MANITOU

HANDLING YOUR WORLD

52765698EN-USM3 (A-10/2024)
(NORTH AMERICA)

OPERATOR'S MANUAL
(ORIGINAL MANUAL)

ATJ 46 E S1

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EXPLANATION OF SYMBOLS

⚠ DANGER

Indicates an imminent hazardous situation which, if not avoided will result in death or serious injury.

⚠ WARNING

Indicates a potentially hazardous situation which, if not avoided, may result in death or serious injury.

⚠ CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor injury or damage to property. It is also used to warn users of unsafe practices.

NOTICE

Indicates a practice not related to a physical injury which, if not avoided, may damage the machine.

Indicates a message to draw attention to important information regarding environmental protection.

Indicates special tools for performing a task.

Indicates the value of tightening torque to be applied.

Indicates the weight of an item.
e.g. it helps to anticipate an action linked to a person's health or the choice of lifting equipment.

1. SAFETY

1.1. FOREWORD

1.1.1 ABOUT THIS OPERATOR'S MANUAL

This operator's manual forms an integral part of this machine and must be kept in the platform's storage compartment at all times.

Manitou reserves the right to change its models and their equipment without notice. Contact Manitou for up-to-date information.

This operator's manual provides operators with all the information relating to the safety precautions, usage instructions and maintenance procedures to ensure safe and reliable use of this machine.

Carefully read and understand this operator's manual before operating this machine.

This operator's manual has been produced based on the equipment list and technical specifications given at the time of its design.

The level of equipment depends on the options chosen and the country of sale.

According to the options and the date of sale, certain items of equipment/functions described in this operator's manual may not be present on the machine.

Specifications, descriptions and illustrations are non-binding.

1.1.2 INTENDED USE OF THE MACHINE

This machine is a mobile aerial work platform of the type 3b designed to transport and lift personnel and their tools and equipment to a workplace at height.

Manitou has ensured that this machine is suitable for use in the standard operating conditions defined in this operator's manual.

1.1.3 SERVICE BULLETINS

The safety of the machine and personnel is essential for Manitou. The service bulletins are written to communicate important safety information intended for dealers, owners and operators of the machine.

This machine must comply with all the associated service bulletins. Contact Manitou or your dealer for information on the bulletins applicable to your machine.

These service bulletins are sent to machine owners. As a result, it is very important to register your machine and ensure that the information is accurate and up to date.

When transferring ownership of the machine, update the information to guarantee that the service bulletins are sent to the new owner.

1.1.4 CONTACTING THE MANUFACTURER

You should contact Manitou in the following scenarios:

- to report an accident,
- to update information about the current owner,
- for questions about compliance with standards and regulations,
- for questions about machine use and safety,
- for questions about any special application or any modification of the product.

1.2. SAFETY PRECAUTIONS

1.2.1 SAFETY PRECAUTIONS: GENERAL

⚠ DANGER

Risk of incorrect use

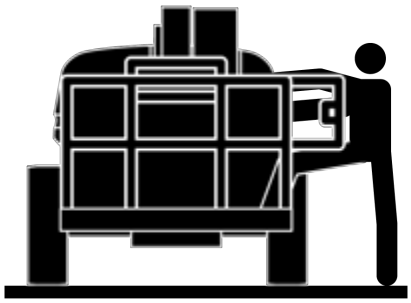
Employers are responsible for ensuring that all operators are familiar with this machine before operating it.
Failure to observe these instructions, the safety precautions

and the hazards listed in this operator's manual may result in damage to this machine, property damage, personal injury or death.
If you have any questions about safety rules and precautions, please contact Manitou.
Use this machine only for the purposes described in this operator's manual.
Do not modify this machine without written approval from Manitou.
Do not use this machine in hazardous weather conditions such as thunderstorms, snow or ice.
Do not use this machine outside its ambient operating temperature range.
Do not use this machine in a potentially flammable environment where explosive gases or particles may be present.
Do not use this machine near sources of strong electro-magnetic fields.
Only authorized and properly trained personnel should be allowed to operate this machine.
Do not operate this machine alone. A qualified ground operator properly trained in the use of this machine and the emergency controls must be present.
Familiarize yourself with the machine's emergency controls as described in this operator's manual.
All covers must be in place and locked, if applicable, when this machine is in use.
Do not use this machine if it is defective or poorly maintained.
Do not modify or replace any components of this machine which could affect its stability.
Do not replace wheels or high-voltage batteries with non-approved components that could cause this machine to overturn.
Do not disable or modify safety devices.
Do not operate this machine under the influence of alcohol, drugs or medication.
Before using this machine:

- read and make sure you have understood the operator's manual, the responsibilities manual and the stickers,
- read, make sure you have understood and follow all the safety instructions in this operator's manual,
- read, understand and comply with all applicable local and government regulations, employer safety instructions and worksite rules,
- perform the walk-around inspection, routine maintenance, workplace inspection and function tests.

1.2.2 FALLING RISKS

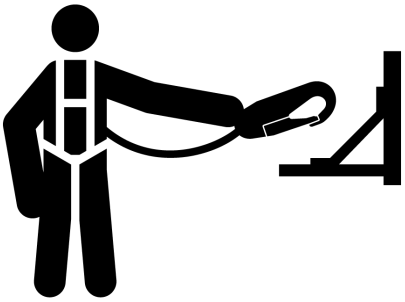
⚠ DANGER



Risk of falling

Do not enter or exit the platform unless it is fully lowered.
Always enter and exit the platform through the gate or using the sliding mid rails.
Always enter and exit the platform facing the inside of the platform.
Always use both hands and one foot or both feet and one hand to enter and exit the platform.
Make sure that the gate is properly closed and that the sliding mid rails are down before using this machine.
Do not attach the sliding mid rails in the high position.

⚠ DANGER



Risk of falling

Always use this machine with personal fall protection equipment consisting of a safety harness fitted with a lanyard.
Operators and occupants must wear a suitable safety harness, in accordance with government regulations, attached to a lanyard anchorage point in the platform.
Personal fall protection equipment must comply with government regulations and be inspected in accordance with current safety rules.

⚠ DANGER

Risk of falling

Keep both feet on the platform floor.
Do not sit or climb on the platform railings.
Do not lean over the railings.
Do not attempt to raise the height of the platform using ladders, stepladders, crates or similar objects.

⚠ DANGER

Risk of falling

Do not climb or walk on the machine's arms.
Do not climb onto the machine's covers.

⚠ CAUTION

Risk of falling

Keep the platform floor and the soles of shoes clean and free of grease, mud and other slippery substances.

1.2.3 ELECTROCUTION RISKS

⚠ DANGER

Risk of electrocution

Bear in mind that this machine is not insulated and does not provide protection in contact with or near electrical current.

⚠ DANGER

Risk of electrocution

Consult a qualified person if power lines or live components may carry more than 50 kV.
Keep a distance of at least 3 meters (10 feet) between power lines or live components and any part of the body, any conductive object or any part of the machine, unless the applicable local and government regulations, the employer's safety rules or the worksite regulations are stricter with regard to the distance required.
Allow for platform movement and swaying or sagging power lines.

⚠ DANGER

Risk of electrocution

Personnel on the ground or in the platform must not touch the machine if it is in contact with live power lines or components until they have been de-energized.
Do not use this machine as a ground for welding.

1.2.4 RUNAWAY RISKS

⚠ DANGER

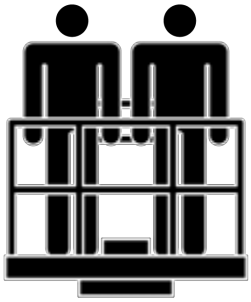
Risk of runaway

Do not drive the machine on slopes exceeding the maximum permitted gradient.

The maximum authorized slope values depend on ground conditions and adequate traction.

1.2.5 OVERTURNING RISKS

⚠ DANGER



Risk of tilting

Do not exceed the platform's maximum load capacity: the total weight of the occupants and their tools and equipment must not exceed the platform's maximum load capacity.
Distribute the load evenly over the platform floor.
Do not exceed the maximum number of occupants in the platform.
Do not use the overload warning as a load indicator. Always be aware of the load in the platform, especially when a load is added with the machine in the working position.

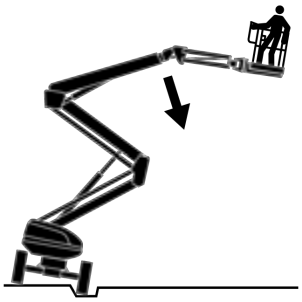
⚠ DANGER

Risk of tilting

Always raise the arms of this machine on a firm, level surface.
Do not use the tilting warning as a level indicator.

This machine is equipped with a system that restricts some of its functions when it is in the working position on a steep slope.

⚠ DANGER



Risk of tilting

Familiarize yourself with the terrain before operating this machine.
Exercise extreme caution around dips, slopes and bumps.
Always adapt the machine's speed to the ground conditions.

Depending on the conditions, only 3 wheels may be in contact with the ground.

⚠ DANGER

Risk of tilting

Do not put this machine in the working position or drive it in the working position on soft or uneven ground, or on or near an inclined surface.
Always check the permissible load capacity before driving this machine over bridges, floors, loading ramps and other potentially dangerous structures.

⚠ DANGER

Risk of tilting

Do not use this machine as a crane or jack.
Do not use this machine to tow or pull materials or other machinery.
Do not attach the platform to a structure.
Do not attach cables, wires or similar objects to the platform.

⚠ DANGER

Risk of tilting

Do not put this machine in the working position or drive it in the working position if the wind speed exceeds 45 km/h (28 mph), 12.5 m/s or in gusty conditions.
Do not use unapproved attachments that may increase the wind resistance of this machine.

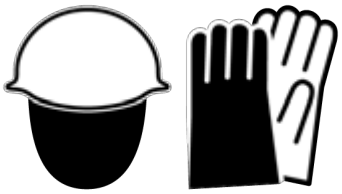
⚠ DANGER

Risk of tilting

Do not push or pull structures, objects or similar elements located outside the platform.
Maximum permissible manual force = 400 N (90 lb).

1.2.6 RISK OF COLLISION AND CRUSHING

⚠ DANGER



Risk of crushing

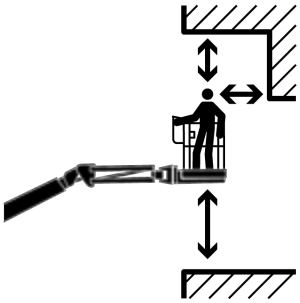
Comply with all the local and government regulations in force, the employer's safety rules and the worksite regulations concerning the use of personal protective equipment such as safety helmets and gloves.

⚠ WARNING

Risk of crushing

Operators and occupants must keep every part of their bodies inside the platform's railings when using this machine.
Hold onto the handrails in the platform at all times when using this machine.

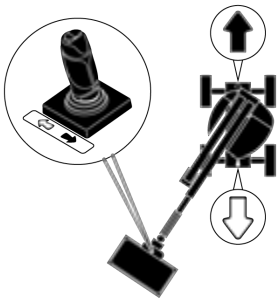
⚠ WARNING



Risk of collision and crushing

Make sure there are no obstructions above, beside or under the platform at all times when this machine is in use.
Avoid any contact between the machine and fixed or moving objects.
Make sure that ground personnel are at least 5 meters (16.5 feet) from this machine.

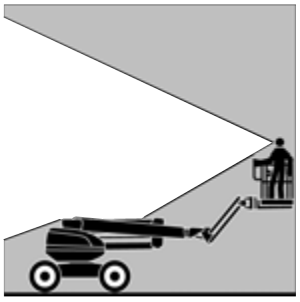
⚠ WARNING



Risk of collision

Always refer to the “White arrow” and “Black arrow” stickers on the machine’s chassis and the white and black arrows on the control panel in the platform before driving and steering the machine.

⚠ WARNING



Risk of collision

Be aware of the limited visibility distance and blind spots when driving or operating this machine.

⚠ WARNING

Risk of collision

The operator must adapt the driving speed to terrain, visibility, traffic, slopes, location of personnel, and any other factors that may cause collision or injury.
Bear in mind that braking distances may differ depending on the terrain.

1.2.7 INSPECTION AND MAINTENANCE-RELATED RISKS

⚠ DANGER

Maintenance-related risk

This machine is equipped with a tilt sensor mounted on a bracket above the ground-level control panel. Always calibrate the tilt sensor after disassembly/reassembly or loosening/tightening of the tilt sensor, any brackets or any fastening screws between the turntable and the tilt sensor. Refer to the machine’s repair manual.

⚠ DANGER

Inspection and maintenance-related risk

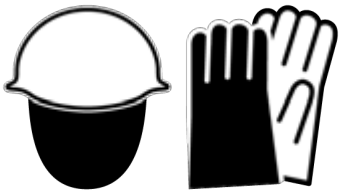
In order to maintain the machine’s connectivity, some electrical components remain live even when the 12 V battery connector is disconnected.

⚠ DANGER

Inspection and maintenance-related risk

Switch the machine off before performing the walk-around inspection and the maintenance operations.
Do not smoke during the walk-around inspection or the maintenance operations.
Do not expose sensitive components, such as electrical components and cylinder wiper seals, to high-pressure cleaning.

⚠ WARNING



Inspection and maintenance-related risk

Always wear a safety helmet, protective clothing and gloves when carrying out the walk-around inspection.
Always use a piece of paper or cardboard to check there are no hydraulic oil leaks.
Even when the machine is de-energized, there may still be hydraulic pressure in the system: do not attempt to repair or tighten hydraulic hoses or fittings until the hydraulic pressure has been released.

⚠ WARNING

Inspection and maintenance-related risk

Only Manitou-approved service technicians should be allowed access to the machine's components protected by covers, except for the walk-around inspection and routine maintenance.
Avoid contact with hot components and fluids.
Do not use this machine as a ground for welding.

1.2.8 BATTERY-RELATED RISKS

⚠ WARNING

Battery-related risk

Make sure that the positive terminals cannot come into contact with the negative terminals or the metallic parts of the machine at any time.
No flames or sparks. Do not smoke near to the batteries during charging or maintenance.
Always disconnect the batteries before carrying out any work on the electrical circuit.
Always disconnect the batteries before doing any welding on the structure.

⚠ CAUTION

Battery-related risk

The batteries contain electrolyte, a highly corrosive liquid: always wear protective clothing, gloves and safety glasses or a face shield during maintenance.
At all times, avoid contact between the electrolyte from the batteries and any part of the body or clothing; rinse any exposed areas with clean water and seek medical advice.

1.3. STICKERS

1.3.1 LOCATION OF STICKERS - ATJ 46 E S1

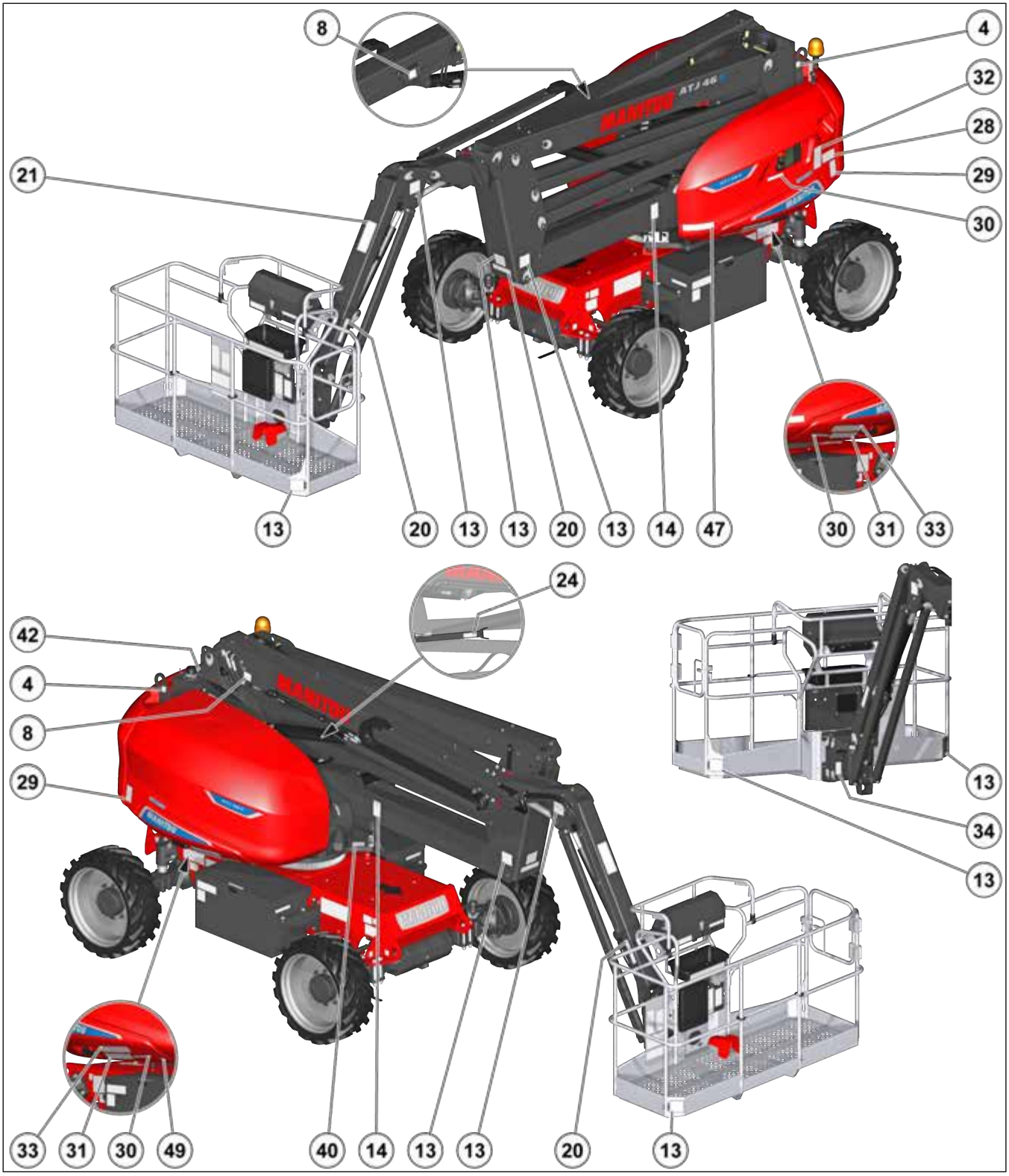


Figure 1: Location of stickers 1 - ATJ 46 E S1

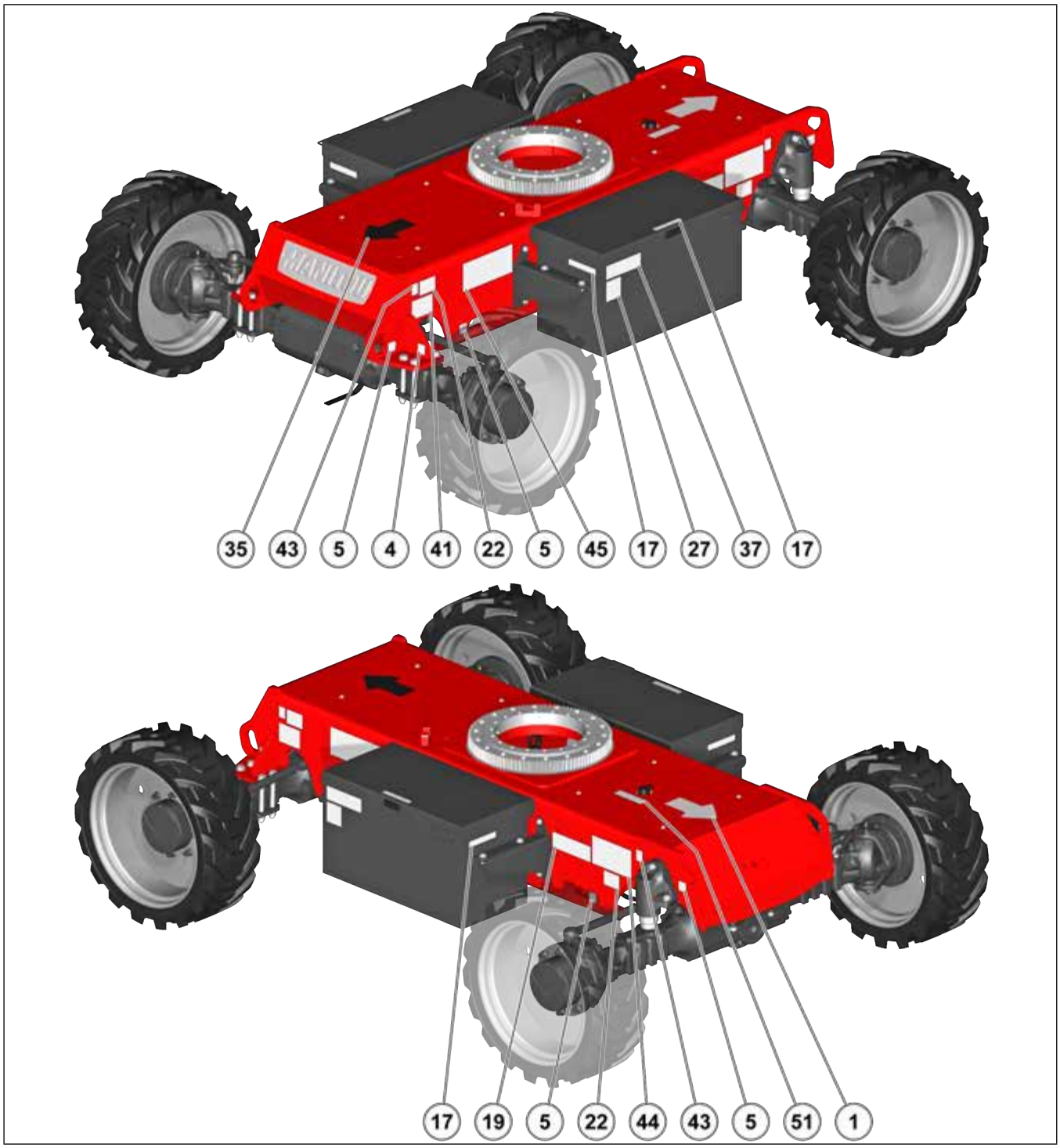


Figure 2: Location of stickers 2 - ATJ 46 E S1

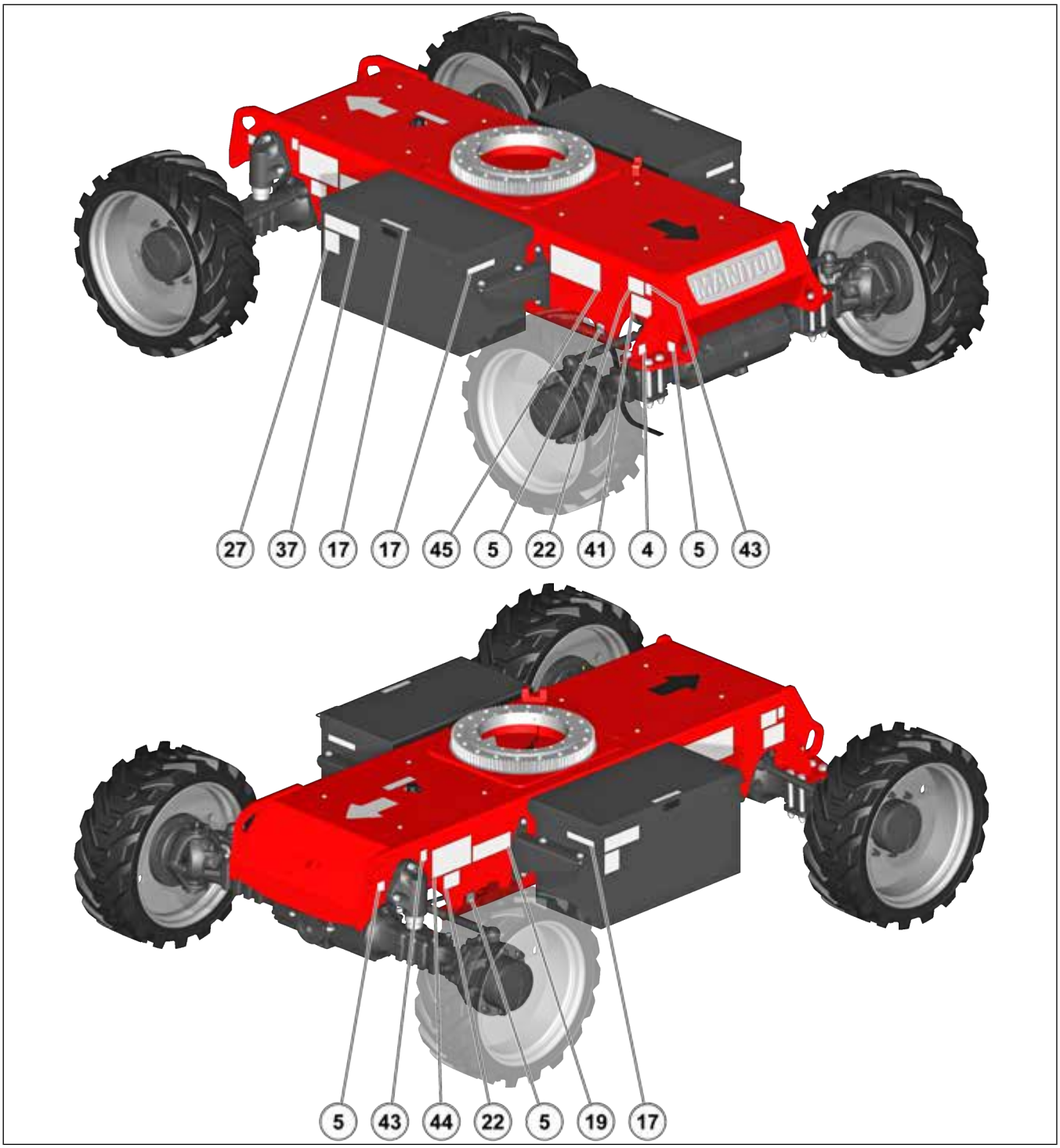


Figure 3: Location of stickers 3 - ATJ 46 E S1

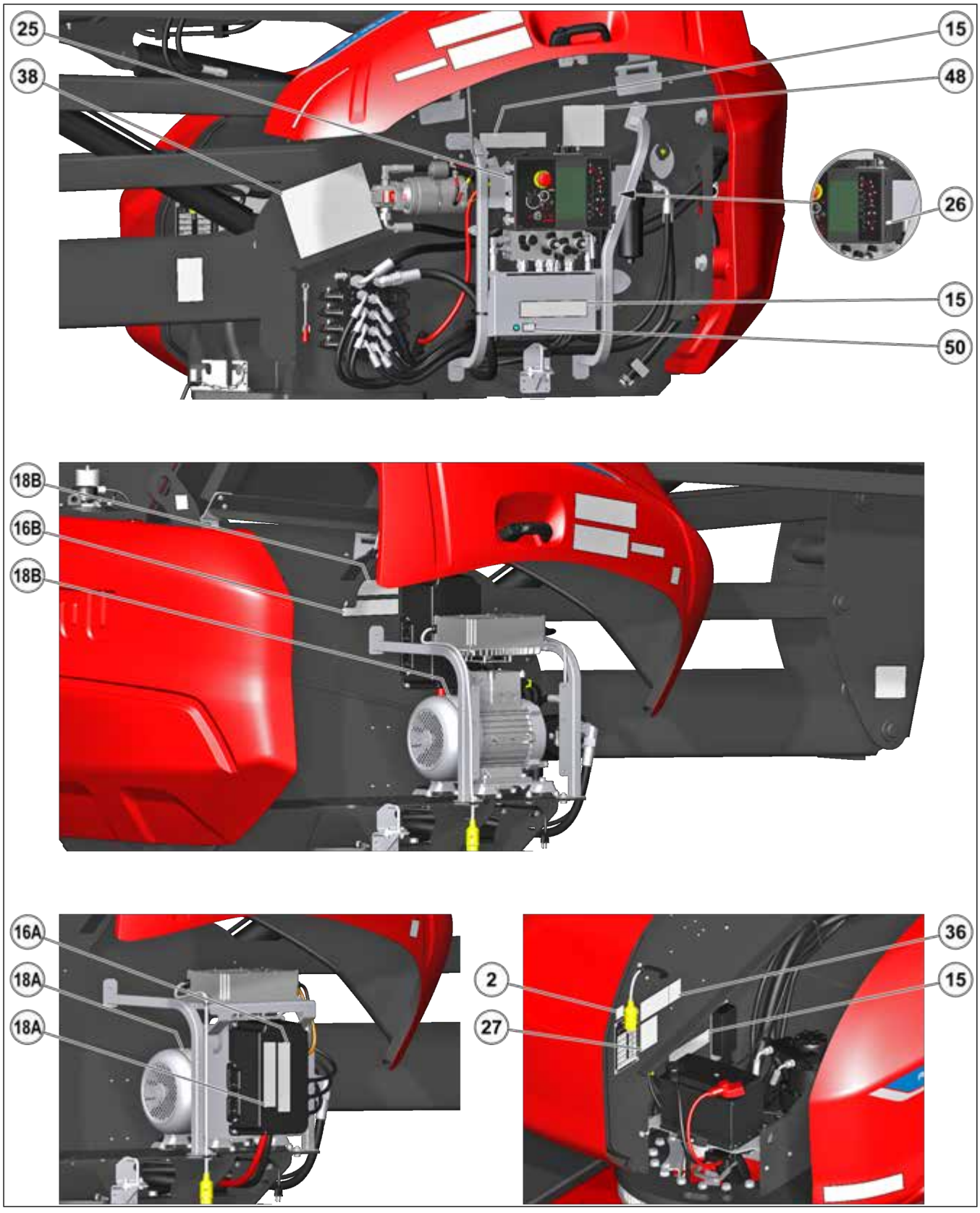


Figure 4: Location of stickers 4 - ATJ 46 E S1

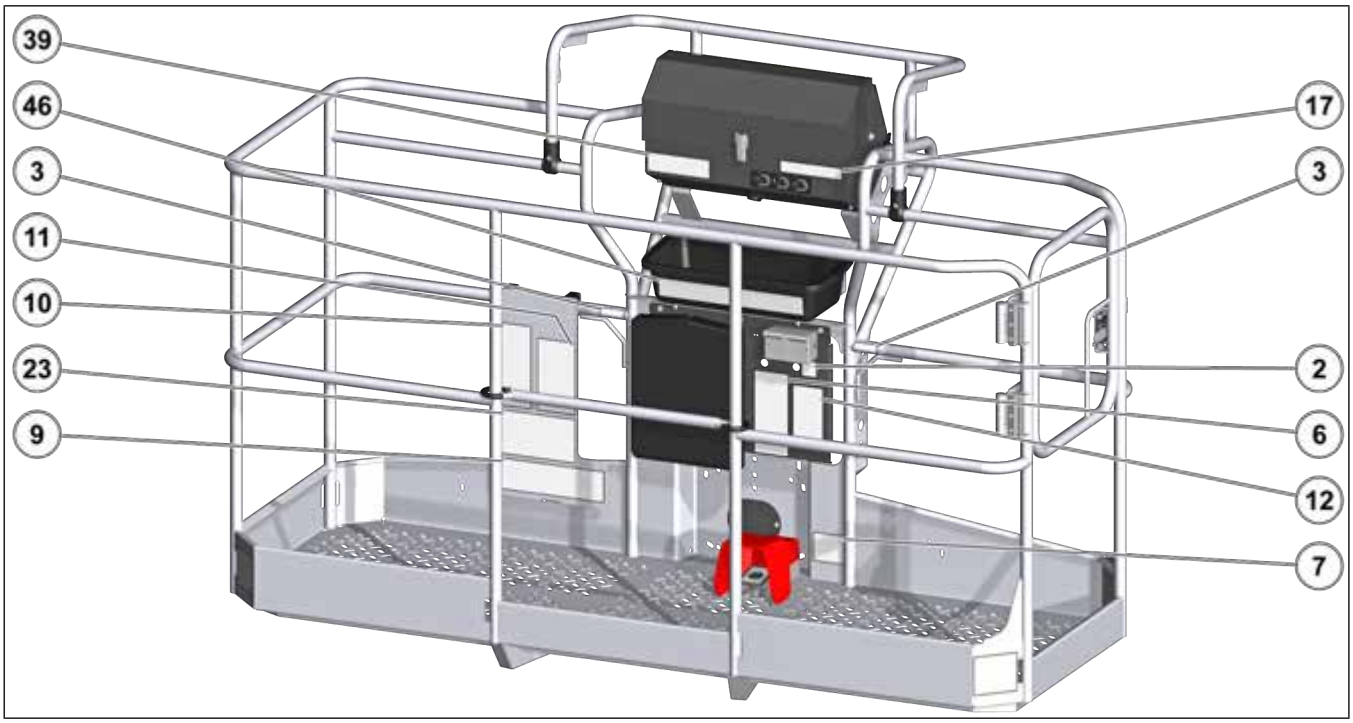


Figure 5: Location of stickers 5 - ATJ 46 E S1

Table 1. Location of stickers - ATJ 46 E S1

Item	Part No.	Designation	Option
1	833553	Sticker - White arrow	
2	52557505	Sticker - 110 V power supply	
3	52558004	Sticker - Lanyard anchorage point	
4	52558006	Sticker - Lifting point	
5	52558007	Sticker - Anchoring point	
6	52568472	Sticker - Warning driving direction risk	
7	52568473	Sticker - Warning foot switch	
8	52568475	Sticker - Warning limit switch sensor	
9	52568483	Sticker - Danger risk of electrocution	
10	52568487	Sticker - Danger risk of overturning	
11	52568488	Sticker - Danger risk of incorrect use	
12	52568491	Sticker - Warning collision risk	
13	52568492	Sticker - Warning collision risk	
14	52568493	Sticker - Warning crush hazard	
15	52568498	Sticker - Danger risk of electrocution	
16A (1)	52568498	Sticker - Danger risk of electrocution	
16B (2)	52568498	Sticker - Danger risk of electrocution	
17	52568501	Sticker - Risk of short-circuit	
18A (1))	52568502	Sticker - Warning risk of burns	
18B (2)	52568502	Sticker - Warning risk of burns	
19	52568508	Sticker - Danger risk of overturning	
20	52572575	Sticker - Warning crush hazard	
21	52579611	Sticker - Danger fall risk	

Item	Part No.	Designation	Option
22	52579615	Sticker - Wheel size and tightening torque	
23	52579616	Sticker - Danger risk of runaway	
24	52582485	Sticker - Safety strut	
25	52582487	Sticker - Backup pump button	
26	52588137	Sticker - CAN ICES-2/NMB-2	
27	52618158	Sticker - California Proposition 65 warning	
28	52621179	Sticker - Danger risk of electrocution	
29	52621180	Sticker - Warning crush hazard	
30	52621183	Sticker - Risk of short-circuit	
31	52621186	Sticker - Warning restricted access	
32	52621188	Sticker - Danger risk of incorrect use	
33	52621200	Sticker - Danger risk of electrocution	
34	52621220	Sticker - Warning load control system	
35	52695142	Sticker - Black arrow	
36	52696336	Sticker - Warning danger of explosion	
37	52696338	Sticker - Warning danger of explosion	
38	52696687	Sticker - Emergency controls instructions	
39	52712417	Sticker - Emergency controls instructions	
40	52757263	Sticker - 12 V battery connector	
41	52759205	Sticker - Warning collision risk	
42	52759543	Sticker - Hydraulic oil	
43	52767025	Sticker - Wheel load	
44	52767774	Sticker - Lashing	
45	52767799	Sticker - Danger risk of collision / Lifting	
46	52768291	Sticker - Danger risk of overturning	
47	52768294	Sticker - Warning collision risk	
48	52828145	Sticker - Fault codes	
49	52568503	Sticker - Hydraulic oil heater	●
50	52687873	Sticker - Electric central filling	●
51	52814527	Sticker - Distilled water only	●

(1) Up to the machine: MAN00000J01101633.

(2) From the machine: MAN00000J01101634.

The illustrations show a standard platform with a gate.

2. FAMILIARIZATION

2.1. MACHINE IDENTIFICATION

2.1.1 MANUFACTURER'S PLATE

Figure 6: Manufacturer's plate

The manufacturer’s plate is riveted to the inside of the turntable on the left-hand side.

The following information is engraved on it:

MODEL DESIGNATION	
Year of manufacture Année de fabrication	
MEWP classification Classification PEMP	
Unladen mass Masse à vide	
Power Puissance	
Voltage Tension	
Maximum work platform height Hauteur maxi plateforme de travail	
Rated load Charge nominale	
Max. nb of persons Nb de personnes maxi	
Mass of equipment Masse de l'équipement	
Manual forces Forces manuelles	
Maximum chassis inclination Inclinaison maxi	

Maximum wind speed Vitesse maxi du vent	
Serial no. N° de série	

2.2. MACHINE DESCRIPTION

2.2.1 MAIN SPECIFICATIONS - ATJ 46 E S1

The technical designation of this machine is: ATJ 46 E S1.

Its commercial name is: ATJ 46 E.

Its main specifications are:

- built-in batteries,
- built-in battery charger,
- electric wheel motor,
- electric pump,
- 4 wheel drive,
- 4 wheel steer,
- oscillating front axle,
- negative brakes on rear wheels,
- turntable rotation limited to 350°,
- maximum platform floor height of 14.0 meters (46 feet),
- maximum platform reach of 7.6 meters (25 feet),
- maximum platform load capacity of 250 kg (550 lb).

This machine is equipped with specific controls allowing the following functions to be operated from the ground and/or from the platform:

- drive and steer,
- brake,
- turn the platform,
- raise and lower the jib arm,
- tilt the platform/jib arm up and down,
- extend and retract the telescopic arm,
- raise and lower the main arm,
- raise and lower the secondary arm,
- turn the turntable.

This machine is equipped with specific safety devices that could restrict its operation in certain circumstances, for instance:

- 1 main/secondary arm lowering limit switch sensor,
- 1 telescopic arm retraction limit switch sensor,
- 2 platform overload sensors,
- 1 tilt sensor in the turntable,
- 1 pressure sensor on each oscillation cylinder,
- 1 negative brake hydraulic circuit pressure sensor.

2.2.2 TRANSPORT POSITION AND WORKING POSITION

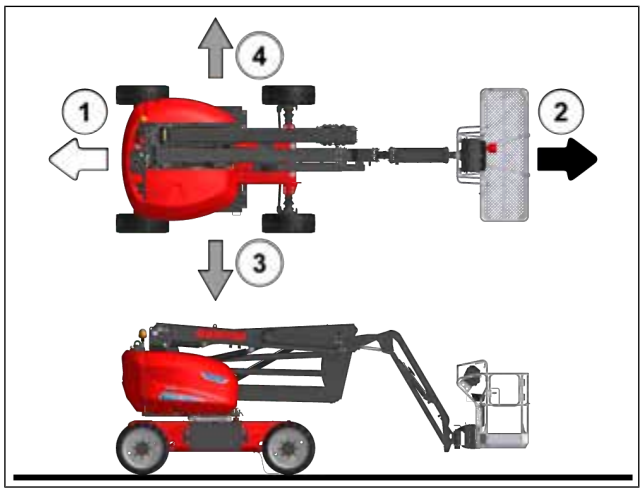


Figure 7: Machine in transport position, turntable and platform in neutral position

Item	Description
1	Forward
2	Reverse
3	Left
4	Right

Transport position

The machine is in the transport position when all the following conditions are met:

- the main arm is completely lowered,
- the secondary arm is completely lowered,
- the telescopic arm is completely retracted.

The jib arm may or may not be raised, the turntable and the platform may or may not be turned.

The turntable and the platform are in neutral position when the main/secondary arm and the platform are parallel to the machine's chassis with the platform between the 2 rear wheels.

Front, rear, left and right are defined as follows:

- the machine is in the transport position,
- the turntable and the platform are in the neutral position,
- the operator is in the platform facing the direction of the front wheels.

Working position

The machine is in working position when one or more of the following conditions are met:

- the main arm is not completely lowered,
- the secondary arm is not completely lowered,
- the telescopic arm is not completely retracted.

The jib arm may or may not be raised, the turntable and the platform may or may not be turned.

2.2.3 SIMULTANEOUS FUNCTIONS

The audible warning sounds twice when the machine's functions cannot be activated simultaneously.

Ground controls

2 machine functions can be activated simultaneously.

Controls in the platform

4 machine functions can be activated simultaneously.

2.2.4 STEERING MODES

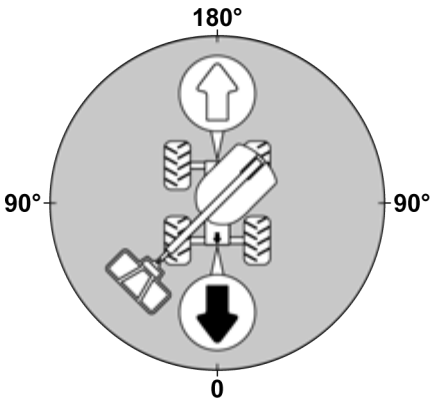
Steering mode	Description
4 steering wheels 	The front and rear wheels steer in opposite directions. *This steering mode offers a smaller turning radius than the 2 wheel steer mode.*
2 steering wheels 	The front wheels are steering wheels.
Crab 	The front and rear wheels steer in the same direction. *This steering mode allows the machine to move sideways.*

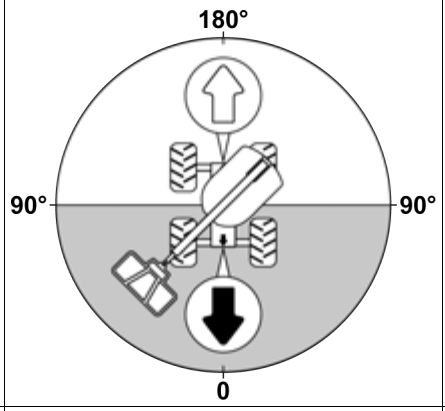
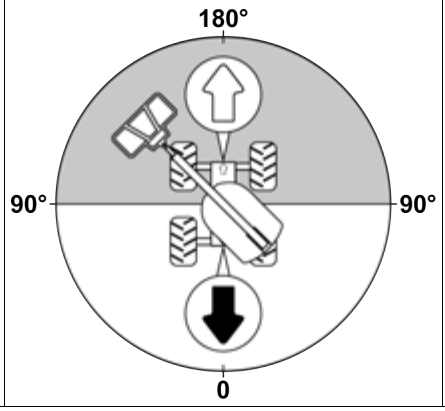
2.2.5 TRAVEL SPEEDS

Machine in the transport position

The tortoise and hare speeds can only be activated if the machine is in the transport position.

Depending on conditions, restrictions may apply:

Driving speed selected	Turntable angle in relation to the neutral position (0)	Direction of travel	Steering mode selected	Driving speed activated
Low speed	Regardless of the angle 	Regardless of the driving direction	Regardless of the steering mode	Low speed
High speed	Less than 90° (to the left or to the right)	Indicated by the "White arrow" sticker on the machine chassis	2-wheel steering or crab steering	Hare (1) Reduced (2)
			4 steering wheels	Low speed

Driving speed selected	*Turntable angle in relation to the neutral position (0)*	*Direction of travel*	*Steering mode selected*	*Driving speed activated*
		Indicated by the “Black arrow” sticker on the machine chassis	2-wheel steering or crab steering	Hare (1)(3) Reduced (2)(3) Reduced (4)
			4 steering wheels	Low speed
High speed	Greater than or equal to 90° and less than 180° (to the left or to the right) 	Regardless of the driving direction	2-wheel steering or crab steering	Reduced
			4 steering wheels	Low speed

(1) Differential unlocked.

(2) Differential locked.

(3) Reverse speed reduction in hare speed deactivated.

(4) Reverse speed reduction in hare speed activated.

Machine in the working position

The working speed is automatically activated when the machine is in working position.

2.3. MACHINE COMPONENTS

2.3.1 LOCATION OF THE MACHINE COMPONENTS - ATJ 46 E S1

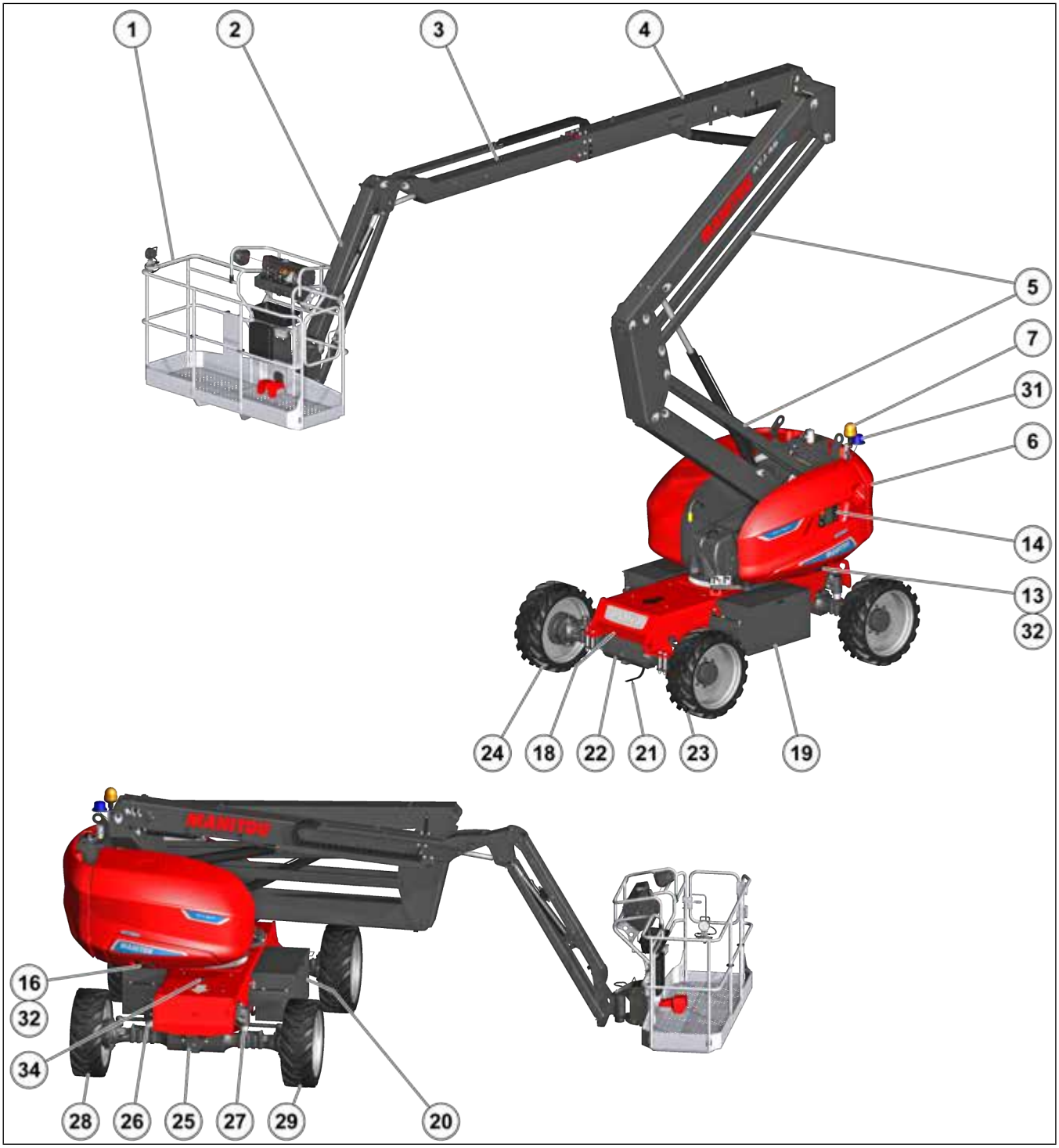


Figure 8: Location of the machine components 1 - ATJ 46 E S1

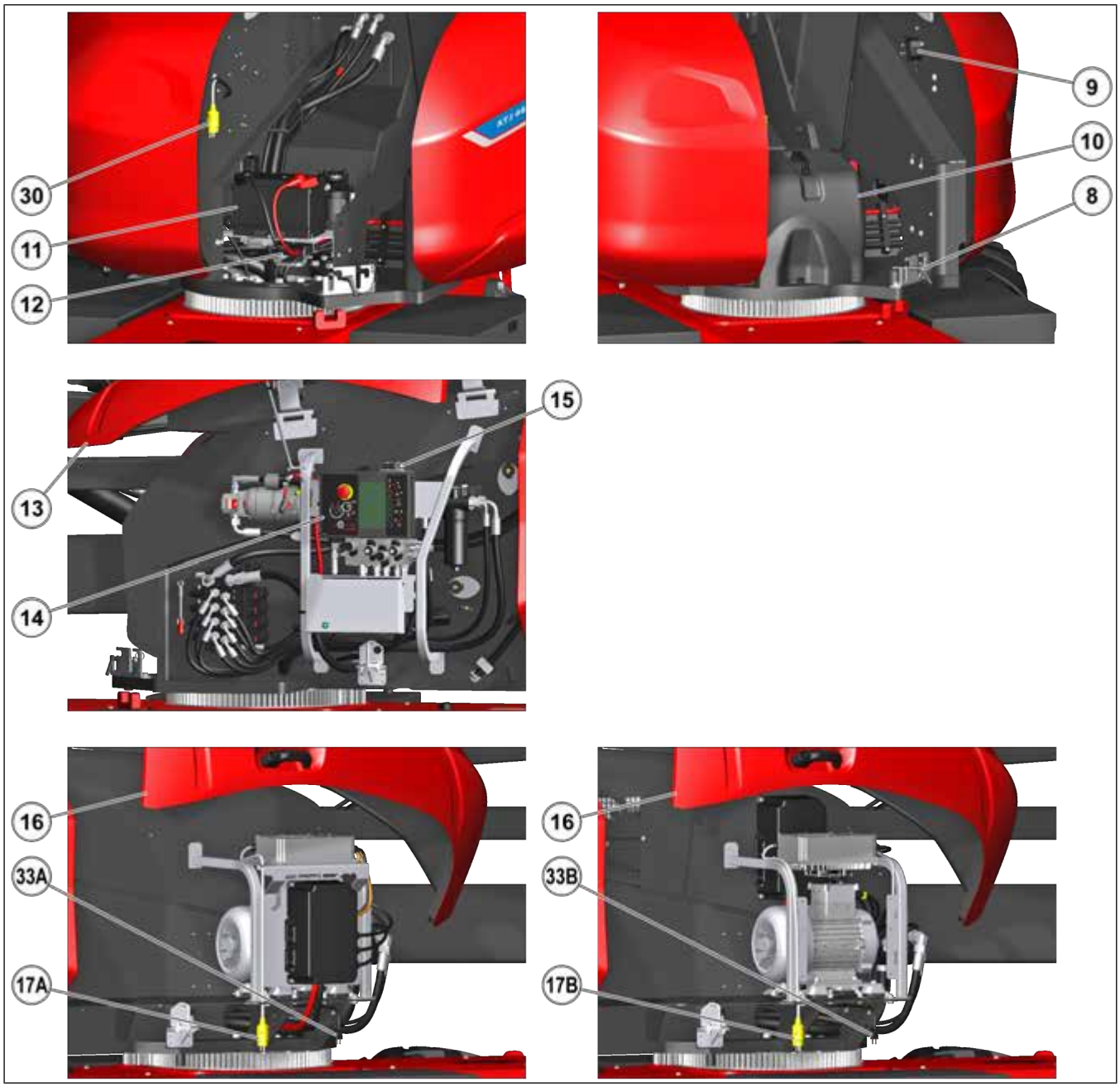


Figure 9: Location of the machine components 2 - ATJ 46 E S1

Table 2. Location of the machine components 1 and 2 - ATJ 46 E S1

Item	Designation	Option
1	Platform	
2	Jib arm	
3	Telescopic arm	
4	Main arm	
5	Secondary arm	
6	Turntable	
7	Orange rotating beacon light	
8	Turntable locking pin	
9	Horn	
10	12 V battery cover	

Item	Designation	Option
11	12 V battery (under the 12 V battery cover)	
12	12 V battery connector (under the 12 V battery cover)	
13	Right-hand turntable cover	
14	Ground controls - Ground-level control panel	
15	Tilt sensor	
16	Left-hand turntable cover	
17A (1)	Battery charger electric plug	
17B (2)	Battery charger electric plug	
18	Chassis	
19	Right high-voltage battery	
20	Left high-voltage battery	
21	Antistatic strip	
22	Rear axle	
23	Right rear wheel	
24	Left rear wheel	
25	Oscillating front axle	
26	Right oscillation cylinder	
27	Left oscillation cylinder	
28	Right front wheel	
29	Left front wheel	
30	Electrical plug - 110 V electric power socket in the platform	
31	SPS flashing light (3) - Secondary protection system SPS	●
32	Key locks for turntable covers	●
33A (1)	Electrical plug - Oil heater	●
33B (2)	Electrical plug - Oil heater	●
34	Distilled water tank - Centralized electric filling of high-voltage batteries	●

(1) Up to the machine: MAN00000J01101633.

(2) From the machine: MAN00000J01101634.

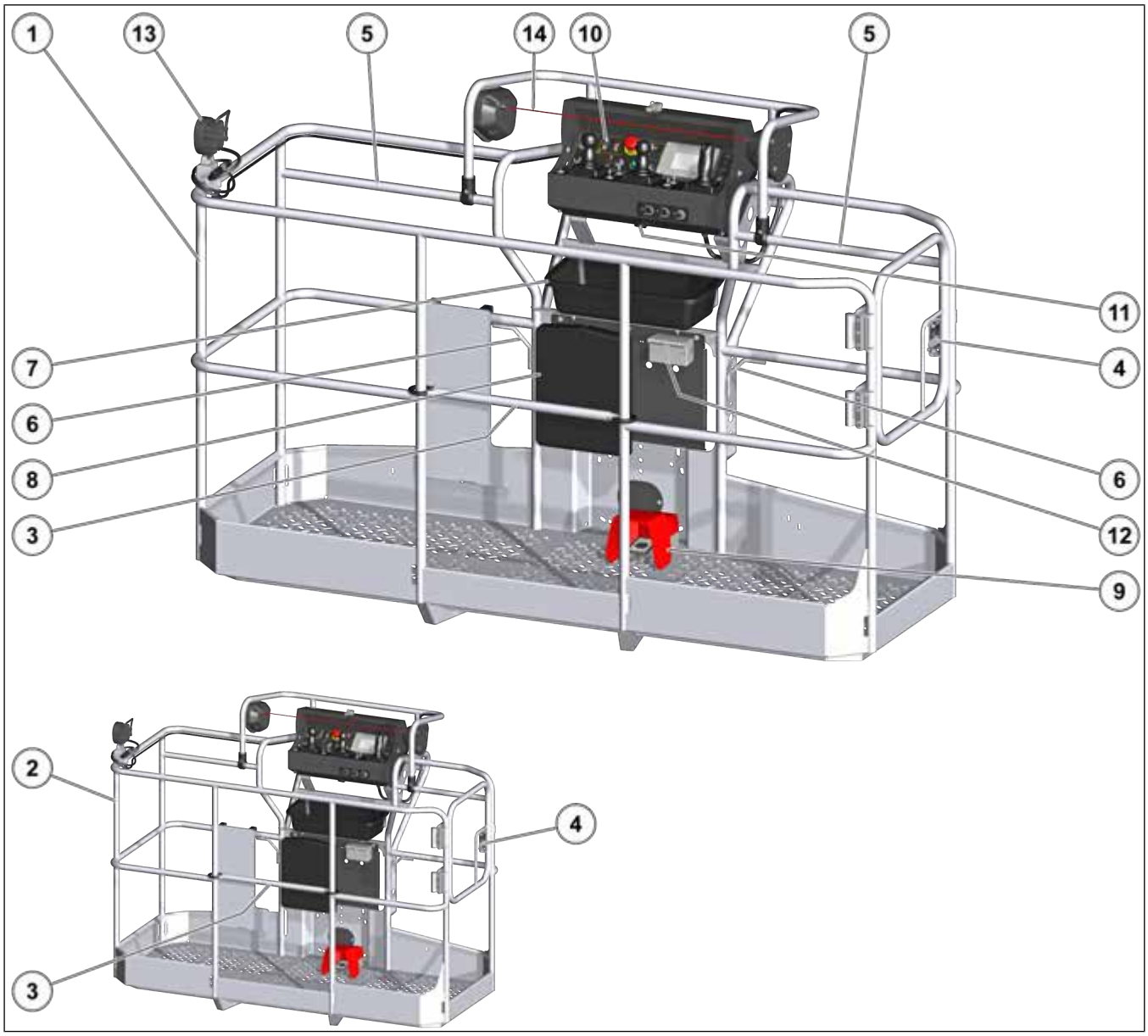


Figure 10: Location of the machine components 3 - ATJ 46 E S1

Table 3. Location of the machine components 3 - ATJ 46 E S1

Item	Designation	Option
1	Standard platform with gate	
2	Narrow platform with gate	●
3	Sliding mid rail	
4	Gate	
5	Handrail	
6	Lanyard anchorage point	
7	Tool box	
8	Storage box	
9	Platform controls - Foot switch	
10	Platform controls - Platform control panel	
11	Audible alarm	
12	Electric power socket - 110 V electric power socket in the platform	

Item	Designation	Option
13	Worklight	•
14	SPS Safety cable - Secondary protection system SPS	•

2.3.2 ORANGE ROTATING BEACON LIGHT

Permanent orange rotating beacon light deactivated: the orange rotating beacon light comes on when the machine's functions are activated.

