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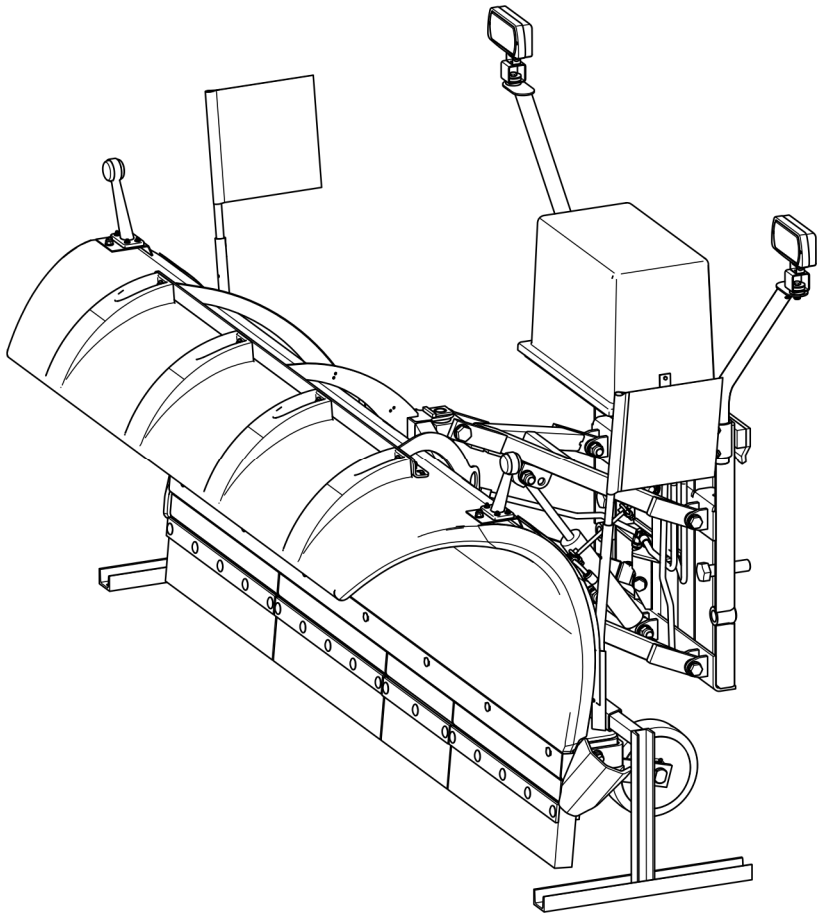
OPERATOR'S MANUAL

SNOW PLOUGH

PRONAR PU-S25HL / PU-S27HL PU-S30HL / PU-S34HL

TRANSLATION OF THE ORIGINAL INSTRUCTIONS



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SNOW PLOUGH

PRONAR PU-S25HL / PU-S27HL

PU-S30HL / PU-S34HL

MACHINE IDENTIFICATION

TYPE: ……

SERIAL NUMBER:

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 snow plough. 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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CONTACT TELEPHONES

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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:	**Snow plough**			
Type:	**PU-S25HL**	**PU-S27HL**	**PU-S30HL**	**PU-S34HL**
Model:	–	–	–	–
Serial number:				
Commercial name:	**Snow plough PRONAR PU-S25HL** **Snow plough PRONAR PU-S27HL** **Snow plough PRONAR PU-S30HL** **Snow plough PRONAR PU-S34HL**			

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.

Z-CA DYREKTORA
d/s technicznych
członek Zarządu
Roman Melianiuk

Narew, the 2015-12-09

Place and date

Full name of the empowered person position, signature

TABLE OF CONTENTS

SECTION

1

BASIC INFORMATION

1.1 IDENTIFICATION

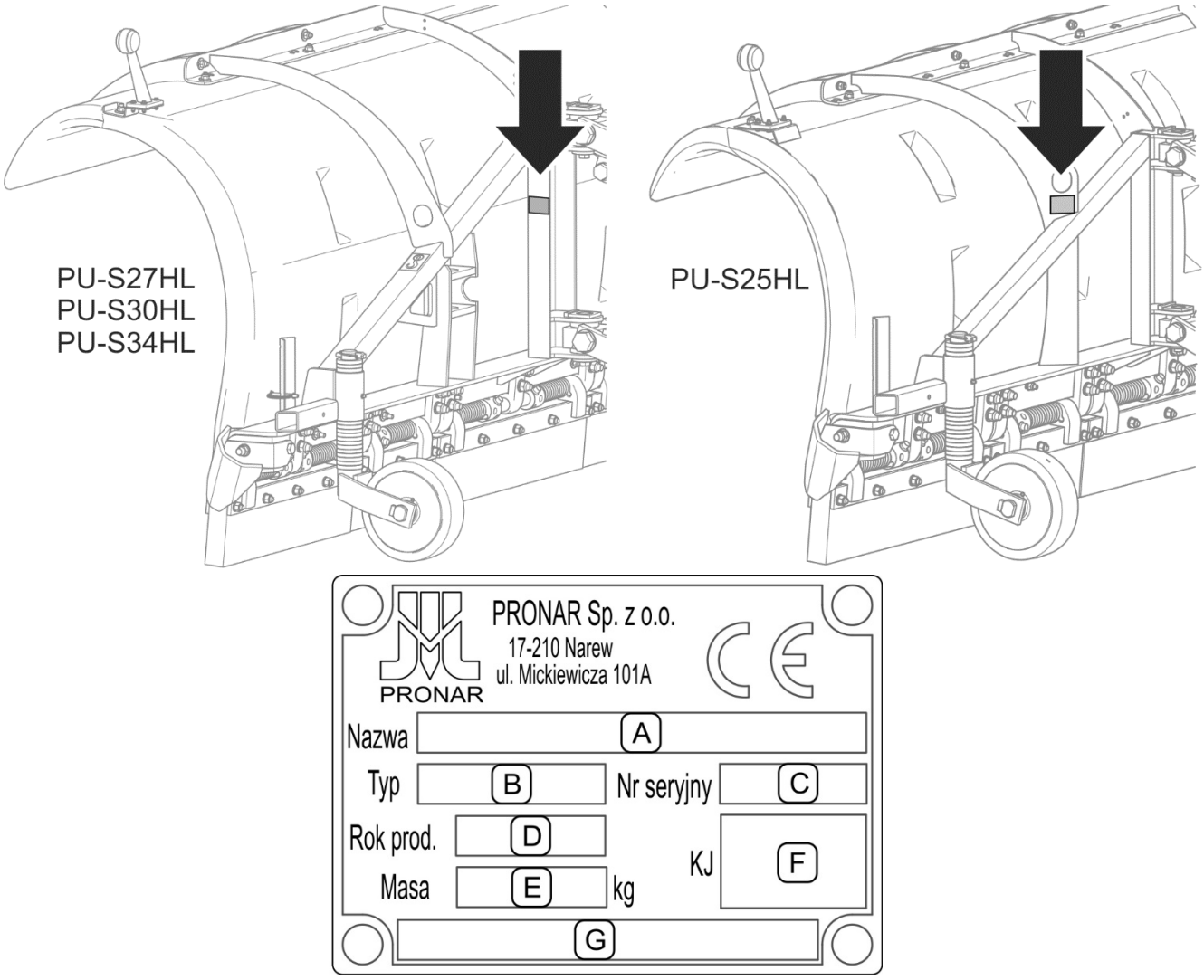


FIGURE 1.1 Location of the data plate

Meaning of data plate items (FIGURE 1.1):

A - machine name

B – type

C – serial number

D – year of manufacture

E – machine tare weight [kg]

F – Quality Control stamp

G – additional information *(supply voltage of **12V** or **24V**; **PD**- with floating position and press-down function; **P**- with floating position and without press-down function)*

The factory number is stamped into the data plate and on the frame under the data plate. Data plate is located on the frame on the left side of the machine. 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

PRONAR PU-S25HL / PU-S27HL / PU-S30HL / PU-S34HL snowploughs are designed for removing loose snow and snowdrift from roads, squares and other hard road surfaces such as asphalt, concrete paving blocks, paving and concrete. Use for other purposes should be regarded as improper.

It is not recommended to remove icy, compacted or compressed and considerably thick layer of snow frozen to road surface.

Depending on the equipment, the snowploughs can be mounted on trucks and special vehicles that are equipped with the front mounting plate and meet the requirements set out 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 the vehicle and are familiar with the road traffic regulations and transport regulations.

IMPORTANT!

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

- **removing icy, compacted or compressed and considerably thick layer of snow frozen to road surface,**
- **levelling of roads, terrain;**
- **transport of people, animals and other items on the machine**

TABLE 1.1 Carrying vehicle requirements

	UNIT	REQUIREMENTS	
Snow plough model		PU-S25HL	PU-S27HL/PU-S30HL/PU-S34HL
Mounting method	–	front mounting plate according to DIN 76060 standard TYPE A or TYPE B	
Electrical system Electrical system voltage	V	12 or 24*	
Connection type	–	High current socket on the front of the vehicle (*included in the snowplough equipment)*	
Carrying vehicle load capacity	t	up to 6	up to 8 *(with 2 or more driven axles)* or more than 8
Other requirements Equipment of carrying vehicle	–	beacon light *(orange light)*	

* - *depending on the snowplough electrical system*

1.3 EQUIPMENT

The snowplough equipment includes:

- Operator's Manual,
- Warranty Book,
- control panel with a connection lead,
- high current socket with electrical supply lead

Equipment versions:

- Type of snowplough blades:

– rubber snowplough blades with shock absorbers or

– rubber snowplough blades without shock absorbers or

– steel snowplough blades with shock absorbers

- The electrical system *(depending on the carrying vehicle electrical system):*

– 12V or

– 24V

- Type of control system:

– electro-hydraulic control with "floating" position or

– electro-hydraulic with "floating" position and press-down function

- Mounting system acc. to DIN 76060 *(with securing bolts):*

– Type A or

- Type B

- Type of hydraulic system:

– with one turning cylinder or

– with two turning cylinders *(only PU-S27HL / PU-S30 / PU-S34HL snowploughs)*

Additional fittings and optional equipment:

- Warning banners

1.4 TERMS & CONDITIONS OF WARRANTY

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 Warranty Service. The repair period is specified in the WARRANTY BOOK.

The warranty 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:

- collecting blades, fenders
- light bulbs, fuses, decals,
- wheels,

The warranty service only applies to factory defects and mechanical damage that is not due to the user's fault.

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 warranty repair coupons. A missing date of purchase or sale point stamp, may make the user ineligible for any warranty repair or refund.

For detailed Terms & Conditions of Warranty, please refer to 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 straps or chains fitted with pulley.

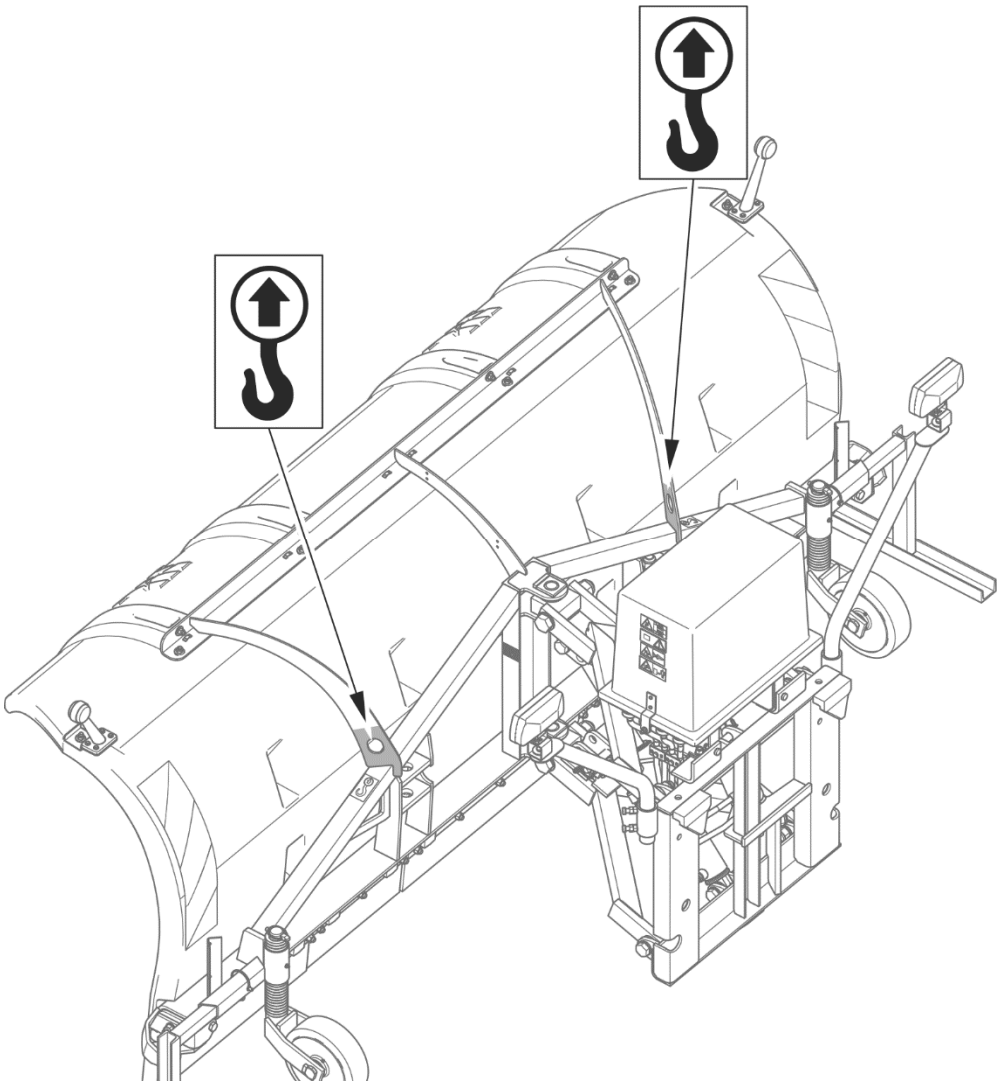


FIGURE 1.2 Transport lugs

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 attached to lifting equipment in places specially designed for this purpose (FIGURE 1.2), i.e. by the holes in the mouldboard frame brackets. 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.

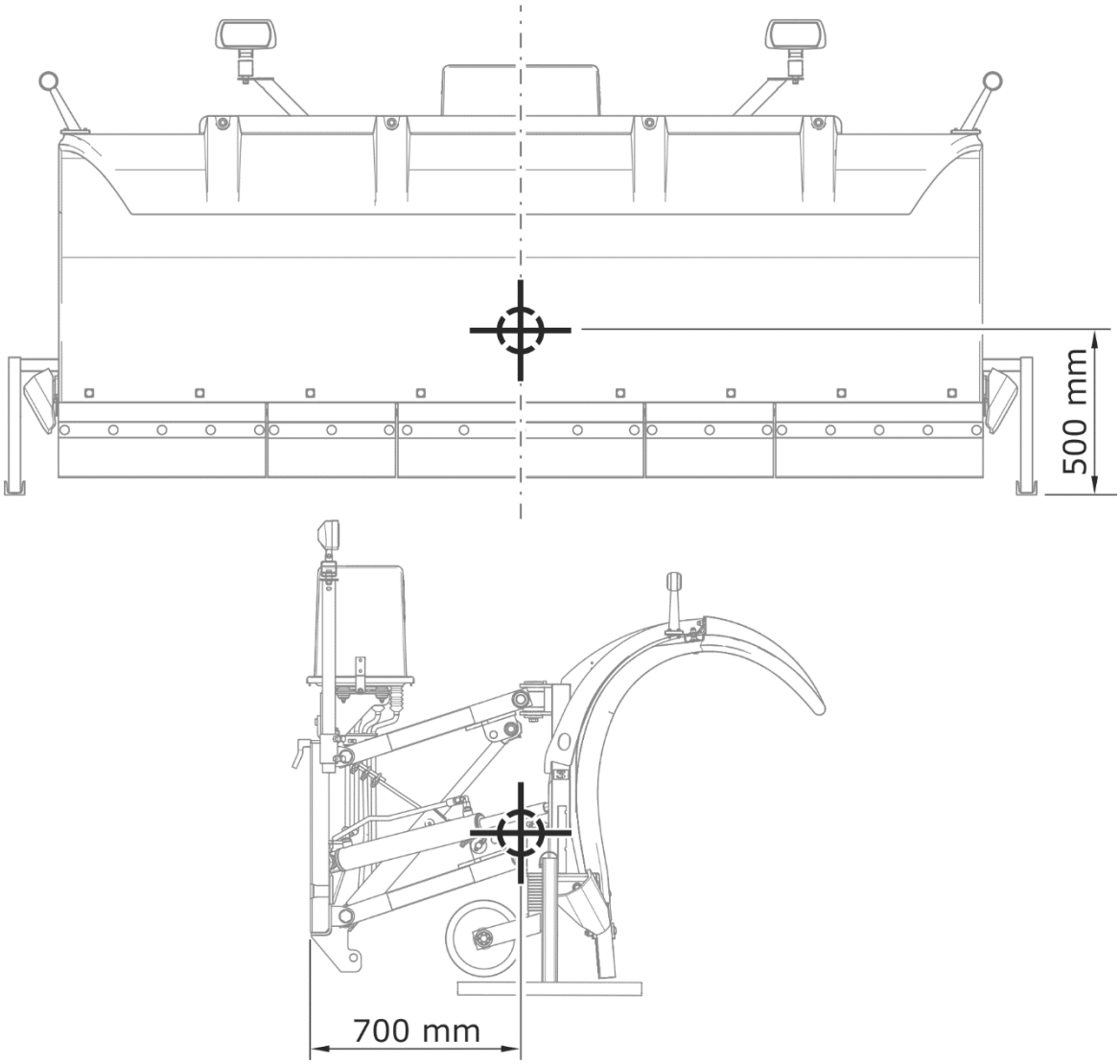


FIGURE 1.3 Centre of gravity

ATTENTION!

Centre of gravity, depending on the version varies in the ±50 mm range.

ATTENTION!

Do NOT secure lifting slings or any types of load securing elements to hydraulic and electrical system components and fragile elements of the machine

1.6 ENVIRONMENTAL HAZARDS

A hydraulic oil leak constitutes a direct threat to the natural environment owing to its limited biodegradability. While carrying out maintenance and repair work which involves the risk of an oil leak, this work should take place on an oil resistant floor or 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

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 carrying vehicle and trained in the use of the machine.
- If the information stated 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.
- Careless and improper use and operation of the machine, and non-compliance with the recommendations given in this operator's manual is dangerous to your health.
- Be aware of the existence of a residual 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 carrying vehicle, 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 warranty.
- The machine may only be used when all the protective elements (i.e. safety guards, bolts, cotter pins) 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 HITCHING AND UNHITCHING FROM CARRYING VEHICLE

- Do NOT hitch the machine to a carrying vehicle, if the linkage system of the machine is not compatible with the linkage system of the carrying vehicle.
- Be especially careful when linking and unhitching the machine from the carrying vehicle.
- When hitching, there must be nobody between the machine and the carrying vehicle.
- To hitch the machine to the carrying vehicle use only linking elements recommended by the Manufacturer.
- The carrying vehicle to which the machine will be coupled must be technically reliable and must fulfil the requirements specified by the machine Manufacturer.
- After completion of hitching the machine, check the safeguards. Carefully read the carrying vehicle Operator's Manual.
- The machine disconnected from the carrying vehicle must be supported on the parking stands and placed on level, sufficiently hard surface in such a manner as to ensure that it is possible to connect it again.

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 conduits. There must be no oil leaks.
- In the event of the hydraulic system malfunction, discontinue using the machine until the malfunction is corrected.
- 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).
- Use the hydraulic oil recommended by the Manufacturer. Never mix two types of oil.

- 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.
- Hydraulic conduits must be changed 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 the machine raised and unsecured while the carrying vehicle 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 and hydraulic and electrical system.
- When driving with raised implement, use transport lock.
- 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.
- In the event of work requiring the machine to be raised, use properly certified hydraulic or mechanical lifts for this purpose. After raising the machine, proper supports should be placed. Do NOT perform service or repair work under raised and unsupported machine.
- The machine must not be supported using fragile elements (bricks or concrete blocks).
- 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 carrying vehicle engine turned off and the ignition key removed. Immobilise the carrying vehicle with parking brake and ensure that unauthorised persons do not have access to the vehicle's cab.
- 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 warranty.
- Do NOT weld, drill holes in, cut or heat the main structural elements, which have a direct impact on the machine operation safety.
- 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 lowering or lifting the machine mounted on carrying vehicle make sure there are no bystanders, especially children, near the machine.
- Before starting the machine make sure that there are no bystanders (especially children) or animals in the danger zone. The carrying vehicle 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.
- Person must not stand in the machine operation area and also between the carrying vehicle and the machine.
- Do NOT operate the machine while reversing. While reversing raise the multifunction arm.
- Do NOT use the snowplough with additional ballast.

2.2 DESCRIPTION OF RESIDUAL RISK

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

- using the plough for purposes other than those for which it is intended,
- being between the carrying vehicle and the machine while the engine is running and when the machine is being attached,
- being on the machine while the engine is running,
- 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 unauthorised persons or persons under the influence of alcohol or other intoxicating substances,
- cleaning, maintenance and technical checks when carrying vehicle is connected and engine is running.

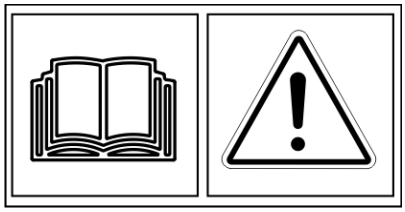
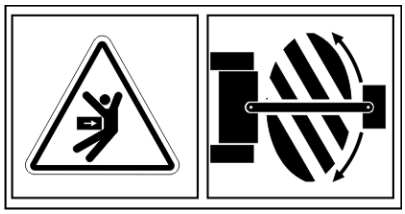
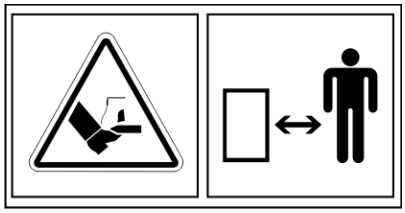
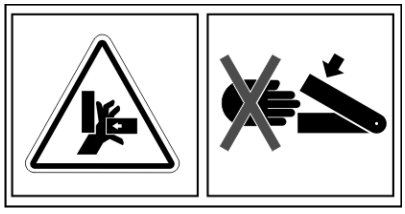
The residual risk may be kept to a minimum by following the recommendations below:

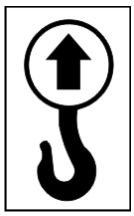
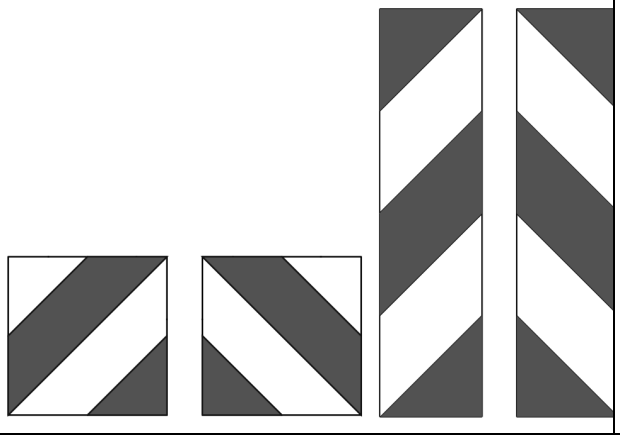
- prudent and unhurried operation of the machine,
- reasonably apply all the remarks and recommendations stated in the Operator's Manual,
- carry out repairs and maintenance work in line with operating safety rules,
- carrying out repair and maintenance work by persons trained to do so,
- use close fitting protective clothing,
- ensure unauthorised persons have no access to the machine, especially children,
- maintain safe distance from prohibited or dangerous places
- do not climb 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 the machine in operation. 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.

