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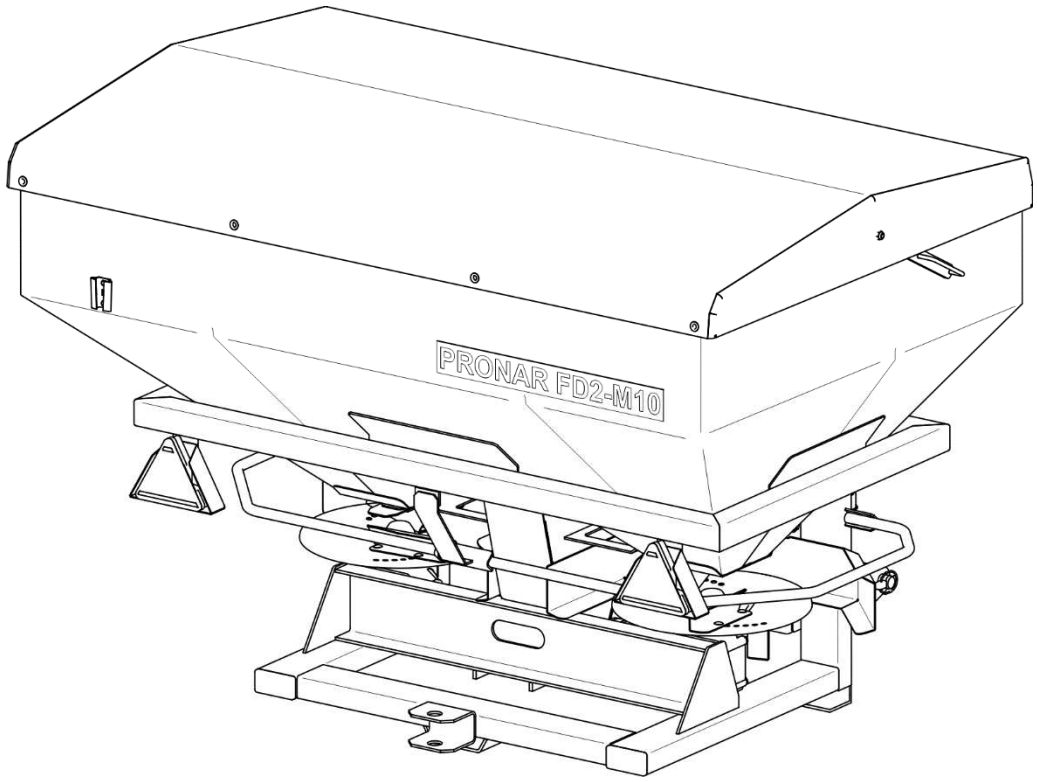
OPERATOR'S MANUAL

FERTILIZER SPREADER

PRONAR FD2-M10

TRANSLATION OF THE ORIGINAL INSTRUCTIONS



EDITION 1B-05-2011

PUBLICATION NO 288N-00000000-UM

EN

FERTILIZER SPREADER

PRONAR FD2-M10

MACHINE IDENTIFICATION

TYPE: *FD2-M10*

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 FD2-M10 fertilizer spreader. 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:

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SYMBOLS APPEARING IN THIS OPERATOR'S MANUAL

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

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

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

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

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

Additional tips and advice for machine operation are marked:

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

DIRECTIONS USED IN THIS OPERATOR'S MANUAL

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

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EC DECLARATION OF CONFORMITY OF THE MACHINERY

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

Description and identification of the machinery	
Generic denomination and function:	**Fertilizer spreader**
Type:	**FD2-M10**
Model:	–
Serial number:	
Commercial name:	**Fertilizer spreader PRONAR FD2-M10**

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 2011 -03- 24

Place and date

Z-CA DYREKTORA
d/s technicznych
członek zarządu
Roman [illegible]uk

Full name of the empowered person position, signature

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SECTION

1

BASIC INFORMATION

1.1 IDENTIFICATION

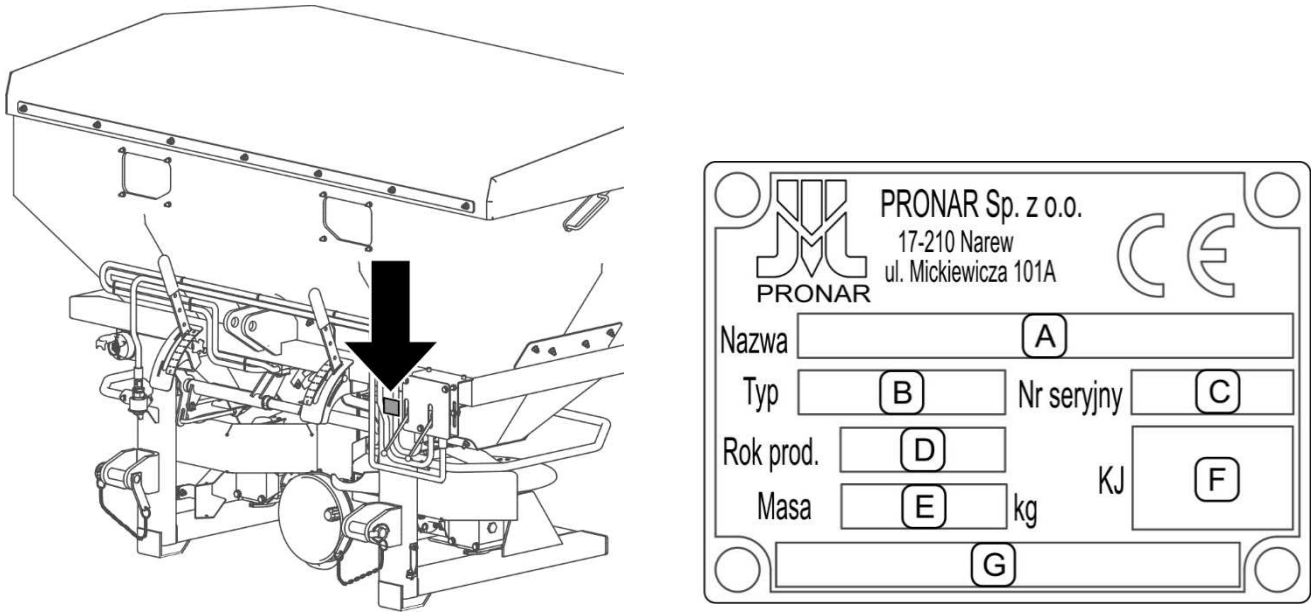


FIG. 1.1 Location of the data plate

Meaning of data plate items (FIG. 1.1):

A - machine name

B – type,

C – serial number

D – year of manufacture

E – machine tare weight [kg]

F – Quality Control stamp

G – maximum carrying capacity [kg]

Serial number is stamped on the data plate. Data plate is located in the front left section of the machine, next to the valve lever (FIG. 1.1). When buying the machine, confirm that the serial number on the machine corresponds to the number indicated in the *WARRANTY BOOK*, in the sales documents and in the *OPERATOR'S MANUAL*.

1.2 PROPER USE

PRONAR FD2-M10 fertilizer spreader is designed for surface spreading of dry, granular or crystalline fertilizers. Use for other purposes should be regarded as improper. Fertilizer spreader may be mounted on agricultural tractors that meet the requirements set out in Table 1.1

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

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

The machine may only be used by persons, who:

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

ATTENTION

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

- **spreading materials other than fertilisers,**
- **transport of people, animals and other items on the machine**

TAB. 1.1 Agricultural tractor's requirements

	UNIT	REQUIREMENTS
Rear three point linkage	–	Category II according to ISO 730-1
PTO speed	RPM	540
PTO rotation direction	–	clockwise *(looking at the shaft front in the tractor)*
PTO shaft profile	–	type 1 according to ISO 500 *(Ø 35 mm, 6 splines)*
Minimum power on PTO shaft	hp (kW)	16 (12)

1.3 EQUIPMENT

The equipment of FD2-M10 fertilizer spreader includes:

- Operator's Manual
- Warranty Book

Additional (optional) equipment:

- PTO shaft – 5R 502 4 BA 502
- tarpaulin cover, part number 288N-12000000 – *the tarpaulin cover is installed on the tank in order to keep fertilizer dry; it is easily foldable to enable tank loading.*
- axle system, part number 288N-13000000 – *set of wheels that enables easy attachment of fertilizer spreader and convenient manoeuvring after disconnecting the fertilizer spreader from the tractor three-point linkage.*

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.

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

In the event of damage arising from:

- mechanical damage which is the user's fault, caused by road accidents,
- by inappropriate use, adjustment or maintenance, use of the machine for purposes other than those for which it is intended,
- use of damaged or malfunctioning machine,
- repairs carried out by unauthorised persons, improperly carried out repairs,
- making unauthorised alterations to machine design,

the user will lose the right to warranty service.

TIP

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

During warranty period the user is obliged to report immediately on noticing any wear in the paint coating or traces of corrosion, and to have the faults rectified whether they are covered by the warranty or not. For detailed Terms & Conditions of Warranty, please refer to the *WARRANTY BOOK* attached to each machine.

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

1.5 TRANSPORT

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

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

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

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

DANGER

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

The machine should be attached to lifting equipment in places specially designed for this purpose (FIG. 1.2), i.e. by central link bracket (2) and transport lugs (1) inside the tank.

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

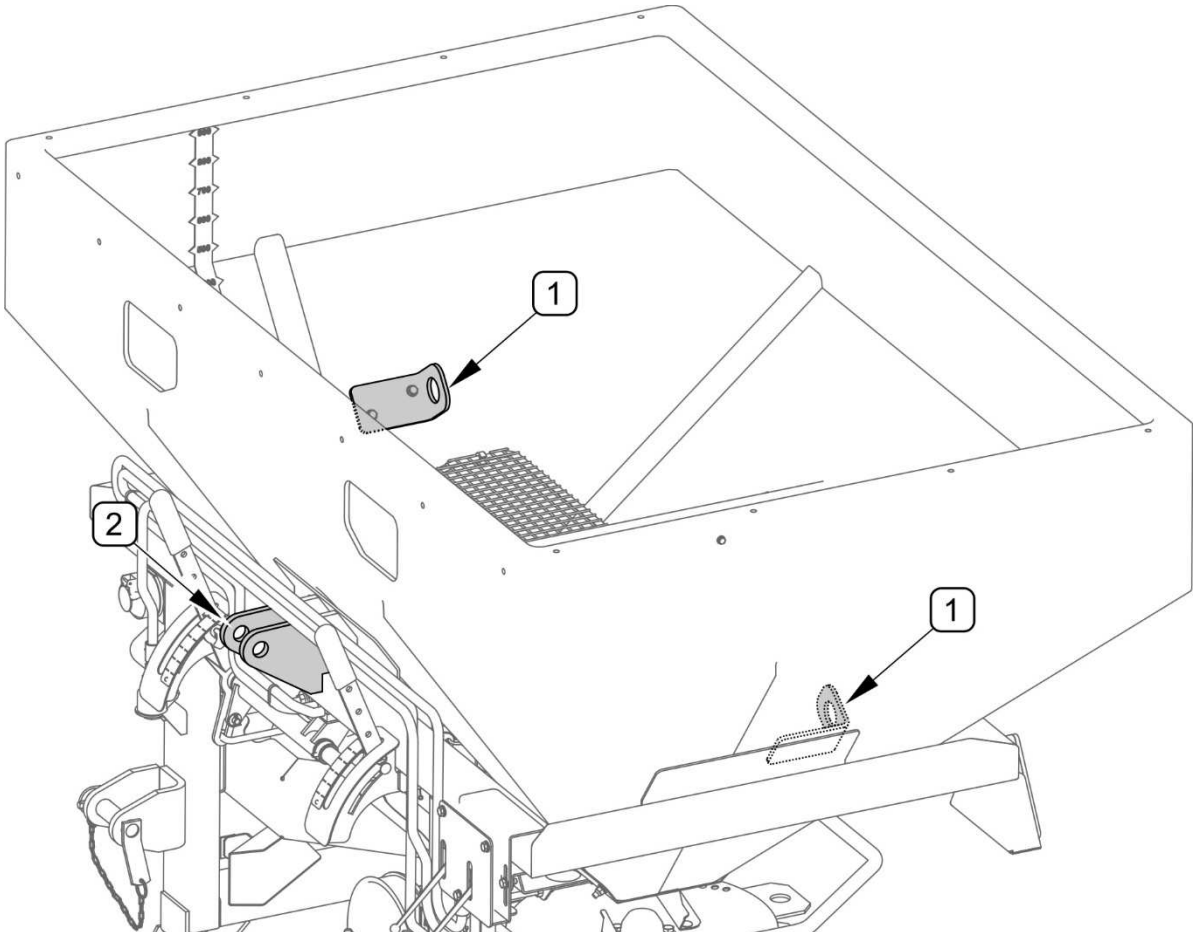


FIG. 1.2 Transport lugs

(1) - transport lugs inside the tank; (2) - central link bracket

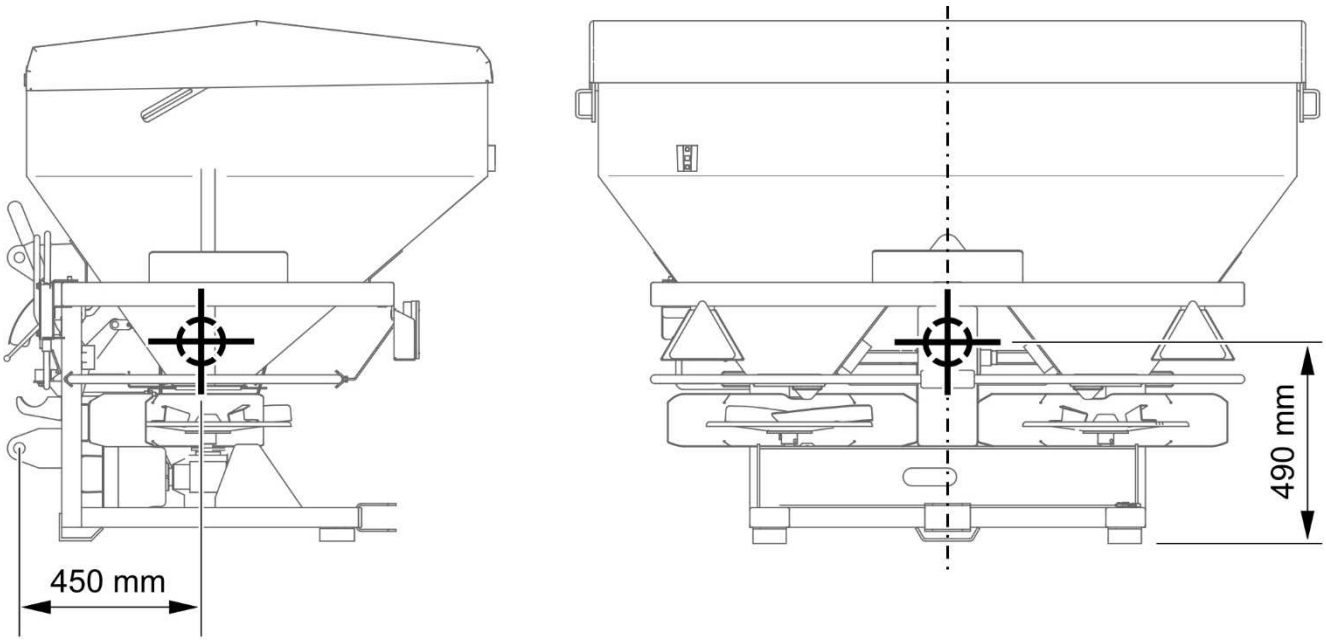


FIG. 1.3 Location of centre of gravity of FD2-M10 fertilizer spreader (empty tank)

ATTENTION!

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

1.6 ENVIRONMENTAL HAZARDS

A lubricant leak constitutes a direct threat to the natural environment owing to its limited biodegradability. Maintenance and repair work which involves the risk of a leak should be performed in the rooms with oil resistant surface. In the event of lubricant leaking into the environment, first of all contain the source of the leak, and then collect the leaked lubricant using available means. Remaining lubricant should be collected using sorbents, or by mixing the oil with sand, sawdust or other absorbent materials. The lubricant 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.

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

1.7 WITHDRAWAL FROM USE

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

Before proceeding to dismantle machine, oil shall be completely removed from hydraulic system. Transmissions should be dismantled in order to remove transmission lubricant.

When spare parts are changed, worn out or damaged parts should be taken to a collection point for recyclable raw materials. Waste oil, hydraulic conduits, electrical system components and plastic elements should be taken to the appropriate facility dealing with the recycling of this type of waste.

ATTENTION

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

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

SECTION

2

SAFETY ADVICE

2.1 BASIC SAFETY RULES

2.1.1 USE OF MACHINE

- Before using the machine, the user must carefully read this Operator's Manual and the WARRANTY BOOK. When operating the machine, the operator must comply with the recommendations.
- The machine may only be used and operated by persons qualified to drive 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.
- 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 machine other than the way intended takes full responsibility for himself for any consequences of this use.
- Use of the machine for purposes other than those for which it is intended by the Manufacturer may invalidate the warranty.
- The machine may only be used when all the protective elements (i.e.. safety guards, bolts, cotter pins) are technically sound and correctly positioned. In the event of loss or destruction of the safety guards, they must be replaced with new ones.
- Before using the machine always check its technical condition, especially

- in terms of safety. In particular, check the technical condition of the hitch system and elements of drive transmission system.

2.1.2 HITCHING AND UNHITCHING THE MACHINE

- Carefully read the tractor Operator's Manual.
- Do not hitch the machine to the tractor when the linkage systems of machine and tractor are not compatible.
- To hitch the machine to tractor use only genuine pins and safeguards.
- The agricultural tractor to which the machine will be hitched must be technically reliable and must fulfil the requirements of machine Manufacturer.
- Be especially careful when hitching the machine to tractor.
- After completed hitching of the machine, check the safeguards.
- Be especially careful when unhitching the machine from the tractor.
- Machine disconnected from the tractor must be placed on level, sufficiently hard surface in such a manner as to ensure that it is possible to connect it again.

2.1.3 TRANSPORTING THE MACHINE

- Before driving on public roads, check operation of indicator lights
- While driving on public roads the machine shall be marked with a warning triangle distinguishing slow-moving vehicles. The warning triangle should be attached to the rear of 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.
- Do NOT leave machine raised and unsecured while the tractor is parked. When parked, the machine should be lowered to the ground.

- The machine must never be used for transport of people, animals and other items.
- When transporting the machine lock the tractor three-point linkage
- in the upper position to prevent lowering it by accident.
- Reckless driving and excessive speed may cause accidents.

2.1.4 MAINTENANCE

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

- Do NOT weld, drill holes in, cut or heat the main structural elements, which have a direct impact on the machine operation safety
- In the event of work requiring the machine to be raised,
- use properly certified hydraulic or mechanical lifts for this purpose. After lifting the machine, stable and durable supports must also be used
- Do NOT carry out work under the machine, which has been raised only with the tractor's three point linkage.
- The machine must not be supported using fragile elements (bricks or concrete blocks).
- After completing work associated with lubrication, remove excess oil or grease.
- In order to reduce the danger of fire the machine must be kept in a clean condition.

2.1.5 MACHINE OPERATION

- Before starting the tractor with the connected machine make sure the PTO drive is not engaged, otherwise it can lead to uncontrolled operation of the machine.
- Before lifting or lowering the machine mounted on the tractor, make sure there are no bystanders near the machine.
- Before starting the machine make sure that there are no bystanders (especially children) or animals in the danger zone. The machine operator is obliged to ensure proper visibility of the machine and the working area.
- During machine operation do not occupy a different position than that of the operator in the vehicle's cab. Do NOT leave the cab, when the machine is in operation.
- Do NOT stand within the material spreading zone and also between the tractor and the machine when the tractor's engine is working.
- DO NOT allow persons to stand near the spreading discs until rotating parts stop completely.
- During machine operation do not use PTO nominal rotation speed greater than 540 rpm

- When filling the tank, the machine should be mounted on the tractor and lowered to the ground and the tractor's engine should be switched off.
- All instructions of the fertilizer producer should be adhered to. If necessary, use personal protection equipment, i.e. protective overalls, gloves, safety shoes, safety goggles, mask etc.

2.1.6 OPERATION OF PTO SHAFT

- The machine may only be connected to the tractor by appropriately selected PTO shaft.
- Never use a damaged PTO drive 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.
- Do not exceed recommended by the manufacturer shaft working angle.
- The shaft must be equipped with guards. 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 machine.
- 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 drive 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 sweeper for purposes other than those for which it is intended,
- being between the carrying vehicle and the machine while the machine is being attached,
- being on the machine while the engine is running,
- operating the machine with removed or faulty safety guards,
- not maintaining safe distance from the danger zone or being within the zones while the machine is operating,
- operation of the machine by unauthorised persons or persons under the influence of intoxicating substances,
- cleaning, maintenance and technical checks when carrying vehicle is connected and engine is running

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

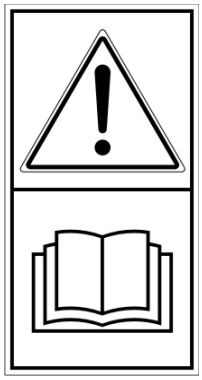
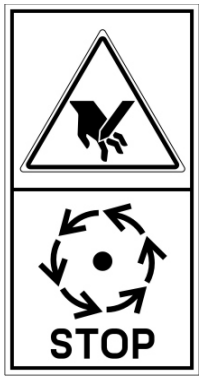
- prudent and unhurried operation of the machine,
- sensible application of the remarks and recommendations stated in the Operator's Manual,
- carrying out repair and maintenance work in line with operating safety rules,
- carrying out repair and maintenance work by persons trained to do so,
- using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

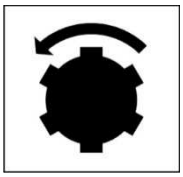
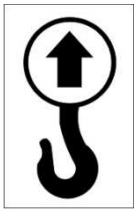
- a ban on being on the machine when it is operating

2.3 INFORMATION AND WARNING DECALS

All signs should always be legible and clean, visible to the operator and also to persons possibly being in the vicinity of 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's Manual.
2		Danger of severing or cutting fingers or a palm by rotating parts of the machine. Do not touch any rotating elements until they come to a complete standstill.
3		Danger caused by materials thrown out by the machine. Keep a safe distance from the operating machine.

