



PRONAR Sp. z o.o.

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

phone:	+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

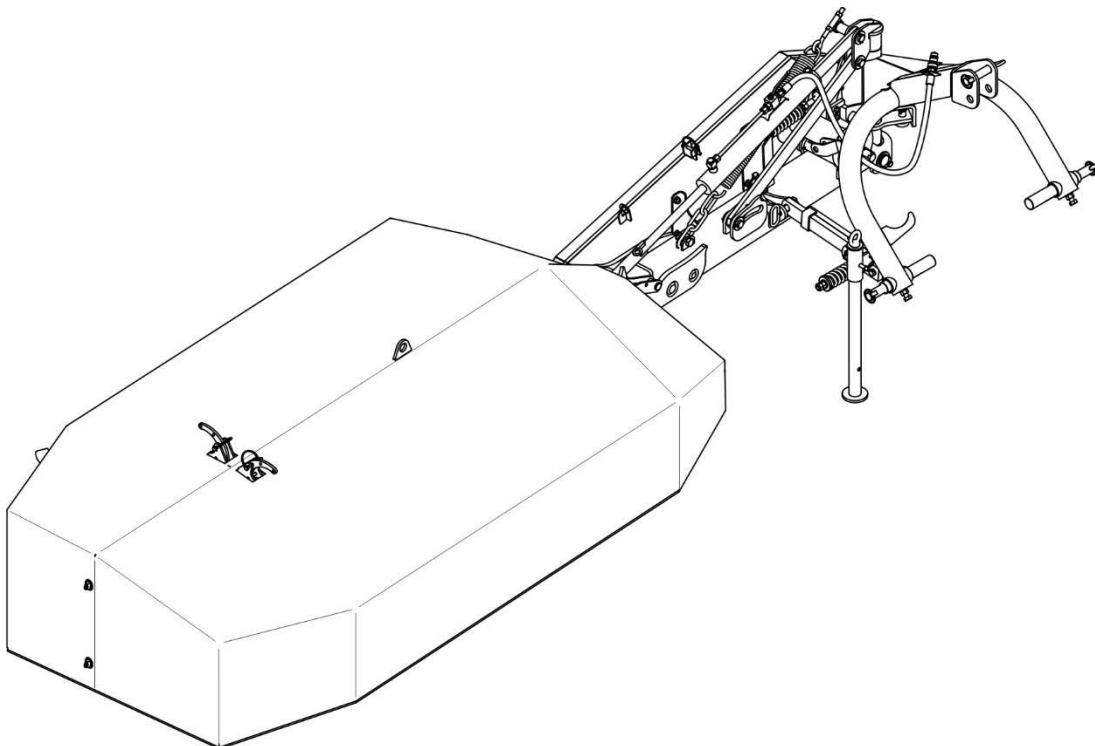
www.pronar.pl

OPERATOR'S MANUAL

ROTARY DISC MOWER

PRONAR PDK220

TRANSLATION OF THE ORIGINAL INSTRUCTION



ISSUE 1D-05-2014

PUBLICATION NO 378N-00000000-UM



ROTARY DISC MOWER

PRONAR PDK220

MACHINE IDENTIFICATION

TYPE: PDK220

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 PDK220 mower. If the information stated 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:

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

CONTACT TELEPHONES

<i>+48 085 681 63 29</i>	<i>+48 085 681 64 29</i>
<i>+48 085 681 63 81</i>	<i>+48 085 681 63 82</i>

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.



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:	Disc Mower
Type:	PDK220
Model:	–
Serial number:	
Commercial name:	Disc Mower PRONAR PDK220

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

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

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

Narew, the 2014-06-03

Place and date

Z-CA DYREKTORA
d/s technicznych
członk zarządu
Roman Orzechaniuk

*Full name of the empowered person
position, signature*

TABLE OF CONTENTS

1	BASIC INFORMATION	1.1
1.1	IDENTIFICATION	1.2
1.2	PROPER USE	1.3
1.3	EQUIPMENT	1.5
1.4	TERMS & CONDITIONS OF WARRANTY	1.5
1.5	TRANSPORT	1.6
1.6	ENVIRONMENTAL HAZARDS	1.8
1.7	WITHDRAWAL FROM USE	1.9
2	SAFETY ADVICE	2.1
2.1	BASIC SAFETY RULES	2.2
2.1.1	USE OF MACHINE	2.2
2.1.2	HITCHING AND UNHITCHING FROM CARRYING VEHICLE	2.3
2.1.3	HYDRAULIC SYSTEM	2.3
2.1.4	TRANSPORTING THE MACHINE	2.4
2.1.5	MAINTENANCE	2.5
2.1.6	WORK OF MOWER	2.7
2.1.7	OPERATION OF PTO SHAFT	2.7
2.2	DESCRIPTION OF RESIDUAL RISK	2.9
2.3	INFORMATION AND WARNING DECALS	2.10
3	DESIGN AND OPERATION	3.1
3.1	TECHNICAL SPECIFICATION	3.2
3.2	GENERAL DESIGN	3.3
3.3	LINKAGE	3.4
3.4	DRIVE TRANSMISSION	3.5

3.5 CUTTING UNIT	3.6
4 CORRECT USE	4.1
4.1 PREPARE FOR WORK	4.2
4.2 CHECKING TECHNICAL CONDITION	4.4
4.3 HITCHING TO TRACTOR	4.5
4.4 TRANSPORTING THE MACHINE	4.8
4.5 SETTING AND MOWING	4.11
4.5.1 SETTING THE MOWER IN WORKING POSITION	4.11
4.5.2 SETTING CUTTING HEIGHT	4.14
4.5.3 CONNECTING OF PTO SHAFT	4.15
4.5.4 ADJUSTMENT OF STAY SPRING	4.16
4.5.5 MOWING	4.17
4.5.6 SAFETY DEVICE	4.18
4.6 UNHITCHING FROM TRACTOR	4.20
5 MAINTENANCE	5.1
5.1 CHECKING AND REPLACING CUTTING BLADES	5.2
5.2 CUTTING UNIT SERVICE	5.5
5.3 OPERATION OF DRIVE TRANSMISSION	5.9
5.4 HYDRAULIC SYSTEM OPERATION	5.11
5.5 STORAGE	5.13
5.6 LUBRICATION	5.14
5.7 TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS	5.16
5.8 TROUBLESHOOTING	5.17

SECTION

1

BASIC INFORMATION

1.1 IDENTIFICATION

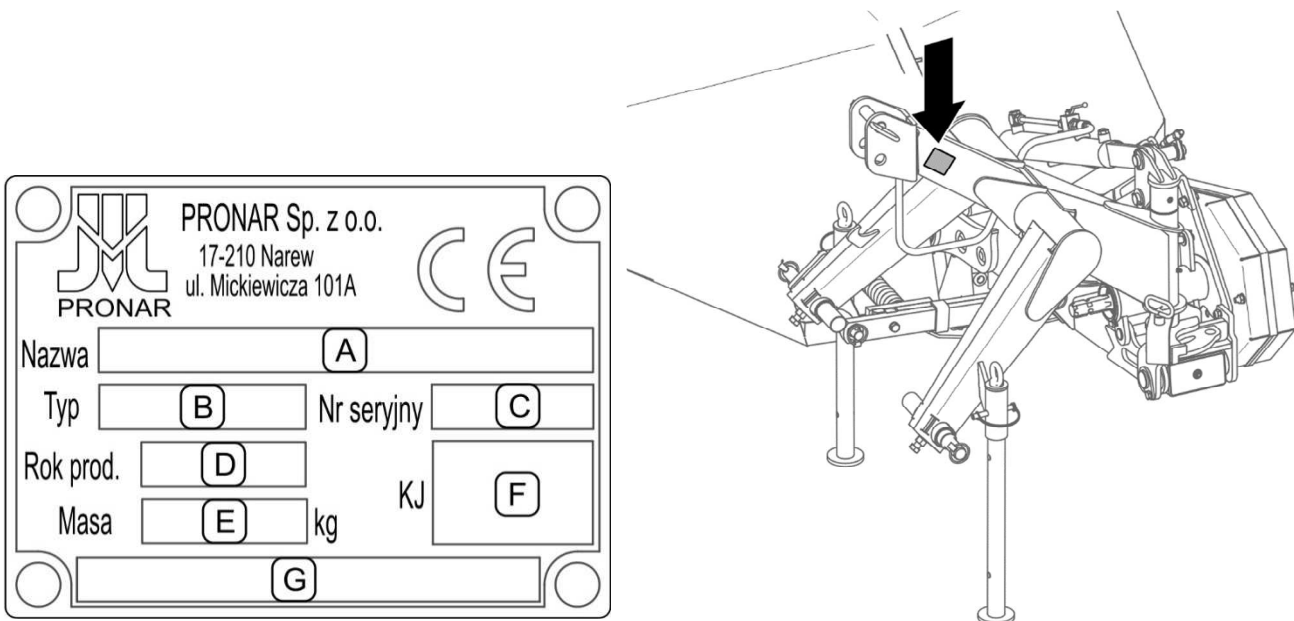


FIGURE 1.1 Location of the data plate

The PDK220 mower is marked with a data plate, placed on upper beam of the suspension system of machine. When buying the machine check that the serial numbers on the machine agree with the number written in the *WARRANTY BOOK*, in the sales documents and in the *OPERATOR'S MANUAL*.

The meanings of the individual fields found on the data plate (FIGURE 1.1) are presented in the table below:

- A - machine name
- B – machine type (e.g. PDK220)
- C – serial number
- D – year of manufacture
- E – machine tare weight [kg]
- F – Quality Control stamp
- G – Unfilled box or extension of name (box A)

1.2 PROPER USE

PRONAR PDK220 mower is constructed according to current safety requirements and engineering standards.

This machine is designed to cut grass and low stemmed green fodder (grass, lucerne, etc) on permanent grassland and on stone free cultivated fields with a level surface. Machine use for other purposes should be regarded as improper.

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.

Unauthorised repairs and modifications of the machine without prior consent of the Manufacturer will be regarded as use contrary to the intended purpose. The machine may only be used by appropriately trained users, who are aware of the dangers, design and operation of the machine. Repairs to the machine shall only be made by qualified personnel (in the warranty period all repairs must be performed in the warranty service, indicated by the Manufacturer). Maintenance and repairs that can be performed by the user, are described in section 5 „*MAINTENANCE*”.

TABLE 1.1 Agricultural tractor's requirements

	UNIT	REQUIREMENTS
Hydraulic system		
Hydraulic oil	-	HL 32
Pressure rating of the system	MPa	16
Number of hydraulic sockets	pc.	1 hydraulic section socket with floating position at the rear of the tractor
Implement suspension system (TPL - three-point linkage)		
Rear three point linkage system	-	cat. Category II and III according to ISO 730-1 <i>(cat. I after changing pins)</i>
Power take-off shaft (PTO)		
Rotation speed	RPM	540
PTO shaft profile	-	type 1 according to ISO 500 <i>(Ø 35 mm, 6 splines)</i>
Number of splines on PTO shaft	pc.	6
Rotation direction	-	clockwise
Other requirements		
Minimum power	kW / Horsepower	22/30
Tractor equipped with operator cabin	-	yes

IMPORTANT!

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

- for transporting people and animals,
- for transport of whatever materials or objects.

1.3 EQUIPMENT

The equipment of PRONAR PDK220 mower includes:

- Operator's Manual,
- Warranty Book,
- Key for changing cutting blades,
- PTO shaft (*catalogue No. 904-01404*)
- Additional set of 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'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:

- cutting blades, V-belts
- tarpaulin covers,
- bearings, seals, slides.

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 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.

For detailed Terms & Conditions of Warranty, please refer to the WARRANTY BOOK attached to each machine.

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



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.

1.5 TRANSPORT

The mower is ready for sale completely assembled and does not require packing. Packing is only required for the machine's technical documentation and any extra fittings.



IMPORTANT!

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

Delivery is either by transport on a vehicle or independently. Transport of the mower is permissible connected to a tractor provided the tractor's driver familiarises himself with the machine's Operator's Manual and particularly with information concerning safety and principles of connection and transport of mower on public roads. Do NOT drive the tractor with mower connected when visibility is limited.

**IMPORTANT!**

Do NOT drive the tractor with mower connected when visibility is limited.

When loading and unloading the mower, 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.

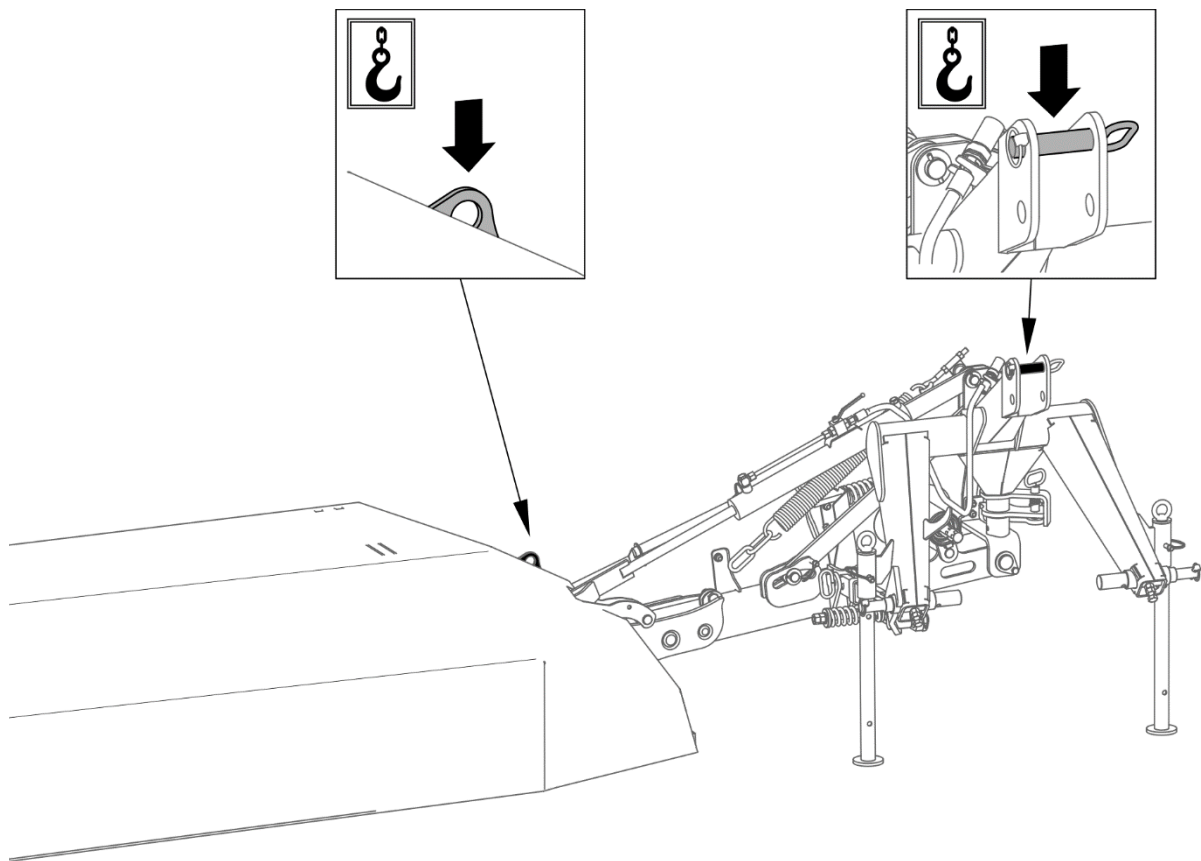


FIGURE 1.2 Transport lugs

The mower should be attached to lifting equipment in places shown on figure (FIGURE 1.2), i.e. to central connection pin and to transport lug.

The machine should be attached firmly to the platform of the vehicle using straps or chains fitted with a tightening mechanism. The fastening equipment used must have a valid safety certificate. Exercise particular caution when lifting the machine. 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.

**TIP**

When loading with lifting equipment, put the mower in its parking position, with the lifting arm secured with a pin. Support legs should be lowered and secured with pins.

**IMPORTANT!**

Do NOT secure lifting slings or any types of securing elements to hydraulic cylinders or slack machine components.

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 equipment oil shall be completely removed from hydraulic system, cutting blades and transmission. Locations of drain plugs and method for draining oil are described in section 5.

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 mower may only be used and operated by persons qualified to drive agricultural tractors and agricultural machines and trained in the use of the machine.
- If the information 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 agricultural tractors, including children and people under the influence of alcohol or other drugs.
- Non-compliance with the safety rules of this Operator's Manual can be dangerous to the health and life of the operator and others.
- The machine must not be used for purposes other than those for which it is intended. Anyone who uses the mower other than the way intended takes full responsibility for himself for any consequences of this potentially improper 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 safety guards and other protective elements are technically sound and correctly positioned. In the event of loss or destruction of the safety guards, they must be replaced with new ones.

- In order to limit occupational risks associated with exposure to noise during mower operation use individual protection (ear protectors). In order to reduce the level of noise during work the tractor cab window and door should be closed.

2.1.2 HITCHING AND UNHITCHING FROM CARRYING VEHICLE

- Do NOT link the mower to a tractor, if hydraulic oil applied in both machines are of different types, or if the three point linkage system of the mower is not compatible with the category of the linkage system of the tractor.
- To attach the machine to the tractor only the rear three point linkage may be used. After hitching the machine, check the safeguards. After coupling the machine, check the safeguards. Carefully read the tractor Operator's Manual.
- To hitch the machine to tractor use only genuine pins and safeguards.
- The agricultural tractor to which the mower will be coupled must be technically reliable and must fulfil the requirements of mower Manufacturer.
- Be especially careful when hitching the machine.
- During hitching there must be nobody between the mower and the tractor. A person assisting in the hitching of the machine should stand in such a place (beyond the area of danger), in order to be continuously visible to the tractor driver.
- Do NOT unhitch the mower from the tractor if the cutting system is raised. Exercise caution when unhitching the machine.
- Hitching and unhitching may only take place when the cutting head and the tractor are switched off.
- Mower uncoupled from tractor must be supported on support legs.

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.

- When connecting the hydraulic lines to the tractor, make sure that the tractor hydraulic system and mower are not under pressure. If necessary reduce residual pressure in the system.
- 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.
- After changing the hydraulic oil, the used oil should be properly disposed of. 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.
- Before beginning travel, the mower must be placed in transport position and raised using the rear three-point linkage system.
- Do NOT leave machine raised and unsecured while the tractor is parked. When parked, the machine should be lowered.