TABLE 2.1 Information and warning decals

ITEM	SYMBOL	DESCRIPTION
1		Before starting work, carefully read the Operator's Manual.
2		When implement is in use there must be no bystanders in designated areas. If any work is required in these areas, make sure the carrying vehicle is stationary, and whether the implement is disconnected from the power source.
3		Risk of injury to foot or leg. Keep a safe distance.
4		Do not reach into crushing space because elements may move. Danger of crushing hands or fingers.

ITEM	SYMBOL	DESCRIPTION
5	PRONAR PU-S25HL PRONAR PU-S27HL PRONAR PU-S30HL PRONAR PU-S34HL	Machine model
6		Lifting equipment attachment points while loading the machine
7		Outline marking.

Numbers in the item column correspond to decals (FIGURE 2.1)

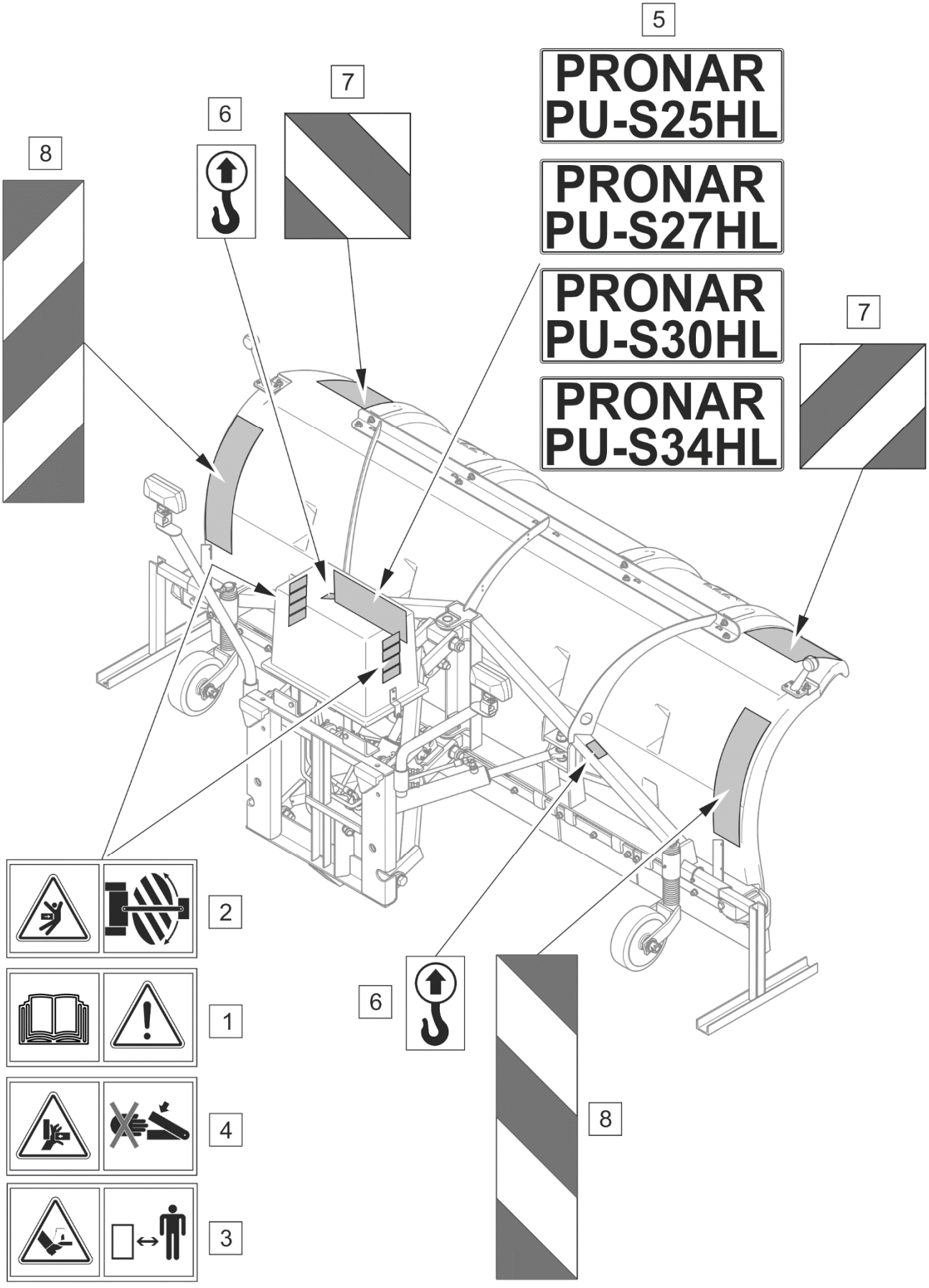


FIGURE 2.1 Locations of information and warning decals.

Meaning of symbols (TABLE 2.1)

SECTION

3

DESIGN AND OPERATION

3.1 TECHNICAL SPECIFICATION

TABLE 3.1 BASIC TECHNICAL SPECIFICATION

	Unit				
Snowplough model		PU-S25HL	PU-S27HL	PU-S30HL	PU-S34HL
Working width – angle of 30°	mm	2,155	2,380	2,630	2,970
Working height	mm	930		10,060	
Total width *(with a bumper)* – angle of 30° – straight	 mm mm	 2,350 2,690	 2,570 2,945	 2,825 3,235	 3,630 3,160
Total height *(with lighting)*	mm	1,565	1,490		
Total length: – angle of 30° – straight	 mm mm	 1,920 1,500	 2,160 1,745	 2,235 1,745	 3,160 1,745
Number of working positions	-	2 fixed *intermediate positions possible*			
Power supply *	-	Power-Pack electro-hydraulic power supply: - with floating position, - with floating position and press-down function (option)			
Operation	-	with the aid of the control panel, from the operator cab			
Electrical system voltage *	V	24 or 12			
Types of collecting blades *	-	- rubber snowplough blades with shock absorbers or - rubber snowplough blades without shock absorbers or - metal snowplough blades with shock absorbers			
Number of hydraulic cylinders *	pc.	- 1 mouldboard turning, 1 raising/lowering or - 2 mouldboard turning, 1 raising/lowering*			
Weight *	kg	450	530	550	590
Working speed	km/h	30 – 60 *(depending on amount of snow and road conditions)*			
Other information	-	single person operation			

** – refers only to PU-S27HL / PU-S30HL / PU-S34HL*

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

3.2 GENERAL DESIGN

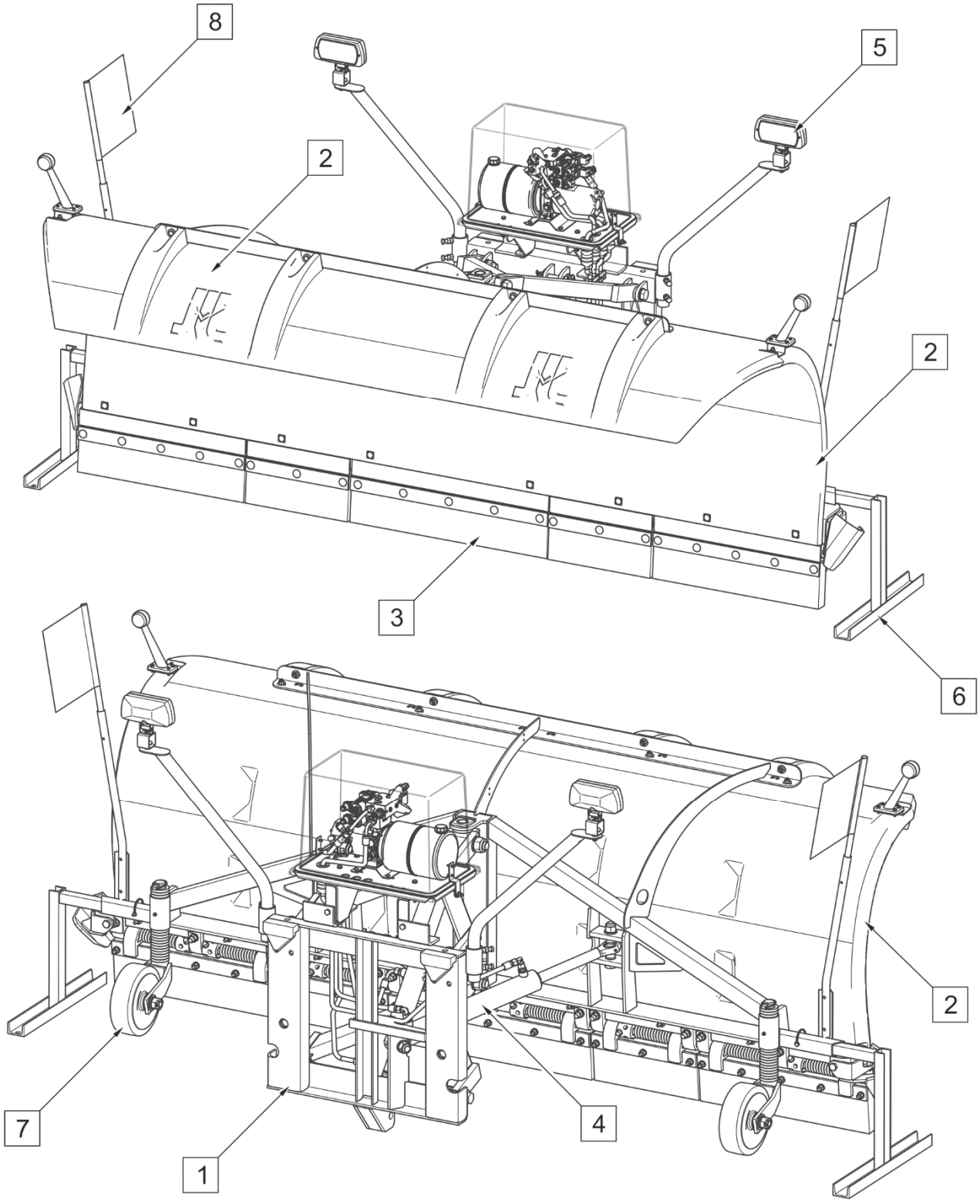


FIGURE 3.1 General design

(1) - linkage; (2) - mouldboard; (3) - snowplough blades; (4) - hydraulic system; (5) - electrical lighting system; (6) - parking stands; (7) - wheels; (8) - flag (option)

3.3 HYDRAULIC SYSTEM

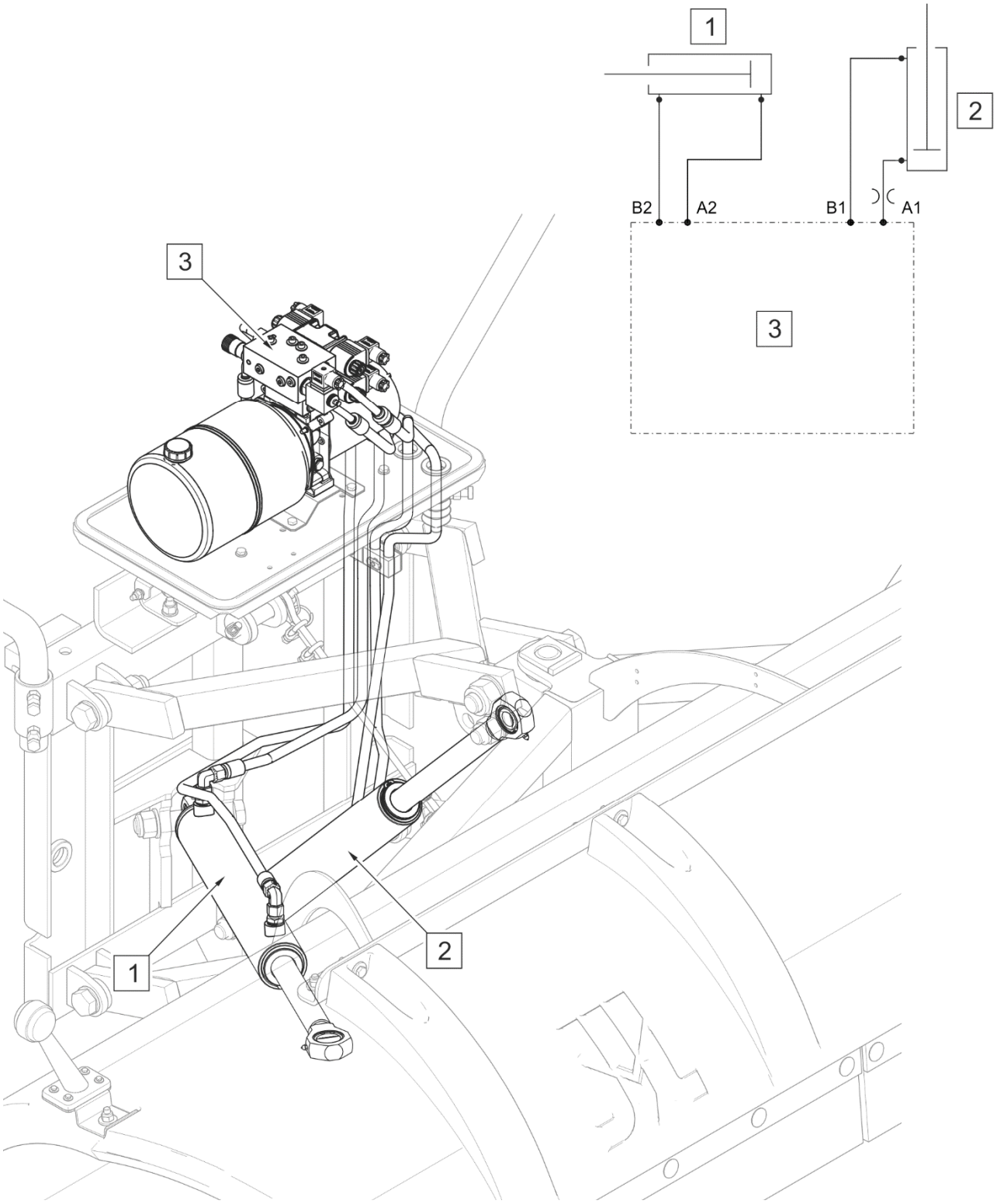


FIGURE 3.2 Hydraulic system (1 mouldboard turning cylinder)

(1) - mouldboard turning cylinder; (2) - mouldboard lifting cylinder; (3) - Power-Pack electro-hydraulic power supply

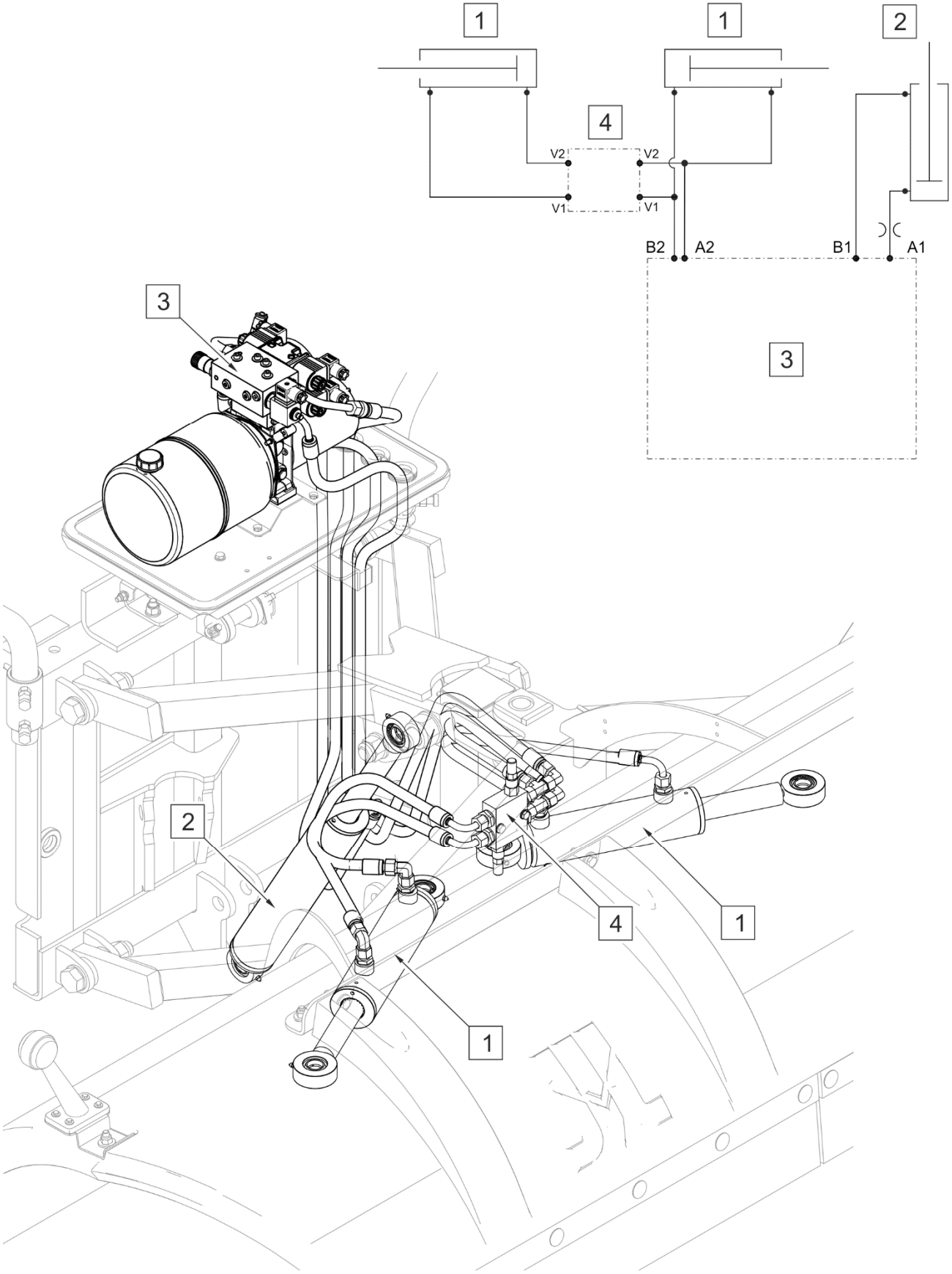


FIGURE 3.3 Hydraulic system (2 mouldboard turning cylinders)

(1) - mouldboard turning cylinder; (2) - mouldboard lifting cylinder; (3) - Power-Pack electro-hydraulic power supply; (4) - overflow valve

3.4 ELECTRICAL SYSTEM DESIGN

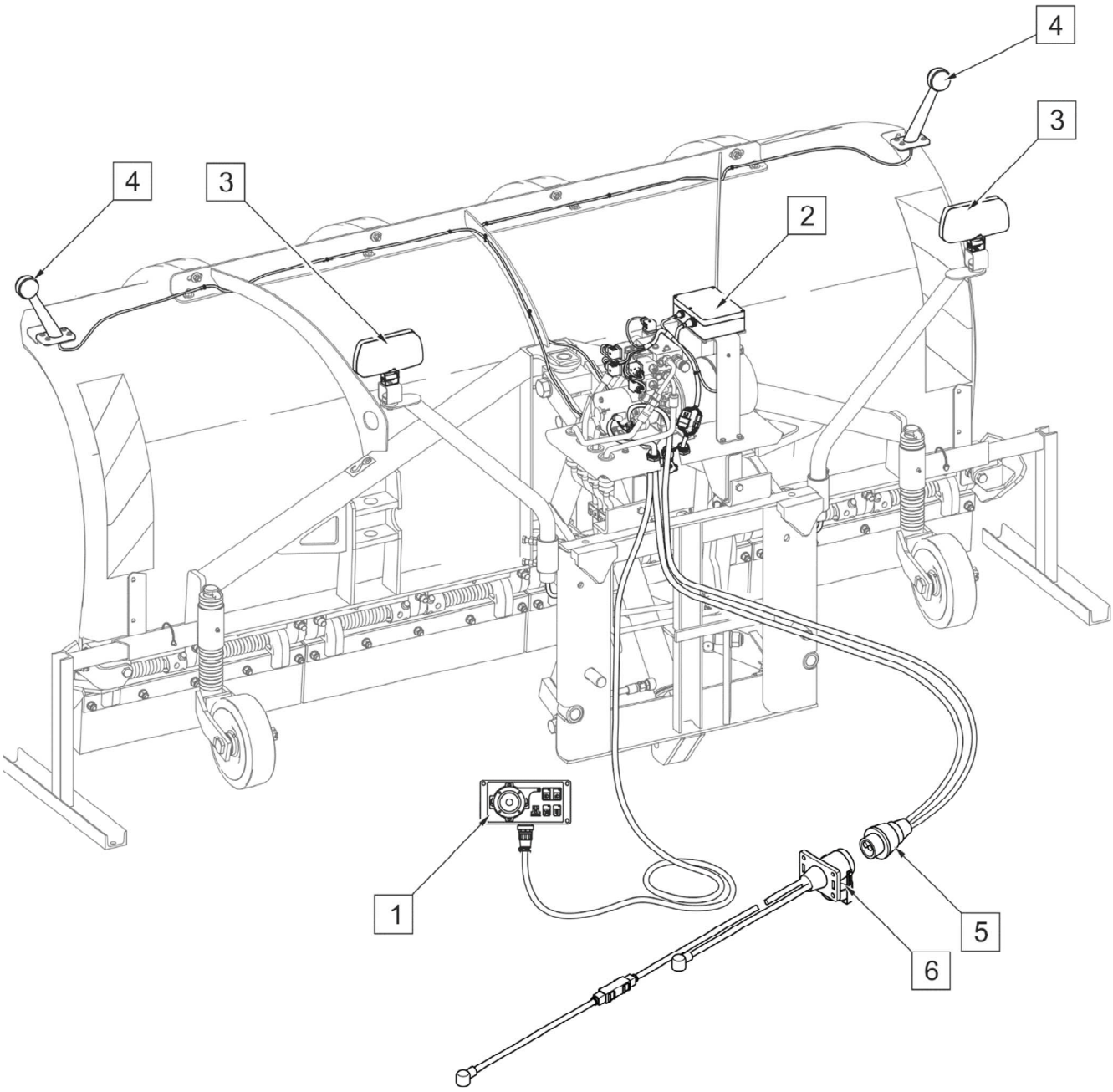


FIGURE 3.4 Electrical system design

(1) - control panel; (2) - actuator module; (3) - working lights; (4) - clearance lights; (5) - high current plug; (6) - high current supply socket

The snowplough's electrical system controls the electro-hydraulic power supply and the lighting system using the control panel (1). The lighting system consists of working lights (3) installed on brackets and clearance lamps (4) installed on the snowplough mouldboard. The supply plug (5) of the snowplough electrical system is connected to the high current socket (6) with a wiring harness connected to the vehicle's battery.

