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USER MANUAL

SUSPENDED SWEEPER

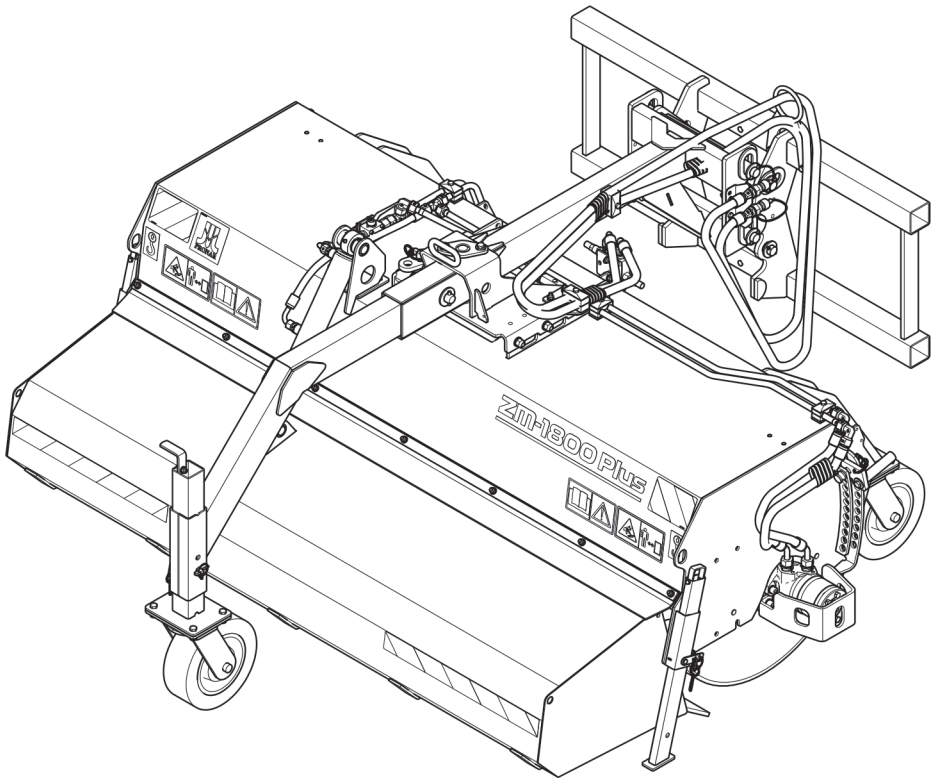
PRONAR

ZM-1500Plus

ZM-1800Plus

ZM-2300Plus

TRANSLATION OF ORIGINAL MANUAL



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This manual contains important safety and operating instructions for the machine. The manual should be kept near the machine so that it is available for authorized persons.

Keep this manual for future reference. If the manual is lost or damaged, contact the seller or the manufacturer for a duplicate.

Contents

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Deklaracja zgodności WE maszyny

PRONAR Sp. z o.o. deklaruje z pełną odpowiedzialnością, że maszyna:

Opis i dane identyfikacyjne maszyny			
Ogólne określenie i funkcja:	**Zamiatarka zawieszana**		
Typ:	**ZM-1500Plus**	**ZM-1800Plus**	**ZM-2300Plus**
Model:	–	–	–
Numer seryjny:			
Nazwa handlowa:	**Zamiatarka zawieszana PRONAR ZM-1500Plus**	**Zamiatarka zawieszana PRONAR ZM-1800Plus**	**Zamiatarka zawieszana PRONAR ZM-2300Plus**

do której odnosi się ta deklaracja, spełnia wszystkie odpowiednie przepisy dyrektywy **2006/42/WE** Parlamentu Europejskiego i Rady z dnia 17 maja 2006 r. w sprawie maszyn, zmieniającej dyrektywę 95/16/WE (Dz. Urz. UE L 157 z 09.06.2006, str. 24).

Osobą upoważnioną do udostępnienia dokumentacji technicznej jest Kierownik Wydziału Wdrożeń w PRONAR Sp. z o.o., 17-210 Narew, ul. Mickiewicza 101A.

Deklaracja ta odnosi się wyłącznie do maszyny w stanie, w jakim została wprowadzona do obrotu i nie obejmuje części składowych dodanych przez użytkownika końcowego lub przeprowadzonych przez niego późniejszych działań.

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

Narew, dnia 2024-03-20

Miejsce i data wystawienia

Imię, nazwisko osoby upoważnionej
stanowisko, podpis

CHAPTER 1.

INTRODUCTION

Pronar ZM-1500 / 1800 / 2300Plus

1.1 DEAR USER

The manual instruction is intended for the end user. For this reason, some required maintenance is listed in the inspection tables but the procedure is not described in this publication. To perform them, call the manufacturer's authorized service center.

Before starting the machine, you will be familiarized with its construction, principle of operation, available equipment and operation, and above all safety rules. The operator and qualified personnel should be trained during final reception.

Remember!!! You can run the machine only when you have read the content of this "User Manual", you have been trained and you can handle it safely. In case of any doubts, contact the seller to clarify the problem.

The most important thing during operation is your safety, therefore, regardless of everything, all recommendations contained in the "User's Manual" should be observed and guided by reasonable procedure. Remember that the correct service, in accordance with the manufacturer's instructions, reduces the risk of an accident to a minimum, and working with the machine is more efficient and less emergency.

When buying machines, check the compatibility of serial numbers placed on the machine with the number entered in the "Warranty card" and in the sales documents. For information on identifying the machine, see "Basic information" chapter. We recommend that you have the most important serial numbers entered the field below.

Machine serial number:

WST.3.B-001.01.EN

1.2 RULES FOR USING THE USER'S MANUAL

The information contained in the publication is current as at the date of publication. As a result of improvement, some sizes and illustrations contained in this publication may not correspond to the actual state of the machine delivered to the user.

The drawings contained in this publication are aimed at clarifying the principle of machine operation and may differ from the facts. This can not be a reason for any claims for this. The manufacturer reserves the right to introduce constructional changes in the manufactured machines to facilitate operation and improve the quality of their work, without making any current changes to this publication.

The operating instruction is the basic equipment of the machine. If the information contained in this study prove not fully understandable to ask for aid to the point of sale in which the machine has been purchased or directly to the manufacturer.

The machine was constructed in accordance with applicable standards, documents and current legal regulations.

Separate studies can be attached to this manual that can be found in the chapter "*Attachments and additional materials*".

WST.3.B-002.01.EN

1.3 TARGET GROUP

The User Manual is intended for staff operating the machine called end users, and qualified persons (electrician, mechanic, plumber). Detailed information on the competences and liability of end users and qualified personnel can be found later in this chapter.

1.3.1 End user (User, Authorized User, Operator)

Who is the end user?

An end user, otherwise known as the user or operator, call the person authorized to operate the machine. The user can be authorized to handle the machine if the following conditions have been met.

- The user has familiarized with the content of the "User's Manual".
- He gets acquainted with the contents of the farm tractor instruction manual and observes its recommendations.
- He has been trained in terms of compliance with established maintenance and regulation plans.
- He has authorizations to drive vehicles (vehicle assemblies) required in the country of use.

Responsibilities and permissions

The user acquired by the user allows for safe handling of the machine. In unforeseen cases, the user should follow a reasonable procedure and take care of their safety, people located near a working machine and other traffic users.

The knowledge and skills are entitled to the end user to handle the machine, carry out maintenance and repair or adjustment procedures in the scope specified by the manufacturer. The activities that can be performed by the operator are marked with the pictogram:

1.3.2 Qualified person (qualified personnel)

Who is a qualified person?

We call a qualified person any person admitted to perform some maintenance, repair or regulatory work in the scope specified by the machine manufacturer and who gained appropriate technical education in a specific profession and confirmed by the relevant document, completed the training carried out by the authorized manufacturer's or seller staff, can see threats and counteract them. Professional experience and professional skills entitle a qualified person to carry out some repairs of the machine and perform basic maintenance procedures in the scope provided by the manufacturer. A qualified person in addition to the necessary knowledge has the skills to use the specialized accessories necessary to perform the obligations. The following persons include qualified persons:

- qualified mechanic,
- qualified electrician,
- qualified plumber.

Activities that can be performed by a qualified mechanic are marked with a pictogram:

Activities that can be performed by a qualified electrician are marked with a pictogram:

Activities that can be performed by a qualified plumber are marked with a pictogram:

1.3.3 Service personnel

Who is the service personnel?

Service personnel, otherwise known as the manufacturer's service or service, is a person or a group of qualified persons who have a much greater experience and knowledge to perform certain corrective and maintenance activities than qualified personnel. It has the right tools necessary to carry out work. The manufacturer's service has the required permissions and is a representative of a machine manufacturer or other equipment.

1.3.4 Unauthorized user

Who is an unauthorized user?

An unauthorized user also known as a bystander is a person who has not been trained by the manufacturer or an authorized seller, has not been familiarized with the basic issues of security, knowledge of the machine, did not familiarize with the entire content of the operating instructions, and therefore there are no authorizations to operate the machine. A bystander can not be admitted to work with the machine.

WST.3.C-002.02.EN

1.4 SYMBOLS AND TAGS USED IN THE MANUAL

1.4.1 Danger

Information, descriptions of hazards and precautions as well as instructions and orders related to the safety of use in the content of the manual are marked with a frame with the word **DANGER**. Failure to comply with these recommendations may endanger the health or life of persons operating the machine or bystanders.

1.4.2 Caution

Particularly important information and recommendations, the observance of which is absolutely necessary, are highlighted in the text with a frame and word **CAUTION.** Failure to comply with these recommendations creates the risk of damage to the machine due to improper handling, adjustment or use.

1.4.3 Advice

Additional instructions contained in the manual describe useful information on operating the machine and are marked with a frame with the word **ADVICE.**

1.4.4 Personal protective equipment pictograms

	Work shoes
	reflective vest
	industrial helmet
	working clothes
	respiratory protection
	safety goggles
	protective gloves
	hearing protectors

1.4.5 Qualification pictograms

	operator
	qualified mechanic
	qualified plumber
	qualified electrician

1.4.6 Typography of the User Manual

Bulleted list

The bulleted list presents actions to perform whose order is not relevant.

Example of using a bulleted list

- ....
- Check the condition of connections and hydraulic and pneumatic hoses. Hydraulic oil leaks and air defects from a leaky installation are unacceptable.
- In the event of a hydraulic or pneumatic installation failure, the trailer should be turned off from operation until the failure is removed.
- .....

Comment on the text

Comment is most often a supplement and additional explanation to order a specific activity. Additional information can also be included in the comment.

An example of a comment

The required air pressure is described on the sticker placed on the machine frame, over the wheel.

Defined list

List shows the to-do, which execution order is important.

Example of using a defined list

1. .....
2. Unscrew the handles (2) securing the crank (1).
3. Insert the crank into a square shaft of the gear and turning the clock clockwise on the direction of the clock.
4. ....

References to pages

Reference to chapter (place in the manual) related thematically

An example of a reference application

📖 *page 9.4*

WST.3.B-004.02.EN

1.5 GLOSSARY

agricultural tractor

A motor vehicle constructed for use in conjunction with equipment for agricultural, forestry or horticultural work; such a tractor may also be adapted for pulling trailers and for earthworks.

truck tractor

A motor vehicle designed exclusively for towing a trailer; the term includes a semi-trailer tractor and a ballast tractor.

Load capacity

A motor vehicle made in a special way so that it not only pulls the tools but also carries them on itself, it can work with attachable or hanging tools at the rear or front of the vehicle.

Final acceptance

The set of activities involved in the preparation and actual handover of the finished product for use. The final acceptance includes the handover of documentation, basic training, acceptance under transport and the first commissioning of the machine.

bystander

see - unauthorised user

qualified person

A person who is authorised to carry out certain maintenance, repair or adjustment work within the scope defined by the manufacturer of the machine and who has acquired the relevant technical training in the specified profession and confirmed by a relevant document, has completed training provided by authorised personnel of the manufacturer or the dealer, and is able to recognise and prevent risks.

truck

A motor vehicle designed for the carriage of goods; the term also includes a lorry designed for the carriage of goods and passengers between 4 and 9 including the driver.

Danger zone

A danger zone is a designated area around a machine in which people are at risk of losing their health or life.

TPL

TPL - Three-point linkage - a lever system used on agricultural tractors for the aggregation of machinery and equipment suspended from a hydraulic linkage.

end user

Otherwise known as the user, authorised user or operator, this is the person permitted to operate the machine.

Unauthorised user

Also referred to as a bystander, this is a person who has not been trained and allowed to operate the machine.

PTO

PTO - Power take-off - the system that transmits the drive from the carrier (tractor) to the mating machine. The drive is usually transmitted via an articulated telescopic shaft (WPT) and taken up by the machine via the power take-up shaft (WPM).

WST.2.3-002.01.EN

1.6 DEFINITION OF DIRECTIONS IN THE MANUAL

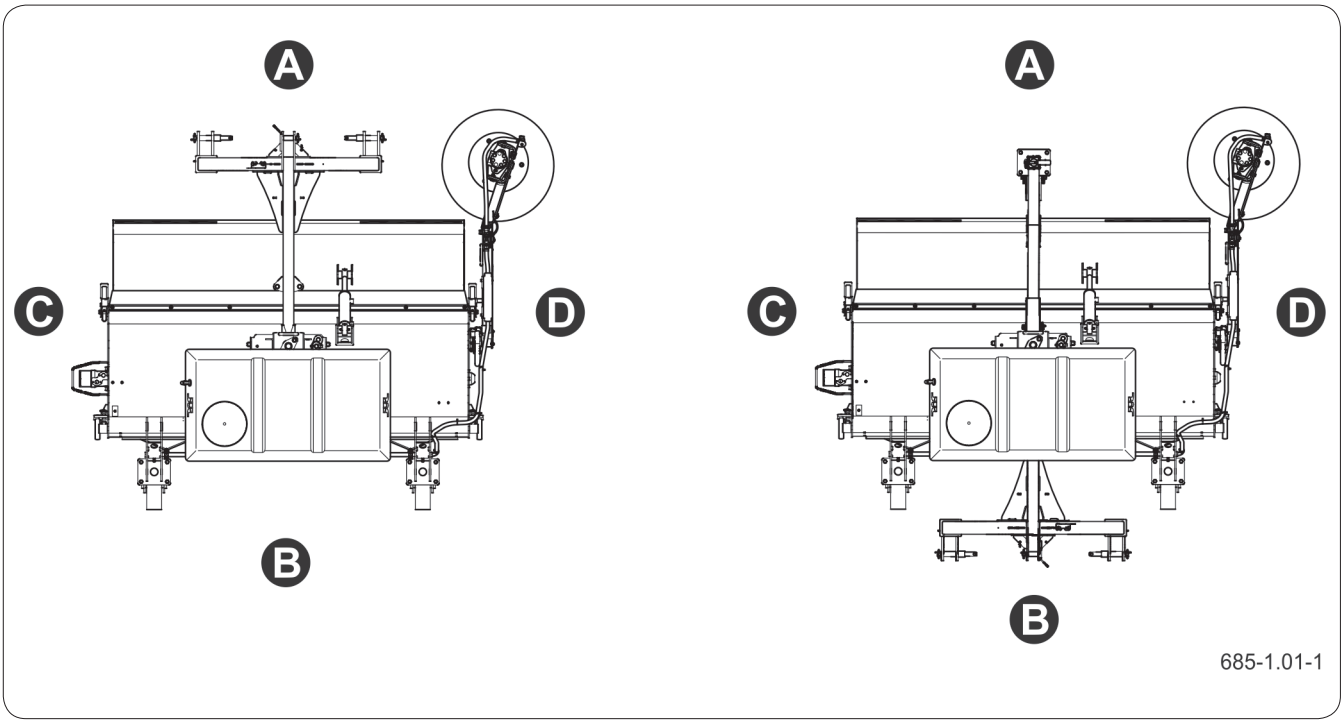

Figure 1.1 Determination of directions on the machine (in forward and reverse configurations)
(A) front *(B) rear* *(C) left side*
(D) right side

Left side - the side on the left hand of the observer facing the forward direction of the machine.
Right side - the side to the right of the observer facing the forward direction of the machine.
Right-hand rotation - clockwise rotation of the mechanism (operator facing the mechanism).
Left-hand rotation - counterclockwise rotation of the mechanism (operator facing the mechanism).

WST.2.6-001.11.EN

1.7 FINAL ACCEPTANCE

1.7.1 Preliminary information

Final acceptance is carried out upon delivery of the machine to the customer. The acceptance includes the following:

- Provide the required documents, including the *"User's Manual*", "*Warranty Card*" and others,
- information from the seller on how to use the machine, the hazards arising from improper use of the machine, and on the aggregation of the machine with the carrier and its operation,
- checking the machine after delivery,
- initial start-up of the machine and discussion of machine operation.

1.7.2 Checking the machine after delivery,

Scope of control

- Check the machine assembly according to your order.
- Check the condition of the safety guards.
- Check the condition of the paint coating, check for any signs of corrosion.
- Inspect the machine for damage resulting from improper transport of the machine to the destination (dents, punctures, bends or broken parts, etc.).

1.7.3 First start-up of the machine

It must be preceded by training by the Seller or the Seller's authorised employees.

The scope of the first start-up

Commissioning must be preceded by training by the Vendor or the Vendor's authorised employees.

- Ensure that the hydraulic and electrical connections on the carrier match those on the machine.
- Check the condition of the hydraulic system hoses. Make sure the systems are tight.

- Inspect the hydraulic cylinders for leaks and leaks.
- Check all lubrication points, grease if necessary.

If the condition of the machine is not objectionable, proceed with a trial run:

- Connect the machine to a suitable carrier suspension system.
- Connect the hydraulic and electrical system pipes (optional).
- Check the correct operation of the electrical system (optional).
- Check the correct operation of the machine's hydraulic system by controlling the relevant circuit of the carrier's hydraulic distributor.
- Carry out a test run.

If worrying symptoms of the type occur during the trial run:

- noise and unnatural noises from moving parts rubbing against the machine structure,
- oil leaks,
- malfunction of the hydraulic cylinders,

or other faults, diagnose the problem. If the fault cannot be rectified or if rectifying it risks voiding the warranty, contact the point of sale for clarification or repair.

WST.2.6-004.01.EN

1.8 PERSONAL PROTECTIVE EQUIPMENT

1.8.1 General

CAUTION

Personal protective equipment should be used in accordance with the recommendations of the security manufacturer.

Follow local regulations regarding personal protective equipment.

The personal protective equipment listed below is a minimum protection for the operator against the effects of unfavourable external factors and is only a recommendation for use.

We recommend carrying out a risk assessment at the machine's workplace and adjusting the personal protective equipment of operator depending on the actual working conditions.

1.8.2 Work clothing

Work clothing should fit the operator's body correctly. The material from which the clothing is made should be characterized by high tear strength. Clothing must not have any protruding elements that may be accidentally caught by the mechanisms of the machine.

1.8.3 Hearing protectors

It is recommended to use of ear muffs for use with a protective industrial helmet for hearing protection. The selection of the damping value should be selected individually depending on the noise level at the location of the machine, which is the result of various sources (e.g. tractor, loader, belt conveyors, etc.).

Remember to properly store and maintain your hearing protectors. Poorly stored and maintained hearing protectors lose their protective properties over time. Periodically replace the soundproofing cushions according to the manufacturer's recommendations.

1.8.4 Work shoes

Work shoes should have the following properties:

- non-slip sole,
- sole material made of a material resistant to oils, gasoline and other organic solvents.
- toe cap resistant to impact with an energy of 200 J,
- insert securing the foot against piercing of the sole.

The above properties correspond to the S3 shoe category according to PN-EN ISO 20345.

1.8.5 Warning vest

The warning (reflective) vest is designed to increase the operator's visibility to other users. Instead of a reflective vest, you may wear work clothes that meet the requirements of EN471. It is recommended that the warning vest (or work clothing) be class 2.

1.8.6 Protective gloves

Protective gloves should be selected depending on the currently performed work.

Strong protective gloves

Strong protective gloves for hand protection are used for protection during heavy work such as cleaning the machine, removing clogs and the like, where there is a risk of damaging the hands. Protective gloves should protect the hands from cuts, scratches, abrasions, punctures and similar injuries to the skin and

against light burns in contact with hot surfaces.

Light protective gloves

For light work (general operation, minor maintenance etc.), we recommend using light protective gloves for work in a dry or slightly oily environment. The working surface of the gloves (internal part should be covered with an impermeable material, e.g. nitrile.

Nitrile gloves

Nitrile gloves designed for working with urea, fuel or lubricants. They are designed for light work where there is a risk of skin contact with lubricants, fuel, urea, gear oil and hydraulic oil.

1.8.7 Safety glasses with side shields

Safety glasses to protect the eyes against contact with hazardous substances, splashing liquids or dust and airborne of the machine dust. Safety glasses with side shields increase the level of protection.

1.8.8 Industrial protective helmet

The industrial safety helmet is designed to protect the head against injuries related to the fall of thrown objects, parts or materials. The design of the helmet should be in accordance with the EN397 standard. During normal machine operation, wearing lightweight industrial helmets will not protect the user from injury and is therefore not recommended.

The protective helmet must fit correctly to the anatomical shape of the skull. There are adjustment straps for this purpose. The helmet has a limited shelf life.,

After this date, the material from which it was made loses its properties and does not fulfil the assumed task. The helmet must be replaced.

1.8.9 Anti-dust respirator

CAUTION

Remember that personal protective equipment should be regularly maintained and used in accordance with the recommendations of the product manufacturer. Following these guidelines will ensure safe use and the best protection.

Dust can become airborne when operating the machine. It is recommended to use disposable respirators with an exhalation valve to protect the respiratory tract.

The size of the mask should match the operator's face. The mask should fit snugly against the skin. The nasal part should be adjusted using the adjustment plate. Remember that facial hair can make it difficult to seal the face mask.

Minimum half mask recommendations:

- type FFP1, in accordance with EN-149: 2001 + A1: 2009, protection against non-toxic liquid or solid aerosols,
- P1 class.

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CHAPTER 2.

BASIC INFORMATION

Pronar ZM-1500 / 1800 / 2300Plus

2.1 IDENTIFICATION

2.1.1 Machine identification

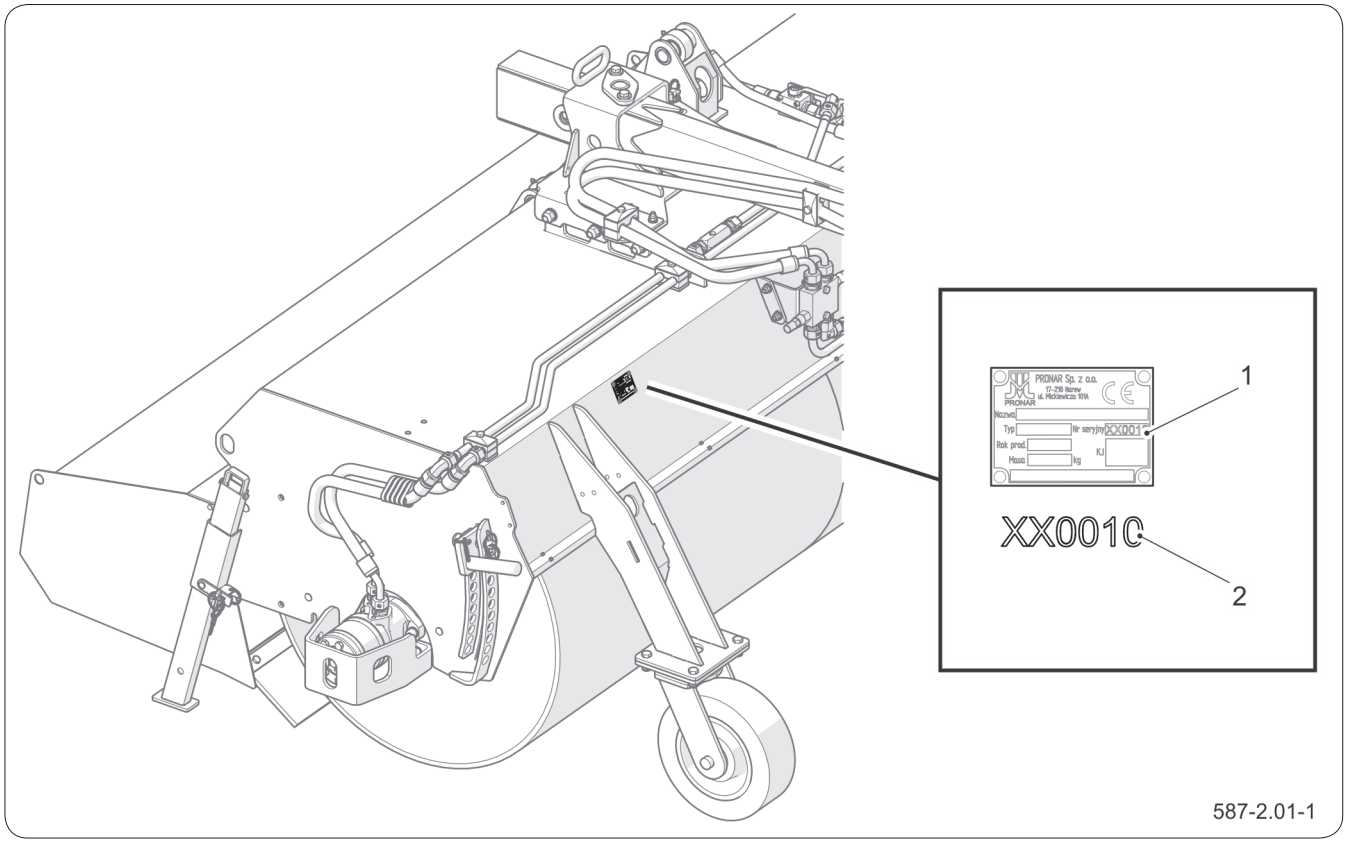


Figure 2.1 Machine identification
(1) nameplate *(2) serial number*

ADVICE

You should require the seller to carefully fill out the Warranty Card and complaint coupons. The lack of e.g. date of sale or point of sale stamp exposes the user to not accept any complaints.

The machine was marked with a nameplate (1) and a serial number (2) underneath the plate on the machine frame.

When purchasing the machine, check the conformity of the serial numbers on the machine with the number entered on the *Warranty Card*, on the sales documents and in the *Operating Instructions*.

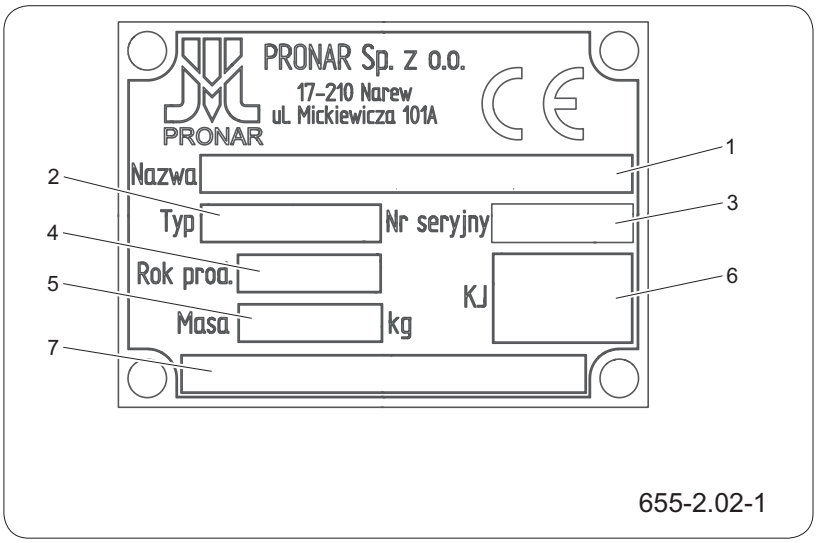


Figure 2.2 Nameplate
Name of machine
2 Type / symbol
3 Serial number
4 Year of production
5 Total weight [kg]
6 Quality control mark KJ
7 Additional information

INF.2.3-001.11.EN

2.2 INTENDED USE OF THE MACHINE

2.2.1 Intended use

DANGER

The machine must not be used improperly.

The sweeper is designed for cleaning traffic roads, car parks, squares, outdoor areas of buildings with hardened surfaces such as asphalt, concrete cubes, cobblestones, concrete.

The sweeper can be used for the technological cleaning of the substrate prior to laying the asphalt carpet.

With or without a raised dirt tank, it can be used to sweep dirt or a thin, fresh layer of snow to the right or left side without collecting it.

When operating the machine, the traffic and transport regulations in force in the country in question must be complied with, and any infringement of these regulations is regarded by the manufacturer as misuse.

The machine can be aggregated to the front or rear of an agricultural tractor or other carrier meeting the requirements of table *"Carrier requirements"*.

Intended use also includes all activities related to the correct and safe operation and maintenance of the machine.

Therefore, the user is obliged to:

- read the *"User manual"* and follow its recommendations,
- understand the principle of machine operation and the safe and proper operation,
- work in compliance with general safety regulations,
- accident prevention,
- comply with traffic regulations.

The machine may only be used by persons who:

- are familiar with the contents of this publication and the documents accompanying the machine, and with the contents of the carrier's operating

instructions,
- have been trained in the machine operation and work safety,
- have the required driving licence and are familiar with road traffic and transport regulations.

2.2.2 Anticipated inappropriate use

The sweeper must not be used contrary to its intended use, in particular:
- as a snow plough without the drive engaged,
- for transporting people and animals,
- for the transport of any cargo,
- working with or without open covers,
- working in a public environment,
- working with incomplete or defective machinery.
- working with an unrecommended carrier and on unrecommended parameters,
- working with an excessively worn brush.

An employee who has not been trained in operation and safety, is not qualified and has the required skills must not be allowed to operate the machine.

When operating the machine, it is strictly prohibited to:
- stay in the danger zone,
- climb on the machine while it is running,
- make arbitrary structural changes,
- repair and servicing by unauthorized and unqualified personnel.

INF.2.6-009.01.EN

2.3 CARRIER REQUIREMENTS

Tabela 2.1. Carrier requirements

Content	Unit	Requirements
Carrier suspension system		
Type *(depending on machine version)*	- - - - - -	Rear or front three-point linkage cat. I, II according to ISO 730- 1 Forklift truck EURO GIANT / TOBROCO SCHAFFER HYDRO(SMALL) WEIDEMANN HYDRO
The hydraulic system		
Hydraulic connections required: - basic version - optional version (1). - with hydraulic steering	 - - -	 1 pair quick-connect couplings, size 12 series A, ISO 7241-1 1 pair quick-connect couplings, size 20 series A, ISO 7241-1 2 pairs quick release couplings, size 12 series A, ISO 7241-1
Pressure in the installation	MPa	16-20
Maximum capacity of the oil pump	l/min	60 *(basic version)*. 150(1) *(optional version)*.
Hydraulic oil	-	L-HL-46 (2)
Electrical system		
Electrical system voltage	V	12 or 24 *(depending on machine version)*
Lighting installation connector	-	3-pin DIN9680 compliant socket
Other requirements		
Capacity	-	minimum 2x the weight of the machine
Warning light	-	orange light

(1) - for a machine with hydraulic installation for carriers with a high oil pump output of more than 60l/min (up to 150l/min)

(2) - it is permissible to use a different oil, provided that it can be mixed with the oil poured into the machine.

INF.2.6-010.01.EN

2.4 MACHINE EQUIPMENT

Tabela 2.2. Equipment (1).

Content	STANDARD	OPTIONAL
User Manual	●	
Warranty Card	●	
Sprinkler system		●
Marker lights		●
Hydraulic system for high flows		●
Without dirt tank		●
Cylindrical brush (medium)	●	
Roller brush (soft, hard, extra hard)		●
Coronary brush (soft, medium, hard)		●
Right or left side brush (soft, medium, hard, extra hard)		●
Front support wheel (solid)	●	
Front support wheel (pneumatic)		●
Hydraulic torsion of the suspension system		●
Swingarm suspension system (without attachments)	●	
Three-point attachment cat. I/II		●
Cat. I/II		●
Pendulum suspension without attachment		●
EURO fixing		●
GIANT / TOBROCO fixing		●
SCHAFFER HYDRO fixing (SMALL)		●
WEDEMANN HYDRO fixing		●
Forklift attachment		●
Indicators of the centre position of the pendulum suspension system.		●

(1) Some items of standard equipment, which are listed in the table, may not be present in the machine supplied. This is due to the possibility of ordering a new machine with a different set - optional equipment, replacing standard equipment.

INF.2.6-012.01.EN

2.5 TRANSPORT

The machine is prepared for sale fully assembled and requires no packaging. Only the machine's documentation and possibly some pieces of equipment are packaged. Delivery to the user is by truck or self-transport using a carrier.

2.5.1 Trucking

When loading and unloading the machine, follow the general health and safety rules for handling work. Persons operating handling equipment must have the required authorisation to use the equipment.

The machine should be attached firmly to the platform of the vehicle using straps, chains, lashings or other fastening devices equipped with a tensioning mechanism. Fasten the fastening elements in the transport fixtures intended for this purpose (maximum force - 400 kg per fixture).

Use approved and technically sound means of fastening. Rubbed straps, cracked fixing lugs, bent or corroded hooks or other damage will disqualify a measure from use. Refer to the manufacturer's instructions for the fixing agent used. The number of fastening elements (ropes, belts, chains, lashings, etc.) and the force needed for their tension depends, among others, on the weight of the trailer, the construction of the car carrying the machine, the speed of travel and other conditions. For this reason, it is not possible to define the attachment plan in detail.

The fixing means must be selected according to the guidelines of the manufacturer of these components. In case of doubt, a larger number of attachment and securing points for the machine should be used. If necessary, protect the sharp edges of the machine, thus protecting the means of attachment from damage during transport.

When handling, take special care not to damage the

DANGER

During road transport, the machine must be secured on the platform of the means of transport in accordance with safety requirements and regulations.

When driving, the driver of the car should exercise extreme caution. This is due to the fact that the centre of gravity of the vehicle with the loaded machine has been shifted upwards.

Use only approved and technically reliable securing measures. Familiarise yourself with the contents of the attachment manufacturer's Operating Instructions.

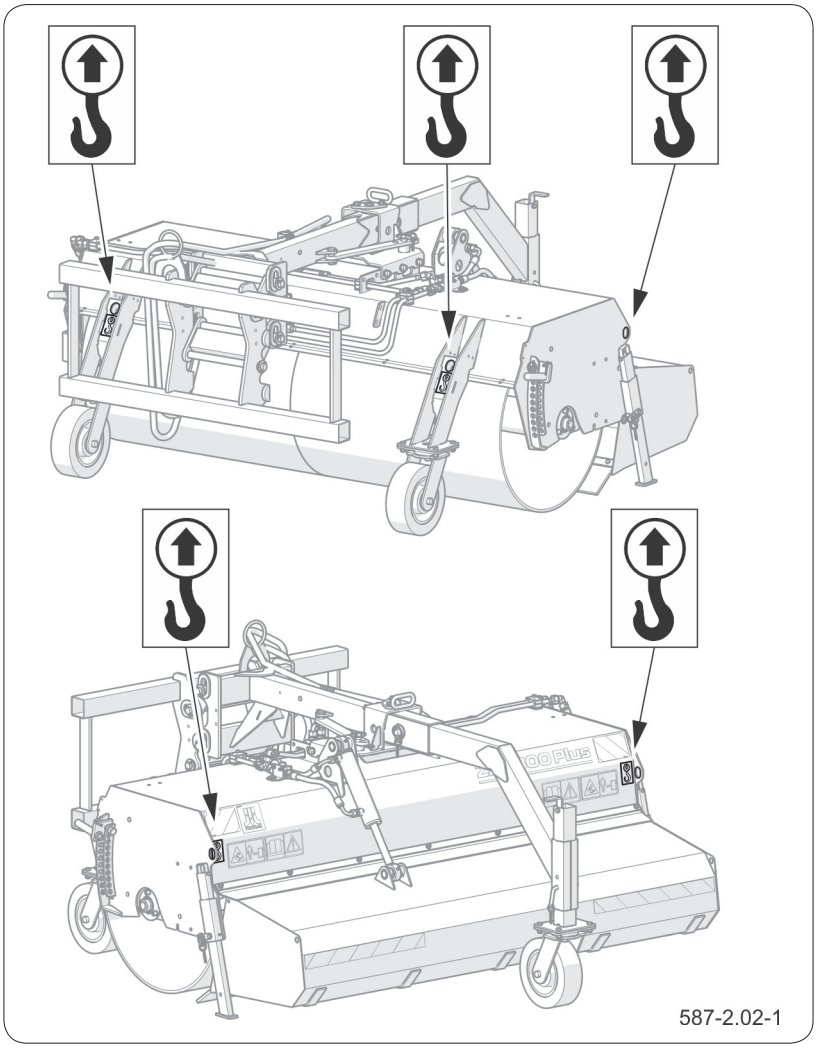
Improper use of restraints can cause an accident.

