

ORIGINAL INSTRUCTIONS - according to Directive 2006/42/EC, Annex I 1.7.4.1 and according to Supply of Machinery (Safety) Regulations 2008, Annex I 1.7.4.1

# **CX25EV**

## Mini Excavator

# OPERATOR'S MANUAL

**Part Number 92141657**  
1st edition English  
September 2023





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**COMMISSIONING**

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Fill-in before commissioning of the equipment:

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**Machine model:** .....

**Machine serial no./PIN:** .....

**Engine Serial No.:** .....

**Year of construction:** .....

**Commissioned on:** .....

**Dealer:**



|   |            |
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# 1 - INTRODUCTION

## 1.1 - Regarding this manual

This booklet is a manual containing the use and maintenance instructions for the operator, relating to a **excavator electric**:

- model **CX25EV**.

The electrical excavator is powered by a rechargeable lithium-ion battery positioned on the electrical excavator.

This manual will help you to understand how to set your machine up, prepare it for work, perform normal operations and carry out the routine maintenance operations. Additionally, it contains indications that contribute to increasing the degree of reliability and the duration of the machine.

This manual contains information required for a safe and correct use of the equipment.

**All operators must be trained and competent; they must have read and understood the instructions indicated in this manual.**

The reading of this manual, careful study and verification that it has been understood by the operator, with particular attention to the safety provisions, must be part of the training and education programme.

For more information see section "2.3 - Safety signs and operation related labels" to page 2-5.

Failure to read and comply with the instructions preceded by a safety-related warning symbol can cause death or serious injury.

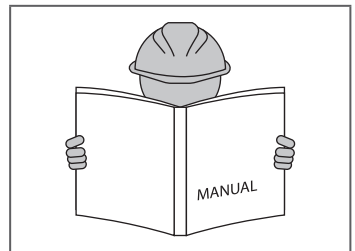


***This is the danger symbol. It is used in this manual to warn the user of a potential risk of personal injuries. Comply with all the safety notices referred to this symbol to prevent the risk of serious injuries or death.***

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The use and maintenance manual is an integral and essential part of the machine and must be delivered to the user.

**This manual must always be kept on board the machine or in any case available to operators and must accompany the machine upon resale.**



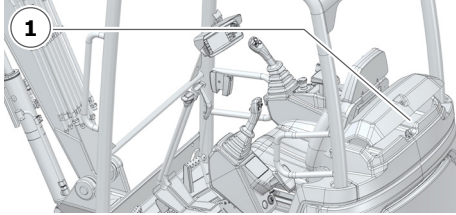


It must be kept safely in the appropriate lockable housing (1) and referred to carefully as it contains important directions for operator safety, proper working operation and correct maintenance.

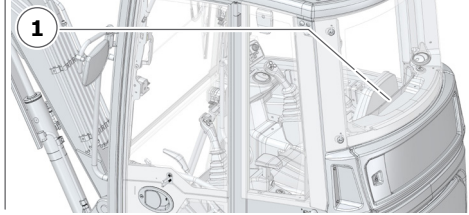
The machine must be used only as expressly indicated. Any other use is to be considered inappropriate and therefore hazardous.

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### CANOPY VERSION



### CAB VERSION



The manufacturer is excluded from any contractual and non-contractual liability for damages caused by errors in the use and handling of the machine or by the failure to observe the instructions provided by the manufacturer.

The maximum expected life span of this machine is deemed to be 10 years or 10,000 working hours. Said duration is subject to the regular carrying out of all the control and maintenance operations as indicated in the relevant manual. Upon expiry of one of the above periods, the machine must be subjected to extraordinary servicing by the manufacturer or by workshops authorised by the same in order to assess the conditions of use and to determine the residual life. Otherwise it must be taken out of service.



## NOTICE

*The MANUFACTURER reserves the right to modify the product and amend the associated technical documentation without constituting any form of obligation towards third parties.*

*This version of the use and maintenance manual describes the characteristics of the standard machine, at the time of going to print.*

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If the use and maintenance manual is lost or damaged, please contact the Service Centre to request a new one.

### Copyright

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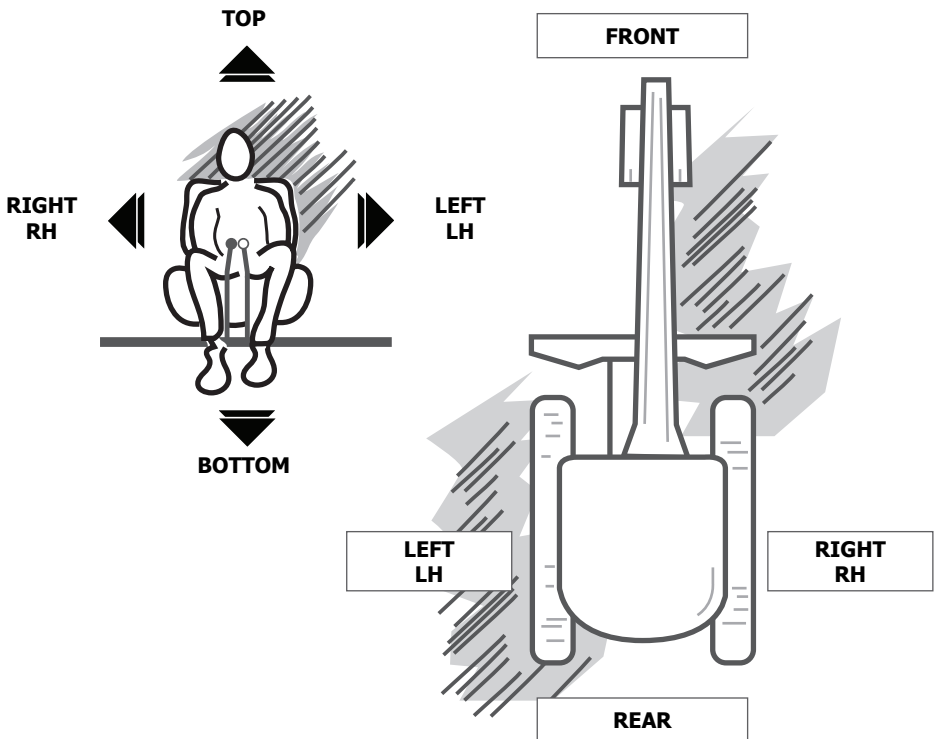
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### 1.1.1 - Manual consultation and terminology

The manual has been made up using terminology that is indicated below:

- **"left"** abbreviated as **"lh"** refers to the left side of the operator when sitting in the driver's position;
- **"right"** abbreviated as **"rh"** refers to the right side of the operator when sitting in the driver's position;
- **"top"** or **"above"** always refers to the part of the machine located above the operator when sitting in the driver's position;
- **"bottom"** or **"underneath"** always refers to the part of the machine located below the operator when sitting in the driver's position;
- **"front"** is always the part of the machine where the dozer blade is fitted;
- **"rear"** is always the part of the machine opposite to the dozer blade position.

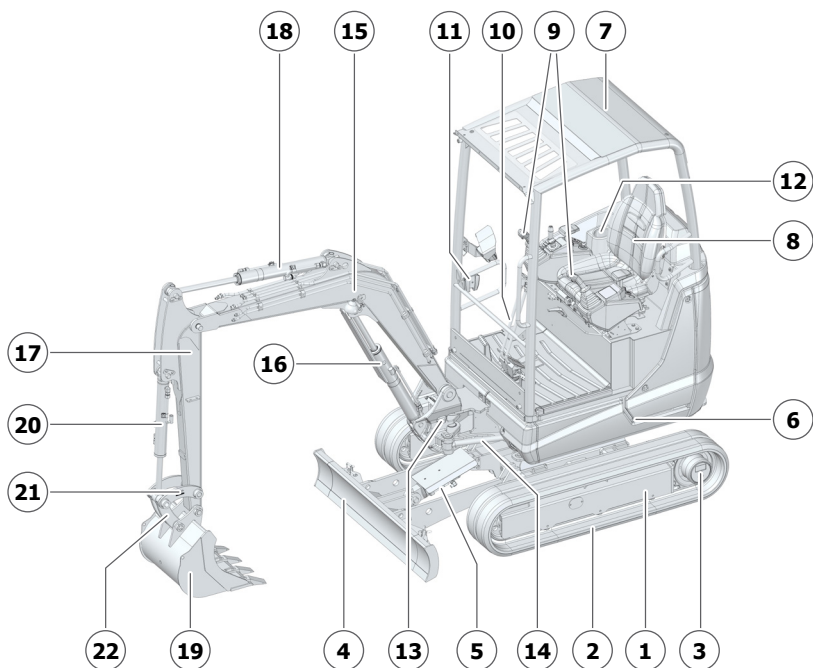




## INTRODUCTION

For ease of use and maintenance, the following are the names of some of the machine parts, which will be referred to in the descriptions provided in the manual.

### CANOPY VERSION

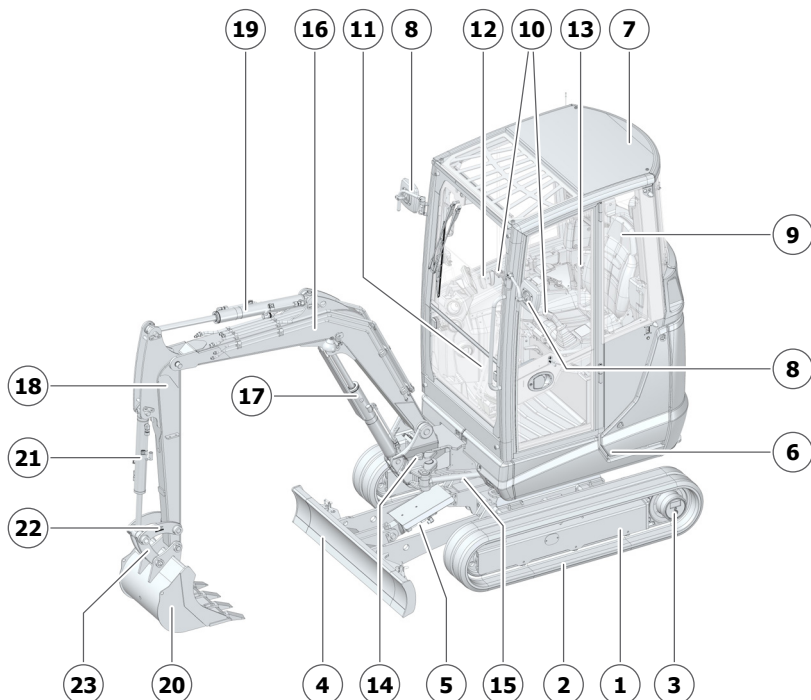


#### Key:

|    |                        |    |                      |
|----|------------------------|----|----------------------|
| 1  | Undercarriage          | 12 | Bottle holder        |
| 2  | Tracks                 | 13 | Boom Swing Tower     |
| 3  | Translation Gear Motor | 14 | Boom Swing Cylinder  |
| 4  | Dozer Blade            | 15 | First Boom           |
| 5  | Dozer Blade Cylinder   | 16 | Lifting Cylinder     |
| 6  | Turning Frame          | 17 | Second Boom          |
| 7  | Canopy                 | 18 | Digging Arm Cylinder |
| 8  | Operator Seat          | 19 | Bucket               |
| 9  | Joysticks              | 20 | Bucket Cylinder      |
| 10 | Travel levers          | 21 | Bucket Articulations |
| 11 | Mobile phone holder    | 22 | Connecting Rod       |



## CAB VERSION



### Key:

|           |                        |           |                      |
|-----------|------------------------|-----------|----------------------|
| <b>1</b>  | Undercarriage          | <b>13</b> | Bottle holder        |
| <b>2</b>  | Tracks                 | <b>14</b> | Boom Swing Tower     |
| <b>3</b>  | Translation Gear Motor | <b>15</b> | Boom Swing Cylinder  |
| <b>4</b>  | Dozer Blade            | <b>16</b> | First Boom           |
| <b>5</b>  | Dozer Blade Cylinder   | <b>17</b> | Lifting Cylinder     |
| <b>6</b>  | Turning Frame          | <b>18</b> | Second Boom          |
| <b>7</b>  | Cab                    | <b>19</b> | Digging Arm Cylinder |
| <b>8</b>  | Rear-view mirrors      | <b>20</b> | Bucket               |
| <b>9</b>  | Operator Seat          | <b>21</b> | Bucket Cylinder      |
| <b>10</b> | Joysticks              | <b>22</b> | Bucket Articulations |
| <b>11</b> | Travel levers          | <b>23</b> | Connecting Rod       |
| <b>12</b> | Mobile phone holder    |           |                      |





### **NOTICE**

*The pictures in this manual may NOT correspond to the machine for the following reasons:*

- *technical modifications made after the date when this publication was printed;*
- *presence of accessories and/or optional equipment;*
- *installed equipment that differs from that shown in the pictures.*

*These differences do not compromise the safety of the operator and of the machine; read and always follow the instructions given.*

*Contact the Service Centre if any part of the manual is not clear.*

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## 1.2 - Machine identification data

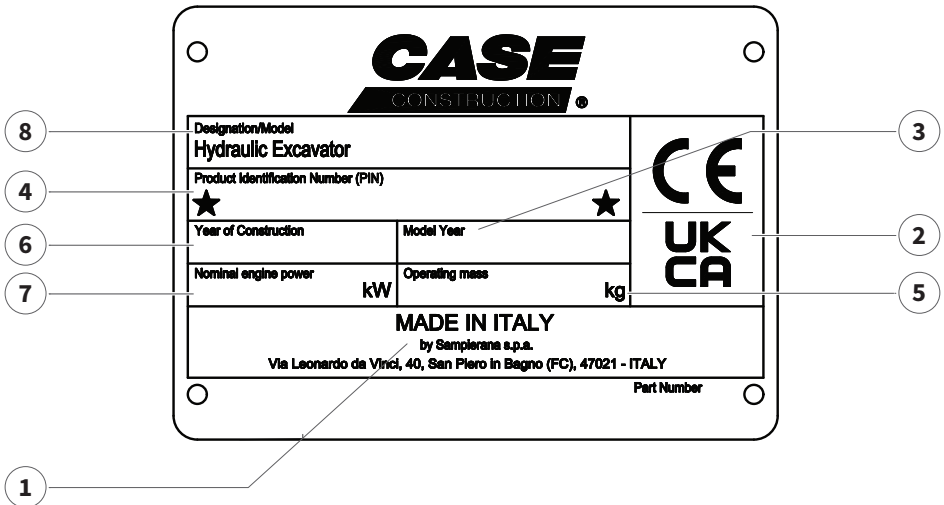
The machine identification plate contains the machine type and serial number. This plate and that on the engine are necessary to request spare parts or to indicate technical problems to the *After-sales Centre*.



### NOTICE

*Under no circumstances must the information shown on the plates be altered.*

## FACSIMILE OF THE MACHINE CE-UKCA PLATE



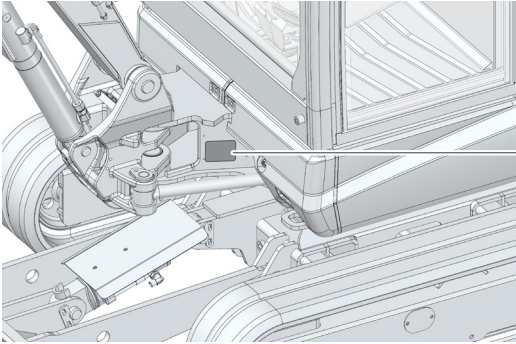
### Key:

- |   |   |
|---|---|
| 1 | Business name or manufacturer's full address                                      |
| 2 | CE / UKCA Marking   |
| 3 | Model year  |
| 4 | Serial number/machine identification number (product identification number - PIN) |
| 5 | Weight of the most usual configuration (expressed in kg)                          |
| 6 | Year of manufacture   |
| 7 | Engine nominal power (expressed in kW)  |
| 8 | Machine designation   |



## POSITION OF THE MACHINE CE PLATE

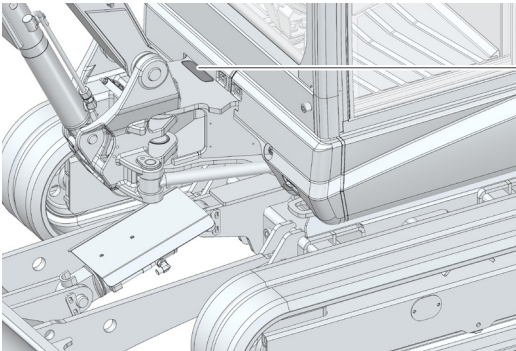
---



**Machine ID  
plate**

## POSITION OF MACHINE PUNCHING PINS

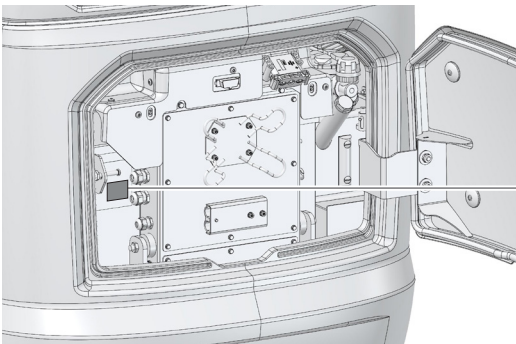
---



**Machine PIN**

## POSITION OF THE BATTERY POWER PLATE

---

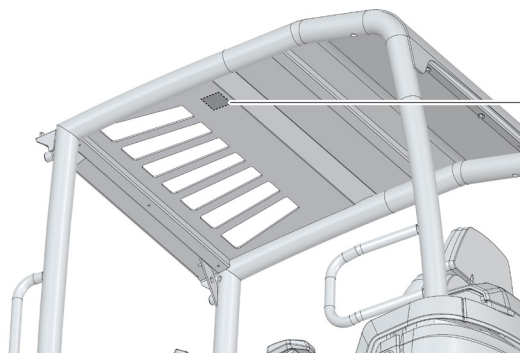


**Power battery  
ID plate**

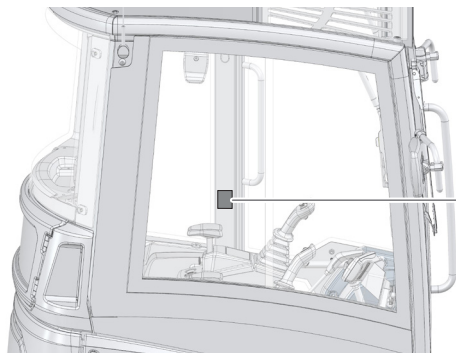


## POSITION OF THE PROTECTIVE STRUCTURE PLATE

---



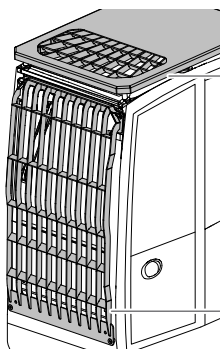
**Protective structure  
ID plate  
(canopy)**



**Protective structure  
ID plate  
(cab)**

## POSITION OF THE OPTIONAL PROTECTIVE GRIDS

---



**TOP-GUARD  
protective grid  
identification plate**

**FRONT-GUARD  
protective grid  
identification plate**



### 1.3 - Manufacturer

The **excavator electric** is produced exclusively by:

---

#### **SAMPIERANA s.p.a.**

Via Leonardo da Vinci, 40

47021 S. Piero in Bagno (FC)

---

#### **1.3.1 - Contact the after-sales network**

For any communication contact the after-sales network by providing the following information:

- machine model;
- serial number/machine identification number (product identification number - PIN);
- year of manufacture;
- date of purchase;
- model and serial number of the engine;
- detailed information concerning problems detected.



### 1.4 - Spare Parts

Our company also boasts top quality original spare parts and a *Service Centre*. However, this manual is not a spare parts catalogue and must not be used to order spare parts.

Only the spare parts catalogue, which can be consulted on-line via serial number/ machine identification number (product identification number - PIN), is a valid source of codes and descriptions of the spare parts for your machine.

With the perspective of continuous improvement of product design, several parts may be modified in the future. The only way to have the most updated information regarding spare parts is the on-line catalogue.

The *Service Centre* is at the customers' disposal to assist with any technical problems and spare parts orders.

**For replacement of spare parts of the equipment, it is recommended to use original parts; the MANUFACTURER declines all liability with regard to a possible drop in performance of the equipment or damage to the machine and/or personal injuries resulting from the use of non-original spare parts. Please note that some of the parts that compose the machine were produced in PRC.**

**For maintenance operations that cannot be easily performed with the means that are ordinarily available to an individual, please consult our *Service Centre* that is able to provide skilled staff, adequate equipment and original spare parts.**

**The *Service Centre* is available to provide any required explanations and advice, or to intervene with the company's own specialised technicians if there are any doubts regarding machine performance.**



### 1.5 - Information to the owner of the machine

The safety of users that operate the machine is of essential importance for the *MANUFACTURER*.

To communicate important information about the machine the *MANUFACTURER* uses **TECHNICAL INFORMATION** (INFO TECH) which is transmitted to the dealers and owners of the machine.

The information contained in the technical information is related to the machine using the model and serial number/PIN.

The distribution of technical information is based on the personal information data of the most recent owner, associated with the dealer, available in the *MANUFACTURER*'s archives.

It is important to keep your contact information up-to-date.

**In order to guarantee the safety of the machine, the owner must ensure that the specifications indicated in all the technical information are observed.**



### 1.6 - Intended use

The machine, with standard equipment (bucket) is designed for earthmoving operations, specifically:

- movement, collection, transport and unloading of earth, rocks or other materials;
- loading of said materials onto lorries, conveyor belts or other means of transport.

The machine can be fitted with interchangeable equipment or accessories which, however, must have the features indicated in chapter "7 - *Recommended optional equipment*" to page 7-1.

In the event that the user installs unauthorised equipment, the *MANUFACTURER* declines all responsibility for this combination.

After installing approved interchangeable equipment or accessories, the machine can be used for jobs corresponding to the function of the equipment or accessory itself.

Strictly observing the instructions given in this manual and performing the maintenance operations at the frequency indicated is also part of the intended use.

Always observe the instructions reported in the use and maintenance publications supplied by the manufacturer of the equipment or interchangeable accessories.

No changes can be made to the machine without the *MANUFACTURER's* authorisation, as the change could be dangerous.



### 1.7 - Prohibited use

The machine has been designed and built according to the work for which it is intended. Therefore the technical specifications must be understood as binding for use of the machine depending on the relevant intended use.

Any use of the machine, which does not follow the indications given in the section "1.6 - Intended use" to page 1-13 IS FORBIDDEN.



## DANGER

***This machine has been designed and manufactured to be used exclusively as indicated in the previous chapter, therefore use of the machine to perform operations different to those described is strictly prohibited.***

***This section lists some uses considered improper or unauthorised; as it is impossible to foresee all potential improper uses, if particular situations of machine use arise, before commencing work contact the Service Centre for more information.***



## WARNING

***No changes can be made to the machine without the written authorisation of the manufacturer, as the modification could be dangerous.***

***It is nevertheless necessary to adhere strictly to the safety regulations contained in this manual.***

The MANUFACTURER is RELEASED of all liability in the event of any other use or failure to observe the instructions provided by the manufacturer itself.

DO NOT allow the machine to be used by minors or unskilled persons.

DO NOT operate the ground controls. The control devices must only be operated from the driving position.

DO NOT transport flammable or otherwise hazardous materials.

DO NOT use the machine to lift or transport people.

NEVER use the machine for load handling operations if it is not equipped with the specific load handling equipment (available as an optional accessory).

DO NOT use the machine to tow other vehicles or trailers.

DO NOT use the machine if it is not in a suitable condition for work, if it has malfunctions in operation or if the controls do not respond perfectly.

DO NOT store the machine at temperatures below -15°C for more than 24 hours. If the temperature is below -15°C or the storage time is more than 24 hours, the machine must be kept continuously in charge.



DO NOT use the machine at an ambient temperature lower than  $-15^{\circ}\text{C}$  if adequate modifications are not made as indicated in the section relating to low temperatures. In all cases, it is not possible to operate at temperatures below  $-30^{\circ}\text{C}$ .

DO NOT store the machine at an ambient temperature above  $+50^{\circ}\text{C}$ , if the temperature exceeds this value the machine must be kept continuously in charge.

DO NOT operate the machine at an ambient temperature above  $+50^{\circ}\text{C}$ , if the temperature exceeds this value, place the machine in an environment with a lower temperature and stop its operation.

For battery precautions refer to section "6.13 - Battery power" to page 6-51.

DO NOT use the machine in:

- fire risk areas;
- corrosive atmospheres;
- explosive atmospheres;
- atmospheres with dust harmful to the health of the operator;
- contaminated or unhealthy environments;
- in busy areas (town centres, etc.) without having taken the appropriate and necessary safety measures.

DO NOT use the bucket as a pile-driver or as a pile-extractor.

When possible, AVOID large obstacles, highly uneven ground, stones, fallen logs, steps, ditches, etc., which can cause the tip-over or roll-over of the machine.



## WARNING

***The MANUFACTURER cannot accept any responsibility in the event of accidents involving persons or property caused by non-compliance with the regulations and instructions listed in this manual and by failure to comply with safety regulations and accident prevention rules.***



## WARNING

***If the machine is used in an improper manner, the operator is personally responsible for his own safety and that of any other persons involved.***



## WARNING

***It is strictly prohibited to drive the machine on public roads, since the machine is not approved for this purpose. Therefore, it is only possible to operate in private spaces and/or building sites NOT open to the public.***



## **1.8 - FORMS AND DECLARATIONS**

### **EC Declaration of Conformity**

An original of this EC Declaration of Conformity is supplied with each machine and must be kept carefully by the owner.

*NOTE: The official documents supplied with the machine must be kept by the owner so as to be able to present them to any inspecting authority which may request them.*

On the following page is provided copy of the EC Declaration of Conformity (EC Declaration of Conformity). The EC Declaration of Conformity is the manufacturer's declaration about equipment compliance to relevant EU provisions. Please keep the original document in a safe place. Local authorities may require you to show this document in order to assure compliance of your equipment.

Translation of this declaration in your own country language is provided on the front page and the reverse page of the original document.

The EC Declaration of Conformity contains the following information:

1. Manufacturer
2. Commercial name and model
3. Denomination
4. Type (Specify any variant/version)
5. Planning key
6. Serial number
7. 2006/42/EC Machinery Directive. European harmonized standards according to which conformity is declared
8. Name and address of the person authorised to compile the technical file:
9. 2000/14/EU EMC Directive (if applicable). European harmonized standards according to which conformity is declared
10. 2000/14/EC Outdoor Noise Directive (if applicable). Category
11. Conformity assessment procedure followed
12. Name and address of the Notified Body
13. Measured sound power level LWA
14. Guaranteed sound power level LWA
15. Engine power (as defined by ISO 14396)
16. Holder of the technical documentation
17. Place of the declaration
18. Date of the declaration
19. Signature of the person empowered to draw up the EC Declaration of Conformity
20. Name of the person empowered to draw up the EC Declaration of Conformity
21. Position of the person empowered to draw up the EC Declaration of Conformity



[illegible]



### **UKCA Declaration of Conformity**

An original of this UKCA Declaration of Conformity is supplied with each machine and must be kept carefully by the owner.

*NOTE: The official documents supplied with the machine must be kept by the owner so as to be able to present them to any inspecting authority which may request them.*

On the following page is provided copy of the UKCA Declaration of Conformity. The UKCA Declaration of Conformity is the manufacturer's declaration about equipment compliance to relevant UK provisions. Please keep the original document in a safe place. Local authorities may require you to show this document in order to assure compliance of your equipment.

The UKCA Declaration of Conformity contains the following information

1. Manufacturer
2. Commercial name and model
3. Denomination
4. Type (Specify any variant/version)
5. Planning key
6. Serial number
7. Supply of Machinery (Safety) Regulations 2008 n.1597 and its amendments. Designed standards according to which conformity is declared
8. Name and address of the person authorised to compile the technical file:
9. Electromagnetic Compatibility Regulations 2016 n.1091 (if applicable) and its amendments. Designed standards according to which conformity is declared
10. Noise Emission in the Environment for use outdoor 2001 n.1701 (if applicable) and its amendments. Category
11. Conformity assessment procedure followed
12. Name and address of the Notified Body
13. Measured sound power level LWA
14. Guaranteed sound power level LWA
15. Engine power (as defined by ISO 14396)
16. Holder of the technical documentation
17. Place of the declaration
18. Date of the declaration
19. Signature of the person empowered to draw up the UKCA Declaration of Conformity
20. Name of the person empowered to draw up the UKCA Declaration of Conformity
21. Position of the person empowered to draw up the UKCA Declaration of Conformity
22. Name and address of the UK Authorised Representative/Importer



|     |                     |
|-----|---------------------|
| [2] |                     |
| [3] | Hydraulic Excavator |

|     |                       |
|-----|-----------------------|
| [7] | EN 474-1:2006+A6:2019 |
|     | EN 474-5:2006+A3:2013 |

[9] SAMPIERANA S.p.A.  
Engineering Department  
Via Leonardo da Vinci, 40  
47021 San Piero in Bagno (FC)  
Italy

[9] EN ISO 13766-1:2018

(10) Hydraulic Excavator

(11) Schedule 9, Procedure 1

[16] SAMPIERANA S.p.A.  
Engineering Department  
Via Leonardo da Vinci 40  
47021 San Piero (FC) - ITALY

[17] San Piero in Bagno, Italy  
[18] (vvvv-mm-dd)

Signature: [19]

Name: [20]

and position: [21]

of the person empowered to draw up the UKCA Declaration of Conformity.

Name and address of the UK Authorised Representative/Importer: [22]

90498853 rev.B

## UKCA Declaration of Conformity of the Machinery

We, [1]

declare under our sole responsibility, that the product:

Commercial Name and Model: [2]

Denomination: [3]

Type (Specify any variant/version): [4]

Planning key: [5]

Serial Number: [6]

to which this declaration relates, fulfills all the relevant provisions of the following Regulations:

## # Supply of Machinery (Safety) Regulations 2008 n.1597 and its amendments

Designated standards according to which conformity is declared: [7]

Name and address of the person authorised to compile the technical file [8]

2

# Electromagnetic Compatibility Regulations 2016 n.1091 (if applicable)

Designated standards according to which conformity is declared: [9]

[illegible]

## # Noise Emission in the Environment for use outside

Category: [10]

Conformity assessment procedure followed: [11]

Name and address of the Notified Body: [12]

Measured sound power level LWA (ref. 1 pW): [13]

Guaranteed sound power level LWA (ref. 1 pW): [14]

Engine power (as defined by ISO 14396): [11]

Place: [17]

and date: [18]

of the declaration.

Signature: [19]

Name: [20]

and position: [21]

of the person empowered to draw up the UKCA Declaration of Conformity.

Name and address of the UK Authorised Representative/Importer: [22]



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## 2 - SAFETY

### 2.1 - Safety symbol

---



***This is the danger symbol. It is used in this manual to warn the user of a potential risk of personal injuries. Comply with all the safety notices referred to this symbol to prevent the risk of serious injuries or death.***

---

### 2.2 - General safety

There are many risks linked to work with a **excavator electric**.

It is recommended that the machine is only used by staff trained specifically for this purpose. The employer is responsible for checking that all safety regulations in force in the place of use of the machine are respected before starting any activity. Safety plates are positioned on the machine to indicate possible hazards.

- The machine must only be used by authorised, skilled, qualified and trained persons.
- Read the instruction manual before using the machine.
- Wear clothing suitable for work on a construction site.
- Inspect the machine thoroughly every day or at every shift, performing a thorough external control before starting it in order to prevent injury or damage to persons.
- Always fasten the seat belt before starting the machine.
- Learn the position and use of the pedals, command levers, instruments and LED indicators.
- Perform all controls indicated.
- Never drive the machine under the effect of alcohol, medicines or other drugs.



- Make sure there are no persons in the machine's radius of action before starting it.
- Always face the machine when climbing onto or off of it and use the steps and handles or cab uprights. DO NOT JUMP DOWN!
- Never try to climb onto or off of the machine when it is moving.
- Do not use the commands as a handle to get on and off the machine.
- Always check the slipperiness of the foot boards, steps and handles when climbing onto or off of the machine.
- Perform a risk assessment of the work area and reduce all risks identified before starting work.



## WARNING

***It is forbidden to make any modifications to the machine.***

- The machine must not be modified without the *MANUFACTURER's* permission.
- The realisation of modifications without said consent will lower the level of safety, thus increasing any dangers. Modifications not only worsen the machine functions, but also reduce their duration.
- We are not liable for any accidents or faults due to modifications made without our consent.
- Should you decide to intervene on the machine, it is necessary to submit a written request to the *MANUFACTURER*.



## WARNING

***Anticipate any precautions with regard to optional parts and accessories.***

- Do not install any components or accessories that have not been approved by the *MANUFACTURER*.
- The use of components or accessories not approved by the *MANUFACTURER* may determine a reduction in the level of safety, thus increasing the possible hazards.
- We are not liable in any way for any injuries, accidents or machine faults due to the use of components or accessories not approved by the *MANUFACTURER*.



### 2.2.1 - Manual safety sign consultation

To ensure a safe use of the machine, this manual provides all the information on safety precautions in order to highlight potential hazards and the relevant methods to be adopted to avoid them.

The following words are used to provide indications regarding potential hazardous situations that could cause injury and/or damage to property.

They are highlighted by the wording: **DANGER**, **WARNING** and **CAUTION**.



## **DANGER**

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



## **WARNING**

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



## **CAUTION**

***Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.***

In addition to those listed above, the following indication words are used to recommend precautions to be taken to protect the machine or to provide useful information.



## **NOTICE**

*Indicates information considered important, but not hazard related (e.g., messages related to property damage).*

---



***Indicates information considered important to protect the environment, indicating the correct disposal of waste based on the Laws in force in the country where the machine is used.***

---



## SAFETY

The manufacturer cannot anticipate all possible circumstances involving potential hazard during operation or maintenance. As a result the safety messages shown in this manual or on the machine may not include all possible safety precautions.

When performing procedures or operations that are not explicitly recommended or permitted in this manual, it is necessary to take all necessary safety precautions to avoid potential hazards.

Under no circumstances must actions be taken or operations performed that are expressly prohibited in this manual.

If you are unsure of the safety requirements for some of the procedures, contact the **MANUFACTURER** or the **Service Centre**.

### Meaning of the symbols used:



***Correct, Allowed.***



***Incorrect, Forbidden.***



***Be Careful!***



***Direction of operation or Direction of movement.***



***Closed, Locked.***



***Open, Released.***



***Manual Operation.***



### 2.3 - Safety signs and operation related labels

Affixed to the machine are **safety signs** with warning and safety symbols for the operator and those who operate near the machine itself; there are also **operation related labels** which provide the instructions for operation and maintenance.

Each type of sign is placed near the part of the machine that may be a hazard source or that requires operating instructions.

The safety signs and the operation related labels are attached to the machine in the form of stickers; they can be divided into three different types:

- **safety signs;**
  - these are yellow with a black border and lettering to indicate warning;
  - these are yellow with a red border and black lettering to indicate prohibition;
- **operating instructions;**
  - these are white or transparent with a black border and lettering;
- **maintenance instructions;**
  - these are white or transparent with a black border and lettering.

Read carefully and become aware of the symbols and their message before using the machine.

Check the presence and legibility of the safety signs and operating instructions daily; repair or replace them immediately whenever they are damaged or missing.



## DANGER

***Make sure that the safety signs and operating instructions are always legible and in the correct position; if necessary, ask the Spare Parts Service for replacements.***

***The manufacturer declines all responsibility for damage to persons or property due to non-compliance with the warnings and instructions reported by the safety signs and operation related labels or by their imperfect preservation.***

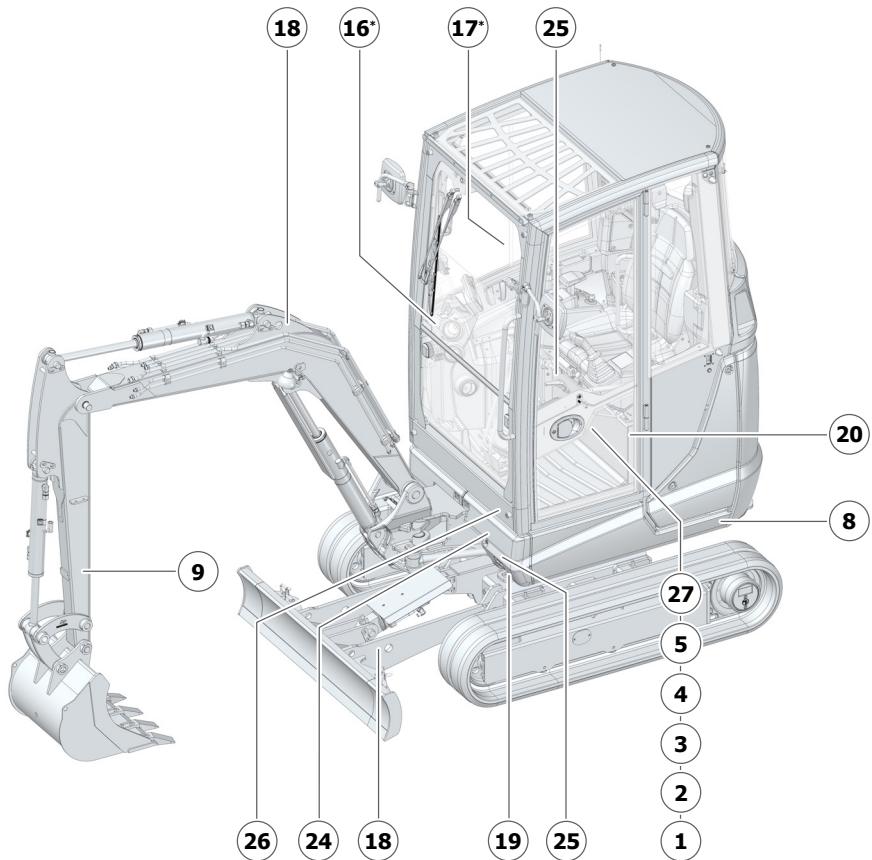


- Wash the labels with soap and water and dry them with a soft cloth.
- When washing the machine using water sprays, keep a distance of at least one metre from the surface to avoid damaging the labels.
- Replace any damaged or missing labels with original stickers obtained from your *Service Centre*.
- Should it be necessary to replace a component displaying stickers, make sure that the new component has the same labels.
- When replacing labels, make sure that the base is clean, dry and free from oil or grease. Press any air bubbles towards the outer edges.

Below is a series of images indicating the positioning of the safety signs and operation related labels.



SAFETY SIGNS AND OPERATION RELATED LABELS

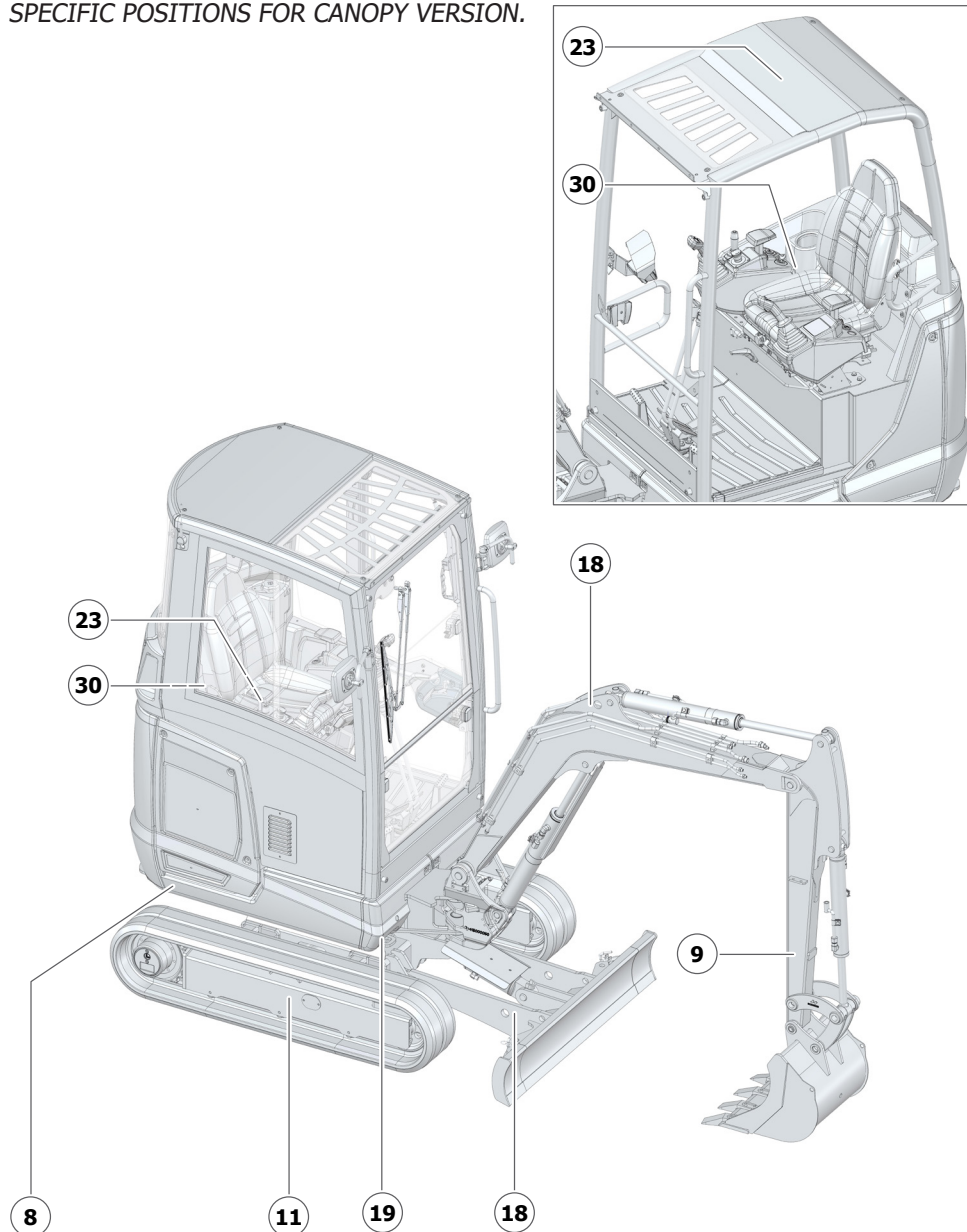


*\*SIGNS ONLY AVAILABLE FOR CAB VERSION.*



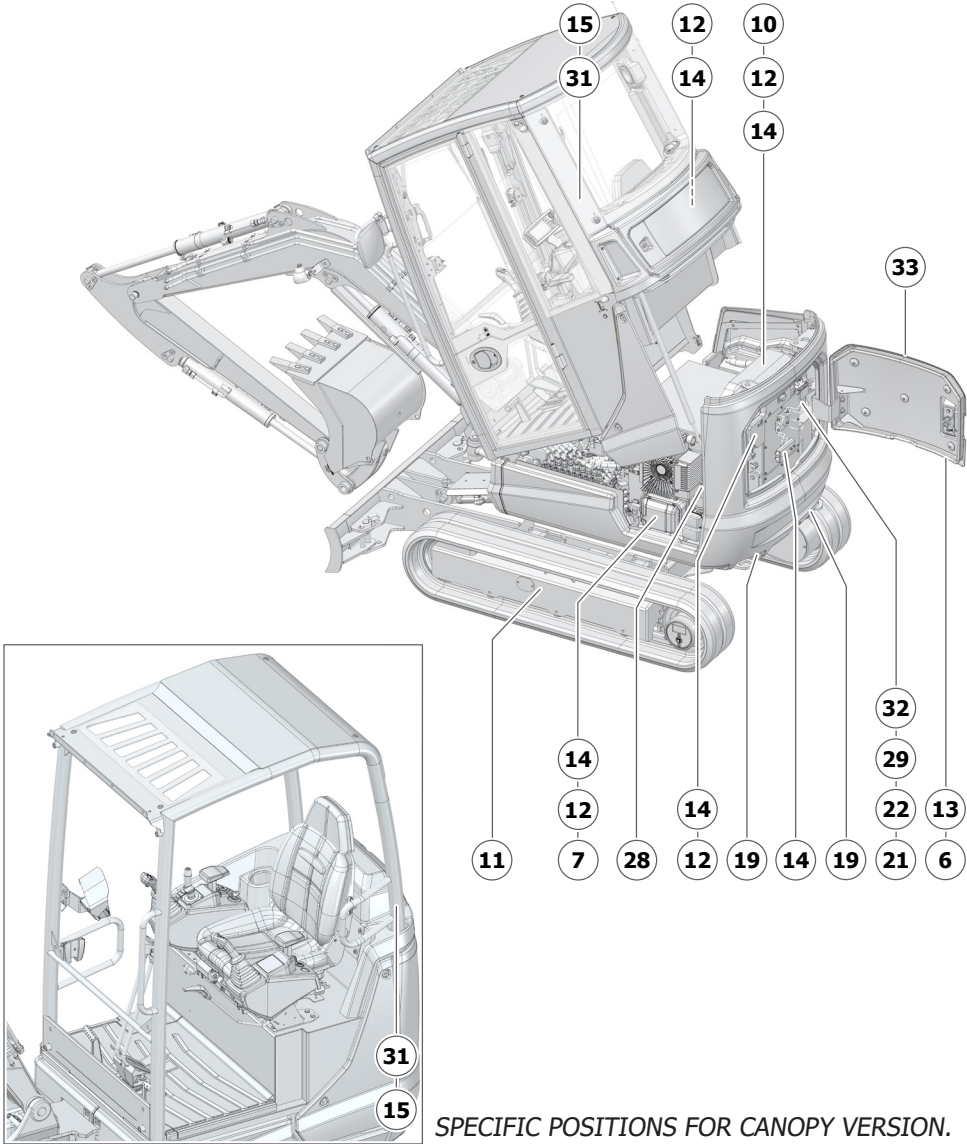
**SAFETY SIGNS AND OPERATION RELATED LABELS**

*SPECIFIC POSITIONS FOR CANOPY VERSION.*





SAFETY SIGNS AND OPERATION RELATED LABELS





**Safety Sign Key:****1 Risk of damage caused by wrong operations and maintenance**

Read and acquire the information contained in the use and maintenance manual before starting the machine to prevent all risk of injury.

**2 Risk of tip-over or roll-over**

Always fasten the seat belt when on-board the machine.

In the event of tip-over or roll-over, do not leave the driver's position but grip the seat tightly.

**3 Risk of fatal injury caused by contact or being too close to electric cables**

Keep the safety distances indicated by the power cables.

**4 Risk of damage caused by involuntary movement of the machine**

Prior to leaving the driver's seat:

- lower the machine boom;
- lock the controls using the controls cut-out lever;
- shut down the machine and remove the key.

**5 Risk of damage caused by the impact of the equipment against the cab**

Use caution when using the boom swing: read and understand the use and maintenance manual.

**6 Risk of damage caused by electricity**

The user is warned that the machine uses electricity that could cause harm to persons.

Take care NOT to enter into contact with the electricity.





**7 Risk of burns caused by hot surfaces**

Do not touch hot surfaces.

Wait for the machine to cool before carrying out any maintenance intervention.

**8 Risk of fatal injury caused by the slewing or by the reversed motion**

Stay at a safe distance from the machine to prevent all risk of injury.

**9 Risk of damage caused by the machine booms or by the equipment installed**

Stay at a safe distance from the boom and the equipment installed to prevent all risk of injury.

**10 Risk of damages/burns caused by the explosion of the battery or by the contact with the battery acid**

Never use open flames, do not generate sparks.

Wear personal protective equipment.

Follow the operating instructions.

**11 Risk of damages caused by the projection of objects while adjusting the track tension**

Read and understand the use and maintenance manual.

**12 Risk of damage caused by electricity**

Do not wash the electrical components with water jets to avoid the risk of electrical discharges.

Washing with water jets can only be carried out with hoods and covers closed. Keep a distance of at least one metre from the machine and direct the water spray towards the undercarriage.





**13 Risk of damage caused by electricity**

Do not extinguish fires with water to avoid electric shock hazard.  
Use only suitable ABC, CO<sub>2</sub> or class D fire extinguishers.

**14 Risk of damage caused by electricity**

Indicates areas where there may be electrical energy, which may cause injuries.

It is forbidden to remove the guards and/or perform maintenance operations where indicated.

**15 Crushing risk during maintenance**

Always engage the safety catch before starting any maintenance operations, with the canopy or cab in the raised position, in order to prevent all risk of crushing.

**16 Risk of damage caused by the fall of the openable windshield**

Always lock the windshield, both in open and closed position.

**17 Safety exit (cab version only)**

Indicates the emergency exit in case of machine tip-over, roll-over or other obstructions of the main exit (see "EMERGENCY EXIT" to page 2-35).





**Operational labels key:****18 Lifting point**

Indicates the points to be used to lift the machine.

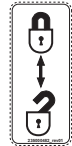
**19 Anchorage point**

Indicates the points to be used to anchor the machine during transport.

**20 Lock - Unlock**

The closed padlock indicates the locked position.

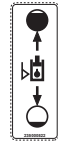
The open padlock indicates the unlocked position.

**21 Hydraulic oil tank cap**

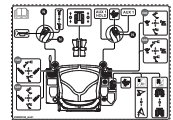
Indicates the position of the cap for topping-up the hydraulic oil.

**22 Hydraulic oil MIN-MAX level**

Indicates the position of the MIN-MAX level indicator of the hydraulic oil.

**23 Controls**

Indicates the position and functioning of the machine controls.

**24 AUX 1 system single/double-acting switch**

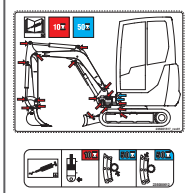
Indicates how to modify the functioning of the AUX 1 hydraulic plant.





## 25 Lubrication points

Indicates the points where lubrication must be performed.  
Indicates lubrication intervals.



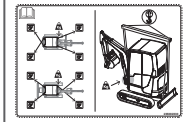
## 26 Sound emission

Indicates the value in decibels Lwa of the sound emitted by the machine (read the value on the label located on the machine or refer to section "3.17 - Sound emission" to page 3-21).



## 27 Lifting and anchorage for transport

Indicates where the lifting and anchorage points for transport can be found on the machine.



## 28 Fuse and relay box

Indicates the layout and relative functions of the fuses and relays.



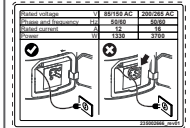
## 29 Machine charging operations

Indicates the technical data of the mains to which the on-board battery charger needs to be connected.

Indicates that the machine charging operations should be performed with the cable fully extended.

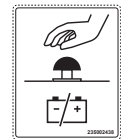
Indicates that the rear cover must be kept open while charging the machine.

For more details, see section "6.14.1 - On-board battery charger" to page 6-56.



## 30 Emergency stop button

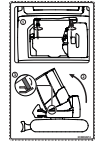
Indicates the position of the emergency stop button.





**31 Protective structure tip-over procedure**

Indicates the procedure to overturn the protective structure.

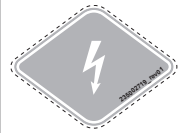
**32 Use only approved battery chargers**

It is forbidden to use external battery chargers other than those approved by the manufacturer.

For more details, see section "6.14.2 - Portable battery charger (optional)" to page 6-58.

**33 Electric vehicle**

This indicates that the machine is electrically powered.





## 2.4 - Machine driver

The driver must be a **skilled operator**. This term means a skilled and trained person, appointed to move and manoeuvre the machine.

The use of the machine by a **skilled operator** lies within the normal conditions of use.

From here on the skilled operator will be indicated as **operator**.

The employer must provide the training and education necessary, especially on the introduction of new work equipment (in Italy the obligation is indicated in Legislative Decree 626 art. 22 par. C).

**Machine functioning safety is entrusted directly to those operating daily on the same.**

**Operation and maintenance** of the machine must be **limited to** those persons who:

- are at least 18 years of age;
- are physically and mentally fit for work, are able to address the requirements associated with operation of the machine at its most intense use;
- have been trained to operate the machine and perform maintenance, are familiarised with the technical features, the overall dimensions, the performance and the relevant limitations;
- know the rules and regulations relating to workplace safety;
- prove their ability;
- are qualified, according to the standards in force, to drive the machine on public roads (only if used on public roads and only if the machine is authorised for road use).

These persons must be assigned to this task by the legal representative of the company that owns the machine.



**The operator** is also responsible for:

- stopping anyone approaching during use of the machine;
- preventing use of the machine by unauthorised and untrained staff;
- following on a daily basis the safety procedures learned during the training course;
- identifying and avoiding potential risks at the workplace;
- understanding and complying with the indications of the safety signs and operating labels;
- inspecting the machine and checking for correct operation before starting the work shift;
- communicating every problem related to operating detected before or during operation of the machine;
- avoiding careless or reckless actions that could endanger their own or others' safety;
- always using common sense and always giving priority to absolute safety.

For any further questions on the use of the machine call the *Service Centre* which will provide all the necessary information.



## DANGER

***The purchaser and the operator of this machine must carefully read the user manual the first time they use it.***

***If the machine is supplied with a user or hire contract, it is responsibility of the owner to ensure that the new user reads and accepts the user manual. In addition, ensure the new operator has performed an inspection around the machine and that they have become familiar with all safety signs and equipment in addition to trying out the correct use of all the commands.***

At the time of first sale, the seller informs the purchaser about safe use and operation of the machine. In the event the machine is to be used by someone other than the original purchaser, for example by an employee or it is to be rented, lent or sold to someone other than the purchaser, make sure the new operator reads and accepts the **User Manual** for the **excavator electric** supplied with the machine, before using it for the first time.



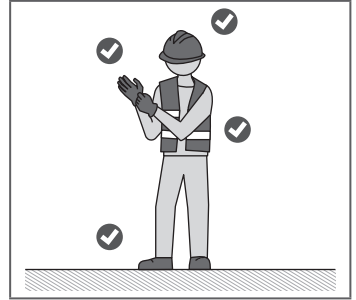
### 2.4.1 - Personal Protective Equipment (PPE)



## WARNING

***Operators must ALWAYS wear suitable clothing for construction work. Clothes must not be greasy or soaked with oil.***

***Long hair must be gathered, avoid wearing chains, clothes with dangling parts, ties, or any other object that could get caught in the moving parts of the machine.***



The PPE to be used during **use of the machine** is listed below:

- safety footwear;
- high visibility clothing.

The PPE to be used during **maintenance of the machine** or **assembly/disassembly of optional equipment** is listed below:

- a safety helmet;
- safety footwear;
- safety goggles;
- protective gloves;
- ear defenders;
- high visibility clothing.

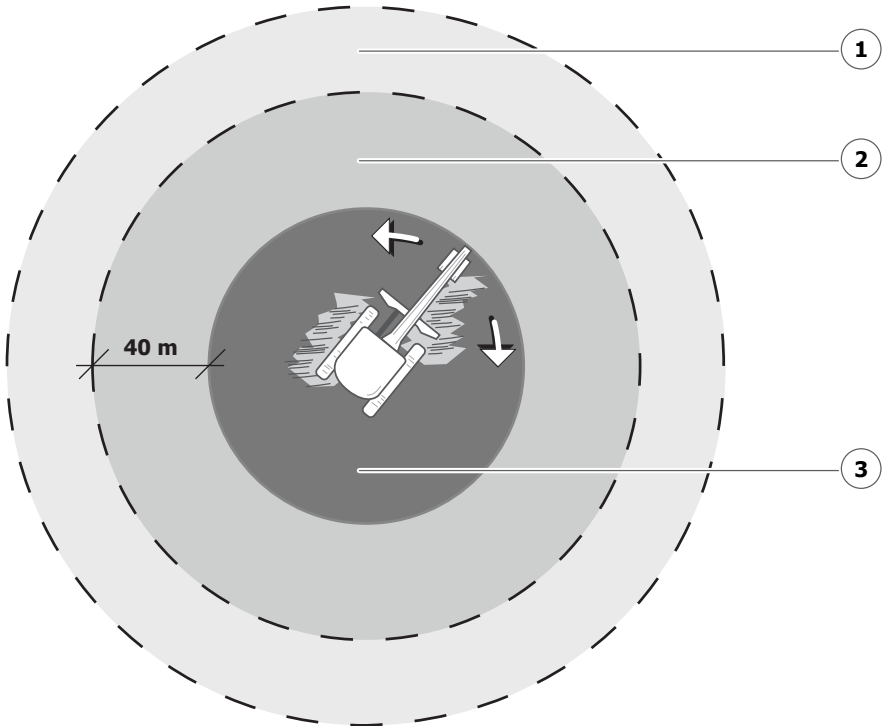


## 2.5 - Work Area - Hazard Zone - No Entry Zone



# DANGER

***Nobody must stand in the NO ENTRY ZONE and/or in the HAZARD ZONE.***



### Key:

- |          |               |
|----------|---------------|
| <b>1</b> | Work Area     |
| <b>2</b> | Hazard Zone   |
| <b>3</b> | No Entry Zone |



### 1 - WORK AREA

This is the area surrounding the hazard zone. The machine may enter this area; when this happens, the work area becomes a hazard zone.

Only authorised people, aware of the operating capacity of the machine, may stand in this area.

### 2 - HAZARD ZONE

This is the area near the machine where the operating equipment is never present but there is a constant hazard due to the projection of material, the oscillation of the load or the tip-over or roll-over of the machine.