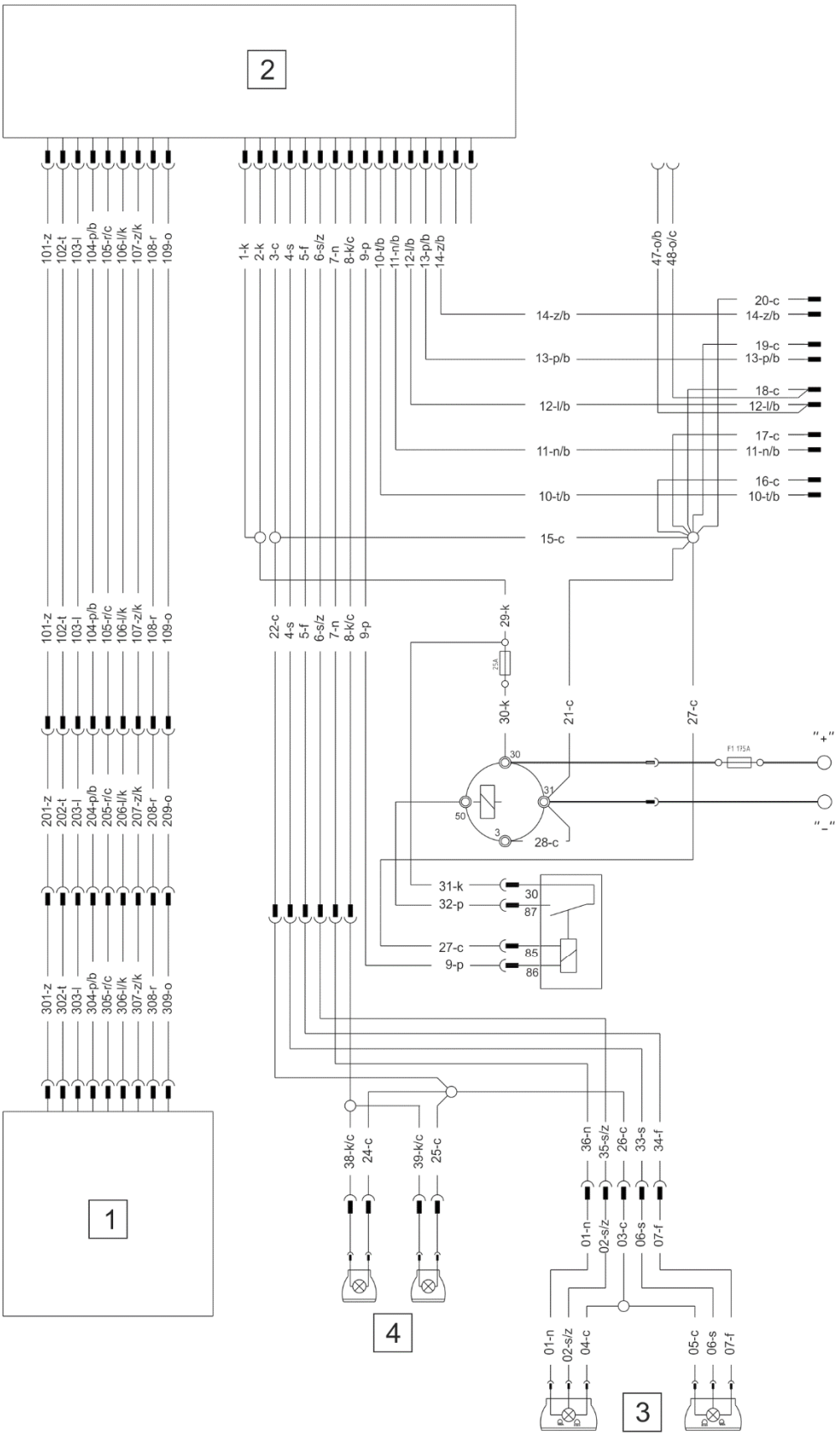


FIGURE 3.5 Electrical system diagram

(1) - control panel; (2) - actuator module; (3) - working lights; (4) - clearance lights

SECTION

4

CORRECT USE

4.1 PREPARING FOR WORK

DANGER

Before using the machine, the user must carefully read this Operator's Manual.

Careless and improper use and operation of the machine, and non-compliance with the recommendations given in this Operator's Manual is dangerous to your health.

The machine must never be used by persons, who are not authorised to drive 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 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 (unless otherwise agreed with the customer). Prior to connecting to the carrying vehicle, machine operator must verify the machine 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 compatibility of the machine's linkage with the carrying vehicle's linkage,
- make sure that the electrical system parameters and the hydraulic system parameters as well as connection sockets are compatible,
- 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 according to recommendations provided in section 5 "MAINTENANCE'",
- check technical condition of the hydraulic and electrical system;
- check technical condition of mouldboard, collecting blades,

- check technical condition of the linkage components,
- check and possibly adjust the tension of springs of snowplough blades with shock absorbers *(see 5.3 ADJUSTMENT OF SPRINGS OF SNOWPLOUGH BLADES WITH SHOCK ABSORBERS*

ATTENTION!

Non-adherence to the recommendations stated 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:

- hitch the machine to a carrying vehicle (see *4.3* HITCHING TO CARRYING VEHICLE),
- after connecting the electrical and hydraulic system wiring, check the correct operation of individual machine functions and operation of lighting system and inspect tightness of the system and hydraulic cylinders,

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 warranty, please contact the Manufacturer for additional clarifications.

ATTENTION!

Before using the machine always check its technical condition. In particular, check the technical condition of the linkage as well as the hydraulic system and the electrical system.

ATTENTION!

After mounting the snowplough on the carrying vehicle, set working lights in such a manner as not to dazzle oncoming drivers.

4.2 CHECKING TECHNICAL CONDITION

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

TABLE 4.1 Technical inspection schedule

DESCRIPTION	SERVICE OPERATION	FREQUENCY OF INSPECTIONS
Technical condition of mouldboard and collecting blades	Visually inspect and, if necessary, replace according to point *5.1 CHECKING AND REPLACEMENT OF COLLECTING BLADES*	Before beginning work
Technical condition of support wheels	Check technical condition, if complete and correctly mounted.	
Technical condition of the linkage, locking bolts and pins.	Check the technical condition, if complete and correctly mounted.	
Technical condition of the hydraulic system.	Visually inspect the technical condition	
Technical condition of the electrical system and lighting system components	Visually inspect the technical condition, check the operation	
Tightening of all main nut and bolt connections	According to point *5.8 TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS*	Once a week
Lubrication	Lubricate the elements according to point *5.6 LUBRICATION*.	According to table 5.5

ATTENTION!

Do NOT use a malfunctioning or incomplete machine.

4.3 HITCHING TO VEHICLE

The snowplough can be hitched to a carrying vehicle that meets the requirements contained in Table 1.1 „REQUIREMENTS FOR CARRYING VEHICLE”.

DANGER

Before hitching the machine to carrying vehicle, read the carrying vehicle operator's manual.

When hitching, there must be nobody between the machine and the carrying vehicle. Exercise particular caution.

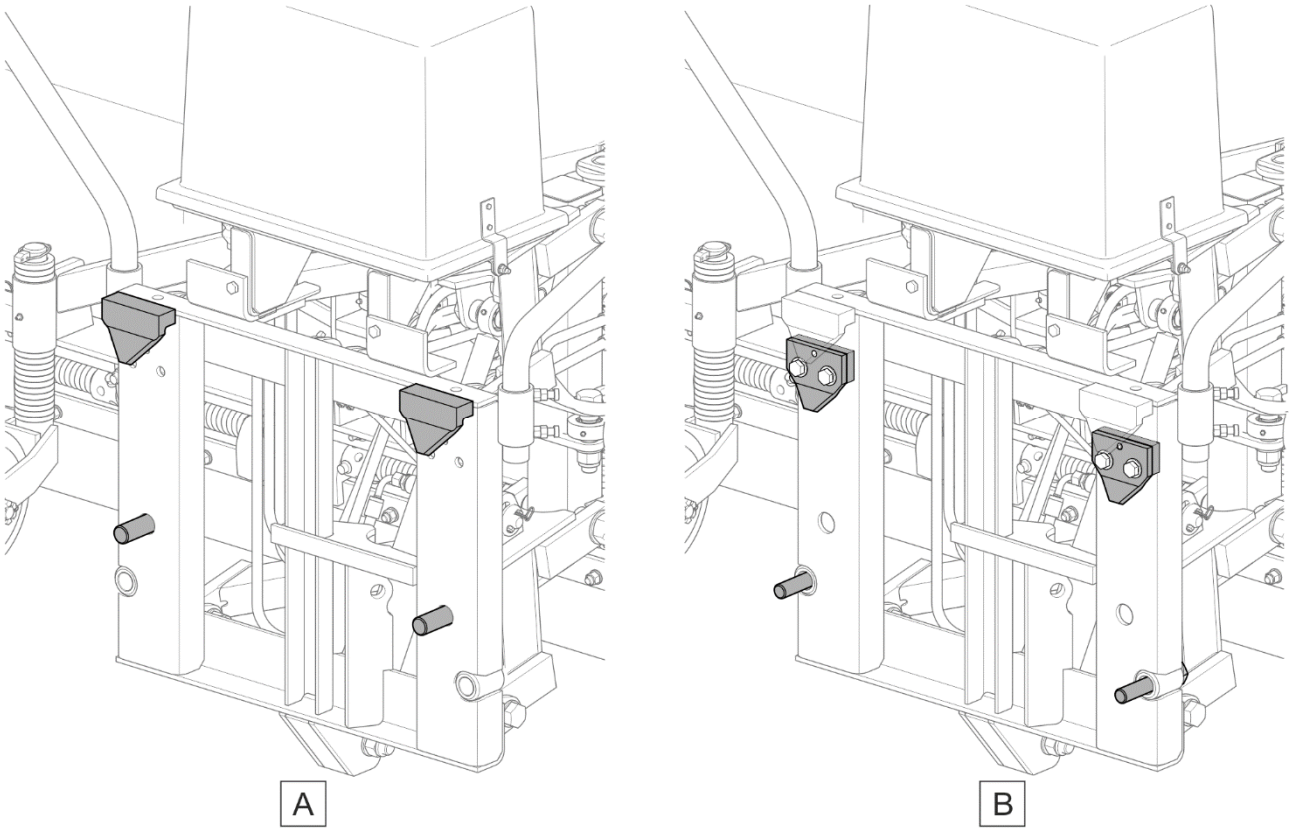


FIGURE 4.1 Fixing elements of the linkage

A - DIN 76060 type A fixing elements; (B) - DIN 76060 type B fixing elements (option)

The carrying vehicle's head plate should be mounted at the vehicle's front, vertically in the vehicle's axis of symmetry. The upper edge of the plate should be located at the following height from the ground:

- 900 ±60 mm, B type plate acc. to DIN 76060
- 980 ±60 mm, A type plate acc. to DIN 76060

ATTENTION!

Before mounting the snowplough on the carrying vehicle, make sure that the linkage and the electrical system parameters are compatible.

ATTENTION!

Before hitching the snowplough to carrying vehicle, dismantle the transport protection (FIGURE 4.2).

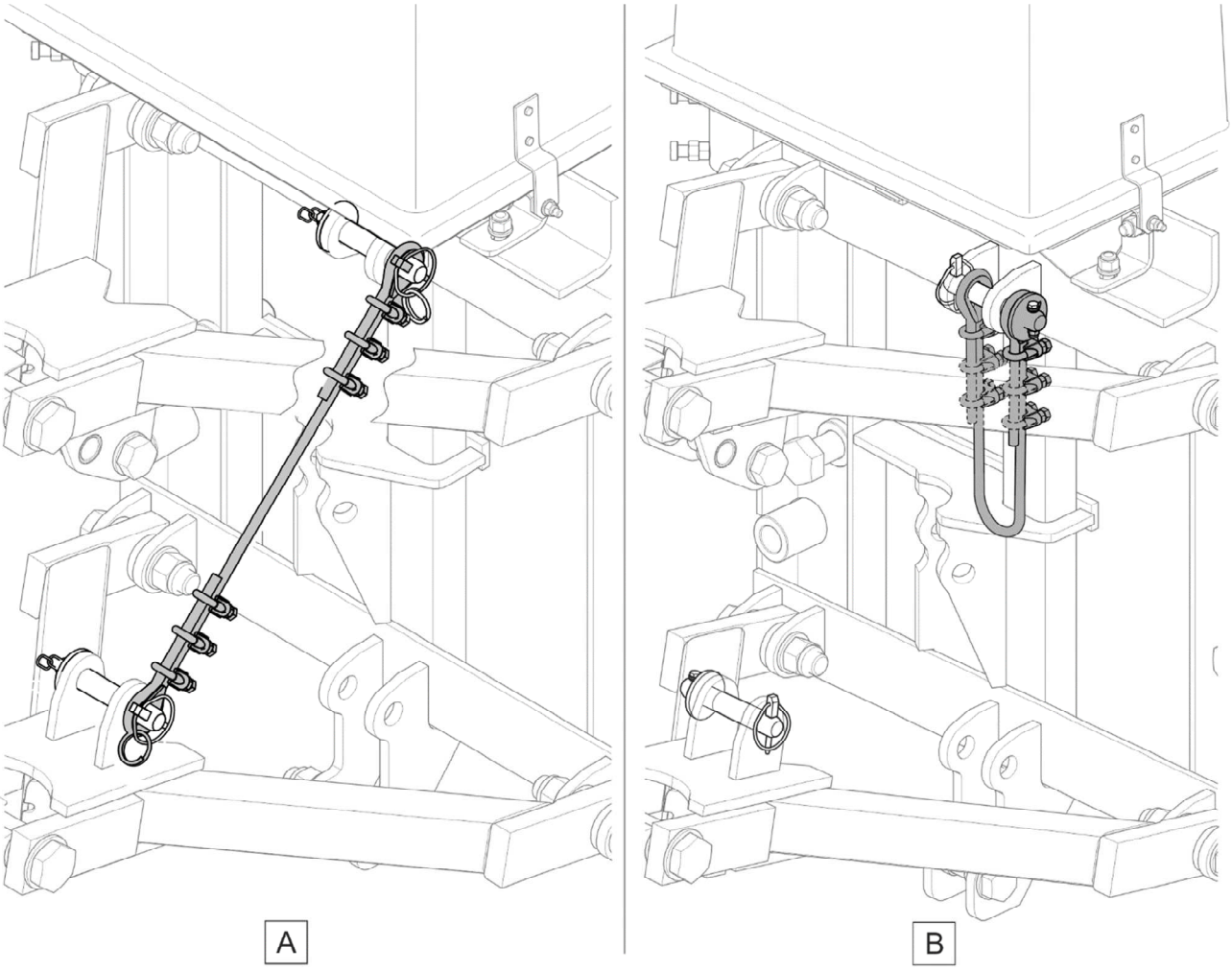


FIGURE 4.2 Transport protection

(A) - mounted transport protection; (B) - dismantled transport protection

The procedure of dismantling the transport protection is described in detail in point „4.4.1 DISMANTLING TRANSPORT PROTECTION”

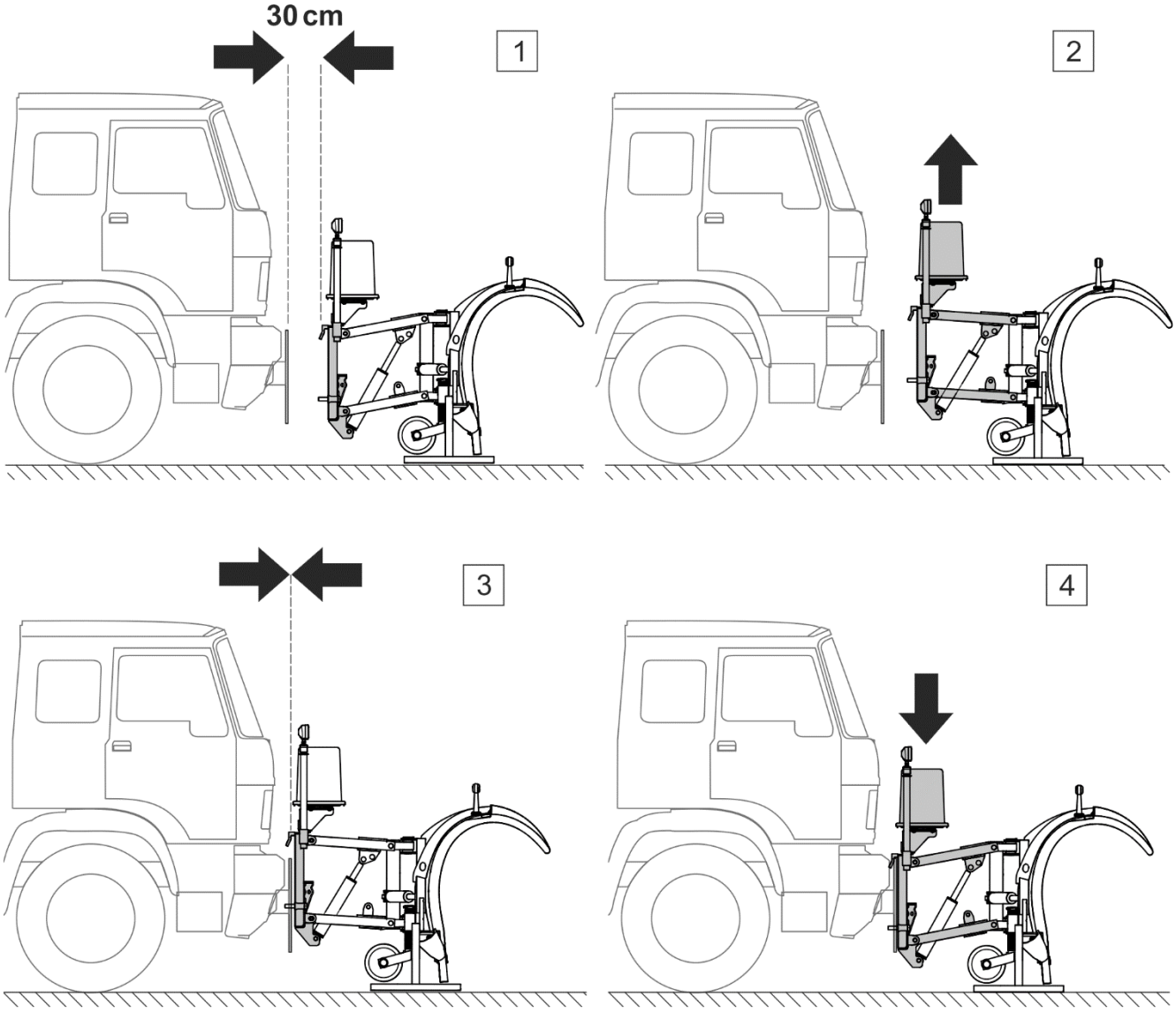


FIGURE 4.3 Mounting the snowplough on the carrying vehicle

(1,2,3,4) - successive stages of mounting the plough on the carrying vehicle

Check the linkage compatibility before mounting the snowplough on the carrying vehicle.

To mount the snowplough on the carrying vehicle (FIGURE 4.3):

1) Drive the carrying vehicle to a distance of about 30 cm from the snowplough linkage and immobilise the vehicle. Connect Power-Pack electric power supply and control panel (FIGURE 4.4). Start the control panel using switch (1) and activate the linking function using push-button (2) (FIGURE 4.5) – yellow indicator light (3) located next to the push-button will light up.

2) Using the joystick (4) on the control panel (FIGURE 4.5), raise the snowplough linkage in such a manner as to position the hooks of the snowplough linkage plate above the seats of the carrying vehicle' mounting plate.

3) Drive the carrying vehicle carefully to the snowplough linkage plate and immobilize the vehicle.

4) If the hooks and the carrying vehicle's mounting plate are correctly aligned, lower the snowplough's linkage using joystick until the hooks are set in the seats of the carrying vehicle's mounting plate. Deactivate "linking" function using push-button (2) (FIGURE 4.5) – yellow indicator light (3) located next to the push-button will go out. Secure the mounting plate and the snowplough linkage against disconnecting (FIGURE 4.6).

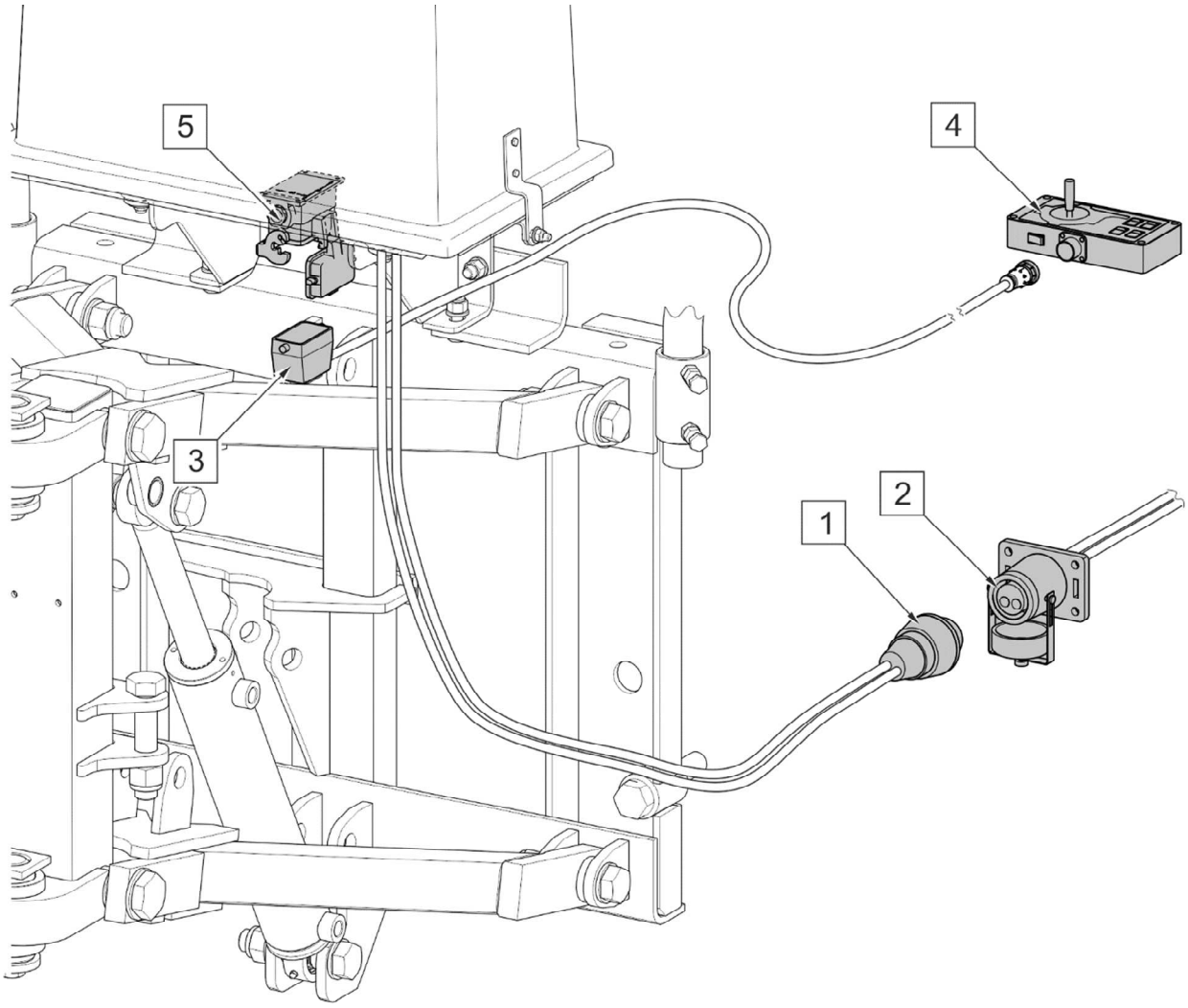


FIGURE 4.4 Connecting the electrical system

(1) - power lead plug; (2) - high current socket; (3) - control lead plug; (4) - control panel; (5) - control lead socket

Depending on voltage in carrying vehicle electrical system, the snowplough can be equipped with 12V or 24V electrical system. Connect power lead plug (1) of Power-Pack unit to high current socket (2) in the carrying vehicle (FIGURE 4.4). Control lead plug (3)

should be connected to socket (5) under the Power-Pack housing and the other end of the lead should be connected to control panel (4).

ATTENTION!

The connecting cables should be routed so that they do not get entangled in machine parts.