ITEM	SYMBOL	DESCRIPTION
4		Nominal PTO shaft rotation speed is 540 rpm.
5		Required rotation direction of PTO shaft
6		Lifting equipment attachment points while loading the machine
7		Maximum transport speed
8		Machine model

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

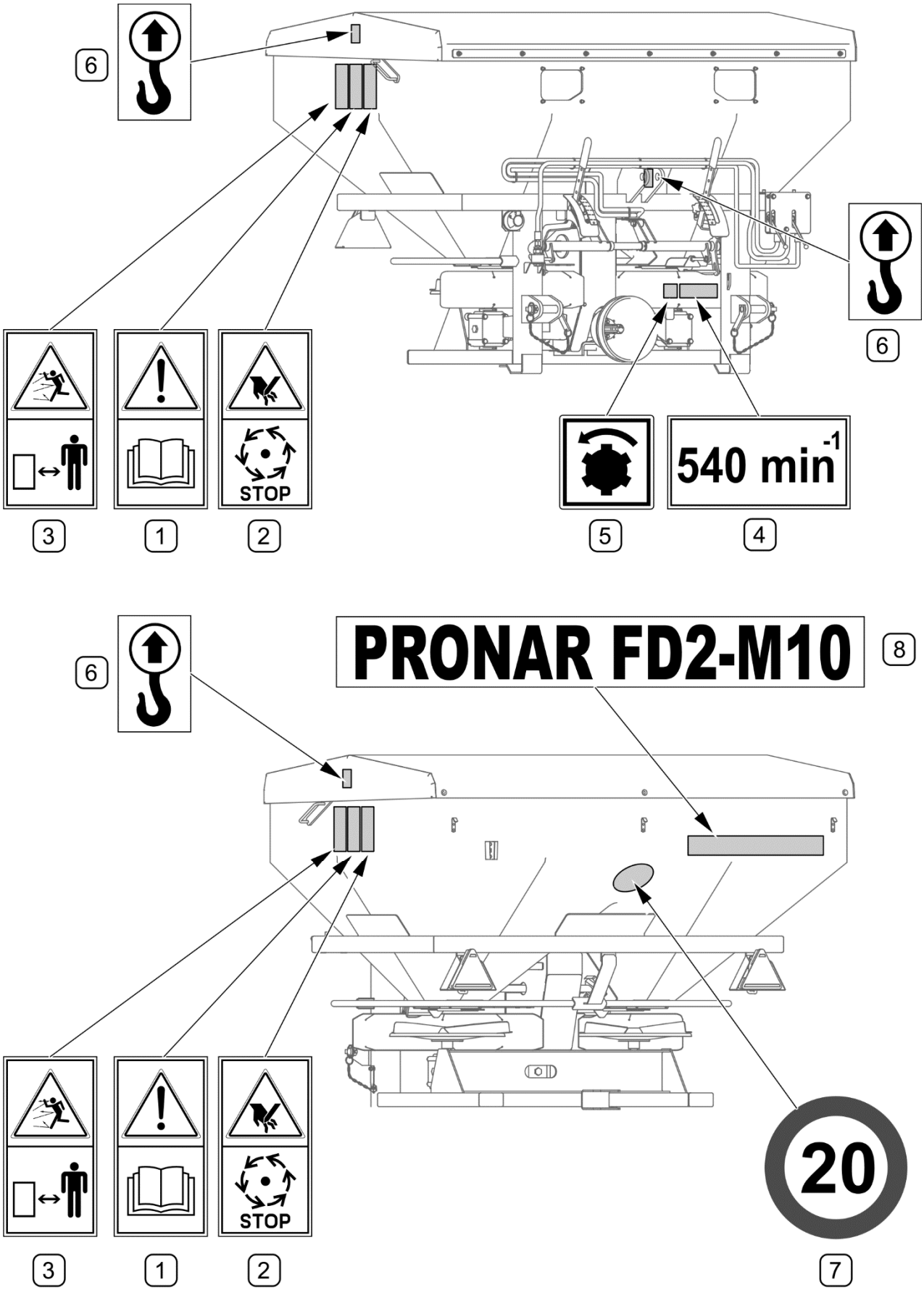


FIG. 2.1 Locations of information and warning decals.

Meaning of symbols (TAB. 2.1)

SECTION

3

DESIGN AND OPERATION

3.1 TECHNICAL SPECIFICATION

TAB. 3.1 BASIC TECHNICAL DATA OF FERTILIZER SPREADER

	Unit	
Model		FD2-M10
Mounting method	–	three point linkage cat. II according to ISO 730-1
Spread width	m	10 - 24
Tank capacity	dm^3	1,000
Tank carrying capacity	kg	1,300
Amount of spread fertilizer	kg/ha	10 – 1 500
Minimum power demand	hp (kW)	15 (11)
Maximum working speed	km/h	12
Maximum transport speed	km/h	20
Number of spreading discs	pc.	2
Number of spreading disc blades	pc.	2
Charging height	m	1.2
Weight of machine ready for operation:	kg	170
Other information	–	one person operation

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

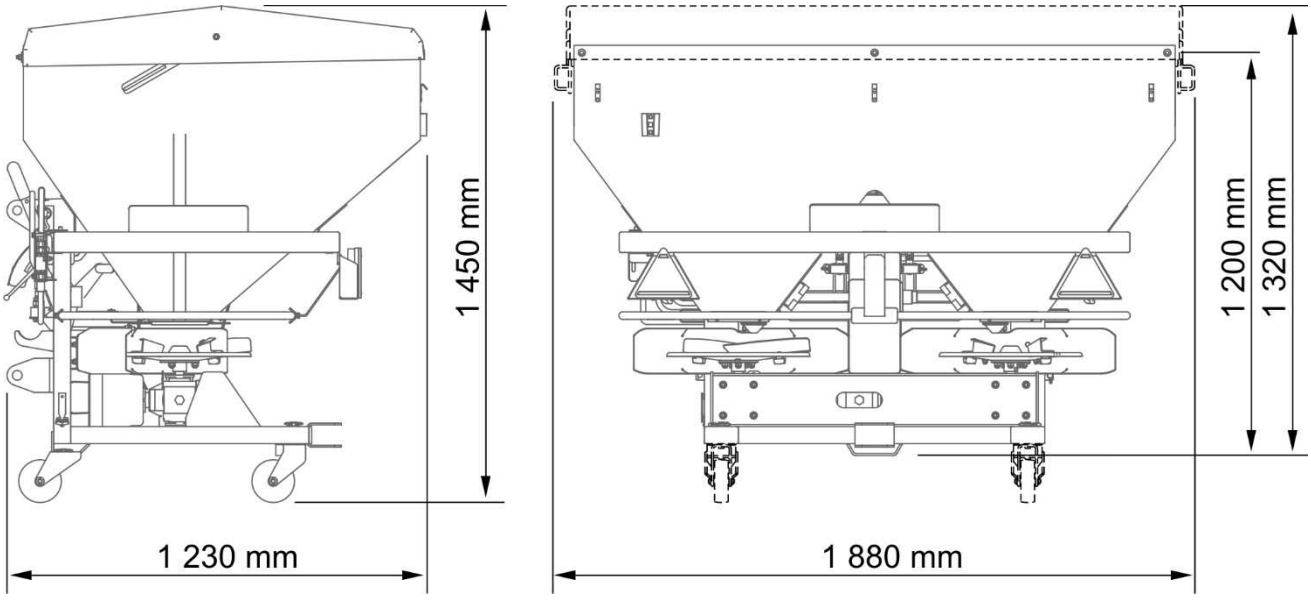


FIG. 3.1 External dimensions of FD2-M10 fertilizer spreader

3.2 GENERAL DESIGN

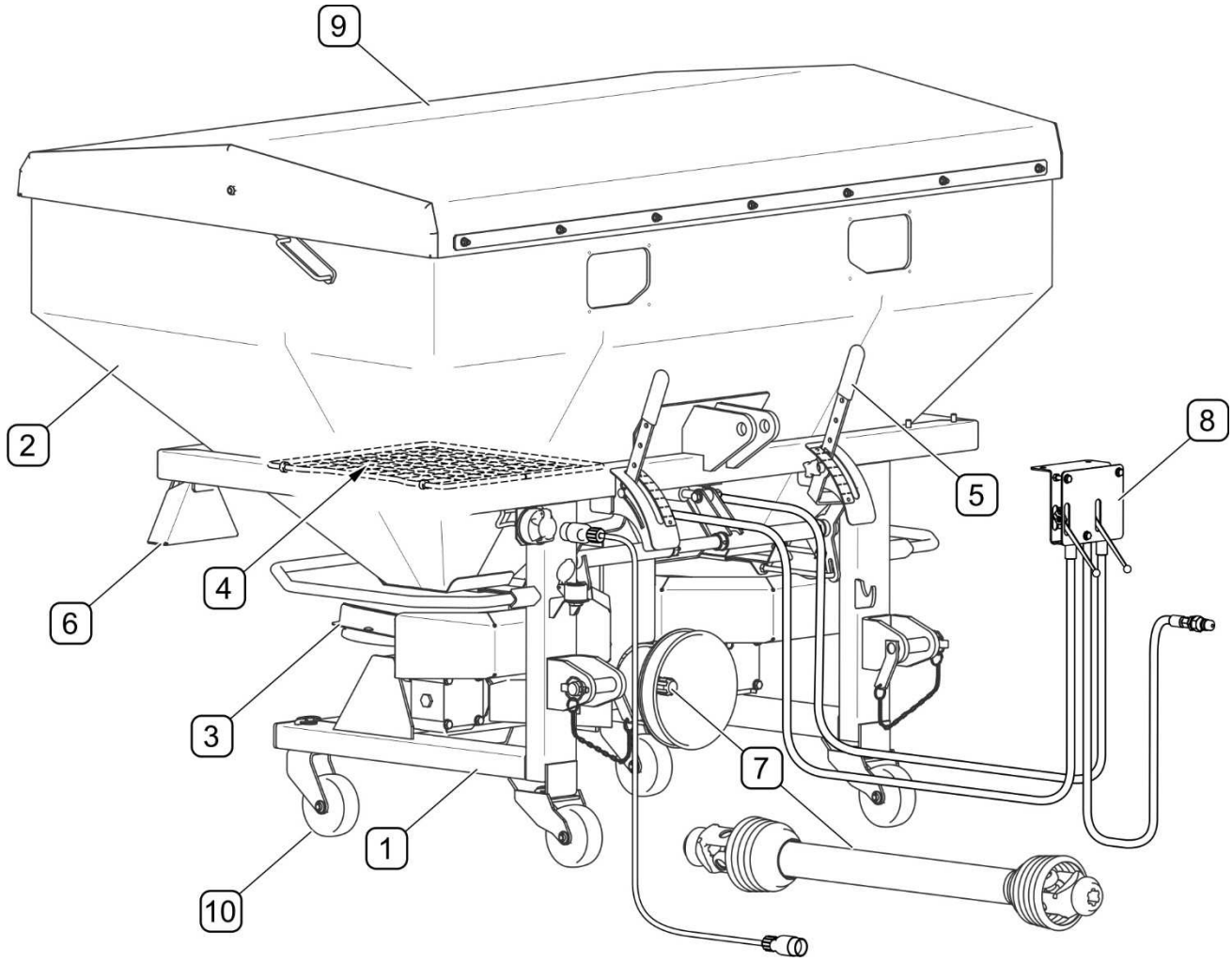


FIG. 3.2 General design

(1) - frame; (2) - tank; (3) - spreading disc; (4) - sieve; (5) - dose adjustment mechanism; (6) - electrical system; (7) - drive transmission system; (8) - hydraulic system; (9) - frame with tarpaulin cover (option); (10) - wheels and suspension (option)

The fertilizer spreader consists of a frame (1) to which a plastic tank (2) is screwed. A sieve (4) is installed inside the tank. Mechanism (5) enables smooth adjustment of fertilizer dose. Working elements of the fertilizer spreader are driven by drive transmission system (7). Hydraulic system (8) is used for opening and closing the dampers in the tank bottom. The machine is hitched to the tractor with the three point linkage.

3.3 DRIVE TRANSMISSION MECHANISM

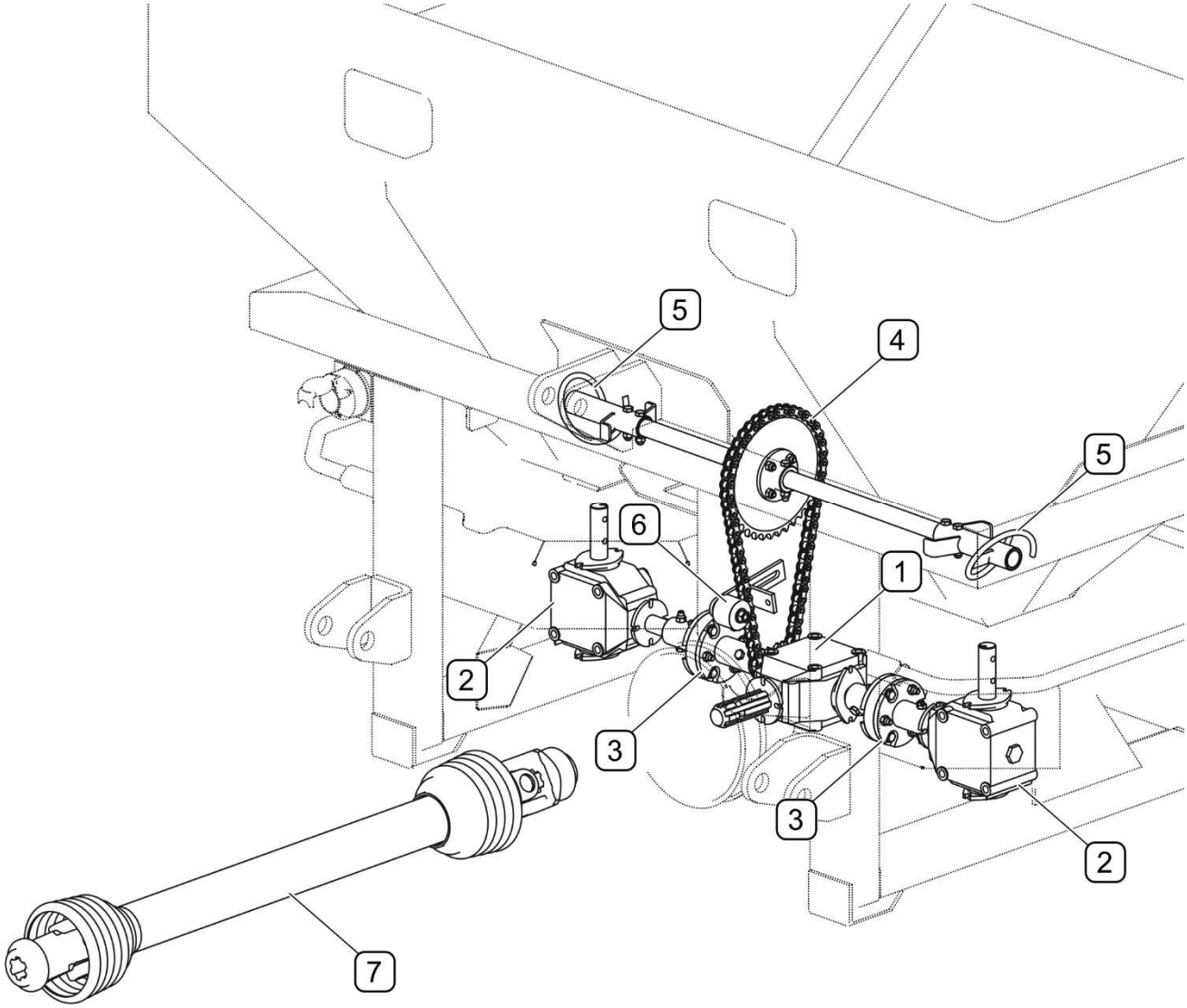


FIG. 3.3 Design of drive transmission mechanism

(1) - central gear; (2) - intersecting axis gears; (3) - coupling; (4) - chain transmission; (5) - mixer;

The drive is transmitted to central gear (1) by PTO shaft (*not included in the standard equipment of the machine)* that is connected to the tractor's PTO. Intersecting axis gears (2) are connected to central gear (1) through couplings (3). Mixers (5) are driven by central gear (1) through the chain transmission.

3.4 DOSE ADJUSTMENT MECHANISM

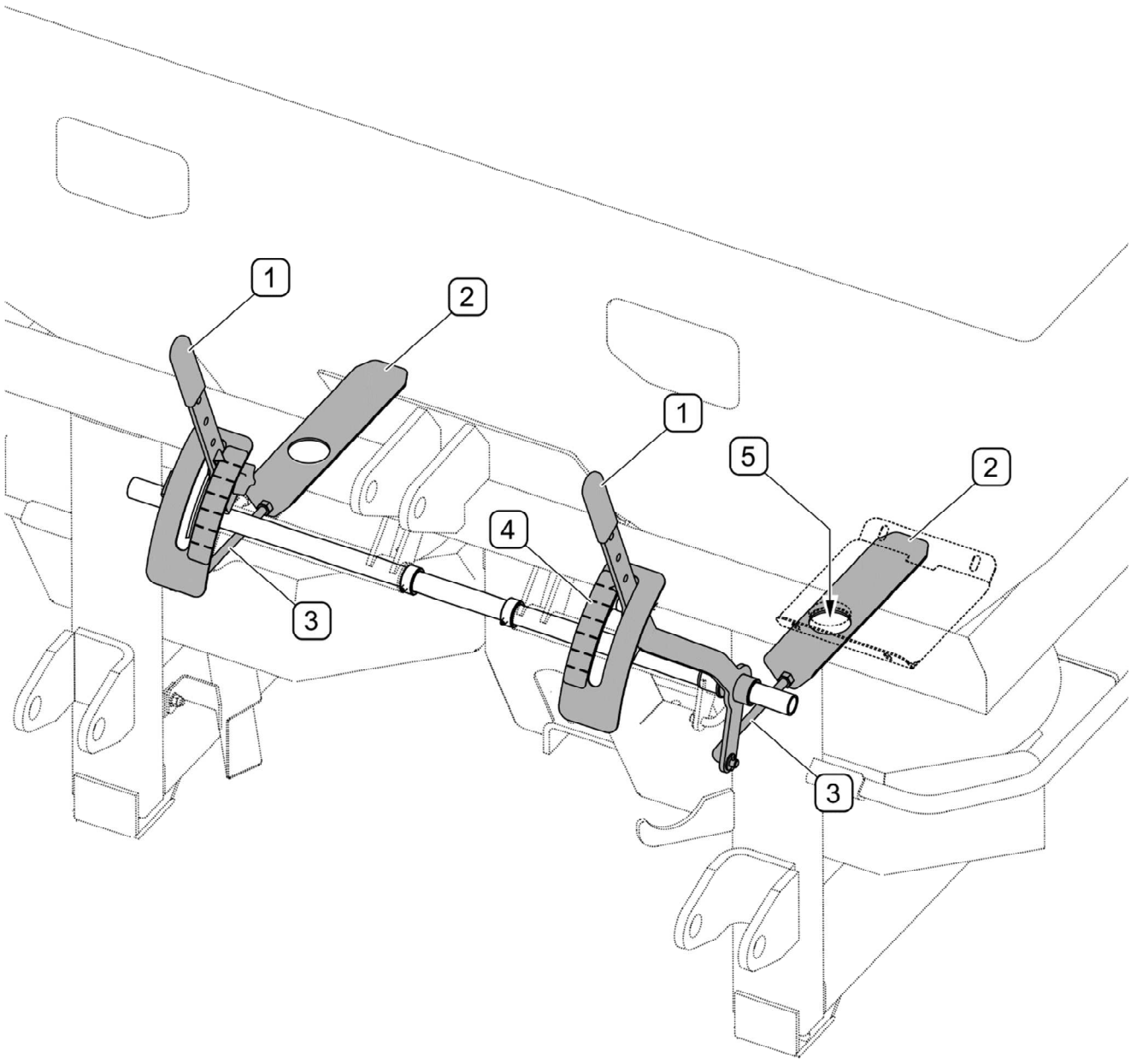


FIG. 3.4 Design of dose and spreading direction adjustment mechanism

(1) - control levers; (2) - damper; (3) - link; (4) - partition disc; (5) - dosing hole

Fertilizer dose is adjusted by means of two levers (1), which control dampers (2) through links (3). Fertilizer dose and spreading direction are controlled by properly positioned dampers of dosing holes (5) in the tank bottom.