Permanent orange rotating beacon light activated: the orange rotating beacon light comes on when the machine is powered up.

2.3.3 HORN

All movements alarm option and driving/steering alarm option deactivated: the horn sounds when the horn button is pressed.

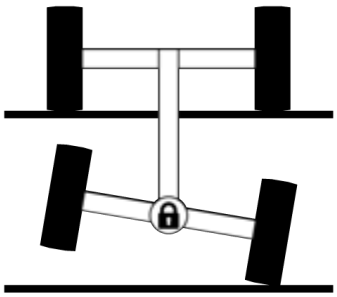
All movements alarm option activated: the horn sounds intermittently when the machine functions are activated and when driving/steering the machine.

Driving/steering alarm option activated: the horn sounds intermittently when driving/steering the machine.

The horn can also sound in the event of an alert or fault.

2.3.4 OSCILLATING FRONT AXLE

⚠ DANGER



Risk of tilting

Only 3 wheels may be in contact with the ground when driving the machine in working position.
Do not drive the machine in working position on soft or uneven ground.

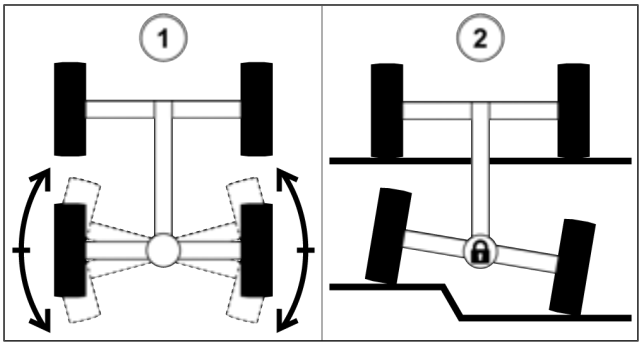


Figure 11: Front axle oscillation unlocked and locked

Item	Description
1	Machine in transport position: front axle oscillation is unlocked.
2	Machine in working position: front axle oscillation is locked.

2.3.5 HANDRAILS

⚠ DANGER

Risk of crushing

When using the machine:

- do not hold onto the platform guardrails,
- hold onto the handrails at all times.

2.3.6 STORAGE BOX

The storage box is weather-resistant.

It must contain the operator's manual and the manual of responsibilities.

2.4. MACHINE CONTROLS

2.4.1 GROUND CONTROLS

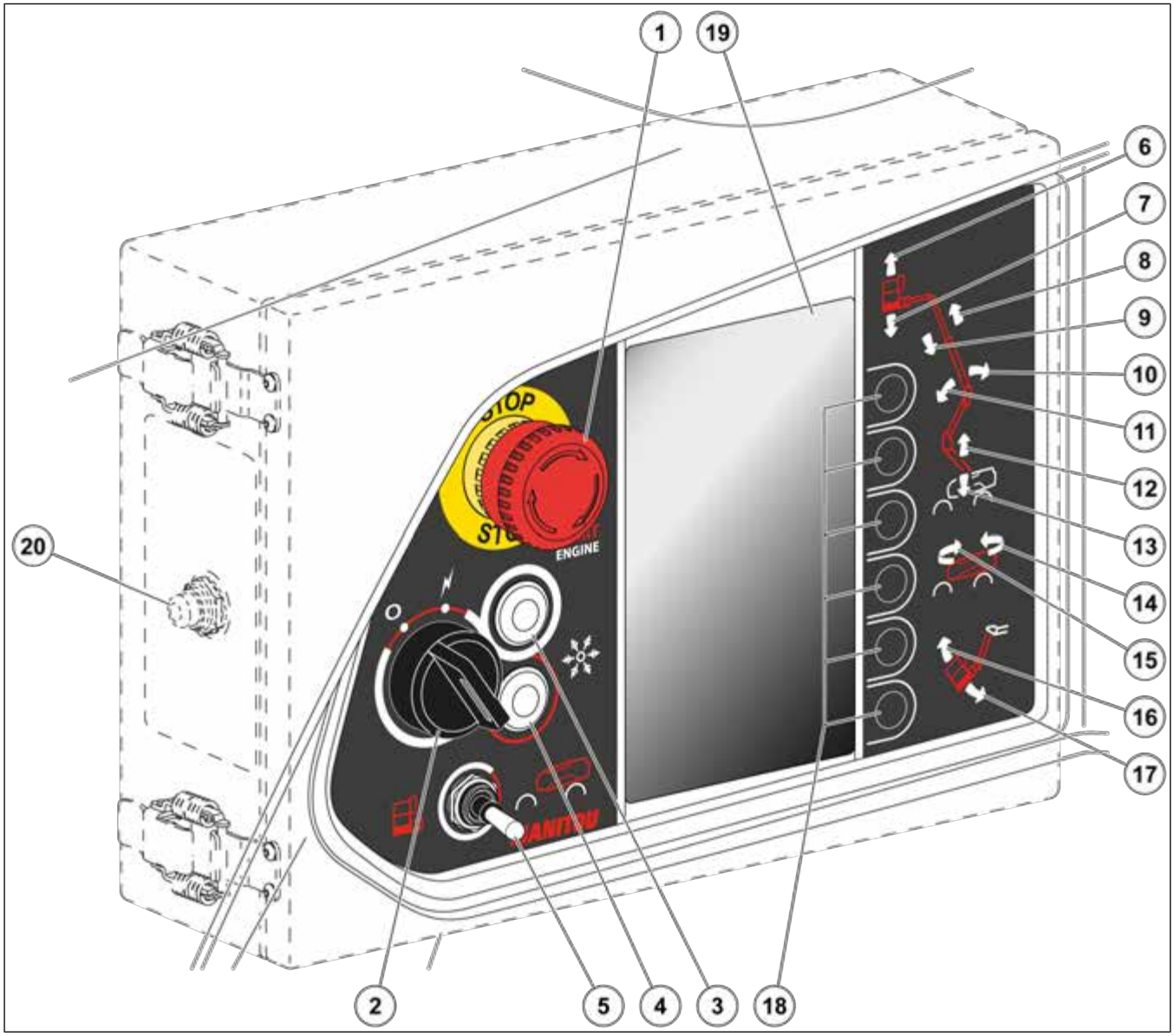


Figure 12: Ground level control panel

Table 4. Ground controls

Item	Designation		Description
1	Emergency button	STOP	Push the emergency stop button in and lock it in the OFF position. Pull the emergency stop button or turn it clockwise to release it into the ON position. ***In all cases this control takes priority, even if the machine functions are activated from the platform control panel.***
2	Key switch		Turn the switch to the OFF position to switch the control system off. ***The key can be removed.***

Item	Designation		Description
2	Key switch		Turn the switch to the ON position to switch the control system on. ***The key cannot be removed.***
3	-		Not used.
4	-		Not used.
5	Activation switch		Released: the machine functions from the platform are activated.
5	Activation switch		Push and hold the switch to the right to activate the machine functions from the ground. ***This operating mode is known as the "dead man" function.***
6	Jib arm lift control button		Press and hold the key to raise the jib arm.
7	Jib arm lowering control button		Press and hold the key to lower the jib arm.
8	Telescopic arm extension control button		Press and hold the key to extend the telescopic arm.
9	Telescopic arm retraction control button		Press and hold the key to retract the telescopic arm.
10	Main arm lift control button		Press and hold the key to raise the main arm.
11	Main arm lowering control button		Press and hold the key to lower the main arm.
12	Secondary arm lift control button		Press and hold the key to raise the secondary arm.
13	Secondary arm lowering control button		Press and hold the key to lower the secondary arm.
14	Turntable right rotation control button		Press and hold the key to turn the turntable to the right.
15	Turntable left rotation control button		Press and hold the key to turn the turntable to the left.
16	Platform/jib arm tilt up control button		Press and hold the key to tilt the platform/jib arm up.
17	Platform/jib arm tilt down control button		Press and hold the key to tilt the platform/jib arm down.
18	Left platform rotation control button		Press and hold the corresponding button to turn the platform to the left. ***The pictogram appears on the ground-level display screen.***
18	Right platform rotation control button		Press and hold the corresponding button to turn the platform to the right. ***The pictogram appears on the ground-level display screen.***
18	Ground display screen control keys		Please refer to "Familiarization: Ground-level display screen: Ground-level display screen control keys".
19	Ground level display screen		Please refer to "Familiarization: Ground-level display screen".
20	Backup pump button		Press and hold down the button to activate the backup pump.

2.4.2 CONTROLS IN THE PLATFORM

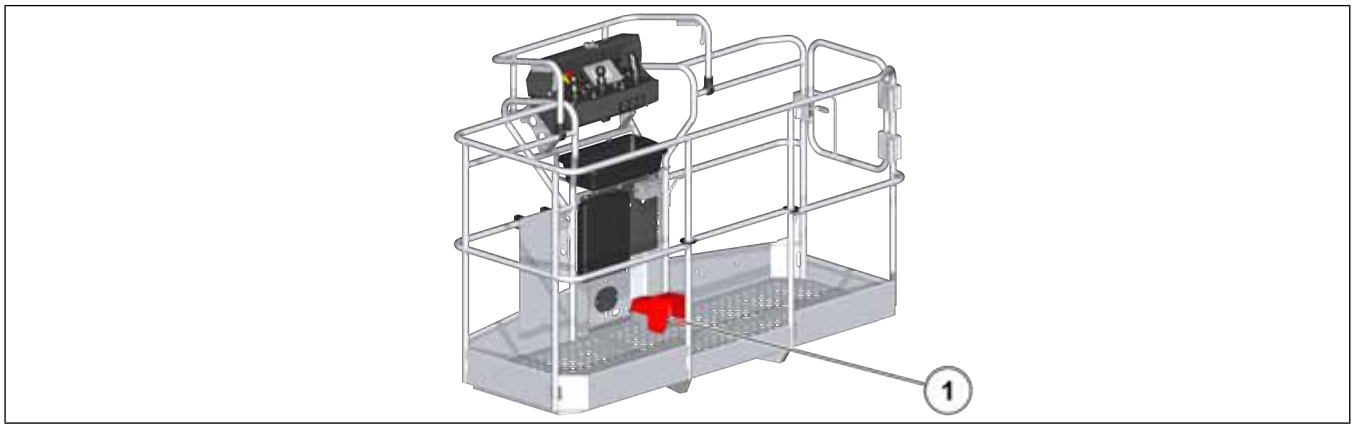


Figure 13: Foot switch

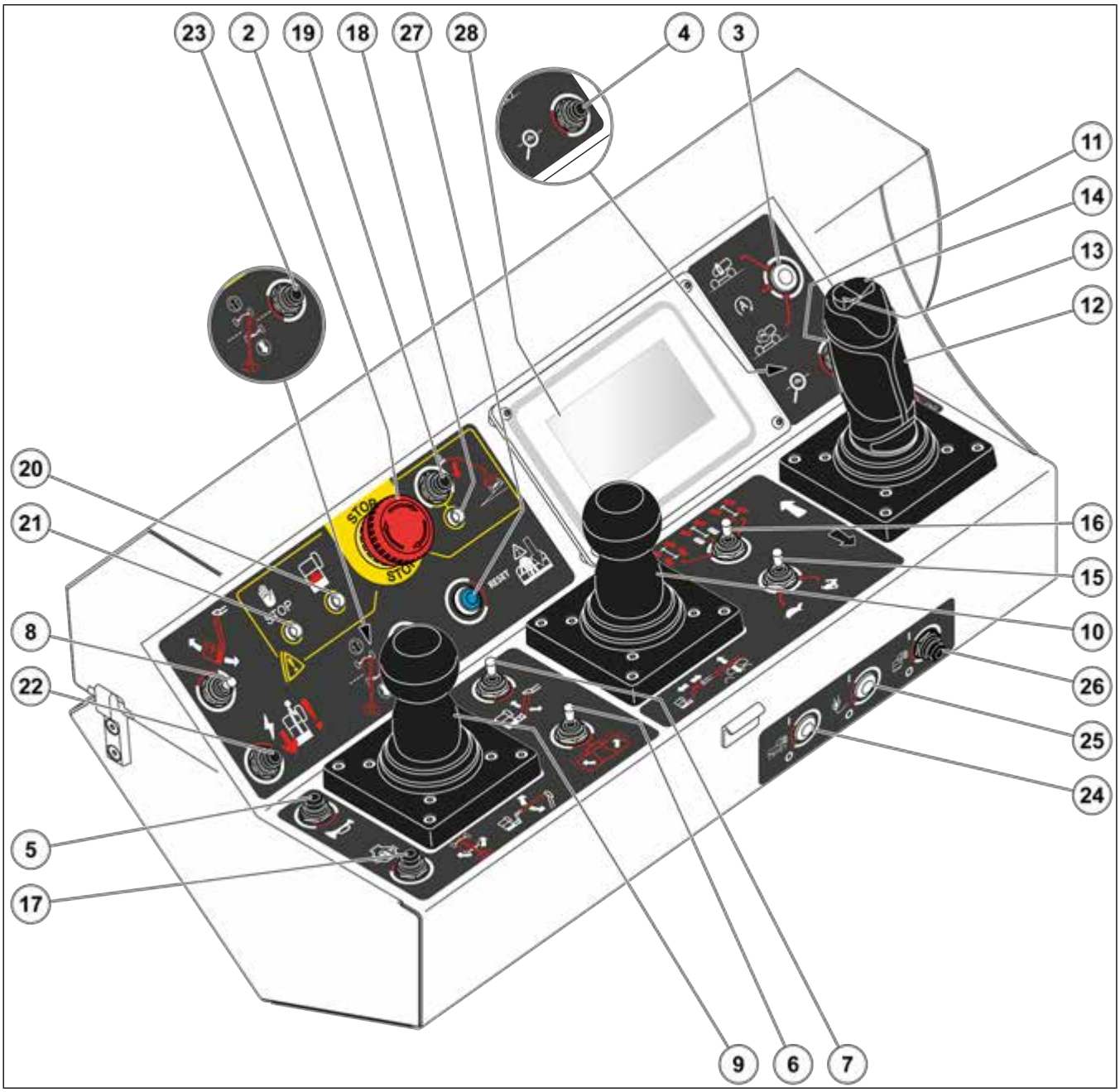


Figure 14: Platform control panel

Table 5. Controls in the platform

Item	Designation		Description
1	Foot switch		Press and hold down the switch to activate the machine functions. ***This operating mode is known as the "dead man" function.***
2	Emergency button	STOP	Push the emergency stop button in and lock it in the OFF position. Pull the emergency stop button or turn it clockwise to release it into the ON position. ***In all cases, this control takes priority, except when the machine functions are activated from the ground level control panel.***

Item	Designation		Description
3	-		Not used.
3	-		Not used.
3	-		Not used.
4	Diagnostics button		Used only for diagnostics performed by Manitou-accredited service technicians.
5	Horn button		Press and release the button to sound the horn.
6	Platform rotation switch		Push and hold the switch to the left to turn the platform to the left. Push and hold the switch to the right to turn the platform to the right.
7	Jib arm switch		Push and hold the switch forward to raise the jib arm. Pull and hold the switch backward to lower the jib arm.
8	Platform/jib arm tilt switch		Push and hold the switch up to tilt the platform/jib arm upward. Push and hold the switch down to tilt the platform/jib arm downward.
9	Main arm/turntable rotation control handle		Push and hold the control handle forward to raise the main arm. Pull and hold the control handle backward to lower the main arm.
9	Main arm/turntable rotation control handle		Push and hold the control handle to the left to turn the turntable to the left (1). Push and hold the control handle to the right to turn the turntable to the right (1).
10	Secondary arm/telescopic arm control handle		Push and hold the control handle forward to raise the secondary arm. Pull and hold the control handle backward to lower the secondary arm.
10	Secondary arm/telescopic arm control handle		Push and hold the control handle to the left to extend the telescopic arm. Push and hold the control handle to the right to retract the telescopic arm.
11	Activation trigger		Press and hold the trigger to activate the machine's driving/steering functions.
12	Driving/steering control handle		Push and hold the control handle forward to drive the machine forward (1). ***When the turntable and/or platform are not in neutral position: push and hold the control handle forward to drive the machine in the direction indicated by the "White arrow" sticker on the machine chassis.*** Released: braking is activated.
12	Driving/steering control handle		Pull and hold the control handle backward to reverse the machine (1).

Item	Designation		Description
			When the turntable and/or platform are not in neutral position: pull and hold the control handle backward to drive the machine in the direction indicated by the "Black arrow" sticker on the machine chassis. Released: braking is activated.
13	Steering button to the left		Press and hold the button to steer the machine to the left (1).
14	Steering button to the right		Press and hold the button to steer the machine to the right (1).
15	Driving speed switch		Set the switch to the tortoise position to select tortoise speed.
15	Driving speed switch		Set the switch to the hare position to select hare speed.
16	Steering mode switch		Set the switch to the 4 wheel steer position to select 4 wheel steer mode.
16	Steering mode switch		Set the switch to the 2 wheel steer position to select 2 wheel steer mode.
16	Steering mode switch		Set the switch to the crab position to select crab mode.
17	Differential lock button		Press and hold down the button to lock the differential.
18	Tilting indicator lamp		Flashing: indicates a tilting warning.
19	Unlock button		Press and hold the button to unlock the functions, except the forward and reverse functions, in the event of a tilt alert with the machine in the working position.
20	Overload indicator light		Flashing: indicates an overload warning.
21	Fault indicator light		Flashing: indicates a fault.
22	Backup pump button		Press and hold down the button to activate the backup pump.
23	Turntable slewing button		Press and release the button to unlock the driving/ steering functions in the event of a turntable slewing alert.

Item	Designation		Description
24	-		Not used.
25	-		Not used.
26	Button - Worklight (2)		Press and release the button to turn the worklight on or off.
27	Reset button - Secondary protection system SPS (2)		Press and release the button to unlock the functions in the event of a secondary protection system SPS alert.
28	Display screen in the platform		Please refer to “Familiarization: Display screen in the platform”.

(1) Front, rear, left and right are defined in “Familiarization: Machine description: Transport position and working position”.

(2) Option.

2.5. GROUND LEVEL DISPLAY SCREEN

2.5.1 GROUND POWER-UP CYCLE

The battery charger is turned off.

The following pages are displayed in turn when the machine is turned on:

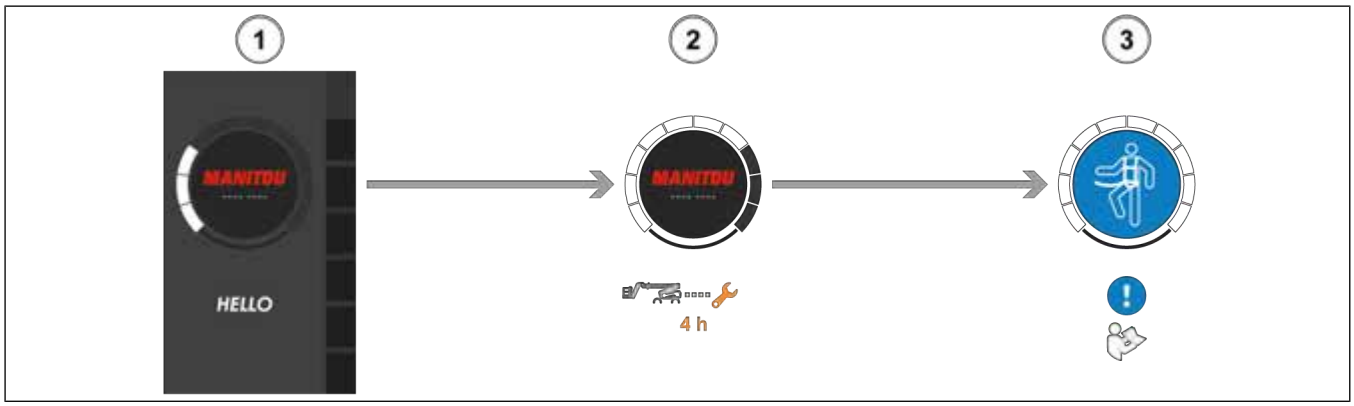


Figure 15: Ground power-up cycle

Table 6. Ground power-up cycle

Item	Designation	Description
1	Initial page	Welcome message.
2	Loading page	Time remaining before next maintenance.
3	Verification page	Use of personal fall protection equipment: see the operator’s manual. Alert and fault search: • no alert and no fault: the audible alarm sounds once and the work page on the ground is displayed, • one or more alerts and/or one or more faults: a ground-level alert page and/or a ground-level fault page is displayed.

2.5.2 GROUND-LEVEL DISPLAY ZONES

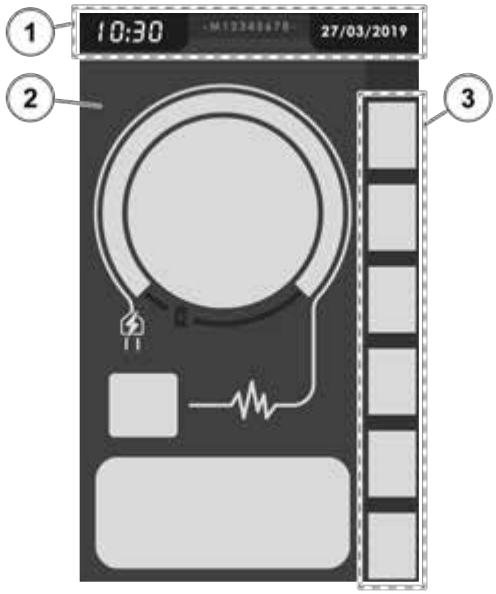


Figure 16: Ground-level display zones

Table 7. Ground-level display zones

Item	Designation	Description
1	Display zone no. 1	Displayed, from left to right: • current time, • machine serial number, • current date.
2	Display zone no. 2	Displayed, as appropriate: • ground-level work page, • battery charger page, • ground-level alert pages and ground-level fault pages.
3	Ground-level display screen control pictograms	Please refer to “Familiarization: Ground-level display screen: Ground-level display screen control keys”.

2.5.3 GROUND-LEVEL WORK PAGE

The following information is displayed when:

- the battery charger is turned off,
- no alerts, except for high-voltage battery charge level alert,
- there are no faults.

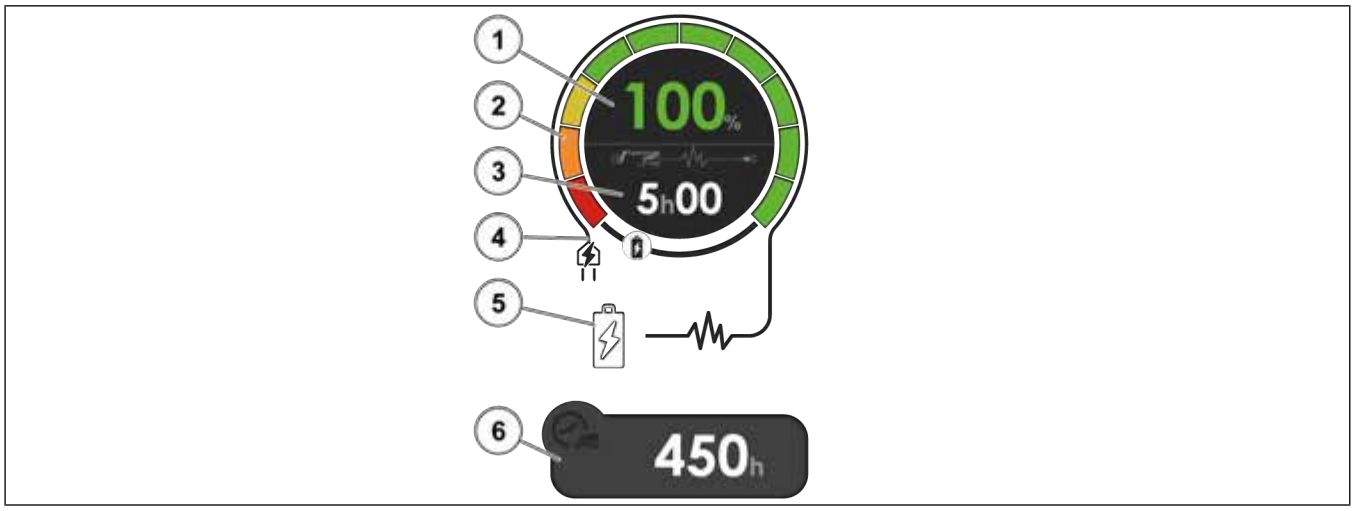


Figure 17: Ground-level work page

Table 8. Ground-level work page

Item	Designation	Description
1	High voltage battery charge level	Percentage value displayed: • in red between 0% and 10% (1), • in orange between 11% and 20% (2), • in yellow between 21% and 30% (2), • in green between 31% and 100%.
2	High voltage battery charge level	Segments displayed: • 1 flashing red segment between 0% and 10% (1), • 1 orange segment between 11% and 20% (2), • 1 yellow segment between 21% and 30% (2), • 7 green segments between 31% and 100%.
3	Estimated life of high-voltage batteries	Value displayed in hours and minutes.
4	High voltage battery charge level	Pictogram: • flashing red between 0% and 10% (1), • flashing orange between 11% and 20% (2), • displayed in yellow between 21% and 30% (2), • displayed in black between 31% and 100%.
5	Machine status pictogram	Displayed in white: machine switched on.
6	Total time machine in operation	Value displayed in hours.

(1) High-voltage battery charge level warning.

(2) We recommend that you charge the high-voltage batteries. Refer to “Operating the machine: Charging the high-voltage batteries and the 12 V battery”.

2.5.4 BATTERY CHARGER PAGE

The following information is displayed when:

- the battery charger is turned on,
- there are no warnings,
- there are no faults.

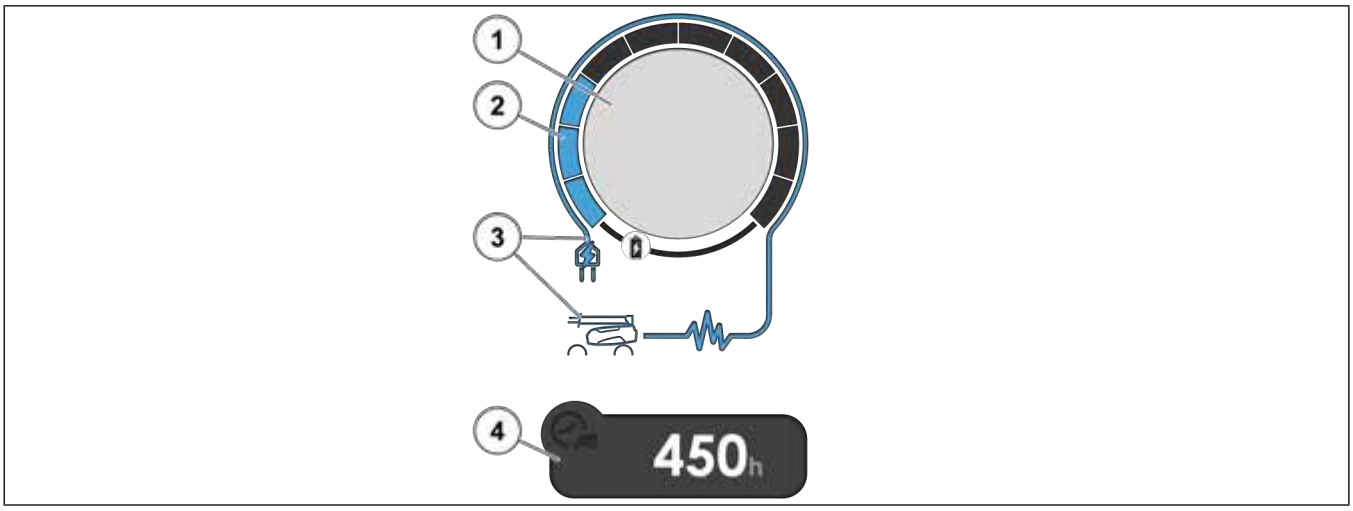


Figure 18: Battery charger page

Table 9. Battery charger page

Item	Designation		Description
1	High voltage battery charge level		Displayed, from top to bottom: • in blue, percentage value of high-voltage battery charge level, • in gray, phase of the high-voltage battery charge cycle (1/3, 2/3 or 3/3).
1	Equalization of the high-voltage batteries		Message in red: “Equalization pending” or “Equalizing, do not interrupt”. ***Black background and red frame.***
1	End of high-voltage battery charging		Displayed: "OK". ***Green background.***
2	High voltage battery charge level		1 segment in blue corresponds to 10%.
3	Battery charger status pictograms		Displayed in blue: battery charger switched on. ***Displayed in red: battery charger fault.***
4	Total time machine in operation		Value displayed in hours.

2.5.5 GROUND-LEVEL ALERT PAGES AND GROUND-LEVEL FAULT PAGES

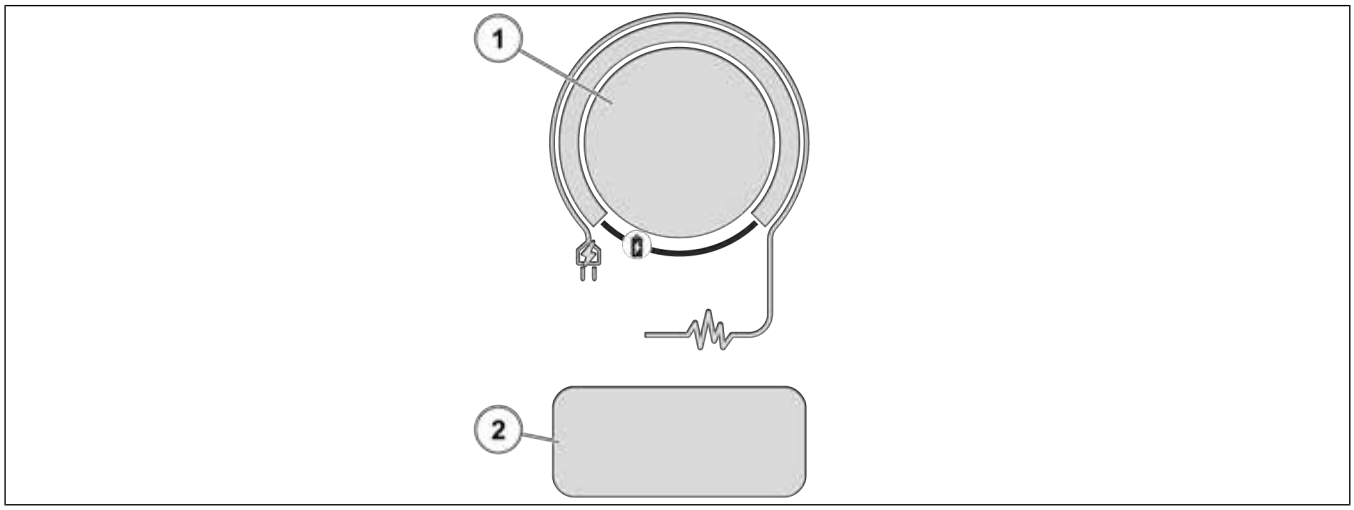
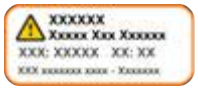
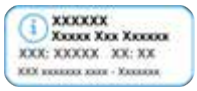


Figure 19: Ground-level alert pages and ground-level fault pages

Ground-level alert pages

Table 10. Ground-level alert pages

Item	Designation		Description
1	Danger - pictogram		Displayed: red background with alert pictogram and pictogram depending on the alert. Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
2	Danger - description		Displayed: red box with alert pictogram and text describing the alert. Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
1	Warning - pictogram		Displayed: orange background with alert pictogram and pictogram depending on the alert. Indicates a hazardous situation which, if not avoided, may result in death or serious injury.
2	Warning - description		Displayed: orange box with alert pictogram and text describing the alert. Indicates a hazardous situation which, if not avoided, may result in death or serious injury.
1	Warning - pictogram		Displayed: yellow background with alert pictogram and pictogram depending on the alert. Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.
2	Warning - description		Displayed: yellow box with alert pictogram and text describing the alert. Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.
1	Information - pictogram		Displayed: blue background with information pictogram and pictogram depending on the alert. Indicates normal operation of the machine or a procedure to be followed that presents no risk of bodily injury.

Item	Designation		Description
2	Information - description		Displayed: blue box with information pictogram and text describing the alert. Indicates normal operation of the machine or a procedure to be followed that presents no risk of bodily injury.
1	High-voltage battery charge level warning - pictogram	-	Displayed: please refer to “Familiarization: Ground-level display screen: Ground-level work page”. Indicates normal operation of the machine or a procedure to be followed that presents no risk of bodily injury.
2	High-voltage battery charge level warning - description		Displayed: blue box with information pictogram and text describing the alert. Indicates normal operation of the machine or a procedure to be followed that presents no risk of bodily injury.

Ground-level fault pages

Table 11. Ground-level fault pages

Item	Designation		Description
1	Multiple faults - pictogram		Displayed: gray background with alert pictogram. Indicates that several faults have occurred.
1	Major engine/drive fault - pictogram		Displayed: gray background with “STOP” pictogram and engine pictogram. Indicates a situation that, if not avoided, will result in damage to the machine but that does not pose any risk of bodily injury.
2	Major engine/drive fault - description		Displayed: gray box with alert pictogram and text describing the fault. Indicates a situation that, if not avoided, will result in damage to the machine but that does not pose any risk of bodily injury.
1	Major machine fault - pictogram		Displayed: gray background with alert pictogram and pictogram depending on fault. Indicates a situation that, if not avoided, will result in damage to the machine but that does not pose any risk of bodily injury.
2	Major machine fault - description		Displayed: gray box with alert pictogram and text describing the fault. Indicates a situation that, if not avoided, will result in damage to the machine but that does not pose any risk of bodily injury.
1	Minor engine/drive fault - pictogram		Displayed: gray background with alert pictogram and engine pictogram. Indicates a situation that, if not avoided, may result in damage to the machine but that does not pose any risk of bodily injury.

Item	Designation		Description
2	Minor engine/drive fault - description		Displayed: gray box with alert pictogram and text describing the fault. Indicates a situation that, if not avoided, may result in damage to the machine but that does not pose any risk of bodily injury.
1	Minor machine fault - pictogram		Displayed: gray background with alert pictogram and pictogram depending on fault. Indicates a situation that, if not avoided, may result in damage to the machine but that does not pose any risk of bodily injury.
2	Minor machine fault - description		Displayed: gray box with alert pictogram and text describing the fault. Indicates a situation that, if not avoided, may result in damage to the machine but that does not pose any risk of bodily injury.
1	High-voltage battery charging interrupted fault - pictogram		Displayed: red text on black background and red box with battery pictogram. Messages: • countdown for the first 30 seconds: “You have xx s to resume charging”, • after the first 30 seconds: “Charging interrupted”.
2	High-voltage battery charging interrupted fault - description		Displayed: gray box with alert pictogram and text describing the fault.
1	Battery charger fault - pictogram		Displayed: red text on black background and red box with battery pictogram. Message: “Charger error”.
2	Battery charger fault - description		Displayed: gray box with alert pictogram and text describing the fault.

2.5.6 GROUND DISPLAY SCREEN CONTROL KEYS

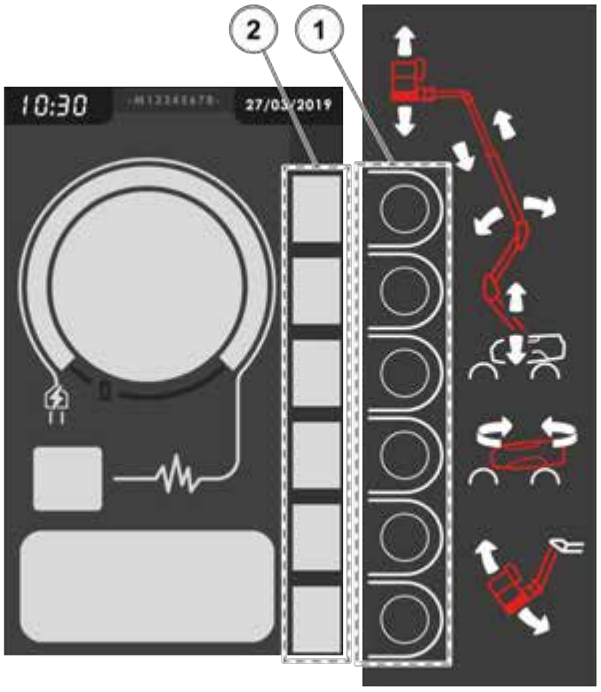


Figure 20: Ground display screen control keys

Table 12. Ground display screen control keys

Item	Designation		Description
1	Ground display screen control keys		Press and release the keys (1) to activate the controls corresponding to the pictograms (2).
2	Menu		Press and release the corresponding button (1) to access the menus.
2	Back		Press and release the corresponding button (1) to access the previous menu.
2	OK	OK	Press and release the corresponding button (1) to confirm the selection.
2	Update Restore Reset		As required, press and release the corresponding button (1) to: • update the display, • restore data, • reset data.
2	Menu navigation up		Press and release the corresponding button (1) to scroll up in the main menu.
2	Menu navigation down		Press and release the corresponding button (1) to scroll down in the main menu.
2	Menu navigation left		Press and release the corresponding button (1) to navigate to the left in the main menu.
2	Menu navigation right		Press and release the corresponding button (1) to navigate to the right in the main menu.
2	Navigation up		Press and release the corresponding button (1) to scroll up in the submenu/selection.
2	Navigation down		Press and release the corresponding button (1) to scroll down in the submenu/selection.
2	Page navigation		Press and release the corresponding button (1) to activate page navigation.

Item	Designation		Description
2	Line navigation		Press and release the corresponding button (1) to activate line navigation.
2	Write		Press and release the corresponding button (1) to activate write mode.
2	Plus		Press and release the corresponding button (1) to increase a value.
2	Minus		Press and release the corresponding button (1) to decrease a value.
2	Validate		Press and release the corresponding button (1) to confirm a change.
2	Cancel		Press and release the corresponding button (1) to cancel a change.
2	Day/night		Press and release the corresponding button (1) to change the display screen's day/night mode.
2	Maintenance menu		Press and release the corresponding button (1) to access the maintenance menu directly. ***Black background.***
2	Maintenance warning		Indicates a maintenance warning. Press and release the corresponding button (1) to access the menus. ***Orange background.***
2	Alerts/faults		Signals an alert or a fault. Press and release the corresponding button (1) to go directly to the list of alerts and faults.
2	Fault display		Press and release the corresponding button (1) to view the type of fault.
2	Filtration		Press and release the corresponding button (1) to filter alerts, faults or events.
2	Delete		Press and release the corresponding button (1) to delete the display of an alert, fault or event
2	Factory settings		Press and release the corresponding button (1) to restore the factory settings.

2.6. DISPLAY SCREEN IN THE PLATFORM

2.6.1 POWER-UP CYCLE IN THE PLATFORM

The battery charger is turned off.

The following pages are displayed in turn when the machine is turned on:

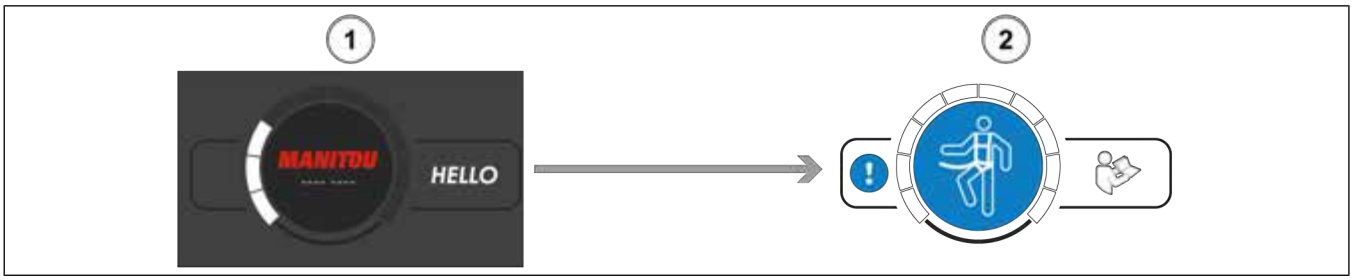


Figure 21: Power-up cycle in the platform

Table 13. Power-up cycle in the platform

Item	Designation	Description
1	Initial page	Welcome message.
2	Verification page	Use of personal fall protection equipment: see the operator's manual. Alert and fault search: • no alert and no fault: the audible alarm sounds once and the work page in the platform is displayed, • one or more alerts and/or one or more faults: a platform warning page and/or a platform fault page is displayed.

2.6.2 DISPLAY ZONES IN THE PLATFORM

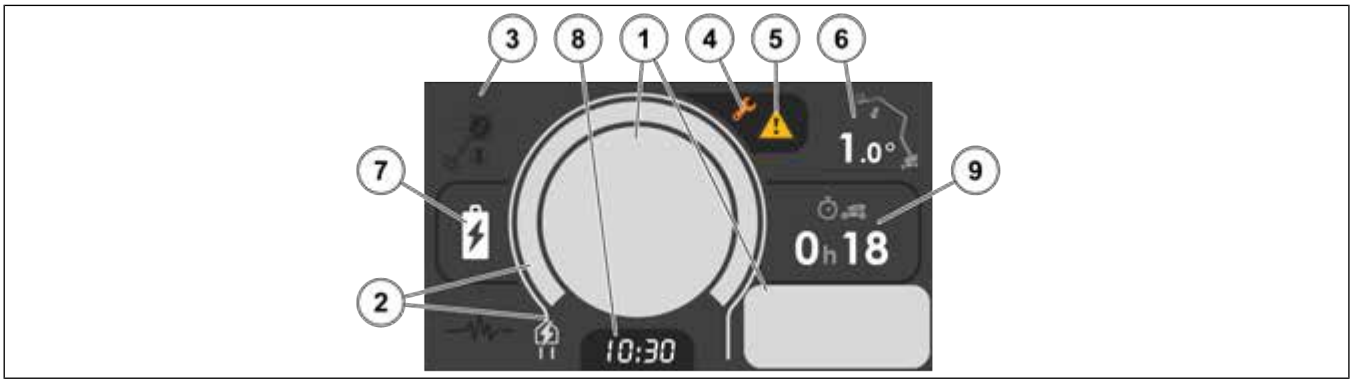


Figure 22: Display zones in the platform

Table 14. Display zones in the platform

Item	Designation		Description
1	Display zone no. 1		Displayed, as appropriate: • platform work page, • platform warning pages and platform fault pages.
2	Display zone no. 2		Please refer to "Familiarization: Display screen in the platform: Work page in the platform".
3	'Slewing less than' pictogram		Turntable slewing less than 90° (to the left or to the right) in relation to the neutral position. ***Displayed in black.***
3	'Slewing greater than' pictogram		Turntable slewing greater than 90° (to the left or to the right) in relation to the neutral position. ***Displayed in white and red.***

Item	Designation		Description
4	Maintenance warning pictogram		In black: no maintenance warning. In orange: maintenance warning.
5	Fault pictogram		In black: no fault detected. In black and yellow: fault detected.
6	Tilt pictogram		Chassis tilt less than the maximum authorized value. ***Pictogram displayed in gray and value in degrees displayed in white.***
6	Work tilt pictogram		Chassis tilt greater than the maximum authorized chassis tilt in working position. ***Pictogram and value in degrees displayed in red.***
7	Machine status pictogram		Displayed in white: machine switched on.
8	Current time		Value displayed in hours and minutes.
9	Total daily time machine in operation		Value displayed in hours and minutes.

2.6.3 WORK PAGE IN THE PLATFORM

The following information is displayed when:

- the battery charger is turned off,
- no alerts, except for high-voltage battery charge level alert,
- there are no faults.

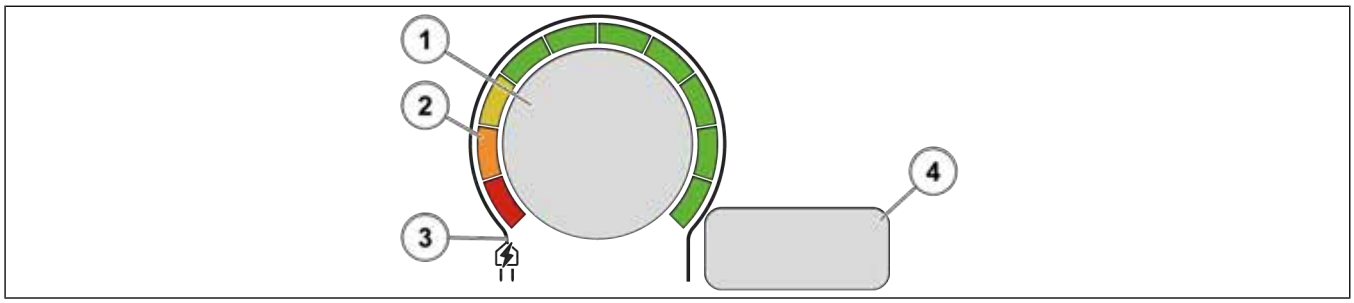


Figure 23: Work page in the platform

Table 15. Work page in the platform

Item	Designation		Description
1	High-voltage battery charge level (1)		Percentage value displayed: • in red between 0% and 10% (4), • in orange between 11% and 20% (4), • in yellow between 21% and 30% (5), • in green between 31% and 100%.
1	Information (1)		Displayed, as appropriate: • estimated high-voltage battery life in hours and minutes, ***Displayed in white.*** • or, • information message.

Item	Designation		Description
			Displayed in orange.
1	Electrical power (2)		The position of the red pointer indicates: • the electrical power recovered in the blue zone, • the electrical power consumed in the other zones.
2	High voltage battery charge level		Segments displayed: • 1 flashing red segment between 0% and 10% (4), • 1 orange segment between 11% and 20% (4), • 1 yellow segment between 21% and 30% (5), • 7 green segments between 31% and 100%.
3	High voltage battery charge level		Pictogram: • flashing red between 0% and 10% (4), • flashing orange between 11% and 20% (4), • displayed in yellow between 21% and 30% (5), • displayed in black between 31% and 100%.
4	Differential unlocked pictogram		The differential is unlocked. ***Displayed in black.***
4	Differential locked pictogram		The differential is unlocked. ***Displayed in green.***
4	Wheels not aligned pictogram		Front and rear wheels not aligned (3). ***Front and rear wheels displayed in black.***
4	Front wheels aligned pictogram		Front wheels aligned, rear wheels not aligned (3). ***Front wheels displayed in green, rear wheels displayed in black.***
4	Rear wheels aligned pictogram		Front wheels not aligned, rear wheels aligned (3). ***Front wheels displayed in black, rear wheels displayed in green.***
4	Wheels aligned pictogram		Front and rear wheels aligned (3). ***Front and rear wheels displayed in green.***
4	Transport pictogram		Machine in the transport position. ***Displayed in white.***
4	Work pictogram		Machine in the working position. ***Displayed in white.***

(1) Displayed when the driving functions are not activated.

(2) Displayed when the driving functions are activated.

(3) The wheels are aligned when they are parallel with the machine's chassis.

(4) High-voltage battery charge level warning.

(5) We recommend that you charge the high-voltage batteries. Refer to “Operating the machine: Charging the high-voltage batteries and the 12 V battery”.

2.6.4 ALERT PAGES IN THE PLATFORM AND FAULT PAGES IN THE PLATFORM

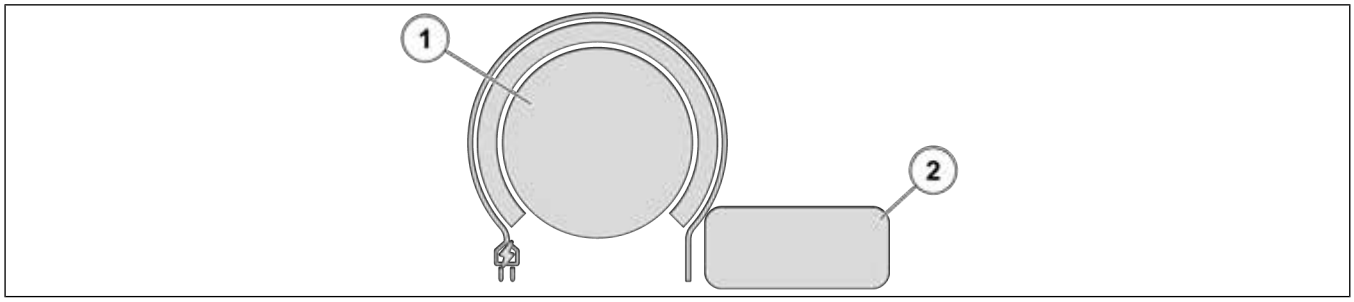
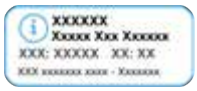


Figure 24: Alert pages in the platform and fault pages in the platform

Alert pages in the platform

Table 16. Alert pages in the platform

Item	Designation		Description
1	Danger - pictogram		Displayed: red background with alert pictogram and pictogram depending on the alert. Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
2	Danger - description		Displayed: red box with alert pictogram and text describing the alert. Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
1	Warning - pictogram		Displayed: orange background with alert pictogram and pictogram depending on the alert. Indicates a hazardous situation which, if not avoided, may result in death or serious injury.
2	Warning - description		Displayed: orange box with alert pictogram and text describing the alert. Indicates a hazardous situation which, if not avoided, may result in death or serious injury.
1	Warning - pictogram		Displayed: yellow background with alert pictogram and pictogram depending on the alert. Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.
2	Warning - description		Displayed: yellow box with alert pictogram and text describing the alert. Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.
1	Information - pictogram		Displayed: blue background with information pictogram and pictogram depending on the alert. Indicates normal operation of the machine or a procedure to be followed that presents no risk of bodily injury.

Item	Designation		Description
2	Information - description		Displayed: blue box with information pictogram and text describing the alert. Indicates normal operation of the machine or a procedure to be followed that presents no risk of bodily injury.
1	High-voltage battery charge level warning - pictogram	-	Displayed: please refer to “Familiarization: Ground-level display screen: Work page in the platform”. Indicates normal operation of the machine or a procedure to be followed that presents no risk of bodily injury.
2	High-voltage battery charge level warning - description		Displayed: blue box with information pictogram and text describing the alert. Indicates normal operation of the machine or a procedure to be followed that presents no risk of bodily injury.

Fault pages in the platform

Table 17. Fault pages in the platform

Item	Designation		Description
1	Multiple faults - pictogram		Displayed: gray background with alert pictogram. Indicates that several faults have occurred.
1	Major engine/drive fault - pictogram		Displayed: gray background with “STOP” pictogram and engine pictogram. Indicates a situation that, if not avoided, will result in damage to the machine but that does not pose any risk of bodily injury.
2	Major engine/drive fault - description		Displayed: gray box with alert pictogram and text describing the fault. Indicates a situation that, if not avoided, will result in damage to the machine but that does not pose any risk of bodily injury.
1	Major machine fault - pictogram		Displayed: gray background with alert pictogram and pictogram depending on fault. Indicates a situation that, if not avoided, will result in damage to the machine but that does not pose any risk of bodily injury.
2	Major machine fault - description		Displayed: gray box with alert pictogram and text describing the fault. Indicates a situation that, if not avoided, will result in damage to the machine but that does not pose any risk of bodily injury.
1	Minor engine/drive fault - pictogram		Displayed: gray background with alert pictogram and engine pictogram. Indicates a situation that, if not avoided, may result in damage to the machine but that does not pose any risk of bodily injury.

Item	Designation		Description
2	Minor engine/drive fault - description		Displayed: gray box with alert pictogram and text describing the fault. Indicates a situation that, if not avoided, may result in damage to the machine but that does not pose any risk of bodily injury.
1	Minor machine fault - pictogram		Displayed: gray background with alert pictogram and pictogram depending on fault. Indicates a situation that, if not avoided, may result in damage to the machine but that does not pose any risk of bodily injury.
2	Minor machine fault - description		Displayed: gray box with alert pictogram and text describing the fault. Indicates a situation that, if not avoided, may result in damage to the machine but that does not pose any risk of bodily injury.

2.7. WARNINGS AND FAULTS

2.7.1 DEFINITION OF ALERTS

Overload warning

It occurs when the load in the platform has reached the platform's maximum load capacity.

Tilting warning

It occurs when the tilt of the chassis is greater than the maximum authorized chassis tilt in working position.

Turntable slewing alert

It occurs when the turntable angle is greater than 90° (to the left or to the right) in relation to the neutral position and the driving functions are activated without briefly pressing the **Turntable slewing** button.

Secondary protection system SPS alert

It occurs when a platform occupant is trapped between the SPS safety cable and a structure (1).

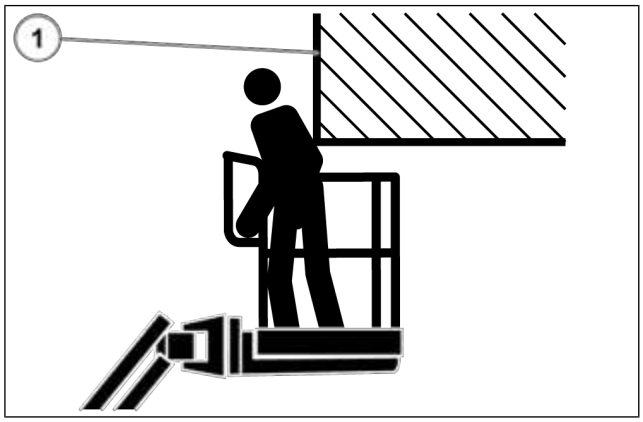


Figure 25: Secondary protection system SPS

Maintenance warning

It occurs when maintenance is required.

High-voltage battery charge level warning

It occurs when the charge level of the high-voltage batteries is:

- between 6% and 10% (level 1),
- between 1% and 5% (level 2),
- at 0% (level 3).

2.7.2 SIGNALING OF WARNINGS AND FAULTS

Signaling of alerts on the ground

Table 18. Signaling of alerts on the ground

Warning	Ground level display screen	Horn	SPS flashing light
Overload warning	Displays an alert page Displays the alerts/faults pictogram	Does not sound	Unlit
Tilting warning (machine in working position)	Displays an alert page Displays the alerts/faults pictogram	Does not sound	Unlit
Secondary protection system SPS alert	Displays an alert page Displays the alerts/faults pictogram	Sounds intermittently	Flashes
Maintenance warning	Briefly displays an alert page Displays the maintenance warning pictogram	Does not sound	Unlit
High-voltage battery charge level warning	Displays an alert page Displays the alerts/faults pictogram	Unlit	Unlit
Other “Information” alerts	Displays an alert page Displays the alerts/faults pictogram	Unlit	Unlit

Signaling of alerts in the platform

Table 19. Signaling of alerts in the platform

Warning	Display screen in the platform	Overload indicator light	Tilting indicator lamp	Audible alarm
Overload warning	Displays an alert page	Flashes	Unlit	Continuous
Tilting warning (machine in transport position)	Displays the tilt pictogram	Unlit	Flashing (1)	Sounds intermittently (2)
Tilting warning (machine in working position)	Displays an alert page Displays the working tilt pictogram	Unlit	Flashing (1)	Sounds intermittently (2)
Turntable slewing alert	Displays an alert page Displays the ‘slewing greater than’ pictogram	Unlit	Unlit	Sounds twice
Secondary protection system SPS alert	Displays an alert page	Unlit	Unlit	Does not sound
Maintenance warning	Briefly displays an alert page	Unlit	Unlit	Does not sound

Warning	Display screen in the platform	Overload indicator light	Tilting indicator lamp	Audible alarm
	Displays the maintenance warning pictogram			
High-voltage battery charge level warning	Displays an alert page	Unlit	Unlit	Does not sound
Other “Information” alerts	Displays an alert page	Unlit	Unlit	Does not sound

(1) On = 0.6 seconds, off = 0.4 seconds.

(2) Buzzer = 1 second, no buzzer = 1 second.

Signaling of faults on the ground

Table 20. Signaling of faults on the ground

Fault	Ground level display screen	Horn
Major engine/drive fault	Displays an alert page Displays the alerts/faults pictogram	Does not sound
Major machine fault	Displays an alert page Displays the alerts/faults pictogram	Does not sound
Minor engine/drive fault	Displays an alert page Displays the alerts/faults pictogram	Does not sound
Minor machine fault	Displays an alert page Displays the alerts/faults pictogram	Does not sound

Signaling of faults in the platform

Table 21. Signaling of faults in the platform

Fault	Display screen in the platform	Fault indicator light	Audible alarm
Major engine/drive fault	Displays a fault page and the fault pictogram	Flashing (1)	Does not sound
Other major machine faults	Displays a fault page and the fault pictogram	Flashing (1)	Does not sound
Minor engine/drive fault	Displays a fault page and the fault pictogram	Flashing (2)	Does not sound
Minor machine faults	Displays a fault page and the fault pictogram	Flashing (2)	Does not sound

(1) On = 0.3 seconds, off = 0.2 seconds.

