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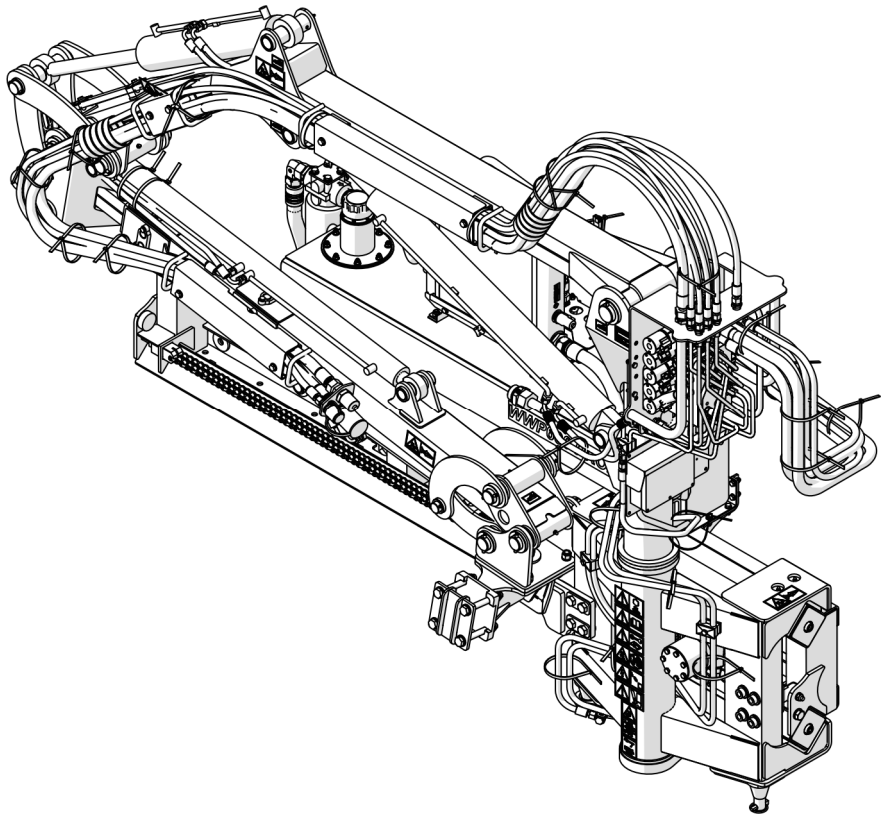
OPERATOR MANUAL

MULTI-FUNCTION ARM

PRONAR WWP600 / PRONAR WWP500

TRANSLATION OF THE ORIGINAL COPY OF THE MANUAL



EDITION 2B-06-2018, PUBLICATION NO 320N-00000000-UM

EN

MULTI-FUNCTION ARM

PRONAR WWP600 / PRONAR WWP500

MACHINE IDENTIFICATION

SYMBOL /TYPE:

SERIAL NUMBER:

INTRODUCTION

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

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

The manual describes the basic principles of safe use and operation of multifunction arm PRONAR WWP600 / WWP500. If the information in this Operator Manual needs clarification, refer for assistance to the sale point where the machine was purchased or to the Manufacturer.

MANUFACTURER'S ADDRESS:

PRONAR Sp. z o.o.
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SYMBOLS APPEARING IN THIS OPERATOR MANUAL

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

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

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

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

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

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

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

DIRECTIONS USED IN THIS OPERATOR MANUAL

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

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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:	**Multifunction arm**	
Type:	**WWP600**	**WWP500**
Model:	–	–
Serial number:		
Commercial name:	**Multifunction arm PRONAR WWP600** **Multifunction arm PRONAR WWP500**	

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

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

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

Narew, the 22 MAR. 2013

Place and date

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

Full name of the empowered person position, signature

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SECTION

1

BASIC INFORMATION

1.1 IDENTIFICATION

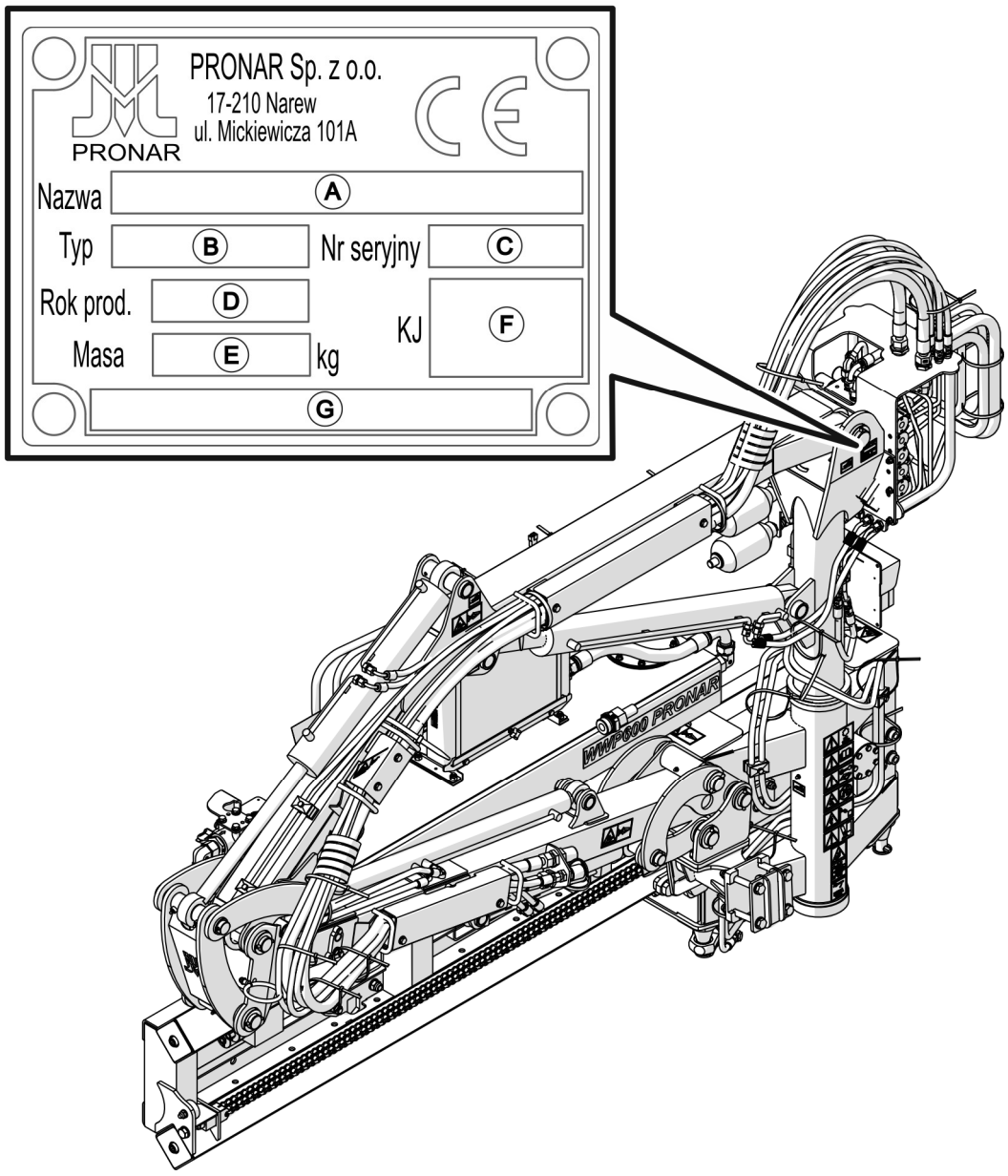


FIGURE 1.1 Location of the nameplate.

PRONAR PRONAR WWP600 / WWP500 multifunction arm is marked with the nameplate located on the multifunction arm mast. When purchasing the machine, make sure that the serial numbers on the machine are the same as entered in the *WARRANTY BOOK*, in sales documents and in the *OPERATOR MANUAL*.

The meaning of individual items of the nameplate – figure (FIGURE 1.1) are presented in the table below:

A – machine name, B – machine type/symbol

C – serial number, D – year of manufacture,

E – gross weight [kg], F – Quality control stamp,

G – machine name, name extension

1.2 INTENDED USE

The PRONAR WWP600 / WWP500 multifunction arms are designed and constructed according to current safety and engineering standards.

The PRONAR WWP600 / WWP500 multifunction arm is designed for installing on the tractors that meet the requirements set out in TABLE 1.1.

The multifunction arm cooperates with various types of compatible working heads designed for this type of multifunction arms.

The multifunction arm with a working head is designed for the maintenance of municipal infrastructure, urban greenery, orchards and wooded areas and for agricultural works. Exact intended purpose of the multifunction arm-working head set is described in the Operator Manual of a given working head. The articulated structure of the multifunction arm and its far reach enable the operator to carry out works in hard-to-access places such as roadside ditches behind safety barriers, slopes and field drains.

Transporting people, animals or other materials is prohibited and regarded as contrary to the intended purpose. During the use of the machine comply with all road traffic regulations and transport regulations in force in the given country, and any breach of these regulations is regarded by the Manufacturer as use contrary to the intended use of the machine.

ATTENTION

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

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

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

- carefully read the *OPERATOR MANUAL* and comply with its recommendations,
- understand the machine's operating principle and how to operate it safely and correctly,
- 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 the given country, in which the machine is used,
- carefully read the Operator Manual and comply with its recommendations,

The multifunction arm may only be used by persons, who:

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

TABLE 1.1 Tractor requirements

CONTENTS	UNIT	REQUIREMENTS
Linkage		Front three-point linkage category II according to ISO 730 or Mounting plate DIN 76060 type A or Mounting plate DIN 76 060 type B
Front power take-off shaft (PTO)		
Rotation speed	rpm	1000
Shaft type	-	TYPE 1 (1 3/8”, 6 splines)
Rotation direction (looking at the face of the PTO shaft):		
- type WWP600 / WWP500	-	right
- type WWP600L / WWP500L	-	left
Other requirements		
Min. tractor power	kW/KM	55/75
Minimum tractor weight		
- WWP500	kg	4000
- WWP600	kg	4500
Front axle lock	-	necessary equipment
Counterweight	-	if necessary

1.3 EQUIPMENT

TABLE 1.2 Equipment of multifunction arm PRONAR WWP600 / WWP500

EQUIPMENT	STANDARD	OPTION
Operator Manual	•	
“Warranty Book”	•	
Adapter plate		•
Mounting plate DIN A		•
Mounting plate DIN B		•
Working head connection TYPE 80P	•	
Working head connection TYPE 60P		•
Adapter P0G01		•
Connection lead	•	
Power supply wiring harness	•	
Stand	•	
Tractor axle lock		•

1.4 TERMS & CONDITIONS OF WARRANTY

PRONAR Sp. z o.o. Narew guarantees the reliable operation of the machine when it is used according to its intended purpose as described in the *OPERATOR MANUAL*. Defects discovered during the warranty period will be removed by the Warranty Service. The repair period is specified in the WARRANTY BOOK.

The warranty does not cover those parts and sub-assemblies of the machine which are subject to wear in normal usage conditions, regardless of the warranty period.

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, damage caused by road accidents,

- incorrect use, adjustment or maintenance, use of the machine for purposes other than those for which it is intended,
- use of damaged machine,
- repairs carried out by unauthorised persons, repairs carried out improperly,
- making unauthorised alterations to machine design,

the user will lose the right to warranty service.

TIP

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

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

Modification of the multifunction arm without the written consent of the Manufacturer is prohibited. 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 multifunction arm is ready for sale completely assembled and does not require packing. Packing is only required for the machine's technical documentation and any extra accessories.

ATTENTION

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

Delivery is either by transport on a vehicle or independently. Transport of the multifunction arm is permissible connected to a tractor provided the tractor's driver familiarises himself with the machine's Operator Manual and particularly with information concerning safety and

principles of connection and transport of multifunction arm on public roads. Do NOT drive the tractor with the multifunction arm hitched when visibility is limited.

When loading and unloading the multifunction arm, follow the general health and safety regulations for reloading work. Persons operating reloading equipment must have the qualifications required to operate these machines.

ATTENTION

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

TIP

During loading, the multifunction arm should be placed on the stand in transport position, without the working head. (FIGURE 1.2).

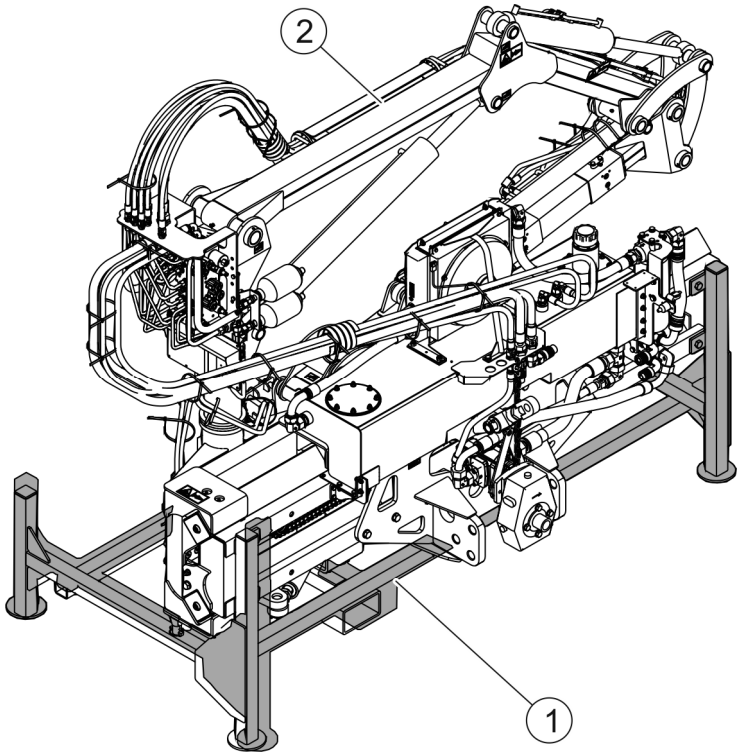


FIGURE 1.2 Multifunction arm stand.

(1)- stand; (2)- multifunction arm.

During transport and storage, the multifunction arm should be mounted on special stand (FIGURE 1.2). The stand is used for loading the multifunction arm with the aid of a forklift truck to the platform of the transport vehicle.

The multifunction arm should be firmly secured on the transport vehicle platform with belts or chains equipped with a tensioning mechanism. The fastening equipment used must have a valid safety certificate. Exercise particular caution when lifting the stand with the machine. During reloading work, special care should be taken not to damage the paint coating.

ATTENTION

Nobody may be in the manoeuvring zone when transferring the machine to another means of transport.