3.5 HYDRAULIC SYSTEM

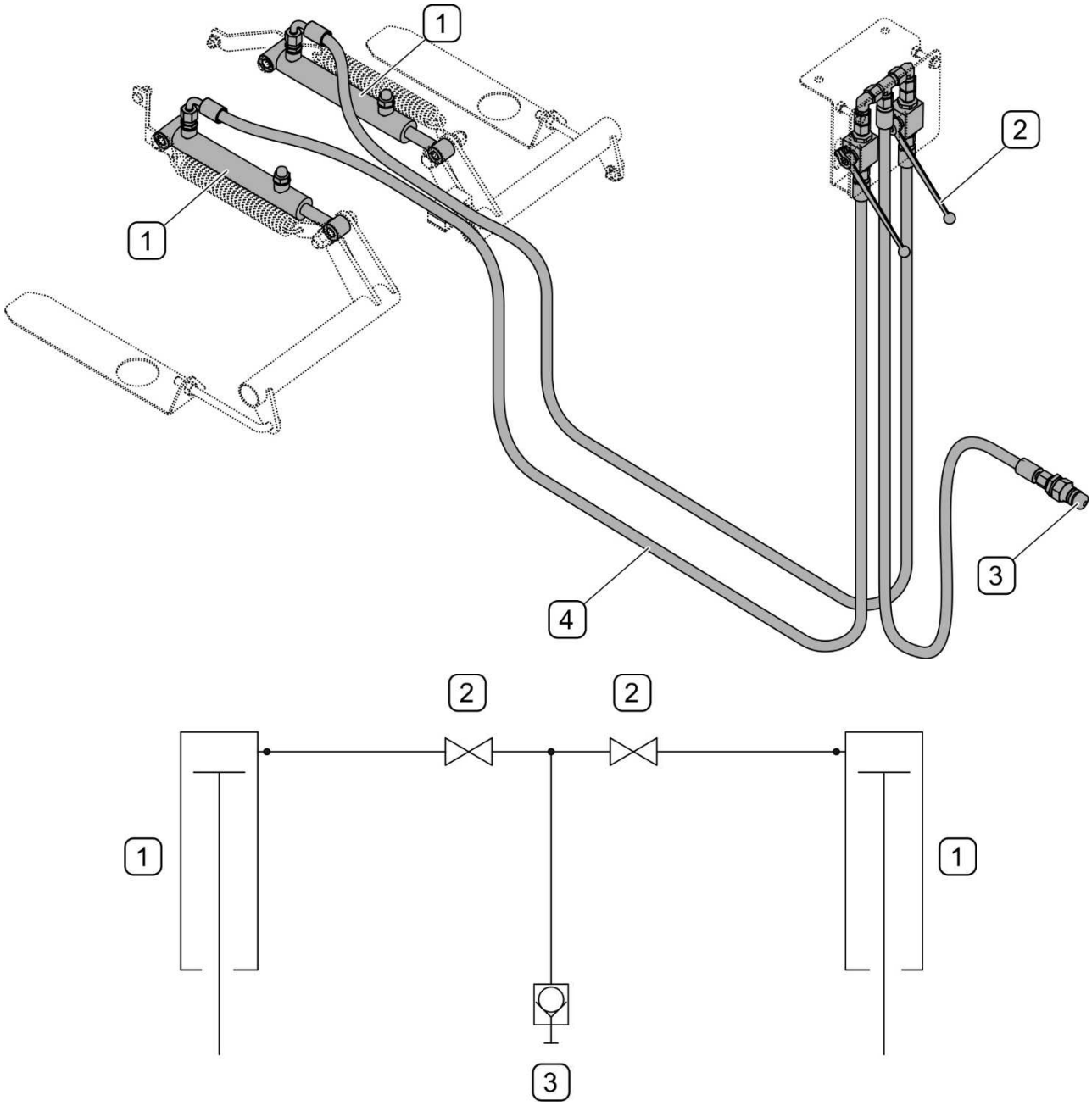


FIG. 3.5 Hydraulic system design

(1) - hydraulic cylinder; (2) - valve; (3) - hydraulic connection; (4) - conduits

Hydraulic system of the fertilizer spreader is used for opening and closing the dampers in the tank bottom. Hydraulic cylinders (1) supplied by conduits (4) are connected to the tractor external hydraulic system through connection (3). Thanks to this, the dampers in the tank can be closed regardless of the settings of the spreading dose adjusting lever. Valve levers (2) can be placed in the tractor cab.

3.6 ELECTRICAL SYSTEM

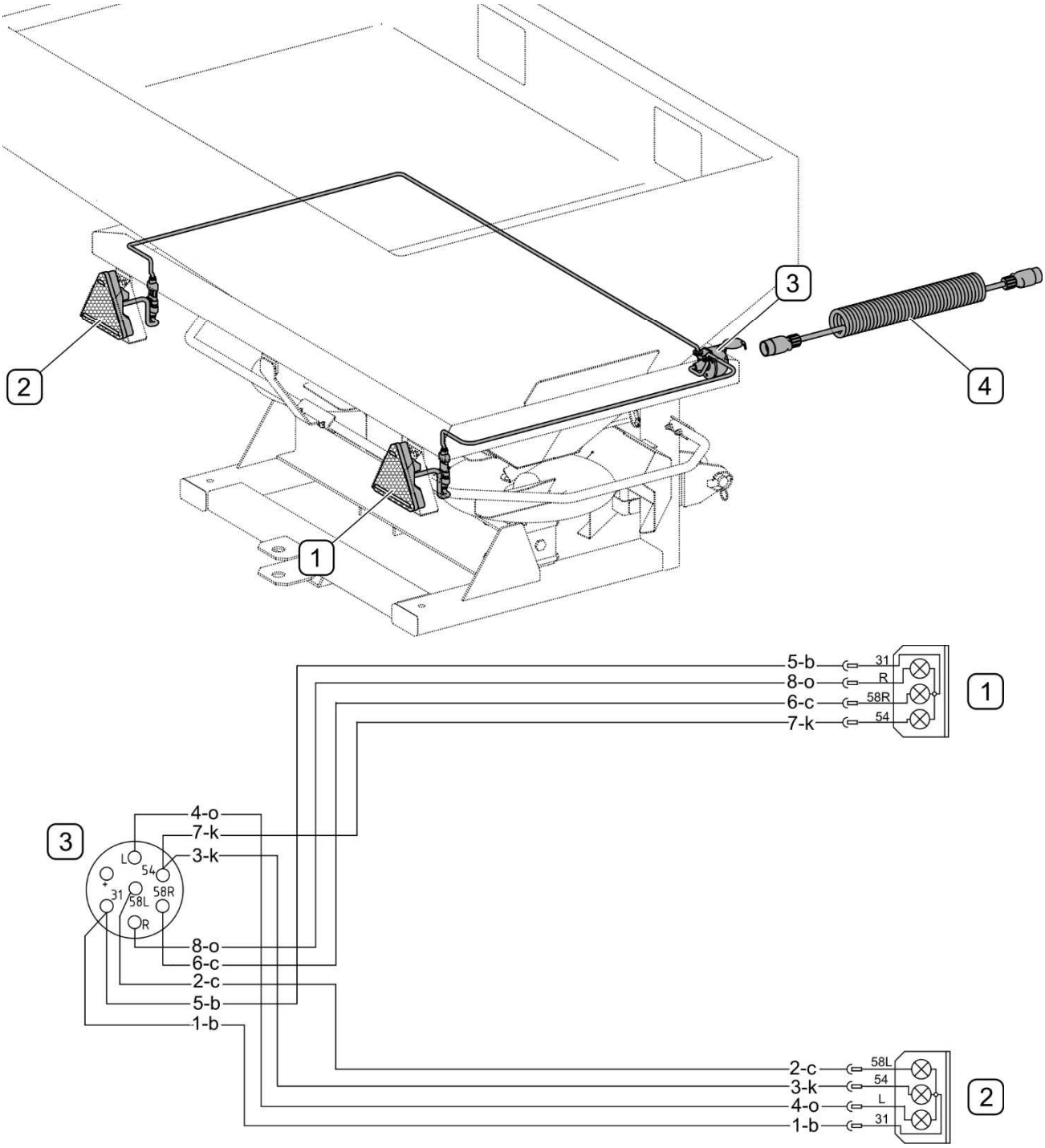


FIG. 3.6 Hydraulic system design

(1) - right lamp; (2) - left lamp; (3) - 7-pole socket; (4) - connection lead

Colour designations on electrical diagram:

***b** - white; **c** - black; **k** - red; **o** - brown;*

SECTION

4

CORRECT USE

4.1 PREPARING FOR WORK

DANGER

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

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

The machine must never be used by persons, who are not authorised to drive 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 machine, make sure that there are no bystanders in the danger zone.

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

- the user must carefully read this Operator's Manual and observe all recommendations, understand the design and the principle of machine operation
- check the condition of protective paint coat,
- Inspect machine's individual components for mechanical damage resulting from incorrect transport (dents, piercing, bent or broken components),
- Check all the lubrication points, lubricate the machine as needed according to recommendations provided in section *5 MAINTENANCE*,
- check technical condition of the hydraulic system,
- check the compatibility of the machine linkage with the tractor's linkage,
- check the compliance of PTO parameters, termination type, speed,
- check technical condition of the spreading discs and dose adjustment elements,
- check technical condition of protective guards and check if they are correctly installed,
- check technical condition of the transmission,

DANGER

Before starting the tractor with the connected machine make sure the PTO drive is not engaged, otherwise it can lead to uncontrolled operation of the machine.

ATTENTION!

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

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

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

- connect the machine to the tractor (see *HITCHING TO TRACTOR*)
- connect hydraulic system to tractor and check operation of dosing hole closing mechanism, check hydraulic cylinders for tightness,
- connect PTO shaft, check operation of drive transmission system and check gears for tightness,
- check rotation direction of spreading discs.

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

ATTENTION!

Before using the machine always check its technical condition.

4.2 CHECKING TECHNICAL CONDITION

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

TAB. 4.1 TECHNICAL INSPECTION SCHEDULE

DESCRIPTION	SERVICE OPERATION	FREQUENCY
Technical condition of safety guards	Check technical condition of safety guards, if complete and correctly mounted.	Before beginning work
Technical condition of spreading discs, mixers and dose adjustment elements	Check the technical condition, if complete and correctly mounted. Check operation of dose adjustment elements.	
Technical condition of tank and tarpaulin cover (if any)	Check for damage	
Level of lubricant in intersecting axis gears and tension of the chain of mixer drive transmission	For details please refer to section *MAINTENANCE OF PTO DRIVE TRANSFER SYSTEM*	
Tightening of all main nut and bolt connections	Torque values should be according to table (*5.4*)	Once a week
Lubrication	Lubricate elements according to table *LUBRICATION*	According to table *5.3*

ATTENTION!

Do NOT use a malfunctioning or incomplete machine.

4.3 HITCHING TO TRACTOR

4.3.1 HITCHING TO THE THREE POINT LINKAGE

Fertilizer spreader can be attached to agricultural tractor that meets the requirements contained in Table 1.1 *REQUIREMENTS FOR A TRACTOR*.

DANGER

Exercise caution when hitching the machine to tractor.

Do NOT hitch the machine to the tractor when the tractor's engine is running.

ATTENTION!

Before hitching the fertilizer spreader to tractor, the user must carefully read the tractor operator's manual. Check compatibility of the linkage category.

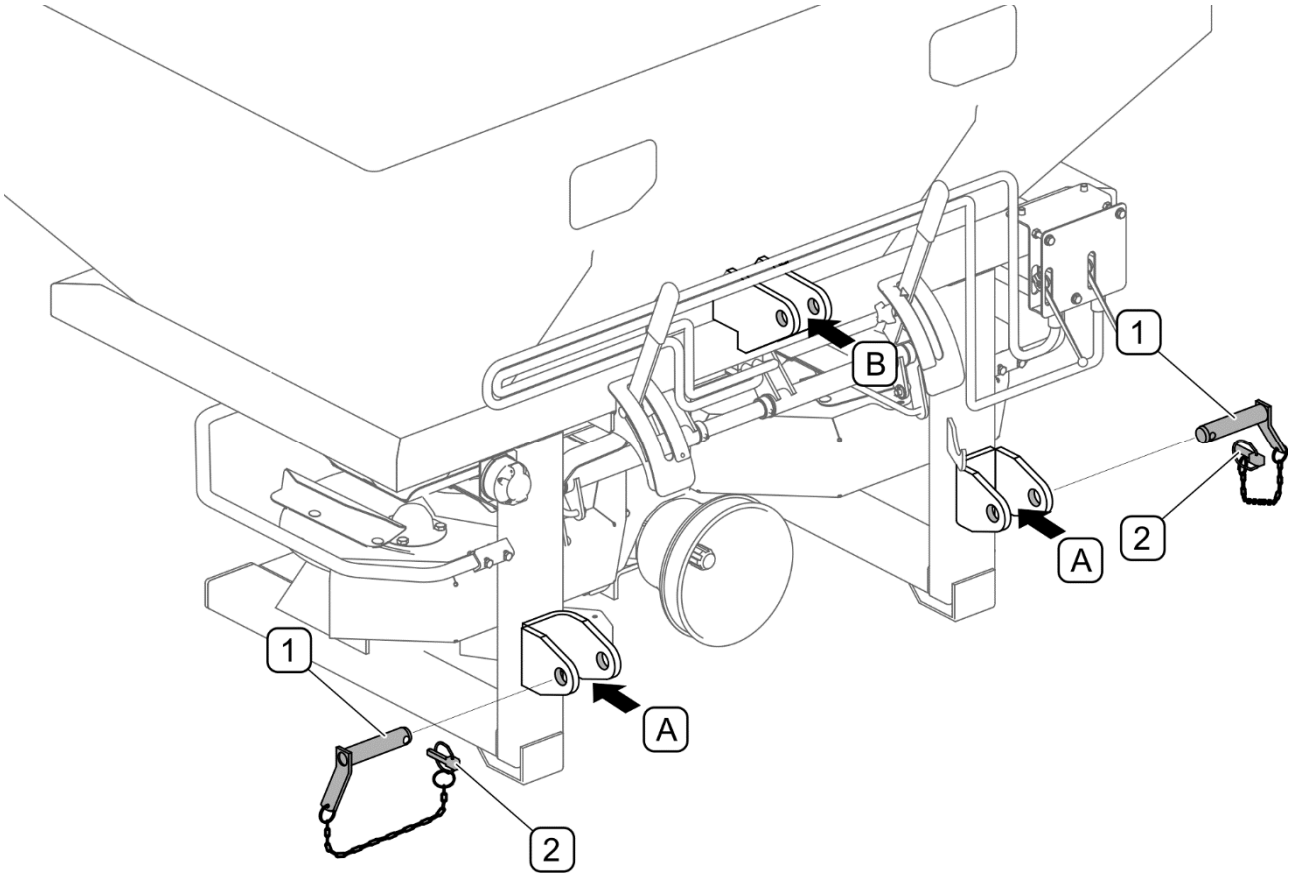


FIG. 4.1 Attachment points of three-point linkage Cat II according to ISO 730-1

(A) - mounting points for the lower links of the tractor's three point linkage; (B) - mounting point for the top link (central link), (1) - pins of lower links; (2) - securing cotter pin;

In order to hitch the machine to the tractor (FIG. 4.1)

- Reverse the tractor and bring the lower links of the tractor's three point linkage close to mounting points (A) on the fertilizer spreader frame.
- Set lower links of the tractor three-point linkage at appropriate height.
- Switch off tractor's engine and prevent it from moving.
- Connect the lower mounting points (A) with the lower links of the tractor's three point linkage using pins (1) and secure them with cotter pins (2).
- Connect top link (B*)* of the tractor's three point linkage with upper mounting point (B) and secure it.

DANGER

To hitch the machine to tractor use only genuine pins and safeguards.

TIP

In order to facilitate manoeuvring while hitching the fertilizer spreader to tractor, the spreader can be equipped with a set of wheels (additional equipment) secured to the machine frame (see FIG. 4.15)

4.3.2 CONNECTING PTO SHAFT

DANGER

Before connecting the shaft, turn off the tractor's 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 PTO shaft 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. 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 shaft length should be equal to (L) in order to enable its connection to the hitched machine (FIG. 4.2), i.e. it should not be longer than the distance between the front of the machine's PTO shaft and the front of the tractor's PTO shaft.

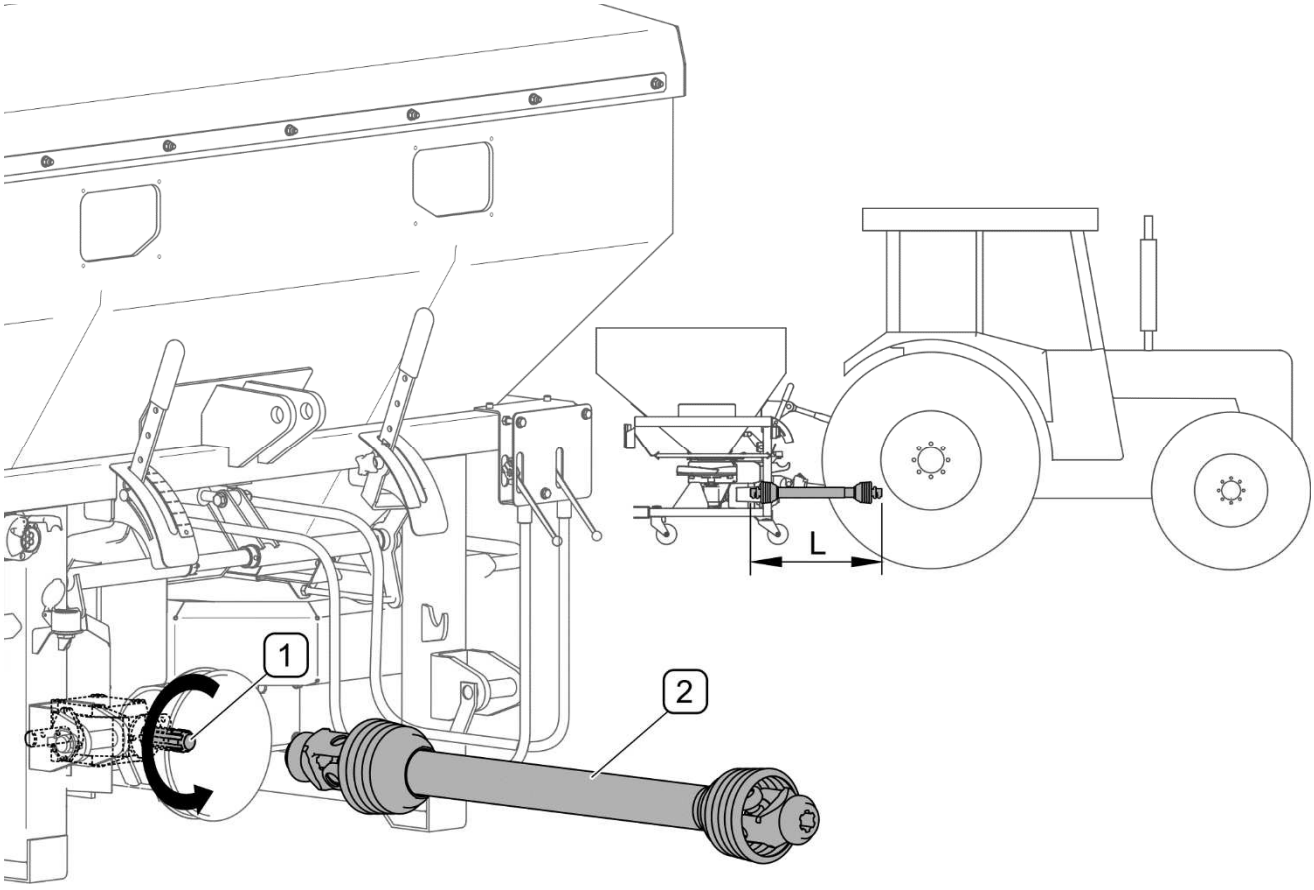


FIG. 4.2 Connecting PTO drive shaft

(1)- drive shaft of intersecting axis gear; (2)- PTO shaft (not included in the machine standard equipment)

CAUTION

The tractor PTO drive may be engaged only when the fertilizer spreader is lifted to working position

4.3.3 CONNECTING HYDRAULIC AND ELECTRICAL SYSTEM

DANGER

When connecting the hydraulic conduits, make sure that the tractor's hydraulic system is not under pressure

.

DANGER

Hydraulic conduits and electric leads should be so arranged as to prevent their damage during operation of the machine.

