

TRANSLATION OF “ISTRUZIONI ORIGINALI”



ELECTRONIC SELF-PROPELLED TRUCK



USE AND MAINTENANCE MANUAL

Model:	SGAE VC R 25/2	Revision:	00
Serial number:	2762	Working Load Limit (WLL):	25 t
Version:	GROUND OPERATOR	Year of manufacture:	2026

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REVISION

REVISION				
MODEL	LANGUAGE	DATE	VERSION	NOTES
SGAE VC R 25/2	English	07/2026	00	First issue

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In case of doubts or difficulties in understanding or interpreting the manual, the original/official version indicated as "ISTRUZIONI ORIGINALI" on the cover must be considered the valid version.

Some of the images included in this manual must be considered only as examples, as they do not refer to the machine described herein.

ADDITIONAL INFORMATION



The **electronic self-propelled truck**, subject of this manual, will hereinafter be referred to as the "**machine**".

MANUAL STRUCTURE

The manual is divided into 9 chapters.

CHAPTER 1 – GENERAL INFORMATION

This chapter contains general information regarding the machine and the Manufacturer's data.

CHAPTER 2 – SAFETY

This chapter contains a description of the intended use of the machine, the type of certification applied, the operating environmental conditions, the safety functions applied, the residual risks and the warning plates applied to the machine.

CHAPTER 3 – GENERAL DESCRIPTION

This chapter contains the description of the operating principles of the machine and the controls available to the operator, the general technical data and the description of the units making up the machine.

CHAPTER 4 – TRANSPORT AND STORAGE

This chapter contains the instructions for correctly carrying out packaging, handling, transport and unloading at the user's plant.

CHAPTER 5 – INSTALLATION

This chapter contains the instructions for correctly carrying out any assembly operations, checks, controls and adjustments to be made before start-up.

CHAPTER 6 – USE

This chapter contains the instructions for starting up and using the machine, with a description of the most important operating sequences and the use of the diagnostic systems.

CHAPTER 7 – DISMANTLING

This chapter contains the warnings and instructions for correctly carrying out the decommissioning and dismantling of the machine at the end of its operating life.

CHAPTER 8 – MAINTENANCE

This chapter contains the maintenance schedule of the machine. It provides the warnings, precautions and instructions for correctly carrying out maintenance operations on the machine.

CHAPTER 9 – ATTACHED DOCUMENTATION

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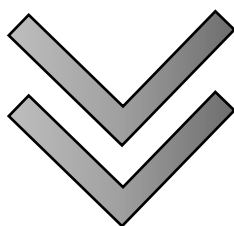
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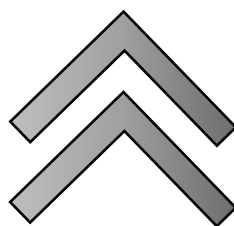
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GENERAL INFORMATION



**ELECTRONIC SELF-PROPELLED
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1. GENERAL INFORMATION

1.1 INTRODUCTION

ADDITIONAL INFORMATION



MORELLO S.r.l. the company that manufactures the machine in question will be referred to in the manual as the **Manufacturer**.

ADDITIONAL INFORMATION



The company that purchased the machine will be referred to in the manual as the **Customer**.

The Manufacturer recommends a training course for personnel in charge of operating and maintaining the machine, in order to increase familiarity and knowledge of the various procedures.

This manual contains all the information necessary to properly use and adequately maintain the machine.

The Manufacturer requires personnel in charge of operating and maintaining the machine, as well as personnel in charge of transport and possible assembly operations, to read this document.

This document represents the use and maintenance manual of the:

ELECTRONIC SELF-PROPELLED TRUCK SERIES SGAE VC R 25/2 WITH GROUND OPERATOR

and is drawn up in compliance with the machinery directive 2006/42/EC.

The Use and Maintenance manual is to be considered an integral part of the machine and must be kept until final disposal. It must be kept by the person responsible to whom the machine is entrusted.

1.2 ASSISTANCE

For technical assistance, contact directly:

Morello S.r.l.

Headquarters and Plant:

Lungo Dora Colletta 85/A

10153 – Torino (Italy)

TEL. 011.248.05.69

TEL. / FAX. 011.85.00.85

E-mail: info@morellogiovanni.it

Website: www.morello.eu.com

1.3 GLOSSARY

Emergency stop – emergency stop function: function that is provided:

- to prevent the occurrence of, or to reduce, existing hazards to persons, damage to the machinery or to the work in progress, and
- to be initiated by a single human action.

Machinery Directive: is DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the approximation of the laws of the Member States relating to machinery.

Control device: device inserted in a control circuit used for operating the machine.

Supplier: entity (Manufacturer, installing agent, system integrator) that supplies the equipment or services associated with the machine (the user may also act as Manufacturer for themselves).

Safety function: function of a machine whose failure can result in an immediate increase in risks.

Failure: the termination of the ability of an element to perform a required function.

Machine:

- an assembly equipped or intended to be equipped with a drive system other than direct human or animal force, consisting of parts or components, at least one of which is movable, joined together for a specific application;
- an assembly as referred to in the first indent, lacking only the elements for connection to the site of use or to the sources of energy and motion;
- an assembly as referred to in the first and second indents, ready to be installed and which can only function after being mounted on a means of transport or installed in a building or structure;
- assemblies of machines as referred to in the first, second and third indents, or of partly completed machinery, which, in order to achieve the same result, are arranged and controlled so as to function as an integral whole;
- an assembly of parts or components, at least one of which is movable, joined together for the purpose of lifting loads and whose only power source is direct human force;

Malfunction: the inability of a machine to perform its intended function.

Marking: symbol and text for the identification of the machine, affixed by the Manufacturer.

Safety measure: means that eliminates or reduces a hazard.

Operator: person responsible for operating the machine.

Hazard: potential source of harm.

Qualified personnel or qualified maintenance technician: means those persons who have undergone specialization courses, training, etc., and who have experience with respect to installation, commissioning, maintenance, repair, transport and handling of the machine.

PLC: Programmable Logic Controller capable of managing and controlling all the movements of the machine. It is equipped with electronic boards designed to control the various devices and to receive the related control signals.

Protection: protective measure that uses protective means to protect persons from hazards that cannot reasonably be eliminated or from risks that cannot be sufficiently reduced by protective measures integrated into the design.

Safety guards: guard or protective device used as a safety measure to protect persons from a present or latent hazard.

Guard: physical barrier, designed as part of the machine, to provide protection.

Fixed guard: guard fastened (for example: by means of screws, nuts, welding) in such a way that it can only be opened or removed by using tools or removing the fastening means.

Risk: combination of the probability of occurrence of harm and the severity of that harm.

Residual risk: risk that remains after protective measures have been taken.

Transport: set of operations aimed at transferring the machine from the Manufacturer's assembly site to the Customer's final work site.

Intended use: use of the machine in accordance with the information provided in the instructions.

User: entity that uses the machine and the associated electrical equipment.

Hazardous area: all spaces, inside and/or around the machinery, in which a person may be exposed to a hazard.

1.4 SYMBOLS

Certain symbols are used in the manual for the purpose of drawing the reader's attention to and highlighting some particularly important aspects.

The explanation of each indication is provided below.

DANGER



It indicates a situation where an immediate hazard is present that, if not avoided, will result in serious injury or death to the operator.

It identifies operations that are absolutely forbidden and procedures that must be mandatorily adopted in order to avoid serious injury or death to the operator.

WARNING



It indicates a situation where a potential hazard is present that, if not avoided, could result in serious injury or death to the operator.

It describes operations that require particular attention in order to avoid serious injury or death to the operator.

CAUTION



It indicates a situation where a non-immediate or potential hazard is present that, if not avoided, could result in minor or moderate injury or harm to the operator's health.

It describes operations that require particular attention in order to avoid injury to the operator.

NOTE



It indicates important information and/or describes those procedures whose failure to observe, in whole or in part, may cause damage to the machine or to the equipment connected to it.

ADDITIONAL INFORMATION



It provides useful information and/or refers to other complementary documentation, such as attached instruction manuals for use, technical documents, or other sections of this manual.

1.5 MANUFACTURER'S CONTACT INFORMATION

For any type of information or clarification regarding use, maintenance, etc., the Manufacturer's Technical Office is always available to the Customer's requests.

It is advisable that the Customer formulate the questions clearly, with reference to this manual, always indicating the data shown on the identification plate of the machine in question.

Any request for service assistance intervention at the Customer's premises, or for clarification regarding the technical aspects of this document, must be addressed to:



MORELLO S.r.l.

Lungo Dora Colletta 85/A 10153 – TORINO (TO) – ITALIA

TEL. 011.248.05.69 – TEL./FAX 011.85.00.85

E-mail: info@morellogiovanni.it

[Website: www.morello.eu.com](http://www.morello.eu.com)

1.6 SAFETY REGULATIONS

The requirements, indications, standards, and related safety notes described in the various chapters of the manual are intended to define a series of behaviors and obligations to be followed when carrying out the various activities that constitute the intended methods of use of the machine, in order to operate under conditions of safety for personnel, equipment, and the surrounding environment.

The safety standards set forth herein are addressed to all personnel authorized, trained, and assigned to carry out the various activities and operations of:

- Transport.
- Installation.
- Use.
- Management.
- Maintenance.
- Cleaning.
- Decommissioning and dismantling.

1.7 MANUFACTURER'S RESPONSIBILITY

The Manufacturer disclaims any liability arising from incorrect or improper use of the machine in question and from any damage caused by the use of non-prescribed spare parts, by maintenance operations not carried out correctly, and by tampering with circuits, components, and system software.

Responsibility for the application of the safety requirements set out below lies with the technical personnel responsible for the activities carried out on the machine. They must ensure that the operators authorized to carry out the required activities are qualified, that they comply with and are aware of the requirements contained in this document and of the general safety standards applied to the machine itself.

Failure to observe the safety standards may cause injury to personnel and damage to the equipment.

1.8 MACHINE MANAGEMENT

Management of the machine is permitted only to authorized and suitably trained operators, or at least those possessing sufficient technical experience.

Operators assigned to the use and maintenance of the machine must be aware that knowledge and application of the safety standards is an integral part of their work.

Operators not assigned to work on the machine must not have access to its control panels.

Before starting the machine, carry out the following operations:

- carefully read this manual;
- know which guards and emergency stop devices are present on the machine, where they are located and how they work.

Removal, even partial, of the guards, safety devices, and warning plates placed on the machine is prohibited. In case of malfunction or failure of such devices, proceed immediately to their repair or replacement.

1.9 WARRANTY

The Manufacturer guarantees that its machines are free from manufacturing defects for the period specified in the contractual conditions established.

The purchaser is entitled only to the replacement of parts recognized as defective; packing and transport costs, as well as any installation costs, are at his expense. In such a case, the following must be specified:

- Date and number of the purchase document.
- Machine model.
- Serial number.

No claims for compensation of damages for lost production caused by any periods of machine inactivity will be accepted.

Damages resulting from use not compliant with the instructions contained in this "Use and Maintenance Manual", which constitutes an integral part of the machine, are excluded from the warranty, including maintenance not performed in accordance with the instructions provided.

The warranty will not be recognized for machines on which unauthorized modifications have been carried out. Modifications or tampering with safety devices are strictly prohibited in any case.

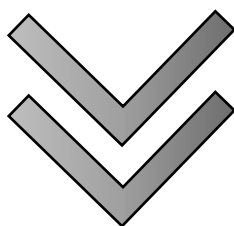
In the event of breakage during the warranty period, in order for the warranty to remain valid, use original spare parts.

Repair work must be performed only by specialized operators who are familiar with the machine.

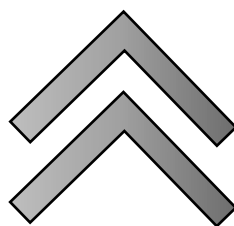
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SAFETY



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2. SAFETY

2.1 GENERAL INFORMATION

The Customer must ensure that personnel are trained regarding the risks of injury, the safety devices installed on the machine, and the general accident prevention rules set forth by community directives and by the legislation of the country where the machine is used.

Operators must know the position and operation of all the machine's controls and its characteristics.

Tampering with, or unauthorized replacement of, one or more components of the machine, the adoption of accessories, and the use of spare parts different from those recommended, may cause risks of injury.

WARNING



It is absolutely forbidden to exclude / tamper with the safety devices provided on the machine. The Manufacturer disclaims all responsibility for the safety of the machine in case of failure to comply with this prohibition.

CAUTION



It is the responsibility of the operator using the machine to ensure that the area is safe and clear of persons and objects.

2.1.1 Machine certification

The machine is supplied with the EC Declaration of Conformity to the essential safety requirements according to the Machinery Directive 2006/42/EC (Annex II A) and the Electromagnetic Compatibility Directive 2014/30/EU.

ADDITIONAL INFORMATION



Any modification made to the machine immediately voids the EC certification issued by the Manufacturer.

ADDITIONAL INFORMATION



The following image is provided solely to indicate the position of the CE plate **(1)** with the main identification data of the machine.



1 – EXAMPLE OF CE PLATE

Lungo Dora Colletta, 85 / A 10153 TORINO - ITALY			
MODEL		SGAE VC R 25/2	
DEAD LOAD	Kg	6.300	
PAYLOAD	Kg	25.000	
SERIAL NUMBER		2762	
YEAR OF CONSTRUCTION		2026	

2.1.2 Intended and non-intended uses

The machine has been designed and built to handle heavy loads (steel bars with a maximum length of 19.8 m) distributed on the loading surface, according to the technical specifications indicated in this manual.

It can be used indoors, on a flat, smooth, and level concrete flooring.

It is forbidden to use the machine on the road (road traffic).

The machine cannot be used for purposes other than those intended.

DANGER



The use of the machine for purposes not described in this manual constitutes **IMPROPER USE**. The Manufacturer declines all responsibility for damage possibly caused to property and/or persons and considers any and all forms of warranty on the machine itself to be voided. The Manufacturer declines all responsibility in the event of tampering with the machine, for unauthorized modifications, or for maintenance operations performed by untrained personnel.

CAUTION



Use of the machine is permitted only to an expert and qualified operator who has fully read and understood this document.

CAUTION



It is strictly forbidden to climb onto / transport persons on the machine.

CAUTION



For operation of the machine, the presence of a single operator is required, who must position themselves as indicated in the paragraph "Operator station" and comply with the operating procedures described in the "Use" chapter.

NOTE



In the event of abnormal machine behavior, or lack of power supply, it is forbidden to perform any type of movement, as this is the specific responsibility of the operators in charge of maintenance.

2.2 OPERATING ENVIRONMENTAL CONDITIONS

The machine must be used in environments equipped with all the safety provisions required by the laws in force in the country of use, and provided with adequate ventilation.

Operating environmental conditions:

- Ambient temperature between 0 °C and + 40 °C.
- Humidity: < 80% (non-condensing).

2.2.1 Fire prevention

The machine is not equipped with its own fire-fighting system.

2.2.2 Explosive atmosphere

The machine is neither designed nor built to operate in environments with an explosive or partially explosive atmosphere.

2.2.3 Lighting

The machine is not equipped with its own lighting system.

NOTE



It is the Customer's responsibility to provide proper lighting of the work area.

2.2.4 Vibrations

The machine does not produce vibrations that are hazardous to the health of the personnel operating it.

NOTE



Excessive vibration can only be caused by a mechanical failure, which must be reported and eliminated immediately.

2.2.5 Noise

Noise measurements were carried out in accordance with the provisions established by acoustic regulations. The sound level data are kept on file by the Manufacturer.

The operating characteristics of the machine are such that, when running unloaded, the overall noise generated, measured at the operator's work stations, is less than 75 dB (A).

NOTE



The sound pressure level, under actual operating conditions, depends on the characteristics of the load.

NOTE



Measurements of the personnel's noise exposure levels must be carried out by the Customer, in accordance with the legislation in force in their own country.

2.2.6 Electromagnetic emissions

The machine contains electronic components subject to Electromagnetic Compatibility regulations, affected by conducted and radiated emissions.

The emission values comply with the standard thanks to the use of components complying with the Electromagnetic Compatibility directive, suitable connections, and the installation of filters where necessary.

NOTE



Any maintenance activities on the electrical equipment carried out in a non-compliant manner, or incorrect replacement of components, may compromise the efficiency of the equipment itself.

2.3 DISPOSAL OF WASTE MATERIALS

The machine generates waste materials (gearbox oil).

Specific regulations exist in every country for the disposal of such materials for the protection of the environment.

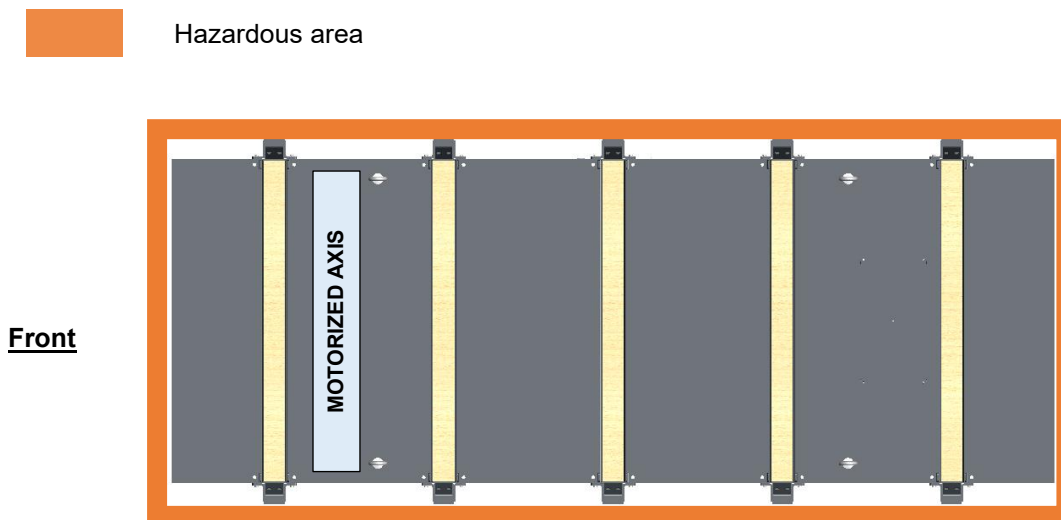
The Customer must necessarily be aware of such regulations and act in compliance with them.

In particular, please refer to chapter 7 for the disposal of the materials that make up the machine.

2.4 DELIMITATION OF HAZARDOUS AREAS

The hazardous areas of the machine are delimited by fixed guards. Access to such areas, which is permitted exclusively for maintenance operations, must be carried out in accordance with the instructions given in this manual.

The following drawing shows the hazardous areas in the vicinity of the machine resulting from its movement.



2.5 OPERATOR'S STATION

Machine operation requires the presence of a single operator who must position themselves laterally to the machine, in the direction of travel, so as to have a complete view of the surrounding maneuvering area, always keeping a safety distance from the machine (**Figure A**).



Operator station (with radio control or wired pushbutton panel)



Direction of travel of the machine

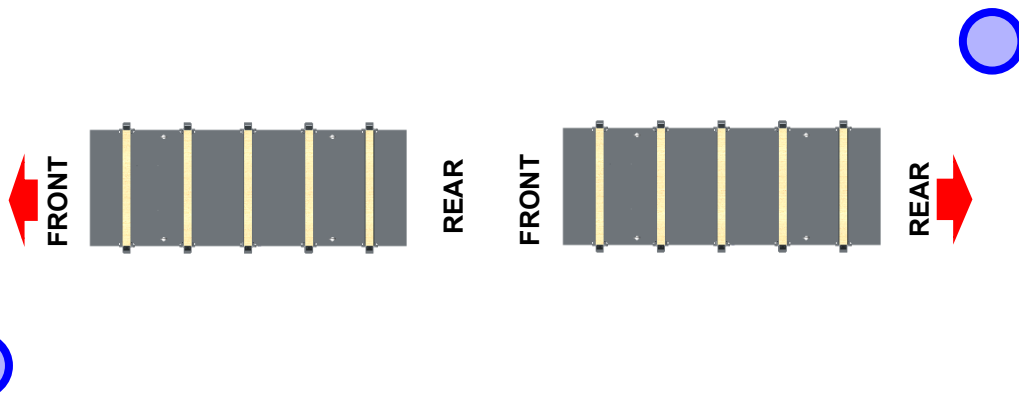


Figure A - Image for illustrative purposes

WARNING



In the presence of bulky loads that limit the operator's visibility, the operator must position themselves facing the direction of travel (always at a safety distance), so as to have complete visibility of both sides of the machine (**Figure B**).



