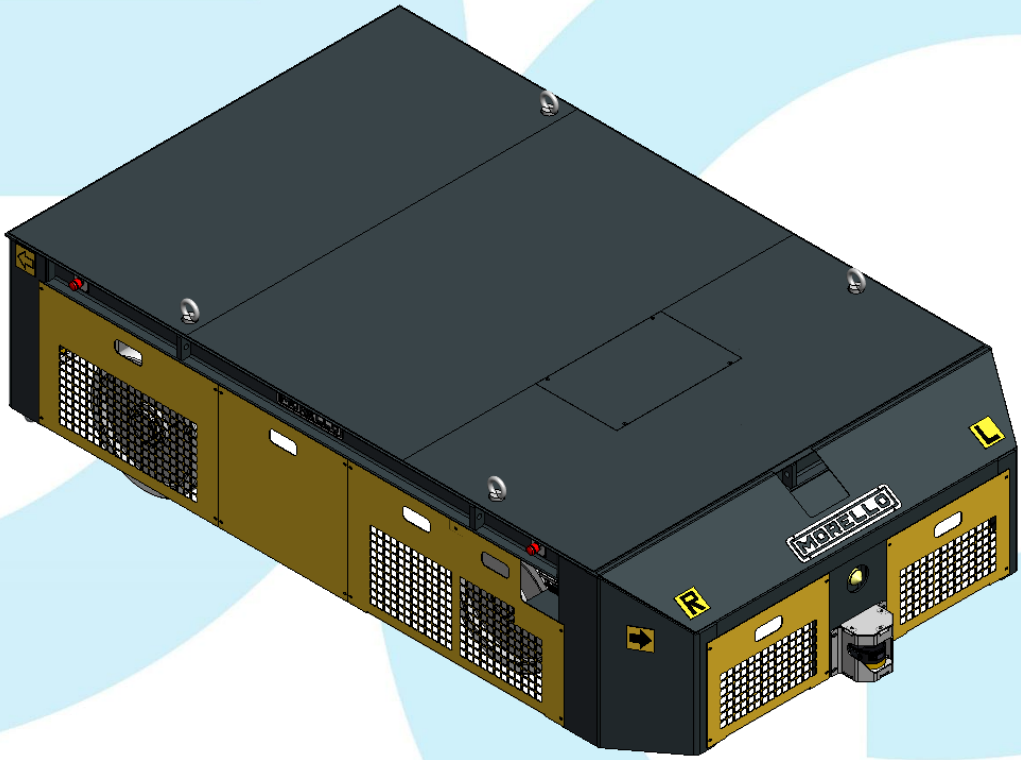
TRANSLATION OF
“ISTRUZIONI ORIGINALI”

MORELLO
SHAPING INTRALOGISTICS

SELF-PROPELLED ELECTRIC RUBBER-TYRED TROLLEY



MANUAL USER AND MAINTENANCE

Model:	**SGAE ± 90° R 20/2**	Revision:	**00**
Serial number:	**2769**	Working load limit (WLL):	**20 t**
Version:	**GROUND OPERATOR**	Construction year:	**2026**

BLANK PAGE

REVISION

REVISION				
MODEL	**LANGUAGE**	**DATE**	**VERSION**	**NOTES**
SGAE ±90° R 20/2	English	09/2026	00	First issue

The information contained in this handbook is the property of **Morello S.r.l.**

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

It is forbidden to distribute and/or duplicate, under any form or by any means, this handbook, even partially, without written authorization from **Morello S.r.l.**

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 images included in this manual should be considered as examples only, as some details may have changed over time

ADDITIONAL INFORMATION

The **SELF-PROPELLED ELECTRIC RUBBER-TYRED TROLLEY**, 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

his 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 – MAINTENANCE

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

CHAPTER 8 – DISMANTLING

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

CHAPTER 9 – ATTACHMENTS

TABLE OF CONTENTS

1. GENERAL INFORMATION 1-1

1.1 INTRODUCTION 1-1
1.2 SERVICE DEPARTMENT 1-1
1.3 GLOSSARY 1-2
1.4 SYMBOLS 1-4
1.5 MANUFACTURER'S ADDRESS 1-5
1.6 SAFETY STANDARDS 1-6
1.7 RESPONSIBILITY OF THE MANUFACTURER 1-6
1.8 MANAGEMENT OF THE MACHINE 1-7
1.9 WARRANTY 1-7

2. SAFETY 2-1

2.1 GENERAL INFORMATION 2-1
2.1.1 Certification of the machine 2-2
2.1.2 Foreseen and unforeseen uses 2-3
2.2 OPERATING ENVIRONMENTAL CONDITIONS 2-4
2.2.1 Installation of fire protection 2-4
2.2.2 Explosive atmosphere 2-4
2.2.3 Lighting 2-4
2.2.4 Vibrations 2-4
2.2.5 Rumore 2-5
2.2.6 Electromagnetic emissions 2-5
2.3 DISPOSAL OF EXHAUSTED MATERIALS 2-5
2.4 DELIMITATION OF DANGEROUS AREAS 2-6
2.5 OPERATOR WORKSTATION 2-7
2.6 SAFETY DEVICES 2-8
2.6.1 Power supply key selector switch 2-9
2.6.2 Emergency button/s 2-10
2.6.3 Retained action movement system 2-11
2.6.4 Fixed guards 2-12
2.6.5 Laser scanner 2-13
2.6.6 Visual and acoustic signalling systems 2-16
2.6.7 Safety circuits 2-17
2.7 PERSONAL PROTECTIVE EQUIPMENT 2-18
2.8 RESIDUAL RISKS 2-19
2.8.1 General information 2-19
2.8.2 Residual risks 2-19
2.8.3 Plates on the machine 2-19

3. GENERAL DESCRIPTION 3-1

3.1 LAYOUT 3-1
3.2 TECHNICAL DATA 3-3
3.3 GROUPS DESCRIPTION 3-5
3.3.1 Machine structure 3-5
3.3.2 Wheels assembly 3-6
3.3.3 Steering 3-7

3.3.4 Drive and braking system ... 3-8
3.3.5 Control devices ... 3-9
3.3.6 Laser scanner ... 3-9
3.3.7 Power supply ... 3-10
3.3.8 Accessories ... 3-10
3.4 PUSHBUTTONS ... 3-11
3.4.1 Pushbutton on electric panel ... 3-11
3.4.2 RFID reader with numeric keypad ... 3-13
3.4.3 Wired control panel ... 3-14
3.4.4 Radio-control ... 3-16
3.5 VISUAL AND ACOUSTIC INDICATIONS ... 3-18

4. TRANSPORT AND STORAGE ... 4-1

4.1 STORAGE ... 4-1
4.1.1 Storage of battery/batteries ... 4-1
4.2 TRANSPORT ... 4-2
4.3 LIFTING ... 4-3
4.3.1 Weight/s ... 4-3
4.3.2 Complementary to the machine ... 4-3
4.3.3 Machine lifting ... 4-4

5. INSTALLATION ... 5-1

5.1 INTACTNESS CHECK ... 5-1
5.2 INSTALLATION OF THE MACHINE ... 5-1
5.2.1 Choice of place of use and check on requirements ... 5-1
5.3 CHECKS AND INSPECTIONS ... 5-2
5.3.1 Overall checks on mechanical units ... 5-3
5.3.2 Electrical system checks ... 5-4
5.3.3 Checks on safety devices ... 5-5
5.4 UNIVERSAL INTERNATIONAL RECYCLING CODES ... 5-6

6. USE ... 6-1

6.1 VIDEO PAGES ... 6-1
6.1.1 Screen 1: battery remaining charge ... 6-1
6.1.2 Screen 2: trolley data ... 6-1
6.1.3 Screen 3: movements ... 6-2
6.1.4 Screen 4 and 5: alarms ... 6-3
6.1.5 Screen 6: reset encoder ... 6-4
6.2 ALARMS ... 6-5
6.3 PRELIMINARY CHECKS BEFORE OPERATING THE MACHINE ... 6-8
6.4 MACHINE OPERATION ... 6-9
6.4.1 Battery connection ... 6-9
6.4.2 Starting the machine with the wired control panel ... 6-10
6.4.3 Starting the machine with the radio control ... 6-11
6.4.4 Machine movement (translation and steering) ... 6-12
6.4.5 Direction indicators ... 6-13
6.4.6 Start-up after an emergency stop ... 6-13
6.4.7 Laser scanner intervention ... 6-13

6.4.8 Parking brakes 6-14
6.4.9 Shutting down the machine 6-14
6.5 LOAD POSITIONING 6-15
6.5.1 Stability area 6-16
6.6 BATTERY 6-17
6.6.1 Flat battery and extra time 6-17
6.6.2 Maintaining the Lithium battery 6-18
6.6.3 Battery removal 6-19
6.6.4 Recharge of the battery 6-21

7. MAINTENANCE 7-1

7.1 GENERAL SAFETY PRECAUTIONS 7-1
7.1.1 General hazards 7-1
7.1.2 General warnings 7-2
7.2 QUALIFICATION OF MAINTENANCE TECHNICIANS 7-3
7.2.1 General skills 7-3
7.3 PROCEDURE TO STOP MACHINE 7-4
7.4 MACHINE PROCEDURE FOR MAINTENANCE POSITIONING 7-5
7.5 CONTROL PLAN ON SAFETY 7-8
7.5.1 Checks and functional tests on safety devices 7-8
7.6 MAINTENANCE FREQUENCY 7-9
7.7 LUBRICATION 7-11
7.8 CHAIN TENSIONING 7-13
7.9 TIGHTENING TORQUES 7-14
7.10 ACCESS TO THE STEERING ENCODER 7-15
7.11 MAINTENANCE SHEET 7-16
7.12 SPARE PARTS 7-17
7.12.1 Mechanical spare parts 7-17
7.12.2 Electrical spare parts 7-18

8. DISPOSAL 8-1

8.1 RECYCLING 8-2
8.2 DISPOSAL 8-2

9. ATTACHED DOCUMENTATION 9-1

BLANK PAGE

GENERAL INFORMATION

BLANK PAGE

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 references to the preventive and remedial operations of the machine.

The manufacturer compels 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 ELECTRIC RUBBER-TYRED TROLLEY

MODEL SGAE ±90° R 20/2 SERIAL NUMBER 2769

and has been drawn up in compliance with machines directive 2006/42/CE.

The Use and Maintenance Manual is to be considered an integral part of the machine and must be kept until final disposal or transfer of ownership, at which time the manual must be handed over to the new owner. It must be kept by the person in charge who is entrusted with 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.morello.eu.com

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: terms 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.

Protection: measure using means to prevent hazards that cannot be reasonably eliminated or risks that cannot be sufficiently reduced by design-integrated protective measures.

Safety protection: Shelter or protective device used as a safety measure for the protection of persons from 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 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 Customer, 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.morello.eu.com

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-original and non-prescribed spare parts, by maintenance not carried out properly and by tampering with circuits, components, and system software.

The responsibility for the application of the safety requirements, as set out below, lies with the technical personnel of the Customer responsible for the planned activities on the machine.

They must ensure that the operators authorised to carry out the required activities are qualified, comply with and are aware of the requirements contained in this document and the general safety regulations 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 machine, 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 the replacement of parts acknowledged to be defective, excluding parts subject to wear and tear (such as gaskets, seals and electrical and electronic components). The costs of packaging and transport, as well as any installation, shall be borne by him. In such cases, the Buyer shall specify in writing:

- Date and number of the purchase document.
- Machine model.
- Serial number.
- Defective part, if known.

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

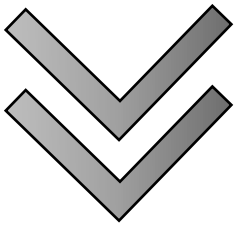
Damages are excluded caused by improper use to the contents of this “Use Manual and Maintenance” which is an integral part of the machine, including the maintenance, if not conforming to the instructions provided.

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.

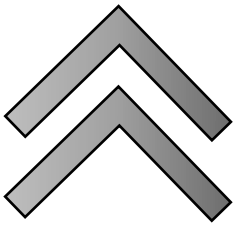
If damages occur during warranty period, the warranty is valid only using original spare parts.

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

BLANK PAGE



SAFETY



BLANK PAGE

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 machine and its characteristics.

Tampering, or unauthorized replacement of one or more components of the machine, the adoption of accessories and the use of particular parts different from the originals 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

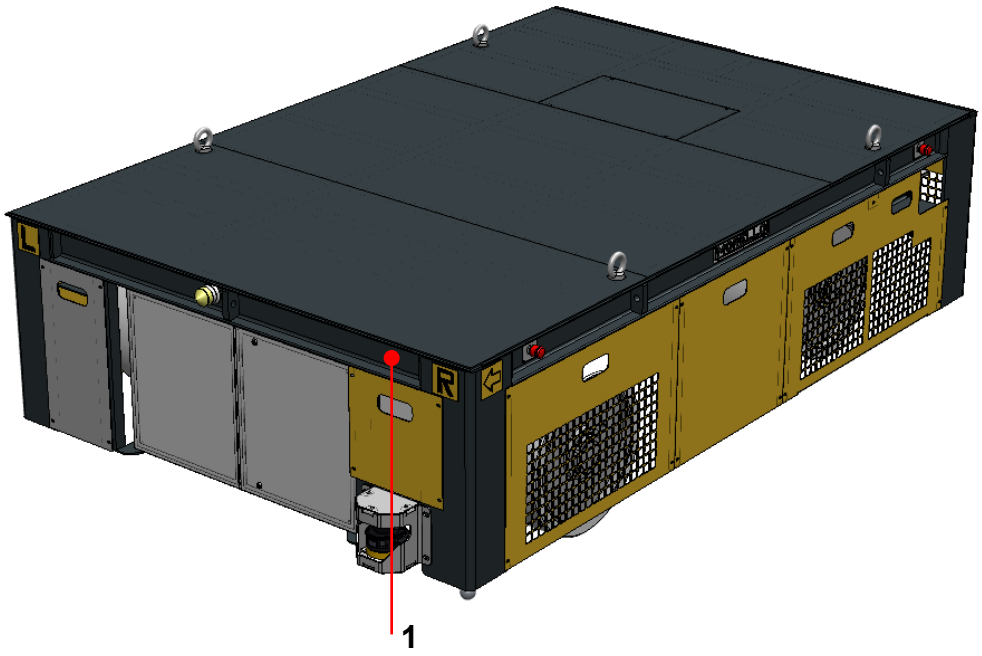
The Machine is provided with the EC declaration of conformity to the essential safety requirements in accordance with Directive 2006/42/EC (annex II A) and EMC Directive 2014/30/UE.

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 **(1)** with the main machine identification data.



1

MORELLO
Lungo Dora Pietro Colletta, 85/A
10153 TORINO, ITALY

CE

MODEL		SGAE ±90° R 20/2
DEAD LOAD	kg	2.700
PAYLOAD	kg	20.000
SERIAL NUMBER		2769
YEAR OF CONSTRUCTION		2026

2.1.2 Foreseen and unforeseen uses

The machine has been designed and manufactured to handle heavy loads (moulds), whether distributed or concentrated on the loading surface, in accordance with the technical specifications indicated in this manual. It can be used indoors, on a concrete floor (flat, smooth and level).

The machine is not to be used on roads (road traffic).

Use is not possible of the machine for purposes other than those planned.

DANGER



The use of the machine for processing purposes not described in this manual is **IMPROPER USE**. In that case 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 to + 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 Rumore

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 directive 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 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.

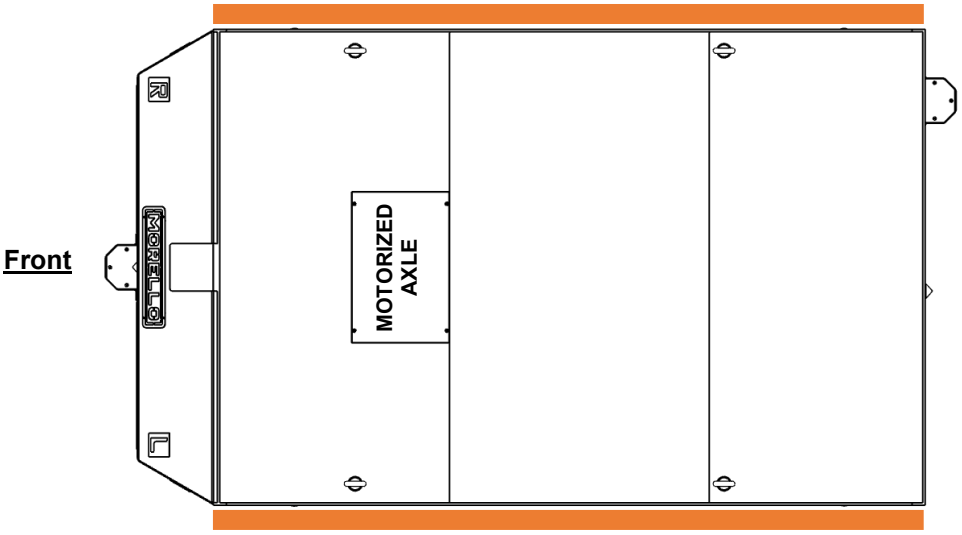
In particular, see chapter 8 for disposal of the materials that the machine is composed of.