(2) On = 0.6 seconds, off = 0.4 seconds.

(3) On = 0.4 seconds, off = 0.2 seconds.

(4) Buzzer = 0.4 seconds, no buzzer = 0.4 seconds.

2.7.3 FUNCTIONS RESTRICTED OR LOCKED IN THE EVENT OF AN ALERT OR FAULT

Functions may be restricted or locked depending on faults and certain “Information” alerts not listed in the tables below.

A restricted function is one that is authorized for 3 seconds at a time.

Machine in the transport position

Functions restricted (●) or locked (●●) from the ground:

Table 22. Machine in transport position, functions restricted or locked from the ground 1

Function	Overload warning	Tilting warning	Turntable slewing alert
Turn the platform (to the left/right)	●●	-	-
Tilt the platform/jib arm (up/down)	●●	-	-
Raise/lower the jib arm	●●	-	-
Extend the telescopic arm	●●	-	-
Raise the main arm	●●	-	-
Raise the secondary arm	●●	-	-
Turn the turntable (to the left/right)	●●	-	-

Table 23. Machine in transport position, functions restricted or locked from the ground 2

Function	High-voltage battery charge level warning		
	between 6% and 10% (level 1)	between 1% and 5% (level 2)	0% (level 3)
Turn the platform (to the left/right)	●	●	●●
Tilt the platform/jib arm (up/down)	-	-	●●
Raise the jib arm	●	●	●●
Lower the jib arm	-	-	●●
Extend the telescopic arm	●	●	●●
Raise the main arm	-	-	●●
Raise the secondary arm	●	●●	●●
Turn the turntable (to the left/right)	-	-	●●

Functions restricted (●) or locked (●●) from the platform:

Table 24. Machine in transport position, functions restricted or locked from the platform 1

Function	Overload warning	Tilting warning	Turntable slewing alert
Drive (forward/backward)	●●	-	-
Steer (to the left/right)	●●	-	-
Turn the platform (to the left/right)	●●	-	-
Tilt the platform/jib arm (up/down)	●●	-	-
Raise/lower the jib arm	●●	-	-
Extend the telescopic arm	●●	●●	-
Raise the main arm	●●	●●	-
Raise the secondary arm	●●	●●	-
Turn the turntable (to the left/right)	●●	-	-

Table 25. Machine in transport position, functions restricted or locked from the platform 2

Function	High-voltage battery charge level warning		
	between 6% and 10% (level 1)	between 1% and 5% (level 2)	0% (level 3)
Drive (forward/backward)	-	Tortoise speed activated by default	●●
Steer (to the left/right)	-	-	●●

Function	High-voltage battery charge level warning		
	between 6% and 10% (level 1)	between 1% and 5% (level 2)	0% (level 3)
Turn the platform (to the left/right)	●	●	●●
Tilt the platform/jib arm (up/down)	●	●	●●
Raise the jib arm	●	●	●●
Lower the jib arm	-	-	●●
Extend the telescopic arm	●	●●	●●
Raise the main arm	●	●●	●●
Raise the secondary arm	●	●●	●●
Turn the turntable (to the left/right)	●	●	●●

Machine in the working position

Functions restricted (●) or locked (●●) from the ground:

Table 26. Machine in working position, functions restricted or locked from the ground 1

Function	Overload warning	Tilting warning	Turntable slewing alert
Turn the platform (to the left/right)	●●	-	-
Tilt the platform/jib arm (up/down)	●●	-	-
Raise/lower the jib arm	●●	-	-
Extend the telescopic arm	●●	-	-
Retract the telescopic arm	●●	-	-
Raise the main arm	●●	-	-
Lower the main arm	●●	-	-
Raise the secondary arm	●●	-	-
Lower the secondary arm	●●	-	-
Turn the turntable (to the left/right)	●●	-	-

Table 27. Machine in working position, functions restricted or locked from the ground 2

Function	High-voltage battery charge level warning		
	between 6% and 10% (level 1)	between 1% and 5% (level 2)	0% (level 3)
Turn the platform (to the left/right)	●	●	●●
Tilt the platform/jib arm (up/down)	-	-	●●
Raise the jib arm	●	●	●●
Lower the jib arm	-	-	●●
Extend the telescopic arm	●	●	●●
Retract the telescopic arm	-	-	●●
Raise the main arm	-	-	●●
Lower the main arm	-	-	●●
Raise the secondary arm	●	●	●●
Lower the secondary arm	-	-	●●
Turn the turntable (to the left/right)	-	-	●●

Functions restricted (●) or locked (●●) from the platform:

Table 28. Machine in working position, functions restricted or locked from the platform 1

Function	Overload warning	Tilting warning	Turntable slewing alert
Drive (forward/backward)	●●	●●	●●
Steer (to the left/right)	●●	●●	-
Turn the platform (to the left/right)	●●	-	-
Raise/lower the jib arm	●●	-	-
Extend the telescopic arm	●●	●●	-
Retract the telescopic arm	●●	-	-
Raise the main arm	●●	●●	-
Lower the main arm	●●	-	-
Raise the secondary arm	●●	●●	-
Lower the secondary arm	●●	-	-
Turn the turntable (to the left/right)	●●	-	-

Table 29. Machine in working position, functions restricted or locked from the platform 2

Function	High-voltage battery charge level warning		
	between 6% and 10% (level 1)	between 1% and 5% (level 2)	0% (level 3)
Drive (forward/backward)	-	-	●●
Steer (to the left/right)	-	-	●●
Turn the platform (to the left/right)	●	●	●●
Raise the jib arm	●	●	●●
Lower the jib arm	-	-	●●
Extend the telescopic arm	●	●	●●
Retract the telescopic arm	-	-	●●
Raise the main arm	●	●	●●
Lower the main arm	-	-	●●
Raise the secondary arm	●	●	●●
Lower the secondary arm	-	-	●●
Turn the turntable (to the left/right)	●	●	●●

3. OPERATING THE MACHINE

3.1. SAFETY PRECAUTIONS: OPERATING THE MACHINE

⚠ DANGER

Risk of incorrect use

It is the operator's responsibility to read and understand this operator's manual and the manual of responsibilities.
Do not use this machine for any purpose other than transporting and lifting personnel with their tools and equipment in an elevated work area.
Do not use this machine in hazardous weather conditions. Always check wind speed or the risk of an impending storm.
Key lock for turntable covers: ensure that the right-hand turntable cover is unlocked before operating the machine from the platform to guarantee access to the emergency controls.

⚠ DANGER

Risk of collision

Sound the horn to warn ground personnel of any situation deemed dangerous.

3.2. GETTING INTO THE PLATFORM

3.2.1 GETTING INTO OR OUT OF THE PLATFORM

⚠ DANGER

Risk of falling

Do not enter or exit the platform unless it is fully lowered.
Always enter and exit facing the inside of the platform.
Always use both hands and one foot or both feet and one hand to enter and exit the platform.
Do not attach the sliding mid rails in the high position.

- Follow these instructions when using the sliding mid rail.
  a. Lift and hold the sliding mid rail.
  b. Get into or out of the platform.
  c. Release the sliding mid rail.
  d. Check that the sliding mid rail is in the down position.
- Follow these instructions when using the gate.
  a. Open the gate.
  b. Get into or out of the platform.
  c. Close the gate.
  d. Check that the gate is properly closed.

3.2.2 ATTACHING THE SAFETY HARNESS LANYARD

⚠ DANGER

Risk of falling

Bear in mind that only one operator/occupant is permitted per lanyard anchorage point.

1. Put on the safety harness.
2. Attach the safety harness lanyard to an anchorage point in the platform.
3. Check that the lanyard is properly attached.

3.3. BEFORE OPERATING THE MACHINE

3.3.1 SAFETY PRECAUTIONS: BEFORE USING THE MACHINE

⚠ DANGER

Risk of incorrect use

The walk-around inspection, routine maintenance, the workplace inspection and the functional tests must be carried out in the order described in this operator's manual by the operator before each shift and before any use of the machine in the workplace.

3.3.2. WALK-AROUND INSPECTION

3.3.2.1 Safety precautions: walk-around inspection

⚠ DANGER

Risk associated with a damaged machine

Do not use the machine if any damage is discovered.

The purpose of the walk-around inspection is to ensure that the machine is free from visible damage.

The operator is responsible for carrying out the walk-around inspection.

The operator is authorized to take the machine out of service if damage is discovered.

If damage is discovered, the machine must be repaired by a qualified service technician accredited by Manitou.

The walk-around inspection must be carried out again after repair.

During the walk-around inspection:

- the machine must be switched off,
- the machine should be in the transport position,
- the turntable and the platform must be in the neutral position,
- the jib arm must be fully lowered,
- the platform must be empty.

3.3.2.2 Performing the walk-around inspection

The left and right turntable covers must be opened for the walk-around inspection and closed when finished.

The 12 V battery cover and the high-voltage battery covers must be removed for the inspection, and replaced when finished.

- Perform a visual and physical inspection of the machine.
  a. Check that the operator's manual and the manual of responsibilities are clean and complete.
  b. Check the stickers and make sure they are all present, clean and legible.
  c. Check for leaks: battery electrolyte, hydraulic oil and lubricants.
  d. Check the machine structure for dents or damage.
  e. Check for cracks in the welding.
  f. Check the components for cracks and excessive corrosion.
  g. Check for excessive mechanical play and wear in the structure.
  h. Check that the platform is in good condition: structure, guardrail, floor, gate, sliding mid rails, lanyard anchorage points, etc.
  i. Check that the hydraulic components are in good condition: pumps, control valves, motors, cylinders, hydraulic hoses, unions, etc.
  j. Check that the mechanical components are in good condition: axles, drive shaft, wheels, tires, tie rods, crown gear, pins, etc.
  k. Check that all the electrical components are in good condition: control panels, batteries, variable speed drives, motors, cables, fuses, rotating beacon lights, wires, connectors, foot switch, switches, buttons, control buttons, control handles, etc.
  l. Check that the antistatic strip under the chassis is in good condition.
  m. Check that the covers, handles and latches are in good condition.
  n. Check that no components are missing or loose: pins, brackets, fixings, nuts, bolts, etc.
  o. Check that no parts are missing or have had unauthorized modifications.
  p. Check the general cleanliness of the machine: platform floor, compartments under the turntable covers, etc.

3.3.3. ROUTINE MAINTENANCE

3.3.3.1 Safety precautions: routine maintenance

The walk-around inspection must be carried out prior to routine maintenance.

Routine maintenance is designed to ensure that the machine is operational.

The operator is responsible for carrying out routine maintenance.

Unless specific instructions are given, during maintenance operations:

- the machine must be switched off,
- the machine must be on a level surface,
- the machine should be in the transport position,
- the turntable and the platform must be in the neutral position,

- the jib arm must be fully lowered,
- the platform must be empty.

3.3.3.2 Checking the high-voltage battery charge level

NOTICE

Risk of high-voltage battery damage

Do not use the machine if the high-voltage battery charge level is less than or equal to 10%.

1. Switch on the machine.
2. Check the charge level of the high-voltage batteries displayed on the ground-level display screen.

   If the charge level of the high-voltage batteries is low.

   - Refer to the maintenance personnel.
3. Make sure that the ground-level and platform display screens are working correctly and that all the information is visible.
4. Switch off the machine.

3.3.3.3 Checking the high-voltage battery electrolyte level

⚠ DANGER

Risk of explosion

No flames or sparks. Do not smoke near to the high-voltage batteries during maintenance.

⚠ WARNING

Risk of electrocution

Make sure that the positive terminals cannot come into contact with the negative terminals or the metallic parts of the machine at any time.

⚠ CAUTION

Risk of burns

High-voltage batteries contain electrolyte, a highly corrosive liquid: always wear protective clothing, gloves and safety glasses or a face shield during maintenance.
At all times, avoid contact between the electrolyte from the high-voltage batteries and any part of the body or clothing; rinse any exposed areas with clean water and seek medical advice.

NOTICE

Risk of high-voltage battery damage

Only fill the bottle with distilled water.
Only fill the tank with distilled water.
Do not add distilled water if the charge level of the high-voltage batteries is not 100%.

The high-voltage batteries are fully charged.

At least 10 complete charging cycles have been performed.

The ambient temperature is above 0 °C (32 °F).

- **Check the electrolyte level of the high-voltage batteries - machines equipped with manual centralized filling system for high-voltage batteries.**

Each high-voltage battery has its own centralized filling circuit.

Figure 26: Manual centralized filling of high-voltage batteries 1

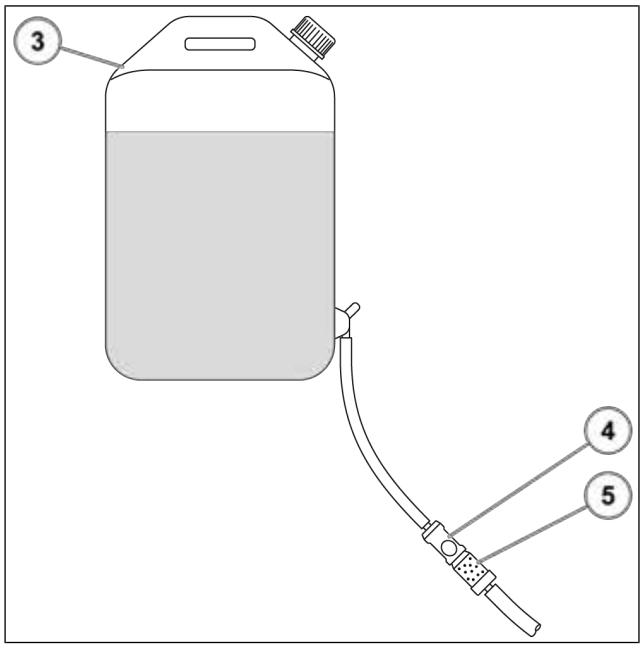


Figure 27: Manual centralized filling of high-voltage batteries 2

The bottle (3) fitted with a tap, a filling hose and the connector (4) is supplied with the machine.

a. Place the machine on a level surface.
b. Switch off the machine.
c. Remove the left and right battery covers.
d. Check that all the fill level indicators are at the top (1).
e. Refit the left and right battery covers if the fill level indicators are all at the top.

If one or more fill level indicators are at the bottom (2).

1. Fill the bottle (3) with distilled water.

Please refer to "Technical specifications: Consumables: Liquids and lubricants".

2. Connect the connector (4) to the connector (5) on the battery's centralized filling system.
3. Put the bottle at least 3 meters (10 feet) above the ground.

Make sure not to damage the filler pipe.

4. Open the valve on the bottle.
5. Close it when the fill level indicators are all at the top (1).
6. Disconnect the connectors (4) and (5).
7. Refit the left and right battery covers.

- **Check the electrolyte level of the high-voltage batteries - machines equipped with high-voltage battery auto fill system.**

The centralized electric filling circuit is connected to the 2 high-voltage batteries.

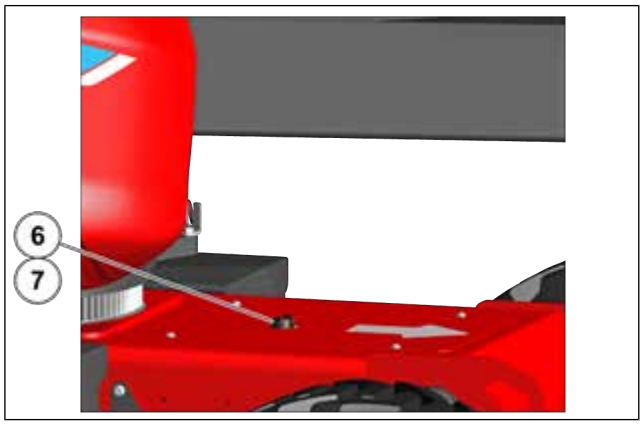


Figure 28: Electric centralized filling for high-voltage batteries 1

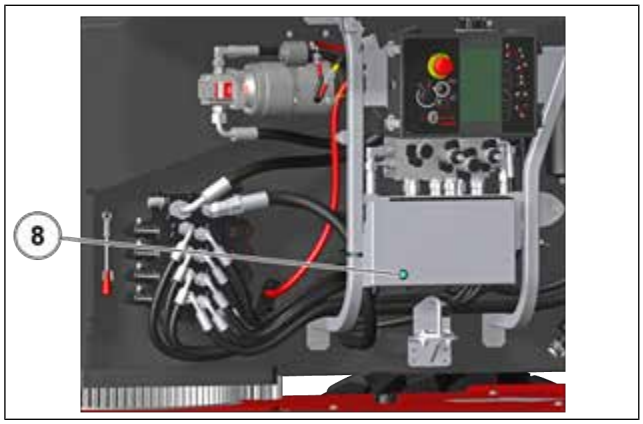


Figure 29: Electric centralized filling for high-voltage batteries 2

a. Place the machine on a level surface.
b. Open the right-hand turntable cover.
c. Switch on the machine.

d. Follow the instructions on the ground-level display screen to decide whether to fill the distilled water tank (6).

e. Make sure that the filler plug (7) is correctly closed.

f. Follow the instructions on the ground-level display screen to decide whether or not to press push button (8).

g. Follow the instructions on the ground-level display screen to decide whether to release the push button (8).

h. Switch off the machine.

i. Close the right-hand turntable cover.

If you need to refill the distilled water tank (6).

1. Get into the platform.
2. Turn the turret to gain access to the filler cap (7).

   We recommend that you turn the turntable to the left so that the turntable angle is less than 160° relative to the neutral position.

3. Get out of the platform.
4. Remove the filler cap.
5. Fill the distilled water tank.

   Please refer to "Technical specifications: Consumables: Liquids and lubricants".

6. Refit the filler cap.
7. Get into the platform.
8. Put the turntable in neutral position.
9. Get out of the platform.

3.3.3.4 Checking the hydraulic oil level

NOTICE

Risk of damage to the machine

Make sure the machine is in the transport position and the jib arm is completely lowered before checking the hydraulic oil level.
As there may be a difference in level between hot oil and cold oil, we recommend rechecking the level when the hydraulic oil is warm.

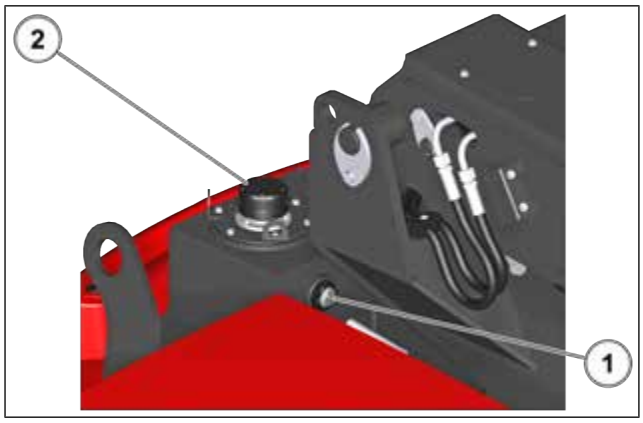


Figure 30: Checking the hydraulic oil level

1. Check the hydraulic oil level.

   The level is correct when the hydraulic oil reaches the red dot on the level indicator (1).

   If the level is low.

   1. Remove the cap from the tank (2).
   2. Add hydraulic oil until the correct level is reached.

      Please refer to "Technical specifications: Consumables: Liquids and lubricants".

   3. Refit the tank cap.

2. If the level is correct, make sure that the tank cap (2) is properly closed.

3.3.4. WORKPLACE INSPECTION

3.3.4.1 Safety precautions: workplace inspection

⚠ DANGER

Risk associated with the workplace

Do not use the machine if the workplace is unsafe.
Do not use the machine in hazardous weather conditions.

The walk-around inspection and routine maintenance must have been carried out before performing the workplace inspection.

Workplace inspections are designed to gather a wide range of information about the workplace.

The operator is responsible for carrying out the workplace inspection.

It is the operator's responsibility to recognize and remember all potential hazards, and to avoid them while using the machine.

3.3.4.2 Inspecting the workplace

1. Check and remember weather conditions such as wind speed or an impending storm.
2. Check and remember power lines, cranes, building structures, trees and any potentially dangerous overhead obstacles.
3. Check and remember electrical components, building structures, fences and any potentially dangerous obstructions on the ground.
4. Check and remember holes, slopes, bumps, debris and any other potentially hazardous ground conditions.
5. Check and remember slopes, slippery or uneven surfaces and any other potentially hazardous surface conditions.
6. Check and remember the movement of people on the ground, the movement of other machines or vehicles and any other potentially hazardous traffic conditions.
7. Check and remember bridges, walkways, ramps and any other potentially dangerous structures that may not withstand the weight of the machine.
8. Check and remember all other potentially dangerous locations.

3.3.5. FUNCTION TESTS

3.3.5.1 Safety precautions: function tests

⚠ DANGER

Risk associated with a faulty machine

Do not use the machine if any malfunctions are discovered.

The walk-around inspection, routine maintenance and the workplace inspection must have been carried out before the function tests are performed.

The walk-around inspection must be continued during the function tests.

The function tests are designed to ensure that the machine does not malfunction.

It is the operator's responsibility to carry out the function tests.

Function tests must be performed on a firm, level surface, free of obstructions and debris.

The functional tests must be carried out in the order described in this operator's manual.

During function testing:

- the platform must be empty, unless specific instructions are given,
- the turntable must be unlocked.

The operator is authorized to take the machine out of service if malfunctions are discovered.

If malfunctions are discovered, the machine must be repaired by a service technician accredited by Manitou.

The walk-around inspection, routine maintenance and the function tests must be carried out again after repair.

3.3.5.2 Behavior of the orange rotating beacon light and the horn during function tests

The orange rotating beacon light and the horn should behave as follows during the function tests:

- permanent orange rotating beacon light deactivated: the orange rotating beacon light must come on when the machine's functions are activated,
- permanent orange rotating beacon light activated: the orange rotating beacon light must come on when the machine is powered up,
- all movements alarm option activated: the horn sounds intermittently when the machine functions are activated,
- driving/steering option activated: the horn sounds intermittently when driving/steering the machine.

3.3.5.3 Testing power-up and the emergency stop from the ground

The ignition key is in the OFF position.

The machine is in transport position.

The turntable and the platform are in the neutral position.

The jib arm is completely lowered.

1. Make sure the 12 V battery connector is plugged in.
2. Ensure that the **Emergency stop** button on the ground-level control panel is in the ON position.
3. Ensure that the **Emergency stop** button on the platform control panel is in the ON position.
4. Turn the ignition switch to the ON position.

   Result:

   - the ground-level display screen must come on and the power-up cycle must be displayed,

- the drive fans in the chassis and under the left turntable cover should be running at high speed,
- the audible alarm should sound once,
- secondary protection system SPS: the SPS flashing light must flash several times and then go out.

5. Wait for the power-up cycle to complete.

   Result:

   - the drive fans in the chassis and under the left turntable cover should stop.

6. Press the **Emergency stop** button.

   Result:

   - the **Emergency stop** button should be pressed down in the OFF position,
   - the ground-level display screen should turn off.

7. Pull the **Emergency stop** button or turn it clockwise and release it.

   Result:

   - the **Emergency stop** button should be in the ON position,
   - the ground-level display screen must come on and the power-up cycle must be displayed,
   - the drive fans in the chassis and under the left turntable cover should be running at high speed,
   - the audible alarm should sound once,
   - secondary protection system SPS: the SPS flashing light must flash several times and then go out.

8. Wait for the power-up cycle to complete.

   Result:

   - the drive fans in the chassis and under the left turntable cover should stop.

3.3.5.4 Testing the machine's functions from the ground

⚠ WARNING

Risk of collision

Do not turn the turntable too much during this test.

The machine is powered up.

The machine is in transport position.

The turntable and the platform are in the neutral position.

The jib arm is completely lowered.

1. Do not touch the **Activation** switch.
2. Try to activate all the machine's functions one by one.

   Result:

   - it should not be possible to activate any of the functions.

3. Push and hold the **Activation** switch to the right.
4. Activate all the machine's functions one by one and check that the movements are complete and stop at the mechanical stops.

   Result:

   - it should be possible to activate all the functions,
   - all the movements must operate correctly and smoothly,
   - all the movements must be complete up to the mechanical stops.

5. Place the machine in the transport position.
6. Put the turntable in neutral position.
7. Put the platform in neutral position.
8. Level the platform/jib arm.
9. Fully lower the jib arm.
10. Release the **Activation** switch.

3.3.5.5 Testing the emergency controls from the ground

The machine is powered up.

The machine is in transport position.

The turntable and the platform are in the neutral position.

The jib arm is completely lowered.

1. Turn the ignition switch to the OFF position.
2. Press the **Emergency stop** button on the control panel in the platform.
3. Turn the ignition switch to the ON position.
4. Push and hold the **Activation** switch to the right.

   Result:

   - the ground-level display screen must come on and the power-up cycle must be displayed,
   - the drive fans in the chassis and under the left turntable cover should be running at high speed,

- the audible alarm should sound once,
- secondary protection system SPS: the SPS flashing light must flash several times and then go out.

5. Wait for the power-up cycle to complete.

   Result:

   - the drive fans in the chassis and under the left turntable cover should stop.

6. Activate all the machine's functions one by one.

   Result:

   - it should be possible to activate all the functions.

7. Raise the main arm for 10 seconds and extend the telescopic arm for 4 seconds.
8. Release the **Activation** switch.

   Result:

   - the ground-level display screen should turn off.

9. Carry out the emergency commands described in "Familiarization: Operating the machine: Using the emergency controls: What to do if the machine is not working: Using the emergency controls from the ground".

   Result:

   - the emergency controls should function properly.

10. Place the machine in the transport position.
11. Put the turntable in neutral position.
12. Put the platform in neutral position.
13. Level the platform/jib arm.
14. Fully lower the jib arm.
15. Pull the **Emergency stop** button on the control panel in the platform or turn it clockwise a quarter turn and release it.

3.3.5.6 Testing the overload warning from the ground

The machine is powered up.

The machine is in transport position.

The turntable and the platform are in the neutral position.

The jib arm is completely lowered.

1. Place an evenly distributed load of between 275 kg (606 lb) and 305 kg (672 lb) in the platform.

   Result:

   - an alert page must be displayed on the ground-level display screen,
   - the audible alarm should sound continuously.

2. Try to activate all the machine's functions one by one.

   Result:

   - it should not be possible to activate any of the functions.

3. Remove between 25 kg (55 lb) and 55 kg (121 lb) to obtain a load of 250 kg (551 lb) in the platform.

   Result:

   - the alert page should no longer be displayed,
   - the audible alarm should stop.

4. Activate all the machine's functions one by one.

   Result:

   - it should be possible to activate all the functions.

5. Place the machine in the transport position.
6. Put the turntable in neutral position.
7. Put the platform in neutral position.
8. Level the platform/jib arm.
9. Fully lower the jib arm.

3.3.5.7 Testing the overload warning from the platform

The machine is powered up.

The machine is in transport position.

The turntable and the platform are in the neutral position.

The jib arm is completely lowered.

A load of 250 kg (551 lb) is in the platform.

1. Get into the platform.

   Result:

   - the overload indicator lamp should flash,
   - an alert page must be displayed on the platform display screen,
   - the audible alarm should sound continuously.

2. Try to activate all the machine's functions one by one.

   Result:

   - it should not be possible to activate any of the functions.

3. Get out of the platform.

Result:

- the overload indicator lamp should go out,
- the alert page should no longer be displayed,
- the audible alarm should stop.

4. Remove the entire load from the platform.

3.3.5.8 Testing the emergency stop from the platform

The machine is powered up.

The machine is in transport position.

The turntable and the platform are in the neutral position.

The jib arm is completely lowered.

1. Get into the platform.
2. Press the **Emergency stop** button.

   Result:

   - the **Emergency stop** button should be pressed down in the OFF position,
   - the platform display screen should go off.
3. Pull the **Emergency stop** button or turn it clockwise and release it.

   Result:

   - the **Emergency stop** button should be in the ON position,
   - the platform display screen must come on and the power-up cycle must be displayed,
   - the drive fans in the chassis and under the left turntable cover should be running at high speed,
   - the audible alarm should sound once,
   - secondary protection system SPS: the SPS flashing light must flash several times and then go out.
4. Wait for the power-up cycle to complete.

   Result:

   - the drive fans in the chassis and under the left turntable cover should stop.
5. Raise the jib arm, at the same time pressing the **Emergency stop** button.

   Result:

   - the jib arm should stop,
   - the **Emergency stop** button should be pressed down in the OFF position.
6. Release the **Jib arm** switch.
7. Pull the **Emergency stop** button or turn it clockwise and release it to put it in the on position.
8. Wait for the power-up cycle to complete.
9. Fully lower the jib arm.

3.3.5.9 Testing the horn

The machine is powered up.

The machine is in transport position.

The turntable and the platform are in the neutral position.

The jib arm is completely lowered.

The operator is in the platform.

1. Press and release the **Horn** button.

   Result:

   - the horn should sound.

3.3.5.10 Testing platform/jib arm tilting from the platform

⚠ WARNING

Risk of falling

Do not tilt the platform/jib arm up and down too much during this test.

The machine is powered up.

The machine is in transport position.

The turntable and the platform are in the neutral position.

The jib arm is completely lowered.

The operator is in the platform.

The transport pictogram must appear on the platform display screen.

1. Do not touch the foot switch.
2. Try to tilt the platform/jib arm up and down.

   Result:

   - it should not be possible to activate the functions.
3. Press and hold down the foot switch.
4. Raise the jib arm slightly.
5. Tilt the platform/jib arm up and down slightly.

   Result:

- it should be possible to activate the functions.

6. Raise the main arm for 4 seconds.

   Result:

   - it should be possible to activate the function,
   - the work pictogram must appear on the platform display screen.

7. Try to tilt the platform/jib arm up and down.

   Result:

   - it should not be possible to activate the functions.

8. Fully lower the main arm.

   Result:

   - the transport pictogram must appear on the platform display screen.

9. Level the platform/jib arm.
10. Fully lower the jib arm.
11. Release the foot switch.

3.3.5.11 Testing the machine's functions from the platform

The machine is powered up.

The machine is in transport position.

The turntable and the platform are in the neutral position.

The jib arm is completely lowered.

The operator is in the platform.

Do not drive or steer the machine during this test.

Do not tilt the platform/jib arm up and down during this test.

1. Do not touch the foot switch.
2. Try to activate all the machine's functions one by one.

   Result:

   - it should not be possible to activate any of the functions.

3. Press and hold down the foot switch.
4. Activate all the machine's functions one by one and check that all the movements are complete and stop at the mechanical stops.

   Result:

   - it should be possible to activate all the functions,
   - all the movements must operate correctly and smoothly,
   - all the movements must be complete up to the mechanical stops.

5. Place the machine in the transport position.
6. Put the turntable in neutral position.
7. Put the platform in neutral position.
8. Level the platform/jib arm.
9. Fully lower the jib arm.
10. Release the foot switch.

3.3.5.12 Testing the driving/steering functions from the platform

The machine is powered up.

The machine is in transport position.

The turntable and the platform are in the neutral position.

The jib arm is completely lowered.

The front and rear wheels are aligned.

The operator is in the platform.

1. Set the **Steering mode** switch to 2-wheel steer.
2. Test the foot switch and the **Activation** trigger.

   a. Do not touch the foot switch or the **Activation** trigger. Try to drive and steer the machine.

   b. Do not touch the foot switch. Press and hold the **Activation** trigger. Try to drive and steer the machine.

   c. Press and hold the foot switch but do not touch the **Activation** trigger. Try to drive and steer the machine.

   Result:

   - it should not be possible to activate the functions.

3. Set the **Driving speed** switch to the hare position.
4. Raise the jib arm slightly for better visibility.
5. Press and hold down the foot switch.
6. Press and hold down the **Activation** trigger.
7. Drive the machine forward, test the steering and brake.

   Assess and remember the machine's braking distance.

   Result:

- it should not be possible to activate the driving/steering functions,
- driving and steering should function properly and smoothly,
- the brakes should function properly,
- the driving speed must be hare speed.

8. Reverse the machine for a short distance and brake.

   Result:

   - it should be possible to activate the driving function,
   - driving should function properly and smoothly,
   - the brakes should function properly,
   - reverse speed reduction in hare mode deactivated: driving speed must be hare speed,
   - reverse speed reduction in hare mode activated: driving speed must be reduced speed.

9. Set the **Driving speed** switch to the tortoise position.
10. Drive the machine forward, test the steering and brake.

    Assess and remember the machine's braking distance.

    Result:

    - it should not be possible to activate the driving/steering functions,
    - driving and steering should function properly and smoothly,
    - the brakes should function properly,
    - the driving speed must be tortoise speed.

11. Reverse the machine for a short distance and brake.

    Result:

    - it should be possible to activate the driving function,
    - driving should function properly and smoothly,
    - the brakes should function properly,
    - the driving speed must be tortoise speed.

12. Align the front wheels.

    Result:

    - the wheels aligned pictogram must appear on the platform display screen.

13. Release the **Activation** trigger.
14. Release the foot switch.

3.3.5.13 Testing steering modes from the platform

The machine is powered up.

The machine is in transport position.

The turntable and the platform are in the neutral position.

The jib arm is slightly raised.

Tortoise speed is selected.

2-wheel steer mode is selected.

The front and rear wheels are aligned.

The operator is in the platform.

1. Set the **Steering mode** switch to 4-wheel steer.
2. Set the **Driving speed** switch to the hare position.
3. Drive the machine forward, test the steering and brake.

   Result:

   - it should not be possible to activate the driving/steering functions,
   - steering mode selection should function properly,
   - driving and steering should function properly and smoothly,
   - the brakes should function properly,
   - the driving speed must be tortoise speed.

4. Reverse the machine for a short distance and brake.

   Result:

   - it should be possible to activate the driving function,
   - driving should function properly and smoothly,
   - the brakes should function properly,
   - the driving speed must be tortoise speed.

5. Align the front and rear wheels.

   Result:

   - the wheels aligned pictogram must appear on the platform display screen.

6. Set the **Steering mode** switch to crab position.
7. Drive the machine forward, test the steering and brake.

   Result:

   - it should not be possible to activate the driving/steering functions,

- steering mode selection should function properly,
- driving and steering should function properly and smoothly,
- the brakes should function properly,
- the driving speed must be hare speed.

8. Reverse the machine for a short distance and brake.

   Result:

   - it should be possible to activate the driving function,
   - driving should function properly and smoothly,
   - the brakes should function properly,
   - reverse speed reduction in hare mode deactivated: driving speed must be hare speed,
   - reverse speed reduction in hare mode activated: driving speed must be reduced speed.

9. Align the front and rear wheels.

   Result:

   - the wheels aligned pictogram must appear on the platform display screen.

10. Set the **Steering mode** switch to 2-wheel steer.

3.3.5.14 Testing the working speed from the platform

The machine is powered up.

The machine is in transport position.

The turntable and the platform are in the neutral position.

The jib arm is slightly raised.

Hare speed is selected.

2-wheel steer mode is selected.

The front and rear wheels are aligned.

The operator is in the platform.

The transport pictogram must appear on the platform display screen.

1. Set the **Driving speed** switch to the tortoise position.
2. Drive the machine forward for a short distance and brake.

   Assess and remember the machine's braking distance.

3. Raise the main arm for 4 seconds.

   Result:

   - the work pictogram must appear on the platform display screen.

4. Drive the machine forward for a short distance and brake.

   Result:

   - the driving speed must be working speed.

5. Fully lower the main arm.

   Result:

   - the transport pictogram must appear on the platform display screen.

6. Drive the machine forward for a short distance and brake.

   Result:

   - the driving speed must be tortoise speed.

7. Raise the secondary arm for 4 seconds.

   Result:

   - the work pictogram must appear on the platform display screen.

8. Drive the machine forward for a short distance and brake.

   Result:

   - the driving speed must be working speed.

9. Fully lower the secondary arm.

   Result:

   - the transport pictogram must appear on the platform display screen.

10. Drive the machine forward for a short distance and brake.

    Result:

    - the driving speed must be tortoise speed.

11. Extend the telescopic arm for 4 seconds.

    Result:

    - the work pictogram must appear on the platform display screen.

12. Drive the machine forward for a short distance and brake.

    Result:

    - the driving speed must be working speed.

13. Fully retract the telescopic arm.

    Result:

    - the transport pictogram must appear on the platform display screen.

14. Drive the machine forward for a short distance and brake.

    Result:

    - the driving speed must be tortoise speed.

3.3.5.15 Testing the differential lock from the platform

The machine is powered up.

The machine is in transport position.

The turntable and the platform are in the neutral position.

The jib arm is slightly raised.

Tortoise speed is selected.

2-wheel steer mode is selected.

The front and rear wheels are aligned.

The operator is in the platform.

1. Press and hold down the **Differential lock** button.
2. Drive the machine forward and steer fully to the left or right.

   Result:

   - the differential locked pictogram must be displayed,
   - the rear right-hand wheel or the rear left-hand wheel should slip.
3. Align the front wheels.
4. Release the **Differential lock** button and brake the machine.

   Result:

   - the differential unlocked pictogram must be displayed.
5. Drive the machine forward and steer fully to the left or right.

   Result:

   - the wheel should no longer slip.
6. Align the front wheels.
7. Brake the machine.

3.3.5.16 Testing the turntable slewing alert from the platform

The machine is powered up.

The machine is in transport position.

The turntable and the platform are in the neutral position.

The jib arm is slightly raised.

Tortoise speed is selected.

2-wheel steer mode is selected.

The front and rear wheels are aligned.

The operator is in the platform.

1. Set the **Driving speed** switch to the hare position.
2. Turn the turntable to the left so that the turntable angle is greater than 90° relative to the neutral position.

   Result:

   - the ‘slewing greater than’ pictogram must be displayed.
3. Try to drive the machine forward or backward.

   Result:

   - it should not be possible to activate the functions,
   - an alert page must be displayed on the platform display screen,
   - the audible alarm should sound twice.
4. Press and release the **Turntable slewing** button.
5. Drive the machine forward/backward and steer left/right, matching the white and black arrows on the control panel in the platform and the “White arrow” and “Black arrow” stickers on the machine chassis.

   Result:

   - it should not be possible to activate the driving/steering functions,
   - the driving speed must be reduced speed,
   - the white and black arrows on the control panel in the platform and the “White arrow” and “Black arrow” stickers on the machine chassis must enable the machine to be driven and steered in the desired direction.
6. Brake the machine.
7. Turn the turntable to the right so that the turntable angle is less than 90° relative to the neutral position.

   Result:

   - the ‘slewing less than’ pictogram must be displayed.
8. Turn the turntable to the right so that the turntable angle is greater than 90° relative to the neutral position.

   Result:

- the ‘slewing greater than’ pictogram must be displayed.

9. Try to drive the machine forward or backward.

   Result:

   - it should not be possible to activate the functions,
   - an alert page must be displayed on the platform display screen,
   - the audible alarm should sound twice.

10. Press and release the **Turntable slewing** button.
11. Drive the machine forward/backward and steer left/right, matching the white and black arrows on the control panel in the platform and the “White arrow” and “Black arrow” stickers on the machine chassis.

    Result:

    - it should not be possible to activate the driving/steering functions,
    - the driving speed must be reduced speed,
    - the white and black arrows on the control panel in the platform and the “White arrow” and “Black arrow” stickers on the machine chassis must enable the machine to be driven and steered in the desired direction.

12. Turn the turntable to the left so that the turntable angle is less than 90° relative to the neutral position.

    Result:

    - the ‘slewing less than’ pictogram must be displayed.

13. Put the turntable in neutral position.
14. Align the front wheels.

3.3.5.17 Testing the tilt sensor calibration

The machine is powered up.

The machine is in transport position.

The turntable and the platform are in the neutral position.

The jib arm is slightly raised.

Hare speed is selected.

2-wheel steer mode is selected.

The front and rear wheels are aligned.

The operator is in the platform.

1. Select a slope between 3.5% (2°) and 6% (3.5°).
2. Drive the machine forward slowly onto the slope, facing it, with the platform at the bottom of the slope.

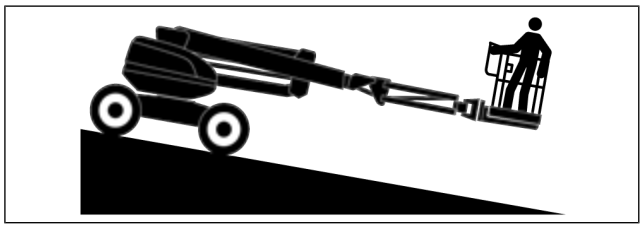


Figure 31: Machine on a slope

3. Brake the machine on the slope.
4. Fully lower the jib arm.
5. Get out of the platform.
6. Open the right-hand turntable cover.
7. Access the “Diagnostics” menu, then the “General info” sub-menu on the ground-level display screen.
8. Place a calibrated digital inclinometer under the turntable on the hatched area (1), as close as possible to the ring gear.

Figure 32: Tilt sensor calibration test

9. Compare the value displayed on the inclinometer with the value “TS101” or “TS102” displayed on the ground-level display screen.

   Result:

   - the values must be within ±0.3° for both.

10. Remove the inclinometer.
11. Return to the work page.
12. Get into the platform.
13. Raise the jib arm slightly.
14. Reverse slowly to drive the machine off the slope onto a level surface.

3.3.5.18 Testing the tilting warning from the platform

The machine is powered up.

The machine is in transport position.

The turntable and the platform are in the neutral position.

The jib arm is slightly raised.

Hare speed is selected.

2-wheel steer mode is selected.

The front and rear wheels are aligned.

The operator is in the platform.

The transport pictogram must appear on the platform display screen.

The tilting pictogram must appear on the platform display screen.

1. Select a slope between 10.5% (6°) and 35% (19°).
2. Test the tilting warning in the transport position.
   a. Set the **Driving speed** switch to the tortoise position.
   b. Raise the jib arm to the horizontal position.
   c. Drive the machine forward slowly onto the slope, facing it, with the platform at the bottom of the slope.

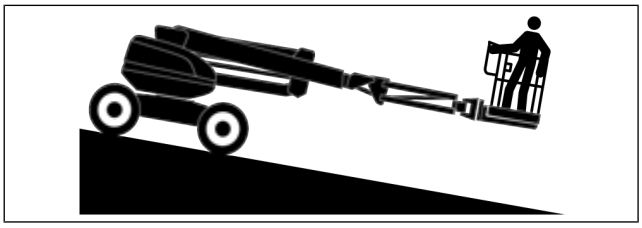


Figure 33: Machine on a slope

   Result:
   - the tilting indicator lamp should flash,
   - the audible alarm should sound intermittently.

   d. Brake the machine on the slope.

   Result:
   - the brakes should function properly,
   - the machine should come to rest on the slope for at least 1 minute.

   e. Try to raise the main arm, raise the secondary arm and extend the telescopic arm.

   Result:
   - it should not be possible to activate the functions.

   f. Reverse slowly to drive the machine off the slope onto a level surface.

   Result:
   - the tilting indicator lamp should go out,
   - the audible alarm should stop.

   g. Brake the machine.
3. Test the tilting warning in the working position.
   a. Extend the telescopic arm for 4 seconds.

   Result:
   - the work pictogram must appear on the platform display screen.

   b. Drive the machine forward slowly onto the slope, facing it, with the platform at the bottom of the slope.

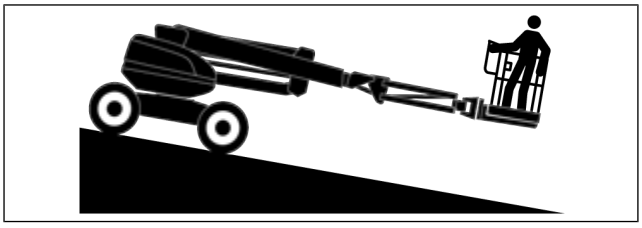


Figure 34: Machine on a slope

   Result:
   - the machine should brake automatically,
   - the tilting indicator lamp should flash,
   - an alert page must be displayed on the platform display screen,
   - the work tilting pictogram must appear on the platform display screen,
   - the audible alarm should sound intermittently.

   c. Try to raise the main arm and the secondary arm, to extend the telescopic arm and to drive/steer the machine.

   Result:
   - it should not be possible to activate the functions.

   d. Fully retract the telescopic arm.

   Result:
   - it should be possible to activate the function,
   - the alert page should no longer be displayed,
   - the transport pictogram must appear on the platform display screen,
   - the tilting pictogram must appear on the platform display screen.

   e. Reverse slowly to drive the machine off the slope onto a level surface.

   Result:

- the tilting indicator lamp should go out,
- the audible alarm should stop.

f. Brake the machine.

g. Fully lower the jib arm.

h. Get out of the platform.

3.3.5.19 Testing oscillating axle locking from the platform

The machine is powered up.

The machine is in transport position.

The turntable and the platform are in the neutral position.

The jib arm is completely lowered.

Tortoise speed is selected.

2-wheel steer mode is selected.

The front and rear wheels are aligned.

The operator is in the platform.

1. Place a sufficiently solid ramp in front of the right front wheel.

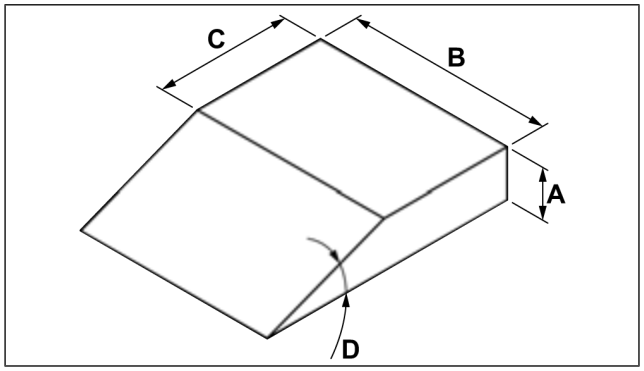


Figure 35: Ramp

Item	Value
A	7.5 cm (3 in.) minimum, 9 cm (3.5 in.) maximum
B	60 cm (24 in.) minimum
C	75 cm (30 in.) minimum, 100 cm (40 in.) maximum
D	10° minimum, 25° maximum

2. Get into the platform.

   The transport pictogram must appear on the platform display screen.

3. Raise the jib arm slightly.
4. Drive the machine slowly forward until the right front wheel is at the top of the ramp.
5. Brake the machine.
6. Turn the turntable 90° to the left.
7. Extend the telescopic arm for 4 seconds.

   Result:

   - the work pictogram must appear on the platform display screen.
8. Reverse the machine slowly until the wheel is off the slope.
9. Brake the machine.
10. Ask someone on the ground to check the right front wheel and the oscillating cylinders.

    Result:

    - the right front wheel should be up and not in contact with the ground,
    - the right oscillating cylinder should be retracted and the left one extended.
11. Ask the person on the ground to move away.
12. Fully retract the telescopic arm.

    Result:

    - the transport pictogram must appear on the platform display screen.
13. Ask the person on the ground to check the front wheels.

    Result:

    - the 2 front wheels must be in contact with the ground.
14. Put the turntable in neutral position.
15. Fully lower the jib arm.
16. Get out of the platform.
17. Place the ramp in front of the left front wheel.
18. Get into the platform.

    The transport pictogram must appear on the platform display screen.

19. Raise the jib arm slightly.
20. Drive the machine slowly forward until the left front wheel is at the top of the ramp.
21. Brake the machine.
22. Turn the turntable 90° to the right.
23. Extend the telescopic arm for 4 seconds.

    Result:

    - the work pictogram must appear on the platform display screen.
24. Reverse the machine slowly until the wheel is off the slope.
25. Brake the machine.

26. Ask someone on the ground to check the left front wheel and the oscillating cylinders.

    Result:

    - the left front wheel should be up and not in contact with the ground,
    - the left oscillating cylinder should be retracted and the right one extended.

27. Ask the person on the ground to move away.
28. Fully retract the telescopic arm.

    Result:

    - the transport pictogram must appear on the platform display screen.

29. Ask the person on the ground to check the front wheels.

    Result:

    - the 2 front wheels must be in contact with the ground.

30. Put the turntable in neutral position.
31. Fully lower the jib arm.
32. Get out of the platform.
33. Switch off the machine.

3.3.5.20 Testing the 110 V electric power socket in the platform

⚠ DANGER

Risk of electrocution

Connect the plug to a 110 V/60 Hz power source delivering 15 A.
Only connect electrical appliances that work with 110 V/60 Hz, 15 A maximum.
Do not connect extension cords, power supply bars or plugs with multiple sockets to the electric power sockets.

The machine is powered down.

The machine is in transport position.

The turntable and the platform are in the neutral position.

The jib arm is completely lowered.

1. Connect the plug to a power source.
2. Get into the platform.
3. Plug an electrical appliance into the first outlet of the electric power socket.
4. Switch on the electrical appliance.

   Result:

   - the electrical appliance should operate.

5. Switch off the electrical appliance.
6. Plug the electrical appliance into the second outlet of the electric power socket.
7. Switch on the electrical appliance.

   Result:

   - the electrical appliance should operate.

8. Switch off the electrical appliance.
9. Disconnect the electrical appliance.
10. Get out of the platform.
11. Disconnect the electrical plug.

3.3.5.21 Testing the secondary protection system SPS from the platform

The machine is powered down.

The machine is in transport position.

The turntable and the platform are in the neutral position.

The jib arm is completely lowered.

1. Switch on the machine.

   Result:

   - the audible alarm should sound once,
   - the SPS flashing light should flash several times and then go out.

2. Get into the platform.
3. Check the condition of the SPS safety cable.

   If there is doubt about its condition, have it replaced by a service technician approved by the Manitou network.

4. Raise the jib arm slightly.
5. Extend the telescopic arm for 4 seconds.
6. Raise the jib arm, at the same time pushing the SPS safety cable forward.
7. Release the **Jib arm** switch and the SPS safety cable.

   Result:

   - the jib arm should stop,
   - the SPS flashing light should flash,
   - an alert page must be displayed on the platform display screen,
   - the horn should sound intermittently.

8. Try to activate all the machine's functions one by one.

   Result:

- it should not be possible to activate any of the functions.

9. Press and release the **SPS Reset** button.

   Result:

   - the SPS flashing light should go out,
   - the alert page should no longer be displayed,
   - the horn should stop.

10. Fully retract the telescopic arm.

    Result:

    - it should be possible to activate the function.

11. Extend the telescopic arm for 4 seconds.
12. Raise the jib arm, at the same time pushing and holding the SPS safety cable forward.
13. Release the **Jib arm** switch without releasing the SPS safety cable.

    Result:

    - the jib arm should stop,
    - the SPS flashing light should flash,
    - an alert page must be displayed on the platform display screen,
    - the horn should sound intermittently.

14. Press and release the **SPS Reset** button without releasing the SPS safety cable.
15. Fully retract the telescopic arm.

    Result:

    - it should be possible to activate the function.

16. Release the SPS safety cable.

    Result:

    - the SPS flashing light should go out,
    - the alert page should no longer be displayed,
    - the horn should stop.

17. Fully lower the jib arm.
18. Get out of the platform.
19. Switch off the machine.

3.4. EMERGENCY STOP

3.4.1 USING THE EMERGENCY STOP

- Press the **Emergency Stop** button to stop all machine functions in the event of an error or dangerous situation.

  *The machine functions may stop abruptly when the **Emergency stop** button is pressed.*

3.5. CHARGING THE HIGH-VOLTAGE BATTERIES AND THE 12 V BATTERY

⚠ DANGER

Risk of electrocution

Always connect the battery charger to a
110 V/60 Hz power source delivering 15 A
protected by a 30 mA residual-current circuit breaker.

⚠ WARNING

Fire hazard

Do not connect the battery charger to a domestic power socket. It should instead be connected to a reinforced socket that can deliver a power of 3.7 kW.
Always use a suitable extension cord that can deliver power of 3.7 kW.

⚠ WARNING

Risk of electrocution and explosion.

Always charge the high-voltage batteries in a well-ventilated area, protected from sunlight and rain.
Do not charge the high-voltage batteries if the electrolyte temperature is above 40 °C (104 °F).
Always leave the left and right battery covers open when charging the batteries.
No flames or sparks. Do not smoke near to the batteries during charging.
Make sure that the positive terminals cannot come into contact with the negative terminals or the metallic parts of the machine at any time.

NOTICE

Risk of high-voltage battery damage

The machine must be parked on a level surface.
Do not interrupt the charging cycle. Refer to the information on the ground-level display screen.
Do not charge the batteries during a lightning storm.
Do not leave the battery charger connected during an electrical storm.
We recommend that you always charge high-voltage batteries to 100% to preserve their life.

The integrated battery charger is designed to charge the high-voltage batteries and the 12 V battery.

It is recommended to charge the high-voltage batteries at the end of each day of use only if the charge level is below 30%.

The charging time from 20% to 100% is approximately 11 hours.

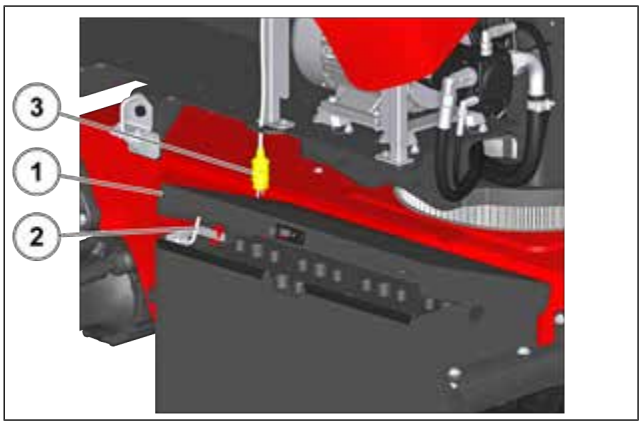


Figure 36: Electrical plug for battery chargers and high-voltage batteries

1. Park the machine, referring to “Operating the machine: Parking and storing the machine: Parking the machine”.
2. Open the left and right battery covers (1) and hold them open with the support legs (2).
3. Plug the battery charger’s plug (3) into a power source.

   Result:

   - the charging cycle should start. Refer to “Familiarization: Ground-level display screen: Battery charger page”.

   The platform display screen is off when the battery charger is switched on.
4. Wait until the charging cycle is complete. Refer to “Familiarization: Ground-level display screen: Battery charger page”.
5. Disconnect the battery charger’s electrical plug.
6. Switch on the machine.
7. Check the electrolyte level of the high-voltage batteries, see “Operating the machine: Before using the machine: Routine maintenance: Checking the high-voltage battery charge level”.
8. Close the left and right battery covers.
9. Switch off the machine.
10. Check the electrolyte level of the high-voltage batteries, see “Operating the machine: Before using the machine: Routine maintenance: Checking the high-voltage battery electrolyte level”.

    Only add distilled water to high-voltage batteries after 10 complete charging cycles.

3.6. OPERATION FROM THE GROUND

3.6.1 LOCKING AND UNLOCKING THE TURNTABLE IN NEUTRAL POSITION

Locking the turntable in neutral position prevents it from rotating.

