



**PRONAR Sp. z o.o.**

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

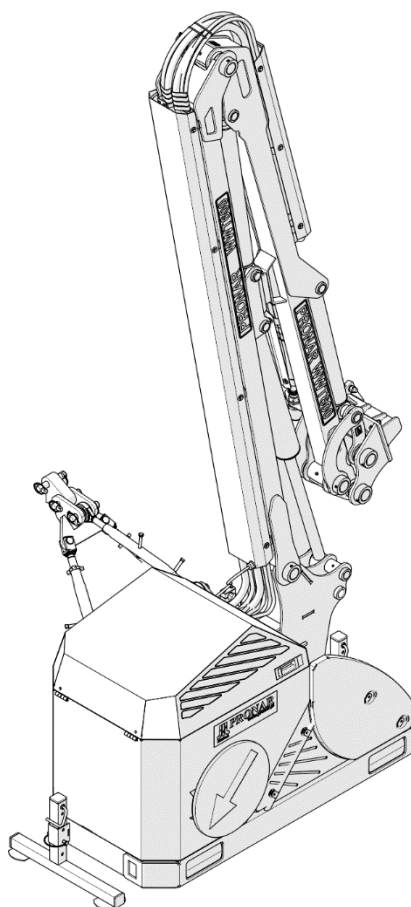
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# **OPERATOR'S MANUAL**

## **MULTIFUNCTION ARM PRONAR WWT600**

TRANSLATION OF THE ORIGINAL COPY OF THE MANUAL



EDITION 1A-05-2016

PUBLICATION NO. 21N-00000000-UM

EN



# MULTIFUNCTION ARM

## PRONAR WWT600

### MACHINE IDENTIFICATION

SYMBOL /TYPE:

SERIAL NUMBER:

|  |  |  |  |  |  |
|--|--|--|--|--|--|
|  |  |  |  |  |  |
|--|--|--|--|--|--|

# INTRODUCTION

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

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

The manual describes the basic safety rules and operation of PRONAR WWT600 multifunction arm. If the information stated in the Operator's Manual needs clarification then the user should refer for assistance to the sale point where the machine was purchased or to the Manufacturer.

## MANUFACTURER'S ADDRESS:

*PRONAR Sp. z o.o.  
ul. Mickiewicza 101A  
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## CONTACT TELEPHONES

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## SYMBOLS APPEARING IN THIS OPERATOR'S MANUAL

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



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

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



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

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



Additional tips and advice for machine operation are marked:



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

## DIRECTIONS USED IN THIS OPERATOR'S MANUAL

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

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



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## EC DECLARATION OF CONFORMITY OF THE MACHINERY

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

| Description and identification of the machinery |  |
|---|--|
| Generic denomination and function:              | <b>Multifunction arm</b>               |
| Type:   | <b>WWT600</b>                          |
| Model:  | —                                      |
| Serial number:                                  |  |
| Commercial name:                                | <b>Multifunction arm PRONAR WWT600</b> |

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 2015-12-09

*Place and date*

Z-CA DYREKTORA  
d/s technicznych  
członek zarządu  
*Roman Ormelianiuk*

*Full name of the empowered person  
position, signature*





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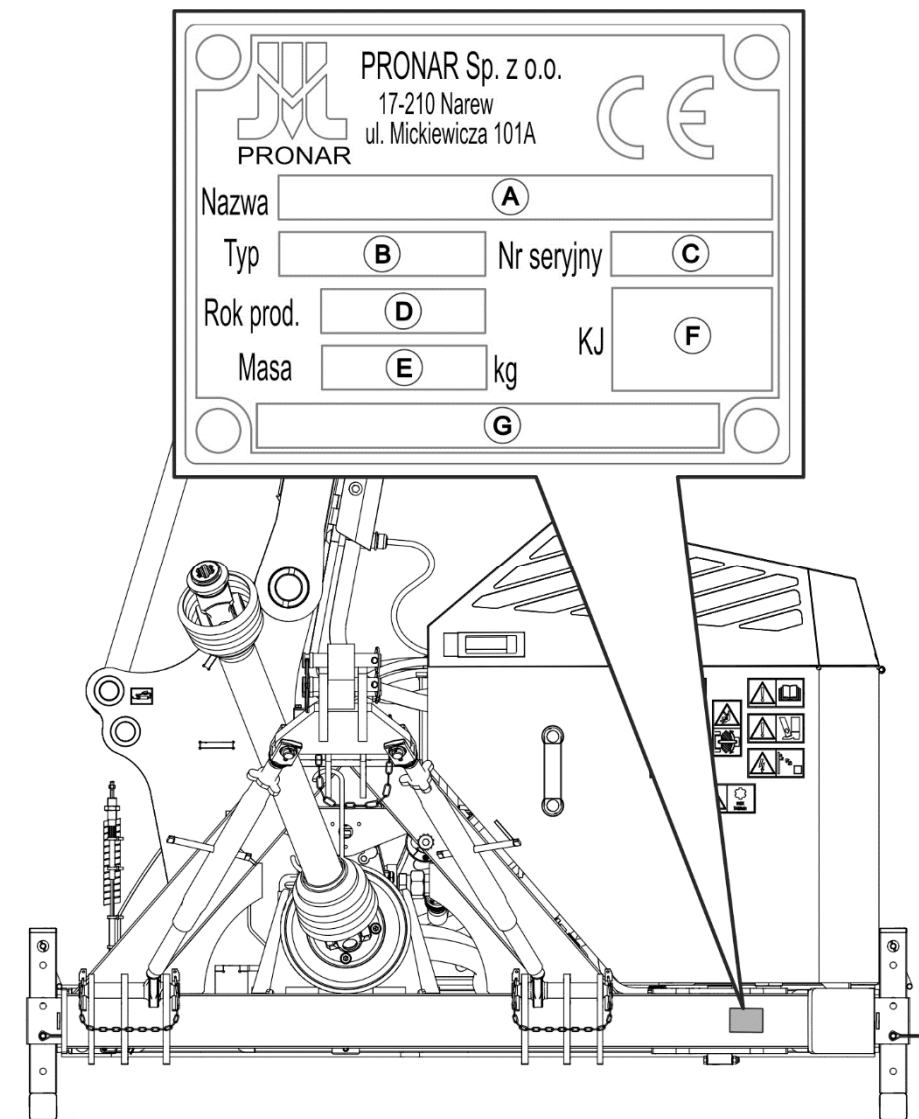
***SECTION***

**1**

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**BASIC  
INFORMATION**

## 1.1 IDENTIFICATION



**FIGURE 1.1** Location of the data plate.

PRONAR WWT600 multifunction arm is marked with the data plate located on the lower part of the multifunction arm's frame (FIGURE 1.1). When buying the machine check that the serial numbers on the machine agree with the number written in the *WARRANTY BOOK*, in the sales documents and in the *OPERATOR'S MANUAL*.

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

A - machine name,                      B - machine type/symbol  
C - serial number,                      D - year of manufacture,  
E - gross weight [kg],                      F - Quality Control marking,  
G – machine name, name extension

## 1.2 INTENDED USE

PRONAR WWT600 multifunction arm is designed according to current safety requirements and engineering standards.

PRONAR WWT600 multifunction arms is designed for cooperating with various types of compatible working heads.

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. It could be used for maintaining grass and hedges, trimming branches and boughs, cleaning field drains and for maintaining road infrastructure. Exact intended purpose of the multifunction arm-working head set is described in the Operator's Manual of a given working head. The multifunction arm's jointed design and its far reach enables 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 forbidden 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 its intended purpose.

### 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 transport of 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'S 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 a given country, in which the machine is used,
- carefully read the carrying vehicle's operator's manual and comply with its recommendations.

**TABLE 1.1 Requirements for carrying vehicle (agricultural tractor).**

| CONTENTS  | UNIT | REQUIREMENTS  |
|---|------|---|
| <b>Carrying vehicle's (tractor's) three-point linkage</b> |      | Rear three-point linkage of Category II according to ISO 730-1 standard |
| <b>Rear power take-off shaft (PTO)</b>                    |      |   |
| Type  | -    | Type 1 (1 3/8") acc. to ISO 730-1                                       |
| Rotation speed  | RPM  | 540   |
| Number of splines on PTO shaft                            | pc.  | 6   |
| Rotation direction  | -    | clockwise   |
| <b>Electric sockets</b>                                   | —    | 3-pin socket, 12V (power supply of cooler fan)                          |
|   | —    | 7-pin socket, 12V (power supply of rear lamp assembly)                  |
| <b>Other requirements</b>                                 |      |   |
| Minimum carrying vehicle's weight                         | kg   | 4500  |

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

- are familiar with the contents of this publication and with the contents of the carrying vehicle Operator's 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.

## 1.3 EQUIPMENT

**TABLE 1.2**      Equipment of PRONAR WWT600 multifunction arm

| EQUIPMENT   | STANDARD | OPTION |
|---|----------|--------|
| Operator's Manual   | •        |        |
| Warranty book   | •        |        |
| Drive shaft 5R 502 4 BA 502   |          | •      |
| Working head connection TYPE 60   |          | •      |
| Wiring harness of the carrying vehicle (tractor) supplying the cooler fan |          | •      |

## 1.4 TERMS OF WARRANTY

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

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

In the event of damage arising from:

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

the user will lose the right to warranty service.

**TIP**

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

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

Modification of the multifunction arm 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 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 fittings.

**ATTENTION**

**Before transporting independently, the carrying vehicle driver must carefully read this Operator's Manual and observe its recommendations. 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 take particular care while driving. This is due to the vehicle's centre of gravity shifting upwards when loaded with the machine.**

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

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

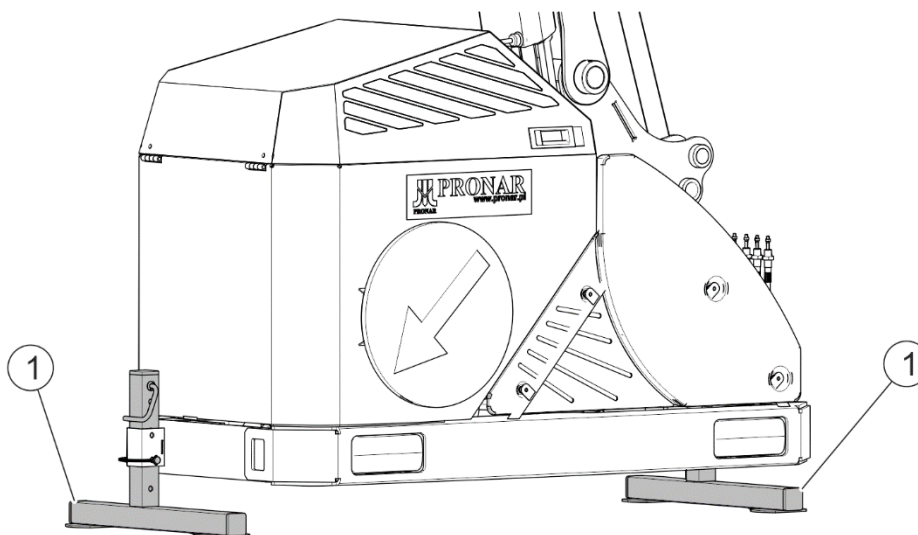
**ATTENTION**

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



**TIP**

During loading, the multifunction arm should be placed in transport position, without the working head. (FIGURE 4.6).



**FIGURE 1.2 Support feet of multifunction arm during loading.**

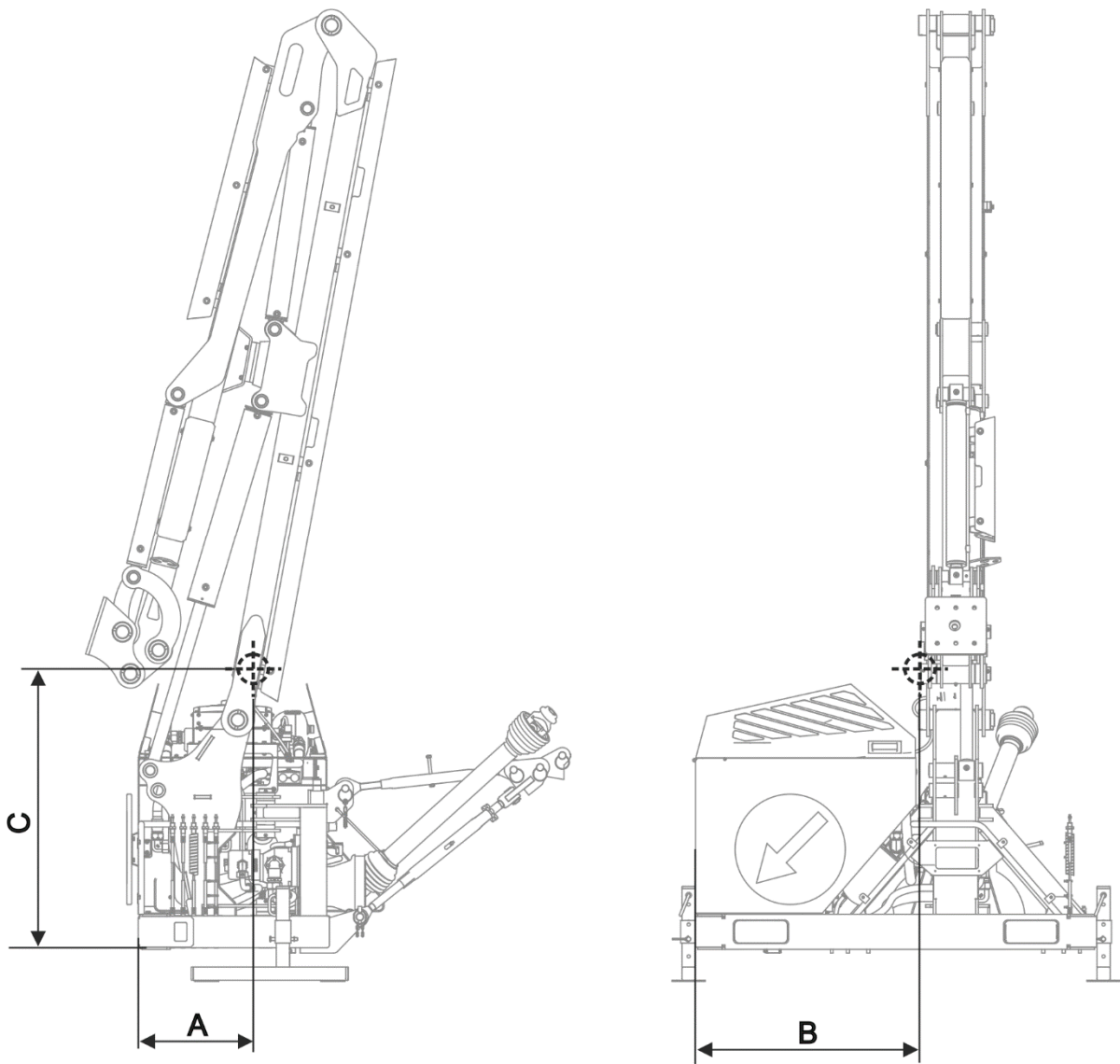
*(1)- support feet.*

During loading and transportation the multifunction arm should stand on support feet (1) (FIGURE 1.2) extended and locked on both sides of the arm at the same height.

The multifunction arm should be attached firmly to the platform of the vehicle using straps or chains fitted with a tightening mechanism. The fastening equipment used must have a valid safety certificate. Exercise particular caution when lifting the machine. During the loading work particular care should be taken not to damage paint coating.

**ATTENTION**

Nobody may be in the manoeuvring zone during transferring multifunction arm to other 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.

| Dimension (FIGURE 1.3 | Unit | WWT600 |
|-----------------------|------|--------|
| A                     | mm   | 433    |
| B                     | mm   | 845    |
| C                     | mm   | 1049   |

## 1.6 ENVIRONMENTAL HAZARDS

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

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

## 1.7 WITHDRAWAL FROM USE

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

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

When spare parts are changed, worn out or damaged parts should be taken to a collection point for recyclable raw materials. Waste oil and also rubber and plastic elements should be taken to establishments undertaking the utilisation of such waste.