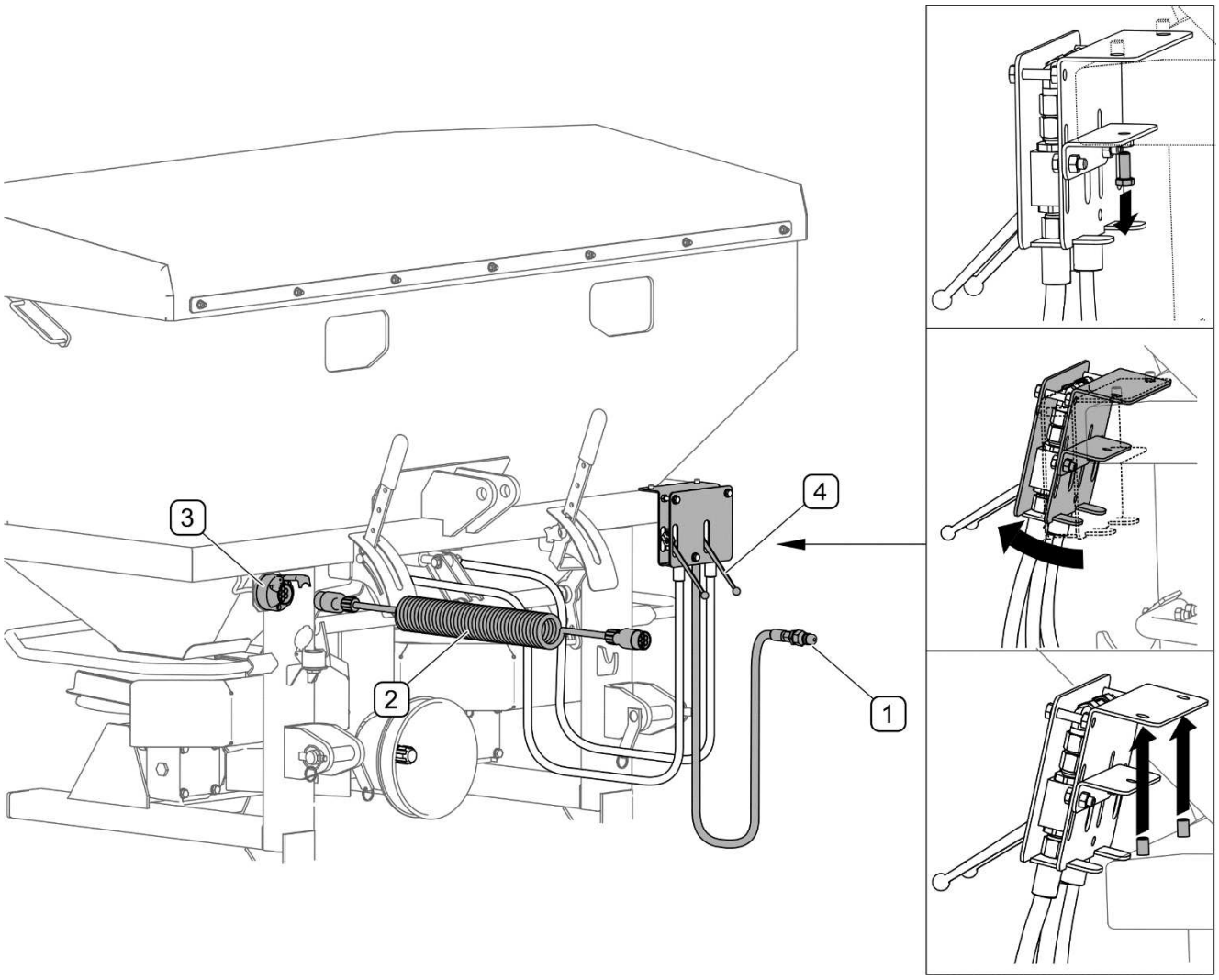


FIG. 4.3 Connecting the electrical system and hydraulic system

(1) - hydraulic conduit connector; (2) - electrical system connection lead; (3) - 7-pole socket; (4) - levers for opening and closing the dampers in the tank

Insert hydraulic conduit connector (1) to the socket of the tractor external hydraulic system. Connect electrical system connection lead (2) to the fertilizer spreader's socket (3) and to 7-pole socket on the tractor. Levers for opening and closing the dampers (4) can be dismounted from the fertilizer spreader's frame and placed in the tractor cab.

4.4 FERTILIZER SPREADER'S SETTINGS

4.4.1 LEVELLING THE MACHINE

For optimum operation, position the fertilizer spreader body (FIG. 4.4) in such a manner as to ensure that the rotation axis of the spreading disc is set at an angle of 90° to ground surface. This setting is performed with the use of the indicator located on the machine frame (FIG. 4.4)

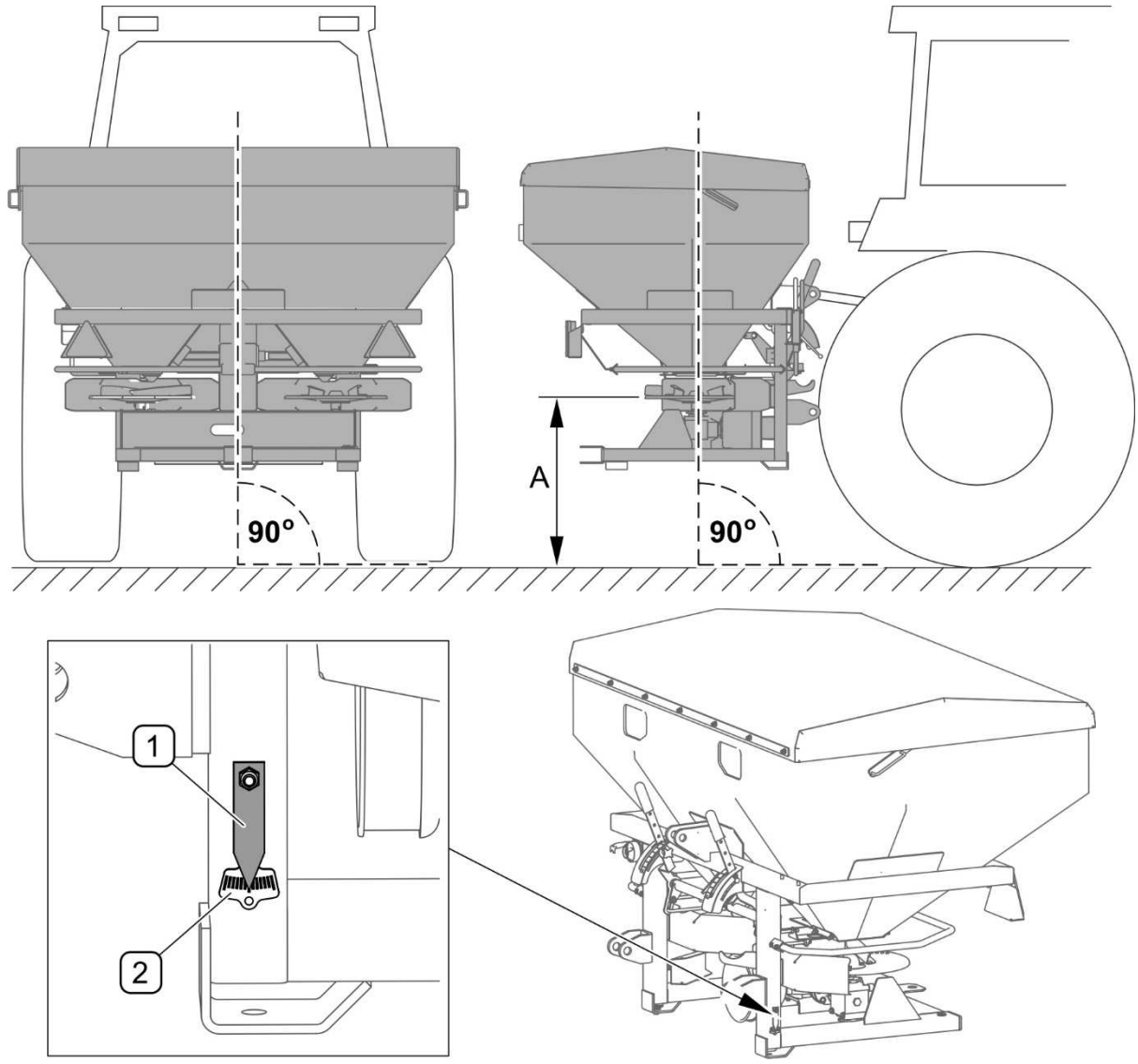


FIG. 4.4 Levelling the machine

1 - indicator; (2) - disc with scale; A - maximum working height (distance between the spreading disc blades and the ground) should not exceed 850 mm

Longitudinal inclination is set by adjusting the central link length while transverse inclination is set by changing the length of tractor lower arm hanging rod. Working height (A) should be set

in such a manner as to ensure that the distance between the spreading disc and the ground does not exceed 850 mm.

4.4.2 SETTINGS OF FERTILIZER DOSE

TIP

Various characteristics of fertilizers (e.g. dampness, granulation, specific weight), influence of wind and rotation speed of the spreading disc determine the spreading parameters. That is why it is impossible to predetermine the settings of the fertilizer spreader's adjusting devices. In order to determine the settings, preset the machine, make a test and correct the settings, if necessary.

Fertilizer dose is adjusted by means of levers (1) and (2), which change the position of dampers, via links, with regard to dosing holes (A) and (B). Dosing hole (A) is adjusted by means of lever (1), while dosing hole (B) is adjusted by means of lever (2). When lever (1) or (2) is shifted in „+" direction *(towards the tank)* (FIG. 4.5), the dampers are open and fertilizer dose is increased. When the adjustment levers are shifted to the extreme position „–", the dampers of dosing holes are completely closed.

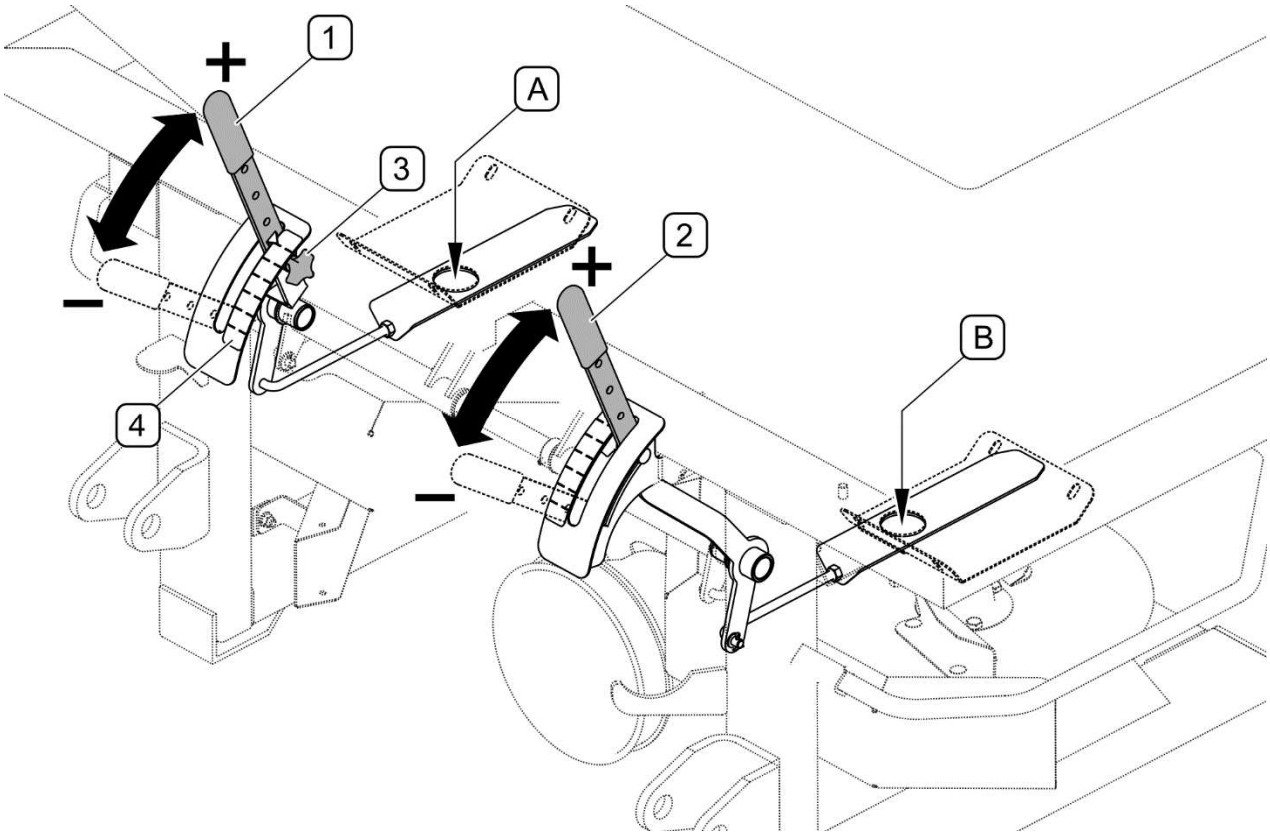


FIG. 4.5 Settings of fertilizer dose and spreading direction

(A), (B) - dosing holes; (1) - adjustment lever of A dosing hole; (2) - adjustment lever of B dosing hole; (3) - clamp bolt; (4) - partition disc

4.4.3 SETTINGS OF SPREADING WIDTH

Spreading width (FIG. 4.6) is adjusted by changing the position of blades on the spreading disc. Spreading width is increased by shifting the blades in the direction of spreading disc rotation. Each spreading disc is equipped with two blades: long one and short one. The long blade determines the external area of spreading width while the short blade determines the internal area of spreading width.

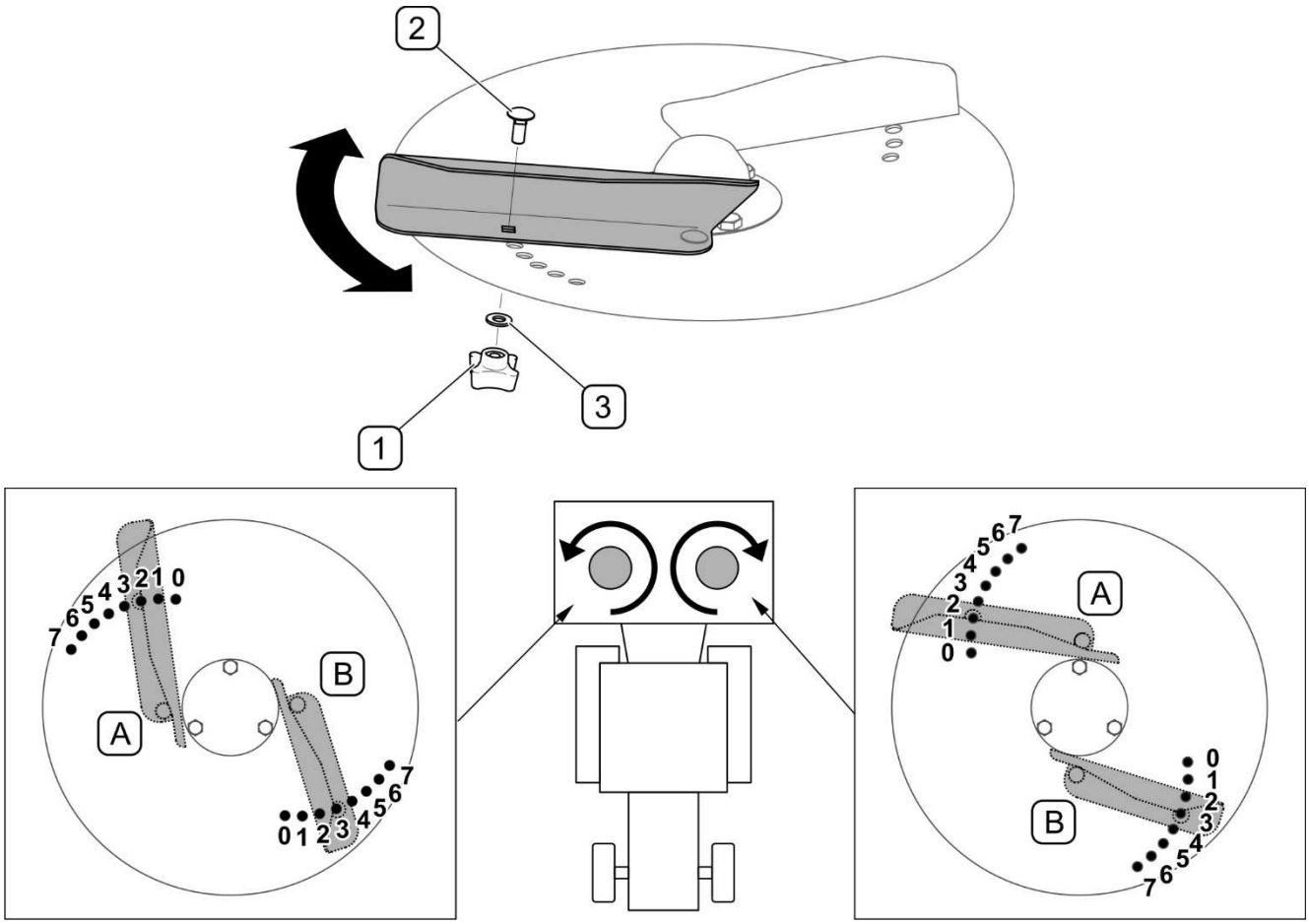


FIG. 4.6 Adjustment of spreading width

(A)- long blade; (B) - short blade; (1) - pressure knob; (2) - Z 8x20 bolt; (3)- washer 8;

Changing the position of blades on the spreading disc is conducted as follows:

- Unscrew knob (1) under the disc, remove washer (3) and bolt (2).
- Shift the blade in such a manner as to install bolt (2) in a proper hole on the disc.
- Lock spreading blade in a selected position by means of knob (1).

The minimum spreading width is achieved when the blades are set in „0” holes (FIG. 4.6). The maximum spreading width is achieved when the blades are set in „7” holes.

4.4.4 CONTROLLING FERTILIZER DOSE

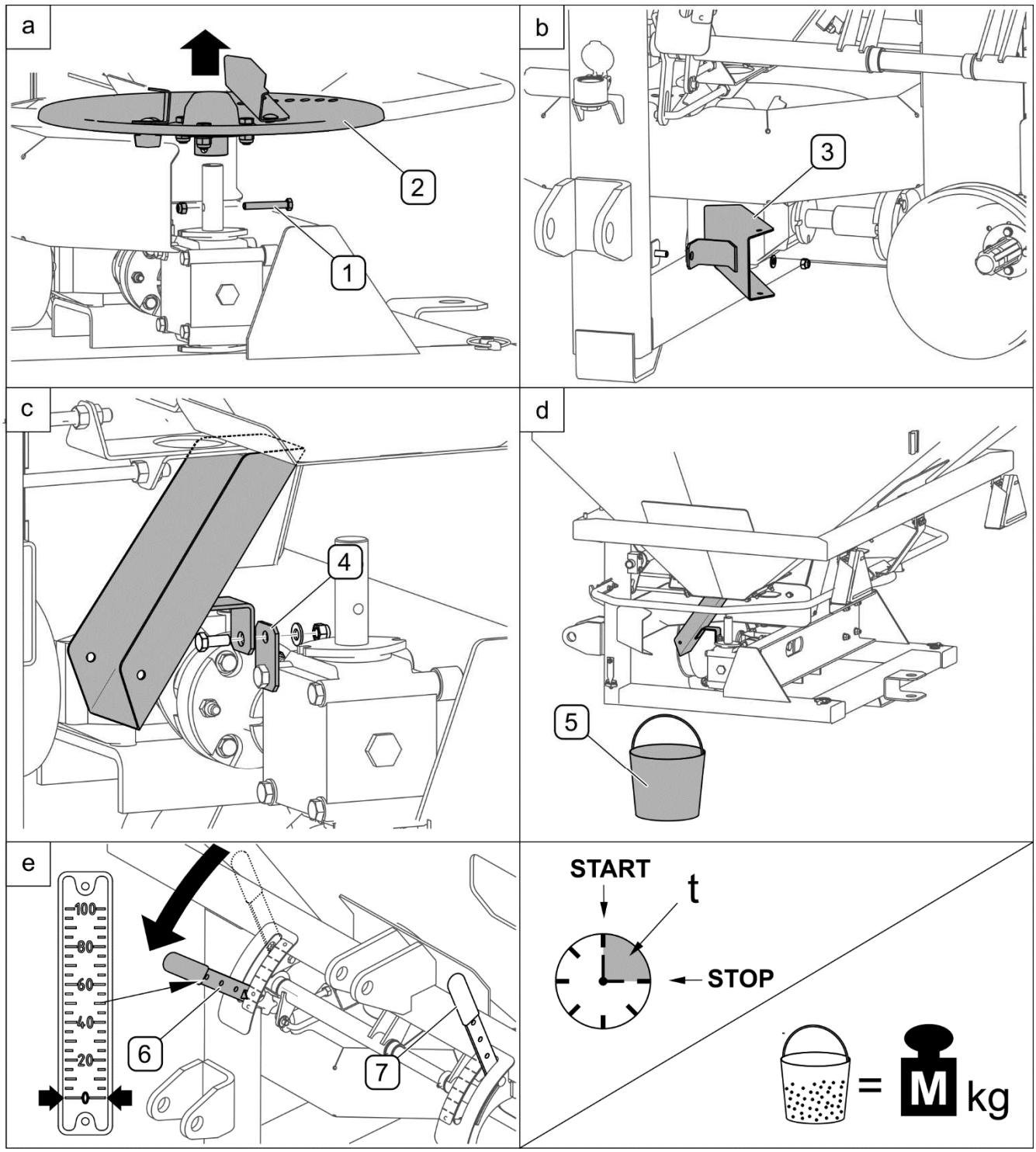


FIG. 4.7 Controlling fertilizer dose when the fertilizer spreader is parked

(1) - bolt; (2) - left spreading disc; (3) - chute; (4) - bracket; (5) -container for fertilizers; (6) - fertilizer dose adjustment lever for the right spreading disc; (7) - fertilizer dose adjustment lever for the left spreading disc

Fertilizer dose can be checked when the fertilizer spreader is parked but some conditions influencing the amount of spread fertilizer may not be taken into account. In order to check

the fertilizer dose, the fertilizer spreader should be hitched to tractor and the left chamber (looking in the direction of tractor travel) of the tank should be half full. Tank loading method is described in point 4.5.1 LOADING THE TANK.

In order to perform checking of fertilizer dose when the fertilizer spreader is parked (calibration test) (FIG. 4.7):

a. Unscrew bolt (1) and dismantle the left (looking in the direction of tractor travel) spreading disc (2)

b. Unscrew chute (3) installed on the machine frame and attach it to bracket (4) on the left intersecting axis gear.

c. Place a container (5) (e.g. a bucket) under the chute

d. Fertilizer dose adjustment lever (6) for the right spreading disc should be set on „0" on the partition disc while the fertilizer dose adjustment lever (7) for the left spreading disc should be set on, for example, „20".

e. Open hydraulic dampers for the time of (t) (see TAB. 4.2), depending on assumed travel speed and spreading width.

Weigh the fertilizer collected in the container (M) and use the following formula:

M x i = ? kg/ha

***M** - weight of the fertilizer collected during test [kg], **i** - multiplier of total amount of spread fertilizer (i = 40 for spreading width up to 23 m, **i** = 20 for spreading width above 23 m)*

The result is the amount [kg] of fertilizer dose per hectare [ha] for a given setting of both levers (in this case, for the value of „20"). If the result differs from the measured amount, correct the lever setting and repeat the test.

