressure in the tank.

7. Transportation on public roads

- Before transportation, the working elements of the machine should be properly folded and lifted according to the producer's instructions.
- During transport, the width of the folded machine must not exceed 3 m and the height 4 m. You should also remember about the appropriate transport clearance.
- Take into account the prevailing road conditions while driving.
- Always abide by allowable dimensions and weights.
- The tractor must have proper weight, so it can provide proper handling and efficiency of braking.
- Before driving, check whether the headlights and light signals are connected and work correctly.

ATTENTION 

- It is forbidden to transport people and things on the machine during transport.
- It is forbidden to drive on public roads with the filled tank.
- It is forbidden to drive the machine on public roads over 30 km/h.

8. Warranty claims

Warranty claims must be sent to the Service Department of the Czajkowski Maszyny Company.

9. Danger to children

Children in the close vicinity of the machine are subject to exceptional danger. It's forbidden for children to approach the machine. Before leaving the cabin, you must turn the tractor engine off and remove the keys from the ignition so children cannot start the machine by accident. Before starting work, you must check if there aren't any children in the danger zone. Always secure the machine where it's parked.

10. Warning pictograms

Warning pictograms on the machine are very important when it comes to safety, because they inform about possible threats in dangerous places. If there aren't any warning pictograms on the machine, the risk of serious and deadly injuries is increased. Damaged or unreadable warning stickers must be replaced immediately. You must put proper warning stickers on spare parts. Clean any dirty warning stickers. New warning pictograms can be purchased from the producer.

Pictograms have the following meaning:

N001 – It's forbidden for people to stay between the machine and the tractor while attaching them

N002 – Fold the drawback support after attaching the machine to the tractor

N003 – It's forbidden to transport people on the machine

N004 – Pay attention to excessive hydraulic pressure while the machine is working

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N005 – Read the user manual and follow its instructions before starting the machine

N006 – It's forbidden to touch working discs while the machine is working

N007 – Turn off the engine and remove the key from the ignition before performing maintenance operations and repairs

N008 – Keep caution when releasing the high-pressure liquid, follow the instructions of the user manual

N009 – Keep your distance

N010 – Do not enter the folding/unfolding zone

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N011 – Don’t get on the rotating elements. Use parking brake when the machine is not moving

N012 – Pressure accumulator is under gas and oil pressure. Follow instructions of the technical manual when disassembling and repairing it

N013 – Never reach inside the crush zone if the parts may still fold/rotate

N014 – Never reach into the area around the gears where there is a crashing hazard

N015 - Never direct the water jet directly at the electronic devices under the cover.

10.1. Placement of warning pictograms

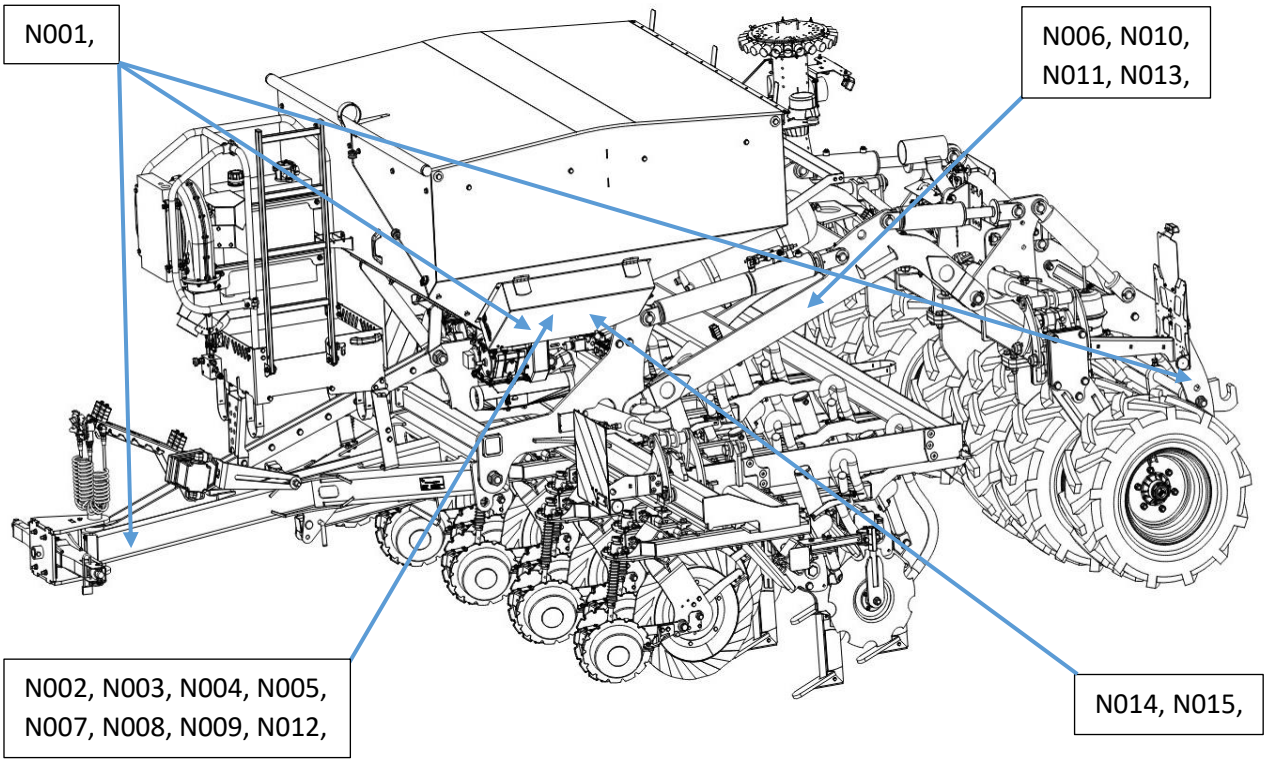

Fig. 1. Placement of warning pictograms

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11. Technical data

MODEL	STK 300	STK 400
Working width	4 x 75cm – maize, rapeseed. 6 x 45cm – beetroot, rapeseed. 6 x 50cm – soybean. 7 x 44,4cm – grains, rapeseed. 8 x 37,5cm – grains, rapeseed.	4 x 75cm – maize, sunflower. 6 x 45cm – beetroot, rapeseed. 6 x 50cm – soybean. 6 x 70cm – maize, sunflower. 6 x 75cm – maize, sunflower. 8 x 37,5cm – grains, rapeseed. 9 x 44,4cm – grains, rapeseed.
Spacing of furrow openers [cm]	37,5; 44,4; 45; 50; 75;	37,5; 44,4; 45; 50; 70; 75;
Number of furrow openers	From 4 to 8	From 4 to 9
Weight [kg]*	5500	6500
Minimum power demand [KM]**	160	180
Transport width [m]	3	
Transport height [m]	3,1	
Transport length [m]	6,5	
Tank volume [l]	2800 (2 x 1400)	
Filling height of the tank [m]	2,6	
Working depth [cm]	from 20 to 35	
Roller ⌀ [cm]	89	
Seeders	2 x electrical	
Hydraulic connectors	3 or 4 pairs + free flow	
Rear 3-point linkage	Cat. I or cat. II or cat. III (2350kg)	
Rear PTO	Hydraulic	
Power supply	12V	
Lightning	LED	
Video camera [pcs.]	from 1 to 2	
Hydraulic filter [pcs.]	2	
Connector type	Beam, cat. III	

* The given values are the maximum weights and dimensions that occur in a full option of a given version of the machine.

** The minimum power demand will be correspondingly lower depending on the number of working sections.

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STK 300

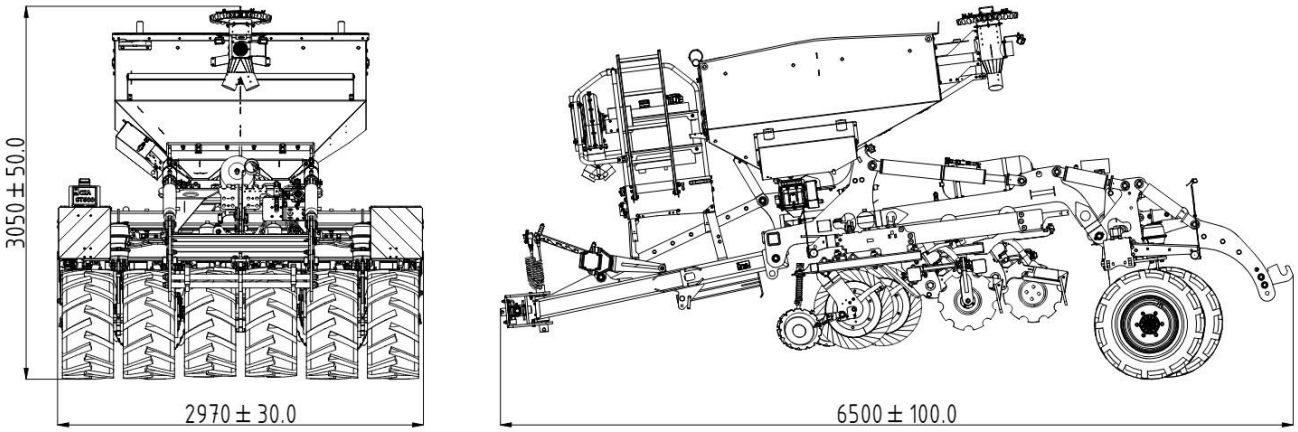

Fig. 2. Overall dimensions of STK 300

STK 400

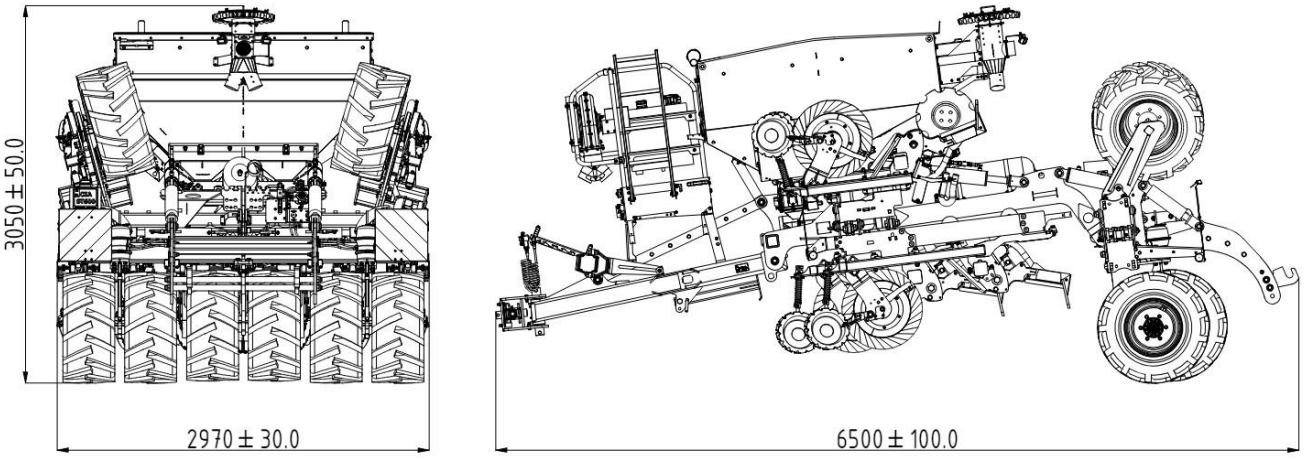

Fig. 3. Overall dimensions of STK 400

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12. Load calculation

Allowable load of the load-bearing capacity of tyres, axles, and the tractor weight cannot be exceeded when attaching or installing equipment. Before road transport, you must check whether the used tractor is not overloaded and is suitable for the machine. Load on the front axle of the tractor must always equal at least 20% of the self-weight of the tractor. Due to differences in equipment, machines must be weighed separately to determine their self-weight.

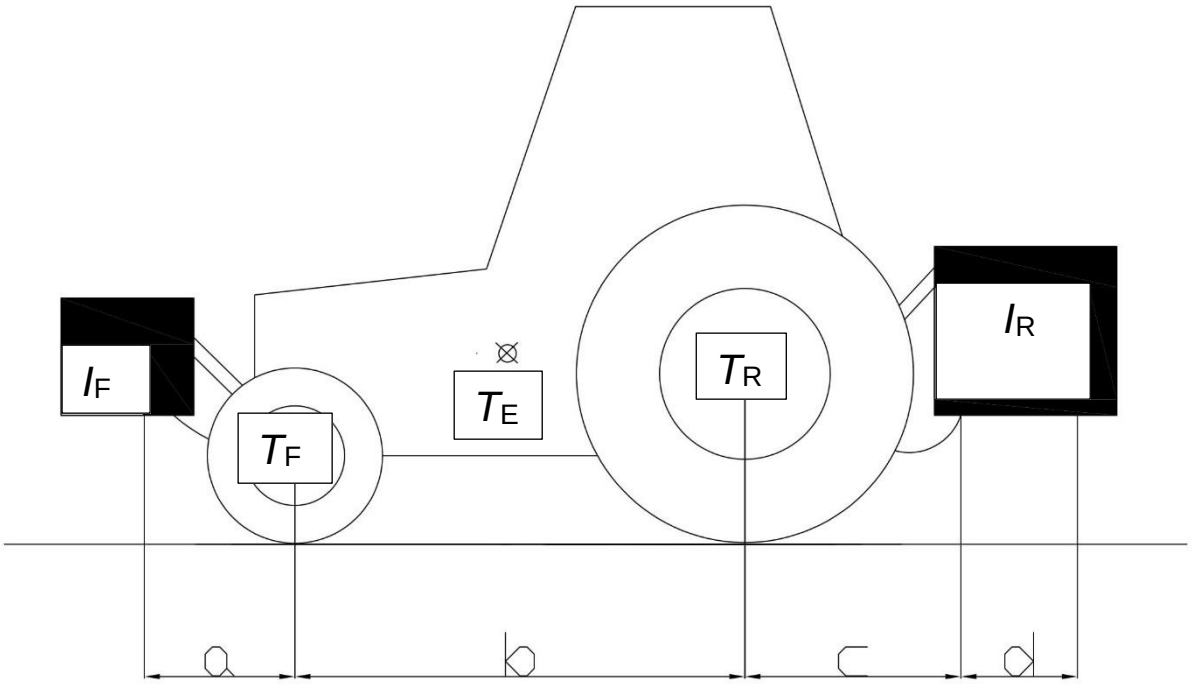

Fig. 4. Load calculation scheme

T_E [kg] – self-weight of the tractor
T_F [kg] – pressure of the front axle without load
T_R [kg] – pressure of the rear axle without load
I_R [kg] – total weight of the machine mounted at the rear/ rear weights
I_F [kg] – total weight of the machine mounted at the front/ front weights
a [m] – distance from the middle of the front axle to the centre of gravity of the machine mounted at the front/ front weights
b [m] – tractor axle track
c [m] – distance from the middle of the rear axle to the middle of the bottom mounting points
d [m] – distance from the middle of the bottom mounting points to the centre of gravity of the machine mounted at the rear/ rear weights
x - information provided by the tractor producer about minimum load at the rear (if there aren't any additional pieces of information, use the value of 0,45).

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1. Calculation of the minimum front load if the equipment is mounted at the rear:

$$I_{Fmin} = \frac{[I_R \ x \ (c+d)] - (T_F \ x \ b) + (0{,}2 \ x \ T_E \ x \ b)}{a+b}$$

2. Calculation of the minimum rear load if the equipment is mounted at the front:

$$I_{Rmin} = \frac{(I_F \ x \ a) - (T_R \ x \ b) + (x \ x \ T_E \ x \ b)}{b+c+d}$$

3. Calculation of the real pressure on the front axle:

$$T_{Fmin} = \frac{[I_R \ x \ (a+b)] - (T_F \ x \ b) + [(T_R \ x \ (c+d))]}{b}$$

4. Calculation of the real total weight:

$$T_{real} = I_f + T_E + I_R$$

5. Calculation of the real load on the rear axle:

$$T_{R\,real} = T_{real} - T_{F\,real}$$

Verification of calculations
Calculations must be additionally verified by weighing the mounted machine and load, weigh the pressure on the front and rear axles. Compare the calculated values with allowable values.
Additionally, check:

- minimum pressure on the front axle (20% of the self-weight of the tractor),
- maximum pressure on the front and rear axles,
- allowable total weight.

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13. Danger zone

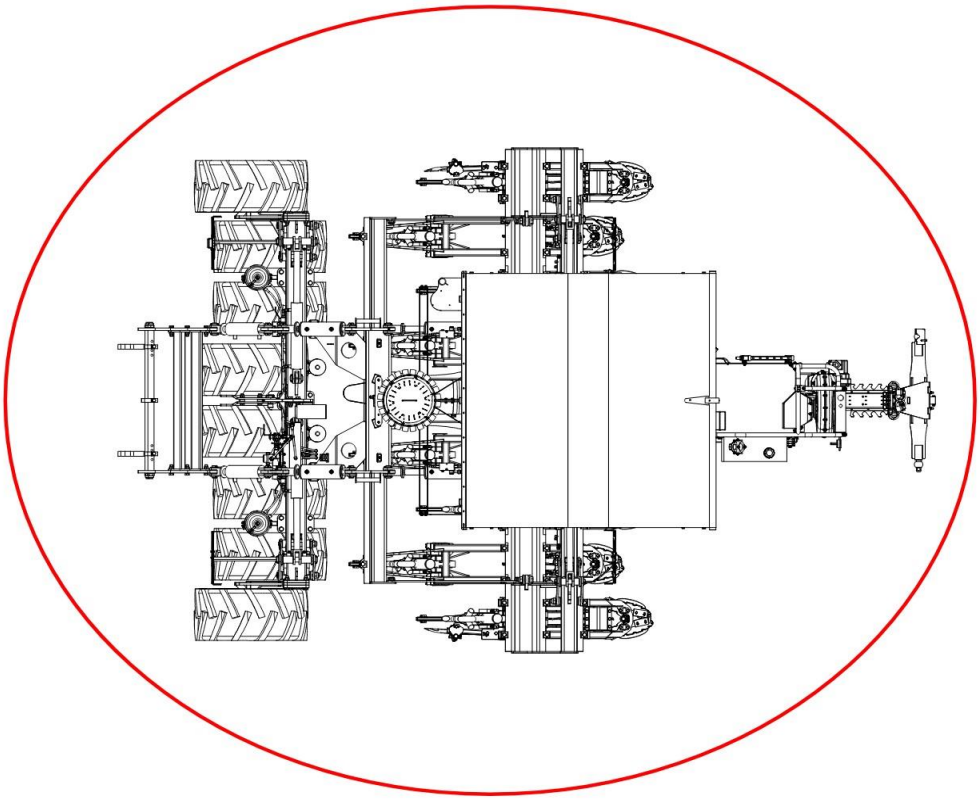

Fig. 5. Danger zone

Figure above shows the danger zone around the machine It is the zone, in which the following dangers may occur:

- parts lifted using the hydraulic system may move unobserved;
- movement of the machine;
- torn or partially isolated wires may electrocute;
- turning on the hydraulic system by accident may cause the machine to move in an uncontrollable fashion.

Entering and staying in the danger zone may result in serious injuries to the body or may cause death. It is forbidden to stay in the zone between the machine and the tractor. Turn off the tractor while staying in the danger zone – also during routine inspections. It is forbidden to stay under the lifted elements of the machine. Always follow instructions of the user manual.

14. Use of fertilizers and treated seeds

The producer recommends original fertilizers of the highest quality with moisture content that allows the seeder to work without problems. Both fertilizers and treated seeds must be handled in a professional way that does not threaten the life and health of the operator. You must also follow safety requirements of the product producer and if there aren't any, contact the dealer or the producer. While working you need to wear personal protective equipment that complies with information provided by the producer.

15. Identification plates

Fig. 6. STK machine ID plate

Fig. 7. STK drawbar ID plate

16. Description and design of the machine

The strip till cultivation units STK 300, STK 400 consist of the following components:

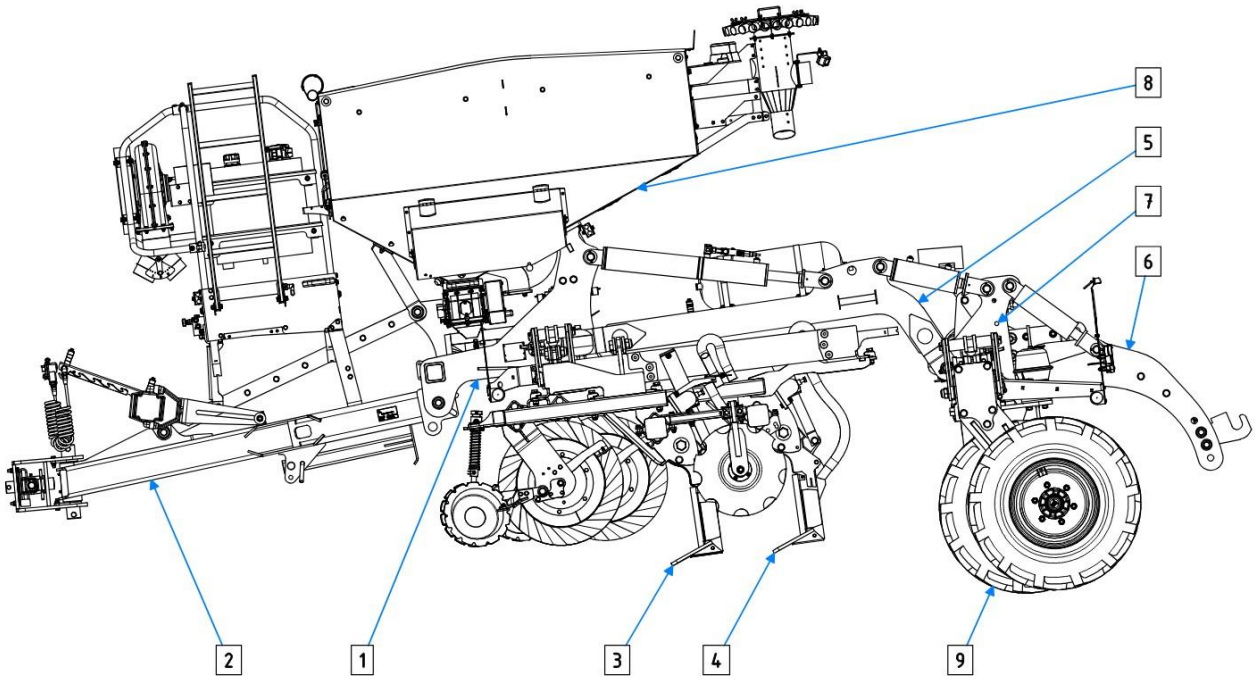

Fig. 8. The machine

1. Main frame
2. Drawback
3. Short working section
4. Long working section
5. Machine lifting arm
6. Rear 3-point linkage
7. Rear frame
8. Tank
9. Roller

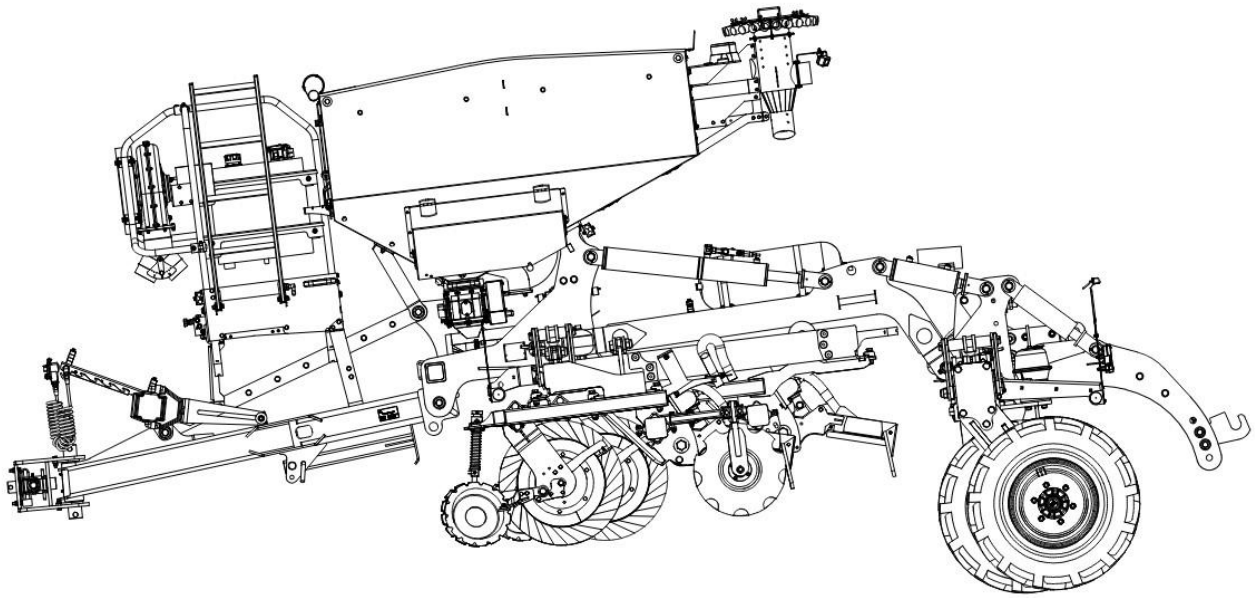

Fig. 9. Lifted machine with folded working parts

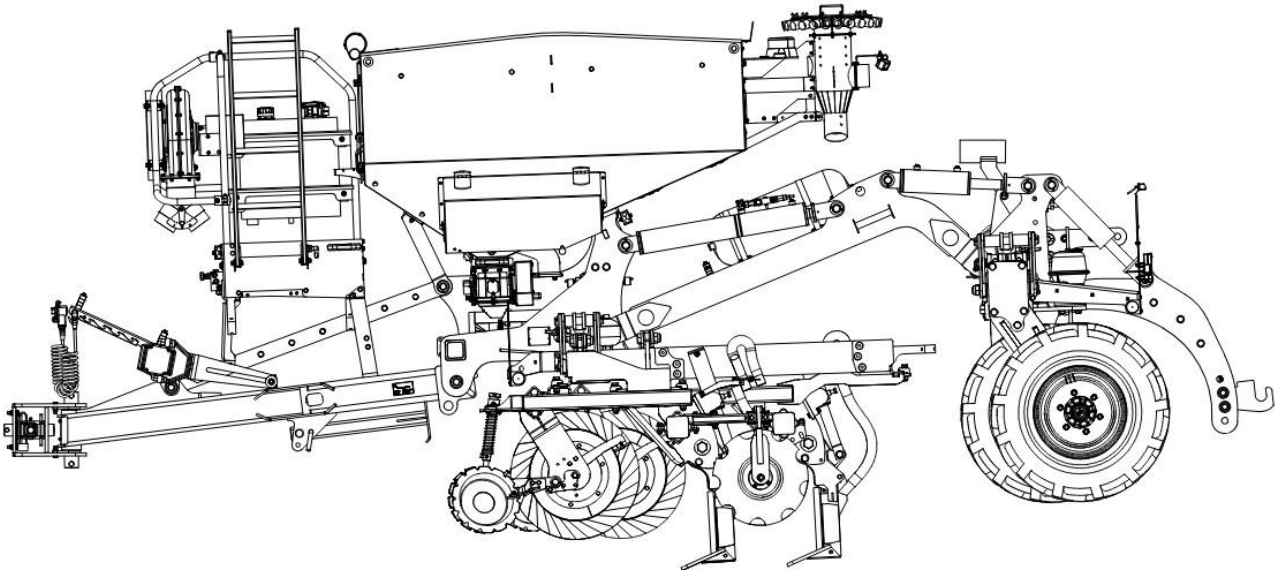

Fig. 10. Lowered machine with unfolded working parts

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The front section of the cultivation unit for strip till is equipped with a drawback and a linkage axis fixed to the mainframe using pins. The main frame is fixed to the lifting arm. The STK 400 is an advanced version of STK 300. Side frames folded using the hydraulic system are attached to the main frame of STK 400. The frames of the roller folded using the hydraulic system are fixed to the rear frame. The STK 400 enables seeding using the spacing configuration of 6 x 70 cm, 6 x 75 cm and 9 x 44,4 cm. Assuming the transport width is facilitated by the hydraulic system of the side frames and the roller. Working sections are fixed to side frames and the main frame using brackets. There's a tank for seed and fertilizer distribution with all necessary equipment on the main frame. The main frame in the rear part of the machine is fixed to the rear frame and the roller using the lifting arm. Hydraulic cylinders responsible for lifting the machine are fixed to the main frame on one end and to the machine-lifting arm on the other end. The 3-point linkage lifted by hydraulic cylinders is fixed to the rear frame using pins. The 3-point linkage is used to attach the precision seeder or the PS attachment.

Description of actions performed by working parts of the machine:

- Spreading the preceding crop with spreading and breaking discs.
- Cutting the soil at the depth of 12 cm with the wavey cutting disc.
- Breaking and aerating the soil to the depth of 35 cm using the furrow opener covered with a replaceable rotating cover in the shape of a channel section, the opening share and a replaceable self-sharpening rotating sword.
- Application of fertilizer using the fertilizer coulter (application can be adjusted in 3 positions).
- Closing the gap using toothed closing discs (3 adjustable positions).
- Compacting and levelling the soil surface using the compacting and levelling shaft.
- Sowing plants using the PS attachment (if sowing wheat, peas or rapeseed).

In case of sowing other plants, the PS attachment must be replaced with a precision seeder of another company. Seeders that meet spacing requirements of Polish standards can be attached to the unit.