### ATTENTION

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

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



***SECTION***

**2**

---

**SAFETY ADVICE**

## 2.1 BASIC SAFETY RULES

### 2.1.1 USE OF MACHINE

- Before using the machine, the user must carefully read this Operator's Manual and the *WARRANTY BOOK*. When operating the machine, the operator must comply with the recommendations.
- The multifunction arm may only be used by persons qualified to drive carrying vehicles (tractors) and trained in the operation of the machine. The multifunction arm can be operated by a single person only.
- If the information stated in the Operator's Manual is difficult to understand, contact a seller, who runs an authorised technical service on behalf of the Manufacturer, or contact the Manufacturer directly.
- Careless and improper use and operation of the machine, and non-compliance with the recommendations given in this operator's manual is dangerous to your health.
- Be aware of the existence of a residual risk, and for this reason the fundamental basis for using this multifunction arm should be the application of safety rules and sensible behaviour.
- The machine must never be used by persons, who are not authorised to drive carrying vehicles (agricultural tractors), including children and people under the influence of alcohol or other drugs.
- Non-compliance with the safety rules of this Operator's Manual can be dangerous to the health and life of the operator and others.
- The machine must not be used for purposes other than those for which it is intended. Anyone who uses the 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 warranty.
- 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 destruction of the safety guards, they must be replaced with new ones.

- Do NOT operate the multifunction arm with the carrying vehicle (tractor) without the driver's cab. The carrying vehicle (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 (ear protectors). In order to reduce the level of noise during work the tractor cab window and door should be closed.

### **2.1.2 HITCHING AND UNHITCHING FROM CARRYING VEHICLE**

- Do not hitch the multifunction arm to the carrying vehicle (agricultural tractor) when the linkage systems of multifunction arm and carrying vehicle are not compatible.
- Only the rear linkage of the carrying vehicle (agricultural tractor) should be used for hitching the machine with the carrying vehicle (agricultural tractor). After hitching the machine, check the safeguards. Carefully read the Operator's Manual of the carrying vehicle (agricultural tractor).
- Use only genuine pins and safeguards to hitch the machine to the carrying vehicle (agricultural tractor)
- The carrying vehicle (agricultural tractor) to which the the multifunction arm will be hitched must be technically reliable and must fulfil the requirements of the machine Manufacturer.
- Be especially careful when hitching the machine to the tractor.
- When hitching, there must be nobody between the multifunction arm and the carrying vehicle (agricultural tractor).
- Unhitching the multifunction arm from the carrying vehicle (agricultural tractor) is forbidden when the working head is raised. Exercise caution when unhitching the machine.
- Hitching and unhitching may only take place when the machine and the tractor are switched off.
- Unhitched multifunction arm must be secured against overturning and supported on 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 connections and the hydraulic conduits. There must be no oil leaks.
- In the event of the hydraulic system malfunction, discontinue using the machine until the malfunction is corrected.
- When connecting the hydraulic conduits 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 oil which has lost its properties should be stored in original containers or replacement containers resistant to action of hydrocarbons. Replacement containers must be clearly marked and appropriately stored.
- Do not store hydraulic oil in packaging designed for storing food or foodstuffs.
- Rubber hydraulic conduits 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, comply with the road traffic regulations in force in the country in which the machine is used.



- Do not exceed the permitted speed arising from road conditions and design limitations. Adjust travel speed to the prevailing road conditions and other limitations arising from road traffic regulations limits.
- Before beginning travel, the multifunction arm must be folded to transport position.
- Do NOT leave working head raised and unsecured while the carrying vehicle (agricultural tractor) is parked. When parked, the working head should be lowered.
- 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 connection elements of the hydraulic system.
- Reckless driving and excessive speed may cause accidents.

### **2.1.5 MAINTENANCE**

- During the warranty period, any repairs may only be carried out by Warranty Service authorised by the manufacturer. It is recommended that necessary repairs to machine should be undertaken by specialised workshops.
- In the event of any fault or damage whatsoever, do not use the multifunction arm until the fault has been corrected.
- During work use the proper, close-fitting protective clothing, gloves and appropriate tools. When working on hydraulic systems it is recommended to use oil resistant gloves and protective goggles.
- Any modification to the multifunction arm frees the manufacturer from any responsibility for damage or detriment to health, which may arise as a result.
- Before undertaking any work on the multifunction arm disconnect carrying vehicle`s (agricultural tractor`s) engine and wait until all rotating parts come to a stop.
- Regularly check the technical condition of the safety devices and correct tightening of bolt connections.

- Regularly perform service inspections of machine as recommended by the Manufacturer.
- Do NOT perform service or repair work under raised and unsupported machine.
- Before beginning repair works on hydraulic systems, reduce oil pressure.
- Servicing and repair work should be carried out in line with the general principles of workplace health and safety. In the event of injury, the wound must be immediately cleaned and disinfected. In the event of more serious injuries, seek a doctor's advice.
- Repair, maintenance and cleaning work should be carried out with the carrying vehicle (agricultural tractor) engine turned off and the ignition key removed. Immobilise the carrying vehicle (agricultural tractor) with parking brake. Ensure that unauthorised persons do not have access to the carrying vehicle (agricultural 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 540 rpm. Do NOT overload the multifunction arm's hydraulic system and also do NOT engage the PTO suddenly.
- Do NOT leave the carrying vehicle (agricultural 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. While reversing raise the multifunction arm.
- 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 carrying vehicle's (agricultural tractor's) cab. Operating the control panel outside the operator's cab is forbidden.
- Do NOT operate the multifunction arm with a carrying vehicle (tractor) which has a complete vehicle kerb weight smaller than 4500 kg.
- 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 carrying vehicle (agricultural tractor) and length of 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 carrying vehicle (agricultural 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 carrying vehicle (agricultural tractor) with the multifunction arm, immediately lower the working head to the ground and stop the carrying vehicle (agricultural tractor).

### **2.1.7 OPERATION OF PTO SHAFT**

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

- The machine may only be connected to the carrying vehicle (tractor) by means of an appropriately selected PTO shaft recommended by the Manufacturer.
- Adjust the length of PTO shaft to compatible carrying vehicle (tractor) according to the Operator's Manual of PTO shaft.
- The PTO shaft has markings on the casing, indicating which end of the shaft shall be connected to the carrying vehicle (tractor).
- Never use a damaged PTO shaft, it may cause an accident. A damaged shaft must be repaired or replaced.
- Disconnect the shaft drive each time when it is not necessary to drive the machine, or when the carrying vehicle (tractor) and the machine are positioned at an unsuitable angle with regard to each other.
- The chains preventing the shaft cover from turning while the shaft is working, shall be secured to a fixed element of machine structure.
- Do NOT use the securing chains to support the shaft while machine is parked or when transporting the machine.
- Before using the machine, the user should thoroughly acquaint himself with the PTO shaft Operator's Manual and adhere to the recommendations contained in it.
- The drive shaft must be equipped with a cover. Do NOT use the shaft with damaged or missing guards.
- After connecting the shaft, ensure that it is correctly and safely connected to the carrying vehicle (tractor) and to the machine.
- Before starting PTO shaft make certain that the PTO rotation direction is correct.
- Before disconnecting the shaft, turn off the engine of the carrying vehicle (tractor) and remove the key from the ignition.
- Do NOT wear loose clothing, straps or whatever that may become wrapped round the rotating drive shaft. Contact with rotating PTO shaft may cause severe injuries.
- Do NOT go over and under the shaft or stand on it equally during work as also when the machine is parked.

## 2.2 DESCRIPTION OF RESIDUAL RISK

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

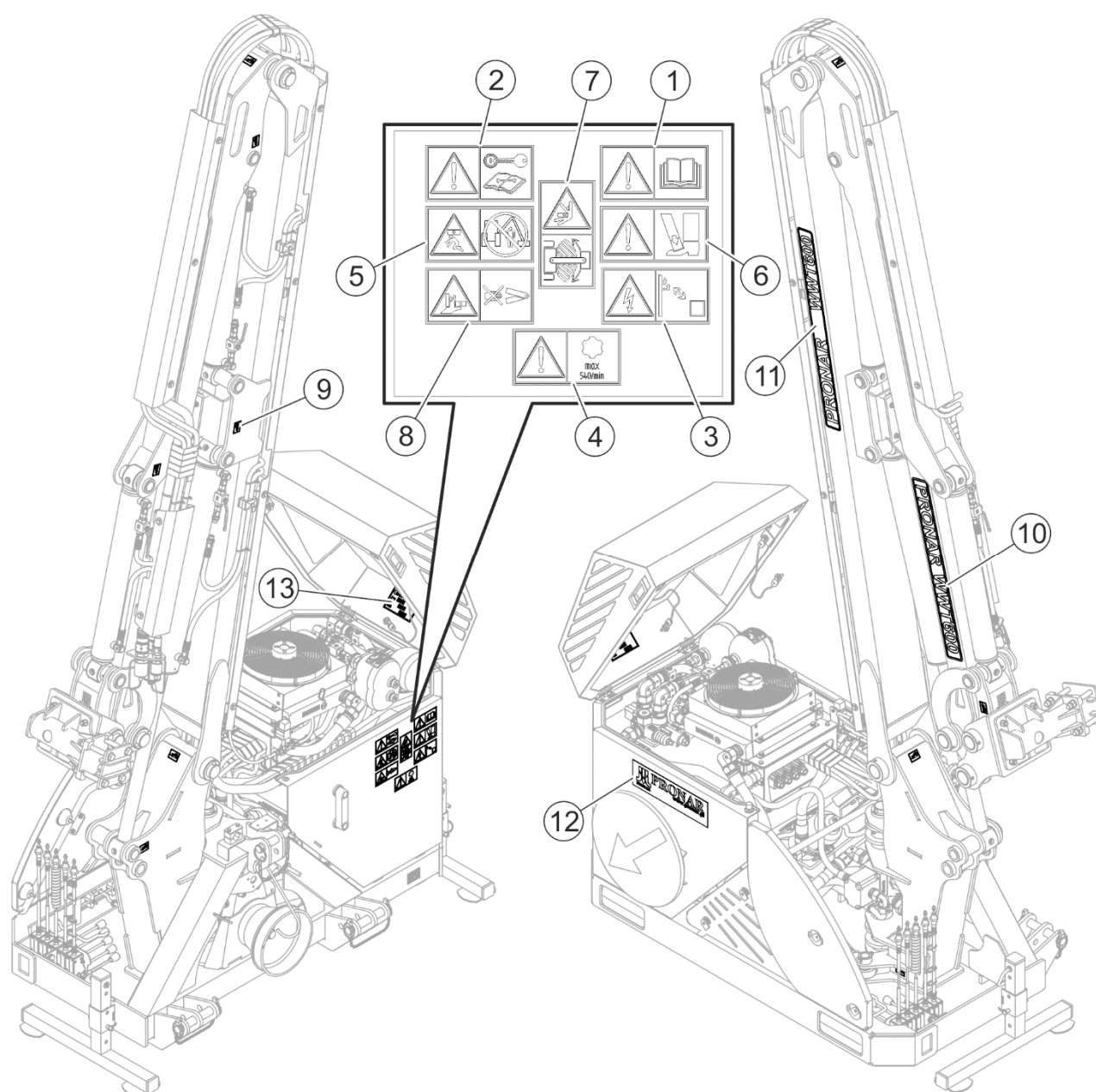
- using the machine for purposes other than those for which it is intended,
- being between the carrying vehicle (agricultural tractor) and the machine while the engine is running and when the machine is being attached,
- being on the machine while the engine is running,
- operating the multifunction arm with removed or faulty safety guards,
- not maintaining safe distance from the danger zone or being within the zones while the machine is operating,
- operation of the machine by persons under the influence of alcohol,
- cleaning, maintenance and technical checks when carrying vehicle (agricultural tractor) is connected and engine is running.

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

- prudent and unhurried operation of the machine,
- reasonably apply all the remarks and recommendations stated in the Operator's Manual,
- carry out repairs and maintenance work in line with operating safety rules,
- 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 safe distance from prohibited or dangerous places
- do not climb on the machine when it is operating

## 2.3 INFORMATION AND WARNING DECALS

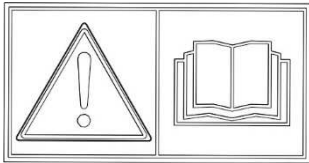
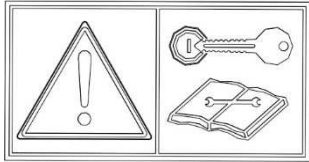
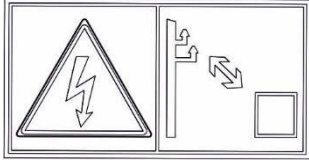
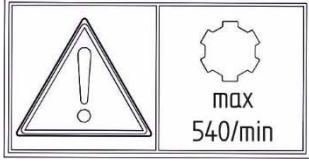
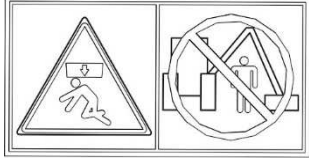
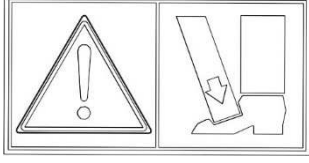
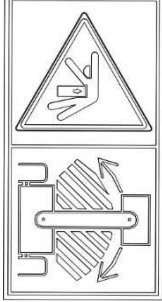
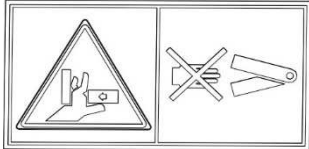
The multifunction arm is marked with the information and warning decals specified in Table 2.1. Throughout the time it is in use, the user of the machine is obliged to take care that notices and warning and information symbols located on the machine are clear and legible. In the event of their destruction, they must be replaced with new ones. Safety decals are available from your PRONAR dealer or directly from PRONAR customer service. New assemblies, changed during repair, must be labelled once again with the appropriate safety signs. During multifunction arm cleaning do not use solvents which may damage the coating of information decals and do not subject them to action of strong water jets.



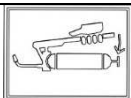

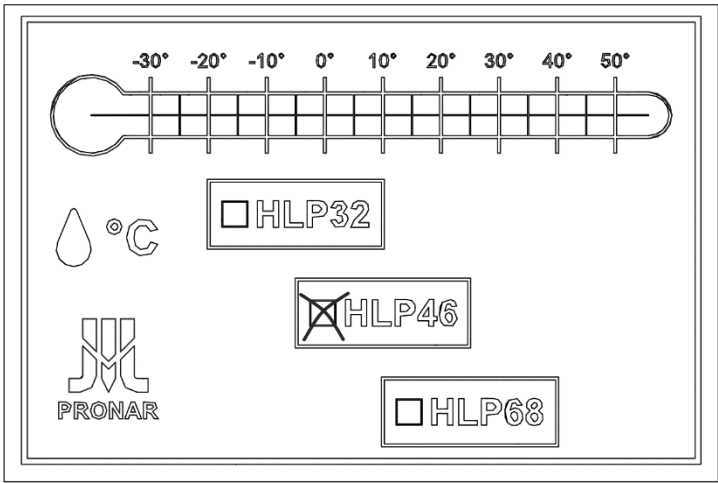
**FIGURE 2.1** Locations of information and warning decals.

