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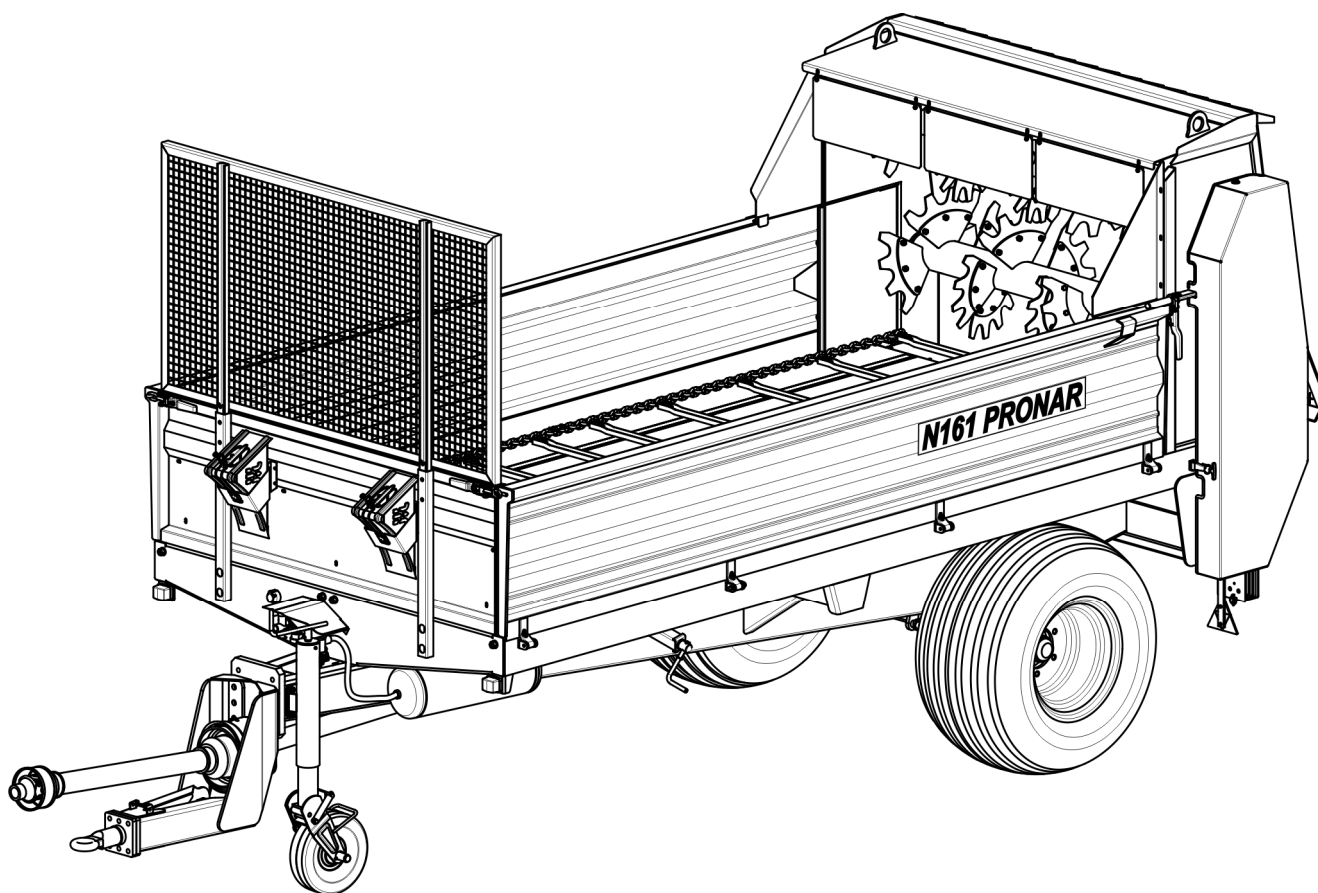
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OPERATOR'S MANUAL

MANURE SPREADER

PRONAR N161

TRANSLATION OF THE ORIGINAL COPY OF THE MANUAL



ISSUE 1A-02-2011

PUBLICATION NO 250N-00000000-UM



MANURE SPREADER

PRONAR N161

MACHINE IDENTIFICATION

SYMBOL /TYPE: N161

SERIAL NUMBER:

S	Z	B	1	6	1			X			X				
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INTRODUCTION

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

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

This Operator's Manual describes the basic safety rules and operation of N161 Manure Spreader. If the information contained in the Operator's Manual needs clarification then the user should refer for assistance to the sale point where the tractor was purchased or to the Manufacturer

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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.

REQUIRED SERVICE ACTIONS

Service actions described in the manual are marked: ➡

Result of service/adjustment actions or comments concerning the performance of actions are marked: ⇨



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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:	MANURE SPREADER
Type:	N161
Model:	-----
Serial number:	
Commercial name:	MANURE SPREADER PRONAR N161

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

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

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

Z-CA DYREKTORA
d/s technicznych
członek zarządu

Roman Omelaniuk

Narew, the 29 GRU. 2009

Place and date

*Full name of the empowered person
position, signature*

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SECTION

1

BASIC INFORMATION

1.1 IDENTIFICATION

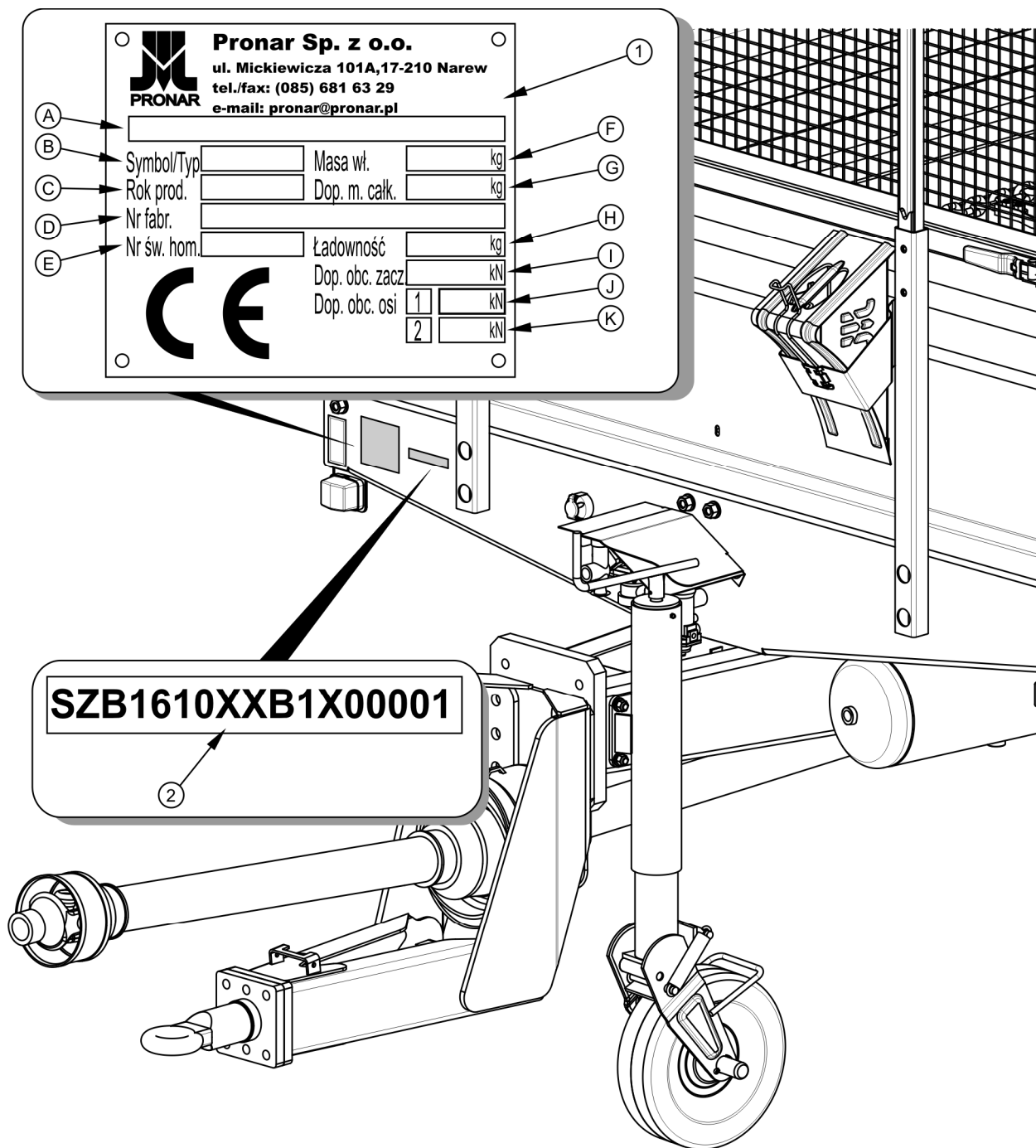


FIG. 1.1 Manure spreader identification

(1) data plate, (2) serial number

The manure spreader is marked with the data plate (1), and the factory number (2) located on a gold painted rectangle. The serial number and data plate are located at the front of manure spreader on the right angle brace of the lower frame, figure (1.1).

When buying the manure spreader check that the factory 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 are presented in the table (1.1).

TAB. 1.1 Markings on data plate

ITEM	MARKING
A	General description and purpose
B	Symbol /Type
C	Year of manufacture
D	Seventeen digit serial number (VIN)
E	Official certificate number
F	Machine tare weight
G	Maximum gross weight
H	Carrying capacity
I	Permissible hitching system loading
J	Permissible front axle load
K	Permissible rear axle load

1.1.1 AXLE IDENTIFICATION

The factory number of the axle shaft and its type are stamped onto the data plate (2) secured to the axle shaft beam (1) – figure (1.2).

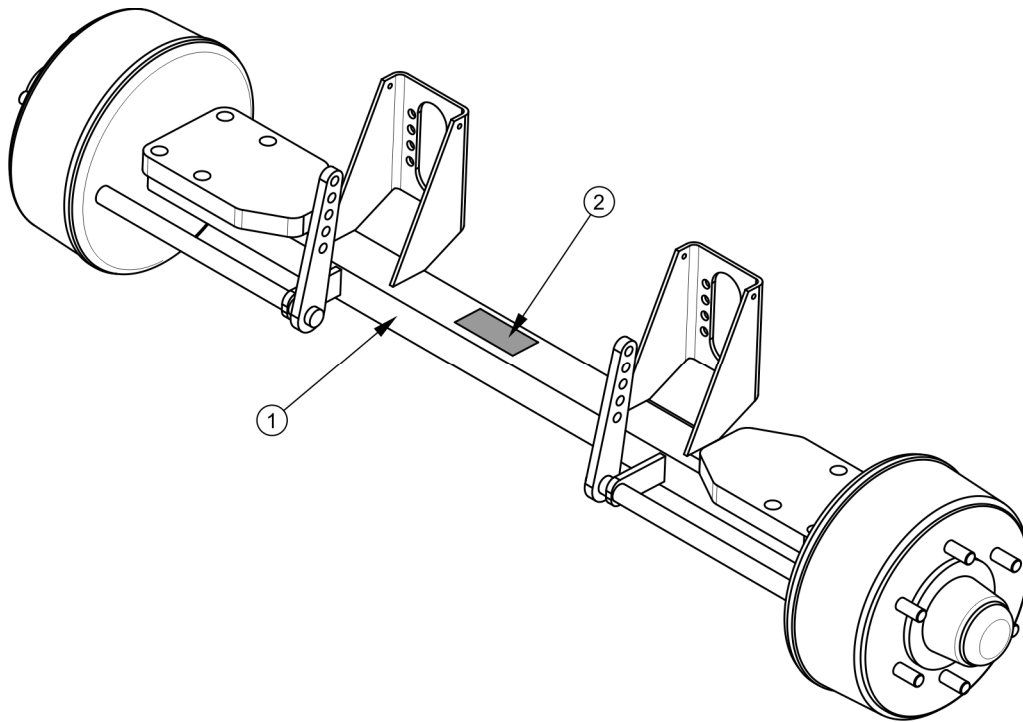



FIG. 1.2 Location of the axle data plate

(1) wheel axle, (2) data plate

1.1.2 LIST OF FACTORY NUMBERS

	<p>TIP</p> <p>In the event of ordering a replacement part or in the case of the appearance of problems it is often essential to give the factory numbers of parts or the VIN number of the manure spreader, therefore it is recommended that these numbers are inscribed in the spaces below.</p>
---	--

VIN

S	Z	B	1	6	1	0	X	X			X				
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FRONT AXLE FACTORY NUMBER AND TYPE

REAR AXLE FACTORY NUMBER AND TYPE

1.2 PROPER USE

Pronar N161 single axle manure spreader is designed for uniform spreading of all kinds of manure, peat and compost. The manure spreader must not be used in any way other than that described above. Using it as intended also involves all actions connected with the safe and proper operation and maintenance. The manure spreader is not intended or designed for transporting people or animals.

ATTENTION!

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



- for transporting people and animals,
- for spreading and transporting toxic and flammable materials,
- for spreading fluids, sand or fibrous substances,
- for transporting construction materials, single objects or any materials and substances outside the scope of intended use of the manure spreader.

The manure spreader is constructed according to current safety requirements and engineering standards. The brake system and the light and indicator system meet the requirements of road traffic regulations. The maximum speed of the manure spreader on public roads is 30 km/h in Poland (pursuant to Road Traffic Act of June 20th 1997, art. 20). In the countries where the manure spreader is used, the limits stipulated by the road traffic legislation in force in a given country must be observed. The manure spreader speed must not, however, be greater than the maximum design speed.

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

- carefully read the *OPERATOR'S MANUAL* of the manure spreader and the *WARRANTY BOOK* and conform with the recommendations contained in these documents,
- understand the manure spreader's operating principle and how to operate it safely and correctly,

- adhere to the established maintenance and adjustment plans,
- comply with general safety regulations while working,
- prevent accidents,
- comply with the road traffic regulations and transport regulations in force in a given country, in which the manure spreader is used,
- carefully read the Operator's Manual and comply with its recommendations,
- only hitch the manure spreader to an agricultural tractor, which fulfils all the requirements made by the rotary rake's Manufacturer.

The manure spreader may only be used by persons, who:

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

TAB. 1.2 Agricultural tractor's requirements

CONTENTS	UNIT	REQUIREMENTS
Brake system - sockets		
Single conduit pneumatic system	-	according to PN-ISO 1728
Double conduit pneumatic system	-	according to PN-ISO 1728
Nominal pressure of the pneumatic system	bar / kPa	6.5 / 650
Hydraulic system		
Hydraulic oil	-	2 sockets of one hydraulic distribution section L-HL32 Lotos ⁽¹⁾
Pressure rating of the system	bar / MPa	160 / 16
Electrical system		
Electrical system voltage	V	12
Attachment socket	-	7 polar compliant with ISO 1724

CONTENTS	UNIT	REQUIREMENTS
Other requirements		
PTO RPM	RPM	540
The required minimum power	hp / /kW	68 / 50
Minimum vertical load capacity of hitch	kg	1 500

⁽¹⁾ – use of other oil is permitted, on condition that it may be mixed with the oil in the manure spreader.
Detailed information may be found on the product information card.

1.3 EQUIPMENT:

When buying the manure spreader check integrity of the machine.

TAB. 1.3 N161 manure spreader equipment

EQUIPMENT	STANDARD	ADDITIONAL
Operator's Manual	•	
Warranty Book	•	
Front net protection	•	
Connection lead for the electrical system	•	
Wheel chocks	•	
PTO shaft for connection of manure spreader with tractor	•	
16B-1 PZ straight link, 16B-1 WZ bent link	•	
Slow-moving vehicle warning sign		•
Warning reflective triangle		•

Information concerning tyres is provided at the end of this publication in ANNEX A.

Some standard equipment elements, which were listed in table (1.3), may not be present in the delivered manure spreader. This allows the possibility of ordering new machines with a different set of optional equipment, replacing standard equipment.

Recommended PTO shafts with shear bolt clutch (2 400 Nm) for connection of manure spreader with tractor:

- manufacturer: Bondioli & Pavesi, type 7 105 086 CE 007 1R1 (6/6) ⁽¹⁾
- manufacturer: Bondioli & Pavesi, type 7 105 086 CE 008 1R1 (21/6) ⁽²⁾

⁽¹⁾ 6-spline end of PTO shaft on the tractor side.

⁽²⁾ 21-spline end of PTO shaft on the tractor side.

1.4 WARRANTY TERMS

PRONAR Sp. z o.o., Narew guarantees the reliable operation of the machine when it is used according to its intended purpose as described in the *OPERATOR'S MANUAL*. The repair period is specified in the *WARRANTY BOOK*.

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

- drawbar hitching eye,
- pneumatic system connector filters,
- tyres,
- brake shoes,
- bulbs and LED lamps,
- seals,
- chains,
- spreading adapter blades,
- gear wheels,
- bearings.

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

In the event of damage arising from:

- mechanical damage which is the user's fault, caused by road accidents,
- by inappropriate use, adjustment or maintenance, use of the manure spreader 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.



TIP

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

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

Modification of the manure spreader 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.

1.5 TRANSPORT

The manure spreader 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. The manure spreader is delivered to the user either transported on a vehicle or, independently (towed), after being attached to a tractor.

1.5.1 TRANSPORT ON VEHICLE

Loading and unloading of the manure spreader from vehicle shall be conducted using loading ramp with the aid of an agricultural tractor. During work adhere to the general principles of Health and Safety at Work applicable to reloading work. Persons operating reloading equipment must have the qualifications required to operate these machines. The manure spreader must be properly connected with the tractor according to the requirements closed in this Operators Manual. The brake system must be started in checked before driving off or onto ramp.

The manure spreader should be attached firmly to the platform of the vehicle using straps or chains fitted with a tightening mechanism. Securing elements should be hitched to the transport lugs designated for that purpose or permanent structural elements of manure spreader (longitudinal members, cross-bars, etc.). Transport lugs are welded to the longitudinal members of lower frame (2), a pair on each side of the manure spreader, and marked with decals (8) - see table (2.1). Use certified and technically reliable securing measures. Worn straps, cracked securing catches, bent or corroded as well as other damage may disqualify use of the given element from use. Carefully read the information contained in the Operator's Manual for the given securing measure. Chocks, wooden blocks or other objects without sharp edges should be placed under the wheels of the manure spreader to prevent it from rolling. Manure spreader wheel blocks must be nailed to the low platform planks of the vehicle or secured in another manner preventing their movement. The number of securing elements (cables, straps, chains and stays etc.) and the force necessary for their tensioning depends on a number of things, including weight of the manure spreader, the construction of vehicle carrying manure spreader, speed of travel and other conditions. For this reason it is impossible to define the securing plan precisely. A correctly secured manure spreader does not change its position with regard to the transport in vehicle. The securing elements must be selected according to the guidelines of the Manufacturer of these elements. In case of doubt apply a greater number of securing straps in order to immobilise the manure spreader. If necessary, sharp edges of the manure spreader should be protected at the same time protecting the securing straps from breaking during transport.

IMPORTANT!

When being road transported on a motor vehicle the manure spreader must be mounted on the vehicle's platform in accordance with the transport safety requirements and the regulations.

Driver of the vehicle should be particularly careful during travel. This is due to the vehicle's centre of gravity shifting upwards when loaded with the machine.

Use only certified and technically reliable securing measures. Carefully read the manufacturer's instructions for the securing measures.

During reloading work, particular care should be taken not to damage parts of the machine's fittings or the lacquer coating. The tare weight of the manure spreader in condition ready for travel is given in table (3.1).

DANGER

Incorrect application of securing measures may cause an accident.

1.5.2 INDEPENDENT TRANSPORT BY THE USER

In the event of independent transport by the user after purchase of the manure spreader, the user must read the manure spreader Operator's Manual and adhere to the recommendations contained therein. Independent transport involves towing the manure spreader with own agricultural tractor to destination. During transport adjust travel speed to the prevailing road conditions, but do not exceed the maximum design speed.

IMPORTANT!

When transporting independently, the user must carefully read this operator's manual and observe its recommendations.

1.6 ENVIRONMENTAL HAZARDS

A hydraulic oil leak constitutes a direct threat to the natural environment owing to its limited biodegradability. Because of the low solubility of oil in water, it is not highly toxic to living organisms. An oil leak into water reservoirs may however lead to a reduction of the oxygen

content. 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. The container should be kept away from heat sources, flammable materials and food.

**DANGER**

Used hydraulic oil or gathered remains mixed with absorbent material should be stored in a precisely marked container. Do not use food packaging for this purpose.

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. Waste oil should be taken to the appropriate facility dealing with the re-use of this type of waste. Waste code: 13 01 10. Detailed information concerning hydraulic oil may be found on the product's Material Safety Data Sheet.

**TIP**

The hydraulic system of the manure spreader is filled with L-HL32 Lotos hydraulic oil.

**IMPORTANT!**

Waste oil should only be taken to the appropriate facility dealing with the re-use of this type of waste. Do NOT throw or pour oil into sewerage or water tanks.

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 commencing dismantling, totally remove the oil from the hydraulic system and reduce air pressure completely in the pneumatic brake system (e.g. using air tank drain valve).

**DANGER**

During disassembly, use proper tools, equipment (cranes, lifts, elevators, etc.) personal protective equipment, such as protective clothing, footwear, gloves, glasses, etc.

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

When spare parts are changed, worn out or damaged parts that cannot be reclaimed should be taken to a collection point for recyclable raw materials. Hydraulic oil should be taken to the appropriate facility dealing with the re-use of this type of waste.

SECTION

2

SAFETY ADVICE

2.1 BASIC SAFETY RULES

2.1.1 USE OF MANURE SPREADER

- Before using the machine, the user must carefully read this Operator's Manual and the Operator's Manual of the PTO shaft. During use all the recommendations laid down in this Operator's Manual should be observed.
- If the information contained in the Operator's Manual is difficult to understand, contact a seller, who runs an authorised technical service on behalf of the manufacturer, or contact the manufacturer directly.
- Careless and improper use and operation of the manure spreader, and non-compliance with the recommendations given in this operator's Manual is dangerous to your health.
- Non-compliance with the safety rules of this Operator's Manual can be dangerous to the health and life of the operator and others.
- Be aware of the existence of a minimal risk, and for this reason the fundamental basis for using this manure spreader 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.
- Do NOT install PTO shaft when the manure spreader is used without spreading adapter.
- 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.
- Any modification to the manure spreader frees the manufacturer from any responsibility for damage or detriment to health which may arise as a result.
- The machine can only be stood on when it is absolutely motionless and the tractor engine is switched off.

- Use appropriate ladders or platforms in order to climb the machine. In accordance with PN-EN standards, N161 manure spreader is not equipped with a ladder.

2.1.2 HITCHING AND DISCONNECTING THE MANURE SPREADER, LOADING THE LOAD BOX

- The manure spreader should be hitched to and transported with only such an agricultural tractor which fulfils all the requirements of the Manufacturer (minimum tractor power demand, required tractor hitch etc.) – compare table (1.2) *AGRICULTURAL TRACTOR REQUIREMENTS*.
- Before hitching the manure spreader make certain that oil in external hydraulic system of tractor may be mixed with the hydraulic oil of the manure spreader.
- Be especially careful when hitching the machine to tractor.
- When hitching, there must be nobody between the manure spreader and the tractor.
- Before each use of the manure spreader check its technical condition. In particular, check the technical condition of the hitch systems and axle systems of the manure spreader and tractor, the technical condition of the brake system and indicator lights and tension of feeding chain.
- While connecting the manure spreader to the tractor, use only the hitch designed for single axle trailers. After completing the coupling of the machine check the safety of the hitch. Carefully read the tractor Operator's Manual.
- The manure spreader may only be used when all the safety guards and other protective elements are technically sound and correctly positioned.
- The manure spreader disconnected from the tractor must be immobilised with the parking brake. If the machine is positioned on a slope or elevation it should be additionally secured against moving by placing chocks under the machine's wheels.
- Do NOT climb on load box during loading and unloading.
- Loading work should be conducted by person having experience of this type of work.

- Loading of manure spreader may only take place when the machine is positioned on level and hard surface and connected to tractor. Tractor and manure spreader must be placed to drive forwards.
- The load must be arranged in such a way that it does not threaten the stability of the manure spreader, and does not hinder driving.
- Consider large vertical load of the drawbar and tractor hitch when loading the manure spreader.

2.1.3 TRANSPORTING THE MACHINE

- During travel on public roads comply with the road traffic regulations and transport regulations in force in a given country, in which the manure spreader is used.

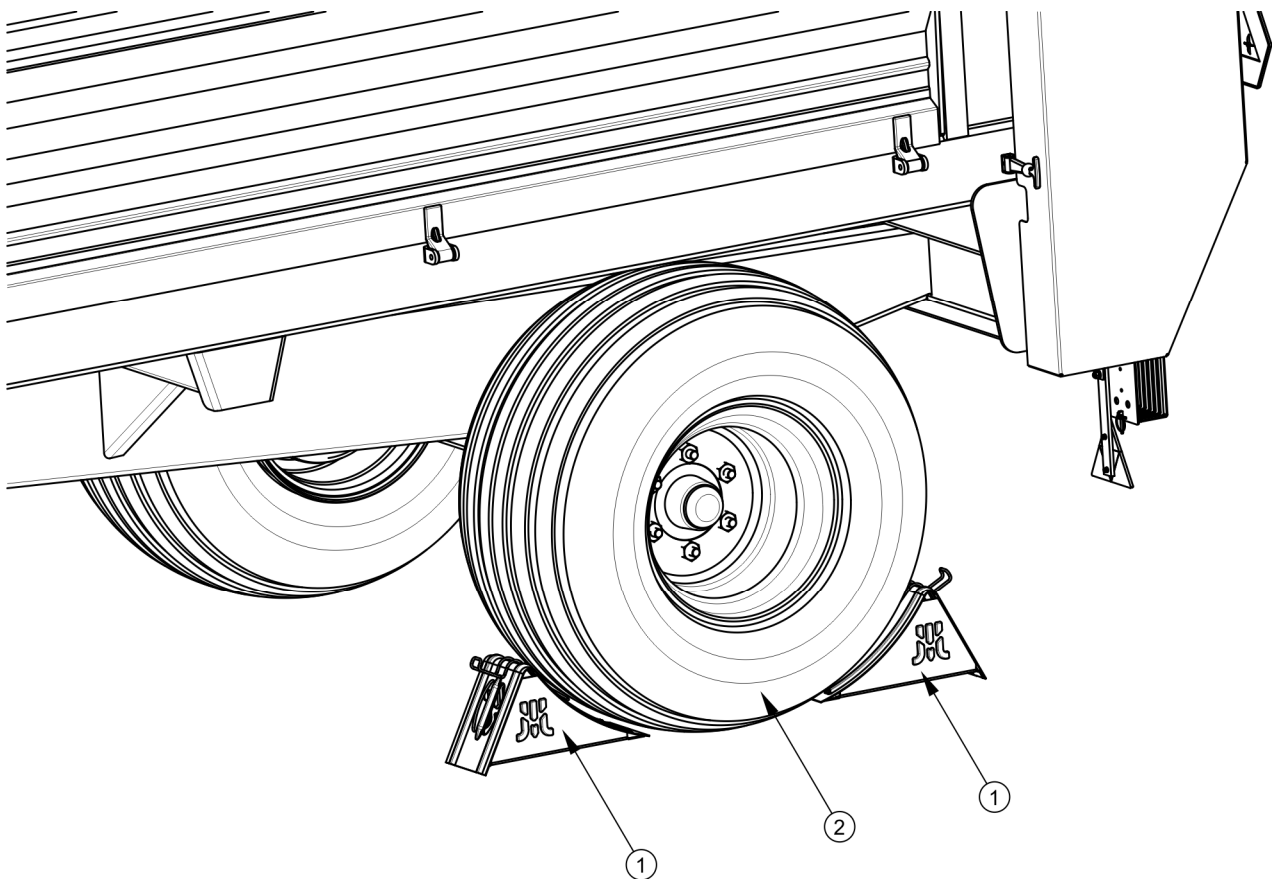


FIG. 2.1 Method of placing chocks

(1) wheel chock, (2) axle wheel

- Chocks (1), should be placed only under one wheel (one in front of the wheel, the second behind the wheel - figure (2.1)).