- Do not transport the machine with the cutting assembly set in the working position.
- During transport the hydraulic cylinder ram valve should be set in the closed position.
- During transport disconnect PTO shaft from tractor.
- The mower may not be used or transported in conditions of limited visibility.
- Do NOT ride on the machine or transport any materials on it.
- Before using the machine always check its technical condition, especially in terms of safety. In particular, check the technical condition of the hitch system, the cutting system and elements connecting hydraulic system.
- 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 mower 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 the manufacturer from any responsibility for damage or detriment to health which may arise as a result.
- Before undertaking any work on the mower disconnect tractor engine and wait until all rotating parts come to a stop.
- Regularly check the technical condition of the safety devices and correct tightening of bolt connections.
- Regularly perform service inspections of machine as recommended by the Manufacturer.
- Do NOT perform service or repair work under raised and unsupported machine.

- Before beginning repair works on hydraulic systems, reduce oil pressure.
- Servicing and repair work should be carried out in line with the general principles of workplace health and safety. In the event of injury, the wound must be immediately cleaned and disinfected. In the event of more serious injuries, seek a doctor's advice.
- Repair, maintenance and cleaning work should be carried out with the tractor engine turned off and the ignition key removed. Immobilise tractor with parking brake. Ensure that unauthorised persons do not have access to the tractor 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.
- Regularly check technical condition and mounting of all guards and protective elements.
- The paint coating should be cleaned off before beginning welding work. Burning paint fumes are poisonous for people and animals. Welding work should be carried out in a well lit and well ventilated space.
- During welding work pay attention to flammable or fusible elements (parts of the hydraulic systems, plastic parts). If there is a risk that they will catch fire or be damaged, they should be removed or covered with non-flammable material before commencing welding work. Before beginning work, prepare a CO₂ or foam extinguisher.
- In the event of work requiring the mower to be raised, use properly certified hydraulic or mechanical lifts for this purpose. After lifting the machine, stable and durable supports must also be used. Do NOT carry out work under a machine, which has been raised only with the three point linkage.
- The machine must not be supported using fragile elements (bricks or concrete blocks).
- After completing work associated with lubrication, remove excess oil or grease.
- Damaged, missing or worn cutting blades must be replaced in pairs in order to maintain the balance of the cutting disc.

- In order to reduce the danger of fire the machine must be kept in a clean condition.

2.1.6 WORK OF MOWER

- Before lowering or lifting the mower mounted on the three-point linkage, make sure there are no bystanders, especially children, near the machine.
- Before starting mower drive, the cutting assembly must be in working position.
- Before starting the mower make sure that there are no bystanders (especially children) or animals in the danger zone. The machine operator is obliged to ensure proper visibility of the machine and the working area.
- Mowing should begin after reaching nominal PTO RPM of 540 rpm. Do NOT overload shaft and mower and also do NOT engage the clutch suddenly.
- During cutting do NOT use PTO revolution speed greater than 540 rpm.
- When mowing on the edges of streets, public roads, on stony ground there is a risk that thrown out stones and foreign bodies may pose a risk to bystanders and other vehicle passing by.
- Do NOT operate mower without guards in place.
- Do NOT leave the tractor cab, when the machine drive is engaged.
- Do NOT stand within the mower's working zone.
- Do NOT approach cutting unit guards until the rotating cutting parts come to a complete standstill.
- Do NOT operate mower while reversing. While reversing raise the multifunction arm.
- Do NOT lift cutting unit before cutting discs come to a complete standstill.
- Keep a safe distance from electric power lines during travel with raised cutting assembly.

2.1.7 OPERATION OF PTO SHAFT

- While reversing and during turns, the PTO drive must be disengaged.

- The machine may only be connected to the tractor by appropriately selected PTO shaft recommended by the Manufacturer.
- The PTO shaft has markings on the casing, indicating, which end of the shaft shall be connected to the tractor.
- Never use a damaged PTO shaft, it may cause an accident. A damaged shaft must be repaired or replaced.
- Disconnect the drive shaft each time when it is not necessary to drive the machine.
- The chains preventing the shaft cover from turning while the shaft is working, shall be secured to a fixed element of machine structure.
- Do NOT use the securing chains to support the shaft while machine is parked or when transporting the machine.
- Before using the machine, the user should thoroughly acquaint himself with the PTO shaft Operator's Manual and adhere to the recommendations contained in it.
- The drive shaft must be equipped with a cover. Do NOT use the shaft with damaged or missing guards.
- After connecting shaft ensure that it is correctly and safely connected to the tractor and to the mower.
- Before starting the machine make sure that there are no bystanders (especially children) in the danger zone. The machine operator is obliged to ensure proper visibility of the machine and the working area.
- Before starting PTO shaft make certain that the PTO rotation direction is correct.
- Before disconnecting the shaft, turn off the tractor engine and remove the key from the ignition.
- Do NOT wear loose clothing, straps or whatever that may become wrapped round the rotating drive shaft. Contact with rotating PTO shaft may cause severe injuries.
- Do NOT go over and under the shaft or stand on it equally during work as also when the machine is parked.

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

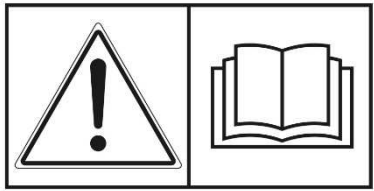

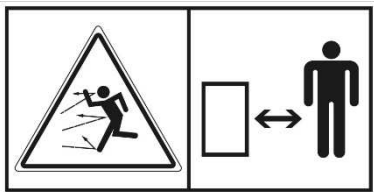
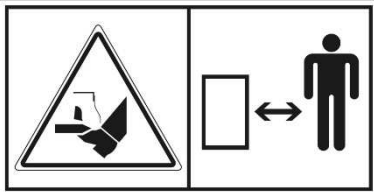
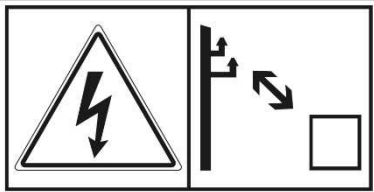
The residual risk may be kept to a minimum by following the recommendations below:




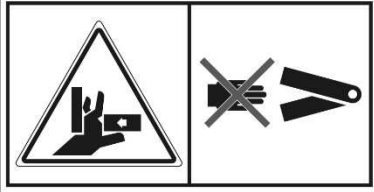

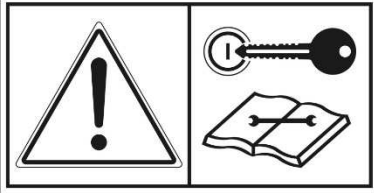

- prudent and unhurried operation of the machine,
- reasonably apply all the remarks and recommendations stated in the Operator's Manual,
- carry out repairs and maintenance work in line with operating safety rules,
- carrying out repair and maintenance work by persons trained to do so,
- using close 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

The mower is labelled with information and warning decals shown in (FIGURE 2.1) and described in TABLE 2.1. Throughout the time it is in use, the user of the machine is obliged to take care that notices and warning and information symbols located on the machine are clear and legible. In the event of their destruction, they must be replaced with new ones. Safety decals are available from your PRONAR dealer or directly from PRONAR customer service. New assemblies, changed during repair, must be labelled once again with the appropriate safety signs. During cleaning do not use solvents, which may damage label covering and do not direct strong water jet at machine.

TABLE 2.1 Information and warning decals

NO.	DECAL	MEANING
1		<p>Before starting work, carefully read the Operator's Manual.</p>
2		<p>Risk of injury when machine is being arranged in transport or working position.</p>
3		<p>Thrown out objects endanger the whole body. Keep a safe distance from the operating machine.</p>
4		<p>Risk of injury to foot or leg. Keep a safe distance.</p>
5		<p>Keep a safe distance from electric power lines.</p>

NO.	DECAL	MEANING
6		<p>Danger - cutting elements!</p> <p>Do NOT approach an operating machine.</p>
7		<p>Do not touch any rotating elements until they come to a complete standstill.</p>
8		<p>Danger associated with the rotating PTO shaft.</p>
9		<p>Do not reach into crushing space because elements may move. Danger of crushing hands or fingers.</p>
10		<p>Maximum allowable PTO shaft rotation speed is 540 rpm.</p>
11		<p>Before beginning servicing or repairs, turn off engine and remove key from ignition</p>
12		<p>Do not stand directly behind the tractor while operating the rear hitch.</p>

NO.	DECAL	MEANING
13		<p>Attention! Belt transmission, take extreme care.</p>
14		<p>Proper working position setting</p>
15		<p>Before unhitching mower from the tractor secure beam with cotter pin</p>
16		<p>Transport lug points marking.</p>
17		<p>Lubrication points</p>
18	<p>PDK220 PRONAR</p>	<p>Machine type</p>

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

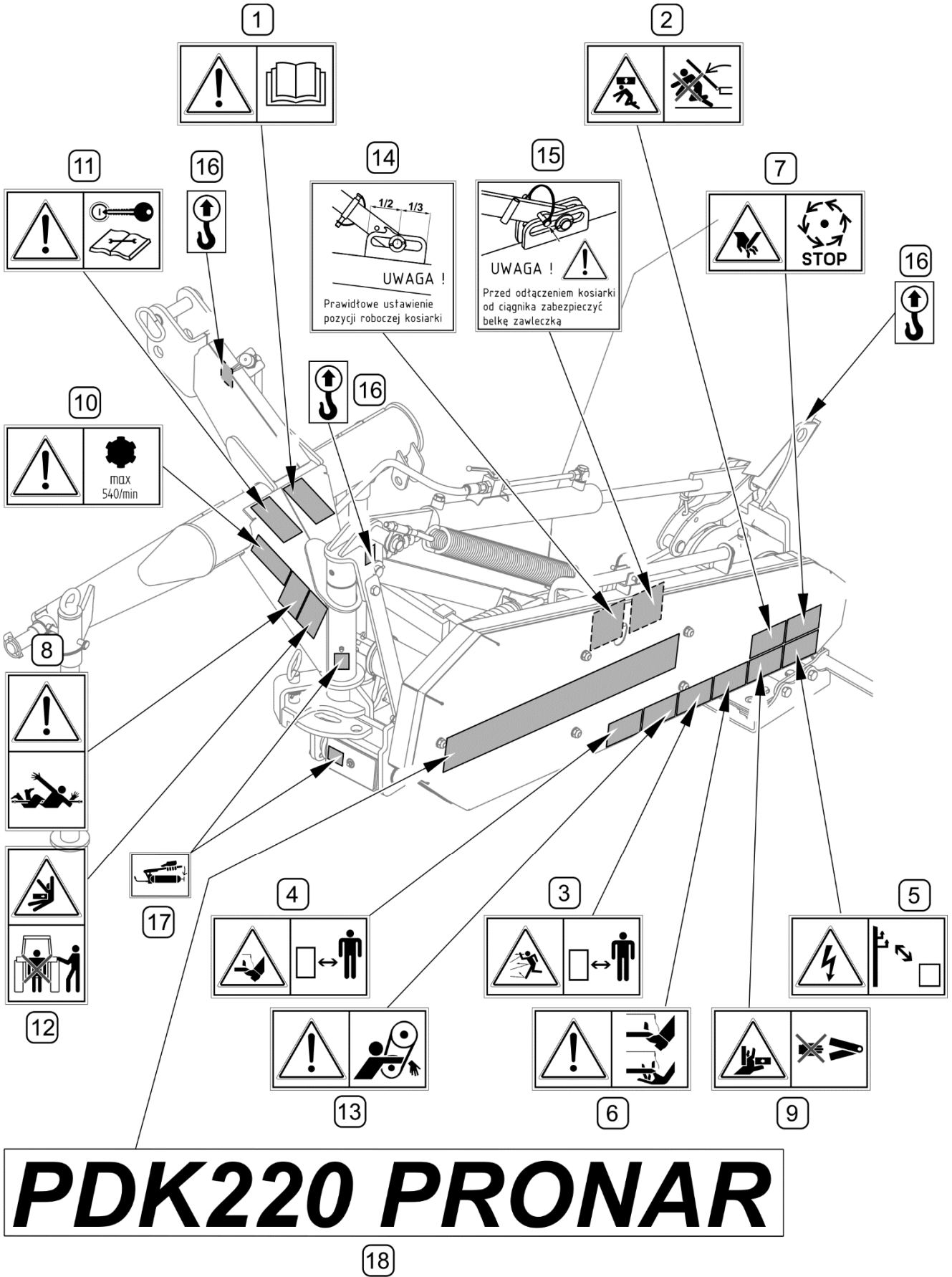


FIGURE 2.1 Locations of information and warning decals.

Meaning of symbols (TABLE 2.1)

SECTION

3

**DESIGN
AND OPERATION**

3.1 TECHNICAL SPECIFICATION

TABLE 3.1 BASIC TECHNICAL SPECIFICATION

	Unit	
Dimensions		
Total width in working setting	mm	4,110
Total height in working setting	mm	1,120
Total length in working setting	mm	1,430
Total length in transport setting: minimum / maximum	mm	1,430 / 4,440
Width in transport setting: minimum / maximum	mm	1,250 / 1,740
Height in transport setting: minimum / maximum	mm	980 / 2,720
Technical specification		
Cutting width	mm	2,200
Swath width	mm	1,450
Capacity (<i>at recommended cutting speed</i>)	ha/h	2.2
Tare weight	kg	520
Minimum power demand	kW / hp	22 / 30
Maximum PTO speed	RPM	540
Linkage	-	cat. II and III according to ISO 730-1 (<i>cat. I after changing pins</i>)
Number of discs	pc.	5
Number of cutting blades	pc.	10
Rotation speed of discs	RPM	3,265
Recommended mowing speed	km/h	10
Noise emission level:		
L _{pA}	dB	91
L _{Amax}	dB	92

L_{pA} – noise level exposure relating to 8 hour working day. Time averaged acoustic pressure emission level correlated with frequency characteristic A. **L_{Amax}** – maximum value of measurement correlated with frequency characteristic A of acoustic power level.

3.2 GENERAL DESIGN

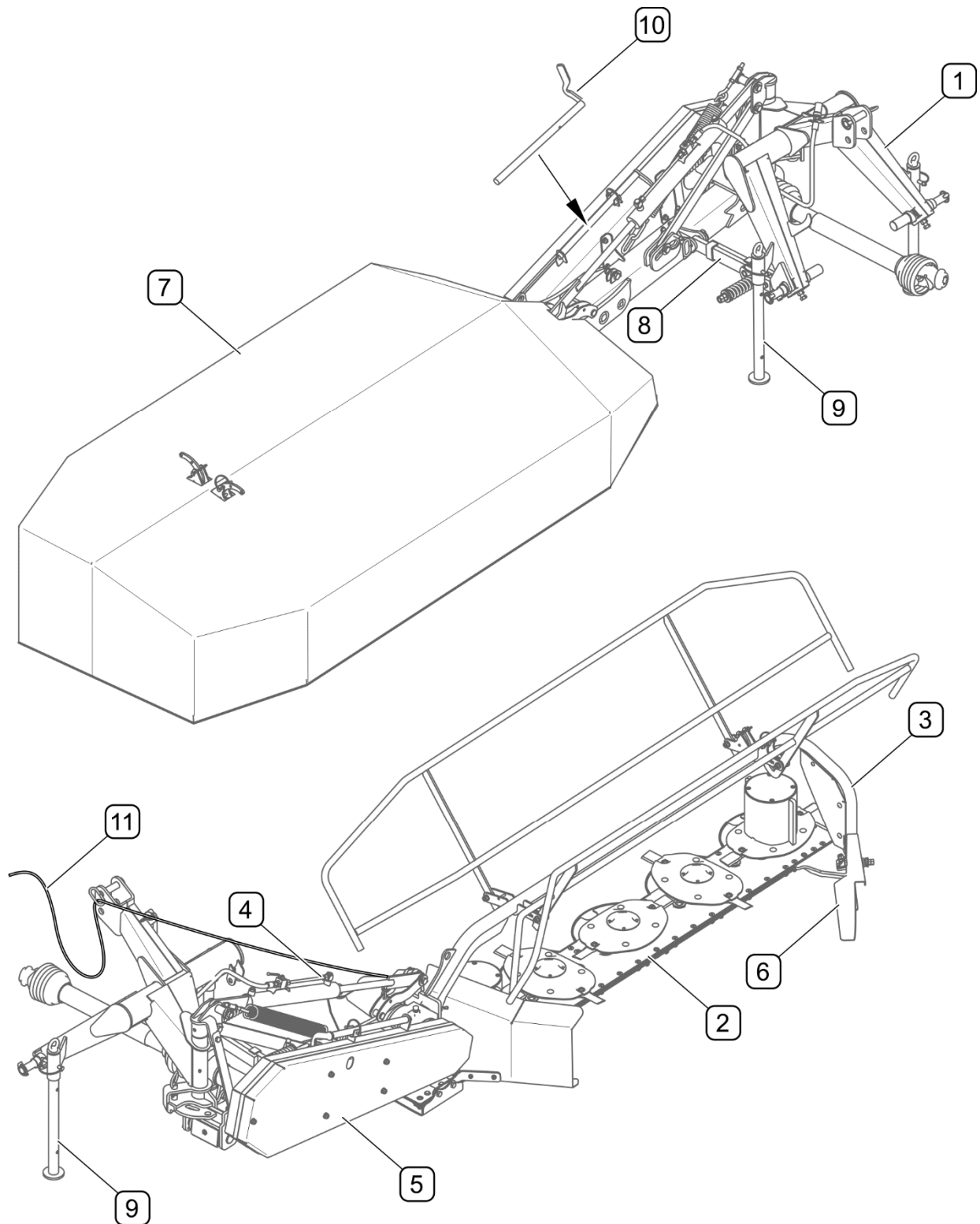


FIGURE 3.1 General design

(1) - linkage; (2) - cutting unit; (3) - support frame; (4) - hydraulic cylinder; (5) - drive transmission; (6) - swath guide; (7) - tarpaulin shields; (8) - safety device; (9) - support; (10) - key for changing cutting blades; (11) - block cable

3.3 LINKAGE

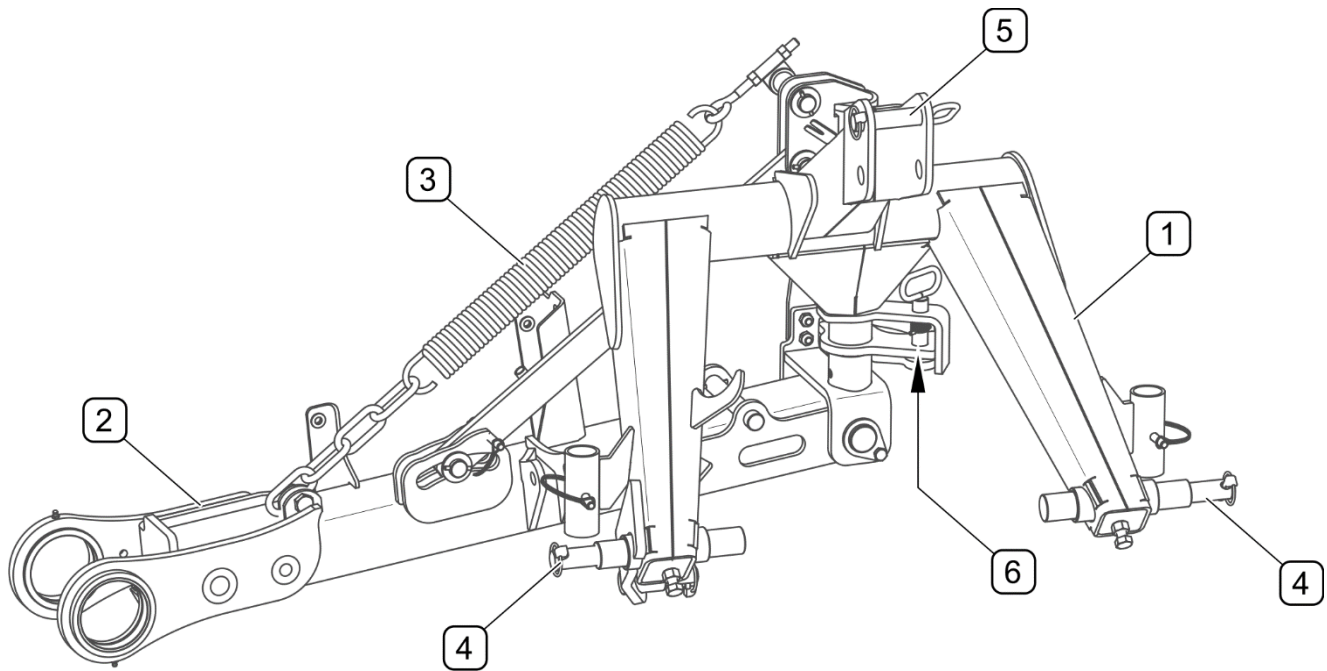


FIGURE 3.2 Linkage

(1) - three-point linkage frame; (2) - load-bearing beam; (3) - tensioning spring; (4) - three-point linkage lower links pin; (5) - central connection pin; (6) - beam rotation lock pin;

The main component of the linkage (FIGURE 3.2) of mower PDK220 is the three-point linkage frame (1), fitted with two adjustable pins of lower links (4) and a central connection pin (5) used for attachment to the tractor three-point linkage. Load-bearing beam (2) lifts and lowers the cutting unit. An adjustable-tension spring (3) is used to relieve load of the cutting unit. A pin (6) is used to lock the load-bearing arm turned to the transport position.