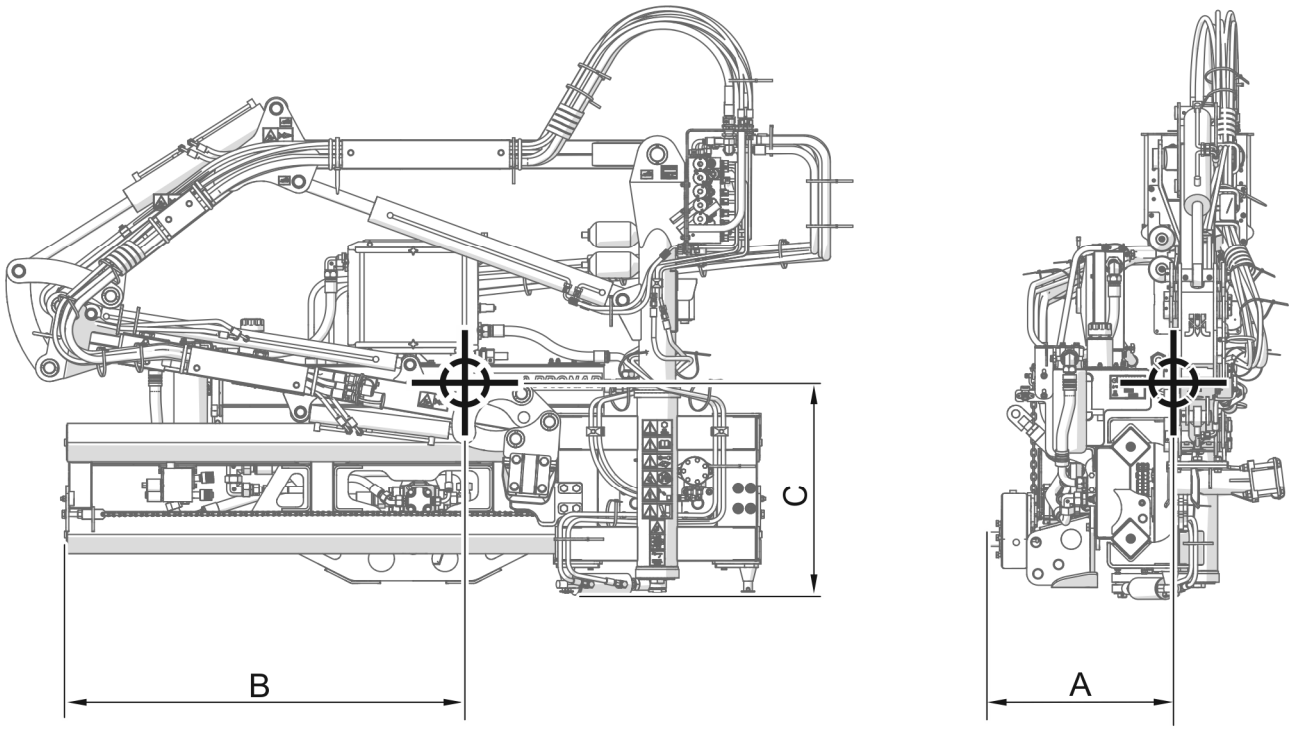


FIGURE 1.3 Location of centre of gravity of the multifunction arm in transport position (without hydraulic oil in the tank).

TABLE 1.3 Centre of gravity.

		Multifunction arm model	
Dimension (FIGURE 1.3)	Unit	**WWP600**	**WWP500**
A	mm	600	590
B	mm	1340	1370
C	mm	820	750

1.6 ENVIRONMENTAL RISK

A hydraulic oil leak constitutes a direct threat to the natural environment owing to its limited biodegradability. While carrying out maintenance and repair work which involves the risk of an oil leak, this work should take place on an oil resistant floor or surface. In the event of oil leaking into the environment, first of all contain the source of the leak, and then collect the leaked oil using available means. Remaining oil should be collected using sorbents, or by mixing the oil with sand, sawdust or other absorbent materials. The oil contaminations, once gathered up, should be kept in a sealed, marked, hydrocarbon resistant container, and then passed on to the appropriate oil waste recycling centre. The container should be kept away from heat sources, flammable materials and food.

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

1.7 WITHDRAWAL FROM USE

Should you decide to withdraw the machine from use, comply with the regulations in force in the given country regarding withdrawal from use and recycling of machines withdrawn from use.

Before proceeding to dismantle equipment, oil shall be completely removed from hydraulic system and transmission. Locations of drain plugs and method for draining oil are described in Section 5.

When spare parts are changed, worn out or damaged parts should be taken to a collection point for recyclable raw materials. Used oil and also rubber and plastic elements should be taken to the appropriate facilities dealing with the recycling of this type of waste.

ATTENTION

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

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

SECTION

2

SAFETY ADVICE

2.1 BASIC SAFETY RULES

2.1.1 MACHINE USE

- Before use, the user must carefully read this Operator Manual and the *WARRANTY BOOK*. When operating the machine, follow all instructions in these documents.
- The multifunction arm may only be used and operated by persons qualified to drive tractors and trained in operation of the machine. The multifunction arm can be operated by a single person only.
- If the information in this Operator Manual is difficult to understand, contact the seller who runs the authorised technical service on behalf of the Manufacturer, or contact the Manufacturer directly.
- Careless and improper use and operation of the machine, and failure to comply with the instructions of this operator manual is dangerous to your health.
- Be aware of the residual risk. Use caution when operating this multifunction arm and apply all relevant safety principles.
- The machine must never be used by persons who are not authorised to drive tractors, including children, and people under the influence of alcohol, drugs or other abusive substances.
- Non-compliance with the safety rules of this Operator's Manual can be dangerous to the health and life of the operator and others.
- The machine must not be used for purposes other than those for which it is intended. Anyone who uses the multifunction arm other than the way intended takes full responsibility for himself for any consequences of this use. Use of the machine for purposes other than those for which it is intended by the Manufacturer may invalidate the guarantee.
- The multifunction arm may only be used when all the safety guards and other protective elements are technically sound and correctly positioned. In the event of loss or damage to the protective guards , they must be replaced with new ones.
- Do NOT operate the multifunction arm with the tractor without the driver's cab. The tractor should be equipped with the cab protecting the operator against possible

hazards. The operator should also use personal protective equipment such as protective clothing, safety goggles, safety helmet to reduce the risk of injuries.

- In order to limit occupational risks associated with exposure to noise during multifunction arm operation use individual protection (hearing protectors). In order to reduce the level of noise during work, the operator cab windows and door should be closed.

2.1.2 HITCHING AND UNHITCHING THE MACHINE

- To attach the machine to the tractor only the front linkage system may be used. After mounting the machine, check the linkage safeguards. Carefully read the tractor Operator Manual.
- To hitch the machine to tractor use only genuine pins and safeguards.
- The tractor to which the multifunction arm will be hitched must be technically reliable and must fulfil the requirements of multifunction arm Manufacturer.
- Be especially careful when hitching the machine to the tractor.
- When hitching, there must be nobody between the multifunction arm and the tractor.
- Unhitching the multifunction arm from the tractor is forbidden when the working head is connected with the multifunction arm. Exercise caution when unhitching the machine.
- Hitching and unhitching may only take place when the machine and the tractor are switched off.
- Multifunction arm unhitched from the tractor must be mounted on the stand and supported on a stable and level surface.

2.1.3 HYDRAULIC SYSTEM

- The hydraulic system is under high pressure when operating.
- Regularly check the technical condition of the hydraulic lines and connections. There must be no oil leaks.
- In the event of the hydraulic system malfunction, discontinue using the machine until the malfunction is corrected.

- When connecting the hydraulic lines to the working head, make sure that the hydraulic system of the multifunction arm is not under pressure. If necessary, reduce residual pressure in the system.
- In the event of injuries being caused by pressurised hydraulic oil, contact a doctor immediately. Hydraulic oil may penetrate the skin and cause infections. In the event of contact of oil with eye, rinse with large quantity of water and in the event of the occurrence of irritation consult a doctor. In the event of contact of oil with skin wash the area of contact with water and soap. Do NOT apply organic solvents (petrol, kerosene).
- Use the hydraulic oil recommended by the Manufacturer. Never mix two types of oil.
- After changing the hydraulic oil, the used oil should be properly disposed of. Used oil or deteriorated oil should be stored in original containers or replacement containers resistant to hydrocarbons. Replacement containers must be clearly marked and appropriately stored.
- Do not store hydraulic oil in packaging designed for storing food or foodstuffs.
- Rubber hydraulic lines must be replaced every 4 years regardless of their technical condition.
- Repair and replacement of hydraulic system elements should be entrusted to the appropriately qualified persons.

2.1.4 TRANSPORTING THE MACHINE

- When driving on public roads, observe all road traffic regulations in force in the country, in which the machine is used.
- Do not exceed the maximum speed resulting from road conditions and design restrictions. Adjust speed to the prevailing road conditions and other limitations arising from road traffic regulations.
- Before beginning travel, the multifunction arm must be folded to transport position.
- Do NOT leave working head raised and unsecured while the tractor is parked. When parked, the working head should be lowered to the ground or mounted on the working head hitch.

- Do not transport the multifunction arm set in the working position.
- The multifunction arm may not be used or transported in conditions of limited visibility.
- Do NOT ride on the machine or transport any materials on it.
- Before using the machine always check its technical condition, especially in terms of safety. In particular, check the technical condition of the linkage and the hydraulic system connections.
- Reckless driving and excessive speed may cause accidents.

2.1.5 MAINTENANCE

- During the warranty period, any repairs may only be carried out by warranty service authorised by the Manufacturer. It is recommended that necessary repairs to machine should be undertaken by specialised workshops.
- In the event of any fault or damage, do not use the multifunction arm until the fault has been corrected.
- During work, use appropriate, close-fitting protective clothing, gloves and appropriate tools. When working on hydraulic system it is recommended to use oil resistant gloves and protective goggles.
- Any modification to the multifunction arm frees PRONAR Narew from any responsibility for damage or detriment to health, which may arise as a result.
- Before commencing any work on the multifunction arm, turn off the tractor engine and wait until all rotating parts have come to a stop.
- Regularly check the technical condition of the safety devices and correct tightening of bolt connections.
- Regularly perform service inspections of machine as recommended by the Manufacturer.
- Do NOT perform maintenance or repair work under raised and unsupported machine.
- Before beginning repairs on hydraulic systems, reduce oil pressure.
- Servicing and repair work should be carried out in line with the general principles of workplace health and safety. In the event of injury, the wound must be immediately

cleaned and disinfected. In the event of more serious injuries, seek a doctor's advice.

- Repair, maintenance and cleaning work should be carried out with the tractor engine turned off and the ignition key removed. Immobilise tractor with parking brake. Ensure that unauthorised persons do not have access to the tractor cab.
- Should it be necessary to change individual parts, use only original parts. Non-adherence to these requirements may put the user and other people's health and life at risk, and also damage the machine and invalidate the warranty.
- Regularly check technical condition and mounting of all guards and protective elements.
- In the event of work requiring the multifunction arm to be raised, use properly certified hydraulic or mechanical lift jacks for this purpose. After lifting the machine, stable and durable supports must also be used. Do NOT carry out work under a machine, which has been raised only with the three point linkage.
- The machine must not be supported using fragile elements (bricks or concrete blocks).
- After completing work associated with lubrication, remove excess oil or grease.
- In order to reduce the danger of fire the machine must be kept in a clean condition.

2.1.6 OPERATING THE MULTIFUNCTION ARM

- Before starting the multifunction arm, make sure that there are no bystanders (especially children) or animals in the danger zone. The machine operator is obliged to ensure proper visibility of the machine and the working area.
- Before starting the working head drive, lower the working head to working position.
- Multifunction arm operation should begin after reaching nominal PTO speed of 1000 rpm. Do NOT overload the multifunction arm's hydraulic system and also do NOT engage the PTO suddenly.
- Do NOT leave the tractor cab, when the machine drive is engaged.
- Do NOT stand within the multifunction arm's working zone.
- Do NOT operate the working head while reversing. Raise the machine while reversing.

- Keep a safe distance from electric power lines during travel with raised multifunction arm.
- All the control panel operations should be performed only from the operator's seat in the carrier vehicle's cab. Operating the control panel outside the operator's cab is forbidden.
- The multifunction arm MUST NOT be used without the tractor axle lock and counterweight on the tractor (if it is required for maintaining the stability of the tractor and the multifunction arm).
- Operation and transport of the multifunction arm is allowed only on slopes with the maximum inclination of 7°. However, due to changing location of centre of gravity depending on type of working head, type of tractor and length of telescopic multifunction arm, the allowable slope inclination angle may be smaller. That is why the user must exercise particular caution and determine by himself the maximum slope inclination angle for operating the multifunction arm.
- If the full reach of the multifunction arm is to be used, make sure that stability of the tractor will be maintained.
- While working on slopes, do not raise the working head more than 0,5 m above the ground.
- In the event of a tilt of the tractor with the multifunction arm, immediately lower the working head to the ground and stop the tractor.

2.1.7 MAINTENANCE OF PTO DRIVE

- While reversing and during turns, the PTO drive must be disengaged.
- The machine may only be connected to the tractor PTO by multiplier gear box recommended by the Manufacturer.
- Before starting the machine make sure that there are no bystanders (especially children) in the danger zone. The machine operator is obliged to ensure proper visibility of the machine and the working area.
- Before starting PTO, make certain that the PTO rotation direction is correct.
- Before disconnecting the multiplier gear box connection, turn off the tractor engine and remove the key from the ignition.

- Do NOT wear loose clothing, straps or whatever that may become wrapped round the rotating multiplier gear box connection. Contact with the rotating multiplier gear box connection may cause severe injuries.
- Do NOT go over and under the multiplier gear box connection or stand on it equally during work as also when the machine is parked.

2.2 RESIDUAL RISK

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

- using the machine for purposes other than those for which it is intended,
- being between the tractor and the machine while the engine is running and when the machine is being hitched,
- being on the machine while the engine is running,
- operating the multifunction arm with removed or faulty safety guards,
- failure to maintain a safe distance from the danger zone or being within the zones while the machine is operating,
- machine operation by unauthorized persons or persons under the influence of alcohol
- cleaning, maintenance and technical checks when tractor is connected and engine is running.

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

- operate the machine in prudent and unhurried manner,
- sensibly apply the remarks and recommendations contained in the Operator Manual,
- carry out repairs and maintenance work in line with operating safety rules,
- repair and maintenance work should be carried out by persons trained to do so,
- use close fitting protective clothing,
- ensure unauthorised persons have no access to the machine, especially children.
- maintain a safe distance from forbidden or dangerous places
- do not climb on the machine when it is operating

2.3 INFORMATION AND WARNING DECALS

The multifunction arm is marked with the information and warning decals specified in TABLE 2.1. The arrangement of symbols is shown in FIGURE 2.1. Throughout the machine use, you must ensure that any warning messages and information decals located on the machine are clear and legible. If any are destroyed or damaged, they must be replaced with new. Safety decals are available from your PRONAR dealer or directly from PRONAR customer service. New assemblies, changed during repair, must be labelled once again with the appropriate safety signs. When cleaning the multifunction arm, do not use solvents that may damage the coating of information decals and do not subject them to action of strong water jets.