Nobody must stand in this area.

### 3 - NO ENTRY ZONE

This is the area surrounding the machine. In this area you may be hit by the operating equipment, by the load falling from a height, or reached by the moving machine.

Nobody must stand in this area.

The Safety Manager at the work area must assess the hazards prior to commissioning the machine.

The work area must be appropriately indicated, even if working at a site that has already been delineated.

**Nobody must stand in the NO ENTRY ZONE and/or in the HAZARD ZONE.**

The driver of the machine may operate only when **NOBODY is in the NO ENTRY ZONE and in the HAZARD ZONE.**

Before starting work, the driver must warn any the people near the machine of the possible hazards and wait for them to move away. This usually occurs by using the horn or simply by telling them.

Stop the machine immediately if someone enters the **HAZARD ZONE**, warn them of the risk and make sure they move away before proceeding with the operations.

To avoid any bruises or accidental contact it is advisable, in the presence of scaffolding or unstable structures, to maintain a safe distance (at least 0.5 m) such that even during accidental manoeuvre, there is no danger of contact with these structures.



## 2.6 - List of Residual Risks

***Below is a description of the operations or situations that may expose people to danger or risks.***

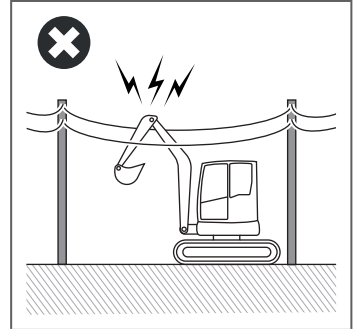


### **DANGER**

#### **RISK OF ELECTROCUTION CAUSED BY HIGH ELECTRIC VOLTAGE**

Pay attention to overhead power lines, contact or approach may expose the operator to electrical shocks.

Ensure that the boom, equipment, or protective structure is always at a suitable distance.



If the machine enters into contact with the electrical lines:

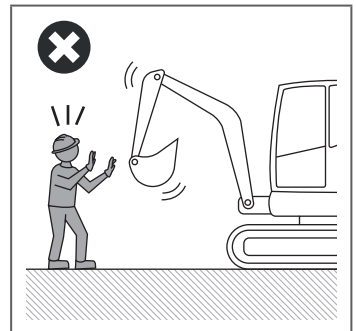
- DO NOT leave the driver's seat and DO NOT touch the metal parts;
- se possibile allontanare il veicolo dalla zona di pericolo;
- avoid other people approaching;
- ask other people to cut the power supply to the electrical supply lines.



### **DANGER**

#### **RISK OF INJURIES TO PERSONS NEAR THE MACHINE**

During the work phases do not allow unauthorised persons to approach the machine.





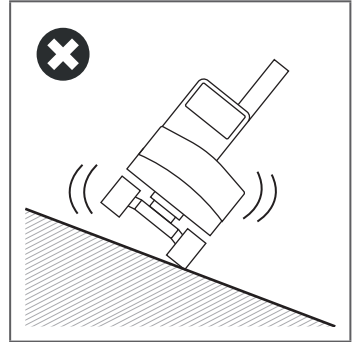


## DANGER

### RISK OF TIP-OVER OR ROLL-OVER

The machine centre of gravity changes depending on the size and position of the load, the slope of the ground and the movement of the machine.

Analyse and record the topography and geological characteristics of the place in order to take appropriate measures to prevent the tip-over or roll-over of the machine, against landslides or mudslides.



Level the ground in the machine's work area.

Careless use and driving that does not comply with this type of machine could cause the tip-over or roll-over of the machine.

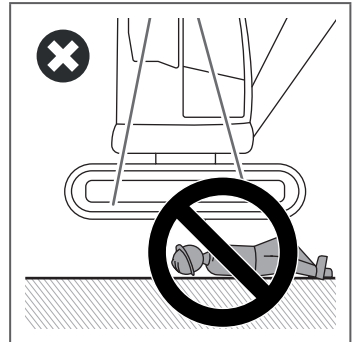
Never exceed the nominal lifting capacity of the machine.



## DANGER

### RISK OF FALLING OBJECTS/CRUSHING

When handling the machine pay particular attention to people, animals or objects around the work area.



#### **Do not stand under the lifted parts.**

- Nobody must stand under the boom or work equipment if raised.
- When the machine is lifted by means of the work equipment, under no circumstances stand under the raised parts.

Lowering the raised parts may cause serious accidents with possible injuries or even death.





## DANGER

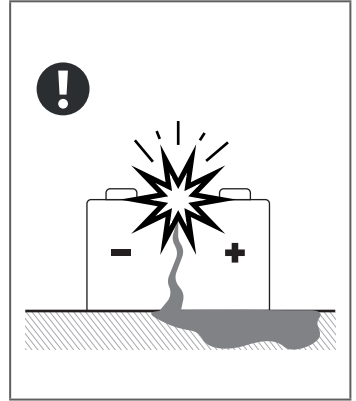
### RISK CAUSED BY LITHIUM BATTERY

The lithium-ion battery, if damaged or exposed to high temperatures, could ignite and produce harmful chemical substances.

Never create sparks or flames, or smoke near the battery.

A damaged lithium battery can ignite and/or explode, this type of fire has a very high energy and is more difficult to extinguish than that of a conventional battery, immediately contact specialised personnel, communicating the type of chemical substance. Do not attempt to extinguish the fire yourself.

Avoid inhalation or contact with chemicals and smoke from the battery by moving away, they are extremely toxic and can cause serious injury or death.



## DANGER

### RISK OF INJURY TO TRANSPORTED PERSONS

The machine cannot be used for the transport of persons; only the operator must drive it himself.

Do not allow anyone else to get in the driver's seat, to climb on the tracks or on the work equipment.







## DANGER

### RISK OF CRUSHING

During a possible tip-over or roll-over of the machine, the operator could be thrown off the seat and then get crushed by the machine.

Choose a comfortable driving position. Adjust the position of the seat and the control levers. Adjust the tension of the belt so that it can hold the operator leaving the abdomen completely free. Do not start working before having followed these safety conditions.



## DANGER

### RISK OF FALLING

Be sure to check the steps and handrails. If damage or other faults are found, carry out the necessary repairs.

If there are any slippery substances on steps or handles, such as mud, oil or lubricant, remove them completely.



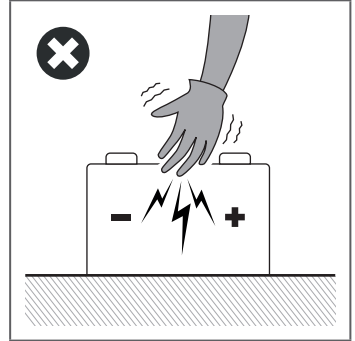




## DANGER

### RISK OF ELECTRIC SHOCK

Any work on the electrical system or on the battery must be carried out by a skilled, authorised person.

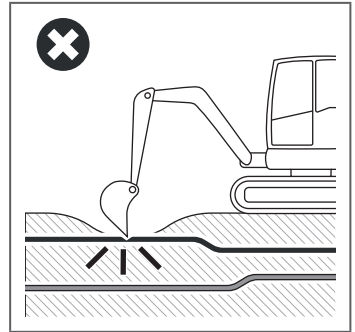


## DANGER

### RISK OF DAMAGE DURING EXCAVATION

Before starting work in a new area, check for the presence of any electrical power lines, pipelines and telephone lines.

All these elements are a hazard source for the operator and damage to them a safety risk and a potential economic cost.



Before starting the excavation, contact the site manager of the work area or the authorities to locate all utilities present in the subsoil.

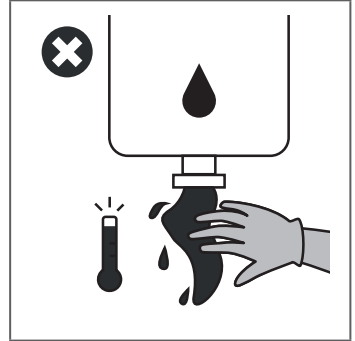




## DANGER

### RISK OF BURNS

Do not carry out maintenance work on the hydraulic system immediately after stopping the machine, the oil is very hot. The hot oil could cause serious injuries; have it cool before intervening.



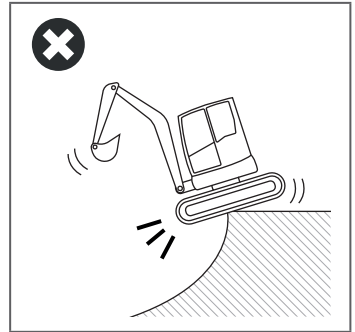
## DANGER

### RISKY WORKING CONDITIONS

Find out about any dangers that may be present in the work area.

Proceed with care when working along basins, embankments and slopes; keep away from the edges.

Be careful when working under protrusions that the top part of the machine might hit.



Pay attention to falling rocks and to landslides.

Be careful during filling operations. Do not get too close to the edge because the weight of your equipment may cause subsidence in the soil and the machine may overturn or tilt.





## DANGER

### RISK OF HIGH PRESSURE JETS

The hydraulic system is under pressure when the machine is running and could maintain the pressure even after it is off.

In the event of a fault or maintenance intervention, the operator may be exposed to high-pressure fluid jets.

Fluid escaping under high pressure could enter the skin or eyes and cause serious injury or death.



Pressurised fluid leaks may be invisible. **DO NOT** use hands to check for leaks. Use a piece of cardboard or paper to this purpose.

If oil leaks are found, stop the machine immediately and make the necessary repairs.

Wear appropriate personal protective equipment, as indicated in the specific section, during maintenance work.

**DO NOT** attempt to repair or tighten hydraulic lines or fittings when the machine's hydraulic system is under pressure.

In the event of a hydraulic component failure, place the machine on firm level ground, lower the equipment and dozer blade to the ground, stop the machine and release any residual pressure as described in section "6.28 - Discharge residual pressure in the hydraulic system" to page 6-90.

Should anyone suffer injury due to contact or to the penetration of hydraulic oil or grease into the skin, seek a doctor immediately. Failure to summon a doctor could lead to the emergence of other serious injuries.

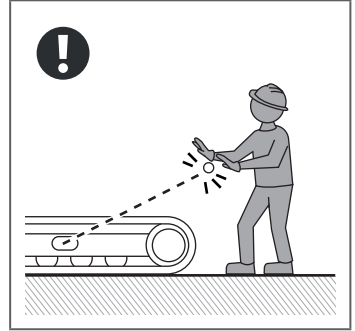




## DANGER

### RISK OF OBJECTS/LIQUIDS PROJECTION

Use caution when greasing the belt tensioner; parts of the belt tensioner or jets of high-pressure grease could be projected toward the operator, risking serious injuries or death.



The cylinder that adjusts the track tension is filled with grease; therefore the grease itself may be under high pressure. Under this circumstance, if the plug is loosened carelessly, both the plug and the lubricant may get pushed out causing a dangerous situation.

For operations on the track tensioner, refer to the dedicated section.



## NOTICE

### RISK OF ENVIRONMENTAL POLLUTION

The improper disposal of waste fluids may cause serious damage to the environment. Before disposing of waste fluids, contact the competent local bodies for information regarding the correct procedures.

Use suitable containers. Never use empty containers to store food.



**NEVER** pour waste fluids on the ground, into drain lines, into courses or water basins. **Always observe the environmental protection regulations** in force when discharging the following substances:

- oils or lubricant grease;
- filters;
- battery;
- cooling liquids;
- containers or absorbent materials impregnated with these substances.



## 2.7 - Safety procedures



# WARNING

### UNAUTHORISED MODIFICATIONS

No modification can be made to the machine without the permission of the manufacturer. Consult the *Service Centre* before making any modifications. The *MANUFACTURER* denies all liability for any injuries or damage caused by unauthorised modifications.



# WARNING

### SEAT BELT

Adjust the seat and always fasten the seat belt before starting the machine. Carefully follow the indications given in the dedicated sections: "6.3 - *Driver's seat*" to page 6-4, and "6.5 - *Seat belt*" to page 6-7.



# WARNING

### CHECK FOR ADEQUATE VISIBILITY BEFORE STARTING TO OPERATE

**Make sure there is proper visibility for work purposes.**

DO NOT operate in conditions of poor visibility (e.g. fog, strong storms, etc...).

Clean the windows (if present), rear-view mirrors (if present) and lights, in order to guarantee good visibility. Make sure the rear-view mirrors are intact and correctly positioned so as to ensure the complete visibility around the machine.

If the cab windows (if present) are cracked or broken, do not start work without repairing them.





## **WARNING**

### **CHECKING THE SAFETY DEVICES**

Check all safety devices and guards to ensure their proper installation, operation and the presence of any damage. If faults are found, carry out the necessary repairs. Misuse of safety devices could cause serious accidents with a potential risk of injury or death. Make sure to correctly use the safety devices.



## **WARNING**

### **EXAMINATIONS PRIOR TO THE START UP**

Before commissioning, carry out all verifications envisaged. If failures are found, repair the machine immediately. Using the machine when faulty could cause accidents.



## **WARNING**

### **CHECK THE SURROUNDING AREA BEFORE COMMISSIONING**

Prior to using the machine carry out a visual inspection of the surrounding area to make sure the safety conditions are met.



## **WARNING**

### **ALERTS PRIOR TO THE START UP**

Before starting the machine, use the horn to signal.





## WARNING

### SAFETY ASPECTS DURING OPERATION

Before starting to travel, use the horn to signal.



## WARNING

### GETTING ON AND OFF THE MACHINE

Get on and off the machine only near the dedicated handles or steps (if present) and tracks.

Before getting on the machine, clean the steps (if present), the part of the track that will be stepped on and the handles if stained with oil, grease or mud, check their condition; have them repaired if necessary.

Both for the upward movement and downward movement, always keep, if possible, **three contact points** (gripping or supporting), **two hands and one foot or two feet and one hand**, to be sure not to lose your balance and fall.

Always face the machine when climbing on or off.

Get on and off the machine slowly and carefully, DO NOT carry tools or other items, always keep your hands free and able to grip the handles.

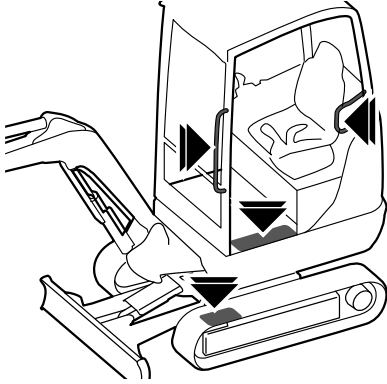
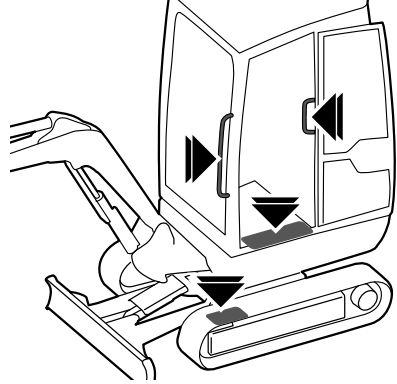
Do not jump on or off the machine.

Do not try to climb on or off the machine when it is moving.

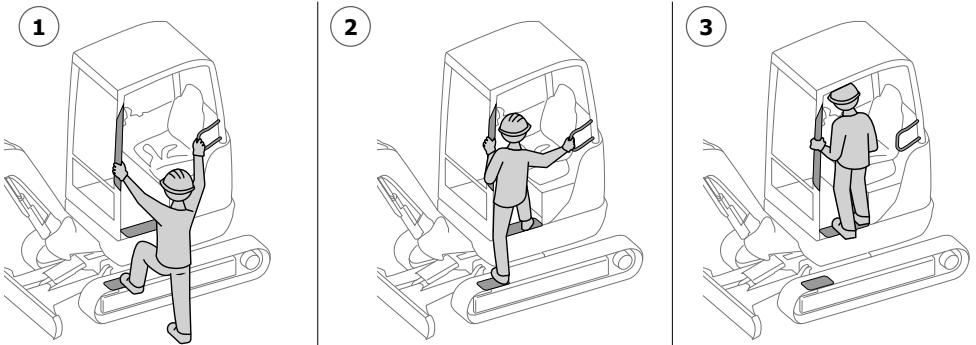
Do not get on or off the machine by grasping the control levers or the controls cut-out lever.

In the cab version machine, lock the door in the open position before getting in or out of the machine.



**Machine hooking points:****CANOPY VERSION****CAB VERSION**

**Get on** facing the machine as shown in the figure (from **1** to **3**).



Before getting off the machine, **ALWAYS** perform the following operations:

- align the turning frame to the undercarriage so that the dozer blade stays near the boom;
- lower the dozer blade and the equipment to the ground;
- stop the engine and remove the ignition key;
- lift the controls cut-out lever and unbuckle the seat belt.

**Get off** looking at the machine as shown in the figure observing the described procedure in reverse order.





## WARNING

### RISK DUE TO MOVING PARTS

**DO NOT** place the limbs or other parts of the body close to the moving or rotating parts of the machine during operation. Failure to comply with this warning may lead to serious injury or death due to crushing or amputation.

**STOP** the engine and wait for all moving parts to come to a standstill before carrying out maintenance work.



## WARNING

### MACHINE INSPECTIONS AND MAINTENANCE

**Stop the machine before starting inspection and maintenance work on the machine.**

It is extremely risky to carry out checks or maintenance operations with the machine in operation. Make sure that you have already stopped the machine. Only start work after the temperature of each device in the machine has lowered.



## WARNING

### PREPARATION AND PREVENTION

Know the location and function of all machine controls. Before starting the machine, make sure that no one is in the work area.

Holes, obstacles, rubble and other hazards associated with work areas could cause bodily harm or death. Always inspect the work area, taking care to identify the hazards before operating the machine.

Avoid hazards when driving the machine around the work site. Get informed on the movement of persons and vehicles around the site. Comply with all signals and signs.

**DO NOT** use the machine unless:

- all equipment is present and in good condition;
- all covers and guards are in place;
- all safety signs and labels are applied and readable.

Repair or replace any missing and/or damaged parts.





# WARNING

## RISK OF TIP-OVER OR ROLL-OVER

***Performing movements of slewing or travel with the boom extended is hazardous and may cause the machine to tip over or roll over. When moving, keep the boom as close to the machine as possible and maintain a maximum distance of 30 cm between the lower part of the equipment and the ground.***

The stability of the machine decreases when it is used on uneven ground or on slopes. When travelling, plan the direction in which the machine is to move. Avoid making any jerky turns, starts, or stops. Travel with extreme caution and at the slowest possible speed.

**DO NOT** exceed the nominal load capacity of the machine, as the non-observance of the suggested values may cause instability and dangerous operating conditions for the machine and for the operator.

**The guard structure makes the driver's seat the only safe place to be in the event of the machine tipping over or rolling over.**

### **During tip-over or roll-over:**

- KEEP THE SEAT BELT FASTENED.
- DO NOT LEAVE THE DRIVER'S SEAT.
- STAY SEATED AND HOLD THE SEAT FIRMLY WITH YOUR HANDS BETWEEN YOUR LEGS.
- LEAN AWAY FROM THE POINT OF IMPACT.

### **Once the tip-over or roll-over has finished:**

- make sure the machine is stable and there cannot be further tilting;
- unbuckle the seat belt;
- quickly leave the driver's seat by leaving from the machine side facing upwards.

Do not attempt to leave the machine by sliding beneath the structure.

**In case the main door is blocked, use the emergency exit.**





## WARNING

### EMERGENCY EXIT

After an emergency situation during which it is not possible to use the main access route to abandon the machine, the emergency exit must be used. This is at the front of the driver's seat.

If the emergency exit is blocked too, identify a possible exit on the right side of the cab or at the back.

**If the machine is equipped with a closed cab**, the emergency exit is the front windshield and is indicated by means of the label in the figure.

To exit, open the windshield.



If the front windshield mechanism is blocked, use the special hammer to break the glass and exit.

If the emergency exit is blocked, identify a possible exit through the right-hand side or rear windows. Once identified, break the glass with the dedicated hammer.

**If the FRONT-GUARD front protective grid is installed on the machine**, the emergency exit is to be identified as the right-hand side or rear window. To exit, break the glass (if present) using the special hammer.



## WARNING

### MACHINE STABILITY

When the turning frame and the boom assembly form a 90° angle with the undercarriage, the stability of the machine is at its minimum; in this position, pay more attention to the risk of tipping over or rolling over.

To provide maximum machine stability while working:

- where possible, position the machine so that the tracks are parallel with the turning frame and first boom assembly;
- keep the dozer blade lowered and in contact with the ground;
- avoid lifting the tracks off the ground using the dozer blade.





## WARNING

### INCREASING STABILITY USING THE DOZER BLADE

***If the dozer blade is used improperly, the hydraulic hoses can get damaged and cause a sudden loss of stability of the machine with the consequent damage to the operator and/or to the machine.***

The cylinder of the dozer blade can be provided with a lock valve (optional); if so, the blade can be used to increase the stability of the machine.

**ALWAYS** lower the dozer blade before starting work; the safety of the operator, maximum nominal loads and the stability of the machine are increased thanks to the lowering of the dozer blade in any working condition.



## WARNING

### TRAVELLING AND WORKING ON SLOPES

***When the machine is used in conditions other than those indicated in the manual (for instance, on a surface which is not compact, but rough or slippery, or on a slope, etc.), the operator must take into account the new conditions that reduce the machine's stability and capacity. The operator must therefore work at lower speeds and with lighter loads so as to ensure the stability of the machine.***

All indications supplied in the manual refer to the use of the machine on a flat and stable surface.

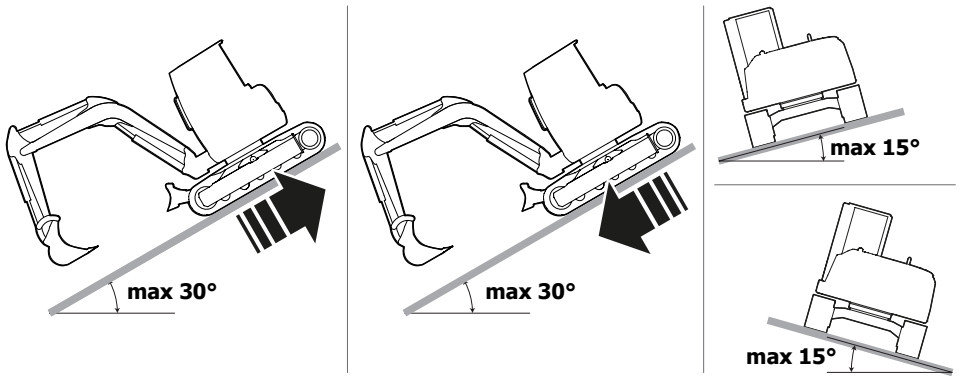
Travelling or working on a slope is riskier than travelling or working on flat ground.

If it is not possible to avoid slopes, take the following precautions.

Ascend or descend slopes slowly and cautiously. Unexpected obstacles or changes in slope can cause loss of machine control that may result in tip-over or roll-over.



## Maximum slopes permitted for travel

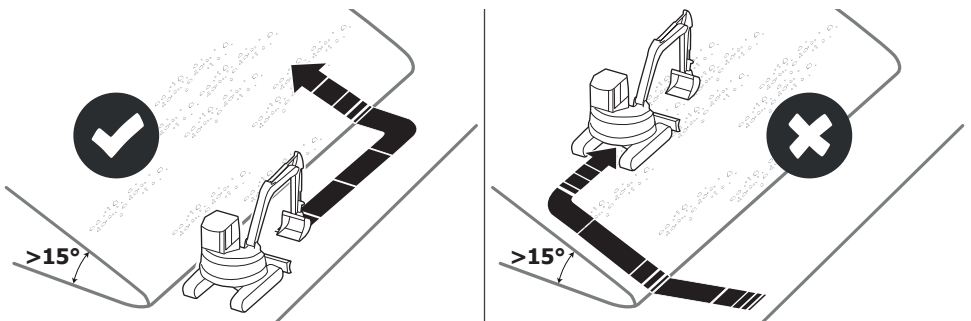


**When travelling on a slope with an angle lower than 15°,** always reduce the machine speed and maintain a slow, steady motion. Apply braking by smoothly returning both travel control levers to the NEUTRAL position (N).

**If travel on a slope with an angle greater than 15° is required,** take the following additional precautions:

- descend or ascend only and NEVER drive the machine across steep slopes;
- the boom assembly must be facing the direction of travel;
- position the dozer blade in front of the operator, under the boom assembly;
- to climb up and go down, proceed with forward travel;
- position the lower part of the equipment about 30 cm off the ground.

**Changing direction on slopes is allowed only if the slope is less than 15°.**







## **WARNING**

### **USE ON DECKS OR RAISED FLOORS**

Check always the space within which the machine is operated and all limitations regarding size and scope of the working area. When working on a deck or a raised floor, always check their bearing capacity. Pay particular attention to the overall rotation of the machine.



## **WARNING**

### **LIFTING OF THE MACHINE**

Follow all the instructions given in section "4.4 - *Lifting of the machine*" to page 4-8.



## **WARNING**

### **RISKS WHILE TRANSPORTING PASSENGERS**

DO NOT allow anyone to ride on the machine with the operator.

DO NOT use the machine as a lift or working platform for people.

DO NOT allow anyone to climb onto the operating equipment.

There is the risk of falling and of being seriously injured.



## **WARNING**

### **DISTANCES**

Always check overhead and side clearances carefully before driving around or under any fixed structures, such as buildings, bridges, towers, etc.





## WARNING

### RISKS RELATED TO THE SUBSOIL

Get informed on the location of all underground dangers before operating the machine in a new work area. Contact with electrical cables, telephone lines, gas or water pipes, sewers, or other underground utilities could lead to injury or death. Before starting work, contact your local telephone service supplier and request them to locate and mark these utilities.



## DANGER

### RISK OF ELECTROCUTION CAUSED BY HIGH ELECTRIC VOLTAGE

***When operating near any overhead power lines, either barricade them off or apply insulating guards around them. It is also very risky to operate near high voltage lines: the lines can be dangerous even when the machine is NOT in direct contact with the line.***

***In case of operations at a distance lower than those indicated, contact the company that owns the electrical line to disable the voltage in the work area line section.***

NEVER operate this machine in an area where there are overhead or underground power lines, cables, or other power sources, without first requesting that the appropriate power or utility companies isolate the lines or taking other adequate precautions.

Maintain a safe distance from the power lines according to the indications below:

| CABLES VOLTAGE      | MINIMUM PERMITTED DISTANCE  |
|---------------------|---|
| from 0 to 50 kV     | 3.0 m   |
| from 50 to 200 kV   | 4.6 m   |
| from 200 to 350 kV  | 6.1 m   |
| from 350 to 500 kV  | 7.6 m   |
| from 500 to 750 kV  | 10.7 m  |
| from 750 to 1000 kV | 13.7 m  |
| more than 1000 kV   | Ask the company in charge of the electrical power line for information regarding the minimum distance to be kept from the cables. |





## WARNING

### **OBSTRUCTED VISIBILITY**

Dust, smoke, fog, etc. can decrease vision and cause an accident.

Always stop or slow the machine down until the obstruction clears and the work area is once again clearly visible.



## WARNING

### **MOVING ON A FROZEN OR SNOW-COVERED SURFACE**

If work must be performed on surfaces coated with ice or frozen snow, reduce the speed and avoid making any jerky movements. Sideways slipping could easily occur while the machine functions become more sensitive.

When a large amount of snow has fallen, the road edges and any equipment provided are difficult to see. Exercise extreme caution in such situations.

Frozen ground will often get softer as the temperature rises. Exercise extreme caution in such situations.



## WARNING

### **WORKING NEAR WATER COURSES**

Near water courses, lakes or seas, pay attention to the work operations. Risk of electric shock.

Do not submerge the machine in water.

Submerging the machine in water may cause electric shock and serious damage to the machine and to the operator.





## WARNING

### WORK SITE CONDITIONS

Prior to start working, assess and record thoroughly the topography and geological characteristics of the place in order to take appropriate measures to prevent the tip-over or roll-over of the machine, against landslides or mudslides.

Other conditions may also generate effects at the workplace. People can enter the area, equipment and materials can be moved or added. Always be aware of the existing conditions on the work site and always look in the intended direction before starting any movement.

Do not start working if the necessary safety conditions are not met.



## WARNING

### VENTILATION

Good ventilation of the work area is very important for the operation of the machine. DO NOT operate the machine in an area containing flammable dust or fumes. Provide good ventilation and wait until the hazard has been eliminated.



## NOTICE

### ABNORMAL NOISE PRODUCED BY THE MACHINE

While working, pay attention to any abnormal noises from hydraulic devices, transmission components, work equipment, etc.

Find below a list of possible abnormal noises.

- Do you hear a squeak caused by poor lubricating oil quantity?
- Do you hear friction noise?
- Do you hear an abnormal vibration or tinkling?
- Do you hear an uneven sound?
- Do you hear a strange noise coming from the hydraulic devices?
- Do you hear beats at determined intervals?
- Do you hear rumbling?

If any of these noises are detected, stop the machine immediately and carry out a check.





## WARNING

### KEEP THE AREA AROUND THE OPERATOR SEAT CLEAN

Always keep the operator's seat and its accesses clean.

Do not climb with dirty, muddy or greasy shoes.

Do not place any object at the bottom of the operator seat or around pedals, and do not hang anything on the control levers.

These control levers may be engaged accidentally, causing the machine to move or the work equipment to be activated, which may result in dangerous situations.

Stow away any items not required for the current operations in their proper places.



## NOTICE

*The electrical components have extremely limited resistance to water. The infiltration of water into the various sensors, connectors or electrical system components may result in malfunctions. Do not clean using steam and water.*

---



## WARNING

### PRECAUTIONS DURING MAINTENANCE

Before starting maintenance, always deactivate the machine as indicated in section "8.1.1 - Placement out of service for maintenance" to page 8-5.

Use the correct tools, make sure that spanners and tools are in the correct position. Treat machined and polished surfaces with care.

Never re-use broken, damaged or badly worn parts.

Tighten all bolts, unions and accessories to the torques specified in the specific sections.

Replace all protections and guards, lock all hoods and covers with a key (if present).





## WARNING

### REPAIRS REQUIRING WELDING

All welding operations on the machine are **prohibited**.

If welding repair is required, contact the *Service Centre*.



## DANGER

### PREVENTION OF FIRES INVOLVING OILS

Oil is easily flammable if it comes into contact with a flame or spark, utmost care must be taken when working with this fluid.

Follow the precautions listed below:

- keep open flames away;
- stop the machine and do not smoke;
- operate within a well-defined area and do not allow unauthorised persons to approach;
- carefully tighten any caps removed during operations;
- wipe off and dry any spilled oil;
- do not heat the hydraulic devices;
- store the oil in suitable containers and warehouse it in a safe place where access is only permitted to persons authorised to handle it.



## WARNING

### DECOMMISSIONING

**Park the machine on a flat surface.**

Before leaving the machine, lower the equipment and the dozer blade to the ground.

Stop the machine, remove the key and close all doors and covers.





## WARNING

### RESIDUAL PRESSURE IN THE HYDRAULIC SYSTEM

Before carrying out any maintenance work on the hydraulic system, the residual pressure must be released, see section "6.28 - Discharge residual pressure in the hydraulic system" to page 6-90.

Please contact the *Service Centre* for more details.



## WARNING

### PRECAUTIONS TO BE TAKEN WHILE OPERATING

***Never carry out excavations on overhang areas, the edges might collapse or the soil could slide, causing serious injury or fatal accidents.***

***Do not place the equipment above people or above the cab.***

***Falling of the loads from the bucket or impacts against the bucket can cause serious injury or damage to the machine.***



## 2.8 - Safety devices

### 2.8.1 - Operator protective structure



## WARNING

***It is prohibited to remove or change the protective structure.***

***It is prohibited to operate the machine with no protective structure in place.***

The **protective structure (1)** protects the operator from being crushed in the event that the machine tips over or rolls over.

The machine is always supplied with a protective structure to safeguard the operator. It can be **closed** (cab) or **open** (canopy).

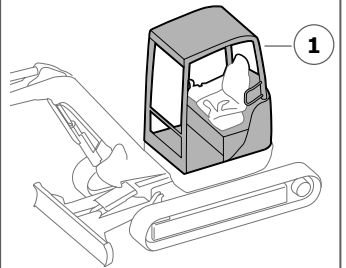
The protective structure has been tested and has passed the tests according to the following standards:

- ROPS ISO 12117-2  
(Roll Over Protective Structure)
- TOPS EN 13531  
(Tip Over Protective Structure)
- FOPS ISO 10262 Level I  
(Falling Object Protective Structure)

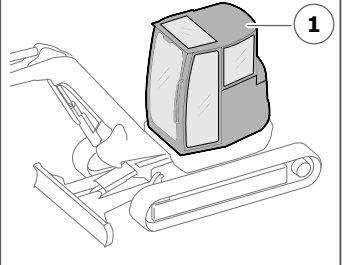
Check that the protective structure is in good condition:

- it must not be damaged;
- it must not have any rusted parts;
- the fastening screws must be correctly tightened.

**CANOPY**



**CAB**



In case of running into one of the indicated problems, contact the *Service Centre* to have checks carried out and to restore the structure.

**DO NOT** change, repair, carry out welding or drilling on the operator protective structure. The protection will be compromised by this, creating a hazard that could cause death or serious injury to persons.

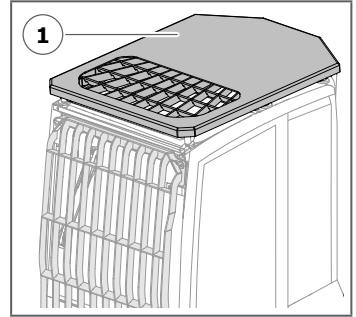
The protective structure, the operator seat and the seat belt must be carefully checked after any accidents. Contact the *Service Centre* to replace any parts that show signs of damage.



### 2.8.1.1 - TOP-GUARD Level II protective grid (optional)

The TOP-GUARD level II (1) protective grid is a metal grid that is installed in the upper part of the protection structure which prevents falling objects from reaching the operator.

The use of this protection is mandatory when working under conditions where there is the risk of heavy objects falling from above, for example: large rocks, large pieces of debris.



The use of this protection is mandatory when working in certain types of environments, for example: tunnels, slopes with falling objects.

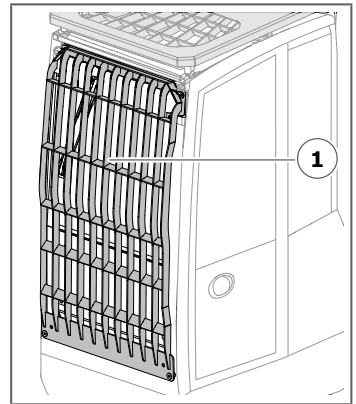
It is the operator's duty to assess these risks and so his responsibility to fit the protection.

### 2.8.1.2 - Protection grid FRONT-GUARD Level II (option)

The FRONT-GUARD Level II (1) protective grid is a metal grid that is installed at the front of the protection structure which prevents objects from the front of the machine from reaching the operator.

The use of this protection is mandatory when working in environments where there is the risk that large objects may hit the front of the machine, for example: large rocks, large pieces of debris.

The use of this protection is mandatory when working with certain types of equipment, for example: trunk grapple, selection grapple.



For instructions on the installation of this equipment refer to chapter "7 - Recommended optional equipment" to page 7-1.

It is the responsibility of the equipment installer to ensure that this protection is present on the machine.



### 2.8.2 - Seat belt

The seat belt is essential because it retains the operator anchored to the seat in case of tip-over or roll-over. The condition, cleanliness and mechanical mountings of the seat belt must be checked regularly.

**Operations to be carried out before starting equipment:** before starting the machine, the operator has to fasten the seat belt, after having checked it is in perfect order.

**Operations to be carried out before leaving the machine:** the operator can remove the seat belt only when the machine has come to a stop



## WARNING

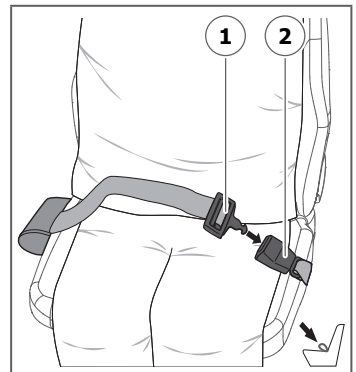
***Serious injury or death may result from any failure to use the seat belt fitted to this machine. The seat belt is an essential component that complements the operator's protective structure and is provided to protect the operator in the event of the machine tipping over or rolling over. The seat belt MUST be used whenever the machine is being operated.***

***Inspect the seat belt on each occasion prior to use, in order to identify any cuts or worn webbing, or any defect in the latch assembly. If any wear or damage is noted, DO NOT operate the machine until the seat belt has been replaced.***

Before starting the machine, first adjust the seat as required for optimum reach and comfort. Then adjust the seat belt as follows.

**Locking** the seat belt:

- take the end of the seat belt (**1** - from the side of the seat) and pull it across to the other side;
- while holding your back upright on the seat, pull the belt buckle over your body at the level of your pelvis;
- check that the belt is not twisted and that it does not rest on sharp pieces of clothing;
- insert the end of the belt (**1**) into the latch (**2**);
- check that it has been inserted correctly by pulling the latch plate (**1**).





**Releasing** the seat belt:

- press the red button (2) on the buckle;
- remove the latch plate from the buckle (1), and slowly accompany it on the winder to free yourself, then get off the machine.



## WARNING

***Following an accident, the seat belt must be replaced, the operator seat and the seat fixings must be checked by specialised technicians.***

### 2.8.3 - Controls cut-out lever

The control cut-out lever (safety lever) is located on the left joystick holder assembly.

Pulling the lever (1) upwards raises the whole assembly; in position (2) all controls are disabled.

When the lever (1) is pushed down again, the joystick unit returns to operating mode and the control circuit is restored.

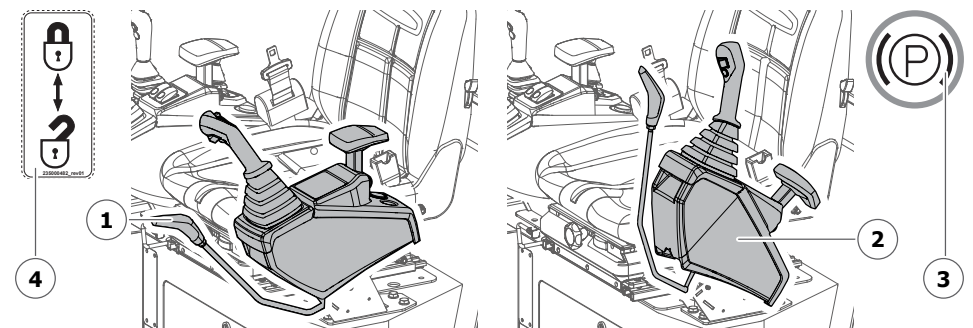


## WARNING

***This operation must be performed every time one leaves the driver's seat, so as to prevent the accidental activation of the controls while getting on/off the machine.***

Once the control console has been raised, the "control locked" warning light on the control panel turns on (3).

In order to work, the machine must have the lever (1) lowered; the label (4) applied to the side of the joystick holder shows how the lever works.





### 2.8.4 - Emergency stop button

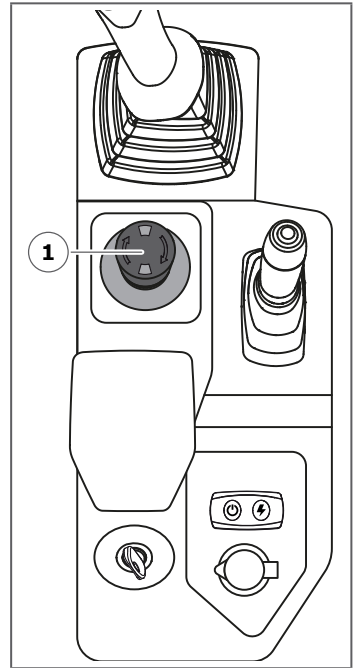
The emergency stop button (1) is positioned on the right console, is red on a yellow background and is shaped like a mushroom, hence why it is called the **emergency mushroom**.

This button stops the machine and therefore all movements and functions are interrupted.

It can be used in situations of risk, for example when control of the machine is lost or before maintenance is performed on the machine.

The button features two openings on the top that show a different colour according to the activation status:

- **GREEN:** button deactivated, machine operational;
- **RED:** button activated, machine locked;



#### To activate the emergency button:

- press the button until you feel it latch.

#### To restore the machine operating conditions, it is necessary to:

- deactivate the ignition key;
- deactivate the emergency button, turning it clockwise;
- start the machine.



### 2.8.5 - Location of fire extinguisher

Local rules or regulations may require a **fire extinguisher to be fitted** to the machine at the operator station.

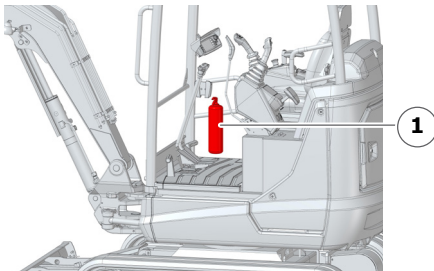


## CAUTION

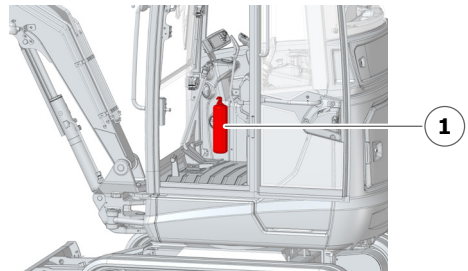
***The machine is supplied without a fire extinguisher. Installation must be carried out in compliance with the current standards in force and is the responsibility of the owner of the machine.***

The space for the installation of the fire extinguisher is located behind the operator seat on the left (1).

**CANOPY VERSION**



**CAB VERSION**



The installed extinguisher must include the following specifications:

- it must be firmly anchored to prevent it from falling or moving during operation and injuring the operator;
- it must be positioned so as not to restrict the minimum space requirements available to the operator;
- during installation of the extinguisher **AVOID WELDING** the protective structure of the machine;
- it must be of a type approved by the current standards in the country where the machine is used;
- it must be suitable for extinguishing fires caused by electrical short circuits, fuel, oils, or plastic materials;
- it must be inspected regularly to ensure that it always operates as required by the current standards in the country where the machine is used.



### 3 - TECHNICAL DATA

#### 3.1 - General data

| MODEL  |                    | CX25EV   |
|--|--------------------|--|
| Operating weight ISO 6016 with <b>canopy</b><br>(with bucket and operator) | kg                 | 2340   |
| Operating weight ISO 6016 with <b>cab</b><br>(with bucket and operator)    | kg                 | 2470   |
| Specific ground pressure   | kg/cm <sup>2</sup> | 0.37   |
| Travel speed<br>1 <sup>st</sup> - km/h<br>2 <sup>nd</sup> - km/h           |                    | from 0 to 2.3<br>from 0 to 4.0<br>(AUTO TWO SPEED) |
| Slewing rotation speed   | rpm                | 10.0   |

The weights considered for the calculation of the operating weight are:

- bucket 55 kg;
- operator 75 kg.

***If the installed equipment differs from that indicated, the weight of the machine may vary.***

The operating weight indicated is referred to the machine with a standard configuration; always take into account the weight of the various accessories installed (e.g. long boom, etc.).



### 3.2 - Engine

| MODEL                   |     | CX25EV                              |
|-------------------------|-----|-------------------------------------|
| Type                    |     | Internal permanent magnets (IPM)    |
| Brand                   |     | BENEVELLI                           |
| Model                   |     | SMAC 200-157                        |
| Nominal power (S2-30')  | kW  | 25.0                                |
| Nominal torque (S2-30') | Nm  | 86.0                                |
| Max. rotation speed     | rpm | 2,400 ECO<br>2,600 STD<br>2,800 PWR |
| Cooling                 |     | Air                                 |

### 3.3 - Power supply

| MODEL  |     | CX25EV   |
|--|-----|----------|
| Type   |     | Battery  |
| Battery chemistry type                               |     | LiFePo4  |
| Rated voltage  | V   | 102.4 DC |
| Nominal capacity                                     | Ah  | 315      |
| Energy   | kWh | 32.2     |
| Autonomy<br>(varies depending on the operating mode) | h   | 4 ÷ 8    |



### 3.4 - Battery charge times

| MODEL                                    |   | CX25EV |
|--|---|--------|
| 120 V on-board battery charger (20%/80%) | h | 13.0   |
| 120 V on-board battery charger (0%/100%) | h | 22.0   |
| 240 V on-board battery charger (20%/80%) | h | 5.0    |
| 240 V on-board battery charger (0%/100%) | h | 9.0    |

The charging times with the external battery charger vary according to the type chosen; for further information, refer to the documentation of the external battery charger.

### 3.5 - Electrical system

| MODEL  |        | CX25EV         |
|--|--------|----------------|
| Nominal voltage of electrical power system   | V      | 102 DC         |
| Nominal voltage of electrical service system | V      | 12 DC          |
| Service battery                              | V - Ah | 12 DC - 12     |
| DC/DC Converter                              | V - V  | 102 DC - 12 DC |



### 3.6 - Hydraulic system

| MODEL  | CX25EV  |
|--|---|
| Plant type   | Load Sensing centre closed with Flow Sharing distributor  |
| Pump type  | 1 Load Sensing pump with variable displacement  |
| Pump displacement cc   | 18.0  |
| Total flow rate l/min  | 46.0  |
| Operating pressures:<br>- first boom<br>- second boom<br>- bucket<br>- boom swing<br>- dozer blade<br>- translation gear motors<br>bar | 210   |
| - Slewing gear motor bar   | 190   |
| Electronic controls for operation  | 3 joysticks + 1 hydraulic pedal   |
| Travel   | Hydraulic drive units with axial pistons with automatic device for speed transmission "AUTO TWO SPEED" and negative parking brake |
| Slewing  | Hydraulic drive units with axial pistons and negative parking brake   |

**For the data of the auxiliary hydraulic systems, refer to section "6.29 - Auxiliary hydraulic systems" to page 6-90.**



### 3.7 - Performances

| MODEL  |     | CX25EV    |
|--|-----|-----------|
| Bucket breakout force ISO 6015                   | daN | 1450      |
| Standard boom breakout force (optional) ISO 6015 | daN | 880 (800) |
| Tractive force                                   | daN | 2100      |
| Climbing capacity                                | %/° | 60/30     |

### 3.8 - Digging arm

| MODEL   |    | CX25EV      |
|---|----|-------------|
| First boom length   | mm | 1900        |
| Second boom length  | mm | 1,250/1,450 |
| "Increased weight of the second optional boom (compared to the second standard boom)" | kg | 10          |

### 3.9 - Dozer blade

| MODEL  |    | CX25EV      |
|--|----|-------------|
| Width  | mm | 990 - 1,300 |
| Height                                       | mm | 245         |
| Stroke height                                | mm | 280         |
| Stroke depth                                 | mm | 275         |
| Distance from the centre of the slewing ring | mm | 1,220       |



### 3.10 - Undercarriage

| MODEL                |    | CX25EV   |
|----------------------|----|--|
| FRAMED UNDERCARRIAGE |    | VARIABLE with hydraulic extension  |
| Lower rollers        |    | 3 rh + 3 lh - oil bath   |
| Track tensioner      |    | In oil bath with hydraulic grease regulation of the tension of the track |
| Rubber tracks        | mm | 230 x 48 x 74  |

### 3.11 - Fluid capacities

Refer to section "8.7.1 - Refilling quantity table" to page 8-14.

| MODEL              |   | CX25EV     |
|--------------------|---|------------|
| Hydraulic oil tank | l | 15         |
| Hydraulic system   | l | 28         |
| Travel gear motors |   | 0.35 l x 2 |



### 3.12 - Brakes

| MODEL  | CX25EV   |
|--|--|
| Service brake on travel and rotation               | <p><b>Type:</b> hydrostatic.</p> <p><b>Brake activation:</b> it is activated automatically when the movement control lever is released (the distributor spool, together with the balancing valves (counter balance valve) of the drive units, closes the oil passage completely or partially).</p> <p><b>Brake deactivation:</b> it is deactivated automatically when the movement control lever is moved (the distributor spool moves from the centre towards the use, opening the oil passage).</p>  |
| Secondary and parking brake on travel and rotation | <p><b>Type:</b> negative mechanical with spring on discs in oil back inside the gear motors.</p> <p><b>Brake activation:</b> it is activated automatically when the movement control lever is released (the movement control pressure is interrupted and this also releases the brake discs). The activation is not instantaneous but it takes place after a delay necessary to avoid excessive wear to the discs in case it is activated when the machine is not completely stopped.</p> <p><b>Brake deactivation:</b> it is deactivated automatically when the movement control lever is moved (the movement control pressure also releases the brake discs). The deactivation is instantaneous.</p> |



### 3.13 - Nominal lifting capacity



## WARNING

***The machine is not equipped for handling objects, therefore such operations are forbidden. The handling of objects may cause tip-over or roll-over of the machine and could result in serious injuries or death.***

The **nominal lifting capacity** is the maximum weight that can be applied to the bucket pin (weight of equipment with any loaded material).

The nominal lifting capacity refers to:

- machine positioned on sound, firm and level ground;
- the indicated capacities are valid for the full slewing range of the turning frame;
- boom in NON-slewed position (if present);
- the indicated capacities refer to the bucket hinge pin;
- outreach referred to the centre of rotation (slewing ring);
- undercarriage extended to maximum track widening (if present);
- machine without quick-coupling attachment and equipment;
- all the protective structures available;
- all types of tracks available;
- the lifting capacities do not exceed 75% of the tip-over or roll-over limit or 87% of the hydraulic limit, in accordance with Standard **ISO 10567**;
- for some optional equipment, the Standards indicate that the nominal lifting capacities must be reduced in certain operating conditions. For information on the equipment in use, see the relevant section in the chapter "7 - Recommended optional equipment" to page 7-1.





## WARNING

*When the machine is used in conditions other than those indicated in the manual (for instance, on a surface which is not compact, but rough or slippery, or on a slope, etc.), the operator must take into account the new conditions that reduce the machine's stability and capacity. The operator must therefore work at lower speeds and with lighter loads so as to ensure the stability of the machine.*

*The capacities shown must be adapted depending on the type of equipment fitted.*



## WARNING

*If the dozer blade is used improperly, the hydraulic hoses can get damaged and cause a sudden loss of stability of the machine with the consequent damage to the operator and/or to the machine.*

If the cylinder of the dozer blade is equipped with a security valve (optional), the dozer blade **CAN be used** to stabilize the machine.

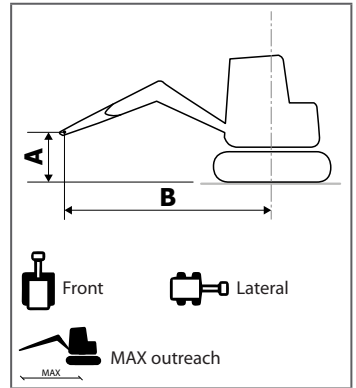


The lifting capacities indicated are for a machine equipped with any type of protective structure, any type of track, without bucket and without quick coupling attachment with fully extended undercarriage.














The symbol \* indicates the hydraulic load limit.

**0 m** refers to the ground level.

The unit of measurement for the lifting capacity is **tonnes**.















| A<br>(m) | B (m)   |   |   |   |   |   |   |   |   |   |   |   |   |
|----------|---|---|---|---|---|---|---|---|---|---|---|---|---|
|          | 1.5   |   | 2.0   |   | 2.5   |   | 3.0   |   | 3.5   |   | MAX   |   |   |
|          |  |  |  |  |  |  |  |  |  |  |  |  |   |
|          |   |   |   |   |   |   |   |   |   |   |   |   |  MAX |
| 2.5      | ---   | ---   | ---   | ---   | ---   | ---   | *0.36   | *0.36   | ---   | ---   | *0.39   | 0.36  | 3.25 m  |
| 2.0      | ---   | ---   | ---   | ---   | ---   | ---   | *0.37   | *0.37   | 0.38  | 0.32  | 0.37  | 0.32  | 3.52 m  |
| 1.5      | ---   | ---   | ---   | *0.45   | *0.45   | *0.41   | 0.40  | 0.37  | 0.37  | 0.32  | 0.35  | 0.29  | 3.68 m  |
| 1.0      | ---   | *0.74   | 0.69  | *0.55   | 0.50  | 0.46  | 0.39  | 0.37  | 0.37  | 0.31  | 0.33  | 0.28  | 3.76 m  |
| 0.5      | ---   | ---   | 0.81  | 0.59  | 0.49  | 0.45  | 0.38  | 0.36  | 0.36  | 0.31  | 0.33  | 0.28  | 3.75 m  |
| 0        | 1.26  | 0.99  | 0.79  | 0.65  | 0.57  | 0.48  | 0.45  | 0.37  | 0.36  | 0.30  | 0.34  | 0.29  | 3.66 m  |
| -0.5     | 1.26  | 0.99  | 0.79  | 0.64  | 0.57  | 0.47  | 0.44  | 0.37  | ---   | ---   | 0.36  | 0.31  | 3.48 m  |
| -1.0     | 1.27  | 1.00  | 0.79  | 0.64  | 0.57  | 0.47  | 0.44  | 0.37  | ---   | ---   | 0.41  | 0.34  | 3.19 m  |
| -1.5     | *1.14   | 1.01  | *0.78   | 0.65  | *0.56   | 0.48  | ---   | ---   | ---   | ---   | *0.46   | 0.43  | 2.73 m  |













**B - Lowered blade, Standard boom (1,250 mm)**














| A<br>(m)    | B (m)   |   |   |  |   |   |   |   |   |   |
|-------------|---|---|---|--|---|---|---|---|---|---|
|             | 1.5   |   | 2.0   |  | 2.5   |   | 3.0   |   | 3.5   |   |
|             |  |  |  |  |  |  |  |  |  |  |
| <b>2.5</b>  | ---   | ---   | ---   | ---  | ---   | ---   | *0.36   | *0.36   | ---   | 0.36  |
| <b>2.0</b>  | ---   | ---   | ---   | ---  | ---   | ---   | *0.37   | *0.37   | *0.39   | 0.32  |
| <b>1.5</b>  | ---   | ---   | ---   | ---  | *0.45   | *0.45   | *0.41   | *0.40   | *0.40   | 0.29  |
| <b>1.0</b>  | ---   | ---   | *0.74   | 0.69   | *0.55   | 0.50  | *0.47   | 0.39  | *0.42   | 0.28  |
| <b>0.5</b>  | ---   | ---   | *0.93   | 0.66   | *0.65   | 0.49  | *0.52   | 0.38  | *0.44   | 0.28  |
| <b>0</b>    | *1.69   | 0.99  | *1.02   | 0.65   | *0.71   | 0.48  | *0.55   | 0.37  | *0.46   | 0.29  |
| <b>-0.5</b> | *1.60   | 0.99  | *1.02   | 0.64   | *0.73   | 0.47  | *0.56   | 0.37  | ---   | 0.31  |
| <b>-1.0</b> | *1.43   | 1.00  | *0.94   | 0.64   | *0.69   | 0.47  | *0.52   | 0.37  | ---   | 0.34  |
| <b>-1.5</b> | *1.14   | 1.01  | *0.78   | 0.65   | *0.56   | 0.48  | ---   | ---   | ---   | 0.43  |



**C - Raised blade, Optional Boom (1,450 mm)**

| A<br>(m)    | B (m)   |   |   |  |   |   |   |   |   |   |
|-------------|---|---|---|--|---|---|---|---|---|---|
|             | 1.5   |   | 2.0   |  | 2.5   |   | 3.0   |   | 3.5   |   |
|             |  |  |  |  |  |  |  |  |  |  |
| <b>2.5</b>  | ---   | ---   | ---   | ---  | ---   | *0.31   | *0.31   | ---   | ---   | 0.32  |
| <b>2.0</b>  | ---   | ---   | ---   | ---  | ---   | *0.33   | *0.33   | *0.34   | 0.32  | 0.29  |
| <b>1.5</b>  | ---   | ---   | ---   | ---  | ---   | *0.37   | *0.37   | *0.36   | 0.32  | 0.27  |
| <b>1.0</b>  | ---   | *0.64   | *0.64   | *0.50  | *0.50   | *0.43   | 0.39  | 0.37  | 0.31  | 0.26  |
| <b>0.5</b>  | ---   | ---   | 0.81  | 0.67   | 0.59  | 0.49  | 0.38  | 0.36  | 0.30  | 0.26  |
| <b>0</b>    | 1.26  | 0.98  | 0.79  | 0.64   | 0.57  | 0.47  | 0.37  | 0.36  | 0.31  | 0.26  |
| <b>-0.5</b> | 1.25  | 0.98  | 0.78  | 0.64   | 0.56  | 0.47  | 0.37  | 0.36  | 0.33  | 0.28  |
| <b>-1.0</b> | 1.26  | 0.98  | 0.78  | 0.63   | 0.56  | 0.46  | 0.36  | ---   | 0.37  | 0.31  |
| <b>-1.5</b> | 1.27  | 0.99  | 0.79  | 0.64   | 0.56  | 0.47  | *0.44   | ---   | *0.43   | 0.37  |



| A<br>(m) | B (m)   |   |   |   |   |   |   |   |   |   |   |   |   |
|----------|---|---|---|---|---|---|---|---|---|---|---|---|---|
|          | 1.5   |   | 2.0   |   | 2.5   |   | 3.0   |   | 3.5   |   | MAX   |   |   |
|          |  |  |  |  |  |  |  |  |  |  |  |  |   |
|          |   |   |   |   |   |   |   |   |   |   |   |   |  MAX |
| 2.5      | ---   | ---   | ---   | ---   | ---   | ---   | *0.31   | *0.31   | ---   | ---   | *0.35   | 0.32  | 3.49 m  |
| 2.0      | ---   | ---   | ---   | ---   | ---   | ---   | *0.33   | *0.33   | *0.34   | 0.32  | *0.36   | 0.29  | 3.74 m  |
| 1.5      | ---   | ---   | ---   | ---   | ---   | ---   | *0.37   | *0.37   | *0.36   | 0.32  | *0.36   | 0.27  | 3.89 m  |
| 1.0      | ---   | ---   | *0.64   | *0.64   | *0.50   | *0.50   | *0.43   | 0.39  | *0.39   | 0.31  | *0.37   | 0.26  | 3.97 m  |
| 0.5      | ---   | ---   | *0.85   | *0.61   | *0.61   | 0.49  | *0.49   | 0.38  | *0.42   | 0.31  | *0.38   | 0.26  | 3.96 m  |
| 0        | *1.69   | 0.98  | *0.98   | 0.64  | *0.69   | 0.47  | *0.54   | 0.37  | *0.45   | 0.30  | *0.39   | 0.26  | 3.87 m  |
| -0.5     | *1.65   | 0.98  | *1.02   | 0.64  | *0.72   | 0.47  | *0.56   | 0.37  | *0.45   | 0.30  | *0.41   | 0.28  | 3.71 m  |
| -1.0     | *1.53   | 0.98  | *0.98   | 0.63  | *0.71   | 0.46  | *0.54   | 0.36  | ---   | ---   | *0.42   | 0.31  | 3.44 m  |
| -1.5     | *1.29   | 0.99  | *0.86   | 0.64  | *0.62   | 0.47  | *0.44   | 0.37  | ---   | ---   | *0.43   | 0.37  | 3.03 m  |



### 3.14 - Standard / optional equipment

The following table indicates the different equipment available for the machine.