*Meaning of decals (TABLE 2.1)*

**TABLE 2.1** Information and warning decals

| NO. | DECAL   | MEANING  |
|-----|---|--|
| 1   |    | Before starting work, carefully read the Operator's Manual.  |
| 2   |    | Before beginning servicing or repairs, turn off engine and remove key from ignition  |
| 3   |    | Take particular care while working near electric power lines. Danger of electric shock.  |
| 4   |   | Maximum allowable PTO shaft rotation speed is 540 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   |  | No bystanders may stay in the areas marked in this way when implement is in use. If any work is required in these areas, make sure the carrying vehicle (agricultural 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.   |



| NO. | DECAL  | MEANING                            |
|-----|--|------------------------------------|
| 9   |   | Lubrication points                 |
| 10  | <b>PRONAR WWT600</b>   | Machine type                       |
| 11  | <b>PRONAR WWT600</b>   | Machine type                       |
| 12  |   | PRONAR decal                       |
| 13  |  | Hydraulic oil classification decal |



***SECTION***

**3**

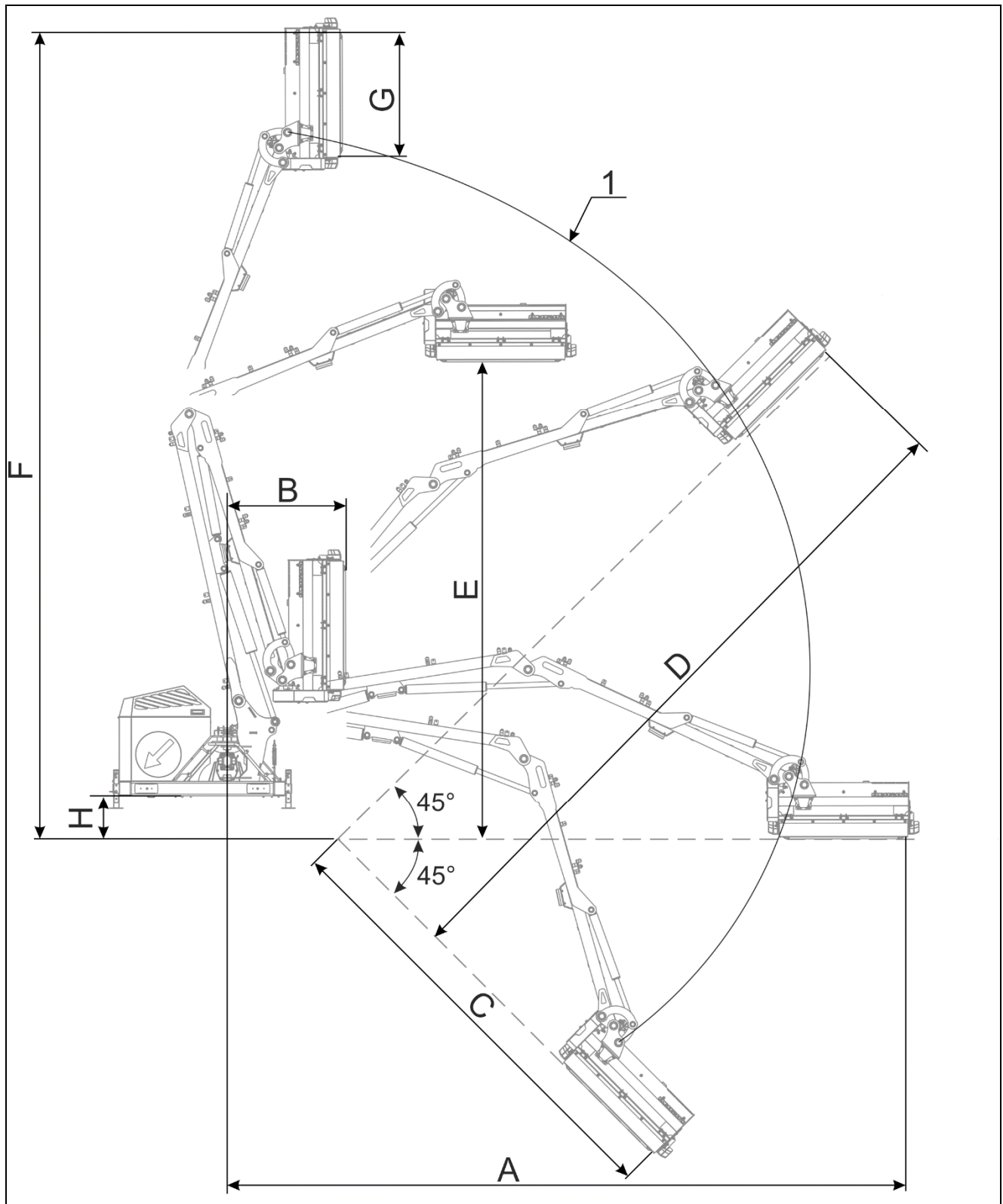
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**DESIGN AND  
OPERATION**

## 3.1 TECHNICAL SPECIFICATION

**TABLE 3.1 BASIC TECHNICAL SPECIFICATION**

|   | Unit | WWT600                       |
|---|------|------------------------------|
| <b>Dimensions</b>   |      |                              |
| Total length in transport setting:                                | m    | 1,35                         |
| Width in transport setting:                                       | m    | 1,63                         |
| Height in transport setting:                                      | m    | 3,56                         |
| <b>Technical specification</b>                                    |      |                              |
| Multifunction arm drive   | -    | Hydraulic - own power source |
| Multifunction arm control   | -    | Mechanical - pull rods       |
| Working pressure of the hydraulic system                          | bar  | 215                          |
| Maximum power of the hydraulic system (head+arm control in total) | kW   | 30                           |
| Oil tank capacity   | l    | 180                          |
| Head rotating angle   | °    | 205                          |
| Floating position rotating angle                                  | °    | 90                           |
| Arm safeguard   | -    | Hydraulic safety device      |
| Oil cooler  | -    | Standard                     |
| Rear lamp assembly  | -    | Standard                     |
| Horizontal reach (measured to centre of attachment)               | m    | 5,17                         |
| Multifunction arm position with regard to the carrying vehicle    | -    | Right                        |
| Weight without a tool (hydraulic system filled with oil)          | kg   | 970                          |



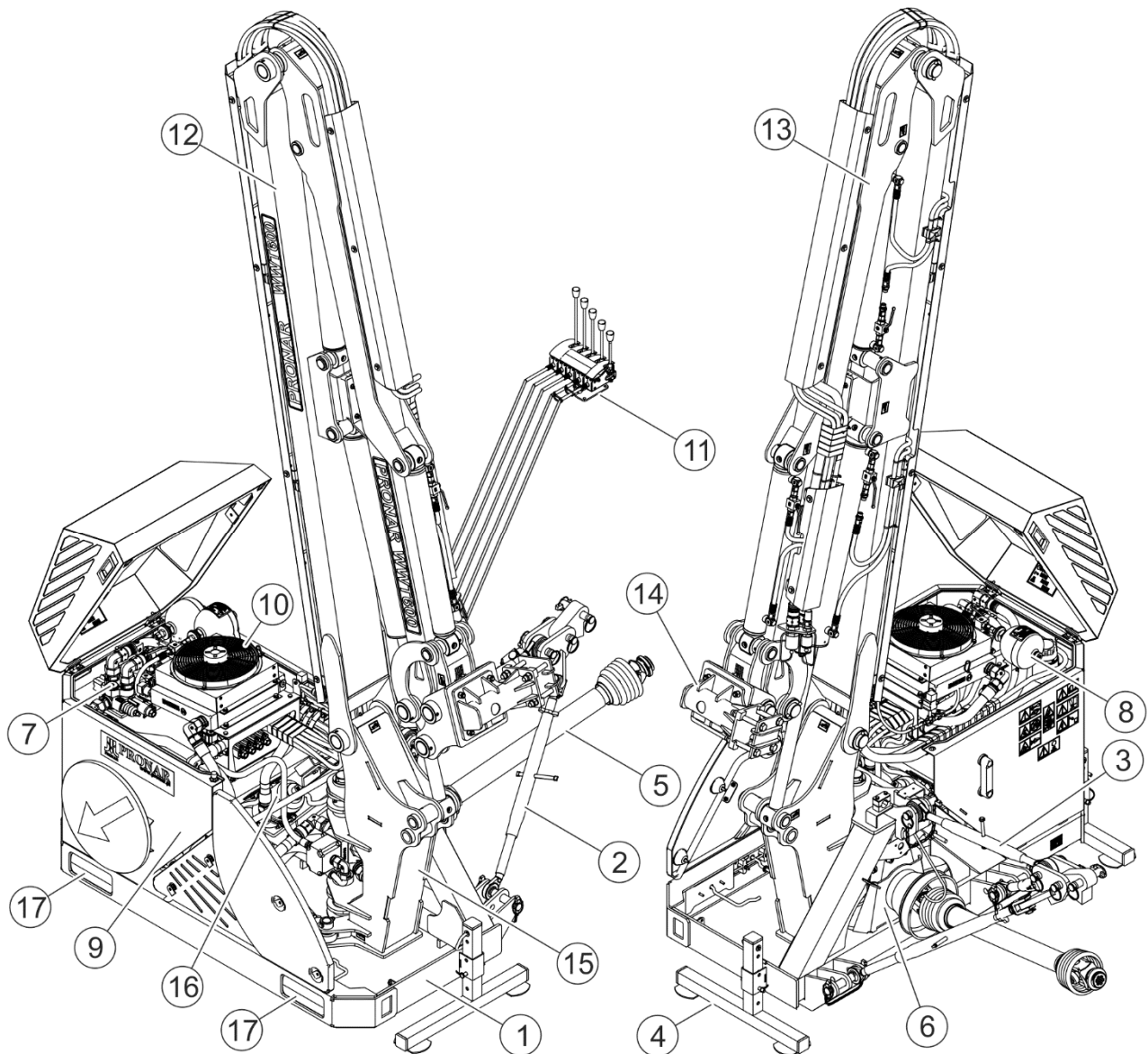
**FIGURE 3.1** Working reach of the multifunction arm with GK110 head.

(1)- reach of centre of attachment;

**TABLE 3.2 WORKING REACH OF THE MULTIFUNCTION ARM (FIGURE 3.1)**

|                                | Unit | WWT600 |
|--------------------------------|------|--------|
| Horizontal reach (A)           | m    | 6,12   |
| Minimum lateral reach (B)      | m    | 1,07   |
| Reach at 45° (C)               | m    | 4,22   |
| Reach on embankment at 45° (D) | m    | 6,23   |
| Maximum hedge height (E)       | m    | 4,37   |
| Vertical reach (F)             | m    | 7,32   |
| Width of GK110 head (G)        | m    | 1,10   |
| Height above ground (H)        | m    | 0,40   |

## 3.2 GENERAL DESIGN AND OPERATION



**FIGURE 3.2 General design**

(1)- frame; (2)- three-point linkage lock; (3)- central connector; (4)- support feet; (5)- drive shaft (option); (6)- multiplier gear box with hydraulic pumps; (7)- hydraulic system; (8)- arm shock absorbing unit; (9)- oil tank; (10)- oil cooler; (11)- control system; (12)- main arm; (13)- end arm; (14)- working head connection (TYPE 80); (15)- rotary hanger; (16)- shock absorbing unit of hydraulic safety device; (17)- rear lamp assembly.

Main elements of the multifunction arm:

- three-point linkage with lock
- working head support system arms
- power transmission system

- hydraulic system with controls.

The multifunction arm design is based on frame (1) to which jointed main arm (12) and end arm (13) are connected through rotary hanger (15). The rotary 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 arms (12) and (13) in transport position. At the end of the arm there is an attachment (14) (TYPE 80) for fixing the working head. Attachment (14) (TYPE 60) (with reduced width of working head handle) is available as an option.

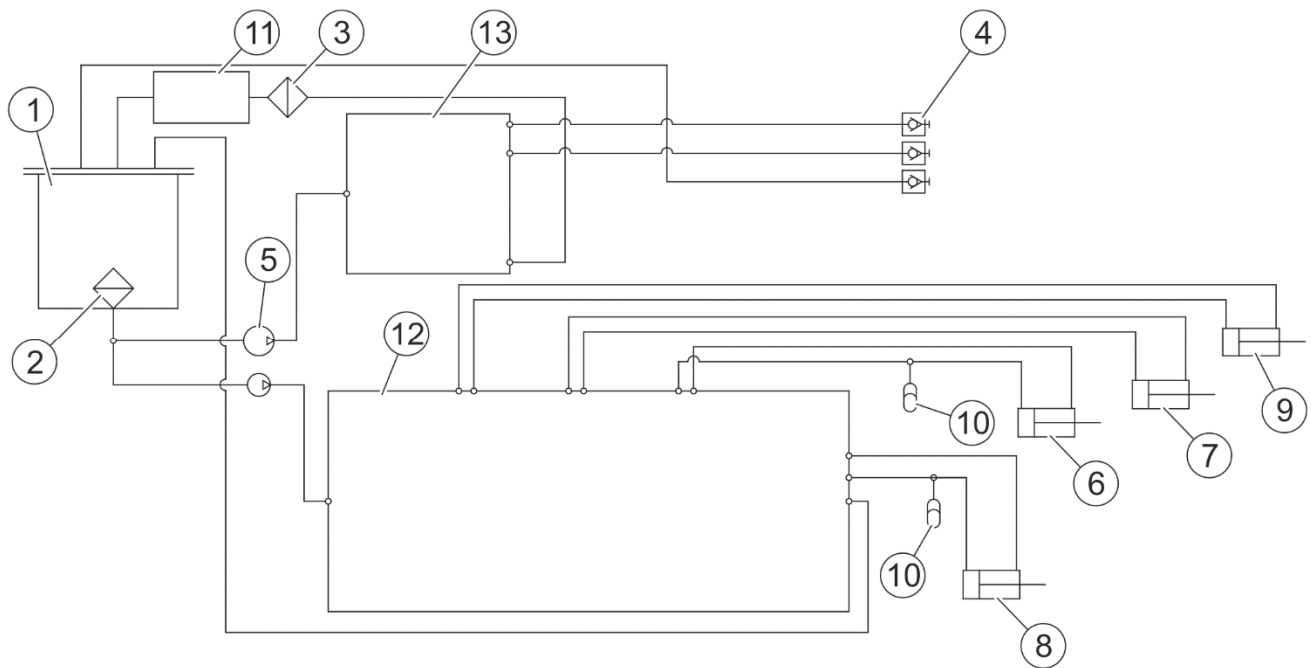
There are three attaching points on the frame, which enables the operator to attach the multifunction arm to the rear linkage of the carrying vehicle (tractor) by means of two bottom links of the carrying vehicle (tractor) and a central link (3). During the operation and transport of the multifunction arm, the carrying vehicle's (tractor's) rear three-point linkage is locked with the three-point linkage lock (2). The three-point linkage lock improves the stability of the carrying vehicle - multifunction arm combination.

The multifunction arm is equipped with an independent hydraulic system (7) driven by the carrying vehicle's (tractor's) power take-off shaft (PTO) via a drive shaft (5) and multiplier gear box (6) with pumps supplying two circuits of the hydraulic system. One circuit of the hydraulic system is for positioning arms and the working head while the other circuit is for driving the working head. Hydraulic pumps draw oil from an independent oil tank (9) via an oil suction filter and pump it into the two hydraulic circuits. Oil tank (9) is located on the frame on the opposite side of the main arm (12) mount. Thanks to this, the oil tank performs also the function of a counterweight.

The hydraulic system is equipped with a hydraulic oil cooler (10) installed on oil return to tank. The cooler fan is powered by the carrying vehicle's (tractor's) electrical system through a wiring harness. The fan is switched on by the relay connected with the thermostat installed near the cooler when the allowed oil temperature in the cooler is exceeded. The cooler fan is switched on when oil temperature exceeds 52°C and switched off when oil is cooled down to a temperature below 42°C.

Main arm (12) and end arm (13) are moved by means of hydraulic cylinders. Hydraulic cylinders enable free manoeuvring of the arms of the multifunction arm to which the working head is attached. Hydraulic cylinders are controlled by means of a hydraulic selective control valve by the carrying vehicle's (tractor's) driver using the controls (11). The selective control valve is controlled mechanically by means of cables connected to the controls levers (11).





**FIGURE 3.3 Hydraulic system - diagram**

(1) - oil tank; (2) - coarse oil filter (suction filter); (3) - fine oil filter; (4) – quick couplers; (5) - tandem pump; (6) - main arm cylinder; (7) - end arm cylinder; (8) - rotation cylinder; (9) - working head rotation cylinder; (10) - hydraulic accumulator; (11) - cooler; (12) – hydraulic selective control valve of cylinders of support system arms; (13) - hydraulic selective control valve of hydraulic motor of working head



*SECTION*

**4**

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**CORRECT  
USE**

## 4.1 PREPARING FOR WORK

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



### ATTENTION!

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

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



### ATTENTION!

**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 pins and locking cotter pins,
- 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 the carrying vehicle (tractor). Start the carrying vehicle's (tractor's) engine, check all systems and perform a test run before beginning work. In order to inspect:

- hitch the multifunction arm to the carrying vehicle (tractor) (see "*HITCHING THE MULTIFUNCTION ARM TO THE CARRYING VEHICLE (TRACTOR)*")
- start PTO drive.