Figure B - Image for illustrative purposes

2.6 SAFETY FUNCTIONS

The machine is equipped with the following safety features:

TYPE OF DEVICE	FUNCTION
Key-operated power selector switch	Prevent movement of the machine.
Emergency button(s)	Emergency stop of the machine.
Hold-to-run movement system	Interruption of machine movements upon release of the control.
Fixed guards	Segregation of hazardous areas of the machine.
Visual and audible signaling systems	Signaling of machine in motion.
Safety circuits	Interruption of electrical power in the event of overload or short circuit.

2.6.1 Key-operated power selector switch

Function: Prevent movement of the machine.

Characteristics and operating mode: The machine's electrical power is disconnected by turning the "key-operated power selector switch," located on the electrical panel, to position (0), and removing the key.

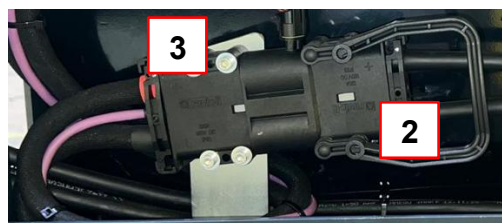
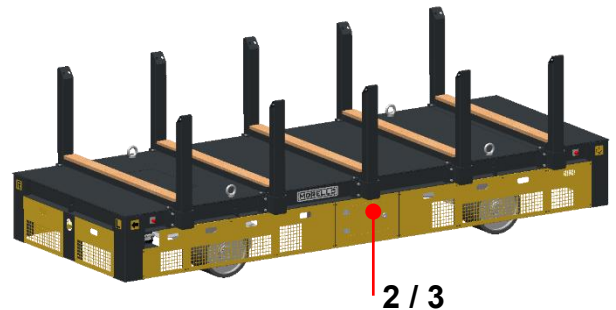
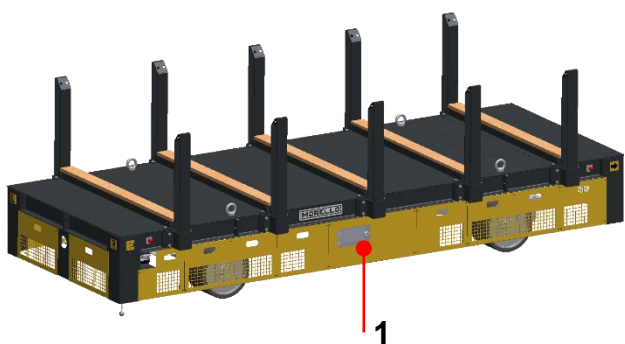
Disconnecting the machine's power plug from the battery socket achieves the disconnection of power.

WARNING



In case of maintenance, disconnect the battery by unplugging the machine's power plug from the battery socket.

1. Key-operated power selector switch
2. Machine power plug
3. Battery socket



Example images for illustrative purposes

2.6.2 Emergency button(s)

Function: Immediate stop of the machine.

Characteristics and operating mode: Press this button in the event of danger to the operator's safety and/or the machine itself.

Pressing this button **(1)** causes the interruption of power to the motors, resulting in the stop of the machine's movements.

Once pressed, the emergency button remains in the lowered position. To reset it, turn it clockwise.

The emergency buttons are located on the control pushbutton panels and on the machine.

CAUTION



The emergency buttons require periodic checks to verify their correct operation.

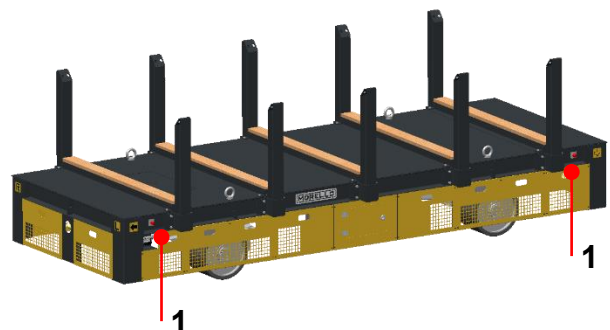
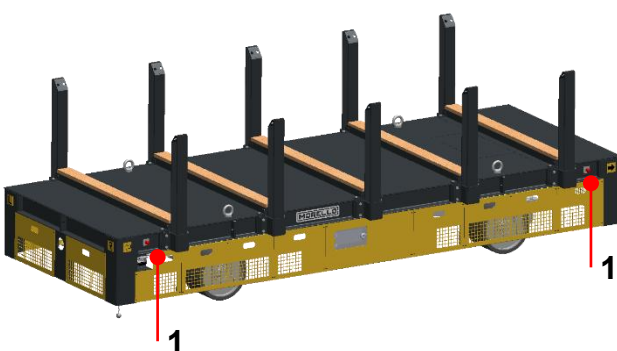
NOTE



In the event of maintenance, acting on the emergency button alone is not sufficient to achieve the disconnection of the machine's electrical power.



Wired pushbutton panel / Radio control



2.6.3 Hold-to-run movement system

Function: Movement of the machine with an operator present.

Characteristics and operating mode: For machine movement, the wired pushbutton panel and the radio control feature hold-to-run levers (1).
Releasing the lever causes the machine's movement to stop.

CAUTION



For correct use of the wired pushbutton panel / radio control, the operator must position themselves as indicated in the "Operator station" paragraph.



Wired pushbutton panel / Radio control

2.6.4 Fixed guards

Function: Segregation of hazardous areas of the machine.

Characteristics and operating mode: The guards (covers) are firmly fixed to the structure by means of screws that require a specific tool for removal.

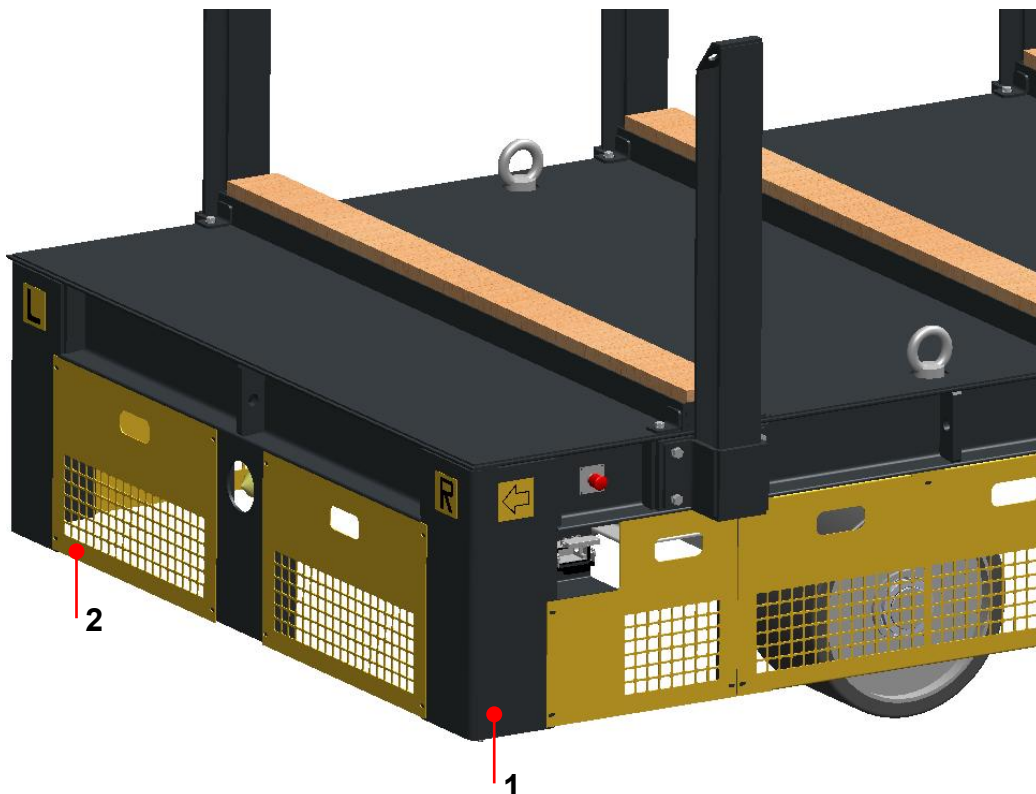
They are not monitored, and their removal is exclusively subject to maintenance operations, with the machine's power disconnected and isolated.

WARNING



The Manufacturer disclaims any liability if the machine is operated without guards.

1. Machine frame
2. Example of a protective guard made of grated steel sheet

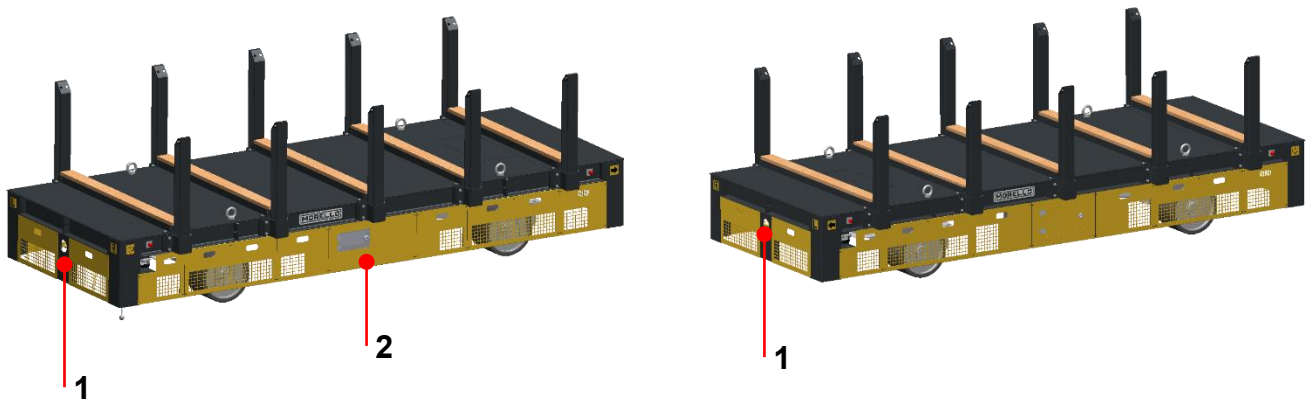


2.6.5 Visual and audible signals

Function: Visual and audible signaling of machine in motion.

Characteristics and operating mode: The machine is equipped with two lamps and a buzzer that activate when it is in motion.

1. Signal lamp
2. Buzzer



2.6.6 Safety circuits

Function: Monitoring of electrical circuits and interruption of electrical power before the generation of hazardous overloads/short circuits.

Characteristics and operating mode: In case of overload or short circuit, the fuses installed inside the electrical panel interrupt the power supply to the circuits and cause an immediate stop of the machine.

ADDITIONAL INFORMATION



For further information on the fuses, refer to the electrical diagram with the relevant parts list.

2.7 PERSONAL PROTECTIVE EQUIPMENT

Anyone operating the machine must use personal protective equipment such as to limit possible risks to the maximum extent.

CAUTION



The clothing of anyone operating, or performing maintenance, on the machine must comply with the essential safety requirements set out by EU directives and by the laws in force in the country where the machine is used.

NOTE



Personnel must wear suitable work clothing so as to prevent accidents from occurring.

In order to avoid mechanical risks, such as entanglement, entrapment or other, tie back hair and do not wear bracelets, watches, rings or necklaces.

2.8 RESIDUAL RISKS

2.8.1 General information

During the design phase, all hazardous zones or parts were assessed and, as a result, all necessary precautions were taken to avoid risks to persons and damage to the machine's components.

WARNING



Periodically check the operation of all safety devices.

Do not remove the guards present.

Check that there are no obstacles in the machine's maneuvering area.

2.8.2 Residual risks

After carefully considering all the possible risks of the machine, all the necessary solutions have been adopted to eliminate risks and limit hazards to exposed persons.

- **Danger of impact**

It is the responsibility of the operator in charge to keep a safe distance from the machine and maintain full visibility of the area, verifying that no persons are present during movement.

- **Danger of crushing of lower/upper limbs near the wheels**

It is the responsibility of the operator in charge to keep a safe distance from the machine and maintain full visibility of the area, verifying that no persons are present during movement.

2.8.3 Plates present on the machine

The Manufacturer has applied a series of warning plates to the machine, defined in accordance with the European standard concerning the graphic symbols to be used. The plates in question are located in a clearly visible position.

The maintenance service is required to immediately replace all plates that, due to wear, become illegible.

CAUTION



It is strictly forbidden to remove the warning plates present on the machine.

The Manufacturer declines all responsibility for the safety of the machine in the event of non-compliance with this prohibition.

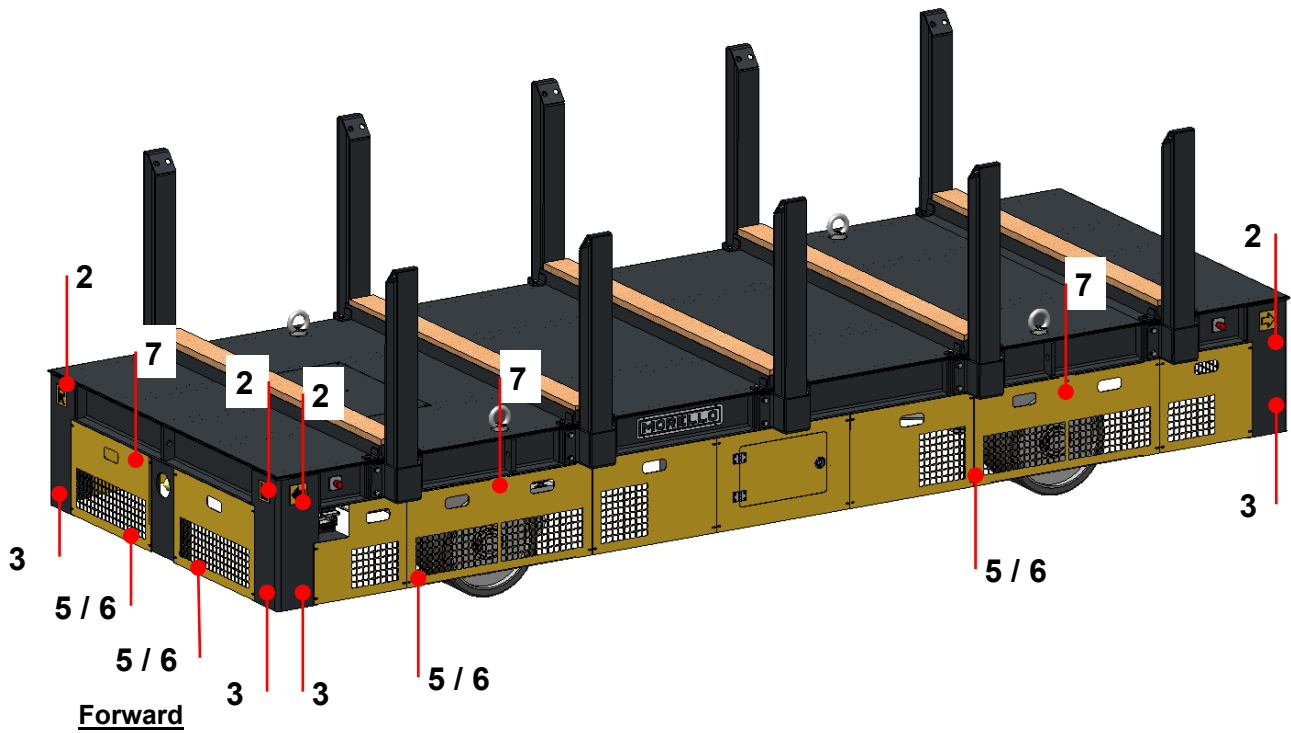
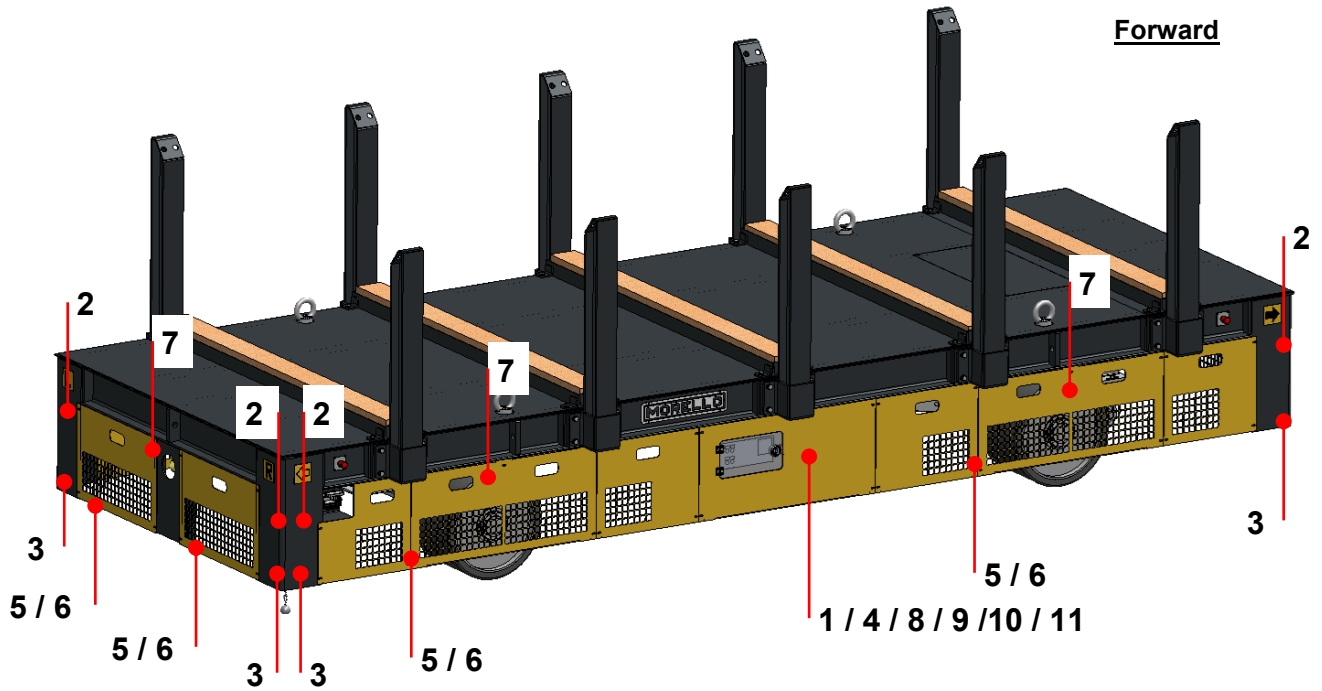
ADDITIONAL INFORMATION



For information concerning the warning plates installed on the incorporated machine parts, consult the specific manuals.

PLATES PRESENT ON THE MACHINE		
Plate 1		<u>Danger</u> of electric current.
Plate 2		<u>Danger</u> of impact.
Plate 3		<u>Danger</u> of crushing of lower and upper limbs.
Plate 4		<u>Prohibition</u> of maintenance on live equipment.
Plate 5		<u>Prohibition</u> of cleaning, oiling, greasing, repairing or adjusting parts in motion.
Plate 6		<u>Prohibition</u> of removing safety devices.

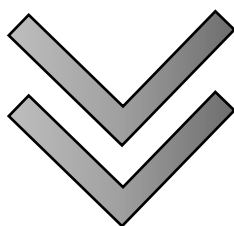
PLATES PRESENT ON THE MACHINE		
Plate 7		<u>Prohibition</u> of climbing onto the machine.
Plate 8		<u>Prohibition</u> of extinguishing fires with water.
Plate 9		<u>Obligation</u> to wear protective gloves.
Plate 10		<u>Obligation</u> to wear safety shoes.
Plate 11		<u>Obligation</u> to read the use and maintenance manual.



