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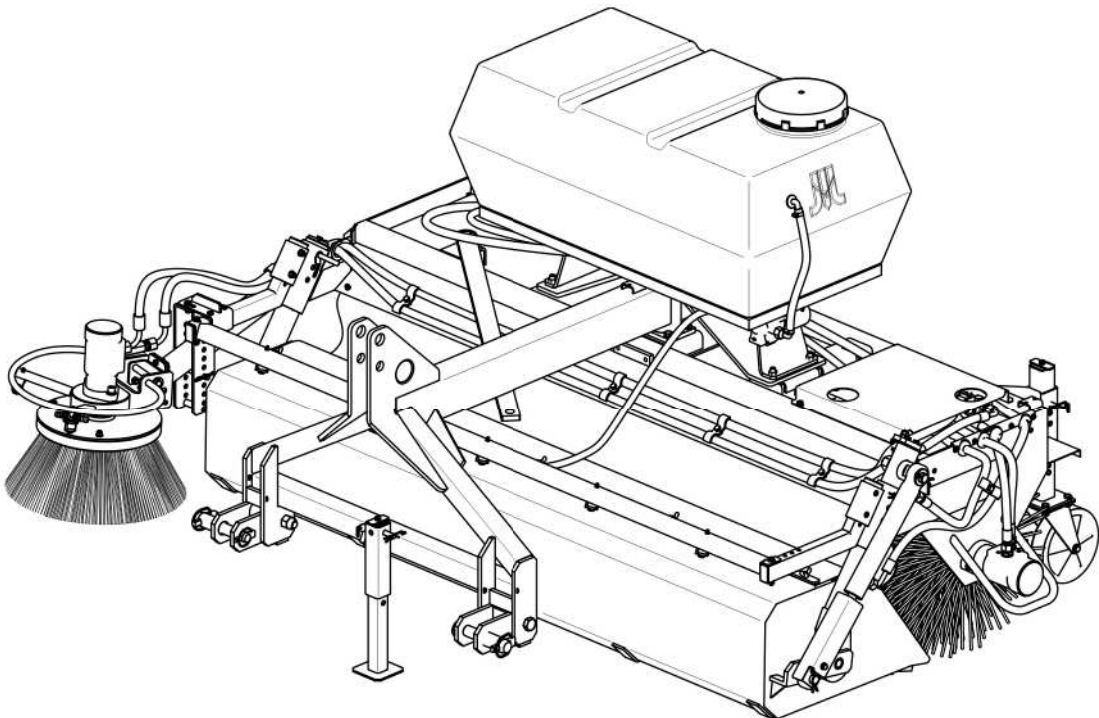
# **OPERATOR'S MANUAL**

## **MOUNTED SWEEPER**

### **PRONAR „Agata”**

**ZM-2000-01    ZM-2000-02    ZM-2000-03**  
**ZM-2000-04    ZM-2000-05**

TRANSLATION OF THE ORIGINAL COPY OF THE MANUAL



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# INTRODUCTION

Information contained herein is current at date of publication. As a result of improvements, some numerical values and illustrations contained in this publication may not correspond to the factual specification of the machine supplied to the user. The manufacturer reserves the right to introduce design changes in machines produced that facilitate operation and improve the quality of their work, without making minor amendments to this Operator's Manual.

This Operator's Manual is an integral part of the machine's documentation. Before using the machine, the user must carefully read this Operator's Manual and observe all recommendations. This guarantees safe operation and ensures malfunction free work of the machine. The machine is designed to meet obligatory standards, documents and legal regulations currently in force.

The manual describes the basic safety rules and operation of the Sweeper. If the information contained in the Operator's Manual needs clarification then the user should refer for assistance to the sale point where the machine was purchased or to the Manufacturer.

## MANUFACTURER'S ADDRESS:

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## SYMBOLS APPEARING IN THIS OPERATOR'S MANUAL

Information, descriptions of danger and precautions and also recommendations and prohibitions associated with user safety instructions are marked:



and also preceded by the word "**DANGER**". Failure to observe the instructions may endanger the machine operator's or other person's health or life.

Particularly important information and instructions, the observance of which is essential, are distinguished in the text by the sign:



and also preceded by the word "**ATTENTION**". Failure to observe the instructions may lead to damage to the machine as a result of improper operation, adjustment or use.

In order to focus the user's attention on the need to perform maintenance, the relevant section of the Operator's Manual is marked with the pictogram:



Additional tips and advice for machine operation are marked:



and also preceded by the word „**TIP**”.

## DIRECTIONS USED IN THIS OPERATOR'S MANUAL

Left side – side to the left hand of the operator facing in the direction of machine's forward travel.

Right side – side to the right hand of the operator facing in the direction of machine's forward travel.



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## EC DECLARATION OF CONFORMITY OF THE MACHINERY

PRONAR Sp. z o.o. declares with full responsibility, that the machine:

Description and identification of the machinery					
Generic denomination and function:	<b>Tractor attached sweeper</b>				
Type:	<b>ZM-2000-01</b>	<b>ZM-2000-02</b>	<b>ZM-2000-03</b>	<b>ZM-2000-04</b>	<b>ZM-2000-05</b>
Model:	—	—	—	—	—
Serial number:					
Commercial name:	<b>Tractor attached sweeper PRONAR Agata ZM-2000-01</b> <b>Tractor attached sweeper PRONAR Agata ZM-2000-02</b> <b>Tractor attached sweeper PRONAR Agata ZM-2000-03</b> <b>Tractor attached sweeper PRONAR Agata ZM-2000-04</b> <b>Tractor attached sweeper PRONAR Agata ZM-2000-05</b>				

to which this declaration relates, fulfills all the relevant provisions of the Directive **2006/42/EC** of The European Parliament and of The Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (Official Journal of the EU, L 157/24 of 09.06.2006).

The person authorized to compile the technical file is the Head of Research and Development Department at PRONAR Sp. z o.o., 17-210 Narew, ul. Mickiewicza 101A, Poland.

This declaration relates exclusively to the machinery in the state in which it was placed on the market, and excludes components which are added and/or operations carried out subsequently by the final user.

Narew, the 2010-04-07

Place and date

Z-C.A. DYREKTORA  
d/s technicznych  
czynności zarządu

*Roman Omelianiuk*

Full name of the empowered person  
position, signature

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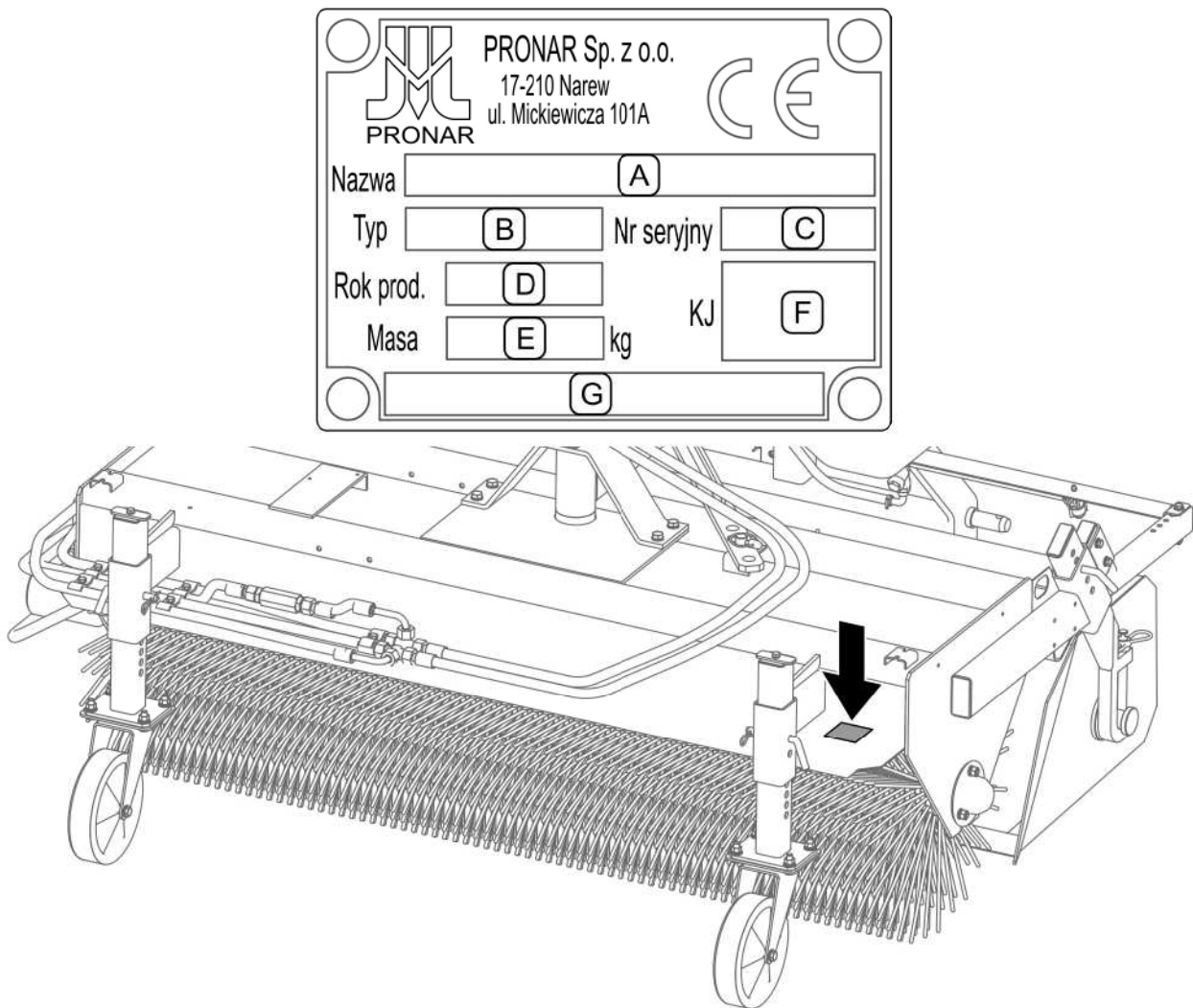
*SECTION*

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**BASIC INFORMATION**

## 1.1 IDENTIFICATION



**FIG. 1.1** Location of the data plate

Meaning of data plate items (FIG. 1.1):

- A – machine name
- B – type (i.e. ZM-2000-01)
- C – serial number
- D – year of manufacture
- E – machine tare weight [kg]
- F – Quality Control stamp
- G – Unfilled box or extension of name (box A)

Serial number is stamped on the data plate. The data plate is located at the rear, on the frame at the right bracket of the jockey wheel (FIG. 1.1). When buying the machine, check that the serial number corresponds with that indicated in the *WARRANTY BOOK*, in the sales documents and in the *OPERATOR'S MANUAL*.

## 1.2 PROPER USE

The ZM-2000 mounted sweeper is used for keeping clean access roads, squares, parking spaces, extensive warehouse areas, external surroundings of buildings with paved surfaces as asphalt, concrete paving blocks, concrete. The sweeper may be used by road maintenance services for technological cleaning of the roadbed prior to application of asphalt layer on renovated road sections. Without the waste tank the sweeper can be used for clearing of dirt or a thin, fresh layer of snow on the right or left without actually collecting the swept materials. Sweeper can be mounted on tractors (carrying vehicles) that meet the requirements presented in Table 1.1

Using it as intended also involves all actions connected with the safe and proper operation and maintenance of the machine. Due to the above, the user is obliged to:

- carefully read the *OPERATOR'S MANUAL* and comply with its recommendations,
- understand the machine's operating principle and how to operate it safely and correctly,
- comply with general safety regulations while working,
- prevent accidents,
- comply with road traffic regulations.

The machine may only be used by persons, who:

- are familiar with the contents of this publication and with the contents of the carrying vehicle Operator's Manual
- have been trained in machine operation and safe working conditions,
- have the required authorisation to drive and are familiar with the road traffic regulations and transport regulations.

**IMPORTANT!**



The machine must not be used for purposes other than those for which it is intended, in particular for:

- for transporting people and animals,
- for transport of whatever objects on the machine

**TAB. 1.1 Agricultural tractor (carrying vehicle) requirements**

	UNIT	REQUIREMENTS
<b>Linkage</b> Three point linkage	-	Category II or III according to ISO 730-1 with a floating position
<b>Hydraulic system</b> Nominal pressure	MPa	16
Type of oil	-	hydraulic, HL32
Hydraulic sockets	-	2 sockets of one section, with lockable ON position and the option to change the oil flow direction
The minimum system efficiency	dm <sup>3</sup> /min	13
<b>Electrical system</b> Lighting system socket	-	7 polar compliant with ISO 1724
Electrical system voltage	V	12
<b>Other requirements</b> Minimum power	hp (kW)	35 (25)
Beacon light	-	orange light



## 1.3 OPTIONAL EQUIPMENT

The sweeper equipment includes:

- Operator's Manual,
- Warranty Book,

Additional fittings and optional equipment:

- Front jockey wheel (*catalogue number 80RPN-20.00.00.00*)
- electrical system with lighting (*catalogue number 12N-32030000-01*),
- warning sign bracket (*catalogue number 12RPN-31.00.00.00*)

## 1.4 WARRANTY TERMS

PRONAR Sp. z o.o., Narew guarantees the reliable operation of the machine when it is used according to its intended purpose as described in the *OPERATOR'S MANUAL*. Defects discovered during the warranty period will be removed by the Service under warranty. The repair period is specified in the *WARRANTY BOOK*.

The guarantee does not apply to those parts and sub-assemblies of the machine, which are subject to wear in normal usage conditions, regardless of the warranty period. Consumables include the following parts/sub-assemblies:

- working elements of the roller brush and side brush;
- bearings,
- filters,
- bulbs,

The warranty service only applies to such cases as: mechanical damage, which is not the user's fault, factory defects of parts, etc.

In the event of damage arising from:

- mechanical damage which is the user's fault, caused by road accidents,
- by inappropriate use, adjustment or maintenance, use of the machine for purposes other than those for which it is intended,

- use of damaged or malfunctioning machine,
- repairs carried out by unauthorised persons, improperly carried out repairs,
- making unauthorised alterations to machine design,

the user will lose the right to warranty service.



### TIP

Demand that the seller carefully and precisely fills out the *WARRANTY BOOK* and guarantee repair coupons. A missing date of purchase or sale point stamp, may make the user ineligible for any warranty repair or refund.

The user is obliged to report immediately on noticing any wear in the paint coating or traces of corrosion, and to have the faults rectified whether they are covered by the guarantee or not. Detailed guarantee regulations are contained in the *WARRANTY BOOK* attached to each machine.

Modification of the machine without the written consent of the Manufacturer is forbidden. In particular, do NOT weld, drill holes in, cut or heat the main structural elements, which have a direct impact on the machine operation safety.

## 1.5 TRANSPORT

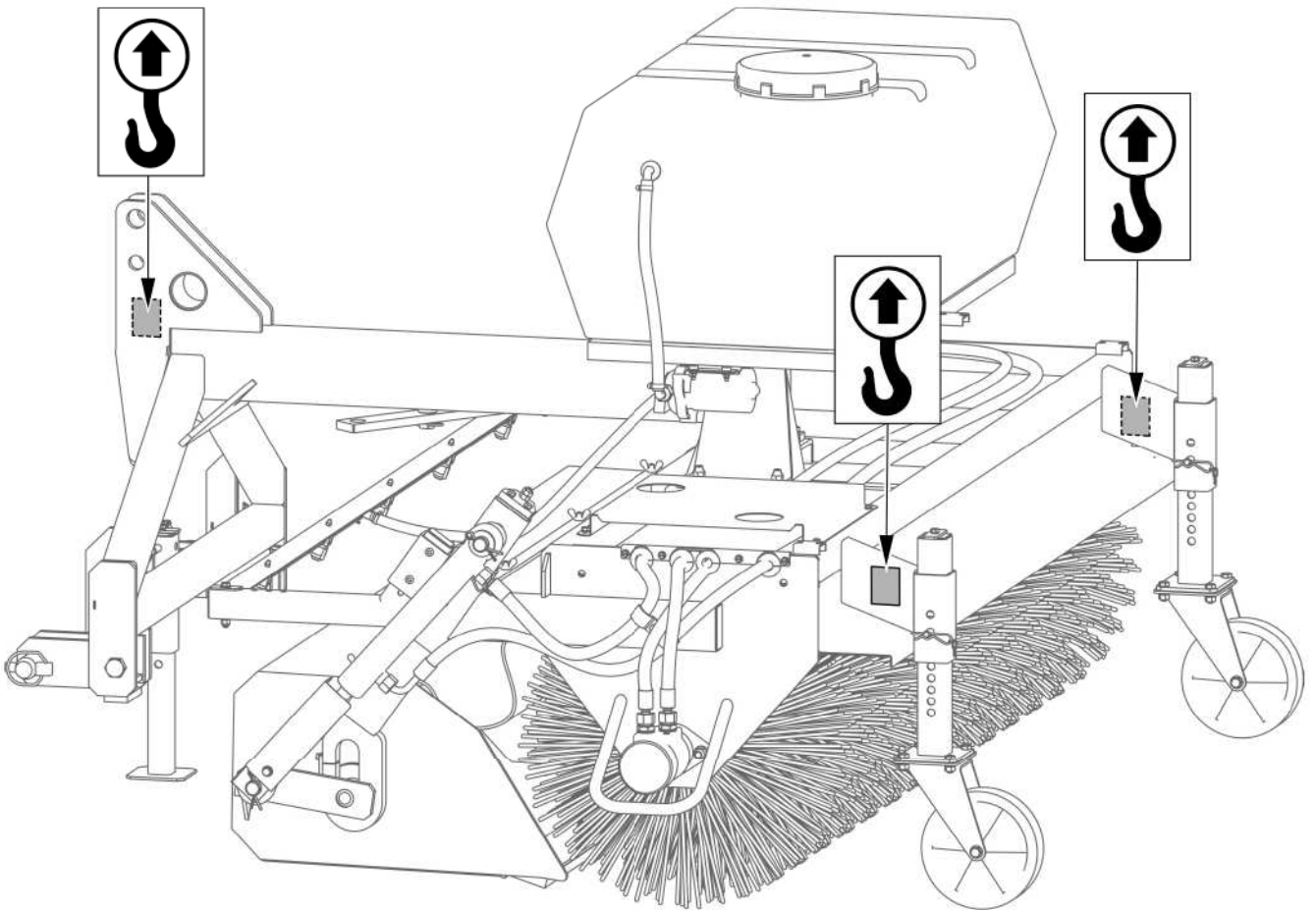
The machine is prepared for sale completely assembled and does not require packing. Packing is only required for the machine operator's manual and electrical system components.

Delivery is either by transport on a vehicle or independently, after being attached to a tractor. Transport of the machine is permissible connected to a carrying vehicle provided the vehicle's driver familiarises himself with the machine's Operator's Manual and particularly with information concerning safety and principles of connection and transport on public roads.

During road transport the machine should be secured on the carrier platform by certified belts or chains fitted with pulley.

When loading and unloading the machine, comply with the general principles of workplace health and safety for reloading work. Persons operating reloading equipment must have the qualifications required to operate these machines.

The machine should be hitched to lifts in specially designated places (FIG. 1.2) i.e., using a three-point linkage and each of the jockey wheel brackets.



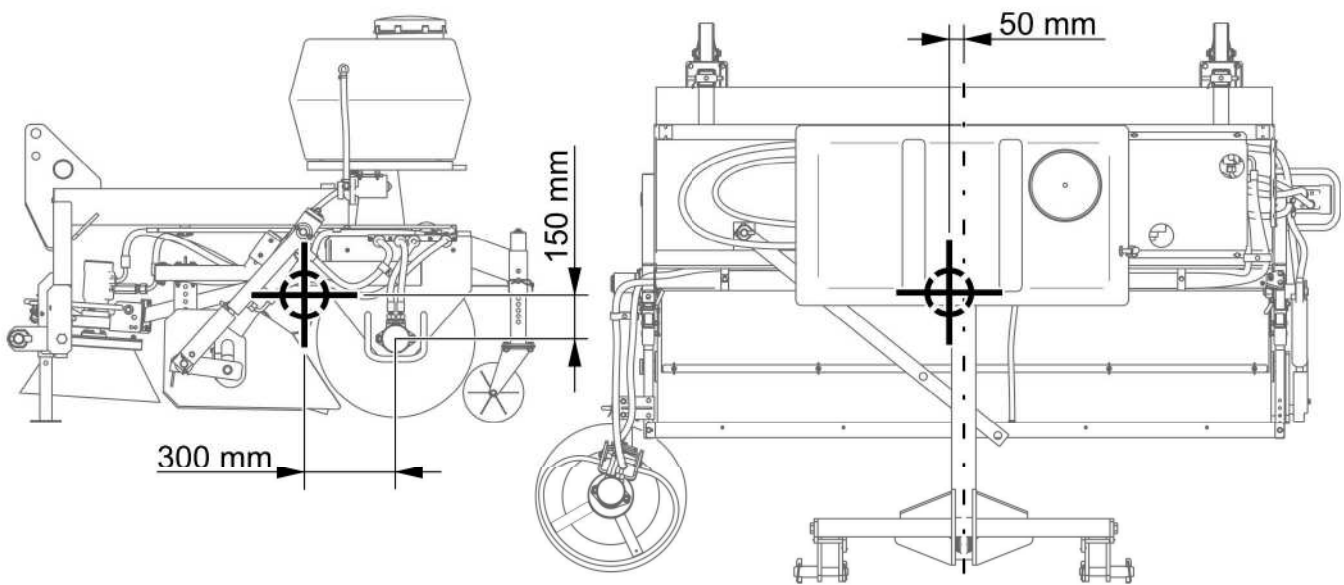
**FIG. 1.2** transport lugs

Suspension points are identified with information decals. When lifting the machine take particular care due to the possibility of tipping over the machine and the risk of injuries from protruding parts. To keep lifted machine in the correct direction it is recommended to apply additional guy cables. During the loading work particular care should be taken not to damage paint coating.

**DANGER**



When transporting independently, the user must carefully read this Operator's Manual and observe all recommendations. When being transported on a motor vehicle the machine must be mounted on the vehicle's platform in accordance with the transport safety requirements. The driver of the vehicle should take particular care while transporting the machine. This is due to the vehicle's centre of gravity shifting upwards when loaded with the machine.



**FIG. 1.3** Centre of gravity



**ATTENTION!**

Depending on the machine version (ZM-2000-01..05), centre of gravity varies in the  $\pm 75$  mm range



**ATTENTION!**

Do not attach any slings or fastening elements to cylinder or hydraulic motor.

