

Year: 2026
Rev. 01 - 04/2026



USER MANUAL



PROTESO

MOVI 2.0



Proteso srl

Operational Headquarters: Via Ezio Andolfato, 10, 20126 Milano MI

Registered Office: Via Giacomo Leopardi 7, 20123 Milano MI

www.proteso.it

info@proteso.it

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1.1 Manufacturer Identification details



PROTESO Srl

Operational Headquarters: Via Ezio Andolfato 10, 20126 Milan, Italy

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The **PROTESO Srl** company is available - upon request -
to provide the following services:

- Installation support
- Commissioning and start-up assistance
- Staff training
- Extraordinary maintenance support
- Routine maintenance support
- Repair assistance
- Consultancy for modifications and/or upgrades
- Supply of spare parts

TECHNICAL SUPPORT

supporto@proteso.it

www.proteso.it



TRANSLATED INSTRUCTIONS

1.2 CE Marking

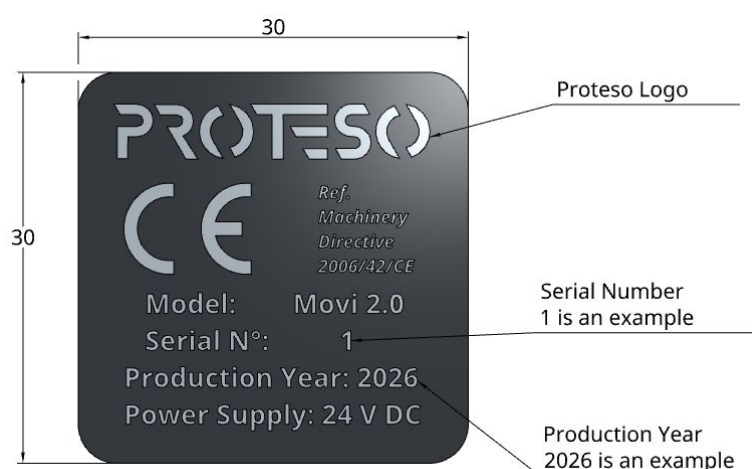
To guarantee that the design and construction of the device comply with the EC Machinery Directive, an identification plate is applied (see example) containing the main technical data and the CE symbol.

The CE certification, in accordance with current regulations, is attached to the device's technical documentation.

All identification data for the device is engraved on the plates. For any information, communication, or reporting of anomalies, always provide the model and serial number of your device whenever you contact our Technical Support Service.

Should the CE MARKING plate be accidentally damaged and/or detached from the device, the customer is obliged to inform **Proteso Srl**.

For any communication with **Proteso Srl**, always refer to the Serial N° printed on the CE MARKING plate.



**The identification plate
MUST NOT, for any reason,
be removed from the
device**

1.3 CE MARKING Plate Positioning

The CE MARKING plate is positioned on the device as indicated in the picture



1.4 EC Declaration Of Conformity



EC DECLARATION OF CONFORMITY FOR MACHINERY

(Machinery Directive 2006/42/EC)

The manufacturer:

Proteso Srl

Operational Headquarters: Via Enzo Andolfato 10, 20126 Milan, Italy

Registered Office: Via Giacomo Leopardi 7, 20123 Milan, Italy

HEREBY DECLARES THAT THE:

MOVI 2.0

MACHINE TYPE

SERIAL NUMBER:

YEAR OF CONSTRUCTION:

COMPLIES WITH THE PROVISIONS OF THE MACHINERY DIRECTIVE (2006/42/EC);

The technical file is kept at the operational headquarters of Proteso Srl in via Enzo Andolfato 10, 20126 Milan, Italy.

The person authorized to compile the technical file and signatory of this declaration for Proteso Srl, undertakes to transmit, in response to a reasoned request by the national authorities, relevant information regarding the unit in question, without prejudice to its intellectual property rights.

This declaration relates exclusively to the machinery in the state in which it was placed on the market, excluding components added and/or modifications subsequently carried out by the end user.

Place and date of issue:

Signature

Milan, ...

.....

1.5 Copyright and Directive

IMPORTANT

Some photos and/or drawings in this publication may represent the device equipped with optional elements which, if not purchased, have not been installed on your device. Please consult your purchase agreement and the list provided in this manual regarding the configuration of your device.

This manual reflects the state of the device at the time of delivery and cannot be considered inadequate simply because it is subsequently updated based on new modifications.

Proteso Srl reserves the right to update production and manuals without the obligation to update previous production and manuals, and without the obligation to inform users of previously supplied devices

Copyright

All rights reserved. The reproduction of any part of this manual, in any form, is prohibited without the express written permission of **Proteso Srl**. The content of this manual may be modified without prior notice. Every care has been taken in collecting and verifying the documentation contained in this manual; however, **Proteso Srl** cannot assume any responsibility resulting from the use of the same. The same applies to any company involved in the creation and production of this manual.

The official language chosen by the manufacturer is: **ITALIAN** 

No responsibility is assumed for translations into other languages that do not conform to the original meaning.



NOTE

This manual has been drafted in compliance with the requirements of DIRECTIVE 2006/42/EC.

2.1 Introduction

In thanking you for your preference and the trust placed in us, **Proteso Srl** is pleased to count you among its loyal customers and trusts that the use of its devices – designed and manufactured according to the most modern and efficient production systems – will be a source of complete satisfaction for you.

The indications and instructions for the use of the device contained in this manual are in addition to, but are not intended to replace, supplement, or modify, any specific Standard, Regulation, Decree, Directive, or Law in force in the place of use regarding the safety, operation, and maintenance of the devices.



NOTE

Keep this manual (or the QR code) and all attached publications in an accessible location known to all users (operators and maintenance personnel).

The Manual and technical documentation delivered with the device are the exclusive property of **Proteso Srl**, which reserves all rights; therefore, they may not be made available to third parties. This manual may not be reproduced or photocopied without the prior consent of **Proteso Srl**.

Do not remove or damage labels, lettering, or warnings placed on the device. Should it be necessary to restore them, contact **Proteso Srl**.



NOTE

It is mandatory to organize an adequate instruction and training program regarding the correct and safe use of this device, and it is strongly recommended to repeat it periodically to ensure that operating and maintenance personnel remain fully aware of its operation and safety procedures.

Regarding requests for spare parts, please order what is necessary from Proteso Srl, which will provide them in the shortest possible time.

2.2 OWNERSHIP OF INFORMATION

The use of this documentary material is permitted only to the Customer to whom the manual was supplied as part of the device equipment, and only for the purposes of use and maintenance of the device to which the manual refers. **Proteso Srl** reserves the right to make changes and improvements to this documentation and the related **Proteso Srl** production devices without prior notice.

2.3 PURPOSE OF THE MANUAL

This manual is intended to be a useful tool for the correct and safe use of the device, as well as for its effective maintenance. Compliance with the indications contained herein guarantees the best performance and optimal operation of the device.

The purpose of this manual is to provide information for the safe and correct use of the **MOVI 2.0 exoskeleton**. It is also intended to provide all the information necessary for:

- Properly raising operator awareness regarding safety issues
- Handling the device under safe conditions
- Correct installation of the device
- Correct use under safe conditions
- Carrying out maintenance interventions in a correct and safe manner
- Dismantling the device in compliance with current regulations for the protection of worker health and the environment

It is the customer's responsibility to ensure that this document is read in its entirety by the personnel assigned to use the device.



NOTE

Proteso Srl declines all responsibility for accidents caused by improper use of the device by individuals who have not followed the instructions contained in this manual.

2.4 STORAGE OF THE MANUAL

Unless otherwise specified in the order, **Proteso Srl** provides a copy of this Manual (or a QR code pointing to the Manual) in Italian or in English.

It accompanies the shipment, is included in the packaging, and must be used for all operations related to installation, transport, assembly, commissioning, use, etc. Once installation is complete, the copy must be kept for all maintenance interventions.

This instruction manual/ QR code is an integral part of the device and must be preserved for any future consultation.

It is recommended to:

- Keep the manual/QR-code in an accessible location known to all operators, protected from humidity, heat, and direct sunlight;
- Use the manual/QR-code in such a way as not to damage its content, in whole or in part: do not remove, tear, or modify any part of the manual for any reason.

In the event of the sale or transfer of the device to another person, this manual and the relative attachments must be handed over, intact, to the new owner.

The purpose of the information contained in the manual is to: indicate the intended use of the device based on design assumptions and technical characteristics; provide instructions for movement, installation, assembly, adjustment, and use; provide indications regarding residual risks.