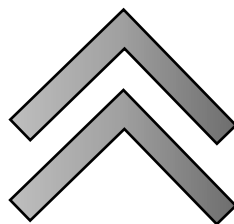
**ELECTRONIC SELF-PROPELLED
TRUCK**
Serial number 2762



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GENERAL DESCRIPTION



**ELECTRONIC SELF-PROPELLED
TRUCK**
Serial number 2762



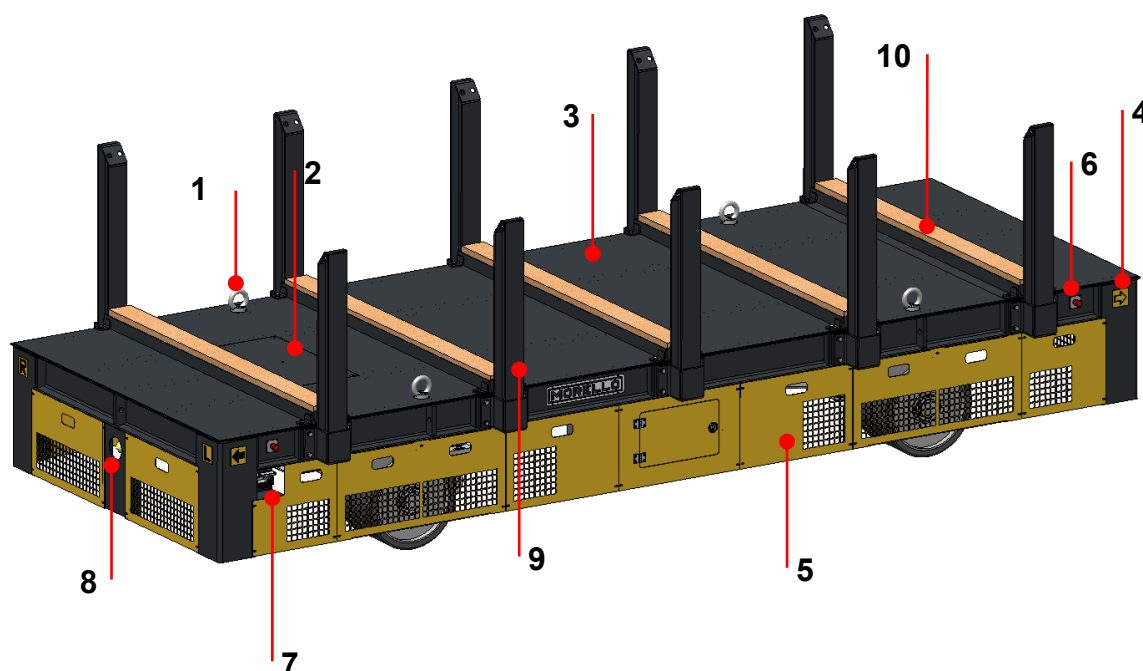
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3. GENERAL DESCRIPTION

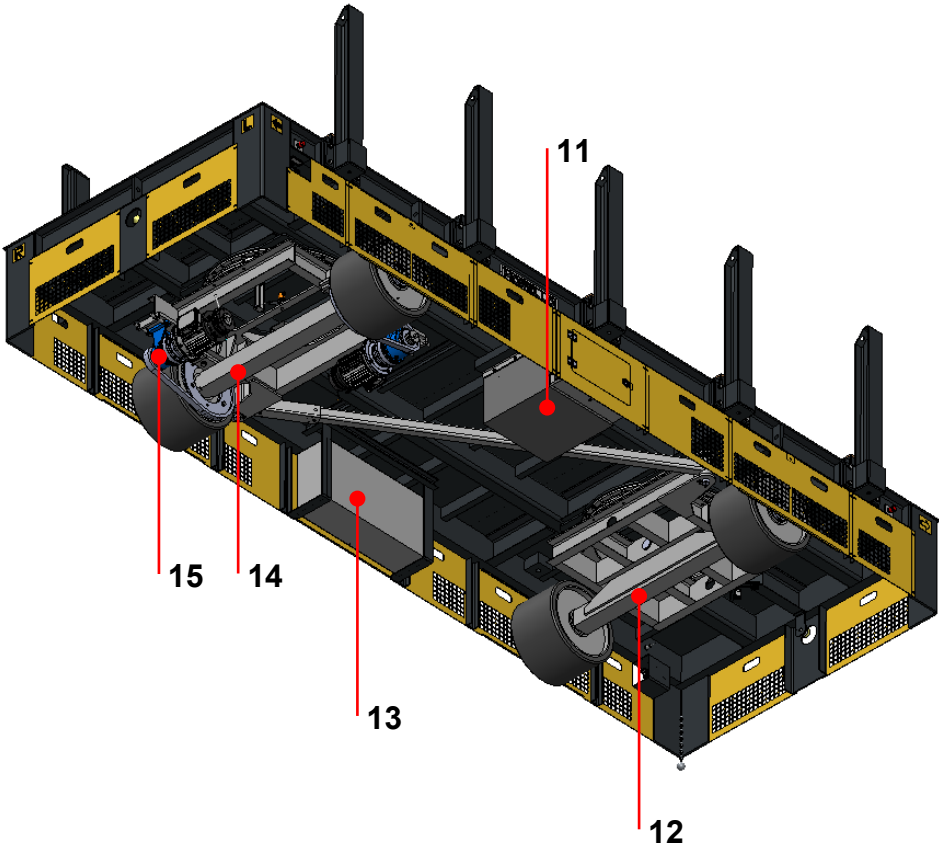
The machine has been designed and built to perform the movement of heavy loads (steel bars with a maximum length of 19.8 m) distributed on the loading surface, according to the technical specifications indicated in this manual. It can be used indoors, on a flat, smooth and level concrete floor. The work area must be clear and sufficiently large for the machine's movement.

3.1 LAYOUT

No.	DESCRIPTION
1	Machine lifting point
2	Removable panel for maintenance (encoder access)
3	Loading surface
4	Direction of travel plate
5	Guard
6	Emergency button
7	Wired pushbutton panel connection socket
8	Signal lamp
9	Load containment stanchions
10	Wooden load support crossbeams



No.	DESCRIPTION
11	Battery
12	Rear idle pendulum axle
13	Electrical panel
14	Front rigid motorized axle
15	Traction gearmotor
16	Remote control / Wired pushbutton panel



3.2 TECHNICAL CHARACTERISTICS

The following table shows the main characteristics of the machine.

GENERAL	
Machine weight	Approx. 6,300 kg
Maximum working load (WLL)	25 t distributed
Loading deck dimensions	Approx. 9,000 mm x 2,200 mm
Loading deck height	Approx. 857 mm from the ground without load support crossbeams Approx. 955 mm from the ground with load support crossbeams
Maximum climbable gradient	Approx. 2%
Emergency buttons	1 on each control pushbutton panel + 4 on the machine
Movement indicators	Audible and visual
Machine lifting points	4
Frame	Steel
Loading surface	Smooth steel sheet + crossbeams with wood for load support
Transmission	Electromechanical
Travel	Adjustable electronic
Steering	Electric
Steering type	Corrected turn
Steering angle	+ 35° / -35°
Axles	2
Steering axles	2
Wheels	4
Wheel type	Rubber Ø 560x350 mm
Traction motor	2 AC electric motors 5 kW 80 V 2,300 rpm
Maximum speed	Approx. 30 m/min. at full load on level ground
Service brake	Electric negative
Parking brakes	Electromagnetic negative
Control devices	Wired pushbutton panel / Radio control

POWER SUPPLY	
Power supply type	Lithium battery
Power supply voltage	80 V
Rated capacity	220 Ah
Range	Approx. 5.1 km
Charging mode	Rectifier
Charging time (full)	Approx. 2 h
Battery weight	Approx. 190 kg

ADDITIONAL INFORMATION



The characteristics shown in the previous tables may be subject to change, therefore for greater precision or verification of the machine characteristics, refer to the attached diagrams.

3.3 DESCRIPTION OF UNITS

ADDITIONAL INFORMATION



For more information on the components making up the assemblies, refer to the relevant attached documentation.

3.3.1 Machine structure

The machine is built with a frame **(1)** made of steel sheets and profiles and perimeter protection guards **(2)** made of smooth and mesh steel sheet.

In the upper part of the frame there is the loading deck **(3)**, made of smooth steel sheet. Five supports with wooden crossbeams **(4)** for load support are bolted onto the deck.

The loading deck features:

- Four threaded holes **(5)** for inserting as many lifting eyebolts for lifting the machine.
- A removable panel **(6)** for accessing the steering encoder.

On the perimeter, the insertion pockets for 5+5 load containment bars **(7)** are bolted on.

A small chain is fixed to the machine, whose function is to discharge static electricity to the ground.

Painting is carried out in gray RAL 7016 for the frame and yellow RAL 1018 for the perimeter guards.



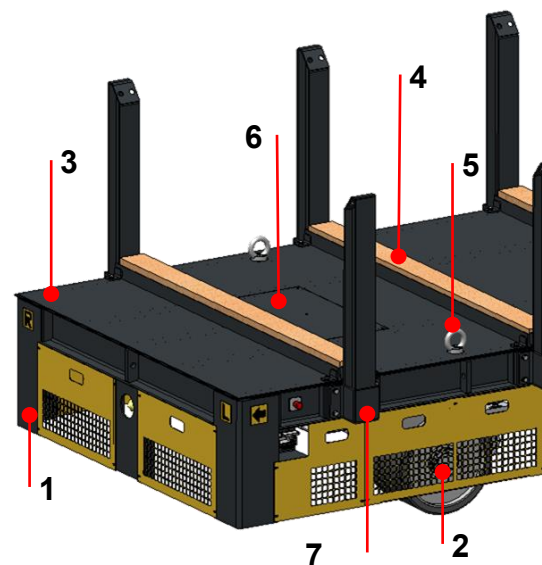
Front



Back



Machine painting



3.3.2 Wheel unit

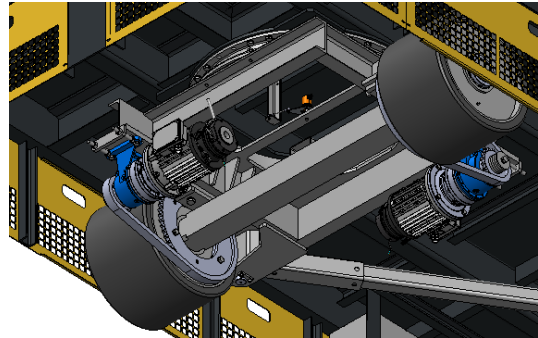
The machine is moved by means of four wheels, two motorized front wheels **(1)** and two idle rear wheels **(2)**, mounted in pairs on two steering axles, joined by a steering bar **(3)**.

Each wheel is made with a steel core and rubber covering.

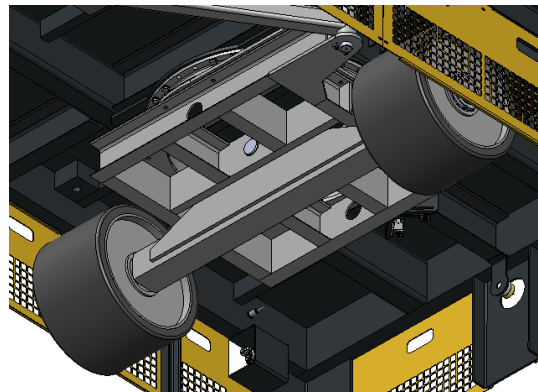
The idle rear wheels are mounted on a pivoting axle **(4)**. This axle is fixed, by means of a support (carriage) **(5)**, to a turntable that allows it to steer.

The pivoting axle ensures ground contact for all wheels, guaranteeing better traction and correct load distribution.

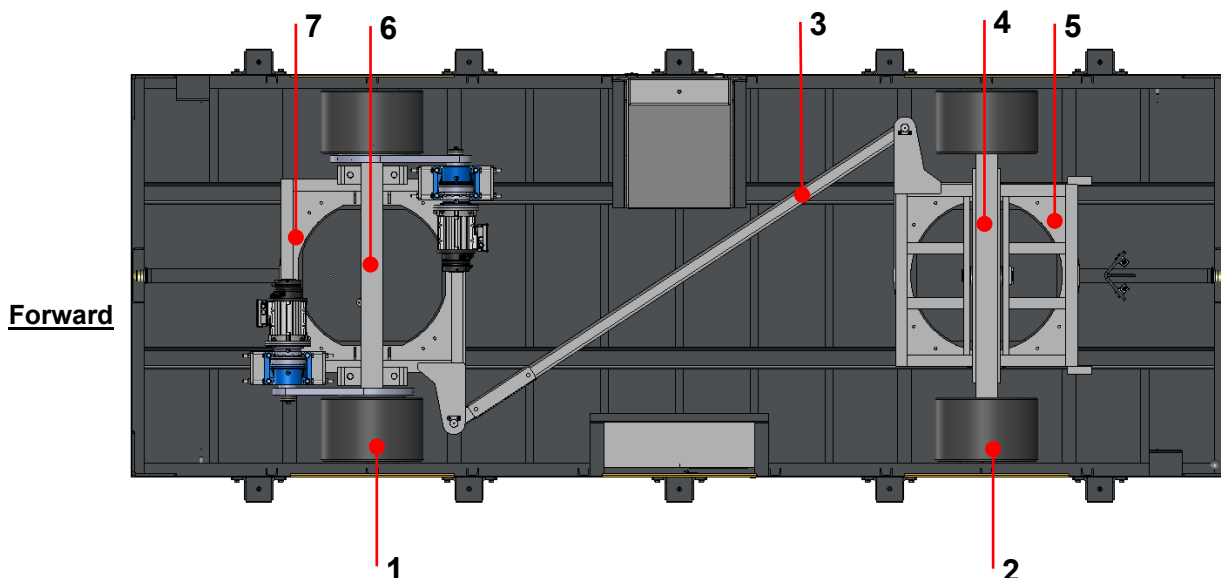
The pair of front wheels is mounted on a rigid axle **(6)**. This axle is fixed, by means of a support (carriage) **(7)**, to a turntable that allows it to steer.



Front motorized axle



Rear idle axle

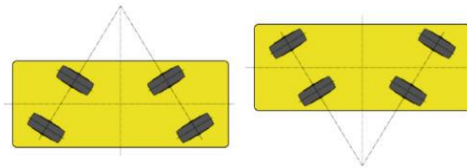


3.3.3 Steering

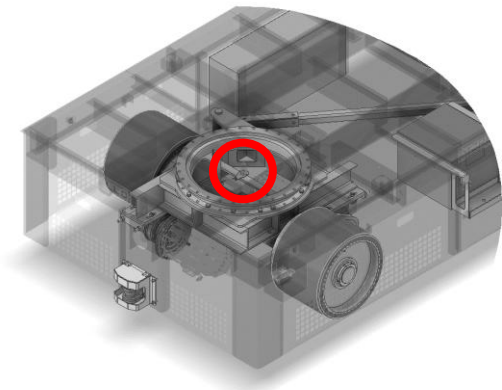
The steering, of the electric type, is managed via software. It is of the corrected turn type at the center of the machine: the wheels, consistently with the angle set by the operator, converge at a single point.

The steering angle is read by an encoder **(1)**, located at the center of the front turntable. The wheels can rotate approximately $\pm 35^\circ$ (maximum).

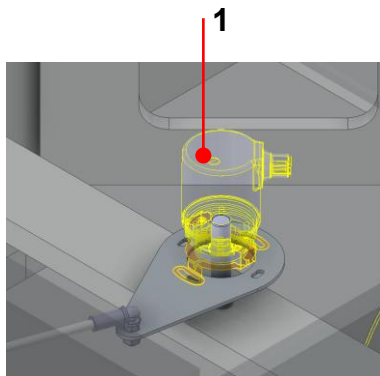
To ensure machine safety, in the event of encoder failure, two types of overtravel limit switches are provided (the first of an electrical type **(2)** and the second of a mechanical type **(3)**).



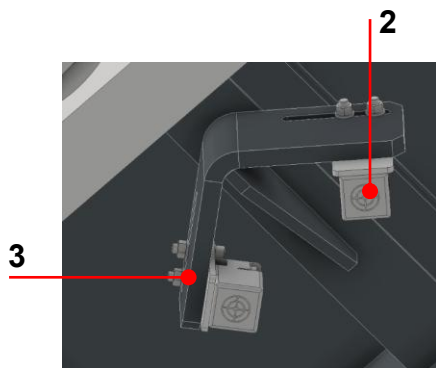
Steering with correct return to straight position



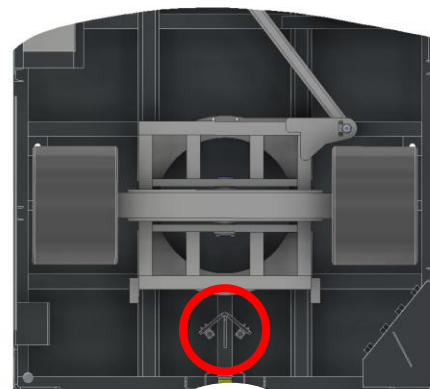
Encoder position on the front axle



Steering encoder



Steering limit switch



Limit switch position on the rear axle

Images for illustrative purposes

3.3.4 Traction and braking

Traction is exerted on the front wheels.

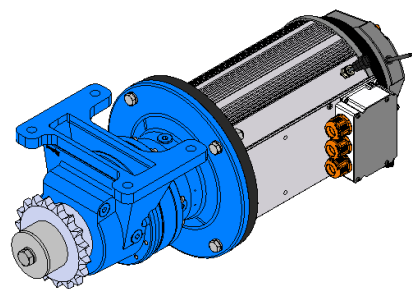
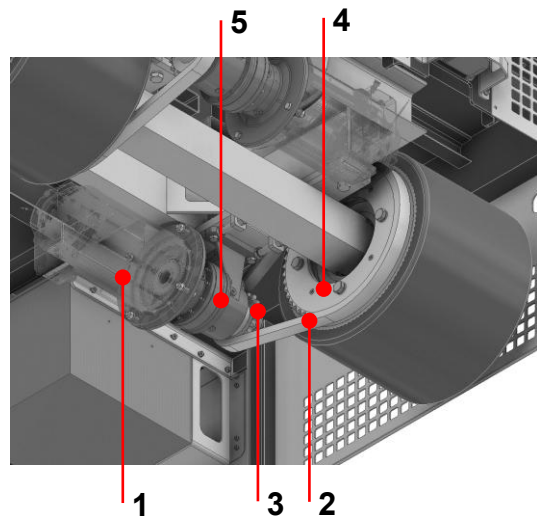
Each front wheel is driven by an electric motor **(1)**, by means of a chain **(2)** on a pinion **(3)** and ring gear **(4)**. Transmission is achieved by means of a gear reducer **(5)** with helical gear teeth.

Electronic-type translation allows gradual acceleration and deceleration ramps, millimetric movements, and uniform speed variations.

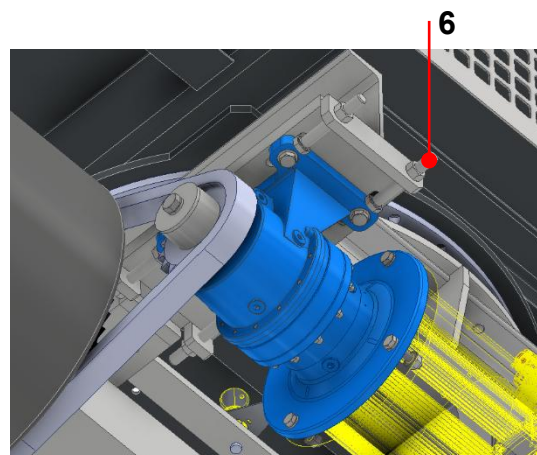
Transmission chain tensioning is adjustable by means of dedicated screws **(6)**.

Service braking is achieved through negative torque of the traction motors.

Parking braking is achieved through negative electromagnetic brakes mounted on the traction motors.



Gearmotor



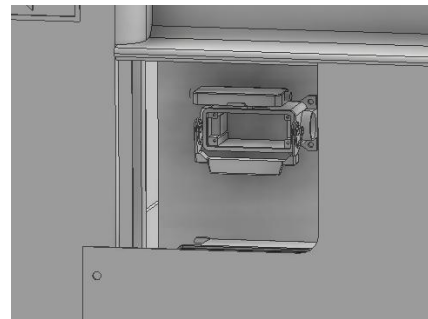
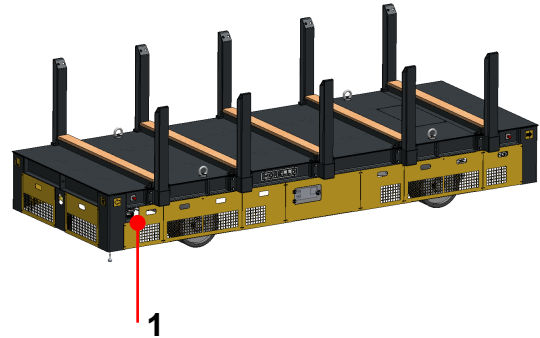
Images for illustrative purposes

3.3.5 Control devices

Machine movements are managed via the control pushbutton panel (radio remote control or wired pushbutton panel).

The operator, through a single connected device, can execute all commands.

Two sockets **(1)** are provided on the machine for connecting the wired pushbutton panel.