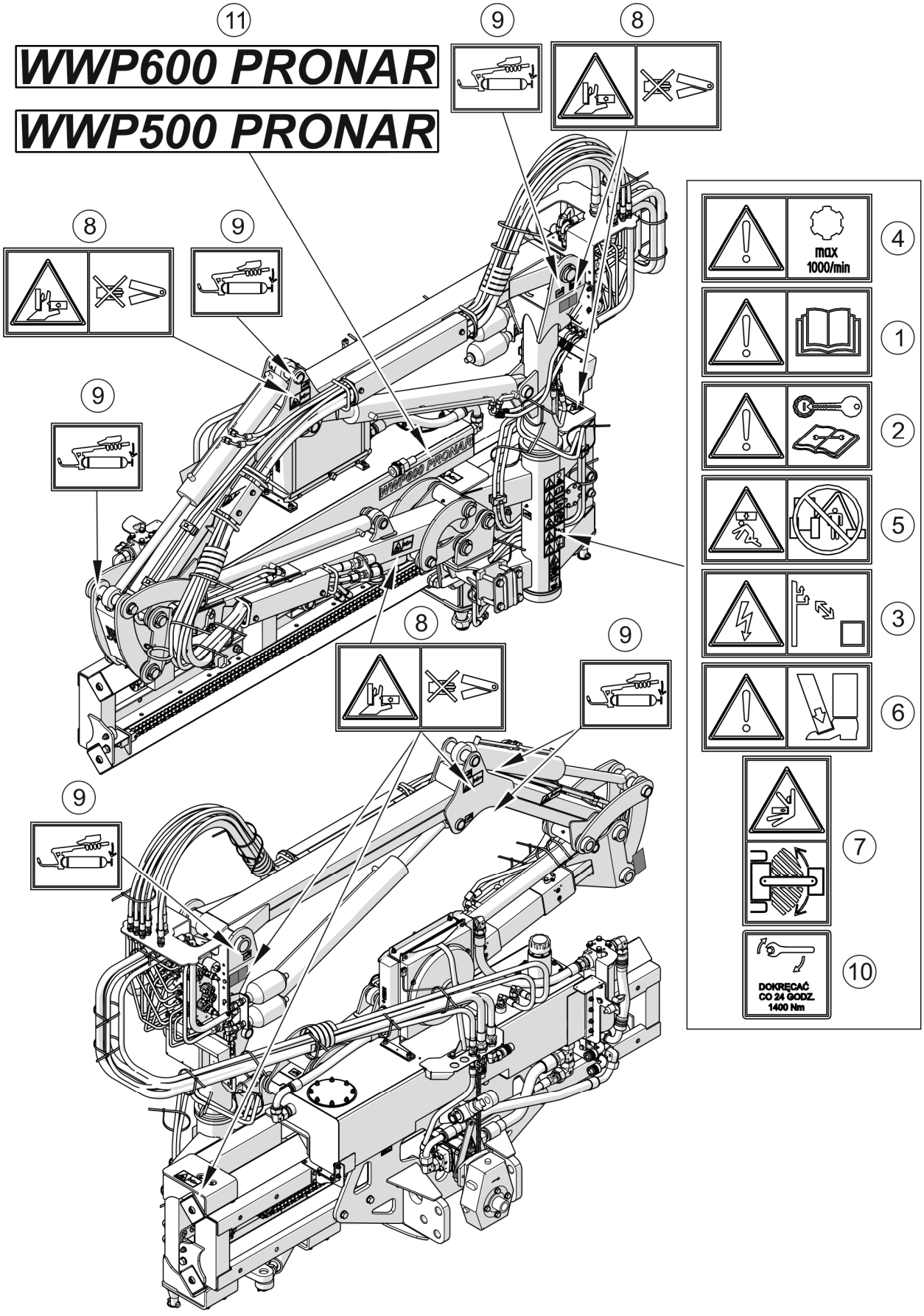
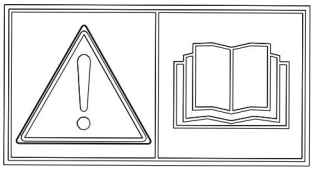
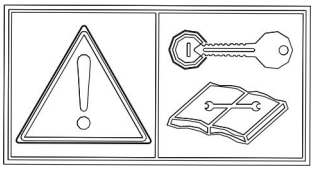
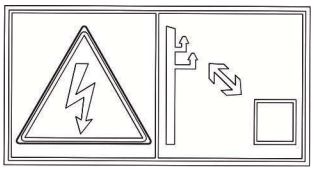
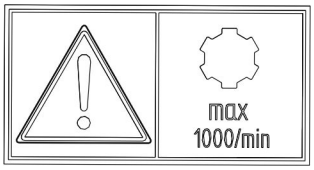
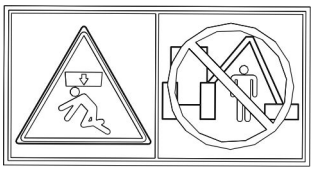
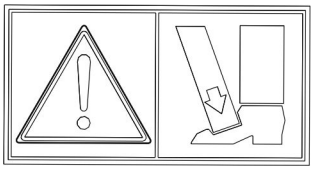
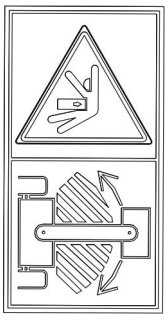
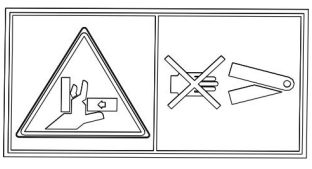
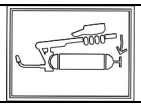


FIGURE 2.1 Locations of information and warning decals

Meaning of symbols (TABLE 2.1)

TABLE 2.1 Information and warning decals

ITEM	DECAL	MEANING
1		Before starting work, carefully read the Operator Manual.
2		Before maintenance or repairs, turn off engine and remove key from ignition.
3		Use extreme caution when working near electric power lines. Danger of electric shock.
4		Maximum allowable PTO shaft rotation speed is 1000 rpm.
5		Danger of being struck. Do not stay within the reach of the multifunction arm and working head
6		Danger of crushing foot or toes
7		When implement is in use there must be no bystanders in designated areas. If any work is required in these areas, make sure the tractor is stationary, and whether the implement is disconnected from the power source.
8		Do not reach into crushing space because elements may move. Danger of crushing hands or fingers

ITEM	DECAL	MEANING
9		Lubrication points
10		Information decal "Tighten every 24 hours, 1400 Nm"
11	***WWP600 PRONAR*** or ***WWP500 PRONAR***	Machine type

SECTION

3

DESIGN AND OPERATION

3.1 TECHNICAL SPECIFICATION

TABLE 3.1 BASIC TECHNICAL DATA

	Unit	**WWP500**	**WWP600**
Dimensions			
Total length in transport setting	mm	920	920
Width in transport setting:	mm	2400	2720
Height in transport setting:	mm	2020	2100
Technical specification			
Weight (without working head)	kg	870	956
Method of hitching to tractor:	-	Adapter plate and tractor front three-point linkage or Mounting plate DIN 76060 type A or type B	
Electric power supply	V	12	
Horizontal range of multifunction arm operation	mm	4750	5400
Multifunction arm drive	-	Own hydraulic system driven by the tractor's PTO	
Multifunction arm control	-	Electrohydraulic – joystick and control panel installed in the operator's cab	
Oil tank capacity	l	75	
Power of working head drive system	kW	37.5	
Arm safeguard		Hydraulic safety device	
Maximum arm rotation angle with safety device activation	°	20	
Working head rotation range	°	190	
Oil cooler	-	Standard	

3.2 DESIGN AND OPERATION

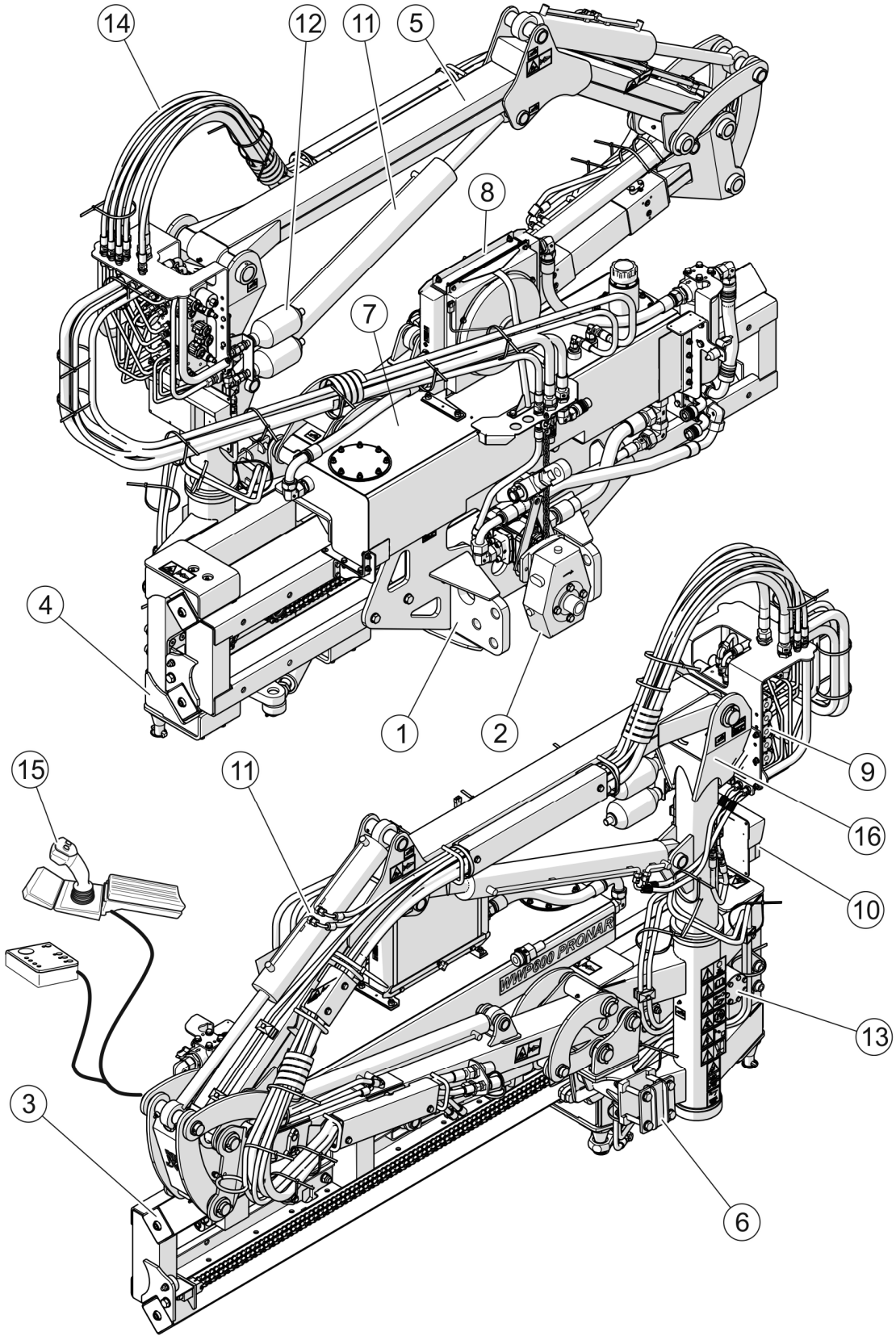


FIGURE 3.1 General design of the multifunction arm.

(1)- front adapter plate; (2)- multiplier gear box with hydraulic pumps; (3)- guide; (4)- support system slide; (5)- support system arms; (6)- working head connection; (7)- hydraulic oil tank;

(8)- oil cooler; (9)-electrohydraulic selective control valve; (10)- selective control valve control box; (11)- hydraulic cylinder; (12)- hydraulic accumulators; (13)- hydraulic motor for support system slide drive; (14)- hydraulic conduits; (15)- control panel and joystick; 16- hanger.

Main elements of the multifunction arm:

- linkage
- support system
- hydraulic system
- control system

The multifunction arm's linkage enables hitching to the tractor's front three-point linkage frame through the front adapter plate (1) (FIGURE 3.1) attached to the multifunction arm's guide. The design of the adapter plate depends on the type of tractor to which the multifunction arm will be hitched.

The support system consists of arms (5) that are moved by hydraulic cylinders (11). Hydraulic cylinders enable free manoeuvring of the arms of the multifunction arm to which the working head is attached. One of the arms has telescopic design, which increases working range of the working head.

The support system arms (5) are mounted on hanger (16). The hanger connected with rotation cylinder (hydraulic safety device) protects the multifunction arm against damage when the working head hits an obstacle and makes it possible to set the arms of the support system in transport position. At the end of the arm there is an attachment (6) (TYPE 80P) for fixing the working head. TYPE 60P attachment (with reduced width of the working head beam) and P0G01 adapter (depending on type of working head) are available as options.

Slide (4) is connected with hydraulic motor (13) and enables movement of the support system on guide (3) to the left or right with regard to the tractor. The multifunction arm can work on the right and on the left side of the tractor (after manual rearrangement of securing elements and after turning the arm).

The multifunction arm is equipped with independent hydraulic system driven by the tractor's power take-off shaft (PTO) through multiplier gear box (2) with pumps supplying two circuits of the hydraulic system. One circuit of the hydraulic system is for moving the arms and the working head while the other circuit is for driving the working head. Hydraulic pumps draw oil from independent oil tank (7) through oil suction filter and pump it into the two hydraulic circuits.

The hydraulic system is equipped with a hydraulic oil cooler (8) installed on oil return to tank. The oil cooler fan is powered by the tractor's electrical system through a wiring harness protected with a 15A fuse located next to the control box (10) of the selective control valve. The fan is switched on automatically when the working head drive is switched on or when the hydraulic system of the multifunction arm overheats.

Hydraulic cylinders are controlled by means of electrohydraulic selective control valve (9) by the tractor driver using control panel and joystick (15).

SECTION

4

CORRECT USE

4.1 GET READY FOR OPERATION

The manufacturer guarantees that the machine is fully operational and has been checked according to quality control procedures and is ready for use. This does not release the user from an obligation to check the machine's condition after delivery and before first use. The machine is delivered to the user completely assembled.

NOTE

Check technical condition of the multifunction arm before each use. In particular, check the technical condition of the linkage, hydraulic system, drive system and the integrity of safety guards.

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

- the user must carefully read this Operator Manual and observe all recommendations, understand the design and the principle of machine operation,
- check the condition of protective paint coat,
- inspect machine's individual components for mechanical damage resulting from incorrect transport (dents, piercing, bent or broken components),
- check all the lubrication points, lubricate the machine according to recommendations provided in section *5 "MAINTENANCE"*,

NOTE

Before beginning work lubricate all lubrication points.

- check technical condition of the hydraulic system;
- check if working head, linkage and safety guards are correctly installed,
- check technical condition of hitching system and protective elements,
- check the hydraulic oil level in the hydraulic tank and multiplier gear box.

If all the above checks have been performed and there is no doubt as to the machine's good technical condition, it can be hitched to tractor. Start the tractor engine, check all systems and perform a test run before beginning work. In order to inspect:

- hitch the multifunction arm to tractor (see *"HITCHING TO TRACTOR"*)
- start the tractor PTO drive,
- set it in working position,

DANGER

Do NOT exceed the PTO rotation speed of 1000 rpm. Otherwise the multiplier gear box and hydraulic system of the multifunction arm may be damaged.

Engage multifunction arm's drive for 3 minutes and check the following:

- that there is no knocking or noise in the hydraulic pump drive system arising from scraping or grinding of metal elements,
- confirm that there are no oil leaks in the hydraulic system.
- confirm that the movement of the support system slide along the guide as well as other movements of the multifunction arm are performed smoothly and without jamming.

The multifunction arm's operation at no load should be smooth. Shaking of drive transmission is not acceptable, nor is abnormal noise and vibrations coming from loose nut and bolt connections. Confirm that oil does not leak from the hydraulic system.

DANGER

Before using the multifunction arm, the user must carefully read this Operator Manual

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

The multifunction arm must never be used by persons who are not authorised to drive carrier vehicles, including children and people under the influence of alcohol or other drugs.

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

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

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

4.2 TECHNICAL INSPECTION

When preparing the multifunction arm for use, check individual elements according to guidelines presented in TABLE 4.1.

TABLE 4.1 TECHNICAL INSPECTION SCHEDULE

DESCRIPTION	MAINTENANCE ACTIVITIES	FREQUENCY
Correct mounting of the multifunction arm on the tractor linkage	Check that the bolts are tightened and the linkage fixing pins are secured	Daily before beginning work
Technical condition of the multifunction arm's hydraulic system	Check according to section "*HYDRAULIC SYSTEM MAINTENANCE"*	
The oil level in the hydraulic oil tank and multiplier gear box	Check according to section "*HYDRAULIC SYSTEM MAINTENANCE"*	
Check if all main nut and bolt connections are properly tightened	Check according to section "TIGHTENING OF BOLT AND NUT CONNECTIONS*"*	
Lubrication	Lubricate the components according to section "*LUBRICATION*".	
Replace oil filter	According to section "5.2.1 OIL TANK AND OIL FILTERS"	Oil filter: After the first 100 h and then, after activation of the filter clogging indicator Oil suction filter: Every 1000 h or once a year
Change oil in tank	According to section "5.2.1 OIL TANK AND OIL FILTERS"	Every 1000 h or once a year
Change oil in multiplier gear box	According to section "5.2.2 MULTIPLIER GEAR BOX WITH HYDRAULIC OIL PUMP ASSEMBLY"	After the first 50 hours, then every 1000 hours or every 6 months

NOTE

Do NOT use out of order multifunction arm.

4.3 HITCHING TO TRACTOR

The PRONAR WWP500 / WWP600 multifunction arm may only be hitched to a tractor which meets the requirements specified in TABLE 1.1 „*REQUIREMENTS FOR TRACTOR”*.

NOTE

Hitching the multifunction arm to the tractor should be carried out by the Authorised Service Point of the multifunction arm's Manufacturer.

NOTE

Before hitching the multifunction arm to carrier vehicle, read the carrier vehicle Operator Manual. Comply with the recommendations relating to linkage and mounting points.

DANGER

Do NOT operate the multifunction arm with the tractor without the driver's cab. The tractor should be equipped with the cab protecting the operator against possible hazards.

The operator should also use personal protective equipment such as protective clothing, safety goggles, safety helmet to reduce the risk of injuries.

