PRONAR Sp. z o.o.

17-210 NAREW, UL. MICKIEWICZA 101A, PODLASKIE PROVINCE

tel.:	+48 085 681 63 29	+48 085 681 64 29
	+48 085 681 63 81	+48 085 681 63 82
fax:	+48 085 681 63 83	+48 085 682 71 10

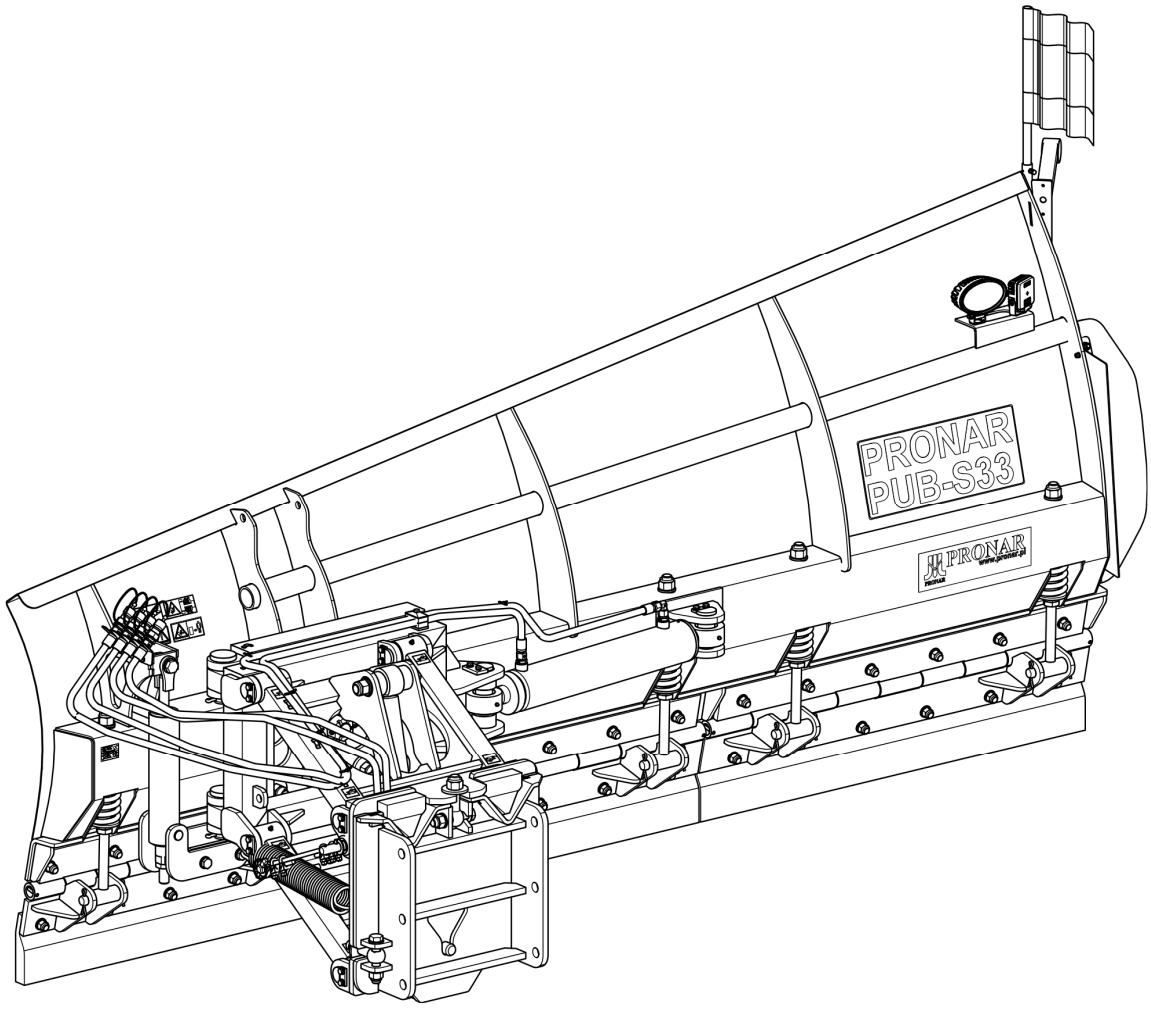
www.pronar.pl

OPERATOR'S MANUAL

SNOW PLOUGH

PRONAR PUB-S33

TRANSLATION OF THE ORIGINAL INSTRUCTIONS



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SNOW PLOUGH

PRONAR PUB-S33

MACHINE IDENTIFICATION

TYPE: *PUB-S33*

SERIAL NUMBER: | | | | |

INTRODUCTION

Information in this document 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 actual specification of the machine supplied to the user. The manufacturer reserves the right to introduce design changes in machines produced that facilitate and improve the quality of machine operation, without making minor amendments to this Operator Manual.

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

The Operator Manual describes the basic principles of safe use and operation of the machine. If the information in this Operator Manual needs clarification, refer for assistance to the sale point where the machine was purchased or to the Manufacturer.

MANUFACTURER'S ADDRESS:

PRONAR Sp. z o.o.
ul. Mickiewicza 101A
17-210 Narew

CONTACT TELEPHONES

+48 085 681 63 29 *+48 085 681 64 29*
+48 085 681 63 81 *+48 085 681 63 82*

SYMBOLS APPEARING IN THIS OPERATOR 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.

Vital information and instructions that must be observed are by the symbol:

and also preceded by the word **"IMPORTANT".** 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 Manual is marked with the pictogram:

Additional tips and advice for machine operation are marked with the sign:

and also preceded by the word **"TIP".**

DIRECTIONS USED IN THIS OPERATOR 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.

PRONAR Sp. z o.o.
ul. Mickiewicza 101 A
17-210 Narew, Polska
tel./fax (+48 85) 681 63 29, 681 63 81, 681 63 82,
681 63 84, 681 64 29
fax (+48 85) 681 63 83
http://www.pronar.pl
e-mail: pronar@pronar.pl

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 PRONAR**
Type:	**PUB-S33**
Model:	–
Serial number:	
Commercial name:	**Snow plough PRONAR PUB-S33**

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.

„PRONAR"
Spółka z o.o.
17-210 Narew, ul. Mickiewicza 101 A
tel. (085) 681 6329, 681 6429
(085) 681 6383

Z-CA DYREKTORA
d/s technicznych
członek zarządu
Roman Omelianiuk

Narew, the 2015-09-03

Place and date

Full name of the empowered person
position, signature

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SECTION

1

BASIC INFORMATION

1.1 IDENTIFICATION

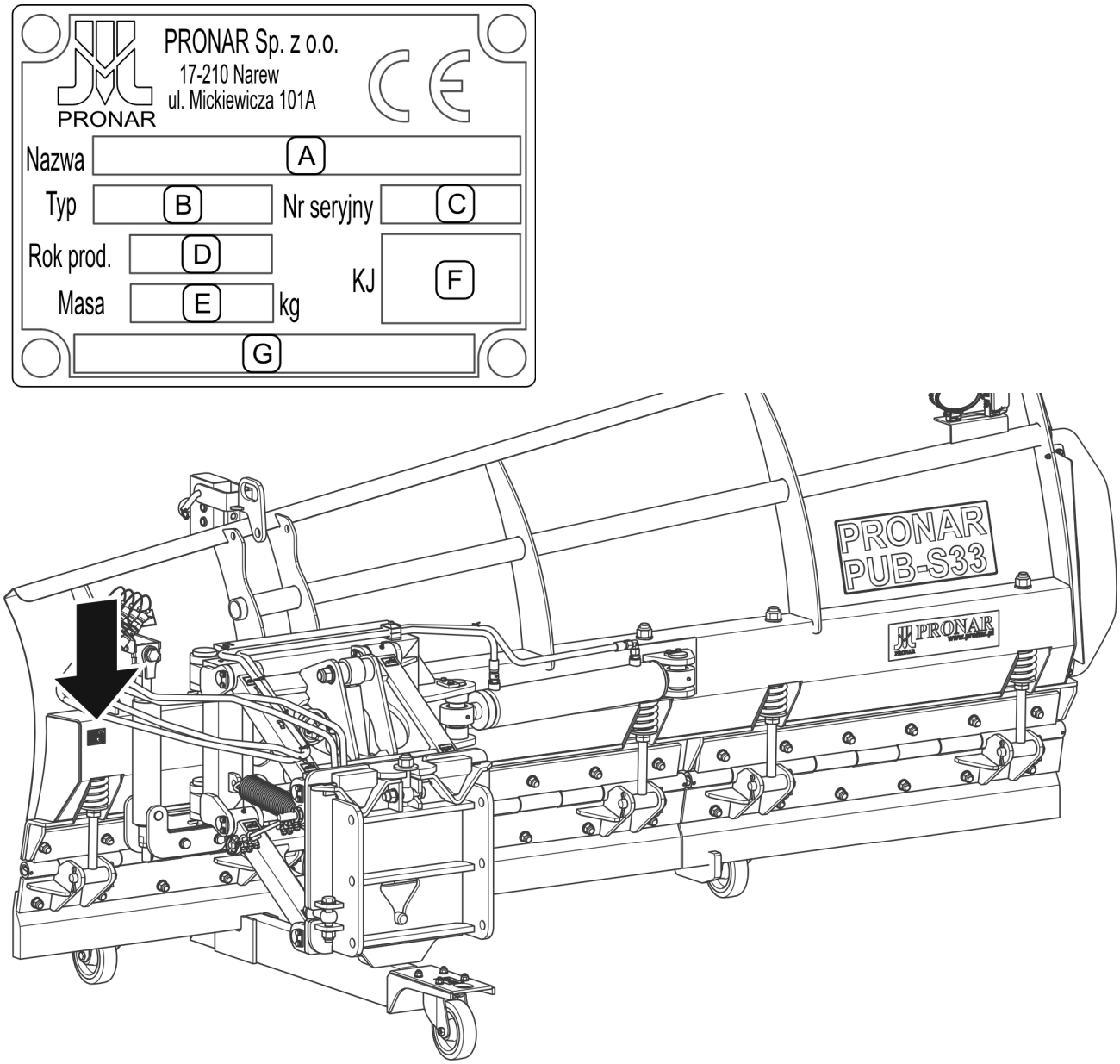


FIG. 1.1 Location of the nameplate

Meaning of nameplate items (FIG. 1.1):

A - machine name,

B – machine type,

C – serial number

D – year of manufacture

E – machine tare weight [kg],

F – quality Control stamp,

G – additional information

The factory number is stamped into the nameplate and on mouldboard underneath the nameplate. The nameplate is located on the left side of the snow plough's mouldboard. When purchasing the machine, check that the serial number corresponds with that indicated in the *WARRANTY BOOK*, in the sales documents and in the *OPERATOR MANUAL*.

1.2 INTENDED USE

The PRONAR PUB-S33 snow plough is designed for removing loose snow and snowdrift from roads, yards and other hard road surfaces such as asphalt, concrete paving blocks, paving, concrete. It is not recommended to remove icy, compacted or compressed and considerably thick layer of snow frozen to road surface. Using the machine for other purposes will be regarded as contrary to intended use.

The plough is mounted on the side of the vehicle, between the axles and is used as a supplement to the plough mounted at the front of the carrier. The plough can be mounted on trucks and special vehicles equipped with a dedicated mounting plate that meets the requirements of 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 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 this publication and with the carrier vehicle's Operator 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 machine must not be used for purposes other than those for which it is intended, in particular for:

- **levelling of roads, terrain;**
- **transport people, animals or any items on the machine**
- **to remove compacted or compressed snow**

TAB. 1.1 Carrier vehicle requirement

The plough is powered and controlled by the external hydraulics of the implement carrier

	UNIT	REQUIREMENTS
Mounting method	–	dedicated mounting plate mounted between the axles of the vehicle (*part number 488N-13000000*)
Electrical system	–	dedicated electrical system with control panel to control plough lighting *(part number 488N-70000000)*
Electrical system voltage	V	24
Hydraulic system	–	external hydraulic system comprising two sections with oil flow direction change (including one section with a floating position), controlled from the operator's cabin
Type of hydraulic couplings	–	2 pair of hydraulic quick coupler sockets *(size 1/2 "ISO 7241-1 mushroom head)*
Type of oil	–	hydraulic, HL-32

The plough is powered and controlled by the Power-Pack electro-hydraulic power unit (optional)

	UNIT	REQUIREMENTS
Mounting method		dedicated mounting plate mounted between the axles of the vehicle (*part number 488N-13000000*)
Electrical system	–	dedicated electrical system included in the Power-Pack electro-hydraulic power unit equipped with a control panel to control plough functions
Electrical system voltage	V	24

Hydraulic system	–	dedicated system with the Power-Pack electro-hydraulic power supply mounted on the implement carrier. *(part number 488N-61000000)*

1.3 EQUIPMENT

The snow plough equipment includes:

- Operator Manual
- Warranty Book
- steel rubber ceramic blades
- transport cart
- connection plate
- plough lighting control panel with a power harness

Equipment versions:

- powered and controlled by an electro-hydraulic Power-Pack
- rubber plough blades,

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 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 cover 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

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,
- 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, repairs carried out improperly,
- making unauthorised alterations to machine design,

the user will lose the right to warranty service.

TIP

Demand that the seller carefully and accurately 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 newly purchased machine.

Modification of the machine without the written consent of the Manufacturer is prohibited. 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 in assemblies:

- the plough on a transport cart,
- Power-Pack electro-hydraulic power supply (option) in a box

Packing is also required for the machine Operator 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 carrier vehicle provided the vehicle's driver familiarises himself with the machine's Operator Manual and particularly with information concerning safety and principles of connection and transport on public roads.

The plough on the loading platform should be installed on a transport cart *(provided with the machine)*. Spacers should be placed under the cart in order to relieve the wheels. Secure the machine with approved fastening belts or chains equipped with a tensioning mechanism.

When loading and unloading the machine, follow the general health and safety regulations 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 (FIG. 1.2), i.e. by the lugs on the sides of the cart wheels. Suspension points are identified with information decals. When lifting the machine take special care to avoid 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 reloading work, special care should be taken not to damage the paint coating.

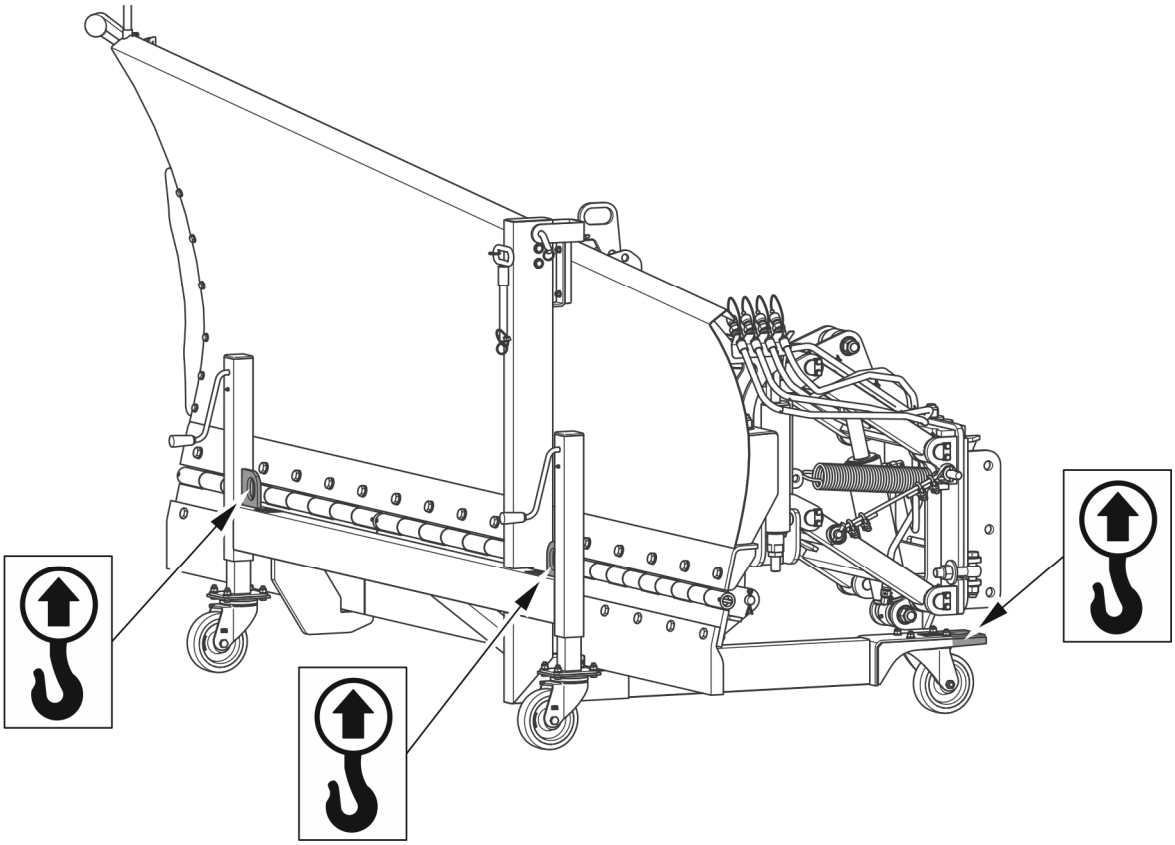


FIG. 1.2 Transport lugs

NOTE

During lifting and transport, the plough should be installed on the cart (FIG. 1.2). The plough suspension system should be set parallel to the mouldboard. The lift cylinder should be extended to the maximum length.

DANGER

When transporting independently, the user must carefully read this Operator Manual and observe all its instructions. 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 use extreme caution while transporting the machine. This is due to the vehicle's centre of gravity shifting upwards when the machine is loaded.

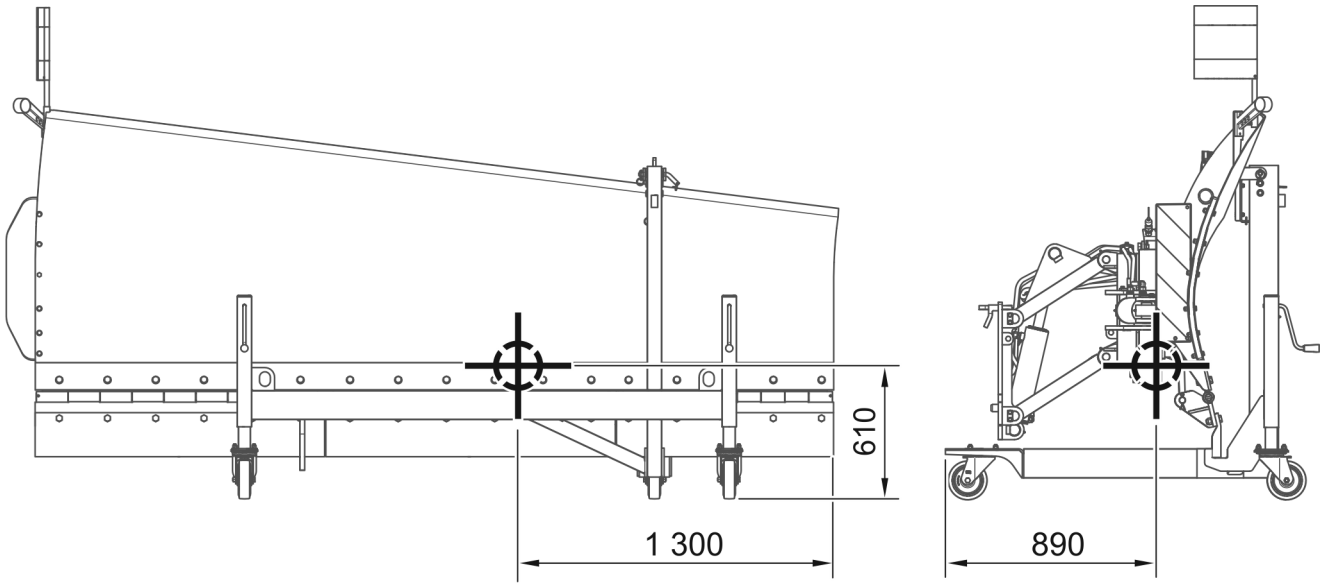


FIG. 1.3 Centre of gravity

All dimensions given in millimetres [mm]

NOTE

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 RISK

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 contaminations, 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 loss of its properties should be stored in its original packaging in the conditions described above.