Socket (1)



Wired pushbutton panel



Radio remote control

CAUTION



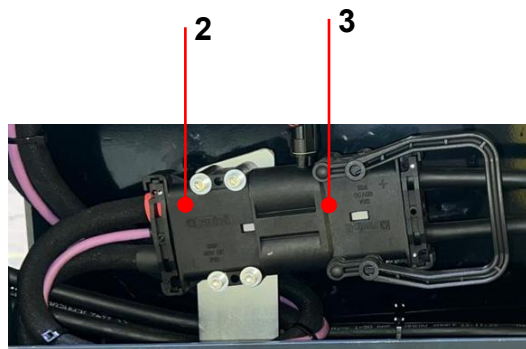
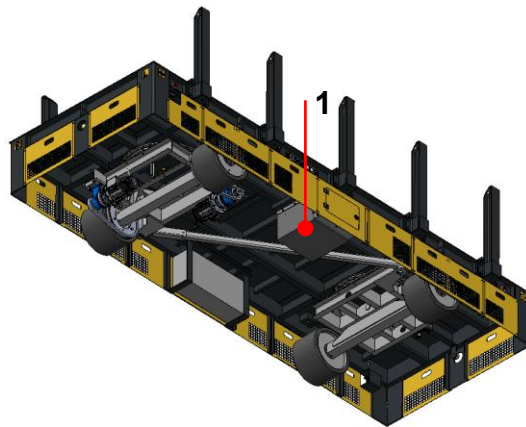
Operation of the machine requires the presence of a single operator, who must be positioned as indicated in the "Operator station" paragraph.

3.3.6 Power supply

The machine is powered by a lithium battery **(1)** housed in a dedicated compartment.

The battery socket **(2)**, located near the battery itself, can be connected to the machine plug **(3)** for powering the machine, or to the rectifier plug for charging operations.

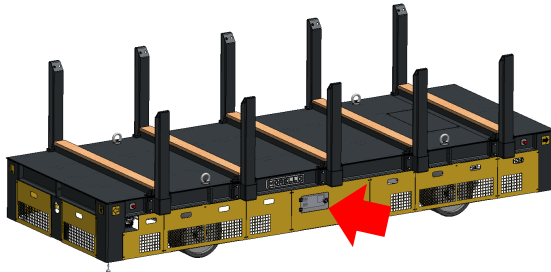
The connectors are accessible through a dedicated door.



Sample image

3.4 PUSHBUTTON PANELS

3.4.1 Pushbutton panel on the electrical panel



Position



Image

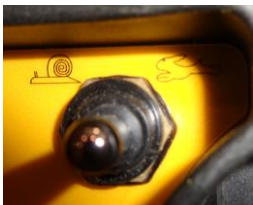
IMAGE	DESCRIPTION
	Key-operated power selector switch Turn to position (1) to switch on the machine. Turn to position (0) to switch off the machine.
	White illuminated pushbutton for service activation Press to activate the auxiliaries.
	White LED lamp for power on If lit, it indicates that the machine is powered on.
	Yellow illuminated pushbutton for supplemental time Its lighting indicates that the battery has reached approximately 30% of its remaining capacity. Pressing it supplies power to the machine for an additional 15 minutes in order to reach the charging station.

IMAGE	DESCRIPTION
	Red LED lamp for generic fault Its lighting indicates the presence of a fault / emergency condition. Check the display for the cause of the fault / emergency condition.
	CAN network programming port connector.
	Battery display This device makes it possible to view information relating to the battery (remaining charge, voltage, amperage, etc.). For further information, refer to the battery manual, provided as an attachment.

3.4.2 Wired control pushbutton panel



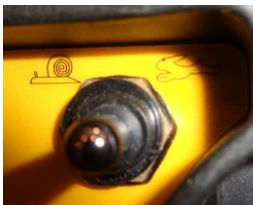
IMAGE	DESCRIPTION
	Key-operated pushbutton panel power switch (SIDE) Turn to (I) to switch on the pushbutton panel. Turn to (O) to switch off the pushbutton panel.
	Green START / HORN pushbutton (SIDE) Press to enable the pushbutton panel after switching it on. During machine operation, press to sound the horn.
	0° pushbutton (SIDE) Press to straighten the steering wheels.
	Green ON indicator light If lit, it indicates that the pushbutton panel is switched on.
	RESET / SAFETY OFF lever Push the lever to RESET to activate the auxiliaries. SAFETY OFF function not enabled.

IMAGE	DESCRIPTION
	Maximum travel speed selection lever Push "HARE" to set the maximum speed of 30 m/min. Push "SNAIL" to set the maximum speed of 15 m/min.
	Lever with functions not enabled
	Emergency button Press in case of danger to obtain the immediate stop of the machine. To reset it, rotate it clockwise.
	LEFT / RIGHT steering lever Operate the lever to steer left or right. The lever is hold-to-run.
	FORWARD / REVERSE movement lever Operate the lever to move the machine forward or backward. The lever is hold-to-run. The travel speed is proportional to the pressure applied.
	Pendant cable connector.

3.4.3 Radio remote control



IMAGE	DESCRIPTION
	Radio control key-operated power selector switch (SIDE) Turn to (I) to switch on the radio control. Turn to (O) to switch off the radio control.
	Green START / HORN pushbutton (SIDE) Press to connect the radio control after switching it on. During machine operation, press to sound the horn.
	0° pushbutton (SIDE) Press to straighten the steering wheels.
	Green ON indicator light If lit, it indicates that the radio control is switched on.
	RESET / SAFETY OFF lever Push the lever to RESET to activate the auxiliaries. SAFETY OFF function not enabled.

IMAGE	DESCRIPTION
	Maximum travel speed selection lever Push "HARE" to set the maximum speed of 30 m/min. Push "SNAIL" to set the maximum speed of 15 m/min.
	Lever with functions not enabled
	Emergency button Press in case of danger to obtain the immediate stop of the machine. To reset it, rotate it clockwise.
	LEFT / RIGHT steering lever Operate the lever to steer left or right. The lever is hold-to-run.
	FORWARD / REVERSE movement lever Operate the lever to move the machine forward or backward. The lever is hold-to-run. The travel speed is proportional to the pressure applied.

ADDITIONAL INFORMATION

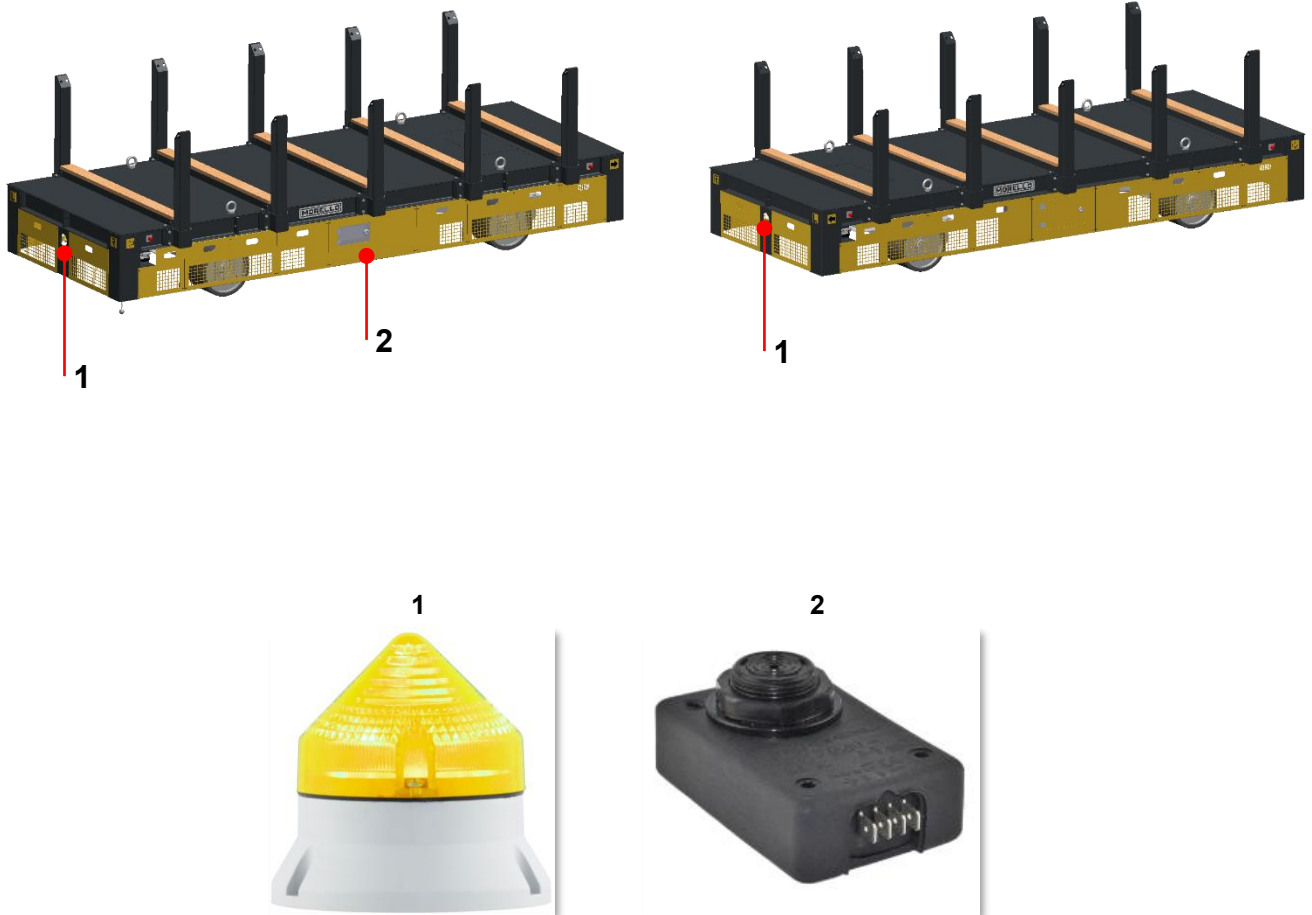


The radio control battery must be recharged, even when not in use, according to the intervals given in the supplier's manual. For further information on the radio control and its charging, refer to the relevant manual attached.

3.5 VISUAL AND ACOUSTIC SIGNALING

The machine is equipped with the following acoustic and light signaling devices:

1. Lamp
2. Buzzer



SIGNALING	DESCRIPTION
FLASHING YELLOW LIGHTS + BUZZER	They activate during machine movement and deactivate when it is completely stopped.

ADDITIONAL INFORMATION

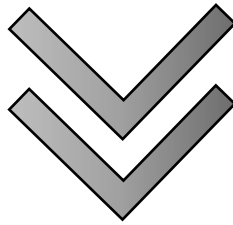


There is a horn that the operator can use to warn of the machine's passage.

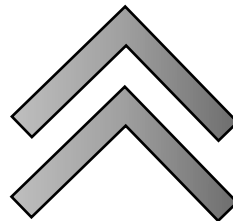
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TRUCK**
Serial number 2762



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TRANSPORT AND STORAGE



**ELECTRONIC SELF-PROPELLED
TRUCK**
Serial number 2762



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4. TRANSPORT AND STORAGE

4.1 STORAGE

The machine is shipped by the Manufacturer already assembled and with the battery charged inside.

The packaging does not protect the machine from external weather events such as rain, snow, hail, etc., even if transported in a wooden crate. For this reason, if it remains exposed to the weather, it is essential that it remains in the closed container until its final storage.

The storage site must be suitable for use as a machine warehouse: enclosed, protected from weather agents, clean and ventilated. The floor must be able to support the weight of the machine. The ambient temperature must be between 0°C and +30°C.

The Manufacturer is not liable for damage caused by storage for long periods or under conditions other than those indicated.

4.1.1 Battery storage

When not in use, the battery must be stored in a covered area protected from weather agents, dry, free of dust and protected from frost. Perform regular inspections and recharges, at least on a weekly basis. Perform complete charge cycles before extended periods of inactivity.

ADDITIONAL INFORMATION



For any other clarification on the battery, refer to the relevant manual attached.

4.2 TRANSPORT

Depending on the destination, the machine may be shipped in the following ways:

- BY SEA → the machine is enclosed in a crate with a flat bottom and anchored with tie rods. The crate is lined with tarred paper and contains bags of desiccant salts against humidity and salt air.
- BY AIR → the machine is enclosed in a crate with a flat bottom and anchored with tie rods.
- BY LAND → land transport can be divided into two categories:
 - LONG-DISTANCE TRANSPORT the machine is covered with protective sheets, enclosed in a wooden cage with a flat bottom and anchored with tie rods on the loading bed of the semi-trailer truck.

To lift the crate, strictly follow the instructions printed on the outside of the packaging. The packaging may be recovered for possible reuse; it is therefore good practice to try to keep it in protected places, in order to avoid damaging it and making it unreliable. If, on the other hand, it is disposed of, it will be the Customer's responsibility to dispose of it in accordance with the regulations in force in their own country.
 - TRANSPORT OVER MEDIUM AND SHORT DISTANCES the machine is fastened to a platform and covered with protective sheets.

The lifting anchor points are indicated on the transport packages.

In addition, all the information for identifying the contents and for safe handling is present on the outside of the various packages:

- Address of the consignee and the sender.
- Dimensions (length, width, height).
- Gross weight, net weight, and tare.
- Center of gravity.
- Notes and pictograms (e.g. fragile, top, etc.).
- Packing list holder plate (a copy must be present inside each package).

4.3 LIFTING

Before any handling and/or lifting operation, it is essential to know the weight.

NOTE



All handling and/or lifting operations must be carried out by qualified personnel, familiar with the regulations relating to the lifting and handling of loads, so that they can act in full compliance with them.

NOTE



Use a suitable lifting device, adequate for the weight and size of the load to be handled.

NOTE



Always check the correct balance of the load. If it turns out to be unbalanced, immediately place it on the ground and reposition the slings appropriately.

CAUTION



When the load is lifted to a height greater than 50 cm, operators must strictly remain at a safe distance greater than 2 m from the perimeter.

A breakage of the slings or an uncontrolled movement of the load in fact constitute a serious danger to the safety of personnel.

4.3.1 Weight(s)

DESCRIPTION	WEIGHT
Machine (overall weight)	approx. 6,300 kg
Side load-retaining stanchion	approx. 31.7 kg each
Stanchion pocket	approx. 11.7 kg each
Load support cross members - support	approx. 50.3 kg each
Load support cross member – wooden cross member	approx. 21.24 kg each

4.3.2 Equipment supplementary to the machine

In addition to delivering the machine, the Manufacturer supplies:

- No. 1 rectifier for battery charging, complete with cables.
- No. 1 battery charger for the radio control.
- No. 4 fixed M36 eyebolts for lifting the machine.

ADDITIONAL INFORMATION

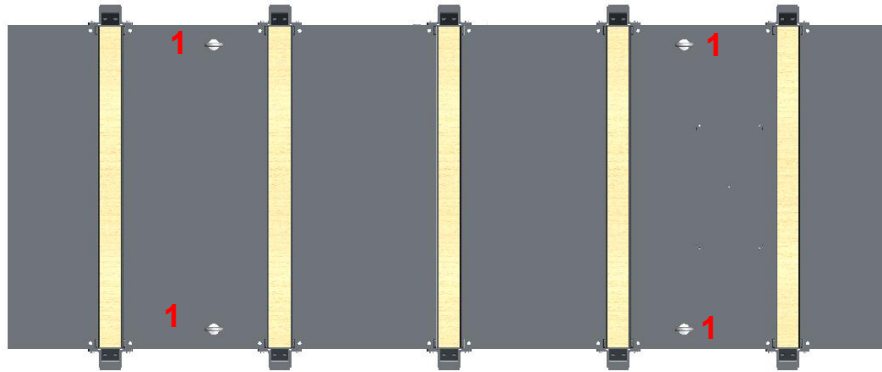


For more information on the supplementary devices, refer to the relevant documentation.

4.3.3 Lifting the machine

To lift the machine, proceed as follows:

- Make sure the loading surface is clear.
- Insert a fixed M36 eyebolt into each of the four points (1) provided on the machine.



NOTE

Before using the eyebolt, check that the thread is intact and clean.

To orient the eyebolts correctly, insert suitable washers.



Images for illustrative purposes

- Insert suitable hooks with chains into the four eyebolts.
- Attach the chains to the hook of the lifting device.
- Slowly lift the machine, taking care to balance it correctly.
- Transport it avoiding sudden movements and keeping it as close to the ground as possible.
- Once at the destination, lower it to the ground slowly and gradually.
- Unhook the chains only after the machine has been perfectly set down on the ground.
- Remove the eyebolts.

LIFTING DIAGRAM

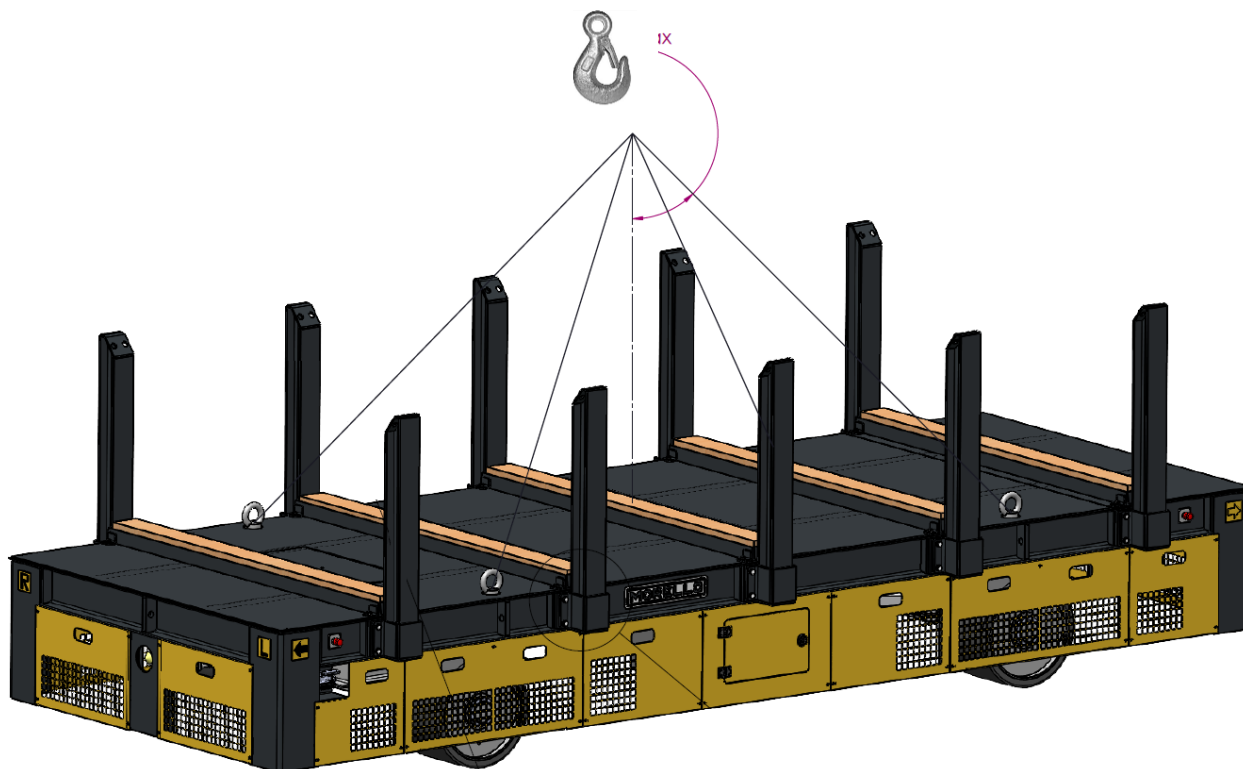
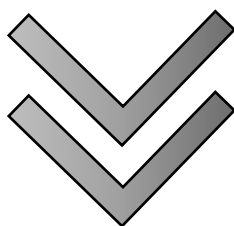
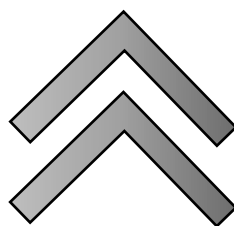


Image for illustrative purposes



INSTALLATION



**ELECTRONIC SELF-PROPELLED
TRUCK**
Serial number 2762



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5. INSTALLATION

Before using the machine in question, it is necessary to remove:

- Any fastening restraints used for transport.
- The protective packaging.

5.1 INTEGRITY CHECK

It is necessary to check that the machine has not been damaged during transport. Therefore, in the event of accidents or in the presence of visible damage (signs or traces of impact), please report it as follows:

- with a written note on the Transport Document;
- by notifying the carrier and the Manufacturer of the damage found by registered letter, within 48 hours of receiving the machine.

5.2 MACHINE INSTALLATION

NOTE



The machine is shipped by the Manufacturer already assembled and with the battery charged inside.