- set multifunction arm in working position.

**DANGER**

Never exceed the PTO's rotational speed of 540 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.

The multifunction arm's operation at no load should be smooth. Shaking of drive transmission is not acceptable, nor is changed 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's Manual.

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

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

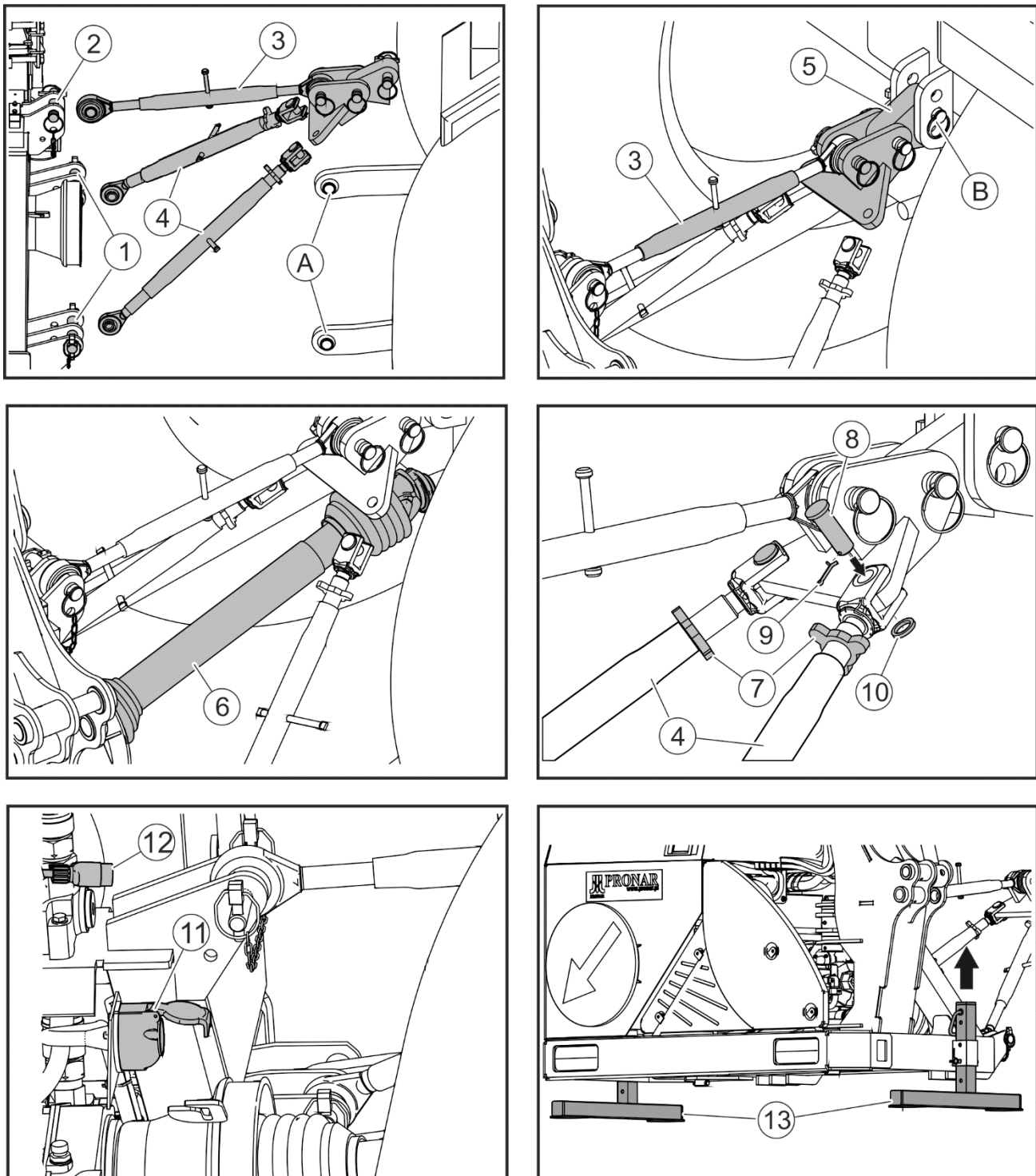
Non-compliance with the safety rules of this Operator's Manual can be dangerous to the health and life of the operator and others.

Before starting the 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 HITCHING THE MULTIFUNCTION ARM TO THE CARRYING VEHICLE (TRACTOR)

PRONAR WWT600 multifunction arm may be hitched to a carrying vehicle (tractor) which meets the requirements specified in Table 1.1 “*REQUIREMENTS FOR CARRYING VEHICLE (TRACTOR)*”.



**FIGURE 4.1** Hitching the multifunction arm to the carrying vehicle (tractor).

(A)- lower links of the rear three-point linkage of carrying vehicle (tractor); (B)- upper securing point of the rear three-point linkage of carrying vehicle (tractor); (1)- lower fixing pins of the multifunction arm's linkage; (2)- upper fixing pin of the multifunction arm's linkage; (3)- central connector of the three-point linkage lock system; (4)- lower links of the three-point linkage lock system; (5)- bracket of the three-point linkage lock system; (6)- drive shaft; (7)- locking nut; (8)- pin of the three-point linkage lock; (9)- cotter pin; (10)-washer; (11)- 7-pole electric socket; (12)- 3-pole electric socket; (13)- support feet.

**ATTENTION!**

Before hitching the multifunction arm to carrying vehicle, read the carrying vehicle (tractor) operator's manual. Comply with the recommendations relating to linkage and mounting points.

**DANGER**

Do NOT operate the multifunction arm with the carrying vehicle (tractor) without the driver's cab. The carrying vehicle (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 carrying vehicle (tractor).

Exercise caution when hitching the machine.

**DANGER**

Do NOT operate the multifunction arm with a carrying vehicle (tractor) which has a complete vehicle kerb weight smaller than 4500 kg.

In order to hitch the multifunction arm to the carrying vehicle's (tractor's) rear three-point linkage, adhere to the following guidelines (FIGURE 4.1):

- Reverse the carrying vehicle (tractor) and bring lower links (A) of the carrying vehicle's (tractor's) three-point linkage to lower pins (1) of the multifunction arm and set them at the same height with pins (1).
- Turn off the carrying vehicle's (tractor's) engine and immobilize the carrying vehicle (tractor).

- Connect lower links (A) of the carrying vehicle's (tractor's) three-point linkage and unlocked lower links (4) of the three-point linkage lock system with two lower pins (1) of the multifunction arm linkage. Secure pins (1) with cotter pins.
- Connect central connector (3) of the three-point linkage lock with the upper fixing point (2) of the multifunction arm linkage.
- Adjust the length of central connector (3) in order to connect the upper securing point of the three-point linkage (B) of carrying vehicle (tractor) with bracket (5) of the three-point linkage lock and secure with a cotter pin;
- Connect the carrying vehicle's (tractor's) rear PTO to the multifunction arm's multiplier gear box by means of the drive shaft (6);

Before connecting the multifunction arm to the carrying vehicle's (tractor's) PTO shaft, the user must read the operator's manual supplied by the PTO shaft's manufacturer and observe all the recommendations contained in it. Before connecting the drive shaft, the user shall check the technical condition of guards, the completeness and condition of securing chains and the overall technical condition of the shaft.

**DANGER**

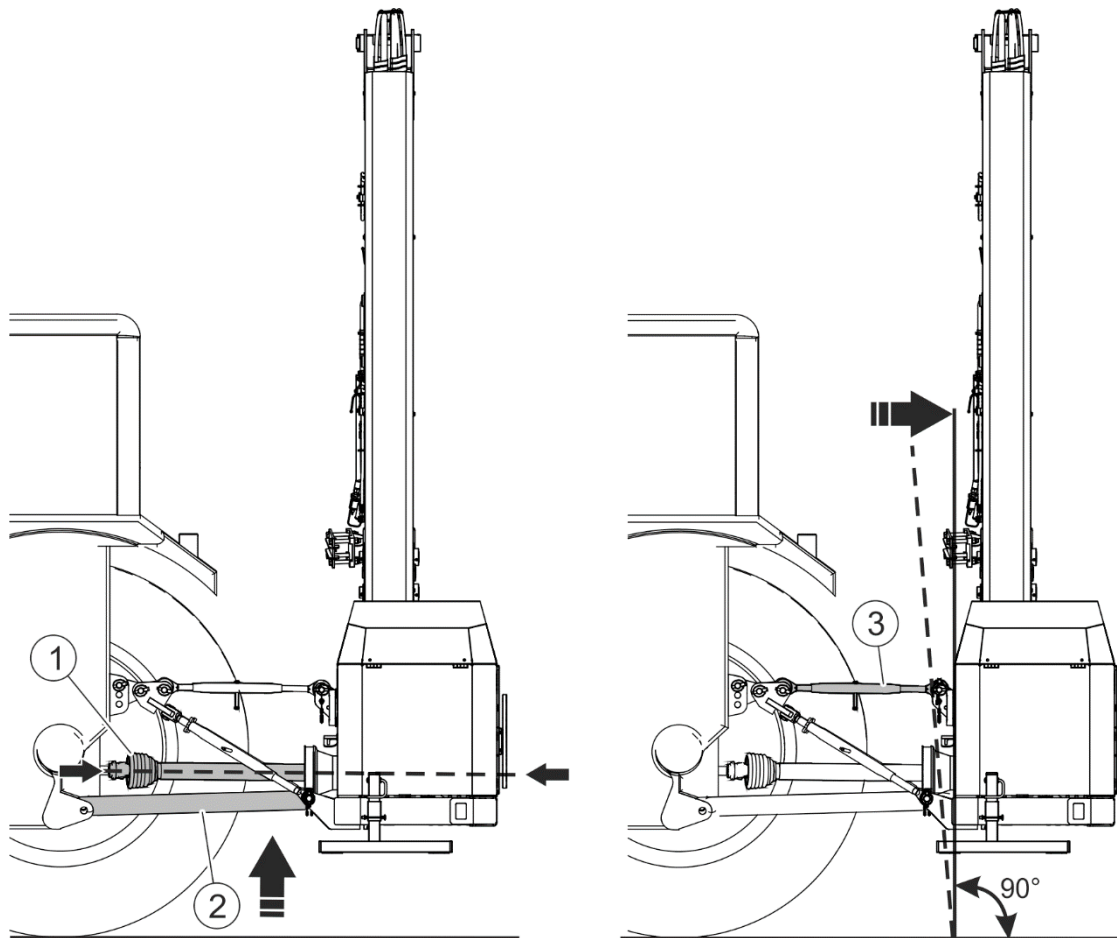
Turn off the carrying vehicle's (tractor's) engine and remove the key from the ignition before connecting the carrying vehicle's (tractor's) rear PTO with the multifunction arm's multiplier gear box. Ensure that unauthorised persons do not have access to the carrying vehicle (tractor) cab.

**DANGER**

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

- When links (4) of the three-point linkage lock system are unlocked (FIGURE 4.1), raise the multifunction arm by means of lower links (2) (FIGURE 4.2) of the rear three-point linkage of the carrying vehicle (tractor) to such a height that drive shaft (1) connecting the multifunction arm's multiplier gear box with PTO shaft of the carrying vehicle (tractor) is positioned horizontally with regard to the ground. Both lower links (2) of the rear three-point linkage of the carrying vehicle (tractor) should be positioned at the same height with regard to the ground.





**FIGURE 4.2** How to position the multifunction arm in relation to the ground.

(1)- drive shaft; (2)- lower links of the carrying vehicle's (tractor's) rear three-point linkage;  
(3)- central link of the three-point linkage lock system.

- Level the multifunction arm by adjusting the length of central link (3).
- Lock the three-point linkage by fixing the fork of links (4) (FIGURE 4.1) to the bracket of the three-point linkage lock using pins (8). Secure the pins with cotter pins (9). Lock the set length of links (4) of the three-point linkage lock by means of lock nuts (7).




### ATTENTION!

Once the carrying vehicle (tractor) rear three-point linkage is locked with the three-point linkage lock, the user shall not use the control of the carrying vehicle (tractor) rear three-point linkage. Otherwise the carrying vehicle (tractor) rear three-point linkage and the three-point linkage lock may be damaged.

- Connect 7-pole electric socket (11) of the power supply system of rear lamp assembly and 3-pole electric socket (12) of power supply system of the multifunction arm's oil

cooler fan with corresponding electric sockets on the carrying vehicle (tractor) (FIGURE 4.1).

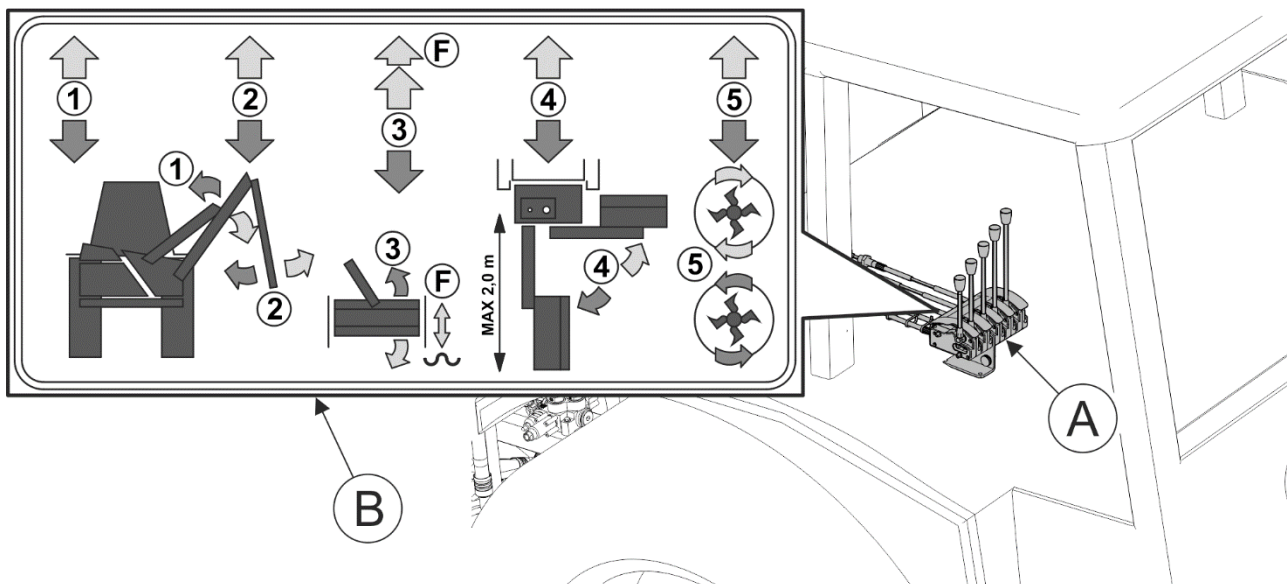
A 3-pole electric socket installed at the rear of the carrying vehicle (tractor) is required to operate the multifunction arm. If the carrying vehicle is not equipped with such a socket or is equipped with a socket of a different type, install the power supply wiring harness on the carrying vehicle to make it possible to connect the multifunction arm's 3-pin electric socket.



**ATTENTION!**

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

- Raise the support feet (10) to the maximum height and secure them with a cotter pin.



**FIGURE 4.3 The multifunction arm controls in the carrying vehicle's (agricultural tractor`s) cab plus a pictogram.**

(A)- controls; (B)- controls pictogram

- Mount the controls (A) (FIGURE 4.3) of the multifunction arm inside the carrying vehicle's (tractor's) cab in the place which makes it possible to manoeuvre the control levers freely from the seat of the carrying vehicle (tractor) operator. The controls should be mounted in a stable manner, without weakening the protective structure of the carrying vehicle (tractor).

## 4.3 START AND OPERATION OF THE MULTIFUNCTION ARM BY MEANS OF THE CONTROLS

Once the multifunction arm is attached to the carrying vehicle (agricultural 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.



### **ATTENTION!**

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

Engage rear PTO in the carrying vehicle (agricultural tractor) at a suitably low speed and then gradually increase the speed until PTO speed of 540 rpm is reached. When the proper PTO speed is reached, one may commence work with the multifunction arm.