16.1. Working sections

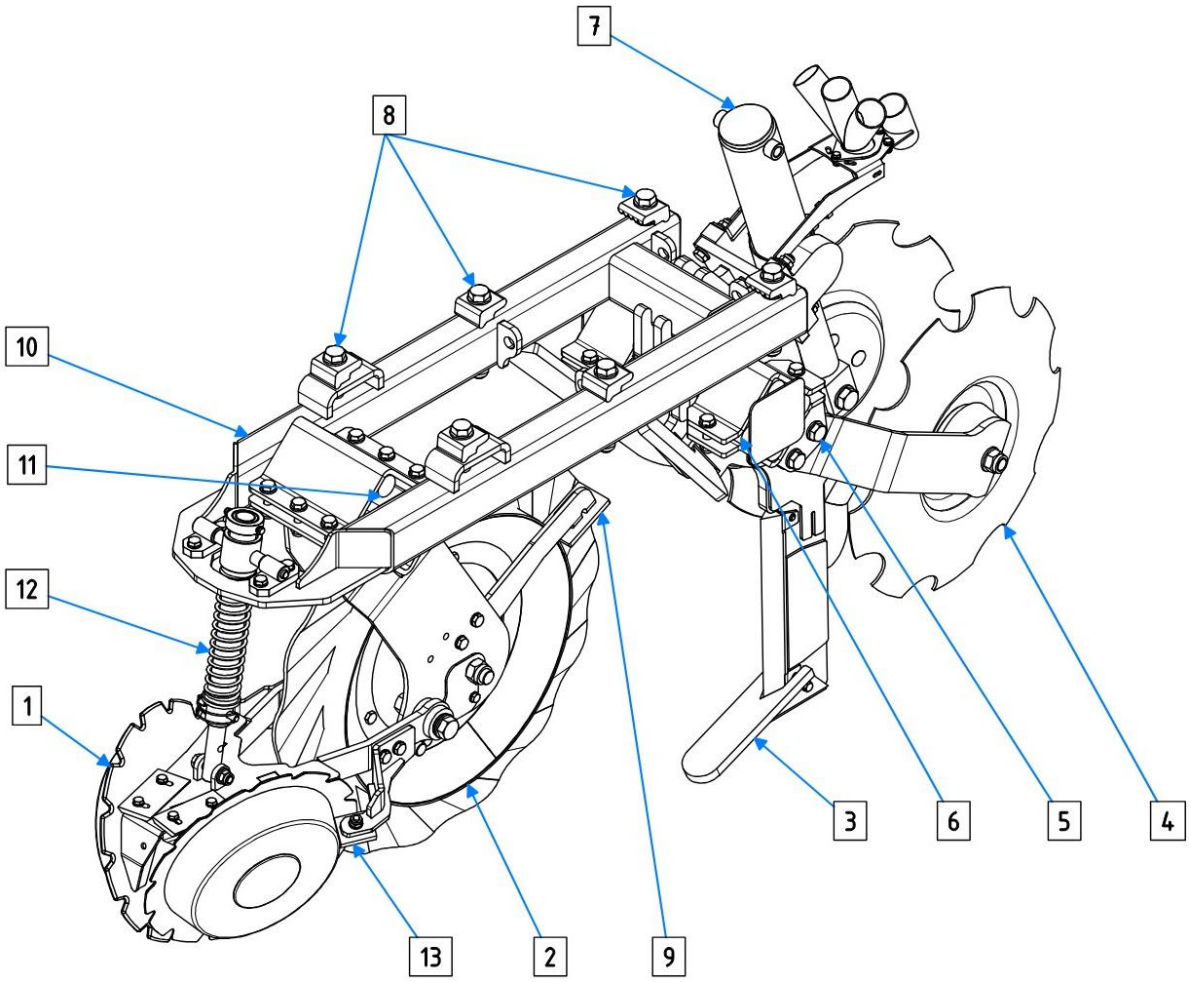

Fig. 11. Short section

1. Spreading and breaking disc
2. Wavey cutting disc
3. Furrow opener
4. Toothed closing disc
5. Adjustment of the toothed closing disc
6. Rubber protection of the toothed closing disc
7. Hydraulic protection of the furrow opener
8. Brackets for mounting the frame
9. Scraper
10. Short section frame
11. Rubber protection of the cutting disc
12. Shock absorber of the spreading and breaking discs
13. Scraper of the spreading and breaking disc

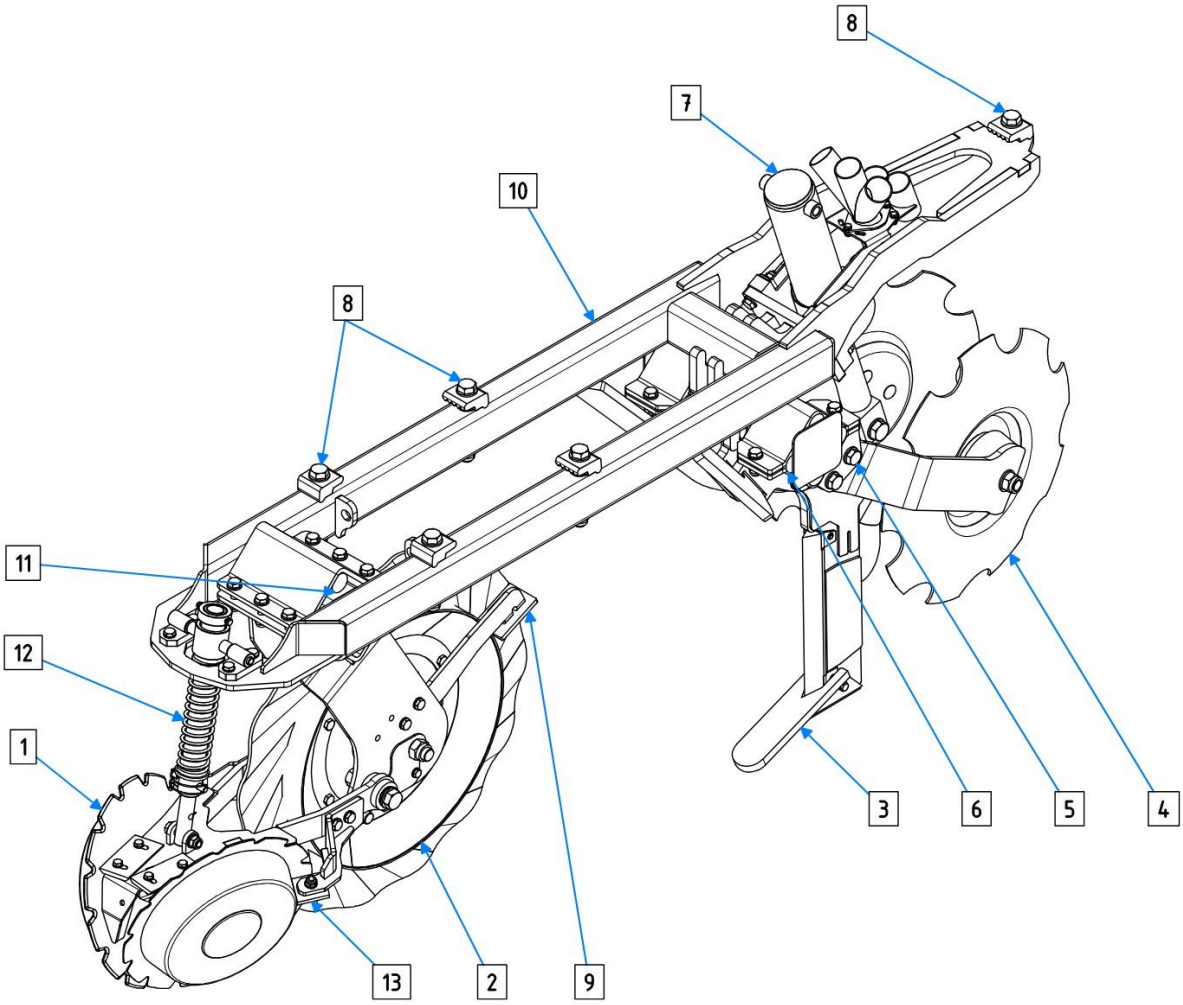

Fig. 12. Long section

1. Spreading and breaking disc
2. Wavey cutting disc
3. Furrow opener
4. Toothed closing disc
5. Adjustment of the toothed closing disc
6. Rubber protection of the toothed closing disc
7. Hydraulic protection of the furrow opener
8. Brackets for mounting the frame
9. Scraper
10. Short section frame
11. Rubber protection of the cutting disc
12. Shock absorber of the spreading and breaking discs
13. Scraper of the spreading and breaking disc

16.2. Design of the furrow opener

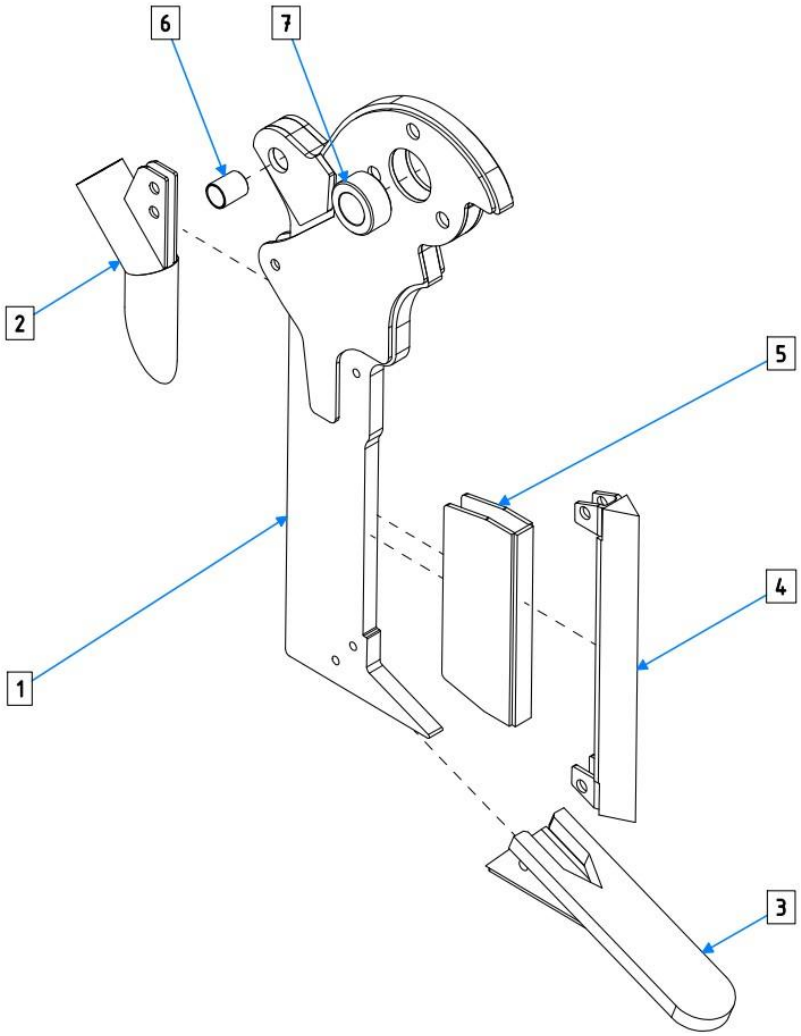

Fig. 13. Design of the furrow opener

1. Coulter beam (irreplaceable element, doesn't wear out)
2. Seed pipe (irreplaceable element, doesn't wear out)
3. Chisel fixed with a rawlplug (replaceable element, wears out)
4. Self-sharpening rotating sword (replaceable element, wears out)
5. Beam cover (replaceable element, wears out)
6. d20/D23 sleeve (replaceable element, wears out)
7. d30/D50 L24 sleeve (replaceable element, wears out)

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16.3. Types of chisels

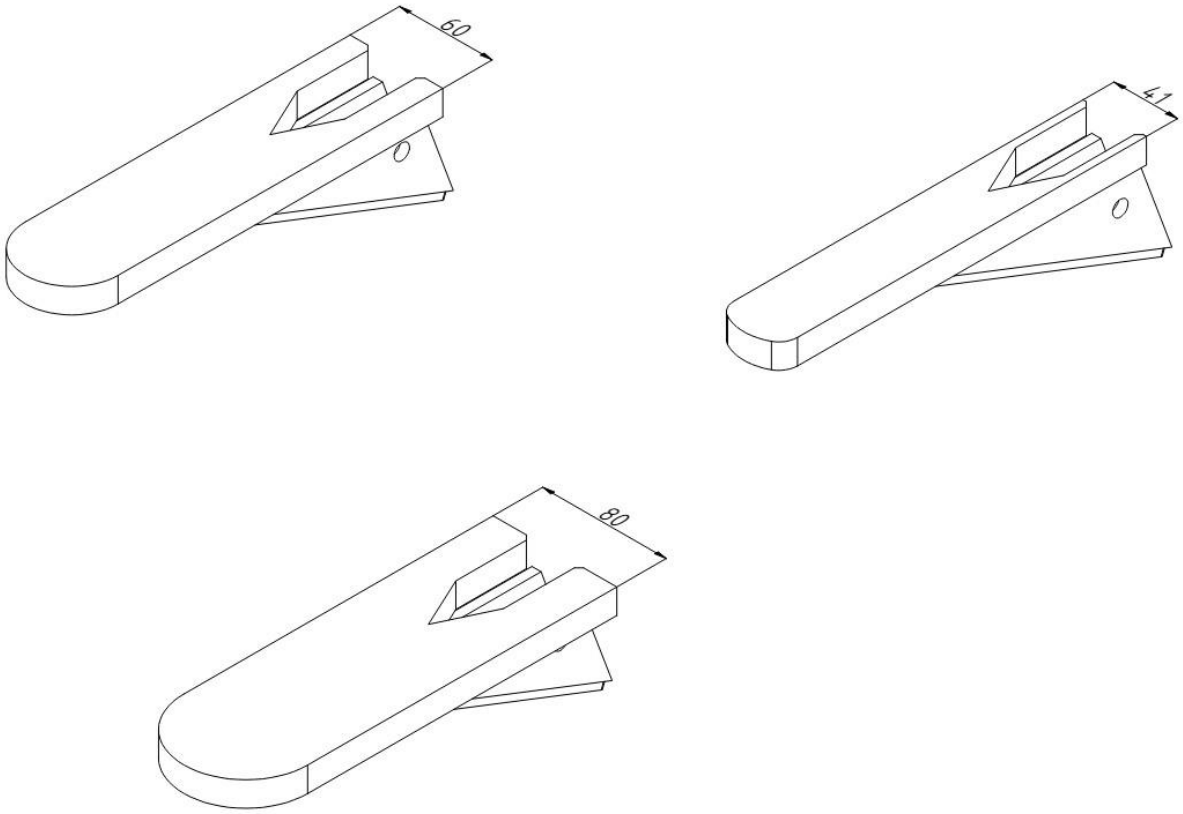

Fig.14. Types of available chisels

The producer recommends using different types of chisels dedicated for specified plants:

- in rapeseed cultivation, it's recommended to use narrow chisels with working width of 45mm;
- in maize cultivation, it's recommended to use wide chisels with working width of 80mm;
- cultivation of plants other than those mentioned above, it's recommended to use standard chisels with working width of 60mm.

Each type of the above-mentioned chisels is available with a soldered carbide plate or an abrasion resistant hard-faced plate.

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16.4. Tank

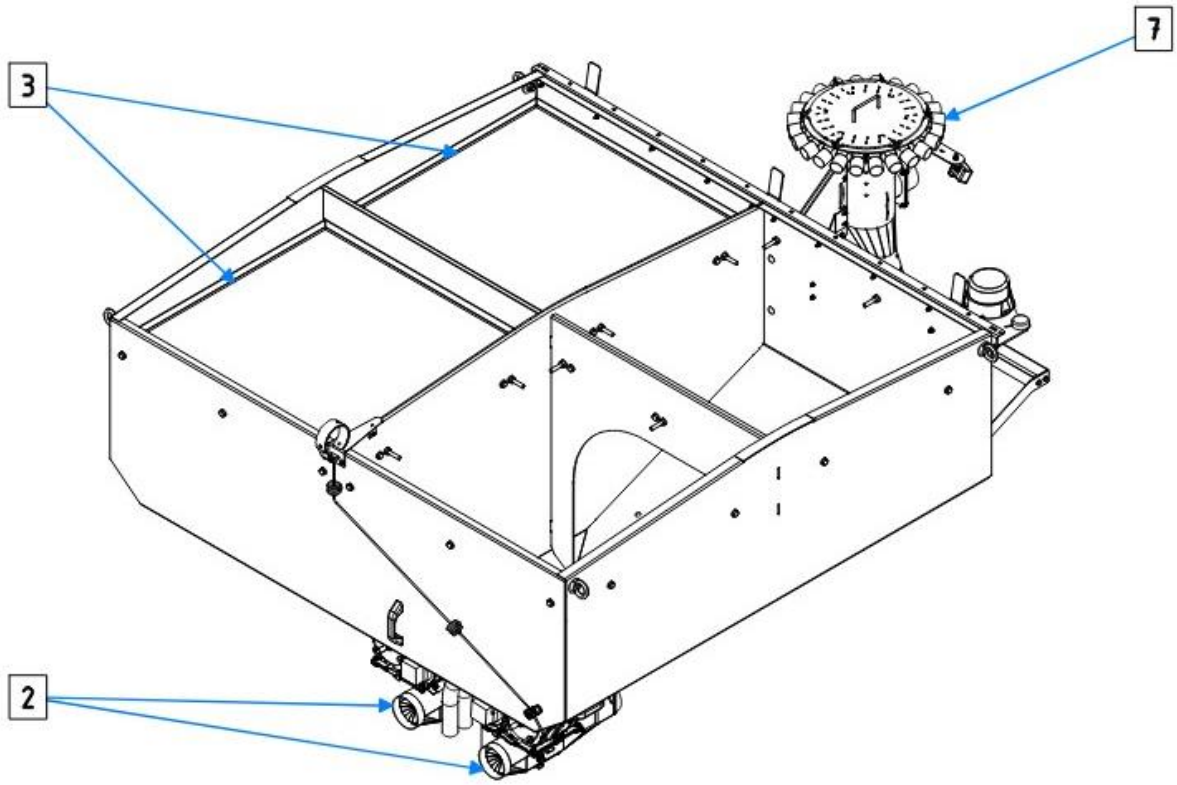

Fig. 15. Tank – View 1

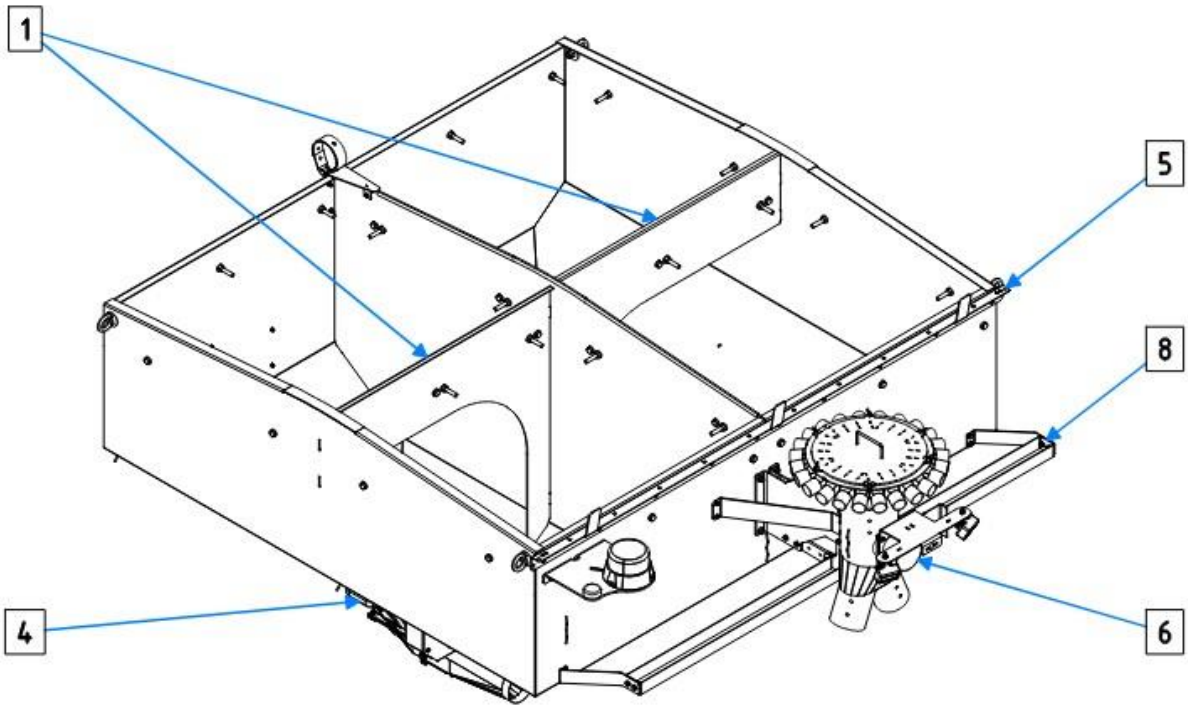

Fig. 16. Tank – View 2

1. Tank chambers
2. Seeders
3. Nets in the tank x4
4. Valve for cutting off the tank from the distributors
5. Tarpaulin support frame and tarpaulin
6. Bleed valve
7. Seed distributor with replaceable inserts.
8. Guide bars for sowing hoses

16.5. Setting the seed level sensor

The sensor has two work modes. In the upper position, it detects the low level when the fill comes to around 40 – 50 kg. In the lower position, it detects the low level when the fill comes to around 2 – 3 kg. When changing the position of the sensor loosen the sensor nut and unscrew it. Then unscrew the blind and put it into the hole from which the senor has just been removed. Insert the sensor into the hole and tighten the nut gently..

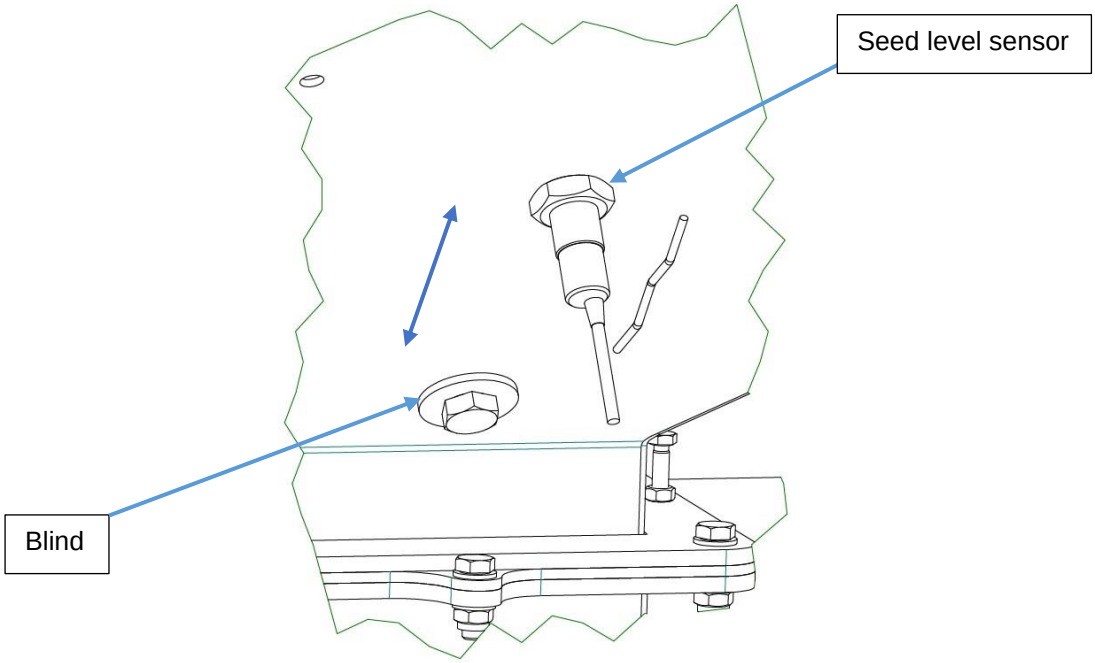

Fig. 17. Changing the place of the sensor in the tank

17. Spacing configurations for STK 300 – individual seeding operations

It should be remembered that in spacings of 37.5 cm the toothed closing disc should be mounted only on the extreme sections.

17.1. 37,5 cm spacing for 8 frames of STK 300

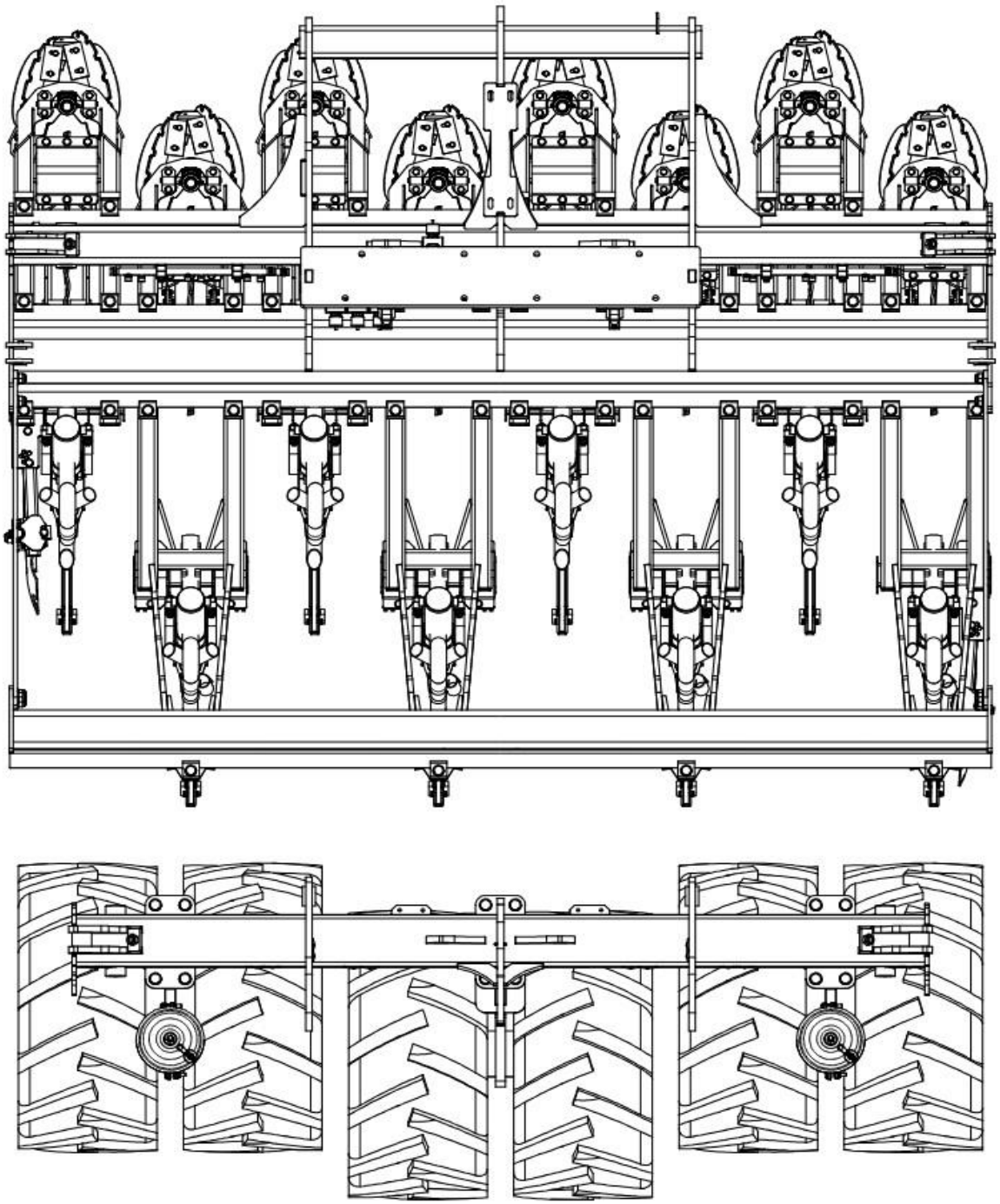

Fig. 18. 37,5 cm spacing for STK 300

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17.2. 44,4 cm spacing for 7 frames of STK 300

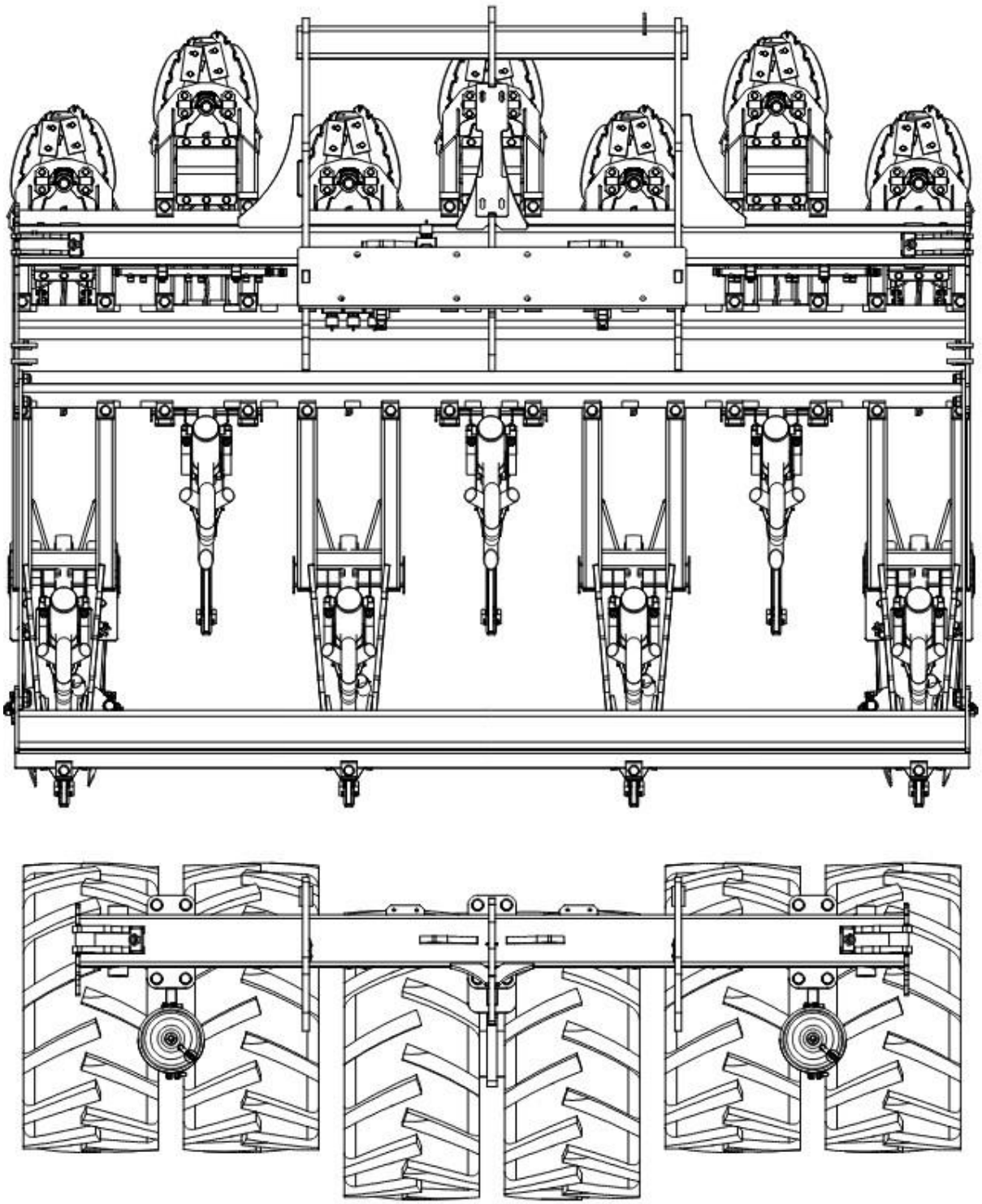

Fig. 19. 44,4 cm spacing for STK 300

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17.3. 45 cm spacing for 6 frames of STK 300

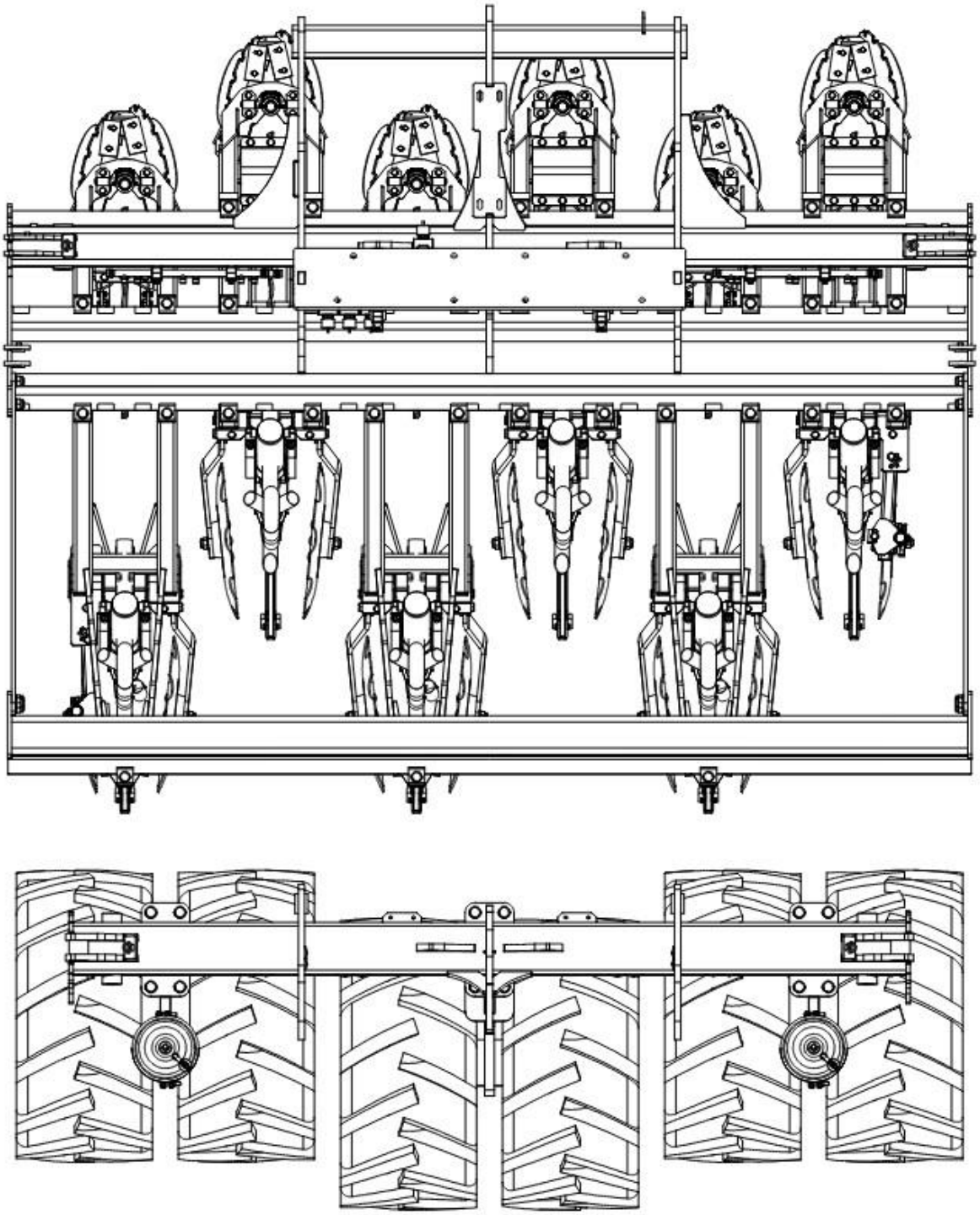

Fig. 20. 45 cm spacing for STK 300

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17.4. 75 cm spacing for 4 frames of STK 300

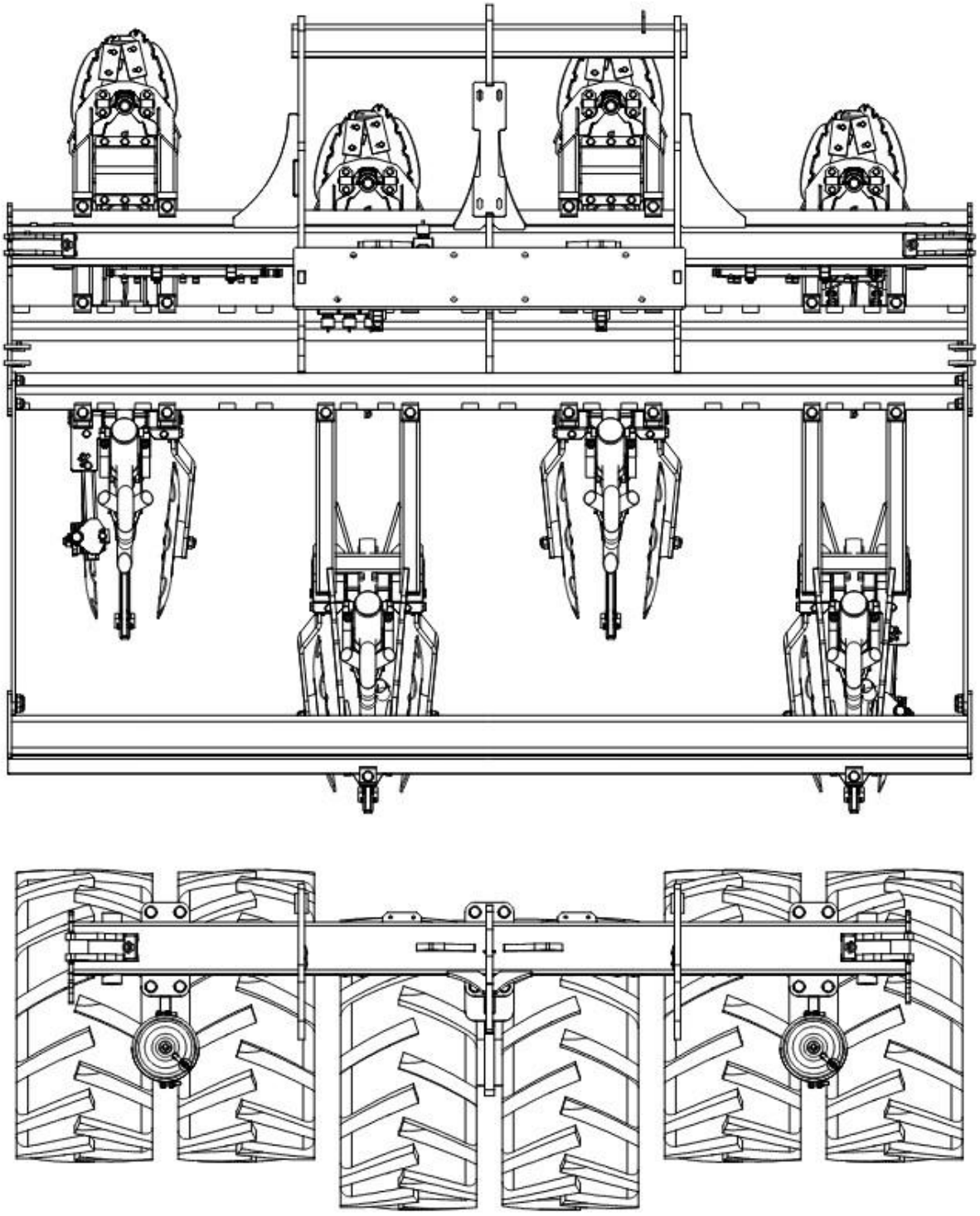

Fig. 21. 75 cm spacing for STK 300

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18. Spacing configurations for STK 400 - individual seeding operations