Since this device is intended for professional use by trained personnel, the manual can never replace adequate user training.

The instruction manual is to be considered part of the equipment and must be kept for future reference until final decommissioning.

It must always be available for consultation in the vicinity of the device.

The manual reflects the state of the art at the time the device was placed on the market and cannot be considered inadequate simply because it was subsequently updated based on new experience.

The manufacturer has the right to update production and manuals without the obligation to update previous production and manuals, except in exceptional cases.

The customer or the user may contact the manufacturer to receive further information.

2.5 ORGANIZATION OF THE MANUAL

The manual provides a general overview of the company, a section relating to safety, and the hardware and software characteristics of the device. Particular attention has been paid to safety standards for the operator: it is suggested to follow these rules in order to reduce the risk of accidents as much as possible.

2.6 HOW TO CONSULT THE MANUAL

In accordance with the provisions of the Machinery Directive 2006/42/EC, the use and maintenance manual is an integral part of the delivery and marketing of the device. The manual must be preserved for the entire service life of the device and must accompany the device even in the event of transfer to third parties.

The manual is easy to consult and is divided into the following main parts:

- Introductory cover, always located at the beginning of the manual;
- Identification page for the device and its manufacturer;
- General table of contents of the manual;
- Indexed chapters divided by subject.

An identification code is present on the front and inside covers to identify the manual.



2.7 REQUEST FOR ADDITIONAL COPIES OF THE MANUAL

This manual is provided on electronic media accompanying the device. The customer may request an additional copy of this manual, including a hard copy version, by making an appropriate request to the Technical Support of Proteso Srl, specifying the device model.

To make a request, a regular purchase order must be sent to the following address:

Operational headquarters: Via Ezio Andolfato 10, 20126 Milan, Italy

www.proteso.it

supporto@proteso.it

2.8 UPDATES TO THE MANUAL

If, during the service life of the device used by the user, the manufacturer intervenes to make technical modifications, an update to the manual relating to the modified part or parts of the device will be drawn up.

2.9 WHERE TO FIND FURTHER INFORMATION

Further information regarding the company and products can be found on the corporate website at: www.proteso.it

2.10 CUSTOMER DUTIES

The Customer must ensure that the device is not used improperly, is used solely by Users trained or authorized by the Manufacturer, and is used only within the design limits, avoiding danger to the safety of the operator or third parties. Furthermore, it must be guaranteed that the relevant accident prevention regulations and other safety provisions, as well as operation and maintenance, are observed. The customer must also ensure that all persons using the device have read and understood these instructions for use.

No modifications to the device are permitted. Before proceeding with any modifications, please contact the manufacturer. Without the consent of the Manufacturer, no modification of the device that could change and/or damage its functionality may be carried out.

2.11 WARNINGS

This document is intended for professionals who, in terms of experience or qualifications, know how to operate according to the most common safety standards and specific skills; it is assumed that each individual has a basic knowledge relative to their role. The Customer must ensure that the operator has the necessary skills and training for their function.



NOTE

**Reading this manual is mandatory for all persons who interact with the device.
Furthermore, they should be informed of any RESIDUAL RISKS deriving from the use of the device.**

The manual CANNOT fill any cultural or intellectual gaps of the various professional figures who interact with the device. Personnel assigned to operation, maintenance, and/or any other operation related to the device must have specific experience with this type of device or similar devices, or must undergo specific professional training beforehand.



ATTENTION

The Customer, or employer, is civilly liable for all damage caused or suffered by the personnel whom they themselves have authorized to use the device.

Some general safety precautions provided may be excessive or even impossible to respect in certain unusual situations (for example, initial start-up, special maintenance, vacuum tests, faults or malfunctions, etc.).

In these cases, the operator and the maintenance operator may behave differently provided that:

- they are fully aware of what they are doing;
- they have adequate skills and training;
- they do not deliberately act in a self-destructive manner.

2.12 GLOSSARY AND TERMINOLOGY

Many accidents are caused by insufficient knowledge and failure to apply safety rules to be put into practice during the operation and maintenance of the device.

To avoid accidents, read, understand, and follow all precautions and warnings contained in this manual and those shown on the plates applied to the device. To improve the understanding of this manual, we clarify the terms and symbols used below:

PICTOGRAMS:

- Very important information/instructions, particularly regarding safety. Failure to comply may result in:
 - Danger to the safety of operators;
 - Loss of contractual warranty;
 - Disclaimer of the manufacturer's liability.

CUSTOMER:

- Indicates the legal entity, organized in an autonomous and/or professional and/or individual or collective form, which accepts this manual, and which is already in possession, under various titles (owner, holder, custodian, hirer), of the **PROTESO Srl** device;

DISCLAIMER OR STATEMENT OF LIMITATION OF LIABILITY:

- Part of this manual where the content of the limitation of liability of **PROTESO Srl** is defined;

LEGAL INFORMATION:

- Information of a legal nature contained in this manual;

MANUAL:

- Indicates this document or a QR code pointing to the online version of it, containing the rules for using the device, intended for the end user of the product;

QUALIFIED TECHNICIAN:

- A person certified by the manufacturer for the installation and technical assistance of the device, authorized by the manufacturer itself to operate on the system;

OPERATOR OR USER:

- A person trained by the qualified technician so that they can use the device correctly;

ADMINISTRATOR:

- A person trained and designated by the organization to hold the configuration rights of the device;

COMPETENT AUTHORITY:

- Any authority that performs regulatory activities and has jurisdiction in the place where the device is installed, used, or maintained.



NOTE

A NOTE message contains information that must be kept in mind, additional to the main text.



ATTENTION

An ATTENTION message indicates certain steps that should be performed with caution. Incorrect management could be associated with certain risks.

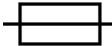


DANGER

A DANGER message indicates the presence of intrinsic hazards at the corresponding step. The message includes information to follow on how to avoid the danger.

2.13 PICTOGRAMS AND SYMBOLS

In the text, you may also encounter some symbols, which are described below.

Symbols	Description
	Manufacturer
	Date of manufacture
	Reference Number
	Do not use if packaging is damaged
	WEEE
	Refer to the instruction manual
	Temperature limit
	Humidity limit
	“ON/OFF”
	Caution
	Fuse

2.14 EXCLUSIONS OF LIABILITY

The Manufacturer shall not be held liable for inconveniences, breakages, accidents, etc., resulting from a lack of knowledge (or otherwise from the non-application) of the prescriptions contained in this manual.

The company **Proteso Srl** considers itself relieved of any liability in the event of incorrect use of the device, such as:

- Improper use of the device or use by untrained personnel;
- Use contrary to specific regulations;
- Incorrect installation;
- Power supply defects;
- Serious deficiencies in maintenance;
- Unauthorized modifications or interventions;
- Use of non-original spare parts or parts not specific to the model;
- Total or partial non-compliance with the device instructions;
- Exceptional events.

The Customer is obliged to use exclusively original spare parts with Proteso Srl identification codes and to install them according to the indicated uses.



ATTENTION

The manufacturer declines all responsibility if the standards for correct installation are not respected and if the installation does not conform to the systems provided in the upper part (electronic box with battery correctly inserted) and lower part (telescopic arms with anchored actuators) of the device.

The Manufacturer SHALL NOT BE LIABLE for any damage caused to persons and/or property, or suffered by the device itself, following use other than that described in the documentation, or if safety devices, have not been used or have been tampered with, or if warranty labels are damaged. In case the warranty labels get damaged by accident, directly contact the Manufacturer.

The Manufacturer declines all responsibility for damages of any kind that may derive from improper or imprudent operations carried out by inexperienced personnel or experts who have performed operations on the device that do not comply with the descriptions provided in this manual and the attached documentation.

The Manufacturer shall not be responsible for materials being processed or for damages that such materials may cause to personnel or the environment.

The production of a product with characteristics different from those intended by the manufacturer must be agreed upon in advance with the manufacturer.

The User is requested to read the contents of this Manual carefully, which remains the exclusive property of **Proteso Srl**.

2.15 STATEMENT OF LIMITATION OF LIABILITY

With this Manual, **Proteso Srl** provides the User with general information for the correct use of the device.



ATTENTION

Anyone using this device must be fully qualified by their own organization in both theory and practice, or use the equipment under the direct supervision of a qualified person.

The User is requested to read carefully the contents of this Manual, which remains the exclusive property of **Proteso Srl**.