### **DANGER**

Never exceed the PTO's rotational speed of 540 rpm. Otherwise the multiplier gear box and hydraulic system of the multifunction arm may be damaged.

The arms of the multifunction arm and working head are controlled by means of the controls inside the carrying vehicle (agricultural tractor) (FIGURE 4.3).



### **ATTENTION!**

All the control panel operations should be performed only from the operator's seat in the carrying vehicle's (agricultural tractor's) cab. Operating the control panel outside the operator's cab is forbidden.

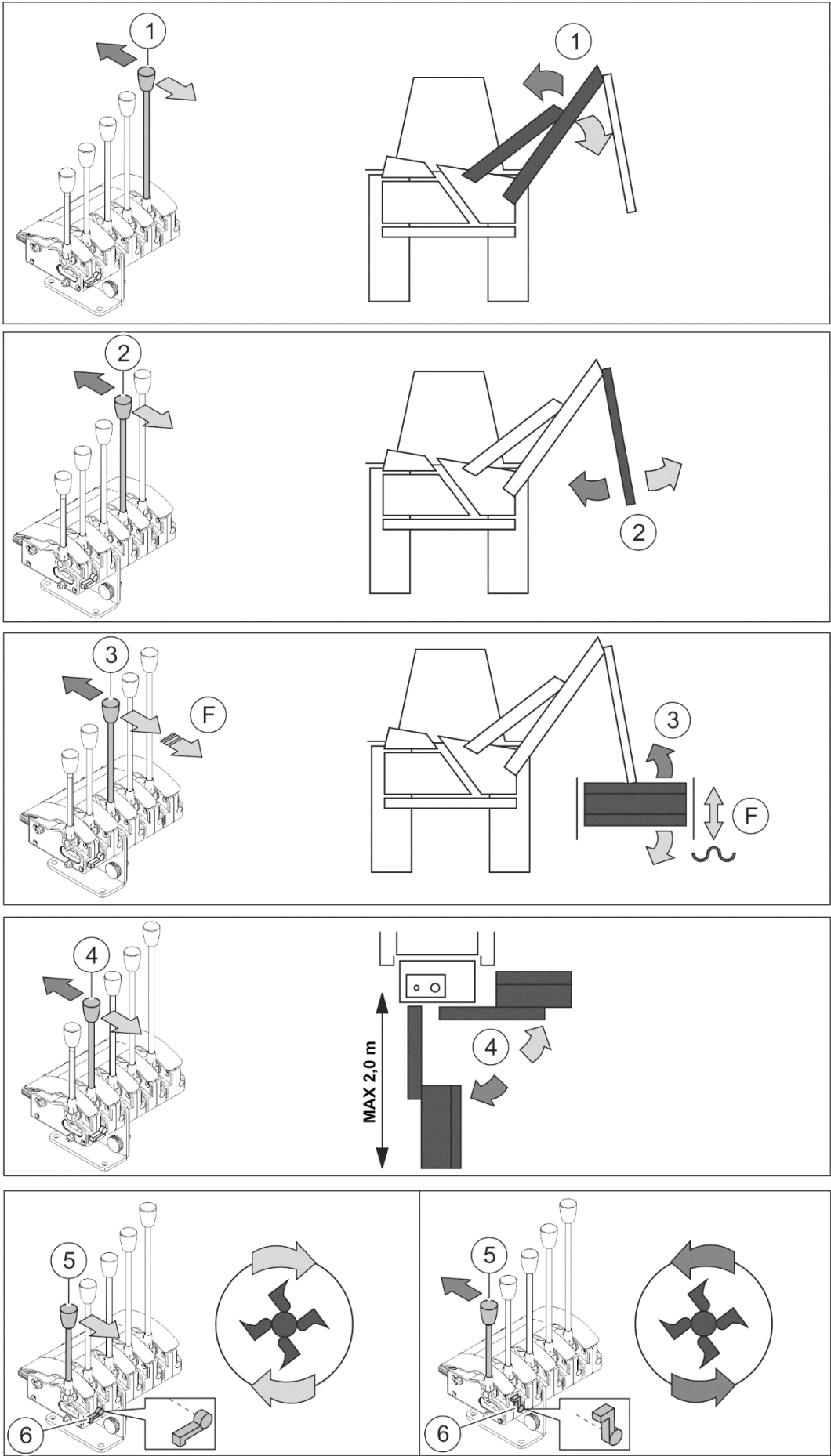


FIGURE 4.4 Operating the multifunction arm.

*(1)- main arm control lever; (2)- end arm control lever; (3)- working head control lever; (4)- lever controlling the rotation of multifunction arm from working position to transport position; (5)- lever controlling the rotation direction of the working head's hydraulic motor; (6)- locking before the change of the rotation direction of the working head's hydraulic motor; (F)- position of the lever controlling the working head in floating position.*

The pictogram showing the lever control diagram is located on the control panel (FIGURE 4.3). Individual functions of control lever (FIGURE 4.4):

- tilt control lever (1) forward or backward to actuate the hydraulic cylinder which tilts the main arm of the multifunction arm;
- tilt control lever (2) forward or backward to actuate the hydraulic cylinder which tilts the multifunction arm's end arm;
- tilt control lever (3) forward or backward to actuate the hydraulic cylinder which tilts the working head. When lever (3) is moved to position (F), the multifunction arm's working head floating position is enabled;
- tilt control lever (4) forward or backward to actuate the hydraulic cylinder which rotates the arms around the axis of rotary hanger;
- tilt control lever (5) forward or backward, after changing the position of lock (6), to actuate right or left hand of rotation of the working head's hydraulic motor.



### **ATTENTION!**

A sudden change of the hand of rotation of the working head's hydraulic motor with control lever (5) may damage the hydraulic system. Hand of rotation of the hydraulic motor can be changed only when the rotation of hydraulic motor and working elements of the working head is completely stopped by shifting the lever to neutral position and then, changing the position of lock (6) and shifting lever (5) to the rotation direction change position.

## 4.4 ATTACHING THE WORKING HEAD

WWT600 multifunction arm can be connected with working heads designed for cooperating with the working head connection and hydraulic system of the multifunction arm.



### ATTENTION!

Before hitching the working head, the user must carefully read the operator's manuals of the working head, carrying vehicle (agricultural tractor) and multifunction arm and observe all instructions contained in the manuals.



### DANGER

When hitching, there must be nobody between the machine and the carrying vehicle (tractor).

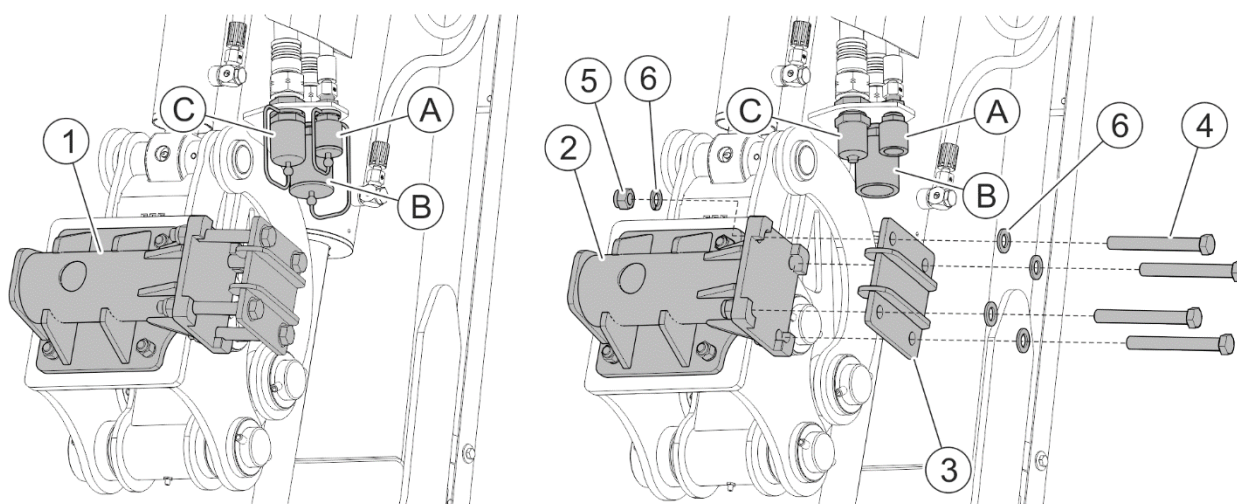
Exercise caution when hitching the machine.



### DANGER

Before hitching the working head, turn off the carrying vehicle (agricultural tractor) engine and remove the key from the ignition. Ensure that unauthorised persons do not have access to the carrying vehicle (tractor) cab.

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



**FIGURE 4.5 Attaching the working head to the multifunction arm.**

(1)- working head attachment TYPE 80 (option: TYPE 60); (2)- working head attachment holder; (3)- working head attachment lock; (4)- clamping bolts; (5)- nuts; (6)- washer; (A)- hydraulic return quick coupler (seat); (B)- hydraulic supply quick coupler (seat); (C)- hydraulic supply quick coupler (plug).

In order to hitch the working head to the multifunction arm head (FIGURE 4.5), proceed as follows:

- Reversing the carrying vehicle (agricultural tractor), move the multifunction arm's head attachment (1) closer to the working head's attachment (support beam).
- Using the controls, position the multifunction arm's head attachment (1) at the same height as the working head's attachment (support beam).
- Turn off the carrying vehicle's (agricultural tractor's) engine and prevent the carrying vehicle (tractor) from moving.
- Connect the multifunction arm's head attachment (1) to the working head's attachment (support beam) by means of holder (2) and lock (3) of the attachment. Screw the entire assembly together with four fixing bolts (4).
- Connect the hydraulic quick couplers (A), (B) and (C) of the multifunction arm with the corresponding quick couplers of the working head's hydraulic conduits.
- Turn on the carrying vehicle's (agricultural tractor's) engine and the multifunction arm's drive. Raise the working head by means of the multifunction arm's controls.

**DANGER**

Prior to connecting individual hydraulic system conduits, the user must carefully read the operator's manual of the multifunction arm and working head and observe all recommendations of the Manufacturer.

**DANGER**

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

## 4.5 TRANSPORTING THE MACHINE

### ATTENTION

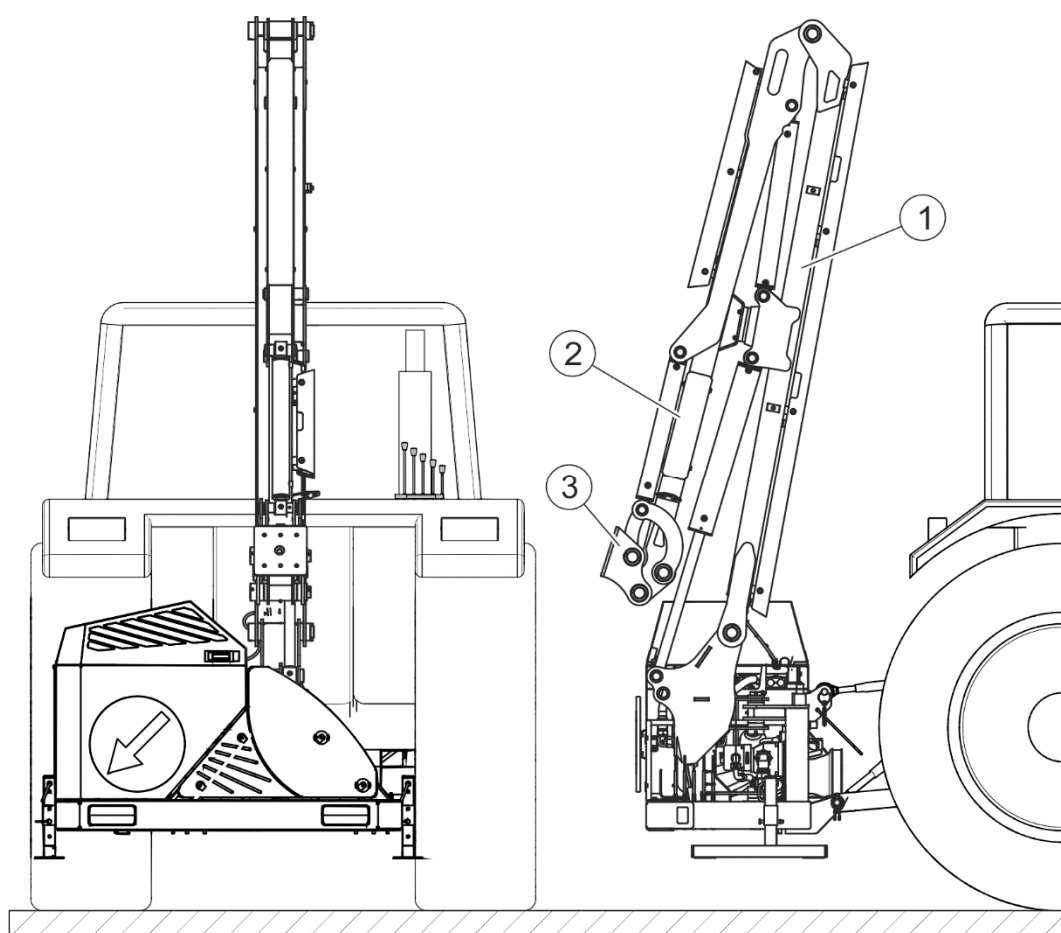


Before driving on public roads in order to transport the multifunction arm to the work site and back, the multifunction arm shall be folded to its transport position.

When driving on public roads, comply with the 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 multifunction arm are properly mounted and visible.

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



**FIGURE 4.6** Transport position

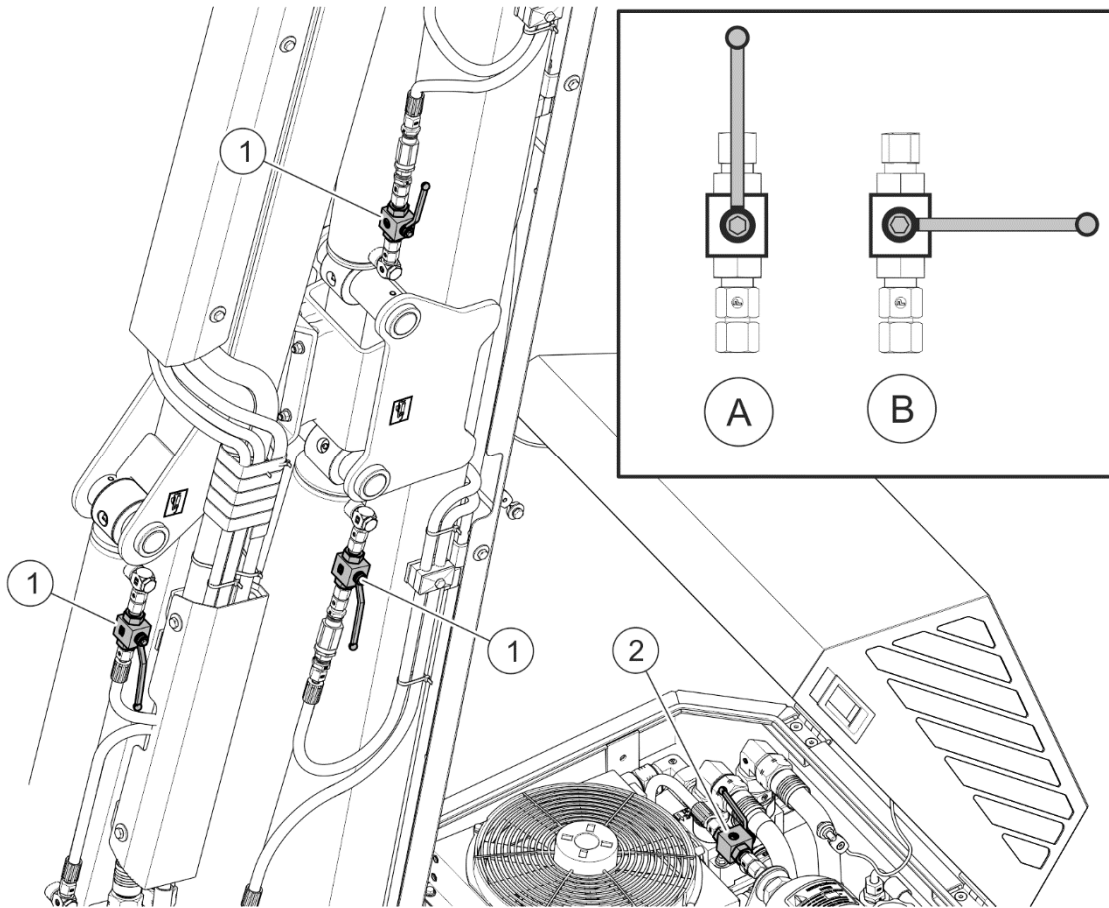
(1)- main arm, (2)- end arm; (3)- working head connection.