2.4 DELIMITATION OF DANGEROUS AREAS

The hazardous areas of the machine are enclosed by fixed guards and protected on the short sides by laser scanners. Access to these areas, subject only to maintenance operations, must be carried out as indicated in this manual.

The following drawing shows the danger zones in the vicinity of the machine as a result of its movement.

Dangerous area



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

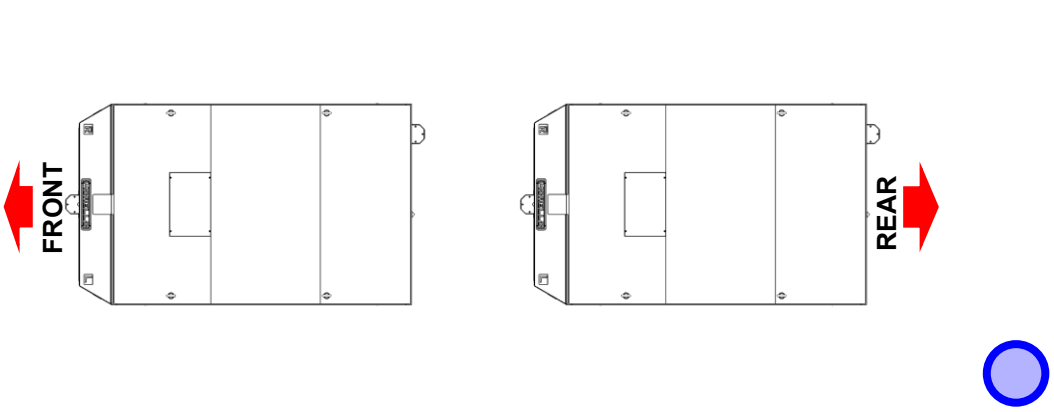


***Figure A** - Image for illustrative purposes*

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 that he has full visibility of both sides of the machine (**Figure B**). The operator must remain outside the operating areas of the laser scanners.

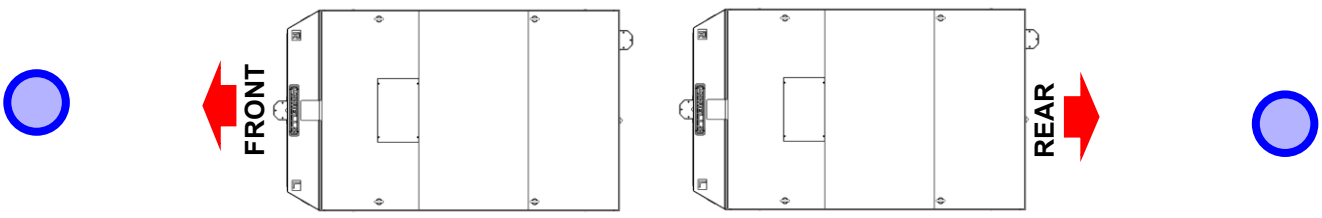


***Figure B** - Image for illustrative purposes*

2.6 SAFETY DEVICES

The machine is equipped with the following safety devices:

DEVICE TYPE	FUNCTION
Power supply key selector switch	Prevent the machine from being moved.
Emergency button/s	Emergency stop of the machine.
Retained action movement system	The machine's movements are halted when the control is released.
Fixed guards	Demarcation of hazardous areas of the machine.
Laser scanner	Slowing down and stopping the machine in the event of an interception of the intervention areas.
Visual and acoustic signalling systems	Signalling a moving machine.
Safety circuits	Cuts-out the electric power supply in the case of overload or short circuit.

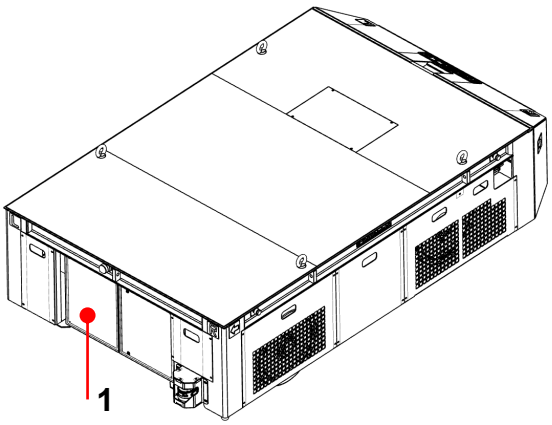
2.6.1 Power supply key selector switch

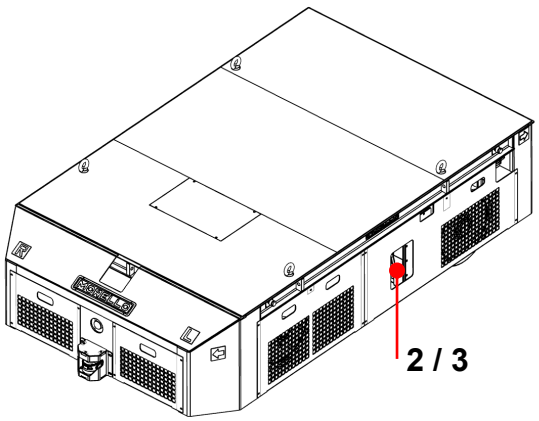
Function:	Prevent the machine from being moved.
Characteristics and methods:	The machine electric power is disconnected by turning the “power supply key selector switch”, on the electric panel to position (0), and removing the key. Subsequently disconnect the machine plug from the battery socket to cut out the power supply.

WARNING

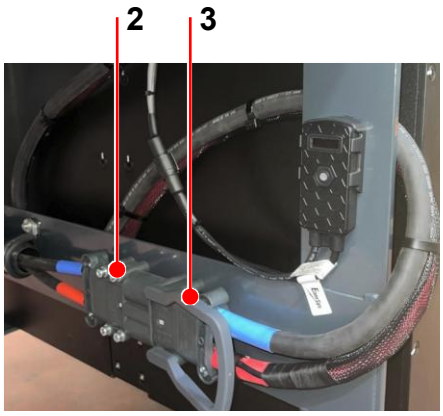
For maintenance, disconnect the battery, removing the machine power supply plug from the battery socket.

1. Power supply key selector switch
2. The machine’s power plug
3. Battery socket









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.

If pressed, the emergency button remains in low position. To reset, turn it clockwise.

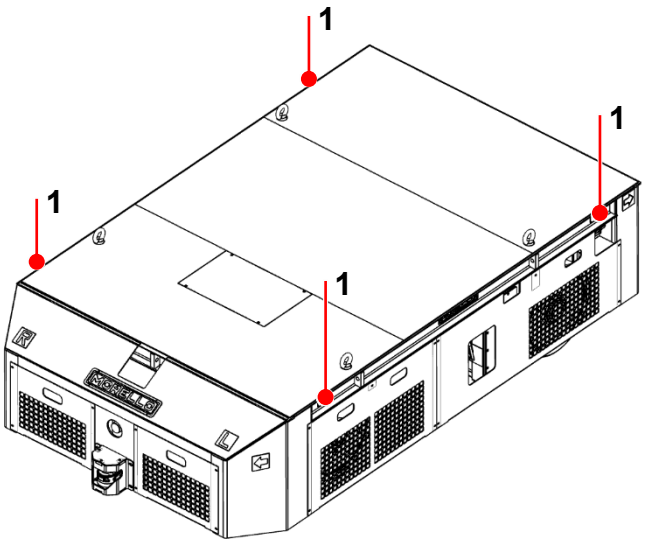
The emergency buttons are located on the control panel and on the machine.

CAUTION

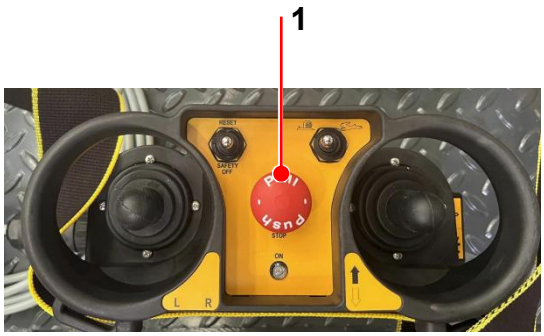
The emergency buttons require periodic checks to ensure its correct operation.

NOTE

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



Machine



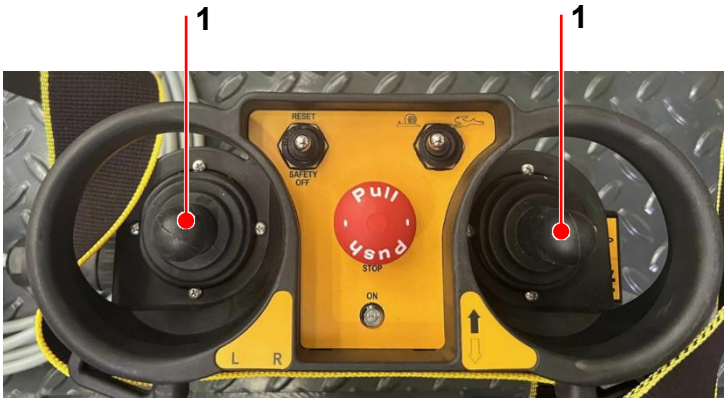
Wired control panel / Radio control

2.6.3 Retained action movement system

Function:	Machine handling with a person present
Characteristics and methods:	For machine handling, maintained-action levers **(1)** are provided on the wired control pendant and on the radio control. Releasing the lever causes the machine movement to stop.

CAUTION

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



Wired control panel / Radio-control

2.6.4 Fixed guards

Function: Demarcation of hazardous areas of the machine.

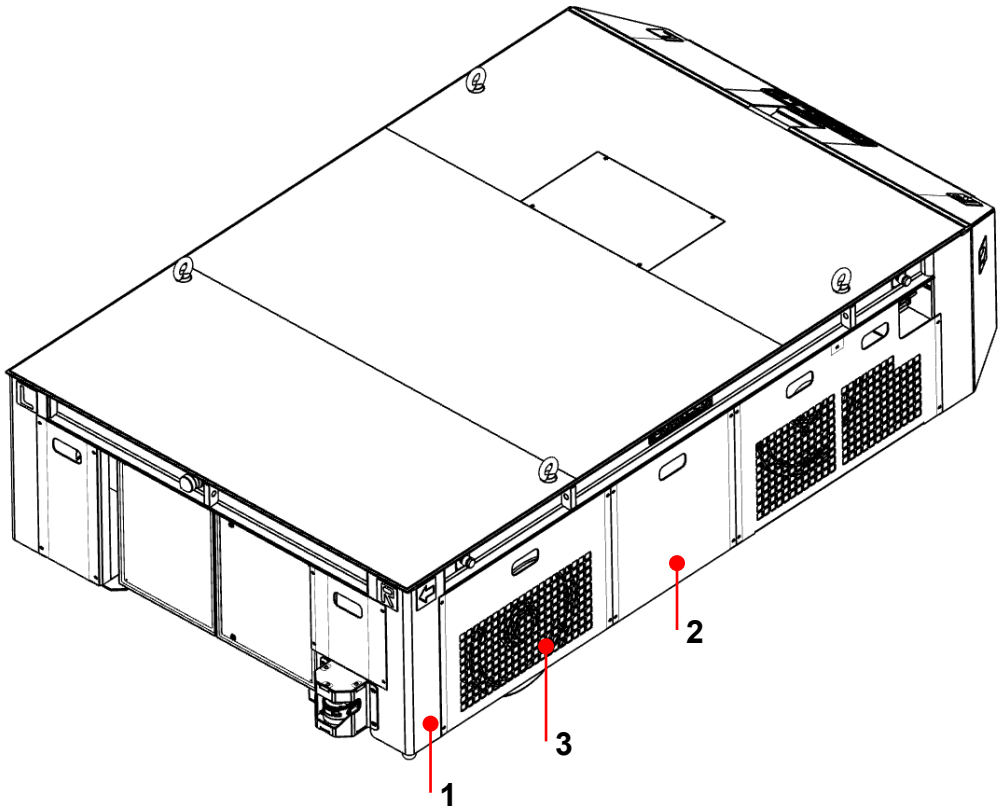
Characteristics and methods: The fixed guards (casings) are firmly secured to the structure by screws that require a specific tool for removal.

They are not controlled and their removal is only subject to maintenance operations, with the power supply to the machine switched off and disconnected.

WARNING

The manufacturer accepts no liability if the machine is operated without guards.

1. Machine frame
2. Example of a protective cover made from smooth sheet steel
3. Example of a protective cover made from perforated sheet steel



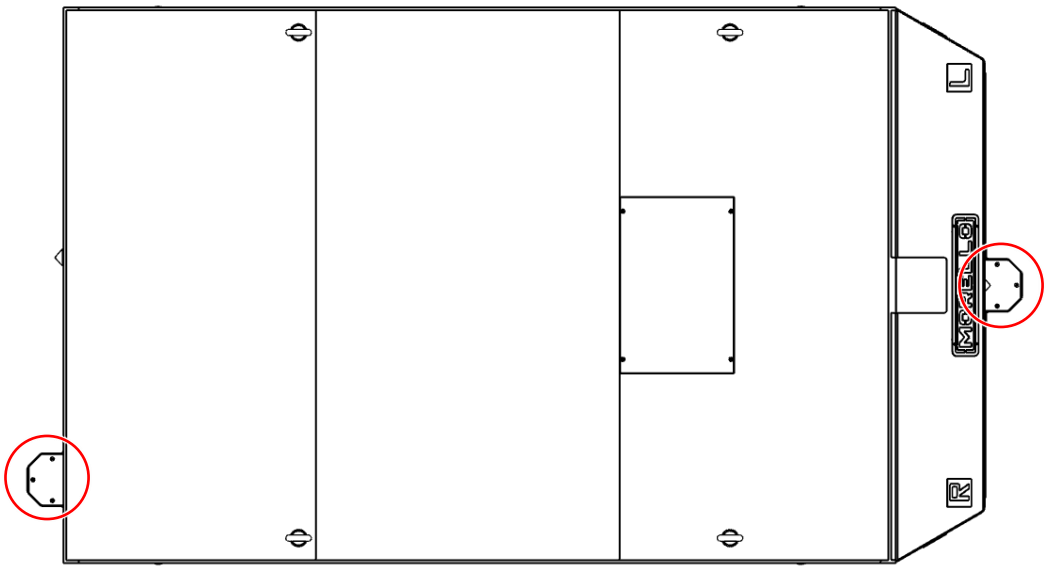
2.6.5 Laser scanner

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

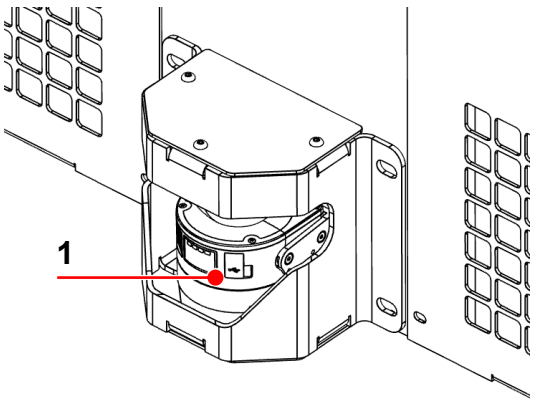
Characteristics and methods: Two laser scanners **(1)** are fitted to the machine, each fitted with impact protection.

Each of these devices is programmed with two intervention areas:

- Slowdown area (GREEN): the machine slows down.
- Stop area (RED): the machine stops immediately.



Position of the laser scanners



The following image shows the scanning areas of the laser scanners (dimensions in mm).