3.4 DRIVE TRANSMISSION

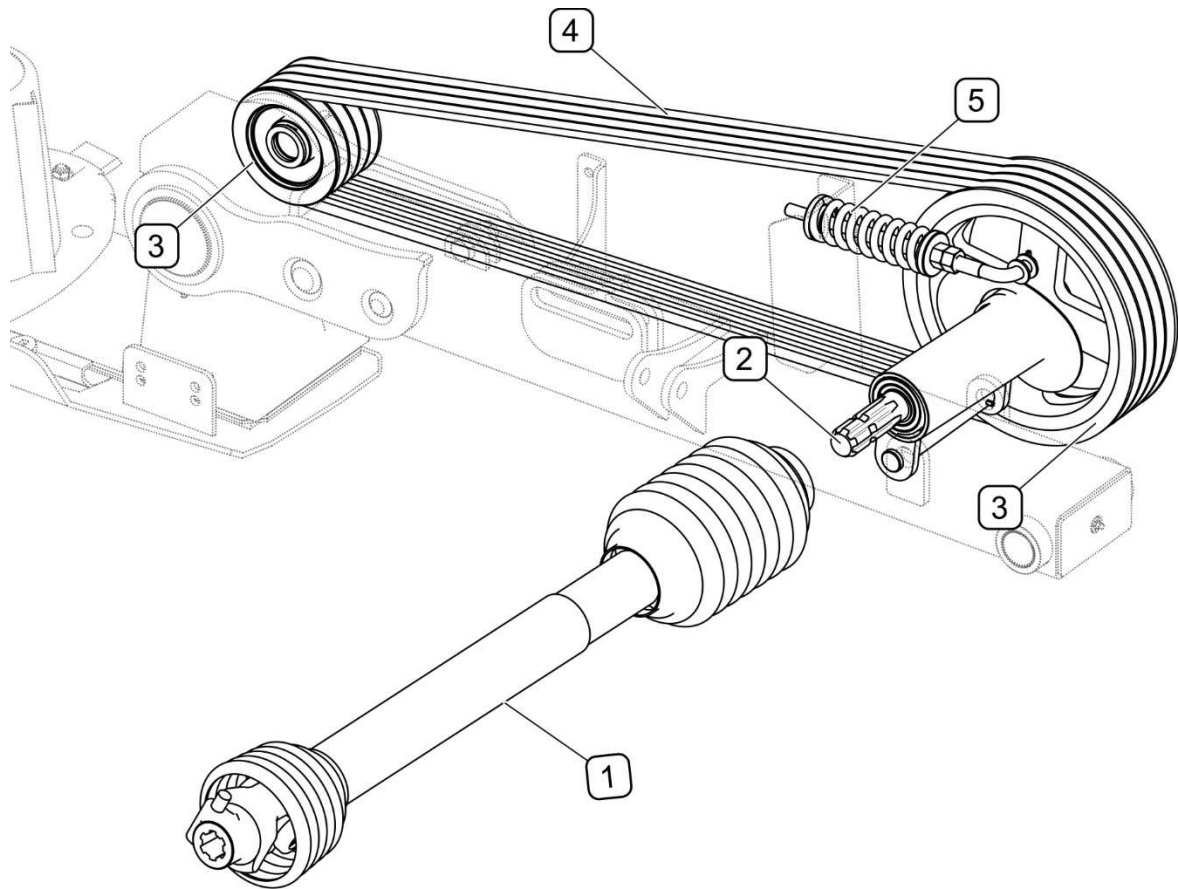


FIGURE 3.3 Drive transmission

(1) - PTO shaft; (2) - drive shaft; (3) - pulleys; (4) - V-belts; (5) - tensioner

Drive is transmitted from the power take-off shaft (PTO) of the tractor through the PTO shaft (1) with backstop clutch to drive shaft (2). Then four belts (4) and pulleys (3) drive the intersecting axis gear of the cutting unit. To adjust the tension use tensioner spring (5)

3.5 CUTTING UNIT

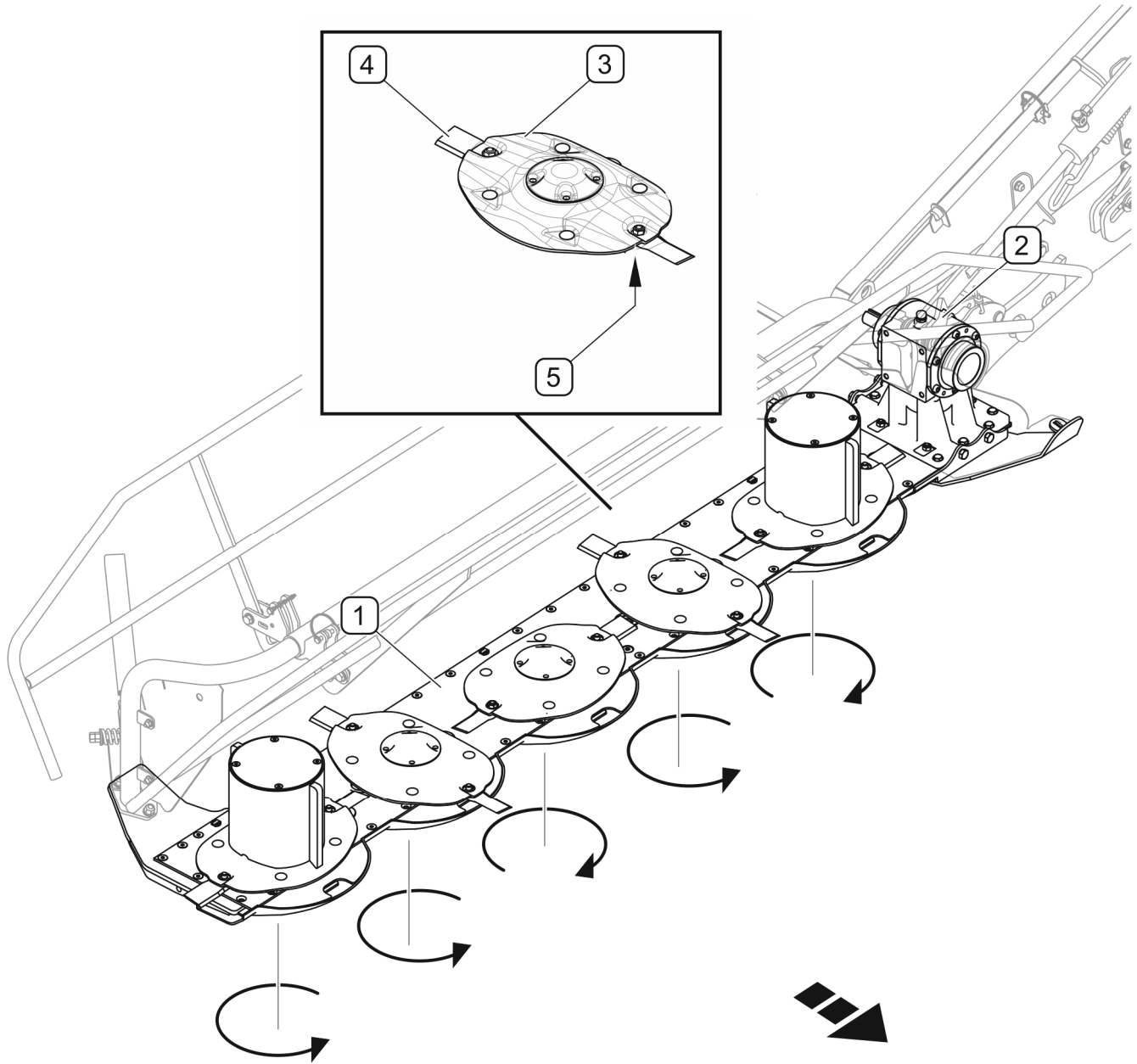


FIGURE 3.4 Cutting unit

(1) - cutter bar; (2) - intersecting axis gear; (3) - cutting disc; (4) - blade; (5) - blade holder

The cutting unit of mower PDK220 is composed of cutter bar (1) on which is mounted intersecting axis gear (2). On the cutter bar are mounted five cutting discs (3). On each disc are seated two rotating cutting blades (4) to right or left depending on the rotation direction of the disc. Disks are equipped with blade holders (5). Rotation direction of individual discs is shown on figure FIGURE 3.4.

SECTION

4

CORRECT USE

4.1 PREPARE FOR WORK

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.

Before connecting to tractor, machine operator must check the technical condition of the mower and prepare it for test start-up. In order to do this:

- the user must carefully read this Operator's Manual and observe all recommendations, understand the design and the principle of machine operation
- check the condition of protective paint coat,
- inspect machine's individual components for mechanical damage resulting from incorrect transport (dents, piercing, bent or broken components),
- check all the lubrication points, lubricate the machine as needed according to recommendations provided in section 5 *MAINTENANCE*,
- check technical condition of the hydraulic system;
- check if cutting blades, cutter bar, lifting arms and safety guards are correctly installed,
- check technical condition of V-belts in drive transmission,
- check compliance of power take-off shaft parameters e.g. type of tip, rotational speed,
- ensure PTO shaft can be connected to tractor (shaft should be adapted to tractor – see the shaft manufacturer's instruction manual)
- check technical condition of hitching system pins and locking cotter pins,
- check oil level in cutter bar and intersecting axis gear (see *MAINTENANCE*).

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 tractor. Start the tractor engine, check all systems and perform a test run before beginning work. In order to inspect:

- hitch the mower to tractor (see 4.3 *HITCHING TO TRACTOR*)
- set in working position,
- connect PTO shaft to tractor and mower,

- operate PTO drive at low engine RPM.

Engage mower's drive for a few minutes and in the meantime check the following:

- that there is no knocking or noise in the drive system arising from scraping or grinding of metal elements,
- whether there is excessive vibration in the cutting unit,
- synchronised rotation of cutting unit,



ATTENTION!

Before using the mower always check its technical condition. In particular check the technical condition of the cutting unit, linkage, drive system, and integrity of protective guards.

The mower's operation at no load should be smooth. Shaking of drive transmission, cutting unit and whole machine is not acceptable, nor is changed noise and vibrations coming from loose nut and bolt connections. After stopping mower and turning off engine, check fastening of cutting blades. Check that gear oil does not leak from reduction gear and cutter bar.



DANGER

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

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

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

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

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


If any faults are detected they must be identified and rectified. If a fault cannot be rectified or the repair could void the warranty, please contact retailer for additional clarifications.

4.2 CHECKING TECHNICAL CONDITION

When preparing the mower 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
Condition of safety guards	Check technical condition of safety guards, if complete and correctly mounted.	Daily before beginning work
check if cutter bar and lifting arm are correctly installed,	Check if correctly installed	
Technical condition of cutting blades	Visually inspect and if necessary replace according to section „ <i>CHECK AND REPLACE CUTTING BLADES</i> ”	
Oil level in intersecting axis gear	For details please refer to section " <i>CUTTING UNIT MAINTENANCE</i> "	
Check oil level in cutter bar	For details please refer to section " <i>CUTTING UNIT MAINTENANCE</i> "	
Tightening of all main nut and bolt connections	Torque values should be according to table (5.5)	every 3 months
Lubrication	Lubricate elements according to table <i>LUBRICATION</i>	According to table 5.3

	<p>ATTENTION!</p> <p>Do NOT use unreliable mower.</p>
---	--

4.3 HITCHING TO TRACTOR

PRONAR PDK220 mower may only be mounted on a tractor fulfilling the requirements contained in table „1.1 AGRICULTURAL TRACTOR'S REQUIREMENTS”.



ATTENTION!

Before using the mower, the user must carefully read the tractor operator's manual.

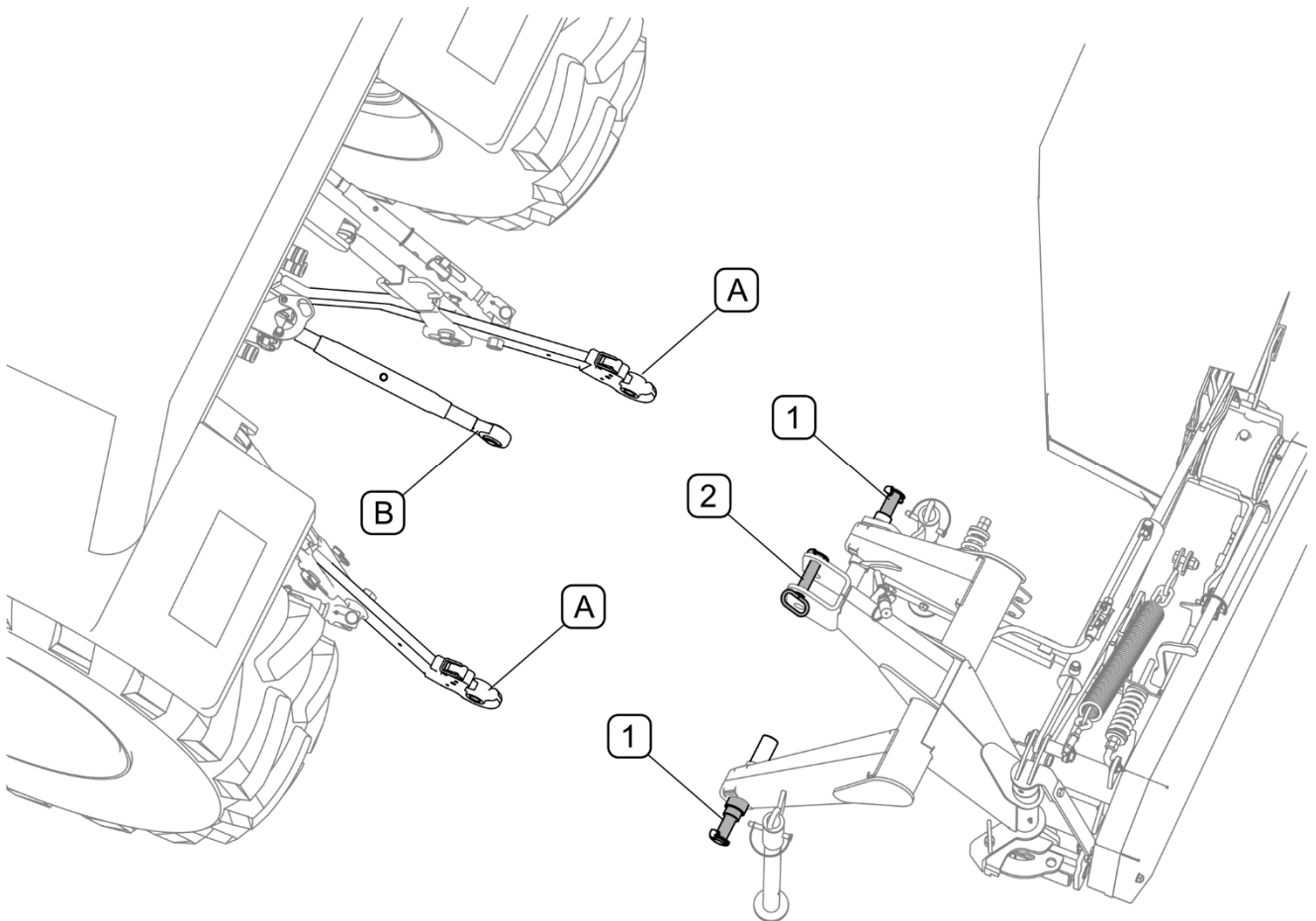


FIGURE 4.1 Hitching to tractor

(A) - lower three point linkage arms; (B)- top link; (1) - mower linkage lower pins;
(2) - top link mounting pin



DANGER

When hitching, there must be nobody between the machine and the tractor.
Exercise caution when hitching the machine.

In order to attach the mower to tractor (FIGURE 4.1), proceed as follows:

- Reversing the tractor bring the lower three point linkage connection points (A) of the tractor close to pins (1) of the mower.
- Set links (A) of tractor at appropriate height.
- Turn off tractor engine and prevent it from moving.
- Connect lower pins (1) with linkage arms (A) and lock with the aid of cotter pins.
- Connect tractor top link (B) with mower pin (2) and secure with cotter pin.
- Lift mower using tractor's three point linkage.
- Raise parking stand and secure with cotter pin.
- Unlock lifting arm by removing lock pin (2) (FIGURE 4.15)

Set both lower linkage arms of the tractor at the same height.