- Before driving off make certain that the manure spreader is correctly hitched to the tractor.
- Before driving off check braking ability of the tractor-manure spreader set.
- People or animals must not be carried on the manure spreader.
- Before driving off check that the parking brake is released, the braking force regulator is positioned in the proper position (applies to pneumatic systems with a manual three position regulator).
- Remember that the tractor front axle is unloaded and the tractor is more difficult to steer because of vertical drawbar load.

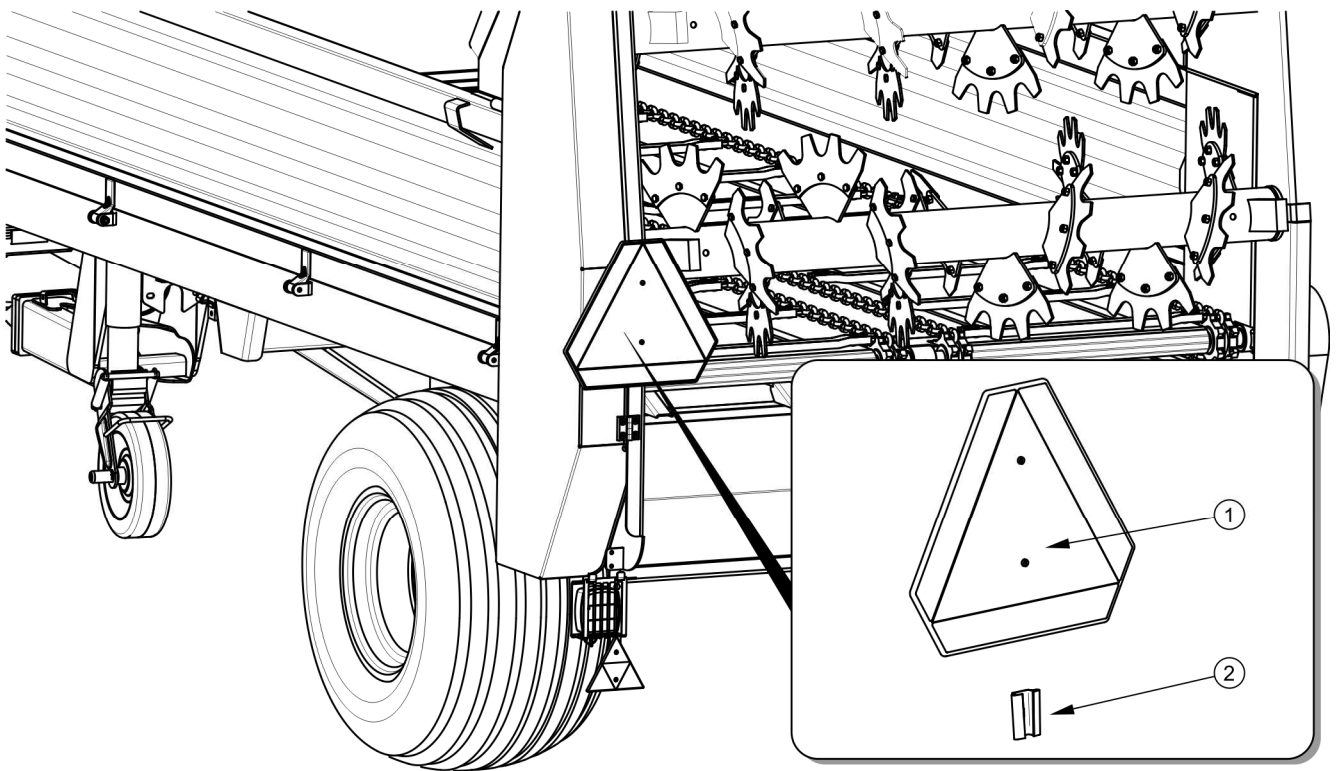


FIG. 2.2 **Positioning the warning sign**

(1) warning sign, (2) attachment point

- Place the slow-moving vehicle warning sign on the rear wall – figure (2.2). The warning sign (1) should be attached using the specifically prepared holder (2).
- Exceeding the permissible carrying capacity of the manure spreader may lead to damage to the machine, loss of stability while driving, scattering of the load and also threaten the safety of traffic. The brake system is adjusted to the gross

weight of the manure spreader, exceeding the weight limit causes drastic reduction of basic braking effectiveness.

- Adjust travel speed to the prevailing road conditions, manure spreader load and road traffic regulations limits. If possible avoid travelling on uneven terrain and unexpected corners.
- Load the manure spreader in such a manner as to ensure that the road is not soiled with transported material while driving on public roads.
- The machine must NOT be left unsecured. The manure spreader disconnected from the tractor must be immobilised with parking brake and secured against rolling away with wheel chocks placed under the wheels.
- While driving on public roads the manure spreader must be fitted with a certified or authorised reflective warning triangle.
- When transporting the load on the manure spreader without the spreading adapter, secure the load against falling out backwards. The load must be secured so that it cannot move or fall over.

2.1.4 HYDRAULIC SYSTEM AND PNEUMATIC SYSTEM

- The hydraulic system is under high pressure when operating.
- Use the hydraulic oil recommended by the Manufacturer. Never mix two types of oil.
- Regularly check the technical condition of the connections and the hydraulic and pneumatic leads. There must no oil or air leaks.
- In the event of malfunction of the hydraulic or pneumatic system, do not use the machine until the malfunction is corrected.
- When connecting the hydraulic conduits to the tractor, make sure that the hydraulic system of the tractor and manure spreader is not under pressure. If necessary reduce residual pressure in the system.
- Before beginning repair works on hydraulic or pneumatic systems reduce oil or air pressure.

- 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.
- Rubber hydraulic conduits must be replaced every 4 years regardless of their technical condition.

2.1.5 OPERATION WITH PTO

- The manure spreader may only be connected to the tractor by appropriately selected PTO shaft recommended by the Manufacturer.
- Do NOT install PTO shaft when the manure spreader is used without spreading adapter.
- 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.
- PTO shaft may be connected and disconnected only if:
 - ⇒ PTO is disengaged,
 - ⇒ tractor's engine is switched off,
 - ⇒ parking brake is applied,
 - ⇒ ignition key is removed from ignition switch.
- Before starting the tractor with the coupled manure spreader, make sure that PTO drive in the tractor is disconnected.
- PTO shaft must be equipped with shields. Do NOT use the shaft with damaged or missing guards.
- Install PTO shaft according to guidelines presented in the PTO shaft Operator's Manual.
- The PTO shaft has markings on the casing, indicating, which end of the shaft shall be connected to the tractor. Torque limiter (if used) or unidirectional clutch ("freewheel") must be always installed on the machine side.
- Protect the PTO shaft shields against turning with the aid of small chains, which should be secured to a fixed structural element of the manure spreader.

- After connecting shaft ensure that it is correctly and safely connected to the tractor and to the manure spreader.
- Before activating the manure spreader, always ensure that all the safety guards are in good condition and in place. Damaged or incomplete sub-assemblies must be exchanged for original new ones.
- 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.
- When working in limited visibility conditions, use the tractor's working lights to illuminate the PTO shaft and its vicinity.
- During transport the shaft must be stored in the horizontal position to avoid damage to safety guards or other protection elements.
- When using the manure spreader and power take-off shaft, do not use PTO rotation speed other than 540 rpm. Do NOT overload shaft and manure spreader and also engage the clutch suddenly. Before starting PTO shaft make certain that the PTO rotation direction is correct.
- Do NOT go over and under the shaft or stand on it equally during work and also when the manure spreader is parked.
- 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, or when the tractor and manure spreader are positioned at an unsuitable angle to each other.
- Make sure that shaft is covered when travelling on an uneven terrain.
- Disconnected PTO shaft should be placed in the specifically prepared holder.
- Do NOT use the securing chains to support the shaft while machine is parked or when transporting the spreader.

2.1.6 MACHINE OPERATION

- Staying in the material spreading area is forbidden due to danger which may be caused by stones, pieces of wood etc. contained in the material.
- Take particular care while spreading material near people and animals.
- Before starting work, always check condition of elements securing spreading adapter blades.
- Take particular care while spreading material near roads and other vehicles.

2.1.7 CLEANING, MAINTENANCE AND REPAIRS

- Repair, maintenance and cleaning work should be carried out with the tractor's engine switched off and the ignition key removed.
- Manure spreader, spreading adapter in particular, should be kept clean.
- Remove the remains of manure from the manure spreader each time after finished work.
- Before climbing on to the manure spreader's load box, make sure unauthorised persons do not have access to the tractor, disconnect PTO shaft and disconnect hydraulic system conduits from the tractor.
- The manure spreader must be absolutely motionless and particular care must be taken while climbing on to the manure spreader's load box.
- During the warranty period, any repairs may only be carried out by Warranty Service authorised by the manufacturer. After the expiry of the warranty period it is recommended that possible repairs to the machine be performed by specialised workshops.
- In the event of any fault or damage whatsoever, do not use the manure spreader until the fault has been corrected.
- During work use the proper, close-fitting protective clothing, gloves and appropriate tools.
- 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.

- Regularly check the condition of the bolt and nut connections.
- 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 manure spreader and invalidate the guarantee.
- Before welding or electrical work, the manure spreader should be disconnected from the power supply.
- 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 pneumatic, electric and hydraulic systems, plastic parts). If there is a risk that they will catch fire or be damaged, they should be removed before commencing welding work.
- In the event of work requiring the manure spreader to be raised, use properly certified hydraulic or mechanical lifts for this purpose. After lifting the manure spreader, stable and durable supports must also be used. Do NOT carry out work under the manure spreader, which has only been raised with the lift jack.
- must not be supported using fragile elements (bricks, hollow bricks or concrete blocks).
- After completing work associated with lubrication, remove excess oil or grease.
- After changing the hydraulic oil, the used oil should be properly disposed of.
- Check the tyre pressure regularly.
- When working with tyres, the manure spreader should be immobilised with parking brake and secured against rolling by placing under the wheels the chocks delivered with the spreader. Wheels can be taken off only when the manure spreader is not loaded.
- Repair work on the wheels or tyres should be carried out by persons trained and entitled to do so. This work should be carried out using appropriate tools.

- After removing a wheel, always check how firmly the nuts are screwed in. Individual checks should be made after the first use, after the first journey with a load, after travelling 1000 km and then every 6 months. The above actions should be repeated each time if a wheel has been removed from the wheel axle.

2.2 DESCRIPTION OF MINIMAL RISK

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

- using manure spreader for purposes other than those described in the Operator's Manual,
- being between the tractor and the manure spreader while the engine is working and when the machine is being attached,
- operation of the manure spreader by persons under the influence of alcohol or other intoxicating substances,
- oil leaks and sudden movement of elements resulting from conduit cracking,
- operation of manure spreader by an authorised person,
- being on the machine during work,
- cleaning, maintenance and technical checks when engine is running,
- using unreliable PTO shaft,
- making modifications to the machine without the consent of the Manufacturer,
- exceeding permissible travel speed,
- presence of persons or animals in areas invisible from the driver's position.

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



- prudent and unhurried operation of the machine,
- sensible adherence to the remarks and recommendations contained in the Operator's Manual,
- maintaining safe distance from forbidden or dangerous places,

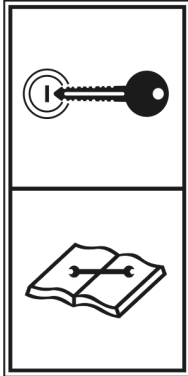



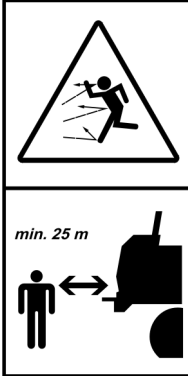
- a ban on being on the machine when it is operating,
- carrying out repair and maintenance work by persons trained to do so,
- using suitable protective clothing,
- ensuring unauthorised persons have no access to the machine, especially children,
- making certain that there are no persons in the driver's blind spots (particularly while reversing).



2.3 INFORMATION AND WARNING DECALS

The manure spreader is marked with information and warning decals referred to in table (2.1). The symbols are positioned as presented in figure (2.3).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 manure spreader are clear and legible. In the event of their destruction, they must be replaced with new ones. Safety decals can be purchased from the Manufacturer of the manure spreader or your PRONAR dealer. New assemblies, changed during repair, must be labelled once again with the appropriate safety signs. During cleaning do not use solvents which may damage the coating of information label stickers and do not subject them to strong water jets.

TAB. 2.1 Information and warning decals

ITEM	SAFETY SYMBOL	DESCRIPTION
1		Machine Symbol
2		<p>Caution!</p> <p>Before starting work, carefully read the Operator's Manual.</p>

ITEM	SAFETY SYMBOL	DESCRIPTION
3		<p>Danger of inadvertent starting or rolling of the machine.</p> <p>Before beginning servicing or repairs, switch off engine and remove key from ignition</p>
4		<p>Grease according to the recommendations in the Operator's Manual</p>
5		<p>Check the condition of the screw and nut connections of the wheel axles</p>
6	<p>Łączenie tylko z zaczepem do przyczep jednoosiowych</p>	<p>Use exclusively the hitch for single axle trailers.</p>
7		<p>PTO RPM</p>
8		<p>Beware of thrown out objects.</p> <p>Thrown out objects, endanger the whole body. Keep a safe distance from the spreading adapter, minimum 25 metres</p>

ITEM	SAFETY SYMBOL	DESCRIPTION
9		<p>Caution!</p> <p>Do not stand on the chain conveyor if the tractor engine is working and PTO shaft is engaged</p>
10		<p>Caution! Danger of crushing.</p> <p>Do not place hands near working elements of the chain conveyor</p>
11	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> <p>350 kPa</p> </div>	<p>Air pressure in the tyres ⁽¹⁾</p>

⁽¹⁾ -air pressure in standard tyres, pressure levels may be subject to change depending on the tyres used

Numbers in the item column correspond to labels in figure (2.3).

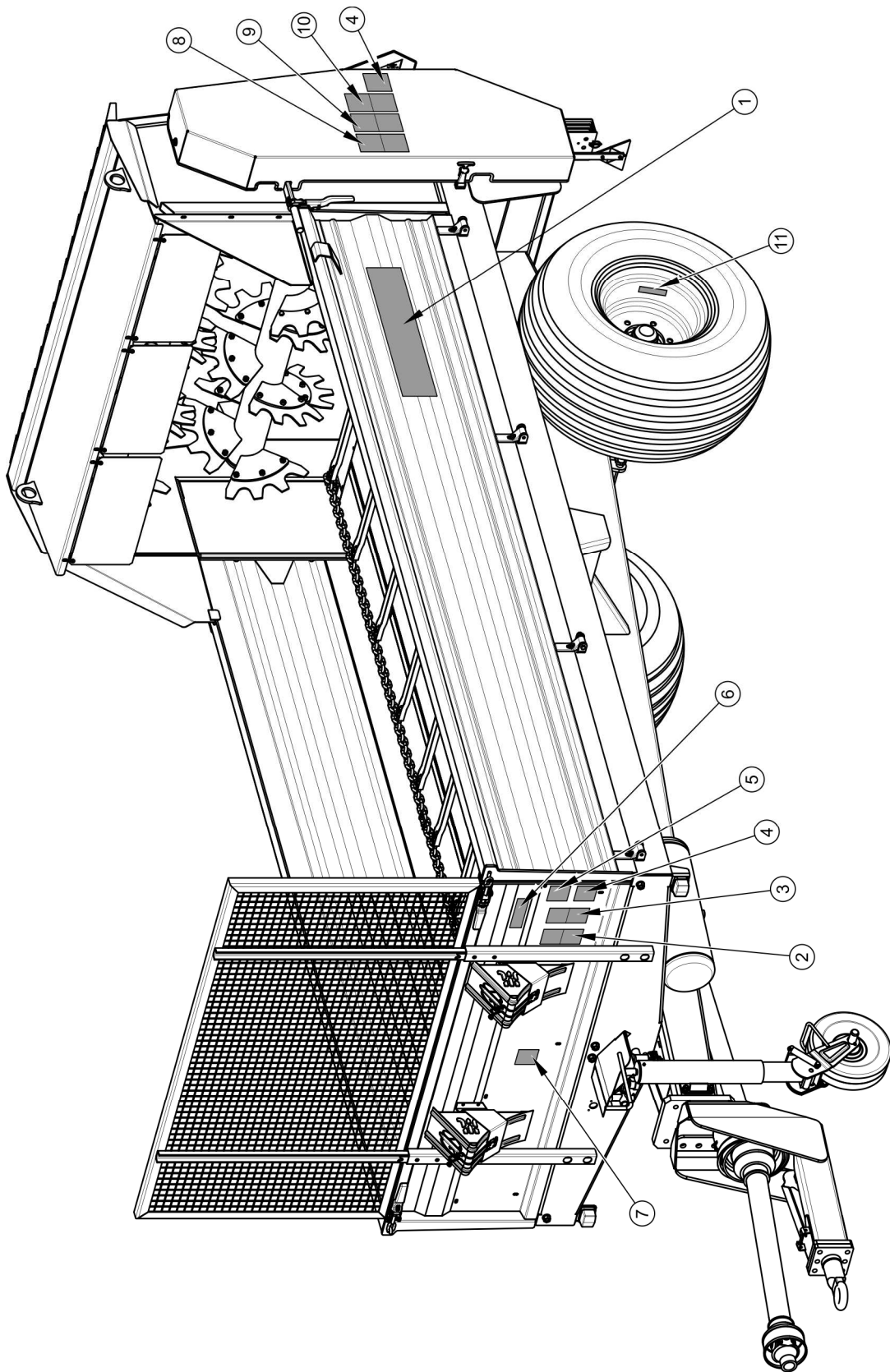


FIG. 2.3 Locations of information and warning decals.

SECTION

3

**DESIGN AND
OPERATION**

3.1 TECHNICAL SPECIFICATION

TAB. 3.1 Basic technical specification of N161 manure spreader

CONTENTS	UNIT	N161
Manure Spreader dimensions		
Total length	mm	5,780
Total width	mm	2,230
Total height (with net protection)	mm	2,750
Axle track	mm	1,670
Internal load box dimensions		
Length	mm	4,000
Width	mm	1,900
Height	mm	600
Technical specification		
Maximum gross weight	kg	8,200
Carrying capacity	kg	6,000
Tare weight	kg	2,200
PTO speed	RPM	540
Tractor power demand (minimum)	hp \ kW	68 / 50
Cargo capacity	m ³	4.1
Load surface	m ²	7.6
Maximum spread width	m	2.4
Maximum design speed	km / h	25
Other information		
Height of floor from ground	mm	1,150
Electrical system voltage	V	12
Drawbar attachment point load	kg	1,500
Capacity of feed mechanism transmission	l	4.2

3.2 MANURE SPREADER DESIGN

3.2.1 GENERAL DESIGN

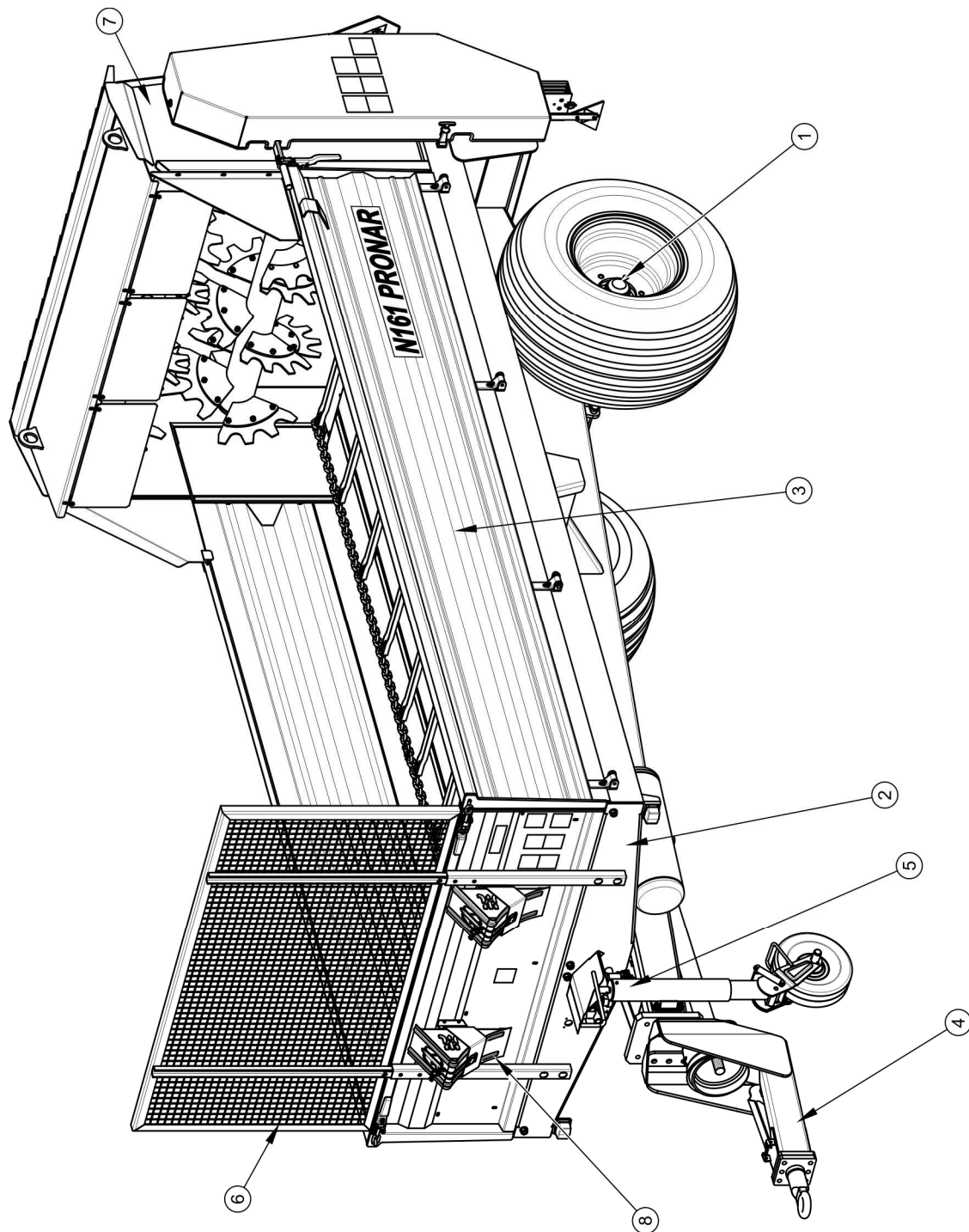


FIG. 3.1 Manure spreader design

(1) single axle system, (2) manure spreader body frame, (3) set of walls, (4) drawbar, (5) support with wheel, (6) net protection, (7) spreading adapter, (8) wheel chock

Manure spreader design is shown on figure (3.1). The manure spreader consists of body (2) connected with rigid single axle system (1). Drawbar (4) with rotating drawbar eye is bolted to the front plate in the front part of the body frame. Support with wheel (5) is attached to the side plate of the body frame. The support is used for supporting the manure spreader during parking, when the machine is not connected to the tractor, and for adjusting the drawbar height.

Set of load box walls (3) is made of profiled sheet metal. Lower edges of the side walls are connected to the bearing frame of body (2) with hinges. Front wall is attached to the front beam of the body frame and to the side walls. On the front wall of the manure spreader there are wheels wedges (8) and net protection (6), which protects the operator against injuries resulting from the machine operation. In the rear part of the manure spreader there is spreading adapter (7) in the form of a frame with two wormshafts positioned horizontally.

3.2.2 MANURE SPREADER BODY

Entire structure of the manure spreader body is welded. The main support elements of the body are two longitudinal members in the lower frame (1) connected with crossbars. In the rear section of the frame there are pins welded on and side panels for installing the spreading adapter.

Lower frame (1) of manure spreader and load box frame (4) are uniform assembly covered with floor. Manure spreader floor is made of flat metal plate (2) with slides (3) welded on. The slides protect the load box floor against rubbing of the floor conveyor strips and chains. The floor is supported on rigid frame (4) reinforced with crossbars (5).

Wheel axle (6) has absorber plates welded on. The plates are used for attaching (with bolts) the set with the frame bracket. The axle is made from a square bar terminated with a pins, where wheel hubs are mounted. Complete single wheels equipped with brake shoes activated through mechanical expander cams are mounted on hub pins.