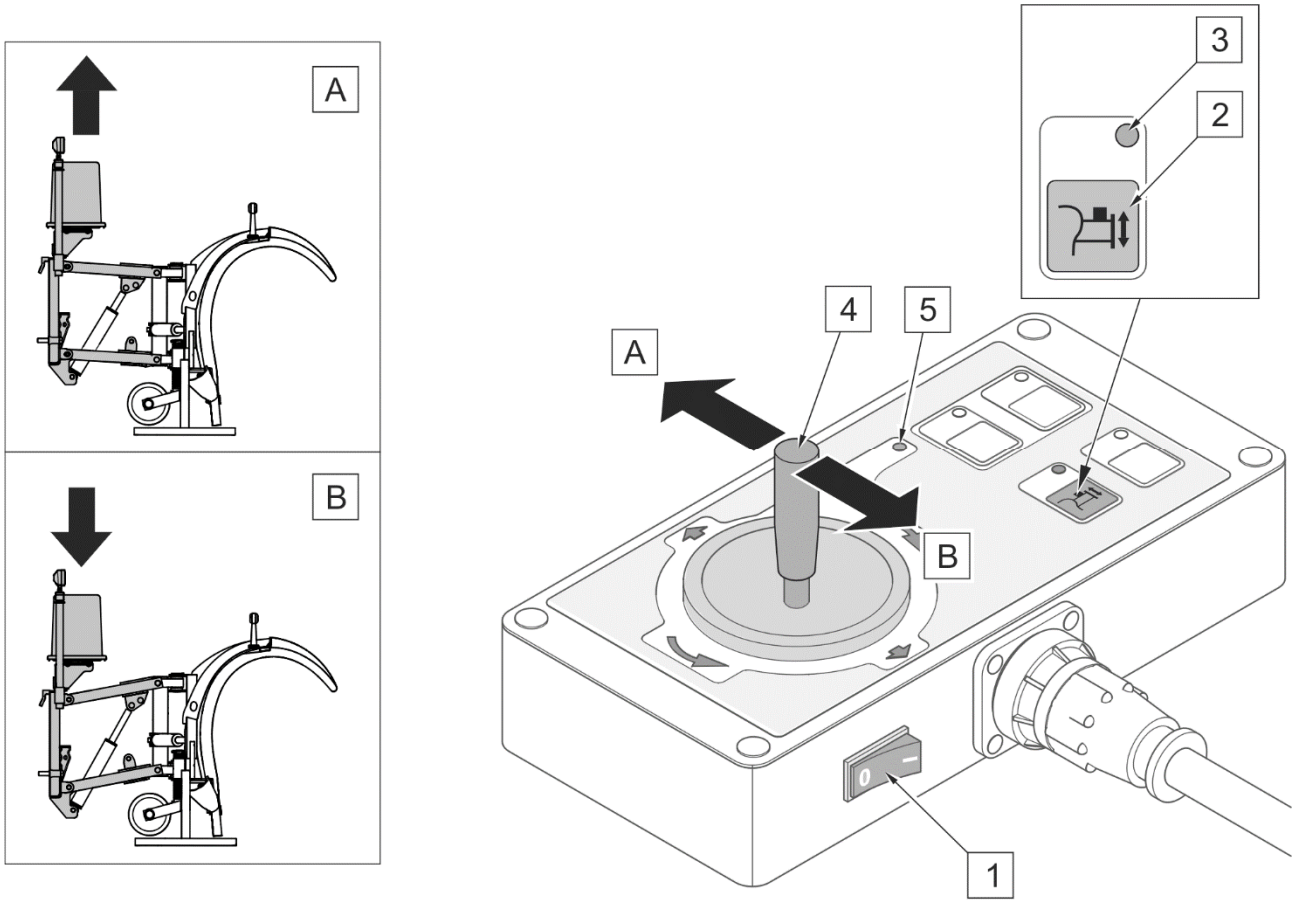


FIGURE 4.5 Linking the plough

(1) - main switch of control panel; (2) - linking function switch; (3) - linking function ON indicator light; (4) - joystick; (5) - Power-Pack ON indicator light; (A) - linkage rising; (B) - linkage lowering

Linking function is used during mounting and disconnecting the snowplough from the carrying vehicle. Linking function is activated using switch (2) on the control panel (FIGURE 4.5). When the linking function is activated, yellow indicator light (2) lights up. In this mode, if joystick (4) is set in position (A), the linkage is raised and if joystick is set in position (B), the snowplough linkage is lowered. When the linking function is deactivated using switch (2), yellow indicator light (3) will go out.

Activation of the linking function (FIGURE 4.5) causes deactivation of the floating function (FIGURE 4.6) (if it was activated before).

DANGER

To hitch the machine to the carrying vehicle use only linking elements recommended by the Manufacturer.

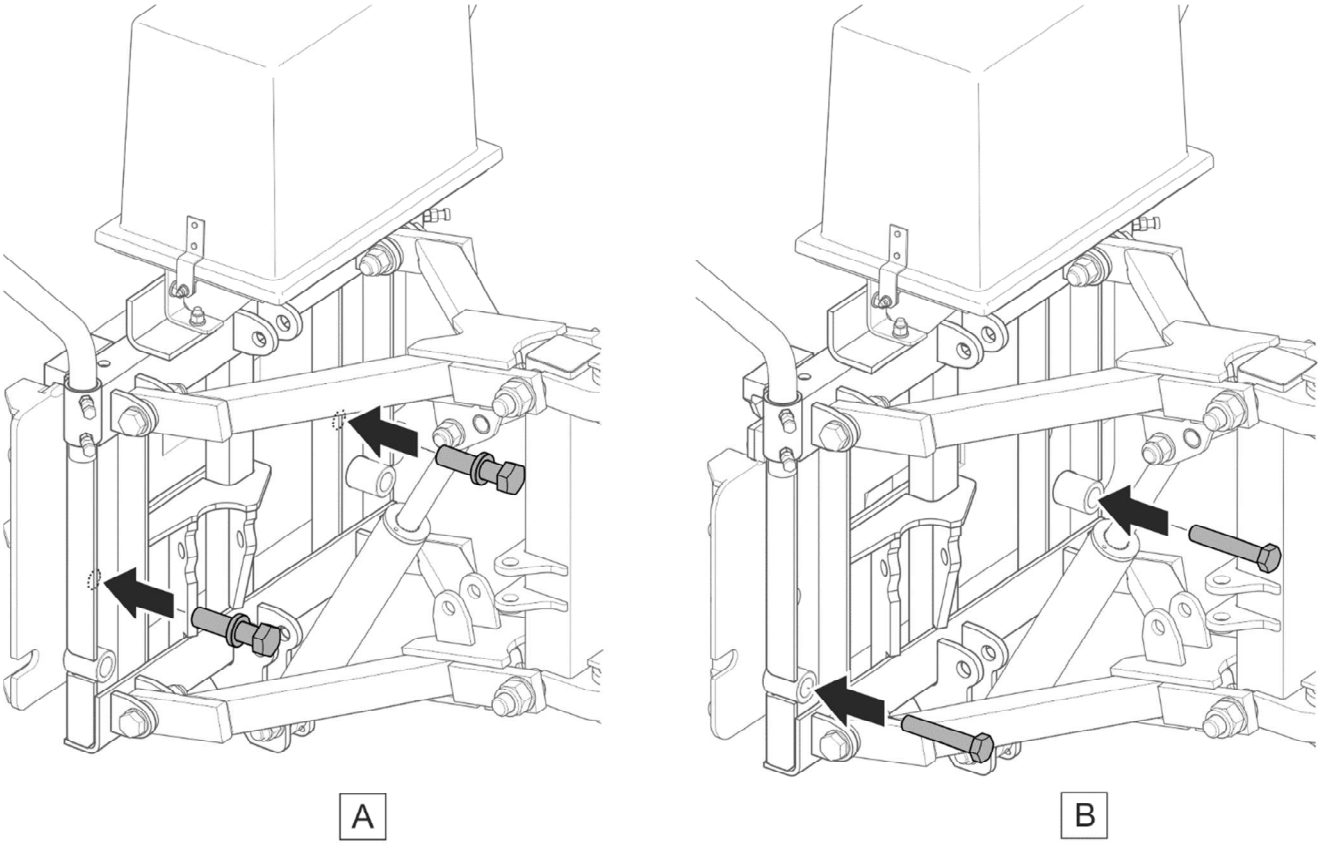


FIGURE 4.6 Protection of the linkage plate

A - DIN 76060 type A fixing bolts; (B) - DIN 76060 type B fixing bolts

After mounting the snowplough on the carrying vehicle, connect the snowplough linkage to the carrying vehicle's head plate using bolts (FIGURE 4.6)

TIP

Depending on type of the carrying vehicle's head plate (FIGURE 4.6), tighten the securing bolts using the following tightening torques:

- bolts (A) (DIN 76060-A plate) - 600 Nm

- bolts (B) (DIN 76060-B plate) - 500 Nm

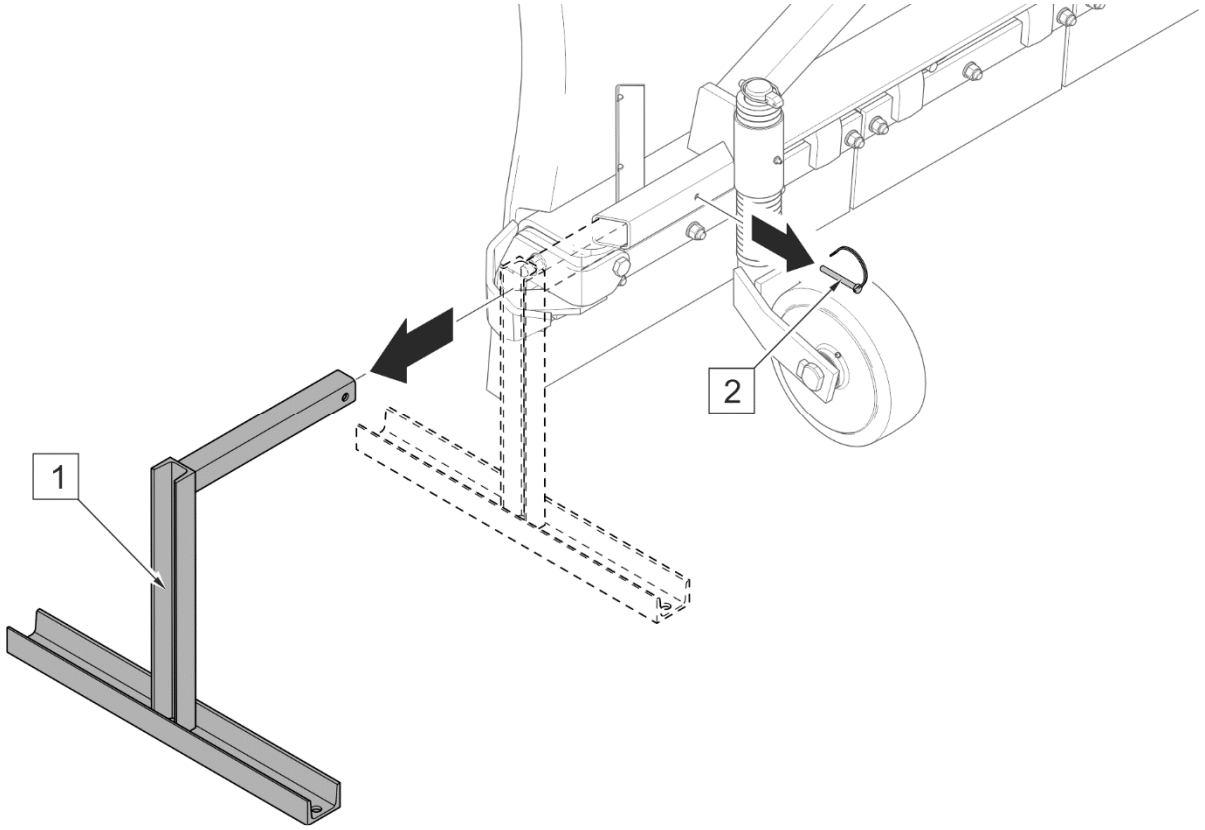


FIGURE 4.7 Dismantling parking stands

(1) - parking stand; (2) - locking cotter pin

The snowplough is equipped with two parking stands (FIGURE 4.7). To dismantle the parking stands:

- lift the snowplough mounted on a carrying vehicle,
- take out locking cotter pin (2) and dismantle parking stand (1) from the guide,
- dismantle the second parking stand in the same way.

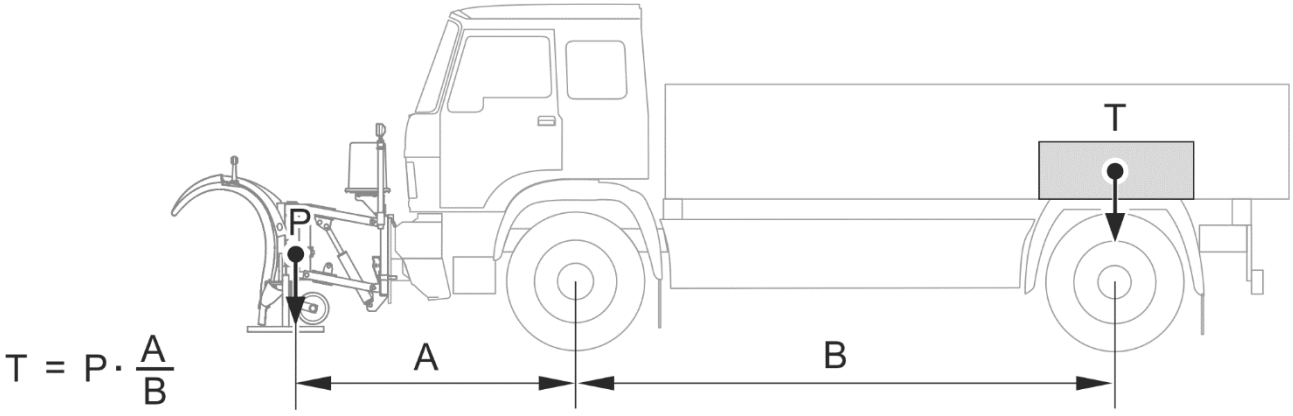


FIGURE 4.8 Ballasting the carrying vehicle

A - distance between the snowplough centre of gravity and the carrying vehicle's front axle; (B) - carrying vehicle axle base; (P) - snowplough weight; (T) - additional ballast

The ballast of the carrying vehicle's rear axle should be checked after the snowplough is mounted. Amount of additional ballast can be calculated using the following formula (FIGURE 4.8). Additional ballast should be placed above the rear axle of the carrying vehicle.

4.4 SNOW PLOUGH OPERATION

4.4.1 DISASSEMBLING TRANSPORT PROTECTION

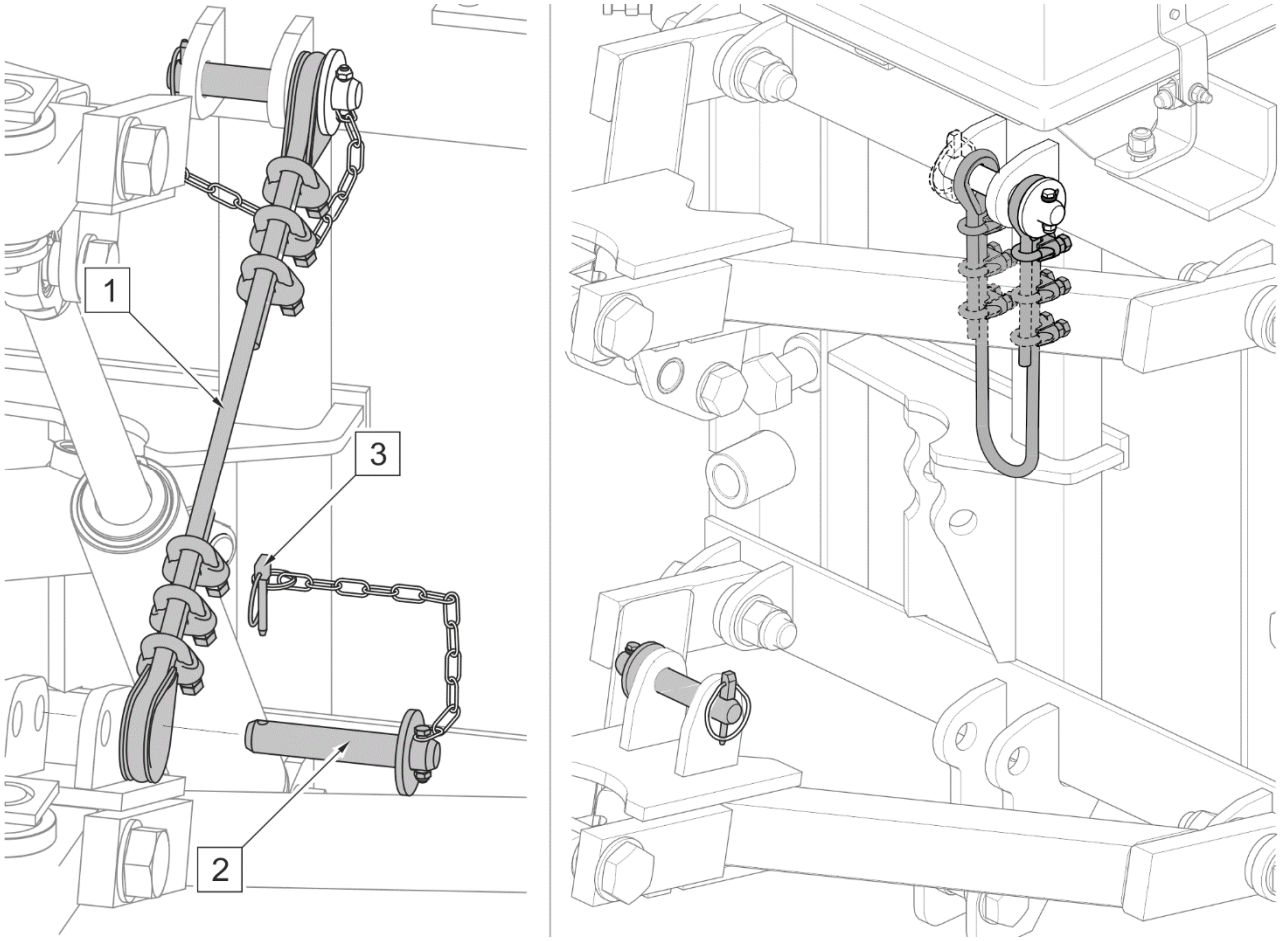


FIGURE 4.9 Releasing the transport protection

(1) - securing cable; (2) - pin; (3) - cotter pin;

If the snowplough linkage system has been locked in upper transport position, release the transport protection just before lowering the linkage (FIGURE 4.9) in the following manner:

- raise the snowplough mounted on the carrying vehicle to the extreme upper position and immobilise the vehicle with parking brake,
- take out cotter pin (3) securing lower pin (2),
- take out the pin (2) fixing the cable (1),

- suspend both cable ends (1) at upper fixing point (FIGURE 4.9),
- secure the pins with cotter pins.

4.4.2 CONTROLLING THE SNOWPLOUGH

DANGER

When the machine is in use there must be no bystanders near the machine.

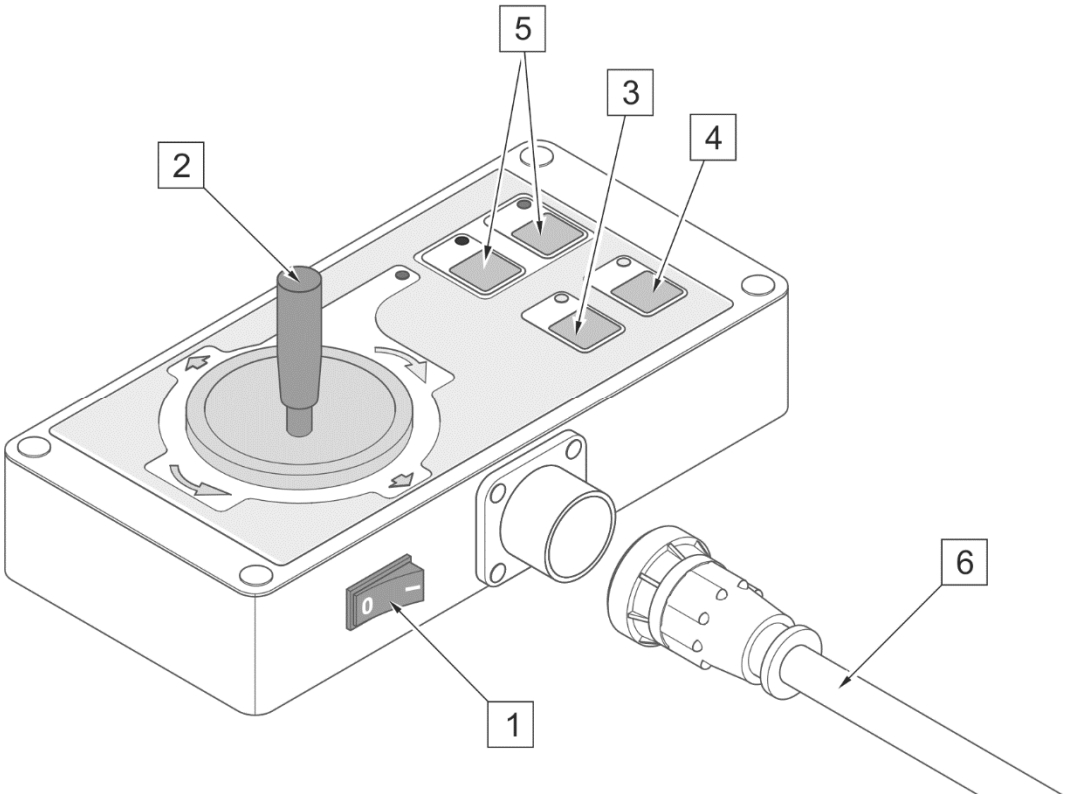


FIGURE 4.10 Control panel

(1) - main switch; (2) - joystick; (3) - linking function switch; (4) - floating position switch; (5) - lighting system switch; (6) - lead

The snowplough's functions are controlled from the control panel. Control panel (FIGURE 4.10) is protected against accidental use by the main switch (1). When the switch (1) is ON, the clearance lights on the snowplough mouldboard and the complete control panel are ON.

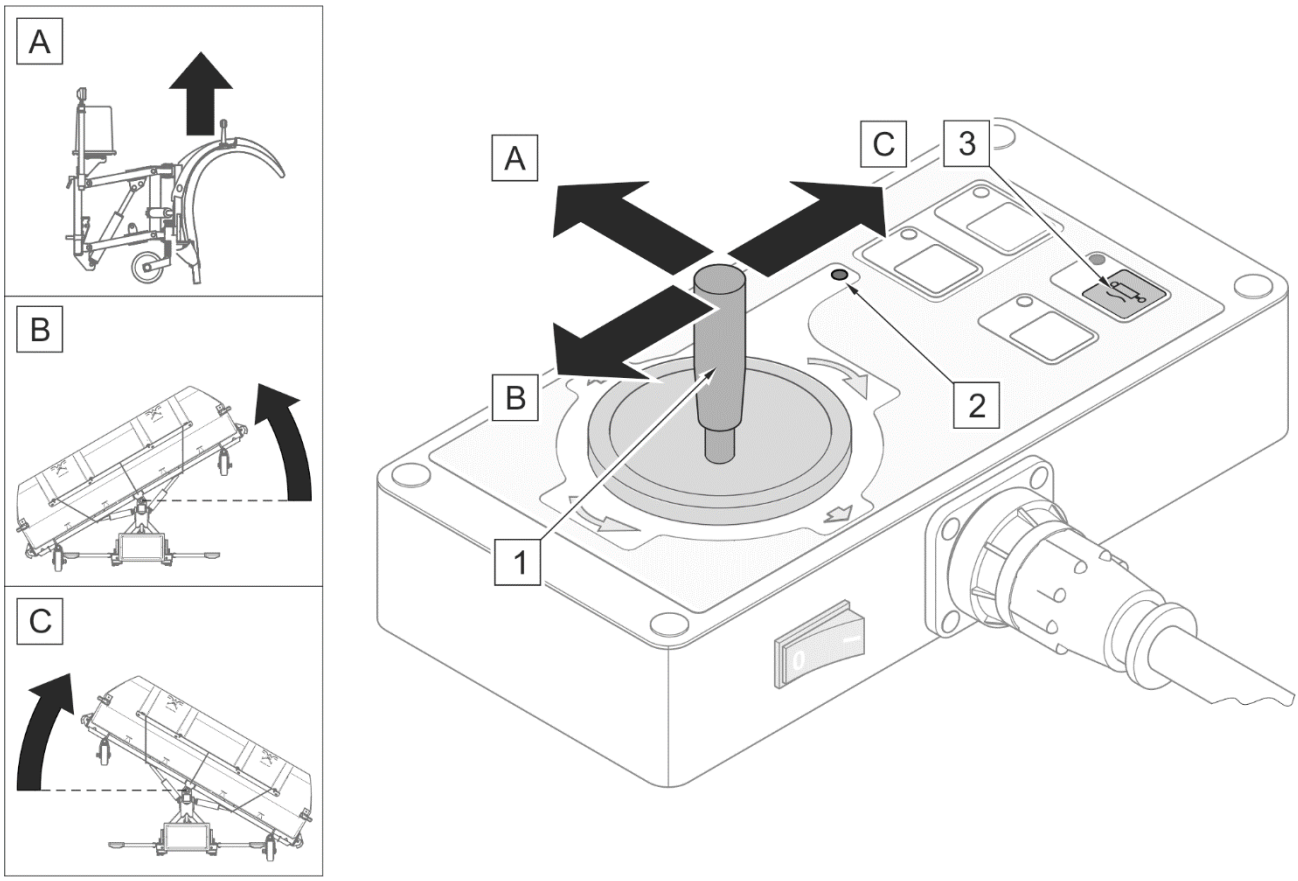


FIGURE 4.11 Controlling the mouldboard

(A) - rising the mouldboard; (B) - turning the mouldboard to the left; (C) - turning the mouldboard to the right; (1) - joystick; (2) - Power-Pack ON indicator light; (3) - floating function switch

The snowplough's mouldboard can be raised, lowered and turned to the right/left within the range of ±30˚.