Anyone using the device must have read and understood the information contained herein. For any needs, do not hesitate to contact **Proteso Srl** to receive further clarification regarding the correct use of the device.

Proteso Srl issues this Manual to provide the User with preliminary information concerning the safe use of the device.

It remains understood that the Customer recognizes the general nature of the information contained herein; therefore, **Proteso Srl** provides no warranty and declines all responsibility regarding the completeness and exhaustiveness of the same. In any case, **Proteso Srl** disclaims all liability resulting from incorrect interpretations or improper use by the User of the information contained in this Manual and cannot be held responsible for any errors or omissions, nor for the consequences of using the information contained in this Manual.

The Customer undertakes not to use the device for illicit purposes. For this reason, whenever an illicit use of the device is carried out, the Customer undertakes to indemnify and hold **Proteso Srl** harmless, even in cases where the illicit use is carried out by employees, collaborators, or agents of the Customer.

Furthermore, **Proteso Srl** shall not be held liable for direct, indirect, consequential, punitive damages or those attributable to specific cases (such as, by way of example but not limited to, damages resulting from the failure to conclude contracts, loss of business activities, etc.) deriving from or related to improper use or the User's inability to use the Manual, as well as the information contained therein.

Proteso Srl shall not be held liable even in the event that the Customer has informed it of the fact that such damages may occur.

The Customer shall be required to compensate **Proteso Srl** for any loss of profit, damage to reputation, expense, criminal and/or civil proceedings brought by third parties due to or as a consequence of the failure by the User to comply with this Manual. In particular, by viewing this Manual, the Customer declares to respect all references regarding the use of the system, and to accept these conditions regarding the limitation of liability of **Proteso Srl**.

2.16 LEGAL INFORMATION

The Customer is requested to read carefully the provisions of this Manual. By continuing the consultation and reading, the Customer accepts this Legal Notice.

All information contained herein belongs to **Proteso Srl**, which reserves the right from this moment on to proceed with modifications to the same without the need to preventively inform the Customer.

Proteso Srl is committed to the utmost effort to include in this Manual information that it deems up-to-date, exhaustive, and accurate.

Notwithstanding the above, **Proteso Srl** makes no representation or warranty regarding the adequacy, accuracy, or correctness of such information, nor does it guarantee or declare that this Manual is in every respect complete, error-free, or up-to-date.

In this regard, it is reminded that the devices covered by the Manual are subject to variations and updates that will take place without any prior notice, given the mission of **Proteso Srl** which is strictly linked to the need to provide a product that is always at the forefront, in order to meet production development and customer needs.

It remains understood that neither the Customer nor third parties may proceed to:

- Modify
- Publish
- Copy
- Distribute

the content of this Manual.

The User is permitted to make copies exclusively for personal use.

2.17 WARRANTY

The full warranty clauses are set out in the sales contract and summarized in the "Warranty Certificate."

The warranty is, in any case, subject to the following conditions:

- The device must be used within the limits stated on the identification plate;
- The device must be used following the instructions in this manual;
- Maintenance must be carried out within the times and in the manner provided by the manual, using original spare parts and entrusting the interventions to qualified personnel;
- The warranty for various components is valid within the limits granted by the manufacturers of said components.

All liability is disclaimed arising from:

- Improper use;
- Use by unauthorized and/or untrained personnel;
- Partial or total non-compliance with the instructions;
- Power supply defects;
- Lack of maintenance;
- External contamination of the device;
- Unauthorized modifications or repairs;
- Use of non-original spare parts;
- Exceptional events such as earthquakes, floods, or fires;
- Damaged or missing warranty labels.

The warranty is intended only for the free replacement of mechanical parts found to be defective at the time of manufacture and not tampered with.

2.17.1 Operations resulting in the voiding of the warranty

The warranty is immediately voided if modifications and/or repairs are carried out on the device by unauthorized and incompetent personnel.

The warranty is also voided in the following cases:

- Failure to comply with payment terms;
- Failure to perform proper maintenance;
- Removal or tampering with plates and/or labels concerning the data and technical characteristics of the product;
- Connections to power sources not performed by the manufacturer's technicians;
- Installation of the device not performed by the manufacturer's technicians.

2.17.2. Request for warranty interventions

Any requests for spare parts or technical interventions under warranty must be reported to the manufacturer or authorized dealer immediately when a defect is found that falls within the specifications in the "WARRANTY" chapter.

Always indicate the type, model, and serial number of the device in the request for spare parts under warranty or technical interventions under warranty.

During the warranty period, **Proteso Srl** declares itself available to repair or replace, at its own discretion, any part recognized as faulty or defective. **Proteso Srl** requires that the devices be used correctly and subjected to adequate periodic maintenance according to the indications in this manual.

The warranty is voided if the devices have been subject to improper use, modifications, alterations, or lack of correct maintenance. Only **Proteso Srl** or personnel authorized by **Proteso Srl** may intervene during the warranty period, as any service provided by unauthorized personnel voids the warranty with immediate effect.

The warranty, defined in greater detail in the Terms and Conditions of Purchase, constitutes the sole and exclusive liability of **Proteso Srl** as compensation to the purchaser of the device and replaces any other further warranty, whether written or oral, express or implied or provided by law, including, by way of example, the warranty or conditions of merchantability and fitness for a particular purpose.

Under no circumstances shall **Proteso Srl** be held liable for direct, indirect, special, collateral, incidental, or consequential damages, or for loss of profit. Furthermore, **Proteso Srl** shall not be held liable should the use of the machinery lead to claims for damages against the owner of the device, who undertakes and agrees to hold **Proteso Srl** harmless from any and all such claims.

2.18 REGULATORY FRAMEWORK

The reference documentation for the design and construction of the device manufactured by **Proteso Srl** is as follows:

Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast).

In accordance with Annex II, part I, section A of Directive 2006/42/EC, the manufacturer highlights that this declaration relates exclusively to the device described above in the state and for the intended uses for which it was placed on the market, excluding any components subsequently added and/or operations subsequently carried out by the end user without the manufacturer's authorization.

Devices manufactured by **Proteso Srl** are subject to testing at the **Proteso Srl** facility, during which functional and dimensional characteristics, processing times, etc., are verified.

Furthermore, a final test might be carried out by **Proteso Srl** personnel at the customer's premises, coinciding with the instruction phase for the customer's operators.

This testing is certified by a report containing:

- Device identification data;
- Tests and verifications performed;
- Notes attachments, specifications, etc.



ATTENTION

The device cannot be used until it has been successfully tested and operator training has been completed.

2.19 SOUND PRESSURE LEVEL

The device, throughout its various manufacturing stages, has been constructed to maintain the A-weighted equivalent continuous sound pressure level (dB) below the maximum permitted limit of 85dB.

To achieve this value, all systems deemed necessary and, at the same time, non-intrusive for normal use by the operator have been employed.

We remind you that the device's emission depends on various factors, such as the presence of other machines or noise sources, and the modes and conditions of use of the device.

It is therefore necessary for the installer to carry out measurements after installing the device in order to correctly comply with legal obligations.

For the device in question, measurements have been conducted to quantify the value of the sound pressure emitted during normal operation.



ATTENTION

In the event that the device is operated in a high-noise environment, the customer is recommended to provide operators with suitable hearing protection (earplugs, earmuffs).



ATTENTION

In the event that operators detect excessive noise from the device, verify the presence of faults or the need to carry out maintenance operations on it.

2.20 CHARACTERISTICS OF THE INSTALLATION ENVIRONMENT

The installation and use of MOVI 2.0 requires that the work environment respects the conditions indicated below:

- Workspace: 2m x 2m x 2m (at least)
- Temperature: 0°C – 40°C
- Humidity: 35% – 90%
- Energy Source: Battery (on board)
- On-board battery voltage: 24 Vdc
- Battery charger voltage (external): 100-240V @ 50-60Hz

For the correct operation of the equipment, particular attention must be paid to the storage temperature, which must in no way exceed the limits indicated above.

2.21 TRANSPORTATION AND INSTALLATION

MOVI 2.0 is transported in a single, robust container measuring 60x60x60cm and weighing approximately 20kg (when full).

The placement of the elements inside is carried out with care by personnel to prevent shifting during transport. In addition to the main container, a tripod equipped with custom-made components might be provided



2.22 UNPACKING



ATTENTION

When unpacking the MOVI 2.0 hang the device. The shoulder straps of the exoskeleton feature a webbing strap dedicated to this purpose.

