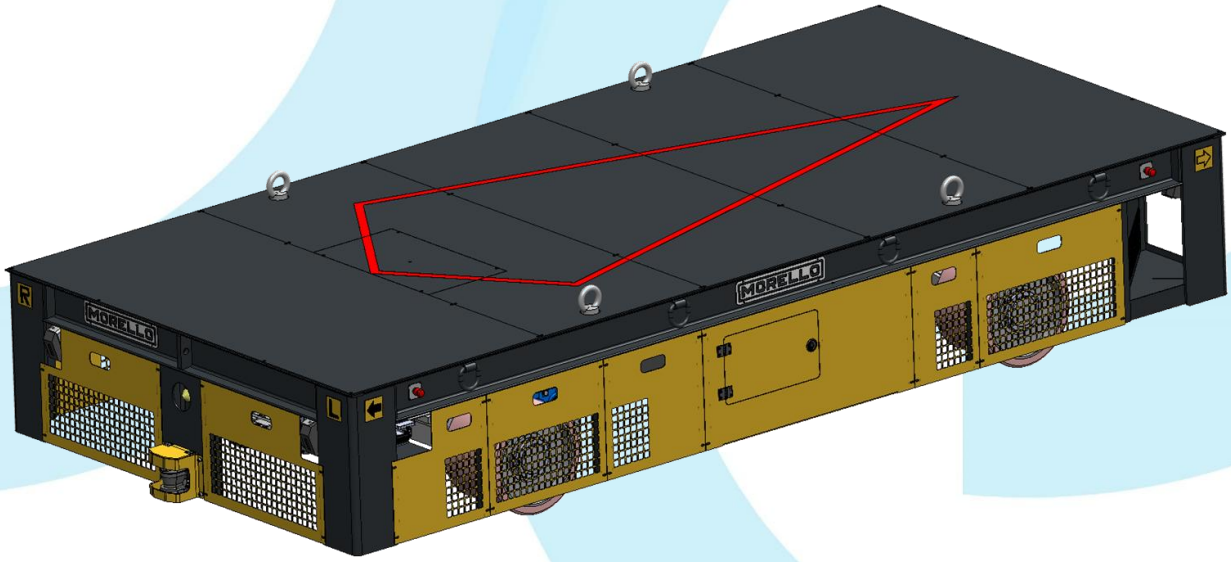
TRANSLATION OF
“ISTRUZIONI ORIGINALI”

TESLA

MORELLO
MATERIAL HANDLING TECHNOLOGY SINCE 1946

SELF-PROPELLED ELECTRONIC TROLLEY WITH TYRE



USER AND MAINTENANCE MANUAL

Model:	**SGAE VC P 50/2**	Revision:	**00**
Serial number:	**2555 C3**	Working load limit (WLL):	**50 t**
Version:	**GROUND OPERATOR**	Construction year:	**2026**

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REVISION

REVISION				
MODEL	**LANGUAGE**	**DATE**	**VERSION**	**NOTES**
SGAE VC P 50/2	English	01/2026	00	First issue

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Drawings and other documents that accompany the machine are property of **Morello S.r.l.**

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The company **Morello S.r.l.** reserves the right to change, without prior warning, the characteristics of the product described in this manual.

In case of doubts or difficulties in understanding or interpretation of the manual, the original/official version referred to as “ISTRUZIONI ORIGINALI” on the cover, must be considered as the valid version.

Some of the pictures included in this handbook must be considered as an example, therefore they may not refer to the machine herein described.

ADDITIONAL INFORMATION

The **Self-propelled electronic trolley with tyres**, described, hereinafter will be called “**machine**”.

HANDBOOK STRUCTURE

The manual is divided into 9 chapters.

CHAPTER 1 – GENERAL INFORMATION

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

CHAPTER 2 – SAFETY

This chapter contains a description regarding the standards, the type of certification applied, working environment conditions, accident prevention devices used, residual risks, warning plates applied to the machine.

CHAPTER 3 – GENERAL DESCRIPTION

This chapter contains the description of the machine functioning principles and of the controls available for the operator, the general technical data and the description of the groups that constitute the same.

CHAPTER 4 – TRANSPORT AND STORAGE

This chapter contains instructions on how to use the proper packing, handling, transport and unloading at the user's plant.

CHAPTER 5 – INSTALLATION

This chapter contains the instructions to carry out any assembly, checking, inspection and adjustment operations to be performed before start-up.

CHAPTER 6 – USE

This chapter contains the instructions for machine start-up, use, with description of the more important operating sequences and use of the diagnostics system.

CHAPTER 7 – DISMANTLING

This chapter contains information and warnings to properly decommission and dismantle the machine at end-of life.

CHAPTER 8 – MAINTENANCE

This chapter contains the system maintenance schedule. It contains the warnings, precautions and instructions to correctly carry out the maintenance operations on the machine.

CHAPTER 9 – ATTACHED DOCUMENTATION

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GENERAL INFORMATION

SELF-PROPELLED ELECTRONIC TROLLEY WITH TYRES
Serial number 2555C3

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1. GENERAL INFORMATION

1.1 INTRODUCTION

ADDITIONAL INFORMATION



MORELLO S.r.l. the machine manufacturing company, is indicated in the handbook with the name: **Manufacturer**.

ADDITIONAL INFORMATION



The Company purchasing the machine is indicated in the handbook with the name: **Customer**.

The manufacturer recommends a training course for personnel responsible for operating and maintaining the machine to increase familiarity and know-how of the various procedures.

This manual contains the features, performances, instructions for use and the references to the preventive and remedial operations of the machine.

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

This document is the Use and Maintenance handbook for the:

SELF-PROPELLED ELECTRONIC TROLLEY WITH TYRES SGAE VC P 50/2 WITH OPERATOR ON THE GROUND

and has been drawn up in compliance with Machinery Directive 2006/42/EC.

The Use and Maintenance Handbook is to be considered an integral part of the machine and must be kept until final disposal. It must be kept by the person in charge of the machine.

1.2 SERVICE DEPARTMENT

For technical assistance, contact the manufacturer:

Morello S.r.l.

Head Office and Factory:

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.morellogiovanni.it

1.3 GLOSSARY

Emergency stop – to stop in an emergency: the purpose of this function is:

- to avoid or reduce hazards that exist for persons, damage to the machinery or to the work in progress and
- to be initiated by a single human action.

Machinery Directive: the 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.

Command device: device inserted in a command circuit for use of the machine.

Supplier: entity (Manufacturer, installer, system integrator) that provides equipment or services associated with the machine (the user can also act as a manufacturer for himself).

Safety function: machine function, the failure of which could cause an immediate increase of risks.

Failure: loss of the capacity of an element to perform a required function.

Machine:

- an assembly equipped or to be equipped with a drive system different from direct human or animal force, composed of parts or components, at least one of which is mobile, integrally connected together for a well determined application;
- an assembly as per the first section, lacks only the elements of connection to the site of use or connection to the sources of energy and movement;
- an assembly as per the first and second sections, ready for installation and that can only function after assembly on a means of transport or installed in a building or in a construction;
- a group of machines, as per the first, the second and the third section, or partly completed machines, that to attain the same result are arranged and controlled in a manner to have an integral functioning;
- a group of parts or components, one of which is mobile, integrally connected together for the lifting of weights, and having direct human forces as the only source of energy;

Malfunctioning: inability of a machine to perform the foreseen function.

Marking: symbol and wording for the identification of the machine, which is affixed by the Manufacturer.

Safety measure: means that eliminate or reduce a hazard.

Operator: person in charge of running the machine.

Hazard: Potential source of harm.

Qualified technician or skilled maintenance technician: the persons who have attended specialisation courses, vocational training, etc. and have experience regarding installation, putting into service and maintenance operations, repairs, transport, and handling of the machine.

PLC: Programmable Logic Controller can manage and control all movements of the machine. It's equipped with electronic cards designed to control the various devices and to receive the associated control signals.

Protections: protection measures that use means of protection to safeguard persons against hazards that cannot be rationally removed from the risks in a manner sufficiently effective by the protection measures integrated in the project design.

Safety Protection: Shelter or protective device used as a safety measure for the protection of persons from a present or latent danger.

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

Fixed guard: fixed protection (for example: by screws, nuts, welding) so that it can only be opened or removed using tools or by removal of the means of anchorage.

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

Residual risk: risk that remains after the protective measures have been applied.

Transport: a set of operations designed to transfer equipment from the manufacturer to the final work position at the Customer's.

Foreseen use: use of the machine in conformity with the information provided in the instructions for use.

User: entity using the machine and the associated electrical equipment.

Danger zone: all spaces, area within or near the machine in which the presence of an exposed person constitutes a risk to his health and / or safety.

1.4 SYMBOLS

The manual uses a number of symbols that are meant to draw the reader's attention and highlight some aspects that are particularly important.

An explanation of each indication is given below.

DANGER



Indicates a situation where there is an immediate danger which, if not avoided, will result in serious injury or death to the operator.

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

WARNING



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

Describes operations that require special attention in order to avoid serious injury or death to the operator.

CAUTION



Indicates a situation where a non-immediate or potential hazard is present which, if not avoided, could result in medium or low-level injury or health damage to the operator.

Describes operations that require special attention in order to avoid injury to the operator.

NOTE



Indicates important information and/or describes those procedures, the non-observance or partial observance of which may result in damage to the machine or equipment connected to it.

ADDITIONAL INFORMATION



It provides useful information and/or indicates references to other supplementary documentation, such as accompanying instruction manuals, technical documents or other sections of this manual.

1.5 MANUFACTURER'S ADDRESS

For any kind of information or clarifications regarding the use, maintenance, etc., the Technical Office of the Manufacturer is always available to the customer requirements.

It is appropriate that the latter puts the questions in clear, with references to this manual, always indicating the data shown on the identification plate of the machine in question.

Any request for assistance, service at the client, or clarification regarding the technical aspects of this document should 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.morellogiovanni.it

1.6 SAFETY STANDARDS

Prescriptions, instructions, regulations and related safety notes described in the various chapters of the manual are intended to define a set of behaviours and rules to be observed when performing the various activities that constitute the mode of intended use of the machine in order to operate in conditions of safety for personnel, for the equipment and the surrounding environment.

The safety instructions are addressed to all authorized personnel, trained and authorized to perform the various activities and operations:

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

1.7 RESPONSIBILITY OF THE MANUFACTURER

The manufacturer declines any liability arising from the incorrect use or misuse of the machine in question and from damage caused by the use of non-prescribed spare parts, by maintenance not carried out properly and by tampering with circuits, components, and system software.

The responsibility for what concerns the application of safety requirements, mentioned below, it is the responsibility of the technical staff responsible for the activities provided for the system. They should ensure that operators, authorized to carry out the required activities, are qualified, that respect and are aware of the requirements contained in this document and the safety regulations of a general nature applied to the machine itself.

Failure to follow the safety instructions can cause injury to persons and damage to equipment.

1.8 MANAGEMENT OF THE MACHINE

The machine control is allowed only to authorized and properly trained persons, or at least with adequate technical expertise.

Operators responsible for running and maintenance operations should be aware that the knowledge and application of safety standards is an integral part of their work.

Operators not authorised to work on the machine are not to have access to the pushbuttons.

Before starting the machine, do the following:

- Read this manual carefully.
- Know what protections and emergency stop devices are present on the system, where they are located and how they work.

Do not remove, even partially, the protections, safety devices and/or warning signs applied to the machine. In the event of malfunction or failure of such devices, they should be immediately repaired or replaced.

1.9 WARRANTY

The manufacturer guarantees that its machines are free of manufacturing flaws for the period specified in the relevant terms of the contract.

The buyer is only entitled to replacement of parts recognized as defective: the costs of packaging and transport, as well as any installation, are against him. In this case, must be specified:

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

Will not be recognized claims for damages for loss of production caused by any periods of inactivity of the machine.

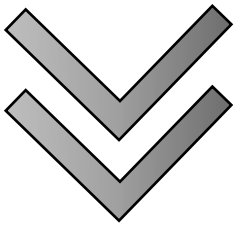
Damages are excluded caused by improper use to the contents of this “Use Manual and Maintenance” which is an integral part of the machine, including the maintenance, if not conforming to the instructions provided.

The warranty will not be recognized for the machines on which were performed unauthorized modifications. Modifications or tampering of safety devices are in every way strictly prohibited.

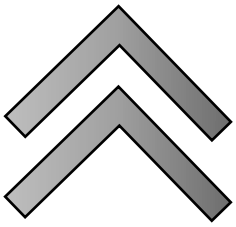
If damages occur during warranty period, the warranty is valid only using original spare parts.

Repair work may only be performed by skilled operators, who are familiar with the machine.

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SAFETY



SELF-PROPELLED ELECTRONIC TROLLEY WITH TYRES
Serial number 2555C3

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2. SAFETY

2.1 GENERAL INFORMATION

The Customer must provide instructions for the operators about the risks of injury, safety devices installed on the machine and the general rules regarding accident prevention as specified by the Community directives and the law of the country where the machine is used.

The operators must know the location and operation of all the controls of the system and its characteristics.

Tampering, or unauthorized replacement of one or more components of the system, the adoption of accessories and the use of particular parts other than those recommended may cause injury risks.

WARNING



It is absolutely forbidden to exclude/tamper with the safety devices on the machine. The Manufacturer declines 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 who uses the machine to check that during movement there are no objects or persons in the area.

2.1.1 Certification of the machine

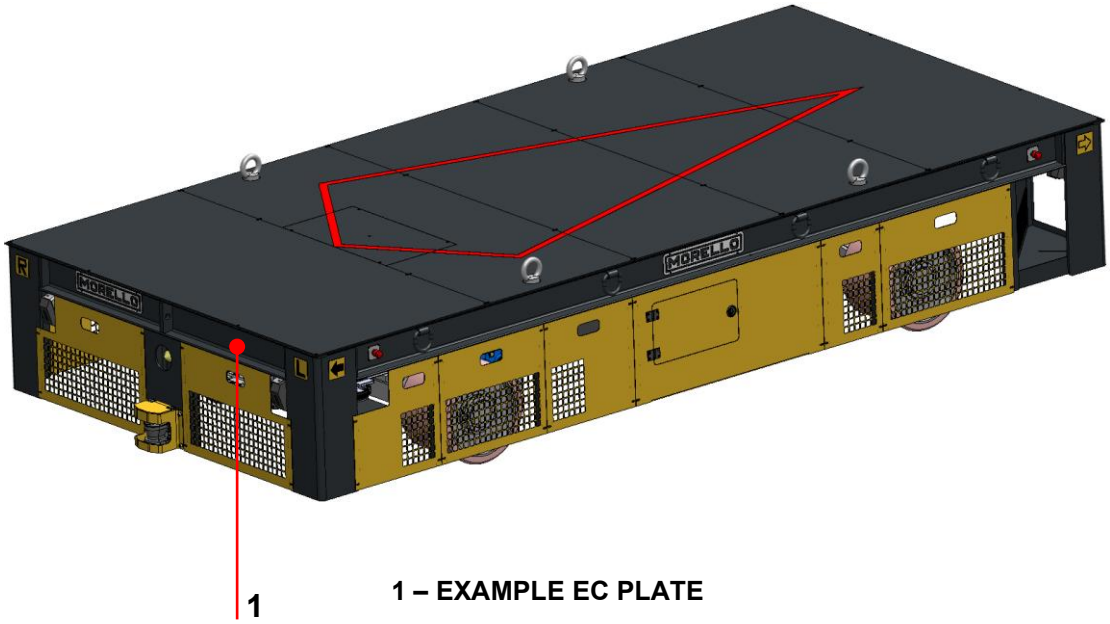
The Machine is provided with the EC declaration of conformity to the essential safety requirements in accordance with Directive 2006/42/EC (annex II A) and EMC Directive 2014/30/UE.

ADDITIONAL INFORMATION

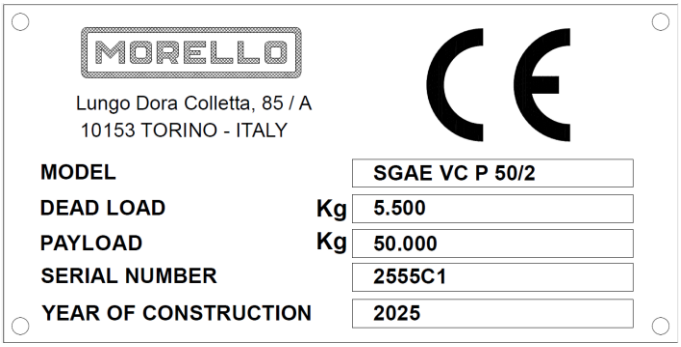
Any changes made to the machine immediately invalidate the EC certification issued by the manufacturer.

ADDITIONAL INFORMATION

The picture shown below is for the sole purpose of indicating the position of the EC plate **(1)** with the main machine identification data.



1 – EXAMPLE EC PLATE



2.1.2 Foreseen and unforeseen uses

The machine has been designed and built to handle heavy loads distributed on the loading surface, according to the technical specifications indicated in this manual.

It can be used indoors on concrete and asphalt paving, smooth and level.

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

It is not possible to use the machine for any other use than the intended one.

DANGER



The use of the machine for processing purposes not described in this manual is **IMPROPER USE**. The Manufacturer declines all responsibility for any damage caused to property and/or persons and considers annulled every kind of guarantee of the machinery. The manufacturer declines all responsibility in the event of tampering with the machine, unauthorised modifications or maintenance operations carried out by unskilled operators.

CAUTION



The use of the machine is allowed only to the experienced and qualified operator, who has taken full vision and awareness of this document.

CAUTION



Never climb on/transport persons on the machine.

CAUTION



Only one operator is required to manage the machine, who is to position as indicated in the paragraph “Operator workstation” and to follow the instructions as described in the chapter “Use”.

NOTE



In the event of abnormal behaviour of the machine, or lack of power, it is forbidden to carry out any movement because specific competence of maintenance personnel.

2.2 OPERATING ENVIRONMENTAL CONDITIONS

The machine is to be placed in an environment equipped with all safety requirements specified by the laws in the user country, and with adequate ventilation.

Operating environment conditions:

- Environment temperature ranging between 0 °C and + 40 °C.
- Humidity: <80% (with no condensation).

2.2.1 Installation of fire protection

The machine is not equipped with its own sprinkler system.

2.2.2 Explosive atmosphere

The machine has not been designed and built to operate in zones with explosive atmosphere or partially explosive atmosphere.

2.2.3 Lighting

The machine does not have its own lighting system.

NOTE



It is the task of the Customer to provide correct lighting in the working area.

2.2.4 Vibrations

The machine does not produce hazardous vibration to the health of the operators who work there.

NOTE



Excessive vibration can only be caused by a mechanical failure, that is to be immediately reported and eliminated.

2.2.5 Noise

Noise measurement has been carried out in conformity with the specifications of acoustic standards. The typical sound data are filed by the manufacturer.

The machine operating features are such that, with no load, the overall noise generated is less than 75 dB (A), measured in the workstations of the relevant operators.

NOTE



The sound pressure level in the actual working conditions depends on the characteristics and the capacity of the load.

NOTE



The measurement of exposure to noise levels of workers should be carried out by the user, in compliance with the legislation in force in your country.

2.2.6 Electromagnetic emissions

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

Emission values are in accordance with regulations thanks to the use of EMC compatible components, suitable connections and installation of filters where necessary.

NOTE



Any maintenance on electrical equipment made in a non-compliant manner, or wrong replacement of components, can impair the effectiveness of the equipment.

2.3 DISPOSAL OF EXHAUSTED MATERIALS

The machine produces some types of exhausted materials (reducers oil).

In every country there are specific regulations for disposal to safeguard the environment.

The customer must be aware of these standards and work in such a manner to respect them.

In particular, see chapter 7 for disposal of the materials that the machine is composed of.

2.4 DEMARCATION OF HAZARDOUS AREAS

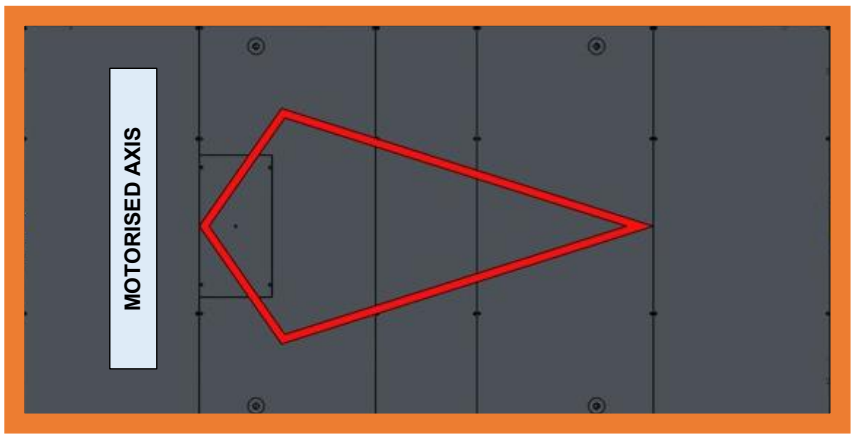
The dangerous zones of the machine are segregated by fixed guards. Access to these areas, subject only to maintenance operations, must be carried out as indicated in this manual.

The following drawing shows the hazardous areas in the vicinity of the machine as a result of its movement.