## 1.6 ENVIRONMENTAL HAZARDS

A hydraulic oil leak constitutes a direct threat to the natural environment owing to its limited biodegradability. Maintenance and repair work which involves the risk of an oil leak should be performed in the rooms with oil resistant surface. In the event of oil leaking into the environment, first of all contain the source of the leak, and then collect the leaked oil using available means. Remaining oil should be collected using sorbents, or by mixing the oil with sand, sawdust or other absorbent materials. The oil pollution, once gathered up, should be kept in a sealed, marked, hydrocarbon resistant container, and then passed on to the appropriate oil waste recycling centre. The container should be kept away from heat sources, flammable materials and food.

Oil, which has been used up or is unsuitable for further use owing to a loss of its properties should be stored in its original packaging in the conditions described above.

## 1.7 WITHDRAWAL FROM USE

In the event of decision by the user to withdraw the machine from use, comply with the regulations in force in the given country concerning withdrawal from use and recycling of machines withdrawn from use.

Before proceeding to dismantle machine, oil shall be completely removed from hydraulic system.

When spare parts are changed, worn out or damaged parts should be taken to a collection point for recyclable raw materials. Waste oil and also rubber and plastic elements should be taken to establishments undertaking the utilisation of such waste.



### **IMPORTANT!**

During dismantling personal protection equipment shall be used i.e. protective clothing, boots, gloves and protective goggles etc.

Avoid contact of skin with oil. Do not allow used oil to spill.



**SECTION**

**2**

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**SAFETY ADVICE**

## 2.1 BASIC SAFETY RULES

### 2.1.1 USE OF MACHINE

- Before using the machine, the user must carefully read this Operator's Manual and the *WARRANTY BOOK*. When operating the machine, the operator must comply with the recommendations.
- The machine may only be used and operated by persons qualified to drive agricultural tractors and agricultural machines and trained in the use of the machine.
- If the information contained in the Operator's Manual is difficult to understand, contact a seller, who runs an authorised technical service on behalf of the manufacturer, or contact the manufacturer directly.
- Be aware of the existence of a minimal risk, and for this reason the fundamental basis for using this machine should be the application of safety rules and sensible behaviour.
- The machine must never be used by persons, who are not authorised to drive agricultural tractors, including children and people under the influence of alcohol or other drugs.
- Non-compliance with the safety rules of this Operator's Manual can be dangerous to the health and life of the operator and others.
- The machine must not be used for purposes other than those for which it is intended. Anyone who uses the machine other than the way intended takes full responsibility for himself for any consequences of this use. Use of the machine for purposes other than those for which it is intended by the Manufacturer may invalidate the guarantee.
- The machine may only be used when all the protective elements (i.e. safety guards) are technically sound and correctly positioned. In the event of loss or destruction of the safety guards, they must be replaced with new ones.



### **2.1.2 LINKING AND DISCONNECTING FROM TRACTOR**

- Do NOT link the sand spreader to a tractor, if different types of hydraulic oil are used in both machines, or if the three point linkage system of the machine is not compatible with the category of the linkage system of the carrying vehicle.
- After completion of coupling the machine, check the safeguards. Carefully read the carrying vehicle Operator's Manual.
- To mount machine on carrying vehicle use only genuine pins and safeguard cotter pins.
- The carrying vehicle to which the machine will be coupled must be technically reliable and must fulfil the requirements of machine Manufacturer.
- Be especially careful when hitching the machine to carrying vehicle.
- When hitching, there must be nobody between the machine and the carrying vehicle. A person assisting in the hitching of the machine should stand in such a place (beyond the area of danger), in order to be continuously visible to the carrying vehicle driver.
- Be especially careful when disconnecting the machine from the tractor.
- The machine disconnected from the tractor must be supported on the jockey wheels and parking stand, set on a level, sufficiently hard surface in such a way as to allow re-connecting.

### **2.1.3 HYDRAULIC SYSTEM**

- The hydraulic system is under high pressure when operating.
- Regularly check the technical condition of the connections and the hydraulic lines. There must be no oil leaks.
- In the event of malfunction of the hydraulic system, the machine shall be disconnected from use until the malfunction is corrected.
- When connecting or disconnecting the hydraulic lines, make sure that carrying vehicle and machine hydraulic system is not under pressure. If necessary reduce residual pressure in the system.
- Use the oil recommended by the Manufacturer. Never mix two types of oil.

- In the event of injuries being caused by pressurised hydraulic oil, contact a doctor immediately. Hydraulic oil may find its way under the skin and cause infections. In the event of contact of oil with eye, rinse with large quantity of water and in the event of the occurrence of irritation consult a doctor. In the event of contact of oil with skin wash the area of contact with water and soap. Do NOT apply organic solvents (petrol, kerosene).
- Used oil or oil, which has lost its properties, should be stored in original containers or replacement containers resistant to action of hydrocarbons. Replacement containers must be clearly marked and appropriately stored.
- Do not store hydraulic oil in packaging designed for storing food or foodstuffs.
- Rubber hydraulic lines must be replaced every 4 years regardless of their technical condition.
- Repair and replacement of hydraulic system elements should be entrusted to the appropriately qualified persons.

#### **2.1.4 TRANSPORTING THE MACHINE**

- When driving on public roads, comply with the road traffic regulations. in force in the country, in which the machine is used.
- Do not exceed the permitted speed arising from road conditions and design limitations. Adjust travel speed to the prevailing road conditions and other limitations arising from road traffic regulations limits.
- Do NOT leave machine raised and unsecured while the tractor is parked. When parked, the machine should be lowered.
- Do NOT ride on the machine or transport any materials on it.
- Before using the machine always check its technical condition, especially in terms of safety. In particular, check the technical condition of the hitch system and elements connecting hydraulic system.
- When transporting the machine lock the tractor three-point linkage in the upper position to prevent lowering it by accident (*if such an option is available*)
- Reckless driving and excessive speed may cause accidents.

### 2.1.5 MAINTENANCE

- During the warranty period, any repairs may only be carried out by Warranty Service authorised by the manufacturer. It is recommended that necessary repairs to machine should be undertaken by specialised workshops.
- In the event of any fault or damage whatsoever, do not use the machine until the fault has been corrected.
- During work use the proper, close-fitting protective clothing, gloves and appropriate tools. When working on hydraulic systems it is recommended to use oil resistant gloves and protective goggles.
- Any modification to the machine frees PRONAR from any responsibility for damage or detriment to health which may arise as a result.
- Regularly check the technical condition of the safety devices and correct tightening of bolt connections.
- Regularly perform service inspections of machine as recommended by the Manufacturer.
- Do NOT perform service or repair work under raised and unsupported machine.
- Before beginning work on hydraulic systems, reduce oil pressure.
- Servicing and repair work should be carried out in line with the general principles of workplace health and safety. In the event of injury, the wound must be immediately cleaned and disinfected. In the event of more serious injuries, seek a doctor's advice.
- Repair, maintenance and cleaning work should be carried out with the tractor's engine switched off and the ignition key removed. Immobilise tractor with parking brake. Ensure that unauthorised persons do not have access to the vehicle.
- Should it be necessary to change individual parts, use only original parts. Non-adherence to these requirements may put the user and other people's health and life at risk, and also damage the machine and invalidate the guarantee.
- The paint coating should be cleaned off before beginning welding work. Burning paint fumes are poisonous for people and animals. Welding work should be carried out in a well lit and well ventilated space.

- During welding work pay attention to flammable or fusible elements (parts of the hydraulic systems, plastic parts). If there is a risk that they will catch fire or be damaged, they should be removed or covered with non-flammable material before commencing welding work. Before beginning work prepare a CO<sub>2</sub> or foam extinguisher.
- Do NOT weld, drill holes in, cut or heat the main structural elements, which have a direct impact on the machine operation safety.
- In the event of work requiring the machine to be raised, use properly certified hydraulic or mechanical lifts for this purpose. After lifting the machine, stable and durable supports must also be used. Do NOT carry out work under a machine, which has only been raised with the three point linkage.
- The machine must not be supported using fragile elements (bricks or concrete blocks).
- After completing work associated with lubrication, remove excess oil or grease.
- In order to reduce the danger of fire the machine must be kept in a clean condition.

### **2.1.6 MACHINE OPERATION**

- Before starting the tractor with the coupled machine make sure the hydraulic system control levers are in off position, otherwise it may lead to uncontrolled operation of the machine.
- Before lifting or lowering the machine mounted on the tractor, make sure there are no bystanders near the machine.
- Before starting the machine make sure that there are no bystanders (especially children) or animals in the danger zone. The machine operator is obliged to ensure proper visibility of the machine and the working area.
- During machine operation do not occupy a different position than that of the operator in the vehicle's cab. Do NOT leave the cab, when the machine is in operation.
- Keep a safe distance from rotating machine parts.

- When filling the water tank, lower the machine to its operating position and turn off the tractor engine.

## 2.2 DESCRIPTION OF MINIMAL RISK

Pronar Sp. z o. o. in Narew has made every effort to eliminate the risk of accidents. There is, however, a certain minimal risk, which could lead to an accident, and this is connected mainly with the actions described below:

- using the mower for purposes other than those for which it is intended,
- being between the carrying vehicle and the machine while the engine is working and when the machine is being attached,
- being on the machine while the engine is working,
- operating the machine with removed or faulty safety guards,
- not maintaining safe distance from the danger zone or being within the zones while the machine is operating,
- operation of the machine by persons under the influence of alcohol,
- cleaning, maintenance and technical checks when tractor is connected and engine is running.





The minimal risk may be kept to a minimum by following the recommendations below:




- prudent and unhurried operation of the machine,
- sensible application of the remarks and recommendations contained in the Operator's Manual,
- carrying out repair and maintenance work in line with operating safety rules,
- carrying out repair and maintenance work by persons trained to do so,
- using close fitting protective clothing,
- ensuring unauthorised persons have no access to the machine, especially children,
- maintaining safe distance from forbidden or dangerous places
- a ban on being on the machine when it is operating

## 2.3 INFORMATION AND WARNING DECALS

All signs should always be legible and clean, visible to the operator and also to persons possibly being in the vicinity of working machine. If any safety sign is lost or illegible, it should be replaced with a new one. All elements having safety signs replaced during repairs should be affixed with these signs. Safety signs and decals may be purchased from the Manufacturer or the Seller.

**TAB. 2.1 Information and warning decals**

ITEM	SYMBOL	DESCRIPTION
1		<p>Before starting work, carefully read the Operator's Manual.</p>
2		<p>Pressurised liquid. Keep a safe distance.</p>
3		<p>Risk of injury caused by thrown objects. Keep a safe distance from the operating machine.</p>
4		<p>Do NOT approach and do NOT touch rotating brushes</p>

ITEM	SYMBOL	DESCRIPTION
5		Marking of points of suspension
6	<p style="text-align: center;"><b><i>Agata</i></b></p>	Trade mark
7	<p style="text-align: center;"><i>Municipal Series</i></p>	Additional marking
8	<p><b><i>ZM 2000-01    ZM 2000-02</i></b>  <b><i>ZM 2000-03    ZM 2000-04</i></b>  <b><i>ZM 2000-05</i></b></p>	Sweeper model
9		Rear clearance marking
10		Front clearance marking

Numbers in the item column correspond to marking (FIG. 2.1)

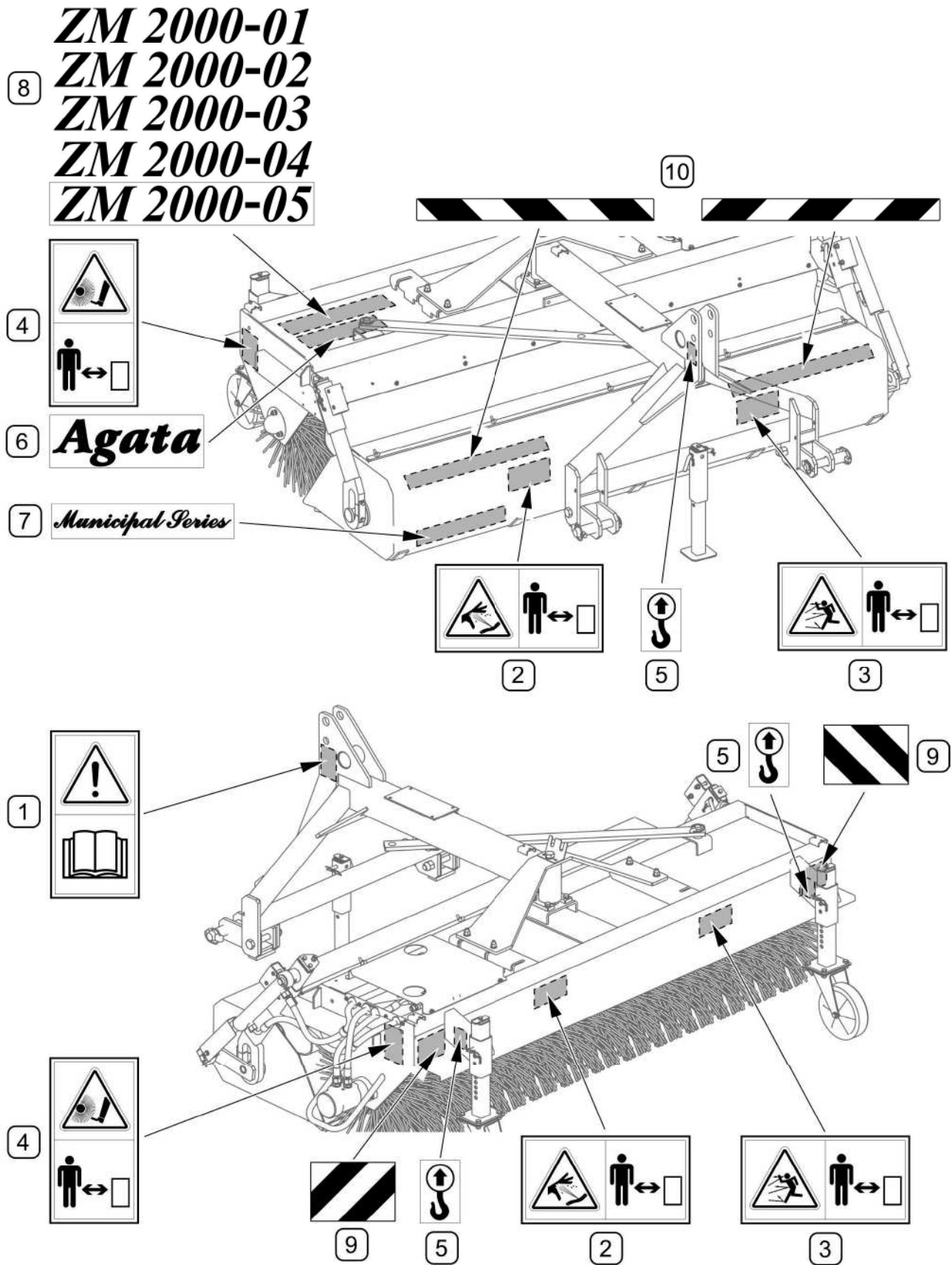


FIG. 2.1 Locations of information and warning decals.

Meaning of symbols (TAB. 2.1)



*SECTION*

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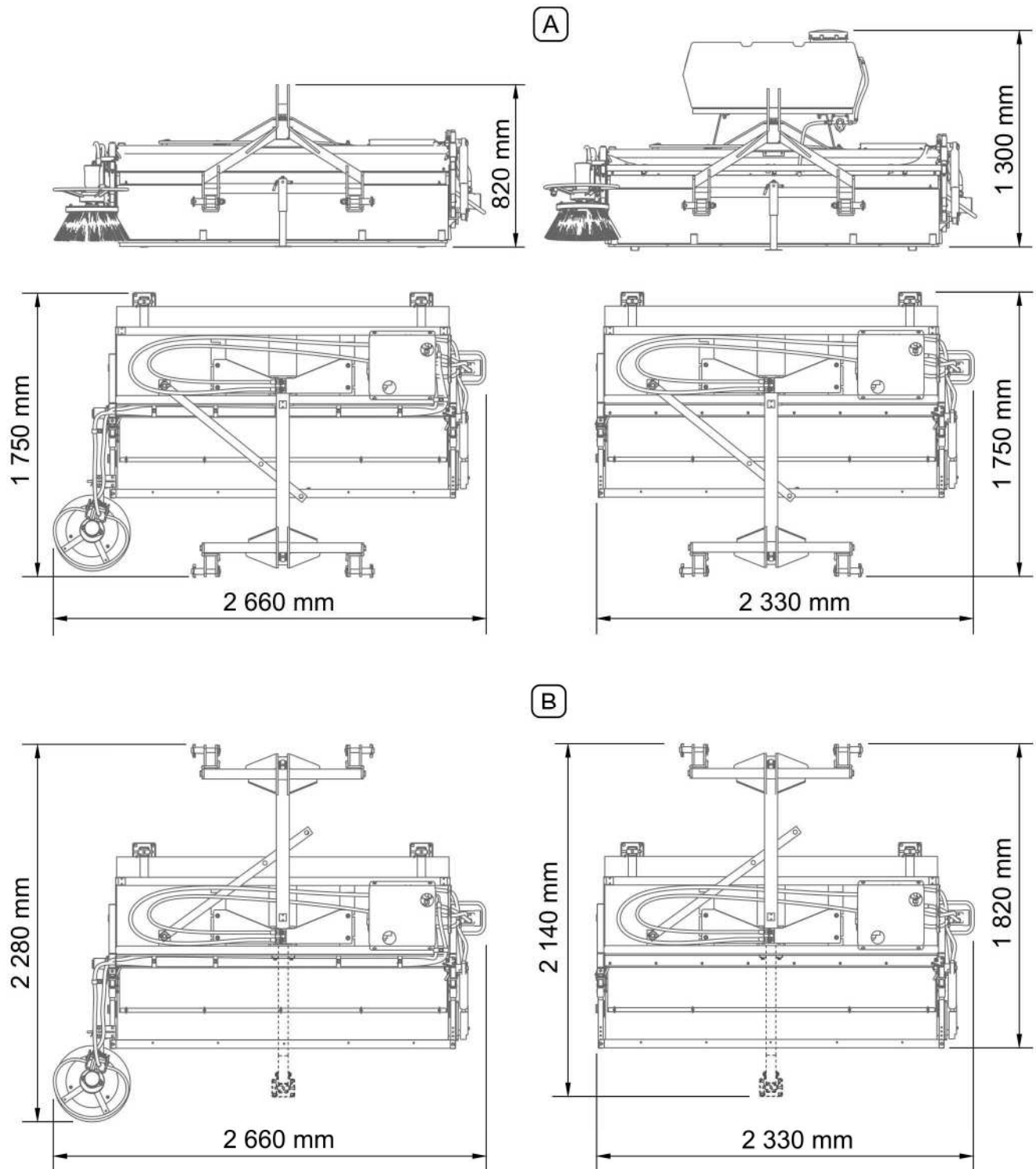
**DESIGN AND  
OPERATION**

### 3.1 TECHNICAL SPECIFICATION

**TAB. 3.1 BASIC TECHNICAL SPECIFICATION**

	Unit	ZM-2000-01	ZM-2000-02	ZM-2000-03	ZM-2000-04	ZM-2000-05
Model						
Mounting method	–	three-point linkage cat. II and III according to PN-ISO 730-1				
Sweeping width		2,000	2,400	2,000	2,400	2,000
Sweeping width (when inclined at 20°)	mm	1,875	2,375	1,875	2,375	1,875
Productivity (The recommended sweeping speed)	m <sup>2</sup> /h	11,875	14,750	11,875	14,750	11,875
Recommended sweeping speed	km/h	6				
Type of working components	–	roller	roller + brush	roller	roller + brush	roller
Power transmission	–	tractor external hydraulics				
Waste tank capacity	dm <sup>3</sup>	250				–
Tare weight (without water)	kg	405	445	430	470	320
Rotation speed of sweeping roller brush: - recommended – maximum	RPM	100 130				
Water tank capacity	dm <sup>3</sup>	–	200		–	
Quantity of sprinkling nozzles	item	–	4	6	–	
Sprinkler system supply	–	–	12V socket 7-pole		–	
Sprinkler system control	–	–	switch on the supply line		–	

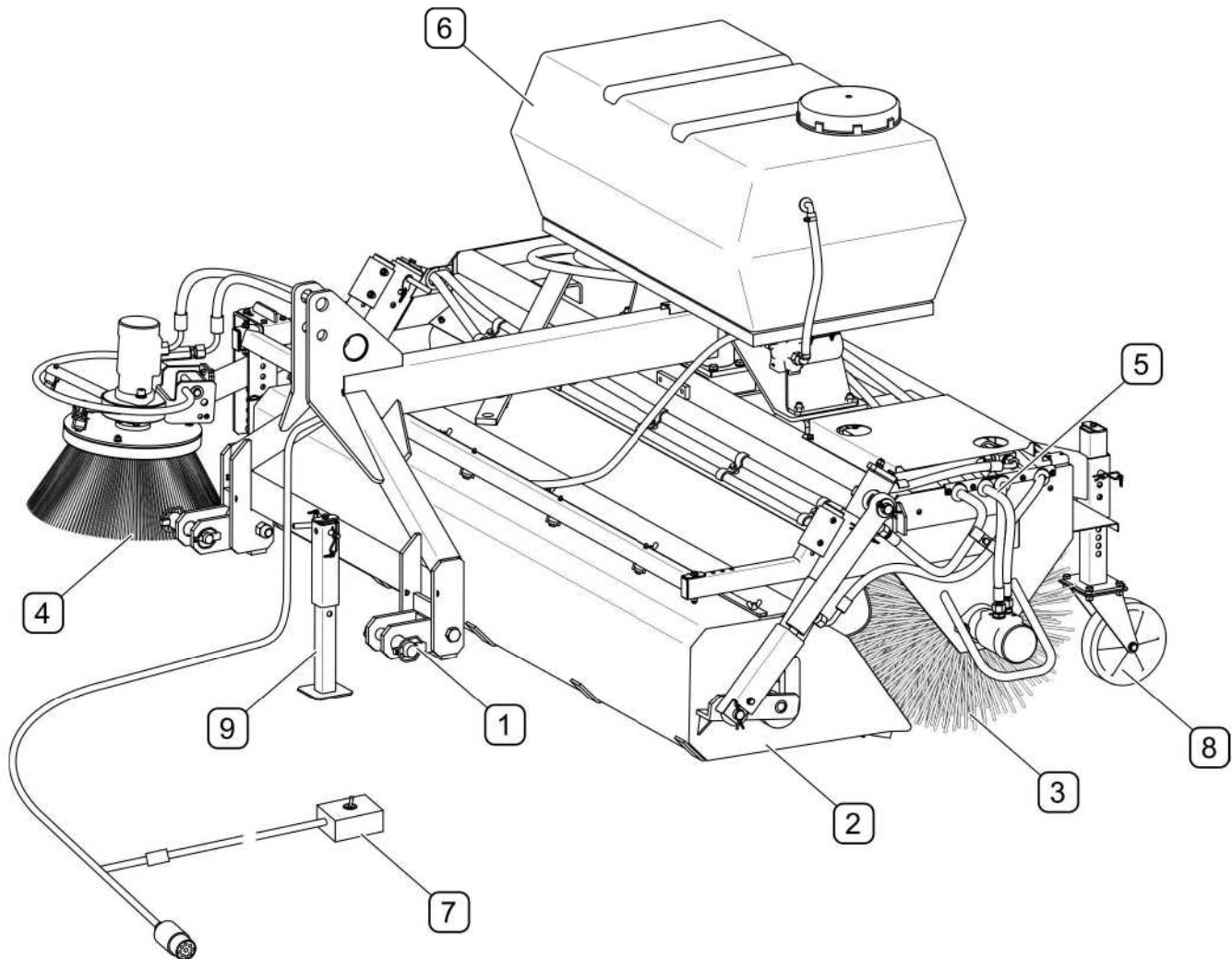
Level of noise emitted by the Sweeper does not exceed 70 dB(A)