2.23 MATERIAL CHECK AND VERIFICATION



ATTENTION

Verify the presence of all necessary material. In particular, check for the presence of:

- **Pre-assembled exoskeleton (shoulder straps, waist belt, leg wraps, frame, user control interface, electronics box)**
- **at least one battery**

Verify the following conditions:

- **No damage to the components should be visible**
- **Cables must not be jammed or torn**
- **Parts are securely connected, and there are no loose screws**



2.24 DISPOSAL

The disposal of the device and any of its components must be carried out in compliance and in accordance with the national regulations in force.

Proteso Srl manufactures using a limited amount of hazardous substances in order to protect the environment, according to the provisions of the European RoHS Directive 2011/65/EU.

3.1 INTRODUCTION TO SAFETY

The employer shall provide for the training of personnel on accident risks, on the devices provided for operator safety, and on the general accident prevention rules provided for by international directives and the legislation of the country of destination of the device.

The behavior of the personnel must, in any case, scrupulously comply with the accident prevention regulations of the country in which the device is used.

The elimination of risks was achieved during the design phase of the device itself, ensuring the absence of risks that are not due to transport, installation, use, or maintenance that does not comply with the indications of this manual.



ATTENTION

Before starting work, the operator must be perfectly aware of the position and functioning of all controls and the characteristics of the device; furthermore, they must have read this manual in its entirety.

It is advisable for the operator to undergo a period of training regarding the use of the device.

The unauthorized tampering/replacement of one or more parts that make up the device, the use of accessories, tools, or consumable materials other than those recommended by the manufacturer, and the use of the device by untrained personnel may represent an accident risk and relieve the Manufacturer of civil and criminal liability.



NOTE

If part of the documentation is even partially illegible, consult the manufacturer before performing any further operations.

During the use of the device, incorrect functioning situations not foreseen by the manuals could occur. These situations, which are entirely anomalous, can sometimes be caused by environmental factors or accidental faults not predictable by the manufacturer.

In the event that problems of any nature are encountered which are not addressed in this document, contact the manufacturer IMMEDIATELY to receive the necessary technical assistance.

Should it become necessary to perform an operation or intervention not provided for by the standard procedure, the customer is obliged to contact the technical support service to verify its feasibility before proceeding.

3.2 GENERAL PRECAUTIONS FOR OPERATORS

MOVI 2.0 has been built to offer maximum safety together with maximum performance, but maximum safety is always in your hands. It must always be kept in mind that when using any device, accident-related risks may be incurred!



ATTENTION

It is strictly forbidden to make changes to the configuration parameters of the device. Protective and emergency devices must not be removed or deactivated for any reason. In the event of tampering, the company is not liable for damage caused to property or persons.

Before performing any maintenance operation, some general safety rules must be kept in mind.



ATTENTION

SWITCH OFF THE DEVICE AND REMOVE THE BATTERY

- Wear suitable clothing, specifically:
 - gloves in case of maintenance;
 - goggles in case of maintenance to avoid contact with parts that could detach from the device;
 - if necessary, accessories to keep hair tied back;
- Remove various objects that can cause accidents, such as watches, ties, bracelets, etc.
- Always work in optimal lighting conditions, reporting any inadequacies to supervisors and ensuring they are resolved.
- Do not allow unauthorized personnel to start, adjust, operate, or repair the device. Also refer to this manual for the necessary operations.
- To avoid personal risk, use only power tools that are correctly grounded and comply with national safety regulations.
- Do not use your hands instead of suitable tools to operate on the device.
- Before carrying out modification or replacement of device components, consult the manufacturer and await their approval.
- Scrupulously observe all maintenance interventions indicated in the device's technical documentation to guarantee its proper functioning and a longer lifespan.
- Always take all precautions to ensure that operations are safe.
- In case of device malfunctions or damage to components, contact the maintenance supervisor without proceeding with further repair attempts.
- The customer is obliged to keep all labels legible, changing their position if necessary to ensure full visibility to the operator.
- It is strictly forbidden for anyone to use the device for purposes other than those expressly provided for and documented in the sales contract.

- Use must always occur in the manners, times, and places provided for by the rules of good practice and laws in force in each nation, even if specific regulations for the sector do not exist in that specific country.
- NEVER perform rushed or makeshift repairs that could compromise the proper functioning of the device.

IN CASE OF DOUBT, ALWAYS REQUEST THE INTERVENTION OF SPECIALIZED PERSONNEL.

ANY TAMPERING BY THE USER RELIEVES THE MANUFACTURER OF ALL LIABILITY AND MAKES THE CUSTOMER SOLELY RESPONSIBLE TO THE COMPETENT AUTHORITIES FOR ACCIDENT PREVENTION.

- Never use matches, lighters, or open flames near the device. Vapors could ignite, causing serious damage to people and property.
- The position of the device must be chosen so that it cannot be hit by jets of steam, water, or other liquids.
- It can only be used in environments that respect the following standard environmental conditions:
 - Temperature between 0°C and +40°C;
 - Relative humidity between 35% and 90%.
- It is forbidden to use the device in environments that are:
 - Dusty;
 - In a corrosive atmosphere;
 - Workplaces at high risk of fire;
 - In an explosive atmosphere;
 - In the presence of water.

For the correct operation of the equipment, particular attention must be paid to the storage temperature, which must in no way exceed the limits indicated above.

3.3 INTENDED CORRECT USE

MOVI 2.0 is an exoskeleton designed to support the back during physically strenuous activities such as manual load handling and prolonged maintenance of awkward postures.

MOVI 2.0 consists of a robotic part and a wearable part. The robotic part is composed of a battery, two electric actuation units, sensors, a user controller interface, and an on-board computer. Thanks to these components, it is possible to read the movements of the operator wearing the MOVI 2.0 in real time, map these movements, and consequently provide the most appropriate level of assistance. The assistance generated by the exoskeleton is transmitted to the operator via the wearable part, which consists of shoulder straps, a lumbar belt, and leg straps.

Any other or additional use will be considered non-compliant with the purpose for which it was designed.

Use must be permitted ONLY to trained and/or informed personnel.

Should the device be used outside its intended field of application, the manufacturer shall under no circumstances be held responsible for damages or harm of any nature.

Appropriate use of the device therefore entails:

- Compliance with the rules of use, maintenance, and servicing established by the manufacturer and collected in this manual;
- The exclusive use of original spare parts and accessories; the device must be used and repaired by competent personnel according to the provisions of this manual;
- Information regarding risk situations to which one might be exposed during the use of the device.

The customer is required to fully comply with current legislation regarding fire prevention and workplace safety.

All signs and warnings must be scrupulously observed.

Furthermore, any modification or tampering with the device, carried out by the user or any other subject without written authorization from the manufacturer, will relieve the latter of responsibility for any damage that may eventually occur.

During the operation of the device, the operator is well protected from any risks due to its functioning. Correct use of the device allows for full exploitation of the performance it is capable of providing in complete safety.

3.4 REASONABLY FORESEEABLE INCORRECT USE

The manufacturer defines "reasonably foreseeable incorrect use" of the device as any use other than that described in the "intended correct use" paragraph.

Unintended use of the device is not permitted, under penalty of the manufacturer's disclaimer of all liability for damages of any nature caused to persons or property, in addition to the voiding of any form of warranty.

The use of the device in environments with particular characteristics can only be permitted if agreed upon and approved by the manufacturer's technicians.

IMPROPER USE OF THE DEVICE

- Modifying the operating parameters of the device.
- Should it become necessary to make modifications, it is mandatory to contact the manufacturer to obtain the new operating technologies.
- Use of improper or inadequate power sources.
- Use of the device by insufficiently trained personnel.
- Use of the device without complying with the specific regulations of the country of installation.
- Failure to comply with periodic maintenance requirements or maintenance performed incorrectly.
- Maintenance performed incorrectly by inexperienced personnel, use of non-original or unsuitable spare parts.
- Modifying safety devices and/or tampering with the equipment.
- Carrying out inspection, maintenance, or repair operations without having taken the device out of service.
- Carrying out temporary repairs or restoration interventions that do not comply with the instructions.
- Total or partial non-compliance with the instructions in this manual; exceptional events.
- Failure to install safety devices that are the responsibility of the customer as possibly specified in the sales contract.



NOTE

The manufacturer declares that they are not responsible for mechanical damage or injury to persons caused by the aforementioned "INCORRECT USES."

3.5 PERSONNEL TRAINING

The employer shall provide for the instruction of personnel regarding accident risks, the devices provided for operator safety, and the general accident prevention rules stipulated by international directives and the legislation of the country where the system is destined.