Dangerous zone

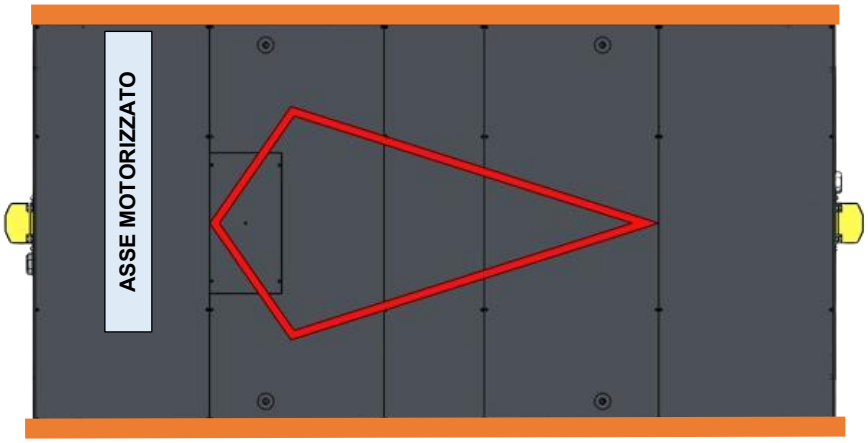
Configuration without laser scanner

Front



Configuration with laser scanner

Front



2.5 OPERATOR WORKSTATION

To run the machine, only one operator is required who is to position lateral to it, in the direction of travel, so as to have a complete view of the surrounding handling area, always remaining at a safe distance from the machine (**Figure A**).

Operator workstation (with radio-control or wired control panel)

Machine direction of travel

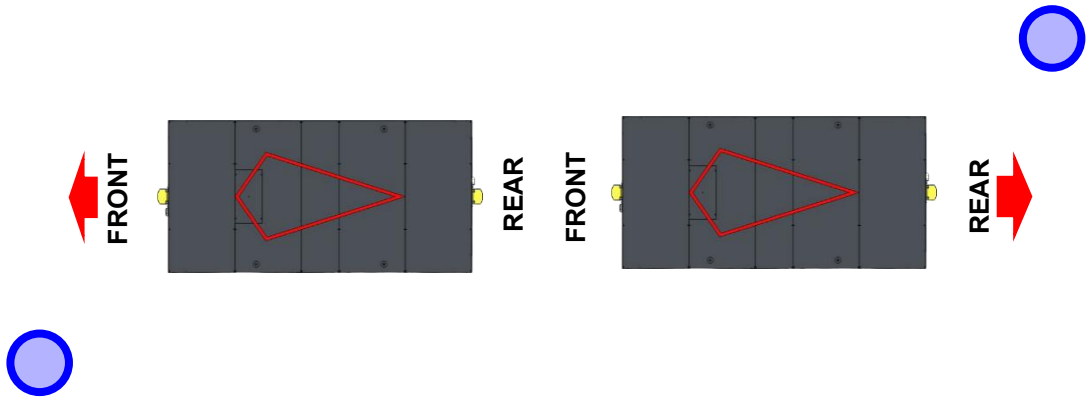


Figure A *- Image for illustrative purposes*

WARNING

In the presence of bulky loads, which restrict the operator's view, the operator must position himself in front of the direction of travel (always at a safe distance), so as to have full visibility of both sides of the machine (**Figure B**).

The operator must keep out of the laser scanners' areas of operation.



Figure B *- Image for illustrative purposes*

2.6 SAFETY DEVICES

The machine is equipped with the following safety devices:

DEVICE TYPE	FUNCTION
Power-on key selector switch	To prevent machine movement.
Emergency buttons	Emergency stop of the machine.
Hold-to-run movement system	Stops machine movements if the control is released.
Fixed guards	Segregation of machine hazardous zones.
Visual and acoustic signalling systems	It indicates when the machine is in motion.
Laser scanner (IF REQUIRED)	Slowing down and stopping the machine in case of interception of the intervention areas.
Safety circuits	Cuts-out the electric power supply in the case of overload or short circuit.

2.6.1 Power-on key selector switch

Function: To prevent machine movement.

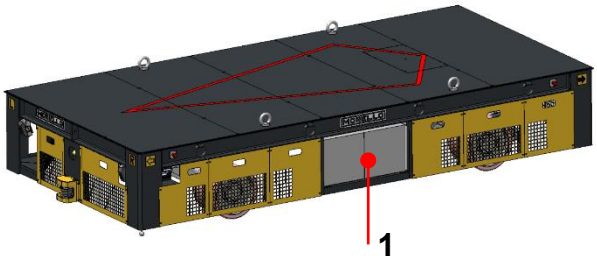
Characteristics and methods: The machine electric power is disconnected by turning the “power-on key selector”, on the electric panel to position (0), and removing the key.

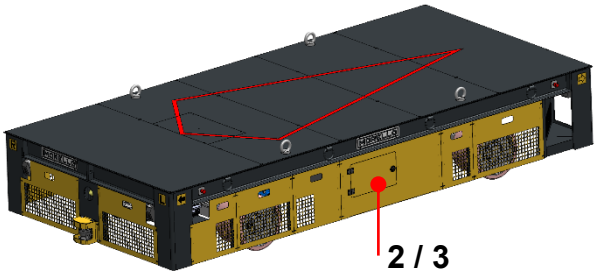
Subsequently disconnect the machine plug from the battery socket to cut out the power supply. Alternatively, you can press the isolating switch on the machine.

WARNING

For maintenance, disconnect the battery, removing the machine power supply plug from the battery socket.

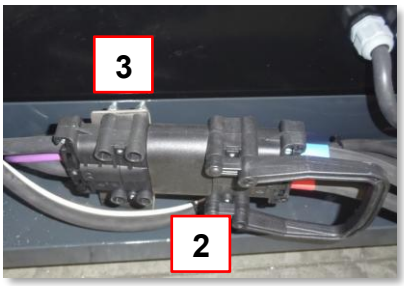
1. Power-on key selector switch
2. Machine power plug
3. Battery socket





1





Example images for illustrative purposes

2.6.2 Emergency button/s

Function: Immediate machine stoppage.

Characteristics and methods: Press this button in a hazardous situation to safeguard the operators and/or the machine.

Pressing this button **(1)** causes the power supply to the motors to be cut off, thus stopping the machine's movements.

When pressed, the emergency button remains in the down position. To reset it, turn it clockwise.

Emergency buttons are located on the control panel and on the machine.

CAUTION

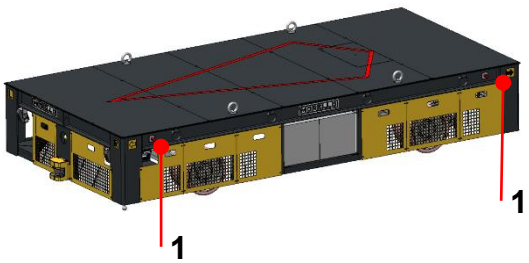
The emergency buttons require periodic checks to ensure its correct operation.

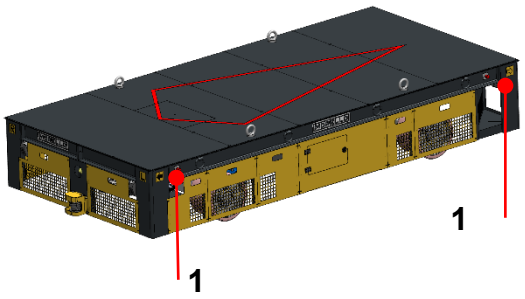
NOTE

In case of maintenance is not enough to intervene on emergency buttons for cutting energy of the machine.



Wired control panel / radio-control





2.6.3 Hold-to-run movement system

Function: Machine movement, with presence of operator.

Characteristics and methods: For machine handling there is, on the radio-control / wire control panel, there are retained pressure levers **(1)**.

If the lever is released, the machine stops immediately.

CAUTION

For correct use of the wired control panel / radio-control the operator is to remain in position as indicated in paragraph “Operator work station”.



Wired control panel / Radio-control

2.6.4 Fixed guards

Function: Segregation of machine hazardous zones.

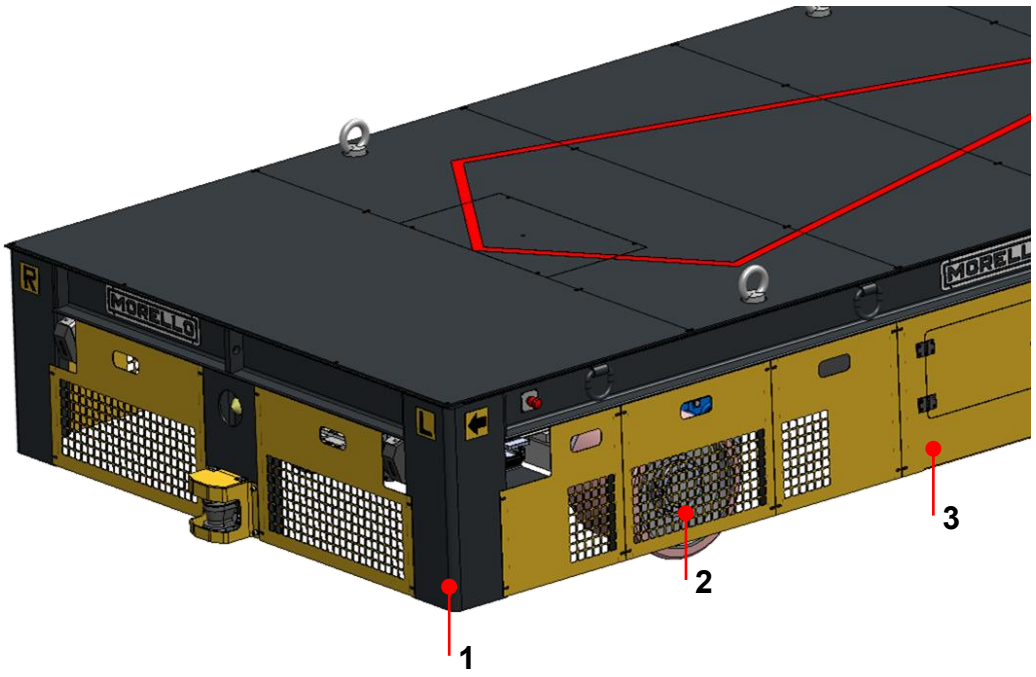
Characteristics and methods: The fixed guards (casings) are firmly secured to the structure by screws that require a specific tool for removal.

These protections are not controlled, and removal is only to take place for maintenance operations, with the machine energy source disconnected and cut-out.

WARNING

The Manufacturer declines any responsibility if the machine is operated with incomplete protections or with the movable guard open.

1. Machine frame
2. Example of grilled sheet steel protective casing
3. Example of smooth sheet steel casing (with hatch for access to connectors)



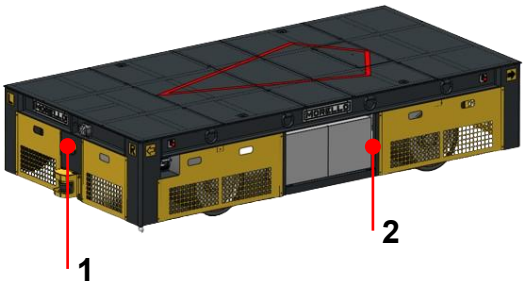
2.6.5 Visual and acoustic signalling systems

Function: Visual and acoustic signalling of moving machine.

Characteristics and methods: The machine is equipped with two lamps and a buzzer that are activated when it is in motion.

1. Signal lamp
2. Buzzer





1



2



2.6.6 Laser scanner (IF REQUIRED)

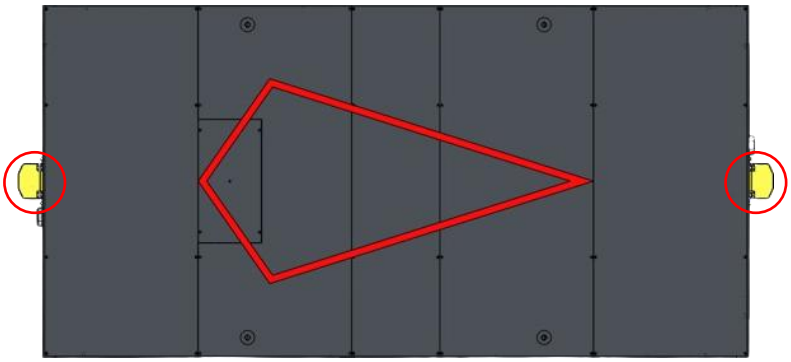
Function: Slowing down and stopping the machine in the event of an interception of the intervention areas.

Characteristics and methods: A laser scanner **(1)** is mounted at the front and rear of the machine, protected by steel covers **(2)**.

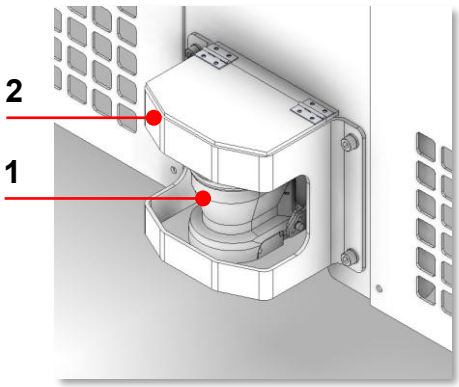
Each of these devices is programmed with two areas of operation:

- Slowdown area (GREEN): the machine decreases its speed.
- Stop area (RED): the machine stops immediately.

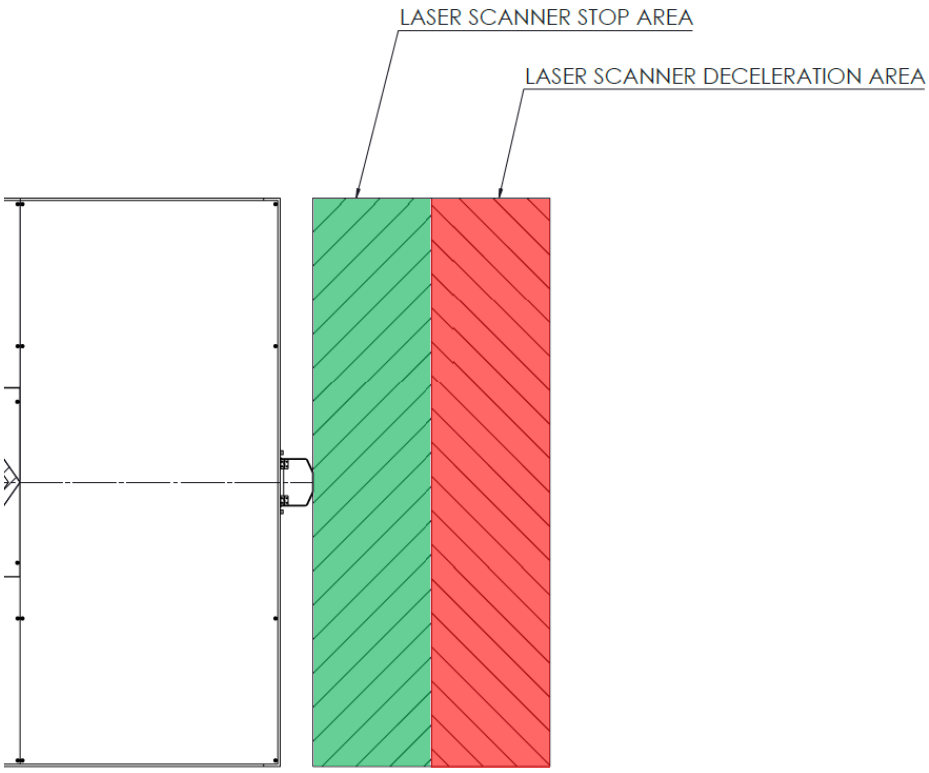
During machine movement, only the areas of the laser scanner located in the machine's direction of travel are active.



Laser scanner position



Below is a diagram of the laser scanner intervention areas (dimensions in mm):



CAUTION

By pressing the BYPASS button, located on the control panel, the laser scanner intervention areas are disabled.

CAUTION

The beam interceptor must not be used to lock the machine for maintenance. Any tampering with the devices poses a possible risk.

NOTE

The protection of personnel operating and maintaining the machine is not guaranteed if laser scanners are not used in accordance with the relevant manual.

ADDITIONAL INFORMATION

For more information, please refer to the attached laser scanner manual.

2.6.7 Bypass Laser scanner

CAUTION

The laser scanner bypass function is a mode that can only be used by authorised personnel. Activating this function disables the laser safety systems, rendering the manoeuvring area unprotected. It is essential that the operator exercises increased vigilance during operations.

CAUTION

When operating the machine with the bypass activated, the operator must pay particular attention to the surroundings, as the laser scanners, normally used to detect obstacles and ensure safety, have been disabled.



Procedures for activating the bypass:

1. **Entering the enabling code (PIN) on the control panel:**

Enter the enabling code on the control panel to activate the bypass function, followed by the hash key (#) (PIN#).

2. **Using the RFID card:**

Scan the associated RFID card to enable bypass.

Once the bypass function has been successfully activated, the device will provide visual confirmation by illuminating a green light. This indicates that the bypass has been successfully activated and that the laser scanners are disabled.

NOTE

The PIN code is not included in this manual and is provided separately or upon request to the Manufacturer.

NOTE

Only personnel with appropriate authorisation and training may use this function. The disabling of laser scanners should only be carried out in cases of strict necessity and in complete safety.

Three options are available to restore the functionality of laser scanners after the bypass mode has been activated:

1. **Reusing the code:**

Enter the enabling code (PIN) again on the control panel, followed by the hash key (#) (PIN#).

2. **Reusing the RFID card:**

Re-scan the RFID card associated with the authorised operator to restore the functionality of laser scanners.

3. **Switching the trolley off and on again:**

Switch the trolley off completely and then switch it on again to automatically restore the functionality of the laser scanners.

ADDITIONAL INFORMATION



Once the functionality of the laser scanners is reactivated, the manoeuvring area will again be monitored by safety sensors, reducing the risk of accidents.

2.6.8 Safety circuits

Function: To control electric circuits and interrupt electric supply before hazardous overloads/short circuits are generated.

Characteristics and methods: If an overload or short circuit occurs, the fuses installed inside the electric panel cut out the power supply to the circuits and immediately stop the machine.

ADDITIONAL INFORMATION



For information on the location of the fuses refer to the electrical diagram with its bill.

2.7 PERSONAL PROTECTIVE EQUIPMENT

The machine operator is to use the personal protection devices to reduce the possibility of risks to a minimum.

CAUTION



The clothing of those who work or perform maintenance on the system must comply with the essential safety requirements set by EU Directives and laws in the country where the machine is used.

NOTE



During the operations of management and maintenance, personnel should wear appropriate work clothing so as to prevent the occurrence of accidents.

To avoid mechanical risks, such as dragging, entrapment, etc, keep hair gathered up and do not wear bracelets, wrist-watches, rings or chains.

2.8 RESIDUAL RISKS

2.8.1 General information

In the design phase have been assessed all zones or high-risk parts and were taken as a result all necessary precautions to avoid risks to persons and damage to machine components.

WARNING



Periodically check the operation of all safety devices.

Do not remove the protections installed.

Do not insert foreign objects and/or equipment in the machine movement area.

2.8.2 Residual risks

After carefully examining all possible machine risks, all the necessary solutions have been applied to eliminate the risks and limit hazards for exposed persons.

- **Danger of impact**

  It is the operator's responsibility to keep a safe distance from the machine and maintain a full view of the area, making sure that no people are present during handling.

- **Risk of crushing lower / upper limbs in the vicinity of the wheels**

  It is the operator's responsibility to keep a safe distance from the machine and to maintain a full view of the area, making sure that no persons are present during handling.

2.8.3 Plates on the machine

The Manufacturer has installed a series of plates on the machine, defined in compliance with the European standards regarding graphic symbols to be used. The plates in question are located in a prominent position on the machine.

The maintenance service is required to immediately replace all the plates which, due to wear, they should become illegible.

CAUTION



It is absolutely forbidden to remove the warning notices on the machine.

The manufacturer declines all responsibility for the safety of the machine in case of failure to comply with this prohibition.