For transport to place of work and back, set the multifunction arm in transport position (FIGURE 4.6) 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.



**DANGER**

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



**FIGURE 4.7 Ball valves in the transport position**

(1)- ball valves of arms tilt cylinders, (2)- ball valve of arm shock absorbing unit; (A)- OPEN valve; (B)- CLOSED valve.

After setting the multifunction arm in transport position, switch the ball valves protecting cylinders (1) and arm shock absorbing unit (2) to CLOSED position (B) (FIGURE 4.7).

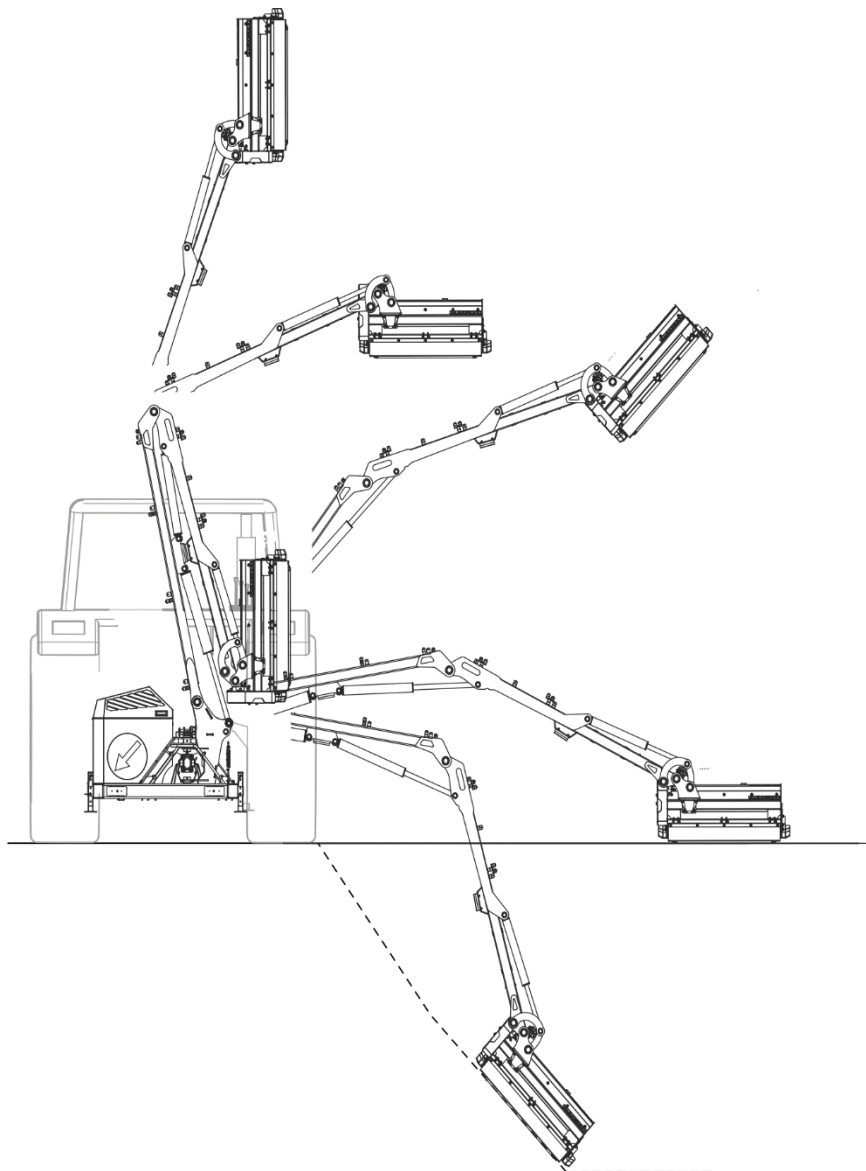
**DANGER**

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

## 4.6 SETTING THE MULTIFUNCTION ARM IN WORKING POSITION AND OPERATION

To set the multifunction arms in working position:

- switch the ball valves (1) of cylinders to the OPEN position (A) (FIGURE 4.7);
- turn on the drive of the carrying vehicle's (agricultural tractor's) rear PTO;
- operate appropriate hydraulic cylinders of the multifunction arm (FIGURE 4.4) in order to place the working head in the working area (FIGURE 4.8);



**FIGURE 4.8** Examples of working positions of the multifunction arm with GK110 cutting head.

- turn on the hydraulic motor which drives the working head using the multifunction arm's controls (FIGURE 4.4);

## 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 carrying vehicle (agricultural tractor) gear and start working.

During operation, the multifunction arm's operator shall ensure the proper visibility of the machine and work site so that the operator may see obstacles and possible dangers in the route of the working head. The rotating elements of the working head shall never be directed towards the carrying vehicle (agricultural tractor (FIGURE 4.9).

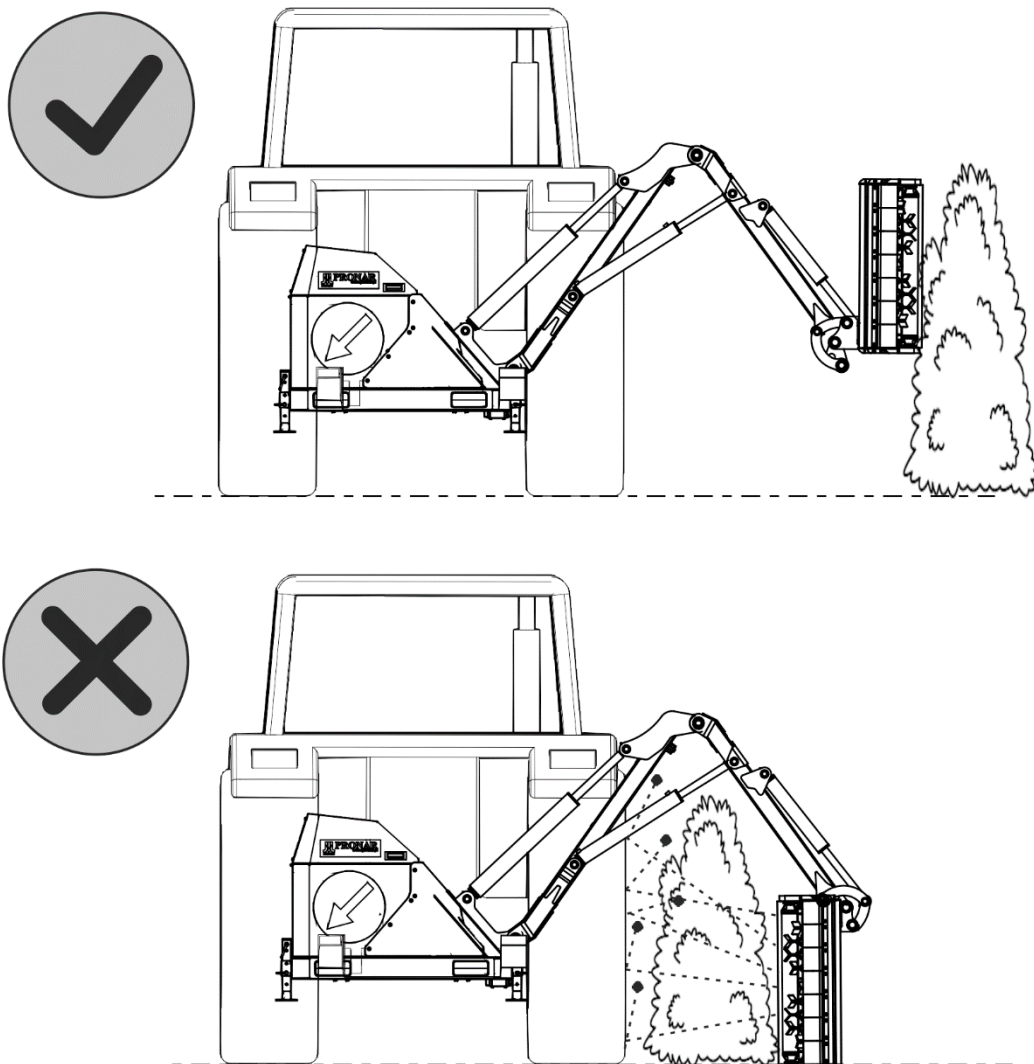


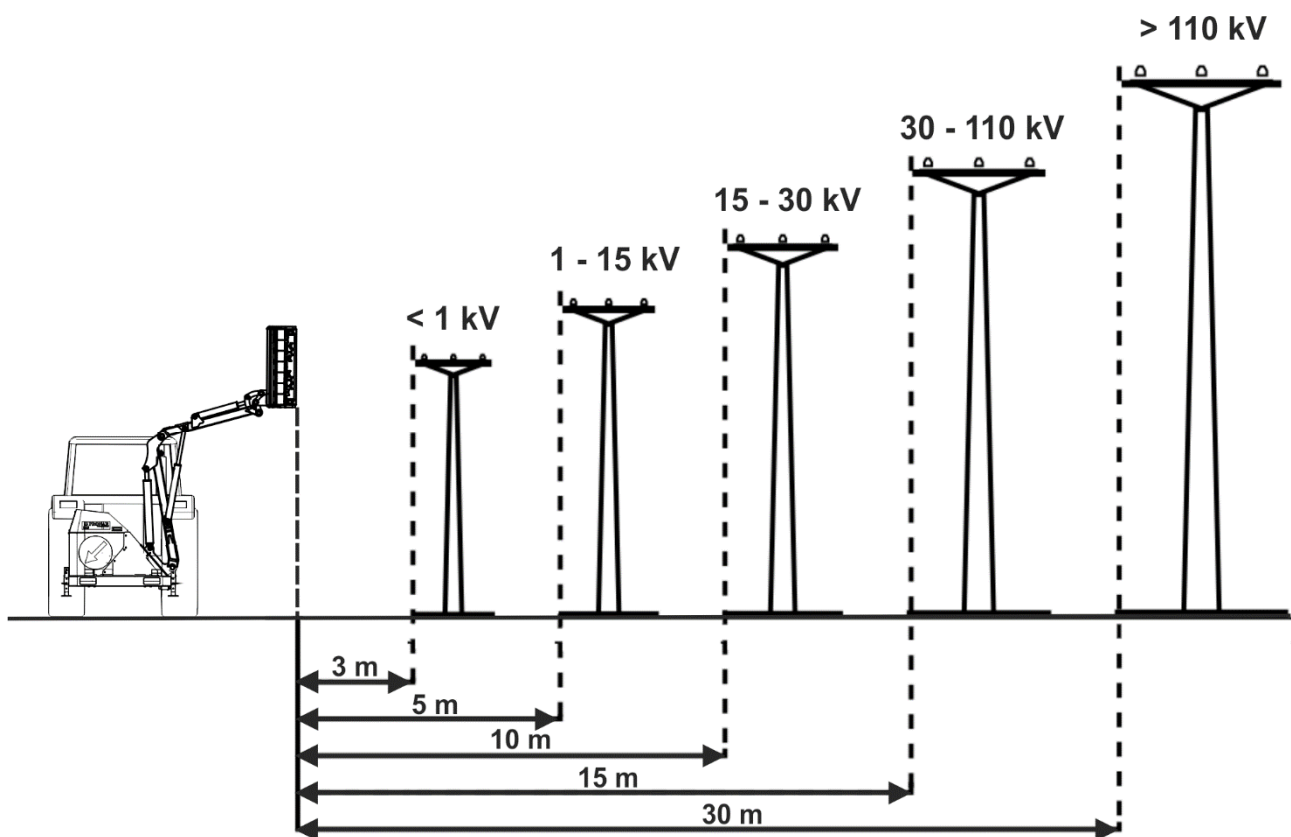
FIGURE 4.9 Safe position of the working head during hedge trimming.

**DANGER**

NEVER work if the rotating elements of the working head are directed towards the carrying vehicle (agricultural tractor). Otherwise the carrying vehicle (agricultural tractor) may be damaged or the operator may be injured.

**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 4.10).



**FIGURE 4.10 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 4.10):

- 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.

### ATTENTION!

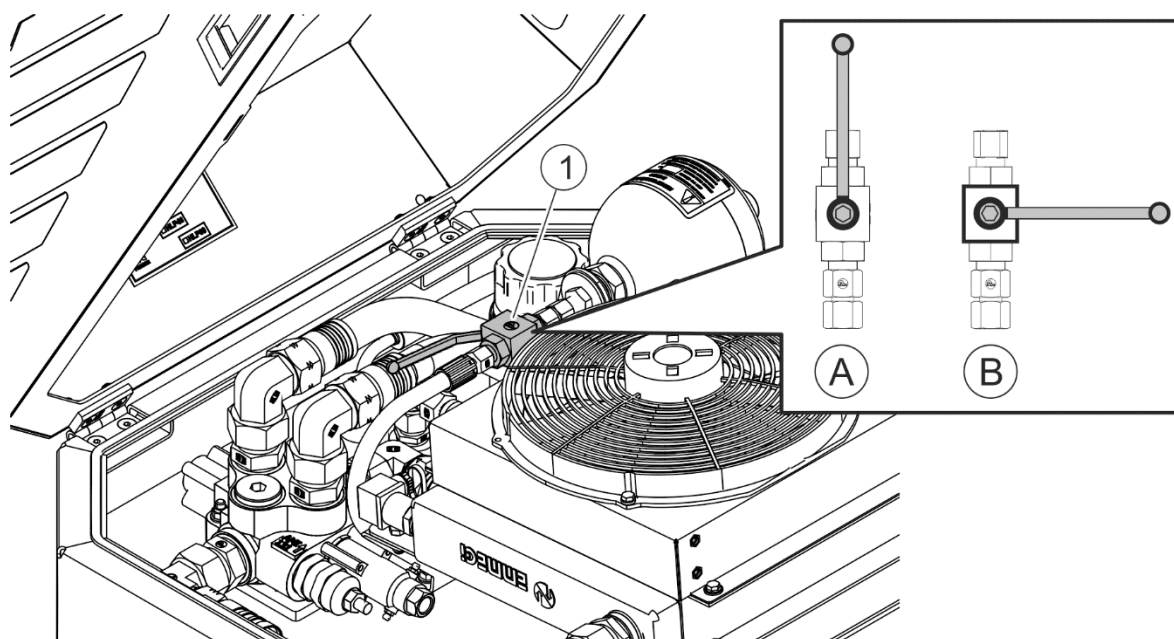


Operation and transport of the carrying vehicle (agricultural tractor) with hitched multifunction arm is allowed only on slopes with the maximum inclination of 7°. However, due to changing location of centre of gravity depending on type of working head, type of carrying vehicle (tractor) and length of 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 carrying vehicle (agricultural tractor) with the multifunction arm.