The behavior of the personnel must, in any case, scrupulously comply with the accident prevention regulations of the country in which the device is installed.

The device is designed to operate, be adjusted, and be maintained without risks to persons or the environment, provided that everything is carried out under the conditions described in this manual.

The elimination of risks was achieved during the design phase, ensuring the absence of risks that are not due to transport, installation, use, or maintenance that does not comply with the instructions in this manual.

- **Before starting work, the operator must be perfectly aware of the position and operation of all controls and the characteristics of the device; furthermore, they must have read this manual in its entirety.**
- **The unauthorized tampering/replacement of one or more parts that make up the device, or the use of accessories or tools different from those recommended by the manufacturer, may represent an accident risk and relieve the manufacturer of civil and criminal liability.**

3.6 PROTECTIVE CLOTHING

Maintenance technicians and persons involved in maintenance operations are advised to approach the device using clothing that complies with the essential safety requirements in force in the user's country, as indicated in EEC Directive no. 89/656 and 89/868 regarding the use of personal protective equipment.



ATTENTION

Further particular attention must be paid to bracelets, watches, rings, or chains, which must not dangle or hinder movement; do not wear clothing with wide sleeves, scarves, ties, or any garment that could get caught during maintenance operations.

3.7 SAFETY DEVICES



ATTENTION

**Safety devices must not be removed or deactivated for any reason.
Periodic checking of their operation is important.**

3.7.1 ACTIVE SAFETY DEVICES

"Active safety" refers to those devices or measures that eliminate risks for operators or exposed persons, or reduce risks that could not be eliminated during the design phase to acceptable levels, and which require active and conscious intervention by the operator to perform their preventive action

3.7.2 EMERGENCY STOP BUTTON

It is located on the backpack of the device. In the event that a certain condition exceeds the permitted limits, leading to a potentially dangerous situation, the emergency button must be used to interrupt the power supply circuit.



ATTENTION

Press the emergency button only in case of risk to persons and not as a standard stopping procedure.



NOTE

Before restarting the device after an emergency stop, the cause that generated the anomaly must be identified and eliminated.



3.8 SAFETY PLATES AND PICTOGRAMS

It is of fundamental importance to consult this manual before proceeding with any startup, maintenance, or use of the device. Furthermore, it is necessary to carefully examine the safety plates attached to the device and follow their instructions. It is the user's obligation NOT to remove the plates attached to the device and to keep them clearly visible at all times.



ATTENTION

Safety plates are stamped on the device; the instructions they contain must be carefully followed by anyone preparing to operate on the device itself.



ATTENTION

Failure to comply with the instructions on these plates relieves the Manufacturer of any liability for damages or injuries to persons or property that may result and makes the operator solely responsible to the competent authorities. IMMEDIATELY REPLACE DETERIORATED OR ILLEGIBLE PLATES.

3.9 RESIDUAL RISKS

Despite the device being equipped with all necessary protective devices, residual risks still exist due to partial efficiency of the safety devices or the impossibility of eliminating the causes that generate risks as a consequence of the work processes.

These risks are indicated by specific signs located on the system or are highlighted in the instruction manual, accompanied by indications regarding the appropriate behavior required of the operators.

Below is a list of all possible risks, with the relevant measures to be adopted:

HAZARD DEFINITION	RECOMMENDATION
Acoustic emission Excessive acoustic emissions	The noise emitted by the actuators must be less than 85dB. If the noise is higher, Personal Protective Equipment (PPE) for hearing must be used.
Stress, posture and use Device dimensions and geometric configurations that are not optimal for a specific user	The device must be adjusted to the user's physique as illustrated in this manual.
Stress, posture and use General risks	The use of Personal Protective Equipment is recommended, particularly safety shoes with toe protection.
Moving parts Designed to avoid mechanical instability due to foreseeable breakage or errors.	The risk is minimized by designing reversible actuators that can be moved even in the event of malfunction and power failure.
Moving parts Instability during donning or removal	Ensure the device is firmly grasped when being donned or removed by the user.
Moving parts Instability during donning or removal	Ensure that the device and its actuators are disabled (as shown in this manual) while being donned or removed by the user.
Moving parts Instability during use	During normal use, periodically ensure that the device is securely fastened to the person via the lumbar belt, leg loops, and shoulder straps. If a loss of fastening stability is perceived, stop use to restore it.

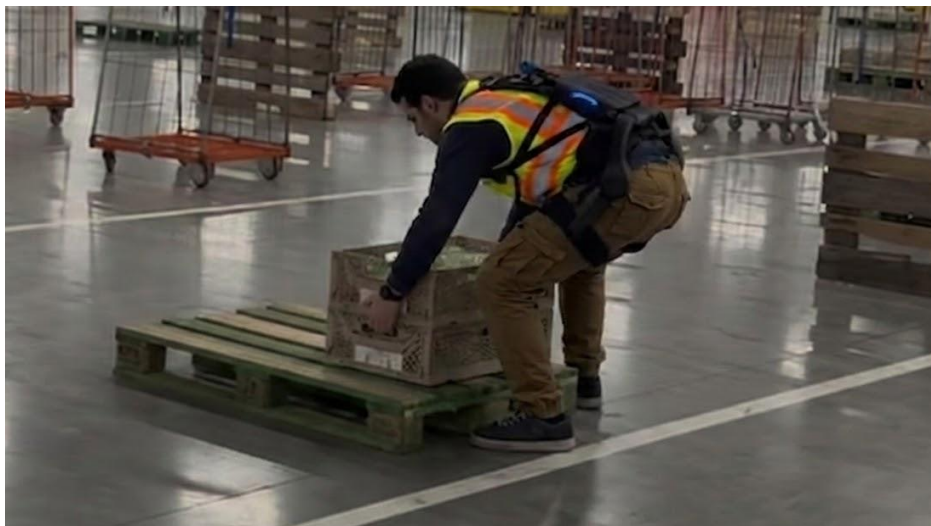
HAZARD DEFINITION	RECOMMENDATION
Durability limitations The limited durability of components could lead to breakage and subsequent malfunction	As extensively illustrated in this manual, visually verify the integrity of the device and its components before and after each use. In case of perceived malfunction, vibrations, or heat higher than normal use, stop use and contact the manufacturer for assistance.
Environmental conditions Particularly dusty environments could damage moving parts, causing malfunctions	The device is protected against accidental contact but not against dust and infiltration of small-sized residues. Do not use MOVI 2.0 in very dusty environments.
Environmental conditions Particularly humid environments could cause malfunctions of electrical components	The device is not protected against excessively humid environments. Use MOVI 2.0 within the humidity range specified in this manual.
Environmental conditions The use of non-recommended cleaning and maintenance products could damage and cause malfunctions to some parts of the device	It is recommended to clean, maintain, and store MOVI 2.0 following the guidelines provided in this manual.

4.1 INTRODUCTION

MOVI is an active lumbar support exoskeleton designed to assist operators during Manual Material Handling (MMH) tasks, such as lifting and moving luggage, logistics parcels, and industrial components.

By providing powered assistance to the lower back, the device mimics natural physiological movement to reduce physical strain and fatigue. This technology is engineered to improve the operator's long-term well-being while mitigating the risk of work-related musculoskeletal disorders (WMSDs), ensuring safer and more sustainable productivity.

The MOVI2.0 represents the latest evolution in active exoskeleton technology. Specifically designed for high-frequency use in assembly lines, warehouses, and handling operations, it features an ultra-lightweight, ergonomic frame. Its streamlined design ensures maximum freedom of movement and seamless integration into daily work routines, providing world-class comfort without compromising performance.