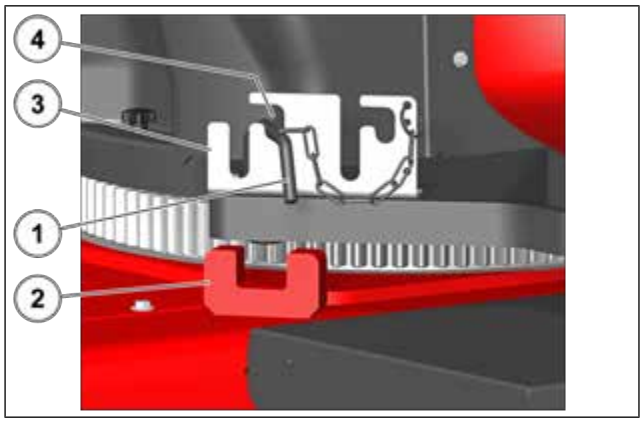


Figure 37: Turntable unlocked in neutral position

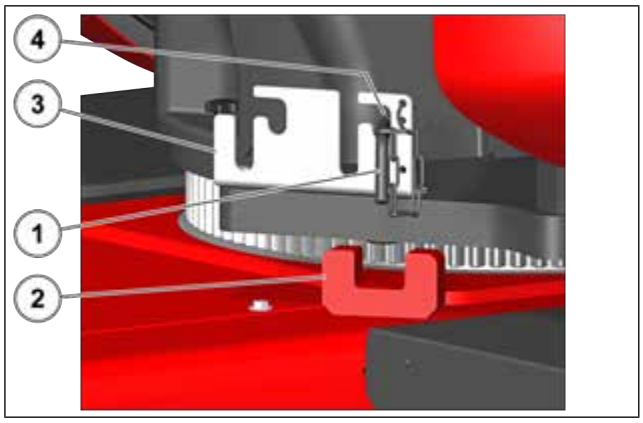


Figure 39: Turntable unlocked at 12°

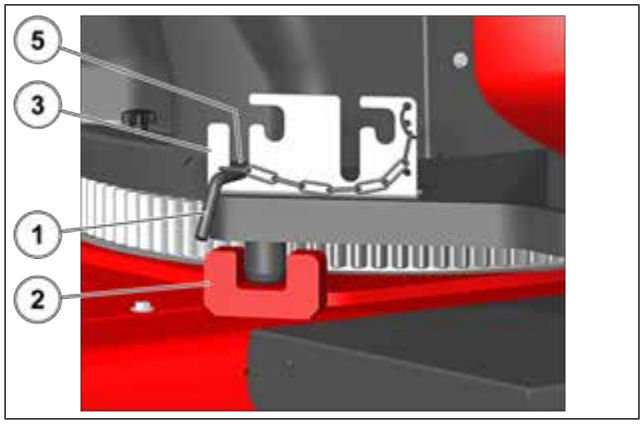


Figure 38: Turntable locked in neutral position

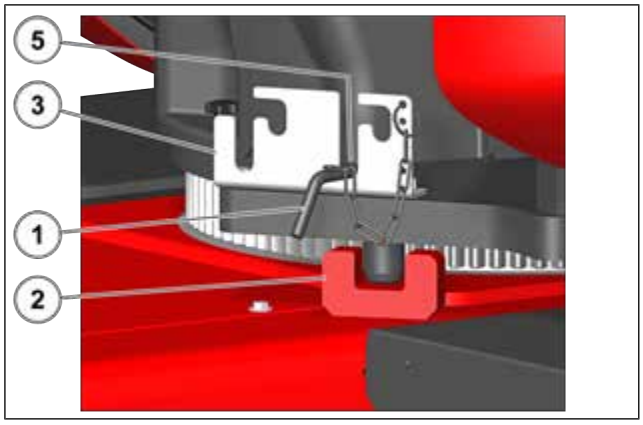


Figure 40: Turntable locked at 12°

- **Lock the turntable in neutral position.**
  a. Insert the turntable locking pin (1) into the hole in the turntable aligned with the notches (4) and (5) in the locking bracket (3).
  b. Insert the handle of the turntable locking pin into the notch (4) in the locking bracket (3).
  c. Put the turntable in neutral position to align the turntable locking pin with the notch (2) in the chassis.
  d. Pull the turntable locking pin up and turn it to the left, with its handle aligned with the notch (5).
  e. Push the turntable locking pin down into the notch in the chassis.
- **Unlock the turntable in neutral position.**
  a. Pull the turntable locking pin (1) up and turn it to the right, with its handle aligned with the notch (4) in the locking bracket (3).
  b. Push it down into the notch (4).

3.6.2 LOCKING AND UNLOCKING THE TURNTABLE AT 12°

The 12° turntable lock prevents rotation when the machine is lifted.

- **Lock the turntable at 12°.**
  a. Insert the turntable locking pin (1) into the hole in the turntable aligned with the notches (4) and (5) in the locking bracket (3).
  b. Insert the handle of the turntable locking pin into the notch (4) in the locking bracket (3).
  c. Turn the turntable 12° to the left from neutral position to align the turntable locking pin with the notch (2) in the chassis.
  d. Pull the turntable locking pin up and turn it to the left, with its handle aligned with the notch (5).
  e. Push the turntable locking pin down into the notch in the chassis.
- **Unlock the turntable at 12°.**
  a. Pull the turntable locking pin (1) up and turn it to the right, with its handle aligned with the notch (4) in the locking bracket (3).
  b. Push it down into the notch (4).

3.6.3 OPERATING THE 12 V BATTERY CONNECTOR

NOTICE

Risk of data corruption

Wait at least 10 seconds before disconnecting the 12 V battery connector after turning the key switch to the off position.

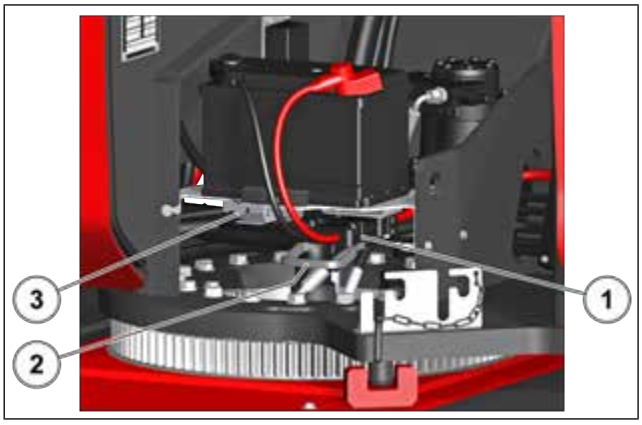


Figure 41: 12 V battery connector connected

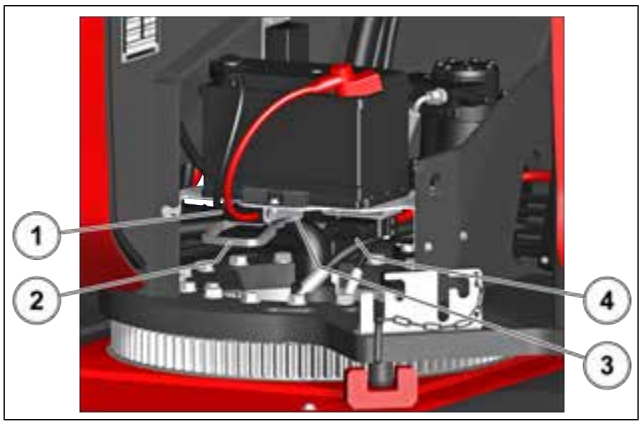


Figure 42: 12 V battery connector disconnected

- **Connect the 12 V battery connector (1).**
  a. Turn the ignition switch to the OFF position.
  b. Remove the 12 V battery cover.
  c. Pull the 12 V battery connector out of the housing (3) by the handle (2).
  d. Connect the 12 V battery connector to the 12 V connector (4) on the machine.
  e. Put the 12 V battery cover back in place.
- **Disconnect the 12 V battery connector (1).**
  a. Turn the ignition switch to the OFF position.
  b. Remove the 12 V battery cover.
  c. Pull the 12 V battery connector by the handle (2).
  d. Place the 12 V battery connector in the housing (3).

  The 12 V battery connector can be locked in the housing with a padlock.
  e. Put the 12 V battery cover back in place.

3.6.4 SWITCHING THE MACHINE ON FROM THE GROUND

1. Ensure that the **emergency stop** button on the ground is in the ON position.
2. Ensure that the **Emergency stop** button in the platform is in the ON position.
3. Make sure the 12 V battery connector is plugged in.
4. Turn the ignition switch to the ON position.

   Result:
   - the ground-level display screen comes on and the power-up cycle is displayed,
   - the drive fans in the chassis and under the left-hand turntable cover run at high speed and stop when the power-up cycle is complete,
   - permanent orange rotating beacon light activated: the orange rotating beacon light comes on,
   - secondary protection system SPS: the SPS flashing light flashes several times and then goes out.

3.6.5 SWITCHING THE MACHINE OFF FROM THE GROUND

- Turn the ignition switch to the OFF position.

3.6.6 POSITIONING THE PLATFORM FROM THE GROUND

1. Switch on the machine.
2. Unlock the turntable in neutral position, referring to “Operating the machine: Operation from the ground: Locking and unlocking the turntable in neutral position”.

   The turntable must be locked in neutral position when the machine is being transported.

   The turntable must be locked at 12° during lifting of the machine.
3. Push and hold the **Activation** switch to the right.

4. Use the appropriate control buttons to position the platform.
5. Release the **Activation** switch.

3.6.7 USING THE HYDRAULIC OIL HEATER

⚠ DANGER

Risk of electrocution

Always plug the hydraulic oil heater into a 110 V/60 Hz power source delivering 15 A protected by a 30 mA residual-current circuit breaker.

NOTICE

Risk of damage to the machine

Before connecting the hydraulic oil heater:

- make sure the machine is in the transport position and the jib arm is completely lowered,
- make sure that the hydraulic oil level is correct,
- ensure that the machine is switched off.

The hydraulic oil heater is designed to heat the hydraulic oil when the ambient temperature is below -10 °C (14 °F).

The heating time depends on the ambient temperature and other factors. Adjust the heating time by observing the machine's operating conditions.

1. Open the LH turntable cover.
2. Locate the electrical plug (1).

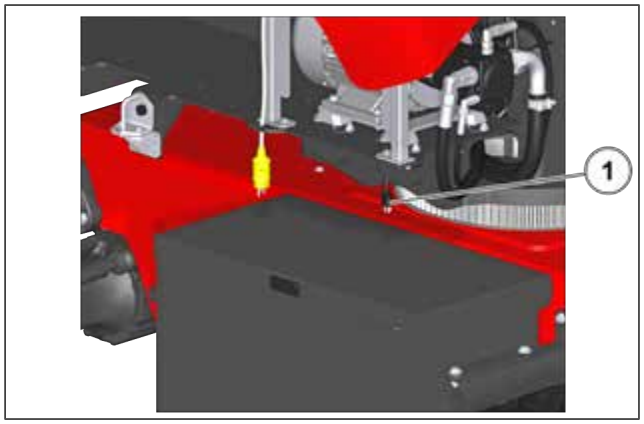


Figure 43: Electrical plug for hydraulic oil heater

3. Connect the plug to a power source.
4. Wait for the desired heating time and disconnect the electrical plug.
5. Close the left-hand turntable cover.

3.7. OPERATION FROM THE PLATFORM

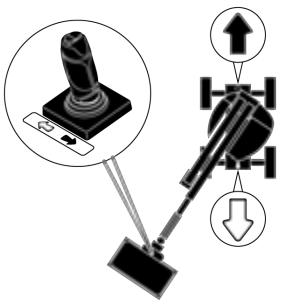
3.7.1 SWITCHING THE MACHINE ON AND OFF FROM THE PLATFORM

- Refer to "Operating the machine: Operation from the ground: Switching the machine on from the ground" and "Operating the machine: Operation from the ground: Switching the machine off from the ground".

3.7.2. DRIVING THE MACHINE

3.7.2.1 Driving, steering and braking the machine

⚠ DANGER



Driving direction risk

Always refer to the "White arrow" and "Black arrow" stickers on the machine's chassis and the white and black arrows on the control panel in the platform before driving and steering the machine.

NOTICE

Risk of damage to the machine

Always brake the machine before selecting the driving speed.
Always brake the machine before selecting the steering mode.

1. Switch on the machine.

2. Unlock the turntable in neutral position, referring to “Operating the machine: Operation from the ground: Locking and unlocking the turntable in neutral position”.

   The turntable must be locked in neutral position when the machine is being transported.

   The turntable must be locked at 12° during lifting of the machine.

3. Set the **Driving speed** switch to the desired speed.
4. Set the **Steering mode** switch to the desired steering mode.

   The front and rear wheels must be aligned before changing steering mode. Refer to “Operating the machine: Operation from the platform: Driving the machine: Aligning the front and rear wheels”.

5. Press and hold down the foot switch.
6. Press and hold down the **Activation** trigger on the **Driving/steering** control handle.
7. Use the **Driving/steering** control handle to drive, steer and brake the machine.
8. Release the **Activation** trigger.
9. Release the foot switch.

3.7.2.2 Aligning the front and rear wheels

Follow this procedure when the front and rear wheels are not correctly aligned with the machine axis.

1. Select 2-wheel steer mode.
2. Align the front wheels.
3. Select 4-wheel steer mode.
4. Align the rear wheels.
5. Select 2-wheel steer mode.
6. Align the front wheels.

3.7.2.3 Using the differential lock

NOTICE

Risk of damage to the machine

Always brake the machine before locking the differential.
Always align the front and rear wheels with the machine axis before locking and unlocking the differential.

- **Lock the differential.**
  a. Press and hold down the **Differential lock** button and then drive the machine.

     Result:

     - the differential locked pictogram is displayed.

- **Unlock the differential.**
  a. Release the **Differential lock** button and then brake the machine.

     OR

  b. Brake the machine, then release the **Differential lock** button.

  Result:

  - the differential unlocked pictogram is displayed.

3.7.2.4 Driving the machine over long distances

1. Place the machine in the transport position.
2. Put the turntable in neutral position.
3. Put the platform in neutral position.
4. Raise the jib arm slightly for better visibility.
5. Select hare speed.
6. Select 2-wheel steer mode.
7. Drive the machine forward.

3.7.2.5 Driving the machine on a slope

⚠ DANGER

Risk of runaway

Always measure the slope before driving: use a digital inclinometer or refer to the procedure below.
Do not drive the machine on slopes exceeding the maximum permitted gradient.
Refer to “Operating the machine: Transporting and lifting the machine” if the slope exceeds the maximum authorized slope.

- **Measure a slope.**

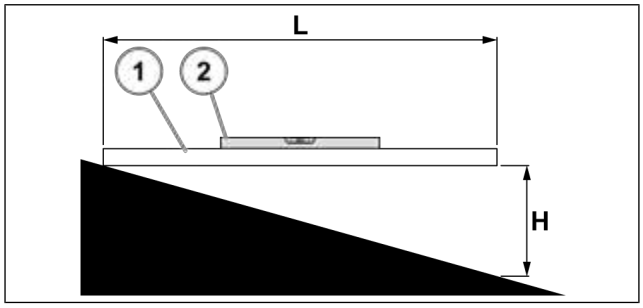


Figure 44: Slope measurement

a. Place a piece of wood (1) and level it with a spirit level (2).

Piece of wood (1) at least 90 cm (36") long.

Spirit level (2) at least 30 cm (12") long.

b. Measure L and H.

H is the height perpendicular to the leveled piece of wood.

c. Divide H by L.

d. Multiply the result by 100.

Example:

- L = 122 cm (48 in),
- H = 25 cm (10 in),
- slope value = (H/L) x 100 = (25/122) x 100 = 20.5%.

- **Drive the machine on the slope.**

a. Place the machine in the transport position.

b. Put the turntable in neutral position.

c. Put the platform in neutral position.

d. Raise the jib arm slightly for better visibility.

e. Select tortoise speed.

f. Select 2-wheel steer mode.

g. Drive the machine on the slope.

We recommend that you drive the machine facing the slope.

3.7.3 POSITIONING THE PLATFORM FROM THE PLATFORM

⚠ WARNING

Risk of falling

Make sure that the platform is level before putting the machine in the working position.

1. Switch the machine on from the ground.
2. Unlock the turntable in neutral position, referring to "Operating the machine: Operation from the ground: Locking and unlocking the turntable in neutral position".

The turntable must be locked in neutral position when the machine is being transported.

The turntable must be locked at 12° during lifting of the machine.

3. Get into the platform.
4. Press and hold down the foot switch.
5. If necessary, tilt the platform/jib arm up or down to level the platform.

The platform/jib arm tilt-up and tilt-down functions are locked when the machine is in the working position.

6. Use the appropriate switches and control handles to position the platform.
7. Release the foot switch.

3.7.4 USING THE 110 V ELECTRIC POWER SOCKET IN THE PLATFORM

⚠ DANGER

Risk of electrocution

Always plug the plug into a 110 V/60 Hz power source delivering 15 A protected by a 30 mA residual-current circuit breaker.
Only plug electrical appliances that work with 110 V/ 60 Hz, 15 A maximum into the electric power socket.
Do not connect extension cords, power supply bars or plugs with multiple sockets to the electric power sockets.

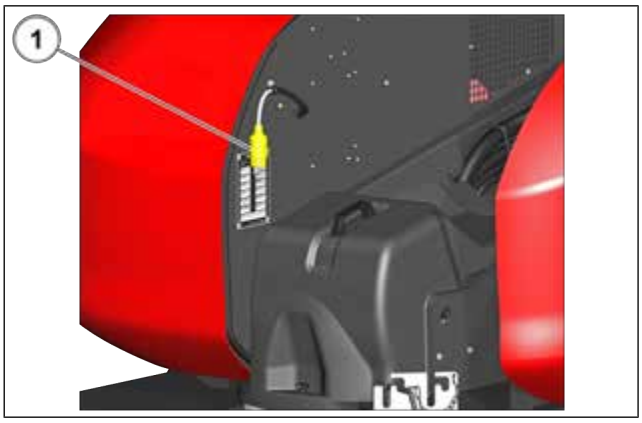


Figure 45: Electrical plug and electrical box

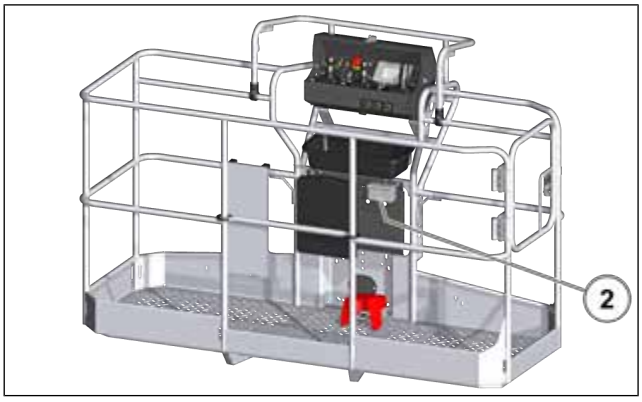


Figure 46: Electric power socket

1. Plug the electrical plug (1) into a power source.
2. Plug 1 or 2 electrical appliances into the electric power socket (2).
3. Power on the electrical appliances.
4. Power down the electrical appliances when the work has been completed.
5. Disconnect the electrical plug.

Reset the residual-current circuit breaker.

The electric power socket (2) is fitted with a residual-current circuit breaker.

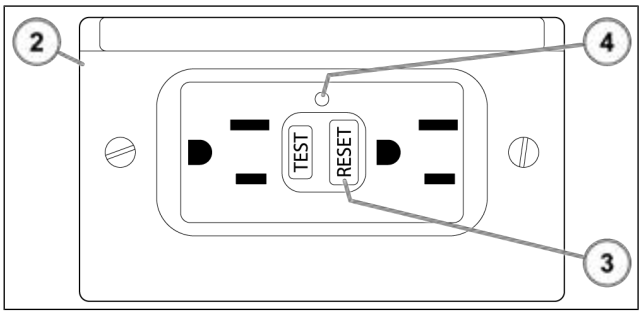


Figure 47: Electric power socket

1. Switch off the electrical appliance.
2. Press the "Reset" button (3) until it stays down.

Contact maintenance personnel if the warning light (4) is flashing.

3.7.5 ADJUSTING THE WORKLIGHT

Figure 48: Worklight

- Use the handle (2) to direct the worklight (1) left, right, up or down.
- Move the worklight (1) along the guardrail.
  a. Loosen the tightening wheel (3).
  b. Move the worklight.
  c. Do the tightening wheel back up.

3.8. PROCEDURE IN THE EVENT OF AN ALERT

- **Stop the overload warning.**

  This procedure must be followed by an operator operating the machine from the ground or from the platform.

  a. Remove the excess load from the platform.
- **Stop the tilting warning in the transport position.**

  This procedure must be followed by an operator operating the machine from the platform when the machine is in the transport position.

  a. Drive the machine onto a level surface.
- **Stop the tilting warning in the working position.**

  This procedure must be followed by an operator operating the machine from the platform when the machine is in the working position.

  a. Fully retract the telescopic arm.
  b. Fully lower the main arm.
  c. Fully lower the secondary arm.
  d. Drive the machine onto a level surface.

- **Unlock the functions in the event of a tilting warning in the working position.**

⚠ DANGER

Risk of tilting

Use this function only when absolutely necessary and with extreme caution.

This procedure must be followed by an operator operating the machine from the platform when the machine is in the working position.

This procedure unlocks the machine's locked functions, with the exception of the forward and reverse functions.

a. Press and hold down the **Unlock** button.
b. Use the machine's functions.
c. Release the **Unlock** button.

- **Stop the turntable slewing warning.**

This procedure must be followed by an operator operating the machine from the platform.

a. Release the **Driving/steering** control handle.

- **Unlock the functions in the event of a turntable slewing alert.**

This procedure must be followed by an operator operating the machine from the platform.

a. Release the **Driving/steering** control handle.
b. Press and release the **Turntable slewing** button.

The turntable slewing alert will occur again if the machine's driving functions are not activated within 5 seconds.

c. Use the machine's driving functions.

- **Stop the secondary protection system SPS alert from the ground.**

⚠ DANGER

Risk of crushing

Operate the machine's functions extremely carefully during clearance attempts.

This procedure must be followed by an operator operating the machine from the ground when the operator in the platform is unable to activate the machine's functions.

a. Push and hold the **Activation** switch to the right.
b. Activate the machine's functions.
c. Press the **SPS Reset** button on the control panel in the platform.

The secondary protection system SPS alert stops when the occupant in the platform is no longer trapped between the SPS safety cable and the structure.

- **Stop the secondary protection system SPS alert from the platform.**

⚠ DANGER

Risk of crushing

Operate the machine's functions extremely carefully during clearance attempts.

This procedure must be followed by an operator operating the machine from the platform.

a. Press and release the **SPS Reset** button.
b. Activate the machine's functions from the platform.

The secondary protection system SPS alert stops when you are no longer trapped between the SPS safety cable and the structure.

- **Stop the maintenance warning.**

This procedure must be followed by an operator operating the machine from the ground or from the platform.

a. Stop using the machine.
b. Refer to the maintenance personnel.

- **Stop the high-voltage battery charge level warning.**

  This procedure must be followed by an operator operating the machine from the ground or from the platform.

  a. Charge the high-voltage batteries, referring to “Operating the machine: Charging the high-voltage batteries and the 12 V battery”.

- **Follow this procedure in the event of another “Information” warning when there is no operator in the platform.**

  This procedure must be followed by an operator operating the machine from the ground when there is no operator in the platform.

  a. Stop using the machine.

  b. Refer to the maintenance personnel.

- **Follow this procedure in the event of another “Information” warning when there is an operator in the platform.**

  This procedure must be followed by an operator operating the machine from the platform.

  a. Fully retract the telescopic arm.

  b. Fully lower the main arm.

  c. Fully lower the secondary arm.

  d. Put the turntable in neutral position.

  e. Put the platform in neutral position.

  f. Drive the machine onto a level surface.

  g. Fully lower the jib arm.

  h. Get out of the platform.

  i. Refer to the maintenance personnel.

3.9. PROCEDURE IN THE EVENT OF A FAULT

- **Follow this procedure in the event of a fault if there is no operator in the platform.**

  This procedure must be followed by an operator operating the machine from the ground when there is no operator in the platform.

  a. Stop using the machine.

  b. Refer to the maintenance personnel.

- **Follow this procedure in the event of a fault if there is an operator in the platform.**

  This procedure must be followed by an operator operating the machine from the platform.

  a. Fully retract the telescopic arm.

  b. Fully lower the main arm.

  c. Fully lower the secondary arm.

  d. Put the turntable in neutral position.

  e. Put the platform in neutral position.

  f. Drive the machine onto a level surface.

  g. Fully lower the jib arm.

  h. Get out of the platform.

  i. Refer to the maintenance personnel.

3.10. USING THE EMERGENCY CONTROLS

3.10.1. PROCEDURE TO FOLLOW IF THE MACHINE IS WORKING

3.10.1.1 Using the priority controls from the ground

⚠ DANGER

Risk of incorrect use

This procedure must be read and understood by any operator on the ground who is likely to activate the machine’s functions from the ground when the operator on the platform is unable to do so.

⚠ DANGER

Risk of overturning and crushing

Activate the machine’s functions with extreme caution and check for obstructions at all times.

- **Follow this procedure when the following conditions are met:**
  - the machine is powered up,
  - the ground-level display screen is turned on.

  a. Push and hold the **Activation** switch to the right.

b. Use the appropriate control buttons to position the platform.

c. Release the **Activation** switch.

- **Follow this procedure when the following conditions are met:**
  - the 12 V battery connector is connected,
  - the ignition key is in the ON position,
  - the **Emergency stop** button on the ground-level control panel in the ON position,
  - the ground-level display screen is off.

  a. Push and hold the **Activation** switch to the right.

  Result:

  - the ground-level display screen comes on.

  b. Wait for the power-up cycle to complete.

  c. Use the appropriate control buttons to position the platform.

  d. Release the **Activation** switch.

3.10.2. WHAT TO DO IF THE MACHINE IS NOT WORKING

3.10.2.1 Using the emergency controls from the ground

⚠ DANGER

Risk of incorrect use

This procedure must be read and understood by any operator on the ground who is likely to activate the machine's functions from the ground when the operator on the platform is unable to do so.

⚠ DANGER

Risk of overturning and crushing

Activate the machine's functions with extreme caution and check for obstructions at all times.
The tilting warning and the overload warning may no longer be active. Do not activate functions likely to overturn or imbalance the machine.

NOTICE

Risk of damage to the backup pump

Do not activate the backup pump for more than 4 minutes at a time, waiting at least 10 minutes between each 4-minute cycle.

- **Follow this procedure if one or more of the following conditions are met:**
  - the ground-level control panel is not functional,
  - The electric pump is not working.

  a. Open the right-hand turntable cover.

  b. Make sure the 12 V battery connector is plugged in.

  c. Locate the various emergency control elements:

  - backup pump button (1),
  - proportional control valve (2) and manual controls (3) to (6),
  - lever (7),

- hydraulic block (8) and electrovalves (9) and (10).

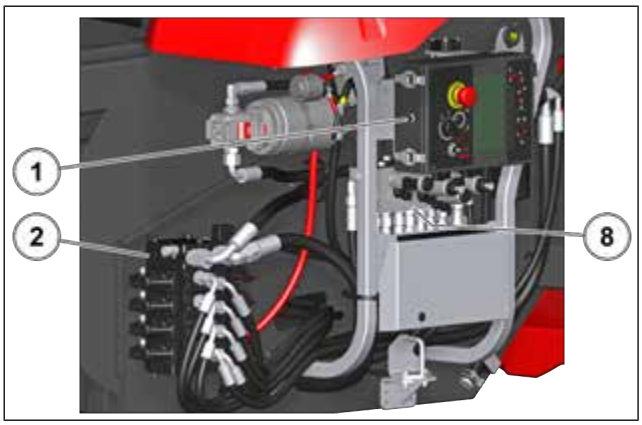


Figure 49: Location of the emergency controls 1

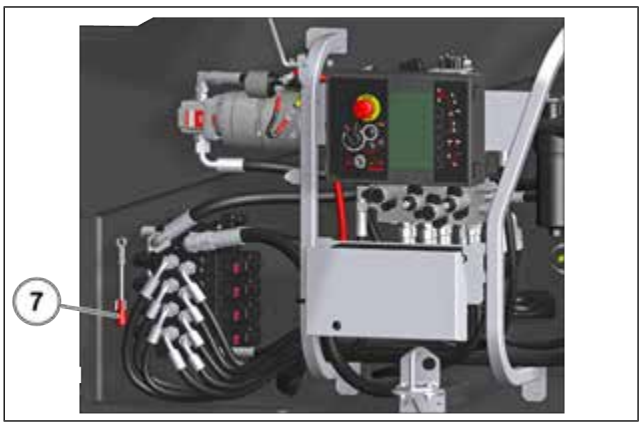


Figure 50: Location of the emergency controls 2

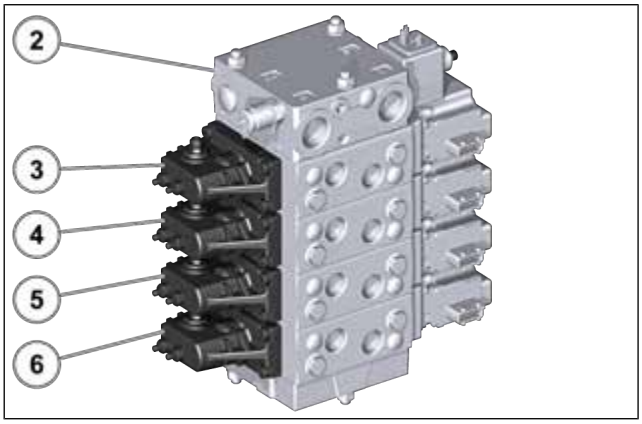


Figure 51: Proportional control valve (2)

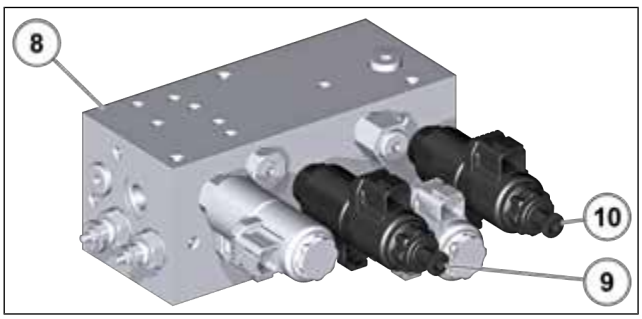


Figure 52: Hydraulic block (8)

d. Activate the appropriate machine functions listed below.

- **Raise the secondary arm.**

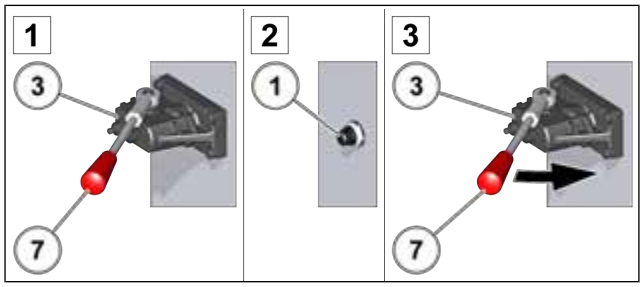


Figure 53: Emergency controls - Lifting the secondary arm

a. Place the lever (7) on the manual control (3).

b. Press and hold down the **Backup pump** button (1).

c. Push the lever to the right to raise the secondary arm.

d. Release it when the desired position is reached.

e. Release the **Backup pump** button.

Remove the lever, put it back in place and close the right-hand turntable cover when no other machine functions are necessary.

- **Lower the secondary arm.**

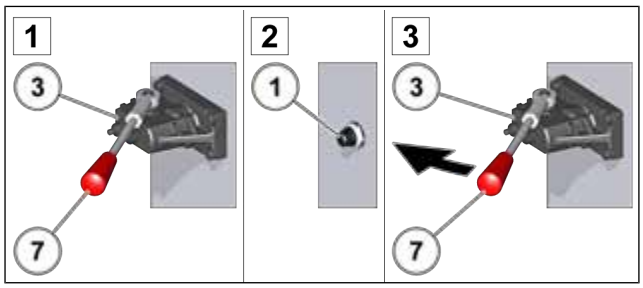


Figure 54: Emergency controls - Lowering the secondary arm

a. Place the lever (7) on the manual control (3).

b. Press and hold down the **Backup pump** button (1).

c. Push the lever to the left to lower the secondary arm.

d. Release it when the desired position is reached.

e. Release the **Backup pump** button.

Remove the lever, put it back in place and close the right-hand turntable cover when no other machine functions are necessary.

- **Extend the telescopic arm.**

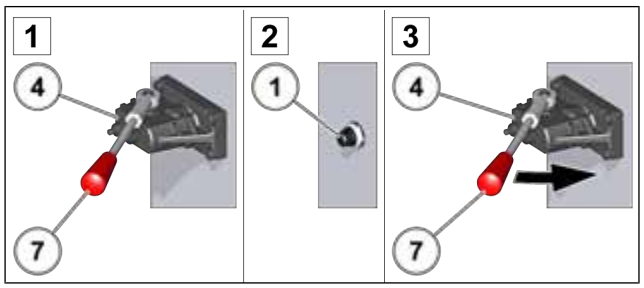


Figure 55: Emergency controls - Telescopic arm extension

a. Place the lever (7) on the manual control (4).
b. Press and hold down the **Backup pump** button (1).
c. Push the lever to the right to extend the telescopic arm.
d. Release it when the desired position is reached.
e. Release the **Backup pump** button.

Remove the lever, put it back in place and close the right-hand turntable cover when no other machine functions are necessary.

- **Retract the telescopic arm.**

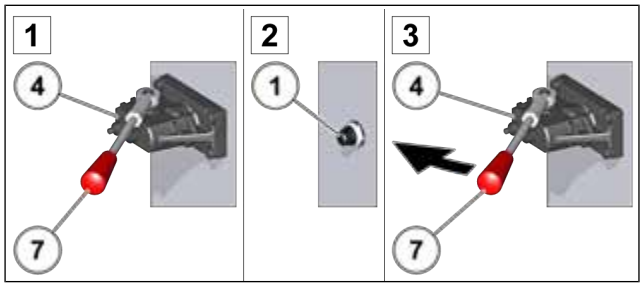


Figure 56: Emergency controls - Telescopic arm retraction

a. Place the lever (7) on the manual control (4).
b. Press and hold down the **Backup pump** button (1).
c. Push the lever to the left to retract the telescopic arm.
d. Release it when the desired position is reached.
e. Release the **Backup pump** button.

Remove the lever, put it back in place and close the right-hand turntable cover when no other machine functions are necessary.

- **Raise the main arm.**

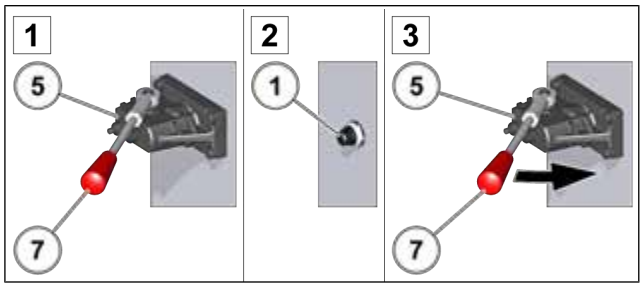


Figure 57: Emergency controls - Lifting the main arm

a. Place the lever (7) on the manual control (5).
b. Press and hold down the **Backup pump** button (1).
c. Push the lever to the right to raise the main arm.
d. Release it when the desired position is reached.
e. Release the **Backup pump** button.

Remove the lever, put it back in place and close the right-hand turntable cover when no other machine functions are necessary.

- **Lower the main arm.**

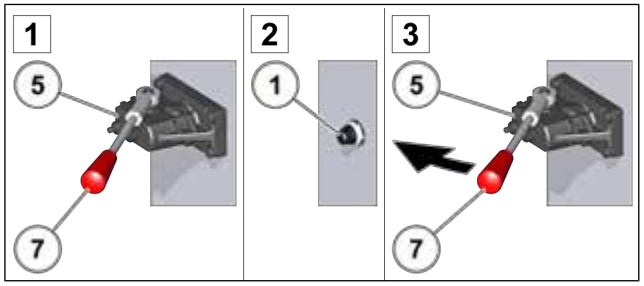


Figure 58: Emergency controls - Lowering the main arm

a. Place the lever (7) on the manual control (5).
b. Press and hold down the **Backup pump** button (1).
c. Push the lever to the left to lower the main arm.
d. Release it when the desired position is reached.
e. Release the **Backup pump** button.

Remove the lever, put it back in place and close the right-hand turntable cover when no other machine functions are necessary.

- **Raise the jib arm.**

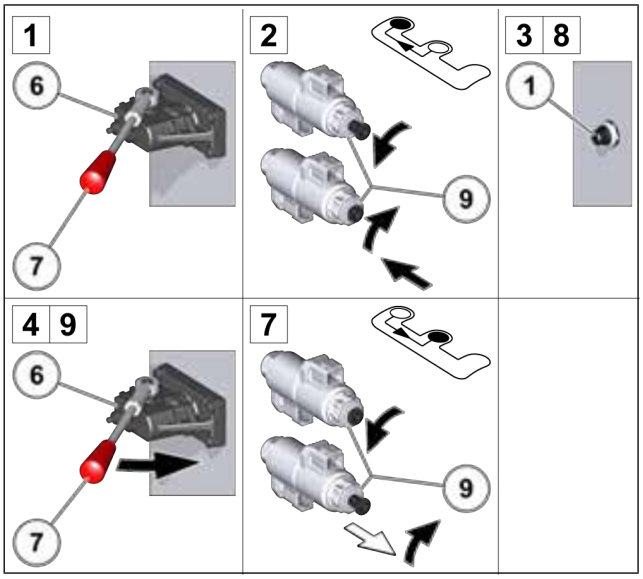


Figure 59: Emergency controls - Lifting the jib arm

a. Place the lever (7) on the manual control (6).
b. Turn the electrovalve knob (9) counter-clockwise, push it and then turn it clockwise until it stops.
c. Press and hold down the **Backup pump** button (1).
d. Push the lever to the right to raise the jib arm.
e. Release it when the desired position is reached.
f. Release the **Backup pump** button.
g. Turn the electrovalve knob (9) counter-clockwise, release it and then turn it clockwise until it stops.
h. Press and hold down the **Backup pump** button .
i. Push the lever to the right.

   Result:

   - the jib arm should not move.

j. Release the lever
k. Release the **Backup pump** button.

Remove the lever, put it back in place and close the right-hand turntable cover when no other machine functions are necessary.

- **Lower the jib arm.**

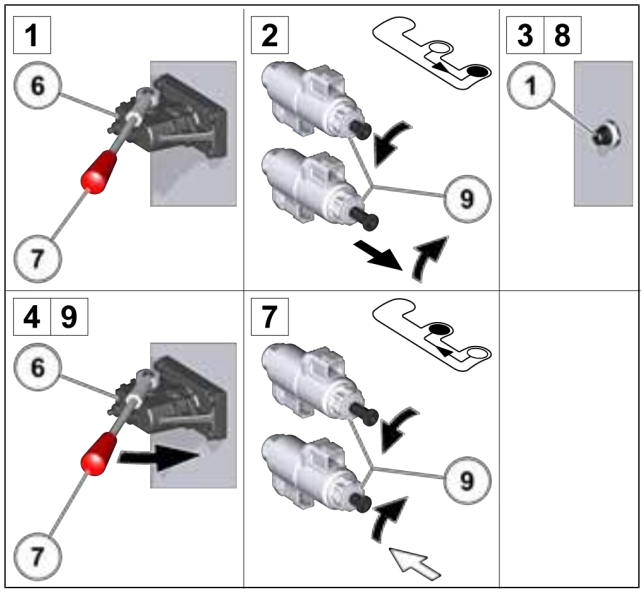


Figure 60: Emergency controls - Lowering the jib arm

a. Place the lever (7) on the manual control (6).
b. Turn the electrovalve knob (9) counter-clockwise, pull it and then turn it clockwise until it stops.
c. Press and hold down the **Backup pump** button (1).
d. Push the lever to the right to lower the jib arm.
e. Release it when the desired position is reached.
f. Release the **Backup pump** button.
g. Turn the electrovalve knob (9) counter-clockwise, release it and then turn it clockwise until it stops.
h. Press and hold down the **Backup pump** button .
i. Push the lever to the right.

   Result:

   - the jib arm should not move.

j. Release the lever
k. Release the **Backup pump** button.

Remove the lever, put it back in place and close the right-hand turntable cover when no other machine functions are necessary.

- **Turn the turntable to the left.**

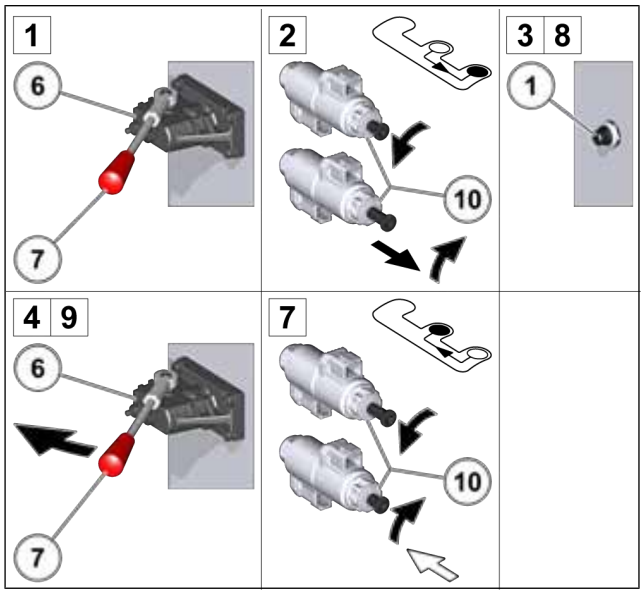


Figure 61: Emergency controls - Turntable rotation to the left

a. Place the lever (7) on the manual control (6).
b. Turn the electrovalve knob (10) counter-clockwise, push it and then turn it clockwise until it stops.
c. Press and hold down the **Backup pump** button (1).
d. Push the lever to the left to rotate the turntable to the left.
e. Release it when the desired position is reached.
f. Release the **Backup pump** button.
g. Turn the electrovalve knob (10) counter-clockwise, release it and then turn it clockwise until it stops.
h. Press and hold down the **Backup pump** button .
i. Push the lever to the left.

   Result:

   - the turntable should not move.

j. Release the lever
k. Release the **Backup pump** button.

Remove the lever, put it back in place and close the right-hand turntable cover when no other machine functions are necessary.

- **Turn the turntable to the right.**

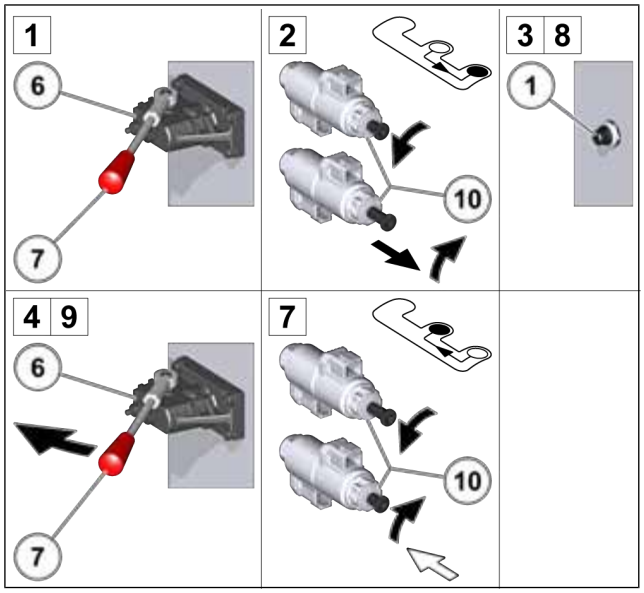


Figure 62: Emergency controls - Turntable rotation to the right

a. Place the lever (7) on the manual control (6).
b. Turn the electrovalve knob (10) counter-clockwise, pull it and then turn it clockwise until it stops.
c. Press and hold down the **Backup pump** button (1).
d. Push the lever to the left to turn the turntable to the right.
e. Release it when the desired position is reached.
f. Release the **Backup pump** button.
g. Turn the electrovalve knob (10) counter-clockwise, release it and then turn it clockwise until it stops.
h. Press and hold down the **Backup pump** button .
i. Push the lever to the left.

   Result:

   - the turntable should not move.

j. Release the lever
k. Release the **Backup pump** button.

Remove the lever, put it back in place and close the right-hand turntable cover when no other machine functions are necessary.

3.10.2.2 Using the emergency controls from the platform

NOTICE

Risk of damage to the backup pump

Do not activate the backup pump for more than 4 minutes at a time, waiting at least 10 minutes between each 4-minute cycle.
Do not activate simultaneous functions.

- **Follow this procedure when the following conditions are met:**
  - the electric pump is not working,
  - the platform display screen is on.
  a. Press and hold down the foot switch .
  b. Press and hold down the **Backup pump** button .
  c. Use the appropriate switches or control handles to position the platform.

     The driving/steering functions cannot be activated.
  d. Release the **Backup pump** button.
  e. Release the foot switch.

3.11. PARKING AND STORING THE MACHINE

3.11.1 PARKING THE MACHINE

⚠ DANGER

Risk of incorrect use

Follow this procedure when the machine is not in use.

NOTICE

Risk of high-voltage battery damage

Check the charge level of the high-voltage batteries every week, and charge them if necessary.

This procedure applies if the machine is being parked for less than 3 months.

After 3 months, refer to “Operating the machine: Parking and storing the machine: Storing the machine for a long period”.

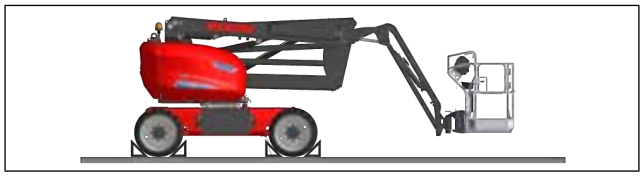


Figure 63: Parking the machine

1. Put the machine in a protected area on a level surface.
2. Place the machine in the transport position.
3. Put the turntable in neutral position.
4. Put the platform in neutral position.
5. Fully lower the jib arm.
6. Chock the wheels.
7. Completely empty the platform.
8. Switch off the machine.
9. Remove the key.
10. Close the left and right turntable covers, then lock them (if applicable).

3.11.2 STORING THE MACHINE FOR A LONG PERIOD

The long-term machine shutdown and machine recommissioning procedures must be performed by Manitou-approved service technicians.

The long-term machine shutdown procedure must be carried out when the machine is to be put into storage for more than 3 months.

The machine’s long-term shutdown must not exceed 12 months.

After the 12 months of long-term machine shutdown, follow the procedure for long-term machine shutdown, then follow the procedure for recommissioning the machine.

- **Follow this procedure for long-term machine shutdown.**
  a. Park the machine, referring to “Operating the machine: Parking and storing the machine: Parking the machine”.
  b. Perform the walk-around inspection, referring to “Operating the machine: Before using the machine: Walk-around inspection”.
  c. Replace or repair any worn or damaged parts.
  d. Clean the machine thoroughly.
  e. Protect any cylinder rods that remain visible.

f. Wrap the wheels.

g. Disconnect the 12 V battery connector, referring to “Operating the machine: Operation from the ground: Operating the 12 V battery connector”.

h. Cover the machine with a waterproof tarpaulin if stored outdoors.

i. Once a week: check the charge level of the high-voltage batteries. Refer to “Operating the machine: Before using the machine: Routine maintenance: Checking the high-voltage battery charge level”.

The 12 V battery connector must be connected to check the charge level of the high-voltage batteries. It must be disconnected when finished. Refer to “Operating the machine: Operation from the ground: Operating the 12 V battery connector”.

If the charge level of the high-voltage batteries is below 30%.

- Charge the high-voltage batteries, referring to “Operating the machine: Charging the high-voltage batteries and the 12 V battery”.

- **Follow this procedure to recommission the machine.**

a. Remove the tarpaulin.

b. Remove the protective covers from the wheels and cylinder rods.

c. Connect the 12 V battery connector, referring to “Operating the machine: Operation from the ground: Operating the 12 V battery connector”.

d. Perform the walk-around inspection, referring to “Operating the machine: Before using the machine: Walk-around inspection”.

e. Perform routine maintenance, referring to “Operating the machine: Before using the machine: Routine maintenance”.

f. Perform the function tests, referring to “Operating the machine: Before using the machine: Function tests”.

g. Perform optional maintenance, refer to “Maintenance: Maintenance instructions: Optional maintenance”.

3.12. TRANSPORTING AND LIFTING THE MACHINE

3.12.1. WINCHING OR TOWING THE MACHINE

3.12.1.1 Winching or towing the machine

⚠ DANGER

Risk of falling

The platform must always be empty, with no occupants or equipment in it, when towing or winching the machine.

⚠ WARNING

Risk of runaway

Always tow or winch the machine in the transport position with the jib arm fully lowered.
Do not exceed the maximum authorized slope when towing or winching the machine.
Always ensure that the machine is on a level surface before disengaging the brakes.
Always chock the machine’s wheels before disabling the brakes.
Always use a suitable winch for winching the machine.
Always use a suitable towing device to attach the towing vehicle to the machine.
Ensure that the towing vehicle has sufficient braking capacity to stop the machine being towed.

NOTICE

Risk of damage to the machine

Do not exceed 5 km/h (3.1 mph) when towing the machine.
Do not winch or tow the machine over a distance of more than 50 m (164 ft).

NOTICE

Risk of damage to the axle

Always tighten and loosen the screws alternately by a quarter turn each time.

The machine may need to be winched or towed when one of the following conditions is met:

- the machine is not working and needs to be moved,
- the machine lacks grip when negotiating a slope.

1. Winch or tow the machine.

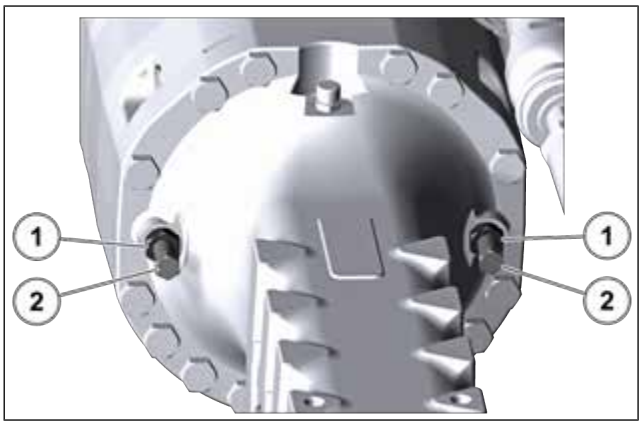


Figure 64: Rear axle

a. Ensure that the machine is in the transport position and that the jib arm is completely lowered.

We recommend putting the turntable and the platform in neutral position.

b. Switch off the machine.

c. Chock the wheels.

d. Attach the towing vehicle or the winch to the tie-down points on the machine.

e. On both sides of the rear axle, loosen the 4 nuts (1) by approximately 8 mm (5/16 in).

f. On both sides of the rear axle, do up the 4 screws (2) by hand until there is resistance.

g. On one side of the rear axle, tighten the 2 screws (2) alternately by a quarter turn each time until you have done a complete turn.

h. On the other side of the rear axle, tighten the 2 screws (2) alternately by a quarter turn each time until you have done a complete turn.

i. Make sure the route is free of any obstructions.

j. Remove the chocks from the wheels.

k. Tow or winch the machine.

l. Chock the wheels when the machine is in the desired position.

2. Restore the brakes.

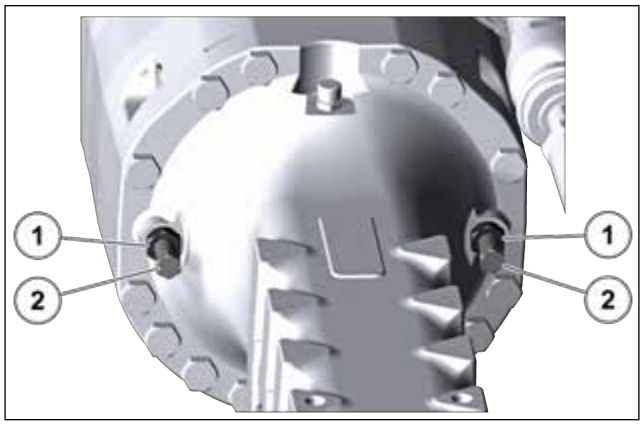


Figure 65: Rear axle

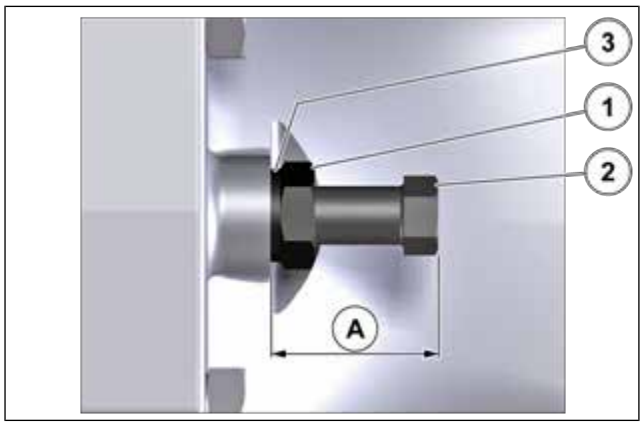


Figure 66: Rear axle detail

a. On one side of the rear axle, undo the 2 screws (2) alternately by a quarter turn each time until you have done a complete turn.

b. On the other side of the rear axle, undo the 2 screws (2) alternately by a quarter turn each time until you have done a complete turn.

c. Unscrew the 4 screws (2) completely.

d. Change the 4 seals (3).

e. Lubricate the screws (2) with Manitou black multi-purpose lubricant and put them back in place.

Please refer to "Technical specifications: Consumables: Liquids and lubricants".

f. Adjust the distances (A) between the axle housing and the 4 screw heads (2) = 34 mm ±0.5 mm (1.34 in ±0.02 in).

g. Tighten the 4 nuts (1) and check the distances between the body of the axle and the 4 screw heads.

h. Detach the towing vehicle or the winch.

i. Remove the chocks from the wheels.

3. Test the brakes when the machine is not on a transportation vehicle and when you can turn the turntable.

   Refer to stage no.4 when the machine is on a transportation vehicle or when you cannot turn the turntable.

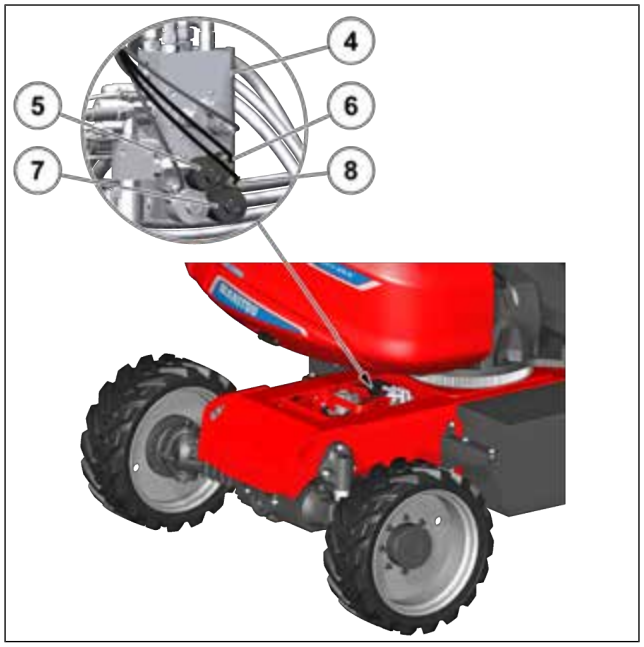


Figure 67: Brake test 1

   a. Switch on the machine.
   b. Turn the turntable 90° towards the left or to the right, relative to the neutral position.
   c. Switch off the machine.
   d. Remove the front chassis cover.
   e. Locate the coil (5) on the hydraulic block (4).
   f. Disconnect the electrical connector (6).
   g. Switch on the machine.
   h. Get into the platform.
   i. Try to drive the machine forward and backward.

      Result:

      • the machine should remain stationary.

   j. Get out of the platform.
   k. Switch off the machine.
   l. Reconnect the electrical connector (6) to the coil (5).
   m. Locate the coil (7) on the hydraulic block (4).
   n. Disconnect the electrical connector (8).
   o. Switch on the machine.
   p. Get into the platform.
   q. Try to drive the machine forward and backward.

      Result:

      • the machine should remain stationary.

   r. Get out of the platform.
   s. Switch off the machine.
   t. Reconnect the electrical connector (8) to the coil (7).
   u. Refit the front chassis cover.
   v. Switch on the machine.
   w. Put the turntable in neutral position.
   x. Switch off the machine.

4. Test the brakes when the machine is on a transportation vehicle or when you cannot turn the turntable.

   Refer to stage no.3 when the machine is on a transportation vehicle and when you cannot turn the turntable.

Figure 68: Brake test 2

   a. Locate the hydraulic block (4) under the chassis at the front of the machine.
   b. Locate the coil (5) on the hydraulic block (4).
   c. Disconnect the electrical connector (6).
   d. Switch on the machine.
   e. Get into the platform.
   f. Try to drive the machine forward and backward.

      Result:

- the machine should remain stationary.

g. Get out of the platform.

h. Switch off the machine.

i. Reconnect the electrical connector (6) to the coil (5).

j. Locate the coil (7) on the hydraulic block (4).

k. Disconnect the electrical connector (8).

l. Switch on the machine.

m. Get into the platform.

n. Try to drive the machine forward and backward.

Result:

- the machine should remain stationary.

o. Get out of the platform.

p. Switch off the machine.

q. Reconnect the electrical connector (8) to the coil (7).

3.12.2. TRANSPORTING THE MACHINE

3.12.2.1 Safety precautions: transporting the machine

⚠ DANGER

Risk of falling and collision

Check that the safety instructions associated with the transport vehicle have been correctly applied before loading the machine and ensure that the driver of the vehicle has been informed of the dimensional characteristics and total weight of the machine.
Make sure that the dimensions and load capacity of the transportation vehicle are sufficient for transporting the machine.
Make sure that the loading ramps, chains and/or straps are solid enough to take the weight of the machine.
The turntable must be locked in the neutral position when the machine is being transported.
The platform must be empty when the machine is being transported.
The left and right turntable covers must be closed and locked (if applicable) when the machine is being transported.