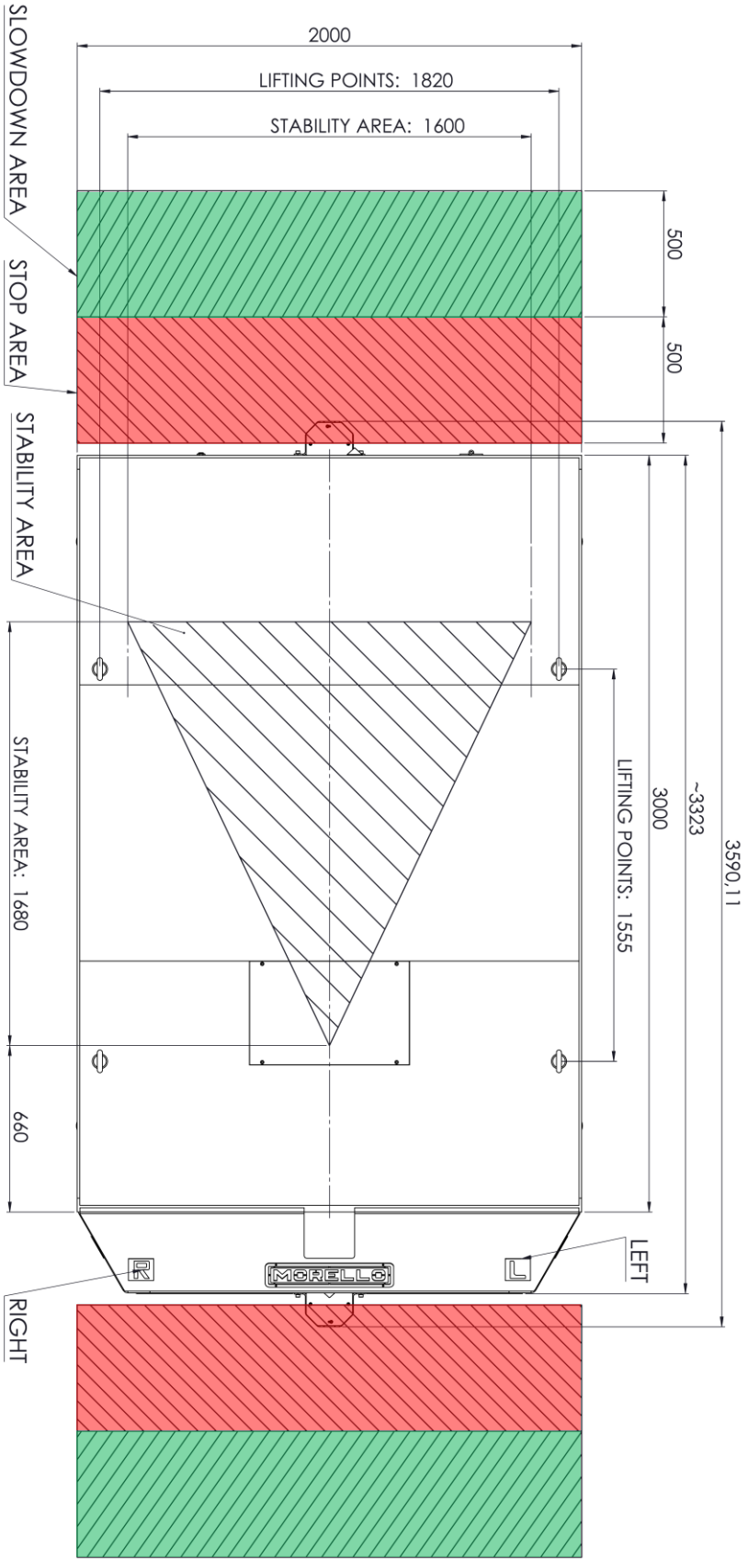


Image for illustrative purposes

CAUTION



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

CAUTION



By means of the SAFETY OFF control, located on the wired control pendant and on the radio control, the laser scanners are disabled (until the selector switch is released). In this condition (exclusion of the safety function), it is the operator's responsibility to verify that the area is clear of objects and people during movement.

CAUTION



It is possible to disable the laser scanners until the machine is switched off, using the RFID reader located on the control panel, which is fitted with a numeric keypad for entering the PIN.

In this state (with the safety function disabled), it is the operator's responsibility to ensure that the area is clear of objects and people during operation.

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.

NOTE



Direct sunlight on the laser scanner lens causes a false positive (i.e. the presence of an obstacle) to be detected.

ADDITIONAL INFORMATION

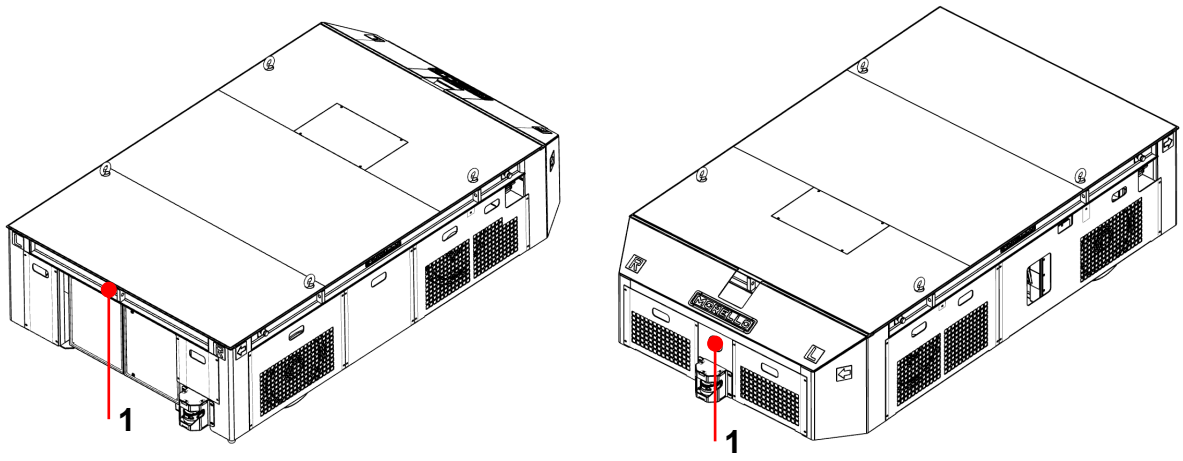


For more information, please refer to the attached laser scanners manual.

2.6.6 Visual and acoustic signalling systems

Function: Visual and audible warning when the machine is in motion.

Characteristics and methods: The machine is equipped with two **(1)** signal lamps and a buzzer that activate during the movement of the machine.



1



2.6.7 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 further information on fuses, please refer to the wiring diagram.

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 dismantle the guards on the machine.

Do not insert foreign objects 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.

Despite the necessary precautions taken, some risks remain on the machine that cannot be eliminated. For these, appropriate monitoring plates have been provided in the area concerned.

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

  It is the responsibility of the operator to keep a safe distance from the machine and to maintain a clear view of the area, ensuring that no people are present whilst the machine is in operation.

2.8.3 Plates on the machine

The manufacturer has affixed to the machine a set of monitoring plates defined in accordance with the European regulations on the graphic symbols to be used. These plates are located in a highly visible position.

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.

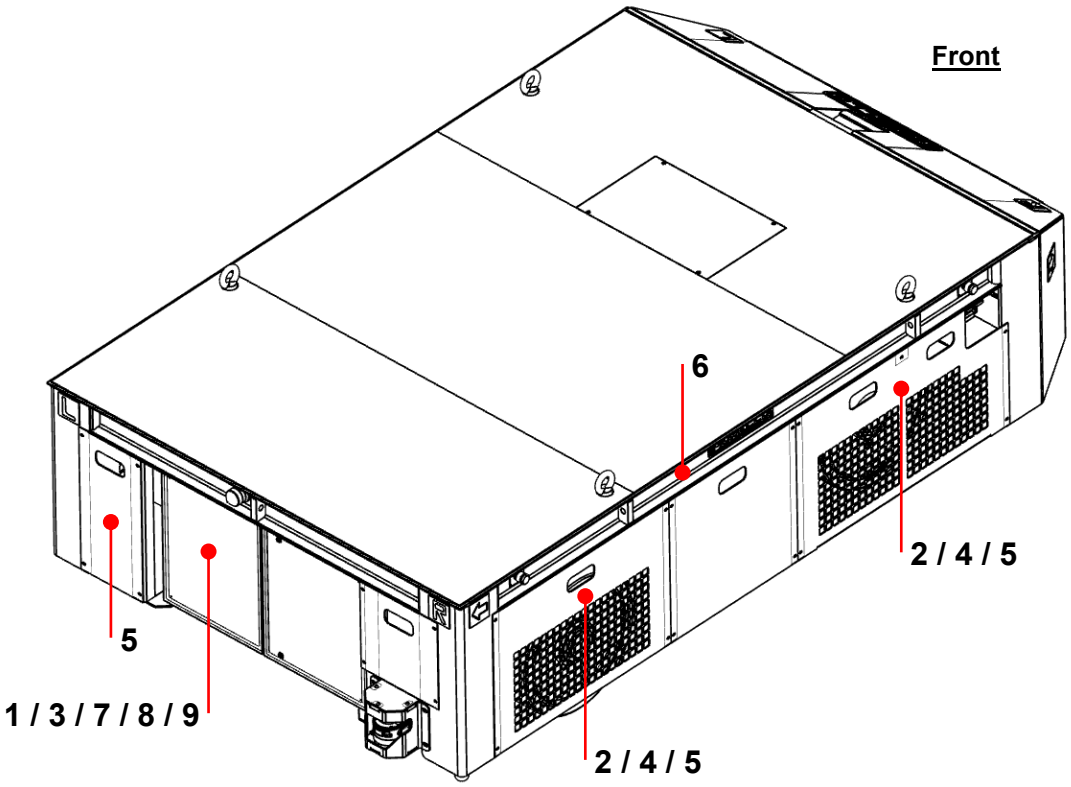
The manufacturer declines all responsibility for the safety of the machine in case of failure to comply with this prohibition.

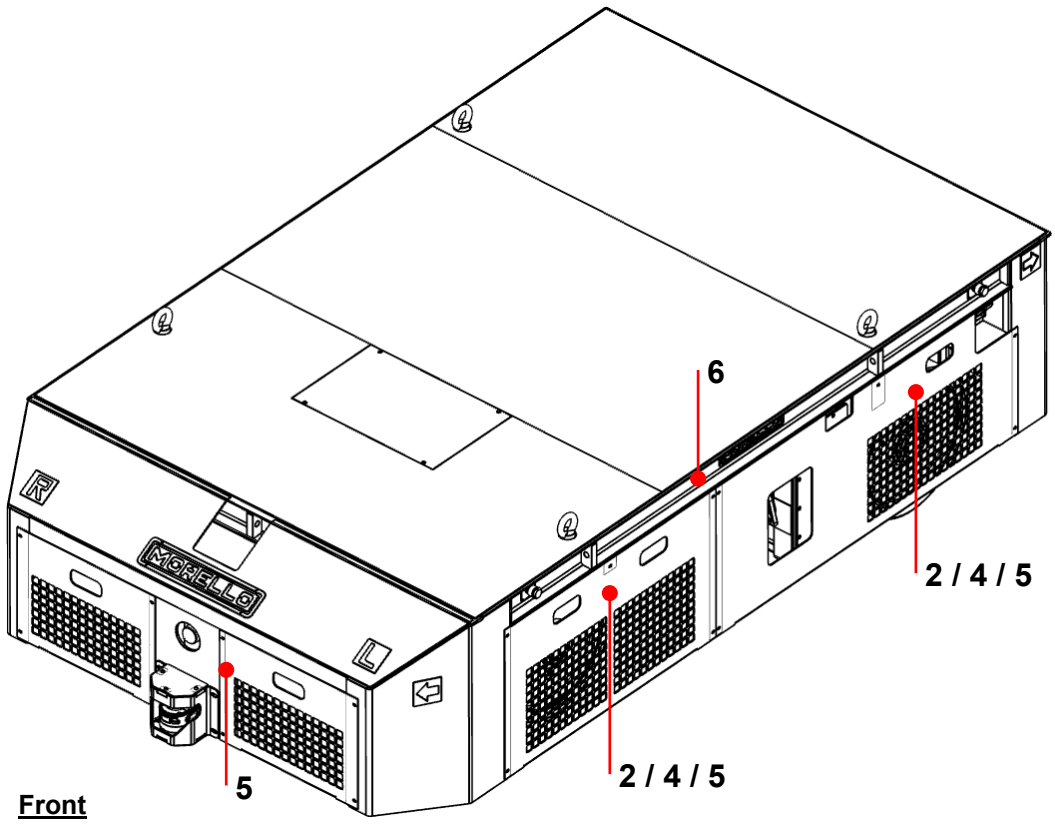
ADDITIONAL INFORMATION



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

PLATES ON THE MACHINE		
Plate 1		Hazard of electric voltage.
Plate 2		Hazard of crushing lower limbs.
Plate 3		Do not carry out maintenance with equipment powered.
Plate 4		Do not clean, oil, grease, repair or adjust moving parts by hand.
Plate 5		Do not remove safety devices.
Plate 6		Do not climb on the machine.
Plate 7		Do not extinguish fires with water.
Plate 8		Obligation to wear protective gloves.
Plate 9		Obligation to read the user and maintenance manual.


Front
6
2 / 4 / 5
5
1 / 3 / 7 / 8 / 9
2 / 4 / 5


6
2 / 4 / 5
MORELLO
5
2 / 4 / 5
Front

BLANK PAGE

GENERAL DESCRIPTION

BLANK PAGE

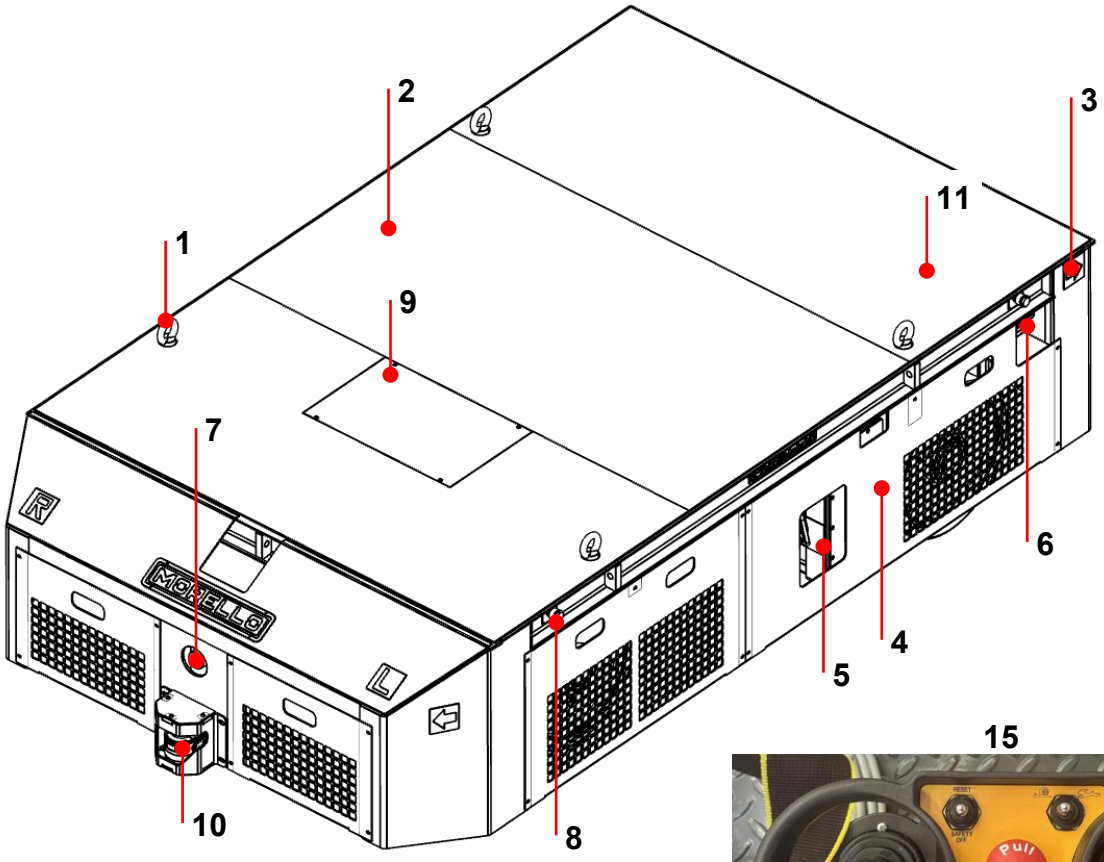
3. GENERAL DESCRIPTION

The machine has been designed and manufactured to handle heavy loads (moulds), whether distributed or concentrated on the loading surface, in accordance with the technical specifications indicated in this manual. It can be used indoors, on a concrete floor (flat, smooth and level). The work area must be clear and sufficiently spacious to allow the machine to be moved around.

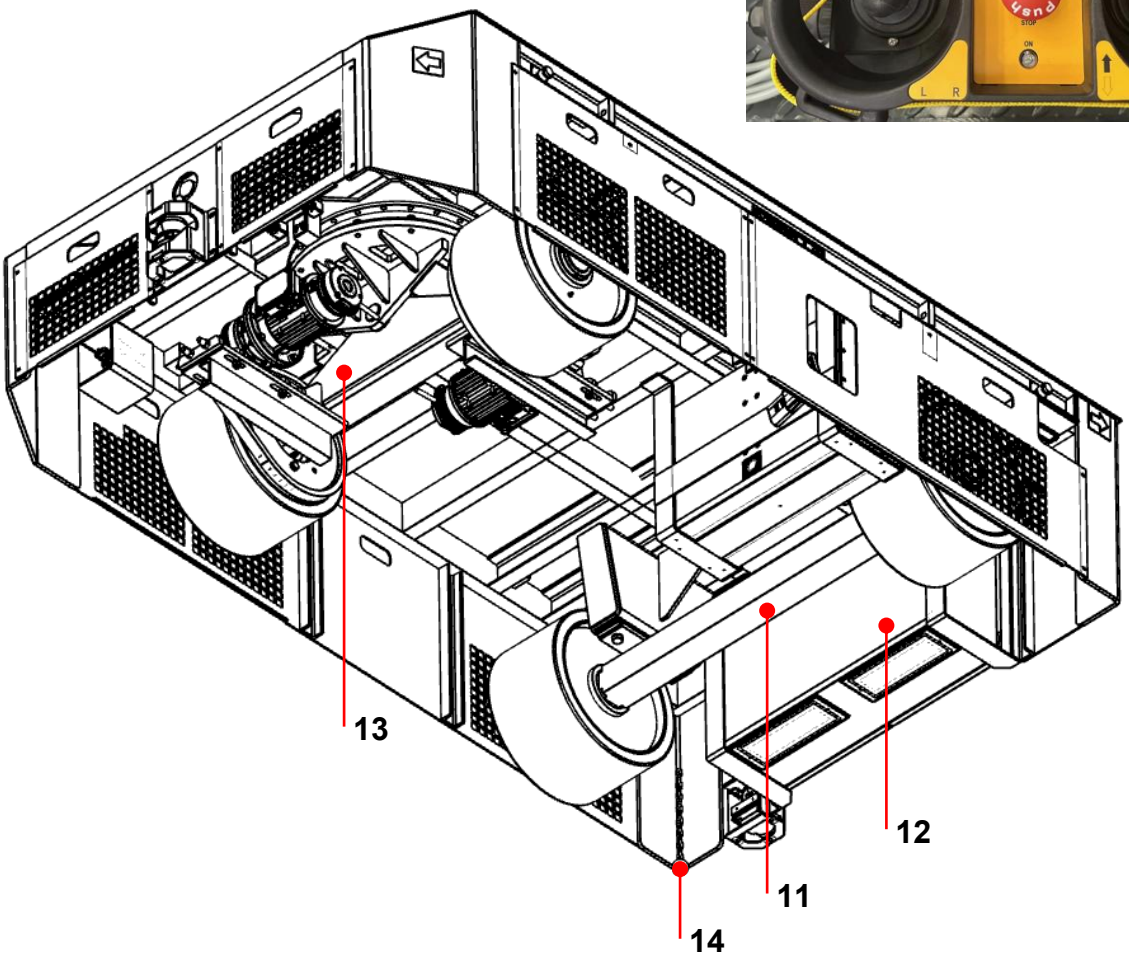
3.1 LAYOUT

N.	DESCRIPTION
1	Lifting point of the machine
2	Loading platform
3	Direction-of-travel plate
4	Carter
5	Battery
6	Connection socket for wired control panel
7	Signal lamp
8	Emergency button
9	Removable maintenance panel (encoder access)
10	Laser scanner
11	Rear idle axle
12	Electrical panel
13	Powered front axle
14	Stainless steel ground chain
15	Wired control panel / Radio-control

SELF-PROPELLED ELECTRIC
RUBBER-TYRED TROLLEY
Serial number 2769







3.2 TECHNICAL DATA

The following table contains the main machine data.