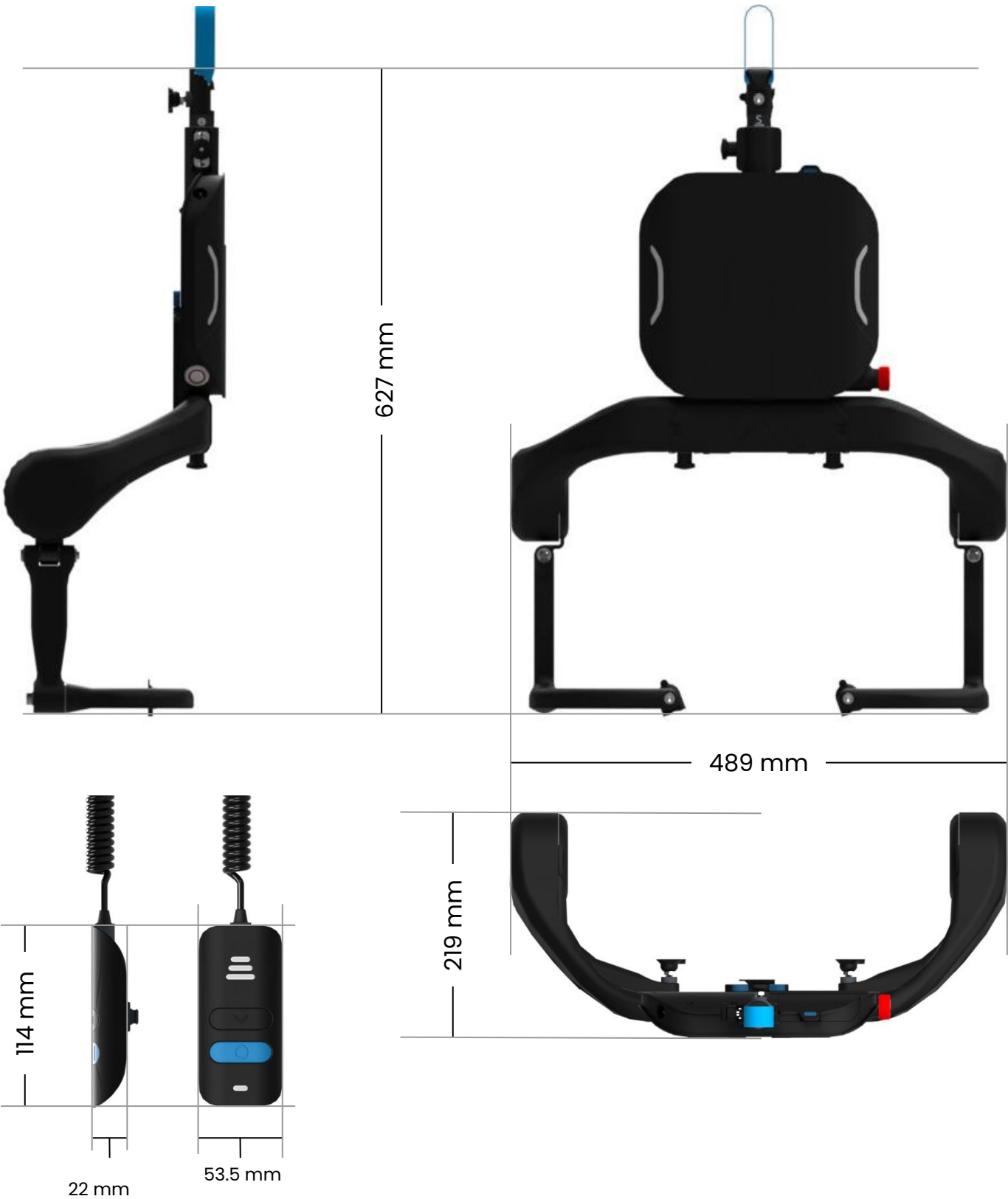
4.2 FEATURES

- Lumbar support exoskeleton specifically designed for Manual Material Handling (MMH) tasks.
- Active device: equipped with high-performance motors, rechargeable batteries, and real-time control algorithms.
- Seamless motion: sophisticated control algorithms ensure total naturalness of movement during MMH operations.
- Intuitive user experience: designed for unrestricted freedom of movement with zero operational lag.
- Adjustable power assistance: customizable support levels to meet the requirements of high-intensity tasks.
- Universal fit: easily adjustable manual settings to accommodate a wide range of body types and sizes.

4.3 TECHNICAL DATA

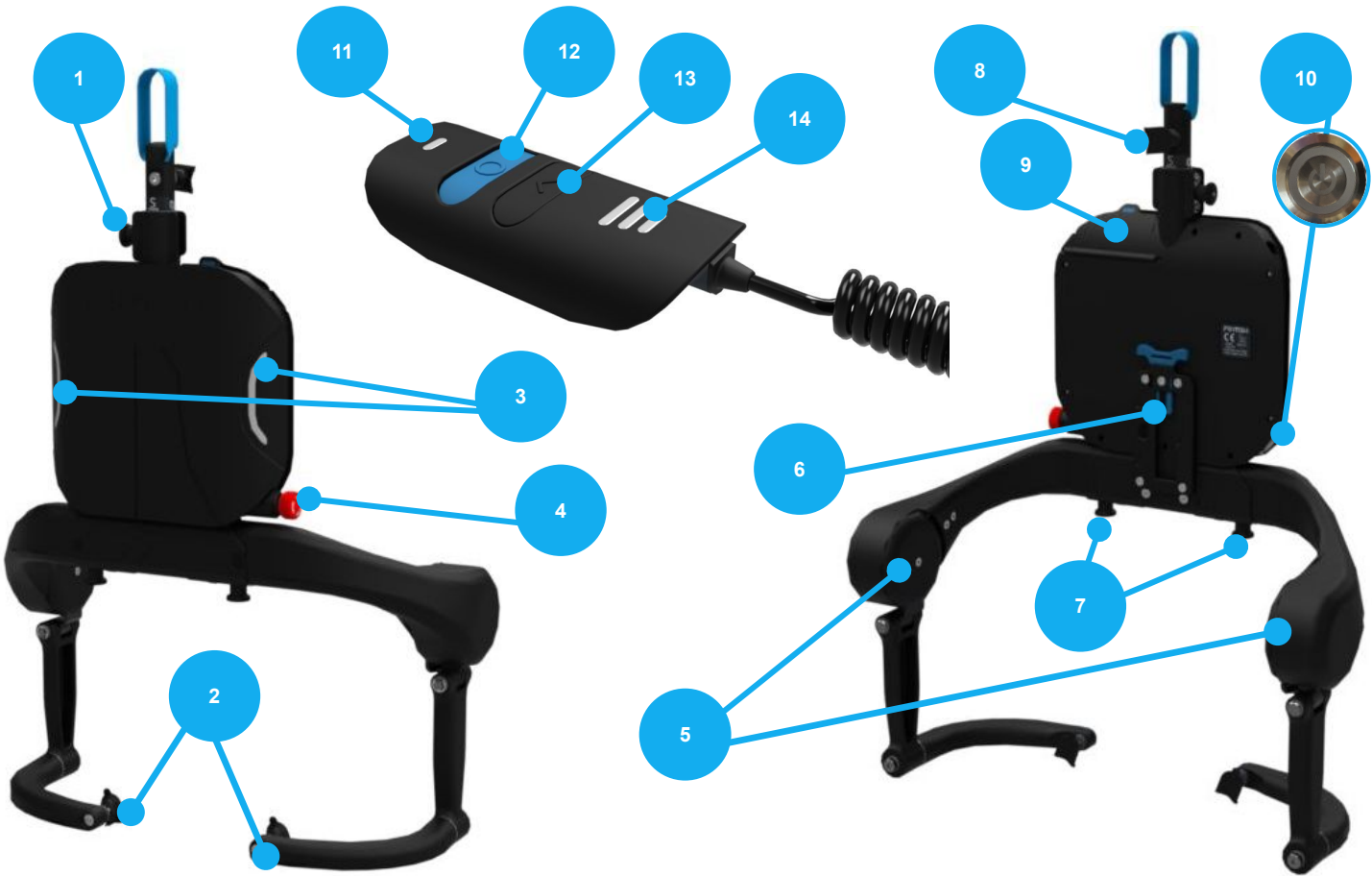
Feature	Specification
Device weight	4.5 kg (including 370g battery)
Maximum user weight	110 kg
Minimum user weight	50 kg
Maximum user height	1.95 m
Minimum user height	1.60 m
Max. allowed walking speed	5 km/h
Max. lumbar assistance	30 Nm (15 Nm per side)
Hip Range of Motion (ROM)	120° flexion, 30° extension
Power source	Lithium-ion battery (<100Wh)
Battery supply	Li-Ion (approx. 2 hours per charge)
Motor power	440 W (peak) and 222 W (rated)
Connectivity	Wi-Fi (Local Network). 4G Modem for data transmission during non-operational status only
Operating temperature range	0°C – 40°C
Operating humidity range	35% – 90%
Materials	Interior (Belt, shoulder straps, leg loops): 3D synthetic air-mesh. Exterior: Nylon fabric Buckles: Nylon
Service life	12 months