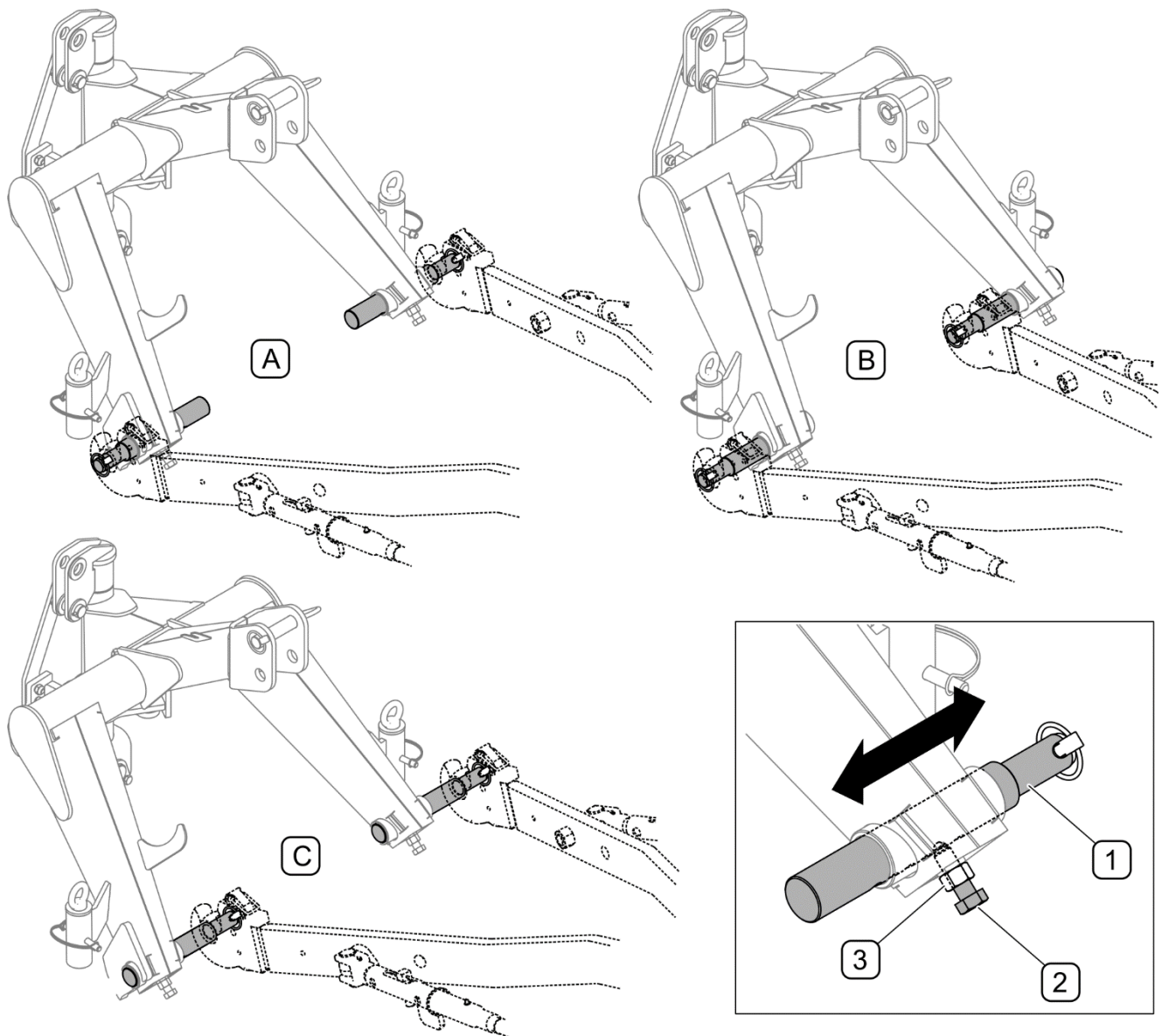


FIGURE 4.2 Adjustment of lower pins of the mower's linkage

(1) - lower linkage pins; (2) - setting screw; (3) - counter nut, (A), (B), (C) - setting pins in arm

Lower pins (1) of the mower linkage enable spacing adjustment (FIGURE 4.2). To change spacing of linkage pins:

- loosen counter nut (1),
- unscrew retaining bolt (2),
- move pin (1) to the right or the left to obtain the required spacing,
- you may also turn pins towards the inside or outside of frame (A), (B), (C) changing thus the lateral shift of mower in relation to tractor
- Block pin position with setting bolt (2) and counter nut (3)

The method of adjustment of right and left pins is identical.

As standard PRONAR PDK220 mower is equipped with pins for linking with category II linkage according to ISO 730-1. Use appropriate pins (optional equipment) or adapter balls for linking with category III or I linkage.

Connect hydraulic quick coupler of cable of cutting unit load-bearing arm lifting cylinder to hydraulic circuit with floating position.



DANGER

When connecting the hydraulic conduits to the tractor, make sure that the tractor hydraulic system is not under pressure.

4.4 TRANSPORTING THE MACHINE

For transport to place of work and back, raise mower on tractor three point linkage so that the lower pins are at height of not less than 500 mm above the ground. It is recommended to disconnect PTO shaft.

The mower can be set in one of three transport positions (A, B, C FIGURE 4.3)

To set the mower in (A) transport position:

- raise lifting arm by operation of appropriate hydraulic circuit in tractor until it is locked with the catch (1) (FIGURE 4.4),
- close cylinder valve (2)

To set the mower in (B) position:

- raise lifting arm by operation of appropriate hydraulic circuit in tractor until it is locked with the catch (1) (FIGURE 4.4), close lifting cylinder valve (2),
- release and take out securing pin (2), from safety catch (FIGURE 4.5)
- raise safety catch (1) and place in bracket frame and secure with pin (2) and cotter pin (FIGURE 4.5)
- manually tilt whole cutting unit backwards until it locks in that position;

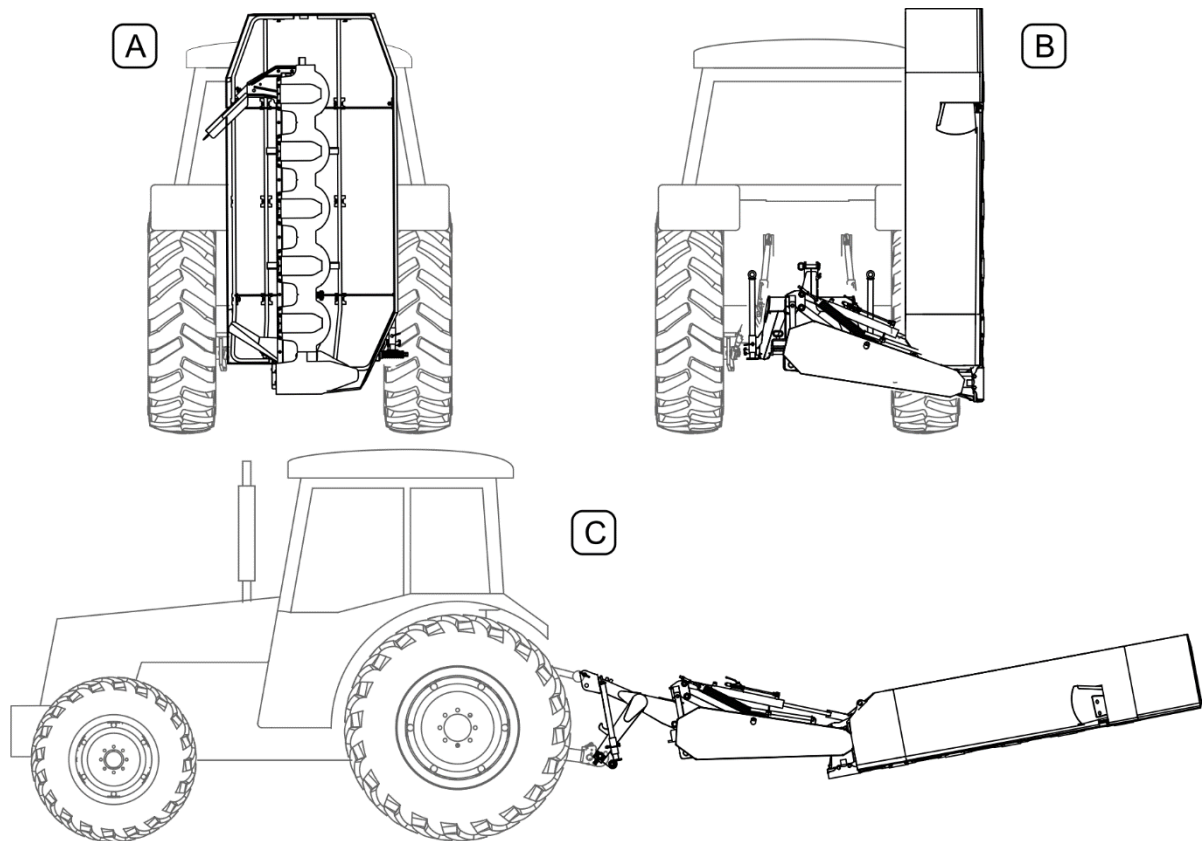


FIGURE 4.3 Transport position

(A), (B), (C)- transport positions

To set the mower in (C) position:

- Lift the mower on three-point linkage
- release and take out securing pin (2), from safety catch (FIGURE 4.5)
- raise safety catch (1) and place in bracket frame and secure with pin (2) and cotter pin (FIGURE 4.5)
- manually tilt whole cutting unit backwards until it locks in that position;
- close lifting cylinder valve (2) (FIGURE 4.4)

In (C) transport position the mower can be transported only short distances at an appropriately reduced travel speed.

Three point linkage lower arms must be secured so that mower does not swing sideways.



DANGER

During transport of the mower mounted on the tractor, the cylinder valve (2) (FIGURE 4.4) should be set in position "0 – closed"

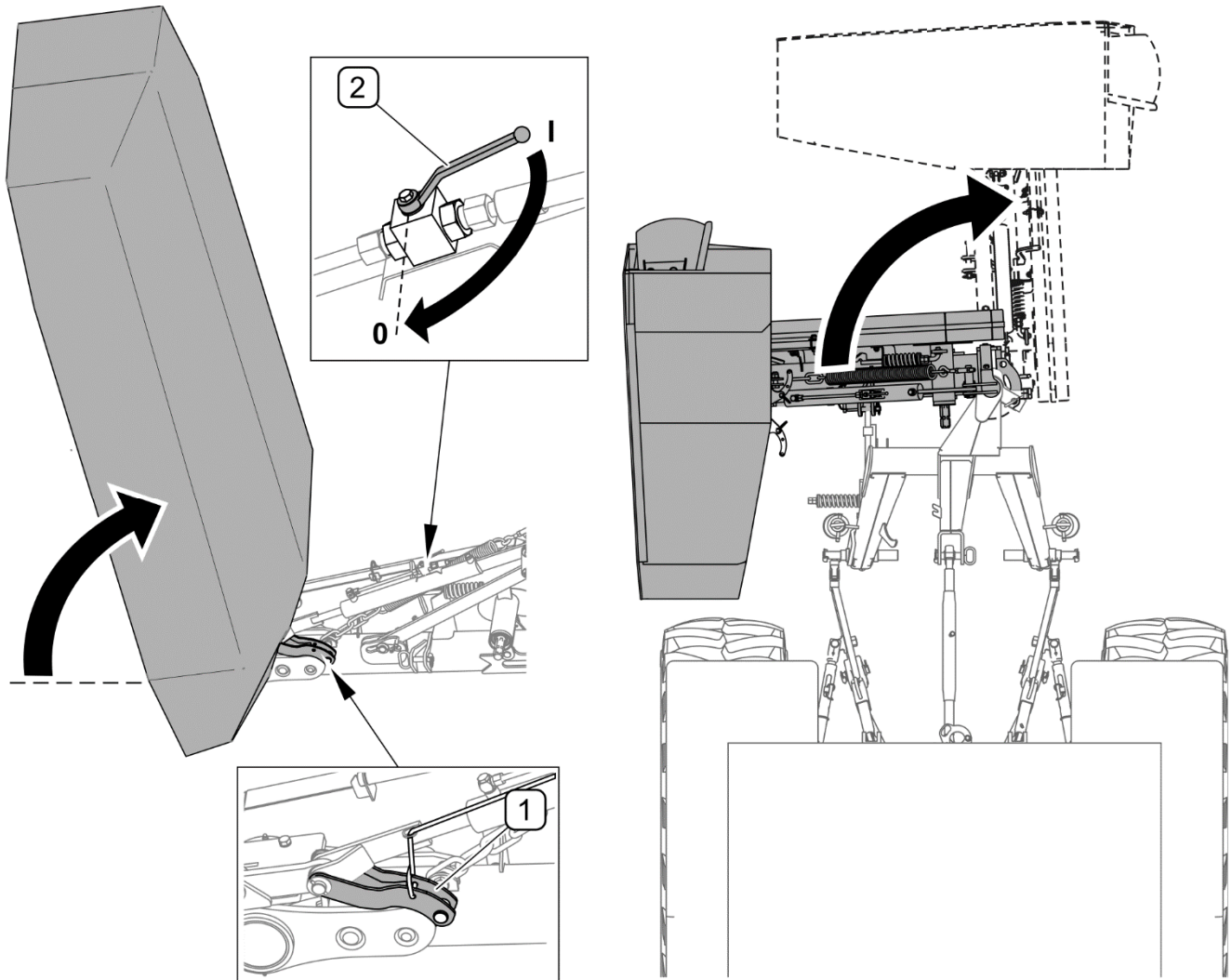


FIGURE 4.4 Setting transport position
(1) - lifting arm catch, (2) - cylinder valve

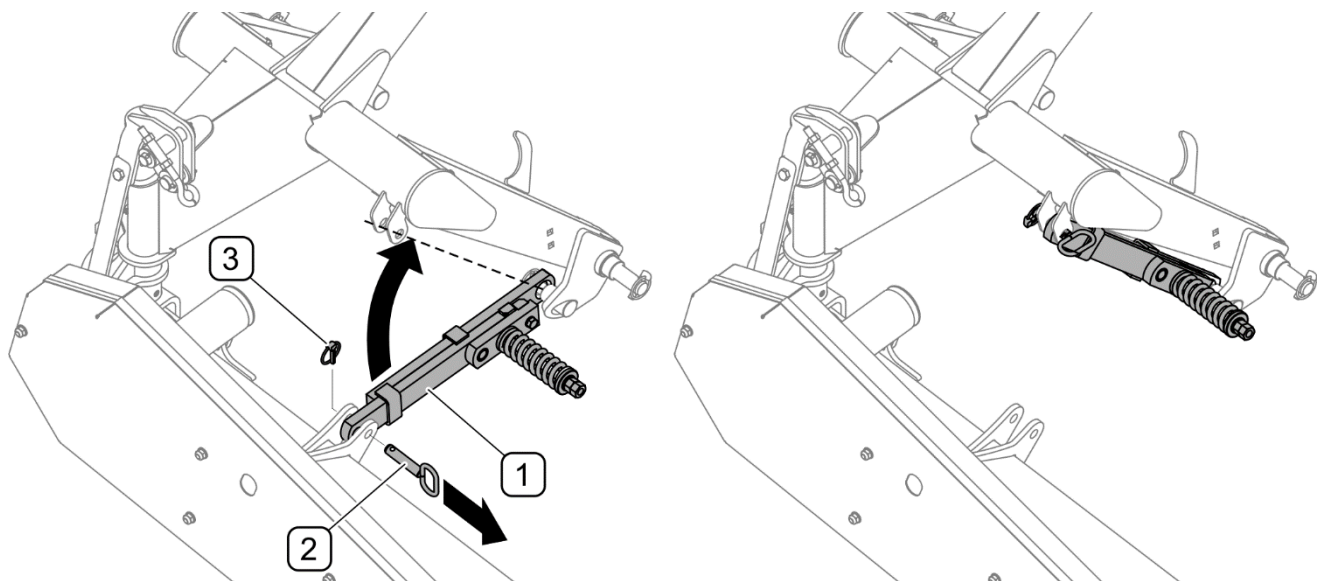


FIGURE 4.5 Disassembly of safety device
(1) - safety device; (2) - pin; (3) - cotter pin

To disassemble the safety device (1) from the lifting arm, remove the cotter pin (3) and pin (2), lift the safety device (1) and mount it in the linkage. The safety device is dismantled in order to set the mower to the transport position (A, C FIGURE 4.4).

4.5 SETTING AND MOWING

4.5.1 SETTING THE MOWER IN WORKING POSITION



NOTE

Only set the mower in the working position after the machine is mounted on the tractor.

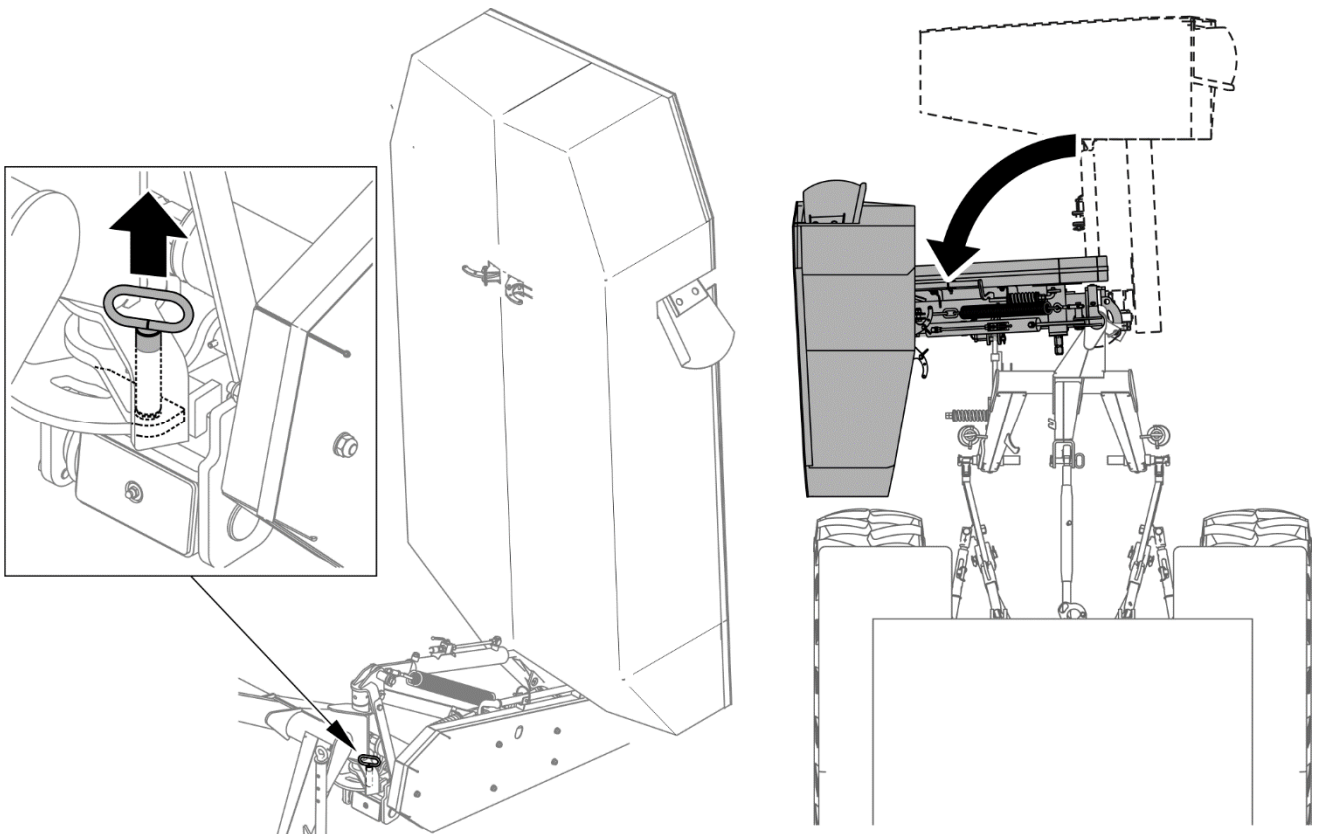


FIGURE 4.6 Unlocking lifting arm

If in the transport position (FIGURE 4.6), the lifting arm with the cutting unit of the mower is tilted backwards (safety catch disconnected), raise the lock pin and then turn the lifting arm by hand to the working position.