18.1. 37,5 cm spacing for 8 frames of STK 400

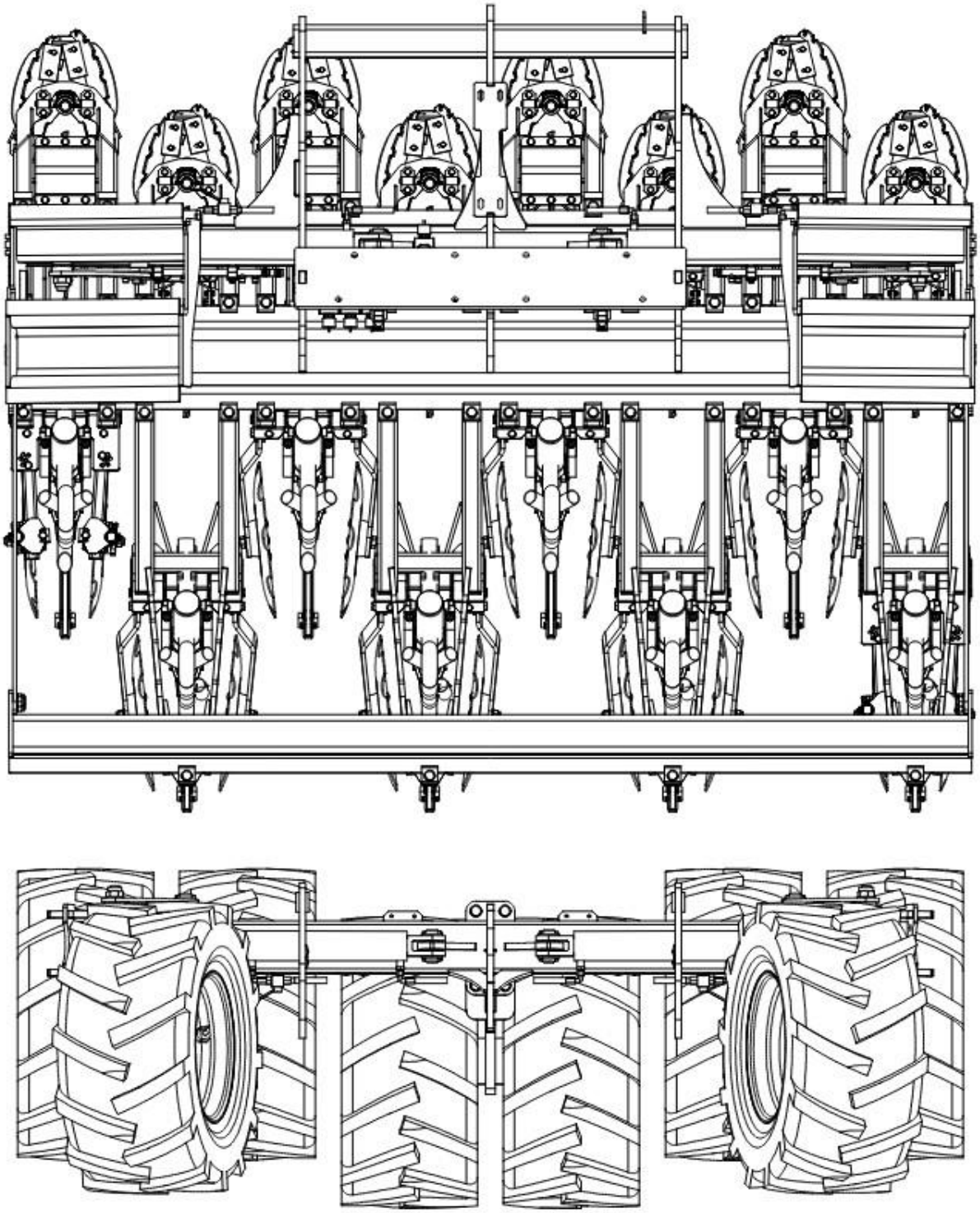

Fig. 22. 37,5 cm spacing for STK 400

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18.2. 44,4 cm spacing for 9 frames of STK 400

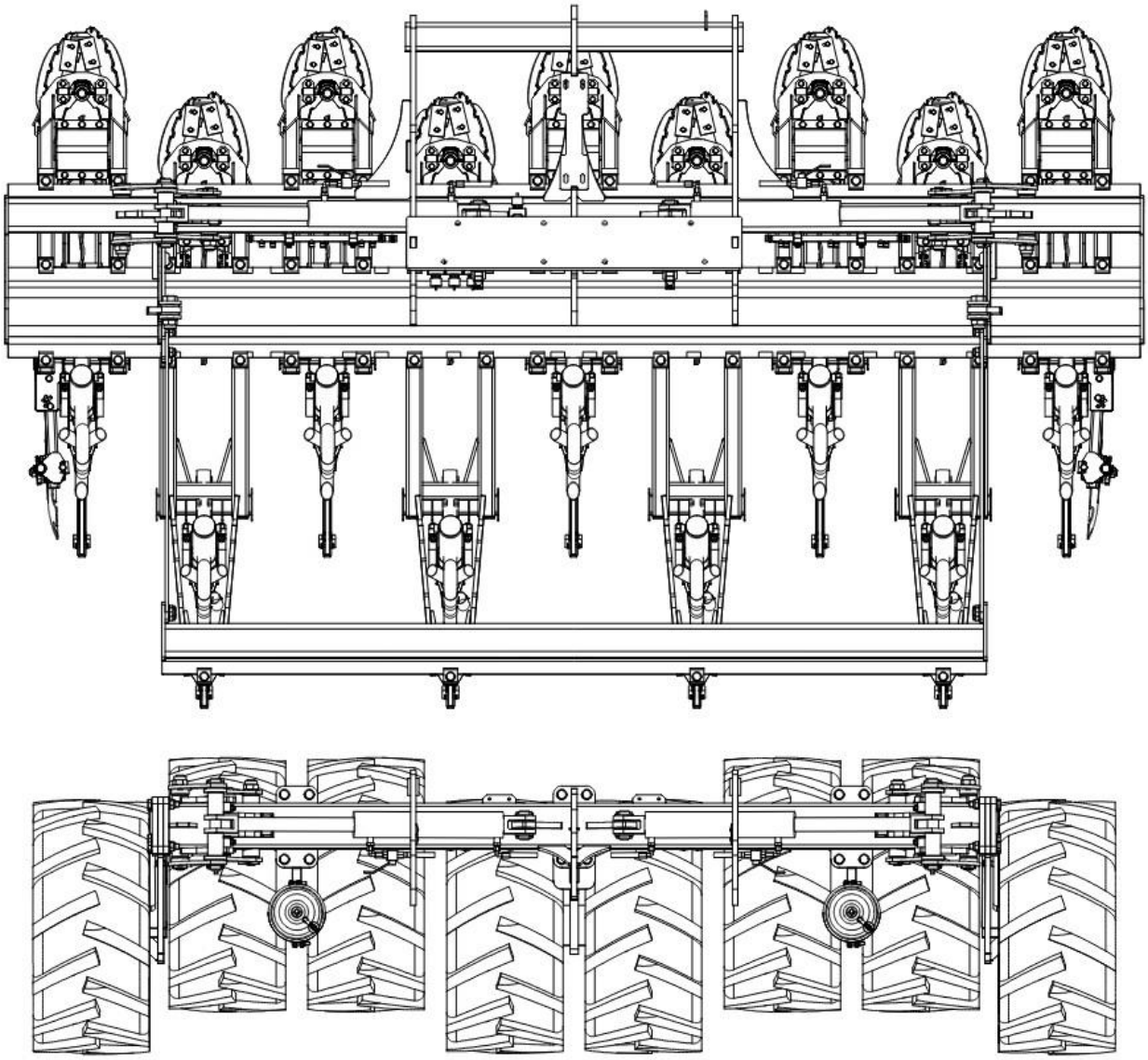

Fig. 23. 44,4 cm spacing for STK 400

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18.3 45 cm spacing for 6 frames of STK 400

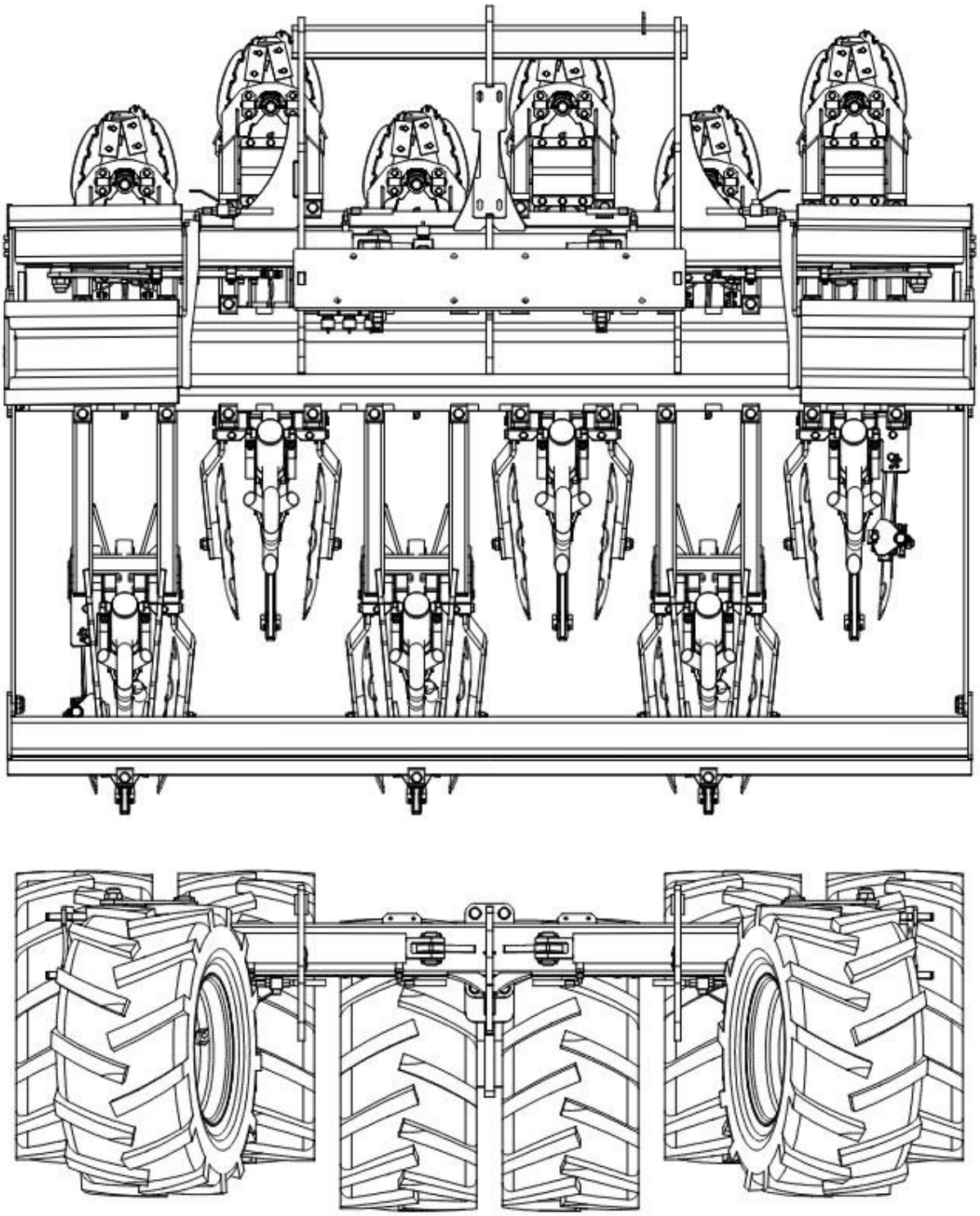

Fig. 24. 45 cm spacing for STK 400

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18.4. 75 cm spacing for 6 frames of STK 400

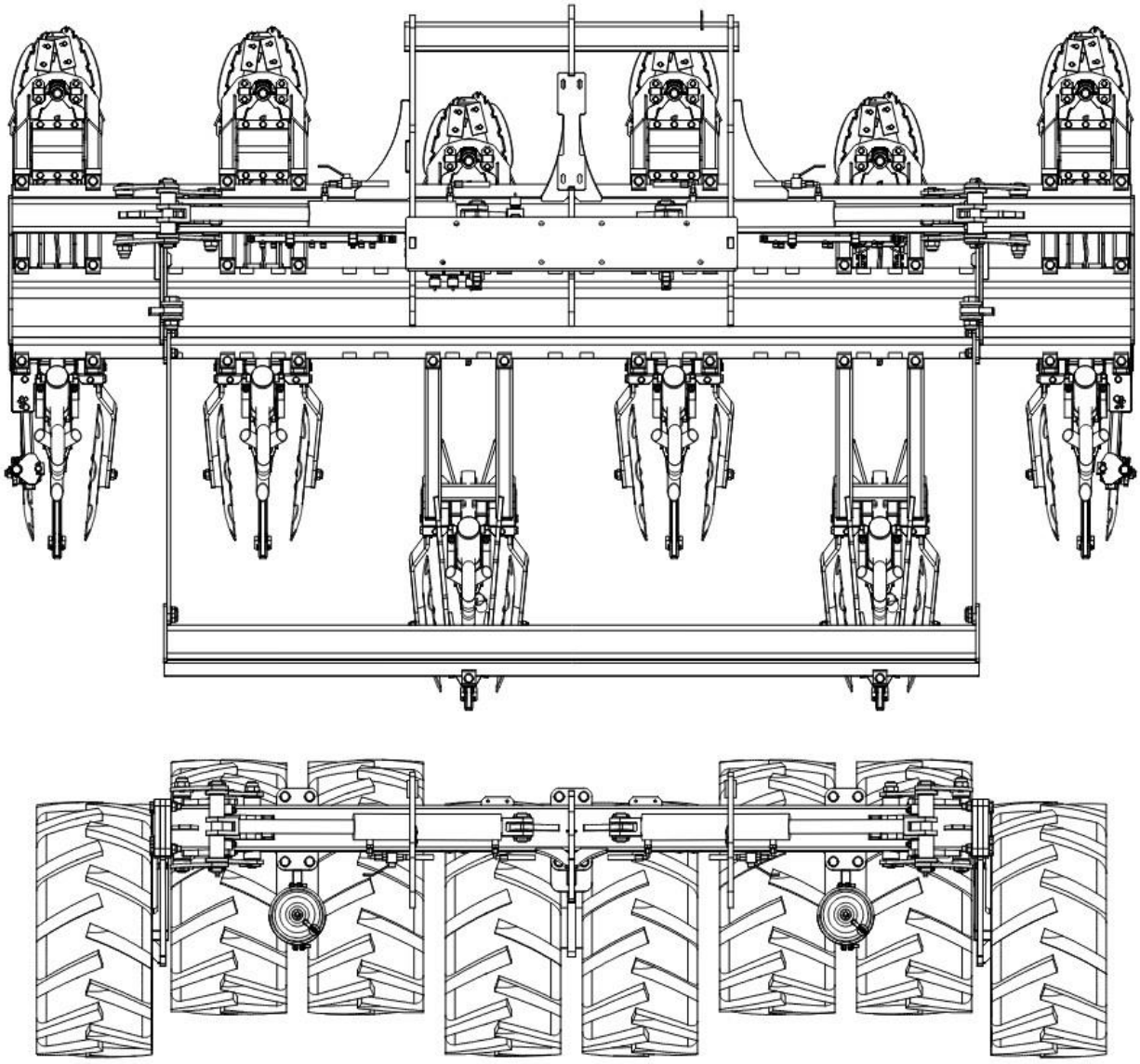

Fig. 25. 75 cm spacing for STK 400

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19. Attaching and detaching the working sections

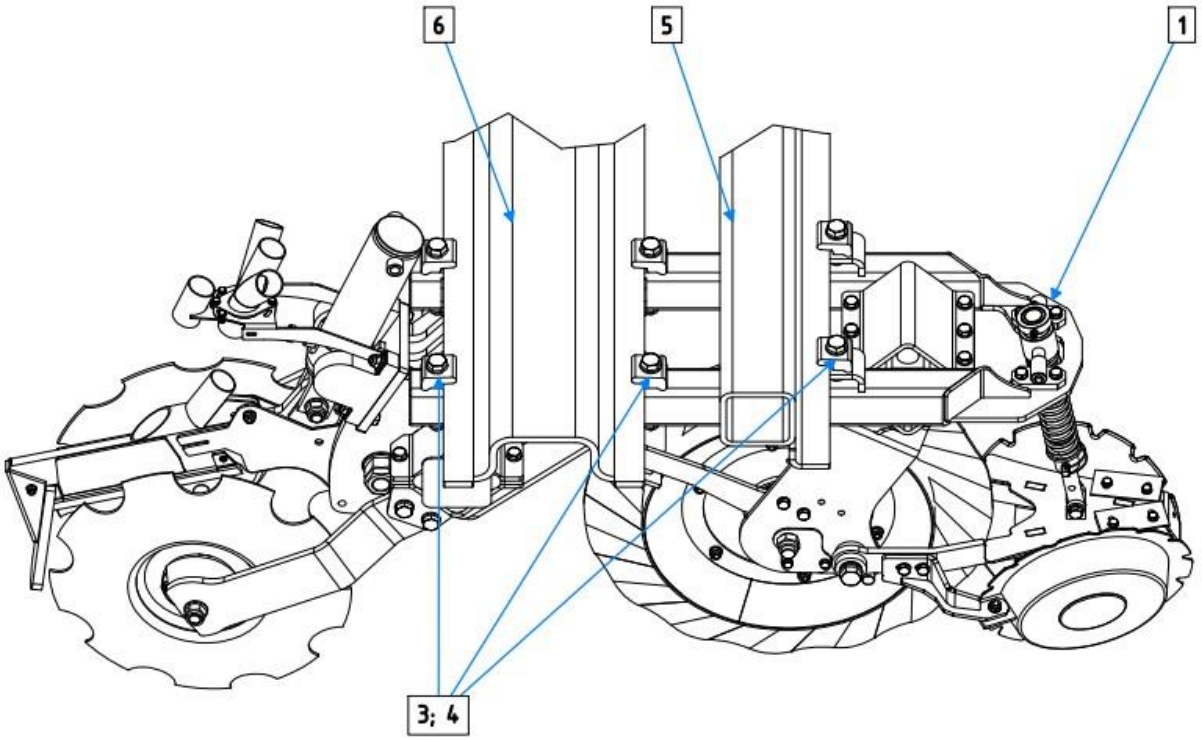

Fig. 26. Attaching the short working section

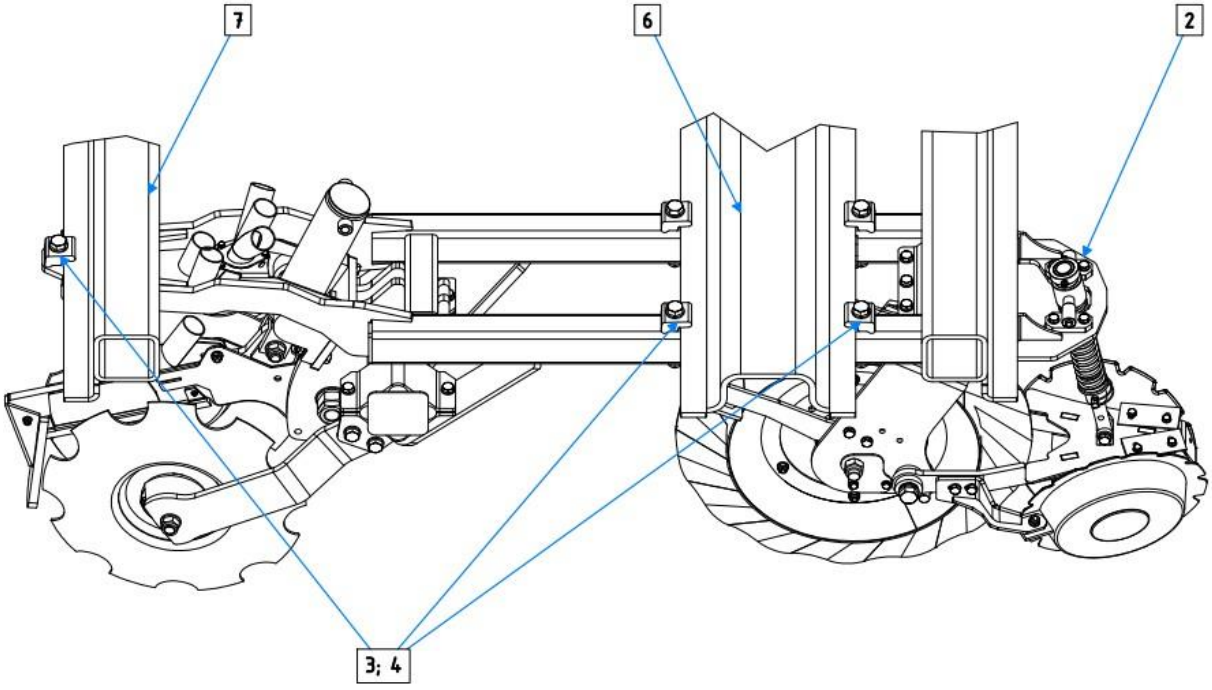

Fig. 27. Attaching the long working section

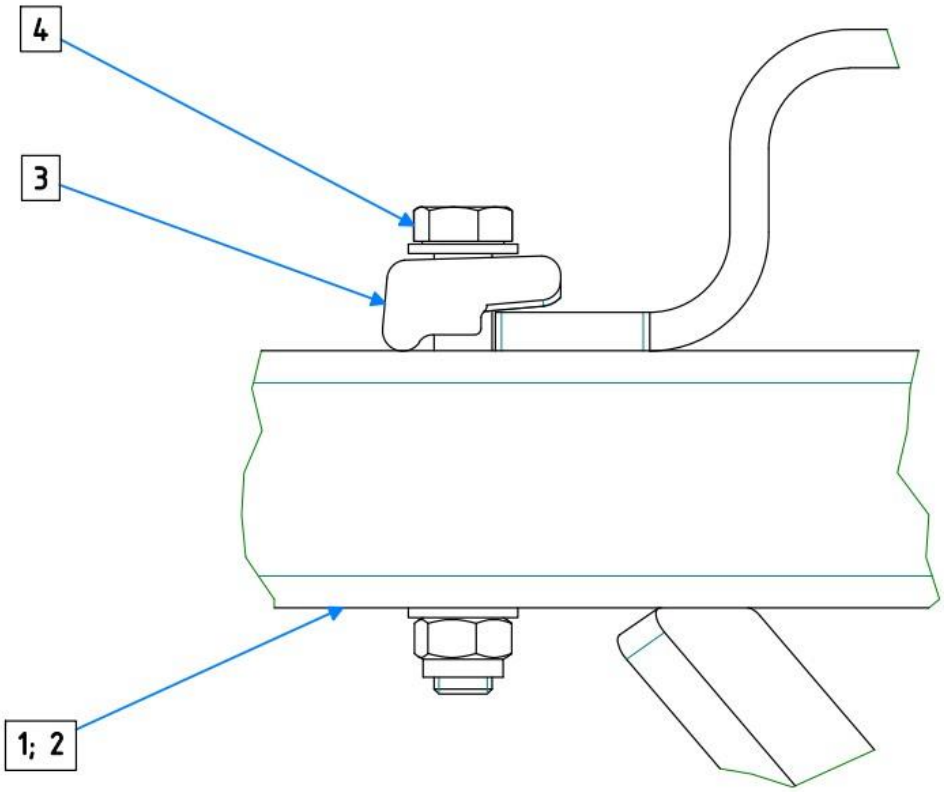

Fig. 28. Attaching the working sections

Working sections are attached to the frame with brackets [3] tightened using the M18 screw [4].

The short working section [1] is attached at the middle [6] and the front [5] section of the frame with 6 brackets [3].

The long working section [2] is attached at the middle [6] and the front [7] section of the frame with 5 brackets [3].

The plow frame have to be folded while attaching the working sections. A dedicated trolley has to be used to detach the parts.

20. Changing the spacing of working sections

In order to change the spacing of working sections do the following:

1. Fold the plow frames of the working sections.
2. Set the machine at the height which allows for free movement of working sections.
3. Low the pressure in the plow frame protection system.
4. Mount two middle trolleys [8] in the mounting holes of the short section [1]. Mount one middle trolley [8] for the long working section [2] and one rear trolley [9] in the mounting hole [3].
5. Disconnect the hydraulic hoses from the hydraulic collectors if necessary.
6. Detach the fertilizer hose from the fertilizer spreader.
7. Loosen the M18 screws [4] which hold the brackets [3] until the trolley rollers [8; 9] start resting on the track of the middle [6] and rear [7] (for the long section) part of the frame.
8. Move the sections to the intended place on the frame. To set the sections you need to use the linear scale on the frame.
9. To attach the frame, do the above in the reverse order.

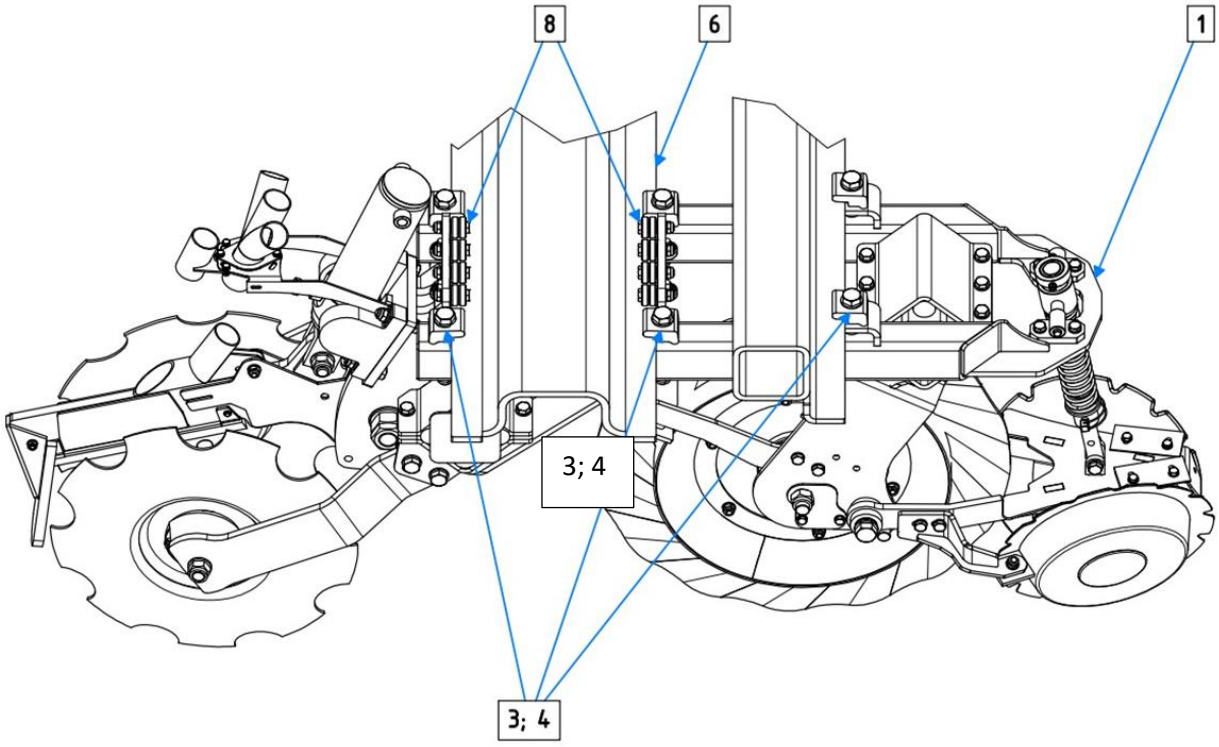

Fig. 29. Changing the spacing of the short working section

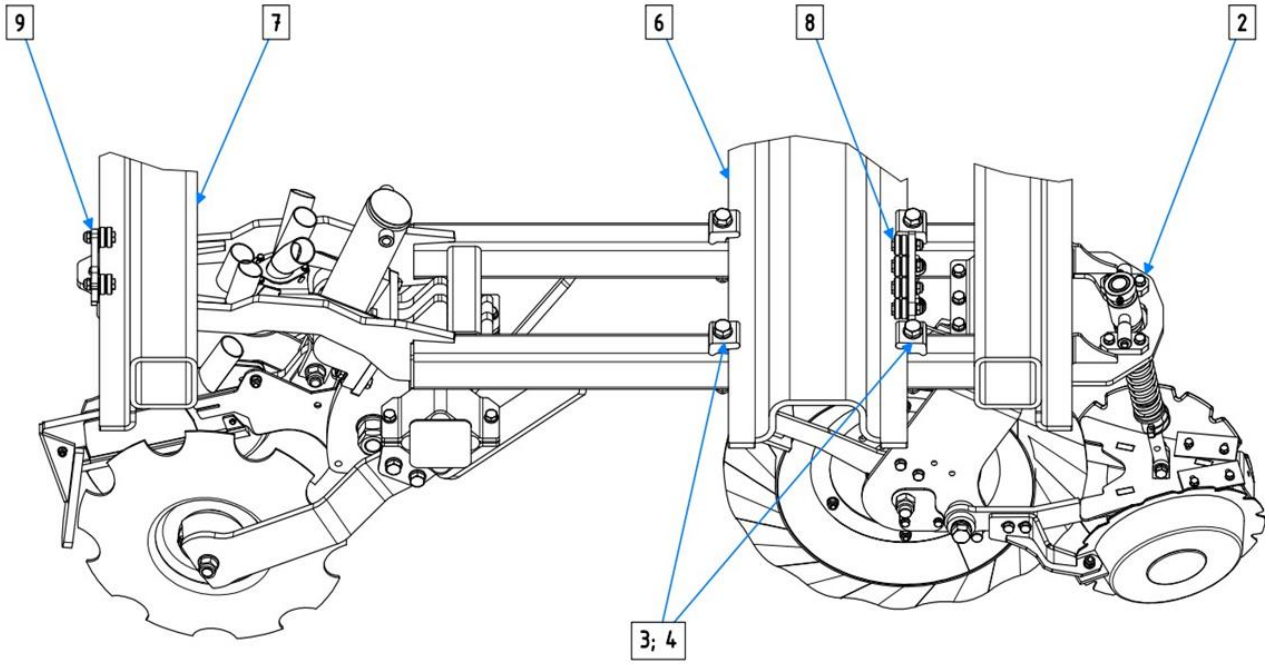

Fig. 30. Changing the spacing of the long working section

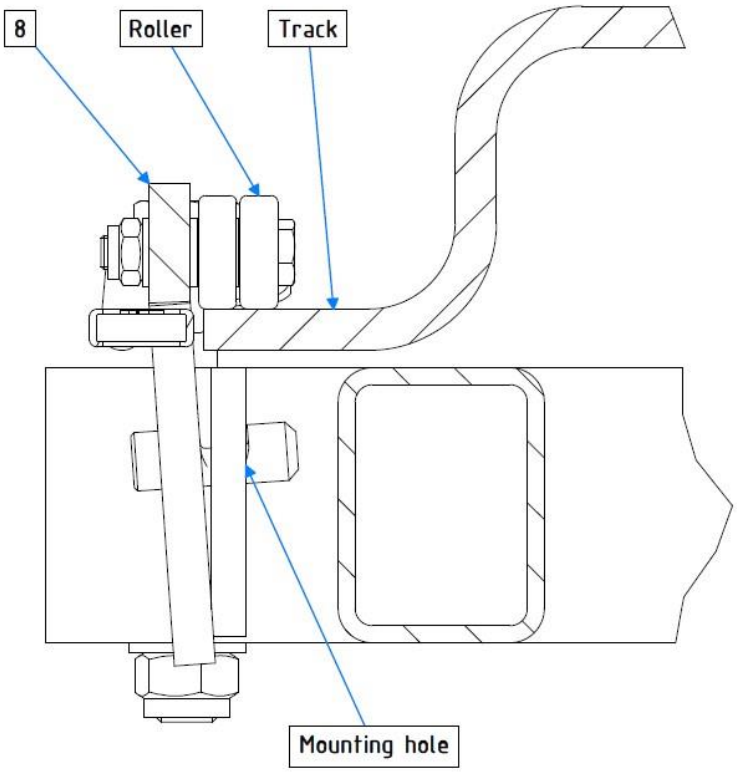

Fig. 31. Mounting the middle trolley

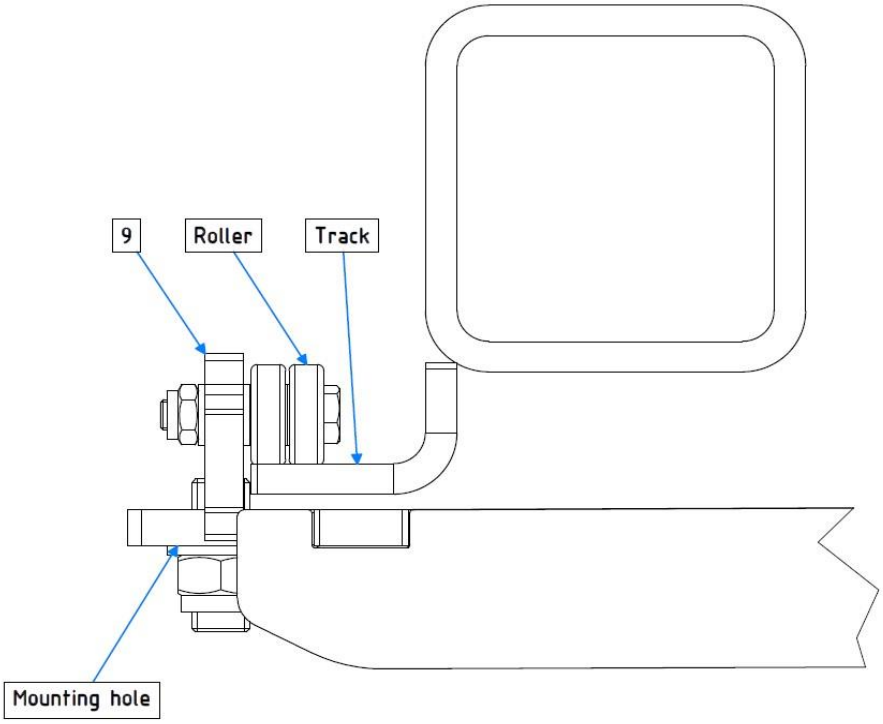

Fig. 32. Mounting the rear trolley

21. Hydraulic system

- It is a high-pressure system (around 200 bar).
- When connecting hydraulic cylinders or hydraulically driven engines pay attention to the correct connection of hydraulic cables.
- When connecting hydraulic cables to the machine to the hydraulic system of the tractor make sure that the cables are depressurized.
- It's important to pay attention to the correct connection of the machine to the hydraulic system of the tractor. Incorrect connecting may result in unexpected actions (e.g. lowering instead of lifting, damage to the hydraulic motors of the blower and the multiplier).
- Hydraulic cables must be controlled periodically; they must be replaced when damaged.
- In case of a leak, you need to take all safety precautions to avoid injuries to the body.
- Hydraulic oil escaping under high pressure upon contact with the skin may cause serious injuries. In this situation you must contact a doctor immediately due to infection risk.
- Before repairing the hydraulic system you must lower the machine, depressurize the system and remove the key.
- Hydraulic cables must be replaced every 6 years.
- Used oil must be collected and delivered to designated places for disposal.
- You must control the oil level in the system.