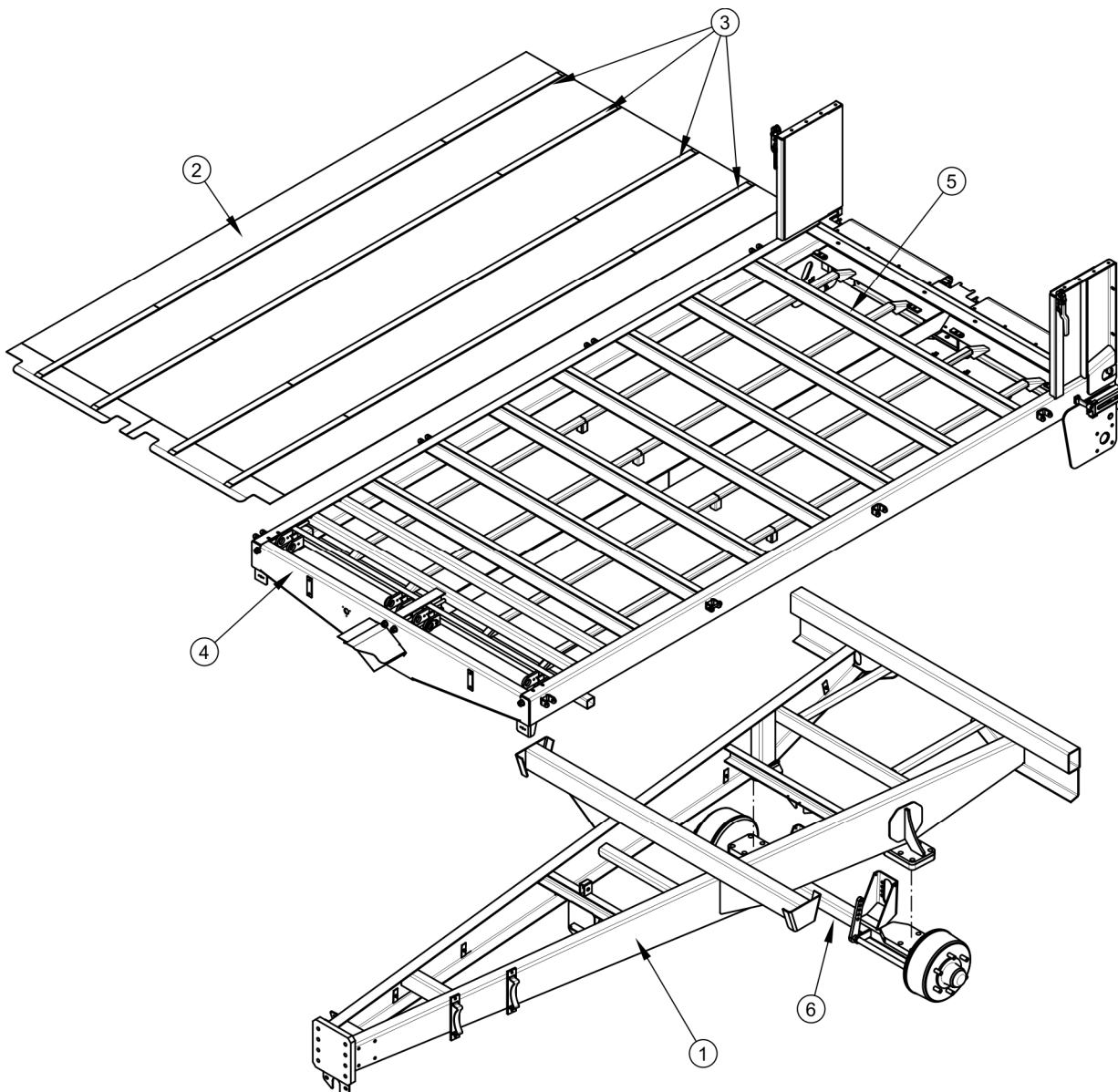


FIG. 3.2 Design of manure spreader body

(1) lower frame, (2) floor metal plate, (3) slide, (4) load box frame, (5) load box crossbar, (6) wheel axle

3.2.3 FEEDING MECHANISM

Feeding mechanism of the manure spreader consists of two transfer assemblies (1). Hydraulic motor (4) rotates drive mechanism shaft (6) via reduction gear (5). Chain wheels are mounted on the drive mechanism shaft.

The chain wheels rotate and cause shifting of transfer assemblies (1), which consist of chains (2) connected with screwed collecting strips (3).

The transfer assemblies are seated on cast iron gear wheels of drive mechanism shaft (6) and on wheels of front tensioning assemblies (7). The transfer assemblies are installed in such a manner as to ensure that collecting strips are arranged alternately on the transfer assemblies which guarantees uniform load and regular unloading of transported material. Scrapers whose ends are set in the chain wheel channels protect chain wheels against contamination.

Tension is adjusted with four tensioning bolts (8). Principles of conveyor speed adjustment are presented in chapter 4.5.1 – figure (4.2), whereas the method of adjusting the tension of floor conveyor chains is described in chapter 5.7 - figure (5.14).

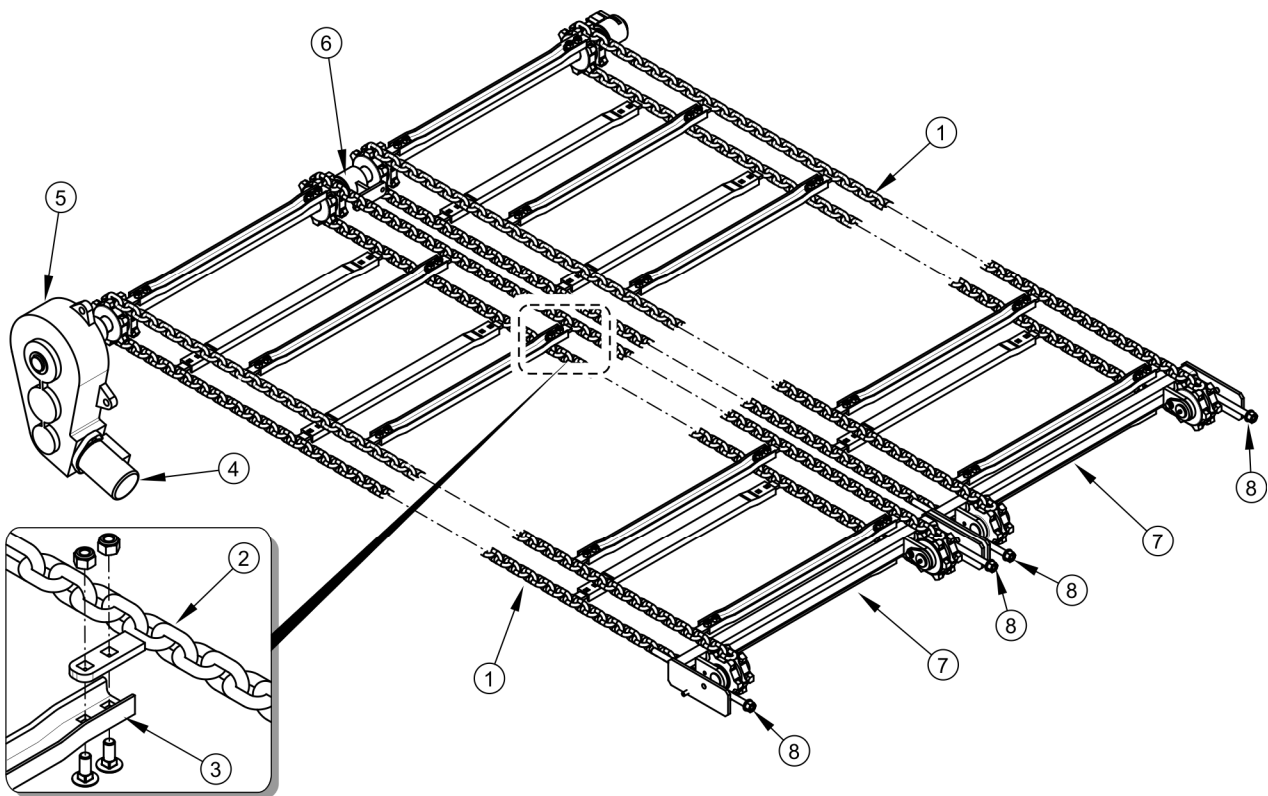



FIG. 3.3 Feeding mechanism

(1) transfer assembly, (2) conveyor chain, (3) collecting strip, (4) hydraulic motor, (5) reduction gear, (6) drive mechanism shaft, (7) tensioning assembly, (8) tensioning bolt

	<p>IMPORTANT!</p> <p>Movement direction of loaded feeding mechanism may be reversed only for a short time.</p>
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3.2.4 HYDRAULIC SYSTEM OF FEEDING MECHANISM

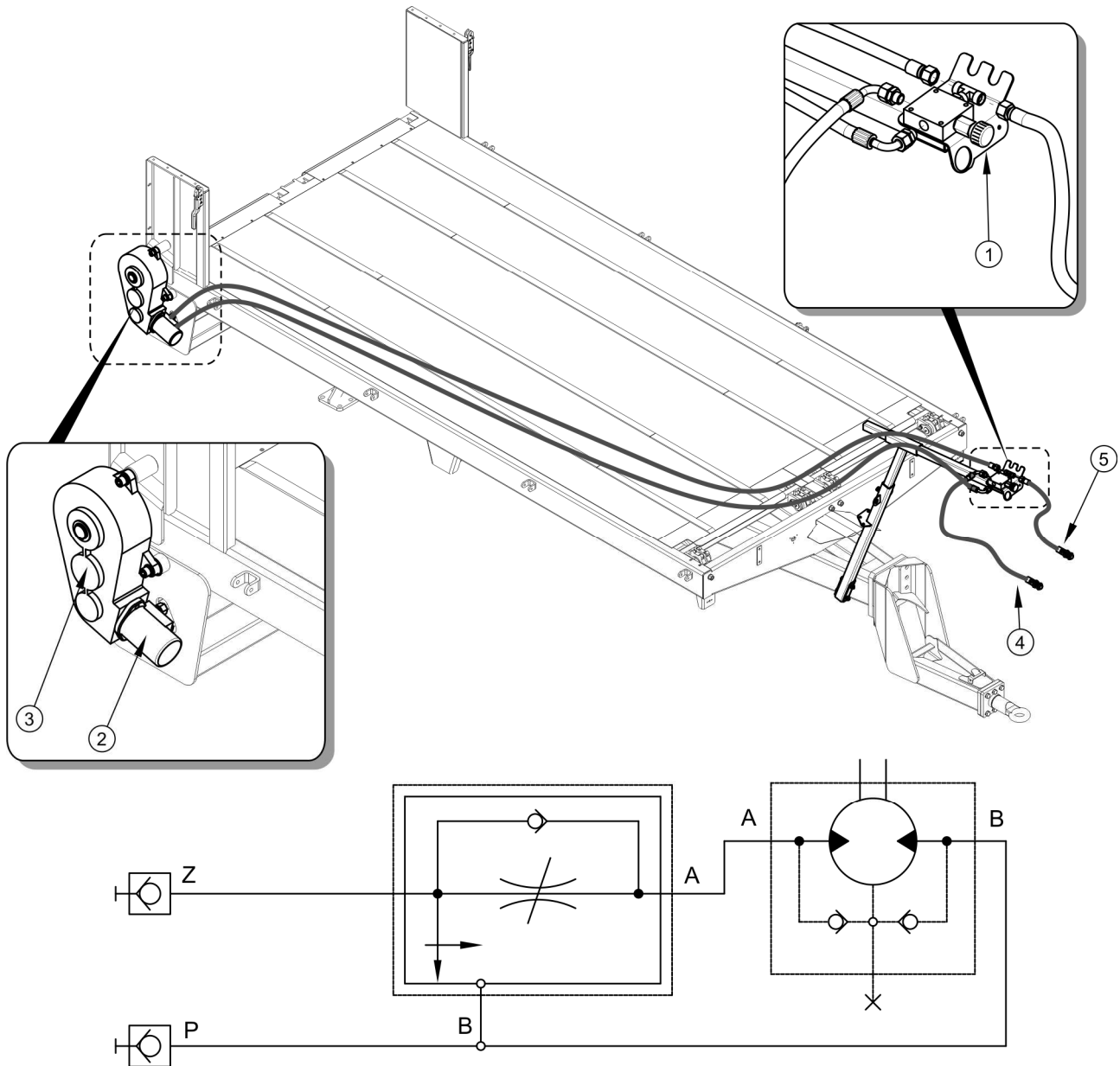


FIG. 3.4 Design and diagram of hydraulic system of feeding mechanism

(1) flow rate regulator, (2) hydraulic motor, (3) reduction gear, (4) supply conduit, (5) return conduit, (Z) tractor supply, (P) tractor return, (B) return, (A) receiver supply (hydraulic motor)

Hydraulic system of feeding mechanism is used for controlling the floor conveyor. The hydraulic system is supplied from the tractor's external hydraulic system through hydraulic conduits (4) and (5). Conveyor movement direction depends on direction of hydraulic oil flow in the system. In order to identify the conduits, labels with arrows are located near the

connection plugs. The arrows indicate direction of hydraulic oil flow through hydraulic motor (2), which drives the feeding mechanism via reduction gear (3).

The floor conveyor operation is controlled by means of the manifold in the tractor cab. Such a solution enables quick change of conveyor movement direction and shortens reaction time.

Conveyor movement speed is adjusted with flow regulator knob (1) within scale from 0 to 10. Flow regulator is located on the outrigger in the front section of the manure spreader. The maximum flow rate (maximum conveyor speed) is achieved if flow regulator setting is 10, while the minimum flow rate is achieved if flow regulator setting is 0. Design and diagram of hydraulic system of feeding mechanism is shown on figure (3.4).

3.2.5 DRIVE TRANSMISSION

Spreading adapter is driven by the drive transmission whose design is shown on figure (3.5).

Torque is transmitted from the tractor PTO to the manure spreader's mechanisms via PTO shaft with shear bolt clutch (1). Torque from PTO shaft (1) is transmitted to reduction gear of the spreading adapter drive (4) via power transmission shaft (2) and PTO shaft (3).



IMPORTANT!

Do NOT use PTO rotation speed other than 540 rpm.

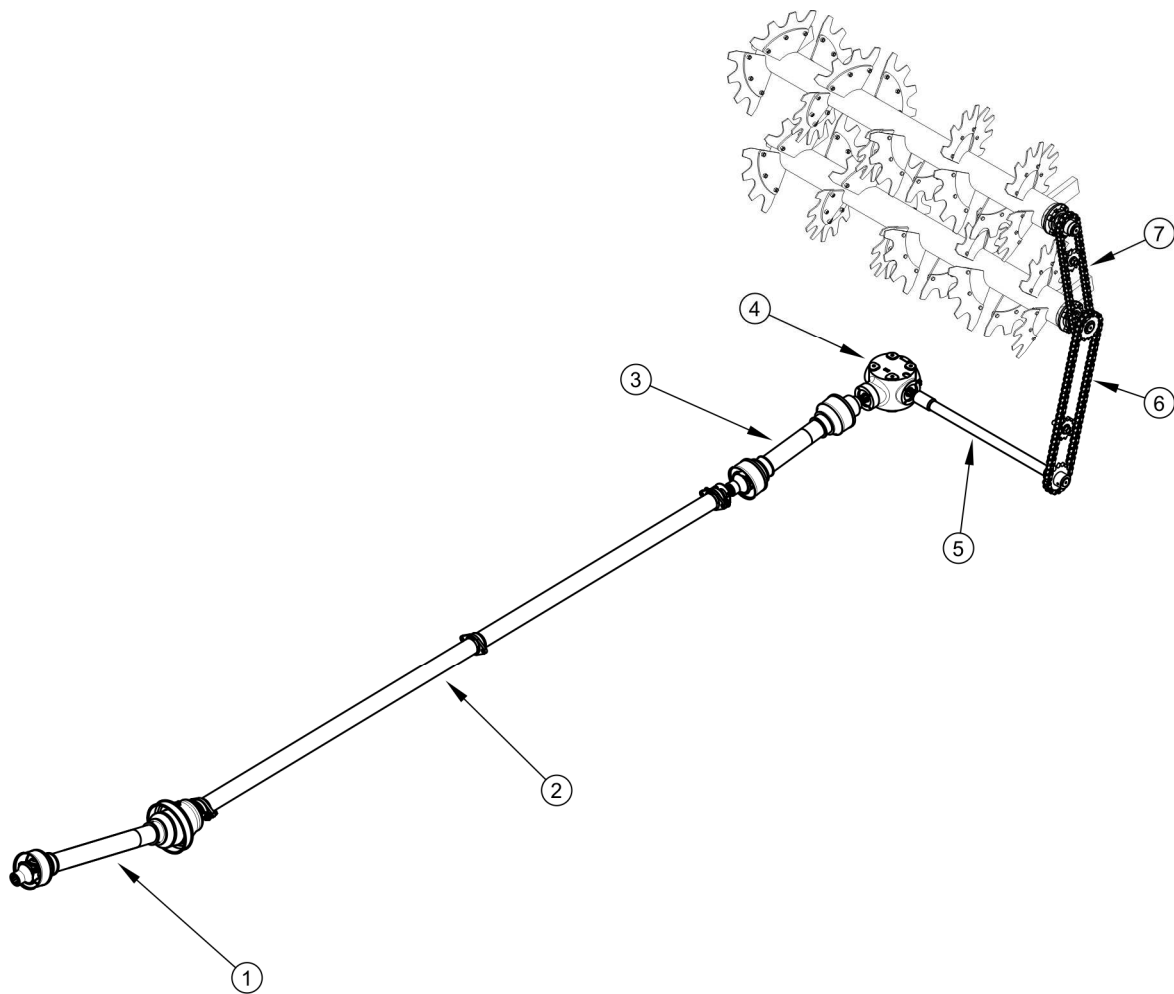


FIG. 3.5 Drive transmission

(1) PTO shaft with shear bolt clutch, (2) power transmission shaft, (3) PTO shaft with unidirectional clutch ("freewheel"), (4) reduction gear, (5) adapter drive shaft, (6) lower wormshaft drive chain, (7) upper wormshaft drive chain

Reduction gear (4) of the spreading adapter drive is secured to the manure spreader frame with four bolts. The reduction gear transfers torque to adapter drive shaft (5). At the end of the adapter drive shaft there is a sprocket wheel. Spreading adapter wormshafts are driven by chains (6) and (7). Drive transmission is protected against damage by means of shear bolt clutch installed in PTO shaft (1) and with unidirectional clutch ("freewheel") located on shaft (3).

3.2.6 TWO-WORMSHAFT SPREADING ADAPTER

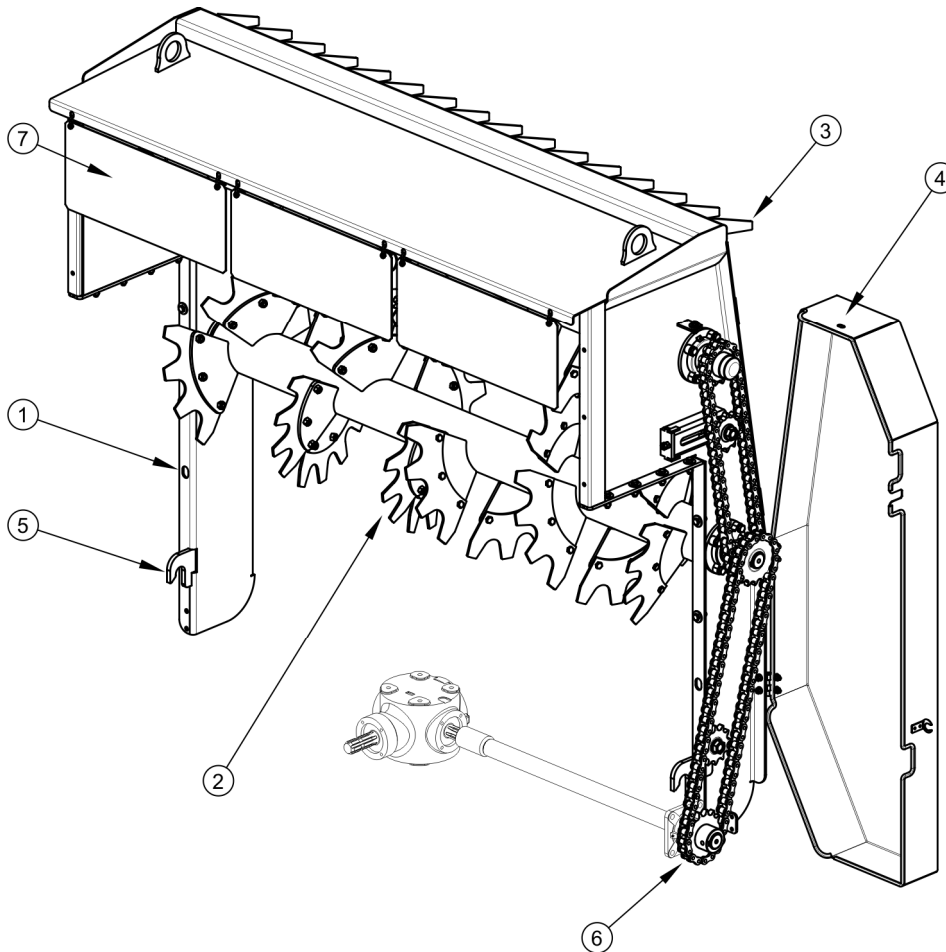


FIG. 3.6 Two-wormshaft spreading adapter

(1) spreading adapter frame, (2) wormshaft, (3) disintegrating flat bar, (4) side shield, (5) fixing hook, (6) chain mechanism

Two-wormshaft spreading adapter is used for disintegrating and spreading manure supplied by the floor conveyor. Design of the spreading adapter is shown on figure (3.6). The spreading adapter has the form of frame (1) with wormshafts. The frame consists of two channel sections connected with upper rectangular section. Disintegrating flat bars (3) (used for disintegrating and levelling the manure layer spread by the upper wormshaft) and the upper shield with individual shields (7) protecting the operator against injuries are welded to the upper rectangular section.

Blades (working tools) are bolted to wormshafts (2). Rotating wormshafts disintegrate manure fed by the conveyor and spread it backwards.

The spreading adapter is attached in the rear section of the manure spreader by installing hooks (5) on the pins welded to the manure spreader frame and securing with bolts the spreading adapter frame to the side panels of the manure spreader body. Side shield (4) attached to the spreading adapter frame protects against accidents caused by operation of chain mechanism (6).



IMPORTANT!

The rotation speed of the tractor PTO shaft driving the spreading adapter must be 540 rpm.

If PTO shaft works at a different speed, rotation speed of spreading wormshafts will be insufficient.

3.2.7 MAIN BRAKE

The manure spreader is equipped with one of two types of working brake:

- single conduit pneumatic system - figure (3.7),
- double conduit pneumatic system - figure (3.8),

Working brake is activated from the tractor driver's cab by pressing on the brake pedal in the tractor. The function of the control valve (2), applied in pneumatic systems - figure (3.7), (3.8), is the operation of the manure spreader brakes simultaneously when tractor's brakes are applied. Furthermore, in case of an inadvertent disconnection of the conduit between the manure spreader and the tractor, the control valve will automatically activate machine's brakes. Valve used in the system is equipped with a brake to be applied when manure spreader is disconnected from the tractor. When compressed air conduit is connected to the tractor, the device automatically applying the brakes now changes its position to allow normal brake operation.

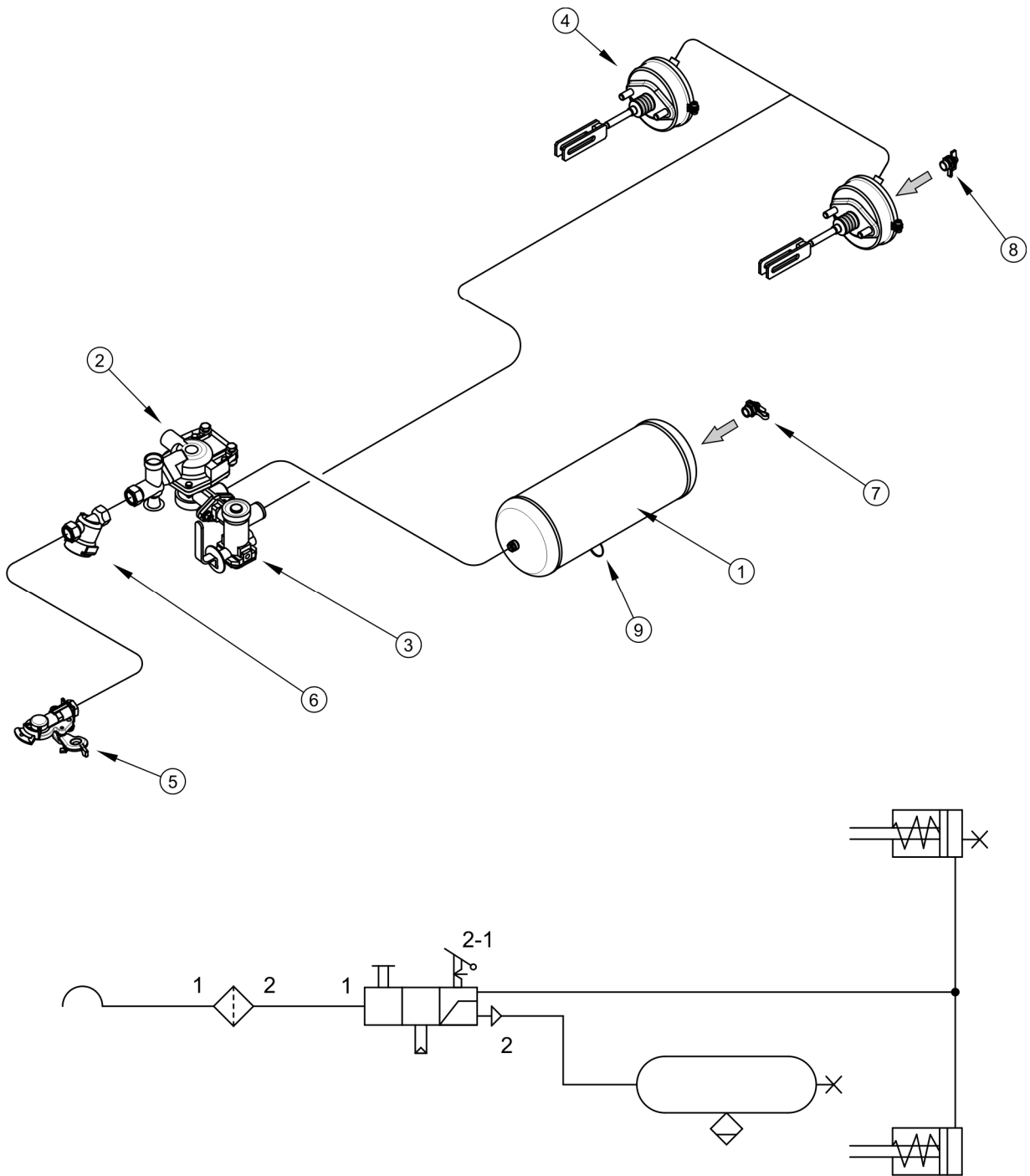


FIG. 3.7 Single conduit pneumatic system

(1) air tank, (2) control valve, (3) brake force regulator, (4) pneumatic cylinder, (5) conduit connection, (6) air filter, (7) air tank control connector, (8) pneumatic cylinder control connector, (9) drain valve

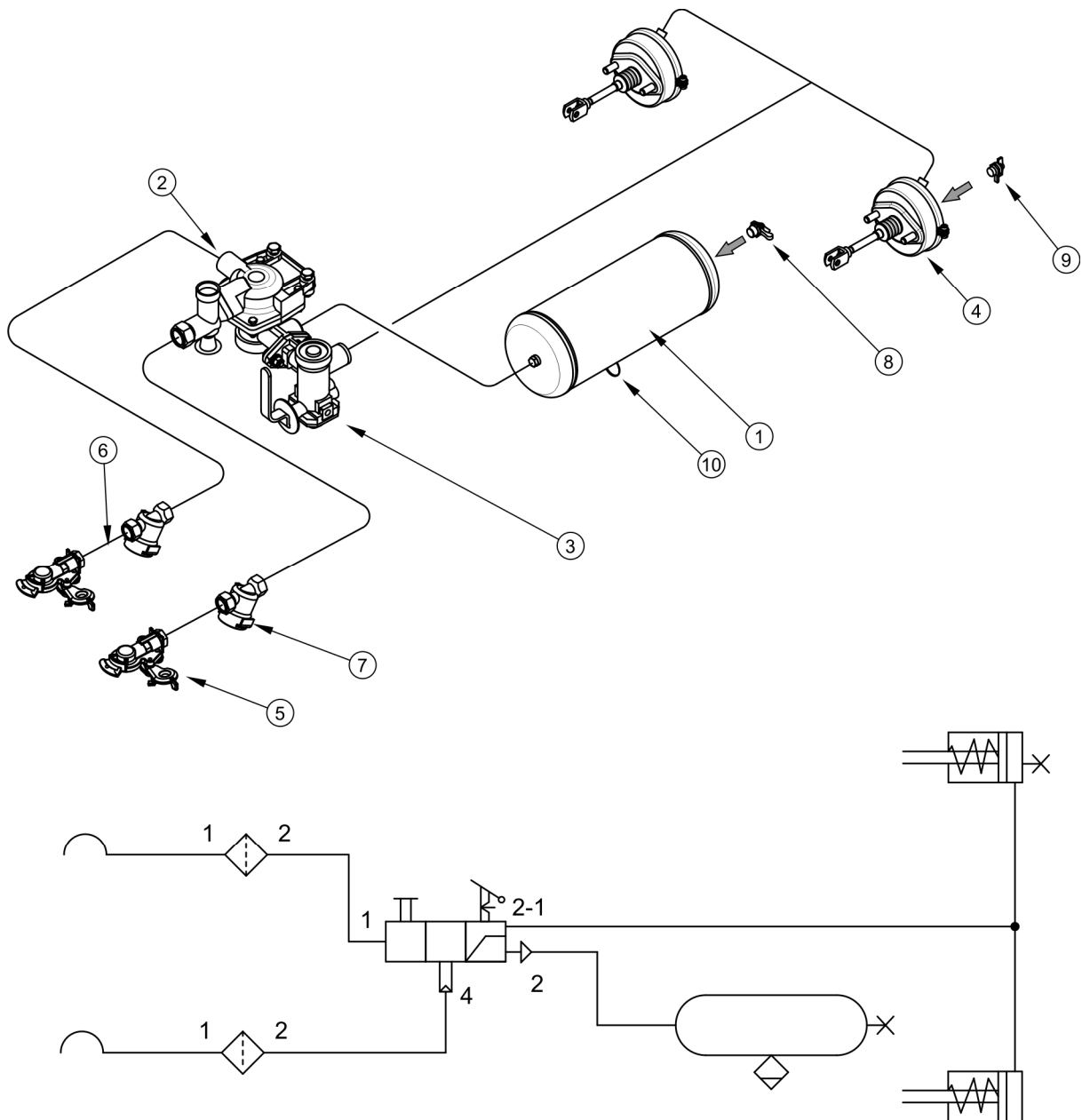


FIG. 3.8 Double conduit pneumatic system

(1) air tank, (2) control valve, (3) braking force regulator, (4) pneumatic cylinder, (5) conduit connector (red), (6) conduit connector (yellow), (7) air filter, (8) air tank control connector, (9) pneumatic cylinder control connector, (10) drain valve

Three-step brake force regulator - figure (3.12), applied in pneumatic systems adjusts braking force depending on setting. Switching to a suitable working mode is done manually by machine operator using the lever (4) prior to moving off. Three working positions are available: A - "no load", B - "half load" and C - "full load".