CAUTION

It is forbidden to attach slings and fastenings of any kind to hydraulic, electrical or flaccid machine components (e.g. guards, cables).

CAUTION

When transporting the sweeper on the loading platform and during storage, position the machine so that it does not rest on the roller brush.



Rysunek 2.3 Fixing points

ADVICE

The position of the machine's centre of gravity can vary by +- 50mm, depending on the picking version

machine's fittings and paintwork.

When transported on the loading platform, the machine should be supported on castors and parking supports.

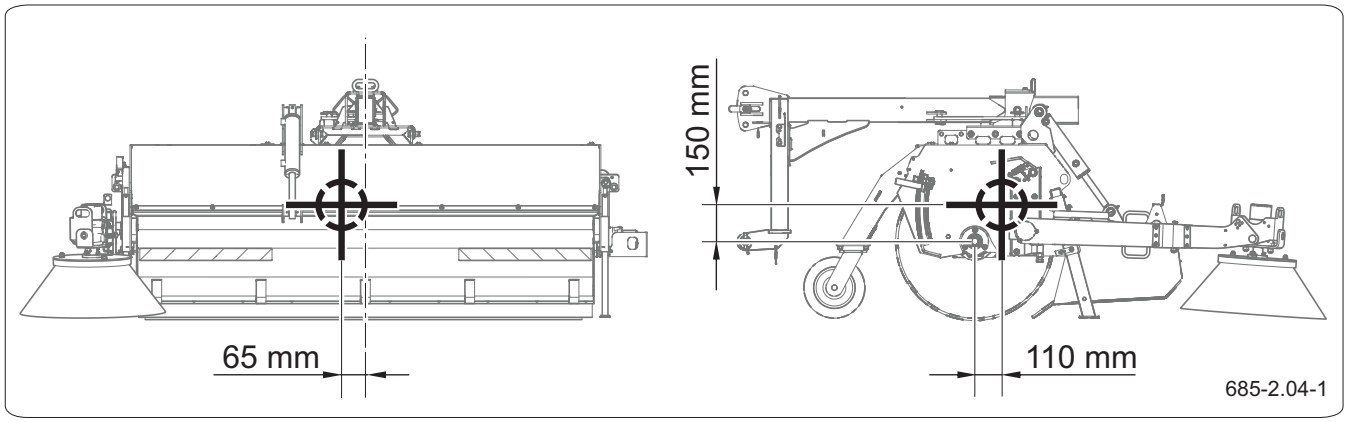
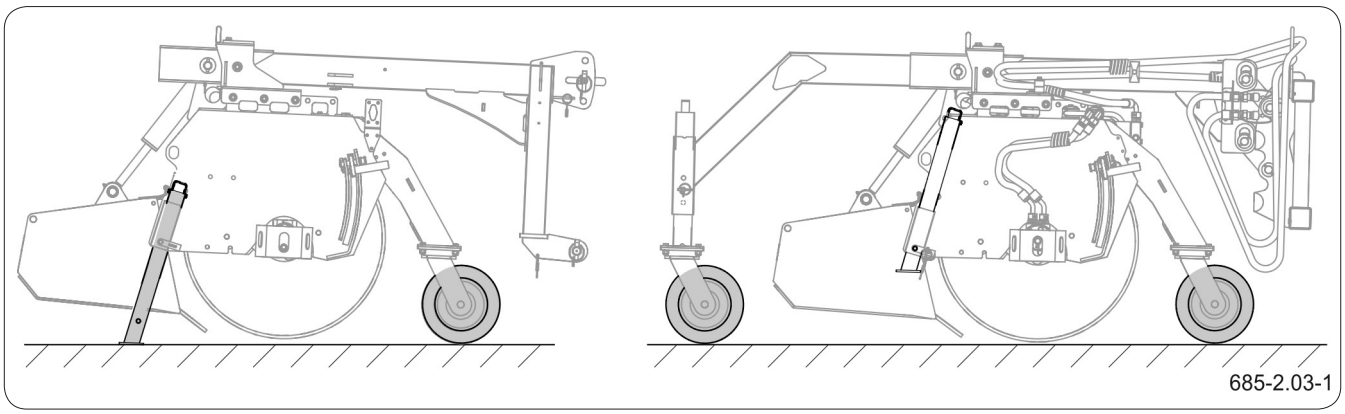


Figure 2.4 Position of the centre of gravity of the machine
the dimensions on the figure are given in millimetres [mm].



Rysunek 2.5 Positioning the machine during transport on the loading platform

2.5.2 Own transport

CAUTION

When transporting yourself as an operator, read and follow the contents of this Operating Manual.

Own transport on public roads when connected to a carrier can be used if the machine does not obstruct the carrier's lights.

If transporting yourself, read and follow the User Manual. When driving, adapt your speed to the prevailing road conditions, with no more than the permitted transport speed of 25km/h.

INF.2.6-011.01.EN

2.6 TERMS OF WARRANTY

ADVICE

You should require the seller to carefully fill out the Warranty Card and complaint coupons. The lack of e.g. date of sale or point of sale stamp exposes the user to not accept any complaints.

PRONAR Sp. z o.o. in Narew guarantees smooth operation of the machine when it is used in accordance with the technical and operational conditions described in the*USER MANUAL*. Deadline for completion of repairs is specified in the *Warranty Card*.

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

The warranty services only apply to such cases as: mechanical damage not caused by the fault of the user, factory defects of parts, etc.

In the event that damage occurs as a result of:

- mechanical damage caused by the user's fault, road accident,
- from improper operation, adjustment and maintenance, using the machine contrary to its purpose,
- use of a damaged machine,
- repairs carried out by unauthorized persons, improper repairs,
- execution of user changes in machine design,

the user loses the warranty.

Modifications to the machine without the written consent of the Manufacturer are prohibited. In particular, welding, reaming, cutting and heating of major structural components of the machine that directly affect safety during use is not permitted.

Detailed warranty conditions are given in the *WARRANTY CARD* attached to the newly purchased machine.

INF.3.B-006.02.EN

2.7 ENVIRONMENTAL RISK

DANGER

Used oil or collected residues mixed with absorbent material should be stored in an accurately labelled container. Do not use food packaging for this purpose.

CAUTION

Oil waste may only be taken to an oil recycling or reclamation centre. It is forbidden to discharge or pour oil into drains or bodies of water.

ADVICE

The machine's hydraulic system is filled with L-HL 46 oil.

A hydraulic oil spill poses direct environmental risks due to its limited biodegradability. Maintenance and repair work where there is a risk of oil spills should be carried out in rooms with an oil-resistant surface. In the event of a spill into the environment, the source of the spill must first be secured and the spilled substance must then be collected using available means. Collect oil residues with sorbents or mix with sand, sawdust or other absorbent materials. Collected oil contaminants should be stored in a sealed and labelled hydrocarbon-resistant container and then taken to an oil waste disposal facility. Keep the container away from heat sources, flammable materials and food.

Used oil or oil unsuitable for reuse due to loss of its properties is recommended to be stored in the original packaging under the same conditions as described previously.

INF.2.6-007.01.EN

2.8 WITHDRAWAL FROM USE

DANGER

The work involved in dismantling the plumbing system should be carried out by suitably qualified personnel. Before removing the gas accumulator, reduce the pressure in the accumulator on both the liquid and gas side!

DANGER

During dismantling, use appropriate tools, equipment (cranes, hoists, etc.), use personal protective equipment, i.e. protective clothing, footwear, gloves, goggles, etc. Avoid oil coming into contact with your skin. Do not allow oil to leak.

If the user decides to dispose of the machine, follow the regulations for disposal and recycling of end-of--life machinery in your country.

Before dismantling, reduce the residual pressure in the hydraulic system, completely remove the oil from the system and from the gearbox. When replacing parts, hand over worn or damaged items to a recycling centre. Dispose of used oil as well as rubber or plastic parts at recycling facilities for this type of waste.

INF.2.3-008.01.EN

Tabela 2.3. Codes for waste arising from dismantling of the machine

ITEM	Code	Meaning
1	07 02 13	Plastic waste
2	13 01 10*	Other hydraulic oils
3	13 02 04*	Mineral-based chlorinated engine, gear and lubricating oils
4	13 02 06*	Synthetic engine, gear and lubricating oils
5	13 02 08*	Other engine, gear and lubricating oils
6	13 05 02*	Sludges from oil dehydration in separators
7	13 05 08*	Mixture of wastes from grit chambers and oil separator dewatering
8	15 01 10*	Packaging containing or contaminated with residues of hazardous substances
9	15 02 02*	Sorbents, filter materials and protective clothing contaminated by hazardous substances
10	16 01 03	Used tyres
11	16 01 17	Ferrous metals
12	16 01 22	Other items not mentioned

CHAPTER 3.

SAFETY OF USE

PRONAR ZM-1500 / 1800 / 2300PLUS

3.1 BASIC SAFETY RULES

CAUTION

If the information contained in the User's Manual is difficult to understand, contact a seller who runs an authorized technical service on behalf of the manufacturer, or contact the manufacturer directly.

- Before using the machine, please read carefully the content of this publication and the „Warranty Card". During operation, follow all recommendations.
- The user manual should be available to the operator for all the time. Protect the manual from damage.
- If the information contained in the User's Manual is difficult to understand, contact a seller who runs an authorized technical service on behalf of the manufacturer, or contact the manufacturer directly.
- If you ignore the recommendations contained in these document, you create a threat to the health and life of bystanders and/or the machine operator.
- Use and operate the machine carefully! By a careless work, you create a threat to the health and life of bystanders and/or the machine operator.
- You are obliged to familiarize yourself with the construction, operation principles and safe operation of the machine.
- Familiarize yourself with all machine controls before starting work.
- Do not use the machine without knowing its function.
- There is a residual risk of threats, therefore the basic principle of using the machine should be the application of the principles of safe use and sensible behaviour. Remember that your safety is the most important thing.
- It is forbidden to use the machine by persons who are not authorized to drive carriers, including children, people under the influence of alcohol, drugs or other intoxicating substances,

CAUTION

The machine may only be used and operated by persons qualified to drive agricultural tractors (carriers).

etc.

- The machine may not be used for purposes other than those for which it was intended. Everyone who uses the machine in a manner contrary to its intended use, thus takes full responsibility for all consequences arising from its use.
- Use of the machine for purposes other than envisaged by the Manufacturer is inconsistent with the intended use and may void the warranty.
- The machine may only be used when all safety elements (e.g. covers, pins, cotter pins, warning labels) are technically sound and placed in the right place. If the safety elements are damaged or lost, replace them with new ones.

BHP.2.9-001.01.EN

3.2 SAFETY WHEN AGGREGATING THE MACHINE

DANGER

Take special care.

- Do not connect the machine to a carrier (tractor) if it does not meet the requirements set by the manufacturer (minimum power requirement of the carrier, unsuitable connections, etc.) - see point *"Carrier requirements"*..
- Before connecting the machine, make sure that the oil in the carrier's external hydraulic system can be mixed with the machine's hydraulic oil.
- Ensure that the carrier and machine are in working order before connecting.
- Familiarise yourself with the contents of the carrier manual.
- Use only original pins and locks to connect the machine to the carrier.
- Once aggregation is complete, check the safety features.
- Take special care.
- No one is allowed between the machine and the carrier during the connection.
- You may only couple and uncouple the machine when the carrier is stationary.
- The machine disconnected from the carrier must be placed on a horizontal, sufficiently firm surface so that it can be reconnected.

BHP.2.3-002.01.EN

3.3 SAFETY DURING TRANSPORT JOURNEYS

CAUTION

When driving on public roads, the machine should be fitted with marker lights (optional equipment)

CAUTION

Do not exceed the speed limit resulting from the limitations of the road conditions and construction limits (maximum 25 km/h)

DANGER

It is forbidden to carry persons on the machine or to transport materials.

Before starting the travel:

1. Make sure the machine is properly connected to the media.
2. Ensure that an approved or homologated warning reflective triangle is fitted to the machine and tractor when driving on public roads.
3. Check the correct operation of the lighting.

And above that:

- When driving on public roads, comply with the traffic regulations of the country in which the machine is being operated.
- Adapt your speed to the prevailing road conditions.
- Before using the machine always check its technical condition, especially in terms of safety. In particular, check the condition of the suspension system attachment components, hydraulic and electrical system connection components.
- When driving the machine on uneven terrain, exercise extreme caution and reduce your speed due to the possibility of damage and/or overturning of the carrier with the machine.
- Brash driving and excessive speed can cause accidents.
- When travelling with the machine raised, lock the carrier's suspension system in the upper position against accidental lowering
- It is forbidden to leave the machine raised and unsecured when the carrier is stationary. Leave the machine at a standstill.

BHP.2.6-010.01.EN

3.4 MAINTENANCE AND CLEANING

- During the warranty period, any repairs may only be carried out by a manufacturer-authorised warranty service. It is recommended that any repairs are carried out by specialised workshops.
- When you find any malfunctions or damage to the machine, stop using it until it is repaired.
- Use appropriate, fitted protective clothing, gloves and the right tools when working. Wear oil-resistant gloves and safety goggles when working on the hydraulic system.
- Any modifications to the machine will relieve PRONAR Narew of any responsibility for damage or injury caused.
- Before any work is undertaken on the machine, switch off the engine of the carrier (tractor) and wait for all rotating parts to stop.
- Regularly check the technical condition of the safety devices and the correct tightness of the screw connections.
- Carry out regular maintenance on the machine in accordance with the scope specified by the manufacturer.
- Reduce the residual oil pressure completely before carrying out repair work on the hydraulic system.
- Carry out repair, maintenance and cleaning work with the carrier engine switched off and the ignition key removed from the ignition. Secure the carrier with the parking brake. Secure the tractor cab against unauthorised access.
- If individual components need to be replaced, only use parts recommended by the manufacturer. If you do not comply with these requirements you may endanger the health or life of bystanders or operators, contribute to damage to

the machine. This constitutes grounds for revocation of the guarantee.

- Check the condition of protective elements, their technical condition and correct fastening.
- In the event of work requiring the machine to be raised, use properly certified hydraulic or mechanical lifts for this purpose. After lifting the machine, stable and durable supports must also be used. You may not carry out any work underneath the machine, raised only by means of a lift (without supports).
- Do not support the machine with brittle elements (bricks, hollow blocks, concrete blocks).
- After completing work associated with lubrication, remove excess grease or oil. Keep the machine clean.
- You may not carry out repairs to plumbing components yourself. If these components are damaged, have them repaired by an authorised repairer.
- To reduce the risk of fire, keep the machine clean.
- Clean the machine as required.
- Before using the pressure washer, familiarise yourself with the principle of operation and the recommendations for safe operation of this equipment.
- Use only clean running water for cleaning. It is possible to use pH-neutral cleaning detergents that do not have an aggressive effect on the structural components of the machine.
- The use of pressure washers increases the effectiveness of cleaning, but be careful when working. When cleaning, do not approach the nozzle of the cleaning unit at a distance of less than 50 cm from the surface to be cleaned.
- The water temperature should not exceed 55 ^{0}C.

DANGER

Refer to the instructions for using cleaning detergents and preservatives.

When washing with detergents, wear suitable protective clothing and eye protection.

CAUTION

Strong water jet pressure can cause mechanical damage or corrosion to the machine.

- Do not point the water jet directly at system components and equipment, i.e. control valves, bearings, electrical and hydraulic plugs, lights, electrical connections, information and warning labels, rating plate, cable connections, lubrication points, etc. High water jet pressure can cause water penetration and consequent mechanical damage or corrosion.
- Do not use organic solvents, preparations of unknown origin or other substances which may cause damage to painted, rubber or plastic surfaces. It is recommended to make a test on an invisible surface in case of doubt.
- Surfaces oily or greasy by grease should be cleaned with petrol or degreasing agents, and then washed with clean water and detergent. Follow the cleaning agent manufacturer's instructions.
- Store detergents for washing in their original containers, or alternatively in substitute containers, but very carefully labelled. Detergents must not be stored in food or drink storage containers or unlabelled containers.
- Observe the rules of environmental protection, wash the machine in designated areas.
- Washing and drying of the axle must take place at an ambient temperature above 0°C.
- Every time you wash the machine, carry out lubrication.
- Perform maintenance and repair activities applying the general principles of health and safety at work.

Accident management

- In case of injury, wash and disinfect the wound immediately.
- In case of serious injuries consult a physician.

BHP.2.9-005.01.EN

3.5 SAFETY RULES FOR OPERATING A HYDRAULIC SYSTEM

DANGER

The hydraulic system is under high pressure during operation of the machine. The work involved in dismantling the plumbing system should be carried out by suitably qualified personnel.

CAUTION

The hydraulic system vents itself while the machine is running.

ADVICE

Regularly check the condition of connections and hydraulic hoses.

ADVICE

Use the oils recommended by the manufacturer.

- Operation of the machine with a leaking system is not permitted.
- In the event of failure of the hydraulic system, the machine must be decommissioned until the failure is remedied.
- When connecting the hydraulic lines to the carrier, ensure that the tractor's hydraulic system and the machine are not under pressure. If necessary, reduce the residual pressure in the system.
- After a change, the used oil must be disposed of. Used oil or oil which has lost its properties should be stored in original containers or replacement packaging resistant to hydrocarbons. Replacement containers must be accurately described and properly stored.
- Do not store oil in food storage containers.
- Replace the hydraulic hoses every 4 years regardless of their condition.

Handling of accidents

- In the event of injuries being caused by pressurized hydraulic oil, contact a doctor immediately. Hydraulic oil can penetrate the skin and cause infection.
- If the oil gets into the eyes, rinse with plenty of water and if irritation occurs, contact a doctor.
- In the event of contact of oil with skin, wash the area of contact with water and soap. Do not use organic solvents (petrol, paraffin).

BHP.2.6-014.01.EN

3.6 SAFETY WHEN OPERATING THE MACHINE

DANGER

The machine can eject objects at a distance during operation. Stop the machine when bystanders are in the working area.

DANGER

It is forbidden to occupy any position other than that of the operator in the vehicle cab when operating the machine. It is forbidden to leave the operator's cab while the machine is in operation.

CAUTION

Rapid lowering may result in damage to the machine (wheels) on contact with the ground.

- Before starting the machine, make sure that there are no bystanders (especially children) or animals in the danger zone.
- The machine operator must ensure that the machine and the working area are properly visible.
- Ensure that all guards are in working order and correctly positioned before starting the machine each time. Damaged or incomplete components must be replaced with new original components.
- Before starting the carrier with the aggregated machine, ensure that the hydraulic system is not engaged - otherwise uncontrolled starting of the machine may occur.
- Make sure there are no bystanders around before lifting or lowering the machine.
- When turning and reversing, always raise the machine to the transport position and switch off the drive.
- Use the correct settings and parameters when operating the machine.
- Perform raising, lowering and controlling the machine gently without jerks.
- It is forbidden to enter the working area or to move machine components.
- It is forbidden for people to be between the carrier and the machine during operation.
- It is forbidden to approach the machine before the rotating parts have stopped.
- During a break or stoppage, switch off the drive and lower the machine to the ground.

BHP.2.6-011.01.EN

3.7 DESCRIPTION OF RESIDUAL RISK

Pronar Sp. z o. o. in Narew has made every effort to eliminate the risk of an accident. However, there is some residual risk that can lead to an accident and is primarily associated with the following activities:

- misuse of the machine,
- staying between the carrier (tractor) and the machine while the engine is running and while the machine is coupled,
- being on the machine during engine work,
- operation of the the machine with the covers removed or inoperative,
- failure to keep a safe distance from danger zones or to occupy a place in these zones while the machine is running,
- operation of the machine by unauthorised persons or persons under the influence of alcohol or psychoactive substances,
- cleaning, maintenance and technical inspection with the media connected and running,
- introducing design changes without the consent of the Manufacturer,
- presence of persons or obstacles in areas invisible from the operator's position.
- sweeping surfaces where there may be long components (wire, ropes, cables),
- encountering an invisible obstacle,
- careless maintenance and replacement of sharp brush components.
- failure to observe the required work paramentals.

Residual risk can be reduced to a minimum by following these recommendations:

- prudent and leisurely machine operation,
- sensible application of the remarks and recommendations contained in the User Manual,
- performing maintenance and repair work in

accordance with the principles of operating safety,

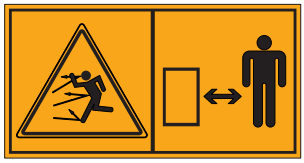
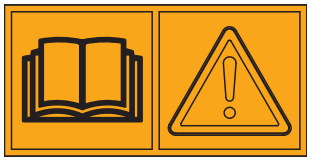
- carrying out maintenance and repair work by trained persons,
- use of appropriate protective clothing,
- Securing the machine against access by unauthorized persons, especially children.
- keeping a safe distance from prohibited and dangerous places,
- Prohibition on being on the machine during operation or transport,

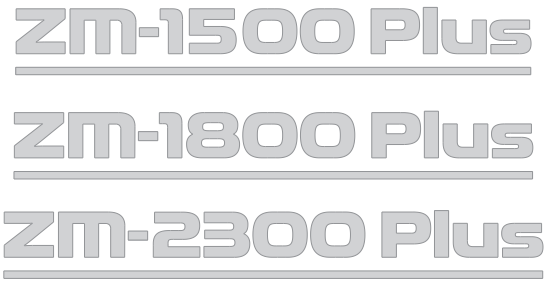
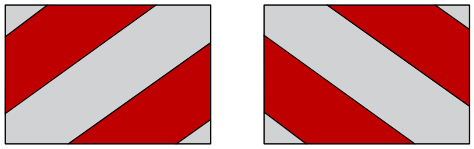
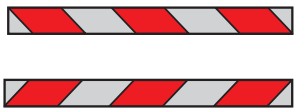
BHP.2.6-012.01.EN

3.8 INFORMATION AND WARNING STICKERS

The machine is marked with the information and warning stickers listed in Table 3.1. The operator of the machine must, throughout the entire period of use, ensure that the inscriptions, warning and information symbols placed on the machine are legible. If they are damaged, they should be replaced with new ones. New assemblies replaced during repair must be marked again with the appropriate safety signs. When cleaning the machine, do not use solvents that can damage the coating of the labels and do not direct a strong jet of water at them.

Tabela 3.4. Information and warning stickers

ITEM	Sticker	Meaning
1		Thrown or flying objects, whole body hazard. Keep a safe distance **12N-15000008**
2		High-pressure liquid jet. Keep a safe distance **12N-15000009**
3		Do not approach or touch the rotating brushes. Keep a safe distance **12N-15000007**
4		Read the contents of the operating instructions before use. **35N-27000007**

ITEM	Sticker	Meaning
5		An attachment point for conveyor belts or chains. **35N-27000009**
6		Machine model **684N-95000001-01** **685N-95000001-01** **686N-95000001-01**
7		Manufacturer's logo **685N-95000002**
8		Demarcation markings **12N-150000L 12N-150000P**
9		Tank markings **12N-150005L 12N-150005P**

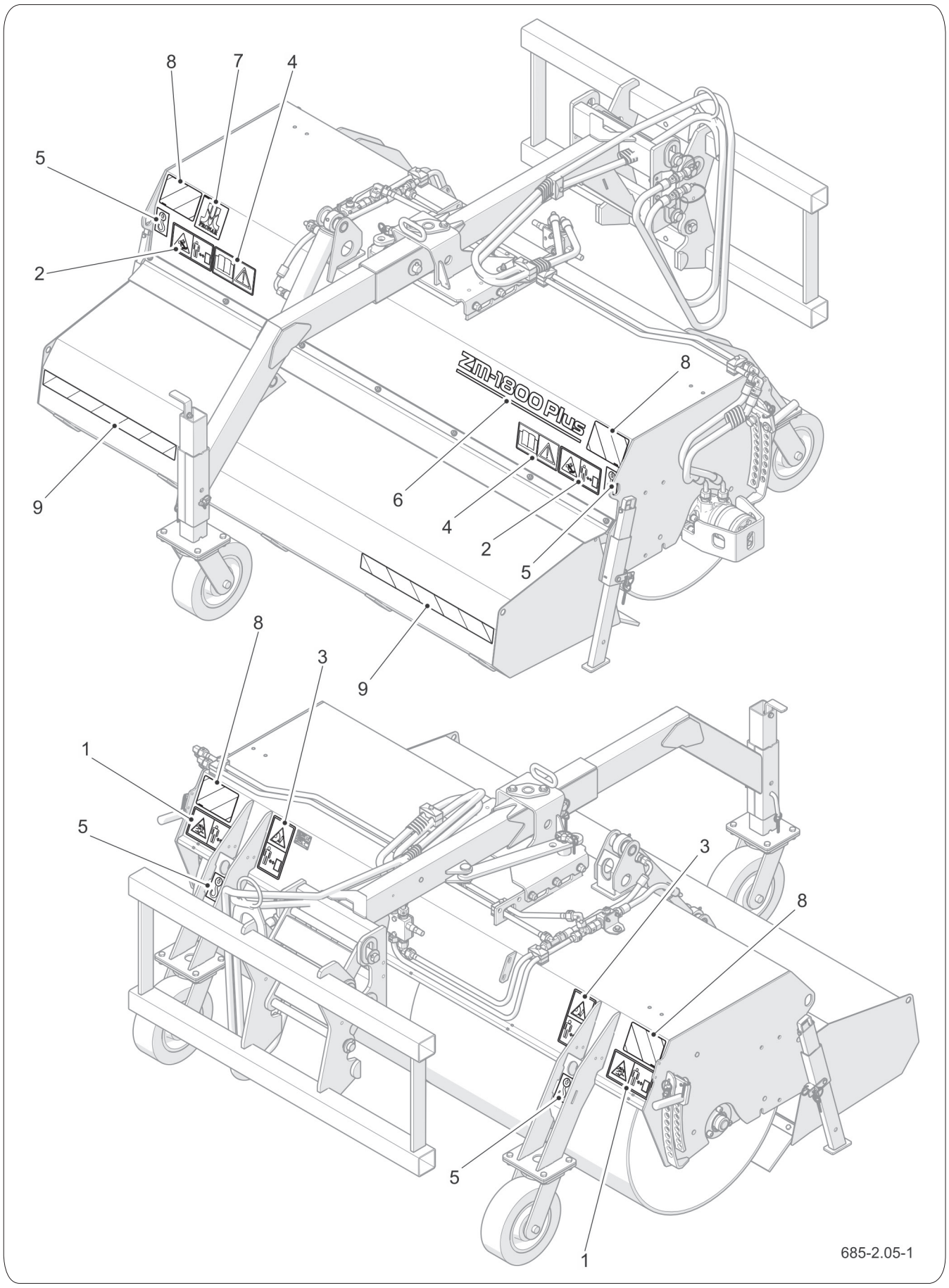


Figure 3.1 Positioning of information and warning stickers

BHP.2.6-013.01.EN

CHAPTER 4.

CONSTRUCTION AND PRINCIPLE OF OPERATION

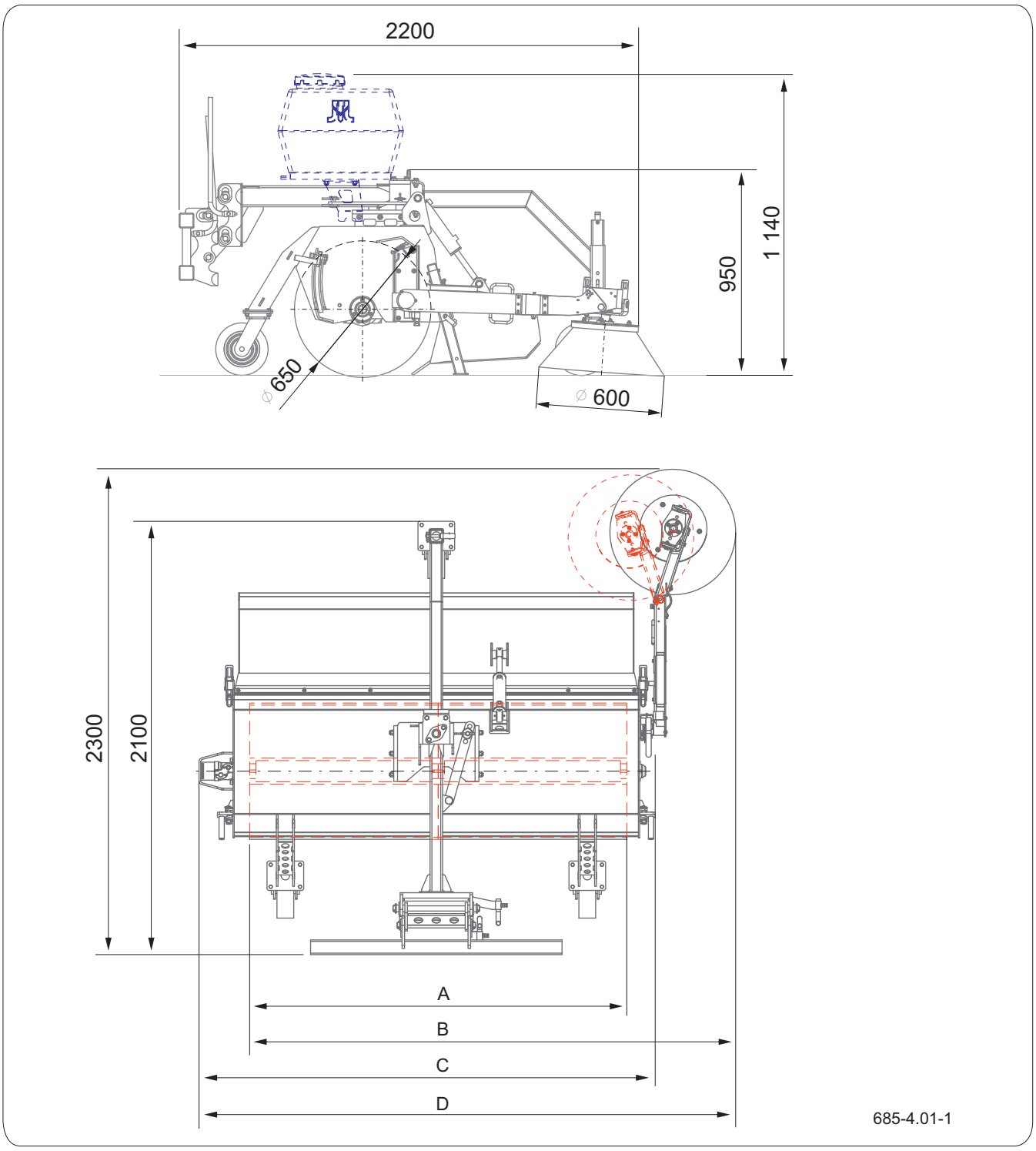
PRONAR ZM-1500 / 1800 / 2300PLUS

Tabela 4.1. Technical specifications

Content	Unit	ZM-1500	ZM-1800	ZM-2300
Method of attachment to the carrier: - front or rear three-point linkage - other	- - - - - -	3-point suspension system according to ISO 730-1 category I/II, rigid or swinging-arm Forklift truck EURO GIANT/TOBROCO SCHAFFER HYDRO(SMALL) WEIDEMANN HYDRO		
Working width: - without side brush A - with side brush B	 mm mm	 1,500 2,000	 1,800 2,300	 2,300 2,800
Working speed	km/h	6 *(recommended value)*.		
Performance (at 6 km/h) (1).	m^2	9,000	10,800	13,800
Mass (2): - without side brush - without side brush and dirt tank - with side brush	 kg kg kg	 422 357 482	 445 380 505	 480 405 540
Dirt tank capacity	mm	170	200	250
Width - without side brush C - with side brush D	 mm mm	 1,910 1,970	 2,210 2,270	 2,710 2,770
Length: - mounting on the front of the carrier - mounting on the back of the carrier	 mm mm	 2 100 (1) / 2 200 1,895		
Height: - with sprinkler system - without sprinkler system	 mm mm	 1,440 950		
Brush speed (3): - roller brush - side brush	 rpm rpm	 180 180		
Supply of marker lights and sprinkler system	-	12V or 24V from a 3-pin socket *(depending on version)*		

Content	Unit	ZM-1500	ZM-1800	ZM-2300
The hydraulic system: - power and control - optimum pressure - oil demand	 - MPa l/min	external hydraulics of the carrier 16-20 up to 60		
Sprinkler system: - water tank capacity - control - system pressure - performance	 dm^3 - bar l/min	200 Control panel 3-4 11		
Transport speed	km/h	25 *(maximum)*.		
Operation	-	single-person		
Noise level emitted	dB	< 70		

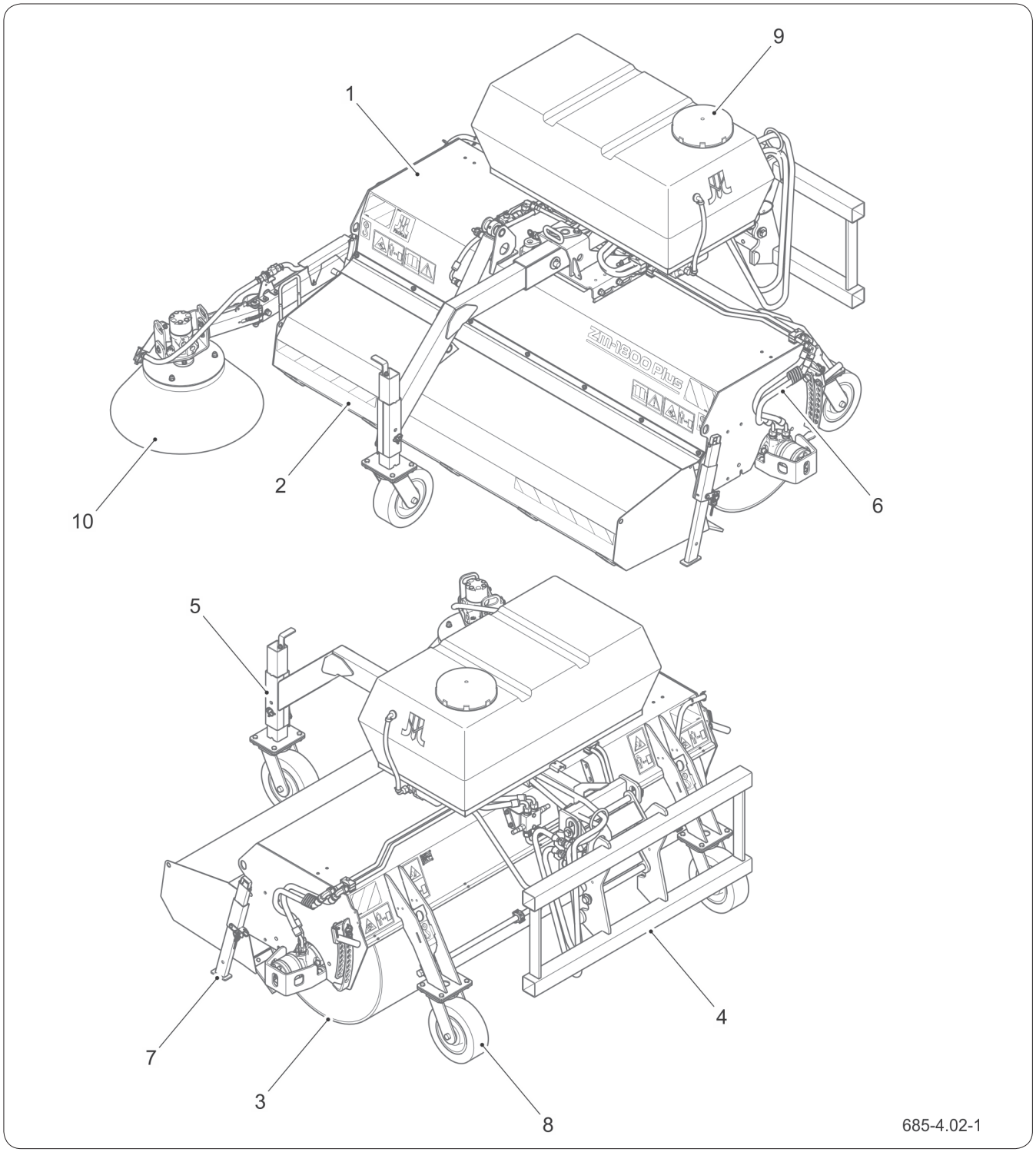
(1) - without side brush
(2) - without sprinkler system
(3) - for installations with an oil flow of up to 60l/min.