1.7 WITHDRAWAL FROM USE

Should you decide to withdraw the machine from use, comply with the regulations in force in the given country regarding 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. Used oil and also rubber and plastic elements should be taken to the appropriate facilities dealing with the recycling of this type of waste.

IMPORTANT

During dismantling, use the appropriate tools, equipment and use personal protection equipment, i.e. protective clothing, footwear, gloves and eye protection 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 MACHINE USE

- Before use, the user must carefully read this Operator Manual and the *WARRANTY BOOK*. When operating the machine, follow all instructions in these documents.
- The machine may only be used and operated by persons qualified to drive carrier vehicle and trained in the use of the machine.
- If the information in this Operator Manual is difficult to understand, contact the seller who runs the authorised technical service on behalf of the Manufacturer, or contact the Manufacturer directly.
- Careless and improper use and operation of the machine, and failure to comply with the instructions of this operator manual is dangerous to your health.
- Be aware of the residual risk. Use caution when operating this machine and follow all relevant safety instructions.
- The machine must never be used by persons, who are not authorised to drive carrier 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 guarantee.
- 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 damage to the protective features, they must be replaced with new ones.

2.1.2 HITCHING AND UNHITCHING THE MACHINE

- Do NOT hitch the machine to a carrier vehicle, if the linkage system of the machine is not compatible with the linkage system of the carrier vehicle.
- Be especially careful when hitching and unhitching the machine.
- When hitching, there must be nobody between the machine and the carrier vehicle.
- To hitch the machine to the carrier vehicle use only linking elements recommended by the Manufacturer.
- The carrier vehicle to which the machine will be coupled must be technically reliable and must meet all manufacturer's requirements.
- After completion of hitching the machine, check the safeguards. Carefully read the carrier vehicle Operator Manual.
- The machine disconnected from the carrier vehicle must be placed on a transport cart and set on a 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 hydraulic lines and connections. 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 penetrate 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 deteriorated oil should be stored in original containers or replacement containers resistant to 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 changed every 4 years regardless of 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, observe all road traffic regulations in force in the country, in which the machine is used.
- Do not exceed the maximum speed resulting from road conditions and design restrictions. Adjust speed to the prevailing road conditions and other limitations arising from road traffic regulations.
- Do NOT leave the machine raised and unsecured while the carrier 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 technical condition of linkage, shields and components of hydraulic system and electrical system.
- When driving with raised machine, 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, do not use the machine until the fault has been corrected.

- During work, use proper, close fitting protective clothing, gloves and appropriate tools. When working on hydraulic system it is recommended to use oil resistant gloves and protective goggles.
- Any modification to the machine frees the manufacturer 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 maintenance 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 carrier vehicle engine turned off and the ignition key removed. Immobilise the carrier 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 carrier 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 carrier 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 tractor 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 carrier vehicle and the machine.
- Do NOT operate the machine while reversing. Raise the machine while reversing.
- Do NOT operate the machine with a load other than that resulting from the design of the plough.

2.2 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 machine for purposes other than those for which it is intended,
- being between the carrier vehicle and the machine while the engine is running and when the machine is being hitched,
- being on the machine while the engine is running,
- operating the machine with removed or faulty safety guards,
- not maintaining a 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 carrier vehicle is connected and engine is running.

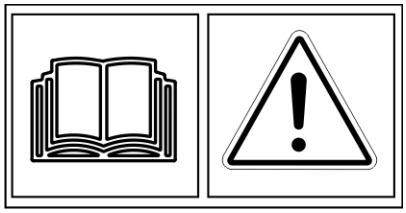
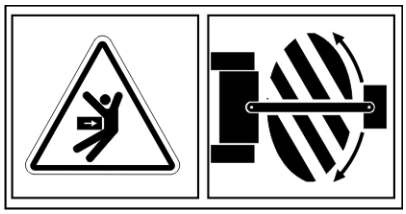
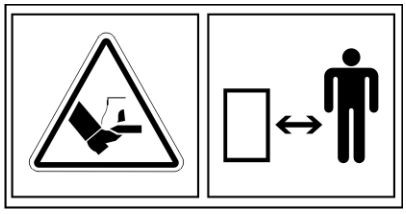
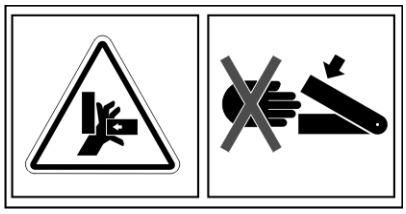
The residual risk may be kept to a minimum by following the recommendations below:

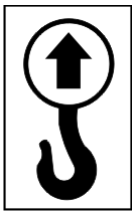
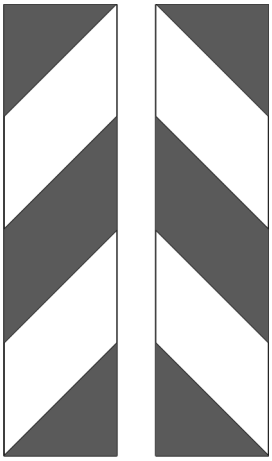
- operate the machine in prudent and unhurried manner,
- reasonably apply all the remarks and recommendations stated in the Operator Manual,
- carry out repairs and maintenance work in line with operating safety rules,
- repair and maintenance work should be carried out by persons trained to do so,
- use close fitting protective clothing,
- ensure unauthorised persons have no access to the machine, especially children,
- maintain a safe distance from forbidden 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.

TAB. 2.1 Information and warning decals

ITEM	SYMBOL	DESCRIPTION
1		Before starting work, carefully read the Operator 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 carrier 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.
5		Machine model
6		Lubrication points

ITEM	SYMBOL	DESCRIPTION
7		Lifting equipment attachment points while loading the machine
8		Outline marking.
9	PRONAR www.pronar.pl PRONAR	Manufacturer

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

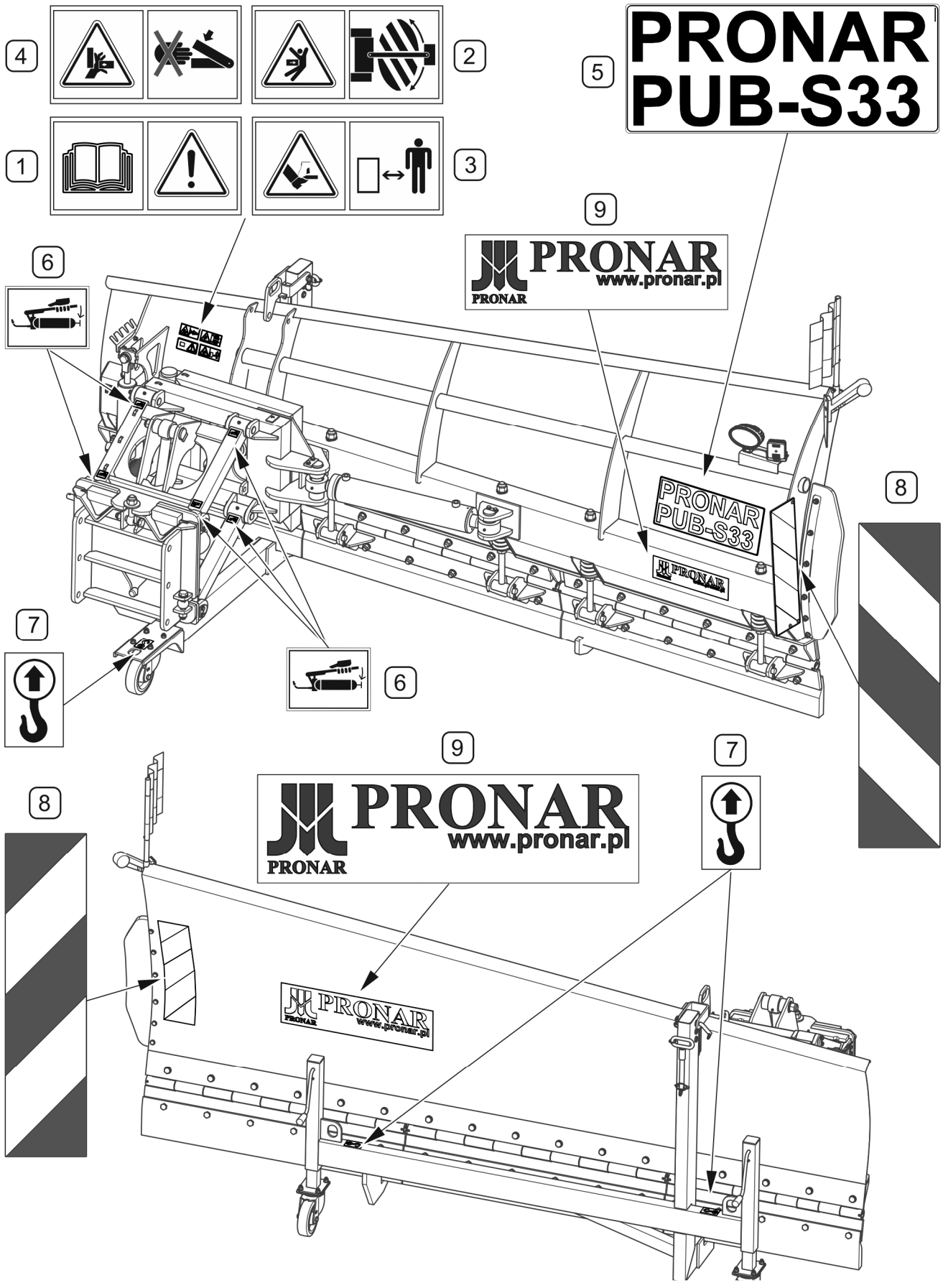


FIG. 2.1 Locations of information and warning decals

Meaning of symbols (TAB. 2.1)

SECTION

3

DESIGN AND OPERATION

3.1 TECHNICAL SPECIFICATION

TAB. 3.1 BASIC TECHNICAL DATA

	Unit	
Snowplough model	–	PUB-S33
Working width (*at an angle of 45°*)	mm	2,340
Total width: *with a fender*	mm	3,450
Height of the working part	mm	1,400
Total height *(with flag)*	mm	1,860
Minimum length - with a cart - without a cart	 mm mm	 1,550 1,210
Mouldboard turning angles	°	0 ÷ 45
Types of collecting blades	– –	- steel rubber ceramic, 3-segment, vertical – rubber blades
Supply	–	- external hydraulic system of the carrier Power-Pack electro-hydraulic power supply (option)
Control	–	with the aid of the external hydraulic system of the carrier vehicle - via the control panel (Power-Pack option)
Electrical system voltage	V	24
Working speed *(maximum)*	km/h	60
Weight *(without mounting plate and transport cart)*	kg	850
Other information	–	single person operation

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

3.2 GENERAL DESIGN

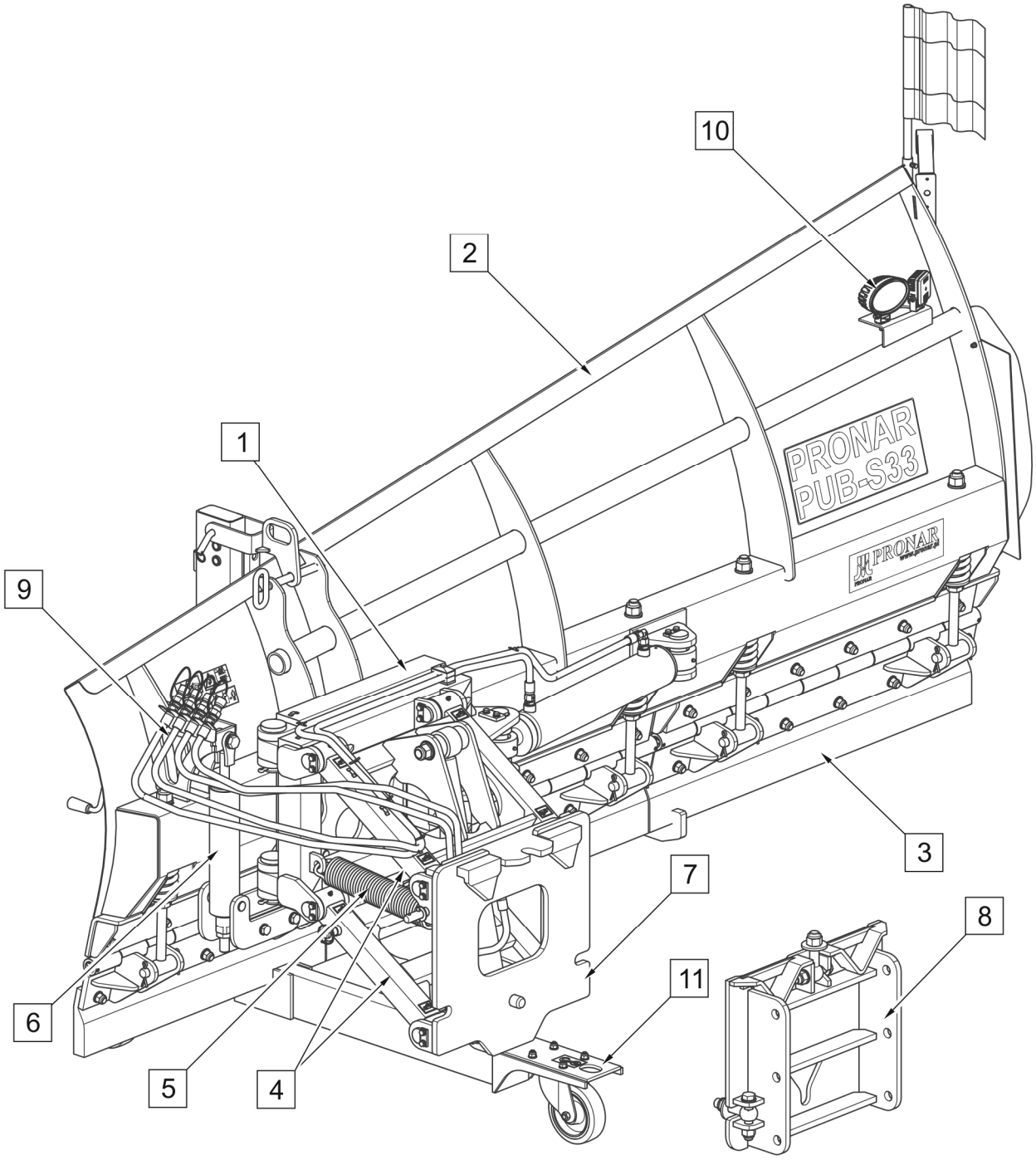


FIG. 3.1 General design

(1) - frame; (2) - mouldboard; (3) - blade; (4) - rocker arms; (5) - spring; (6) - balancer; (7) - suspension system plate; (8) - connection plate; (9) - hydraulic system; (10) - electrical system; (11) - cart

3.3 HYDRAULIC SYSTEM

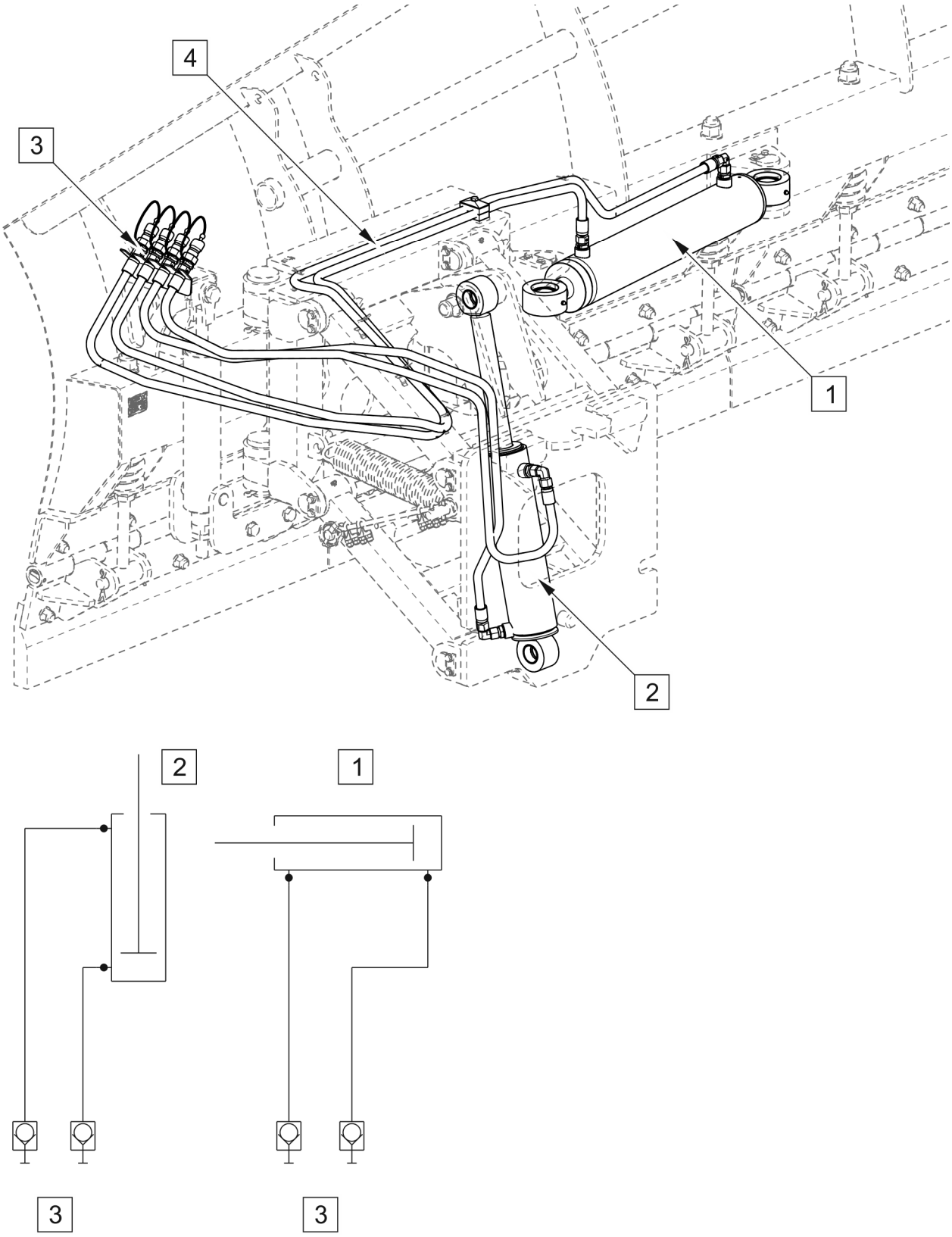


FIG. 3.2 Construction and diagram of the hydraulic system (basic version)

(1) - mouldboard turning cylinder; (2) - mouldboard lifting cylinder; (3) - (3) - hydraulic quick couplers; (4) - lines