DANGER

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

4.3.1 HITCHING THE MULTIFUNCTION ARM TO THE TRACTOR'S LINKAGE

In order to hitch the multifunction arm to the tractor's linkage, proceed as follows:

- hitch the multifunction arm to the tractor's front three-point linkage frame through the front adapter plate. The design of the adapter plate depends on the type of tractor to which the multifunction arm will be hitched. Mounting the adapter plate and hitching the multifunction arm to the tractor's linkage should be carried out by the Authorised Service Point of the multifunction arm's Manufacturer.
- load the tractor's rear axle with a counterweight calculated using the following formula (FIGURE 4.3);
- install the tractor front axle lock (FIGURE 4.4).

DANGER

The multifunction arm MUST NOT be used without a counterweight on the tractor rear axle (if it is required for maintaining the stability) and the tractor front axle lock.

DANGER

Turn off the tractor engine and remove the key from the ignition before connecting the tractor front PTO multifunction arm multiplier gear box. Ensure that unauthorised persons do not have access to the tractor.

4.3.2 CONNECTING THE TRACTOR'S ELECTRICAL SYSTEM

The electrical system of the multifunction arm hitched to the tractor is designed for 12V DC supply.

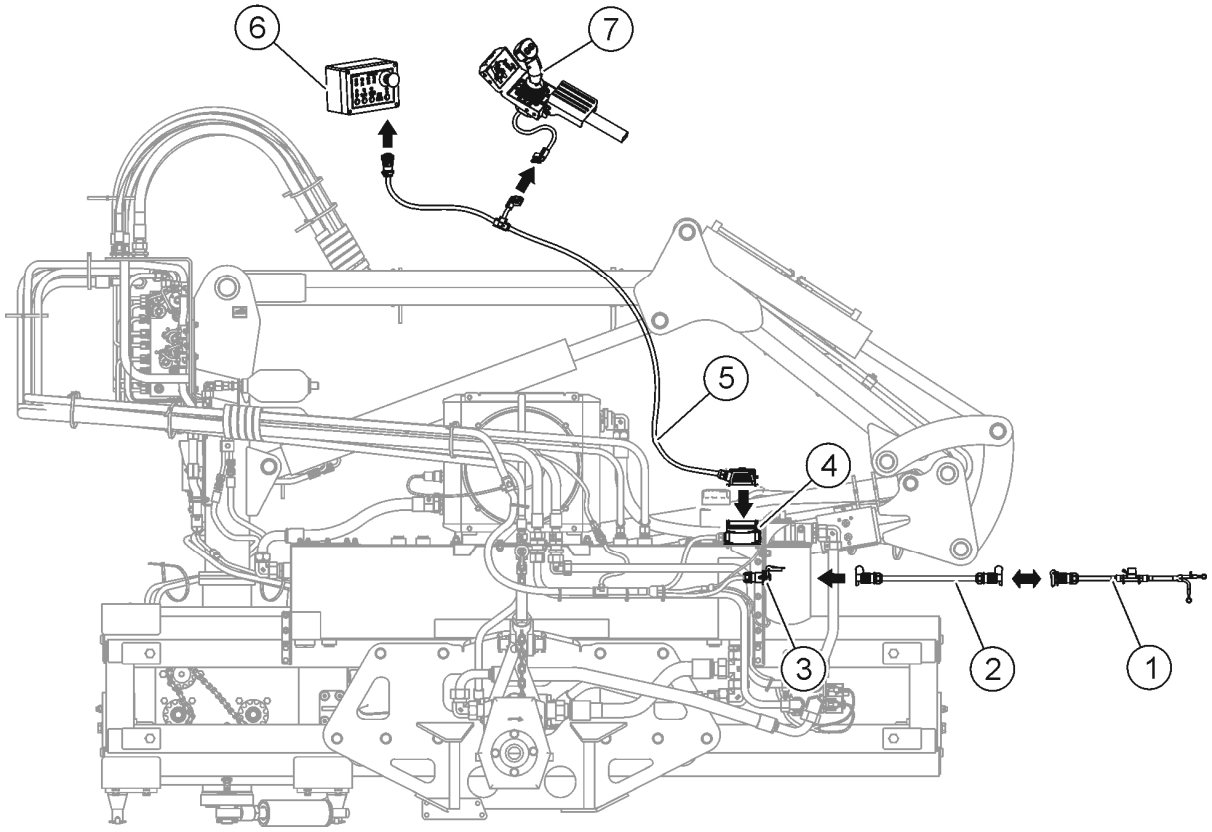


FIGURE 4.1 Connecting the multifunction arm's electrical system.

(1)- power supply wiring harness; (2)- connection wire; (3)- connection socket of the multifunction arm's electrical system; (4)- connection socket of the control panel's wiring harness; (5)- control panel's wiring harness; (6)- control panel; (7)- joystick

In order to cooperate with the multifunction arm, the tractor should be equipped with the power supply wiring harness (1) (FIGURE 4.1) with a 3-pin electric socket to which the multifunction arm's electrical system should be connected using the connection lead (2).

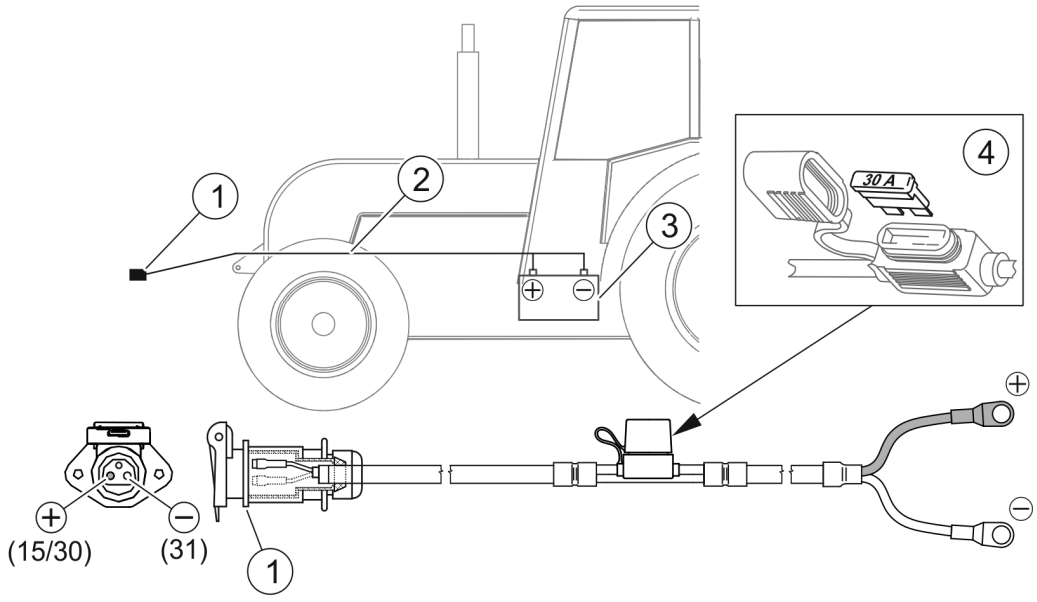


FIGURE 4.2 Installation diagram of the power supply wiring harness on the carrier

(1) - 3-pin electric socket; (2) - power supply wiring harness installed on the tractor; (3) - battery; (4) - UNIVAL 30A fuse.

The power supply wiring harness (2) (FIGURE 4.2) should be installed by a properly qualified person according to the instructions of the tractor manufacturer. The tractor's power supply wiring harness (2) is equipped with a 30A fuse.

NOTE

When installing the power supply wiring harness on the tractor (FIGURE 4.2), ensure correct polarity of the power supply socket (1). The battery reversed polarity may cause damage to the multifunction arm's electrical system.

DANGER

Prior to connecting the electrical system leads, carefully read the Operator Manual of the tractor and observe all manufacturer's recommendations.

The tractor must be equipped with a 12V DC 3-pin socket with correct polarity of individual pins: "+"- pin 15/30, "-"- pin 31 (FIGURE 4.2).

NOTE

During operation, the electrical leads should be routed so that they do not get entangled in moving machine and tractor parts and should be protected against damage during the multifunction arm operation.

NOTE

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

When the power supply wiring harness (1) (FIGURE 4.1) is installed on the tractor, the multifunction arm can be connected with the tractor's electrical system using the connection lead (2).

Connect the control panel (6) and joystick (7) to the control panel's wiring harness (5). Then, connect the wiring harness plug (5) to the connection socket (4) of the multifunction arm's electrohydraulic system, install the control panel (6) and the joystick (7) inside the tractor cab in the place which makes it possible to manoeuvre the control levers freely from the tractor operator's seat. The control panel and joystick should be mounted in a stable manner, without weakening the protective structure of the tractor.

4.4 BALLASTING THE TRACTOR

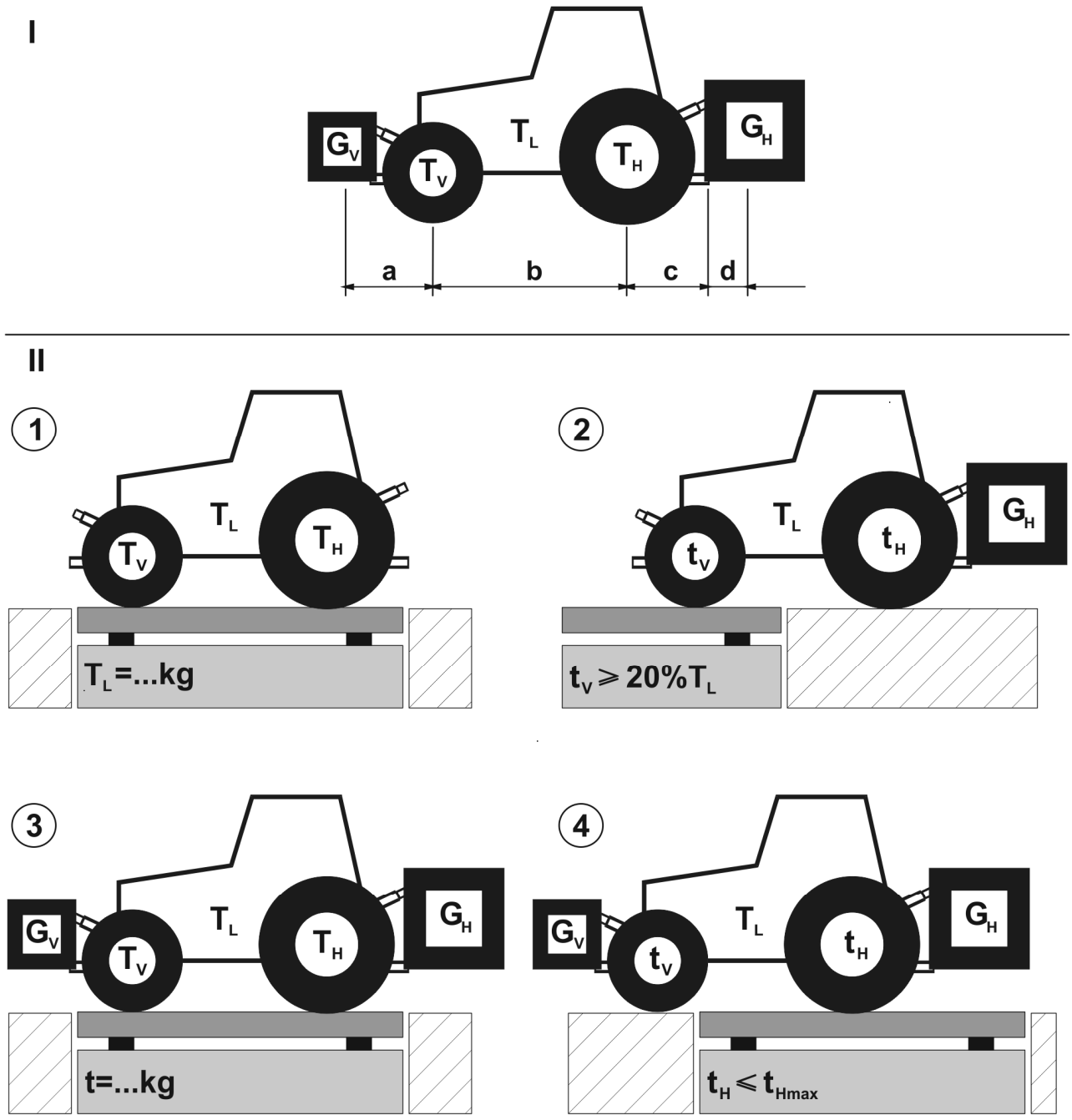


FIGURE 4.3 Ballasting the tractor.

Figure description: Table 4.2

NOTE

Misuse of the tractor may cause damage to the tractor as well as reduce its stability, manoeuvrability and braking efficiency.

NOTE

Installation of implements on the three-point linkage and a counterweight on the tractor must not result in exceeding the permissible total weight, permissible axle load and load capacity of tractor's tyres.

TABLE 4.2 BALLASTING THE TRACTOR (DESCRIPTION OF FIGURE 4.3)

SYMBOL / DIMENSION (FIGURE 4.3)	UNIT	DESCRIPTION
T_L	kg	Tractor tare weight
T_V	kg	Front axle load for tractor without machine
T_H	kg	Rear axle load for tractor without machine
t	kg	Load applied to axles of tractor with machine
t_V	kg	Front axle load for tractor with machine
t_H	kg	Rear axle load for tractor with machine
G_H	kg	Total weight of a rear-mounted machine or a rear ballast
G_V	kg	Total weight of a front-mounted machine or a front ballast
a	m	Distance between the centre of gravity of a front-mounted machine / front ballast and the centre of the front axle
b	m	Tractor axle base
c	m	Distance between the centre of the rear axle and the centre of the lower linkage arms of the tractor
d	m	Distance between the centre of the lower linkage arms of the tractor and the centre of gravity of a rear-mounted machine or a rear ballast

Before hitching the machine to the tractor, confirm that the tractor is suitable for this purpose. Installation of implements on the front or rear three-point linkage must not result in exceeding the permissible total weight, permissible axle load and load capacity of tractor's tyres. The tractor's front axle must be always loaded with at least 20% of the tractor's weight.

Make the following calculations (FIGURE 4.3 – I) in order to confirm that these conditions are met:

CALCULATION OF THE MINIMUM FRONT BALLAST G_{Vmin}

$$G_{Vmin} = \frac{G_H \bullet (c + d) - T_V \bullet b + 0{,}2 \bullet T_L \bullet b}{a + b}$$

CALCULATION OF THE MINIMUM REAR BALLAST G_{Hmin}

$$G_{Hmin} = \frac{G_V \bullet a - T_H \bullet b + 0{,}45 \bullet T_L \bullet b}{b + c + d}$$

It is assumed that all parameters for the calculations of the minimum front and rear ballast are known.

If the parameters are unknown and cannot be determined, make the measurements using a weighing scale (FIGURE 4.3 – II).

MEASUREMENT OF PERMISSIBLE AXLE LOADS USING A WEIGHING SCALE

- Measure the tare weight of the carrier vehicle (T_L).
- Hitch the machine to tractor and measure the front axle load (t_V). If the axle load is smaller than 20% of the carrier vehicle weight (T_L), add weights to exceed the minimum axle load value ($t_V \geq 20\% T_L$).
- Measure the total weight (t) of the carrier vehicle with the machine and weights. Check in the tractor's Operator Manual if the measured value is smaller than the average value of gross weight.
- Measure the rear axle load (t_H) and check in the carrier vehicle's Operator Manual if the measured value is smaller than the maximum permissible rear axle load of the carrier vehicle (t_{Hmax}).

NOTE

The load on the front axle of the carrier vehicle (tractor) must be at least 20% of its own weight.