Rysunek 4.1 Basic dimensions
Dimensions in the figure are given in millimetres [mm]. (A,B,C,D) width depending on model and completion version (Table 4.1 Technical characteristics)

BIZ.2.6-007.01.EN

4.1 GENERAL CONSTRUCTION

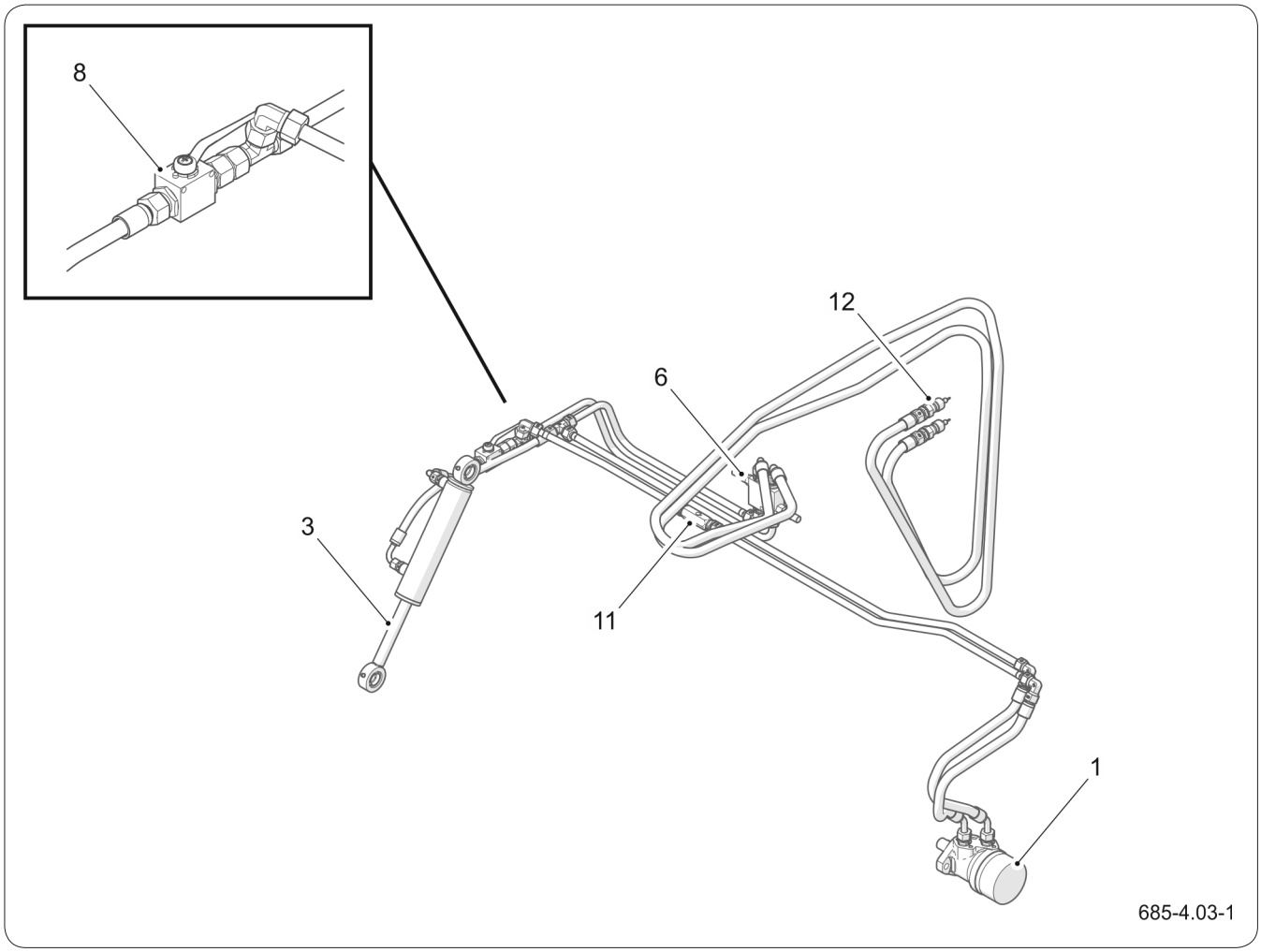


Rysunek 4.2 Machine construction

(1) frame *(2) dirt tank* *(3) roller brush*
(4) suspension system *(5) front support wheel* *(6) hydraulic system*
(7) parking support *(8) running wheel* *(9) sprinkler system*
(10) side brush

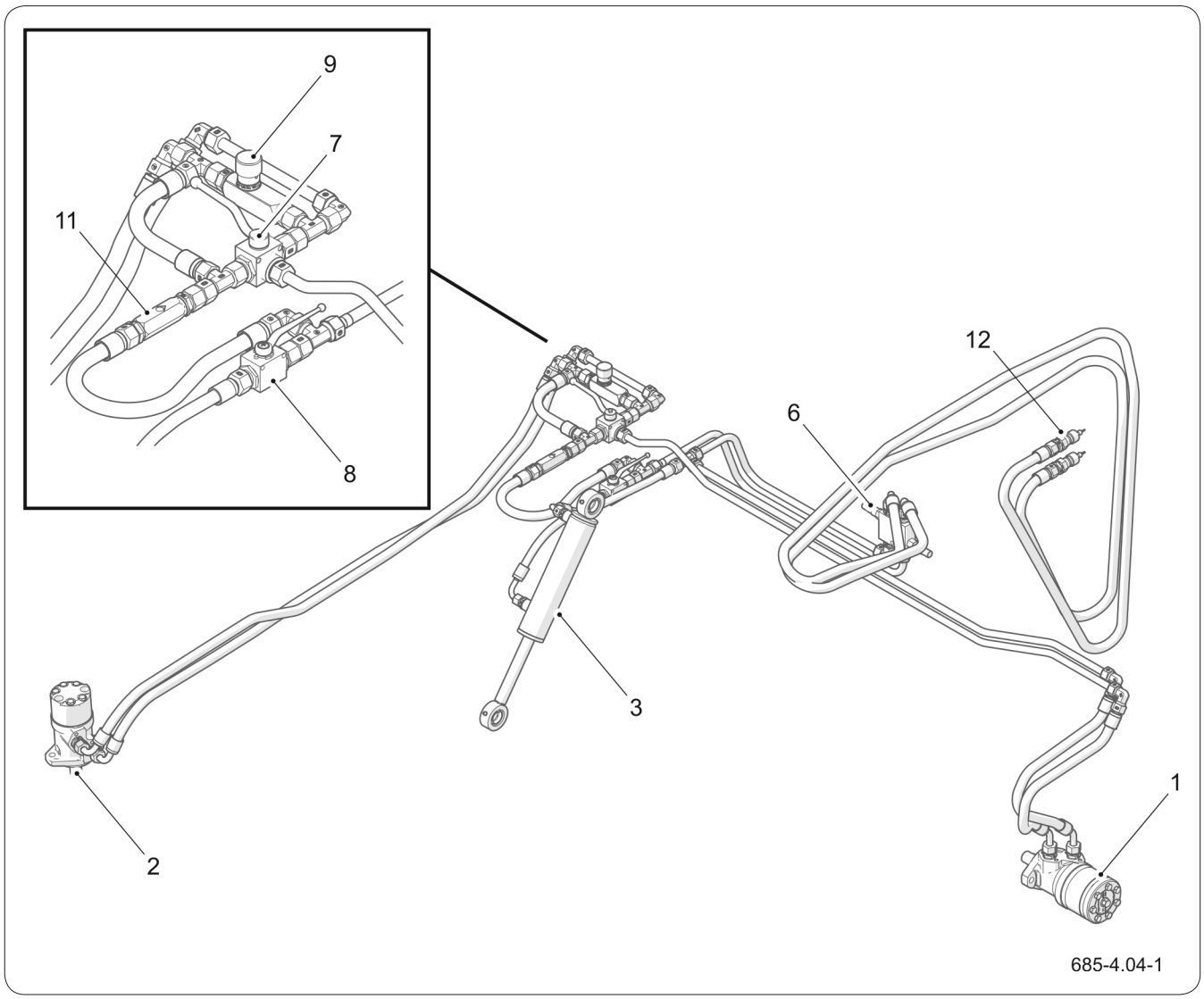
BIZ.2.6-008.01.EN

4.2 THE HYDRAULIC SYSTEM



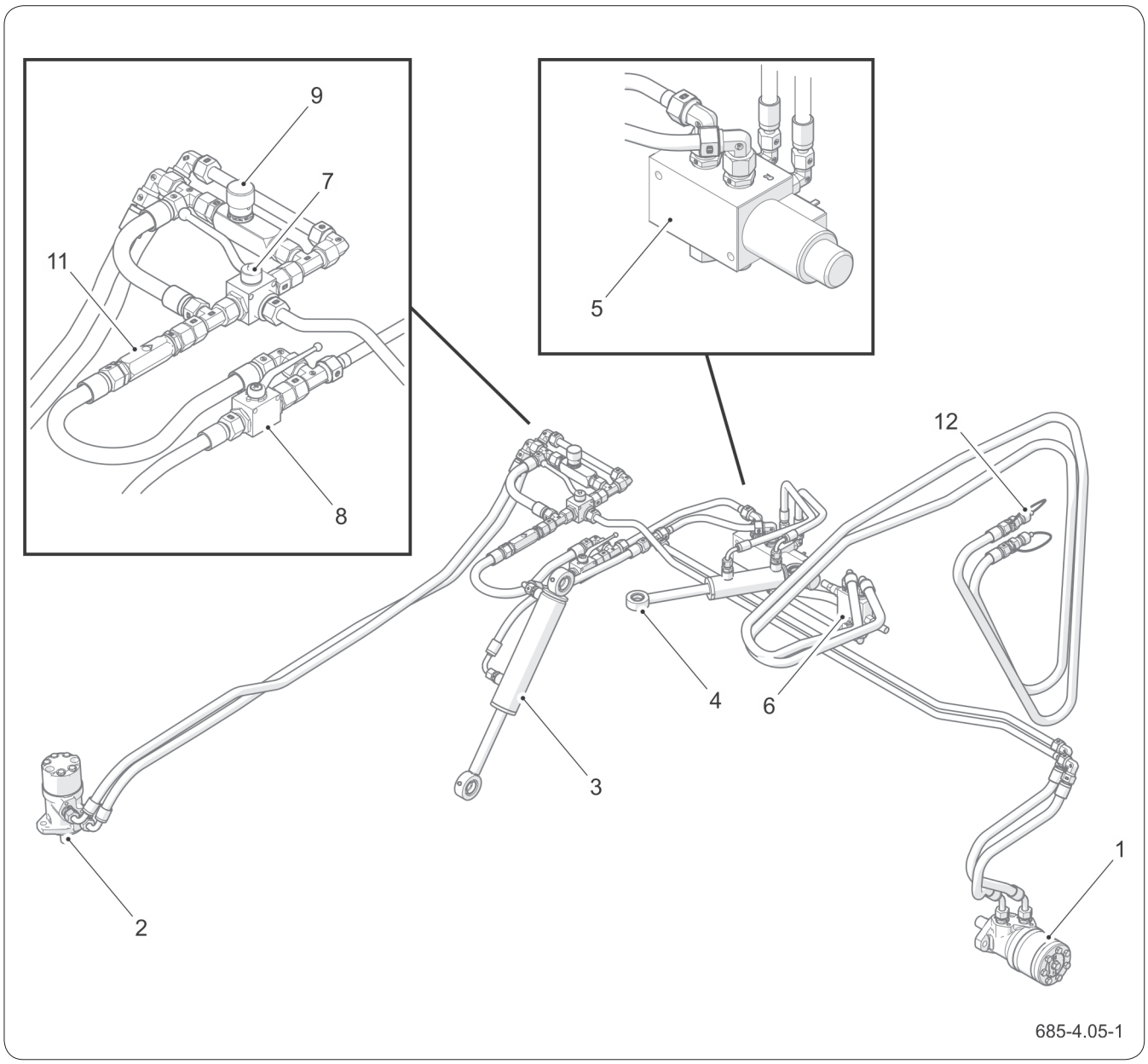
Rysunek 4.3 Plumbing construction (standard)

(1) roller brush hydraulic motor *(3) dirts tank cylinder* *(6) bypass valve*
(8) dirts tank locking valve *(11) non-return valve* *(12) quick couplings*



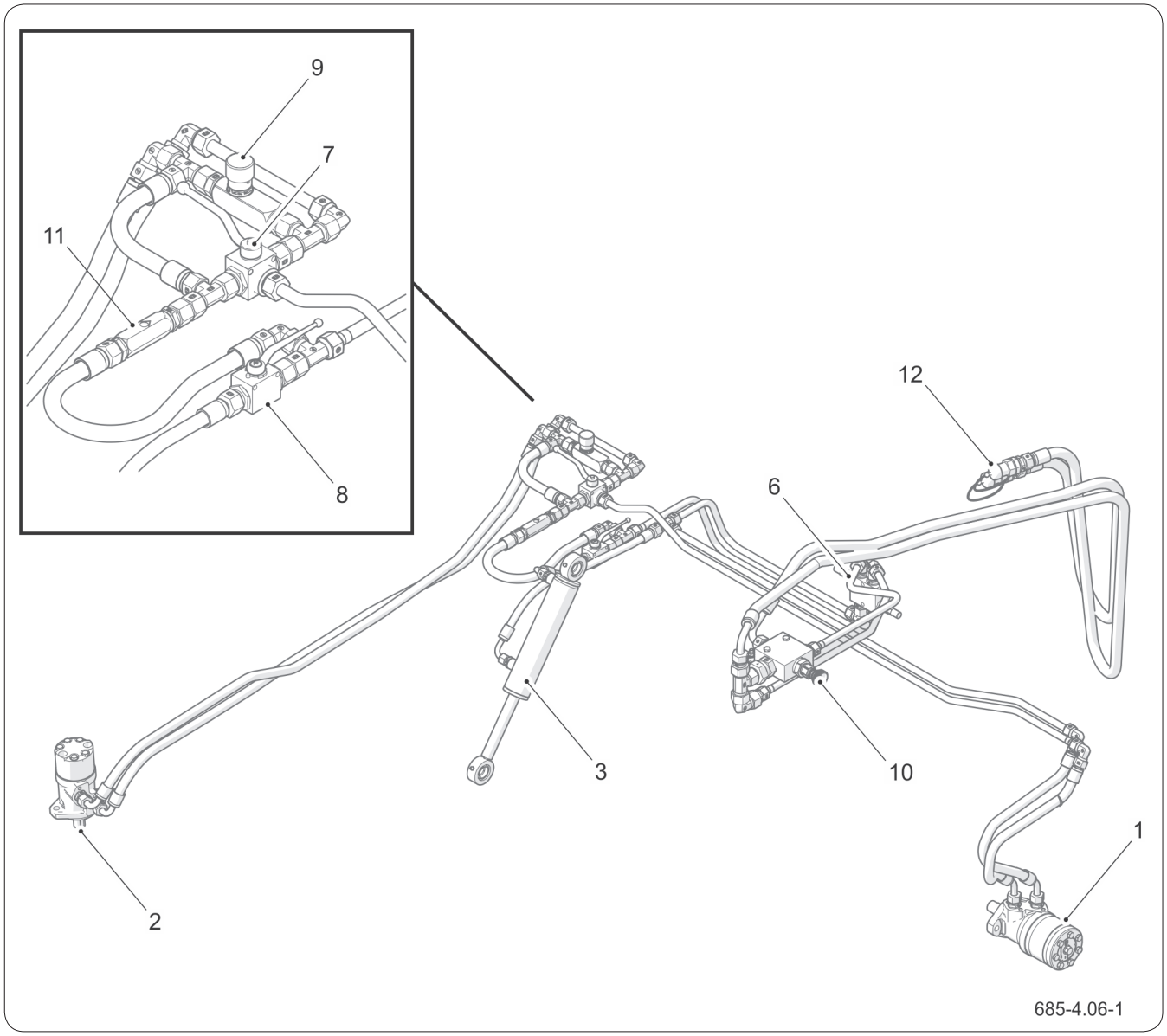
Rysunek 4.4 Hydraulic system construction (with side brush)

(1) roller brush hydraulic motor *(2) side brush hydraulic motor* *(3) dirt hopper cylinder*
(6) bypass valve *(7) side brush shut-off valve* *(8) dirt hopper valve*
(9) throttle valve *(11) non-return valve* *(12) quick couplings*



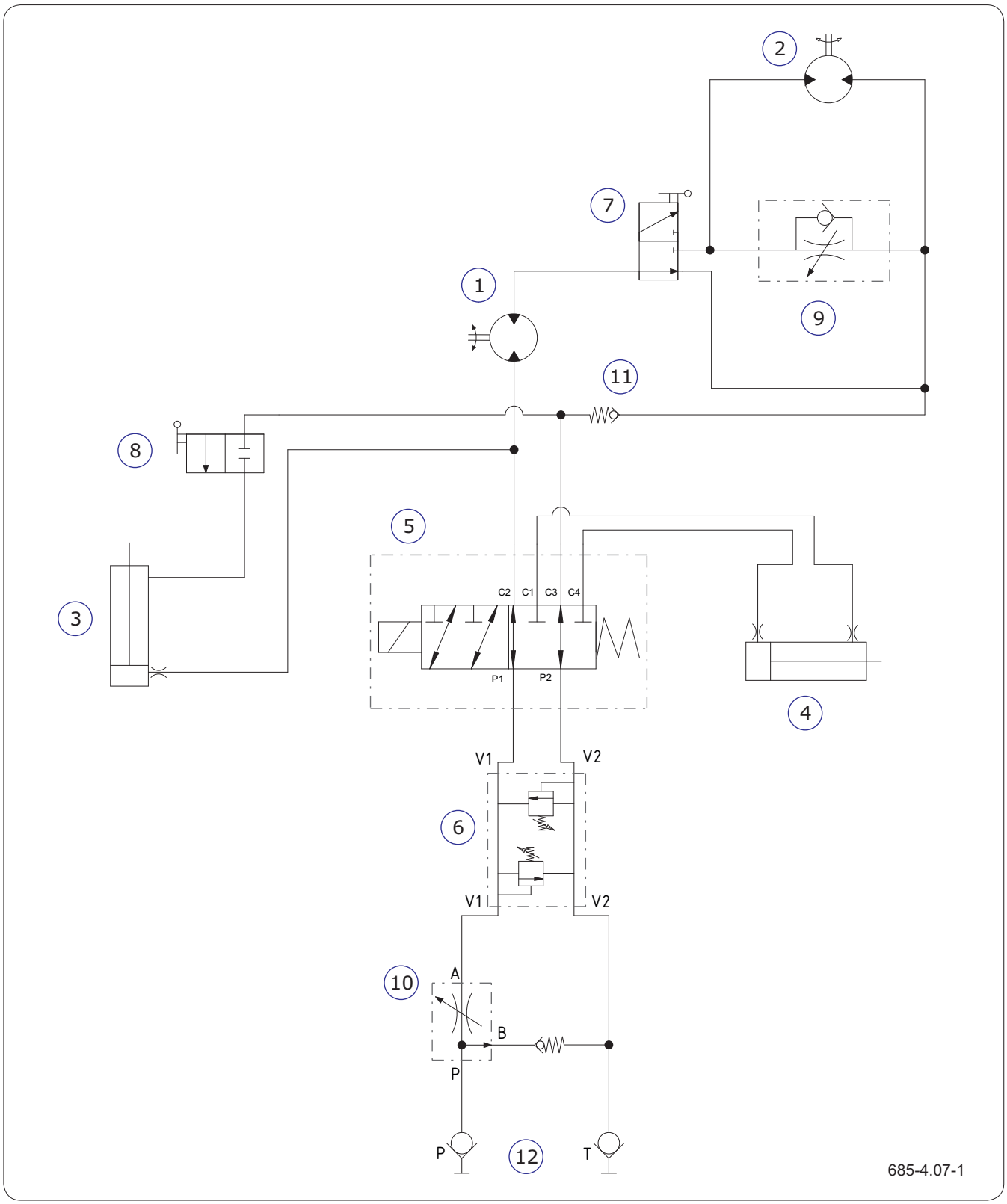
Rysunek 4.5 Construction of the hydraulic system (with side brush and hydraulic twist)

(1) roller brush hydraulic motor *(2) side brush hydraulic motor* *(3) dirt hopper cylinder*
(4) steering cylinder *(5) electro-valve* *(6) cross-over valve*
(7) side brush shut-off valve *(8) dirt hopper lock valve* *(9) throttle valve*
(11) non-return valve *(12) quick couplings*



Rysunek 4.6 Hydraulic system design (with side brush, high flow installation)

(1) roller brush hydraulic motor *(2) side brush hydraulic motor* *(3) dirt hopper cylinder*
(6) cross over valve *(7) side brush shut-off valve* *(8) dirt hopper lock valve*
(9) throttle valve *(10) flow regulator* *(11) non-return valve*
(12) quick couplings



Rysunek 4.7 Schematic diagram of the plumbing system

(1) roller brush hydraulic motor *(2) side brush hydraulic motor* *(3) debris tank cylinder*
(4) steering cylinder *(5) electro-valve* *(6) cross-over valve*
(7) side brush shut-off valve *(8) debris tank locking valve* *(9) throttle valve*
(10) flow regulator *(11) non-return valve* *(12) quick couplings*

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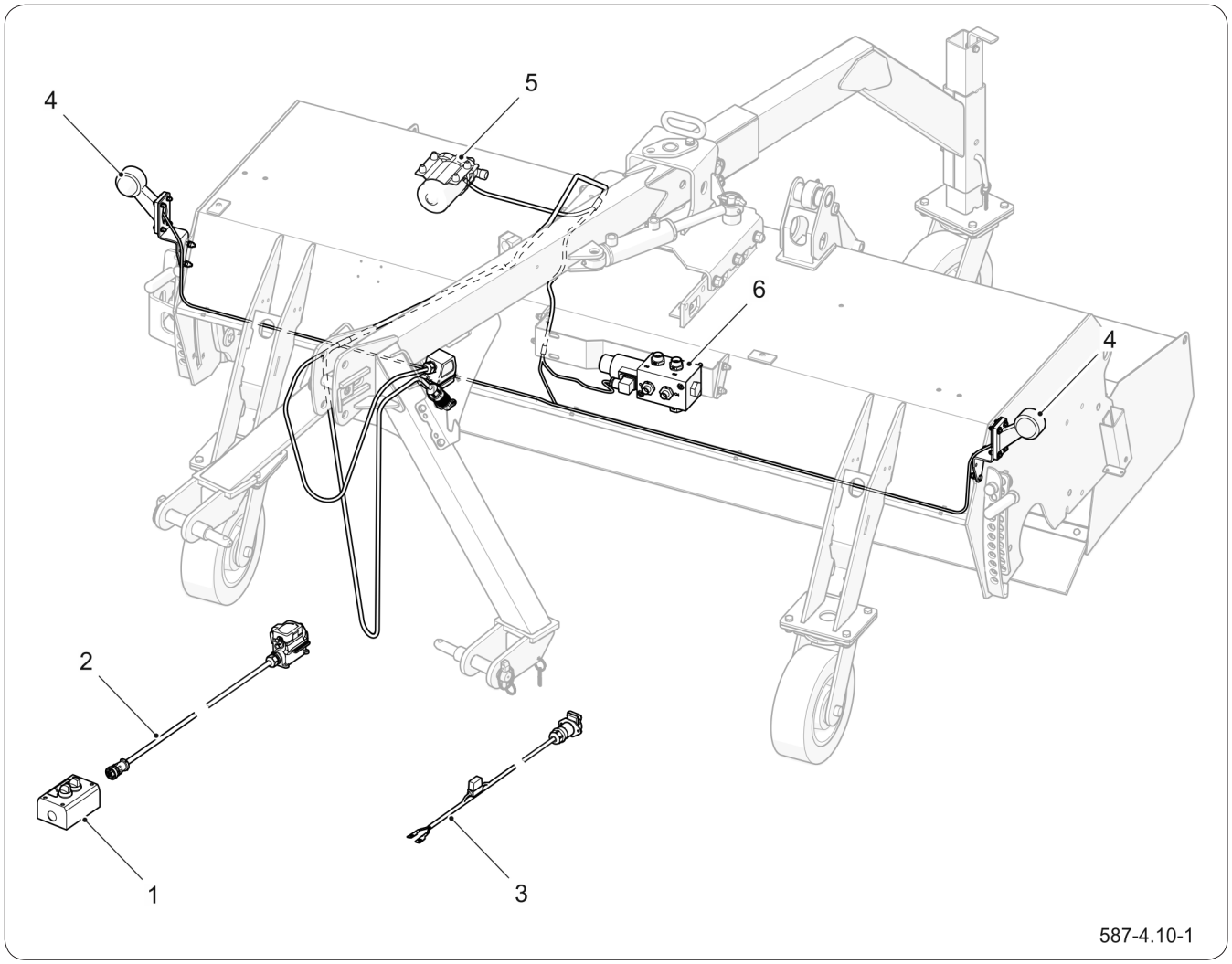
4.3 ELECTRICAL SYSTEM



Rysunek 4.8 Construction of the electrical installation

(1) control panel *(2) control harness* *(3) power harness* *(4) marker lamp*
(5) water pump *(6) hydraulic solenoid valve*

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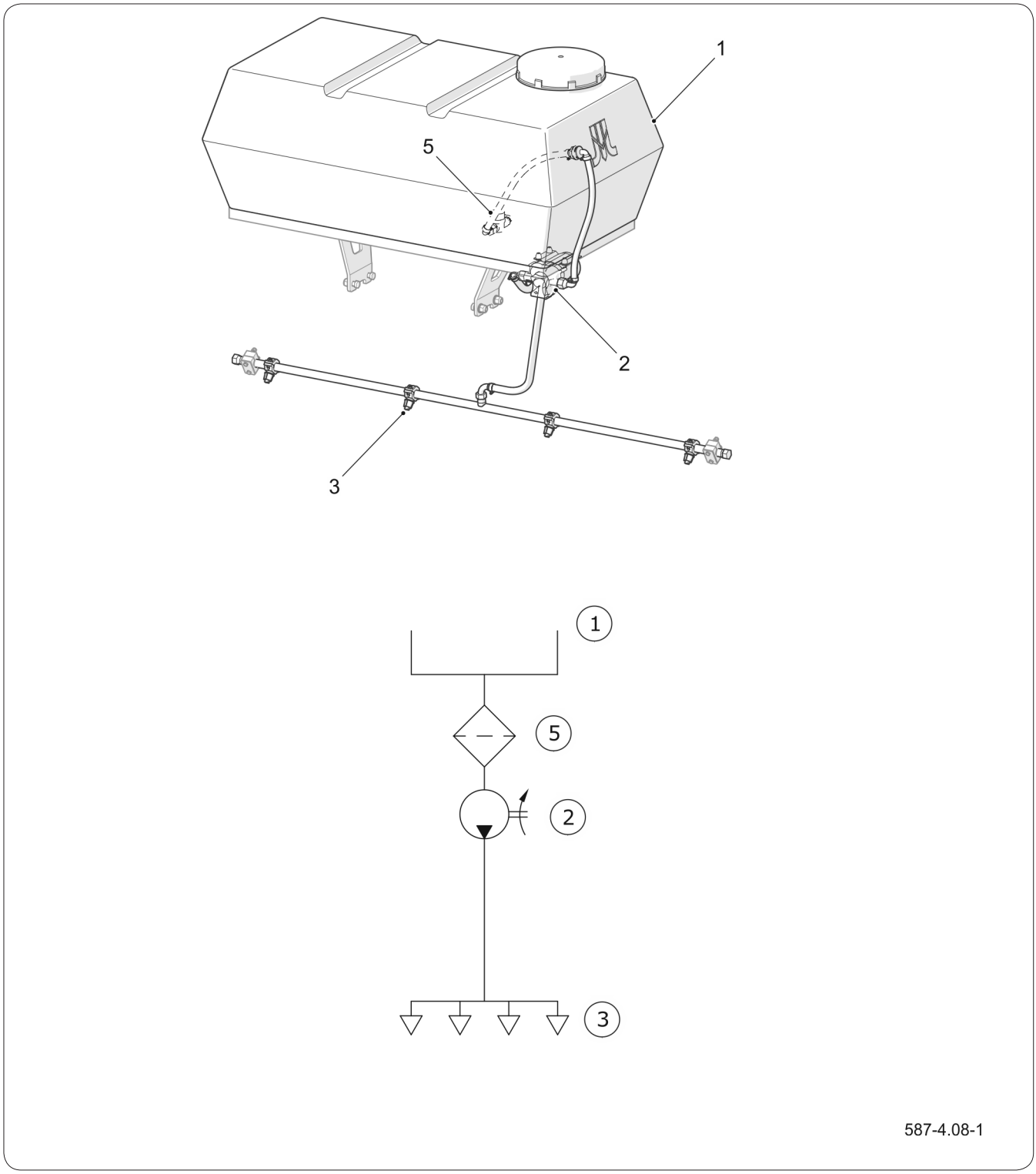
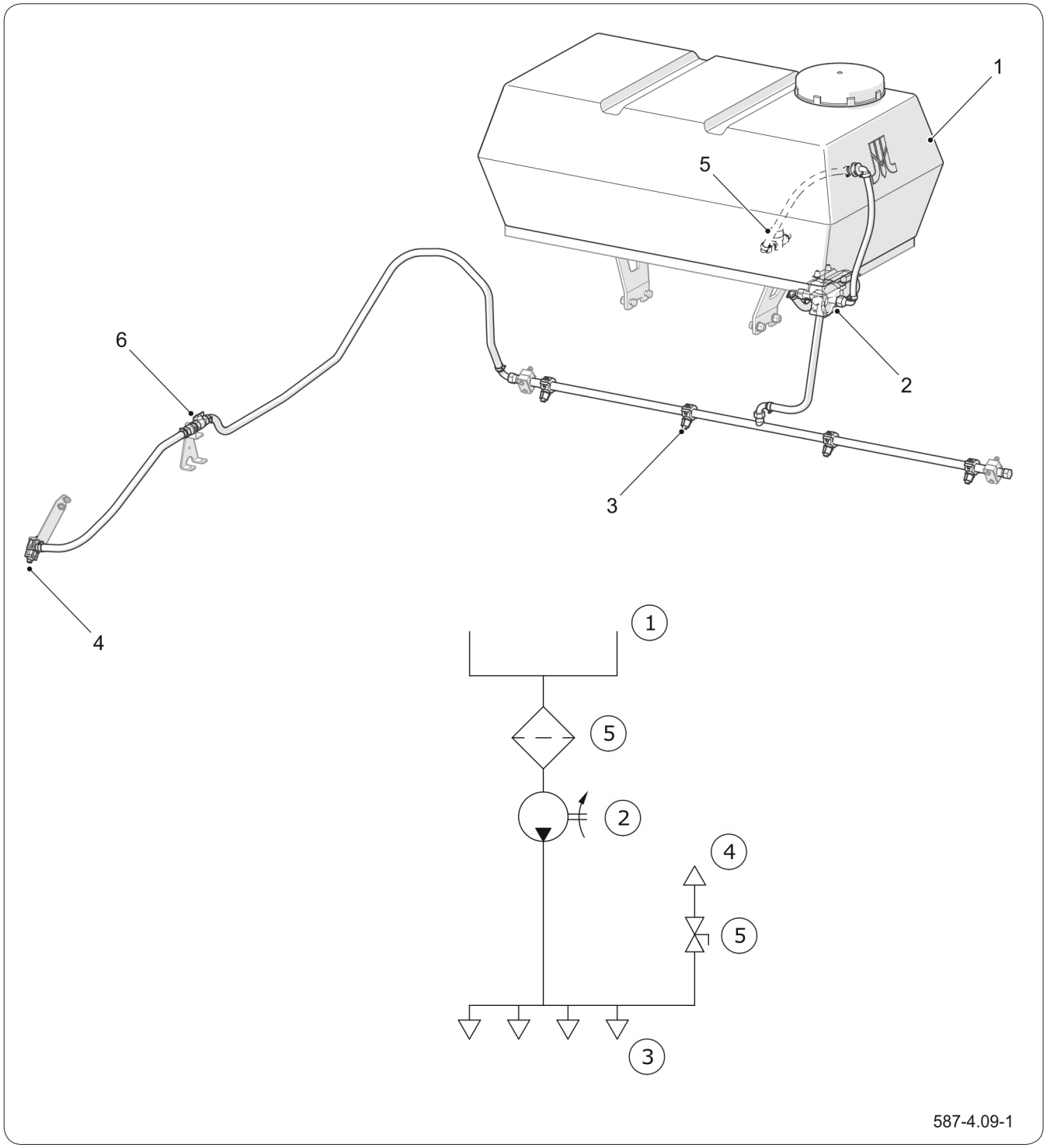
4.4 SPRINKLER SYSTEM



Rysunek 4.9 Construction of sprinkler system (without side brush)
(1) water tank *(2) water pump* *(3) roller brush spray nozzles*
(5) water filter



Rysunek 4.10 Construction of the sprinkler system (with side brush)
(1) water tank *(2) water pump* *(3) roller brush spray nozzles*
(4) side brush spray nozzle *(5) water filter* *(6) side brush sprinkler shut-off valve*

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CHAPTER 5.

RULES OF USE

PRONAR ZM-1500 / 1800 / 2300PLUS

5.1 PREPARATION FOR WORK

DANGER

Before using the machine, the User is obliged to read the contents of this manual.

Careless and improper use and operation of the machine, as well as failure to comply with the instructions in this manual, poses a risk to life and health.

DANGER

The use of the machine by persons not authorised to drive the carriers, including children and intoxicated persons, is prohibited.

Failure to observe the rules for safe use, poses a health risk to operators and bystanders.

CAUTION

Before each use of the machine, check its technical condition. In particular, check the condition of the suspension system, the drive train, the completeness of the safety guards and the lighting.