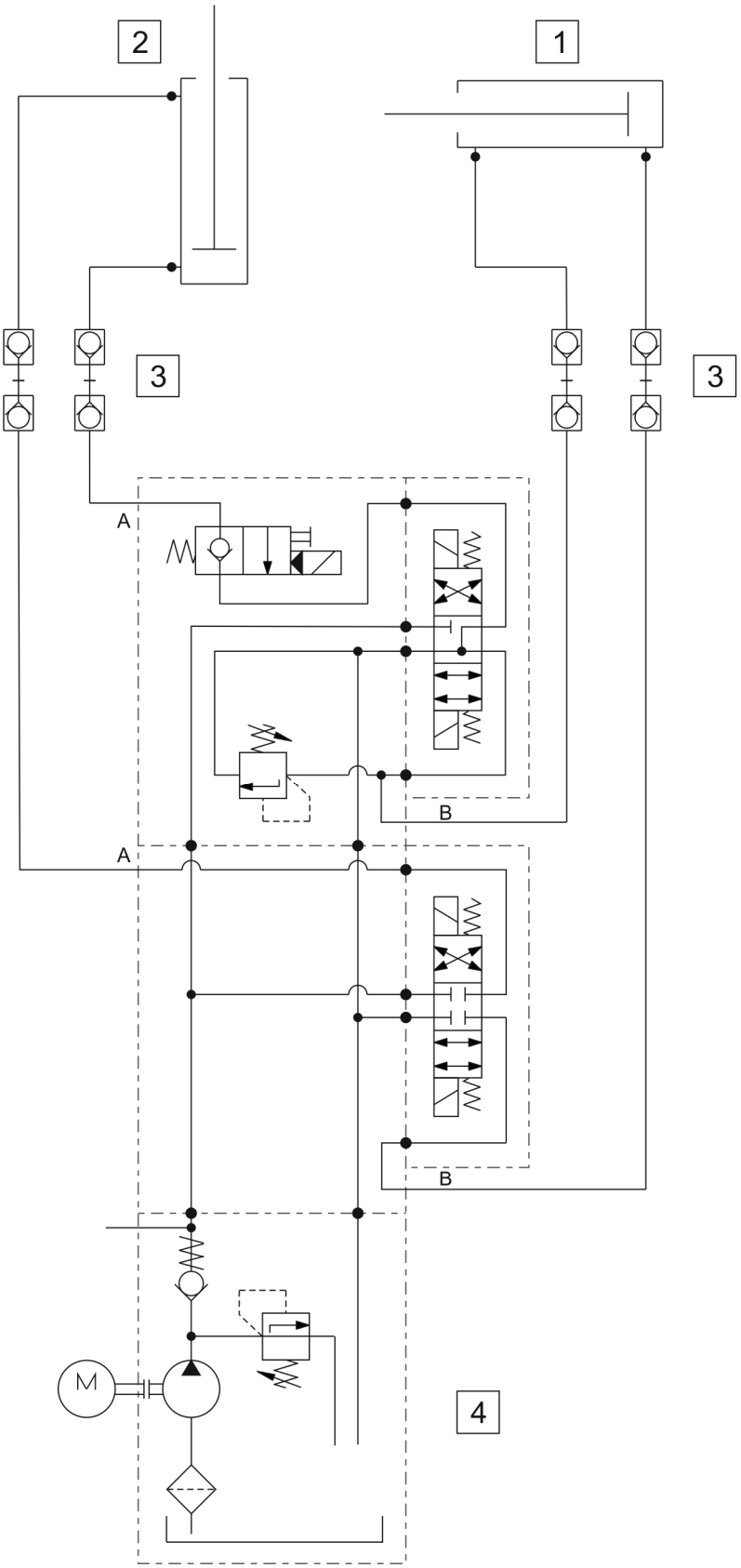


FIG. 3.3 Schematic diagram of the (Power-Pack) hydraulic system - option

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

SECTION

4

CORRECT USE

4.1 GET READY FOR OPERATION

DANGER

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

Careless and incorrect use and operation of the machine, and failure to follow instructions in this Operator Manual is dangerous to your life and health.

The machine must never be used by persons, who are not authorised to drive carrier 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, ensure 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 mounted on the carrier *(or in assemblies for assembly by the dealer)*. Prior to connecting to the carrier vehicle, machine operator must verify the machine technical condition. In order to do this:

- the user must carefully read this Operator Manual and observe all recommendations, understand the design and the principle of machine operation,
- 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,

NOTE

Failure to follow instructions in this Operator Manual or starting the machine incorrectly 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 carrier vehicle, started and all its individual systems checked. In order to do this:

- connect the machine to the carrier vehicle (see 4.3 *HITCHING TO 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.

NOTE

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.

4.2 TECHNICAL INSPECTION

To get the machine ready for use, check components according to guidelines presented in Table 4.1.

TAB. 4.1 TECHNICAL INSPECTION SCHEDULE

DESCRIPTION	MAINTENANCE ACTIVITIES	FREQUENCY
Technical condition of mouldboard and collecting blades	Visually inspect and if necessary replace according to section 5 CHECKING AND REPLACEMENT OF COLLECTING BLADES	Before starting work
Technical condition of the linkage, locking bolts and pins.	Assess 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 (option)	Visually inspect the technical condition, check the operation	
Check if all main nut and bolt connections are properly tightened	Tightening torque should be according to table 5.4 in section 5	Once a week
Lubrication	Lubricate the components according to section "*LUBRICATION*".	According to table 5.3

NOTE

Do NOT use a malfunctioning or incomplete machine.

4.3 HITCHING TO VEHICLE

The snowplough can be hitched to a carrier vehicle that meets the requirements presented in Table 1.1 „REQUIREMENTS FOR CARRIER VEHICLE”.

DANGER

Before hitching the machine to carrier vehicle, read the carrier vehicle Operator Manual.

When hitching, there must be nobody between the machine and the carrier vehicle. Exercise extra caution.

A special attachment plate (FIG. 4.1) is required to connect the machine to the carrier. It is mounted on the right side between the axles of the carrier. The connection plate should be mounted so that the plane of the mounting holes (3) is vertical.

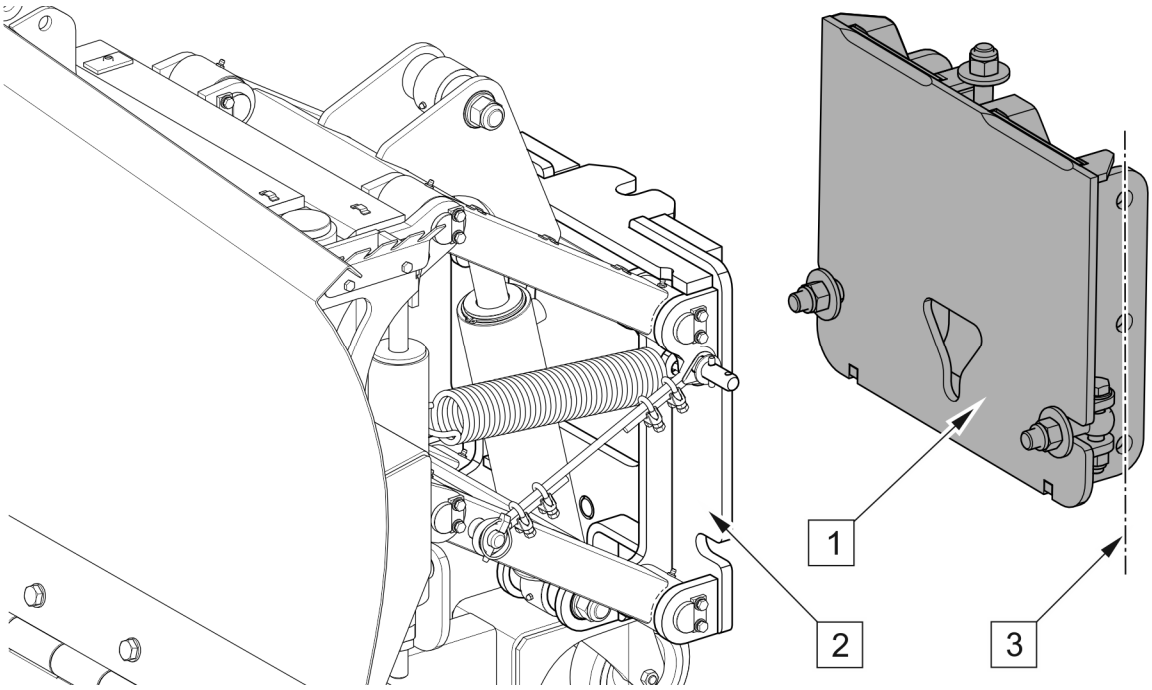


FIG. 4.1 Fixing elements of the linkage

(1) - carrier connection plate ; (2) - plough linkage; (3) - plane of holes for mounting the mounting plate

NOTE

The installation of the subplate and the Power-Pack option on the carrier should be performed only by the Manufacturer or the dealer according to the instructions “Installation of the PUB-S33 plate”

NOTE

Before mounting the machine on the carrier vehicle, check the linkage compatibility. The plough is adapted to be connected to a carrier equipped with a dedicated connection plate (provided with the plough).

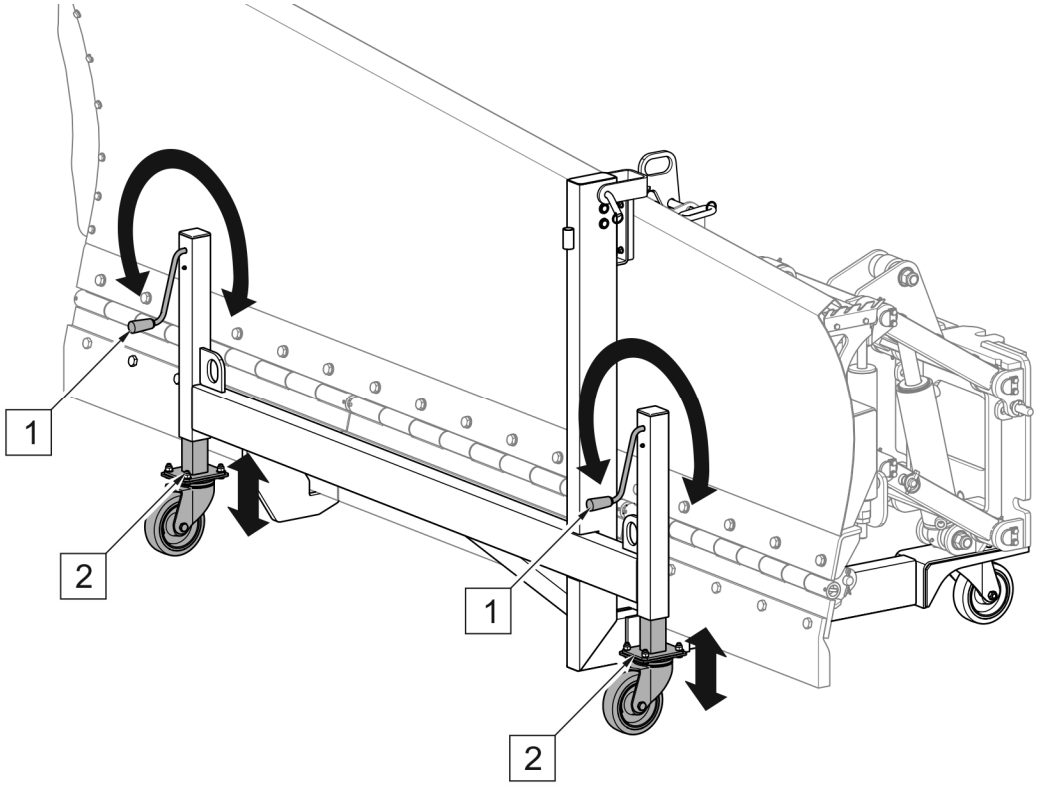


FIG. 4.2 Cart adjustment

(1) - support height adjustment crank; (2) - support with a wheel

The cart (FIG. 4.2) has two height-adjustable supports with wheels (2). When mounting the plough on the carrier vehicle, in order to adjust the inclination of the linkage to the connection plate, use the crank (1) to adjust the height of the appropriate support (2).

DANGER

Reduce pressure in the carrier vehicle's hydraulic system prior to connecting the snow plough's hydraulic system.

NOTE

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

NOTE

Before starting to connect the plough to the carrier vehicle, make sure that the transport lock (B, FIG. 4.3) is disassembled.

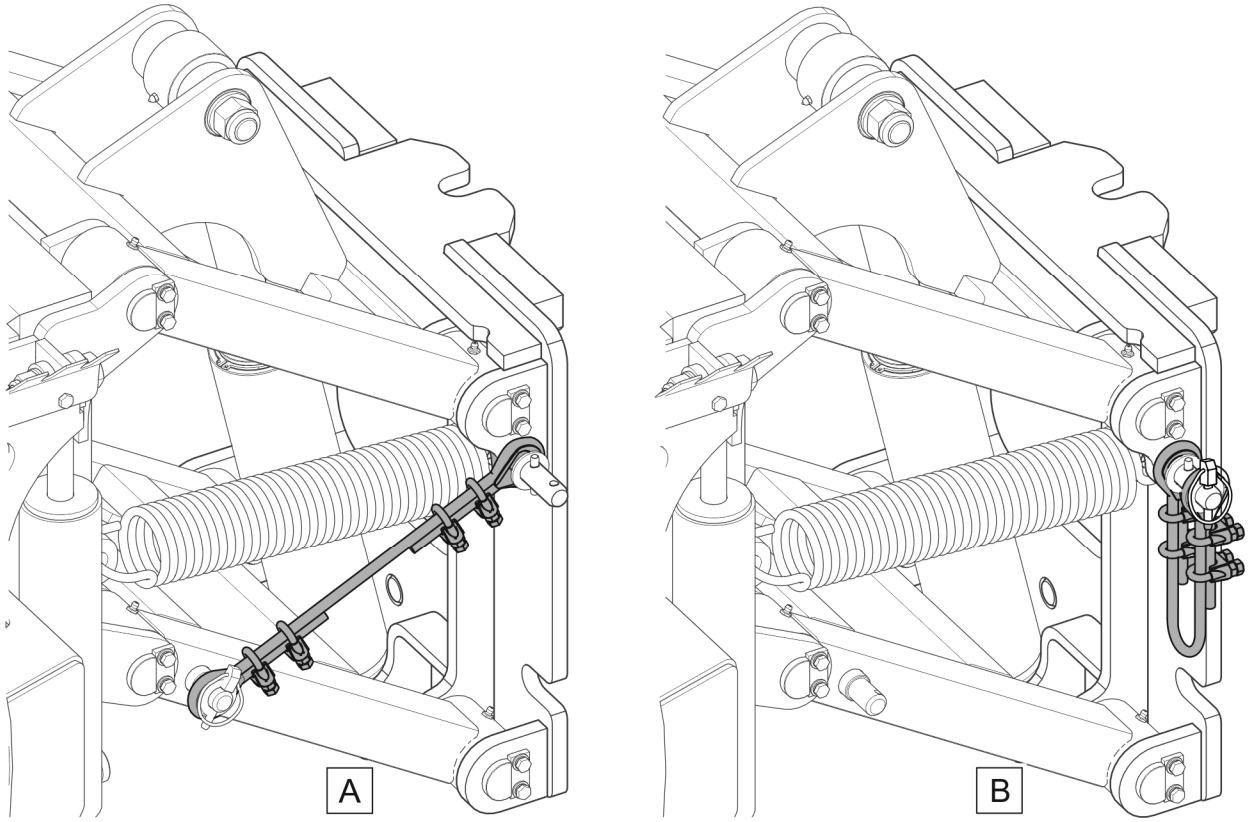


FIG. 4.3 Transport protection

(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”

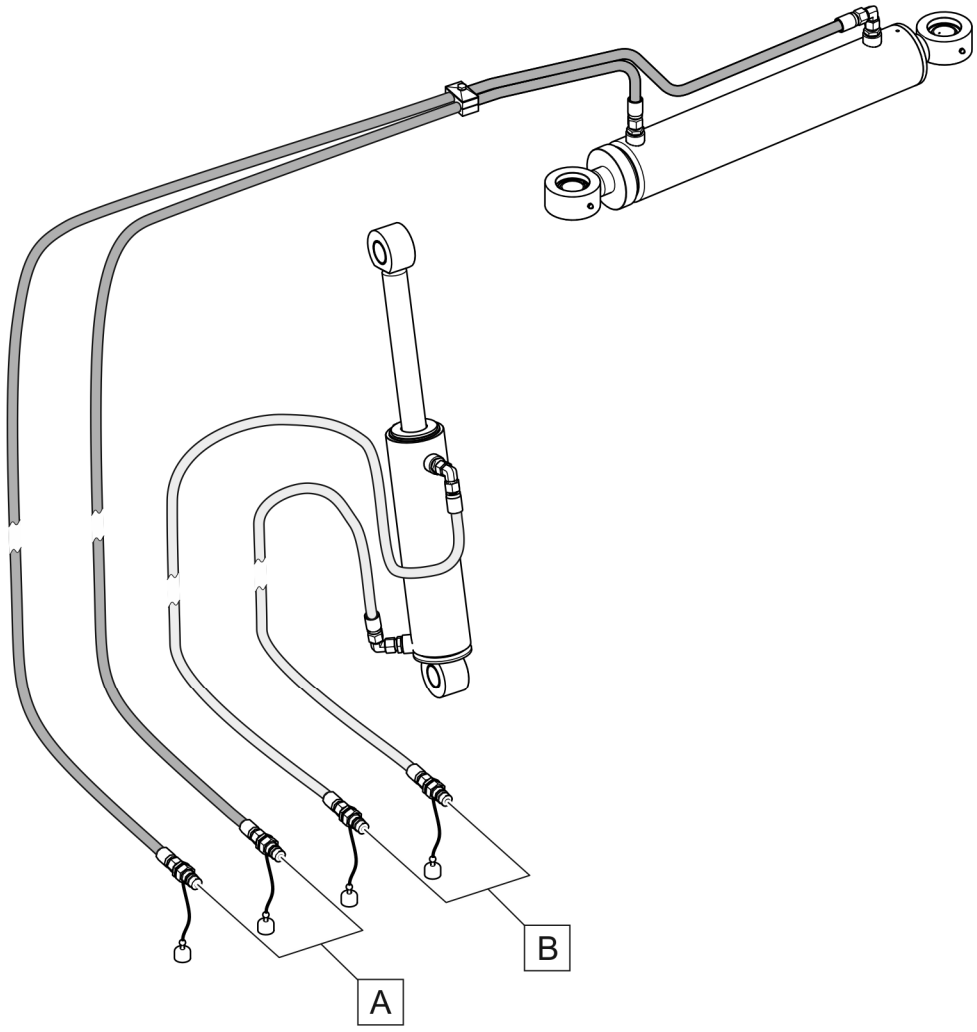


FIG. 4.4 Connect the hydraulic system

(A) - hydraulic couplings for controlling the mouldboard; (B) - hydraulic connectors for lifting / lowering the mouldboard

The plough hydraulic system (FIG. 4.4) is equipped with 2 pairs of quick couplers (size 1/2" ISO7241-1), which connect to two sections of the external hydraulic system of the carrier vehicle. Connectors (A) are responsible for the circuit controlling the mouldboard to the right / left, while the plugs (B) should be connected to the section with a floating position controlling the lifting and lowering of the mouldboard. To facilitate identification of quick couplers protective plugs in various colours are used.