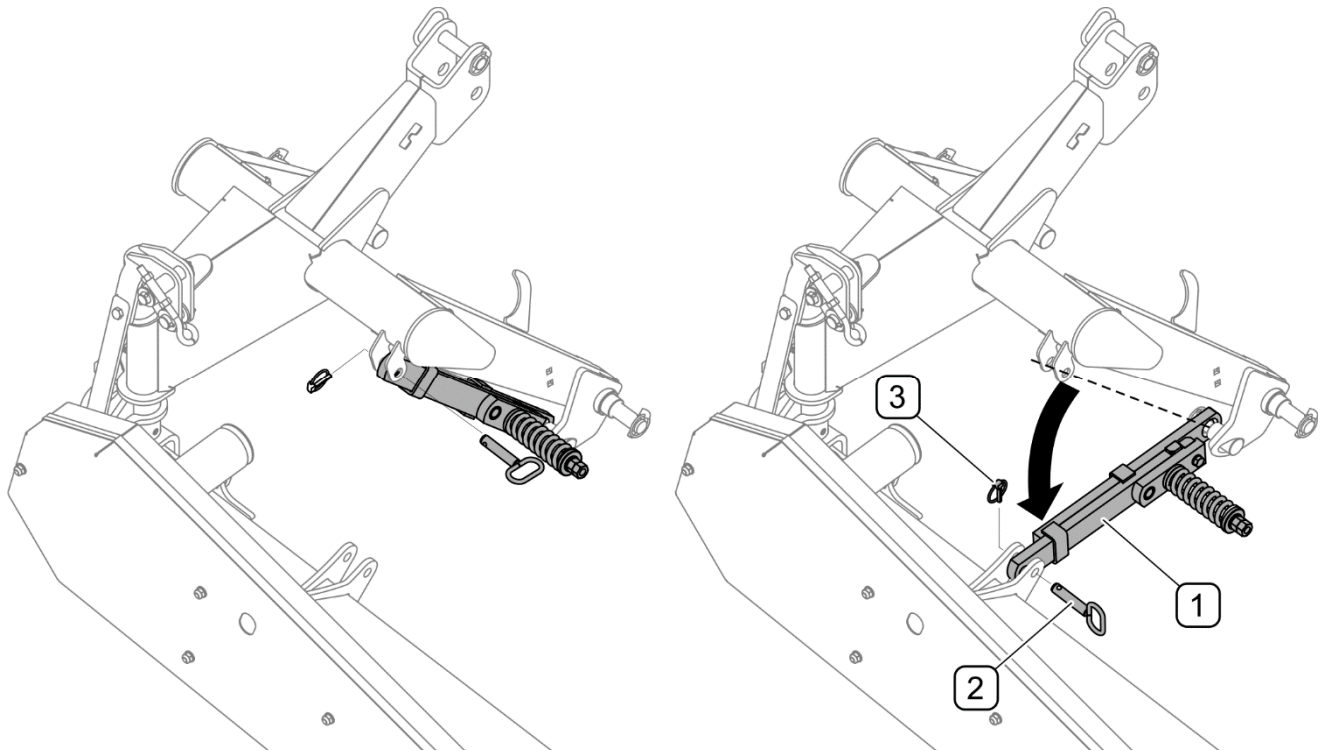


FIGURE 4.7 Assembly of safety device

(1) - safety device; (2) - pin; (3) - cotter pin

To lock lifting arm in working position, assemble safety device (FIGURE 4.7). To this end, remove cotter pin (3) and, holding safety device (1), remove pin (2). Lower safety device (1) and attach to lifting arm using pin (2) with cotter pin (3).

In order to set mower in working position from transport position (FIGURE 4.8):

- release valve (1) of cylinder (FIGURE 4.8),
- release catch (2) by pulling catch cord (3) and operate hydraulic circuit in tractor to lower lifting arm with cutting unit so that cutter bar rests freely on ground, switching tractor hydraulic circuit to floating position.

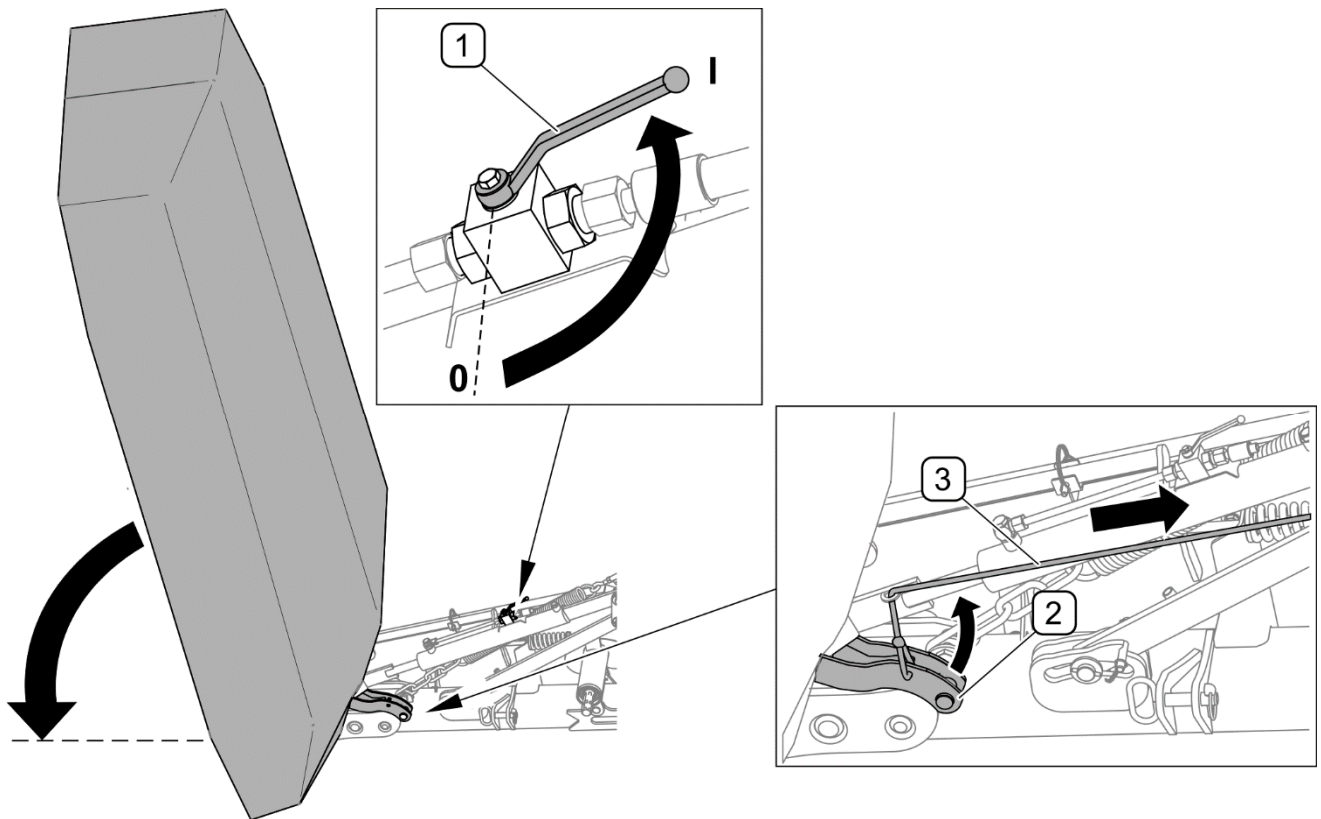


FIGURE 4.8 Setting mower in working position

(1)- cylinder valve ;(2)- catch; (3)- catch cord;

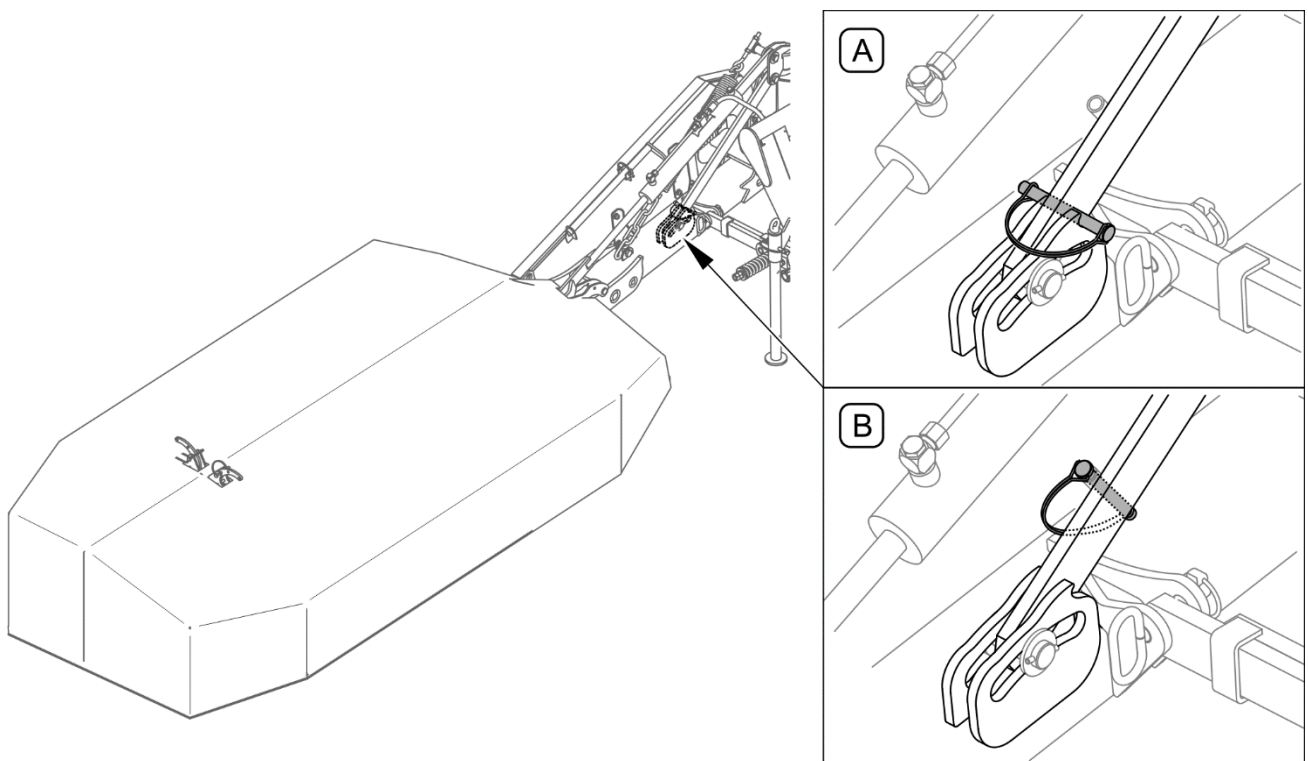


FIGURE 4.9 Unlocking of ground surface tracking

(A) - ground surface tracking locked (parking position); (B) - ground surface tracking unlocked

If ground surface tracking has been locked (A) (e.g. mower in parking position, disconnected from carrying vehicle), unlock mower lifting arm (B), prior to operation of mower, by removing cotter pin from hole in bar and install it in sleeve (FIGURE 4.9).

4.5.2 SETTING CUTTING HEIGHT

Raise lower lifting arms of tractor to such a height (A) that the pin may be set as in figure 4.10

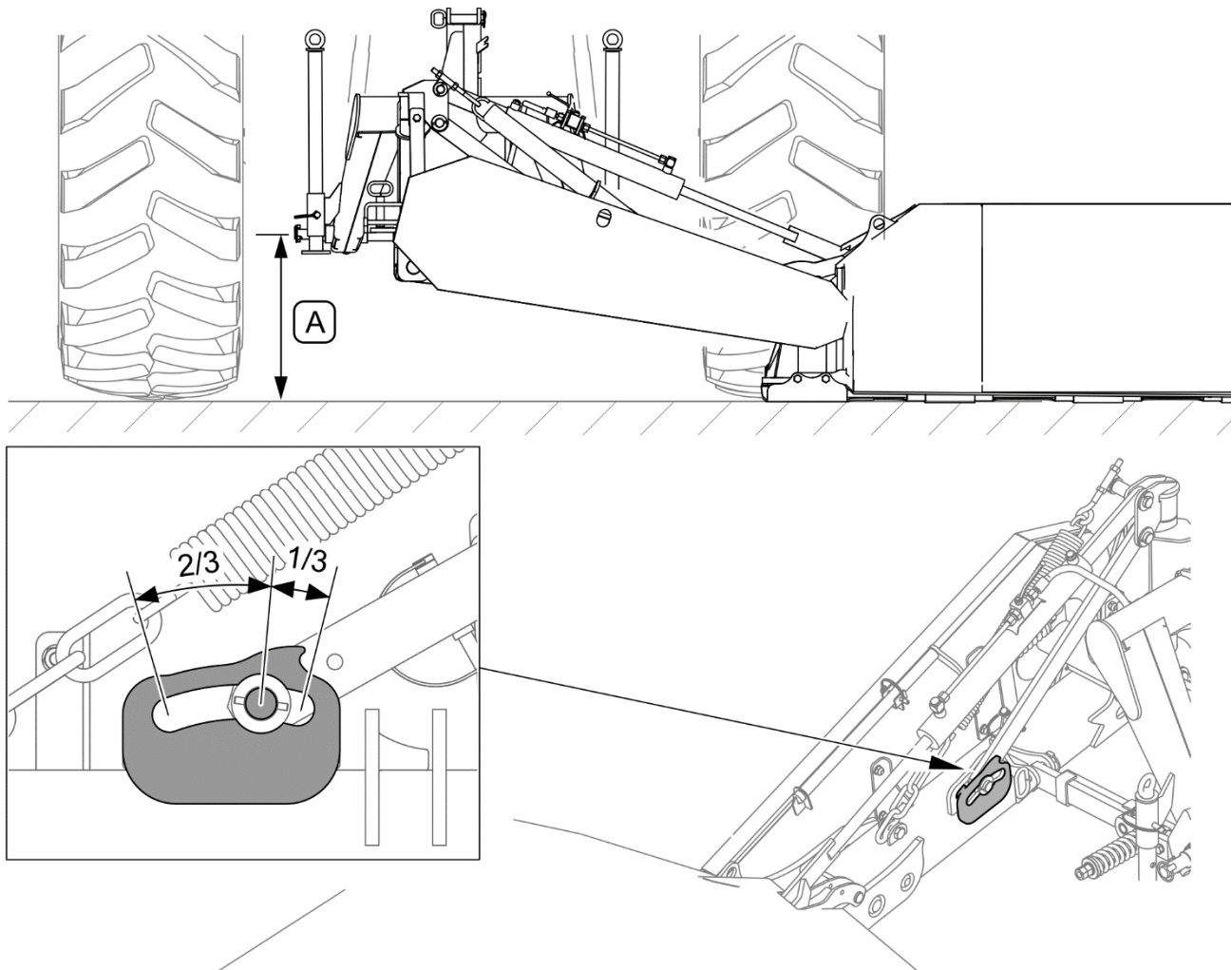


FIGURE 4.10 Setting mower suspension height

(A)- distance of lower lifting arms from the ground



TIP

Optimum angle of inclination of cutter bar to the front is from 4° do 5°. Inclination to the rear causes faster wearing of cutter bar slide surfaces.

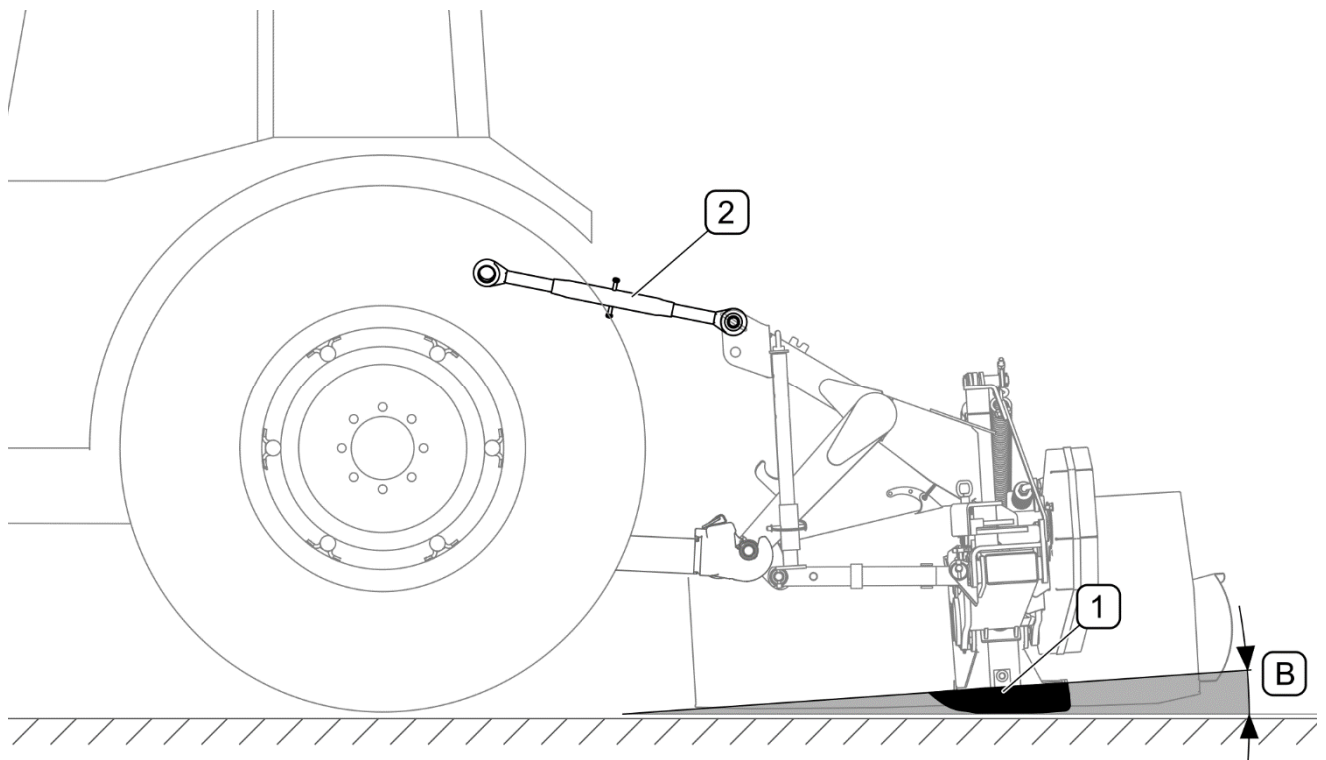


FIGURE 4.11 Setting cutting height

(1) - cutter bar; (2) - top link (central link); (B) - cutter bar inclination of 4° ÷ 5° against ground

Adjust length of top link (2) so that cutter bar inclination angle (B) (in the mowing direction) should be 4° to 5° . Lengthen top link to increase cutting height. Shorten top link to reduce cutting height.