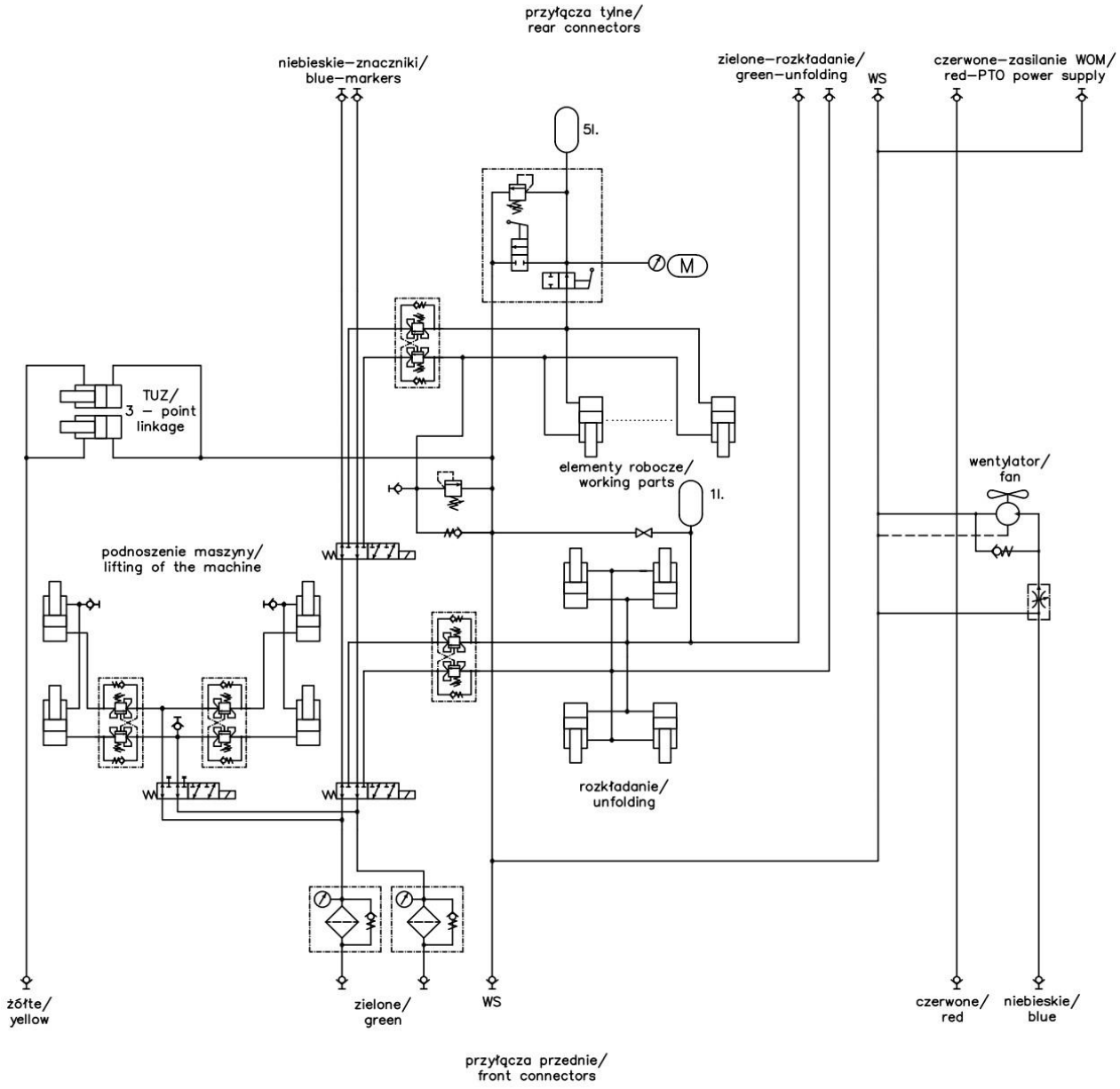

Fig. 33. Hydraulic system of STK 400.

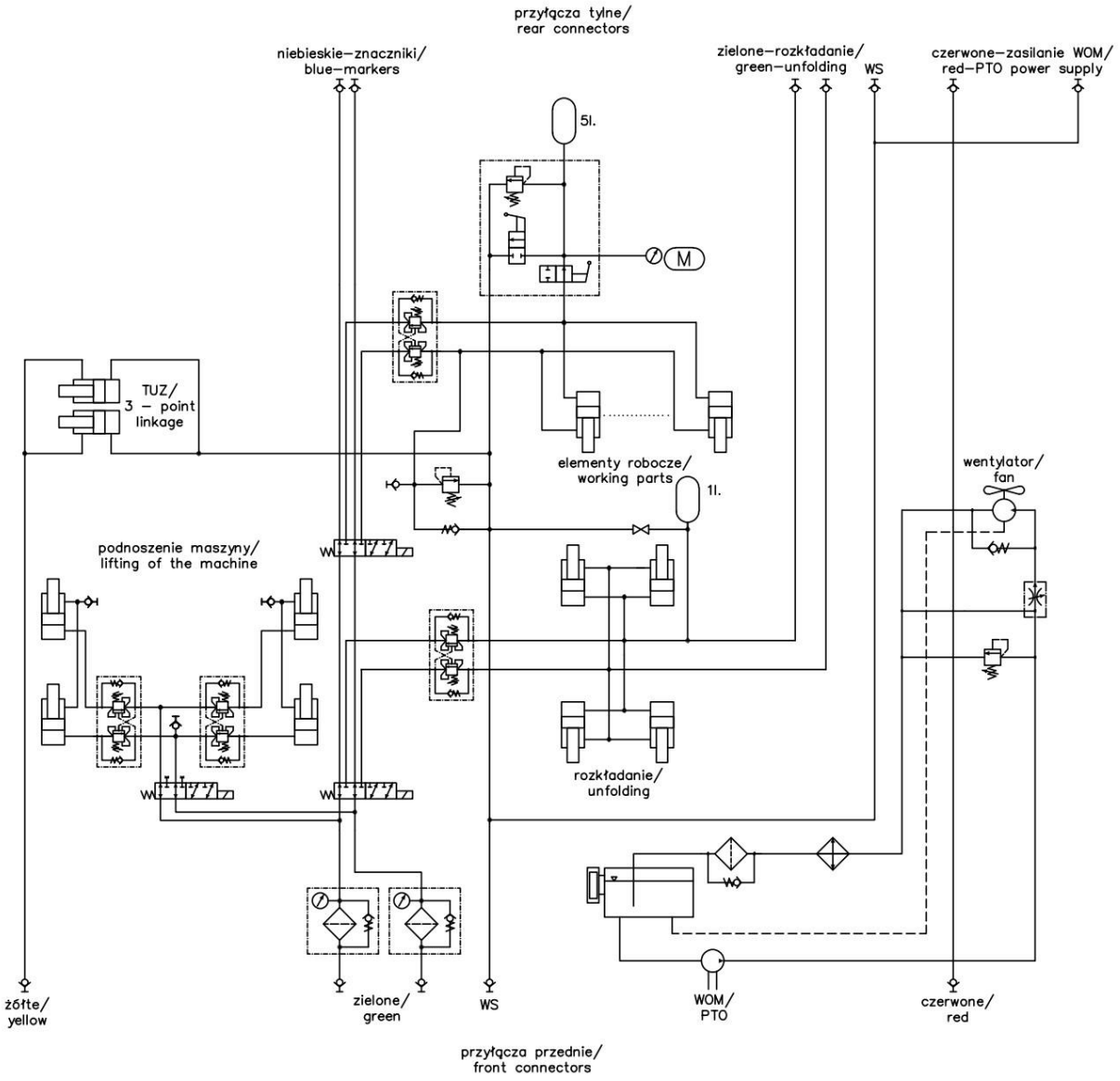

Fig. 34. Hydraulic system of STK 400 with external hydraulic system.

Front connectors (to the tractor):
Red – air vent and PTO power supply (or the seeder air vent),,
Yellow – 3-point linkage and working parts
WS – free flow
Green – lifting the machine and folding side frames (only STK 400)

Rear connectors (to the seeder):
Red – air vent or PTO
Blue – markers
WS – free flow
Green – unfolding of the machine (only STK 400)

22. Brake system

The cultivation unit STK is equipped with pneumatic brakes. While driving on roads, the brake system must be connected and operational at all times. Before transportation, you must check the condition of the brake system. Before moving, you must remember about releasing the parking brake. Before detaching, you must secure the machine against rolling. All repairs and adjustments of the brake system can be performed only by specialists or employees specially trained for that purpose by Czajkowski Maszyny Sp. z o.o.

Brake diagram

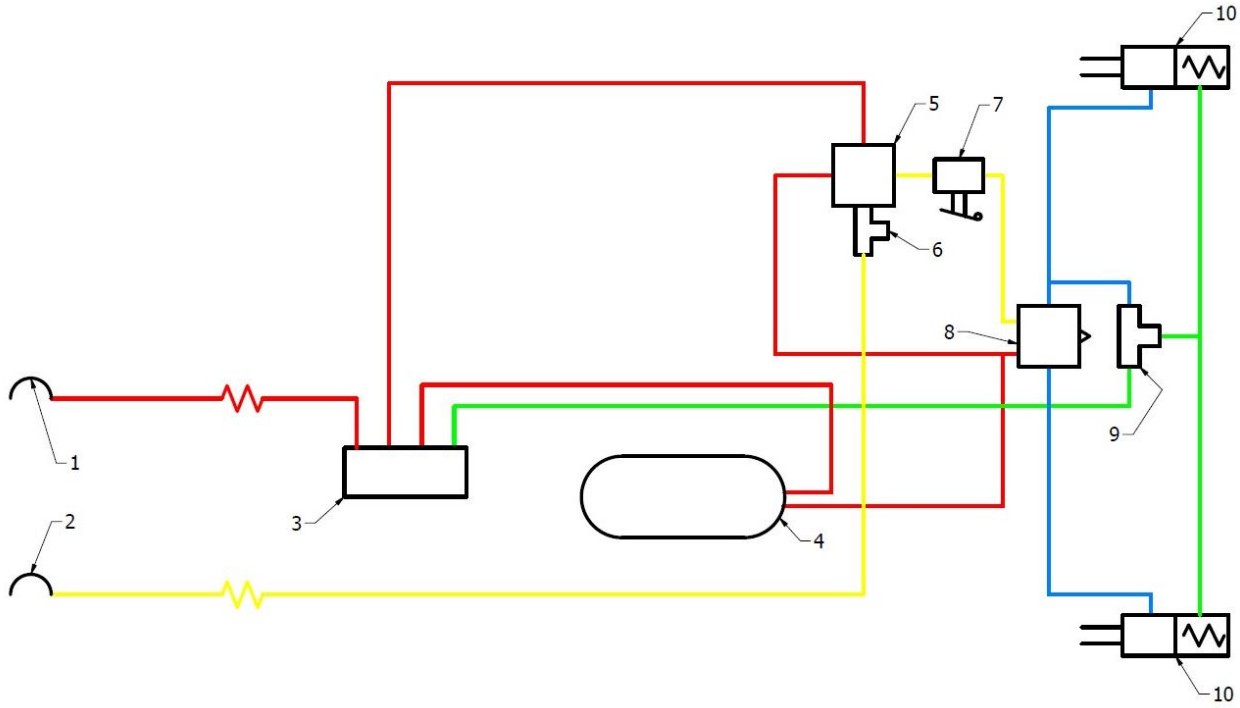

Fig. 35. Brake diagram.

1	Red coupling head
2	Yellow coupling head
3	Park and shunt valve
4	Air reservoir
5	Main valve
6	Test point connector
7	Load sensing valve
8	Relay valve
9	Double check valve
10	Spring brake actuator

Parking brake

The Czajkowski STK unit is equipped with a parking brake. It is used for immobilizing the machine while its stopped and preventing the machine from rolling and moving.

Fig. 36. Parking brake.

Park valve – use the red button to park.
The park valve activates the parking brake of the trailer vehicle by aerating and venting the spring brake. Press the red actuation button to release the park brake. Whether uncoupled or coupled – the red actuation button must be pulled out to correctly park the trailer via the spring brake and ensure the parking brake is not unintentionally triggered.

Release valve – black button to shunt
The release valve – also called shunt valve – allows an automatically braked, decoupled trailer to be moved. If the black actuation button is pushed in, the trailer brake releases.

MACHINE DECOUPLED FROM THE TRACTOR				
Button color	Button position	Button color	Button position	Brakes
Black	Pressed in	Red	Pressed in	Released
Black	Pulled out	Red	Pressed in	Braked
Black	Pressed in	Red	Pulled out	Braked
Black	Pulled out	Red	Pulled out	Braked
MACHINE COUPLED TO THE TRACTOR				
Button color	Button position	Button color	Button position	Brakes
Black	Pulled out	Red	Pressed in	Released
Black	Pulled out	Red	Pulled out	Braked

23. Lightning

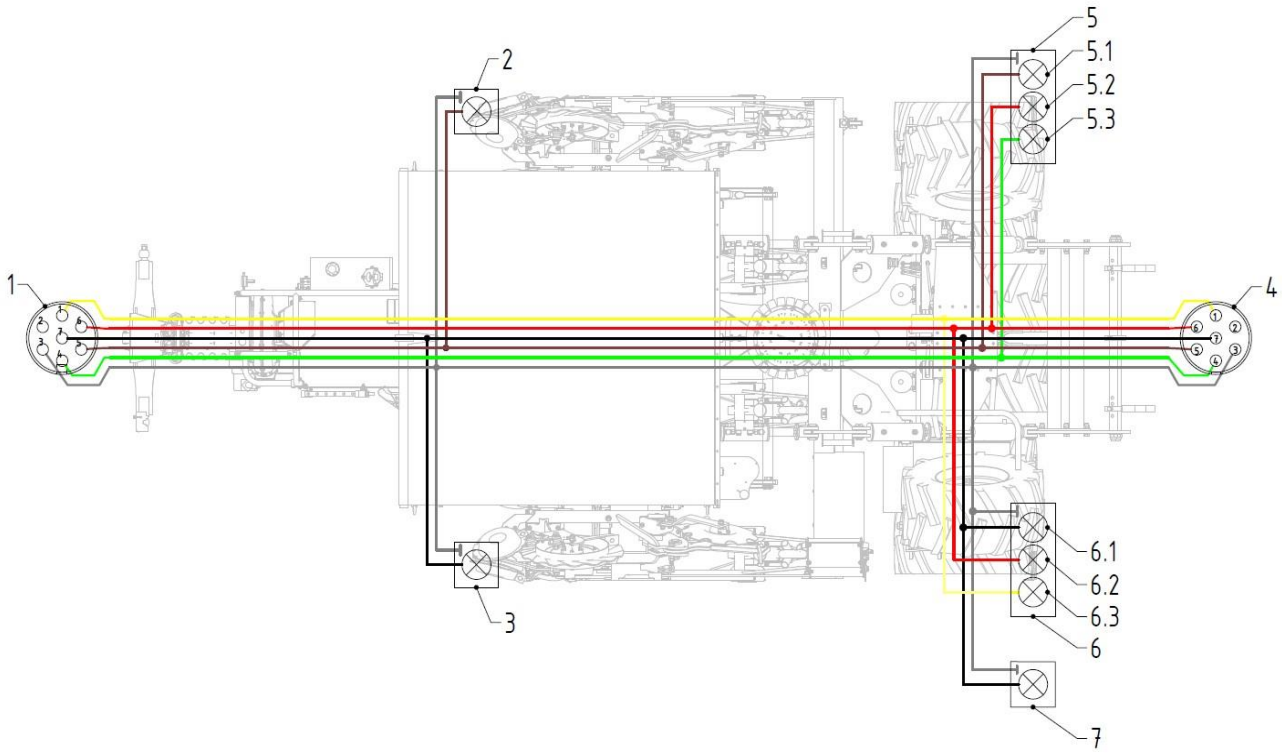

Fig. 37. Lightning system of STK

Lightning installation
1. 7-PIN male connector
2. Right front lamp
3. Left front lamp
4. 7-PIN female connector
5. Right rear lamp 5.1. Right tail light 5.2. Stop 5.3. Right indicator
6. Lampa lewa tylna 6.1. Left tail light 6.2. Stop 6.3. Left indicator
7. License plate lamp

Connectors and wires markings			
No	Symbol	Color	Function
1.	L	Yellow	Left indicator
2.	-	-	-
3.	31	White/Grey	Ground
4.	R	Green	Right indicator
5.	58R	Brown	Right tail light
6.	54	Red	Stop
7.	58L	Black	Left tail light

ATTENTION ⚠ Only persons with electrical qualifications can perform repairs of the electrical or lightning system!
Damaged lighting can cause an accident!
Regularly check that the lights are working properly, that they are clean, and that the marker boards are clean.

24. Function-describing pictograms

N017 – Working pressure of hydraulic protection

25. Handling of the machine

25.1. Preparation of the machine

Before starting work, you need to check the technical condition of the machine, especially the working parts. Worn parts must be replaced with new ones.
Furthermore:

- Check screws and pins of the three-point linkage, working sections; tighten the loosened connections, secure the pins.
- Check folding, unfolding, lifting and lowering operations of the machine.
- Check the condition of hydraulic and pneumatic hoses of the machine, look for damage, spills and pressure drops. Replace damaged wires with new ones.
- Check whether quick release couplings of hydraulic hoses fit into the hydraulic sockets, adjust if necessary (in particular the free flow)
- Check the cord (extension cord) between the tractor and the precision seeder.
- Check the spacing between working sections. Adjust it if it is not suitable for the planned seeding.
- Set the section of the hydraulic distributor in the tractor used to operate the Seed Attachment in the open position - free flow.

25.2. Maintenance

The machine must be cleaned in the following way:

- before cleaning the machine attached to the tractor, always place it on a support foot,
- empty the tank and seeders,
- unfold and lower the machine,
- clean the distributor heads,
- clean the machine with water or a pressure washer,
- don’t direct the water stream onto the fan, electrical system, lamps, diodes, solenoid valves, electrical and electronic boxes, machine controller, transmitter, electrical sensors, various types of warning stickers, logo and wrapping.

25.3. Maintenance and adjustment of the distributor head

Cleaning must be performed in the following way:

- pull the parking brake of the tractor, turn off the engine and remove the key from the ignition,
- unscrew the wing nuts and remove the cover of the distributor head,
- remove deposits and dirt first with a brush and then compressed air,
- fix the cover of the head and close the wing nuts.

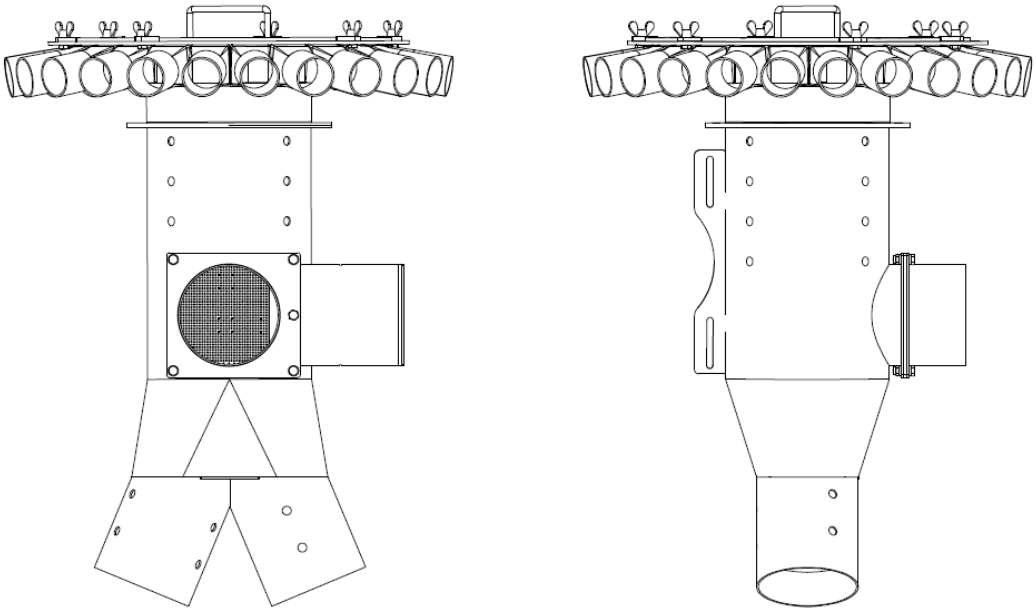

Fig. 38. Head of the seed distributor

25.4. Maintenance of the hydraulic system

Only trained personnel can perform maintenance of the hydraulic system. Read and follow the content of the following chapter – „safety regulations.” Before each start of the machine, you must:

- visually check the tightness of the whole hydraulic system,
- check hydraulic cables for visible hose damage (abrasions, cracks, thickenings, breaks, bends),
- check screws and nuts,
- check the condition of joints and hydraulic cylinders.

Hydraulic hoses must be replaced every 6 years at the latest.

25.5. Using the air blower

The hydraulic air blower is powered directly by the hydraulic system of the tractor. Air stream from the blower moves the seeds of the seeder through the distributor head to the coulters. The amount of air required for proper seeding depends on the weight and type of seeds, sowing speed and working width, therefore setting the correct rotational speed must be specified during field trials. Air stream must be specified as accurately as possible, if it's too low the seeds can deposit in the hoses and that may result in clogging. Speed, which is too low, may also result in incorrect distribution of seeds. That's why it's recommended to set the highest rotational speed of the air blower. Seeds must be placed correctly at each section just after the sowing starts. When sowing on large fields, it's recommended to check the correctness of the sowing process. Pay special attention to eliminating contamination of the protective net and blades of the air blower, because such contamination may lead to air losses, blocking of hoses, imbalance of rotating parts, which may lead to damage of the bearing. Rotational speed of the air blower is controlled by the amount of oil (see figure below). The hydraulic pump must deliver enough oil so that the rotational speed of the blower is not too low even after the rotational speed of the tractor decreases, or if another function of the hydraulic system is turned on.

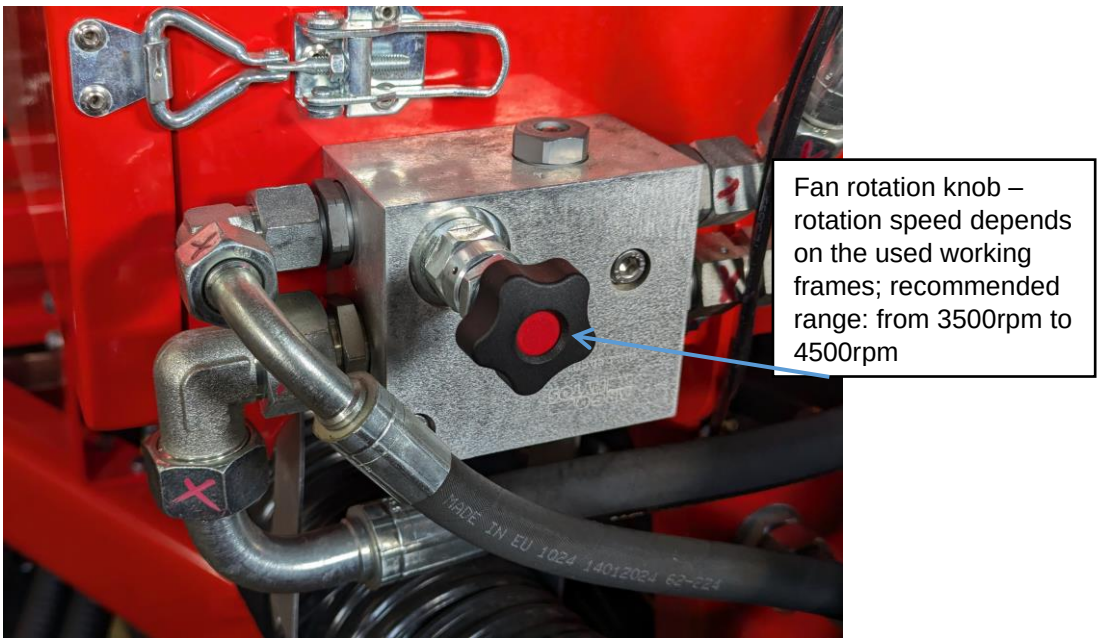

Fig. 39. Knobs for adjusting fan and PTO rotational speed of the attached equipment.

Airstream can be adjusted using the air stream regulator. To change the direction of the air stream, use the lever to move the cover to the proper hole on the adjustment plate.. Setting the lever in 0 position is neutral. Neutral position divides the airstream equally for each hole. After moving the lever in direction I, more air will flow through pipe I. After moving the lever in direction II more air will flow though pipe II. The position of the adjustment lever indicates the direction of the increased air flow.

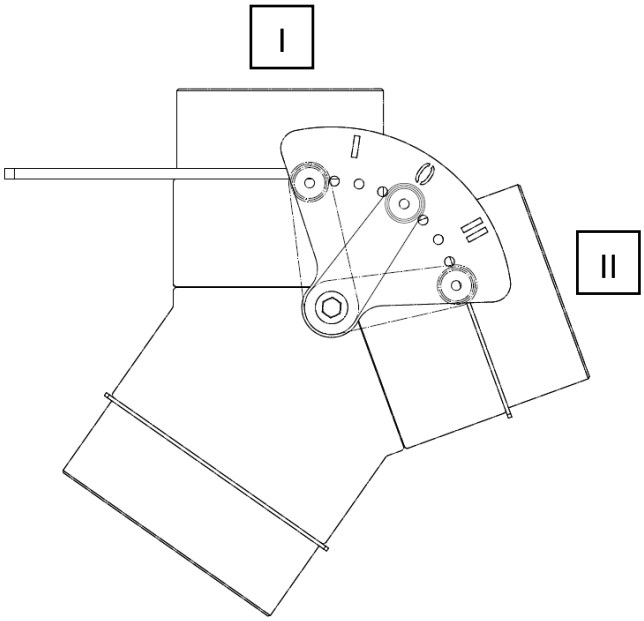

Fig. 40. Airstream controller.

25.6. Changing the number of rows

All the hoses can be connected at the same time. If you are using only half of the frames (75 cm spacing for 4 frames of STK 300), there are two hoses for one distributor in the frame. In the case of other frame spacing configurations, hoses must be connected to distributors separately.

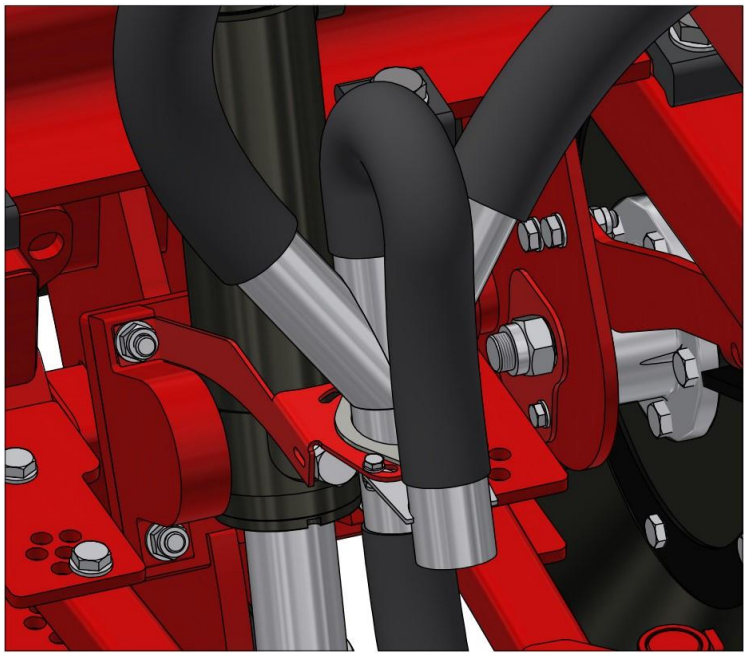

Fig. 41. Connecting the fertilizer hoses to the distributor of the working section

25.7. Connecting the hydraulic hoses to the tractor

ATTENTION ⚠ To ensure that the machine is working correctly, you must act in accordance with the following schemes, which show the correctly connected hydraulic hoses!

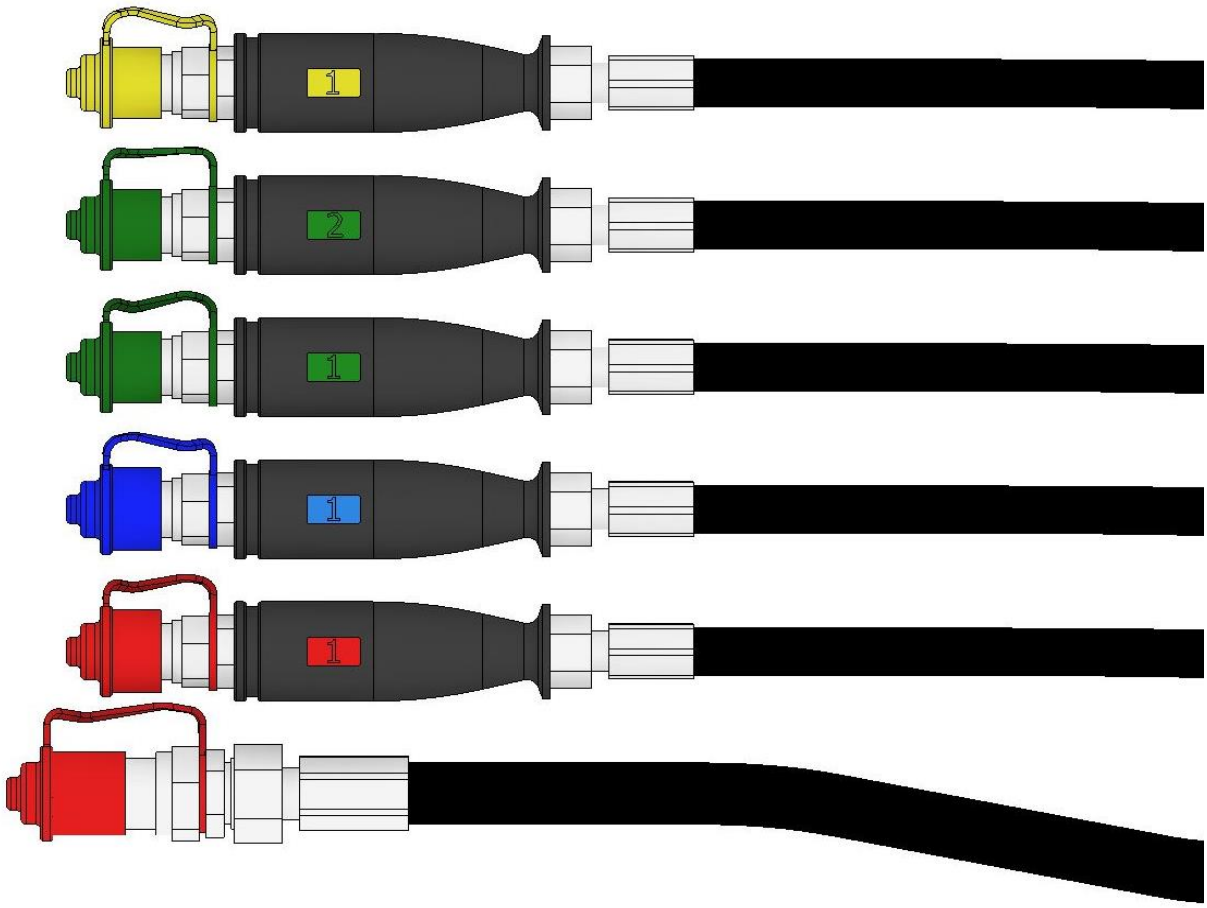

Fig. 42. Hoses connections to the tractor

Colours of hydraulic hoses connected to the tractor

- Yellow – Rear 3-point linkage
- Green (1 & 2) – Hydraulic bank power supply (lifting the machine and folding side frames and working parts)
- Blue – Front fan
- Red – Rear fan
- Red (without plastic handle) – Free flow (overflow)

When using an external hydraulic system, the blue hydraulic hose is not used.

25.8. Connecting the hydraulic hoses to the STK unit

Fig. 43. Hydraulic sockets of the STK unit

1. Green – unfolding of the machine (only STK 400)
2. Blue – markers
3. Red – PTO or seeder fan
4. WS (Large red socket) – free flow

25.9. Opening – closing the tarpaulin

In order to open the tank, release the cable [1] from the clamp [2] located on the face of the tank. Then, slowly let the cable [1] go and the tarpaulin [3] should fold. To close the tank, pull the cable [1], and the tarpaulin [3] should unfold. After the tarpaulin unfolds, secure the cable in the clamp [2] and roll the cable between two clamps [4].