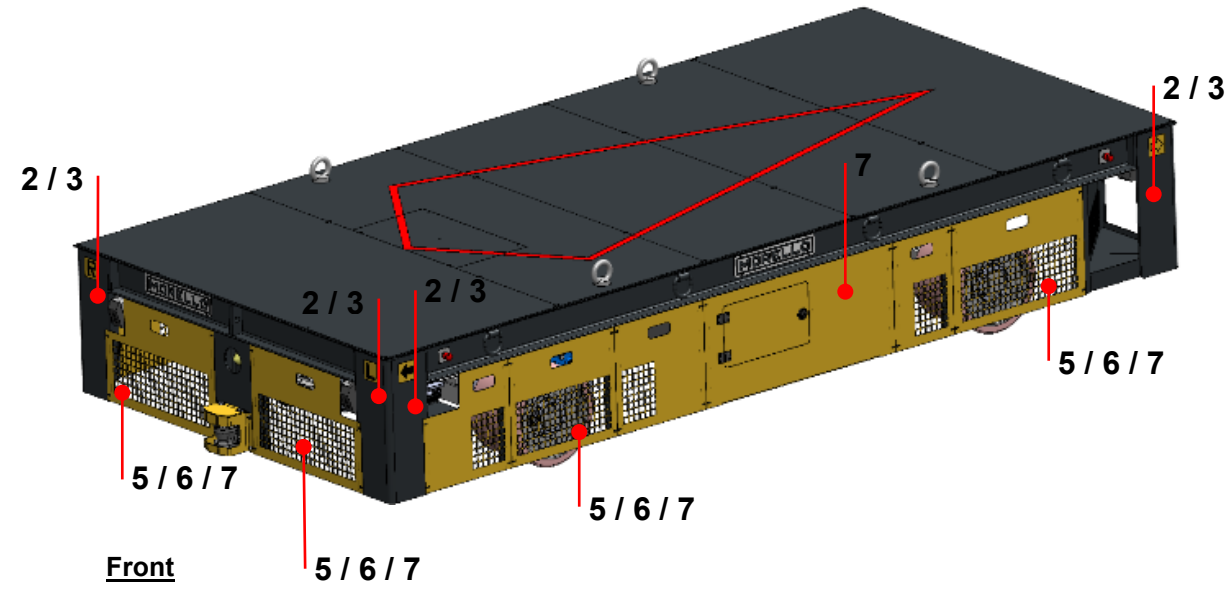
ADDITIONAL INFORMATION

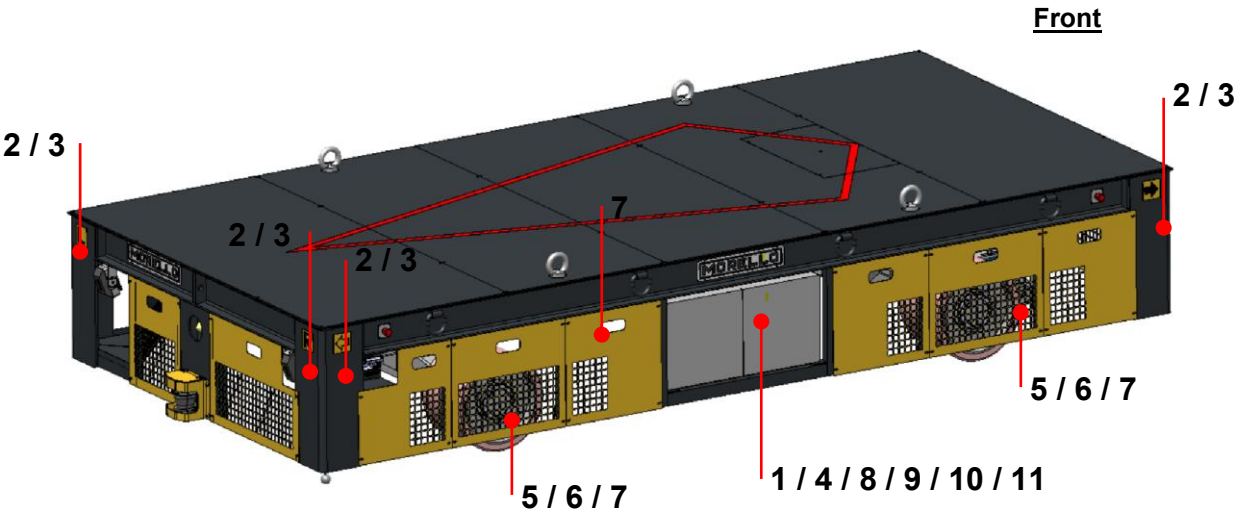


For information on the warning plates installed on the incorporated parts of the machine, consult the specific manuals.

PLATES ON THE MACHINE		
Plate 1		Hazardous electric voltage.
Plate 2		Danger of impact.
Plate 3		Danger of crushing lower/upper limbs.
Plate 4		Do not carry out maintenance with equipment powered
Plate 5		Do not clean, oil, grease, repair or adjust moving parts by hand
Plate 6		Do not remove safety devices
Plate 7		Do not climb on the machine
Plate 8		Do not extinguish fires with water
Plate 9		It is compulsory to wear protective gloves
Plate 10		It is compulsory to wear safety shoes

PLATES ON THE MACHINE		
Plate 11		Obligation to read the user and maintenance manual





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GENERAL DESCRIPTION

SELF-PROPELLED ELECTRONIC TROLLEY WITH TYRES
Serial number 2555C3

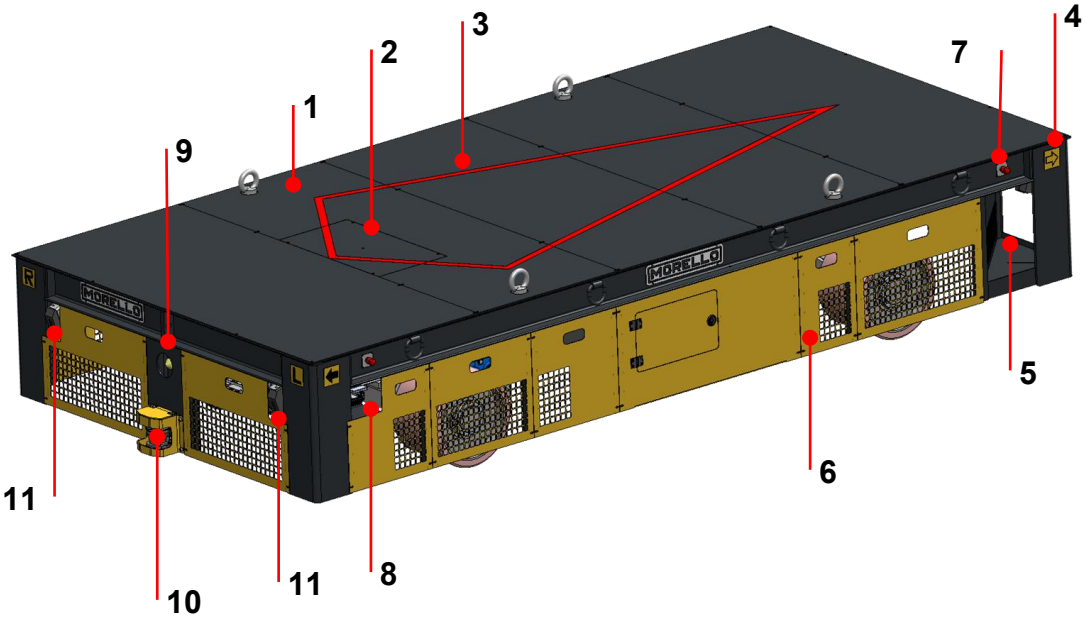
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3. GENERAL DESCRIPTION

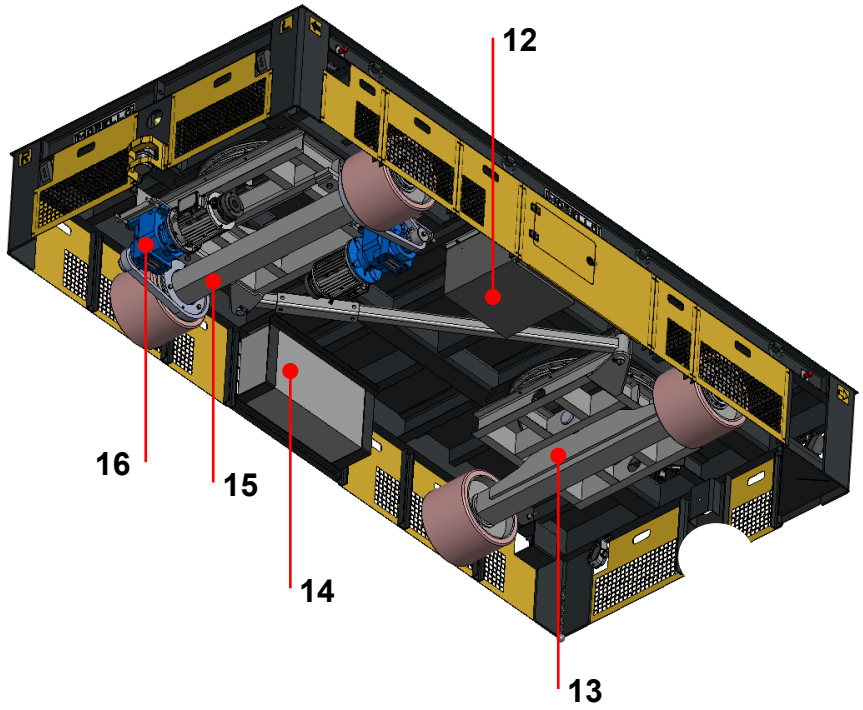
The machine has been designed and built to handle heavy loads distributed on the loading surface, according to the technical specifications indicated in this manual. It can be used indoors on concrete and asphalt paving, smooth and level. The working area must be clear and large enough for the machine to move.

3.1 LAYOUT

N.	DESCRIPTION
1	Machine lifting point
2	Removable panel for maintenance (encoder access)
3	Loading surface
4	Direction of travel plate
5	Storage compartment for control panels
6	Carter
7	Emergency button
8	Wired control panel connection socket
9	Signal lamp
10	Laser scanner (IF REQUIRED)
11	Led projectors (IF REQUIRED)



N.	DESCRIPTION
12	Battery
13	Rear pendulum axle idle
14	Electric panel
15	Motorised rigid front axle
16	Traction motor
17	Radio-control / Wired control panel



17



3.2 TECHNICAL DATA

The following table contains the main machine data.

GENERAL	
Machine weight	Approx. 5.500 kg
Maximum working load (WLL)	50 t distributed
Dimensions of loading surface	Approx. 5.000 mm x 2.400 mm
Height of loading surface	Approx. 843 mm from the ground
Maximum surmountable slope	Approx. 3 %
Emergency buttons	1 on each control panel + 4 on the machine
Motion detectors	Acoustic and lights
Machine lifting points	4
Frame	Steel
Loading surface	Chequered sheet steel
Transmission	Electro-mechanical
Translation	Adjustable electronic
Steering	Electrical
Type of steering	Correct turn
Steering angle	± 35°
Axes	2
Steered axles	2
Wheels	4
Type of wheels	Polyurethane Ø 500x350 mm
Traction motors	2 electrical motors AC 8 kW 80 V 2.200 rpm
Maximum speed	Approx. 30 m/min. fully loaded in flat
Operating brake	Electric negative
Parking brakes	Electromagnetic negatives
Control devices	Wired control panel / Radio-control

POWER SUPPLY					
Type of power supply	Lead-acid battery	Lead-acid battery	LITHIUM battery	LITHIUM battery	LITHIUM battery
Power supply voltage	80 V	80 V	80 V	80 V	80 V
Nominal capacity	240 Ah	320 Ah	110 Ah	220 Ah	330 Ah
Autonomy	Approx. 4 km	Approx. 5,2 km	Approx. 2 km	Approx. 4,1 km	Approx. 6,2 km
Charging modes	Rectifier	Rectifier	Rectifier	Rectifier	Rectifier
Charging time (complete)	Approx. 8 h	Approx. 8 h	Approx. 2 h	Approx. 2 h	Approx. 2 h
Battery weight	Approx. 750 kg	Approx. 950 kg	Approx. 75 kg	Approx. 170 kg	Approx. 215 kg

ADDITIONAL INFORMATION

The data contained in the tables above may vary, therefore, for more precision or verifications of the machine data, see the attached diagrams.

3.3 DESCRIPTION GROUPS

ADDITIONAL INFORMATION

For more information on the components that make up the groups, please refer to the accompanying documentation.

3.3.1 Machine structure

The machine is constructed with a frame **(1)** in made of sheet and profile steel **(2)** and perimeter casings made of smooth and grated sheet steel.

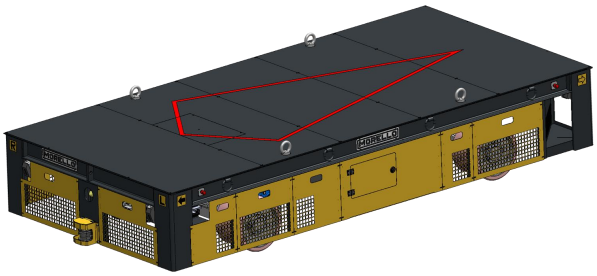
In the upper part of the frame is the loading surface **(3)**, made of chequered steel plate.

On the loading surface are:

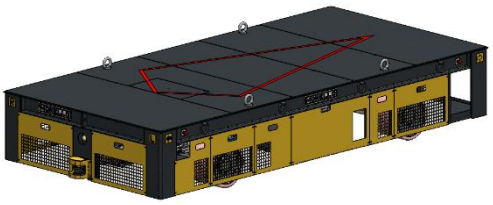
- Four threaded holes **(4)** for inserting as many eyebolts for lifting the machine.
- A removable panel **(5)** for access to the steering encoder.

A chain is attached to the machine to discharge static electricity to the ground.

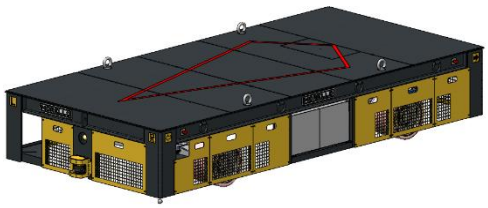
Painting is done in RAL 7016 grey for the frame and RAL 1018 yellow for the perimeter casings.



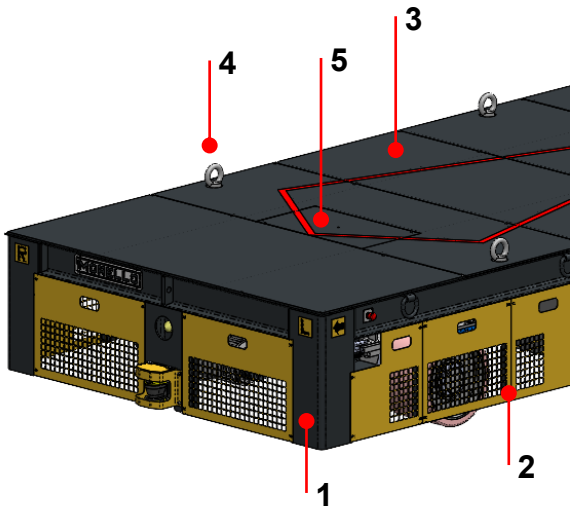
Painting the machine



Rear



Front



3.3.2 Wheel unit

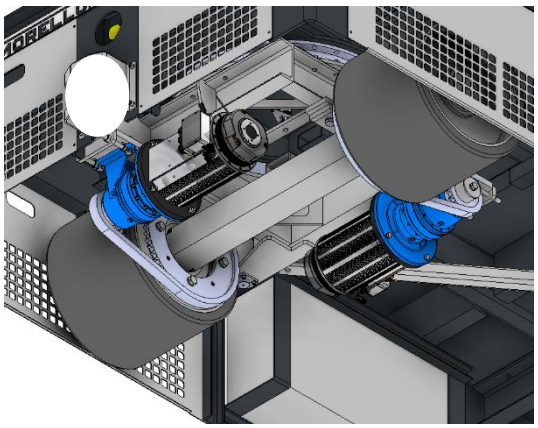
The machine is moved by means of four wheels, two at the front motorised **(1)** and two at the rear idle **(2)**, mounted in pairs on two steered axles, joined by a steering bar **(3)**.

Each wheel has a steel core and polyurethane tyres.

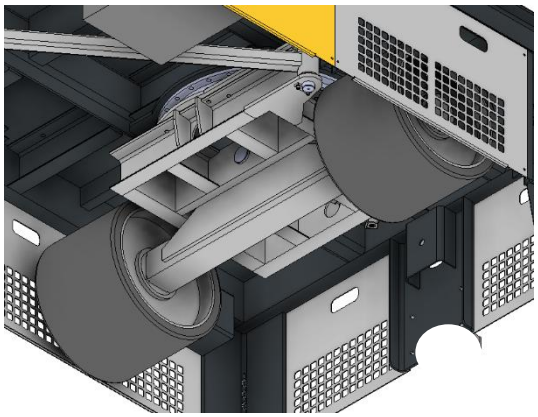
The rear idle wheels are mounted on a pivoting axle **(4)**. This axle is attached, by means of a support (trolley) **(5)**, to a fifth wheel which allows it to be steered.

The tilting axle ensures ground contact of all wheels, providing better traction and correct load distribution.

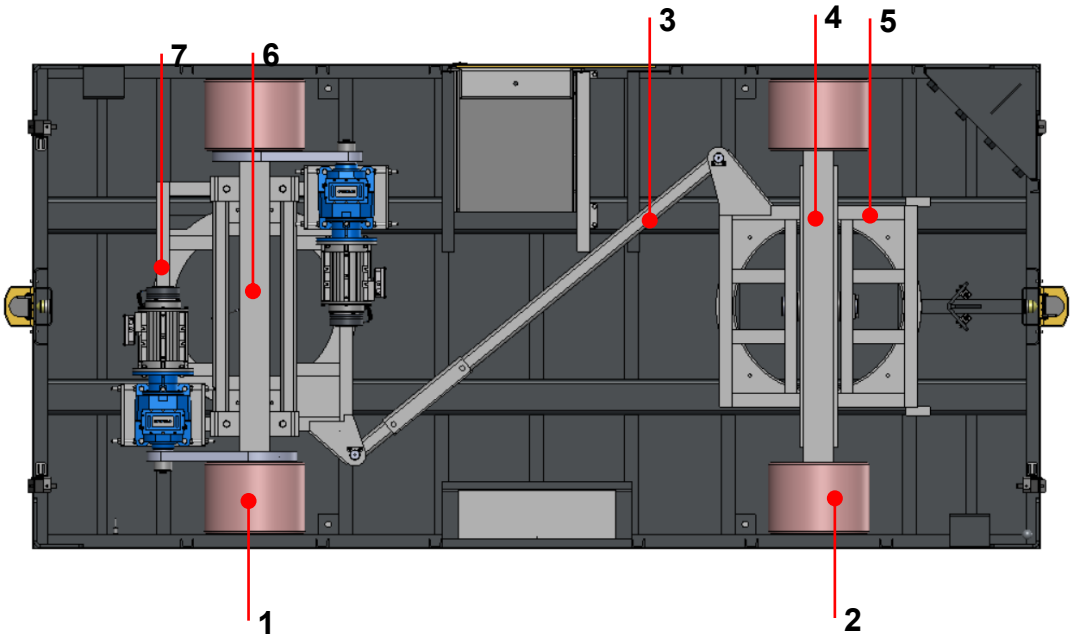
The pair of front wheels is mounted on a rigid axle **(6)**. This axle is attached, by means of a support (trolley) **(7)**, to a fifth wheel which allows it to be steered.



Motorised front axle



Idle rear axle



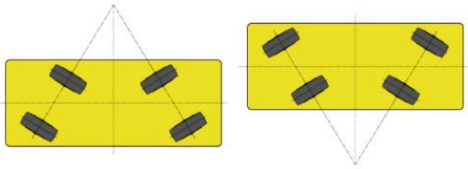
Front

3.3.3 Steering

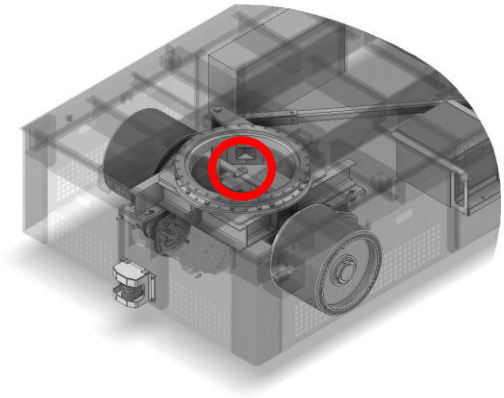
The steering, which is of the electric type, is managed by software. It is corrected at the centre of the machine: the wheels, in accordance with the angle set by the operator, converge at a single point.

The steering angle is read from an encoder **(1)**, located in the centre of the front wheel. The wheels can turn approximately ± 35° (maximum).

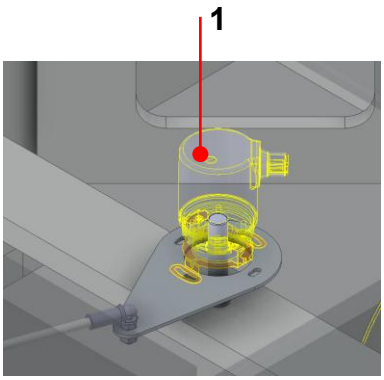
In order to guarantee the safety of the machine, in the event of an encoder failure, there are two types of limit switches (the first electrical type **(2)** and the second mechanical type **(3)**).



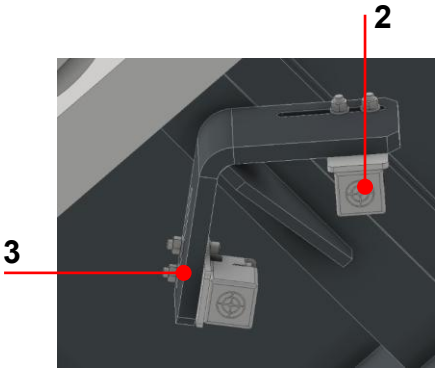
Correct vaulted steering



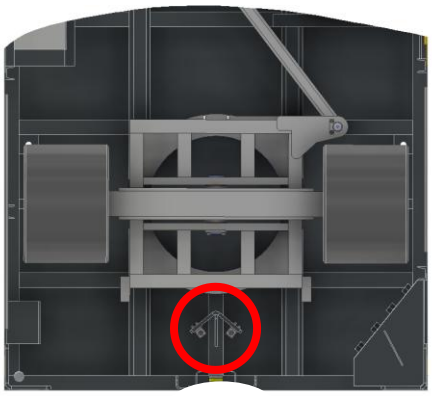
Encoder position on front axle



Steering encoder



Steering limit switch



Rear axle limit position

3.3.4 Traction and braking

Traction is exerted on the front wheels.

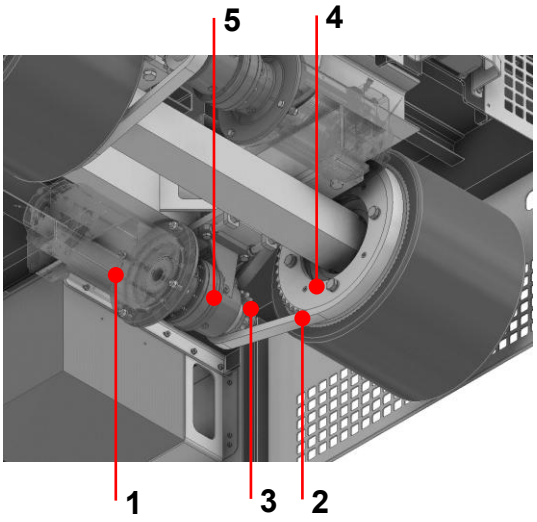
Each wheel is driven by an electric motor **(1)**, via a chain **(2)** on a pinion **(3)** and sprocket **(4)**. The transmission is realised by means of a gearbox **(5)** with helical teeth.