Transportation vehicle drivers are responsible for ensuring that the machine is properly secured and that the transportation vehicle complies with the applicable Ministry of Transport regulations, applicable local by-laws and company policy.

Containerized transport must be carried out by a qualified freight company, which must ensure that the machine is loaded, unloaded, secured and lifted correctly.

3.12.2.2 Loading the machine onto a transportation vehicle

⚠ DANGER

Risk of runaway

The transportation vehicle must be parked on a level surface and its wheels chocked before loading the machine.
The gradient of the loading ramps must not exceed the maximum authorized slope values.
The machine must be loaded using a winch if the loading ramps are slippery.
The platform must be loaded using a crane if the angle of the loading ramps exceeds the maximum authorized slope values.

⚠ DANGER

Risk of falling and collision

The turntable must be locked in the neutral position before the machine is loaded onto the transportation vehicle.
Never turn the turntable when loading the machine onto the transportation vehicle.

⚠ DANGER

Risk of incorrect use

Only qualified and trained operators should drive the machine to load it onto the transportation vehicle.

---

1. Configure the machine from the ground.
   a. Switch on the machine.
   b. Place the machine in the transport position.
   c. Put the turntable in neutral position.
   d. Lock the turntable in the neutral position. Refer to “Operating the machine: Operation from the ground: Locking and unlocking the turntable in neutral position”.
   e. Put the platform in neutral position.
   f. Fully lower the jib arm.
2. Get into the platform.

3. Raise the jib arm slightly to prevent the platform hitting the ground or the loading ramps.
4. Select tortoise speed.
5. Drive the machine forward slowly with the platform at the bottom of the slope as shown in the illustration.

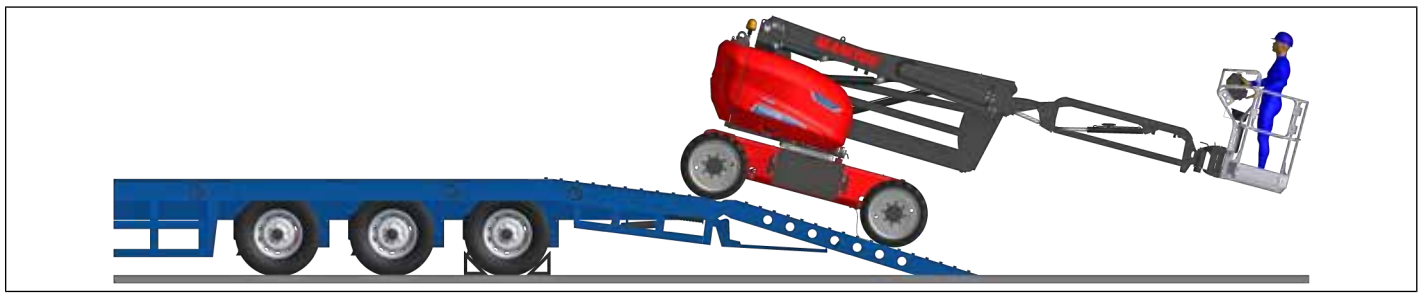


Figure 69: Loading the machine

3.12.2.3 Configuring the machine: securing to a transportation vehicle

⚠ DANGER

Risk of falling and collision

The turntable must be locked in the neutral position when the machine is on the transportation vehicle.
Never turn the turntable while the machine is on the transportation vehicle, unless the machine has been loaded using a crane with the turntable locked at 12°. In this case, turntable rotation is authorized to turn the turntable from the 12° position to neutral position.

NOTICE

Risk of damage to the machine

The platform must never touch the bed of the transportation vehicle.
The platform must never touch the rear wheels of the machine when it is in folded position (2).

The machine must be transported in the transport position (1) or in the folded position (2) on an unsheeted transportation vehicle.

The machine must be transported in the folded position (3) on a sheeted transportation vehicle.

The transportation vehicle is parked on a level surface with its wheels chocked.

The machine is powered up.

The machine is in transport position.

The turntable and the platform are in the neutral position

The jib arm is slightly raised.

The turntable is locked in neutral position.

The operator is in the platform.

- **Configure the machine in the transport position (1).**

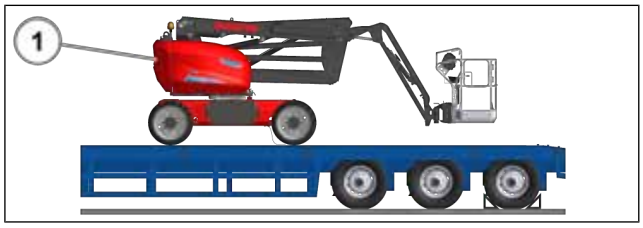


Figure 70: Machine in transport position (1)

a. Completely lower the jib arm from the platform.
b. Get out of the platform.
c. Switch off the machine.
d. Remove the key.
e. Make sure the left and right turntable covers are properly closed, then lock them (if applicable).

- **Configure the machine in the folded position (2).**

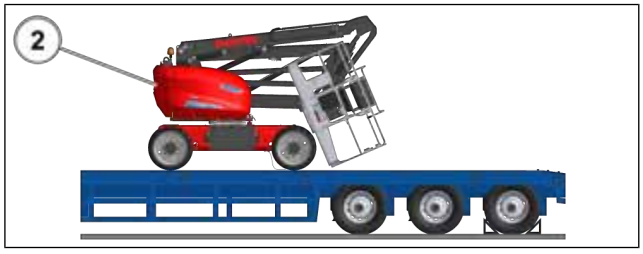


Figure 71: Machine in folded position (2)

a. Completely lower the jib arm from the platform.
b. Get out of the platform.
c. Turn the platform fully to the left from the ground.
d. Raise the main arm slightly from the ground.

e. Tilt the platform/jib arm downward from the ground until the platform is approximately 200 mm (8 in) from the left rear wheel.

Make sure that the platform cannot hit the bed of the transportation vehicle, raising the main arm slightly if necessary.

f. Lower the main arm from the ground and tilt the platform/jib arm up or down from the ground until the platform is approximately 50 mm (2”) from the left rear wheel and approximately 50 mm (2”) from the bed of the transportation vehicle.

g. Switch off the machine.

h. Remove the key.

i. Make sure the left and right turntable covers are properly closed, then lock them (if applicable).

- **Configure the machine in the folded position (3).**

Figure 72: Machine in folded position (3)

a. Completely lower the jib arm from the platform.

b. Get out of the platform.

c. Raise the main arm slightly from the ground.

Ensure that the telescopic arm does not touch the ceiling of the transportation vehicle.

d. Tilt the platform/jib arm downward from the ground until the platform is approximately 50 mm (2 in) from the bed of the transportation vehicle.

e. Switch off the machine.

f. Remove the key.

g. Make sure the left and right turntable covers are properly closed, then lock them (if applicable).

3.12.2.4 Securing the machine to a transportation vehicle

⚠ DANGER

Risk of falling and collision

The turntable must be locked in the neutral position when the machine is on the transportation vehicle.
Never turn the turntable while the machine is on the transportation vehicle.

NOTICE

Risk of damage to the machine

The platform must never touch the bed of the transportation vehicle.
The chains and/or straps must never touch the wheels once the machine has been lashed down.

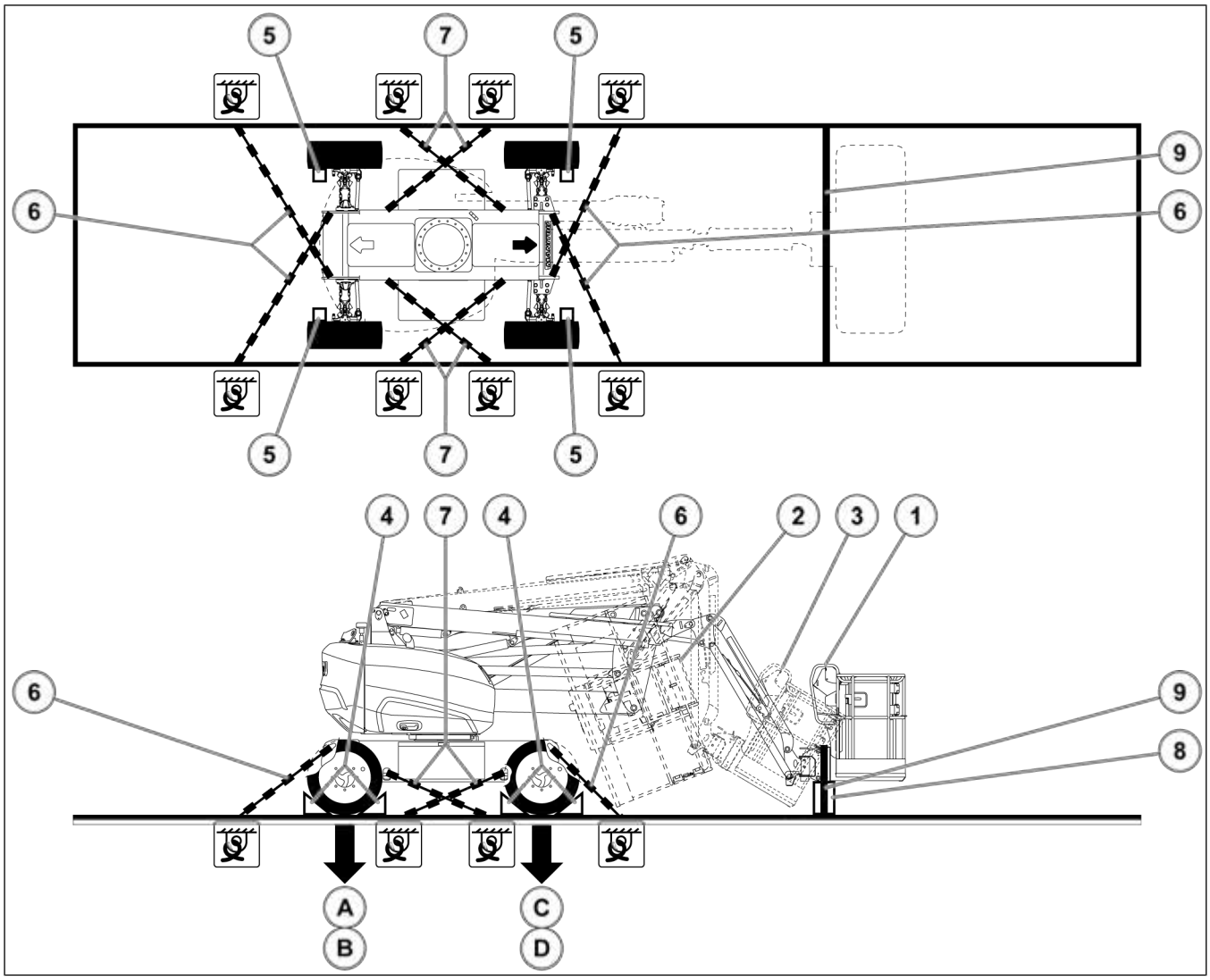


Figure 73: Securing the machine

Table 30. Wheel load and total weight

Item	Designation	Unit	Value
A	Load on 1 front wheel	kg (lb)	1,600 (3530)
B	Load on 2 front wheels	kg (lb)	3,000 (6615)
C	Load on 1 rear wheel	kg (lb)	1,900 (4190)
D	Load on 2 rear wheels	kg (lb)	3,400 (7500)
-	Total weight	kg (lb)	6,400 (14110)

The transportation vehicle is parked on a level surface with its wheels chocked.

The machine is powered down.

The machine is in transport position (1) or in folded position (2) on an unsheeted transportation vehicle.

The machine is in folded position (3) on a sheeted transportation vehicle.

The turntable is locked in neutral position.

The left and right turntable covers are closed and locked (if applicable).

1. Fix the chocks (4) to the transportation vehicle in front of and behind each of the machine's wheels.
2. Fix chocks (5) to the transportation vehicle on the inside of each of the machine's wheels.
3. Secure the machine to the transportation vehicle with straps or chains (6) and (7) attached to the machine's anchorage points.
4. For machines in the transport position (1) only: fix a wooden shim (8) under the overload system as shown in the illustration.

5. For machines in the transport position (1) only: secure the platform with a strap (9), but do not overtighten to avoid damage.

3.12.2.5 Configuring the machine: unloading the transportation vehicle

⚠ DANGER

Risk of runaway

The transportation vehicle must be parked on a level surface and its wheels chocked before unloading the machine.

⚠ DANGER

Risk of falling and collision

The turntable must be locked in the neutral position when the machine is on the transportation vehicle.
Never turn the turntable while the machine is on the transportation vehicle, unless the machine is to be unloaded by crane with the turntable locked at 12°. In this case, turntable rotation is authorized to turn the turntable from neutral position to the 12° position.

The machine must be in the transport position (1) to be unloaded from the transportation vehicle.

The machine is powered down.

The machine is secured in the transport position (1) or in the folded position (2) on an unsheeted transportation vehicle.

The machine is secured in the folded position (3) on a sheeted transportation vehicle.

The turntable is locked in neutral position.

- **Configure the machine when it is in the transport position (1).**

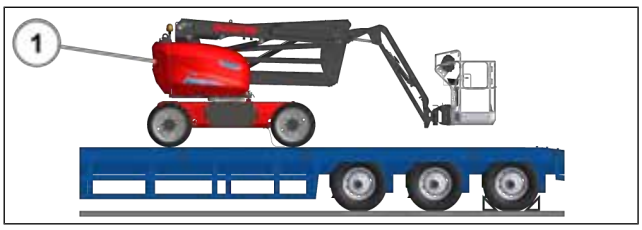


Figure 74: Machine in transport position (1)

a. Remove all straps and/or chains so that the machine is no longer secured to the transportation vehicle.

b. Remove all the chocks used to secure the machine to the transportation vehicle.

- **Put the machine in transport position (1) when it is in folded position (2).**

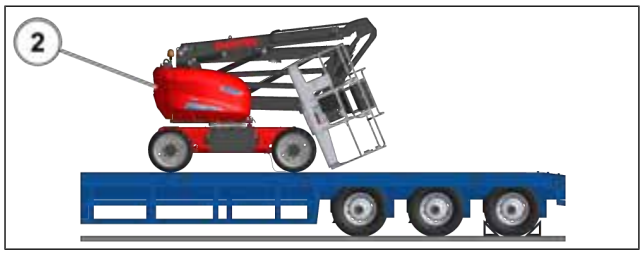


Figure 75: Machine in transport position (2)

a. Remove all straps and/or chains so that the machine is no longer secured to the transportation vehicle.

b. Remove all the chocks used to secure the machine to the transportation vehicle.

c. Switch on the machine.

d. Raise the main arm slightly from the ground.

e. Tilt the platform/jib arm upward from the ground until the platform floor is level.

Make sure that the platform cannot hit the bed of the transportation vehicle, raising the main arm slightly if necessary.

f. Completely lower the main arm from the ground.

g. Turn the platform to the right from the ground until it is in the neutral position.

h. Switch off the machine.

- **Put the machine in transport position (1) when it is in folded position (3).**

Figure 76: Machine in transport position (3)

a. Remove all straps and/or chains so that the machine is no longer secured to the transportation vehicle.

b. Remove all the chocks used to secure the machine to the transportation vehicle.

c. Switch on the machine.

d. Tilt the platform/jib arm upward from the ground until the platform floor is level.

Make sure that the platform cannot hit the bed of the transportation vehicle, raising the main arm slightly if necessary.

e. Completely lower the main arm from the ground.

f. Switch off the machine.

3.12.2.6 Unloading the machine from a transportation vehicle

⚠ DANGER

Risk of runaway

The transportation vehicle must be parked on a level surface and its wheels chocked before unloading the machine.
The gradient of the loading ramps must not exceed the maximum authorized slope values.
The machine must be unloaded using a winch if the loading ramps are slippery.
The platform must be unloaded using a crane if the angle of the loading ramps exceeds the maximum authorized slope values.

⚠ DANGER

Risk of falling and collision

The turntable must be locked before the machine is unloaded from the transportation vehicle.
Never turn the turntable while the machine is on the transportation vehicle, unless the machine is to be unloaded by crane with the turntable locked at 12°. In this case, turntable rotation is authorized to turn the turntable from neutral position to the 12° position.

⚠ DANGER

Risk of incorrect use

Only qualified and trained operators should drive the machine to unload it from the transportation vehicle.

The machine is in transport position.

The machine is powered down.

The turntable is locked in neutral position.

1. Make sure the turntable is correctly locked in the neutral position.
2. Switch on the machine.
3. Get into the platform.
4. Raise the jib arm slightly to prevent the platform hitting the ground or the loading ramps.
5. Select tortoise speed.
6. Reverse the machine slowly with the platform at the bottom of the slope as shown in the illustration.

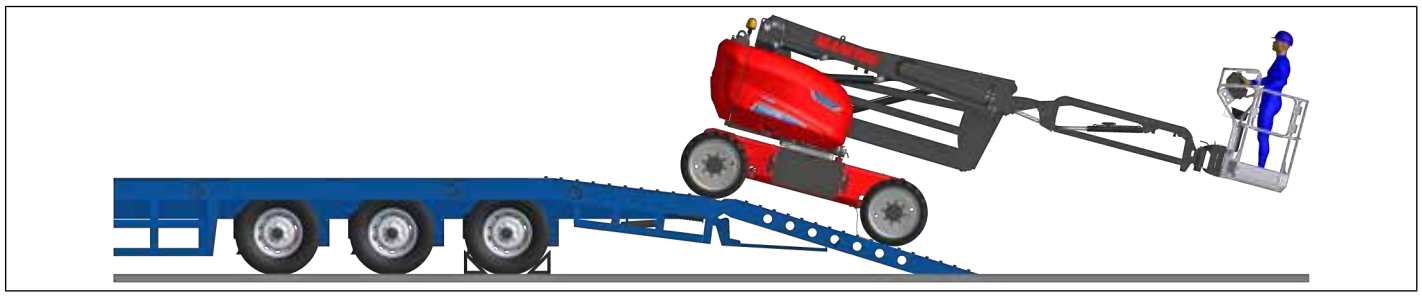


Figure 77: Unloading the machine

3.12.3. LIFTING THE MACHINE

3.12.3.1 Lifting the machine by crane

⚠ DANGER

Risk of crushing and collision

Only qualified riggers should be allowed to rig the machine for lifting in accordance with current regulations.
Only certified crane operators should be allowed to lift the machine in accordance with current regulations.
The surface of the departure and arrival zones must be closed, level and even.
If the departure and/or arrival zone is a transportation vehicle:

- the transportation vehicle must be parked on a level, firm surface,
- the wheels of the transportation vehicle must be chocked.

Make sure that the lifting slings are solid enough to take the weight of the machine.
Make sure that the lifting capacity of the crane is sufficient to take the weight of the machine.
The turntable must be locked at 12° during lifting of the machine.
The platform must be empty when the machine is being lifted.
The left and right turntable covers must be closed and locked (if applicable) when lifting the machine.

⚠ WARNING

Risk of collision

Always tie the lifting slings (2) around the rear axle (3) only. Never tie the lifting slings (2) around the steering connecting rods (4).

Containerized transport must be carried out by a qualified freight company, which must ensure that the machine is loaded, unloaded, secured and lifted correctly.

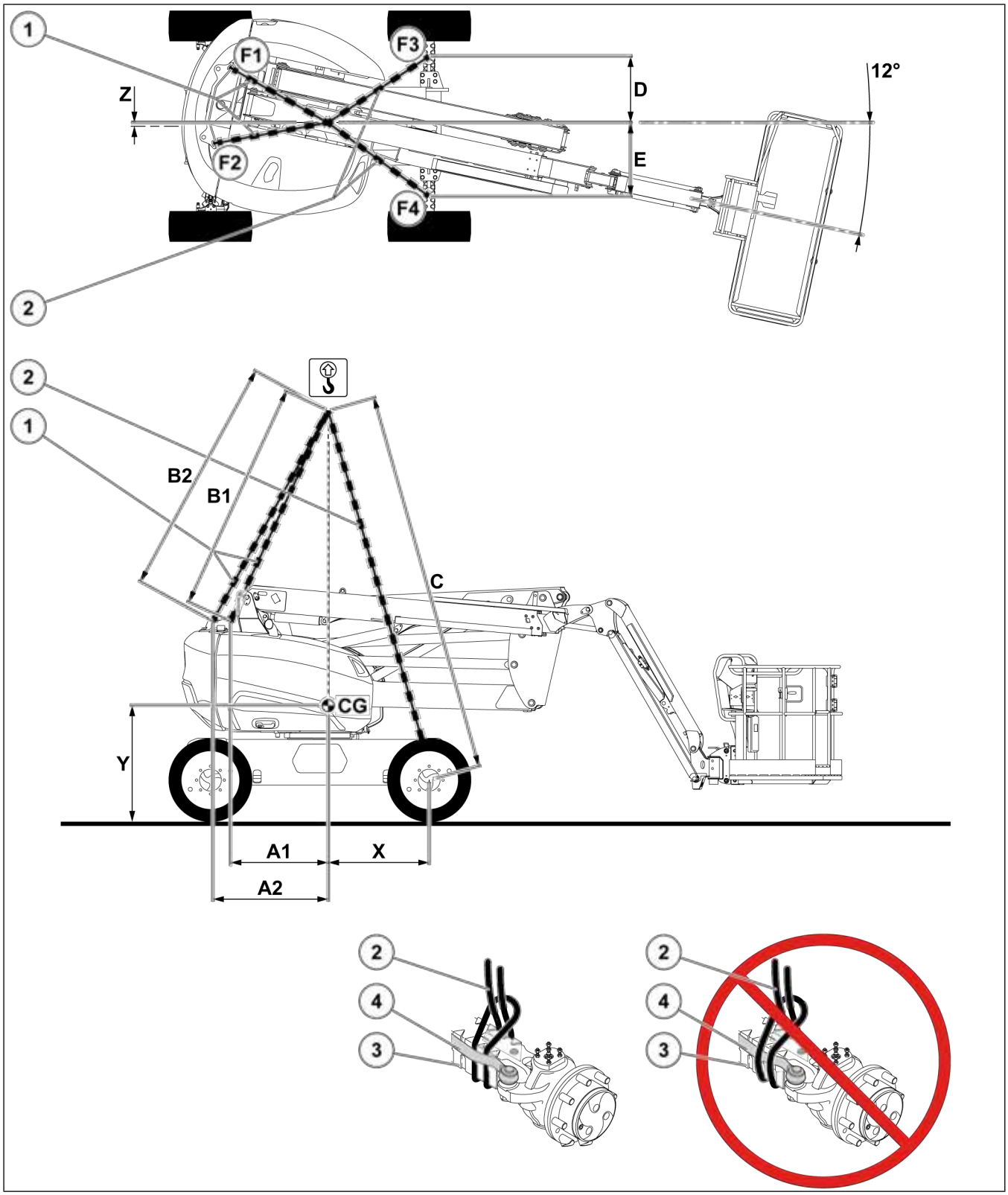


Figure 78: Lifting the machine

Table 31. Lifting the machine

Item	Designation	Unit	Value
CG	Center of gravity	-	-
X	Distance between the rear wheel axle/the rear lifting points and the center of gravity	mm (ft-in)	1,040 (3-5)

Item	Designation	Unit	Value
Y	Distance between wheels on ground and center of gravity	mm (ft-in)	1,060 (3-5.7)
Z	Distance between machine axis and center of gravity	mm (in)	43 (1.7)
A1	Distance between center of gravity and front right lifting point	mm (ft)	1,230 (4)
A2	Distance between center of gravity and front left lifting point	mm (ft-in)	1,395 (4-7)
B1	Length of front right lifting sling	mm (ft-in)	3,200 (10-6)
B2	Length of front left lifting sling	mm (ft-in)	3,220 (10-6.7)
C	Length of rear lifting slings	mm (ft-in)	4,700 (15-5)
D	Distance between center of gravity and rear right lifting point	mm (ft-in)	660 (2-2)
E	Distance between center of gravity and rear left lifting point	mm (ft-in)	740 (2-5)
F1	Load at front right lifting point	kg (lb)	1,285 (2835)
F2	Load at front left lifting point	kg (lb)	1,680 (3705)
F3	Load at rear right lifting point	kg (lb)	2,080 (4585)
F4	Load at rear left lifting point	kg (lb)	2,545 (5610)
-	Total weight	kg (lb)	6,400 (14109)

1. Mark out a wide safety area around the machine.
2. Configure the machine from the ground.
   a. Switch on the machine.
   b. Place the machine in the transport position.
   c. Put the platform in neutral position.
   d. Fully lower the jib arm.
   e. Lock the turntable at 12°. Refer to “Operating the machine: Operation from the ground: Locking and unlocking the turntable at 12°.
   f. Switch off the machine.
   g. Remove the key.
   h. Make sure the left and right turntable covers are properly closed, then lock them (if applicable).
3. Attach lifting slings (1) to the 2 lifting points on the turntable.
4. Attach lifting slings (2) around the rear axle (3) as shown in the illustration.
5. Attach the lifting slings (1) and (2) at 1 point to the crane lifting hook.
6. Slowly lift the crane’s lifting hook until the lifting slings are slightly taut.
7. If necessary, adjust the lifting slings to prevent damage and keep the machine level.
8. Ensure that there is nobody in the safety zone.
9. Lift the machine slowly and move it to the arrival zone.
10. Slowly lower the machine until the 4 wheels are in contact with the receiving surface.
11. Lower the crane’s lifting hook until the lifting slings are no longer taut.
12. Detach the lifting slings.
13. Switch on the machine.
14. Unlock the turntable at 12°. Refer to “Operating the machine: Operation from the ground: Locking and unlocking the turntable at 12°.
15. Turn the turntable to the right into the neutral position from the ground.
16. Switch off the machine.

4. MAINTENANCE

4.1. GENERAL POINTS

4.1.1 SAFETY PRECAUTIONS: MAINTENANCE

⚠ DANGER

Maintenance-related risk

Read and make sure you have understood the operator's manual, the responsibilities manual and any applicable stickers before carrying out any maintenance work.
Read, make sure you have understood and follow all the safety instructions in this operator's manual.
Observe the following instructions when carrying out maintenance, unless specific instructions are given:

- the machine must be parked on a level surface,
- the wheels must be chocked,
- the machine should be in the transport position,
- the turntable and the platform must be in the neutral position,
- the jib arm must be fully lowered,
- the turntable must be unlocked,
- the machine must be switched off,
- the platform must be empty.

⚠ DANGER

Inspection and maintenance-related risk

In order to maintain the machine's connectivity, some electrical components remain live even when the 12 V battery connector is disconnected.

⚠ WARNING

Risk of burns

Avoid contact with hot components that could cause severe burns.

NOTICE

Risk of damage to the machine

Always tighten screws and nuts in a cross or star pattern.

4.1.2 MANITOU ORIGINAL SPARE PARTS

⚠ DANGER

Risk associated with unapproved spare parts

Machine maintenance must always be carried out using Manitou original spare parts.

By allowing the use of non-original spare parts, counterfeit parts or unapproved components, you risk:

- legally, being held responsible in the event of an accident,
- causing damage or malfunctions or shortening the service life of the machine,
- losing the contractual guarantee benefits.

By using Manitou original spare parts for maintenance operations, you benefit from:

- know-how and competence,
- guaranteed high-quality work,
- original spare parts,
- help with preventive maintenance,
- efficient help with diagnosis,
- improvements as a result of feedback,
- operator training.

Only the Manitou network has the in-depth knowledge of the machine and the best technical ability for its maintenance.

Original spare parts are distributed exclusively by Manitou and its dealer network. A list of dealers is available on the Manitou website: www.manitou.com

4.2. LOCATION OF MAINTENANCE COMPONENTS - ATJ 46 E S1

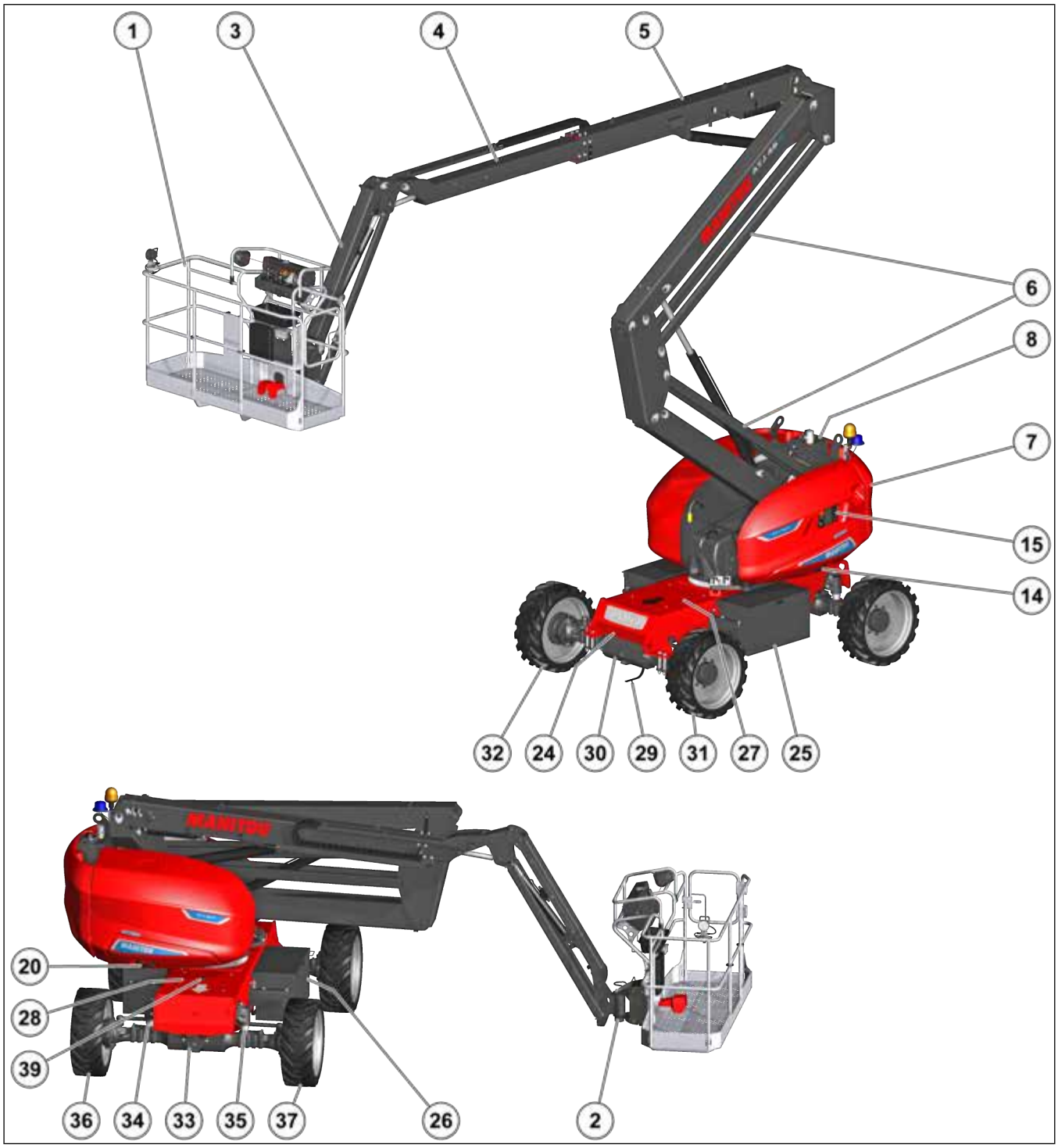


Figure 79: Location of maintenance components 1 - ATJ 46 E S1

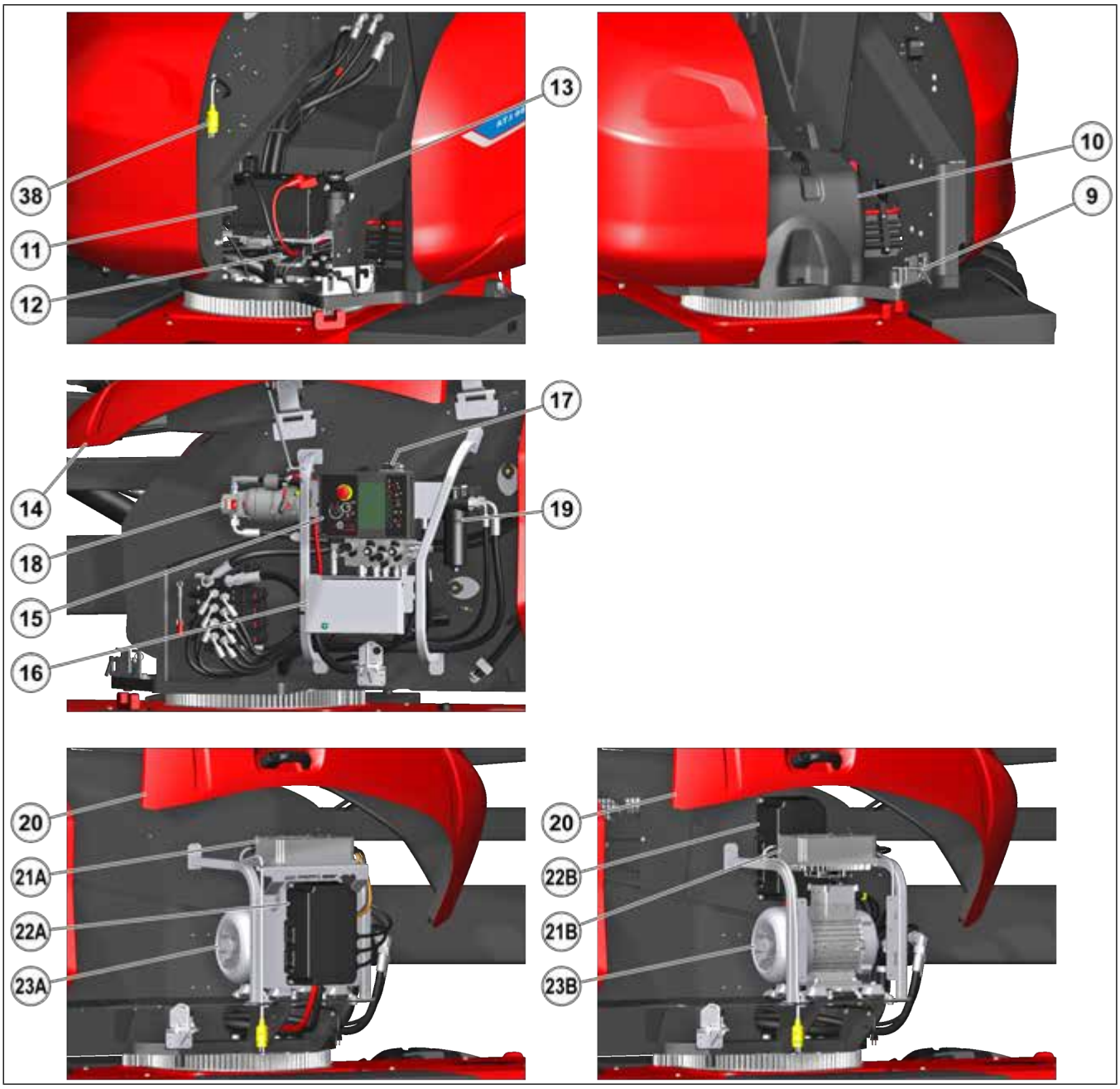


Figure 80: Location of maintenance components 2 - ATJ 46 E S1

Table 32. Location of the machine components 1 and 2 - ATJ 46 E S1

Item	Designation	Option
1	Platform	
2	Platform rotation switch	
3	Jib arm	
4	Telescopic arm	
5	Main arm	
6	Secondary arm	
7	Turntable	
8	Hydraulic oil tank	
9	Turntable locking pin	
10	12 V battery cover	

Item	Designation	Option
11	12 V battery (under the 12 V battery cover)	
12	12 V battery connector (under the 12 V battery cover)	
13	Turntable rotation motor (under the 12 V battery cover)	
14	Right-hand turntable cover	
15	Ground controls - Ground-level control panel	
16	Control system fuse/relay box cover	
17	Tilt sensor	
18	Backup pump	
19	Hydraulic circuit filter	
20	Left-hand turntable cover	
21A (1)	Battery charger	
21B (2)	Battery charger	
22A (1)	Electric pump drive cover	
22B (2)	Electric pump drive cover	
23A (1)	Electric pump motor	
23B (2)	Electric pump motor	
24	Chassis	
25	Right high-voltage battery	
26	Left high-voltage battery	
27	Rear chassis cover	
28	Front chassis cover	
29	Antistatic strip	
30	Rear axle with reduction gearbox	
31	Right rear wheel	
32	Left rear wheel	
33	Oscillating front axle	
34	Right oscillation cylinder	
35	Left oscillation cylinder	
36	Right front wheel	
37	Left front wheel	
38	Electrical plug - 110 V electric power socket in the platform	
39	Distilled water tank - Centralized electric filling of high-voltage batteries	●

(1) Up to the machine: MAN00000J01101633.

(2) From the machine: MAN00000J01101634.

4.3. MAINTENANCE SCHEDULE

⚠ WARNING

Maintenance-related risk

Mandatory maintenance must be carried out by Manitou-approved service technicians.

Scheduled maintenance "4 Every 50 hours or every month" must be carried out by qualified maintenance personnel or Manitou-approved service technicians.

Scheduled maintenance except "4 Every 50 hours or every month" must be carried out by Manitou-approved service technicians.
Optional maintenance must be carried out by Manitou-approved service technicians.

Mandatory maintenance

- 1 First 50 hours: perform this maintenance after the first 50 hours of use.
- 2 First 6 months before first 500 hours: perform this maintenance 6 months after commissioning of the machine if the first 500 hours of use have not been reached.
- 3 First 500 hours before the first 6 months: perform this maintenance after the first 500 hours of use if less than 6 months has passed since commissioning of the machine.

Scheduled maintenance

- 4 Every 50 hours or every month: perform this maintenance every 50 hours of use or every month.
- 5 Every 250 hours or every 6 months: perform this maintenance every 250 hours of use or every 6 months.

  Also carry out the scheduled maintenance 4.

- 6 Every 500 hours or every year: perform this maintenance every 500 hours of use or every year.

  Also carry out the scheduled maintenance 4 and 5.

- 7 Every 1000 hours or every 2 years: perform this maintenance every 1000 hours of use or every 2 years.

  Also carry out scheduled maintenance 4, 5 and 6.

- 8 Every 1500 hours or every 3 years: perform this maintenance every 1500 hours of use or every 3 years.

  Also carry out scheduled maintenance 4, 5 and 6.

- 9 Every 2000 hours or every 4 years: perform this maintenance every 2000 hours of use or every 4 years.

  Also carry out the scheduled maintenance 4, 5, 6 and 7.

- 10 Every 6000 hours or every 12 years: perform this maintenance every 6000 hours of use or every 12 years.

  Also carry out the scheduled maintenance 4, 5, 6, 7, 8 and 9

Optional maintenance

- 11 : perform this maintenance 2 years after commissioning of the machine and 2 years after each hydraulic oil change:
  - when the thermal amplitude is significant,

    Example: regular transition from an icy to a temperate environment.

  - when the machine has not reached 500 hours of service in 2 years,
  - or when recommissioning the machine after a long shutdown.

Table 33. Maintenance schedule

	1	2	3	4	5	6	7	8	9	10	11
4.5.1.1 Checking the density of the electrolyte in the high-voltage batteries, page 112	•	•	•	•							
4.5.1.2 Checking the machine, page 113	•	•	•	•							
4.5.1.3 Lubricating the axles, page 113	•	•	•	•							
4.5.1.4 Checking the reduction gearbox for leaks, page 113	•	•	•	•							
4.5.1.5 Checking the axle differentials for leaks, page 114	•	•	•	•							

	1	2	3	4	5	6	7	8	9	10	11
4.5.1.6 Checking the wheel reduction gears for leaks, page 114	●	●	●	●							
4.5.1.7 Checking the 110 V electric power socket in the platform, page 114	●	●	●	●							
4.5.2.1 Checking wheel tightness, page 115	●	●	●		●						
4.5.2.2 Checking oscillation cylinder tightness, page 115	●	●	●		●						
4.5.2.3 Checking drive shaft tightness, page 116	●	●	●		●						
4.5.2.4 Checking axle tightness, page 116	●	●	●		●						
4.5.2.5 Checking the telescopic arm, page 117		●	●		●						
4.5.2.6 Lubricating the crown gear, page 117		●	●		●						
4.5.2.7 Lubricating the lifting structure, page 119		●	●		●						
4.5.2.8 Checking the turntable rotation motor oil level, page 123		●	●		●						
4.5.2.9 Draining the high-voltage battery trays, page 123		●	●		●						
4.5.2.10 Checking the cables and the 12 V electrical connections, page 124		●	●		●						
4.5.2.11 Checking the high-voltage cables and electrical connections, page 127		●	●		●						
4.5.2.12 Cleaning the heat sink and the battery charger fan, page 132		●	●		●						
4.5.2.13 Cleaning the heat sinks and the drive fans, page 133		●	●		●						
4.5.2.14 Checking the tilt sensor calibration, page 133		●	●		●						
4.5.2.15 Checking the overload system, page 134		●	●		●						
4.5.2.16 Checking the procedure for setting freewheel mode, page 135		●	●		●						
4.5.2.17 Checking the braking distance, page 135		●	●		●						
4.5.2.18 Checking braking on a slope, page 136		●	●		●						
4.5.2.19 Checking the emergency controls from the platform, page 136		●	●		●						
4.5.2.20 Reset the maintenance warning, page 137					●						
4.5.3.1 Checking tightening of the tilt sensor bracket, page 137	●	●	●			●					
4.5.3.2 Checking the tightness of the platform rotation cylinder, page 137		●	●			●					
4.5.3.3 Checking the chocking of the telescopic arm, page 138		●	●			●					
4.5.3.4 Checking the tightness of the crown gear assembly, page 139	●	●	●			●					
4.5.3.5 Checking the tightness of the turntable rotation motor, page 140		●	●			●					
4.5.3.6 Checking counterweight tightness, page 141		●	●			●					
4.5.3.7 Checking the tightness of the high-voltage batteries, page 141	●	●	●			●					
4.5.3.8 Checking the hydraulic hoses, page 142		●	●			●					
4.5.3.9 Replacing the turntable rotation motor oil, page 142			●			●					
4.5.3.10 Replacing the hydraulic circuit filter cartridge, page 142			●			●		●		●	
4.5.3.11 Checking the electrical insulation resistance, page 143		●	●			●					
4.5.2.20 Reset the maintenance warning, page 137		●	●			●					
4.5.4.1 Replacing the reduction gearbox oil, page 143							●				
4.5.4.2 Replacing the axle differential oil, page 144							●				

	1	2	3	4	5	6	7	8	9	10	11
4.5.4.3 Replacing the wheel reduction gear oil, page 144							●				
4.5.4.4 Checking the electric pump motor silent blocks, page 145							●				
4.5.4.5 Checking the clearance of the crown gear assembly, page 145							●				
4.5.4.6 Checking the hydraulic movement speeds, page 145							●				
4.5.4.7 Checking the condition of the cylinders, page 145							●				
4.5.4.8 Checking the condition of electric control wiring, page 145							●				
4.5.2.20 Reset the maintenance warning, page 137							●				
4.5.5.1 Replacing the hydraulic oil, page 145								●		●	
4.5.5.2 Cleaning the filling filter and the suction strainer, page 146								●		●	
4.5.2.20 Reset the maintenance warning, page 137								●			
4.5.6.1 Checking the hydraulic circuit pressures, page 147									●	●	
4.5.2.20 Reset the maintenance warning, page 137									●	●	
4.5.7.1 Checking the hydraulic oil, page 147											●

4.4. OCCASIONAL MAINTENANCE AND OCCASIONAL OPERATIONS

⚠ WARNING

Maintenance-related risk

Occasional maintenance must be carried out by qualified maintenance personnel or Manitou-approved service technicians.
Occasional operations must be carried out by qualified maintenance personnel or Manitou-approved service technicians.

	Occasional maintenance	*Occasional operations*
4.5.8.1 Replace the wheels, page 147	●	
4.5.8.2 Replace the fuses and relays, page 148	●	
4.5.8.3 Replacing high-voltage batteries, page 153	●	
4.5.9.1 Using the safety stand, page 156		●

4.5. MAINTENANCE INSTRUCTIONS

4.5.1. EVERY 50 HOURS OR EVERY MONTH

4.5.1.1 Checking the density of the electrolyte in the high-voltage batteries

⚠ DANGER

Risk of electrocution

Electrical accreditation may be required for this maintenance operation: comply with local, governmental and national regulations in force.

⚠ WARNING

Risk of electrocution

Make sure that the positive terminals cannot come into contact with the negative terminals or the metallic parts of the machine at any time.

⚠ CAUTION

Battery-related risk

High-voltage batteries contain electrolyte, a highly corrosive liquid: always wear protective clothing, gloves and safety glasses or a face shield during maintenance.
At all times, avoid contact between the electrolyte from the high-voltage batteries and any part of the body or clothing; rinse any exposed areas with clean water and seek medical advice.

NOTICE

Risk of high-voltage battery damage

Contact the after-sales service if significant differences in electrolyte density are observed between the cells of the high-voltage batteries.
Contact the after-sales service if significant differences in electrolyte density are observed in relation to the previous measurements.

1. Switch on the machine.
2. Check that the high-voltage battery charge level shown on the ground-level display screen is 100%.

   If the charge level of the high-voltage batteries is below 100%.

   1. Switch off the machine.
   2. Charge the high-voltage batteries, referring to “Operating the machine: Charging the high-voltage batteries and the 12 V battery”.
   3. Switch on the machine.
   4. Check that the charge level of the high-voltage batteries is 100%.
   5. Check the electrolyte level of the high-voltage batteries. Refer to “Operating the machine: Before using the machine: Routine maintenance: Checking the high-voltage battery electrolyte level”.
3. Wait at least 2 hours if you have added distilled water to at least one of the two high-voltage batteries.
4. Remove the left and right high-voltage battery covers.
5. Open one of the high-voltage battery cell caps (1).

Figure 81: Checking the density of the electrolyte in the high-voltage batteries

6. Measure the density and the temperature of the electrolyte in the high-voltage battery cell, and record and archive the measured values.

   The nominal density of the electrolyte is 1.29 kg/L ±0.1 kg/L at a nominal temperature of 30 °C (86 °F). The nominal density is reached after the first 10 high-voltage battery charging cycles.

The correction coefficient for the temperature of the electrolyte is -0.0007 kg/l per K (Kelvin). Example: an electrolyte density of 1.28 kg/l at 45 °C (113 °F) corresponds to an electrolyte density of 1.29 kg/l at 30 °C (86 °F).

7. Clean and dry the high-voltage battery cell cap.
8. Check the condition of the cell cap seal and replace it if necessary.
9. Close the high-voltage battery cell cap.
10. Repeat steps 5 to 9 for all the cells of the high-voltage battery.
11. Refit the left and right high-voltage battery covers when the electrolyte density and the temperature of all the high-voltage battery cells have been measured.

4.5.1.2 Checking the machine

1. Perform the walk-around inspection, referring to “Operating the machine: Before using the machine: Walk-around inspection”.
2. Perform routine maintenance, referring to “Operating the machine: Before using the machine: Routine maintenance”.
3. Perform the function tests, referring to “Operating the machine: Before using the machine: Function tests”.

4.5.1.3 Lubricating the axles

NOTICE

Risk of damage to the machine

Lubricate the axles more often when the machine is used in a dusty environment.

1. Lubricate the steering pivots on the front and rear axles.

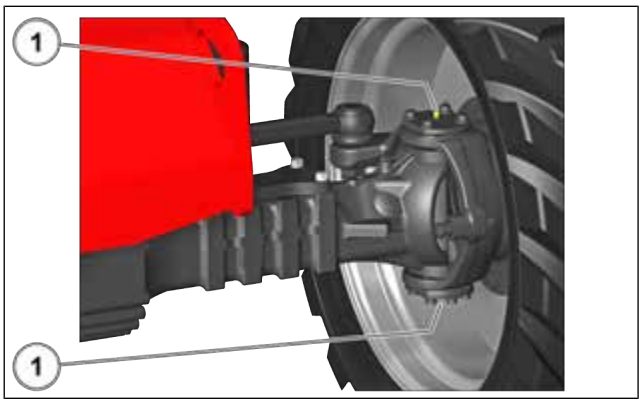


Figure 82: Axle lubrication 1

a. Remove the caps from the lubrication connectors (1), on the left and right sides.
b. Inject the lubricant into the lubrication connectors.

Please refer to “Technical specifications: Consumables: Liquids and lubricants”.

c. Refit the caps on the lubrication connectors.

2. Lubricate the front axle oscillation bearings.

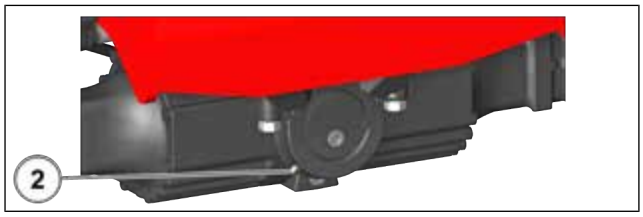


Figure 83: Axle lubrication 2

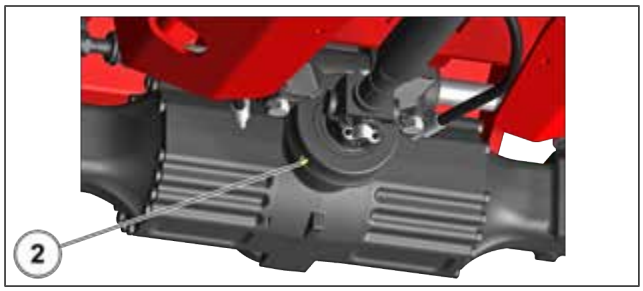


Figure 84: Axle lubrication 3

a. Remove the caps from the lubrication connectors (2).
b. Inject the lubricant into the lubrication connectors.

Please refer to “Technical specifications: Consumables: Liquids and lubricants”.

c. Refit the caps on the lubrication connectors.

4.5.1.4 Checking the reduction gearbox for leaks

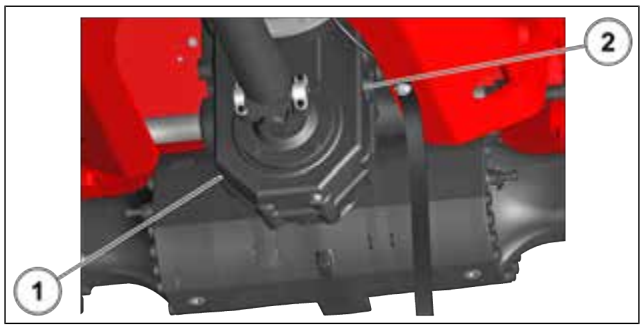


Figure 85: Checking the reduction gearbox for leaks

1. Check no oil is leaking from the reduction gearbox (1).

If a leak is detected.

1. Clean the outside of the reduction gearbox with a clean cloth.
2. Remove the filler plug (2).
3. Check that the oil reaches the rim of the filling hole.
4. Add oil if necessary.

   Please refer to "Technical specifications: Consumables: Liquids and lubricants".

5. Refit the filler cap.

4.5.1.5 Checking the axle differentials for leaks

1. Check for oil leaks from the front and rear axle differentials.

   Check the axle differentials one by one.

   If a leak is detected.

   1. Clean the outside of the axle differential with a clean cloth.
   2. Remove the filler cap (1) from the front axle or the filler cap (2) from the rear axle.

Figure 86: Checking the front axle differential for leaks

Figure 87: Checking the rear axle differential for leaks

   3. Check that the oil reaches the rim of the filling hole.
   4. Add oil if necessary.

      Please refer to "Technical specifications: Consumables: Liquids and lubricants".

   5. Refit the filler cap.

4.5.1.6 Checking the wheel reduction gears for leaks

1. Check for oil leaks from the front and rear wheel reduction gears, left and right.

   Check the wheel reduction gears one by one.

   If a leak is detected.

   1. Turn the wheel to put the drain/filler cap (1) in the horizontal position.

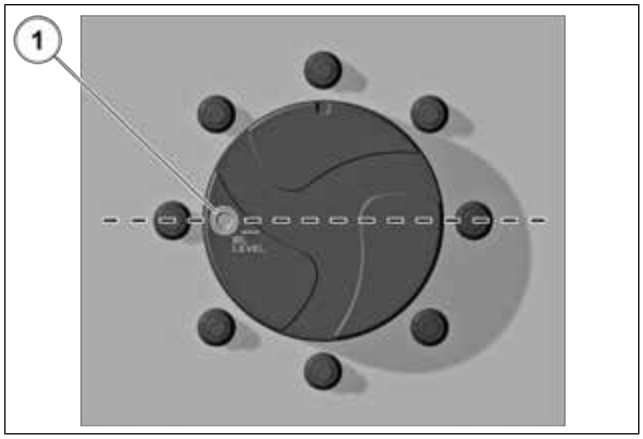


Figure 88: Checking the wheel reduction gears for leaks

   2. Clean the outside of the axle differential with a clean cloth.
   3. Remove the drain/filler plug.
   4. Check that the oil reaches the rim of the drain/filling hole.
   5. Add oil if necessary.

      Please refer to "Technical specifications: Consumables: Liquids and lubricants".

   6. Refit the filler cap.

      42 Nm ±7 Nm (31 lb-ft ±5 lb-ft).

4.5.1.7 Checking the 110 V electric power socket in the platform

⚠ DANGER

Risk of electrocution

Always plug the plug into a 110 V/60 Hz power source delivering 15 A protected by a 30 mA residual-current circuit breaker.
Only plug electrical appliances that work with 110 V/60 Hz, 15 A maximum into the electric power socket.
Do not connect extension cords, power supply bars or plugs with multiple sockets to the electric power sockets.

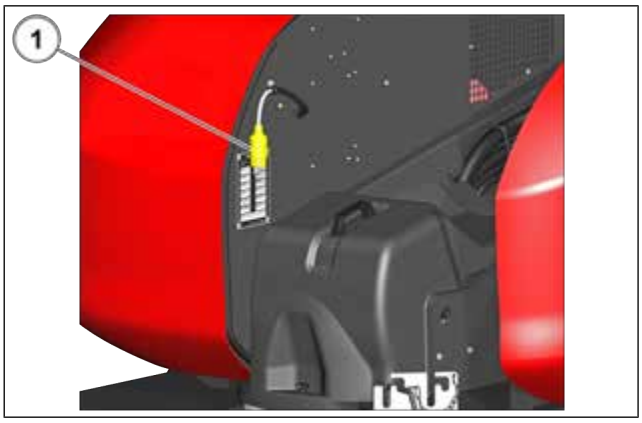


Figure 89: Checking the 110 V electric power socket in the platform 1

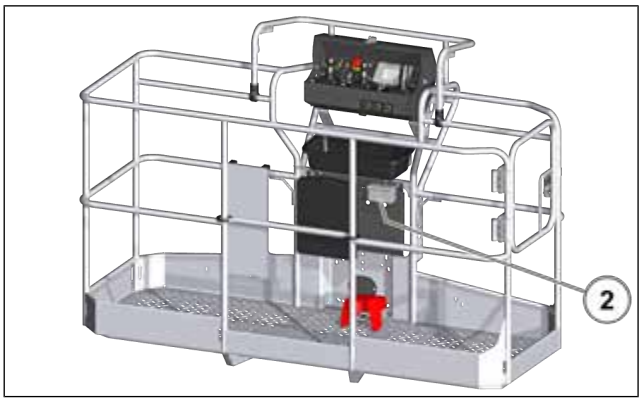


Figure 90: Checking the 110 V electric power socket in the platform 2

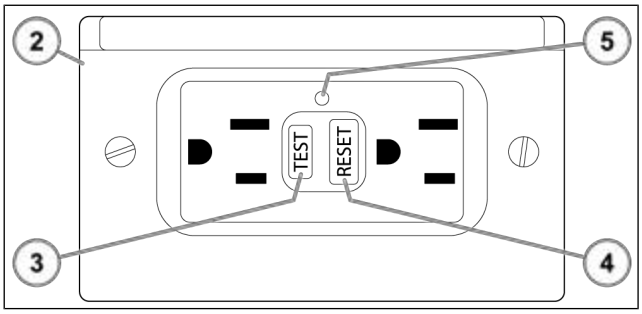


Figure 91: Checking the 110 V electric power socket in the platform 3

Replace the electric power socket if the indicator lamp (5) is flashing.

1. Plug the electrical plug (1) into a power source.
2. Plug an electrical appliance into the first outlet of the electric power socket (2).
3. Switch on the electrical appliance.

   Result:

   - the electrical appliance should operate.
4. Press and release the "Test" button (3).

   Result:

   - the "Reset" button (4) must be in the released position,
   - the electrical appliance should not operate.
5. Switch off the electrical appliance.
6. Press the "Reset" button until it stays down.
7. Switch on the electrical appliance.