4.5 TRACTOR FRONT AXLE LOCK SYSTEM

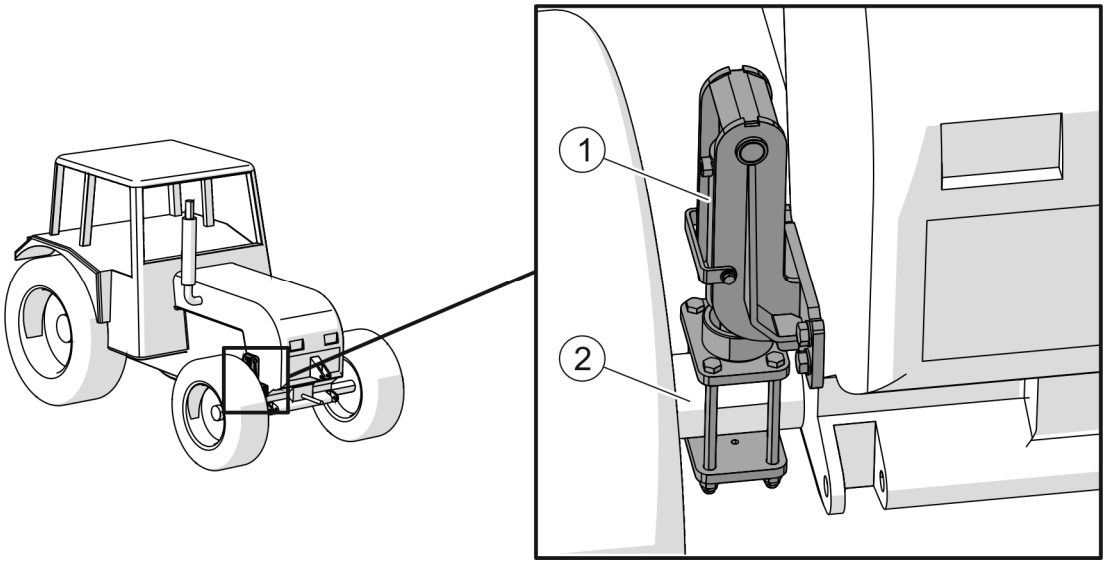


FIGURE 4.4 Tractor front axle lock.

(1)- axle lock; (2)- tractor front axle;

To ensure additional stability of the machine during operation, the tractor should be equipped with a front axle lock system.

The front axle lock system (FIGURE 4.4) blocks the tilting of the tractor axle in case of unsymmetrical vertical side loads occurring when the tractor is working with machines such as the multifunction arm.

The axle lock is an additional equipment of the tractor and the multifunction arm. Use the axle lock suitable for the type of tractor with which the multifunction arm cooperates.

Installation

Installation of the axle lock should be carried out by a person with appropriate qualifications. During installation, ensure that all threads of bolt and nut connections are free from contaminations and that they are not mechanically damaged. Ensure that the bolt and nut connections fixing the axle lock are tightened using proper tightening torques according to Table 5.2.

To enable control of the axle lock, the axle lock hydraulic system must be connected to the quick couplers of the tractor's external hydraulic system.

DANGER

The axle lock may be installed only when the tractor's engine is turned off and the tractor is protected against rolling away by means of parking brake. Accidental motions of working elements are prevented in this way.

Perform the test run of installed axle lock in order to check if it works correctly.

Release hydraulic pressure before starting work on the lock's hydraulic system.

Use

ATTENTION

Check technical condition of the axle lock before each use.

Do NOT use out of order axle lock.

Before starting the tractor with the axle lock installed, make sure that the external hydraulic system circuit of the lock control is not switched on. Otherwise, the tractor's suspension may move in an uncontrolled manner.

The axle lock is controlled hydraulically from the tractor driver's seat using the hydraulic manifold lever. When the hydraulic manifold lever is set in the position of supplying oil to the axle lock's hydraulic system, the axle lock function is activated. Before driving the tractor with the multifunction arm to the place of work and back, set the hydraulic manifold lever controlling the axle lock in the floating position (front axle unlocked).

ATTENTION

The maximum travelling speed of the tractor with the axle lock engaged (the lock cylinder in the locked position) must not exceed 10 km/h.

Before driving the tractor to the place of work and back, unlock the axle lock (lock cylinder in the floating position).

4.6 STARTING AND OPERATING THE MULTIFUNCTION ARM BY MEANS OF THE CONTROL SYSTEM

Once the multifunction arm is hitched to the tractor, you may start the machine.

DANGER

The multifunction arm may only be started when all its protection guards are installed properly.

Before engaging PTO drive make sure that there are no bystanders, especially children, near the multifunction arm.

NOTE

Before operating the multifunction arm, lubricate all the lubrication points until the lubricant appears between the shaft and the bearing housing.

Engage front PTO in the tractor at a suitably low speed and then gradually increase the speed until PTO speed of 1000 rpm is reached. When the proper PTO speed is reached, one may commence work with the multifunction arm.

DANGER

Do NOT exceed the PTO rotation speed of 1000 rpm. Otherwise the multiplier gear box and hydraulic system of the multifunction arm may be damaged.

The arms of the multifunction arm and the working head are controlled by means of the control panel (FIGURE 4.5) and joystick (FIGURE 4.6) located inside the tractor cab.

NOTE

All the control panel and joystick operations should be performed only from the operator's seat in the tractor cab. Operating the control panel and the joystick outside the operator's cab is forbidden.

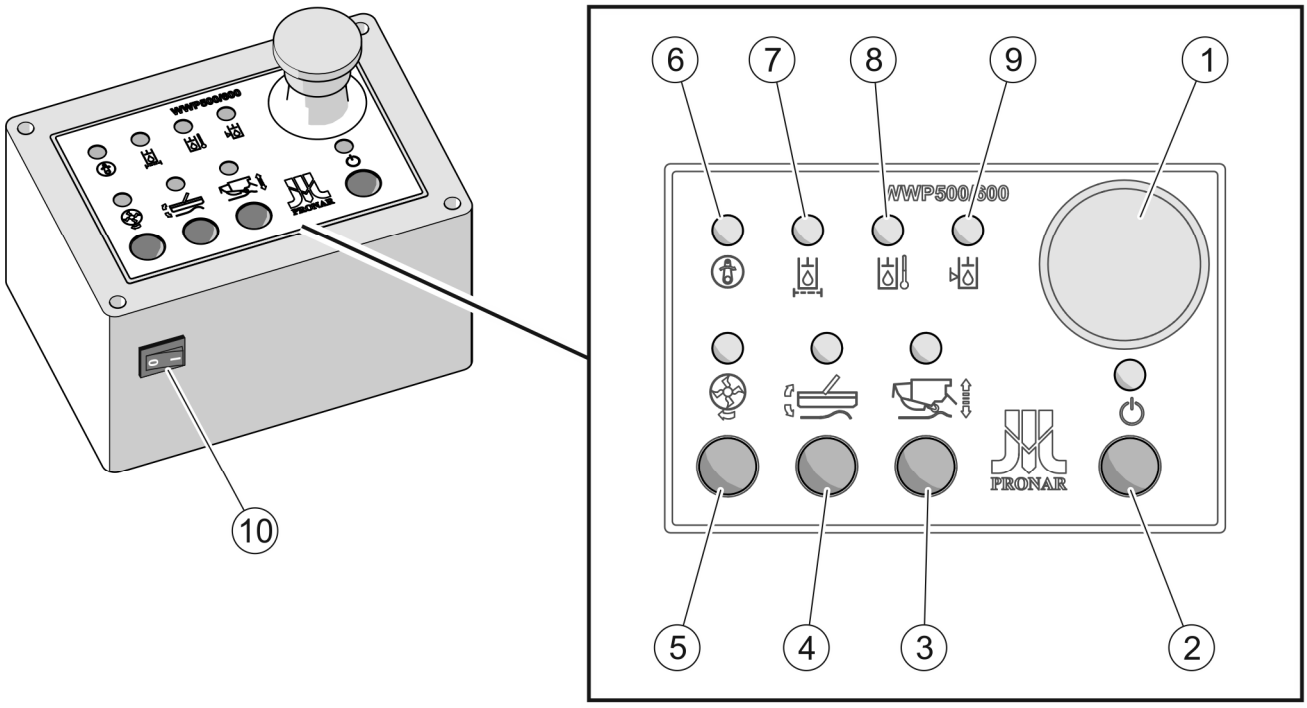


FIGURE 4.5 Control panel of multifunction arm.

(1)- emergency stop (mushroom button); (2)- control system activation button and indicator light; (3)- activation button and indicator light of the arm shock absorbing function; (4)- activation button and indicator light of working head's floating function; (5)- activation button and indicator light of the working head drive; (6)- safety device activation indicator light; (7)- oil filter contamination indicator light; (8)- oil temperature indicator light; (9)- indicator light of oil level in the tank; (10)- main power supply switch of control panel.

Before manoeuvring the multifunction arm, switch on the main power supply switch of control panel (10) (FIGURE 4.5) and activate control panel by depressing button (2) for about 3 seconds. Activation of the control system is signalled by the indicator light above the activation button.

The hydraulic drive of the working head is switched on by depressing the button (5). When the arm shock absorbing function is required, press button (3). When ground surface tracking is required for the working head, press button (4) of the working head's floating function.

When immediate emergency stopping of the multifunction arm is required, press emergency stop (red mushroom button) (1) on the control panel. This button switches off the complete control system.

The multifunction arm movements are controlled by means of the joystick. The pictogram placed on the joystick mounting (FIGURE 4.6) shows the joystick control diagram.

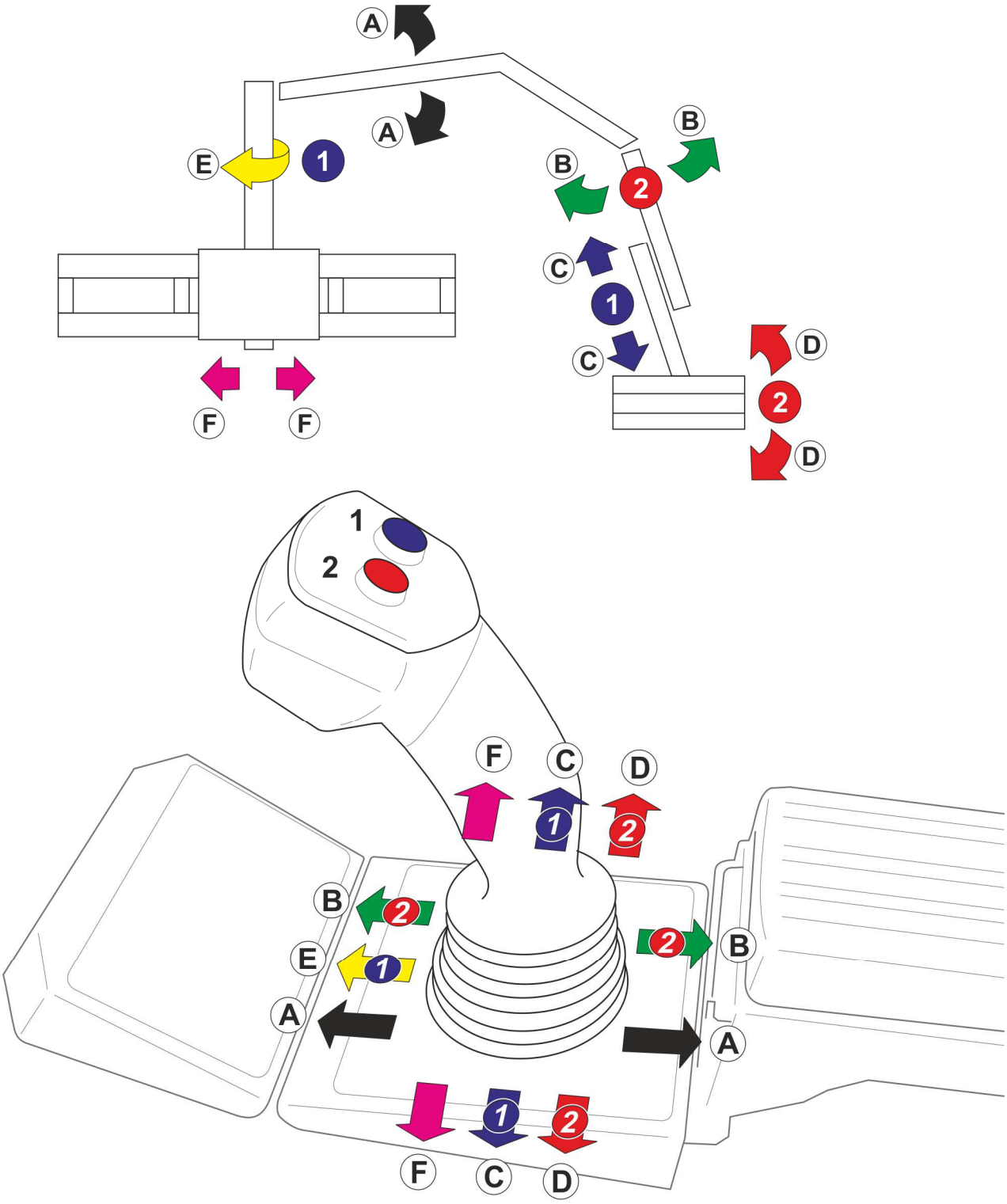


FIGURE 4.6 Controlling individual hydraulic cylinders of the multifunction arm by means of the joystick.

(A), (B), (C), (D), (E)- controlling the hydraulic cylinders of the multifunction arm; (F)- controlling the hydraulic motor shifting the arm along the guide; (1)- function button of the joystick (blue); (2)- function button of the joystick (red).

Individual functions of the joystick (FIGURE 4.6):

- (F) tilt the joystick to the right or left to start the hydraulic motor shifting the multifunction arm along the guide to the right or left;
- (C) tilt the joystick to the right or left while pressing the function button (1) to actuate the hydraulic cylinder extending the telescopic arm of the multifunction arm;
- (D) tilt the joystick to the right or left while pressing the function button (2) to actuate the hydraulic cylinder tilting the working head;
- (A) tilt the joystick forward or backward to actuate the hydraulic cylinder tilting the main arm of the multifunction arm;
- (E) tilt the joystick forward while pressing the function button (1) to actuate the hydraulic cylinder of the safety device causing the return of the safety device cylinder piston to start position.
- (B) tilt the joystick forward or backward while pressing the function button (2) to actuate the hydraulic cylinder tilting the telescopic arm;

4.7 ATTACHING THE WORKING HEAD

The WWP500 / WWP600 multifunction arm can be connected with working heads designed for cooperating with the working head connection and hydraulic system of the multifunction arm.

NOTE

Before attaching the working head, the user must carefully read the Operator Manuals of the working head, tractor and multifunction arm and observe all instructions contained in the manuals.

DANGER

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

DANGER

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

Check technical condition of the working head's guards and general technical condition of the machine.