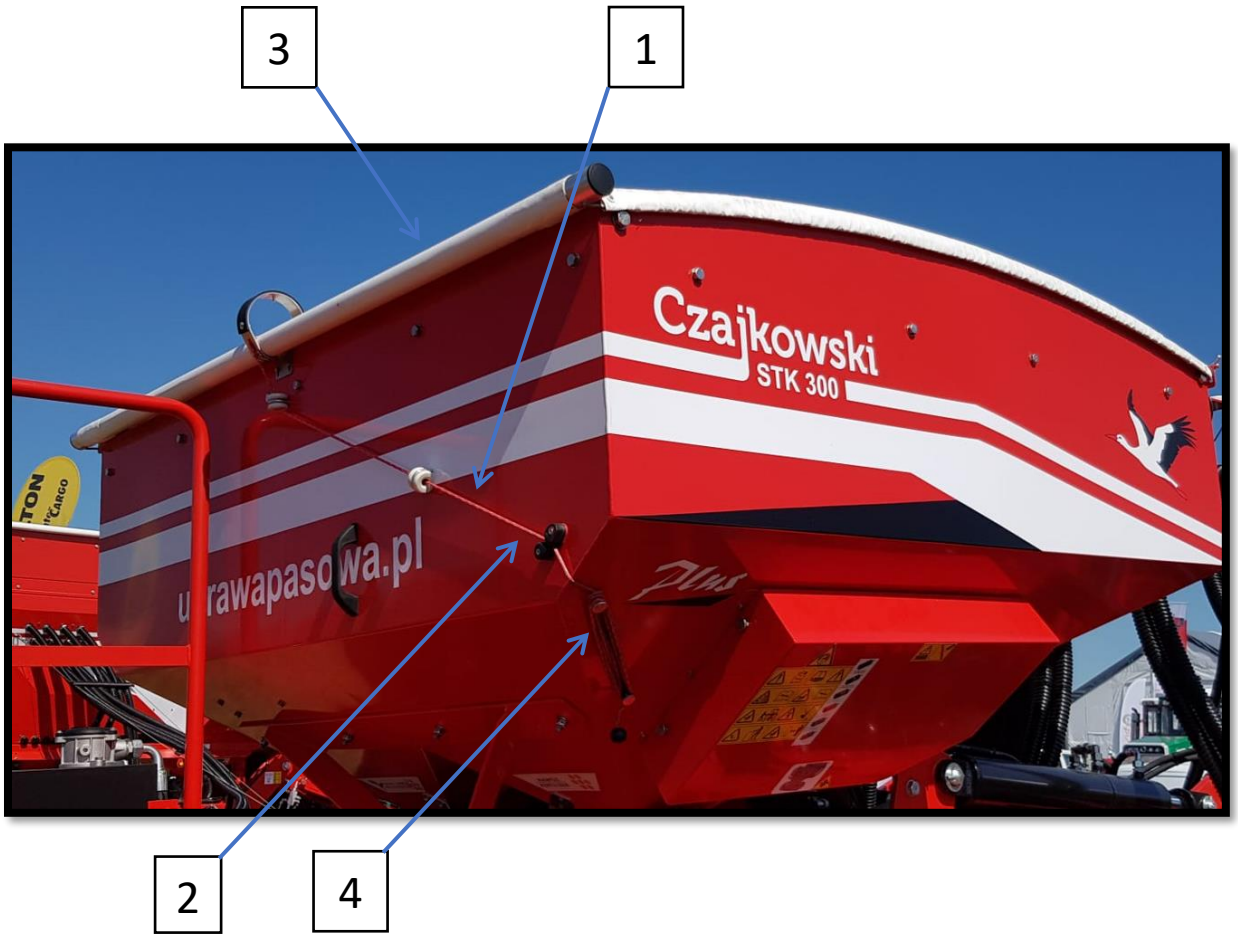

Fig. 44. Securing the tarpaulin

25.10. Setting the three-point linkage hooks

The rear three-point linkage of the unit has hooks with different spacing configurations. It allows for attaching units of linkages cat. 1, 2 and 3. To change spacing of the hooks loosen the nuts and counter screws. Then move the hooks to the desired width and lock them with the screw. The hooks must be set symmetrically to ensure correct functioning of the unit.

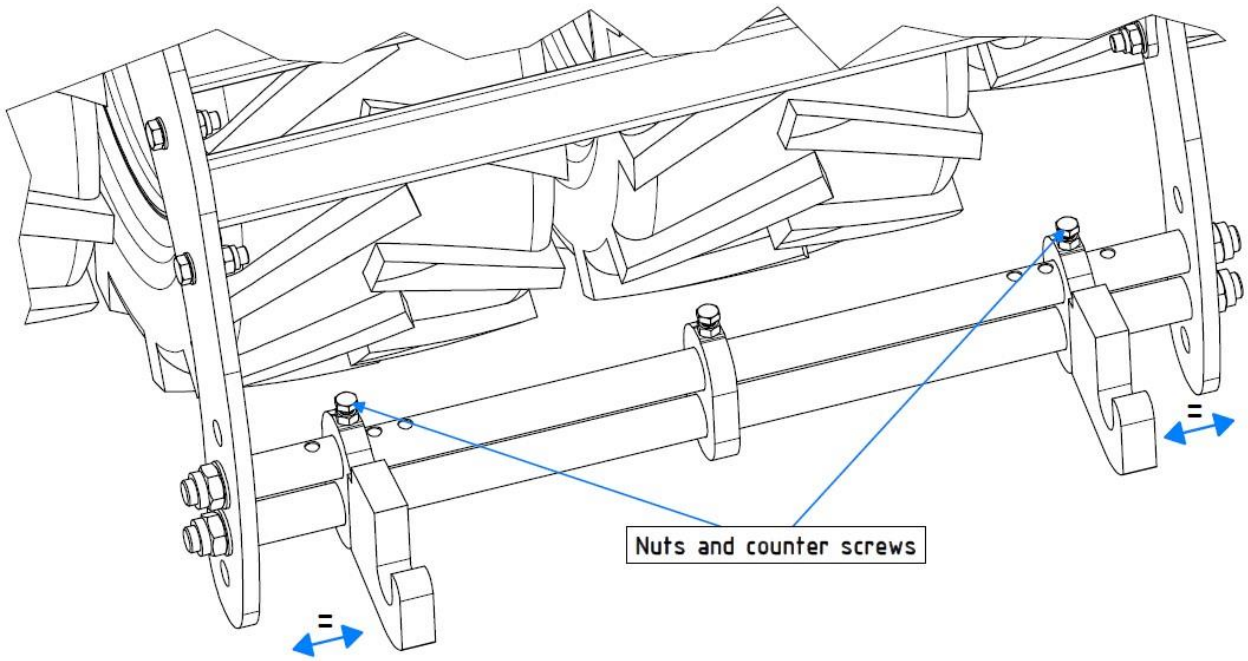

Fig. 45. Setting the linkage hooks

25.11. Folding – unfolding of coulter beams

To unfold or fold coulter beams (furrow openings) set lever no. 1 to the bottom position, lever no. 2 to the open position. Lever no. 3 (next to the fan) has to be set to the bottom position. After that you can fold and unfold the coulter beam.

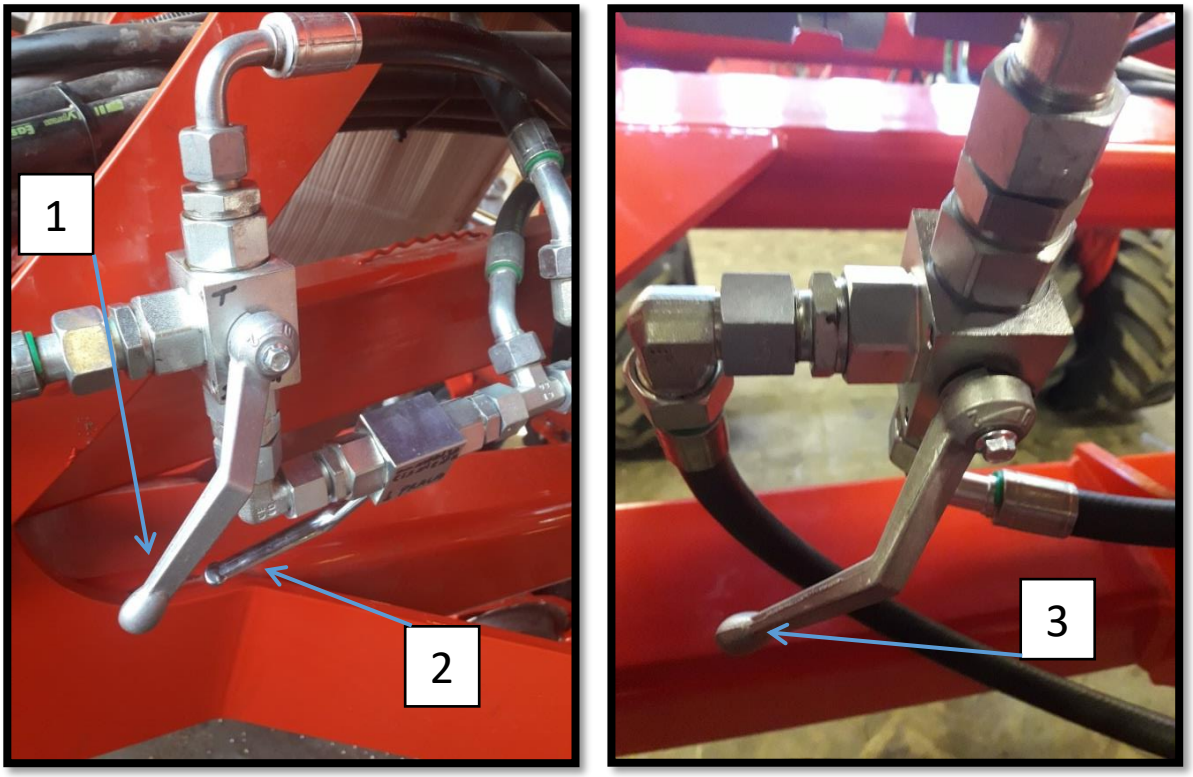

Fig. 46. Operating the coulter beams.

Increase pressure after unfolding the coulter beams. Hold the unfolding lever and observe the manometer. After the accumulator reaches the intended pressure (optimal pressure: 100 - 120 bar) move the levers in the following way. Lever no. 2 to the closed position, lever 3 to the top position.

Such a system is present in the basic version of the machine without a valve block

25.12. Operating the three-point linkage

To operate the rear three-point linkage move lever no. 1 to the top position. Don't exceed the allowable load of the three-point linkage (see table 1). The lever must remain in this position while the machine is working or is being transported.

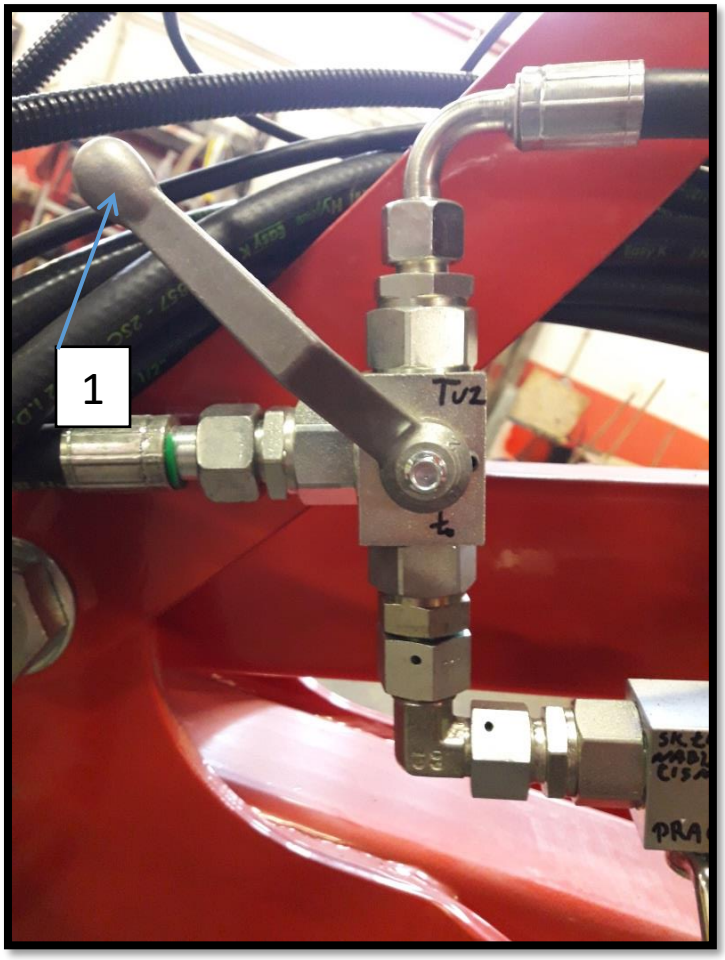

Fig. 47. Operating the 3-point linkage.

(Such a system is present in the basic version of the machine without a valve block).

25.13. Emergency mode for electronic controls

If machine electronics fail, the machine individual elements can be folded and unfolded in emergency mode. To start the emergency operation mode, screw the knob all the way into one of the three places that control the given components:

1. folding and unfolding of working elements,
2. folding, unfolding side frames,
3. lifting, lowering the main frame,

Mechanically activated coil in the valve bank will enable free flow of oil.
As standard, the knob is partially screwed into coil no.2. This knob is adapted to all three coils, so we can also control coils number 1 and 3 by removing the plastic covers.

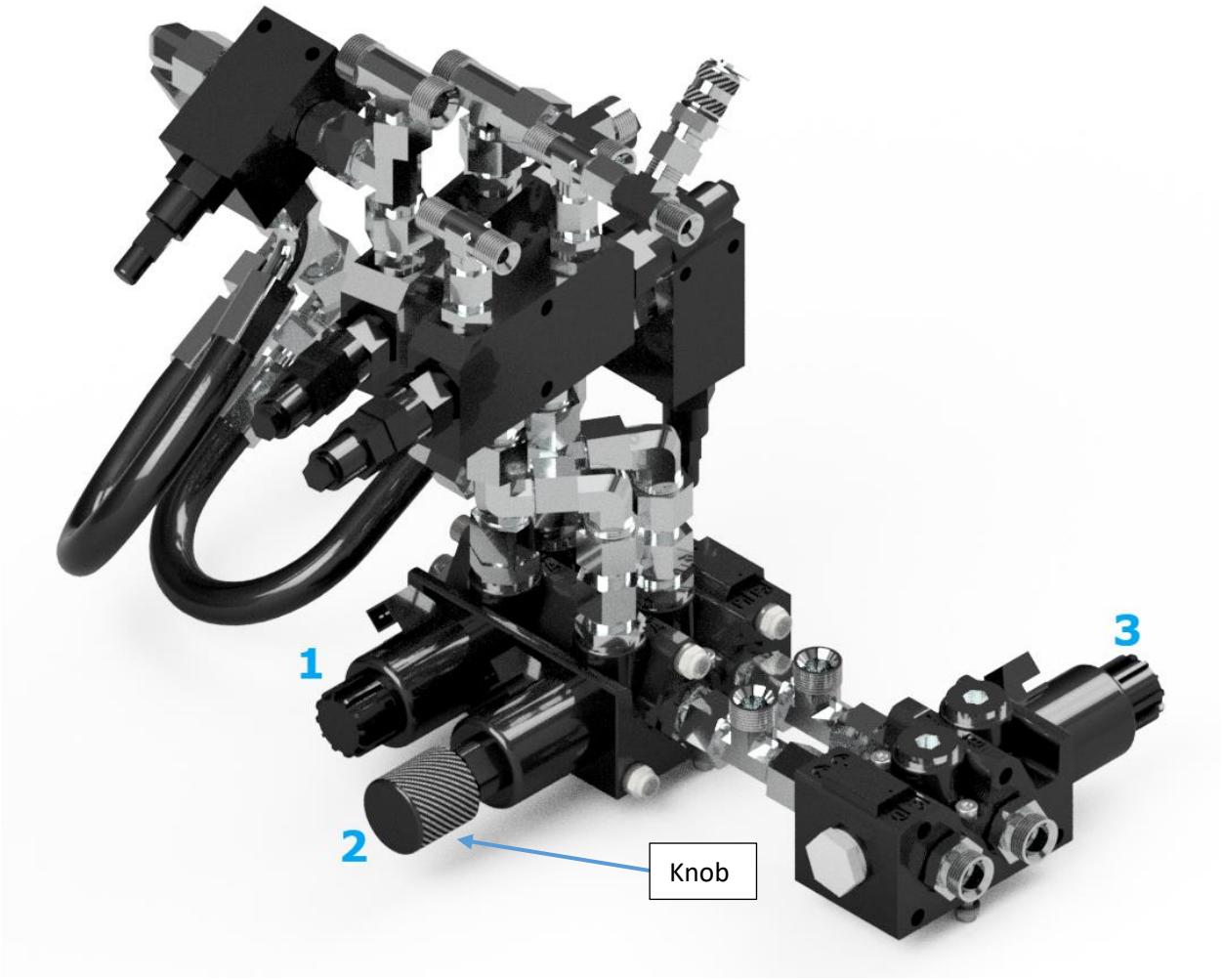

Fig. 48. Hydraulic bank

ATTENTION ⚠ Secure the system by closing the oil flow when transporting the folded machine in emergency mode.

25.14. External hydraulic system

Optionally, STK can be equipped with an external hydraulic system. This system drives the fan and PTO of a machine attached to the STK. The main parts of the external hydraulic system include:

1. 50l oil tank.
2. Oil pump fixed to the PTO of the tractor.
3. Hydraulic oil cooler.
4. Hydraulic oil filter.

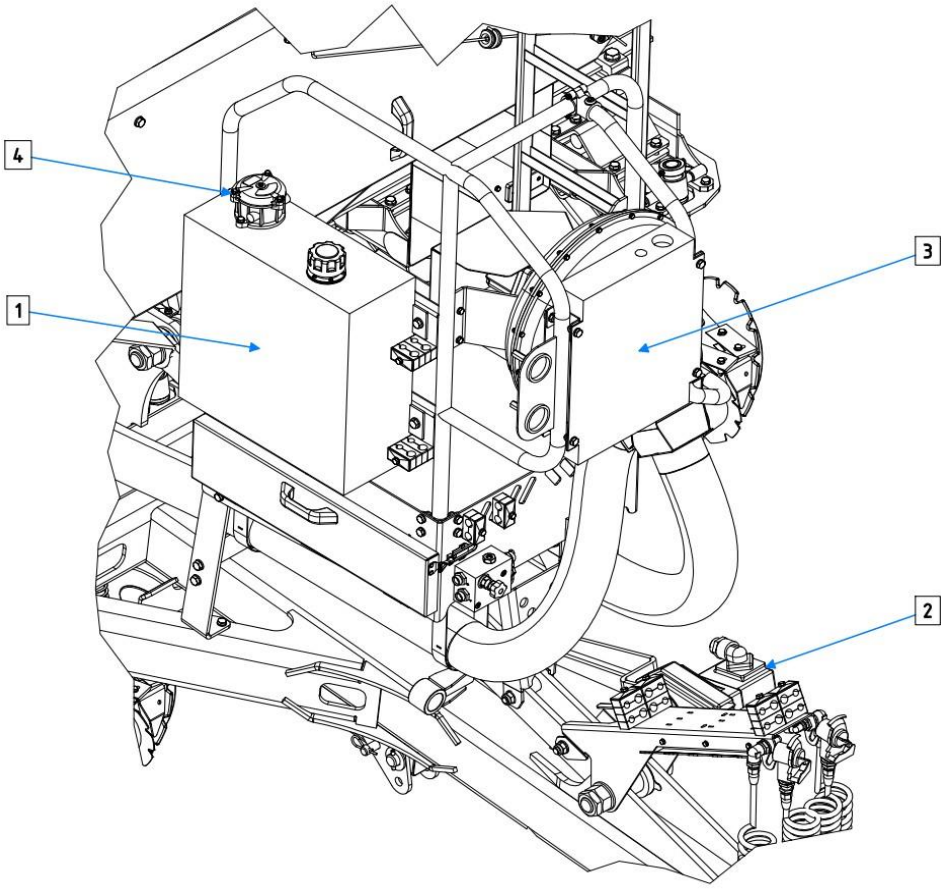

Fig. 49. External hydraulic system

The oil pump must be secured against rotating after its fixed to the PTO of the tractor. Free rotation may damage it.

The hydraulic oil filter must be replaced at least once a year.

You must control the tank filling level, which shouldn't exceed the middle value on the meter. Maximum working temperature shouldn’t exceed 80 degrees C.

It’s recommended to use 540 rpm for the PTO shaft to operate only the STK fan. If the PTO is also driving the machine attached to the rear three-point linkage of the STK unit, PTO rotational speed must be increased to1000 rpm.

26. Seeder device

Seeder device consists of the following parts:

1. Body,
2. Drive,
3. Shaft
4. Side cover,
5. Mixer,
6. Gears
7. Gust attachment.

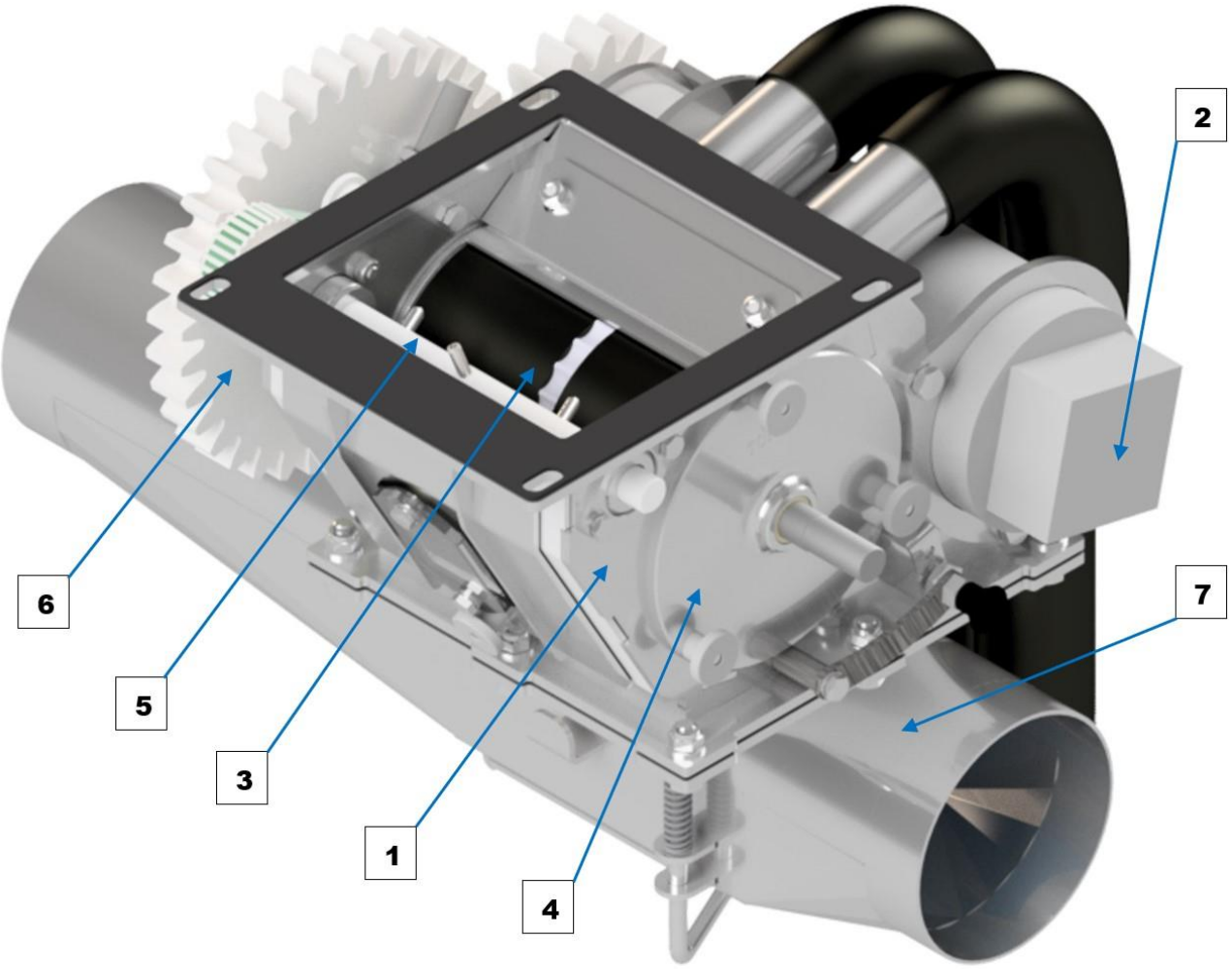

Fig. 50. Seeder device.

Parts necessary to use the seeder device can be removed without tools. The seeder device flap enables verification of the correct functioning of the seeder device and is used to empty the tank from deposited seeds. It also facilitates cleaning of the device. The mixer is used to flake the material and to ensure that the seeder device shafts are fully filled. At the top, there's a hatch that separates the seeds from the seeder device. At the bottom there's a gust attachment. The gearbox is secured with a cover, which facilitates access to gears and selection of proper ratio.

When attaching the seeder device you must tighten the adjoining edges. Lack of tightness may lead to changes in distributed dosages of seeds.

26.1. Sowing shafts

Dedicated sowing shafts have been made for the seeder device, which differ in relation to profiles of seeders. Table below shows sowing shafts marked from 1 to 7. It also shows precise values of distributed volumes. Use of several types of shafts offers a wide range of distributed doses and different sizes of sowing material. When shafts 1 and 2 are working only the sowing disc is active, the remaining elements are blocked by the limiter.

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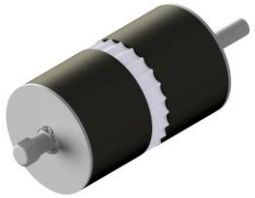
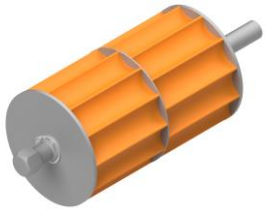
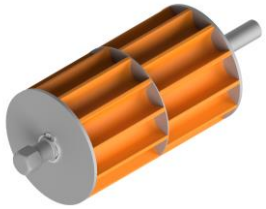
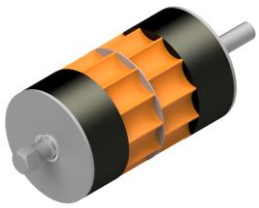
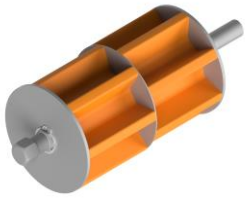
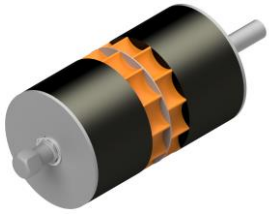
Name	Picture	
Sowing shaft 1		Rotor rapeseed - working width to 3 m
Sowing shaft 2		Rotor rapeseed - working width from 4 to 6 m
Sowing shaft 3		Rotor 100-200 kg
Sowing shaft 4		Rotor 200-280 kg
Sowing shaft 5		Rotor 50-100kg
Sowing shaft 6		Rotor 280-400 kg
Sowing shaft 7		Rotor 25-50 kg

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26.2. Replacing the sowing shaft

To replace the sowing shaft, you must close the hatch and empty the seeder. Then you must perform the following actions in appropriate order:

1. Open 3x star knobs [1],
2. Remove the side cover [2],
3. Take out the sowing shaft [3],
4. Put in a suitable shaft [3] and check the limiter settings [4],
5. Put back the side cover and tighten it [2]

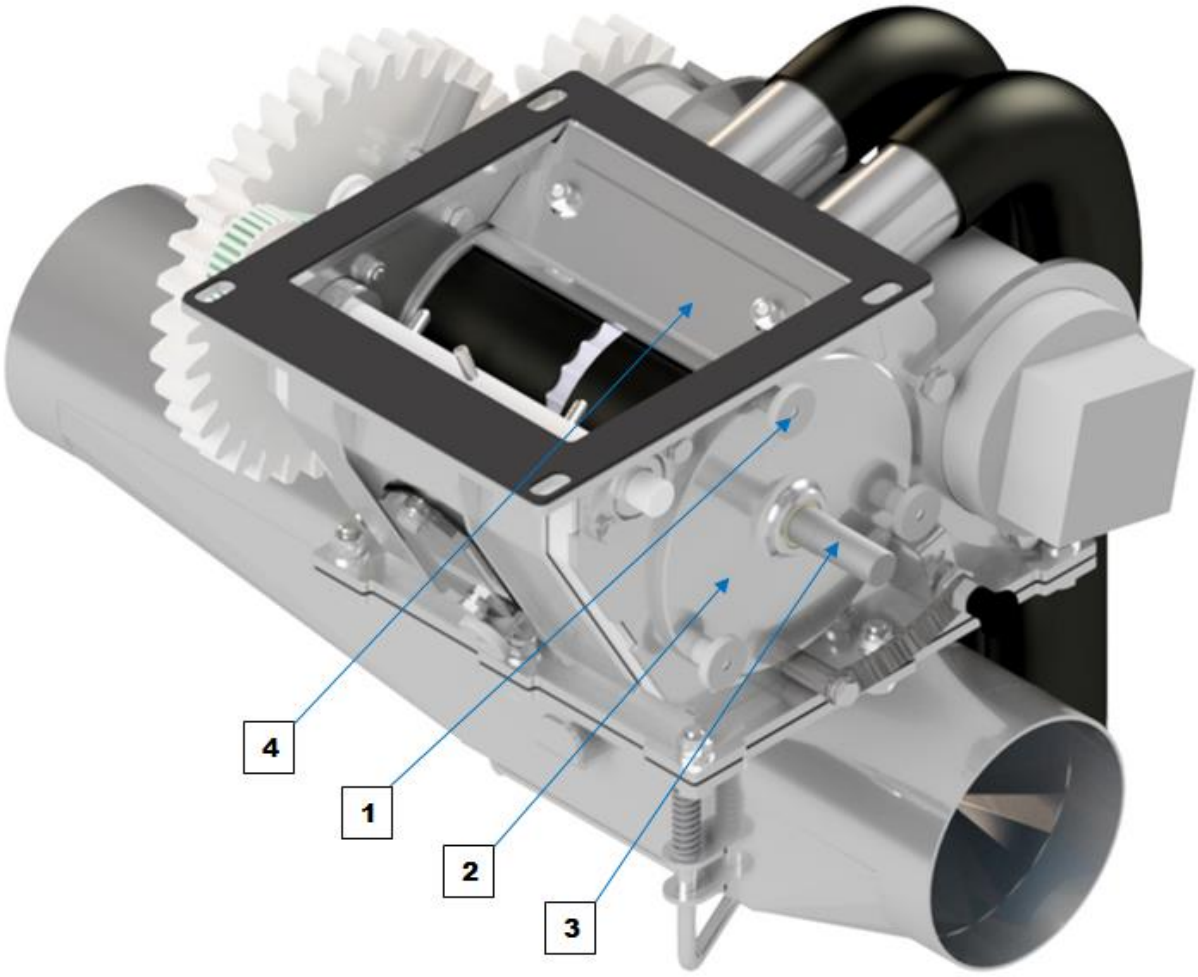

Fig. 51. Replacing the sowing shaft.

You must check the position of the limiter [4] and the guide seal [5] each time after replacing the sowing shaft [3].

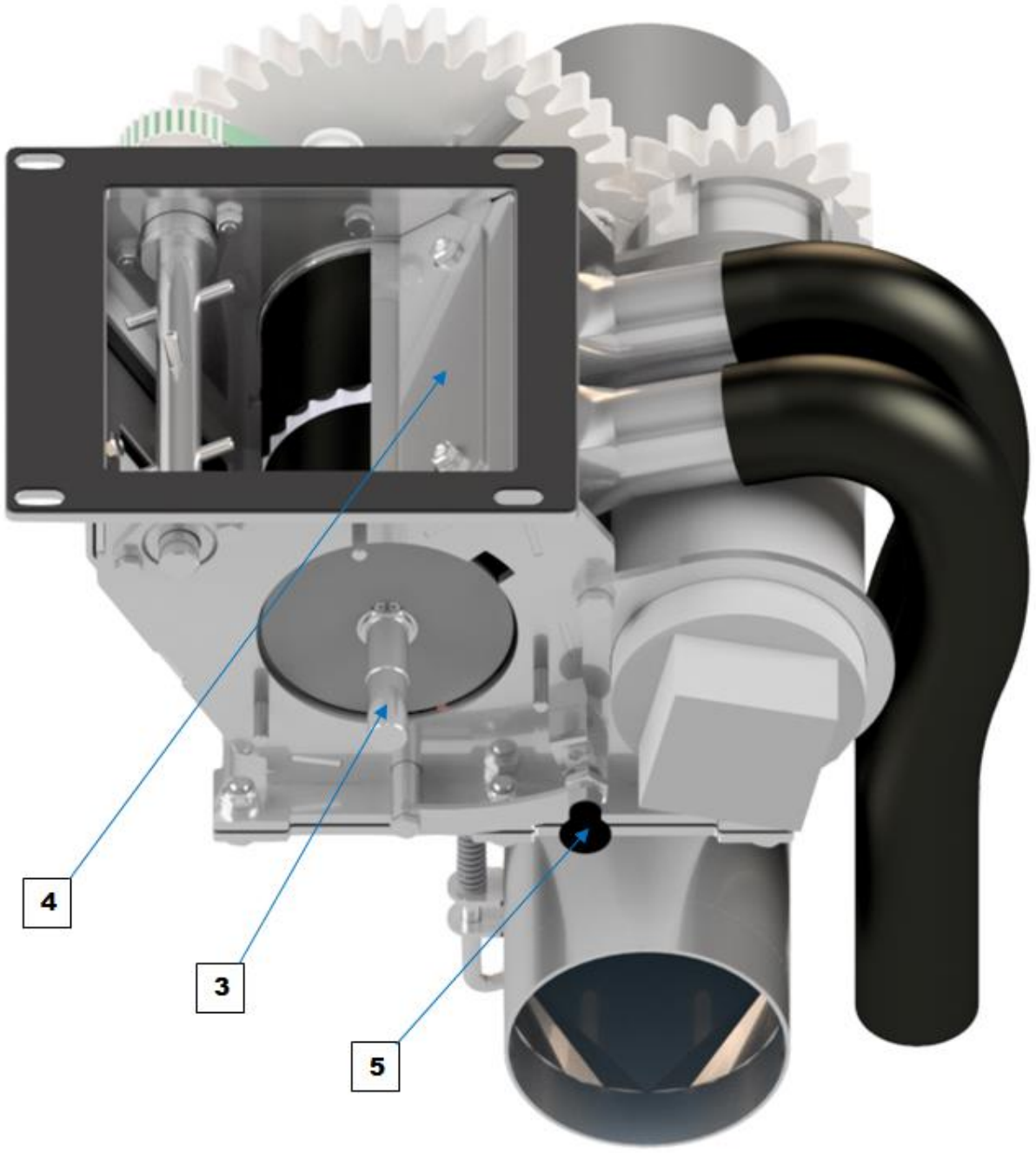

Fig. 52. Placement of the sowing shaft.