GENERAL	
Machine weight	Approx. 2.700 kg
Maximum working load (WLL)	20 t evenly distributed or concentrated (whilst remaining centred on the loading platform)
Loading platform dimensions	Approx. 3.000 mm x 2.000 mm
Loading platform height	Approx. 830 mm from the ground
Maximum gradable gradient	Approx. 2 %
Emergency buttons	1 on control panel + 4 on machine
Movement indicators	Acoustic and luminous
Machine lifting points	4
Frame	Steel
Loading platform	Treadplate steel sheet
Transmission	Electro-mechanical
Translation	Adjustable electronics
Steering	Electrical
Type of turn	Simple turn
Steering angle	± 90°
Axles	2
Steered axles	1
Wheels	4
Type of wheels	Non-marking rubber
Wheels size	Ø 560 x 300 mm
Traction motors	2 electric motors 3 kW 48 V 2.200 rpm
Maximum speed	Approx. 30 m/min. at full load on level ground
Service brake	Electric negative
Parking brakes	Electromagnetic negatives
Control devices	Wired control panel / Radio-control

POWER SUPPLY	
Type of power supply	1 LITHIUM battery
Power supply voltage	48 V
Autonomy	Approx. 3,9 km
Nominal capacity	148 Ah
Recharging method	Rectifier
Full recharging time	Approx. 2 h
Battery weight	Approx. 285 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 GROUPS DESCRIPTION

ADDITIONAL INFORMATION

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

3.3.1 Machine structure

The machine is built with a steel sheet and profile section frame **(1)** and perimeter protective casings **(2)** made of smooth or perforated steel sheet.

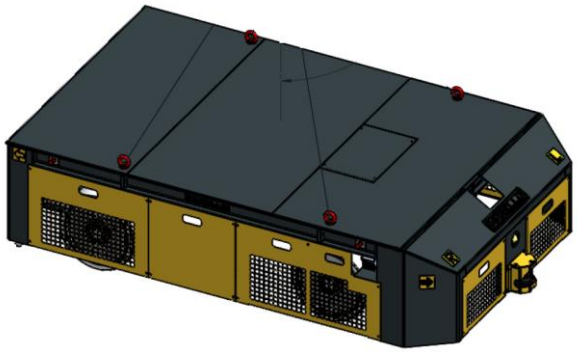
On the upper part of the frame, there is the loading surface **(3)** made of treadplate steel sheet.

The loading platform features:

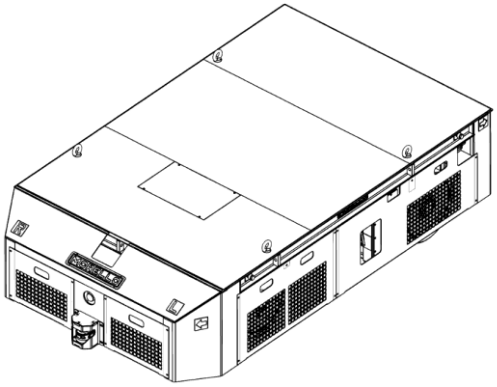
- Four threaded holes for inserting eyebolts **(4)** to lift the machine.
- A removable panel **(5)** for accessing the steering encoder.

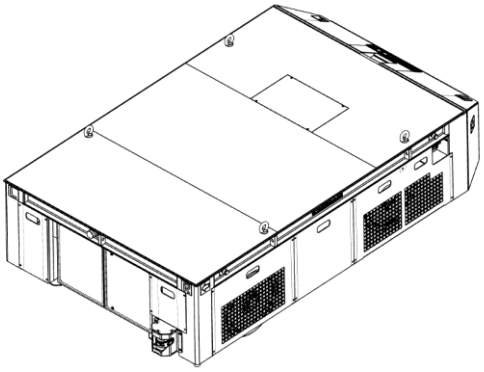
A chain is attached to the machine to discharge static electricity to the ground.

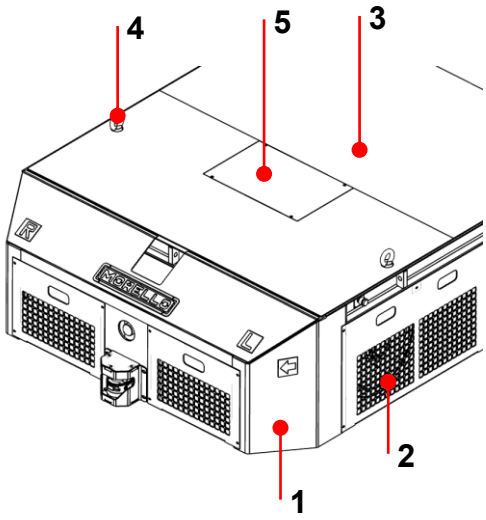
Painting is carried out in RAL 7016 grey for the frame and RAL 1016 yellow for the perimeter guards.



Painting







3.3.2 Wheels assembly

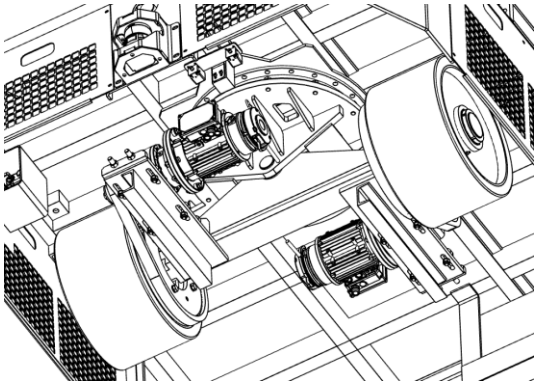
Machine movement is provided by four wheels, two motorized front wheels **(1)** and two idle rear wheels **(2)**.

Each wheel is made with a steel core and a non-marking rubber coating.

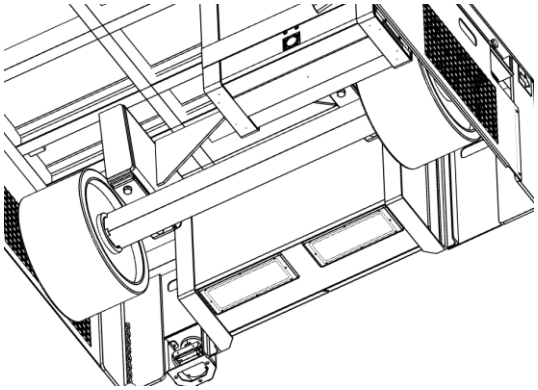
The rear wheels are mounted on a fixed axle **(3)**.

The front wheels are mounted on an oscillating axle **(4)**. The axle is hinged to a small carriage **(5)**, which in turn is fixed to the slewing ring that allows it to steer.

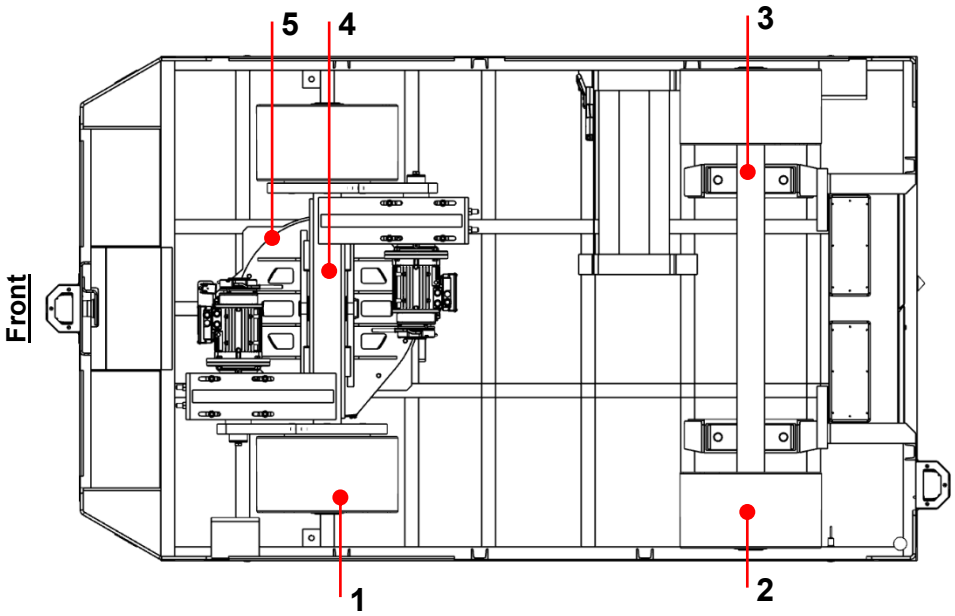
The swing axle ensures that all wheels maintain contact with the ground, guaranteeing better traction and correct load distribution.



Front axle line



Rear axle line

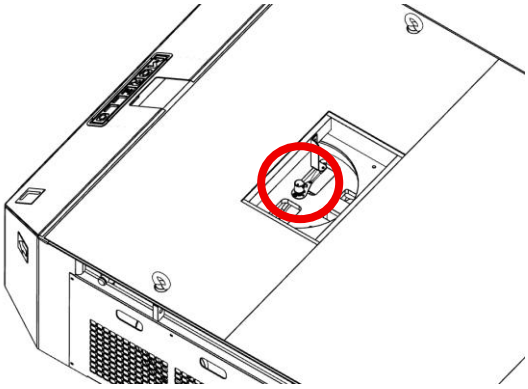


3.3.3 Steering

The electrical steering system is software managed.

The steering angle is measured by an encoder **(1)** located at the centre of the slewing ring. The wheels can rotate up to approximately ± 90° (maximum).

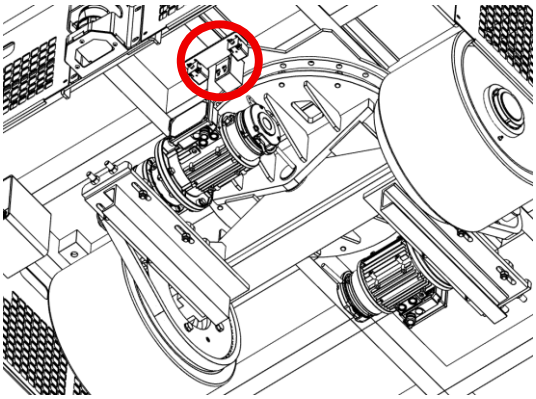
To ensure machine safety in the event of an encoder failure, two types of overtravel limit switches are provided: the first is electrical **(2)** and the second is mechanic **(3)**).



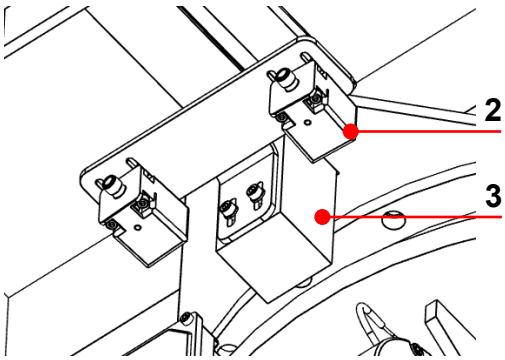
Encoder position



Steering encoder (1)



Limit switch position



Steering limit switch

3.3.4 Drive and braking system

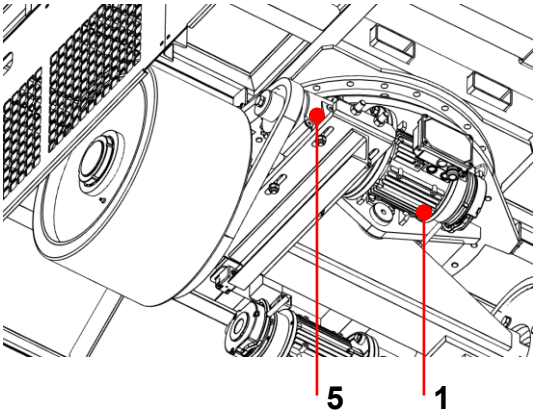
Drive is applied to the front wheels. Each wheel is driven by an electric motor **(1)** via a chain **(2)** on a pinion **(3)** and sprocket **(4)**. Transmission is provided by a helical gear reducer **(5)**.

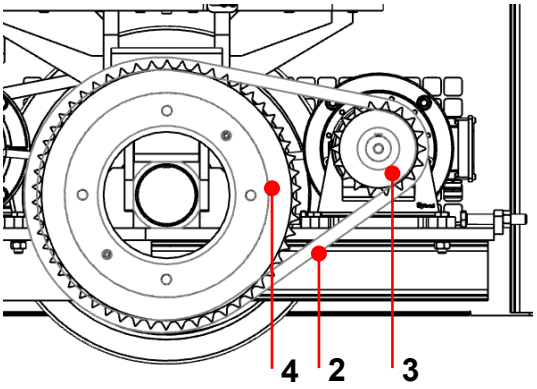
The electronically controlled travel system allows smooth acceleration and deceleration ramps, millimetre-precise movements, and uniform speed variations.

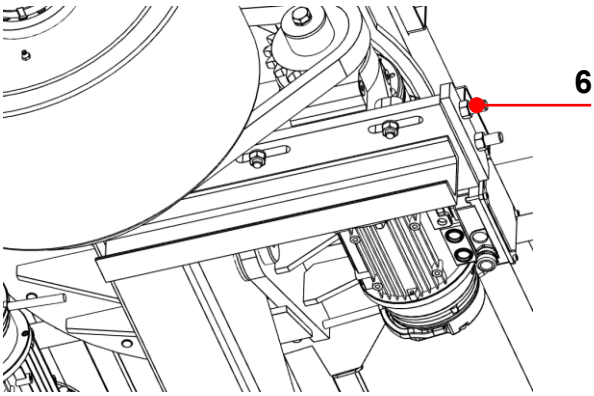
The tensioning of the drive chains is adjustable by means of dedicated screws **(6)**.

Service braking is achieved via counter-torque from the drive motors.

Parking braking is achieved via negative electromagnetic brakes mounted on the drive motors.







3.3.5 Control devices

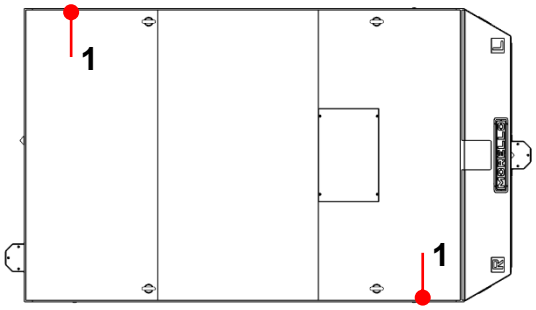
Machine movements are controlled via the control panel (radio-control or wired control panel).

The operator can execute all commands via a single connected device.

There are two sockets **(1)** on the machine for connecting the wired control panel.



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.

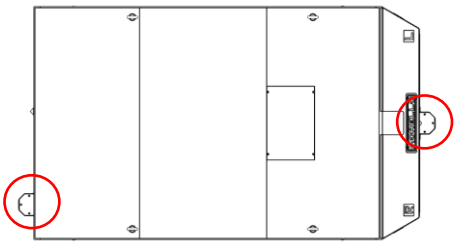
3.3.6 Laser scanner

Two laser scanners **(1)** are fitted around the perimeter of the machine to slow it down and bring it to a halt in the event of obstacles.

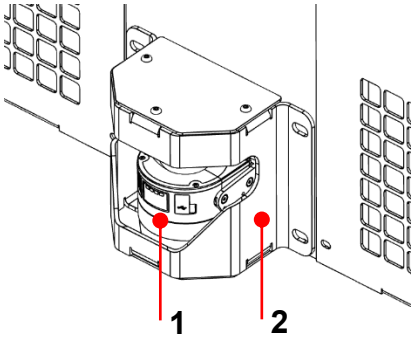
Each laser scanner is fitted with impact-resistant guards **(2)**.