4.4.1.1 Frame & Remote Control Dimension



4.4 PRODUCT OVERVIEW

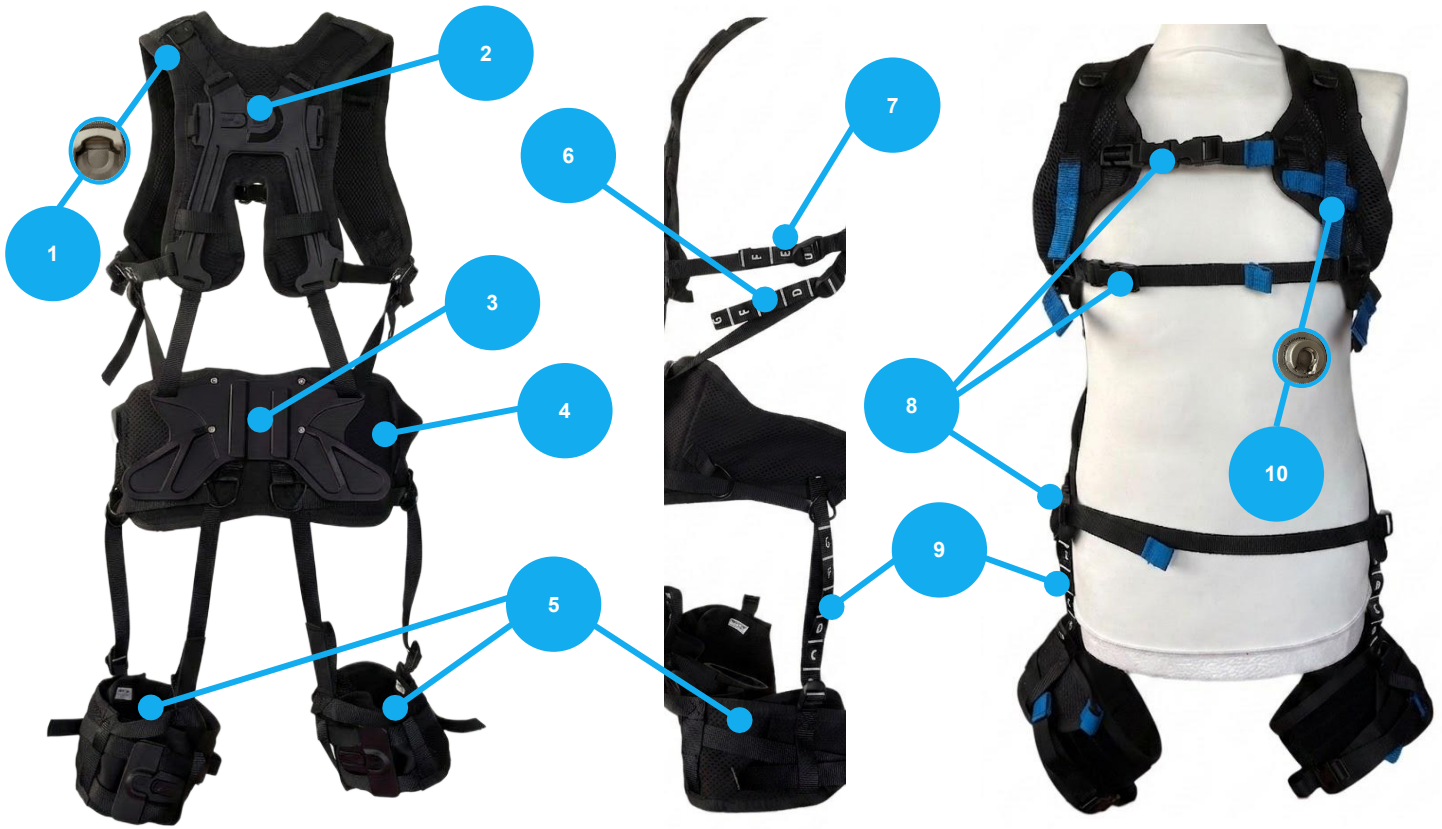
4.4.1



Pos.	Description	Pos.	Description
1	Frame height adjustment knob	6	Waist belt attachment
2	Left/Right leg quick attachment	7	Frame width adjustment knobs
3	Back status LEDs (Headlights)	8	Back quick attachment
4	Emergency Stop button	9	Battery door
5	Actuators	10	Power button

Pos.	Description	Pos.	Description
11	Status LED	13	Level button (Assistance Level)
12	Start/Stop button	14	Level LEDs

4.4.2 Garment



Pos.	Description	Pos.	Description
1	Remote cable magnetic attachment	6	Back riser preset
2	Back plate	7	Underarm preset
3	Waist belt plate	8	Waist and chest buckles
4	Waist belt	9	Leg riser preset
5	Leg cuffs	10	Remote magnetic attachment

4.5 USER JOURNEY

4.5.1 Before use

4.5.1.1 Attach the garment to the frame



Connect the garment to the frame, starting by hooking the vest.

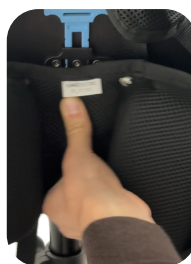
Slide the two arrows toward each other until they align and click into place.

Once attached, proceed by positioning the remote control.



Secure the cable magnet into its designated housing at the top of the left shoulder strap.

Attach the remote to its magnetic dock on the left side of the harness.



Insert the waist belt into its designated position.

Push to the right until it reaches the end stop.

Close the latch by pressing firmly in the direction of the arrow until it is fully seated.



Attach the leg frame to the leg cuffs.



Slide until you hear a click.
Repeat the process for the other leg cuff.



CLICK!

4.5.1.2 Sizing Adjustment



Width Adjustment: Pull the knob downward and slide the frame to the left. Once you reach the desired size, release the knob. The size is correctly locked when you hear a click.



Height Adjustment: Pull the knob to the left and slide the frame upward. Once you reach the desired size, release the knob. The size is correctly locked when you hear a click.

Harness Preset Configuration:



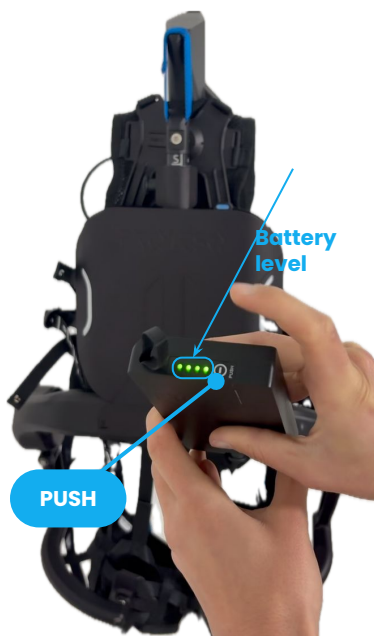


Set the harness size by adjusting the presets at the following points: 1.Shoulder Straps: riser and underarm straps; 2.Waist Belt: left side; 3.Leg Cuffs: riser.
Pull the straps until the desired size marker is reached.

4.5.1.3 Battery Check and Installation



Check the battery status before use.



Press the button to verify the battery charge level.



Open the battery compartment (blue tab).



Push the cover to open the compartment fully.

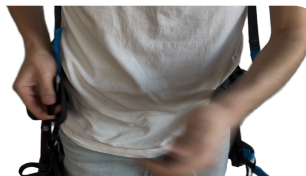


Insert the battery.

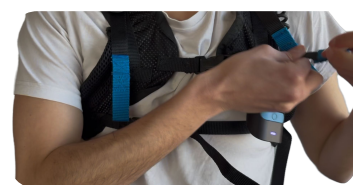
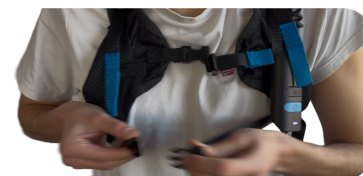


Close the compartment by pressing until you hear an audible click.

4.5.1.4 Donning



1. Grip the exoskeleton by the vest arm-opening and put it on as you would a backpack.
2. Fasten the waist belt buckle and tighten by pulling the strap toward the center.
3. The buckle should sit slightly above your pants' beltline, or where it feels most comfortable.



1. Fasten the chest buckles to ensure a snug fit.
2. Pull the straps to the left until they are tight and secure.



Pull the side tensioners forward so that the harness feels wrap-around and snug, but not overly tight.



Pull the shoulder strap tensioners downward as desired to redistribute the weight of the exoskeleton.