#### Equipment key:

| <p>● STANDARD                      ○ OPTIONAL                      / NOT AVAILABLE</p>  |        |
|---|--------|
| EQUIPMENT   | CX25EV |
| Canopy (ROPS - FOPS Level 1)  | ●      |
| "Cab (ROPS/TOPS - FOPS Level 1):<br>- heating and ventilation<br>- automatic courtesy light<br>- front windscreen wiper and washer" | ○      |
| Closing protective structure platform for maintenance   | ●      |
| FRONT-GUARD Level II front protective grid  | ○      |
| TOP-GUARD Level II upper protective grid  | ○      |
| Hydraulic track widening  | ●      |
| Double travel speed with AUTOMATIC SHIFT DOWN   | ●      |
| Horn for travel movement  | ●      |
| Extendible dozer blade with extensions  | ●      |
| Rubber tracks   | ●      |
| Monoboam  | ●      |
| Second standard boom  | ●      |
| Long second boom  | ○      |
| Boom swing  | ●      |
| Load handling configuration   | ○      |
| Guard on lifting cylinder and on dozer blade cylinder   | ●      |
| Auxiliary hydraulic system on AUX1 boom   | ●      |
| Auxiliary hydraulic system on AUX2 boom   | ○      |
| Auxiliary hydraulic system on mechanical AUX3 boom  | ○      |
| Drainage line on boom towards hydraulic oil tank  | ○      |
| Single-acting/double-acting mechanical switch on AUX1 auxiliary hydraulic system  | ●      |



| EQUIPMENT  | CX25EV |
|--|--------|
| Electronic adjustment of the speed of each movement and of the flow rate of each auxiliary hydraulic system                              | •      |
| Piloted block valves on cylinders on first boom and second boom  | ○      |
| Block valve on the dozer blade cylinder  | ○      |
| ISO-SAE controls inversion TPSS function   | •      |
| 120/240 V AC on-board battery charger  | •      |
| 380 V AC portable battery charger  | ○      |
| Set-up for hydraulic quick-coupling equipment  | ○      |
| LED work light on first boom   | •      |
| LED strips on roof on front and rear sides   | ○      |
| Rotating head lamp   | ○      |
| Auxiliary power socket at the driver's seat  | •      |
| Electrical outlet on roof for rotating head lamp with switch (cab version)   | •      |
| USB socket   | •      |
| Geo-localisation system  | ○      |
| Rear-view mirrors on canopy (left and right)   | ○      |
| Rear-view mirrors on cab (left and right)  | •      |
| Seat with adjustable spring suspension and seat belt   | •      |
| Use and maintenance manual   | •      |
| Compartment for maintenance tools  | •      |
| Document glove box   | •      |
| Interchangeable equipment to be fitted to the second boom (refer to section "7.1.1 - Specifications on authorised equipment" to page 7-4 | ○      |

### 3.15 - Rotary structure

The upper structure of the machine (turning frame, booms) rotates independently from the bottom section (undercarriage). This movement is permitted by the slewing ring, which ensures movement of parts with minimum friction. The slewing ring consists of two rings free to rotate with each other; one is securely joined to the undercarriage, the other to the turning frame.

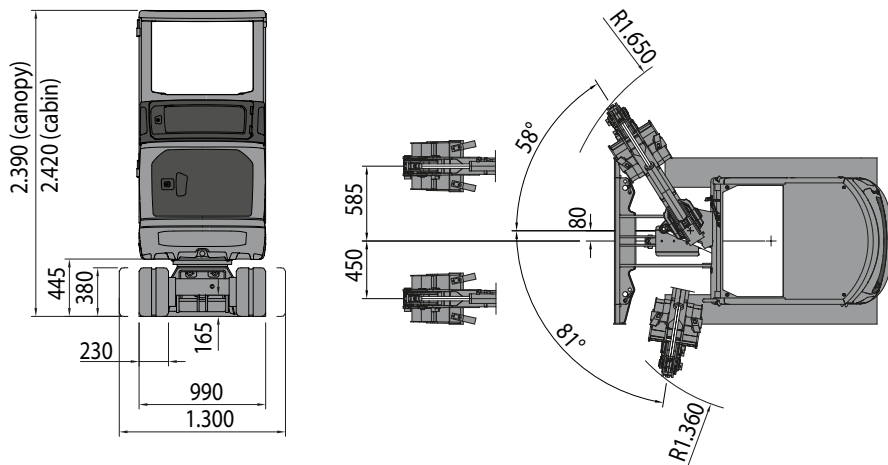


### 3.16 - Overall dimensions

Overall dimensions are given in **mm** for machine equipped with standard 2nd arm and excavation bucket with standard attachment.

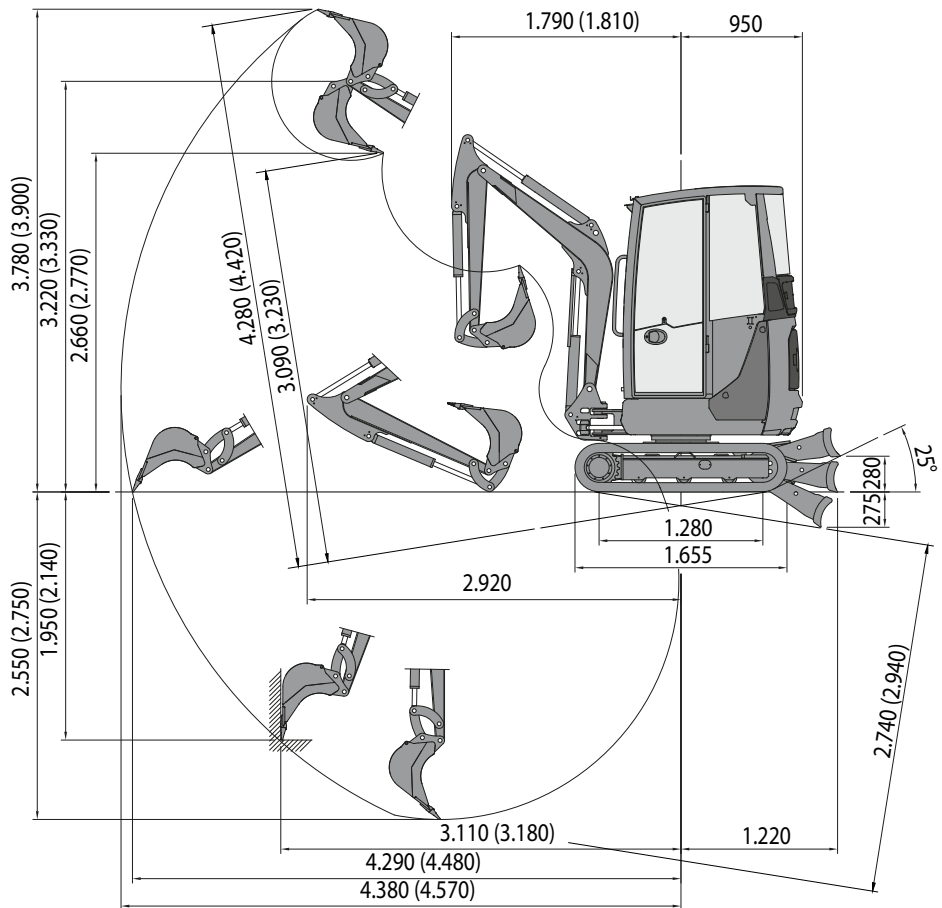
If in round brackets **(xxx)**, they refer to machines with optional 2nd arm.

#### STANDARD VERSION



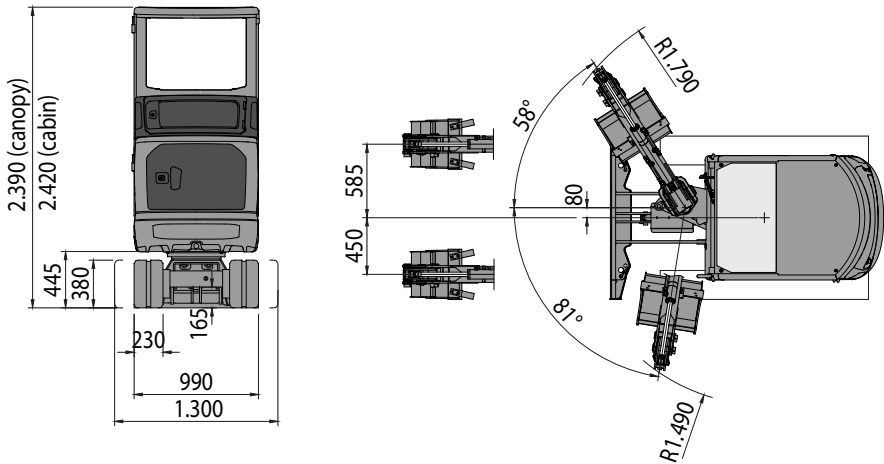


## STANDARD VERSION

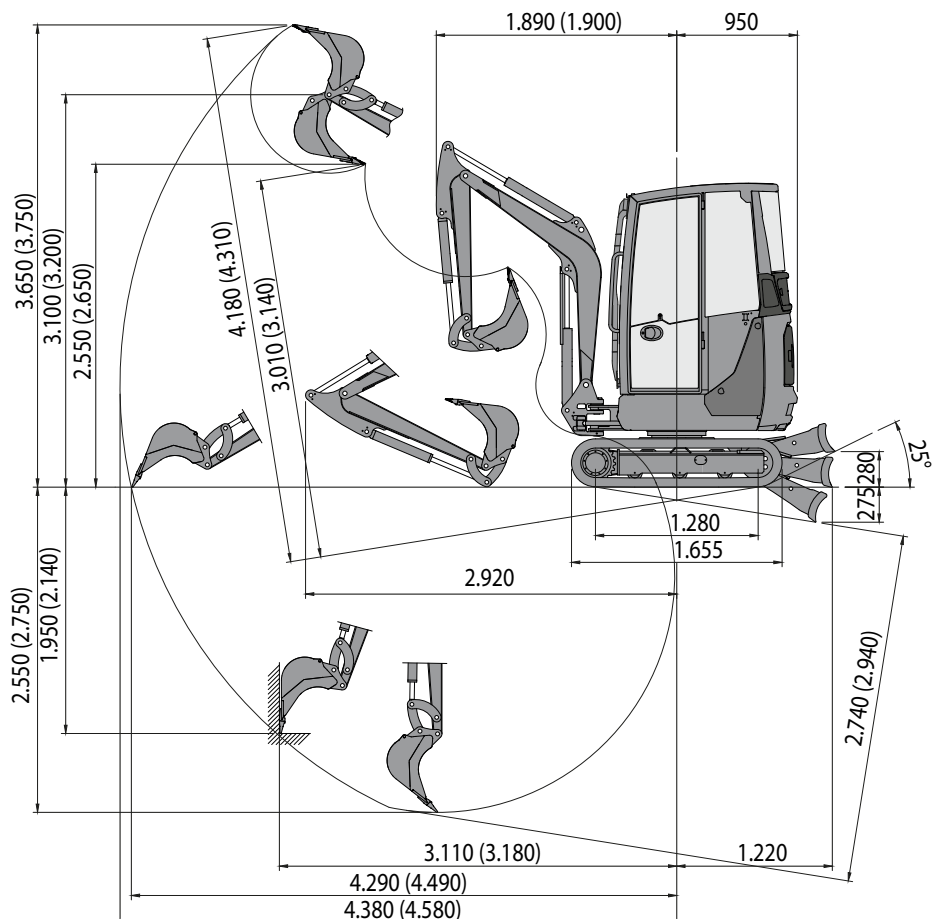




**VERSION WITH FRONT GUARD GRILLE**









### 3.17 - Sound emission

#### SOUND PRESSURE

| NAME  | CX25EV |
|---|--------|
| ISO 6396 - LpA<br>(recorded at the driver's seat) dB(A) | 75     |

#### SOUND POWER

| NAME  | CX25EV |
|---|--------|
| 2000/14/CE and with UK<br>directive 2001 n.1701 – LwA<br>and subsequent changes dB(A) | 85     |

The guaranteed sound power level is indicated on a sticker attached to the machine (refer to section "2.3 - Safety signs and operation related labels" to page 2-5).





### 3.18 - Vibrations

The vibrations level transmitted to the operator depends mainly on the conditions of the ground on which the machine is operating, on the work methods being applied and the equipment fitted to the machine.

Exposure to vibration can be reduced substantially by complying with the following suggestions:

- use equipment suitable for the type of machine and the type of task to be performed;
- adjust and lock the seat in the appropriate position; inspect on regular basis the seat suspension, making any necessary adjustments and performing any necessary maintenance;
- regularly perform any maintenance operation of the driving position;
- operate the accessories smoothly, as far as possible, avoiding any sudden movements or excessive jolts;
- adjust your speed and path and, as far as possible, avoid particularly rough paths and hitting possible obstacles, so as to minimise the vibration level.

The machine has been tested in accordance with the following regulations:

- ISO 2631
- EN ISO 5349
- EN 1032
- EN 12096

| <b>HAND-ARM VIBRATIONS</b> |                  |      |
|----------------------------|------------------|------|
| Vibration level            | m/s <sup>2</sup> | 1.54 |
| Measurement uncertainty    | m/s <sup>2</sup> | 0.77 |

| <b>VIBRATIONS OF WHOLE BODY</b> |                  |      |
|---------------------------------|------------------|------|
| Vibration level                 | m/s <sup>2</sup> | 0.47 |
| Measurement uncertainty         | m/s <sup>2</sup> | 0.23 |

Tests performed without load on a flat, compact surface.

The values indicated refer to continuous exposure during an 8-hour working day.



## 4 - TRANSPORTING THE MACHINE



### WARNING

***Make sure that the truck used to transport the machine has an adequate load capacity.***

***Before loading the machine, make sure the truck bed and/or the loading ramps are clean and free of any traces of grease, oil, soil, ice or other slippery residues.***

***A non-slip mat with a friction coefficient of at least 0.6 is required, to be placed between the tracks and the loading platform.***

***Do not change direction on the ramps. Align the machine with the ramps before getting on and travel in a straight line.***

***During transportation, the machine must be anchored to the means of transport; to anchor it use the appropriate anchor points.***

***Observe the current standards regarding width, height, weight and transport speed permitted.***

#### 4.1 - Shipping dimensions

The dimensions of the machine are indicated in section "3.16 - Overall dimensions" to page 3-17.

The weight of the machine is indicated in section "3.1 - General data" to page 3-1.



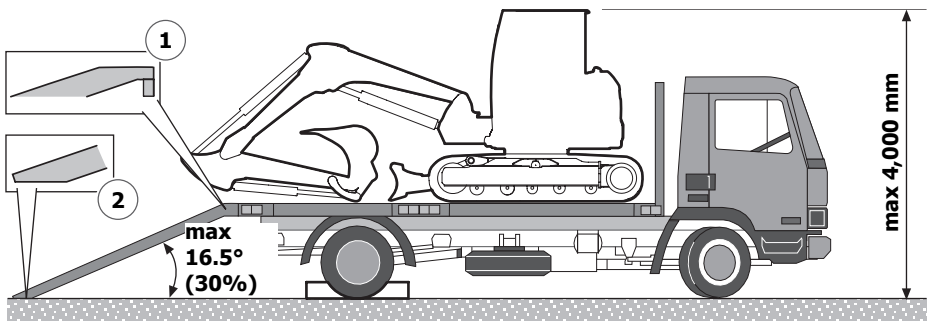
### 4.2 - Loading/unloading operations

It is recommended to use a special platform while loading and unloading the machine from the means of transport.

However, it is permitted to use loading ramps, in this case also consult the use and maintenance manual provided by the manufacturer of the ramps.

Before using ramps to load or unload the machine:

- perform loading/unloading operations on flat and compact ground, keep a safe distance from the edges of canals or roads;
- ensure that the nominal load capacity of the ramps is adequate for the weight of the machine and that each ramp is at least as wide as the track;
- the ramps **MUST NOT** form an angle greater than  $16.5^\circ$  (30% slope);



- fit the ramps so that the axis of the machine is aligned to the track axis;
- the ramps must be rigidly connected (1) to the truck deck to avoid possible disconnection while the machine is being loaded;
- at the contact zone of the track with the ground (2) do not allow a level difference greater than 50 mm; therefore choose ramps with bevelled support;
- make sure the parking brake of the means of transport is engaged;
- apply wedges to block the wheels of the means of transport;
- place a non-slip mat on the loading platform of the truck, in the area where the machine will be placed;
- if necessary, remove the bucket or equipment to suit the size or maximum capacity of the means of transport. They can be transported in an appropriate manner.





## NOTICE

*At low temperatures (below +5°C), follow the instructions given in the relevant section before starting the loading/unloading manoeuvres.*

---



## WARNING

***To reduce the risk of personal injury caused by the machine tipping over or rolling over, DO NOT attempt to change the machine direction and DO NOT activate any lever other than the travel lever while the machine is on a loading ramp.***

Load the machine according to the indications:

- 1 - align the turning frame to the undercarriage so that the dozer blade stays near the boom;
- 2 - if the machine is equipped with an extendible undercarriage and dozer blade, it is preferable to keep them in an extended position to increase their stability;
- 3 - point the rear of the machine to the means of transport;
- 4 - Align the machine to the means of transport.
- 5 - Start loading the machine in reverse. Have another operator watch the loading/unloading operations from a safe distance so as to warn the driver on possible hazardous situations which are not visible from the driver's seat.



## WARNING

***When reversing, pay attention to the direction of the controls which may not be intuitive, see section "6.21.1 - Forward and reverse travel" to page 6-70 and "6.21.4 - Turning while reversing" to page 6-73.***

- 6 - If, when climbing the ramp, the machine is not aligned, go back to the starting position and repeat the aligning phase, then resume the loading procedure.



## WARNING

***As the machine passes over the top of the ramps during loading, it will pivot on the centre of its tracks towards the level of the truck or deck of the means of transport. Maintain a slow, steady movement until the machine completes this rotation movement and both tracks are in full contact with the deck of the means of transport.***



- 7** - Position the machine on the means of transport and lower the dozer blade onto the deck;
- 8** - close the bucket or the equipment, retract the second boom and lower the digging arm onto the deck to reduce the overall footprint to the minimum;
- 9** - park the machine according to the indications given in section "6.20 - *Stopping and parking the machine*" to page 6-66;
- 10** - make sure that the machine tracks are on the non-slip mat, for the entire surface; if not, reposition the machine correctly;
- 11** - secure the machine to the deck of the means of transport as indicated in the following section.

**To unload the machine, follow the procedure above in reverse order.**



## **WARNING**

***During unloading operations, the machine will pivot again as it crosses over the top of the ramp. Maintain slow, steady progress until the machine completes this pivoting movement and both tracks are fully in contact the ramps.***



### 4.3 - Securing the machine on the means of transport

Before loading the machine, see the identification plate attached to it to know the weight and make sure that the truck used to transport it has an adequate load capacity.

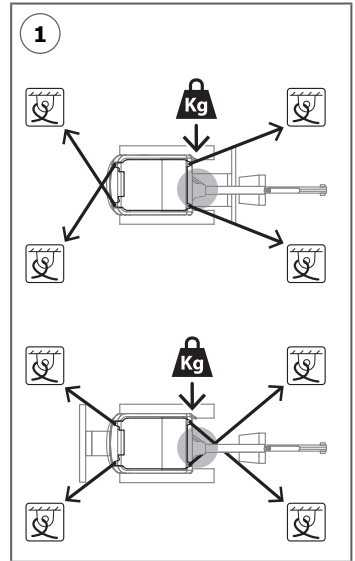
After having loaded the machine onto the truck, position it and secure it as indicated below and on the special operation label (1).

Collect the boom and rest it on the loading platform, in order to reduce the overall dimensions as much as possible; pay particular attention to the maximum height and to anything that may protrude from the back of the truck.

If bulky equipment is installed, remove it and transport it separately, taking care to secure it as indicated by its manufacturer.

Position any equipment installed in such a way that it cannot move during transportation. If necessary, secure it using dedicated fastening elements.

To avoid damage to the anchoring elements and/or to the anchor points of the machine, use guards for sharp edges.



The accessories used to secure the machine and the fixing points of the means of transport must have suitable capacity.

Check and follow the Standards in force in the country the transport is carried out.



## WARNING

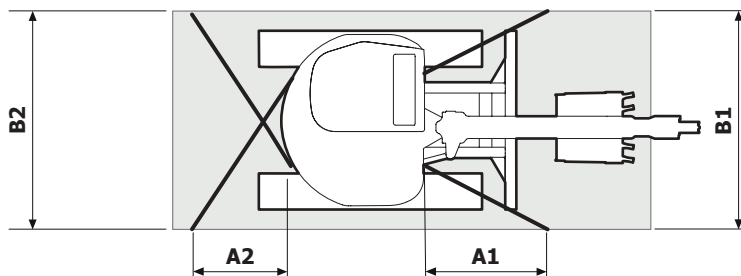
***The anchoring accessories must not come into contact with parts of the machine or with other objects. These must only be connected to the anchoring points of the machine and to the anchoring points of the means of transport.***



The machine can be anchored as shown in the figure:

### CONFIGURATION 1

Boom in blade position with 4 anchor points: 2 front ones on the turning frame and 2 rear ones on the turning frame.



| Anchor points on DOZER BLADE SIDE |    |               |
|-----------------------------------|----|---------------|
| Allowed range of values           |    | CX25EV        |
| <b>A1</b>                         | mm | 650 ÷ 1,450   |
| <b>B1</b>                         | mm | 1,900 ÷ 2,450 |

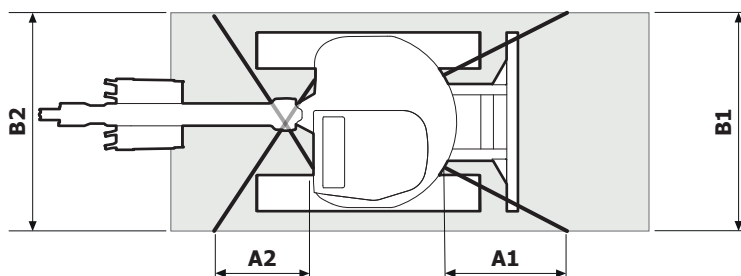
| Anchor points on SIDE OPPOSITE TO DOZER BLADE |    |               |
|---|----|---------------|
| Allowed range of values                       |    | CX25EV        |
| <b>A2</b>                                     | mm | 500 ÷ 3,500   |
| <b>B2</b>                                     | mm | 1,900 ÷ 2,450 |

| Anchoring capacity of the fastening system            |         |
|---|---------|
| Minimum value   | CX25EV  |
| LC (Lashing Capacity)<br>Dozer blade side             | 590 daN |
| LC (Lashing Capacity)<br>Side opposite to dozer blade | 200 daN |



**CONFIGURATION 2**

Boom in opposite position to blade with 4 anchor points: 2 front ones on the turning frame and 2 rear ones on the turning frame.



| Anchor points on DOZER BLADE SIDE |    |               |
|-----------------------------------|----|---------------|
| Allowed range of values           |    | CX25EV        |
| <b>A1</b>                         | mm | 500 ÷ 3,500   |
| <b>B1</b>                         | mm | 1,900 ÷ 2,450 |

| Anchor points on SIDE OPPOSITE TO DOZER BLADE |    |               |
|---|----|---------------|
| Allowed range of values                       |    | CX25EV        |
| <b>A2</b>                                     | mm | 650 ÷ 1,450   |
| <b>B2</b>                                     | mm | 1,900 ÷ 2,450 |

| Anchoring capacity of the fastening system            |         |
|---|---------|
| Minimum value   | CX25EV  |
| LC (Lashing Capacity)<br>Dozer blade side             | 210 daN |
| LC (Lashing Capacity)<br>Side opposite to dozer blade | 590 daN |



#### 4.4 - Lifting of the machine



## DANGER

***When lifting the machine, comply with the Standards in force in the machine's country of use.***

***Before lifting the machine, make sure that the lifting device has a suitable capacity in relation to the weight of the machine.***

***Use clean, undamaged lifting accessories (cables, ropes, track chains, shackles, etc.) of adequate capacity.***

***Use only the anchorage points indicated in the specific label.***

***Never lift the machine with the operator on board.***

***Do not lift the machine if it is blocked by mud, debris or ice.***

***Do not allow access near the machine.***

***While lifting, keep the machine in horizontal position.***

***Nobody must stand under the machine when it is lifted from the ground.***

***Lift the machine ONLY as indicated by the procedure; other methods are risky and therefore forbidden.***

***Do not use the fillets of the counterweight and/or of the protective structure, to lift the machine; it may break and cause the machine to fall, resulting in serious damage to people or objects.***

***In order to reduce the risk of accidents and serious damage to people as much as possible, all staff in charge of operating the lifting device and the relative operations must be specialised and must have been appropriately trained. It is their responsibility to ensure that proper equipment is used to lift the machine.***



## NOTICE

*For details on the weight of the machine, refer to section "6.1 - Commissioning" to page 6-1.*

*The lifting procedure is valid for the machine with standard equipment (bucket) or without equipment. If the machine features different equipment, remove it before starting the lifting procedures.*

*If in doubt, contact the Service Centre.*

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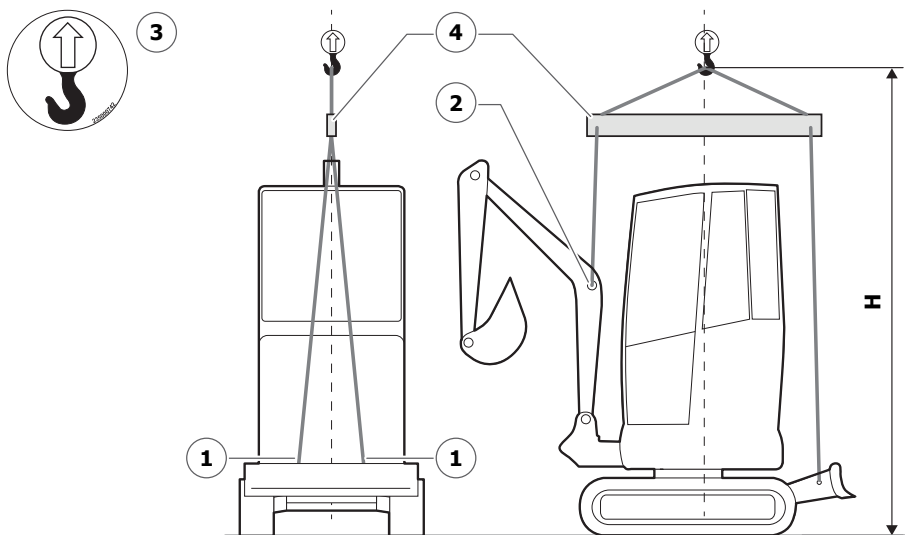


### 4.4.1 - Lifting procedure

The machine must be lifted on a flat and compact surface via the following procedure:

- 1** - start the engine, rotate the turning frame so that the boom is on the opposite side to the blade, with the turning frame parallel to the tracks;
- 2** - move the boom to a swing angle equal to **0°** (if present);
- 3** - lift the first boom completely;
- 4** - close the bucket completely;
- 5** - close the 2nd arm until there is a distance of about **10 cm** between the digging boom or the bucket, and the machine;
- 6** - raise the dozer blade completely;
- 7** - raise the controls cut-out lever;
- 8** - Enable the slewing lock (if provided);
- 9** - stop the engine, close the windows (if present), remove the ignition key, then get off the machine. Close the cab door (if present);
- 10** - attach lifting cables to the points on the machine intended for that purpose, as shown in the figure (these points are identified on the machine by means of special labels - **3**):
  - one for each side to the left and right of the dozer blade (**1**);
  - one for each side to the left and right of the top part of the first boom (**2**);
- 11** - connect the cables to the lifting accessory (bar) (**4**), respecting the dimensions indicated in the figure;
- 12** - respect the minimum height indicated in the figure to avoid contact between the lifting accessories and the machine, a greater height is allowed;
- 13** - lift the machine slowly.



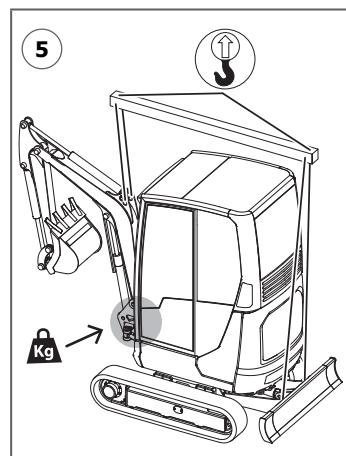


|          |  |                  |
|----------|--|------------------|
| <b>H</b> | Minimum ground height of the anchoring point | 3,000 mm         |
| <b>L</b> | Length of lifting accessory                  | 1,400 ÷ 2,200 mm |

The lifting instructions are given in a simplified manner on a special label (5) applied to the machine.

When the machine has been lifted from the ground, stop the lifting operations and make sure that the machine is in a **HORIZONTAL POSITION**; if the position is not correct, adjust the length of the accessories, then continue with the lifting operations;

**14** - move the machine to the desired place and lower it slowly; the supporting surface must be flat and compact;



**15** - when the machine is completely resting on the ground, disconnect the accessories.



## 4.5 - Recovering and towing the machine



# WARNING

***When towing the machine, comply with the Standards in force in the machine's country of use.***

***Before towing the machine, make sure that the towing vehicle has adequate braking power and capacity to control both machines.***

***Use a rigid tow bar, with a capacity of at least 150% of the weight of the towed machine. The bar must be clean and free of damage. Comply with the safety instructions given by the manufacturer of the same.***

***Use only the anchorage points indicated in the specific label.***

***Nobody must stand near the machine while towing; only the operators on the two machines can be present. Since it is not possible to control the towed machine completely, other people may get crushed resulting in serious injuries.***

***Tow the machine ONLY as indicated by the procedure; other methods are risky and therefore forbidden.***



# NOTICE

***It is forbidden to tow the machine with other mechanical means for long distances; there is a risk of damaging the travel system.***

---

Towing must be performed only when strictly necessary.

These instructions refer to moving the machine when it has broken down or is stuck in the ground.

If the machine has broken down, try to repair it on site if possible, thus avoiding towing operations. If this is not possible (e.g. machine stuck on a road full of traffic) proceed with towing.

If the machine is stuck in the ground (e.g. muddy ground), proceed with recovery by towing it only as much as necessary to pull it out.

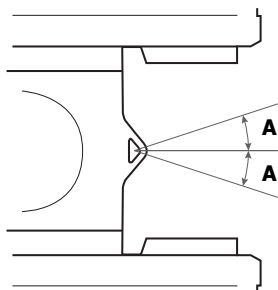
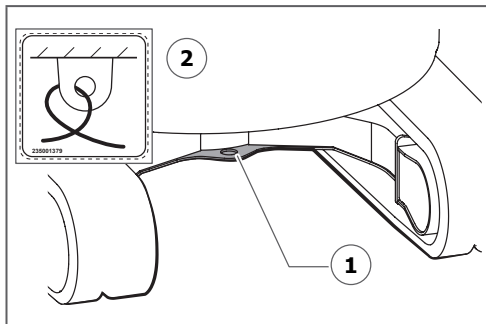
**When towing**, meet the following conditions:

- while towing, the operator **MUST NOT** be on the towed machine;
- tow the machine on flat surfaces only;



## TRANSPORTING THE MACHINE

- the distance towed should be as short as possible; for long distances, load the machine on a truck;
- tow at a maximum speed of **1 km/h**;
- maintain a sufficient distance to avoid contact between the machine and the towing vehicle; this distance must be under **3 m**;
- while towing, do not allow anyone to access the space between the towing vehicle and the machine;
- connect a tow bar to the dedicated tow hook of the undercarriage (**1**), the hooks are indicated by the dedicated labels (**2**).
- **DO NOT** use other anchorage points (e.g. boom, bucket or any accessory installed);
- the tow bar must be positioned as indicated below;



|          |                               |     |
|----------|-------------------------------|-----|
| <b>A</b> | Maximum horizontal pull angle | 30° |
| <b>B</b> | Maximum vertical pull angle   | 5°  |

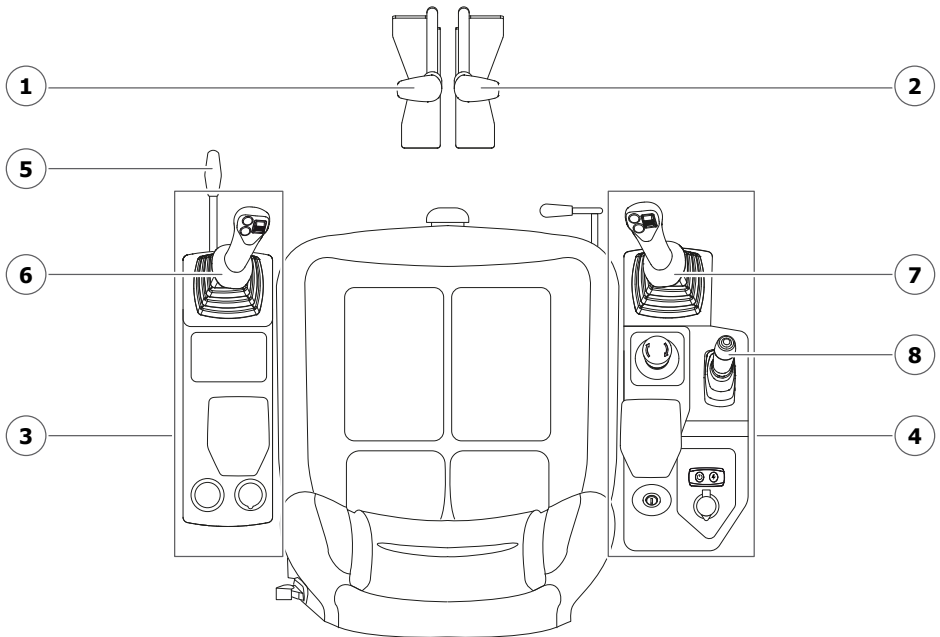
- **NEVER** continue towing unless both tracks are fully in contact with the ground.



## 5 - CONTROLS AND TOOLS

The function of each control and tool is described in detail in chapter "6 - Using the machine" to page 6-1.

### 5.1 - Description of main controls and levers

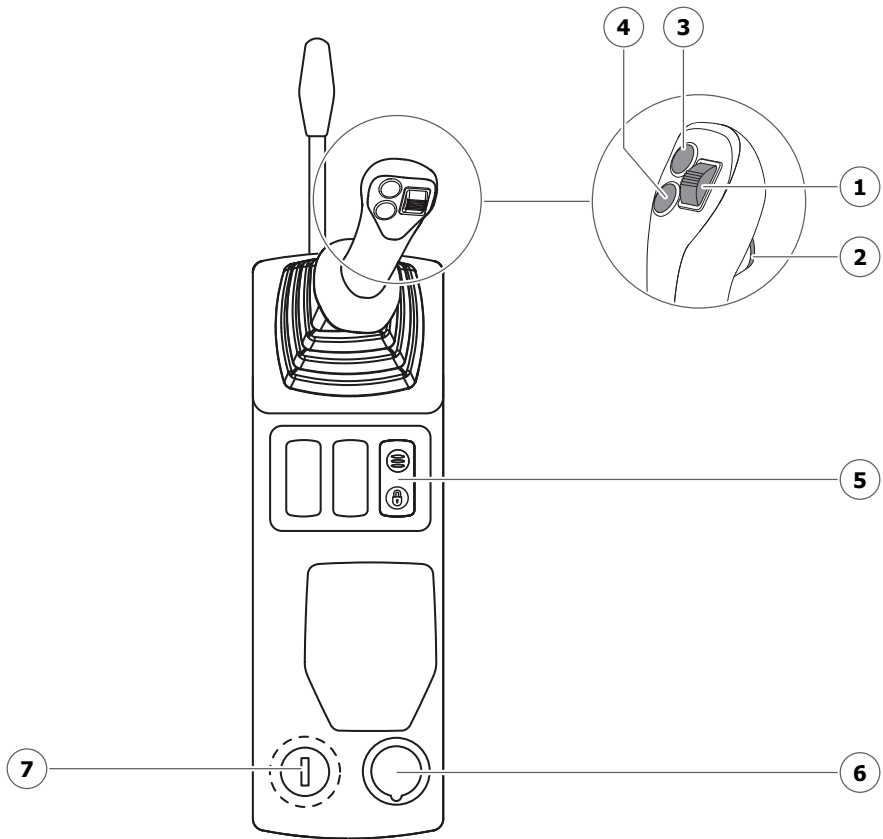


#### Key:

|   |                       |   |  |
|---|-----------------------|---|--|
| 1 | Left travel lever     | 5 | Controls cut-out lever                                   |
| 2 | Right travel lever    | 6 | Left Joystick  |
| 3 | Left control console  | 7 | Right joystick   |
| 4 | Right control console | 8 | Undercarriage width adjustment /<br>dozer blade joystick |



## 5.2 - Description of left control console

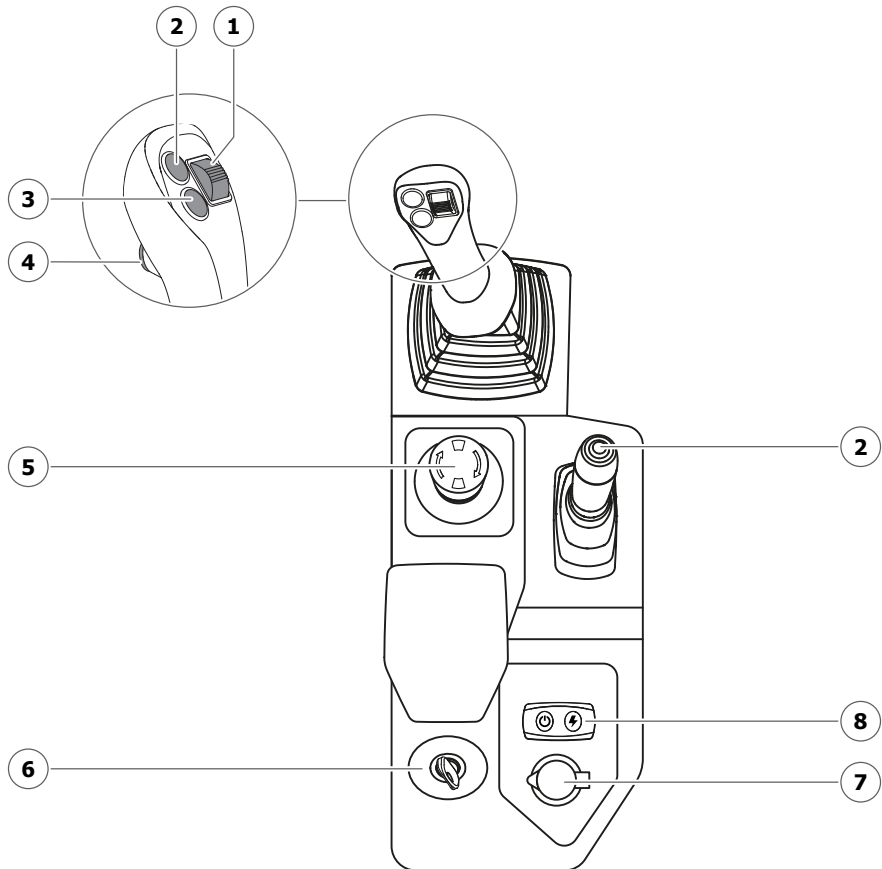


### Key:

|          |   |          |   |
|----------|---|----------|---|
| <b>1</b> | Boom swing roller/AUX 2 hydraulic system (optional) | <b>5</b> | Double-acting hydraulic quick coupling attachment approval button ( <b>optional</b> ) |
| <b>2</b> | Inactive button                                     | <b>6</b> | 12V current tap   |
| <b>3</b> | Inactive button                                     | <b>7</b> | Key switch for hydraulic quick coupling ( <b>optional</b> )                           |
| <b>4</b> | Horn button   |          |   |



### 5.3 - Description of right control console



#### Key:

|          |  |          |                                   |
|----------|--|----------|-----------------------------------|
| <b>1</b> | Roller AUX1 hydraulic system   | <b>5</b> | Emergency stop button             |
| <b>2</b> | Fast drive button  | <b>6</b> | Starter switch                    |
| <b>3</b> | Boom swing/AUX2 hydraulic system mode selector button on left joystick roller (active only if the <b>optional</b> system is present) | <b>7</b> | USB power socket                  |
| <b>4</b> | Lock button AUX1 hydraulic system  | <b>8</b> | Vehicle status warning indicators |



## 5.4 - Roller operation

The rollers are proportional electric controls, not retained, which control hydraulic functions; depending on the installation, they can turn to the right/left or up/down.

A greater movement of the roller gives a proportionally quicker response from the associated function.



### **NOTICE**

*The rollers are very sensitive, so take care when working not to touch them by accident, an unwanted hydraulic function could occur compromising the safety of the operator and anyone nearby.*

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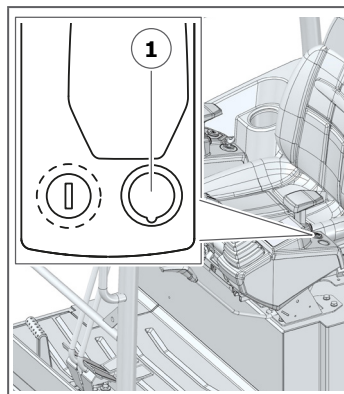
## 5.5 - Optional electrical buttons on the joystick

The electrical buttons, on the joysticks, can be used to activate some optional functions. For details, see the control sticker near the driver's seat.

## 5.6 - Auxiliary power socket on console

An auxiliary socket (1), used to connect the rotating head lamp, is located on the left control console. The socket is of the ISO 4165 standard two-pin type, powered by 12V.

The socket is *locked*; it is powered only when the key in the starting equipment switch is in the STARTING EQUIPMENT position.



### **NOTICE**

*When the socket is not used, close the cover (if present) to protect it from the elements, which could cause faults.*

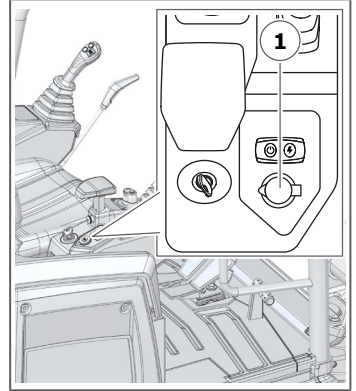
---



### 5.6.1 - USB power socket on console

On the right console there is a socket (1) used to charge portable devices. It is a USB type A socket.

The socket is locked; it is powered only when the key in the starting equipment switch is in the STARTING EQUIPMENT position.



### **NOTICE**

*When the socket is not used, close the cover (if present) to protect it from the elements, which could cause faults.*

---



## 5.7 - Flashing light (optional)

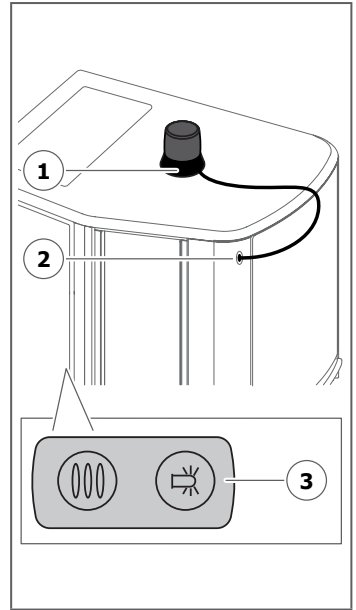
The machine can be equipped with an approved flashing light (called rotating head lamp).

The rotating head lamp (1) is used to indicate the presence of a moving operating machine and it must be used when required by local Standards.

The rotating head lamp is equipped with a magnetic base, it must be installed on the roof of the protective structure and it must be on when the machine is running.

To **position/remove** the rotating head lamp:

- park the machine according to the indications given in section "6.20 - Stopping and parking the machine" to page 6-66;
- Get off the machine;
- place a ladder (not supplied), of a size suitable for current Standards, at the back of the machine, climb up and place the rotating head lamp at the centre of the roof;
- climb down and remove the ladder;
- insert the electrical connection (2) of the rotating head lamp into one of the sockets available.



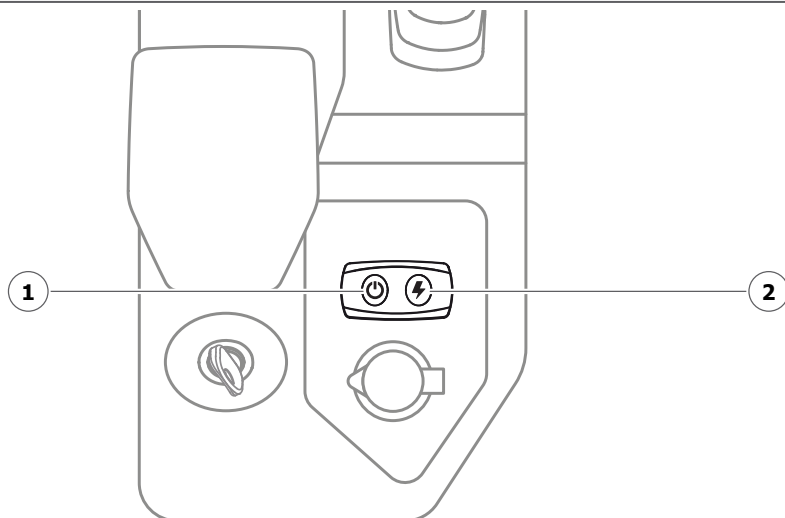
To remove the rotating head lamp, perform the operations in reverse order.

When the machine is started, the rotating head lamp is activated:

- **automatically** if it has been connected to the auxiliary socket on the control panel, see section "5.6 - Auxiliary power socket on console" to page 5-4.
- **by pressing the dedicated switch (3)** if it has been connected to the auxiliary socket on the protective structure, see sections and "6.7.4 - Auxiliary socket outside the cab" to page 6-12.



## 5.8 - Machine status warning indicators



### Key:

**1** Machine status indicator light on

**2** Machine charging status indicator light

### MACHINE STATUS INDICATOR LIGHT ON

This light indicates when the machine is on.



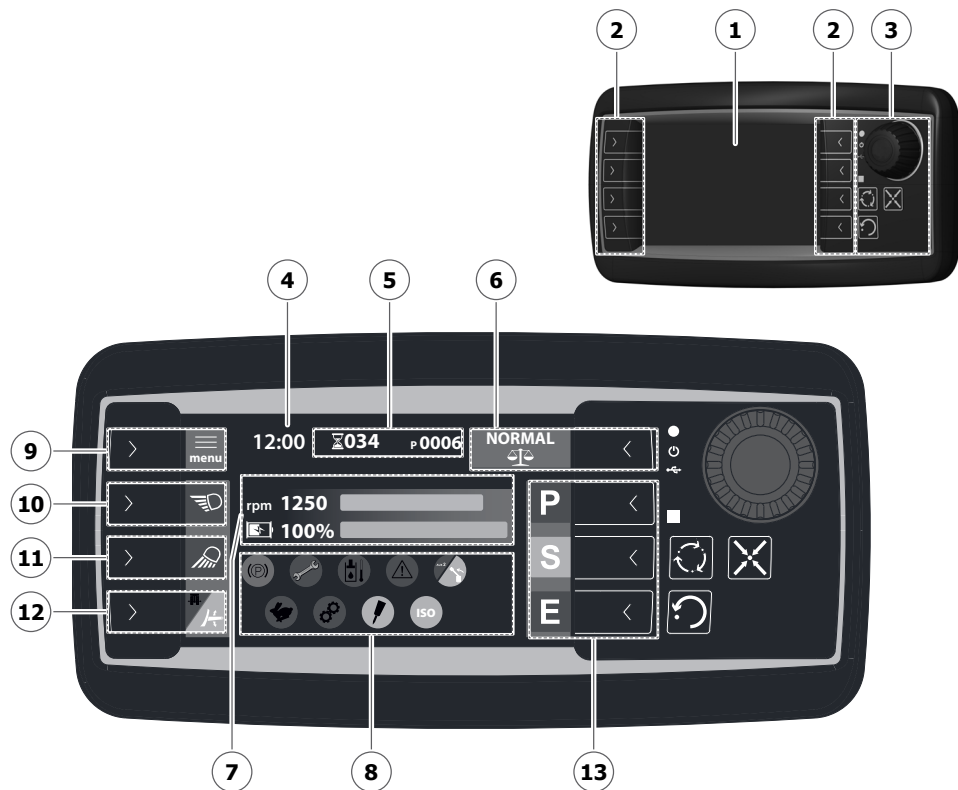
### MACHINE CHARGING STATUS INDICATOR LIGHT

This light comes on when the charging cable is connected.





## 5.9 - Control panel



### Key:

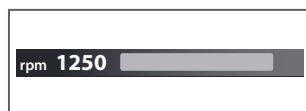
|          |   |           |  |
|----------|---|-----------|--|
| <b>1</b> | Display                                 | <b>8</b>  | Warning indicators   |
| <b>2</b> | Function keys                           | <b>9</b>  | Push-button menu and relative icon   |
| <b>3</b> | Navigation console                      | <b>10</b> | Boom work lights indicator light and button  |
| <b>4</b> | Hour                                    | <b>11</b> | Canopy work lights indicator light and button                                      |
| <b>5</b> | Machine hours                           | <b>12</b> | Indicator light and button for dozer blade/undercarriage width adjustment selector |
| <b>6</b> | Control mode indicator light and button | <b>13</b> | Indicator lights and work mode management buttons                                  |
| <b>7</b> | Engine data and battery data            |           |  |



### ROTATION SPEED INDICATOR

Indicates the current engine speed.

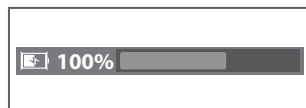
The value is expressed both in percentage, on the left side, and graphically, on the right side.



### BATTERY LEVEL INDICATOR

Indicates the battery charge level.

The value is expressed both in percentage, on the left side, and graphically, on the right side.



### CONTROLS CUT-OUT LIGHT

Turns on when the controls cut-out lever is open.

When this indicator light is on, no movements can be made with the machine.



### MAINTENANCE LIGHT

Lights up when the periodic maintenance period has expired.



### HYDRAULIC OIL TEMPERATURE LIGHT

Turns on when the hydraulic oil temperature is too high.



### ALARM LIGHT

Turns on whenever an alarm message appears, remains lit as long as the alarm is present.





### **FAST DRIVE INDICATOR LIGHT**

Lights up when fast drive is engaged.



### **AUX1 HYDRAULIC SYSTEM OPERATION LIGHT**

It turns on when the electrical stop of the AUX1 hydraulic system is active.



### **OVERLOAD ALARM INDICATOR LIGHT**

Comes on when the load lifting mode is activated. For further details see section "7.7 - Load handling" to page 7-28.

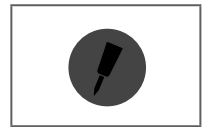
**It works ONLY if the load handling kit is installed (optional).**



### **EQUIPMENT LIGHT**

Indicates the setting of the selected auxiliary hydraulic systems, in combination with a specific piece of equipment.

For further details see section "6.10.3 - EQUIPMENT screen" to page 6-30.



### **CONTROLS CONFIGURATION INDICATOR LIGHT**

Indicates which controls configuration is active (ISO or SAE).

To change this option, see section "6.10.8.7 - COMMAND CONFIGURATION" to page 6-36.



### **BOOM SWING/AUX2 HYDRAULIC SYSTEM SELECTOR LIGHT**

Indicates the active function between the boom swing or AUX2 hydraulic system (optional).

The light is only present if the system is installed.





### BOOM WORK LIGHTS INDICATOR LIGHT

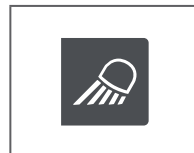
It is the indicator light combined with the relative button, indicates the status of the working lights on the boom. Turns on when the working lights are activated.



### CANOPY WORKING LIGHTS INDICATOR LIGHT (optional)

It is the indicator light combined with the relative button, indicates the status of the working lights on the canopy. Turns on when the working lights are activated.

The button and relative indicator light are only active if the optional lights are installed.



### DOZER BLADE SELECTOR / UNDERCARRIAGE WIDTH ADJUSTMENT INDICATOR LIGHT

Indicates the active function between dozer blade or undercarriage width adjustment.



### POWER WORK MODE INDICATOR LIGHT

It is the indicator light combined with the relative button, which indicates that the **Power** work mode is active; suitable for particularly heavy workloads.



### STANDARD WORK MODE INDICATOR LIGHT

It is the indicator light combined with the relative button, which indicates that the **Standard** work mode is active; suitable for normal work operations.



### ECONOMY WORK MODE INDICATOR LIGHT

It is the indicator light combined with the relative button, which indicates that the **Economy** work mode is active; suitable to optimise consumption.



The signals, lights and buttons only operate once the key starter switch has been turned to the STARTING EQUIPMENT position.



### 5.10 - Display

By means of software designed and custom made for each machine, the display on the operator panel shows information and any machine operating errors.

The information is displayed in the form of numbers and letters.

The way it works is described in section "6.8 - Control panel operation" to page 6-19.

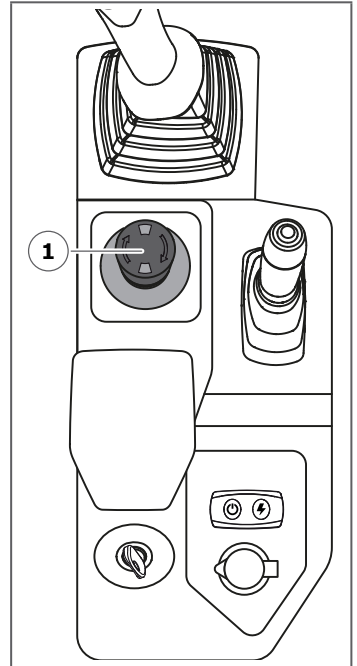


### 5.11 - Battery disconnect switch (emergency stop button)

The battery disconnect switch functions are performed by the emergency stop button (1), which is located on the right console.

This button stops the machine by interrupting the flow of current, therefore all movements and functions are interrupted.

For operation see section "6.2 - Battery disconnect switch (emergency stop button)" to page 6-3.





## 5.12 - Geo-localisation system



### NOTICE

*the CASE CONSTRUCTION **SiteWatch™** website ([www.casesitewatch.com](http://www.casesitewatch.com)) will not be accessible until the CASE CONSTRUCTION **SiteWatch™** subscription for this machine is registered by an authorized CASE CONSTRUCTION dealer. Contact an authorized CASE CONSTRUCTION for details.*

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This machine can be equipped with a telematics system. This is an asset-monitoring system that combines Internet, cellular, and GPS technologies. A transponder unit is mounted on the equipment that wirelessly communicates with the user interface CASE CONSTRUCTION **SiteWatch™** at [www.casesitewatch.com](http://www.casesitewatch.com). Using cellular technology, the transponder can send equipment data, including location, on/off status, usage and production metrics, diagnostic data, movement alarms, and unauthorized usage to the interface. The system will help cut costs and keep accurate records. See the furnished guide for operating your telematics system.