   Result:

   - the electrical appliance should operate.
8. Disconnect the electrical appliance.
9. Plug the electrical appliance into the second outlet of the electric power socket.
10. Repeat steps 3 to 8.
11. Disconnect the electrical plug.

4.5.2. EVERY 250 HOURS OR EVERY 6 MONTHS

4.5.2.1 Checking wheel tightness

⚠ DANGER

Risk of tilting

Always follow this procedure and respect the inspection frequency.

1. Check the tightening torques of all the wheel nuts.

   360 Nm ±36 Nm (265 lb-ft ±26 lb-ft).

4.5.2.2 Checking oscillation cylinder tightness

⚠ DANGER

Risk of tilting

Always follow this procedure and respect the inspection frequency.

1. Check the tightening torques of all the fixing screws (1), on the left and right sides.

247.5 Nm ±12 Nm (182.5 lb-ft ±9 lb-ft).

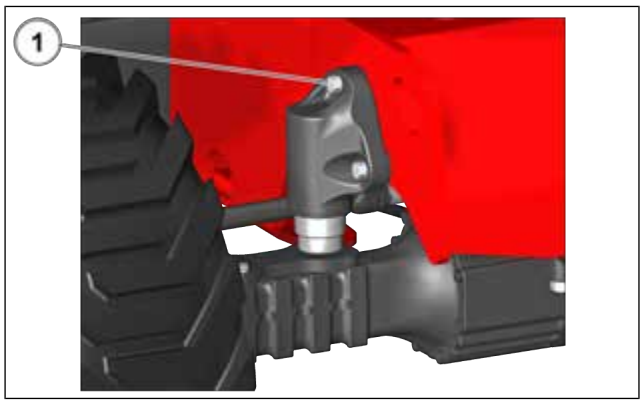


Figure 92: Checking oscillation cylinder tightness

4.5.2.3 Checking drive shaft tightness

⚠ DANGER

Risk of runaway

Always follow this procedure and respect the inspection frequency.

1. Check the tightening torques of all the fixing screws (1), at the front and rear.

37 Nm ±3.5 Nm (27.5 lb-ft ±2.5 lb-ft).

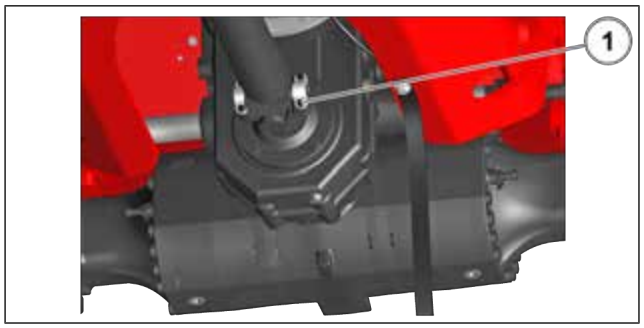


Figure 93: Checking drive shaft tightness 1

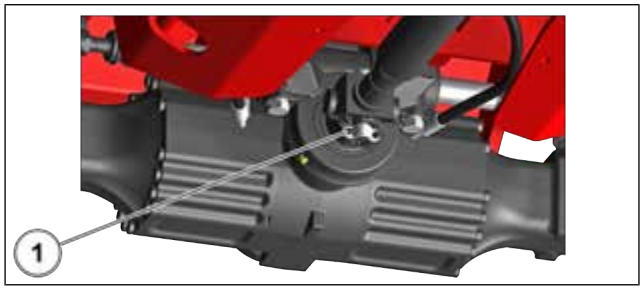


Figure 94: Checking drive shaft tightness 2

4.5.2.4 Checking axle tightness

⚠ DANGER

Risk of tilting

Always follow this procedure and respect the inspection frequency.

1. Check the tightening torque of all the front axle oscillation bearing fixing screws (1).

407 Nm ±40.5 Nm (300 lb-ft ±29.5 lb-ft).

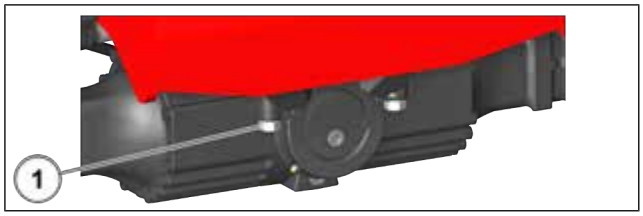


Figure 95: Checking axle tightness 1

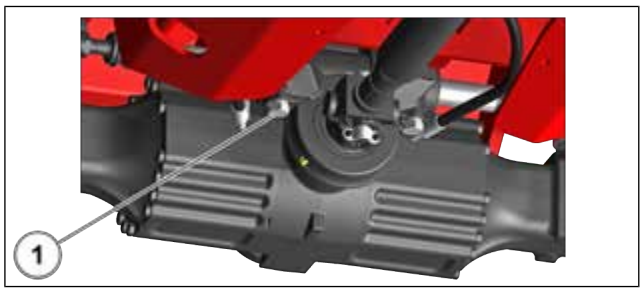


Figure 96: Checking axle tightness 2

2. Check the tightening torque of all the front axle plate fixing screws (2).

132 Nm ±13 Nm (97.5 lb-ft ±9.5 lb-ft).

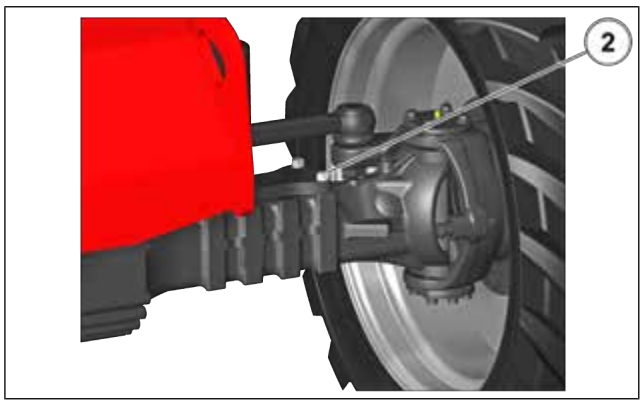


Figure 97: Checking axle tightness 3

3. Check the tightening torques of all the rear axle fixing screws (3), left and right sides.

340 Nm ±34 Nm (250.5 lb-ft ±24.5 lb-ft).

Figure 98: Checking axle tightness 4

4.5.2.5 Checking the telescopic arm

NOTICE

Risk of damage to the machine

Lubricate the telescopic arm more often when the machine is used in a dusty environment.

1. Switch on the machine.
2. Raise the jib arm slightly.
3. Fully extend the telescopic arm.
4. Check the sliding surfaces (1) of the pads.

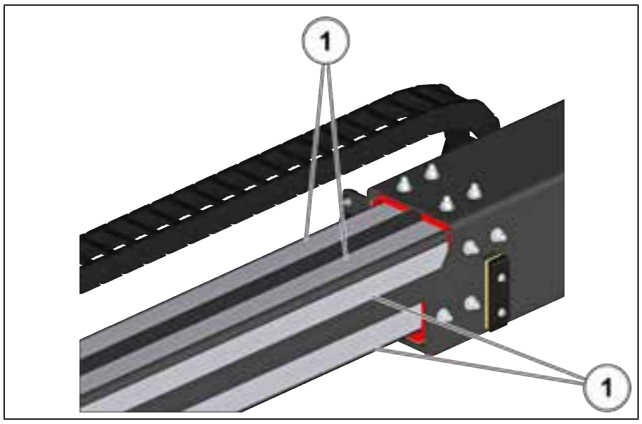


Figure 99: Checking the telescopic arm 1

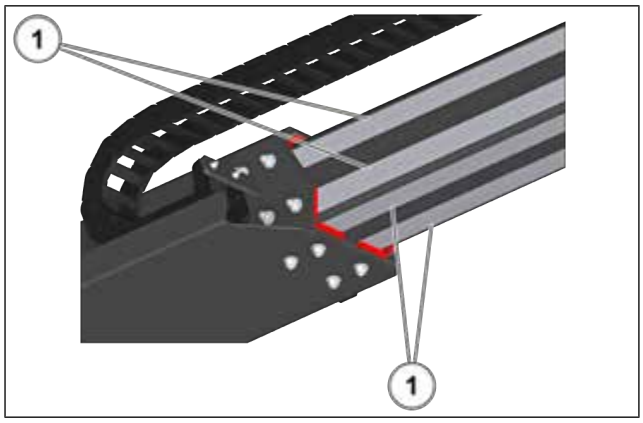


Figure 100: Checking the telescopic arm 2

Result:

- sliding surfaces must be smooth and free from corrosion.

5. Lubricate the telescopic arm if necessary.

Please refer to "Technical specifications: Consumables: Liquids and lubricants".

6. Extend and retract the telescopic arm several times to spread the lubricant.
7. Remove the excess with a clean cloth.
8. Fully retract the telescopic arm.
9. Fully lower the jib arm.

4.5.2.6 Lubricating the crown gear

The machine is powered up.

1. Put the safety strut in place.

Refer to "Maintenance: Maintenance instructions: Occasional operations: Using the safety stand".

2. Remove the 12 V battery cover.
3. Remove the caps of the 2 lubrication connectors (1) for the crown gear.

Figure 101: Lubrication of the crown gear assembly 1

4. Inject the lubricant into the lubrication connectors.

   Please refer to “Technical specifications: Consumables: Liquids and lubricants”.

5. Turn the turntable 90° to the left or right and inject lubricant again.
6. Refit the caps on the lubrication connectors.
7. Lubricate the teeth of the crown gear (2).

   Please refer to “Technical specifications: Consumables: Liquids and lubricants”.

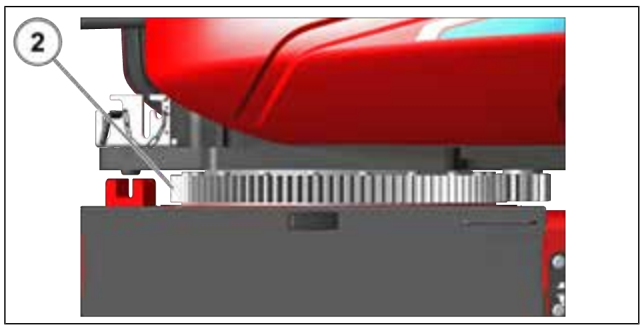


Figure 102: Lubrication of the crown gear assembly 2

8. Turn the turntable a full turn to spread the lubricant.
9. Put the turntable in neutral position.
10. Switch off the machine.

4.5.2.7 Lubricating the lifting structure

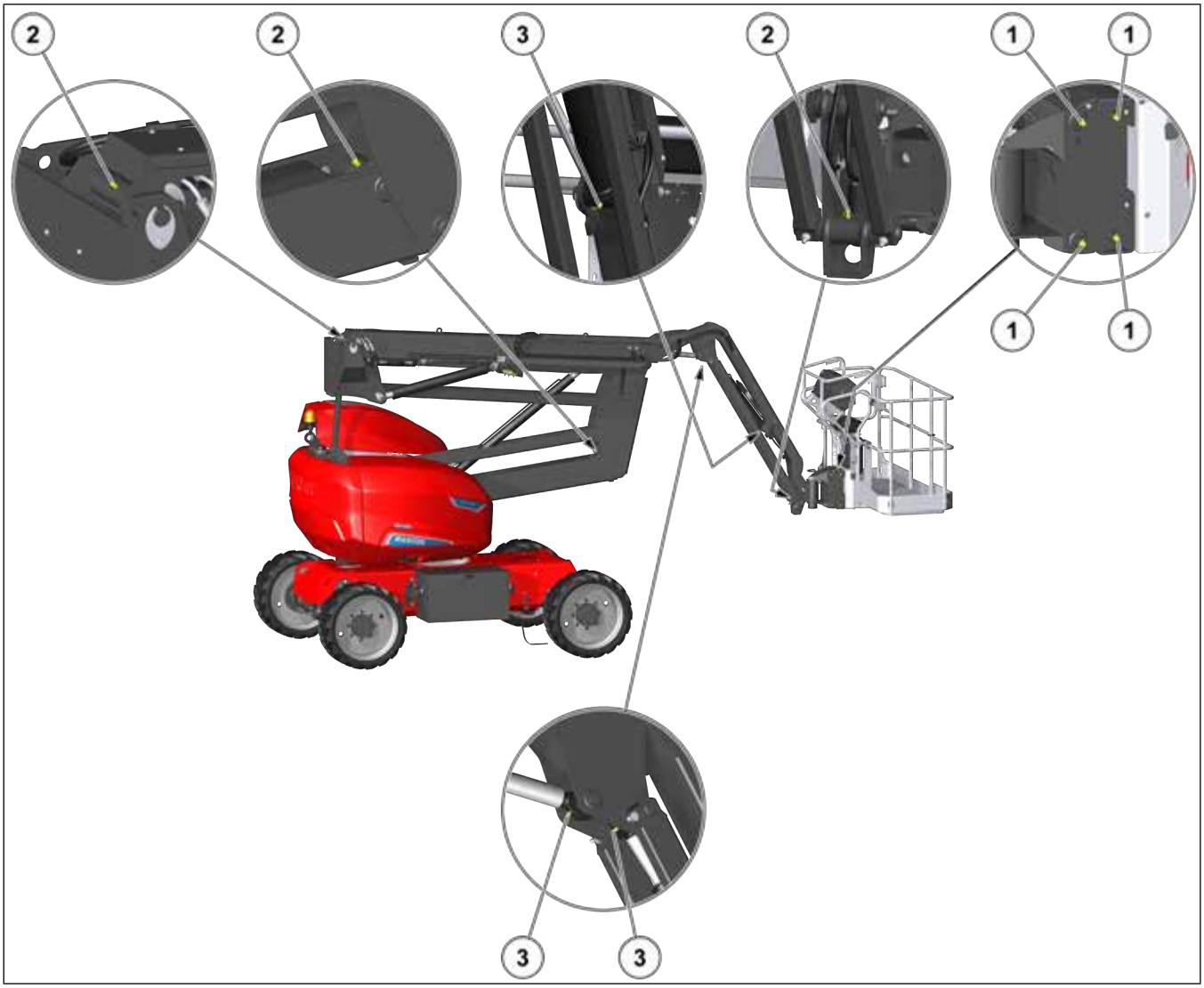


Figure 103: Lifting structure lubrication 1

1. Lubrication connector on shaft
2. Lubrication connector on hub
3. Lubrication connector on cylinder

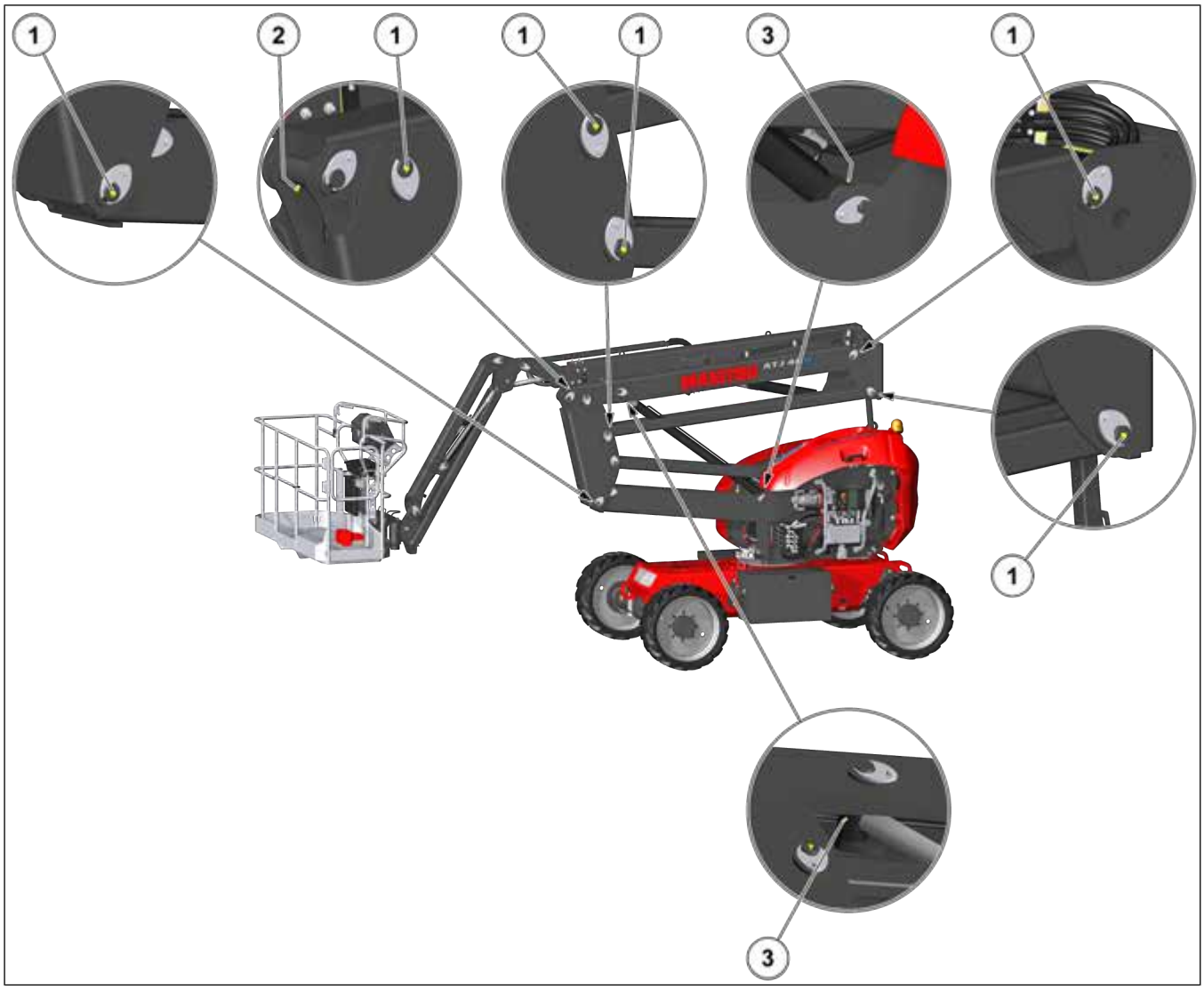


Figure 104: Lifting structure lubrication 2

1. Lubrication connector on shaft
2. Lubrication connector on hub
3. Lubrication connector on cylinder

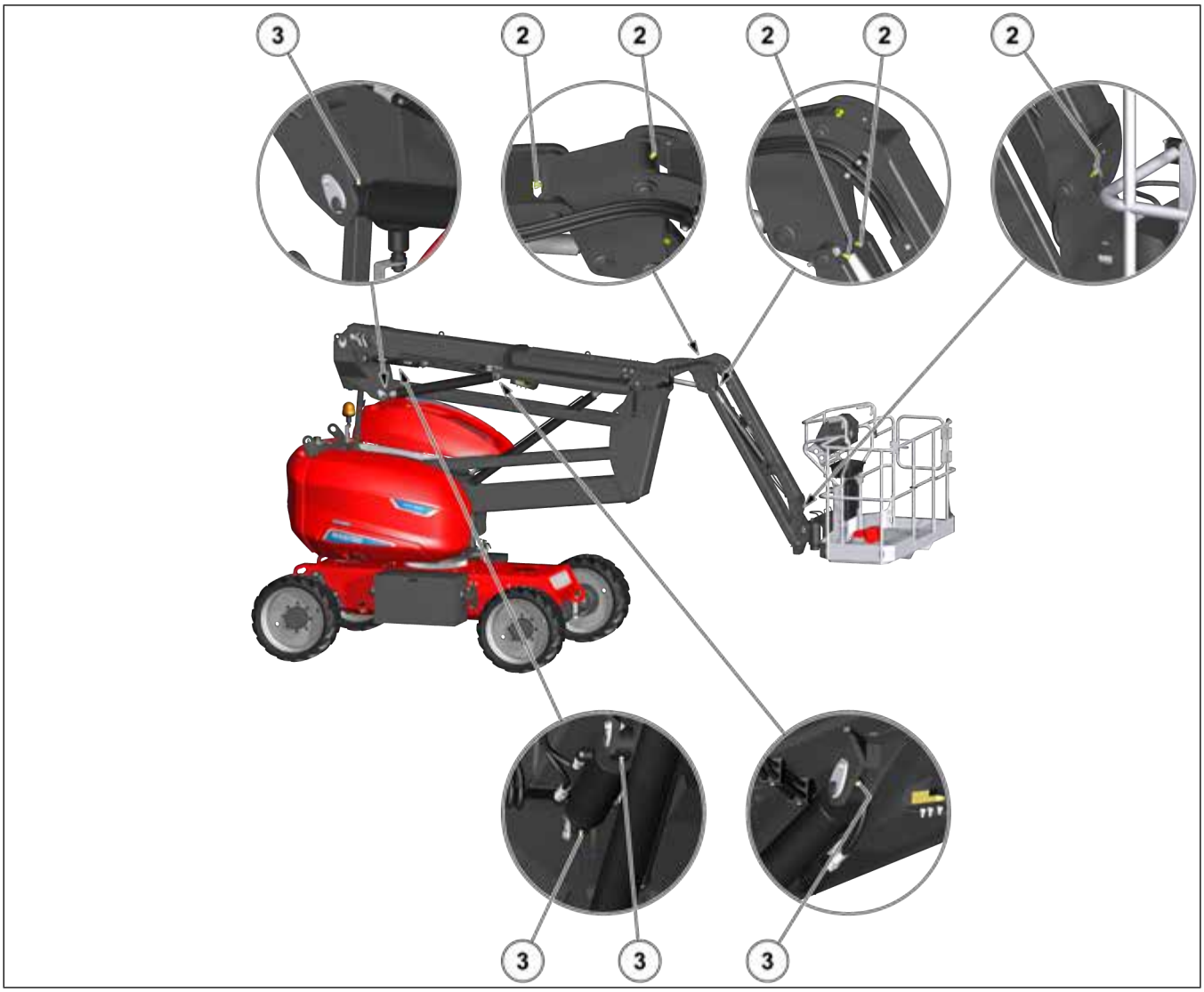


Figure 105: Lifting structure lubrication 3

1. Lubrication connector on shaft
2. Lubrication connector on hub
3. Lubrication connector on cylinder

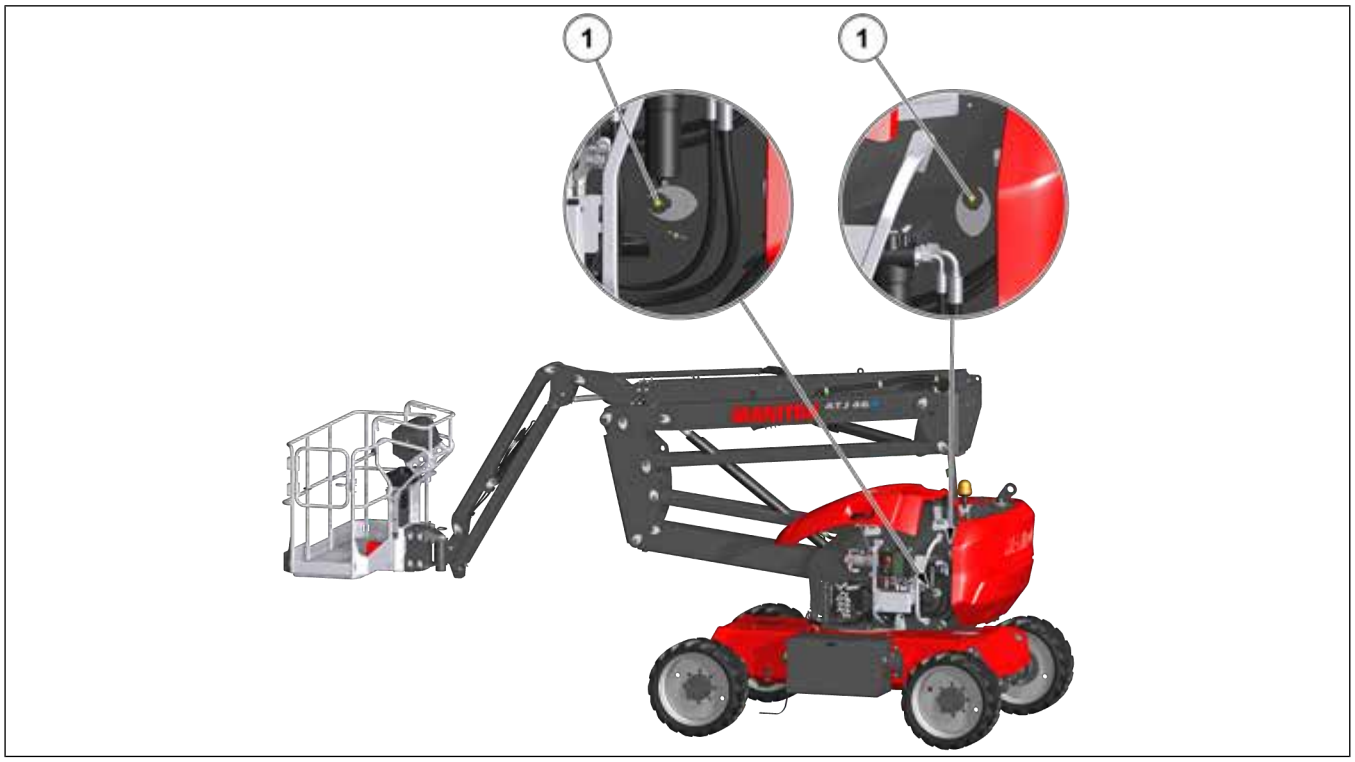


Figure 106: Lifting structure lubrication 4

1. Lubrication connector on shaft
2. Lubrication connector on hub
3. Lubrication connector on cylinder

The safety strut is put in place.

The 12 V battery cover is removed.

1. Open the right-hand turntable cover.
2. Remove the caps from the lubrication connectors (1), (2) and (3).
3. Inject the lubricant into each lubrication connector.

   Please refer to “Technical specifications: Consumables: Liquids and lubricants”.

4. Refit the caps on the lubrication connectors.

4.5.2.8 Checking the turntable rotation motor oil level

Figure 107: Checking the oil level of the turntable rotation motor 1

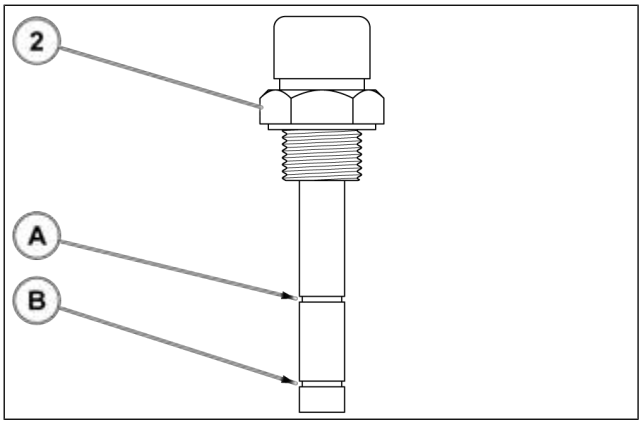


Figure 108: Checking the oil level of the turntable rotation motor 2

The safety strut is put in place.

The 12 V battery cover is removed.

The right turntable cover is open.

1. Clean the outside of the turntable rotation motor (1) with a clean cloth.
2. Check the turntable rotation motor for leaks.
3. Remove the filler plug (2).
4. Clean the dipstick on the filler cap with a clean cloth and put it back in place.
5. Remove the filler cap.
6. Check the oil level.

   The level is correct when the oil is between the 2 marks (A) and (B) on the filler cap (2).

   If the level is low.

   - Add oil until the correct level is reached, see steps 4 to 6.

     Please refer to "Technical specifications: Consumables: Liquids and lubricants".

7. Refit the filler cap.

4.5.2.9 Draining the high-voltage battery trays

⚠ WARNING

Risk of electrocution

Make sure that the positive terminals cannot come into contact with the negative terminals or the metallic parts of the machine at any time.

NOTICE

Risk of battery damage

Drain the high-voltage battery trays more often when the machine is parked outdoors.

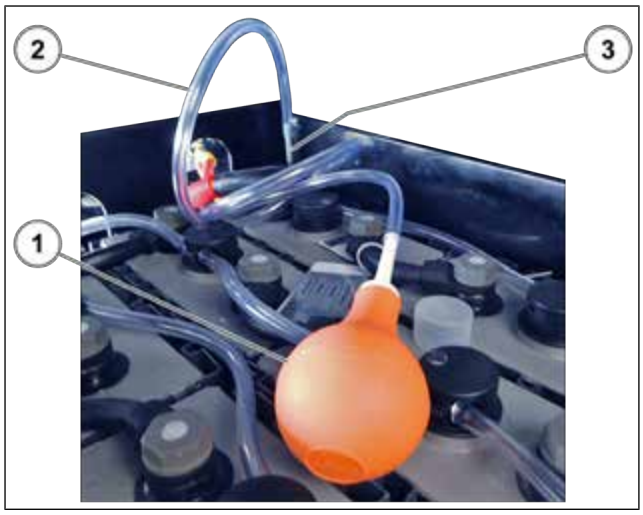


Figure 109: Draining the high-voltage battery trays

The safety strut is put in place.

The 12 V battery cover is removed.

The right turntable cover is open.

1. Remove the left and right high-voltage battery covers.

   Drain the high-voltage battery trays one after the other.

2. Locate the aspirator bulb (1) and the flexible hose (2) on top of one of the high-voltage batteries.
3. Locate the rigid pipe (3) in the high-voltage battery.
4. Connect the flexible hose to the aspirator bulb and the rigid hose.

5. Drain the water contained in the high-voltage battery tray using the aspirator bulb.
6. Remove the aspirator bulb and empty it.
7. Remove the flexible hose.
8. Refit the aspirator bulb and the flexible hose.
9. Replace the left and right high-voltage battery covers.

4.5.2.10 Checking the cables and the 12 V electrical connections

⚠ DANGER

Risk of electrocution

Electrical accreditation may be required for this maintenance operation: comply with local, governmental and national regulations in force.

⚠ WARNING

Risk of electrocution

Make sure that the positive terminals cannot come into contact with the negative terminals or the metallic parts of the machine at any time.
Be sure to replace the protective covers on electrical components: covers, lids, terminal caps, etc., when this maintenance operation is finished.

Figure 110: Checking the cables and the 12 V electrical connections 1

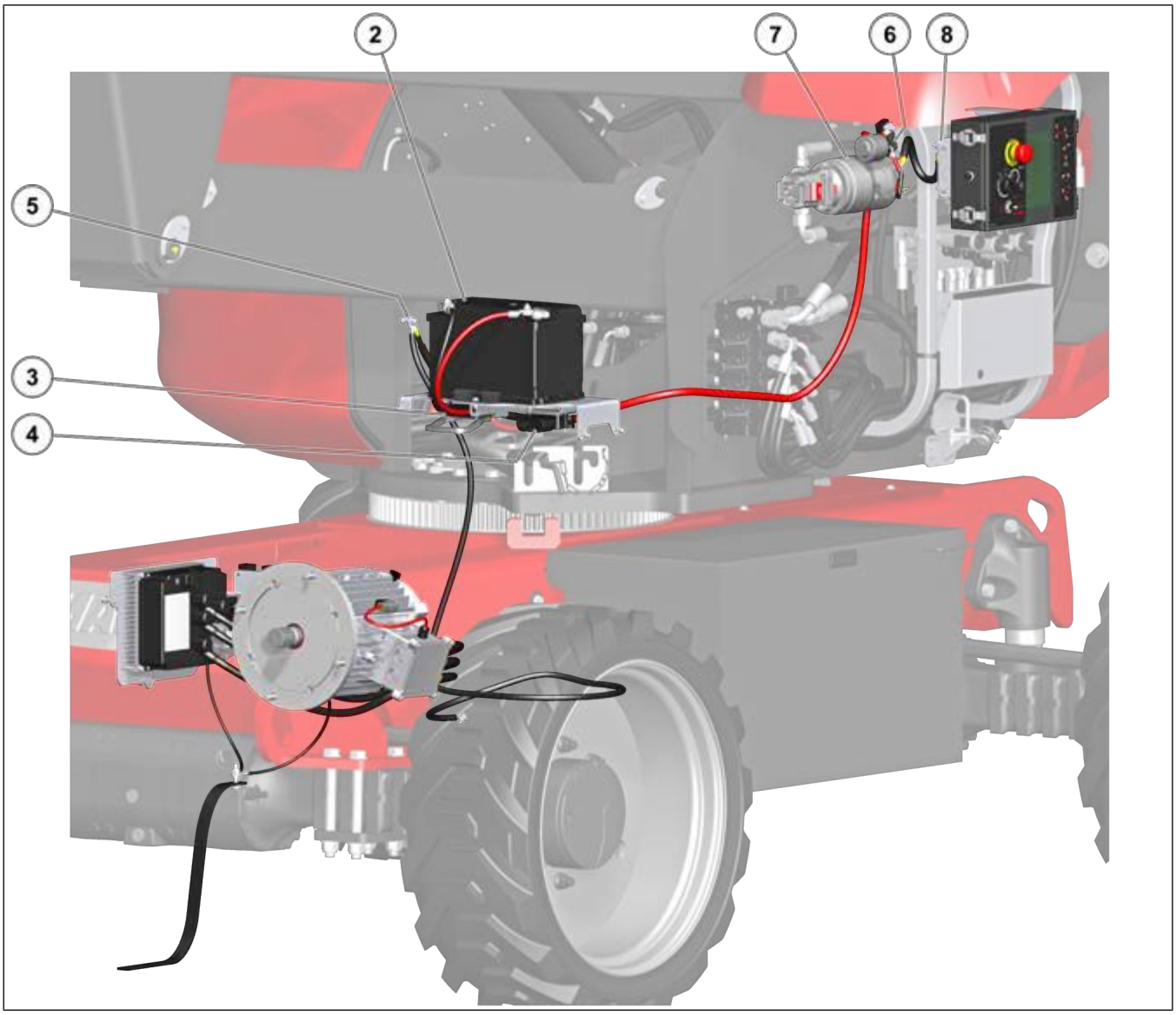


Figure 111: Checking the cables and the 12 V electrical connections 2

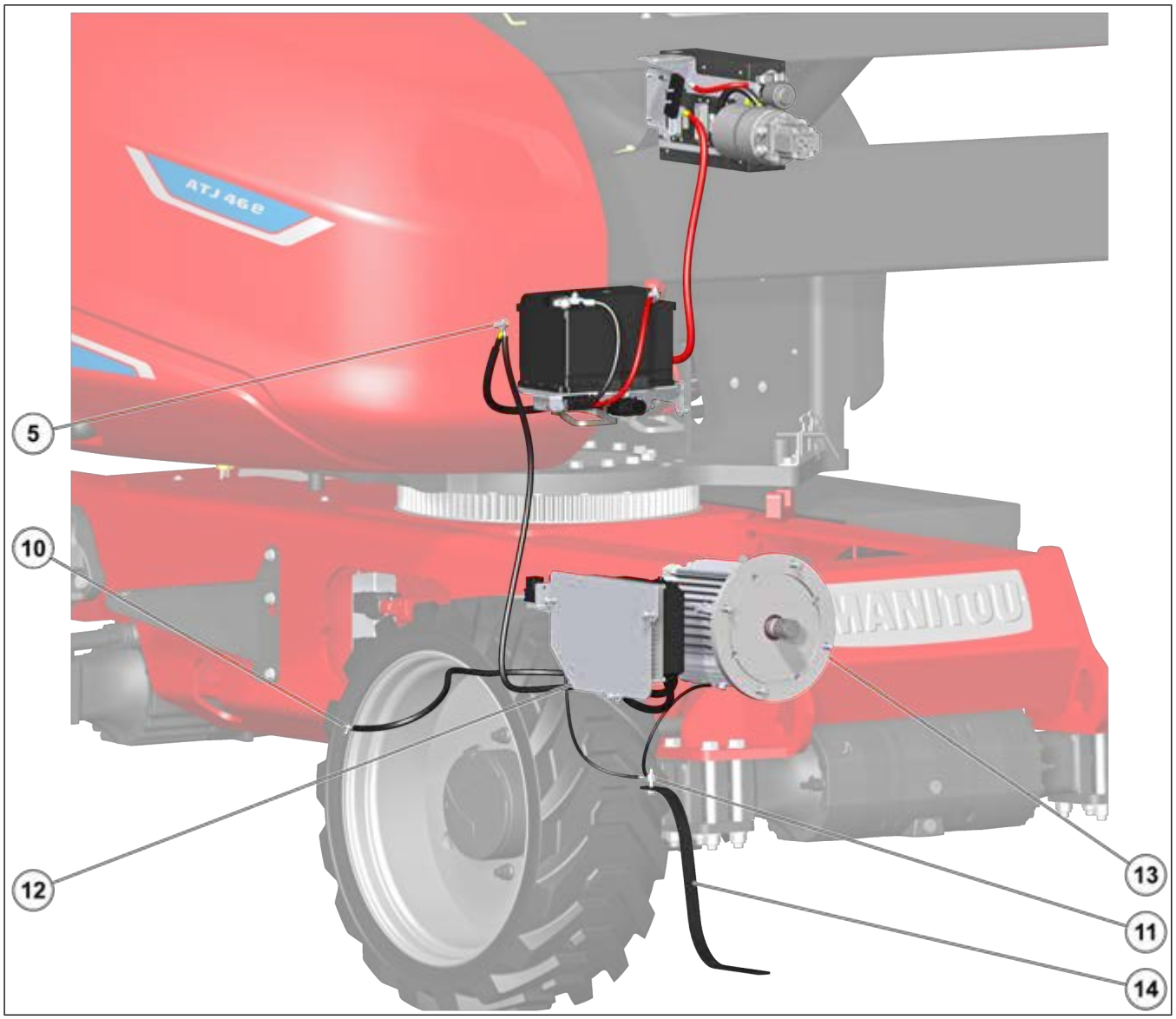


Figure 112: Checking the cables and the 12 V electrical connections 3

The safety strut is put in place.

The 12 V battery cover is removed.

The right turntable cover is open.

1. Disconnect the 12 V battery connector.

   Refer to "Operating the machine: Operation from the ground: Operating the 12 V battery connector".

2. Lock it in its housing with a padlock.
3. Remove the left high-voltage battery.

   Refer to "Maintenance: Maintenance instructions: Occasional maintenance: Replacing high-voltage batteries".

4. Remove the left chassis cover (1).
5. Remove the rear chassis cover.
6. Remove the protective caps on the electrical connections.
7. Remove the fuse compartment cover (6).
8. Check the condition of the 12 V electrical wires:
   - between the 12 V battery (2) and the 12 V battery connector (3),
   - between the machine's 12 V connector (4) and the turntable's ground point (5),
   - between the machine's 12 V connector (4) and the fuse holder (6),
   - between the fuse holder (6) and the backup pump (7),
   - between 2 electrical connections of the backup pump (7),
   - between the backup pump (7) and the ground point (8) of the ground-level control panel support.

- between the ground point (5) on the turntable and the ground point (10) on the chassis,
- between the ground point (11) on the chassis and the support (12),
- between the ground point (11) on the chassis and the wheel motor (13),

9. Check the condition of the antistatic strip (14).
10. Check the tightness of the 12 V electrical connections by sight and touch:
    - on the 12 V battery (2),
    - on the turntable's ground point (5),
    - on the fuse holder (6),
    - on the backup pump (7),
    - on the ground point (8) of the ground-level control panel support.
    - on the chassis's mass point (10),
    - on the chassis's mass point (11),
    - on the support (12),
    - on the wheel motor (13),

    If loosening is detected.

    - Refer to the machine repair manual.
11. Reinstall the fuse holder cover (6).
12. Refit the protective caps on the electrical connections.
13. Close the right-hand turntable cover.

4.5.2.11 Checking the high-voltage cables and electrical connections

⚠ DANGER

Risk of electrocution

Electrical accreditation may be required for this maintenance operation: comply with local, governmental and national regulations in force.

⚠ WARNING

Risk of electrocution

Make sure that the positive terminals cannot come into contact with the negative terminals or the metallic parts of the machine at any time.
Be sure to replace the protective covers on electrical components: covers, lids, terminal caps, etc., when this maintenance operation is finished.

Figure 113: Checking the tightness of the high-voltage electrical connections 1

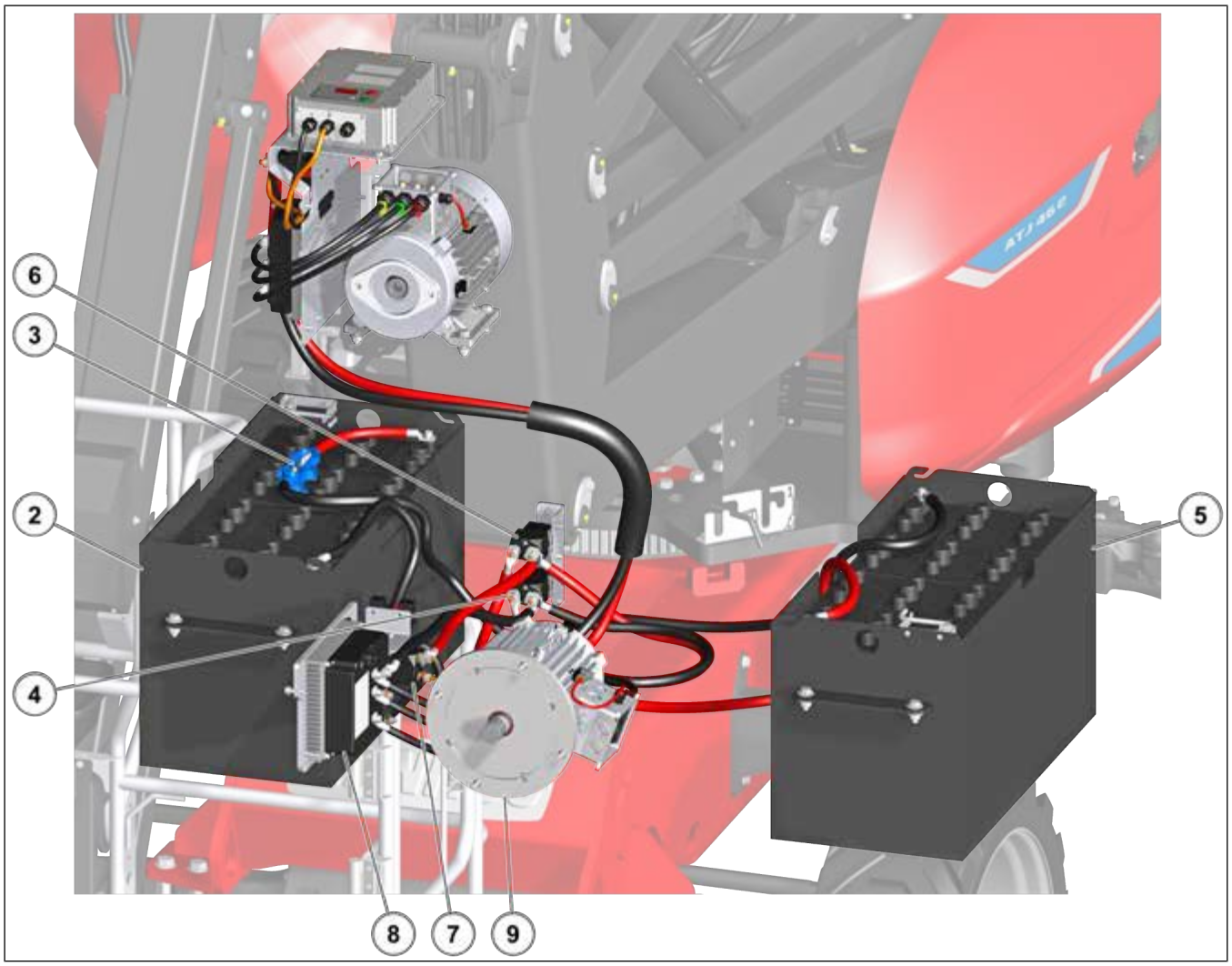


Figure 114: Checking cables and high-voltage electrical connections 2 - up to machine no. MAN00000J01101633

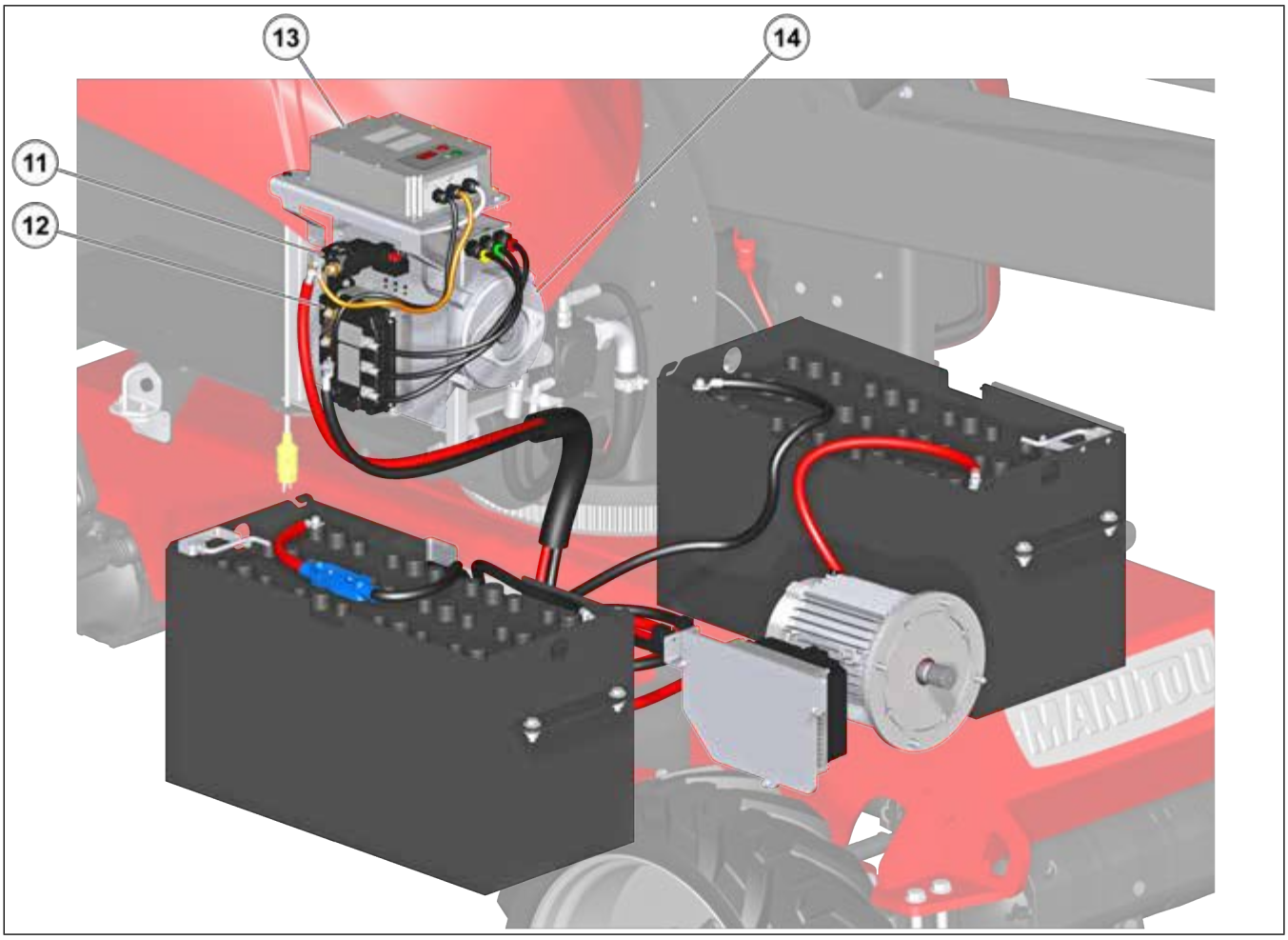


Figure 115: Checking cables and high-voltage electrical connections 3 - up to machine no. MAN00000J01101633

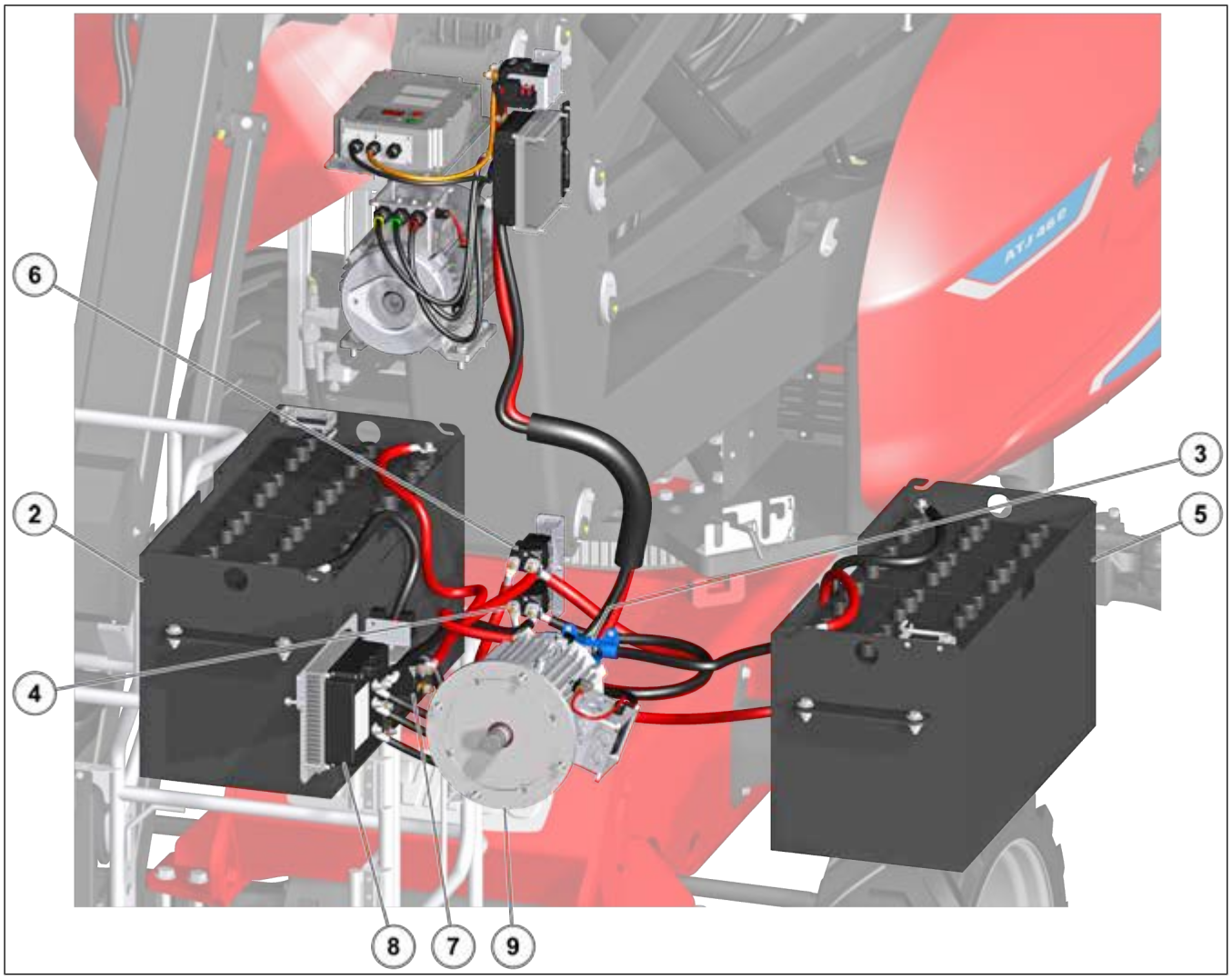


Figure 116: Checking cables and high-voltage electrical connections 2 - from machine no. MAN00000J01101634

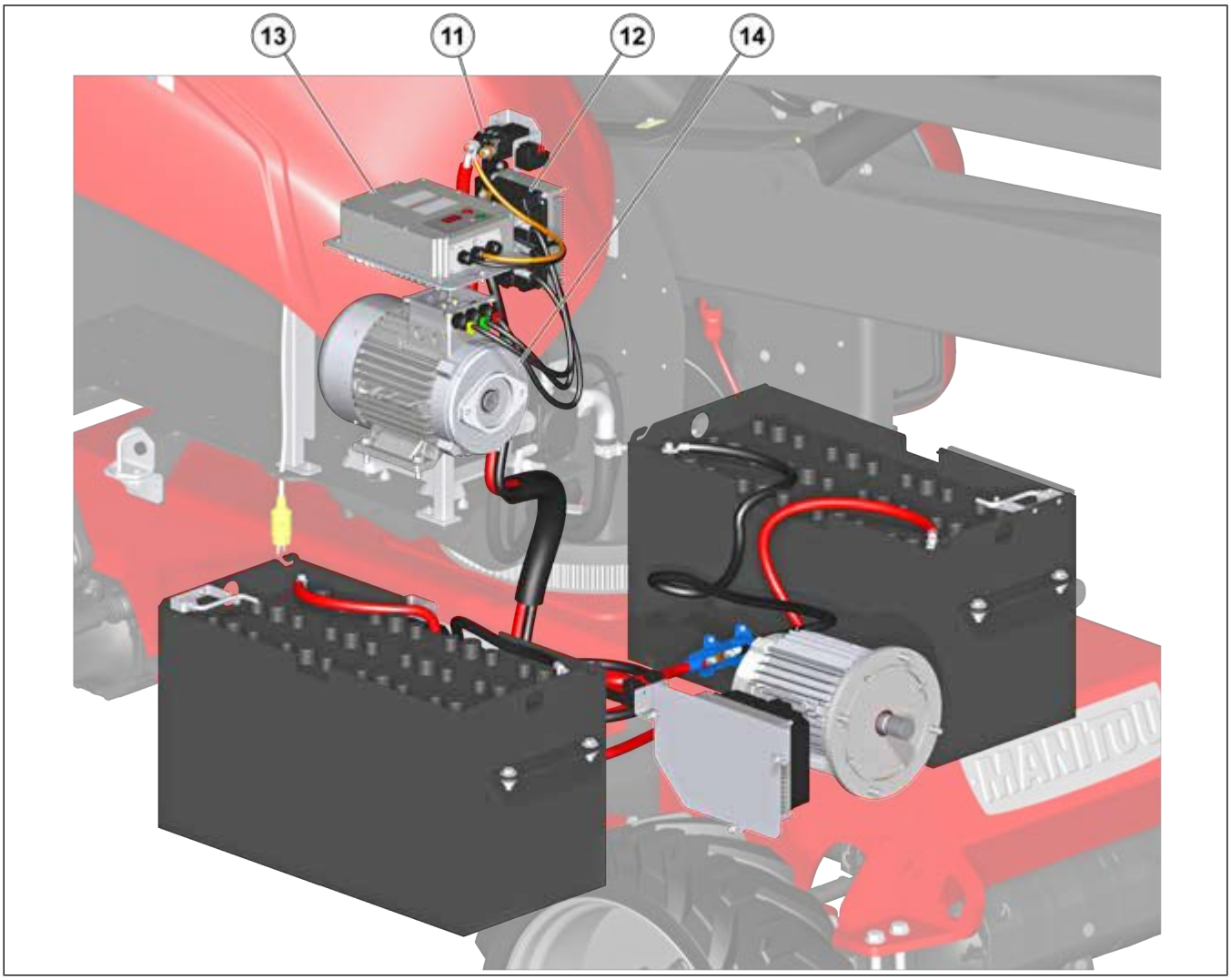


Figure 117: Checking cables and high-voltage electrical connections 3 - from machine no. MAN00000J01101634

The safety strut is put in place.

The 12 V battery cover is removed.

The 12 V battery connector is disconnected and locked.

The left high-voltage battery is removed.

The left chassis cover (1) has been removed.

The rear chassis cover has been removed.

1. Open the LH turntable cover.
2. Remove the drive cover from the electric pump.
3. Remove the right high-voltage battery cover.
4. Remove the protective caps on the electrical connections.
5. Remove the fuse compartment cover (3).
6. Remove the covers from the motor electrical boxes (9) and (14).
7. Check the condition of the high-voltage electrical cables:
   - between the left high-voltage battery (2) and the fuse holder (3),
   - between the left high-voltage battery (2) and the power relay (4),
   - between the fuse holder (3) and the right high-voltage battery (5),
   - between the right high-voltage battery (5) and the power relay (6),
   - between the power relay (6) and the power relay (7),
   - between the power relay (4) and the wheel motor drive (8),
   - between the wheel motor drive (8) and the wheel motor (9),
   - between the power relay (6) and the power relay (11),

- between the power relay (4) and the electric pump drive (12),
- between the power relay (11) and the battery charger (13),
- between the electric pump drive (12) and the battery charger (13),
- between the electric pump drive (12) and the electric pump motor (14),

8. Check the condition of the copper bars:
   - between the power relay (7) and the wheel motor drive (8),
   - between the power relay (11) and the electric pump drive (12),
9. Check the condition of the battery charger power cable (13).
10. Check the tightness of the high-voltage electrical connections by sight and touch:
    - on the fuse holder (3),
    - on the right (5) high-voltage battery,
    - on the power relays (4), (6), (7) and (11),
    - on the drives (8) and (12),
    - on the motors (9) and (14).