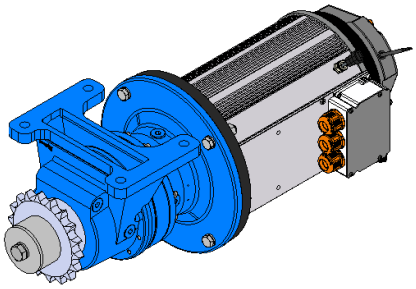
The translation, which is electronic, allows gradual acceleration and deceleration ramps, millimetre shifts, smooth speed changes.

The tensioning of the drive chains is adjustable by means of special screws **(6)**.

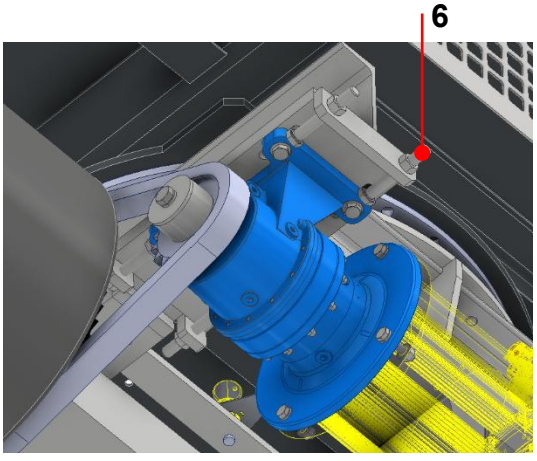
Operating braking is achieved through negative torque of the traction motors.

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





Gear motor

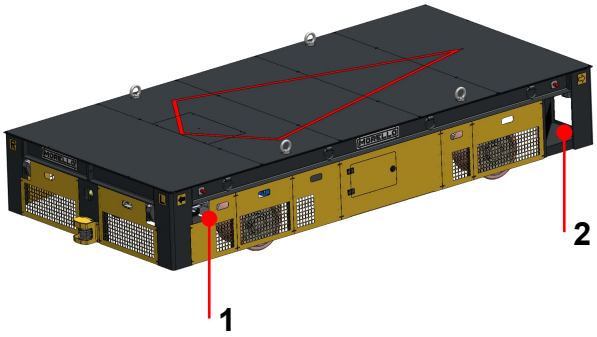


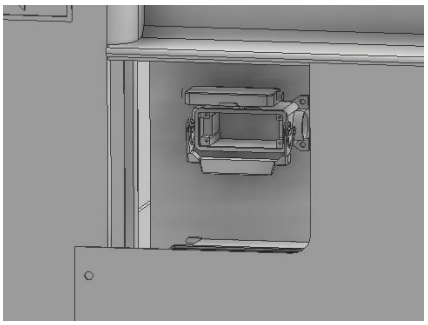
3.3.5 Control devices

Machine movements are controlled via the control panel (radio control or wired control panel).

The operator can carry out all commands using just one device connected.

On the machine there are two sockets **(1)** for connecting the wired hand control and a compartment **(2)** for storing the hand control when not in use.





Socket (1)



Wired control panel



Radio-control

CAUTION

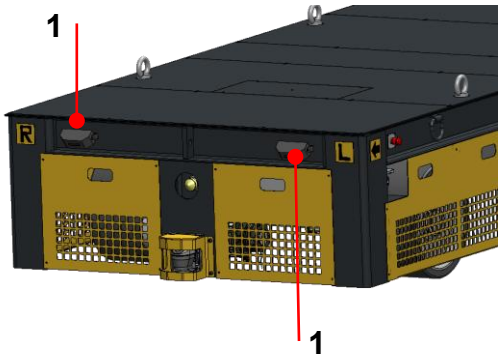
Only one operator is required to operate the machine, who must position himself as indicated in the "Operator workstation" section.

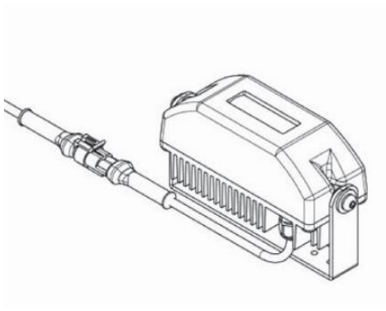
3.3.6 LED Projectors (if required)

LED devices **(1)** are installed on all four sides of the machine to project its footprint onto the floor.

The projectors can be adjusted by the operator, who can choose the position of the red light according to operational requirements.

The LEDs automatically turn on when the machine is in motion.





Led projector (1)

Images for illustrative purposes

CAUTION

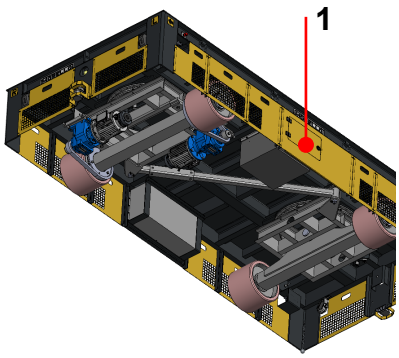
The projectors do not constitute a safety function and serve solely as a visual aid.

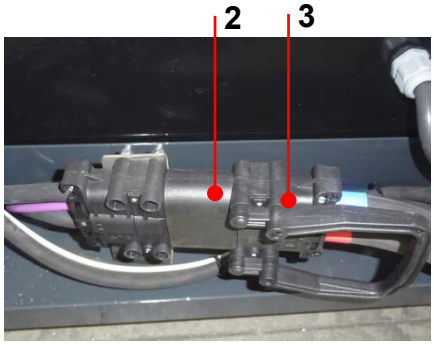
3.3.7 Power supply

The machine is powered by a lithium battery **(1)**, placed in a special compartment.

The socket **(2)** of the battery, located near the battery, can be connected to the plug **(3)** of the machine, for its power supply, or to that of the rectifier for charging operations.

The connectors are accessible via a special hatch.





Example image

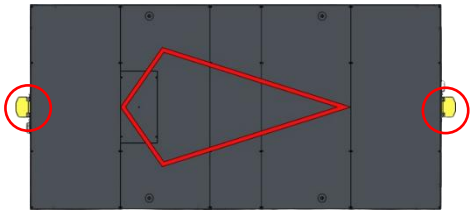
3.3.8 Laser scanner (if required)

A laser scanner **(1)** is installed at the front and rear of the machine for slowing down and stopping the machine in the presence of obstacles.

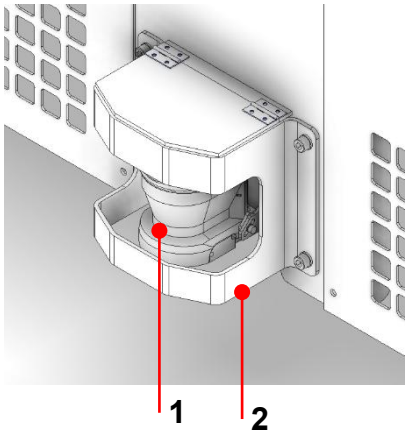
The devices are protected by casings **(2)** made of sheet steel.

There are two areas of intervention:

- Slowdown: if an obstacle is intercepted in this area, there is a slowdown of the machine.
- Stop: if an obstacle is intercepted in this area, the machine stops immediately.

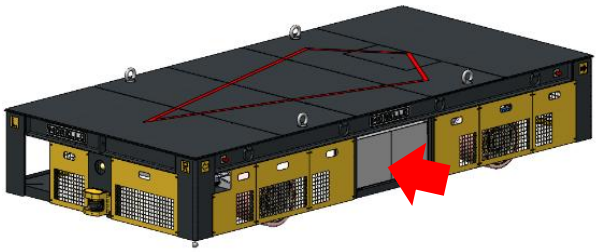


Laser scanner position



3.4 PUSHBUTTONS

3.4.1 Pushbutton on electric panel



Position



Image

IMAGE	DESCRIPTION
	**Power-on key selector switch** Turn to position (1) to switch on the machine. Turn to position (0) to switch off the machine.
	**Insertion services white luminous button** Press to insert the auxiliary services.
	**Voltage on white led** When alight, it indicates the machine is powered.
	**Battery additional time orange luminous button** This switches on to indicate that the battery has reached approx. 30% autonomy. Pressing restores power to the machine for another 15 minutes, to be able to reach the recharging station.

IMAGE	DESCRIPTION
	**Red luminous generic fault button** When alight it indicates there is a fault/emergency. Check the cause of the fault/emergency on the display.
	**Red LED lamp of intervened scanners** Its switching on signals that the laser stop area has been intercepted scanner.
	CAN net programming port connector.
	**Battery Display (lithium nattery)** This tool allows you to view battery information (remaining charge, voltage, amperage, etc.). Please refer to the attached battery manual for more information.

3.4.2 Wired control panel / Radiocontrol



IMAGE	DESCRIPTION
	**Pushbutton on key selector (SIDE)** Turn to (I) to switch on the control pushbutton panel. Turn to (O) to switch off the control pushbutton panel.
	**Green START / HORN button (SIDE)** Press to enable the pushbutton after it has been switched on. Press to activate the horn while the machine is in use.
	**0° button (SIDE)** Press to straighten steering wheels.
	**Green indicator light ON** When lit, signals that the pushbutton is switched on.
	**Lever RESET / SAFETY OFF** Push the lever to RESET to perform the auxiliary switch-on. If the lever is pushed to SAFETY OFF (held in this position), the laser scanners are disabled (if required). If it is held down for more than 60 seconds, an alarm is generated.

IMAGE	DESCRIPTION
	**Lever for selecting maximum travel speed** Push on 'HARE' to set the maximum speed of 30 m/min. Push on 'SNAIL' to set the maximum speed of 15 m/min.
	**Emergency button** Press if there is a hazardous situation to immediately stop the machine. To reset it, turn it clockwise.
	**Steering lever LEFT / RIGHT** Operate the lever to steer to the left or right. The lever is maintained action.
	**Handling lever FORWARD / BACKWARD** Act on the lever to move the machine forwards or backwards. The lever has a maintained action. The travel speed is proportional to the pressure exerted.
	Connector for wired pendant control cable.

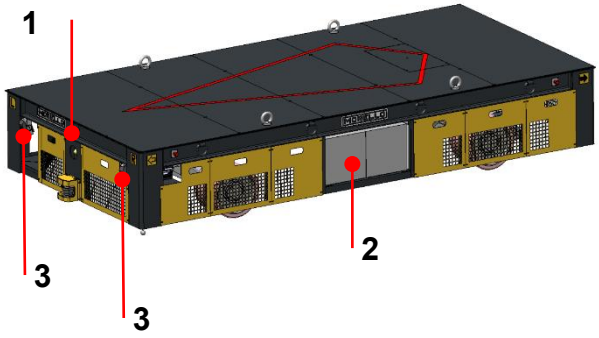
ADDITIONAL INFORMATION

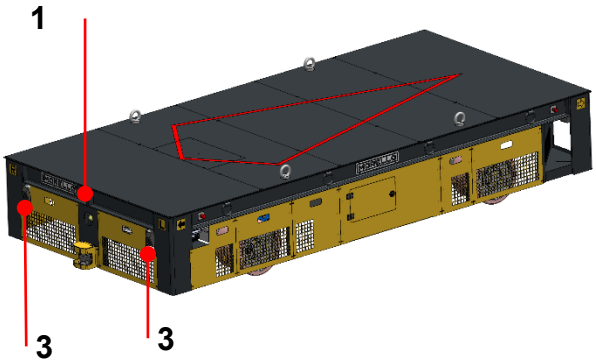
The battery of the radio-control is to be recharged even if not used, following the frequency indicated in the manual of the manufacturer. For further information regarding the radio-control and the recharge, see the relevant manual attached.

3.5 VISUAL AND ACOUSTIC INDICATIONS

The following visual and acoustic indication devices are installed on the machine:

1. Lamp
2. Buzzer
3. LED projector for space indication (if required)





1



2



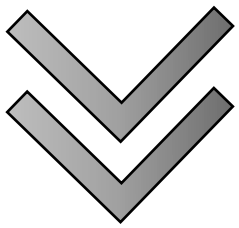
3



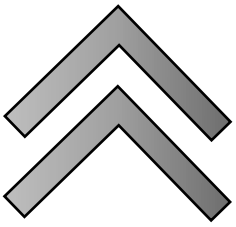
SIGNALLING	DESCRIPTION
YELLOW FLASHING LIGHTS + BUZZER	They are activated during machine movement and deactivated when the machine is completely stationary.

ADDITIONAL INFORMATION

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



TRANSPORT AND STORAGE



SELF-PROPELLED ELECTRONIC TROLLEY WITH TYRES
Serial number 2555C3

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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 it.

The packaging does not protect the machine against external weather conditions, such as rain, snow, hail, etc even if it is transported in wooden cases. Therefore, if it remains exposed to weather conditions it is indispensable that it remains in the closed container until the final storage.

The storage site is to be appropriate for use as a machine warehouse: closed, protected against weather conditions, clean and ventilated. The floor is to be able to sustain the weight of the machine. Environment temperature is to be between 0 ° C and + 30 ° C.

The Manufacturer shall not be held liable for damage caused by long periods of storage or under conditions that differ from those indicated.

4.1.1 Storage of battery/batteries

When not used, the battery is to be kept in a covered area that is protected against weather conditions, dry, free of dust and protected against frost. Inspect and recharge at regular intervals, at least monthly. Run complete recharging cycles before periods of long inactivity.

ADDITIONAL INFORMATION

For any other information regarding the battery, see the relevant manual attached.

4.2 TRANSPORT

The machine may be shipped, according to the destination, in the following ways:

- BY SEA → The machine is enclosed in a flat-bottom case and anchored with tie-bars. The case is lined with tarred paper and it contains bags with drying salts to protect against humidity and salinity.
- BY AIR → The machine is enclosed in a flat-bottom case and anchored with tie-bars.
- BY LAND → Land transport can be divided into two categories:
    - LONG-DISTANCE TRANSPORT the machine is covered with protective sheets, closed in a flat bottom wooden case and anchored on the truck loading bed with tie-bars.
      To lift the case, scrupulously follow the instructions stamped on the outside of the packaging. The packaging can be recovered for possible re-use, it is therefore a good rule to keep it in a protected place, to avoid damage that could affect the reliability. If instead it is to be disposed of, it is the responsibility of the Customer to dispose of it in accordance with the regulations of the country.
    - MEDIUM AND SHORT-DISTANCE TRANSPORT the machine is secured to a flatbed and covered with protective sheets.

The anchorage points for lifting are indicated on the shipped packages.

Furthermore, externally on the packages there are all the indications to identify the contents and for the safe handling:

- Address of the receiver and the sender.
- Dimensions (length, width, height).
- Gross, net weight and tare.
- Centre of gravity.
- Notes and symbols (e.g. fragile, this way up, etc.).
- Packing list holder label (to be contained inside each package).

4.3 LIFTING

Before any handling and/or lifting operations, it is important to know the weight.

NOTE



All handling and lifting operations are to be carried out by qualified operators, who know the standards regarding lifting and handling of loads, so that it can act in full respect of them.

NOTE



Use suitable lifting equipment, appropriate for the weight and overall dimensions of the load to be handled.

NOTE



Always check the correct balancing of the load. If it is unbalanced, immediately rest it on the ground and rearrange the slings appropriately.

CAUTION



When the load is lifted by more than 50 cm from the ground, the operators are to remain at a safe distance of more than 2 m from the perimeter.

Breakage of a chain or an uncontrolled movement of the load is, in fact, a serious hazard for the safety of the operators.

4.3.1 Weight/s

DESCRIPTION	WEIGHT
Machine (total weight)	Approx. 5.500 kg

4.3.2 Complementary to the machine

The Manufacturer, as well as the delivery of the machine, also supplies:

- N.1 Rectifier for battery recharging, complete with cables.
- N.1 Battery charger for the radio-control.
- N. 4 Fixed M36 eyebolts for lifting the machine.

ADDITIONAL INFORMATION

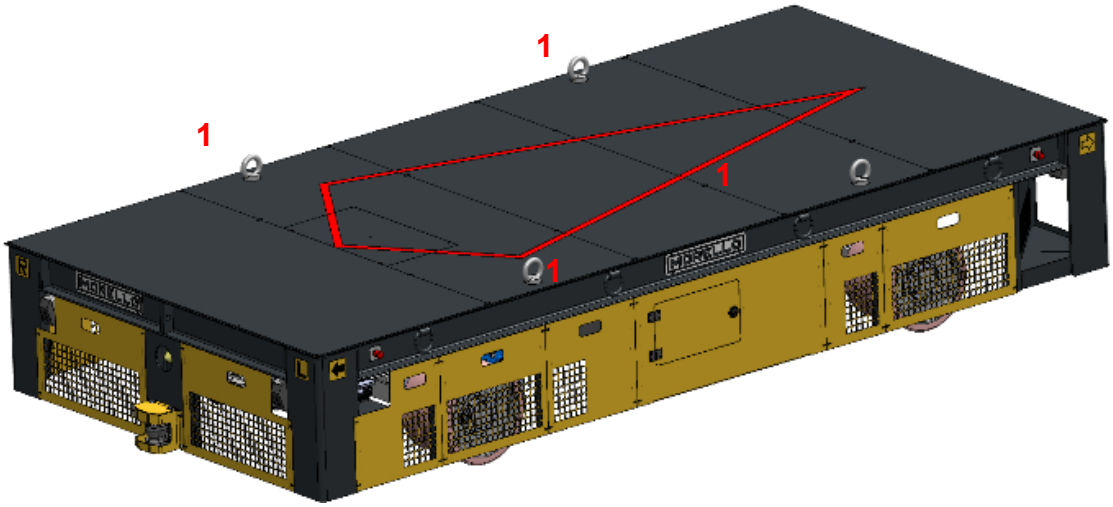


For further information regarding the additional devices, see the relevant documentation.

4.3.3 Machine lifting

To lift the machine, proceed as follows:

- Ensure that 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 the integrity and cleanliness of the thread.

To orientate the eyebolts correctly, insert suitable washers.



Images for illustrative purposes

- Insert appropriate hooks with chains in the four eyebolts.
- Secure the chains to the hooks of an appropriate lifting.
- Slowly lift the machine taking care to balance it correctly.
- Transport it is avoiding abrupt movements and keeping it as close to the ground as possible.
- Upon arrival at destination, slowly and gradually rest it on the ground.
- Only release the chains after the machine is resting perfectly on the ground.
- Remove the eyebolts.

LIFTING DIAGRAM

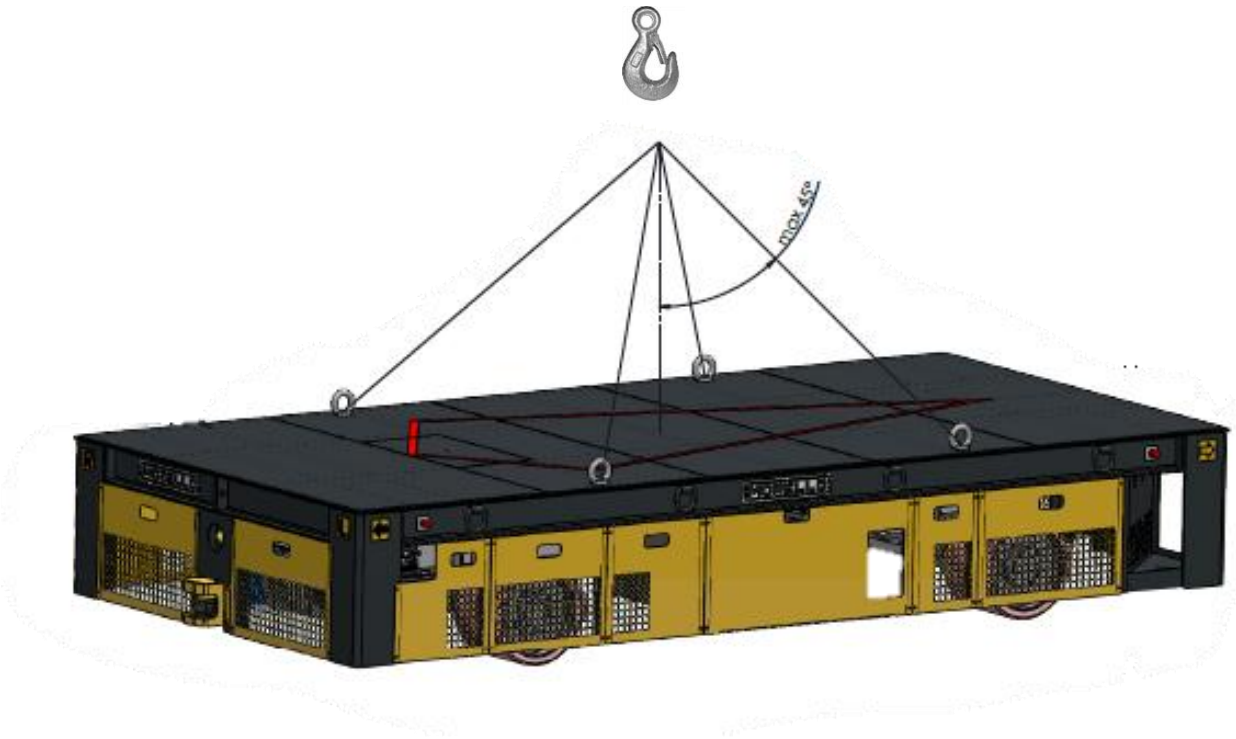
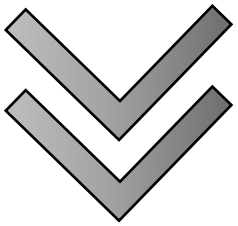
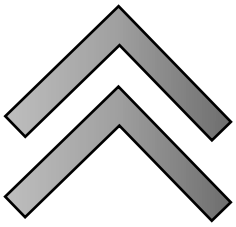


Image for illustrative purposes



INSTALLATION



SELF-PROPELLED ELECTRONIC TROLLEY WITH TYRES
Serial number 2555C3

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5. INSTALLATION

Before using the machine, the following have to be removed:

- Any fastening restraints used for transport.
- Protective packaging.