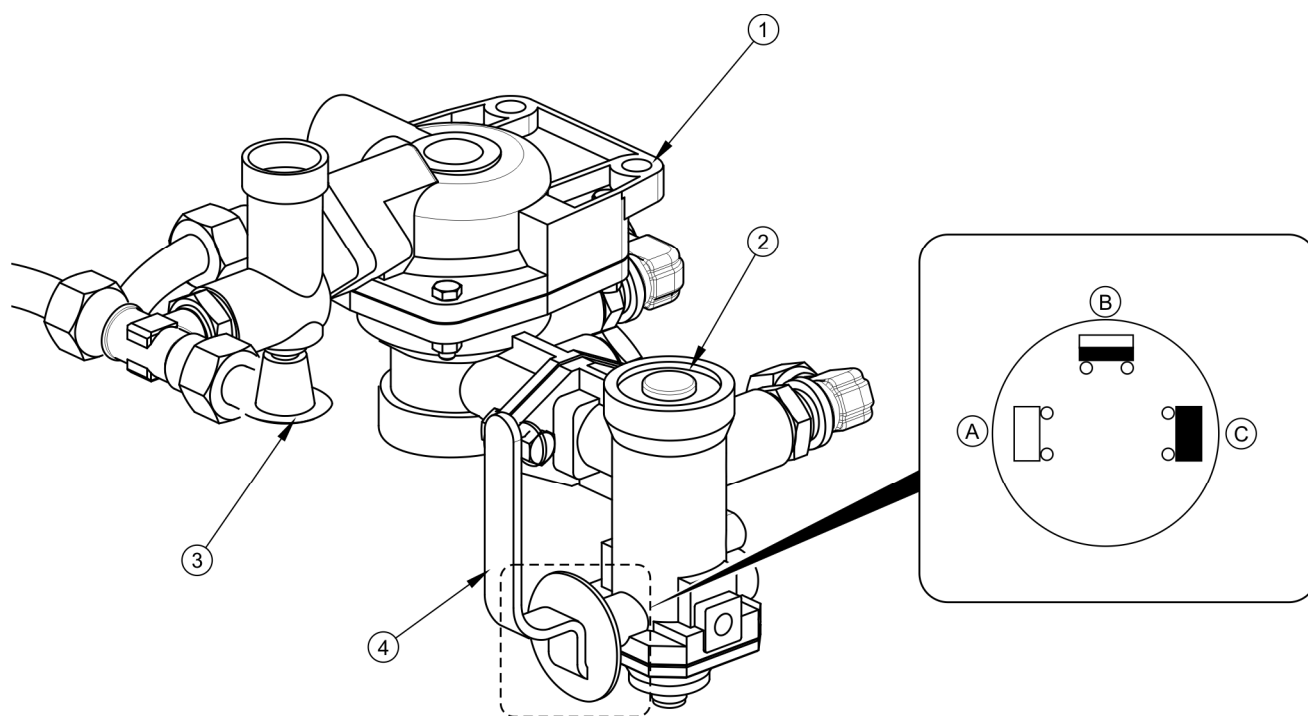


FIG. 3.9 Control valve and brake force regulator

(1) control valve, (2) brake force regulator, (3) manure spreader parking brake release button, (4) work selection regulator lever, (A) position "NO LOAD", (B) position "HALF LOAD", (C) position "FULL LOAD"

3.2.8 PARKING BRAKE

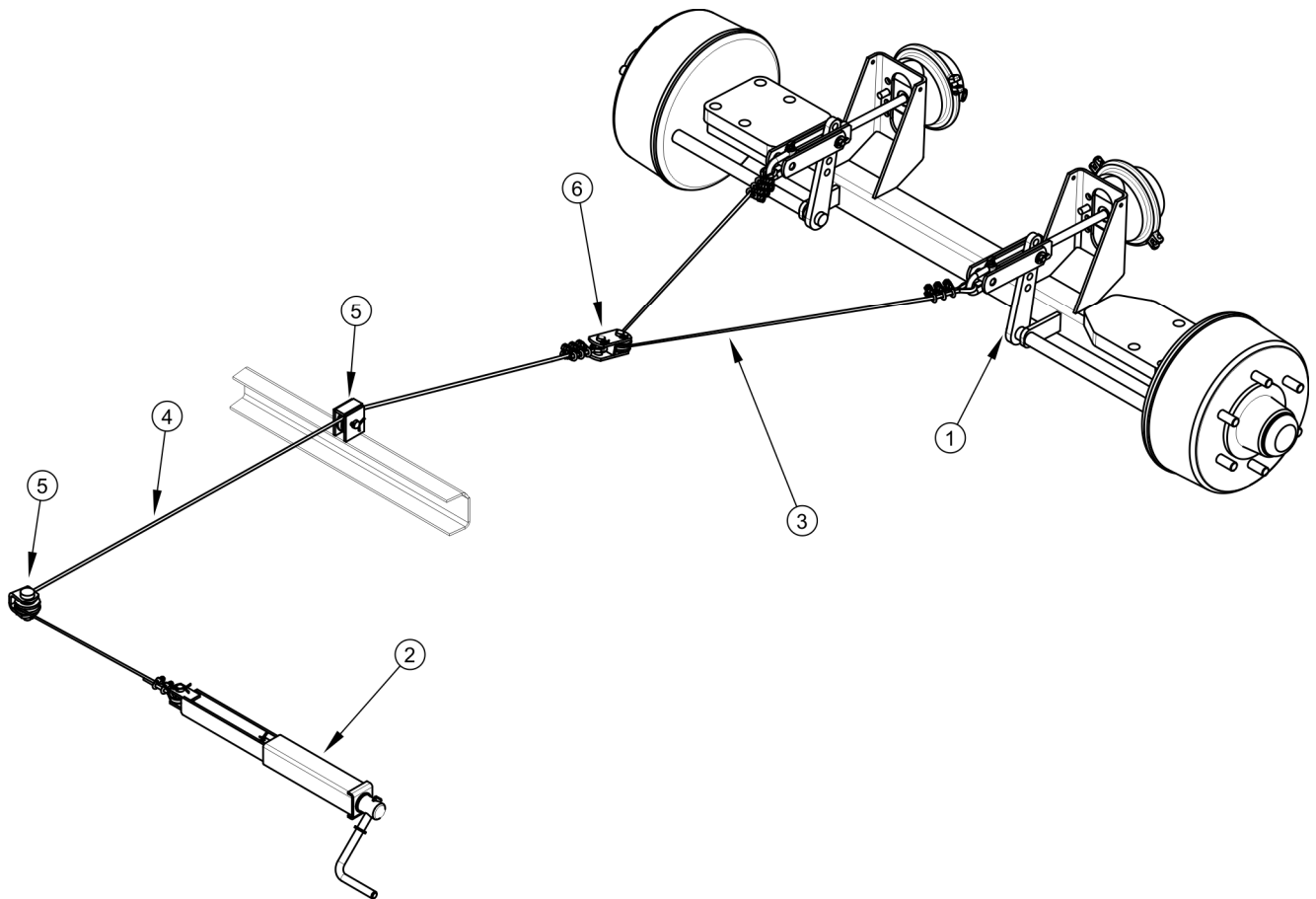


FIG. 3.10 Parking brake

(1) expander lever, (2) brake crank mechanism, (3) steel cable $L=2\ 550$ mm, (4) steel cable $L=2\ 100$ mm, (5) cable roller, (6) pulley block of parking brake

The parking brake is for immobilising manure spreader while standing motionless. System construction is shown in Figure (3.10). Brake crank mechanism (2) is welded to the left longitudinal member of the lower frame.

Expander levers (1) of wheel axle are connected to pulley block (6) with cable (3). Brake mechanism (2) is connected to pulley block (6) with cable (4) carried through cable rollers (5). Tightening the cables (turning the brake mechanism crank clockwise) causes tilting of the expander lever, which expands the brake shoes immobilising the manure spreader.

3.2.9 LIGHTING SYSTEM

The manure spreader electrical system is designed for supply of 12 V DC. Connection of the manure spreader electrical system with the tractor should be made through an appropriate connection lead that is part of the machine's standard equipment.

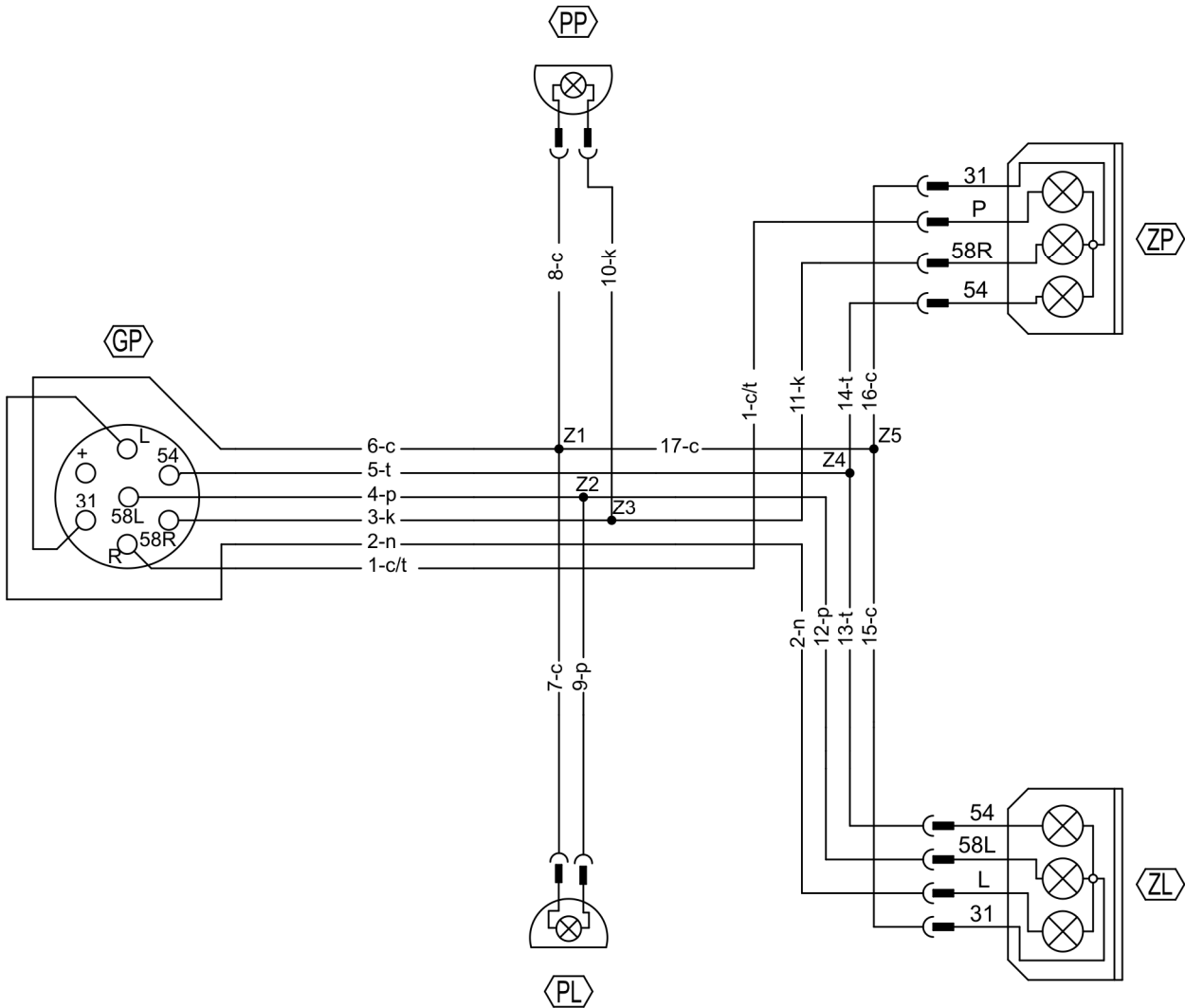


FIG. 3.11 Electrical system diagram

Marking according to table (3.2), (3.3) and (3.4)

TAB. 3.2 Conduit colour marking

MARKING	COLOUR
B	White
C	Black
K	Red
N	Blue
P	Orange
T	Green
C/T	Black and green

TAB. 3.3 List of electrical component markings

SYMBOL	NAME
ZP	Rear right lamp assembly
ZL	Rear left lamp assembly
GP	Front seven pin socket
PP	Front right parking light
PL	Front left parking light

TAB. 3.4 GT socket connection markings

MARKING	FUNCTION
31	Weight
+	Power supply +12V (not used)
L	Left indicator
54	STOP light
58L	Rear left parking light
58R	Rear right parking light
R	Right indicator

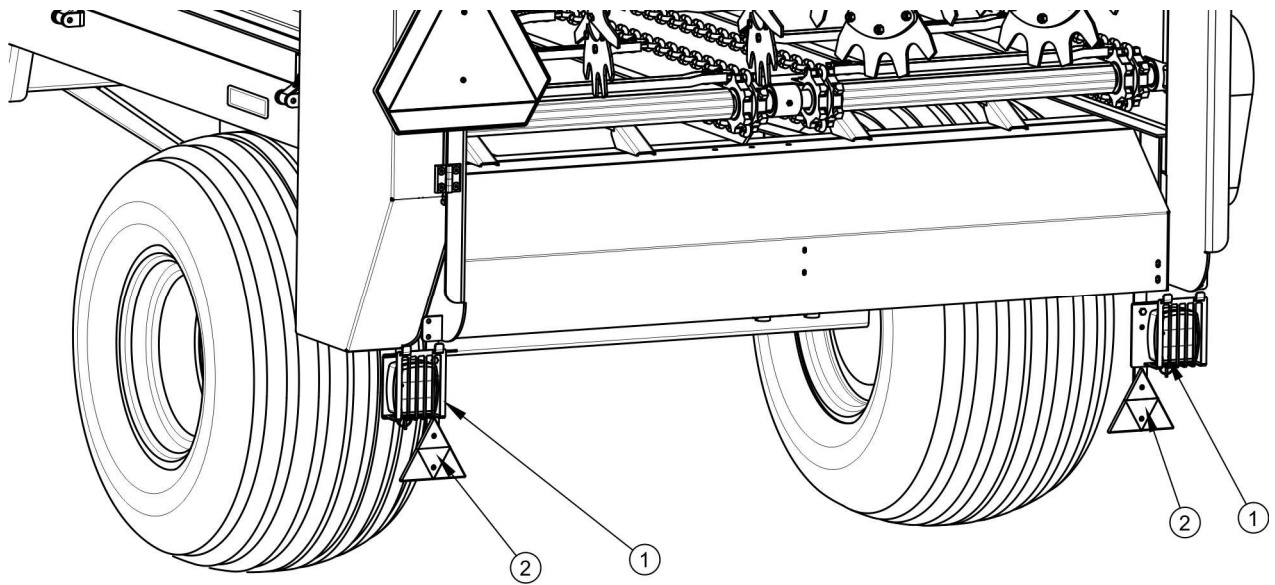


FIG. 3.12 Positioning of electrical system components and reflectors – rear view

(1) rear lamp assembly, (2) triangular reflector

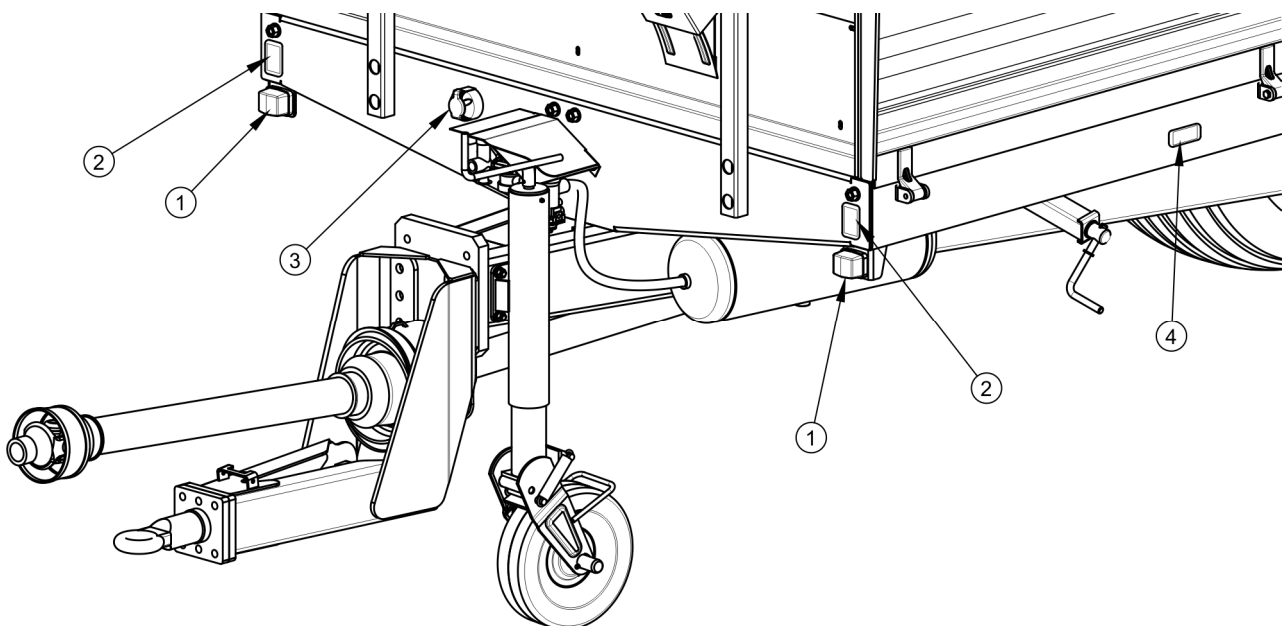


FIG. 3.13 Positioning of electrical system components and reflectors – front view

(1) front parking light, (2) white reflector, (3) front 7-pin socket, (4) orange reflector

SECTION

4

CORRECT USE

4.1 PREPARING FOR WORK BEFORE FIRST USE

4.1.1 CHECKING THE MANURE SPREADER AFTER DELIVERY

The manure spreader is supplied to the user completely assembled and does not require additional mounting operations of machine sub-assemblies. The manufacturer guarantees that the manure spreader is fully operational and has been checked according to quality control procedures and is ready for normal use. This does not release the user from an obligation to check the machine's condition prior to purchasing and before first use.

Before connecting the manure spreader, check whether the tractor meets applicable requirements. The manure spreader may be hitched only to such a tractor which meets the requirements specified in table (1.2).

ATTENTION!



Before proceeding to hitching to tractor and before first use of the manure spreader the user must carefully read this Operator's Manual and the Operator's Manual of PTO shaft attached to the machine and observe all recommendations.

The manure spreader may only be hitched to a tractor which has the appropriate hitch and required connection sockets for braking, hydraulic and electrical systems. Oil in the tractor external hydraulic system must have appropriate characteristics or must be mixable with the oil in the hydraulic system of the manure spreader.

Before connecting to tractor, machine operator must inspect the technical condition of the manure spreader, adapt it to his/her own needs and prepare it for test start-up. In order to do this:

- ➔ check completeness of machine,
- ➔ check condition of paint coatings, traces of corrosion or mechanical damage (crushing, piercing, bending or breaking of minor elements),
- ➔ check technical condition of protective shields and check if they are correctly installed,
- ➔ visually inspect the manure spreader individual components for mechanical damage resulting from incorrect loading, transport or unloading of the machine,

- ➔ check technical condition of the manure spreader lights and indicators,
- ➔ check technical condition of PTO shafts and their shields as well as completeness of these elements,
- ➔ check technical condition of hydraulic and pneumatic conduits,
- ➔ check that there are no hydraulic oil leaks.

4.1.2 PREPARING THE MANURE SPREADER FOR THE FIRST USE

When preparing the manure spreader for the first use, check the following:

- ➔ all lubrication points, lubricate the machine elements as needed according to recommendations provided in section 5.6 "*MANURE SPREADER LUBRICATION*",
- ➔ check if the nuts fixing the following components are properly tightened: (wheels, drawbar hitching eye, spreading mechanism),
- ➔ oil level in the spreading adapter transmission,
- ➔ oil level in the transfer mechanism transmission,
- ➔ tension of chains driving spreading adapter wormshafts,
- ➔ tension of chain conveyor's chain,
- ➔ technical condition of PTO shaft, its shields and securing chains,
- ➔ make sure that the attached PTO shaft may be connected to the tractor (PTO shaft should be suitable for the tractor – see the Operator's Manual of PTO shaft),
 - ⇒ check length of PTO shaft in the most favourable and difficult working conditions,
 - ⇒ check whether the PTO shaft pipes are sufficiently covered when the widest angle is set,
 - ⇒ check whether the PTO shaft can be still slid when the smallest angle is set (while turning),
- ➔ check correct PTO shaft rotation speed (see decal pos. 7 table (2. 1)).

ATTENTION!

Pipe profiles of the PTO shaft must overlap at least at 1/2 of the length in normal working conditions and at least at 1/3 of the length in all working conditions.

When adjusting the PTO shaft, follow the instructions presented in the Operator's Manual of the PTO shaft.

When the tractor with the manure spreader are turning or travelling on an uneven terrain, the PTO shaft may be damaged and/or destroyed if it is squeezed or disconnected as a result of its wrong adjustment.

**TIP**

Adjustment of the PTO shaft applies only to a specific type of tractor. If the machine is connected to a different type of tractor, the adjustment procedure for this type of tractor should be possibly carried out.

4.1.3 TEST START

If all the above checks have been performed and there is no doubt as to the manure spreader's good technical condition, it should be hitched to tractor according to chapter 4.3 „*HITCHING AND DISCONNECTING THE MANURE SPREADER FROM TRACTOR*“. Start tractor engine, check all systems and perform a test run of the manure spreader without load before beginning work. It is recommended that the inspection is conducted by two people, one of which should always remain in the tractor cab. Test start should be conducted according to the sequence shown below.

- ➔ Connect the manure spreader to appropriate hitch on agricultural tractor.
- ➔ Connect PTO shaft and secure it in a proper manner.
- ➔ Raise the support.
- ➔ Connect brake, electrical and hydraulic system conduits.
- ➔ Check correct operation of lights and indicators.
- ➔ Start tractor.
- ➔ When moving off check if the main brakes operate correctly.
- ➔ Check if the chain conveyor operates correctly.

- ⇒ Using the appropriate manifold lever in the tractor cab, start the chain conveyor. Set the conveyor speed by turning the knob of the flow regulator installed on the outrigger in the front section of the manure spreader from position „0” to the maximum position „10” and check if the feed direction is correct. Forward or reverse direction of movement is selected using the appropriate manifold lever in the tractor cab. Check if conduits are connected in a correct manner and if flow regulator operates correctly.
- ➔ Start tractor PTO slowly (starting the drive of the spreading adapter wormshafts).
- ➔ Leave for several minutes working at low RPM, during which check:
- ⇒ that there is no knocking or noise in the drive system and the spreading adapter arising from scraping or grinding of metal elements,
- ⇒ if spreading adapter wormshafts rotate smoothly and without resistance.
- ➔ Disconnect PTO drive, turn off tractor engine and unhitch the manure spreader from tractor.