The manufacturer ensures that the machine is fully operational, has been checked in accordance with inspection procedures and is authorised for use. However, this does not release the user from the obligation to check the machine upon delivery and before first use. The machine is delivered to the user completely assembled. Before connecting to the carrier, a trained machine operator must carry out a health check on the machine.

The scope of activities:

- Read and follow the instructions in this manual, learn about the construction and understand the principle of operation of the machine.
- Check the compatibility of the suspension system of the machine with that of the carrier with which it is to be aggregated.
- Check the compatibility and condition of the hydraulic and electrical systems, including the compatibility of hydraulic connectors.
- Carry out a visual inspection of the individual machine components for mechanical damage caused by, for example, incorrect transportation of the machine (dents, punctures, bent or broken workpieces).
- Check the technical condition of the working components (wear, damage).
- Check the technical condition of the guards and safety elements and that they are correctly fixed.

If all the previously described steps have been carried out and the machine is in perfect working order, connect it to the carrier, start it up and check the various systems.

The scope of activities:

- Connect the machine to the carrier (see Chapter: "LINKING TO THE CARRIER").

DANGER

Before starting the machine, ensure that there are no bystanders in the danger zone.

DANGER

Special care should be taken when the machine's hydraulic system is first put into operation and also after servicing, as a blown hydraulic system causes accelerated movement of the working elements of the system.

CAUTION

Have electrical and hydraulic components repaired, replaced or reconditioned by specialised workshops that have the technology and qualifications to carry out this type of work.

- Once the hydraulic and electrical system hoses are connected, check the correct operation of the various systems of the machine and inspect the hydraulic system for leaks.
- In the event of a malfunction, stop use immediately, locate and rectify the fault. If the fault cannot be rectified or if rectifying the fault risks invalidating the warranty, contact the dealer or the Manufacturer directly to clarify the problem.

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5.2 CARRIER LOADING

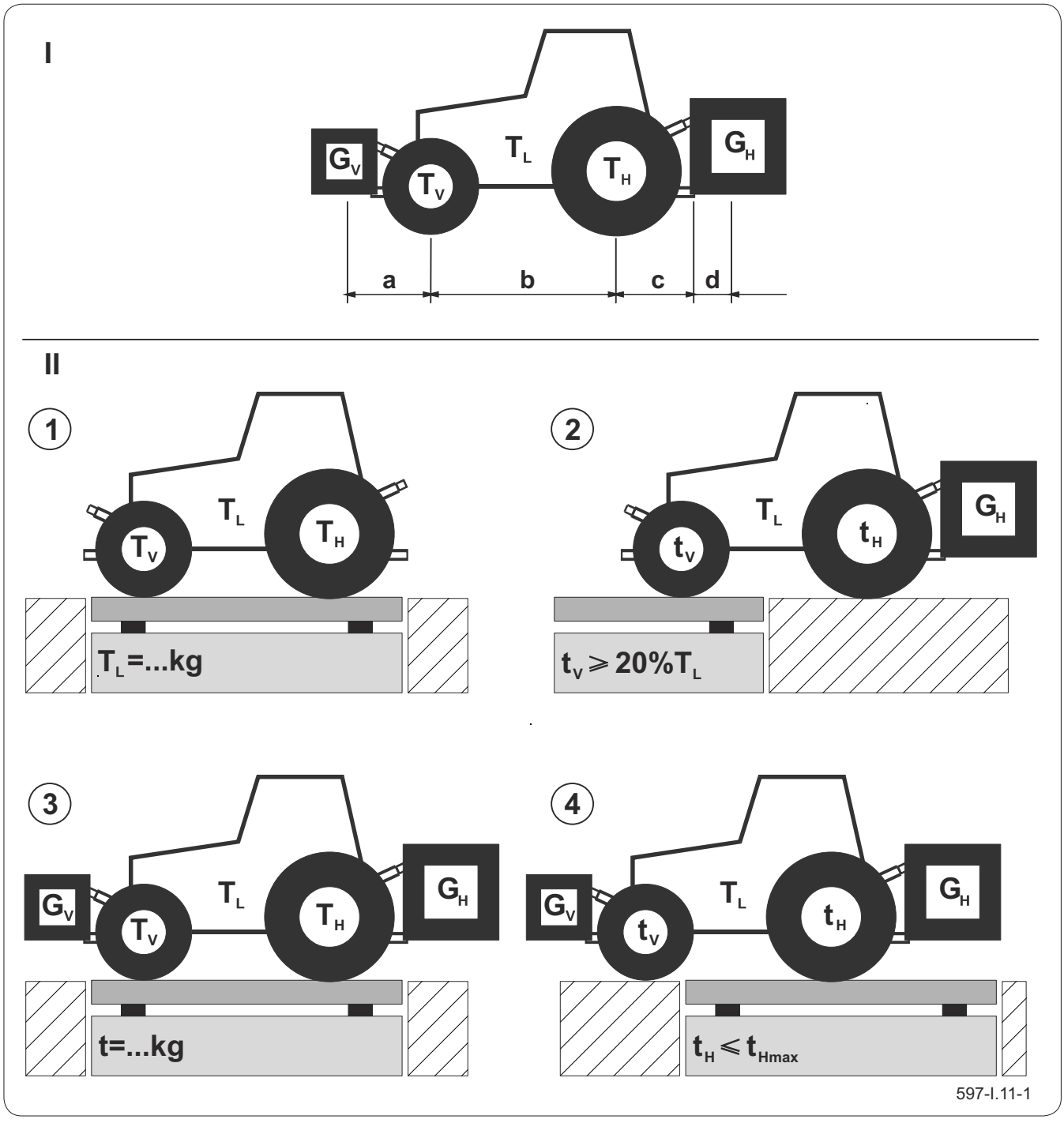

Figure 5.1 Loading of the tractor

CAUTION

The load on the front axle of the tractor must be at least 20% of its own weight and the load of the aggregated machine.

Before attaching the machine to the tractor, check the suitability of your tractor for this purpose. Suspension of tools in the three-point linkage at the front or rear must not exceed the permissible total weight, permissible axle load and load capacity of tractor tires. The

CAUTION

Incorrect use of the tractor may cause breakage, insufficient stability and the ability to steer and brake the tractor.

front axle of the tractor must always be loaded with at least 20% of the tractor's own weight and the load of the aggregated machine.

To ensure that these conditions are met, perform the following calculations:

CALCULATION OF MINIMUM FRONT BALLAST G_{Vmin}

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

Table 5.1. Carrier loading

Symbol / dimensions	Unit	Description
T_L	kg	Carb weight of the tractor
T_V	kg	The load on the front axle of the tractor without the machine
T_H	kg	The load on the rear axle of the tractor without the implement
t	kg	Axle load of the tractor with the machine
t_V	kg	The load on the front axle of the tractor with the machine
t_H	kg	The load on the rear axle of the tractor with the machine
G_H	kg	Total weight of the rear-attached machine or rear weight
G_v	kg	The total weight of the front-attached machine or front weight
a / *and*	m	Distance between the centre of gravity of the front-mounted machine/front load and the centre of the front axle
b	m	Tractor wheelbase
c	m	Distance from the centre of the rear axle to the centre of the tractor lower links
d	m	Distance from the centre of the tractor's lower links to the centre of gravity of the rear-attached machine or rear weight

CALCULATION OF MINIMUM REAR BALLAST G_{Hmin}

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

The calculation of the required minimum front and rear ballast assumes that all parameters are known.
If the parameters are not known and cannot be determined, measurements should be made using a scale.

MEASUREMENT OF PERMISSIBLE AXLE LOADS USING A SCALE

Measure the curb weight of the tractor (T_L).
Hitch the machine to the tractor and measure the front axle load (t_V). If the load is less than 20% of the weight of the tractor alone (T_L), add weights to bring the load above the minimum value ($t_V \geq 20\% T_L$).
Measure the total weight (t) of the tractor with the machine and weights. Check the tractor manual to see if the measured value is less than the Average Gross Weight.
Measure the load on the rear axle (t_H) and check in the tractor manual whether the measured value is lower than the permissible maximum value of the load on the rear axle of the tractor (t_{Hmax}).

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5.3 CONNECT THE MACHINE TO THE CARRIER

CAUTION

The machine can only be operated while moving forward.

You can connect the machine to the carrier if all connections (electrical, hydraulic), and the suspension system on the carrier comply with the machine manufacturer's requirements given in the table "Carrier requirements":

5.3.1 Adaptation of Cat I/II rigid RUPD suspension system

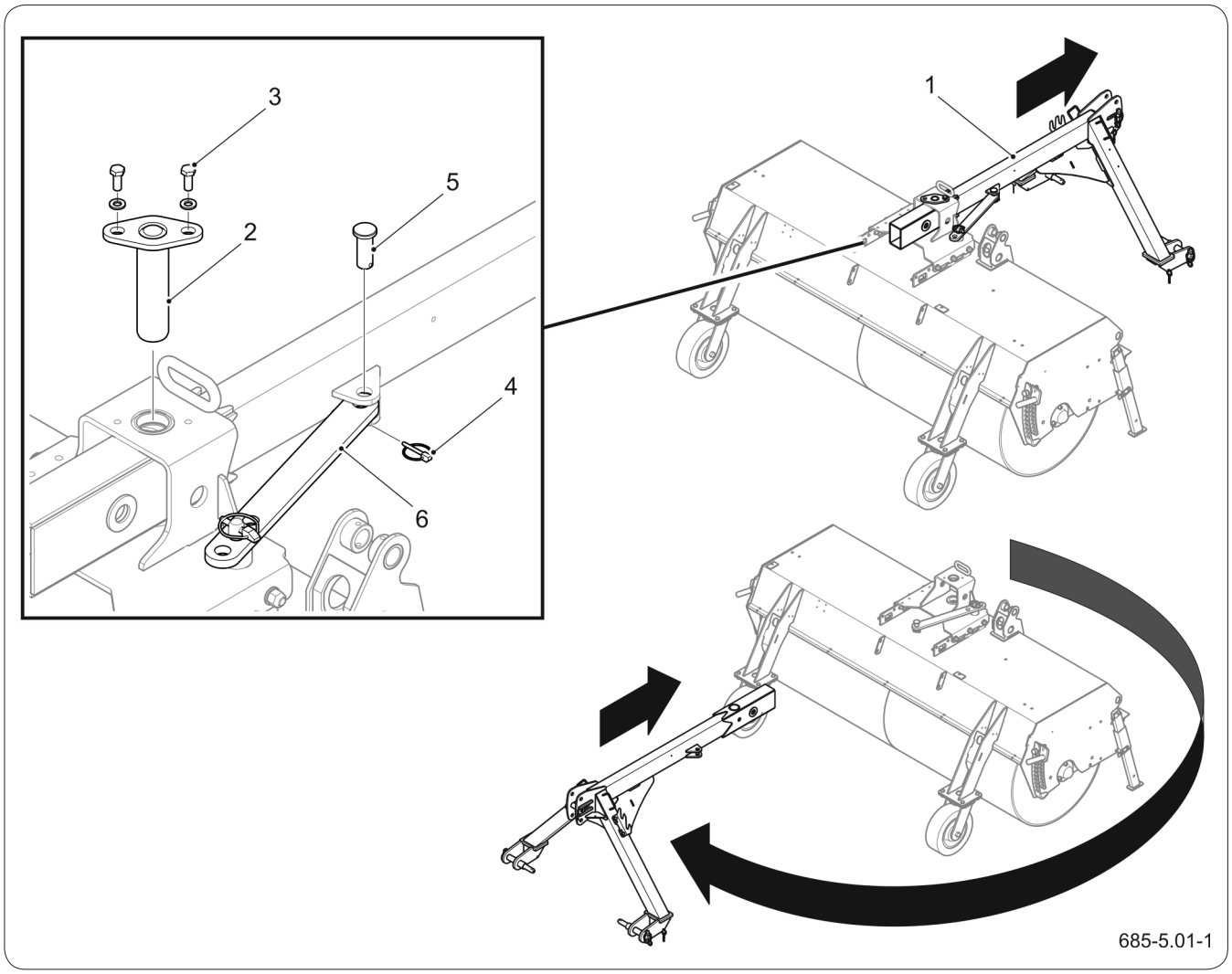

Figure 5.2 Adaptation of the suspension system to work from the front or rear of the carrier
(1) suspension system *(2) main pin* *(3) locking screw* *(4) pin*
(5) pin *(6) link*

Equipped with a Category I/II rigid suspension system, the machine has the option of being connected to the front or rear of the carrier.

To change the way the machine is attached to the carrier, change the position of the suspension system

CAUTION

Three-point linkage rigid cat. I/II machines can be connected to the tractor's rear implement linkage if the machine is operated without the linkage being twisted. Failure to do so could result in the machine's side brush colliding with the wheels of the carrier or the dirt tank colliding with the suspension system.

CAUTION

The pendulum (swingarmed) suspension systems of the machine can only be connected at the front of the carrier.

in the machine frame as follows (Figure 5.2):

1. Remove the locking screws (3) and remove the main pin (2).
2. Remove the connector (6).
3. Remove the hydraulic lines from the suspension system.
4. Slide the suspension system (1) completely out of the machine frame.
5. Insert the suspension system from the other side of the machine.
6. Fit the main pin (2) and secure with screws.
7. Fit and secure the connector (6).
8. Tighten the clamps of the hydraulic lines to the frame of the suspension system.

5.3.2 Coupling of the machine with the three-point linkage (tractor)

The order of joining (Figures 5.3 and 5.4):

DANGER

No bystanders are allowed between the machine and the carrier during coupling. The operator of a carrier should take special care when coupling the machine and ensure that no bystanders are in the danger zone during coupling.

Ensure adequate visibility when coupling.

Once aggregation is complete, check the safety features.

1. Position the carrier in front of the machine's suspension system.
2. When driving the carrier, bring the lower linkages of the suspension system closer to the lower attachment points on the machine.
3. Adjust the lower links to the correct height by controlling the carrier suspension system.
4. Connect the lower links to the lower attachment points on the machine and secure.
5. For hook links, place the balls on the pivots of the machine's suspension system and secure with pins, then lift the links until the balls lock into the hooks.
6. Switch off the engine of the carrier, immobilise with the parking brake. Secure the cab against unauthorised access.
7. Connect the central link to the top fixing point on the machine and the carrier, secure and level the machine.

DANGER

Use only original pins and locks to connect the machine to the carrier.

8. Connect the hydraulic and electrical system pipes.

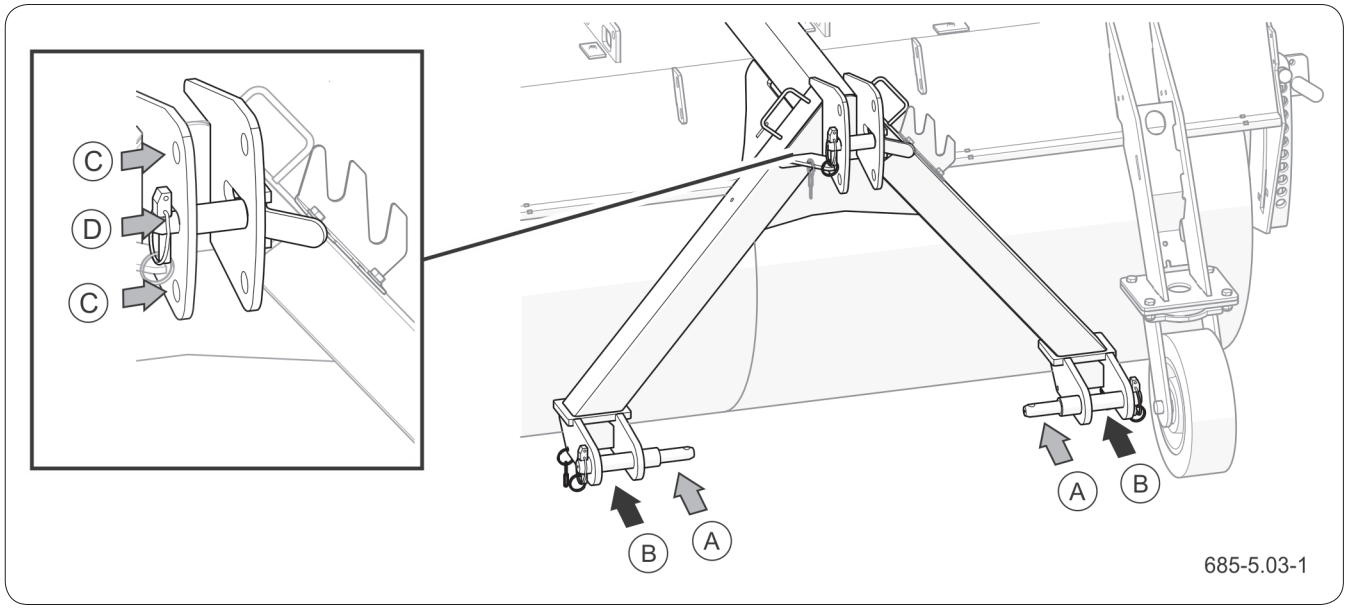

Figure 5.3 Rigid linkage of the Cat. I/II
(A) Lower link attachment points cat. I
(B) Lower link attachment points cat. II
(C) Fastening point for central link (fixed) only for version without front support wheel
(D) Centre link fixing point (sliding) for front wheel version only

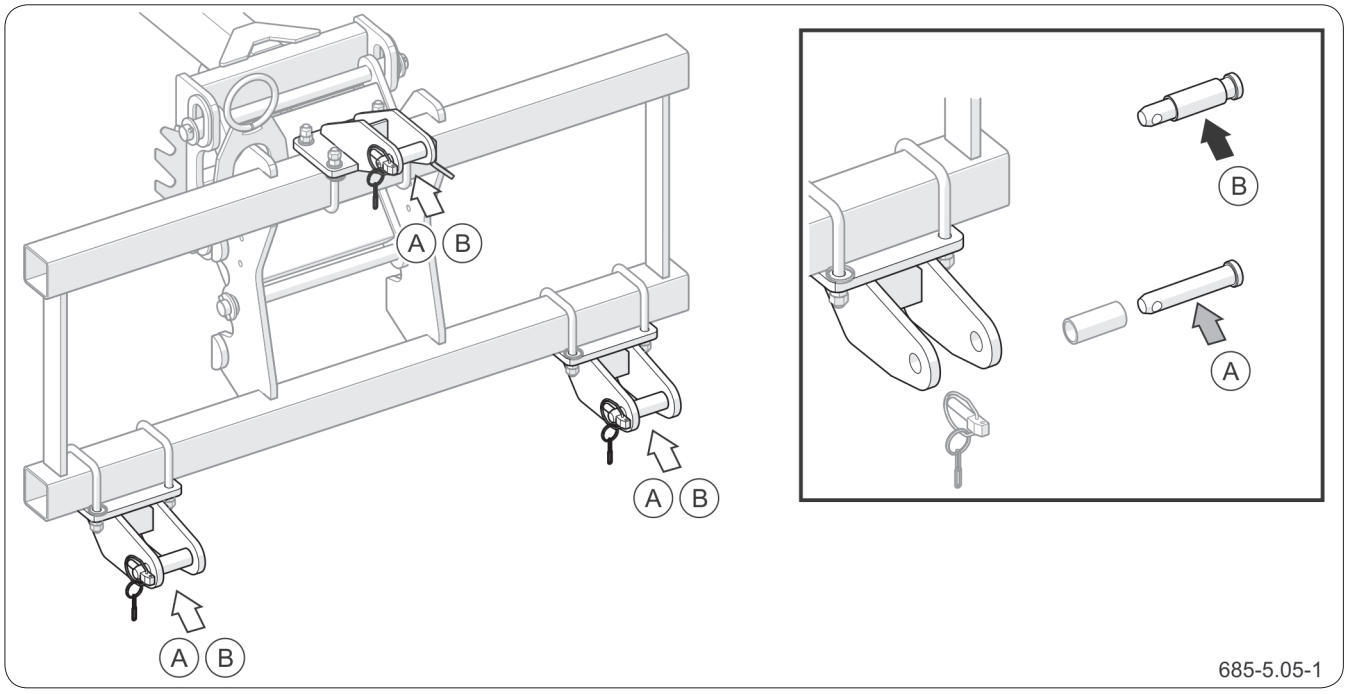

Figure 5.4 Linking the pendulum linkage of the Cat. I/ II (on the front of the carrier)
(A) fixing points cat. I *(B) anchorage points cat. II*

5.3.3 Coupling of the machine with the EURO suspension (loader)

ADVICE

The described joining method is indicative and may vary depending on the media model.

CAUTION

A machine set up with a swinging suspension system should be equipped with an additional front support wheel.

CAUTION

When operating the machine, position the boom horizontally in the middle of the range of the machine's suspension system in order to be able to copy the terrain.

The order of coupling (Figure 5.5):

1. Unlock the attachment mechanism of the implement in the loader frame (depends on the type of carrier).
2. Lower the boom and rotate the frame downwards (A) so that the fixing points on the fixing frame are below the fixing hooks on the machine,
3. Drive the loader up to the machine and insert the attachment points into the appropriate places in the loader frame,
4. Raise the boom (B) so that the upper attachment points are in the hooks of the machine's suspension system.
5. By controlling the boom, swing the frame backwards (C) causing the clamping mechanism to lock (depends on the type of carrier),
6. Check that the fixing is correct, lock the fixing

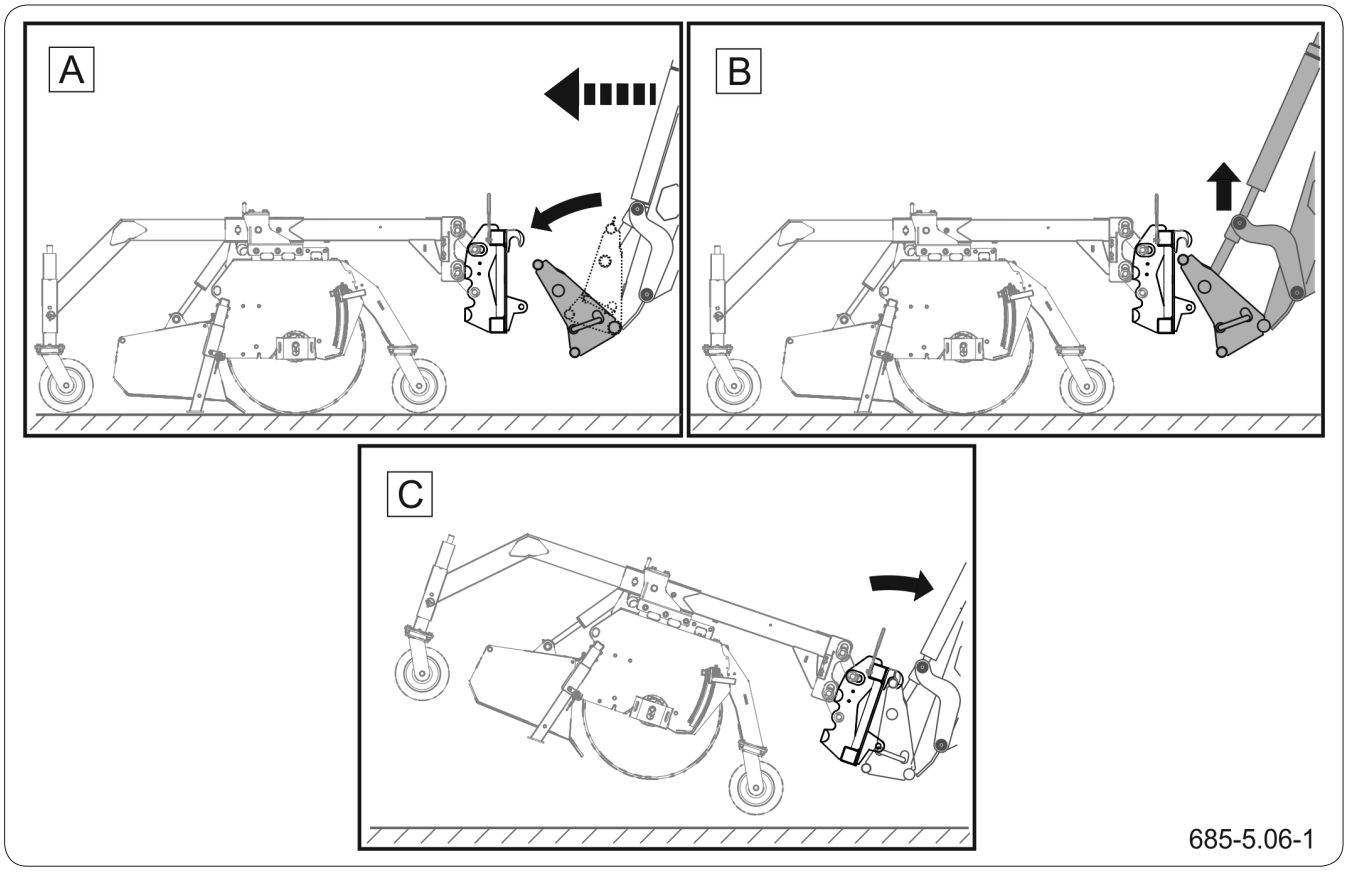

Figure 5.5 Combining the machine with a front loader
(A), (B), (C) successive stages of merging

mechanism (depends on the type of carrier).

7. Connect the hydraulic and electrical system pipes.

Follow the carrier manufacturer's recommendations when combining the machine with another suspension system.

5.3.4 Coupling of the machine with the fork lift.

The order of coupling (Figure 5.6):

CAUTION

When operating the machine, position the forks horizontally in the middle of the machine's suspension system to allow for ground copying.

1. Set the correct fork width in the carrier.
2. Remove the pins (3) and dismantle the yoke (4).
3. Loosen the lock nuts (1) and unscrew the pressure bolts (2) so that the forks can be removed.
4. Drive the carrier and insert the forks into the

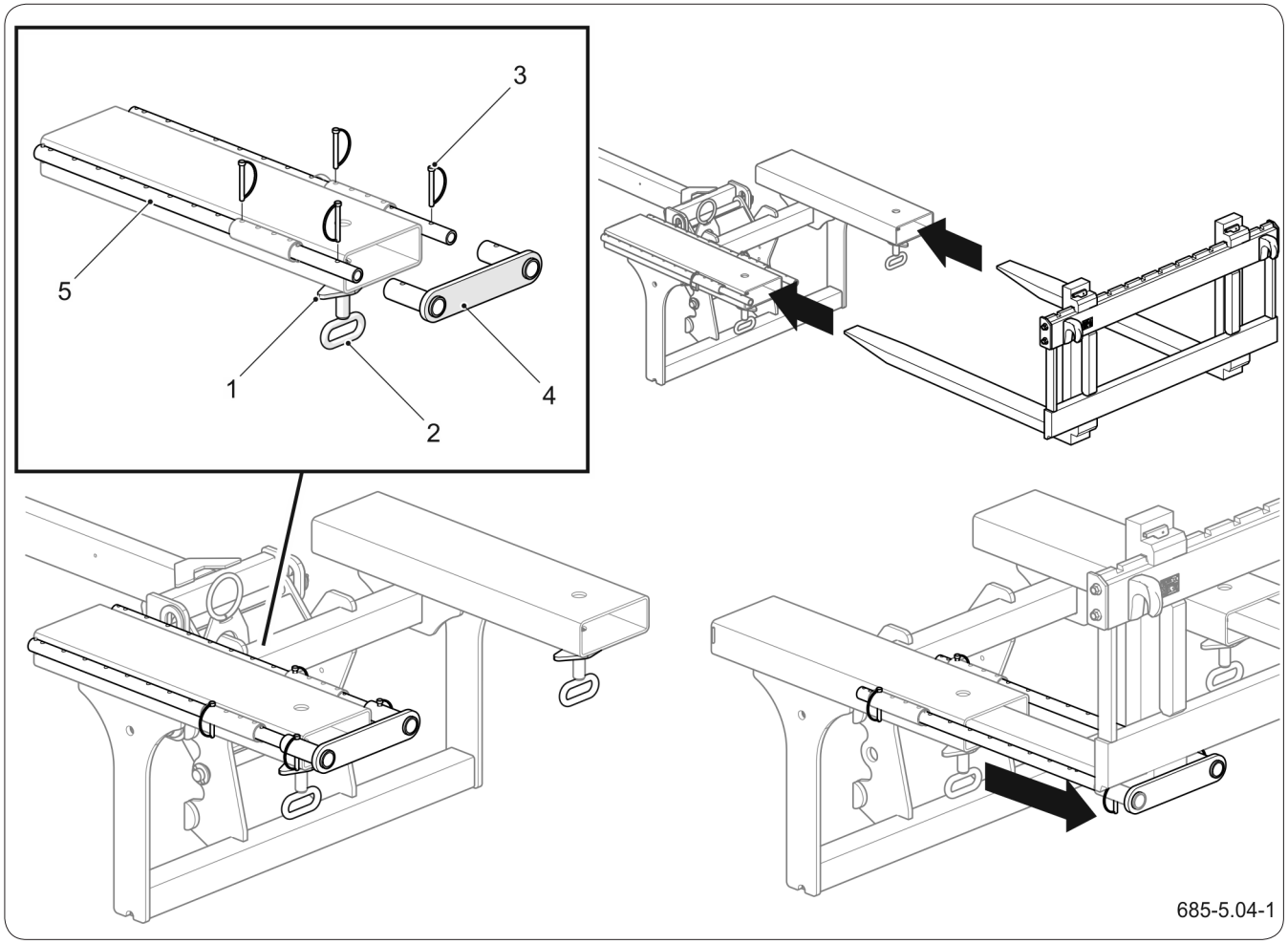

Figure 5.6 Combination with a forklift truck
(1) lock nut (2) grub screw (3) lynch pin (4) yoke (5) slider

suspension system of the machine (up to the stop).

5. Tighten both clamping screws (2) and secure with lock nuts (1).
6. Unlock the retaining pins and adjust the length of the sliders (5) to the fork length.
7. Connect the sliders with a yoke (4) behind the forks to prevent them from slipping out.
8. Secure the sliders and yoke with pins.
9. Connect the hydraulic and electrical system pipes.

5.3.5 Lifting the parking supports

The sweeper is equipped with two parking supports. Once the machine is suspended on the carrier, raise the parking supports as follows:

1. Raise the machine to a low height, switch off the engine, secure the carrier with the parking brake.
2. Remove the pin (3).
3. Hold the support by the handle (1) and remove

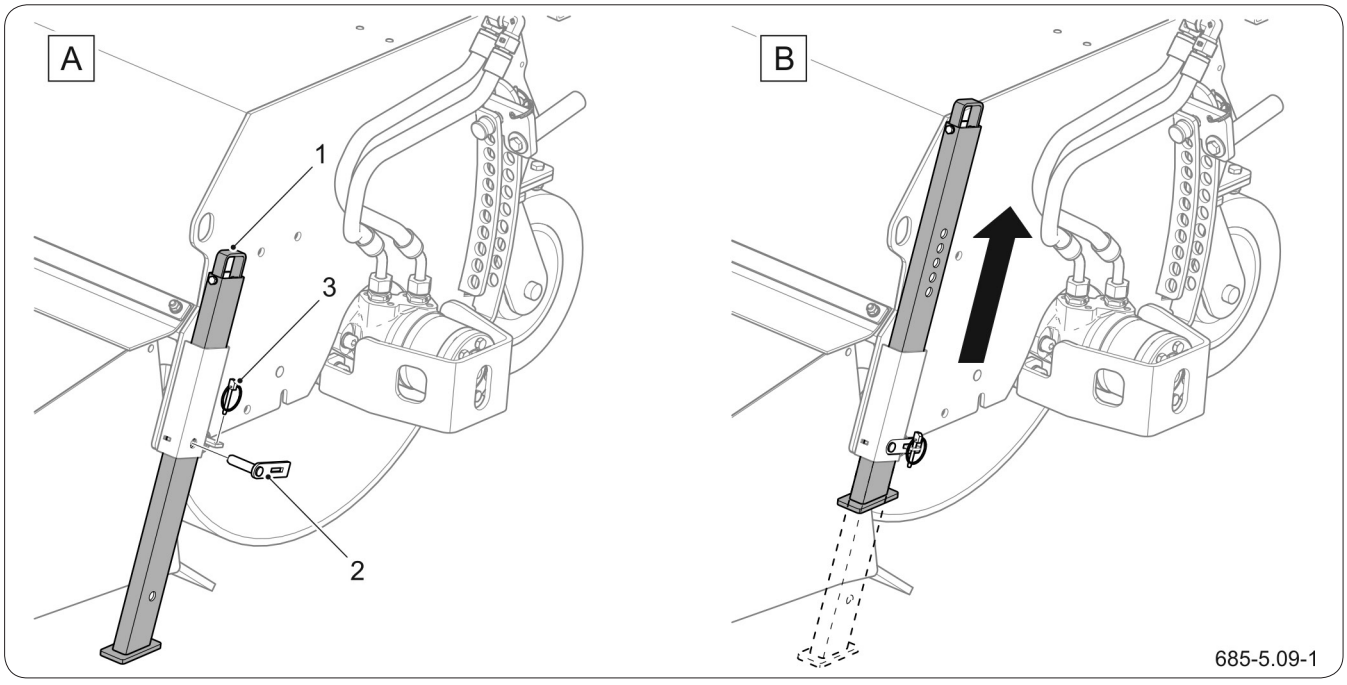

Figure 5.7 Lifting the parking supports
(1) support holder *(2) cotter pin* *(3) pin*
(A) support raised *(B) support lowered*

the cotter pin (2).

4. Rise the support into the upper extreme position, lock with the cotter pin (2) and secure with the pin.
5. Repeat on the other side of the machine.

5.3.6 Adjustment of the electrical installation

CAUTION

Hydraulic and electrical hoses should be routed in such a way that they do not become entangled in moving parts of the machine and carrier and are not subject to damage. .

The electrical installation of the machine is designed for connection to a DIN 9680 3-pin socket in the carrier. If the carrier does not have a socket or the socket is of a different type, install the power cord with the socket according to the diagram (Figure 5.8). Depending on the completion version, the machine can be equipped with a 12V or 24V installation. Have the electrical installation work carried out by suitably qualified persons.