5.1 INTACTNESS CHECK

The machine has to be checked to ensure that no damage has occurred during transport. Therefore, in the case of accidents or if visible damage is seen (signs or traces of impact), please notify in this manner:

- With a written notification on the Shipping Document.
- Informing the carrier and the Manufacturer of the damage found by means of registered letter, within 48 hours of the machine delivery.

5.2 INSTALLATION OF THE MACHINE

NOTE



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

5.2.1 Choice of place of use and check on requirements

The Customer **MUST** provide:

- A sufficiently large room, free of obstacles, equipped according to the safety standards in force in the user country.
- Correct ventilation and lighting.
- Appropriate lifting devices.
- Operational spaces.
- Passageways.
- Escape routes.
- Flat floor that is level and smooth, able to sustain the weight of the machine and the load on.
- Areas suitable for battery recharging (interior environment).

5.3 CHECKS AND INSPECTIONS

Before starting the machine, some general controls and checks have to be carried out to avoid risks or problems during machine operation.

CAUTION



These checks and preparation for the first start-up are to be carried out by a specialised technician of the Manufacturer or by a specialised technician who has been specifically trained.

NOTE



Before starting any movement, make sure there are no anomalies to avoid damage to the machine. Before deleting any fault, check the cause and remove it.

ADDITIONAL INFORMATION



The checks and inspections that follow are to be considered as routine maintenance operations.

ADDITIONAL INFORMATION



Refer to specific manuals for information on built-in devices.

5.3.1 Overall checks on mechanical units

WARNING



These checks and inspections are to be carried out with the machine stationery and energy source deactivated and cut-out. Ensure the working area is clear and free of obstructions.

- Visually check the wheel groups, checking there are no mechanical faults (ovalizing, crushing, warping due to loads and/or foreign objects).
- Perform a general visual inspection of the various groups that make up the machine, verifying that there are no particular mechanical anomalies or foreign bodies.
- Check that all the guards are mounted correctly.
- Check that moving parts are correctly lubricated.
- Check for correct tightness of all nuts and bolts.

ADDITIONAL INFORMATION



To check the tightness, see the table in the paragraph “Tightening torques” in the chapter “Maintenance”.

NOTE



If problems arise, contact the Manufacturer immediately.

5.3.2 Electrical system check

Proceed with a general check on the electrical system and in particular check that all the junction boxes are closed and all the conductors are connected.

Main switch

- Rotate the voltage input selector on (1) and verify the presence of voltage, by turning on the appropriate lamp.

Motor/s

- Check correct connection of the motor/s.

Pushbutton panels

- Check correct functioning of the buttons and selectors with consequent switching on of the luminous indicators.
- Check that the machine movement corresponds to the relevant control.

Indicators and sensors

- Check correct connection and functioning of the buzzer and the horn.
- Check the correct connection and operation of the lamps.
- Check the correct connection and function of the limit switches and encoder.
- Check the correct connection and function of the laser scanner.

ADDITIONAL INFORMATION

For further information and details, see the wiring diagram.

5.3.3 Checks on safety devices

Check that the guards and the safety devices are correctly assembled and functioning.

WARNING



Machine safety cannot be ensured if safety devices are removed or tampered with.

CAUTION



Carry out the functional, tightness and positioning checks of the safety systems as indicated in chapter 2.

NOTE



These control procedures are to be applied as normal maintenance procedures.

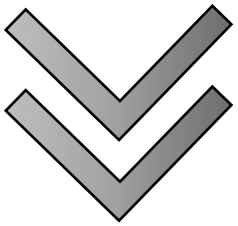
5.4 UNIVERSAL INTERNATIONAL RECYCLING CODES

Symbol	Code	Description
Plastics		
	#1 PET o PETE	Polyethylene terephthalate or arnite: water bottles, soft drink bottles, shampoo bottles
	#2 HDPE	High-density polyethylene: containers of yogurt, detergent bottles
	#3 PVC o V	Polyvinyl chloride: food containers
	#4 LDPE	Low Density Polyethylene: frozen food bags, squeezable bottles
	#5 PP	Polypropylene or MOPLEN: bottles
	#6 PS	Polystyrene or Styrofoam: disposable glasses
	#7-#19 O	Any other plastics
Paper		
	#20 PAP	Corrugated Cardboard: boxes of furniture to assemble
	#21 PAP	Paperboard, not corrugated: packaging of sandwiches in fast-food
	#22 PAP	Paper: pack of fries in fast-food, newsprint, paper bags
	#23-#39	Other types of paper
Metals		
	#40 FE	Steel
	#41 ALU	Aluminium: cans
	#42-#49	Other types of metal
Wooden materials		
	#50 FOR	Wood

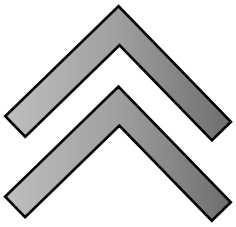
Symbol	Code	Description
	#51 FOR	Cork
	#52-#59	Other types
Textiles		
	#60 TEX	Cotton
	#61 TEX	Jute
	#60-69	Other textile materials.
Glass		
	#70	Transparent / colourless glass: water bottles
	#71	Green glass: wine bottles
	#72	Brown glass: bottles of beer
	#73-79	Other materials in glass and cans
Composite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

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SELF-PROPELLED ELECTRONIC TROLLEY WITH TYRES
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USE



SELF-PROPELLED ELECTRONIC TROLLEY WITH TYRES
Serial number 2555C3

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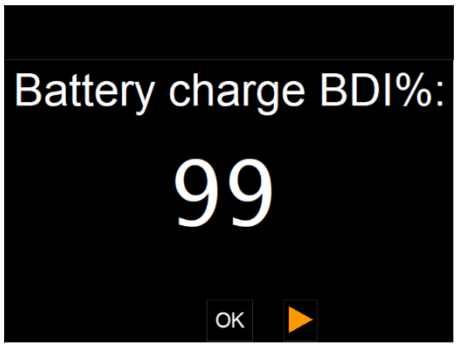
6. USO

6.1 VIDEO PAGES

On the electric panel there is an LCD screen display to view the information regarding the machine.

The screens that can be displayed on the screen are shown below. You can scroll through the screens using the arrows.

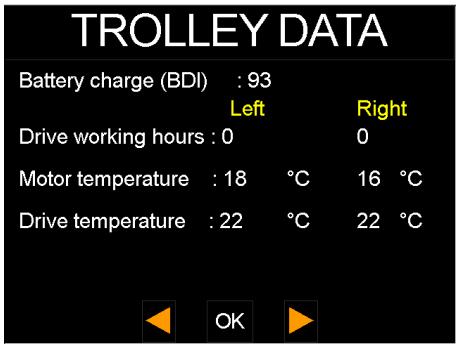
6.1.1 Screen 1: battery remaining charge



This page indicates:

- Battery remaining charge level.
- Any faults / emergency present.

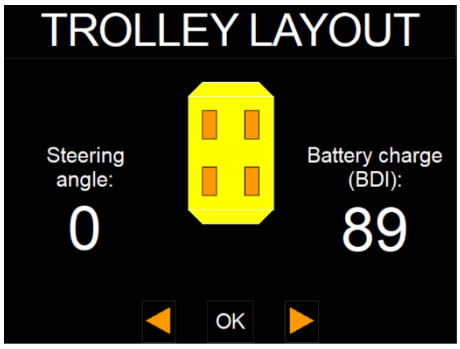
6.1.2 Screen 2: trolley data



This page displays the data regarding:

- Battery remaining charge level.
- Working hours of motor drives.
- Motors temperature in degrees Celsius (°C).
- Temperature of motor drives in degrees Celsius (°C).
- Any faults / emergency present.

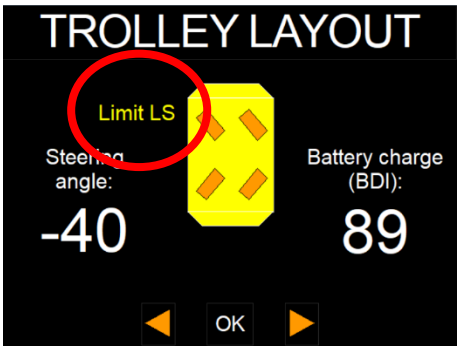
6.1.3 Screen 3: movements

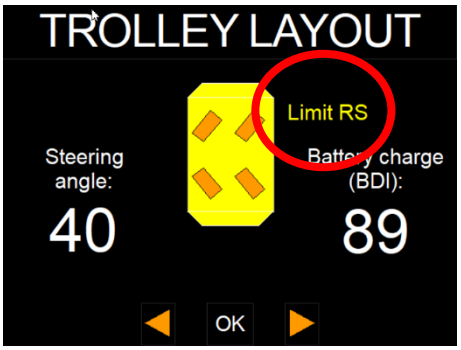


This page displays the data regarding:

- Battery remaining charge level.
- Position of steering wheel.
- Wheels steering angle.
- Steering direction (blue arrow).
- Any faults / emergency present.

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



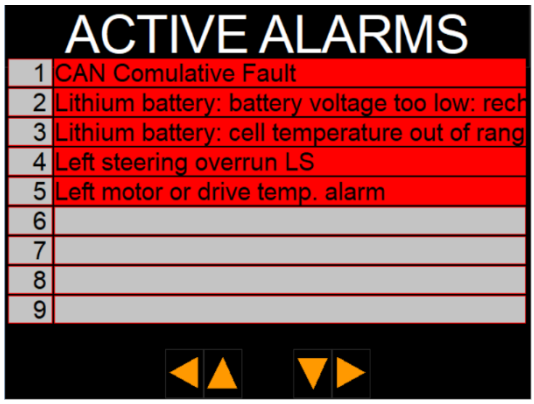


NOTE

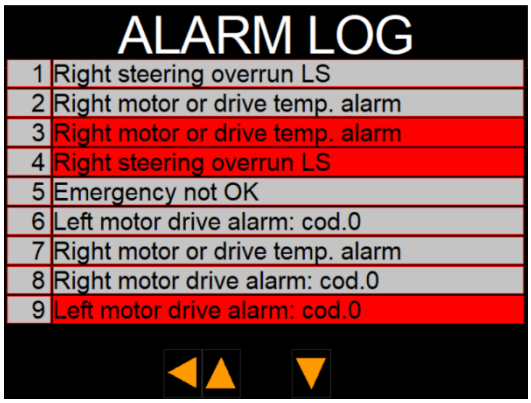
If the overrun limit switch triggers, the red generic fault luminous button on the electric panel switches on.

6.1.4 Screens 4 and 5: alarms

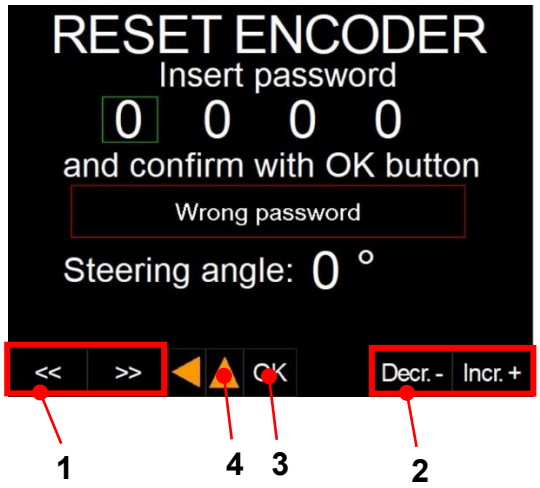
The following screen displays active alarms. The list/pages can be scrolled using the arrows.



On the following screen it is possible to view a history of the alarms in chronological order. Red highlighted lines show active alarms, while grey lines show reset alarms.



6.1.5 Screen 6: Encoder reset



Using this screen, the steering encoder can be reset after entering the access password.

NOTE

Please contact the manufacturer for the password.

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

To perform a reset, after having positioned the steering axis appropriately press the button below the arrow **(4)** and hold for 5 seconds.

6.2 ALARMS

A list follows of possible alarms that may be shown on the display.

NOTE

All the operations to be carried out to reset the fault are to be carried out by a specialised technician.

NOTE

For further information and details regarding how to solve faults that could occur, contact the Manufacturer.

ALARM DISPLAYED	CAUSE	ACTION
Emergency not OK	Emergency circuit has activated.	Remove the cause of the error or the hazard and reset the emergency. SPECIALISED TECHNICIAN: Check electrical continuity of the emergency circuit and correct functioning of the emergency devices.
Right motor drive alarm: cod.[xxxx] **Left motor drive alarm: cod.[xxxx]**	Inverter fault.	SPECIALISED TECHNICIAN: Make sure the battery is charged. Check that the inverter protection fuses are intact. Check that the relevant motor is not blocked or impeded. Check that there is voltage on the auxiliary circuits (24 Vdc). Check drive alarms through the control desk or the configuration software.
Right motor or drive temp. alarm **Left motor or drive temp. alarm**	Motor overload, motor blocked, battery flat, interruption of a phase or temperature sensor failure.	SPECIALISED TECHNICIAN: Make sure the battery is charged. Check that the motor is not impeded, or blocked. Check continuity of the drive and the motor power circuits. Check continuity of the temperature sensor.
Battery low	Battery flat.	Recharge the battery.

ALARM DISPLAYED	CAUSE	ACTION
Right steering overrun LS **Left steering overrun LS**	Incorrect positioning of the steering wheels by software due to possible encoder failure or encoder slippage.	SPECIALISED TECHNICIAN: Reset the steering encoder if it is not aligned with the mechanical zero position. After the reset, move wheels several times and check there is no discrepancy between the mechanical zero position and the zero shown on the display. Check that the encoder is secured correctly with no mechanical slipping. Check cables and wiring of the encoder. Check that the encoder functions correctly, watching the position on the display during the steering. If necessary, replace.
	Overrun limit switch fault.	SPECIALIST TECHNICIAN: If the steering axle has not reached the overtravel limit switch activation position, check the operation of the limit switch, the limit switch power cable and the wiring
Encoder not OK	Encoder fault.	SPECIALISED TECHNICIAN: Check the electrical connection. If connected correctly, contact the Manufacturer.
CAN Cumulative Fault	CAN communication with errors.	SPECIALISED TECHNICIAN: Check the electrical connection. If connected correctly, contact the Manufacturer.
CAN Encoder Fault	No CAN communication between encoder and PLC.	SPECIALISED TECHNICIAN: Check the electrical connection. If connected correctly, contact the Manufacturer.
CAN Pushbutton Fault	No CAN communication between control pushbutton panel and PLC.	SPECIALISED TECHNICIAN: Check the electrical connection. If connected correctly, contact the Manufacturer.
CAN Right Driver Fault	Missing CAN communication between right motor control driver and PLC.	SPECIALISED TECHNICIAN: Check the electrical connection. If connected correctly, contact the Manufacturer.
CAN Left Driver Fault	Missing CAN communication between left motor control driver and PLC.	SPECIALISED TECHNICIAN: Check the electrical connection. If connected correctly, contact the Manufacturer.

ALARM DISPLAYED	CAUSE	ACTION
Steering offset is ZERO	No ZERO offset setting.	Contact the Manufacturer.
Fault PLC in STOP	PLC hardware or power supply fault.	SPECIALISED TECHNICIAN: Check the status of the PLC via the diagnostic LED. Check the electrical connection. Contact the Manufacturer for more information.
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.	See the battery manual.
Front laser scanner: area switching feedback missing **Rear laser scanner: area switching feedback missing**	Relay failure or disconnected wire.	Contact the Manufacturer.
Interference for Laser scanner	The laser scanner stop area has been intercepted.	Free the area, removing the obstacle and reset the alarm.
Laser scanner bypass activated	Laser scanner bypass is activated (laser scanners are excluded).	SPECIALISED TECHNICIAN: Reset the laser scanners by turning the relevant bypass 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 BYPASS lever.

6.3 PRELIMINARY PROCEDURES FOR MACHINE MOVEMENT

Before starting to move the machine, the operator shall:

- Check there is no foreign matter attached to the wheels and that these are not warped.
- Check correct functioning and position of the safety devices installed.
- Check that there is no maintenance/cleaning in progress on the machine.
- Check that all the guards are assembled correctly.
- Check correct functioning of limit switches.
- Check correct functioning on control devices.
- Check correct connection of the machine power supply plug to the battery socket.
- Verify the correct insertion of the wired control panel connector into the socket on the machine (if used).
- Check that the batteries of the radio-control are charged (if used).
- Check that the battery charge level of the machine is sufficient.
- Check the absence of fault signals.
- Check that the electrical cabinet doors are properly 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 operated using one of the two control panels supplied.

WARNING

Before starting handling operations, make sure there are no obstacles or people near the machine and that no people are in the danger zone.

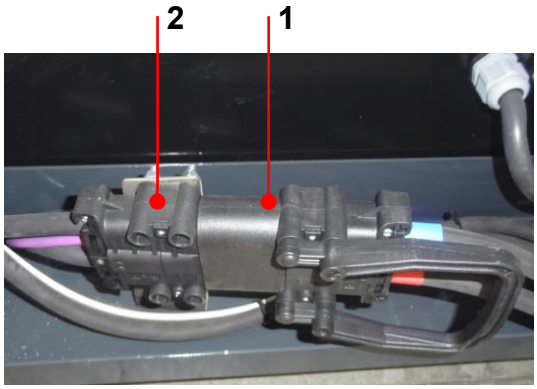
CAUTION

The use of manual operating mode is not permitted by unqualified person.

6.4.1 Battery connection

Before starting-up the machine:

- Open the access door to the connectors.
- Insert the machine's power plug **(1)** coming out of the electrical cabinet) into the battery socket **(2)**.
- Close the hatch.



Example image

6.4.2 Starting the machine with a wired control panel

To start the machine, proceed as follows:

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

NOTE

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

- **Electrical panel:**
  - Insert the key into the voltage selector switch and turn it to position (1).
  - The switched-on voltage LED lights up.
- **Wired control panel:**
  - Switch on the hand control by inserting the appropriate key and turning the selector switch to position (I).
  - The ON lamp lights up.
  - If pressed, release the emergency button.
  - Press the green START button.
- **Electrical panel:**
  - Press the luminous white insertion services button (alternatively push the relevant lever of the wired control panel to RESET).
  - The internal LED of the service button lights up.

You are ready to move the machine.

NOTE

Do not disconnect or connect the wired control panel unless the machine has first been de-energised (voltage switch in position “0”).

6.4.3 Starting the machine with radio-control

To start the machine, proceed as follows:

- **Radio-control:**
  - Switch on the hand control by inserting the appropriate key and turning the selector switch to position (I).
  - The ON lamp lights up.
  - If pressed, release the emergency button.
- **Electrical panel:**
  - Insert the key into the voltage selector switch and turn it to position (1).
  - The switched-on voltage LED lights up.
- **Radio-control:** Press the green START button.
- **Electrical panel:**
  - Press the luminous white insertion services button (alternatively push the relevant lever of the wired control panel to RESET).
  - The internal LED of the service button lights up.

You are ready to move the machine.

NOTE



Before changing the pushbutton panel (by radio-control to wired control panel and vice versa), switch off the pushbutton and the machine using the appropriate selector switches.

6.4.4 Machine handling (traversing and steering)

To move the machine, after start-up, proceed as follows.

Via the control panel in use (radio-control or wired control panel):

- Set the maximum travel speed by means of the travel speed selector switch.
- Exert pressure on the FORWARD / BACKWARD movement lever to move the machine. The travel speed is proportional to the pressure exerted. Release the lever to stop the machine.
- In order for the machine to perform the required wheels angle change, exert pressure on the steering lever LEFT/RIGHT. The maximum steering angle of the wheels is ± 35°. Releasing the lever stops the steering movement.

CAUTION



It is the responsibility of the operator who uses the machine to check that during movement there are no objects or persons in the area.

CAUTION



Only one operator is required to manage the machine, who is to position as indicated in the paragraph “Operator workstation”.

NOTE



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

NOTE



Before starting any movement, make sure there are no anomalies to avoid damage to the machine. Before deleting any fault, check the cause and remove it.

Pay attention to the lighting up of the general fault indication lamp and the indications shown on the display.

6.4.5 Direction indicators

On the machine there are visual indications regarding the directions.

DISPLAY	DESCRIPTION
	FORWARD
	BACKWARD
	LEFT
	RIGHT

6.4.6 Start-up after an emergency stop

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

- Remove CAUTION cause of the error or the hazard.
- Reset the EMERGENCY STOP button by turn it clockwise, if pressed.
- Wired control panel / radio-control: press the START button.
- Electric panel: press the white luminous service button and check that the internal LED lights up.

The machine is ready to move.

6.4.7 Laser scanner intervention (if required)

In the presence of an obstacle in the stop area, the machine stops. On the control panel, the "scanners intercepted" LED lights up steadily and the "services insertion" LED flashes.

To reset the laser scanners, it is necessary.

Remove the obstacle.

CAUTION



If it is not possible to remove the obstacle, use the 'BYPASS' command on the control panel to exclude the laser scanners, and move the machine in manual mode until the intervention areas are disengaged.

It is the responsibility of the operators using the machine to ensure that the area is clear of people and things during movement.

Press the service button on the control panel to reset the safety functions (or, alternatively, press the RESET lever on the control panel).

6.4.8 Parking brakes

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

NOTE



It is not possible to tow the machine because the negative brakes of the electric motors prevent wheel movement. If it is necessary to release the motor brakes, contact the manufacturer.

6.4.9 Shutting down the machine

To shut down the machine, proceed as follows:

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

NOTE



Do not disconnect the wired control panel if no tension has been removed to the machine before (voltage selector switch in “0” position).