5.2.1 Choice of place of use and verification of requirements

The Customer **MUST** have:

- A sufficiently large room, free of obstacles, equipped in accordance with the safety regulations in force in the user's country.
- Proper ventilation and lighting.
- Appropriate lifting equipment.
- Operating spaces.
- Passageways.
- Escape routes.
- A flat, level, and smooth flooring surface, capable of supporting the weight of the machine and its load.
- A suitable area for battery charging (indoor environment).

5.3 CHECKS AND VERIFICATIONS

Before starting the machine, a series of checks and verifications must be performed in order to avoid problems during its operation.

CAUTION



These verifications and the preparation for the first startup must be performed by a specialized technician of the Manufacturer or by a specialized operator who has been appropriately trained.

NOTE



Before performing any movement, make sure that no anomalies exist in order to avoid damage to the machine. Before clearing any anomaly, verify the cause and eliminate it.

ADDITIONAL INFORMATION



The checks and verifications listed below are to be considered normal maintenance operations.

ADDITIONAL INFORMATION



Refer to the specific manuals for information regarding the incorporated devices.

5.3.1 General checks on the mechanical units

WARNING



These checks and verifications must be performed with the machine stopped and with the power source deactivated and disconnected. The work area must be cleared beforehand.

- Perform a visual check of the wheel units, verifying that there are no particular mechanical anomalies (ovalization, crushing, deformation due to loads and/or foreign bodies).
- Perform a general visual check of the various units making up the machine, verifying that there are no particular mechanical anomalies or foreign bodies.
- Verify that all guards are correctly installed.
- Verify that the movement components are correctly lubricated.
- Verify the correct tightening of all screws and all nuts.

ADDITIONAL INFORMATION



To verify tightening, refer to the table provided in the "Tightening torques" paragraph in the "Maintenance" Chapter.

NOTE



Should problems be found, immediately contact the Manufacturer.

5.3.2 Electrical system checks

Perform a general check of the electrical system and, in particular, verify that all junction boxes are closed and all conductors are connected.

Main switch

- Turn the power selector switch to (1) and verify the presence of voltage by checking that the relevant lamp lights up.

Motor(s)

- Perform a check of the correct connection of the motor(s).

Push-button panels

- Verify the correct operation of the buttons and selectors and the resulting activation of the indicator lights present.
- Verify that the movement of the machine actually corresponds to the commands given.

Signals and sensors

- Verify the correct connection and operation of the buzzer and the horn.
- Verify the correct connection and operation of the lamps.
- Verify the correct connection and operation of the limit switches and the encoder.

ADDITIONAL INFORMATION



For further information and clarification, refer to the electrical diagram.

5.3.3 Checks on the safety devices

Verify that the guards and safety devices provided are correctly installed and functioning.

WARNING



The safety of the machine is not guaranteed in case of removal or tampering with the safety devices.

CAUTION



Perform the functional, tightening, and positioning checks of the safety systems indicated in chapter 2.

NOTE



These control procedures must be adopted as a normal maintenance procedure.

5.4 INTERNATIONAL UNIVERSAL RECYCLING CODES

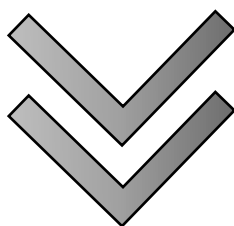
Symbol	Code	Description
Plastics		
	#1 PET or PETE	Polyethylene terephthalate or Arnite: water bottles, beverage bottles, shampoo bottles
	#2 HDPE	High-density polyethylene: yogurt containers, detergent bottles
	#3 PVC or V	Polyvinyl chloride: food containers
	#4 LDPE	Low-density polyethylene: frozen food bags, squeezable bottles
	#5 PP	Polypropylene or Moplen: bottles
	#6 PS	Polystyrene: disposable cups
	#7-#19 O	All other plastics
Paper		
	#20 PAP	Corrugated cardboard: boxes containing flat-pack furniture
	#21 PAP	Non-corrugated cardboard: fast-food sandwich packaging
	#22 PAP	Paper: fast-food fries packaging, newspaper, paper bags
	#23-#39	Other types of paper.
Metals		
	#40 FE	Steel
	#41 ALU	Aluminum: beer and soft drink cans.
	#42-#49	Other types of metal.
Wood materials		
	#50 FOR	Wood

Symbol	Code	Description
	#51 FOR	Cork
	#52-#59	Other types of wood materials.
Textiles		
	#60 TEX	Cotton
	#61 TEX	Jute
	#60-69	Other textile materials.
Glass		
	#70	Transparent/colorless glass: water bottles
	#71	Green-colored glass: wine bottles
	#72	Brown-colored glass: beer bottles
	#73-79	Other glass materials and cans
Composite materials		
	#80	Paper and cardboard/various metals
	#81	Paper and cardboard/plastic
	#82	Paper and cardboard/aluminum: packaged cookie bags
	#83	Paper and cardboard/tin
	#84	Paper and cardboard/plastic/aluminum
	#85	Paper and cardboard/plastic/aluminum/tin
	#86-#89	Other composite materials
	#90	Plastic/aluminum
	#91	Plastic/tin
	#92	Plastic/various metals
	#93-#94	Other composite materials
	#95	Glass/plastic
	#96	Glass/aluminum
	#97	Glass/tin
	#98	Glass/various metals
	#99	Other composite materials

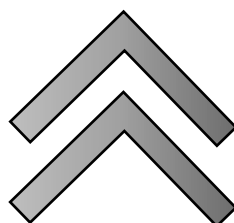
**ELECTRONIC SELF-PROPELLED
TRUCK**
Serial number 2762



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USE



**ELECTRONIC SELF-PROPELLED
TRUCK**
Serial number 2762



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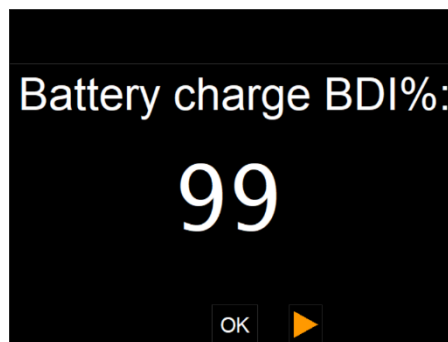
6. USE

6.1 VIDEO PAGES

The electrical panel is equipped with an LCD display that allows the machine's information to be viewed.

The screens that can be displayed are shown below. It is possible to scroll through the screens using the appropriate arrows.

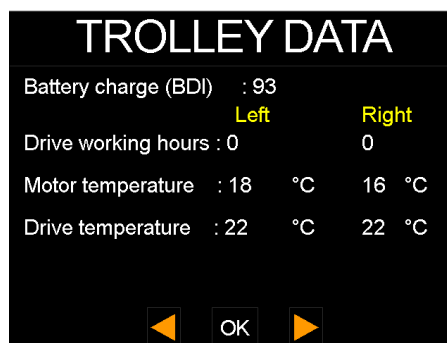
6.1.1 Screen 1: remaining battery charge



This page shows:

- The remaining battery charge level.
- Any fault/emergency present.

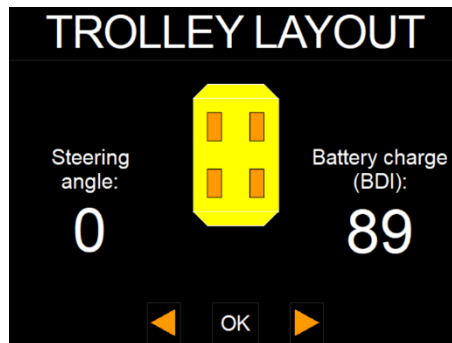
6.1.2 Screen 2: truck data



This page displays data relating to:

- Remaining battery charge level.
- Motor drive operating hours.
- Motor temperatures in degrees Celsius (°C).
- Motor drive temperatures in degrees Celsius (°C).
- Any fault/emergency present.

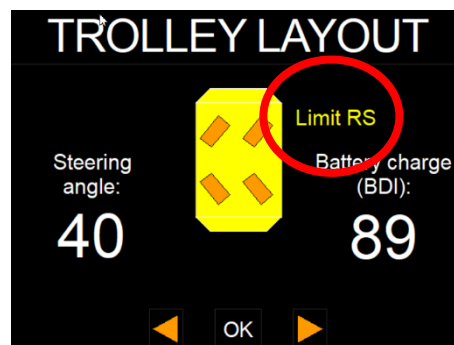
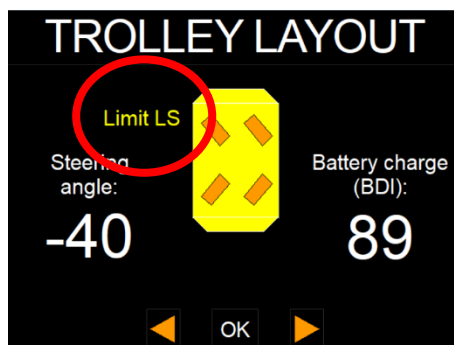
6.1.3 Screen 3: movements



This page displays data relating to:

- Remaining battery charge level.
- Positioning of the steering wheels.
- Wheel steering angle.
- Steering direction (blue arrow).
- Any fault/emergency present.

When the maximum steering angle is reached, a warning message is displayed, as shown in the screens below.



NOTE



If the overtravel limit switch is triggered, the red generic fault warning light located on the electrical panel turns on.

6.1.4 Screens 4 and 5: alarms

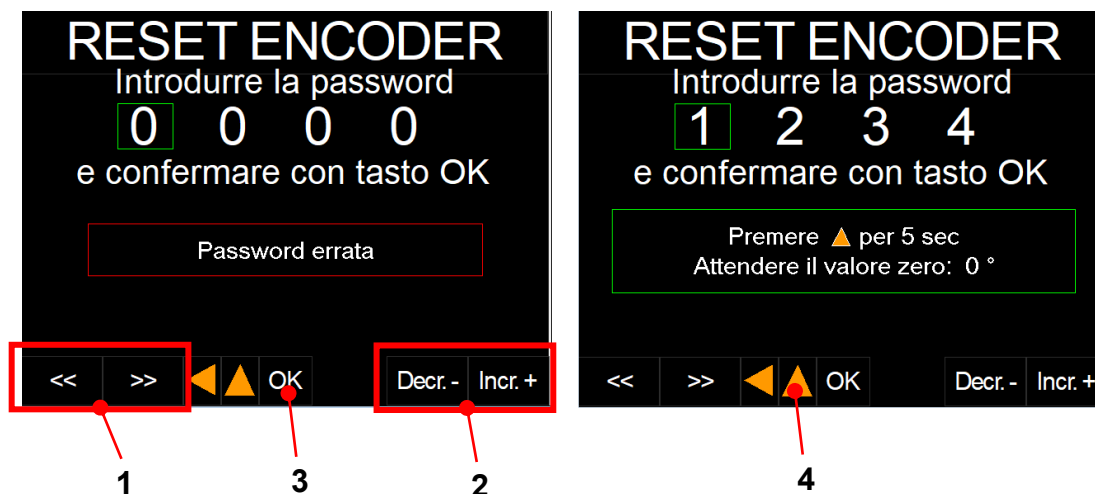
The following screen allows active alarms to be displayed. It is possible to scroll through the list/pages using the appropriate arrows.

ALLARMI ATTIVI	
1	Extracorsa sterzata destra
2	Anom.datì da encoder bloccati
3	Anom.CAN Encoder
4	Batteria: temperatura cella anomala
5	
6	
7	
8	
9	
	

The following screen allows a chronological history of alarms to be displayed. Rows highlighted in red show active alarms, while gray rows show reset alarms.

STORICO ALLARMI	
10	Anom.Temp. motore o inverter DX
11	Emergenza inserita
12	Anom.Temp. motore o inverter SX
13	Anom.inverter motore SX: cod.0
14	Anom.Temp. motore o inverter DX
15	Anom.inverter motore DX: cod.0
16	Emergenza inserita
17	Anom.Temp. motore o inverter SX
18	Anom.inverter motore SX: cod.0
	

6.1.5 Screen 6: encoder reset



This screen allows the steering encoder to be reset, after entering the access password.

NOTE



Contact the Manufacturer to obtain the password.

Use the physical keys located below the **(1)** indicators to move between the four digits and the physical keys located below the **(2)** indicators to select the digit. Press the OK key **(3)** to confirm.

To perform the reset, after suitably positioning the steering axle, press the key located below the arrow **(4)** and hold it down for 5 seconds.

6.2 ALARMS

The list of possible alarms displayable on the display is provided below.

NOTE



All operations required to reset an active fault must be performed by a specialized technician.

NOTE



For further information and clarification on how to resolve any faults encountered, contact the Manufacturer.

ALARM DISPLAYED	CAUSE	ACTION
Emergency not OK	The emergency circuit has been triggered.	Eliminate the cause of the error or hazard and reset the emergency. SPECIALIZED TECHNICIAN: Check the electrical continuity of the emergency circuit and the correct operation of the emergency devices.
Right motor drive alarm: cod.[xxxx] Left motor drive alarm: cod.[xxxx]	Inverter fault.	SPECIALIZED TECHNICIAN: Make sure the battery is charged. Check that the inverter protection fuses are intact. Check that the relevant motor is not blocked or obstructed. Check that there is voltage on the auxiliary circuits (24 Vdc). Check the drive alarms using the console or the configuration software.
Right motor or drive temp. alarm Left motor or drive temp. alarm	Motor overload, motor block, low battery, phase interruption, or faulty temperature sensor.	SPECIALIZED TECHNICIAN: Make sure the battery is charged. Check that the relevant motor has no obstructions and is not blocked. Check the continuity of the drive and motor power circuits. Check the continuity of the temperature probe.
Battery low	Low battery.	Put the battery on charge.

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ALARM DISPLAYED	CAUSE	ACTION
Right steering overrun LS Left steering overrun LS	Incorrect positioning of the steering wheels via software due to possible encoder failure or encoder slippage.	SPECIALIZED TECHNICIAN: Zero the steering encoder, if it is not aligned with the mechanical zero position. After zeroing, move the wheels several times and check that there are no discrepancies between the mechanical zero position and the zero displayed on the display. Check that the encoder is correctly fastened and has no mechanical slippage. Check the encoder cables and wiring. Check that the encoder is working correctly by viewing the position on the display during steering, and replace it if necessary.
	Overrun limit switch fault.	SPECIALIZED TECHNICIAN: If the steering axle has not reached the overrun limit switch, check the operation of the limit switch, the limit switch power cable, and the wiring.
Encoder not OK	Encoder fault.	SPECIALIZED TECHNICIAN: Check the electrical connection. If correctly connected, contact the Manufacturer.
CAN Cumulative Fault	CAN communication with errors.	SPECIALIZED TECHNICIAN: Check the electrical connection. If correctly connected, contact the Manufacturer.
CAN Encoder Fault	Missing CAN communication between encoder and PLC.	SPECIALIZED TECHNICIAN: Check the electrical connection. If correctly connected, contact the Manufacturer.
CAN Pushbutton Fault	Missing CAN communication between control pushbutton control unit and PLC.	SPECIALIZED TECHNICIAN: Check the electrical connection. If correctly connected, contact the Manufacturer.
CAN Right Driver Fault	Missing CAN communication between right motor control driver and PLC.	SPECIALIZED TECHNICIAN: Check the electrical connection. If correctly connected, contact the Manufacturer.
CAN Left Driver Fault	Missing CAN communication between left motor control driver and PLC.	SPECIALIZED TECHNICIAN: Check the electrical connection. If correctly connected, contact the Manufacturer.

ALARM DISPLAYED	CAUSE	ACTION
Steering offset is ZERO	Missing ZERO offset setting.	Contact the Manufacturer.
Fault PLC in STOP	PLC hardware or power supply fault.	SPECIALIZED TECHNICIAN: Check the PLC status via the diagnostic LED. Check the electrical connection. For more information, contact the Manufacturer.
Lithium battery: voltage or current too high Lithium battery: cell temperature out of range Lithium battery: out current too high Lithium battery: cell voltage too low: recharge Lithium battery: battery voltage too low: recharge Lithium battery: generic fault: see battery display	Lithium battery fault.	Refer to the battery manual.
Front laser scanner: area switching feedback missing Rear laser scanner: area switching feedback missing	Faulty relay or disconnected wire.	Contact the Manufacturer.
Interference for Laser scanner	The laser scanner stop area has been intercepted.	Clear the area by removing the obstacle present and reset the alarm.
Laser scanner bypass activated	The laser scanner bypass is activated (the laser scanners are excluded).	SPECIALIZED TECHNICIAN: Restore the laser scanners by turning the relevant bypass selector switch to position (0) and removing the key.
Too much time maintaining SAFETY OFF	The time limit for the activated function has been reached.	Release the SAFETY OFF lever.

6.3 PRELIMINARY CHECKS BEFORE OPERATING THE MACHINE

Before proceeding to operate the machine, the operator must:

- Check that there are no foreign bodies attached to the wheels and that they are not deformed.
- Check the correct operation and positioning of the safety devices present.
- Check that the machine is not in a maintenance/cleaning state.
- Verify that all guards are correctly installed.
- Check the correct operation of the limit switches.
- Check the correct operation of the control devices.
- Check that the machine's power supply plug is correctly inserted into the battery socket.
- Check that the wired pushbutton panel connector is correctly inserted into the socket located on the machine (if used).
- Check that the radio control battery is charged (if used).
- Check that the machine's battery charge level is sufficient.
- Verify the absence of malfunction signals.
- Verify that the electrical panel doors are correctly closed and locked and that there are no damaged or loose components on the control panels.

6.4 MACHINE OPERATION

The machine can only be used by means of one of the two control panels supplied.

WARNING



Before performing movement operations, make sure that no obstacle is located near the machine and that no person is located in the danger zone.

CAUTION

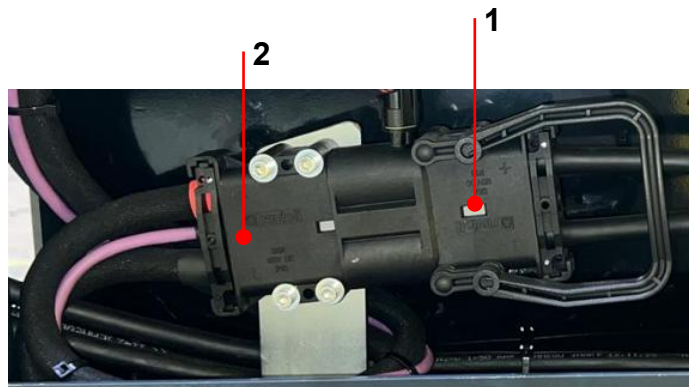


It is forbidden to allow unqualified and unauthorized personnel to use the machine.

6.4.1 Battery connection

Before starting the machine:

- Open the access door to the connectors.
- Insert the machine power supply plug (1) (coming out of the electrical panel) into the battery socket (2).
- Close the door.



Sample image

6.4.2 Starting the machine with the wired control panel

To start the machine, proceed as follows:

- Connect the wired control panel connector to the socket located on the machine.

NOTE



The wired control panel is enabled by connecting the connector to the socket located on the machine. Inserting the connector disables the radio control, therefore only one device at a time can be used.

- **Electrical panel:**
 - Insert the key into the power selector switch and turn it to position (1).
 - The power-on LED lights up.
- **Wired control panel:**
 - Turn on the control panel by inserting the appropriate key and turning the selector to position (I).
 - The ON indicator light turns on.
 - If pressed, release the emergency button.
 - Press the green START button.
- **Electrical panel:**
 - Press the white illuminated services activation button (alternatively, push the corresponding lever on the wired control panel to RESET).
 - The internal LED of the services activation button lights up.

The machine is now ready for movement.

NOTE



Do not disconnect or connect the wired control panel unless power has first been removed from the machine (power selector switch in position "0").

6.4.3 Starting the machine with the radio control

To start the machine, proceed as follows:

- **Radio control:**
 - Turn on the radio control by inserting the appropriate key and turning the selector to position (I).
 - The ON indicator light turns on.
 - If pressed, release the emergency button.
- **Electrical panel:**
 - Insert the key into the power selector switch and turn it to position (1).
 - The power-on LED lights up.
- **Radio control:** Press the green START button.
- **Electrical panel:**
 - Press the white illuminated services activation button (alternatively, push the corresponding lever on the radio control to RESET).
 - The internal LED of the services activation button lights up.

The machine is now ready for movement.

NOTE



Before switching the control panel (from wired control panel to radio control and vice versa), turn off the control panel and the machine using the appropriate selector switches.

6.4.4 Machine movement (translation and steering)

To move the machine, after starting it, proceed as indicated below.