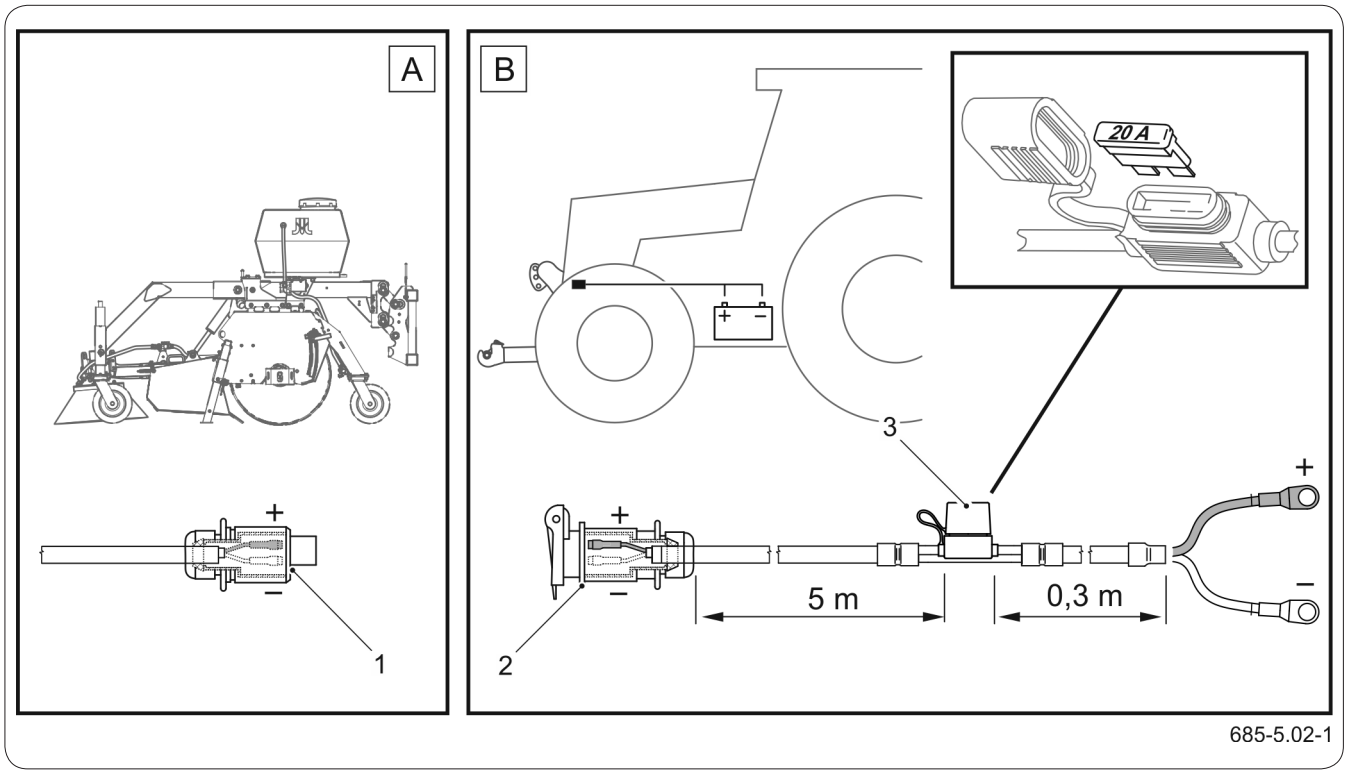

Figure 5.8 Adjustment of the electrical supply
(1) 3-pin plug *(2) 3-pin socket*

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5.4 WORKING WITH THE MACHINE

5.4.1 Setting the working height

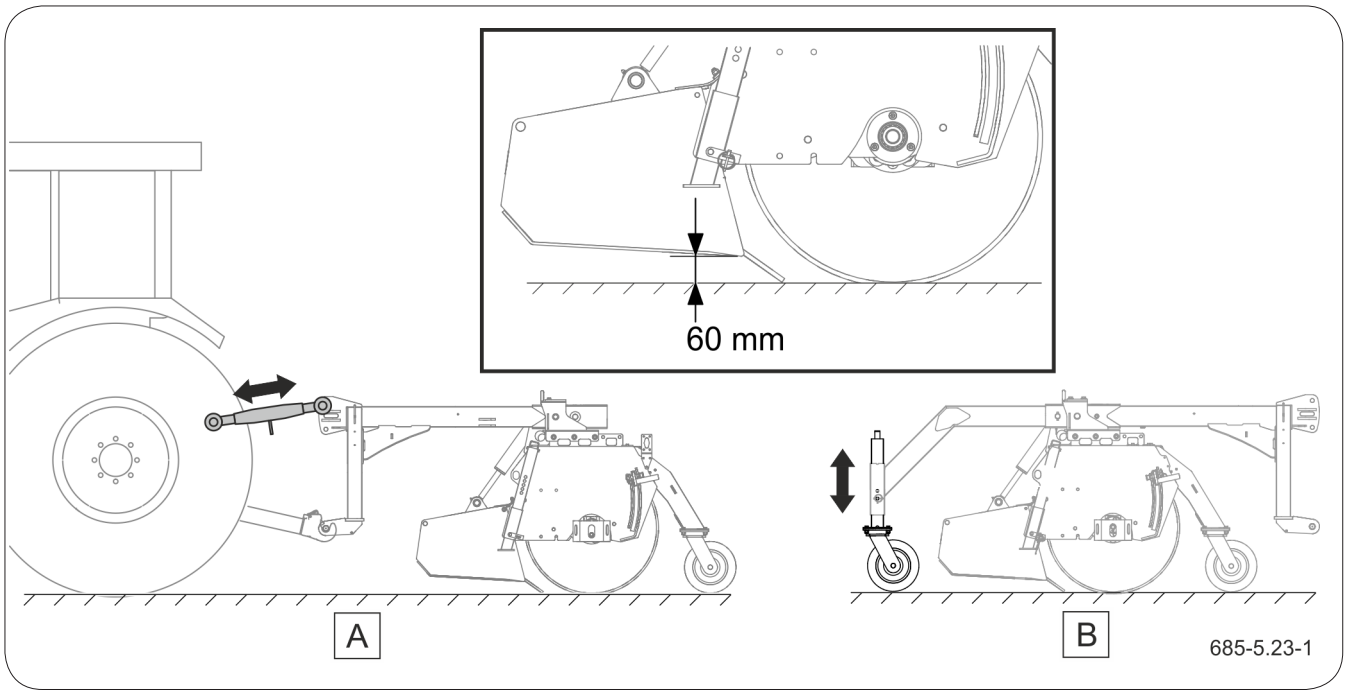

Figure 5.9 Setting the working height
(A) sweeper at the rear of the carrier *(B) sweeper at the front of the carrier*

CAUTION

Always use the front support wheel when using a machine with a swinging suspension system.

CAUTION

When the machine is in use, the suspension system must be capable of copying uneven terrain. Otherwise, the weight of the carrier can weigh down the machine and this can lead to damage.

A sweeper set up with a swinging suspension system should be equipped with an additional front support wheel. The height of the front wheel should be set so that the distance of the dirt tank from the ground surface is approximately 60mm (Figure 5.9).
Depending on the version (Figure 5.10), the height of the front wheel is adjusted by repositioning the cotter pin in the bore of the wheel column or by repositioning the spacer rings (5).
On a sweeper set up to work at the rear of the carrier (without an additional wheel), equipped with a rigid Cat. I/II the working height is adjusted by adjusting the length of the central link (upper linkage of the three-point attachment). If the machine is equipped with a Cat.I/II rigid RUPD suspension system, the carrier suspension system should be in the so-called "floating" position during operation to allow ground copying.

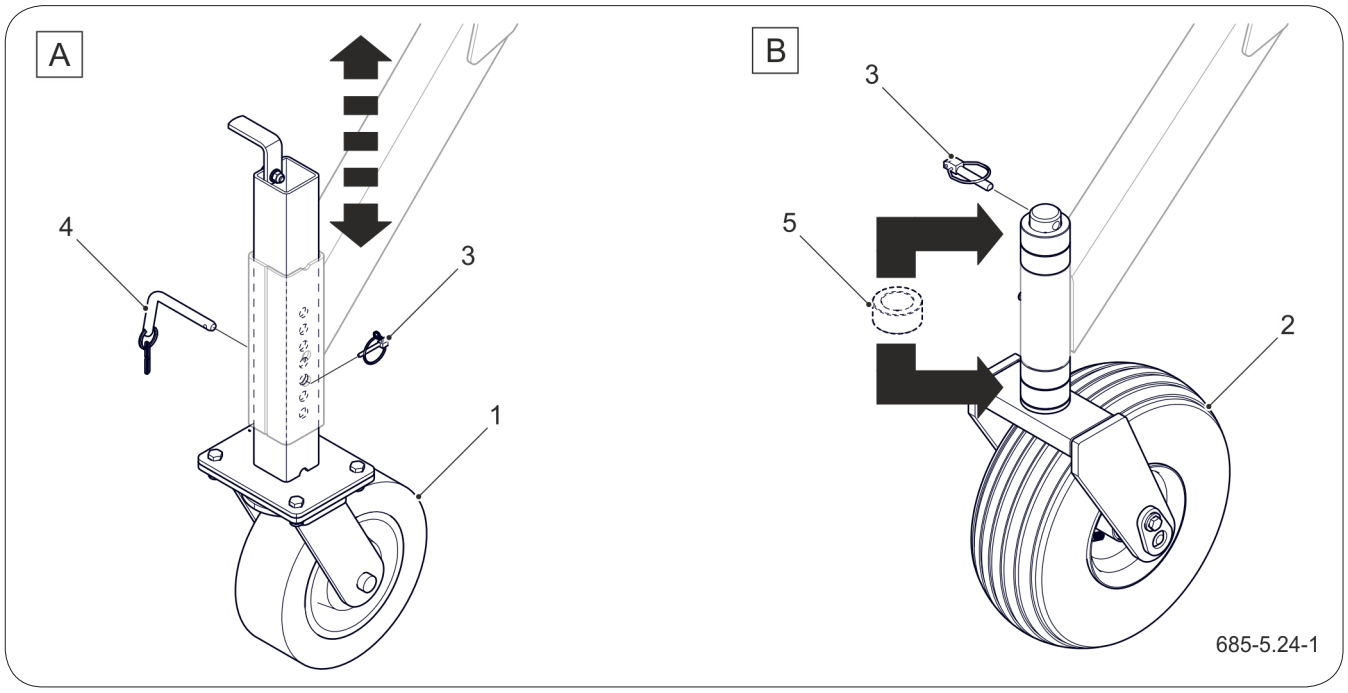

Figure 5.10 Height adjustment of the front support wheel, depending on the version
(1) solid wheel (2) pneumatic wheel (optional) (3) cotter pin (4) cotter pin
(5) spacer ring

If the machine is equipped with a pendulum (swingarmed) suspension system, the carrier suspension system should be in a fixed, rigid position during operation because the special design of the machine allows the ground to be copied. In this case,

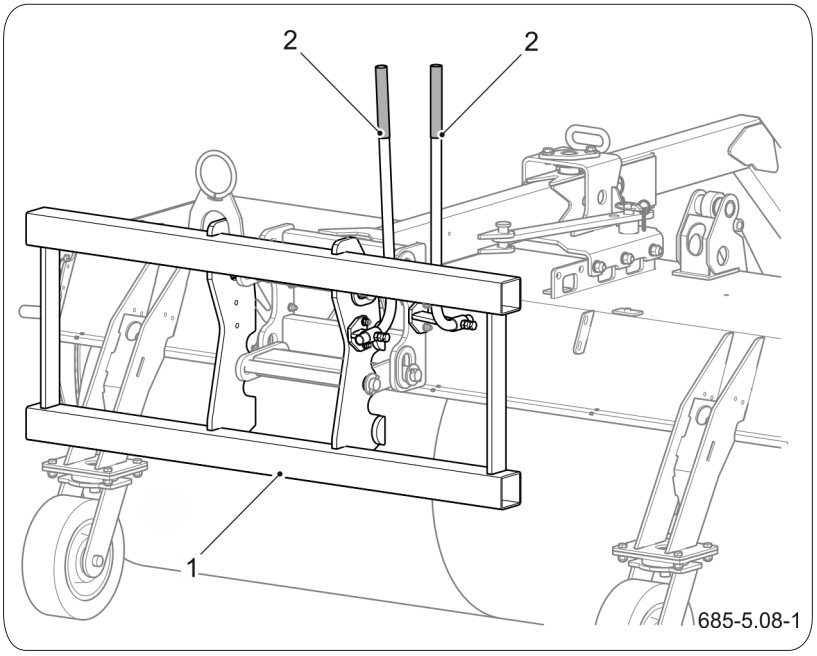

Figure 5.11 Swinging suspension system indicators (optional)
(1) suspension system (2) marker

the suspension system of the carrier should be set in the middle of the range of movement of the swingarm system of the machine.

If the machine is equipped with indicators (accessory), the suspension system should be set so that the markers at the ends are at the same level and parallel to each other (Figure 5.11).

5.4.2 Roller brush pressure adjustment

The correct adjustment of the pressure of the roller brush on the ground influences the efficiency of sweeping and the durability of the working elements.

The roller brush (Figure 5.12) should be positioned so that the contact area is between 80-120mm (as viewed from the side of the brush).

ADVICE

Adjust the brush pressure according to the level of wear.

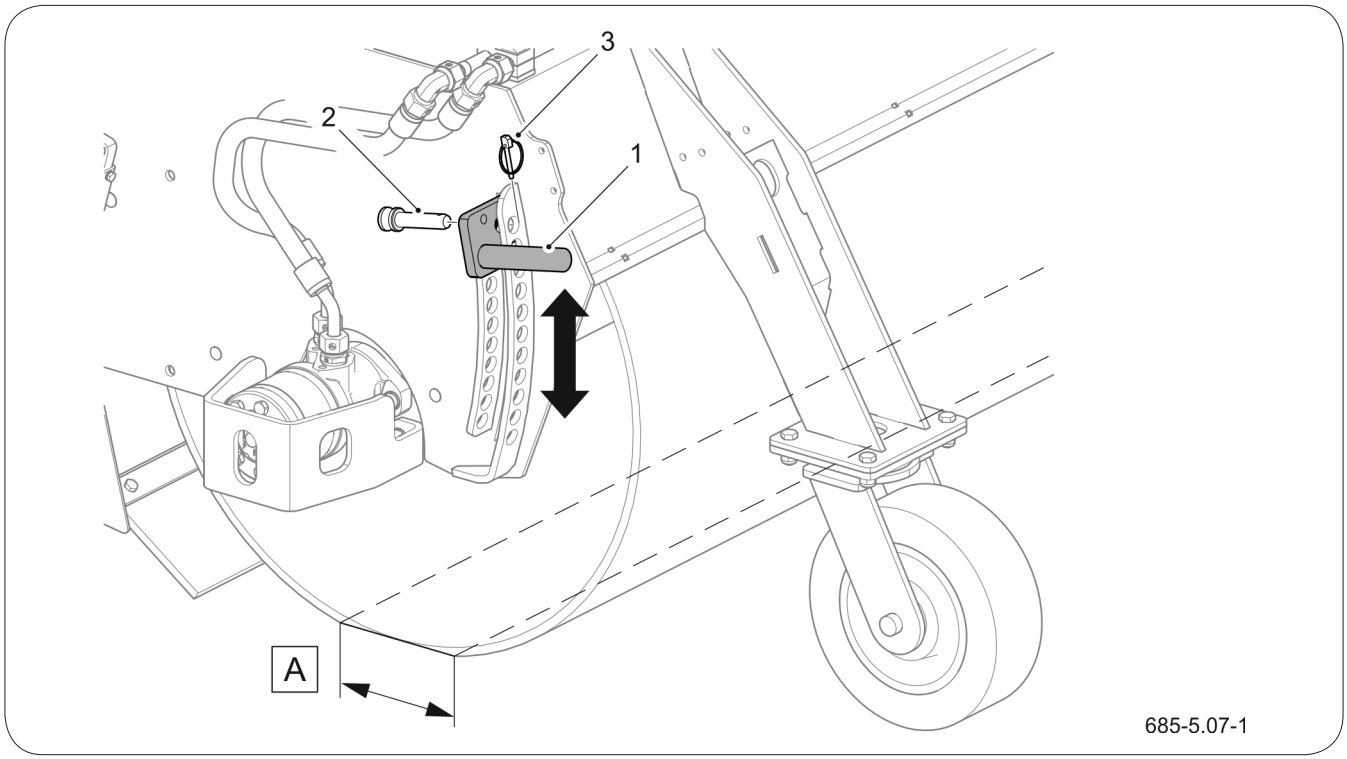

Figure 5.12 Roller brush pressure adjustment
(1) adjusting lever *(2) pin* *(3) pin*
(A) brush pressure surface

CAUTION

Different pressure settings on the right and left side of the machine cause uneven brush wear and can lead to damage to the machine.

The scope of activities:

1. Lower the machine to the ground, immobilise and secure the carrier against unauthorised access.
2. Remove the pin (3) and cotter pin (2).
3. Use the lever (1) to lower the brush to achieve the correct pressure.
4. Lock the selected position with the cotter pin (2) and pin (3).
5. Adjust the pressure on the other side of the machine in the same way. The brush pressure on the right and left sides should be equal.

5.4.3 Sweeping

DANGER

Ensure that the hydraulic system is not engaged before starting the carrier engine. Failure to do so may result in uncontrolled machine start-up.

DANGER

The machine drive can only be started if all safety guards are correctly fastened.

DANGER

When working, ensure that bystanders are not within 10m of the machine.

CAUTION

When operating the machine, periodically check the condition of the working parts and guards.

When you reach the work area, slowly lower the machine until it is fully resting on the ground. Adjust the position of the suspension system so that it is possible to copy the terrain during operation and the weight of the carrier does not weigh down the machine. .

Start the machine drive using the carrier's external hydraulics. Check the direction of rotation of the roller brush.

The brush should rotate counter-clockwise. If the brush will not rotate and the dirt tank overturns, change the direction of the oil flow.

Adjust your speed according to the amount and type of dirt. If necessary, start sprinkling as described under:

📖 ***5.9 Sprinkler system***

When sweeping and driving over speed bumps, protruding manholes, steep driveways or other obstacles, reduce speed or even raise the machine. To empty the dirt tank, follow the steps outlined in section:

📖 ***5.10 Dirts tank***

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5.5 CHANGING OF THE WORKING POSITION

The angled sweeper position is used when sweeping sideways without collecting debris in the hopper.

Depending on the version of the machine, the position can be changed either mechanically (manual) or hydraulically.

5.5.1 Mechanical twist

The sweeper equipped with a mechanical twist allows the setting of three fixed working angles -15^0/0^0/+15^0.

Scope of activities (Figure 5.13)

1. Remove the safety pin (2).
2. Remove the connector (1) from the pivot (3).
3. Manually adjust the angle of the sweep so that the corresponding hole (A,B or C) in the

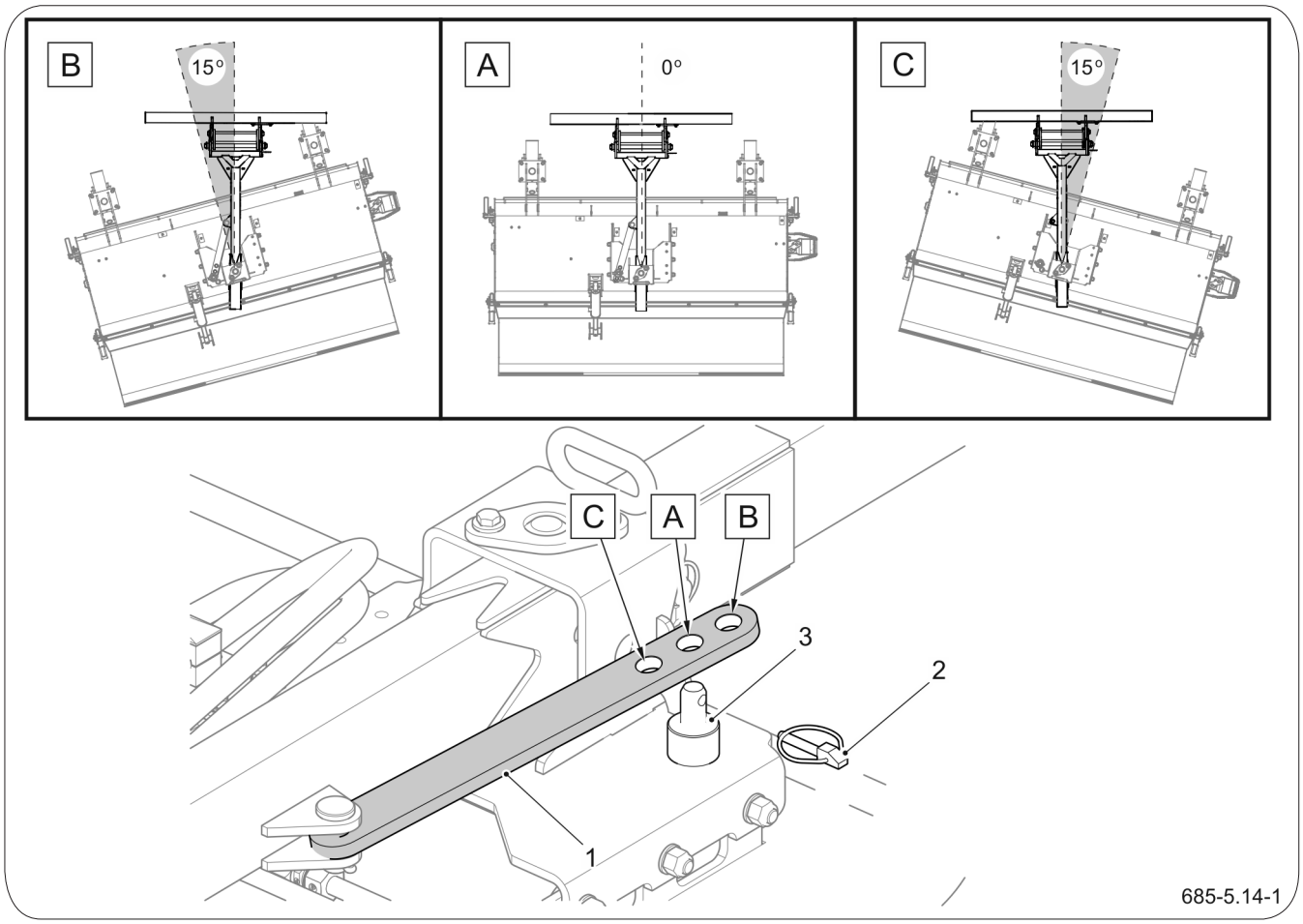

Figure 5.13 Changing of the working position (mechanical turning)
(1) link *(2) pin* *(3) pivot*
(A) straight ahead *(B) (C) pivot 15^0 to right or left*

connector (1) coincides with the pivot (3).

4. Fit the connector (1) onto the pivot (3) and secure with the pin (2).

5.5.2 Hydraulic twist

The sweeper equipped with a hydraulic swivel (optional) allows infinite adjustment of the working angle within a range of 15^0 to the right and to the left.

Scope of activities (Figure 5.14)

1. Set the main switch (A) of the control panel to position "1" (on).
2. Move switch (B) to the far right position (hydraulic solenoid valve supply).
3. By controlling the external hydraulic circuit of the carrier, change the working position of the sweeper.
4. Move the switch (B) to the middle position.

Optionally, the sweeper can be fitted with a hydraulic turn controlled by an additional circuit of the carrier's external hydraulics independently of the control panel.

CAUTION

On a machine fitted with the Cat. I/II suspended from the rear of the carrier equipped with a side brush, it is recommended to work without twisting the suspension system. Failure to do so could result in the machine's side brush colliding with the wheels of the carrier or the dirt tank colliding with the suspension system.

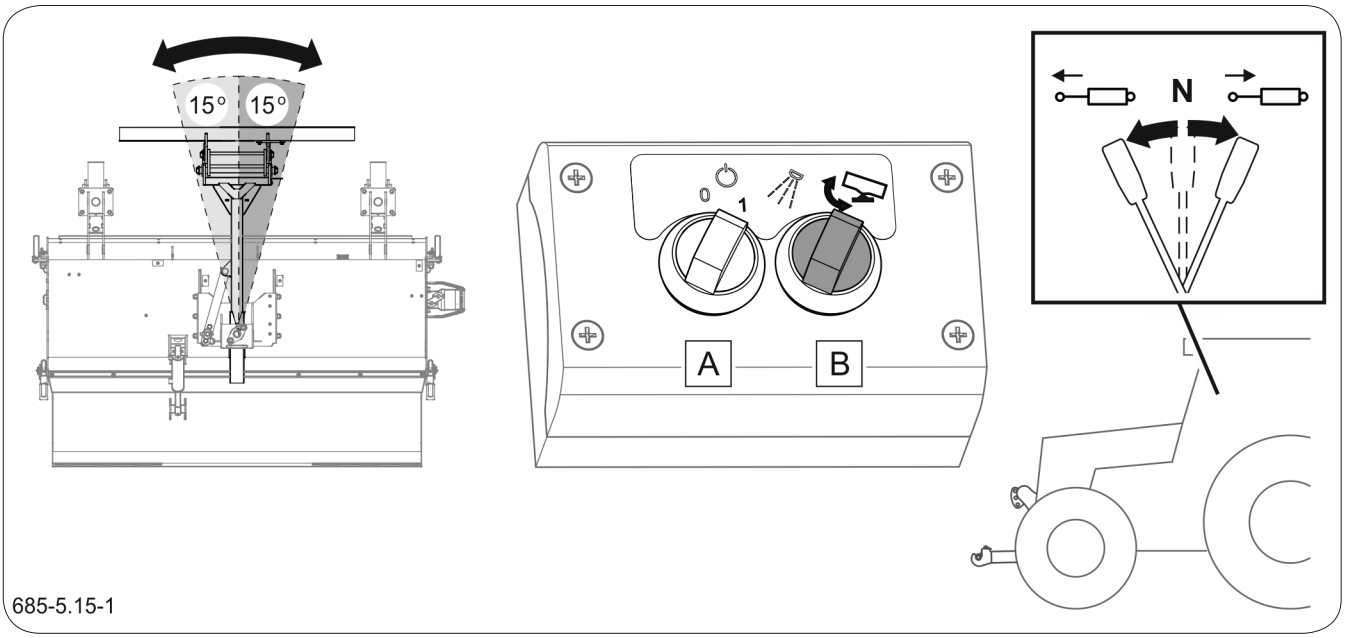

Figure 5.14 Changing the working position (electro-hydraulically controlled steering)
(A) main switch *(B) hydraulic turning and sprinkler switch*

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5.6 CONNECTING AND DISCONNECTING THE ELECTRICAL SYSTEM

CAUTION

Check the operation and completeness of the electrical system before driving.

It is forbidden to operate the machine with a defective lighting system.

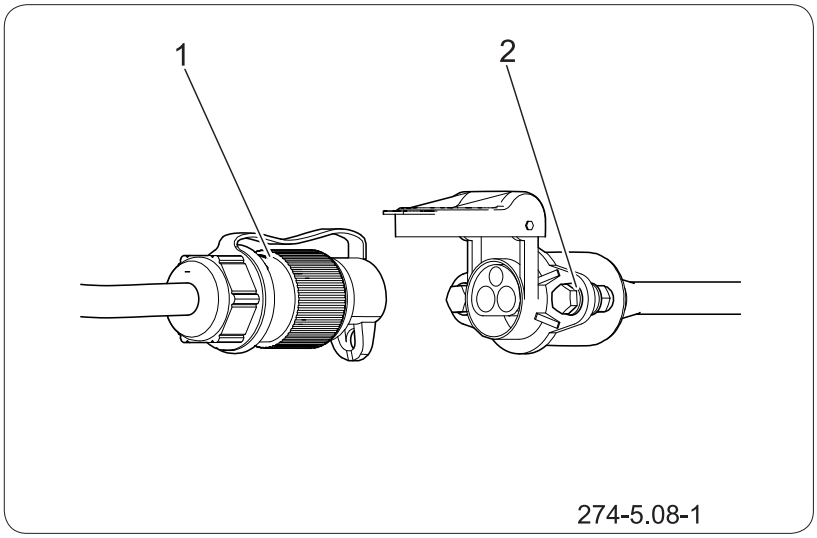

Figure 5.15 Electrical connection
(1) 3-pin plug *(2) 3-pin socket*

CAUTION

Route the electrical connection cables so that they do not become entangled in moving machine and carrier components and are not liable to kink or cut.

Requirements

1. Secure the machine against rolling.
2. Connect the machine to the carrier.
3. Switch off the carrier engine. Secure the carrier with the parking brake.

Connection

1. Connect the plug of the power cable with the 3-pin socket on the carrier.
2. Check the operation of the installation.
3. If the carrier does not have suitable sockets or the sockets are of a different type, then have the 3-pin socket fitted by qualified persons.

Disconnection

1. Disconnect the power cord.
2. Secure the carrier and machine sockets with lids.

OBS.2.6-005.12.EN

5.7 CONNECTING AND DISCONNECTING OF THE HYDRAULIC SYSTEM

DANGER

The use of faulty machinery is prohibited.

Take special care, the hydraulic system may be under high pressure.

Requirements

1. Connect the carrier tool attachment system to the sweeper;
2. Reduce pressure in the carrier's hydraulic system;
3. Immobilise the machine before rolling.
4. Turn off the engine.

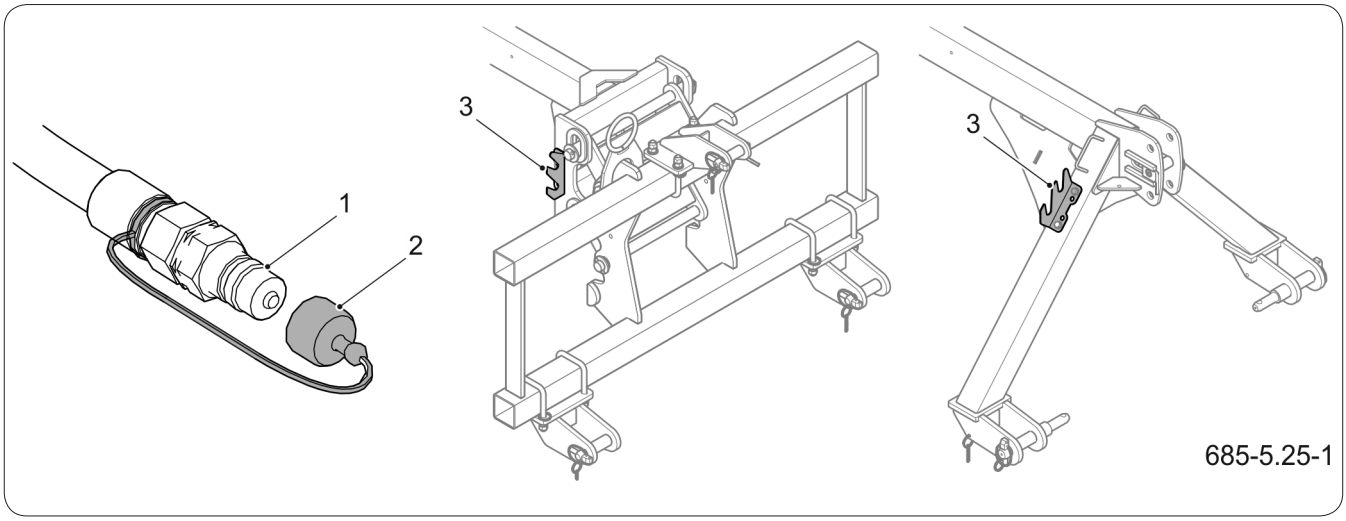

Figure 5.16 Plumbing connection
(1) hydraulic plug *(2) plug* *(3) hose bracket*

Connecting of the system

1. Check the condition and cleanliness of the hose plugs and sockets of the carrier's hydraulic distributor.
2. Connect the hydraulic system plugs (1) to the corresponding sockets on the carrier's external hydraulic manifold.

Disconnection of the system

CAUTION

Secure the disconnected cables with plugs and place them on the cable support.

1. Reduce the residual pressure of the machine's hydraulic system using the carrier's hydraulic system.

   Due to the diversity of carrier hydraulic systems, the machine manufacturer is unable to specify a universal method of pressure reduction in the hydraulic system.

CAUTION

Do not open the tank shut-off valve when it is raised and the machine is not disconnected from the carrier.

DANGER

When loosening joints, take extra care as the oil may be under pressure.

Refer to the carrier user manual.

2. Disconnect the plugs of the hydraulic lines (1) from the carrier manifold sockets.
3. Secure the cable connectors (1) with plugs (2) and place on the cable support.

Residual pressure reduction

The hydraulic system is designed in such a way that, when the machine is operated correctly, there is no residual pressure. However, situations may arise during the use of the machine where pressure will build up in the hydraulic system. Such a situation occurs when simultaneously:

- the machine is disconnected from the carrier,
- the tank remained elevated,

To relieve the pressure in such a case:

- close the tank shut-off valve,
- try to push in the plug of the quick-release coupling or gently loosen the hydraulic connection.

OBS.2.6-022.01.EN

5.8 SIDE BRUSH

Depending on the version, the sweeper can be additionally equipped with a side brush on the right or left side.

5.8.1 Side brush drive control

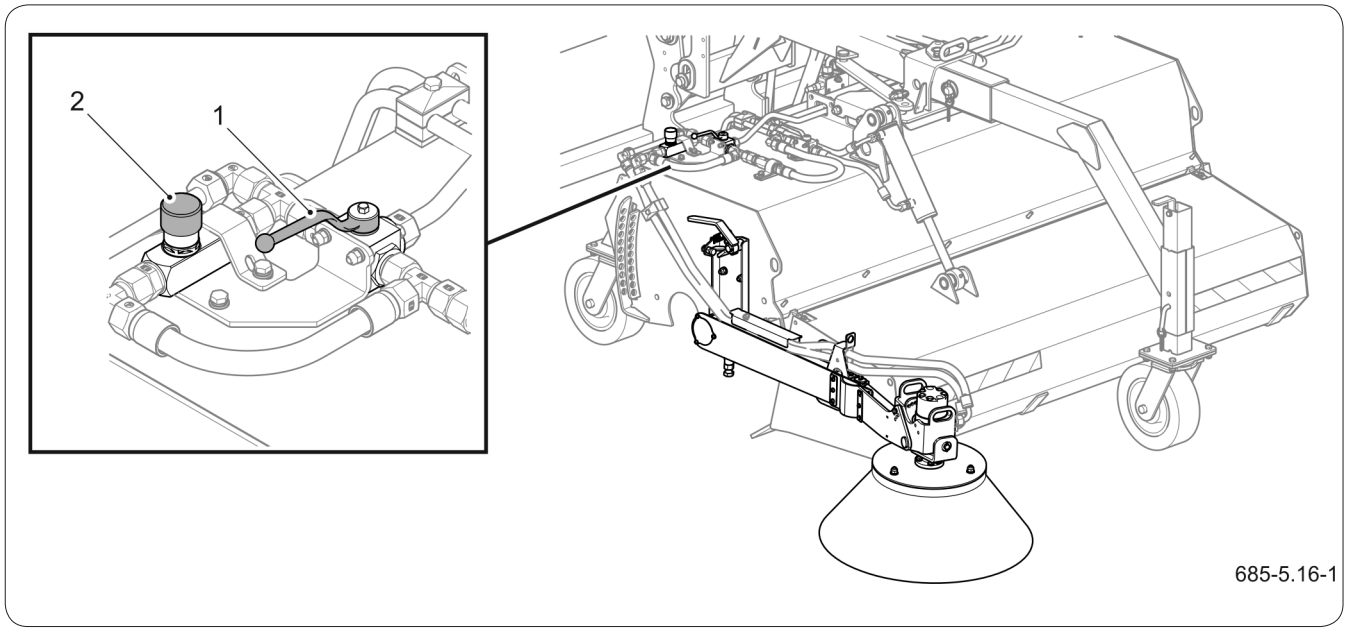

Figure 5.17 Side brush drive control
(1) shut-off valve *(2) brush speed adjustment knob*

The side brush drive is activated together with the roller brush drive. The side brush (Figure 5.17) has the possibility of disengaging its drive by means of a shut-off valve (1). The throttle valve knob (2) is used to adjust the brush speed (adjustment range 0 to maximum)

5.8.2 Raising and lowering the side brush

If the side brush is not to be used during operation, it is possible to lift and lock it as follows:

1. Close the side brush drive shut-off valve.
2. Close the side brush sprinkler shut-off valve (if present).
3. Holding the handle (2), manually lift the arm (1) of the side brush until the pawl (3) locks into

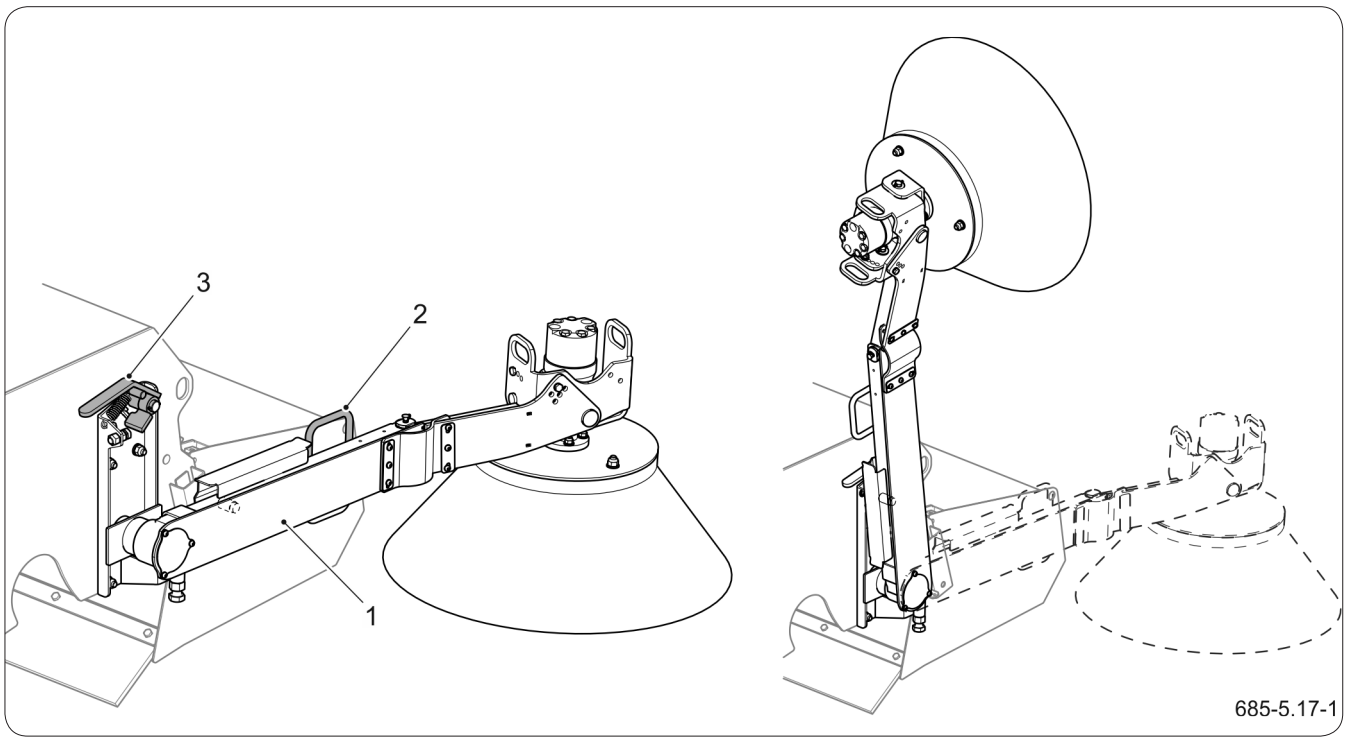

Figure 5.18 Raising and lowering the side brush
(1) brush arm *(2) handle* *(3) ratchet*

DANGER

Be caution when lifting and lowering the side brush due to the significant weight and potential for injury.

place.