TAB. 4.2 PARAMETERS FOR CONTROLLING FERTILIZER DOSE WHEN THE FERTILIZER SPREADER IS PARKED

SPREADING WIDTH [M]	MULTIPLIER OF TOTAL AMOUNT OF SPREAD FERTILIZER	DAMPERS OPENING TIME (T) [S] EXPECTED TRAVEL SPEED		
		8 km/h	10 km/h	12 km/h
9	40	25	20	17
12		19	15	13
16		14	11	9
20		11	9	8
24	20	19	15	13

More precise results can be obtained by checking the amount of spread fertilizer during travel (FIG. 4.8). To do this, perform the activities (a,b,c,d) in the same manner as during controlling fertilizer dose when the fertilizer spreader is parked and then:

- Measure the measuring distance (X) *(see TAB. 4.3)* and mark the beginning (A) and the end (B) (*FIG. 4.8)*.
- While travelling at a constant speed, open the damper exactly at the beginning (A) of the measuring distance, travel the distance (X) and close the damper exactly at the end (B) of the distance.
- Weigh the fertilizer collected in the container (M) and use the same formula as for controlling fertilizer dose when the fertilizer spreader is parked.

The result is the amount [kg] of fertilizer spread per 1 hectare [ha] for a given setting of both levers (in this case, for the value of „20”).

If the result differs from the measured amount, correct the lever setting and repeat the test.

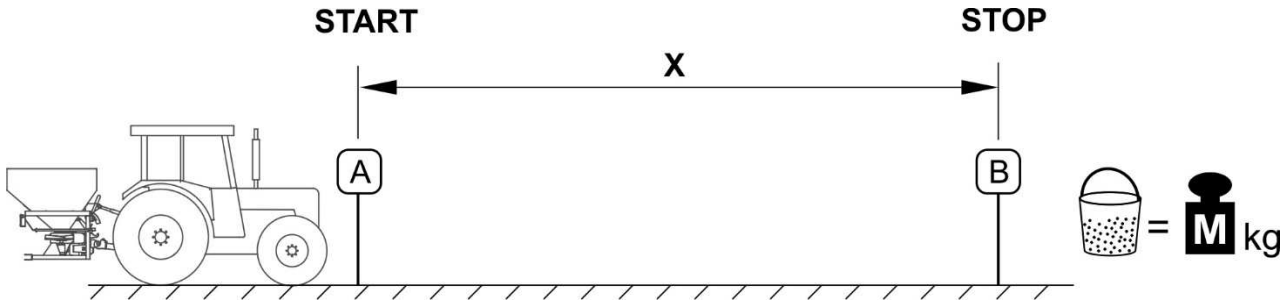


FIG. 4.8 Controlling fertilizer dose during travel

A - beginning of measuring distance; (B) - end of measuring distance; (X) - length of measuring distance; (M) - weight of fertilizer collected during the test

TAB. 4.3 PARAMETERS FOR CONTROLLING FERTILIZER DOSE DURING TRAVEL

SPREADING WIDTH [M]	MULTIPLIER OF TOTAL AMOUNT OF SPREAD FERTILIZER	LENGTH OF MEASURING DISTANCE X [M]
9	40	55.50
12		41.60
16		31.25
20		25
24	20	41.60

TIP

Fertilizer dose should be checked after each change of fertilizer type.

4.5 OPERATING THE FERTILIZER SPREADER

4.5.1 LOADING THE TANK

DANGER

Loading may be performed only if the fertilizer spreader is switched off, hitched to tractor and lowered to the ground.

Be especially careful when loading the fertilizer spreader with front loader.

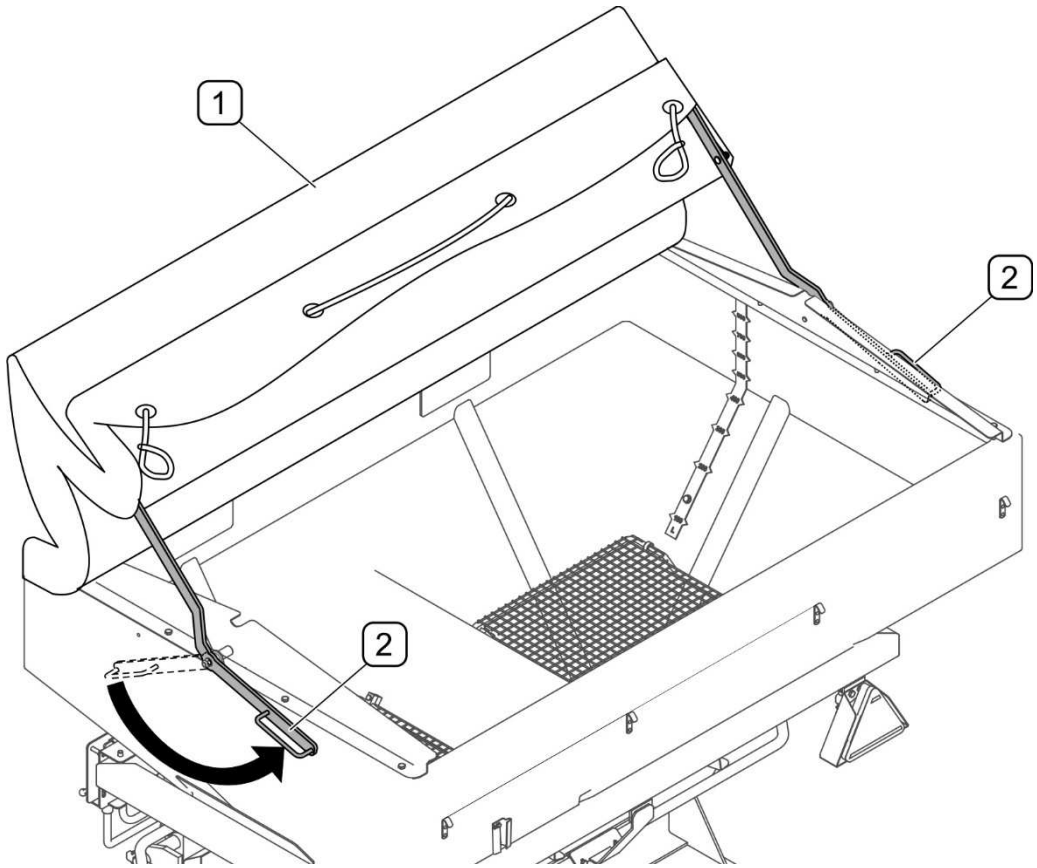


FIG. 4.9 Raising the tarpaulin cover

(1) - raised tarpaulin cover; (2) - levers for raising the tarpaulin cover

TIP

In order to maintain full steering ability of the tractor during travel with filled fertilizer spreader, the front axle of the tractor must be loaded with 20% of the tractor weight. If necessary, use additional front axle weights or fill the fertilizer spreader tank only partially.

The fertilizer spreader's tarpaulin cover (1) (if any) should be raised before tank loading (FIG. 4.9). To do this, remove securing cables from the tank catches, shift lever (2) and raise the frame with tarpaulin cover *(the levers are located on both sides of the tank).*

Before loading the tank, make certain that there are no remains of fertilizer or other objects in the tank. The fertilizer spreader's tank is loaded from above through the charging hole. The sand spreader's tank can be filled manually or mechanically e.g. using a front loader. Close both dosing holes at the tank bottom before filling the tank. Pay attention to prevent lumpy or contaminated fertilizer from entering the tank. Inside the tank, on both side walls, there are two capacity indicators (FIG. 4.10) with the scale graduated in litres [L] from 100÷900.

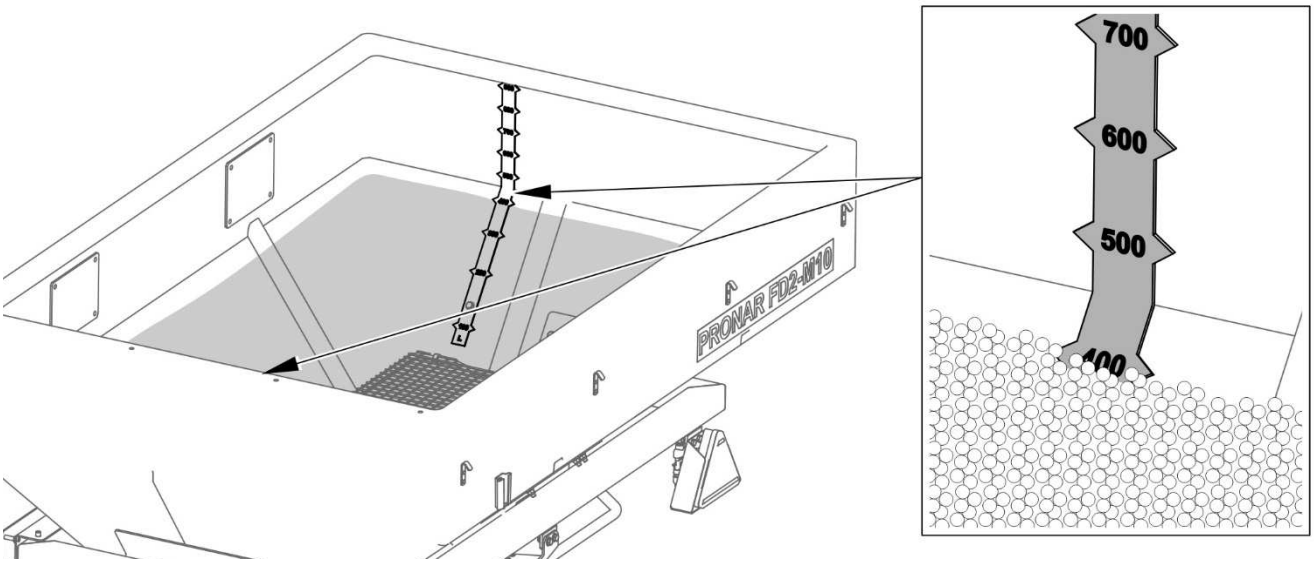


FIG. 4.10 Tank capacity indicator

Before loading, fertilizers should be sieved and their humidity should not exceed 12%. Spreading of powdery fertilizers or mixtures based on powdery fertilizers is not recommended.

DANGER

Use proper protective clothing while handling fertilizers i.e. protective overalls, gloves, safety shoes, safety goggles, mask.

All instructions of the fertilizer producer should be adhered to.

During transport, fertilizers in the tank may get compacted, which may hinder their spreading. It is recommended that fertilizers are delivered to the place of spreading with the use of other means of transport e.g. a trailer.

If it is necessary to load the fertilizer spreader's tank earlier and deliver fertilizers in the tank to the field, the tank should be filled only up to 2/3 of its capacity.

ATTENTION

Do not exceed permissible load capacity of the fertilizer spreader (see technical data) and permissible total weight of the cooperating tractor.

4.5.2 FERTILIZER SPREADING

DANGER

The machine drive system can be controlled only from the tractor cab.

There must be no bystanders within the machine working zone.

Having made sure that all the protective elements and all the connections are properly installed, one may commence working with the machine. Lift the fertilizer spreader using the tractor three point linkage, drive to the place of work and then, engage PTO shaft drive and set a proper engine rotational speed.

ATTENTION

PTO drive may be engaged only when the fertilizer spreader is lifted.

ATTENTION

It is not recommended to operate the fertilizer spreader at a working speed of more than 12 km/h.

Dampers are closed and opened by means of cylinders controlled using the proper lever of the tractor's external hydraulic system. The use of two valves (FIG. 4.11) makes it possible to close oil flow to the right cylinder or the left cylinder of hydraulic dampers. For example, when one of the valves is closed, only one damper can be closed or opened. If both valves are set to position (0), the dampers can not be opened and closed. The dampers of dosing holes should be opened only after PTO shaft has reached the required rotational speed. Maintain constant PTO shaft speed when spreading.

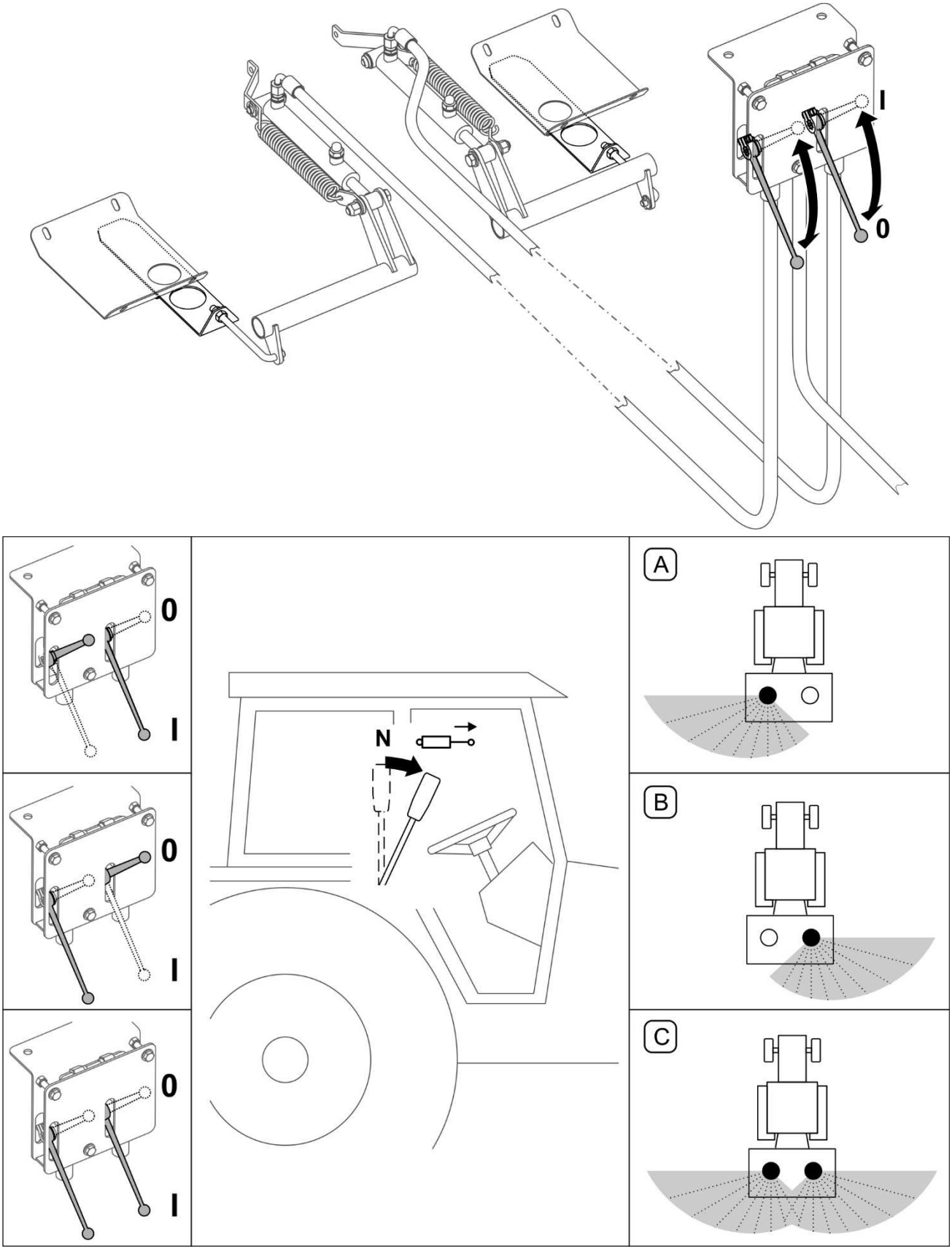


FIG. 4.11 Opening and closing the hydraulic dampers

(I) - damper valve is open; (0) - damper valve is closed; (A) - left-sided spreading; (B) - right-sided spreading; (C) - symmetrical spreading

Pay attention to spreading width (B), successive tractor tracks (FIG. 4.12) should be evenly spaced. When turning or stopping the tractor, the dampers of dosing holes should be closed hydraulically from the tractor cab. At the ends of the field and when starting a new track, take into account the rear range (A) of the spreading zone and properly close and open the tank dampers.

When spreading fertilizers near the field boundaries, asymmetrical, right-sided or left-sided spreading can be used by closing or reducing the size of one of the dosing holes in the tank

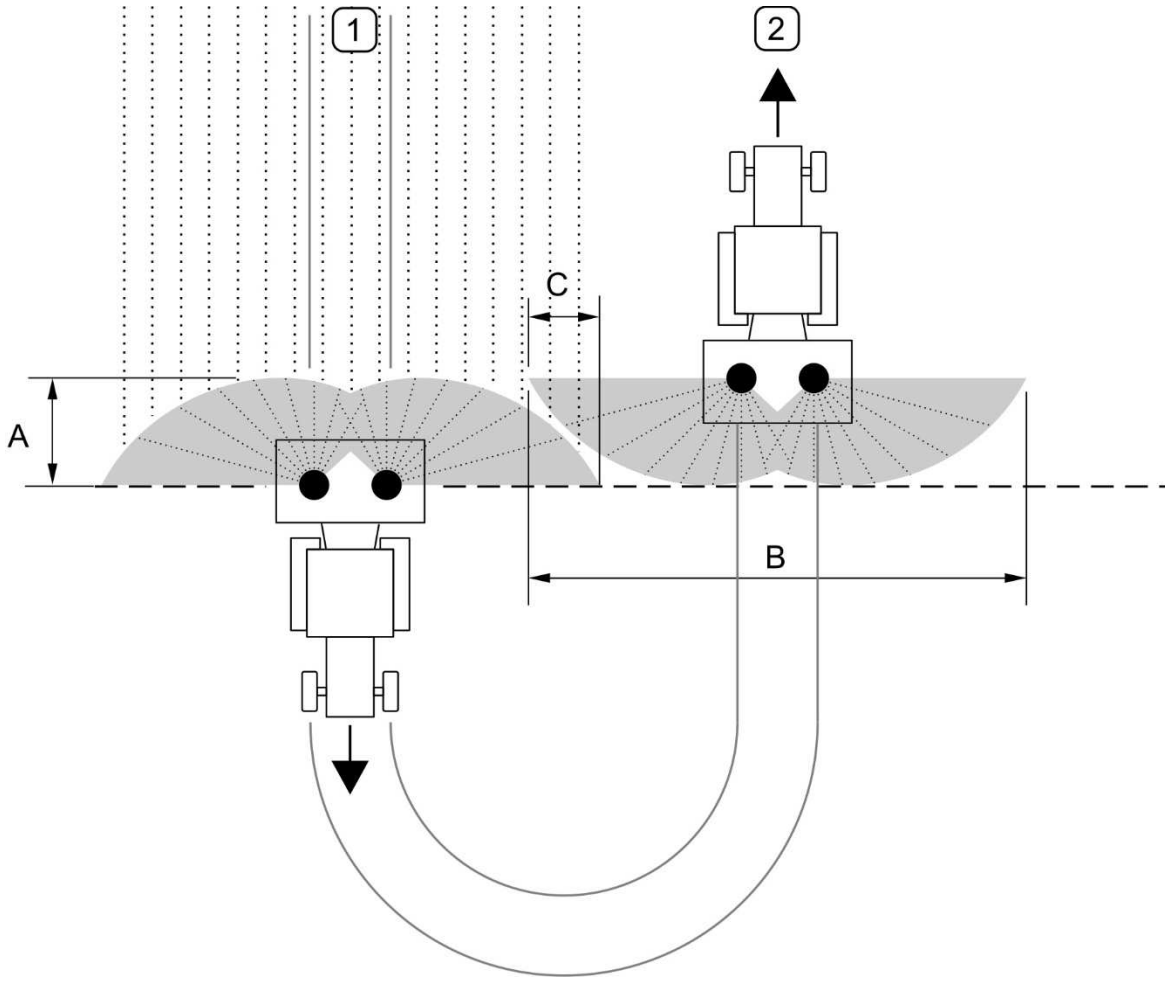


FIG. 4.12 Fertilizer spreader operation diagram

(A) - rear spreading range, (B) - spreading width (width of fertilizer spreading belt); (C) - spreading belt overlap; (1), (2) - numbers of successive tracks

In order to prevent clogging of fertilizer spreader's tank:

- Before loading the tank, make certain that there are no remains of fertilizer or other objects in the tank.
- Use sieved fertilizers whose humidity does not exceed 12%.
- Transport of fertilizers in the tank is not recommended because they may get compacted. Fertilizers should be delivered to the place of spreading with the use of other means of transport.
- Do not leave fertilizers in the fertilizer spreader's tank.