Using the control panel in use (radio control or wired control panel):

- Set the maximum translation speed by means of the appropriate selector.
- Apply pressure to the FORWARD / BACKWARD movement lever to move the machine. The translation speed is proportional to the pressure applied. Release the lever to stop the machine.
- To perform the required steering, so that the machine changes the wheel angle, apply pressure to the LEFT / RIGHT steering lever. The maximum wheel steering angle is $\pm 35^\circ$. Releasing the lever stops the steering movement.

CAUTION



It is the responsibility of the operator using the machine to verify that the area is clear of objects and people during movement.

CAUTION



The machine is intended to be operated by a single operator, who must be positioned as shown in the "Operator Station" paragraph.

NOTE



During movement, pay attention and, if necessary, signal the passage of the machine by sounding the horn.

NOTE



Before performing any movement, make sure that there are no malfunctions in order to avoid damaging the machine. Before clearing any malfunction, verify the cause and eliminate it.

Pay attention to the possible activation of the generic fault warning light and to the related indications shown on the display.

6.4.5 Visual direction indications

Visual indications relating to directions are shown on the machine chassis.

INDICATION	DESCRIPTION
	FORWARD
	REVERSE
	LEFT
	RIGHT

6.4.6 Starting after an emergency stop

If movement is interrupted by an EMERGENCY STOP, proceed as follows:

- Eliminate the cause of the error or hazard.
- Reset by turning the EMERGENCY STOP button clockwise, if pressed.
- Wired pushbutton panel / remote control: press the START button.
- Electrical panel: press the white illuminated services power-on button and check that the internal LED lights up.

The machine is now ready for movement.

6.4.7 Parking brakes

The machine is equipped with electromagnetic parking brakes that release when the movement command is given and engage when the machine stops.

NOTE



It is not possible to tow the machine, as the negative brakes of the electric motors prevent the wheels from moving. If it is necessary to release the motor brakes, contact the Manufacturer.

6.4.8 Machine shutdown

To switch off the machine, proceed as follows:

- Stop the machine on a flat floor surface.
- Switch off the control pushbutton panel in use (remote control or wired pushbutton panel).

NOTE



Do not disconnect the wired pushbutton panel unless power has first been removed from the machine (power selector switch in position "0").

- Switch off the machine by turning the power selector switch, located on the electrical panel, to position (0) and remove the key.
- If used, disconnect the wired pushbutton panel connector from the machine.

NOTE



In case of prolonged downtime or maintenance work, disconnect the machine's power supply plug from the battery socket to isolate the electrical power.

NOTE



Do not leave the load on the machine.

6.5 LOAD POSITIONING

It is recommended to lay the load on the support surface or on the support crossbars, without impacts, which would cause additional stresses inside the load-bearing structure and on the mechanical components of the machine.

WARNING



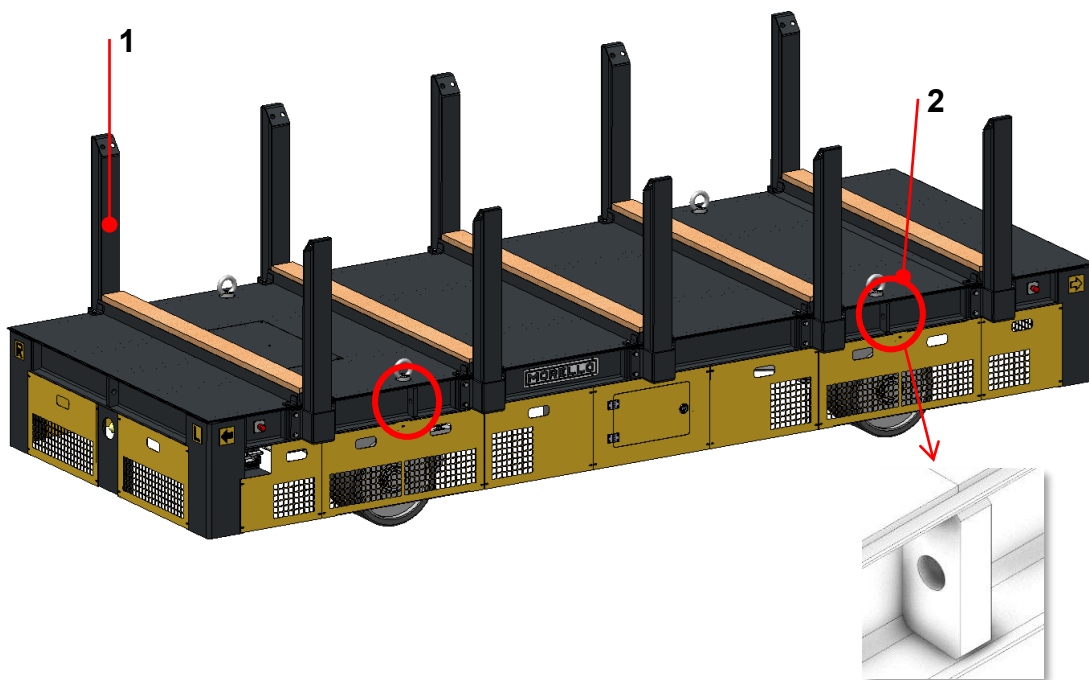
Distribute the load evenly, making sure to check that the center of gravity is within the stability area.

NOTE



It is the operator's responsibility to correctly position the load on the machine and to comply with the indications relating to the maximum capacity, ensuring correct load distribution.

The machine has 5+5 load-containment uprights (1) and 2+2 load-anchoring points (2)



Load anchoring points - Image for illustrative purposes

WARNING



It is the operator's task to anchor the load before moving the machine, using suitable slinging systems appropriate to the size of the load itself.

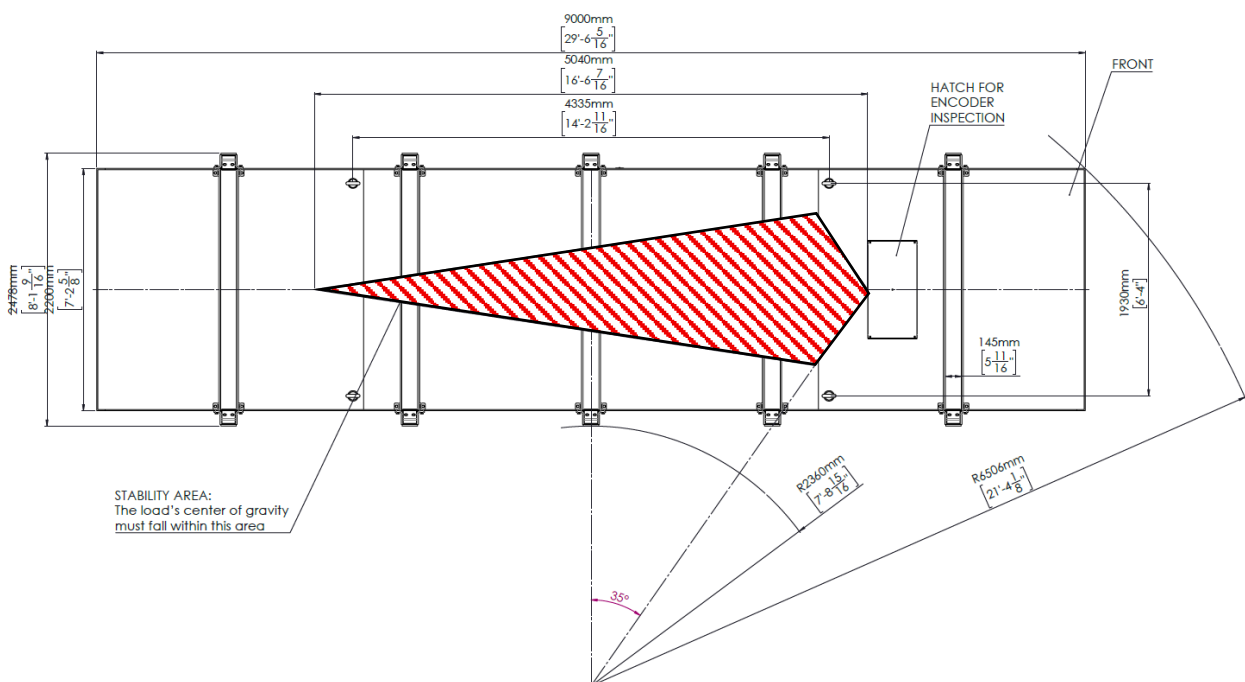
6.5.1 Stability area

The points that allow the chassis to transfer the weight of the load to the ground are four, as shown in the following image. There is therefore a "stability area" formed by connecting said points.

WARNING



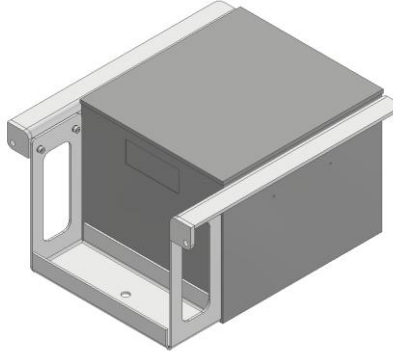
To avoid the risk of tipping over, the center of gravity of the load must always be positioned within the aforementioned area.



Stability area in red (dimensions in mm)

6.6 BATTERY

On first use, the machine does not require anything, as the battery inside it is already charged to 100%.



Example of lithium battery

6.6.1 Low battery and extra time

The battery range at 100% charge, indicated in the technical characteristics table, is calculated based on actual use on flat ground (50% at full load and 50% empty).

When a residual charge of approximately 30% is reached, the machine stops and the yellow illuminated extra time button located on the electrical panel lights up. To move the machine again, this button must be pressed. This provides an additional range of approximately 15 minutes to reach the charging station.

Once the extra time has expired, the battery must be recharged.

NOTE



It is not possible to tow the machine, as the negative brakes of the electric motors prevent movement of the wheels.

Therefore, the only way to move it is to recharge / replace the battery or lift it.

For the possible release of the brakes, contact the Manufacturer.

6.6.2 Lithium battery maintenance

ADDITIONAL INFORMATION



For all information relating to the battery (recharging frequency, use and storage methods and temperatures, maintenance, etc.), refer to the battery manual provided in the attachment.

To maintain the battery, it is recommended to:

- Do not go below 20% of remaining charge.

NOTE



Deep discharge can irreparably damage the lithium cells. Completely discharged cells are not replaced under warranty.

- If not in use, store the charged battery in a dry place, with no risk of freezing.

NOTE



The battery charge level decreases even if it is not used. For this reason, even when not in use, recharge the battery periodically (at least once a week), to prevent it from slowly dropping below the indicated threshold.

ADDITIONAL INFORMATION

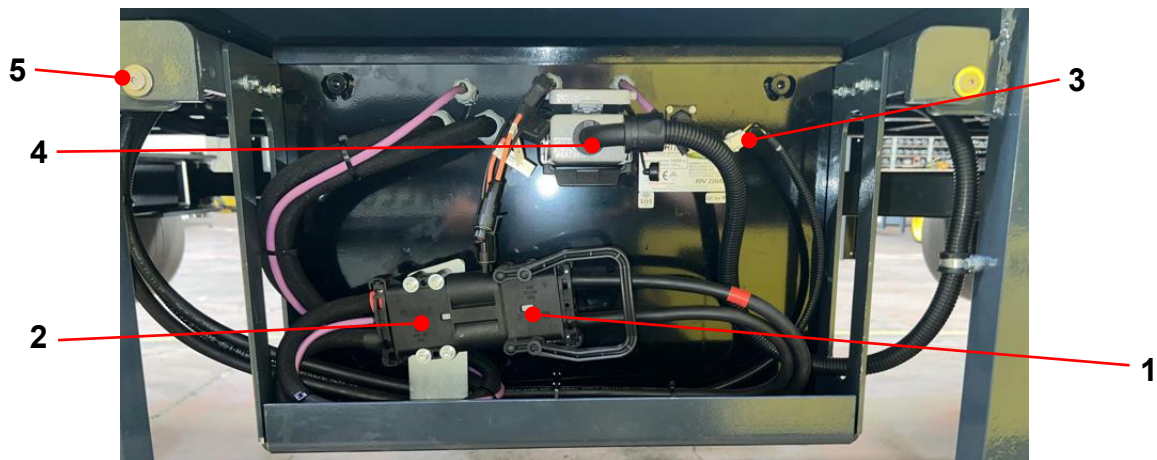


For any further clarification about the battery and the rectifier, refer to the respective manuals provided in the attachment.

6.6.3 Battery removal

To remove the battery, proceed as follows:

- Disconnect the machine's power supply by turning the key-operated power selector switch, located on the electrical panel, to position (0). Remove the key.
- Unscrew the fastening screws and remove the guard located in front of the battery.
- Disconnect the machine's power supply plug **(1)** from the battery socket **(2)**.
- Disconnect the battery display cable **(3)** and the PLC connector **(4)**.
- Unscrew the screws **(5)** that secure the battery to the machine, and remove the respective washers.



Example image for illustrative purposes only

- Insert a suitable means of transport (e.g.: pallet truck) under the battery.
- Remove the battery.
- Lower it slowly and transport it avoiding sudden movements.

To reposition the battery, proceed in reverse order.

ADDITIONAL INFORMATION



For further information on battery handling, refer to the respective manual provided in the attachment.

6.6.4 Battery charging

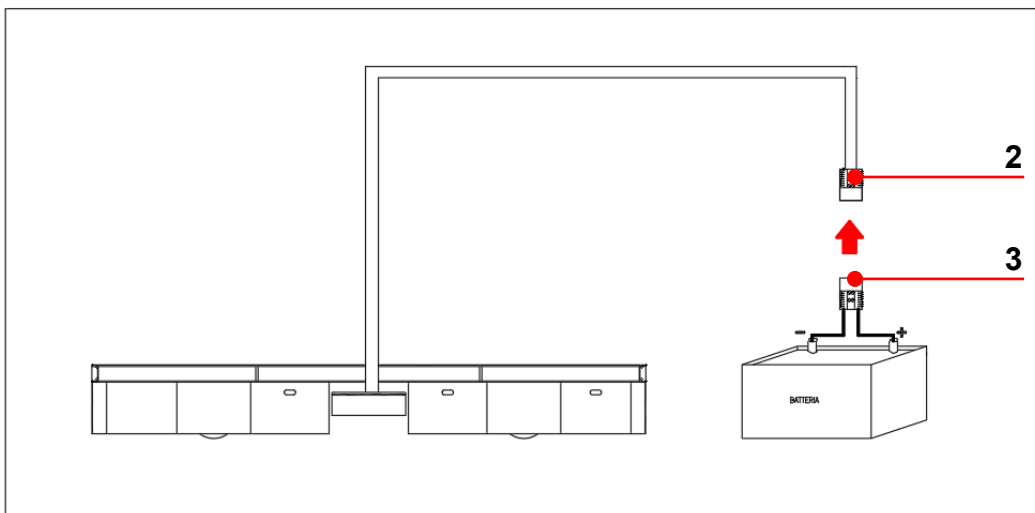
To recharge the battery, proceed as follows:

- Move the machine to the charging area, observing the appropriate safety distances.
- Disconnect the machine's power supply by turning the key selector switch **(1)**, located on the electrical panel, to position (0). Remove the key.

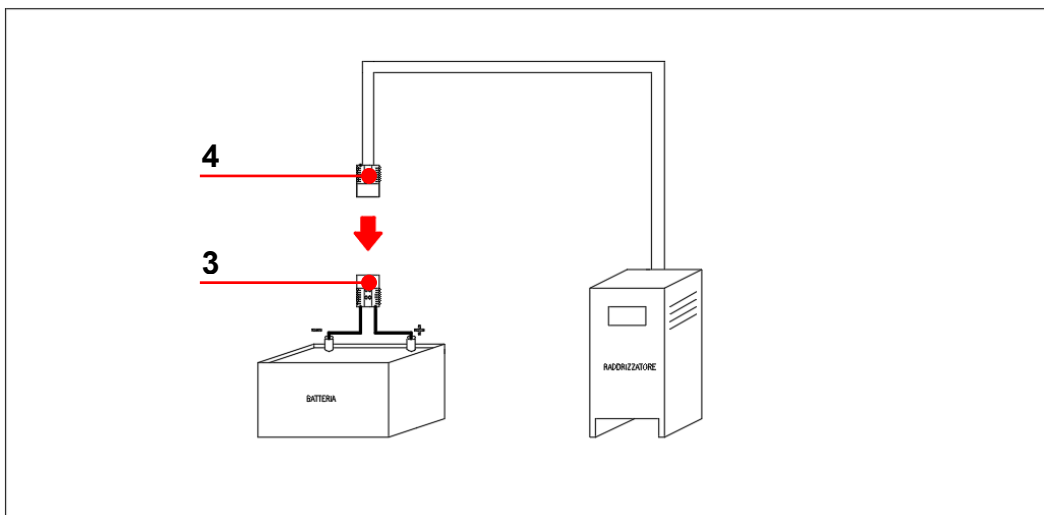


Selector switch (1)

- Disconnect the machine's power supply plug **(2)** from the battery socket **(3)**.



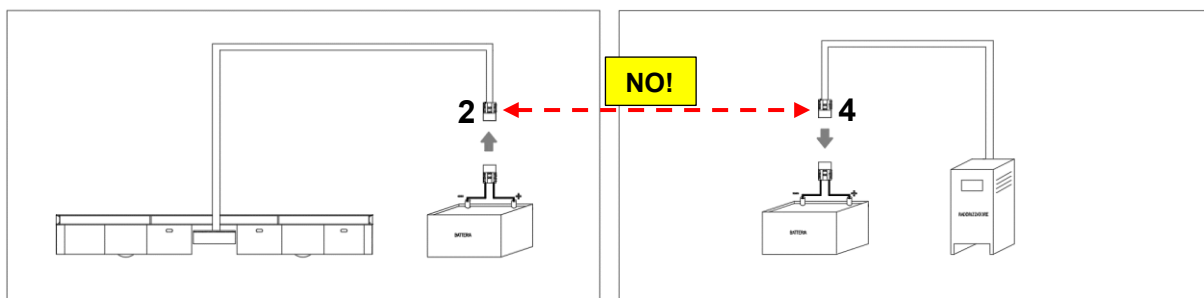
- Connect the rectifier's plug **(4)** to the battery socket **(3)**.



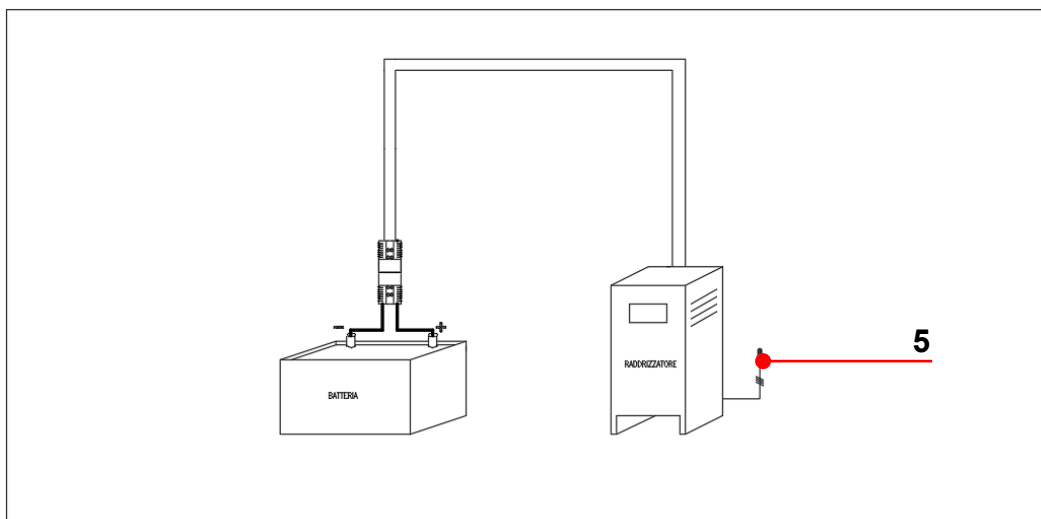
NOTE



It is forbidden to connect the rectifier's plug **(4)** to the machine's power supply plug **(2)** (output from the onboard electrical panel).



- Connect the rectifier's plug **(5)** to the electrical mains.



- Operate the rectifier to recharge the battery, turning the switch to ON.
- Wait for the battery to recharge.

Once recharging is complete, proceed in reverse order.

ADDITIONAL INFORMATION

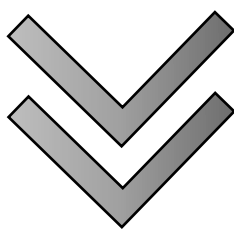


For more information on recharging the battery through the rectifier, consult the respective manual provided in the attachment.