    If loosening is detected.
    - Refer to the machine repair manual.
11. Reinstall the fuse holder cover (3).
12. Refit the motor electrical box covers (9) and (14).
13. Refit the protective caps on the electrical connections.
14. Put the left chassis cover (1) back in place.
15. Put the left high-voltage battery back in place.

    Refer to “Maintenance: Maintenance instructions: Occasional maintenance: Replacing high-voltage batteries”.
16. Put the right high-voltage battery cover back in place.

4.5.2.12 Cleaning the heat sink and the battery charger fan

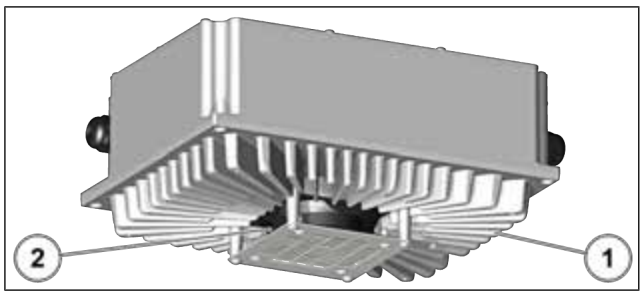


Figure 118: Cleaning the heat sink and the battery charger fan

The safety strut is put in place.

The 12 V battery cover is removed.

The 12 V battery connector is disconnected and locked.

The left-hand turntable cover is open.

The electric pump drive cover is removed.

The rear chassis cover has been removed.

1. Clean the heat sink (1) with dry compressed air.

   Maximum pressure = 3 bar (43 psi), minimum distance = 30 mm (1.25 in).
2. Clean the fan air intake (2) with a clean, dry cloth.

4.5.2.13 Cleaning the heat sinks and the drive fans

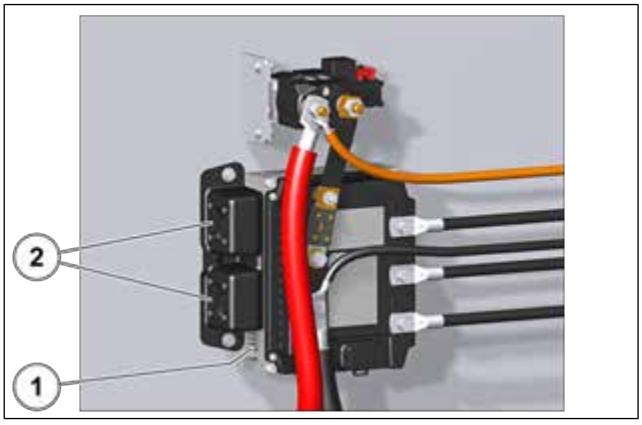


Figure 119: Cleaning the heat sinks and electric pump drive fans - up to machine No. MAN00000J01101633

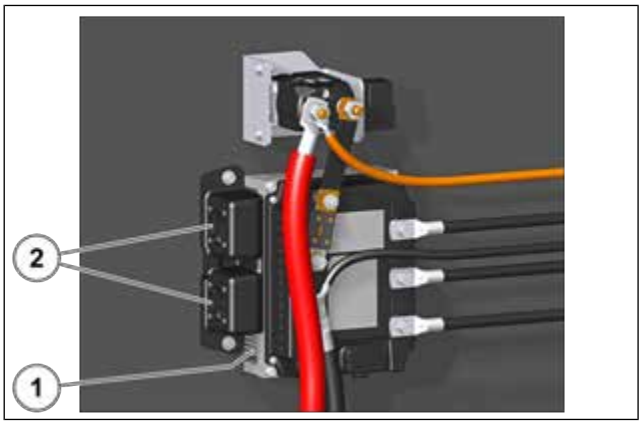


Figure 120: Cleaning the heat sinks and electric pump drive fans - from machine No. MAN00000J01101634

Figure 121: Cleaning the heat sinks and the wheel motor drive fans

The safety strut is put in place.

The 12 V battery cover is removed.

The 12 V battery connector is disconnected and locked.

The left-hand turntable cover is open.

The electric pump drive cover is removed.

The rear chassis cover has been removed.

1. Clean the heat sinks (1) and (3) with dry compressed air.

   Maximum pressure = 3 bar (43 psi), minimum distance = 30 mm (1.25 in).

2. Clean the air inlets of the fans (2) and (4) with a clean, dry cloth.
3. Unlock and connect the 12 V battery connector.

   Refer to "Operating the machine: Operation from the ground: Operating the 12 V battery connector".

4. Switch on the machine.
5. Check that the drive fans are operating correctly.

   Result:

   - the drive fans must run at high speed and then stop.

6. Switch off the machine.
7. Reattach the electric pump's drive cover.
8. Refit the rear chassis cover.
9. Put the 12 V battery cover back in place.
10. Close the left-hand turntable cover.
11. Remove the safety strut.

    Refer to "Maintenance: Maintenance instructions: Occasional operations: Using the safety stand".

4.5.2.14 Checking the tilt sensor calibration

⚠ DANGER

Risk of tilting

Always follow this procedure and respect the inspection frequency.

The machine is powered down.

The machine is in transport position.

The turntable and the platform are in the neutral position.

The jib arm is completely lowered.

The front and rear wheels are aligned.

1. Select a slope between 3.5% (2°) and 6% (3.5°).
2. Switch on the machine.
3. Get into the platform.
4. Raise the jib arm slightly.

5. Drive the machine forward slowly onto the slope, facing it, with the platform at the bottom of the slope.

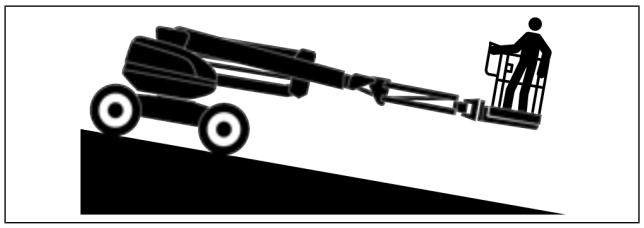


Figure 122: Machine on a slope

6. Brake the machine on the slope.
7. Fully lower the jib arm.
8. Get out of the platform.
9. Open the right-hand turntable cover.
10. Access the “Diagnostics” menu, then the “General info” sub-menu on the ground-level display screen.
11. Place a calibrated digital inclinometer under the turntable on the hatched area (1), as close as possible to the ring gear.

Figure 123: Checking the tilt sensor calibration

12. Compare the value displayed on the inclinometer with the value “TS101” or “TS102” displayed on the ground-level display screen.

    Result:

    - the values must be within ±0.3° for both.

    If the values are outside tolerance.

    - Refer to the machine repair manual to calibrate the tilt sensor.
13. Remove the inclinometer.
14. Turn the turntable 90° to the left.
15. Repeat steps 11 to 13.
16. Turn the turntable 90° to the left.

    Result:

    - the turntable is rotated 180° from the neutral position.
17. Repeat steps 11 to 13.
18. Turn the turntable 270° to the right.

    Result:

    - the turntable is rotated 90° to the right from the neutral position.
19. Repeat steps 11 to 13.
20. Return to the work page.
21. Switch off the machine.

4.5.2.15 Checking the overload system

⚠ DANGER

Risk of tilting

Always follow this procedure and respect the inspection frequency.
Refer to the machine repair manual to calibrate the overload system if the result is not in line with the procedure.

The machine is powered down.

The machine is in transport position.

The turntable and the platform are in the neutral position.

The jib arm is completely lowered.

1. Switch on the machine.
2. Place a uniformly distributed 275 kg (606 lb) weight in the platform.

   Result:

   - an alert page must be displayed on the ground-level display screen,
   - the audible alarm should sound continuously.
3. Try to activate all the machine’s functions one by one using the ground level control panel.

   Result:

   - it should not be possible to activate any of the functions.
4. Remove 25 kg (56 lb) to obtain a load of 250 kg (550 lb) in the platform.

   Result:

   - the alert page should no longer be displayed,
   - the audible alarm should stop.
5. Activate all the machine’s functions one by one.

   Result:

   - it should be possible to activate all the functions.

6. Place the machine in the transport position.
7. Put the turntable in neutral position.
8. Level the platform/jib arm.
9. Fully lower the jib arm.
10. Get into the platform.

    Result:

    - the overload indicator lamp should flash,
    - an alert page must be displayed on the platform display screen,
    - the audible alarm should sound continuously.
11. Try to activate all the machine's functions one by one using the platform control panel.

    Result:

    - it should not be possible to activate any of the functions.
12. Get out of the platform.

    Result:

    - the overload indicator lamp should go out,
    - the alert page should no longer be displayed,
    - the audible alarm should stop.
13. Remove the entire load from the platform.
14. Switch off the machine.

4.5.2.16 Checking the procedure for setting freewheel mode

⚠ DANGER

Risk of runaway

Always follow this procedure and respect the inspection frequency.

The machine is powered down.

The machine is in transport position.

The turntable and the platform are in the neutral position.

The jib arm is completely lowered.

- Follow the procedure for winching or towing the machine. Refer to "Operating the machine: Transporting and lifting the machine: Winching or towing the machine".

4.5.2.17 Checking the braking distance

⚠ DANGER

Risk of runaway

Always follow this procedure and respect the inspection frequency.

The machine is powered down.

The machine is in transport position.

The turntable and the platform are in the neutral position.

The jib arm is completely lowered.

1. Select a level surface for the following test.
2. Switch on the machine.
3. Place an evenly distributed load of 250 kg (550 lb) less your own weight in the platform.
4. Get into the platform.

   The transport pictogram must appear on the platform display screen.
5. Select hare speed.
6. Raise the jib arm slightly for better visibility.
7. Drive the machine forward until the maximum speed is reached.
8. Release the control handle to brake the machine.

   Result:

   - the braking distance should be 1,400 mm ± 300 mm (4 ft 7 in ± 11.75 in).
9. Extend the telescopic arm for 4 seconds.

   Result:

   - the work pictogram must appear on the platform display screen.
10. Drive the machine forward until the maximum speed is reached.

    The driving speed must be working speed.
11. Release the control handle to brake the machine.

    Result:

    - the braking distance should be 200 mm ± 50 mm (7.875 in ±2 in).
12. Fully retract the telescopic arm.

    Result:

- the transport pictogram must appear on the platform display screen.

13. Fully lower the jib arm.

4.5.2.18 Checking braking on a slope

⚠ DANGER

Risk of runaway

Always follow this procedure and respect the inspection frequency.

The machine is powered up.

The machine is in transport position.

The turntable and the platform are in the neutral position.

The jib arm is completely lowered.

The operator is in the platform.

The load from the previous maintenance operation is in the platform. Refer to “Maintenance: Maintenance instructions: Every 250 hours or every 6 months: Checking the braking distance”.

1. Select a slope of 25% (14°) for the following test.
2. Raise the jib arm to the horizontal position.
3. Drive the machine forward slowly onto the slope, facing it, with the platform at the bottom of the slope.
4. Release the control handle to brake the machine on the slope.

   Result:

   - the machine should come to rest on the slope for at least 1 minute.
5. Drive the machine off the slope.
6. Fully lower the jib arm.
7. Get out of the platform.
8. Remove the entire load from the platform.
9. Switch off the machine.

4.5.2.19 Checking the emergency controls from the platform

⚠ WARNING

Risk of falling

Do not tilt the platform/jib arm up and down during this check.

NOTICE

Risk of damage to the backup pump

Do not activate the backup pump for more than 4 minutes at a time, waiting at least 10 minutes between each 4-minute cycle.

The machine is powered down.

The machine is in transport position.

The turntable and the platform are in the neutral position.

The jib arm is completely lowered.

1. Open the LH turntable cover.
2. Locate the electrical connector “X127” (1) and disconnect it.

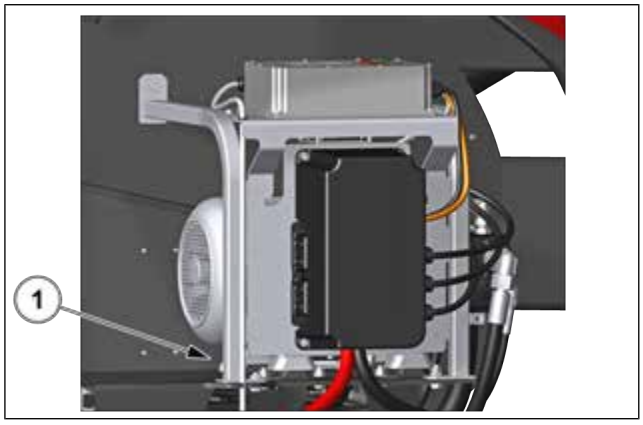


Figure 124: Checking the emergency controls from the platform - up to machine No. MAN00000J01101633

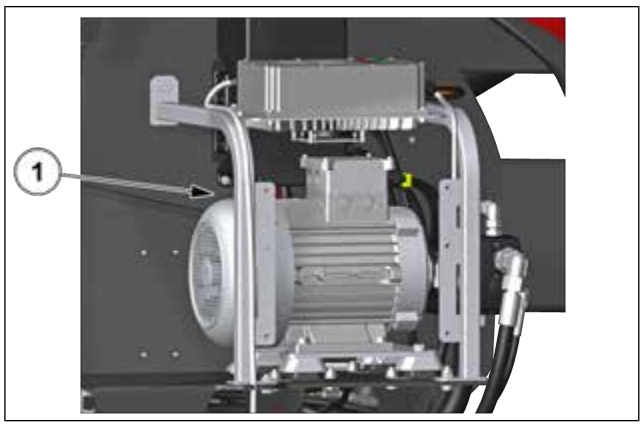


Figure 125: Checking the emergency controls from the platform - from machine No. MAN00000J01101634

3. Close the left-hand turntable cover.
4. Switch on the machine.
5. Get into the platform.
6. Press and hold down the foot switch.
7. Press and hold down the **Backup pump** button .

8. Raise and lower the jib arm.
9. Raise and lower the main arm.
10. Raise and lower the secondary arm.
11. Extend and retract the telescopic arm.

    Result:

    - it should be possible to activate all the functions.
12. Release the **Backup pump** button.
13. Release the foot switch.
14. Place the machine in the transport position.
15. Fully lower the jib arm.
16. Get out of the platform.
17. Switch off the machine.
18. Open the LH turntable cover.
19. Reconnect the electrical connector “X127”.
20. Close the left-hand turntable cover.
21. Switch on the machine.
22. Activate some of the machine’s functions from the ground.

    Result:

    - it should be possible to activate all the functions.
23. Place the machine in the transport position.
24. Put the turntable in neutral position.
25. Put the platform in neutral position.
26. Level the platform/jib arm.
27. Fully lower the jib arm.

4.5.2.20 Reset the maintenance warning

1. Switch on the machine.
2. Go to the “Access code” menu on the ground-level display screen.
3. Enter the access code.
4. Go to the “Maintenance” menu.
5. Reset the maintenance warning.
6. Return to the work page.
7. Switch off the machine.

4.5.3. EVERY 500 HOURS OR EVERY YEAR

4.5.3.1 Checking tightening of the tilt sensor bracket

⚠ DANGER

Risk of tilting

Always follow this procedure and respect the inspection frequency.

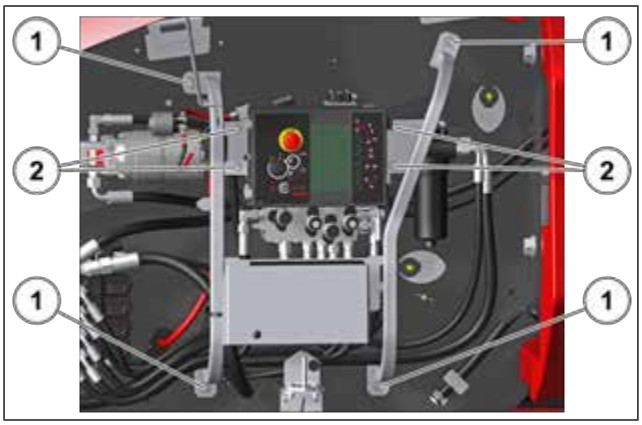


Figure 126: Checking tightening of the tilt sensor bracket

1. Open the right-hand turntable cover.
2. Check the tightening torques of all the fixing screws (1).

   52 Nm ±5 Nm (38.5 lb-ft ±3.5 lb-ft).
3. Check the tightening torques of all the fixing screws (2).

   26 Nm ±2.6 Nm (19 lb-ft ±1.9 lb-ft).
4. Close the right-hand turntable cover.

4.5.3.2 Checking the tightness of the platform rotation cylinder

⚠ DANGER

Risk of platform falling

Always follow this procedure and respect the inspection frequency.

1. Check the tightening torque of the pin (1).

   80 Nm ±16 Nm (59 lb-ft ±11.5 lb-ft).

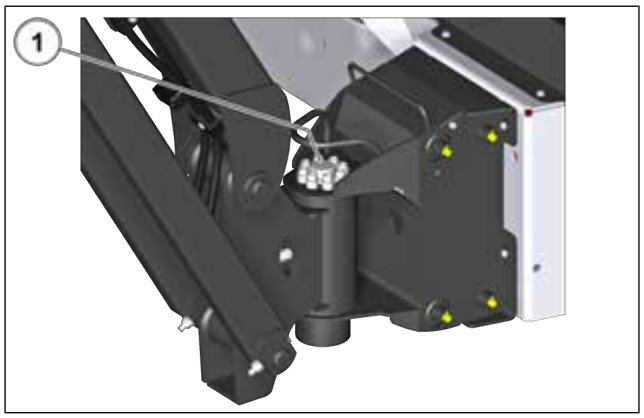


Figure 127: Checking the tightness of the platform rotation cylinder 1

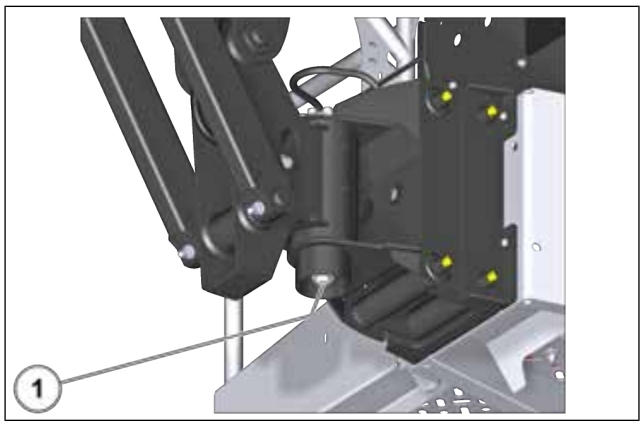


Figure 128: Checking the tightness of the platform rotation cylinder 2

4.5.3.3 Checking the chocking of the telescopic arm

NOTICE

Risk of damage to the machine

Adjust the telescopic arm chocking if the clearances are greater than the values indicated in this procedure. Refer to the machine's repair manual.

1. Check the tightening torques of all nuts (1).

   69 Nm ±6.5 Nm (51 lb-ft ±4.5 lb-ft).

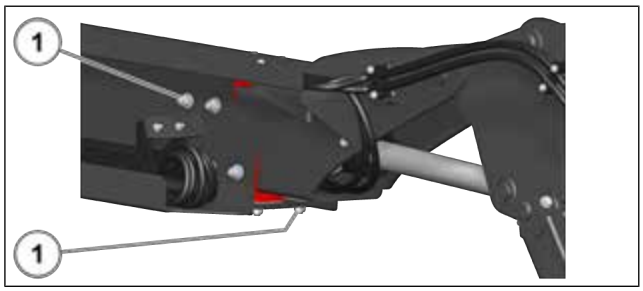


Figure 129: Checking the shimming of the telescopic arm 1

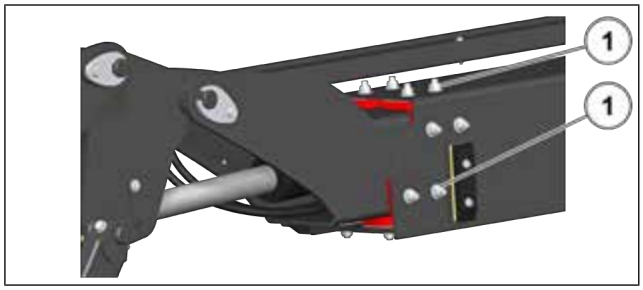


Figure 130: Checking the shimming of the telescopic arm 2

2. Switch on the machine.
3. Raise the jib arm slightly.
4. Extend the telescopic arm for 1 second.
5. Check the clearances between the pads and the telescopic arm (2).

   Result:

   - the clearances (A) of the upper pads (3) must be between 1 mm (0.04") and 1.5 mm (0.06").
   - the clearances (B) of the side pads (4) must be between 0.5 mm (0.02") and 0.75 mm (0.03") on each side.

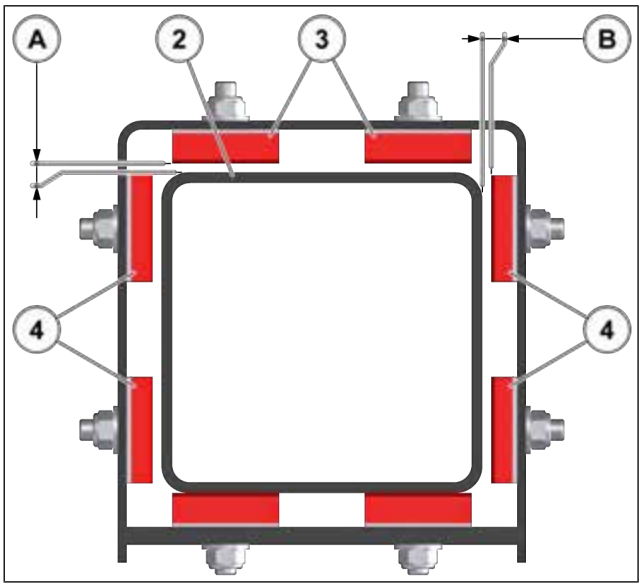


Figure 131: Checking the shimming of the telescopic arm 3

6. Fully extend the telescopic arm.
7. Check the clearances (A) and (B) again, see step 5.
8. Fully retract the telescopic arm.
9. Fully lower the jib arm.
10. Remove the cover (5).

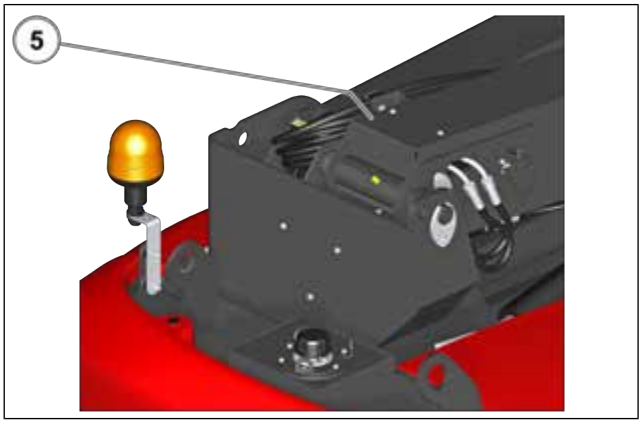


Figure 132: Checking the shimming of the telescopic arm 4

11. Raise the main arm slightly.
12. Place several wooden pallets under the platform.
13. Slowly lower the main arm until the pads (6) are in contact with the main arm (7), as shown in step 14.
14. Check the clearances between the pads and the main arm.

    Result:

    - the clearances (C) of the upper pads (8) must be between 1 mm (0.04”) and 1.5 mm (0.06”),
    - the clearances (D) of the side pads (9) must be between 0.5 mm (0.02”) and 0.75 mm (0.03”) on each side.

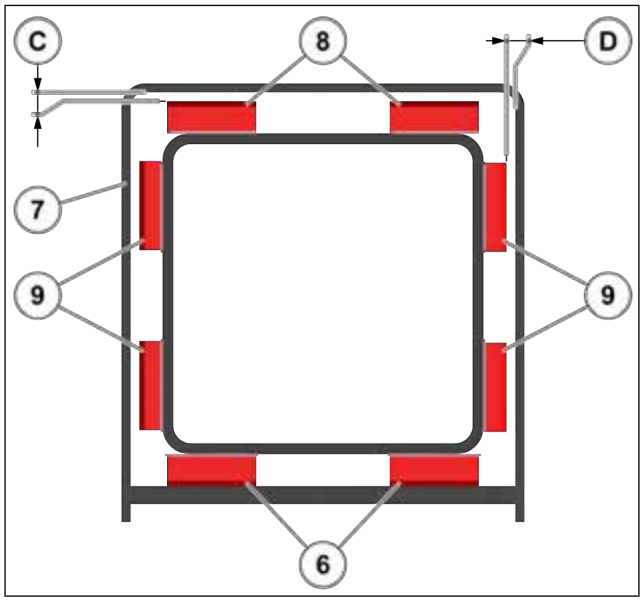


Figure 133: Checking the shimming of the telescopic arm 5

15. Raise the main arm slightly.
16. Remove the wooden pallets.
17. Fully lower the main arm.
18. Switch off the machine.
19. Refit the cover (5), as shown in step 10.

4.5.3.4 Checking the tightness of the crown gear assembly

⚠ DANGER

Risk of tilting

Always follow this procedure and respect the inspection frequency.

Figure 134: Checking the tightness of the crown gear assembly 1

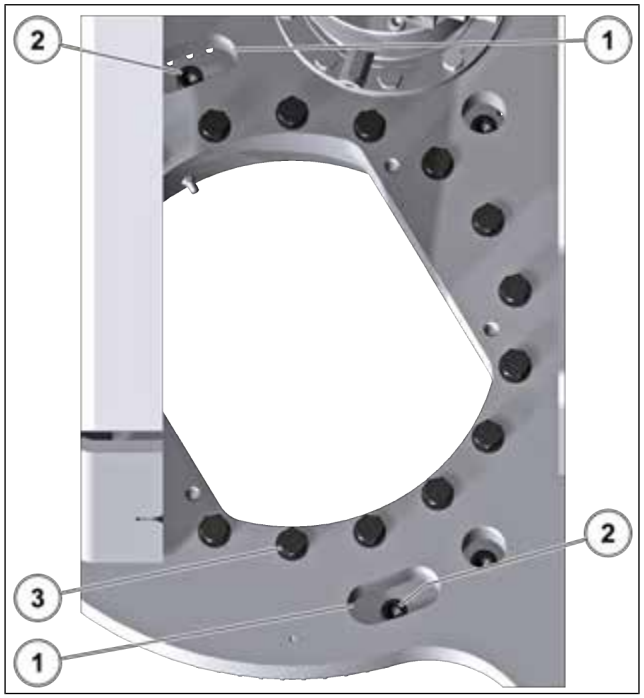


Figure 135: Checking the tightness of the crown gear assembly 2

1. Put the safety strut in place.

   Refer to "Maintenance: Maintenance instructions: Occasional operations: Using the safety stand".

2. Remove the 12 V battery cover.
3. Switch on the machine.
4. Turn the turntable to align the holes (1) with 2 fixing screws (2).
5. Check the tightening torques of all the fixing screws (2).

   215 Nm ±21 Nm (158 lb-ft ±15 lb-ft).

   a. Check the tightening torque of the first 2 fastening screws (2).
   b. Turn the turntable to align the holes (1) with the next 2 fixing screws (2) to check their tightening torques.
   c. Repeat the previous step until the tightening torques of all the fixing screws (2) have been checked.

   If one or more screws are loose.

   - Replace the loose screws with new screws and tighten them to torque.

6. Check the tightening torques of all the fixing screws (3).

   215 Nm ±21 Nm (158 lb-ft ±15 lb-ft).

   If one or more screws are loose.

   - Replace the loose screws with new screws and tighten them to torque.

7. Put the turntable in neutral position.
8. Switch off the machine.

4.5.3.5 Checking the tightness of the turntable rotation motor

⚠ WARNING

Risk of collision and crushing

Always follow this procedure and respect the inspection frequency.

The safety strut is put in place.

The 12 V battery cover is removed.

1. Check the tightening torques of all the fixing screws (1).

   76 Nm ±15 Nm (56 lb-ft ±11 lb-ft).

Figure 136: Checking the tightness of the turntable rotation motor

4.5.3.6 Checking counterweight tightness

⚠ DANGER

Risk of tilting

Always follow this procedure and respect the inspection frequency.

The safety strut is put in place.

The 12 V battery cover is removed.

1. Open the left and right-hand turntable covers.
2. Check the tightening torques of all the fixing screws (1), on the left and right sides.

300 Nm ±30 Nm (221 lb-ft ±21.5 lb-ft).

Figure 137: Checking counterweight 1 tightening torque

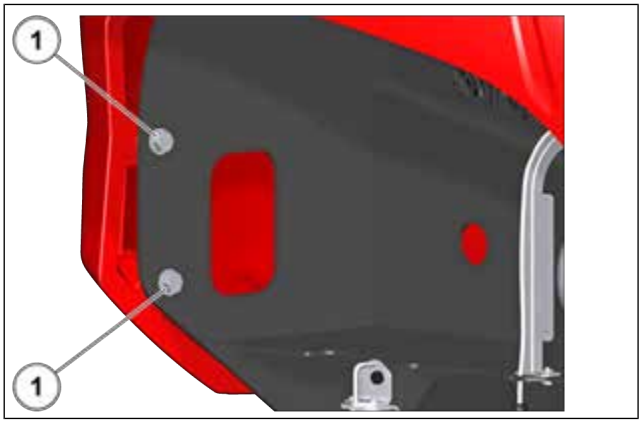


Figure 138: Checking counterweight 2 tightening torque

4.5.3.7 Checking the tightness of the high-voltage batteries

⚠ DANGER

Risk of tilting

Always follow this procedure and respect the inspection frequency.

The safety strut is put in place.

The 12 V battery cover is removed.

The right and left-hand turntable covers are open.

Figure 139: Checking the tightness of the high-voltage electrical connections 1

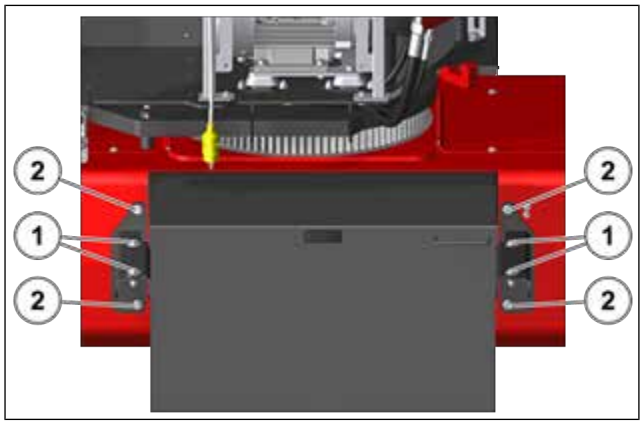


Figure 140: Checking the tightness of the high-voltage electrical connections 2

1. Check the tightening torques of all the fixing screws (1), on the left and right sides.

65 Nm ±6.5 Nm (51 lb-ft ±4.5 lb-ft).

2. Check the tightening torques of all the fixing screws (2), on the left and right sides.

76 Nm ±7.5 Nm (56 lb-ft ±5.5 lb-ft).

4.5.3.8 Checking the hydraulic hoses

⚠ WARNING

Maintenance-related risk

Always use a piece of paper or cardboard to check there are no hydraulic oil leaks.

The safety strut is put in place.

The 12 V battery cover is removed.

The right and left-hand turntable covers are open.

1. Remove the front and rear chassis covers.
2. Check the condition of all the hydraulic hoses and check for leaks.
3. Refit the front and rear chassis covers.
4. Close the left-hand turntable cover.

4.5.3.9 Replacing the turntable rotation motor oil

Figure 141: Replacement of the turntable rotation motor oil 1

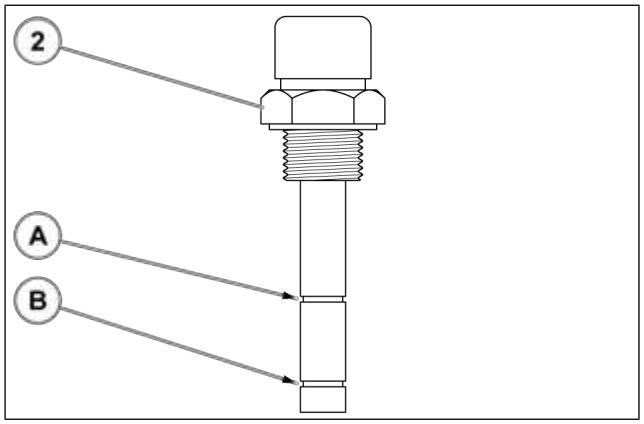


Figure 142: Replacement of the turntable rotation motor oil 2

The safety strut is put in place.

The 12 V battery cover is removed.

The right turntable cover is open.

The used oil should be slightly warm before draining the engine casing.

1. Clean the outside of the turntable rotation motor with a clean cloth.
2. Place a drain pan under the drain plug (1).
3. Remove the drain plug and the filler cap (2).
4. Wait until the crankcase is completely empty.
5. Clean around the drain hole with a clean cloth.
6. Refit the drain plug.
7. Fill the turntable rotation motor with new oil.

   Please refer to "Technical specifications: Consumables: Liquids and lubricants".
8. Clean the dipstick on the filler cap with a clean cloth and put it back in place.
9. Remove the filler cap.
10. Check the oil level.

    The level is correct when the oil is between the 2 marks (A) and (B) on the filler cap (2).

    If the level is low.

    - Add oil until the correct level is reached, see steps 8 to 10.

      Please refer to "Technical specifications: Consumables: Liquids and lubricants".
11. Refit the filler cap.
12. Put the 12 V battery cover back in place.

4.5.3.10 Replacing the hydraulic circuit filter cartridge

NOTICE

Risk of damage to the machine

Never use the machine without the hydraulic circuit filter cartridge or if it is damaged.

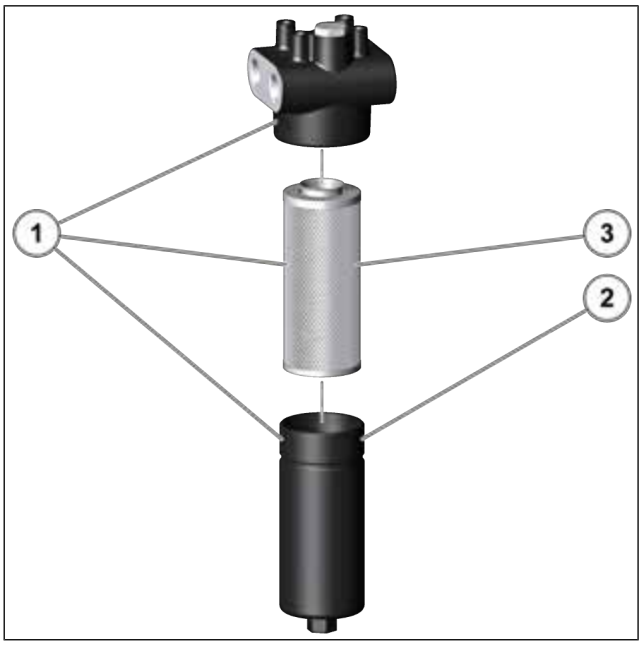


Figure 143: Replacement of the hydraulic circuit filter cartridge

The safety strut is put in place.

The right turntable cover is open.

1. Clean the outside of the hydraulic circuit filter (1) with a clean cloth.
2. Place a drain pan underneath.
3. Unscrew the tank (2).
4. Remove the used hydraulic circuit filter cartridge (3).
5. Fit the new hydraulic circuit filter cartridge.
6. Refit the tank.
7. Carry out the following operations, except every 1,500 hours or every 3 years when the hydraulic circuit filter cartridge is replaced while the hydraulic oil is being changed.
   a. Remove the safety strut.

      Refer to "Maintenance: Maintenance instructions: Occasional operations: Using the safety stand".

   b. Switch on the machine.
   c. Lift and lower the main arm and the jib arm for 10 minutes.
   d. Fully lower the main arm and the jib arm.
   e. Check the hydraulic circuit filter for leaks.
   f. Check the hydraulic oil level and top up if necessary.

      Refer to "Operating the machine: Before using the machine: Routine maintenance: Checking the hydraulic oil level".

   g. Switch off the machine.
8. Close the right-hand turntable cover.

4.5.3.11 Checking the electrical insulation resistance

- Refer to the machine repair manual.

4.5.3.12 Reset the maintenance warning

1. Switch on the machine.
2. Go to the "Access code" menu on the ground-level display screen.
3. Enter the access code.
4. Go to the "Maintenance" menu.
5. Reset the maintenance warning.
6. Return to the work page.
7. Switch off the machine.

4.5.4. EVERY 1000 HOURS OR EVERY 2 YEARS

4.5.4.1 Replacing the reduction gearbox oil

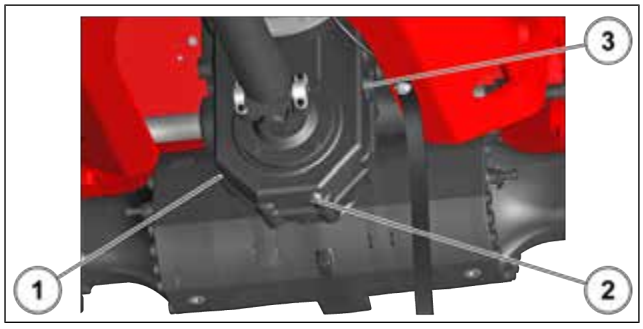


Figure 144: Replacing the reduction gearbox oil

The used oil should be slightly warm before draining the reduction gearbox.

1. Clean the outside of the reduction gearbox (1) with a clean cloth.
2. Place a drain pan under the drain plug (2).
3. Remove the drain plug and the filler cap (3).
4. Wait until the reduction gearbox is completely empty.
5. Clean around the drain hole with a clean cloth.
6. Refit the drain plug.
7. Fill the reduction gearbox with new oil; the level is correct when the oil reaches the rim of the filler hole.

   Please refer to "Technical specifications: Consumables: Liquids and lubricants".

8. Refit the filler cap.

4.5.4.2 Replacing the axle differential oil

Figure 145: Replacing the front axle differential oil

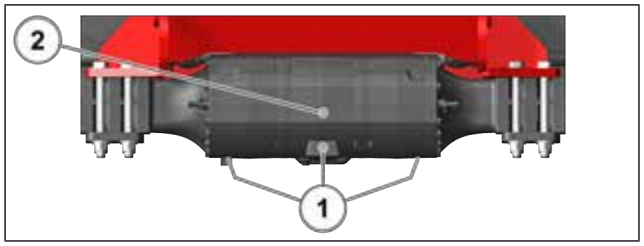


Figure 146: Replacing the rear axle differential oil

Replace the oil in the axle differentials one by one.

The used oil should be slightly warm before draining the axle differential.

1. Clean the outside of the axle differential with a clean cloth.
2. Front axle: place a drain pan under the drain plug (1).
3. Rear axle: place a drain pan under the 3 drain plugs (1).
4. Remove the drain plug(s) and the filler cap (2).
5. Wait until the axle differential is completely empty.
6. Clean around the drain hole (s) with a clean cloth.
7. Front axle: refit the drain plug.
8. Rear axle: refit the 3 drain plugs.
9. Fill the axle differential with new oil; the level is correct when the oil reaches the rim of the filler hole.

   Please refer to “Technical specifications: Consumables: Liquids and lubricants”.

10. Refit the filler cap.

4.5.4.3 Replacing the wheel reduction gear oil

Replace the oil in the wheel reduction gears one by one.

The used oil should be slightly warm before draining the wheel reduction gears.

1. Clean the outside of the wheel reduction gear with a clean cloth.
2. Turn the wheel to put the drain plug/filler cap (1) in the vertical position.

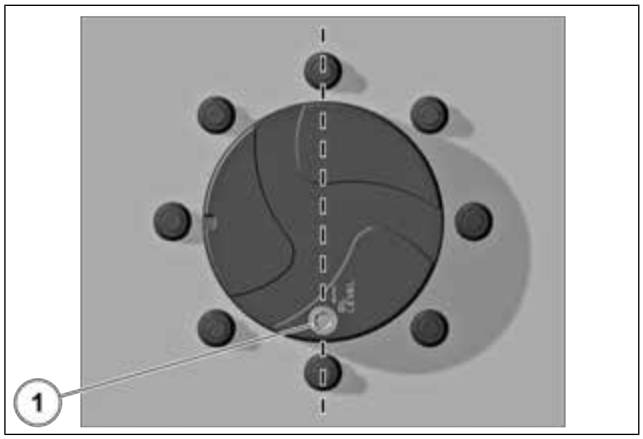


Figure 147: Replacing the wheel reduction gear oil 1

3. Place a drain pan underneath.
4. Remove the drain/filler plug.
5. Wait until the wheel reduction gear is completely empty.
6. Clean around the drain/filling hole (2) with a clean cloth, as shown in step 7.
7. Turn the wheel to put the drain/filling hole (2) in the horizontal position.

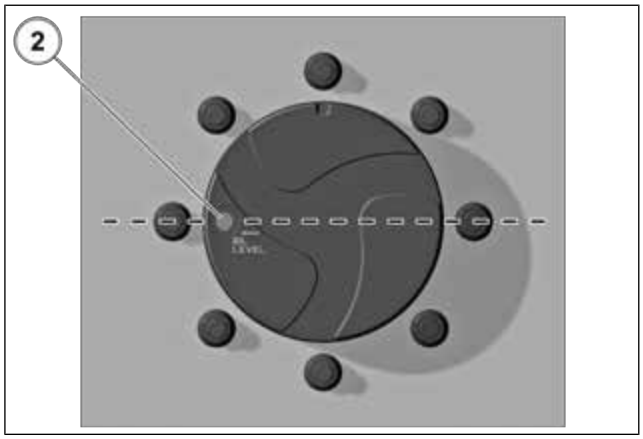


Figure 148: Replacing the wheel reduction gear oil 2

8. Fill the wheel reduction gear with new oil; the level is correct when the oil reaches the rim of the drain/filling hole.

   Please refer to “Technical specifications: Consumables: Liquids and lubricants”.

9. Refit the drain plug/filler cap.

   42 Nm ±7 Nm (31 lb-ft ±5 lb-ft).

4.5.4.4 Checking the electric pump motor silent blocks

- Refer to the machine repair manual.

4.5.4.5 Checking the clearance of the crown gear assembly

- Refer to the machine repair manual.

4.5.4.6 Checking the hydraulic movement speeds

- Refer to the machine repair manual.

4.5.4.7 Checking the condition of the cylinders

- Refer to the machine repair manual.

4.5.4.8 Checking the condition of electric control wiring

- Refer to the machine repair manual.

4.5.4.9 Reset the maintenance warning

1. Switch on the machine.
2. Go to the “Access code” menu on the ground-level display screen.
3. Enter the access code.
4. Go to the “Maintenance” menu.
5. Reset the maintenance warning.
6. Return to the work page.
7. Switch off the machine.

4.5.5. EVERY 1500 HOURS OR EVERY 3 YEARS

4.5.5.1 Replacing the hydraulic oil

NOTICE

Risk of damage to the machine

As there may be a difference in level between hot oil and cold oil, we recommend rechecking the level when the hydraulic oil is warm.

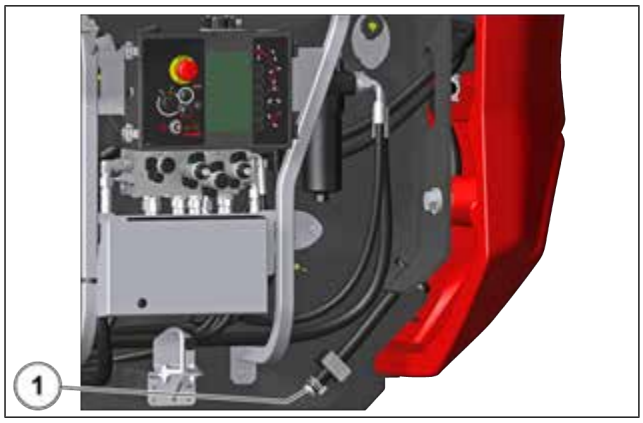


Figure 149: Replacement of the hydraulic oil 1

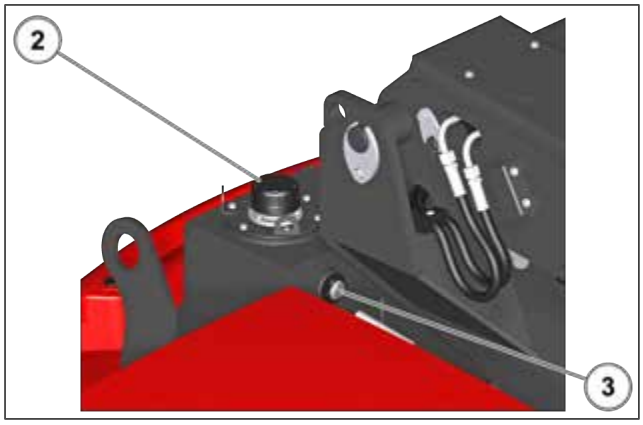


Figure 150: Replacement of the hydraulic oil 2

The used hydraulic oil should be slightly warm before draining the tank.

1. Put the safety strut in place.

   Refer to “Maintenance: Maintenance instructions: Occasional operations: Using the safety stand”.

2. Open the right-hand turntable cover.
3. Place a drain pan under the drain plug (1).
4. Remove the drain plug and the tank plug (2).
5. Wait until the tank is completely empty.
6. Clean the filling filter and the suction strainer, referring to “Maintenance: Maintenance instructions: Every 1500 hours or every 3 years: Cleaning the filling filter and the suction strainer”.
7. Replace the hydraulic circuit filter cartridge, referring to “Maintenance: Maintenance instructions: Every 500 hours or every year: Replacing the hydraulic circuit filter cartridge”.
8. Refit the drain plug (1).

9. Fill the tank with new hydraulic oil. The level is correct when the oil reaches the bottom of the level indicator (3).

   Please refer to "Technical specifications: Consumables: Liquids and lubricants".

   The hydraulic oil must not reach the red dot on the level indicator because the secondary arm is slightly raised with the safety strut in place.

10. Refit the filler cap (2).
11. Remove the safety strut.

    Refer to "Maintenance: Maintenance instructions: Occasional operations: Using the safety stand".

12. Switch on the machine.
13. Lift and lower the main arm and the jib arm for 10 minutes.
14. Fully lower the main arm and the jib arm.
15. Check the hydraulic circuit filter and the hydraulic tank for leaks.
16. Check the hydraulic oil level and top up if necessary.

    Refer to "Operating the machine: Before using the machine: Routine maintenance: Checking the hydraulic oil level".

17. Close the right-hand turntable cover.
18. Switch off the machine.

4.5.5.2 Cleaning the filling filter and the suction strainer

NOTICE

Risk of damage to the machine

Never use the machine without the filling filter or if it is damaged.
Never operate the machine if the suction strainer is damaged.

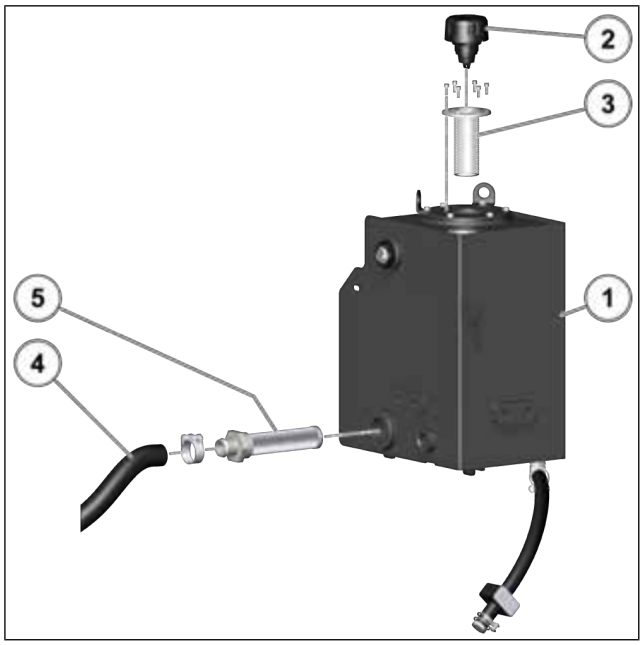


Figure 151: Cleaning the filling filter and the suction strainer

Hydraulic oil tank (1) is empty.

Refer to "Maintenance: Maintenance instructions: Every 1500 hours or every 3 years: Replacing the hydraulic oil".

The tank cap (2) is removed.

1. Remove the filling filter (3).
2. Clean it with dry compressed air, from the outside in.

   Maximum pressure = 3 bar (43 psi), minimum distance = 30 mm (1.25 in).

3. Check its condition and replace it if necessary.
4. Locate the hydraulic hose (4) and put a drain pan underneath.
5. Remove the hydraulic pipe and the suction strainer (5).
6. Clean the suction strainer with dry compressed air, from the inside out.

   Maximum pressure = 3 bar (43 psi), minimum distance = 30 mm (1.25 in).

7. Check its condition and replace it if necessary.
8. Check that there is no debris or dust in the bottom of the hydraulic tank. Clean if necessary.
9. Refit the filling filter.
10. Refit the suction strainer and the hydraulic pipe.

4.5.5.3 Reset the maintenance warning

1. Switch on the machine.
2. Go to the "Access code" menu on the ground-level display screen.

3. Enter the access code.
4. Go to the “Maintenance” menu.
5. Reset the maintenance warning.
6. Return to the work page.
7. Switch off the machine.

4.5.6. EVERY 2000 HOURS OR EVERY 4 YEARS

4.5.6.1 Checking the hydraulic circuit pressures

- Refer to the machine repair manual.

4.5.6.2 Reset the maintenance warning

1. Switch on the machine.
2. Go to the “Access code” menu on the ground-level display screen.
3. Enter the access code.
4. Go to the “Maintenance” menu.
5. Reset the maintenance warning.
6. Return to the work page.
7. Switch off the machine.

4.5.7. OPTIONAL MAINTENANCE

4.5.7.1 Checking the hydraulic oil

1. Order a Manitou oil analysis kit.
2. Take a sample of hydraulic oil and follow the instructions included with the kit.
3. Replace the hydraulic oil according to the results.

   Please refer to “Technical specifications: Consumables: Liquids and lubricants”.

4. Keep the analysis report.

4.5.8. OCCASIONAL MAINTENANCE

4.5.8.1 Replace the wheels

⚠ DANGER

Risk of crushing

Refer to the technical data sheet and the applicable stickers for information on the total weight of the machine, the wheel load and the weight of a wheel.
Always use a suitable jack for lifting the machine.
Always use suitable jack stands to secure the raised machine.
Always chock the 2 wheels on the axles opposite the wheel to be replaced.
Always use a suitable lifting sling to lift the wheel.

1. Place the machine on a level surface with the lifting hole (1) facing up.

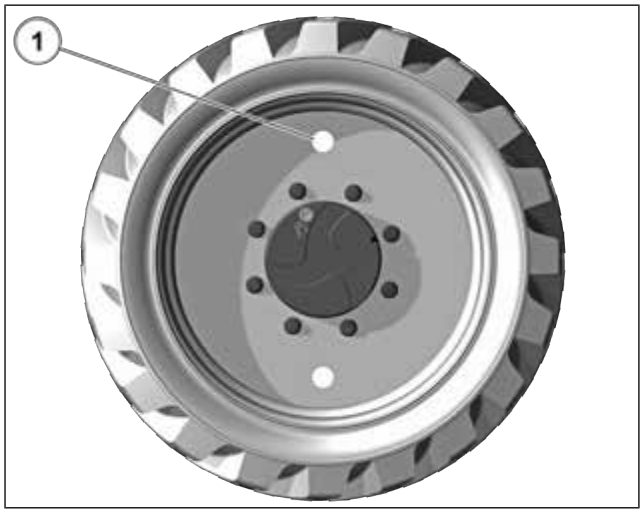


Figure 152: Wheel replacement

2. Switch off the machine.
3. Chock the 2 wheels on the axles opposite the wheel to be replaced.
4. Unscrew the wheel nuts to be replaced.
5. Position the jack near the wheel to be removed.
6. Raise the machine until the wheel is no longer in contact with the ground.
7. Put a stand under the axle to secure the raised machine.
8. Remove the wheel nuts.
9. Place a lifting sling in the wheel’s lifting hole.
10. Attach the lifting sling to an appropriate lifting device.

11. Slowly lift the lifting device until the lifting sling is slightly taut.
12. Remove the wheel.
13. Place a lifting sling in the lifting hole in the wheel to be fitted.
14. Attach the lifting sling to an appropriate lifting device.
15. Raise the wheel.
16. Put the wheel in place.
17. Refit the wheel nuts and tighten them slightly with a wrench.
18. Remove the lifting sling.
19. Remove the stand.
20. Lower the machine to the ground.
21. Tighten the wheel nuts.

Refer to "Maintenance: Maintenance instructions: Every 250 hours or every 6 months: Checking wheel tightness" in the operator's manual.

22. Remove the jack.
23. Remove the wheel chocks.

4.5.8.2 Replace the fuses and relays

⚠ DANGER

Risk of electrocution

Electrical accreditation may be required for this maintenance operation: comply with local, governmental and national regulations in force.

⚠ WARNING

Risk of electrocution

Make sure that the positive terminals cannot come into contact with the negative terminals or the metallic parts of the machine at any time.
Be sure to replace the protective covers on electrical components: covers, lids, terminal caps, etc. when this maintenance operation is complete.

- **Put the high-voltage electrical circuit back in place - up to machine no. MAN00000J01101633.**

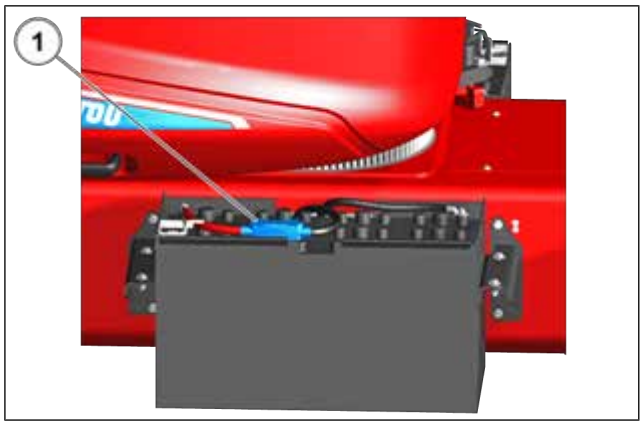


Figure 153: Putting the high-voltage electrical circuit fuse back in place - up to machine no. MAN00000J01101633

a. Switch off the machine.
b. Disconnect the 12 V battery connector.

Refer to "Operating the machine: Operation from the ground: Operating the 12 V battery connector" in the operator's manual.

d
c. Lock it in its housing with a padlock.
d. Remove the left high-voltage battery cover.
e. Remove the fuse compartment cover (1).
f. Replace the fuse:

Item	Type and value	Description
-	500 A fuse	General high-voltage power supply

14 Nm ±1.4 Nm (10.4 lb-ft ±0.9 lb-ft).

g. Refit the fuse holder cover.
h. Replace the left high-voltage battery cover.
i. Unlock and connect the 12 V battery connector.

Refer to "Operating the machine: Operation from the ground: Operating the 12 V battery connector" in the operator's manual.

- **Put the high-voltage circuit fuse back in place - from machine no. MAN00000J01101634**

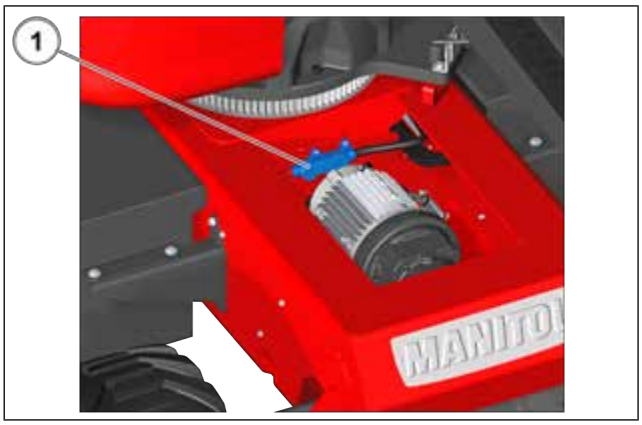


Figure 154: Put the high-voltage circuit fuse back in place - from machine no. MAN00000J01101634

a. Switch off the machine.

b. Disconnect the 12 V battery connector.