- Switch off the machine, turning the power-on selector on the electric panel to (0) and take out the key.
- If used, disconnect the wired control panel from the machine.

NOTE



In the case of long periods of disuse, or for maintenance operations, disconnect the machine plug from the battery socket to cut out the electrical supply.

NOTE



Do not leave the load on the machine.

6.5 LOAD POSITIONING

It is recommended that the load be placed on the supporting beams without shocks, which would cause additional stresses within the supporting structure and the mechanical parts of the machine.

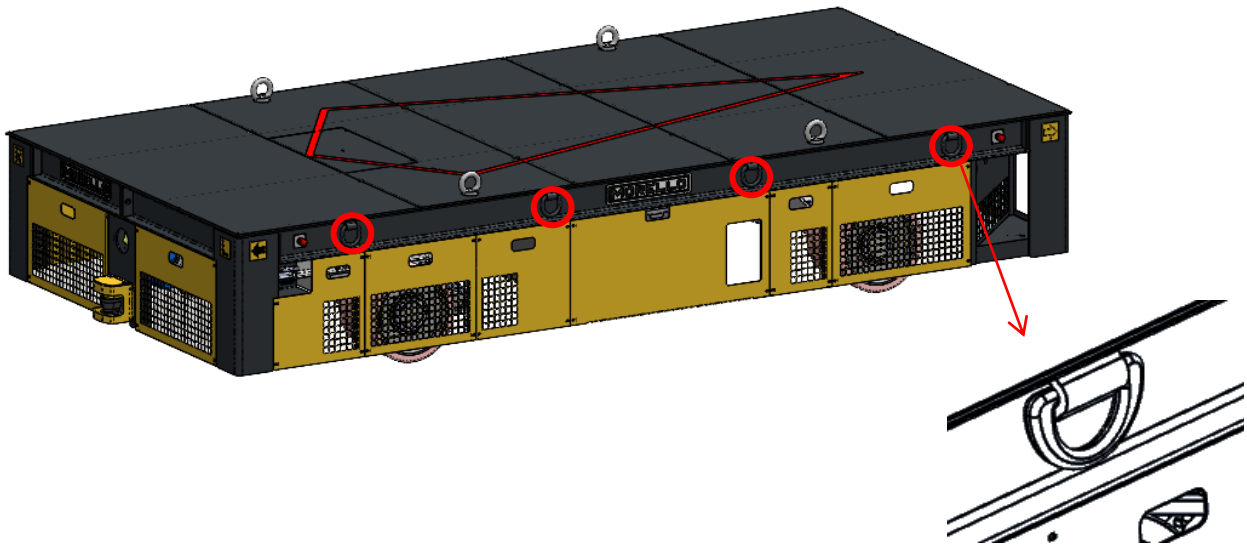
WARNING

Distribute the load evenly over the machine plane, taking care to check that the centre of gravity of the load is within the stability zone.

NOTE

It is the operator's responsibility to place the load correctly on the machine and to follow the maximum load capacity instructions.

The machine is equipped with eight points for anchoring the load (n.4 per side), as shown in the following image.



Load anchoring points – Image for illustrative purposes only

WARNING

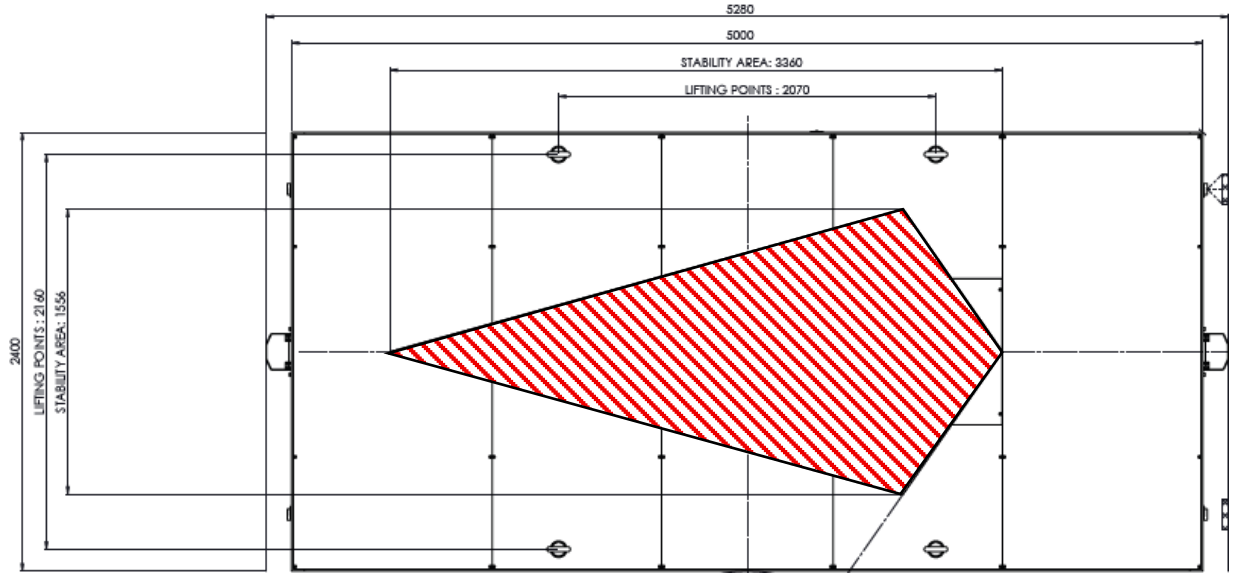
It is the operator's responsibility to anchor the load before handling the machine, using suitable slinging systems appropriate to the size of the load.

6.5.1 Stability area

There are four points that allow the frame to discharge the weight of the load to the ground, as shown in the following image. There is therefore "an area of stability" given by the junction of these points.

WARNING

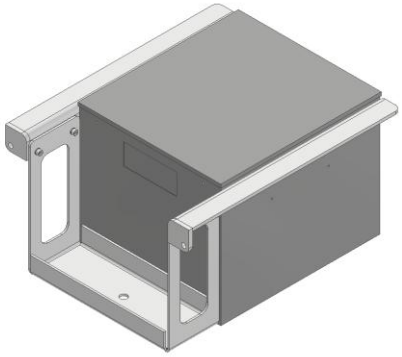
To avoid overturning hazards, the centre of gravity of the load must always be positioned inside this area.



Stability area (red)

6.6 BATTERY

For the first use of the machine nothing is required, since the battery inside is already charged 100 %.



6.6.1 Flat battery and extra time

Battery autonomy with full 100 % charge, indicated in the technical data table, has been calculated with an effective use on a flat surface (50% with full load and 50% empty).

When a residual charge remains of approx. 30% the machine stops and the orange luminous extra time button on the electric panel switches on. To be able to move the machine again, it is necessary to press this button. This resumes autonomy for approx. 15 minutes to reach the recharging station.

After this additional time has expired it is obligatory to recharge the battery.

NOTE

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

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

For possible release of the brakes contact the Manufacturer.

6.6.2 Maintaining the lithium battery

ADDITIONAL INFORMATION



For information on the battery (charging frequency, mode and temperature of use and storage, maintenance, etc.) please refer to the manual of the same annex.

To maintain the battery, it is recommended to:

- Never drop below 20 % residual charge.

NOTE



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

- When not in use, store the charged battery in a dry, frost-free place.

NOTE



The battery charge level decreases even if it is not used. Therefore, 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 on the battery and on rectifier, see the relevant manuals attached.

6.6.3 Maintaining the Lead Acid Battery

ADDITIONAL INFORMATION



For all information on the battery (recharging frequency, use and storage modes and temperatures, maintenance, etc.) please refer to the battery manual enclosed.

In order to prevent damage to the battery, and to maintain its performance over time, at least once every four weeks carry out one of the following operations:

- Use the machine by fully discharging the battery and recharging it completely.
- Connect the battery to the rectifier to perform a trickle or equalisation charge.

It is recommended to:

- Do not go below 30% residual charge.
- Do not carry out partial recharging.
- Do not leave the battery discharged and idle for too long periods.

NOTE



If the battery is not to be used for an extended period, disconnect it from the machine and store it in a dry, frost-free environment.

NOTE



The battery charge level decreases even if it is not used. Therefore, 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

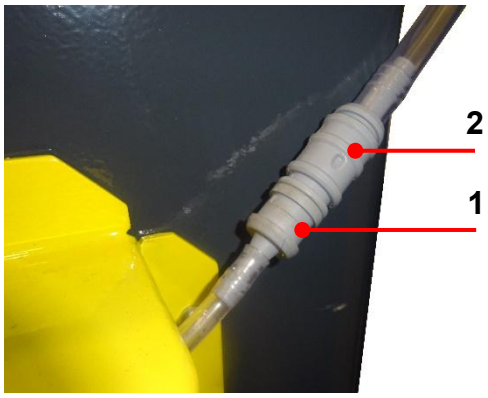


For any further clarification on the battery and rectifier, please refer to the accompanying manuals.

6.6.4 Refilling batteries

Each battery is equipped with an electrolyte level sensor inside it. The equipment required for topping up is supplied with the machine.

Topping up is centralised and takes place via the tube **(1)** (connected to the battery) to which the tube **(2)** of the equipment (supplied) is connected.



Example image

NOTE

Do not top up during the first ten charging cycles.

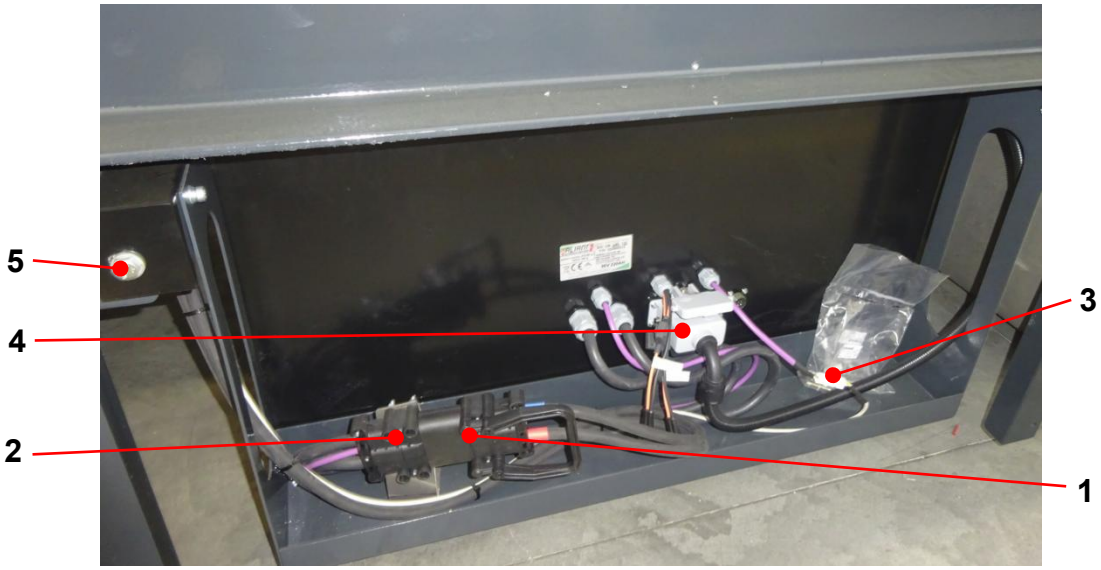
ADDITIONAL INFORMATION

Please refer to the enclosed battery manual for information on the sensor and the topping-up procedure.

6.6.5 Battery removal

To remove the battery, proceed as follows:

- Disconnect the machine power supply, turning the power-on key selector on the electric panel to position (0). Remove the key.
- Unscrew the fixing screws and remove the casing in front of the battery.
- Disconnect the machine's power plug **(1)** from the battery socket **(2)**.
- Lithium battery: disconnect the cable **(3)** of the battery display and the connector **(4)** of the PLC.
- Unscrew the n.2 screws M12 **(5)**, which secure the battery to the machine and remove the respective washers.



Example image for illustrative purposes only

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

To reposition the battery, proceed backwards.

ADDITIONAL INFORMATION

For further information on battery handling, please refer to the accompanying manual.

6.6.6 Battery recharging

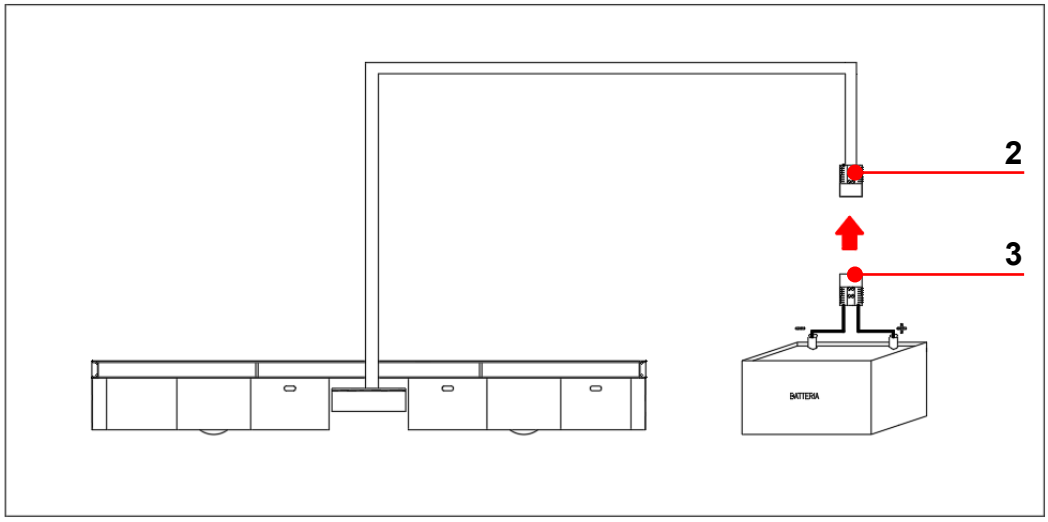
To recharge the battery, proceed as follows:

- Bring the machine to the recharging zone, maintaining the specific safety distances.
- Deactivate the machine power supply, turning the key selector **(1),** on the electric panel, to position **(0)**. Take out the key.

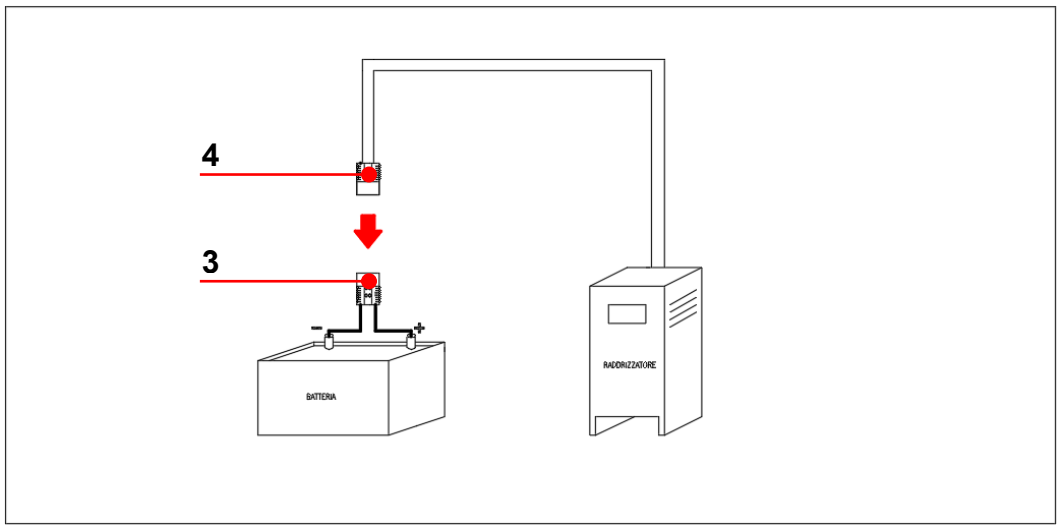


Selector (1)

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

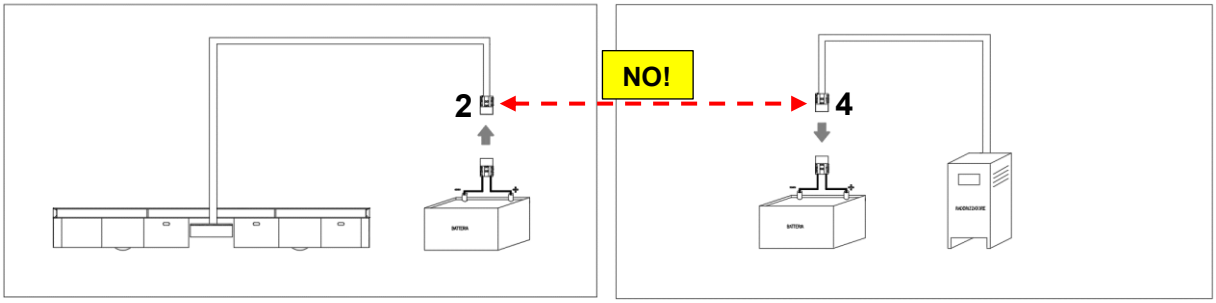


- Connect the rectifier plug **(4)** to the battery socket **(3)**.

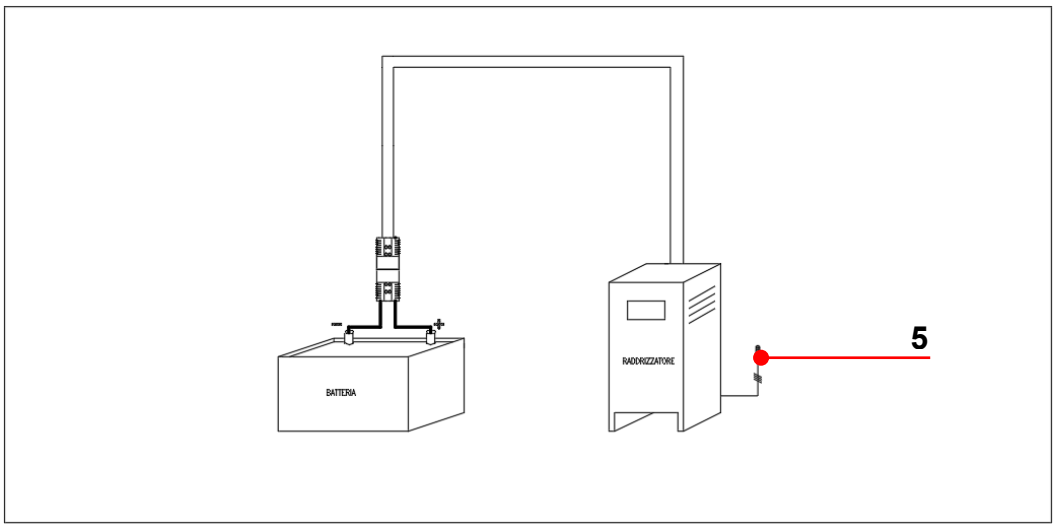


NOTE

Do not connect the rectifier plug **(4)** to the machine power supply plug **(2)** (in output from the electric panel on board).



- Connect the rectifier plug **(5)** to the electrical line.



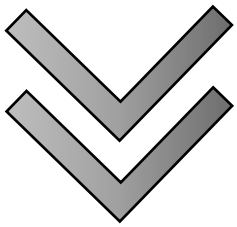
- Operate the battery charging rectifier by turning the switch to ON.
- Wait for the battery to recharge.

When recharging is complete, proceed backwards.

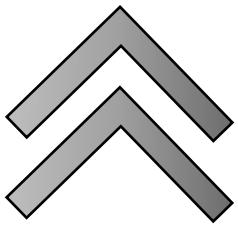
ADDITIONAL INFORMATION

For more information on recharging the battery through the rectifier, please refer to the accompanying manual.

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DISPOSAL



SELF-PROPELLED ELECTRONIC TROLLEY WITH TYRES
Serial number 2555C3

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7. DISPOSAL

The following paragraph contains some suggestions and indications to correctly carry out the operations for putting out of service, dismantling and removal of the machine at the end of its operating life.

CAUTION



The following operations are the responsibility of authorized personnel.

- Make sure that, around the machine, there is sufficient space to enable staff to perform all the necessary movements without risk.
- Disconnect the electrical energy devices.
- Disconnect and remove the battery.

ADDITIONAL INFORMATION



For disposal of the battery, see the relevant manual attached.

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

WARNING



Pay close attention to possible falling machine parts or components during removal. This could cause serious danger to operators.

- Remove the moving parts and separate, as far as possible, the various components for the type of materials (plastic, metal, etc.), in order to be able to be disposed of through a separate collection.
- Remove and move the machine parts from the work area by taking all the necessary precautions.
- Before lifting large/heavy components check correct anchorage of the lifting device and only use adequate slings and equipment.

ADDITIONAL INFORMATION



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

NOTE

In case of difficulty in dismantling, demolition of the machine, or for added security, please contact the Manufacturer and indicate cause of the removal and serial number of the machine.

- The machine is built with various materials, recyclable and not. For this reason, its removal involves adequate separation of the materials: steel, aluminium, copper, bronze, special alloys, plastic, etc.
- The manufacturer assumes no liability for any damage caused by any use of the individual components other than the one prescribed.

NOTE

Demolition is to be carried out in compliance with the laws in force

7.1 RECYCLING

Part of the dismantled materials can be recycled.

For the relevant indications, see the table in Chapter 5 “INTERNATIONAL RECYCLING CODES”.

7.2 DISPOSAL

During the machine working life, waste materials are produced (lubricants).

To dispose of some of these materials, specific standards are in place to safeguard the environment.