### WARNING

***Do not remove, repair, modify or move the communication terminal, the antenna or cables, as this could cause a breakdown or short-circuit in the equipment or to the machine itself.***

***The Service Centre will take care of equipment removal and installation. Prevent cables or wires from being crushed or damaged, do not pull cables or wires with undue force. Short-circuits or disconnected wires could lead to the equipment or the machine breaking down or catching fire.***



### NOTICE

*The system absorbs a small amount of energy even when the machine is turned off. In the event of prolonged machine inactivity, carefully follow the instructions given in section "8.10 - Long inactivity periods" to page 8-52.*

---

Because the system provides wireless communication, it does not guarantee operation in tunnels, underground, in buildings or in mountainous areas where radio waves cannot be received. Even when the machine is positioned outdoors, operation is not guaranteed in areas where the radio signal is weak or absent.



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## 6 - USING THE MACHINE



### WARNING

***Safety is dependent on the operator's actions and attitude.***

***Incorrect use of the machine can be dangerous.***

***Before starting work, concentrate all your attention on what you are about to do, and take all the necessary precautions.***

***After ensuring the machine is safe and in good working order, remember that everyone using it must be suitably trained in regards to its use, must be well informed about the hazards deriving from the use of the machine and must be aware of all procedures to be followed to ensure a correct use.***

### 6.1 - Commissioning

***Carefully read through the information below and always comply with the requirements. Should any malfunctions occur with the operation of the machine, contact the Service Centre.***



### DANGER

***DO NOT check or top up the hydraulic oil tank or other flammable liquids in the presence of open flames or sparks.***



### WARNING

***Remove any dirt from the windshield in order to ensure good visibility.***

***Remove all dirt from the work lights and check to ensure that they switch on properly.***

***Remove all dirt from the surface of the rear-view mirrors and check that they are correctly positioned (if present).***

***Check that no mud or dirt has accumulated around any of the moving parts and ensure that the controls are functioning properly.***

***Adjust the operator seat to a comfortable position that facilitates machine operation, and check for any signs of damage or wear on the seat belt and its locking mechanism.***





## **WARNING**

***Check that the warning lights are working properly and check the angle of the headlights and working lights.***

***Before starting the machine, fasten the seat belt.***

***Check that there are no people or obstacles on, under or anywhere in the vicinity of the machine.***

***Before moving the machine or operating the equipment, ensure no persons are present in the surrounding working area.***

***Acquaint yourself with the rules relating to the use of machines in the working area.***

***Always maintain a safe distance from other machines and obstacles in order to ensure ideal conditions of visibility.***

***When reversing, turn the turning frame so as to always look in the direction of movement. Pay attention to the presence of people in the area: should someone enter the manoeuvre area, stop the machine immediately.***

***Use only equipment that complies with the indications in chapter "7 - Recommended optional equipment" to page 7-1.***

***Follow the provisions of the machine lifting capacity tables and ascertain whether there are any load restrictions imposed by the ground, paving or ramps on which you are to work.***

***Do not leave the machine until the bucket or equipment and the dozer blade are fully lowered and the machine turned off.***

***Never leave the machine on without supervision, the operator is liable for the use of the machine by unauthorised persons.***

***While using the machine, avoid any sudden swerves, abrupt acceleration or braking and making sharp turns. If there is any doubt about the function of the controls, stop the machine and refer to the operation manual.***



## 6.2 - Battery disconnect switch (emergency stop button)

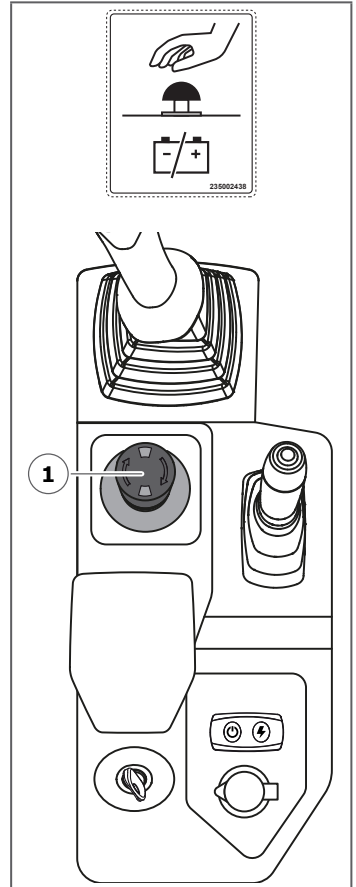
The battery disconnect switch functions are performed by the emergency stop button (1), which is located on the right console.

This button stops the machine by interrupting the flow of current, therefore all movements and functions are interrupted.

### ALWAYS SWITCH OFF:

- before carrying out maintenance on the machine, so that it cannot be turned on accidentally by others;
- at the end of the working day before leaving the machine, to prevent any short circuits that could set fire to the machine.

For instructions on use, refer to section "2.8.4 - Emergency stop button" to page 2-49.



## NOTICE

*Always cut off the power supply before performing operations on the battery or on the electrical system.*

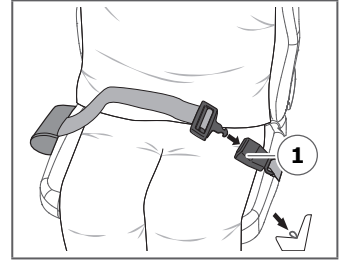


### 6.3 - Driver's seat

The operator seat is equipped with an approved seat belt (1) with two connection points and adjustable in length.

Before starting work, the operator can choose the most comfortable driving position depending on his/her physique by making the adjustments described below.

After adjusting the position of the seat, fasten the seat belt so that it can hold the operator at the waist, leaving the abdomen completely free.



## WARNING

***Do not operate the seat adjustment levers while the machine is operating. During this operation the control levers could be accidentally moved and generate uncontrolled movements of the machine and therefore cause serious or fatal injuries.***

***To prevent accidents, before starting the machine check that all adjustments have clicked into place properly.***



## CAUTION

***Do not leave any objects near the seat because during the movements there may be collisions and this may damage the seat or injure the operator.***



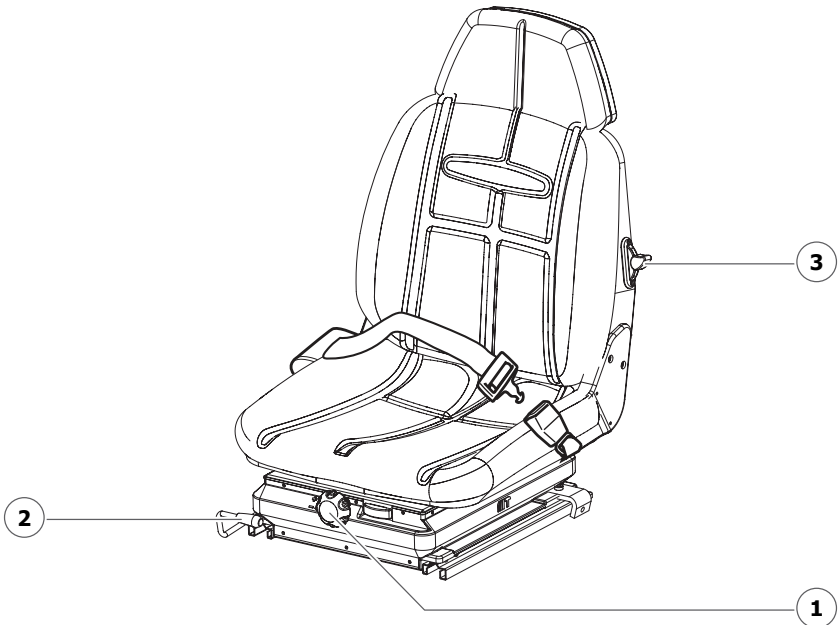
## NOTICE

*The seat is not waterproof; make sure it does not come into contact with any liquid. Always close the windows and doors of the cab (if present) after work or during maintenance.*

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The driver's seat is of the approved type and complies with workplace safety legal requirements. It is fitted with a damping system and permits adjustment to the optimum setting for the operator's weight.



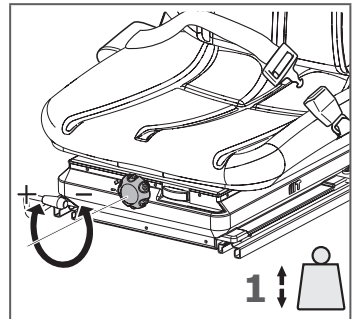
### Key:

- |          |   |          |                            |
|----------|---|----------|----------------------------|
| <b>1</b> | Weight adjustment   | <b>3</b> | Adjustment of the backrest |
| <b>2</b> | Longitudinal adjustment of the seat with respect to the joysticks |          |                            |

### 1 - WEIGHT ADJUSTMENT

The weight of the operator must be adjusted by turning the weight control knob.

Turning the knob changes the hardness of the suspension to obtain the one most suitable for the weight of the operator.







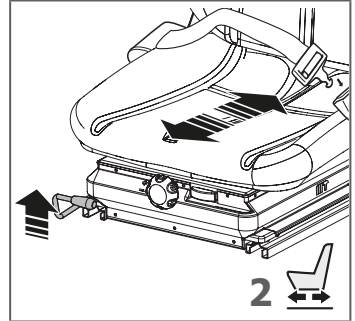
## CAUTION

***Seats that have not been properly adjusted have a lower range of oscillation. To prevent injury to persons, whenever the machine is started or the driver is changed, the seat must be adjusted according to the weight of the driver.***

### 2 - LONGITUDINAL ADJUSTMENT OF THE SEAT WITH RESPECT TO THE JOYSTICKS

Move the adjustment lever upwards to release the guides, adjust the seat lengthwise with respect to the joysticks.

After making the adjustment make sure that the lever "clicks" to secure the runners. Check that the seat does not move any further backwards or forwards.



### 3 - ADJUSTING THE BACKREST

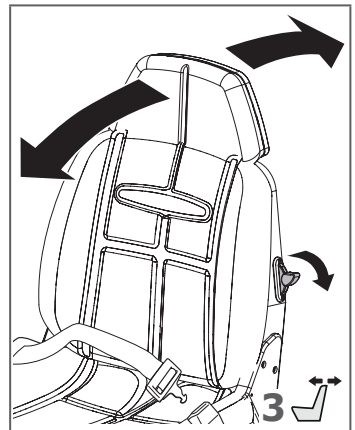
To release the backrest pull the locking lever downwards.

Do not press on the backrest while releasing it.

The most comfortable position is found by increasing or decreasing the pressure on the backrest.

To secure the backrest in place release the lever.

The backrest can be collapsed completely forwards until it is horizontal.



## NOTICE

*If the operator is not sitting down, activate the locking lever keeping one hand on the top of the backrest to stop it from jumping forwards.*



The seat position should always be adjusted to suit the operator's physique.

A seat adjustment that is unsuited to the operator or to the type of work to be performed may lead to premature operator tiredness and result in the improper operation of the machine.

The seat position should be individually adjusted for each machine operator.

The operator must be in a position to press the pedals down fully and to operate the control levers properly, with his back resting comfortably against the backrest.

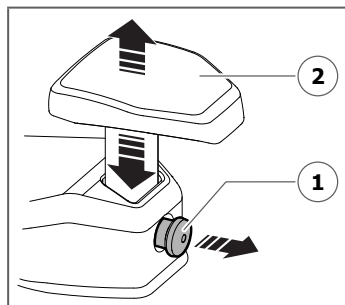
If not, move the seat forwards or backwards and then try again.

### 6.4 - Arm rests

The arm rests can be adjusted in height.

Height adjustment is carried out for each arm rest as follows:

- slightly unscrew knob (1) counter-clockwise;
- pull it outwards and simultaneously raise or lower the arm rest (2);
- Once the desired height has been reached, release the knob and tighten the knob clockwise.



### 6.5 - Seat belt

The seat belt is essential because it retains the operator anchored to the seat in case of tip-over or roll-over. The condition, cleanliness and mechanical mountings of the seat belt must be checked regularly.

For further details, refer to section "2.8.2 - Seat belt" to page 2-47.

**ALWAYS FASTEN the seat belt when seated in the driver's seat.**



## 6.6 - Controls cut-out lever

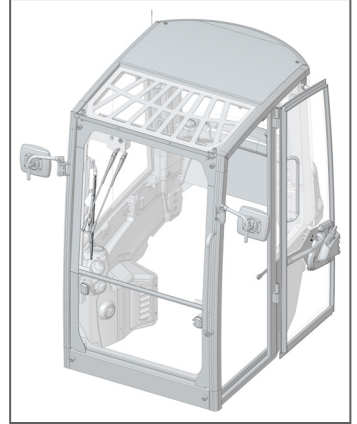
The controls cut-out lever prevents the accidental activation of all machine functions. For further details, refer to section "2.8.3 - Controls cut-out lever" to page 2-48.

**Before leaving the driver's seat, ALWAYS lock the controls by means of the controls cut-out lever.**

## 6.7 - Driver's cab (optional)

The machine can be equipped with a closed cab.

The cab consists of a single unit, secured to the structure by flexible supports to dampen vibrations for increased operator comfort.



## WARNING

***If the cab is bumped or the machine tips or rolls over for any reason, contact the Service Centre immediately to check the cab's rigidity and the active protection that it must provide to the operator.***



### 6.7.1 - Entering and leaving the driving cab



## WARNING

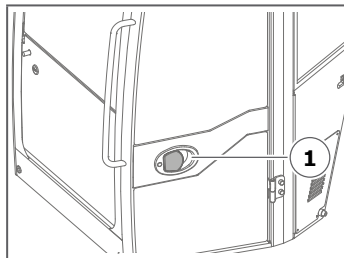
***For the procedures, refer to section "GETTING ON AND OFF THE MACHINE" to page 2-31.***

***The controls cut-out lever must be raised every time the operator leaves his/her seat. In this way, the controls will not be accidentally activated while the machine is ascending/descending.***

### ENTRY TO THE DRIVING CAB

Access to the enclosed cab is by means of the left hand side door.

To enter the enclosed cab, unlock the door with the key provided, pull the handle (1) to release the latch, and pull to open. Once inside, grasp the special handhold and pull to close and latch the door.



The door can be locked from the outside using the key provided.

It is recommended to note the number of the key so that a spare one can be ordered if necessary.



## WARNING

***The driving cab door should be kept locked when operating the machine, in order to prevent it from opening accidentally.***



## EXIT FROM THE DRIVING CAB



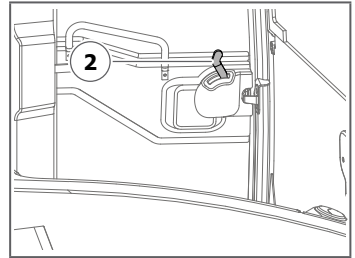
# WARNING

***Before getting out of the cab:***

- ***lower the equipment to the ground;***
- ***lift the controls cut-out lever;***
- ***switch off the engine.***

***In this way, uncontrolled actions will be prevented while the operator is getting off the machine.***

To exit the enclosed cab, grasp the latch release lever (2) and pull inwards, then push the door to open. After having got out, close and lock the door.



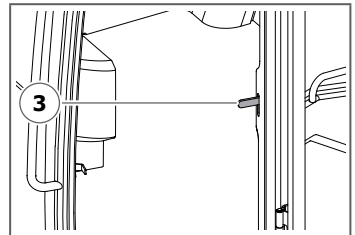
# WARNING

***If an emergency occurs preventing the door from being used, the front windshield of the cab can be used as an emergency exit, for further details refer to section "6.7.10 - Hammer for emergency exit" to page 6-17.***

## OPEN DOOR RESTRAINT RELEASE

The left cab door will be secured in the open position when it is opened and swung to 180°.

To release the door and allow it to close, push down the lever that controls the lock, (3) located on the left upright.



# NOTICE

***For easier connection/release, grease the connecting parts of the lock periodically.***

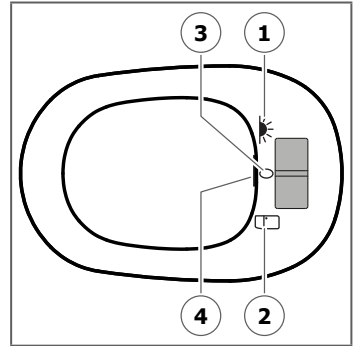


### 6.7.2 - Courtesy light

The courtesy light is positioned on the left upright and it is used to light up the inside of the cab in conditions of poor visibility.

The courtesy light has two operating modes that can be selected by means of the switch:

- **light always on**, put the switch in position (1);
- **automatic light**, put the switch in position (2), in this mode the courtesy light turns on when the door is open;
- **light always off**, put the switch in position (3).



To replace the courtesy light bulb, insert a screwdriver between the protective glass and the light bulb housing (4) to release the locks on the glass, then remove.

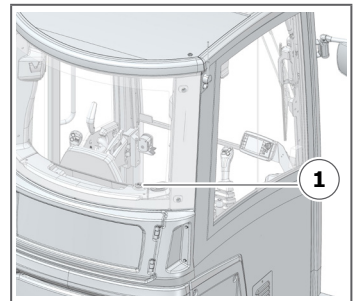
The new light bulb must have the same characteristics as the one replaced.

To refit the courtesy light, carry out the operations in reverse order.

### 6.7.3 - Auxiliary socket inside the cab

An auxiliary socket (1), used to power the rotating light is located at the base of the rear right upright (inside the cab). The socket is of the ISO 4165 standard two-pin type, powered by 12V.

The socket is *locked*; it is powered only when the key in the starting equipment switch is in the STARTING EQUIPMENT position.

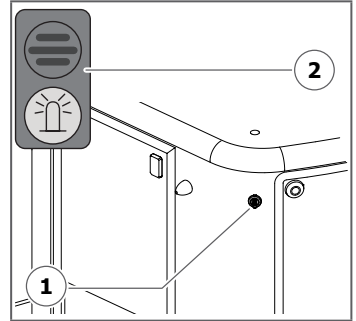




#### 6.7.4 - Auxiliary socket outside the cab

An auxiliary socket (1), used to power the rotating head lamp is located on the rear left upright (outside the cab). The socket is of the ISO 4165 standard two-pin type, powered by 12V.

The socket is *locked*; it is powered only when the key of the ignition switch is on the STARTING EQUIPMENT position. To activate the socket, press the rotating head lamp button on the right control console (2).



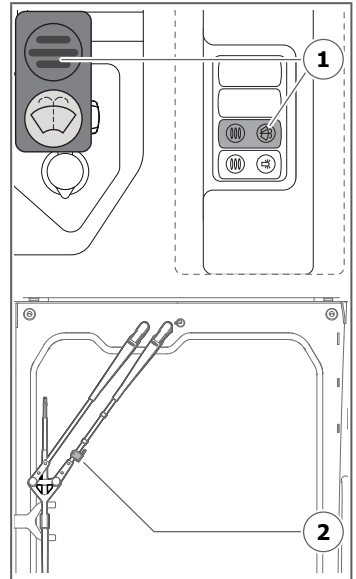
#### 6.7.5 - Windshield wiper

To **activate** the **windshield wiper** use the switch (1) located on the right side of the cab; the first position turns the wiper on, the second position turns on the screen washer; when sufficient cleaning fluid has been dispensed, release the switch.

The ignition key switch must be in **STARTING EQUIPMENT** position for the windshield wiper to operate.

Clean the wiper blades periodically with suitable detergents or alcohol. Make sure that they are not damaged or the cleaning will be streaky. Replace the wiper blades if the rubber is permanently deformed or shows any signs of wear.

In case of especially cold conditions (below 0°C) check that the wiper blades have not frozen to the windshield; if necessary, use a special de-icing product.



If the screen washer (2) fails to operate, ensure the supply circuits are not blocked; if necessary clear the spray nozzles using a pin.



### NOTICE

*Failure to follow the above procedures will cause premature wear of the wiper blade rubber.*



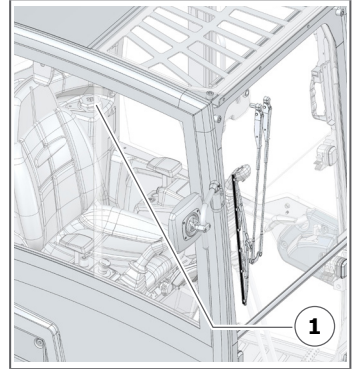
### 6.7.6 - Water container for windshield wiper

The cap of the screen washer tank (1) is located to the driver's left, allowing quick and easy access for topping up the liquid.

To **top up** the container:

- unscrew the cap (1);
- top up as required;
- refit the cap.

If ambient air temperature is expected to drop below 0°C, use a special washer fluid formulated for low temperatures.



### 6.7.7 - Opening the windshield

The windshield (1) can be opened for ventilation purposes.



## WARNING

***When opening the glass, always make sure that the machine is off to avoid operating the controls accidentally.***

***When opening/closing the windshield, take care not to injure your fingers or your head.***

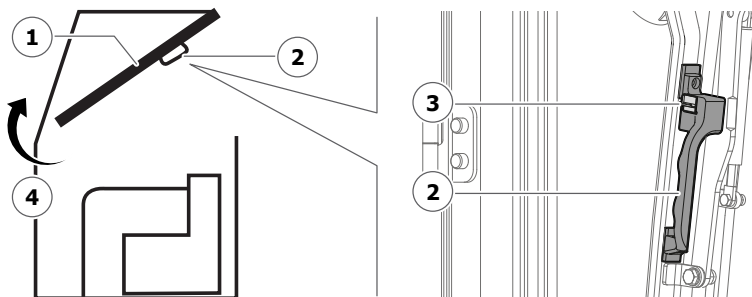
***Never use the machine without the windshield properly locked in place at the front (windshield closed) or at the top (windshield open).***

***During operations with the equipment, that imply the risk of projected objects which could enter the cab, make sure the cab door and windows are closed and locked.***



To **open** the windshield:

- turn off the machine;
  - grab both handles (**2**) and push the buttons (**3**) with both thumbs;
  - pull simultaneously both handles backwards tilting the windshield inwards (**4**);
  - while still holding the handles, push the windshield upwards until it is parallel with the cab roof and you hear both locks "**click**" into place;
  - reposition the display so that the image is clearly visible.
- 



To **close** the windshield:

- turn off the machine;
- grab both handles (**2**) and push the buttons (**3**) with both thumbs;
- pull simultaneously both handles downwards tilting the windshield outwards (**4**);
- while still holding the handles, push the windshield outwards until you hear both locks "**click**" into place.

It is possible to reposition the glass by following the above procedure in reverse order; make sure that **both** levers (**2**) have locked into place.



## WARNING

***During operations with the equipment, that imply the risk of projected objects which could enter the cab, make sure the cab door and windows are closed and locked.***



### 6.7.8 - Opening the lower front glass

The lower front glass (1) can be opened for ventilation purposes.



## WARNING

**When opening the glass, always make sure that the machine is off to avoid operating the controls accidentally.**

**During operations with the equipment, that imply the risk of projected objects which could enter the cab, make sure the cab door and windows are closed and locked.**

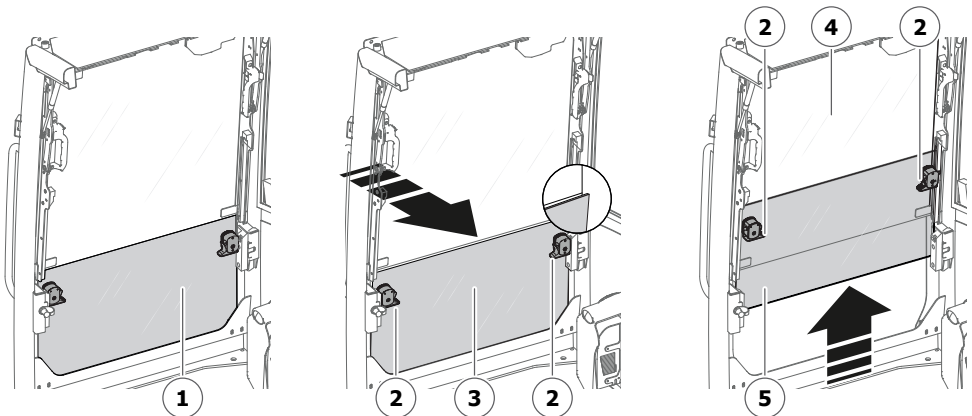
The glass can be tilted inwards or it can be opened completely.

To **tilt** the glass:

- push both levers (2) down;
- pull the glass towards the inside of the cab;
- release the levers and make sure that the glass is locked in the tilted position (3).

To **open** the glass:

- make sure that the windshield (4) is closed;
- push both levers (2) down;
- lift the glass, about 10 cm, upwards (5);
- release the levers and continue to lift the glass making it sliding in the special guides until both levers click;
- open and lift the windshield completely, as described in section "6.7.7 - Opening the windshield" to page 6-13.



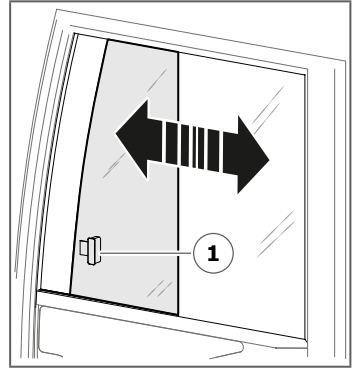


### 6.7.9 - Opening the right side window

The right side of the cab has a window that slides open.

Follow the procedure below to open and close it:

- take hold of the closing handle (1);
- move the window slowly (backwards to open the window, forwards to close it) to the required position;
- let go of the handle (1).



To lock the window closed, push the rear of the closing system forwards until a “click” is heard.



## WARNING

***During operations with the equipment, that imply the risk of projected objects which could enter the cab, make sure the cab door and windows are closed and locked.***



### 6.7.10 - Hammer for emergency exit



## WARNING

***If the glass has to be broken using the hammer, avoid possible injuries caused by shards of glass.***

***Before leaving the cab, remove the fragments of glass left around the windshield edge to avoid injury.***

***Pay attention not to slip on the glass spread out all over the ground.***

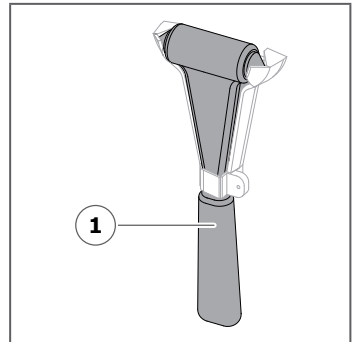
The emergency exit has been identified and indicated in section "2.7 - Safety procedures" to page 2-29.

In the event of an emergency, if the windshield does not open by the normal means, break the it with the hammer (1).



## NOTICE

Make sure that the glass breaker hammer is **always present** in the cab and fixed on the upright.

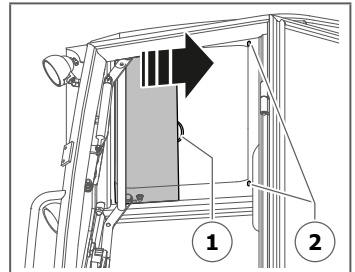


### 6.7.11 - Sun shade

The large top window can be covered with a sun shade to protect from being dazzled by the sun.

Pull the end (1) to lengthen the curtain and to hook it into the appropriate clips (2).

To open the shade again, unhook it and accompany it as it rewinds.



## NOTICE

***Do not let go of the shade suddenly, rewinding too abruptly could damage it.***



## 6.7.12 - Cab ventilation system

The **ventilation and heating unit** is positioned on the inner right side of the cab.

It allows to keep a comfortable climate in the cab while operating the machine, both in hot weather and in cold weather.

Ventilation and exchange of air are achieved by means of a variable speed fan.

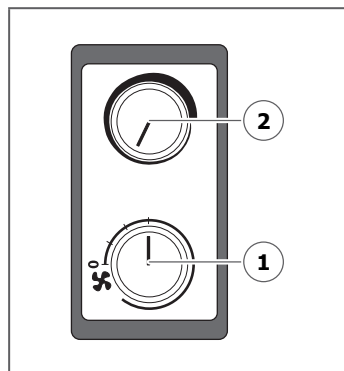
The ventilation power and temperature of the ventilated air are controlled by two hand grips on the rear right upright.

To adjust the fan **speed**:

- turn the hand grip **(1)** and bring it to the desired speed.

To adjust the **temperature** of the ventilated air:

- turn the hand grip **(2)** counter-clockwise for cold air or clockwise for warm air.



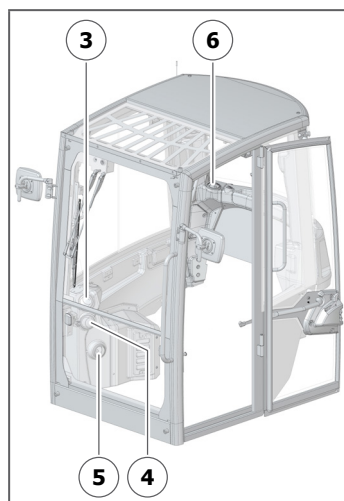
## AIR VENTS

The air vents can be adjusted and are arranged in such a way that to make the cab comfortable and well ventilated.

The air vents **(3-4)** are positioned so as to direct the airflow towards the front windshield, in order to keep the glass clear.

A slot **(5)** is positioned to direct the air flow towards the operator.

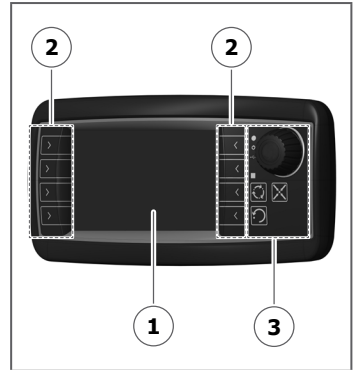
An air vent **(6)** is positioned behind the seat in order to direct the air flow towards the rear windshield in order to demist the glass.





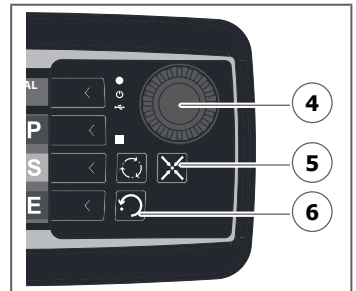
## 6.8 - Control panel operation

A control panel is installed inside the cab and houses a display (1), no. 8 function keys (2) and a navigation console (3).



The operator can interact with the display either with the **no. 8 function keys**, located on either side of the screen, or with the navigation **hand grip** (4) and the buttons **Home** (5) and **Reset** (6) located to the right of the display.

Refer to the following texts for operation.



## WARNING

***Before making any changes to the settings on the control panel, always make sure that the controls cut-out lever is in the OPEN position.***

***If this is not done, while reading/changing the parameters on the display you may knock the controls making the machine carry out involuntary movements and causing damage to property and/or persons.***



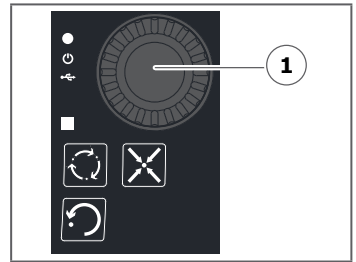
## DISPLAY NAVIGATION

To the right of the display are the controls for display navigation.

In particular:

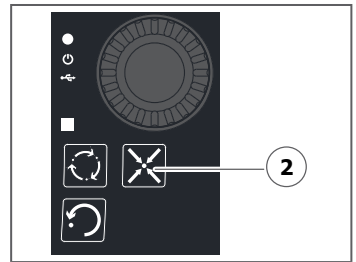
### 1 - NAVIGATION HAND GRIP

The hand grip can be turned to the right and to the left to scroll through the various items of the menus, to scroll through the texts in the message area of the display, to continuously change the values of any parameters. The hand grip is also a confirmation button, therefore when it is pushed it performs the **Enter** command on the set values, which are accepted by the machine control box.



### 2 - HOME BUTTON

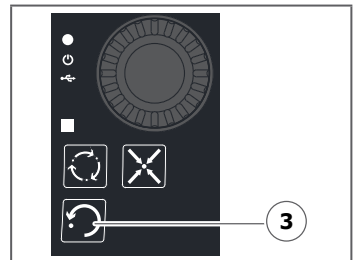
By pushing it, the display goes back to the Home page, see section "6.9 - HOME page" to page 6-22.



### 3 - RESET BUTTON

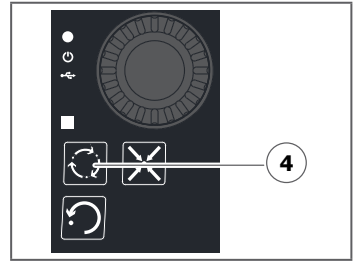
By pushing it, the previous command is cancelled, therefore you will leave the current page and go back to the previous one.

Push the button several times to go back to the Home page.





## 4 - BUTTON NOT ACTIVE



On all screens, if no action is performed after a short period of time, the display will automatically reposition itself on the HOME page.

## MULTIPAGE SCREEN

Certain screens of the display are made up of multiple pages.

The presence of additional pages with respect to the one displayed is indicated by the following symbol.

You can navigate through the various display screens using the navigation hand grip.

| Scroll bar | Description   |
|------------|---|
|            | Indicates the presence of other pages with respect to the one displayed, which can be viewed by scrolling down. |
|            | Indicates the presence of other pages with respect to the one displayed, which can be viewed by scrolling up.   |

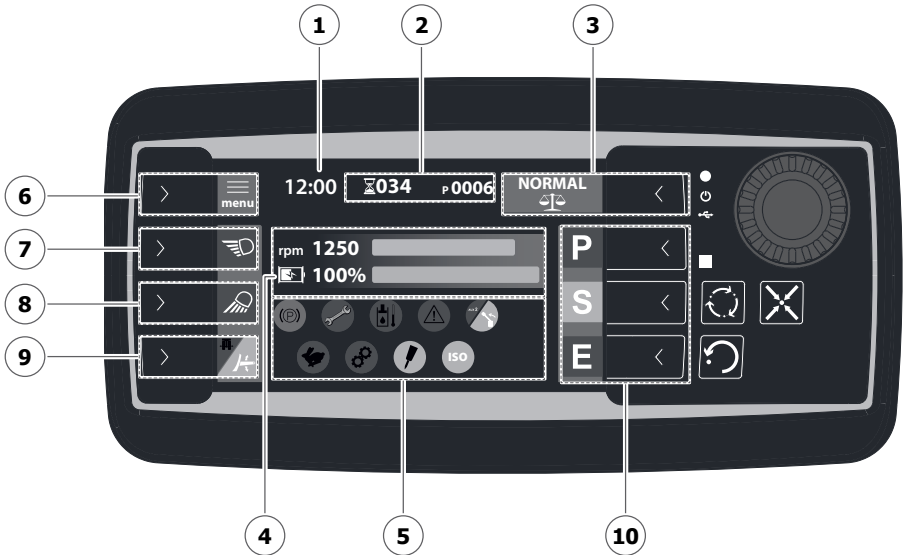
On all screens, if no action is performed after a short period of time, the display will automatically reposition itself on the Home page.



## 6.9 - HOME page

When the machine is turned on, the panel performs an initial check of all the electronics; this procedure lasts about 5 seconds.

Following the confirmation of enabling commands by the operator (refer to section "6.12.2 - Procedure for starting the machine" to page 6-46), the **Home** screen appears, present during normal operation of the machine.



### Key:

|   |   |    |  |
|---|---|----|--|
| 1 | Hour                                    | 6  | Push-button menu and relative icon   |
| 2 | Machine hours                           | 7  | Boom work lights indicator light and button  |
| 3 | Control mode indicator light and button | 8  | Canopy work lights indicator light and button                                      |
| 4 | Engine data and battery data            | 9  | Indicator light and button for dozer blade/undercarriage width adjustment selector |
| 5 | Warning indicators                      | 10 | Indicator lights and work mode management buttons                                  |



### 6.9.1 - Time

This area shows the current time, which can be changed from the dedicated screen, see section "6.10.8.5 - DATE/TIME sub-menu" to page 6-35).



### 6.9.2 - Machine hours

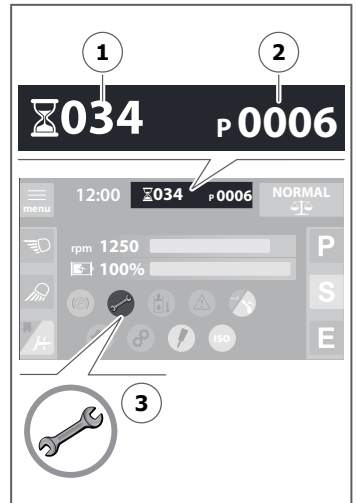
This panel displays the machine's hours of operation, divided as follows:

- **TOTAL** machine hour meter (1);
- **PARTIAL** machine hour meter (2): to reset it (refer to section "6.10.8.3 - PARTIAL HOURS RESET" to page 6-34).

When the periodic maintenance interval expires, the maintenance indicator light (3), represented by a wrench, lights up to indicate that periodic maintenance is required.

When the light (3) turns on, consult:

- the machine hour meter,
- the maintenance register;
- check the maintenance table to determine which operations need to be carried out, see section "8.9 - Periodic maintenance" to page 8-23.

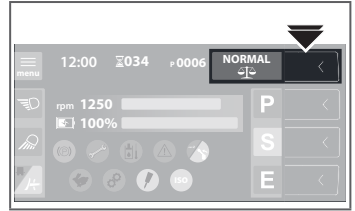


After completing the maintenance operations, the Service Centre will reset the maintenance interval data counter, via the specific SERVICE page, so that the indicator light (3) goes out.



## 6.9.3 - Control mode

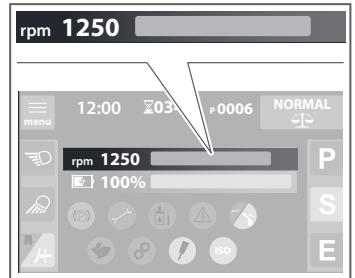
Through the button by the control mode icon, one accesses the **CONTROLS** screen, where it is possible to set the control mode for movements of the machine, see section "6.10.9 - CONTROL MODE screen" to page 6-38.



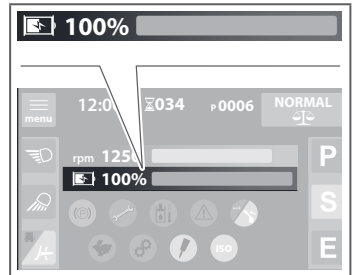
It is possible to select the control mode that will be active each time the machine is switched on, see section "6.10.8.1 - CONTROL START MODE" to page 6-34.

## 6.9.4 - Engine data and battery data

**Engine speed** see section "5.9 - Control panel" to page 5-8.



**Battery percentage indicator** see section "5.9 - Control panel" to page 5-8.





### 6.9.5 - Pop-up messages (information/alarms)

The operator is notified of any warnings via pop-up messages on the display.

The warnings can be **INFORMATIONAL MESSAGES** or **ALARM MESSAGES**.

Some errors are textual and indicate the steps for resolving the problem, other errors appear in code form, for the resolution of these, contact the *Service Department*.

#### 1 - INFORMATION MESSAGES (INFO)

Their purpose is to notify the operator with information concerning, for example:

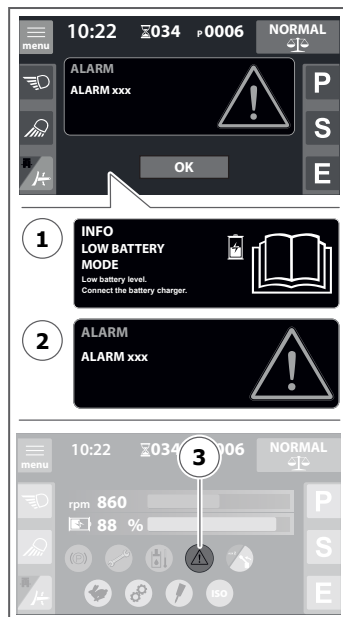
- the battery status;
- periodic maintenance;

#### 2 - ALARM MESSAGES

These messages inform the operator of any machine alarms, such as electronic faults, etc.

The alarm message is also indicated by the indicator light (3) on the display.

All messages, pressing **OK**, are removed from the display.



Some alarms are indicated in section "6.15 - Electrical isolation" to page 6-60.

**If an alarm message is received which is not expressly illustrated in this manual, contact the Service Centre.**



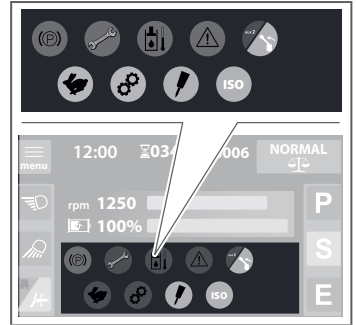
### NOTICE

*The machine features a protection system that is activated when certain errors or malfunctions occur. This system limits the maximum engine speed or stops the engine to prevent the machine conditions from worsening.*



### 6.9.6 - Warning indicators

Refer to section "5.9 - Control panel" to page 5-8.



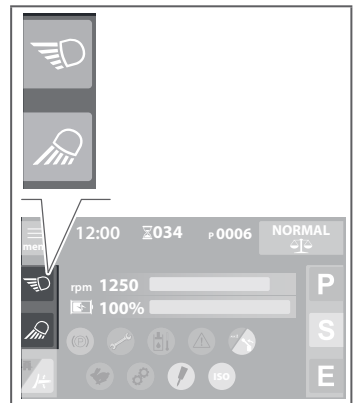
### 6.9.7 - Menu button

Through the button by the icon, one accesses the **MENU** screen, where it is possible to view the machine data and set machine functions, see section "6.10 - MENU screen" to page 6-29.



### 6.9.8 - Work lights switch

Refer to section "6.17 - Work lights" to page 6-61.





### 6.9.9 - Dozer blade mode/undercarriage width indicator light

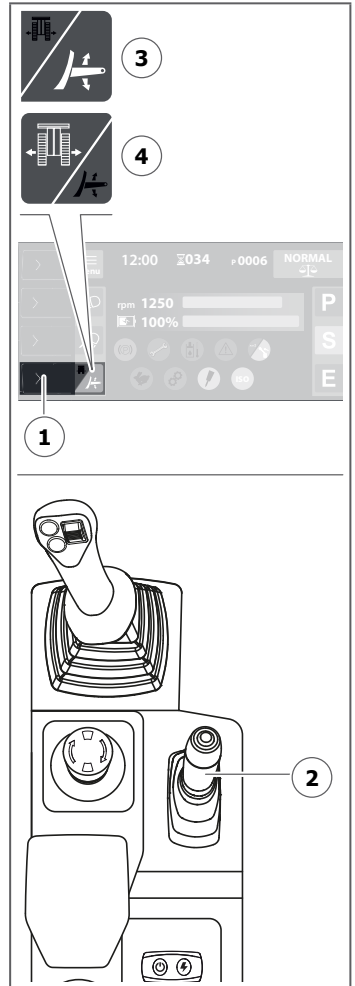
Through this button (1) it is possible to change the function of the lever (2) located on the right console by selecting one of the following modes:

- **dozer blade;**
- **undercarriage width.**

Selection is confirmed by the corresponding indicator light next to the button:

- **dozer blade (3):** this indicator light indicates that the movement of the dozer blade is selected;
- **undercarriage width (4):** this indicator light indicates that the undercarriage adjustment movement is selected.

For lever operation, refer to section "6.23 - Dozer blade control/undercarriage width adjustment lever" to page 6-77.





### 6.9.10 - Work mode management

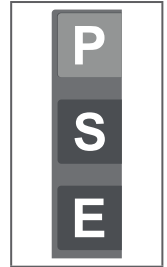
Various work modes can be selected for optimised machine operation, depending on the type of operation to be carried out.

The work mode changes the maximum engine speed and power consumption.

There are three work modes that can be selected by means of specific buttons.

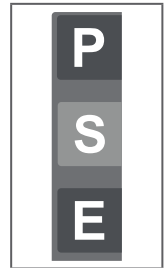
#### POWER

**Maximum performance mode:** suitable for particularly heavy workloads. The engine can reach a maximum speed of **2,800 rpm**, the power consumption will be high.



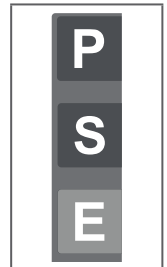
#### STANDARD

**Standard mode:** suitable for normal work operations. The engine can reach a maximum speed of **2,600 rpm**.



#### ECONOMY

**Energy saving mode:** designed to optimise energy consumption. The engine can reach a maximum speed of **2,400 rpm**.

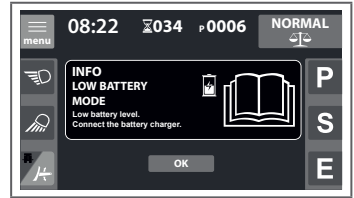




## LOW BATTERY MODE

**Low battery mode:** automatically activates when the battery charge level reaches 10%.

**Remember to charge the battery as soon as possible.**

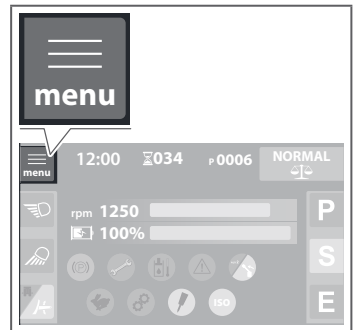


Other work modes cannot be selected when this mode is active.

The engine can reach a maximum speed of **2,200 rpm**.

## 6.10 - MENU screen

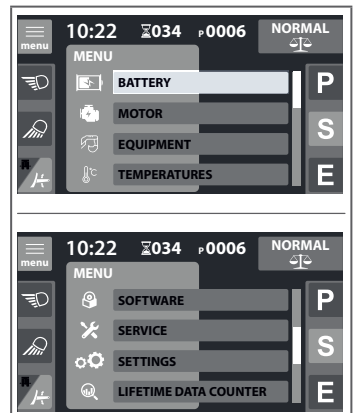
By means of the MENU indicator light button, it is possible to access the machine functions/settings menu.



Turning the navigation hand grip will scroll through the items.

The selected item is highlighted in a different colour than the other items.

Pushing the navigation hand grip to confirm, one accesses the selected submenu.



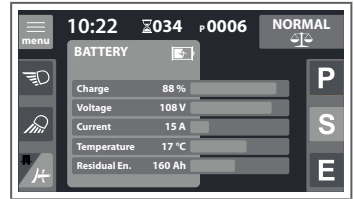


### 6.10.1 - BATTERY screen

It is possible to view all data about the **BATTERY** power.

The data displayed are:

- CHARGE: percentage of available charge;
- VOLTAGE: current voltage;
- CURRENT: current intensity;
- TEMPERATURE: battery temperature;
- RESIDUAL ENERGY: displays the available energy.

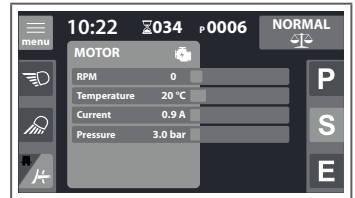


### 6.10.2 - ENGINE screen

It is possible to view all data about the **ENGINE**.

The data displayed are:

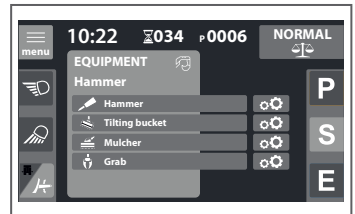
- RPM: number of revolutions of the engine;
- TEMPERATURE: engine temperature;
- CURRENT: current intensity;
- PRESSURE: current hydraulic system pressure.



### 6.10.3 - EQUIPMENT screen

It is possible to view the list of custom equipment. Specific settings for the auxiliary hydraulic systems can be selected for each piece of equipment.

Select the desired equipment to call up the previously saved settings. To change the settings for each piece of equipment, select the icon to the right of the name of the equipment.



The name of the selected EQUIPMENT appears at the beginning of the equipment list, whereas its icon appears on the HOME page.



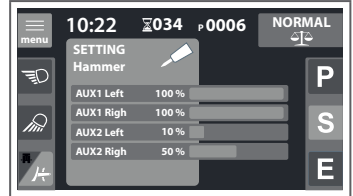
### 6.10.3.1 - Equipment **SETTINGS** sub-menu

Selecting the icon to the right of the implement name in the **EQUIPMENT** screen will access the **SETTINGS** sub-menu. The list of customisable values appears on this screen.

Turn the navigation hand grip to select the setting to be changed, confirm the selection by pressing the same hand grip, turn it to set the desired value and then confirm it by pressing it again.

In particular, the following can be changed:

- The **AUX 1** flow rate value for both hydraulic lines, left and right of the boom;
- The **AUX 2** flow rate value for both hydraulic lines, left and right of the.



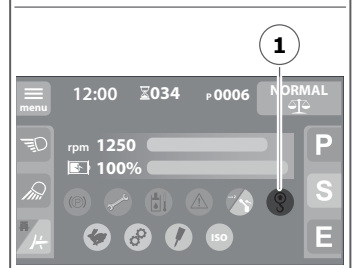
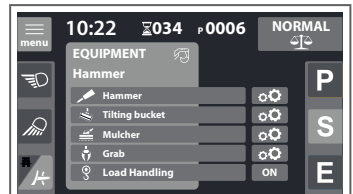
For each piece of equipment, it is possible to customise the parameters for all the auxiliary hydraulic systems available. It is recommended to perform adjustments only on the systems that the equipment actually uses.

### 6.10.3.2 - **LOAD HANDLING** equipment screen (optional)

By selecting the **LOAD HANDLING** item on the **EQUIPMENT** screen, two options can be activated:

- **ON** in order to activate the overload indicator to perform load handling operations. Its activation is signaled by coming on of the light (1) on the **HOME** screen;
- **OFF** to deactivate the overload warning device.

For more details, see section "7.7 - Load handling" to page 7-28.



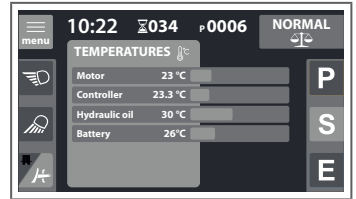


#### 6.10.4 - TEMPERATURES screen

It is possible to view the **TEMPERATURE** values of the various components.

The data displayed are:

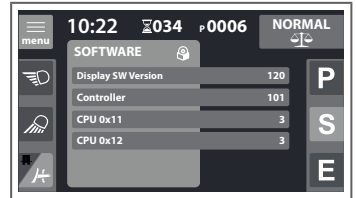
- ENGINE;
- CONTROLLER: engine control device;
- HYDRAULIC OIL;
- BATTERY.



#### 6.10.5 - SOFTWARE screen

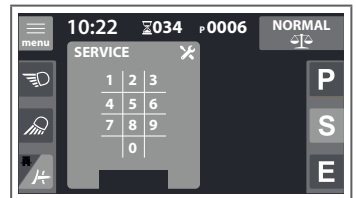
It is possible to view all data about the **SOFTWARE**.

These codes can be useful when requesting assistance or spare parts and they must be communicated to the *Service Centre*.



#### 6.10.6 - SERVICE screen

Screen for entering the password reserved for the *Service Centre*.

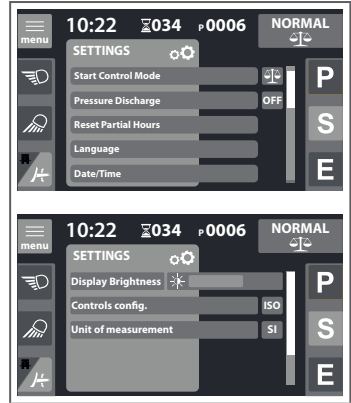




### 6.10.7 - SETTINGS screen

The **SETTINGS** screen has a list of items that can be changed:

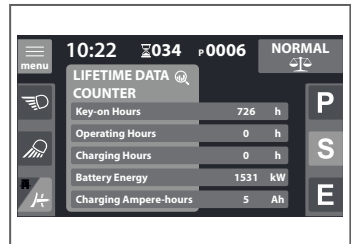
- CONTROL START MODE;
- PRESSURE RELIEF;
- PARTIAL HOURS RESET;
- LANGUAGE;
- DATE/TIME;
- DISPLAY BRIGHTNESS;
- COMMAND CONFIGURATION;
- UNIT OF MEASUREMENT.



### 6.10.8 - LIFETIME DATA COUNTER Screen

The **LIFETIME DATA COUNTER** screen contains meters that analyse the entire life of the machine and of the battery:

- KEY-ON HOURS: time during which the machine was switched on. The data counter is active when the following conditions occur: emergency stop button deactivated, ignition key positioned on 1 and battery not charging;
- HOURS OF USE: time during which the machine was turned on with the engine running;
- CHARGING HOURS: time during which the machine is charging. The data counter is disabled when the charge status reaches 100%;
- BATTERY ENERGY: amount of energy that the battery absorbs during charging for its entire life cycle;
- CHARGING AMPERE-HOURS: amount of current that the battery draws during charging throughout its life cycle.



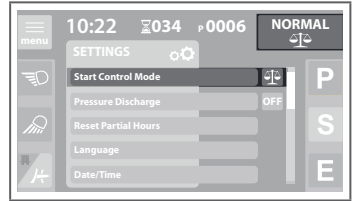
These counters cannot be reset.



### 6.10.8.1 - CONTROL START MODE

By selecting the **CONTROL START MODE** item in the SETTINGS screen, it is possible to select the control mode that will be active each time the machine is switched on

Turn the navigation knob to select the desired setting, confirm the selection by pressing the hand grip.

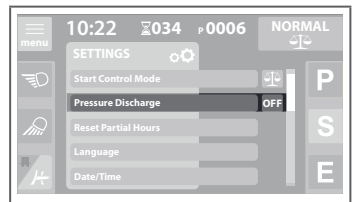


For specific settings, see section "6.10.9 - CONTROL MODE screen" to page 6-38.

### 6.10.8.2 - PRESSURE RELIEF

By selecting the **PRESSURE RELIEF** item in the SETTINGS screen, it is possible to activate two options:

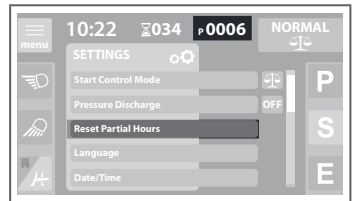
- **ON** when the residual pressure of the hydraulic system is to be released;
- **Off** to resume normal machine operation.



For more details, see section "6.28 - Discharge residual pressure in the hydraulic system" to page 6-90.

### 6.10.8.3 - PARTIAL HOURS RESET

By selecting the **PARTIAL HOURS RESET** item on the SETTINGS screen, it is possible to reset the partial hours counter.

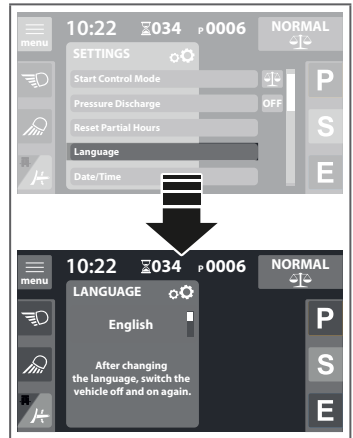




## 6.10.8.4 - LANGUAGE sub-menu

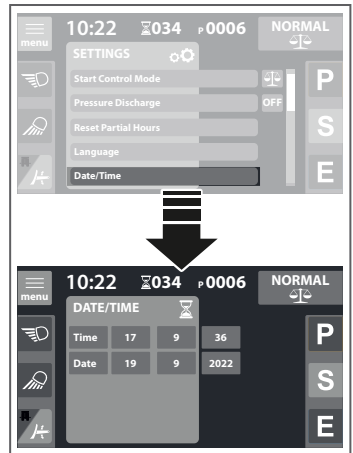
By selecting the **LANGUAGE** sub-menu in the SETTINGS screen, it is possible to select the preferred language.

**Turn the machine off and then on again after changing the language.**



## 6.10.8.5 - DATE/TIME sub-menu

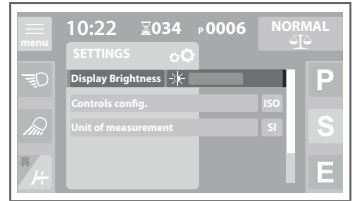
By selecting the **DATE/TIME** sub-menu in the SETTINGS screen, it is possible to set both.





### 6.10.8.6 - DISPLAY BRIGHTNESS

By selecting the **DISPLAY BRIGHTNESS** item in the **SETTINGS** screen, it is possible to adjust the brightness of the display.

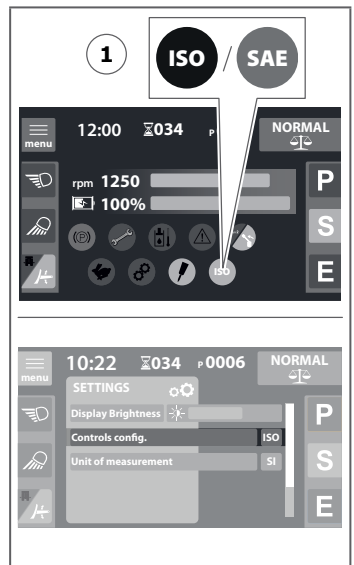


### 6.10.8.7 - COMMAND CONFIGURATION

By selecting the **COMMAND CONFIGURATION** item in the **SETTINGS** screen, it is possible to change the configuration of the commands of the joysticks from the **ISO** (European) standard to the **SAE** (American) standard.

For more information, see section "6.25.3 - ISO-SAE controls layout TPSS function" to page 6-86.

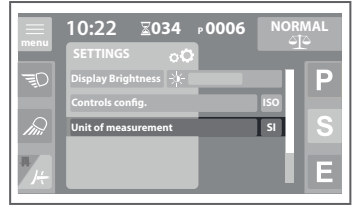
Before starting work, always check which configuration is selected using the appropriate light (1) on the HOME screen.