To turn the side brush setting over to the working position unlock the ratchet (3) and, holding the handle (2), lower the brush arm.

OBS.2.6-017.01.EN

5.9 SPRINKLER SYSTEM

ADVICE

The sweeper with sprinkler system is equipped with a 200 litre water tank.

CAUTION

If there is a risk of freezing temperatures, drain the water from the sprinkler system, remove the filters from the sprinklers and run the water pump "dry" for about 15 seconds.

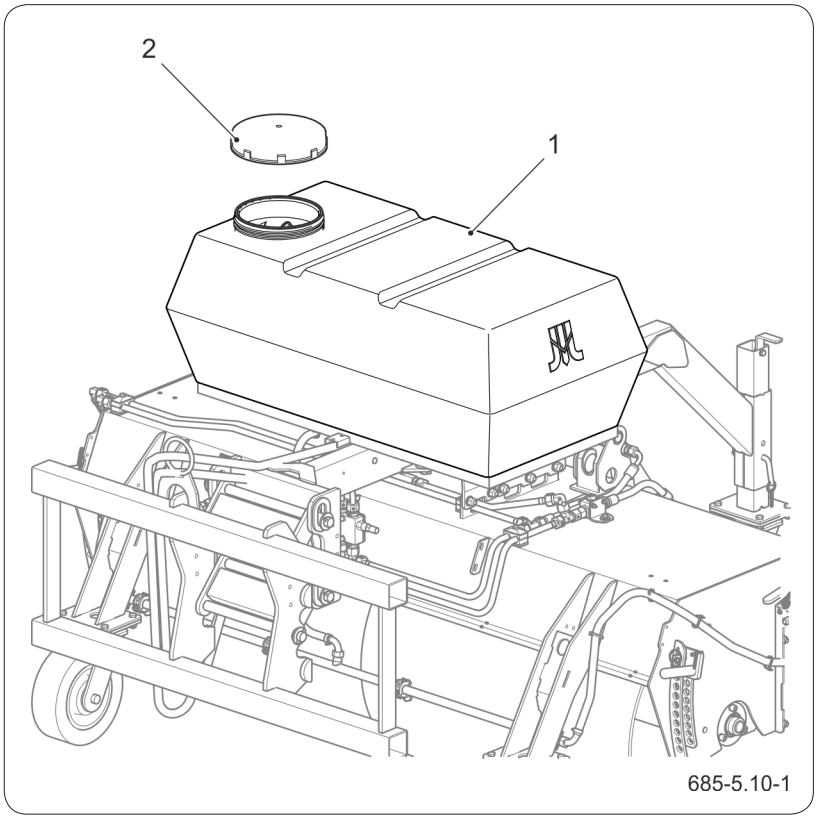

Figure 5.19 Filling the water tank of the sprinkler system
(1) water tank *(2) filler plug*

The tank (1) is filled with water through the filler hole, after unscrewing the cap (2) with the vent (Figure 5.19).

Control of the sprinkler system requires the system's power supply to be connected to the carrier's 12V (or 24V depending on version) 3-pin socket.

5.5 Connecting and disconnecting of the electrical system.

Once the power is connected, place the control panel (Figure 5.22) in the operator's cab in an accessible location.

Switch (A) serves as the main switch for the control panel and the switch for the marker lights. Spraying can only be switched on when the switch (A) is in position I (on).

CAUTION

When the water supply in the tank is exhausted, the sprinkler system should be switched off.

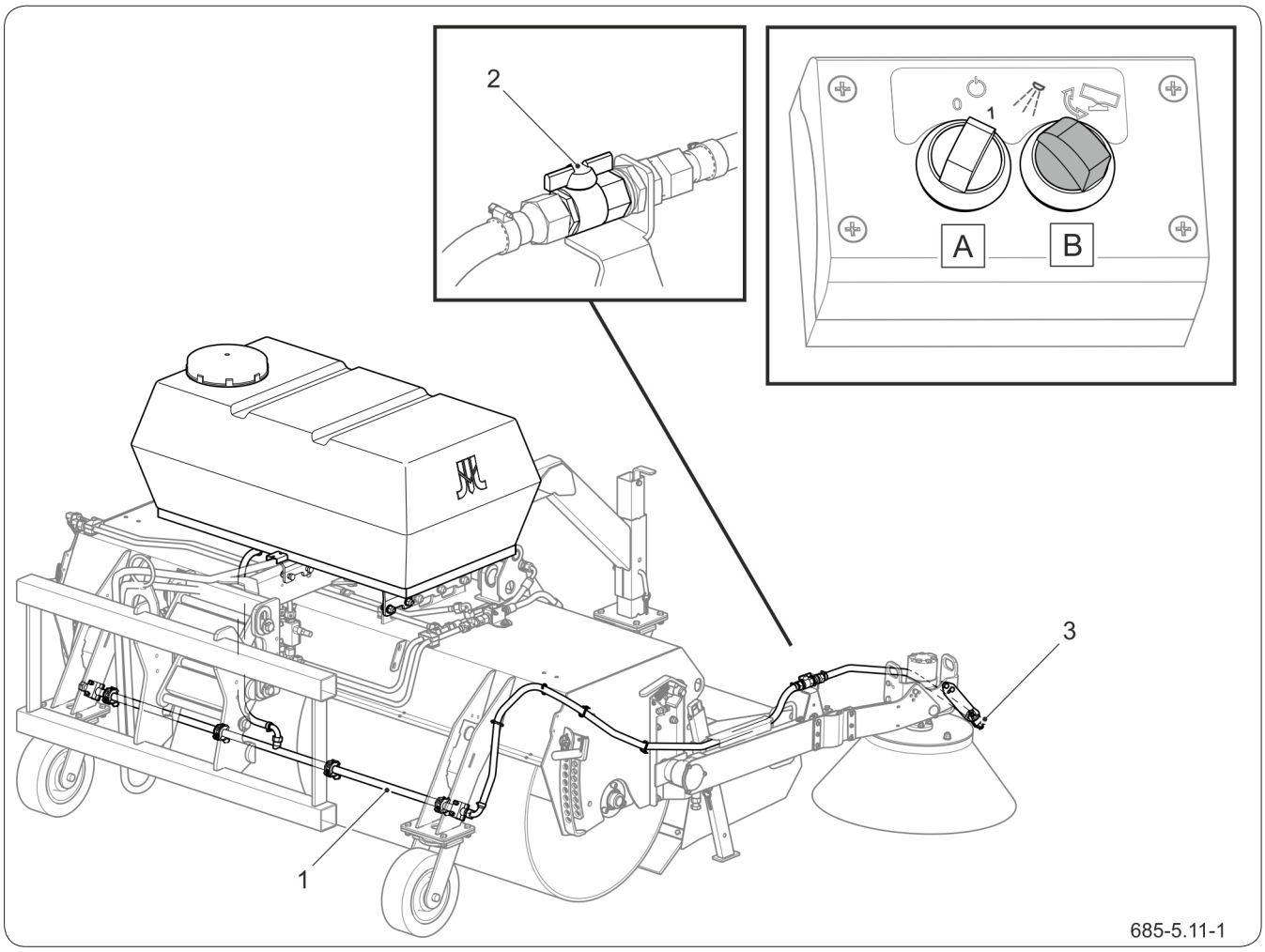

Figure 5.20 Sprinkler system control
(A) main switch and marker lights *(B) switch for sprinkler system and hydraulic turning solenoid valve*
(1) sprinkler bar *(2) side brush sprinkler shut-off valve*
(3) side brush sprinkler

The sprinkler is switched on using the switch (B) when moved to the far left position.

OBS.2.6-015.01.EN

5.10 DIRTS TANK

5.10.1 Emptying of the dirts tank.

ADVICE

The degree of filling of the tank depends on the type of contamination.

CAUTION

Do not leave accumulated dirt in the tank in sub-zero ambient temperatures.

CAUTION

The lowering of the tank is accompanied by the activation of the brushes.

Drive the carrier with the machine to the discharge point and then empty the tank as follows:

1. Raise the machine at least 0.5m above the ground.
2. Run the carrier's external hydraulic circuit with the oil circulation in the opposite direction to the sweep.
3. Once the tank has been emptied, change the direction of oil circulation in the system again to drain the tank.

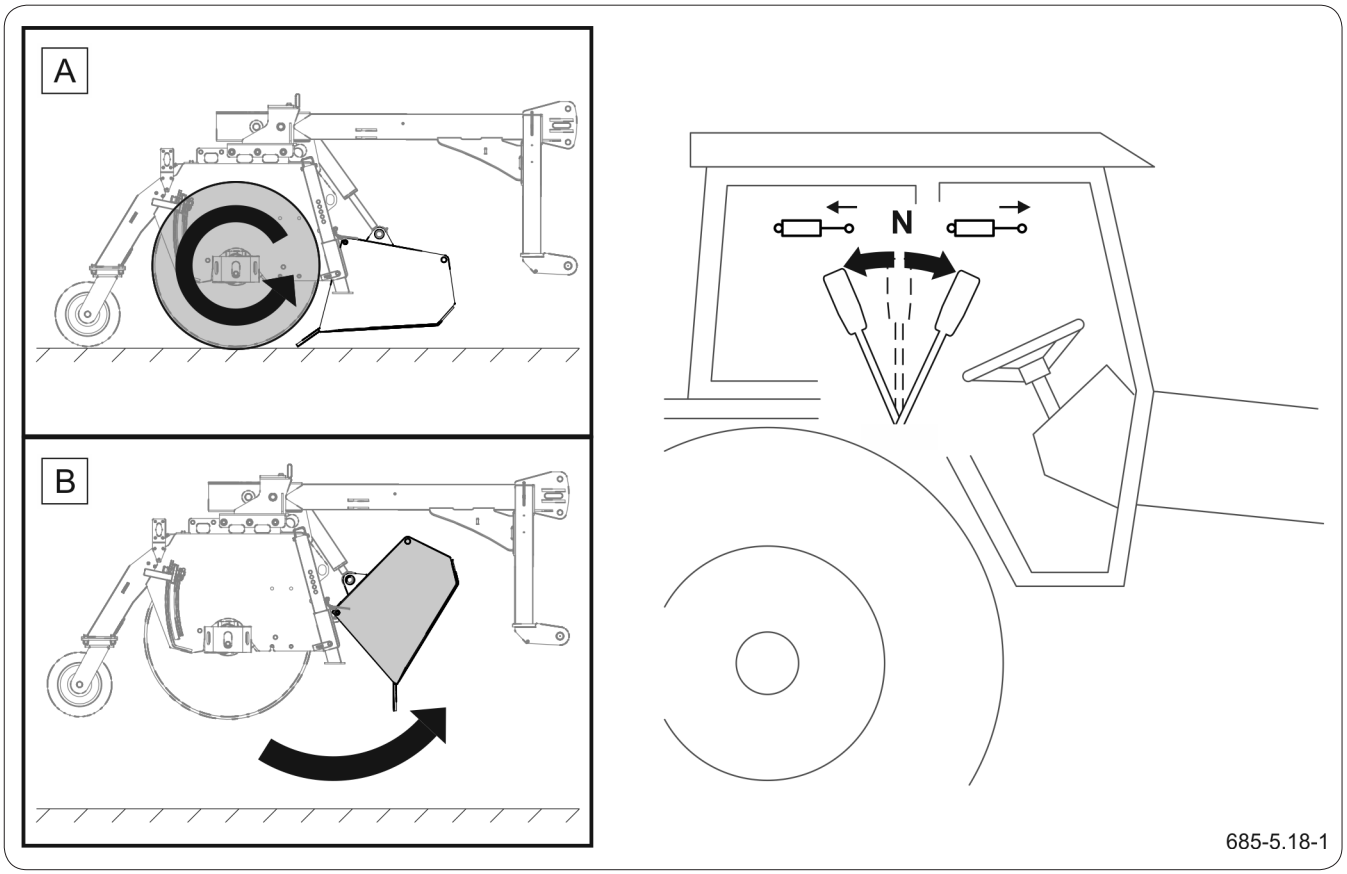

Figure 5.21 Emptying the dirt tank
(A) sweeping *(B) emptying the tank*

5.10.2 Dirt trap lock

CAUTION

If the tank lock valve is closed, the dirt tank cannot be controlled.

The sweeper can operate with the hopper raised in sweeping mode to the right or left side without collecting dirt. To lock the tank in the upper position:

1. Switch off the side brush drive (if present), lift and lock it in the upper position.

   📖 ***5.8 Side brush***

2. Move the sweeper to the right or left working position.

   📖 ***5.5 Changing the working position***

3. Lift the dirt tank as you would when emptying.
4. Close the valve (1) of the tank lock.

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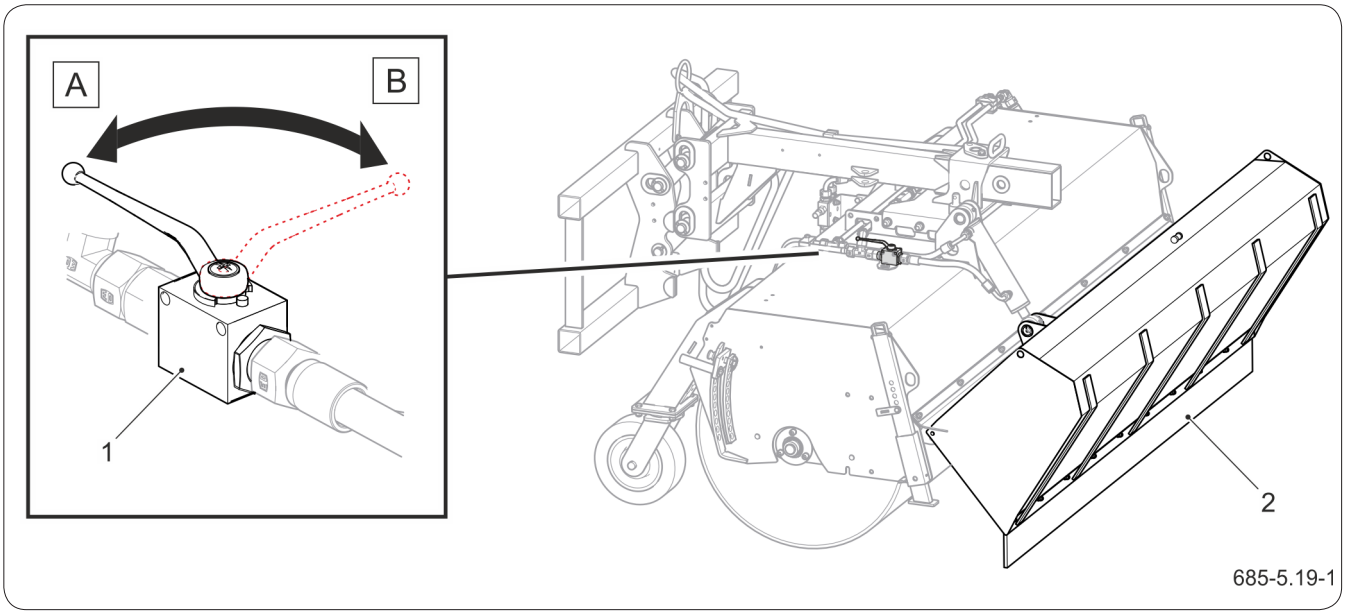

Figure 5.22 Dirt trap lock
(A) tank unlocked *(B) tank blocked* *(1) shut-off valve (tank locks)* *(2) dirt tank*

5.11 DRIVING ON PUBLIC ROADS

DANGER

When driving the machine in transport position on uneven terrain, exercise extreme caution and reduce your speed due to the possibility of damage and/or overturning of the carrier with the machine.

CAUTION

When driving on public roads, the machine should be fitted with a marker light system (optional equipment) and must not obstruct the carrier's lights.

When driving on public roads, comply with traffic regulations, use caution and sensible behaviour. The most relevant tips for directing a carrier with a connected machine are outlined below.

- Make sure there are no bystanders, especially children, in the vicinity of the machine and the carrier before driving. Ensure adequate visibility.
- Make sure the machine is properly connected to the carrier and the suspension system is properly secured.
- The weight of the machine affects the controllability of the carrier and the length of the braking distance.
- Do not exceed the permitted transport speed of 25 km/h and the speed limit imposed by traffic laws. Adapt your speed to the prevailing road conditions and other circumstances.
- While driving, obey the rules of the road, signal the change of direction by means of direction indicators, keep clean and take care of the technical condition of the lighting installation (auxiliary accessories).
- When driving with the machine raised, position the machine so as not to obstruct the lights or restrict visibility from the operator's position.
- Reduce speed before approaching bends, when driving on uneven or sloping terrain.
- Use the orange warning light in the carrier when driving with the machine.
- Place a slow-moving vehicle distinguishing sign on the rear of the vehicle when travelling on public roads.

OBS.2.6-014.01.EN

5.12 CLEANING

DANGER

Refer to the instructions for using cleaning detergents and preservatives.

When washing with detergents, wear suitable protective clothing and eye protection.

DANGER

When the machine is connected to a carrier, staying near the machine is only possible when:

- the media engine is switched off,

- the machine is lowered and rests on the ground.

CAUTION

When cleaning, do not direct a strong jet of water or steam at information and warning labels, bearings, hydraulic and electrical lines.

Thoroughly clean the machine of debris every day after work. Before using the pressure washer, familiarise yourself with the principle of operation and the recommendations for safe operation of this equipment.

Guidelines for cleaning the machine

Hold the carrier z on a flat, level surface.

- Lower the machine to the ground;
- Turn off the carrier engine and remove the ignition key.
- Secure the carrier with the parking brake;
- Secure the media from access by others.
- Remove debris from the surface of the machine,
- If necessary, cut off the waste wound up on the rotating parts of the machine;
- Clean and wash the machine with a strong jet of water and leave it to dry in a dry and well-ventilated place.

The use of pressure washers increases the effectiveness of cleaning, but be careful when working. During cleaning, the nozzle of the cleaning unit must not approach within 50 cm of the surface to be cleaned.

The water temperature should not exceed 55^0C.

Damage to the paintwork can occur when washing with too much pressure.

Do not point the water jet directly at the machine's fittings and equipment, i.e. valves, actuators, water pump, bearings, electrical and hydraulic plugs, lights, electrical connectors, information and warning labels, rating plate, cable connections, lubrication points, etc. High water jet pressure can damage these components.

- For cleaning and maintenance of plastic

CAUTION

Clean the machine of any debris after each use.

After cleaning, wait for the machine to dry and then lubricate all lubrication points as recommended. Wipe off any excess grease or oil with a dry cloth.

Use appropriate, fitted protective clothing, gloves and the right tools when working.

ADVICE

Once the machine has been cleaned and dried, apply a coat of oil to the piston rods of the cylinders (if any) to protect against corrosion.

surfaces, to use clean water or specialized preparations intended for this purpose.

- Do not use organic solvents, preparations of unknown origin or other substances which may cause damage to painted, rubber or plastic surfaces. Perform a test on an invisible surface if in doubt.
- Surfaces oily or greasy by grease should be cleaned with petrol or degreasing agents, and then washed with clean water and detergent. Follow the cleaning agent manufacturer's instructions.
- Store detergents for washing in their original containers. Detergents must not be stored in food or drink storage containers.
- Observe environmental protection rules, wash the machine in designated areas.
- Washing and drying of the machine must take place at an ambient temperature above 0°C.

In winter, freezing water can cause damage to the paint finish or machine components.

OBS.2.6-023.01.EN

5.13 DISCONNECTING THE MACHINE FROM THE CARRIER

5.13.1 Lowering the parking supports

DANGER

Before disconnecting the machine from the carrier, switch off the engine, apply the parking brake and secure the cab to prevent unauthorised access.

Special care must be taken when disconnecting the machine from the carrier.

CAUTION

If the sweeper is resting on the roller brush on the ground, the brush bristles may become deformed, which is why it is advisable to base the machine on extended parking supports or a lowered front (third) support wheel.

The scope of activities

1. Place the carrier with the machine in a parking position.
2. Raise the machine to a low height, switch off the engine, secure the carrier with the parking brake.
3. Remove the pin (3).
4. Hold the support by the handle (1) and remove the cotter pin (2).
5. Lower the support into the lower extreme position, lock with the cotter pin (2) and secure with the pin.
6. Repeat the same steps for the support on the other side of the machine.
7. Lower the machine completely to the ground.
8. Disconnect the howls of the hydraulic system, secure with plugs and place in the bracket.

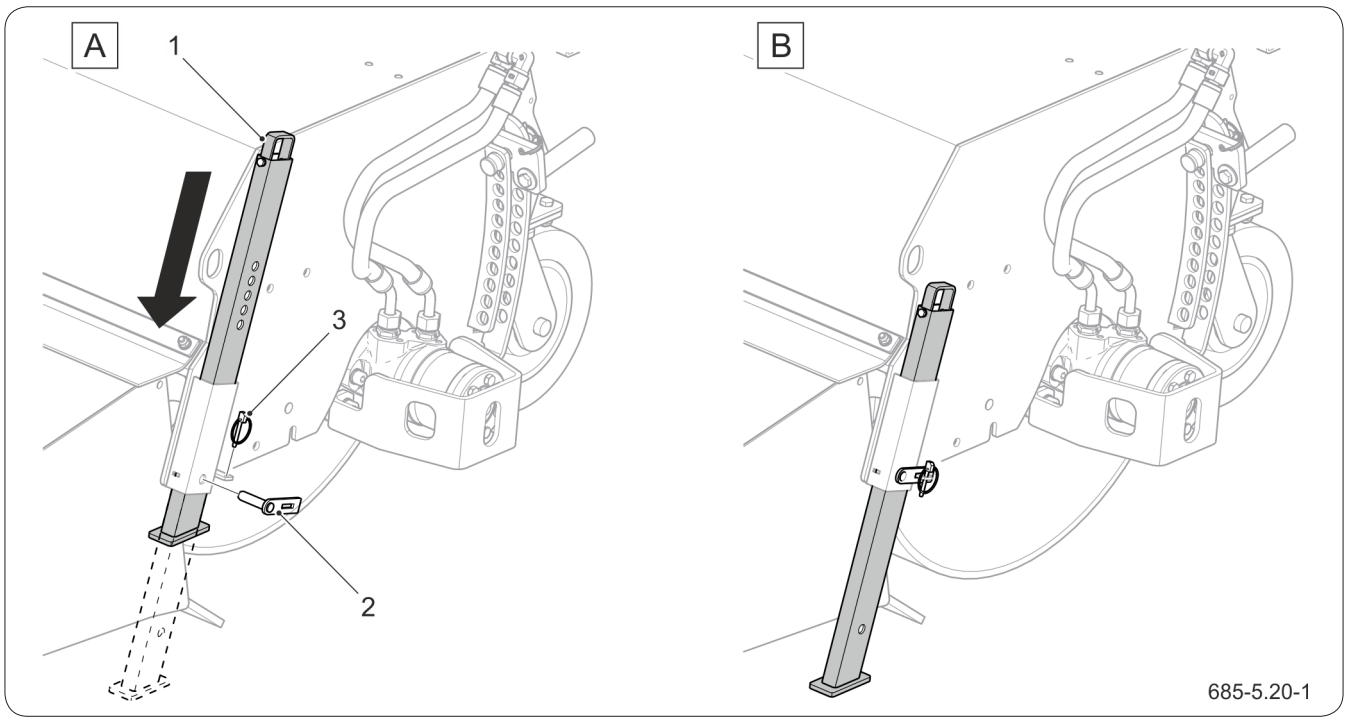

Figure 5.23 Lowering the parking supports
(1) prop holder *(2) cotter pin* *(3) pin*
(A) prop raised *(B) prop lowered*

DANGER

Reduce the system pressure before disconnecting the hydraulic system.

📖 *5.6 Connecting and disconnecting the hydraulic system*

9. Disconnect the electrical installation plug and secure with a plug.

📖 *5.5 Connecting and disconnecting the electrical system.*

The machine should be disconnected and placed on a horizontal, suitably firm surface in such a way that it can be reconnected safely.

5.13.2 Uncoupling the machine from the three-point linkage (tractor)

CAUTION

It is advisable to empty the dirt tank before disconnecting the sweeper from the carrier.

The scope of activities

1. Unlock and disconnect the top link (central link).
2. Unlock and disconnect the lower links of the three-point attachment.
3. Drive the tractor away from the machine.

5.13.3 Uncoupling the machine from the EURO suspension (loader)

CAUTION

The procedure for disconnecting the carrier from the sweeper may vary depending on the type of connector.

Follow the recommendations in the media manual.

The scope of activities

1. Unlock the attachment mechanism of the implement in the loader frame (depends on the type of carrier).
2. Using the boom control, pivot and lower the carrier mounting frame until it exits the upper mounting points of the machine.
3. Drive the carrier away from the machine

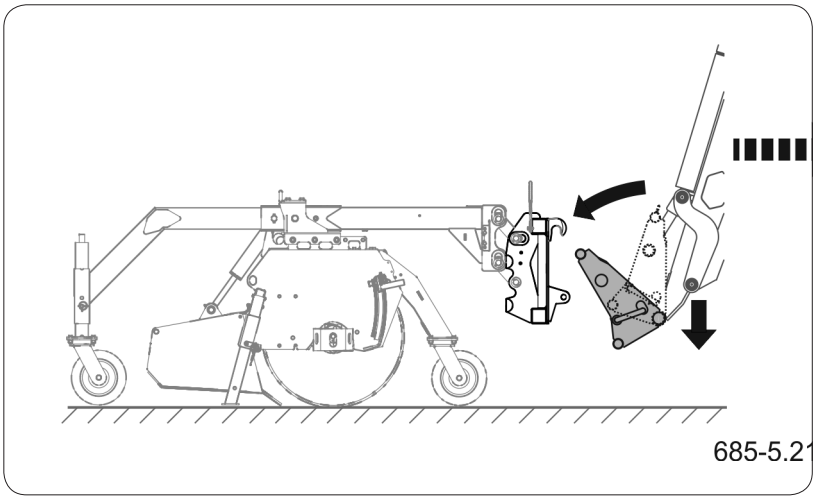

Figure 5.24 Uncoupling the machine from the EURO loader

5.13.4 Disconnecting the machine from the forklift truck.

DANGER

When disconnecting the machine, there must be no bystanders in the vicinity due to the possibility of crushing.

1. Remove the pins (2) and dismantle the yoke (1).
2. Loosen the lock nuts (4) and unscrew the pressure bolts (3) so that the forks can be removed.
3. Remove the forks from the machine's suspension system by carefully driving the carrier away from the machine.
4. Fix the yoke (1) and secure with pins.

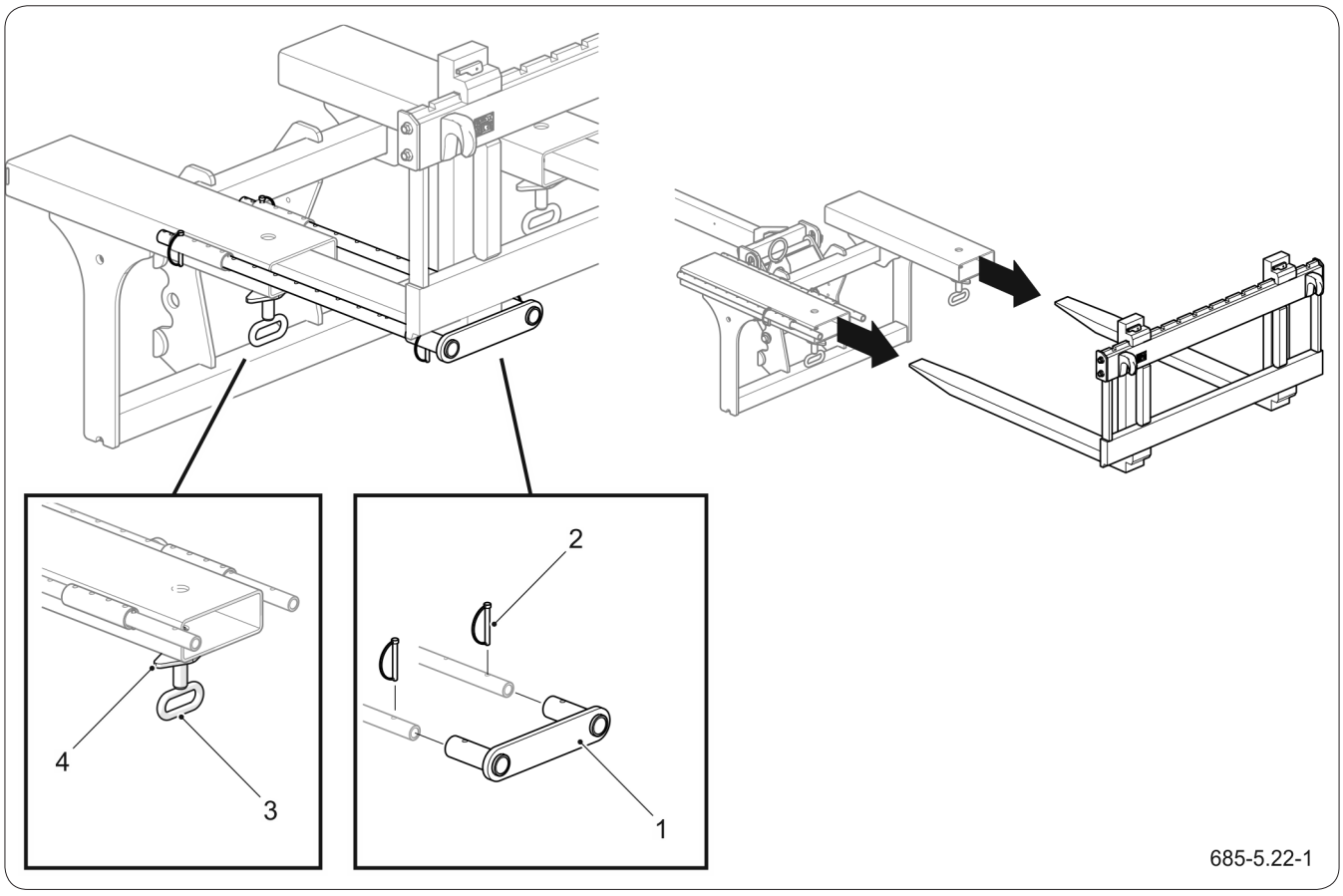

Figure 5.25 Decoupling the machine from the forklift truck
(1) yoke *(2) cotter pin* *(3) pressure bolt*
(4) lock nut

OBS.2.6-019.01.EN

5.14 STORAGE

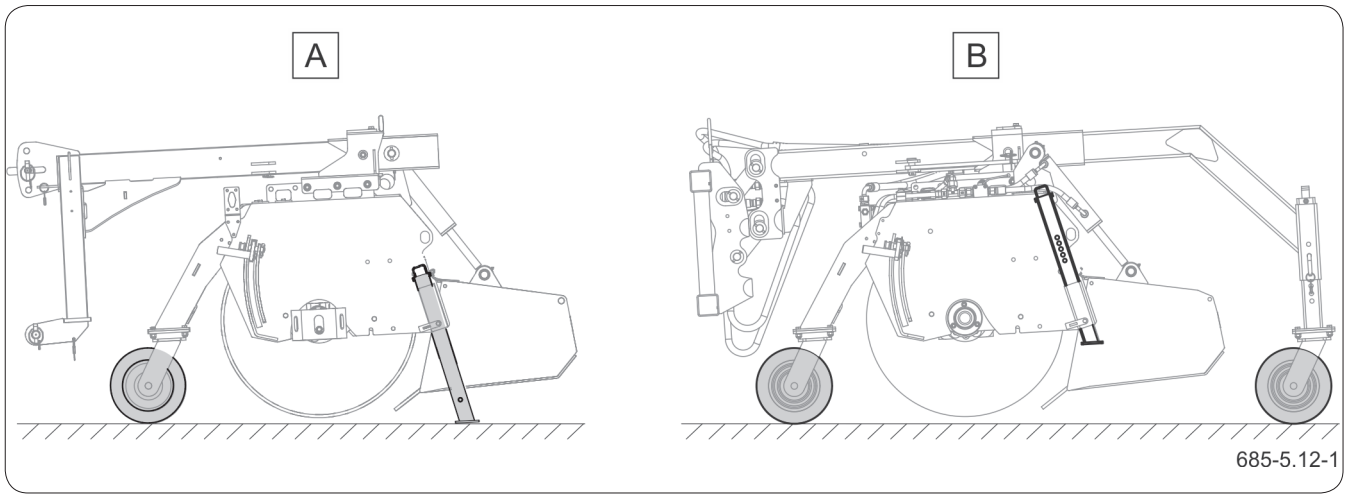

Figure 5.26 Storage position (depending on machine version)
(A) without front support wheel (B) with front support wheel

ADVICE

When stationary, the machine should rest on the ground on the running wheels and parking supports in such a way that the brush bristles do not come into contact with the ground.

CAUTION

Do not use the sprinkler system in sub-zero temperatures.

Clean the machine thoroughly after use. After washing, lubricate the machine. It is recommended that the machine is stored in a closed or covered room.

If stored outdoors for long periods of time, it is essential to protect it from the weather, especially from corrosive agents on the steel.