**FIG. 3.1** External dimensions depending on the equipment

(A) - mounting at the rear of the carrying vehicle, (B) - mounting at the front of the carrying vehicle;

## 3.2 GENERAL DESIGN

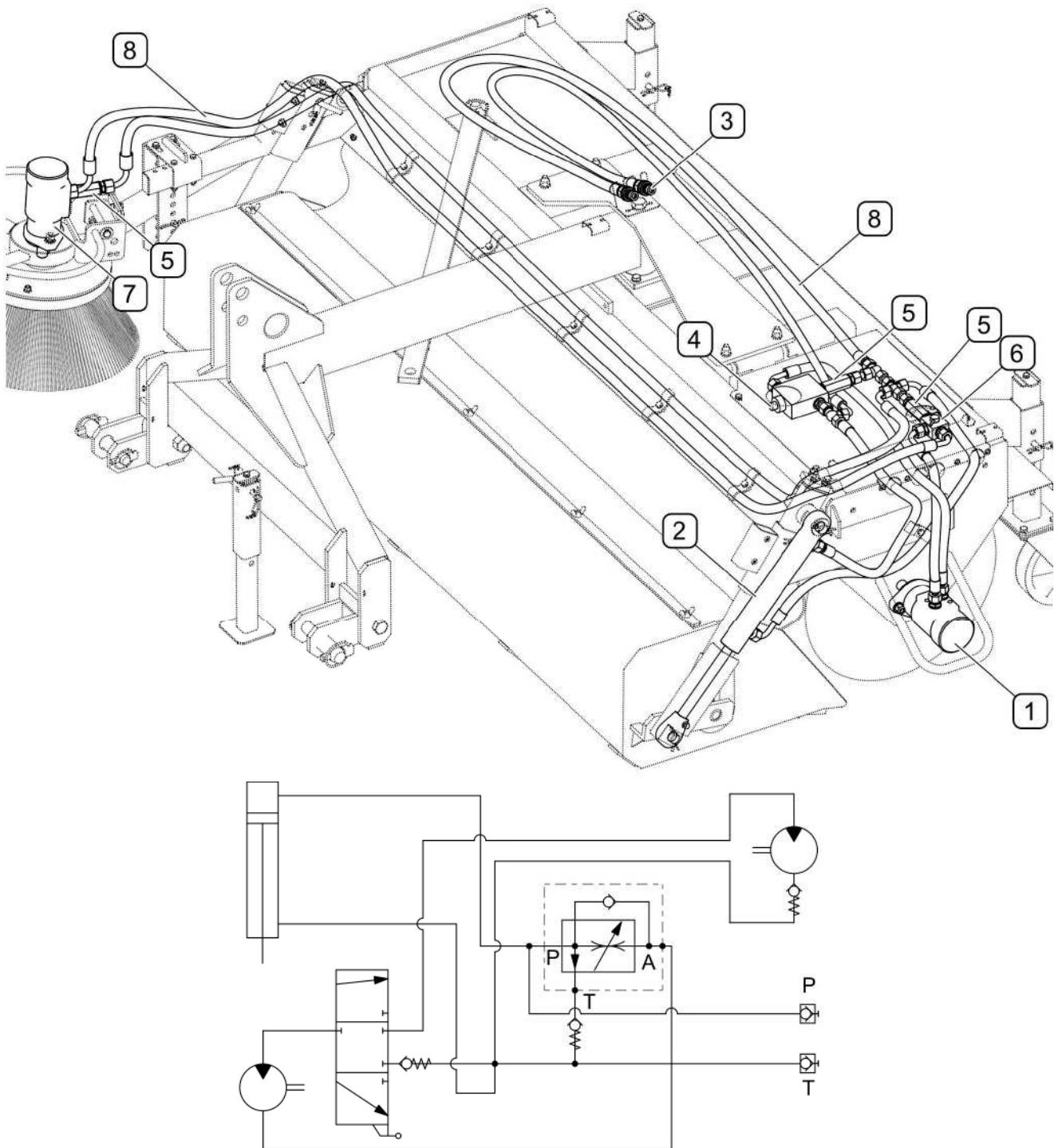


**FIG. 3.2**      **General design**

(1) - linkage, (2) - waste tank, (3) - sweeping roller brush, (4) - side brush, (5) - hydraulic system, (6) - sprinkler system, (7) - electrical system; (8) - Jockey wheel, (9) - parking stand.

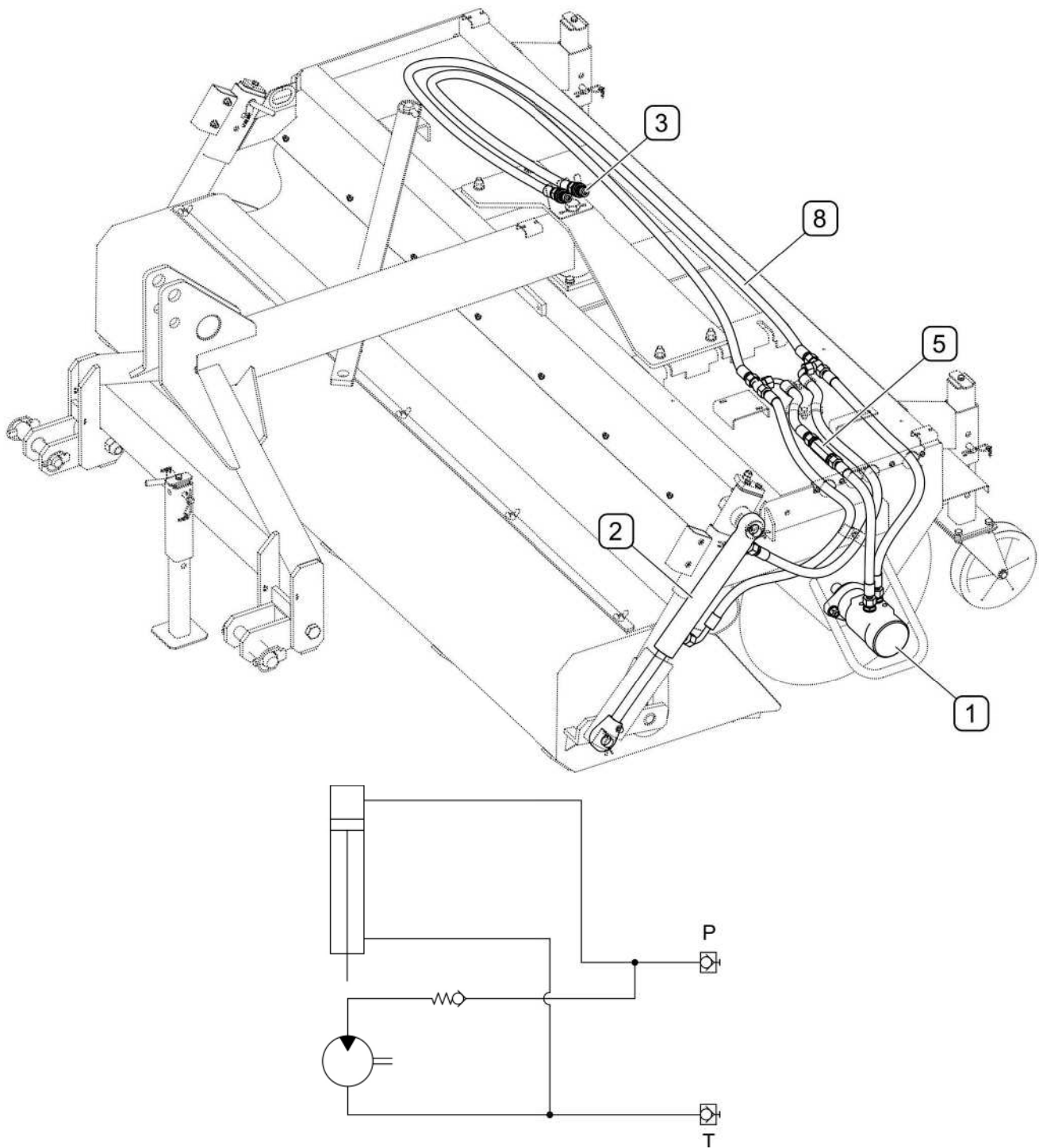
The sweeper linkage (1) is mounted on a frame by means of a pivot allows rotation and operation in front of the carrying vehicle and also operation at an angle. Sweeping roller brush (3) driven by hydraulic drive directs the dirt to the waste tank (2), which can be emptied from the operator's seat using the hydraulic system (5). The ZM-2000-02 and ZM-2000-04 Sweepers are additionally equipped with side brush (4) to allow sweeping close to walls or curbs. The sprinkler system (6) (*applies to ZM-2000-03, ZM-2000-04*) is controlled through the electrical system (7). Self-adjusting jockey wheels (8) support the machine on the ground during operation, while the sweeper detached from the carrying vehicle rests on its parking stand (9).

### 3.3 HYDRAULIC SYSTEM

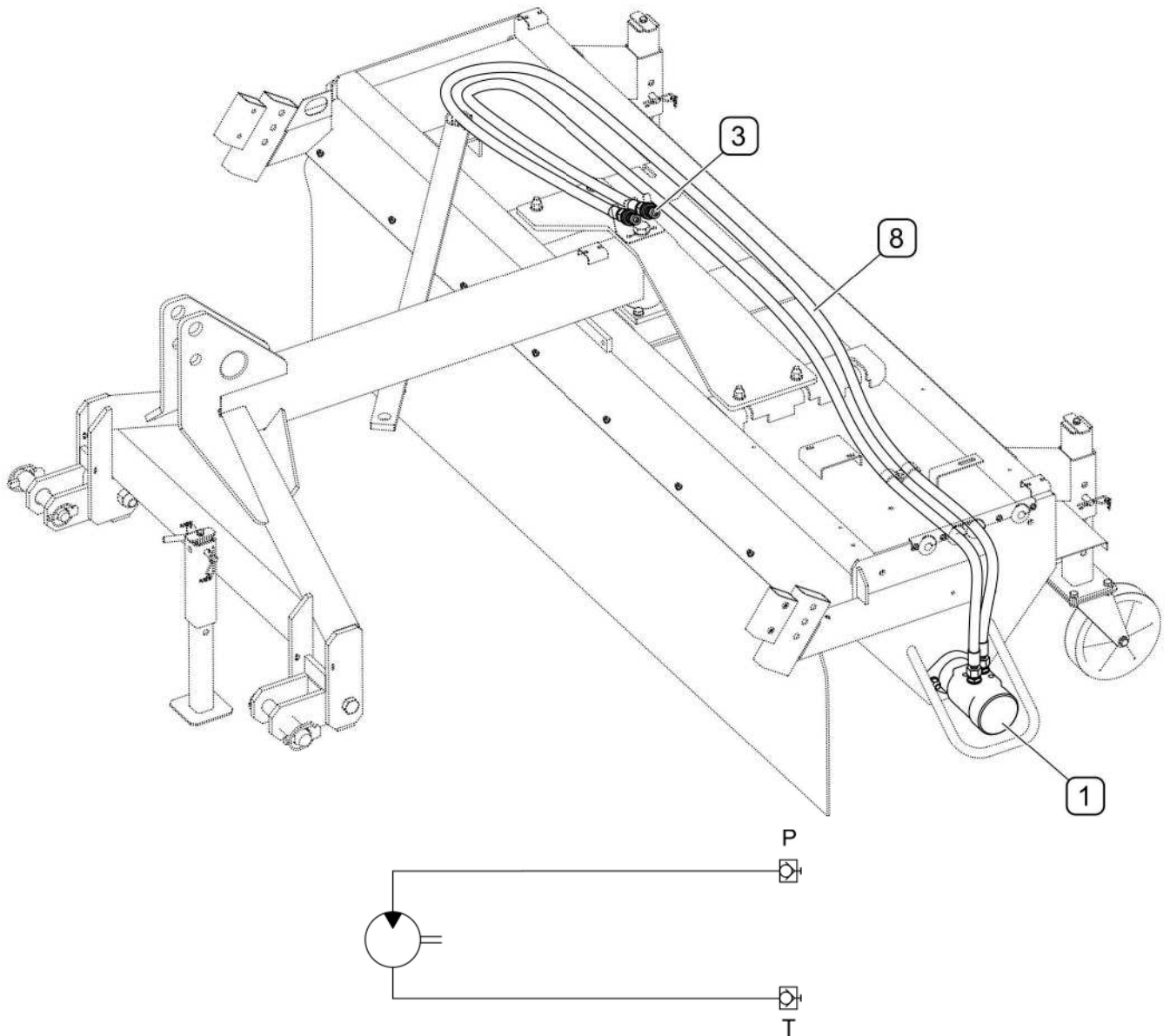


**FIG. 3.3 ZM-200-02; ZM-2000-04 sweeper hydraulic system design**

(1) - sweeping roller brush hydraulic drive, (2) - waste tank hydraulic tipping cylinder, (3) - hydraulic quick couplers, (4) - flow regulator, (5) - check valve, (6) - side brush drive splitter, (7) - side brush hydraulic drive, (8) - hydraulic lines



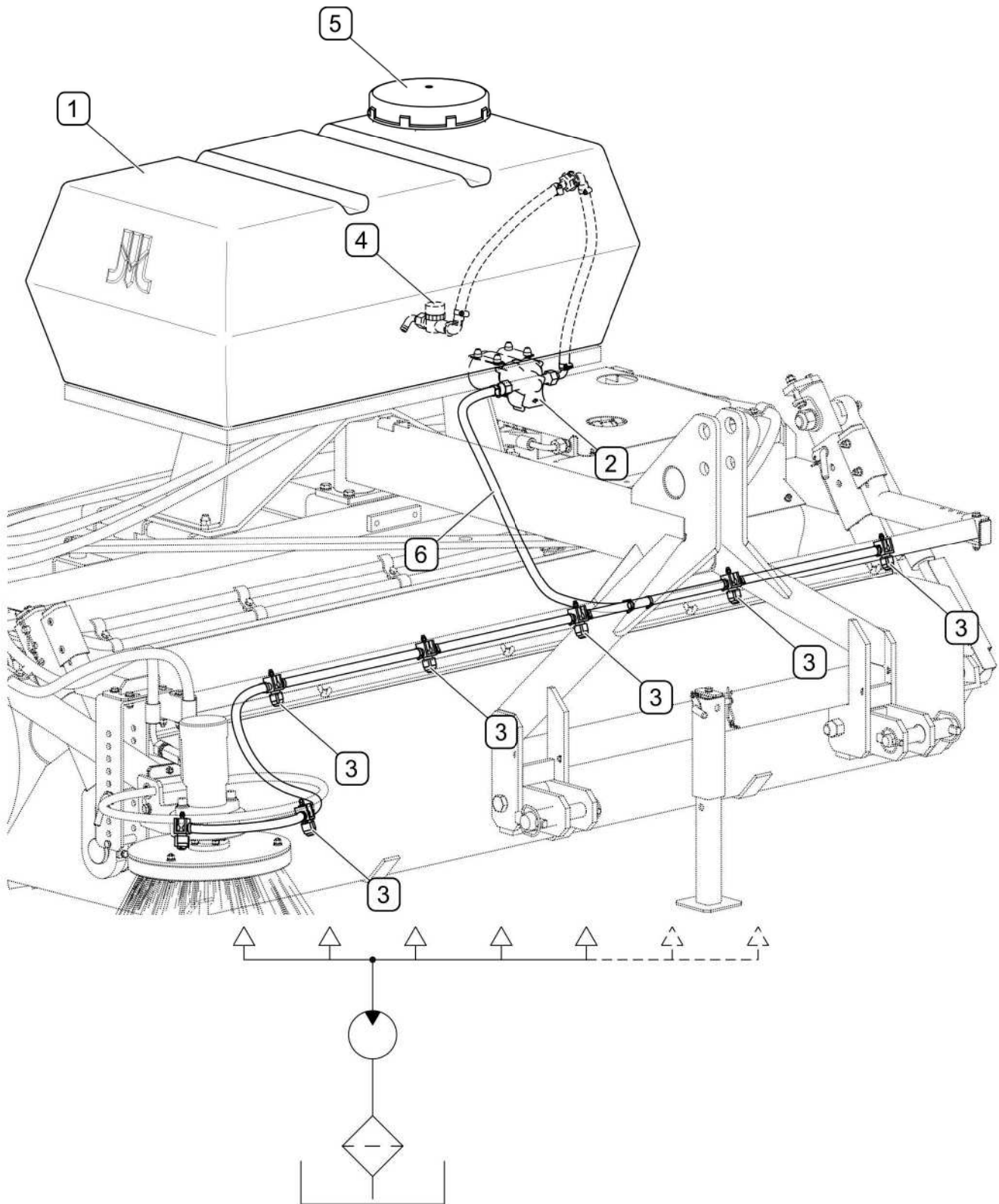
**FIG. 3.4 Construction ZM-2000-01 and ZM-2000-03 sweepers hydraulic system**  
 (1) - sweeping roller brush hydraulic drive, (2) - waste tank hydraulic tipping cylinder,  
 (3) - hydraulic quick couplers, (5) - check valve; (8) - hydraulic lines



**FIG. 3.5** ZM-2000-05 sweeper hydraulic system design

(1) - sweeping roller brush hydraulic drive,, (3) - hydraulic quick couplers; (8) - hydraulic lines

### 3.4 SPRINKLER SYSTEM

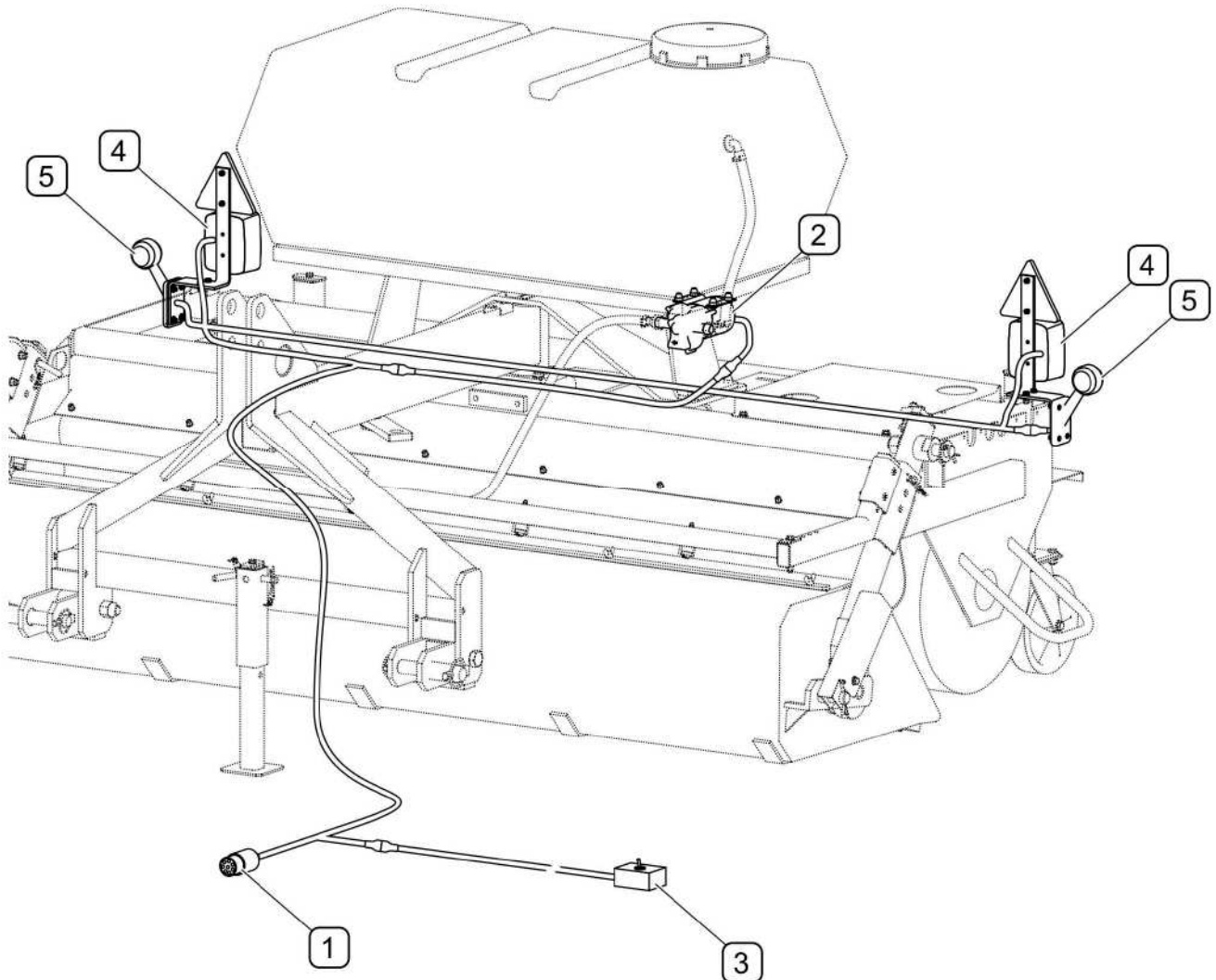


**FIG. 3.6 Construction of the sprinkling system, ZM-2000-03; ZM-2000-04**  
(1) - water tank, (2) - water pump, (3) - spraying nozzles, (4) - water filter, (5) - filler plug,  
(6) - hydraulic lines



Water tank (1) and water pump (2) are the main elements of the sprinkler system. Sprinkling nozzles (3) placed in front of the sweeping roller brush and side brush (*does not apply to ZM-2000-03*) effectively prevent excessive dust during operation. The system is controlled via a switch located on the power supply cord connected to the 7-pole socket on the tractor.