### 6.10.8.8 - UNIT OF MEASURE

By selecting the **UNIT OF MEASURE** item in the **SETTINGS** screen, you can change the unit of measurement of the data shown on the display from the International Standard (**SI**) to the US Customary System (**USA**).



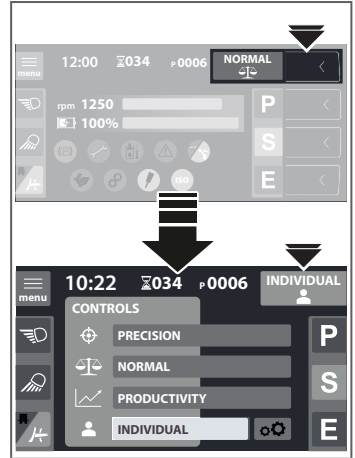


### 6.10.9 - CONTROL MODE screen

Through the button by the control mode icon, one accesses the **CONTROLS** screen, where it is possible to set the control mode for movements of the machine, in particular:

- PRECISION;
- NORMAL;
- PRODUCTIVITY;
- INDIVIDUAL.

The active control mode is indicated by the control mode button.



#### PRECISION

In this mode, the sensitivity of the controls is increased; this allows the machine to perform slow and precise movements.



#### NORMAL

In this mode, the machine performs movements at normal speed.



#### PRODUCTIVITY

In this mode, the sensitivity of the controls is reduced; this allows the machine to perform rapid and dynamic movements.



#### INDIVIDUAL

In this mode, the operator can set the sensitivity of each individual control, see following section.



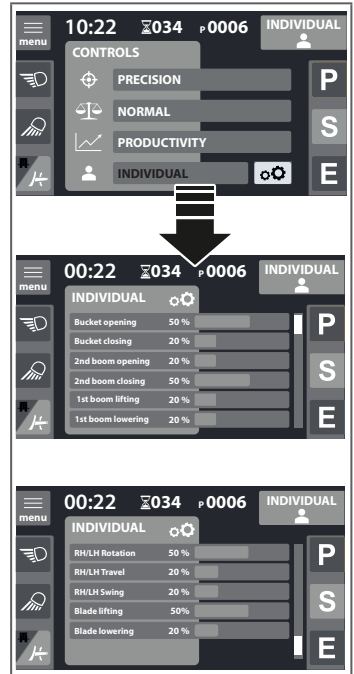


### 6.10.9.1 - INDIVIDUAL sub-menu

Selecting the icon to the right of the CONTROLS screen will access the relative **INDIVIDUAL** sub-menu. The list of customisable values appears on this screen.

For each movement, it is possible to set the maximum speed, shown in percentage, example: 100% corresponds to the maximum speed.

Turn the navigation hand grip to select the setting to be changed, confirm the selection by pressing the same hand grip, turn it to set the desired value and then confirm it by pressing it again.





### 6.11 - Visibility

During machine operation, constantly check the surrounding area in order to identify any potential hazardous s in advance as soon as they become visible.

Pay particular attention when moving. More information on how to configure the machine is provided below.

The machine can be equipped with devices to improve visibility, such as rear-view mirrors; refer to the procedures below for instructions on how to use them.

The employer must organise the construction site in such a way as to minimise risks caused by poor visibility.

Some events to pay attention to are listed below:

- well-defined routes for each vehicle;
- presence of personnel directing traffic;
- safety signs on the machine or vehicles;
- a communication system between machine operators;
- a communication system between personnel and operators of the machines.

**Changes to the configuration of the machine by the operator, with consequent reduction of visibility, ARE FORBIDDEN.**



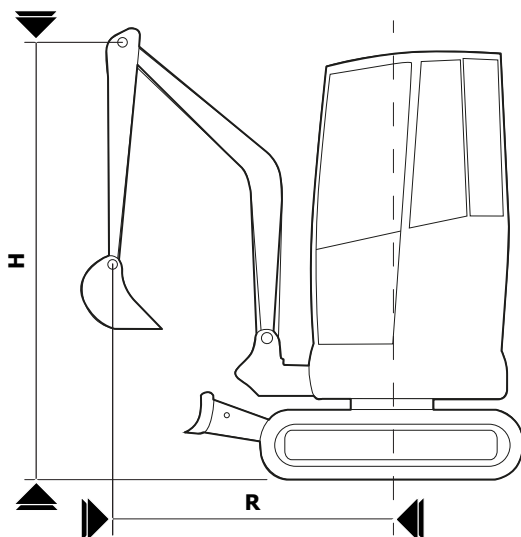
## 6.11.1 - Travel position

To move, keep the machine configured as indicated below.

- move the boom to a swing angle equal to **0°** (if present);
- lift the first boom completely;
- position the digging boom vertically;
- position the bucket as indicated in the figure;
- raise the dozer blade completely;
- An illustrative image is shown below.

If it is not possible to follow the instructions provided with the equipment installed, it will be necessary to:

- adjust the position of the booms as closely as possible to the indications listed above, ensuring a distance of **approximately 400 mm** between the ground and the equipment itself;
- ensure that the site is properly organised to minimise the risks of limited visibility.



|          |  |            |
|----------|--|------------|
| <b>H</b> | Height from ground at centre of pin of first/second boom                     | ~ 2,300 mm |
| <b>R</b> | Distance from the centre of the slewing ring to the centre of the bucket pin | ~ 1,900 mm |



### 6.11.2 - Adjusting the rear view mirrors

The rear-view mirrors are installed as standard on the cab version, while they are an optional accessory on the canopy version.



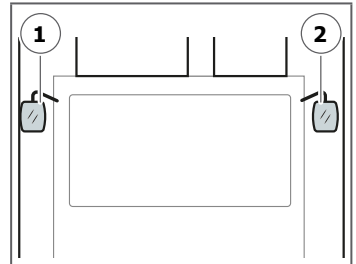
## WARNING

***Adjust all rear-view mirrors as indicated in this manual.***

The machine can be equipped with rear-view mirrors installed on the machine:

- 1** - left side (**1**);
- 2** - right side (**2**).

The rear-view mirrors improve visibility in the area surrounding the machine.



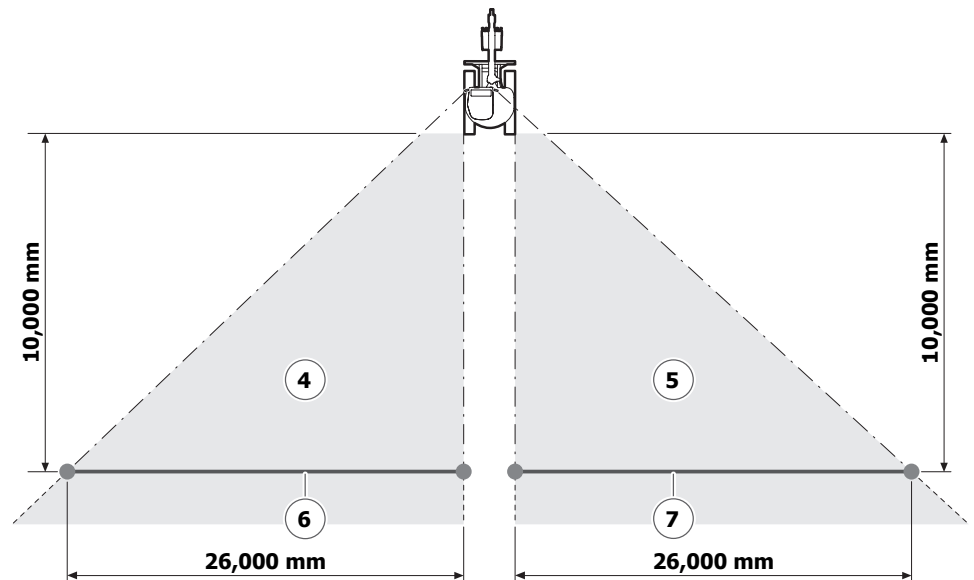
Before starting the machine or each time the operator changes, it is necessary to make sure that the rear-view mirrors are not damaged, that they are clean and that they are adjusted according to the following procedures.

It is advisable to use the help of an operator outside the machine who must move the mirrors while the operator in charge of driving the machine is sat in the driver's seat with the seat belt fastened, providing instructions for correct adjustment.



### Adjusting the side mirrors:

- park the machine on a level surface, with plenty of space and without any obstacles;
- lower the equipment and the dozer blade to the ground;
- retract the undercarriage to the minimum track width;
- raise the control cut-out lever and stop the engine;
- adjust the rear-view mirrors so as to ensure the visibility of the area indicated in the figure; adjust them from the ground without climbing onto the tracks or any other parts of the machine; if they cannot be reached from the ground, use an approved ladder;
  - use the left side mirror to view the area (4);
  - use the right side mirror to view the area (5);
- the area indicated (4-5) is measured at ground level;
- be sure to see the ground indicated by the line (6-7);
- be sure to also see part of the machine.



**NOTE:** picture not to scale.



## 6.12 - Starting the machine

### PRECAUTIONS WHEN STARTING THE ENGINE

- Start up and run the machine exclusively from the driver's seat.
- On starting the engine, sound the horn to warn everyone.
- Do not allow unauthorised persons to get on the machine.

#### 6.12.1 - Checks prior to the start up

Always perform all checks in this section before starting the machine.

Neglecting any of the checks may result in problems being experienced with the machine, including the hydraulic equipment.



## CAUTION

***Carry out checks and maintenance operations before starting the machine.***

***Keep unauthorised persons away from the machine while checking it.***

The checks and inspections to be performed before starting the engine are:

---

### 1 PERIODIC MAINTENANCE

Perform the reading of the hour meter to check whether periodic maintenance is required, see section "8.9 - Periodic maintenance" to page 8-23.

---

### 2 CHECKING THE MACHINE FOR LEAKS

Check the whole machine for any liquid leaks, even if slight.

Leaks can lead to malfunctions and machine breakdown.

It is necessary to check all the parts present: flexible and rigid pipes, hydraulic jacks, pumps and motors.

---



### **3 CLEANING THE MACHINE**

Check the cleanliness of the machine so as to avoid any operating problems or faults occurring while the machine is working.

Clean away from the machine all material that has built up during use (e.g. dirt, dust, stones, grass, etc.), especially in the movement and articulation are.

Check the outside as well as the inside of the machine to avoid any manoeuvrability problems during operation.

---

### **4 CHECKING THE MACHINE FOR WEAR**

Check the machine for any signs of worn or missing parts.

If so, replace or restore them prior to starting up the machine.

---

### **5 CHECKING THE TRACKS FOR WEAR**

Check to ensure the tracks show no signs of cracks, breaks or excessive wear, and their tension is correct (see the section on maintenance for adjustment procedures).

---

### **6 STATUS OF EQUIPMENT**

Check the equipment installed on the second boom in order to ensure that it has been properly installed and fixed in place, as indicated in the manuals of the respective manufacturers.

Check the wear and inspect for signs of oil leaks or accumulation of debris on the equipment, in which case immediate action must be taken to repair the leaks and remove the debris to avoid machine malfunction.

---

### **7 EMERGENCY STOP BUTTON**

Make sure that the emergency button on the machine is deactivated, see section "2.8.4 - *Emergency stop button*" to page 2-49.

---

### **8 POSITIONING OF REAR-VIEW MIRRORS (IF PRESENT)**

Make sure the rear-view mirrors are intact and correctly positioned so as to ensure the complete visibility around the machine.

---



### **6.12.2 - Procedure for starting the machine**

Before starting the machine, learn the procedure described in the following pages.

Each command, indicator and indicator light involved in starting the machine and in checking the condition of the machine when it is started is listed in the order in which the operator encounters them.



## **WARNING**

***Before starting the machine, carefully study the safety indications and function of the controls described in this manual.***

***After starting the machine, the operator is directly responsible for any damage that may result from failure to comply with the instructions in this manual and with the laws in force.***

***Only start the machine when the operator is sitting in the driver's seat and with the seat belt fastened.***

***Before starting the machine, check that there are no persons within the machine's operating range and then signal the starting with the horn.***

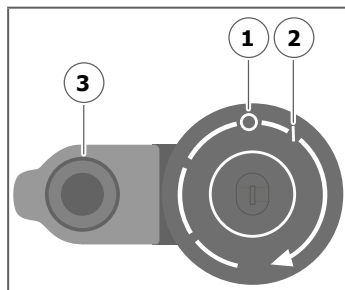


## IGNITION SWITCH

The starter switch and other locks used on this machine use the same key.

The starter switch has two positions:

- 1 - "OFF";
- 2 - "STARTING EQUIPMENT".



### 1 - OFF POSITION:

When the key is absent or in this position, **the machine is OFF**, and does not supply electrical power to any function; in this position the key can be inserted or removed.

While the machine is switched on, turning the key to the OFF position will turn off the machine.

### 2 - STARTING EQUIPMENT POSITION:

When the key is inserted and moved to this position, **the machine is SWITCHED ON**.

If the machine does not turn on, check the position of the emergency stop button switch, see section "2.8.4 - Emergency stop button" to page 2-49.



## NOTICE

*Once the key has been removed, close the cover (3), if present, to protect the starter switch from the elements, which could cause faults.*

---



## MACHINE STATUS INDICATOR LIGHT

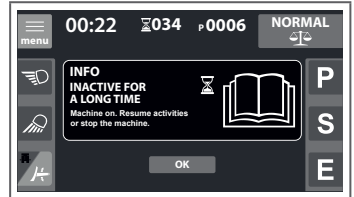
This light indicates that **the machine is SWITCHED ON.**

The light will only go out when the ignition key switch is turned back to the **OFF** position.



## NOTICE

When the machine is switched on and no movement is carried out, it remains one when entering in **IDLE mode FOR A LONG TIME (also called IDLE)**: the engine speed values are reset while **the machine controls remain operational.**



If the idle mode lasts for a long time, a message appears on the display and the machine beeps to remind the operator that it is switched on.



## WARNING

**Always check the machine status light to see if the machine is switched on.**

**In idle mode, the machine does not emit sound, but remains switched on and the controls are operational. Avoid distractions, the activation of an undesired control command could cause involuntary movements and serious injuries.**

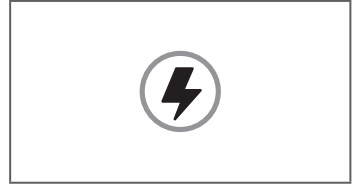
**When the work is complete, check that the ignition light is off before leaving the machine.**



## MACHINE CHARGING STATUS INDICATOR LIGHT

This light will turn on to indicate when the machine is charging, the machine cannot be operated in this state. At the same time, the display shows the charging status.

To restore normal working functionality, see section "6.14 - Machine charging mode" to page 6-53.



## START-UP

After you have learned the procedure, proceed to starting the machine.

Before starting work operations, make sure you have learned the following indications.

## DISPLAY

When the display is turned on, the commands are disabled. To enable the commands, press the **OK** button (navigation hand grip) to confirm the message **(1)**.



No errors should appear on the display, if there are any, stop and start the machine again. In this way, the system can recover from errors by restarting. If the errors are still present, see section "6.9.5 - Pop-up messages (information/alarms)" to page 6-25.



## BATTERY LEVEL INDICATOR

This indicator shows the percentage of battery charge.



Before starting work, check the battery charge level indicated by the gauge, if the value is **less than or equal to 10%**, it is necessary to charge the machine.

When the battery charge level drops below the indicated limit, the machine enters the **low battery mode** and the performance is automatically reduced, this situation is indicated on the display with appropriate messages; proceed to charging the machine as soon as possible.



## **NOTICE**

*Maintain a charge of between 20% and 80% to ensure longer battery life.*

*For information on charging the machine, see section "6.14 - Machine charging mode" to page 6-53.*

---

## TRAVEL HORN

Before starting work, check that the travel horn is working, if not stop the machine and have the horn repaired.

**Refer to the following sections to learn the work modes.**



### 6.13 - Battery power



## WARNING

***Do not tamper with the battery, it contains chemicals that can cause fire and serious health problems.***

***Respect the machine use temperatures indicated in section "1.7 - Prohibited use" to page 1-14.***

The machine is powered by a rechargeable lithium-ion battery positioned on board.

The battery is very sensitive to ambient temperature, the optimum temperature range (within which the battery has the best performance) is between **+5°C and +45°C**.

An integrated system in the battery monitors its temperature: when the machine is started or during charging, if the temperature is below a certain level, the system warms up the battery.

During the heating of the battery (indicatively between **-15°C** and **-10°C**), the performance of the machine is reduced; when the battery reaches the ideal temperature, it will deliver maximum performance again.

The battery heating is automatically switched on/off without notice or indication to the operator.



## NOTICE

*When the machine is out of service, store it at a temperature between +5°C and +45°C to ensure a longer battery life.*

---



**Charging conditions based on ambient temperature/machine usage**

| Temperature<br>Duration of inactivity | <-30°C | >-30°C<br><-15°C | >-15°C<br><+50°C | >+50°C |
|---------------------------------------|--------|------------------|------------------|--------|
| Up to 24 hours                        | •      | /                | /                | •      |
| Up to 4 weeks                         | •      | •                | ○                | •      |
| Over 1 month                          | •      | •                | •                | •      |

**Key:**

- Continuous charging / Charge not strictly necessary
- At least one full charge before storing the machine

The battery guarantees maximum performance when the charge level is above 10%.

When the battery charge level drops below the indicated limit, the machine enters the **low battery mode** and the performance is automatically reduced, this situation is indicated on the display with appropriate messages; proceed to charging the machine as soon as possible.

If the display does not come on after the ignition key has been switched on, the cause could be that the battery is completely discharged (0% charge level). Proceed to charge the machine and wait at least **60 minutes** before starting the machine; if the problem persists, contact the *Service Centre*.

**The battery requires no maintenance, so any work on it is prohibited, only the Service Centre can intervene in the event of a fault.**



**NOTICE**

*At the end of the work it is always recommended to charge the battery.*

*Prolonged periods of low battery power damage the battery. If the charge is less than 10%, charge within one week.*



## 6.14 - Machine charging mode



### DANGER

***Do not charge the machine if the connecting cables and their connectors are damaged. A damaged component exposes people to a risk of electrical discharge that could cause serious injury or death.***



### WARNING

***The operator is the only person authorised to charge the machine. Charging operations must be carried out from the ground. Pay attention to cables, there is a risk of tripping.***

***No person is allowed on board the machine during charging.***



### WARNING

***For charging, place the machine and the accessories used for charging in a covered, dry place where they are not in the way of people or vehicles.***

***When charging the machine, the temperature of the components inside the rear cover may be high and may cause burns. Avoid touching hot components indicated by the safety signs.***

***The characteristics of the mains supply and the type of socket must comply with those indicated in the following sections.***

The battery can be charged at any time of the day to increase the available energy, even if it is not completely discharged. It supports a large number of charge and discharge cycles even if they occur in multiple partial sessions or in full sessions.

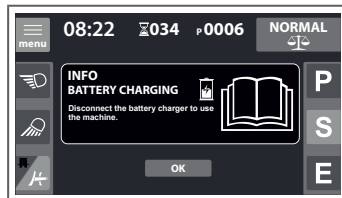
- **Partial charging** session: a charging operation in which the battery charge level DOES NOT reach 100%.
- **Full charging** session: the charging operation, carried out with the machine switched off, in which the battery charge level reaches 100%.



The battery must be charged with the machine in the park position (machine off).

If the machine is switched on while charging, a notice message appears on the display.

In this situation, all commands are disabled.



To keep the battery in good condition, follow these guidelines:

- perform at least a **full charge** once **every 4 weeks**, while the machine is not in use;
- perform at least one **full charge** once a **week**, during the period when the machine is in use;
- charge when the charge level indicator mark is **less than or equal to 10%**.

A system integrated into the battery monitors its temperature, if the battery temperature is below a certain level, the battery will warm up before starting charging.

In cold weather, the battery charge can be automatically inhibited or slowed down.

The charging time can vary depending on different factors, the charging current, the ambient temperature, battery charge status, the time elapsed since the last charge.

When charging, make sure that no person or other vehicles can approach the machine, cable and portable battery charger (if present).

The battery can be charged only:

- with **on-board** battery charger;
- with **portable** battery charger (optional).

Both modes draw power from an electrical mains.

The connection to the mains and/or to the machine is made with cables equipped with connectors. Remove the connectors by grasping them, avoid yanking at the cable.

Protect connection cables from heat, oil, sharp edges or moving parts of equipment.



The cables and their connectors must NOT be changed.

DO NOT use adapters or multi-way adapters.

Electrical extension cables can only be used if they comply with current standards and have the **same or superior characteristics** compared to the cables to be extended. The use of charging cable extensions (between the battery charger and the machine) is PROHIBITED when using the portable battery charger.



### **NOTICE**

*Maintain a charge of between 20% and 80% to ensure longer battery life.*

*Do not connect both chargers at the same time, the battery could receive excessive stresses which could damage it.*

---



### 6.14.1 - On-board battery charger

The on-board battery charger is located inside the machine within the rear compartment where a cable is located to connect to the mains.

The mains power supply and its socket must comply with the standards in force and have the following characteristics:

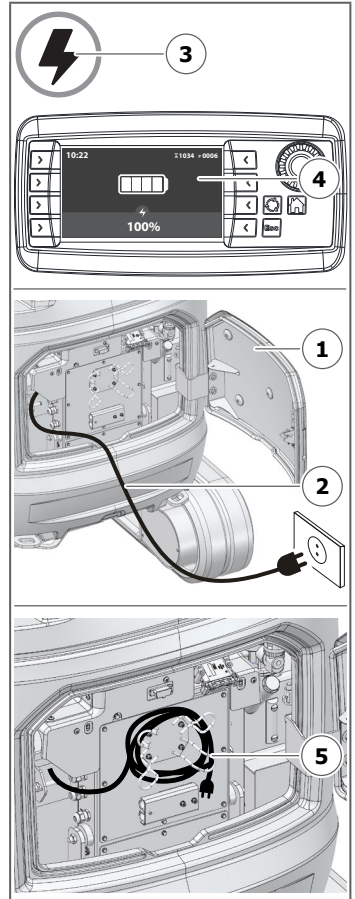
|                     |                            |           |            |
|---------------------|----------------------------|-----------|------------|
| Rated voltage       | V                          | 85/150 AC | 200/265 AC |
| Phase and frequency | Hz                         | 50/60     | 50/60      |
| Rated current       | A                          | 12        | 16         |
| Power               | W                          | 1330      | 3700       |
| Plug type           | IEC60309 2P+E or NEMA 6-20 |           |            |

To **charge** the battery:

- position the machine on an area with a compact surface, if possible levelled and in which the movement of persons or other vehicles is not obstructed;



- lower the equipment and the dozer blade to the ground;
- stop the machine;
- get off the machine and open the rear cover (1);
- **fully** unwind the charging cable (2) and connect the plug to the mains socket;
- while charging, the rear cover must remain open;
- charging starts immediately and is indicated by the light (3) coming on and by the display lighting up and showing the charging status (4);
- it is possible to stop charging at any time;
- when charging is complete, the power consumption will be stopped automatically, the indicator light (3) will remain on to indicate that the charging cable is connected;
- when the desired charge has been completed or the complete charge has been reached, disconnect the plug from the mains, the indicator light (3) goes out;
- rewind the cable (2) into the cable holder (5), close the rear cover (1).



## NOTICE

*Keep the rear cover open during charging to allow the heat to be disposed of.*



### 6.14.2 - Portable battery charger (optional)

The portable battery charger is external to the machine and must be transported to the charging location by a suitable means.

The portable battery charger has two cables, the charging cable that connects to the machine and the power supply cable that connects to the mains.



## WARNING

***The portable battery charger or the electrical network to which it is connected must be equipped with TYPE B differential switches.***

***The recharging cable (from the portable battery charger to the machine) must be covered with adequate protective corrugated element to prevent damage to the cable and the possible dispersion of electrical energy on the machine frame.***



## NOTICE

*The portable battery charger must always be placed in a covered, ventilated area, away from heat and flammable materials, rain or water jets.*

*The portable battery charger must be of the type indicated and authorised by the machine manufacturer; for further details, contact the Service Centre.*

*Always consult the manual supplied by the manufacturer of the battery charger.*

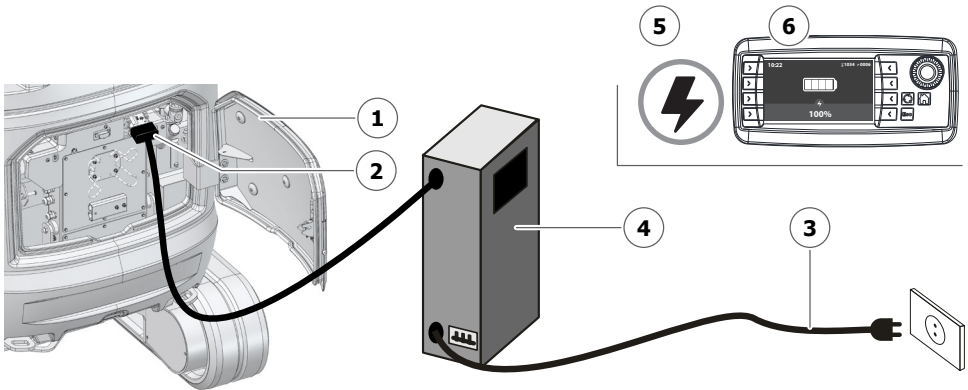
---

To **charge** the battery:

- position the machine on an area with a compact surface, if possible levelled and in which the movement of persons or other vehicles is not obstructed;
- lower the equipment and the dozer blade to the ground;
- stop the machine;
- get off the machine and open the rear cover (1);
- connect the charging cable from the portable charger to the socket (2) of the machine;
- connect the power cable (3) of the portable battery charger (4) to the mains socket;
- activate the battery charger as indicated in the relative user manual;



- charging is indicated by the light (5) coming on and by the display lighting up and showing the charging status (6);
- it is possible to stop charging at any time;
- when charging is complete, the power consumption will be stopped automatically, the indicator light (5) will remain on to indicate that the charging cable is connected;
- once the desired charge is complete or full charge has been reached, deactivate the charger then disconnect the plug (3) from the mains, the indicator light (5) turns off;
- disconnect the charging cable from the socket (2) and close the rear cover (1).



### **NOTICE**

*Keep the rear cover open during charging to allow the heat to be disposed of.*



## 6.15 - Electrical isolation



# WARNING



***IT IS FORBIDDEN to carry out work and/or maintenance operations when the electrical isolation alarm is shown on the display; people could be exposed to a risk of electric shock. Contact the Service Centre as soon as possible.***

The machine is equipped with a system that constantly monitors the correct isolation of the electrical components.

In the event of anomalies, the following alarm is shown on the display; the precautions to be taken are described below:

- interrupt work;
  - drive the machine on a flat, levelled surface;
  - choose an area where the machine will not get in the way of people or other vehicles;
- ALARM**  
**LOSS ELECTRICAL**  
**INSULATION**

ALARM xxx  
Contact customer service

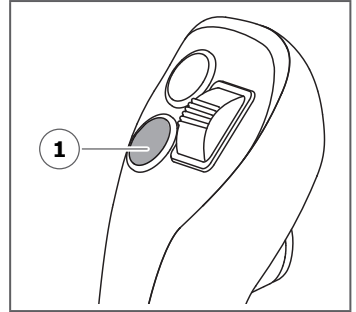


- lower the equipment and the dozer blade to the ground;
  - stop the machine, remove the ignition key and get off;
  - cordon off the area around the machine to prevent people from approaching it and to make sure that no one can use the machine until the fault has been repaired;
  - contact the *Service Centre* to request a repair intervention.



## 6.16 - Horn

The horn button (1) is located at the bottom of the left joystick and is activated when the ignition key switch is set to the "STARTING EQUIPMENT" position.

Sound the horn every time you climb aboard and start working, use it especially when it is noticed that anyone in the vicinity is in danger.



## 6.17 - Work lights

On the machine there are **working lights** that are to be used when visibility is low:

**As standard**, there are:

- **no. 1 light** on the first boom.

On request, (**optional**) the following are available:

- **no. 2 lights** on the front canopy.

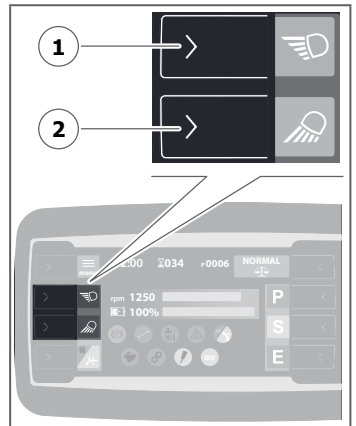
The standard lights are controlled using the (1) button.

The optional lights are controlled using the (2) button.

Their lighting is confirmed by the indicator light located next to the relative control button.

**First press** (indicator light on): lights ON.

**Second press** (indicator light off): lights OFF.





## 6.18 - Operating at low temperatures



### CAUTION

***It is not possible to operate at temperatures below -30°C.***

For battery precautions refer to section "6.13 - Battery power" to page 6-51.

At low ambient temperature (below +5°C) the viscosity of the oil increases, in these conditions, it is possible to have difficulty in using the machine immediately after the first cold start. It is important to use an oil suitable for low temperatures, to select one, take advantage of the recommendations of the *Service Centre*.



### NOTICE

*When starting at low temperatures, work at low speed for 10 minutes, this allows the oil to reach normal operating temperature.*

---

## HYDRAULIC OIL

Use oil that is suitable for low temperatures, see section "8.7.3 - Hydraulic system oil" to page 8-16.



## 6.19 - Precautions during operation



# WARNING

***The control devices must only be operated from the driving position. Using the controls from the ground may cause serious injuries or death.***

***Learn the position and operation of: controls, instruments and indication lights, then check that they are working correctly. If abnormal operation occurs, stop the machine immediately and call the Service Centre.***

***Do not use the equipment for lifting people or as a work platform.***

***Never transport other persons.***

***Avoid making sudden, sharp movements.***

***At low temperatures (below +5°C), follow the instructions given in the relevant section before starting the normal work operations.***

***When working on uneven ground, always proceed slowly and operate with the bucket or equipment as low as possible.***

***Carefully check the conditions of the area in which you will be working, in order to ascertain whether there are any anomalies in the terrain that could make the work hazardous.***

***If possible, level the ground of the work area, prior to starting operation.***

***Note the position of any overhead or buried pipes or electrical cables, as well as any open or filled trenches.***

***When travelling, move carefully near the edge of excavations or trenches, and exercise extreme caution in cramped working spaces, or when working on uneven or steeply sloping ground.***

***Never try to start or use the machine unless you are sitting in the driver's seat.***

***Only use the controls when you are sure of the movement the machine will make and do not take any chances if you're unsure, especially in obligatory work conditions or in the presence of dangers for your safety or the safety of others.***





## **WARNING**

***Do not rest the feet on the control pedals when not in use; rest your feet on the floor, or, alternatively, on the supports provided at the side of the travel levers (if present).***

***Use extreme caution when moving over uneven ground with kerbs or railway lines; drive slowly so as not to lose machine stability.***

***Do not use the bucket as battering ram. When working on slopes, always keep the bucket lowered.***

***Never stand under the raised bucket.***

***Do not try to crush concrete or boulders using the sideways motion of the bucket.***

***Do not free-fall the bucket during excavation.***

***Do not travel nor dig with the bucket stuck into the ground.***

***Do not use this machine to lift or move materials under any circumstances, if not using appropriate and dedicated optional equipment, at all times following the specific warnings.***

***While reversing:***

- before commencing any movement, check that there are no persons or obstacles in the surrounding area;***
- if there are areas where the operator has poor visibility, place a person in charge of reporting, this person must ALWAYS be in a safe area at an adequate distance from the machine;***
- take particular care not to bump into other machines or persons when turning or rotating the machine;***

***During work, always check that the site conditions (e.g. weather conditions) do not change from what was initially checked, in which case, take appropriate precautions.***





## **NOTICE**

*When driving or transporting the machine with the booms collected, do not allow the bucket to strike against the blade.*

*After having operated in mud, always clean and inspect the machine and grease the pins on the bucket, the swing post, or any other parts that have been submerged.*

*Washing with water jets can only be carried out with hoods and covers closed. Keep a distance of at least one metre from the machine and direct the water spray towards the undercarriage.*

*Digging with the booms on the opposite side of the blade prevents the cylinder of the first boom from striking against the blade.*

*Do not operate the digging boom with brusque movements, especially if moving downwards: the track frame could get damaged.*

*Ensure that the rear of the machine does not hit anything while turning.*

*Before starting to work, always make sure the equipment installed does not collide against the booms.*

*During excavations in depth, make sure the cylinder of the digging boom and the second boom are not accidentally hitting the ground.*

*Do not try to move rocks or similar objects using the blade: it can damage both the blade and its cylinder.*

---



## 6.20 - Stopping and parking the machine



### **WARNING**

***Avoid as much as possible parking the machine on slopes.***

Procedure for stopping and parking the machine:

- drive the machine on a flat, levelled surface;
- choose an area where no falling of rocks nor landslides are possible;
- choose an area where the machine does not block pedestrians or other means and however, in an area permitted according to the standards in force;
- align the turning frame to the undercarriage so that the dozer blade stays near the boom;
- Enable the slewing lock (if provided);
- lower the dozer blade and the equipment to the ground;
- turn the starting equipment key switch to **OFF** and remove the key;
- press the emergency stop button, as indicated in section "2.8.4 - Emergency stop button" to page 2-49;
- open the controls cut-out lever, making sure that it comes up all the way;
- Get off the machine;
- close the controls cut-out lever so that the machine is more compact in the parking position;
- lock all covers present, see section "8.3 - Guards" to page 8-7.



### **NOTICE**

*It is not necessary to enable the parking brakes, they get enabled automatically.*

---





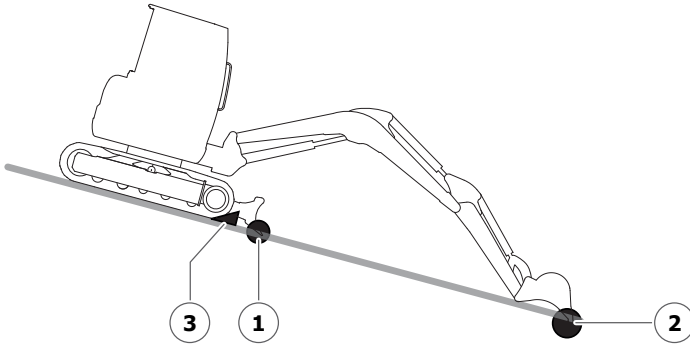
## WARNING

***Do not get off the machine with the equipment raised, always lower it to the ground.***

***Do not leave the machine turned on.***

Should it be unavoidable to park the machine on a slope it is necessary to:

- it is necessary to check that the slope is **less than 10°**;
- point the dozer blade down the slope and dig it in the ground (**1**);
- position the bucket down the slope and make sure the teeth of the bucket are dug in the soil (**2**), if no equipment that can be dug into the ground is present, just rest the bucket to the ground;
- block suitably (using wedges **3**) both tracks.





## 6.21 - Machine movement

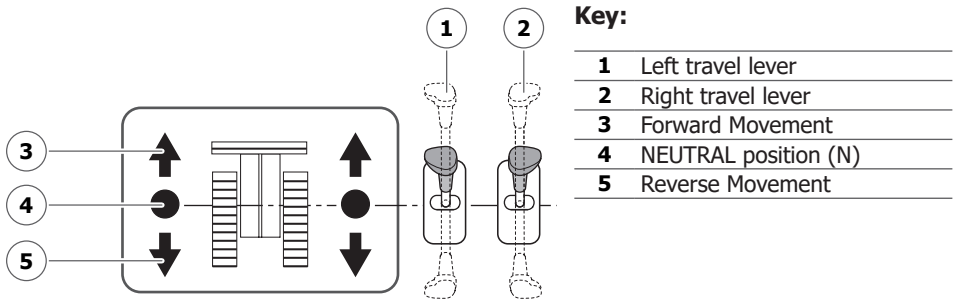
**For safe machine movement, always move the travel control levers slowly and smoothly. Operators which are not familiarised with tracked machines should initially operate the machine at 50% of its maximum travel speed until they master the control function and feel confident on the machine.**

The travel levers control the machine FORWARD and REVERSE motion, as well as LEFT and RIGHT steering and braking. The left lever controls the left track, while the right lever controls the right track.

The functions of all controls are locked when the control cut-out lever is open to the outside for entry/exit operations into/from the machine. To enable the controls, the control cut-out lever must be fully closed, see the procedure in section "6.6 - Controls cut-out lever" to page 6-8.

With both levers in the **NEUTRAL** position (**N**), both tracks are motionless and hydraulic braking is engaged on the travel engines.

- Whenever either lever is moved from its **NEUTRAL** (**N**) position, the brake for the related track drive is released and movement starts.
- Whenever either lever is returned to its **NEUTRAL** position (**N**), the movement of the respective track drive ceases and braking is engaged back.





During movement of one or both tracks, in any direction, the travel horn will sound intermittently to warn any persons in the vicinity of the movement of the machine. The horn is of the "smart" type: it adapts the sound level to the noise in the environment so that the sound is always clearly audible.



### **NOTICE**

*Unless specifically noted, all references to direction in this manual, including travel and turn instructions, are deemed to be from the operator's point of view and with the dozer blade at the front.*

*The travel control levers operate the track drive engines mounted on the undercarriage.*

*The machine movements depend on the driver's orientation; if the operator is turned 180° in relation to the dozer blade, the machine movements are the opposite of those indicated in the operating instructions.*

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### **NOTICE**

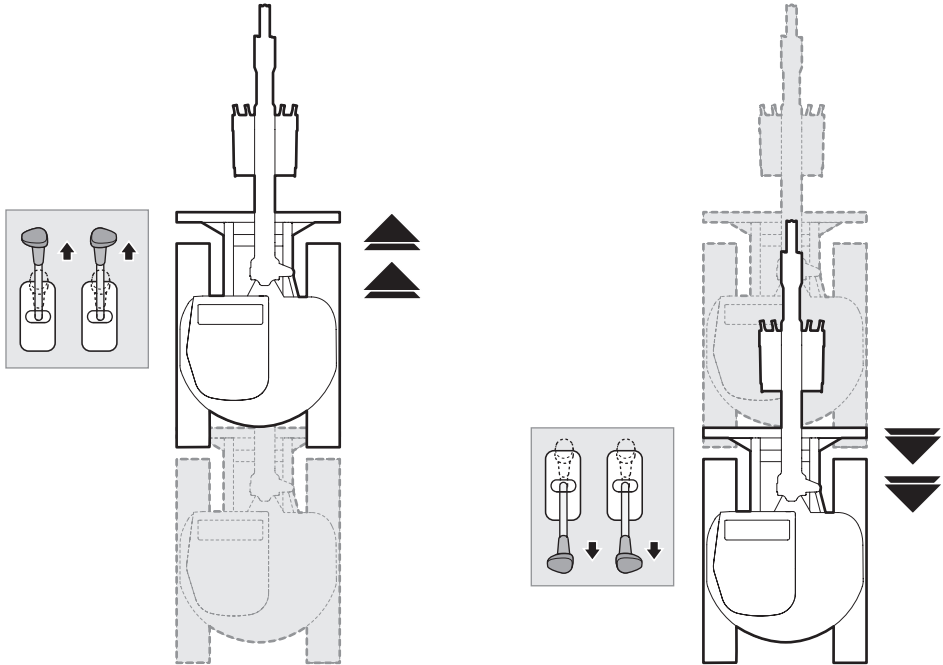
*Both the hand travel control levers have projecting pedals near the bottom of each lever.*

*These pedals allow the operator to operate the tracks without removing his/her hands from the joysticks.*

---



### 6.21.1 - Forward and reverse travel



To begin **FORWARD** travel, move both control levers forward equally. As additional pressure is applied on the control levers, the machine speed will increase. To STOP the forward travel, return slowly both controls to their NEUTRAL (N) position.



### **NOTICE**

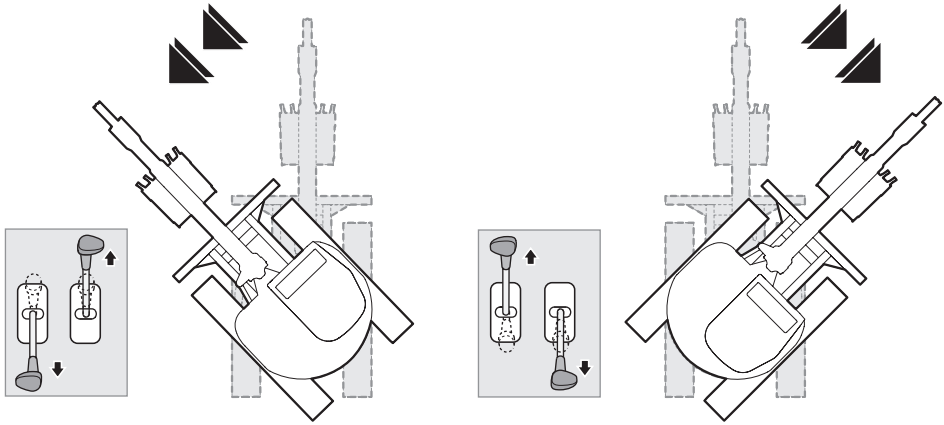
*Any forced, quick return of either travel control levers to the NEUTRAL position will cause an immediate braking response from the respective track drive.*

To travel in **REVERSE**, pull back slowly on both control levers. The further the controls are moved, the more the speed of movement will increase. To STOP REVERSE travel, slowly return both controls to their NEUTRAL (N) position.



### 6.21.2 - Pivoting the machine around its axis

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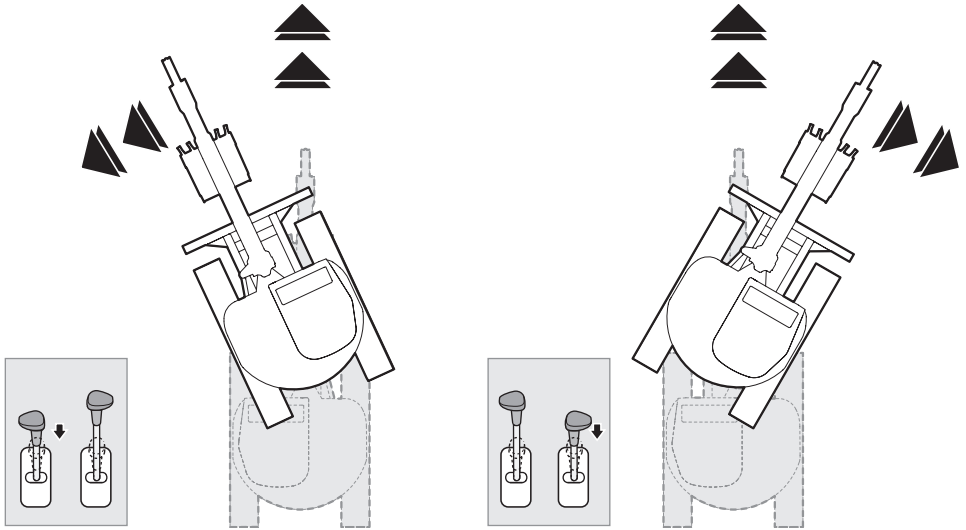
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To pivot the machine to the **LEFT** on its axis, push the right control lever forward while pulling the left lever to the rear.

To pivot the machine to the **RIGHT** on its axis, push the left control lever forward while pulling the right lever to the rear.



### 6.21.3 - Turning while moving forward



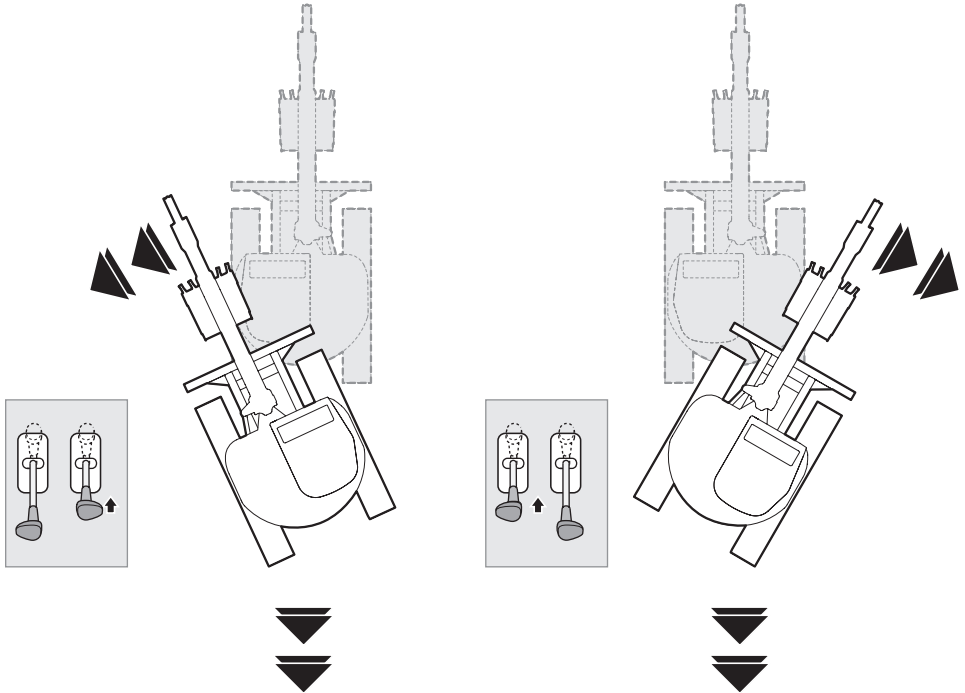
With the machine travelling straight **FORWARD**, both control levers must be pushed forward by equal amounts.

To turn **LEFT** while travelling **FORWARD**, reduce forward pressure slightly on the left hand lever, thus slowing down the left track. The machine will turn toward the LEFT.

To turn **RIGHT** while travelling **FORWARD**, reduce forward pressure slightly on the right hand lever so that the machine will turn toward the RIGHT.



#### 6.21.4 - Turning while reversing



With the machine moving straight in **REVERSE**, both control levers must be pulled back by equal amounts.

To turn **LEFT** while **REVERSING**, reduce rearward pressure slightly on the right hand lever, thus reducing the speed of the right track. The machine will turn toward the LEFT.

To turn **RIGHT** while **REVERSING**, reduce rearward pressure slightly on the left hand lever so that the machine will turn toward the RIGHT.

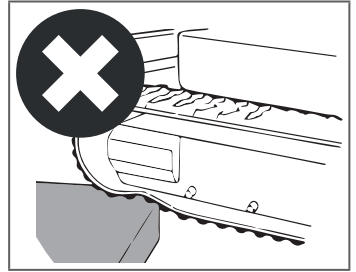


### 6.21.5 - Precautions during the operation of the tracks

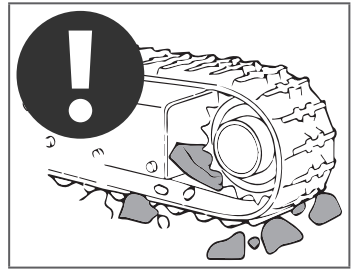
All of the above precautions are applicable to both rubber tracks and steel tracks (optional).

When moving, **DO NOT** ride over or turn on any sharp edges or steps.

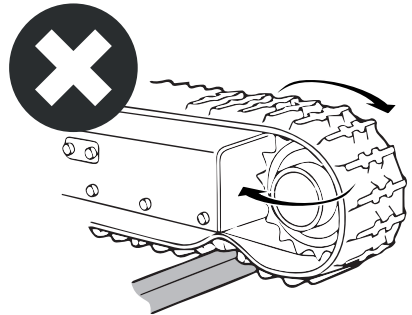
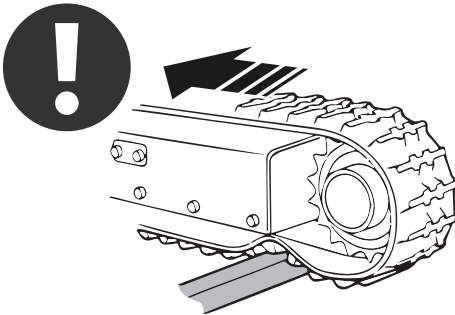
The machine will subject the track to an excessive load, resulting in the breakage or cutting of the tread (in the case of rubber tracks, the internal steel cord may be damaged).



Prevent foreign bodies from getting stuck between the track and the frame or the components of the undercarriage; if this happens, the entire undercarriage may be damaged and the track may be deformed and/or cut.



Protruding bodies should be avoided, if possible. If this manoeuvre is not possible, proceed with care at low speed and moving in a straight direction without steering when the track is over the obstacle.





Do not steer abruptly when travelling over surfaces with a high coefficient of friction (e.g. concrete surfaces); this may cause excessive wear of the track.

Clean the rubber tracks if fuel or hydraulic oil is spilled on them; this may cause corrosion and damage the track.



## WARNING

***The tracks can slip easily on wet, frozen surfaces or surfaces covered with snow. Be very careful when travelling and working in these conditions.***

***Rubber tracks are less stable than those made of steel due to their flexibility. Be very careful when operating a machine with rubber tracks.***



## NOTICE

*Any movements or steering over protruding bodies or uneven ground may cause the local loosening of the track resulting in the possible release of the same (in the case of rubber tracks, the internal steel cord may be damaged).*

*Avoid rotating around the machine axis at high speed.*

*Rotating around the machine axis on a surface made of high friction material, such as sharp stones, could damage the track and the components of the undercarriage.*

---



## 6.22 - Travel speed

The machine features double travel speed which can be used in both directions.

The two gears are called:

- **1<sup>st</sup>** gear or slow gear;
- **2<sup>nd</sup>** gear or fast gear.

The gear selection is made using the button **(1)** located:

- on the top of the dozer blade lever;

**or**

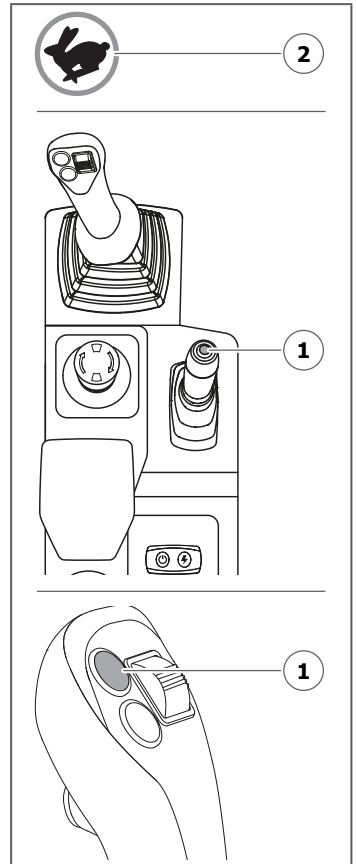
- on the right-hand joystick.

The gear is changed by pressing the button (it is not necessary to keep it pressed).

When the fast gear is active, the relative light **(2)** turns on.

It is possible to change gear before or during travel.

The machine features the **AUTO SHIFT DOWN** function (automatic, cannot be disabled). While travelling in fast gear, after a certain stress value has been exceeded, the machine will be placed in slow gear. When the stress decreases, the machine will return to fast gear.





### **6.23 - Dozer blade control/undercarriage width adjustment lever**

This lever controls both the **lifting/lowering** of the dozer blade function and the **undercarriage width** adjustment function.



### 6.23.1 - Dozer blade control lever



## WARNING

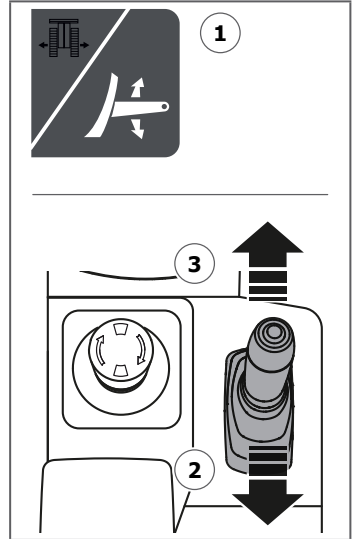
**Before any operation concerning the dozer blade control, ALWAYS check which mode is selected on the indicator light (1 - refer to section "6.9.9 - Dozer blade mode/undercarriage width indicator light" to page 6-27).**

**The activation of an undesired control may cause serious injuries.**

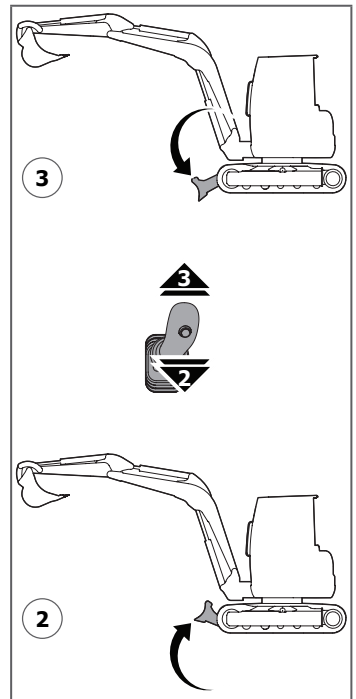
To move the dozer blade:

- check that in the display on the indicator light (1) the dozer blade mode is selected;
- to **lift** the blade pull the lever **back** (2);
- to **lower** the blade push the lever **forward** (3).

The operation may be performed both while the vehicle is stopped and when it is moving (while travelling).







**Key:**

- |          |                                     |
|----------|-------------------------------------|
| <b>2</b> | Raised position of the dozer blade  |
| <b>3</b> | Lowered position of the dozer blade |



### **NOTICE**

*Before starting any digging operation, LOWER the dozer blade until it is completely touching the ground.*

*When parking the machine, the dozer blade must be LOWERED to the ground.*



## 6.23.2 - Undercarriage width adjustment control



# WARNING

**ALWAYS use the machine with the undercarriage in the extended configuration.**

**The narrow configuration should be used only for transfer operations when there is not enough space for the machine to pass with the undercarriage extended.**

**The undercarriage must always be fully extended or fully closed; do not use intermediate positions.**

**Before any operation concerning the undercarriage width adjustment control, ALWAYS check which mode is selected on the indicator light (1 - refer to section "6.9.9 - Dozer blade mode/undercarriage width indicator light" to page 6-27).**

**The activation of an undesired control may cause serious injuries.**

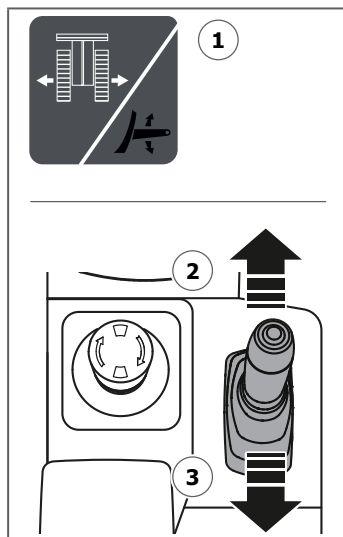
The expandable undercarriage has the ability to hydraulically change the width of the tracks to adapt to the specific movement needs.

In the narrower configuration, the width is reduced to allow access to smaller and more confined work areas or for the transport operations of the machine. In the wider configuration, the maximum stability of the machine is achieved.

To **change the width** of the undercarriage (extension/closing):

- position the machine on flat, compact ground;
- rest the dozer blade on the ground;
- check that in the display on the indicator light (1) the undercarriage width adjustment mode is selected;
- to **extend** the undercarriage push the lever (2) **forwards**. Upon completion of the extension, return the lever to the neutral position;
- to **retract** the undercarriage, pull the lever (3) **backwards**. Upon completion of the extension, return the lever to the neutral position.

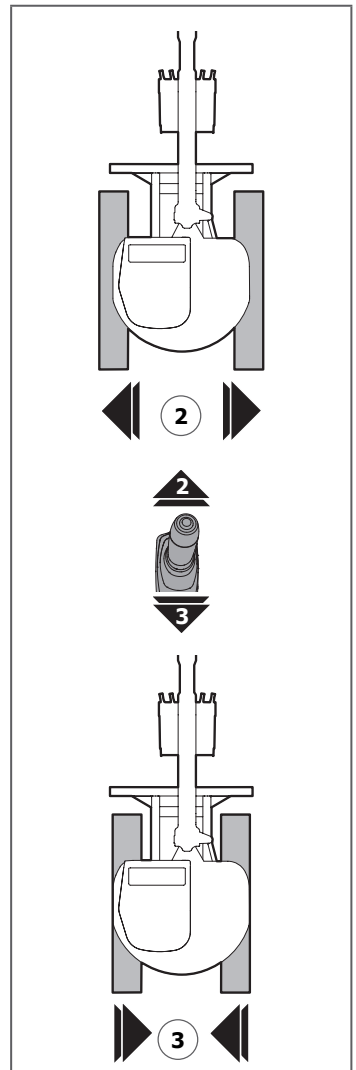
The operation must be performed with the vehicle stopped.