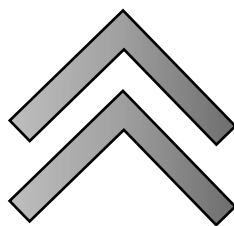
**ELECTRONIC SELF-PROPELLED
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Serial number 2762



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DISMANTLING



**ELECTRONIC SELF-PROPELLED
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7. DISMANTLING

The following paragraph contains some advice and instructions for correctly carrying out the decommissioning, dismantling, and removal operations of the machine at the end of its operating life.

CAUTION



The operations described below are exclusively the responsibility of authorized personnel.

- Make sure there is sufficient space around the machine, such as to allow personnel to perform all necessary movements without risk.
- Disconnect the electrical power supply.
- Disconnect and remove the battery.

ADDITIONAL INFORMATION



For battery disposal, refer to the respective manual provided in the attachment.

- Drain, disconnect, and remove the oil tank from the machine (if present).
- Remove the lubricants.
- Disassemble the machine, proceeding one unit at a time.

WARNING



Pay maximum attention to the possible falling of parts or components of the machine during the removal phase. This could cause serious danger to operators.

- Remove the moving parts and separate, as far as possible, the various components by type of material (wood, metal, etc.), in order to proceed with disposal through separate waste collection.
- Remove and move the machine parts from the work area, adopting all necessary precautions.
- Before lifting components of considerable size and/or weight, check the correct fastening of the lifting devices and use only suitable slings and equipment.

ADDITIONAL INFORMATION



Disposal operations must be carried out in accordance with the regulations in force on the matter in the country where the machine is used.

NOTE



In case of difficulty in the disassembly, demolition, and dismantling operations of the machine, or for greater safety, contact the Manufacturer and indicate the reason for the removal and the serial number of the machine.

- The machine is built with various materials, both recyclable and non-recyclable. For this reason, its removal requires careful separation of these materials: steel, aluminum, copper, bronze, special alloy, plastic, etc.
- The Manufacturer does not assume responsibility for damage caused by use of the individual components other than that prescribed.

NOTE



Scrapping must be carried out in compliance with the laws in force.

7.1 RECYCLING

Part of the residual materials from dismantling can be recycled.

For this provision, please refer to the table in Chapter 5 "INTERNATIONAL UNIVERSAL RECYCLING CODES".

7.2 DISPOSAL

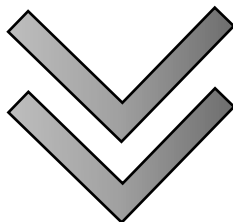
Throughout the entire period of use of the machine, spent materials (lubricants) are produced.

For the disposal of certain materials, specific regulations exist for the protection of the environment.

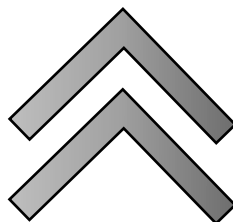
As regards the disposal of spent lubricants, it is necessary to comply with the following environmental protection regulations:

- Lubricants risk contaminating water and soil; therefore, never pour products onto the ground, into water, or into sewer drains. Any infringement of these rules may be prosecuted under the law. When using such products, keep an oil binder within reach.
- Carefully recover lubricants, separating mineral-based products from synthetic-based ones. At the time of disposal, comply with the regulations in force regarding the disposal of spent oils.

It is the Customer's obligation to be aware of the laws in force in their own country and to operate in accordance with such legislation.



MAINTENANCE



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8. MAINTENANCE

8.1 GENERAL SAFETY PRECAUTIONS

Maintenance, troubleshooting, and repair operations are permitted only to authorized personnel.

Personnel responsible for operating and maintaining the machine must be well trained and have a thorough knowledge of accident prevention regulations. Unauthorized personnel must remain outside the work area during operations.

The accident prevention precautions contained in this paragraph must always be strictly observed during the operation and maintenance of the machine, in order to avoid damage to personnel and equipment.

At the end of every maintenance operation, it is mandatory to restore the existing guards, checking their correct operation.

8.1.1 General danger notes

- High voltages can cause death upon contact. Always operate with the utmost caution and in accordance with the accident prevention regulations in force in the country.
- On the machine in operation there are moving parts that can cause serious harm to persons. In this regard, cleaning and specialized maintenance operations, relating to the disassembly or replacement of components on the machine and on the control units, must be carried out with the system switched off.
- Post specific warning signs ("MACHINE UNDER MAINTENANCE - DO NOT SWITCH ON POWER") at the electrical panel(s).
- Avoid the use of flammable or toxic solvents.
- Always wear safety glasses and protective gloves during maintenance operations on equipment.
- Make sure that the tools to be used are in perfect condition and are equipped with insulating handles, where required.
- Check that the insulation of cables and conductors of the test equipment shows no sign of breakage or damage.
- Failure to ground the equipment can cause serious injury to persons. Always verify the presence of ground connections and their compliance with the applicable standards.
- Prolonged overloads or failures can cause overheating of electric motors and electrical equipment with the release of harmful fumes; immediately shut off power for safety and do not approach the equipment until such fumes have been dispersed through adequate ventilation. Avoid inhaling any fumes remaining inside the equipment during repair operations.
- In case of fire, never use water jets on the equipment; disconnect all power supplies and use CO₂ extinguishers.
- Avoid prolonged, excessive, or repeated skin contact with lubrication products, and change clothing immediately if soaked, as lubricants are very harmful to the skin.
- Do not handle lubricants (such as oils, greases, etc.) in the presence of electrical sparks or open flames.

WARNING



Lubricants are flammable products; follow the instructions provided by the warnings on the containers.

- Always make sure, before starting up the machine, that no tools or materials have been left near the equipment.
- Do not wear items that could get caught in the equipment or act as conductors (chains, bracelets, etc.).
- Maintenance, repair, and troubleshooting work must be concluded with a check of correct machine operation and the restoration of all its safety devices.

8.1.2 General warnings

- Maximum machine reliability and minimum maintenance cost are the result of a maintenance and inspection program that is planned and scrupulously followed throughout the machine's entire service life. Strictly observe the established maintenance intervals and schedule interventions according to specific needs.
- If operations of a certain magnitude become necessary, it is advisable to contact the Manufacturer for any clarification on the design or for technical assistance.
- Before starting any control and maintenance operations, dirt present on the machine should be removed.
- Always use perfectly dry air for cleaning, at a pressure not exceeding 0.2 Mpa.
- Always use tools in perfect condition and specifically designed for the operation to be performed; the use of unsuitable or inefficient equipment can cause serious damage.
- During disassembly, mark each individual part with an identification tag to ensure correct reassembly afterward.
- After every maintenance operation involving the disconnection of wiring and/or fixed and moving parts, check the consistency of the number/tag on the fixed and moving parts.
- Before restarting the equipment after a failure, it must be carefully inspected and checked to identify any damage.
- Never intervene, except following a failure, on the adjustment and positioning of limit microswitches, where present: tampering with them can cause serious damage.
- Always exercise the utmost care in checking the lubrication of the various components of the machine since insufficient or defective greasing can be detrimental to its proper operation.
- For lubrication, only the recommended lubricants should be used, or lubricants with equivalent characteristics and known and proven quality.
- The lubricants used must have good emulsion stability and be unalterable with aging.
- It is absolutely necessary to continue using the lubricants employed at the time of the first filling.
- In addition to traditional maintenance activities, maintenance technical personnel must also carry out, when required, instrumental predictive maintenance operations consisting of specialized analyses and checks aimed at predicting, over time, the occurrence of failures in certain machine components.

8.2 QUALIFICATION OF MAINTENANCE PERSONNEL

CAUTION



The safety manager shall ensure that all persons operating on the machine have received all the instructions concerning them contained in this manual.

8.2.1 General competencies

To meet the ever-increasing need for qualification in the field of maintenance, maintenance personnel must:

- have knowledge of the regulations in force relating to accident prevention and be able to apply them,
- have read and understood the "Safety" chapter,
- know the fundamental construction and functions of the machine,
- be able to use and consult the manufacturing documents and machine documentation,
- take responsibility for making autonomous decisions relating to interventions on the machine,
- be willing to adapt to technological changes to the machine,
- detect irregularities and, if necessary, take the necessary measures.

8.3 MACHINE STOP PROCEDURE

WARNING



Maintenance operations must be carried out with no load.

Before carrying out maintenance operations, the operator must stop the machine and place it in maintenance status, following this procedure:

- Disconnect the machine's power source, if the maintenance operations require it. In other cases, do not intervene.

NOTE



To disconnect and isolate the electrical power:

- Switch off the machine following the instructions given in the "Switching off the machine" paragraph.
 - Disconnect the machine's power plug from the battery socket.
- Affix the "DO NOT OPERATE - MACHINE UNDER MAINTENANCE" sign on the electrical panel, near the key-operated power selector switch.



At the end of the maintenance operations, restore the electrical power previously deactivated.

Before resuming normal operation of the machine, recheck the entire system in accordance with the start-up procedures given in this manual.

NOTE



After every maintenance operation, check the correct operation of the machine.

8.4 MACHINE SETUP FOR MAINTENANCE

The following paragraph provides instructions for positioning the machine on suitable support supports (support devices) for the maintenance operations that require it.

Before proceeding, the Customer must equip themselves with four suitable maintenance support devices on which to position the machine.

WARNING



The Manufacturer assumes no responsibility if unsuitable equipment is used.

The maintenance support devices are primarily intended to stabilize the machine while suspended; therefore, the lifting device and the chains must remain under tension.

To position the machine on the devices, the presence of three operators is required, namely:

- one operator for the lifting device;
- one operator for the support devices;
- one operator for the correct positioning of the machine on the support devices.

WARNING



Before lifting the machine, position the four support devices in a suitable and delimited area, access to which is forbidden to unauthorized personnel.

NOTE



Before starting operations, verify that the lifting devices provided have adequate capacity and, furthermore, that all operators involved are equipped with personal protective equipment (PPE).

To set up the machine for maintenance, proceed as follows:

- Stop the machine and disconnect the power supply, following the procedure indicated in **paragraph 8.3 "Machine stop procedure"**.
- If necessary, remove the perimeter protection guards using the appropriate key.
- Lift the machine following the procedure indicated in **paragraph 4.3.3 "Lifting the machine"**.

NOTE



Always check the correct balance of the machine. If it is unbalanced, immediately set it down on the ground and reposition the chains appropriately.

- Transport it avoiding sudden movements.
- Visually check that the machine's support points are aligned with the assistance devices.

- If necessary, correct the position of the devices.
- Set the machine down on these devices avoiding sudden movements, checking that they are perfectly in contact with the frame.

CAUTION



The operator in charge of the lifting equipment must pay particular attention to avoiding collisions with the devices while positioning the machine.

- Continue to keep the lifting chains under tension for the entire duration of the maintenance.

At the end of maintenance, slowly lift the machine, set it down on the ground (following the instructions given in the paragraph on lifting), and reinstall any guards that were removed.

POSITIONING THE MACHINE ON THE ASSISTANCE DEVICES

1. Machine frame
2. Example image of the assistance device

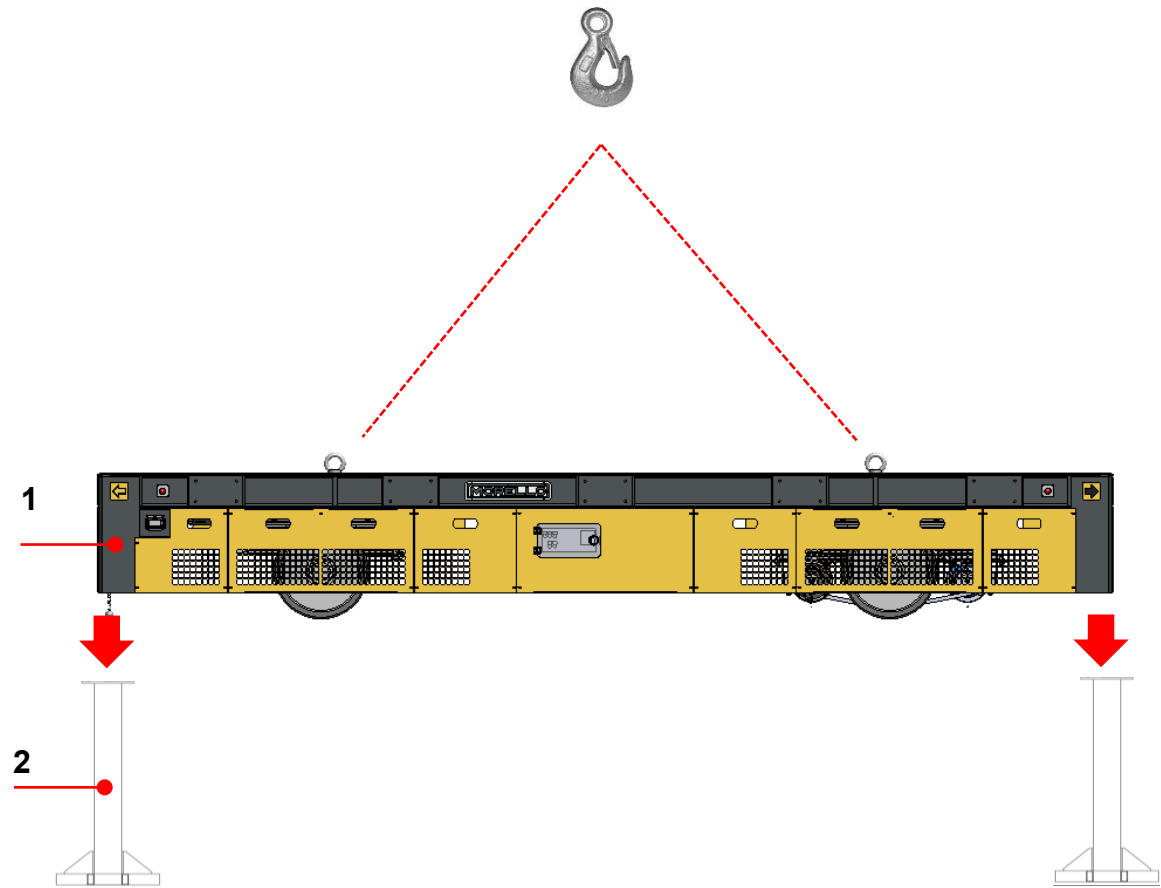


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8.5 SAFETY CONTROL PLAN

WARNING



It is absolutely forbidden to electrically or mechanically bypass the safety circuit switches or tamper with them in any way.

CAUTION



Periodically check the efficiency of the safety systems present on the machine.

This procedure must be repeated as standard maintenance practice.

8.5.1 Functional checks and tests on safety devices

Maintenance personnel are required to periodically check the operation of the safety devices.

The operation must be carried out by competent personnel with specific knowledge of the use of safety devices.

CAUTION



Perform the functional, tightening, and positioning checks of the safety systems indicated in chapter 2.

8.6 MAINTENANCE TABLE

To ensure the reliability of the machine, it is necessary to guarantee regular and effective maintenance and constant monitoring of the parameters of the indicating instruments. Maintenance, troubleshooting, and repair operations are permitted only to authorized personnel.

FREQUENCY	DESCRIPTION
Weekly	Complete battery charging cycle.
Weekly	Check the correct operation of the horn, the buzzer, and the warning lamps.
Weekly	Check the correct operation of the hold-to-run levers.
Monthly	Clean the wheels, the loading platform, and the lamps.
Monthly	Clean the pushbutton panel located on the electrical panel, the radio control, and the wired pushbutton panel.
Monthly	Check the correct connection and tightening of the encoder, limit switches, and lamps.
Monthly	Check the correct operation of the limit switches.
Monthly	Check the correct sliding of the slewing rings. In case of anomalies, contact the Manufacturer.
Monthly	Check the correct fastening of the ground discharge chain.
Quarterly	Check the tension of the chains. If necessary, adjust it using the chain tensioners (see the procedure in the "Chain tensioning" paragraph).
Quarterly	Visually check the wear condition of the chain links. If necessary, replace them.

FREQUENCY	DESCRIPTION
Half-yearly	Carry out a general visual inspection of the various assemblies making up the machine, checking that there are no mechanical anomalies.
Yearly	Check the tightening of all screws and bolts.
Yearly	Check for signs of wear, damage, or mechanical anomalies on the wheels. If necessary, contact the Manufacturer for replacement.

ADDITIONAL INFORMATION



For information on the maintenance of the incorporated commercial devices, refer to the relevant manuals.

NOTE



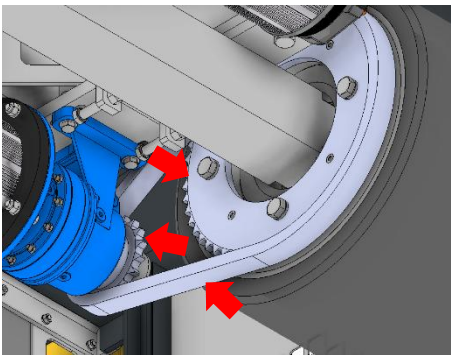
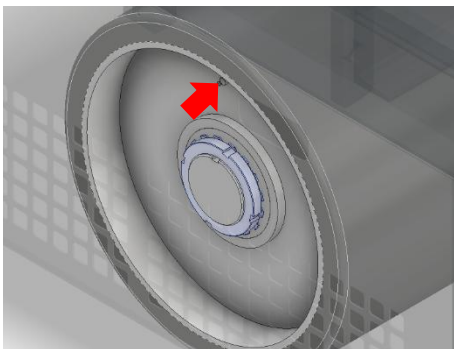
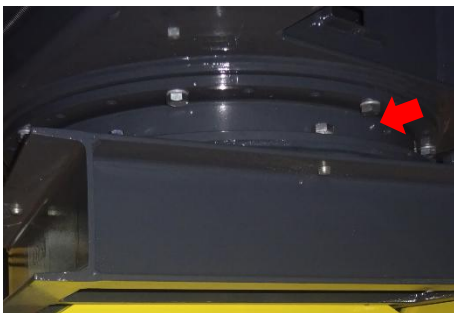
For information on replacement procedures, contact the Manufacturer.

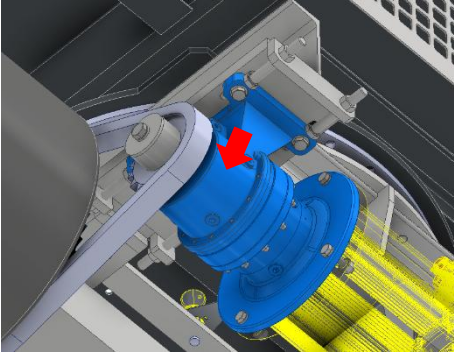
8.7 LUBRICATION

Before performing lubrication operations, stop the machine and disconnect the power supply, as indicated in **paragraph 8.3** "Machine stop procedure". If necessary, remove the perimeter guards (and reinstall them at the end of the operations).

Where necessary, set up the machine for maintenance as indicated in **paragraph 8.4** "Machine setup for maintenance".

The points of the machine to be lubricated are shown below.

FREQUENCY	COMPONENT	IMAGE	METHOD
Quarterly in the first year and semi-annually for subsequent years	Sprockets Chains Pinions		Grease with a brush. Use Castrol - Tribol GR 4020/220-2 PD grease or equivalent.
Quarterly in the first year and semi-annually for subsequent years	Wheel bearings		Insert grease into the nozzles with a suitable grease gun. Use Castrol - Tribol GR 4020/220-2 PD grease or equivalent.
Quarterly in the first year and semi-annually for subsequent years	Slewing rings	 <i>Sample image</i>	Insert grease into the nozzles with a suitable grease gun. Use Castrol - Tribol GR 4020/220-2 PD grease or equivalent.

FREQUENCY	COMPONENT	IMAGE	METHOD
-	Gearboxes		For information on gearbox lubrication, refer to the relevant manual attached and to the plate affixed to it.

NOTE



It is recommended never to mix oils / greases of different types and / or manufacturers.
Waste oil, being a special waste, is subject to disposal through authorized consortia.

NOTE



The use of an oil / grease type not equivalent to the one indicated voids the warranty in case of failures and / or breakages.

8.8 CHAIN TENSIONING

Before performing chain tensioning operations, stop the machine, disconnect the power supply and set it up for maintenance as indicated in **paragraph 8.4** "Machine setup for maintenance".

To perform tensioning, proceed as follows:

- Access the gearmotor and secure it with a suitable support device (equipped with adequate wheels allowing it to move in order to follow the gearmotor during chain tensioning adjustment).
- Slightly loosen the four screws **(1)** that anchor the gearmotor to the plate.
- Adjust the four chain tensioner screws **(2)** to regulate chain tensioning.
- At the end of the operation, properly tighten the four screws **(1)** and then remove the gearmotor support device.