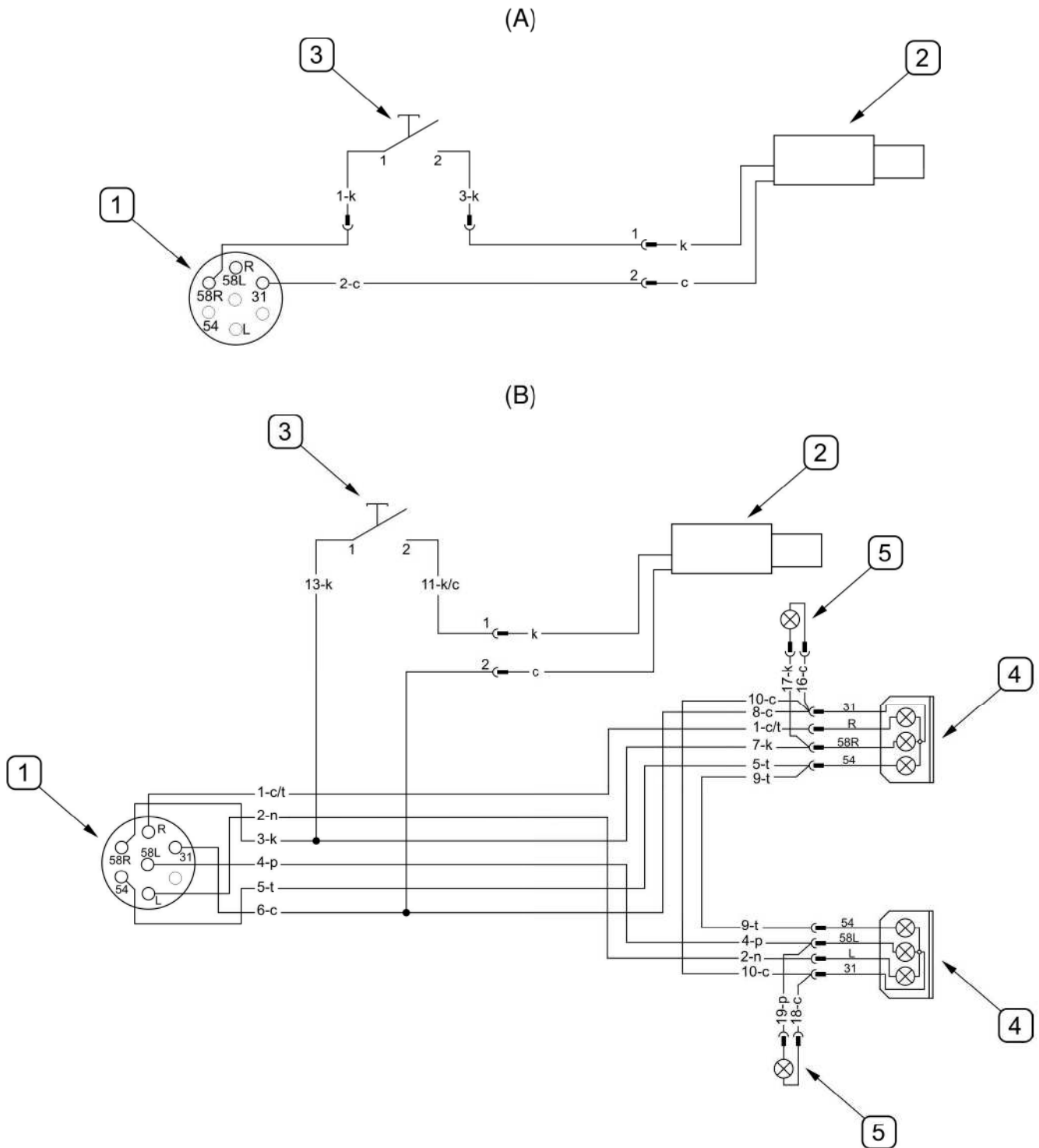
### 3.5 ELECTRICAL SYSTEM



**FIG. 3.7 Construction of the electrical system**

(1) - 7-pole connector, (2) - water pump, (3) - sprinkling system switch, (4) - rear lamp assembly (optional), (5) - clearance lights (optional)

The sweeper electrical system powers and controls the sprinkler system water pump. Water pump (2) located under the tank is powered by the through a connector (1) from the 12V 7-pole socket in the tractor. Sweeper can be equipped with sprinkler system electrical and lighting system consisting of additional lamp assemblies (4) and clearance light (5) located in the rear of the machine.



**FIG. 3.8 Electrical system diagram**  
 (A) - sprinkler electrical system, (B) - sprinkler and lighting electrical system (option),  
 (1) - 7-pole connector, (2) - water pump, (3) - sprinkling system switch, (4) - rear light  
 assemblies, (5) - clearance lights

*SECTION*

**4**

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**CORRECT USE**

## 4.1 PREPARING FOR WORK

### **DANGER**



Before using the machine, the user must carefully read this operator's manual.

The machine must never be used by persons, who are not authorised to drive agricultural tractors (carrying vehicles), including children and people under the influence of alcohol or other drugs.

Non-compliance with the safety rules of this Operator's Manual can be dangerous to the health and life of the operator and others.

Before starting the machine, make sure that there are no bystanders in the danger zone.

The manufacturer guarantees that the machine is fully operational and has been checked according to quality control procedures and is ready for normal use. This does not release the user from an obligation to check the machine's condition after delivery and before first use. The machine is delivered to the user completely assembled. Prior to connecting to the tractor, machine operator must verify the machine's technical condition. In order to do this:

- the user must carefully read this Operator's Manual and observe all recommendations, understand the design and the principle of machine operation
- check the condition of protective paint coat,
- Inspect machine's individual components for mechanical damage resulting from incorrect transport (dents, piercing, bent or broken components),
- check all the lubrication points, lubricate the machine as needed according to recommendations provided in section 5 *MAINTENANCE*;
- check technical condition of the hydraulic system;
- check technical condition of hitching system pins and locking cotter pins,
- check technical condition of protective shields and check if they are correctly installed,

**DANGER**

Before starting the tractor with attached sweeper make sure the external hydraulic system control levers are in off position, otherwise it may lead to uncontrolled operation of the machine.

**ATTENTION!**

Non-adherence to the recommendations contained in the Operator's Manual or improper use may cause damage to the machine.

The technical condition before starting the machine must be no cause for concern.

If all the above checks have been performed and there is no doubt as to the machine's good technical condition, it can be connected to carrying vehicle, started and all its individual systems checked. In order to do this:

- connect the machine to the tractor linkage (see *HITCHING TO TRACTOR*),
- Connect electrical wiring and hydraulic system lines.
- start the machine (see *SWEEPER OPERATION*)
- check the operation of the hydraulic system,
- test the sprinkler system.


**ATTENTION!**

It is recommended to first run the sweeper in the raised position, because oil circulation in the wrong direction can cause waste tank to tip and damage the machine.

Engage sweeper's drive for 3 minutes and check the following:

- that there is no knocking or noise in the drive system arising from scraping or grinding of metal elements,
- there are no leaks in sprinkler and hydraulic system,
- operation of all sprinkler nozzles,
- correct rotation of sweeping roller brush,

In the event of a disruption in the operation of the machine immediately discontinue its use, locate and remove the fault. If a fault cannot be rectified or the repair could void the guarantee, please contact the Manufacturer for additional clarifications.


	<p><b>ATTENTION!</b></p> <p>Before using the machine always check its technical condition. In particular, check the technical condition of the hitch and hydraulic system.</p>
---	--

## 4.2 CHECKING TECHNICAL CONDITION

When preparing the machine for normal use, check individual elements according to guidelines presented in table 4.1

**TAB. 4.1 TECHNICAL INSPECTION SCHEDULE**

DESCRIPTION	SERVICE OPERATION	FREQUENCY
Condition of safety guards	check the technical condition of safety guards, if complete and correctly mounted.	Before beginning work
Correct mounting of sweeping roller brush and side brush	check if correctly installed	
The technical condition of the sweeping roller brush and side brush <i>(if any)</i>	Visually inspect and replace if necessary <i>(see REPLACING SWEEPING ROLLER BRUSH AND SIDE BRUSH)</i>	
Check of all main nut and bolt connections are properly tightened	Torque values should be according to table (5.5)	Every six months
Lubrication	Lubricate elements according to table <i>LUBRICATION.</i>	According to table (5.4)

	<p><b>ATTENTION!</b></p> <p>The machine must not be used when not in working order.</p>
---	---

## 4.3 HITCHING TO TRACTOR

Sweeper can be attached to a tractor that meets the requirements contained in Table 1.1 *REQUIREMENTS FOR A TRACTOR*.



### ATTENTION!

Before hitching the machine to tractor, the user must carefully read the tractor operator's manual.



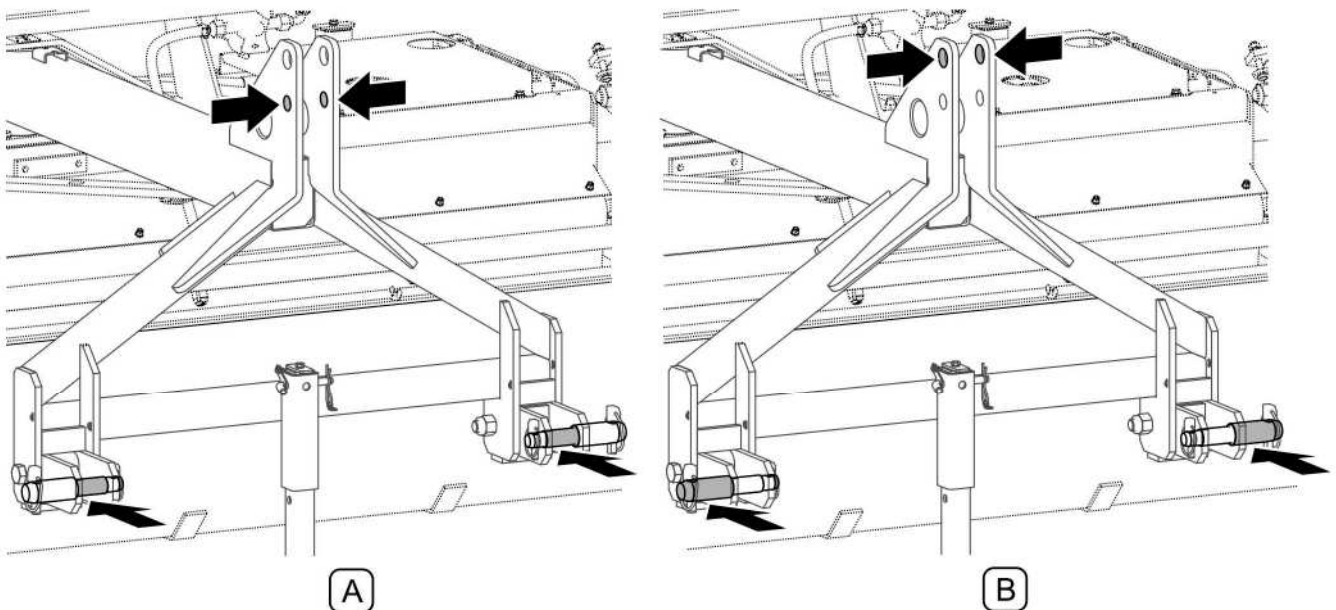
### DANGER

When hitching, there must be nobody between the machine and the tractor. A person assisting in the hitching of the machine should stand in such a place (beyond the area of danger), in order to be continuously visible to the tractor driver.

Exercise caution when hitching the machine to tractor.

### 4.3.1 HITCHING TO THE THREE POINT LINKAGE

Before hitching the sweeper to tractor's three-point linkage, make sure that the category of the tractor linkage is compatible with that of the machine.



**FIG. 4.1** Three-point linkage categories according to ISO 730-1

(A)- linkage of category I ISO 730-1; (B)- linkage of category II ISO 730-1;

In order to attach the sweeper to tractor, proceed as follows:

- Reverse the tractor so as to move the lower links of tractor three-point linkage to the lower linking points of the sweeper.
- Set lower links of tractor at appropriate height.
- Switch off tractor's engine and prevent it from rolling.
- Connect the sweeper linkage lower links with the tractor lower pins and secure.
- Connect tractor upper linkage link with sweeper upper linkage link and secure. Set stabilizers (tensioners) of tractor linkage lower links tractor so as to eliminate lateral movement of the machine.
- Connect the hydraulic line connectors to the appropriate sockets on the tractor.
- Connect the sprinkler and lighting system (option) electrical connector to a 7-pole socket on the tractor.
- Lift sweeper using tractor's three point linkage.
- Raise the parking stand, and lock with the locking cotter pin.

It is recommended to set both tractor lower linkage arms at the same height.

**DANGER**

When hitching, there must be nobody between the sweeper and the carrying vehicle.

**DANGER**

To mount machine on carrying vehicle use only genuine pins and safeguard cotter pins.

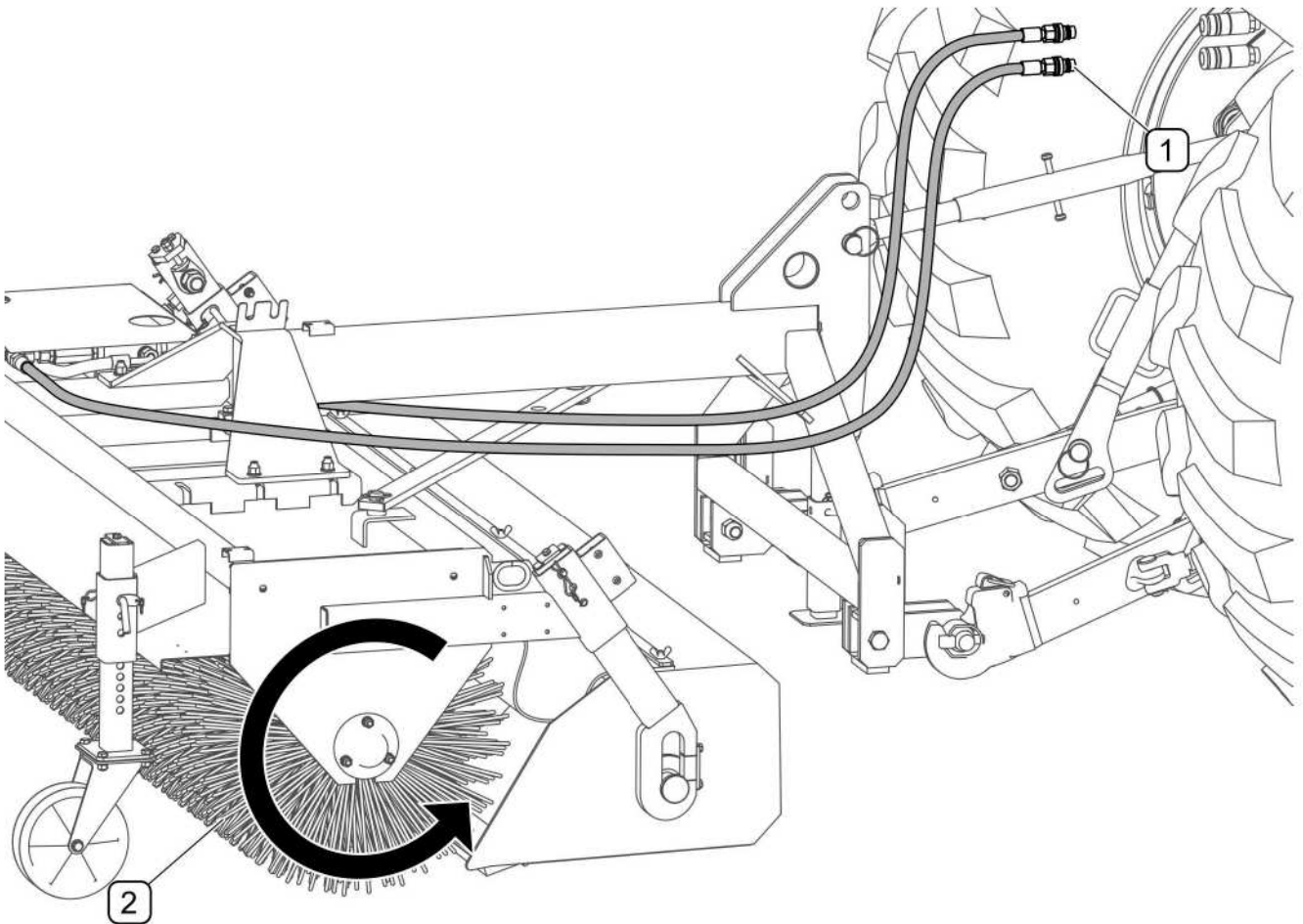
**ATTENTION!**

Comply with the recommendations relating to linkage and mounting points.



### 4.3.2 CONNECTING HYDRAULIC SYSTEM

Connect hydraulic connectors (1) to sockets of one section of the tractor hydraulic selective control valve FIG. 4.2). Sweeping roller brush (2) begins to rotate a moment after actuating the appropriate hydraulic circuit by means of a tractor hydraulic selective control valve lever. If the sweeping roller brush (2) rotates in the wrong direction or does not rotate at all, swap the hydraulic connectors (1).




**FIG. 4.2** Connecting the hydraulic system to the tractor and the sweeping roller brush direction of rotation

(1) - hydraulic connectors, (2) - sweeping roller brush;




#### **DANGER**


Prior to connecting individual system lines the user must carefully read the tractor operator's manual and observe all Manufacturer's recommendations.

 **DANGER**

When connecting the hydraulic lines, make sure that the hydraulic system of the tractor is not under pressure.

 **ATTENTION!**

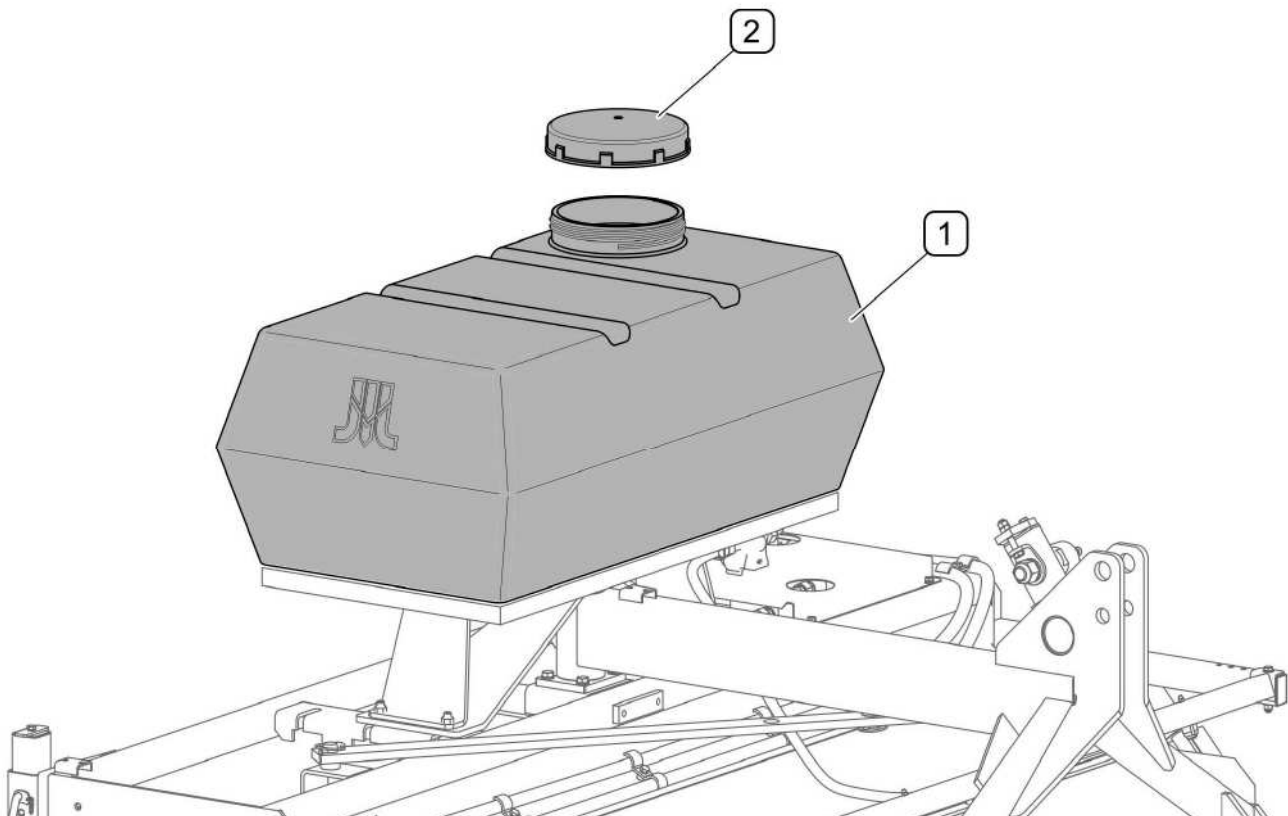
During operation, the connecting cables should be routed so that they do not get entangled in moving machine parts.

 Before beginning work using the sweeper, check the oil level in tractor hydraulic system.

## 4.4 SWEEPER OPERATION

### 4.4.1 FILLING THE SPRINKLER SYSTEM TANK

Fill the water tank (1) through the inlet opening secured with a cap (2) equipped with a vent (FIG. 4.3). The tank capacity is 200 litres of water.