In the event of damage to the paintwork, the damaged areas should be cleaned of rust and dust, degreased and then repainted with paint, maintaining a uniform colour and thickness of the protective coating. Until painting, cover the damaged areas with a thin layer of grease, anti-corrosion preparation or primer paint.

After the machine has been out of service for more than 1 month, lubricate all points regardless of the period of the last treatment and subject the machine to a comprehensive check.

Disconnect the control panel (optional) from the machine and store it indoors.

If there is a risk of freezing temperatures, store the machine in a room with a positive temperature, as there is a risk of damaging the water pump (applies to machines equipped with a sprinkler system).

If it is necessary to store the machine in sub-zero temperatures, drain the water from the tank, spigots and pipes. Blow out the water pump with compressed air.
OBS.2.6-016.01.EN

CHAPTER 6.

PERIODIC INSPECTION AND MAINTENANCE

PRONAR ZM-1500 / 1800 / 2300PLUS

6.1 BASIC INFORMATION

CAUTION

It is forbidden to use a defective machine.

Repairs during the guarantee period may only be carried out by authorised service centres.

When using the sweeper, it is necessary to constantly check the technical condition and perform maintenance procedures that will allow the machine to be kept in good technical condition. Compulsorily carry out all maintenance and adjustment activities specified by the Manufacturer according to the established schedule.

Repairs during the warranty period may only be carried out by Authorised Sales and Service Outlets (APSiO). The warranty inspection of the machine is only carried out by an authorised service centre.

In the event of unauthorised repairs, changes to the factory settings or operations not included as possible by the machine operator (not described in this manual), the user will forfeit the warranty.

For detailed information on the maintenance schedule, refer to the chapter entitled*" Maintenance and Inspection Schedule* ".

After the warranty expires, it is recommended that servicing is carried out by specialised repair shops.

Use appropriate protective clothing and equipment when working.

SER.2.6-001.01.EN

6.2 MAINTENANCE AND INSPECTION SCHEDULE

Table 6.1. Review categories

Category	Description	Responsible	Frequency
A	Daily overview	Operator	Every day before first start-up or every 8 hours of continuous shift work.
B	Maintenance	Operator	Review performed periodically every 6 months. A daily inspection should be carried out each time prior to this inspection.
C	Maintenance	Operator	Inspection performed periodically every 12 months or 500 hours of machine operation (whichever comes first). A daily inspection and a review every 6 months must be carried out each time before this inspection is carried out.
D	Maintenance	Service (1).	Inspection every 4 years of machine use

(1) - post-warranty service

Table 6.2. Technical inspection schedule

Description of activities	A	B	C	D	Page
Technical condition of the roller brush and side brush (optional)	•				6.12
Technical condition of the support wheels	•				-
Inspection of connectors and sockets	•				6.5
Efficiency of the electrical lighting system (optional).	•				6.10
Checking the tightening of screw connections(1)		•			6.8
Inspection of the hydraulic system			•		6.7
Replacement of hydraulic hoses				•	6.6
Lubrication	Table: *Lubrication schedule*				6.24

(1) - according to the table "Tightening torques for screw connections".

SER.2.6-012.01.EN

6.3 INSPECTION OF CONNECTORS AND SOCKETS

DANGER

The hydraulic system of the machine and tractor is under high pressure during operation.

It is forbidden to use a faulty machine.

A damaged connector body or socket on a hydraulic or electrical line qualifies it for replacement. If the lid or gasket is damaged, replace these components with new, working ones.

If the machine is disconnected from the carrier, secure the electrical and hydraulic plugs with lids and place them in the brackets provided.

The hydraulic couplings for the connection to the tractor must be in good working order and kept clean.

Each time before connecting the machine, check the technical condition and cleanliness of the connections as well as the sockets on the carrier.

Clean or repair the media slots if necessary.

Carrier and machine hydraulic systems are sensitive to the presence of solid contaminants, which can cause damage to precision system components (hydraulic valve jams, scratches on cylinder surfaces, etc.).

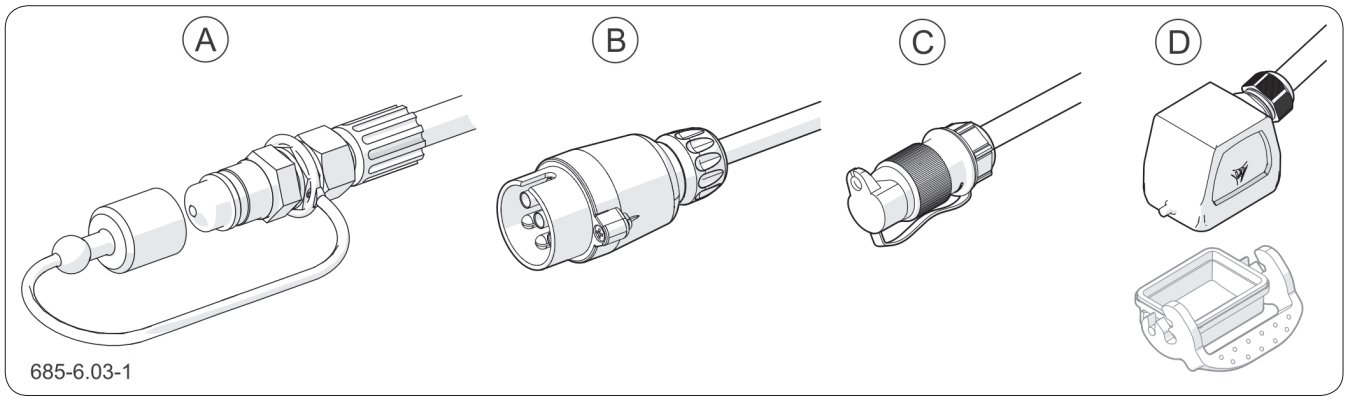

Figure 6.1 Machine connections
(A) hydraulic plug *(B) 7-pin electric plug* *(C) 3-pin electric plug*
(D) 6-pin connector

SER.2.6-021.01.EN

6.4 REPLACEMENT OF HYDRAULIC HOSES

Rubber hydraulic hoses should be replaced every 4 years regardless of their technical condition. This operation should be entrusted to specialized workshops.

SER.3.8-020.01.EN

6.5 INSPECTION OF THE HYDRAULIC SYSTEM

DANGER

The hydraulic system is under high pressure during operation of the machine.

CAUTION

It is forbidden to operate the machine with a defective lighting system.

DANGER

Work to repair or replace plumbing components should be carried out by suitably qualified personnel.

Checking of tightness of the hydraulic system

1. Connect the machine to the carrier.
2. Connect all the lines of the hydraulic system as recommended in the *"Operating Instructions"*.
3. Clean the installation components.
4. Actuate all hydraulic systems sequentially by extending and retracting the cylinder pistons, start the hydraulic brush drive motors.
5. Repeat all steps 3-4 times.
6. Leave the hydraulic cylinders in the maximum extended position.
7. Inspect all hydraulic components for leaks.
8. Once the inspection is complete, fold all cylinders into the resting position.

With the cylinder fully extended, inspect the seal locations. If oil is found on the hydraulic cylinder body, check the nature of the leak.

Minor leaks with signs of 'sweating' are acceptable. When you notice drip-type leaks, do not use the machine until the fault has been rectified.

If visible moisture appears on the cable connections, tighten the connector to the specified torque and retest. If the problem persists, have the leaking component replaced.

Checking the condition of the hydraulic couplings

Follow the steps described under:

📖 ***Inspection of connectors and socket.***

SER.2.6-022.01.EN

6.6 TIGHTENING TORQUES OF SCREW CONNECTIONS

During maintenance and repair work, appropriate tightening torques must be applied to bolted connections. The recommended tightening torques for the most commonly used screw connections are shown in the table "*Tightening torques for screw connections*". The values quoted are for unlubricated galvanised steel screws.

Tighten the hydraulic hoses and other hydraulic components with rubber seals to the torque specified in Table "*Tightening torques for hydraulic components*". The tightening check should be carried out using a torque spanner. During the daily inspection of the machine, look out for loose connections and tighten the coupling if necessary. Replace lost items with new ones.

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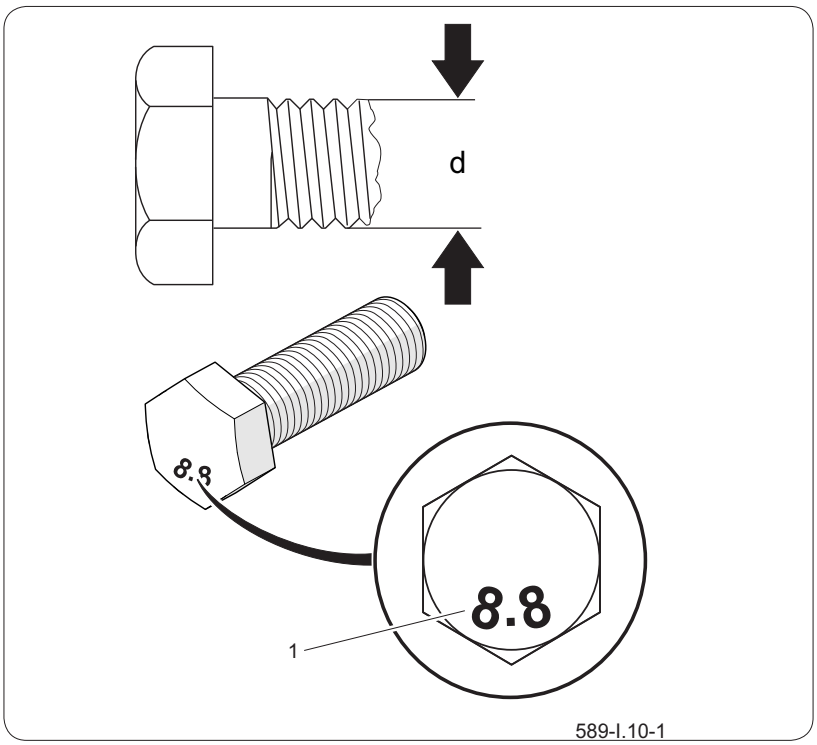

Figure 6.2 Screw with metric thread
(1) Strength class *(d) Thread diameter*

Table 6.3. Tightening torques of screw connections

Thread		
	8.8(*)	**10.9**(*)
M8	25	36
M10	49	72
M10x1.25	53	77
M12	85	125
M14	135	200
M16	210	310
M20	425	610
M24	730	1,050
M27	1,150	1,650
M30	1,450	2,100

(*) - Strength class in accordance with DIN ISO 898

Table 6.4. Tightening torques for hydraulic components

Nut thread	Wire diameter DN (inch)	Tightening torque Tightening [Nm]
M10x1 | M12x1.5 | M14x1.5	6 (1/4”)	30÷50
M16x1.5 | M18x1.5	8 (5/16”)	30÷50
M18x1.5 | M20x1.5 | M22x1.5	10 (3/8”)	50÷70
M22x1.5 | M24x1.5 | M26x1.5	13 (1/2”)	50÷70
M26x1.5 | M27x1.5 | M27x2	16 (5/8”)	70÷100
M30x1.5 | M30x2 | M33x1.5	20 (3/4”)	70÷100
M38x1.5 | M36x2	25 (1”)	100÷150
M45x1.5	32 (1.1/4”)	150÷200

6.7 OPERATION OF ELECTRICAL INSTALLATION AND WARNING ELEMENTS

CAUTION

Driving with a faulty lighting system is prohibited. Damaged lamps must be replaced immediately with new lamps before driving.

Make sure all lamps are clean before leaving.

ADVICE

The light source in the lamps is an LED and, in the event of damage, can only be replaced as a complete lamp without the possibility of repair or reconditioning.

Work on repairing, replacing or reconditioning electrical components shall be carried out by specialised workshops that have the technology and qualifications to carry out this type of work.

Your duties only include the technical inspection of the electrical installation and possibly the replacement of fuses.

The scope of activities

1. Connect the machine to the carrier with the appropriate connection cable.
2. Ensure that the connection cable is in good working order. Check the connection sockets on the carrier and on the machine.
3. Check the completeness, technical condition and correct functioning of the machine lighting.
4. Check the operation of the sprinkler system pump.
5. Check electrical wiring harnesses for damage (abraded insulation, broken wires, etc.).

6.7.1 Replacing the power supply fuse

There is a 20A UNIVAL fuse (1) in the electrical supply harness (Figure 6.3). To replace the fuse, remove the cover (2) and then pull the fuse out of the housing (3) and replace with a new one.

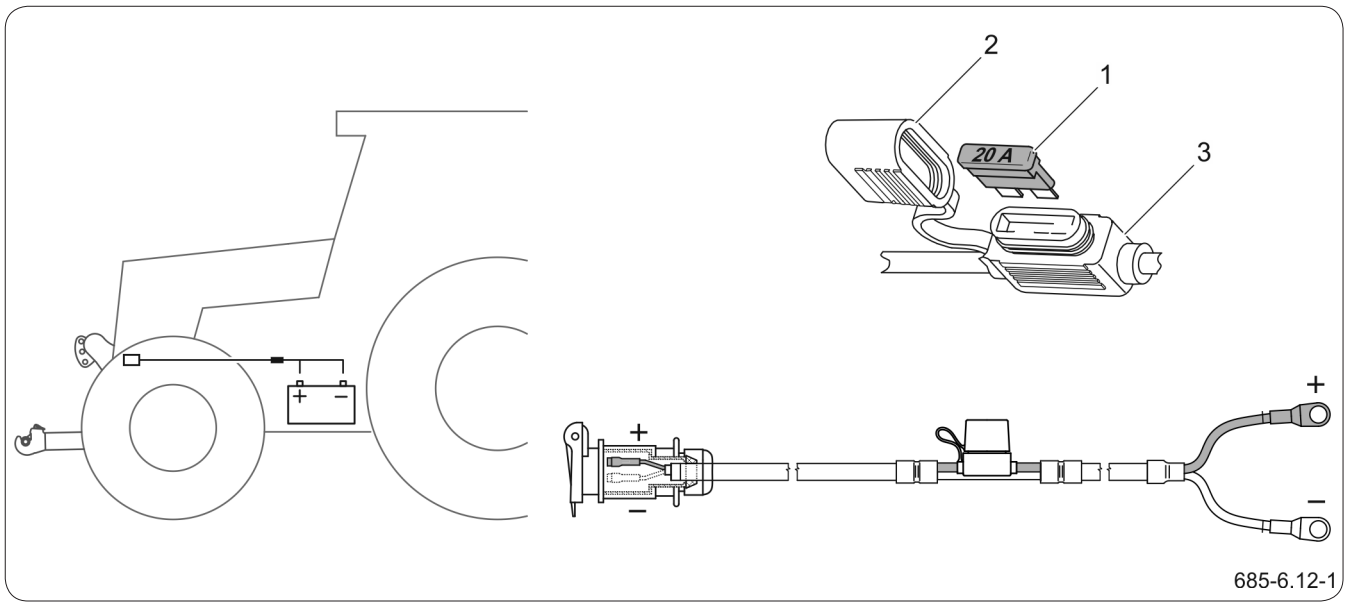

Figure 6.3 Replacement of electrical supply fuse
(1) UNIVAL 20A fuse (2) cover (3) housing

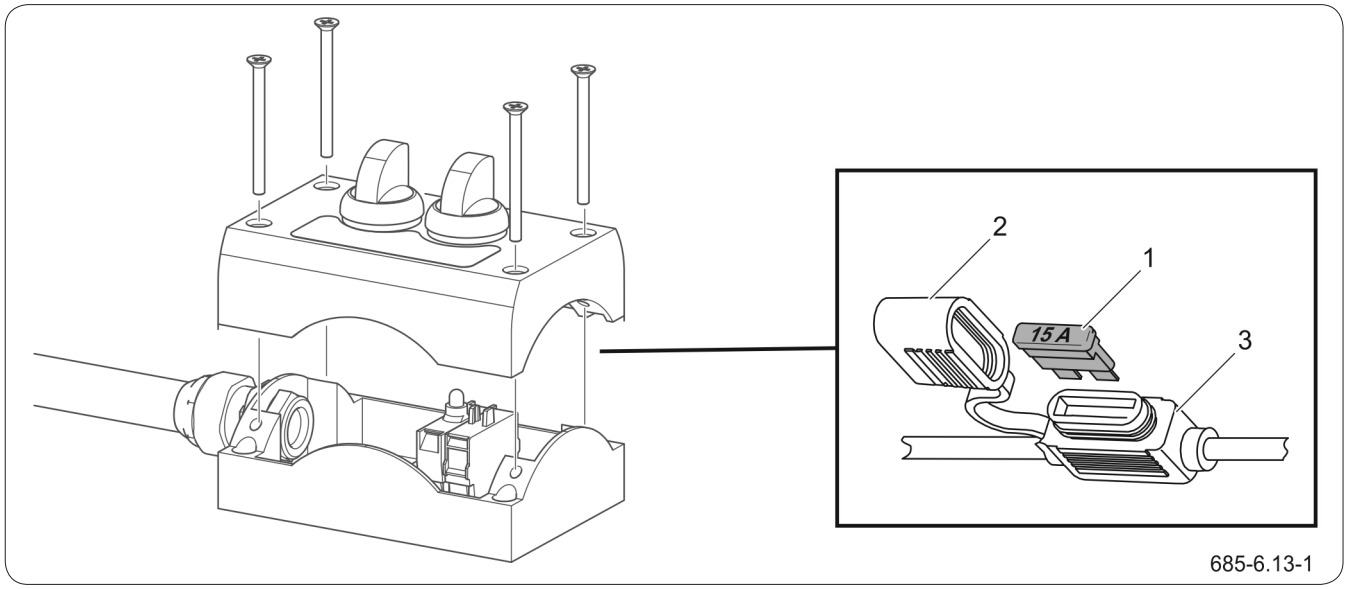

Figure 6.4 Control panel fuse replacement
(1) UNIVAL 15A fuse (2) cover (3) housing

6.7.2 Control panel fuse replacement

The electrical installation of the machine control (Figure 6.4) is equipped with a (1) UNIVAL 15A fuse located inside the control panel housing. To replace the control panel fuse, open the housing, remove the cover (2) and pull the fuse (1) out of the housing (3).

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6.8 ROLLER BRUSH OPERATION

6.8.1 Replacement of roller solid brush (standard)

CAUTION

Check the condition of the roller brush every day before operating the machine and make adjustments if necessary.

If there is no adjustment range, replace the brush with a new one.

DANGER

In the event of work requiring the machine to be raised, use properly certified hydraulic or mechanical lifts for this purpose. After lifting the machine, stable and durable supports must also be used. Do not carry out any work under the machine, raised only by means of a lift.

CAUTION

When replacing the brush, check the condition of the flexible coupling mounted on the shaft on the hydraulic motor side. Check the tightening torque of the clutch bolts If necessary, replace the clutch.

ADVICE

The correct tightening torque for the shaft coupling nuts should be 38 Nm.

If the brush is excessively worn or damaged replace it with a new one. A standard roller brush consists of two segments mounted on a common shaft. Four types of brush hardness are available depending on customer demand:

- soft (PPN1.6)
- Medium (PPN2x3)
- hard (PPN1.6+wire 0.5)
- very hard (PPN2x3+wire 0.5)

The scope of activities:

1. Lower the machine to the ground and rest it on the parking supports in the highest position. Reduce the residual pressure in the plumbing system.
2. Unscrew the retaining nuts and remove the shield (1) and bearing (2) from the shaft (Caution - there is a possibility of the shaft dropping)
3. Pull the shaft off the engine journal.
4. Pull the complete shaft out from under the machine.
5. Remove the lock (5) from the shaft.
6. Remove the individual segments (6) from the shaft and replace with new ones.
7. Clean the shaft pivot and the hydraulic motor pivot bore, pendulum bearing and motor pivot. Lubricate the shaft pivot, motor pivot and rocker bearing.
8. Check the condition of the flexible coupling (3) located on the shaft. Check the tightness of the clutch bolts.
9. Carry out the assembly in reverse order. Pay attention to the keyway on the shaft journal during

installation.

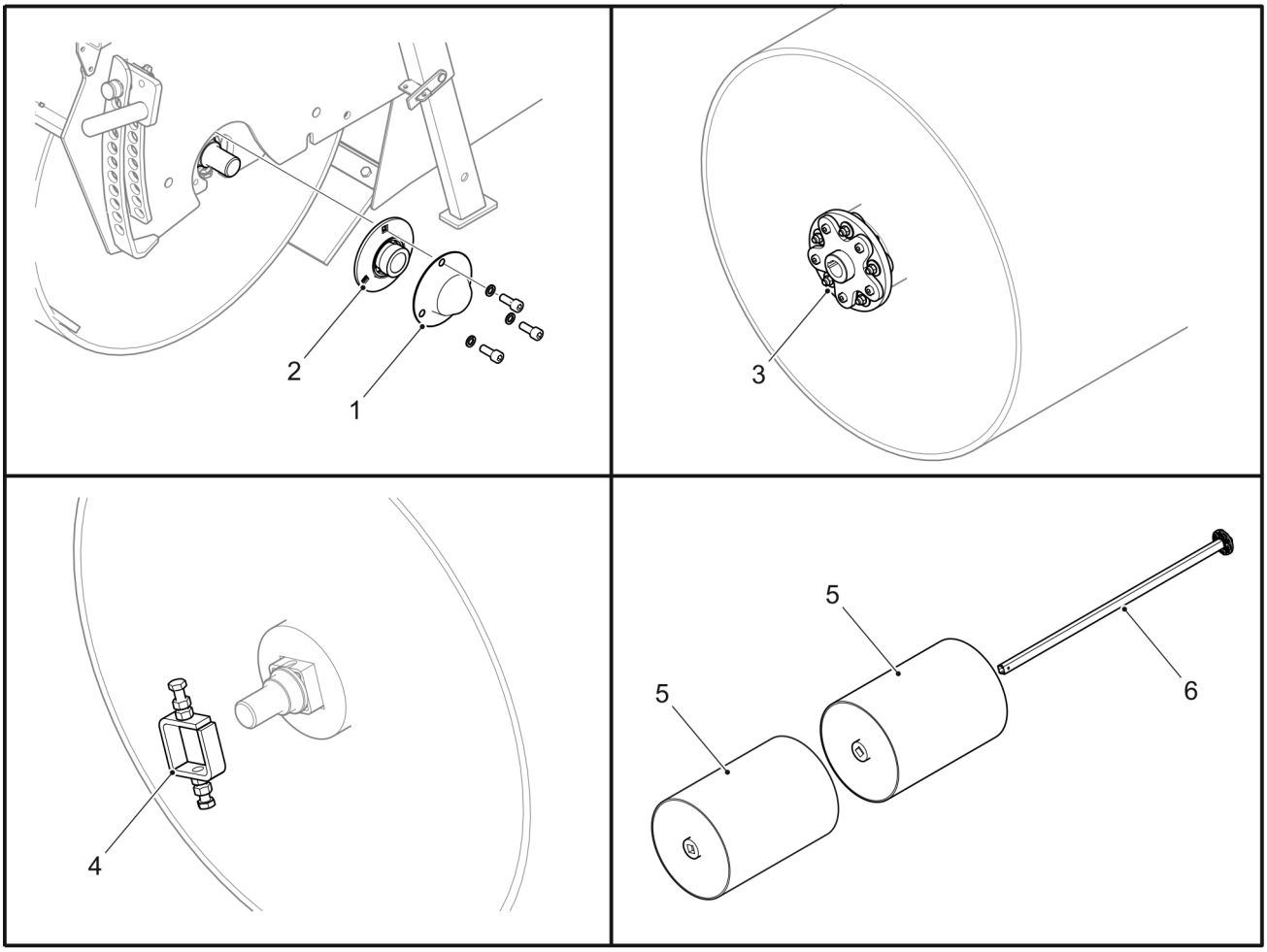

Figure 6.5 Replacement of solid roller brush
(1) bearing cover *(2) self-aligning bearing* *(3) flexible coupling*
(4) Block *(5) Brush segment* *(6) Shaft*

Table 6.5. List of roller brush segments solid (standard) ZM-1500Plus

Characteristics :	Catalogue no.	Number of pieces
Soft 650/750 (PPN 1.6mm)	684N-00000009	2
Medium 650/750 (PPN 2x3mm)	684N-00000009-01	2
Hard 650/750 (PPN 1.6+wire 0.5mm)	684N-00000009-02	2
Extra hard 650/750 (PPN 2x3+wire 0.5mm)	684N-00000009-03	2

Table 6.6. List of roller brush segments solid (standard) ZM-1800Plus

Characteristics :	Catalogue no.	Number of pieces
Soft 650/900 (PPN 1.6mm)	685N-00000009	2
Medium 650/900 (PPN 2x3mm)	685N-00000009-01	2
Hard 650/900 (PPN 1.6+wire 0.5mm)	685N-00000009-02	2
Extra hard 650/900 (PPN 2x3+wire 0.5mm)	685N-00000009-03	2

Table 6.7. List of roller brush segments solid (standard) ZM-2300Plus

Characteristics :	Catalogue no.	Number of pieces
Soft 650/1150 (PPN 1.6mm)	686N-00000009	2
Medium 650/1150 (PPN 2x3mm)	686N-00000009-01	2
Hard 650/1150 (PPN 1.6+wire 0.5mm)	686N-00000009-02	2
Extra hard 650/1150 (PPN 2x3+wire 0.5mm)	686N-00000009-03	2

6.8.2 Replacement of bent crown brush (optional)

The crown brush is replaced in a similar way to the roller brush.

📖 ***Replacement of roller solid brush (standard)***

The crown brush creeps from individual segments (Figure 6.6), which are mounted on the shaft in a suitable manner. The number and type of segments depends on the hardness and width of the brush.

Start and finish assembling the segments with a straight outer segment (D) or (E) depending on the hardness of the brush. When installing the curved segments side by side, position them so that they form a honeycomb. For the hard brush, segments (A) and (C) should be mounted alternately. Once all segments are in place, install the locking device (2) at the end of the shaft (1).

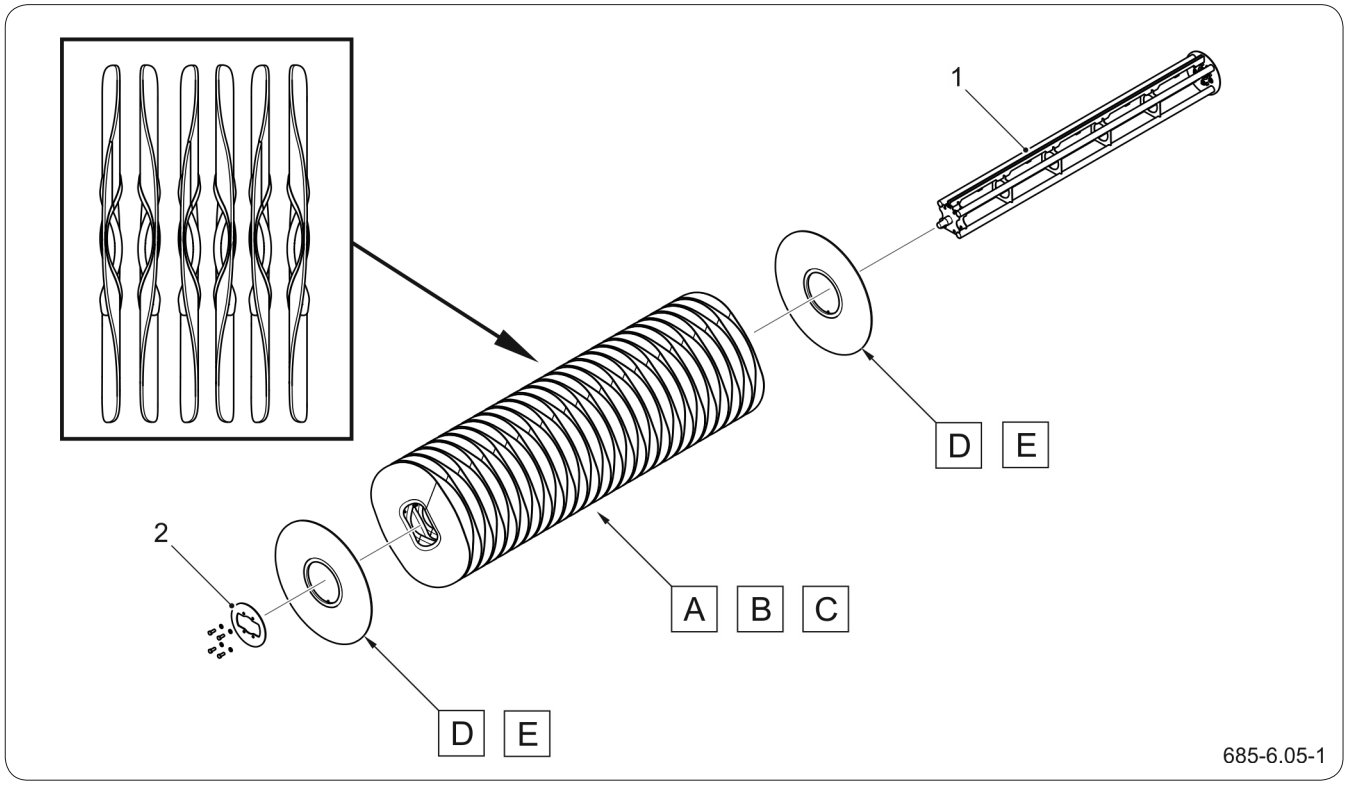

Figure 6.6 Replacement of bent crown brush (optional)
(1) shaft *(2) lock*
(A) (B) (C) curved brush segments
(D) (E) straight segment (PPN2x3mm)

Table 6.8. List of segments of curved brushes (option) ZM-1500Plus

Characteristics :	Segment	Catalogue no.	Quantity
Soft 220/650	B (PPN 2x3mm)	531N-00000012-01	39
	D (PPN 2x3mm)	531N-00000010-01	2
Medium 220/650	B (PPN 2x3mm)	531N-00000012-01	20
	A (0.7mm wire)	531N-00000012-02	19
	D (PPN 2x3mm)	531N-00000010-01	2
Hard 220/650	A (0.7mm wire)	531N-00000012-02	39
	E (0.7mm wire)	531N-00000010-02	2

Table 6.9. List of segments of curved brushes (option) ZM-1800Plus

Characteristics :	Segment	Catalogue no.	Quantity
Soft 220/650	B (PPN 2x3mm)	531N-00000012-01	47
	D (PPN 2x3mm)	531N-00000010-01	2
Medium 220/650	B (PPN 2x3mm)	531N-00000012-01	24
	A (0.7mm wire)	531N-00000012-02	23
	D (PPN 2x3mm)	531N-00000010-01	2
Hard 220/650	A (0.7mm wire)	531N-00000012-02	47
	E (0.7mm wire)	531N-00000010-02	2

Table 6.10. List of segments of curved brushes (option) ZM-2300Plus

Characteristics :	Segment	Catalogue no.	Quantity
Soft 220/650	B (PPN 2x3mm)	531N-00000012-01	60
	D (PPN 2x3mm)	531N-00000010-01	2
Medium 220/650	B (PPN 2x3mm)	531N-00000012-01	30
	A (0.7mm wire)	531N-00000012-02	30
	D (PPN 2x3mm)	531N-00000010-01	2
Hard 220/650	A (0.7mm wire)	531N-00000012-02	60
	E (0.7mm wire)	531N-00000010-02	2

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6.9 SIDE BRUSH OPERATION

6.9.1 Side brush adjustment

DANGER

Only make adjustments to the side brush when the carrier is switched off and secured.

CAUTION

Check the condition of the side brush every day before operating the machine and make adjustments if necessary.

A correctly positioned brush head should contact only part of its circumference with the ground in such a way that dirt is directed towards the centre of the machine, in front of the roller brush. The correct brush pressure setting is indicated in dark colour in the diagram (Figure 6.7).

The following parameters influence the correct positioning of the side brush:

- Pressure stop adjustment.
- Longitudinal tilt adjustment.
- Transverse tilt adjustment.
- Side tilt adjustment.

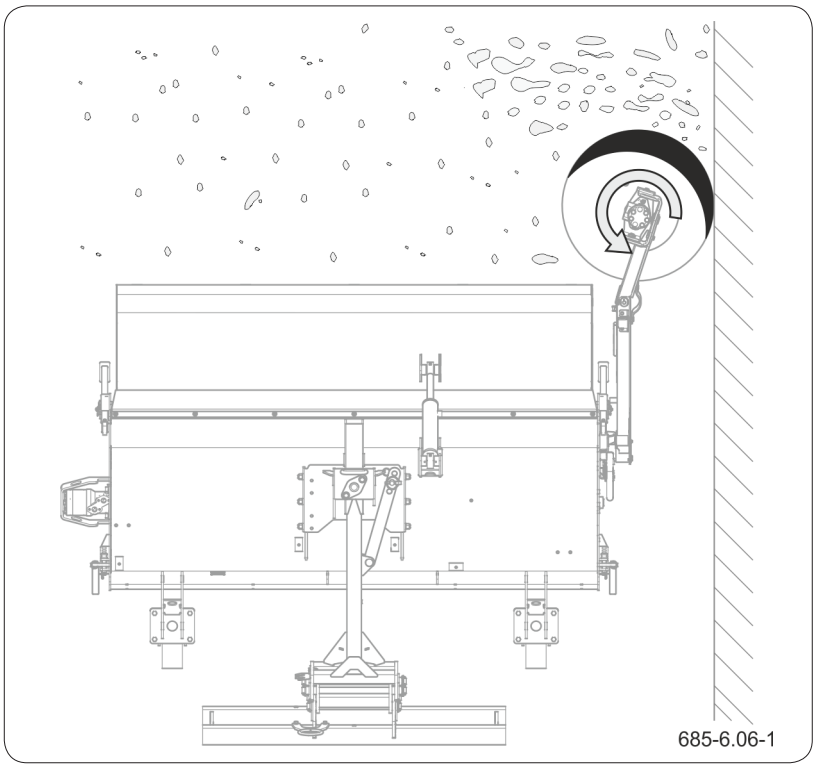

Figure 6.7 Diagram of correct side brush positioning
The dark colour indicates the part of the brush surface that should be in contact with the ground.

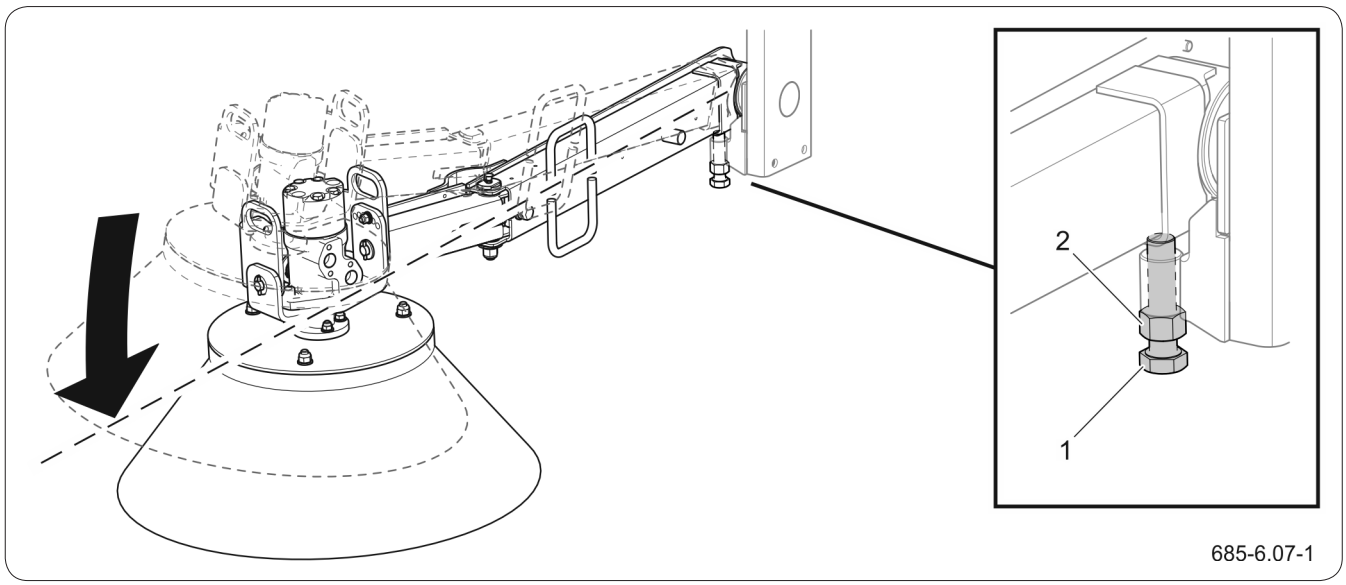

Figure 6.8 Pressure stop adjustment
(1) screw *(2) lock nut*

Adjustment of the pressure stop (Figure 6.8)

During operation, the side brush pressure is limited by a stop screw. To adjust the brush pressure, loosen the lock nut (2) and unscrew or screw in the stop screw (1) accordingly. Check the effect of the adjustment and tighten the lock nut (2). The pressure limiter requires adjustment as the brush wears down.