The snowplough's mouldboard is controlled using joystick (1). Individual functions of joystick (1) are shown in (FIGURE 4.11). When the joystick is shifted to position (A,B,C), the indicator light (2) lights up for the period of operation of the Power-Pack electro-hydraulic power supply. The snowplough's mouldboard can be lowered only by switching on the floating function by means of switch (3).

IMPORTANT!

Do NOT operate the plough while reversing. While reversing raise the machine.

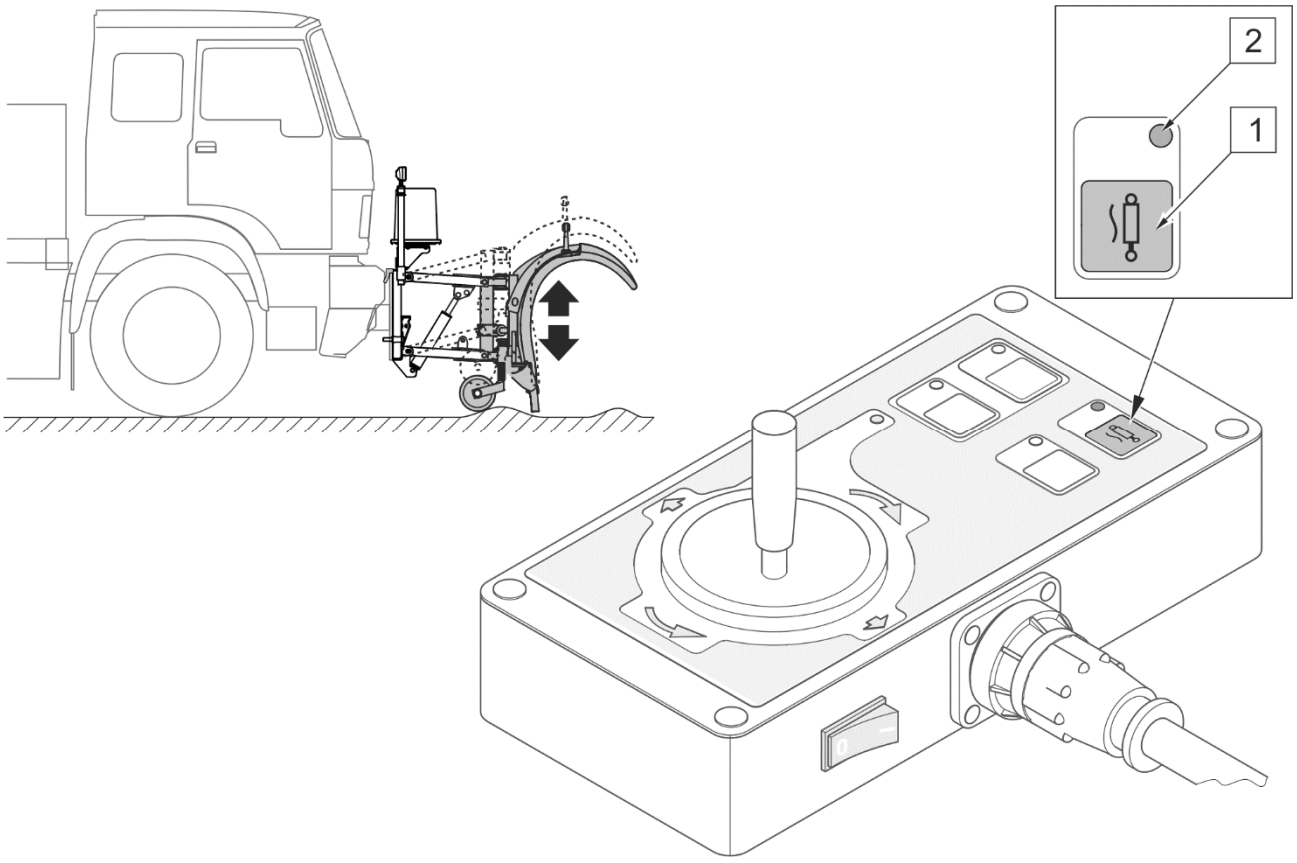


FIGURE 4.12 Floating function

(1) - floating function switch; (2) - floating function indicator light

Floating function enables ground surface tracking during snow clearing i.e. the snowplough linkage system can adjust to uneven surface. Floating function protects the snowplough against damage during operation.

The floating function (FIGURE 4.12) is switched on with push-button (1). Activation of the floating function is signalled by yellow indicator light (2). When push-button (1) is pressed again, floating function and indicator light (2) are switched off.

IMPORTANT!

The use of floating function during snow clearing is recommended in order to protect the snowplough against damage. Carrying vehicle weight must not be transferred to the plough.

TIP

Working speed of the snowplough should be adapted to the type and quantity of collected snow and the type of terrain.

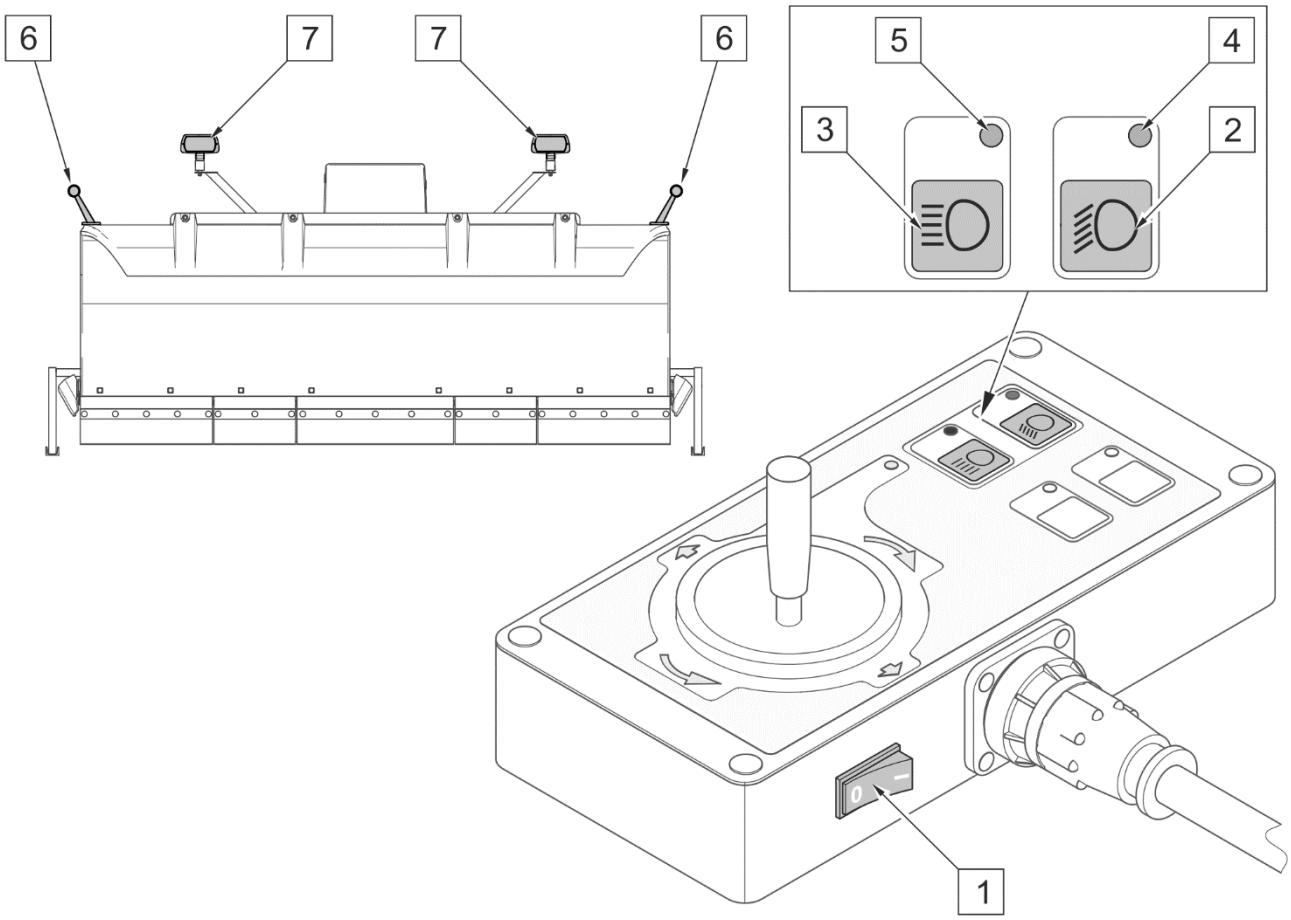


FIGURE 4.13 Switching the lights on

(1) - main switch of control panel and clearance lights; (2) - low beam switch; (3) - high beam switch; (4) - low beam indicator light; (5) - high beam indicator light; (6) - clearance light; (7) - working light

The snowplough is equipped with clearance lights and working lights (FIGURE 4.13). Clearance lights (6) light up when the control panel is switched on by means of main switch (1). The working lights have high beams and low beams. The switch (2) is used for switching on and off the low beams. Activation of the low beams is signalled by green indicator light (4).

High beams are switched on/off using switch (3). Activation of the low beams is signalled by blue indicator light (5). When high beams are switched on the low beams are switched off and vice versa. The low beams and the high beams can be switched on only when the control panel is switched on (the main switch should be set in „I" position - ON).

4.4.3 HYDRAULIC PRESS-DOWN FUNCTION

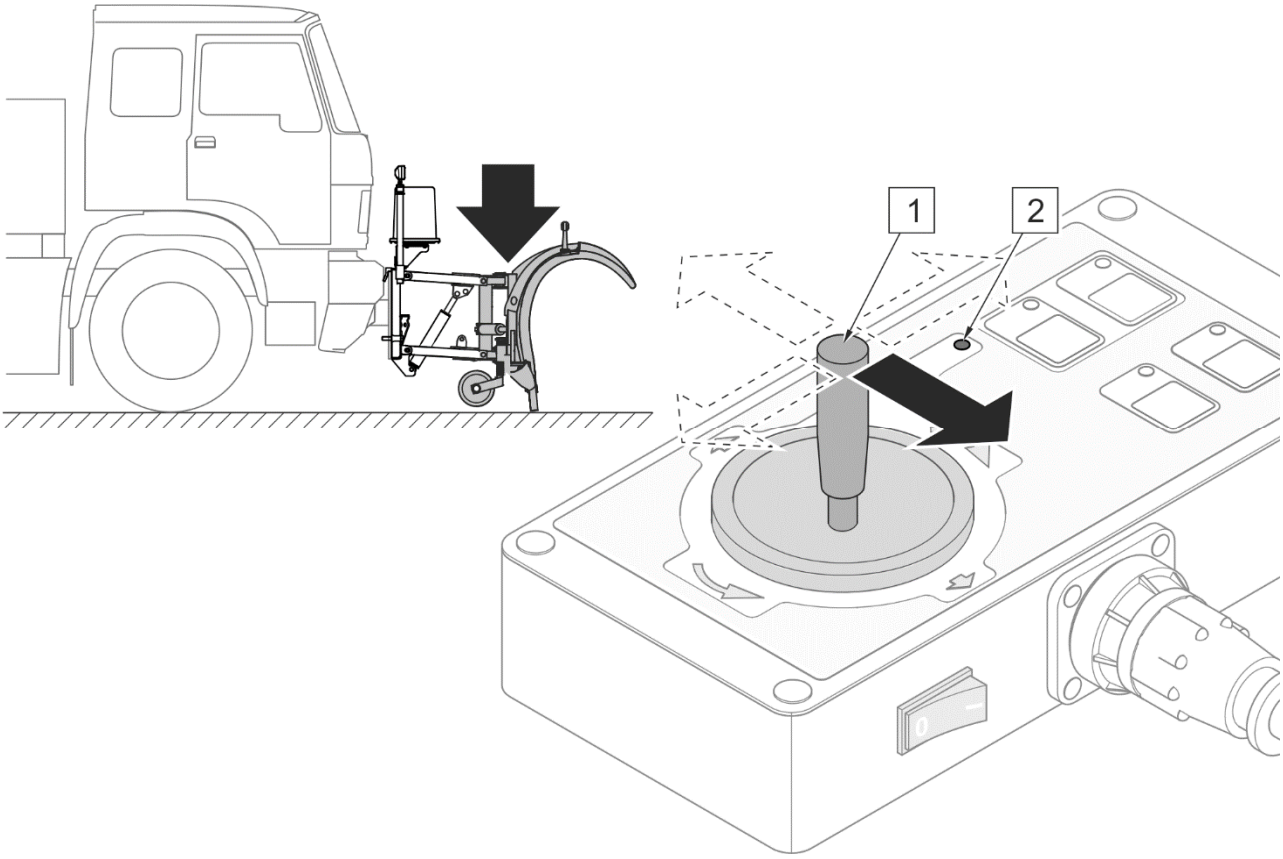


FIGURE 4.14 Hydraulic press-down function (option)

(1) - joystick; (2) - Power-Pack ON indicator light

In the snowplough featuring the press-down function (option), after lowering the snowplough and holding the joystick (1) in the lower position (FIGURE 4.14), the snowplough blades are pressed down to the ground. Red indicator light (2) is ON during Power-Pack operation. When the joystick is released, hydraulic press-down function is switched off.

IMPORTANT!

Prolonged operation with hydraulic press-down function activated causes excessive wear of plough blades, discharging of batteries, activation of thermal protection of electric motor in electro-hydraulic power supply.

Hydraulic press-down function is recommended to be used only if the plough is equipped with rubber plough blades with shock absorbers or rigid rubber plough blades and if the snowplough wheels are dismounted or lifted.

4.4.4 SETTING THE WORKING HEIGHT

DANGER

Setting the working height should be performed only when the engine is stopped, and the snowplough is raised and secured.

The wheels are used in order to maintain a proper distance between the ground and collecting blades, to reduce thickness of scraped material layer and to limit the depth of blade sinking into soft ground. Working height is set (FIGURE 4.15) by proper setting of the wheel height. Wheel height is adjusted with the use of 10 mm-high spacer washers. In order to lift wheel (1), take out cotter pin (2) and relocate spacer washers above the wheel bracket. Wheels are recommended to be set in such a manner as to ensure that the plough blade lightly touches cleaned surface. Right and left wheel heights should be the same.

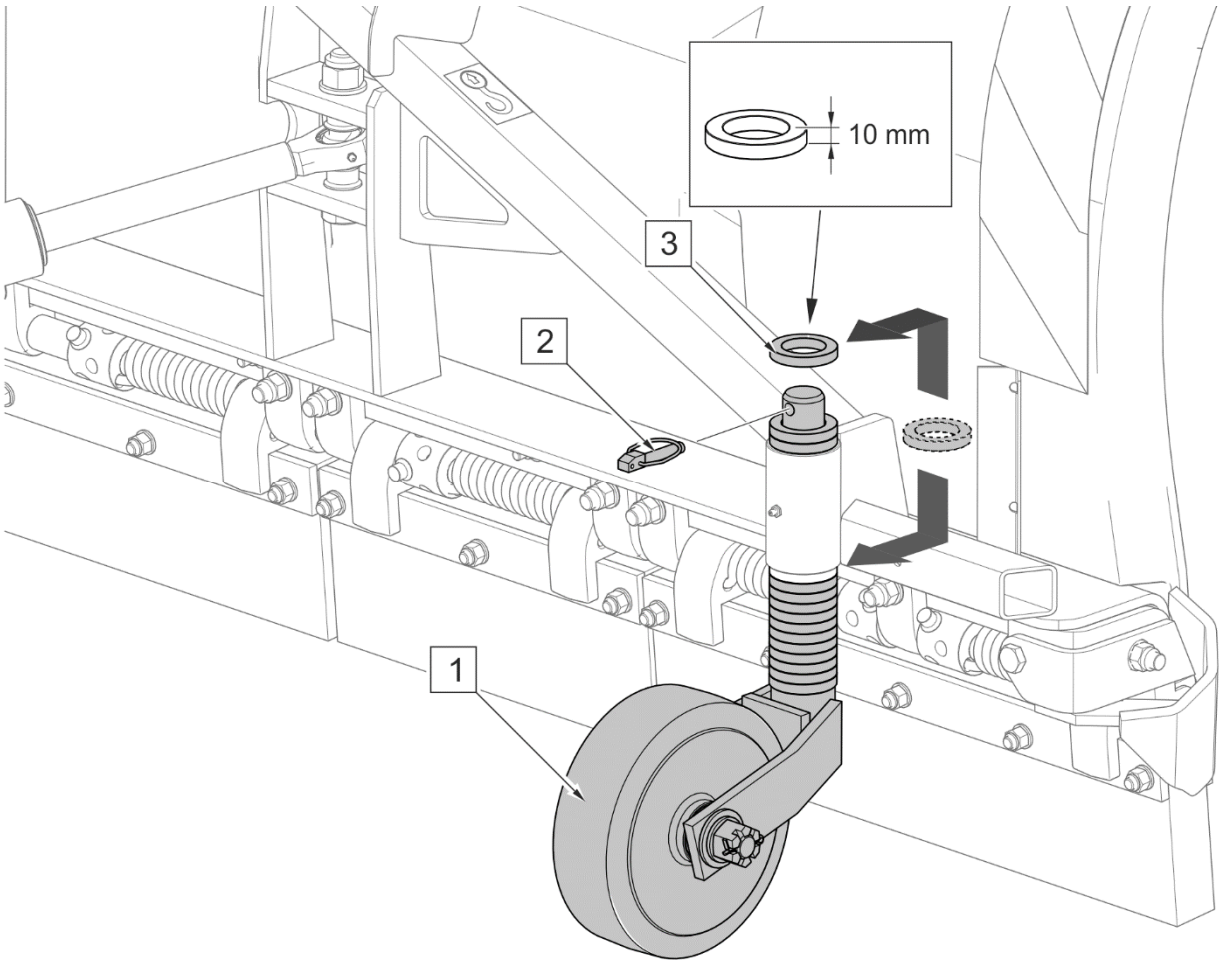


FIGURE 4.15 Working height adjustment

(1) - wheel; (2) - securing cotter pin; (3) - spacer washer

4.5 DRIVING ON PUBLIC ROADS

When driving on public roads, respect the road traffic regulations, exercise caution and prudence. If the clearing with machine is done on a pavement or promenade 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 and the carrying vehicle. Take care that the driver has sufficient visibility.
- Make sure that the machine is correctly attached to the carrying vehicle, and linkage is properly secured.
- The maximum working speed and the maximum speed allowed by road traffic regulations must not be exceeded. Speed of travel should be adjusted to prevailing road conditions and other conditions.
- While driving on public roads turn on the lights.
- Avoid ruts, depressions, ditches or driving on roadside slopes. Driving across such obstacles could cause the machine and the carrying vehicle to suddenly tilt. Driving near ditches or canals is dangerous as there is a risk of 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 plough raised reduce speed due to dynamic loads and the risk of damaging the machine or carrying vehicle.
- When driving with raised snowplough, the mouldboard should be folded and the linkage system should be locked with transport protection (FIGURE 4.16).

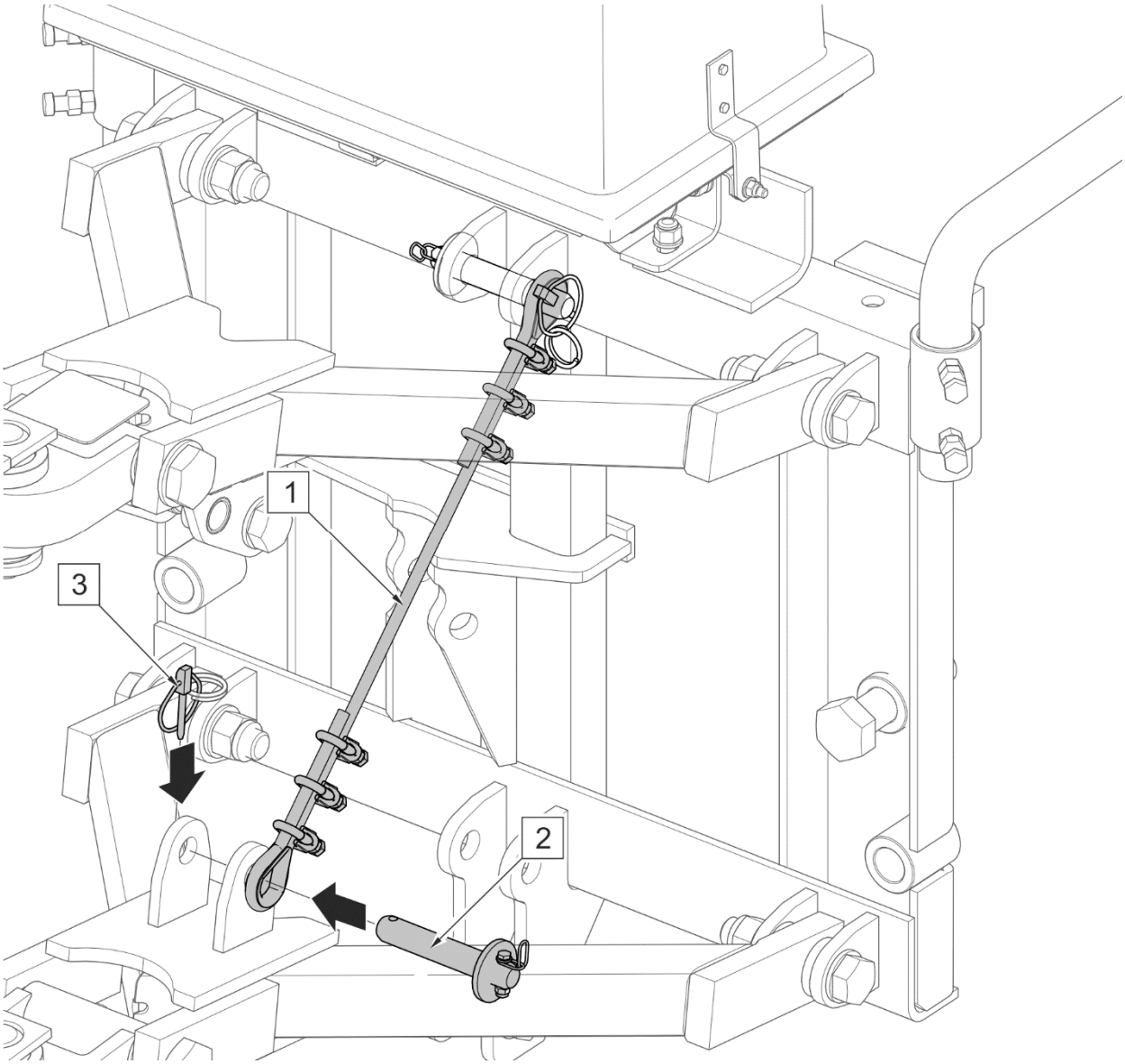


FIGURE 4.16 Installing transport protection

(1) - securing cable; (2) - pin; (2) - cotter pin

In order to secure the machine's linkage in transport position and protect it against falling or accidental dropping (FIGURE 4.16):

- raise the plough to the extreme upper position, immobilise the vehicle with parking brake,
- connect the snowplough linkage frame to lower rocker using cable (1) and pin (2),
- secure the pin with a cotter pin (3).

4.6 UNHITCHING THE MACHINE FROM CARRYING VEHICLE

DANGER

Before leaving the vehicle's cab, turn off the engine and immobilise the vehicle with parking brake.

IMPORTANT!