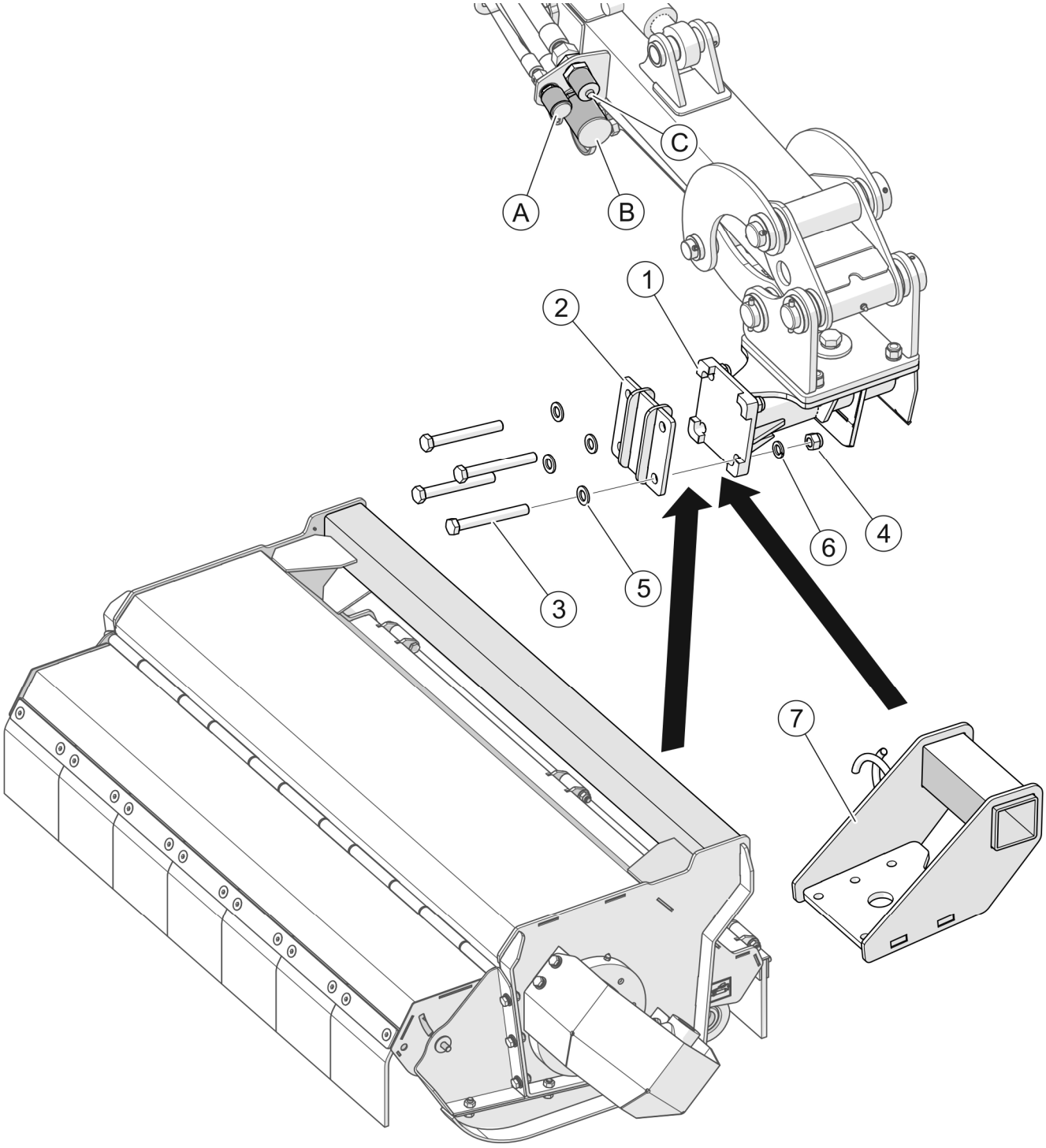


FIGURE 4.7 Attaching the working head to the multifunction arm.

(1)- working head attachment holder; (2)- working head attachment lock; (3)- clamping bolts; (4)- nuts; (5),(6)- washers; (7)- P0G01 adapter (option); (A)- hydraulic quick coupler (socket); (B)- hydraulic quick coupler (socket); (C)- hydraulic quick coupler (plug).

In order to hitch the working head to the multifunction arm head (FIGURE 4.7), proceed as follows:

- Bring the holder (1) of the multifunction arm's working head attachment to the working head attachment (support beam).

- Using the control system, position the multifunction arm's working head attachment holder (1) at the same height as the working head's attachment (support beam).
- Turn off the tractor’s (carrier vehicle's) engine and prevent the tractor (carrier vehicle) from moving.
- Connect the holder (1) of the multifunction arm's working head attachment to the working head's attachment (support beam) by means of the attachment lock (2). Screw the entire assembly together with four fixing bolts (3).
- Depending on the working heads installed, the optional P0G01 (7) adapter can be additionally used.
- Connect the hydraulic quick couplers (A), (B) and (C) of the multifunction arm with the corresponding quick couplers of the working head's hydraulic lines.
- Turn on the tractor’s (carrier vehicle's) engine and the multifunction arm's drive. Raise the working head using the control panel of the multifunction arm.

DANGER

Prior to connecting individual hydraulic system lines, the user must carefully read the Operator Manual of the multifunction arm and working head and observe all recommendations of the Manufacturer.

DANGER

When connecting the hydraulic quick couplers to the working head, make sure that the hydraulic system of the multifunction arm is not under pressure.

4.8 TRANSPORTING THE MACHINE

ATTENTION

Before driving on public roads in order to transport the multifunction arm to the work site and back, the multifunction arm shall be folded to its transport position.

When driving on public roads, observe all road traffic regulations in force in the country, in which the machine is used.

Before driving onto a public road, check if all the lights and warning plates on the tractor (carrier vehicle) are properly mounted and visible.

The multifunction arm may not be used or transported in conditions of limited visibility.

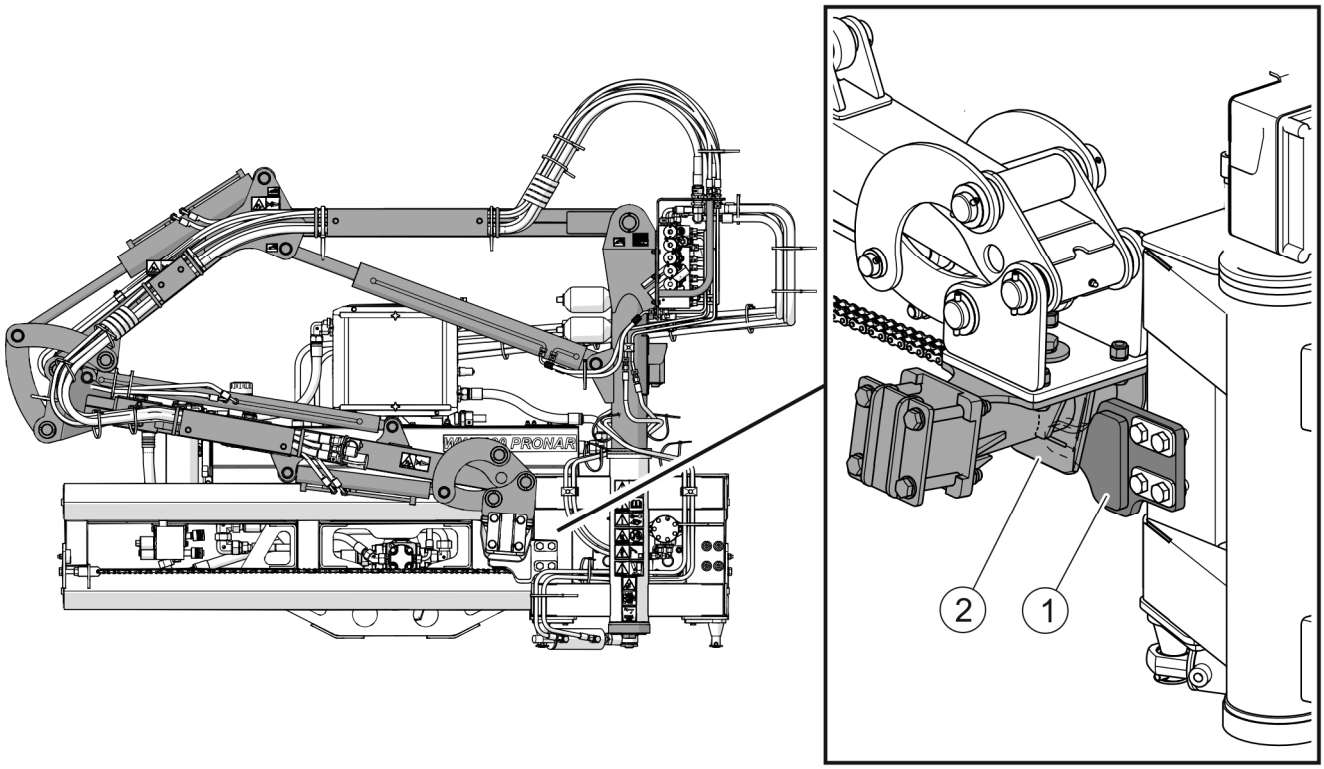


FIGURE 4.8 Transport position of the multifunction arm

(1)- working head hitch; (2)- working head connection

For transport to place of work and back, set the multifunction arm in transport position (FIGURE 4.8) so that the multifunction arm width is minimal and the height measured from the road surface does not exceed the permissible height (4 metres) stipulated by the road traffic regulations. In this position, working head connection (2) is mounted on working head hitch (1).

DANGER

During transport, pay special attention and exercise particular caution when driving the tractor with the multifunction arm under viaducts, bridges and electric power lines.

DANGER

The drive of the working head shall not be turned on when the multifunction arm is in its transport position.

4.9 SETTING THE MULTIFUNCTION ARM IN WORKING POSITION AND OPERATION

To set the multifunction arms in working position:

- engage the tractor's front PTO drive;
- switch on the main power supply switch of control panel (10) (FIGURE 4.5) and activate control panel by depressing button (2) for about 3 seconds. Activation of the control system is signalled by the indicator light above the activation button.
- operate appropriate hydraulic cylinders of the multifunction arm (FIGURE 4.6) in order to place the working head in the working area;
- After setting the working head in working position, engage working head drive by pressing button (5) on the control panel (FIGURE 4.5). Ramp time for activation of working head drive is about 2 seconds.

DANGER

The working head may only be started when all the protection guards of the multifunction arm and working head mounted properly and the working head is in its working position.

Bystanders should be at a safe distance from the multifunction arm's working head during work because of the risk of injury caused by thrown objects (stones, branches etc.).

- engage appropriate tractor gear and start working.

During operation, the multifunction arm operator must ensure proper visibility of the machine and work area so that the operator can see obstacles and possible dangers in the route of the working head. The rotating elements of the working head should never be directed towards the tractor.

DANGER

NEVER work if the rotating elements of the working head are directed towards the tractor. Otherwise the tractor may be damage or the operator may be injured.

While operating the multifunction arm, adjust the tractor speed. The speed depends on a number of factors. The main ones are:

- the working head type used
- the type of the material along which the working head moves
- the type and configuration of the ground along which the tractor travels
- weather conditions.

In all those cases, use the lowest possible speed of the tractor at constant engine speed so that the tractor's PTO rotation speed is fixed and equal to 1000 rpm.

DANGER

During operation with the arm of the multifunction arm raised, keep the arms and working head at a safe distance from overhead power lines (FIGURE 4.11).

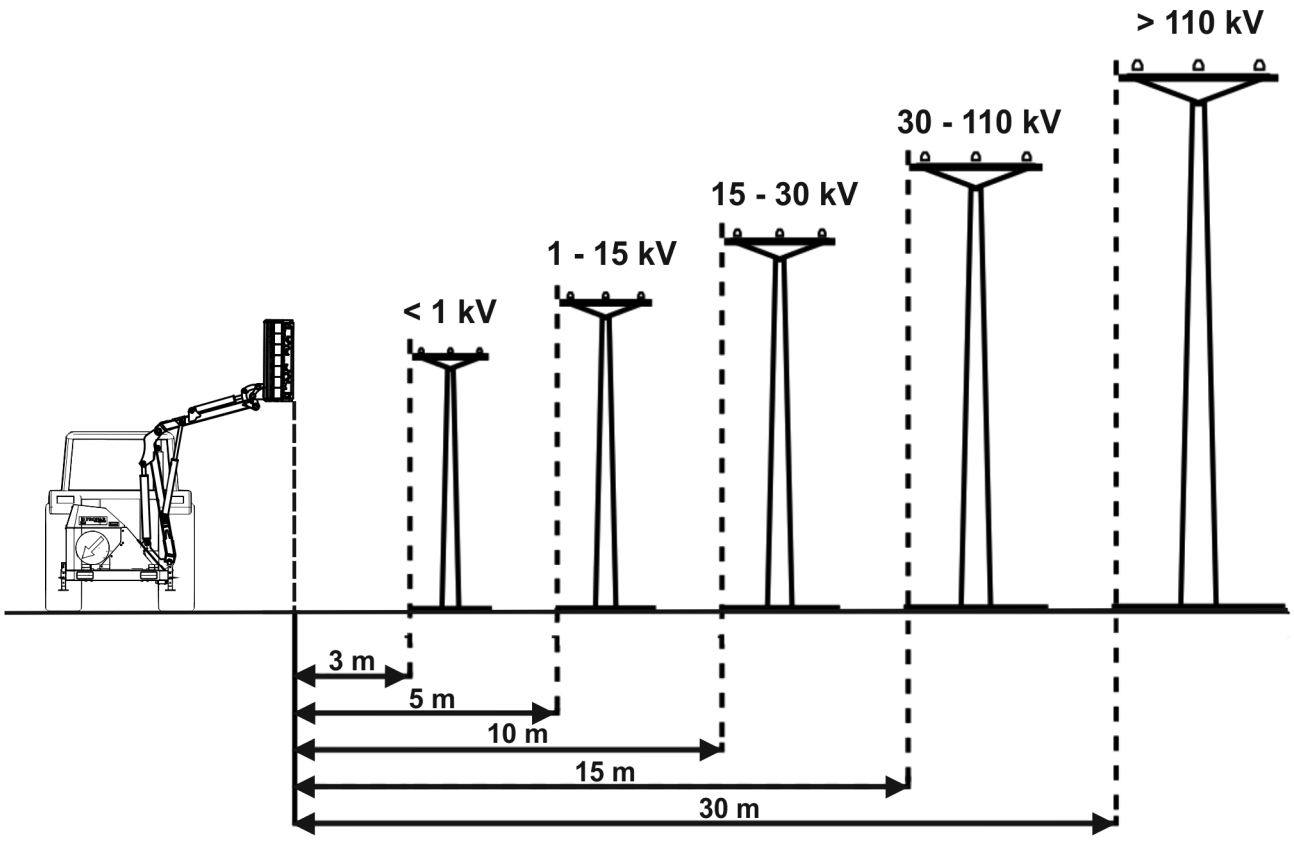


FIGURE 4.9 Safe distances of the machine from power lines.

In line with regulations in force, it is not acceptable to place work stations, machines or devices directly below overhead power lines or at a distance, calculated horizontally from extreme lines, lower than (FIGURE 4.9):

- 3 m - for lines with rated voltage up to 1 kV,
- 5 m - for lines with rated voltage above 1 kV and up to 15 kV,
- 10 m - for lines with rated voltage above 15 kV and up to 30 kV,

- 15 m - for lines with rated voltage above 30 kV and up to 110 kV,
- 30 m - for lines with rated voltage above 110 kV.

If it is impossible to keep the minimum distances in order to work safely in the vicinity of power lines, then apply to the nearest Power Utility and have the lines deenergised for the duration of operation.

NOTE

Operation and transport of the tractor with hitched multifunction arm is allowed only on slopes with the maximum inclination of 7°. However, due to changing location of centre of gravity depending on type of working head, type of tractor and length of multifunction arm, the allowable slope inclination angle may be smaller. That is why the user must exercise due caution and determine the maximum slope inclination angle for operating the tractor with the multifunction arm.

If the full reach of the multifunction arm is to be used, make sure that stability of the tractor will be maintained.

While working on slopes, do not raise the working head more than 0,5 m above the ground.

In the event of a tilt of the tractor with the multifunction arm, immediately lower the working head to the ground and stop the tractor.

When the working head moves along an uneven ground and the ground surface tracking function is required, switch on the floating position function for the working head titling by means of button (4) (FIGURE 4.5). At the time, the head changes its titling position smoothly and adjusts its setting to the ground irregularity (D) (FIGURE 4.10).

When the working head is operated at the ground level and requires the function of tracking the ground surface along which it moves in the vertical plane, enable the arm shock absorbing function using button (5) (FIGURE 4.5). At the time, the arm of the multifunction arm changes its vertical position smoothly and adjusts the head's setting to the ground irregularities (B) (FIGURE 4.10).