**DANGER**

Do NOT use PTO rotation speed other than 540 rpm.

The manure spreader may be used only when all preparatory activities have been completed satisfactorily. If during manure spreader test start worrying symptoms occur such as:

- noise and abnormal sounds originating from the abrasion of moving elements of the manure spreader design,
- hydraulic oil leak,
- pressure drop in brake system,
- blocking of brake cylinders,
- other suspected faults

immediately cut off oil supply, disconnect tractor PTO drive and identify a fault. If a fault cannot be rectified or the repair could void the guarantee, please contact the retailer or directly the manufacturer for additional clarifications or to perform the repair.

ATTENTION!



Check correctness of hydraulic connections. Replace conduit plugs possibly.

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

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

4.2 TECHNICAL CONDITION INSPECTION

When preparing the manure spreader for operation check the following daily:

- ➔ technical condition of tyres and tyre pressure,
- ➔ tightening of nuts fixing the following: (wheels, drawbar hitching eye, spreading mechanism),
- ➔ condition of other bolt and nut connections,
- ➔ operation of manure spreader lights and indicators,
- ➔ operation of manure spreader's brake system,
- ➔ correct operation of the hydraulic system,
- ➔ oil level in the spreading adapter transmission,
- ➔ oil level in the transfer mechanism transmission,
- ➔ technical condition of PTO shaft, its shields and securing chains,
- ➔ after a longer storage period of the machine, check technical condition of PTO shaft and grease all the lubrication points according to the Operator's Manual of the PTO shaft,
- ➔ lubricate elements according to guidelines presented in section „*LUBRICATION OF MANURE SPREADER*“, in compliance with lubrication schedule,

- ➔ check the floor conveyor tension and adjust if necessary – see chapter 5.12 „ADJUSTING THE TENSION OF FLOOR CONVEYOR CHAIN”.

DANGER



Do NOT use unreliable manure spreader.

The manure spreader 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.

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

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

Pneumatic brake systems are equipped with connectors, whose safety caps, are made from coloured plastic. The colours of these elements correspond to the colours of the connection sockets in the tractor (yellow, red or black). Hydraulic brake supply conduit plug should be connected to the tractor hydraulic brake socket.

4.3 HITCHING AND DISCONNECTING MANURE SPREADER FROM TRACTOR

Prior to attempting to hitch the manure spreader to tractor, make sure that the tractor is immobilised with parking brake. The manure spreader may be attached only to the tractor equipped with all necessary connections (electric, pneumatic and hydraulic connections) and the tractor hitch in accordance with the requirements of the manure spreader Manufacturer.

ATTENTION!

Prior to attaching the manure spreader, check the technical condition of the manure spreader's and tractor's hitch system and connection elements of the hydraulic, electrical and pneumatic systems.



The hydraulic oils in the tractor and the manure spreader must be mixable.

Be especially careful when hitching the machine to tractor.

When hitching is completed, secure the electrical leads and hydraulic and braking system conduits in such a way that they do not become entangled in tractor's moving parts and are not at the risk of breaking or severed when making turns.

Drawbar support wheel must be maximally raised during manure spreader operation or travel.

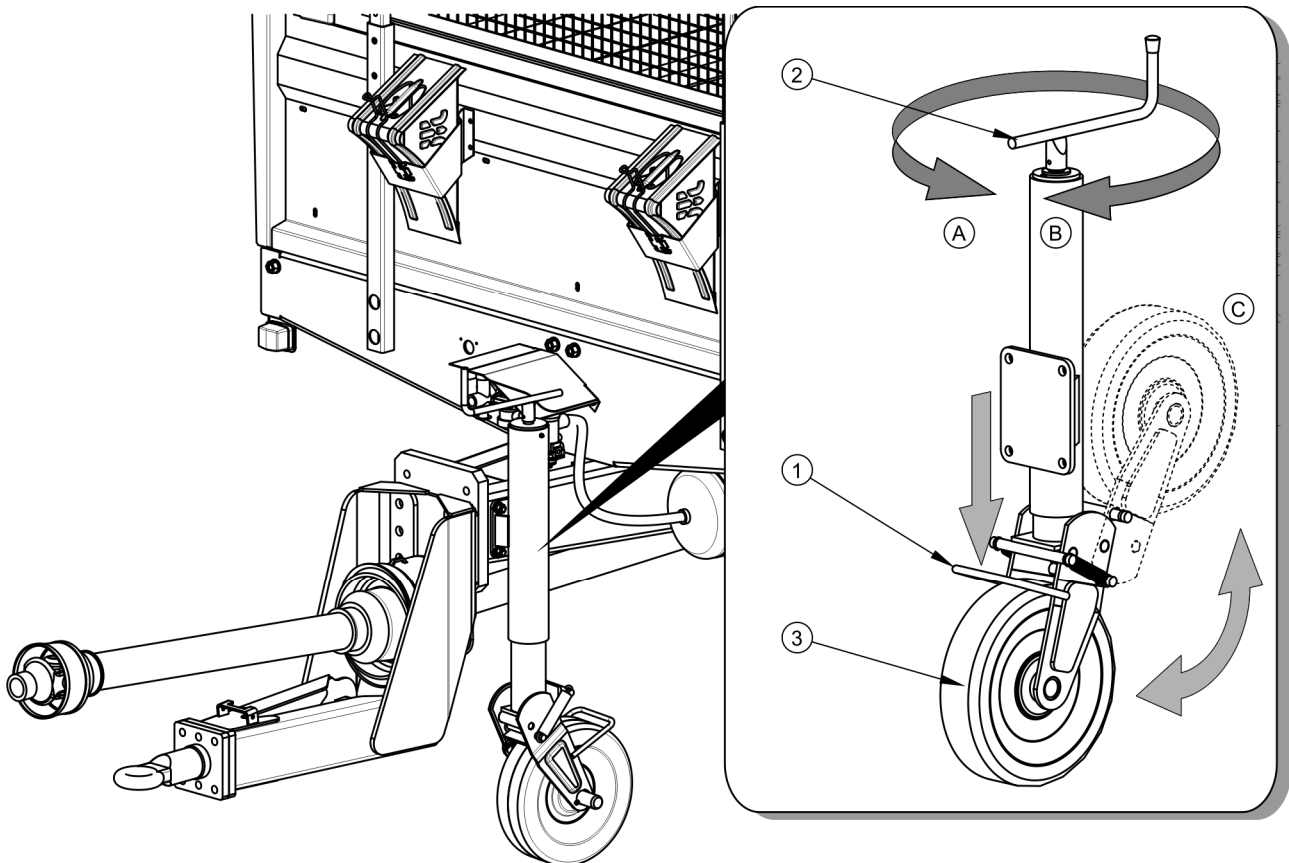


FIG. 4.1 **Hitching to tractor**

(1) support pedal, (2) knob, (3) wheel, (A), (B) support crank turning direction, (C) support transport position

In order to hitch the manure spreader to the tractor perform the actions below in the sequence presented.

Connection

- ➔ Immobilise the manure spreader with parking brake.
- ➔ Position agricultural tractor directly in front of drawbar eye.
- ➔ set the drawbar eye at such a height that it is possible to hitch the machine.
 - ⇒ turn support crank (2) in direction (A) in order to raise the drawbar hitching eye or in direction (B) in order to lower the drawbar hitching eye – figure (4.1).
- ➔ Reverse tractor, hitch manure spreader, check coupling lock protecting machine against accidental unhitching.
 - ⇒ If the agricultural tractor is equipped with an automatic coupler, ensure that the hitching operation is completed and that drawbar eye is secured.
- ➔ Switch off tractor engine, secure cab to prevent unauthorised access.
- ➔ Raise support wheel maximally upwards using knob (2).
- ➔ Press pedal (1), causing the release of wheel, which must be placed by hand in transport position (C).
 - ⇒ After hitching the manure spreader to tractor, the support wheel should be raised at such a height as to avoid hitting the ground or any other obstacle.
- ➔ Connect pneumatic system conduits (applies to double conduit systems):
 - ⇒ Connect pneumatic conduit marked yellow with yellow socket in tractor.
 - ⇒ Connect pneumatic conduit marked red with red socket in tractor.
- ➔ Connect pneumatic system conduit (applies to single conduit system).
 - ⇒ Connect pneumatic conduit marked black with black socket in tractor.
- ➔ Connect hydraulic conduits of the floor conveyor movement system to the tractor.

- ⇒ Conveyor connection conduits are marked with decals in the form of arrows indicating the direction of hydraulic oil flow.



ATTENTION!

When connecting the control conduits of the conveyor drive motor, be careful not to make wrong connections of conduit pairs. Conduits are identified with information decals.

- ➔ Connect main conduit supplying electric lighting system.
- ➔ Install PTO shaft according to guidelines presented in the PTO shaft Operator's Manual.
 - ⇒ Connect the PTO shaft end with clutch to the machine.
 - ⇒ Ensure that the PTO shaft ends (on the tractor and manure spreader sides) are well fitted and the hitch is properly secured.
 - ⇒ Attach chains securing the PTO shaft cover.
- ➔ Release parking handbrake by turning the crank of the parking brake's mechanism.



DANGER

When hitching, there must be nobody between the manure spreader and the tractor. When hitching the machine, tractor driver must exercise caution and make sure that nobody is present in the hazard zone.

Make sure that there is nothing and nobody inside the load box.

When connecting the hydraulic conduits to the tractor, make sure that the tractor and manure spreader hydraulic system are not under pressure.

Disconnecting the manure spreader

In order to disconnect the manure spreader from the tractor carry out the following actions in the following sequence:

- ➔ Immobilise tractor and manure spreader with parking brake.
- ➔ Place chocks under manure spreader wheel.
 - ⇒ Wheel chocks must be so placed that one is in front of the wheel and the second is behind the wheel - see section 2.

- ➔ Turn off tractor ignition. Ensure that unauthorised persons do not have access to the tractor cab.
- ➔ Lower support wheel to transport position.
- ➔ Turning crank, set the drawbar eye at such a height that one may safely unhitch the manure spreader.
- ➔ Disconnect all hydraulic system conduits from tractor.
- ➔ Disconnect electric lead.
- ➔ Disconnect pneumatic system conduits (applies to double conduit systems):
 - ⇒ Disconnect pneumatic conduit marked red.
 - ⇒ Disconnect pneumatic conduit marked yellow.
- ➔ Disconnect pneumatic system conduits (applies to single conduit systems):
 - ⇒ Disconnect pneumatic conduit marked black.
- ➔ Protect terminal ends with covers, Place conduit terminals in appropriate sockets.
- ➔ Disconnect PTO shaft.
- ➔ Release tractor hitch and disconnect manure spreader drawbar from tractor hitch and drive tractor away.
- ➔ Secure PTO shaft.

ATTENTION!



Exercise caution when disconnecting the manure spreader from the tractor. Ensure good visibility. Unless it is necessary, do not go between tractor and manure spreader.

The manure spreader disconnected from the tractor must be immobilised with the parking brake. If the manure spreader is positioned on a slope or elevation it shall be additionally secured against moving by placing chocks or other objects without sharp edges under the manure spreader's wheels.

Before disconnecting conduits, drawbar eye and PTO shaft, close tractor cab and secure it against access by unauthorised persons. Turn off tractor ignition.

Do NOT park a loaded manure spreader, which is disconnected from the tractor and resting on the support with wheel.

4.4 LOADING THE LOAD BOX

Before loading, position the manure spreader connected properly with the tractor on level and stable surface. Immobilise both machines with parking brake.

When loading the manure spreader, it is recommended to use an appropriate loader or conveyor. If loading is carried out by a loader with bucket forks, the width of bucket forks should not exceed the load box length. Bucket forks should be emptied by tilting when positioned not higher than 1 meter above the load box height. Manure should not be artificially compacted. When loading, pay attention not to overload the manure spreader. Height of loaded manure must not exceed the height of the spreading adapter mechanism.

In order to ensure optimum spreading, efforts should be made to evenly distribute the load in the load box. Manure should be loaded starting from the rear and moving towards the front of the manure spreader. Such loading method has positive impact on quality of manure spreading.

Due to the various density of fertilizing materials, using the total load box capacity may cause exceeding permissible carrying capacity of the manure spreader. Guideline specific weight of selected materials is shown in table (4.1). It is necessary to pay particular attention not to overload the manure spreader.

TAB. 4.1 Guideline weights by volume of selected loads

TYPE OF MATERIAL	VOLUME WEIGHT kg / m ³
Organic fertilisers:	
old manure	700 - 800
mature manure	800 - 900
fresh manure	700 - 750
compost	950 – 1,100

Regardless of the type of load carried, the user is obliged to secure it in such a manner that the load is unable to spread and cause contamination of the road. If this is impossible, do NOT transport this type of load.

ATTENTION!

Do NOT exceed permissible load weight of manure spreader because this may cause danger to road traffic and cause damage to the machine.

Unevenly loaded manure is spread unevenly in the field.

Height of loaded manure must not exceed the height of the spreading adapter mechanism.

When loading the manure spreader, pay attention not to load manure onto the spreading adapter blades to ensure unloaded start of the adapter.

4.5 SPREADING AND ADJUSTING FERTILIZER DOSE

4.5.1 ADJUSTING FERTILIZER DOSE

Amount of material spread on a specific field area depends on the following factors:

- load height,
- working width - depends on kind of material spread and type of spreading adapter,
- chain conveyor speed,
- travel speed.

Spreading dose (m^3/ha) should be selected from table (4.2). Set a suitable chain conveyor speed by means of knob (3) on flow regulator (1), which is located on valve bracket (2) in the front section of the manure spreader – figure (4.2).

- Conveyor speed is reduced by turning the regulator knob towards "0" setting.
- Conveyor speed is increased by turning the regulator knob towards „10" setting.

TIP

When the manure spreader travel speed is high and the conveyor speed is low, a small spreading dose is obtained.

When the manure spreader travel speed is low and the conveyor speed is high, a large spreading dose is obtained.

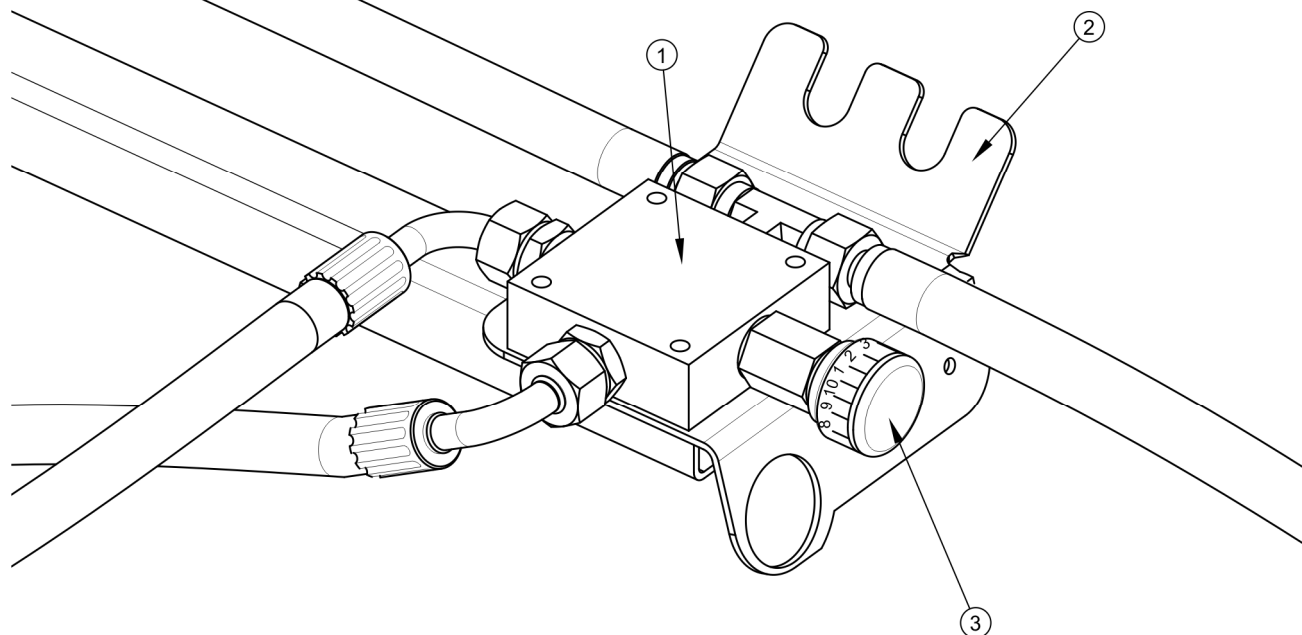


FIG. 4.2 Adjusting conveyor speed

(1) flow regulator, (2) valve bracket, (3) adjusting knob with scale from 0 to 10,

Values given in table (4.2) for various settings of chain conveyor speed have been calculated by Pronar employees for the manure spreader without load. These are approximate values. Other values are possible in other conditions and for other settings.

Obtained spreading dose values have been calculated for working width of 2.4 m.

TAB. 4.2 Spreading dose table

Conveyor speed setting [rotation]	Travel speed [km/h]			
	4	6	8	10
	Spreading dose m ³ /ha			
3	36.7	24.5	18.4	14.7
4	71.9	47.9	35.9	28.8
5	114.1	76.0	57.0	45.6
6	161.7	107.8	80.9	64.7
7	223.4	149.0	111.7	89.4
8	275.8	183.9	137.9	110.3

4.5.2 SPREADING MANURE IN THE FIELD

Before commencing work check again the technical condition of hydraulic connections and safety guards installed on the manure spreader and PTO shaft. Check if net protection is installed on the front wall. The net protection protects the operator against injury and the tractor against damage by thrown elements, for example, stones.

The manure spreader starting procedure in order to spread manure in the field.

- ➔ Set the tractor PTO rotation speed proper for the manure spreader.
- ➔ Start the spreading adapter by engaging drive to tractor PTO.
 - ⇒ Start tractor PTO slowly in order to avoid damage to PTO shaft.
- ➔ Engage the chain conveyor.
- ➔ Engage appropriate tractor gear and start working.
 - ⇒ Disengage PTO when making turns during operation. Protection of PTO shaft and uniform spreading are ensured in this way.

DANGER



Operation of the manure spreader without safety guards or with damaged PTO shaft creates a direct threat to health and life of the machine operators.

The manure spreader may be operated only with the net protection installed on the front wall.

Keep a safe distance from electric power lines. Do NOT spread manure near grazing animals.

Do NOT use PTO rotation speed other than 540 rpm. If PTO shaft works at a different speed, rotation speed of spreading wormshafts will be insufficient and the drive will be at the risk of damage.

TIP



In order to obtain uniform spreading in the beginning of operation, increase PTO rotation speed to maximum 540 rpm and engage the chain conveyor when the manure spreader is still motionless. Spread manure while the manure spreader is motionless until a sufficient amount of manure is delivered to the spreading adapter wormshafts. Then, engage appropriate tractor gear and start working.

In order to ensure optimum spreading, maintain PTO rotation speed at the level of 540 rpm.

ATTENTION!

Do NOT use another manure spreader starting procedure. The use of another manure spreader starting procedure may cause damage to the manure spreader and pose a threat to health and life of the machine operators.

Load may be moved forwards only in exceptional cases, for example, if spreading adapter wormshafts are blocked or in case of slipping of rear tractor wheels. When moving the load forwards, the load must not touch the front wall because the load box or drive transmission system may be damaged.

Before turning and during transport the tractor PTO drive should be disconnected.

4.6 SPREADING MECHANISM CLOGGING

If the spreading mechanism (spreading adapter) is clogged during spreading, the clogging elements can be removed by moving the floor conveyor towards the front wall. If the spreading adapter is still clogged, disengage tractor PTO drive and chain conveyor. Switch off tractor engine and disconnect PTO shaft. Next, remove the elements clogging the spreading adapter using the appropriate tool. Remove strings from manure, if they occur. Otherwise, strings can deteriorate quality of manure spreading. Entwined strings should be removed using a sharp tool.

ATTENTION!

When the load box is loaded, direction of the feeding mechanism movement may be reversed only for a short time.

During work use the proper, close-fitting protective clothing, gloves and appropriate tools.

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.

4.7 PROPER USE AND MAINTENANCE OF TYRES

- When working with tyres, the manure spreader should be secured against rolling by placing chocks under the wheels. Wheels can be taken off only when the manure spreader is not loaded.
- Repair work on the wheels or tyres should be carried out by persons trained and entitled to do so. This work should be carried out using appropriate tools.
- Inspect tightness of nuts after first use of the manure spreader, after first travel under load and then every 6 months of use or every 25,000 km. In the event of intensive work, check the nut tightening at least every 100 km. The inspection should be repeated individually if a manure spreader wheel has been removed from the wheel axle.
- Regularly check and maintain correct pressure in tyres according to Operator's Manual (especially if manure spreader is not used for a longer period).
- Pressure and tyres should be also checked after the whole day of intensive work. Please note that higher temperatures could raise tyre pressure by as much as 1 bar. At high temperatures and pressure, reduce load or speed.
- Do not release air from warm tyres to adjust the pressure or the tyres will be underinflated when temperatures return to normal.
- Tyre valves should be protected with the appropriate caps to avoid soiling.
- Do not exceed the manure spreader's maximum design speed.
- When machine is operated all day, check temperature of tyres.
- Adhere to 30 minutes rest for cooling tyres after driving 75 km or after 150 minutes continuous travel depending on which occurs first.
- Avoid potholes, sudden manoeuvres or high speeds when turning.

SECTION

5

MAINTENANCE

5.1 PRELIMINARY INFORMATION

When using the manure spreader, regular inspections of its technical condition are essential and the performance of maintenance procedures, which keep the machine in good technical condition. In connection with this the user of the manure spreader is obliged to perform all the maintenance and adjustment procedures defined by the Manufacturer.

Repairs during the guarantee period may only be performed by authorised service points.

Detailed procedures and extents of functions are described in this section, which the user may perform with his own resources. In the event of unauthorised repairs, changes to factory settings and other actions, which are not regarded as possible for the manure spreader operator to perform, the user shall invalidate the guarantee.

5.2 SERVICING BRAKES AND AXLES

5.2.1 PRELIMINARY INFORMATION

Work connected with the repair, change or regeneration of axle and brakes elements should be entrusted to specialist establishments, having the appropriate technology and qualifications for this type of work.

The responsibilities of the user are limited to:

- initial inspection of axle brakes,
- check brake shoe linings for wear,
- inspection and adjustment of loose play of axle bearings,
- mounting and dismounting wheel, inspection of wheel tightening,
- checking air pressure, evaluating technical condition of wheels and tyres,
- mechanical brakes adjustment,
- Replacing the parking brake cable and tension adjustment

Procedures connected with:

- changing grease in axle bearings,
- changing bearings, hub seals,

- changing brake linings, repairing brake,

may be performed by specialist workshops.



DANGER

Do NOT use the manure spreader when brake system is unreliable.

5.2.2 INITIAL INSPECTION OF AXLE BRAKES

After purchasing manure spreader, the user is responsible for general checking of brake system of manure spreader axle.

Inspection procedures

- ➔ Hitch manure spreader to tractor and place chocks under manure spreader wheel.
- ➔ Check means of securing cylinder and return springs.
- ➔ Engage and release in turn the main brake and then the parking brake of the manure spreader.
 - ⇒ Main brake and parking brake should be engaged and released without great resistance and severity.
- ➔ Check cylinder movement and correct return of piston to start position.
 - ⇒ The help of a second person is required, who shall engage manure spreader brake.
- ➔ Check if axle elements are in place, (cotter pins in castellated nuts, expansion rings etc.).
- ➔ Check pneumatic cylinders for tightness – compare section 5.3.2.



Initial inspection of axle brakes must be conducted:

- after first use of manure spreader,
- after first travel with load.

5.2.3 CHECK BRAKE SHOE LININGS FOR WEAR

Manure spreader brake shoes should be replaced when the brake lining thickness is less than the minimum specified by the manufacturer.



TIP

Minimum thickness of brake shoe linings is 2 mm.

Check brake shoe linings for wear through the inspection opening (2) – see Figure (5.1).



Check brake shoe linings for wear:

- every 3 months,
- if brakes overheat,
- if brake cylinder piston stroke is significantly longer,
- if there are unusual noises from the drum of wheel axle.