26.3. Gears

The seeder has a set of gears to drive the sowing shafts. The available gears have the ratio of 1:2 and 1:1. Gears can be installed interchangeably, the device must be checked for correct functioning after gears are replaced.

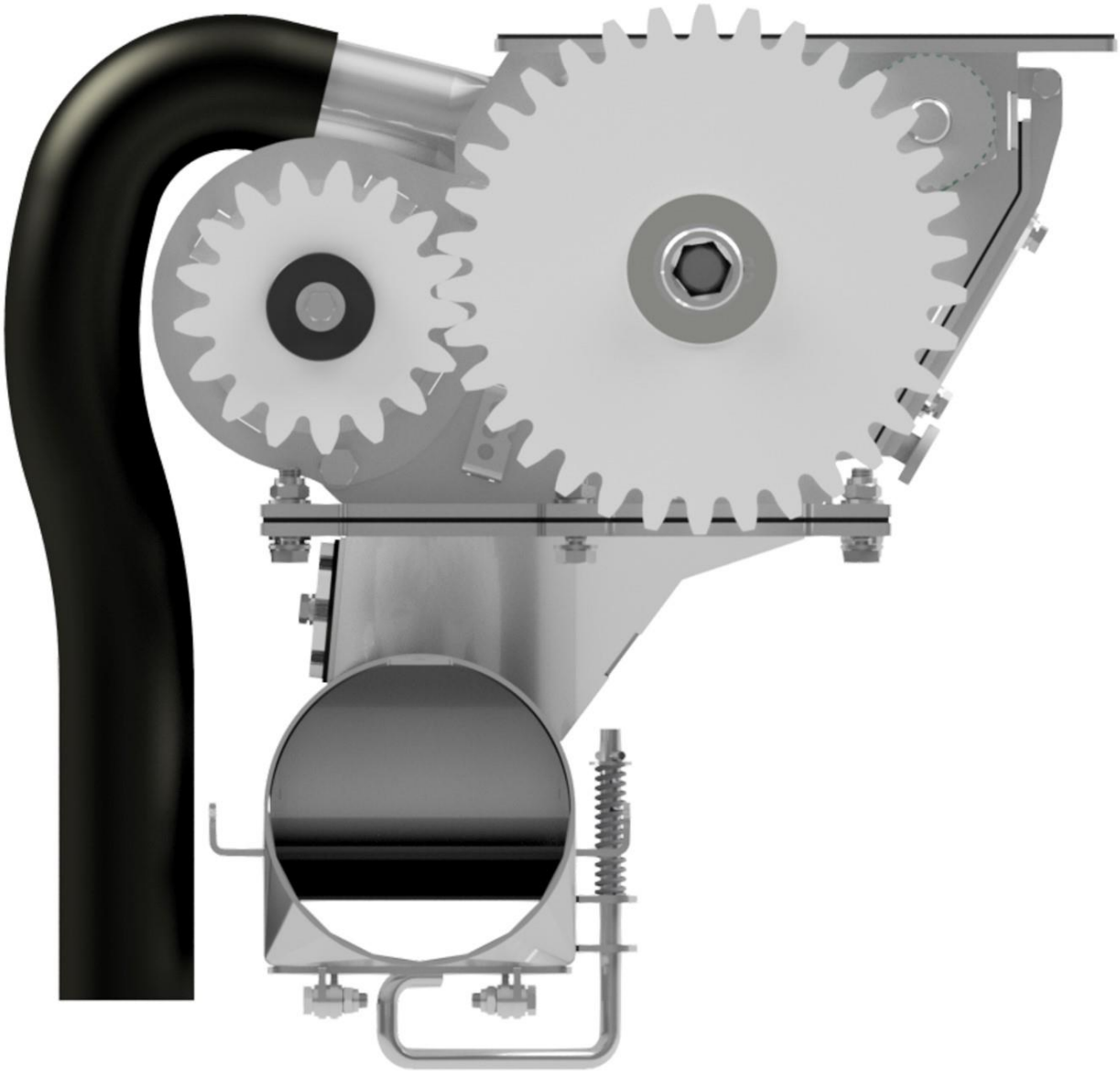

Fig. 53. Gears of the seeder.

26.4. Gear wheels cover of the seeder device

The seeder device is equipped with a gear wheel cover. The cover, for safety reasons, must always be present on the device. After each removal of the cover, e.g. during maintenance, remember to mount the cover back on.

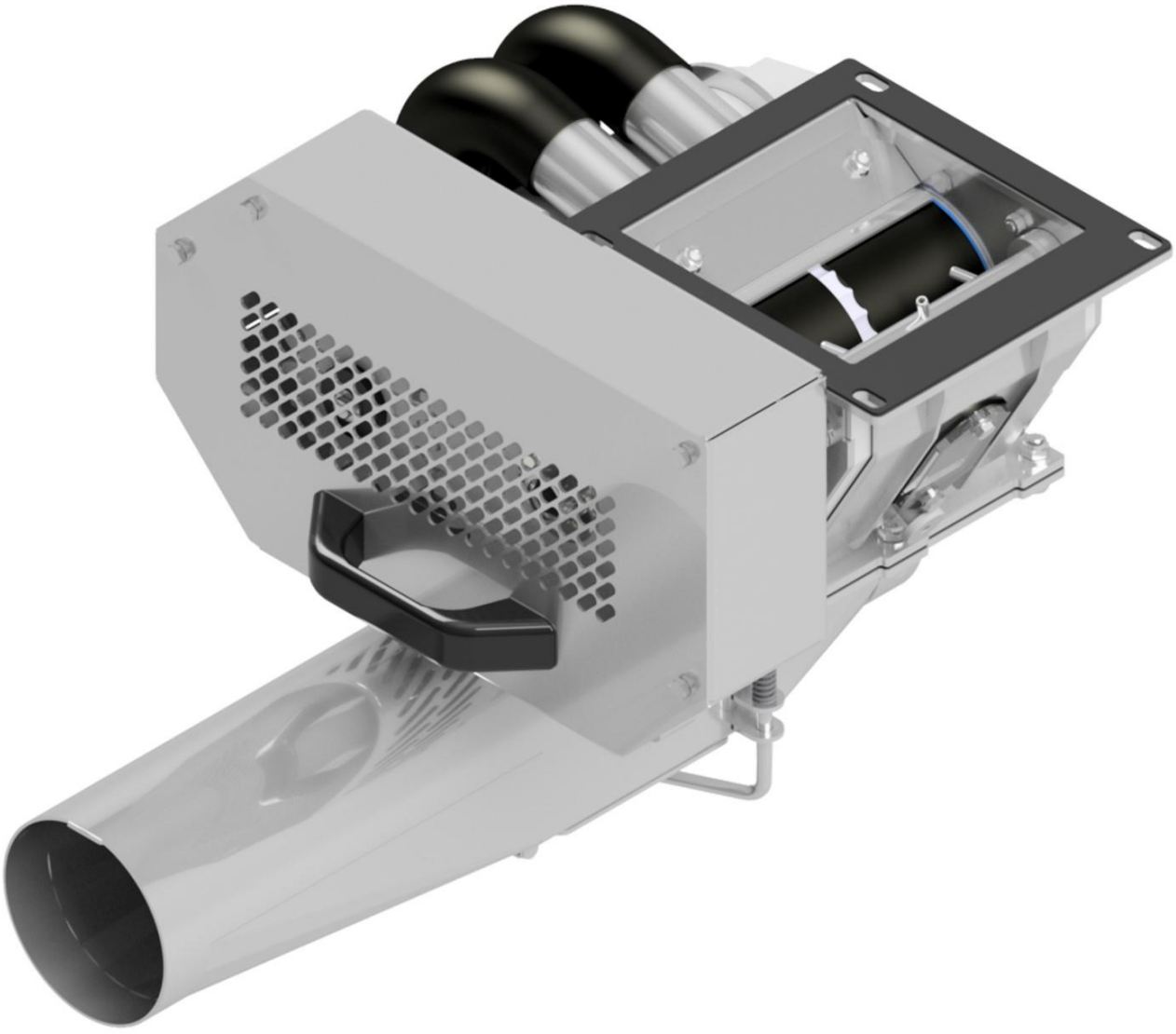

Fig. 54. Gear wheels cover

26.5. Adjusting the scraper

The Scraper [5] adhering to the sowing shaft can be adjusted in 3 positions. Check its position and condition before using the device, damage may lead to imprecise sowing. If sowing tiny seeds, the scraper must be in the highest position, and for bigger seeds it must be in the lowest position.

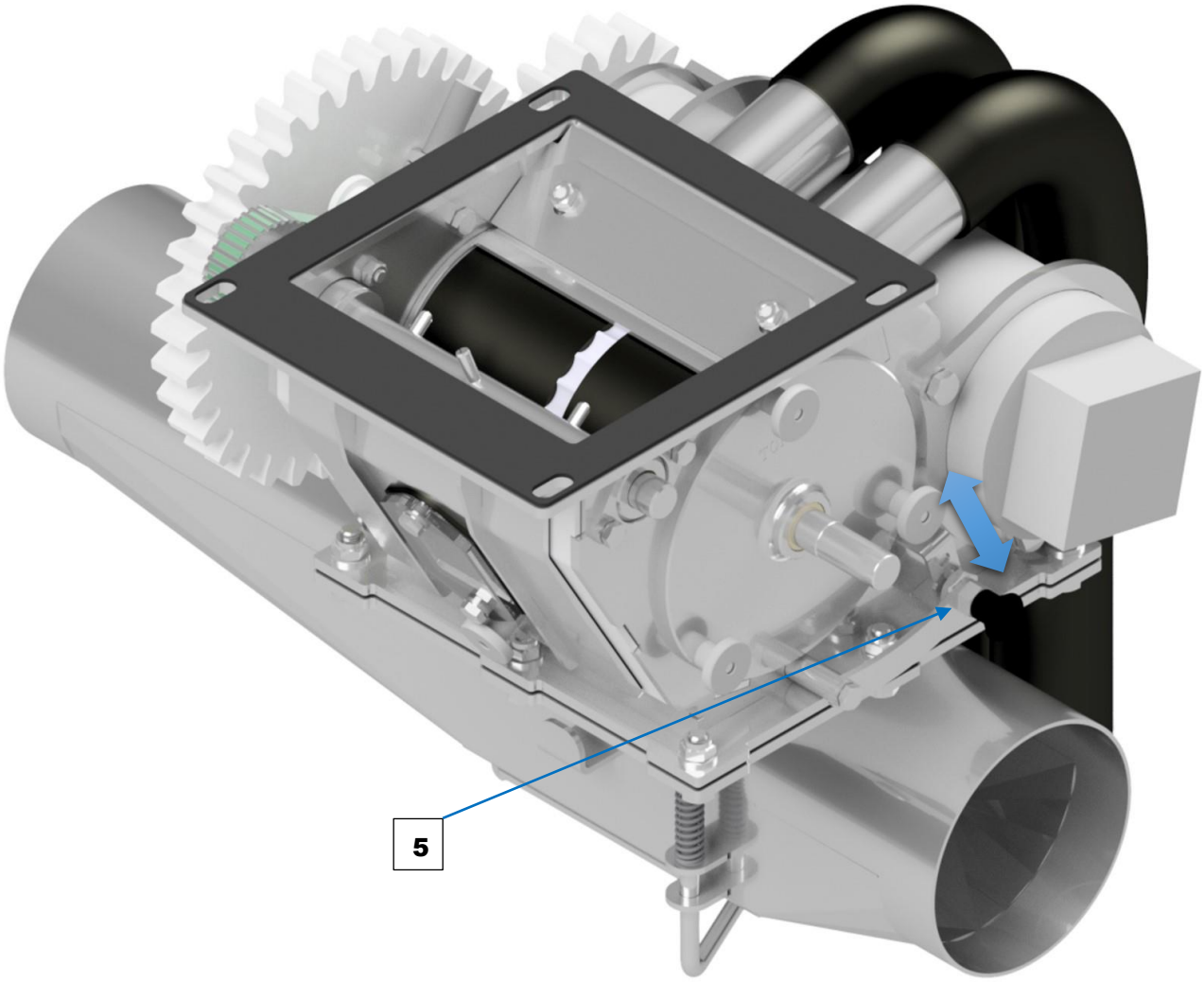

Fig. 55. Adjusting the scraper.

26.6. Adjusting the limiter

The limiter affects tightness of the seeder. It must be set against the sowing shaft. It's recommended to choose the smallest gap. Moreover, you must set the adjustment plate in the correct position depending on the type of the used material – for tiny seeds it's recommended to set the plate as close as possible to the sowing shaft. After the above-mentioned adjustments are done, check if the sowing shaft can move freely. Incorrect adjustment may damage the device.

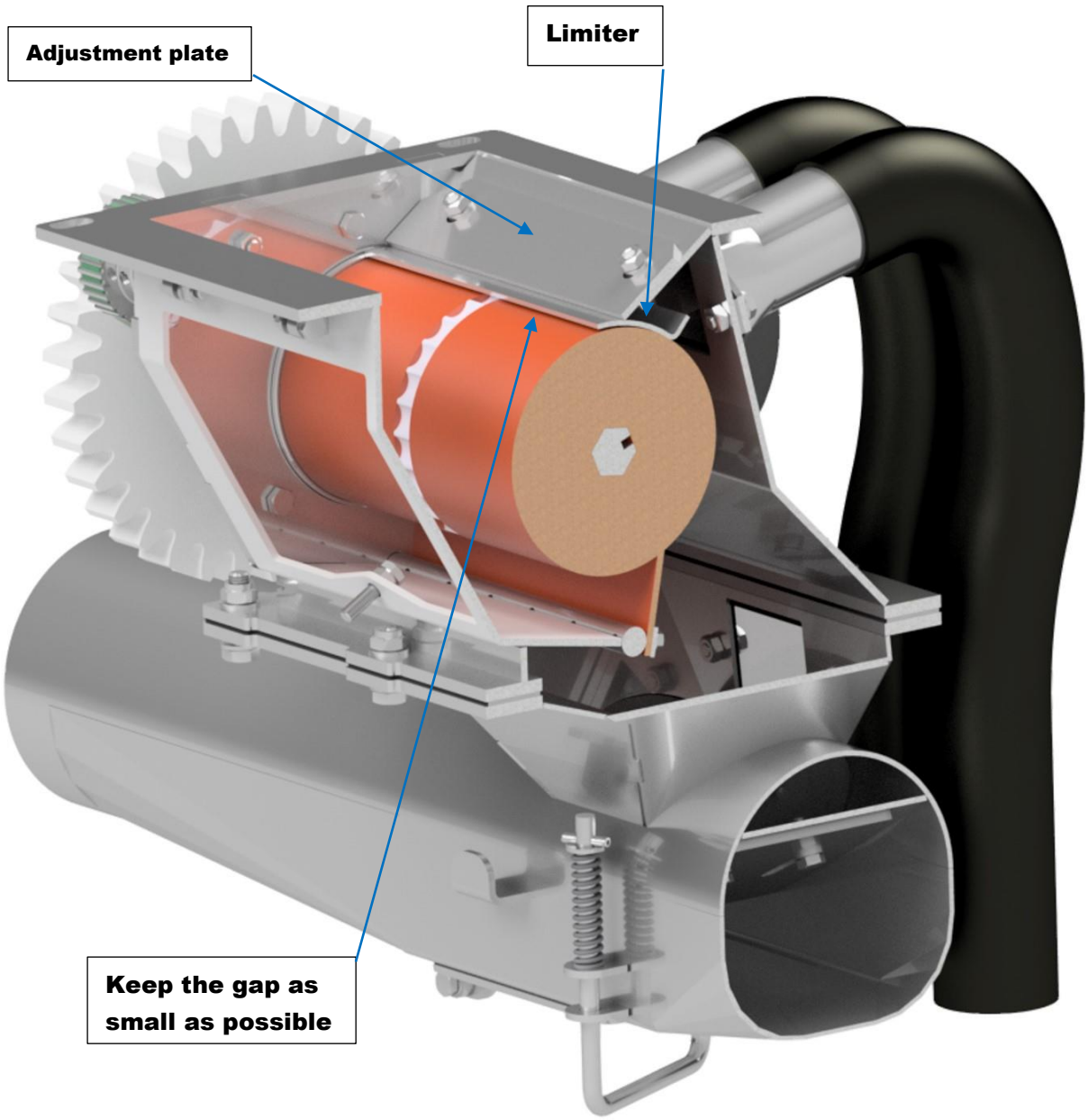

Fig. 56. Adjusting the limiter.

26.7. Tensioner

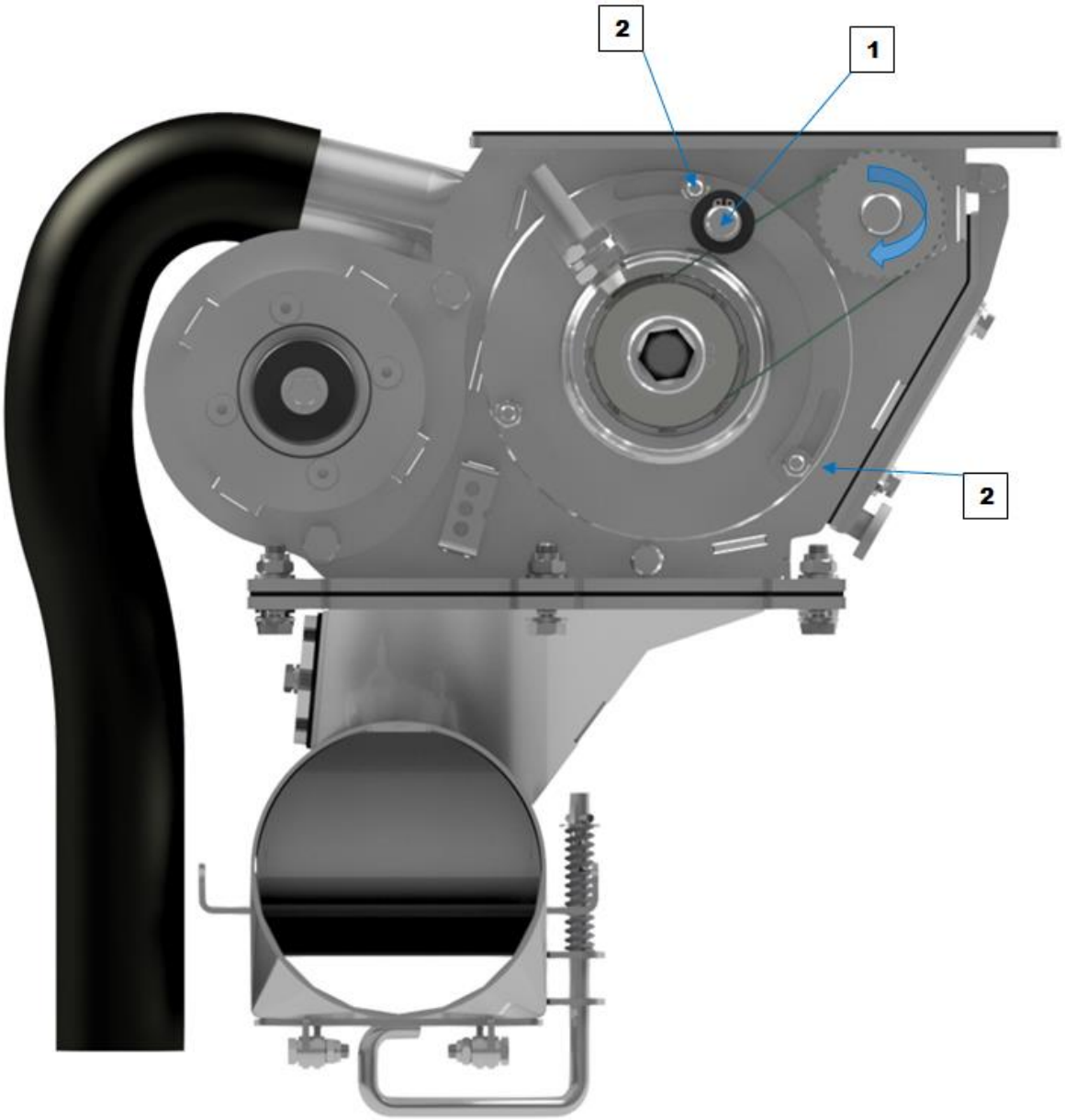

Fig. 57. Tensioner.

The tensioner (item 1) is for adjusting the tension of the mixer drive belt. You must check its condition before starting work. In order to adjust the position of the tensioner, unscrew the two m6 bolts (item 2).

26.8. Gust attachment

The gust attachment is equipped with a flap, which allows for taking the material from the calibration test. After the test the flap must be tightly closed.

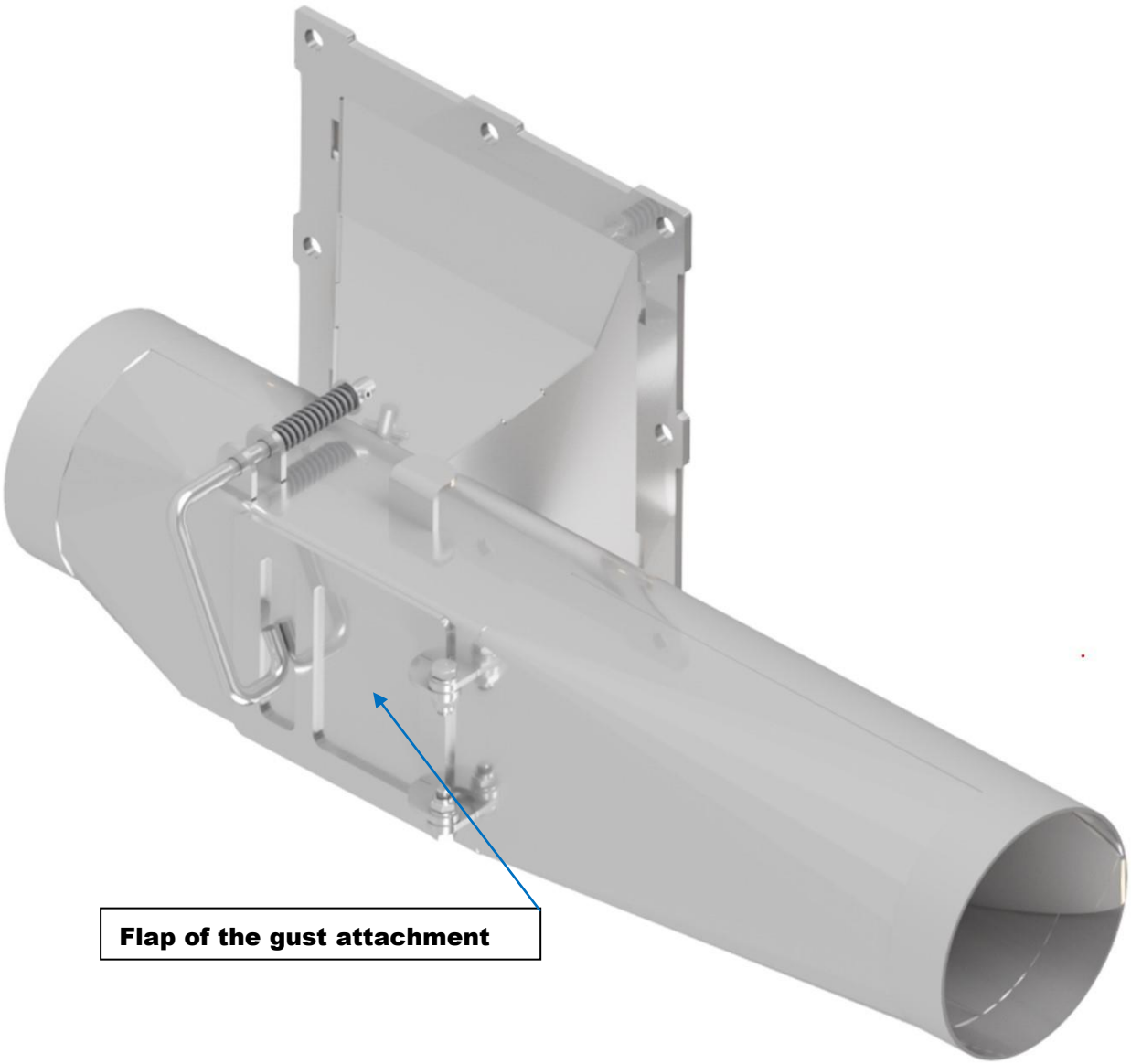

Fig. 58. Flap of the gust attachment

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The gust attachment allows for adjusting the air inlet, which must be properly set in relation to the sowed dose.

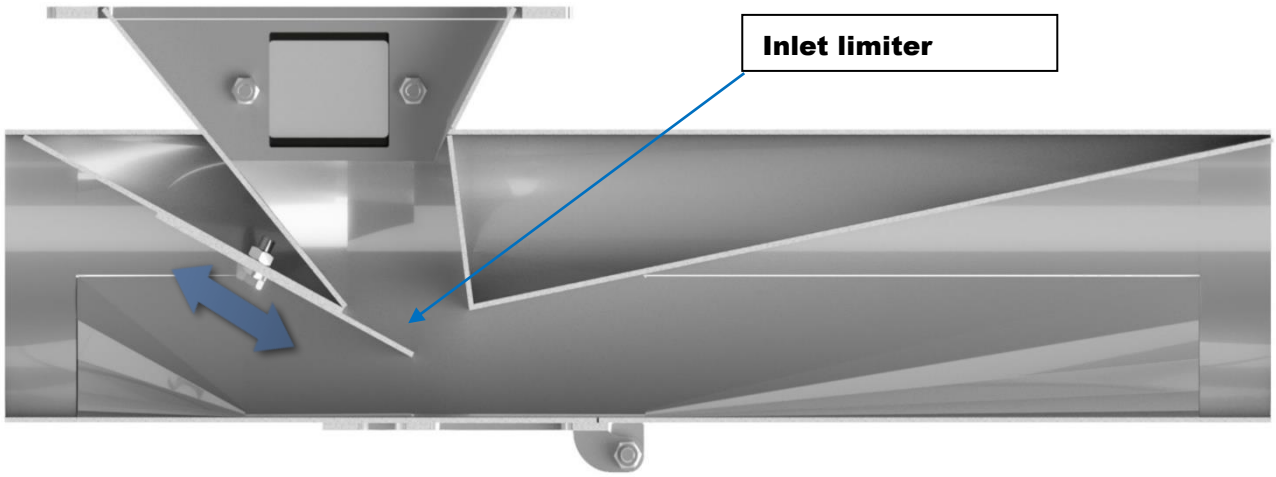

Fig. 59. Inlet limiter.

26.9. Maintenance of the seeder

The seeder does not require special maintenance operations, you must clean the device after the finished work and check for correct working. Remove deposits of the sowing material from the device. It's also recommended to remove the sowing shaft if the machine is not used for a long time and set the scraper in the inner bottom part of the body in the open position.

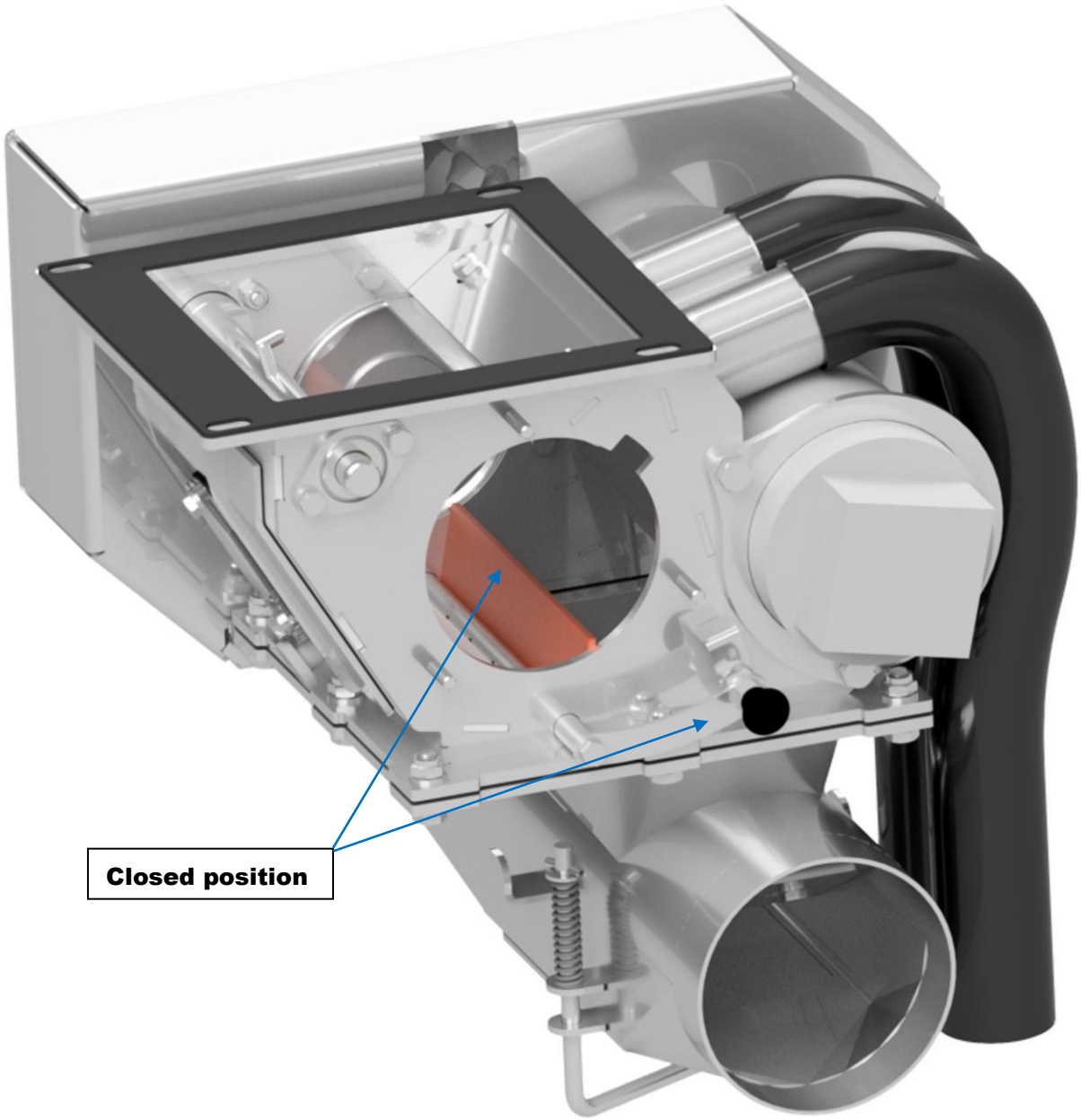

Fig. 60. Closed position of the scraper inside the seeder

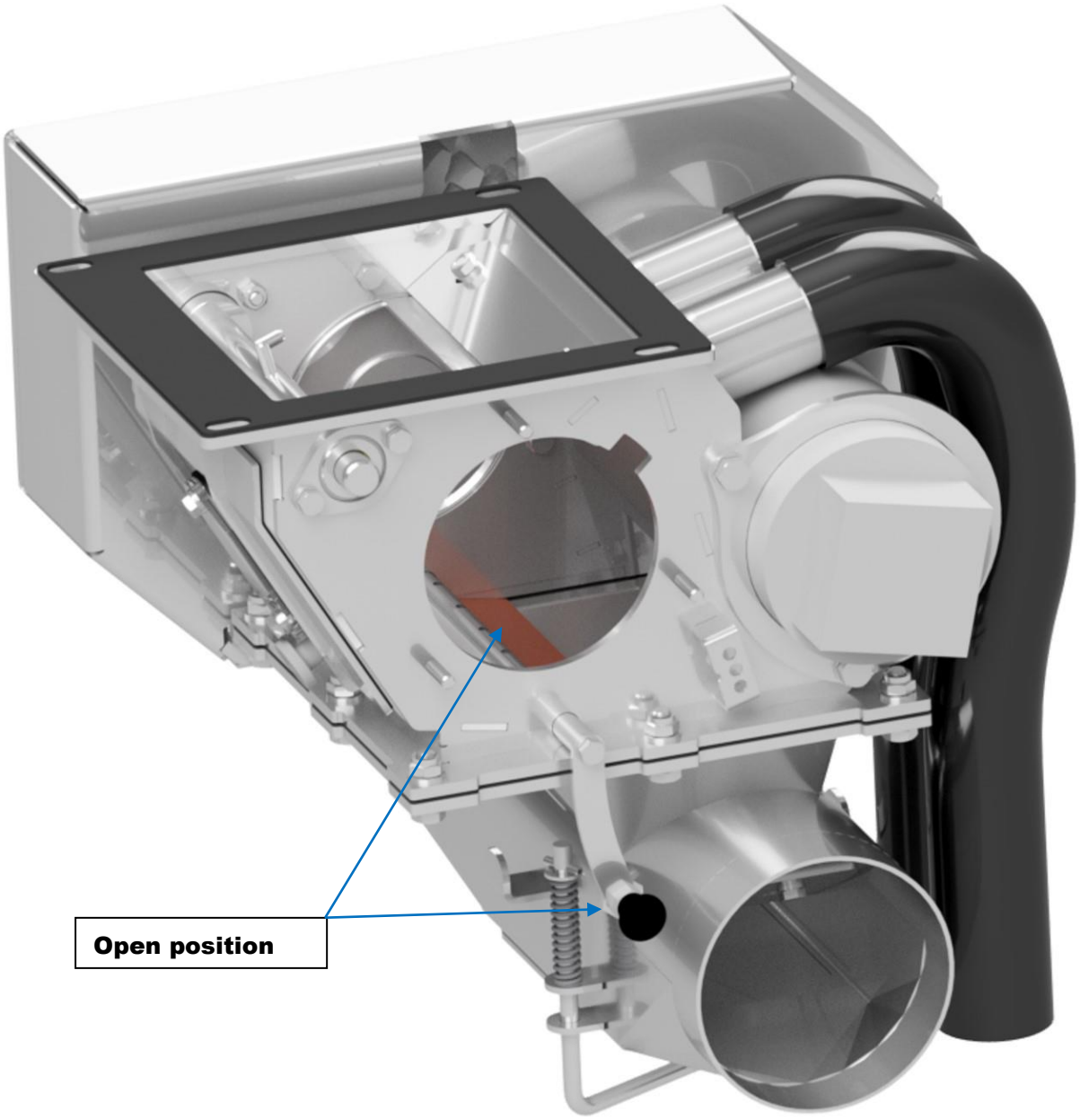

Fig. 61. Open position of the scraper inside the seeder

Frequency of cleaning the device depends on many factors, which include working conditions such as the type of used material, working speed, weather conditions etc. To ensure flawless operation, it's important to follow the recommended maintenance operations.