## Key:

- |          |                               |
|----------|-------------------------------|
| <b>2</b> | Wide position of the tracks   |
| <b>3</b> | Narrow position of the tracks |



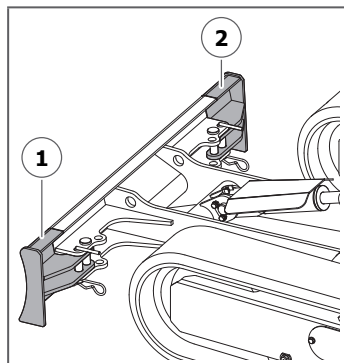


## 6.24 - Extendible dozer blade

The dozer blade is equipped with two extensions (**1 - 2**) which are used to increase the width of the blade so that it adapts to the width of the undercarriage.

In this way the material moved by the dozer blade will be pushed away and not under the tracks, to allow the machine to travel over a level surface.

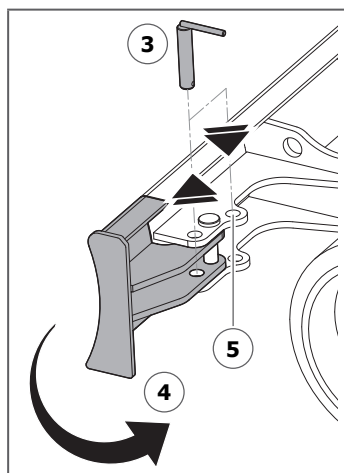
If the extensions are not used, they can be closed back into the blade, limiting its size and making it easier for the machine to travel.



To **close** the extensions:

- remove the outermost fixing pin (**3**);
- remove the split located on the underside of the pin and pull it out;
- turn the extension towards the inside of the machine (**4**);
- secure the extension by placing the pin (**3**) in the hole provided (**5**);
- refit the safety split pin.

To **open** the extensions repeat the procedure in reverse order.



## NOTICE

*Before using the machine after opening or closing the blade extensions, make sure they are secured correctly with the safety pin and relative split pin.*



## 6.25 - Operating the boom

The joysticks allow for the first boom, the second boom, the bucket and machine slewing to be controlled.

2 control configurations, also called "control layouts" are available:

- **ISO - European;**
- **SAE - American.**

Choose the most suitable one depending on the operator's driving experience.

To set the desired layout, see section "6.25.3 - ISO-SAE controls layout TPSS function" to page 6-86.



## WARNING

***Before starting work, always check the controls layout set.***

***Before rotating the turning frame, use the rear-view mirrors (if present) or turn your head to make sure that the area is clear.***

***Pay attention to the presence of people in the area: should someone enter the manoeuvre area, stop the machine immediately.***

The functions of all controls are locked out when the controls cut-out lever is open to allow entry or exit from the machine. To enable both joysticks, the controls cut-out lever must be fully closed, refer to section "6.6 - Controls cut-out lever" to page 6-8.



## NOTICE

*Some movements of the boom have a function that slows down the speed of the hydraulic cylinder near the limit stop. This feature reduces brusque movements during work, ensuring longer life of the machine components.*

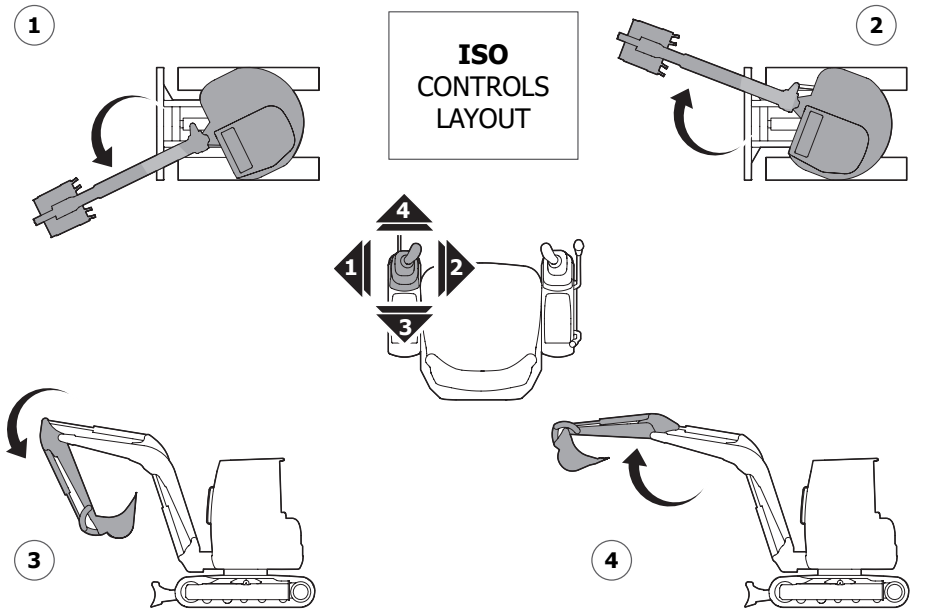
---



### 6.25.1 - Left Joystick

The left joystick controls the extension and retraction of the second boom, as well as the RH and LH rotation of the first boom and turning frame:

- Moving the left joystick to the **LEFT** will swing the turning frame to the left (**1** - counter-clockwise direction);
- moving the left joystick to the **RIGHT** will swing the turning frame to the right (**2** - clockwise direction);
- pushing the left joystick **BACKWARDS** will lower the second boom (**3**);
- pulling the left joystick **FORWARDS** will raise the second boom (**4**).



#### Key:

- |          |  |
|----------|--|
| <b>1</b> | Slewing of the turning frame and first boom to the left  |
| <b>2</b> | Slewing of the turning frame and first boom to the right |
| <b>3</b> | Closing the second boom                                  |
| <b>4</b> | Opening the second boom                                  |



### NOTICE

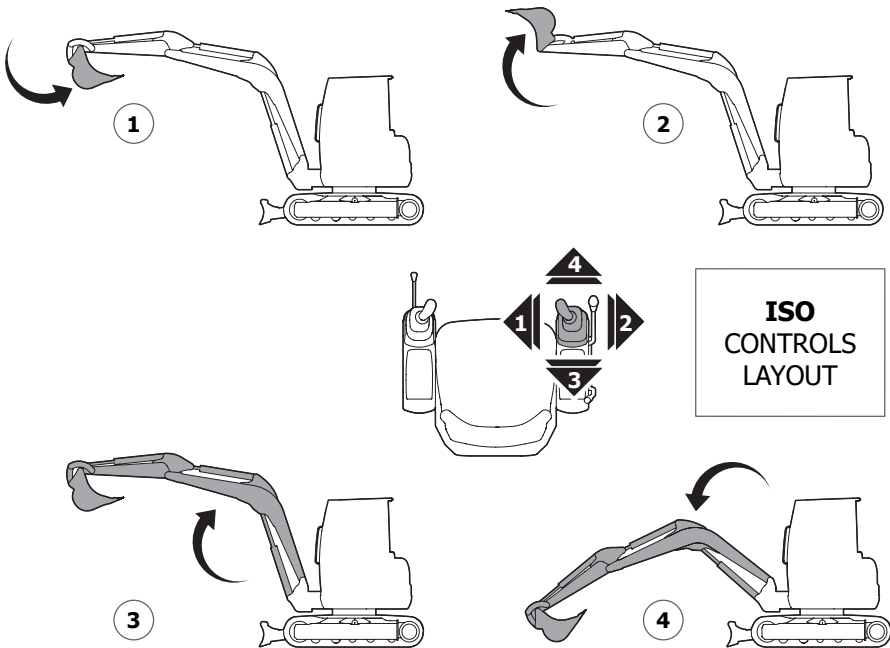
When the joystick is in neutral position (in the centre), the slewing service brake is automatically engages; this braking is of a mechanical type (negative) and, therefore, is always on during normal machine use, acting also as parking brake. The brake is automatically enabled when the machine is stopped.



## 6.25.2 - Right joystick

The right joystick controls the raising and lowering of the digging arm and controls the movement of the bucket. The bucket works according to the switches on the 2nd arm which must be in DIG mode:

- Moving the right joystick to the LEFT will tilt the bucket to the closed position (1);
- moving the right joystick to the RIGHT will tilt the bucket to the open position (2);
- pushing the right joystick FORWARD will extend the first boom (3);
- pulling the right joystick BACKWARD will retract the first boom (4).



### Key:

- |          |                         |
|----------|-------------------------|
| <b>1</b> | Closing the bucket      |
| <b>2</b> | Opening the bucket      |
| <b>3</b> | Lifting the first boom  |
| <b>4</b> | Lowering the first boom |



## 6.25.3 - ISO-SAE controls layout TPSS function

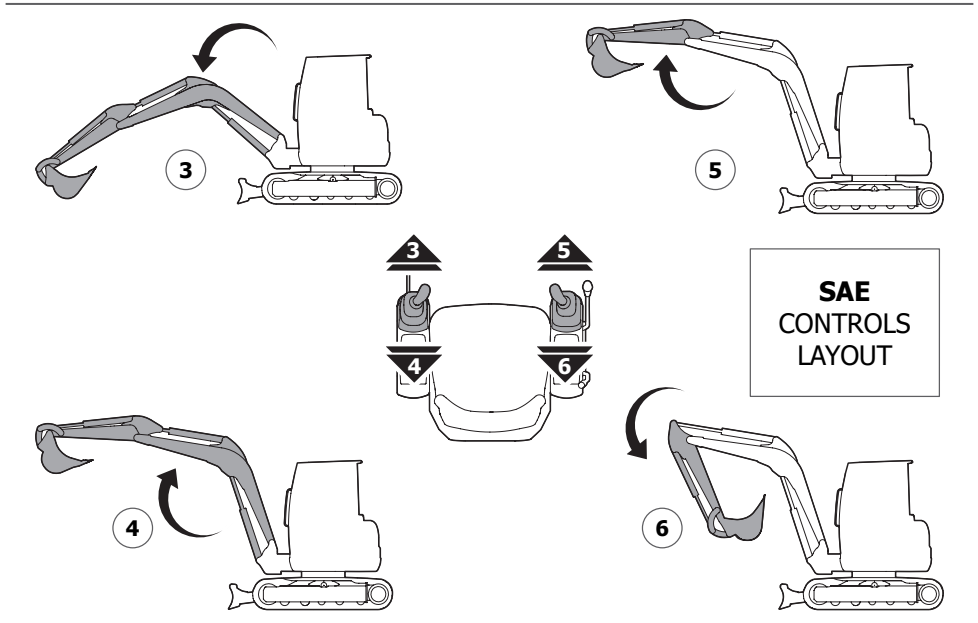
The TPSS function allows the selection of the controls layout:

- **ISO - European (1);**
- **SAE - American (2).**

The ISO controls layout differs from the SAE controls layout for the position of the first boom and second boom controls.

For more information, see section "6.10.8.7 - *COMMAND CONFIGURATION*" to page 6-36.

In SAE configuration, the functions **3-4** of the left joystick are performed by the right joystick **5-6** and vice versa (see figure below). All the other machine functions remain unchanged.



### Key:

|          |                         |
|----------|-------------------------|
| <b>3</b> | Lowering the first boom |
| <b>4</b> | Lifting the first boom  |
| <b>5</b> | Opening the second boom |
| <b>6</b> | Closing the second boom |



## 6.26 - Boom swing/AUX2 hydraulics system selector button (optional)

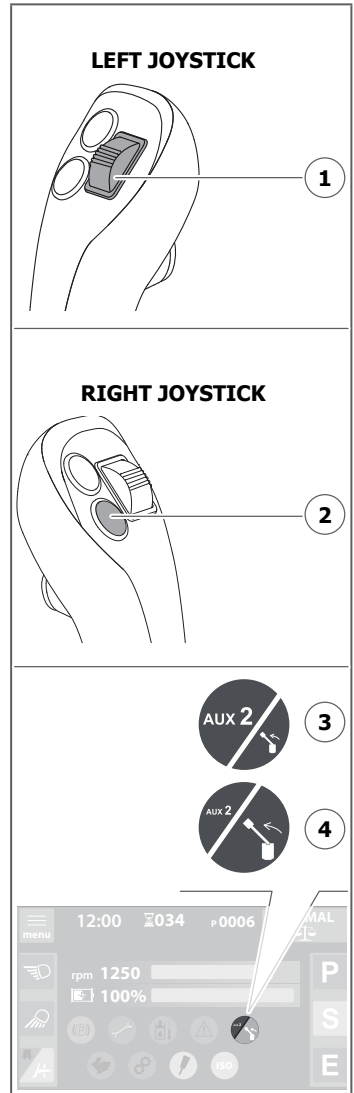
The roller (1) is used both to perform the boom swing movement and to control the AUX2 hydraulic system (optional).

It is possible to select the function of the roller (1) using the button (2).

If the AUX2 system is not installed, the roller is only used for the boom swing and the button does not activate any functions.

When this indicator light (3) is lit, it means that the roller controls the **AUX2 hydraulic system** (refer to section "6.29.4 - AUX2 Auxiliary hydraulic system (optional)" to page 6-97).

When this indicator light (4) is lit, it means that the roller controls the **boom swing** (refer to section "6.27 - Boom swing control" to page 6-88).





## 6.27 - Boom swing control

The roller (1) is used to turn the first boom to the left or to the right of the turning frame; this movement is called the boom swing.



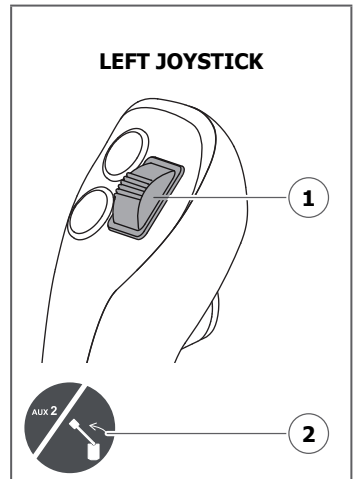
# WARNING

**Before carrying out the boom swing movement, ALWAYS check which mode is selected on the indicator light if present (2 - refer to section "6.26 - Boom swing/AUX2 hydraulics system selector button (optional)" to page 6-87).**

**The activation of an undesired control may cause serious injuries.**

To **activate the control**:

- check that in the display on the indicator light (2) if present, the boom swing mode is selected;
- push **DOWN** the roller to rotate the first boom to the left;
- release the roller when the boom reaches the required position;
- push **UP** the roller to rotate the first boom to the right;
- release the roller when the boom reaches the required position.



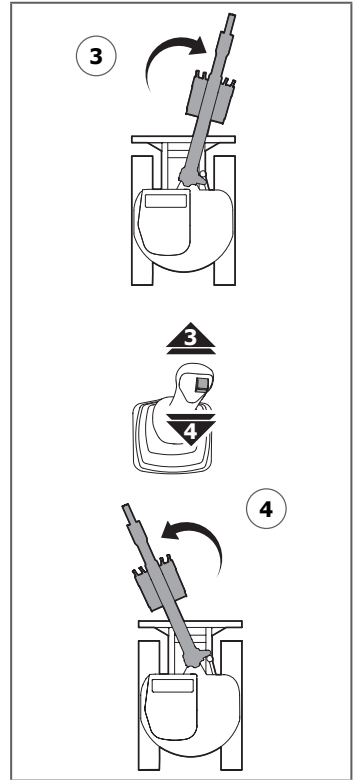
# NOTICE

**DO NOT** leave any of the hydraulic controls engaged after the cylinder reaches its limit stop in any direction. This practice forces the hydraulic oil to pass through the main relief valve, causing a rapid build-up of heat in the system resulting in overheating and loss of power, in addition to reducing the component life.



## Key:

- |          |  |
|----------|--|
| <b>3</b> | Pushing the roller downwards will swing the first boom to the left |
| <b>4</b> | Pushing the roller upwards will swing the first boom to the right  |



## NOTICE

*The hydraulic system is equipped with a shock absorber that reduces the speed of the boom's travel when the cylinders approach their limit stops.*



## WARNING

***If a very wide equipment is fitted (ditch cleaning bucket) and the machine is operated with the boom swing slewed, pay attention when the equipment moves closer to the machine body and/or to the operator protective structure. This position could cause impacts resulting in serious or fatal injury.***



## 6.28 - Discharge residual pressure in the hydraulic system



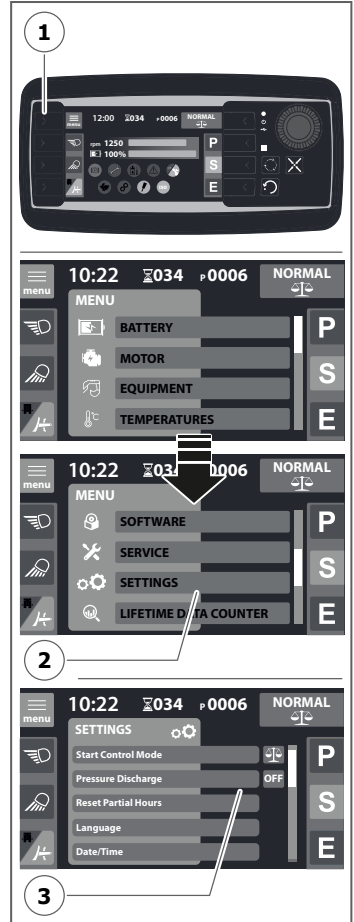
# WARNING

**The hydraulic system may remain under pressure even after the machine has stopped. Release the residual pressure before maintenance interventions.**

To discharge the residual pressure:

- position the machine on flat, compact ground;
- lower the equipment and the dozer blade to the ground;
- from the display:
  - press the button (1) **MENU**;
  - turn the navigation hand grip and select the item (2) **SETTINGS**, then confirm by pressing it;
  - turn the hand grip and select (3) **ON** of the **Pressure relief**, then confirm by pressing it;
- keep the controls cut-out lever closed;
- operate all controls (joysticks, levers and roller) to release the pressure;
- stop the machine;
- slowly unscrew the cap of the hydraulic oil tank;
- proceed with the maintenance of the hydraulic system.

When maintenance is complete, proceed in reverse order, remembering to select **OFF**, to resume normal machine operation.



## 6.29 - Auxiliary hydraulic systems

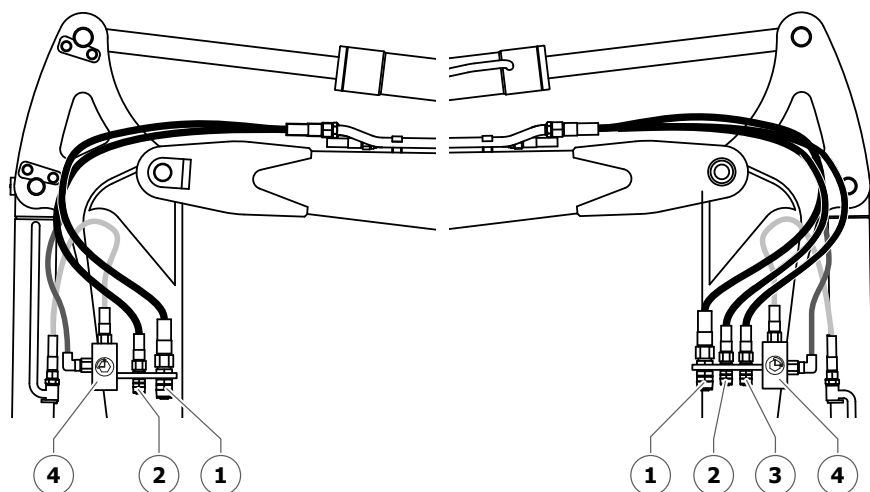
The second boom features the end of some pipes that can be connected to optional equipment that require additional hydraulic functions.



The pipes are on both sides of the boom; below is an indication of which system each pipe refers to.

**LEFT SIDE OF THE BOOM**

**RIGHT SIDE OF THE BOOM**



## Key:

- 1** AUX1
- 2** AUX2 (optional)
- 3** Drain line (optional)
- 4** Mechanical AUX3 (optional)

| Auxiliary hydraulic system | Max capacity (l/min) |       | Pressure max (bar) |       | Connection thread          |
|----------------------------|----------------------|-------|--------------------|-------|----------------------------|
|                            | left                 | right | left               | right |                            |
| <b>AUX1</b>                | 40                   |       | 210                |       | 3/8" GAS lh<br>1/2" GAS rh |
| <b>AUX2</b>                | 13                   | 9     | 210                |       | 1/4" GAS lh<br>1/4" GAS rh |
| <b>Mechanical AUX3</b>     | 28                   | 24    | 210                |       | 3/8" GAS lh<br>3/8" GAS rh |
| <b>DRAINAGE LINE</b>       | //                   | //    | //                 |       | 1/4" GAS                   |

To understand the operation of the systems in detail, see the following sections.



### 6.29.1 - Connection of equipment to the hydraulic systems



## WARNING

***Read carefully the contents of the equipment instruction manual before using the machine or carrying out any maintenance operations.***



## WARNING

***Never connect any equipment to the hydraulic lines before it is properly installed from a mechanical point of view and locked on the second machine boom.***

***Before carrying out any interventions on the hydraulic system, stop the machine and release any residual pressures.***

***All operations must be performed with the machine parked on flat and compact ground.***



## NOTICE

*When removing hydraulic connections, be very careful that impurities do not enter the pipes.*

*Clean immediately any oily area.*

---

To **connect** the equipment to the hydraulic system:

- mechanically install the equipment;
- place the machine on flat,, compact ground and lower the equipment to the ground;
- stop the machine;
- release the residual pressures of the system, see section "6.28 - Discharge residual pressure in the hydraulic system" to page 6-90;
- remove the caps from the ends of the taps indicated, take care not to damage or lose the parts removed;
- connect the pipes from the equipment to the taps, making sure that the characteristics and sizes of the fittings are the same as those prescribed.





## **NOTICE**

*As far as the threads and functions of the equipment connections are concerned, see the manufacturer's manual.*

---

- After connecting the hoses, start the machine;
- lift the equipment off the ground and send pressurised oil for around ten times, alternately to the two connections, in order to purge any air left in the circuit;
- repeat the operation for each system used by the equipment;
- stop the machine and wait at least **5 minutes** before starting work operations. This will eliminate any air bubbles that have built up in the tank;
- make sure there are no oil leaks and clean up any oil spilled.



## **NOTICE**

*For any doubts that may arise concerning the connection of the equipment to the hydraulic system, contact the Service Centre.*

---

### **6.29.2 - Connections on second boom**

The pipes of the auxiliary systems end with threaded fitting on which taps are installed which allow to isolate the hydraulic system from dirt entering and prevent oil leaks if no equipment is connected.

The hydraulic equipment must be connected to the taps by means of flexible rubber hoses.

After disconnecting the equipment, always put the caps back on.



### 6.29.3 - AUX1 Auxiliary hydraulic system



## NOTICE

For the technical characteristics, see section "3.6 - Hydraulic system" to page 3-4.

The **AUX1** auxiliary hydraulic system can feature two operating modes:

- **single-acting** mode;
- **double-acting** mode.

Switching between the two modes takes place manually by means of a 3-way valve; the operation is described in the next section.

For the operating details, refer to sections:

- "6.29.3.2 - Single-acting mode AUX1" to page 6-95;
- "6.29.3.3 - Double-acting mode AUX1" to page 6-96.

The single-acting auxiliary hydraulic system provides a continuous supply of hydraulic oil to a pipe, while the other is discharged directly into the tank, the system used for equipment such as demolition hammers.

The double-acting auxiliary hydraulic system provides pressure alternately to one of two outlets, the system used for equipment such as augers.

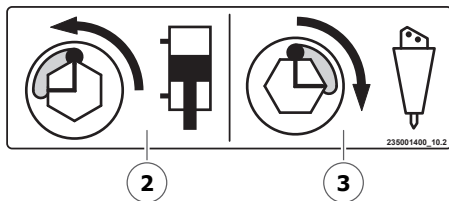
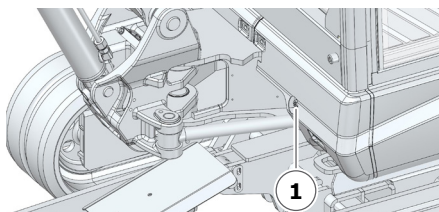
The oil flow can be regulated by acting on the accelerator hand grip; always observe the flow rate indicated by the manufacturer of the equipment.

#### 6.29.3.1 - AUX1 hydraulic system three-way switch

The three-way switch (1) allows to change the operating mode of the **AUX1** system.

To select the desired mode:

- Turn the valve **counter-clockwise** to select the **double-acting** mode (2).
- turn the valve **clockwise** to select the **single-acting** mode (3).





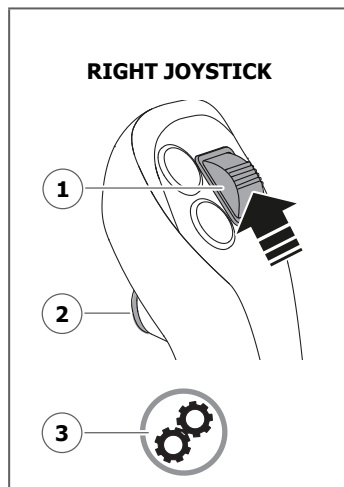
### 6.29.3.2 - Single-acting mode AUX1

This mode provides for the pressurised flow only on the left connection, while the right connection will remain discharged.

To enable this mode, refer to section "6.29.3.1 - AUX1 hydraulic system three-way switch" to page 6-94.

To operate the **AUX1 single-acting control**:

- push and keep pushed **UP** the roller (1) to provide a constant flow of hydraulic oil to the **left piping**; the right piping is always empty (direct to the tank) even if no control is engaged;
- release the roller to stop the flow;
- while pushing the roller, the electric hold can be activated by pressing the button (2), so that the control remains on and the roller can be released; the electric hold for the oil flow to the equipment can be activated at any stage of the roller travel, making it possible to provide a partial flow and keep it constant at the required level; When the automatic hold is activated the relevant light on the control panel comes on (3);



- To **deactivate** the hold, press button (2) again or move the roller (1) from its neutral position;
- no function is activated by pushing the auxiliary hydraulic control roller down if it is in single-acting mode.



## NOTICE

*For details on the controls, refer to the label located on the driver's seat and to the instructions in this user manual.*

*DO NOT keep the roller pressed down for long periods. The hydraulic circuit does not activate any function but is still under pressure and so there is the risk of the hydraulic oil overheating.*



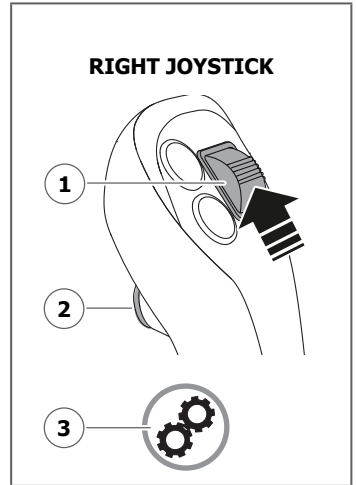
### 6.29.3.3 - Double-acting mode AUX1

This mode provides for the reversible control of the flow; while one of the two pipes is pressurised, the other is discharged.

To enable this mode, refer to section "6.29.3.1 - AUX1 hydraulic system three-way switch" to page 6-94.

To operate **AUX1 double-acting control**:

- push and hold the roller (1) **UP** to provide a constant flow of hydraulic oil to the **left piping**; at the same time, the right piping is discharged;
- release the roller to stop the flow;
- while pushing the roller, the electric hold can be activated by pressing the button (2), so that the control remains on and the roller can be released; the electric hold for the oil flow to the equipment can be activated at any stage of the roller travel, making it possible to provide a partial flow and keep it constant at the required level; When the automatic hold is activated the relevant light on the control panel comes on (3);



- To **deactivate** the hold, press button (2) again or move the roller (1) from its neutral position;
- push and hold the roller (1) pushed **DOWN** to provide a constant flow of hydraulic oil to the **right piping** while the left piping is discharged. In this case, it is not possible to activate the electric hold.



## NOTICE

*For details of the controls, see the label located on the driver's seat and the instructions in this user manual.*



## 6.29.4 - AUX2 Auxiliary hydraulic system (optional)



# WARNING

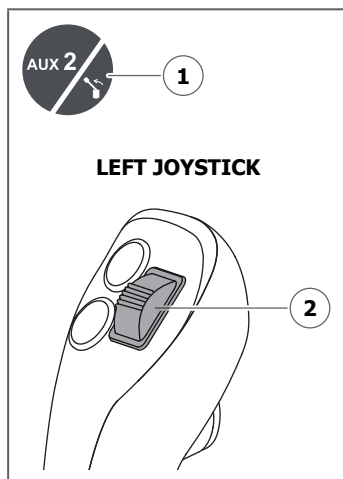
**Before each use, always check which mode is selected on the indicator light (2 - refer to section "6.26 - Boom swing/AUX2 hydraulics system selector button (optional)" to page 6-87), to be sure which control will be activated.**

**The activation of an undesired control may cause serious injuries.**

The hydraulic system **AUX2** works in double-acting mode and is suitable for equipment that requires a reduced oil flow such as for tilting buckets or grab rotors.

To operate the **AUX2** control:

- check that in the display, on the indicator light (1), **AUX2** hydraulic system mode is selected;
- push **UP** and hold the roller (2) to provide a constant flow of hydraulic oil to the **left piping**; at the same time, the right piping is discharged;
- release the roller to stop the flow;
- push **DOWN** and hold the roller (1) to provide a constant flow of hydraulic oil to the **right piping**; at the same time, the left piping is discharged;
- release the roller to stop the flow.



# NOTICE

*For the technical characteristics, refer to section "3.6 - Hydraulic system" to page 3-4.*

*For details on the controls, refer to the label located on the driver's seat and to the instructions in this user manual.*



### 6.29.5 - Mechanical AUX3 auxiliary hydraulic system (optional)

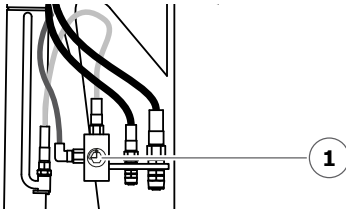
By means of two mechanical switches, the double-acting **mechanical AUX3** hydraulic system, shuts off the pipes of the bucket cylinder and makes them available for connection to equipment requiring a reduced oil flow, such as grab rotors. This system is used for equipment with which there is no need to move the bucket cylinder.

The switches are located on the second boom.

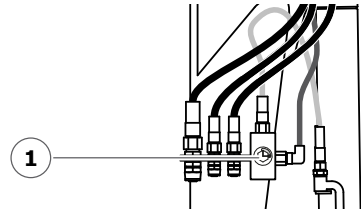
To **activate the control**:

- turn both switches **(1)** as indicated below in the table to activate/deactivate the AUX3 system;
- both switches must be turned in such a way as to enable the same function.

**LEFT SIDE OF THE BOOM**



**RIGHT SIDE OF THE BOOM**



|        | LEFT SIDE OF THE BOOM | RIGHT SIDE OF THE BOOM |
|--------|-----------------------|------------------------|
| AUX3   |                       |                        |
| BUCKET |                       |                        |





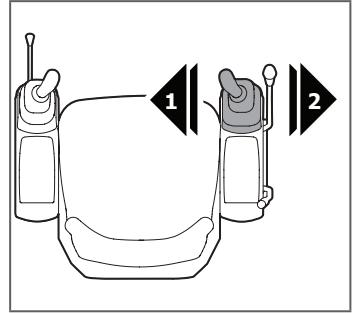
## NOTICE

*Never leave the switches halfway, always bring them to a stop. Before diverting the circuit, fully retract the bucket cylinder. If left extended, it may hit the equipment and get damaged.*

The mechanical AUX3 auxiliary hydraulic system is controlled using the right joystick.

To **activate the control**:

- move the joystick **(1)** to the left to send the oil flow to the left connection;
- release the joystick in the central position to stop the flow;
- move the joystick **(2)** to the right to send the oil flow to the right connection.



### 6.29.6 - Drain line (direct to tank - optional)

For equipment (e.g. shredder head) requiring drainage without back pressure a drainage line may be added to the second boom. This discharges directly into the tank and is suitable for low oil flow rates.

#### DESCRIPTION AND COMMAND

As it is a drainage line it requires no controls.



### 6.30 - Emergency lifting-boom lowering procedure



## WARNING

***Ensure no one is standing under or near the equipment before starting the procedure to lower the booms.***

This procedure is to be carried out if the machine stops and cannot be restarted or, if any other failure occurs that stops the machine with the booms and equipment not resting on the ground.

Lower the lifting boom as follows until the bucket or equipment rest on the ground:

- turn the starter switch (ignition key) to ON;
- close the controls cut-out lever;
- move the right joystick control lever forwards - the first boom will start to descend;
- keep the joystick pushed forwards until the equipment reaches the ground.



## WARNING

***If in carrying out the above procedure the boom does not lower to a position where the equipment is resting on the ground, contact the Service Centre.***

***IN THE MEANTIME DO NOT ALLOW ANYONE TO COME NEAR THE BOOM.***

### 6.31 - Daily storage

Proceed as indicated in section "6.20 - Stopping and parking the machine" to page 6-66.



## 7 - RECOMMENDED OPTIONAL EQUIPMENT



### DANGER

***To perform load handling operations, the machine must be equipped with the special load handling equipment (optional).***

***For further Information, see section "7.7 - Load handling" to page 7-28.***



### WARNING

***If optional equipment is installed and used, carefully read the relevant user manual and strictly follow the instructions contained in it.***

***Only use optional equipment recommended by the MANUFACTURER and compliant with the requirements reported in the table in section "7.1.1 - Specifications on authorised equipment" to page 7-4.***

***THE MANUFACTURER shall not be held responsible for any damage to property or people and for the reduction of the efficiency of the machine, due to the application or use of incompatible equipment.***

All the tools required for the normal replacement of equipment are included in the wrench kit supplied with the machine.

While replacing equipment it is important to wear appropriate PPE, according to the indications given in section "2.4.1 - Personal Protective Equipment (PPE)" to page 2-18, to avoid contact with grease, splashes of pressurised oil or metal splinters.



## 7.1 - Safety precautions

Any type of interchangeable equipment or accessory can be installed on the machine for construction works, roadworks and earth-moving operations, in compliance with the operating limits indicated in this manual. Installation must be performed in compliance with the safety standards, according to the instructions in this manual and in compliance with those of the manufacturer of the equipment or accessory. Interchangeable equipment and accessories must be compliant to the applicable accident prevention standards.

The employer must in any case verify the suitability of the combination in relation to the activities to be carried out.

The installation of optional equipment or accessories other than those authorised by the *MANUFACTURER* not only compromises the machine life, but can also cause safety issues.

When installing accessories or optional equipment not indicated in this use and maintenance manual, contact the *Service Centre*. Otherwise, the *MANUFACTURER* denies all liability for accidents or damage.

The use of equipment on the machine can change its stability. The stability depends on the dimensions and weight of the machine with the accessory fitted to it, as well as on the weight and position of any resulting loads applied to the machine (lifting capacity).

The lifting capacities for this machine are listed in the relative tables in chapter "3 - *Technical data*" to page 3-1; always refer to these tables.

The machine lifting capacity is reduced by the weight of the equipment installed.

Third party accessory suppliers may or may not supply accessory lifting capacity tables. The nominal lifting capacity values for this type of accessory must be requested from the third party suppliers.

The *MANUFACTURER* does not issue any declarations or warranties, express or implied, regarding the design, manufacture or suitability for use on the machine of accessories provided by third parties. This machine does not envisage the use of, and must not be used with, any accessories that exceed the maximum permitted lifting capacity.

The installer of the equipment must check that:

- the **hydraulic characteristics** of the equipment are compatible with those of the machine, see section "6.29 - *Auxiliary hydraulic systems*" to page 6-90;



- the characteristics of the equipment coupling are compatible with those of the second boom of the machine;
- after pairing the machine-equipment, the operator's visibility is guaranteed and complies with standards in force;
- the equipment does not interfere with any parts of the machine, in particular with the protective structure and the driver's seat.



## WARNING

***When removing or installing equipment, take the following precautions and pay attention to the safety conditions during operations.***

***Perform installation and dismantling operations on a solid, level surface.***

***When the operations are performed by two or more operators, agree on the signals for communication and follow them during the operations.***

***Use a crane for the installation or the removal, on the machine, of equipment with a weight greater than 25 kg.***

***The use of a crane requires specialized personnel. Never allow non specialised persons to use a crane.***

***It is dangerous to perform operations with suspended equipment; never stand under a load lifted by a crane. Always choose a safe position in order not to run any risks if the load should drop.***

***Identify the centre of gravity of the equipment so as to hook it in such a way that during the movements it will remain stable and well hooked.***

***After removing the equipment from the machine, place it on the ground and check that it is stable; if the equipment is not stable, place it on a suitable support.***

***After installing the equipment, check that it is connected in a stable manner.***

***Keep unauthorised people out of the equipment storage area.***

For further information on installation and dismantling operations, contact the Service Centre.



### 7.1.1 - Specifications on authorised equipment



## WARNING

**The tables below provide details of the equipment recommended by the MANUFACTURER.**

**Pay particular attention to safety criteria and, before starting any operations, perform a test (in a safe place) to check the operating area of the equipment and its centre of gravity.**

**Some equipment, in fully retracted position, may interfere with some parts of the machine (in particular with the operator cab). Therefore, pay attention to avoid interference.**

The recommended equipment is listed below:

| BUCKET                         | WIDTH<br>(mm) | WEIGHT<br>WHEN EMPTY<br>(kg) | CAPACITY<br>(l) |
|--------------------------------|---------------|------------------------------|-----------------|
| Excavation bucket              | 300           | 41                           | 33              |
| Excavation bucket              | 400           | 47                           | 48              |
| Excavation bucket              | 500           | 54                           | 65              |
| Excavation bucket              | 600           | 60                           | 82              |
| Excavation bucket              | 700           | 68                           | 100             |
| Ditch cleaning bucket          | 800           | 49                           | 75              |
| Ditch cleaning bucket          | 1,000         | 59                           | 96              |
| Pivoting ditch cleaning bucket | 800           | 76                           | 75              |
| Pivoting ditch cleaning bucket | 1,000         | 86                           | 96              |
| Trapezoidal bucket             | 200           | 29                           | 37              |

The weight of the bucket, the volumetric capacity of the bucket and the density of the material to be handled must be considered when choosing the bucket to be used.



| QUICK COUPLING                                    | WEIGHT (kg) |
|---|-------------|
| Mechanical or hydraulic quick-coupling attachment | 84          |

| EQUIPMENT         | MAX WEIGHT (kg) |
|-------------------|-----------------|
| Demolition hammer | 115             |
| Bough shears      | 115             |
| Selection grapple | 115             |
| Auger             | 115             |

**The hydraulic characteristics of the equipment must be compatible with those of the auxiliary hydraulic systems of the machine, refer to section "6.25 - Operating the boom" to page 6-83.**



## NOTICE

The total weight of the equipment must **NOT** exceed the nominal lifting capacity indicated in the table in section "3.13 - Nominal lifting capacity" to page 3-8.

To calculate the total weight of the equipment, use the following formula:

**Total weight = Weight of equipment + Weight of quick coupling (if present) + Weight of hydraulic thumb (if present) + Weight of loaded material (if present).**

## 7.2 - Equipment with standard coupling (pins)

The equipment is installed on the second boom by means of a mechanical pin connection.



## NOTICE

The pictures of the equipment are purely indicative. The procedure is valid for all equipment with a standard coupling (pins).



### 7.2.1 - Installation and removal

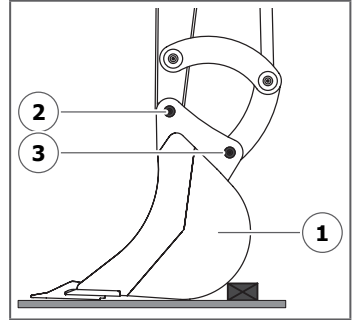


## WARNING

**To avoid personal injury from loose material or flying debris, always wear safety glasses and proper protective clothing when removing or refitting pivot pins.**

To **remove** the equipment:

- position the machine on flat, compact ground;
- lower the first boom, positioning the second boom and equipment in such a way that the latter is resting on the ground;
- block the equipment (**1**) using a suitable support (if necessary) so that it maintains its position during and after the removal operations;



- disconnect any hydraulic or electrical systems as indicated in section "6.29.1 - Connection of equipment to the hydraulic systems" to page 6-92;
- remove both pins (**2-3**) and raise the second boom to release the equipment and complete the operation.

To **install** the equipment:

- the equipment must be firmly secured using a suitable support (if necessary) so that it maintains its position during the installation operations;
- Clean both pivot pins and their fixing holes (**2-3**);
- align the second boom with the first pivot pin mounting holes of the equipment (**2**). Fit the pin and secure it in place;
- align the equipment coupling with the second pivot pin mounting holes of the equipment (**3**). Fit the pin and secure it in place;
- lubricate both pivot pins;
- connect any hydraulic or electrical systems as indicated in the dedicated sections;
- start the engine and make the cylinder perform two complete movements to check that it runs smoothly.

If there is no abnormal friction or jamming when rotating the equipment, it means the operation has been carried out correctly; otherwise, contact the *Service Centre*.



### 7.3 - Quick-coupling



## WARNING

***Use only quick-couplings in accordance with current Standards and which allow for the correct coupling of the equipment to be checked from the operator seat, without having to get off the machine.***

***Before performing any operation, carefully read this manual and the instructions provided by the manufacturer of the quick coupling device.***

***Perform all coupling and release operations with the bucket or the equipment placed on the ground and make sure that there are no people in the work area before and during the procedure.***



## NOTICE

*The quick-coupling system increases the overall dimensions of the equipment. Check the operating range of the coupled equipment to avoid the hazard of contact with the protective structure of the machine.*

---

The quick-coupling attachment is an interchangeable device that can be installed on the machine 2nd arm which is used to rapidly replace the end tool/equipment.

The following positions are therefore possible:

- quick dismantling of the tool/equipment being used;
- quick installation of another tool/different equipment.

With the quick-coupling attachment, changing between various tools/equipment, even of different types, is simple and fast.

The quick-coupling can have the following operation:

- mechanical;
- hydraulic.

The control of the **mechanical quick coupling** is of the manual type and it is activated by means of a lever that acts directly on the quick coupling.

The control of the **hydraulic quick coupling** is achieved by means of a flow of hydraulic oil activated directly from the driver's seat.



**For the warnings concerning safety and instructions for operation, always refer to the use and maintenance manual of the manufacturer of the quick-coupling attachment itself.**

**For the control instructions of the HYDRAULIC quick coupling, refer to the following sections.**

The machine can be supplied with or without the quick-coupling attachment installed.

The machines supplied without the quick-coupling attachment may be equipped with a fitting for the installation of the hydraulic quick-coupling attachment.

To install and remove the quick-coupling attachment, proceed as indicated for the installation of the equipment with standard coupling (pins). If the attachment is of the hydraulic type, see the following sections for instructions on the hydraulic connection.

### **7.3.1 - Set-up for hydraulic quick-coupling**

The set-up for the hydraulic quick-coupling consists of the control part and operating instructions on the operator seat and the hydraulic pipes. that end on the final section of the second boom.

There are the following types of set-up for the hydraulic quick-coupling attachment:

- **single-acting;**
- **single adjustment double-acting.**

All types of quick-couplings have two operating modes:

- **open** (release), which allows the bucket/equipment to be changed;
- **closed** (coupled), which connects the bucket/equipment to the quick-coupling attachment and allows for normal machine operations.



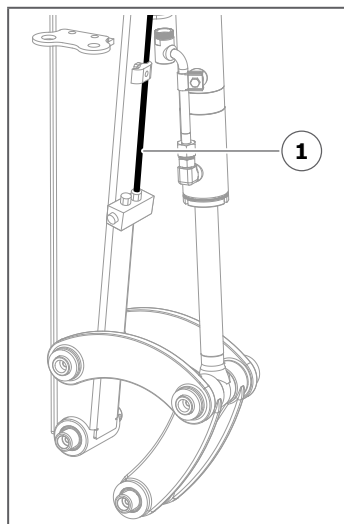
### 7.3.1.1 - Single-acting hydraulic quick coupling attachment set-up

The single-acting hydraulic quick-coupling attachment set-up is designed to control a single-acting hydraulic quick-coupling attachment which is released by hydraulic pressure and coupled mechanically with spring return.

The single-acting hydraulic quick-coupling attachment set-up provides a hydraulic flow line (1) on the second boom.

The hydraulic flow line is pressurised when the quick-coupling release command (opening) is given, otherwise it is discharged.

When opening, the pressure in the line is the maximum pressure indicated in the table.



## WARNING

***Make sure that the control modes and the technical specifications of the hydraulic quick-coupling attachment set-up are compatible with what is indicated in the user manual of the quick-coupling attachment itself.***

***After installing the quick-coupling attachment, make sure that it works properly before starting work.***

### Technical data - Single-acting

|                   |       |                                   |
|-------------------|-------|-----------------------------------|
| MAX pressure      | bar   | 70 ÷ 210<br>(factory setting 200) |
| Flow rate         | l/min | 12                                |
| Connection thread |       | 1/4" GAS                          |

The maximum pressure value can be adjusted mechanically by means of the quick-coupling hydraulic valve; see section "7.3.1.3 - Single-acting valve maximum pressure adjustment" to page 7-12.

The hydraulic connection must be made using a flexible hose (not supplied) with characteristics compatible with those indicated in the table.

For the operating instructions, see section "7.3.2.1 - Single-acting hydraulic quick-coupling attachment" to page 7-15.



### 7.3.1.2 - Double-acting hydraulic quick coupling attachment set-up

The double-acting hydraulic quick-coupling attachment set-up is designed to control a double-acting hydraulic quick-coupling attachment which is released and coupled by hydraulic pressure. This type of quick-coupling has the special feature of keeping the circuit constantly pressurised during working operations.

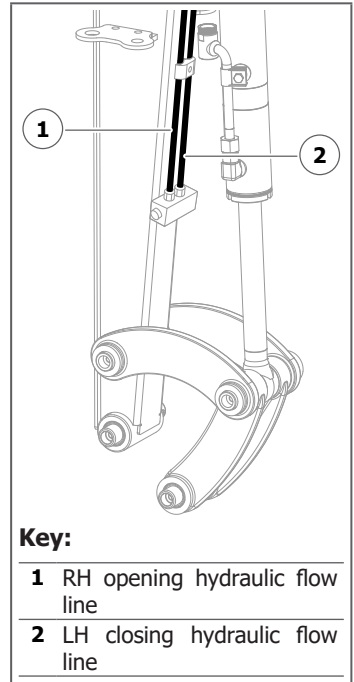
The double-acting hydraulic quick-coupling attachment set-up provides two hydraulic flow lines (1-2) on the second boom.

The opening hydraulic flow line (1) is pressurised when the quick-coupling release command (opening) is given; at the same time, the closing line (2) is discharged.

When the quick-coupling closing command is given, pressure and discharge are inverted on the two lines.

When opening, the pressure in the opening line is the maximum pressure set on the quick-coupling valve.

When closing, the pressure in the closing line is the pressure of the main hydraulic system of the machine. To prevent the quick-coupling closing pressure from changing according to the operating mode of the machine (stand-by or working with load), there is a check valve on the closing hydraulic flow line. The check valve keeps the line pressurised even if the pressure in the machine's main system drops.



## WARNING

***Make sure that the control modes and the technical specifications of the hydraulic quick-coupling attachment set-up are compatible with what is indicated in the user manual of the quick-coupling attachment itself.***

***After installing the quick-coupling attachment, make sure that it works properly before starting work.***



| Technical data - Single adjustment double-acting |       |                                   |
|--|-------|-----------------------------------|
| MAX pressure                                     | bar   | 70 ÷ 210<br>(factory setting 200) |
| Flow rate  | l/min | 40                                |
| Connection thread                                |       | 1/4" GAS                          |

The maximum pressure value can be adjusted mechanically by means of the quick-coupling hydraulic valve; see section "7.3.1.4 - *Single adjustment double-acting valve maximum pressure adjustment*" to page 7-13.

The hydraulic connection must be made using flexible hoses (not supplied) with characteristics compatible with those indicated in the table.

For the operating instructions, see section "7.3.2.2 - *Double-acting hydraulic quick-coupling attachment*" to page 7-19.



### 7.3.1.3 - Single-acting valve maximum pressure adjustment



## WARNING

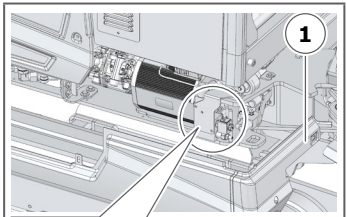
**The following procedure must be performed by specially trained personnel; the operators must wear the PPE indicated in section "2.4.1 - Personal Protective Equipment (PPE)" to page 2-18.**

The single-acting hydraulic quick-coupling attachment valve and the single adjustment double-acting hydraulic quick-coupling attachment valve have a maximum pressure adjustment.

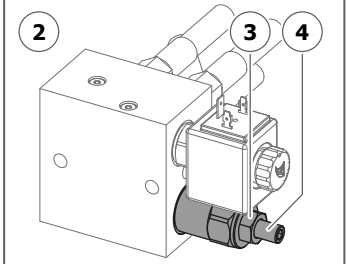
There is only one maximum pressure value for all hydraulic lines.

To **adjust** the maximum pressure:

- make sure that no equipment is installed on the quick-coupling;
- carry out the bucket opening movement to its end of travel (cylinder fully closed);
- rest the boom on the ground and stop the machine;
- connect a special device (not supplied) to measure the pressure of the opening line on the second boom;
- remove the right side panel (1) and identify the maximum pressure adjustment valve (2);
- Unscrew the safety nut (3), adjust the pressure by turning the screw (4). By turning clockwise, the pressure increases; by turning counter-clockwise, the pressure decreases;
- tighten the safety nut, start the machine, accelerate the engine to maximum speed;
- command the release of the equipment and, at the same time, read the pressure value detected by the special device;
- repeat the adjustment (with the engine stopped) if the pressure is not as desired;
- if the pressure is correctly adjusted, stop the machine and put the side panel back in place and continue with the installation of the hydraulic quick-coupling attachment.



**SINGLE-ACTING VALVE - SINGLE ADJUSTMENT**





**7.3.1.4 - Single adjustment double-acting valve maximum pressure adjustment****WARNING**

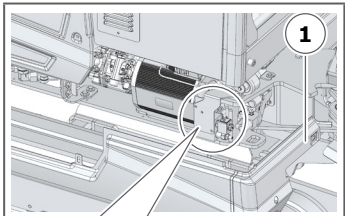
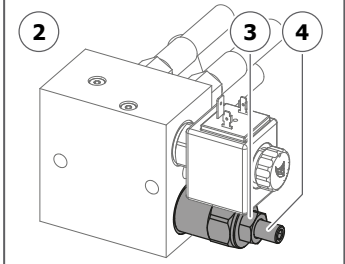
**The following procedure must be performed by specially trained personnel; the operators must wear the PPE indicated in section "2.4.1 - Personal Protective Equipment (PPE)" to page 2-18.**

The single-acting hydraulic quick-coupling attachment valve and the single adjustment double-acting hydraulic quick-coupling attachment valve have a maximum pressure adjustment.

There is only one maximum pressure value for all hydraulic lines.

To **adjust** the maximum pressure:

- make sure that no equipment is installed on the quick-coupling;
- carry out the bucket opening movement to its end of travel (cylinder fully closed);
- rest the boom on the ground and stop the machine;
- connect a special device (not supplied) to measure the pressure of the closing line on the second boom;
- remove the right side panel (1) and identify the maximum pressure adjustment valve (2);
- Unscrew the safety nut (3), adjust the pressure by turning the screw (4). By turning clockwise, the pressure increases; by turning counter-clockwise, the pressure decreases;
- tighten the safety nut, start the machine, accelerate the engine to maximum speed;
- carry out the bucket opening movement insisting on its end of travel and, at the same time, detect the pressure value measured by the special device;
- repeat the adjustment (with the engine stopped) if the pressure is not as desired;

**DOUBLE-ACTING VALVE - SINGLE ADJUSTMENT**

- if the pressure is correctly adjusted, stop the machine and put the side panel back in place and continue with the installation of the hydraulic quick-coupling attachment.



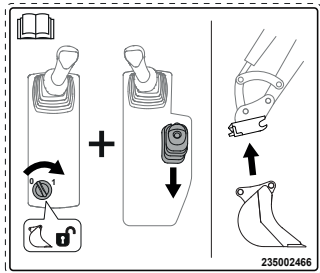
### 7.3.2 - Hydraulic quick-coupling attachment

There are two types of hydraulic quick-coupling attachment:

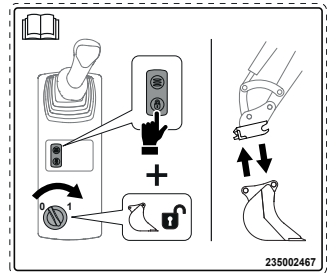
- **single-acting;**
- **double-acting.**

To identify the type of attachment installed, see the illustrative label on the operator seat.

#### SINGLE-ACTING



#### DOUBLE-ACTING



Any hydraulic and electrical systems on the equipment must be:

- **connected** after attaching the equipment to the quick-coupling;
- **disconnected** before releasing the equipment from the quick-coupling.

For further information, see section "6.29.1 - Connection of equipment to the hydraulic systems" to page 6-92.



#### **7.3.2.1 - Single-acting hydraulic quick-coupling attachment**

On the single-acting hydraulic quick-coupling attachment the release is hydraulically operated while coupling is mechanical with a return spring.



## **WARNING**

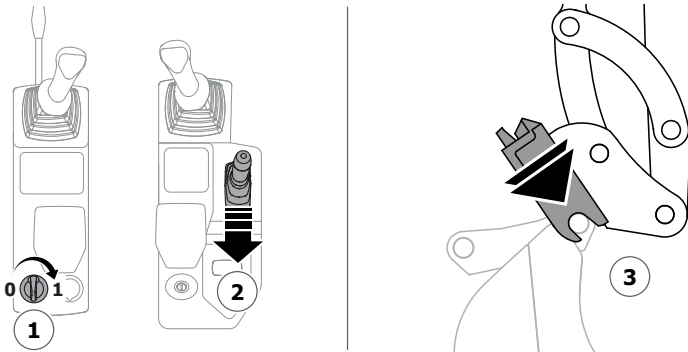
***Always make sure that the bucket or the equipment is securely coupled before starting work and sits in a stable manner on the ground when it is uncoupled, otherwise it could tip over and/or move causing personal injury or damage.***



## SINGLE-ACTING

**Locking** the equipment:

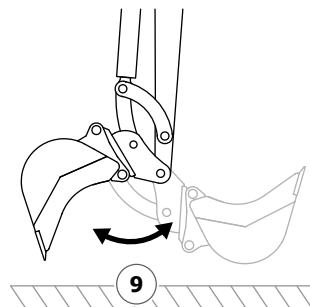
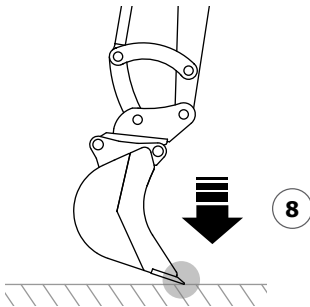
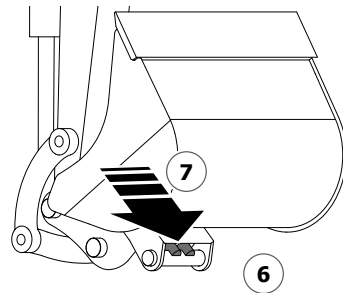
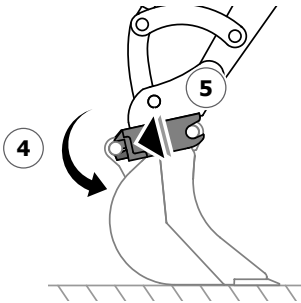
- check there is nobody in the vicinity, and if there is move them away;
- raise the dozer blade completely and lower it slightly to release the pressure;
- insert the special key in the block (1) on the left console;
- turn the key clockwise, a buzzer will begin to signal a dangerous situation;
- keeping the key turned, pull back the lever (2) that controls the dozer blade to pressurise the circuit and open the quick-coupling so it is ready to hitch up;
- release the dozer blade lever and then the key, the buzzer will stop;
- with the quick coupling, move slowly towards the equipment to be connected and hook it onto the inner part of the coupling (3);





## RECOMMENDED OPTIONAL EQUIPMENT

- keeping the equipment on the ground, perform the bucket closing movement (4) to bring the coupling to the end of its stroke; in this way, the coupling closes (5) automatically, securing the coupled equipment.
- Keeping the equipment close to the ground, check that it is correctly attached to the quick-coupling:
  - if the quick-coupling is equipped with a correct coupling indicator, check that it is in the correct position (as indicated in the user manual of the quick-coupling itself), **otherwise** check on the front side of the equipment (6) that the locking devices (pins - 7) of the quick-coupling have come out completely and that they are correctly inserted in the hole;
  - place the equipment on the ground and push (8), this operation is called *BUMP TEST*;
  - make the bucket cylinder perform two complete movements (9).



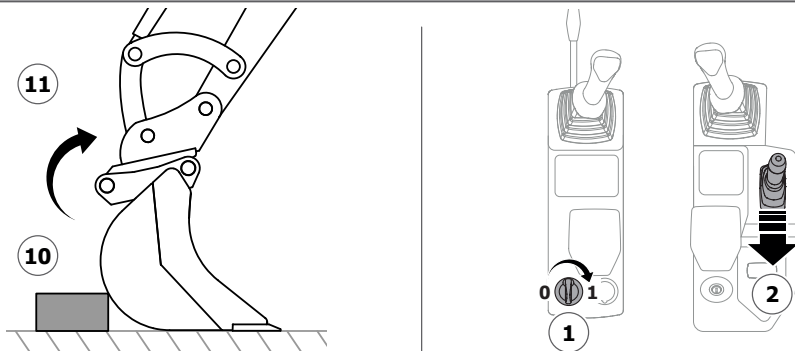
- If all the checks have a positive outcome, the equipment is correctly attached; otherwise, repeat the procedure from the start;
- remove the key (1) from the block and put it in a safe place to prevent the coupling system from being activated by accident;
- The working operations may now be commenced.