There are two areas of operation:

- 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.



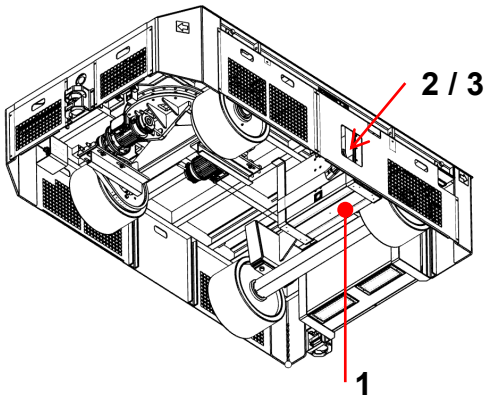
Laser scanner position

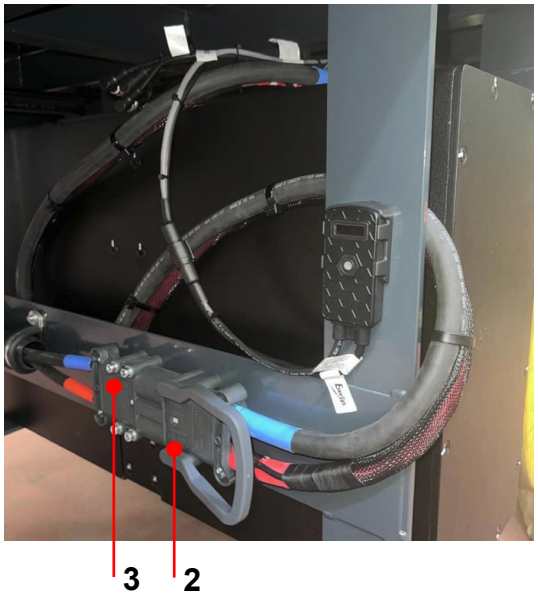


3.3.7 Power supply

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

The battery socket **(2)** can be connected to the machine's plug **(3)** to supply power, or to the rectifier's plug for recharging.





3.3.8 Accessories

The Manufacturer in addition to the delivery of the machine provides:

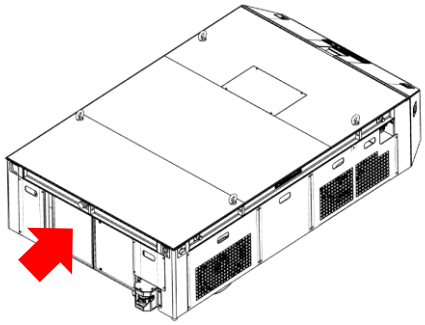
- N.1 Rectifier for battery recharging of the machine.
- N.1 Radio-control battery charger.

ADDITIONAL INFORMATION

For further information regarding the accessories see the relevant documentation.

3.4 PUSHBUTTONS

3.4.1 Pushbutton on electric panel



Position



Image

IMMAGINE	DESCRIPTION
	**Power-on key selector switch** Turn to position (1) to switch on the machine. Turn to position (0) to switch off the machine. Turn to the (ON/OFF BATTERY) position to switch on the battery.
	**Insertion services white luminous button** Press to insert the auxiliary services.
	**Voltage on white led** When alight, it indicates the machine is powered.
	**Yellow illuminated button for extra time** 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 light on intercepted scanners** When this light comes on, it indicates that the laser scanner stop area has been detected.
	**Orange lamp: SCANNER BY-PASSED** If lit, this indicates that the timed bypass for the laser scanners has been activated, which deactivates the devices until the machine is switched off.
	CAN network programming port connector.
	TRUCK-IQ display for monitoring the battery's state of charge and any battery alarms.

3.4.2 RFID reader with numeric keypad



An RFID card reader with a numeric keypad for entering the PIN code is fitted to the machine's control panel.

This device allows the laser scanners to be deactivated until the machine is switched off. When this happens, the flashing orange 'SCANNERS BYPASSED' indicator light on the control panel comes on.

To activate the bypass, you must:

1. Hold the card close to the RFID reader.
2. Enter the relevant PIN.

To reactivate the laser scanners, you need to switch the machine off and on again.

NOTE

RFID cards (and their corresponding PINs) must be kept in a secure place by the person in charge of the machine.

CAUTION

When the bypass is active (i.e. the safety function is disabled), it is the operator's responsibility to ensure that the area is clear of people and objects during operation

3.4.3 Wired control panel



IMAGE	DESCRIPTION
	**Key switch for the control panel (SIDE)** Turn the switch to the (I) position to switch the pushbutton panel on. Turn the switch to the (O) position to switch the pushbutton panel off.
	**Green button START / HORN (SIDE)** Press to activate the wired control panel connect after switching it on. Press to operate the horn while the car is in use.
	**Button 0° (SIDE)** Press to straighten the steering wheels.
	**Green ON indicator light** When lit, this indicates that the pushbutton panel is switched on.
	**RESET / SAFETY OFF lever** Push the lever to RESET to activate the auxiliary circuits. If you move the lever to SAFETY OFF (and hold it in this position), the laser scanners are disabled. If you hold it down for more than 60 seconds, an alarm is triggered.

IMAGE	DESCRIPTION
	**Lever for selecting the maximum travel speed** Push on “HARE” to set maximum speed of 30 m/min. Push on “SNAIL” to set maximum speed of 15 m/min.
	**Emergency button** Press in the event of danger to bring the machine to an immediate stop. To reset it, turn it clockwise.
	**LEFT / RIGHT steering joystick** Operate the joystick to steer left or right. The control is of the maintained-action type.
	**FORWARD / REVERSE movement joystick** Operate the joystick to move the machine forward or backward. The control is of the maintained-action type. The travel speed is proportional to the pressure exerted.
	Pushbutton panel cable connector.

3.4.4 Radio-control



IMAGE	DESCRIPTION
	**Key switch for the radio-control (SIDE)** Turn the switch to the (I) position to switch the radio-control on. Turn the switch to the (O) position to switch the radio-control off.
	**Green button START / HORN (SIDE)** Press to activate the connect the radio control after switching it on. Press to operate the horn while the car is in use.
	**Button 0° (SIDE)** Press to straighten the steering wheels.
	**Green ON indicator light** When lit, this indicates that the radio-control is switched on.
	**RESET / SAFETY OFF lever** Push the lever to RESET to activate the auxiliary circuits. If you move the lever to SAFETY OFF (and hold it in this position), the laser scanners are disabled. If you hold it down for more than 60 seconds, an alarm is triggered.

IMAGE	DESCRIPTION
	**Lever for selecting the maximum travel speed** Push on “HARE” to set maximum speed of 30 m/min. Push on “SNAIL” to set maximum speed of 15 m/min.
	**Emergency button** Press in the event of danger to bring the machine to an immediate stop. To reset it, turn it clockwise.
	**LEFT / RIGHT steering joystick** Operate the joystick to steer left or right. The control is of the maintained-action type.
	**FORWARD / REVERSE movement joystick** Operate the joystick to move the machine forward or backward. The control is of the maintained-action type. The travel speed is proportional to the pressure exerted.

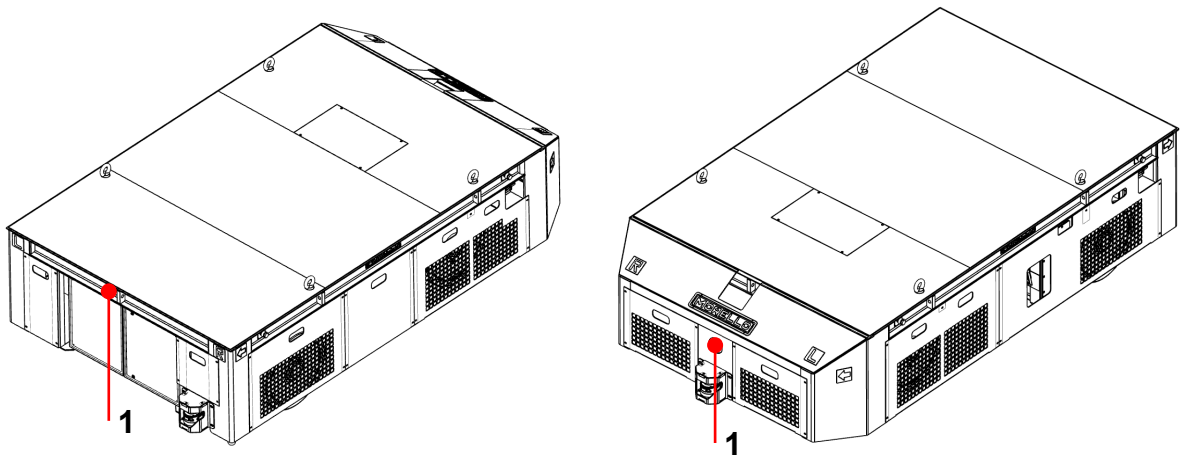
ADDITIONAL INFORMATION

The radio-control battery must be recharged, even when not in use, according to the intervals specified in the supplier's manual. Further information on the radio-control unit and its recharging can be found in the accompanying manual.

3.5 VISUAL AND ACOUSTIC INDICATIONS

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

- Lamp **(1)**
- Buzzer

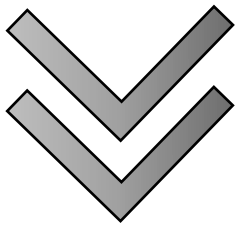




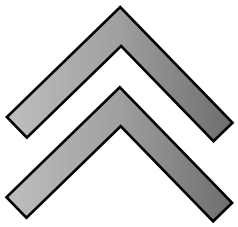
SIGNALLING	DESCRIPTION
YELLOWS FLASHING LIGHTS + BUZZER	They are activated during machine movement and deactivated when the machine is completely stationary.

ADDITIONAL INFORMATION

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



TRANSPORT AND STORAGE



BLANK PAGE

4. TRANSPORT AND STORAGE

4.1 STORAGE

The machine is dispatched by the manufacturer fully assembled and with a fully charged battery inside.

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 + 40 ° 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 on a weekly basis. 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 caisson with a flat bottom and anchored with tie rods. The caisson is lined with tar paper and contains bags with drying salts against moisture and salt.
- BY AIR → the machine is enclosed in a flat-bottomed box and anchored with tie rods.
- BY LAND→ land transport can be divided into two categories:
  - LONG-DISTANCE TRANSPORT the machine is covered with protective tarpaulins, enclosed in a wooden cage with a flat bottom and anchored with tie rods on the loading surface of the articulated truck.

    The instructions printed on the outside of the packaging must be strictly adhered to when lifting the container. Packages may be recovered for eventual re-use; it is good practice to try to keep them in a protected place to avoid damaging them and making them unreliable. If, on the other hand, they are disposed of, it is the Customer's responsibility to dispose of them in accordance with the regulations in force in their own 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	Approx. 2.700 kg

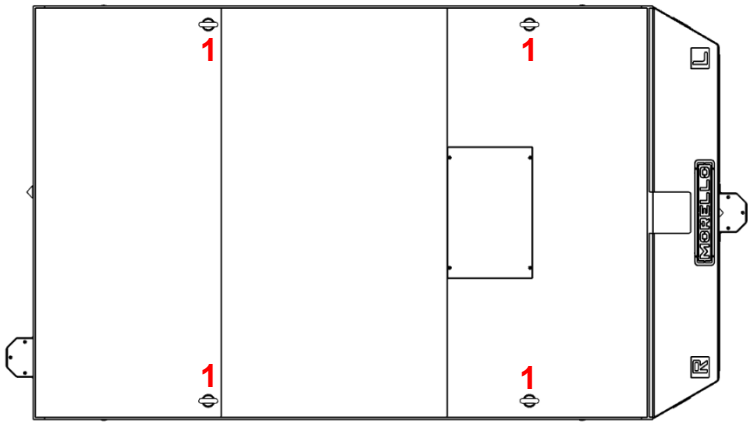
4.3.2 Complementary to the machine

The manufacturer, in addition to the delivery of the machine, provides n.4 fixed M24 eyebolts for lifting the machine.

4.3.3 Machine lifting

To lift the machine, proceed as follows:

- Ensure that the loading surface is clear.
- Fit an M24 fixed eye bolt at each of the four designated points (1) 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

- Fit suitable hooks with chains to the four eye bolts.
- Secure the chains to the hooks of an appropriate lifting.
- Lift the machine slowly, taking care to balance it correctly.
- Move it whilst avoiding sudden movements and keeping it as close to the ground as possible.
- Once you have reached your destination, lower it to the ground slowly and gradually.
- Only unhook the chains once the machine has been lowered completely to the ground.
- Remove the eye bolts.

LIFTING DIAGRAM

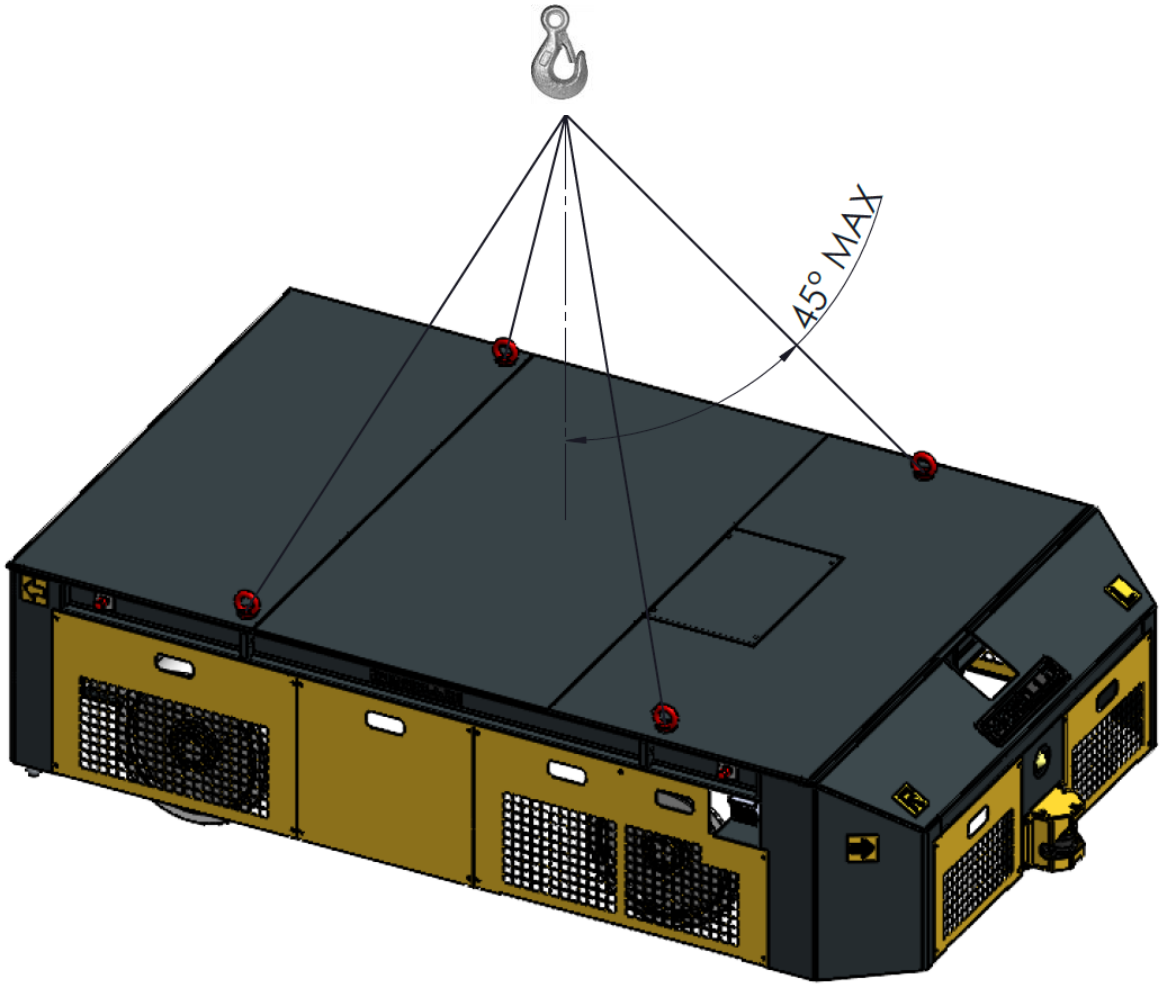


Image for illustrative purposes

BLANK PAGE

INSTALLATION

BLANK PAGE

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 (or PEC) attaching photos of the damage, within 48 hours of the machine delivery.

5.2 INSTALLATION OF THE MACHINE

NOTE



The machine is shipped from the manufacturer already assembled and with a charged battery inside.

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.
- A flat, level and smooth surface capable of supporting the weight of the machine and its load.
- An area suitable for charging the batter (indoor 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 checks

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 controls.

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 scanners.

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.