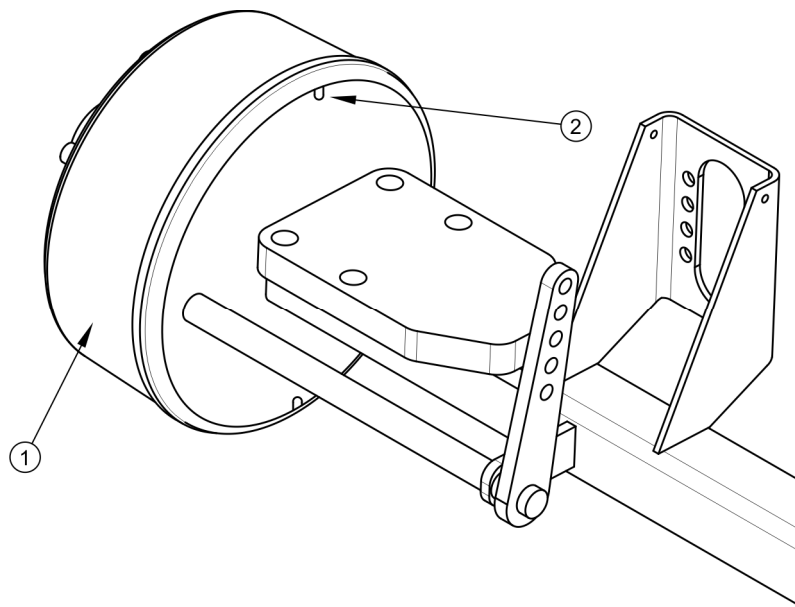


FIG. 5.1 Check brake shoe linings for wear

(1) wheel axle drum, (2) brake shoe linings for wear inspection opening

5.2.4 CHECK WHEEL AXLE BEARINGS FOR LOOSENESS

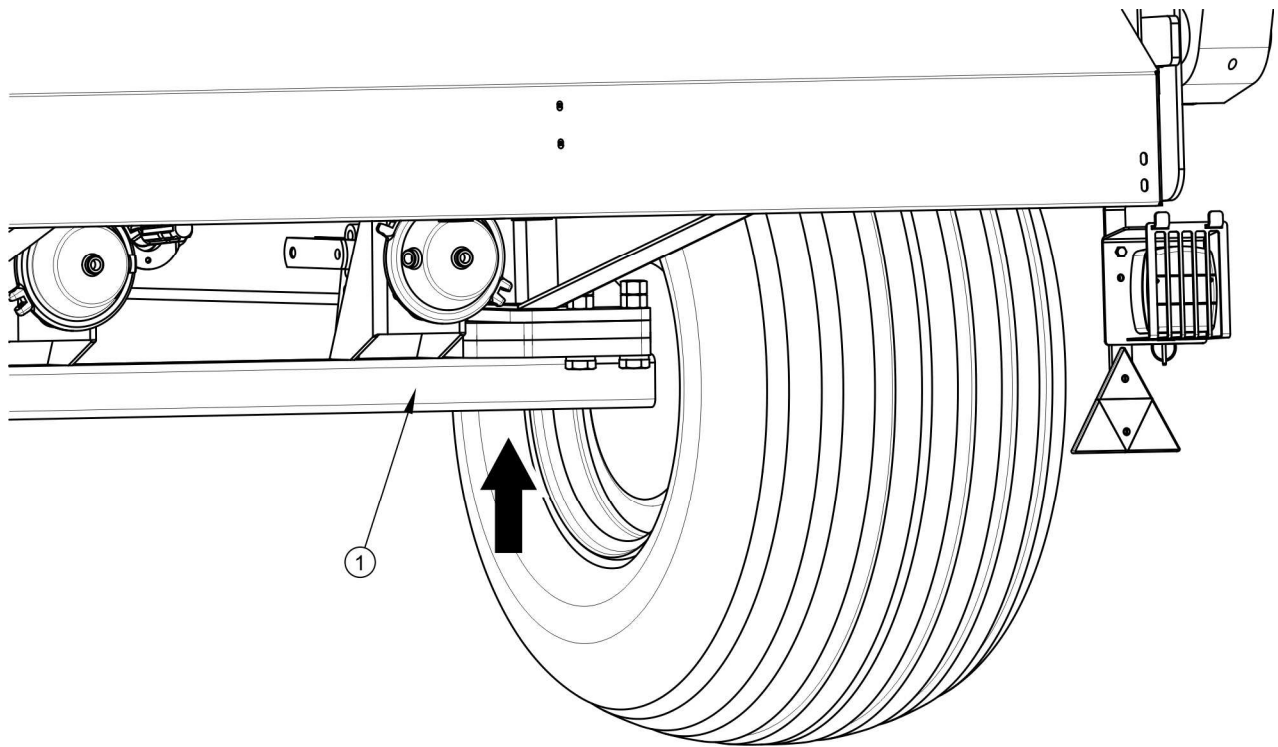


FIG. 5.2 Lifting jack support point

(1) wheel axle

Preparation procedures

- ➔ Hitch manure spreader to tractor, immobilise tractor with parking brake.
- ➔ Park tractor and manure spreader on hard level ground.
 - ⇒ Tractor must be placed to drive forward.
- ➔ Place the wheel chocks under the manure spreader's wheel opposite to the lifted wheel. Ensure that manure spreader shall not move during inspection.
- ➔ Raise wheel (opposite to the side where chocks are placed).
 - ⇒ Lifting jack should be placed as close as possible to the place where wheel axle (1) is attached to the manure spreader frame – figure (5.2). Recommended fulcrum is marked with an arrow. Lifting jack must be suited to weight of manure spreader.

Check wheel axle bearings looseness

- ➔ Turning the wheel slowly in both directions check that movement is smooth and that the wheel rotates without excessive resistance.
- ➔ Turn the wheel so that it rotates very quickly, check that the bearing does not make any unusual sounds.
- ➔ Turning the wheel try to detect looseness.
 - ⇒ You may use a lever placed under the wheel supporting the other end on the floor.
- ➔ Repeat procedure to each wheel individually, remembering that the jack must be on the side opposite to the chocks.

**Check wheel axle bearings for looseness:**

- after passing the first 1,000 km,
- before intensive use of manure spreader,
- every six months use or every 25 000 km.

If slack is felt, adjust bearing. Unusual sounds coming from bearing may be symptoms of excess wear, dirt or damage. In such an event the bearing, together with sealing ring, should be replaced with new parts, or cleaned and greased again. During inspection of bearings ensure that possibly detected looseness comes from the bearing and not from the suspension system.

**TIP**

Damaged hub cover or lack of hub cover causes penetration of contamination and dampness to hub, which causes significantly faster wear of bearing and hub seals.

Bearing life is dependent on working conditions of manure spreader, loading, speed of travel and lubrication conditions.

Check condition of hub cover, if necessary replace with new cover. Inspection of bearing looseness may only be conducted, when the manure spreader is hitched to a tractor, and the load box is empty.

DANGER

Before commencing work the user must read the instructions for lifting and adhere to the manufacturer's instructions.

The lifting jack must be stably supported by the ground and so must the axle.

Ensure that manure spreader shall not move during inspection of bearing looseness of axles.

5.2.5 ADJUSTMENT OF WHEEL AXLE BEARINGS LOOSENESS**Preparation procedures**

- ➔ Prepare tractor and manure spreader for adjustment procedures according with description provided in section 5.2.4.

adjustment of road wheel axle bearings

- ➔ Take off hub cover (1) - figure (5.3).
- ➔ Take out split cotter pin (3) securing castellated nut (2).
- ➔ Tighten castellated nut in order to eliminate looseness.
 - ⇒ Wheel should rotate with insignificant resistance.
- ➔ Unscrew nut (not less than 1/3 rotation) to cover the nearest thread groove with alignment to opening in wheel stub axle. Wheel should rotate with insignificant resistance.
 - ⇒ Nut may not be excessively tightened. Do not apply excessive pressure with regard for deterioration of bearing working conditions.
- ➔ Secure castellated nut with cotter pin and mount hub cap.
- ➔ Delicately tap hub cap with rubber or wooden hammer.

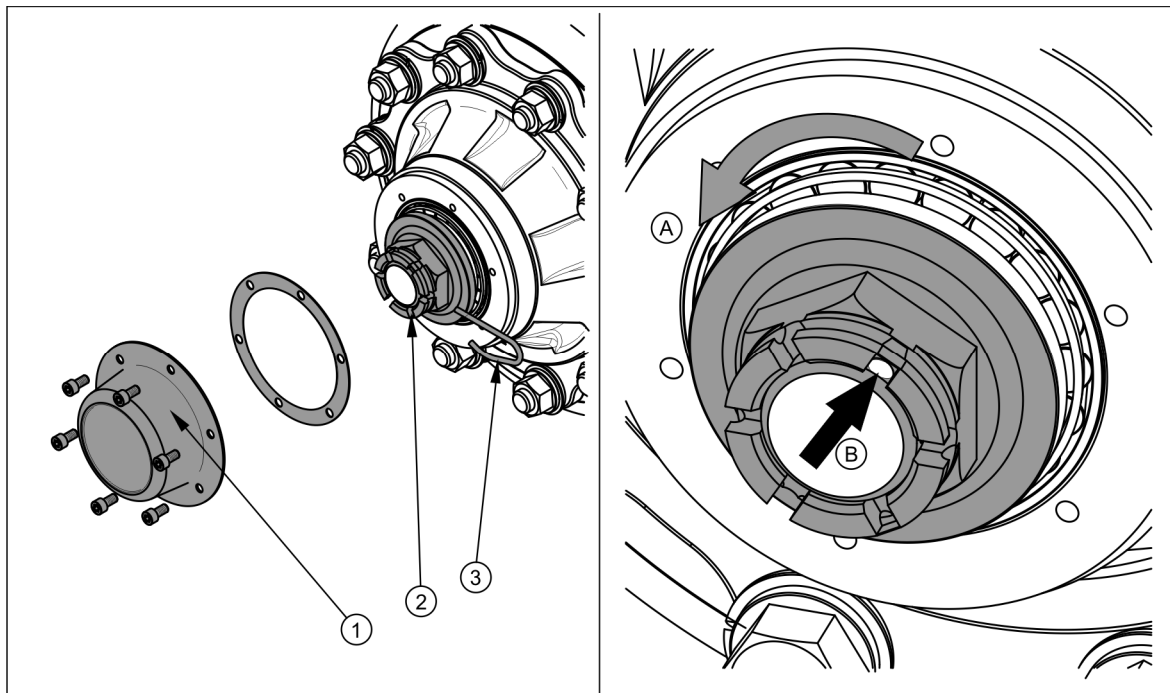


FIG. 5.3 Adjustment of road wheel axle bearings

(1) hub cover, (2) castellated nut, (3) securing split cotter pin

The wheel should turn smoothly without stiffness or detectable resistance not originating from abrasion of brake shoes in brake drum. Adjustment of bearing looseness may only be conducted, when the manure spreader is hitched to a tractor, and the load box is empty.



TIP

If the wheel is dismantled, bearing looseness is easy to check and adjust.

5.2.6 MOUNTING AND DISMOUNTING WHEEL, INSPECTION OF WHEEL NUT TIGHTENING.

Dismounting wheel

- Immobilise the manure spreader with parking brake.
- Place the wheel chocks under the wheel opposite to the dismantled wheel.
- Ensure that the manure spreader is properly secured and shall not move during wheel dismantling.

- ➔ Loosen wheel nuts according to sequence given in figure (5.4).
- ➔ Place a lift and raise the manure spreader to a sufficient height so that the wheel to be replaced does not touch the ground.
- ➔ Dismount wheel.

Mount wheel

- ➔ Clean axle pins and nuts of dirt contamination.
 - ⇒ Do not grease thread of nuts and pins.
- ➔ Check condition of pins and nuts, if necessary replace.
- ➔ Place wheel on hub, tighten nuts so that wheel rim adjoins hub exactly.
- ➔ Lower the manure spreader, tighten nuts according to recommended torque and given sequence.



TIP

Wheel nuts should be tightened using a torque of 270 Nm - nuts M18x1.5.

Tightening nuts

Nuts should be tightened gradually diagonally, (in several stages, until obtaining the required tightening torque) using a torque spanner. If a torque spanner is not available, one may use an ordinary spanner. The arm of the spanner (L) figure (5.4) should be selected according to the weight of the person (F) tightening the nut. Remember that this method of tightening is not as accurate as the use of a torque spanner.

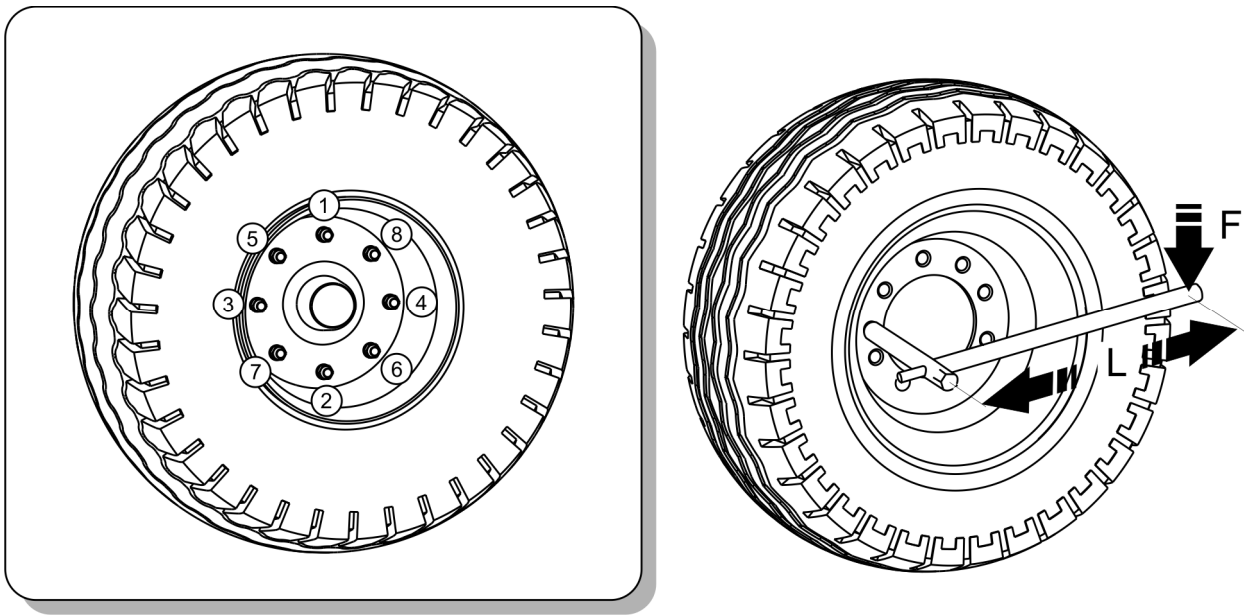


FIG. 5.4 Sequence of tightening nuts, axles with 8 M18x1.5 pins

(1) - (8) sequence of nut tightening, (L) spanner length, (F) user weight

IMPORTANT!



Axle nuts may not be tightened with impact wrench, because of danger of exceeding permissible tightening torque, the consequence of which may be breaking the thread connection or breaking off the hub pins.

The greatest precision is achieved by use of a torque spanner. Before commencing work, ensure that correct tightening torque value is set.

TAB. 5.1 Spanner arm

WHEEL TIGHTENING TORQUE	BODY WEIGHT (F)	ARM LENGTH (L)
[NM]	[KG]	[M]
270	90	0.30
	77	0.35
	67	0.40
	60	0.45

Checking wheel axle tightening:

- after first use of manure spreader,
- after first travel with load,
- after passing the first 1,000 km,
- 25,000 km.

In the event of intensive use of the manure spreader check the nut tightening at least every 100 km. The above actions should be repeated individually if a wheel has been removed from the wheel axle.

5.2.7 CHECK AIR PRESSURE, EVALUATE TECHNICAL CONDITION OF WHEELS AND TYRES,

Tyre pressure should be checked each time after changing spare wheel and not less than every month. In the event of intensive use it is recommended to check air pressure more frequently. The manure spreader must be unloaded during checking. Checking should be done before travelling when tyres are not heated, or after an extended period of parking.

**TIP**

Tyre pressure values are specified in information decal, placed on wheel or on upper frame above manure spreader wheel.

While checking pressure pay attention to technical condition of wheels and tyres. Look carefully at tyre sides and check the condition of tread.

In case of mechanical damage consult the nearest tyre service and check whether the tyre defect requires tyre replacement.

**DANGER**

Damaged tyres or wheels may be the cause of a serious accident.

Wheels should be inspected with regard to distortion, breaking of material, breaking of welds, corrosion, especially in the area of welds and contact with tyre.

Proper technical condition and appropriate maintenance of wheels significantly extends the life of these components and ensures appropriate level of safety to manure spreader users.

**Checking tyre pressure and steel rims:**

- every 1 month of use,
- if needed.

5.2.8 ADJUSTMENT OF MECHANICAL BRAKES

During use of manure spreader abrasive friction covering of brake drums is subject to wear. Piston stroke extends, and exceeding braking force limiting value declines.

Adjustment must be made when:

- piston stroke amounts to 2/3 of maximum stroke,
- expansion levers are not set in parallel to each other during braking,
- repairs are made to braking system.

Manure spreader wheels must brake simultaneously. Brakes adjustment involves changing the position of the expander arm (1) – Figure (5.5), in relation to expander shaft (2).

Required service actions

- ➔ Dismount cylinder fork mounted on expander arm (1).
- ➔ Dismantle expansion ring (3).
- ➔ Mark position of expander arm (1) with regard to the shaft (2).
- ➔ Dismantle arm and set it in the appropriate position:
 - ⇒ forward, if braking is too early,
 - ⇒ backward, if braking is too late.
- ➔ Fit the expansion ring. Check if elements are correctly positioned.

Adjustment should be conducted separately for each wheel. Expander arm (1) should be moved by one notch in chosen direction. If the extent of cylinder action is still incorrect, move the expander arm again. After proper brake adjustment, at full braking the axle shaft expander should create an angle of 90° with the cylinder piston, and the stroke should

amount to approximately half the length of the total stroke of the piston. After the brake is released, expander arms may not be supported on any structural elements, because insufficient withdrawal of a piston ram may cause abrasion of brake shoes in drum and result in overheating manure spreader brakes. Expander arms, placed on one axle, must be positioned in parallel with regard to each other at full braking. If this is not so, adjust the position of the expander, which has the longer stroke.



The main brake system should be inspected annually and in case of need should be adjusted.

During dismantling of cylinder fork remember or mark the original setting of the cylinder fork pin. The mounting position is selected by the Manufacturer and may not be changed.

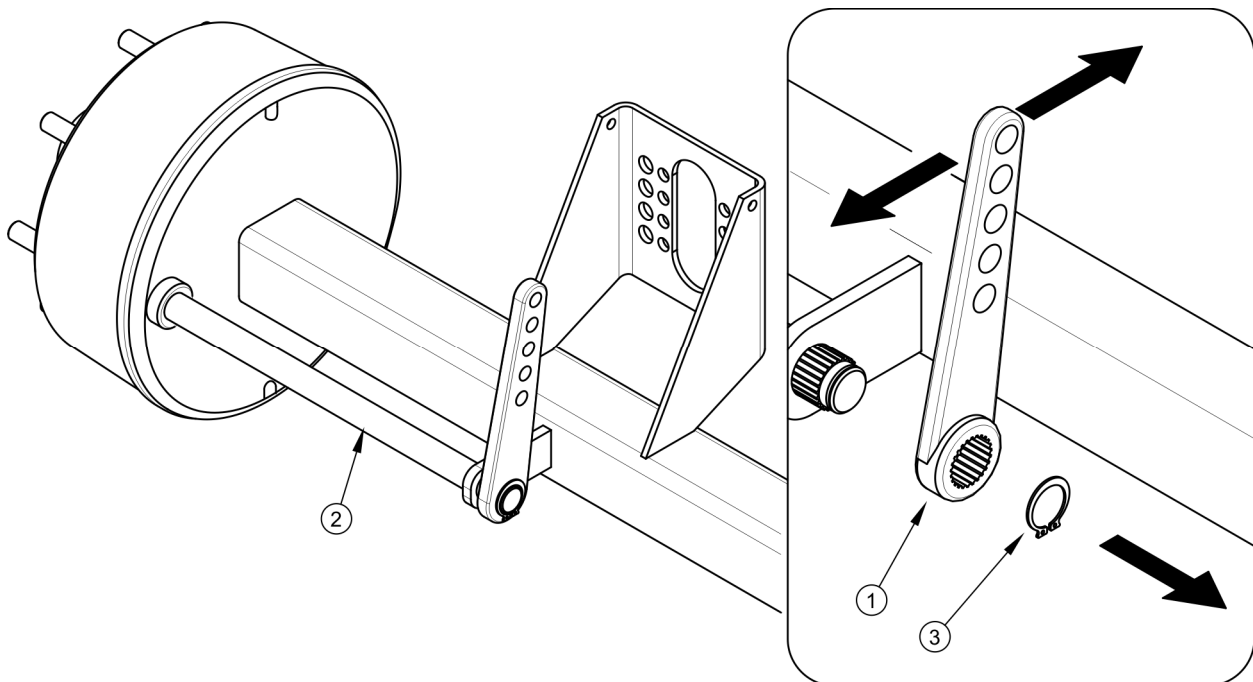


FIG. 5.5 Adjustment of axle mechanical brakes

(1) expander arm, (2) expander shaft, (3) expansion ring

If it is necessary to dismantle the cylinder fork, remember or mark its original position in the expander arm. The mounting position is selected by the Manufacturer and may not be changed.

TAB. 5.2 Position of fork pin in expander arm

TYPE OF BRAKE SYSTEM	PIN POSITION [mm]
Single conduit pneumatic system	175
Double conduit pneumatic system	175

5.2.9 CHANGE OF PARKING BRAKE CABLE AND ADJUSTMENT OF CABLE TENSION.

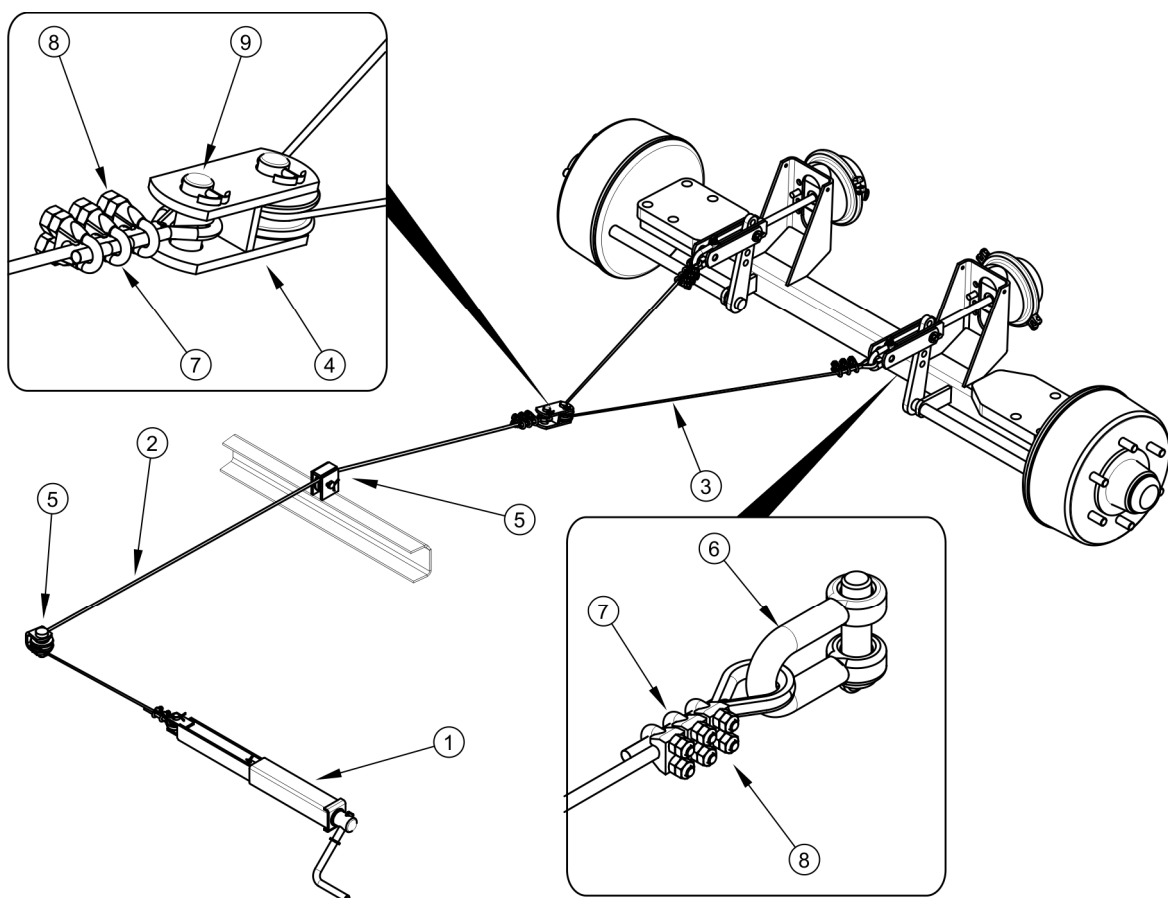


FIG. 5.6 Adjustment of parking brake cable tension

(1) brake crank mechanism, (2) steel cable L=2 100 mm, (4) steel cable L=2,550mm, (4) pulley block of parking brake, (5) cable roller, (6) shackle, (7) U-shaped clamp, (8) clamp nuts, (9) pin

Proper operation of the parking brake is dependent on the effectiveness of the axle brake and the correct brake cables tension.

Replacing the parking brake cable

- ➔ Connect the manure spreader to tractor. Park manure spreader and tractor on level surface.
- ➔ Place securing chocks under one manure spreader wheel.
- ➔ Fully unscrew the bolt of the brake crank mechanism (1).
- ➔ Dismantle shackles (6), remove bolt and guiding roller of pulley block (4).
- ➔ Remove pins (9) from pulley block (4) and brake crank mechanism (1).
- ➔ Loosen nuts (8) of U-shaped clamps (7) located at the ends of cables to be replaced.
- ➔ Dismantle cables.
- ➔ Clean parking brake components, lubricate crank mechanism and pins of cable guide rollers (5).
- ➔ Install new cables.

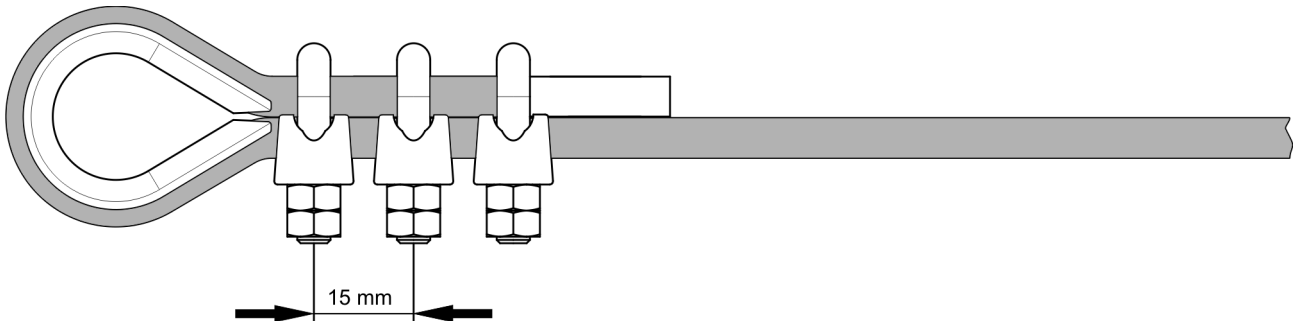


FIG. 5.7 Installation of steel cable clamps

- ⇒ Parking brake cable must be fitted carefully.
- ⇒ Thimbles and three clamps must be fitted at the ends of the cable.
- ⇒ Clamps must be tightened. The distances between the clamps may not be less than 15 mm.
- ⇒ Clamp jaws must be placed at the load bearing cable - see Figure (5.7).
- ⇒ The first clamp should be placed directly on the thimble.

- ➔ After the first load of cable, re-check the condition of cable end, correct if necessary.

Adjustment of parking brake cable tension

- ➔ Connect the manure spreader to tractor. Park manure spreader and tractor on level surface.
- ➔ Place securing chocks under one manure spreader wheel.
- ➔ Fully unscrew the bolt of the brake crank mechanism (1) – figure (5.6), (anticlockwise).
- ➔ Loosen nuts (8) of U-shaped clamps (7) of steel cable (2)
- ➔ Tighten cable and tighten clamps.
 - ⇒ Length of parking brake cable (2) should be so selected that at total release of working and parking brake the pulley block would be loose and hanging by 1 - 2 cm compared to fully tensioned cables.

Adjustment of parking brake cable tension should be conducted in the event of:

- stretching of cable,
- loosening of parking brake cable clamps
- after adjustment of axle brakes,
- after repairs to axle brake system,
- after repairs in parking brake system.

Before commencing adjustment make certain that the main break is correctly regulated and is functioning properly.



Checking and parking brake adjustment:

- every 12 months,
- if needed.