27. Maintenance

1. Before each operation connected with maintenance, cleaning or repairs, turn off the PTO and engine of the tractor and remove the key from the ignition.
2. Check screws and nuts regularly, and if necessary tighten them (i.e. wheels, main pins of working frames etc.). These actions must be performed before each start of the machine.
3. Tighten the clamps securing the working sections after the first 50 ha of work and each time after 50 ha from the moment of changing the width of working sections.
4. Before performing any maintenance operations on the lifted machine use proper supports or put clips on hydraulic cylinders to avoid injuries caused by the lowering machine.
5. Always wear protective gloves and use proper tool when replacing working parts of the machine.
6. Used oils, lubricants and filters must be returned to special disposal points.
7. Always disconnect the power supply before starting work on the electrical system.

   ATTENTION ⚠ only the Czajkowski Service or authorized individuals can open the electric box
8. Spare parts must meet technical requirements of the producer. Only original spare parts meet those requirements.
9. Before starting welding works, disconnect alternator and battery terminals. The producer recommends disconnecting the machine from the tractor.
10. Regularly check protective devices prone to damage, damaged ones must be replaced immediately.
11. Don't exceed the temperature of 60°C when cleaning the machine. Moreover, it's recommended:
    - to use recommended and attested cleaning agents,
    - not to direct the water stream onto places prone to damage such as: the fan, electrical system, lamps, diodes, solenoid valves, electrical and electronic boxes, machine controller, transmitter, electrical sensors, various types of warning stickers, logo and wrapping.
12. The stroke limiter of the coulter beam cylinder should be cleaned every 200 ha or 100 hours of operation.
13. Coulter beam should be protected against corrosion between seasons to avoid problems with folding/unfolding.
14. Regularly check protective devices prone to damage, damaged ones must be replaced immediately.
15. You must check oil levels, add oil if necessary.
16. The greasing points on the machine are the wheel hubs and two points on the drawbar hitch. Before greasing, clean the tip of the grease gun and the grease nipples on the machine. Lubrication of individual machine elements should be completed when fresh, clean grease appears on a given element.
17. The axle manufacturer recommends checking every 500h of work the tightness of the wheel nuts, brake linings, brake lever stroke and its eventual possible regulation. Then every 1500h, check the bearing play and its possible regulation.

18. The oils and grease used by the manufacturer at the first start of the machine are:
    - Hydraulic system – Dynatrans MPV
    - External hydraulic system – Hydrol L-HV 46
    - Multiplicator – 80W/90 GL-4
    - Grease – L2-EP

28. Technical maintenance

Checking technical condition of the machine by the operator before each use increases the sureness and comfort of the operator when working with the machine. It also reduces accident risk. Daily technical maintenance that directly affects safety of work should be based on checking:

- cleanness of the machine;
- air pressure in tyres and their condition;
- brakes;
- external and internal lightning;
- correct oil level;
- validity of extinguishers.

Seasonal maintenance depends on how much the machine has been used during the season or how the weather conditions have changed throughout the season. It should be based on:

- checking technical readiness;
- repairs of damaged parts and protective coating;
- changing and filling lubricants and oils.

29. Attaching the machine to the tractor

When attaching the tractor and the Czajkowski STK unit and/or a seeder and/or a precision seeder it's forbidden to stay between them.

When attaching the machine to the tractor make sure that it stands on hard and even ground.
Bottom linkage points of the tractor must be at the same height. The 3-point linkage must be parallel to the ground during work. The machine must be attached to the tractor in the following way:

- reverse the tractor until the axis of linkage holes overlaps the fixing points,
- stop the tractor and pull the brake,
- attach the tractor linkage hooks to the fixing points on the machine and secure them from loosening using the original pin,
- slightly lift the machine using the rear three-point linkage and fold the support foot of the machine located at the front linkage,
- clean the hydraulic sockets in the tractor and connect the connectors of the hydraulic system to the tractor sockets,
- connect the plug of the electrical system to the socket of the tractor,
- turn on the tablet to operate the machine,
- remove the anti-roll chocks and place them on the machine in the intended place,
- check lifting, lowering, folding and unfolding operations of the machine,
- check the tightness of the hydraulic system,
- connect a seeder or a precision seeder to the operational machine attached to the tractor.

ATTENTION ⚠ Please note that the machine with the tank filled must always be coupled to the tractor. The machine can only be uncoupled from the tractor when the tank is empty.

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30. Detaching the machine from the tractor

When detaching the machine from the tractor make sure that it stands on hard and even ground.

The machine must be detached from the tractor in the following way:

- fold the machine to the transport position,
- place the support foot and lower the machine until it stands on the support in a stable way,
- secure the main machine by placing anti-roll chocks under the roller
- disconnect hydraulic and electrical cables between tractor and machine,
- secure the quick release couplings against dirt, fixing to a intended clip,
- lower the arms of the three-point linkage to detach the machine.

31. Attaching the STK unit to the PS attachment or a precision seeder

You must follow the below instructions when attaching the seeder/attachment to the machine:

- reverse the machine to a seeder or a precision seeder so the linkage openings overlap the fixing points,
- stop the tractor and pull the brake – set the P position (parking),
- attach the machine linkage hooks to the fixing points of the seeder or the precision seeder and secure them against loosening using the original pin,
- attach the machine using the central bottle screw,
- connect the hydraulic system connectors to the machine sockets,
- connect the plug of the electrical system of the PS attachment or the precision seeder to the electrical socket of the machine,
- check lifting, lowering, folding, unfolding operations of the PS/precision seeder,
- check tightness of the hydraulic system,
- level the seeder (the attachment) by shortening or extending the bottle screw.

Detach in opposite order.

32. Configurations

32.1. Transport position

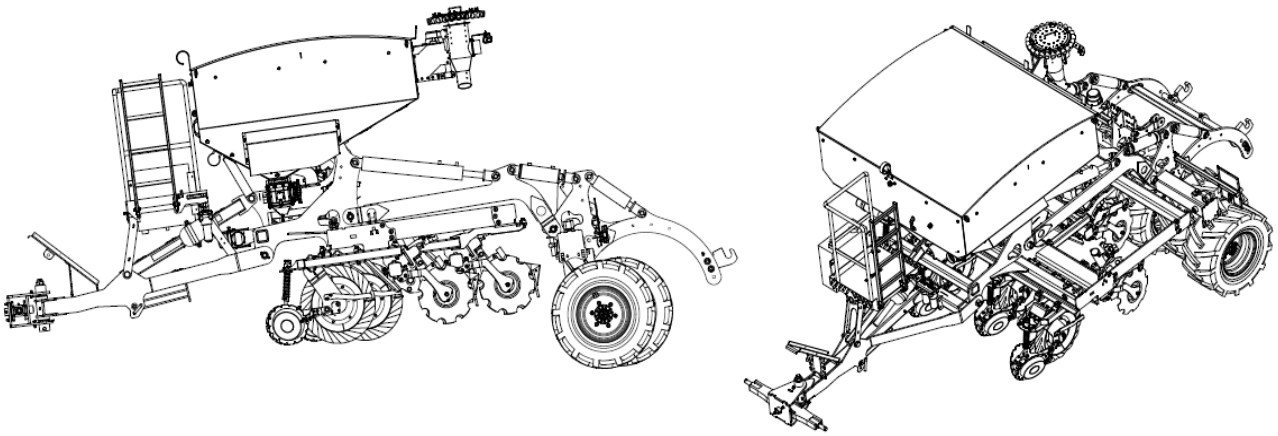

Fig. 62. Transport position of the STK 300 unit

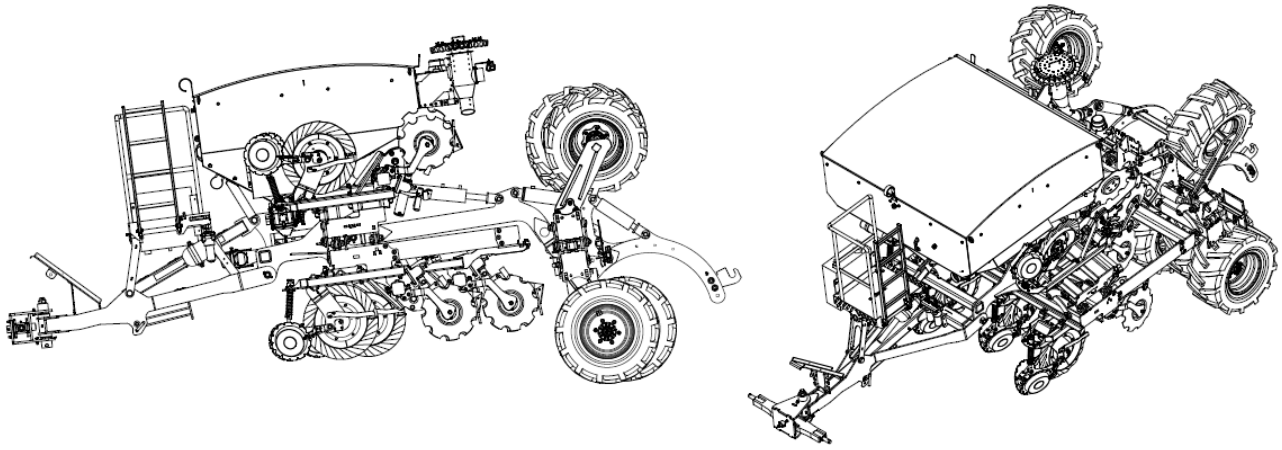

Fig. 63. Transport position of the STK 400 unit

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To set the tractor-unit-attachment/precision seeder in the transport position you must:

- attach the tractor to the unit,
- attach the unit to the attachment/precision seeder,
- by controlling the tractor hydraulic system, lift the attachment/precision seeder to the transport position using the three-point linkage,
- by controlling the tractor hydraulic system, lift the machine to transport position,
- by controlling the tractor hydraulic system, lift side frames of the machine, and then side rear beams of the wheels to transport position,
- level the machine in transport position by using the three-point linkage of the tractor,
- by controlling tractor hydraulic system, set the furrow openers to transport position (fold them),
- check tightness of the hydraulic system for leaks and damage,
- turn on headlights and warning lights.

After performing the above-mentioned actions, the machine will be ready for road transport.

ATTENTION ⚠ Always drive with an empty tank while transporting the machine on public roads! It is forbidden to drive with a filled tank.

32.2. Working position

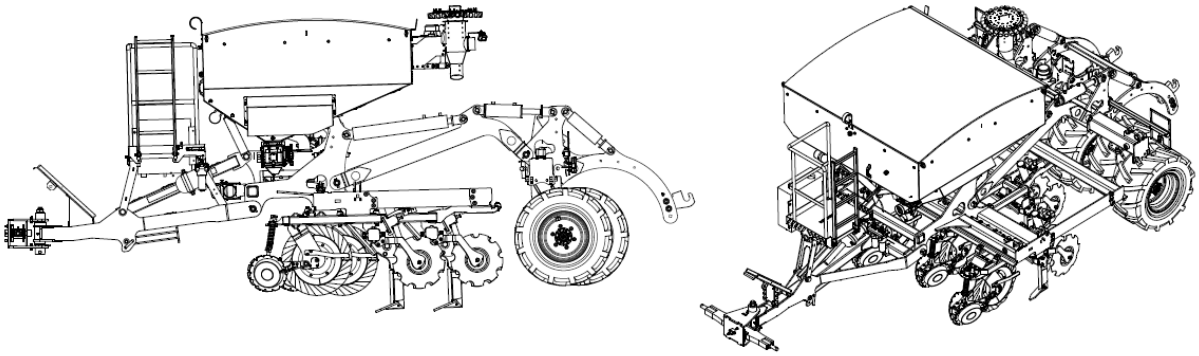

Fig. 64. Working position of the STK 300 unit

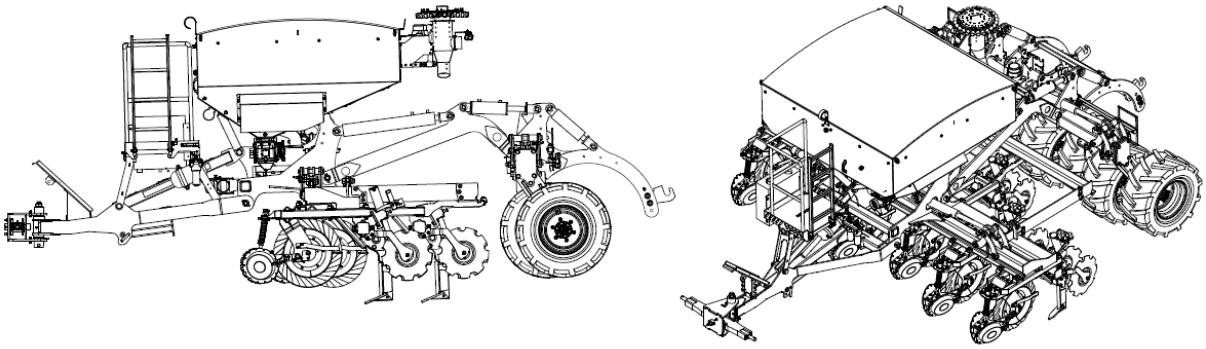

Fig. 65. Working position of the STK 400 unit

After the unit is transported, you must perform the following actions to unfold it:

- turn off headlights and warning lights,
- by using the tablet, and then by controlling the tractor hydraulic system, lower the offset frames of the unit and then side rear beams of the wheels to the work position
- by using the tablet, and then by controlling the tractor hydraulic system, set the furrow openers to work position (unfolded),
- by using the tablet, and then by controlling the tractor hydraulic system, lower the machine to work position,
- by controlling the tractor hydraulic system (the tablet is not required), lower the attachment or a precision seeder on the three-point linkage to work position,
- level the unit to work position by using the three-point linkage of the tractor.

After performing the above-listed actions, the unit is ready to work in the field.

33. Adjustments

33.1. Adjusting fertilizer application depth

Fertilizer application can be adjusted in the 2 following ways:
- from 0 cm neutral position [1]
- from -2.5 cm if the working depth is lower [2]
To adjust depth loosen the nut and remove the bolt, select the desired level, put back the bolt and tighten the nut

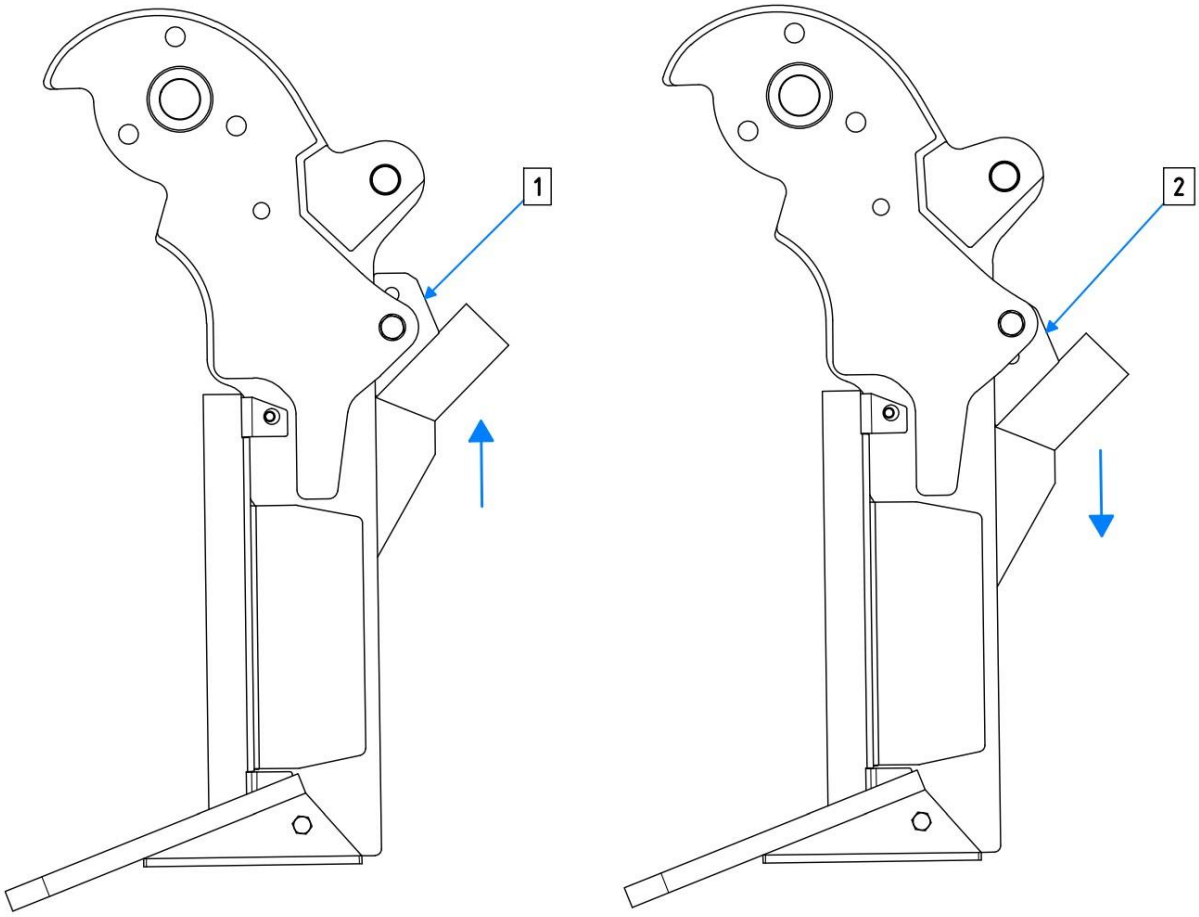

Fig. 66. Adjusting fertilizer application depth

33.2. Adjusting the spreading and breaking discs

The spreading and breaking discs can be adjusted with adjustment holes by changing the length of the shock absorber [2]. To adjust the spreading and breaking discs, you must:

- release and remove the pin [1]
- set the correct length of the shock absorber [2]
- insert the pin [1]

By shortening the length of the shock absorber [2] the discs work less aggressively. By shortening the length of the shock absorber to the maximum [2] the discs become inactive.

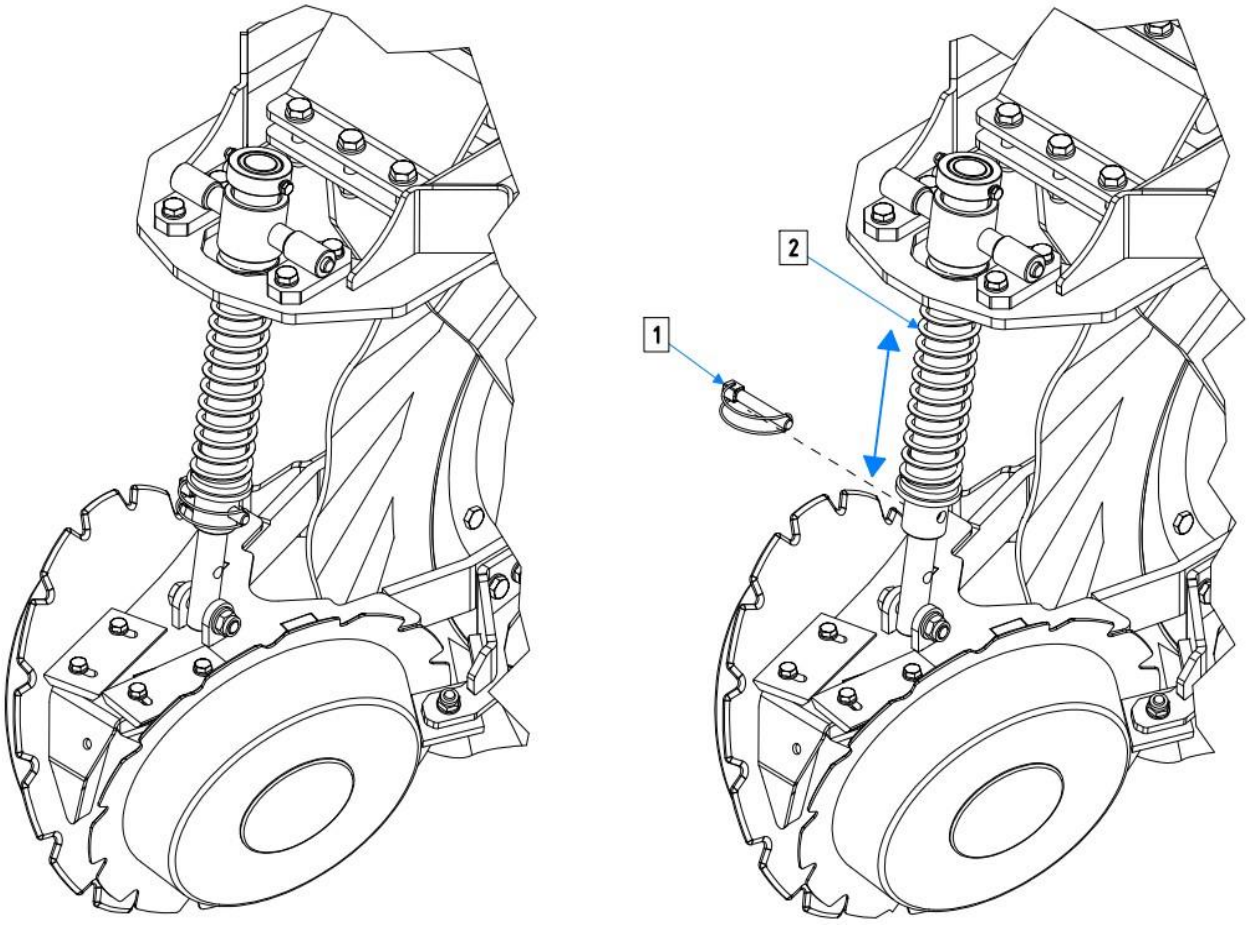

Fig. 67. Adjusting the pressing strength

33.3. Adjusting the cutting disc

The cutting disc can be adjusted using the 3-point linkage (the machine must be levelled). **ATTENTION ⚠ Perforated discs are intended for cutting the soil (up to 12cm), but they cannot be used as support wheels of the unit!**

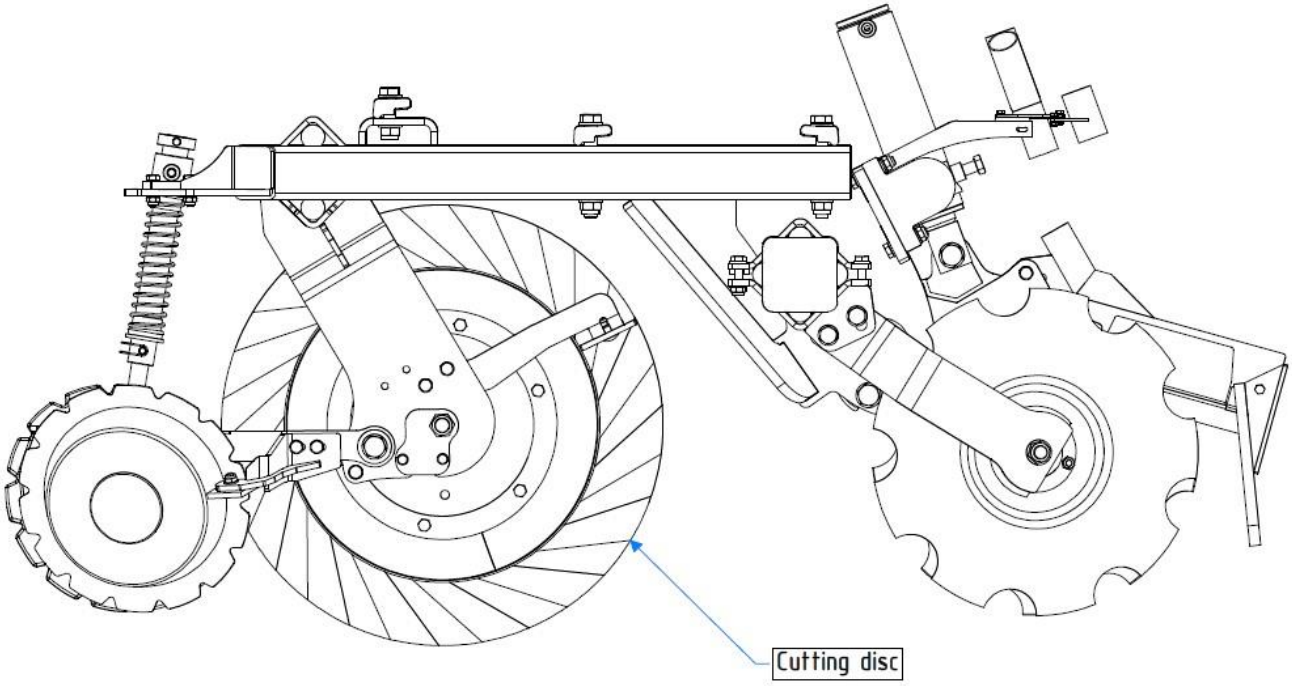

Fig. 68. Side view of the working section

33.4. Adjusting the toothed closing discs

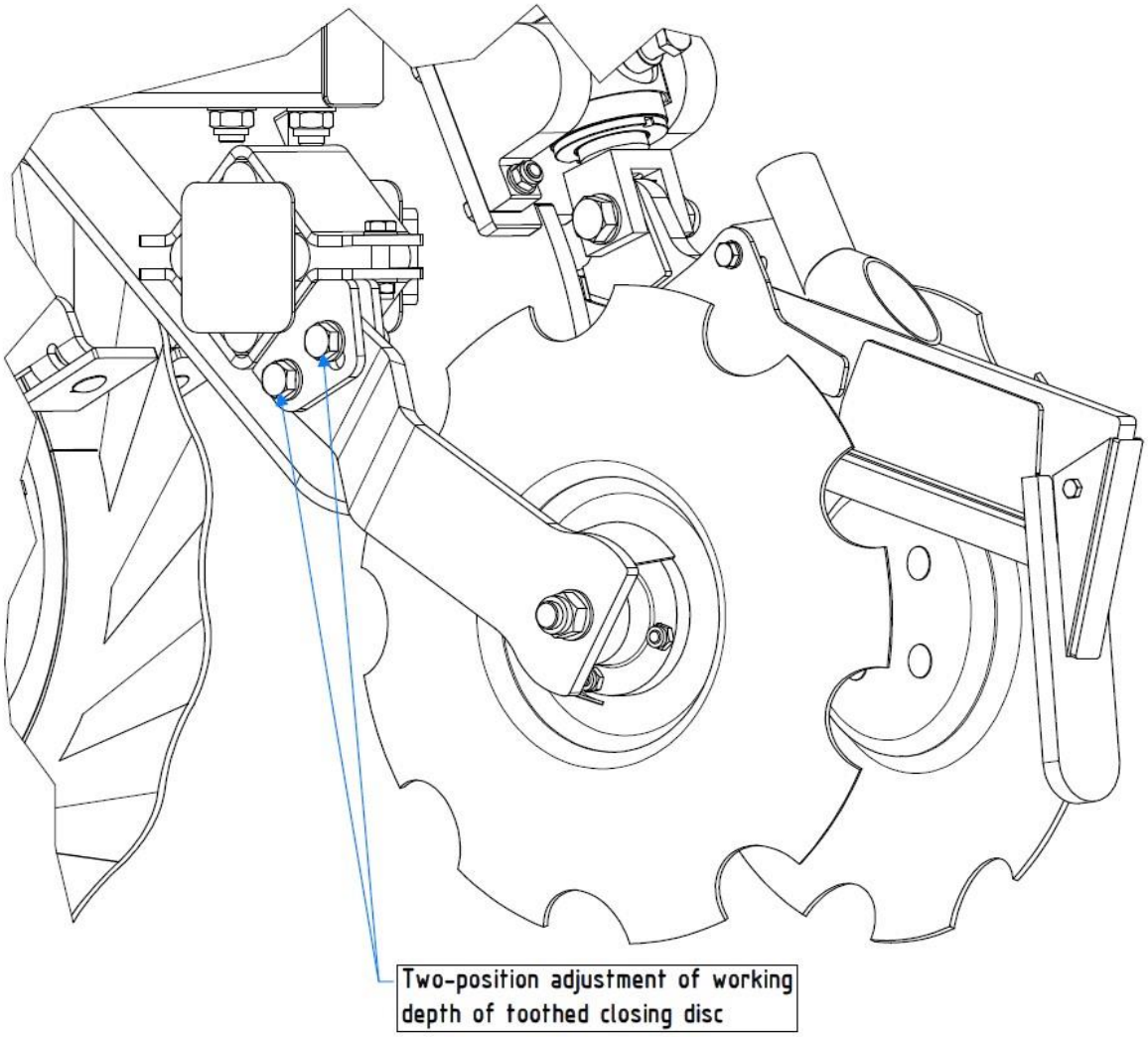

Fig. 69. Adjusting the toothed closing discs

Adjustment of the working depth of the toothed closing disc. To adjust it, loosen the nut, pull out the screw, carry out the adjustment, put in the screw, tighten the nut.

34. Wheel replacement

Replacing wheels should be done with a coupled tractor, on a hardened and level surface, which will ensure safe performance of the task.

ATTENTION ⚠ Wheel replacement must be performed with the tank empty.

To remove the outer wheels of the outer wheel assemblies, you must drive onto a ramp of adequate strength and stability and engage the parking brake. The ramp should be about 10 cm high.