NOTE

For proper operation of the plough, the carrier should be equipped with one section with a floating position,

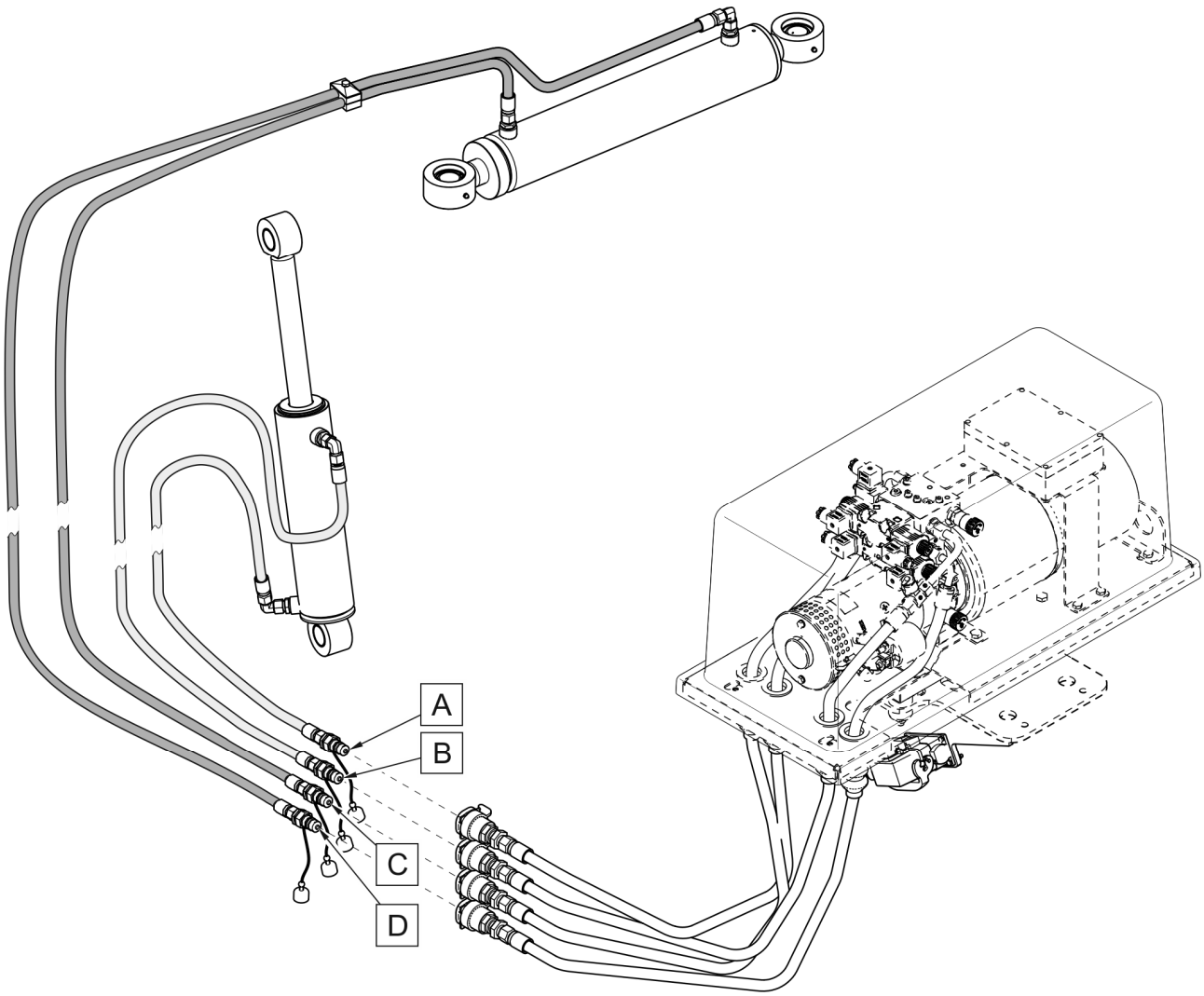


FIG. 4.5 Connect the plough hydraulic system to the Power-Pack

(A) - hydraulic connector for lifting the mouldboard (blue); (B) - hydraulic connector for lowering the mouldboard (red); (C) - hydraulic connector for rotating the mouldboard to the left (black); (D) - hydraulic connector for rotating the mouldboard to the right (yellow)

When connecting the plough to a carrier vehicle equipped with an electro-hydraulic Power-Pack (FIG. 4.5), the hydraulic couplings should be connected to the sockets marked with appropriate colours.

NOTE

Install the machine on the carrier vehicle using the cart provided with the plough.

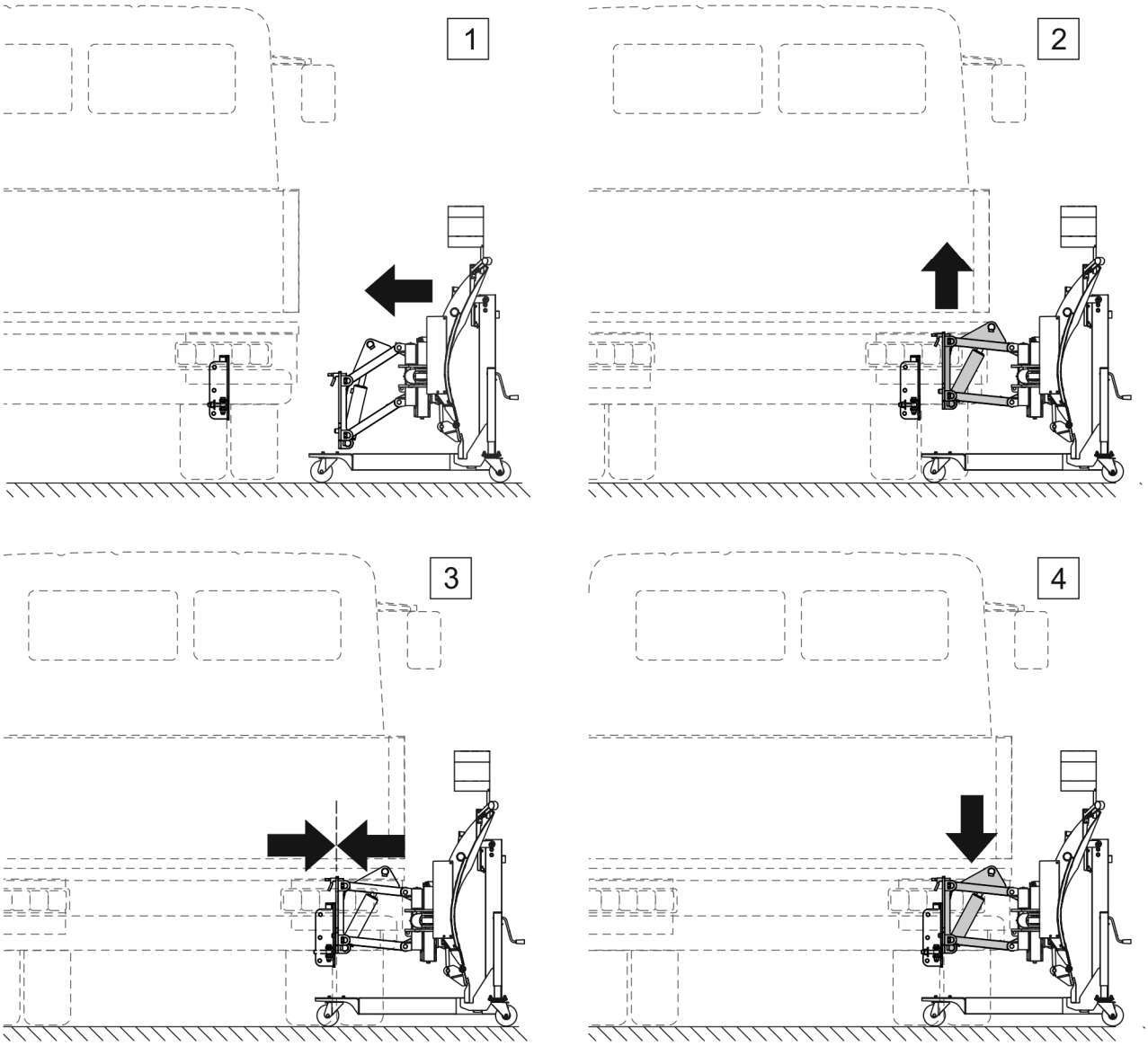


FIG. 4.6 Mount the plough on the carrier vehicle

(1), (2), (3), (4) - successive stages of mounting

Stages of connecting the plough with hydraulic control (FIG. 4.6):

1) Approach the carrier's attachment plate with the plough mounted on the cart. Connect the snowplough's hydraulic system lines to corresponding connectors of the carrier vehicle's external hydraulic system (FIG. 4.4). Connect the electrical system connectors.

2) Using the external hydraulic system of the carrier vehicle, set the snowplough's linkage in such a manner as to position the hooks of the snowplough's linkage plate above the seats of the carrier vehicle's mounting plate.

3) Bring the snowplough on cart close to the carrier vehicle until the snowplough's linkage plate touches the carrier vehicle's mounting plate.

4) If the hooks and the carrier vehicle's mounting plate are correctly aligned, lower the snowplough's linkage by controlling the external hydraulic system of the carrier vehicle until the hooks are set in the seats of the carrier vehicle's mounting plate. Secure the mounting plate and the carrier vehicle's linkage against disconnecting (FIG. 4.8). Disconnect the cart from the plough's mouldboard (FIG. 4.9).

The process of connecting the electrohydraulically controlled plough through the control panel (FIG. 4.6):

1) Approach the carrier's attachment plate with the plough mounted on the cart. Connect the plough hydraulic system lines to the appropriate connectors of the Power-Pack electro-hydraulic power unit in the carrier vehicle (FIG. 4.5). Connect the Power-Pack to the vehicle battery. Connect the electric harness to the control panel and to the socket on the Power-Pack. Start the control panel using switch (1) and activate the linking function using button (2) (FIG. 4.7) – yellow indicator light (3) located next to the button will light up.
2) Using the joystick (4) on the control panel (FIG. 4.7), raise the snowplough linkage in such a manner as to position the hooks of the snowplough linkage plate above the seats of the carrier vehicle' mounting plate.
3) Bring the plough on the cart until it touches the carrier's mounting plate.
4) If the hooks and the carrier vehicle's mounting plate are correctly aligned, lower the snowplough's linkage using joystick until the hooks are set in the seats of the carrier vehicle's mounting plate. Deactivate "linking" function using button (2) (FIG. 4.7) – yellow indicator light (3) located next to the button will go out. Secure the mounting plate and the snowplough linkage against disconnecting (FIG. 4.8). Disconnect the cart from the plough's mouldboard (FIG. 4.9).

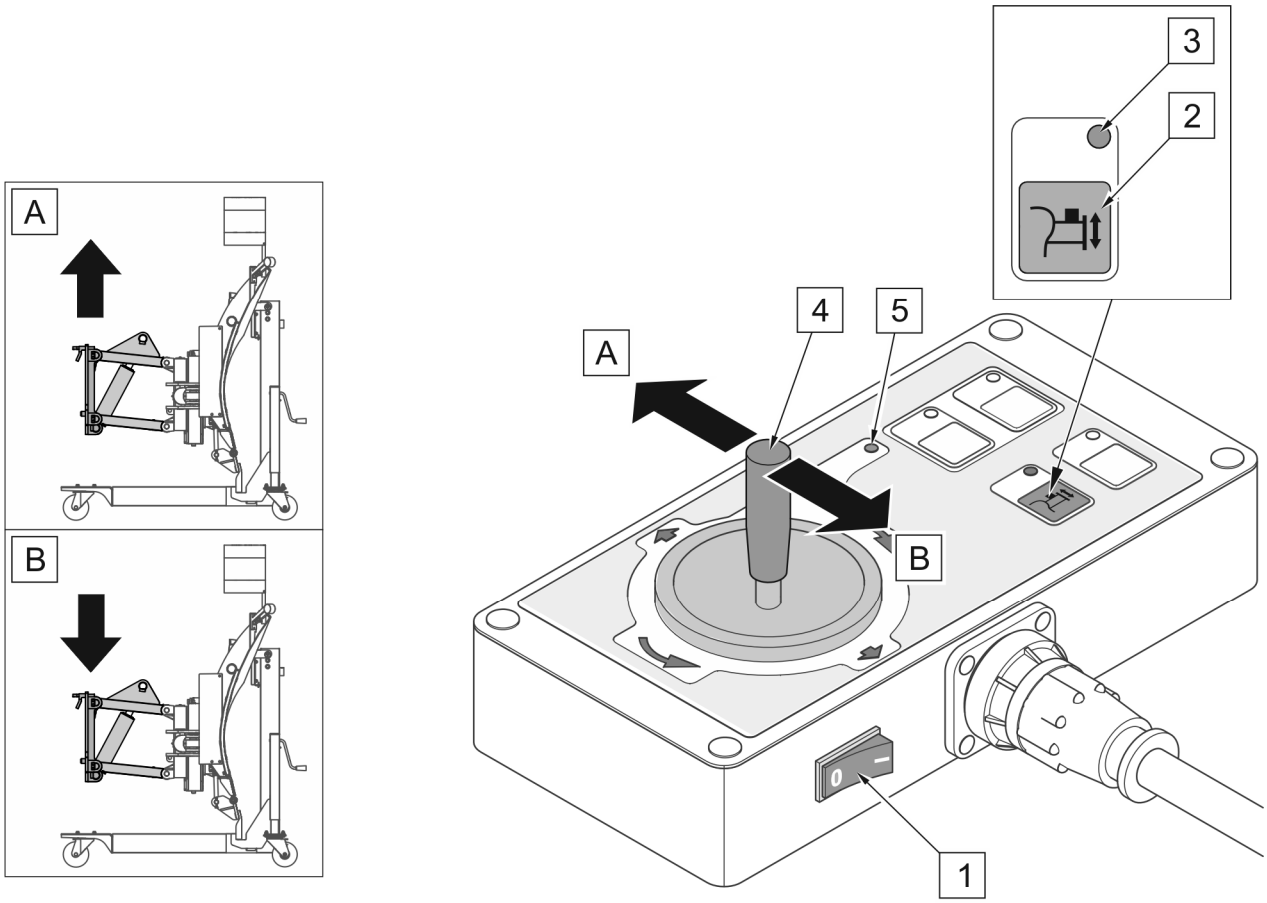


FIG. 4.7 Aggregation (applies to the plough with Power-Pack**)**

(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 raising; (B) - linkage lowering

Linking function is used during mounting and disconnecting the snowplough from the carrier vehicle. Linking function is activated using switch (2) on the control panel (FIG. 4.7). 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 (FIG. 4.7) causes deactivation of the floating function (FIG. 4.15) (if it was activated before).

DANGER

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

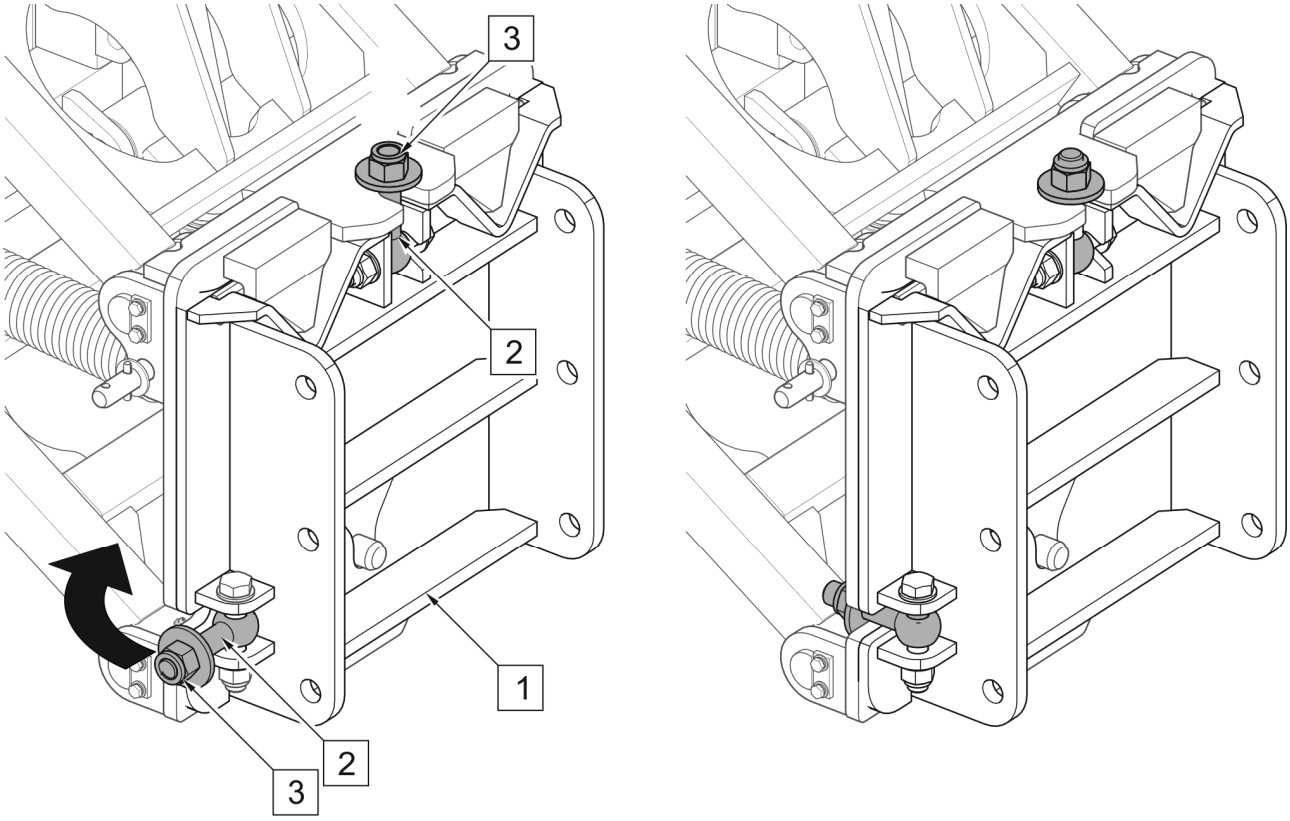


FIG. 4.8 Protection of the linkage plate

(1) - connection plate in the carrier; (2) - eyebolt; (3) - nut

After mounting the machine on the carrier vehicle (FIG. 4.8), put the eyebolts (2) of the carrier vehicle's mounting plate on the plough linkage mounting plate and secure with nuts (3).

TIP

Tighten the lock bolt nuts (FIG. 4.8) to 500 Nm.

After suspending and securing the machine on a carrier vehicle, disconnect it from the cart (FIG. 4.9) as follows:

- by means of adjustable cart supports loosen the connection of the cart with the mouldboard,
- remove the pin (2),
- remove the pin (1) from the hitch (3),
- place the bolt (1) in the sleeve (4) on the cart frame,
- raise the plough mouldboard,

- drive away the cart.

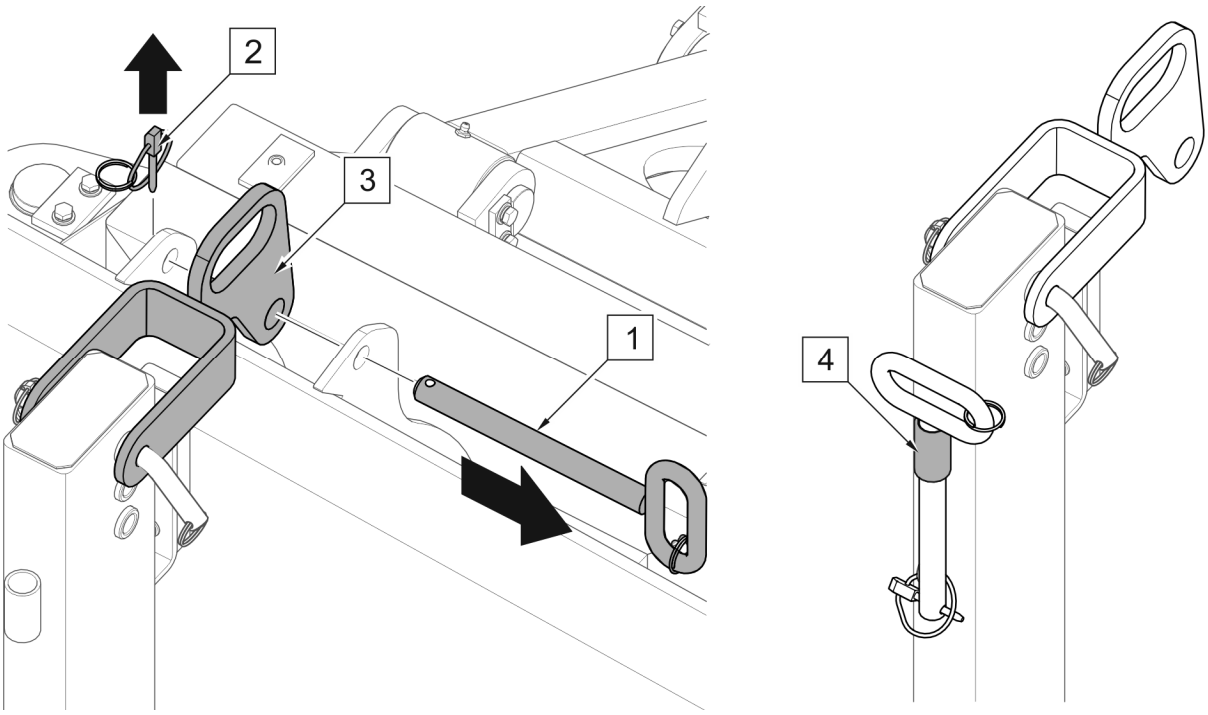


FIG. 4.9 Disconnect the cart from the plough's mouldboard.