4.6 TRANSPORTING THE MACHINE

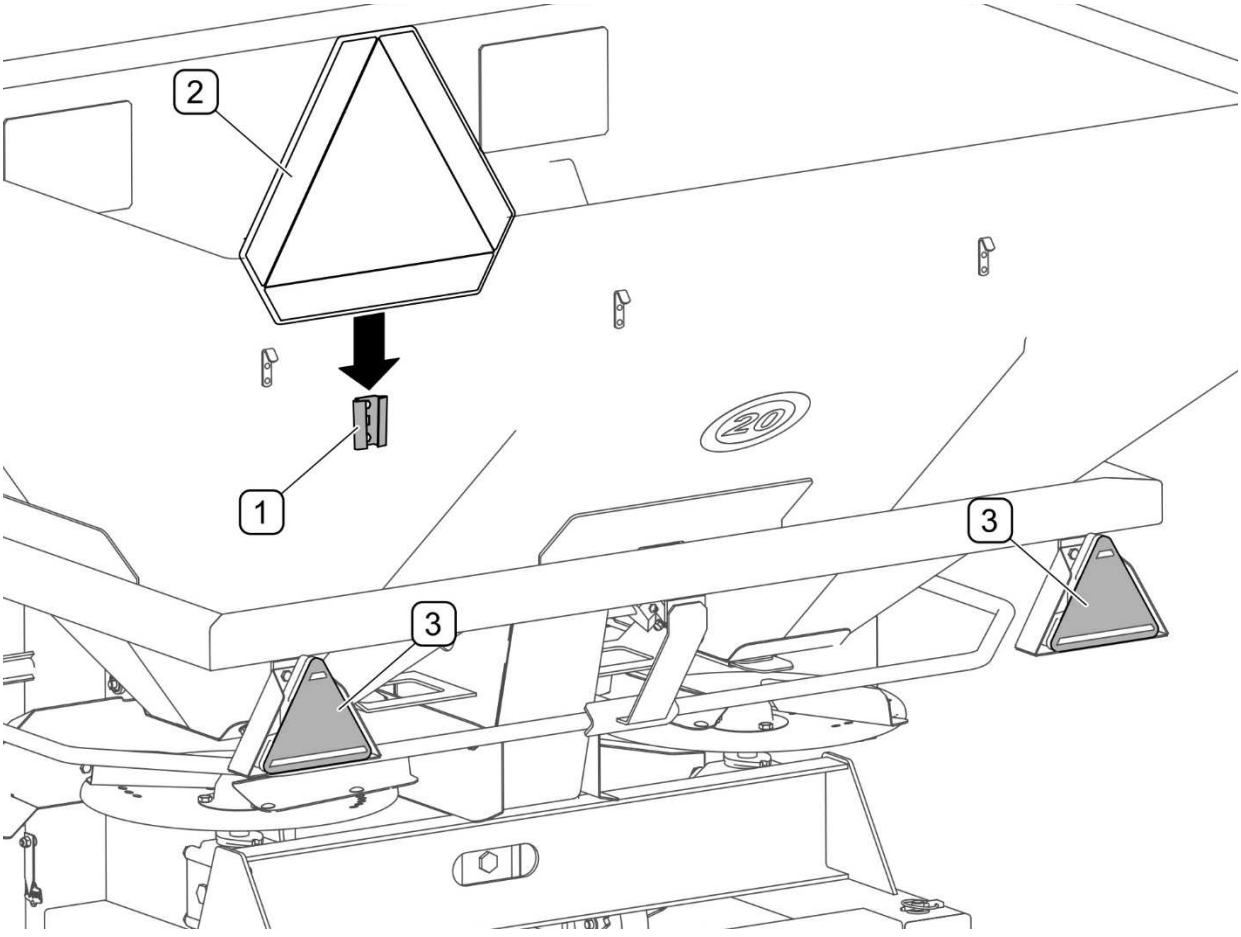


FIG. 4.13 Bracket of slow-moving vehicle warning sign and rear lamps

(1) - bracket; (2) - slow-moving vehicle warning sign (not included in the machine equipment); (3) - rear lamp with reflective warning triangle

- When driving on public or private roads, respect the road traffic regulations, exercise caution and prudence. Listed below are the key guidelines.
- Make sure that the machine is correctly attached to the tractor, and linkage is properly secured.
- Permissible working speed, transport speed and maximum speed allowed by road traffic law must not be exceeded. Speed of travel should be adjusted to prevailing road conditions, pavement condition and other conditions.
- Before driving on public roads, connect the fertilizer spreader's electrical system to the tractor and check operation of the lighting system.
- While driving on public roads, the machine should be marked with a slow-moving vehicle warning sign placed in the bracket in the rear of the machine (FIG. 4.13)
- When driving with raised fertilizer spreader on public roads, set it so as not to restrict the visibility of the operator.
- Avoid ruts, depressions, ditches or driving on roadside slopes. Driving across such obstacles could cause the machine or the tractor to suddenly tilt. Driving near ditches or canals is dangerous as there is a risk of the slope collapsing.
- Speed must be sufficiently reduced before making a turn or driving on an uneven road or a slope.
- When driving on uneven terrain with the machine raised reduce speed due to dynamic loads and the risk of damaging the machine or carrying vehicle.
- When driving with raised implement, secure the tractor linkage against falling or accidental dropping.
- In order to maintain full steering ability of the tractor during travel with filled fertilizer spreader, the front axle of the tractor must be loaded with 20% of the tractor weight. If necessary, use additional front axle weights or fill the fertilizer spreader tank only partially.
- In order to prevent scattering of fertilizers during travel, put protective tarpaulin cover (additional equipment) on the tank.
- The rear hitch of the fertilizer spreader is used only for hitching the double axle trailers with gross weight that does not exceed 1,25 of the allowable gross weight

of the tractor and is not higher than 5 000 kg and the maximum travel speed of 20 km/h (not on the public roads).

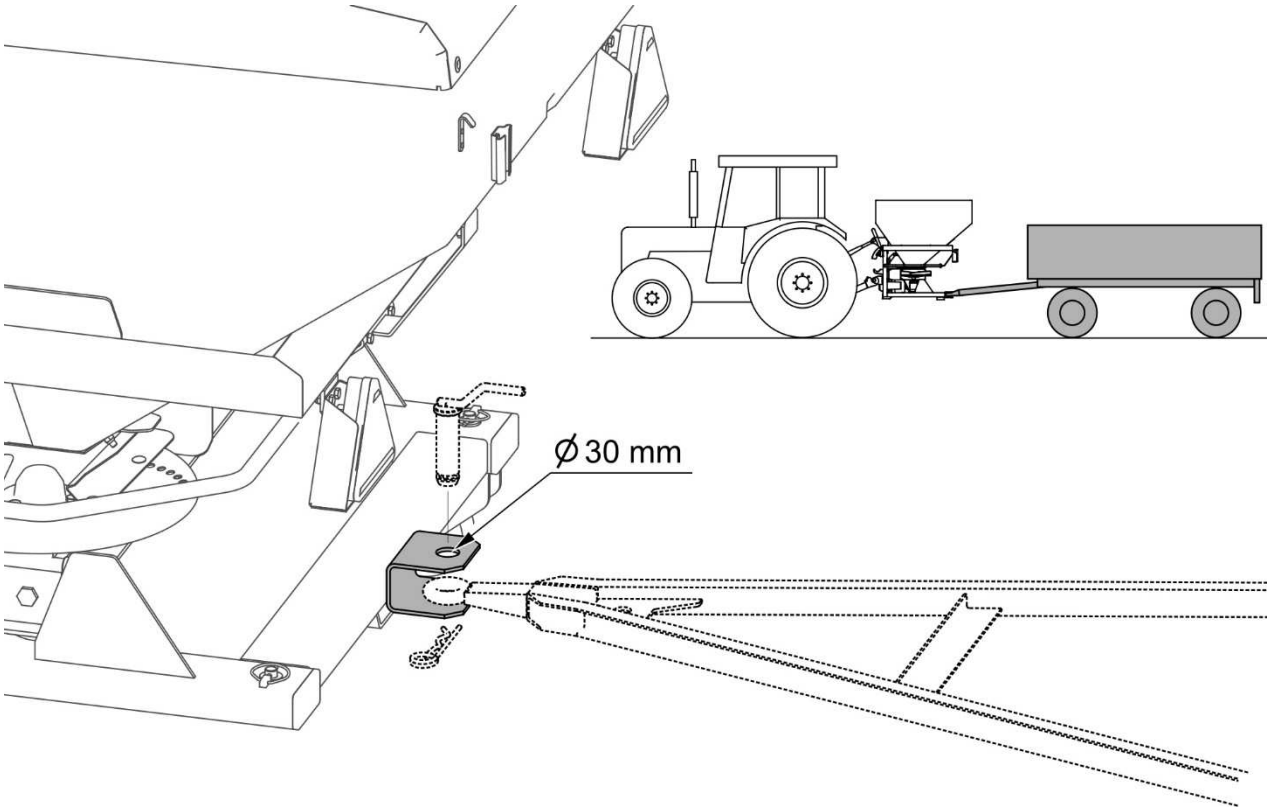


FIG. 4.14 Hitch for double axle trailer

DANGER

Do NOT drive on public roads with a trailer hitched to the rear hitch of the fertilizer spreader.

ATTENTION

Do NOT hitch single axle trailers to the rear hitch of the fertilizer spreader.

4.7 UNHITCHING FROM TRACTOR

DANGER

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

Be especially careful when unhitching the machine from the tractor.

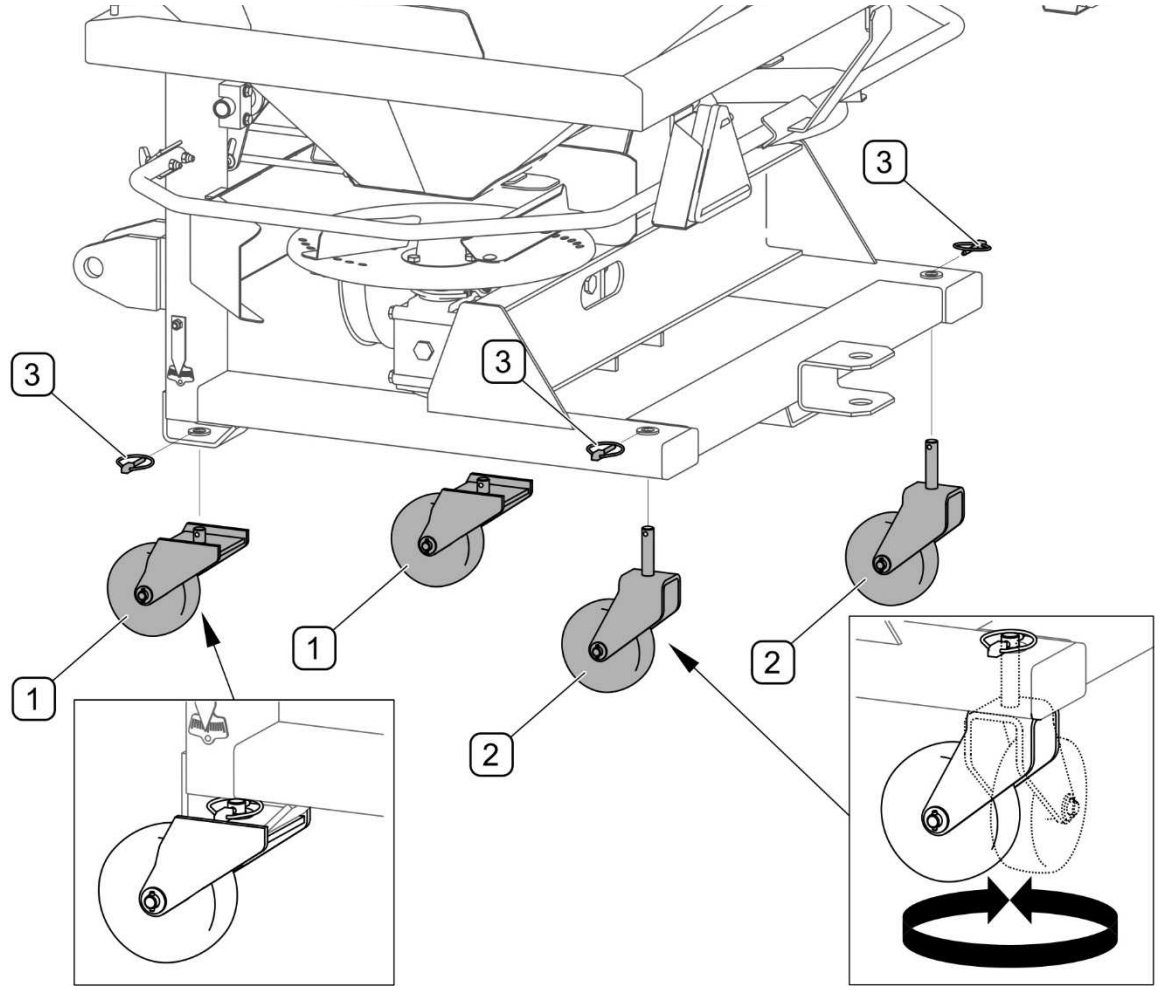


FIG. 4.15 Wheels (option)

(1) - front fixed wheel; (2) - rear turning wheel; (3) - securing cotter pin

In order to facilitate manoeuvring after unhitching the fertilizer spreader from the tractor, the spreader can be equipped with a set of wheels (FIG. 4.15) secured to the machine frame. In order to attach the wheels, raise the machine, insert proper wheels from below into the holes in the frame and secure with cotter pins (3). Fixed wheels (1) are installed in the front part of the machine while turning wheels (2) are installed in the rear of the machine.

DANGER

Empty the fertilizer tank before unhitching the fertilizer spreader from the tractor.

DANGER

Reduce pressure prior to disconnecting the hydraulic system.

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

- Disengage PTO drive, lower the fertilizer spreader until it fully rests on the ground.
- Switch off engine, remove key from ignition and engage parking brake.
- Reduce residual pressure in the hydraulic system by movements of appropriate lever controlling the tractor's hydraulic circuit.
- Disconnect electric lead (1) of lighting system (FIG. 4.17).
- If the control levers of damper valves were previously placed in the tractor cab, suspend them on the machine frame (FIG. 4.16).
- Disconnect hydraulic conduit connector (2) from the tractor and place it in special socket (3) on the frame (FIG. 4.17).
- Disconnect PTO shaft (2) from the tractor and place it on bracket (1) (FIG. 4.18). Disconnect the PTO shaft completely if the machine will not be used for a long time.
- Disconnect top link (so called central connector), take out cotter pins of pins (4), disconnect lower links of the tractor and drive tractor away from the machine (FIG. 4.17)

Machine disconnected from the tractor must be placed on level, sufficiently hard surface in such a manner as to ensure that it is possible to connect it again.

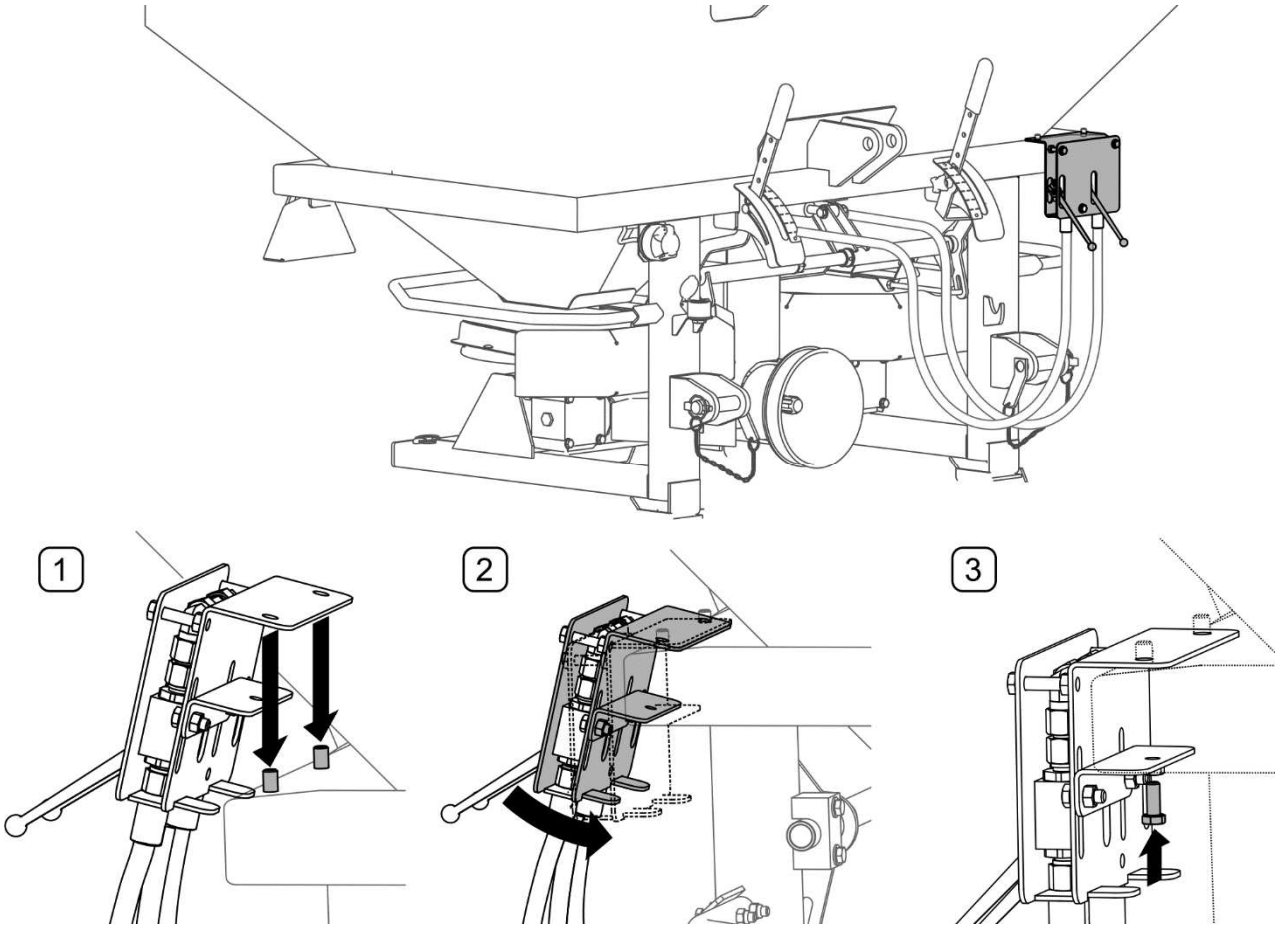


FIG. 4.16 Mounting the levers for opening and closing the dampers

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

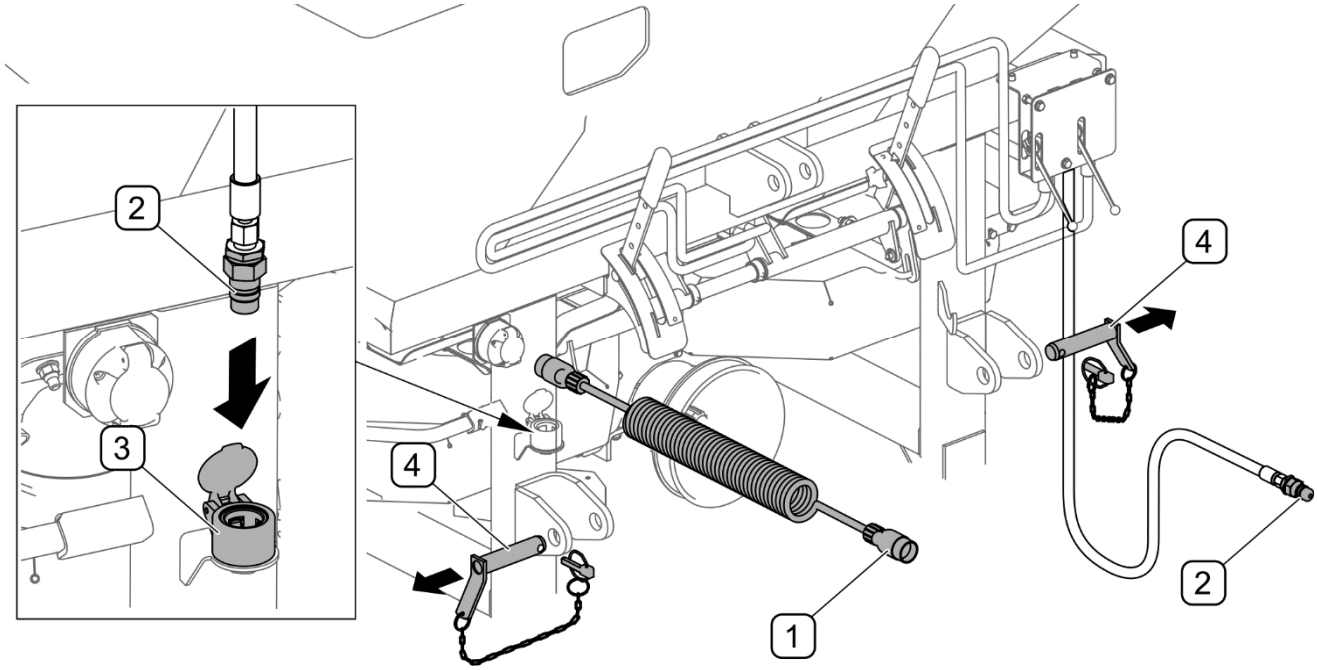


FIG. 4.17 Unhitching from tractor

(1) - lighting system lead; (2) - hydraulic coupler; (3) - protecting socket; (4) - pins of lower links

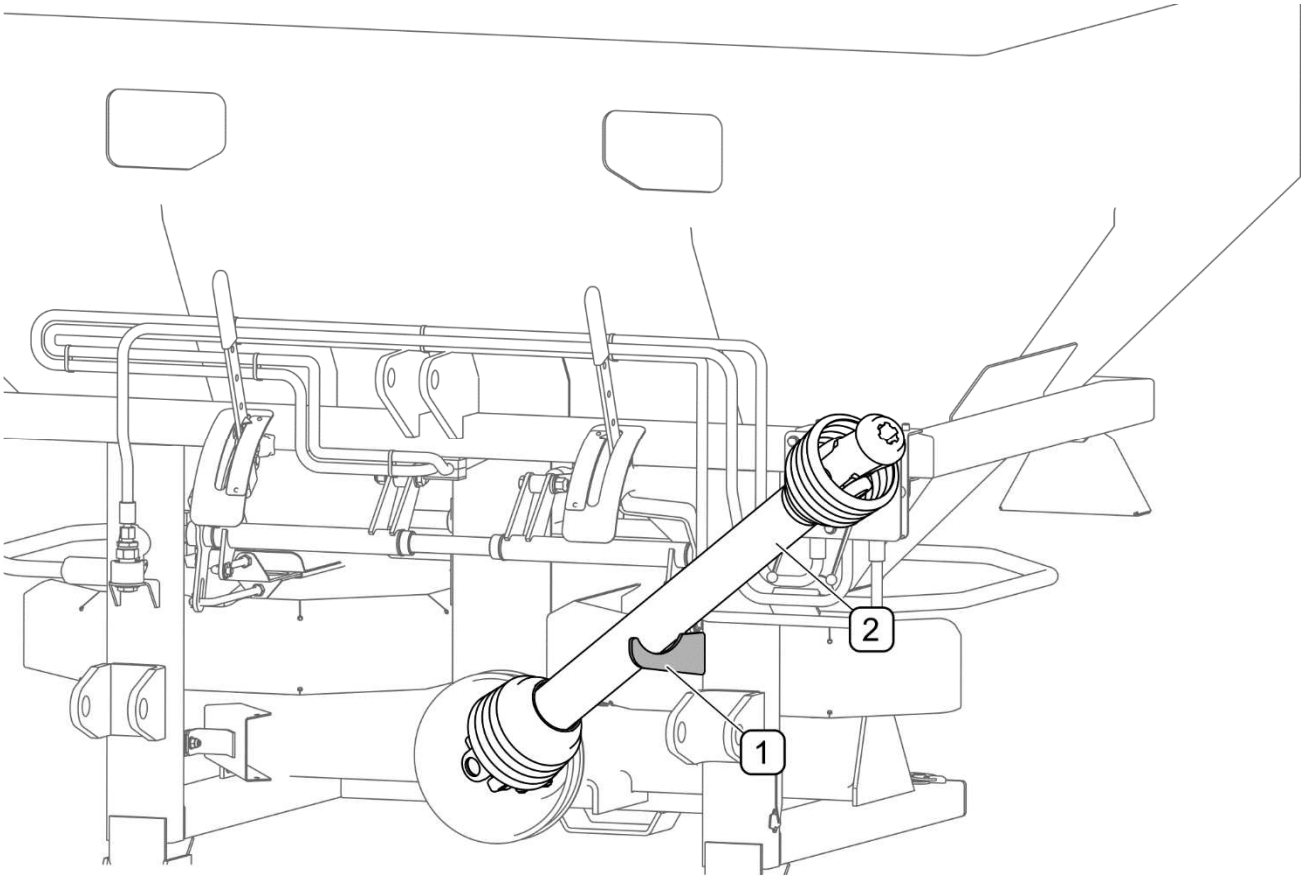


FIG. 4.18 PTO shaft bracket

(1) - PTO shaft bracket; (2) - PTO shaft;

ATTENTION!