Unhitching the snowplough from the carrying vehicle should be performed on level, even and sufficiently hard surface in such a manner as to ensure that it is possible to hitch it again.

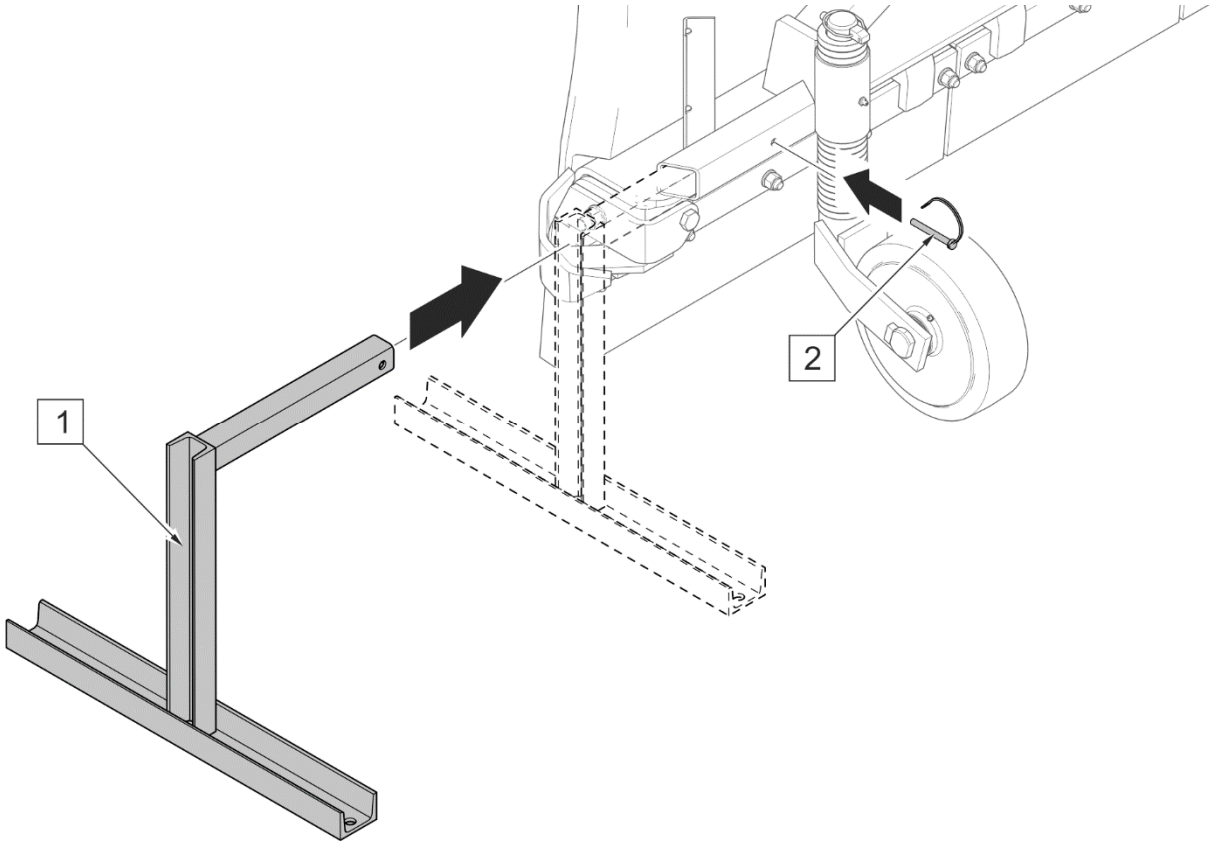


FIGURE 4.17 Installing the parking stands

(1) - parking stand; (2) - cotter pin

Before dismounting the snowplough from the carrying vehicle, install both parking stands (FIGURE 4.17) in the following manner:

- lift the snowplough mounted on a carrying vehicle,
- insert parking stand (1) into the guide on the frame and secure it with cotter pin (2),

- install the second parking stand in the same way

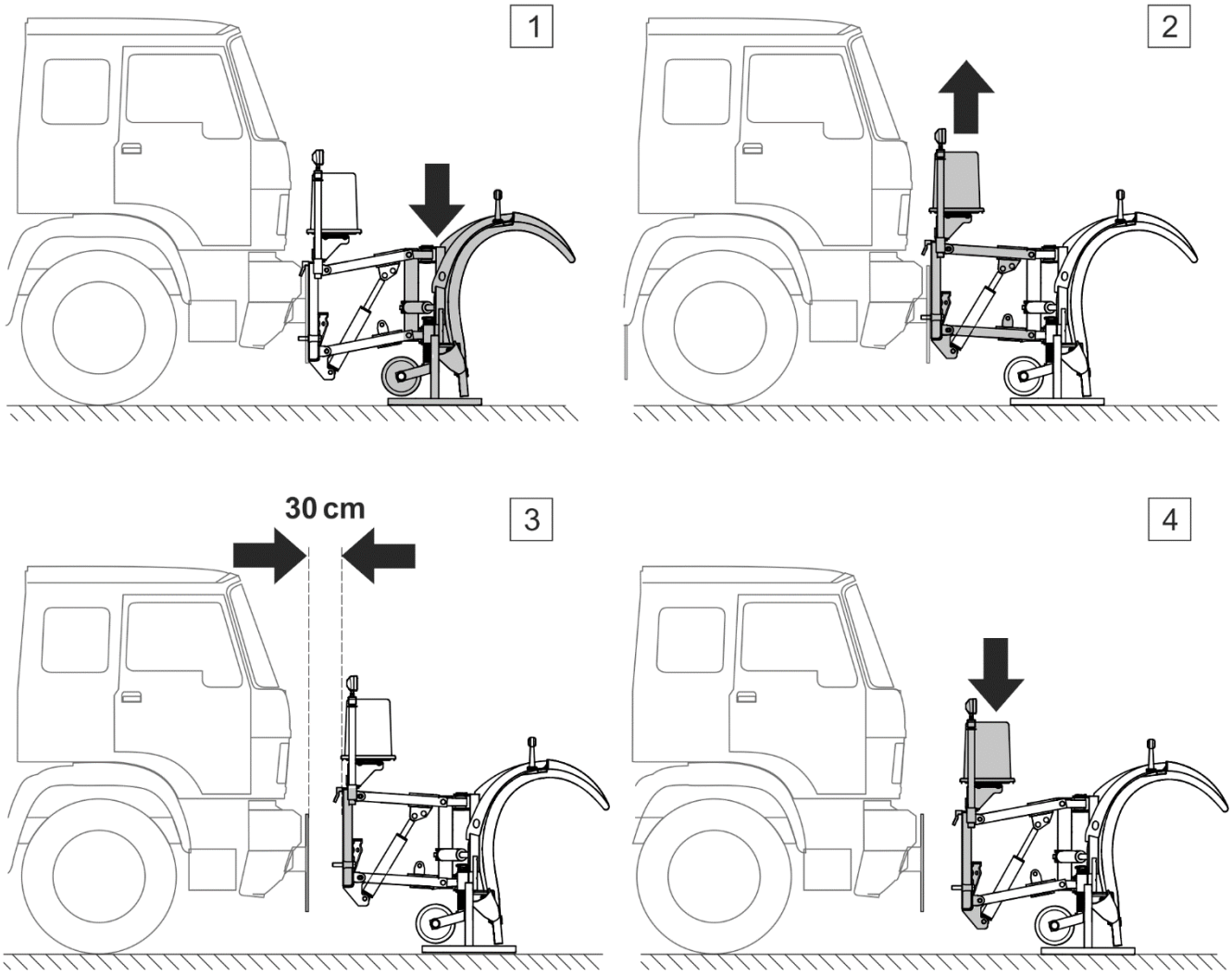


FIGURE 4.18 Disconnecting the snowplough from the carrying vehicle

(1,2,3,4) - successive stages of disconnecting the snowplough from the carrying vehicle

In order to disconnect the snowplough from the carrying vehicle, proceed as follows (FIGURE 4.18):

1) Switch on the floating function on the control panel and lower the snowplough until parking stands fully rest on the ground. Unscrew two bolts that fix the linkage plate with the carrying vehicle's head plate (FIGURE 4.19).
2) Switch on the linking function on the control panel (FIGURE 4.5). Using the joystick on the control panel, raise the snowplough linkage in such a manner as to position the hooks of the linkage plate above the seats of the carrying vehicle' head plate.

3) Drive the carrying vehicle carefully to a distance of about 30 cm from the snowplough.

4) Lower the frame of the snowplough linkage to the lower position, switch the control panel off and immobilize the vehicle. Disconnect the power lead of the Power-Pack unit and the control panel's lead. Secure the electric sockets with plugs.

ATTENTION!

The snowplough disconnected from the carrying vehicle should be placed on parking stands.

Before disconnecting the snowplough, unscrew completely the two bolts that fix the linkage to the carrying vehicle's head plate (FIGURE 4.19). Keep the bolts for the next mounting of the snowplough.

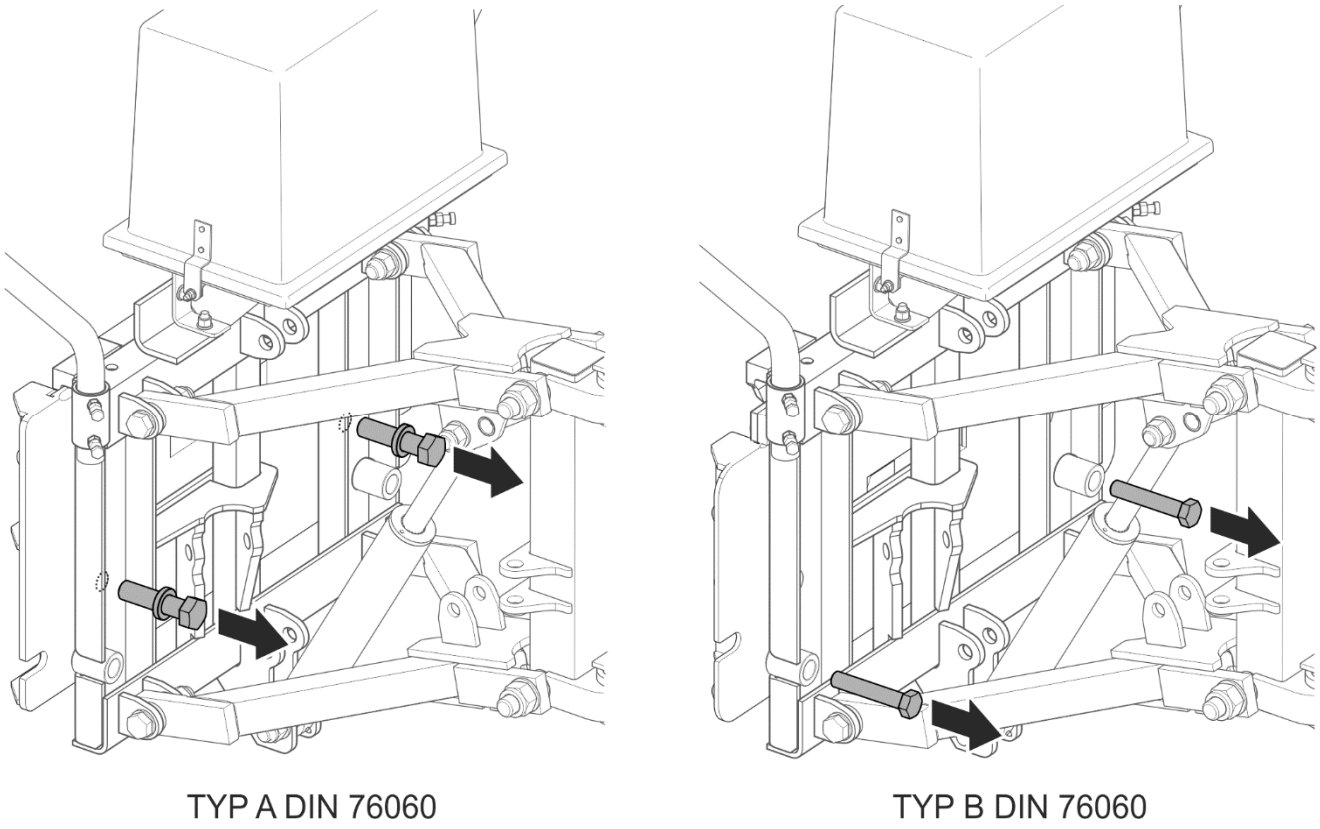


FIGURE 4.19 Dismounting the linkage plate protection

4.7 INSTALLATION OF EQUIPMENT

4.7.1 INSTALLATION OF HIGH CURRENT SOCKET IN THE CARRYING VEHICLE

ATTENTION!

Work on electrical system must be carried out by suitably qualified personnel.

Proper high current socket installed on the front of the carrying vehicle is required for the snowplough operation. If the carrying vehicle is not equipped with such a socket or is equipped with a different type of socket, carry out the socket installation according to the diagram (FIGURE 4.20).

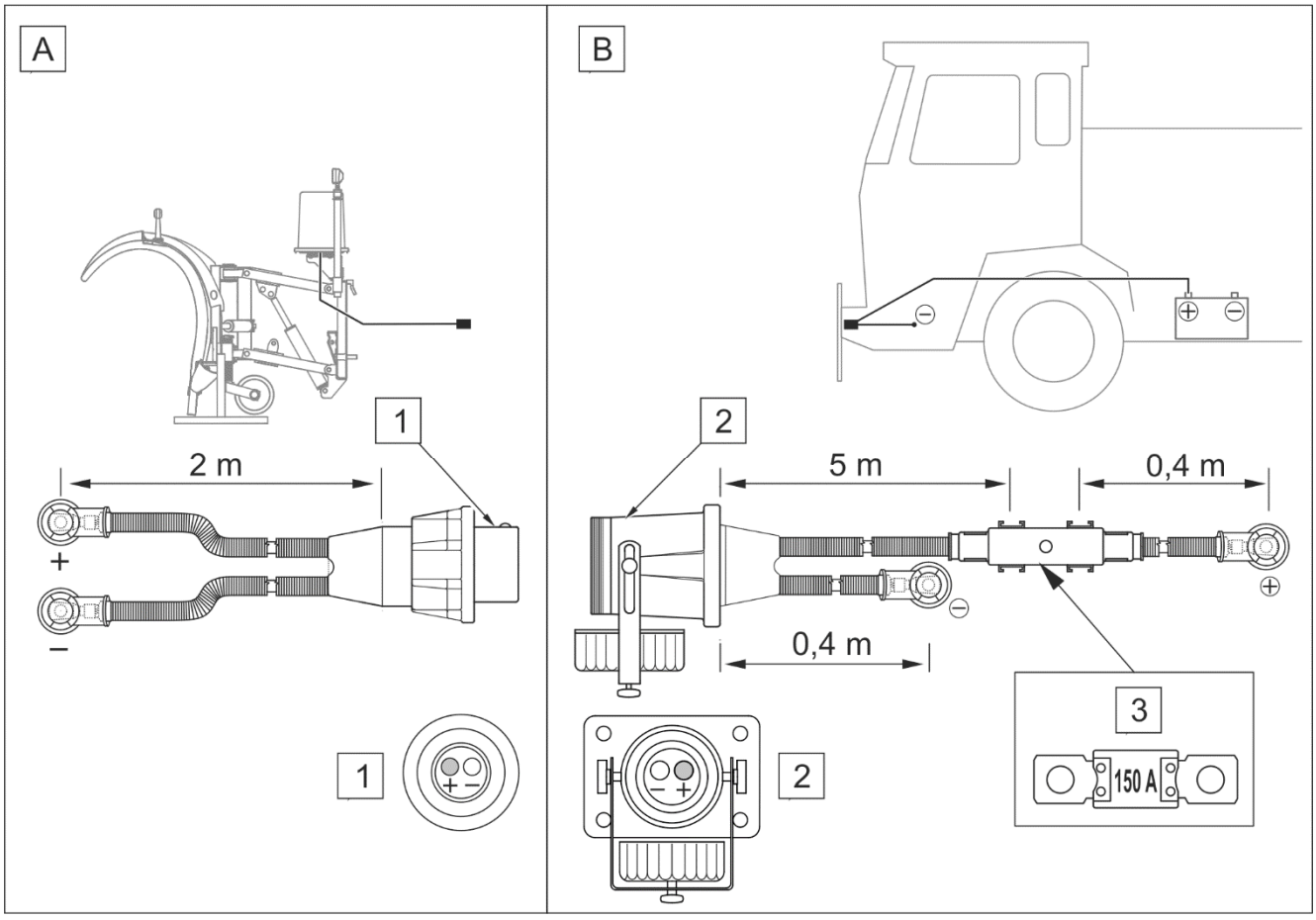


FIGURE 4.20 Installation diagram of the snowplough's electrical supply system

(A) - snowplough electrical system components; (B) - 220N-70020000 power lead ; (1) - plug; (2) - socket; (3) - MEGAVAL 150A fuse

Power lead (B) of the snowplough has a 150A MEGAVAL fuse installed on „+" power lead (FIGURE 4.20)

4.7.2 INSTALLING THE WARNING FLAGS

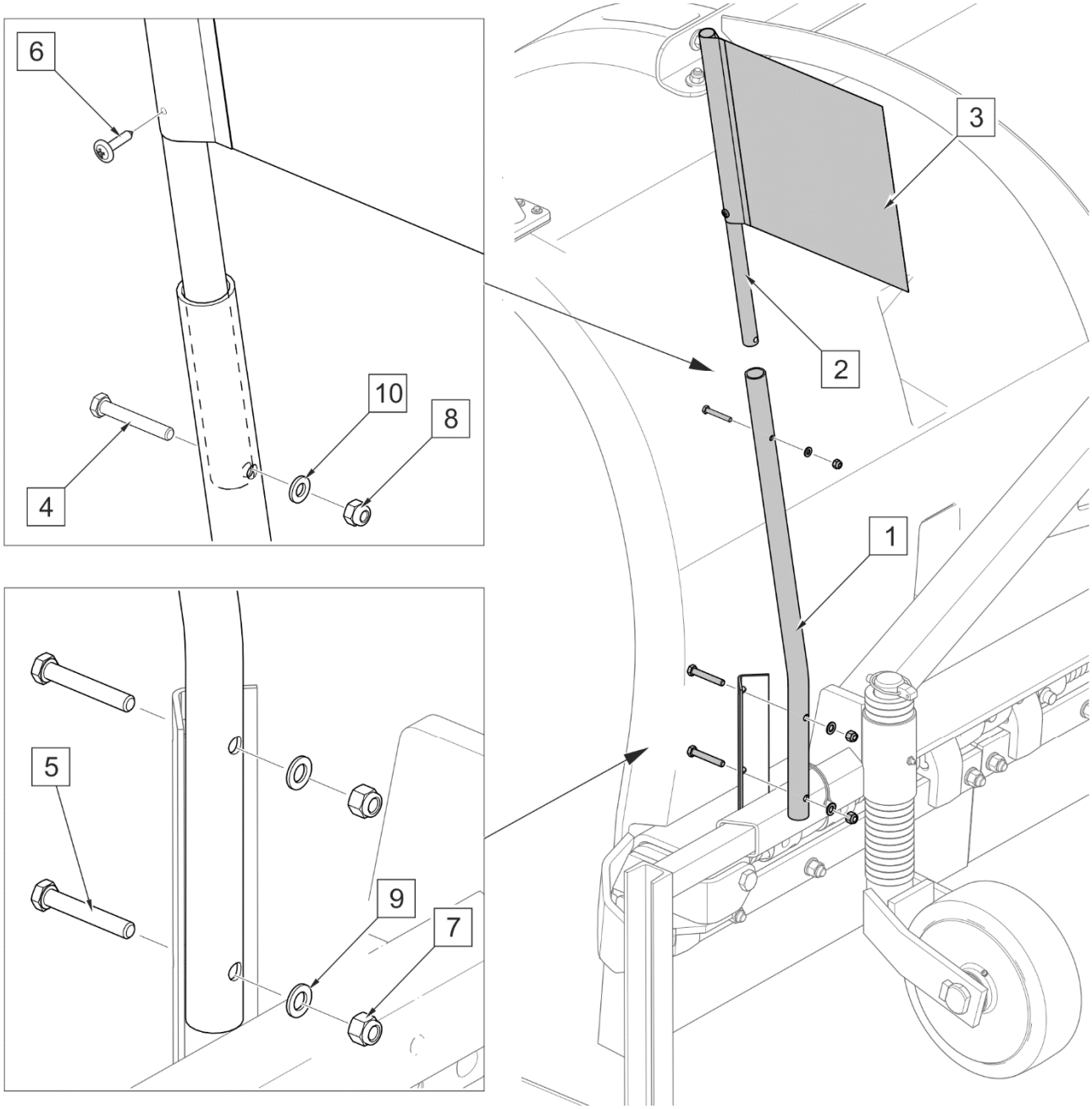


FIGURE 4.21 Installing the warning flags (option)

(1) - bracket; (2) - mast; (3) - flag; (4) - M6x40 bolt; (5) - M8x50 bolt; (6) - 4.2x19 screw; (7) - M8 nut; (8) - M6 nut; (9) - washer 8; (10) - washer 6

The warning flags are optional equipment of the snowplough. The installation method is shown in (FIGURE 4.21).

SECTION

5

MAINTENANCE

5.1 CHECKING AND REPLACEMENT OF COLLECTING BLADES

DANGER

Immobilise the carrying vehicle with parking brake, turn off the carrying vehicle's engine and secure the vehicle's cab against access of third persons.

Do NOT perform service or repair work under raised and unsupported machine. Secure the snowplough linkage system against lowering.

Excessively worn or damaged blades must be replaced with new ones. To remove a rubber snowplough blade (FIGURE 5.1) undo nuts (6) of an appropriate segment, remove bolts (5). Used or damaged snowplough blade should be replaced with a new blade suitable for a given model of the snowplough (TABLE 5.1). Install in reverse order. Bolt and nut connections should be tightened using proper tightening torque (TABLE 5.6)

TABLE 5.1 Types of rubber snowplough blades, depending on the snowplough model

Marking FIGURE 5.1	**Name catalogue No.**	**PU-S25HL**	**PU-S27HL**	**PU-S30HL**	**PU-S34HL**
		Number of items			
1	416mm rubber snowplough blade 220N-05000006-01	1	-	2	-
2	675mm rubber snowplough blade 220N-05000006	3	4	2	5
3	800mm rubber snowplough blade 464N-02000004	-	-	1	-

ATTENTION!

Each time the machine hits an obstacle, technical condition of blades and their mounting should be checked.