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

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

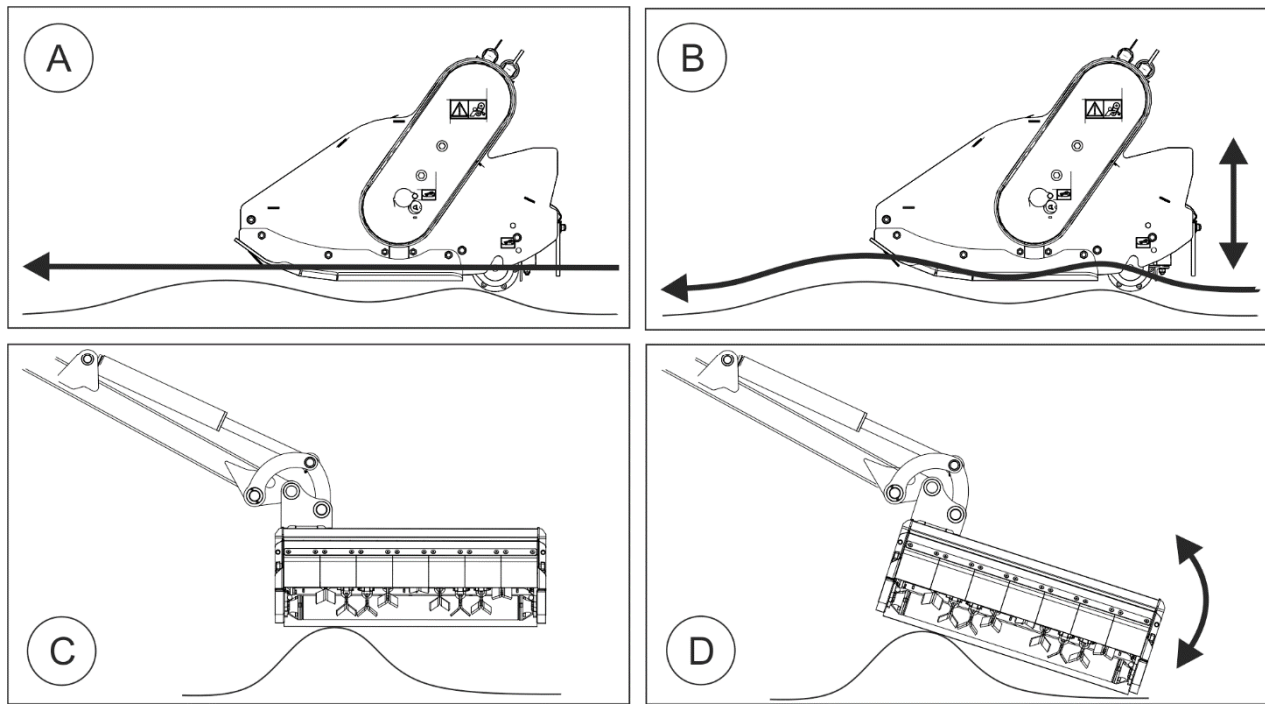
In the event of a tilt of the carrying vehicle (agricultural tractor) with the multifunction arm, immediately lower the working head to the ground and stop the carrying vehicle (agricultural tractor).



**FIGURE 4.11 Arm shock absorption unit.**

(1)- ball valve of arm shock absorbing unit, (A)- OPEN valve; (B)- CLOSED valve.

When the working head moves along an uneven ground and requires frequent changes of its titling position, enable the floating position function for the titling of the working head by moving control lever (3) to position (F) (FIGURE 4.4). At the time, the head changes its titling position smoothly and adjusts its setting to the ground irregularity (D) (FIGURE 4.12).



**FIGURE 4.12 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 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 by opening (A) valve (1) of the arm shock absorbing unit (FIGURE 4.11). 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 4.12).

When the working head is operated with the arm of the multifunction arm raised, disable the working head's tilt floating position with control lever (3) (FIGURE 4.4) and the arm shock absorbing function (option) by closing (B) valve (1) of the arm shock absorbing unit (FIGURE 4.11).

When the arm of the multifunction arm 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 will rotate on rotary hanger (15) (FIGURE 3.2). In such a case, stop the carrying vehicle as quickly as possible and bypass the obstacle with the working head raised.

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.

While operating the multifunction arm, adjust the carrying vehicle's (agricultural tractor's) 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 carrying vehicle travels
- weather conditions.

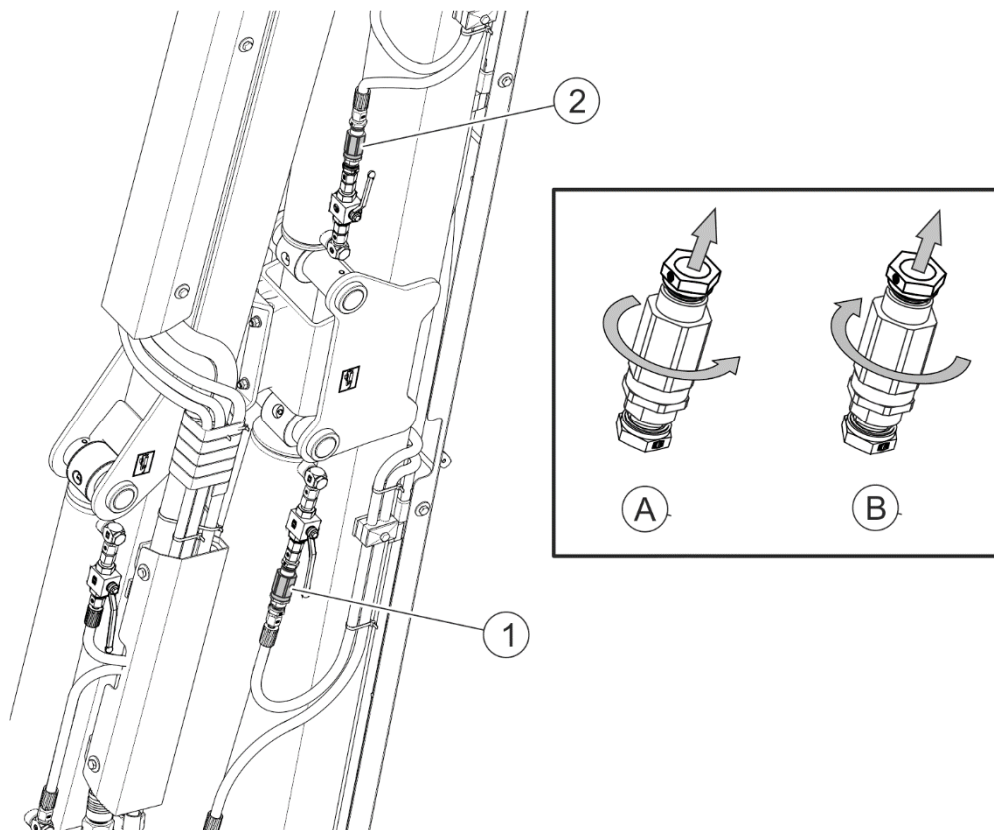
In all those cases, use the lowest possible speed of the carrying vehicle (agricultural tractor) at constant revolutions of the engine so that the carrying vehicle's PTO revolutions were fixed and equal to 540 rpm.

**HIGH NOISE LEVEL WARNING**

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

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





**FIGURE 4.13 Throttle-check valves of arm tilt cylinders.**

*(1)- throttle-check valve of main arm tilt, (2)- throttle-check valve of end arm tilt; (A)- reduction of oil flow speed; (B)- increase of oil flow speed.*

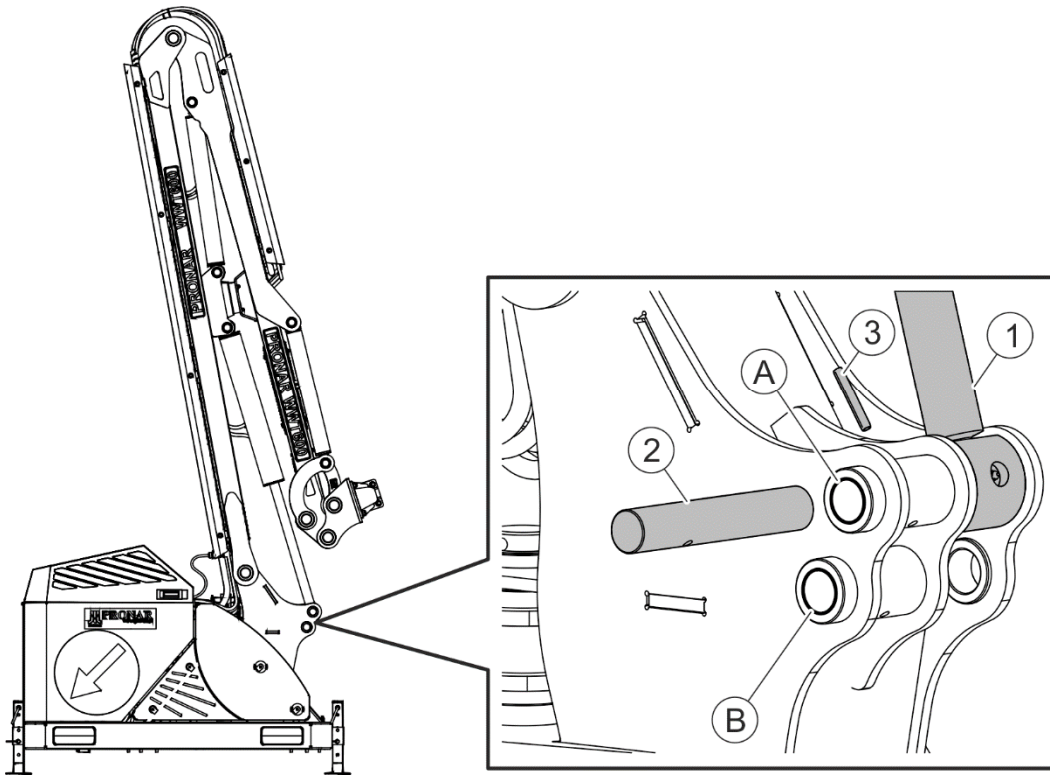
Hydraulic system supplying arm tilt hydraulic cylinders is equipped with throttle-check valves for adjusting oil flow speed (FIGURE 4.13). Consequently, working speed of arm tilt cylinders can be adapted to individual needs of multifunction arm operator.

The valve is regulated by turning it.

Turn the valve to the right, in the direction of oil flow, in order to reduce the flow speed. Reduction of oil flow speed slows down the cylinder motion and improves smoothness of its operation.

Turn the valve to the left, in the direction of oil flow, in order to increase the flow speed. Increase of oil flow speed accelerates the cylinder motion and reduces smoothness of its operation.





**FIGURE 4.14** Method of increasing the maximum reach of the main arm of the multifunction arm.

(1)- main arm cylinder rod, (2)- cylinder pin; (3)- securing pin; (A)- location of cylinder pin for the maximum vertical reach of the arm; (B)- location of cylinder pin for the maximum horizontal reach of the arm.

Arms of hydraulic multifunction arm can achieve the maximum vertical or horizontal reach (FIGURE 4.14).

To achieve the maximum vertical reach of the working head on the multifunction arm with regard to the ground, place the eye of the main arm cylinder rod (1) on pin (2) located in hole (A) and secure with securing pin (3).

To achieve the maximum horizontal reach of the working head on the multifunction arm with regard to the ground, place the eye of the main arm cylinder rod (1) on pin (2) located in hole (B) and secure with securing pin (3).



### ATTENTION

Position of the eye of the main arm cylinder rod may be changed only if the multifunction arm is lowered and supported on support feet and the main arm is secured against falling. Set the arms of the multifunction arm in such a manner as to ensure that the working head installed on the arm rests on the ground.



***SECTION***

**5**

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**MAINTENANCE**

## 5.1 CHECKING TECHNICAL CONDITION

When preparing the multifunction arm for normal use, check individual elements according to guidelines presented in table 5.1.

**TABLE 5.1 TECHNICAL INSPECTION SCHEDULE**

| DESCRIPTION   | MAINTENANCE ACTIVITIES  | FREQUENCY OF INSPECTIONS  |
|---|---|---|
| Correct mounting of the multifunction arm on the carrying vehicle's (tractor's) linkage | Check if correctly installed  | Daily before beginning work   |
| Technical condition of the multifunction arm's hydraulic system                         | For details please refer to section „5.2 "HYDRAULIC SYSTEM MAINTENANCE"           |   |
| The oil level in the hydraulic oil tank and multiplier gear box                         | For details please refer to section „5.2 "HYDRAULIC SYSTEM MAINTENANCE"           |   |
| Tightening of all main nut and bolt connections   | Tightening torque values should be according to Table (5.3)                       |   |
| Lubrication   | Lubricate elements according to section „5.4 LUBRICATION".                        |   |
| Replace oil filter  | According to section "5.2.1 OIL TANK AND OIL FILTERS"                             | Oil filter:<br>After the first 100 h, then every 500 h or once a year<br>Oil suction filter:<br>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" | Every 500 h or once a year  |



### ATTENTION!

Do NOT use out of order multifunction arm.

## 5.2 HYDRAULIC SYSTEM OPERATION



### **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.

Makes 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.



### **ATTENTION!**

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

Flexible hydraulic conduits should not be entwined or fractured.

The hydraulic system should be completely tight sealed. 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.

In the event of confirmation of an oil leak on hydraulic conduit connections, tighten connections, and if this does not remedy faults then change conduit or connection elements. Change of sub-assemblies is equally required in each instance of mechanical damage. Also, pay attention to ensure that flexible hydraulic conduits are not fractured or entwined.



Flexible hydraulic conduits should be replaced after 4 years of use.

**TABLE 5.2 HL46 HYDRAULIC OIL CHARACTERISTICS**

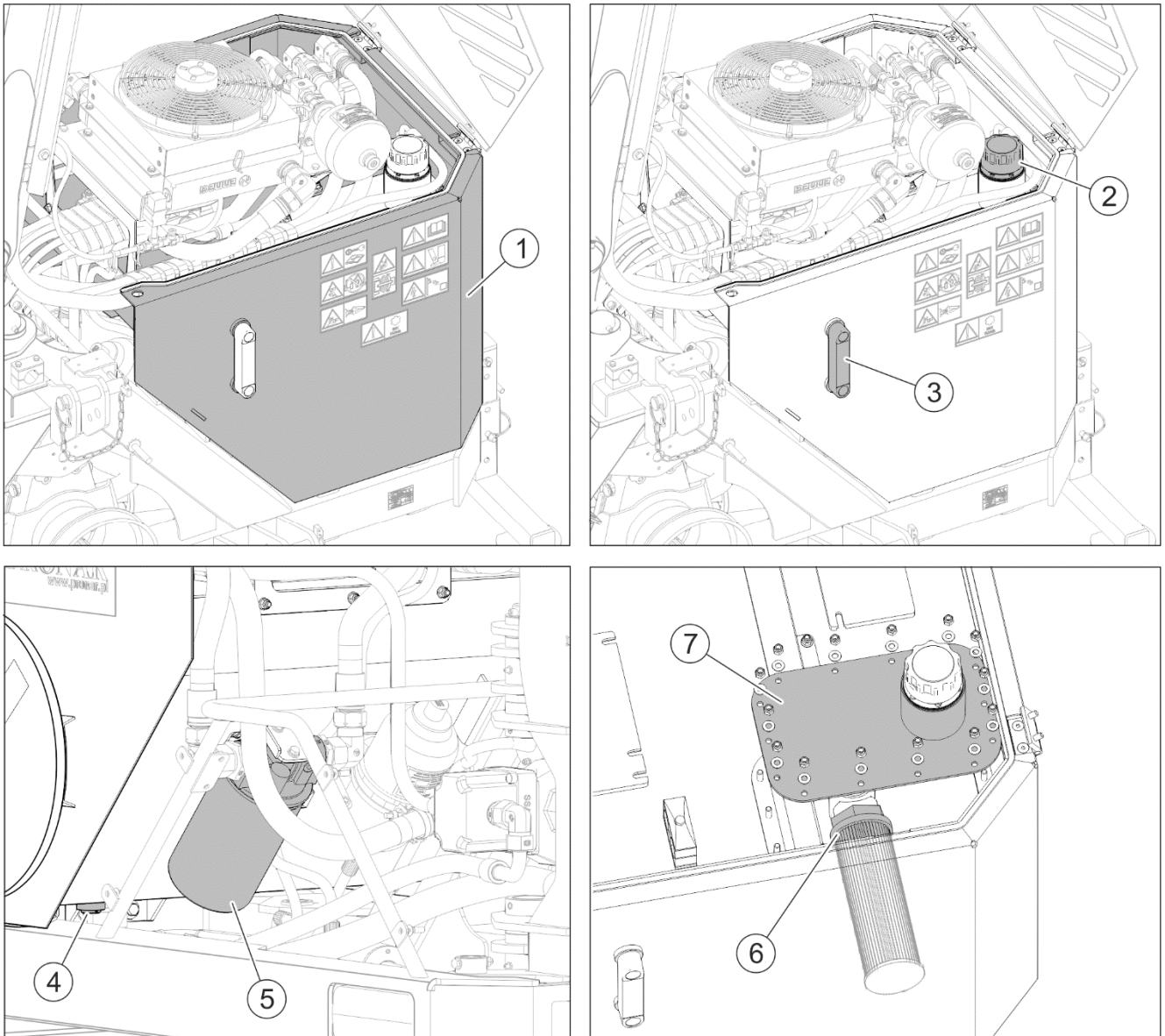
| ITEM | NAME                                | VALUE                          |
|------|-------------------------------------|--------------------------------|
| 1    | ISO 3448VG viscosity classification | 46                             |
| 2    | Kinematic viscosity at 40°C         | 41.4 ÷ 50.6 mm <sup>2</sup> /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 applied is not classified as a dangerous substance, however long-term action on the skin or eyes may cause irritation. In the event of contact of oil with skin wash the place of contact with water and soap. Do NOT apply organic solvents (petrol, kerosene). Contaminated clothing should be changed to prevent access of oil to skin. In the event of contact of oil with eye, rinse with large quantity of water and in the event of the occurrence of irritation consult a doctor. Hydraulic oil in normal conditions is not harmful to the respiratory tract. A hazard only occurs when oil is strongly atomised (oil vapour), or in the case of fire during which toxic compounds may be released. Oil fires should be quenched with the use of carbon dioxide (CO<sub>2</sub>), foam or extinguisher steam. Do NOT use water for fire extinguishing.