Refer to "Operating the machine: Operation from the ground: Operating the 12 V battery connector" in the operator's manual.

c. Lock it in its housing with a padlock.

d. Remove the rear chassis cover.

e. Remove the fuse compartment cover (1).

f. Replace the fuse:

Item	Type and value	Description
-	500 A fuse	General high-voltage power supply

14 Nm ±1.4 Nm (10.4 lb-ft ±0.9 lb-ft).

g. Refit the fuse holder cover.

h. Refit the rear chassis cover.

i. Unlock and connect the 12 V battery connector.

Refer to "Operating the machine: Operation from the ground: Operating the 12 V battery connector" in the operator's manual.

- **Put the voltage converter fuse back in place.**

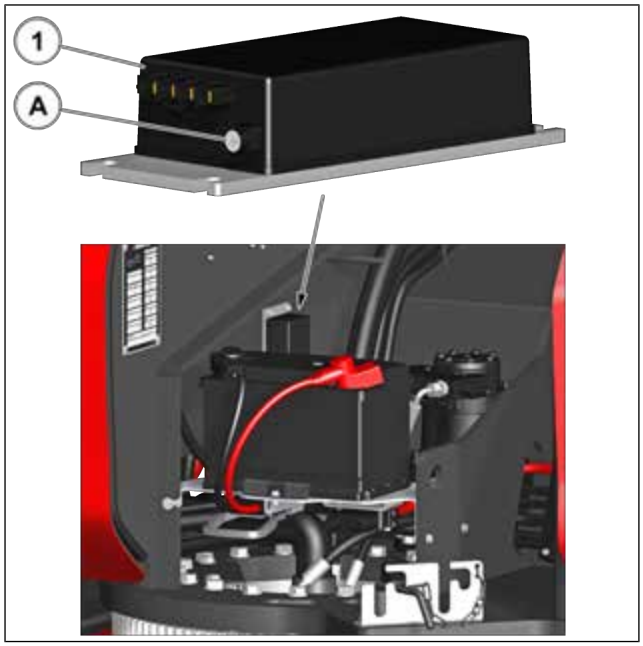


Figure 155: Putting the voltage converter fuse back in place

a. Switch off the machine.

b. Disconnect the 12 V battery connector.

Refer to "Operating the machine: Operation from the ground: Operating the 12 V battery connector" in the operator's manual.

Do not put the 12 V battery cover back in place.

c. Lock it in its housing with a padlock.

d. Locate the voltage converter (1).

e. Remove the fuse compartment cover (A).

f. Replace the fuse:

Item	Type and value	Description
-	30 A fuse	Voltage converter power supply

g. Refit the fuse holder cover.

h. Unlock and connect the 12 V battery connector.

Refer to "Operating the machine: Operation from the ground: Operating the 12 V battery connector" in the operator's manual.

- **Replace the backup pump power fuse.**

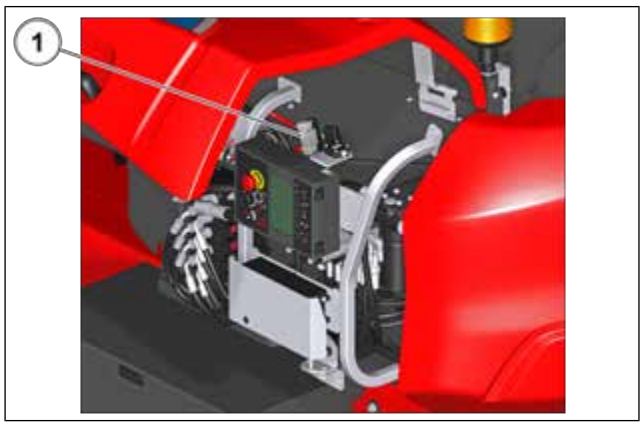


Figure 156: Replacement of the backup pump power fuse.

a. Switch off the machine.

b. Disconnect the 12 V battery connector.

Refer to "Operating the machine: Operation from the ground: Operating the 12 V battery connector" in the operator's manual.

c. Lock it in its housing with a padlock.

d. Open the right-hand turntable cover.

e. Remove the fuse compartment cover (1).

f. Replace the fuse:

Item	Type and value	Description
–	250 A fuse	Backup pump power supply

12.5 Nm ±1.2 Nm (9.2 lb-ft ±0.9 lb-ft).

g. Refit the fuse holder cover.

h. Close the right-hand turntable cover.

i. Unlock and connect the 12 V battery connector.

Refer to "Operating the machine: Operation from the ground: Operating the 12 V battery connector" in the operator's manual.

- **Replace the electric pump motor drive fuses and relays.**

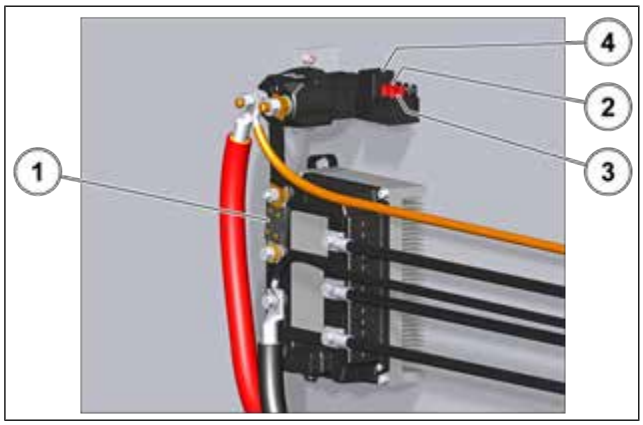


Figure 157: Replacement of the electric pump motor drive fuses and relays - up to machine no. MAN00000J01101633

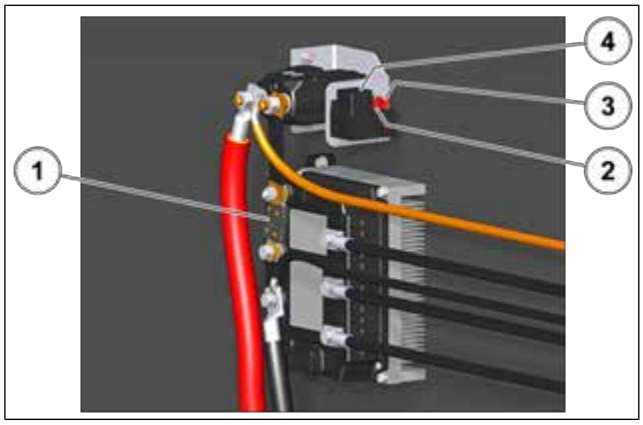


Figure 158: Replace the electric pump motor drive fuses and relays - from machine no. MAN00000J01101634

a. Switch off the machine.

b. Disconnect the 12 V battery connector.

Refer to "Operating the machine: Operation from the ground: Operating the 12 V battery connector" in the operator's manual.

c. Lock it in its housing with a padlock.

d. Open the LH turntable cover.

e. Remove the drive cover from the electric pump.

f. Replace the appropriate fuse and/or relay:

Item	Type and value	Description
1	300 A fuse	Electric pump variable speed drive power supply
2	10 A fuse	Initiation power supply

Item	Type and value	Description
3	10 A fuse	Voltage converter power supply
4	12 V 30 A Relay	Initiation power supply

Item 1: 14 Nm ±0.9 Nm (10.4 lb-ft ±0.6 lb-ft).

g. Reattach the electric pump's drive cover.

h. Close the left-hand turntable cover.

i. Unlock and connect the 12 V battery connector.

Refer to "Operating the machine: Operation from the ground: Operating the 12 V battery connector" in the operator's manual.

- **Replace the wheel motor drive fuses and relays.**

Figure 159: Replacing the wheel motor drive fuses and relays

a. Switch off the machine.

b. Disconnect the 12 V battery connector.

Refer to "Operating the machine: Operation from the ground: Operating the 12 V battery connector" in the operator's manual.

c. Lock it in its housing with a padlock.

d. Remove the rear chassis cover.

e. Replace the appropriate fuse and/or relay:

Remove the fuse cover (1) if necessary.

Item	Type and value	Description
1	300 A fuse	Wheel motor drive power supply
2	10 A fuse	Chassis options power supply
3	1 A fuse	Initiation power supply
4	12 V 30 A Relay	Chassis options power supply
5	12 V 30 A Relay	Initiation power supply

Item 1: 14 Nm ±0.9 Nm (10.4 lb-ft ±0.6 lb-ft).

f. Replace the fuse cover (1) if removed.

g. Refit the rear chassis cover.

h. Unlock and connect the 12 V battery connector.

Refer to "Operating the machine: Operation from the ground: Operating the 12 V battery connector" in the operator's manual.

- **Replace the ground-level control panel fuses and relays.**

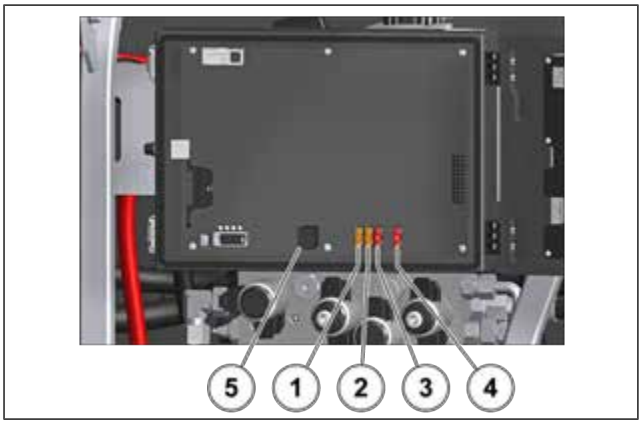


Figure 160: Replacing the ground-level control panel fuses and relays

a. Switch off the machine.

b. Disconnect the 12 V battery connector.

Refer to "Operating the machine: Operation from the ground: Operating the 12 V battery connector" in the operator's manual.

c. Lock it in its housing with a padlock.
d. Open the right-hand turntable cover.
e. Open the ground-level control panel.
f. Replace the appropriate fuse and/or relay:

Item	Type and value	Description
1	5 A fuse	Ground-level display screen and platform control panel power supply
2	5 A fuse	Platform control panel power supply
3	10 A fuse	Backup pump control power supply
4	10 A fuse	Key switch power supply
5	12 V 35 A Relay	Control general power supply

g. Close the ground-level control panel.
h. Close the right-hand turntable cover.
i. Unlock and connect the 12 V battery connector.

Refer to "Operating the machine: Operation from the ground: Operating the 12 V battery connector" in the operator's manual.

- **Replace the control system fuses and relays - turntable.**

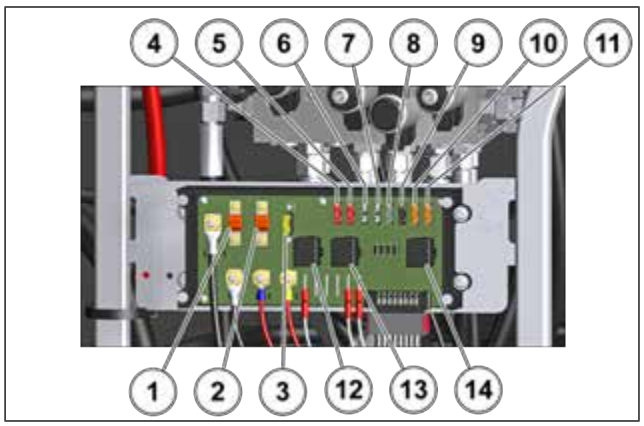


Figure 161: Replacement of the control system fuses and relays - turntable

a. Switch off the machine.
b. Disconnect the 12 V battery connector.

Refer to "Operating the machine: Operation from the ground: Operating the 12 V battery connector" in the operator's manual.

c. Lock it in its housing with a padlock.
d. Open the right-hand turntable cover.
e. Remove the control system fuse/relay box cover.
f. Replace the appropriate fuse and/or relay:

Item	Type and value	Description
1	30 A fuse	Ground-level control panel power supply
2	30 A fuse	Chassis power supply
3	20 A fuse	Auxiliary electronics power supply
4	10 A fuse	Chassis/turntable options power supply
5	10 A fuse	Platform options power supply
6	-	Not used
7	-	Not used
8	2 A fuse	Battery charger power supply
9	1 A fuse	Immobilizer power supply
10	3 A fuse	Orange rotating beacon light power supply
11	5 A fuse	Ground-level control panel auxiliary power supply
12	12 V 40 A Relay	Auxiliary electronics power supply
13	12 V 40 A Relay	Chassis/turntable options power supply
14	12 V 40 A Relay	Initiation activation power supply

g. Refit the control system fuse/relay box cover.
h. Close the right-hand turntable cover.
i. Unlock and connect the 12 V battery connector.

Refer to "Operating the machine: Operation from the ground: Operating the 12 V battery connector" in the operator's manual.

- **Replace the control system fuses and relays - chassis.**

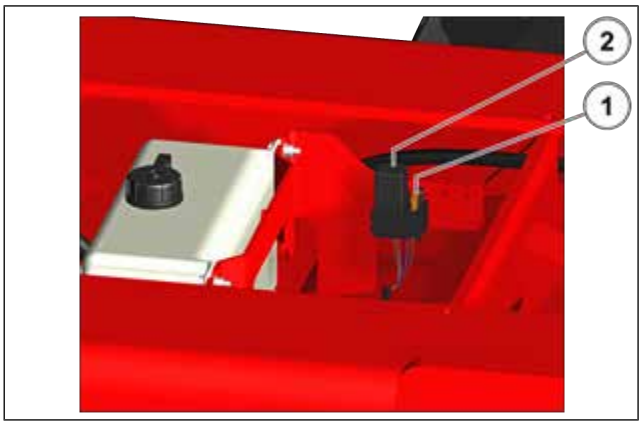


Figure 162: Replacement of the control system fuses and relays - chassis.

a. Switch on the machine.
b. Turn the turntable 90° to the left or the right.
c. Switch off the machine.
d. Disconnect the 12 V battery connector.

Refer to "Operating the machine: Operation from the ground: Operating the 12 V battery connector" in the operator's manual.

e. Lock it in its housing with a padlock.
f. Remove the front chassis cover.
g. Replace the appropriate fuse and/or relay:

Item	Type and value	Description
1	5 A fuse	Electric high-voltage battery auto fill system power supply
2	Module relay CAN	Electric high-voltage battery auto fill system power supply

h. Refit the front chassis cover.
i. Unlock and connect the 12 V battery connector.

Refer to "Operating the machine: Operation from the ground: Operating the 12 V battery connector" in the operator's manual.

j. Switch on the machine.
k. Put the turntable in neutral position.
l. Switch off the machine.

4.5.8.3 Replacing high-voltage batteries

⚠ DANGER

Risk of electrocution

Electrical accreditation may be required for this maintenance operation: comply with local, governmental and national regulations in force.

⚠ DANGER

Risk of crushing and collision

Refer to the technical data sheet for information on the mass of a high-voltage battery.
Only certified forklift operators should lift and move high-voltage batteries.
Make sure the forks are suitable and strong enough to lift a high-voltage battery.
Make sure the lifting capacity of the forklift is sufficient to support the weight of a high-voltage battery.

⚠ WARNING

Risk of electrocution

Make sure that the positive terminals cannot come into contact with the negative terminals or the metallic parts of the machine at any time.
Be sure to replace the protective caps on high-voltage batteries when they are connected.

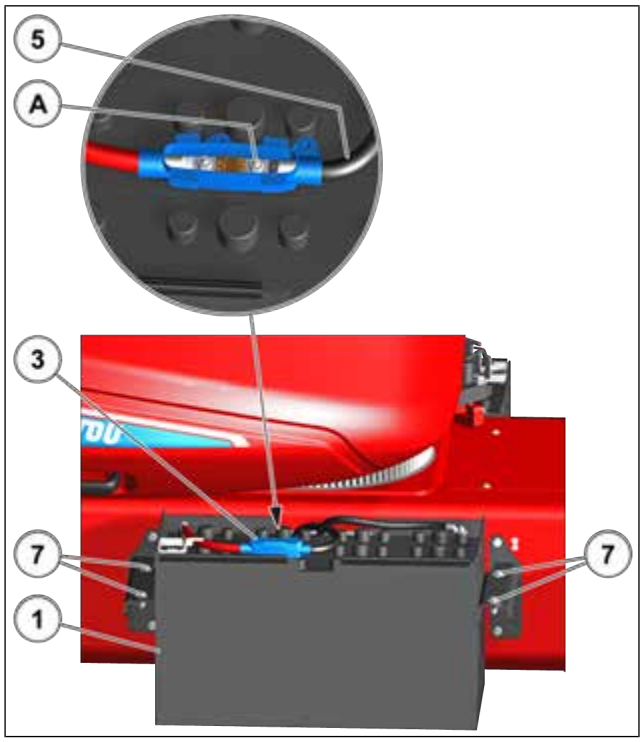


Figure 163: Replacement of high-voltage batteries 1 - up to machine no. MAN00000J01101633

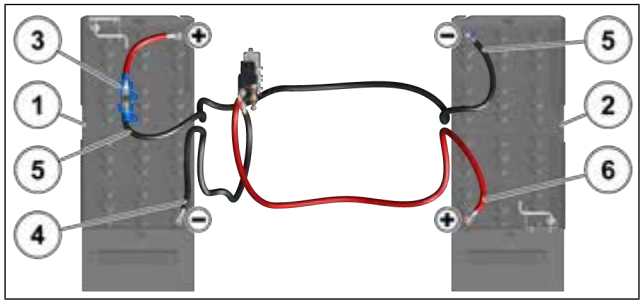


Figure 164: Replacement of high-voltage batteries 2 - up to machine no. MAN00000J01101633

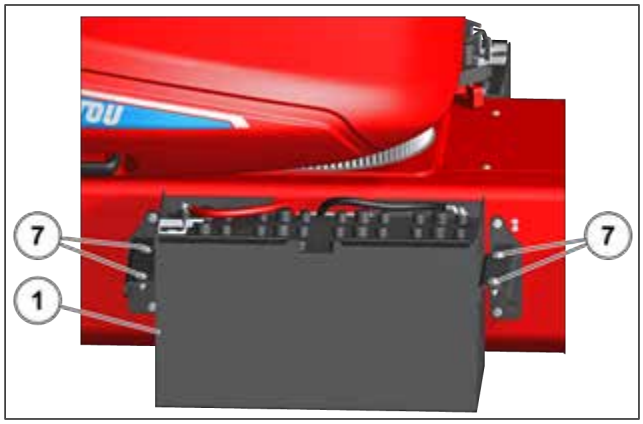


Figure 165: Replacement of high-voltage batteries 1 - from machine no. MAN00000J01101634

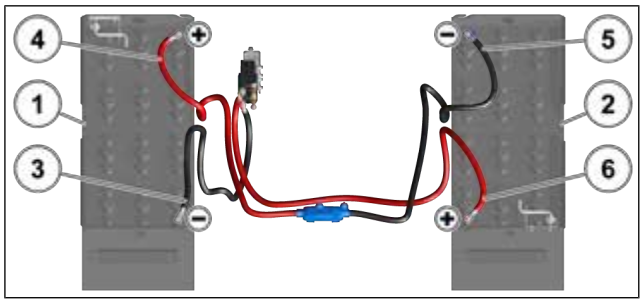


Figure 166: Replacement of high-voltage batteries 2 - from machine no. MAN00000J01101634

Remove the high-voltage batteries and replace them one by one.

1. **Disconnect the high-voltage batteries - up to machine no. MAN00000J01101633.**
   a. Switch off the machine.
   b. Disconnect the 12 V battery connector.

      Refer to "Operating the machine: Operation from the ground: Operating the 12 V battery connector" in the operator's manual.

   c. Lock it in its housing with a padlock.
   d. Remove the left and right battery covers.
   e. Remove the protective caps from the high-voltage batteries (1) and (2).
   f. Remove the fuse compartment cover (3).
   g. Disconnect the power cable (4) connected to the negative (-) terminal of the left-hand high-voltage battery (1).
   h. Disconnect the power cable (5) connected to terminal (A) of the fuse holder (3).
   i. Disconnect the power cable (5) connected to the negative (-) terminal of the right-hand high-voltage battery (2).
   j. Disconnect the power cable (6) connected to the positive (+) terminal of the right-hand high-voltage battery (2).
   k. Depending on the version: disconnect the electric high-voltage battery auto fill system connectors.
   l. Remove the screws (7), left and right sides.
2. **Disconnect the high-voltage batteries - from machine no. MAN00000J01101634.**
   a. Switch off the machine.
   b. Disconnect the 12 V battery connector.

      Refer to "Operating the machine: Operation from the ground: Operating the 12 V battery connector" in the operator's manual.

c. Lock it in its housing with a padlock.

d. Remove the left and right battery covers.

e. Remove the protective caps from the high-voltage batteries (1) and (2).

f. Disconnect the power cable (3) connected to the negative (-) terminal of the left-hand high-voltage battery (1).

g. Disconnect the power cable (4) connected to the positive (+) terminal of the left-hand high-voltage battery (1).

h. Disconnect the power cable (5) connected to the negative (-) terminal of the right-hand high-voltage battery (2).

i. Disconnect the power cable (6) connected to the positive (+) terminal of the right-hand high-voltage battery (2).

j. Depending on the version: disconnect the electric high-voltage battery auto fill system connectors.

k. Remove the screws (7), left and right sides.

3. **Remove the high-voltage batteries using a forklift.**

a. Move forward slowly to place the forks under the high-voltage battery.

b. Lift the high-voltage battery slowly.

c. Back away slowly to remove the high-voltage battery from the machine.

d. Slowly move the high-voltage battery to the desired area.

e. Slowly lower the high-voltage battery until it has been placed.

f. Reverse the lift truck slowly.

4. **Use a forklift to position the high-voltage batteries.**

a. Move forward slowly to place the forks under the high-voltage battery

b. Lift the high-voltage battery slowly.

c. Slowly move and lift the high-voltage battery to its position on the machine.

d. Slowly lower the battery until it is correctly seated on the machine.

e. Reverse the lift truck slowly.

5. **Connect the high-voltage batteries - up to machine no. MAN00000J01101633.**

a. Replace screws (7) on left and right sides.

69 Nm ±6.5 Nm (51 lb-ft ±4.5 lb-ft).

b. Depending on the version: connect the electric high-voltage battery auto fill system connectors.

c. Connect the power cable (6) to the positive (+) terminal of the right-hand high-voltage battery (2).

23 Nm ±2.3 Nm (17 lb-ft ±1.6 lb-ft).

d. Connect the power cable (5) to the negative (-) terminal of the right-hand high-voltage battery (2).

23 Nm ±2.3 Nm (17 lb-ft ±1.6 lb-ft).

e. Connect the power cable (5) to terminal (A) on the fuse holder (3).

14 Nm ±1.4 Nm (10.4 lb-ft ±0.9 lb-ft).

f. Connect the power cable (4) to the negative (-) terminal of the left-hand high-voltage battery (1).

23 Nm ±2.3 Nm (17 lb-ft ±1.6 lb-ft).

g. Reinstall the fuse holder cover (3).

h. Replace the protective caps on the high-voltage batteries (1) and (2).

i. Refit the left and right battery covers.

j. Unlock and connect the 12 V battery connector.

Refer to "Operating the machine: Operation from the ground: Operating the 12 V battery connector" in the operator's manual.

6. **Connect the high-voltage batteries - from machine no. MAN00000J01101634.**

a. Replace screws (7) on left and right sides.

69 Nm ±6.5 Nm (51 lb-ft ±4.5 lb-ft).

b. Depending on the version: connect the electric high-voltage battery auto fill system connectors.

c. Connect the power cable (6) to the positive (+) terminal of the right-hand high-voltage battery (2).

23 Nm ±2.3 Nm (17 lb-ft ±1.6 lb-ft).

d. Connect the power cable (5) to the negative (-) terminal of the right-hand high-voltage battery (2).

23 Nm ±2.3 Nm (17 lb-ft ±1.6 lb-ft).

e. Connect the power cable (4) to the positive (+) terminal of the left-hand high-voltage battery (1).

23 Nm ±2.3 Nm (17 lb-ft ±1.6 lb-ft).

f. Connect the power cable (3) to the negative (-) terminal of the left-hand high-voltage battery (1).

23 Nm ±2.3 Nm (17 lb-ft ±1.6 lb-ft).

g. Replace the protective caps on the high-voltage batteries (1) and (2).

h. Refit the left and right battery covers.

i. Unlock and connect the 12 V battery connector.

Refer to "Operating the machine: Operation from the ground: Operating the 12 V battery connector" in the operator's manual.

7. **Test the powering up of the machine.**

a. Switch on the machine.

Result:

- the ground-level display screen must come on and the power-up cycle must be displayed,
- the drive fans in the chassis and under the left turntable cover should be running at high speed,
- The audible alarm should sound once.
- permanent orange rotating beacon light activated: the orange rotating beacon light should come on,
- secondary protection system SPS: the SPS flashing light must flash several times and then go out.

b. Wait for the power-up cycle to complete.

Result:

- the drive fans in the chassis and under the left turntable cover should stop.

c. Check the high-voltage battery charge level.

Refer to "Operating the machine: Before using the machine: Routine maintenance: Checking the high-voltage battery charge level" in the operator's manual.

d. Charge high-voltage batteries if necessary.

Refer to "Operating the machine: Charging the high-voltage batteries and the 12 V battery" in the operator's manual.

e. Switch off the machine.

4.5.9. OCCASIONAL OPERATIONS

4.5.9.1 Using the safety stand

⚠ DANGER

Risk of crushing

Always put the safety strut in place when you need to carry out a maintenance operation under the raised secondary arm.
If there is not enough space to work with the safety strut in place:

- raise the secondary arm,
- secure the raised secondary arm with a suitable lifting device.

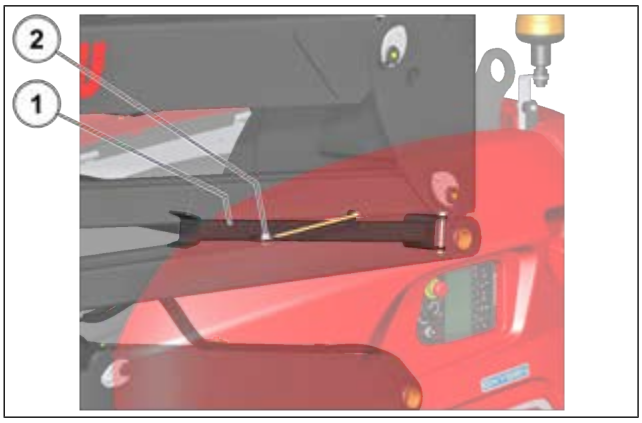


Figure 167: Use of the safety stand 1

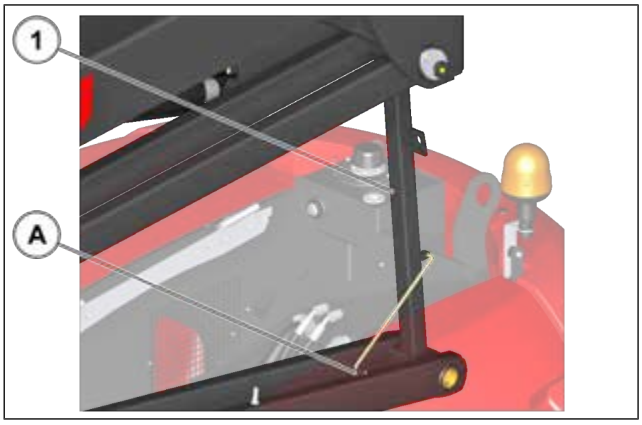


Figure 168: Use of the safety stand 2

- **Put the safety strut in place.**
  a. Locate the safety strut (1).
  b. Remove the washer and the nut (2).
  c. Switch on the machine.
  d. Raise the secondary arm by at least 1 meter (3.5 feet).
  e. Raise the safety stand and lock it using the stop (A).
  f. Lower the secondary arm until it stops on the safety strut.
  g. Switch off the machine.
- **Remove the safety strut.**
  a. Switch on the machine.
  b. Raise the secondary arm slightly.
  c. Lower the safety strut (1).
  d. Fully lower the secondary arm.
  e. Refit the washer and the nut (2).
  f. Switch off the machine.

5. TECHNICAL CHARACTERISTICS

5.1. COMPLIANCE WITH STANDARDS

The machines comply with:

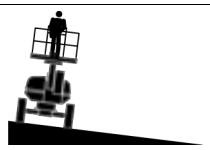
- ANSI/SAIA A92.20
- CAN B354.6

5.2. MACHINE

5.2.1 TECHNICAL DATA SHEET - ATJ 46 E S1

General characteristics

Table 34. General characteristics - ATJ 46 E S1

Designation	Unit	Value	Tolerance
Machine			
Maximum load capacity of the platform	kg (lb)	250 (550)	-
Maximum wind speed when operating outside	km/h (mph)	45 (28)	-
Maximum wind speed when operating outside	m/s	12.5	-
Maximum number of people in the platform (indoor use/ outdoor use)	-	2 / 2	-
Machine weight, unladen	kg (lb)	6,400 (14109)	± 6%
Maximum authorized chassis tilt in working position	°	5	± 0.1%
Maximum authorized slope (maximum slope accessible): • machine in the transport position • platform and turntable in neutral position • platform at the bottom of the slope with 100 kg (220 lb) in the platform 	% (°)	45 (24)	± 2%
Maximum authorized slope: • machine in the transport position • platform and turntable in neutral position • platform at the top of the slope 	% (°)	45 (24)	-
Maximum authorized lateral slope: • machine in the transport position • platform and turntable in neutral position 	% (°)	25 (14)	-
Maximum manual force	N (lb)	400 (90)	-
Surface area exposed to wind when lifting the machine	m² (ft²)	7.3 (78.47)	± 2%
Ambient operating temperature range	°C (°F)	-15 °C / +40 °C (+5 °F / +104 °F)	-
Classification of the load cycle according to AS/ NZS1481.1	-	Light intermittent duty	-
Number of structure load cycles according to AS/ NZS1481.1	-	40000	-

Designation	Unit	Value	Tolerance
Electrical isolation level according to AS/NZS1481.1	-	Machine not isolated	-
Standard non-marking wheels and standard wheels (option)			
Load on one front wheel (transport position)	kg (lb)	1,440 (3175)	± 2%
Load on one rear wheel (transport position)	kg (lb)	1,420 (3130)	± 2%
Maximum load on one wheel (working position)	kg (lb)	4,400 (9700)	± 2%
Bearing surface on hard/soft ground	cm² (sq.in)	340 (52.7) / 733 (113.6)	± 5%
Ground bearing pressure on hard/soft ground	daN/cm² (psi)	13 (188.5) / 6 (87)	± 5%
Large-diameter wheels (optional) and non-marking large-diameter wheels (optional)			
Load on one front wheel (transport position)	kg (lb)	1,517 (3346)	± 2%
Load on one rear wheel (transport position)	kg (lb)	1,497 (3301)	± 2%
Maximum load on one wheel (working position)	kg (lb)	4,400 (9700)	± 2%
Bearing surface on hard/soft ground	cm² (sq.in)	416 (64.5) / 902 (140)	± 5%
Ground bearing pressure on hard/soft ground	daN/cm² (psi)	10.6 (153.7) / 4.88 (70.8)	± 5%

Speeds and movements

Table 35. Speeds and movements - ATJ 46 E S1

Designation	Unit	Value	Tolerance
Travel speeds			
Working speed	km/h (mph)	0.7 (0.43)	± 0.1 (± 0.06)
Hare speed	km/h (mph)	5.2 (3.2)	± 0.5 (± 0.31)
Reduced speed	km/h (mph)	3.4 (2.11)	± 0.5 (± 0.31)
Slow speed	km/h (mph)	2.5 (1.56)	± 0.5 (± 0.31)
Main arm (telescopic arm extended)			
Lifting unladen/laden	s	27 / -	± 2
Lowering (unladen/laden)	s	26 / -	± 2
Main arm (telescopic arm retracted)			
Lifting unladen/laden	s	16 / -	± 2
Lowering (unladen/laden)	s	16 / -	± 2
Secondary arm			
Lifting unladen/laden	s	22 / -	± 2
Lowering (unladen/laden)	s	26 / -	± 2
Telescopic arm			
Extended (unladen/laden)	s	10 / -	± 2
Retracted (unladen/laden)	s	10 / -	± 2
Jib arm			
Lifting unladen/laden	s	21 / -	± 2
Lowering (unladen/laden)	s	21 / -	± 2

Designation	Unit	Value	Tolerance
Turntable			
90° rotation (telescopic arm extended/retracted)	s	30 / 22	0/+5
Platform			
180° rotation to the right / to the left	s	13 / 13	0/+5

Engine / transmission

Table 36. Engine / transmission - ATJ 46 E S1

Designation	Unit	Value	Tolerance
Wheel motor			
Type	-	Electric - BEST MOTORS	-
Quantity	-	1	-
Power	kW (hp)	16 (21.4)	-
Rated voltage	V	48	-
Current	A	200	-
S2 (temporary operation)	min	30	-
S3 (alternate operation)	%	40	-
Axles			
Type	-	DANA SPICER	-
Reduction ratio	-	145	-
Tractive force	daN (lbf)	-	-
Front axle differential	-	45% limited slip	-
Rear axle differential	-	Hydraulic locking 100%	-
Front/rear steering wheels	-	2 / 2	-
Front/rear driving wheels	-	2 / 2	-
Standard non-marking wheels and standard wheels (option)			
Type	-	OTR 33 x 12 D610 NHS	-
Dimensions (external diameter x width)	mm (in)	840 x 295 (33 x 11.7)	-
Inflation	-	Foam	-
Weight of a wheel	kg (lb)	118 (259)	2%
Large-diameter wheels (optional) and non-marking large-diameter wheels (optional)			
Type	-	BOTR 36 x 15 D610	-
Dimensions (external diameter x width)	mm (in)	914 x 381 (36 x 15)	-
Inflation	-	Foam	-
Weight of a wheel	kg (lb)	195 (430)	2%

Brake

Table 37. Brake - ATJ 46 E S1

Designation	Unit	Value	Tolerance
Type	-	Negative	-
Type of order	-	Hydraulics	-
Braked wheels front / rear	-	0 / 2	-

Designation	Unit	Value	Tolerance
Brake release (freewheeling)	-	Manual	-
Braking torque	daNm (lbf-ft)	1,240.2 (9147.2)	± 5%

Hydraulic circuit

Table 38. Hydraulic circuit - ATJ 46 E S1

Designation	Unit	Value	Tolerance
Electric pump			
Engine type	-	Electric - BEST MOTORS	-
Power	kW (hp)	16 (21.4)	-
Sensor Supply Voltage	V	48	-
Current	A	370	-
S2 (temporary operation)	min	5	-
S3 (alternate operation)	%	10	-
Type of pump	-	Variable displacement - BOSCH REXROTH	-
Maximum cylinder capacity	cm³ (in³)	18 (1.1)	-
Max rpm flow rate unladen (at 3,000 rpm)	l/min (gpm)	51.3 (13.5)	-
Maximum continuous service pressure	bar (psi)	240 (3480)	-
Control valve			
Type	-	DANFOSS	-
Maximum pressure	bar (psi)	250 (3626)	± 5 (± 72)
Turntable rotation motor			
Type	-	BONFIGLIOLI	-
Reduction ratio	-	1: 7.2	-
Filtration			
Suction	µm (mil)	125 (4.92)	-
Circuit	µm (mil)	10 (0.4)	-

Electrical system

Table 39. Electrical system - ATJ 46 E S1

Designation	Unit	Value	Tolerance
High-voltage batteries (original equipment)			
Type	-	Lead - EXIDE	-
Quantity	-	2	-
Capacity C5	Ah	2x 480	-
Capacity C20	Ah	-	-
Rated voltage	V	2x 24	-
Weight of a battery	kg (lb)	386.5 (852.1)	-
Number of HIRD cycles battery charged	-	58	-
Number of HIRD cycles per hour	-	3	-
HIRD test discharge profile	-	C5	-
Power consumption per hour	kWh	2.39	-

Designation	Unit	Value	Tolerance
Electricity consumption CO^2 emission factor	g/kWh	141	-
CO^2 emissions per hour	g/h	337	-
Service life - number of load cycles	-	1600	-
12 V battery (original equipment)			
Type	-	Lead - EXIDE	-
Quantity	-	1	-
Capacity C5	Ah	74	-
Capacity C20	Ah	-	-
Rated voltage	V	12	-
Control system voltage	V	13.7	-
Battery charger (original equipment)			
Type	-	ZIVAN	-
Power	W	2880	-
Sensor Supply Voltage	V	110 / 230	-
Maximum output current	A	60	-
Rated output voltage	V	48	-
Type of phase progression (charge curve)	-	IUIa	-
Ground level display screen			
Type	-	Color	-
Size (width x height)	-	91 x 152 (3.6 x 6)	-
Display screen in the platform			
Type	-	Color	-
Size (width x height)	-	122 x 85 (4.8 x 3.4)	-

Backup pump

Table 40. Backup pump - ATJ 46 E S1

Designation	Unit	Value	Tolerance
Type	-	Electric	-
Displacement	cm^3 (in^3)	2 (0.12)	-
Power	kW (hp)	1.7 (2.3)	-
Voltage	V	12	-
Current at 150 bar (2,175 psi)	A	220	-
Integrated thermal break	-	Yes	-

Dimensions

Table 41. Dimensions - ATJ 46 E S1

Designation	Unit	Value	Tolerance
Working height = maximum height of the platform floor + 2,000 mm (+ 6 ft 6.7 in)	mm (ft-in)	16,030 (52-7)	± 1%
Working reach = maximum reach of the platform + 500 mm (+ 19.7 in)	mm (ft-in)	8,115 (26-7)	± 1%
Angle of rotation of the platform to the right / to the left	°	90 / 90	± 1%
Upward and downward angle of deflection of the jib arm	°	65 / 59.5	± 1%
Turntable rotation angle	°	350	± 1%

Designation	Unit	Value	Tolerance
Standard platform with gate			
External dimensions (length x width)	mm (ft-in)	2,100 x 765 (6-10.7 x 2-6.1)	± 1%
Floor dimensions (length x width)	mm (ft-in)	2,085 x 760 (6-10.1 x 2-5.9)	± 1%
Narrow platform with gate (option)			
External dimensions (length x width)	mm (ft-in)	1,800 x 765 (5-10.9 x 2-6.1)	± 1%
Floor dimensions (length x width)	mm (ft-in)	1,785 x 760 (5-10.3 x 2-5.9)	± 1%
Other dimensions: 5.2.2 Dimensions - ATJ 46 E S1, page 165 and 5.2.3 Amplitude of movement - ATJ 46 E S1, page 167			

Noise and vibration

Table 42. Noise and vibration - ATJ 46 E S1

Designation	Unit	Value	Tolerance
Sound pressure level in the operator's cab LpA LpA	dB	< 70	-
Basic standard for sound pressure calculation	-	NF EN ISO 11201	-
Sound power level LwA	dB	Not applicable	-
Basic standard for sound power level calculation	dB	NF EN ISO 3744:2010	-
Acoustic test code	dB	EN 280	-
Whole-body vibration in the platform at maximum speed (hare speed)	m/s² (ft/s²)	0.62 (2.04)	-
Whole-body vibration in the platform at working speed	m/s² (ft/s²)	< 0.5 (1.64)	-
Hand-arm vibration in the platform at maximum speed (hare speed)	m/s² (ft/s²)	< 2.5 (8.2)	-
Hand-arm vibration in the platform at working speed	m/s² (ft/s²)	< 2.5 (8.2)	-
Vibration test code	-	EN 1032	-

Recyclability (in accordance with standard ISO 16714_2015)

Table 43. Recyclability - ATJ 46 E S1

Designation	Unit	Value	Tolerance
Machine recyclability rate Rcyc	%	87.8	-
Machine recyclability and recovery rate Rcov	%	91.3	-

5.2.2 DIMENSIONS - ATJ 46 E S1

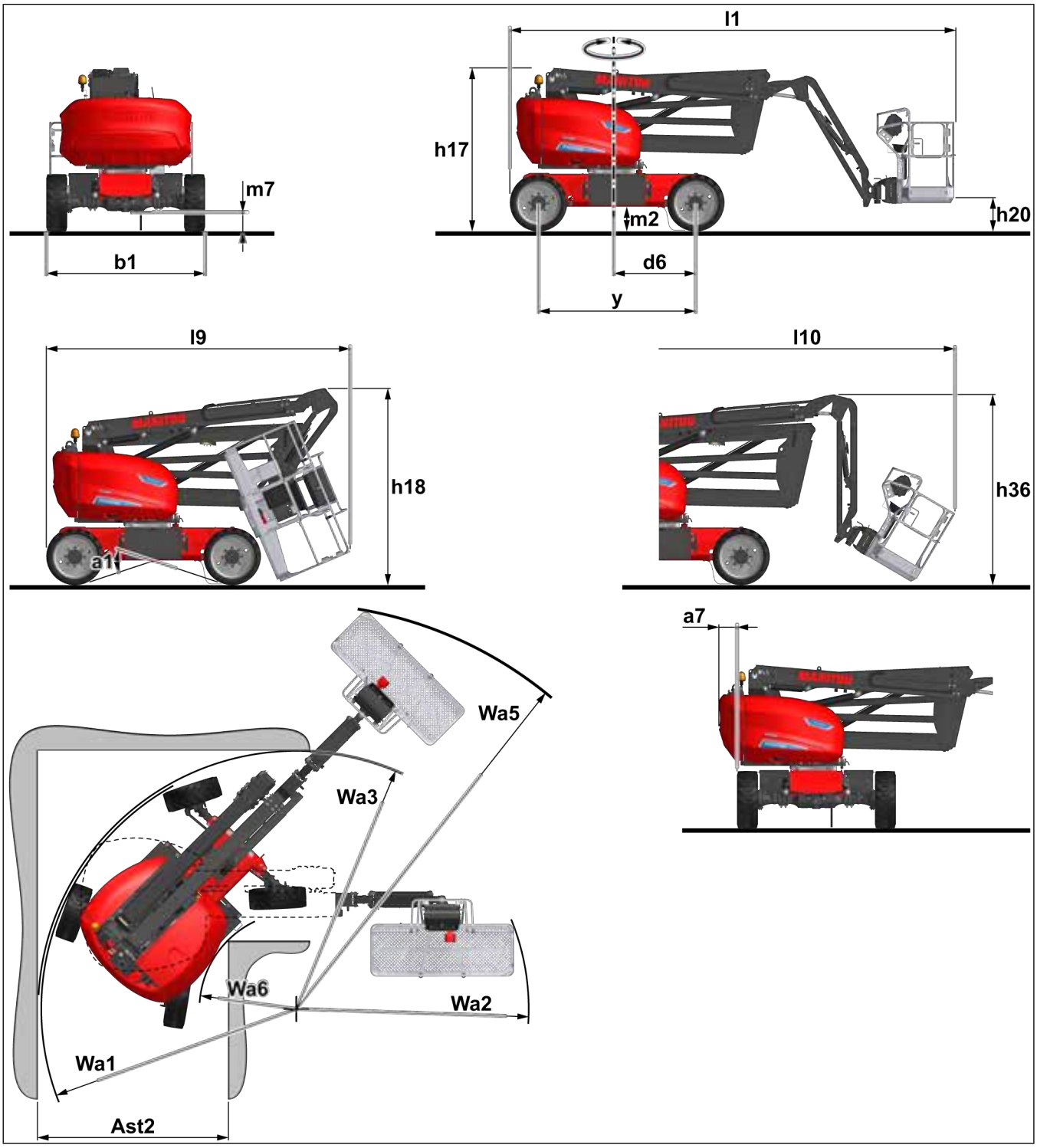


Figure 169: Dimensions - ATJ 46 E S1

Table 44. Dimensions - ATJ 46 E S1

Item	Designation	Unit	Value	Tolerance
l1(1)	Length - Transport position	mm (ft-in)	6,500 (21-4)	± 1%
l1(2)	Length - Transport position	mm (ft-in)	6,537 (21-6)	± 1%
h17(1)	Height - Transport position	mm (ft-in)	2,390 (7-10)	± 1%
h17(2)	Height - Transport position	mm (ft)	2,427 (8)	± 1%

Item	Designation	Unit	Value	Tolerance
h20(1)	Platform floor height - Transport position, jib arm fully lowered	mm (in)	395 (15.6)	± 5%
h20(2)	Platform floor height - Transport position, jib arm fully lowered	mm (in)	432 (17)	± 5%
y	Wheelbase	mm (ft-in)	2,300 (7-7)	± 1%
d6	Ring gear axis	mm (ft-in)	1,200 (3-11)	± 1%
m2(1)	Ground clearance under the chassis	mm (in)	350 (13.8)	± 2%
m2(2)	Ground clearance under the chassis	mm (in)	387 (15.3)	± 2%
b1	Width	mm (ft-in)	2,320 (7-8)	± 1%
m7(1)	Ground clearance under the axle	mm (in)	285 (11.2)	± 2%
m7(2)	Ground clearance under the axle	mm (in)	317 (12.5)	± 2%
l9(1)	Length - Folded position (tie-down on unsheeted transportation vehicle)	mm (ft-in)	4,485 (14-9)	± 1%
l9(2)	Length - Folded position (tie-down on unsheeted transportation vehicle)	mm (ft-in)	4,522 (14-10)	± 1%
h18(1) (3) (4)	Height - Folded position (tie-down on unsheeted transportation vehicle)	mm (ft-in)	2,770 (9-1)	± 2%
h18(2) (3) (4)	Height - Folded position (tie-down on unsheeted transportation vehicle)	mm (ft-in)	2,807 (9-3)	± 2%
a1(1)	Maximum angle under the chassis	° (%)	36.8 (75)	± 2%
a1(2)	Maximum angle under the chassis	° (%)	41 (87)	± 2%
l10(1)	Length - Folded position (tie-down on sheeted transportation vehicle)	mm (ft-in)	5,835 (19-2)	± 1%
l10(2)	Length - Folded position (tie-down on sheeted transportation vehicle)	mm (ft-in)	5,872 (19-4)	± 1%
h36(1)	Height - Folded position (tie-down on sheeted transportation vehicle)	mm (ft-in)	2,800 (9-3)	± 2%
h36(2)	Height - Folded position (tie-down on sheeted transportation vehicle)	mm (ft-in)	2,837 (9-4)	± 2%
a7	Counterweight outreach - Turntable turned to 90°	mm (in)	265 (10.4)	± 1%
Ast2(1)	Minimum channel width	mm (ft-in)	2,680 (8-10)	± 2%
Ast2(2)	Minimum channel width	mm (ft-in)	-	-
Wa1(2)	Outside turning circle - Wheels	mm (ft-in)	3,740 (12-3)	± 3%
Wa2(3)	Outside turning circle - Wheels	mm (ft-in)	-	-
Wa2(3)	Outside turning circle - Platform	mm (ft-in)	3,390 (11-2)	± 3%
Wa2(4)	Outside turning circle - Platform	mm (ft-in)	3,250 (10-8)	± 3%
Wa3	Outside turning circle - Chassis/turntable	mm (ft-in)	3,765 (12-4)	± 3%
Wa5(3)	Outside turning circle	mm (ft-in)	5,900 (19-4)	± 3%
Wa5(4)	Outside turning circle	mm (ft-in)	5,815 (19-1)	± 3%
Wa6	Inner turning radius	mm (ft-in)	1,425 (4-8)	± 3%

(1) Standard non-marking wheels and standard wheels (option).

(2) Large-diameter wheels (optional) and non-marking large-diameter wheels (optional).

(3) Standard platform with gate.

(4) Narrow platform with gate (option).

5.2.3 AMPLITUDE OF MOVEMENT - ATJ 46 E S1

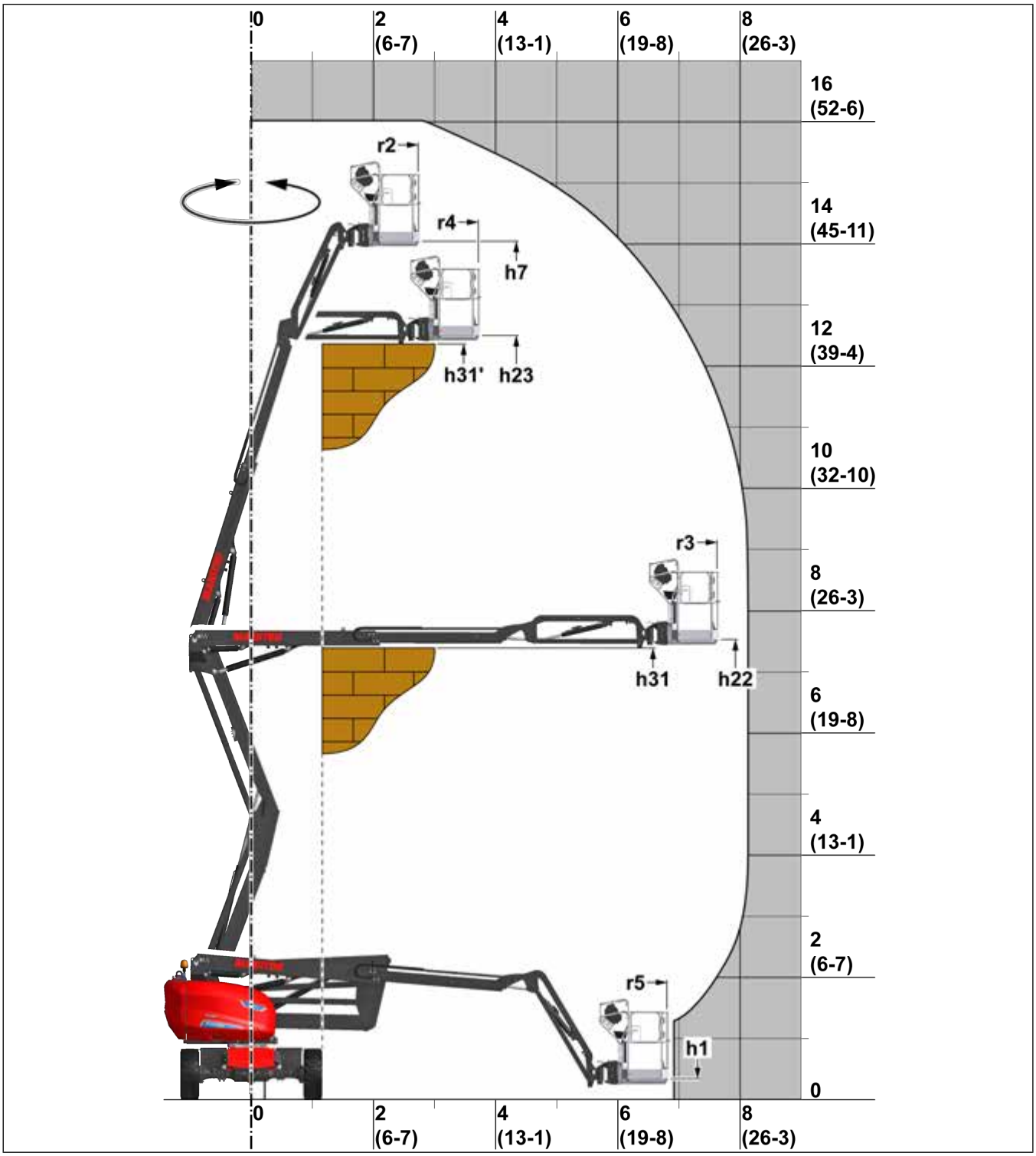


Figure 170: Amplitude of movement - ATJ 46 E S1

Illustration units = meters (feet-inches)

Table 45. Amplitude of movement - ATJ 46 E S1

Item	Designation	Unit	Value	Tolerance
h7(1)	Maximum height of the platform floor	mm (ft-in)	14,050 (46-1)	± 1%
h7(2)	Maximum height of the platform floor	mm (ft-in)	14,087 (46-2)	± 1%

Item	Designation	Unit	Value	Tolerance
r2	Platform reach	mm (ft-in)	2,720 (8-11)	± 1%
h23(1)	Platform floor height	mm (ft)	12,510 (41)	± 1%
h23(2)	Platform floor height	mm (ft-in)	12,547 (41-2)	± 1%
r4	Platform reach	mm (ft-in)	3,710 (12-2)	± 1%
h22(1)	Platform floor height	mm (ft-in)	7,540 (24-8)	± 1%
h22(2)	Platform floor height	mm (ft-in)	7,577 (24-10)	± 1%
r3	Maximum reach of the platform	mm (ft-in)	7,615 (24-11)	± 1%
h1(1)	Platform floor height	mm (in)	350 (13.8)	± 1%
h1(2)	Platform floor height	mm (in)	387 (15.2)	± 1%
r5	Platform reach	mm (ft-in)	6,800 (22-3)	± 1%
h31(1)	Overhang under the main arm	mm (ft-in)	7,430 (24-4)	± 1%
h31(2)	Overhang under the main arm	mm (ft-in)	7,467 (24-6)	± 1%
h31'(1)	Overhang under the main arm	mm (ft-in)	12,370 (40-7)	± 1%
h31'(2)	Overhang under the main arm	mm (ft-in)	12,407 (40-8)	± 1%

(1) Standard non-marking wheels and standard wheels (option).

(2) Large-diameter wheels (optional) and non-marking large-diameter wheels (optional).

5.3. CONSUMABLES

5.3.1 FLUIDS AND LUBRICANTS

NOTICE

Risk of damage to the machine

Always use the recommended fluids and lubricants.
Bear in mind that lubricants may not be miscible.

Hydraulics

Description	Capacity	Recommendation	Ambient temperature range
Hydraulic oil tank	24 L (6.35 US gal)	Manitou HVB 22 hydraulic oil - Standard	-20 °C / +40 °C (-4 ° F / +104 °F)
		Manitou SWED 32 biodegradable hydraulic oil - Option	-15 °C / +40 °C (+5 °F / +104 °F)

Transmission

Description	Capacity	Recommendation	Ambient temperature range
Reduction gearbox	-	Mechanical transmission oil Manitou SAE80W90	-20 °C / +50 °C (-4 ° F / +122 °F)

Rear axle

Description	Capacity	Recommendation	Ambient temperature range
Differential	4 L (4.22 US qt)	Manitou special immersed brake oil Manitou	-45 °C / +55 °C (-49 °F / +131 °F)
Wheel gear reducers	2x 0.8 L (2x 0.84 US qt)	Mechanical transmission oil Manitou SAE80W90	-20 °C / +50 °C (-4 ° F / +122 °F)
Steering pivot pins	-	Black multi-purpose lubricant Manitou	-20 °C / +55 °C (-4 ° F / +131 °F)

Front axle

Description	Capacity	Recommendation	Ambient temperature range
Differential	4 L (4.22 US qt)	Manitou special immersed brake oil Manitou	-45 °C / +55 °C (-49 °F / +131 °F)
Wheel gear reducers	2x 0.8 L (2x 0.84 US qt)	Mechanical transmission oil Manitou SAE80W90	-20 °C / +50 °C (-4 ° F / +122 °F)
Steering pivot pins	-	Black multi-purpose lubricant Manitou	-20 °C / +55 °C (-4 ° F / +131 °F)
Oscillation bearings	-	Black multi-purpose lubricant Manitou	-20 °C / +55 °C (-4 ° F / +131 °F)

Lift structure

Description	Capacity	Recommendation	Ambient temperature range
Axes, hubs and cylinders	-	Black multi-purpose lubricant Manitou	-20 °C / +55 °C (-4 ° F / +131 °F)
Telescopic arm	-	Black multi-purpose lubricant Manitou	-20 °C / +55 °C (-4 ° F / +131 °F)
Crown gear - Bearings	-	Black multi-purpose lubricant Manitou	-20 °C / +55 °C (-4 ° F / +131 °F)
Crown gear - Teeth	-	Manitou multi-purpose extreme pressure lubricant	-20 °C / +55 °C (-4 ° F / +131 °F)
Turntable rotation motor	0.85 L (0.9 US qt)	Mechanical transmission oil Manitou SAE80W90	-20 °C / +50 °C (-4 ° F / +122 °F)

High voltage batteries

Description	Capacity	Recommendation	Ambient temperature range
Can	16 L (4.22 US gal)	Distilled water	-
Distilled water tank	9.7 L (2.5 US gal)	Distilled water	-

6. CALIFORNIA PROPOSITION 65 AND SILICA DUST

6.1. CALIFORNIA PROPOSITION 65 WARNING - LEAD EXPOSURE

Only for USA.

⚠ WARNING

This product can expose you to lead which is known to the State of California to cause cancer and birth defects or other reproductive harm.

For more information go to www.P65Warnings.ca.gov

6.2. SILICA DUST HAZARDS

Only for USA.

Exposure to crystalline silica (found in sand, soil and rocks) has been associated with silicosis, a debilitating and often fatal lung disease.
Comply with all applicable rules and regulations for the workplace.
Wear approved respiratory protection or use water spray or other means if there is no other way to control the dust.

A Silica rule "29 CFR 1929.1153" by the U.S. Occupational Safety and Health (OSHA) indicates a signicant risk of chronic silicosis for workers exposed to inhaled crystalline silica over a working lifetime.
Refer to the rule for more information regarding exposure limits and hazard prevention.

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