5.3 PNEUMATIC SYSTEM OPERATION

5.3.1 PRELIMINARY INFORMATION

Work connected with the repair, change or regeneration of system components (brake cylinders, conduits, control valve, braking force regulator etc.) should be entrusted to specialist establishments, having the appropriate technology and qualifications for this type of work.

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

- inspecting and checking air tightness of system.
- cleaning the air filter (filters),
- draining water from air tank,
- cleaning drain valve,
- cleaning and maintaining pneumatic conduit connections,
- replacement of the pneumatic conduit.



DANGER

Do NOT use the manure spreader when brake system is unreliable.

5.3.2 INSPECTING AND CHECKING AIR TIGHTNESS OF PNEUMATIC SYSTEM.

Checking hydraulic system tightness

- ➔ Connect the manure spreader to tractor.
- ➔ Immobilise tractor and manure spreader with parking brake, place the wheel chocks under the manure spreader wheels.
- ➔ Start tractor in order to supplement air in manure spreader brake system tank.
 - ⇒ In single conduit systems air pressure should amount to approx. 5.8 bar.

- ⇒ In double conduit systems air pressure should amount to approx. 8 bar.
- ➔ Turn off tractor ignition.
- ➔ Check system components by releasing brake pedal in tractor.
 - ⇒ Give particular attention to conduit connections and brake cylinders.
- ➔ Repeat system check with depressed tractor brake pedal.
 - ⇒ The help of a second person is required.

In the event of the appearance of leaks, compressed air will reach places of damage on the exterior, with a characteristic hiss. Lack of system tightness may be exposed by covering checked elements with washing fluid or other foaming preparations, which will not react aggressively with system components. Damaged components should be replaced or repaired. If leaks appear at connections then tighten the connections. If air continues to escape replace connection component or seal.



Checking tightness of pneumatic system:
 after passing the first 1,000 km,
 each time after making repairs or changing system components,
 annually.

Visual assessment of system

During tightness inspection attention should additionally be given to technical condition and degree of cleanness of the system components. Contact of pneumatic conduit seals etc. with oil, grease, petrol etc. may cause damage and accelerate the ageing process. Bent conduits, permanently deformed, cut or worn should be replaced.



Visual assessment of system

- Conduct inspection of system at the same time as when checking tightness.



IMPORTANT!

Repair, exchange or regeneration of pneumatic system components may only be performed in a specialised workshop.

5.3.3 CLEANING THE AIR FILTERS

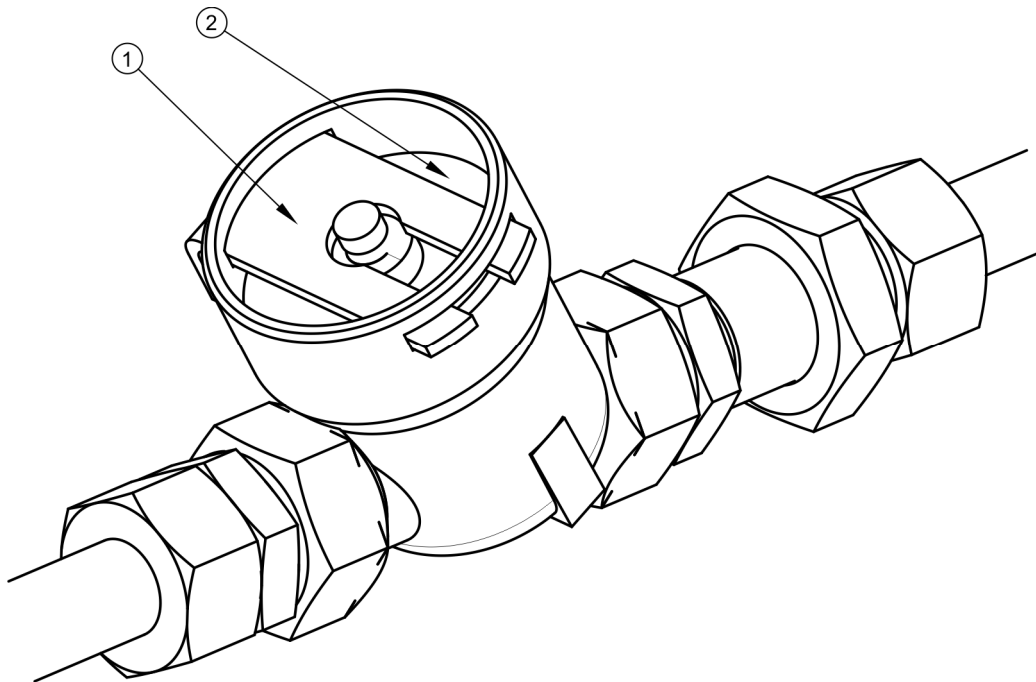


FIG. 5.8 Air filter

(1) securing slide lock, (2) air filter cover



DANGER

Before proceeding to dismantle filter, reduce pressure in supply conduit. While disengaging filter slide gate, hold cover with other hand. Stand away from filter cover vertical direction.

Depending on manure spreader working conditions, but not less than once in three months, take out and clean air filter inserts, which are located in pneumatic system connection conduits. Inserts are used many times and are not subject to changing unless they are mechanically damaged.

Required service actions

- ➔ Reduce pressure in supply conduit.
 - ⇒ Reduction of pressuring conduit may be achieved by pressing the head of the pneumatic connection to resistance point.
- ➔ Remove securing slide (1) – figure (5.8).

- ⇒ Hold the filter cover (2) with the other hand. After removing slide lock, the cover is pushed off by the spring, in the filter housing.
- ➔ The insert and the filter body should be carefully washed out and blown through with compressed air. Assembly should be done in reverse order.

**Cleaning the air filter (filters):**

- every 3 months of use,

5.3.4 DRAINING WATER FROM AIR TANK

Required service actions

- ➔ Open out drain valve (1) placed in lower part of tank (2).
 - ⇒ The compressed air in the tank causes the removal of water to the exterior.
- ➔ After release valve stem should automatically close and stop airflow from tank.

**Draining water from air tank:**

- after each week of use.

- ⇒ In the event, that the valve stem resists returning to its setting, then the whole drain valve must be unscrewed and cleaned, or replaced (if it is damaged) - see section 5.3.5.

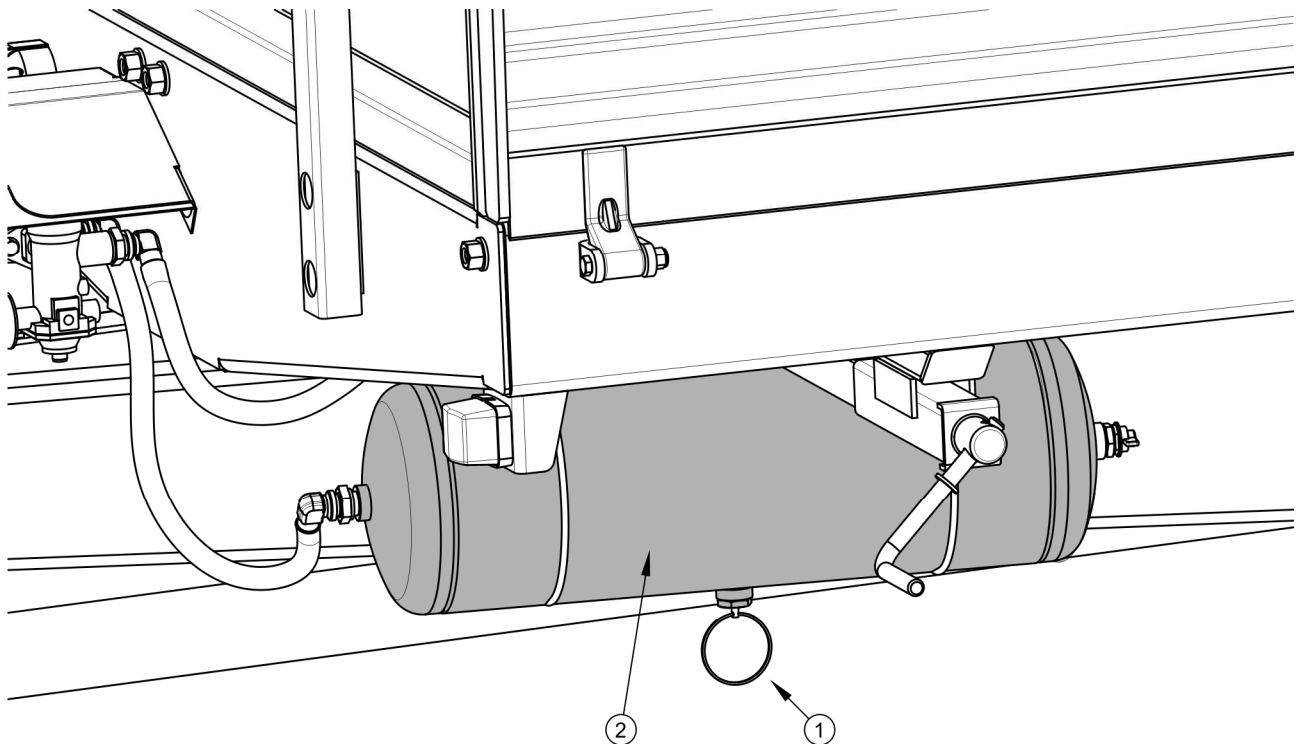


FIG. 5.9 Draining water from air tank

(1) drain valve, (2) air tank

5.3.5 CLEANING DRAIN VALVE



DANGER

Before dismantling drain valve release air from tank.

Required service actions

- ➔ Reduce pressure in air tank.
 - ⇒ Reduction of pressure in tank is achieved by tilting the drain valve mandrel.
- ➔ Unscrew valve.
- ➔ Clean valve, purge with compressed air.
- ➔ Change copper seal.
- ➔ Screw in valve, fill air tank, and check tank tightness.

**Cleaning valve:**

- every 12 months (before winter period).

5.3.6 CLEANING AND MAINTAINING PNEUMATIC CONDUIT CONNECTIONS AND PNEUMATIC SOCKETS

**DANGER**

Unreliable and dirty manure spreader connections may cause unreliability and faulty functioning of braking system.

In event of damage to cover or seal, change these elements for new reliable elements. Contact of pneumatic connector seals with oils, grease, petrol etc. may cause damage and accelerate ageing process.

If the manure spreader is unhitched from the tractor, contact should be protected by cover or placed in its designated socket. Before the winter period it is recommended to preserve the seal with special preparations (e.g. silicon grease for rubber elements).

Each time before connection of the machine inspect technical condition and cleanness of contacts and sockets in tractor. If necessary clean or repair tractor socket.

**Checking the manure spreader connections:**

- each time before hitching manure spreader to tractor.

5.3.7 REPLACEMENT OF THE PNEUMATIC CONDUIT

Pneumatic conduits should be replaced when permanently deformed, cut or frayed.

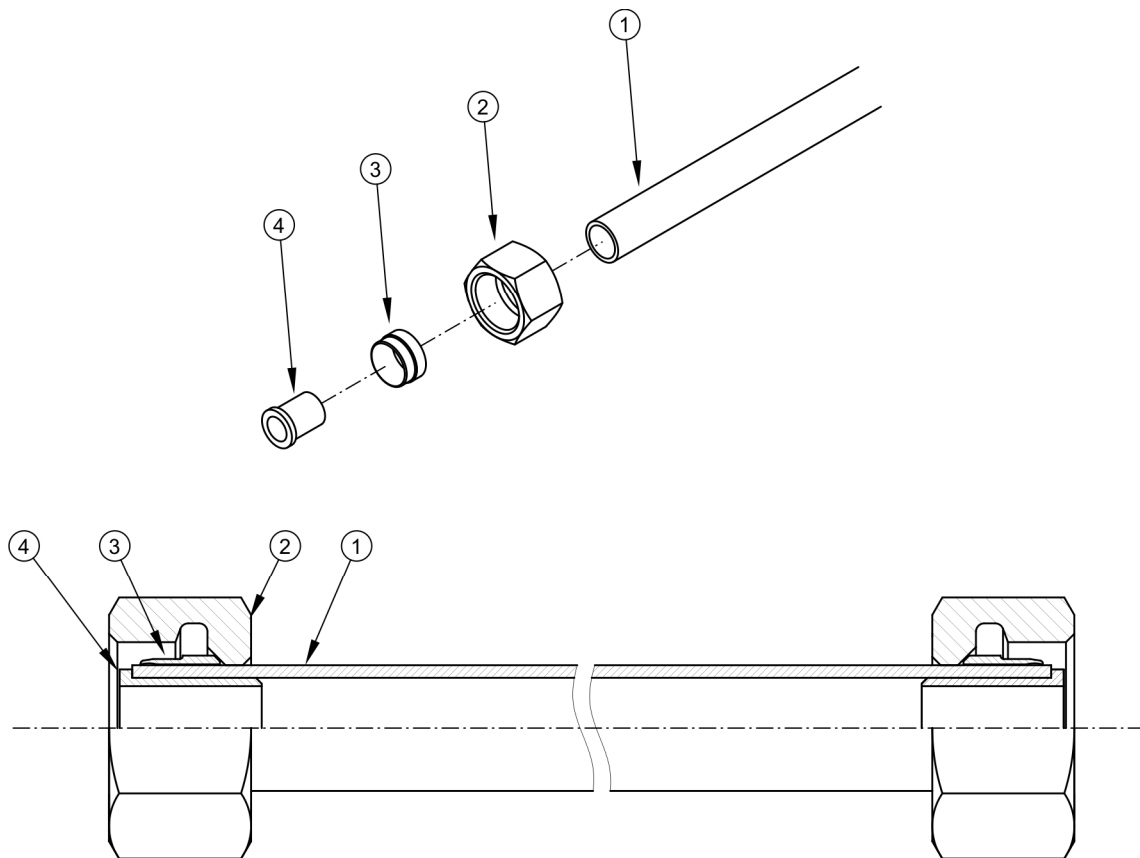


FIG. 5.10 Installation of the pneumatic conduit

(1) pneumatic conduit, (2) connecting nut (3) clamping ring, (4) reinforcing sleeve

Required service actions

- ➔ Release all pressure from the system.
 - ⇒ Reduction of pressure is achieved by tilting the drain valve mandrel.
- ➔ Remove the pneumatic conduit by loosening the nut (2).
- ➔ Fit the new conduit.
 - ⇒ The interior of the conduit should be clean.
 - ⇒ The ends of the pneumatic conduit (1) must be cut exactly at right angles.
 - ⇒ Clamping ring (3) should be fitted according to figure (5.10).
 - ⇒ Reinforcing sleeve (4) of the conduit must be thoroughly depressed.
- ➔ Check tightness of connections in accordance with Chapter (5.3.2).

5.4 HYDRAULIC SYSTEM OPERATION


Always adhere to the principle that the oil in the manure spreader 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 manure spreader, the hydraulic system is filled with L HL32 Lotos hydraulic oil.

The manure spreader's hydraulic system should be completely tight sealed. Checking tightness of the hydraulic system involves connecting the machine with the tractor and activating the floor conveyor several times. 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. If oil leak occurs beyond connection, the leaking conduit system should be changed. Change of sub assemblies is equally required in each instance of mechanical damage.

TAB. 5.3 L-HL32 Lotos 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

In the event of necessity of changing hydraulic oil for another oil, check the recommendations of the oil Manufacturer very carefully. If it is recommended to flush the system with the appropriate preparation, then comply with these recommendations. Attention should be given, so that chemical substances used for this purpose do not damage the materials of the hydraulic system.



Hydraulic conduits should be replaced after 4 years of manure spreader use.
Detailed tightness and technical condition inspection of hydraulic system should be made at least annually.

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

ATTENTION!



Manure spreader with a leaking hydraulic system must NOT be used.

The condition of hydraulic systems should be inspected regularly while using the manure spreader.

The hydraulic system is under high pressure when operating.

Regularly check the technical condition of the connections and the hydraulic conduits.

Use the hydraulic oil recommended by the Manufacturer. Never mix two types of oil.

5.5 REDUCTION GEAR MAINTENANCE

Two reduction gears are used in Pronar N161 manure spreader:

- intersecting axis gear of the spreading adapter drive,
- gear of the floor conveyer mechanism.

The gears are filled with SAE 90 EP (SAE EP 80W/90) transmission oil designed for high-load and extremely difficult conditions.

Reduction gear maintenance involves general checking and supplementing transmission oil deficiencies.

In the event of damage to the gear, contact authorised service point in order to perform repairs.

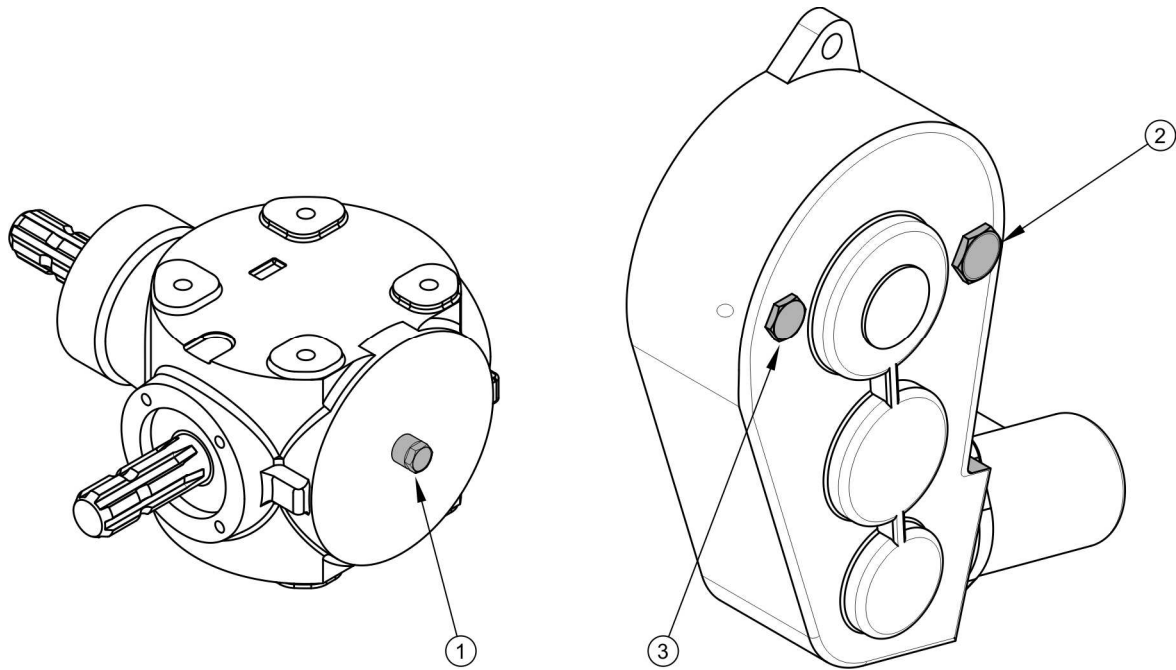



FIG. 5.11 Oil inspection and filling points on the reduction gears

(1) inspection bolt of the intersecting axis gear of the spreading adapter drive, (2) inspection plug of the floor conveyor drive gear, (3) inlet plug of the floor conveyor drive gear



Check oil level in the gears before each start of the machine.

TAB. 5.4 SAE 90 EP oil characteristics

QUALITY CATEGORY	KINEMATIC VISCOSITY AT 40°C, [MM2/S]	VISCOSITY CLASS
API: GL4/5	135 - 185	SAE: 90 EP

5.6 MANURE SPREADER LUBRICATION

Manure spreader lubrication must be carried out in places indicated in figures (5.12) & (5.13), and also detailed in table (5.6). The manure spreader is equipped with grease nipples facilitating maintenance and marked with yellow labels (pos.8 – table (2.1)).

TAB. 5.5 Recommended lubricants

LISTED ON TAB. (5.6)	DESCRIPTION
A	permanent machine general-purpose grease (lithium, alkaline)
B	permanent grease for heavily loaded elements with addition of MOS_2 or graphite
C	ordinary machine oil, silicon grease in aerosol
D	chain grease

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

TAB. 5.6 Lubrication schedule

ITEM	LUBRICATION POINT	NUMBER OF LUBRICATION POINTS	TYPE OF GREASE	FREQUENCY
1	Hub bearings	2	A	24M
2	Drawbar eye	1	B	14D
3	Axle expander shaft sleeves	2	A	3M
4	Parking brake mechanism	1	A	6M
5	Support mechanism with wheel	1	A	3M
6	Bearings of rear drive shaft	3	A	10H

ITEM	LUBRICATION POINT	NUMBER OF LUBRICATION POINTS	TYPE OF GREASE	FREQUENCY
7	Surface of multi-splined shaft	1	A	14D
8	Front tensioner wheel pin	4	A	10H
9	Bearing of the spreading adapter drive	1	A	6M
10	Bearings of the spreading adapter wormshafts	4	A	6M
11	Articulated joints of shafts	4	A	50H
12	Bearings of the wormshaft line connector	3	A	12M
13	Spreading adapter drive chain	2	D	10H
14	Conveyor chain	4	D	6M
15	Tensioning bolt	4	A	6M
16	Hinges of the spreading adapter side shield	2	C	3M
17	Wall pins and locks	2	A	1M
18	Parking brake guide roller pins	2	A	6M

lubrication periods – M month, D – days, H – working hour

Parts, which should be lubricated with machine oil, should be wiped with dry cleaning cloth and then a small quantity of oil should be applied do surfaces (with oil can or brush). Wipe off excess oil.

Change of grease in hub bearings should be entrusted to specialised service points, equipped with the appropriate tools. According to the recommendations of the axle Manufacturer, dismantle the entire hub, remove the bearing and individual sealing rings. After careful washing and inspection mount lubricated elements. If necessary, bearing and seals should be replaced with new parts. Lubrication of axle bearings shall be performed at least once in 2 years or every 50 000 km. In the event of intensive use, lubrication should be performed more frequently.

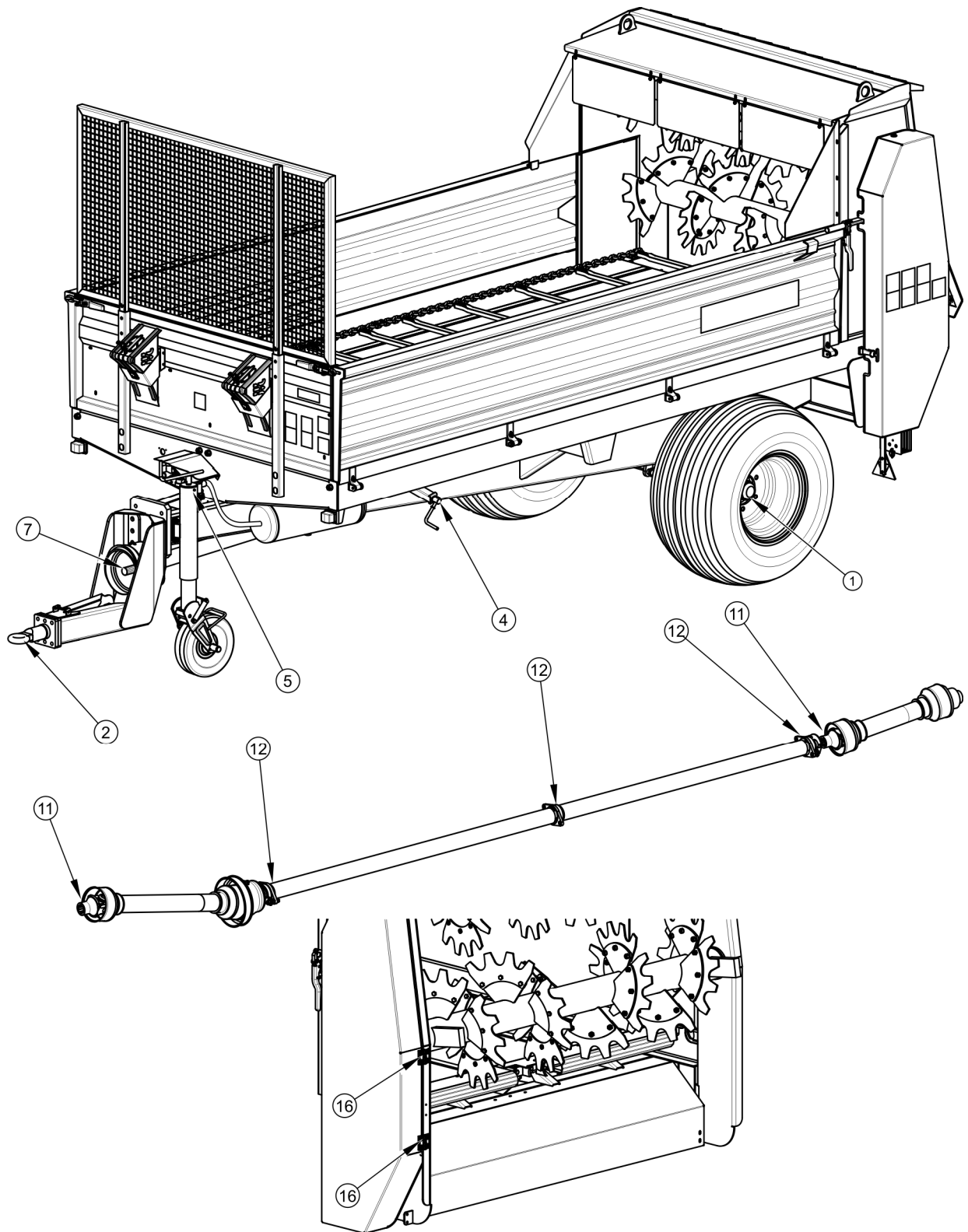


FIG. 5.12 Lubrication points on the manure spreader

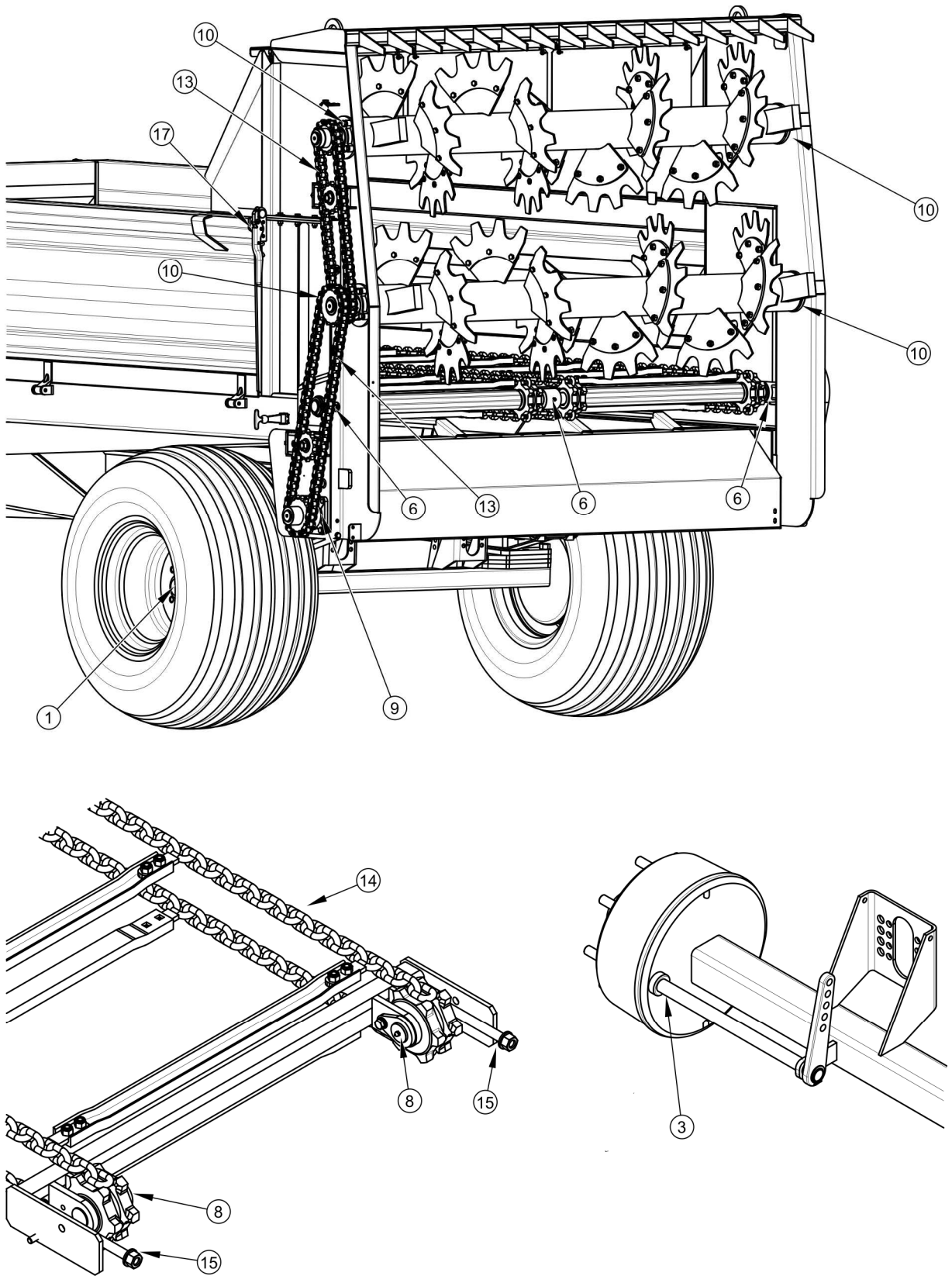


FIG. 5.13 **Lubrication points on the manure spreader**

Empty grease or oil containers should be disposed of according to the recommendations of the lubricant Manufacturer.