## SINGLE-ACTING

### Releasing the equipment:

- check there is nobody in the vicinity, and if there is move them away;
- place the equipment stably on the ground, using some supports (**10**) if necessary, to prevent it from moving after it has been released, with the risk of causing damage to people and/or property;
- raise the dozer blade completely and lower it slightly to release the pressure;
- insert the special key in the block (**1**) on the left console;
- turn the key clockwise, a buzzer will begin to signal a dangerous situation;
- keeping the key turned, pull back the lever (**2**) that controls the dozer blade, so that the circuit is pressurised and the quick-coupling attachment opens to release the equipment;
- release the dozer blade lever and then the key, the buzzer will stop;
- carry out the bucket opening movement to its end of travel (**11**);



- move the boom away slowly, releasing the inner part of the quick-coupling from the equipment;
- the machine is now ready to be fitted with other equipment;
- if you do not wish to carry on working, rest the quick-coupling attachment on the ground and lower the dozer blade;
- remove the key from the block (**1**) and put it in a safe place to prevent the quick-coupling from being activated by accident;
- raise the control cut-out lever, switch off the engine. and get off the machine.



### **7.3.2.2 - Double-acting hydraulic quick-coupling attachment**

In the double-acting hydraulic quick-coupling attachment both coupling and uncoupling functions are hydraulically operated. This type of quick-coupling has the special feature of keeping the circuit constantly pressurised during working operations.



## **WARNING**

***Always make sure that the bucket or the equipment is securely coupled before starting work and sits in a stable manner on the ground when it is uncoupled, otherwise it could tip over and/or move causing personal injury or damage.***

***Each time the machine is started, make sure that the buzzer sounds; if this does not happen, stop the machine and contact the Service Centre to repair the fault.***

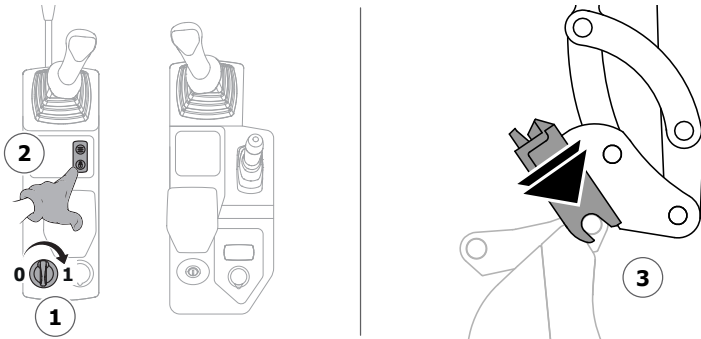
***When starting the machine, while the buzzer is buzzing, DO NOT move the boom.***



## DOUBLE-ACTING

**Locking** the equipment:

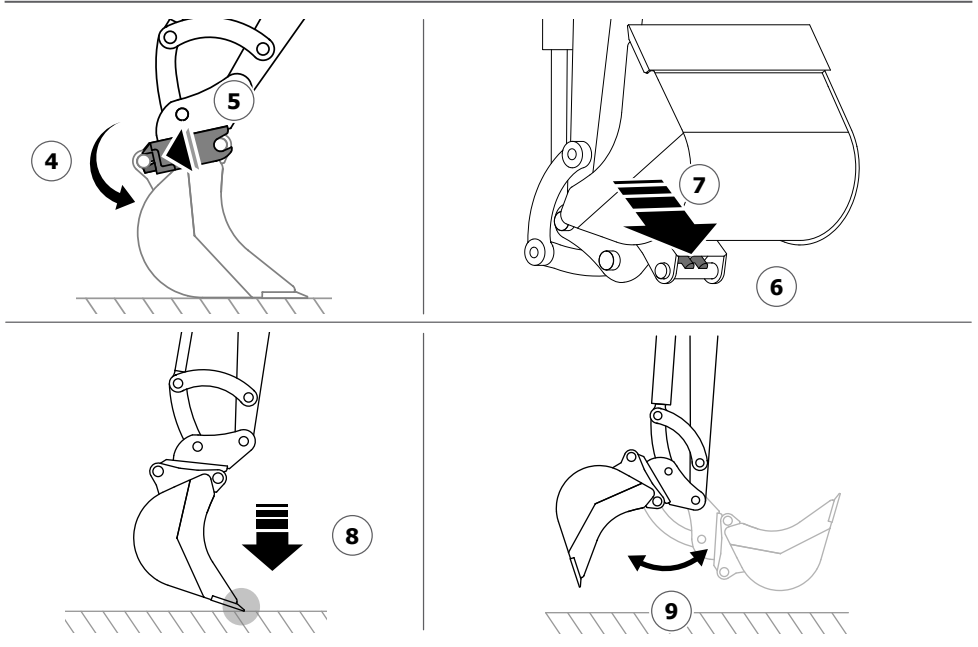
- check there is nobody in the vicinity, and if there is move them away;
- insert the special key in the block **(1)** on the left console and turn it clockwise;
- while keeping the key turned, press the button **(2)** on the right console; a buzzer will begin to sound, signalling a dangerous situation. In this way, the opening circuit is pressurised and the quick-coupling opens and is ready for coupling;
- release the button and the key;
- during this phase, the buzzer will continue to sound;
- with the quick coupling, move slowly towards the equipment to be connected and hook it onto the inner part of the coupling **(3)**;
- keeping the equipment on the ground, perform the bucket closing movement **(4)** to bring the coupling to the end of its stroke;
- turn the key **(1)** clockwise and at the same time press the button **(2)**;
- the quick-coupling starts to close **(5)** and the buzzer stops.





## RECOMMENDED OPTIONAL EQUIPMENT

- Keeping the equipment close to the ground, check that it is correctly attached to the quick-coupling:
  - if the quick-coupling is equipped with a correct coupling indicator, check that it is in the correct position (as indicated in the user manual of the quick-coupling itself), **otherwise** check on the front side of the equipment **(6)** that the locking devices (pins - **7**) of the quick-coupling have come out completely and that they are correctly inserted in the hole;
  - place the equipment on the ground and push **(8)**, this operation is called *BUMP TEST*;
  - make the bucket cylinder perform two complete movements **(9)**.



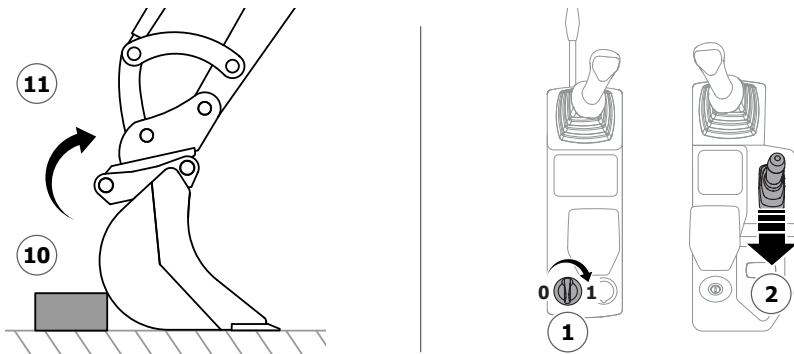
- If all the checks have a positive outcome, the equipment is correctly attached; otherwise, repeat the procedure from the start;
- remove the key **(1)** from the block and put it in a safe place to prevent the coupling system from being activated by accident;
- The working operations may now be commenced.



## DOUBLE-ACTING

### Releasing the equipment:

- check there is nobody in the vicinity, and if there is move them away;
- place the equipment stably on the ground, using some supports **(10)** if necessary, to prevent it from moving after it has been released, with the risk of causing damage to people and/or property;
- insert the special key in the block **(1)** on the left console and turn it clockwise;
- while keeping the key turned, press the button **(2)** on the left console; a buzzer will begin to sound, signalling a dangerous situation. In this way, the opening circuit is pressurised and the quick-coupling opens, releasing the equipment;
- release the button and the key;
- during this phase the buzzer will continue to sound until an equipment coupling operation has been performed;
- carry out the bucket opening movement to its end of travel **(11)**;



- move the boom away slowly, releasing the inner part of the quick-coupling from the equipment;
- the machine is now ready to be fitted with other equipment;
- if you do not wish to carry on working, rest the quick-coupling attachment on the ground and lower the dozer blade;
- remove the key from the block **(1)** and put it in a safe place to prevent the quick-coupling from being activated by accident;
- raise the control cut-out lever, switch off the engine. and get off the machine.



## 7.4 - Demolition hammer



# WARNING

***During operation with the demolition hammer, there is a risk of flying splinters and/or debris which may cause serious injuries to the operator.***

***Do not use the demolition hammer on the roll-bar / canopy version machine without having installed the operator protection front panel (optional).***

The machine is prearranged for the installation of a hydraulic demolition hammer.

A suitable breaker must be chosen, bearing in mind its intended use.

The working conditions with a demolition hammer are more demanding than with other equipment.

### 7.4.1 - Installation and removal

Proceed as indicated in the previous sections according to the type of coupling available on the equipment.

### 7.4.2 - Precautions for use



# WARNING

***During the work, flying splinters or debris may hit the operator position or other parts of the machine; take the following precautions and be very careful so as to prevent accidents that may damage the machine and cause injuries to the operator.***

***During work operations, keep the boom in the position without swing, the demolition hammer must always be in front of the operator, never to the side.***

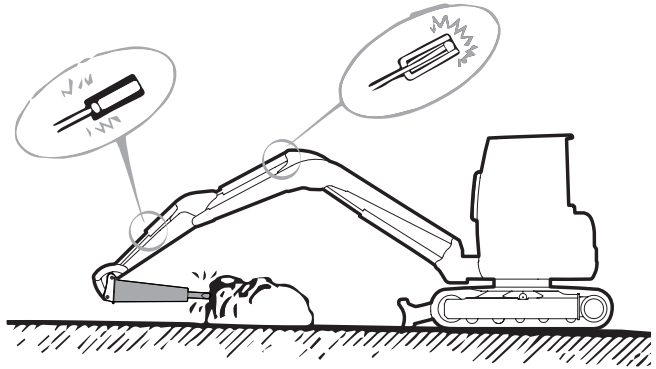


## RECOMMENDED OPTIONAL EQUIPMENT

Avoid operating with the machine cylinders near their limit stop (maximum extension or retraction), so as not to damage the accessory or the cylinders.



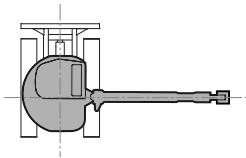
**WRONG**



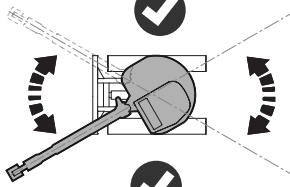
Do not operate with the demolition hammer in a sideways position; the machine will become unstable and the undercarriage components will be subjected to increased wear.



**WRONG**



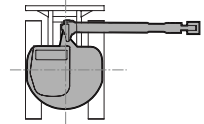
**RIGHT**



**RIGHT**



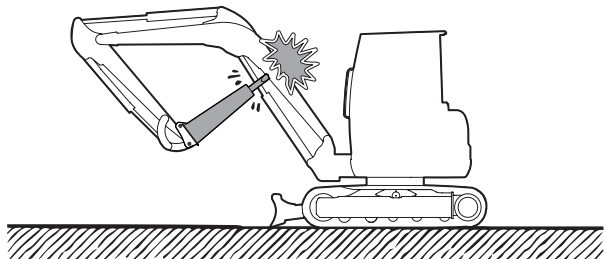
**WRONG**



When operating the machine, take care not to hit the boom or other parts of the machine with the demolition hammer.



**WRONG**

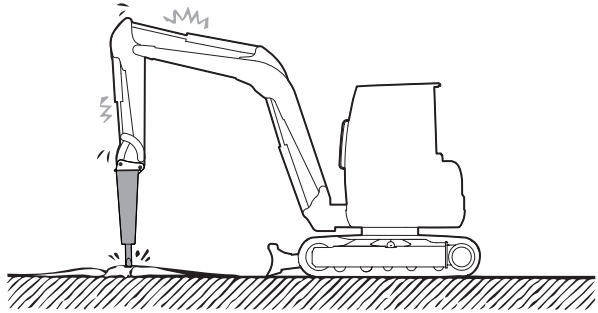




Do not use the demolition hammer with the second boom in a vertical position; excessive vibration on the second boom may cause oil leaks.



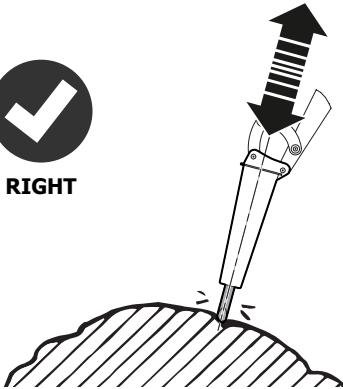
**WRONG**



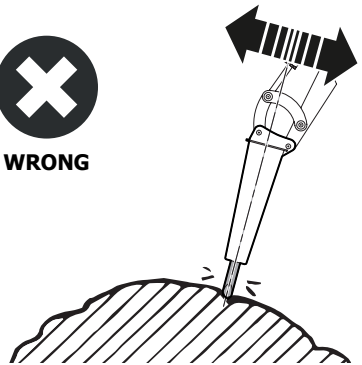
With the boom, apply a force in the same direction of the tip while: approaching the object to be demolished, during the demolition and while moving away from the object.



**RIGHT**



**WRONG**



Do not operate with the demolition hammer for more than one minute in the same spot, since the tip and/or hydraulic mechanism may get excessively worn; if the object does not break within a minute, place the tip on another spot.

### 7.4.3 - Operation

For operating the demolition hammer, refer to section "6.29.3 - AUX1 Auxiliary hydraulic system" to page 6-94. Always consult the manual supplied by the manufacturer of the equipment.



## 7.5 - Material handling grapple



### WARNING

***When working with a rotating grapple (with rotor), there is a risk that the material will hit the machine's protective structure, causing serious injuries to the operator.***

***The rotating grapple can be used ONLY if the machine has a FRONT-GUARD, see section "2.8.1.2 - Protection grid FRONT-GUARD Level II (option)" to page 2-46.***

***Be very careful when handling bulky objects that may hit the cab or parts of the machine during rotation, causing a hazard to the operator.***

The grapple is a piece of equipment designed and built to handle materials; the operations involve grabbing the material, lifting it and placing it elsewhere. The material is grabbed and released with a movement of the grapple itself, without the need for the manual intervention of a person.

The machine is configured to be able to work with different types of grapples.

The most appropriate grapple must be chosen taking into account the intended use.

The grapple can have a static or rotating movement.



### WARNING

***When working with the grapple for trunks, it is possible to travel (machine movement with tracks) only on flat surfaces and with the boom parallel to the tracks. In these conditions, the nominal lifting capacities indicated in section "3.13 - Nominal lifting capacity" to page 3-8 must be reduced by 15%.***

***In stationary mode (movement of the boom only), the nominal lifting capacities do not change.***



### **7.5.1 - Installation and removal**

Proceed as indicated in the previous sections according to the type of coupling available on the equipment.

### **7.5.2 - Operation**

The equipment is hydraulically connected to the auxiliary hydraulic systems; for operation, refer to section "6.29 - *Auxiliary hydraulic systems*" to page 6-90. Always consult the manual supplied by the manufacturer of the equipment.

## **7.6 - Auger**

The auger is a piece of equipment used to drill into the ground.

If envisaged in the user manual of the equipment, it is possible to use the hydraulic system in double-acting mode, which allows for operation in both directions of rotation.

### **7.6.1 - Installation and removal**

Proceed as indicated in the previous sections according to the type of coupling available on the equipment.

### **7.6.2 - Operation**

The equipment is hydraulically connected to the auxiliary hydraulic systems; for operation, refer to section "6.29 - *Auxiliary hydraulic systems*" to page 6-90. Always consult the manual supplied by the manufacturer of the equipment.



## 7.7 - Load handling



# DANGER

***To perform load handling operations, the machine must be equipped with the special load handling equipment (optional).***

***During load handling operations, it is extremely important to follow the instructions contained in this manual and to comply with local Standards.***

***Failure to do so may result in serious or fatal injuries.***

Load handling includes lifting, lowering and carrying a **load** using **lifting accessories**, for which the assistance of a person or machine operator is required to hook, unhook or stabilise (during transport) the load.

The **load** in the load handling application can be, for example: pipes, containers.

The **lifting accessories** are, for example: wire ropes, track chains or textile belts.

Lifting accessories do NOT include any equipment used to hook the load without the intervention of a person, for example: grapples, clamshell buckets, grapples for trunks, vacuum lifting devices, magnetic plates and pallet forks.

Optionally, the machine can be configured for load handling.

The load handling configuration provides for the following components:

- safety valve on first boom cylinder, second boom cylinder and positioner boom cylinder (if present);
- overload signalling device;
- load attachment point (load handling hook);
- load handling table.





## WARNING

***The capacities indicated in the load handling table must be reduced according to the weight of the lifting accessories used and of the equipment installed.***

***The load attachment point is the hook positioned on the bucket articulation connecting rod; DO NOT use other points or methods. It is forbidden to use lifting hooks installed on the equipment, for example: quick-coupling, bucket, etc. Before starting lifting operations, check the lifting hook for cracks or deformation and any abnormalities in the device protecting against the automatic release of the load (spring tab).***

***Use clean, undamaged lifting accessories (cables, ropes, track chains, shackles, etc.) of adequate capacity, in accordance with current lifting regulations. Be sure to use self-locking hooks to prevent unintentional opening during handling operations.***

***During load handling operations, the lifting accessories must NOT come into contact with parts of the boom or equipment to avoid damage and to avoid overloading the structure; remove the equipment if necessary.***

***The lifting devices can be used only to lift parts that are not anchored to the ground. Never use them for pulling, uprooting or demolition operations.***

***Use the tracks to transport the load only if it is really necessary and if the ground is flat and solid. Before starting to travel, rotate the turning frame and position the boom parallel to the undercarriage. Do not travel with the boom positioned transversely to the undercarriage. The travel speed must be less than 3 km/h. Move carefully and avoid abrupt starts and stops.***

***A suspended load may swing freely, hitting people or machine parts such as the protective structure. Make sure that all people are away from the range of action of the moving machine. Move the load slowly. If the load starts to swing while moving it, lower it slowly to the ground and sling it in such a way that unintentional swinging is avoided as much as possible.***





## WARNING

**If the shape or size of the load make it impossible or difficult for the operator to see clearly, the assistance of a ground operator is required. The people helping to guide the load and securing it must always be within the field of vision of the machine operator. During load handling, the operators in charge of securing the load can only approach the load with the approval of the machine operator and only to the side of the boom. The machine operator may only give approval when the machine is stationary and the load is not suspended.**

To **handle** loads, proceed as follows:

- evaluate the weight of the object to be handled and compare it with the data indicated in the load handling table **(1)** in the operator seat. Do not lift loads exceeding the maximum values indicated in the table;
- activate the overload warning light for the handling of loads; the corresponding warning light **(2)** lights up on the display. Refer to section "6.10.3.2 - LOAD HANDLING equipment screen (optional)" to page 6-31.

1

LD<sub>50%</sub> = 1.6 m

LD<sub>25%</sub> = 1.6 m

LD<sub>10%</sub> = 1.6 m

LD<sub>5%</sub> = 1.6 m

LD<sub>2%</sub> = 1.6 m

A = 750 kg

B = 80 kg

C = 120 kg

ISO 10567

| W   | H | 1 | 1.5 | 2 | 2.5 | 3 | 3.5 | MAX | LD  | LD  |
|---|---|---|-----|---|-----|---|-----|-----|-----|-----|
| 3   |   |   |     |   |     |   |     |     | STO | OPT |
| 2.5   |   |   |     |   |     |   |     |     | STO | OPT |
| 2   |   |   |     |   |     |   |     |     | STO | OPT |
| 1.5   |   |   |     |   |     |   |     |     | STO | OPT |
| 1   |   |   |     |   |     |   |     |     | STO | OPT |
| 0   |   |   |     |   |     |   |     |     | STO | OPT |
| -1  |   |   |     |   |     |   |     |     | STO | OPT |
| -0.5  |   |   |     |   |     |   |     |     | STO | OPT |
| -1  |   |   |     |   |     |   |     |     | STO | OPT |
| -1.5  |   |   |     |   |     |   |     |     | STO | OPT |
| A A+B A+C A A+B A+C A A+B A+C A A+B A+C A A+B A+C A A+B A+C |   |   |     |   |     |   |     |     |     |     |
| kg  |   |   |     |   |     |   |     |     |     |     |



**2**



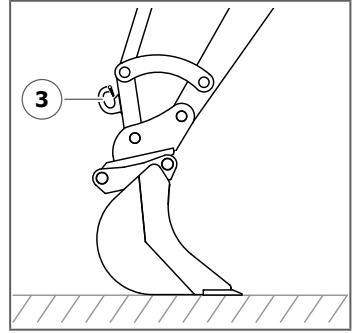
## NOTICE

The overload signalling device warns the operator with an acoustic signal that the lifted load exceeds the allowed limit.

If an overload condition is detected, lower the load to the ground and check the load conditions, referring to the load handling table.



- Extend the bucket cylinder to the end of its stroke;
- secure the load to the lifting hook **(3)** positioned on the bucket articulation connecting rod using lifting accessories of adequate capacity for the load to be lifted. To limit load swinging, use shorter lifting accessories;
- check that there are no obstacles in the work area that the machine will travel through;



- lift the load slowly, avoiding abrupt movement that may make it swing.



## WARNING

***Keep the load close to the machine to increase stability and work preferably in the direction of the longitudinal axis, rather than transversely.***

***Lift the load to the minimum height necessary for handling.***

- Place the load where required, making sure that it is stable and rests on a solid base appropriate for its weight;
- remove the lifting accessories from the hook.



## WARNING

***When the machine is configured for load handling, it must be commissioned in accordance with the Standards in force in the country where the machine is used. For Italy, see the indications in section "7.7.3 - Commissioning and registration of lifting equipment (Italy only)" to page 7-35.***



### 7.7.1 - Load handling table



## WARNING

***When the machine is used in conditions other than those indicated in the manual (for instance, on a surface which is not compact, but rough or slippery, or on a slope, etc.), the operator must take into account the new conditions that reduce the machine's stability and capacity. The operator must therefore work at lower speeds and with lighter loads so as to ensure the stability of the machine.***

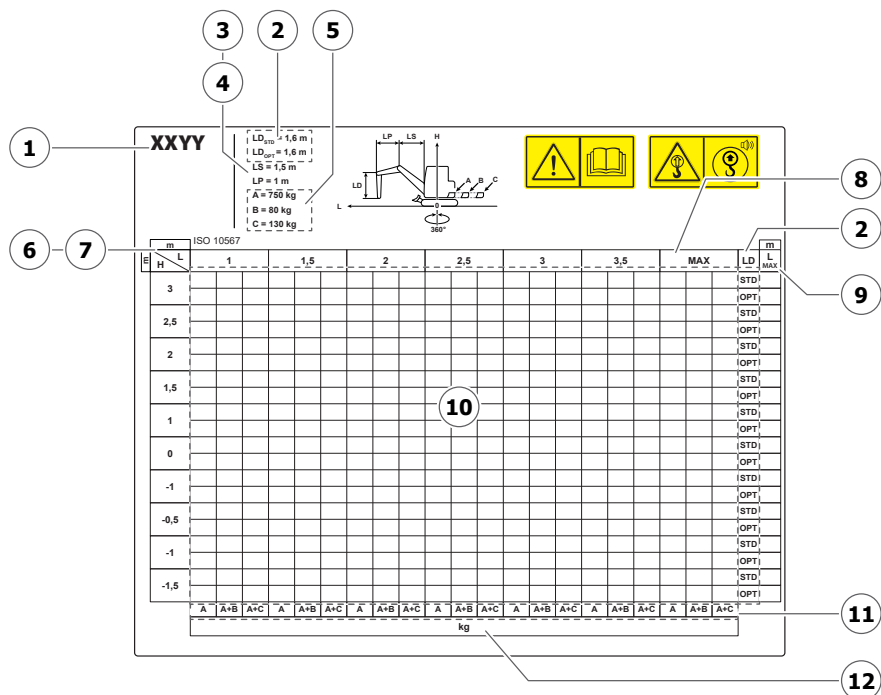
The load handling table indicates the nominal lifting capacity of the machine at different distances from the rotation axis, at different heights from the ground and for different machine configurations.

The nominal lifting capacity refers to:

- machine positioned on sound, firm and level ground;
- the indicated capacities are valid for the full slewing range of the turning frame;
- boom in NON-slewed position (if present);
- outreach referred to the centre of rotation (slewing ring);
- undercarriage extended to maximum track widening (if present);
- machine without quick-coupling attachment and equipment;
- all the protective structures available;
- all types of tracks available;
- dozer blade raised;
- the lifting capacities do not exceed 75% of the tip-over or roll-over limit or 87% of the hydraulic limit, in accordance with standard **ISO 10567**.



## RECOMMENDED OPTIONAL EQUIPMENT



### Key:

|   |   |
|---|---|
| <b>1</b> Machine model  | <b>7</b> <b>H</b> : lifting height from the ground    |
| <b>2</b> <b>LD<sub>STD</sub></b> : Length of second standard boom<br><b>LD<sub>OPT</sub></b> : Length of second optional boom   | <b>8</b> <b>MAX</b> : maximum lifting distance        |
| <b>3</b> <b>LS</b> : Length of first boom   | <b>9</b> <b>L MAX</b> : maximum outreach              |
| <b>4</b> <b>LP</b> : Length of positioner boom (if present)   | <b>10</b> Lifting capacity                            |
| <b>5</b> Weight of counterweights:<br><b>A</b> : main counterweight<br><b>B-C-D</b> : supplementary counterweights (if present) | <b>11</b> Counterweight configuration                 |
| <b>6</b> <b>L</b> : lifting distance from the centre of the slewing ring  | <b>12</b> Unit of measurement of the lifting capacity |



### 7.7.2 - Safety valves

The safety valves prevent the boom from falling in an uncontrolled manner in the event of a pipe rupture or explosion, allowing the operator to slowly lower the equipment to the ground using the normal controls.

In addition to this, the safety valves keep the boom in a stable position during work operations, reducing normal hydraulic distributor leakage.

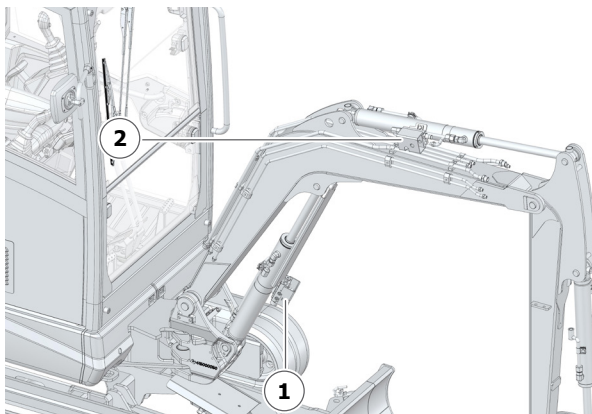


## NOTICE

*Before starting load handling operations, check that the valves are not damaged or noisy.*

*If any abnormal conditions are found, contact the Service Centre.*

---



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#### Key:

**1** Safety valve on first boom cylinder

**2** Safety valve on second boom cylinder

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**7.7.3 - Commissioning and registration of lifting equipment (Italy only)**

The machine configured for load handling is classified by Italian Standards as lifting equipment.

When a brand new piece of lifting equipment is purchased, it is necessary to promptly report its commissioning/registration to the local INAIL (National Institute for Insurance against Industrial Industries) office, using, from 27 May 2019, the CIVA application on the INAIL website.

The certification and verification services of lifting equipment and systems, which must be requested exclusively online using the CIVA application, are the following for an excavator set up for lifting loads:

**COMMISSIONING AND REGISTRATION**

For the **commissioning and registration** of lifting equipment, it is necessary to go to the INAIL website [www.inail.it](http://www.inail.it) and access the online services using SPID-CNS-CIE.

**Enter the section:** *Certification and Verification – CIVA – Lifting – Registration* Select a new service for Mobile Crane.

**Fill in the required fields**, attach the required documents and submit the application.

At this point, it is possible to use the machine. INAIL will not carry out any checks on the occasion of commissioning and registration.

INAIL will then assign a serial number to the machine and send it to the applicant.

**NOTICE**

*The excavator set up for lifting loads is a machine that performs several functions (digging and lifting loads). It is therefore necessary to file a declaration of commissioning and registration even if the load handling function will not be used.*

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## FIRST PERIODIC INSPECTION

The first periodic inspection must be requested from the competent INAIL department. With reference to the date of commissioning, at least 45 days before the expiry of the deadline for the First Periodic Inspection, set out by Anx. VII of the Italian Legislative Decree no.81/2008 according to the type of equipment, the request for the first periodic inspection must be made to INAIL.

To make the **request for the first periodic inspection**, it is necessary to go to the INAIL website [www.inail.it](http://www.inail.it) and access the online services using SPID-CNS-CIE.

**Enter the section:** *Certification and Verification – CIVA – Lifting – First Periodic Inspection* Select a new service for Mobile Crane.

Enter the serial number of the equipment, previously assigned by INAIL, and continue with the application.

INAIL will submit the application to an INAIL technician or delegate it to the Qualified Person indicated by the user. In both cases, the owner will be notified of the assignment of the technician via email.

Once the verification has been carried out, a report with the outcome (positive/negative) will be issued and the owner will be notified via email.

The requests must be made by:

- the Employer of the Company using the lifting equipment or its delegate with the requirements set out by the Italian Legislative Decree 81-2008;
- the Self-Employed owner and/or user of the equipment;
- The Owner (e.g. Hirer, Dealer, etc...).

Alternatively, it is possible to delegate a consultant for systems and equipment who will use CIVA on behalf of the Employer, Self-Employed Worker or Owner.



### **7.7.3.1 - Periodic inspections after the first one**

The purpose of periodic inspections is to ensure compliance with the manufacturer's installation instructions, the state of maintenance and preservation, the maintenance of the safety conditions originally envisaged by the manufacturer and specific to the work equipment, the efficiency of the safety and control devices.

The periodic inspections after the first one must be requested to the Local Health Unit or to authorised subjects according to the Italian Ministerial Decree of 11 April 2011.

At least 30 days before each periodic inspection, the Employer must send a request to the authorised body, either private or public. The deadline for carrying out the inspection is, in this case, **30 days** from the request.

The types of equipment subject to verification and the frequency are listed in Annex VII of the same Decree. In the case of an excavator configured for lifting loads, it falls under the SC Group: Material lifting equipment not operated by hand, art. 1.1.1. of the Italian Ministerial Decree 11-04-2011. a) Mobile material lifting equipment with a capacity of more than 200 kg.

The reports drawn up following the inspections must be kept and made available to the supervisory body.

The inspections are subject to payment and the costs thereof are charged to the owner.

### **7.7.3.2 - Transferring the equipment to another owner**

If the equipment is transferred to another owner, the person eligible must submit a request to INAIL using the CIVA application to transfer the registration of the system/equipment.

### **7.7.3.3 - Purchasing the equipment from another owner**

If the equipment is purchased from another owner, the person eligible must submit a request to INAIL using the CIVA application to transfer the registration of the system/equipment. The periodic inspections after the first one continue with the same frequency indicated in Annex VII of the Italian Legislative Decree no.81/2008.



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## 8 - MAINTENANCE

This section contains a complete list of requirements and procedures regarding the maintenance of this machine.

Maintenance provides for two types of operations:

- **daily:** through checks and operations performed **every day** directly by the operator;
- **periodical:** through checks and operations performed at specific **time intervals** by the *Service Centre*.

See the *Periodical Maintenance* table for the list of operations and relative time intervals.

Periodical maintenance operations must be performed at authorised *CASE workshops*, where the interventions must also be recorded in the special register.

If the information or procedures contained in this chapter are not fully understood, contact your local *Service Centre* for clarifications before proceeding.

Before starting work, make sure that the maintenance work has been carried out on the equipment in use, as described in the Use and Maintenance Manual of the equipment itself.



## 8.1 - Safety



# WARNING

**Carry out maintenance operations on a sturdy, flat surface.**

**Maintenance operations must be carried out with the dozer blade and the equipment resting on the ground.**

**Do not carry out maintenance when the machine is running. Before any intervention set the machine in safety according to "8.1.1 - Placement out of service for maintenance" to page 8-5.**

**Before doing any work on the machine, read the instructions in the manual carefully.**

**During maintenance operations, observe the precautions printed on the safety signs on the machine.**

**Do not try to carry out any maintenance unless you have the necessary skills, the right information, the safety tools and the instruments and equipment necessary to do the job properly.**

**Ensure the equipment used to lift and support the machine is in good working order and withstands the weight of the machine.**

**NEVER carry out any maintenance or servicing work on this machine while the engine is running. Contact with moving or hot parts, or with any high-pressure fluid leaks, may cause serious injury or death.**

**Wear appropriate PPE as indicated in "2.4.1 - Personal Protective Equipment (PPE)" to page 2-18.**

**Do not wash the electrical components with water jets to avoid the risk of electrical discharges. Washing with water jets can only be carried out with hoods and covers closed. Keep a distance of at least one metre from the machine and direct the water spray towards the undercarriage.**



If you are working in dusty environments, reduce maintenance interval times by half.

Failure to comply with the safety regulations and proper maintenance procedures could cause damage or faults on the machine and result in injury or even death of the operator or other persons in the vicinity.

Before starting the machine, clear the area from the machine action range.

Never leave the machine switched on.

Wash the machine regularly and remove all traces of grease, oil and debris, so as to prevent any form of personal injury and machine damage.

Do not spray water or steam inside the cab or anywhere near the driving position.

Clean the machine, taking care not to direct the high-pressure water spray at the radiator or any electrical parts.

When washing, protect the connectors of the electrical system and do not wet the starting equipment switch.

When working in dusty areas:

- check frequently for air filter blockage;
- clean the radiator and air conditioner condenser (if present) frequently, to prevent the fins from clogging;
- clean the electrical components; in particular, remove any dust from the alternator and starter engine.

Do not use flammable liquids to clean machine components, avoid open flames, and do not smoke.

Keep all grease nipples, breather pipes and areas around the dipsticks particularly clean to prevent any dirt getting in.

Thorough cleaning of the machine will help to identify damaged components more easily.





### **NOTICE**

**IT IS RECOMMENDED TO USE ORIGINAL SPARE PARTS ONLY.**

*Do not carry out any procedure, modification or repairs of any kind, except for those indicated in this handbook. Only the Service Centre has the necessary knowledge of the machine and the experience to carry out any intervention with the appropriate technique.*

*This machine has been assembled using instruments based on the metric decimal system. Use metric tools of the appropriate type and size to carry out maintenance procedures.*

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**CASE recommends waste storage and disposal procedures in respect of the environment. Do not discharge liquids into the ground or drains, or into waste catchment areas. Use suitable containers for the collection of these liquids, then store and/or dispose of them in the safe and approved manner. Check and observe all government and/or municipal regulations regarding the storage, disposal and recycling of waste.**

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### 8.1.1 - Placement out of service for maintenance

The **placement out of service for maintenance** procedure must be carried out to deactivate and place the machine in safe conditions during maintenance operations.



## WARNING

***Before carrying out any maintenance intervention or service on components of the hydraulic system, release any residual pressure.***

Before performing any inspections or maintenance operations disable the machine as follows:

- position the machine on a flat, level surface;
- place the equipment and dozer blade on the ground;
- stop the machine;
- Release the pressure of the hydraulic system as described in section "6.28 - Discharge residual pressure in the hydraulic system" to page 6-90;
- remove the starting equipment key, which must remain in possession and accessible only to the person performing the maintenance;
- press the emergency stop button, as indicated in section "2.8.4 - Emergency stop button" to page 2-49;
- apply a caution sign (1), **NOT supplied**, near the starting equipment board.



At the end of the interventions, the person in charge of the maintenance operations can restore the machine by following the procedure in reversed order; the machine will therefore be ready for normal operation.



## 8.2 - Tools and equipment for maintenance

Any additional instruments or tools required for maintenance and adjustment purposes, and not included in the tool kit, are included in the following table.

### Key to the following table:

- (1) "Manually" means that the maintenance or adjustment operation can be performed by hand, without using any tools.
- (2) Various tools may be used to tighten the screws and nuts found on the machine.

| PART INVOLVED IN<br>MAINTENANCE |                 | Torque wrench |   |   |   | Tool for oil filter | Socket wrenches (2) | Hex Keys (2) | Manually (1) |
|---------------------------------|-----------------|---------------|---|---|---|---------------------|---------------------|--------------|--------------|
|                                 |                 |               |   |   |   |                     |                     |              |              |
| UNDERCARRIAGE                   | Tracks          |               | X | X | X |                     | X                   |              |              |
|                                 | Rollers         |               |   |   |   |                     | X                   |              |              |
|                                 | Idle wheel      |               |   |   |   |                     | X                   |              |              |
|                                 | Drive sprocket  |               |   |   |   |                     | X                   |              |              |
| HYDRAULIC SYSTEM                | Components      |               | X | X | X |                     | X                   | X            | X            |
|                                 | Distributor     |               |   |   |   |                     | X                   | X            |              |
|                                 | Gear motors     |               |   |   |   |                     | X                   | X            |              |
|                                 | Radiator        |               |   |   |   |                     | X                   | X            |              |
| ELECTRICAL SYSTEM               | Alternator      |               |   |   |   |                     | X                   | X            |              |
|                                 | Lighting        |               |   |   |   |                     |                     | X            |              |
|                                 | Starting system |               |   |   |   |                     | X                   | X            |              |



### 8.3 - Guards

The guards, also called hoods or covers, provide protection against the risks such as high noise level, burns or moving parts.

The inner parts of the machine can be accessed for maintenance through the hoods and covers.

During the operation the guards must be kept closed. The guards present on the machine are listed below.

Their integrity and anchorage must be checked periodically.



## WARNING

***Do not keep the access covers open when the machine is positioned on a slope or in the presence of strong winds. The covers can close accidentally and injure persons.***

#### 8.3.1 - Rear compartment cover

The rear compartment cover (1) is located on the rear side of the machine.

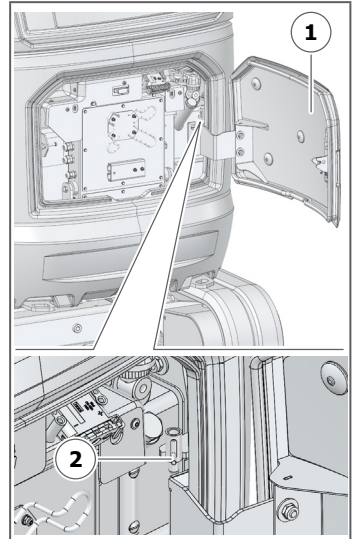
From here it is possible to access: charging plugs, hydraulic oil tank.

To **open** the cover:

- insert the key into the lock and turn it counter-clockwise;
- release the lock by pushing the key;
- using the dedicated handle, pull the cover to the right to open it;
- when the cover is fully open, the catch (2) engages. At this point release the cover which is kept in the open position by the catch.

To **close** the cover:

- push it to the right, lift the stop (2) and close it slowly back to the left until the lock clicks;
- lock the cover by turning the key clockwise and then remove it.







## CAUTION

***Be very careful when the cover is open as it could close suddenly and cause serious injury to the operator's hands or head.***

### 8.3.2 - Tool holder cover (canopy version)

The cover (1) of the tool compartment is positioned on the rear side of the machine, above the rear cover.

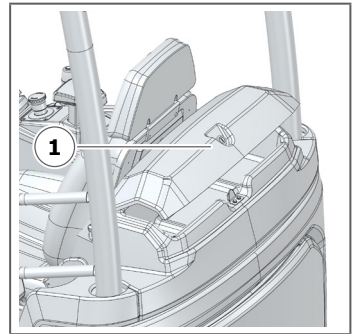
The tool compartment can be accessed via the cover.

To **open** the cover:

- insert the key into the lock and turn it counter-clockwise;
- accompany the cover up to open it.

To **close** the cover:

- push it down until you hear the lock click;
- lock the cover by turning the key clockwise and then remove it.



### 8.3.3 - Tool compartment cover (cab version)

The cover (1) of the tool compartment is positioned on the rear side of the machine in the upper part.

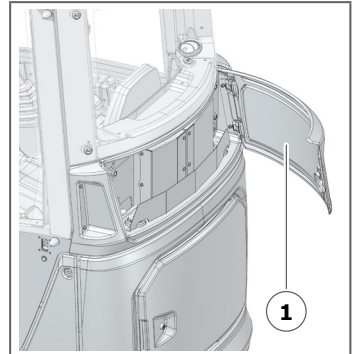
The tool compartment can be accessed via the cover.

To **open** the cover:

- insert the key into the lock and turn it counter-clockwise;
- guide the cover to the right to open it.

To **close** the cover:

- accompany the cover to the left until it stops;
- lock the cover by turning the key clockwise and then remove it.

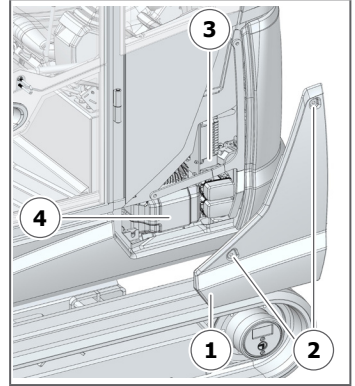




### 8.3.4 - Fuse compartment protection

The fuse compartment protection (1) is positioned on the left side.

From here it is possible to access the fuses and relays.  
To remove the protection, loosen the screws (2).



## WARNING

***IT IS FORBIDDEN to remove the high voltage protections: electrocution hazard due to electrical discharge.***

Inside the fuse compartment there are two protections (3-4) which prevent contact with high voltage components.

Access to the high-voltage components is only permitted to the Service Centre.

### 8.3.5 - High voltage component protections

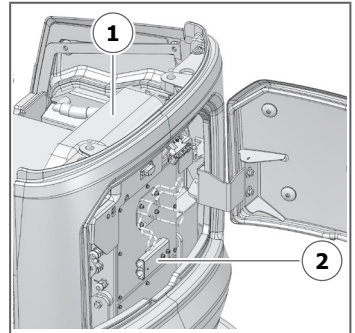


## WARNING

***IT IS FORBIDDEN to remove the high voltage component protections: risk of electrocution due to electrical discharge.***

The high voltage component protections are located under the driver's seat (1) and in the rear compartment (2).

Access to the high-voltage components is only permitted to the Service Centre.





#### 8.4 - Protective structure opening procedure

To perform maintenance operations on internal parts positioned under the driver's seat, the protective structure can be lifted (tipped).



### WARNING

***When the protective structure is being tipped over, follow the procedure indicated very carefully, in order to avoid crushing the operator.***

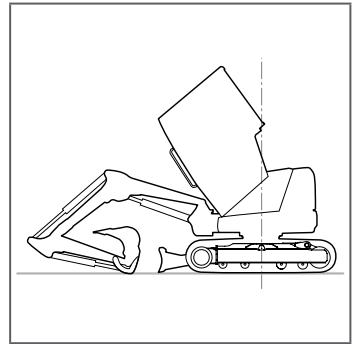


### WARNING

***Secure the machine as indicated in section "8.1.1 - Placement out of service for maintenance" to page 8-5.***

To **tip over** the protective structure:

- position the machine on a flat, level surface;
- rest the dozer blade on the ground and position the boom as shown in the figure;
- stop the engines, lift the controls cut-out lever;
- for the cab version, lift the lower front glass and close the cover;
- leave the driving position;
- close the cover.





- open the rear cover (1);
- loosen the screws (2);
- ensure no-one remains near the machine, especially in the rear area;
- raise the protective structure by pushing it forward, until it has been tipped over completely.

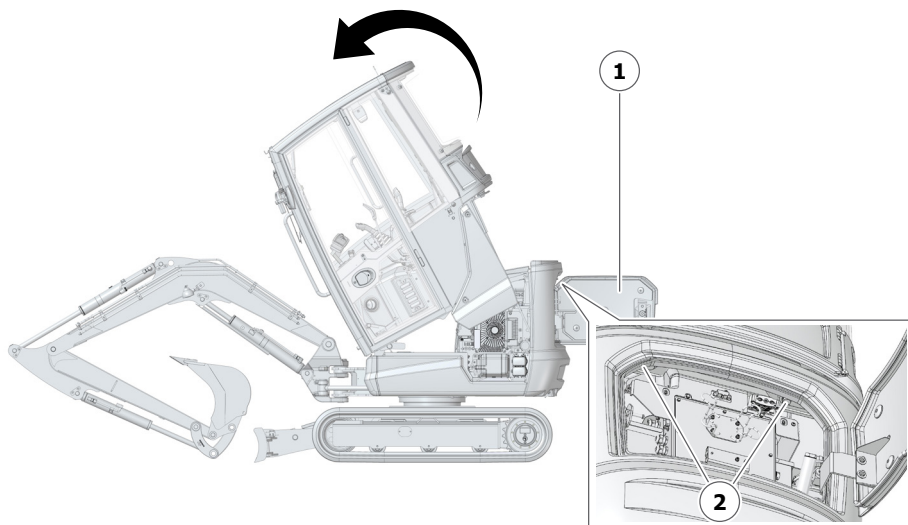


## WARNING

***Crushing/shearing hazard.***

***Handle the protective structure away from the tip-over hinge.***

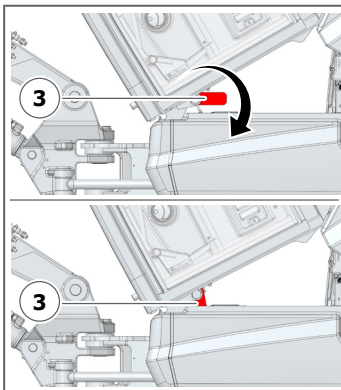
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- turn the safety lock (3) downwards into the locked position, thus preventing involuntary and unexpected tip-over of the structure.

To put the protective structure back in place, repeat the procedure in reverse order.



## Screw characteristics (2)

|                     |              |
|---------------------|--------------|
| Screw size          | M16 x 2 x 60 |
| Bolt strength class | 10.9         |
| Tightening torque   | Nm 170       |



## WARNING

***When the structure is raised, do not attempt to start the machine.***

***Before carrying out any work, replace the protective structure in its original position.***



## 8.5 - Electrical system



# DANGER

***Before any interventions on the electrical system, carefully read the indicated warnings.***

***The battery requires no maintenance, so any work on it is prohibited, only the Service Centre can intervene in the event of a fault.***



# WARNING

**Operations not indicated ARE PROHIBITED.**

The maintenance interventions to be carried out on the electrical system are the following:

- check and replace fuses and relays, see section "9.1 - Fuses and relays" to page 9-1;
- replace work lights, see section "9.2 - Work lights replacement" to page 9-4.

If the cables are damp or their insulation is damaged, the electrical system will leak current and may cause machine malfunction or harm to the operator.

Avoid getting the electrical system wet when washing the machine or if it rains.

If damaged cables are noticed, stop the machine and contact the *Service Centre* for repairs.

When working for extended periods near rivers, lakes or the sea, protect connectors with suitable anti-corrosives.

## 8.6 - Tracks

Inspect the condition of the tracks periodically and check their tension.

If the track is too tight, there will be more friction on the rolling components and, as a consequence, more power will be needed for travel.

If the track is too loose, there will be more friction while reversing and, as a consequence, more power will be needed for travel. The track may also come out of the guide edges of the rolling components, causing the travel to stop.

Make sure that the tracks have equal tension: a different tension can cause a deviation of the machine from the travel trajectory.



## 8.7 - Refilling

### 8.7.1 - Refilling quantity table



## NOTICE

*Before each change or refill of the liquids/oils used by the machine, check to see if the system is filled with mineral or organic products.*

*Never mix different types of products so as not to alter their characteristics.*

For more information on lubricants, see section "8.7.2 - Products for lubrication" to page 8-15.

The filling quantities shown in the table are only indicative values, however, the level indicators are binding.

After each change or refill, check the level of the corresponding group.



***Oil and filters are considered to be polluting waste not to be dispersed in the environment and to be recovered and disposed of in accordance with the current anti-pollution regulations.***

## EQUIPPING THE MACHINE FOR THE FIRST TIME WITH ECO-FRIENDLY LUBRICANTS

| Refilling                      | Type       | Brand                           | Quantity   |
|--------------------------------|------------|---------------------------------|------------|
| Hydraulic system               | ISO 46     | PANOLIN                         | 28 l       |
| Hydraulic oil tank             |            | HLP SYNTH E46                   | 15 l       |
| Travel gear motors             | SAE 80W-90 | PANOLIN<br>BIOGEAR RS<br>80W-90 | 0.35 l x 2 |
| Track tensioner grease nipples | EP 2       | PANOLIN                         | -          |
| Joints greasing points         |            | BIOGREASE EP 2                  |            |



### 8.7.2 - Products for lubrication

The scrupulous observation of the rules for the use of lubricants and products for the operation of the machine, increases the reliability and life of the machine itself.

It is particularly important to comply with the lubricant qualities indicated.

The replacement and lubrication intervals are indicated in section "8.9 - *Periodic maintenance*" to page 8-23.

Do not mix different types of oil, if there is no certainty about the type of oil used, avoid topping up and proceed with changing.

#### **Filling quantity specifications:**

For further information on the filling quantities and specifications on the lubrication and products required for the operation of the machine, refer to section "8.7.1 - *Refilling quantity table*" to page 8-14.



#### **Measures for environmental protection**

Always adopt and respect the measures for environmental protection.

Comply with the specific national laws.

Before draining fluids from the machine, take precautions to ensure their proper disposal.

#### **Disposal of used products**

Used products and special waste are, for example:

- oils, lubricants, etc.;
  - filters, oil filter cartridges, etc.
-



### **8.7.3 - Hydraulic system oil**

The following maintenance is required on the hydraulic system:

- periodic check of the oil level in the tank;
- periodic replacement of the oil filters;
- periodic oil change.

When seals and O-Rings are removed, replace them with new ones and clean the sealing surfaces well. After the maintenance operations, check the seals and make sure there are no leaks.

When a cylinder or hydraulic system component is removed, bleed out the air as follows after refitting:

- start the machine and run the engine at low speed;
- allow all cylinders to perform their full stroke 4/5 times, slowly and without insisting on the limit switch.

The machine is first equipped with mineral or synthetic eco-friendly hydraulic oil with a high viscosity index. The choice between the two products is made at the request of the customer depending on the intended use of the machine.

Eco-friendly hydraulic oil is suitable for use in environmentally sensitive areas, it reduces the risk of contamination in the event of accidental spillage, while minimising direct and indirect legal consequences, additionally, it has longer drain intervals than mineral oil if the requirements indicated are met.

The use of regenerated or re-refined base oil is not recommended.



Hydraulic oils with characteristics equal to or greater than the following are recommended:

| Hydraulic oil type                       | Performance specifications  | Environmental specifications  |
|--|---|---|
| <b>Mineral</b>                           | ISO-L-HV<br>DIN 51524 3rd part (HVLP) or ISO 11158:2009 (HV)<br>Viscosity index $\geq 150$ and $< 170$<br>VICKERS M-2950  | No requirement  |
| <b>Eco-friendly</b><br>(Synthetic ester) | ISO 15380 HEES<br>Viscosity index $\geq 145$ and $< 155$<br>Zinc-free<br>ASTM D943 dry TOST > 3000 h<br>ASTM D 2070 (mod. 1680 h)<br>Test FZG A/8.3/90 12° fill level<br>VICKERS V104 C | Biodegradable as per OCSE 301 B >70%<br>Water hazard class according to VwVwS: WGK1 |



## NOTICE

*Always check the correct type of oil for the machine in use by consulting the liquids table.*

### VISCOSITY OF THE LUBRICATING OIL

The lubricant oil viscosity is chosen according to the ISO classification.

In order to choose the correct ISO class, knowing the **operating temperature** of the oil is essential.

The ISO classification does not determine the quality of a lubricating oil.

If the viscosity is too high, the hydraulic system may not work correctly or get damaged; if the viscosity is too low, the performance of the machine may be reduced.

The viscosity of the hydraulic oil changes as its temperature changes. The oil can work at a viscosity ranging from 13 to 860 mm<sup>2</sup>/s, the optimum conditions for which maximum performance is achieved occur at a viscosity ranging from 15 to 35 mm<sup>2</sup>/s.



It is difficult to correlate the ambient temperature with the operating temperature of the hydraulic oil, because the operating temperature is linked, in addition to the ambient temperature, to the way the machine is used and to the type of work being carried out. The table below gives the indicative values that can help in the selection of the oil, if in doubt contact the *Service Centre*.

| Viscosity class | Reference viscosity at +40°C | Ambient temperature |        |
|-----------------|------------------------------|---------------------|--------|
|                 | mm <sup>2</sup> /s           | min. °C             | max °C |
| ISO VG 32       | 32                           | -20                 | +30    |
| ISO VG 46       | 46                           | -5                  | +40    |
| ISO VG 68       | 68                           | +5                  | +50    |

### 8.7.3.1 - Requirements for using ecological hydraulic oil

The use of eco-friendly lubricants involves the knowledge and the respect of certain specific procedures that have the purpose of allowing oil change intervals that are much longer than the corresponding mineral oil, while ensuring correct operation of the machine and the protection of its components.

The procedures to be followed are as follows:

- Mixing with other biodegradable oils is NOT permitted.
- Top-ups with mineral oil are NOT permitted.
- The maximum percentage of mineral oil permitted is 5% of the total quantity of filling (resulting from accidental mixing, for example, the use of equipment previously installed on a machine equipped with mineral oil).
- Throughout the working life, pollution with solid materials (debris, dust and the like) should be limited as much as possible, it must not exceed the purity class 21/17/13 (according to ISO 4406). Pay particular attention when changing equipment.
- The water content must not exceed the maximum permissible value of 0.1%.
- The costs of the oil analysis, carried out at the intervals indicated below, are borne by the manufacturer of the oil. The costs of taking and sending samples are excluded.
- The measures indicated by the manufacturer following the oil analysis, such as drainage, filtration and the like, must be complied with. After the measurements have been carried out, an additional control sample must be taken and sent back to the manufacturer.
- In the event of an accidental loss of oil into the environment, immediately take a sample of the oil from the machine and send it to the manufacturer in the same way as for regular testing. This operation will be useful in case of any dispute of contamination by the supervisory bodies.



### 8.7.3.2 - Scheduled plan for analysis and control of eco-friendly hydraulic oil

The planned analysis and control plan consists of taking a hydraulic oil sample at pre-defined intervals and sending it to the oil manufacturer's laboratory.

The laboratory will check the functional parameters of the sample, issuing a report with the results and indicating whether the oil needs to be replaced.

The oil check intervals are as follows:

| Check interval after commissioning/oil change | Normal use                         | Heavy duty use<br>(example demolition hammer or shredder head) |
|---|------------------------------------|--|
| 1st check after                               | 500 hours                          | 200 hours  |
| 2nd check after                               | 1000 hours                         | 500 hours  |
| Following checks after                        | 1000 hours or at least once a year | 500 hours or at least once a year                              |

**The actual need to change the oil will be indicated by the laboratory.**



## **NOTICE**

*In the absence of regular periodical checks, the replacement interval is the one indicated in the periodical maintenance table.*

---



### 8.7.3.3 - Requirements for the sampling of eco-friendly hydraulic oil

For the procedure for taking the oil sample from the machine, refer to section "8.9.5 - Hydraulic system oil sampling/replacement" to page 8-32.

The following are additional requirements on which the reliability of the oil analysis depends.

#### CONTAINERS

Use sterile, new, clean and originally sealed sample containers (500 ml capacity).

Containers must have a label with the following data:

- company name;
- machine model;
- machine serial number;
- identification of the content (type of oil);
- sampling date.

To the side is an example of a label and recommended container.



#### ACCOMPANYING DOCUMENT

The document accompanying the oil sample must be sent with the sample. In the absence of a correct accompanying document it is not possible to perform an exact evaluation of the sample. An accompanying document must be filled in completely for each sample submitted.

The form for the sample accompanying document is shown below.

An electronic format for printing can be downloaded directly from the PANOLIN website:

[www.panolin.com](http://www.panolin.com)







### **PACKING**

Containers should be placed inside plastic bags to contain any spills. Store the containers inside a cardboard box with filling material to protect the contents.

Samples must be shipped within 48 hours to the following address:

---

#### **PANOLIN International Inc.**

Bläsimühle 2 - 6

CH-8322 Madetswil

Switzerland

Tel. 044 956 65 65

[info@panolin.com](mailto:info@panolin.com)

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## 8.8 - Tightening torque tables

Refer to these tables when no specific tightening torques are given. The following specifications apply to clamping devices with metric threads supplied, either dry or lubricated with motor oil.