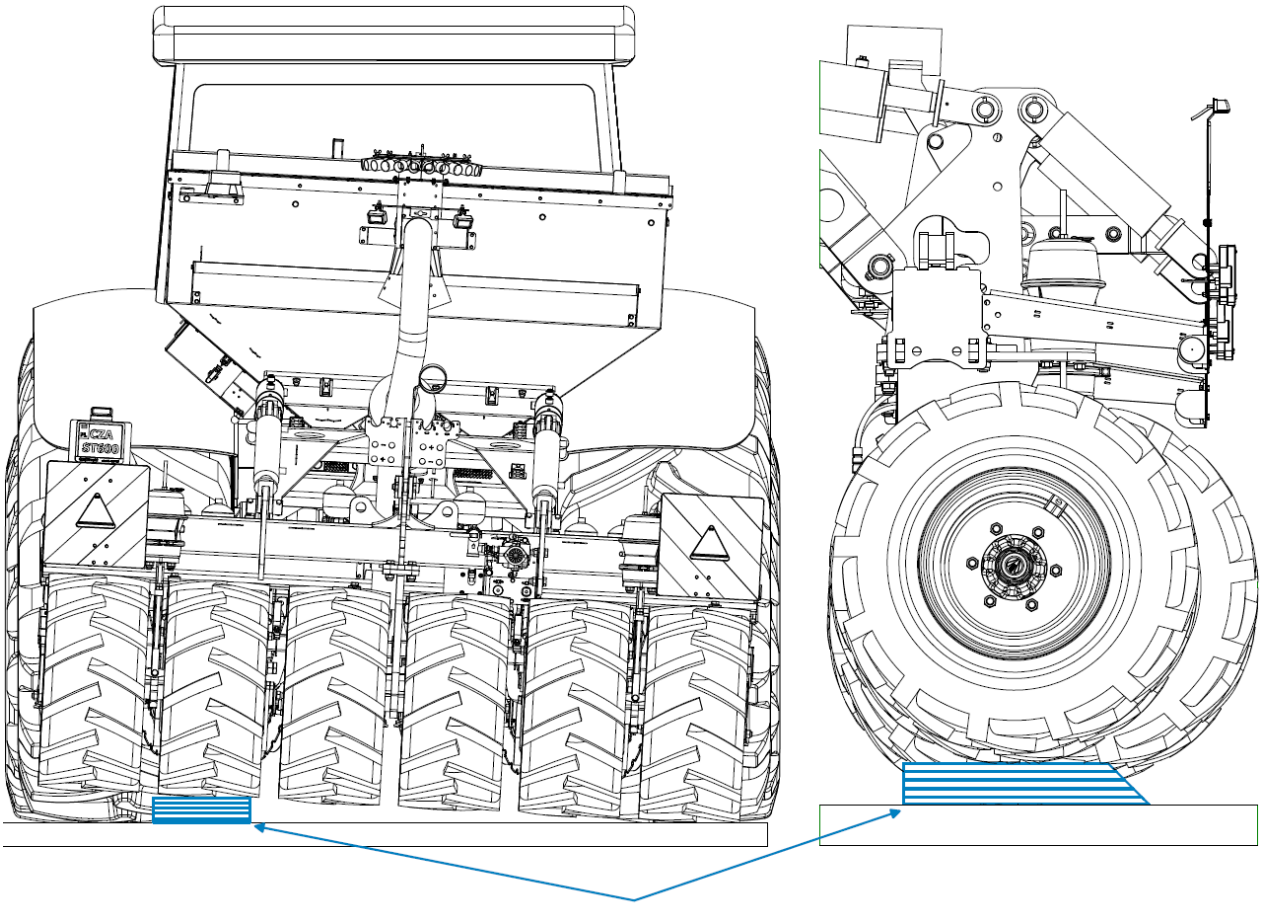

Fig. 70. Ramp under inner wheel

Then proceed to point number **8** below

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To remove one of the four middle wheels, perform the following steps:

1. Level the rear frame of the machine relative to the ground.

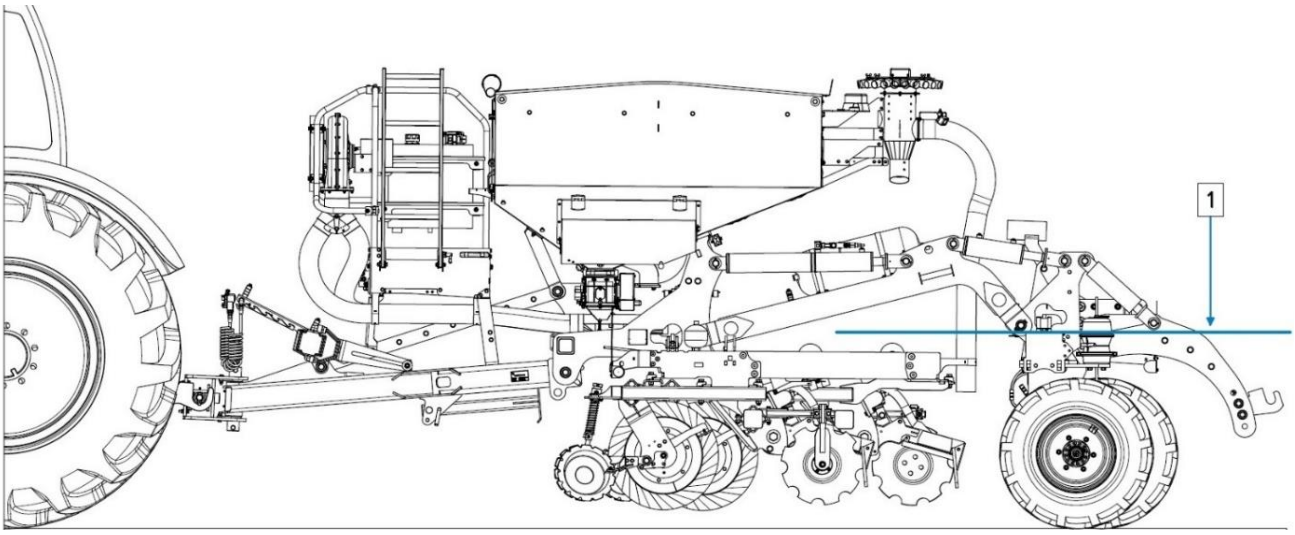

Fig. 71. Leveling the machine

2. Dismantle the 3-point linkage by removing the 4x pins.

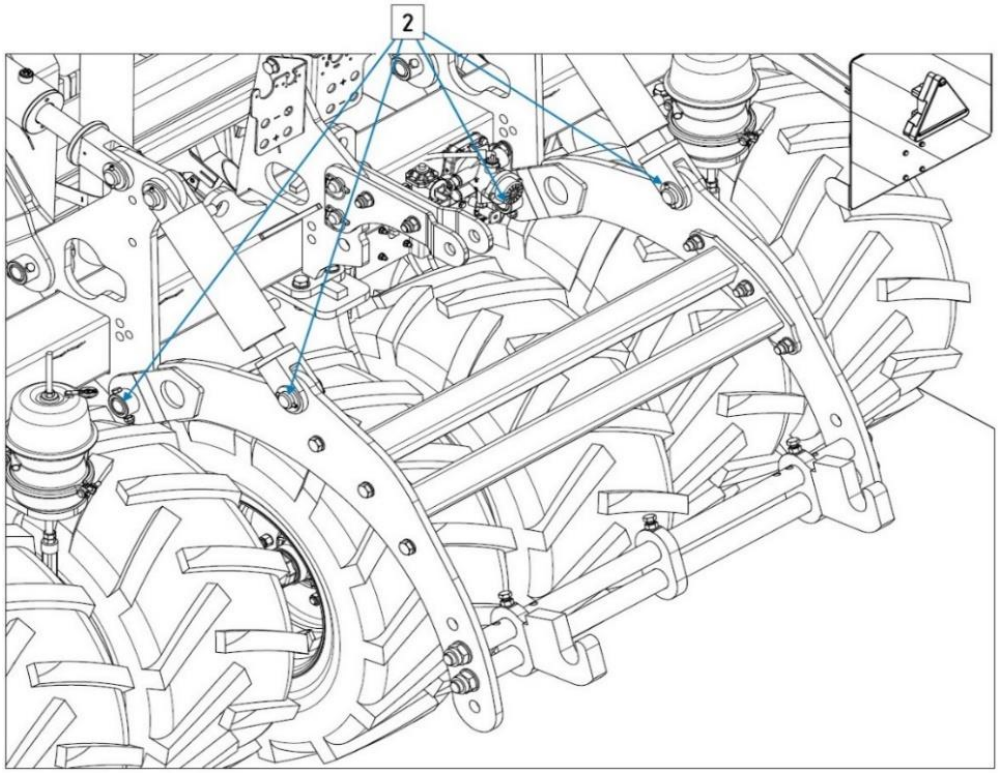

Fig. 72. Dismantling the 3-point linkage

3. Secure one of the wheels of the middle wheel assembly with chocks.

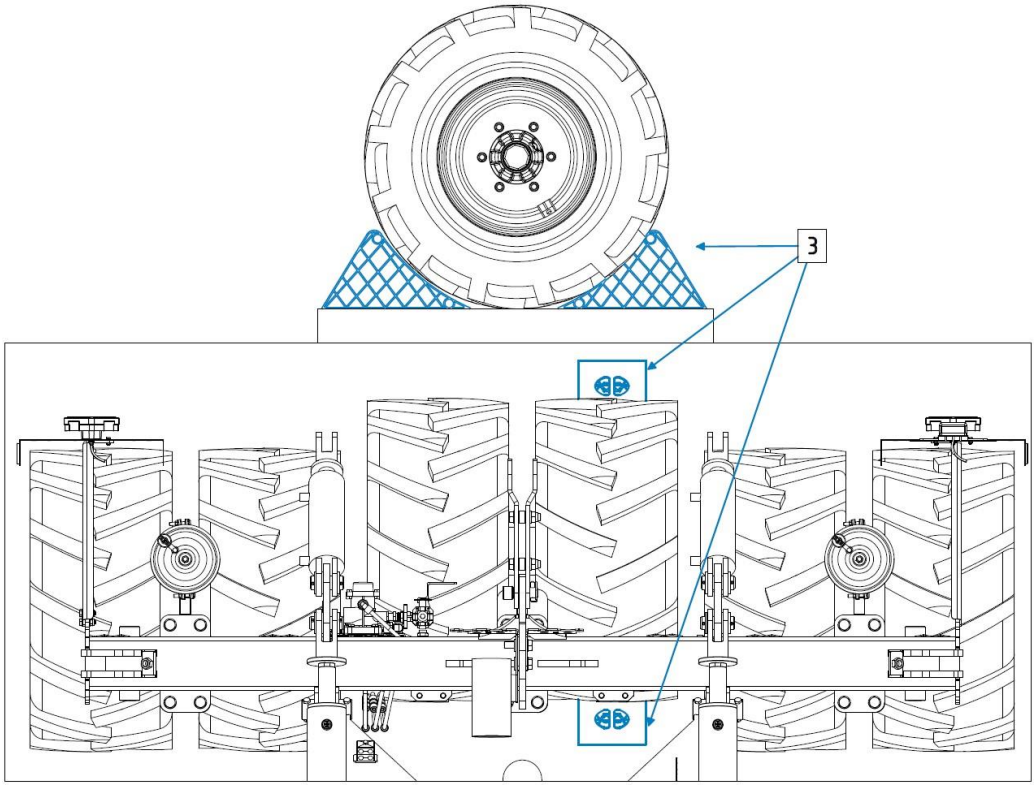

Fig. 73. Securing with chocks

4. Secure the wheel assembly mount with a support.

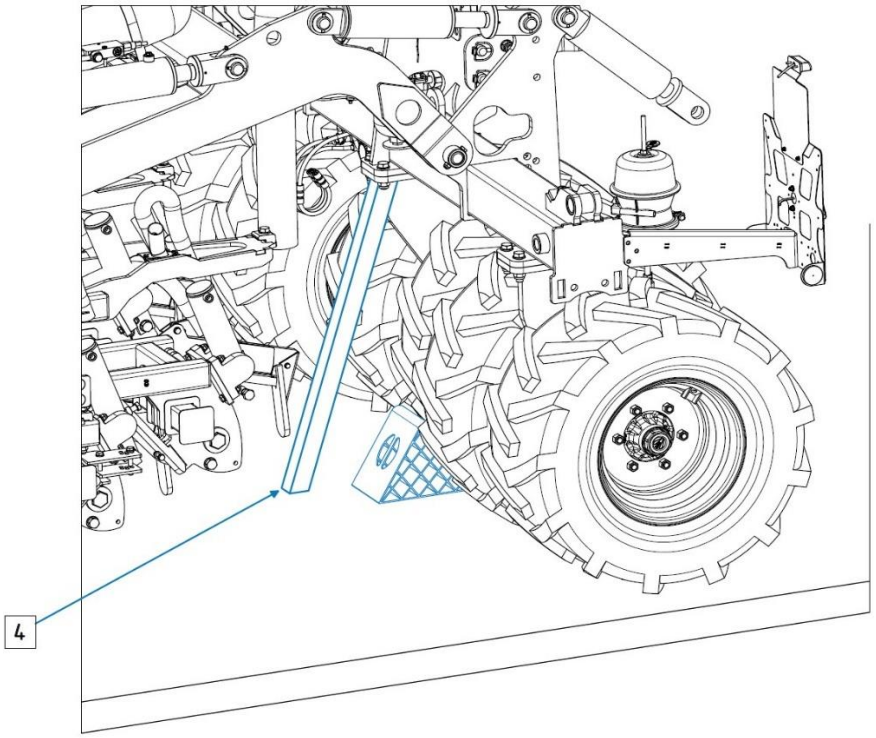

Fig. 74. Securing with support

5. Unscrew the 4x M20 bolts securing the middle wheel assembly.

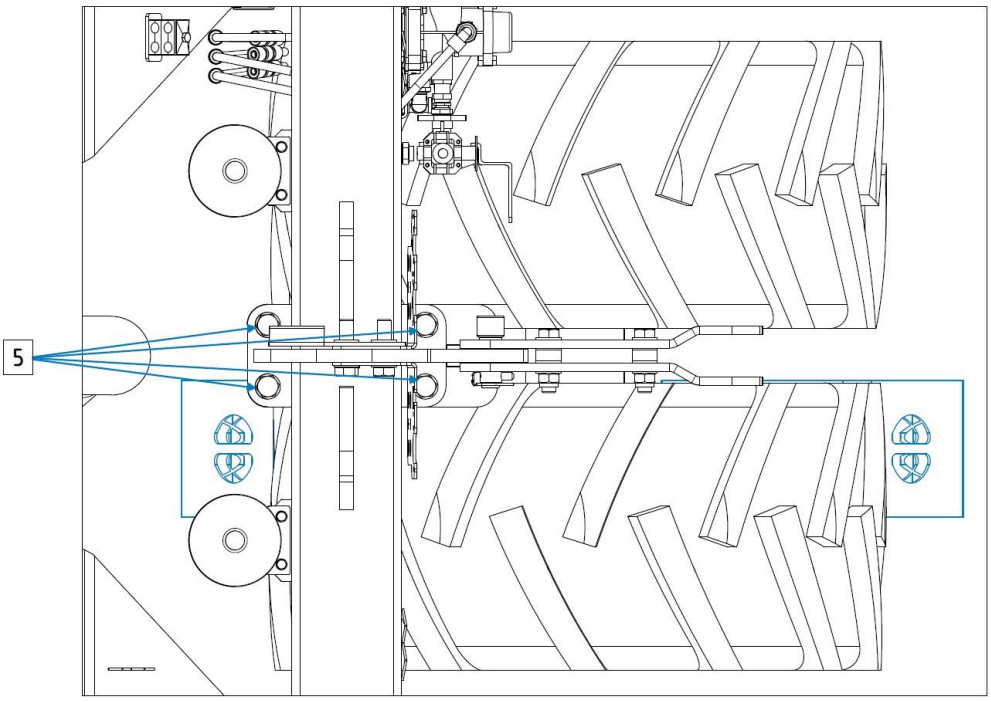

Fig. 75. Dismantling middle wheel assembly

6. Drive the tractor and machine forward, leaving the wheel assembly unscrewed and supported at the rear.

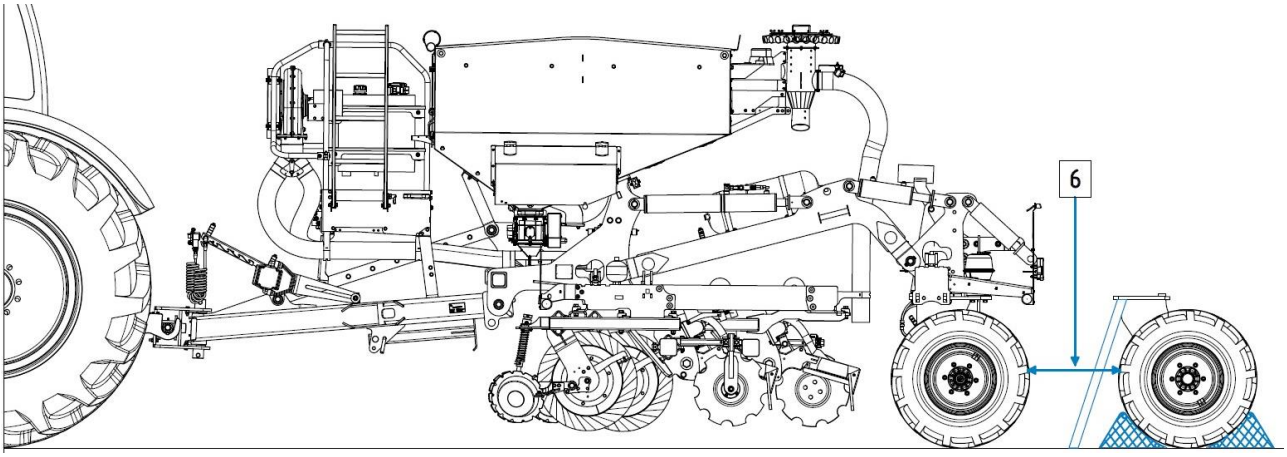

Fig. 76. Driving away from the dismantled wheel assembly

6.1. To remove one of the wheels of the central wheel assembly, use a crane that allows the entire wheel assembly to be safely lifted. For this purpose, use an approved belt sling (min. 500 kg), pulled through an M20 eye bolt/nut, which should be secured in one of the wheel assembly mounting holes.

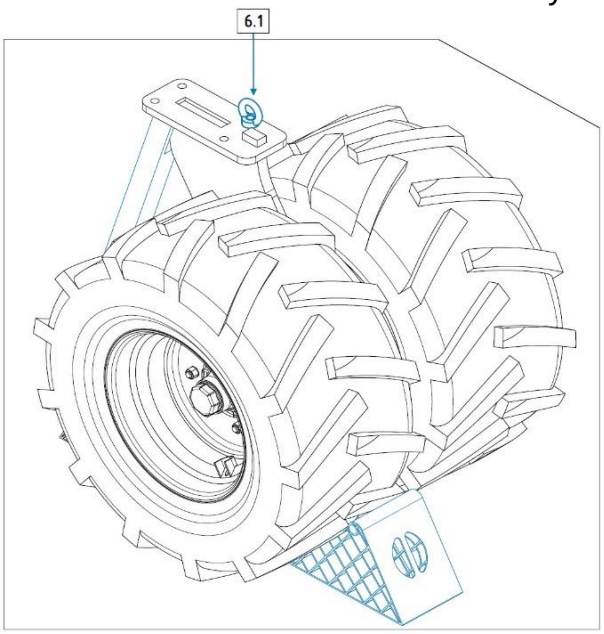

Fig. 77. Lifting the wheel assembly with an eye bolt/nut

Next proceed to point number **8** below

7. To dismantle the inner wheel of the outer wheel assembly, drive onto a ramp of appropriate strength and stability and engage the parking brake. The ramp should be approximately 10cm high.

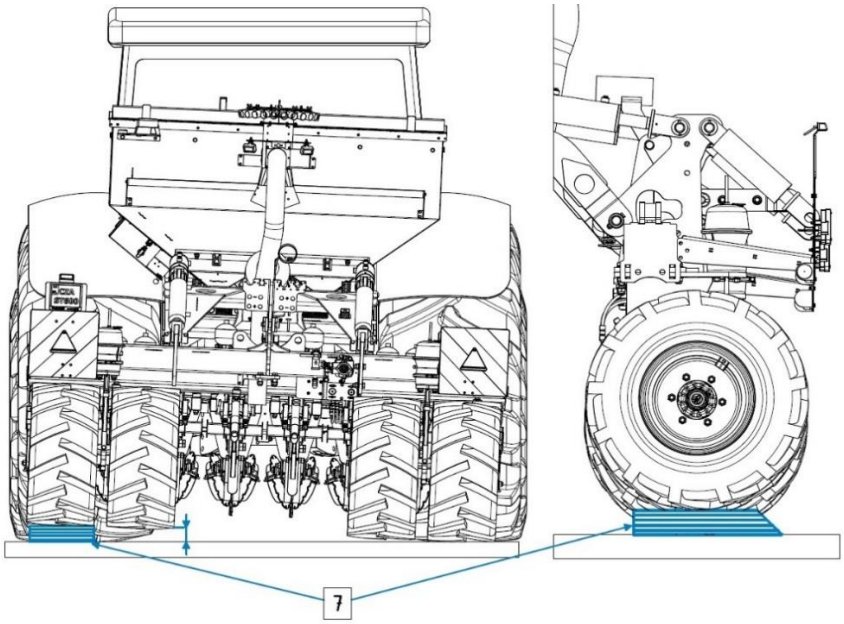

Fig. 78. Ramp under outer wheel

8. To disassemble the wheel, unscrew 6x M18 nuts of a given wheel of the wheel assembly.

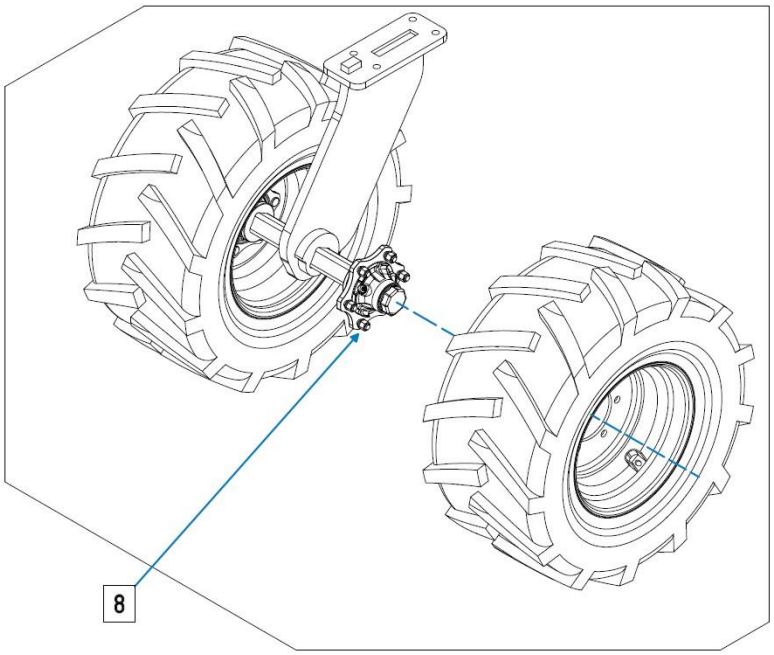

Fig. 79. Removing a single wheel from a wheel assembly

Install the wheels in reverse order, tightening the nuts according to the diagram below:

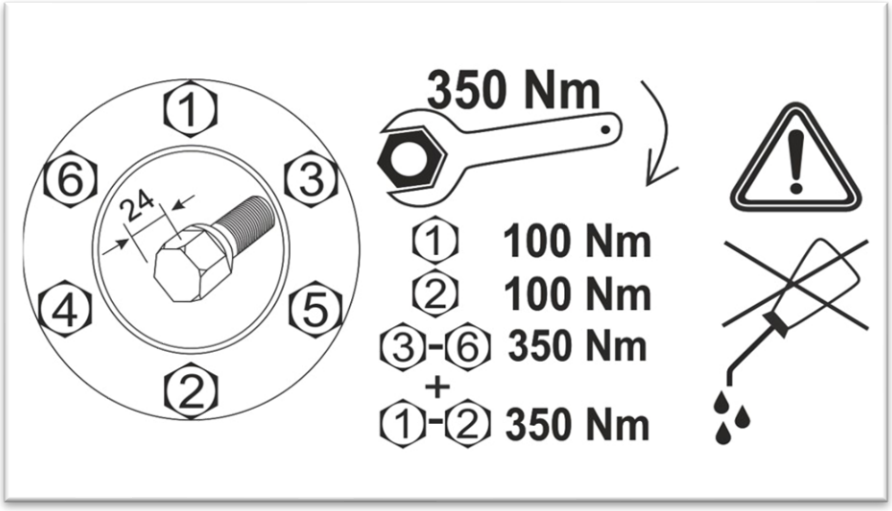

Fig. 80. STK wheel nut tightening diagram

- Tightening torque of the wheel assembly mounting bolts - 660Nm.
- Tighten the wheel assembly mounting bolts gradually, crosswise.

ATTENTION Tire pressure – 3.5 bar. Do not exceed the indicated tire pressure!

35. Lock against unwanted use of the machine

The Czajkowski STK aggregate is equipped with a device that prevents the coupling with tractor in order to transport the machine by unwanted third parties. After field work is completed, the properly parked machine, unhitched from the tractor, should be blocked against possible use. To do this, use the lock on the drawbeam arm. First, slide the lock onto the beam's hitch ball and then put the padlock shackle through the lock holes in such a way that it is between the ball and the hitch beam. Then close the padlock and pull it to make sure that the lock is properly installed.

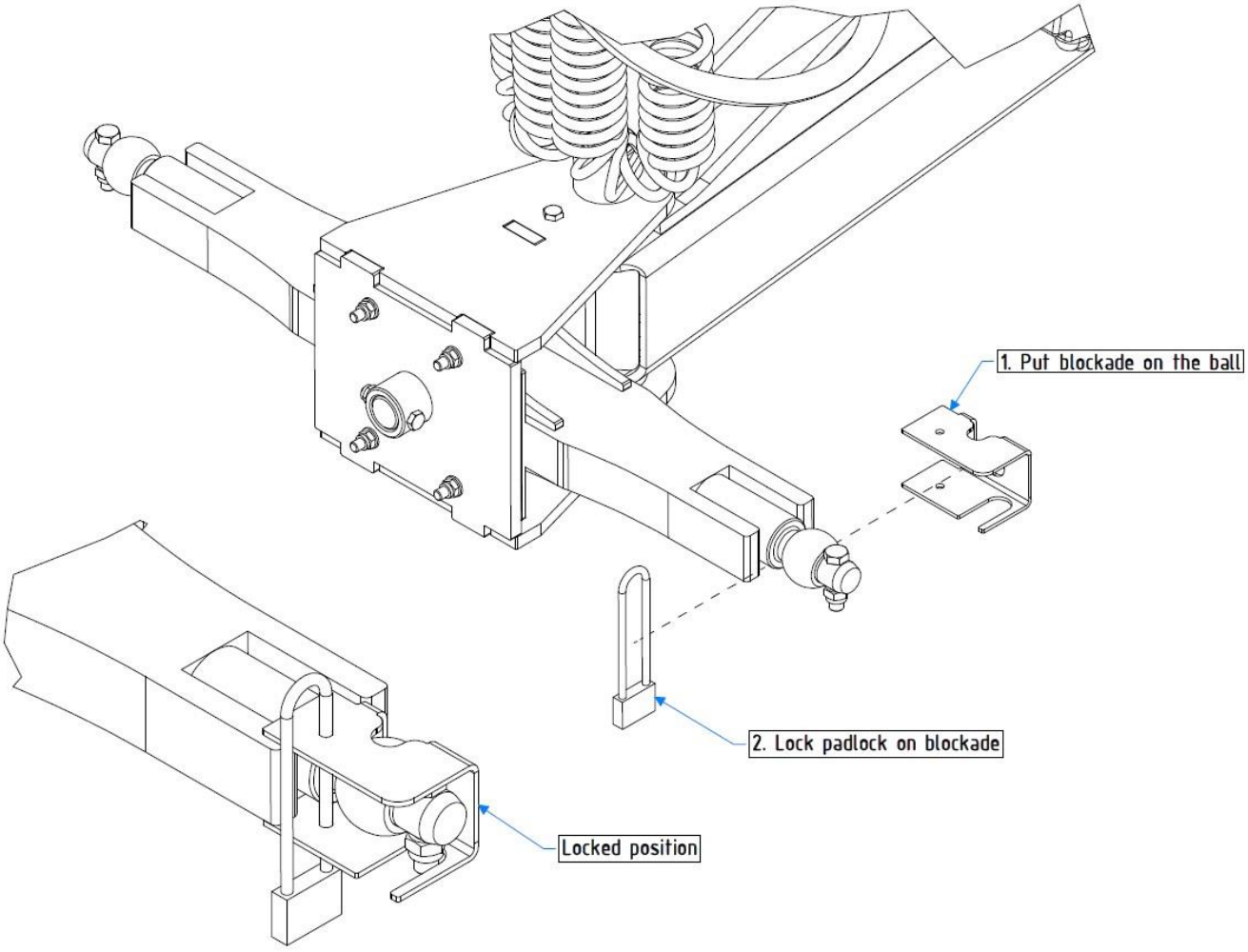

Fig. 81. Drawbar blockade

36. Long-term storage of the machine

- The machine must be carefully cleaned before storing.
- The machine must be stored in closed, roofed space.
- Working parts must be secured using an anti-corrosion agent.
- The tractor and the seeder must be detached when storing.
- Lubricate necessary parts and add oil.

The machine must be stored in a roofed space due to presence of electronics. Although electrics are of the highest quality, this criterion must be met. You must remember that the operating tablet should be stored in a dry room at temperatures above 0 degrees. For long-time storage, the tank must be emptied and cleaned along with the machine. Piston rods of hydraulic cylinders, working parts and other polished elements must be secured using an anti-corrosion agent. The producer recommends retracting the piston rods of hydraulic cylinders. The machine should be in transport position: - side frames folded, tyre roller folded;

- arms lifted, in transport position;
- machine lowered – main piston rods retracted;
- 3-point linkage lowered.

Unplug the power supply when the machine is staying unused for a long time (remove the electric plugs), lower pressure in the roller and secure it with anti-roll chocks.

37. Transportation

If it’s necessary to transport the machine on a car trailer or other mean of transport, the unit must be secured using approved tie-down straps. All fixing elements must be attached to the machine in places marked with an appropriate symbol. All moving and protruding elements of the machine must be immobilized and secured so they don’t pose a threat to other road users. The roller must be secured using additional approved tide-down strips of chains to prevent the machine from accidental unfolding.

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38. Disassembly and disposal

Oils, lubricants and parts for disposal covered in them pose serious threat to the environment and should be disposed according to the law and in an eco-friendly manner that's also safe for people. If necessary, consult with local authorities. While using and maintaining the machine different substances are created, which must be properly disposed of. In the case of excipients, consumable substances and other chemical agents, always follow instructions of the safety data sheets of those substances.

Decommissioning.

If the machine can no longer be used and should be utilized, it must be decommissioned. Machine parts should be segregated according to materials, and then handed over for eco-friendly disposal or recycling. While doing that you must obey the applicable regulations. Contact a disposal company if necessary.

39. Responsibility of the producer

The producer does not bear responsibility for using the machine in a manner inconsistent with the provisions of the law, safety regulations or instructions of this user manual. Due to the fact that events unforeseen in this manual may occur, it's crucial to always follow general safety regulations. Responsibility of the producer is excluded when the user willingly uses spare parts other than original ones or parts approved by the producer, or if elements of the machine have been modified. The producer is not responsible for indirect damages, including damages to other machines or devices. The producer is not responsible for the wrong choice of seeds, their type and quantity. If the experience of the user is not sufficient, it's recommended to ask for help of specialists or contact the Czajkowski Maszyny company**.** Responsibility of the producer does not cover incorrect (or deviating from the expected) results of work. In every case, the user must control and supervise seeding and make sure that the dosage is correct for the given conditions. The user should also control the correctness of seeding at all times. Responsibility for use and maintenance lies in the hands of the owner. The owner of the machine is responsible for making sure that operators have proper qualifications and know how to use the machine. You must remember that incorrect use of the machine poses danger to people, animals, bodies of water and cultivation fields. You must always follow instructions provided by the producers of machines, devices, seeds, plant protection products and fertilizers.

40. Warranty

The warranty period is 12 months and is counted from the day of the first start-up of the machine at the customer's by the Czajkowski Maszyny sp. z o.o. service. However, the warranty is also limited to a maximum of 400 ha worked per meter of the machine's working width.

The warranty covers defects and irregularities inherent in the machine at the time of its issue, resulting from material or manufacturing defects.

Rubber or plastic are covered by the warranty only in the event of obvious material defects.

The warranty does not cover wear and tear of the machine's working elements that wear out during normal use, such as:

- Elements of the furrow opener (chisel, sword, beam cover, sleeves),
- Spreading and breaking disc,
- Wavey cutting disc,
- Toothed closing discs,
- Pre-emergence marker discs,
- Bearings in discs and road/field wheels,
- Rubber compaction tires,
- Cage compaction wheels,
- Fasteners (bolts, nuts, washers etc.),

ATTENTION The producer/seller shall not process warranty claims when:

- Non-original spare parts were used,
- The machine, its individual components and accessories were not used, stored or maintained properly,
- Any repairs or technical changes were made without the manufacturer's consent,
- The contents of this instruction manual were not followed,
- The warranty card was not completed or was completed incompletely,
- The defects or faults that occurred are not related to a material or manufacturing defect,
- The defects or faults were caused by damage to the machine during transport,
- The defects or faults were caused by force majeure, the action of the elements or third parties,

41. Useful tools

While working with the cultivation unit for strip till Czajkowski ST, you should have the following tools in your toolbox. They might come in handy when operating the unit.

- hammer,
- striker (7 mm),
- wrench set: 2x10mm, 2x13mm, 2x17mm, 2x19mm, 1x36mm, 1x46 mm,
- hex key set: 2,5mm, 4mm, 6mm, 8mm.

The above-mentioned tools are not included when buying Czajkowski machines.

42. Bolts tightening torque values

Tightening torque values in **Nm**		
Diameter	**8.8**	**10.9**
M4	3.3	4.8
M5	6.5	9.5
M6	10	15
M8	25	35
M10	50	75
M12	90	130
M14	150	210
M16	220	330
M18	330	470
M20	460	660
M22	630	900
M24	800	1200
M27	1100	1700
M30	1600	2300
M33	2100	3100
M36	2800	4000
M39	3600	5100
M42	4400	6200

- The above-mentioned bolt tightening torques are approximate values,
- When tightening wheel bolts, the values given in the section on changing wheels should be used.

43. Troubleshooting

1.Equipment 2.Action 3.Issue	Main issue	Failure	Failure cause	Failure removal
Attaching the machine	Tractor	**The tractor should be equipped with quick release connector for free oil flow**	oil should return to the tractor freely	Fix the quick release connector for free oil flow directly to the oil tank
Attaching the machine	Tractor	**The cabin should have at least two 3-pin 12v sockets**	Power supply for the camera display and extension cord for the seeder	Install the sockets
Attaching the machine	External hydraulic system	**Pump of the external hydraulic system should be installed in a way that does not allow it to move freely**	Incorrect installation of the pump may lead to damaging the spline	Correct installation of the pump on the PTO shaft axis
Attaching the machine	Connecting hydraulic hoses	**Machine works incorrectly**	Connecting hydraulic hoses incorrectly will cause failure	Connect hoses according to colours and pairs.
Attaching the seeder	Connecting hydraulic hoses	**Machine works incorrectly**	Connecting hydraulic hoses incorrectly will cause failure	Connect hoses according to colours and pairs.
Attaching the seeder	Seeder	**Signal cable is too short**	Use a 10m extension cord between the tractor and the seeder	Use dedicated seeder extension cord
Attaching the PS attachment	Attachment	**Connect:** **-pneumatic hose** **-hydraulic system (blue hoses)** **-electrical cable**	- hose for transporting seeds between the device and the seeder -blue hydraulic outlets for marker control -electronics for controlling seeding and paths	Connect according to the user manual
ST unit	Notched discs	**Don’t break up harvest remains**	Not enough depth	Slide out
ST unit	Furrow opener	**Too shallow**	Too many clips on hydraulic cylinders	Remove excessive clips
ST unit	Furrow opener	**Chisels don't work efficiently, lose their track**	Used opener, working parts replaced too late	Replace the coulter beam
ST unit	Furrow opener	**No pressure in working parts**	There’s a release valve on the hydraulic accumulator	Close the valve
ST unit	Furrow opener	**Deposits remain on the coulter beam**	Not enough depth of the cutting disc	Lower on the three-point linkage of the tractor

ST unit	Fertilizer distributing tubes	**Fertilizer must be applied deeper**	Tubes have 3 depth adjustments	Put on lower holes
ST unit	Fertilizer distributing tubes	**No flow**	Clogged system or wrong connection of hoses	Check hose connections and clean the system
Seed distribution	Flow sensors	**No flow is indicated**	Seeds stay in the flow sensor or the coulter of the applicator	Clean the blocked system
Seed distribution	Tank	**Seeds stay in the tank**	Leaking apparatus	Check the tightening rubber under the rotor
Hydraulic system	Pressing roller	**Pressing strength of the roller is too weak**	Pressure is too low	Correct the pressing pressure. Recommended: 160 - 200 bar
Hydraulic system	Rear three-point linkage	**Uncovered seeds on elevations**	The three-point linkage is not copying the ground	The rear three-point linkage should work in „free float" mode. Set the mode on the tractor.
Hydraulic system	Air blower	**Oil is flowing out due to tightened engine**	Oil is not flowing back to the tractor freely	Check the free flow connection
Hydraulic system	Unfolding	**The machine is folding and unfolding very slowly**	There's a pressure reduction valve at the rear section of the machine	Close the valve
Hydraulic system	Folding, unfolding, working parts, rear three-point linkage	**All functions aren't working correctly**	Hydraulic hoses have colour marking	Check the connection of hydraulic hoses to the tractor
Seed distribution	Flow sensors	**No flow is indicated**	Seeds stay in the flow sensor or the coulter of the applicator	Clean the blocked system
Seed distribution	Flow sensors	**No flow is indicated**	Seeds stay in the flow sensor or the coulter of the applicator	Clean the blocked system
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Hydraulic system	Pressing roller	**Pressing strength of the roller is too weak**	Pressure is too low	Correct the pressing pressure. Recommended: 160 - 200 bar
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Hydraulic system	Unfolding	**The machine is folding and unfolding very slowly**	There's a pressure reduction valve at the rear section of the machine	Close the valve

Hydraulic system	Folding, unfolding, working parts, rear three-point linkage	**All functions aren't working correctly**	Hydraulic hoses have colour marking	Check the connection of hydraulic hoses to the tractor
Electrical system	Display screen	**Displays screen isn't turning on**	No power	Check the power cord between the tractor and the machine
Electrical system	Seeds	**The device is not distributing the specified amount of seeds**	Incorrect settings	Check settings for working width of the unit
Electrical system	Seeds	**Rotor is rotating at maximum speed**	Incorrect rotor size	Replace the rotor with a bigger one