Do NOT use the securing chains to support the shaft while machine is parked or when transporting the machine.

SECTION

5

MAINTENANCE

5.1 HYDRAULIC SYSTEM OPERATION

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

- checking leaktightness of hydraulic connections;
- checking technical condition of hydraulic lines and quick couplers;

DANGER

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

ATTENTION!

Before you begin, visually inspect the hydraulic system components.

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

DANGER

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

TAB. 5.1 HL32 hydraulic oil characteristics

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

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.

The hydraulic system should be completely tight sealed. Minimum leaks are permissible with symptoms of "sweating", however in the event of noticing leaks in the form of "droplets" stop using the machine until faults are remedied.

The hydraulic system is vented automatically during machine operation.

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

DANGER

Before commencing whatever work on hydraulic system reduce the residual 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.

5.2 DRIVE TRANSMISSION MECHANISM MAINTENANCE

5.2.1 MAINTENANCE OF INTERSECTING AXIS GEARS

DANGER

Maintenance of the fertilizer spreader's drive transmission mechanism can be carried out only if the tractor's engine is switched off and the machine is lowered.

It is recommended that grease level in the gear be checked once a year. If necessary, add grease.

Replacement of gear lubricant is not required. Possible grease change is carried out during gear repairs.

Such symptoms as fresh stains of grease and increased noise level of the gear may indicate that lubricant level is too low.

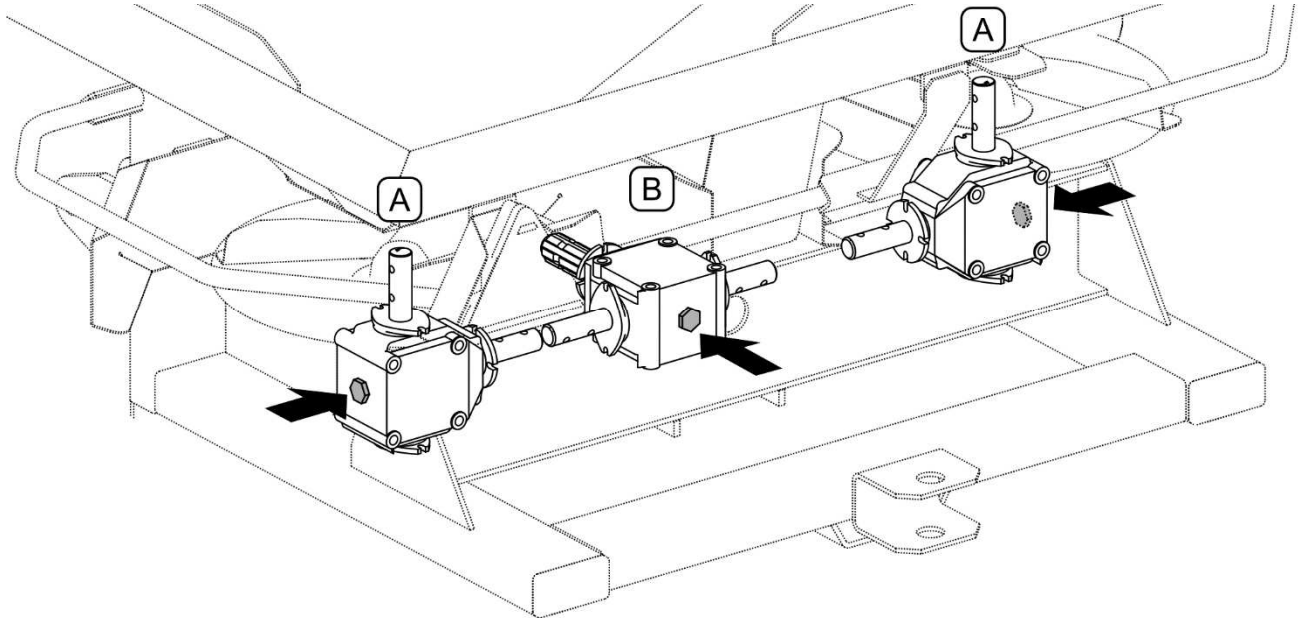


FIG. 5.1 Location of inspection plugs in intersecting axis gears

(A) - side gears, (B) - central gear

Inspection plugs of the side gears (A) are located on the right side and the left side of the fertilizer spreader, while the inspection plug of the central gear (B) is located in the rear part of the fertilizer spreader (FIG. 5.1).

TIP

To lubricate intersecting axis gears, use EPX-00 semi-fluid grease in the amount of 200 cm^3 for each gear.

To check the grease level in intersecting axis gears:

- set the machine horizontally, unscrew plugs (FIG. 5.1)
- grease level should reach the lower edge of the plug opening,
- if necessary, add grease.

DANGER

When checking oil and grease level and changing oil and grease, use appropriate personal protection equipment i.e. protective clothing, safety shoes, gloves, safety goggles. Avoid contact of skin with oil and grease.

Because of its composition the grease 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 and grease 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 lubricant to skin. In the event of contact of oil and grease with eye, rinse with large quantity of water and in the event of the occurrence of irritation consult a doctor. Grease in normal conditions is not harmful to the respiratory tract. A hazard only occurs when grease is strongly atomised or in the case of fire during which toxic compounds may be released.

DANGER

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

Used grease 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 lubricant level. Operation of transmission with insufficient lubricant may cause permanent damage of the mechanism.

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

5.2.2 MAINTENANCE OF CHAIN TRANSMISSION

DANGER

Before you begin the adjustment, turn off the machine drive and ensure that unauthorised persons have no access to the vehicle cab.

In order to check the condition of the chain and make adjustments (FIG. 5.2), unscrew 4 bolts (2) and remove cover (1). A correctly tensioned chain should deflect up to 20 mm in its central point. In order to adjust the chain tension, move tensioner roller (4) by turning bolt (3). The chain tension is increased when bolt (3) is turned clockwise („+"). Lubricate the chain after checking and adjusting (see *5.5 LUBRICATION*) and reinstall cover (1).

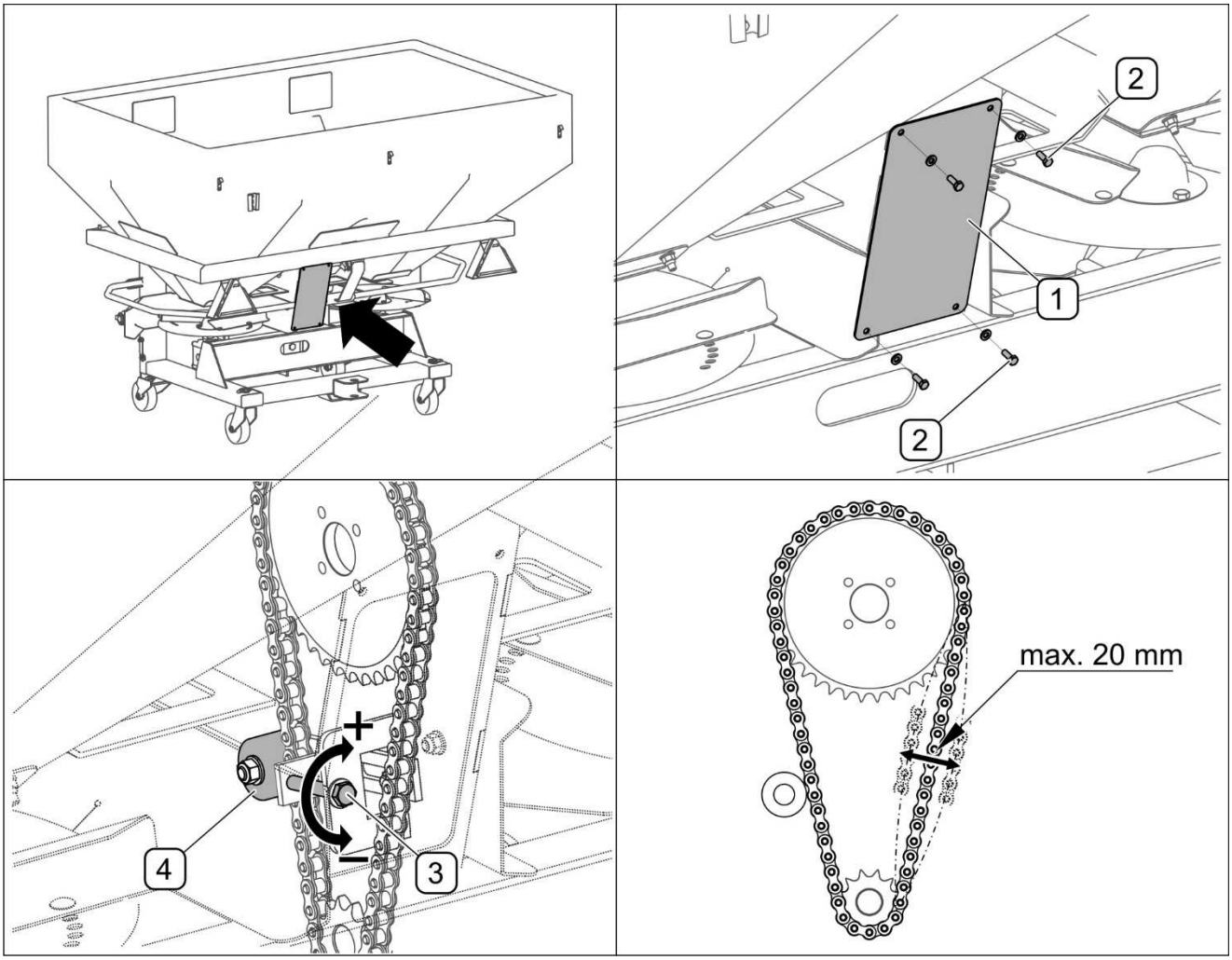


FIG. 5.2 Adjusting the chain transmission

(1) - rear cover of transmission; (2) - bolt; (3) - tensioner bolt; (4) - tensioner roller

Check the condition and lubricate the chain every 40 working hours. Lubricate the chain with graphite grease.

5.3 REPLACING SPREADING DISC BLADES

DANGER

Spreading disc blades may be checked and replaced only if the machine is disconnected from the tractor.

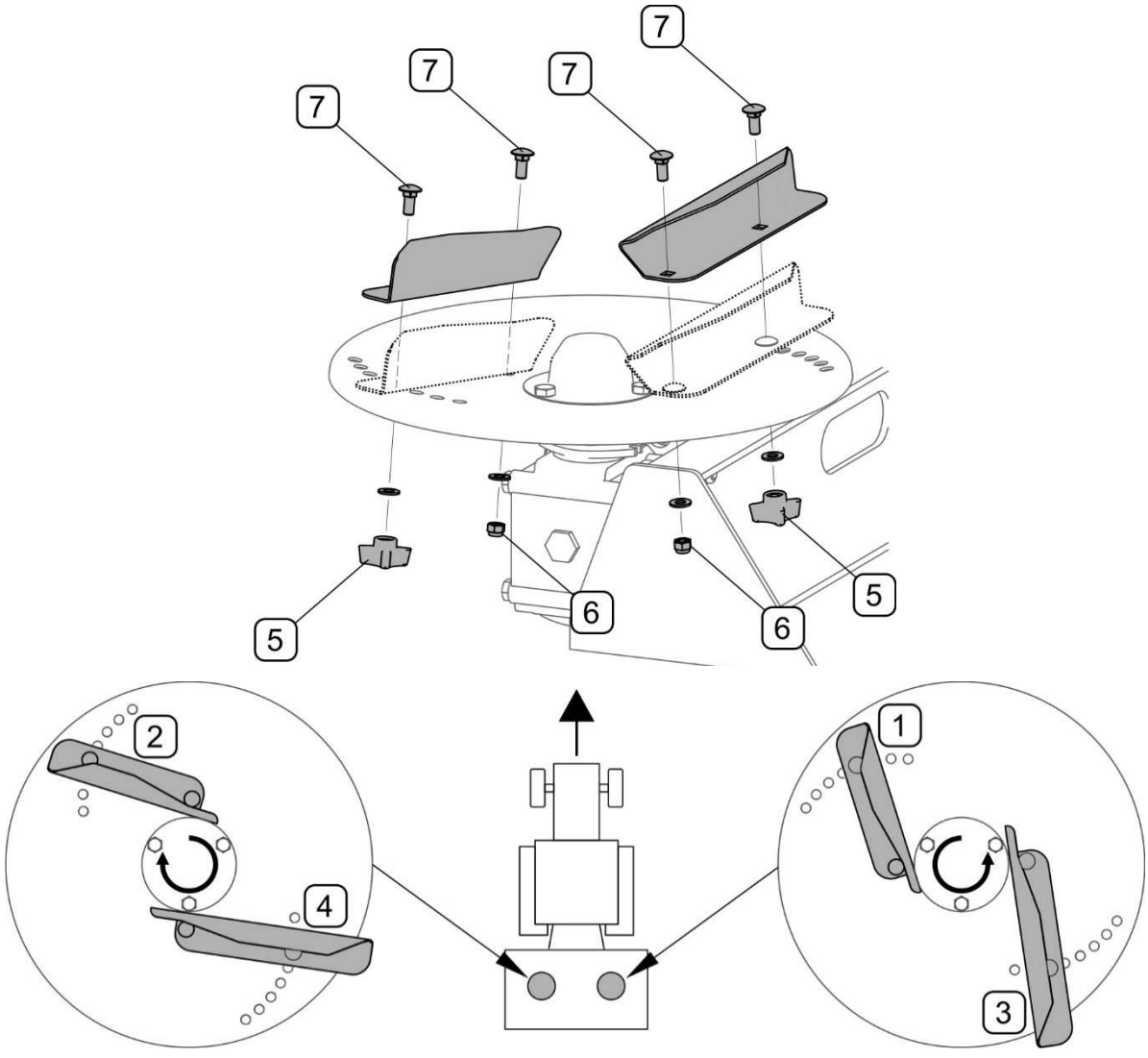


FIG. 5.3 Replacing spreading disc blades

(1) - short right blade; (2) - short left blade: (3) - long right blade; (4) - long left blade; (5) - knob; (6) - M8 nut; (7) - Z 8x20 bolt

Technical condition of spreading disc blades should be checked periodically paying attention to mechanical damage, excessive wear and completeness of securing elements. Before dismantling the blades, pay attention to their setting in proper adjusting holes.

In order to replace spreading disc blades (FIG. 5.3):

- unscrew knob (5) and nuts (6),
- remove bolts (7) and blades,
- install new blades, check condition of bolts (2) and nuts (3), replace them if necessary (see TAB. 5.2)
- install in reverse order

All blades are replaced in the same way. When installing a blade, pay attention to rotation direction of spreading disc and mounting in proper holes.

TAB. 5.2 THE LIST OF WORKING COMPONENTS OF SPREADING DISCS

Marking FIG. 5.3	**Name / Catalogue No.**	**Number** of items
1	Blade 200, right / 288N-04000004P	1
2	Blade 200, left / 288N-04000004L	1
3	Blade 250, right / 288N-04000002P	1
4	Blade 250, left / 288N-04000002L	1
5	Knob / PN2-M8	2+2
6	Self locking nut M8-A4-70 ISO 7040	2+2
7	Bolt Z 8x20-A4-70 PN-87/M-82406	4+4

5.4 ADJUSTMENT OF DAMPERS

5.4.1 ADJUSTMENT OF DAMPERS OF FERTILIZER DOSE CHANGING MECHANISM

DANGER

Spreading disc blades may be checked and replaced only if the machine is disconnected from the tractor.

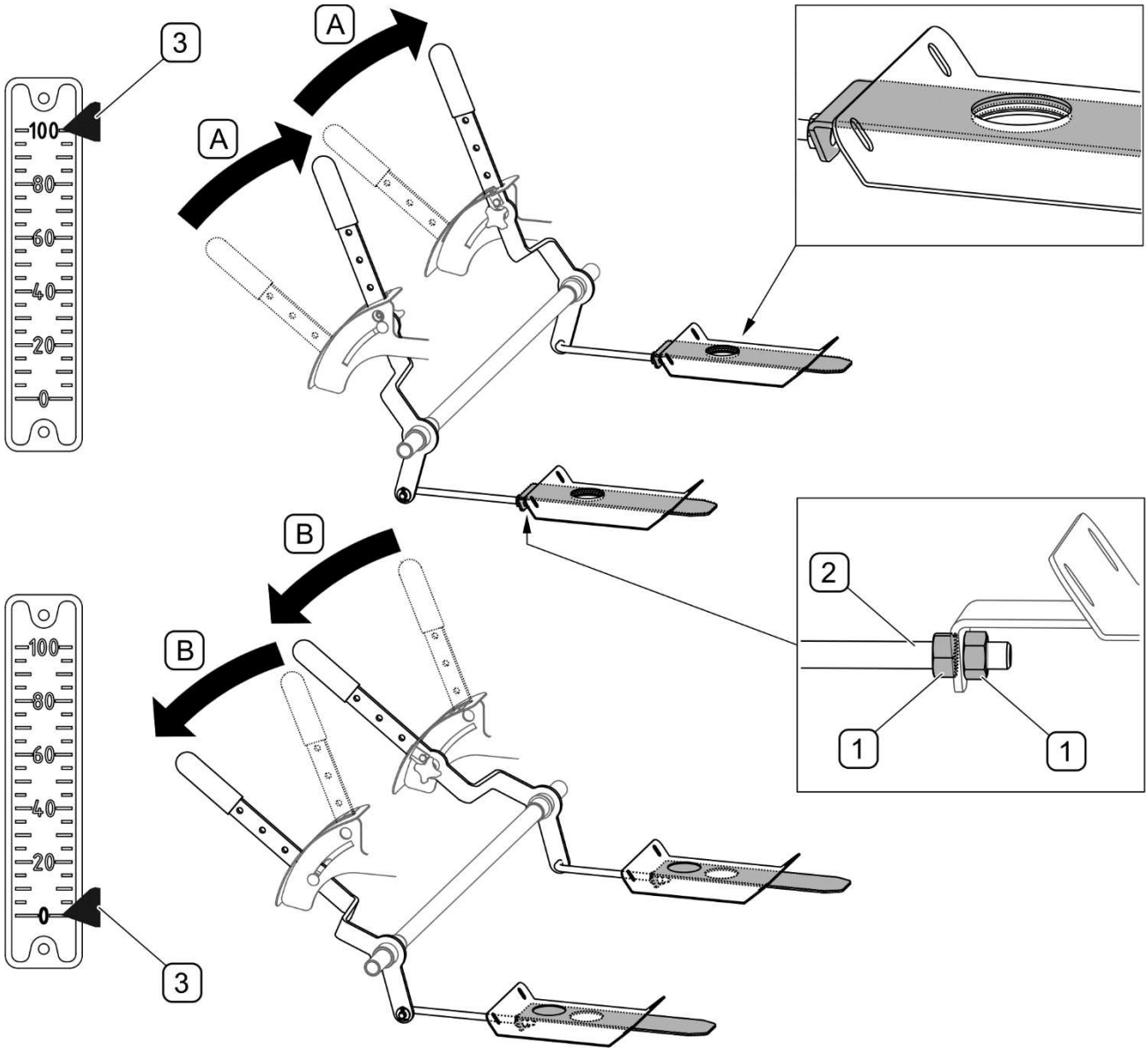


FIG. 5.4 Adjustment of fertilizer dose changing levers

(A) - levers in open position; (B) - levers in closed position; (1) - adjustment nuts; (2) - link; (3) - indicator

Dose adjustment mechanism is set in the factory by the Manufacturer. Readjustment may be necessary if individual elements are replaced (FIG. 5.4). Check position of dampers in extreme position of levers (A) and (B).