(1) - bolt; (2) - linchpin; (3) - catch; (4) - sleeve

4.4 SNOW PLOUGH OPERATION

4.4.1 REMOVE THE TRANSPORT LOCK

If the snowplough linkage system has been locked in upper transport position, release the transport protection just before lowering the linkage (FIG. 4.10) in the following manner:

- raise the snowplough mounted on the carrier vehicle to the extreme upper position and immobilise the vehicle with parking brake,
- take out securing cotter pin (2) and remove washer (3),
- remove the end of the cable (1) from the rocker arm pin and put in on the suspension frame pin,
- secure the cable again with washer (3) and cotter pin (2)

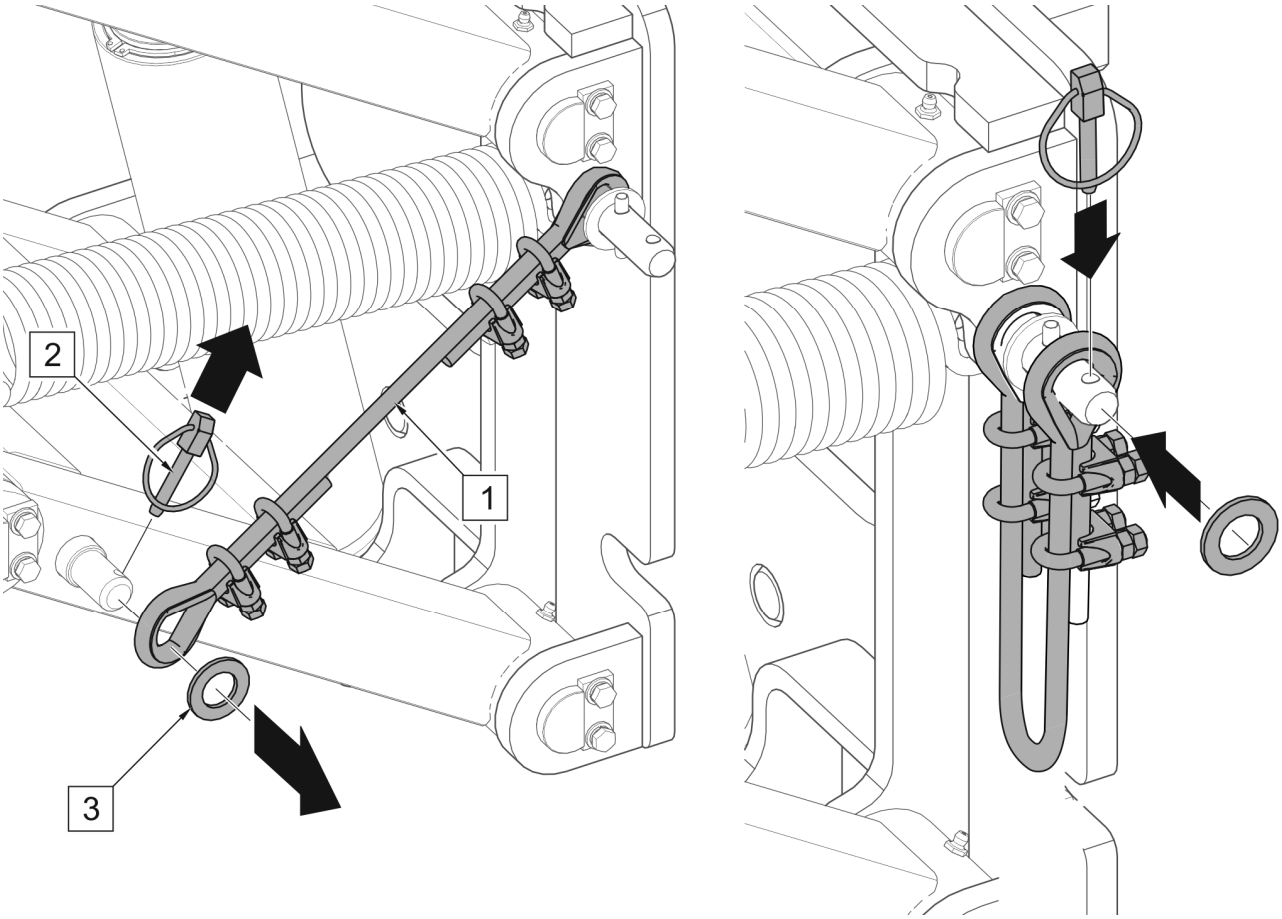


FIG. 4.10 Remove the transport lock

(1) - securing cable; (2) - linchpin; (3) - washer

4.4.2 ADJUSTING THE SNOW PLOUGH WORKING POSITIONS

DANGER

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

The snowplough's mouldboard can be raised, lowered and turned to the left within the range of 0°±45°. Depending on the type of the carrier vehicle's hydraulic system, the snowplough can be controlled by the external hydraulic system or Power-Pack electro-hydraulic power supply.

In the snowplough controlled by the carrier vehicle's external hydraulic system, the working position can be changed by corresponding hydraulic section of the carrier vehicle.

In carriers equipped with an electro-hydraulic Power-Pack, the working position is changed using the control panel (FIG. 4.11)

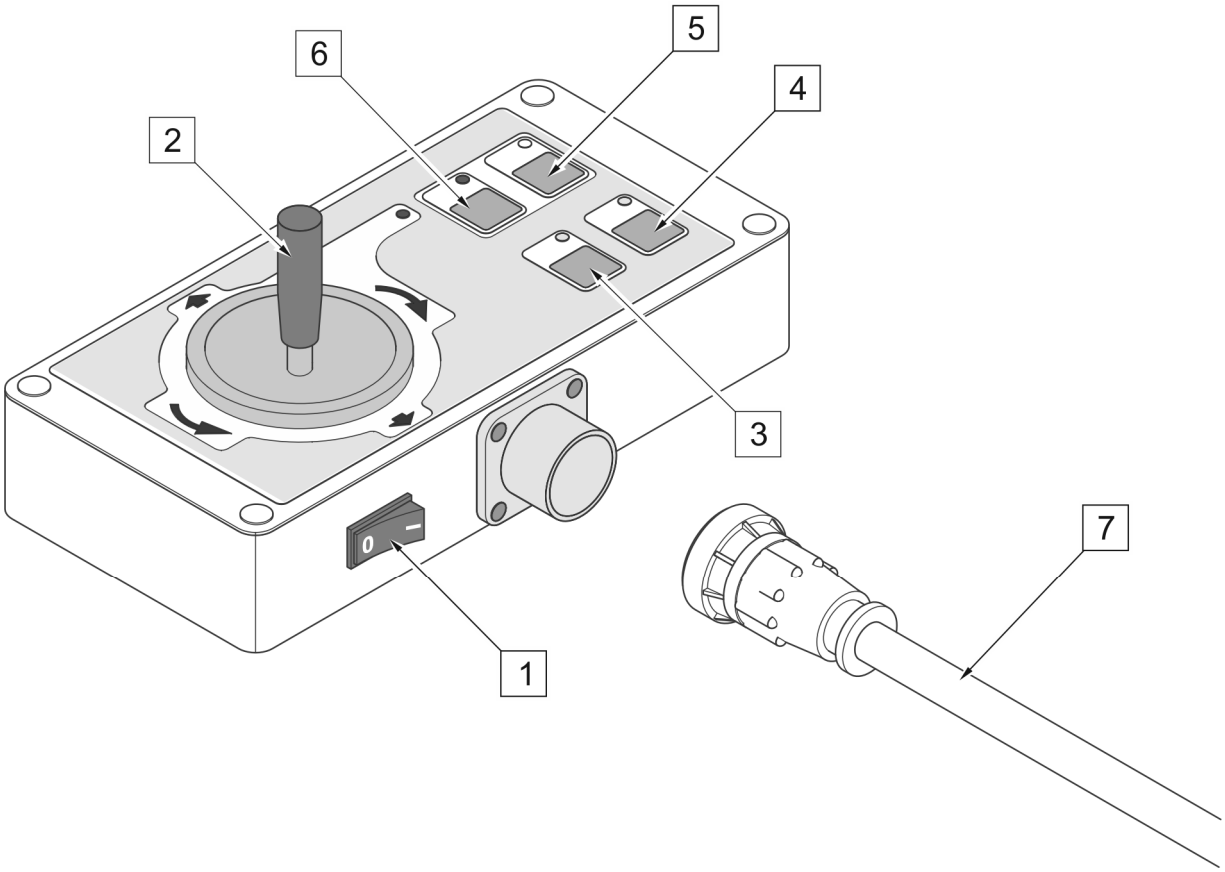


FIG. 4.11 **Control panel** (applies to the plough with Power-Pack)

(1) - main switch ; (2) - joystick; (3) - linking function switch; (4) - floating position switch; (5) - lighting switch; (6) - switch not used; (7) - connection line

Control panel (FIG. 4.11) is protected against accidental use by the main switch (1). When the switch (1) is ON, the clearance light on the snowplough mouldboard and the complete control panel are ON.

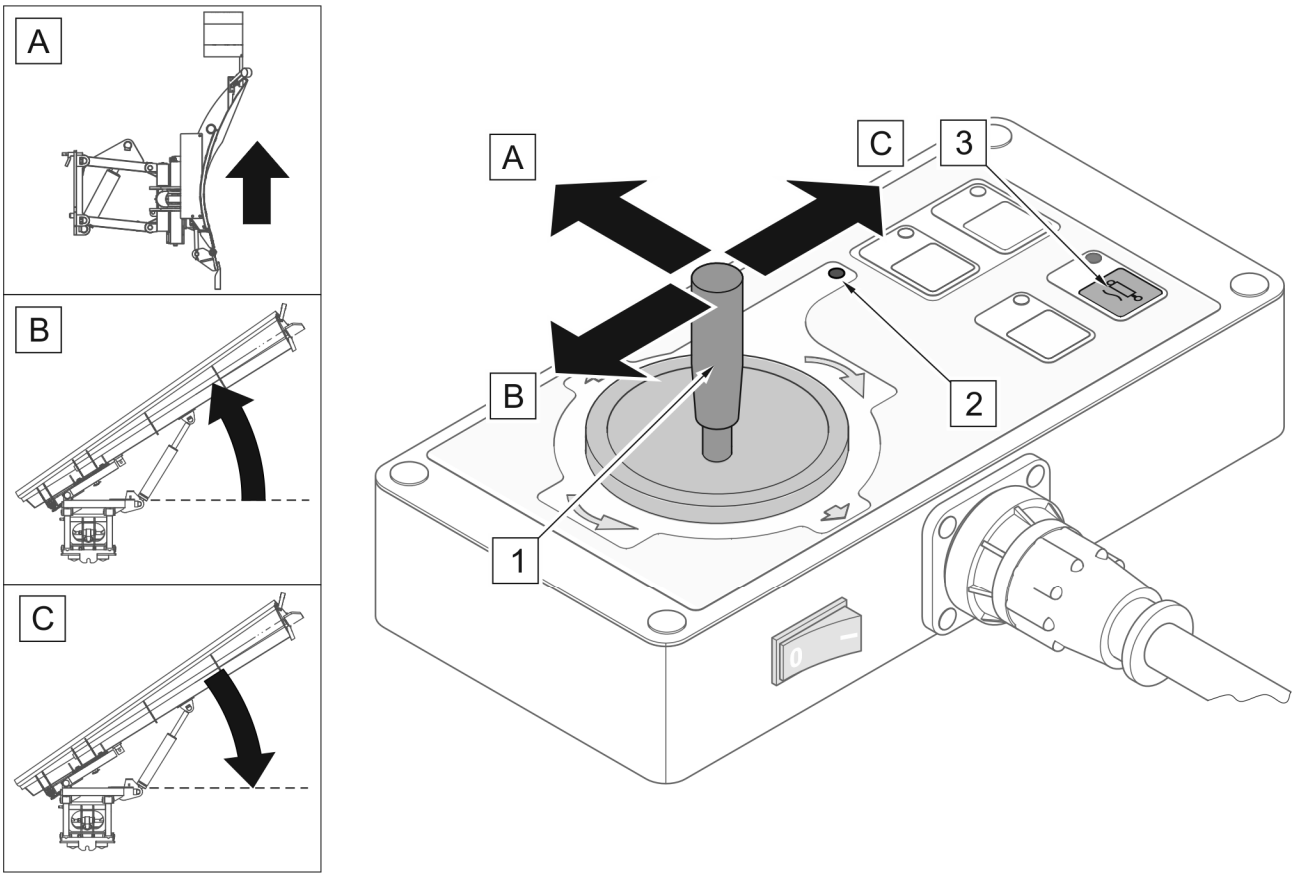


FIG. 4.12 Mouldboard control (applies to the plough with Power-Pack)
(A) - raise the mouldboard; (B) - unfold the mouldboard to the left; (C) - fold the mouldboard to the right; (1) - joystick; (2) - Power-Pack ON indicator light (3) - floating function switch

The snowplough's mouldboard is controlled using joystick. Individual functions of joystick (1) are shown in (FIG. 4.12). 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).

To enable the plough's mouldboard to be controlled, the control panel must be active (main switch set to "I" position - on).

IMPORTANT

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

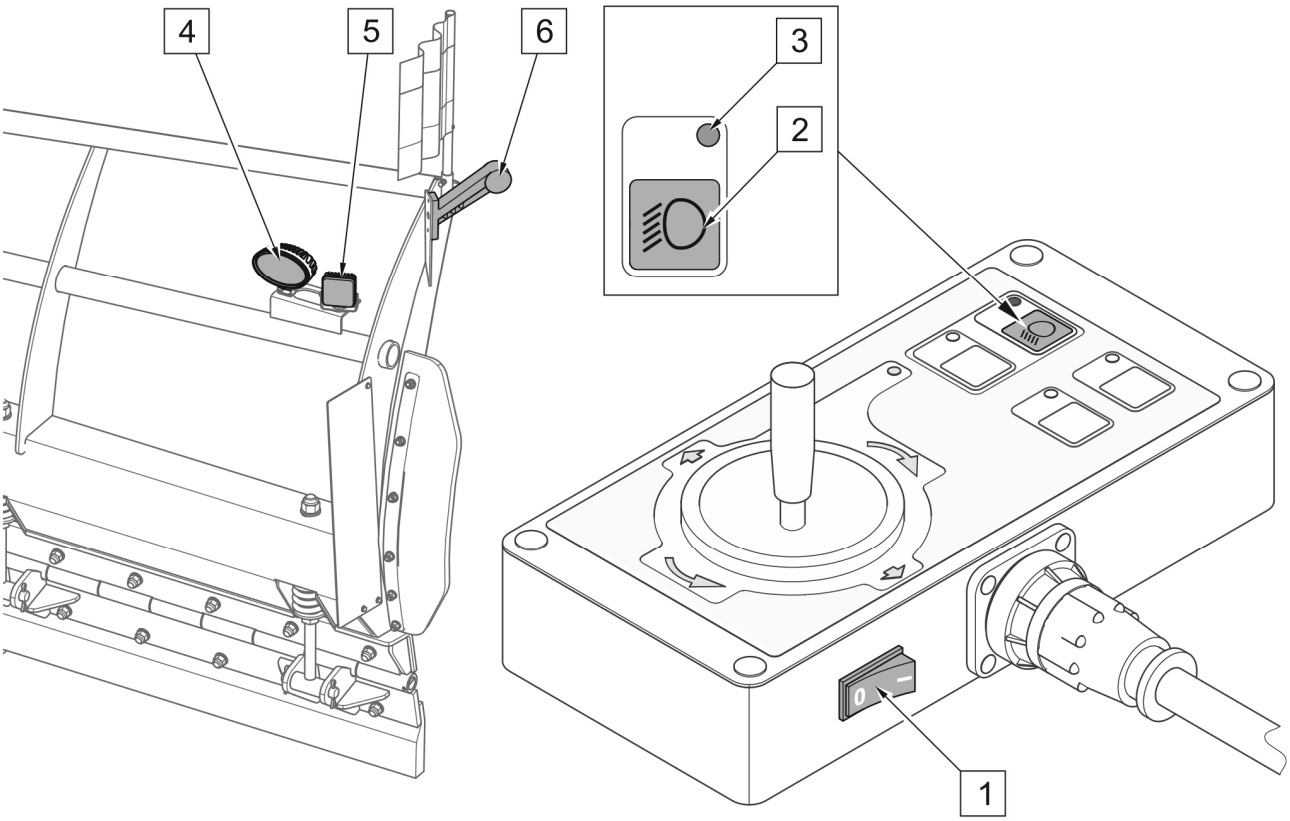


FIG. 4.13 Switch on the lighting (applies to the plough with Power-Pack)
(1) - main panel and clearance lighting switch ; (2) - beacon and work lamp switch; (3) - lighting indicator lamp; (4) - work lamp; (5) - beacon lamp (yellow); (6) - clearance lamp

The snow plough is equipped with clearance lighting, warning beacon and a work lamp (FIG. 4.13). In the plough with Power-Pack supply, the mouldboard marker lamp (6) is switched on when the control panel is activated using the main switch (1). The switch (2) is used to turn the beacon (6) and work light (4) on and off. Activation of the lights with switch (2) is indicated by green light (3). When the switch (2) is pressed again, the beacon and work lamp will be turned off and the lamp (3) will go out.

To turn on the lighting, the control panel must be active (main switch set to "I" - on).