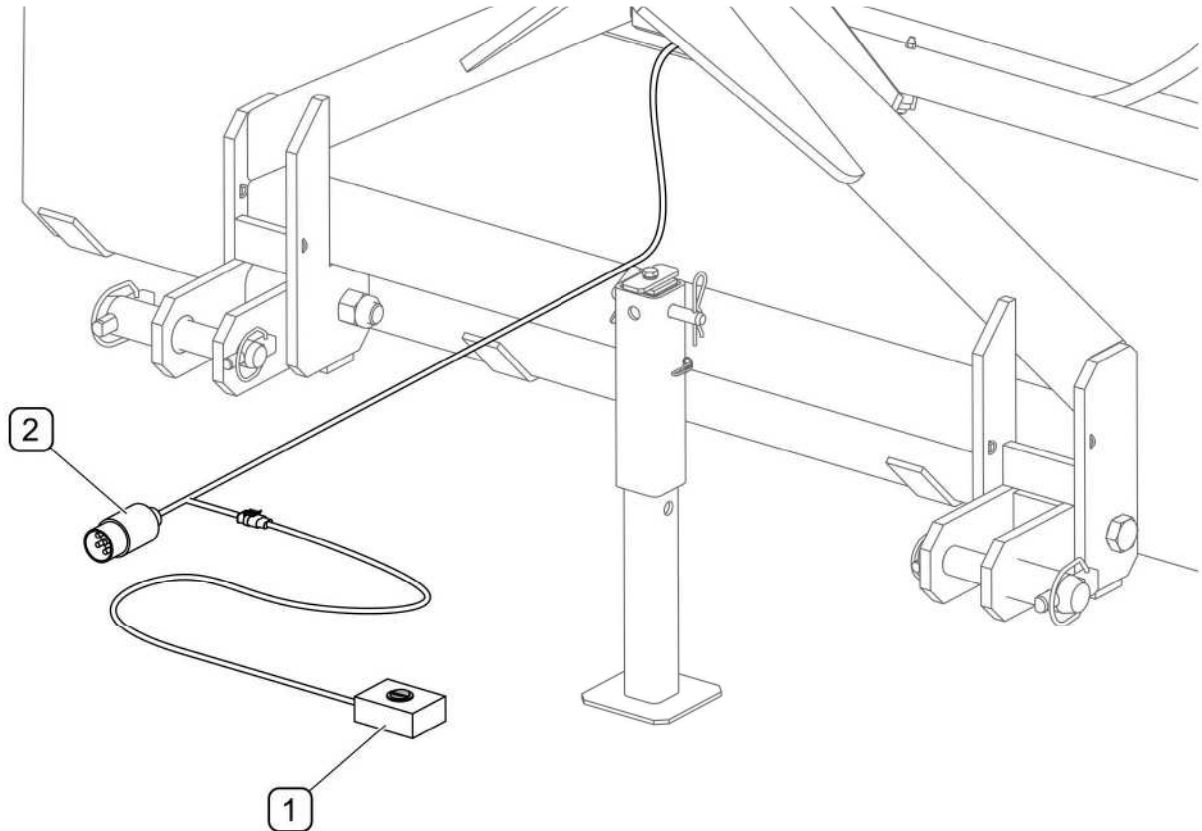


**FIG. 4.3** Water tank of sprinkler system

(1) - water tank, (2) - cap;

**IMPORTANT!**

If there is a risk that temperatures drop below 0°C, drain water from the sprinkler system.

**4.4.2 SPRINKLER SYSTEM CONTROL**

**FIG. 4.4 Sprinkler system control**

(1) - sprinkler system switch, (2) - 7-pole socket connector;

Connect electrical system connector (2) to 12V 7-pole socket on the tractor. Switch the sprinkling system on or off using the switch (1) on the power cord FIG. 4.4).


Switch (1) has two positions:


- "ON" or "I" - sprinkler system turned on;
- "OFF" or "0" - sprinkler system turned off

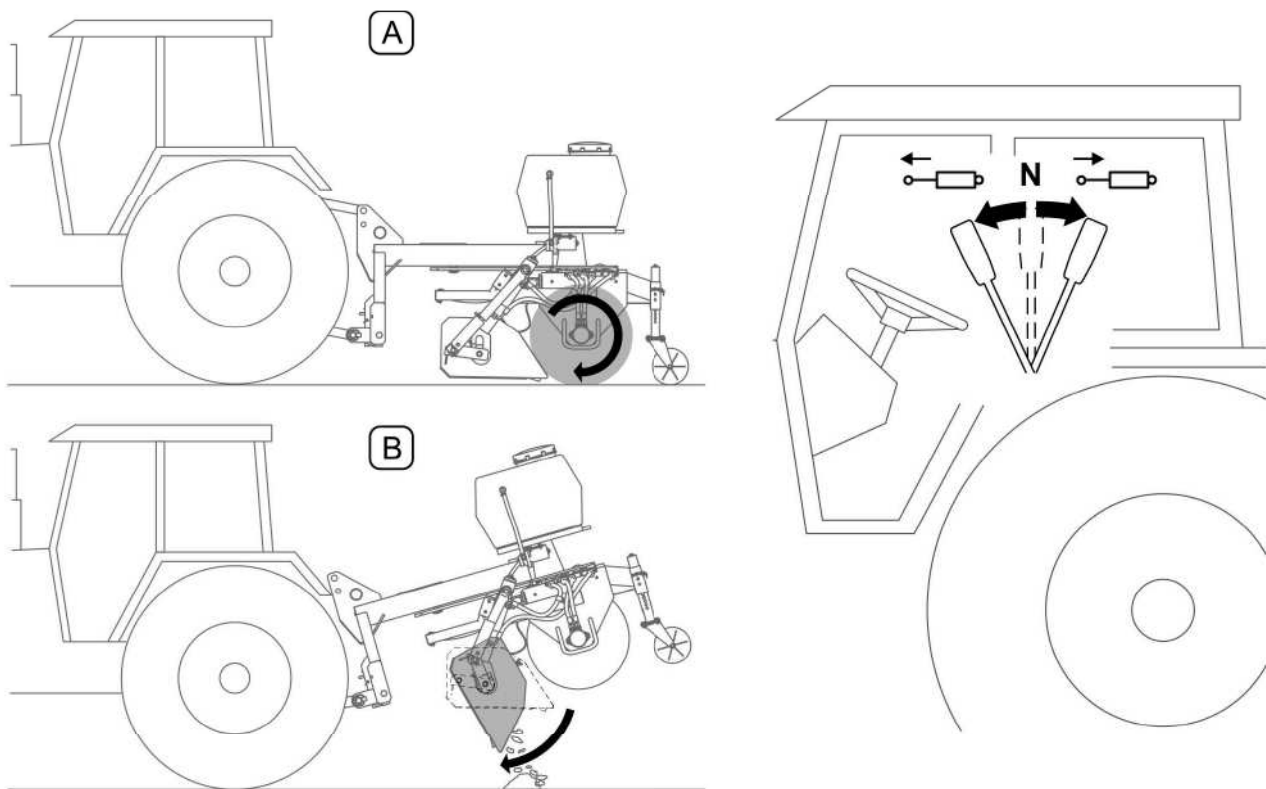
Install the switch in the operator cab in an easily accessible place.

### 4.4.3 EMPTYING THE WASTE TANK

Before you start emptying the tank, raise the sweeper on the tractor three-point linkage. Operator can empty the waste tank using a hydraulic selective control valve by reversing the sweeper hydraulic circuit, so that the oil return line becomes a supply line. After emptying the tank restore the previous setting of the hydraulic circuit.

 **DANGER**  
Do NOT stand under raised sweeper during machine operation.

 **IMPORTANT!**  
Waste tank can be opened and closed hydraulically only after lifting the sweeper.



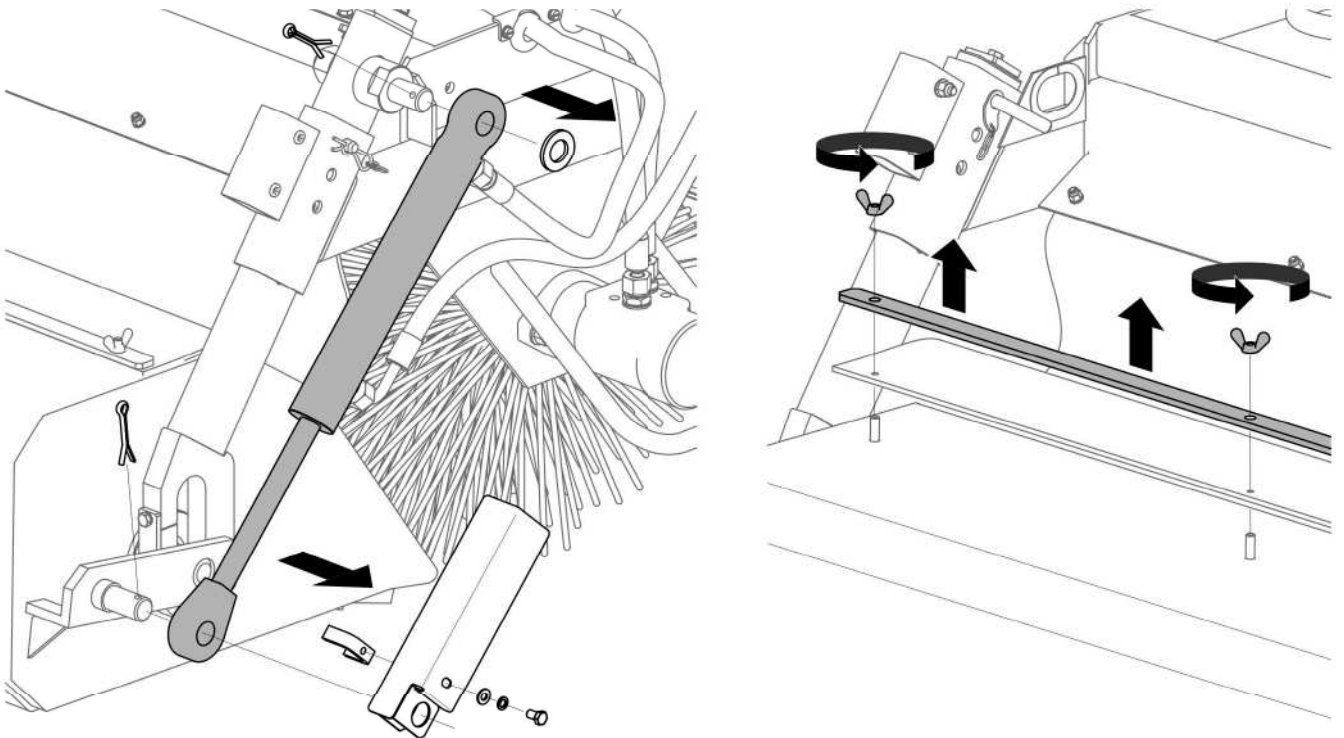
**FIG. 4.5** Emptying the waste tank

(A) - Sweeping, (B) - Emptying the tank;

#### 4.4.4 OPERATING SWEEPER WITHOUT WASTE TANK

Sweepers equipped with waste tank can be converted to a sweeper operating without the waste tank. To remove the waste tank:

- Remove the cotter pins from the hydraulic cylinder mounting points so it can be removed (FIG. 4.6)
- Reconnect the hydraulic system (see FIGURE 3.6)
- Unscrew the wing nut (FIG. 4.6) of the rubber apron to remove the terminal block. During sweeping without the waste tank, apron hangs down and provides protection against ejected particles.
- After removing the fixing bolts remove arm safety locks on the right and left side of the tank (FIG. 4.7) and then remove the tank from catches. When the above preparations are completed, the machine is ready for sweeping without waste tank.

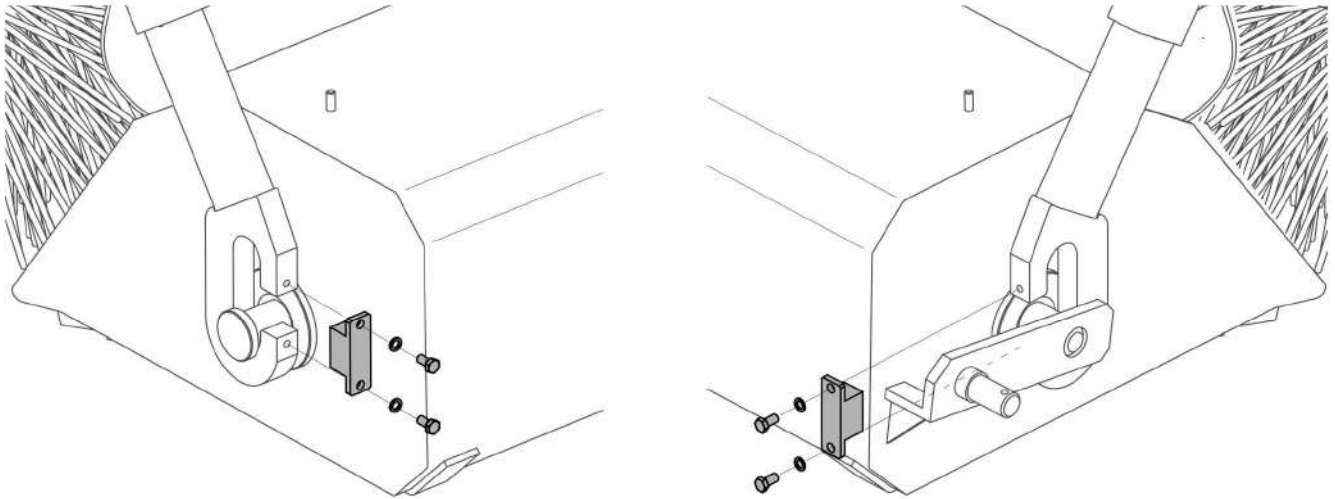


**FIG. 4.6** Removing of the hydraulic cylinder and a rubber apron strip

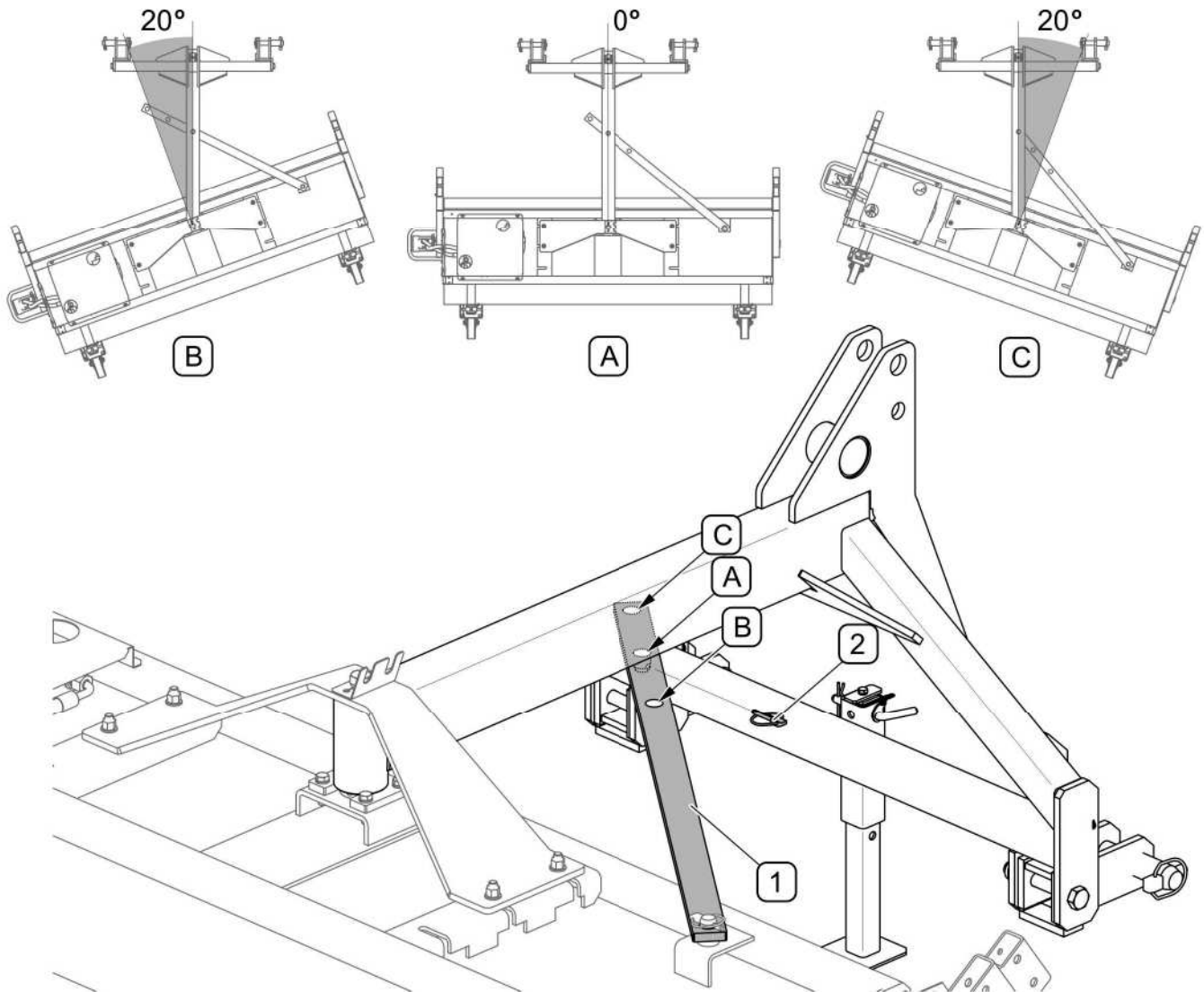


#### **DANGER**

The hydraulic system should be reconnected by a specialized facility, the dealer or manufacturer.



**FIG. 4.7** Removing safety locks of waste tank catches



**FIG. 4.8** Changing the sweeping roller brush angle of operation

(1) - flat bar, (2) - locking cotter pin, (A) - deflection retaining hole 0°; (B) - right deflection retaining hole 20°; (C) - left deflection retaining hole 20°

To set the working angle of the sweeping roller brush (FIG. 4.8) change the position of the pin to the appropriate retaining hole (A), (B), (C) in the flat bar (1). Fix the pin hole (A) of the flat bar (1) to obtain  $0^{\circ}$  sweeper deflection. Use locking cotter pin (2) to lock the desired position. Use holes (B) and (C) for right or left  $20^{\circ}$  deflection. Use the sweeper deflection setting only during sweeper operation without the waste collecting tank.

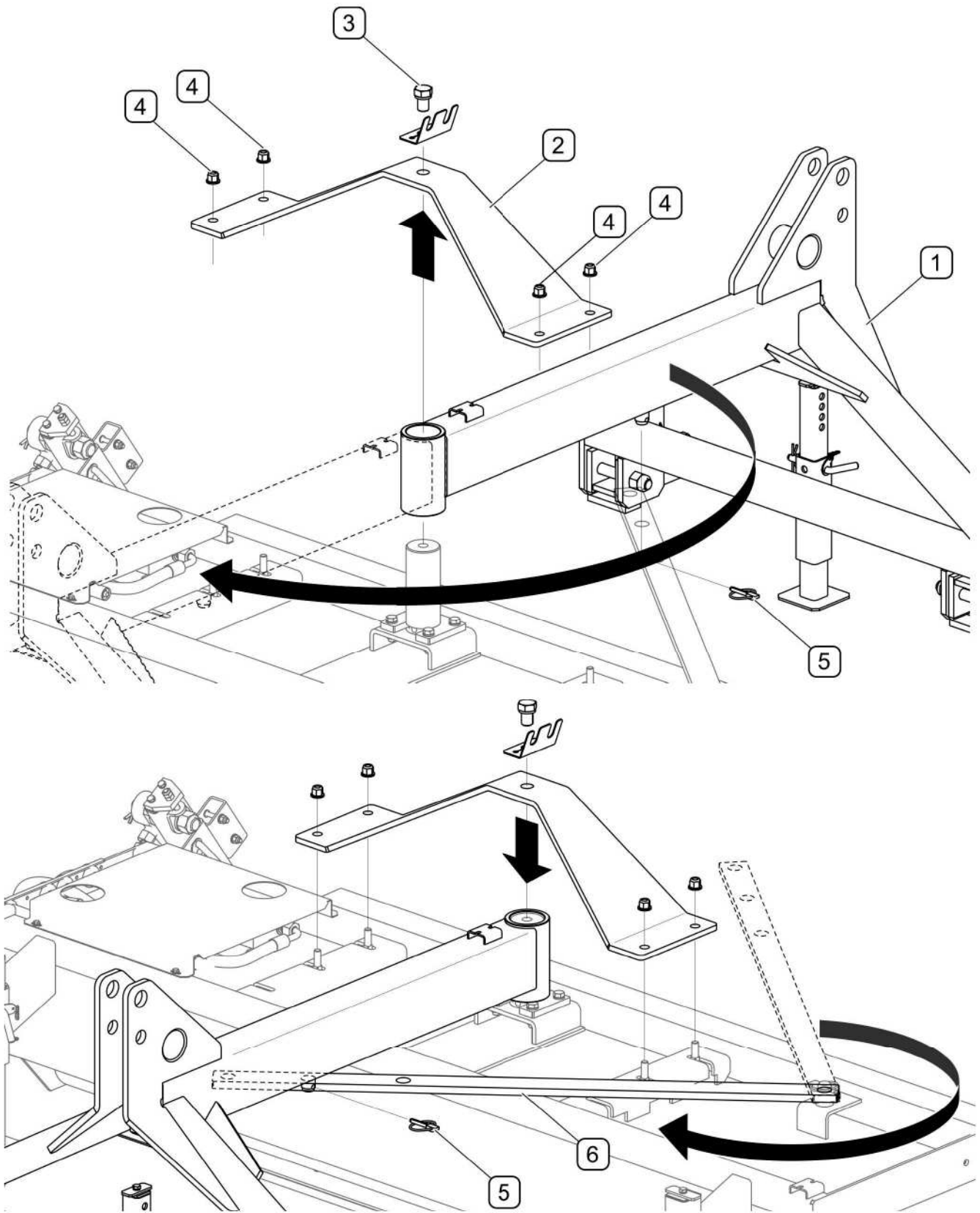
**ATTENTION!**

During sweeper operation, tractor three-point linkage must be set to float mode, otherwise the machine may be damaged.

To adapt the sweeper for operation in front of the carrying vehicle (FIG. 4.9), remove the cotter pin (5) which locks the flat bar (6), unscrew the main pivot bolt (3), unscrew the four nuts (4) mounting the bracket (2) to main pivot and rotate the entire suspension frame (1) by  $180^{\circ}$  and then screw the bracket (2). Turn the flat bar (6), place on the pivot of the suspension frame lock with cotter pin (5). For the sweepers equipped with the sprinkler system remove nuts (4) and remove the water tank with brackets before removing the bracket (2). Re-attach the water tank after rotating the suspension frame (1) and tightening the bracket (2) using bolt (3).