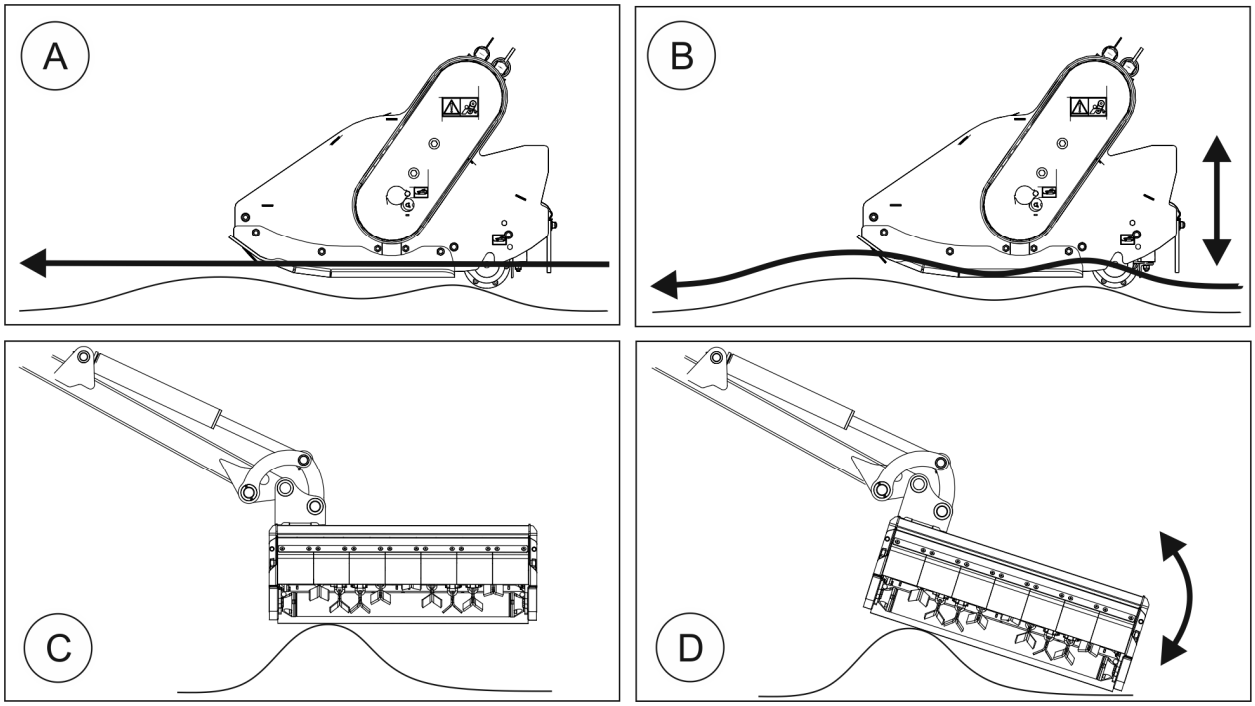


FIGURE 4.10 Arm shock absorbing function and head tilt floating position function.

(A)- operation of the working head with the arm shock absorbing function disabled; (B)- operation of the working head with the arm shock absorbing function enabled; (C)- operation of the working head with the head tilt floating position function disabled; (D)- operation of the working head with the head tilt floating position function enabled.

When the multifunction arm with working head is raised, always start operating the working head at the highest point and move the head gradually downward. When the operation of the working head involves the falling of diverse plant material (branches) from a height, secure the work site so that no one is present in the zone of operation of the head and of the falling plant material.

DANGER

Bystanders should be at a safe distance from the multifunction arm's working head during operation with the arm raised because of the risk of diverse material (stones, branches etc.) falling and being thrown by the head.

While operating the multifunction arm, pay attention to uneven surface and obstacles on the route of moving multifunction arm. When an obstacle is encountered, the main arm rotates, the safety device activation indicator light (6) lights up (FIGURE 4.5) and the acoustic signal is emitted. In such a case, stop the tractor as quickly as possible and bypass the obstacle with the working head raised and then, using the joystick, rotate the main arm of the multifunction arm causing the return of the safety device cylinder piston to start position. Then, the safety device activation indicator light (6) and the acoustic signal should be OFF.

When driving across the road, pavement or other obstacles and when making turns, raise the working head and disengage the working head drive.

Be especially careful when mowing along ditches, furrows and slopes. If overheating of the multifunction arm hydraulic system occurs during operation of the working head, disengage the PTO drive and find the cause of overload. Overheating of the hydraulic system is indicated by the oil temperature warning light (8) (FIGURE 4.5) on the control panel. If the oil temperature does not drop within 10 min, working head drive is turned off. When the light goes out, you can turn on the working head drive again with the button (5) on the control panel.

When immediate emergency stopping of the multifunction arm is required, press emergency stop (red mushroom button) (1) (FIGURE 4.5) on the control panel. This button switches off the complete control system.

After finishing work, turn off the main power supply switch (10) (FIGURE 4.5) of the control panel.

HIGH NOISE LEVEL WARNING

Depending on the working conditions, the tractor with the machine may generate noise exceeding the level of 85dB at the driver position. In such conditions, the operator should use personal protective equipment (ear protectors).

In order to reduce the level of noise during work, the operator cab windows and door should be closed.

SECTION

5

MAINTENANCE

5.1 HYDRAULIC SYSTEM MAINTENANCE

DANGER

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

DANGER

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

Make sure that the oil in the multifunction arm hydraulic system is of adequate grade. Do not add hydraulic oil of other grade. The hydraulic system in a new multifunction arm is filled with HL46 hydraulic oil.

NOTE

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

Flexible hydraulic lines should not be entwined or fractured.

The hydraulic system must be tight. Inspect the seals when hydraulic cylinders are completely extended. If oil is found on hydraulic cylinder body, check origin of leak. Minimum leaks are permissible with symptoms of "sweating", however in the event of noticing leaks in the form of "droplets" stop using the machine until faults are remedied.

If oil leak is detected in hydraulic conduit connections, tighten the connection, and if this does not remedy the problem, replace the leaking hydraulic conduit or connection components. Always exchange each mechanically damaged component. Also, pay attention to ensure that flexible hydraulic lines are not fractured.

Flexible hydraulic lines should be replaced every 4 years of the machine operation.

TABLE 5.1 HL46 hydraulic oil specification

ITEM	NAME	VALUE
1	ISO 3448VG viscosity classification	46
2	Kinematic viscosity at40^{o}C	41.4 ÷ 50.6 mm^2/s
3	ISO 6743/99 quality classification	HL
4	DIN 51502 quality classification	HL
5	Flash-point	above 220°C

Because of its composition, the oil 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 carbon dioxide (CO_2), foam or extinguisher steam. Do NOT use water for fire extinguishing.

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

5.1.1 OIL TANK AND OIL FILTERS

The oil tank (1) (FIGURE 5.1) holds 75 l of hydraulic oil type HL46. Check tank welded joints and hydraulic hoses for leaks every day.

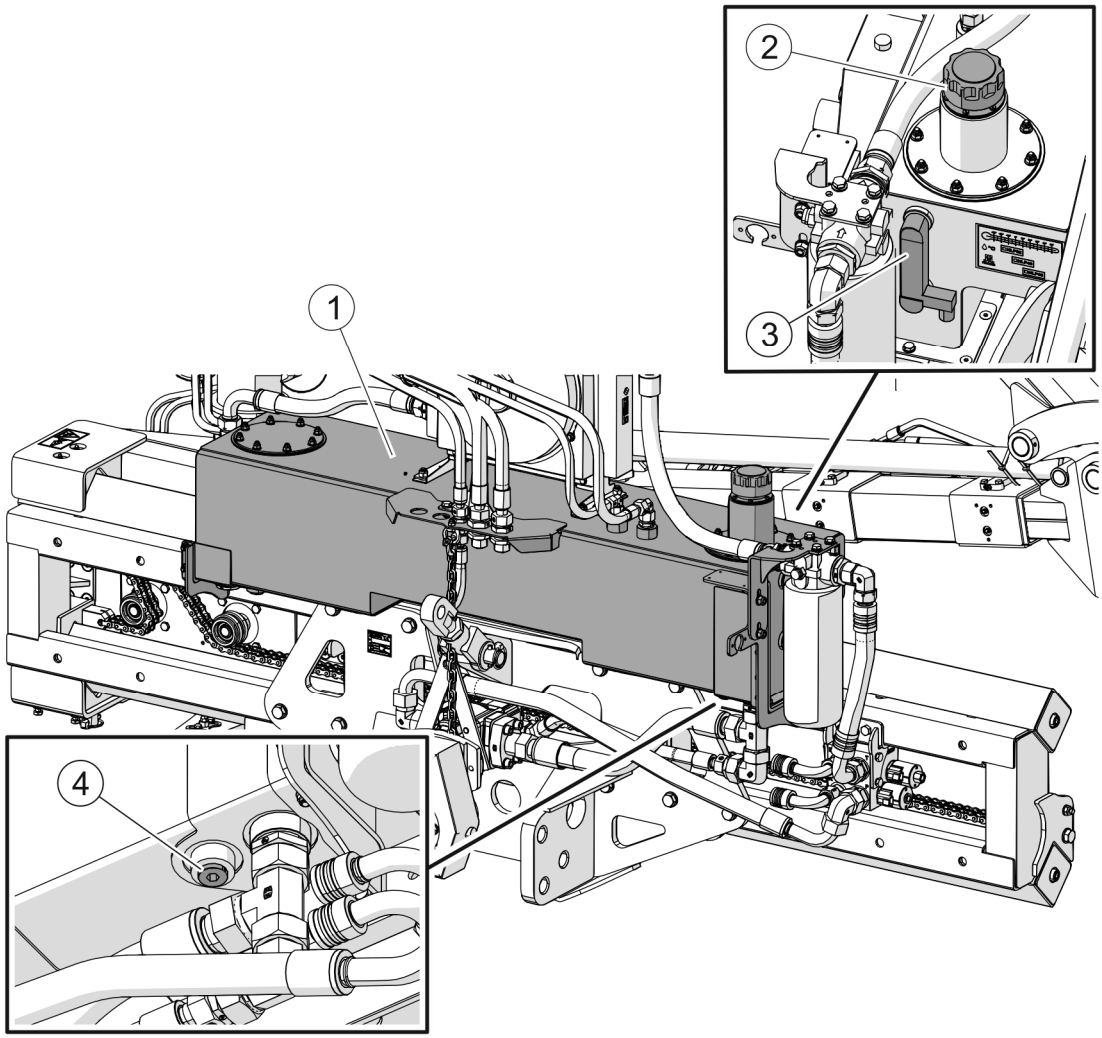


FIGURE 5.1 Oil tank

(1)- oil tank; (2)- oil filler cap with strainer; (3)- oil level indicator; (4)- drain plug.

Change the oil in the tank (1) after every 1000 hours of operation of the multifunction arm or once a year, whichever occurs first. To change the oil in the tank, unscrew the filler plug (2) and then unscrew the drain plug (4) to drain oil to a previously prepared container. Pour fresh oil into the tank through a strainer in the filler plug (2) of the oil tank having previously screwed the drain plug (4) in.

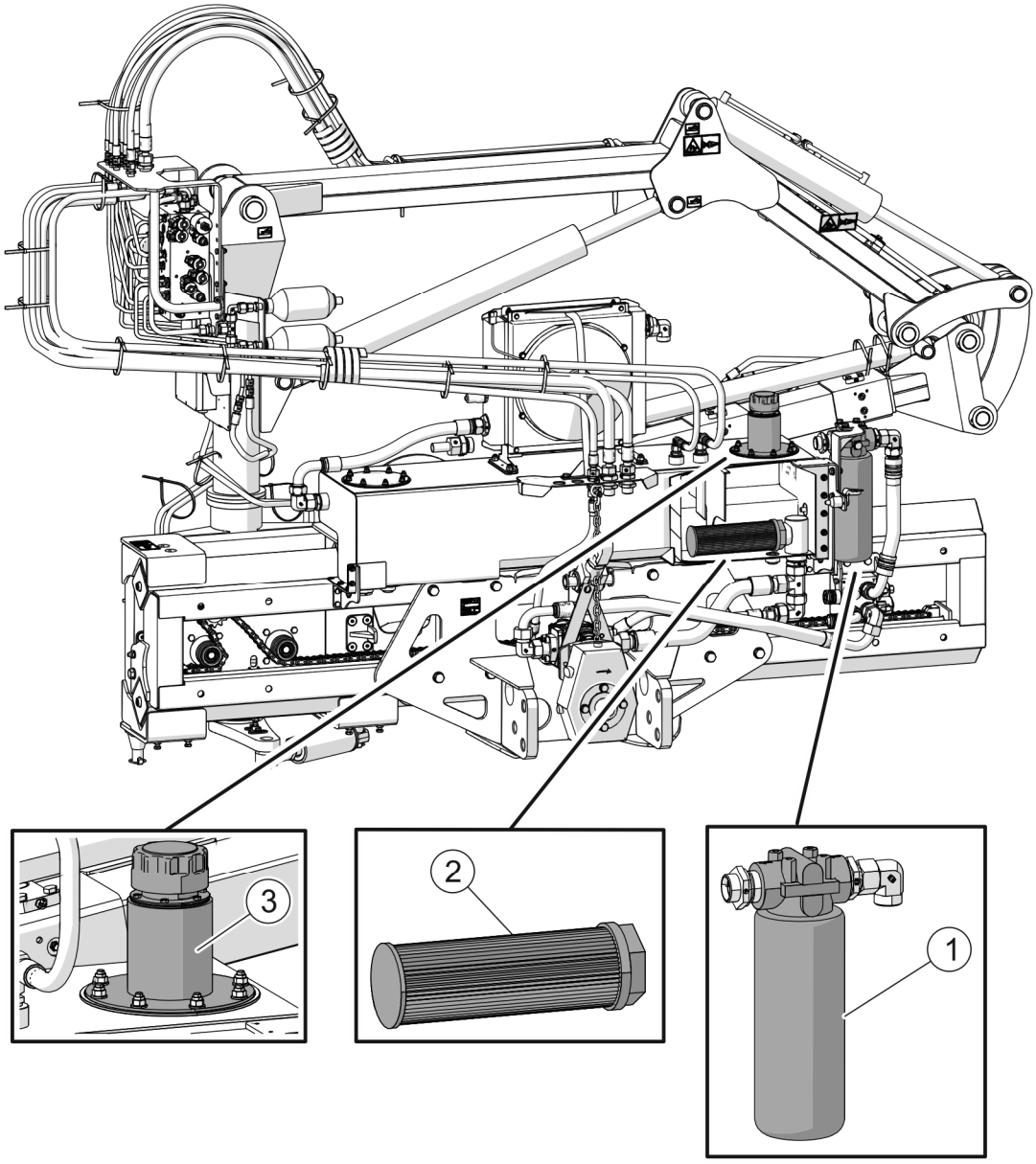


FIGURE 5.2 Oil filters in the hydraulic system.

(1)- oil filter on the oil return to the tank; (2)- oil suction filter; (3)- tank inlet cover.

While changing oil in the tank, always change the suction filter (2) inside the tank and the filter (1) on the oil return to the tank.

Before pouring oil in, change the suction filter (2) (FIGURE 5.2) inside the oil tank.

Replace the suction filter (2) (inside the oil tank) every 1000 hours of operation of the multifunction arm or once a year while changing oil in the tank, whichever occurs first. To this end, unscrew the tank inlet cover (3) and through the opening in the tank unscrew the oil suction filter (2).

The oil filter (1) is located on the oil return to the tank. Filter clogging sensor fitted in the filter housing triggers a light indicator on the multifunction arm control panel (7) (FIGURE 4.5) or the filter clogging level can be checked on the sight glass located on the filter (depending on filter version). Replace the filter each time the filter clogging light indicator is activated.

If the oil filter is not changed after activation of the filter clogging light indicator (7), the power supply of the control system will be switched off after 5 minutes of operation with the clogged filter (the system will switch to standby mode).

The filter should be replaced for the first time after 100 hours of multifunction arm operation regardless of whether the sensor indicates a clogged filter. Replace the oil filter (1) also when changing oil in the tank. In order to change filter:

- unscrew the clogged filter housing;
- cover sealing ring of new filter with oil (a few drops);
- screw in new filter until sealing ring and casing make contact and then screw in by hand making one more half turn (do not screw in too tightly).

NOTE

When unscrewing used suction filter (2) or oil filter (1) (FIGURE 5.2), do not use hammer, chisel etc. as this may damage the filter body. Use filters recommended by the machine manufacturer (original filters).

Screw in filter by hand, without use of any tools.

Each time you change the oil and filters and during the daily checks of the multifunction arm hydraulic system, check the oil level on the tank sight glass (3) (FIGURE 5.1). Sight glass float indicator should be near the top. Oil indicator has a minimum oil level sensor. If the light (9) (FIGURE 4.5) lights up on the multifunction arm control panel, add the oil to the required level.