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

### 5.2.1 OIL TANK AND OIL FILTERS

The oil tank (1) (FIGURE 5.1) holds 180 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 inlet cap; (3)- oil level indicator; (4)- drain plug, (5)- oil filter; (6)- oil suction filter (inside the oil tank); (7)- tank inlet cover.

Change the oil in the tank after every 1000 hours of operation of the multifunction arm or once a year, whichever occurs first. In order to change oil in the tank, unscrew filler plug (2) and suck off oil from the tank through the inlet opening by means of a pump for sucking oil off. Drain oil remaining on the tank bottom to previously prepared vessel through drain plug (4). Pour fresh oil into the tank through a strainer in the top inlet opening (2) of the tank having previously screwed the drain plug (4) in.

Before pouring oil in, change the suction filter (6) inside the oil tank.



**While changing oil replace the suction filter (6) inside the tank and the external suction filter (5) every time.**

Replace the suction filter (6) (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 (7) and through the opening in the tank unscrew the oil suction filter (6).

The oil filter (5) is located on the oil return to the tank. Replace the filter for the first time after 100 hours of operation of the multifunction arm. Then replace the filter every 500 hours of operation of the multifunction arm or once a year, whichever occurs first. Replace the oil filter (5) 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 (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).

### **ATTENTION!**



**When unscrewing used suction filter (6) or oil filter (5), do not use hammer, chisel etc. as this may damage the filter body. Use filters recommended by the machine manufacturer (original filters).**

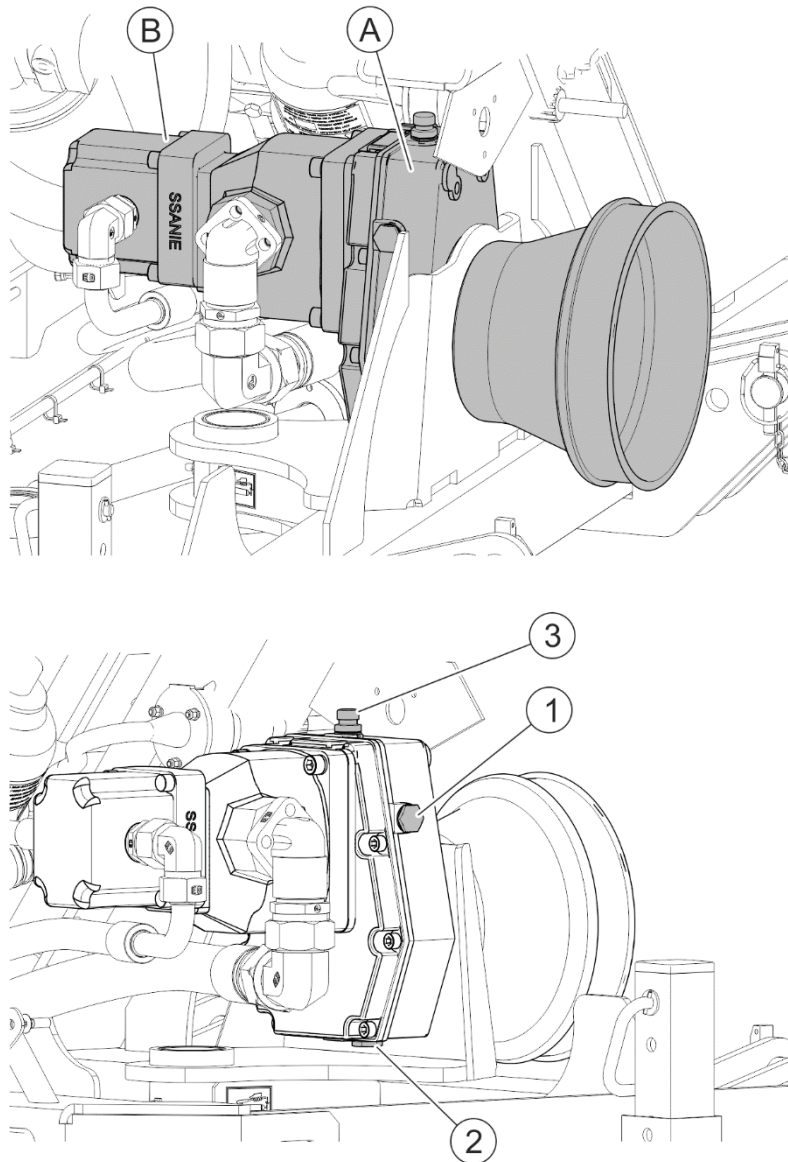
**Screw in filter by hand, without use of any tools.**

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). Sight glass float indicator should be near the top. If the indicator shows an insufficient oil level, fill the tank with oil to the required level.



### 5.2.2 MULTIPLIER GEAR BOX WITH THE HYDRAULIC OIL PUMP ASSEMBLY

Multiplier gear box (A) (FIGURE 5.2) transfers power from the carrying vehicle (agricultural tractor) PTO through a gear train to the hydraulic pumps assembly (B), which supply the multifunction arm hydraulic system and its working head.



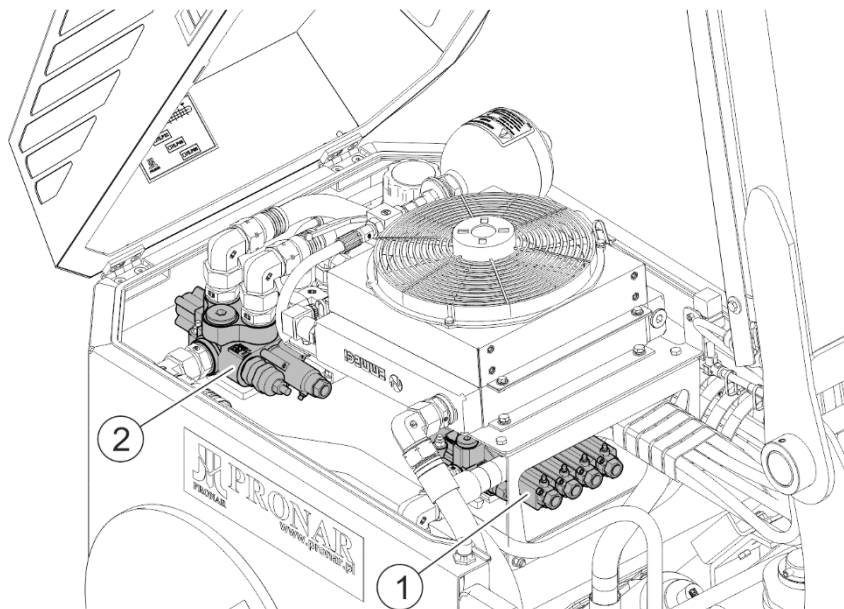
**FIGURE 5.2 Multiplier gear box with hydraulic pump**

(A)- multiplier gear box; (B)- hydraulic pumps assembly; (1)- oil inspection and inlet plug; (2)- drain plug; (3)- vent plug.

Check the condition of the multiplier gear box and pumps every day. There must be no oil leaks. These can be stopped by tightening the mounting bolts or replacing the seals. In the case of oil losses in the multiplier gear box, add SAE 90 EP gear oil by unscrewing inspection and inlet plug (1) and filling the multiplier gear box with oil to the level of the inspection and inlet plug opening (1). Change the oil in the multiplier gear box every 500 hours of operation

or once a year, whichever occurs first. To do this, unscrew the drain cap (2) and drain the oil into a prepared vessel. Then pour oil into the multiplier gear box through the control and inlet plug (1) to the level of the inspection and inlet plug opening (1).

### 5.2.3 HYDRAULIC SELECTIVE CONTROL VALVES.



**FIGURE 5.3 Hydraulic selective control valves.**

(1)- hydraulic selective control valve for support system arms cylinders; (2)- hydraulic selective control valve for the working head hydraulic motor.

The hydraulic selective control valve (1) (FIGURE 5.3) is used to control the four hydraulic cylinders of the support system. Single section selective control valve (2) drives the working head hydraulic motor. Selective control valves are controlled by means of control panel from the tractor's cab. Condition of seals of selective control valves should be checked daily.

#### **ATTENTION!**



Each hydraulic selective control valve has overflow valves preset to the appropriate 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.

## 5.3 ELECTRICAL SYSTEM MAINTENANCE



### **DANGER**

Do not independently repair electrical system, except items described in section "ELECTRICAL SYSTEM MAINTENANCE". All electrical system repairs must be performed only by suitably qualified personnel.

Maintenance of electrical system involves checking the operation of power supply system of oil cooler fan and lighting system.

Light-emitting diodes (LED) are used as the source of light in lamp assemblies. Thanks to this, the lamps are maintenance-free because there is no need to change bulbs.



### **ATTENTION**

Before beginning repairs of electrical system, disconnect the machine from power source.



### **ATTENTION**

Do NOT travel with unreliable lighting system. Burned-out or damaged lamps must be replaced with new ones.

5.4 LUBRICATION

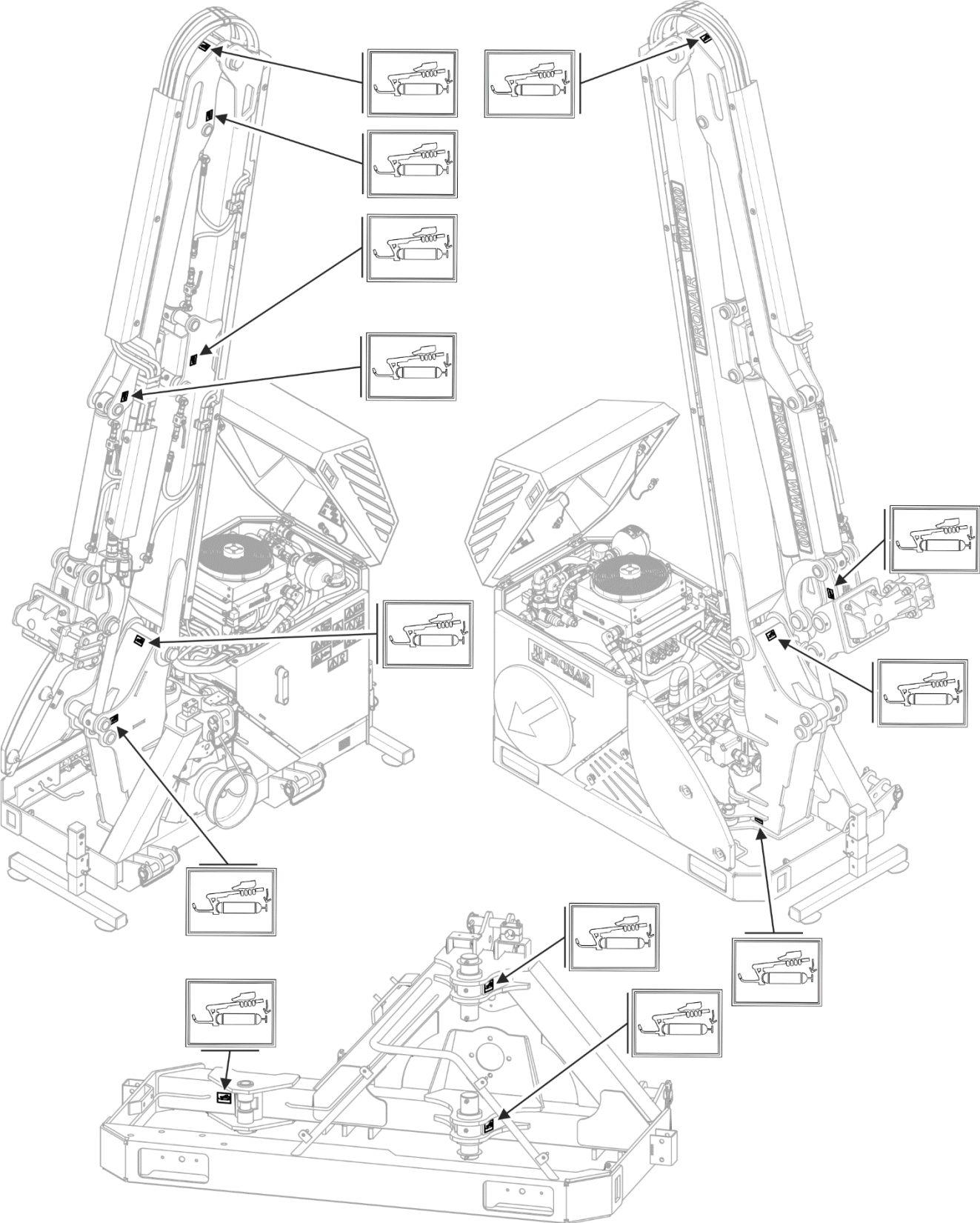
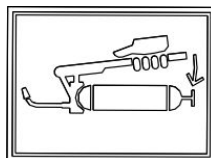


FIGURE 5.4 Location of lubrication point pictograms.



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

Grease all grease nipples located on the machine in places marked with the following pictogram (FIGURE 5.4):



Those are all the pins of articulated joints of the support system arms and the lugs of hydraulic cylinders.

The drive shaft (option) is to be lubricated in line with the shaft's Operator's Manual provided by the drive shaft manufacturer.

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

## 5.5 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 5.3), unless other tightening parameters are given. Recommended torque values apply to non-greased steel bolts.



### ATTENTION!

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

**TABLE 5.3 TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS**

| THREAD<br>DIAMETER<br>[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 |

## 5.6 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 or hydraulic conduits. Nozzle of pressure or steam washer should be kept at a distance of not less than 30 cm from cleaned surface.

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

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

If the multifunction arm shall not be used for a long period of time, protect it against adverse weather conditions. The multifunction arm should be lubricated according to the instructions provided regardless of the date of the last lubrication. Protect against corrosion all cooperating elements i.e. pins, articulated joints, hydraulic cylinder rods. 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 disconnected from the carrying vehicle (tractor) should be placed on support feet, on level, sufficiently hard surface in such a manner as to ensure that it is possible to connect it again. Set the arms of the multifunction arm in such a manner as to ensure that the working head installed on the arm rests on the ground. Dismount the control panel of the multifunction arm from the cab of the carrying vehicle (tractor) and protect it against adverse weather conditions.

## 5.7 TROUBLESHOOTING

**TABLE 5.4 TROUBLESHOOTING**

| TYPE OF FAULT                                   | CAUSE  | REMEDY  |
|---|--|---|
| It is impossible to control support system arms | Control system or control system cables are 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 |
|   | Selective control valve is damaged                   | Repair at an authorised service point                                 |
| Overheating of the multiplier gear box          | Wrong level of oil in the multiplier gear box casing | Check oil level.  |
|   | Damaged multiplier gear box bearings                 | 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                 | Damaged thermostat                                   | Replace the cooler thermostat with a new one                          |
|   | Power supply failure of fan electrical system        | Check power supply  |



# NOTES

[illegible]