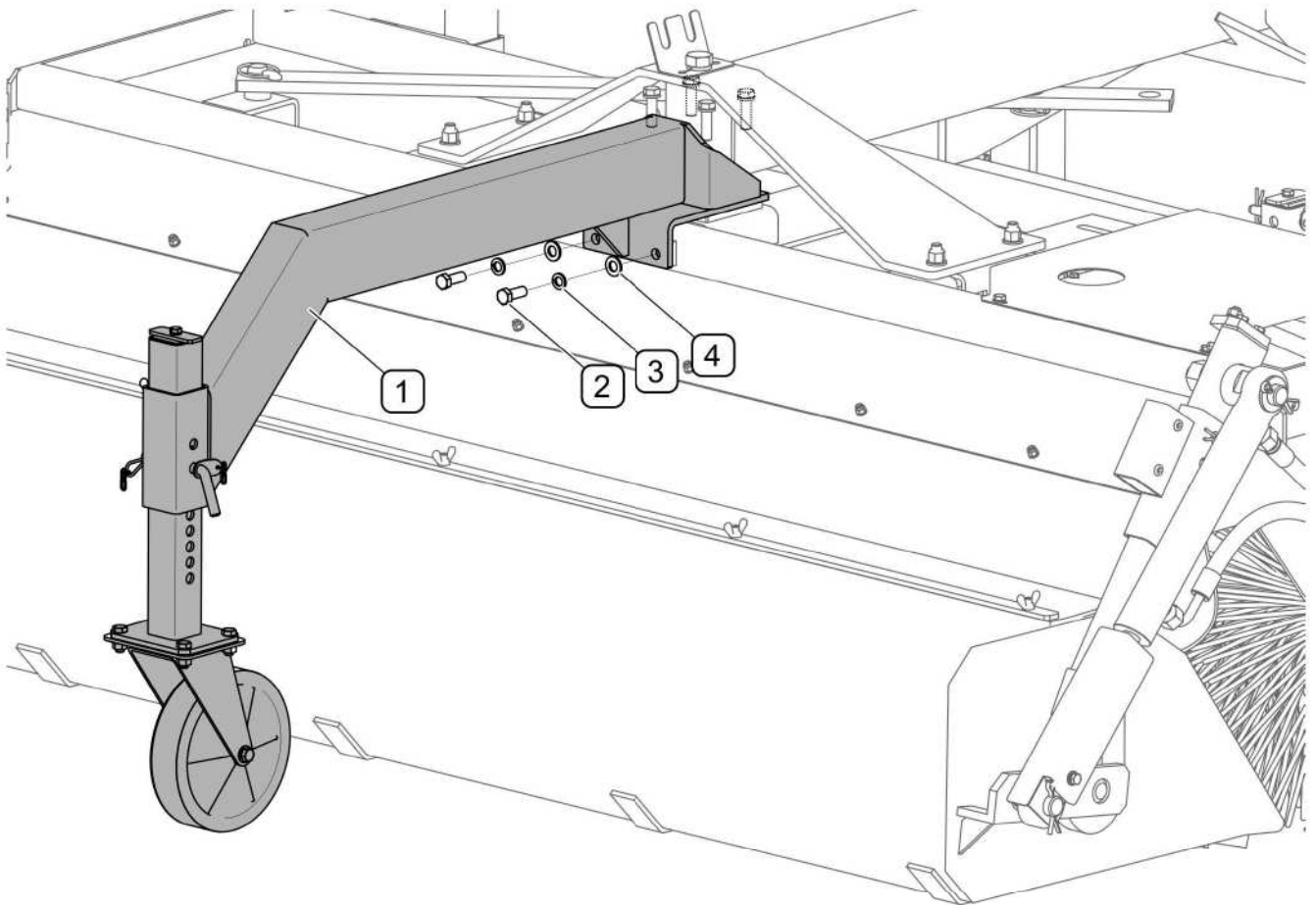
**ATTENTION!**

The machine is designed to operate on even surfaces without obstacles such humps, raised wells, steep climbs. Exercise extreme caution when crossing such obstacles. It is recommended to reduce the speed, and even raising the machine.



**FIG. 4.9** Setting the sweeper for operation in front of the carrying vehicle.  
(1) - suspension frame, (2) - main pivot bracket, (3) - main pivot bolt, (4) - mounting bolts,  
(5) - cotter pin, (6) - flat bar;





**FIG. 4.10 Additional jockey wheel (optional)**

(1) - boom, (2) - bolt, (3) - spring washer, (4) - washer

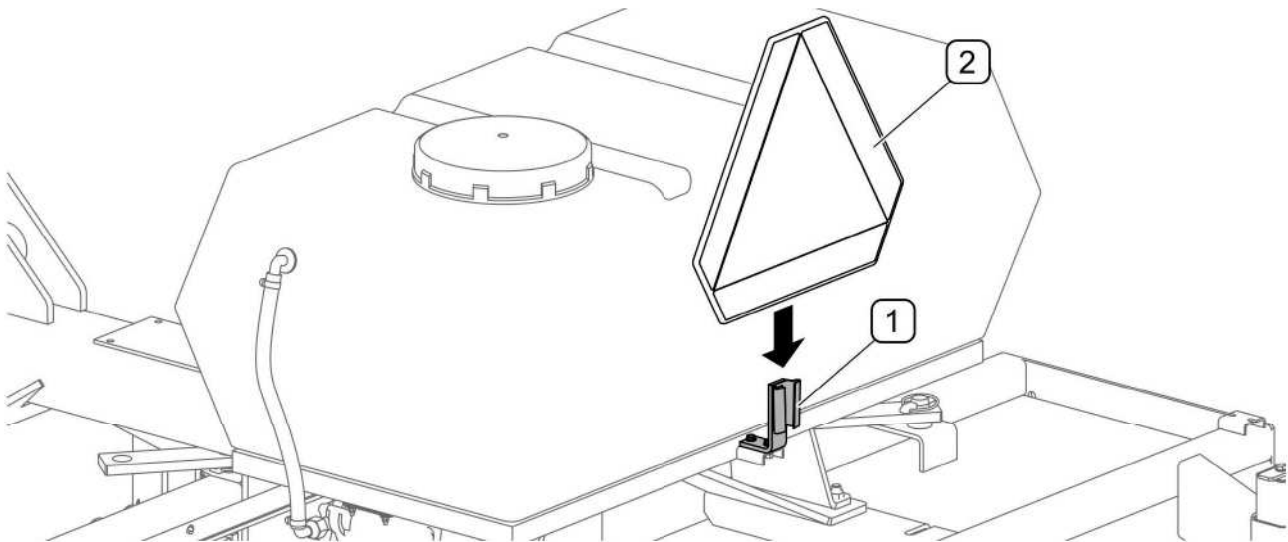
To improve ground surface tracking during sweeper operation in front of the carrying vehicle, attach additional jockey wheel to sweeper frame (*catalogue number 80RPN-20.00.00.00*). Boom (1) and jockey wheel (FIG. 4.10) are screwed to the top of the frame using main pivot mounting bolts and bolts (2) with washers (3) and (4).

After installing the additional jockey wheel, adjust its height as needed. Jockey wheel adjustment is described Chapter 5

## 4.5 DRIVING ON PUBLIC ROADS

When driving on public roads, respect the road traffic regulations, exercise caution and prudence. If the sand spreader is operated on pavements special attention should be paid to the bystanders likely to be near the working machine. Listed below are the key guidelines.

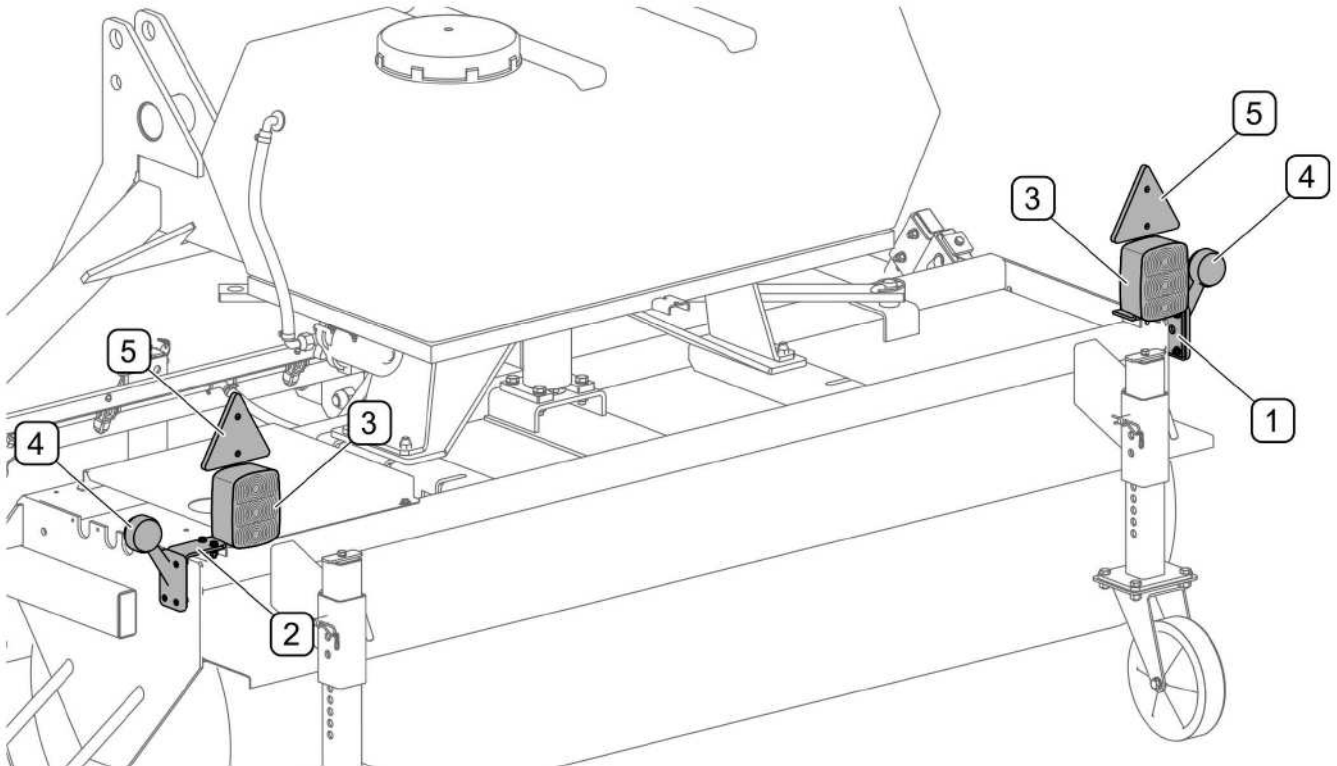
- Before moving off make sure that there are no bystanders, especially children, near the machine or the tractor. Take care that the driver has sufficient visibility.
- Make sure that the machine is correctly attached to the tractor, and linkage is properly secured.
- Permissible design speed and maximum speed allowed by road traffic law must not be exceeded. Speed of travel should be adjusted to prevailing road conditions, pavement condition and other conditions.
- While operating the machine, turn on the orange beacon light in the tractor.
- If the sweeper obscures the slow-moving vehicle warning sign attached to the back of the tractor, the warning sign must be mounted on a dedicated bracket (FIG. 4.11) on the sweeper frame (available as an option).



**FIG. 4.11 Additional bracket for the warning sign (optional)**

(1)- bracket; (2)- slow-moving vehicle warning sign (not included in the machine equipment)

- If the sweeper obscures tractor lights then install additional lighting (FIG. 4.12) mounted on the sweeper rear (available as an option).



**FIG. 4.12 Additional lighting installed on the sweeper rear (optional)**

(1) - right bracket, (2) - left bracket, (3) - lamp assembly, (4) - clearance lamp;  
 (5) - warning reflective triangle

- Avoid ruts, depressions, ditches or driving on roadside slopes. Driving across such obstacles could cause the trailer or the tractor to suddenly tilt. Driving near ditches or canals is dangerous as there is a risk of the wheels sliding down the slope or the slope collapsing.
- Speed must be sufficiently reduced before making a turn or driving on an uneven road or a slope.
- When driving on uneven terrain with the implement raised reduce speed due to dynamic loads and the risk of damaging the machine or carrying vehicle.
- When driving with raised machine set it so as not to obscure the lights or restrict the visibility from the operator seat.
- When driving with raised implement, secure the tractor (carrying vehicle) linkage against falling or accidental dropping.

## 4.6 DISCONNECTING FROM TRACTOR



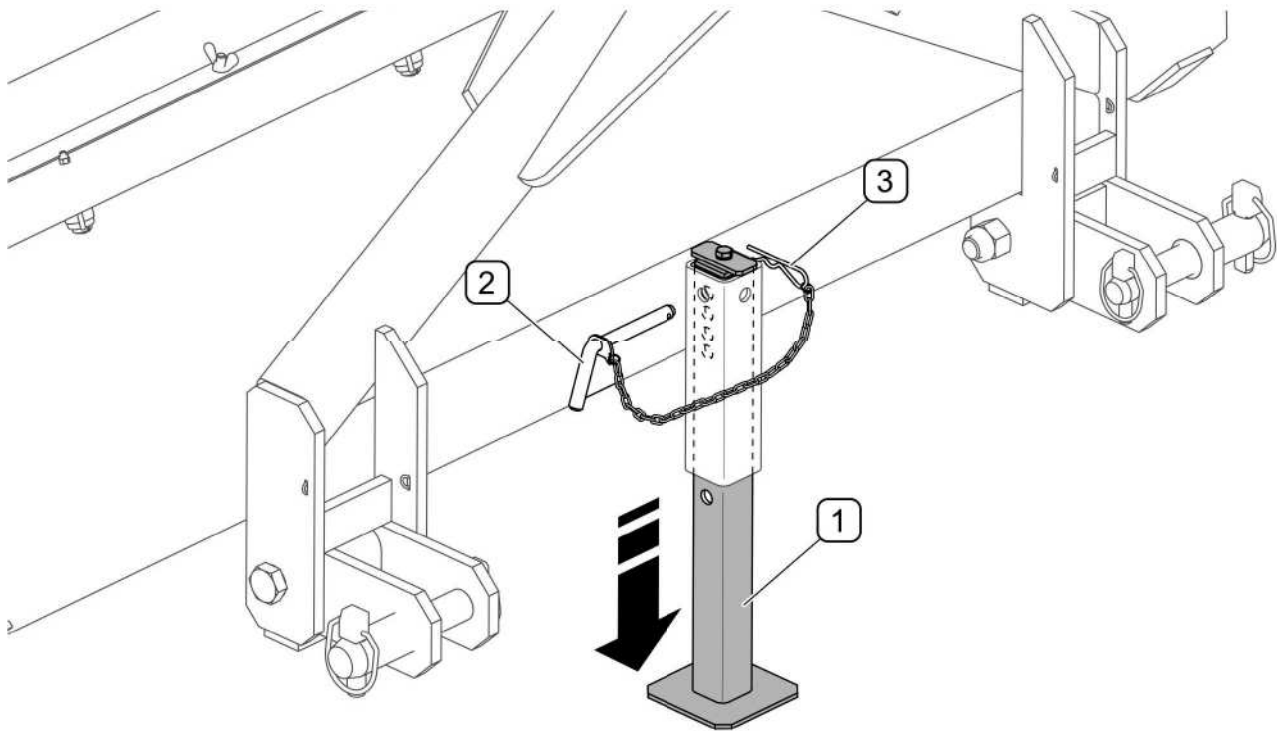
### DANGER

Before disconnecting the machine from the tractor, turn off the tractor engine, engage the parking brake and secure cab against access of third persons.



### DANGER

Reduce pressure prior to disconnecting the hydraulic system.



**FIG. 4.13** Parking stand

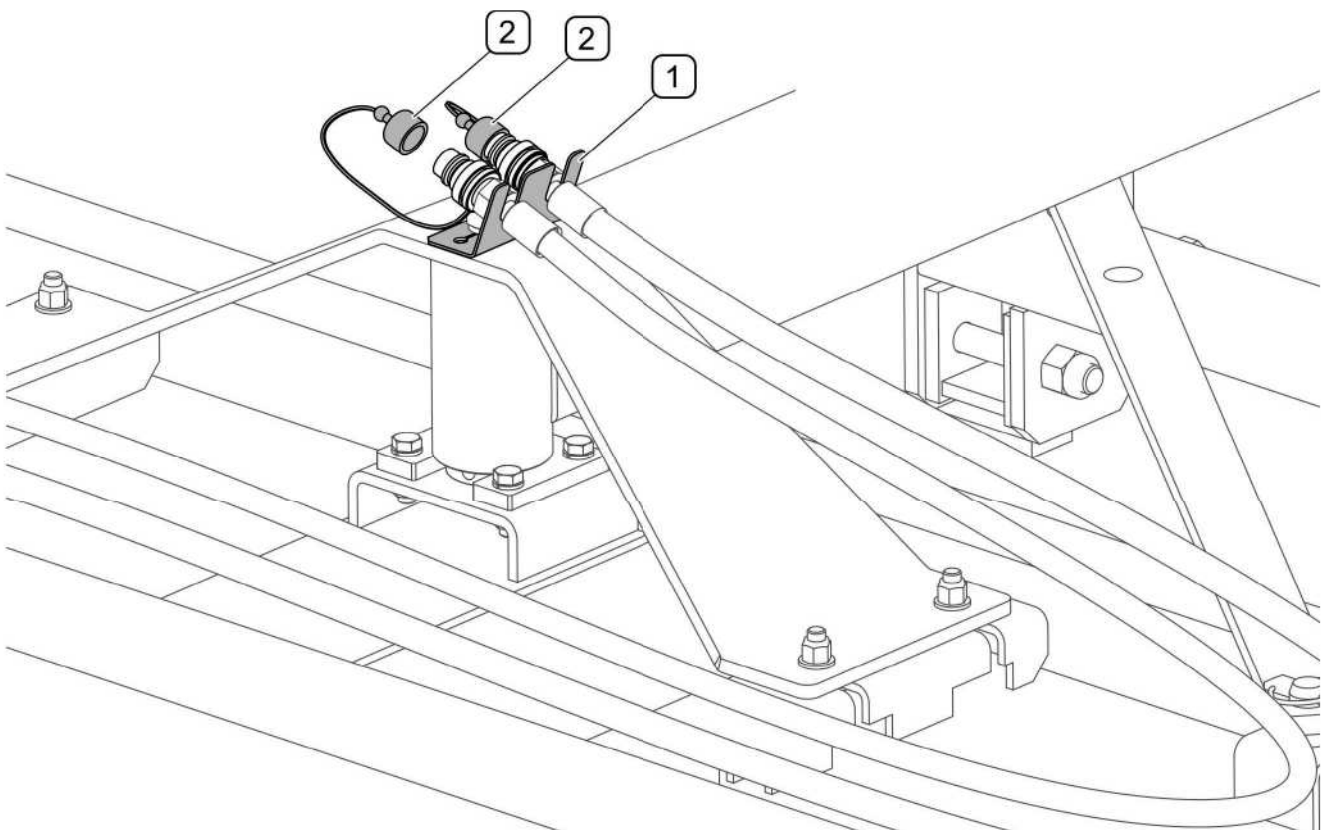
(1) - parking stand, (2) - cotter pin, (3) - locking R-clip

Sweeper disconnected from the tractor must be supported on the parking stand (FIG. 4.13) and the jockey wheels. Otherwise, the weight rests on the sweeping roller brush causing the bristles to deform. Normal sweeping is then impossible.

In order to disconnect the sweeper from the tractor, proceed as follows:

- Lower the parking stand (1) and set at the correct height.
- Lower the sweeper until it fully rests on the ground.
- Switch off engine, remove key from ignition and engage tractor parking brake.

- Reduce residual pressure in the hydraulic system by movements of appropriate lever controlling the tractor's hydraulic circuit.
- Disconnect the tractor hydraulic system connectors from, secure with caps and put in a special bracket on the frame (FIG. 4.14)
- Disconnect top link (so-called central connector), dismount lower arms from pins and drive tractor away from the sand spreader.



**FIG. 4.14**      **Protecting connectors after disconnecting from the tractor**

(1) - bracket, (2) - hydraulic quick coupler caps



*SECTION*

**5**

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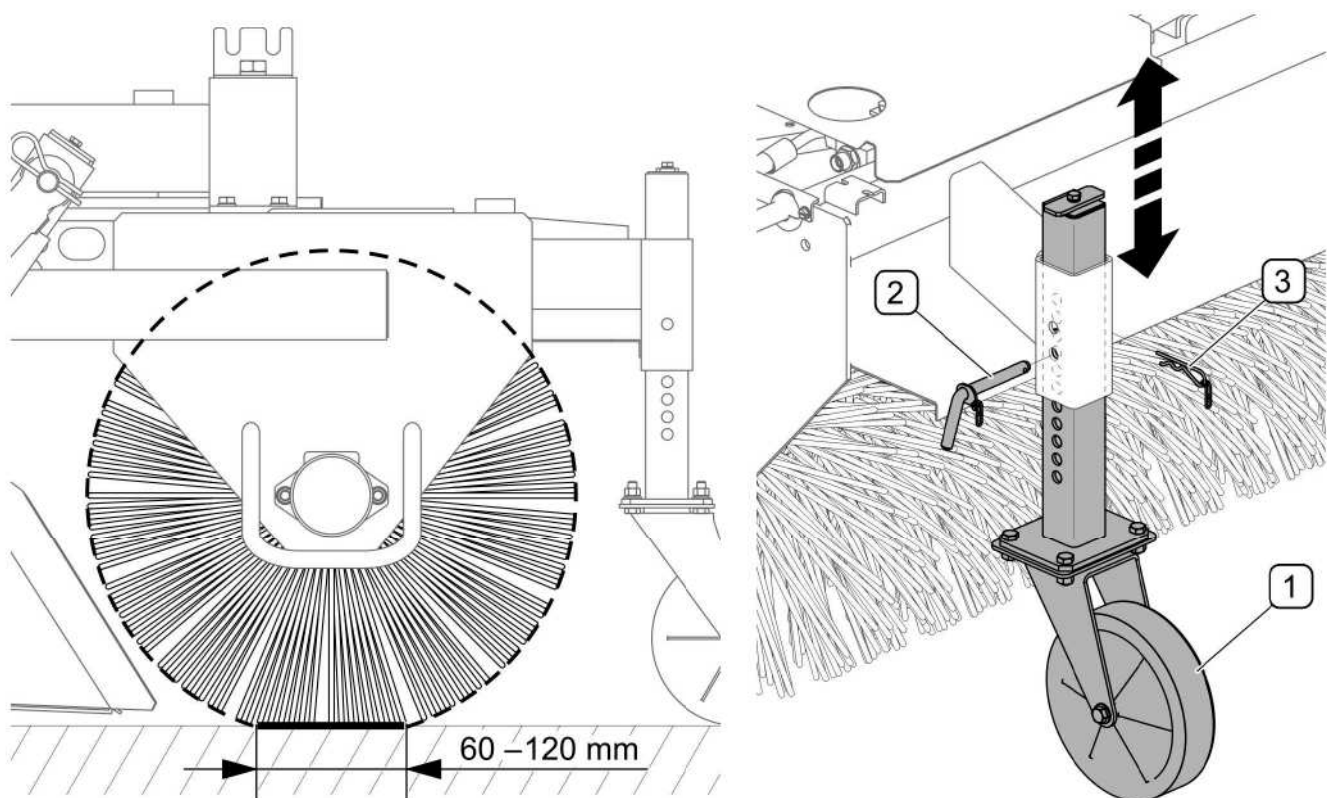
**MAINTENANCE**

## 5.1 SWEEPING ROLLER BRUSH ADJUSTMENT

Adjustment of the sweeping roller brush should always be carried out in conjunction with adjustment of the waste tank. Sweeping roller brush must be adjusted depending on its wear. Sweeping roller brush ground contact surface should be in the range from 60 to 120 mm (FIG. 5.1). The pressure can be set individually depending on the degree of ground contamination.