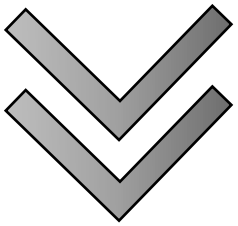
5.4 UNIVERSAL INTERNATIONAL RECYCLING CODES

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

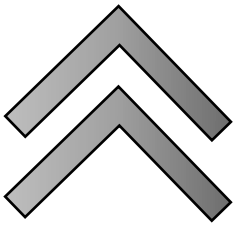
Symbol	Code	Description
	#51 FOR	Cork
	#52-#59	Other types
Textiles		
	#60 TEX	Cotton
	#61 TEX	Jute
	#60-69	Other textile materials.
Glass		
	#70	Transparent / colourless glass: water bottles
	#71	Green glass: wine bottles
	#72	Brown glass: bottles of beer
	#73-79	Other materials in glass and cans
Composite 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

BLANK PAGE

SELF-PROPELLED ELECTRIC RUBBER-TYRED TROLLEY
Serial number 2769



USE



BLANK PAGE

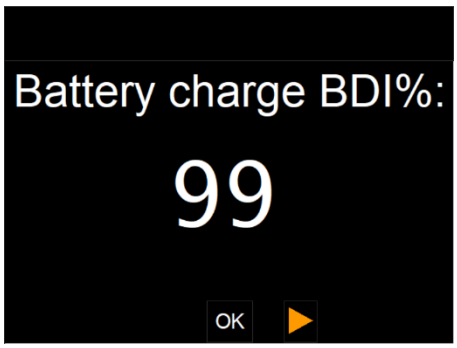
6. USE

6.1 VIDEO PAGES

There is an LCD display on the electrical panel that allows you to view information about the machine.

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

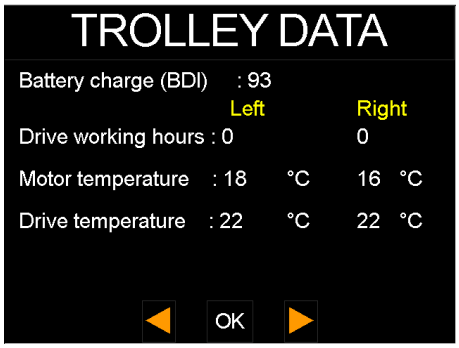
6.1.1 Screen 1: battery remaining charge



This page indicates:

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

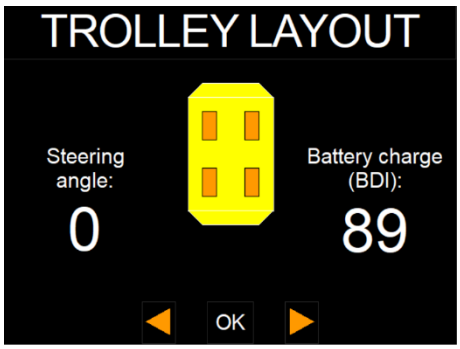
6.1.2 Screen 2: trolley data



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.

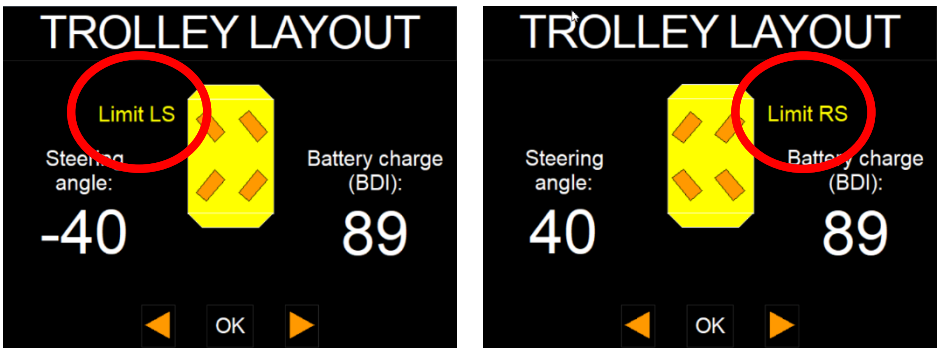
6.1.3 Screen 3: movements



This page displays the data regarding:

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

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



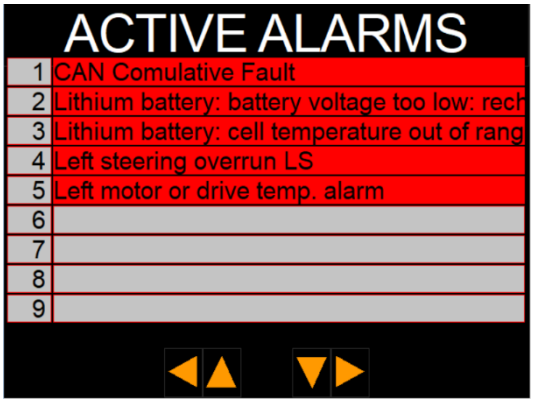
Sample images

NOTE

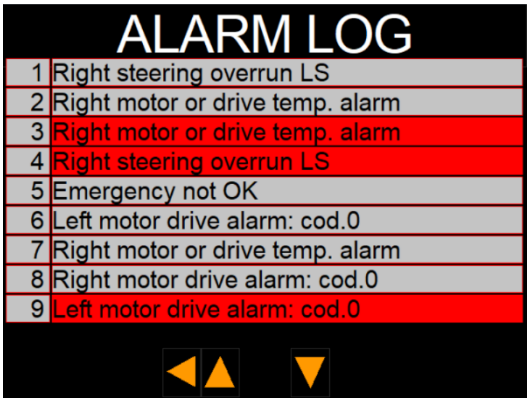
In the event of an overtravel limit switch tripping, the red general fault lamp on the electrical panel lights up.

6.1.4 Screen 4 and 5: alarms

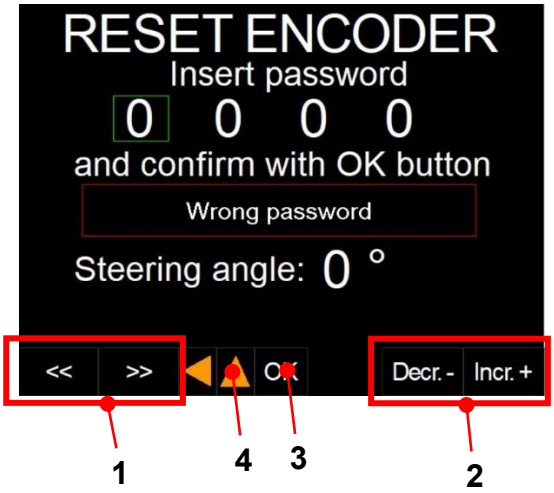
The following screen allows you to view the active alarms. You can scroll through the list / pages using the arrows.



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: reset encoder



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 the reset, once the steering axle has been correctly positioned, press the button marked with an arrow **(4)** and hold it down 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.	Eliminate the cause of the fault or hazard and restore the emergency system. QUALIFIED TECHNICIAN: Check the electrical continuity of the emergency circuit and ensure that the emergency devices are functioning correctly.
Right motor drive alarm: cod.[xxxx] **Left motor drive alarm: cod.[xxxx]**	Inverter fault.	QUALIFIED TECHNICIAN: Ensure that the battery is fully charged. Check that the inverter's protective fuses are intact. Check that the relevant motor is not jammed or obstructed. Check that there is voltage on the auxiliary circuits (24 Vdc). Check the drive's alarms via the console or the configuration software.
Right motor or drive temp. alarm **Left motor or drive temp. alarm**	Motor overload, motor jam, low battery, phase failure, or faulty temperature sensor.	QUALIFIED TECHNICIAN: Ensure that the battery is charged. Check that the corresponding motor has no obstructions or is not jammed. Check the continuity of the drive and motor power circuits. Check the continuity of the temperature probe.
Battery low	Battery flat.	Recharge the battery.

ALLARME VISUALIZZATO	CAUSA	AZIONE
Right steering overrun LS **Left steering overrun LS**	Failure to correctly position the steering wheels via software due to a possible encoder failure or encoder slippage.	QUALIFIED TECHNICIAN: Reset the steering encoder if it is not aligned with the mechanical zero position. After resetting, move the wheels several times and verify that there are no discrepancies between the mechanical zero position and the zero shown on the display. Check that the encoder is securely fixed and has no mechanical slippage. Check the encoder cables and wiring. Verify that the encoder is working properly by checking the position on the display during steering; replace it if necessary.
	Overtravel limit switch fault.	QUALIFIED TECHNICIAN: If the steering axle has not reached the overtravel limit switch, check the operation of the limit switch, the limit switch power supply cable, and the wiring.
Encoder not OK	Encoder fault.	QUALIFIED TECHNICIAN: Check the electrical connection. If it is connected correctly, contact the Manufacturer.
CAN Cumulative Fault	CAN communication with errors	QUALIFIED TECHNICIAN: Check the electrical connection. If it is connected correctly, contact the Manufacturer.
CAN Encoder Fault	Missing CAN communication between encoder and PLC.	QUALIFIED TECHNICIAN: Check the electrical connection. If it is connected correctly, contact the Manufacturer.
CAN Pushbutton Fault	Missing CAN communication between control panel control unit and PLC.	QUALIFIED TECHNICIAN: Check the electrical connection. If it is connected correctly, contact the Manufacturer.
CAN Right Driver Fault	Missing CAN communication between right motor control driver and PLC.	QUALIFIED TECHNICIAN: Check the electrical connection. If it is connected correctly, contact the Manufacturer.
CAN Left Driver Fault	Missing CAN communication between left motor control driver and PLC.	QUALIFIED TECHNICIAN: Check the electrical connection. If it is connected correctly, contact the Manufacturer.

ALLARME VISUALIZZATO	CAUSA	AZIONE
CAN Lithium Battery Fault	Missing CAN communication between battery and PLC	QUALIFIED TECHNICIAN: Check the electrical connection. If it is connected correctly, contact the Manufacturer.
Steering offset is ZERO	Missing ZERO offset setting.	Contact the Manufacturer.
Fault PLC in STOP	PLC hardware or power supply fault.	QUALIFIED TECHNICIAN: Check the PLC status via the diagnostic LED. Check the electrical connection. For more information, contact the Manufacturer.
Lithium battery: voltage or current too high **Lithium battery: cell temperature out of range** **Lithium battery: out current too high** **Lithium battery: cell voltage too low: recharge** **Lithium battery: battery voltage too low: recharge** **Lithium battery: generic fault: see battery display**	Lithium battery fault.	Refer to the battery manual.
Front laser scanner: area switching feedback missing **Rear laser scanner: area switching feedback missing**	Faulty relay or disconnected wire.	Contact the Manufacturer.
Laser scanner intercepted	The laser scanner stop zone has been interrupted	Clear the area by removing the obstacle and reset the alarm.
Safety Off time limit exceeded	The time limit for the activated function has been reached	Release the SAFETY OFF control.
Laser scanner Safety Off active	The SAFETY OFF function is in use and the laser scanners are disabled	Exercise caution while moving the machine. Release the selector switch to re-enable the laser scanners.
Laser scanner bypass activated	The laser scanner bypass has been activated (the laser scanners are excluded until the machine is turned off).	Exercise caution while moving the machine. Turn the machine off and back on to reactivate the laser scanners.

6.3 PRELIMINARY CHECKS BEFORE OPERATING THE MACHINE

Before starting to move the machine, the operator shall:

- Check that there are no foreign objects attached to the wheels and that they are not deformed.
- Check that the safety devices are working correctly.
- Check that the machine is not undergoing maintenance or cleaning.
- Check that all guards are correctly fitted.
- Check the correct operation of the limit switches.
- Check the correct operation of the control devices.
- Check that the machine power plug is correctly inserted into the battery socket.
- Check that the wired control pendant connector is correctly inserted into the socket located on the machine (if used).
- Check that the radio control battery is charged (if used).
- Check that the machine battery charge level is sufficient.
- Check that there are no fault signals.
- Check that the electrical panel doors are correctly closed and locked, and that there are no damaged or loose components on the control panels.

6.4 MACHINE OPERATION

The machine may only be operated using one of the two control panels supplied.

WARNING

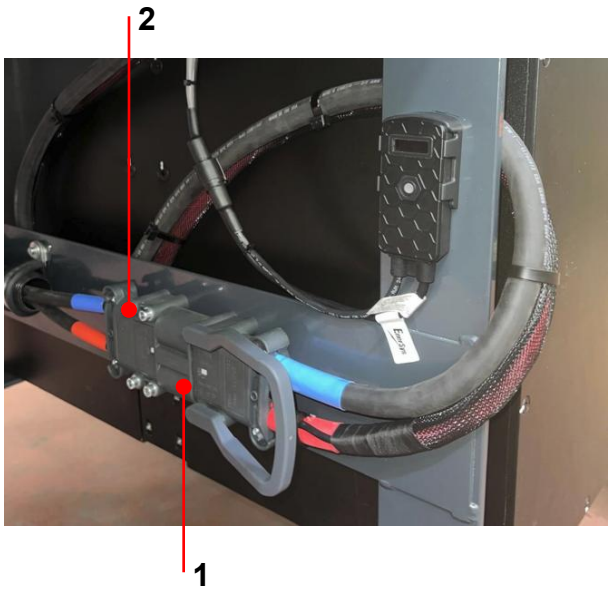
Before starting handling operations, make sure there are no obstacles or people near the machine and that no people are in the danger zone.

CAUTION

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

6.4.1 Battery connection

Before starting the machine, insert the battery connector **(1)** into the machine power supply connector **(2)**.



6.4.2 Starting the machine with the wired control panel

To start-up the machine, proceed as follows:

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

NOTE

The wired control panel is activated by connecting the plug to the socket on the machine. Plugging in the connector disables the radio control; therefore, only one device can be used at a time.

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

The machine is now ready for movement.

NOTE

Do not disconnect or connect the wired control panel until the power to the machine has been switched off (power switch in the ‘0’ position).

6.4.3 Starting the machine with the radio control

To start the machine, proceed as follows:

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

The machine is now ready for movement.

NOTE



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

6.4.4 Machine movement (translation and steering)

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

Using the active control device (radio control or wired control panel):

- Set the maximum travel speed using the dedicated selector switch.
- Apply pressure to the "FORWARD / BACKWARD" joystick to move the machine. The travel speed is proportional to the pressure exerted. Release the joystick to stop the machine.
- To perform the required steering so that the machine changes the wheel angle, apply pressure to the "LEFT / RIGHT" steering joystick. The maximum wheel steering angle is ± 90°. Releasing the joystick stops the steering movement.

CAUTION



It is the responsibility of the operator using the machine to ensure that the area is clear of objects and people whilst the machine is in operation.

CAUTION



Only one operator is required to operate the machine; they must position themselves as shown in the section ‘Operator workstation’.

NOTE



Take care when manoeuvring the machine and, if necessary, warn others of its approach by sounding 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.

PLATE	DESCRIPTION
	FORWARD
	BACKWARD
	LEFT
	RIGHT

6.4.6 Start-up after an emergency stop

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

- Clear the cause of the error or hazard.
- Reset the EMERGENCY STOP button by turning it clockwise, if pressed.
- Wired control panel / Radio control: Press the green "START" button.
- Electrical panel: Press the white illuminated "auxiliary services activation" button and verify that its internal LED turns on.

The machine is now ready for movement.

6.4.7 Laser scanner intervention

If an obstacle on the ground intercepts the stop area, the machine stops. On the electrical panel, the "scanners tripped" indicator light stays on steady, and the LED of the "auxiliary services activation" button flashes.

To reset the laser scanners, it is necessary to:

- Remove the obstacle.
- Press the "auxiliary services activation" button located on the electrical panel to restore safety functions (alternatively, turn the corresponding selector switch on the radio control / wired control pendant to "RESET").

6.4.8 Parking brakes

The machine is equipped with electromagnetic parking brakes that disengage when a 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 the wheels from moving. 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 you are using (radio control or wired control panel).

NOTE



Do not disconnect the wired control panel unless the power to the machine has first been switched off (power switch in the ‘0’ position).

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

NOTE



In the event of prolonged periods of inactivity or maintenance work, disconnect the machine’s power plug from the battery socket to cut off the power supply.

NOTE



Do not leave the load on the machine.

6.5 LOAD POSITIONING

It is recommended that the load be placed gently on the saddles, avoiding any jolts that could cause additional stress within the load-bearing structure and the machine's mechanical components. Ensure that the load remains within the boundaries of the loading area.