When the levers are set in position (A), dosing holes in the tank should be maximally open, indicator (3) on the disc should be set on the value of „100”. When both levers are shifted to position (B), dosing holes in the tank should be completely closed, indicator (3) on the disc should indicate the value of „0”. In order to adjust the levers (FIG. 5.4):

- Open completely the hydraulically controlled closing dampers.
- Loosen both nuts (1) on link (2) *(two nuts on each link).*
- Turn a proper nut (1) in order to set a suitable link length (2).
- Check position of dampers in extreme positions of levers (A) and (B).
- Tighten nuts (1).

Adjust the second lever in the same way.

5.4.2 ADJUSTING THE CLOSING DAMPERS

Damper closing mechanism is set in the factory by the Manufacturer. Readjustment may be necessary if individual elements are replaced (FIG. 5.5). In order to adjust the closing dampers:

- Extend cylinders (3) completely and open the dampers,
- Loosen both nuts (1) on link (2) *(two nuts on each link).*
- Turn a proper nut (1) in order to set a suitable link length (2).
- Check position of dampers in extreme positions of levers (A) and (B).
- Tighten nuts (1).

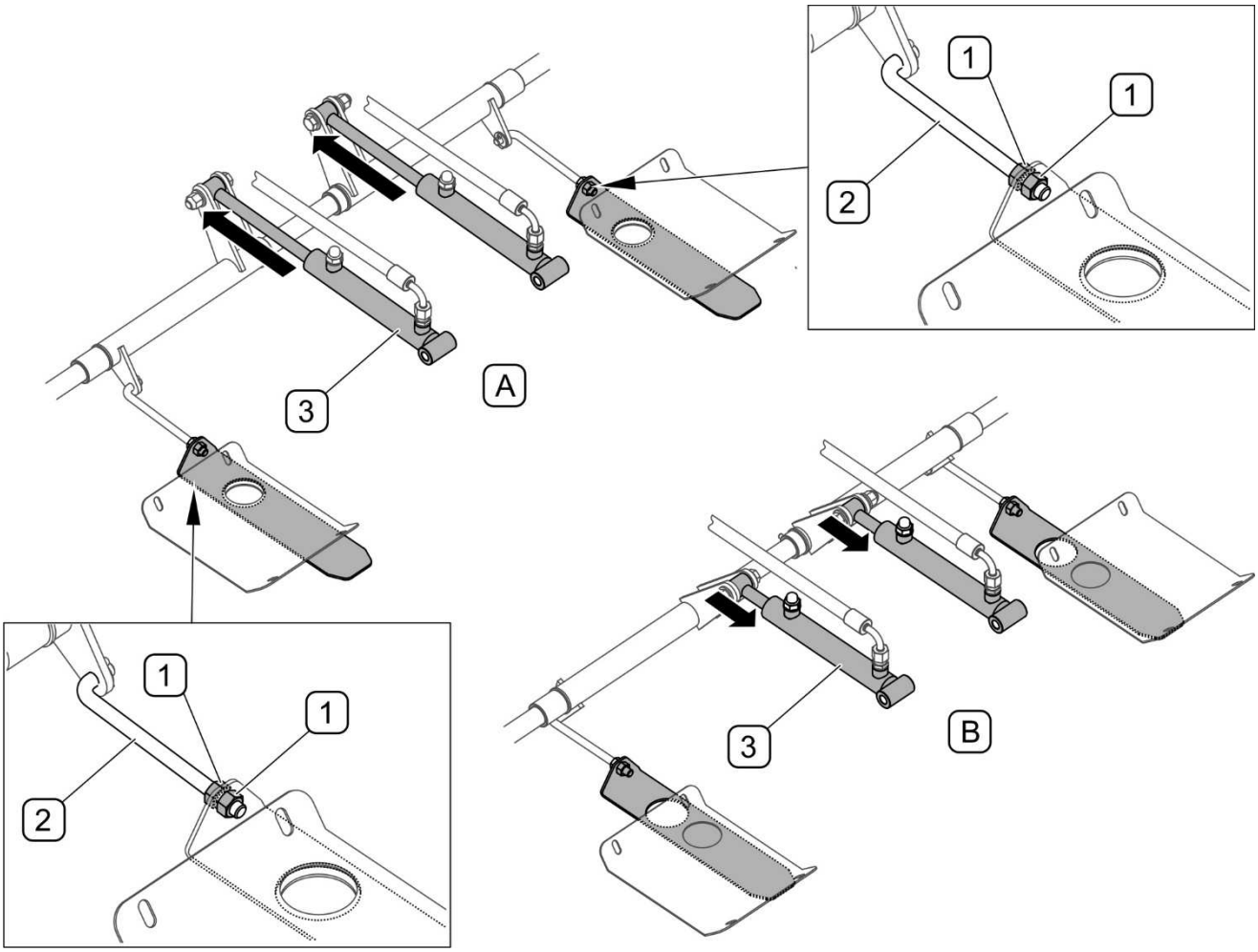


FIG. 5.5 Adjusting the closing dampers

(A) - dampers in open position; (B) - dampers in closed position; (1) - adjustment nuts; (2) - link; (3) - hydraulic cylinders

5.5 LUBRICATION

DANGER

Lubrication may only be performed when the machine is disconnected from the tractor.

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.

Before commencing lubrication insofar as is possible remove old grease and other contamination. Points (B and C FIG. 5.6) should be lubricated with grease. Remove excess of grease.

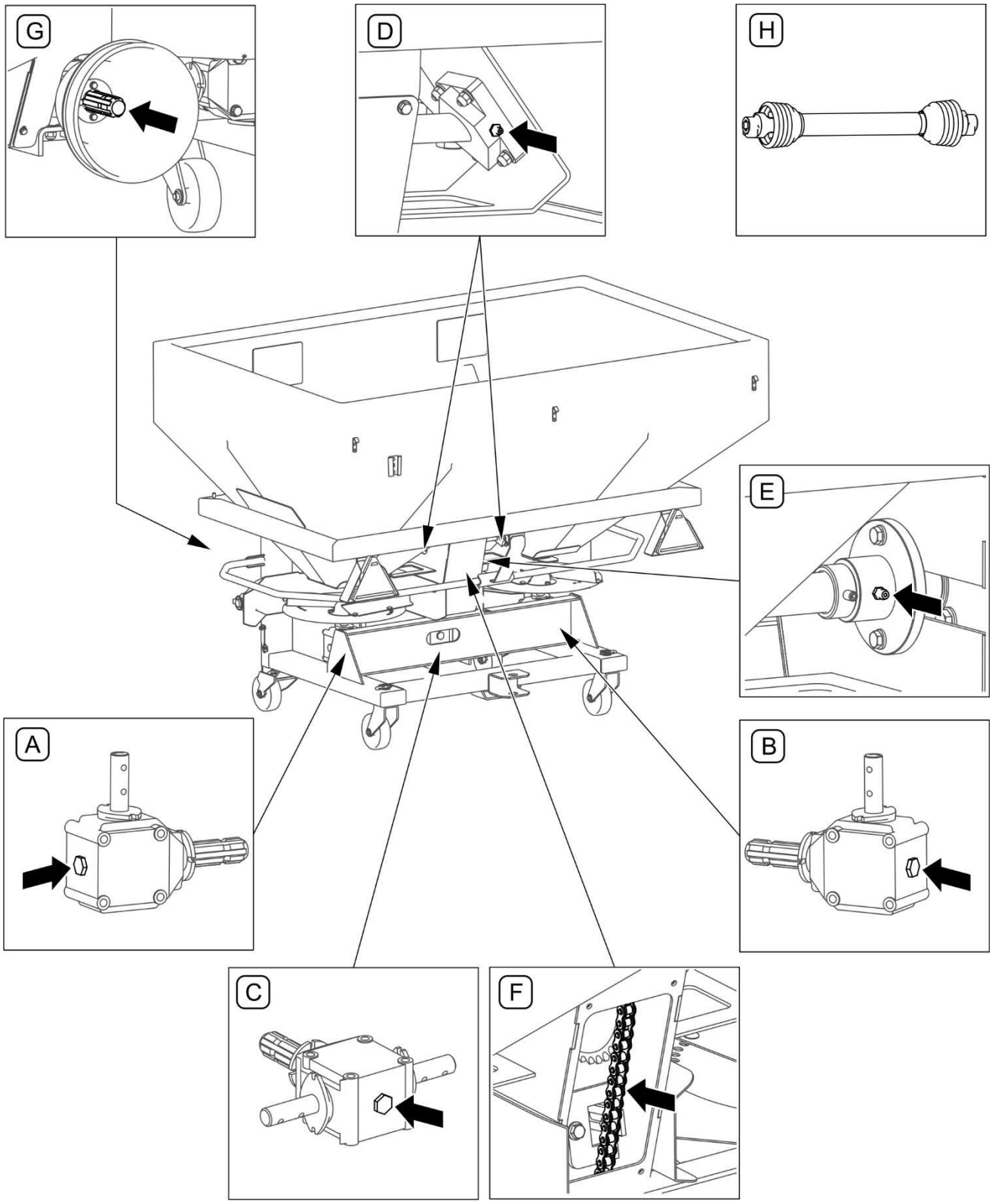


FIG. 5.6 Lubrication points

Lubrication points described in table 5.3

TAB. 5.3 LUBRICATION POINTS AND LUBRICATION FREQUENCY

ITEM	NAME	NUMBER OF LUBRICATION POINTS	TYPE OF GREASE	LUBRICATION FREQUENCY
A	Left intersecting axis gear	1	semi-fluid grease	inspect once a year
B	Right intersecting axis gear	1	semi-fluid grease	inspect once a year
C	Central intersecting axis gear	1	semi-fluid grease	inspect once a year
D	External bearings of mixer	2	grease	20 hours
E	Internal bearings of mixer	1	grease	20 hours
F	Chain of mixer drive	1	graphite grease	20 hours
G	Surface of multi-splined drive shaft	1	grease	20 hours
H	PTO shaft *	*	*	*

** – not included in the machine standard equipment, for detailed information on operation and maintenance please refer to the Operator's Manual of the PTO shaft.*

Marking description in Item column (TAB. 5.3) conforms with numbering shown (FIG. 5.6)

5.6 STORAGE

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

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

In the event of damage to the paint coat, clean rust and dust from damaged area, degrease and then paint with undercoat and after it is dry paint with surface coat paint retaining colour uniformity and even thickness of protective coating. Until the time of touch-up painting, the damaged place may be covered with a thin layer of grease or anticorrosion preparation. Machine should be kept in closed or roofed building.

If the machine shall not be used for a long period of time, protect it against adverse weather conditions. Lubricate machine according to the instructions provided. In the event of prolonged work stoppage, it is essential to lubricate all elements regardless of the period of the last lubrication process. Additionally, before the winter period, apply grease to hitching system pins.

The fertilizer spreader's tank should be emptied and the spreading dose adjusting levers should be set in maximum open position. Put protective tarpaulin cover (if any) on the fertilizer spreader's tank.

ATTENTION!

Remains of fertilizers accelerate corrosion of metal parts.

5.7 TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS

During maintenance and repairs use appropriate torque for bolt connections (unless other is specified for a particular connection). Recommended torque values apply to non-greased steel bolts (TAB. 5.4)

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

ATTENTION!

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

5.8 TROUBLESHOOTING

TAB. 5.5 TROUBLESHOOTING

TYPE OF FAULT	CAUSE	REMEDY
Spreading disc does not rotate	PTO shaft is not connected	Connect PTO shaft to fertilizer spreader and tractor
	Tractor PTO drive is disengaged	Engage PTO drive
	Activation of clutch or another element protecting the shaft against overloading (depending on type of shaft)	Check the cause, remove possible jamming
	Damaged intersecting axis gear	Repair at authorised service point
	Damaged bolt connecting the spreading disc with intersecting axis gear	Check and replace if necessary
The fertilizer spreader does not spread fertilizers	Hydraulic damper control system is not connected to tractor	Check connection, open dampers
	Dose adjusting dampers are closed	Open, adjust according to operator's manual
	Packed material in the tank	Close dosing holes. Start the machine at a low rotation speed and disintegrate packed material in the tank in this way.
Incorrect spreading	Incorrect machine settings	Preset parameters, conduct a test and correct settings.
	Machine is incorrectly mounted on the tractor	Check and adjust according to operator's manual
	Spreading disc rotation speed is too low	Increase engine RPM
	Contaminated, excessively worn spreading disc blades	Clean, replace if necessary

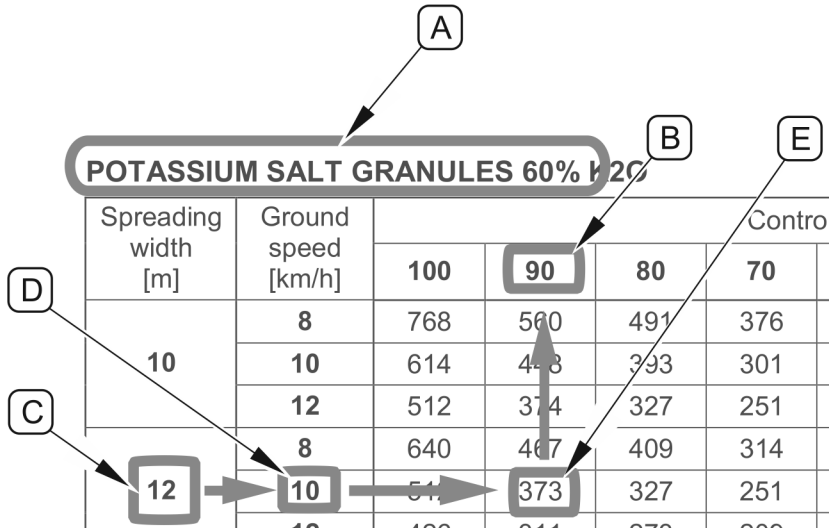
ANNEX A

The PRONAR FD2-M10T fertiliser spreader application rate tables.

The control lever position depends on the fertilizer type, spreading width, ground speed and the desired application rate.

The following figure shows an example of an application rate table:

- Fertiliser type (A): **Potassium salt granules 60% K2O**
- Spreading width (C): **12 m**
- Spreader ground speed (D): **10 km/h**
- Intended application rate (E): **373 kg/ha**
- Control lever position (B): **90**



POTASSIUM SALT GRANULES 60% K2O

Spreading width [m]	Ground speed [km/h]	Control lever position								
		100	**90**	**80**	**70**	**60**	**50**	**40**	**30**	**20**
10	**8**	768	560	491	376	277	180	109	51	13
	10	614	448	393	301	221	144	87	41	10
	12	512	374	327	251	185	120	72	34	9
12	**8**	640	467	409	314	231	150	91	43	11
	10	511	373	327	251	184	120	72	34	9
	12	426	311	273	209	154	100	60	29	7
15	**8**	512	374	327	251	185	120	72	34	9
	10	410	299	262	201	148	96	58	27	7
	12	341	249	218	167	123	80	48	23	6
18	**8**	427	311	273	209	154	100	60	29	7
	10	341	249	218	167	123	80	48	23	6
	12	284	208	182	139	103	67	40	19	5
20	**8**	384	280	245	188	138	90	54	26	7
	10	307	224	196	151	111	72	43	21	5
	12	256	187	164	125	92	60	36	17	4
24	**8**	320	234	205	157	115	75	45	21	5
	10	256	187	164	125	92	60	36	17	4
	12	213	156	136	105	77	50	30	14	4

An example of application rate reading

(A) - fertilizer type; (B) - control lever position; (C) - spreading width; (D) - spreader ground speed; (E) - application rate [kg/ha]

SUPERFOSFAT 20 P(Ca,S)

Spreading width [m]	Ground speed [km/h]	Control lever position								
		100	**90**	**80**	**70**	**60**	**50**	**40**	**30**	**20**
10	**8**	739	601	481	385	265	192	112	51	17
	10	592	481	385	308	212	154	89	41	13
	12	493	400	321	257	176	128	74	34	11
12	**8**	616	500	401	321	220	160	93	42	14
	10	493	400	321	257	176	128	74	34	11
	12	411	334	267	214	147	107	62	28	9
15	**8**	493	400	321	257	176	128	74	34	11
	10	394	320	257	205	141	103	60	27	9
	12	329	267	214	171	118	85	50	23	7
18	**8**	411	334	267	214	147	107	62	28	9
	10	329	267	214	171	118	85	50	23	7
	12	274	222	178	143	98	71	41	19	6
20	**8**	370	300	241	193	132	96	56	25	8
	10	296	240	192	154	106	77	45	20	7
	12	246	200	160	128	88	64	37	17	6
24	**8**	308	250	201	160	110	80	47	21	7
	10	246	200	160	128	88	64	37	17	6
	12	205	167	134	107	74	53	31	14	5

POTASSIUM SALT GRANULES 60% K2O

Spreading width [m]	Ground speed [km/h]	Control lever position								
		100	**90**	**80**	**70**	**60**	**50**	**40**	**30**	**20**
10	**8**	768	560	491	376	277	180	109	51	13
	10	614	448	393	301	221	144	87	41	10
	12	512	374	327	251	185	120	72	34	9
12	**8**	640	467	409	314	231	150	91	43	11
	10	512	373	327	251	184	120	72	34	9
	12	426	311	273	209	154	100	60	29	7
15	**8**	512	374	327	251	185	120	72	34	9
	10	410	299	262	201	148	96	58	27	7
	12	341	249	218	167	123	80	48	23	6
18	**8**	427	311	273	209	154	100	60	29	7
	10	341	249	218	167	123	80	48	23	6
	12	284	208	182	139	103	67	40	19	5
20	**8**	384	280	245	188	138	90	54	26	7
	10	307	224	196	151	111	72	43	21	5
	12	256	187	164	125	92	60	36	17	4
24	**8**	320	234	205	157	115	75	45	21	5
	10	256	187	164	125	92	60	36	17	4
	12	213	156	136	105	77	50	30	14	4

AMMONIUM NITRATE N 32%

Spreading width [m]	Ground speed [km/h]	Control lever position								
		100	**90**	**80**	**70**	**60**	**50**	**40**	**30**	**20**
10	**8**	1064	838	684	522	382	253	150	78	20
	10	851	670	547	417	306	203	120	62	16
	12	709	559	456	348	255	169	100	52	13
12	**8**	886	698	570	435	318	211	125	65	17
	10	709	558	456	348	254	169	100	52	13
	12	591	465	380	290	212	141	83	43	11
15	**8**	709	559	456	348	255	169	100	52	13
	10	568	447	365	278	204	135	80	41	11
	12	473	372	304	232	170	113	67	34	9
18	**8**	591	466	380	290	212	141	84	43	11
	10	473	372	304	232	170	113	67	34	9
	12	394	310	253	193	141	94	56	29	7
20	**8**	532	419	342	261	191	127	75	39	10
	10	426	335	274	209	153	101	60	31	8
	12	355	279	228	174	127	84	50	26	7
24	**8**	443	349	285	217	159	106	63	32	8
	10	355	279	228	174	127	84	50	26	7
	12	296	233	190	145	106	70	42	22	6

POLIDAP complex inorganic fertilizer NP(S) 18-46-(5)

Spreading width [m]	Ground speed [km/h]	Control lever position								
		100	**90**	**80**	**70**	**60**	**50**	**40**	**30**	**20**
10	**8**	635	503	379	285	191	132	75	33	8
	10	508	402	303	228	153	105	60	26	6
	12	424	335	253	190	127	88	50	22	5
12	**8**	529	419	316	237	159	110	63	27	7
	10	423	335	252	190	127	88	50	22	5
	12	353	279	210	158	106	73	42	18	4
15	**8**	424	335	253	190	127	88	50	22	5
	10	339	268	202	152	102	70	40	18	4
	12	282	223	168	127	85	58	33	15	4
18	**8**	353	279	210	158	106	73	42	18	4
	10	282	223	168	127	85	58	33	15	4
	12	235	186	140	106	71	49	28	12	3
20	**8**	318	251	189	142	96	66	38	16	4
	10	254	201	152	114	76	53	30	13	3
	12	212	168	126	95	64	44	25	11	3
24	**8**	265	209	158	119	80	55	31	14	3
	10	212	168	126	95	64	44	25	11	3
	12	177	140	105	79	53	37	21	9	2

POLIFOSKA 8 NPK(S) 8-24-24-(9)

Spreading width [m]	Ground speed [km/h]	Control lever position								
		100	**90**	**80**	**70**	**60**	**50**	**40**	**30**	**20**
10	**8**	758	627	495	374	258	177	98	48	17
	10	606	502	396	299	206	142	78	39	13
	12	505	418	330	249	172	118	65	32	11
12	**8**	631	522	412	311	215	148	82	40	14
	10	505	418	330	249	172	118	65	32	11
	12	421	348	275	207	143	98	54	27	9
15	**8**	505	418	330	249	172	118	65	32	11
	10	404	334	264	199	137	95	52	26	9
	12	337	279	220	166	114	79	44	21	7
18	**8**	421	348	275	208	143	99	54	27	9
	10	337	279	220	166	114	79	44	21	7
	12	281	232	183	138	95	66	36	18	6
20	**8**	379	314	248	187	129	89	49	24	8
	10	303	251	198	149	103	71	39	19	7
	12	253	209	165	125	86	59	33	16	6
24	**8**	316	261	206	156	107	74	41	20	7
	10	253	209	165	125	86	59	33	16	6
	12	211	174	138	104	72	49	27	13	5

NOTES