Pressure is adjusted by changing the position of jockey wheels (1) in guides (FIG. 5.1) as follows:

- Lift tractor mounted sweeper, turn off the engine and engage the parking brake,
- Remove the R-clip (3) and cotter pin (2),
- raise or lower the wheel (3) in the guide so that the holes are coaxial,
- put cotter pin (2) in the corresponding hole and secure with R-clip (3),
- proceed the same way to adjust the height of the second wheel.



**FIG. 5.1 Sweeping roller brush pressure adjustment**

(1) – Jockey wheel, (2) – cotter pin, (3) – R-clip



After adjustment lower the sweeper on the jockey wheels and check the width of the roller ground contact surface, adjust again if necessary. Please also note the levelling of the sweeper through the central linkage (*upper three-point linkage rod*).

While adjusting sweeping roller brush pressure make sure the contact surface is uniform along on the entire length of the roller. Different settings for left and right cause uneven wear of the sweeping roller brush. Check the suspended waste tank and, if necessary, adjust after each adjustment of the jockey wheels.

## 5.2 ADJUSTING THE WASTE TANK

Adjust the waste tank (FIG. 5.2) after adjusting the pressure of the sweeping roller brush (FIG. 5.1) and adjusting the waste tank inclination angle. Adjust the height of the waste tank as follows:

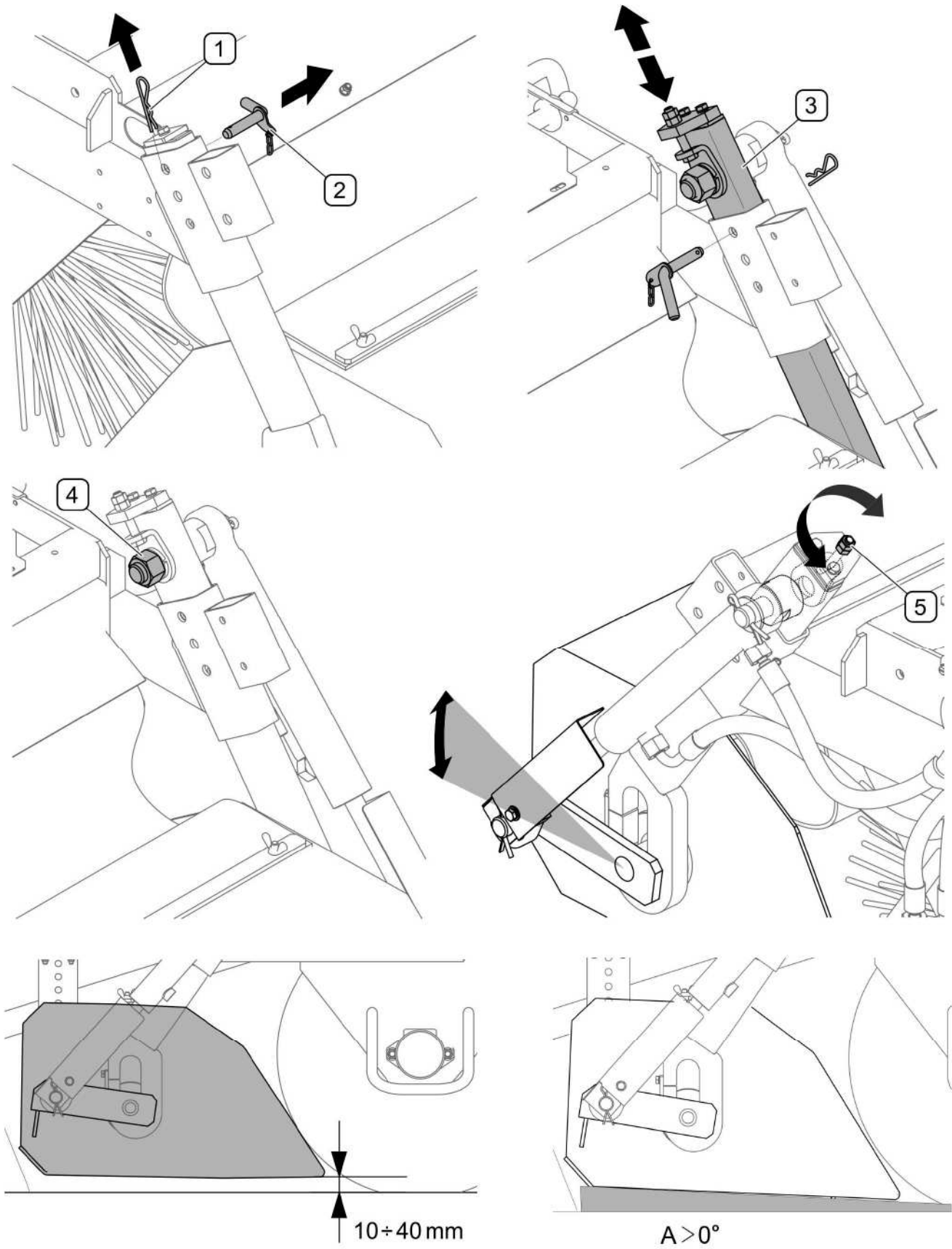
- lower the sweeper on the jockey wheels, level the central linkage,
- remove the R-clip (1) the cotter pin (2) and remove the bolt from the guide hole on the right side of the sweeper,
- sliding the bar (3) set the tank at a height of 10 to 40 mm from the ground,
- Insert the R-clip (2) into a matching through hole in the guide

Proceed the same way to adjust the height of the tank on the left side of the sweeper. The sweeper roller brush distance from the ground on the left and right side of the tank must be the same.

To adjust waste tank tilt angle (FIG. 5.2) move the upper anchorage point of the waste tank tipping cylinder on the left side of the sweeper. The adjustment should be performed as follows:

- loosen the nut (4) fastening the cylinder pin,
- screw in or unscrewing the adjustment bolt (5) to set the inclination angle of the waste tank, so that angle (A) between the bottom of the tank and the ground was positive, the greater the angle (A) should be used for uneven surfaces,
- tighten the nut (4) of the cylinder pin and tighten the bolt (5).

Perform the adjustment with waste tank tipping cylinder maximally extended.



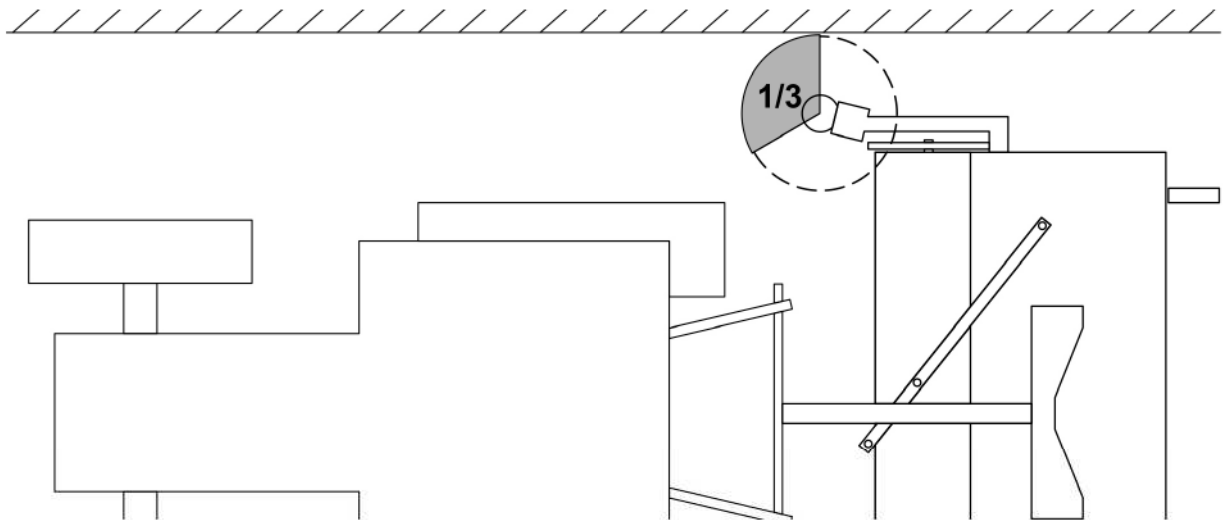
**FIG. 5.2** Adjusting the waste tank

(1) – R-clip, (2) – cotter pin, (3) – bar, (4) – bolt, (5) – adjustment bolt nut;

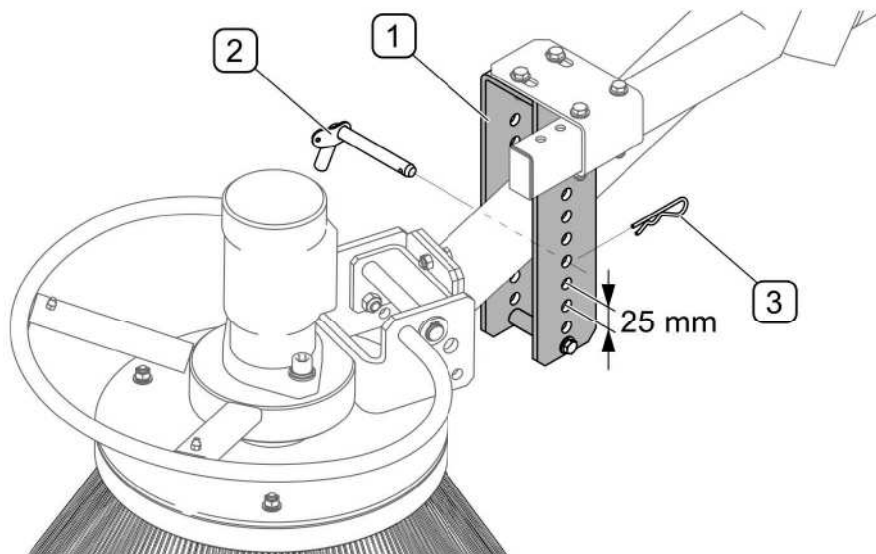
After adjusting the waste tank, check that all fixing bolts and securing elements are properly fitted. As sweeping roller brush wears, monitor the setting of the waste tank.

### 5.3 ADJUSTING THE SIDE BRUSH

All adjustments of the side brush head are performed after adjusting sweeping roller brush and waste tank, depending on the amount of dirt on the surface being swept and head wear. For a properly adjusted head 1/3 of its circumference should touch the ground (FIG. 5.3)



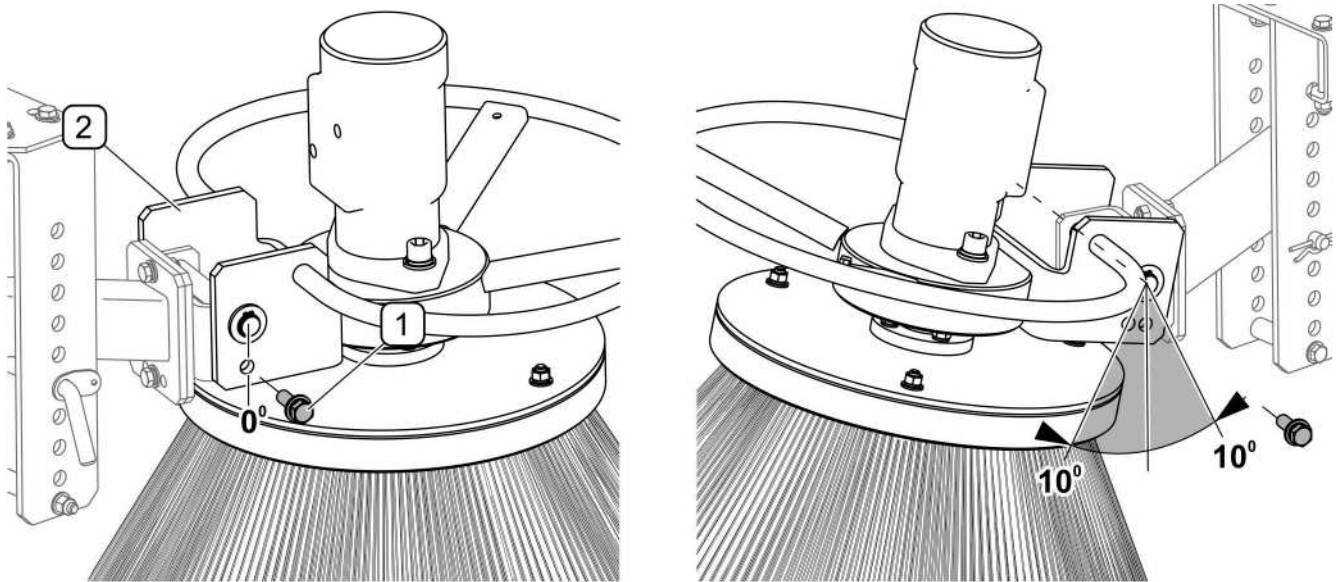
**FIG. 5.3** Correct setting of the side brush



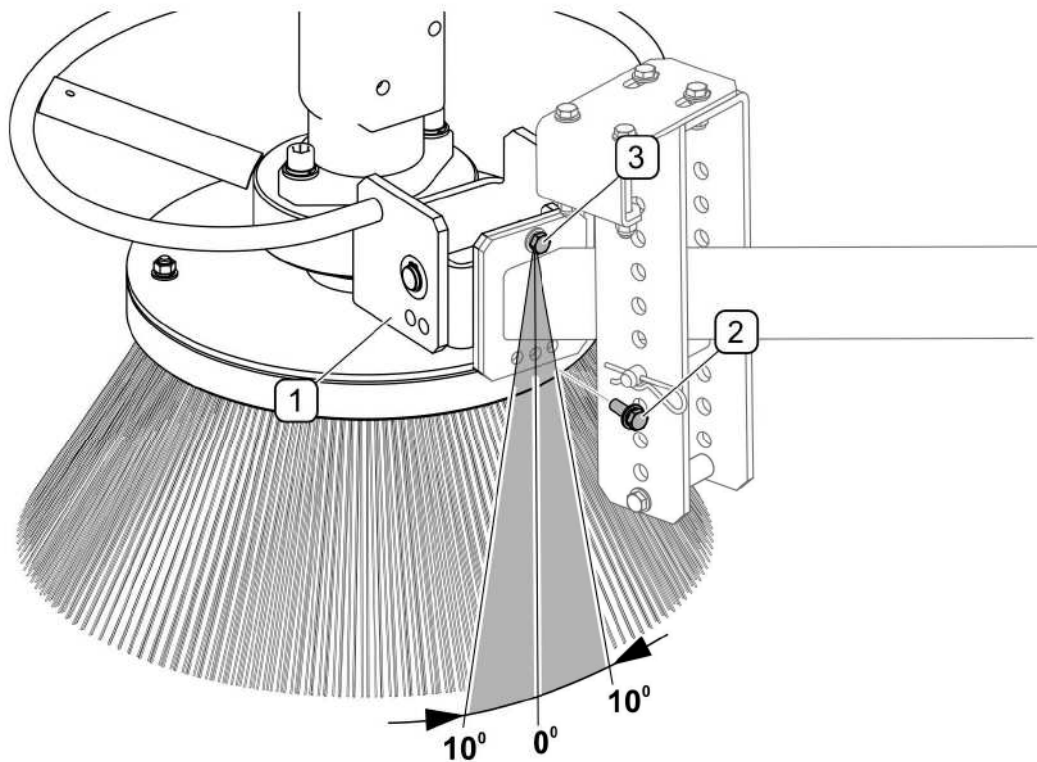
**FIG. 5.4** Adjusting side brush pressure  
(1) – brush arm guide, (2) – cotter pin, (3) – R-clip

To set the brush pressure (FIG. 5.4), remove the R-clip (3) and change the cotter pin (2) mounting hole in the bracket (1) and secure with R-clip (3).

Longitudinal tilting of the head can be set in three positions. This involves changing the position of the retaining bolt (1) in the head bracket holes (2).

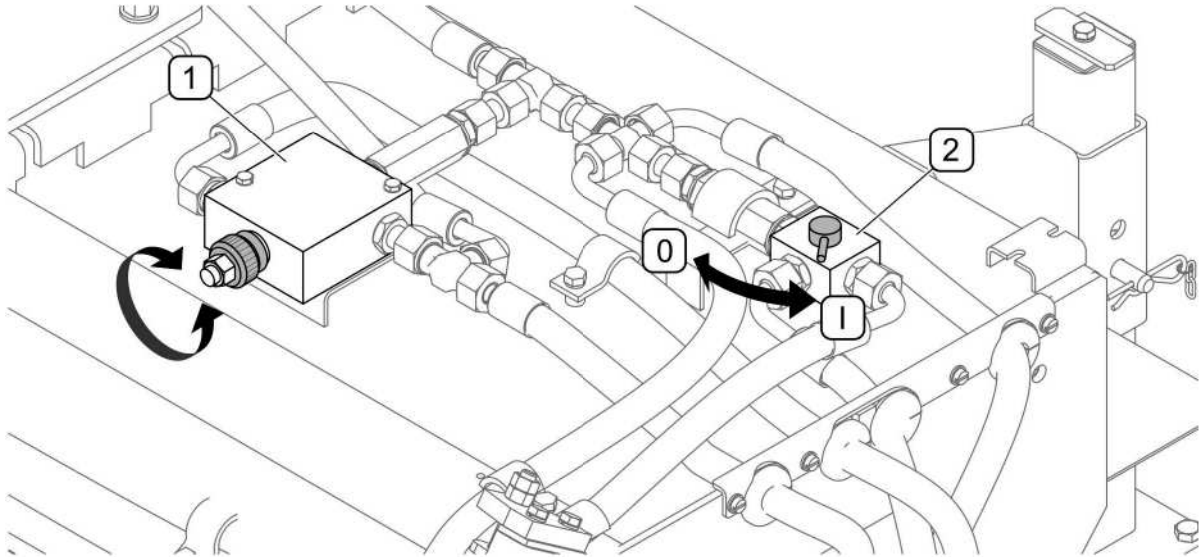


**FIG. 5.5 Adjusting longitudinal tilt**  
(1) - longitudinal tilt retaining bolt, (2) - brush head bracket



**FIG. 5.6 Adjusting lateral tilt**  
(1) - brush head bracket, (2) - lateral tilt retaining bolt, (3) - bolt

To change the lateral tilt angle (FIG. 5.6), remove the retaining bolt (2), loosen the bolt (3) and turn bracket (1) to the right or left side so as to place the bolt (2) in the corresponding hole. Tighten the bolt (3).



**FIG. 5.7 Side brush drive flow regulator selective control valve**

(1) - oil flow regulator; (2) - side brush drive selective control valve; (I) - brush drive on; (0) - brush drive off

The sweepers with side brush are equipped with oil flow controller (1) (FIG. 5.7) for smooth side brush speed control relative to the sweeping roller brush. Speed is controlled using a knob.

Use a selective control valve (2) to turn off the side brush drive (FIG. 5.7) by putting the lever in position (0).

## 5.4 REPLACING THE SWEEPING ROLLER BRUSH

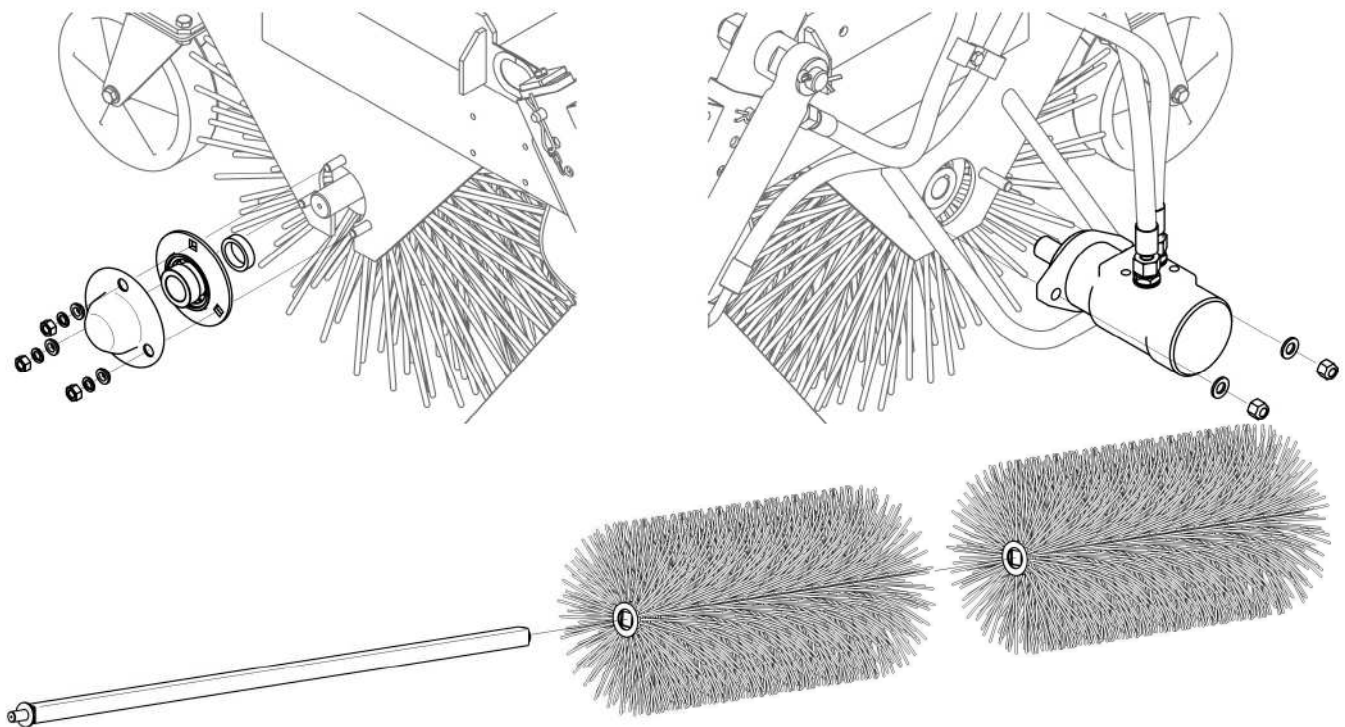
Before changing the sweeping roller brush make sure that the sweeper is disconnected from the tractor hydraulic system, and that the residual pressure in the hydraulic system is reduced.