WARNING

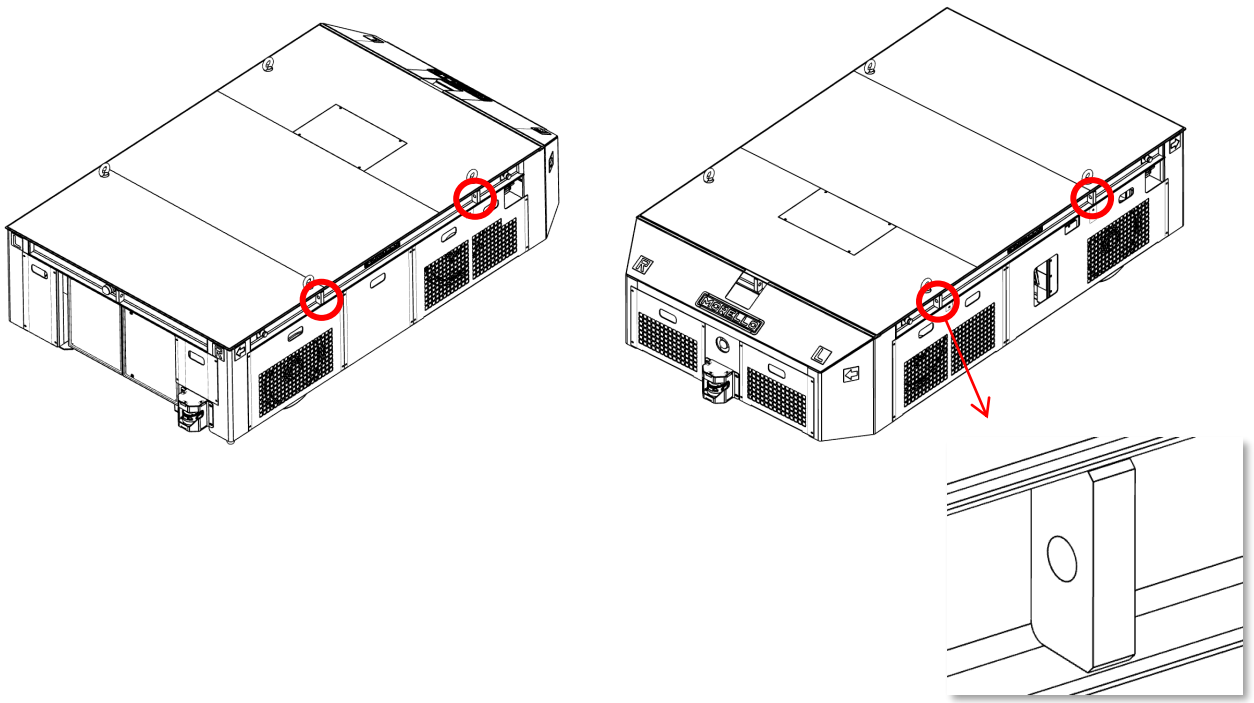
The load must be evenly distributed across the machine's platform, taking care to position the centre of gravity within the stability area.

Alternatively, the load can be concentrated on an area of 2000 x 1500 mm.

NOTE

It is the operator's responsibility to position the load correctly on the machine and to comply with the instructions regarding the maximum load capacity.

The machine is fitted with four load-securing points, as shown in the following image.



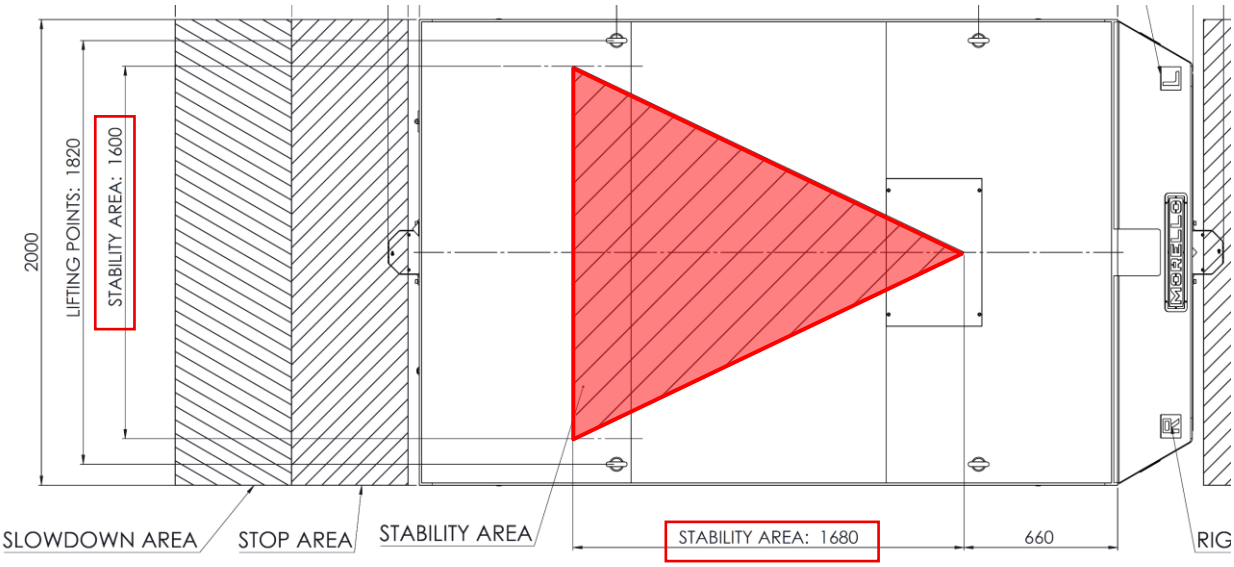
Load securing points

WARNING

It is the operator's responsibility to secure the load before the machine is moved, using suitable slinging methods appropriate to the dimensions of the load.

6.5.1 Stability area

There are three 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.



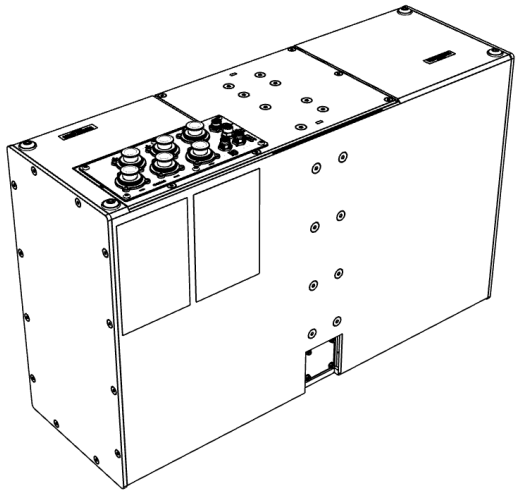
Stability area in red (dimensions in mm)

WARNING

<u>To avoid tipping hazards, the centre of gravity of the load must always be positioned within the above area.</u>

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

The battery life when fully charged (100%), as shown in the technical specifications table, is calculated on the basis of actual use under steady-state conditions (50% under full load and 50% under no load).

When a residual charge of about 30 per cent is reached, the machine stops and the yellow “extra time” button on the electrical panel lights up. To move the machine again, this button must be pressed. This gives an autonomy of about 15 minutes to reach the charging station.

Once the extra time has elapsed, it is mandatory to recharge the battery.

NOTE

It is not possible to tow the machine as the regenerative braking of the electric motors prevents the wheels from moving.

Therefore, the only way to move it is to recharge or replace the battery, or to lift it. To release the brakes, please contact the manufacturer.

6.6.2 Maintaining the Lithium battery

ADDITIONAL INFORMATION

For all information regarding the battery (charging frequency, operating and storage conditions and temperatures, maintenance, etc.), please refer to the battery manual provided in the appendix.

For the battery maintenance, it is recommended:

- Do not go below 20% residual charge.

NOTE

Drastic discharge can irreparably damage the lithium cells. The warranty does not cover replacement of cells that are totally discharged.

- When not in use, store the fully charged battery in a dry place where it will not be exposed to frost.

NOTE

The battery charge level decreases even if not used. Therefore, also in the case of no use, recharge the battery periodically (at least once a week), to avoid slowly dropping under the indicated threshold.

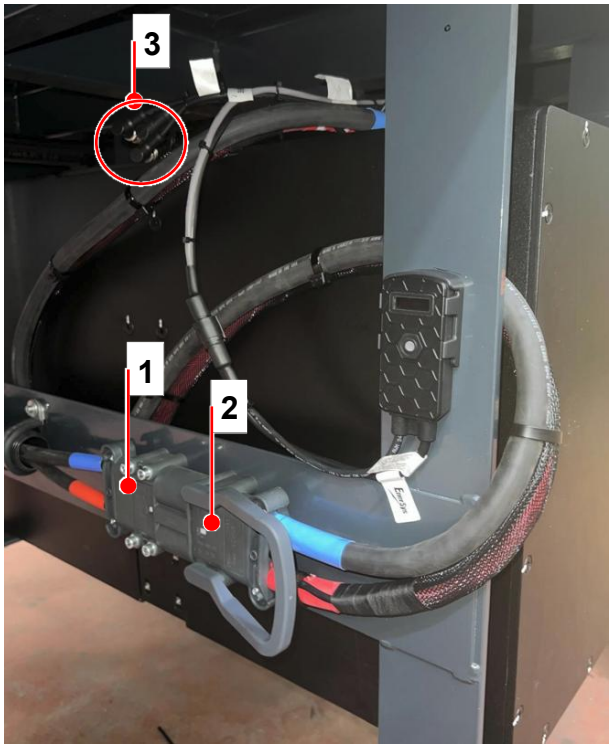
ADDITIONAL INFORMATION

For further information regarding the battery and the rectifier see the relevant manual attached.

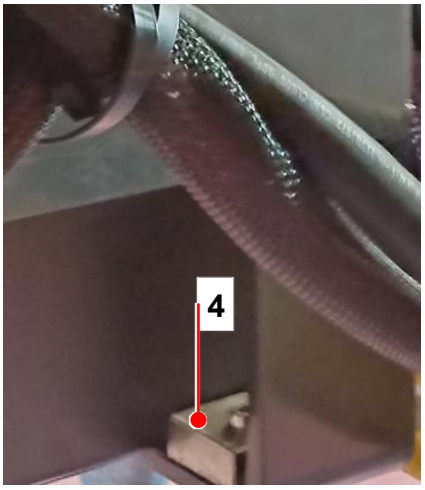
6.6.3 Battery removal

To remove the battery, proceed as follows:

- Disconnect the machine power supply by turning the "key-operated power supply selector switch" located on the electrical panel to position (0). Remove the key.
- Disconnect the machine power plug **(1)** from the battery socket **(2)**.
- Unscrew the screws securing the guard located in front of the battery and remove it.
- Disconnect the connectors **(3)**.



- Remove the L-shaped blocks **(4)** from the base.



- Place a suitable piece of equipment (e.g. a pallet truck) under the battery.
- Remove the battery.
- Lower it slowly and carry it, taking care to avoid any sudden movements.

To reposition the battery, follow the steps in reverse order.

ADDITIONAL INFORMATION

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

6.6.4 Recharge of the battery

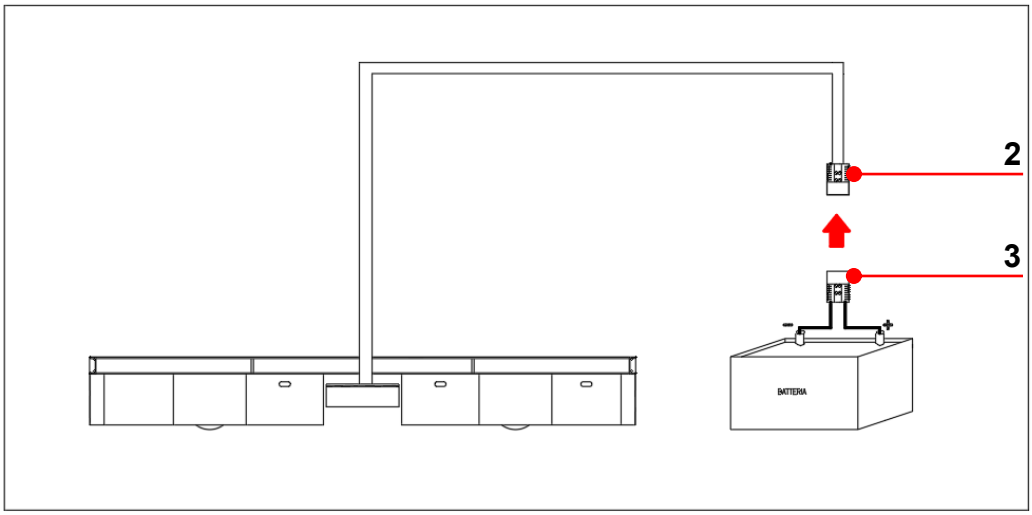
To recharge the battery, proceed as follows:

- Move the machine into the charging area, ensuring that the appropriate safety distances are maintained.
- Switch off the machine's power supply by turning the key selector switch **(1)**, located on the control panel, to position (0) and after turning it to 'ON/OFF BATTERY' to switch off the battery, the selector will automatically return to position (0). Remove the key.

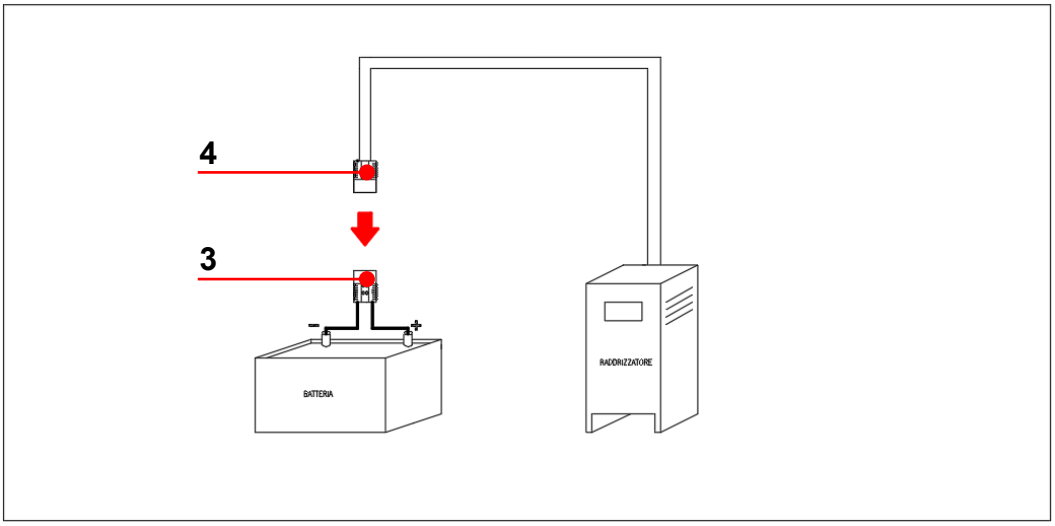


Key selector switch (1)

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

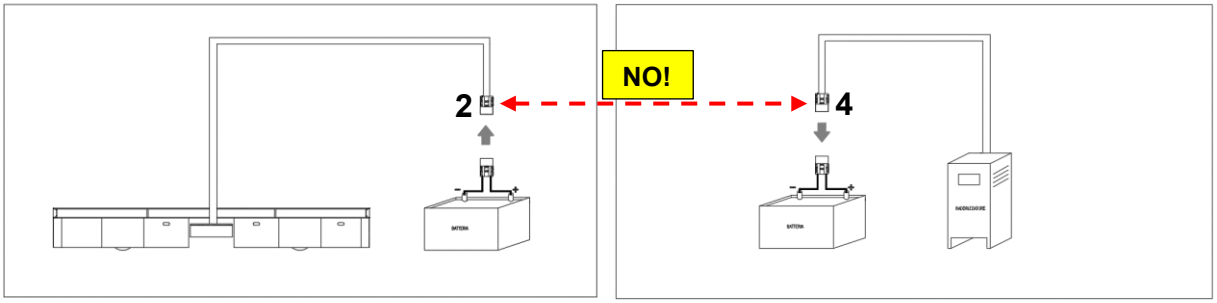


- Connect the charger plug **(4)** to the battery socket **(3)**.

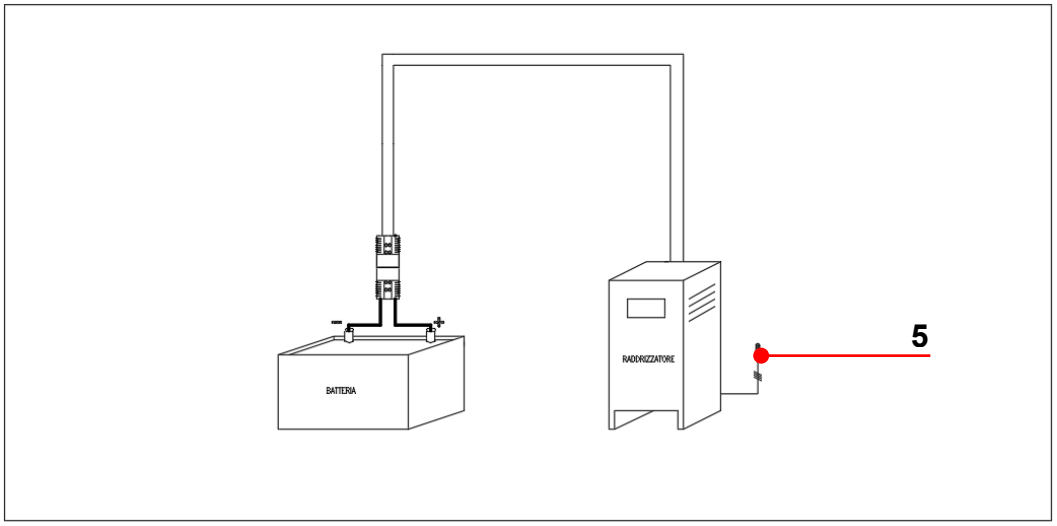


NOTE

Do not connect the charger plug **(4)** to the machine's power supply plug **(2)** (coming from the on-board electrical panel)."



- Connect the charger plug **(5)** to the mains power supply.



- Start the battery charger by turning the switch to ON.
- Wait for the battery to charge.

Once charging is complete, proceed in reverse order.

ADDITIONAL INFORMATION

For more information on charging the battery through the charger, refer to the attached manual.

MAINTENANCE

BLANK PAGE

7. MAINTENANCE

7.1 GENERAL SAFETY PRECAUTIONS

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.