4.5.3 CONNECTING OF PTO SHAFT

DANGER



Before connecting the shaft, turn off the tractor engine and remove the key from the ignition. Ensure that unauthorised persons do not have access to the tractor.

The use of PTO shaft and its technical condition must be in accord with the Operator's Manual of PTO shaft.

Before connecting the mower it is absolutely necessary to carefully read the Operator's Manual attached by the Manufacturer of the shaft and observe the instructions contained in it.



IMPORTANT!

Before first use, adjust the length of PTO shaft according to Operator's Manual of PTO shaft recommendations.

Before connection to the tractor, check technical condition of shaft guards, completeness and condition of protecting chains and general technical condition of PTO shaft. The PDK220 mower has a factory-mounted PTO shaft which is not to be disconnected from the mower (*except for maintenance and repairs, transport travel or extended periods of machine parking*). The PTO shaft of the PDK220 mower is equipped with a backstop clutch, which is at the end of the shaft from the side of the mower.

4.5.4 ADJUSTMENT OF STAY SPRING

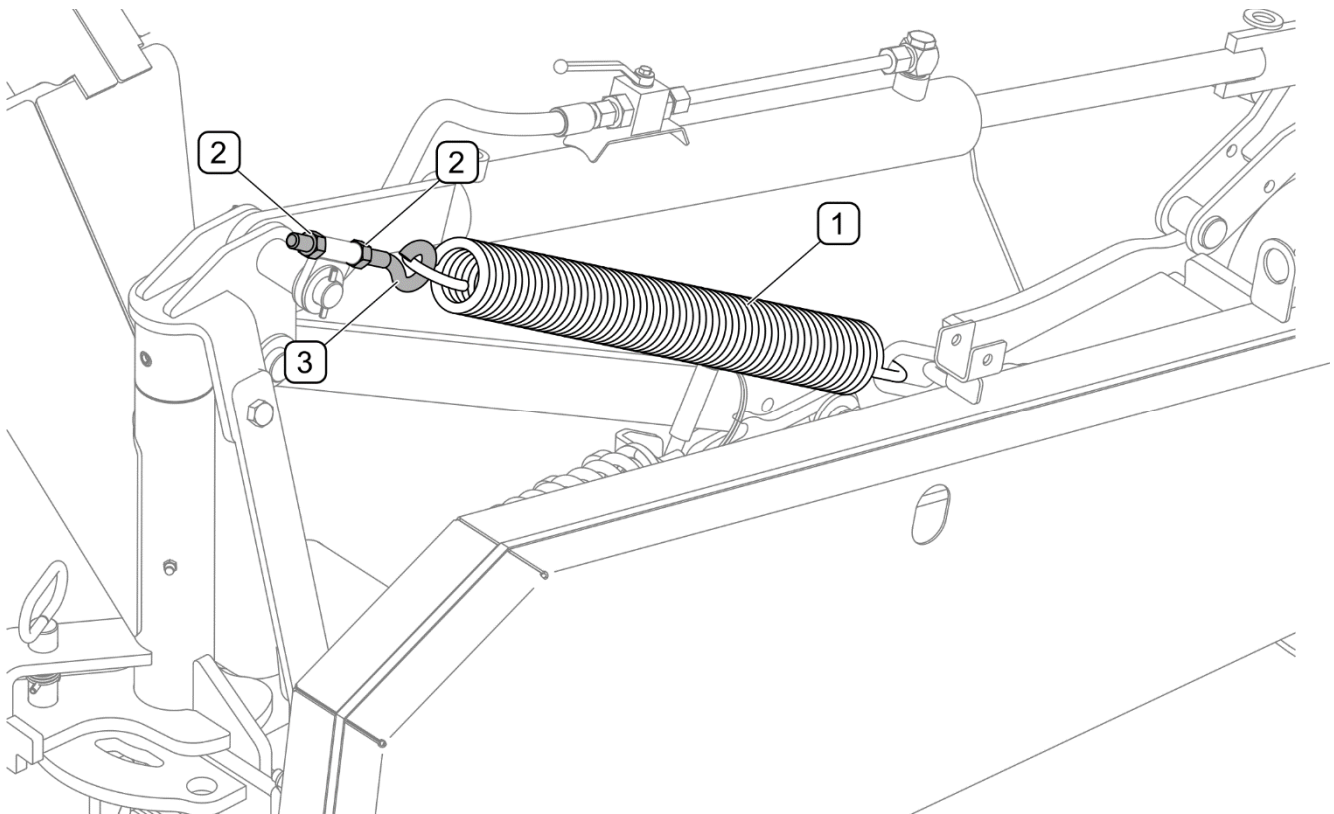


FIGURE 4.12 Adjustment of stay spring

(1) - stay spring; (2) - adjustment nuts; (3) - tensioner;

Stay spring (1) of cutting unit is able to adjust pressure of cutting unit on the ground during cutting (FIGURE 4.12). Depending on the ground and topography, adjust pressure value by changing the tensioning of spring (1) with the right adjustment nut (2) of tensioner (3).

4.5.5 MOWING

DANGER



The mower may only be started when all guards are in place and the cutting unit is set in working position.

Before engaging drive to PTO shaft make sure that there are no bystanders, especially children, near the mower.

Other persons should be at a safe distance from the mower during work because of the danger that objects may be thrown (stones, branches from beneath rotating disks).

After setting mower in working position, setting cutter bar, observe the following procedure: Lower the cutter bar lifting arm until the cutter bar rests on the ground. Engage the PTO in the tractor at a suitably low speed and then gradually increase the speed until PTO speed of 540 rpm is reached. During starting the cutting unit generates considerable noise. Noise is reduced when mower is driven into standing crop. During cutting the lever controlling the hydraulic circuit, lifting the cutting unit, should be set in "floating" position.

HIGH NOISE LEVEL WARNING



Depending on the working conditions, the tractor with the machine may generate noise exceeding the level of 85dB at the driver position. In such conditions the driver should apply individual protection (protective ear guards).

In order to reduce the level of noise during work the tractor cab window and door should be closed.

When mowing pay special attention to uneven surface and any large objects lying in the grass. Mowing speed depends on the quantity and quality of mown crop but also on the type of terrain.

Mowing speed must be reduced if:

- mown ground is uneven,
- crop is laid, or very tall and dense,
- there is a great risk of running into foreign bodies e.g. stones, branches and heaps of soil.

Be especially careful when mowing along ditches, furrows and slopes. When making turns, raise the cutting unit by means of the arm lifting cylinder, without the need to change the height of hoist lower links in the tractor. When mowing on hilly terrain or on slopes make turns so that the cutting unit is set up the slope.

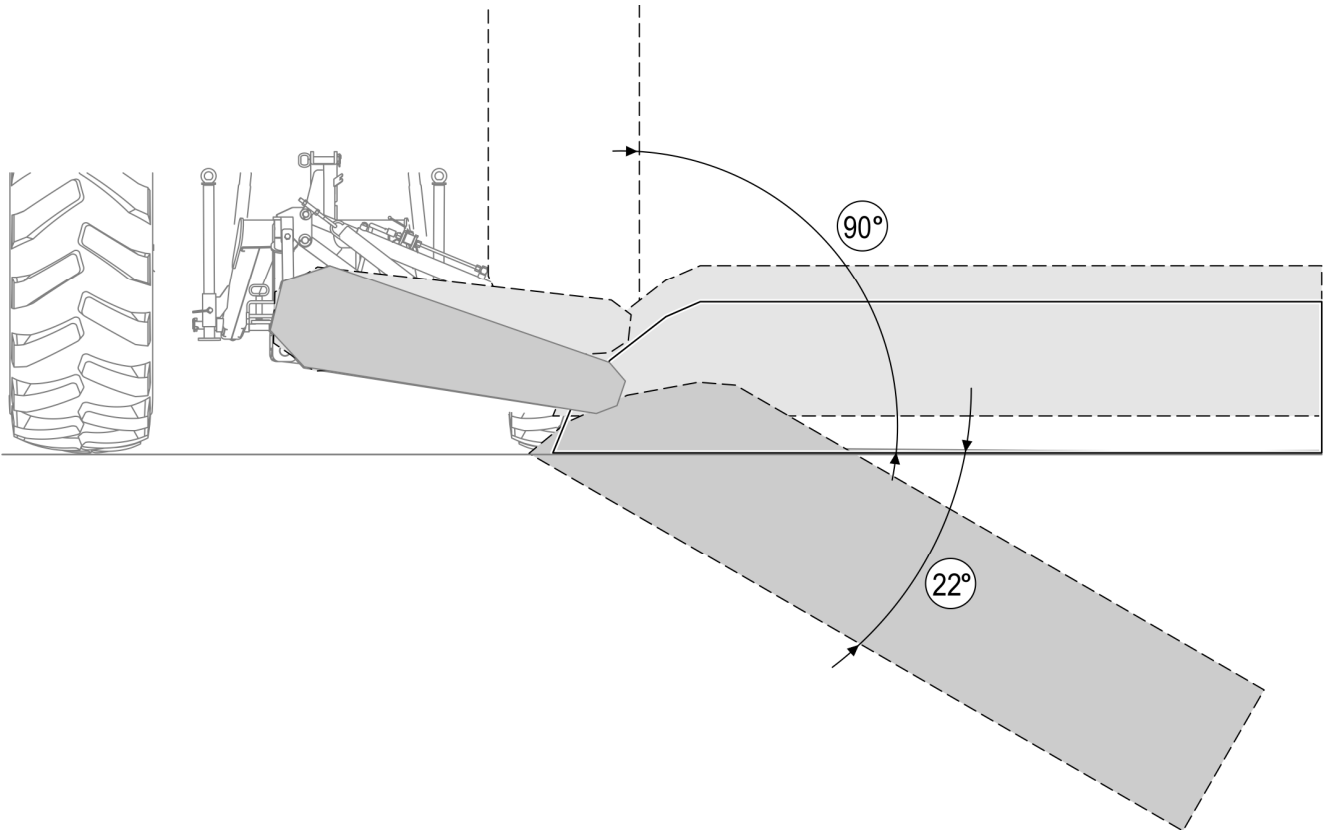


FIGURE 4.13 Range of inclination of cutting unit during mowing

	<p>ATTENTION!</p> <p>Do NOT operate mower while reversing. While reversing raise the cutting unit.</p>
---	---

4.5.6 SAFETY DEVICE

The PDK220 mower is equipped with a safety device, which protects the machine against damage resulting from collision with obstacles (FIGURE 4.14). When driving over an obstacle, the lifting arm with the cutting unit tilts backwards (C). In such a case stop tractor and disconnect drive and then reverse until the safety device blocks itself in setting (B).

The safety device (FIGURE 4.14) is factory set such that the length of the compressed spring (3) is A=132 mm. If the safety device operates too frequently without cause, you may use the nut (2) to reduce size (A) of the spring by 1 - 2 mm.

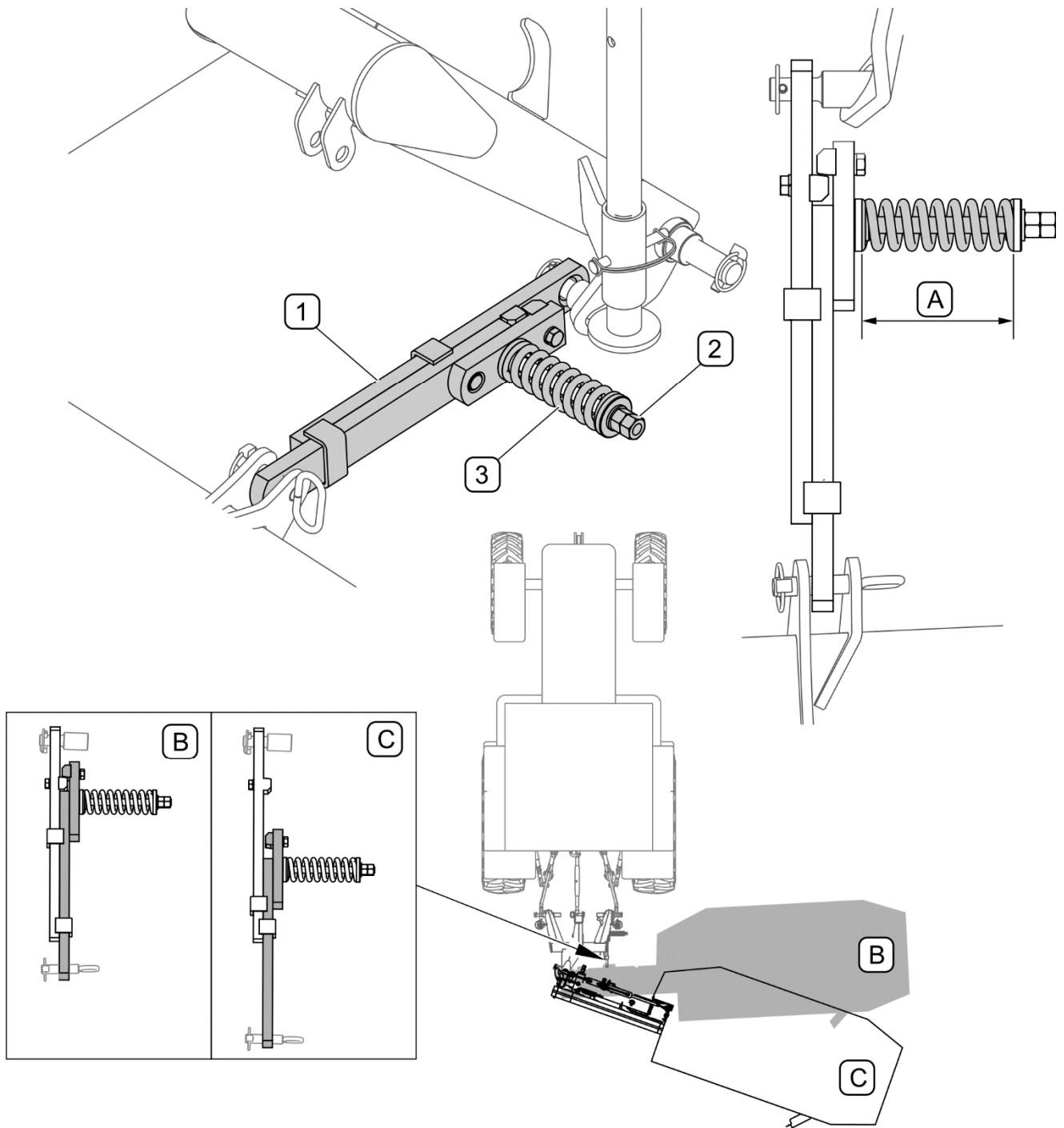


FIGURE 4.14 Fuse

(1) - safety device; (2) - tensioning nut; (3) - safety device spring (A) - factory spring setting
 A=132 mm; (B) - working position; (C) - safety device action



ATTENTION!

Excessive tension of the spring prevents action of safety device and may cause damage to machine as a result of driving over obstacle.

4.6 UNHITCHING FROM TRACTOR

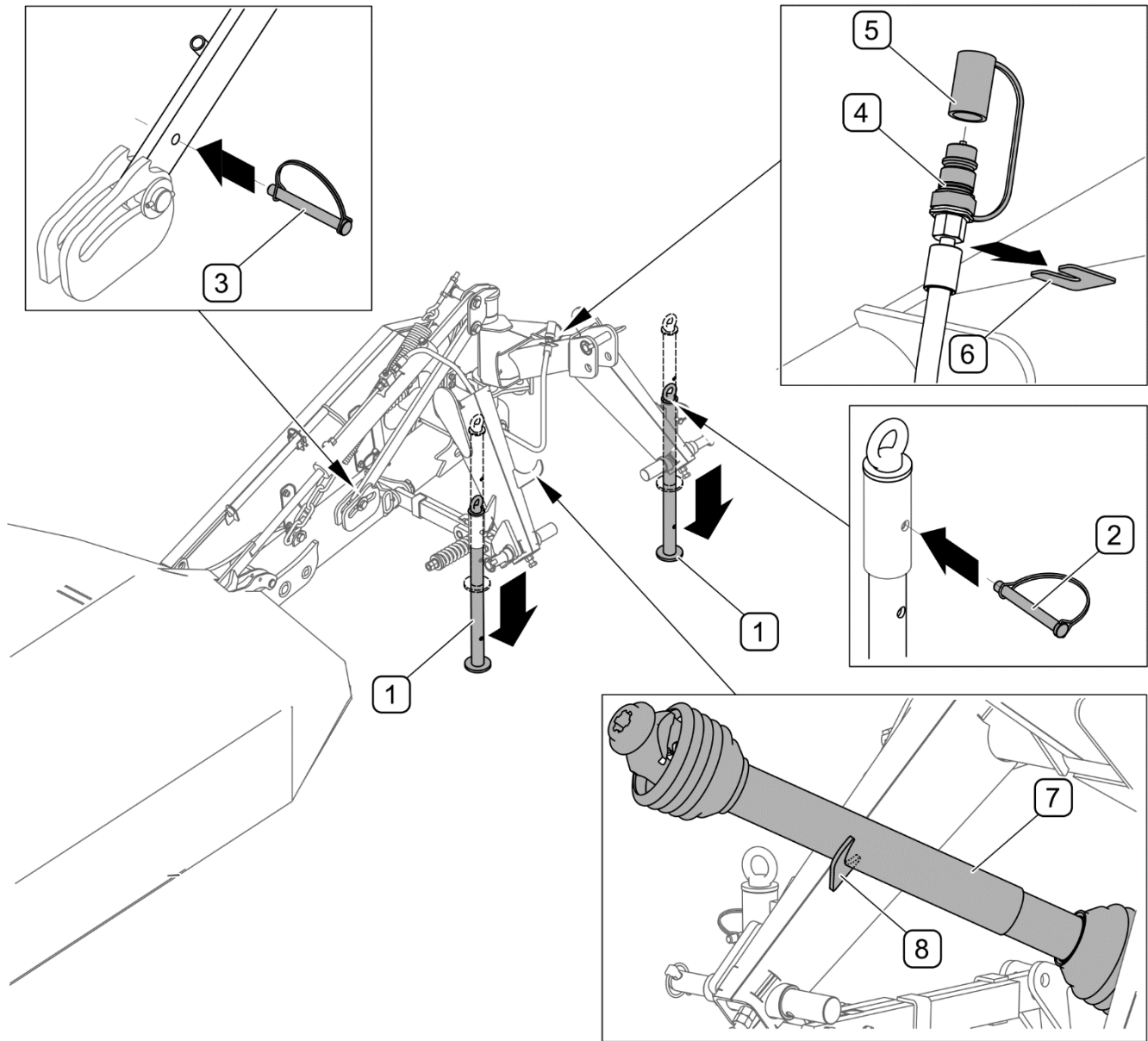


FIGURE 4.15 Disconnecting mower from tractor

- (1) - support leg;
- (2) - support leg securing cotter pin;
- (3) - lifting arm lock cotter pin;
- (4) - hydraulic quick coupler;
- (5) - securing plug;
- (6) - quick coupler bracket;
- (7) - PTO shaft;
- (8) - PTO shaft bracket

	DANGER
Reduce pressure prior to disconnecting the hydraulic system..	