1. Grasp the leg cuff by the two opposite ends and wrap it around your thigh.
2. Secure the Velcro and fasten the buckle.
3. Tighten the buckle strap (using your other hand for leverage) until the leg cuff is firmly secured to your leg.
4. Repeat on both legs.



4.5.1.5 Calibration and Ready to Go



To power on MOV2: Press and hold the power button until the status LEDs turn solid green. (Initialization takes approximately 5 seconds).



System Calibration: Once powered on, a system calibration is required the first time you press the Start/Stop button.



Calibration Procedure: Upon pressing the button, the status LED will blink yellow. The motors will oscillate to signal the start of the procedure. Keep an upright position during the phase. (Maximum duration: 8 seconds).



Ready to Work: Once calibration is complete, the LED will turn white. You can now select your desired assistance mode and begin working.

4.5.1.6 Doffing



Before removing the exoskeleton, ensure it is in Neutral Mode (LED Status: Breath White).



Release the leg cuffs by unfastening the buckles and opening the Velcro.



Loosen the side and shoulder tensioners by pushing the buckles backward.



Unfasten the chest buckles.



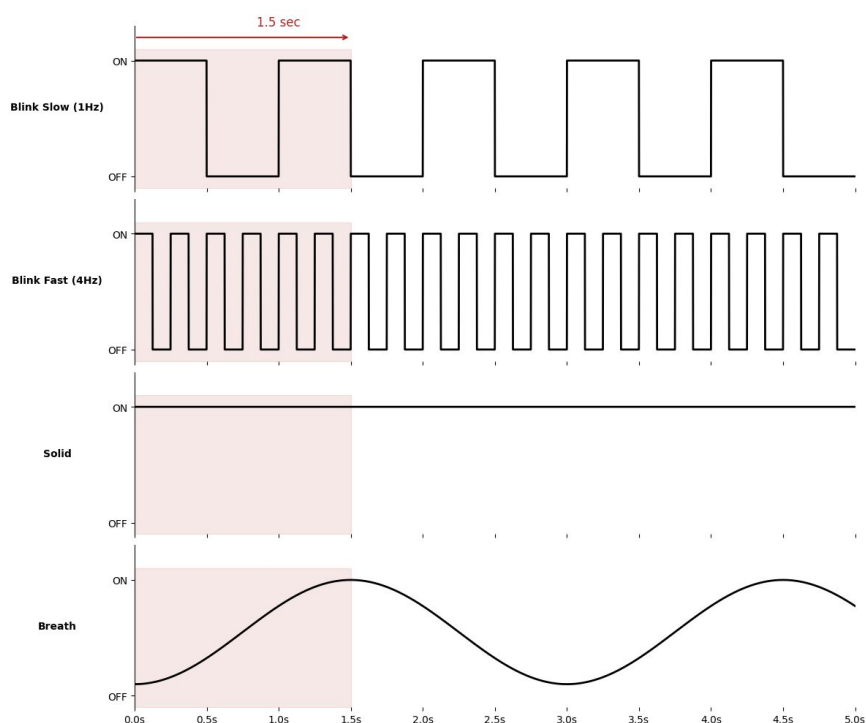
Slide off the exoskeleton (as you would with a backpack).



After removal, place it in the designated storage area without turning it off. The device will automatically shut down once it detects it is no longer in use.

4.5 LED BEHAVIOUR

System Status	STATUS LED	LEVEL LED	Meaning / Action
Power On	Solid Green	Sequential (1-2-3)	System initialization
Calibration Required	Solid Yellow	Off	Perform calibration sequence
Calibration Ongoing	Fast Blink Yellow	Off	Calibration in progress
Calibration Failed	Fast Blink Red	Off	Retry calibration
Neutral Loop	Breath White	Off	Neutral mode no assistance given
Assistance Level 1	Light Blue	1/3 Solid	Low assistance active
Assistance Level 2	Light Blue	2/3 Solid	Medium assistance active
Assistance Level 3	Light Blue	3/3 Solid	High assistance active
Low Battery	Slow Blink Yellow (10s)	Previous status	Approx. 20% charge remaining
Critical Battery	Slow Blink Red (10s)	Previous status	Charge immediately
EMERGENCY	Solid Red	Off	Emergency stop triggered
FAULT	Fast Blink Red	Off	System error
Diagnostics	Slow Blink Blue	All 3 Slow Blink	Diagnostic mode active
Power Off (Quit)	Slow Blink Green	Reverse Sequential (3-2-1)	System shutting down



5.1 HOW TO CONSULT THE MAINTENANCE SHEETS

The maintenance sheets must be kept for the entire productive life of the device and must accompany it even in the event of transfer to third parties.

Maintenance operations have been divided into two categories:

PERIODIC MAINTENANCE

This lists all operations that must be carried out at fixed intervals to guarantee the correct functioning of the device. In the following sheets, you will find the periodic frequency with the necessary interventions to be performed every 8, 100, and 500 hours.

EVERY 8 HOURS

EVERY 100 HOURS

EVERY 500 HOURS

CORRECTIVE OR BREAKDOWN MAINTENANCE

This contains all extraordinary interventions related to sudden anomalies due to wear and/or device monitoring.

Corrective breakdown maintenance may require the intervention of a specialized technician from the manufacturer.

The device was designed and built to reduce necessary maintenance as much as possible and ensure correct operation over the years without problems. However, it is important to keep in mind that maintenance should not be understood only as a periodic check of device operation, but rather as the analysis and subsequent remedy of all those causes which, for any reason, put it out of service. In fact, many device failures can be avoided by implementing a suitable preventive maintenance program. After any maintenance intervention, the device must be tested to verify its correct functioning.

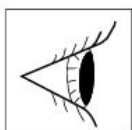


ATTENTION

Before proceeding with any type of maintenance intervention:

- **SWITCH OFF THE DEVICE**
- **REMOVE THE BATTERY**

5.2 PICTOGRAMS SYMBOLS

Symbols	Description
	Dangerous electrical voltage
	General danger Do not enter in the machine even when it is stopped
	Clean with a soft cloth
	It is mandatory to use protective gloves
	It is mandatory to turn off the power before inserting or unplugging the power sockets
	Check
	Use a screwdriver suitable for the procedure to be performed
	Smoking is prohibited near the machine
	Operator

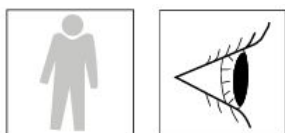
5.3 VISUAL CHECK

Visual Check

Page: 1/1

EVERY 8 HOURS

PERIODIC MAINTENANCE



Visually inspect the frame and other aluminum structures.



WARNING: If you notice any surface damage or cracks, contact the manufacturer for assistance.

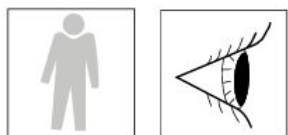
5.3 CONNECTION CHECK

Connection Check

Page: 1/1

EVERY 8 HOURS

PERIODIC MAINTENANCE

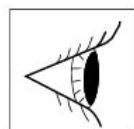


Check the mechanical connections for loose screws or nuts. Specifically, check that the following connections are tight:

- Shoulder connection on main frame (1): knob and nut tight;
- Belt connection on main frame (2): screws tight;
- Leg connections on main frame (3): knob and nut tight;



5.4 GARMENT CLEANING INSTRUCTIONS

Garment cleaning	Page: 1/1	EVERY 100 HOURS	PERIODIC MAINTENANCE	
				

Cleaning depends on users' preferences and garments' status. It is advised to machine clean the garments every 100hrs, at least



ATTENTION

Do not use abrasive tools, hot water or aggressive chemicals to clean the garments

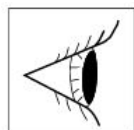
Before cleaning, please make sure to follow this steps:

- 1 - Remove the shoulder pads from the quick attachment
- 2 - Remove the belt using the quick release mechanism
- 3 - Remove the leg wraps using the quick release mechanism
- 4 - Insert the garment into a cloth bag for machine wash. Use only gentle 30°C machine wash program with no spin cycle
- 6 - After thoroughly drying the garments, secure again the garment on the device. Check visually if any damage occurred.

WARNING: If you notice any loosening or damage, contact the manufacturer for assistance.

5.5 IMPACTS

Impacts	Page: 1/1	CORRECTIVE OR BREAKDOWN MAINTENANCE
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If the exoskeleton is subjected to impacts, call Proteso Srl technical support to investigate any damage that may not be visible.

TECHNICAL SUPPORT

supporto@proteso.it

www.proteso.it