Values are given in Nm, tolerance is  $\pm 10\%$ .

| METRIC COARSE THREADS |       |       |       |
|-----------------------|-------|-------|-------|
| THREAD                | 8.8   | 10.9  | 12.9  |
| M6                    | 10    | 14.5  | 17.5  |
| M8                    | 25    | 35    | 42    |
| M10                   | 48    | 68    | 82    |
| M12                   | 86    | 120   | 145   |
| M14                   | 135   | 190   | 230   |
| M16                   | 215   | 300   | 360   |
| M18                   | 295   | 410   | 490   |
| M20                   | 410   | 580   | 690   |
| M22                   | 550   | 780   | 930   |
| M24                   | 720   | 1,000 | 1,200 |
| M27                   | 1,040 | 1,450 | 1,750 |
| M30                   | 1,400 | 2,000 | 2,400 |

| METRIC FINE THREADS |       |       |       |
|---------------------|-------|-------|-------|
| THREAD              | 8.8   | 10.9  | 12.9  |
| M8x1                | 27    | 38    | 44    |
| M10x1.25            | 52    | 72    | 88    |
| M12x1.25            | 95    | 135   | 165   |
| M12x1.5             | 90    | 125   | 150   |
| M14x1.5             | 150   | 205   | 250   |
| M16x1.5             | 220   | 310   | 380   |
| M18x1.5             | 320   | 460   | 550   |
| M20x1.5             | 460   | 670   | 770   |
| M22x1.5             | 620   | 880   | 1,050 |
| M24x2               | 800   | 1,100 | 1,300 |
| M27x2               | 1,100 | 1,600 | 1,300 |
| M30x2               | 1,500 | 2,100 | 2,500 |

## 8.9 - Periodic maintenance

The hour meter records the total engine operating hours, and should be used to schedule all the maintenance procedures listed below. Read the hour meter daily.

Refer to the value indicated on the electronic hour meter on the display (if present).

Carry out the assistance interventions respecting the working hours interval or upon expiry of the indicated time limit.

Intervene more frequently if the machine is used in harsh conditions.



| Reference | OPERATION DESCRIPTION                                       | Page | DAILY | EVERY MONTH | AFTER 100 HOURS | EVERY 500 HOURS | EVERY 1,000 HOURS | EVERY 5,000 HOURS |
|-----------|---|------|-------|-------------|-----------------|-----------------|-------------------|-------------------|
| <b>1</b>  | Check of safety devices                                     | 2-45 | •     |             |                 |                 |                   |                   |
| <b>2</b>  | Check of safety signs                                       | 2-5  | •     |             |                 |                 |                   |                   |
| <b>3</b>  | Check of guards   | 8-7  | •     |             |                 |                 |                   |                   |
| <b>4</b>  | Check of hydraulic oil level                                | 8-28 | •     |             |                 |                 |                   |                   |
| <b>5</b>  | Clean radiator  | 8-25 | •     |             |                 |                 |                   |                   |
| <b>6</b>  | Lubricate pins  | 8-50 | •     |             |                 |                 |                   |                   |
| <b>7</b>  | Check for ventilation system air filter clogging            | 8-45 | •     |             |                 |                 |                   |                   |
| <b>8</b>  | Full battery charge   | 8-37 |       | •           |                 |                 |                   |                   |
| <b>9</b>  | Performance check (speed of machine movements)              | 8-25 |       |             | Δ               |                 |                   |                   |
| <b>10</b> | Hydraulic system operating pressures check                  | 8-25 |       |             | Δ               |                 |                   |                   |
| <b>11</b> | Track tension check   | 8-40 |       |             | Δ               | •               |                   |                   |
| <b>12</b> | Check that the screws of the drive wheel/ rollers are tight | 8-37 |       |             | Δ               | •               |                   |                   |
| <b>13</b> | Replacement of discharge circuit hydraulic oil filter       | 8-30 |       |             | Δ               | •2              |                   |                   |
| <b>14</b> | Ventilation system air filter replacement                   | 8-45 |       |             |                 | •1              |                   |                   |
| <b>15</b> | Translation gear motor oil change                           | 8-47 |       |             |                 | •2              |                   |                   |
| <b>16</b> | Hydraulic system oil sampling / replacement                 | 8-32 |       |             |                 |                 | •2*               |                   |
| <b>17</b> | Replacement of intake circuit hydraulic oil filter          | 8-34 |       |             |                 |                 | •2                |                   |
| <b>18</b> | Electrical test   | 8-51 |       |             |                 |                 |                   | •                 |

To be carried out at the indicated work time interval or at the latest within:

**1** = 1 year

**2** = 2 years

**3** = 3 years

**Δ** = First time only

**\*** = the change interval may vary, refer to the appropriate section for details



### 8.9.1 - Performance check

To check the performance (speed of machine movements) and operating pressures of the hydraulic system, contact the Service Centre.

### 8.9.2 - Cleaning the radiator



## WARNING

**Secure the machine as indicated in section "8.1.1 - Placement out of service for maintenance" to page 8-5.**



## WARNING

***Immediately after using the machine, the temperature of the components and of the hydraulic oil may be high and may cause burns, after stopping, wait until the temperature drops below 40°C before proceeding with maintenance operations.***



## NOTICE

*When the machine works in very dusty environments, check radiator clogging more frequently.*

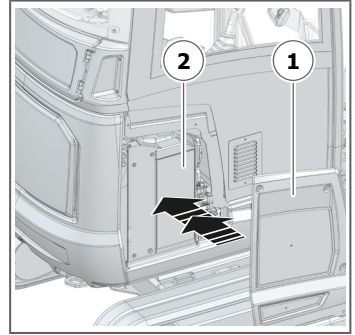
*In these conditions the cleaning interval should be halved with respect to the indications given in the periodic maintenance table.*

---



To check the cleanliness of the radiator:

- remove the hood (**1**);
- check the radiator fins (**2**);
- if **clogged**, clean them using a brush soaked in a specific detergent;
- then dry using a jet of compressed air (max 10 bar) blowing from the outside towards the inside;



- if the radiator is **dirty with dust**, simply clean it with a jet of compressed air (max 10 bar) from the outside inwards;
- use compressed air (max. 10 bar) to clean the radiator compartment;
- refit the hood (**1**).



### **NOTICE**

*Perform this operation every time the radiator, for accidental causes, is dirtied with oil, fuel or other oily or greasy substances, otherwise the radiator may get clogged and its cooling capacity may be reduced, resulting in the overheating of the machine.*

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### 8.9.3 - Check the hydraulic oil level



## WARNING

**Secure the machine as indicated in section "8.1.1 - Placement out of service for maintenance" to page 8-5.**



## WARNING

**Immediately after using the machine, the temperature of the components and of the hydraulic oil may be high and may cause burns, after stopping, wait until the temperature drops below 40°C before proceeding with maintenance operations.**

To **check** the oil level:

- position the machine as indicated in the following figure;
- wait for the oil to cool (temperature below 30°C);
- open the rear cover **(1)**;
- check on the indicator **(2)** that the oil level is in the middle;
- if the level is correct, the check is over.



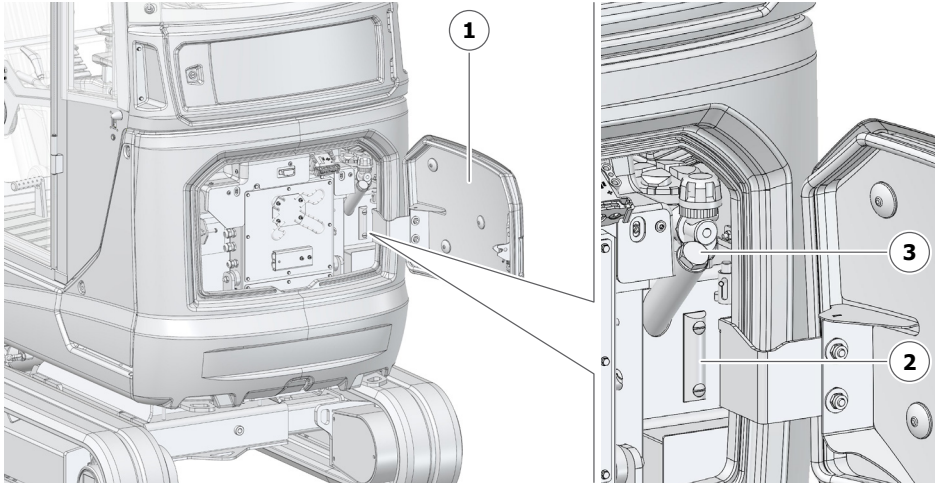
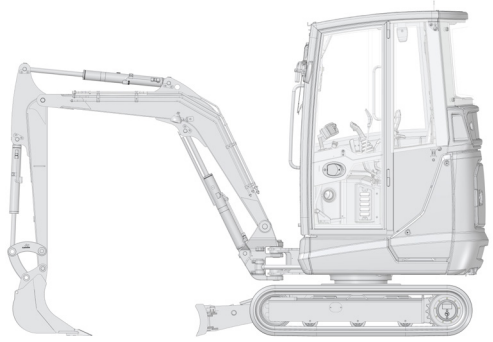
## WARNING

**Before carrying out any maintenance work on the hydraulic system, the residual pressure must be released as indicated in the specific section.**

If the **level is below** the halfway line:

- unscrew the hydraulic oil tank cap **(3)** by turning it counter-clockwise;
- add more oil according to the type indicated in the liquids table until the level has been reached;
- after adding the oil, screw on the cap;
- close the rear cover.







#### 8.9.4 - Change discharge circuit hydraulic oil filter



## WARNING

**Secure the machine as indicated in section "8.1.1 - Placement out of service for maintenance" to page 8-5.**



## WARNING

**Immediately after using the machine, the temperature of the components and of the hydraulic oil may be high and may cause burns, after stopping, wait until the temperature drops below 40°C before proceeding with maintenance operations.**

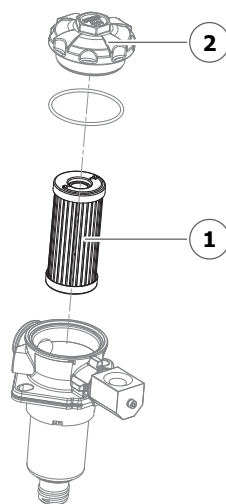
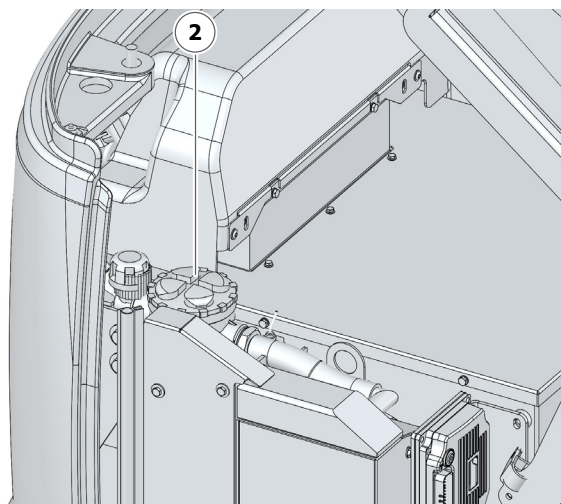
**Before carrying out any maintenance work on the hydraulic system, the residual pressure must be released as indicated in the specific section.**

The discharge circuit hydraulic oil filter (1) is housed under the driver's seat.

To **replace** the filter:

- open the rear cover;
- tip the protective structure;
- unscrew the filter cover (2) and remove it;
- unscrew the old filter (1) and dispose of it in compliance with the applicable standards;
- clean the surrounding area and insert the new filter;
- screw the filter cover;
- make sure that the hydraulic oil level is correct;
- start the machine for a few minutes and then stop it;
- check the level again;
- check for leaks;
- reposition the protection structure;
- close the rear cover.





***Old filters and hydraulic fluid are highly pollutant items; do not discard them into the environment, but put them in sealed containers and deliver them to the specialised waste disposal centres.***



### 8.9.5 - Hydraulic system oil sampling/replacement



## WARNING

**Secure the machine as indicated in section "8.1.1 - Placement out of service for maintenance" to page 8-5.**



## WARNING

**Immediately after using the machine, the temperature of the components and of the hydraulic oil may be high and may cause burns, after stopping, wait until the temperature drops below 40°C before proceeding with maintenance operations.**

**Before carrying out any maintenance work on the hydraulic system, the residual pressure must be released as indicated in the specific section.**



## NOTICE

The hydraulic oil change operation should be performed when the oil is lukewarm (+25 to +40°), as this improves the drainage of the old oil. In lower temperatures, evacuation may be compromised or difficult.

This would cause the mixing of old oil and new oil, resulting in a reduction of the life of the components.

Only use the allowed lubricating oils indicated by CASE in the dedicated table in section "8.7 - Refilling" to page 8-14.

Never start the machine with the tank empty as the pump would certainly be damaged.

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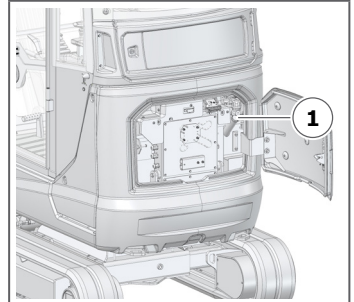
For intervals for sampling/replacement of ecological oil, refer to section "8.7.3.2 - Scheduled plan for analysis and control of eco-friendly hydraulic oil" to page 8-19.

If it is suspected that the hydraulic oil contains water, take the sample with the hydraulic system cold (i.e. after downtime of at least 2 days).



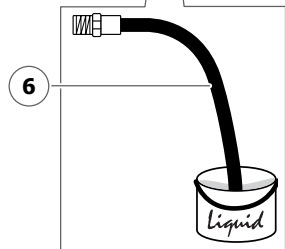
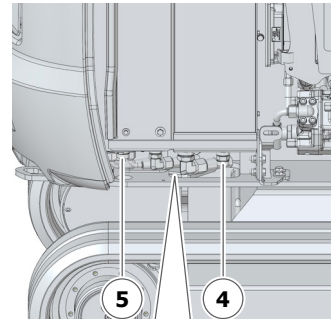
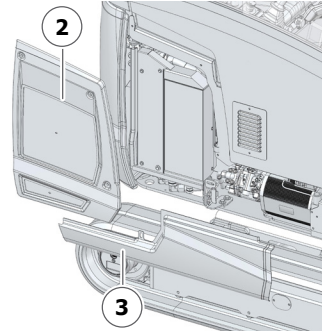
To perform the **sampling** of the oil:

- start the machine and make movements until the hydraulic oil has reached a temperature of approximately  $+40^{\circ}\text{C}$ , then stop the machine;
- open the rear cover;
- unscrew the hydraulic oil tank filler cap (1);
- using a clean syringe, withdraw 500 ml of oil through the cap (1), ensuring that aspiration takes place at the middle of the level;
- oil samples from different sampling points are NOT allowed.



To **replace** the oil:

- loosen the screws and remove the right casing (2) and the right side (3);
- unscrew the hydraulic oil tank filler cap (1);
- unscrew the protective caps of the rapid discharge valves of the radiator (4) and of the tank (5);
- screw the special drain pipe (6) supplied with the machine onto each valve, making sure that the unthreaded end is inside a suitable container; when screwing in, the valves open, causing the oil to flow out;
- wait for all of the oil to flow out, then dispose of it in compliance with the standards in force;
- unscrew the drain pipes and screw on the protective caps of the quick-release valves (4-5);
- replace the discharge circuit hydraulic oil filter, refer to section "8.9.4 - Change discharge circuit hydraulic oil filter" to page 8-30;
- replace the intake circuit hydraulic oil filter, refer to section "8.9.6 - Replacement of intake circuit hydraulic oil filter" to page 8-34;





- fill up with oil, of the type and quantity indicated in the liquids table, until the level is reached as described in section "8.9.3 - Check the hydraulic oil level" to page 8-28, and then screw on the cap (2);
  - reposition the right casing (2) and the right side (3);
  - start the machine and perform all movements several times, extending and closing the cylinders completely to remove the air from the system;
  - stop the machine, recheck the level and reset if necessary.
- 



***Old filters and hydraulic fluid are highly pollutant items; do not discard them into the environment, but put them in sealed containers and deliver them to the specialised waste disposal centres.***

---

### 8.9.6 - Replacement of intake circuit hydraulic oil filter



## WARNING

***Secure the machine as indicated in section "8.1.1 - Placement out of service for maintenance" to page 8-5.***



## WARNING

***Immediately after using the machine, the temperature of the components and of the hydraulic oil may be high and may cause burns, after stopping, wait until the temperature drops below 40°C before proceeding with maintenance operations.***

***Before carrying out any maintenance work on the hydraulic system, the residual pressure must be released as indicated in the specific section.***



## NOTICE

*Never start the machine with the tank empty as the pump would certainly be damaged.*

*Only use the allowed lubricating oils indicated by CASE in the dedicated table in section "8.7 - Refilling" to page 8-14.*

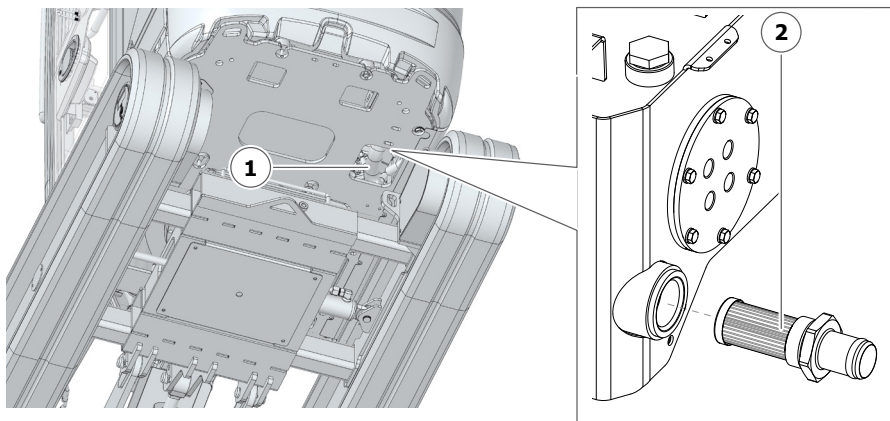
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The intake circuit hydraulic oil filter is housed inside the hydraulic oil tank which can be accessed via an opening positioned under the turning frame on the rear right side.



To **replace** the filter:

- drain the hydraulic oil as indicated in section "8.9.4 - Change discharge circuit hydraulic oil filter" to page 8-30;
- wait for the liquid to flow out completely;
- disconnect the intake sleeve (1);
- unscrew the old filter (2) and dispose of it in compliance with the applicable standards;
- clean the surrounding area and fit a new filter;
- connect the intake sleeve (1);
- restore the hydraulic oil level;
- start the car for a few minutes, stop it and check the level again;
- check for leaks.



**Old filters and hydraulic fluid are highly pollutant items; do not discard them into the environment, but put them in sealed containers and deliver them to the specialised waste disposal centres.**



### 8.9.7 - Check the condition of hydraulic lines



## WARNING

**Secure the machine as indicated in section "8.1.1 - Placement out of service for maintenance" to page 8-5.**



## WARNING

**Before carrying out any maintenance work on the hydraulic system, the residual pressure must be released as indicated in the specific section.**



## CAUTION

**DO NOT run or otherwise operate the machine if any hydraulic hose or fitting is found to be leaking or visibly damaged. Serious injury could result from contact with hydraulic oil expelled under extreme pressure from hoses or fittings.**

Before using the machine, inspect the machine from the outside, and inspect all hydraulic system pipes, hoses and fittings for damage or leaks.

In the doubt of a hidden leak, avoid approaching with your hands but use a piece of cardboard to check for the actual presence of the leak.

If a leak or other damage is found DO NOT use the machine, repair the fault before using the machine.



## NOTICE

*When you disconnect a hydraulic component, label the parts so you do not make mistakes when reconnecting the fittings.*

---



### 8.9.8 - Full charge of the battery

To ensure a longer battery life, periodically fully charge the battery, see section "6.14 - Machine charging mode" to page 6-53.

### 8.9.9 - Check that the screws of the drive wheel/rollers are tight

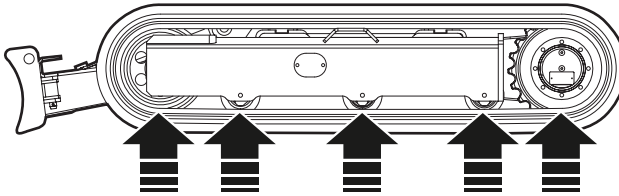


## WARNING

**Secure the machine as indicated in section "8.1.1 - Placement out of service for maintenance" to page 8-5.**

Periodically check for loose bolts on the drive gears, track tensioner and track rollers.

---





### 8.9.10 - Track service position



## WARNING

**Secure the machine as indicated in section "8.1.1 - Placement out of service for maintenance" to page 8-5.**

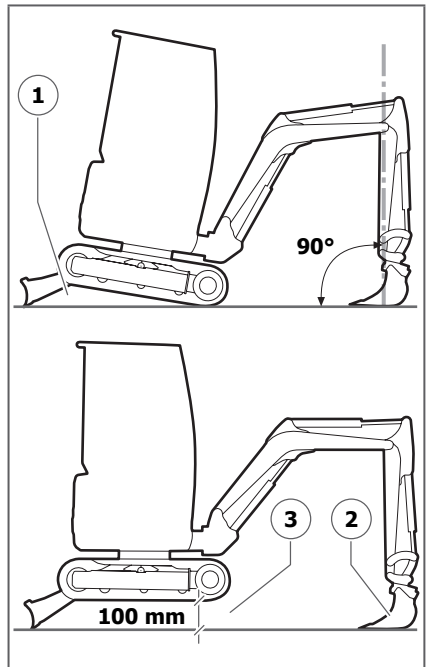


## WARNING

**There must be present a second person in charge with maintenance so as to supports the operator moves from the ground level while the machine is in track service position.**

To carry out a number of maintenance procedures on the undercarriage, the tracks must first be raised off the ground, allowing access and creating some space between the ground and the undercarriage. To raise the machine into the track servicing position, proceed as follows:

- turn the upper part of the structure 180° so that the dozer blade stays behind the operator;
- move the first boom to the central position in front of the operator (if the boom swing or deporté is present);
- lower the dozer blade to the ground and keep pressing the control until the end of the machine is lifted off the ground (1) of about **100 mm**;
- Position the second boom so that the boom cylinder is at right angles (90°) to the ground;
- Lower the boom to bring the bucket to the ground (2);
- apply downward pressure on the first boom, and simultaneously extend the second boom as required, so that the front of the machine rises off the ground (3) of about **100 mm**. The machine body must be positioned horizontally.







## WARNING

***DO NOT lift the machine over the indicated limit since it could tilt and damage the hydraulic lines and cause serious injuries.***

- Switch off the machine, open the controls cut-out lever outwards and wait for the person on the ground to block the machine safely.



## WARNING

***Prior to getting off the machine or starting any maintenance interventions, block it in track service position and set it in safety.***

***The person on the ground must block the machine in a safe condition by placing suitable jacks under the frame of the undercarriage that withstand the entire weight of the machine. While setting the machine in safety, use caution to avoid crushing hazards.***

- Get off the machine very carefully since it is in a lifted position;
- once all track maintenance operations are complete, repeat in reverse order the steps of the procedure described to lower the machine from the track maintenance position.



### 8.9.11 - Track tension check



## WARNING

**Secure the machine as indicated in section "8.1.1 - Placement out of service for maintenance" to page 8-5.**

The machine is equipped with a system that allows the tension of the tracks to be adjusted.

If one or both of the tracks is not properly tensioned the following problems may occur:

- uneven tension between the two tracks will make it difficult for the machine to travel in a straight direction, either forwards or in reverse;
- high tension will result in increased pressure on the idler and drive sprocket bearings, causing vibration and leading to premature failure of the tracks;
- low tension may cause the track to slip off the front idler.

Probable causes of a change in track tension are:

- wear of undercarriage components (tracks, drive wheels, idlers, rollers) caused by normal working operations;
- the type of soil on which the machine is positioned, e.g. muddy or compacted soil;
- accumulation of mud, sand or other material on the surface (inside and outside) of the tracks.

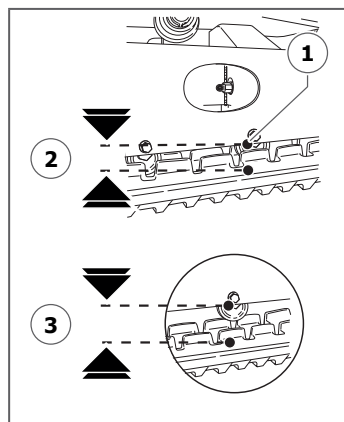
Take the following precautions before checking and adjusting track tension:

- place the machine on flat, firm ground, preferably tarmac or concrete;
- ensure that the tracks and undercarriage components are free from foreign bodies.



## Measurement of track tension:

- Determine a reference point near the centre of each track frame (1), then measure the distance between each reference point and the top of the corresponding track tread (2);
- bring the machine to the track service position as indicated in the dedicated section;
- Re-measure the distance from the same track frame reference points to the corresponding track treads (3);
- Subtract the smaller measurement from the larger (2-3) for each side;
- the result is the track tension value;



- If the result for each side is within the range of values *indicated in the table*, then the tensions are correct.

| TYPE          |    | min | max |
|---------------|----|-----|-----|
| Rubber tracks | mm | 10  | 15  |

- the machine can now be removed from the track service position and placed onto the ground;
- should the tension of the tracks be wrong, see section "8.9.12 - *Adjusting the track tension*" to page 8-42.



## 8.9.12 - Adjusting the track tension



# WARNING

**Secure the machine as indicated in section "8.1.1 - Placement out of service for maintenance" to page 8-5.**



# WARNING

**DO NOT attempt to make any track tension adjustments until the following procedures have been read and clearly understood.**

**If any uncertainty remains after having read the material, contact the Service Centre immediately for additional information.**

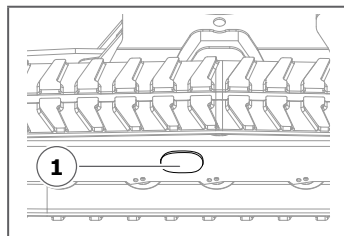
Track tension is adjusted by increasing or reducing the grease loading of a hydraulic cylinder (also known as a track tensioner) that applies a thrust to the idler wheel.

Adding grease increases the thrust and tensions the track, removing it has the opposite effect.

Each track has a dedicated adjustment, adjust one at a time.

The tension is adjusted by means of the tension valve, which is accessed by removing a cover (1) located on the outside of the frame of each track.

The valve is equipped with a grease nipple that meets the specifications given in the table; a suitable grease pump must be used to increase the tension.



| Valve specifications |     |          |
|----------------------|-----|----------|
| Tightening torque    | Nm  | 90       |
| Max. pump pressure   | bar | 300      |
| Pump coupling type   |     | UNI 7663 |





# WARNING

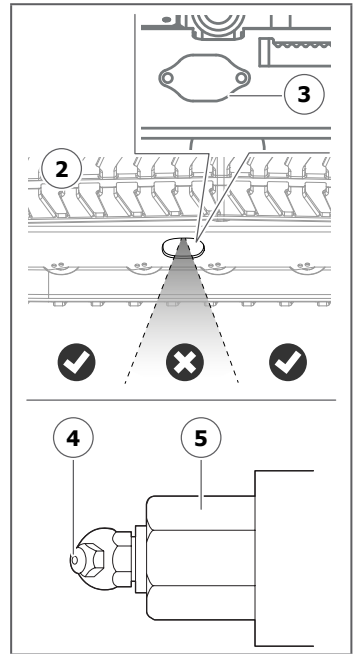
**DO NOT remove the grease nipple on the end of the valve, or attempt to turn the valve body by hand.**

**The grease may be ejected at a very high pressure and penetrate the skin causing serious injuries to the person or the valve body may be projected and hit the operator causing serious injuries or death.**

**Always operate *WHILST STANDING TO THE SIDE* of the valve access hole. DO NOT stand with head, hands or body in front of the valve access hole.**

## To increase track tension

- STAND TO THE SIDE of the valve access cover as shown in figure (2);
- remove the cover (3) located on the track frame;
- using the grease pump, add a small amount of grease to the grease nipple (4) at the end of the valve (5);
- proceed until the tension reaches the indicated value then replace the cover;
- carry out the procedure on the other track, if necessary.
- Start the machine and drive straight ahead for at least 20 m;
- stop the machine and check the tension of the tracks.



If the tension corresponds to the values indicated, the adjustment is complete.

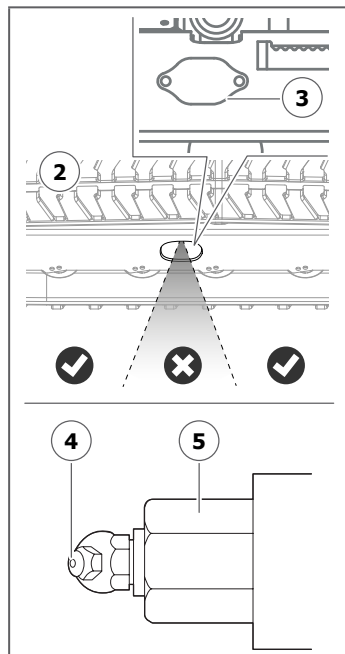
If the tension is still insufficient, repeat the procedure.

If the tension is too high, follow the procedure described below.



## To decrease track tension

- STAND TO THE SIDE of the valve access cover as shown in figure (2);
- remove the cover (3) located on the track frame;
- using a spanner that allows adequate clearance from the opening, slowly unscrew the valve body (5) counter-clockwise by 0.5/1.0 turn to allow the grease to escape;
- When the tension reaches the indicated value, screw the valve in a clockwise direction with the indicated tightening torque, then replace the cover;
- carry out the procedure on the other track, if necessary.
- Start the machine and drive straight ahead for at least 20 m;
- stop the machine and check the tension of the tracks.



If the tension corresponds to the values indicated, the adjustment is complete.

If the tension is still too high, repeat the procedure.

If the tension is insufficient, follow the procedure described above.



### 8.9.13 - Checking for clogging and replacing the cab ventilation system air filter



## WARNING

**Secure the machine as indicated in section "8.1.1 - Placement out of service for maintenance" to page 8-5.**

The cab ventilation system is equipped with two air filters:

- external cab air filter (1);
- internal cab air filter (2).



## NOTICE

*All air cleaner manufacturers agree that attempting to clean or wash an element increases the chances of damaging that element. It is highly recommended that you consider the value of cleaning an element against the risks of the operation. Adopt the policy that all elements should be replaced with new ones rather than cleaning them.*

*Careful cleaning or washing, if carried out correctly, can extend the life of an element. However, you must realize that each time an element is cleaned the dirt holding capacity is reduced and the risk of dirt reaching the clean side of the filter is increased. Filters should never be washed more than six times, or kept in service for more than one year, whichever comes first.*

---



## NOTICE

*When the machine works in very dusty environments, check filter clogging more frequently.*

*In these conditions the replacement interval should be halved with respect to the indications given in the periodic maintenance table.*

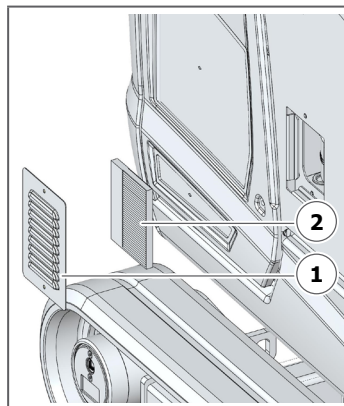
*Perform the check even when there is a reduction in the efficiency of the ventilation system.*

---

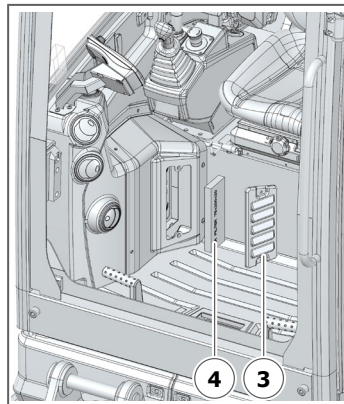


To **check** the status of the filters:

- unscrew the screws that hold the protective grid **(1)**, then remove it;
- remove the **external cab air filter (2)** and check for breakage or cuts. Do not clean or reuse damaged items but replace with new ones;
- clean the filter carefully using compressed air, blowing from the clean side towards the dirty side;
- if the maintenance interval has been reached, replace the filter with a new one and dispose of the old one in accordance with current Standards;



- unscrew the screws that hold the protective grid **(3)**, then remove it;
- remove the **internal cab air filter (4)** and check for breakage or cuts. Do not clean or reuse damaged elements but replace them with new parts;
- clean the filter carefully using compressed air, blowing from the clean side towards the dirty side;
- if the maintenance interval has been reached, replace the filter with a new one and dispose of the old one in accordance with current Standards;



- always clean the inside surface of the filter housing, ensuring that all impurities are removed before fitting the new or cleaned element;
- reposition all components in reverse order.



#### 8.9.14 - Level control and replacement of geared motors translation oil



## WARNING

***Secure the machine as indicated in section "8.1.1 - Placement out of service for maintenance" to page 8-5.***



## WARNING

***Remember that the side travel gear motors and their oil can become extremely hot while working and so it is essential when carrying out this operation with the machine still hot to protect all parts of the body with adequate clothing, goggles and safety equipment, because there is the risk of burns and personal injury.***

***Undo the screw caps slowly to inspect the level of oil in the gear motors.***

***This is so that the pressure built up inside the gear motors can be let out gradually.***

***When the oil is replaced, never stand in front of the caps so as not to be hit by jets of pressurised oil.***

***Aligning the plugs for filler and level plugs on the side gear motors, described below, should be carried out with an assistant on the ground. The assistant must however remain strictly outside the working range of the machine.***

***Never inspect or carry out maintenance on the travel engine circuits while on a slope.***

***They are highly pressurised due to the machine weight.***

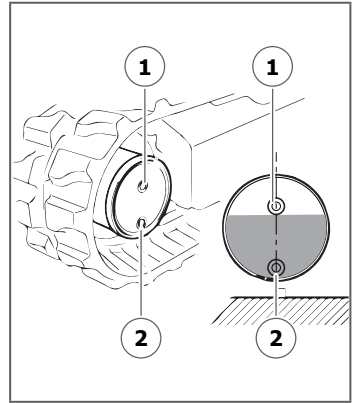


Park the machine on a firm, level surface. The side gear motor must be orientated so that the plugs (1) and (2) are aligned vertically as indicated in then figure.

This position is essential for correct maintenance to be carried out.

After positioning the gear motor for draining or refilling with oil, set out the machine controls in the following way:

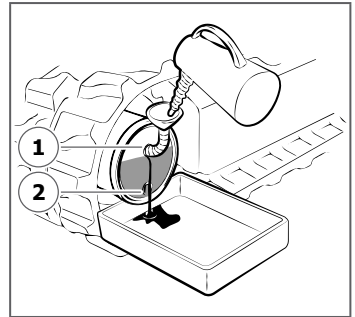
- place the machine on the ground;
- move the throttle lever to the idle position, turn off the engine, take out the ignition key and raise the safety lever to the STOP position.



To **check** the level:

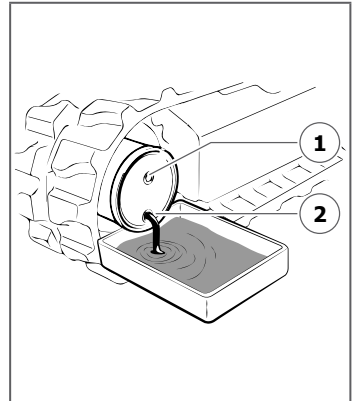
- position the gear motor as indicated above;
- unscrew the cap (1), if the oil level is not up to the hole, top up with the type of oil indicated in "section" until it flows out of the hole. Oil spilling out the hole means the correct level has been reached;
- fit back the plug (1).

The operations described above must be carried out on both side travel gear motors.



To **replace** the oil:

- Position the gear motor as shown in the figure;
- slowly undo the screwplug (1), to allow the pressure in the gear motor to be gradually released. Once the pressure has been released, remove the plug completely (1) from its seat;
- unscrew the plug (2) and remove it from its seat;
- drain out the oil into a suitable container;
- screw in the plug (2);
- follow the instructions of the oil level check procedures, to restore the level.





### 8.9.15 - Swivel geared motor



## WARNING

**Secure the machine as indicated in section "8.1.1 - Placement out of service for maintenance" to page 8-5.**

The swivel gear engine is lubricated internally by the same hydraulic oil as the machine system. This engine therefore requires no maintenance.



### 8.9.16 - Lubrication of pins



## WARNING

**Secure the machine as indicated in section "8.1.1 - Placement out of service for maintenance" to page 8-5.**



## NOTICE

*Only use the allowed lubricating greases indicated by CASE in the dedicated table in section "8.7 - Refilling" to page 8-14.*

Couplings between certain parts of the machine must be lubricated using grease, inserted via special accessories called grease nipples (in accordance with UNI 7663).

Clean the grease nipples before attaching the grease gun.

Clean off any excess worn grease after lubrication.

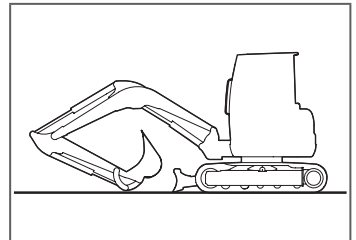
If you use the machine under critical operating conditions, carry out this maintenance task more frequently.

As a general rule it is well to remember that each cylinder has two grease nipples located on the connecting hitch and that each pin that acts as a pivot for movement has at least one grease nipple.

After working with machine parts immersed in water, lubricate pins that have been in contact with water.

To **lubricate** the machine:

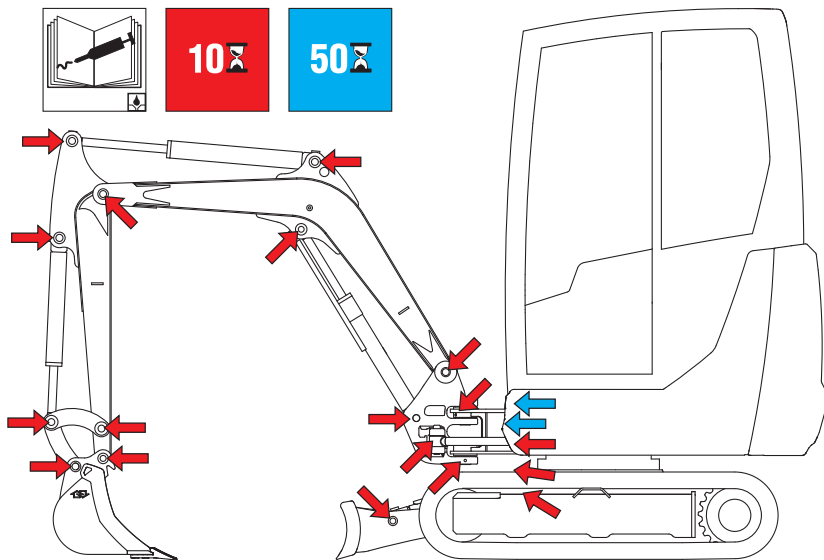
- position the machine as shown in the figure;
- lower the equipment to the ground and turn off the engine;
- Grease nipples are located at the points indicated by the grease nipple label on the machine and shown below.





**POSITION OF LUBRICATION POINTS**


---


**8.9.17 - Electrical test**


# **WARNING**

***The permissible operations on the electrical system are indicated in section "8.5 - Electrical system" to page 8-13.***

**Operations not indicated ARE PROHIBITED.**

In order to ensure correct operation of the machine and the safety of the operator, a test of the electrical system must be carried out periodically.

This procedure must be carried out and registered with the *Service Centre*.



### 8.10 - Long inactivity periods

For battery precautions refer to section "6.13 - Battery power" to page 6-51.

If **long periods of inactivity** are expected (longer than **1 month**), the battery should be fully charged every month to keep it in good condition and prevent it from deteriorating.

If **long periods of inactivity** (over **6 months**) are expected, in addition to the instructions provided above, to keep the machine in efficient condition and prevent it from deteriorating, it is advisable to hospitalise it in a sheltered place and take the following measures:

- park the machine on a flat, solid surface (e.g. concrete floor);
- inspect the machine. Repair any damaged or worn parts. Replace with new parts where necessary;
- carry out a complete and thorough cleaning;
- place the machine in a dry, covered location. If it cannot be placed in a covered area, select flat, compact ground and protect it with a waterproof sheet arranged to allow ventilation. Otherwise condensation could form, which is harmful to the machine;
- the ambient temperature of the machine's place of storage must comply with the instructions given in this manual;
- preferably retract all cylinders. Otherwise, cover any exposed parts of the cylinder rods in grease;
- grease the hydraulic cylinder rods and all the equipment joints;
- lubricate all greasing points;
- paint all vulnerable parts to prevent any rust formation.

**To restore the machine operation follow the procedure below:**

- remove any grease from the hydraulic cylinder rod;
- fully charge the power battery;
- carry out all the periodic maintenance indicated in the special table, see section "8.9 - Periodic maintenance" to page 8-23;



- when a vehicle stands idle for an extended period, the humidity in the air could get into the oil. Make sure that the oil does not contain water before and after starting. If any water is found in the oil, replace the oil;
- before moving the machine, check that the instruments, indicator lights and work lights are working properly;
- check the condition of all hoses and connections;
- carry out complete cycles of all the hydraulic functions several times.

### 8.11 - Long-term storage

If you decide to permanently decommission the machine, dispose of it in accordance with the laws in force in the country of use.



## WARNING

***The disposal of the machine must be undertaken exclusively by suitably trained and qualified personnel authorised to carry out this operation.***

***Commence with the dismantling of hydraulic components only once these, as well as the hydraulic oils and lubricants, are completely cool and after any residual pressure has been vented.***

***Prior to commencing any dismantling operations, drain all the components supplied with the machine, tanks and systems, of all fluids in accordance with the GENERAL SAFETY STANDARDS.***

Below is a non-exhaustive list of the pollutants and components in the machine:

- fluids (hydraulic system oil);
- gas (accumulator);
- acid (service batteries);
- lithium batteries;
- plastic material (tracks, coverings, etc.).



***Break down the machine into homogeneous parts, do not disperse the polluting products in the environment, but deliver them to the appropriate collection centres where they will be disposed of according to the laws in force.***

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## 9 - ELECTRICAL PARTS



### WARNING

***Before working on the electrical system, make sure that the machine is stopped and wear suitable PPE.***

***Before carrying out any work on the electrical system, carefully read all the instructions given in section "8.5 - Electrical system" to page 8-13.***

#### 9.1 - Fuses and relays



### WARNING

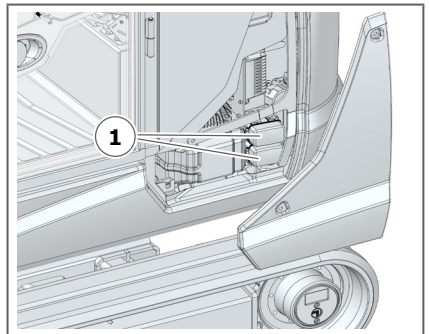
***Secure the machine as indicated in section "8.1.1 - Placement out of service for maintenance" to page 8-5.***

The fuses protect the electrical components and wiring against damage. The relays are used to activate the high power circuits.

If a fuse or a relay appear to be rusty, or are loose in their holders, fit new ones immediately.

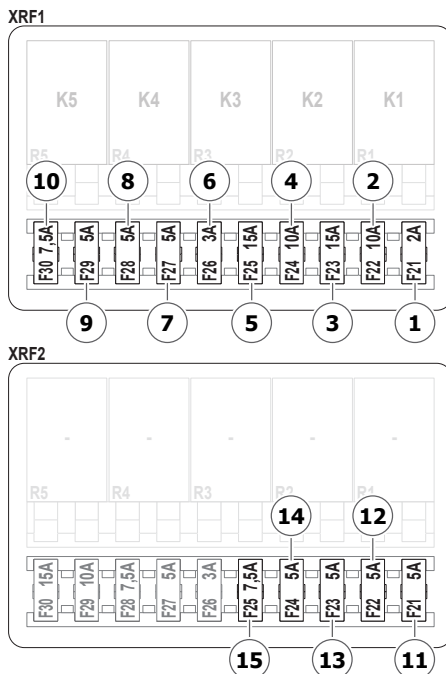
Always replace a fuse with another of the same capacity.

The fuses and relays (1) are located inside the left compartment.





## 9.1.1 - Fuses

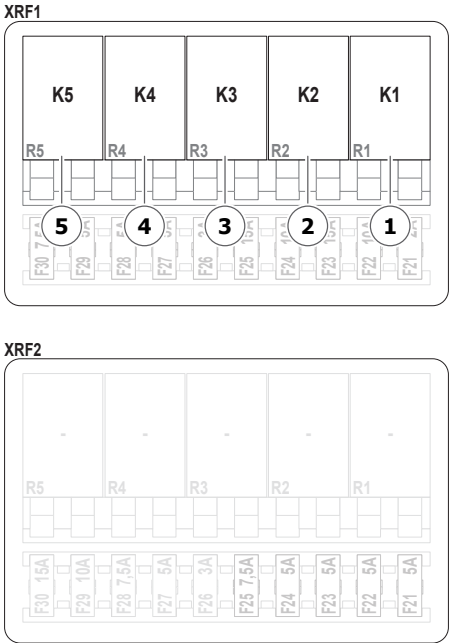


## List of fuses

|    |     |   |
|----|-----|---|
| 1  | F21 | 2A 12V monitoring fuse                              |
| 2  | F22 | 10A Solenoid valve control unit power fuse          |
| 3  | F23 | 15A Fan controller fuse                             |
| 4  | F24 | 10A Fuse horn                                       |
| 5  | F25 | 15A Lights line fuse                                |
| 6  | F26 | 3A Main line auxiliary relay coils/lights fuse      |
| 7  | F27 | 5A Backup battery charger fuse (resettable)         |
| 8  | F28 | 5A 12V emergency line fuse                          |
| 9  | F29 | 5A Satellite/display direct lines fuse              |
| 10 | F30 | 7.5A Boom swing switch fuse/AUX 2                   |
| 11 | F21 | 5A Back-up battery diode                            |
| 12 | F22 | 5A Cigarette lighter socket power (resettable) fuse |
| 13 | F23 | 5A USB socket (resettable) fuse                     |
| 14 | F24 | 5A Vehicle radio memory fuse                        |
| 15 | F25 | 7.5A Quick-coupling fuse (equipment)                |



9.1.2 - Relays



List of relays

|   |    |  |
|---|----|--|
| 1 | R1 | Solenoid valve control unit line relay |
| 2 | R2 | Horn relay                             |
| 3 | R3 | Boom lights relay                      |
| 4 | R4 | Roof lights relay                      |
| 5 | R5 | AUX2 relay                             |



## 9.2 - Work lights replacement



# WARNING

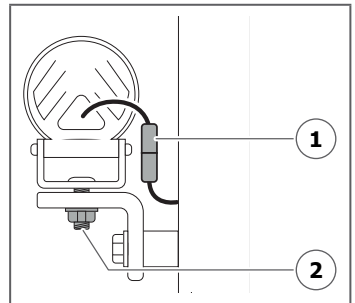
**Secure the machine as indicated in section "8.1.1 - Placement out of service for maintenance" to page 8-5.**

The work lights are of the LED type; in the event of a fault, the entire light must be replaced.

Before replacing the working light, check that all the fuses and relays are in good working order.

To **replace** the working light:

- position the machine on a flat, level surface;
- place the equipment and dozer blade on the ground;
- stop the machine;
- activate the emergency stop button;
- if the work light is not accessible from the ground, use a suitable approved ladder;
- disconnect the electrical connector (1);
- unscrew the mounting screw/s (2);
- remove the damaged light;
- to fit the new working light, follow the procedure described in reverse order.





### 9.3 - LED strip replacement



## WARNING

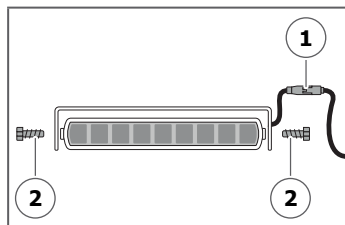
**Secure the machine as indicated in section "8.1.1 - Placement out of service for maintenance" to page 8-5.**

The light strips are of the LED type; in the event of a fault, the entire strip must be replaced.

Before replacing the strip, check that all the fuses and relays are in good working order.

To **replace** the strip:

- position the machine on a flat, level surface;
- place the equipment and dozer blade on the ground;
- stop the machine;
- if the strip is not accessible from the ground, use a suitable ladder according to the standard;
- remove any covers to access the LED strip;
- disconnect the electrical connector (1);
- unscrew the mounting screw/s (2);
- remove the damaged strip;
- to fit the new strip, follow the procedure described in reverse order.



### 9.4 - Auxiliary battery

The machine has an auxiliary battery which powers the display when the main battery is off. This battery is charged automatically by the electrical system during normal machine operation and when recharging. Its main function is to ensure the rapid startup of the display. One hour and thirty minutes after the machine is stopped, the display enters a power-saving mode during which power is not drawn from this battery.

The auxiliary battery keeps the display on standby only for about an hour and thirty minutes, so that when the machine is turned on it is immediately ready and operational.

The auxiliary battery is sealed and requires no periodic maintenance.



## NOTICE

*If the machine is started after a break longer than one hour and thirty minutes, the display has a power-on delay of 15-20 seconds. If this delay persists on subsequent restarts within the hour and thirty minutes, the auxiliary battery needs to be replaced.*

Contact a Service Center for replacement.



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## **10 - RESCUE SHEET**

Below is the machine's Rescue sheet, also called Rescue card.

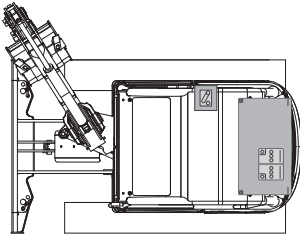
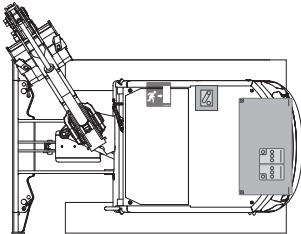
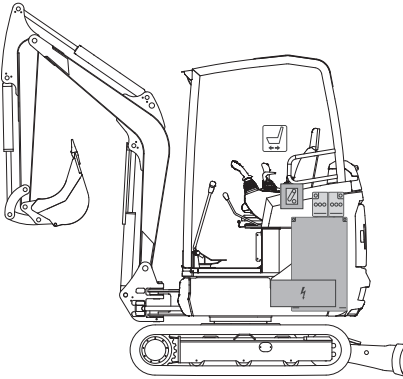
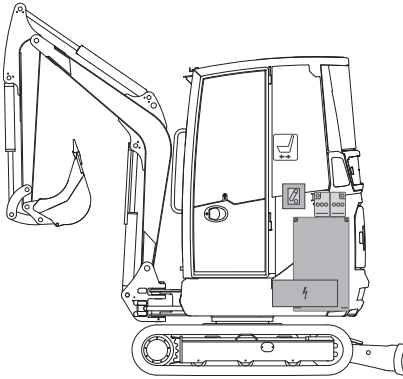






The rescue sheet can also be downloaded in digital format from the Manufacturer's website; this can be printed out and kept available for rescue personnel at the workplace.



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| Canopy version  |                      |   | Cab version   |   |                        |
|---|----------------------|---|---|---|------------------------|
|    |                      |   |    |   |                        |
|   |                      |   |  |   |                        |
|   | Low voltage battery  |  | Low voltage switch that disconnects the high voltage                                |  | High voltage component |
|  | High voltage battery |  | Longitudinal seat adjustment  |  | Emergency exit         |





## 1 - IDENTIFICATION / RECOGNITION

|   |  |  |
|---|--|--|
|   |  |  |
| <p>"CX25EV"<br/>Side frame screen printing<br/>(canopy)</p> | <p>"CASE Electric Vehicle EV"<br/>Rear frame screen printing</p> | <p>"CX25EV"<br/>Side frame screen printing<br/>(cab)</p> |

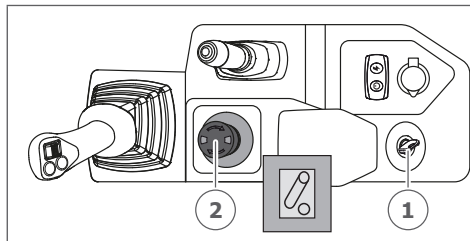
## 2 - IMMOBILISATION / STABILISATION / LIFTING

|  |   |
|--|---|
|  | <ul style="list-style-type: none"> <li>- Turn the key (1) anti-clockwise;</li> <li>- Press the emergency stop button (2);</li> <li>- the parking brake is activated automatically.</li> </ul> |
|  | <ul style="list-style-type: none"> <li>- The lifting points (3-4) are located on the blade and on the boom arm (they are the same for both the canopy and cab versions).</li> </ul>           |





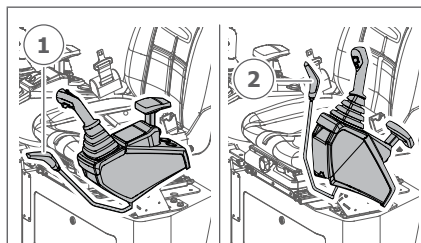
### 3 - DEACTIVATION OF DIRECT DANGER / SAFETY RULES



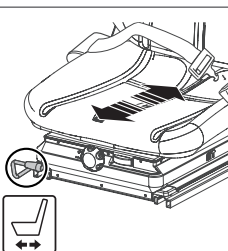
- Stop the machine: turn the key (1) anti-clockwise;
- Press the emergency stop button (2);
- the battery is disconnected.

*Note: wait 2 minutes to make sure that there is no residual voltage in the system.*

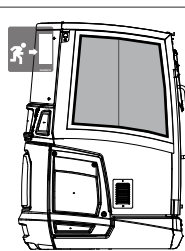
### 4 - OCCUPANT ACCESS



Pull the lever (1) up (2) to raise the left console



Longitudinal adjustment of the operator seat



Emergency exit (cab version)

### 5 - STORAGE OF ENERGY / FLUIDS / GASES / SOLIDS




| Li-ion - LiFePo4 Battery |          | Hydraulic oil |       |
|--------------------------|----------|---------------|-------|
| Rated voltage            | 102V DC  | Type          | ISO46 |
| Rated energy             | 32.2 kWh | Quantity      | 28 l  |



**All high voltage cables have an orange coating: DO NOT TOUCH.**



**6 - IN THE EVENT OF A FIRE**

|  |   |
|--|---|
|  | Use water (H <sub>2</sub> O) to cool the heat source.   |
|  | Use an ABC, CO <sub>2</sub> or class D extinguisher in the event of a fire.                       |
|  | It is highly recommended to monitor the temperature of the battery pack using an infrared camera. |



**WARNING: in the event of battery damage, there is a risk of an undetected flame. In this case, it is necessary to place the damaged vehicle or battery under surveillance in a safe and dedicated location to prevent the ignition or re-ignition of a fire.**

**7 - IN THE EVENT OF SUBMERSION**

If the vehicle is submerged or partially submerged, pull the vehicle out of the water. Then deactivate the high voltage system.



**If the vehicle is completely submerged, the high voltage battery can generate flammable hydrogen gas.**

**When sea water enters, a large amount of hydrogen gas can be generated by rapid electrolysis due to salinity, which can cause fire and hydrogen gas.**



**Do not touch the electrical parts. Risk of severe injuries and electric shock.**







## 8 - TOWING / TRANSPORT / STORAGE

- When towing, the operator **MUST NOT** be on the towed machine;
- connect a towing device to the dedicated tow hook of the undercarriage **(1)**, the hooks are indicated by the dedicated labels **(2)**;

- DO NOT use other anchorage points (e.g. boom, bucket or any accessory installed);
- NEVER continue towing unless both tracks are fully in contact with the ground.



**WARNING: do not cut, break or touch the high voltage components or cables.**

## 9 - IMPORTANT ADDITIONAL INFORMATION

N.A.

## 10 - EXPLANATION OF PICTOGRAMS USED

|  |                         |  |  |  |                                   |
|--|-------------------------|--|--|--|-----------------------------------|
|  | Electric vehicle        |  | Dangerous for human health   |  | Flammable                         |
|  | Corrosive               |  | Use ABC powder, CO <sub>2</sub> or a class D extinguisher to extinguish the fire |  | Use water to cool the heat source |
|  | Warning: generic danger |  | Warning: electricity   |  | Use the infrared camera           |



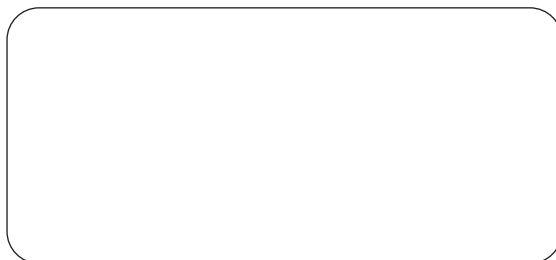
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Dealer's stamp



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The manufacturer and its authorized representative reserves the right to make improvements in design and changes in specifications at any time without notice and without incurring any obligation to install them on units previously sold. Specifications, descriptions, and illustrative material herein are as accurate as known at the time of publication, but are subject to change without notice.

Availability of some models and equipment builds varies according to the country in which the equipment is being used. For exact information about any particular product, please consult your Case dealer.

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