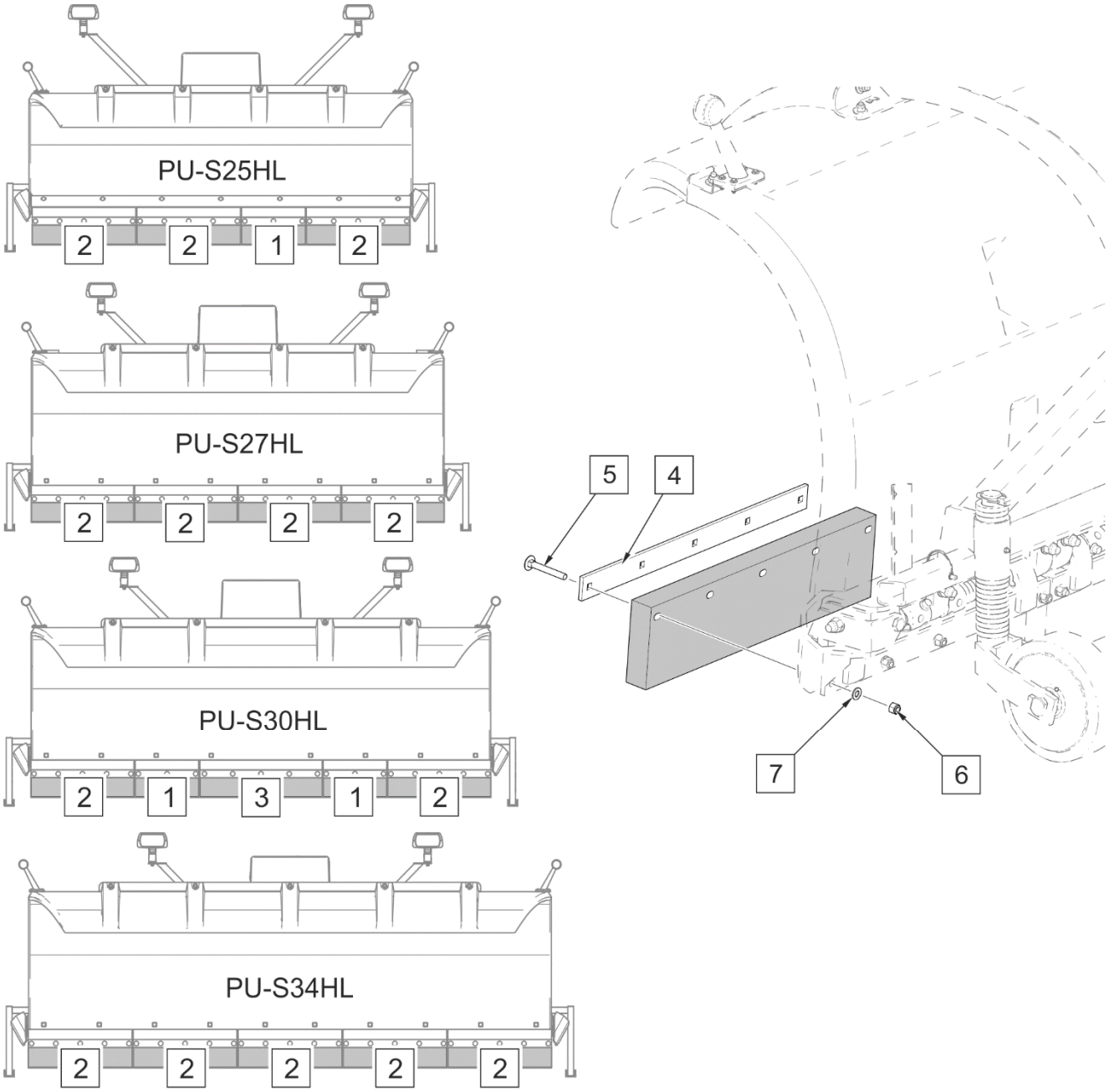


FIGURE 5.1 Replacement of rubber blades

(1) - 416mm rubber snowplough blade; (2) - 675mm rubber snowplough blade; (3) - 800mm rubber snowplough blade; (4) - clamping strip; (5) - bolt; (6) - nut; (7) - washer

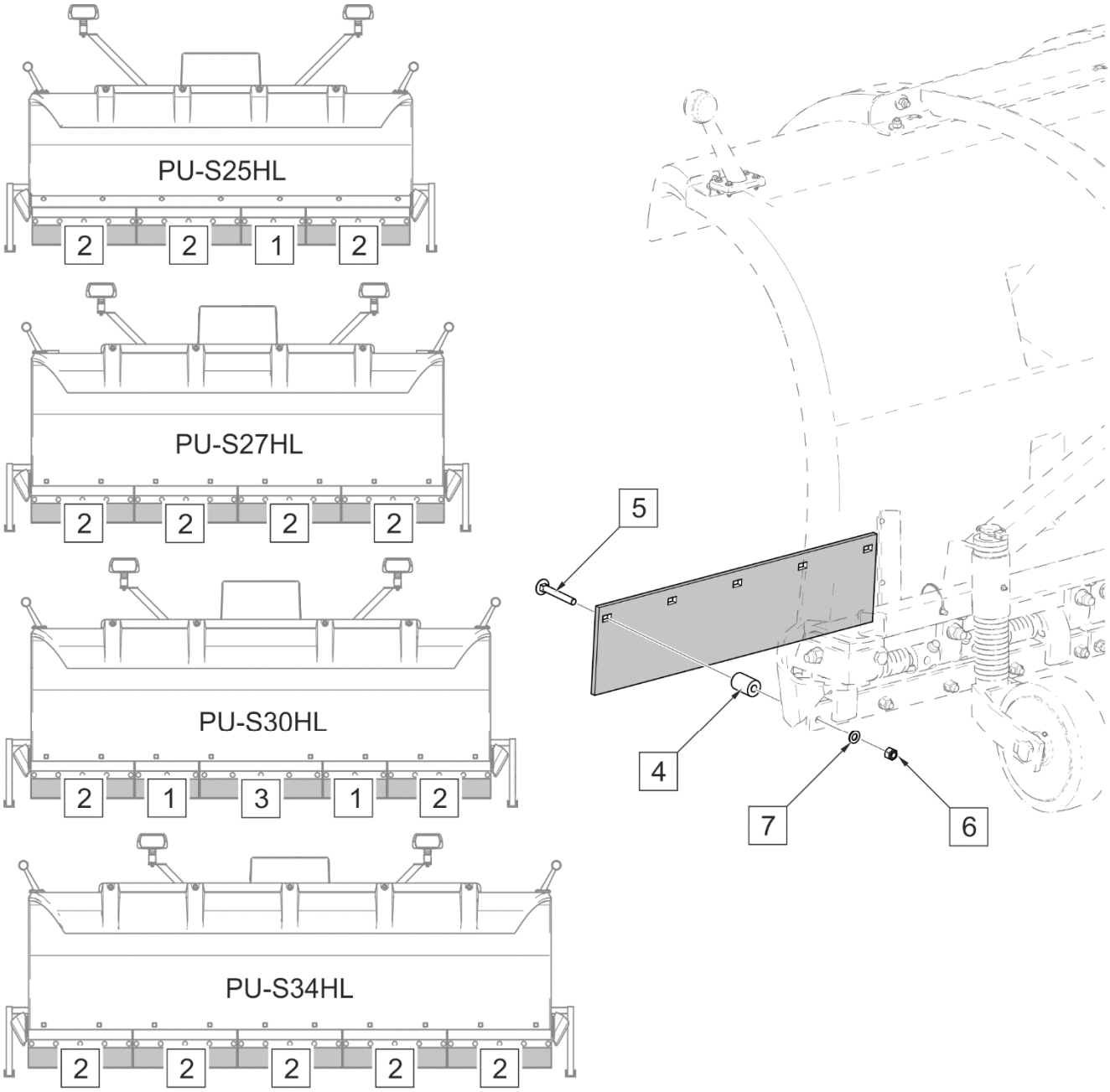


FIGURE 5.2 Replacement of metal snowplough blades

(1) - 416 mm metal snowplough blade; (2) - 675 mm metal snowplough blade; (3) - 800 mm metal snowplough blade; (4) - sleeve; (5) - bolt; (6) - nut; (7) - washer

Optionally, the snowplough can be equipped with metal blades (FIGURE 5.2). Excessively worn or damaged blades must be replaced. Types and quantities of blades are shown in TABLE 5.2

TABLE 5.2 Types of metal plough blades, depending on the plough model

Marking FIGURE 5.2	Name catalogue No.	PU-S25HL	PU-S27HL	PU-S30HL	PU-S34HL
		Number of items			
1	416mm metal snowplough blade 220N-08000001-01	1	-	2	-
2	675mm metal snowplough blade 220N-08000001	3	4	2	5
3	800mm metal snowplough blade 464N-04000001	-	-	1	-

5.2 REPLACEMENT OF FENDERS

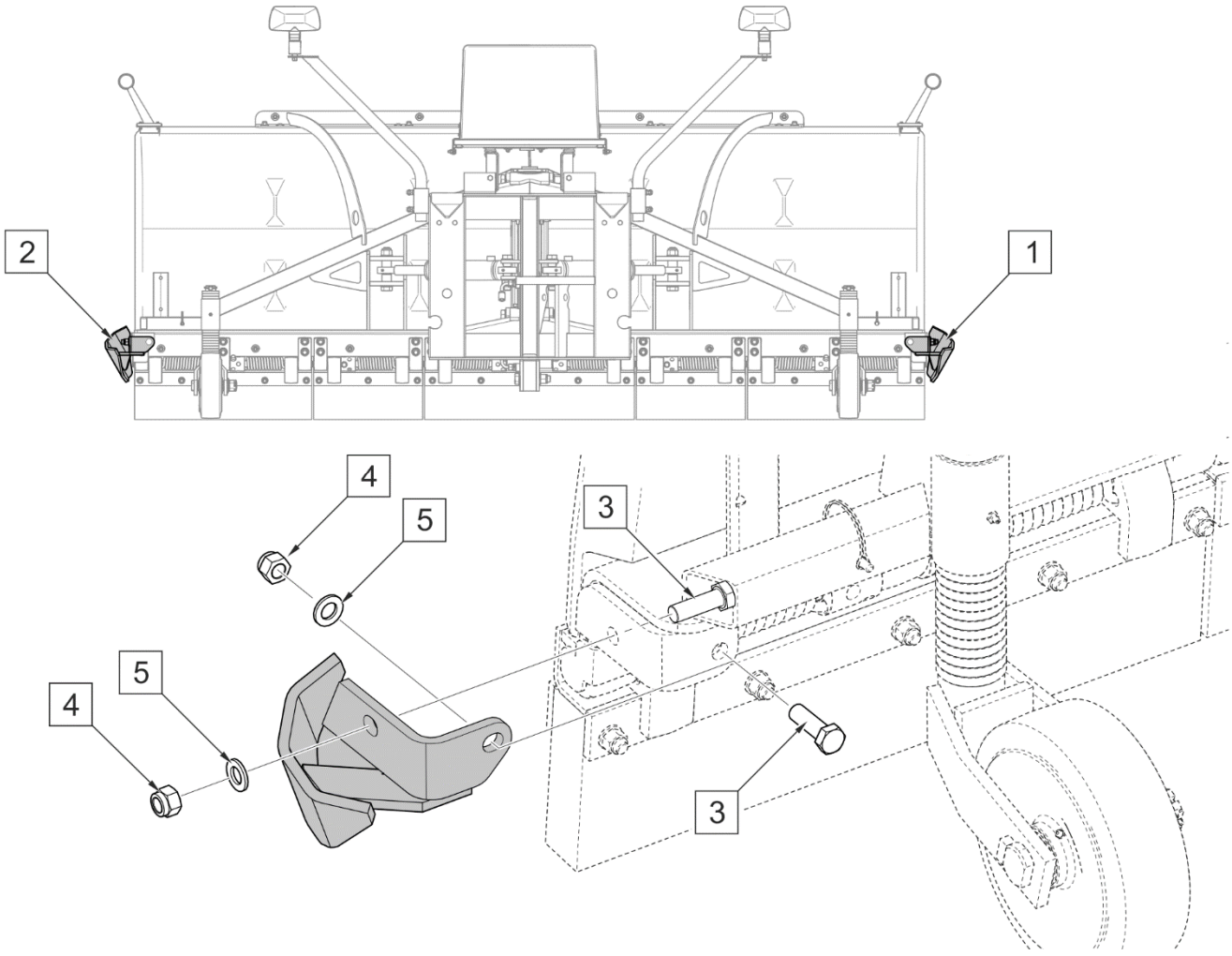


FIGURE 5.3 Installing fenders

(1) - right fender; (2) - left fender; (3) - M16x50 bolt; (4) - M16 nut; (5) - 16 washer

The snowplough is equipped with the right fender (2) and the left fender (3), which are used for protecting the snowplough blades' sides during working near kerbs. Fenders (FIGURE 5.3) are mounted to the mouldboard with bolts (3), washers (4) and nuts (5). The right fender and the left fender are replaced in the same way. Bolt and nut connections should be tightened using proper tightening torque (TABLE 5.6).

TABLE 5.3 Fenders

Marking FIGURE 5.3	**Name / catalogue No.**	Number of items
1	Right fender / 220N-07000000P	1
2	Left fender / 220N-07000000L	1

5.3 ADJUSTMENT OF SPRINGS OF SNOWPLOUGH BLADES WITH SHOCK ABSORBERS

DANGER

The springs should be adjusted after mounting and raising the snowplough on the carrying vehicle. Immobilise the carrying vehicle with parking brake, turn off the carrying vehicle's engine and secure the vehicle's cab against access of third persons. Secure the snowplough linkage system against lowering. Do NOT perform service or repair work under raised and unsupported machine.

In the snowploughs equipped with rubber or metal blades with shock absorbers, there is the possibility of adjusting the tension of shock absorbing springs (FIGURE 5.4). Before starting the adjustment, the snowplough should be mounted on the carrying vehicle, raised and secured against falling by means of the transport lock or proper supports.

To tighten the snowplough blades' springs (FIGURE 5.4):

A) Insert rod (3) into proper opening of tightening sleeve (1).

B) Turn the tightening sleeve using rod (3) to enable removal of locking pin (2).

C) Turn the sleeve (1) downwards and hold it in this position using the other rod (3).

D) Insert the locking pin (2) into proper opening of the sleeve (1) and turn the tightening sleeve (1) so that the locking pin (2) is supported on the frame.

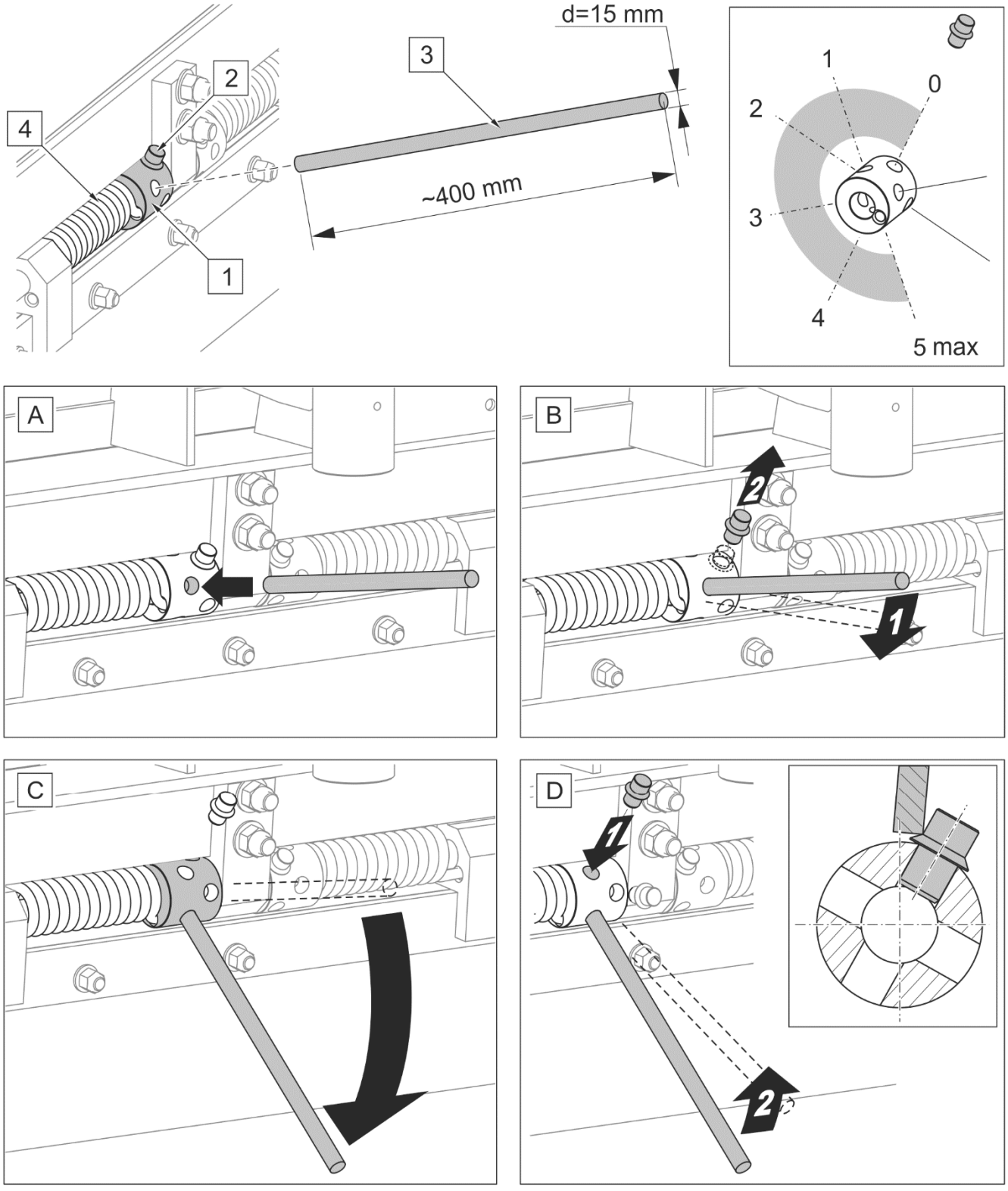


FIGURE 5.4 Adjustment of springs of snowplough blades with shock absorbers

(A),(B),(C),(D) - sequence of actions; (1) - tightening sleeve; (2) - locking pin; (3) - rod; (4) - spring

Repeat actions (A), (B), (C), (D) until proper spring tension is obtained. The adjustment should be performed individually, in the same way, for each spring. The pin (2) should be relocated by the same number of openings in each sleeve (maximally by 5 openings from the

loose, untightened position). To reduce the spring tension, turn the sleeve in the opposite direction.

TIP

Make the adjustment using two steel rods with diameter of d= 15 mm and approximate length of L= 400 mm.

5.4 HYDRAULIC SYSTEM OPERATION

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

- checking oil level and changing oil in the tank of the Power-Pack electro-hydraulic power supply (option);
- checking tightness of cylinders hydraulic connections,
- checking technical condition of hydraulic conduits;
- checking technical condition and leak tightness of hydraulic 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 residual pressure in the system.

ATTENTION!

Before you begin, visually inspect the hydraulic system components.

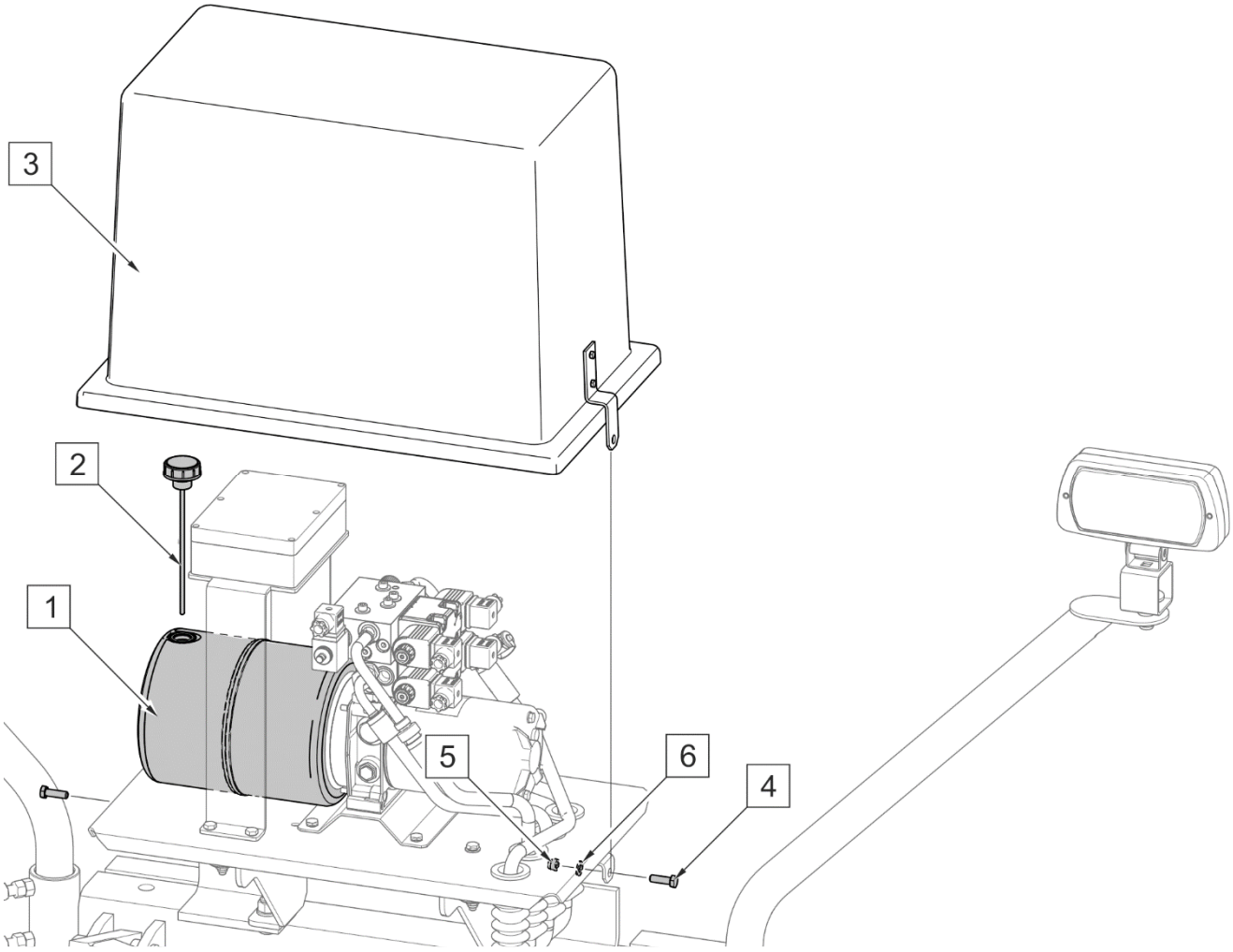


FIGURE 5.5 Checking oil level

(1) - oil tank; (2) - filler plug with an oil level dipstick; (3) - housing; (4) - M8x25 bolt; (5) - M8 nut; (6) - washer 8

The oil tank of the electro-hydraulic power supply (FIGURE 5.5) is located under the housing (3). Before checking oil level, set the snowplough in such a manner as to ensure that the oil tank (1) is positioned horizontally,

- unscrew nuts (5) and remove housing (3),
- unscrew filler plug (2) and check the oil level on the oil level dipstick.
- if necessary, supplement oil to the required level, tighten the plug (2) and install the housing (3).

TIP

The hydraulic system and the oil tank of the snowplough with the electro-hydraulic control system is factory filled with HL32 hydraulic oil in the amount of 4 litres [L].

The oil in the tank of the electro-hydraulic power supply should be changed once a year (after the working season).

Because of its composition, the oil in the hydraulic system 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.

DANGER

Oil fires should be quenched with carbon dioxide (CO_2), foam or extinguisher steam. Do NOT use water for fire extinguishing!

TABLE 5.4 HL32 HYDRAULIC OIL CHARACTERISTICS

ITEM	NAME	VALUE
1	ISO 3448VG viscosity classification	32
2	Kinematic viscosity at 40°C	28.8 – 35.2 mm^2/s
3	ISO 6743/99 quality classification	HL
4	DIN 51502 quality classification	HL
5	Flash point, ^0C	Above 210°C
6	Maximum operating temperature, ^0C	80

DANGER

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

Spilt oil should be immediately collected and placed in marked tight container. Used oil should be taken to the appropriate facility dealing with recycling or regeneration of oils.

The machine's hydraulic system should be completely tight sealed. Inspect the seals when the hydraulic cylinder is completely extended. If oil is found on hydraulic cylinder body, check 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.

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

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.

Rubber hydraulic conduits should be replaced after 4 years of machine use.

5.5 ELECTRICAL SYSTEM MAINTENANCE

DANGER

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.

Maintenance of electrical system involves periodical checking of individual functions of the snowplough and operation of the lighting system.