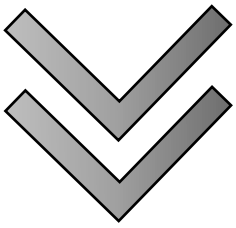
For the disposal of waste lubricants, it is necessary to observe the following environment protection regulations:

- The lubricants risk contaminating water and the soil, therefore never pour the products on the ground, in the water, or the sewage drain. Each breach of these rules can be prosecuted by law. When using lubricants, keep a container for oil within hand's reach.
- Carefully recover all lubricants, by separating the mineral based products with those with a synthetic base. On disposal, comply with the regulations in force on disposal of exhausted oil.

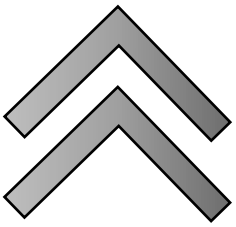
It is compulsory for the client to know the legislation in force in his country and work to ensure this legislation is enforced.

TESLA

SELF-PROPELLED ELECTRONIC TROLLEY WITH TYRES
Serial number 2555C3



MAINTENANCE



SELF-PROPELLED ELECTRONIC TROLLEY WITH TYRES
Serial number 2555C3

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8. MAINTENANCE

8.1 GENERAL PRECAUTIONS FOR SAFETY

Maintenance, troubleshooting and repairs are only to be carried out by the authorised technicians.

The persons assigned to use and maintenance of the machine are to be well trained and have in-depth knowledge of accident-prevention standards. Unauthorized personnel must remain outside of the work area during operations.

The safety precautions contained in this paragraph shall always be strictly observed, during the conduct and maintenance of the machine, in order to avoid damage to personnel and equipment.

At the end of each maintenance operation is required to restore the protections, verifying the correct functioning.

8.1.1 General hazards

- High voltages can cause death upon contact. Always operate with extreme caution and following the accident-prevention standards in force in the country.
- There are moving parts on the machine in operation that can cause serious personal injury. In this regard, specialised cleaning and maintenance work relating to disassembly or replacement of components on the machine and control units must be carried out with the system switched off.
- Place specific warning notices (“MACHINE BEING SERVICED – DO NOT POWER-ON”) near the electric panel/s.
- Do not used inflammable or harmful solvents.
- Always wear protective goggles and gloves when carrying out maintenance on the equipment.
- Make sure that the tools to be used are in perfect condition and have insulated grips, where required.
- Check that the isolation of cables and conductors of testing equipment has no signs of breakage or damage.
- Lack of equipment connection to ground can cause serious harm to persons. Always make sure the ground is connected and that it complies to the standards.
- Long overloads or failures can cause overheating of electric motors and electrical equipment developing harmful fumes; immediately cut-out the power supply for safety and do not approach the equipment before dispersing the fumes by means of appropriate ventilation. Do not inhale residual fumes inside the equipment during the repair operations.
- In the event of fire, never spray water on the equipment; cut-out all power supplies and use CO_2 extinguishers.
- Avoid prolonged, excessive or repeated contact of the skin with lubrication products and change clothes immediately if they become impregnated, because lubricants are very hazardous for the skin.
- Do not handle lubricants (such as oils, greases, etc) where there are electric sparks and/or naked flames.

WARNING



Lubricants are inflammable products; follow the indications on the containers.

- Always make sure, before setting the machine in operation, that no tools or materials have been left near the equipment.
- Do not wear items that could become entangled in the equipment, or act as conductors (chains, bracelets, etc.).
- Maintenance, repair and troubleshooting operations are to terminate with verification of correct machine functioning and restoration of all safety devices.

8.1.2 General warnings

- Machine maximum reliability and minimum maintenance costs are the result of planned maintenance and inspection schedules, scrupulously followed during the entire machine life. Scrupulously observe the set maintenance time intervals and program the operations according to the specific requirements.
- It is advised, should major operations be necessary, to contact the Manufacturer for any explanations regarding the project or for technical assistance.
- Before starting to check and maintenance operations, remove any dirt from the machine.
- Always use perfectly dry air for cleaning and with a pressure not over 0.2 Mpa.
- Always use tools in perfect condition and that are specifically for the operation to be performed; use of inappropriate and/or inefficient equipment can cause serious damage.
- During disassembly, mark the separate parts with an identity tag to ensure the correct reassembly.
- After every maintenance operation that requires disconnection of cables and/or fixed and mobile parts, check that the number/tag on the fixed and on the mobile part coincide.
- Before resetting the equipment in operation after a failure, it is to be carefully inspected and checked to highlight any damage.
- Never act, unless following a failure, on adjustments and position of limit switch microswitches, where installed: tampering with them can cause serious damage.
- Always take utmost care when checking lubrication on machine components, because insufficient or defective greasing can jeopardise correct functioning.
- For lubrication, use only the recommended lubricants, or those with equivalent properties and of a known and proven quality.
- The lubricants used are to have a good emulsion stability and be unalterable with age.
- It is absolutely necessary to continue to use the same lubricants as used for the first filling.
- Upon completion of the normal maintenance activities, the maintenance technicians are to carry out, when foreseen, also predictive instrumental maintenance operations consisting in analysis and specialistic controls to predict, over time, breakdowns that can occur in certain machine components.

8.2 QUALIFICATION OF MAINTENANCE TECHNICIANS

CAUTION



The Security Officer will ensure that all persons operating on the machine have received all their instructions contained in this manual.

8.2.1 General skills

To be up to the ever-increasing qualifications needed in the field of maintenance, the maintenance technicians must have the following requisites:

- be aware of the standards in force regarding prevention of accidents, and be able to apply them,
- have read and understood the “Safety” chapter,
- know the basic structure and functions of the machine,
- know how to use and refer to the manufacturing papers and machine documentation,
- assume the responsibility to make autonomous decisions regarding interventions on the machine,
- be willing to adapt to technological changes on the machine,
- note irregularities and, where appropriate, take the necessary measures.

8.3 PROCEDURE TO STOP THE MACHINE

WARNING

Maintenance operations must be carried out with no load.

Before starting maintenance operations, the operator is to stop the machine and set it in maintenance state following this procedure:

- Cut-out the machine power.

NOTE

To deactivate and cut-out the electrical supply:

- Switch off the machine according to the instructions in section “Shutting down the machine”.
- Disconnect the machine's power plug from the battery socket.

- Place the notice “DO NOT EXECUTE MOVEMENTS – MACHINE BEING SERVICED” on the electric panel near the power-on selector.



After the maintenance operations, restore the previously deactivated electrical supply.

Before resuming normal machine functioning, check the entire system again following the start-up procedure indicated in this manual.

NOTE

After every maintenance operation check correct machine functioning.

8.4 MACHINE PROCEDURE FOR MAINTENANCE POSITIONING

The following paragraph provides indications for the positioning of the machine on appropriate resting supports (maintenance-aid devices) for the maintenance operations where they are required.

Before lifting the machine, the Customer is to procure four suitable maintenance-aid devices, to place the machine.

WARNING



The Manufacturer shall not be held in any way liable if unsuitable devices are used.

I The main purpose of the maintenance-aid devices is to stabilize the suspended trolley; therefore, the lifting device and the chains are to remain tensioned.

To position the machine on the devices, three operators are necessary:

- One operator in charge of the lifting device;
- One operator in charge of the maintenance-aid devices;
- One operator to ensure correct positioning of the machine on the maintenance-aid devices.

WARNING



Before lifting the machine, place the four maintenance-aid devices in an appropriate and segregated area, to which unauthorized persons are not permitted access.

NOTE



Before starting the lifting, operations check that the lifting devices have an adequate grip and that all the operators are equipped with personal protection devices (DPI).

To prepare the machine for maintenance proceed as follows:

- Stop the machine and cut-out the power supply, following the procedure indicated in **paragraph 8.3** “Procedure to stop machine”.
- If necessary, remove the protective perimeter casing using the specific wrench.
- Lift the machine, following the procedure indicated in **paragraph 4.3.3** “Machine lifting”.

NOTE



Always check correct machine balancing. If it is unbalanced, rest it on the ground immediately and correctly reposition the chains.

- Transfer it, avoiding abrupt movements.
- Visually check that the machine resting points are aligned with the maintenance-aid devices.
- If necessary, correct the position of the devices.
- Rest the machine on these devices, avoiding abrupt movements, and check they are perfectly in contact with the frame.

CAUTION



The lifting equipment operator is to pay careful attention to avoid collisions against the devices when positioning the machine.

- Keep the lifting chains tensioned during the entire maintenance operations.

After the maintenance has been completed, slowly lift the machine, place it on the ground (following the indications contained in the paragraph regarding lifting) and refit any casings that were possibly removed.

MACHINE POSITIONING ON MAINTENANCE-AID DEVICES

1. Machine frame
2. Example of maintenance-aid device
3.

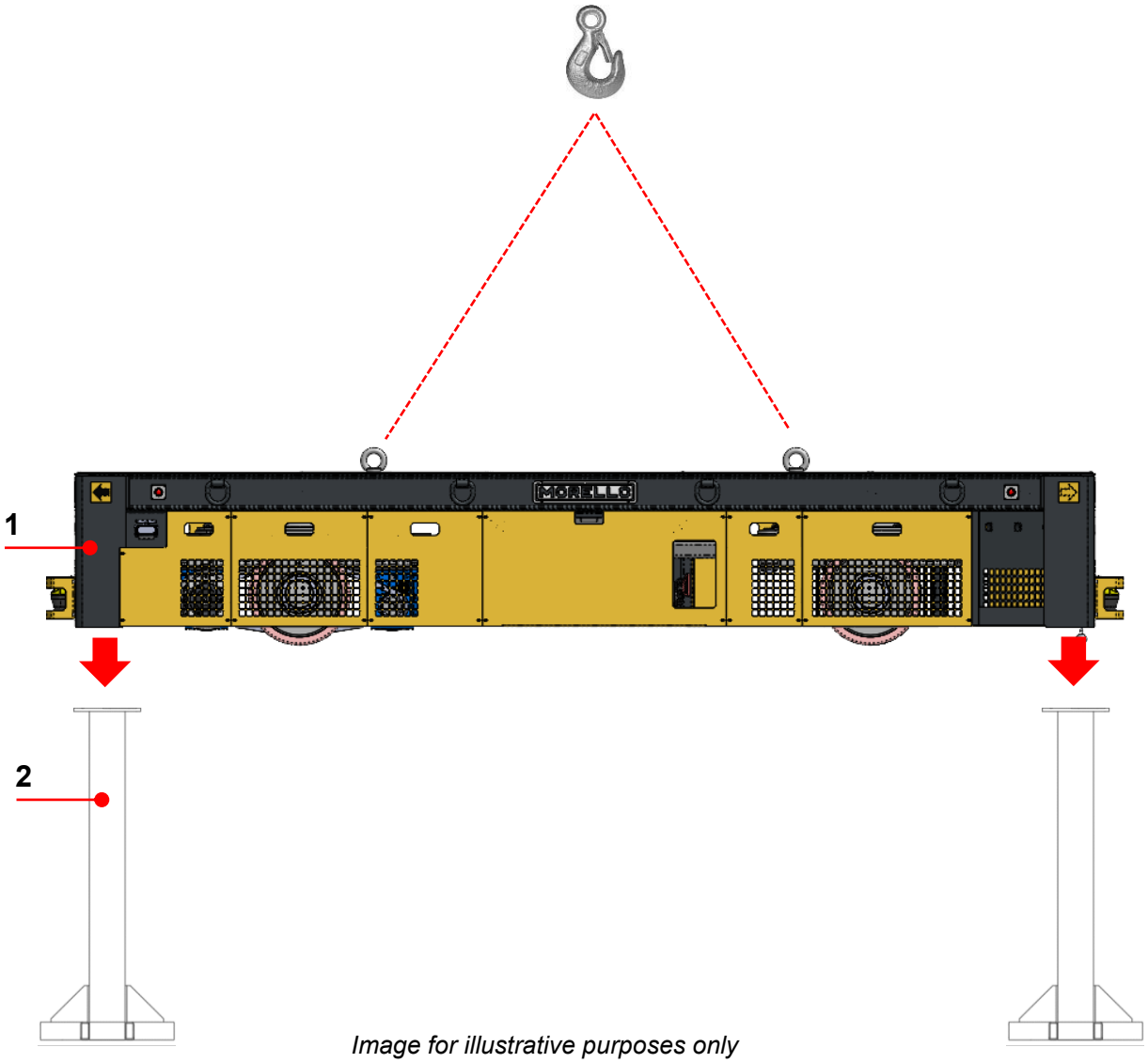


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8.5 CONTROL PLAN ON SAFETY

WARNING



It is strictly forbidden to electrically or mechanically bridge the safety switches of the safety circuits or tamper with them in any way.

CAUTION



Periodically check the efficiency of security systems on the machine.

This procedure must be repeated as normal maintenance practices.

8.5.1 Checks and functional tests on safety devices

The maintenance technicians have the obligation to periodically check the functioning of the safety devices.

The operation is to be carried out by skilled technicians who have specific knowledge regarding the uses of the safety devices.

CAUTION



Carry out the functional, tightness and positioning checks of the safety systems as indicated in chapter 2.

8.6 MAINTENANCE TABLE

To ensure machine reliability, regular and efficient maintenance is necessary and a constant control of the indicator instrument parameters. Maintenance, troubleshooting and repairs are only to be carried out by the authorised technicians.

FREQUENCY	DESCRIPTION
Every week	Full charge cycle of the battery.
Every week / After each recharge	Top up the battery (only for lead acid battery)
Every week	Check the correct functioning of the horn, buzzer and signal lamps.
Every week	Check the correct functioning of the hold-to-run levers.
Every week	Check the correct connection, tightening and operation of the laser scanner. Clean the laser scanner sensor with an appropriate cloth. For further information please refer to the relevant manual.
Every month	Clean the wheels, loading surface, and the lamps.
Every month	Clean the control panel on the control panel, the radio-control and the wired control panel.
Every month	Check the correct connection and tightening of the encoder, limit switches and the lamps.
Every month	Check correct connection and tightness of the limit switches.
Every month	Check correct sliding of the fifth wheels. If faults are found, contact the Manufacturer.
Every month	Check that the discharge chain is correctly attached to the ground.

FREQUENCY	DESCRIPTION
Every three months	Check chain tensioning. If necessary, adjust the chain tensioners (see procedure under "Chain Tensioning").
Every three months	Visually check the wear condition of the chain links. Replace if necessary.
Every six months	Perform a general visual check of the various groups that make up the machine, verifying that there are no mechanical anomalies.
Annual	Check tightness of all nuts and bolts.
Annual	Check there are no signs of wear, damage or mechanical faults on the wheels. If necessary, contact the Manufacturer for the replacement.

ADDITIONAL INFORMATION



For information regarding maintenance of commercial devices incorporated, see the relevant manuals.

NOTE



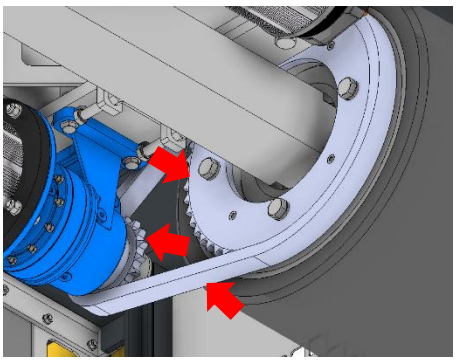
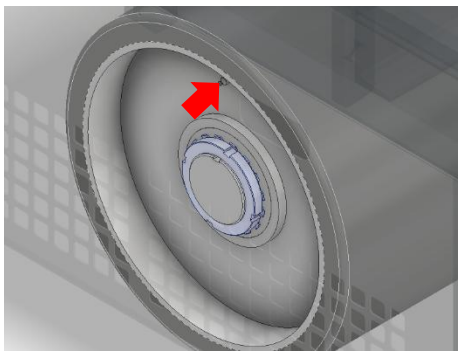
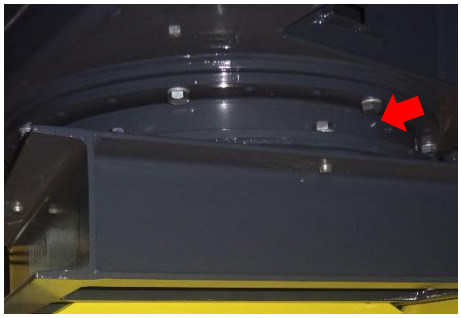
For information regarding replacement procedures, contact the Manufacturer.

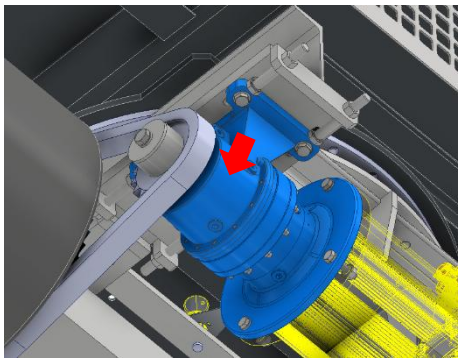
8.7 LUBRICATION

Before carrying out lubrication operations, stop the machine, cut-out the power supply and prepare it for maintenance as indicated in **paragraph 8.3** “Procedure to stop the machine”. If necessary, remove the outer casings (and reassemble them at the end of operations).

Where necessary, prepare the machine for maintenance as described in **paragraph 8.4** "Machine procedure for maintenance positioning”.

The following table indicates the machine points to be lubricated.

FREQUENCY	COMPONENT	IMAGE	METHOD
Every three months for the first year, then every six months	Crown wheels Chains Pinions		Grease with a brush. Use Castrol - Tribol GR 4020/220-2 PD grease or equivalent.
Every three months for the first year, then every six months	Wheel bearings		Grease the nozzles with a grease gun. UseCastrol - Tribol GR 4020/220-2 PD grease or equivalent.
Every three months for the first year, then every six months	Fifth wheels	 *Example image*	Grease the nozzles with a grease gun. Use Castrol - Tribol GR 4020/220-2 PD grease or equivalent.

FREQUENCY	COMPONENT	IMAGE	METHOD
-	Reduction unit		For information on lubricating the gearbox, please refer to the accompanying manual and the nameplate attached to the gearbox.

NOTE

Never mix oils/greases of different types and/or brands.

Waste oil is a special waste and has to be disposed of by authorised consortiums.

NOTE

Use of a type of oil/grease that is not equivalent to that indicated annuls the warranty in the case of failures and/or breakdowns.

8.8 CHAIN TENSIONING

Before tensioning the chain, stop the machine, cut-out the power supply and prepare it for maintenance as indicated in **paragraph 8.4** “Procedure for maintenance positioning”.

To tension, proceed as follows:

- Access the gear motor and secure it with a suitable supporting device (equipped with appropriate castors to accompany the gear motor when adjusting the chain tension).
- Slightly loosen the four screws **(1)** anchoring the geared motor to the plate.
- Turn the four chain tensioner screws **(2)** to adjust the chain tension.
- When finished, tighten the four screws **(1)** correctly and then remove the gear motor support.

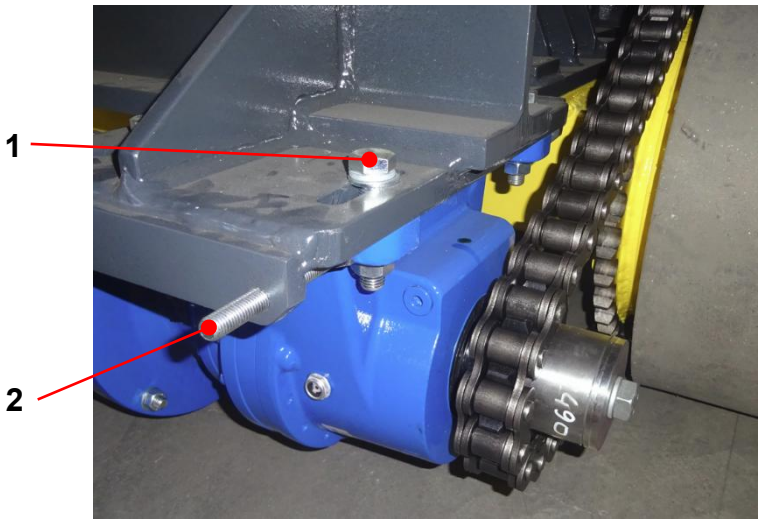


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8.9 TIGHTNESS CHECK

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

ADDITIONAL INFORMATION



To tighten, use a torque wrench.

Ø Screw	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

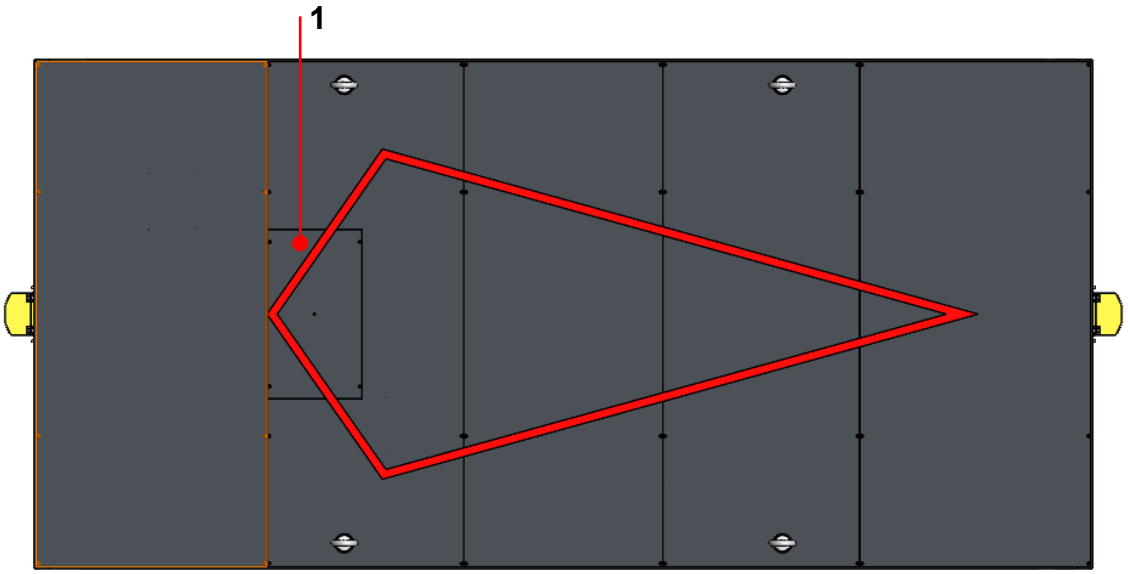
NOTE



Check after the first month of machine use, then every year.