Sweeping roller is composed of two equal segments - 1,000 mm roller brushes, each mounted on a common shaft (FIG. 5.8).

Depending on customer needs four types of roller brushes differing in hardness are available.

**TAB. 5.1**      **Types of roller brushes**

ITEM	SPECIFICATION	CATALOGUE NO.
1	Medium brush ( <i>plastic 2x3 mm</i> )	180350.000600
2	Soft brush ( <i>plastic 1.6 mm</i> )	180350.000580
3	Hard brush ( <i>plastic 1.6 mm &amp; wire</i> )	180350.700580
4	Hard brush ( <i>plastic 2x3 mm &amp; wire</i> )	180350.700600



**FIG. 5.8**      **Replacing the sweeping roller brush**

To remove the sweeping roller brush proceed as follows:

- loosen the bolt connection of the hydraulic drive on the left side of the sweeper.
- remove the drive from the shaft of the sweeping roller brush (*no need to disconnect the hydraulic lines on the hydraulic drive*).
- loosen the clamping sleeve bolt of the bearing inner ring on the right of the sweeper and slide the sleeve off the shaft pivot.
- loosen the bearing frame bolts and remove the bearing from the shaft.

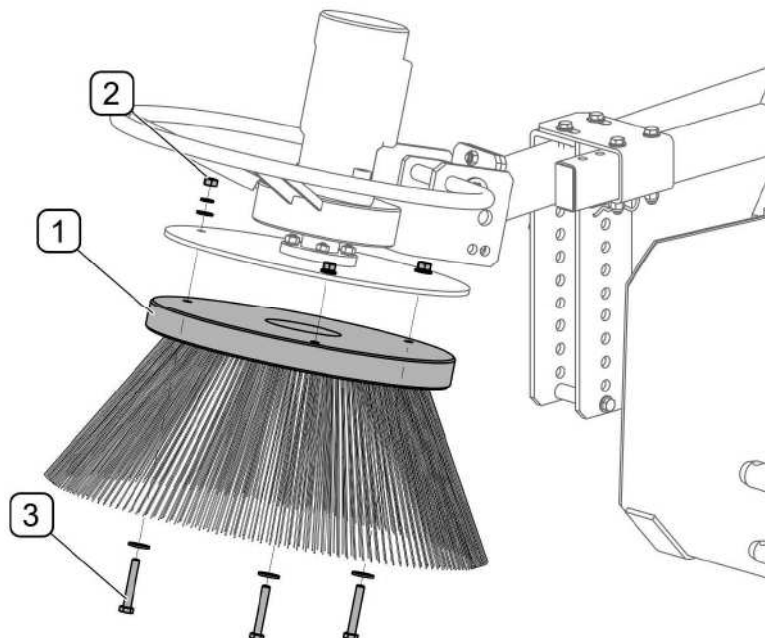
Sweeper can be raised by the carrying vehicle (eg tractor) and secured against falling. Remove the roller, slide the brush segments and replace with new. To mount the sweeping roller perform these steps in reverse order.

## 5.5 REPLACING THE SIDE BRUSH

Replace the side brush only when the sweeper is disconnected from the tractor and rests on the parking stand and jockey wheels. Brush arm should be raised and locked in the guide in its highest position.

Replace the brush as follows:

- Unscrew the nuts (2), remove the bolts (3) and washers;
- Replace worn brush (1),
- Insert the bolts (3) and washers and tighten the nuts (2);



**FIG. 5.9** Replacing the side brush

(1) - brush, (2) - M8 Nut, (3) - bolt M8x50


**TAB. 5.2** The types of side brushes

ITEM	SPECIFICATION	PART NUMBER
1	Medium brush ( <i>wire &amp; plastic 2x3 mm</i> )	260800.900600
2	Soft brush ( <i>plastic 2x3 mm</i> )	260800.000600
3	Hard brush ( <i>wire</i> )	260800.900000

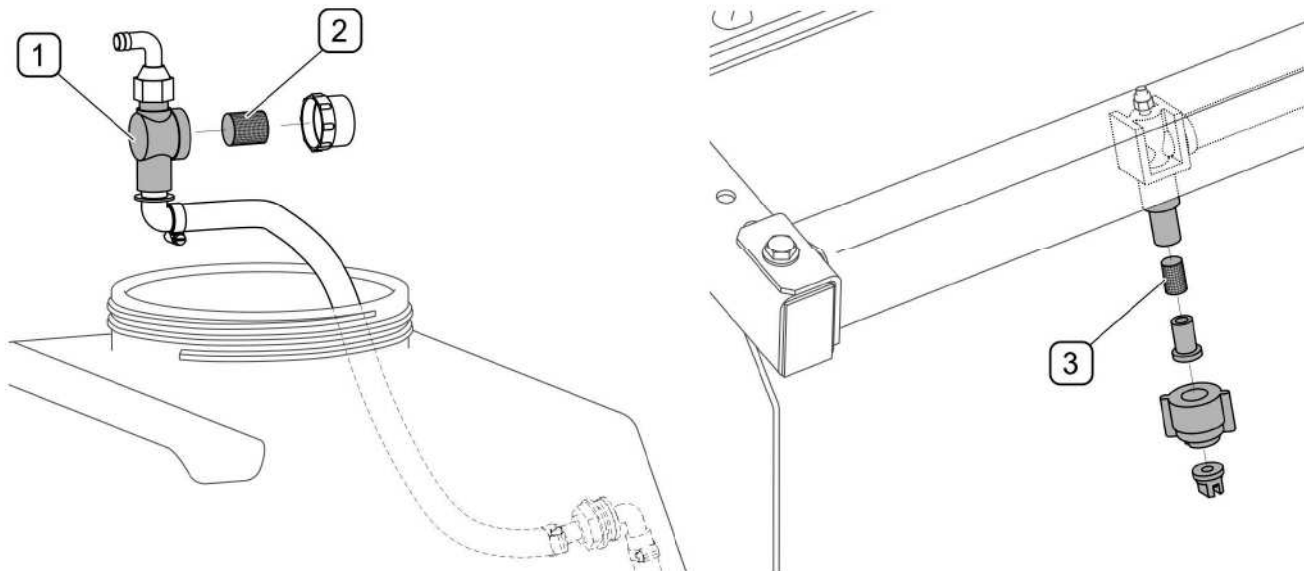
## 5.6 SPRINKLER SYSTEM MAINTENANCE

Maintenance of the sprinkler system consists of periodic inspection of the water system and cleaning (FIG. 5.10) of water filters (2) and (3).

Before first use, check sprinkler operation, especially the setting of spray nozzles. Nozzles should be positioned so that during sweeper operation water is sprayed through the slit perpendicularly to the sweeping direction.




**Water filters are recommended to be cleaned at least once a year. Frequency of filter cleaning depends on amount and size of water contamination.**



**FIG. 5.10 Water Filters**

(1) - water filters, (2) - water filter strainer, (3) - sprinkler strainer



**ATTENTION!**  
Leakage in the sprinkler system causes abnormal water spraying.

The sprinkler system includes a water filter (2) installed in a water tank on the suction line, which captures the grit and also strainers (3) installed in each sprinkler (FIG. 5.10). To clean the filter (2), remove the filter and the line through the tank inlet opening, dismantle the filter housing and remove the strainer (2), and then pressure wash or clean with compressed air. After replacing the strainer reassemble filter housing and check for leaks. To clean the



sprinkler strainer (3) dismantle the housing and then wash the filter and blow with compressed air. Before installing, make sure the nozzle is not clogged.

## 5.7 HYDRAULIC SYSTEM OPERATION

The duties of the operator connected with the hydraulic system include:

- checking tightness of cylinder and hydraulic connections,
- checking technical condition of hydraulic lines and quick couplers;



### **DANGER**

**Do not repair hydraulic system on your own. All hydraulic system repairs must be performed only by suitably qualified personnel.**



### **DANGER**


**Before commencing whatever work on hydraulic system reduce the pressure in the system.**



### **DANGER**

**During work on hydraulic systems use the appropriate personal protection equipment i.e. protective clothing, footwear, gloves and eye protection. Avoid contact of skin with oil.**

In a new sweeper, the hydraulic system is filled with HL32 hydraulic oil. Because of its composition the oil applied is not classified as a dangerous substance, however long-term action on the skin or eyes may cause irritation. In the event of contact of oil with skin wash the place of contact with water and soap. Do NOT apply organic solvents (petrol, kerosene). Contaminated clothing should be changed to prevent access of oil to skin . In the event of contact of oil with eye, rinse with large quantity of water and in the event of the occurrence of irritation consult a doctor . Hydraulic oil in normal conditions is not harmful to the respiratory tract. A hazard only occurs when oil is strongly atomised (oil vapour), or in the case of fire during which toxic compounds may be released.


	<p><b>DANGER</b></p> <p>Oil fires should be quenched with carbon dioxide (CO<sub>2</sub>), foam or extinguisher steam. Do NOT use water for fire extinguishing.</p>
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Spilt oil should be immediately collected and placed in marked tight container. Used oil should be taken to the appropriate facility dealing with the re-use of this type of waste.

**TAB. 5.3 HL32 hydraulic oil characteristics**

ITEM	NAME	VALUE
1	ISO 3448VG viscosity classification	32
2	Kinematic viscosity at 40°C	28.8 – 35.2 mm <sup>2</sup> /s
3	ISO 6743/99 quality classification	HL
4	DIN 51502 quality classification	HL
5	Flash point, °C	Above 210°C
6	Maximum Operating Temperature, °C	80

The hydraulic system should be completely tight sealed. Inspect the seals when hydraulic ram cylinders are completely extended. In the event of confirmation of oil on hydraulic ram cylinder bodies ascertain origin of leak. Minimum leaks are permissible with symptoms of "sweating", however in the event of noticing leaks in the form of "droplets" stop using the machine until faults are remedied.

	<p><b>ATTENTION!</b></p> <p>Before you begin to operate the sweeper, visually inspect the hydraulic system components.</p>
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In the event of confirmation of an oil leak on hydraulic line connections, tighten connections, and if this does not remedy faults then change line or connection elements. Change of sub assemblies is equally required in each instance of mechanical damage.

**ATTENTION!**

The hydraulic system is vented automatically during machine operation.



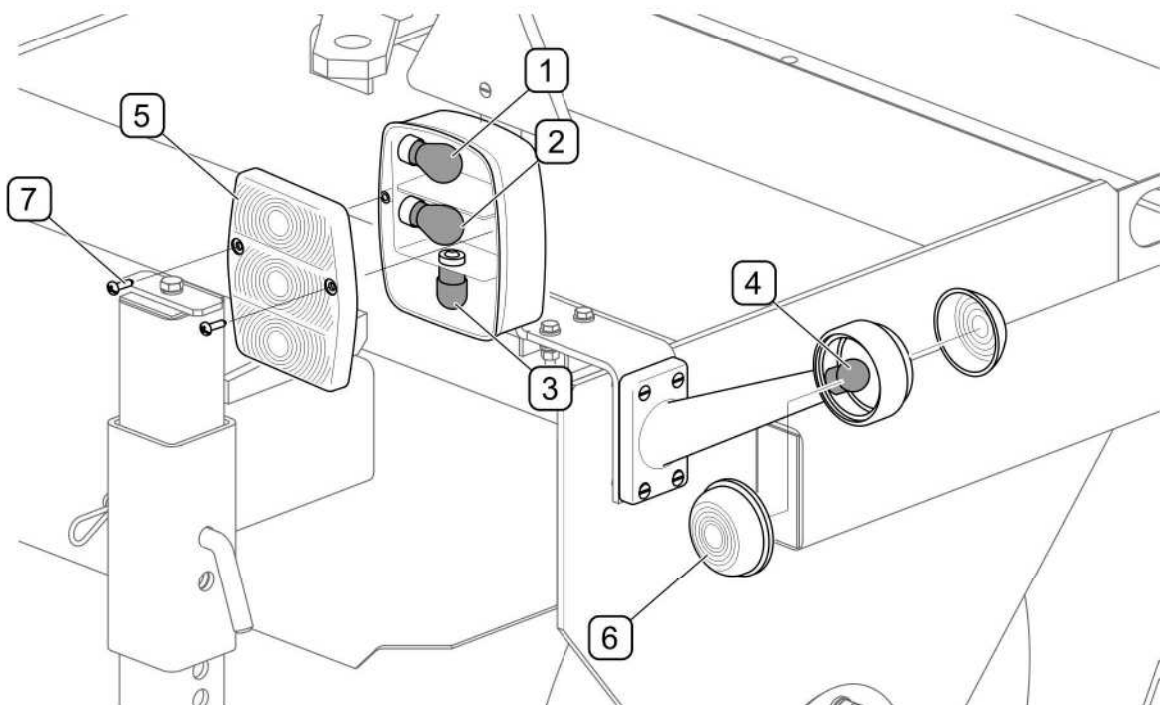
The condition of hydraulic system should be inspected regularly while using the machine.



Flexible hydraulic lines should be replaced after 4 years of use.

## 5.8 ELECTRICAL SYSTEM MAINTENANCE

Electrical system maintenance is conducted during the periodical checking the operation of sprinkler and lighting system (option).



**FIG. 5.11 Change bulbs**

(1) - indicator light bulb, (2) - brake light bulb, (3) - parking light bulb, (4) - clearance lamp bulb, (5) - lamp assembly lens, (6) - clearance lamp lens, (7) - screws


After connecting to 7-pole socket on the tractor, check operation of the lighting system. In case of bulb burnout in lamp assembly, unscrew screws (7) that secure lamp lens (5) and

replace appropriate bulb (FIG. 5.11). To replace bulb of clearance lamp, take out lens (6) from flexible housing.

**TAB. 5.4 List of bulbs**

MARKING (FIGURE FIG. 5.11)	TYPE OF LIGHT	BULB	LAMP
1	indicator light	P21W	Lamp assembly W-18U
2	brake light	P21W	
3	parking light	R10W	
4	clearance light	R5W	Left clearance lamp 127 022 00 00 Right clearance lamp 127 023 00 00


If sprinkler electrical system fails, first check water level in the tank and if filters (FIG. 5.11) are clean and the correct connection of the control cable with the switch and water pump power cable.

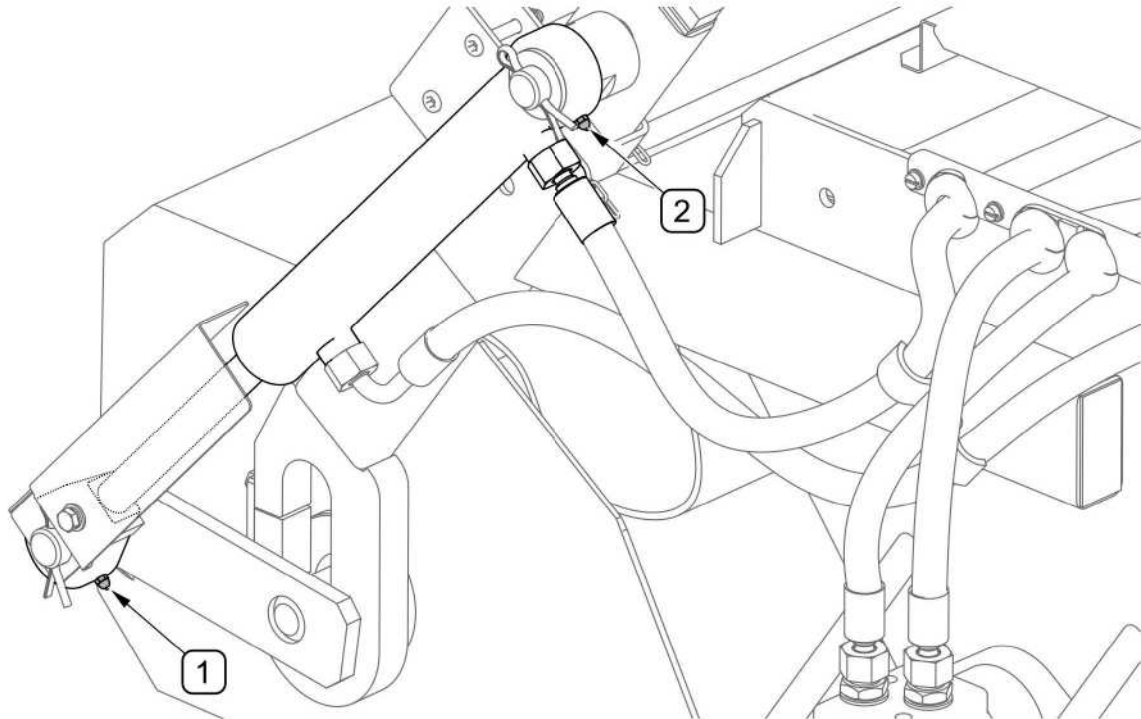
	<p><b>DANGER</b></p> <p>Do not independently repair electrical system, except items described in chapter ELECTRICAL SYSTEM MAINTENANCE. All electrical system repairs must be performed only by suitably qualified personnel.</p>
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## 5.9 LUBRICATION

Machine lubrication should be performed with the aid of a manually or foot operated grease gun, filled with ŁT-43-PN/C-96134 grease.

After lubricating according to instructions, wipe off excess grease.

	<p>When using the machine the user is obliged to observe lubrication instructions according to attached schedule. Excess lubrication substance causes depositing additional contaminants in places requiring lubrication, therefore it is essential to keep individual machine elements clean.</p>
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**FIG. 5.12 Lubrication points**

Lubrication points described in TAB. 5.5

**TAB. 5.5 Lubrication points and lubrication frequency**

ITEM	NAME	NUMBER OF LUBRICATION POINTS	TYPE OF GREASE	LUBRICATION FREQUENCY
1	Cylinder rod lug	1	grease	50 hours
2	Cylinder barrel lug	1		

Marking description in Item column TAB. 5.5 conforms with numbering shown FIG. 5.12

## 5.10 STORAGE

After finishing work, machine should be thoroughly cleaned and washed with water jet. While washing do not direct a strong water jet at information and warning decals, hydraulic cylinders, electrical equipment. In the event of damage to the lacquer coating clean those places from rust and dirt, degrease and then paint with paint maintaining uniform colour and even thickness of protective coating. Until the time of touch-up painting, the damaged place may be covered with a thin layer of grease or anticorrosion preparation. It is recommended to keep the machine in a closed or roofed building.

If the machine shall not be used for a long period of time, protect it against adverse weather conditions. Lubricate machine according to the instructions provided. In the event of

prolonged work stoppage, it is essential to lubricate all elements regardless of the period of the last lubrication process. Additionally before the winter period apply grease to hitching system pins and openings.


If there is a risk that temperatures drop below 0°C, drain water from the sprinkler system.

## 5.11 TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS

Unless other tightening parameters are given, during maintenance repair work apply appropriate torque to tightening nut and bolt connections. Recommended torque (TAB. 5.6) values apply to non-greased steel bolts.

**TAB. 5.6** Tightening torque for nut and bolt connections

THREAD DIAMETER [mm]	5.8	8.8	10.9
	TIGHTENING TORQUE [Nm]		
M6	8	10	15
M8	18	25	36
M10	37	49	72
M12	64	85	125
M14	100	135	200
M16	160	210	310
M20	300	425	610
M24	530	730	1050
M27	820	1150	1650



**ATTENTION!**

Should it be necessary to change individual parts, use only original parts or those indicated by the Manufacturer. Non-adherence to these requirements may put the user and other people's health and life at risk, and also damage the machine.

## 5.12 TROUBLESHOOTING

**TAB. 5.7 Troubleshooting**

TYPE OF FAULT	CAUSE	REMEDY
Sweeping roller does not rotate or rotates in the wrong direction	Hydraulic system not connected or incorrectly connected	Check connection
	Wrong tractor hydraulic circuit activated or hydraulic circuit not activated	Activate correct hydraulic circuit on the tractor
	Faulty hydraulic system	Notify service point
Side brush does not rotate	Hydraulic system not connected or incorrectly connected	Check connection
	Brush drive turned off	Operate the brush drive selective control valve
	Faulty hydraulic system	Notify service point
Side brush rotates too slowly or too quickly	Sweeper oil flow regulator improperly adjusted	Set brush speed by turning the oil flow regulator knob
Waste tank can not be opened or closed	Hydraulic system not connected or incorrectly connected	Check connection
	Wrong tractor hydraulic circuit activated or hydraulic circuit not activated	Change the direction of oil flow in the hydraulic circuit using selective control valve lever on the tractor
Sprinkler system is not working	Sprinkler system turned off	Set the sprinkler system switch to "on" position
	Water pump electrical power supply not connected	Makes sure that correct connector is plugged in the 7-pole socket on the tractor. Check the connection of the sprinkling system switch
	No water in the tank	Top up water
	Sprinkler system clogged	Make sure the system is not clogged, clean the filter strainers and water sprinklers
	Faulty water pump	Notify service point
Sweeper does not collect waste precisely	Sweeping roller brush rotational speed too slow	Increase engine RPM
	Improperly set sweeping roller brush pressure	Adjust according to operator's manual
	Waste tank positioned incorrectly	Adjust according to operator's manual
	Side brush incorrectly set	Adjust according to operator's manual
	Driving too fast	Adjust driving speed
	Waste tank is full	Empty the waste tank
Rapid wear of brushes	Brushes excessively worn	Replace
	Improperly set sweeping roller brush pressure. Side brush incorrectly set	Adjust according to operator's manual
Material is ejected from under the sweeper	Brush rotational speed too high. Brush incorrectly set. Incorrect setting on the tractor	Check and adjust according to operator's manual





# NOTES

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