**DANGER**

Before disconnecting mower from the tractor linkage, lock bearing beam with the aid of cotter pin (3) (FIGURE 4.15). Do NOT disconnect mower from tractor without locking the beam.

In order to disconnect the mower from the tractor (FIGURE 4.15) proceed as follows:

- set the cutting unit in working position;
- lower both support legs (1) and lock them with cotter pins (2),
- lock support beam with cotter pin;
- lower mower using three-point linkage to rest position,
- turn off tractor engine and remove key from ignition,
- reduce residual pressure in the hydraulic system by movement of appropriate lever controlling hydraulic circuit,
- disconnect hydraulic quick coupler (4) from tractor system, secure it with plug and place on bracket (8) on mower frame,
- disconnect PTO shaft (7) from tractor PTO drive and place on bracket (8),
- disconnect top link of three-point linkage,
- disconnect lower pins and drive tractor away.


After disconnection from the tractor mower should be set in the appropriate position supported on support and on cutting bar.

SECTION

5

MAINTENANCE

5.1 CHECKING AND REPLACING CUTTING BLADES

 **DANGER**
During inspection and replacement of blades, turn off tractor engine and remove the key from the ignition and disengage PTO shaft. Cutter bar must rest on the ground.

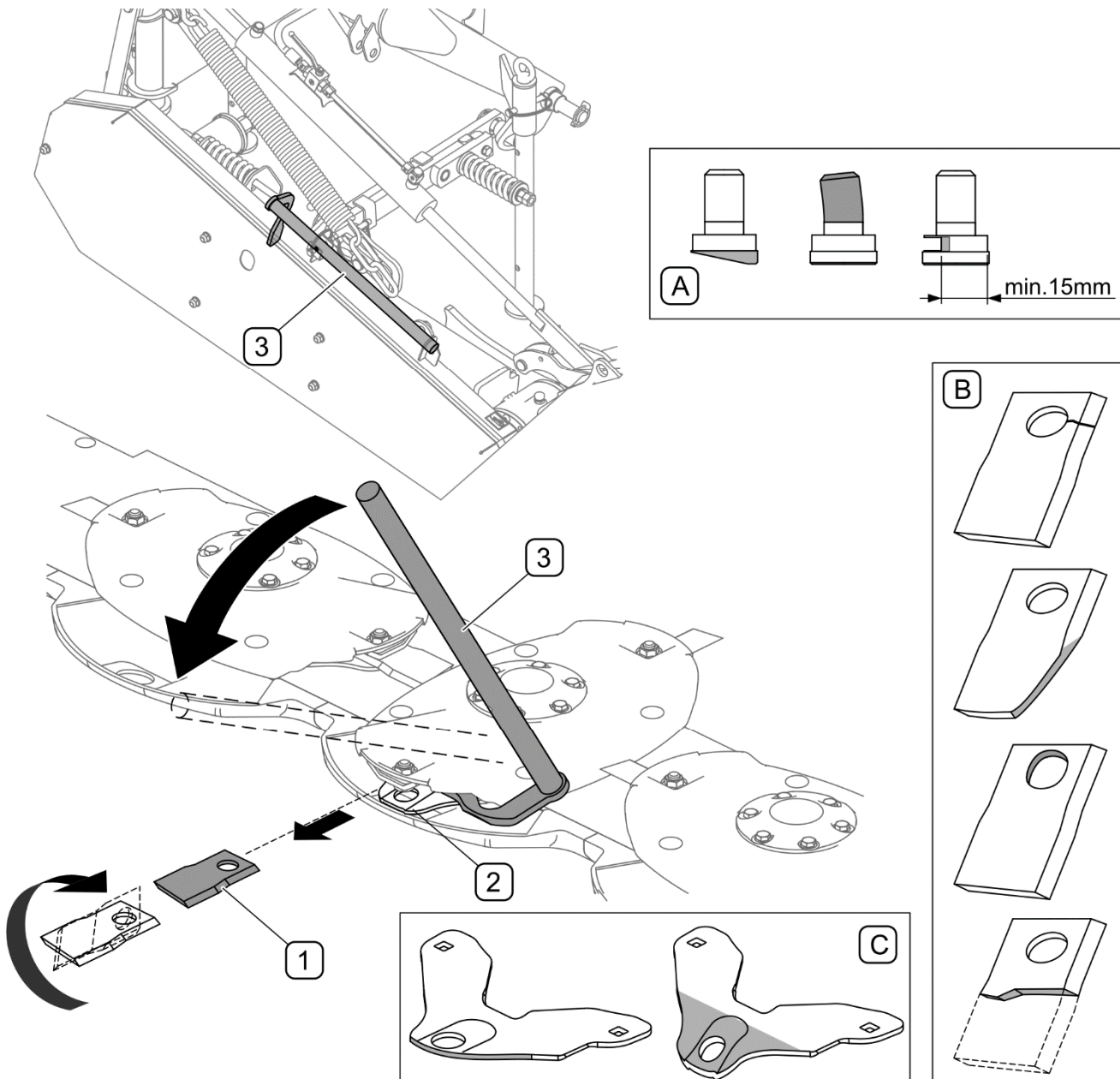


FIGURE 5.1 Replacement of cutting blades

(1)- cutting blade; (2)- blade holder; (3)- blade changing key; (A)- arbor damage example; (B)- blade damage example; (C)- blade holder damage example

Inspections of blades must be carried out regularly. Visual inspection involves checking of the blade and mounting. blades should be worn down uniformly. If blade is worn down naturally it can be reversed and reinstalled on the cutting disk (this applies to double edged blades). A bent or damaged blade must be replaced with a new one. Cutting blades must be replaced in pairs in order to maintain the balance of the cutting disc. Before proceeding to replace the blades, clean the residue of mown material from the cutter bar.

Use key to change parts (3) placing it between blade holder (2) and cutting disc, next press on key (3) till the moment that it is possible to take out the (1). When changing blades check the condition of the arbor securing the blade to the cutting disk and also the blade holder. An excessively worn or damaged arbor or blade holder should be replaced with a new part. Tighten arbor nuts with torque of 120 Nm.

**DANGER**

Use only CE certified blades meeting the requirements of ISO 5718 standard.

**ATTENTION!**

Missing blade or its fragment will cause imbalance and excessive cutting disk vibration and may damage the cutter bar.

TABLE 5.1 Cutting blade characteristics for PDK220 mower

DESIGNATION OF BLADE	DIMENSIONS [mm]	DIRECTION OF ROTATION	QUANTITY
BRZW 120/49/4 P		right	4
BRZW 120/49/4 L		left	6



TIP

Damaged or worn blades must be changed in pairs in order to maintain balance of cutting disc.

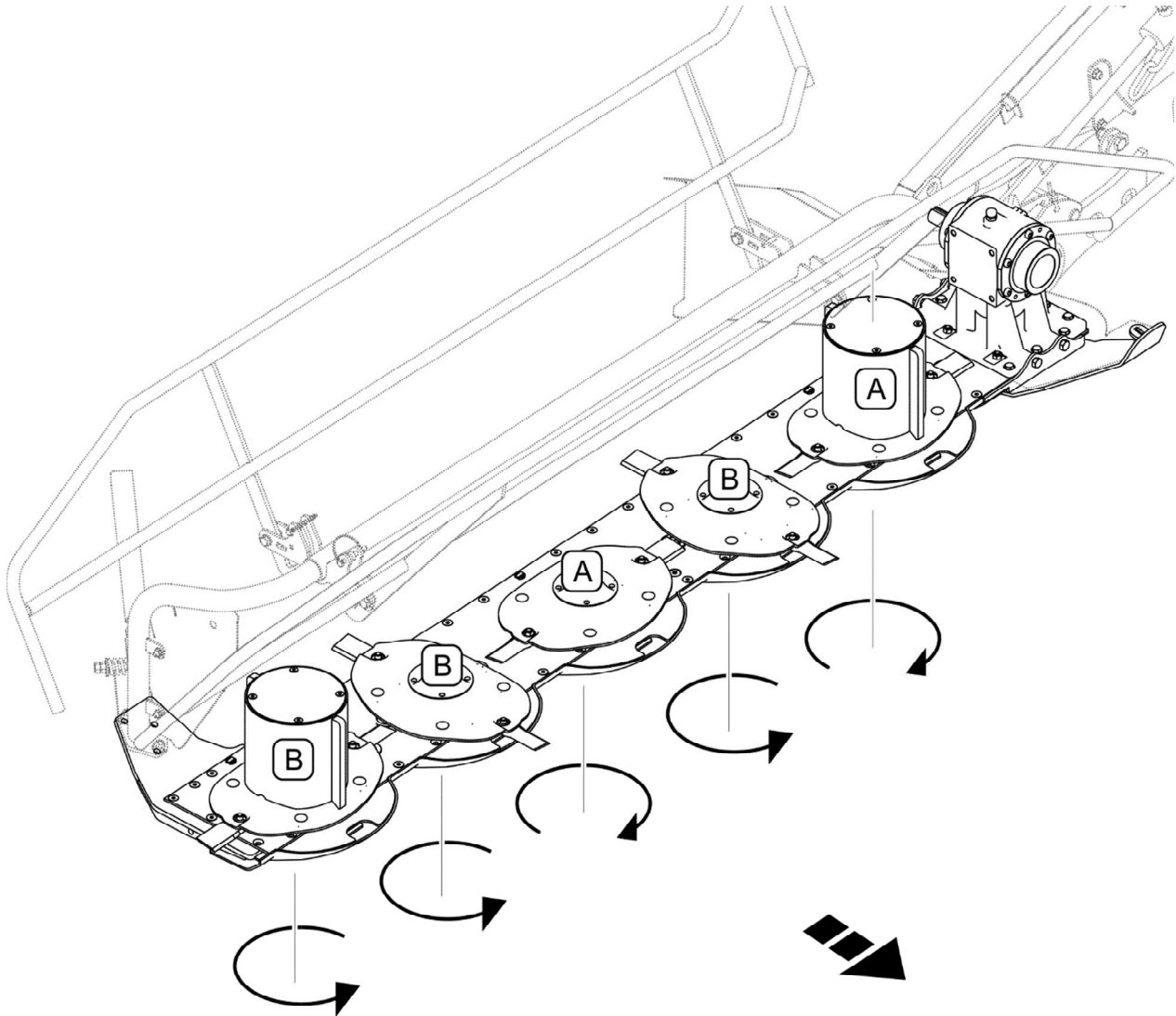


FIGURE 5.2 Blade types depending on cutting disc rotation direction

(A) - right blades; (B) - left blades

Due to different cutting disc rotation direction, cutter bar (FIGURE 5.2) is equipped with the right blades (A) and left blades (B). Rotation direction is indicated on the blade.



ATTENTION!

Check the technical condition of blades and then mounting on each occasion after driving over obstacle e.g. stone, piece of wood, metal etc.

5.2 CUTTING UNIT SERVICE

Service of cutting unit involves periodic inspection and change of oil in cutter bar and in intersecting axis gear.

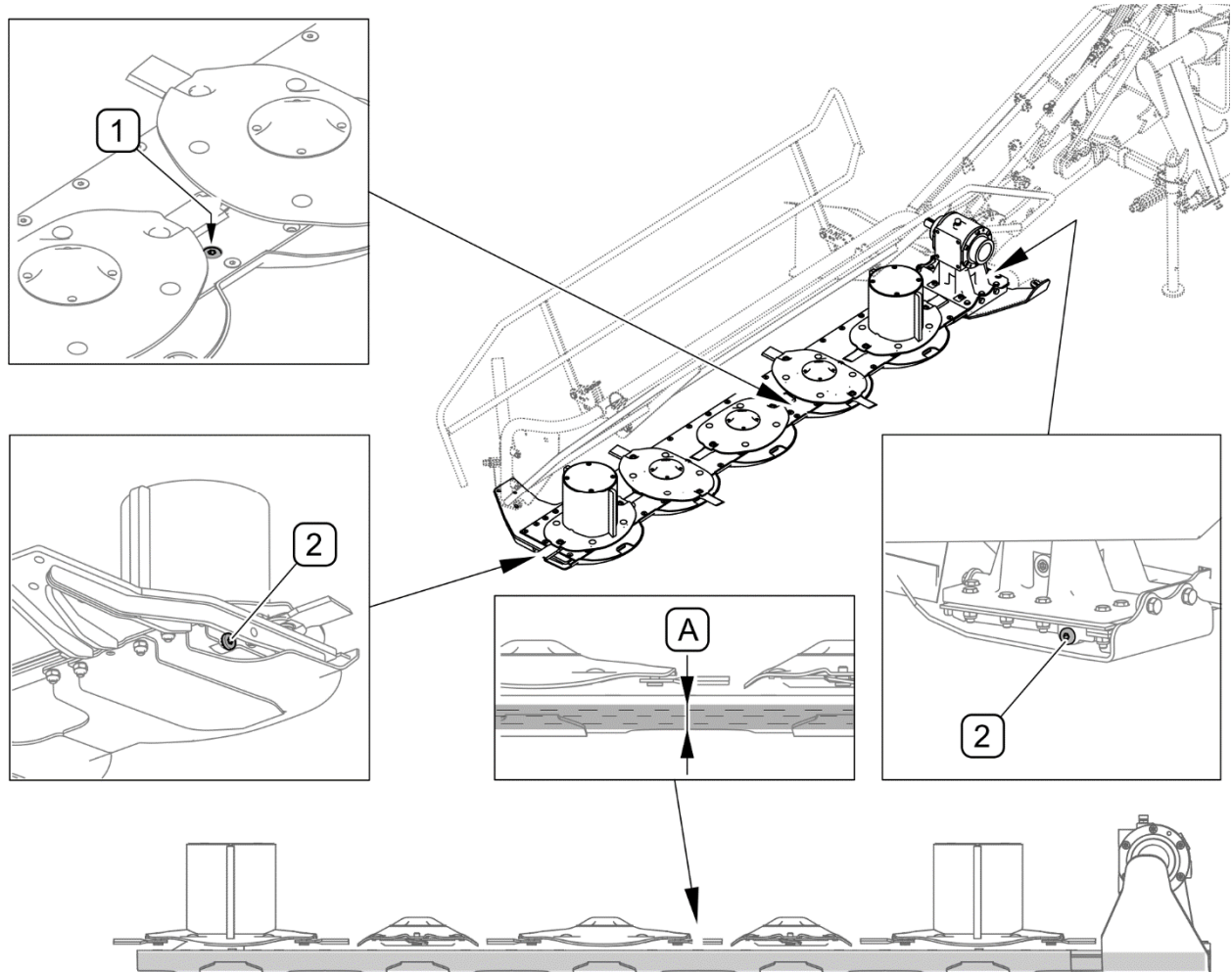


FIGURE 5.3 Checking and change oil in cutter bar

(1)- inspection filler plug; (2)- drain plug; (A)- correct oil level in cutter bar 6÷8 mm from bottom of bar

Correct oil level (A) with cutter bar in horizontal position is 6 ÷ 8 mm from the cutter bar bottom. To check oil level, unscrew inspection filler plug (1) located between the second and third disks counting from the gear. In the case of cold oil after lowering the bar to horizontal position, wait approximately 15 minutes before checking.



Check oil level in cutter bar daily before beginning work.

First oil change should be made after 50 hours mower operation and then, after each 500 hours of operation or at least once in the season, whichever occurs first. 2.4 litres of SAE90EP (80W90 GL5) gear oil can be poured into cutter bar. It is best to change oil immediately after completing work when cutter bar is still hot and impurities are suspended in oil. Cutter bar has two drain plugs (2) on both sides. You may use either drain plug (2) to drain oil, depending on the oil change method.

In order to change oil in cutter bar:

- unscrew filler plug,
- raise cutterbar,
- unscrew drain plug and drain oil to previously prepared basin,
- tighten drain plug,
- position cutting unit horizontally and pour the required quantity of oil through the opening of inspection filler plug,



Oil in cutter bar must be changed after the first 50 hours of work. The next oil change should be made after 500 hours of work or once a year, whichever occurs first.



TIP

To lubricate cutter bar, use 2.7 litre of transmission oil SAE90EP (80W90GL-5). Oil level should be 6 ÷ 8 mm above the bottom of the cutterbar.

If a leak is noticed, carefully inspect seals and check oil level. Mower operation with low oil level in cutter bar may cause lasting damage. Repairs of cutter bar during warranty period (except blade replacement) may only be performed at authorised mechanical workshops.



DANGER

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



Check oil level in intersecting axis gear daily before beginning work.

To check the oil level in intersecting axis gear:

- set cutter bar horizontally,
- unscrew inspection plug (1) (FIGURE 5.4),
- oil level should reach the lower edge of the plug opening (1),
- if necessary, supplement oil to the required level.



DANGER

When checking oil level and changing oil, use the appropriate personal protection equipment i.e. protective clothing, footwear, gloves eye protection. Avoid contact of skin with oil.



Oil in intersecting axis gear must be changed after the first 50 hours of work. The next oil change should be made after 500 hours of work or once a year, whichever occurs first.