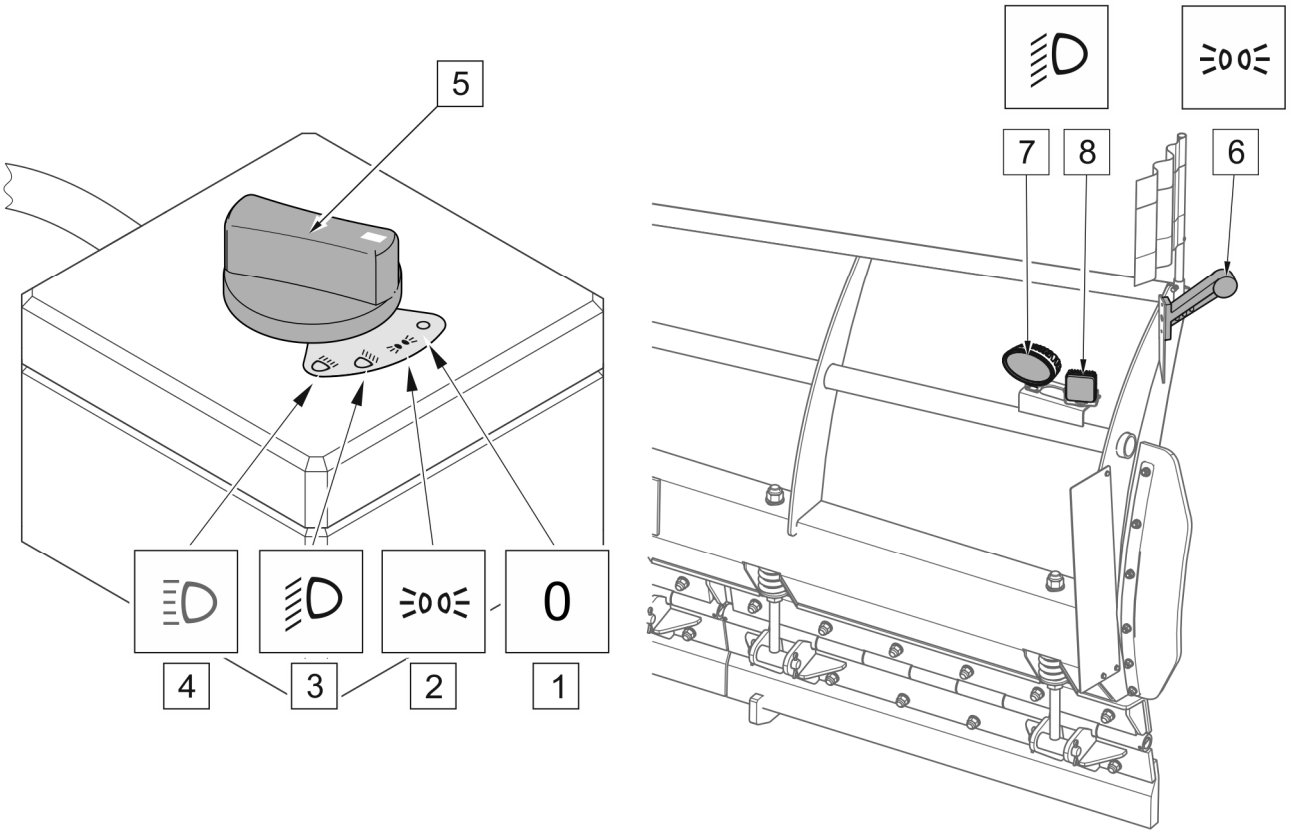


FIG. 4.14 Switch on the plough lighting (basic version**)**

(1) - lighting turned off; (2) - clearance light is on; (3) - working light, beacon warning light and clearance lights are on; (4) - function not used; (5) - lighting switch; (6) - clearance lamp; (7) - work lamp; (8) - beacon (yellow)

In the snowplough controlled by the external hydraulics (FIG. 4.14) of the carrier vehicle, the lighting is turned on using the switch (5). Turn the switch to position (2) to switch on the clearance lights (6). The beacon (8) and work light (7) are activated simultaneously when the switch (5) is moved to position (3).

TIP

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

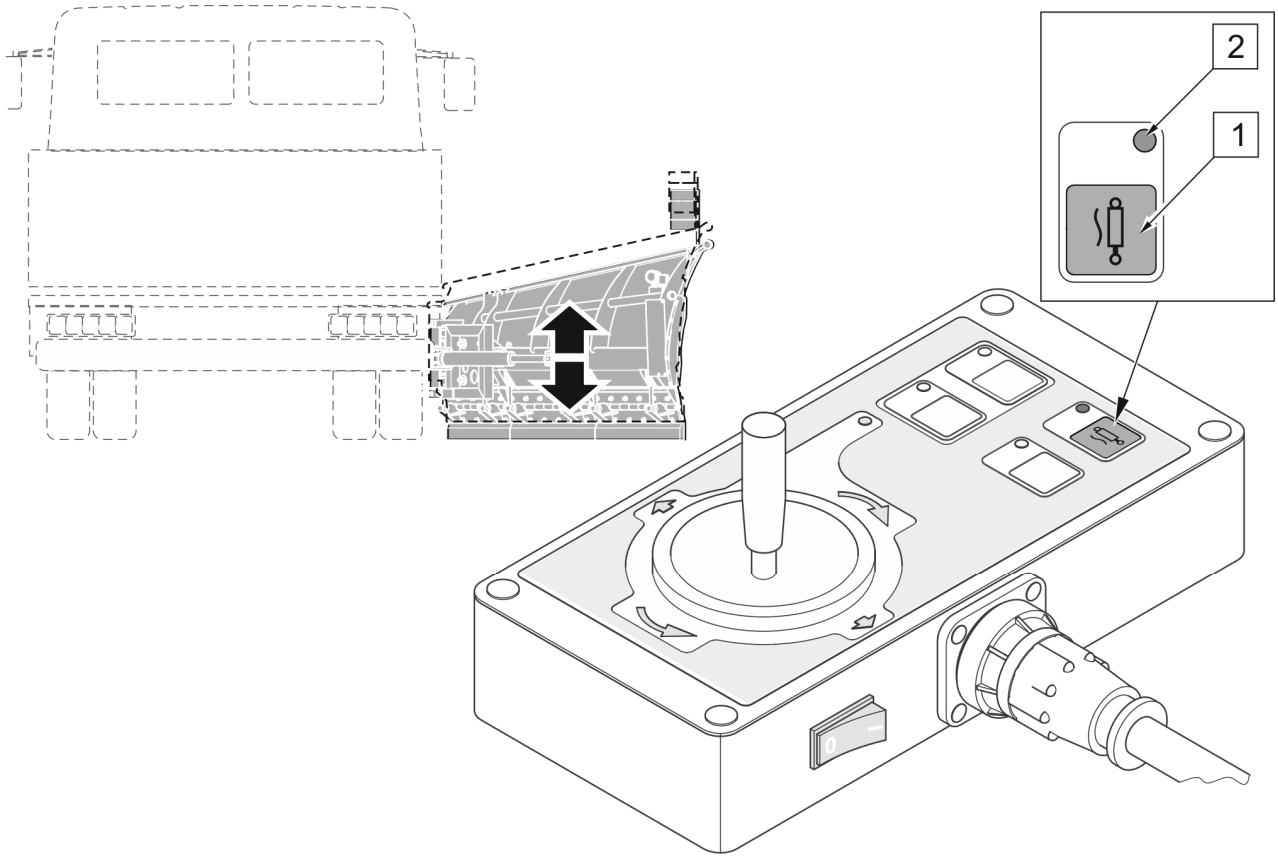


FIG. 4.15 Floating function (applies to the plough with Power-Pack)
(1) - floating function switch; (2) - floating function indicator light

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

The floating function (FIG. 4.15) is switched on with button (1). Activation of the floating function is signalled by yellow indicator light (2). When button (1) is pressed again, the floating function will be switched off and the indicator light (2) will go out.

IMPORTANT

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

4.5 DRIVING ON PUBLIC ROADS

When driving on public roads, respect the road traffic regulations, exercise caution and prudence. Pay special attention to bystanders who may be in the vicinity of 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 carrier vehicle. Ensure that the driver has sufficient visibility.
- Make sure that the machine is correctly attached to the carrier vehicle, and linkage is properly secured.
- Do not exceed the design speed and maximum speed allowed by road traffic regulations. Ground speed 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 carrier vehicle 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 snowplough raised reduce speed due to dynamic loads and the risk of damaging the machine or carrier vehicle.
- When driving with raised snowplough, the mouldboard should be folded and the linkage system should be locked with transport protection (FIG. 4.16).

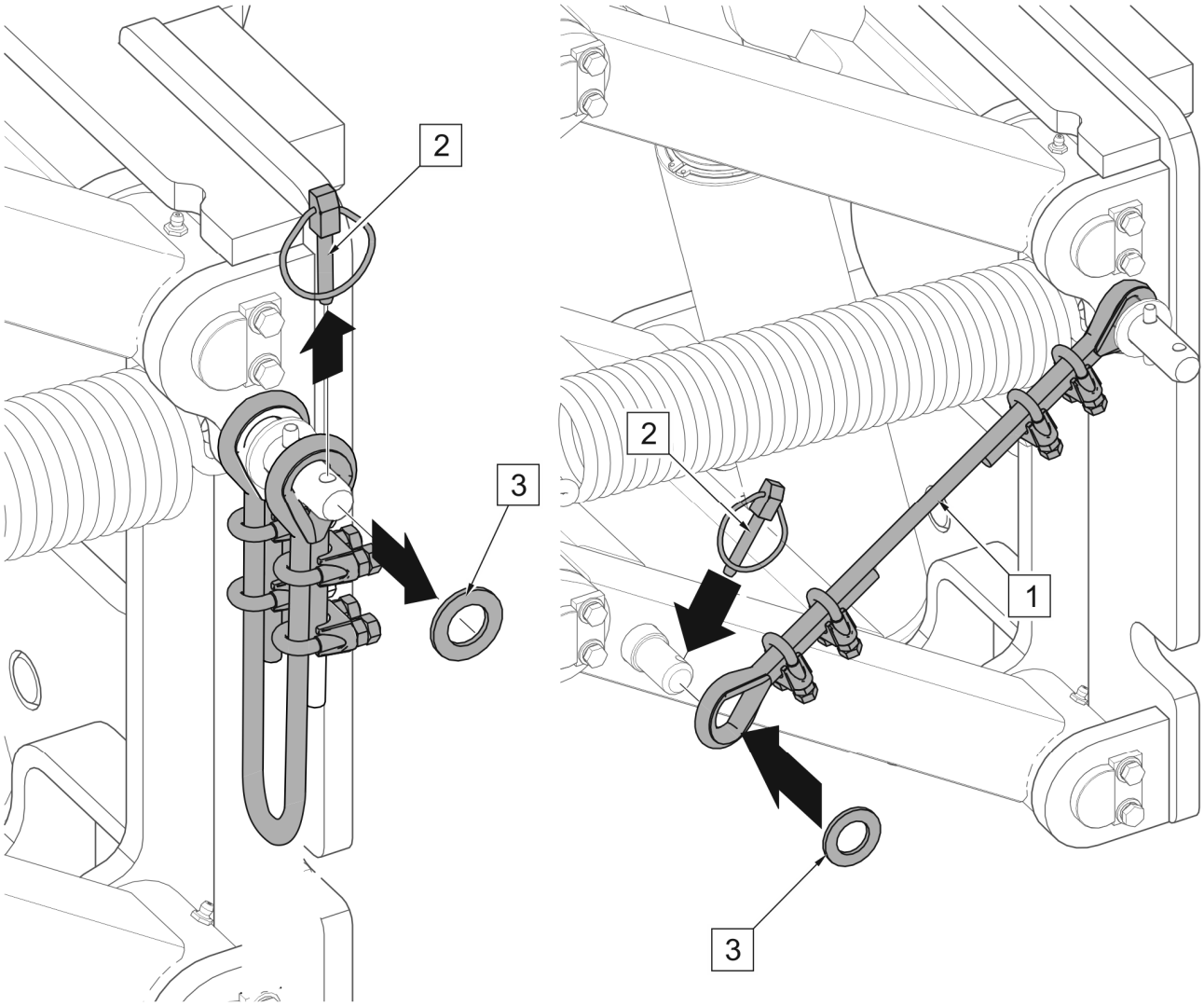


FIG. 4.16 Installing transport lock

(1) - securing cable; (2) - linchpin; (3) - washer

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

- raise the mouldboard to the upper extreme position, immobilize the vehicle with the parking brake,
- remove the linchpin (2) and remove the washer (3),
- remove the end of the cable (1) from the pin on the frame and attach it to the pin of the rocker arm
- secure the cable with the washer (3) and the linchpin (2)

4.6 UNHITCHING THE MACHINE FROM CARRIER VEHICLE

DANGER

Reduce pressure prior to disconnecting the hydraulic system.

IMPORTANT

Disconnect the machine from the carrier vehicle on horizontal, even and hard surface using the cart provided with the plough

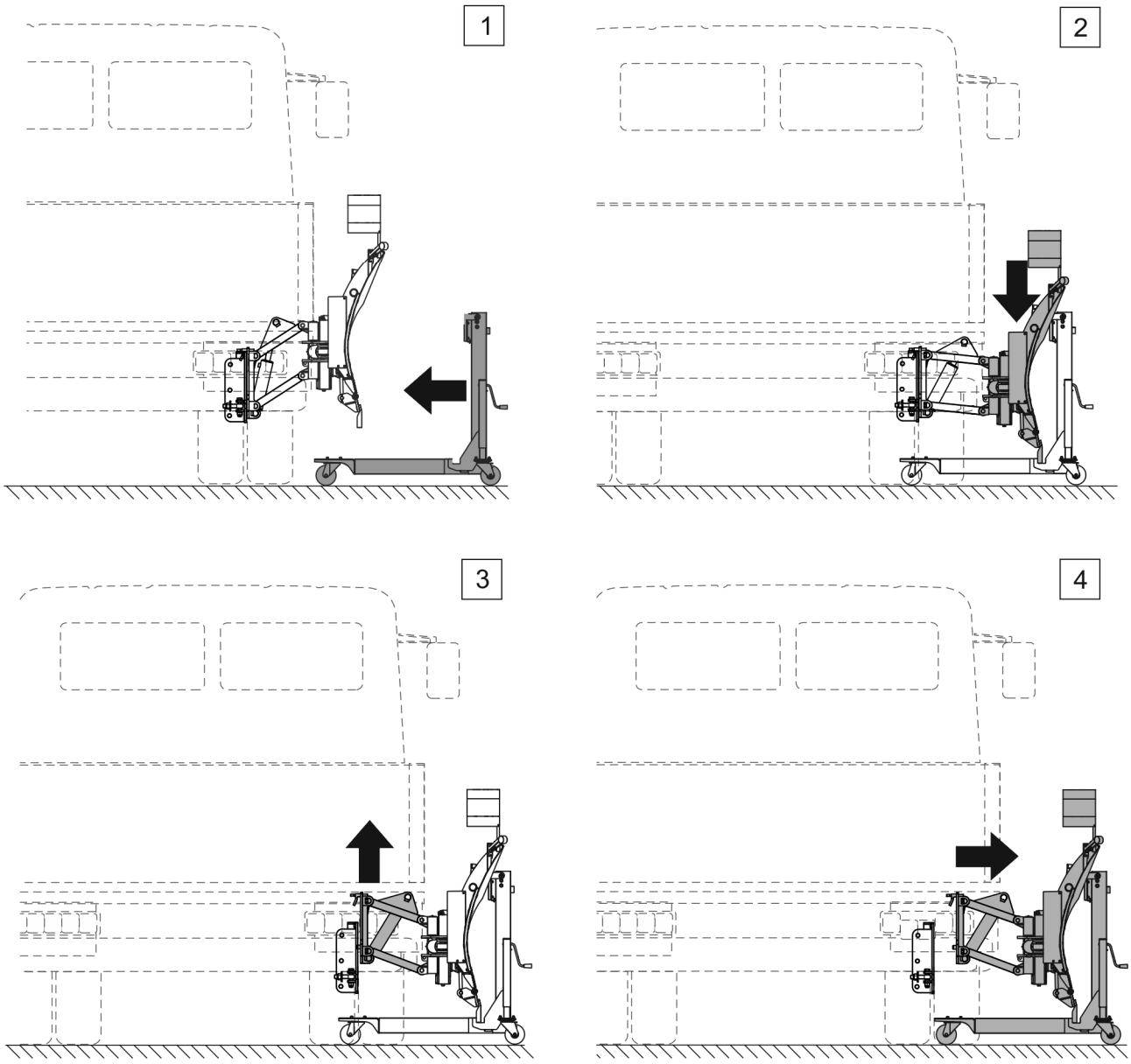


FIG. 4.17 Disconnecting the plough from the carrier vehicle

(1, 2, 3, 4,) - stages of disconnecting the plough

Stages of disconnecting the hydraulically controlled plough (FIG. 4.17):

1) Place the cart (provided) properly under the lifted plough
2) Using the external hydraulic system of the carrier vehicle, carefully lower the snowplough until it fully rests on the cart. Connect the cart with the plough's mouldboard (FIG. 4.18). Disconnect the plough linkage plate from the carrier vehicle's connection plate (FIG. 4.19).
3) Using the external hydraulic system of the carrier vehicle, raise the snowplough's linkage in such a manner as to position the hooks of the snowplough's linkage plate above the seats of the carrier vehicle's mounting plate.
4) Drive the cart away from the carrier vehicle for a distance of about 30 cm, immobilize the cart with the brake in support wheels. Lower the snowplough linkage frame to the lower position. Disconnect hydraulic line plugs and electric lead from the carrier vehicle. Secure hydraulic line plugs with stoppers and place them in bracket on the machine frame (FIG. 4.20).

The process of disconnecting the electrohydraulically controlled plough through the control panel (FIG. 4.17):

1) Place the cart (provided) properly under the lifted plough
2) Using the joystick on the control panel, carefully lower the plough until the plough blade is completely resting on the cart. Connect the cart with the plough's mouldboard (FIG. 4.18). Disconnect the plough linkage plate from the carrier vehicle's connection plate (FIG. 4.19).
3) Switch on the linking function on the control panel (FIG. 4.7). 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 carrier vehicle' mounting plate.
4) Drive the cart away from the carrier vehicle for a distance of about 30 cm, immobilize the cart with the brake in support wheels. Lower the snowplough linkage frame to the lower position. Disconnect hydraulic line plugs and electric lead from the carrier vehicle. Secure hydraulic line plugs with stoppers and place them in bracket on the machine frame (FIG. 4.20).

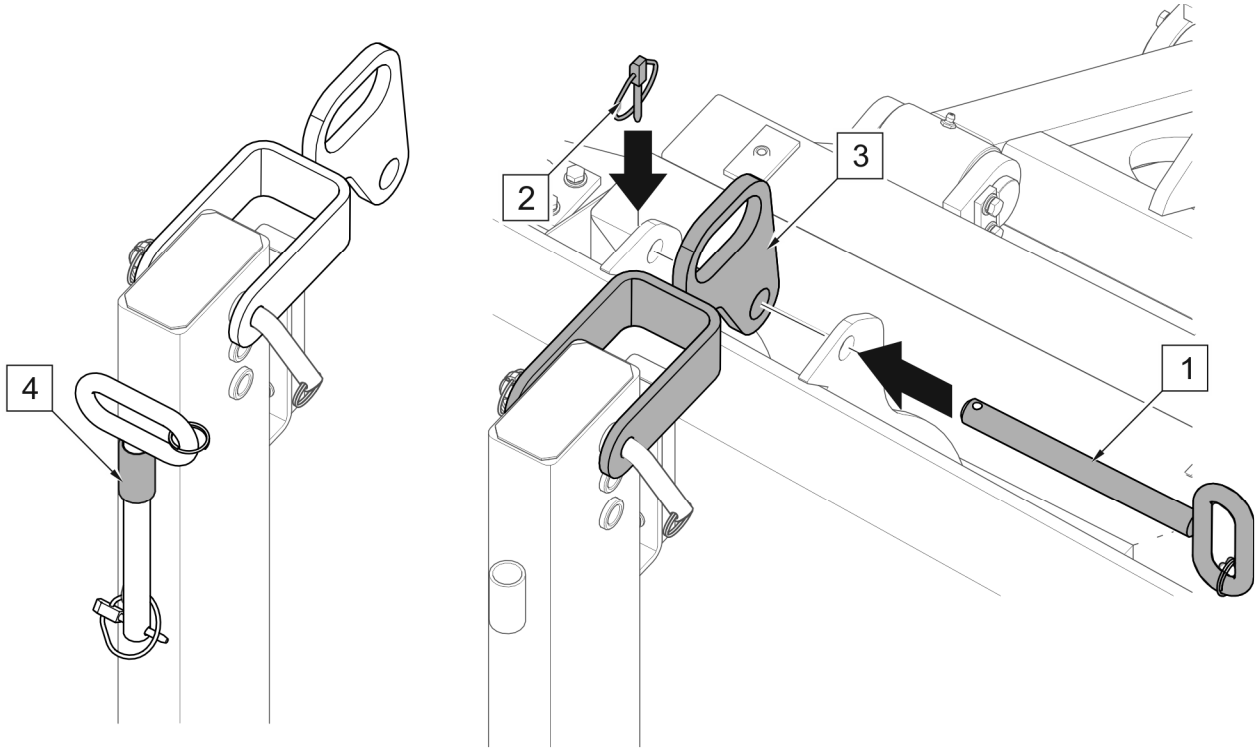


FIG. 4.18 Connect the cart with the plough's mouldboard

(1) - bolt; (2) - linchpin; (3) - catch; (4) - sleeve

After lowering the plough onto the cart (FIG. 4.18), connect the plough mouldboard with the cart's hitch as follows:

- using cart adjustable supports set mouldboard holes align with the hitch (3)
- remove the pin from the sleeve (4) on the cart frame,
- Using bolt (1) connect the hitch (3) to the plough's mouldboard,
- secure the bolt (1) with the linchpin (2).