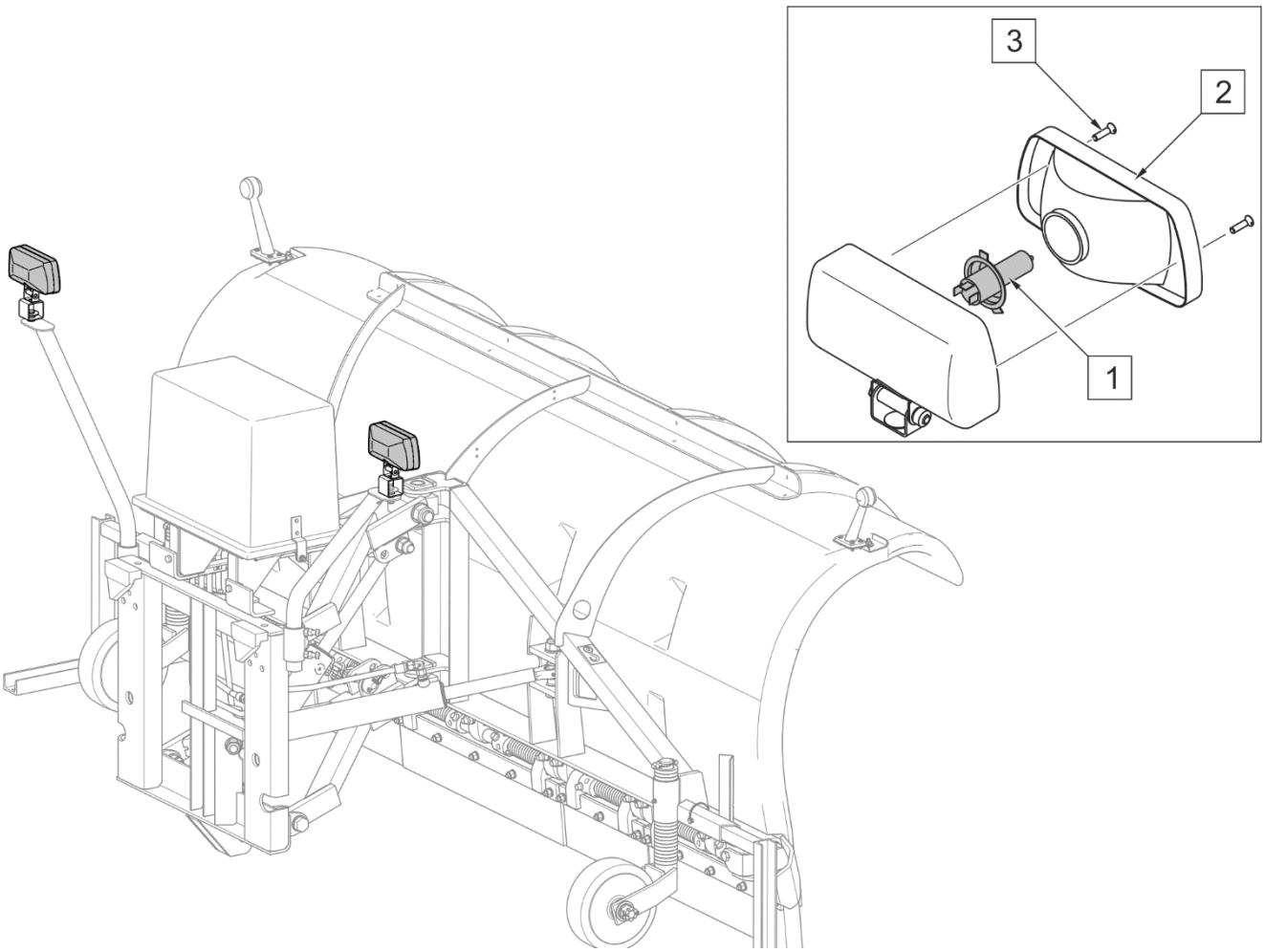


FIGURE 5.6 Changing the working light's bulb

(1) - H4 75/70W 24V or 60/55W 12V bulb (depending on the electrical system version); (2) - light lens; (3) - screw

The working light is equipped with a H4 75/70W 24V bulb or 60/55W 12V bulb - depending on the electrical system version. To replace the working light's bulb (FIGURE 5.6), unscrew the screws (5) and dismount the light lens (3).

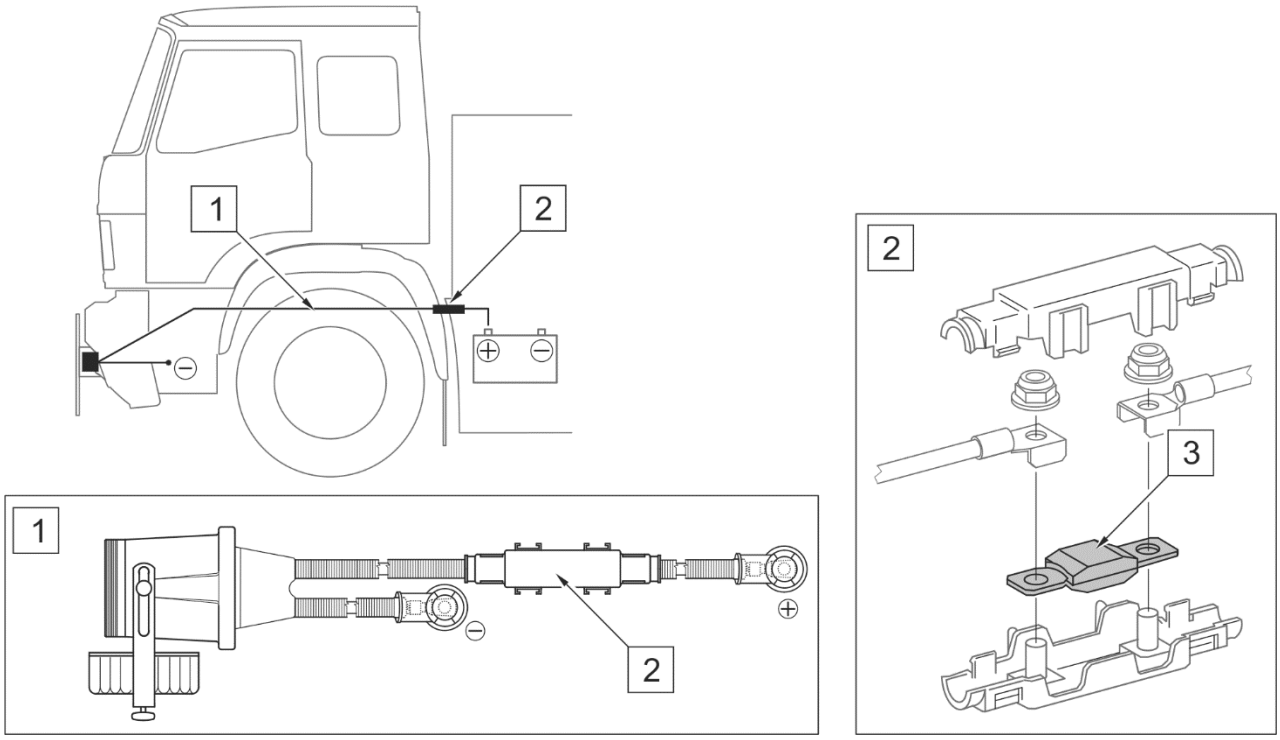


FIGURE 5.7 Replacing the fuse of Power-Pack power supply

(1) - high current power lead; (2) - fuse holder; (3) - MEGAVAL 175A fuse

There is a 175A MEGAVAL fuse (3) on the supply conduit (+) of the electrical system of Power-Pack power supply (FIGURE 5.7). In order to replace the fuse, open the housing (2) and undo the nuts fixing the leads inside the housing.

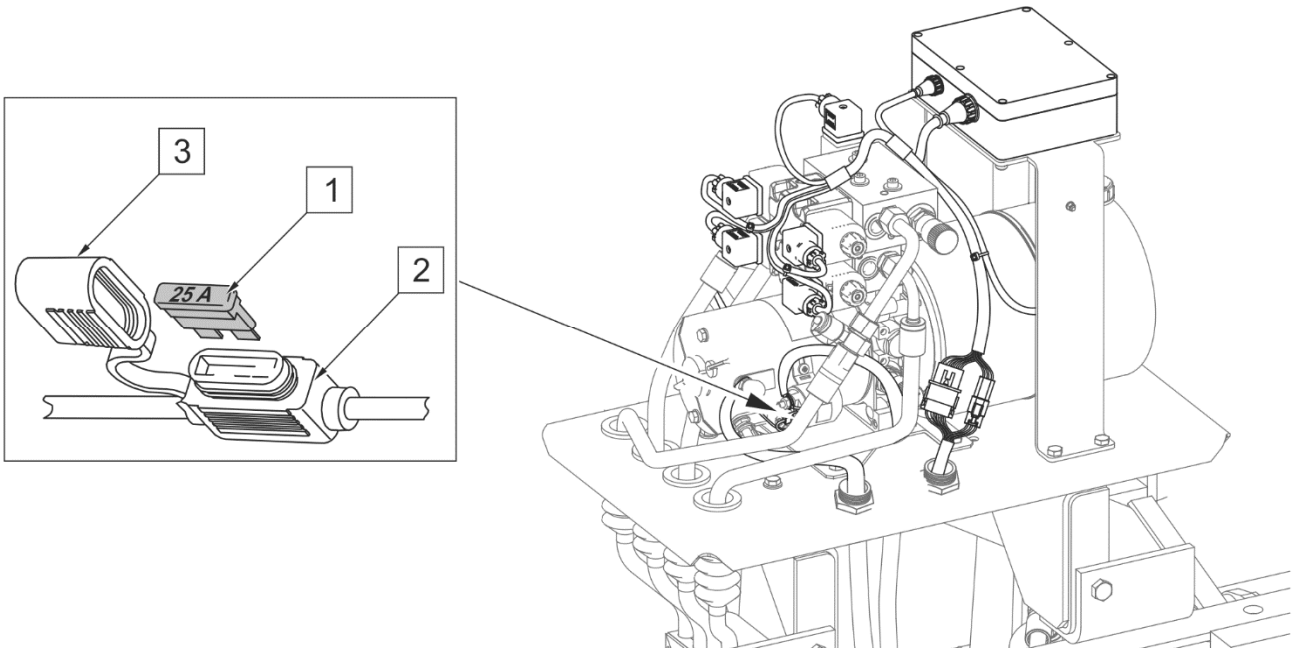


FIGURE 5.8 Replacing the fuse of Power-Pack solenoid valves (option)

(1) - UNIVAL 25A fuse; (2) - fuse holder; (3) - protective cover

To replace the fuse of solenoid valves (FIGURE 5.8), remove the housing of the electro-hydraulic power supply, remove the protective cover (3) and take out the fuse (1) from the housing (2).

5.6 LUBRICATION

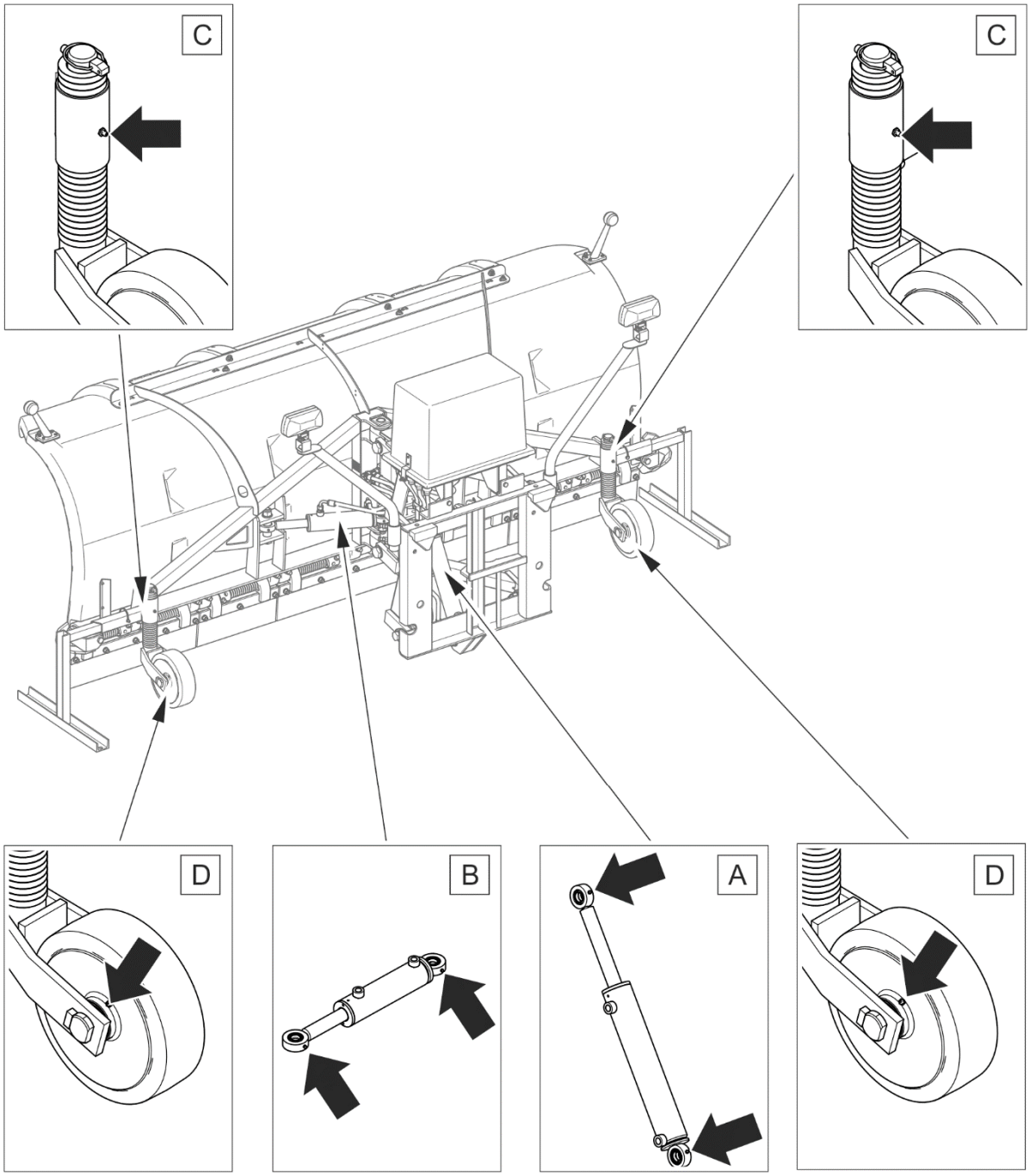


FIGURE 5.9 Lubrication points

Lubrication points are described in TABLE 5.5

Machine lubrication should be performed with the aid of a manually or foot operated grease

gun, filled with grease. Before commencing lubrication insofar as is possible remove old grease and other contamination. Remove and wipe off excess oil or grease ŁT-43-PN/C-96134 grease is recommended for lubrication.

DANGER

Lubrication may only be performed when the snowplough is lowered, and resting on the ground.

Before lubricating, turn off engine, remove key from ignition and engage carrying vehicle brake.

TABLE 5.5 Lubrication points

ITEM	NAME	NUMBER OF LUBRICATION POINTS	TYPE OF GREASE	LUBRICATION FREQUENCY
A	Eye of rising cylinder	2	grease	50 hours
B	Eye of turning cylinder	2 (4)*		50 hours
C	Wheel rotation sleeve	2		50 hours
D	Wheel bearings	2		10 hours

** - depending on the snowplough version*

Marking description in Item column (TABLE 5.5) conforms with numbering shown (FIGURE 5.9)

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.

5.7 STORAGE

After finishing work, machine should be thoroughly cleaned and washed with water jet. While washing, do not direct a strong water or steam jet at information and warning decals or hydraulic lines and electrical components. Nozzle of pressure or steam washer should be kept at a distance of not less than 30 cm from cleaned surface.

After cleaning, inspect the whole machine, inspect technical condition of individual elements. Used or damaged elements should be repaired or replaced.

In the event of damage to the paint coat, clean rust and dust from damaged area, degrease and then paint with undercoat and after it is dry paint with surface coat paint retaining colour uniformity 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. Machine should be kept in 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.

The snowplough disconnected from the carrying vehicle should be placed on parking stands *(included in the machine equipment)*.

Disconnect the control panel and protect it against adverse weather conditions. Secure the electric sockets with plugs.

5.8 TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS

During maintenance and repairs use appropriate torque for bolt connections (unless other is specified for a particular connection). Recommended bolt tightening torque values are given in TABLE 5.6. The tightening torque values given in the table apply to non-greased steel bolts.

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 cause damage to the machine.

TABLE 5.6 TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS

THREAD DIAMETER [mm]	RESISTANCE CLASS	
	8.8	10.9
	TIGHTENING TORQUE [Nm]	
M6	10	15
M8	25	36
M10	49	72
M12	85	125
M14	135	200
M16	210	310
M20	425	610
M24	730	1,050
M27	1,150	1,650
M30	1,450	2,100

The above-mentioned parameters do not apply to places featuring special engineering solutions (FIGURE 5.10) and to mouldboard fixing (FIGURE 5.11)

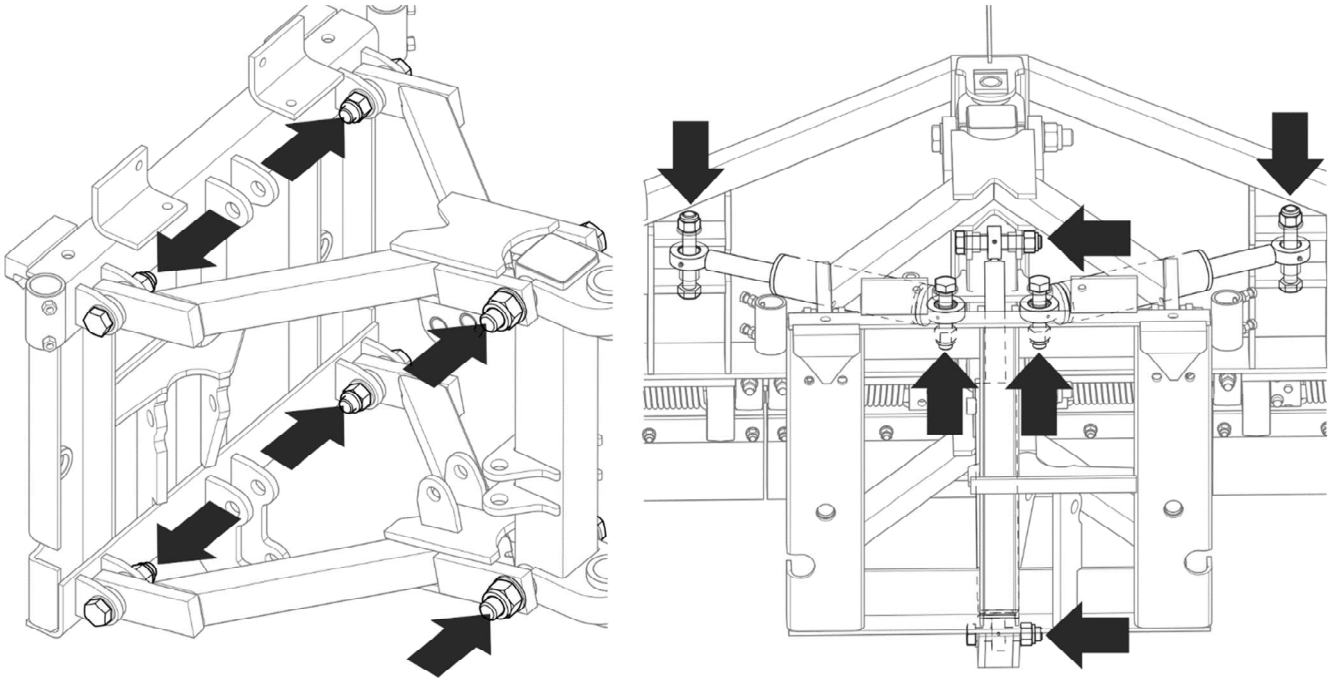


FIGURE 5.10 Special engineering solutions

Bolts and nuts of the rockers' fixing and hydraulic cylinders should be tightened only to eliminate the axial clearance.

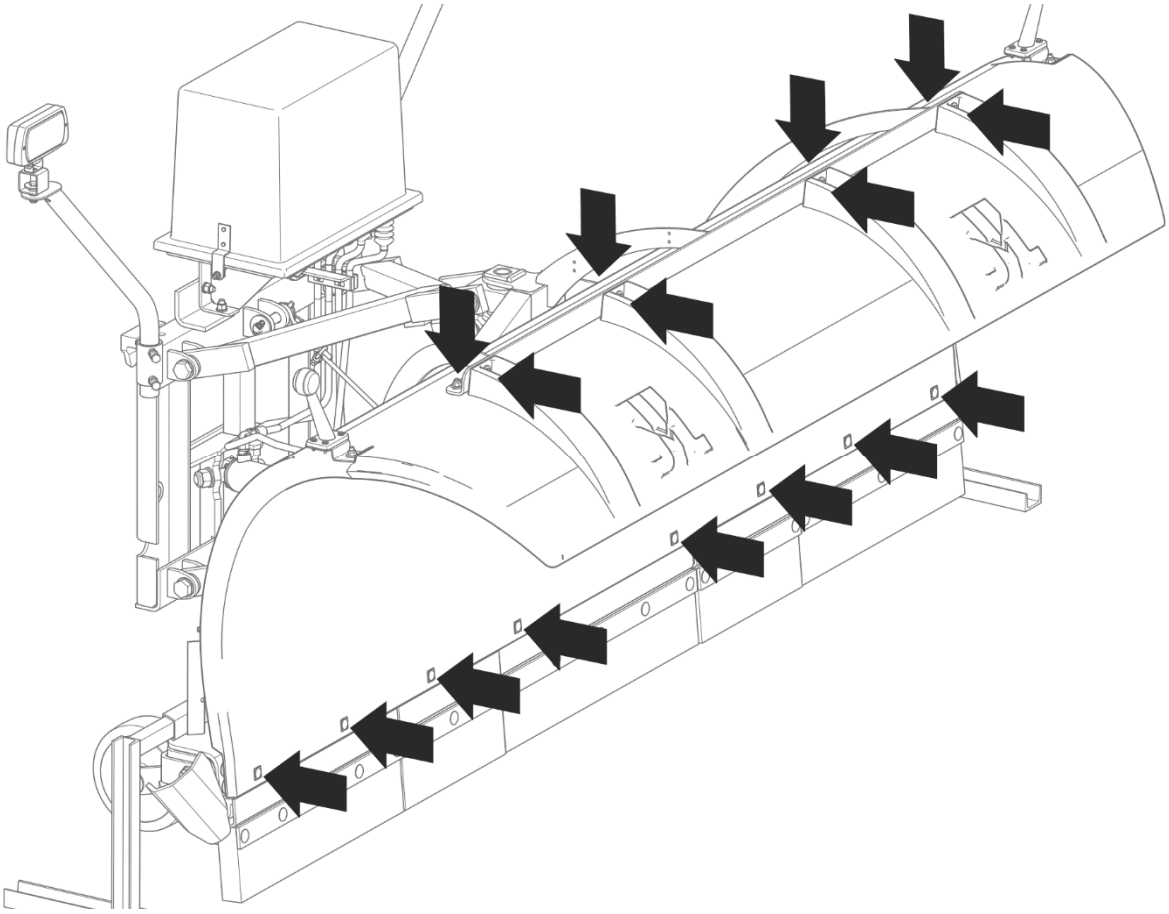


FIGURE 5.11 Mouldboard fixing

Mouldboard fixing bolts should be tightened using the tightening torque of 50±2 Nm.

TIP

The fasteners in the places featuring special engineering solutions (FIGURE 5.10) should be tightened only to eliminate axial clearance.

Mouldboard fixing bolts (FIGURE 5.11) should be tightened using the tightening torque of 50±2 Nm.

5.9 TROUBLESHOOTING

TABLE 5.7 TROUBLESHOOTING

TYPE OF FAULT	CAUSE	REMEDY
Mouldboard position cannot be changed	The electrical system is not connected to the carrying vehicle	Connect to electrical system
	Main switch of control panel is off	Set main switch of control panel in „I" position
	Damaged fuse on power lead	Check and, if necessary, replace the fuse on the power lead.
	The machine hydraulic system is damaged	Repair at an authorised service point
	Electro-hydraulic power supply is damaged	Repair at an authorised service point
Machine scoops snow unevenly	Excessively worn collecting plough blades	Check and replace if necessary
	Incorrectly positioned wheels	Check and adjust according to operator's manual
No lighting	Electrical system is not connected.	Connect electrical system to carrying vehicle. Check connections on electric leads.
	Lights on the control panel are not switched on	Turn on the lights
	Main switch of control panel is off	Set main switch of control panel in „I" position
	Damaged fuse on power lead	Check and replace the fuse if necessary
	Burned-out light bulb	Replace light bulb
	Damaged lamps or conductors	Repair at an authorised service point

NOTES