8.10 ACCESS TO THE STEERING ENCODER

DESCRIPTION	WEIGHT
Encoder access panel (1)	Approx. 24 kg



To access the encoder, proceed as follows:

- Switch off the machine and disconnect the power supply.
- Unscrew the panel fixing screws **(1)**.
- Screw a suitable M10 eyebolt into the hole provided in the panel.
- Hook a suitable shackle (not supplied) into the eyebolt shown above.
- Attach a band, using a suitable hook, to the shackle.
- Hook the straps properly to the hook of the lifting gear.
- Lift the panel **(1)** slowly, avoiding sudden movements.
- Laying it on the ground.

When maintenance operations are complete, restore the removed panels.

8.11 MAINTENANCE WORKSHEET

Record all the maintenance operations in a specific logbook, for which an example follows.

DATE	OPERATOR	DESCRIPTION OF OPERATION

8.12 SPARE PARTS

A spare parts list follows. The letter “U” indicates parts subject to wear that it is recommended to keep in stock, whereas the letter “R” indicates those which could break (for which it is necessary to contact the Manufacturer).

NOTE



Use only original spare parts. Replacement with parts that are not originals could jeopardise machine functioning.

NOTE



The spare parts are to be kept clean, lubricated and stored in appropriate containers to preserve the integrity over time.

8.12.1 Mechanical spare parts

U / R	Description	Manufacturer	Quantity installed	Quantity recommended
U	Motorised polyurethane wheel Ø 500x350 mm	MORELLO	2	1
U	Polyurethane idler wheel Ø 500x350 mm	MORELLO	2	1
U	Taper roller bearing 32928 (140x190x32)	SKF	8	2
R	Ring KM28 M140X2	SKF	4	-
R	Safety washer MB28	SKF	4	-
R	Dust cover 140x190x3	MORELLO	8	-
R	Crown P=1"1/4 Z=39	MORELLO	2	-
R	Pinion 1"1/4 Z=13	MORELLO	2	-
U	Chain 1"1/4 L=1780	MORELLO	2	1
R	Fifth wheel VS100UE00 outer diameter 1000 mm height 82 mm	LALEONESSA	2	-
U	Bushing DU 100x105x50 type GLY.PG 10010550 F	SKF	3	1
U	Bushing DU 100x105x60 type GLY.PG 10010560 F	SKF	1	1
U	Bushing DU 50x55x50 type GLY.PG 505550 F	SKF	4	1
U	Bushing DU 50x55x30 type GLY.PG 505530 F	SKF	2	1

U / R	Description	Manufacturer	Quantity installed	Quantity recommended
R	Swivel joint M5	MORELLO	2	-
R	Coaxial gear reducer H082 T 31 PAM 132 B5	MOTOVARIO	2	-
R	Motor AC 80V 8kW 2200rpm	METALROTA	2	-

8.12.2 Electrical spare parts

U / R	Description	Manufacturer	Quantity installed	Quantity recommended
R	Wired control panel	MORELLO	1	-
R	Radio-control	MORELLO	1	-
R	Inductive sensor IM5123	IFM	2	-
R	Flashing light CTL600	SIRENA	2	-
R	Encoder RM8004	IFM	1	-
R	Laser scanner SZ-16V (se previsti)	KEYENCE	2	-
R	Traction motor 1234SE-6321 48-80V 350A	CURTIS	2	-

8.12.3 Power supply

8.12.3.1 Lead-acid battery

U / R	Description	Manufacturer	Quantity installed	Quantity recommended
R	Lead-acid battery 80 V 240 / 320 Ah	MORELLO	1	-
R	Rectifier 48 / 80V 40 / 60A EVOLUX WT180 three-phase	GM ELECTRIC	1	-

8.12.3.2 LITHIUM battery

U / R	Description	Manufacturer	Quantity installed	Quantity recommended
R	Lithium battery 80 V 110 / 220 / 330 Ah	MORELLO	1	-
R	Rectifier: NG9 EU CAN 80V 80A GREENX 80V 150A 400Vac	ZIVAN S.P.E.	1	-

8.13 EXPLODED DRAWINGS

8.13.1 Idler wheel unit

Pos.	Description	Quantity
1	Ring KM28 M140x2	1
2	Safety washer MB28	1
3	Dust cover 140x190x3	2
4	Taper roller bearing 32928 (140x190x32)	2
5	Polyurethane idler wheel Ø 500x350 mm	1

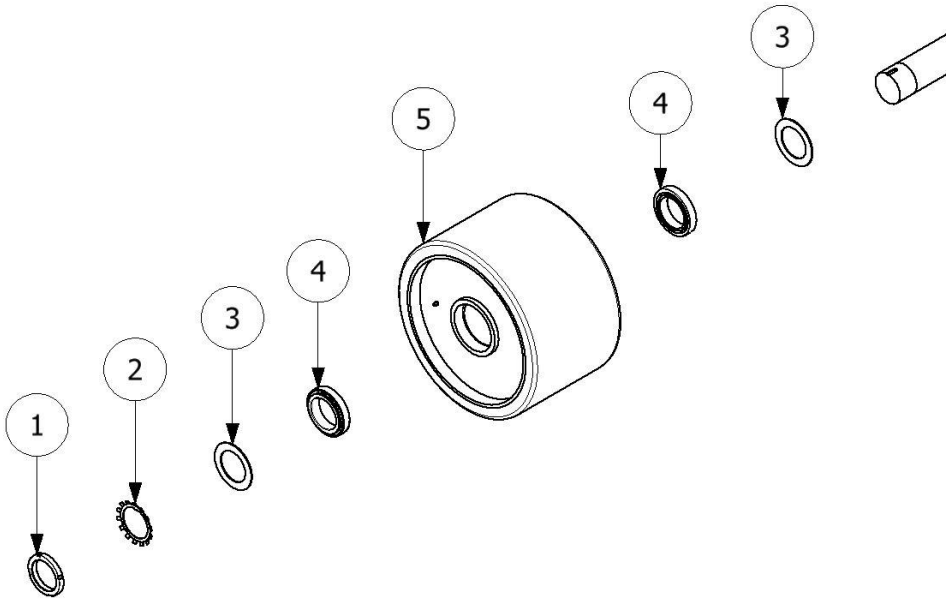


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8.13.2 Motorised wheel unit

Pos.	Description	Quantity
1	Ring KM28 M140x2	1
2	Safety washer MB28	1
3	Dust cover 140x190x3	2
4	Taper roller bearing 32928 (140x190x32)	2
5	Motorised polyurethane wheel Ø500x350 mm	1
6	Chain 1"1/4 L=1780	1
7	Crown P=1"1/4 Z=39	1
8	Plug D16x100	4
9	Open spring washer M16	4
10	TE screw M16x100	4

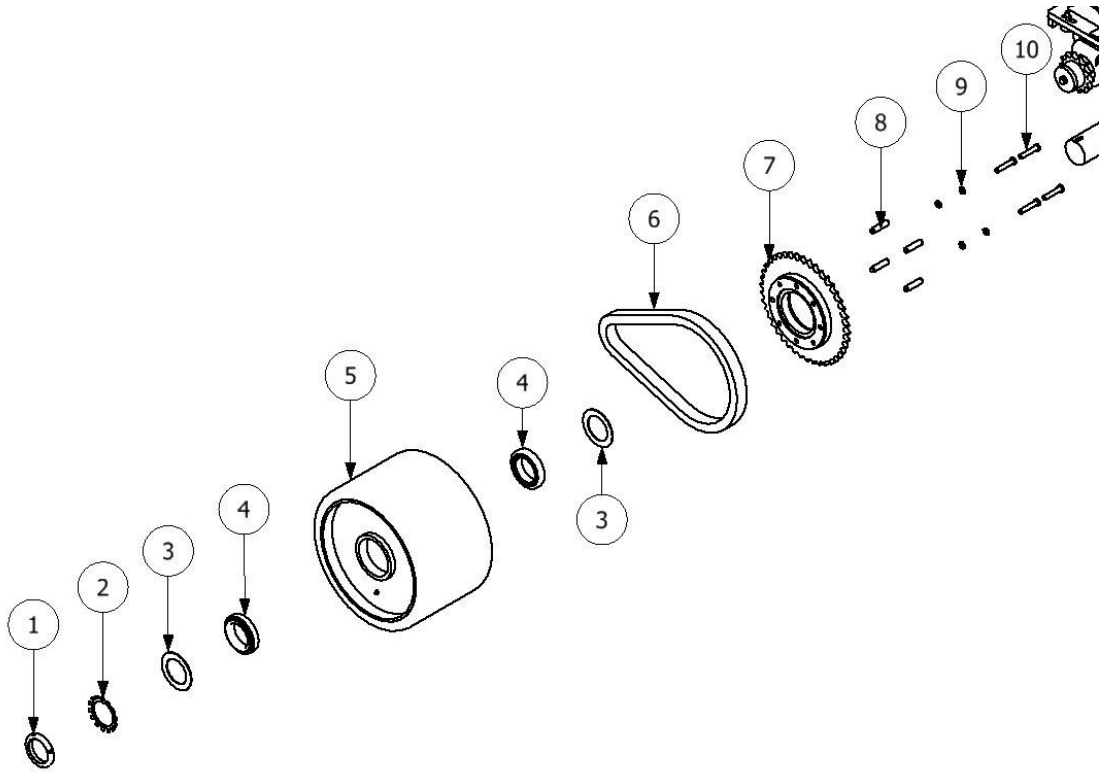


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8.13.3 Gear motor unit

Pos.	Description	Quantity
1	TE screw M16x100	1
2	Open spring washer M16	1
3	Cap	1
4	Spacer	1
5	Pinion 1"1/4 Z=13	1
6	Coaxial gear reducer H082 T 31 PAM 132 B5	1
7	Motor AC 80V 8kW 2200 RPM	1
8	TC screw M16x60	4
9	Open spring washer M16	4
10	Plain washer M16	4
11	Hex nut M16	4

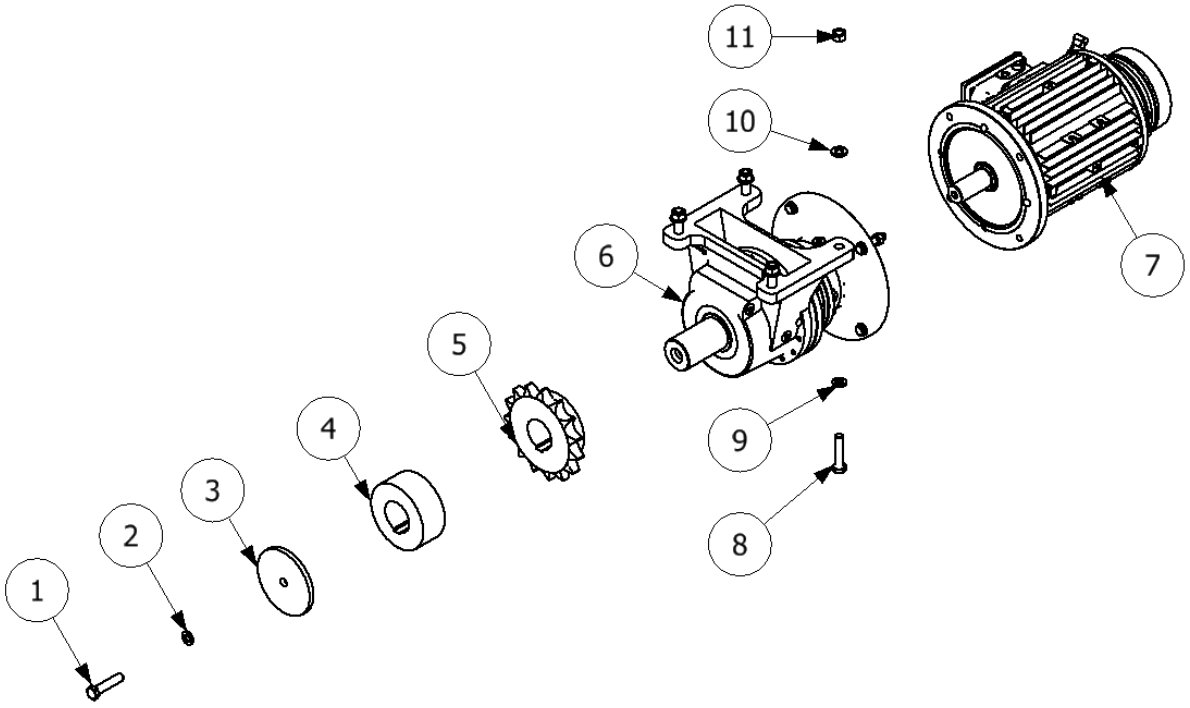


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8.13.4 Tilting axle assembly

Pos.	Description	Quantity
1	TC screw M12x35	2
2	Open spring washer M12	2
3	Anti-rotation plate	1
4	Shim 100/140/5	1
5	Pin	2
6	Bushing DU 100x105x50 type GLY.PG 10010550 F	3
7	Bushing DU 100x105x60 type GLY.PG 10010560 F	1

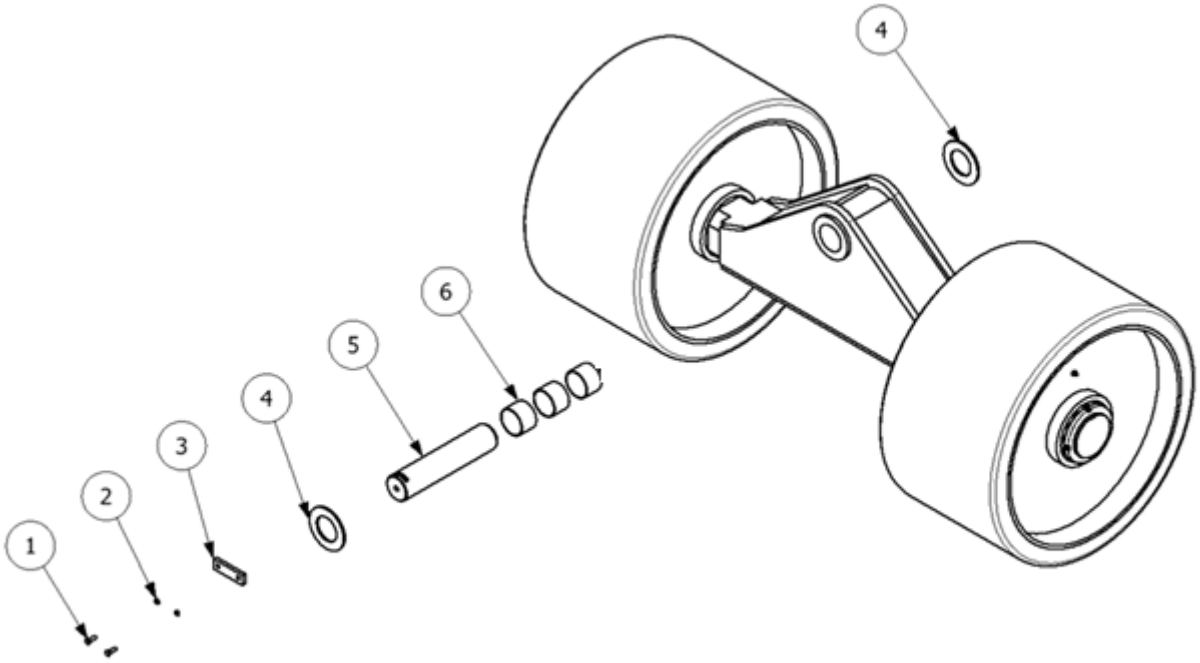


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8.13.5 Steering bar unit

Pos.	Description	Quantity
1	TC screw M8x25	2
2	Open spring washer M8	2
3	Anti-rotation plate	1
4	Pin	1
5	Shim 50,5 x 80 x 5	2
6	Bushing DU 50x55x50 type GLY.PG 505550 F	2
7	Bushing DU 50x55x30 type GLY.PG 505530 F	1
8	Steering bar	1

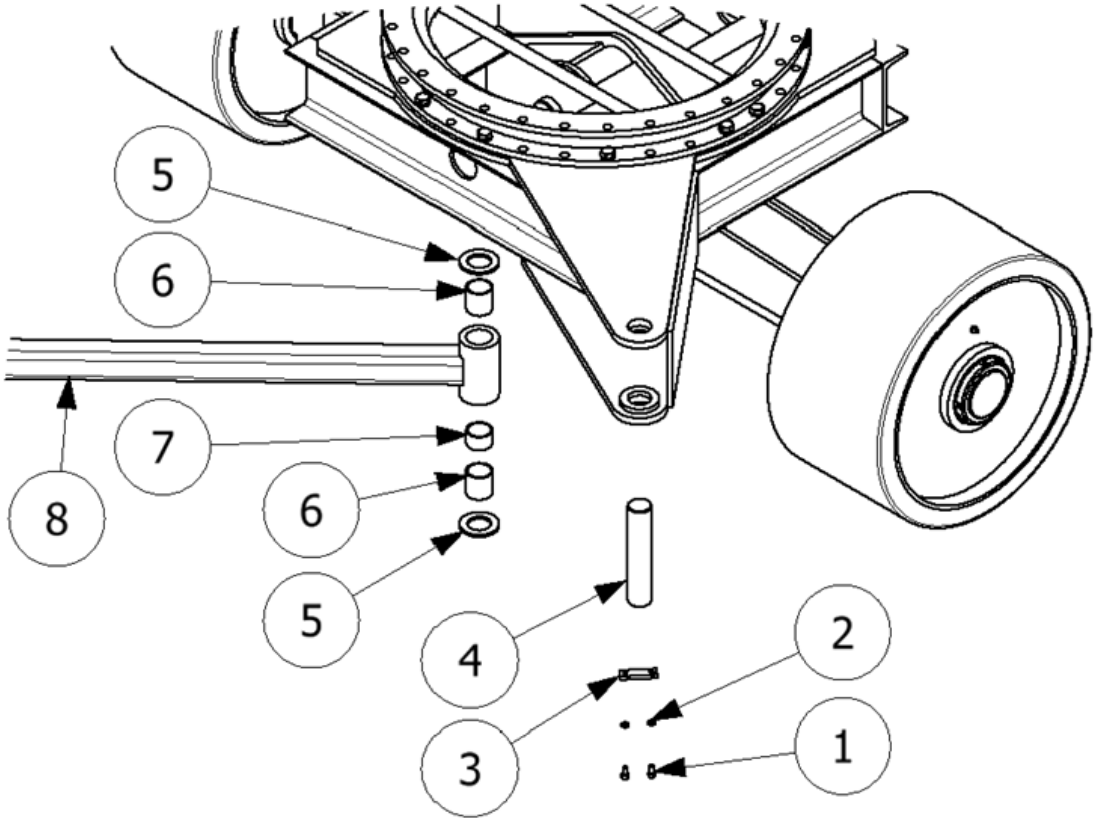


Image for illustrative purposes

8.13.6 Steering encoder unit

Pos.	Description	Quantity
1	Swivel joint M5	2
2	Threaded rod M5	1
3	Fixing bracket	1
4	Encoder 8.M3688.2424.2122 KUBLER	1
5	Fixing plate	1

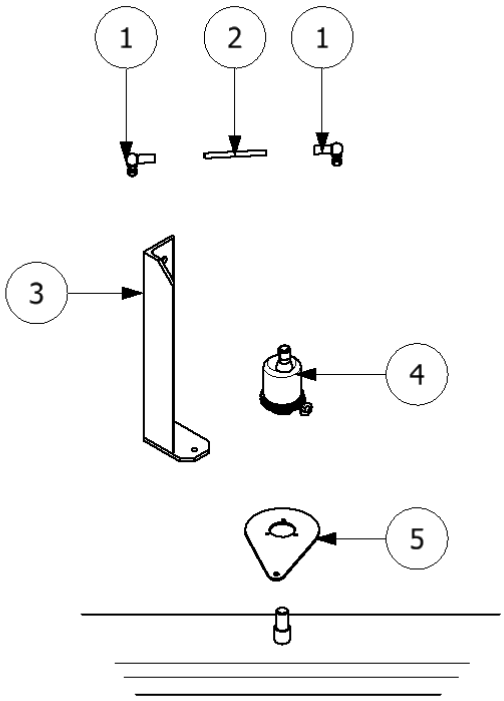
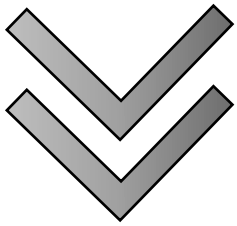


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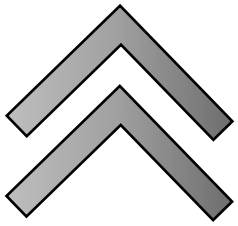
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TESLA

SELF-PROPELLED ELECTRONIC TROLLEY WITH TYRES
Serial number 2555C3



ATTACHED DOCUMENTATION



SELF-PROPELLED ELECTRONIC TROLLEY WITH TYRES
Serial number 2555C3

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9. ATTACHED DOCUMENTATION

The documentation listed below is provided as attachments to this manual.

	DESCRIPTION
1	Machine layout
2	Wiring diagram and bill of materials
3	Motor manual
4	Reduction unit manual
5	Rectifier manual
6	Battery manual
7	Inverter manual
8	Radio-control manual
9	Laser scanner manual (if required)