When using the D – days the user is obliged to observe lubrication instructions according to attached schedule. Excess oil or grease causes depositing additional contaminants in places requiring lubrication, therefore it is essential to keep individual machine elements clean.

5.7 CHECKING AND ADJUSTMENT OF TENSION OF FLOOR CONVEYOR CHAINS

Tension of floor conveyor chains must be checked daily, in particular, at the beginning of the conveyor's working period.

Looseness of chains, measured by lifting them perpendicularly to movement direction, halfway along the load box length, should be as small as possible. Tension of chains is adjusted with adjustment bolts located in the front section of the manure spreader.

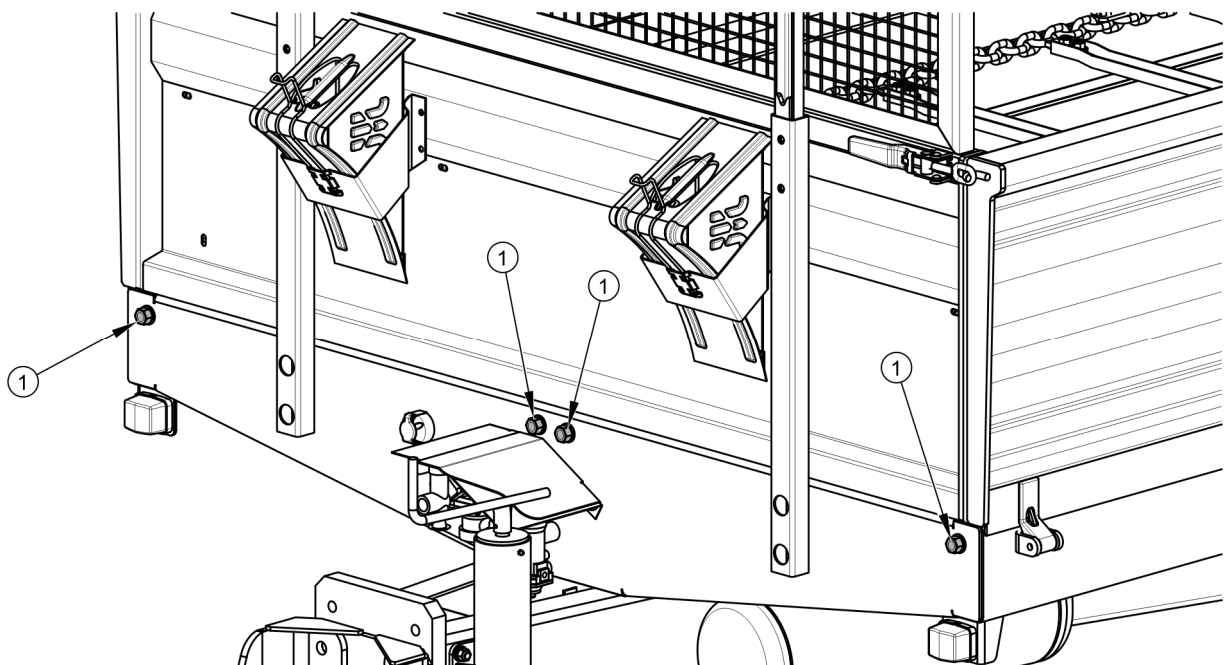



FIG. 5.14 Location of the conveyor tension adjustment bolts

(1) *adjustment bolt*

ATTENTION!



All conveyor chains must be equally tensioned.
Excessive looseness of conveyor chain may lead to serious damage to the manure spreader and pose a direct threat to the machine operators or other persons.

5.8 CHECKING AND ADJUSTMENT OF TENSION OF THE SPREADING ADAPTER DRIVE CHAINS

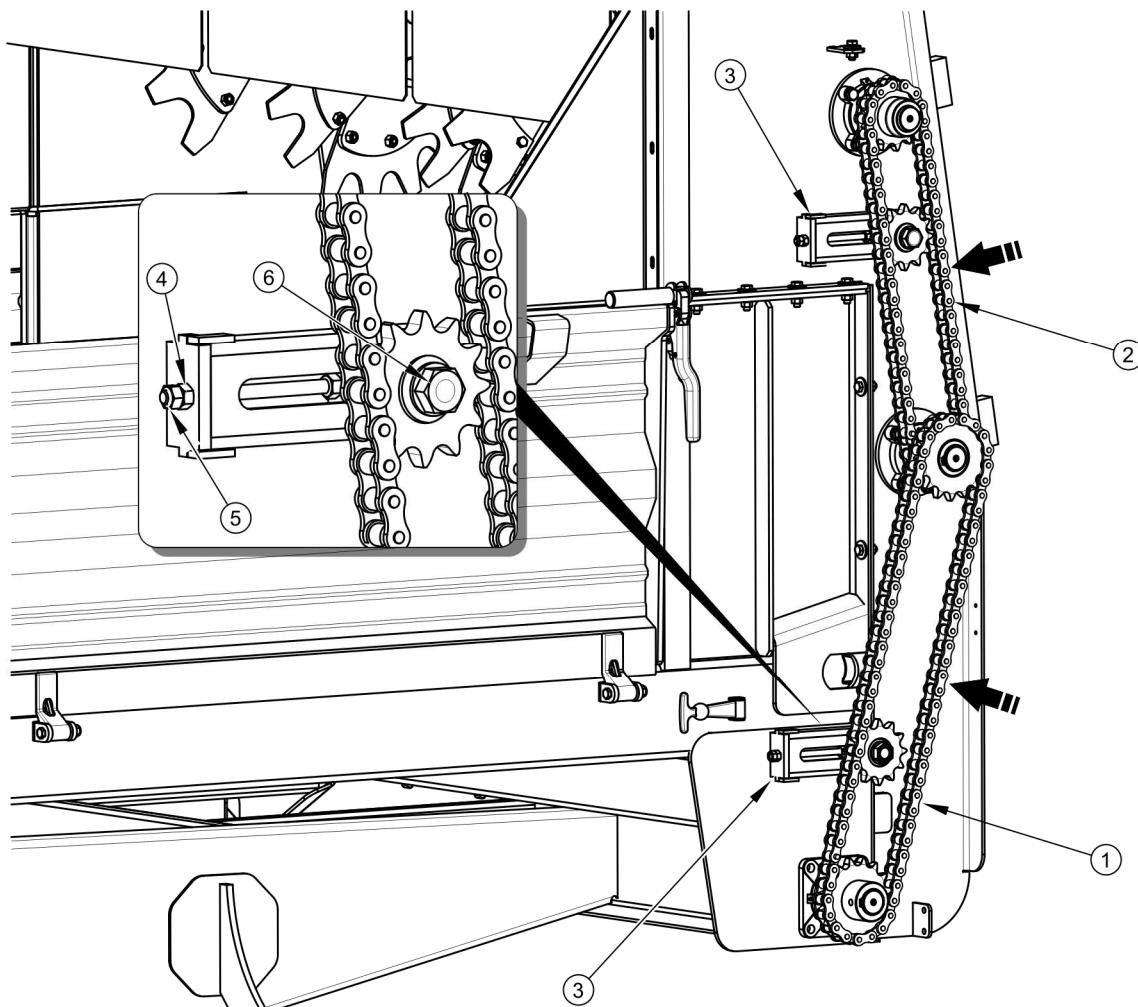


FIG. 5.15 Location of bolts

(1) 16B - 75 WZ roller chain, (2) 16B - 59 WZ roller chain, (3) chain tensioner, (4) nut, (5) counter nut, (6) tensioner bolt

If chain transmission of spreading adapter works too noisily, adjust tension of chains driving the spreading wormshafts. Noisy operation is a symptom of excessive looseness of chains, which increases during machine operation. Lengthening of chain, which causes noisy operation, is a normal symptom.

In order to check and adjust drive chain tension:

- ➔ Immobilise the manure spreader with parking brake and place two chocks under the wheel to prevent the machine from rolling.
- ➔ Open side shield of chain transmission.
- ➔ Check play of chains. Press with thumb in mid-length (place marked with arrow), chain play should amount to 10 – 15 mm.
- ➔ If there is an excessive chain play, first loosen bolt (6) and next, loosen counter nut (5). Tighten chain (1) and/or (2) while tightening nut (4). Toothed wheel connected with tensioner block will move towards the front of the manure spreader.
- ➔ After achieving required tightness, secure counter nut (5) and tighten tensioner bolt (6).

If it is impossible to adjust the chain tension (tensioner setting range is insufficient), replace the chain with a new one or shorten it by removing one chain link. After removing a chain link, connect the chain with a link delivered together with the machine.



Checking chain tightness of rear chain transmission:

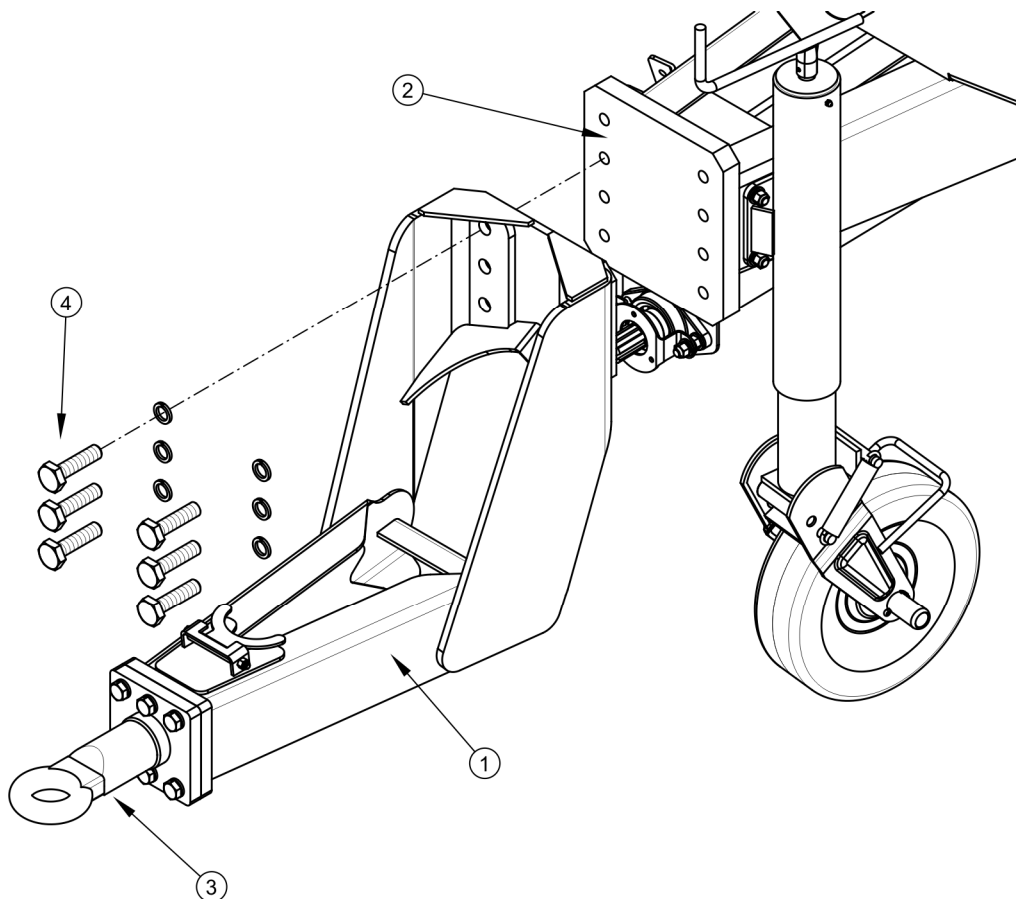
- every 10 hours of work - before lubrication chain.

5.9 ADJUSTMENT OF DRAWBAR POSITION

Adjust drawbar eye (1) by changing the position of the eye in relation to the drawbar faceplate (2).

Extent of activity

- Immobilise the manure spreader with parking brake. Place securing chocks under wheel.
- Unscrew drawbar eye (1) and remove from faceplate (2).
- Set the drawbar eye in its new position and tighten with bolts (3) using appropriate torque.
 - ⇒ The front plate design (2) allows two possible drawbar positions, figure (5.16).
- Check degree of drawbar tightening after first travel under load.

**FIG. 5.16 Adjustment of drawbar position**

(1) lower drawbar , (2) front plate, (3) rotating drawbar eye, (4) bolt connection

5.10 MANURE SPREADER CLEANING

Carefully remove the remains of manure from the manure spreader daily after finished work. Before using pressure washer the user is obliged to acquaint himself with the operating principles and recommendations concerning safe use of this equipment.

Manure spreader cleaning guidelines

- ➔ Immobilise manure spreader and tractor with parking brake, place chocks under manure spreader wheel.
- ➔ Switch off tractor engine and remove key from ignition.
- ➔ Secure tractor against access of unauthorised persons.
- ➔ Clean the manure spreader with strong water jet and leave to dry.
 - ⇒ Using pressure washer increases washing effectiveness, but particular care must be taken during work. During washing washer nozzle may not be closer than 50 cm from the surface being cleaned.
 - ⇒ Water temperature shall not exceed 55°C.
 - ⇒ Using excessive pressure for cleaning may damage lacquer coating.
 - ⇒ Do not direct water stream directly at system and equipment elements of the manure spreader i.e. control valve, brake cylinders, pneumatic, electric and hydraulic plugs, lights, electrical connections, information and warning decals, identification plates, conduit connections and lubrication points etc. Great 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.

- ➔ Surfaces smeared with oil or grease should be cleaned by application of benzene or other degreasing agents and then washed with clean water with added detergent. Comply with recommendations of the Manufacturer.
- ➔ Washing detergent should be kept in original containers, optionally in replacement containers, but very clearly marked. Preparations may not be stored in food and drink containers.

DANGER

Carefully read the instructions for application of washing detergents and maintenance preparations.

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



Switch tractor engine off and disengage PTO shaft before cleaning the machine and standing on the chain conveyor strips.

Before climbing on to the load box, make sure unauthorised persons do not have access to the tractor, disconnect PTO shaft and disconnect hydraulic system conduits from the tractor.

Exercise caution when climbing on top of the load box.

While climbing on to the manure spreader's load box, the manure spreader must be absolutely motionless.

- ➔ Care for the cleanness of elastic conduits and seals. The plastic from which these elements are made may be susceptible to organic substances and some detergents. As a result of long-term reaction of some substances, the ageing process may be accelerated and risk of damage increased. Rubber elements should be maintained with the aid of special preparations after previous thorough washing.
- ➔ Observe environmental protection principles and wash manure spreader in a place designated for such purpose.
- ➔ Washing and drying of the manure spreader must take place at temperatures above 0°C.
 - ⇒ In winter, freezing water may cause damage to paint coating or machine elements.

5.11 PREPARATION FOR END OF SEASON

After finishing fieldwork the manure spreader must be properly prepared for winter storage. In order to do this:

- ➔ carefully remove the remains of manure and wash the manure spreader,
- ➔ check technical condition of: bearings, shields, chains, electrical system, pneumatic system and indicators,
- ➔ grease all inspection points of the manure spreader,
 - ⇒ Conveyor chains and spreading wormshaft drive chains should be washed with petroleum and oiled after drying,
- ➔ check air pressure in tyres,
- ➔ corroded or damaged surface should be cleaned and properly protected with a thin layer of grease, anticorrosion preparation or priming paint,
- ➔ secure PTO shaft, check condition of its shields, grease moving elements of PTO shaft,
- ➔ check visually the components which wear most frequently and replace them if necessary,
- ➔ tyres should be preserved at least once a year using generally available substances for this purpose.

5.12 PREPARATION FOR THE BEGINNING OF A NEW FIELDWORK SEASON

- ➔ Check technical condition of: bearings, shields, chains.
- ➔ Check spreading adapter knives and replace them if necessary.
- ➔ Check technical condition of the electrical system; Check whether lights work correctly.
- ➔ Check leaktightness of pneumatic system and hydraulic system.

- ➔ Check state of wear of hydraulic hoses. Immediately replace worn or damaged hydraulic hoses.
- ➔ Check technical condition of PTO shaft, its shields and securing chains.
- ➔ Check oil level in the spreading adapter drive gear and the floor conveyor drive gear.
- ➔ Grease all inspection points of the manure spreader,
- ➔ Check air pressure in tyres,
- ➔ Check tension of the floor conveyor chain, adjust if necessary.
- ➔ Check setting of brake lever, adjust if necessary.
- ➔ Check condition of bolt connections, tighten if necessary.
- ➔ Check degree of drawbar wear.
- ➔ Check drawbar and frame for scratches and fractures.
- ➔ Check state of wear of the floor conveyor mechanism's strips, if necessary replace them with new ones.

5.13 STORAGE

- ➔ After finishing work, the manure spreader should be thoroughly cleaned and washed.
- ➔ In the event of damage to the lacquer coating clean those places from rust and dirt, degrease and then paint with paint maintaining uniform colour and even thickness of protective coating. Until the time of touch-up painting, the damaged place should be covered with a thin layer of grease, anticorrosion preparation or priming paint.
- ➔ It is recommended to keep the manure spreader in a closed or roofed building.
- ➔ Before longer outdoor storage, it is essential to protect the machine against adverse weather conditions, especially those causing corrosion and accelerated ageing of tyres.
- ➔ In the event of prolonged work stoppage, it is essential to lubricate all elements regardless of the period of the last lubrication process.

- ➔ Chains of the spreading adapter drive should be taken off, carefully washed and, if suitable for further use, reinstalled and smeared generously with grease.
- ➔ Wheel rims and tyres should be carefully washed and dried. During longer storage it is recommended that every 2 to 3 weeks the machine may be moved a bit so that the place of contact of tyres with ground is changed. The tyres will not be deformed and maintain proper geometry. Also tyre pressure should be inspected from time to time, and if necessary pressure should be increased to appropriate value.
- ➔ PTO shaft for connection with tractor should be stored in the horizontal position.

5.14 OPERATION OF ELECTRICAL SYSTEM AND WARNING ELEMENTS

5.14.1 PRELIMINARY INFORMATION

Work connected with the repair, change or regeneration of electrical system components should be entrusted to specialist establishments, having the appropriate technology and qualifications for this type of work.

The responsibilities of the user are limited to:

- ➔ technical inspection of electrical system and reflectors,
- ➔ Changing bulbs




IMPORTANT!

Do NOT travel with unreliable lighting system. Damaged lamp lenses, and burned-out bulbs must be replaced immediately before travelling. Lost or damaged reflective lights must be replaced.

Required service actions


- ➔ Hitch manure spreader to tractor with appropriate connection lead.
 - ⇒ Check if the connection lead is reliable. Check connection sockets in tractor and manure spreader.

- ➔ Check completeness and technical condition of machine lights.
- ➔ Check completeness of all reflectors.
- ➔ Check correct mounting of triangular slow-moving vehicle sign.
- ➔ Before driving on to public road check that the tractor is equipped with warning reflective triangle.



Checking technical condition of electrical system:

- each time while connecting the manure spreader.



TIP


Before driving away make certain that all lamps and reflective lights are clean.

5.14.2 CHANGE BULBS

Bulb set is presented in table (5.7). All light lenses are secured by screws and it is not necessary to dismantle whole lamp or manure spreader subassemblies.

TAB. 5.7 List of bulbs

LAMP	LAMP TYPE	BULB / QUANTITY IN 1 LAMP	NUMBER OF LAMPS
Rear left lamp assembly	W18U	R10W / 1 unit P21W / 2 units	2
Front parking light	LO-110PP	C5W / 1 unit	2



ATTENTION!

The manure spreader's electrical system is supplied with 12V.

5.15 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 tightening torque of most frequently applied nut and bolt connections are given in table (5.8). Given values apply to non-lubricated steel bolts.

TAB. 5.8 Tightening torque for nut and bolt connections

THREAD METRIC	5.8 ⁽¹⁾	8.8 ⁽¹⁾	10.9 ⁽¹⁾
	MD [Nm]		
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
M30	1,050	1,450	2,100

⁽¹⁾ – resistance class according to DIN ISO 898 standard, (M_D) – tightening torque, (d) thread diameter

Hydraulic conduits should be tightened with torque of 50 – 70 Nm.

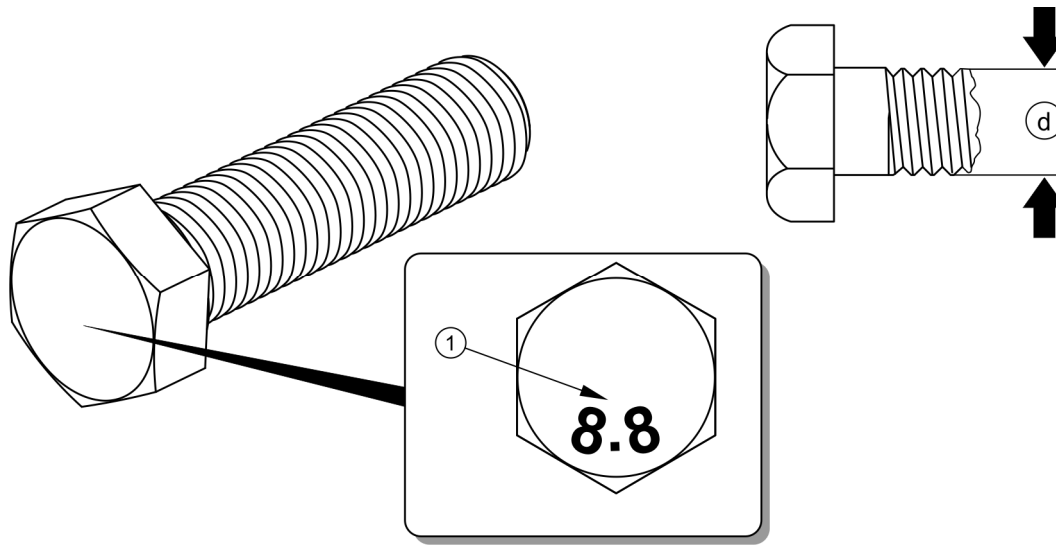


FIG. 5.17 Bolt with metric thread

(1) bolt strength class, (d) thread diameter

5.16 TROUBLESHOOTING

TAB. 5.9 Faults and means of remedying them

FAULT	CAUSE	REMEDY
Conveyor knocking	Excessive lengthening of conveyor chains. Improperly adjusted tension of conveyor chains.	Check tension of chains and adjust according to section 5.7.
Spreading adapter is blocked	Excessive floor conveyor speed.	Reduce floor conveyor speed and momentarily change conveyor movement direction.
Problem with moving off	Brake system conduits/conduit not connected.	Connect brake conduit.
	Damaged brake system connection conduits.	Replace conduits with new ones.
	Leaking connections.	Tighten, replace washers or seal set.
	Parking brake is applied.	Release parking brake.

FAULT	CAUSE	REMEDY
Poor reliability of braking system	Insufficient pressure in the system.	Check pressure on tractor pressure gauge, wait till compressor fills tank to required pressure.
	Damaged air compressor in tractor	Repair or replace.
	Damaged brake valve in tractor.	Repair or replace.
	Leaking system conduits or connections.	Check system for tightness.
Noise in axle hubs	Excessive slack in bearings.	Check slack and regulate if needed.
	Damaged bearing.	Change bearing together with sealing ring.
Excessive heating of axle hubs	Incorrectly adjusted main brake.	Regulate setting of expander arms.
	Incorrectly adjusted parking brake.	Adjust tension of parking brake cables.
	Worn brake linings.	Change brake shoes.
Control system of the chain conveyor does not work	Interrupted oil flow.	Check degree of wear of connector plug. Set the tractor's control valve for pressure.
	Exchanged supply conduits	Exchange the connectors.
Halves of PTO shaft loosen with regard to each other during operation	PTO shaft is too short.	Replace PTO shaft with a longer one.

NOTES

A series of horizontal dotted lines for writing notes.



ANNEX A

Tyre dimensions

MANURE SPREADER VERSION	TYRE DIMENSIONS
N161	Wheel 500/50-17 14PR TL AW
	Wheel 500/50-17 14PR 149A8 IM-07 TL
	Wheel 500/50-17 14PR Flotation+ TL
	Wheel 500/50-17 14PR 152A8 AW-708 TL

Wheel disc 16.00x17"; ET=-30