NOTE

After disconnecting from the carrier vehicle, the plough should be stored on a cart which is an accessory of the machine.

In order to disconnect the plough linkage from the carrier vehicle's mounting plate (FIG. 4.19), loosen the nuts (3) and remove the eyebolts (2) (3 items) from the plough linkage plate.

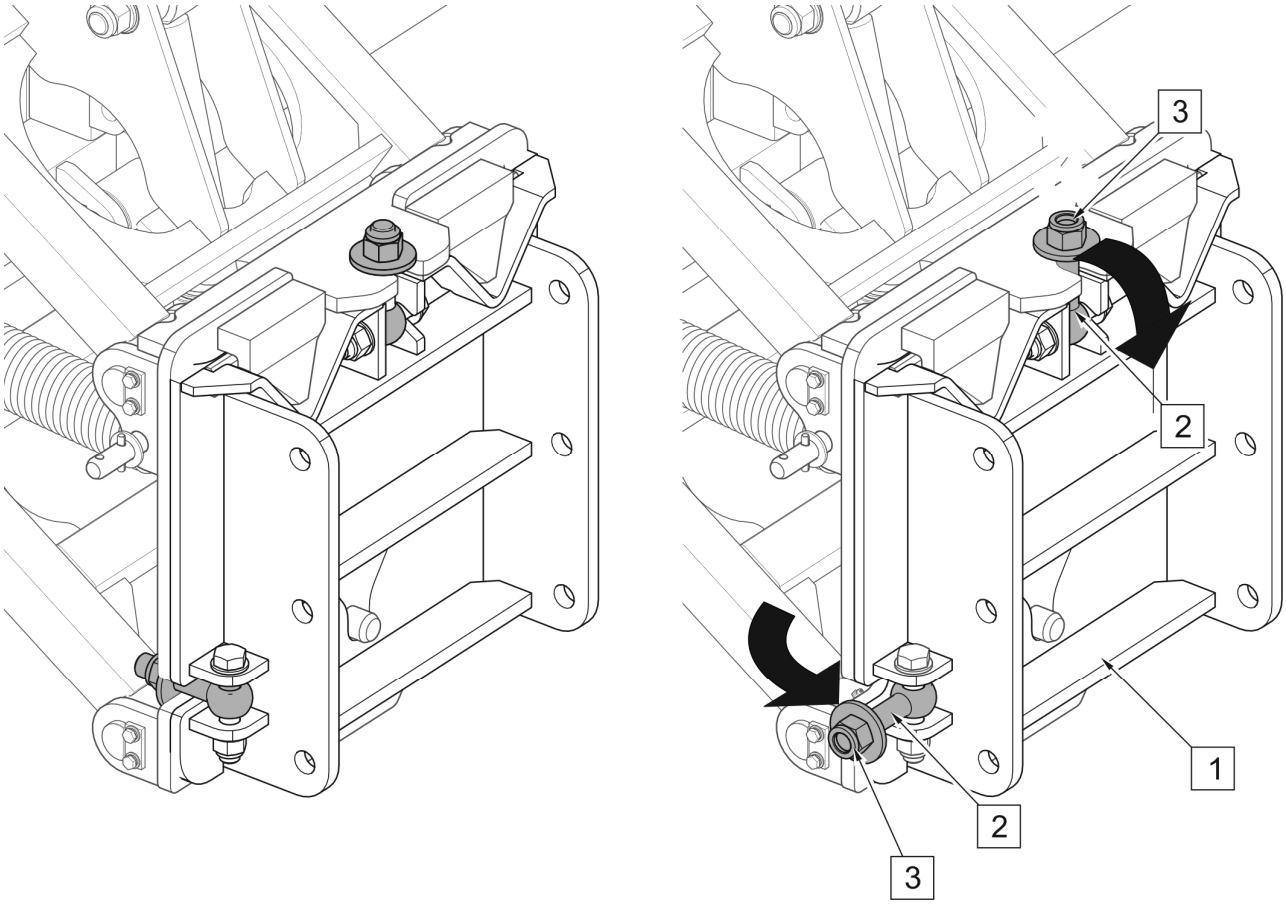


FIG. 4.19 Dismounting the linkage plate protection

(1) - connection plate in the carrier; (2) - eyebolt; (3) - nut

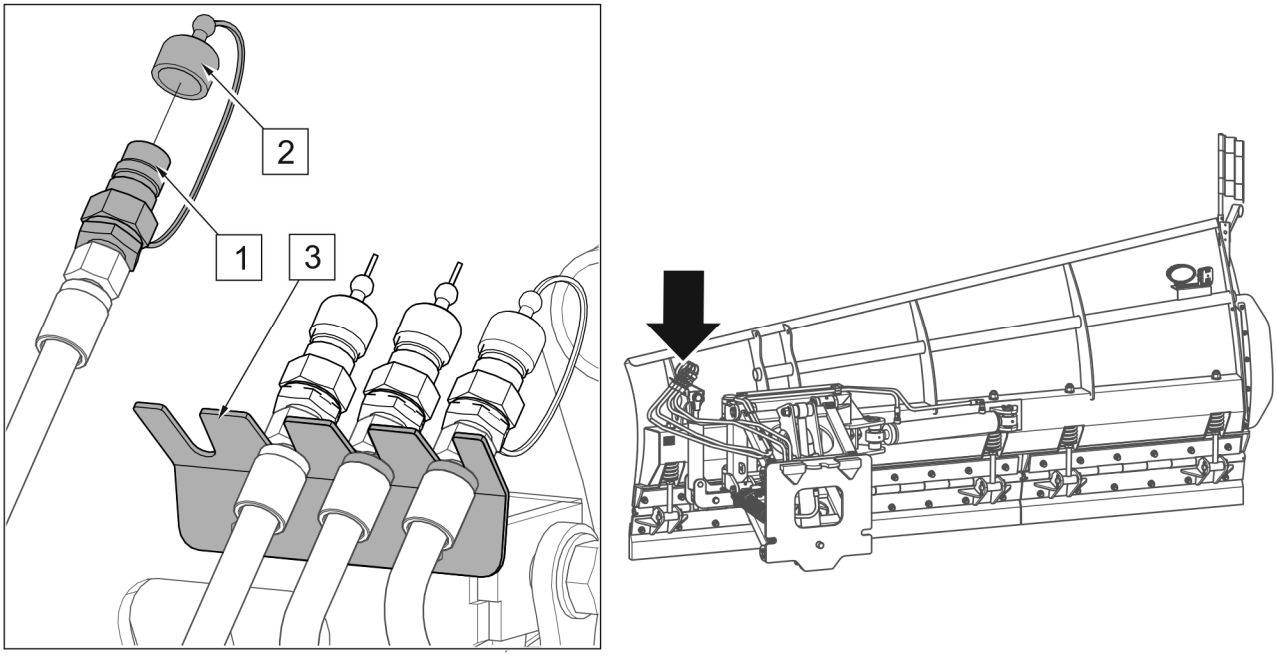


FIG. 4.20 Protection of hydraulic quick couplers

(1) - hydraulic quick couplers ; (2) - safety plug; (3) - bracket

SECTION

5

MAINTENANCE

5.1 CHECK AND REPLACEMENT OF COLLECTING BLADES

DANGER

During inspection and replacement of the snow plough blades, turn off vehicle's engine and remove the key from the ignition.

Excessively worn or damaged blades must be replaced with new ones. When replacing the blades, lift the machine and install the transport lock, turn off the engine and immobilise the vehicle with the parking brake.

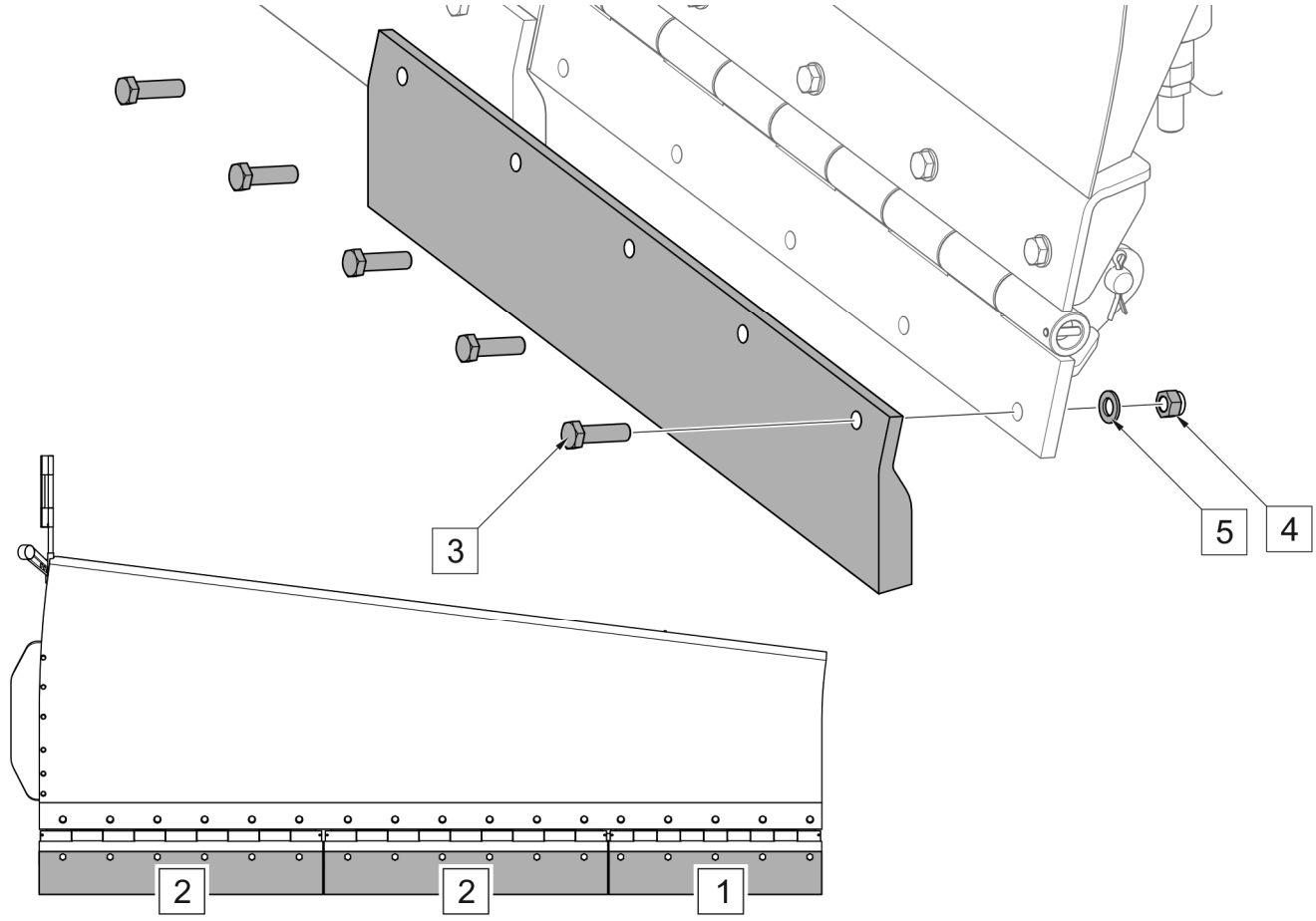


FIG. 5.1 Replace the blades

(1) - blade L=0.9 m; (2) - blade L=1.2 m; (3) - bolt; (4) - nut; (5) - washer

DANGER

Do NOT perform maintenance or repair work under raised and unsupported machine.

NOTE

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

The snow plough mouldboard is equipped with steel-rubber-ceramic blades (FIG. 5.1) with a maximum wear mark on the front part of the blade.

Excessively worn or damaged blades must be replaced. Types and quantities of blades are shown in TAB. 5.1

TAB. 5.1 Steel rubber ceramic blades

Mark FIG. 5.1	**Name / Part No.**	Quantity [item]
1	Combi blade L = 0.9 m CP50	1
2	Combi blade L = 1.2 m CP50	2

5.2 ADJUSTMENT OF COLLECTING BLADE SPRINGS

DANGER

The blades are adjusted with the machine lifted. After raising the machine, turn off the engine, immobilise the vehicle with parking brake and ensure that unauthorised persons do not have access to the vehicle cab. Secure the snowplough linkage system against lowering.

The plough is equipped with three swivelling segments of collecting blades. When an obstacle is encountered, individual segments of collecting blades can independently swing backward and return to working position thanks to shock absorbing springs (FIG. 5.2). Inclination of blades and tension of springs can be adjusted. Blade segment inclination angle is adjusted using nut (1) while spring (4) tension can be adjusted using nut (2) after loosening lock nut (3).

DANGER

Adjustment of collecting blade springs should be performed only when the engine is stopped, and the machine is raised and secured.

TIP

During the adjustment, set the collecting blades in such a manner as to ensure that front surfaces of individual blade segments form a single plane that is perpendicular to the road surface.

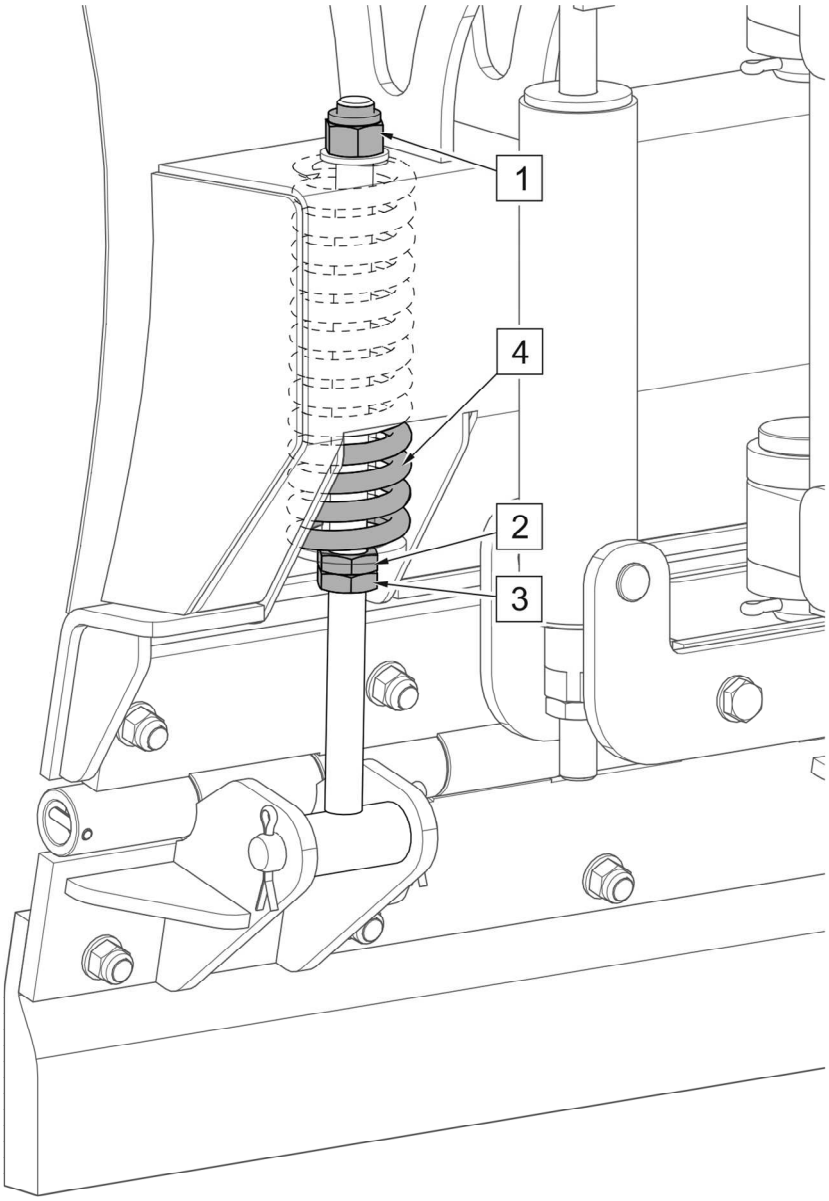


FIG. 5.2 Adjustment of collecting blades

(1) - blade inclination adjusting nut; (2) - blade spring tension adjusting nut; (3) - counter-nut; (4) - spring

5.3 ADJUSTMENT OF BALANCER

DANGER

Adjustment of balancer is performed when the machine is raised. After raising the machine, turn off the engine, immobilise the vehicle with parking brake and ensure that unauthorised persons do not have access to the vehicle cab. Secure the snowplough linkage system against lowering.

The balancer keeps the mouldboard level after lifting and unfolding the mouldboard. If the mouldboard is tilted to the side after lifting and tilting, then adjust the balancer (FIG. 5.3) as follows:

- raise the plough,
- tilt the mouldboard to the working position,
- loosen lock nut (4),
- by means of a nut (3) to adjust the position of the mouldboard.
- after adjustment, tighten lock nut (4).

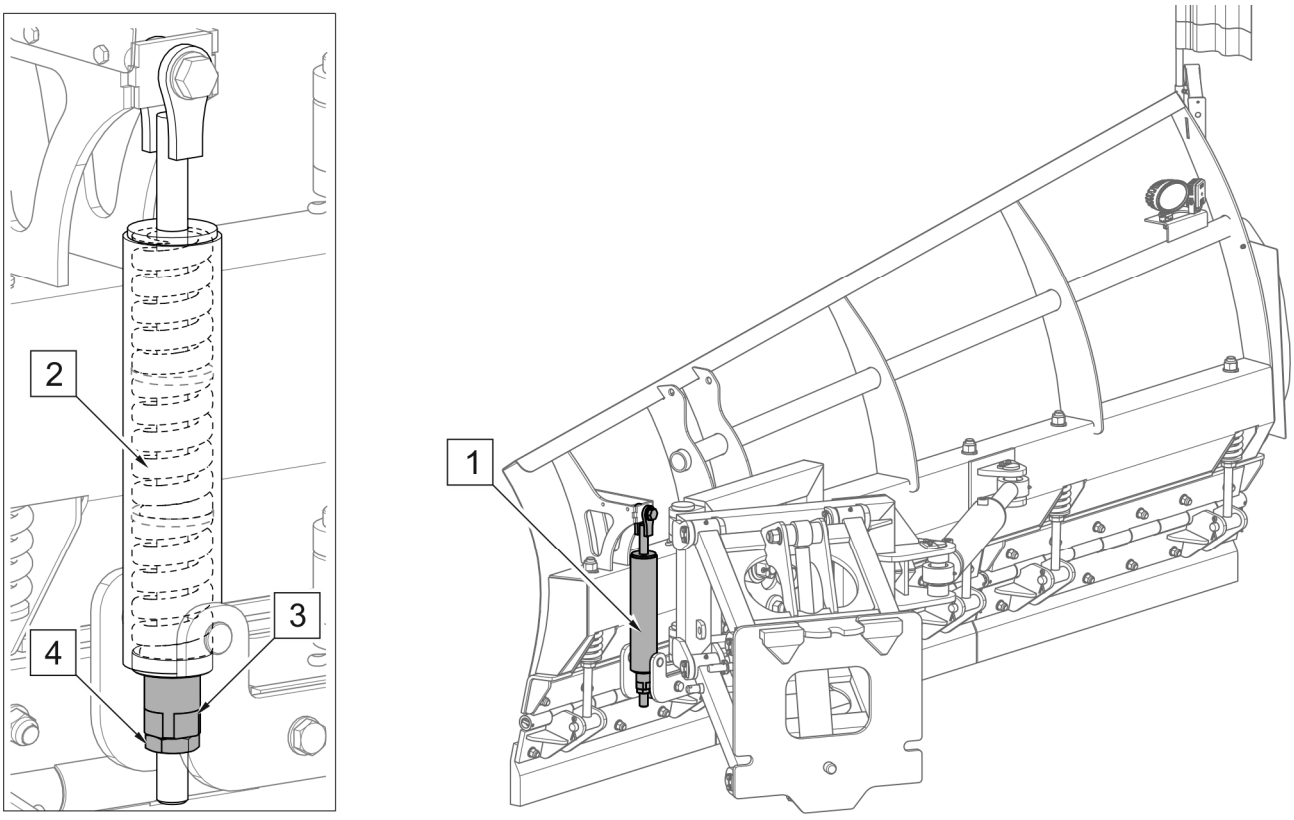


FIG. 5.3 Adjustment of balancer

(1) - balancer; (2) - spring; (3) - adjusting nut; (4) - lock nut

5.4 HYDRAULIC SYSTEM MAINTENANCE

Hydraulic system maintenance duties:

- check oil level and change oil in the tank of the Power-Pack electro-hydraulic power supply (option);
- check tightness of cylinders and hydraulic connections,
- check technical condition of hydraulic lines;
- check 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.