Adjusting the longitudinal tilt (Figure 6.9)

Adjustment of the longitudinal tilt of the side brush consists of changing the position of the set screw (1)

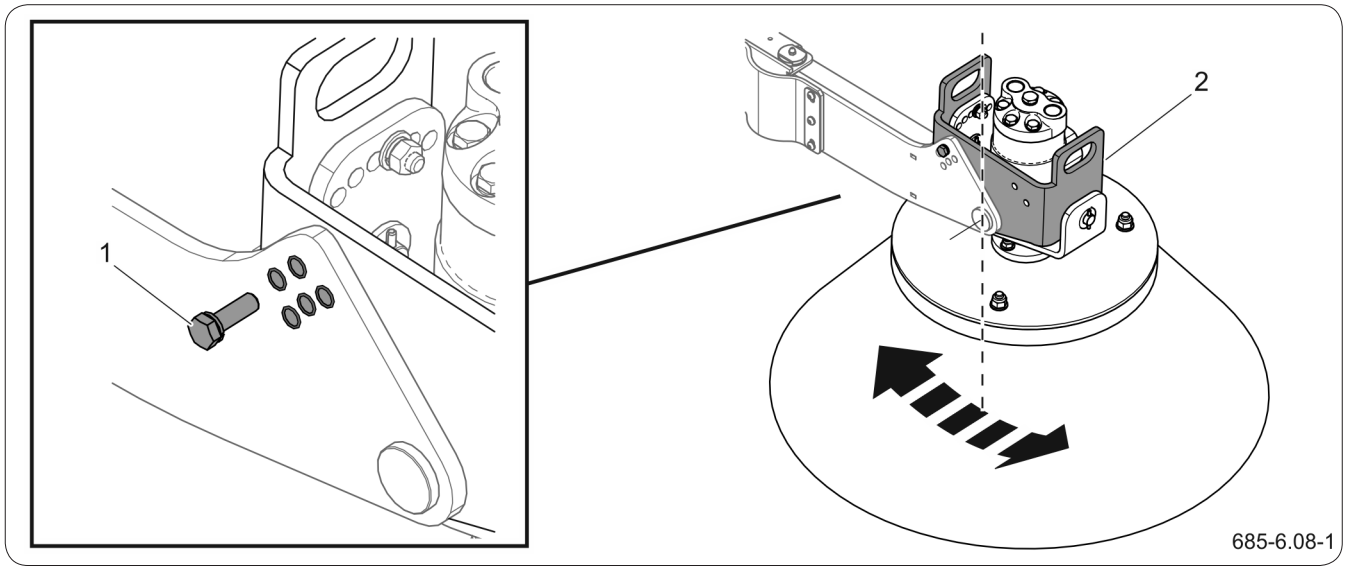

Figure 6.9 Longitudinal tilt adjustment
(1) set screw *(2) head bracket*

in the holes of the bracket (2). Five degrees of adjustment are available.

Adjusting the transverse tilt (Figure 6.10)

To change the transverse tilt angle, unscrew the set screw (1), rotate the bracket (2) accordingly and fix the screw (1) in the corresponding hole of the bracket. Four stages of adjustment are available.

Adjustment of side tilt (Figure 6.11)

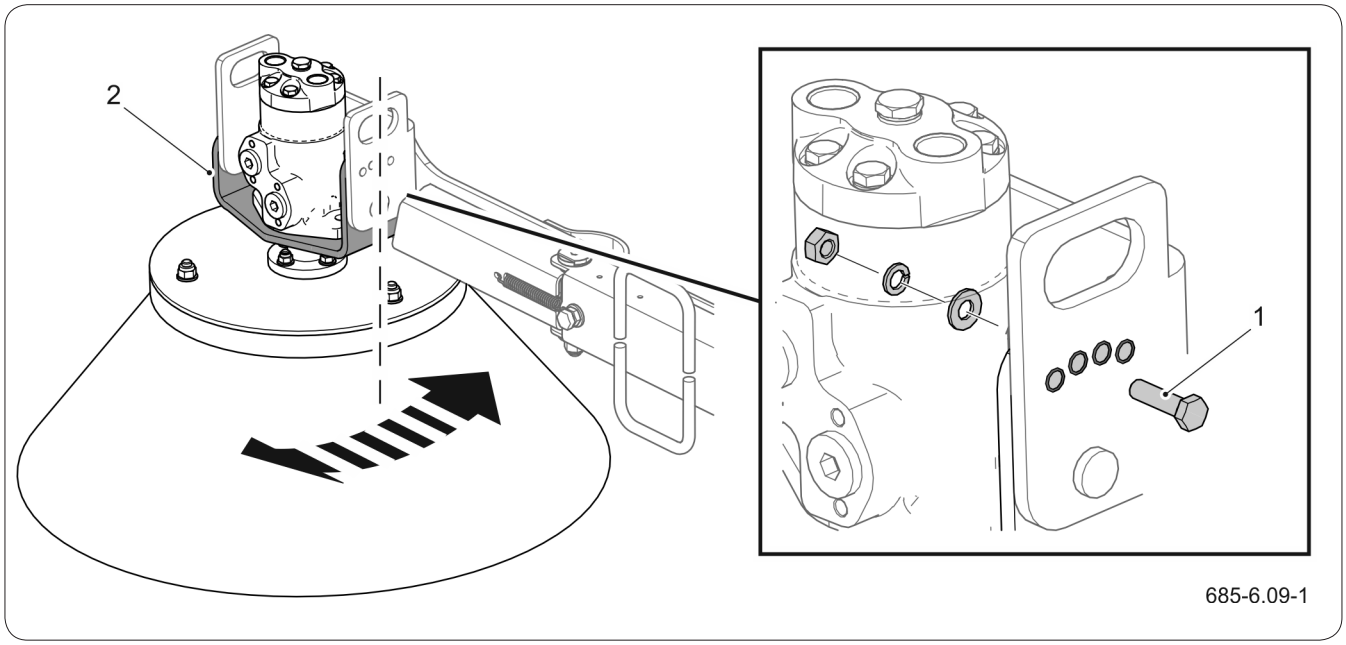

Figure 6.10 Transverse tilt adjustment
(1) set screw *(2) head bracket*

If the sweeper is raised, the side brush frame folds inwards into the machine thanks to a tension spring, and the brush swings outwards during operation.

A correctly positioned side brush should swing away from the machine outline for a distance of A=320mm (for the unused brush), measured from the brush edge to the arm. The horizontal movement range of the side brush is limited by a screw (1) secured by a lock nut (2).

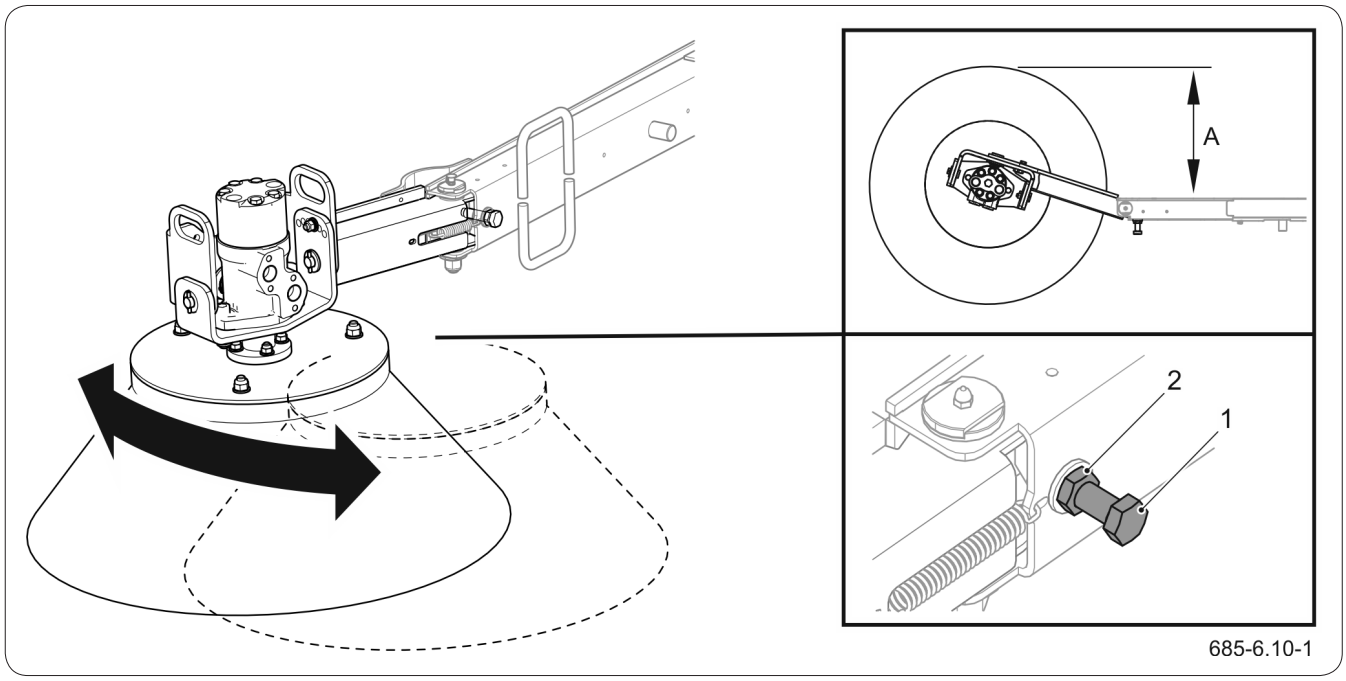

Figure 6.11 Lateral tilt adjustment
(1) stop screw *(2) lock nut* *(A) maximum lateral swing 320mm*

6.9.2 Side brush replacement

DANGER

Only carry out side brush replacement with the carrier switched off and secured.

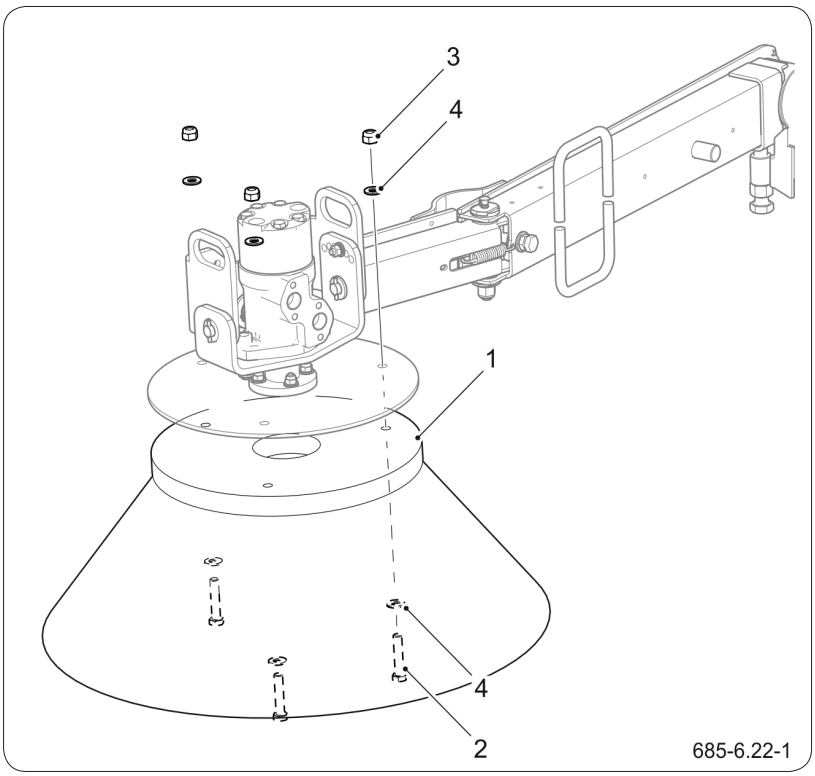

Figure 6.12 Side brush replacement
(1) disc brush *(2) bolt M10x50-8.8*
(3) nut M10-8 *(4) washer 10*

If the brush is excessively worn or damaged replace it with a new one. Three types of side brush hardness are available depending on customer demand:

- soft (plastic)
- medium (plastic+wire)
- hard (wire)

Table 6.11. Types of side brushes

Characteristics :	Catalogue no.	Type of disc
Soft brush (PPN 2x3mm)	531N-14000006	wooden
Soft brush (PPN 2x3mm)	685N-09000001	plastic
Medium brush (PPN 2x3+wire 3.3x0.6mm)	531N-14000006-01	wooden
Hard brush (wire 3.3x0.6mm)	531N-14000006-02	wooden
Hard brush (wire 3.3x0.6mm)	685N-09000001-02	plastic
Medium brush (PPN 2x3+wire 3.3x0.6mm)	685N-09000001-01	plastic

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6.10 LUBRICATION

ADVICE

Lubrication frequency (table Lubrication schedule of the machine):

D - working day (8 hours of machine operation),

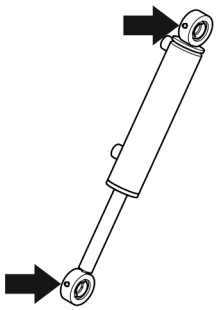
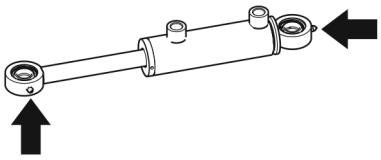
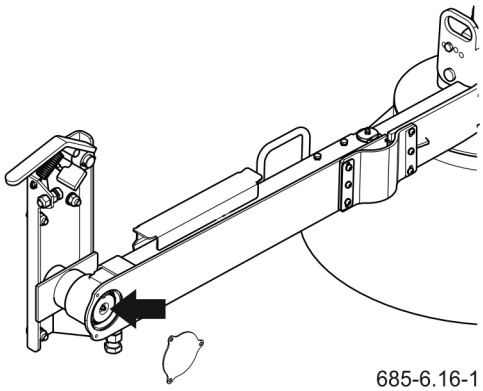
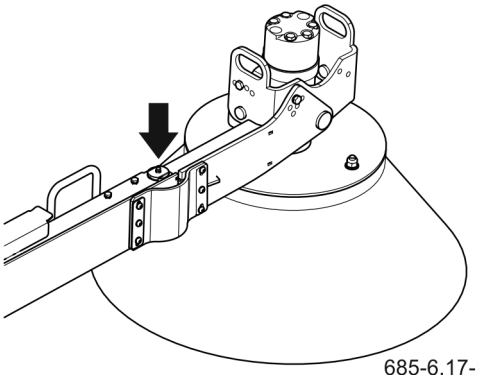
M - month

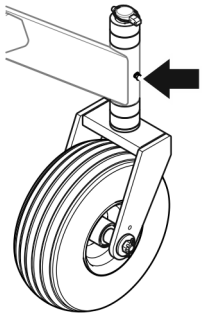
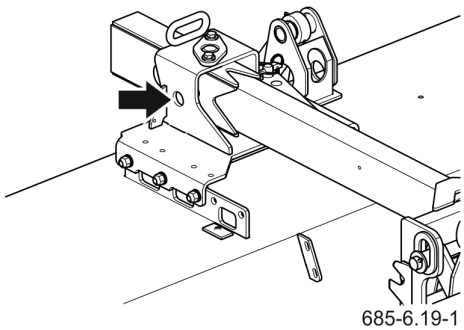
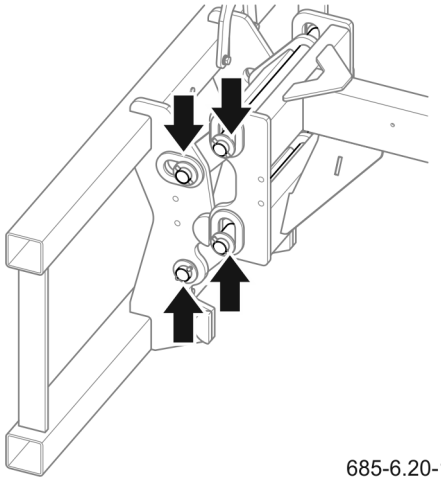
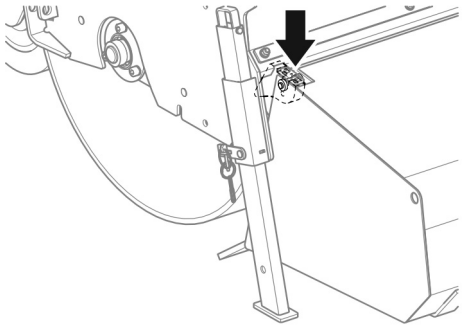
- Lubricate the machine using a grease gun, filled with the recommended lubricant. Remove old grease and other contaminants before lubrication. Wipe off excess grease when finished.
- Wipe parts that should be lubricated with machine oil with a dry and clean cloth. Apply the oil to the surface with a brush or oiler. Wipe off excess oil.
- Dispose of empty grease or oil containers in accordance with the lubricant manufacturer's recommendations.

Table 6.12. Lubricants

ITEM	Symbol	Description
1	A	general purpose solid lubricant (lithium, calcium),
2	B	solid lubricant for heavily loaded parts with MoS_2 or graphite additives
3	C	anti-corrosion spray
4	D	ordinary machine oil, silicone spray lubricant

Table 6.13. Machine lubrication schedule

Name lubrication point	Number of lubrication points	Type of grease	Frequency	
Dirt tank actuator eye	2	A	5D	 685-6.14-1
Hydraulic steering cylinder eye (optional)	2	A	5D	 685-6.15-1
Side brush arm pin (optional)	1	A	2D	 685-6.16-1
Side brush pivot pin (optional)	1	A	2D	 685-6.17-1

Front support wheel	1	A	2D	 685-6.18-1
Central pin	4	A	5D	 685-6.19-1
Swingarm suspension bushes	8	A	1M	 685-6.20-1
Dirt tank hinge	2	A	1M	 685-6.21-1

D-day, M-month

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6.11 OPERATION OF THE SPRINKLER SYSTEM

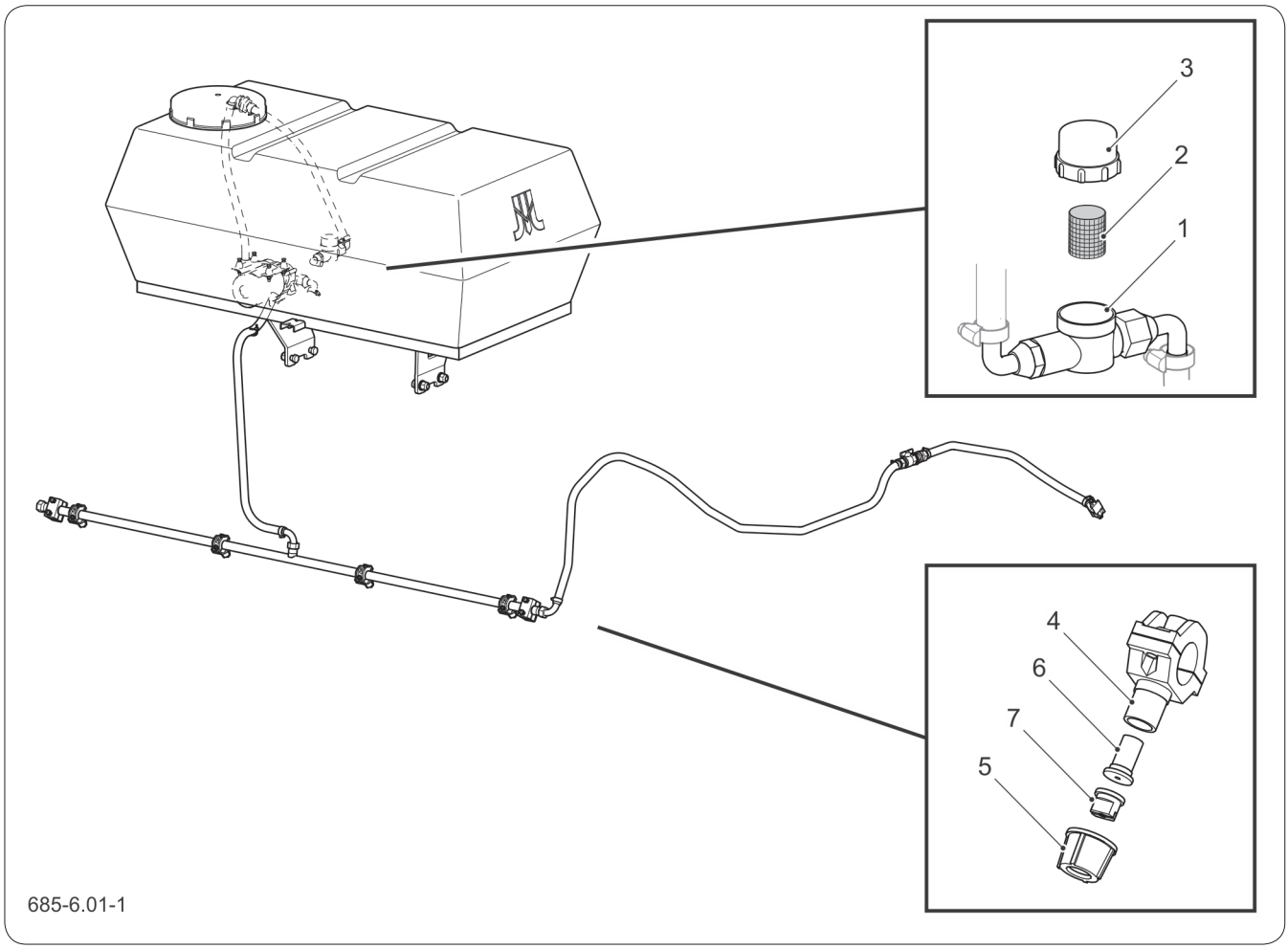

Figure 6.13 Filters in the sprinkler system
(1) filter housing *(2) mesh insert* *(3) cover*
(4) sprinkler housing *(5) nut* *(6) filter with non-return valve*
(7) slotted nozzle

ADVICE

The technical condition of the sprinkler system should be checked on an ongoing basis while the machine is in use. The frequency of filter cleaning depends on the amount and size of contaminants in the water.

Water filters are recommended to be cleaned at least once a week.

On a sweeper equipped with a sprinkler system, the patency of the nozzles and the cleanliness of their filters and the suction filter should be checked periodically. Inside the tank on the suction line is a filter with a mesh insert (2), which is subject to periodic inspection and cleaning.

To clean the mesh cartridge (2) remove the suction line from the tank, unscrew the cover (3) and remove the mesh cartridge (2) from the housing (1), then pressure wash or clean with compressed air. After

CAUTION

A leak in the sprinkler system causes the water to spray incorrectly.

ADVICE

In the event of sub-zero temperatures, store the machine in a room with a positive temperature, as there is a risk of ice forming in the water pump and consequently damaging it. Do not run a frozen water pump.

ADVICE

Water filters are recommended to be cleaned at least once a week. The frequency of filter cleaning depends on the amount and size of contaminants in the water.

inserting the cartridge, twist the filter housing.

Inside each sprinkler is a filter (Figure 6.13). To clean the filter (6) of the sprinkler unscrew the housing remove the filter and wash or blow out with compressed air. Check the patency of the nozzle (7) before installation.

Check the condition of all sprinklers and repair or replace as necessary.

Sprinklers may need to be adjusted after repair or replacement. The roller brush nozzles should be positioned (Figure 6.14) so that they spray water with a slit perpendicular to the sweeping direction (tangential to the roller brush). Adjusting the angle of the roller brush sprinklers involves loosening the fixing (2) and rotating the tube (1).

Adjusting the side brush sprinkler involves loosening the fixing bolts and adjusting the bracket (5) accordingly.

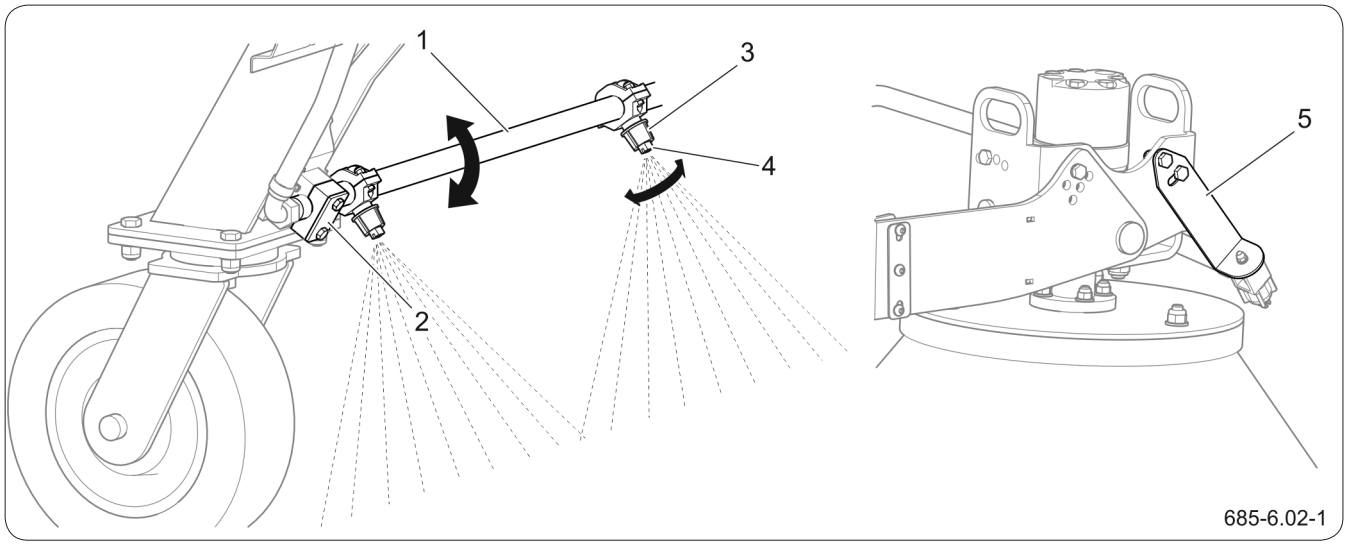

Figure 6.14 Filters in the sprinkler system
(1) pipe *(2) fitting* *(3) nut* *(4) slotted nozzle*
(5) sprinkler bracket

ADVICE

As the brush wears down, adjustments to sprinkler angles may be necessary.

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6.12 FLOW CONTROLLER (OPTIONAL)

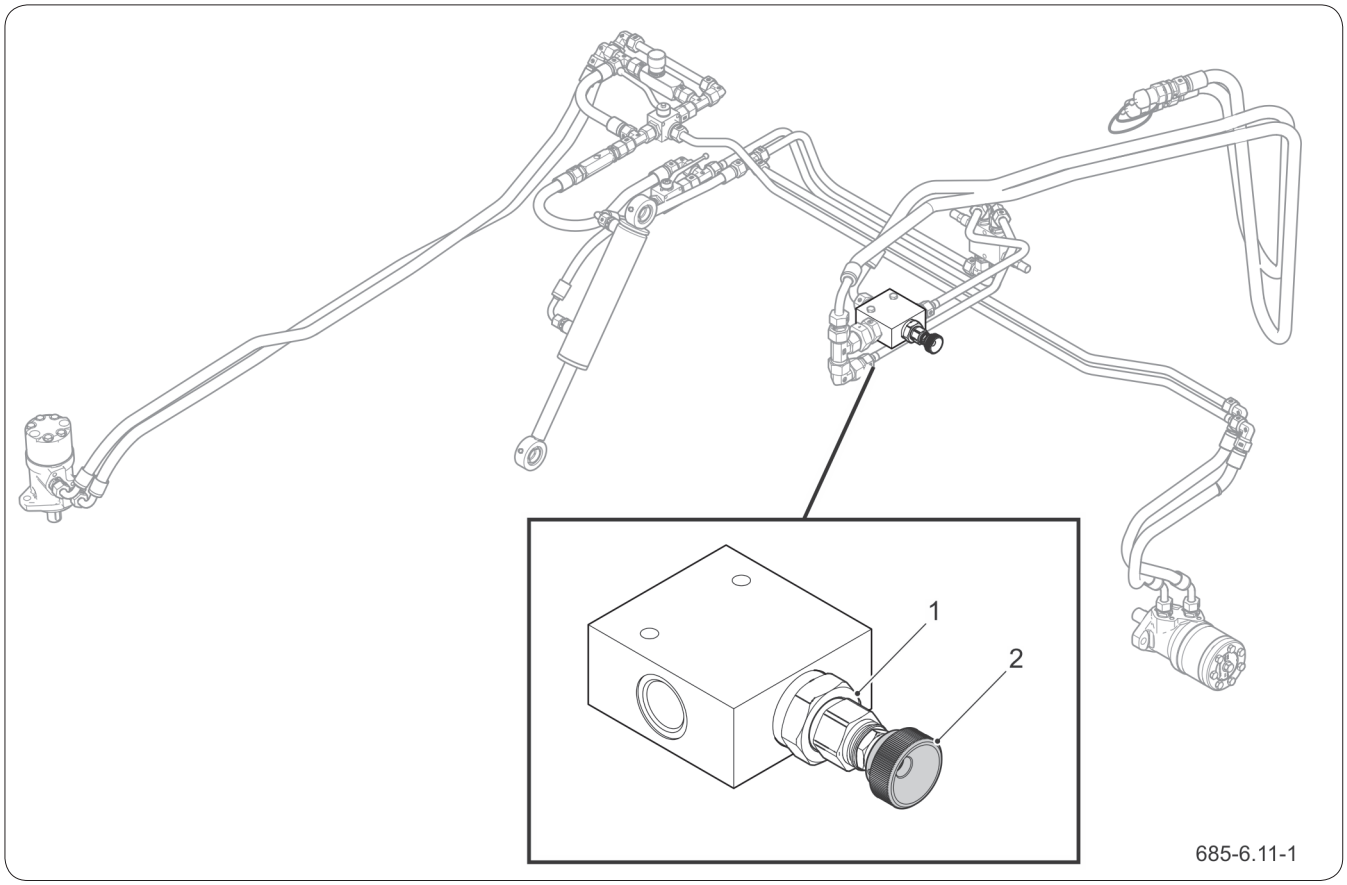

Figure 6.15 Hydraulic flow controller for high flow rates
(1) flow regulator *(2) adjusting screw*

CAUTION

It is forbidden to twist the flow regulator knob, which increases the flow rate and risks damaging the hydraulic motors.

Screwing in, i.e. reducing the output , e.g. to reduce brush speed, is permitted.

On machines optionally equipped with a hydraulic system for carriers with an oil pump output of more than 60 l/min (up to 150 l/min), the flow controller is set to 70% to 78% of the setting range, giving a maximum flow of 60l/min.

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6.13 CONSUMABLES

6.13.1 Hydraulic oil

ADVICE

L-HL 46 Lotos oil was used in the machine's hydraulic system.

Absolutely observe the principle that the oil in the machine's hydraulic system and in the tractor's hydraulic system should be of the same grade. When using different types of oil, make sure that the two hydraulic agents can be mixed together. Using different grades of oil can cause damage to the machine or the carrier. On the new machine, the system is filled with L-HL46 hydraulic oil.

If you need to change to a different hydraulic oil, read the oil manufacturer's recommendations carefully. If he recommends flushing the installation with a suitable preparation, follow these recommendations. Ensure that the chemicals used for this purpose do not have an aggressive effect on the materials of the hydraulic system. During normal operation of the machine, it is not necessary to change the hydraulic oil, but if this is necessary, it should be entrusted to a specialist service centre.

The oil used is not classified as a hazardous substance due to its composition; however, prolonged exposure to skin or eyes may cause irritation. In the event of contact of oil with skin, wash the area

Table 6.14. Oil characteristics L-HL 46

ITEM	Name	Unit	
1	Viscosity classification according to ISO 3448VG	-	46
2	Kinematic viscosity at 40°C	mm^2/s	41.4-50.6
3	Quality classification according to ISO 6743/99	-	HL
4	Quality classification according to DIN 51502	-	HL
5	Flash point	C	190

DANGER

Do not use water to extinguish an oil fire!

of contact with water and soap. Do not use organic solvents (petrol, kerosene). Remove soiled clothing to prevent oil getting on the skin. If the oil gets into your eyes, rinse them with very large amounts of water and if irritation occurs, contact your doctor.
Hydraulic oil does not have a harmful effect on the respiratory tract under normal conditions. The danger is only present when the oil is highly atomised (oil mist), or in the event of a fire, during which poisonous compounds can be released. If oil ignites, extinguish with carbon dioxide, foam or vapour extinguisher

6.13.2 Lubricants

Lithium lubricants with molybdenum disulphide (MoS_2) or graphite are recommended for highly loaded parts. For less heavily loaded components, it is recommended to use general-purpose machine lubricants that contain anti-corrosion additives and are highly resistant to water washout. Similar properties should characterise aerosol formulations (silicone lubricants, anti-corrosive agents).

ADVICE

Lubrication frequency (table Lubrication schedule of the machine):

Before using lubricants, read the information leaflet for your chosen product. In particular, safety rules and how to handle the lubricant in question and how to dispose of waste (used containers, contaminated rags, etc.) are important. Keep the information leaflet (product data sheet) with the lubricant.

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6.14 DEFECTS AND HOW TO RECTIFY THEM

Table 6.15. Defects and how to rectify them

Problem	Possible cause	Solution
The roller brush does not rotate or rotates in the wrong direction.	Plumbing system not connected or incorrectly connected.	Check the connection.
	Incorrect direction of oil flow in the hydraulic system.	Change the direction of oil flow.
	Defective hydraulic system.	Have the repair carried out by a service centre.
Side brush does not rotate.	Throttling valve throttled.	Unscrew the side brush throttle/ return valve.
	Closed brush drive shut-off valve.	Open the side brush valve.
The brush rotates in the wrong direction.	Incorrectly connected hydraulic lines.	Check the connection.
	Incorrectly set flow regulator (if present)	Set the controller as recommended.
Dirt tank does not open or close	Plumbing system not connected or incorrectly connected.	Check the connection.
	Tank control shut-off valve closed.	Open the tank valve.
The sprinkler system is not working.	No water in the tank.	Top up with water.
	Sprinkler system switched off.	Activate sprinkling using the switch on the control panel
	Unconnected or faulty electrical installation.	Check the installation connection. Check the fuse on the power cable and in the control panel.
	Defective water pump	Have the repair carried out by a service centre.
The sprinklers are not spraying properly.	Suspended check valves in sprinklers.	Clean the sprinkler system.

Problem	Possible cause	Solution
The sweeper does not pick up dirt thoroughly	Brush speed too low.	Change the controller settings.
	Driving too fast.	Reduce driving speed.
	Incorrect brush pressure.	Adjust according to the instructions.
	Excessively worn brushes.	Replace.

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