To change oil in intersecting axis gear:

- set mower level horizontally,
- unscrew inspection plug (1) and drain plug (3) (FIGURE 5.4),
- drain oil into the previously prepared vessel and tighten drain plug (3),
- if oil Manufacturer recommends flushing transmission, that operation should be performed according to the guidelines of the oil Manufacturer (guidelines may be detailed on packaging),
- pour oil through plug (2) to lower edge of inspection filler plug opening.
- screw in filler plug (2) and inspection plug (1).

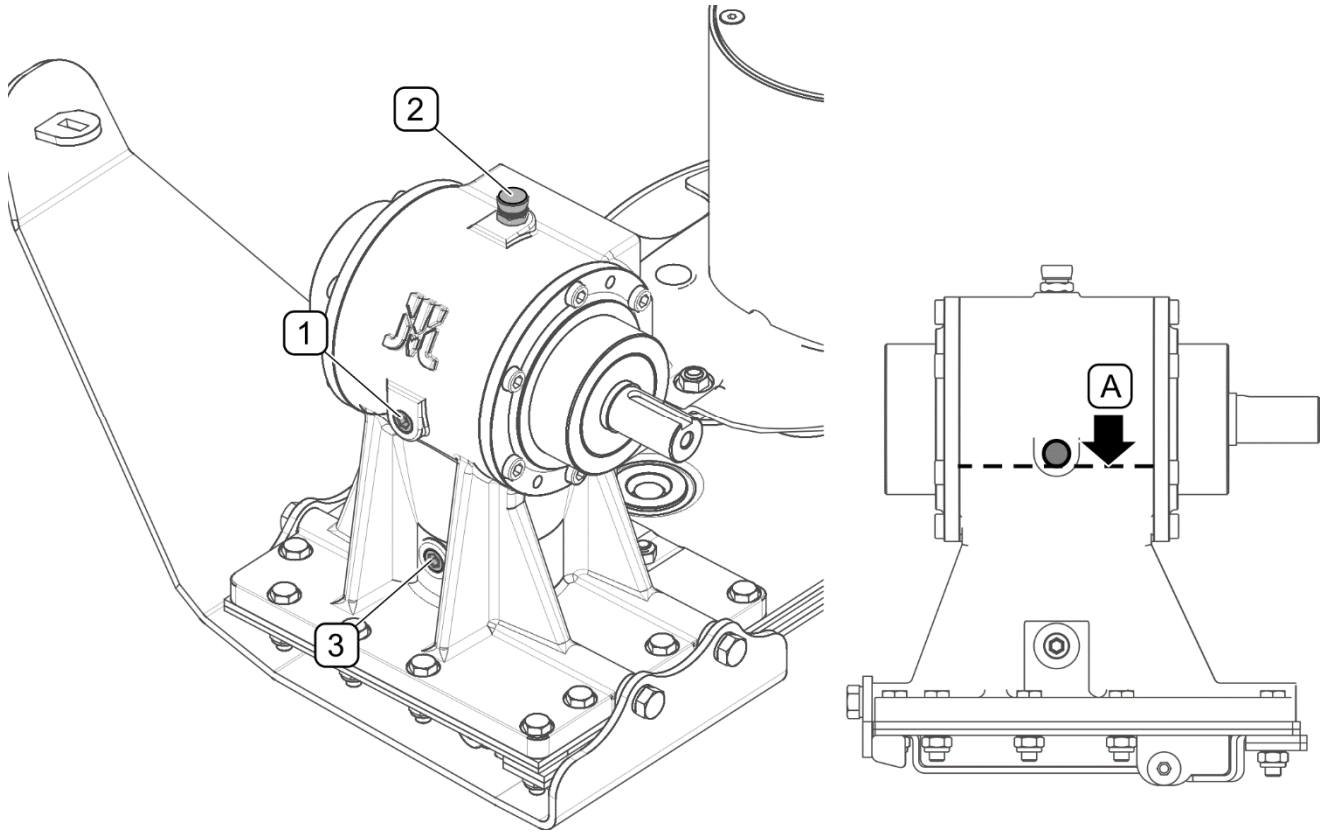


FIGURE 5.4 Checking and change of oil in intersecting axis gear

(1) - inspection plug (2) - filler plug with air vent, (3) - drain plug (A) - correct oil level



TIP

To lubricate intersecting axis gear, use transmission oil SAE90EP (80W90 GL-5).
The correct oil level should reach the lower edge of the inspection plug opening (when the cutter bar is set horizontally)

Used oil should be taken to the appropriate facility dealing with the re-use of this type of waste.

If a leak is noticed, carefully inspect seals and check oil level. Transmission operation with insufficient oil may cause permanent damage of the mechanism.

Repair of transmission during warranty period may only be performed at authorised mechanical workshops.

5.3 OPERATION OF DRIVE TRANSMISSION



DANGER

Before proceeding to check or adjust tension of drive transmission belt set first turn off tractor engine and remove key from ignition.

Drive transmission system maintenance consists of periodic inspection, regulation and possible change of vee belts. To inspect vee belts (FIGURE 5.5), check the tensioning of belts through the inspection opening (3). The deflection (A) of a vee belt measured in the inspection opening (3) in the housing should not exceed 30 mm. Belt tension is checked individually for each of the belts. If belts have slightly different lengths, tension should be adjusted for the shortest belt. Belt tension may be altered using nut (2) of spring tensioner (1).

If one of the belts is damaged the whole belt set should be changed. To replace vee belts, loosen spring tensioner (1), unscrew nuts (4) and remove guard (6). After belt replacement, put guard (6) in place and adjust belt tensioning (FIGURE 5.5).



TIP

There are 4 HB-2650 belts in the mower drive transmission.



ATTENTION!

Do NOT operate mower with the required number of belts.

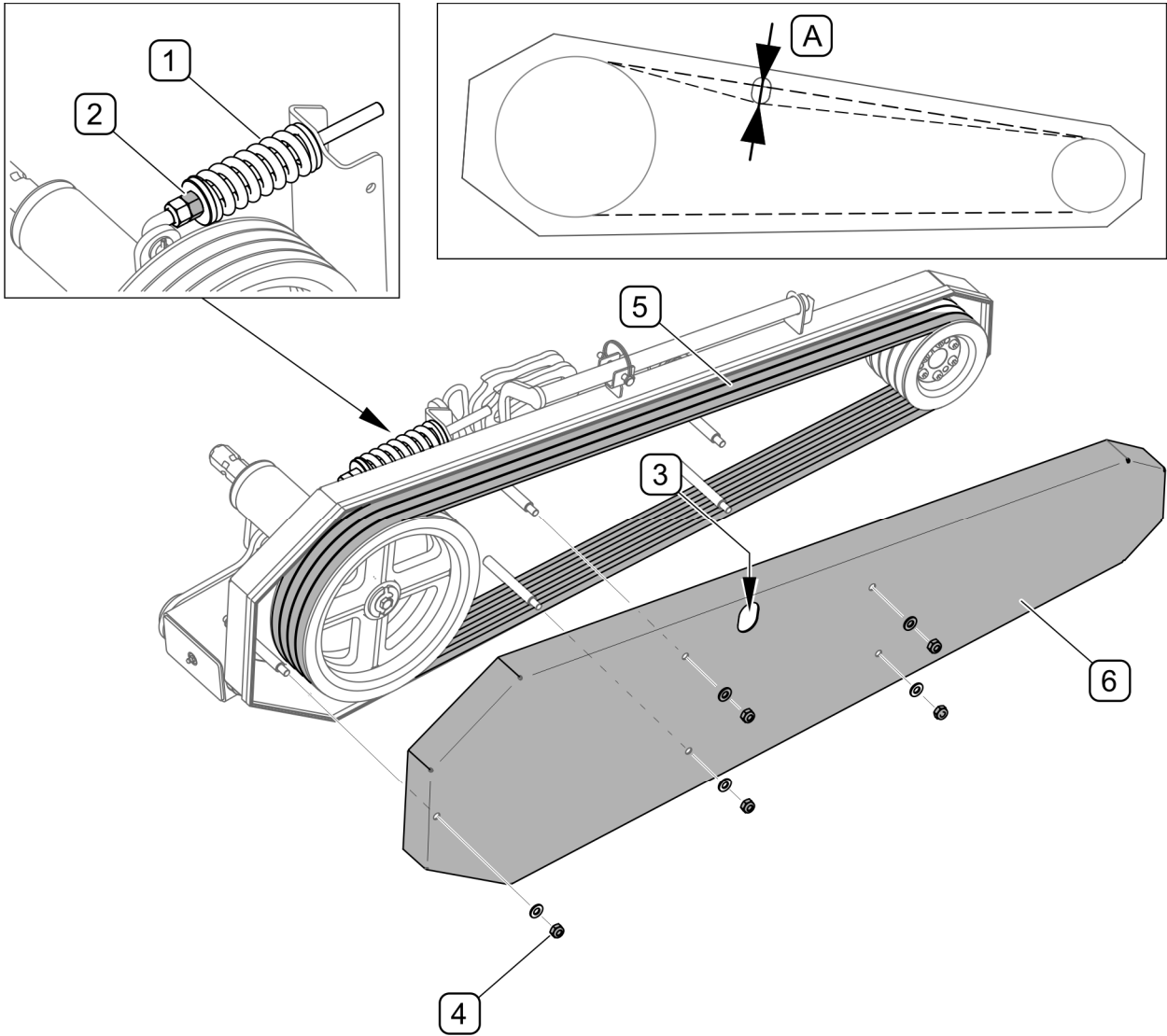


FIGURE 5.5 Check and adjust tension of vee belts

(2) - tensioning spring; (2) - tensioner nut; (3) - inspection opening; (4) - guard fixing nuts; (5) - vee belts; (6) - belt guard (A) - maximum deflection of belt in inspection opening $A=30\text{ mm}$,

	<p>Inspect vee belts in the drive transmission periodically during the use of the machine.</p>
--	---

5.4 HYDRAULIC SYSTEM OPERATION

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

- visual inspection of hydraulic connection tightness,
- checking technical condition of lines,
- visual inspection of hydraulic quick coupler.



DANGER

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



DANGER

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



DANGER

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

Always adhere to the principle that the oil in the mower hydraulic system and in the tractor hydraulic system are of the same type. Application of different types of oil is not permitted. In a new mower, the hydraulic system is filled with HL32 hydraulic oil.



ATTENTION!

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

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

In the event of confirmation of an oil leak on hydraulic conduit connections, tighten connections, and if this does not remedy faults then change conduit or connection elements. Change of sub-assemblies is equally required in each instance of mechanical damage.



Flexible hydraulic conduits must be changed every 4 years regardless of their technical condition.

TABLE 5.2 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	above 210°C

Because of its composition the oil applied is not classified as a dangerous substance, however long-term action on the skin or eyes may cause irritation. In the event of contact of oil with skin wash the place of contact with water and soap. Do NOT apply organic solvents (petrol, kerosene). Contaminated clothing should be changed to prevent access of oil to skin. In the event of contact of oil with eye, rinse with large quantity of water and in the event of the occurrence of irritation consult a doctor. Hydraulic oil in normal conditions is not harmful to the respiratory tract. A hazard only occurs when oil is strongly atomised (oil vapour), or in the case of fire during which toxic compounds may be released. Oil fires should be quenched with the use of carbon dioxide (CO₂), foam or extinguisher steam. Do NOT use water for fire extinguishing.

Spilt oil should be immediately collected and placed in marked tight container. Used oil should be taken to the appropriate facility dealing with the re-use of this type of waste.

5.5 STORAGE

After finishing work, the mower should be thoroughly cleaned. Do NOT direct water jets directly onto hydraulic system components, lubrication points or information and warning decals. High water jet pressure may damage these elements.

For cleaning and maintenance of plastic coated surfaces it is recommended to use clean water or special preparations designed for this purpose. Do not apply organic solvents, preparations of unknown origin or other substances, which may cause damage to lacquered, rubber or plastic surfaces. In the event of doubt it is recommended to make a test on an unseen surface area.



DANGER

While washing with detergents, wear appropriate protective clothing and goggles protecting against splashing.


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. Mower should be kept in closed or roofed building.

If the mower shall not be used for a long period of time, protect it against adverse weather conditions. Lubricate mower 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. Upon the end of the season, lubricate linkage pins.

5.6 LUBRICATION

Machine lubrication should be performed with the aid of a manually or foot operated grease gun, filled with generally available permanent grease. Before commencing lubrication insofar as is possible remove old grease and other contamination. Remove and wipe off excess oil or grease



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.

Gear oil in cutter bar and intersecting axis gear should be changed according to recommendations contained in section 5.2 *CUTTING UNIT MAINTENANCE*

TABLE 5.3 LUBRICATION POINTS AND LUBRICATION FREQUENCY

ITEM	NAME	NUMBER OF LUBRICATION POINTS	TYPE OF GREASE	LUBRICATION FREQUENCY
1	Suspension rotation system pin	1	grease	20 hours
2	Drive transmission bearing pin	1	grease	20 hours
3	Intersecting axis gear	1	gear oil SAE 90EP	500 hours
4	Intersecting axis gear rotation sleeves	2	grease	20 hours
5	Cutter bar	1	gear oil SAE 90EP	500 hours
6	Surface of multi-splined drive shaft	1	grease	20 hours
7	PTO shaft *	*	*	*

Description of designations in "ITEM" column (TABLE 5.3) matches the numbering in (FIGURE 5.6)

*- For detailed information on maintenance please refer to operator's manual attached to the shaft.

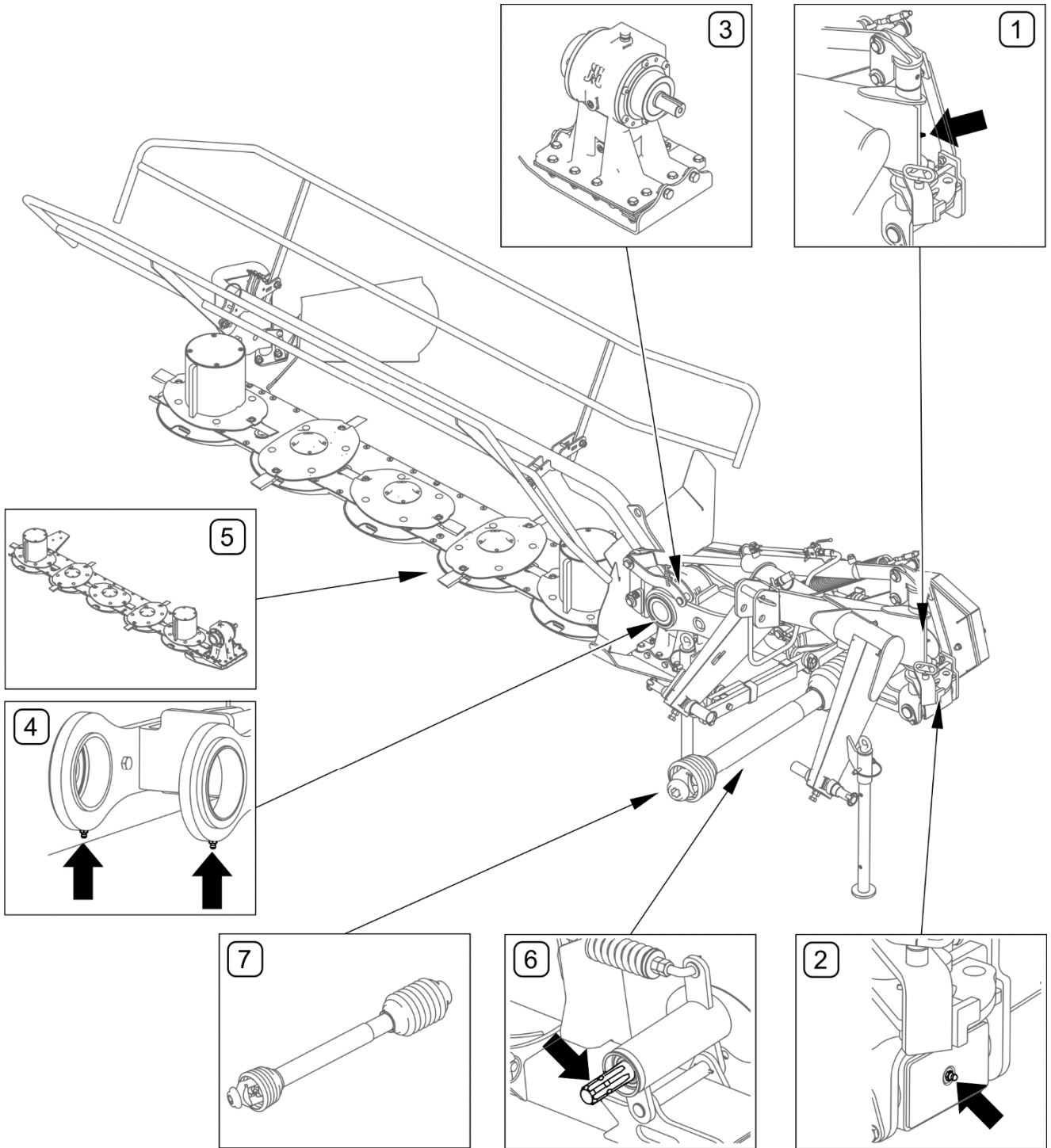


FIGURE 5.6 Lubrication points
Lubrication points described in table 5.3

5.7 TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS

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


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

TABLE 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

Tighten cutting blade arbor nuts with torque of 120 Nm.

5.8 TROUBLESHOOTING

TABLE 5.5 TROUBLESHOOTING

TYPE OF FAULT	CAUSE	REMEDY
Mower arm cannot be lifted or lowered	Lifting arm interlocked	Remove blocking pin
	Incorrectly connected or damaged quick coupler	Check quick couplers and manner of their connection
	The tractor's hydraulic system is out of order	Check condition of tractor hydraulic system
Stubble is uneven	Cutter bar is excessively load relieved	Set load relief spring appropriately
	Tractor PTO rotation speed too low	Maintain correct, constant PTO speed
	Worn cutting blades	Turn blades onto the second side or replace
	Wrong inclination of cutter bar	Set appropriate cutterbar inclination by adjustment of top link
Excessive vibration during work	Damaged or missing flail blade	Check flail blades, if necessary replace
	Damaged PTO shaft	Check shafts, if necessary replace
	Damaged cutterbar bearing	Repair at an authorised service point
Excessive heating of intersecting axis gear or cutter bar	Incorrect oil level	Check oil level.
	Damaged bearing	Repair at an authorised service point
Safety device does not act or acts too frequently	Incorrect adjustment of safety device spring	Adjust spring,
	Safety device components worn excessively	check wear of safety device; replace, if required
Mower drive stops during cutting	Belt slip on belt drive transmission	Disconnect power from mower; remove collected grass or foreign body from cutting unit. Check condition and tension of belts
	Damaged cog in cutterbar	Repair at an authorised service point
	Damaged belt transmission	Repair at an authorised service point

NOTES

A series of horizontal dotted lines for writing notes.