NOTE

Before starting work, visually inspect the hydraulic system components.

The oil tank of the electro-hydraulic power supply (FIG. 5.4) is located under the housing (3). To check oil level in the tank:

- set the carrier so that the PSU tank is horizontal,
- remove the power supply housing
- after unscrewing the plug (2), the correct oil level in the tank (1) should be 100-120 mm from the bottom of the tank, with the mouldboard folded and lowered,
- if necessary, supplement oil to the required level.

TIP

HL32 hydraulic oil was used in the plough's hydraulic system and the Power-Pack electro-hydraulic power unit.

The correct oil level in the electro-hydraulic power unit tank should be 100 - 120 mm from the bottom of the tank with the mouldboard folded and lowered.

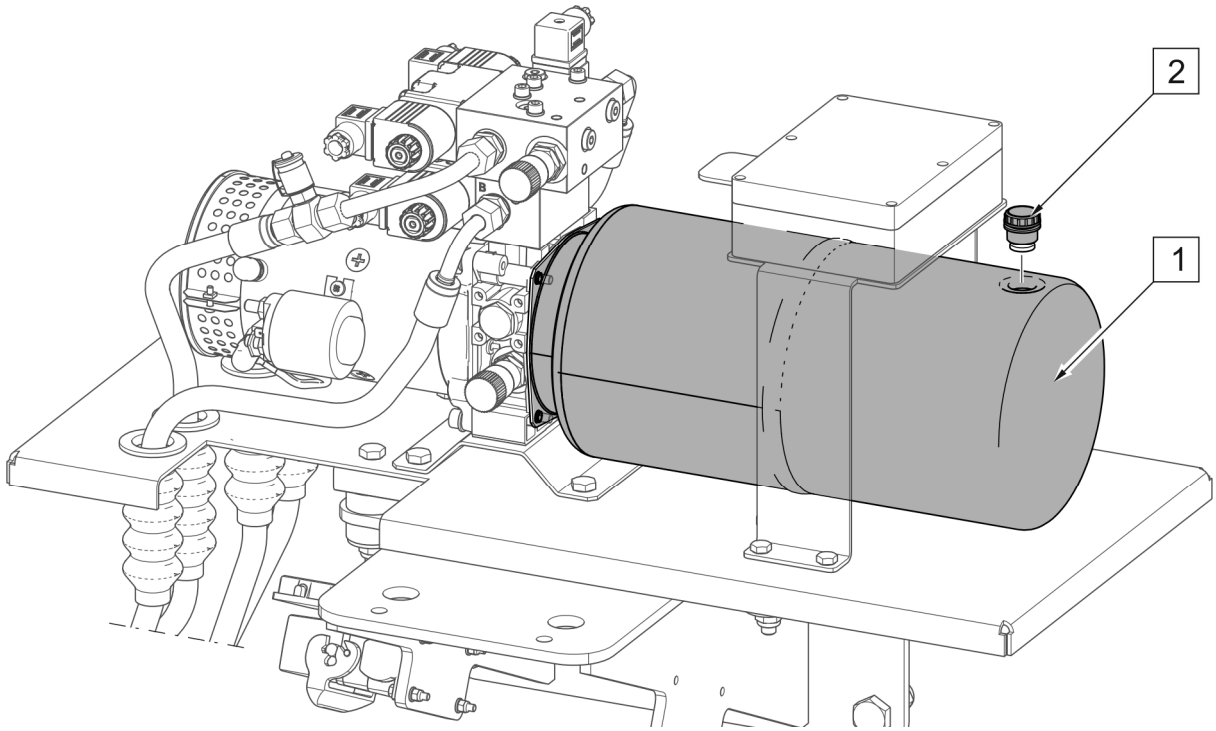


FIG. 5.4 Check oil level in Power-Pack system (option)

(1) - oil tank ; (2) - oil filler cap

It is recommended that once a year (after the end of the season) you change the oil in the Power-Pack electro-hydraulic power unit tank.

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!

TAB. 5.2 HL32 HYDRAULIC OIL SPECIFICATION

ITEM	NAME	VALUE
1	ISO 3448VG viscosity classification	32
2	Kinematic viscosity at 40°C	28.8 - 35.2 mm²/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

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 a 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.

DANGER

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

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

If an oil leak is found on hydraulic connections, tighten the connections. If this does not remedy the problem, replace the lines and connection components. Always exchange each mechanically damaged component.

NOTE

The hydraulic system is vented automatically during machine operation.

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

5.5 ELECTRICAL SYSTEM MAINTENANCE

Electrical system maintenance involves periodical checking the operation of the lighting system. In the plough powered by the carrier's Power-Pack system, connect the hydraulic lines and check the individual functions of the machine.

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.

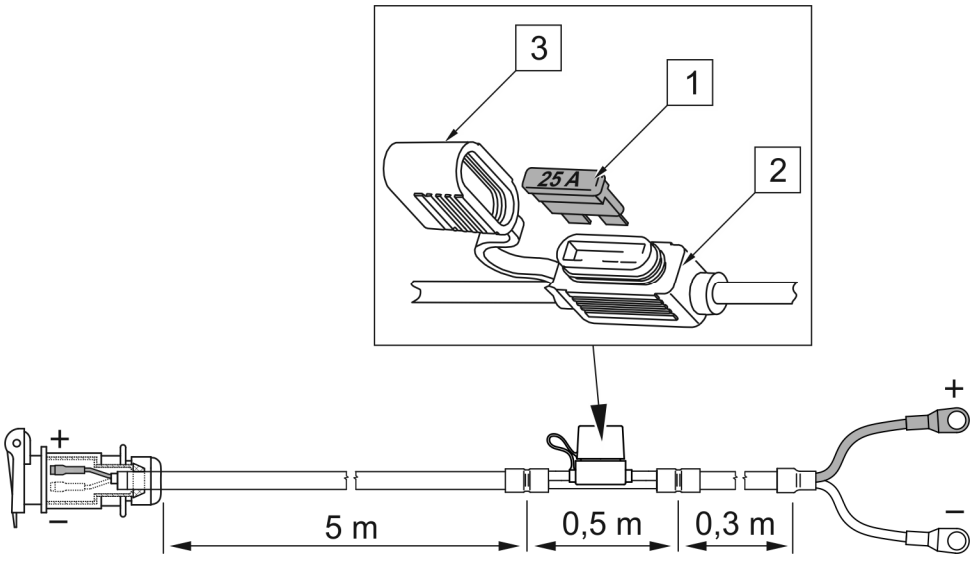


FIG. 5.5 Replace fuse for lighting power supply

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

There is a (1) UNIVAL 25A fuse on the power cable (FIG. 5.5) of the lighting control panel. To replace the fuse, remove protective cover (3) and take the fuse (1) out from holder (2).

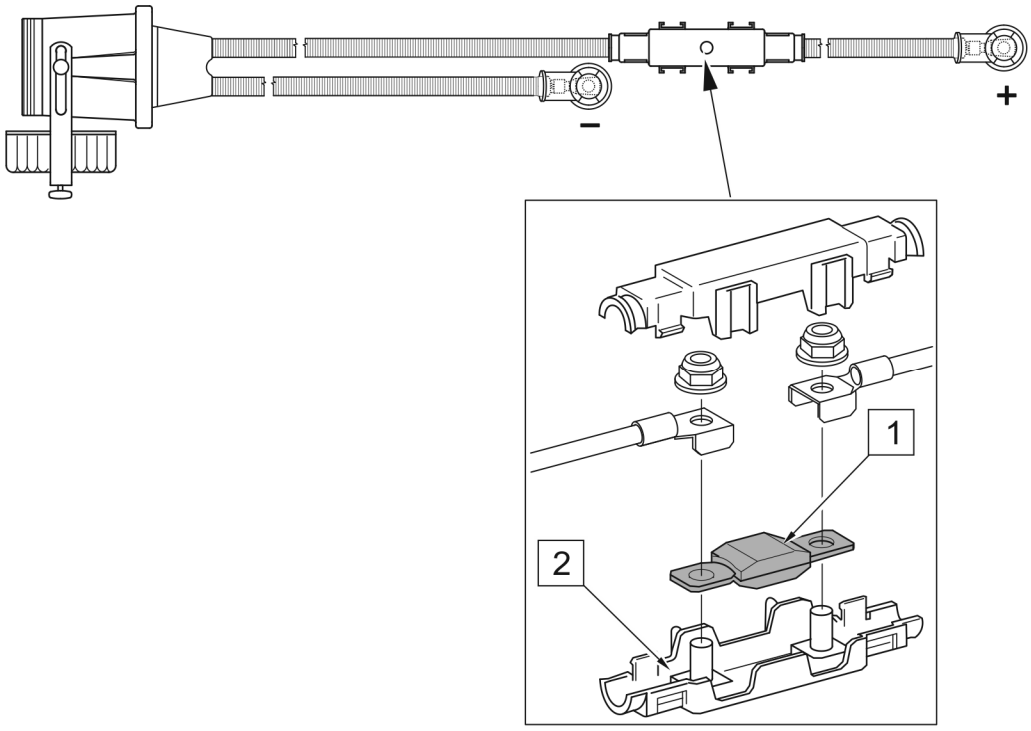


FIG. 5.6 Replace the Power-Pack Fuse (option)

(1) - UNIVAL 175A fuse; (2) - fuse holder

There is a 175A MEGAVAL fuse (1) on the supply conduit (+) of the electrical system of Power-Pack power supply (FIG. 5.6). To replace the fuse, undo nuts fixing the leads inside the fuse holder (FIG. 5.6).

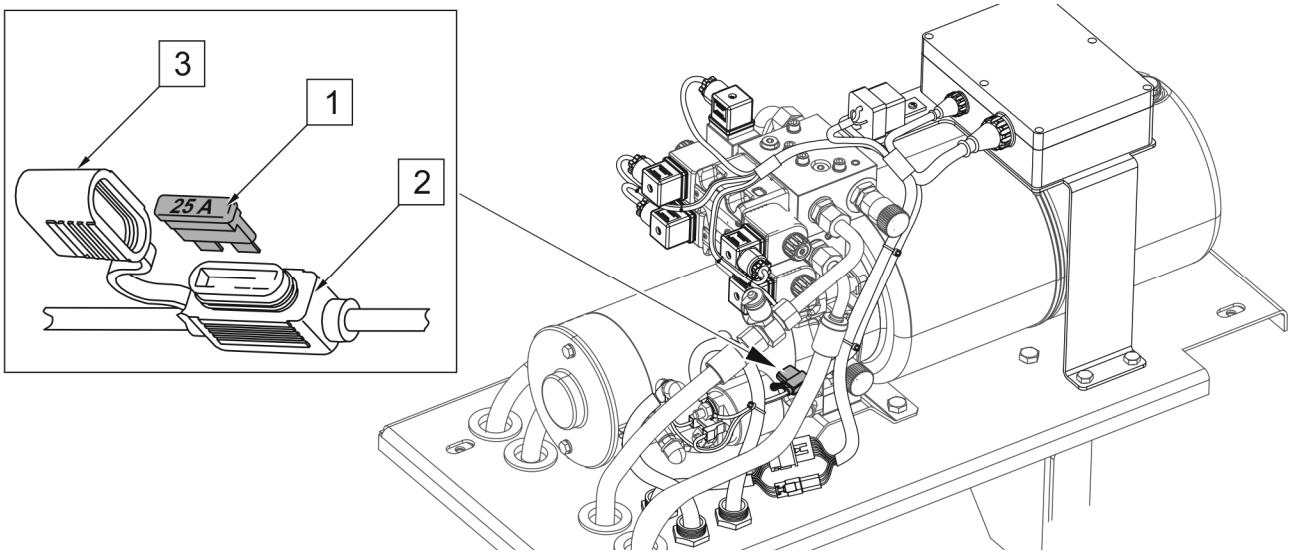


FIG. 5.7 Replacing the fuse of Power-Pack solenoid valves (option)

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

To replace the fuse, 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

Machine lubrication should be performed with the aid of a manually or foot operated grease gun, filled with generally available 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

Lubricate only when the plough is lowered and resting on the ground.

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

When using the machine the user is obliged to observe lubrication instructions according to attached schedule. Excess lubricant causes depositing of additional contaminants in places requiring lubrication, therefore it is essential to keep individual machine components clean.

TAB. 5.3 LUBRICATION POINTS AND LUBRICATION FREQUENCY

ITEM	NAME	NUMBER OF LUBRICATION POINTS	TYPE OF GREASE	LUBRICATION FREQUENCY
A	Mouldboard pivot	2	grease	50 hours
B	Mouldboard lifting cylinder	2		
C	Mouldboard turning cylinder	2		
D	Control arm bushings	8		
E	Mouldboard frame pins	2		

Marking description in Item column (TAB. 5.3) conforms with numbering shown (FIG. 5.8)

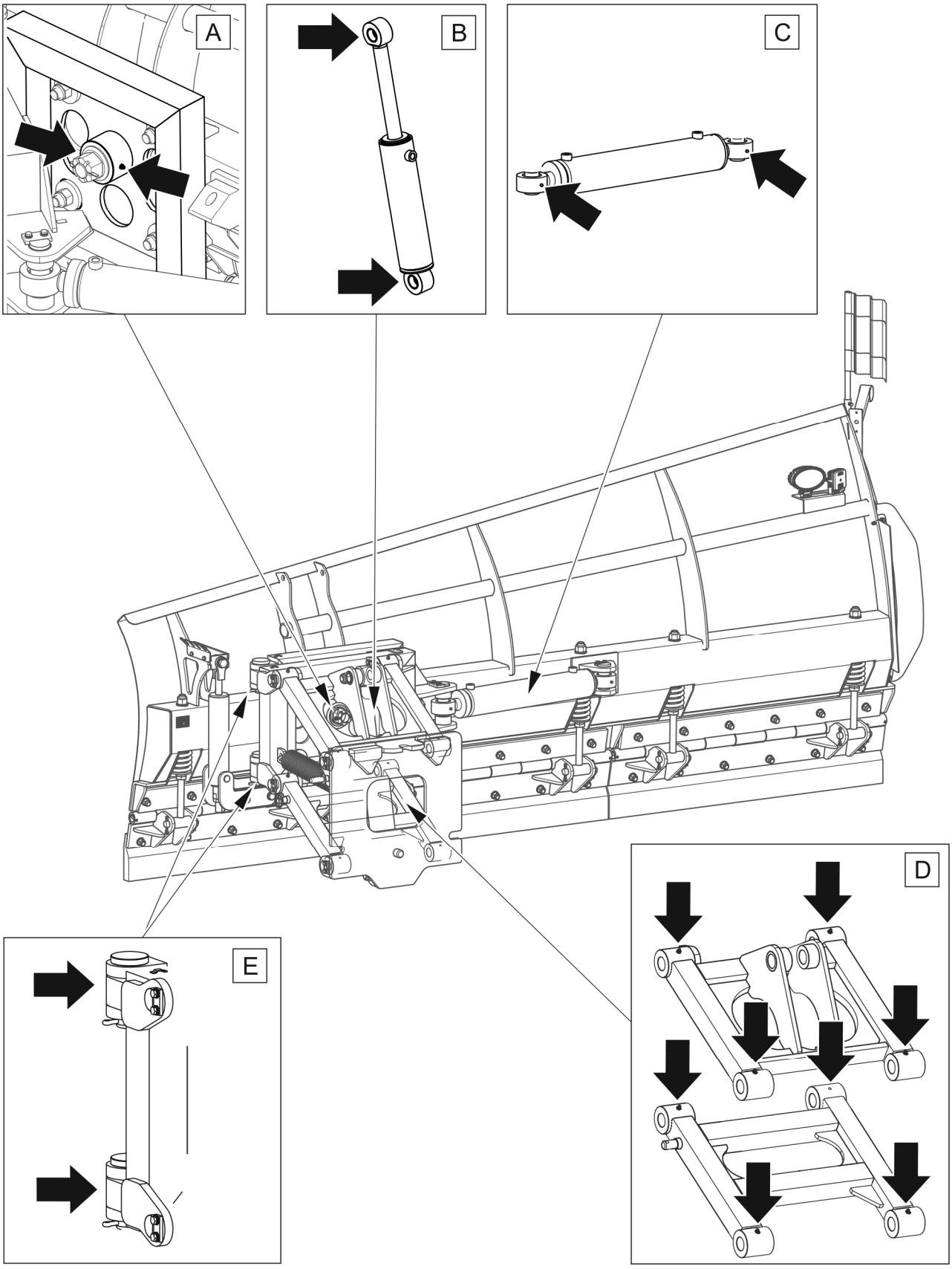


FIG. 5.8 Lubrication points

Lubrication points are detailed in TAB. 5.5

5.7 STORAGE

After finishing work, clean and wash the machine thoroughly with a 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. Repair or replace any used or damaged components.

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 will not be used for an extended period of time, protect it against adverse weather conditions. Lubricate machine according to the instructions provided. In the event of a prolonged storage, it is essential to lubricate all components regardless of the date of the last lubrication.

After disconnecting from the carrier vehicle, the plough should be stored on a cart which is an *accessory of the machine*.

Disconnect the control panel and protect it against adverse weather conditions.

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). The recommended bolt tightening torques are shown in TAB. 5.4.

NOTE

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.

TAB. 5.4 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	1,050
M27	820	1,150	1,650

The tightening torque values given in the table apply to non-greased steel bolts.

5.9 TROUBLESHOOTING

TAB. 5.5 TROUBLESHOOTING

TYPE OF FAULT	POSSIBLE CAUSE	REMEDY
Mouldboard position cannot be changed	The electrical system is not connected to the carrier vehicle *(depending on the machine version)*	Connect to electrical system
	The hydraulic system is not connected to the carrier vehicle	Connect hydraulic quick-couplers to a proper section of the carrier vehicle's hydraulic system.
	Main switch of control panel is off *(depending on the machine version)*	Set main switch of control panel in „I" position
	Damaged fuse on power lead *(depending on the machine version)*	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 *(depending on the machine version)*	Repair at an authorised service point
Machine removes snow unevenly	Excessively worn collecting blades	Check and replace if necessary
No lighting	Electrical system is not connected.	Connect electrical system to carrier 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 *(depending on the machine version)*	Set main switch of control panel in „I" position
	Damaged fuse on power lead	Check and replace fuse if necessary
	Damaged lamps or conductors	Repair at an authorised service point

NOTES