5.1.2 MULTIPLIER GEAR BOX WITH THE HYDRAULIC OIL PUMP ASSEMBLY

NOTE

Depending on the intended method of hitching the multifunction arm to the tractor (carrier vehicle), the hydraulic pumps assembly together with the multiplier gear box can assume two different positions (FIGURE 5.3)

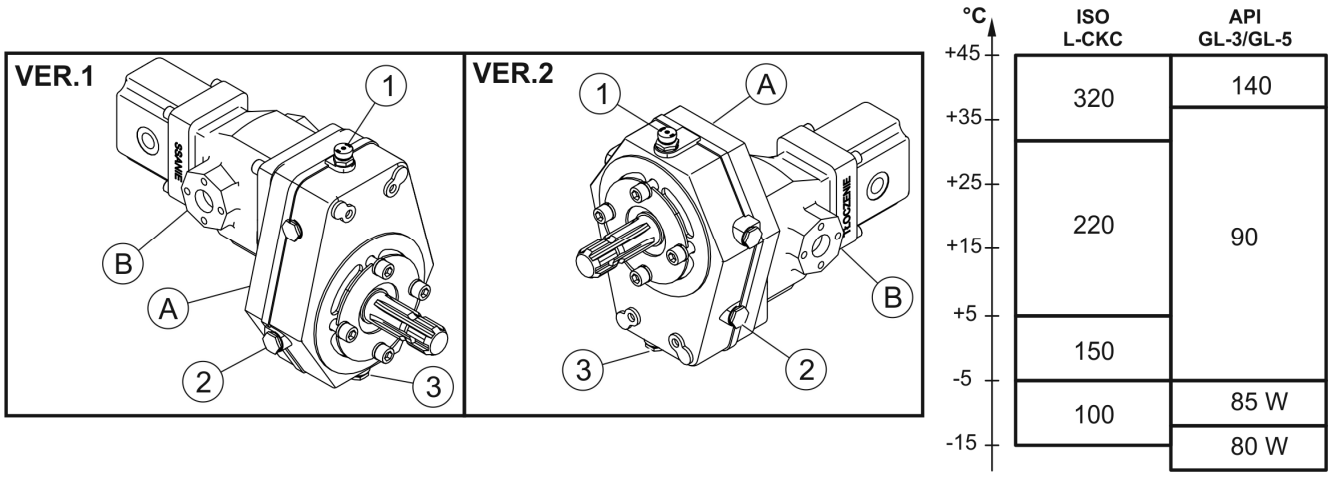


FIGURE 5.3 Multiplier gear box with a hydraulic pump and viscosity classification of gear oils depending on the ambient temperature.

(A)- multiplier gear box; (B)- hydraulic pumps assembly; (1)- oil filler cap with air vent; (2)- sight glass; (3)- drain plug.

There must be no oil leaks from the multiplier gear box (A) and pumps (B) (FIGURE 5.3). These can be stopped by tightening the mounting bolts or replacing the seals. If needed, unscrew the oil filler cap (1) and top up gear oil to the sight glass level (2). To change oil, unscrew the drain plug (3) and drain oil into a prepared container. Then pour oil into the multiplier gear box through filler plug (1) to the sight glass level (2).

NOTE

ISO L-CKC or API GL-3 / GL-5 quality class gear oil may be used. The viscosity class of the gear oil is selected depending on the ambient temperature (FIGURE 5.3).

The multiplier gear box is filled with gear oil of API GL-3 / GL-5 quality class and SAE 90 viscosity class as standard.

NOTE

Tighten the G3/8" plugs (drain plug, filler plug, sight-glass and air vent of the multiplier gear box) with 30 Nm (+/- 2 Nm) torque.

5.1.3 ELECTROHYDRAULIC SELECTIVE CONTROL VALVES

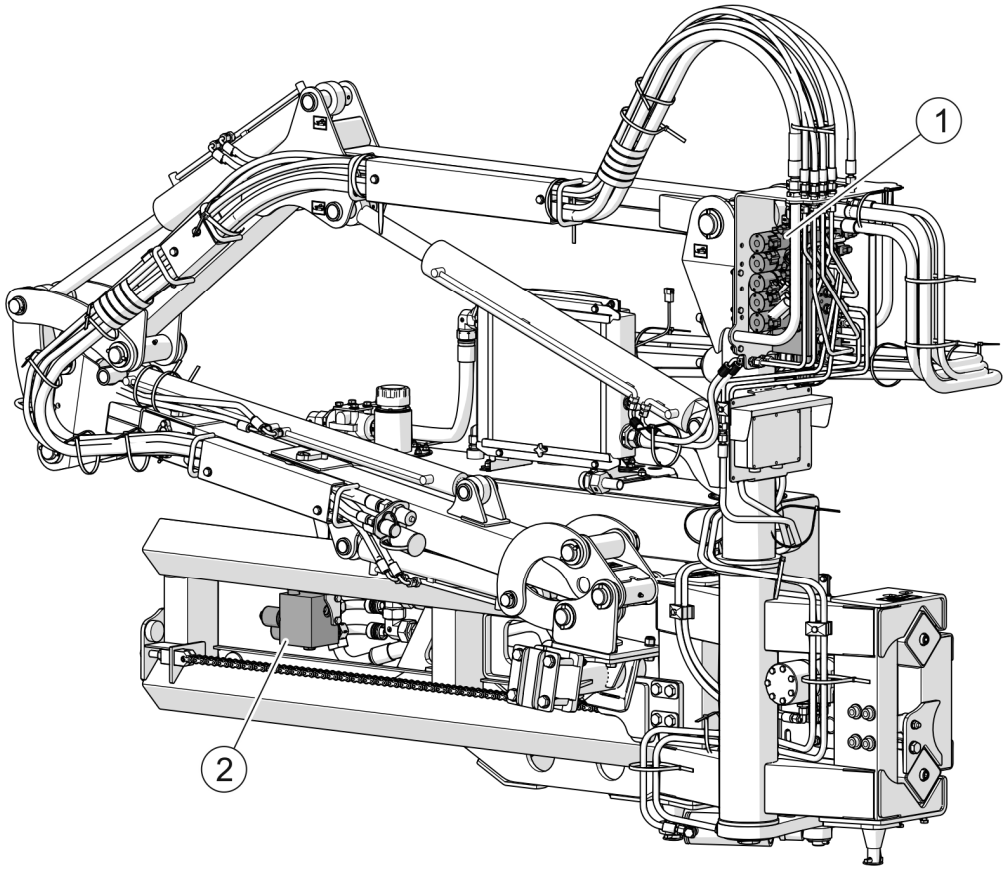


FIGURE 5.4 Electrohydraulic selective control valves.

(1) - electrohydraulic selective control valve of cylinders of support system arms; (2) - electrohydraulic selective control valve of the working head's hydraulic motor.

The electrohydraulic selective control valve (1) (FIGURE 5.4) is used to control the five hydraulic cylinders of the support system. Single-section selective control valve (2) starts the working head's hydraulic motor. Selective control valves are controlled by means of control panel from the tractor cab. Condition of seals of selective control valves should be checked daily.

NOTE

Each electrohydraulic selective control valve is equipped with overflow valves that are set in the factory by the Manufacturer for proper working pressure of the multifunction arm's hydraulic system.

Do NOT adjust overflow valves because it may lead to damage to the multifunction arm's hydraulic system and working head. Adjustment of overflow valves should be carried out by an authorised service station of the machine manufacturer.

5.2 LUBRICATION

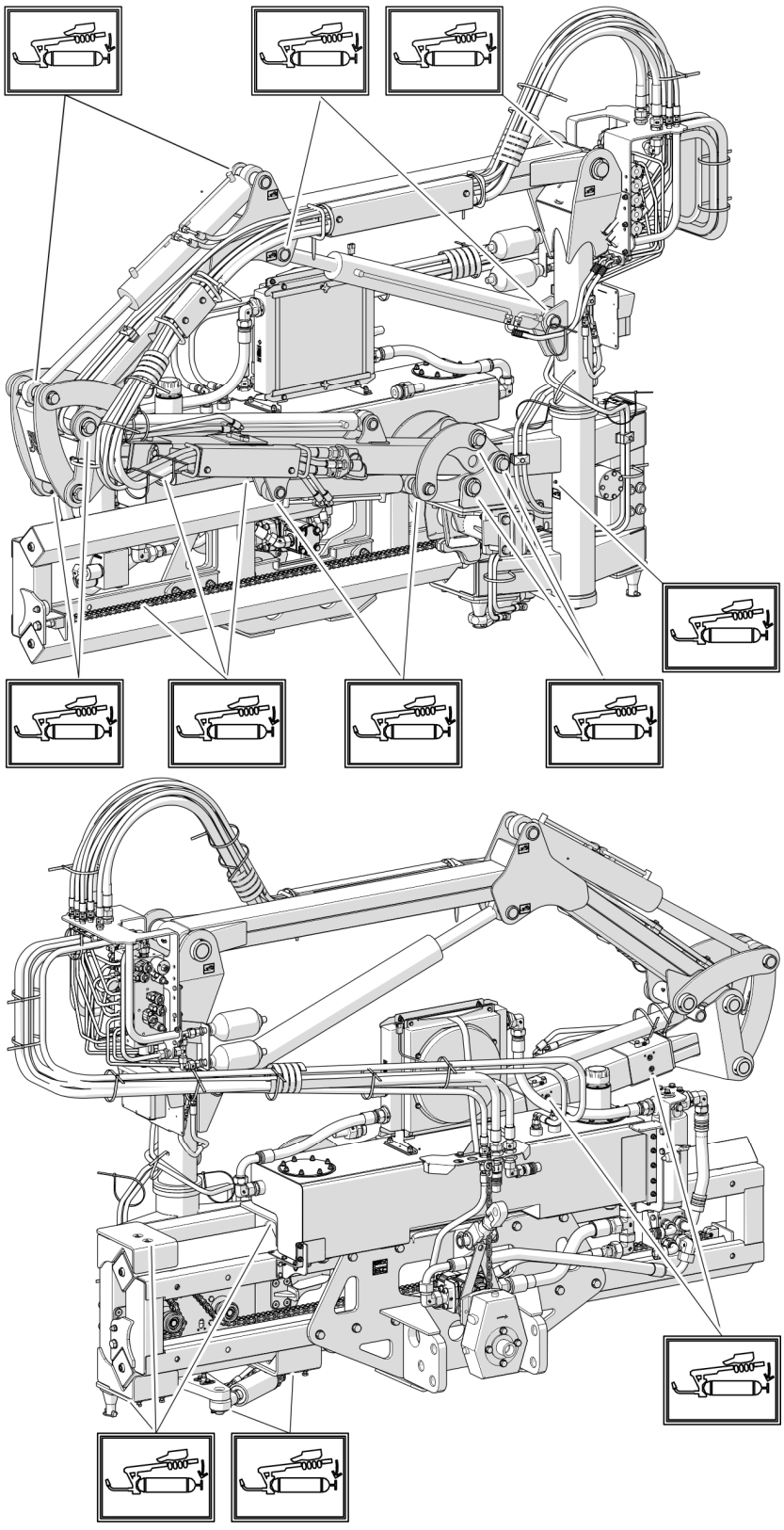


FIGURE 5.5 Location of lubrication points.

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

Grease all grease nipples (FIGURE 5.5) located on the machine in places marked with the following pictogram:

The lubrication points are the following: all the hinge pins of the support system, hydraulic cylinder eyes, extending arm of support system, chain of slide drive mechanism and slide of support system.

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

5.3 TIGHTENING BOLT CONNECTIONS

Before each use of the machine and during maintenance and repair work, confirm that all bolt connections are properly tightened. If any clearances in bolt connections are found, tighten bolt connections using appropriate tightening torque (TABLE 5.2), unless other tightening parameters are given. Recommended tightening torque values apply to non-greased steel bolts.

NOTE

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

NOTE

The bolt fixing the safety device arm to the mast should be tightened every 24 hours using the tightening torque of 1400 Nm (FIGURE 5.6).

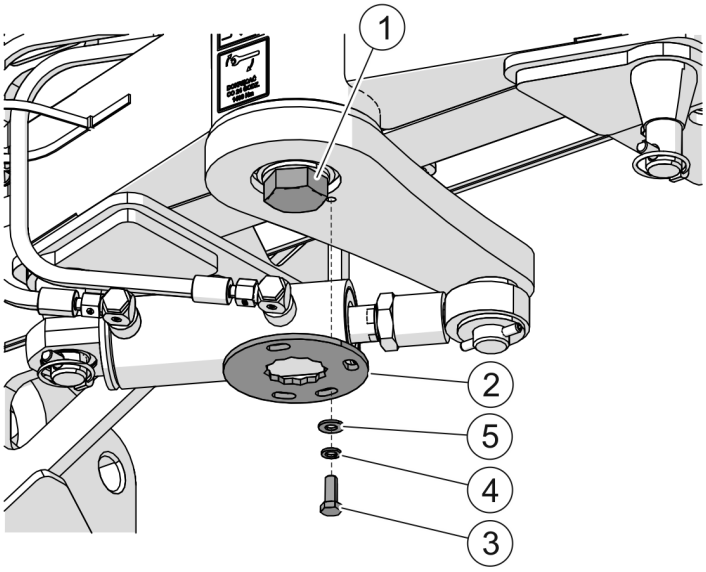


FIGURE 5.6 Bolt fixing the safety device arm to the mast.

(1)- bolt; (2)- protection plate; (3)- bolt; (4)- spring washer; (5)- washer

TABLE 5.2 TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS

THREAD DIAMETER [mm]	**5.8**	**8.8**	**10.9**
	TIGHTENING TORQUE [Nm]		
M6	8	10	15
M8	18	25	36
M10	37	49	72
M12	64	85	125
M14	100	135	200
M16	160	210	310
M20	300	425	610
M24	530	730	1,050
M27	820	1,150	1,650
M30	1050	1,450	2,100
M32	1050	1,450	2,100

5.4 STORAGE

After completed work, the multifunction arm should be carefully cleaned and washed with a water jet. While washing, do not direct a strong water or steam jet at information and warning decals, bearings, hydraulic lines and wiring harnesses. Nozzle of pressure or steam washer should be kept at a distance of not less than 30 cm from cleaned surface.

After cleaning, inspect the whole machine, inspect technical condition of individual elements. Repair or replace any used or damaged components.

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

If the multifunction arm will not be used for a long period of time, protect it against adverse weather conditions. Lubricate the multifunction arm according to the instructions provided. In the event of a prolonged storage, it is essential to lubricate all components regardless of the date of the last lubrication. Protect against corrosion all cooperating elements i.e. pins, articulated joints, hydraulic cylinder pistons, guides of support system slide. Cover them with a thin layer of grease.

The multifunction arm should be stored in a roofed building inaccessible for children and animals. The multifunction arm unhitched from the carrier vehicle should be placed on the stand, on level, sufficiently hard surface in such a manner as to ensure that it is possible to hitch it again. The arms of the multifunction arm should be placed in transport position. The multifunction arm's control panel and joystick should be dismounted from the tractor's cab and protected against adverse weather conditions.

5.5 TROUBLESHOOTING

TABLE 5.3 TROUBLESHOOTING

TYPE OF FAULT	POSSIBLE CAUSE	REMEDY
It is impossible to control support system arms	Control panel is damaged	Repair at an authorised service point
	Multifunction arm's hydraulic system is out of order	Check individual elements of the multifunction arm's hydraulic system
	Burnt out fuse	Replace the fuse on the power supply wiring harness
Overheating of the multiplier gear box	Incorrect oil level	Check oil level.
	Damaged bearing	Repair at an authorised service point
It is impossible to start the working head	Control panel is damaged	Repair at an authorised service point
	Selective control valve is damaged	Repair at an authorised service point
	Hydraulic pump is damaged	Repair at an authorised service point
Oil cooler fan does not turn on	No power	Check the supply voltage
	Faulty temperature sensor	Replace the sensor

NOTES