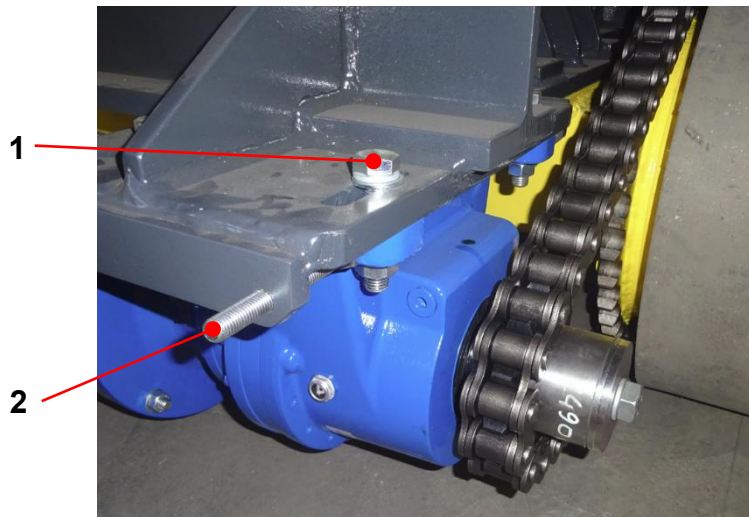


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8.9 TIGHTENING TORQUES

The following table indicates the tightening torques for each screw size.

ADDITIONAL INFORMATION



Use a torque wrench for tightening.

Screw Ø	Screw pitch	Pre-tightening torque [kgm]	Tightening Torque [kgm]
M6	1	0,75	1
M8	1,25	1,8	2,4
M10	1,5	3,6	4,8
M12	1,75	6,5	8,5
M14	2	10	13
M16	2	15	20,5
M18	2,5	22	29
M20	2,5	30	40
M22	2,5	42	56
M24	3	50	70
M27	3	80	105
M30	3,5	95	130

NOTE



Perform a check after the first month of machine use and annually thereafter.

8.10 ACCESS TO THE STEERING ENCODER

DESCRIPTION	WEIGHT
Encoder access panel (1)	Approx. 16 kg



To access the encoder, proceed as follows:

- Turn off the machine and disconnect the electrical power.
- Unscrew the fixing screws of the panel (1).
- Screw a suitable M10 eyebolt into the hole provided on the panel.
- Attach a suitable shackle (not supplied) to the eyebolt indicated above.
- Attach a sling to the shackle using the appropriate hook.
- Properly attach the sling to the hook of the lifting equipment.
- Slowly lift the panel, avoiding sudden movements.
- Set it down on the ground.

At the end of maintenance operations, reinstall the removed panel.

8.11 MAINTENANCE INTERVENTIONS FORM

Record all maintenance operations in a dedicated log, an example of which is shown below.

DATE	OPERATOR	DESCRIPTION OF OPERATION

8.12 SPARE PARTS

The list of spare parts is provided below. Components subject to wear, for which stocking is recommended, are indicated with the letter "U", while those subject to breakage (for which it is necessary to contact the Manufacturer) are indicated with the letter "R".

NOTE



Use only original spare parts. Replacement with non-original spare parts could compromise the functionality of the machine.

NOTE



Spare parts must be kept clean, lubricated, and stored in suitable containers in order to preserve their integrity over time.

8.12.1 Mechanical spare parts

U / R	Description	Manufacturer	Installed quantity	Recommended quantity
U	Motorized rubber wheel Ø560x350 mm	MORELLO	2	1
U	Idle rubber wheel Ø560x350 mm	MORELLO	2	1
U	Tapered roller bearing 32922 (110x150x25)	SKF	8	2
R	Dust seal 110X150X3	MORELLO	8	-
R	Locknut KM22 M110X2	SKF	4	-
R	Lock washer MB22	SKF	4	-
R	Sprocket 1" - Z=54	MORELLO	2	-
R	Pinion P=1" Z=18	MORELLO	2	-
U	Chain 1" - L = 1,750 mm - 69 links + offset link + connecting link	MORELLO	2	1
R	Slewing ring type VS100UE00 (Outer diam. 1000 mm H82 mm)	MORELLO	2	-
U	Bushing DU 70x75x50 type GLY.PG 707550 F	SKF	2	1
U	Bushing DU 70x75x70 type GLY.PG 707570 F	SKF	1	1
U	Bushing DU 45x50x50 type GLY.PG 455050 F	SKF	4	1
U	Bushing DU 45x50x30 type GLY.PG 455030 F	SKF	2	1

U / R	Description	Manufacturer	Installed quantity	Recommended quantity
R	Ball joint M5	MORELLO	2	-
R	Planetary gearbox R 2EL 001A 35.6Y C050M1 P20a I28x250 B8	ROSSI	2	-
R	AC MOTOR 80V 5kW 2300rpm AC201A PAM B5/112	METALROTA	2	-

8.12.2 Electrical spare parts

U / R	Description	Manufacturer	Installed quantity	Recommended quantity
R	Wired pushbutton panel	MORELLO	1	-
R	Radio remote control	MORELLO	1	-
R	Inductive sensor IM5123	IFM	2	-
R	Flashing beacon CTL600	SIRENA	2	-
R	Multi-turn absolute encoder - 8.M3688.2424.2122 - IP65 - shaft Ø10mm	KUBLER	1	-
R	Motor drive 1232SE-6321 48-80V 250A	CURTIS	2	-

8.12.3 Power supply

8.12.3.1 Lithium battery

U / R	Description	Manufacturer	Installed quantity	Recommended quantity
R	Lithium battery 80 V 220 Ah	MORELLO	1	-
R	Rectifier GREEN6 80-100 LB	S.P.E.	1	-

8.13 EXPLODED VIEWS

8.13.1 Idler wheel assembly

Pos.	Description	Quantity
1	Locknut KM22 M110X2	1
2	Lock washer MB22	1
3	Dust seal 110X150X3	2
4	Tapered roller bearing 32922 (110x150x25)	2
5	Rubber idler wheel Ø560x350mm	1

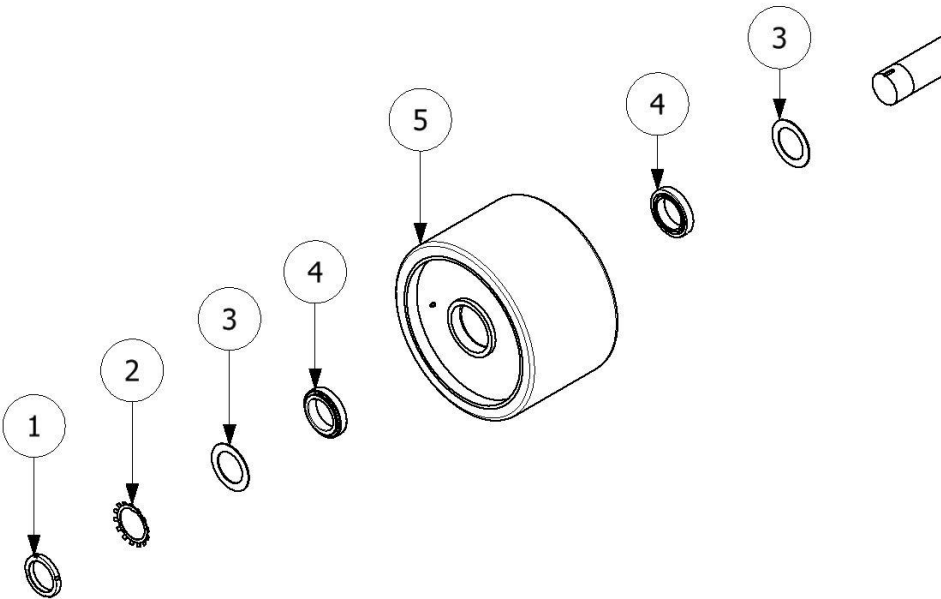


Image for illustrative purposes

8.13.2 Motorized wheel assembly

Pos.	Description	Quantity
1	Locknut KM22 M110X2	1
2	Lock washer MB22	1
3	Dust seal 110X150X3	2
4	Tapered roller bearing 32922 (110x150x25)	2
5	Motorized rubber wheel Ø560x350 mm	1
6	Chain 1" - L = 1,750 mm - 69 links + offset link + connecting link	1
7	Sprocket 1" - Z=54	1
8	Pin D16x90	3
9	Open spring washer M16	3
10	Hex head bolt M16x90	3

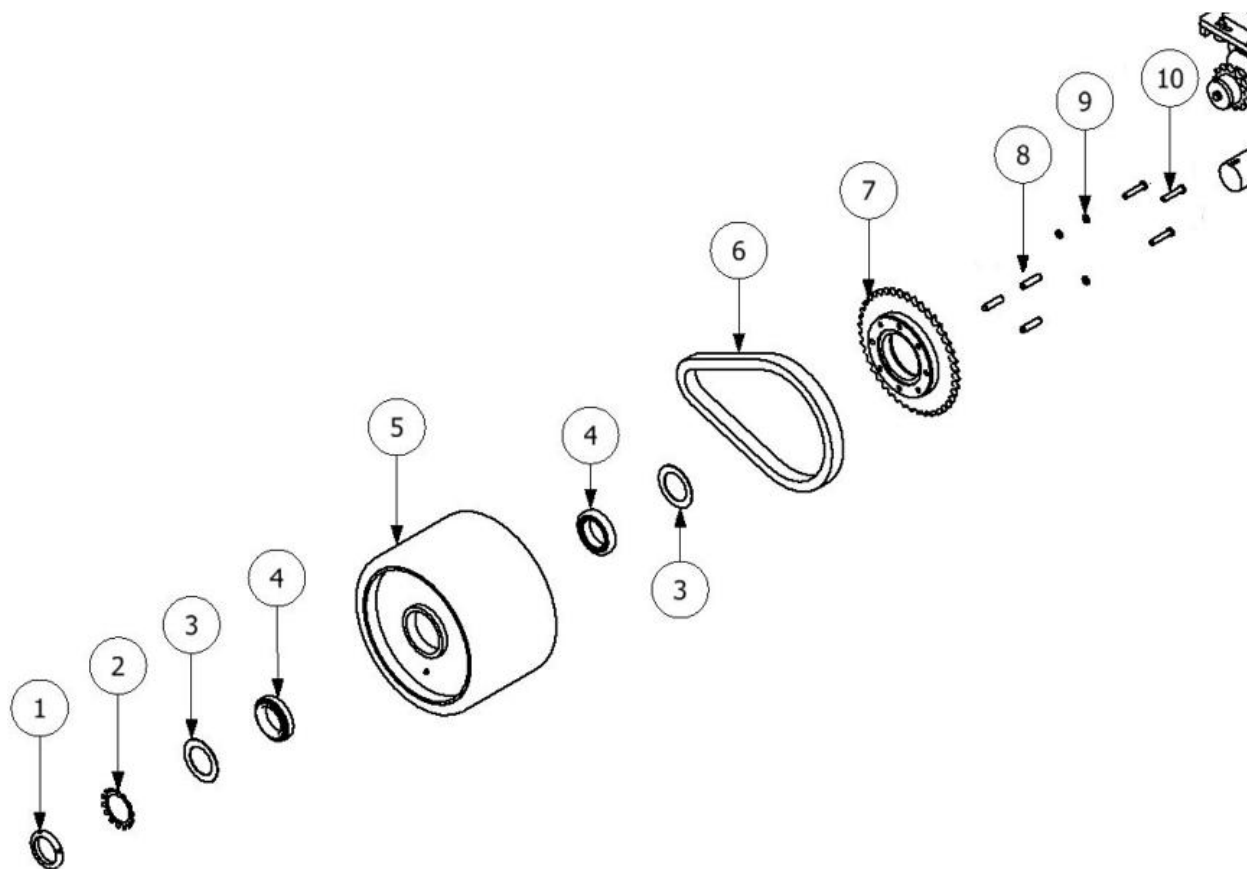


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8.13.3 Gearmotor unit

Pos.	Description	Quantity
1	Hex head bolt M16x50	1
2	Open spring washer M16	1
3	Plug	1
4	Spacer	1
5	Pinion P=1" Z=18	1
6	Planetary gearbox R 2EL 001A 35.6Y C050M1 P20a l28x250 B8	1
7	AC MOTOR 80V 5kW 2300rpm AC201A	1

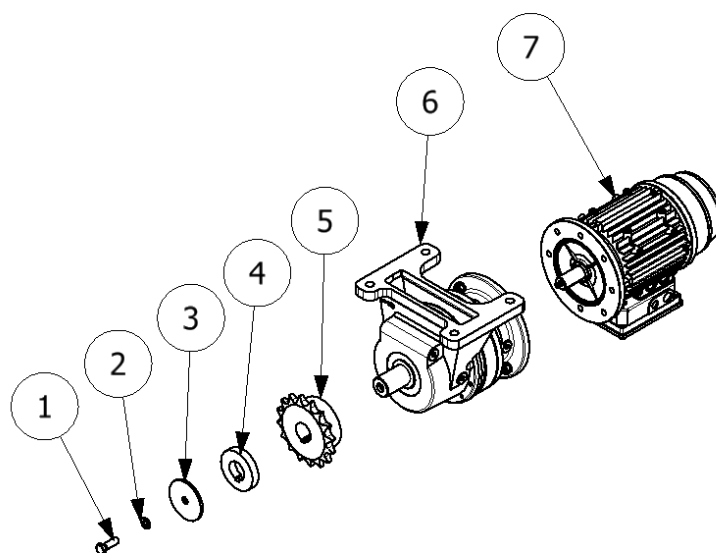


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8.13.4 Rocking axle assembly

Pos.	Description	Quantity
1	Socket head bolt M10x25	2
2	Open spring washer M10	2
3	Anti-rotation plate	1
4	Pin	1
5	Shim 70.5 100 5	2
6	Bushing DU 70x75x50 type GLY.PG 707550 F	2
7	Bushing DU 70x75x70 type GLY.PG 707570 F	1

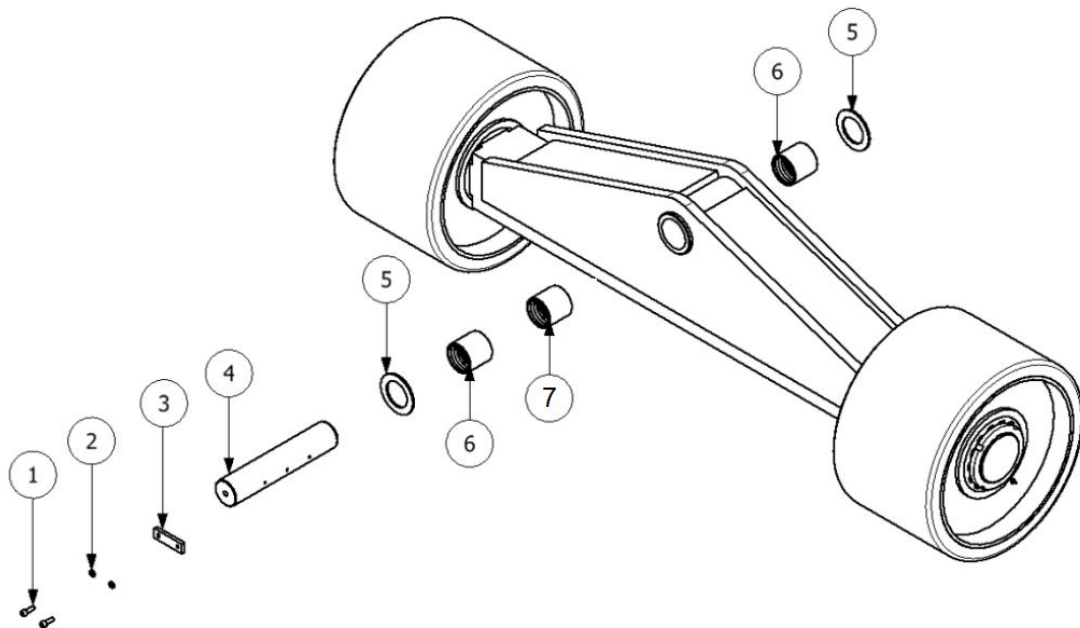


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8.13.5 Steering bar unit

Pos.	Description	Quantity
1	Socket head bolt M8x25	2
2	Open spring washer M8	2
3	Anti-rotation plate	1
4	Pin	1
5	Shim 45.5 75 5	2
6	Bushing DU 45x50x50 type GLY.PG 455050 F	2
7	Bushing DU 45x50x30 type GLY.PG 455030 F	1
8	Steering bar	1

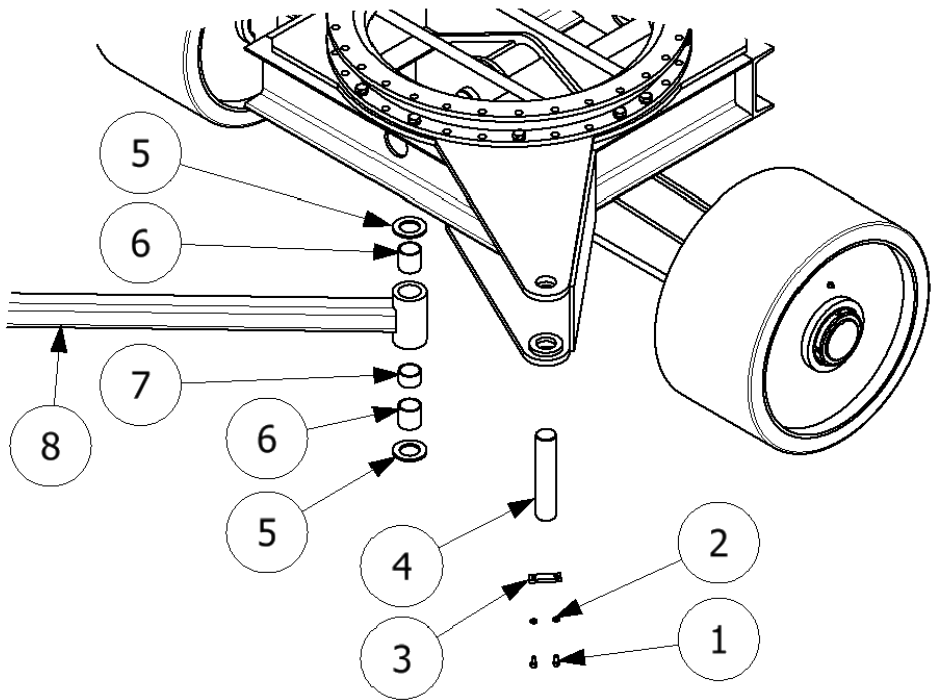


Image for illustrative purposes

8.13.6 Steering encoder unit

Pos.	Description	Quantity
1	Ball joint M5	2
2	Threaded rod M5	1
3	Mounting bracket	1
4	Multi-turn absolute encoder – code 8.M3688.2424.2122 - IP65 - shaft Ø10mm	1
5	Mounting plate	1

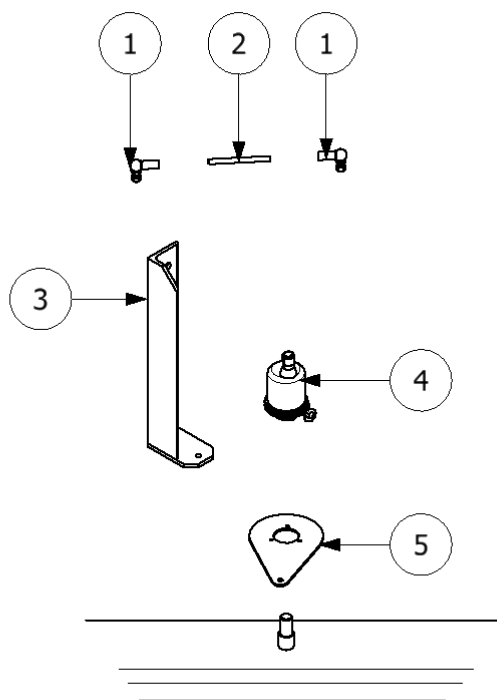
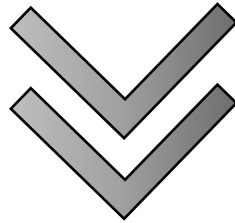


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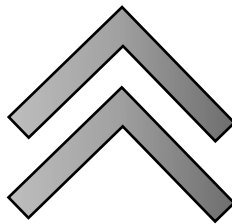
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ATTACHED DOCUMENTATION



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9. ATTACHED DOCUMENTATION

The following documents are attached to this manual.

DESCRIPTION	
1	Machine layout
2	Wiring diagram and bill of materials
3	Motor manual
4	Gearbox manual
5	Rectifier manual
6	Battery manual
7	Inverter manual
8	Remote control manual