7.1.1 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.
- When the machine is functioning there are moving parts that can cause serious harm to persons. Therefore, the cleaning and specialised maintenance operations regarding disassembly or replacement of components on the machine and on the control unit, are to be carried out with the system 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.

7.1.2 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.

7.2 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.

7.2.1 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.

7.3 PROCEDURE TO STOP MACHINE

WARNING

Maintenance work must be carried out when the machine is not under 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 supply sources, if required by the maintenance operation to be carried out. Otherwise, this is not necessary.

NOTE

To deactivate and cut-out the electrical supply:

- Switch off the machine following the indications contained in the paragraph “Shutting down the machine”.
- Disconnect the machine power supply 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.

7.4 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.

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 equipment (PPE).

To prepare the machine for maintenance proceed as follows:

- Stop the machine and cut-out the power supply, following the procedure indicated in **paragraph 7.3** “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 previously removed.

POSITIONING OF THE MACHINE ON SERVICE DEVICES

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

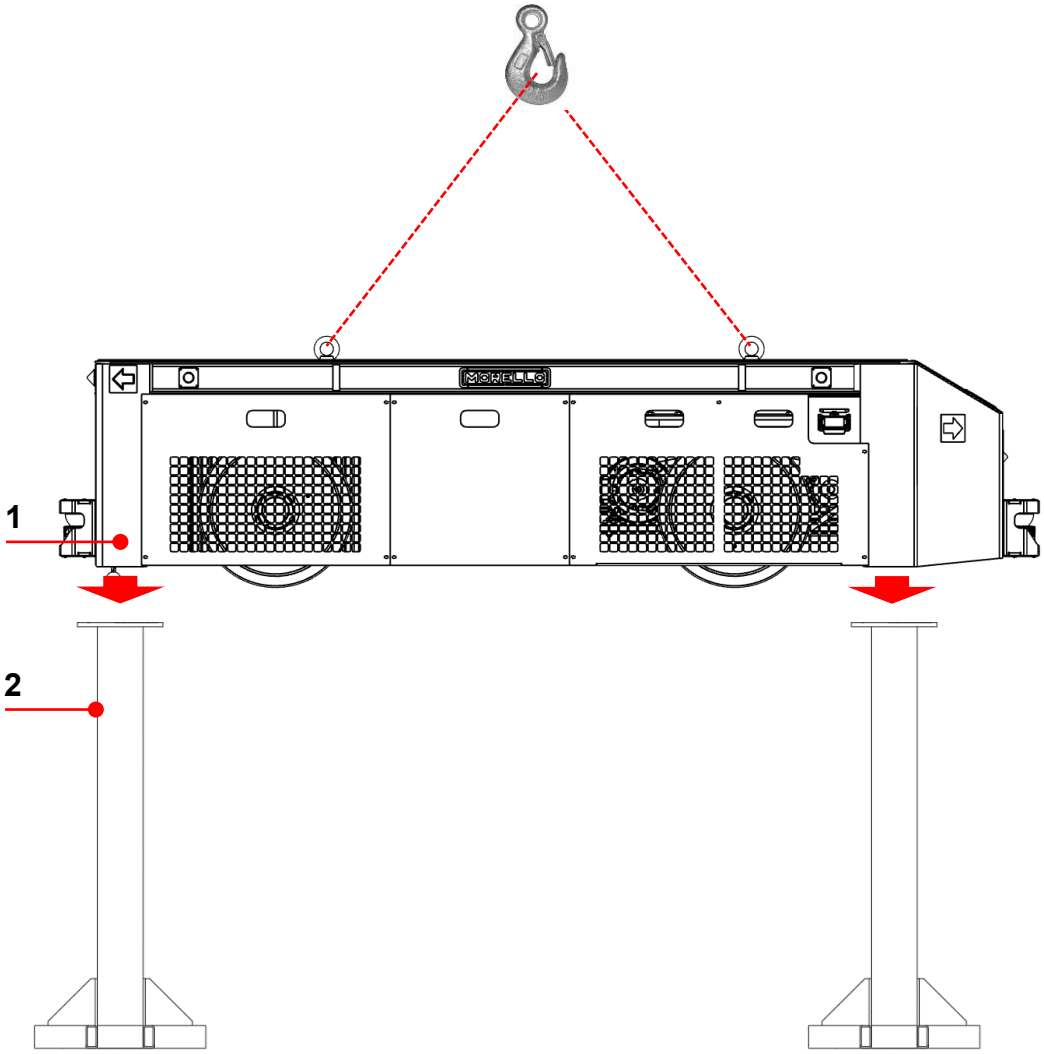


Image for illustration purposes only

7.5 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.

7.5.1 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.

7.6 MAINTENANCE FREQUENCY

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	Complete battery charge cycle (including equalization).
Every week	Check the correct operation of the horn, buzzer, and indicator lights.
Every week	Check the correct operation of the maintained-action controls.
Every month	Clean the wheels, treadplate, and lights.
Every month	Clean the control panel on the electrical panel, the radio control, and the wired control pendant.
Every month	Check the correct connection and tightening of the encoder, limit switches, and lights.
Every month	Check the correct operation of the limit switches.
Every month	Check the smooth rotation of the slewing ring. In case of anomalies, contact the Manufacturer.
Every month	Check the correct fastening of the grounding chain.
Every three months	Check the chain tension. If necessary, use the chain tensioners to adjust it (see the procedure in the "Chain tensioning" paragraph).
Every three months	Visually check the wear condition of the chain links. If necessary, replace them.

FREQUENCY	DESCRIPTION
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



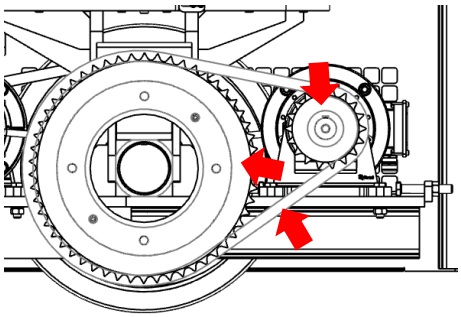
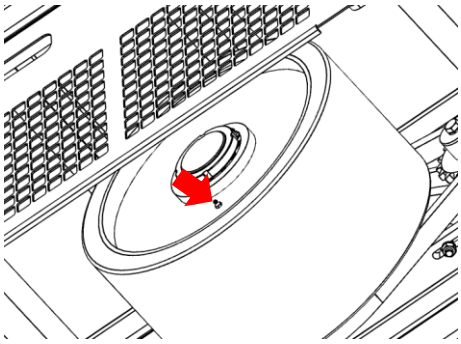
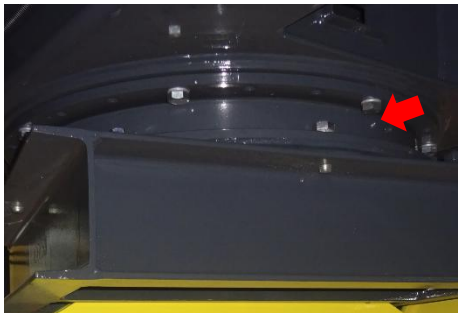
For information regarding replacement procedures, contact the Manufacturer.

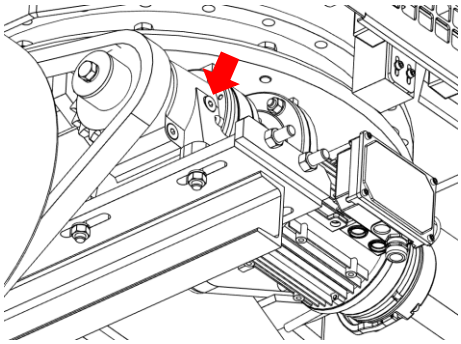
7.7 LUBRICATION

Before carrying out lubrication operations, stop the machine, cut-out the power supply and prepare it for maintenance as indicated in **paragraph 7.3** “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 7.4** "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 TRIBOL GR 4020/220-2 PD grease or equivalent.
Every three months for the first year, then every six months	Wheel bearings		Apply the grease to the nozzles using a suitable grease gun. Use TRIBOL GR 4020/220-2 PD grease or equivalent.
Every three months for the first year, then every six months	Slewing ring		Apply the grease to the nozzles using a suitable grease gun. Use TRIBOL GR 4020/220-2 PD grease or equivalent.

FREQUENCY	COMPONENT	IMAGE	METHOD
-	Gearboxes		For information on gearbox lubrication, please refer to the relevant manual enclosed and to the nameplate affixed to the gearbox itself.

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

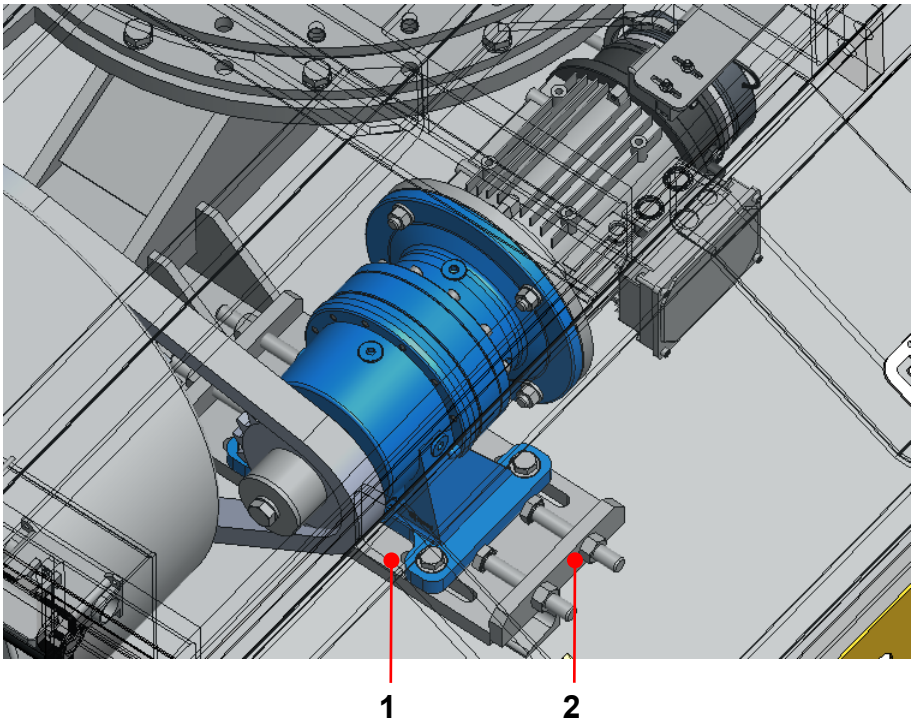
Use of a type of oil/grease that is not equivalent to that indicated annuls the warranty in the case of failures and/or breakdowns.

7.8 CHAIN TENSIONING

Before tensioning the chain, stop the machine, cut-out the power supply and prepare it for maintenance as indicated in **paragraph 7.4** “Machine procedure for maintenance positioning”.

To tension, proceed as follows:

- Access the gearmotor and secure it with a suitable support device (equipped with adequate castors to allow it to move and accompany the gearmotor during the chain tensioning adjustment).
- Slightly loosen the four screws **(1)** anchoring the gearmotor to the plate.
- Turn the four chain tensioner screws **(2)** to adjust the chain tension.
- Once the operation is complete, correctly tighten the four screws **(1)** and then remove the gearmotor support device.



7.9 TIGHTENING TORQUES

The following tables show the tightening torques for each screw size.

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

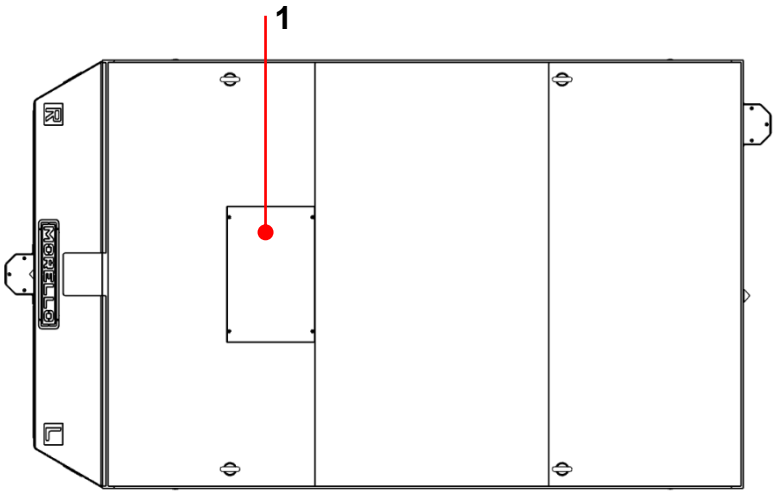
NOTE



Carry out an inspection after the first month of using the machine and annually thereafter.

7.10 ACCESS TO THE STEERING ENCODER

DESCRIPTION	WEIGHT
Encoder access panel **(1)**	Approx. 11 kg



To access the encoder, proceed as follows:

- Turn off the machine and disconnect the electrical power supply.
- Unscrew the screws securing the panel **(1)** and, lifting it slowly, remove it.

Once the maintenance operations are complete, reinstall the removed panel.

7.11 MAINTENANCE SHEET

Record all maintenance work in a dedicated logbook; an example of which is given below.

DATE	OPERATOR	DESCRIPTION OF OPERATION

7.12 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



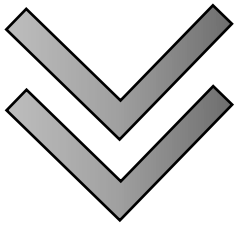
The spare parts are to be kept clean, lubricated and stored in appropriate containers to preserve the integrity over time.

7.12.1 Mechanical spare parts

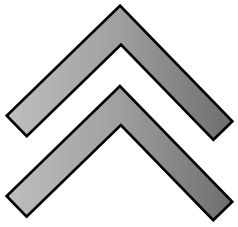
U / R	Description	Manufacturer	Quantity installed	Quantity recommended
U	Non-marking motorized wheel Ø560x300mm	MORELLO	2	1
U	Non-marking idler wheel Ø560x300mm	MORELLO	2	1
U	Tapered roller bearing 32920 (100x140x25)	SKF	8	2
R	Locknut KM20 M100x2	SKF	4	-
R	Lock washer MB20	SKF	4	-
R	Single sprocket P=1" Z=54	MORELLO	2	-
R	Pinion P=1" Z=18	MORELLO	2	-
U	Chain 1" - L = 1.710 mm - 67 links + master link + connecting link	CATOR	2	1
R	Slewing ring M_CSC_RLM_0106	MORELLO	1	-
U	Bushing 60x65x50 TIPO GLY.PG 606550 F	SKF	3	1
R	Swivel joint M5	MORELLO	2	-
R	Planetary gearbox R 2EL 001A 37.7Y C042M1 P10a I28x250 B3	ROSSI	2	-
R	Motor STD AC 48V 3kW - 2200RPM Cnom=13Nm - 500RPM Cstart= 39Nm IP65 - Encoder Rheintacho 48ppr - Termica KTY84-130 - PAM B5/100 - Freno 48V IP54 40Nm + Leva	METALROTA	2	-

7.12.2 Electrical spare parts

U / R	Description	Manufacturer	Quantity installed	Quantity recommended
R	LITHIUM battery 48V 148Ah	ENERSYS	1	-
R	Battery charger code NEXSYS+ 48V 7KW (120A)	ENERSYS	1	-
R	Wired control panel	MORELLO	1	-
R	Radio control	MORELLO	1	-
R	Inductive sensor IM5123	IFM	2	-
R	Yellow flashing beacon CTL600	SIRENA	2	-
R	Multi-turn absolute encoder - code 8.M3688.2424.2122 - IP65 - shaft Ø10mm	KUBLER	1	-
R	Laser scanner MICS3-AAAZ40AZ1P01	SICK	2	-
R	Motor drive cod. 1232SE-6321 48-80V 250A	CURTIS	2	-



DISPOSAL



BLANK PAGE

8. 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 fitted).
- Remove the lubricants.
- Dismantle the machine, working on one assembly at a time.

WARNING



Take the utmost care to prevent any parts or components of the machine from falling during removal. This could pose a serious hazard to operators.

- Remove any moving parts and, as far as possible, separate the various components by material type (wood, metal, etc.) so that they can be disposed of via separate waste collection.
- Remove and move machine parts from the work area, taking all necessary precautions.
- Before lifting components of considerable size and/or weight, check that the lifting equipment is correctly secured and use only suitable slings and equipment.

ADDITIONAL INFORMATION



Disposal must be carried out in accordance with the relevant 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.

8.1 RECYCLING

Part of the dismantled materials can be recycled.

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

8.2 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:

- Lubricants may contaminate water and soil; therefore, never pour these products onto the ground, into water or down the drain. Any breach of these rules may result in legal action. When using such products, keep an oil absorbent to hand.
- Carefully recover lubricants, separating mineral-based products from synthetic ones. When disposing of them, comply with the regulations in force regarding the disposal of waste oil.

It is the Customer’s responsibility to be aware of the laws in force in their own country and to act in accordance with those laws.

ATTACHED DOCUMENTATION

BLANK PAGE

9. ATTACHED DOCUMENTATION

The documents below will be inserted at the end of this manual.

	DESCRIPTION
1	Machine layout
2	Wiring diagram
3	Motor manual
4	Gearbox manual
5	Charger manual
6	Battery manual
7	Inverter manual
8	Radio control manual
9	Laser scanner manual

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.morello.eu.com